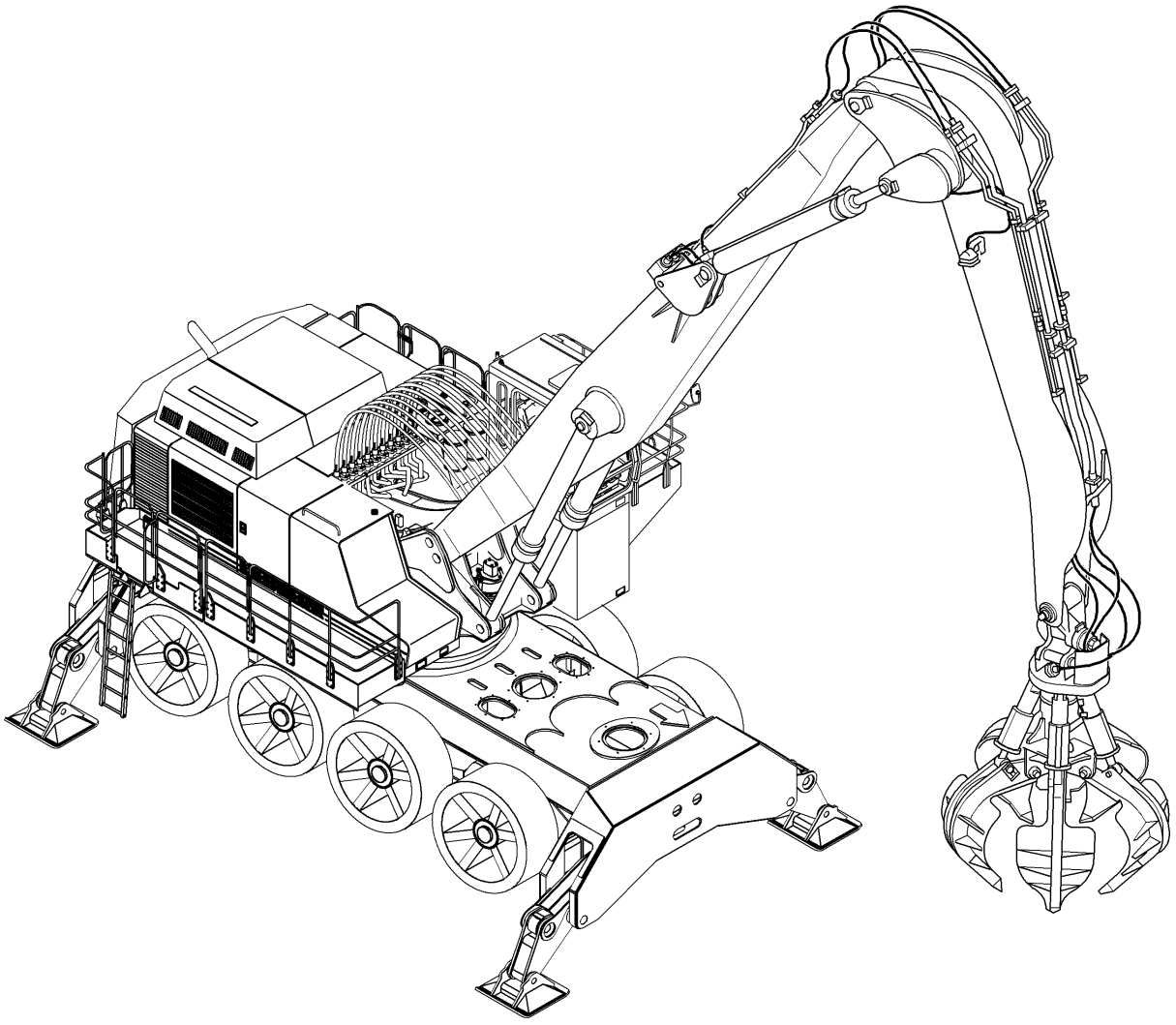
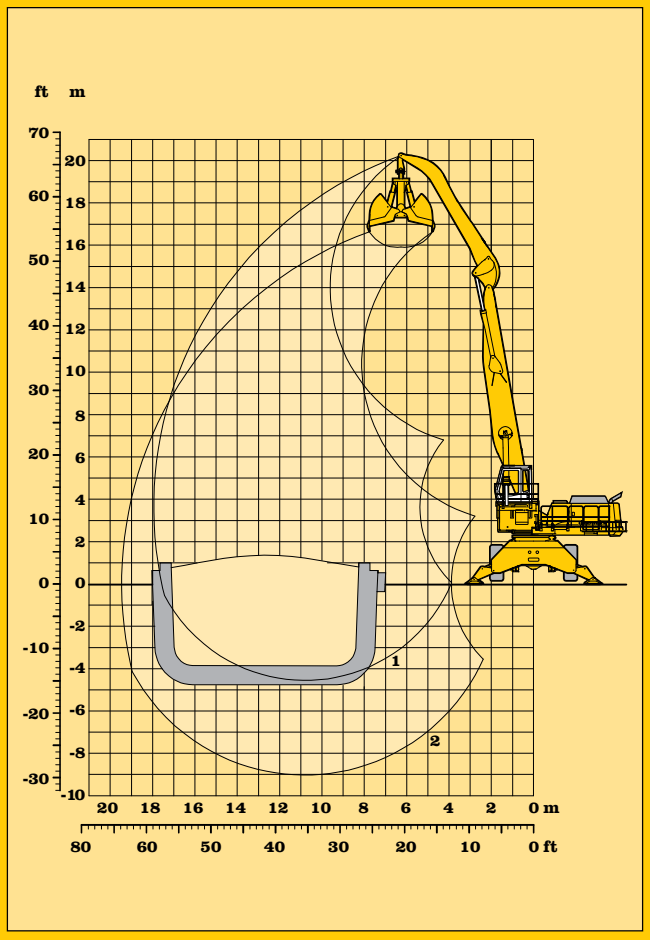
Operation and Maintenance Manual

A974B

Litronic





To order a complete machine you need the following:

- Basic machine
- Extra hydraulic control for rotary drive
- Hoist cylinders
- Industrial-type straight boom 10,50 m with hydraulic lines for grapple operation and hydraulic rotary drive
- Industrial-type gooseneck stick 7,50 m with hydraulic lines for grapple operation and hydraulic rotary drive
- Grapple, clamshell, magnet etc. as required
- Optional: Cab elevation 2,00 m

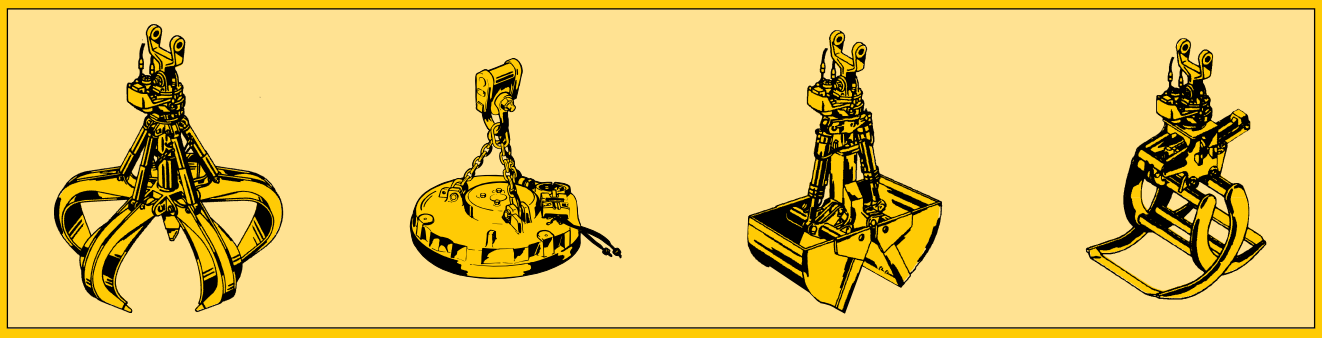
Attachment envelope

Industrial-type straight boom pinned in rear bearing of boom foot bracket
1 with industrial stick 7,50 m
2 with industrial stick 7,50 m and clamshell model 35

Operating Weight

Operating weight includes basic machine with complete industrial type attachment, industrial-type straight boom 10,50 m, industrial-type gooseneck stick 7,50 m

clamshell model 35 (4,0 m³)	112200 kg
or as needed five tine grapple model 85 (4,0 m³)	113000 kg



Industrial Attachment with Industrial-Type Straight Boom 10,50 m

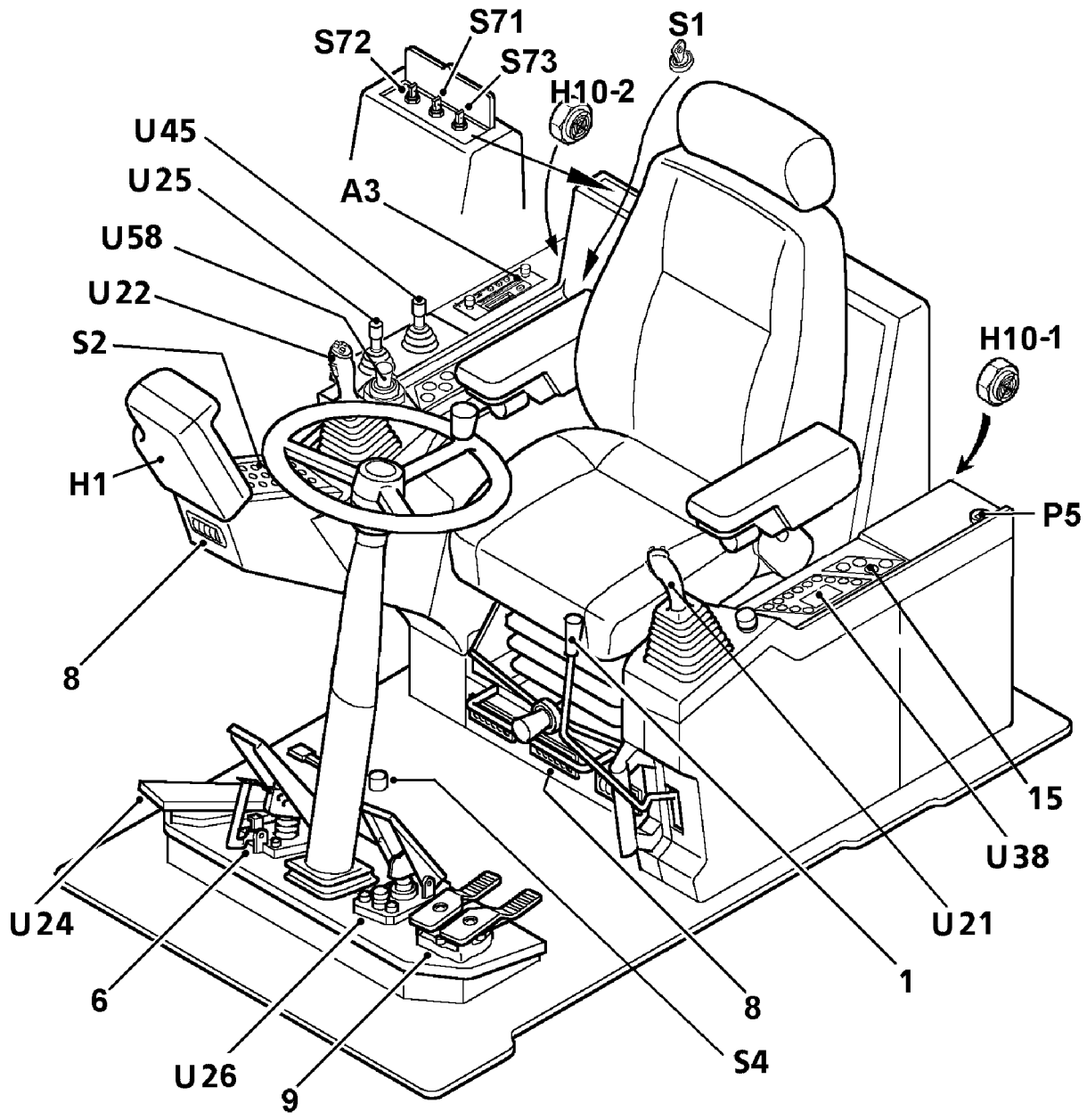
GENERAL SAFETY INFORMATION

- 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 and the safety lever tilted down 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.
  It is forbidden to repair the cab.
- 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.

CONTROLS AND INSTRUMENTATION IN THE CAB



1 Safety lever- Servo control
6 Service brake
8 Air conditioner vent
9 Special attachment control *
15 Control units - additional attachments * (See page 3.26)
A3 Radio *
H1 Monitoring display
H10-1 Buzzer in left console
H10-2 Buzzer in right console
P5 Hour meter
S1 Ignition key
S2 Switching unit
S4 Switch / horn
S71 Switch / Diesel engine RPM control in "manu"
S72 Engine RPM adjustment in mode "manu"
S73 Switch / Safety mode of the servo circuits
U21 Left joystick
U22 Right joystick
U24 Pedal for travel
U25 Control lever - outriggers
U26 Swing brake (Positioning brake) *
U38 Control unit - air conditioner
U45 Joystick for cab position adjustment *
U58 Joystick for steering *

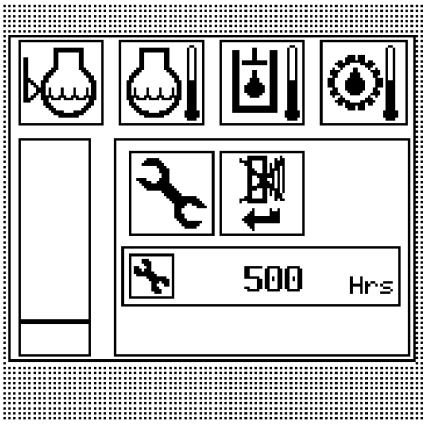
* Optional equipment

Main screen view

SY field: The upper field of the monitor shows warning and indicator symbols, up to maximum 4 symbols at the same time.
If more than 4 symbols must be shown, then every 10 seconds, the symbols move to the left by one symbol.
The following list shows all symbols which can appear in this field

EC field: The EC window displays any applicable error codes for any electrical errors in the excavator electronics, (line errors, sensor errors, ...). Max. 7 error codes can be displayed at the same time . If more than 7 errors occur, an arrow next to the error code window points to additional error codes on the list.
Press the arrow key to move the error code window in the selected direction on the error code list.
For detailed error codes list, refer next

INF field: The INF field on the right hand side of the main screen displays temporary information, also in graphic form.
If more than 3 symbols must be shown, then every 10 seconds, the symbols move to the left by one symbol.
Displays are shown as graphics or text and inform about specific operating conditions (such as actuated flow reduction, emergency operation of Diesel engine or hydraulic pumps, …)



TI field This field, at the bottom right of the screen displays the main hour meter and the daily hour meter of the machine.
During the display start-up phase, the operator will be alerted about a possible upcoming service interval, by a graphic symbol. In this case the hours of this interval are displayed instead of the machine hour meter (as an example 500 hours on fig. beside).
The recalling of upcoming service interval lights up to about 8 seconds.
The symbol Ⓡ is displayed when a flow limitation is activated for the pumps.
The symbol ● indicates that no flow limitation for the pumps is actually activated.

Control of the screen at error recognition:

In case a new error, displayed in field SY, is recognized, the presentation will return to main screen, and the corresponding symbol is displayed.
Depending on the default (urgency step), the buzzer will alert acoustically at the same time, either buzzing in continuous or emitting intermittent sounds.

The symbol  signals that the buzzer of the control unit is activated. Using the key ↵ it is possible to quit the defaults indicated by a continuous buzzing.

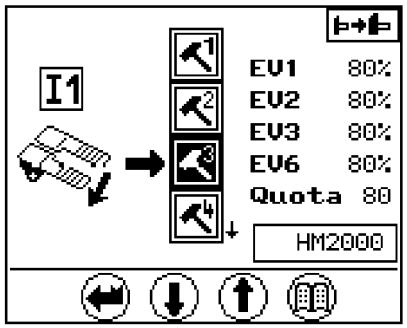


fig. 24

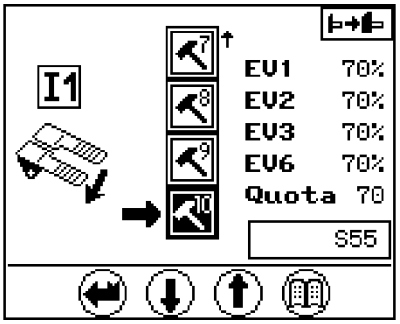


fig. 25

MENU (1 | 2 / 3 | 4) **("set option")**

ALLOCATION OF FLOW LIMIT OPTIONS TO THE EXTERNAL INPUT I1

(Special attachment input; as an example for operation of hydraulic hammer, scrap shear, …)

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

The arrow near the symbol gives the actual allocation. (fig. 24).

In example fig. 24, 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 replacement of the working tool), so first select another attachment in the vertical symbol range via the key "UP" or "DOWN" (as an example in fig. 25, the option 10).

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.

The values EV1 up to EV3 determine the flow limitation of the main pumps when the special attachment is actuated.

Notice: ***- The pump choice EV2 does not appear for the Load Sensing machines R 904 up to R 924.***
- The pump choice EV3 only appears on machines fitted with three independent adjustable working pumps (R984, Special machines, ...).

The value EV6 determines the maximum allowed pressure level for the actuation of the special attachment.

The value behind the choice "Quota" is without importance for crawler excavators.

When selecting an option, a designation related to this option is displayed in the right lower area of the screen, provided that this designation has been memorized during the setting of the parameters of the option.

As an example, in fig. 24 the designation "HM2000" appears, which is the designation for the hydraulic hammer allocated to the selected option.

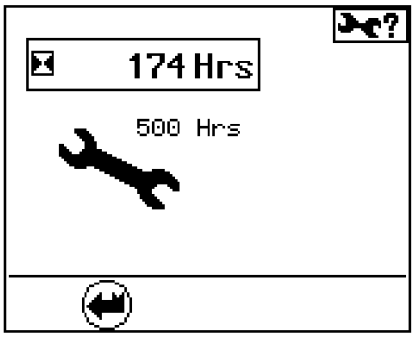


fig. 26

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 beside ="500 hrs") and the current operating hours ("174 hrs").

Control unit S232 - Standstill cab heater

This unit controls an eventually installed standstill heater for the cab or .other circuits on the uppercarriage. Refer to the special issued operation and maintenance manual of the maker of the additional heater.

Key switch S247 - Commutation Normalized control system / Special control system

This key switch allows to commute electrically from a Standard lever arrangement (ISO - PCSA) into a Special lever arrangement (LIEBHERR, other lever arrangement, ...).

Touch S275 - Additional floodlight on rear of cab roof

Actuating the touch will turn on and off above mentioned floodlight. At the same time, the control light inside the button will light up and go out.

Touch S276 - Additional floodlight on counterweight

Same control as for S275.

Touch S321 - Joystick Steering

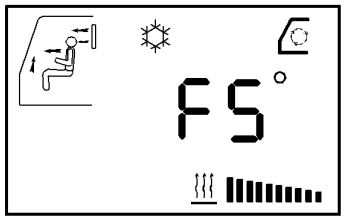
On machines for which the wheels are steered via a two ways control lever (Joystick U58, see page 3.4) the electrical control circuit for the steering is made alive via the touch S321 (indicator light in the touch is on).

Touch S370 – Height adjustable driver's cab

On machines fitted with an adjustable operator's cab with 2-stage elevation, the joystick U45 (see page 3.4) for the control of the cab movements is made alive via the touch S370. The cab adjustment movements via U 45 are possible only as long as the touch S370 is held depressed.

Fig. 19

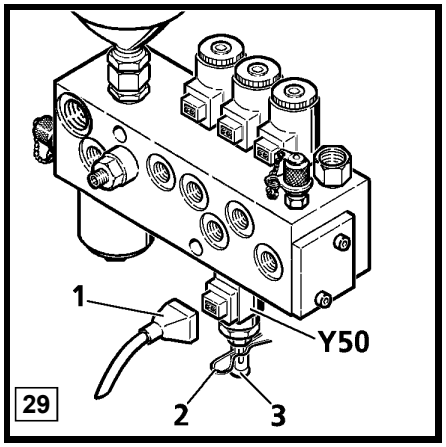
Error code "F5" faulty data transmission operating feature / control unit:



Note:
Data transmission from the operating feature to the control unit is faulty, cause of the fault, short-circuit or interruption of the data line to control unit, plug connection on operating feature or control unit.
The operating feature continues to try to establish data connection to the control unit, if the connection is once again OK, "F5" – fault will no longer be displayed.

Faulty data transmission is displayed flashing!

Note:
If the data transmission from the operating feature can not be established again, the ignition must be switched off, and RESET will be carried out following the restart!



HYDRAULIC PUMPS SAFETY OPERATION

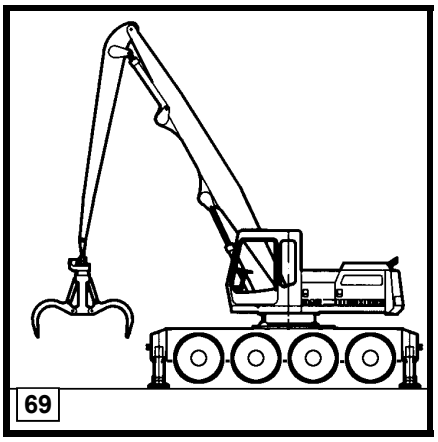
. During normal operation of the excavator, the electronic horsepower control continuously adjusts the pumps flow to the pressure level of the working circuits.

. If a trouble occurs in the circuit of the regulator, the pumps are swivelled back to minimal flow.

. However, it remains possible in this case to carry on the working with the machine (with somewhat reduced pump power) by changing over the lever 3 on the servo oil unit which is mounted to the rear face of the spool valve console.

. Disconnect the connector 1 from the solenoid valve, pull out the pin 2 and tilt the lever 3 in horizontal position (safety position).

ATTACHMENT CONTROL



. When working, always position the excavator on the outriggers (fig. 69).

. Your excavator is designed to operate in one fixed position, i.e. for all the movements of the uppercarriage and of the working attachment (loosening, picking up, displacing material or loads, ….) the excavator must be immobile on the outriggers.

CAUTION

Before starting operation, always immobilize the excavator on the outriggers.

Do not operate the attachment as long as the excavator is not stabilized on the four outriggers.

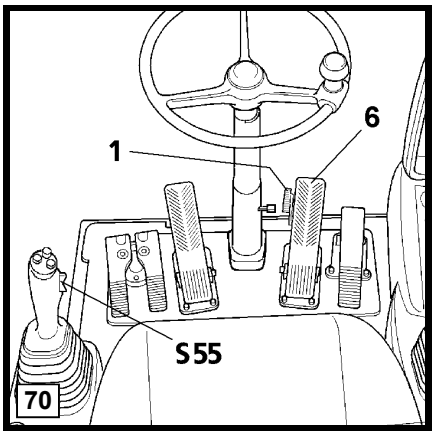
Check and make sure no personnel is within the area of operation of the outriggers during their movements.

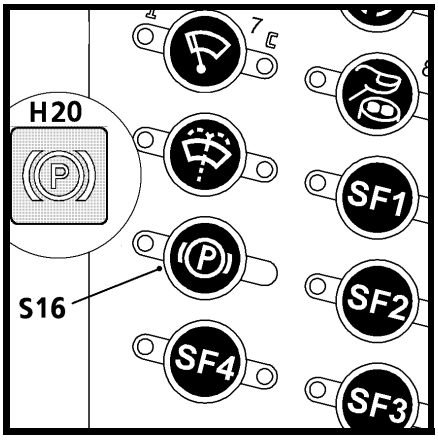
Tell any personnel who might be in the excavator's danger zone to leave immediately.

The lift capacities chart is given for the excavator immobilized on the outriggers.

For work application :

- **apply the service brake while fully depressing the brake pedal 6 until the retainer latch 1 engages,**
- **release the parking brake (the control light in the button S16 may not be on, otherwise the buzzer will sound for warning),**
- **The selector switch S55 for forward / reverse travel must be in position -0-.**





NOTES ON MACHINE-FRIENDLY OPERATION WITH THE ATTACHMENT

. Never stop the swinging motion of the uppercariage when lowering the attachment while striking the bucket or the grab into the material to be loaded or against any obstacle else

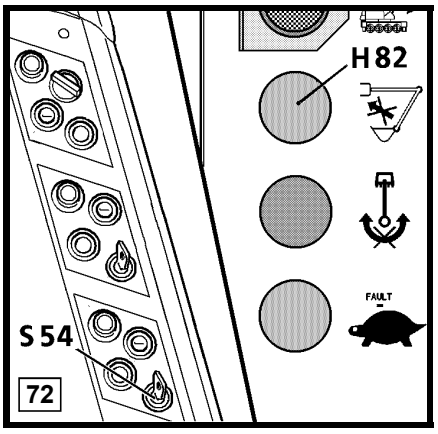
. Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.

. Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.

. Repeated strikes against an object leads to damage to the steel structures and machine components.

. Please refer to your LIEBHERR dealer if special teeth (or a special tool) for heavy-duty or special applications are required.

. Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.



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 the coolant 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 No 5608459).

The water filter 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 added 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..

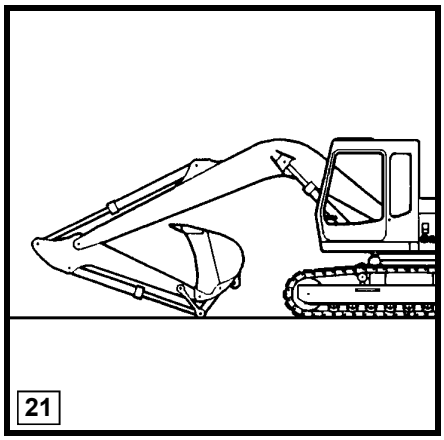
Cooling system capacity (liter / US. Gallons)	DCA4-Water Filter			Quantity of DCA4 liquid(1)	
	Designation	LIEBHER R order no	DCA4 units	0,5 liter cans	DCA4 units
24 - 39 / 6.3-10.4	WF 2071	7367045	4	3	15
40 - 59 / 10.5-15.7	WF 2072	7381493	6	4	20
60 - 79 / 15.8-20.9	WF 2073	7367052	8	5	25
80 - 115 / 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.

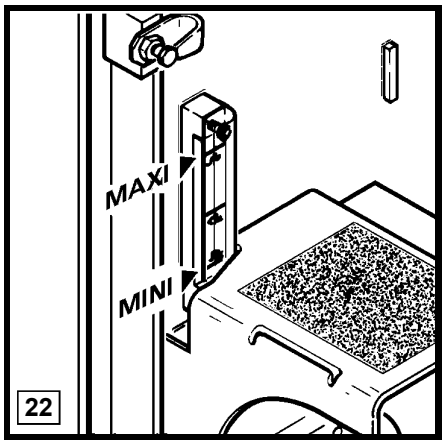
OIL IN THE HYDRAULIC SYSTEM



. When checking the oil level or adding oil, (fig. 21) :

- Park the machine on level ground,
- rest the attachments on the ground with stick and tilt cylinders fully extended and, if applying, with bottom dump bucket closed.
- turn the engine off.

CHECK HYDRAULIC OIL LEVEL



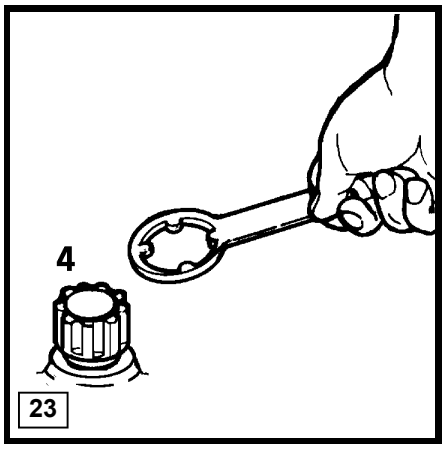
. In this position the oil level may not drop below middle level on the sight gauge (fig. 22) or oil must be added to the tank until reaching this level.

.

. 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

.

. **<u>To drain oil:</u>**

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

. The oil must be drained via the two drain valves 5 and 6 in the bottom of the tank (fig. 27).

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

.

. **<u>Adding oil to the tank:</u>**

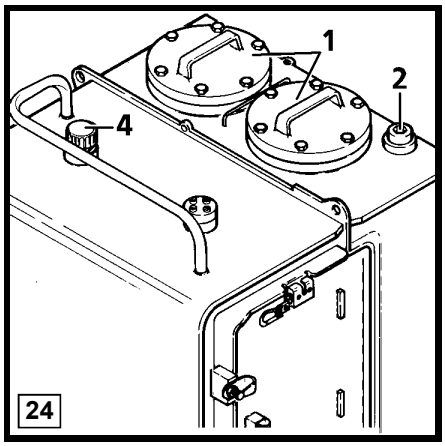
. Unscrew the breather filter 4 one turn.

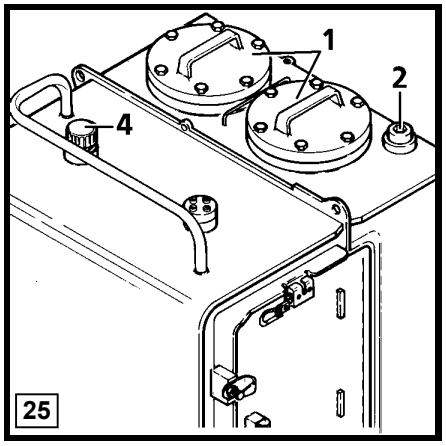
. Add the oil via the filter cover 1 or via the cover 2, until the oil level reaches middle level on the sight gauge..

. 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 centring tube 7 completely.

. Reinstall the filter cover 1 or the cover 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.

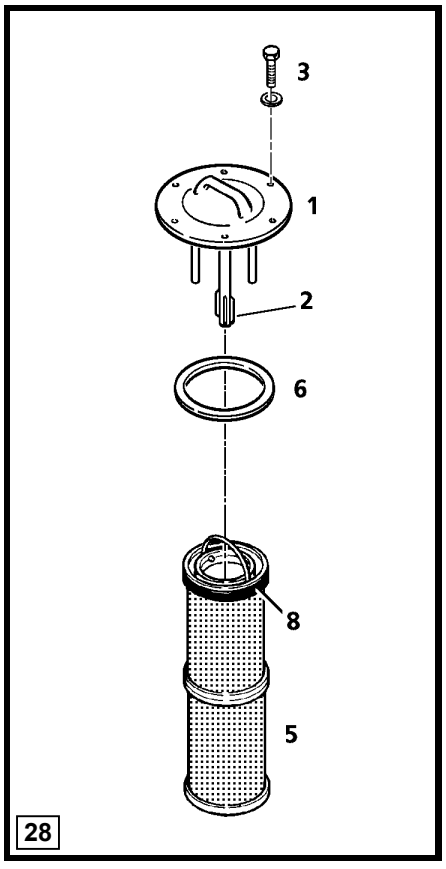
. Always relieve the hydraulic pressure before working on the hydraulic system.

. 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

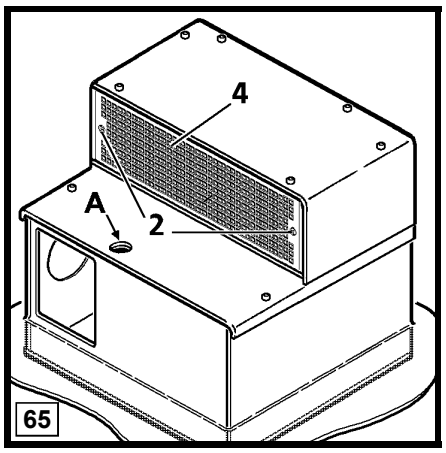
. Change fibre glass filter element 5 after the first 500 and 1000 operating hours.

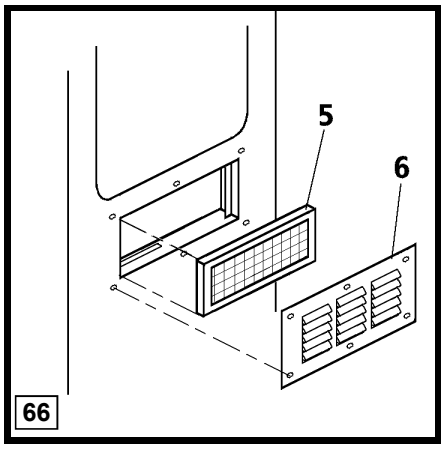
. Further changes of this element

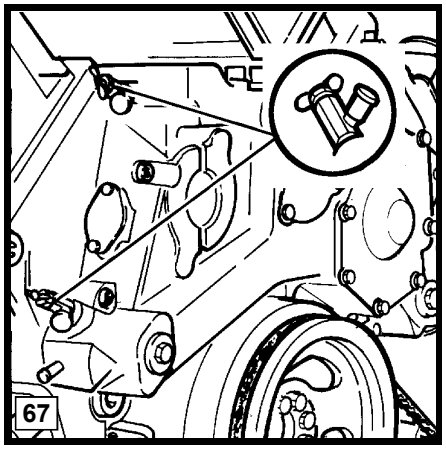
. - every 1000 operating hours,

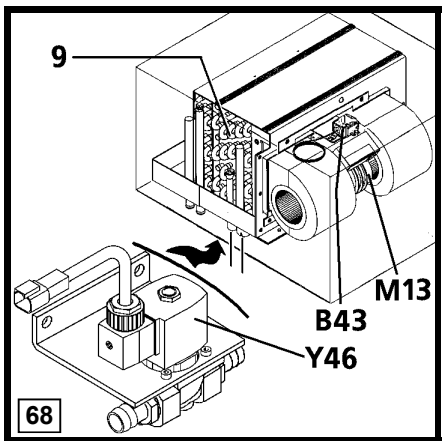
. - and with every occurrence of damage caused by contamination of the hydraulic system.

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









THE HEATER AND AIR CONDITIONER

. **Heater and air conditioner unit**

. Remove and clean the re-circulated 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 air co 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 re circulated air filter 4, tilt the backrest of the driver's seat forward 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).

. Once a year check for damage the lamellas of the heat exchanger 9 (evaporator and heater unit) and in case of clogging blow the exchanger out with pressure air .

. If necessary put the lamellas straight.

.

. **Heater circuit**

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

. - check the heater water circuit for leaks,

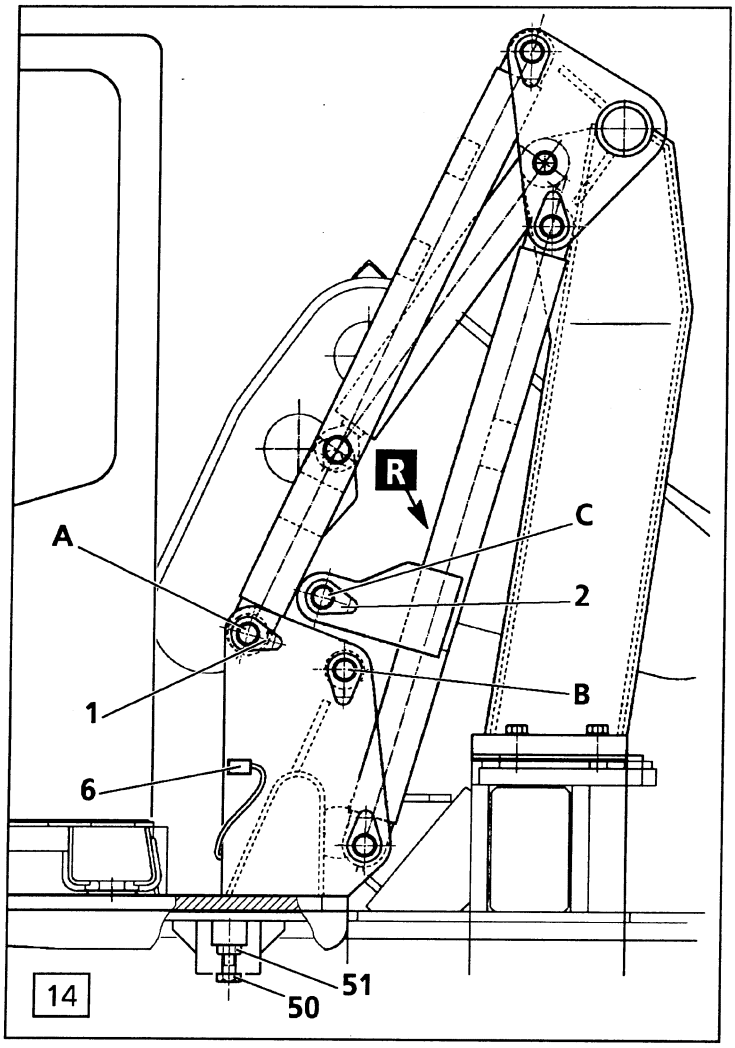
. - check and if necessary retighten all connections, hose clamps and the seals on the water valves,

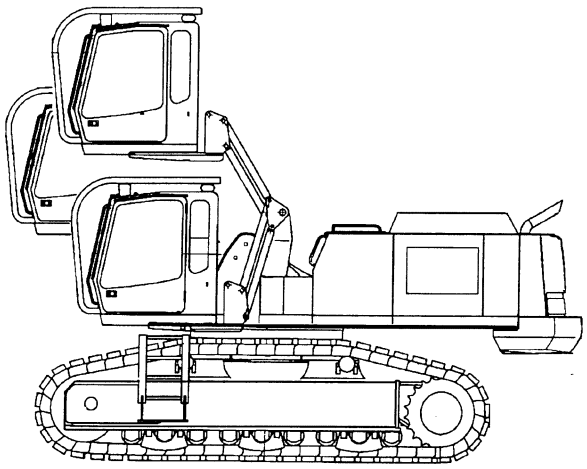
. The heater should only be used with a DCA4 antifreeze and anticorrosive mixture. When changing the engine coolant, close the heater valves on the engine (fig. 67). Otherwise the heater core must be vented correctly after refilling the circuit.

. 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.

. In addition, annually before the beginning of the cold season, and at least if insufficient heating is noticed, remove and clean the solenoid valve Y46 (fig. 68) which controls the warm water flow.

. Clean the membrane of the solenoid valve with clear water and check that the compensation orifice at the membrane is not clogged.





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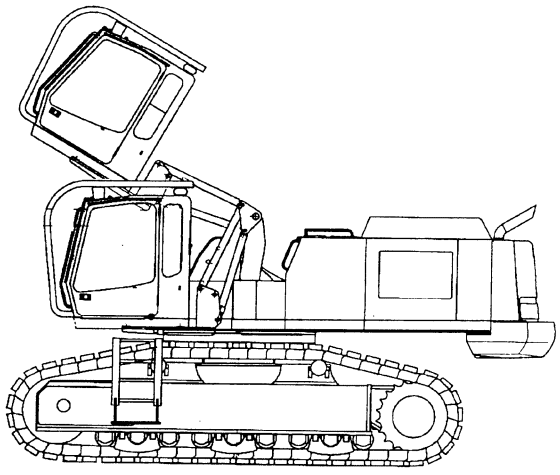

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Maintenance of the cab elevation is limited to the essentials, with regular visual checks of the structure and the elevation's hydraulic system.

Determined malfunctions are to be remedied immediately.

Additionally, the machine should be washed periodically. Worn seals, cracks and other faults are difficult to spot on a dirty machine.

All repair work on the elevation is to be carried out while the cab is positioned on flat and even ground .

Depending on the repair, all the necessary parts are to be supported. Only walk underneath the parts if they are supported.

Structure of the cab elevation

All bearing points are lubricated via the central lubrication system. Each bearing point should be checked visually for the exuding of grease every day.

Visually check the condition of the cab elevation daily, and inspect for parts that may have broken off, fallen off or are worn.

The fixing screws on the base of the cab elevation for the uppercarriage structure should be checked for secure fastening every 500 operating hours and retightened.

The tightening torque of these M30 fixing screws is 2300 Nm.

Modifications such as drilling, burning or welding on components that serve as a power transmission to the elevation may only be carried out by the manufacturer or by an authorised contracted workshop .

Never stick your fingers into the bolt boreholes when replacing bolts or when carrying out other tasks. Use a suitable pin to straighten the boreholes.

Hydraulic system for the cab elevation

Before working with the machine, a visual check of seals for the cab elevation's hydraulic system must be carried out daily.

Modifications to the adjustment of the elevation's hydraulic components may only be carried out by the manufacturer or by an authorised contracted workshop.

Before each intervention in the hydraulic circuit, the control pressure and the dynamic pressures in the elevation's working circuit are to be released as follows....

– bring the start key into the contact position (safety lever must be in the down position),
– switch on the servo-control circuit for cab adjustment while depressing the push button S370.
– briefly actuate the joystick U45 in all 4 directions (keep S370 pressed down).
– Release of pressure is resulted despite the pipe-break protection valves installed on the hydraulic cylinders of the cab elevation .
– then release the push button S370 and start key

....and release the tank's internal pressure as described before in this operation and maintenance manual .

Every 1000 operating hours:

– thoroughly wash the entire machine,
– then visually inspect the hydraulic hoses and hydraulic components for leaks, damage or other faults.
– visually inspect the steel structure parts for crack formations.