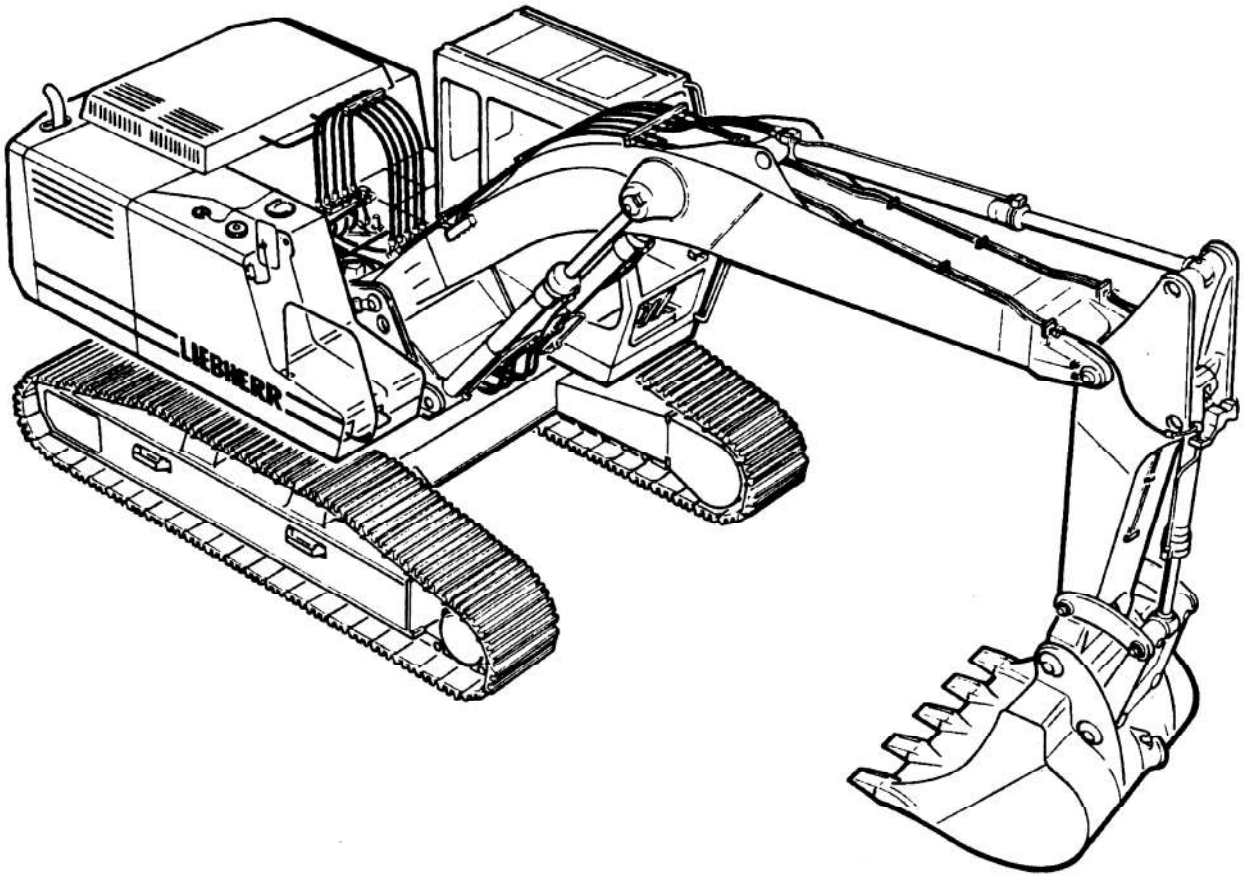
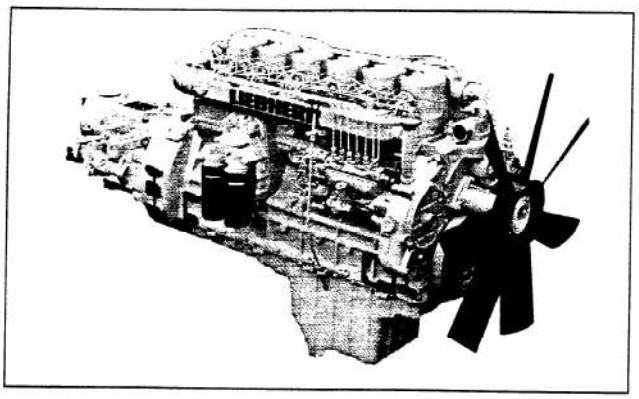
Operation and Maintenance Manual

R 942

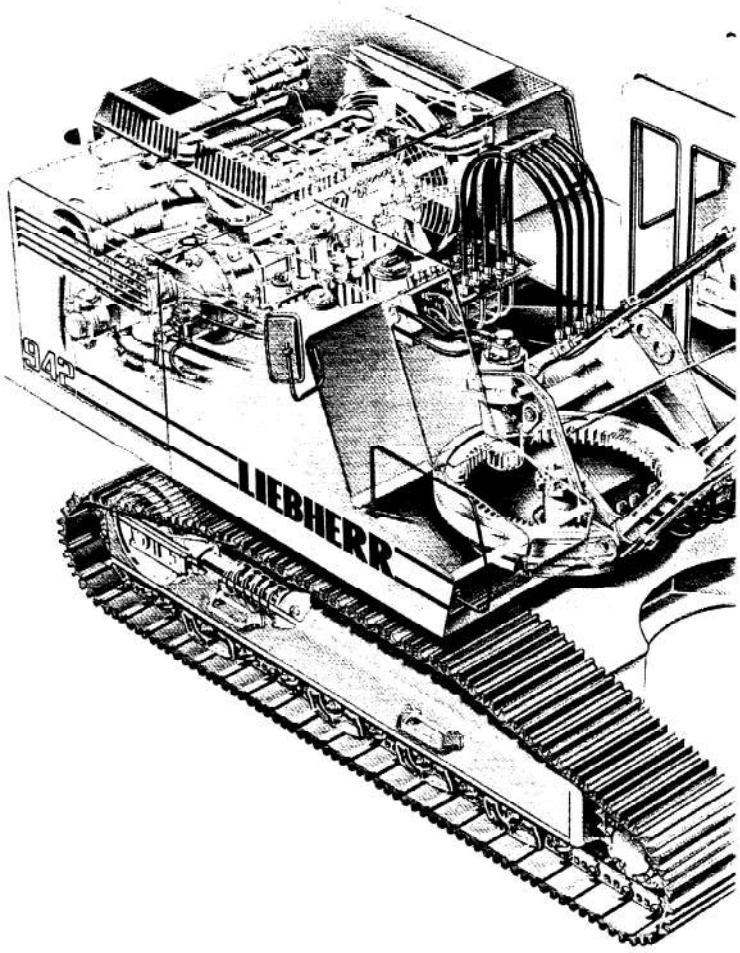
Litronic





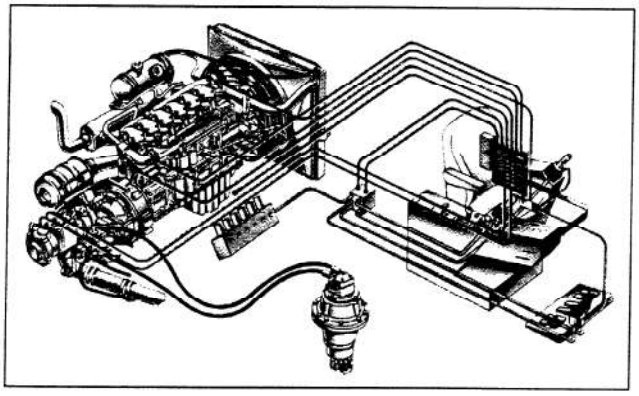
Diesel Engine

The heavy duty, liquid cooled, turbo-charged Liebherr diesel engine, specifically designed for construction machines, delivers superior power and long service life. Its low engine speed results in reduced fuel consumption, low emissions and extended reliability. Highly dependable and maintenance-free gear drive for cooling fan, water pump and auxiliary hydraulic pumps eliminates V-belts. All service points are located on one side of the engine for easy access and reduced maintenance effort.



Litronic System

The electronic engine-speed-sensing pump regulation allows full utilization of the engine's available output, independent from external influences. The Liebherr variable displacement axial piston double pump is fitted with an electro-hydraulic regulator which reacts in fractions of a second to the changing requirements of power or speed.
Flow compensation reduces pump flow to a minimum when joystick levers are in neutral, avoiding excess heat and energy loss. The same effect is achieved with pressure compensation which minimizes pump flow prior to reaching maximum operating pressure. An automatic oil flow optimizer assures efficient power distribution to each individual function.
The Liebherr ECO-control system allows the operator to preselect the machine's performance to match individual application requirements, resulting in significant fuel savings and reduced emissions.
The operator's comfort and efficiency is enhanced by the multicolored LCD display and monitoring system. It monitors all vital machine functions, includes automatic safety features and a diagnostic system.
The Litronic system offers extensive customer benefits, such as improved efficiency, reduced fuel consumption and overall economy.



Undercarriage

A variety of rugged undercarriages and the low overall machine center of gravity provide an exceptional stability in all job applications.
The compact final drives, each consists of a Liebherr axial piston motor and a Liebherr planetary reduction gear. The hydraulic lines are integrated within the track frame for maximum protection.

More Benefits Through Advanced Tech

Basic Machine Contents

	Id. No.
● Basic machine R 942 Litronic With HD-S undercarriage	0001099
● Triple grouser pads	
500 mm	9344997
600 mm	9344998
750 mm	9344999
● Basic machine R 942 Litronic with HD-SL undercarriage	0001100
● Triple grouser pads	
500 mm	9344997
600 mm	9344998
750 mm	9344999

Operating Weight and Ground Pressure

with gooseneck boom

R 942 HD-S

with 500 mm pads:	32430 kg – 0,75 kg/cm²
with 600 mm pads:	33250 kg – 0,63 kg/cm²
with 750 mm pads:	34470 kg – 0,51 kg/cm²

R 942 HD-SL

with 500 mm pads:	32630 kg – 0,75 kg/cm²
with 600 mm pads:	33450 kg – 0,63 kg/cm²
with 750 mm pads:	34670 kg – 0,51 kg/cm²

The operating weight includes the basic machine with 6,30 m gooseneck boom, 2,60 m stick and 1,60 m³ bucket.

with adjustable main boom

R 942 HD-S

with 500 mm pads:	33830 kg – 0,78 kg/cm²
with 600 mm pads:	34650 kg – 0,66 kg/cm²
with 750 mm pads:	35970 kg – 0,53 kg/cm²

R 942 HD-SL

with 500 mm pads:	34030 kg – 0,78 kg/cm²
with 600 mm pads:	34850 kg – 0,66 kg/cm²
with 750 mm pads:	36070 kg – 0,53 kg/cm²

The operating weight includes basic machine with adjustable main boom, 2,60 m stick and 1,60 m³ bucket.

with two piece boom

R 942 HD-S

with 500 mm pads:	32830 kg – 0,76 kg/cm²
with 600 mm pads:	33650 kg – 0,64 kg/cm²
with 750 mm pads:	34870 kg – 0,52 kg/cm²

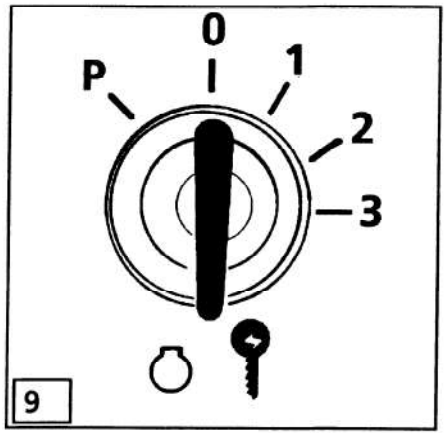
R 942 HD-SL

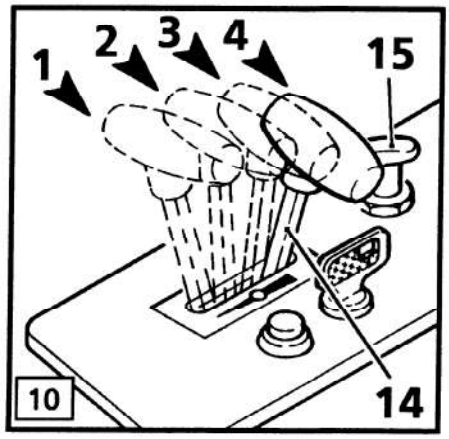
with 500 mm pads:	33030 kg – 0,76 kg/cm²
with 600 mm pads:	33850 kg – 0,64 kg/cm²
with 750 mm pads:	35070 kg – 0,52 kg/cm²

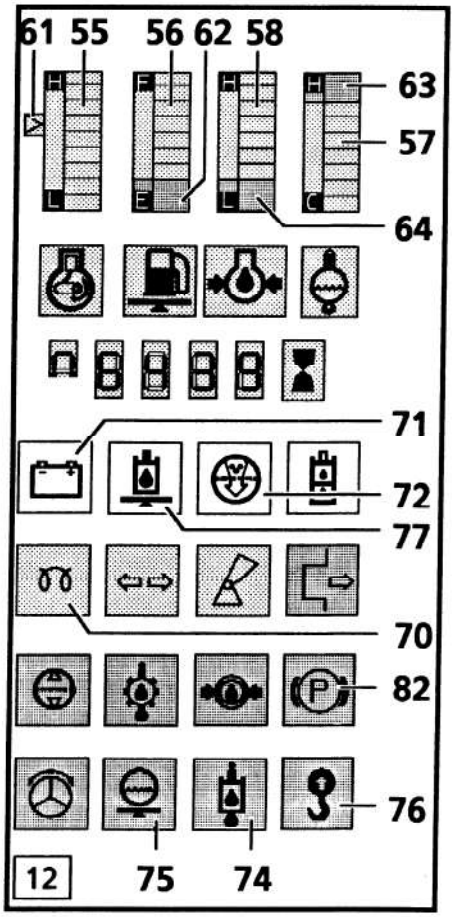
The operating weight includes basic machine with two piece boom, 2,60 m stick and bucket 1,60 m³.

Contents Basic Machine and Operating Weight

- Never work underneath the machine if it is raised or propped up with the attachment. The undercarriage must be supported with wooden blocks and supports.
- Always support the raised machine in such a way that any shifting to the weight change will not influence the stability. Do not support the machine with metal on metal support.
- Only qualified, especially trained personnel may work on travel gear, brake and steering systems.
- If it becomes necessary that the machine must be repaired on a grade, block the chains with wedges and secure the uppercarriage to the undercarriage with the lock pin.
- Only qualified, especially trained personnel may work on the hydraulic system.
- Never check for leaks with your bare hands, always wear gloves. Fluid escaping from a small hole can have enough force to penetrate the skin.
- Never loosen or remove lines or fittings before the attachment has been lowered to the ground and the engine has been turned off. Then turn the ignition key to contact position, move all servo controls (joysticks and foot pedals) in both direction to release pressures. Then release the tank pressure as outlined in this Operation and Maintenance Manual.
- Check all lines, hoses and screw connections regularly for leaks and externally visible damage. Fix any damage immediately. Oil escaping from fittings etc. can cause serious injury and fires .
- Before any repairs, always relieve pressures before opening up any system sections and pressure lines (hydraulic lines and air pressure lines).
- Always route and install hydraulic and air pressure lines properly. Do not interchange the connections. The length and quality of hoses must match specifications and requirements.
- Change all hydraulic hoses in specified or appropriate time intervals, even though no damage or defects are visible.
- Always disconnect the battery cable before working on the electrical system or before any arc welding on the machine. Always disconnect the negative (-) cable first and reconnect it last.
- Check the electrical system regularly.
  Make sure that any problems, such as loose connections, burnt out fuses and bulbs, scorched or chafed cables are fixed immediately by an electrician or qualified personnel.
- Use only Original fuses with the specified amperage. Never use a different size or stronger fuse than the original fuse.
- On machines with electrical medium or high voltage systems:
  - If there is any problem with the electrical energy supply, turn the machine off immediately.
  - Any work on the electrical system may only be performed by a qualified electrician or qualified personnel under the guidance and supervision of an electrician, according to electro - technical regulations.
- If any work is required on any parts which carry current, use a second person to turn off the main battery switch, if necessary. Rope the work area off with a red and white safety rope or chain, and set up warning signs. Use only insulated tools.
- When working on medium and high voltage components, shut off the voltage and connect the supply cable to the ground and ground the components, such as the condensor, with a grounding rod.
- Check all disconnected parts if they are truly free of current, ground them and close them off quickly. Insulate any close-by, current carrying parts.







DIESEL ENGINE OPERATION

IGNITION KEY POSITIONS (Fig. 9).

-0- Off
-1- Contact position
-2- Preheat (must be hold in position)
-3- Start

ENGINE SPEED CONTROL LEVER (THROTTLE CONTROL LEVER) POSITION :

The throttle control lever (Fig. 10, pos. 14) makes it possible to adjust the engine speed with an additional Eco speed position.

Pos. 1 : Idle
Pos. 2 : Start position
Pos. 3 : Eco speed control
Pos. 4 : High range

When the lever is moved to Pos. 3, it automatically shifts to ECO speed control.
The engine runs at somewhat reduced speed and output at utmost fuel efficiency.
The arrow (Fig. 12, pos. 61) on the indicator light lights up.

TO ENERGIZE THE ELECTRICAL SYSTEM

Turn the key to pos. 1 .
Check the function of the indicator lights (Fig. 12).

Make sure that all indicator lights and gauges work, this means indicator lights 61 and 70 to 82 should light up about 3 seconds and at the same time, indicators 55 to 58 should actuate.

STARTING THE ENGINE AT AMBIENT TEMPERATURES TO -12° C (10° F)

If the engine and the batteries are in good condition, the engine can be started without the flame glow plug. Bring the throttle control lever 14 to starting position (Fig. 10, pos.2).

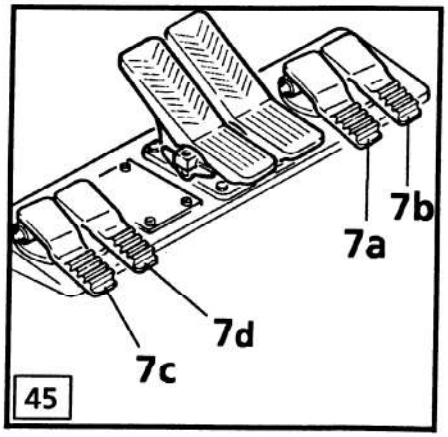
Do not crank the engine for more than 10 seconds!

If the engine does not start, repeat the starting procedure at one minute intervals to allow the starter motor to cool off.

STARTING THE ENGINE WITH FLAME GLOW PLUG AT AMBIENT TEMPERATURES BELOW -12° C (10° F)

Starting the engine with the flame glow plug improves starting the engine at low temperatures.

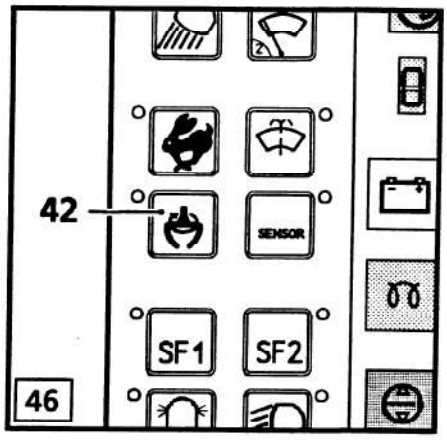
Bring the throttle control lever 14 to start position 2 (Fig. 10).



CONTROL OF HYDRAULIC HAMMER
(optional equipment)

The hydraulic hammer is actuated via the pedal either 7c or 7d of the left pilot control (fig. 45).

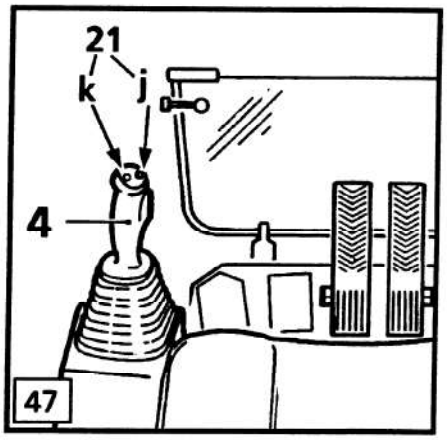
Notice :
Before using an hydraulic hammer, the three way valve 8 (fig. 52) must be turned to position B and the key switch 93 on the rear control desk must be switched to the position "hammer".
After removing the hydraulic hammer and before using the cylinder of the special equipment, turn the three way valve 8 to position A and the key switch 93 to position "cylinder".



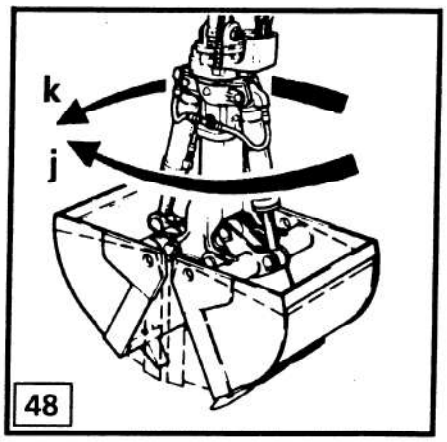
CONTROL OF A ROTATING GRAPPLE
(optional equipment)

The hydraulically rotating grapple is controlled via a solenoid valve using a separate hydraulic circuit.

To actuate this added attachment, switch 42 is used.



The grapple rotation is controlled via the both push buttons 21 in the left joystick handle 4. *



If the right button 21J is pushed, the grapple will rotate clockwise.

If the left button 21K is pushed, the grapple turns counterclockwise.

The grapple rotates until the buttons are released.

INSTALLATION AND REMOVAL
OF
GRAPPLE TO STICK

INSTALLATION

Before installation of a two shell or multi shell grapple, make sure that all necessary hydraulic lines are installed on the stick.

If necessary, remove the bucket as described on page 4.22.

Retract the bucket cylinder all the way and turn the engine off.

Push the bracket carrier 8 between connector bracket 7 and push in right lever 9, secure with cotter pin 10.

Position the grapple with shells open. Start the engine and move the attachment until the lower bore holes of the stick fits between the bore holes of the grapple suspension.

Insert pin 4 and secure with plate 6.

⚠ DANGER

If another person is used as a guide during this installation procedure, the operator must follow the signals given by this person.

Connect the hydraulic hoses 11 and 12 for the shell cylinder to the hydraulic lines of the bucket cylinder circuit.

For grapple with hydraulic rotator, hoses 13 and 14 must be connected to the hydraulic lines for added functions on the stick.

Grapple operation:

Move the shut off lever on block 15 to position A to cut off the oil flow to the piston bottom side of the bucket cylinder.

Lubricate the different lube points on pin 4 and on the grapple mechanism.

Perform all attachment functions several times without load (open and close bucket, turn the grapple in both directions) to release air from the hydraulic system.

REMOVAL

Position the grapple with shells open on flat ground surface.

Turn the engine off, turn the ignition key to contact position, move the right joystick (for tilt cylinder) to the left and right and release pressure in the hydraulic tank.

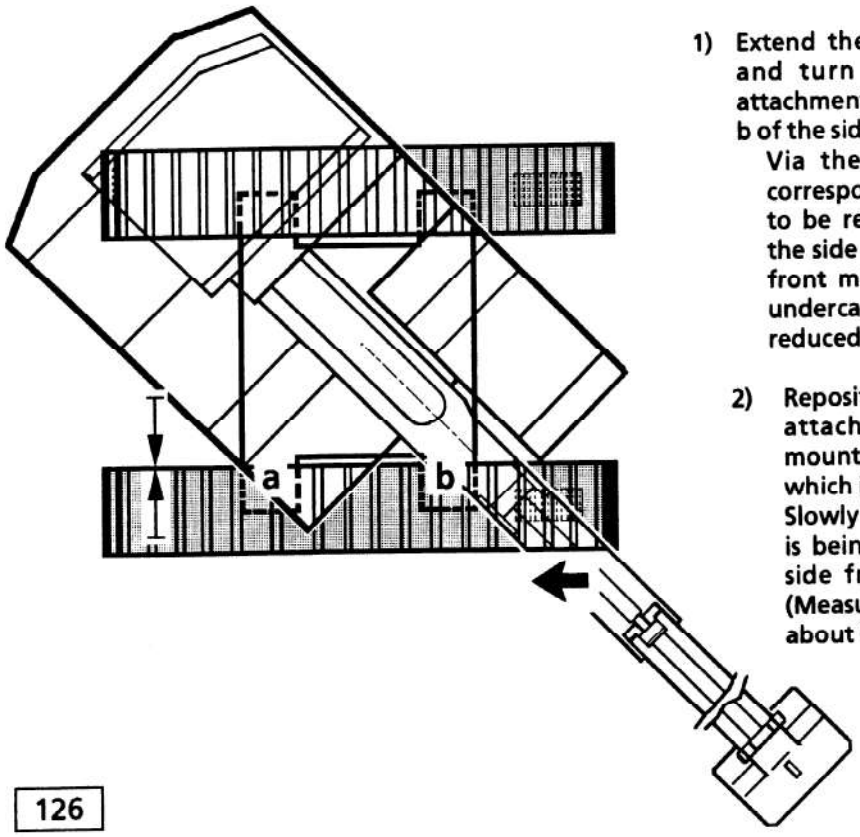
For grapple with hydraulic rotator, push also both buttons on the joystick to relieve the pressure in the swing circuit.

Disconnect two hoses 11 and 12, and if present, two hoses 13 and 14 from hydraulic lines on stick, and immediately close off open lines to prevent contamination.

Support the grapple and carefully drive out the pin. If necessary, start the engine and lift the attachment slightly.

To put the bucket cylinder back in operation, move the shut off lever in block 15 again to position B.

MOVING ONE OF THE SIDE FRAMES IN (Fig. 124, 126 and 128)



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1) Extend the attachment near ground level and turn the uppercarriage until the attachment is above the rear mounting point b of the side frame, which is to be moved in.
   Via the manual control lever on the corresponding travel pedal, run the chain to be retracted slowly to the front, until the side frame is about 3 to 4 cm from the front mounting point in direction of the undercarriage, (measurement Xa is being reduced by about 3 to 4 cm).

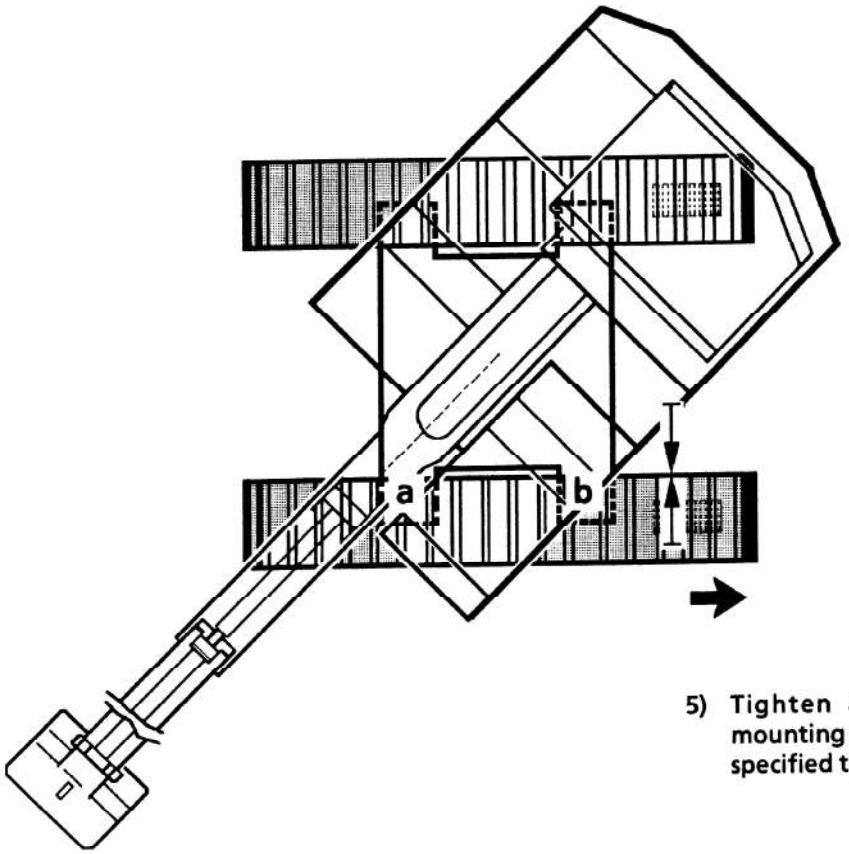
2) Reposition the uppercarriage so that the attachment is now above the front mounting point "a" of the side frame, which is to be retracted.
   Slowly move the chain on the side which is being retracted to the rear, until the side frame moves in about 6 to 8 cm (Measurement Xb is being reduced by about 6 to 8 cm).

3) Move the side frame as described in paragraph 1) and 2) alternately on the front and rear mounting point by about 6 to 8 cm each, until it is positioned on both sides inside on the stop.

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 .

4) 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.

5) Tighten all mounting screws (13 per mounting point in retracted position) to the specified tightening torque.



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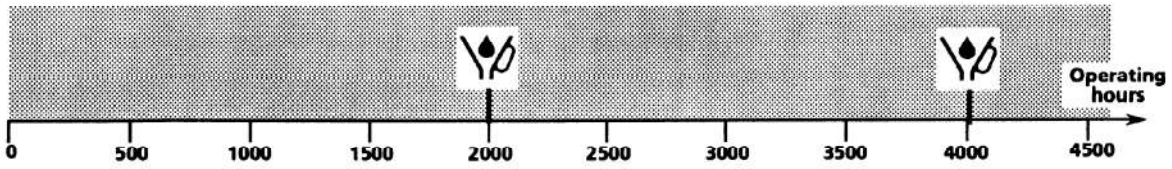
Hydraulic oil change intervals

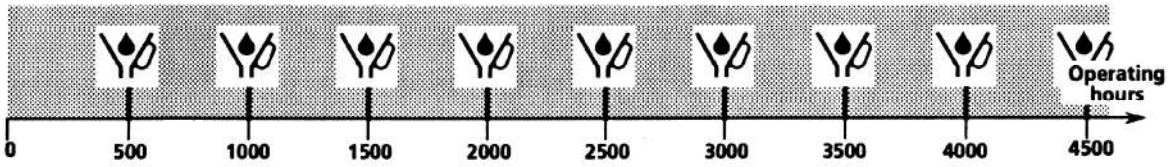
1. Oil changes in preset intervals

Note: **Oil changes in preset intervals are only permitted for mineral oils. When using environmentally friendly hydraulic fluids, oil sample analysis reports must be used to determine the time of the oil change, see §2.**

a) In standard applications



b) In dust intensive applications

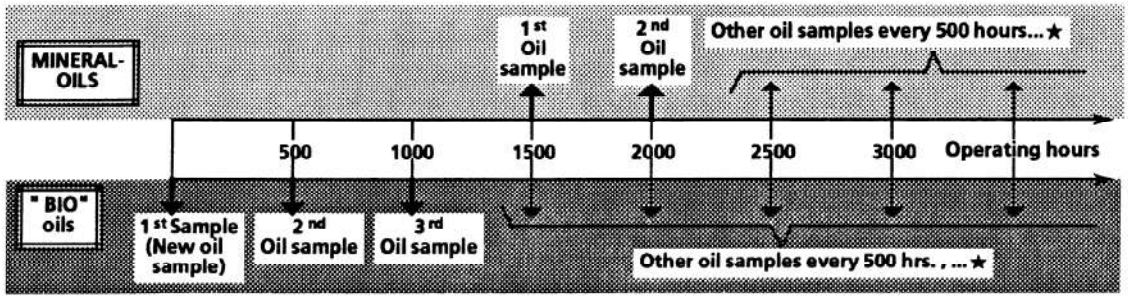


2. Optimized oil change intervals determined through oil sample analysis reports

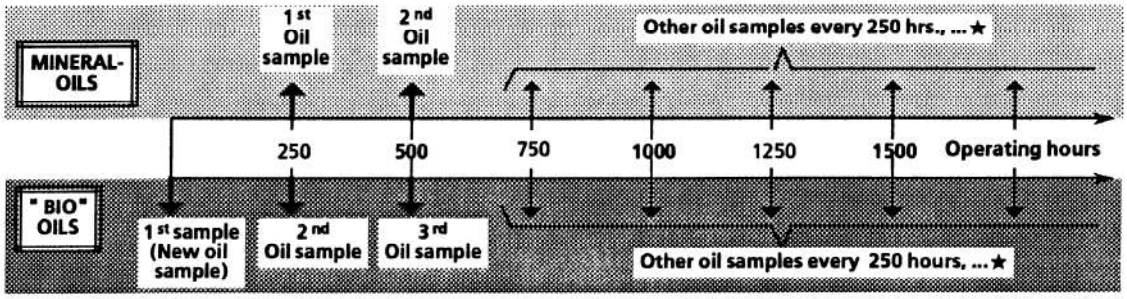
Use this procedure to take oil samples in preset intervals. The intervals may be extended between two oil changes as long as the properties of the oil are still satisfactory.
The time when the oil must be changed is determined by the lab report.

LIEBHERR recommends to submit the oil samples to "WEAR - CHECK" for oil analysis.
A kit for 6 complete analysis at WEAR - CHECK is available : Id. No. 7018368 (The kit contains the sample containers, documentation, shipping container and oil sample hose).
A hand pump is required to take the oil sample, and should be ordered separately (Id. No. 8145666).

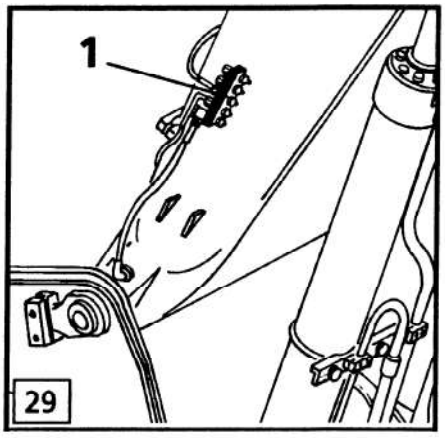
a) In standard applications

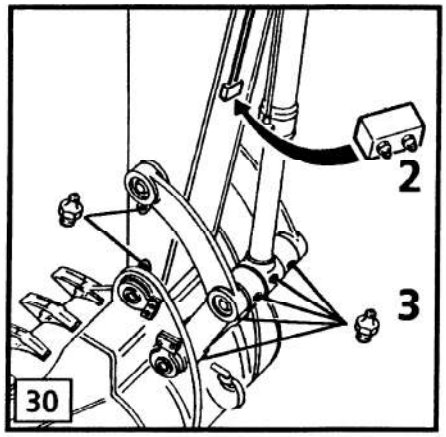


b) In dust intensive applications



★ . . .time for oil change determined by lab report





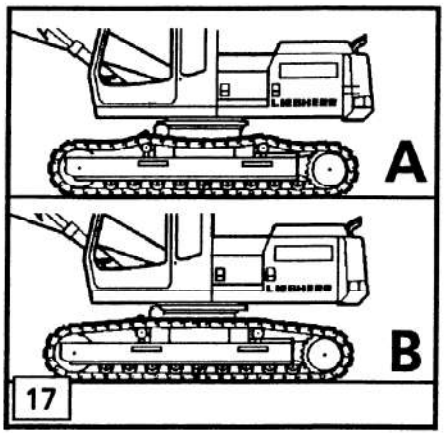
LUBRICATION OF ATTACHMENT BEARING POINTS

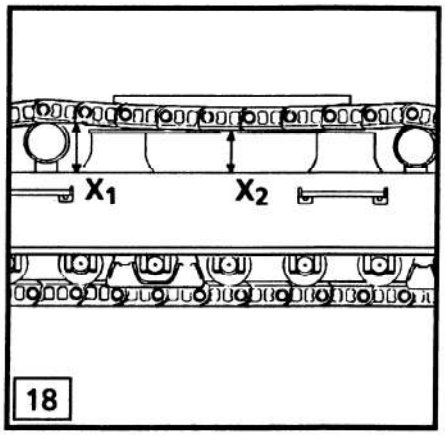
The boom and stick bearing points are either combined into easily accessible plates on the bottom of the boom and stick (Fig. 29, pos. 1 and fig. 30, pos. 2), or, if accessible from the ground level, greased directly via a lubrication fitting (fig. 27, pos. 3).
On the bucket, the different grease fittings are installed separately (fig. 30, pos. 3).

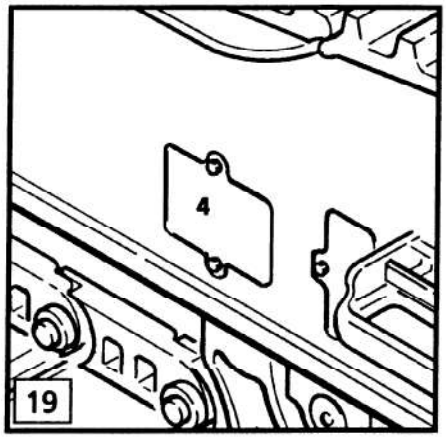
To lubricate the attachment, add grease on every grease fitting, until clean grease runs out of the corresponding bearing point.

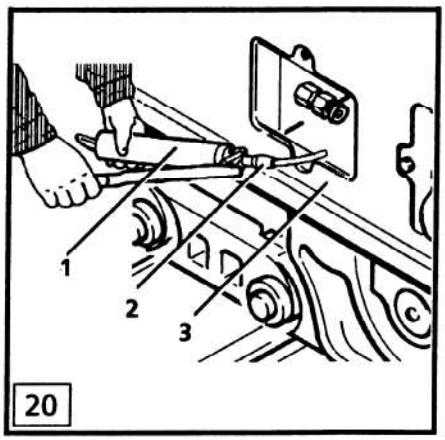
Under normal working conditions, perform a complete lubrication of the attachment weekly.
If the machine is used under hard conditions (working under water, in very abrasive material, ...) or in multi shift service, lubricate more often (up to once a day or once a working shift).

See the lubricant chart for grease specification.









THE TRACK COMPONENTS

The tracks are maintenance free until the track pads or flanges need to be reconditioned or replaced.
The lifetime seals in carrier rollers, track rollers and idlers increase the life expectancy of the tracks and protect from dirt and contamination .

However, even though the track is virtually maintenance free, the following points do need to be checked.

TIGHTENING THE TRACK TENSION

Fig. 17 A shows a track, that is not tightened properly, Fig. 17 B shows a track that is tightened properly.

The track tension needs to be checked regularly due to normal wear of the tracks, and tightened, if necessary.

The track chain tension is correct when the slack between both carrier rollers is 0.6" to 0.8" (15 to 20 mm).

To check the chain slack (fig. 18) :

- measure X_1, distance between running surface of carrier roller and top of sideframe
- measure X_2, distance between chain link and top of sideframe
- calculate chain slack = $X_1 - X_2$.

To tighten a track :

Remove the access cover (Fig. 19, pos. 4) on the side frame of the undercarriage.

Attach a special fitting 2 to grease gun 1 (Fig. 20).
Connect the grease gun to cylinder 3.

Pump grease into cylinder 3 until the track chain is properly tensioned.

To release track tension, carefully release some grease from the grease cylinder by loosening and turning the grease fitting counterclockwise.

⚠ DANGER

When adjusting the chain tension, keep your head clear of the access hole. The grease cylinder is under high pressure and the chain will sag.
Grease is under high pressure and might squirt out.