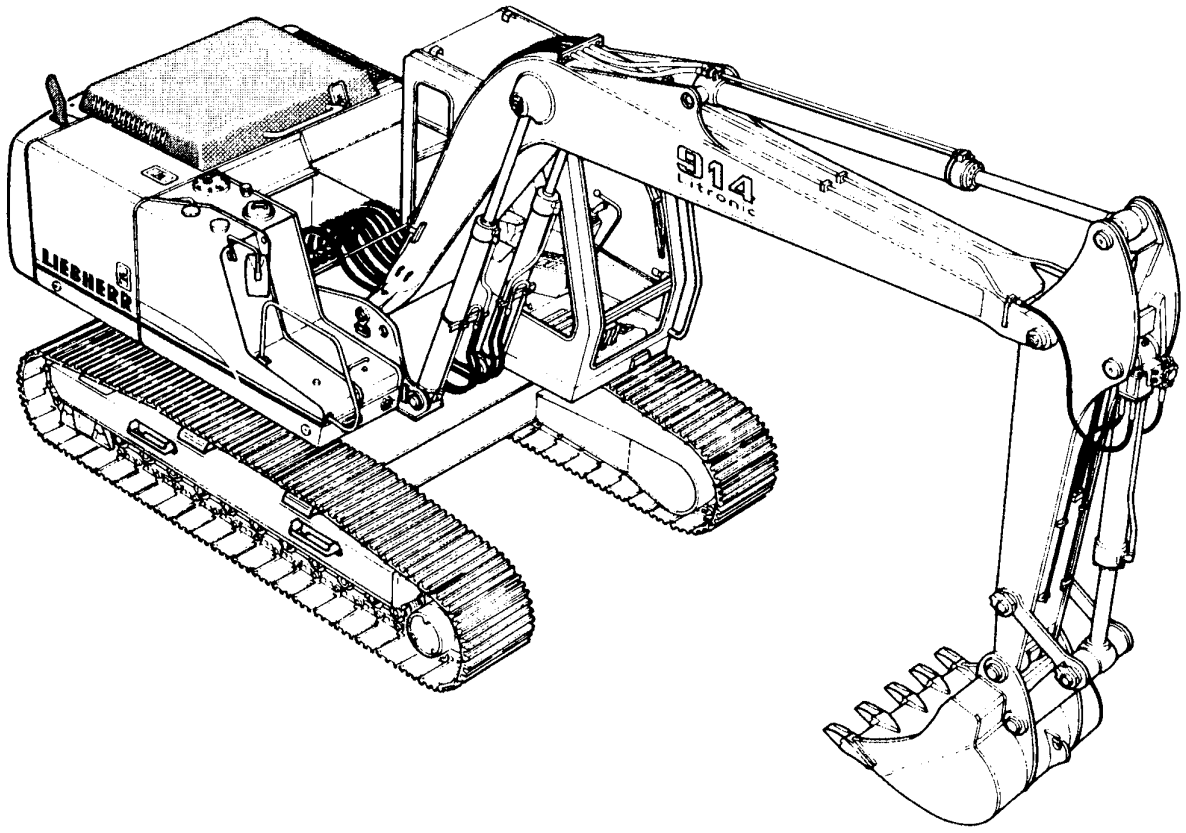
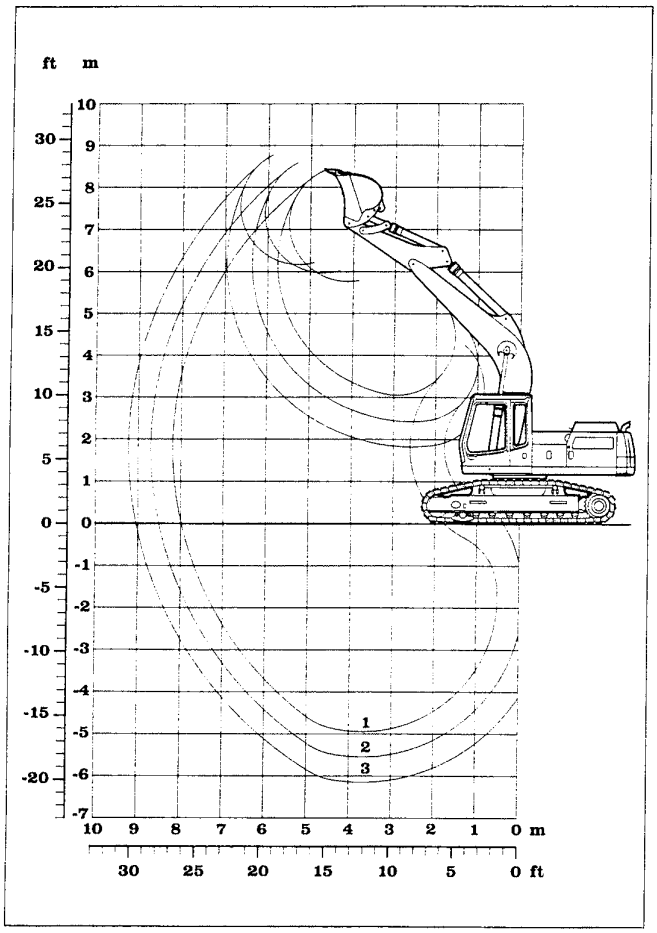
Operation and Maintenance Manual

R 914

Litronic





Digging envelope

1 with stick 1,80 m
2 with stick 2,40 m
3 with stick 3,00 m

Stick length	m	1,80	2,40	3,00
Max. digging depth	m	4,95	5,55	6,15
Max. reach at ground level	m	8,00	8,50	9,05
Max. dump height	m	5,75	6,00	6,20
Max. teeth height	m	8,40	8,60	8,80
Digging force	kN/t	147/15,0	115/11,7	99/10,1
Breakout force	kN/t	159/16,2	147/15,0	147/15,0
Max. breakout force	kN/t			186/19[2]

Operating Weight and Ground Pressure

Operating weight includes basic machine with 5,00 m gooseneck boom, 2,40 m stick and 1,00 m³ bucket.

Undercarriage		Std			HD-S	
Pad width	mm	500	600	750	500	600
Weight	kg	21000	21300	21600	21700	22050
Ground pressure	kg/cm²	0,58	0,49	0,42	0,59	0,60

Buckets

Cutting width		mm	370[1]	440[1]	490[1]	550	620[2]	650	850	1050	1250	1400	1400
Capacity ISO 7451		m³	0,30	0,35	0,40	0,35	0,30	0,40	0,60	0,80	1,00	1,20	1,40
Max. possible material weight	Std	t/m³	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,2
	HD-S	t/m³	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,2
Weight with Liebherr teeth Z 13[3]		kg	–	–	–	500	–	545	640	710	800	860	880
Weight with Liebherr teeth Z 16[4]		kg	–	–	–	560	850	605	730	830	930	990	–
Weight with Bofors teeth		kg	370	390	410	–	–	–	–	–	–	–	–
			Max. stick length for machine stability per ISO 10567:										
Std undercarriage			3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	2,40	2,40
HD-S undercarriage			3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	2,40	2,40

1) Bucket with ejector and Bofors teeth
2) Ripper bucket with teeth size Z 16 P
3) Bucket with Liebherr teeth Z 13 (for applications up to surface class 5, heavy soils)
4) Bucket with Liebherr teeth Z 16 (for applications over surface class 6, easy diggable material)

Note
When digging in highly abrasive materials, buckets must be protected by appropriate wear material.
Optional side cutters with teeth 13 or 16 increase cutting width by approx. 120 mm.

- Weld-on set of adapters
- Set of bolt-on side cutters

Backhoe Attachment with Gooseneck Boom 5,00 m

GENERAL SAFETY INFORMATION

- Study the **Operation and Maintenance Manual** before operating or working on the excavator.

  Make sure that you have additional information for special attachments of your machine, read it and understand it!

- Allow only authorized personnel informed about the safety rules to operate, service or repair the excavator. Make sure to observe any minimum applicable age requirement.

- Allow only properly trained personnel to operate or work on the excavator, make sure to clearly specify the person who is responsible for set up, maintenance and repairs.

- Make sure the operator knows his responsibility regarding the observance of traffic regulations and permit him to refuse any unsafe instructions given by a third person.

- Any persons still in training should only operate or work on the machine under the supervision and guidance of an experienced person.

- Check and observe any person working or operating the excavator periodically and regularly, if they observe safety instructions and guidelines given in the Operation and Maintenance Manual.

- Wear proper work clothing when operating or working on the excavator. Rings, watches, bracelets and loose clothing such as ties, scarves, unbuttoned or unzipped shirts and jackets are dangerous and could cause injury!
  Wear proper safety equipment, such as safety glasses, safety shoes, hard hats, work gloves, reflector vests and ear protection.

- Consult your employer or supervisor for specific safety equipment requirements and safety regulations on the job site.

- Always tilt up the safety lever before leaving the operator's seat.

- Do not carry tools, replacement parts or other supplies while climbing on or off the excavator. Never use the steering column, control levers or joysticks as handholds.

- Never jump off the excavator, climb on and off the excavator using only the steps, rails and handles provided.
  When climbing on or off the excavator, use both hands for support and face the machine.

- If needed, use the front window as an escape hatch.

- If no other guidelines are given, perform maintenance and repairs utilizing the following precautions :

  - Park excavator on firm and level ground. Rest the attachment on the ground.
  - Place all control in neutral position and raise the safety lever.
  - Turn the engine off and remove the ignition key.

- Before working on the hydraulic circuit, move all joysticks and pedals with the ignition key in contact position to relieve the servo pressure and the remaining pressures in the different main circuits. In addition, relieve the pressure in the hydraulic tank as described in the Operation and Maintenance Manual.

- Secure all loose parts on the excavator.

- Never operate the excavator without a complete walk around inspection. Check if all warning decals are on the machine and if they are all legible.

- Observe all danger and safety guidelines.

- For certain special applications, the excavator must be equipped with specific safety equipment. Use the excavator only, if they are installed and functioning properly.

- Never perform any changes, additions or modifications on the machine, which could influence the safety, without obtaining the written permission from the manufacturer. This also applies to the installation and adjustment of safety devices and safety valves as well as to any welding on load carrying parts.

- Do not install any equipment or attachments made by other manufacturers or any which are not specifically authorized by LIEBHERR for installation without first obtaining the written permission from LIEBHERR.
  LIEBHERR will issue any required technical documentation for approved installations.

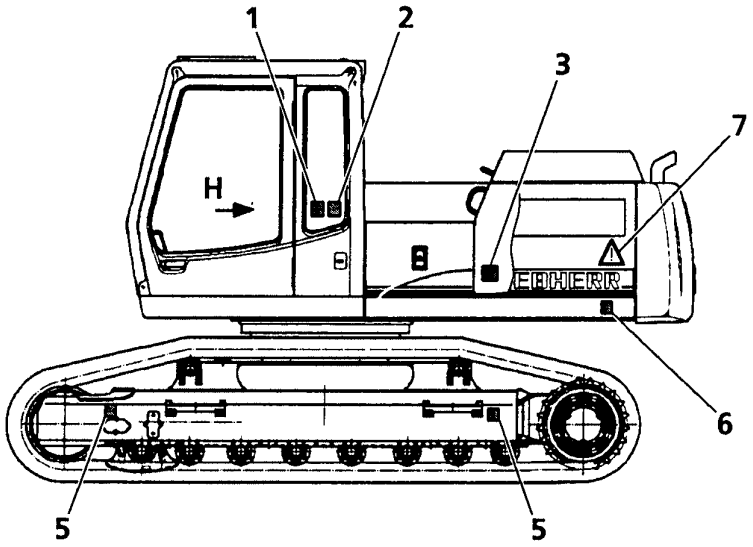
- Should the electrical circuit be modified or additional components be installed, so the modification must be performed according to the national standards and safety regulations (such as OSHA per the USA).
  The installation must be certificated by an approved organization and a copy of the certification has to be sent to the LIEBHERR company.

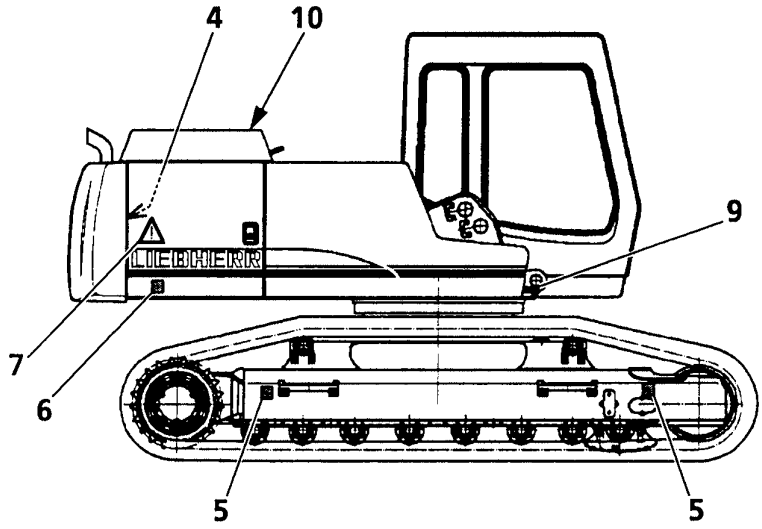
SIGNS ON THE HYDRAULIC EXCAVATOR

Your hydraulic excavator has several kinds of signs.

- Warning Signs: Warnings on accident risks with potentially serious or fatal injuries.
- Notices: Indicate specific points of control, maintenance and properties of the excavator.
- Identification Tags

Contents and location are described hereafter.
Order numbers are contained in the spare parts list





1 Notice Sound Pressure Level L_{pA}
2 Notice Sound Power Level L_{WA}
3 Notice External Start
4 Lubrication Chart Diesel Engine
5 Notice Latch Points
6 Notice Lifting Stop Points
7 Warning Sign Danger Zone
9 Identification and Registration Number Tag
10 Prohibition Sign

Push button S354 - Adaptation of control to precision works

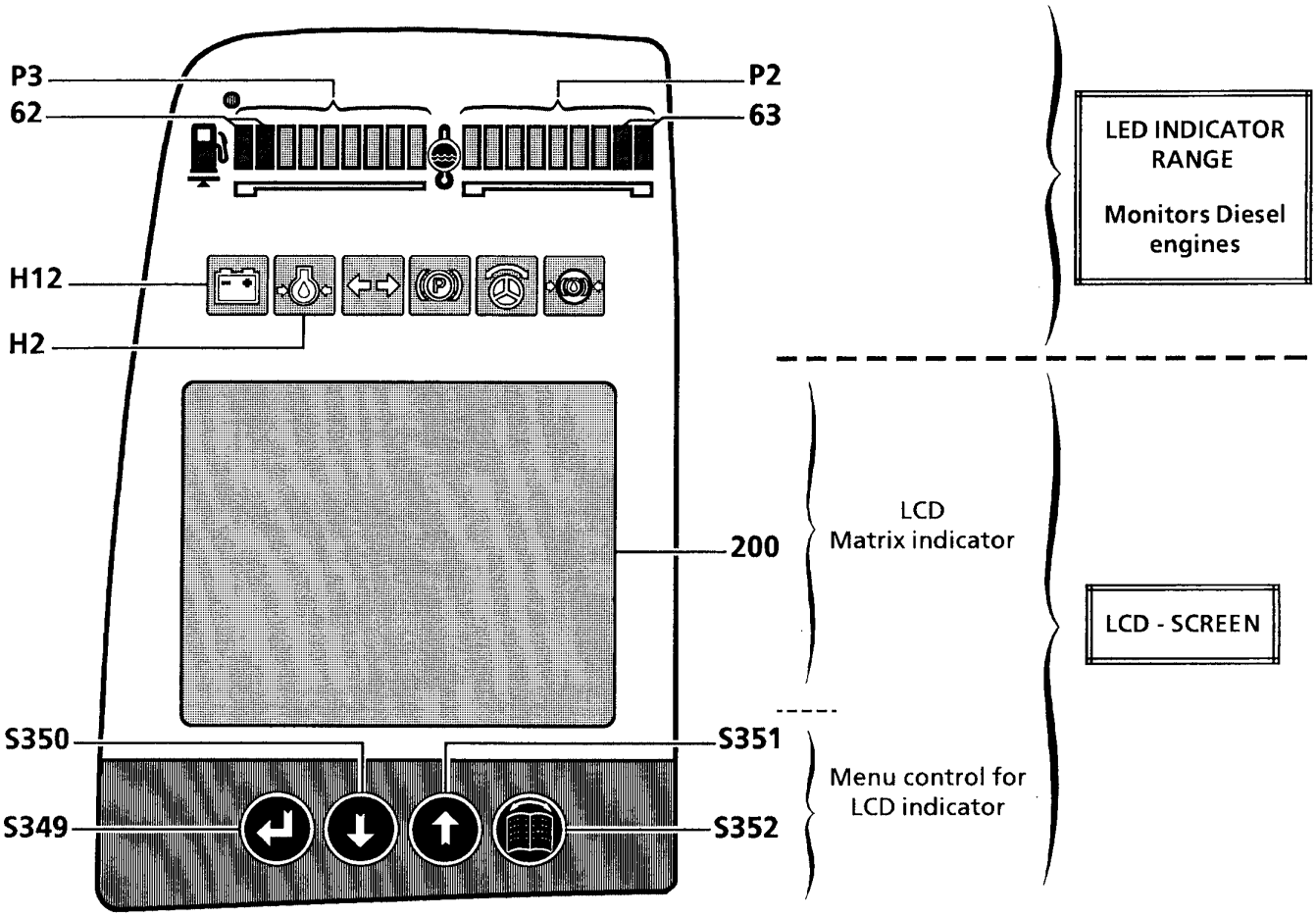
Turn this button on if you want to adapt the operation speed of the machine to precision works.
The maximum oil flow of the working pumps is then depending on the actuated movements. The corresponding limitation value can be adjusted using the menu "SF" of the LCD screen (see description further on).

When operating a landscaping attachment (grading of slopes) the button S354 must be turned on to limit the attachment speed, since the full pump flow would be too important for the cylinders of this attachment.
For landscaping attachment the limitation value adjusted on the display via menu SF must be in the lower quarter of the adjustment range

LED indicator P4 for engine RPM

Via this indicator, the engine RPM is displayed.
The complete RPM range is divided into 10 stages.

MONITORING DISPLAY



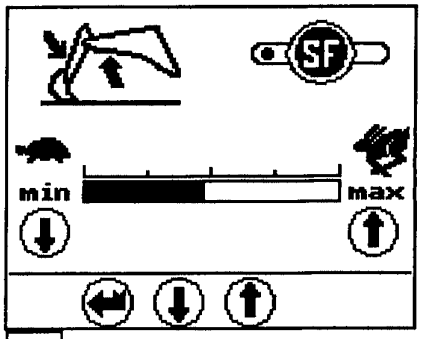
LED INDICATOR RANGE

Fuel gauge P3

The LED indicator lights show the fuel level. When the both red LED 62 light up, about 10% to 20% fuel are left in the tank as reserves.

Engine coolant temperature gauge P2

During operation, the indication must remain in the green range.
If the engine coolant overheats (coolant is above 98°C = 204°F), the red LED indicator light 63 starts to light up on the right end of the indicator. Simultaneously, the buzzer will sound in the cab and the warning signal E503 will appear on the LCD screen.
Stop working soon and keep the engine running at high idle.
If the default persists for over 60 seconds, lower the engine RPM to low idle and turn the engine off after 3 -5 minutes.
Locate the reason for the trouble and get it repaired.



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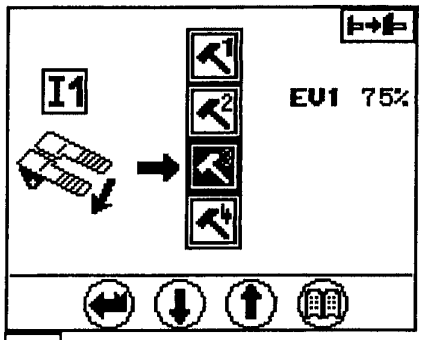
MENU (SF) ("set SF")

ADJUSTMENT OF FLOW ADAPTATION BY KEY SF

This function allows to set the control speed of the excavator attachment (or of special attachment) to a defined value.

The adjustment is performed using the key "UP" and "DOWN".

The limitation value adjusted in this menu is activated and deactivated via the push button S354 (key SF).



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MENU 1 2 3 4 ("set option")

ALLOCATION OF FLOW LIMIT OPTIONS TO EXTERNAL INPUTS (Special attachment input; as an example when operating a hammer pedal)

In this menu , pre-defined flow limitations (options) are allocated to the hardware input I1.

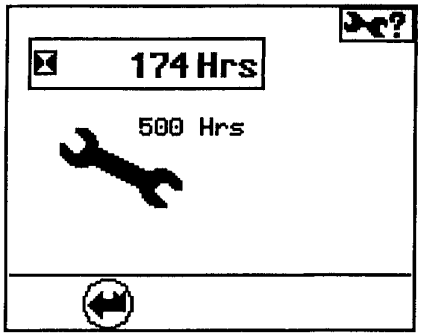
The arrow near the symbol gives the actual allocation.

In example fig. 62, the option 3 is active for the input I1, this means, if the external hardware input I1 is activated, then the nominal pump values allocated in option 3 for the excavator control are given as maximum nominal values.

If another option must be allocated to input I1 (as an example due to a modification of the working attachment), so first select another attachment in the vertical symbol range via the key "UP" or "DOWN".

Confirm the selected option by pressing the "MENU" key, the new option must then appear in the column.

The right part of the screen provides indication for the currently set pump values corresponding to the option shown in the selection window.



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MENU (wrench)? ("set service")

INFORMATION AND CONFIRMATION OF SERVICE INTERVAL

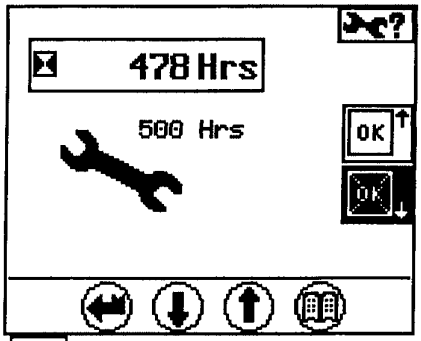
This screen is an information screen and can be used to confirm a completed service interval.

The screen shows the operating hour for the next service interval (in example fig. 63 = "500 hrs") and the current operating hours ("174 hrs").

An upcoming service interval can be confirmed within max. 50 operating hours before the next service interval (fig. 64).

When this time frame is reached, the screen will display a question regarding completion of the service works for this interval.

If the question is answered with "~~OK~~" then this menu will be discontinued.
If it is answered with "OK", then the current operating hour will be stored as the last confirmed service interval.



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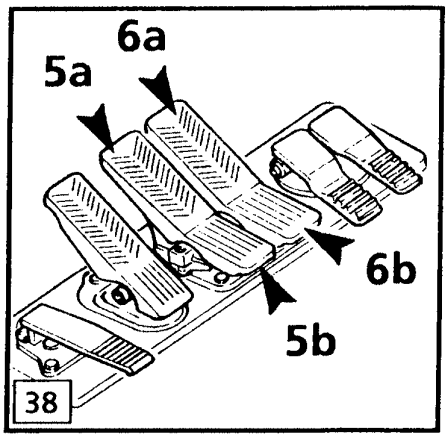
TRAVEL FUNCTIONS

When traveling, align the uppercarriage up with the undercarriage (idlers in front, sprocket wheels in the rear).



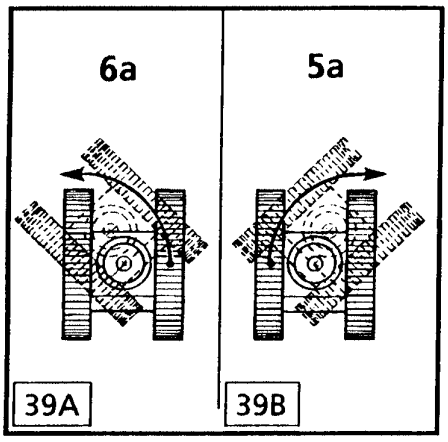
STRAIGHT TRAVEL

- **Travel forward :**
Push both foot pedals equally forward with your toes (Fig. 38, pos. 5a and 6a).

- **Travel reverse :**
Push both foot pedals equally downward with your heels (Fig. 38, pos. 5b and 6b).

⚠ DANGER

Before you travel in reverse make sure , it is clear and nobody is in your way!



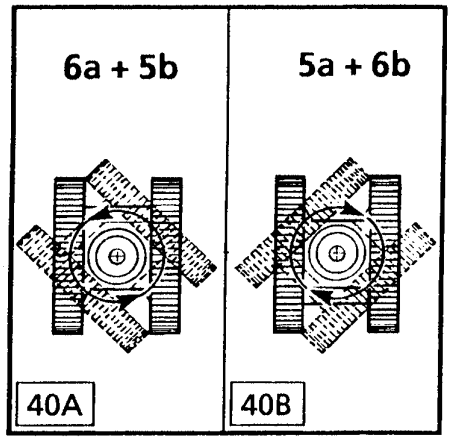
TO TURN OVER ONE TRACK

- **To turn left forward** (Fig. 39 A) :
Push the right foot pedal forward (pos. 6a).

- **To turn right forward** (Fig. 39 B) :
Push the left foot pedal forward (pos. 5a)

⚠ CAUTION

To protect the track components, reverse turns should be avoided.



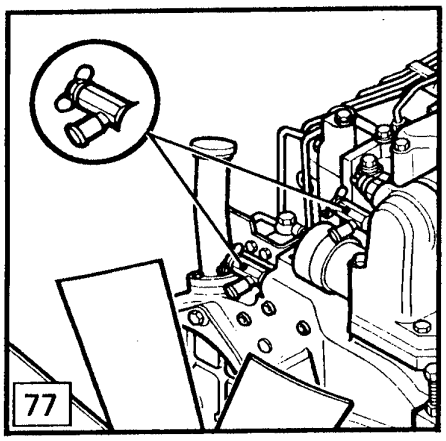
COUNTER ROTATION (Fig. 38)

- **To turn left** (Fig. 40A) :
Push the right pedal forward (pos. 6a) and at the same time push the left pedal down with your heel (pos. 5b).

- **To turn right** (Fig. 40 B) :
Push the right pedal down with your heel (pos. 6b) and at the same time push the left pedal forward (pos. 5a).

⚠ DANGER

If the uppercarriage us turned by 180°, note that the direction of travel is reversed when you push the pedals!



IMPORTANT REMARKS

The air flow through the heater and air conditioner unit is controlled by adjustable and swivelling louvers.

To reach a maximal feeling of comfort we recommend to blow the air:

- out of the louvers 3 in the feet area and 2 at the front windshield when heating,
- out off the louvers 1 in the air duct in the rear cab corners and through the louvers 2 during air conditioner operation,

.... so to always meet the rule "cooling off the head and warming up the feet".

The best heating, resp. cooling effect is reached by recirculating air, this means when the switch S92 in "0" position.

In case of very high outside temperature, preferably close the louver 2, so to avoid an unnecessary warming up of the inside air along the windshield.

Preferably close the warm water shut off valves (fig. 77) on the Diesel engine if the heater is not used for a longer period (sommer time, ...).

We recommend from time to time to check if heater and air conditioner are not simulaneously on.

Every second week and regardless of the season, turn the thermostat S95 to start the compressor of the air conditioner for about 10 minutes.

GUIDELINES FOR HYDRAULIC EXCAVATORS
- WHEN THEY ARE USED FOR LIFTING LOADS SUCH AS PIPES, GIRDERS, ETC. .

GENERAL

On April 1, 1976, the German trade unions for below grade and earthmoving construction put safety guidelines in force for excavators, loaders, dozers, etc. , VBG 40, governing hydraulic excavator use, especially when they are used for lifting and transporting loads overhead. These new safety guidelines must be observed.

Overhead lifting, handling and transporting of loads such as pipes, girders, etc.(lifting operation), requires different safety guidelines than just removing, loading and unloading dirt, stone, minerals etc. (digging or excavating operation), because another person (or persons) is required to enter the swing range of the excavator in order to attach or remove the load on boom or stick.

To protect these persons attaching or removing the loads during lifting operation, certain requirements have to be met by excavators, which are used for lifting loads overhead.

Hydraulic excavators, when they are used for lifting operation, must have all the following mentioned special safety devices installed :

- A load hooking system which must ensure safe attaching and removing of the loads and be designed such that accidental unhooking or uncontrolled movement is minimized.
- An overload warning device must be installed, which alerts the operator optically via a warning symbol and acoustically via a buzzer that the weight of the load is heavier than the load permitted by the rated lift capacity chart.
- A boom lowering control device (such as load check valves) must be installed according to the international standart ISO 8643 to prevent unintentional lowering or dropping of the boom because of the weight of the load, which could happen if a line in this hydraulic circuit suddenly develops a leak (for example, should a hydraulic line break or a hose burst,...).
  These valves are installed between the boom cylinders, see fig. 120 (or the stick cylinder) and the control valve block, directly on hydraulic pressure connections of cylinders.
- With a rated lift capacity chart attached inside the cab and within the view of the operator.

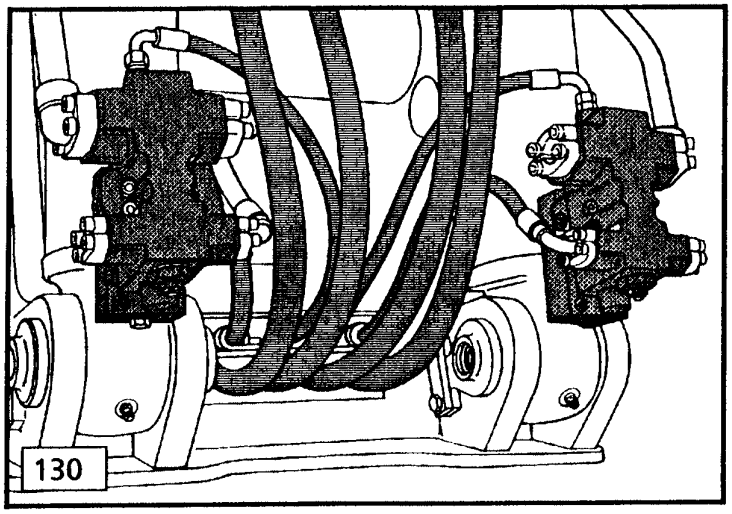
Every LIEBHERR hydraulic excavator can be fitted with an "overload warning device" and/or with load check valves.

⚠ DANGER

Never use your machine for lifting operation without it is fitted with all the above mentionned devices.

Never lift loads over people.

No person may fasten or unfasten a load without approval of the operator and this person may only approach the load from one side. The operator may only approve this action when the excavator has stopped and the attachment is not moving.



Only employ sling ropes and accessories which are permitted for lifting operation, regularly cheched and in good condition.

3) ENGINE COOLANT - Specifications for anticorrosion and antifreeze protection

Using a mixture of antifreeze and anticorrosion with "DCA 4" anticorrosion additive.

To assure the protection from corrosion of the cooling system, the coolant must contain at least 50% corrosion / antifreeze mixture all year round. This protects the cooling system to about - 35° C (- 33° F).

When fluid is added to the coolant mixture, it must be assured that the mixture maintains a 50% antifreeze content.

Caution : The percentage of antifreeze should not exceed 60 % . A higher concentration would lead to reduced antifreeze and cooling properties.

In addition, the cooling system must contain DCA4 (DCA = Diesel Coolant Additive) from FLEETGUARD. The prescribed concentration is from 0.3 to 0.8 DCA units per liter of coolant (1.2 to 3.0 units per US Gallon).

The coolant must be changed every 2 years. Before adding new coolant, check the circuit for cleanness and if necessary flush it with water.

Using a mixture of water and DCA4 (without antifreeze and anticorrosion)

In certain circumstances, and if ambient temperatures are constantly above the freezing point, for instances in tropical regions, and if there are no corrosion or antifreeze fluids available, then a mixture of water and DCA4 additives may be used.

To maintain sufficient anticorrosion properties however, the DCA4 concentration of thecoolant must in this case be about doubled in comparison with the one prescribed when using a mixture also containing antifreeze and anticorrosion, it equals a concentration from 0.6 to 1.6 DCA units per liter of coolant (2.4 to 6.0 units per US Gallon) .

Important !

If employing a mixture consisting only of water and DCA4 additives :

- the use of coolant refiners (corrosion protective oils) is not authorized,
- the coolant change interval must be reduced to once a year.

Checking and maintaining the right DCA4 concentration in the cooling circuit

To check the DCA4 concentration, we recommend the use of the test kit CC 2602 M from FLEETGUARD (LIEBHERR order Nb 5608459).

The water fliter mounted in the cooling circuit contains from 4 up to 8 DCA4 units, see the following schedule. When changing the filter, the corresponding units are addad to the cooling circuit.

If there are no significant coolant leakages, regularly replacing the water filter every 500 working hours is sufficient to maintain the correct concentration of anticorrosive agent.

The DCA concentration has to be checked before each filter change, after each important coolant make up, and at regular intervals if smaller coolant quantities are refilled frequently.

If the concentration is too low, or when changing the coolant in the system, the remaining necessary DCA4 units must be added to the system in liquid form (see schedule).

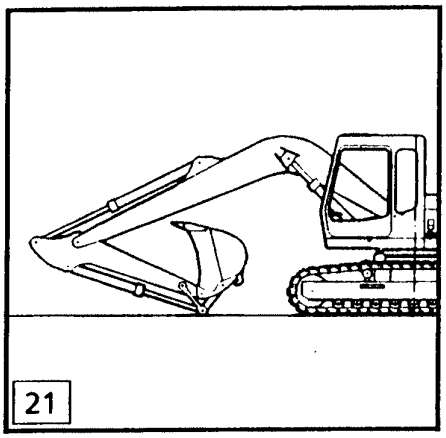
The LIEBHERR order number for a 0,5 liter can containing 5 DCA4 units is 7363898.

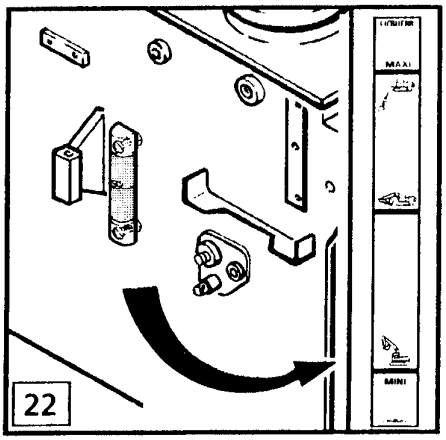
Cooling system capacity (liter / US.Gallons)	DCA4-Water Filter			Quantity of DCA4 liquid(1)	
	Designation	LIEBHERR order nb	DCA4 units	0,5 liter cans	DCA4 units
24 - 39 / 6.3-10.4	WF 2071	7367045	4	3	15
40 - 59 / 10.5-15.7	WF 2072	7381493	6	4	20
60 - 79 / 15.8-20.9	WF 2073	7367052	8	5	25
80 - 115 / 21.0-30.4	WF 2073	7367052	8	8	40

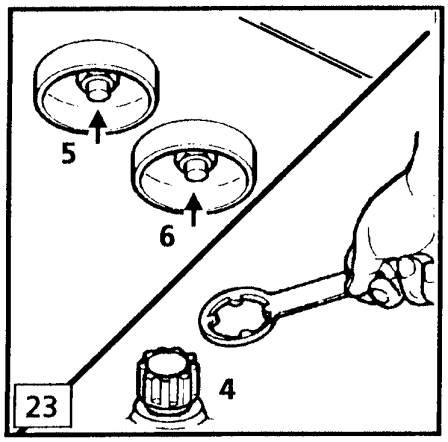
(1) For use with a mixture containing 50% antifreeze and anticorrosion

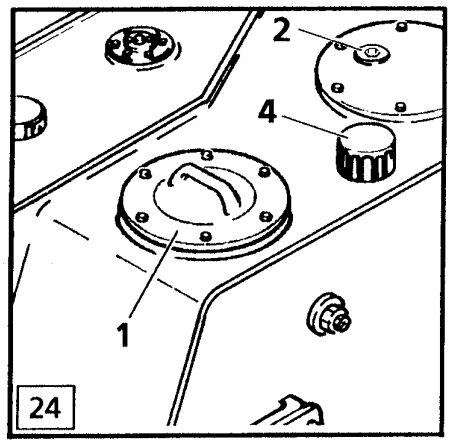
Fresh water guidelines:

To mix the coolant fluid, only clean, preferably soft water should be used. Often, but not always, regular drinking water can be used. Sea water, brackish waters, sole water or industrial waste water may not be used.









OIL IN THE HYDRAULIC SYSTEM

When checking the oil level or adding oil,

- Park the machine on level ground,
- rest the attachments on the ground with stick and tilt cylinders fully extended

CHECK HYDRAULIC OIL LEVEL

In this position the oil level may not drop below middle level on the sight gauge or oil must be added to the tank until reaching this level.

Level "MAXI" shows the maximum oil level when all cylinders are retracted.

Level "MINI" shows the minimum oil level when all cylinders are all the way extended.

TO DRAIN AND TO ADD OIL TO THE HYDRAULIC TANK

⚠ CAUTION

Before draining the oil or opening the hydraulic tank, you always must first unscrew the breather filter 4 one turn to relieve tank pressure.

The hydraulic system should always be refilled or drained using a filler pump.

To drain oil

Remove the cover of the return filter 1 or the plug 2.

The oil must be drained via the two drain valves 5 and 6 in the bottom of the tank.

Attach a drain hose to the valves and suck off or let flow out the oil.

Adding oil to the tank

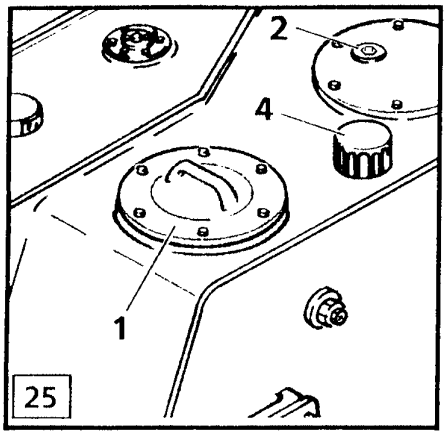
Unscrew the breather filter 4 one turn.

Add the oil via the filter cover 1 or via the plug 2 in the manhole cover, until the oil level reaches middle level on the sight gauge.

Close the breather filter.

Add some more oil to fill the tank up to the top. If refilling through the opening of the filter cover 1, pay attention to refill also the return oil compartment R (fig. 26) around the filter centering tube 7 completely.

Reinstall the filter cover 1 or the plug 2.



THE HYDRAULIC SYSTEM

Maintenance of the hydraulic system is limited to the hydraulic tank.

None of the other components in the hydraulic system require special maintenance.

However, hydraulic lines and hoses must be regularly checked for leaks.

Cleanliness in the hydraulic system is especially important.

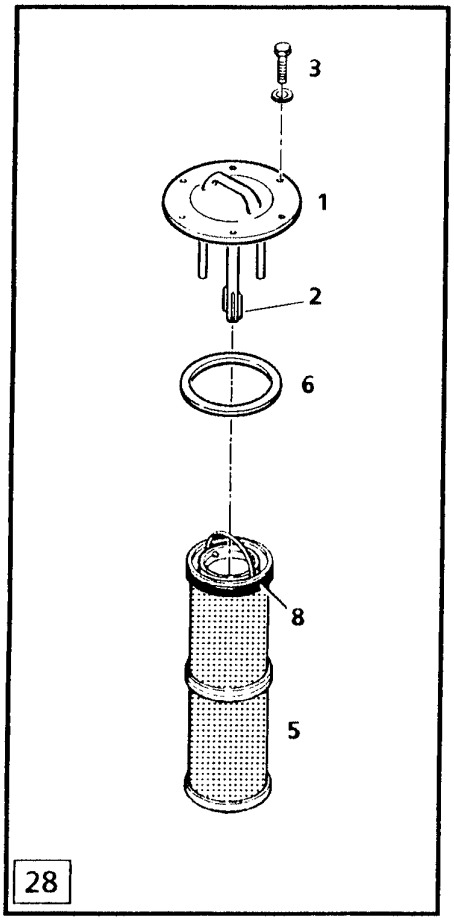
For this reason, the given maintenance intervals to replace the return filter, to clean the oil cooler, and to change the oil need to be strictly observed.

⚠ DANGER

DO NOT ALLOW YOUR SKIN TO COME INTO CONTACT WITH HOT OIL OR COMPONENTS CONTAINING HOT OIL.
At or near operating temperature, engine and hydraulic oil is hot and can be under pressure.

Always relieve the hydraulic pressure before working on the hydraulic system.

Apply both joysticks (with ignition key in contact position) and then unscrew breather filter (Fig. 29, pos 4) one turn to depressurize the hydraulic tank.



OIL COOLER

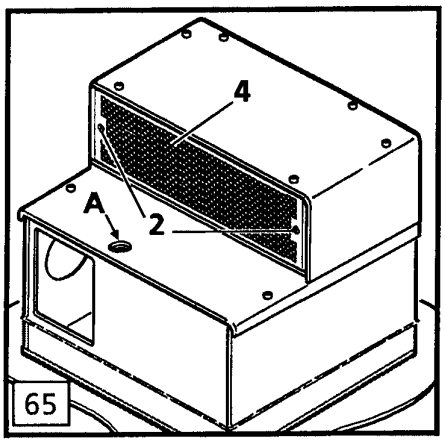
A clean oil cooler is necessary to achieve optimum hydraulic oil cooling.
Clean the cooling circuit with air or steam at the intervals specified in maintenance schedule, and more often if the working conditions make it necessary.

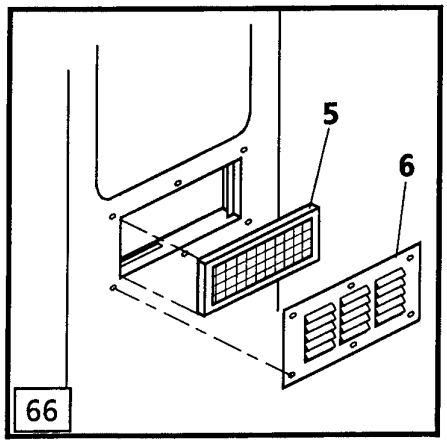
RETURN FILTERS

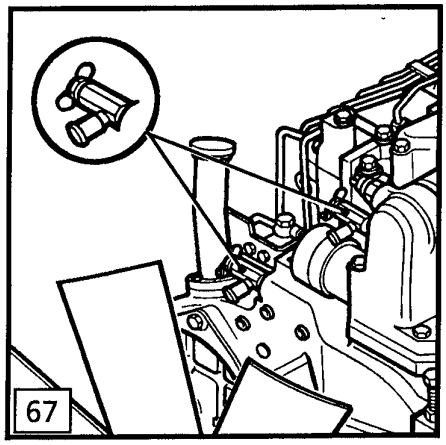
The magnetic rod in the return filter (Fig. 28, pos. 2) should be cleaned daily during the first 300 operating hours, then every week.

Change filter element 5 the first times after the 50 and 500 first operating hours.
Then change these elements
- every 500 hours,
- and after each major repair in the hydraulic system.

Notice : When working under very dusty conditions observe the special recommandations concerning the element change on page 5.9.







THE HEATER AND AIR CONDITIONER

HEATER AND AIR CONDITIONER UNIT

Remove and clean the recirculated air filter 4 and the fresh air filter 5 of the air conditioner unit every 500 working hours and more often in very dusty conditions.

If the filters are contaminated, the air flow through the exchangers is reduced, this causing frequent icing and stop of the airco plant.

Blow out the filter elements with pressure air, or clean them in cold or lukewarm water. Never wash the elements with warm water or using a steam jet. Filter elements which are damaged or in bad condition must be replaced at once.
Never operate the machine, even for a short time when the filters are removed, this would cause a very quick clogging of the heat exchangers of the unit.

To remove the recirculated air filter 4, tilt the backrest of the driver's seat foreward and turn both quick locks (pos.2, fig. 65) by 90 degrees.
The fresh air filter 5 is accessible from the outside of the cab, after removal of the deflector 6 (fig. 66).

Heater circuit

The following maintenance should be performed annually before the beginning of the cold season:

- check the heater water circuit for leaks, check and retighten all connections, hose clamps and the seals on the water valves,
- if dirty, the heat exchanger has to be cleaned or blown out with pressure air immediately.

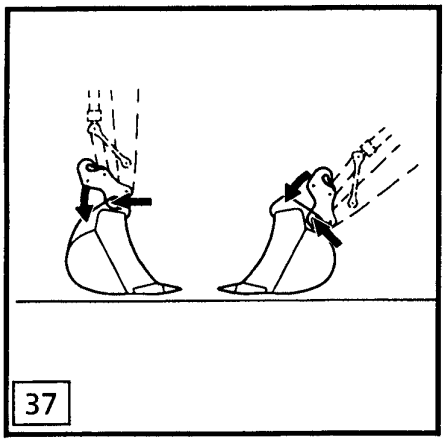
The heater should only be used with an antifreeze and anticorrosive mixture.
When changing the engine coolant, close the heater valves on the engine (fig. 67). Otherwise the heater core must be vented correctly after refilling the circuit.

To vent the circuit, remove the red cap at bleeder valve through the opening A (fig.65), press the valve to let the air escape.

The air conditioner plant

Operate the air conditioner every second week for about 10 minutes regardless of the season.

During the warm season, perform following checks or maintenance works every 500 operating hours :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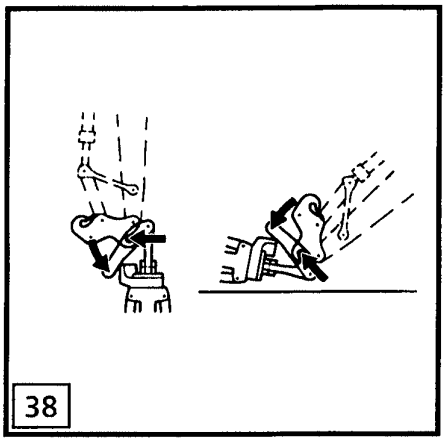
ATTACHING TOOLS

Position the quick change coupler in such a way that the tool can be mounted on the attachment hook (fig. 37 and 38).

Backhoe buckets can alternatively be used as front buckets after changing the attachment pins.

Raise the tool from the ground and extend the bucket cylinder until the bearing plates of the tool are resting at the stops of the mechanical quick change coupler. The attachment bore holes of the tool must be flush with the locking pins (fig. 39 and 40).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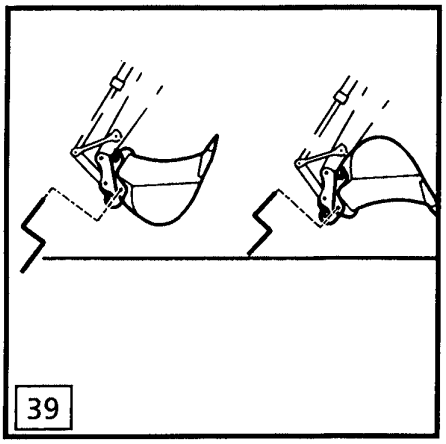
⚠ CAUTION

Keep tools near the ground.

LOCKING THE COUPLER

Insert the crank (**h**) in the locking pin (**b**) (fig. 33) and turn it to the right (clockwise) until both locking pins (**b**) are extended to the stop (fig. 39 and 40).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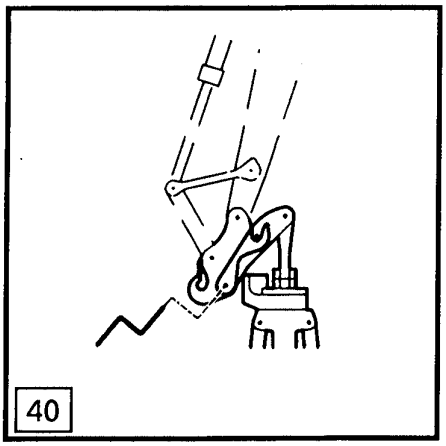
⚠ DANGER

Make sure that no third person can move the working attachment during this procedure!

Then screw in the stop screw (**i**) into the locking pin (**b**).

⚠ DANGER

Make sure that the locking pins are always closed on one side by the plug screw and on the other side by the stop screw!
Check for a secure fitting of the stop screw daily.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Notice: Before starting operation with tools, also observe all instructions for attaching and dismantling attachments.