en

Operator's Manual

Hydraulic excavator
R944C - Demolition

from serial number 22 915

Document identification

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Manufacturer:	LIEBHERR France S.A.S.
Type:	R944C - Demolition
Type no.:	791 / 792 / 1000 / 1079
Conformity:	CE

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1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and descriptions of the components shown.

1.1.1 Machine with backhoe attachment

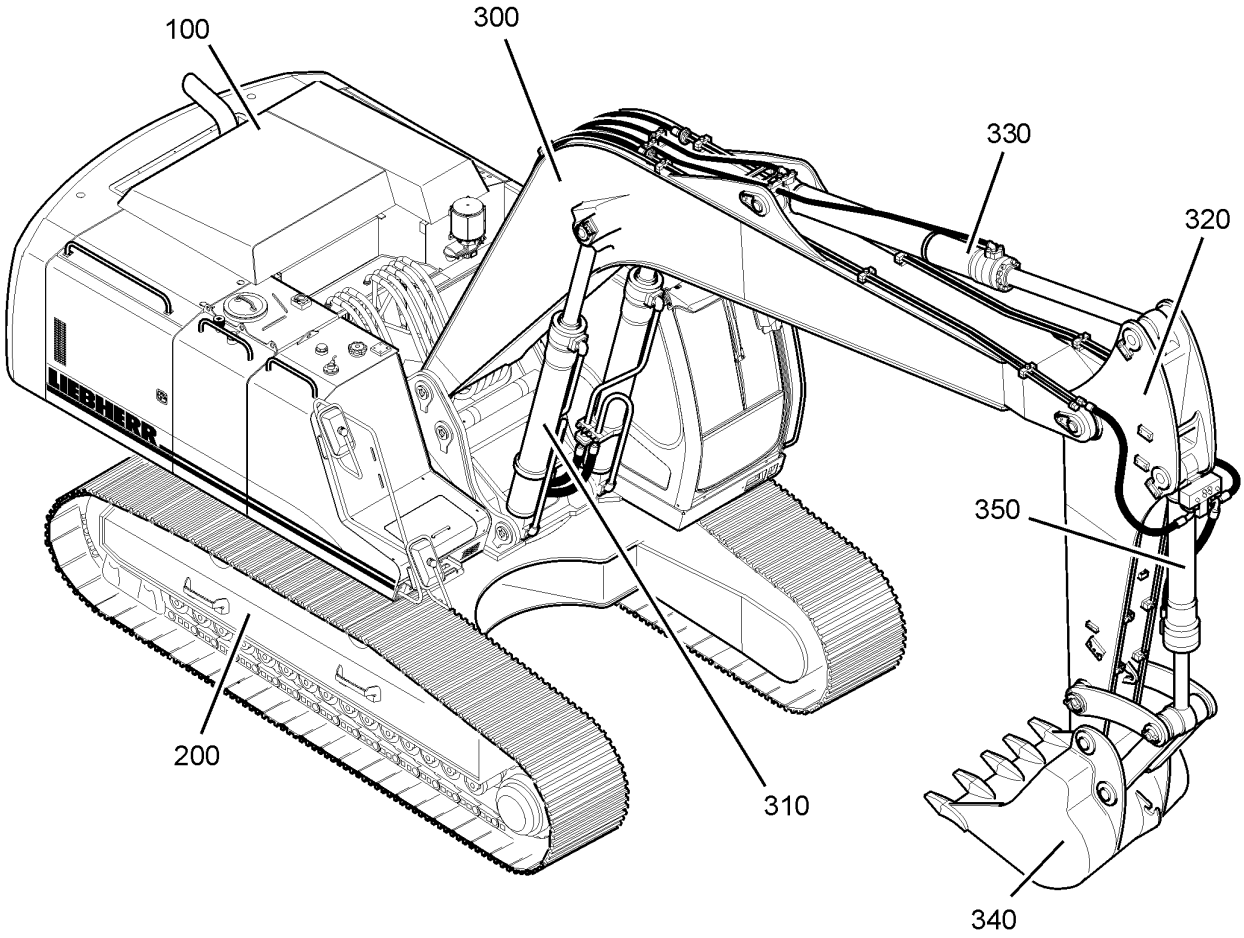

Fig. 1-1 *Machine with backhoe attachment*

100	Uppercarriage	**310**	Boom cylinder	**340**	Bucket
200	Undercarriage	**320**	Stick	**350**	Bucket cylinder
300	Boom	**330**	Stick cylinder		

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Performance

Liebherr crawler excavators feature state-of-the-art technology and high-quality workmanship. The most important components of the drive system are all produced by Liebherr factories and are perfectly coordinated to each other.
The engine generation, as further developed for the “C-series”, assures an effective power delivery, a high degree of efficiency, long life expectancy and complies with the emission standard IIIA / Tier 3.

High Productivity

High digging and break-out forces

The R 944 C features high digging and break-out forces due to optimal attachment geometry. The remarkable forces are especially accomplished with the utilization of large-size stick and bucket cylinders.

Regeneration Plus

The feature “Regeneration Plus“ guarantees quicker attachment lowering, less pressure loss and more safety. A high productivity is achieved due to the optimizing and consolidating of the functions “pressure-less lowering”, “regeneration” and “load holding valves” in connection with a high hydraulic output.

Liebherr Engine Technology

Liebherr Diesel Power

The 6-cylinder in-line engine, developed for the R 944 C with the new common rail injection assures an effective power output, a high efficiency and a long life expectancy.
Already at a low speed range the engine develops a high output and contributes substantially to the economical operation of the entire machine.

Emission reduces combustion

The new engine generation with optimal performance density assures for a more environmentally-friendly fuel combustion. Higher ignition pressures and the newly designed injection technology guarantee the compliance with the emission standard IIIA / Tier 3.

Heavy-duty undercarriage

- An extensive undercarriage selection for every application: mechanically or hydraulically adjustable, various track- gages and -lengths
- Combination of high-strength steel plates with steel castings for a smooth stress flow

Multi-function tool carrier

- For every material and application the correct digging tool
- Change-over of mechanical and hydraulic tool in a matter of seconds due to a modular quick coupler system designed and manufactured by Liebherr:
- Likufix for the change-over of all hydraulic and mechanical tools from the dash board in the operator station
- Liebherr quick coupler adapter for the change-over of mechanical tools

Lift Capacities

with Gooseneck Boom 6,45 m

Stick 2,10 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	HD-S						
	HD-SL						
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			9,4# (9,4#)			
	HD-SL			9,4# (9,4#)			
6,0	HD-S			9,9 (9,9#)	6,9 (8,9#)		
	HD-SL			9,9# (9,9#)	7,5 (8,9#)		
4,5	HD-S		14,3 (14,5#)	9,3 (11,0#)	6,6 (9,2#)		
	HD-SL		14,5# (14,5#)	10,1 (11,0#)	7,2 (9,2#)		
3,0	HD-S		12,8 (17,2#)	8,7 (12,2#)	6,3 (9,8#)		
	HD-SL		14,1 (17,2#)	9,5 (12,2#)	6,9 (9,8#)		
1,5	HD-S		12,0 (16,7#)	8,2 (12,9#)	6,0 (10,2#)		
	HD-SL		13,4 (16,7#)	9,0 (12,9#)	6,6 (10,2#)		
0	HD-S		11,9 (17,2#)	7,9 (13,0#)	5,9 (10,0)		
	HD-SL		13,2 (17,2#)	8,7 (13,0#)	6,4 (10,0)		
-1,5	HD-S	16,2# (16,2#)	12,0 (15,7#)	7,9 (12,2#)	5,8 (9,5#)		
	HD-SL	16,2# (16,2#)	13,3 (15,7#)	8,7 (12,2#)	6,4 (9,5#)		
-3,0	HD-S	15,5# (15,5#)	12,2 (13,2#)	8,0 (10,4#)			
	HD-SL	15,5# (15,5#)	13,2# (13,2#)	8,8 (10,4#)			
-4,5	HD-S		9,2# (9,2#)				
	HD-SL		9,2# (9,2#)				
-6,0	HD-S						
	HD-SL						

Stick 2,60 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	HD-S						
	HD-SL						
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				6,6# (6,6#)		
	HD-SL				6,6# (6,6#)		
6,0	HD-S			9,2# (9,2#)	7,0 (8,3#)		
	HD-SL			9,2# (9,2#)	7,6 (8,3#)		
4,5	HD-S	21,2# (21,2#)	13,3# (13,3#)	9,5 (10,3#)	6,7 (8,8#)	4,9 (6,3#)	
	HD-SL	21,2# (21,2#)	13,3# (13,3#)	10,3 (10,3#)	7,3 (8,8#)	5,4 (6,3#)	
3,0	HD-S		13,2 (16,2#)	8,8 (11,6#)	6,3 (9,4#)	4,8 (7,9)	
	HD-SL		14,5 (16,2#)	9,6 (11,6#)	6,9 (9,4#)	5,2 (7,9)	
1,5	HD-S		12,2 (17,7#)	8,2 (12,6#)	6,0 (9,9#)	4,6 (7,7)	
	HD-SL		13,5 (17,7#)	9,0 (12,6#)	6,6 (9,9#)	5,1 (7,8)	
0	HD-S	6,7# (6,7#)	11,8 (17,6#)	7,9 (12,9#)	5,8 (9,9)	4,5 (7,6)	
	HD-SL	6,7# (6,7#)	13,1 (17,6#)	8,7 (12,9#)	6,4 (10,0)	5,0 (7,7)	
-1,5	HD-S	14,6# (14,6#)	11,8 (16,4#)	7,8 (12,4#)	5,7 (9,7#)		
	HD-SL	14,6# (14,6#)	13,1 (16,4#)	8,6 (12,4#)	6,3 (9,7#)		
-3,0	HD-S	18,2# (18,2#)	12,0 (14,3#)	7,8 (11,1#)	5,8 (8,4#)		
	HD-SL	18,2# (18,2#)	13,3 (14,3#)	8,6 (11,1#)	6,4 (8,4#)		
-4,5	HD-S	13,1# (13,1#)	10,8# (10,8#)	8,1 (8,2#)			
	HD-SL	13,1# (13,1#)	10,8# (10,8#)	8,2# (8,2#)			
-6,0	HD-S						
	HD-SL						

Stick 3,30 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	HD-S						
	HD-SL						
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				7,2 (7,3#)		
	HD-SL				7,3# (7,3#)		
6,0	HD-S				7,1 (7,5#)	5,1 (5,7#)	
	HD-SL				7,5# (7,5#)	5,5 (5,7#)	
4,5	HD-S			9,4# (9,4#)	6,8 (8,1#)	5,0 (7,3#)	
	HD-SL			9,4# (9,4#)	7,3 (8,1#)	5,4 (7,3#)	
3,0	HD-S	8,3# (8,3#)	13,6 (14,7#)	8,9 (10,8#)	6,4 (8,8#)	4,8 (7,6#)	
	HD-SL	8,3# (8,3#)	14,7# (14,7#)	9,8 (10,8#)	7,0 (8,8#)	5,2 (7,6#)	
1,5	HD-S	4,6# (4,6#)	12,4 (17,0#)	8,3 (12,0#)	6,0 (9,5#)	4,6 (7,7)	
	HD-SL	4,6# (4,6#)	13,7 (17,0#)	9,1 (12,0#)	6,6 (9,5#)	5,0 (7,7)	
0	HD-S	8,5# (8,5#)	11,8 (17,6#)	7,8 (12,7#)	5,7 (9,9)	4,4 (7,5)	
	HD-SL	8,5# (8,5#)	13,1 (17,6#)	8,6 (12,7#)	6,3 (9,9#)	4,8 (7,5)	
-1,5	HD-S	13,2# (13,2#)	11,6 (17,0#)	7,6 (12,6#)	5,6 (9,7)	4,3 (7,4)	
	HD-SL	13,2# (13,2#)	12,9 (17,0#)	8,4 (12,6#)	6,1 (9,7)	4,8 (7,5)	
-3,0	HD-S	18,7# (18,7#)	11,6 (15,4#)	7,6 (11,6#)	5,6 (9,0#)		
	HD-SL	18,7# (18,7#)	13,0 (15,4#)	8,4 (11,6#)	6,1 (9,0#)		
-4,5	HD-S	16,6# (16,6#)	11,9 (12,6#)	7,8 (9,6#)			
	HD-SL	16,6# (16,6#)	12,6# (12,6#)	8,6 (9,6#)			
-6,0	HD-S		7,7# (7,7#)				
	HD-SL		7,7# (7,7#)				

Stick 4,10 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	HD-S						
	HD-SL						
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S					4,3# (4,3#)	
	HD-SL					4,3# (4,3#)	
6,0	HD-S					5,2 (6,2#)	
	HD-SL					5,6 (6,2#)	
4,5	HD-S				6,9 (7,1#)	5,0 (6,5#)	
	HD-SL				7,1# (7,1#)	5,5 (6,5#)	
3,0	HD-S	20,2# (20,2#)	12,6# (12,6#)	9,2 (9,6#)	6,5 (8,0#)	4,8 (7,0#)	3,6 (4,8#)
	HD-SL	20,2# (20,2#)	12,6# (12,6#)	9,6# (9,6#)	7,0 (8,0#)	5,2 (7,0#)	4,0 (4,8#)
1,5	HD-S	9,4# (9,4#)	12,8 (15,4#)	8,4 (11,0#)	6,0 (8,8#)	4,5 (7,4#)	3,5 (5,4#)
	HD-SL	9,4# (9,4#)	14,1 (15,4#)	9,2 (11,0#)	6,6 (8,8#)	5,0 (7,4#)	3,8 (5,4#)
0	HD-S	9,4# (9,4#)	11,8 (16,9#)	7,8 (12,0#)	5,7 (9,3#)	4,3 (7,4)	
	HD-SL	9,4# (9,4#)	13,2 (16,9#)	8,6 (12,0#)	6,3 (9,3#)	4,8 (7,5)	
-1,5	HD-S	12,2# (12,2#)	11,4 (17,0#)	7,5 (12,3#)	5,5 (9,5#)	4,2 (7,3)	
	HD-SL	12,2# (12,2#)	12,7 (17,0#)	8,3 (12,3#)	6,0 (9,5#)	4,6 (7,3)	
-3,0	HD-S	16,1# (16,1#)	11,3 (16,0#)	7,4 (11,9#)	5,4 (9,2#)	4,2 (7,1#)	
	HD-SL	16,1# (16,1#)	12,7 (16,0#)	8,2 (11,9#)	5,9 (9,2#)	4,6 (7,1#)	
-4,5	HD-S	19,5# (19,5#)	11,5 (13,9#)	7,5 (10,5#)	5,4 (7,9#)		
	HD-SL	19,5# (19,5#)	12,8 (13,9#)	8,3 (10,5#)	6,0 (7,9#)		
-6,0	HD-S	13,7# (13,7#)	10,3# (10,3#)	7,6# (7,6#)			
	HD-SL	13,7# (13,7#)	10,3# (10,3#)	7,6# (7,6#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. 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 #). Maximum load for the quick change adapter's load hook is 18 t. Without quick change adapter the lift capacities will increase by 430 kg, without bucket cylinder, link and lever they increase by an additional 570 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 have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.

Crawler Excavator

R 944 C
Litronic®

Attachment Information

Liebherr Crawler Excavator
with Demolition Attachment

LIEBHERR

2 Safety instructions

Working with the machine holds dangers to which you as the owner, machine operator or maintenance expert could be exposed. If you regularly read and note the safety information, however, you can prevent danger and accidents. This is particularly true for those who are only occasionally in contact with the machine, eg. for maintenance work. The following information comprises safety regulations which, if followed conscientiously, will guarantee your safety and that of other persons, as well as avoiding damage to the machine.

Following these precautions does not release you from the responsibility to take note of safety regulations which apply on site or of guidelines given by legal bodies or professional associations.

For EU countries, guideline 89 / 655 / EEC contains the minimum safety information applicable to the owner.

2.1 Meaning of the symbols in this manual

Work processes and actions that could cause danger are accompanied by safety informations in these operating instructions. These safety informations describe various dangers which are emphasized by the terms **Danger**, **Caution** and **Note**.

These terms are identified by symbols in the operating instructions and have the following meaning:

Danger!
Warning relating to a danger that carries with it a high risk of death or serious injury if the appropriate preventative measures are not taken.

Caution!
Warning relating to dangers that could result in physical injury and/or damage to the machine if the appropriate preventative measures are not taken.

Note!
This symbol identifies user tips and operating and maintenance procedures whose use will guarantee a high degree of user-friendliness and longevity to the machine or which will considerably simplify working procedures.

– This symbol identifies a listing.
  • This symbol identifies a sub-listing.

❑ This symbol signifies the following: "The precondition must be fulfilled".
The machine operator or the maintenance personnel must first fulfil the precondition described, i e. the machine must be brought into a particular work position in order to be able to carry out the actions subsequently described.

▶ This symbol identifies an action.
The machine operator or the maintenance personnel should be active at this location and carry out the action described.
↳ This symbol means "Carry out an activity".

When moving the machine:

- Rotate the upper structure parallel to the undercarriage undercarriage (transport position).
- Draw the equipment as close as possible to the machine.
- Only at this point may the support feet be retracted and the machine moved.
- Moving with loads is not permitted.
- Check the terrain to be covered to ensure that the ground is solid and even. Potholes and uneven surfaces jeopardize the stability of the machine.
- Adjust vehicle handling to suit the altered machine characteristics (high centre of gravity) and environmental conditions.
- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Ascending gradients and obstacles may only be approached in the longitudinal direction in order to prevent unacceptable banking of the machine.
- Special care should be taken when driving through narrow passages - drive slowly!

When loading and unloading:

- The machine must be supported and aligned horizontally before moving (slewing) the upper structure out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying capacity of the substrate). A support subsiding would have disastrous consequences!
- Carry out all movements with increased care.
- To slew the load, move the equipment as close as possible to the machine **(Caution! swinging grab)**and hold the load close to the undercarriage and above the substrate.
- Avoid braking or accelerating the equipment or upper structure abruptly.
- Do not lift any loads which are heavier than those given in the load chart.

Protection from vibration

– Vibrational loads on mobile building machinery are mainly the result of the type and method of use. The following parameters in particular are decisive influences:
  - Terrain conditions: Uneven areas and potholes;
  - Operational techniques: Speed, steering, brakes, controlling the machine's control elements when driving and working.

– To a large extent, the machine operator determines the vibrational loads since he selects the speed, gearbox ratio, working method and route himself.
  This means that there is a wide range of different vibrational loads for the same machine type.

Whole-body vibrational load for the machine operator can be reduced if the following recommendations are observed:

– Select suitable machines, equipment parts and auxiliary devices for each part of the job.

– Use a machine that has a suitable seat (i.e. for earth-moving machinery such as hydraulic excavators, this should be a seat which corresponds with EN ISO 7096).

– Keep the seat in good condition and adjust it as follows:
  - The seat and its damping action should be adjusted depending on the weight and height of the operator.
  - Check the seat's damping action and adjustment mechanisms regularly and ensure that these seat characteristics remain as per the seat manufacturer's instructions.

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– 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.

2.5 Signs on the machine

2.5.1 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.

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3 Control and operation

3.1 Operating and control elements

3.1.1 Overview of the operator's standing position

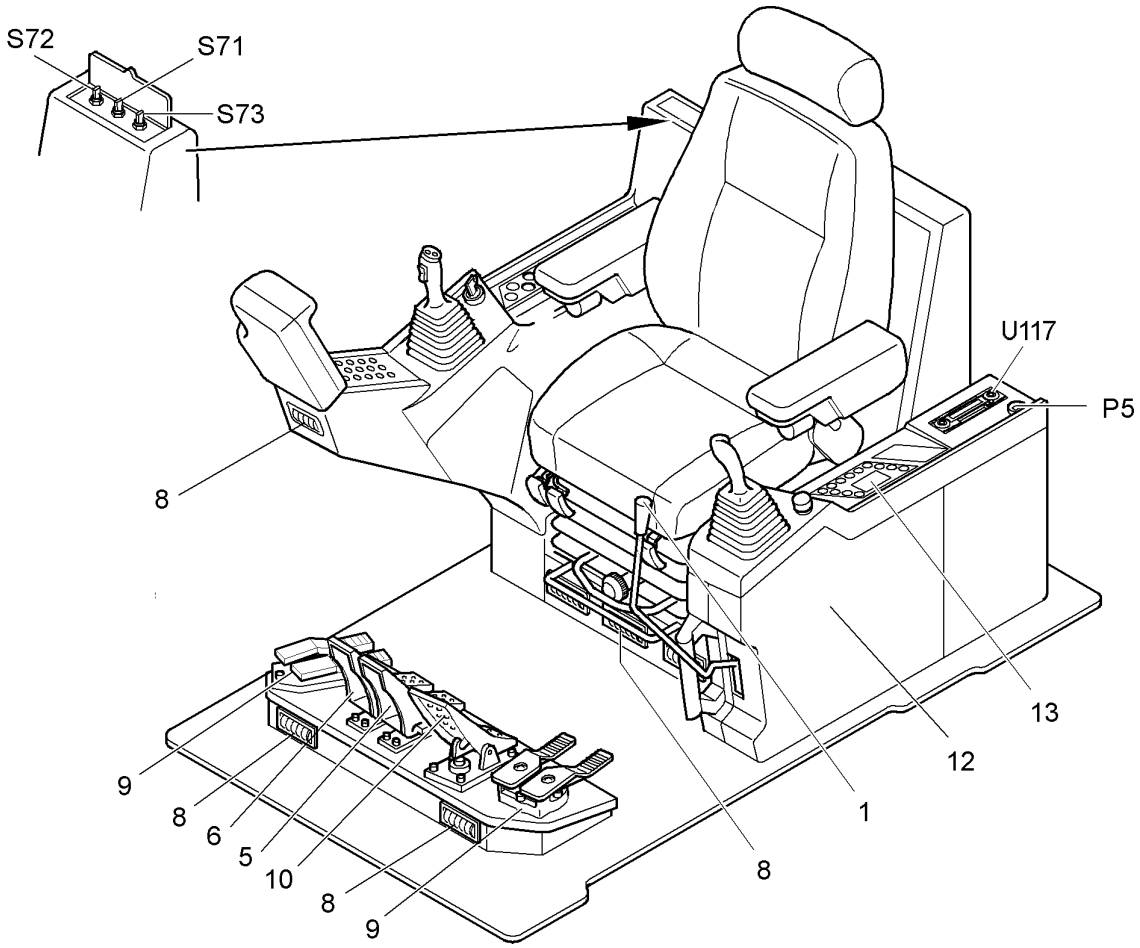


Fig. 3-1 *Operator's standing position*

1	Servo control safety lever	**13**	Heating/air-conditioning system
5	Pedal for left drive unit	**P5**	Operating hours counter
6	Pedal for right drive unit	**S71**	Diesel engine emergency start
8	Air vent, heating	**S72**	RPM adjustment during emergency operation
9	Equipment operation*	**S73**	Safety mode of the servo circuits
10	Positioning swing brake*	**U117**	Control unit / reach monitoring device
12	Fuse box		

* Optional extras

Area A : Analog-value display

P2 –Diesel engine coolant temperature display

The display must be in the green area when operating the machine.

In the event of overheating (over 100 ºC / 212 ºF during more as 3 seconds), the red LEDs **P2.1** at the end of indicator **P2** light up.

Simultaneously, the buzzer in the cab also sounds and the error will be saved as error code **E 503**.

The engine power is automatically reduced.

- ▶ Stop working as soon as possible.
- ▶ Allow the engine to continue to idle high.
- ❑ If the alarm warning exceeds 60 seconds.
- ▶ Allow the engine to low idle for another 3 to 5 minutes.
- ▶ Switch off the engine.
- ▶ Find and correct the cause of the problem.
- ❑ If the overheating is stronger (over 104 ºC / 219 ºF during more as 7 seconds), the corresponding symbol is displayed on the main screen and the error will be saved as error code **E 523**.
- ▶ Switch off the engine immediately.

P3 – Fuel level display

The display's illuminating LEDs indicate the amount of fuel remaining in the tank.

When the red LEDs **P3.1** illuminate, a reserve quantity of 10-20% is still in the tank, depending on the type of machine.

Area B :Indicator lights

H2 – Indicator light, low engine oil pressure

The indicator light illuminates if the engine oil pressure drops below a given value during more than 3 seconds when the machine is operating.

The buzzer in the cab also sounds.

When this indicator light illuminates, the error will be saved as error code **E 501**.

- ▶ Bring the engine to a low idle immediately.
- ▶ Switch off the engine immediately.
- ❑ If the pressure remains too low for 5 other seconds, the corresponding symbol is displayed on the main screen and the error will be saved as error code **E 522**.
- ▶ Find and correct the cause of the problem.

▶ Press the **Menu** key.
  ↳ The operating hours will be reset to 0.
  ↳ The arrow key symbols **Up** and **Down** and the **Menu** symbol will no longer be displayed.

To exit the menu:

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

Menu "Set Service" - confirmation of the execution of a recurring service work

This menu gives information about the falling due of the next service work and allows to confirm the execution of the service work after it just has been carried out.

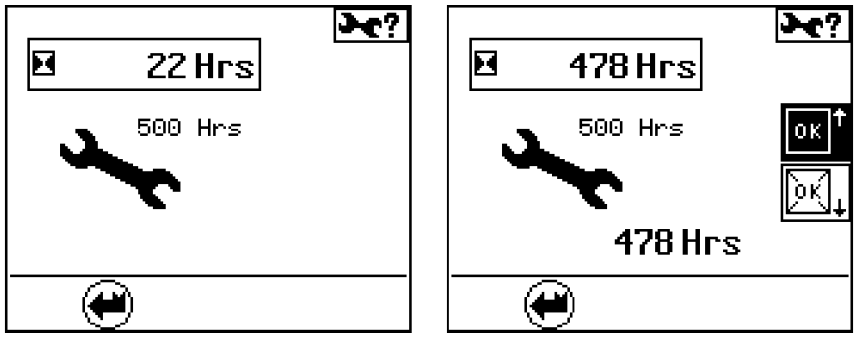


Fig. 3-12 *Menu "Set Service"*

The operating hours of the next service due (in this example, "500 Hrs") and the current operating hours ("478 Hrs") are displayed in the menu.

An upcoming service work can be confirmed a maximum of 50 operating hours before the service interval is due.

When this time period has been reached a query will appear to ask whether the service work has been carried out.

❑ If the service work has been carried out.

▶ Press the **Up** arrow key.
  ↳ The choice "OK not crossed out" will be displayed with a black background.

▶ Press the **Menu** key.
  ↳ The current operating hour will be stored as the time for the last carrying out of a recurring service work.
  ↳ The operating hours indicating the next service due will be increased by the duration of a service interval (as an example they augment from 500 to 1000 working hours).

❑ If the service work has not been carried out.

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

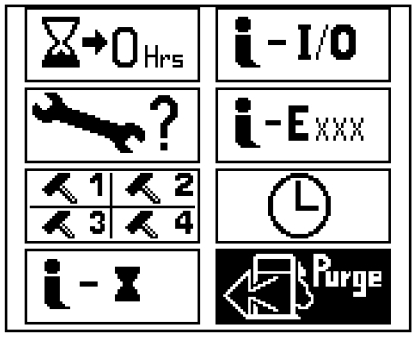
Menu "Set option" - selection of the flow and pressure limitations

This menu allows to allocate flow and pressure limitation options to external input I1 (choice of the maximum oil flows and system pressure depending on the mounted working tool).

Menu "Purge" - Bleeding of the high pressure fuel system

When starting the machine, the operator can activate the bleeding mode.

To start in bleeding mode allows to bleed the high pressure fuel system (see the chapter concerning the maintenance of fuel system).



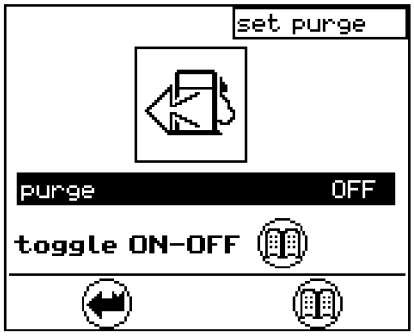


Fig. 3-28 *Menu "Purge"*

Note !
To start in bleeding mode is preconised only in case of running with fuel tank empty or in case of emptying of the fuel system.
When starting in mode "Purge", the engine will emit black smoke.
As soon as the engine rpm reaches 800 rpm, the menu "purge" is not accessible any more.

1 Set horizontal, upper
2 Set horizontal, lower
3 Adjust armrests
4a Set seat inclination, front
4b Set seat inclination, rear
5 Set seat springs
6 Set lumbar support
7 Set lumbar support
8 Seat heating
10 Set backrest

The operator's seat should be set up before starting the machine; this means that:
– The diesel engine may not be started.
– The safety lever must be pushed up.

This will avoid unexpected movement of the machine.

Setting the armrests

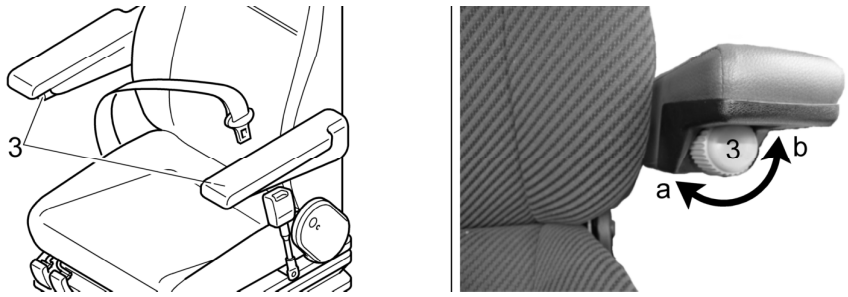


Fig. 3-36 *Setting the armrests*

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

▶ Turn the knurled head screw **3** on the armrest in direction **b**.
  ↳ The armrests incline downwards.

Setting the seat and backrest

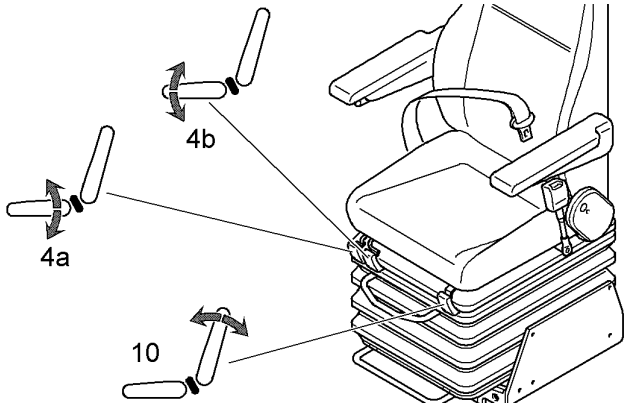


Fig. 3-37 *Setting the seat and backrest*

▶ Rear seat inclination: Pull lever **4a** up, set the inclination and release the lever.

▶ Front seat inclination: Pull lever **4b** up, set the inclination and release the lever.

▶ Backrest: Pull lever **10** up, set the inclination and release the lever.

3.2.11 The heater and air conditioner

The cab is equipped with a heating and air conditioning system as standard. The heating and air conditioning system is used to heat, cool and ventilate the cab.

Control unit of the heating and air conditioning system

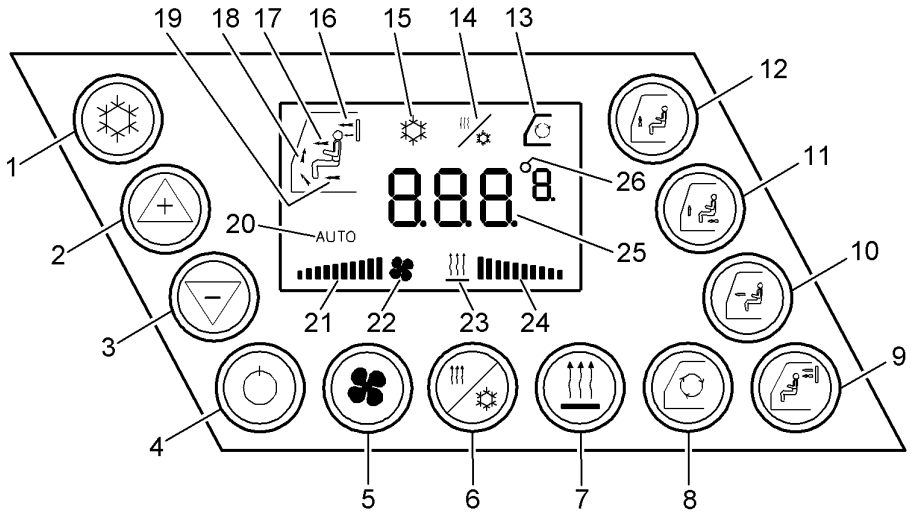


Fig. 3-49 *Control unit of the airco system*

Control keys

1 – Air conditioning (cooling)
2 – Increase cab temperature
3 – Decrease cab temperature
4 – Control ON / OFF
5 – Evaporator fan speed – manual / automatic
6 – REHEAT operation
7 – Heating – manual / automatic
8 – Fresh air / recirculated air
9 – Air flap to rear wall vent OPEN / CLOSED
10 – Air flap to right control panel (8b) OPEN / CLOSED
11 – Air flap to front window, legroom CENTER / CLOSED
12 – Air flap tofront windshield, legroom CENTER / OPEN

Indications at the LCD display

13 – Air circulation
14 – REHEAT operation
15 – Air conditioning (cooling)
16 – Air flap to rear wall OPEN
17 – Air flap to right control panel (8b) OPEN
18 – Air flap to front windshield, legroom CENTER
19 – Air flap to front windshield, legroom OPEN
20 – Automatic operation
21 – Bar graph indicator for fan speed
22 – Symbol, fan speed (in manual operation)
23 – Symbol, heater operation (in manual operation)
24 – Bar graph indicator for heating output
25 – Temperature value or error code
26 – Temperature unit (°)

Note!

▶ If the control unit recognizes a sytem error in the air conditioning circuit, a flashing error code number **F1-F5** is displayed, see the section "faults and remedies", further in this manual.

Utilisation in confined spaces

– Only operate combustion engines and fuel-operated heaters in adequately ventilated spaces. Before starting in closed areas, ensure adequate ventilation. Follow the regulations which apply for the particular area of use.

Starting the machine safely

– Before starting, check all control lamps and instruments for correct function, place all operator's controls in Neutral and tilt the safety lever up.
– Before starting, sound the horn briefly to alert people in the vicinity of the machine.
– Only start the machine from the driver's seat.
– In the absence of any other instructions, start the engine in accordance with the regulations given in the operating instructions.
– Tilt the safety lever down and then test all display and checking devices.
– In enclosed spaces, only allow the engine to run when there is adequate ventilation. If necessary, open doors and windows to ensure sufficient fresh air supplies.
– Bring the engine and hydraulic oil to operating temperature. Low oil temperatures make the control unit react sluggishly.
– Check that the equipment is operating correctly.
– Move the machine carefully to an open area and then check the function of the running and slewing gear brakes, the steering and the signaling and lighting devices.

Stopping the machine safely

– Only stop the machine on level, firm ground.
– If the machine has to be stopped on an incline, chocks should be used to secure it from rolling away.
– Before stopping the machine, each time it is possible, align the uppercarriage with the undercarriage so that the sprockets locate at the back-end. This is the only one position which enables a secured access to every maintenance locations on the uppercarriage.
– Use the stop bolts to secure the upper structure facing the undercarriage, if available.
– Lower the equipment and anchor the grab lightly in the ground.
– Position every control lever into neutral position and depress the parking and slewing brakes.
– 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 unpermited use and vandalis.

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3.3.9 Jump start procedure

Danger!
When connecting to exterior batteries, old batteries can be subject to increased gas formation.

- ▶ Wear protective goggles and gloves whenever jump starting, avoid naked flame and creating any sparks in the vicinity of the flat vehicle battery. RISK OF EXPLOSION!
- ▶ Only use jump starting cables with a sufficient cross section. Always follow the established jump starting procedure.

Connecting the batteries

- ▶ First connect the cable to the positive terminal (+) of the flat battery and then to the positive terminal (+) of the exterior battery.
- ▶ Connect the second cable to the negative terminal (-) of the flat battery and then to the negative terminal (-) of the exterior battery.
- ▶ Start the engine as described above.

Caution!

- ▶ Before removing the jump start cable, be sure to place the diesel engine of the jump started machine into low idle.
- ▶ For safety reasons, switch on large consumers such as work headlights, upper carriage lighting etc. to avoid overvoltage. The electronics could otherwise be damaged.

Disconnecting the batteries

- ▶ First remove the cable from the negative terminal (-) of the exterior battery and then from the negative terminal (-) of the flat battery.
- ▶ Remove the second cable from the positive terminal (+) of the exterior battery and then from the positive terminal (+) of the flat battery.
- ▶ Check the electrical function of the machine.

For battery care and maintenance, see the chapter "Battery care".

3.3.10 Anti-theft device with code key (option)

The machine can be equipped with an electronic anti-theft device.

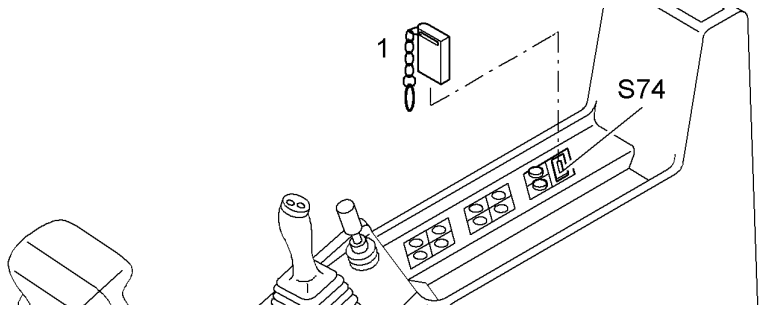


Fig. 3-63 *Electronic anti-theft device*

Emergency cab lowering from outside the cab:

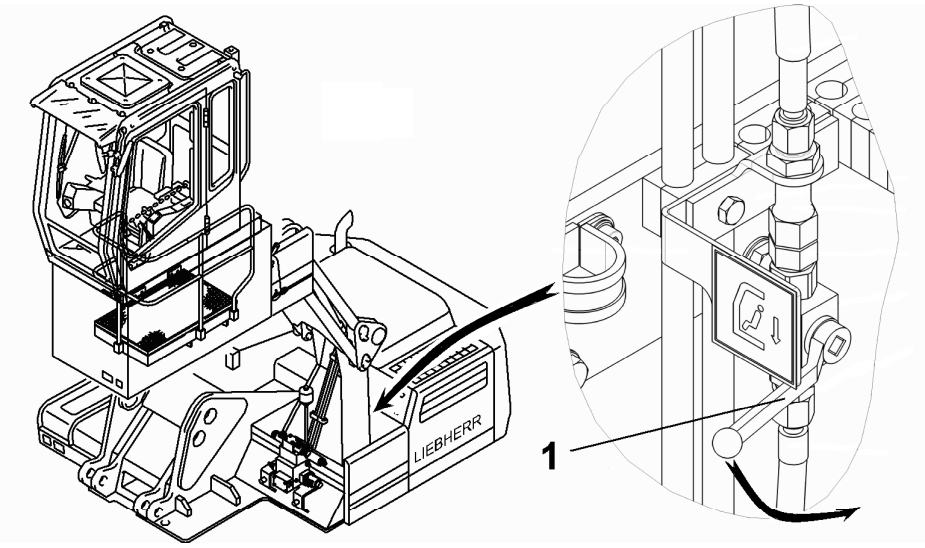


Fig. 3-73 *Shut off valve for emergency cab lowering.*

It is also possible to lower the cab while opening the shut off valve **1** mounted to the carrying structure of the height adjustable cab, specially for this purpose.

Danger!
Danger of crushing.

- ▶ Ensure that no one is standing in the vicinity of the lifting frame when lowering the cab from the outside in an emergency.

Ensure that you do not place any part of the body in the area of the moving parts when lowering the cab in an emergency.

- ▶ Open the shut off valve **1** (tilt the actuation lever down).
  - ↳ The cab travels downwards as long as the vave **1** is kept in opened position.

Adjusting the inclination of the cab

With a 30° tiltable cab for demolition machines **(3)**, the touches S200, S201, S78 and the valve 1 serve in the same manner to tilt the cab to the rear or to the front.

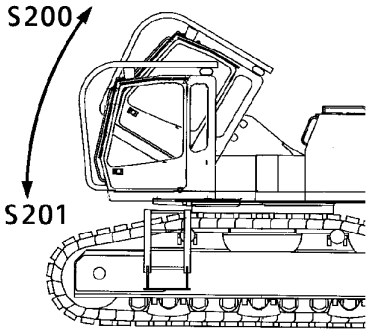


Fig. 3-74 *Adjusting the inclination of the cab*

When moving the machine:

- Rotate the upper structure parallel to the undercarriage undercarriage (transport position).
- Draw the equipment as close as possible to the machine.
- Only at this point may the support feet be retracted and the machine moved.
- Moving with loads is not permitted.
- Check the terrain to be covered to ensure that the ground is solid and even. Potholes and uneven surfaces jeopardize the stability of the machine.
- Adjust vehicle handling to suit the altered machine characteristics (high centre of gravity) and environmental conditions.
- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Ascending gradients and obstacles may only be approached in the longitudinal direction in order to prevent unacceptable banking of the machine.
- Special care should be taken when driving through narrow passages - drive slowly!

When loading and unloading:

- The machine must be supported and aligned horizontally before moving (slewing) the upper structure out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying capacity of the substrate). A support subsiding would have disastrous consequences!
- Carry out all movements with increased care.
- To slew the load, move the equipment as close as possible to the machine **(Caution! swinging grab)**and hold the load close to the undercarriage and above the substrate.
- Avoid braking or accelerating the equipment or upper structure abruptly.
- Do not lift any loads which are heavier than those given in the load chart.

Protection from vibration

– Vibrational loads on mobile building machinery are mainly the result of the type and method of use. The following parameters in particular are decisive influences:
  - Terrain conditions: Uneven areas and potholes;
  - Operational techniques: Speed, steering, brakes, controlling the machine's control elements when driving and working.

– To a large extent, the machine operator determines the vibrational loads since he selects the speed, gearbox ratio, working method and route himself.
  This means that there is a wide range of different vibrational loads for the same machine type.

Whole-body vibrational load for the machine operator can be reduced if the following recommendations are observed:

– Select suitable machines, equipment parts and auxiliary devices for each part of the job.

– Use a machine that has a suitable seat (i.e. for earth-moving machinery such as hydraulic excavators, this should be a seat which corresponds with EN ISO 7096).

– Keep the seat in good condition and adjust it as follows:
  - The seat and its damping action should be adjusted depending on the weight and height of the operator.
  - Check the seat's damping action and adjustment mechanisms regularly and ensure that these seat characteristics remain as per the seat manufacturer's instructions.

Operating the intermediate arm

The intermediate arm is controlled via the right double pedal.

- ▶ Actuate the left pedal 7a.
  - ↳ the intermediate arm is retracted.
- ▶ Actuate the right pedal 7b.
  - ↳ the intermediate arm is extended.

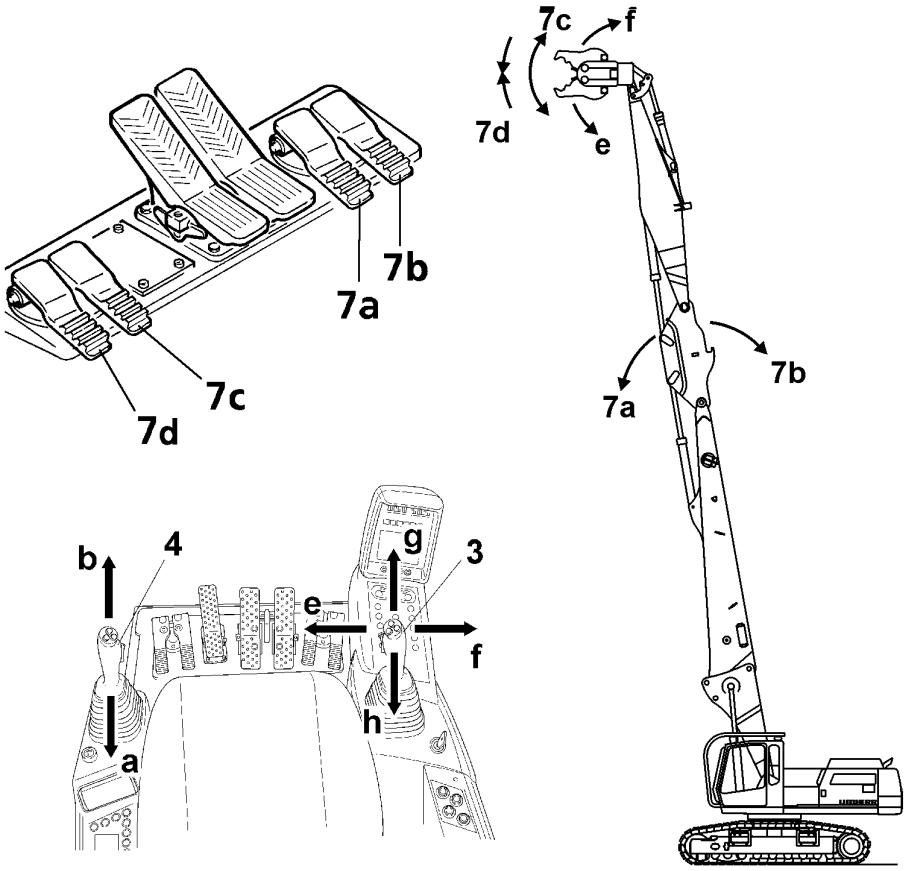


Fig. 3-89 *Operating the intermediate arm and the demolition tool*

Operating the tilt cylinder for demolition tool

The inclination of the demolition tool is controlled via the right joystick **3**.

- ▶ Push the joystick to the left **e**.
  - ↳ The tilt cylinder is extended (the demolition tool is tilted in).
- ▶ Push the joystick to the right **f**.
  - ↳ The tilt cylinder is retracted (the demolition tool is tilted out).

Operating the demolition tool

The demolition tool (concrete crusher, scrap shear, ...) is controlled via the left double pedal.

- ▶ Actuate the right pedal 7c.
  - ↳ the demolition tool is opened.
- ▶ Actuate the left pedal 7d.
  - ↳ the demolition tool is closed.

A concrete breaker weighing 2,1 tons is mounted to a machine R934C – type VH-HD with demolition boom 7,50 meter, intermediate arm 2,10 meter, demolition stick 5,20 meter and a tool shifting kinematics for R932.

According to excavator type and attachment parts the ECN must be chosen in the series 3.4.2.2.

The ECN 3.4.2.2.3 is the right choice (Reach limit - Code 3, corresponding to a reach limit of 10 meter, is suitable for tool with a weight up to 2,5 tons).

The ECN 3.4.2.2.1 and 3.4.2.2.2 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 R944C

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	1	1	1	/	8	2,5
4	4	1	1	2	/	10	2
4	4	1	1	3	/	12	1,5
4	4	1	1	4	/	14	1
4	4	1	3	1	/	8	2,5
4	4	1	3	2	/	10	2
4	4	1	3	3	/	12	1,5
4	4	1	3	4	/	14	1
4	4	2	1	1	/	8	3
4	4	2	1	2	/	10	2,5
4	4	2	1	3	/	12	1,75
4	4	2	1	4	/	14	1,25
4	4	2	2	1	/	8	2,75
4	4	2	2	2	/	10	2,25
4	4	2	2	3	/	12	1,5
4	4	2	2	4	/	14	1
4	4	2	3	1	/	8	2,5
4	4	2	3	2	/	10	2,2
4	4	2	3	3	/	12	1,7
4	4	2	3	4	/	14	1,2
4	4	2	4	1	/	8	2,5
4	4	2	4	2	/	10	2
4	4	2	4	3	/	12	1,5
4	4	2	4	4	/	14	1
4	4	3	1	1	/	8	3
4	4	3	1	2	/	10	2,75
4	4	3	1	3	/	12	2
4	4	3	1	4	/	14	1,5
4	4	3	2	1	/	8	3
4	4	3	2	2	/	10	2,5
4	4	3	2	3	/	12	1,75
4	4	3	2	4	/	14	1,25
4	4	3	3	1	/	8	2,5

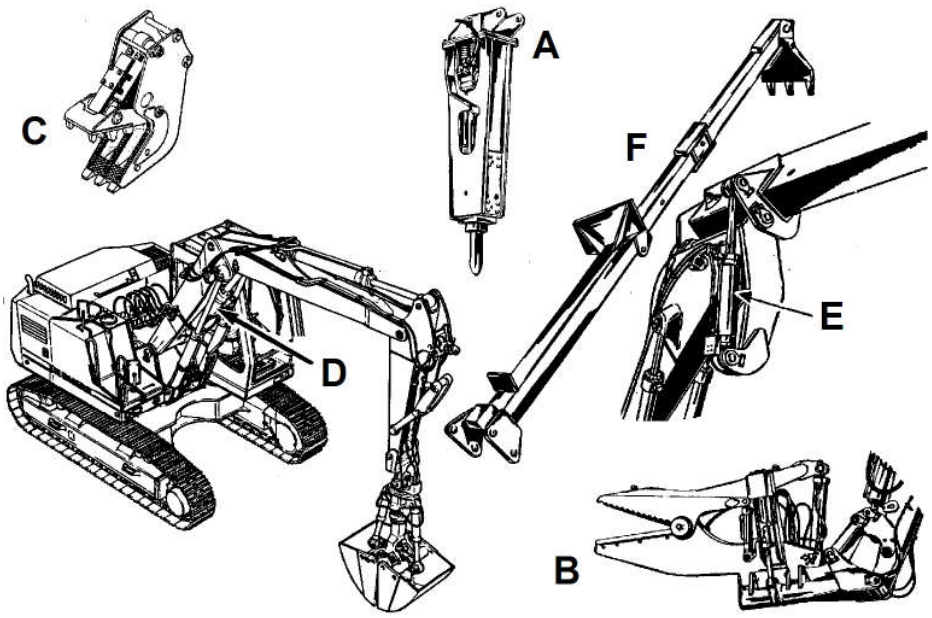


Fig. 3-98 *Special equipments controlled by the additional pedals*

Should two of these special equipments be mounted simultaneously on the machine, so one of them is controlled by the left double pedal 9m/9k, and the second additional user is controlled by the right double pedal 9n/9p.

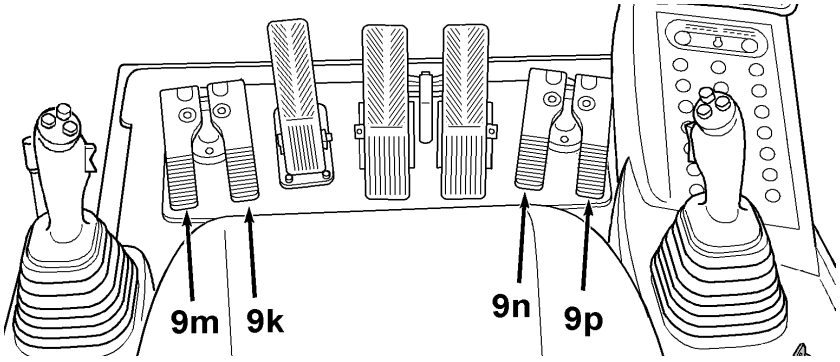


Fig. 3-99 *Disposition of the additional pedals*

Danger!
Additional pedal control units can have various functions. Always check their functions when you start up a machine fitted with special equipments.

When the machine is operated with a special equipment, it may be necessary to previously select the appropriate option in the menu "set option" (depending on the function and/or the size of the auxiliary user). This selection of the pumps parameters determines pressure and oil flow adjustment in the hydraulic circuit.

▶ Check, and if necessary correct the selection of the pumps parameters before you start working with a special equipment.

Caution!
A wrong choice of the option could lead to damage or unsatisfactory operation of the additional equipment due to inadequate pressure and/or oil flow in the circuit.

Note!

When lowering the attachment onto storage supports 4, have two assistants to guide the legs of the storage support from each side.
The person standing on the side of the operator's cab should provide the operator with the correct signals

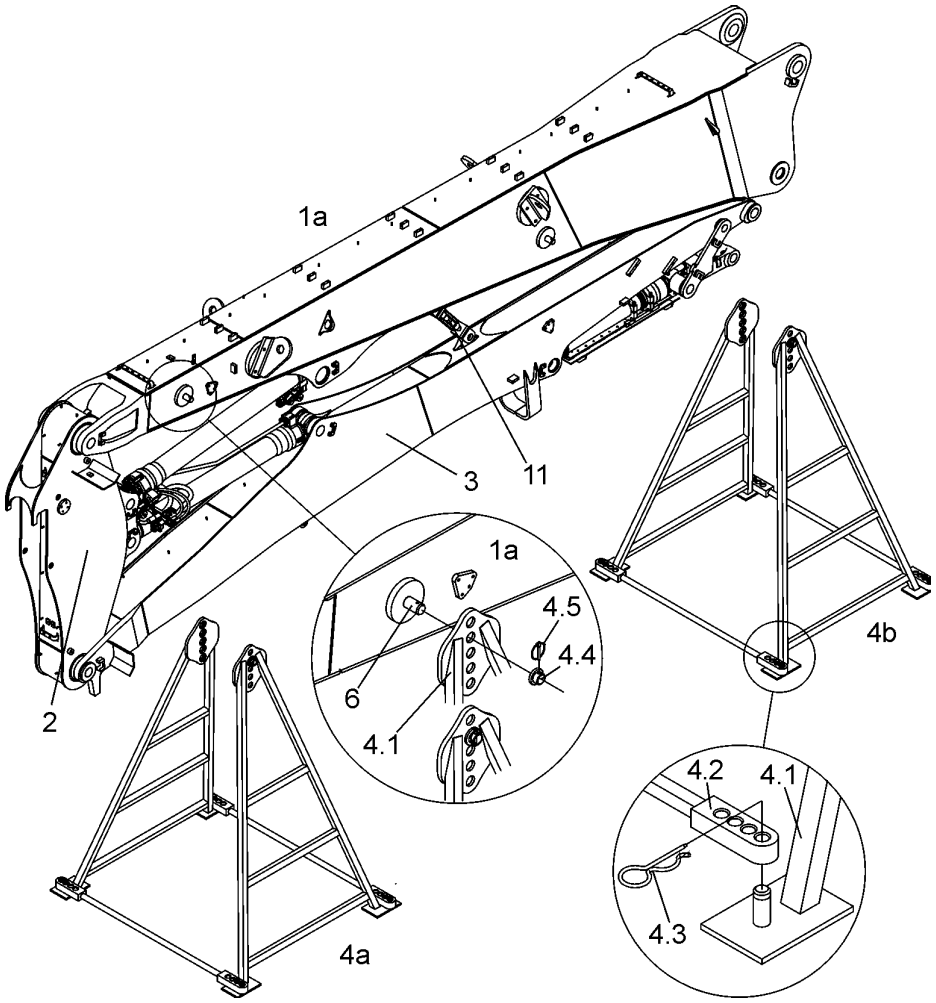
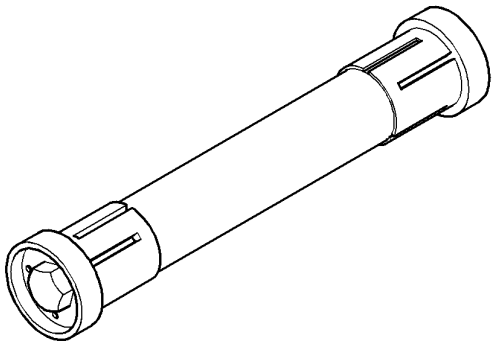


Fig. 3-108 *Storage of the demolition attachment*

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

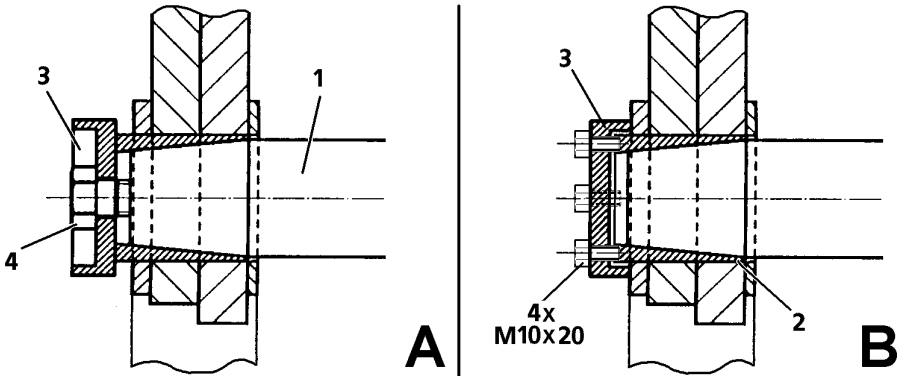
- ▶ Position the both lateral legs 4.1 and slightly move the boom 1a so to be able to insert the supporting spindles 6 in the fixing bores of the legs 4.1.
- ▶ Slide the centering stops 4.4 over the spindles 6 and secure using the securing pins 4.5. Connect the lateral legs 4.1 together with the both connecting traverses 4.2 and using the cotter pins 4.3.

Removal and installation of "Expander" pins



Removal of Expander pins

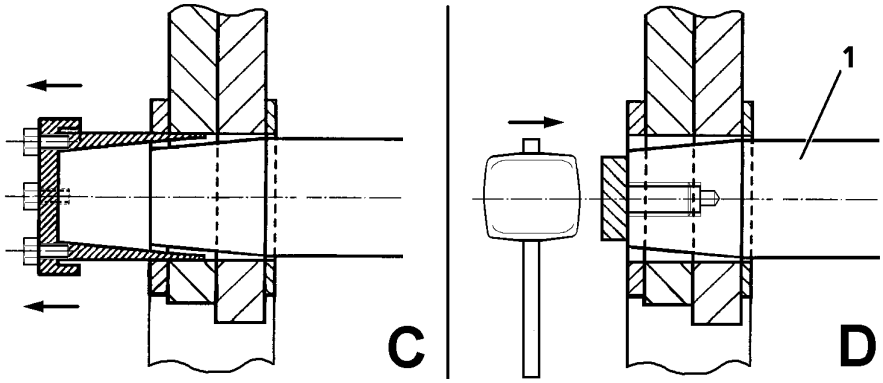
▶ Remove the screw 4 and the extremity washer 3 from each side of the pin 1 (fig. A).



▶ Return one of the extremity washer 3 so that its flange is in contact with the external part of the attachment, then screw on the expansion bushing 2 with the four screws M10. Tighten the screws until contact (fig. B).

▶ Tighten the four screws 4 one after the other and progressively in order to remove the expansion bushing from its housing. Remove the assembly (washer and bushing) and dismount it (fig. C).

▶ Do the same for the expansion bushing at the other pin extremity.



▶ Screw an extractor in the thread of one of the extremity of the pin 1 and remove it with aid of a hydraulic press or using a hammer (fig. D).

Installation of Expander pins

▶ Position the two parts of the attachment so that their bores are in line.

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**.

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– If the buzzer and telltale light are activated without a deliberate locking or unlocking procedure being carried out, stop all work at once. If the buzzer and telltale light are not activated while a deliberate locking or unlocking procedure is being carried out, stop all work at once.
  This could be caused by an unmonitored position change of the locking pins or by mechanical or hydraulic damage. A defect may also be present in the electrical system (eg. proximity switch or buzzer).
  Only resume working once defective parts have been repaired or replaced.
– The quick-change adapter unlocks as soon as the switch / button designed for the purpose is pressed.
  Always keep the work tool as close to the ground as possible when unlocking to avoid creating conditions which may lead to danger. Only activate the quick-change adapter to carry out a deliberate locking or unlocking procedure.
– Each time a work tool is changed, the machine's operator must ensure that the locking pins for the quick-change adapter insert in the bore holes on the work tool which are designed for the purpose and that the work tool raises correctly. A direct visual check must be made to ensure that the work tool is correctly positioned.
– A working cycle should also be carried out with the work tool ,where the work tool is only raised to the point where the correct position of, for example, the pin in the pin eye can be tested by tilting in and out.
– The load carrying capacity of the quick-change adapter or the integrated lifting hook can exceed or fall short of the load carrying capacity of the carrier device. When operating, it should be ensured that the values provided in the load chart and the technical data for the carrier device are adhered to.

Overview

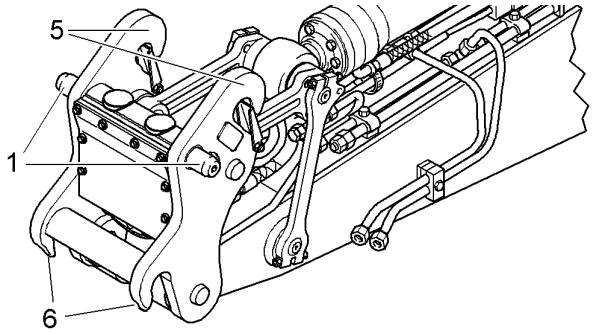


Fig. 3-133 *Hydraulic quick-change adapter*

1 Locking pin (extended)

5 Lifting hook

6 Take-up hook for work tool

Danger!
Risk of fatal injury due to rotating the machine.

▶ Ensure that nobody stands within the danger area **r** of the machine.

Caution!
Risk of injury when working.

▶ Always wear safety shoes and, particularly when leaving the cab when demolition work is going on, a protective helmet and goggles.

▶ Always wear the seat belt.

▶ Use the horn to give a short warning signal before starting work.

3.8.3 Using a backhoe bucket

Danger!
Risk of fatal injury and damage to the machine when moving the backhoe bucket.

▶ Ensure that the backhoe bucket is not slewed too close to the cab.
  ↳ The backhoe bucket could damage the cab and injure the machine's operator.

▶ Ensure that nobody is standing within the danger area of the backhoe bucket.

❑ The machine must be in the working position.

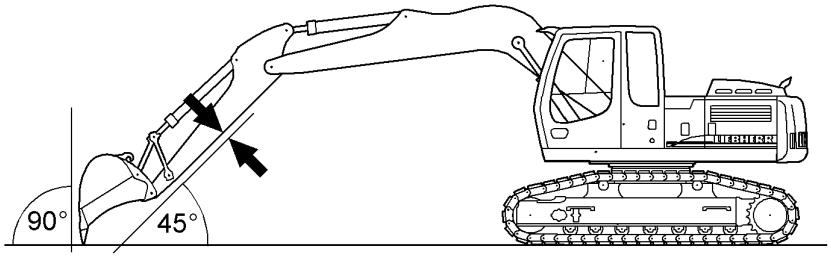


Fig. 3-145 *Aligning the stick and backhoe bucket*

▶ Align the stick in such a way that its underside is at an angle of approx. 45° to the ground.

▶ Align the backhoe backhoebucket in such a way that its ground side can enter the ground at an angle of approx. 90°.

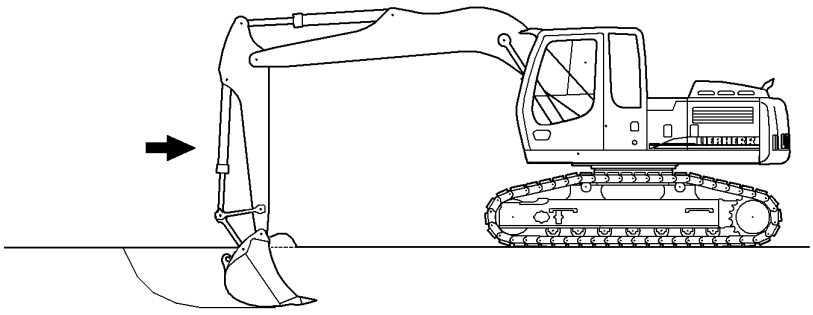


Fig. 3-146 *Taking up grab material*

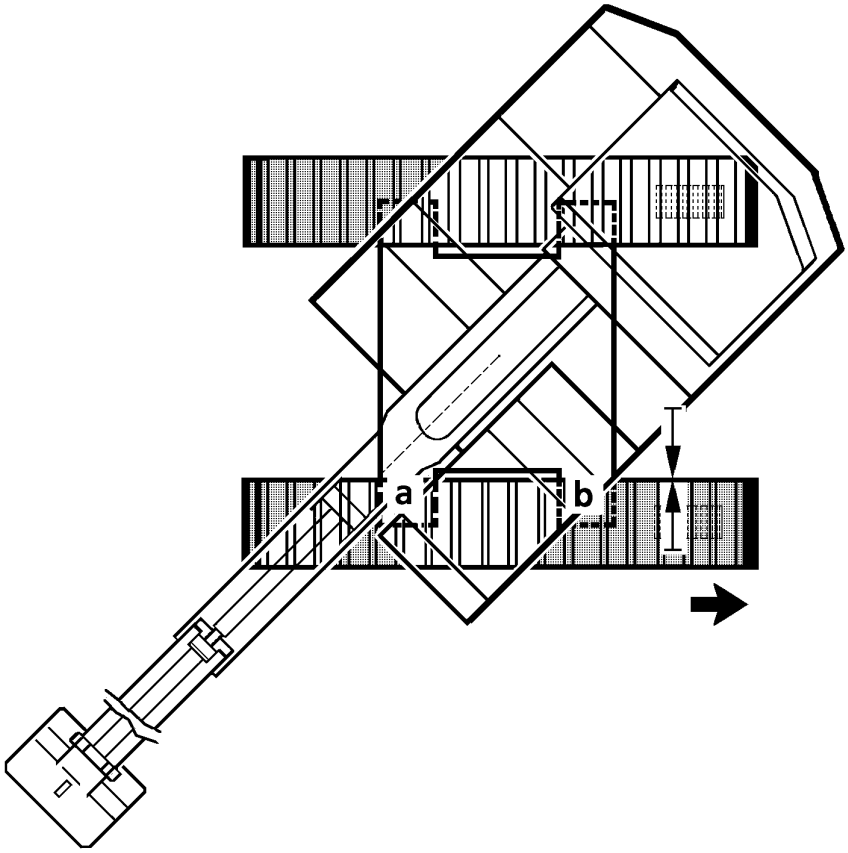


Fig. 3-160 *Moving in the side frame on sprocket wheel side (rear side)*

- ▶ Slowly move the chain on the side which is being retraded to the rear, until the side frame moves in about 6 to 8 cm (Measurement Xb is being reduced by about 6 to 8 cm).
- ▶ Move the side frame in as described above, alternately on the front and on the rear mounting point, each time by about 6 to 8 cm each, until it is positioned on both sides inside on the stop.

Notice!
The person guiding the operator must watch that the side frame retracts evenly on the front and on the rear. The difference between Xa and Xb may never be more than 6 cm.

- ▶ Attach the mounting screws, but do not tighten them yet. If all screws cannot be inserted by hand, then insert first the 2 or 3 mounting screws on the rear or on the front mounting point all the way (but do not tighten them yet) and then move the side frame a little in or out, so that the screws can be inserted easily.
- ▶ Tighten all mounting screws (13 per mounting point in retracted position) to the specified tightening torque.

Loading a machine with a gooseneck boom:

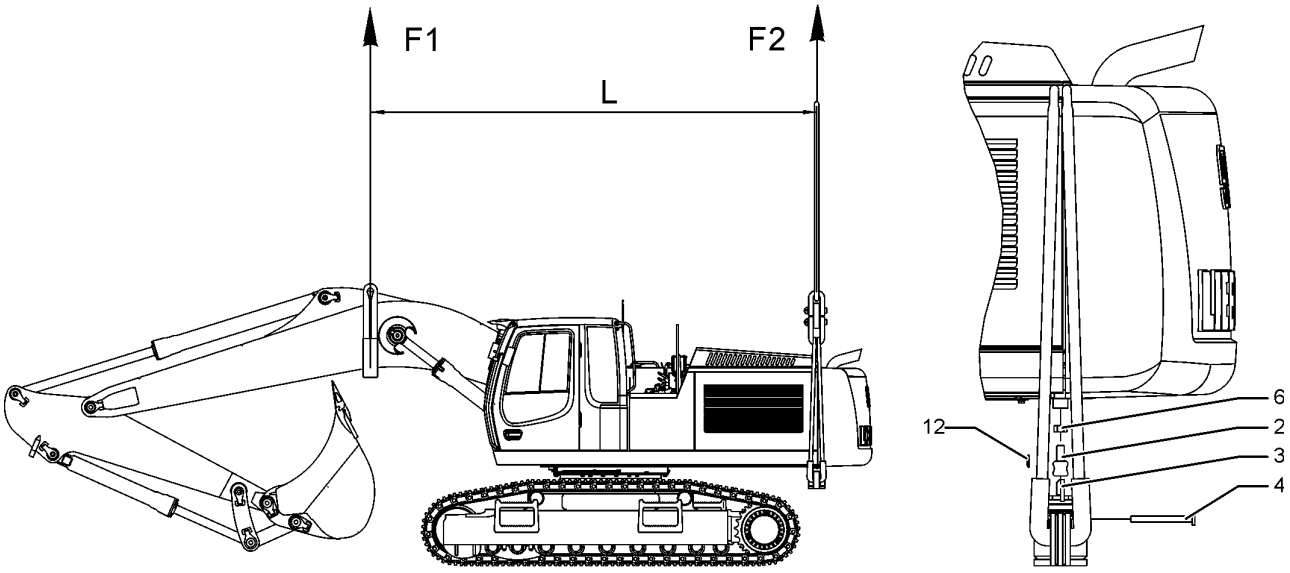


Fig. 3-175 *Suspending the machine with gooseneck boom*

2 Spacer
3 Plate
4 Axle
6 Counternut
12 Pin

- ❑ Only use cargo handling gear which is sufficiently dimensioned or which has been specially developed by LIEBHERR for this purpose.

The following chart give the forces wich must be considered to size the suspending system.

Excavator's model	F1 [daN]	F2 [daN]	L [mm]
R 934 C	19 000	22 000	4850
R 944 C	23 000	27 000	5785

Warning!
The forces indicated F1 and F2 are the maximum values which schould be considered and in all the case sufficient for the tools and lifting systems definition.
For the excavators with demolition equipment, these values are not sufficient, consult your after sales service Liebherr for lifting these excavators.

- ▶ Lower the equipment, draw in the stanchion and tip the bucket as far as the stop.
- ▶ Switch off the engine.
- ▶ Turn the ignition key to the contact position and relieve pressure lines by moving the joystick carefully several times.
- ▶ Remove the ignition key and push the safety lever up.
- ▶ Close and lock all doors, covers and panels on the machine.

Error code	Effect	Cause	Measure / remedy
E 539	Symbol appears	Fuel pressure too low in rail 2 - Safety level	See symbol description
E 597	Symbol appears Engine power reduction Buzzer sounds	Turbocharged air temperature too high - Warning level	See symbol description

4.2 Faults and remedies

4.2.1 Diesel engine and fuel system

Fault / error	Cause	Solution
Diesel engine does not start	Fuel tank almost or completely empty	Fill tank and vent fuel system
	Low pressure in tank	Remove fuel filler cap
	Fuel filter dirty	Clean or change filter and vent fuel system, drain fuel / clean tank
	Outside temperature below 0 °C	For operation under specific climatic conditions, see operating instructions
	Starter motor not drawing through	Check line connections, overhaul starter motor
	Batteries have no power	Charge / replace
Engine starts but stops immediately after or runs irregularly	Fuel tank empty (low pressure in tank)	Fill tank and vent fuel system
	Fuel filter dirty	Clean or change filter and vent fuel system (tank)
	Particularly in winter: too viscous engine oil used	Use engine oil suitable for the outside temperature
	Dry-air filter dirty	Clean or change main filter element
	Air in fuel system	Vent fuel system
	Ventilation in fuel tank obstructed	Clean
	Fuel line bent	Check line and repair if required
Diesel engine emitting grey or black smoke	Dry-air filter dirty	Clean or change filter
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

F31	7,5 A	Fuse on Kl15 - heater and air conditioning system
F33	7,5 A	Fuse on Kl15 - control circuit for refuelling pump (optional extra)
F34	15 A	Fuse on Kl30 - reserve for options
F35	15 A	Fuse on Kl30 - reserve for options
F36	20 A	Fuse on Kl30 - power circuit for refuelling pump (optional extra)
F36-2	15 A	Fuse on Kl15 - cut off of cylinder movements (option)
F37	20 A	Fuse on Kl30 - heater and air conditioning system
F109	50 A	Circuit breaker on Kl30 - special equipments and headlights
F110	50 A	Circuit breaker on Kl30 - power supply of PLD system
F115	7,5 A	Fuse on Kl15 for safety mode
F116	7,5 A	Fuse on Kl30 - controller of PLD system
F117	7,5 A	Fuse on Kl15 - PLD system
F122	7,5 A	Fuse on Kl30 - preheating signal for PLD system
F133	7,5 A	Fuse on Kl30 for hydraulic adjustable cab (option)
F253	25 A	Fuse on Kl30 for additional headlights on attachment (option)
K10-1		
K56		Relay / Fuel preheating
K66-1		Relay / cut off of cylinder movements (option)
K66-2		Relay / cut off of cylinder movements (option)
K127		Relay / engine RPM adjustment in safety mode
K128		Relay / engine start in safety mode
K288		Relay / terminal 15
K302		Relay / engine preglow
K359		Relay / additional standstill heater
K415	20 A	Relay / additional attachment headlights (option)

4.3.2 A1010 Plate

All other fuses are situated in the left control panel of the operator's standing position.

Danger
Incorrect or bypassed fuses do not offer the machine's operator or the electrical system the required degree of protection.

- ▶ Only use original fuses.
- ▶ Never bypass electrical fuses.

If required, order replacement fuses from LIEBHERR.

5.2 Maintenance access doors

5.2.1 Overview of access doors

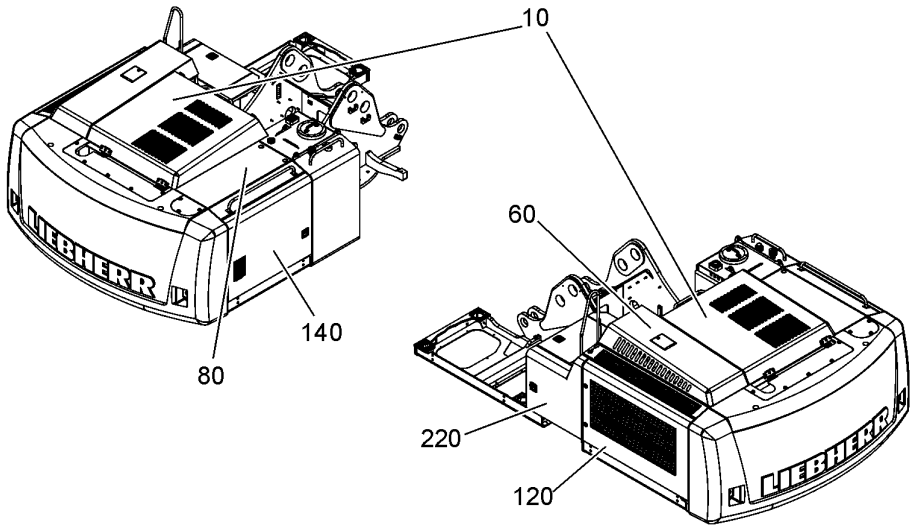


Fig. 5-1 *Access doors on the machine*

10	Engine cover	**120**	Side door, left
60	Radiator cover	**140**	Side door, right
80	Right cover	**220**	Side door, front left

The machine has 6 access doors for maintenance. The locks integrated in the handles must be unlocked before starting to drive.

Caution!
Access doors can close accidentally and trap the operator or maintenance personnel.

▶ When you have opened the access doors, latch them using the retainer.

Access door	Lock	Access to:
Engine cover	Gas pressure spring, auxiliary mechanical retainer	– Diesel engine
Radiator cover	Gas pressure spring	– Radiator
Right cover	Gas pressure spring	– Dry air filter – Control oil unit – Hydraulic pump
Side door, left	Mechanical retainer	– Radiator – Electrics box E50 – Batteries – Main battery switch

Water quality

Clear and clean water free of particles that meets the following chemical requirements is suitable as coolant.

Do not use sea water, brackish water, brine or industrial wastewater.

Contents	Quantity
Total earth alkaline content (water hardness)	0.6 to 3.6 mmol / l (3 to 20 °d)
pH value at 20 °C	6.5 to 8.5
Chloride ion content	max. 80 mg / l
Sulphate ion content	max. 100 mg / l

Tab. 5-7 *Fresh water quality*

Fresh water quality when using coolant with DCA 4

Contents	Quantity
Total earth alkaline content (water hardness)	0.6 bis 2.7 mmol/l (3 to 15 °d)
ph value at 20 °C	6.5 to 8.0
Chloride-ion content	max. 80 mg / l
Sulphate ion content	max. 80 mg / l

Tab. 5-8 *Fresh water quality with use of DCA 4*

Water analysis results are available from the local authorities.

Mixting ratio for coolant

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

Outside temperature up to		Mixing ratio	
°C	°F	Water %	A %
-37	-34	50	50
-50	-58	40	60

Tab. 5-9 *Mixture ratio (for all seasons)*

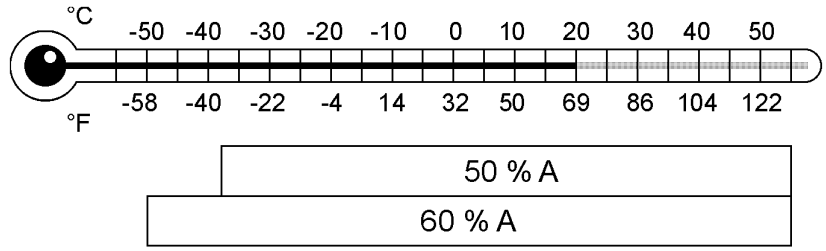


Fig. 5-5 *Temperature-based mixing ratio of water + corrosion inhibitor and antifreeze agent*

- ▶ Start the Diesel engine.
- ▶ Check the oil pressure on the monitoring display of the machine and check the oil filters for tightness.
- ▶ Switch off the Diesel engine.
- ▶ Check the oil level after 2 - 3 minutes on the dipstick.

Quantity, oil quality and oil change intervals: see lubrication and maintenance chart.

5.5.3 Belt for the A/C compressor and alternator installation

The diesel engine is fitted with a tensioning device for the belt. This is self-tensioning and is therefore maintenance-free. The belt should be checked regularly for damage and wear and replaced if necessary.

Damages to the belt include:

- 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

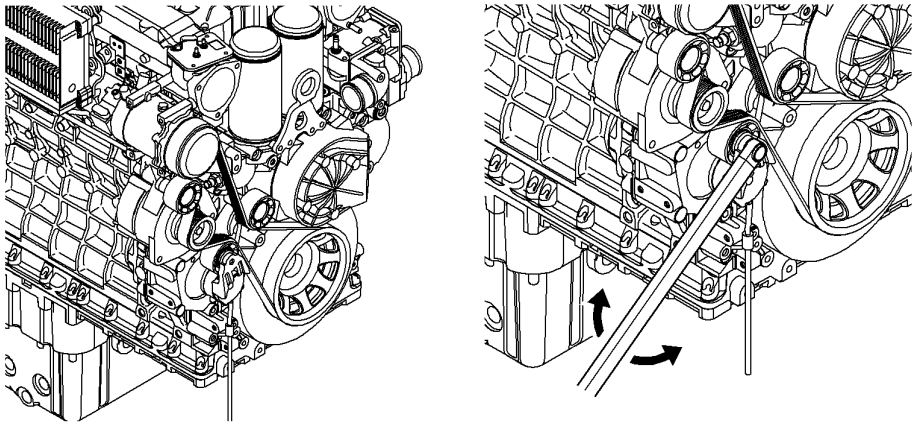


Fig. 5-12 *Replacing the belt*

To replace the belt:

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

– For preference, change the coolant with the shutoff valves **1** for the heating circuit closed.
– Bleed the coolant circuit when refilled.

Note!
If the coolant has been changed without closing the shutoff valves for the heating circuit, the heating circuit must be bled, see chapter "maintenance of heating circuit".
To be sure that the coolant flows threw the heating system, the startkey must be in contact position and the heating system of the cab must be adjusted at maximal temperature.

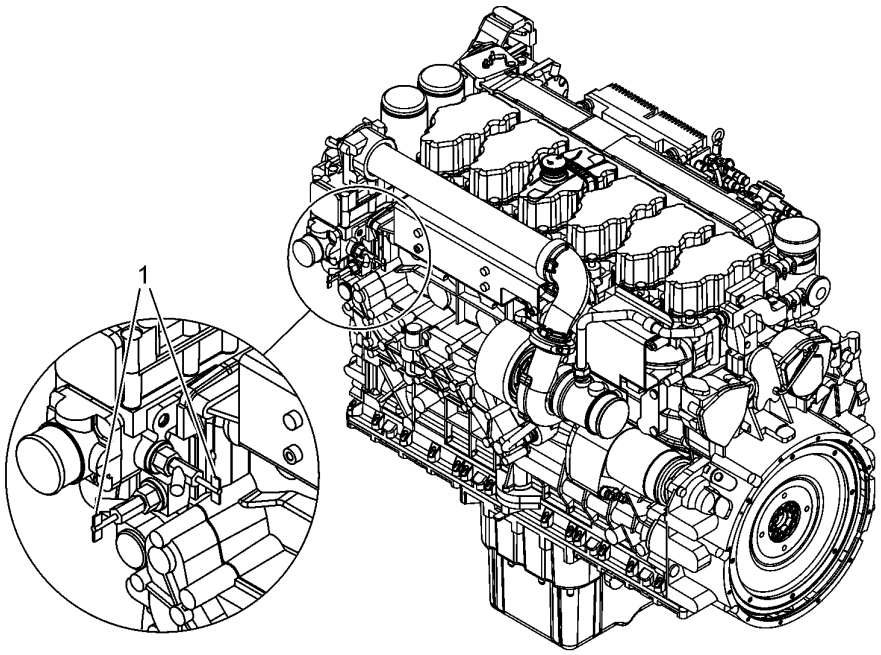


Fig. 5-24 *Shutoff valves for the heating circuit*

- ▶ Actuate the hand pump **2**.
- ▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **6** again.
- ▶ Continue to actuate the hand pump **2** until resistance becomes intense.

To bleed the fuel fine filter

- ▶ Loosen the bleeder screw **13** on the filter head and unscrew 2 to 3 turns of thread.
- ▶ Actuate the hand pump **2**.
- ▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **13** again.
- ▶ Continue to actuate the hand pump **2** until resistance becomes intense.

To bleed the fuel canal on the crankcase

- ▶ Loosen the bleeder screw **14** on the filter head and unscrew 2 to 3 turns of thread.
- ▶ Actuate the hand pump **2**.
- ▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **14** again.
- ▶ Continue to actuate the hand pump **2** until resistance becomes intense.

Bleeding the high pressure fuel system

The bleeding operation of the high pressure fuel system consists in bleeding the air in the injection lines.

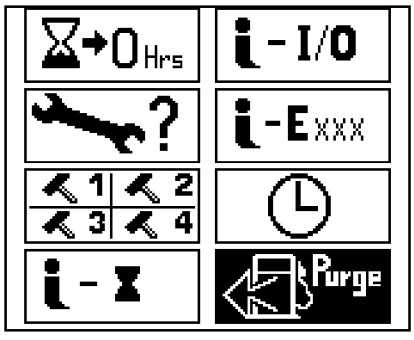
A) Since the software version 36 of the engine control unit

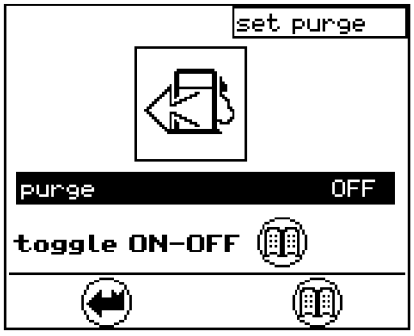
Since the software version 36.0 of the engine control unit and the software version V4.4 of the monitoring display, it is possible to start the engine in bleeding mode.

Notice!
The engine control unit software version can be read on the company nameplate of the engine control unit.

- ▶ Make sure a bleeding of the low pressure fuel system has been correctly carried out.

Select the menu "set purge" at the screen of the display.





- ▶ In the menu "set purge" set the choice "purge" to "ON" using the "menu" touch.
- ▶ Start the Diesel engine

1 Cover
2 Screw
3 Sealing
4 Magnetic rod
5 Filter unit

The magnetic rod **4** of the return-line filter must be cleaned at fixed intervals (see maintenance chart) and the glass fibre filter unit **5** replaced.

Note

▶ When working in heavy dust conditions, please note the special regulations for changing the filter.

To clean the magnetic rod and replace the filter element:

❑ The hydraulic system must be depressurized.

▶ Unscrew the four screws on the filter cover and lift out cover **1** and magnetic rod **4**.

▶ Carefully clean off any dirt sticking to the magnetic rod.

▶ Remove the used filter cartridge **5** on the bracket.

▶ Insert the new filter cartridge on the bracket vertically into the tank and press down lightly. Then lay the clamp to the side on the tank ring.

Caution!

▶ Ensure that the filter cartridge is standing vertical in the tank and that the O-ring **8** is not damaged.

▶ Centre the cover unit on the filter unit **5** and position. When doing this, ensure that the sealing **3** is positioned correctly and is in good condition.

5.10.4 Leak oil filter

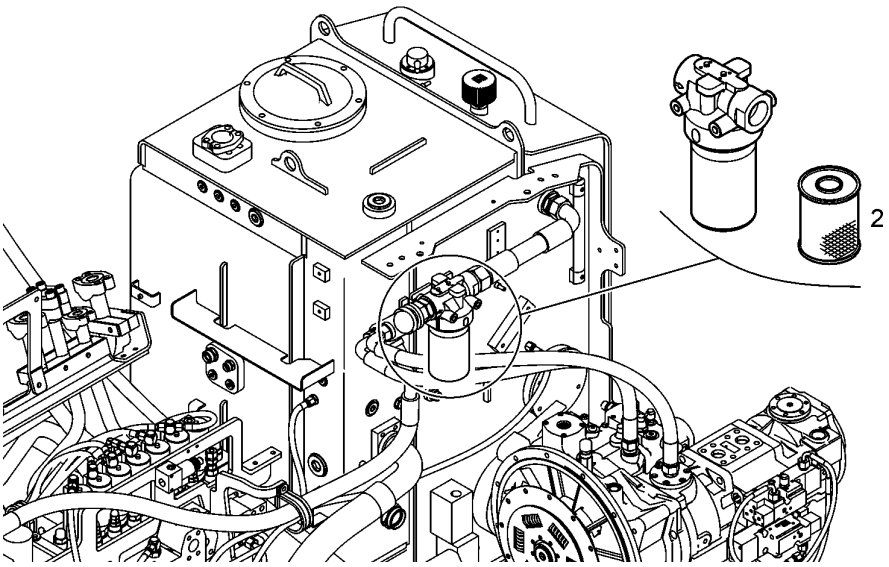


Fig. 5-43 *Leak oil filter*

- ▶ Remove the used filter cartridge **5** with a strap spanner by turning it clockwise and lifting it up lightly
- ▶ Wait that the oil flows out before removing the filter cartridge **5** and let it flow out into a suitable container.
- ▶ Check the input and the output of the filter housing **6** for deposits and clean up if necessary.
- ▶ Remove the new filter cartridge **5** from its packaging. Take care not to remove the cover of carboard on the filter cartridge **5**.

Note!
If the packaging has been damaged, some moisture could have penetrated in the filter cartridge and reduce its lifetime.

- ▶ Be careful that the packaging of the filter cartridge has not been damaged.

- ▶ Install the new filter cartridge **5**.
- ▶ Fill the filter housing **6** with the same oil as, which used int hydraulic circuit.
- ▶ Clean the cover **3** and install a new O-ring **4**.
- ▶ Install the cover **3** and tighten the screw **1** with a torque of 50 Nm.
- ▶ Start the machine and check the bypass oil filter for leaks.

5.10.13 Bypass oil filter for hydraulic system (Special equipment)

The purpose of the bypass oil filter is to eliminate the smallest impurities and the water contained in the hydraulic system.

The bypass oil filter is mounted to the front of the hydraulic tank, resp. in the hydraulic pumps compartment.
On machine model R964 C and above, two bypass oil filters are mounted in parallel due to the oil flow to be filtered.

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

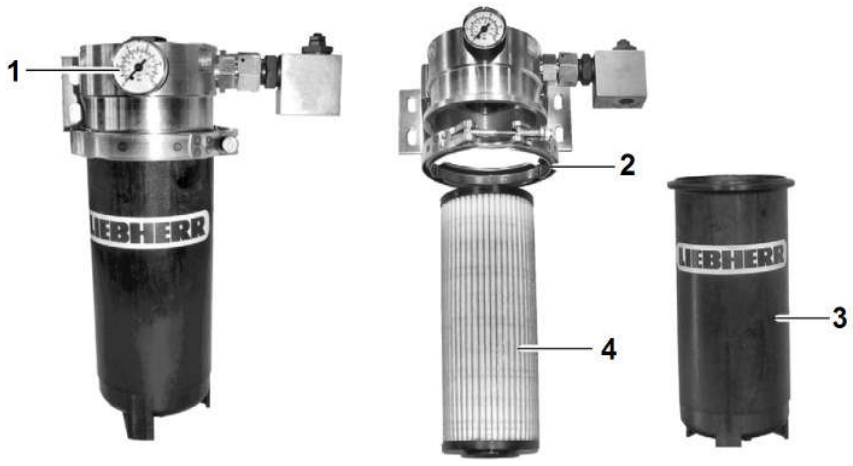


Fig. 5-53 *Bypass oil filter for hydraulic system*

Machine	R 934 C		R 944 C	
Type	**016 / 027 / 918 / 1088**	**023 / 033**	**786 / 791 / 793 / 1000**	**792 / 1079 / 1119 / 1151**
Mounting screws 10 on the hydraulic motor				
Size of screws	M20			
Quality	10,9			
Torque (N.m)	560			
Mounting screws 8 on the travel gear				
Size of screws	M20			M24
Quality	10,9			10,9
Torque (N.m)	560			960

Tab. 5-15 *Mounting torque.*

5.12.2 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.

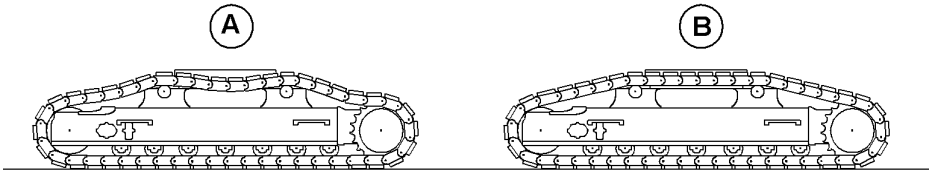


Fig. 5-62 *Track unsufficiently (**A**) and properly (**B**) tightened*

– For the machine with two carrier rollers

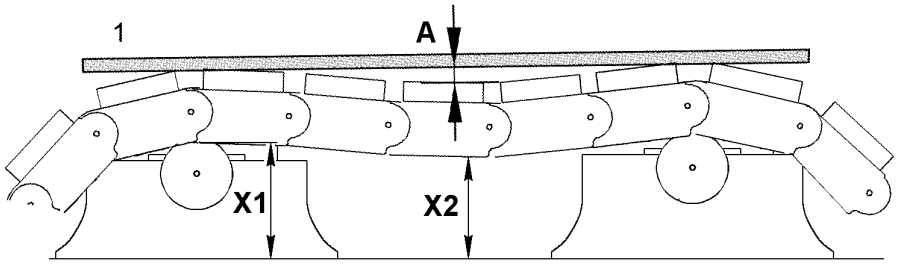
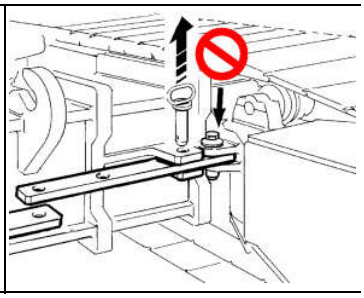


Fig. 5-63 *Monitoring the track tension (with two carrier rollers)*

- ▶ 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.

Caution !
The structure could sustain damage if a locking pin is not removed for the adjustment procedure.

- On connecting shackles fitted with two removable locking pins, only the pin on the side of the undercarriage central part must be removed.
  The locking pin on the side frame end must remain installed.



▶ The excavator operator must be notified by both assistants as soon as the side frame has reached the desired position on a particular side, (widened, narrowed or central) in order that he can engage the track gauge adjustment.

▶ As soon as adjustment of the track gauge has been completed on one side, the assistant must replace the mechanical locking pin(s) on this side

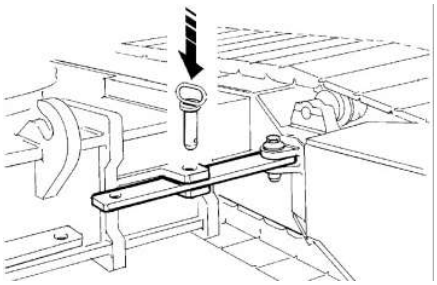


Fig. 5-75 *Replacement of the locking pins*

Caution !
If all locking pins are not inserted correctly, structural damage can be resulted to the excavator during operation.

▶ Adjust the track gauge of the second side frame in the same way.

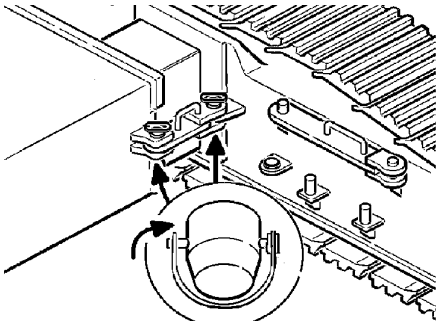


Fig. 5-76 *Storage of the unused shackles*

▶ Once the adjustment of the track gauge is effective on both sides of the side frame, mount any unused spacer plates et the fixing points provided on the side frame.

Fig. 5-87 *Fresh air filter*

The air flow in the heating / air-conditioning system is reduced when the filters are dirty and this frequently results in the system icing up or shutting down.

– Remove and clean the recirculated and fresh air filter **1**and**3** every 500 operating hours.
– Shorten cleaning intervals when working in heavy dust conditions.
– Do not operate the machine, even briefly, without these filters, since the heat exchanger **6** will otherwise quickly become blocked (siehe Fig. 5-88).

To clean and change the recirculated and fresh air filters:

▶ Push the backrest of the operator's seat forwards to remove the recirculated air filter **1**.

▶ Open the quick-release fasteners **2** by a quarter turn.

▶ Remove the recirculated air filter **1**.

▶ Remove the deflector **4**.

▶ Remove the fresh air filter **3**.

Note!

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

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

▶ Blow out the filter elements **1** and **3** using compressed air or clean in cold or lukewarm water.

5.14.2 Heating system

Carry out the following maintenance work on the heating system each year before the start of the heating period:

– Check the entire coolant circuit for leaks.
– Retighten the connection points for the coolant circuit, the hose connections on the heat exchanger, the seals on the shutoff valves and the hose clamps.

15 Grease pump **25** Emergency lube fitting

5.15.6 To refill a grease container

The grease level in the container **13** of the pump must be checked weekly, and if necessary, the container refilled.

See the lubricant chart for grease specification.

The refilling of the grease container should only be done via the special fitting **21**.

Note!

Avoid refilling the container **13** via the upper cover **23**, since it could create an air pocket in the container and cause the pump **15** to run dry.

- ▶ Insert a grease cartridge in the special filling pump **31** (Id. No. 10009239)
- ▶ connect the pump to the fitting **21**
- ▶ push the whole content of the cartridge into the container **13**.

For indication of ordering number of grease cartridges, refer to subgroup "lubricants specifications".

- ❑ If the special filling pump **31** or the grease cartridges are not available:
- ▶ refill the container **13** through the grease fitting **22**, using a grease gun.

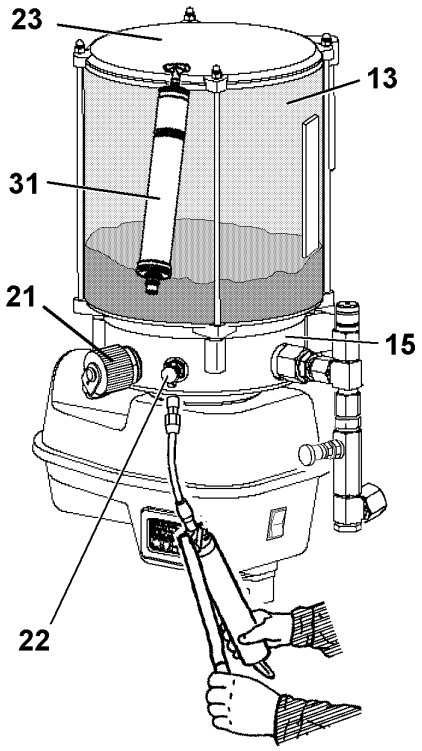


Fig. 5-97 *Refilling the grease container*

13 Grease container **15** Grease pump
21 Fitting for filling pump **22** Grease fitting

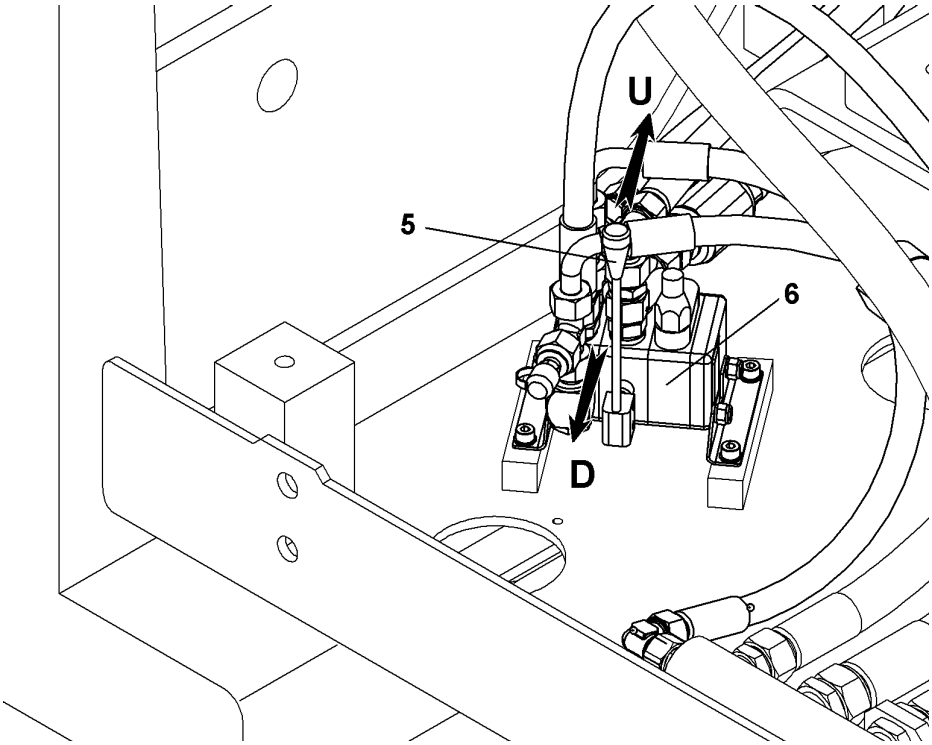


Fig. 5-109 *Control lever to let down and lift up the counterweight*

Removal of the counterweight

Caution!
Depending on the machine type, the model of the undercarriage and the carrying out of a possibly mounted additional counterweight, the counterweight assembly may run into the track chains if stroke down to the ground with the uppercarriage lenghtwise.

▶ Before removal, check if this applies or not.
If it does, the counterweight has to be removed either crosswise down to the ground level, or lenghtwise down to supports having adequate height.

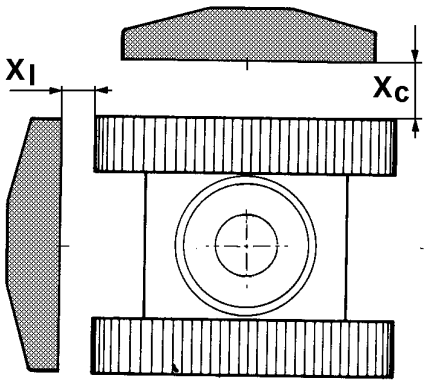


Fig. 5-110 *Notice the distance between counterweight and undercarriage*

▶ Check that the mounting pins **7** are mounted and fully engaged in their bores.

▶ Start the Diesel engine and bring it to low idle.