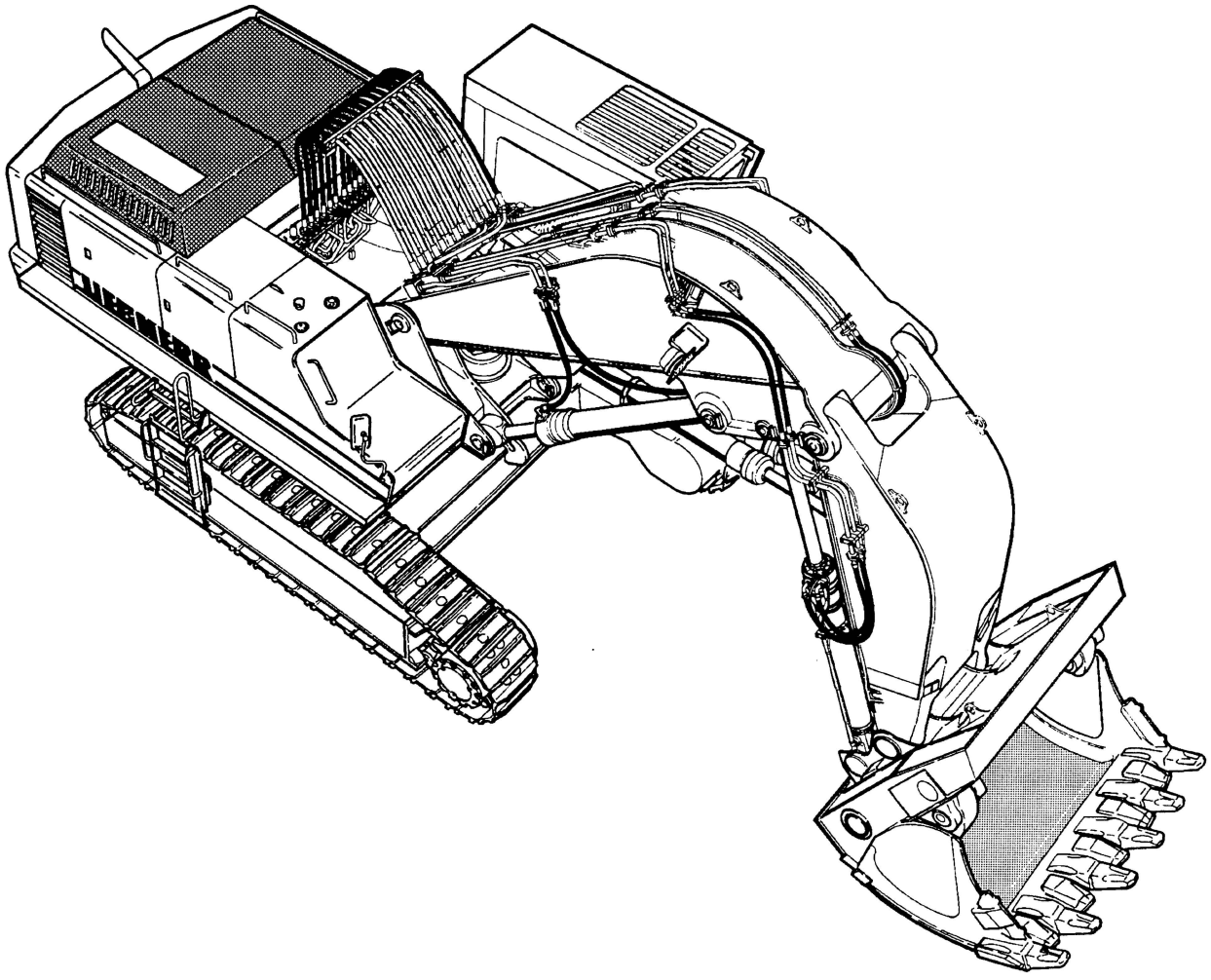
Operation and Maintenance Manual

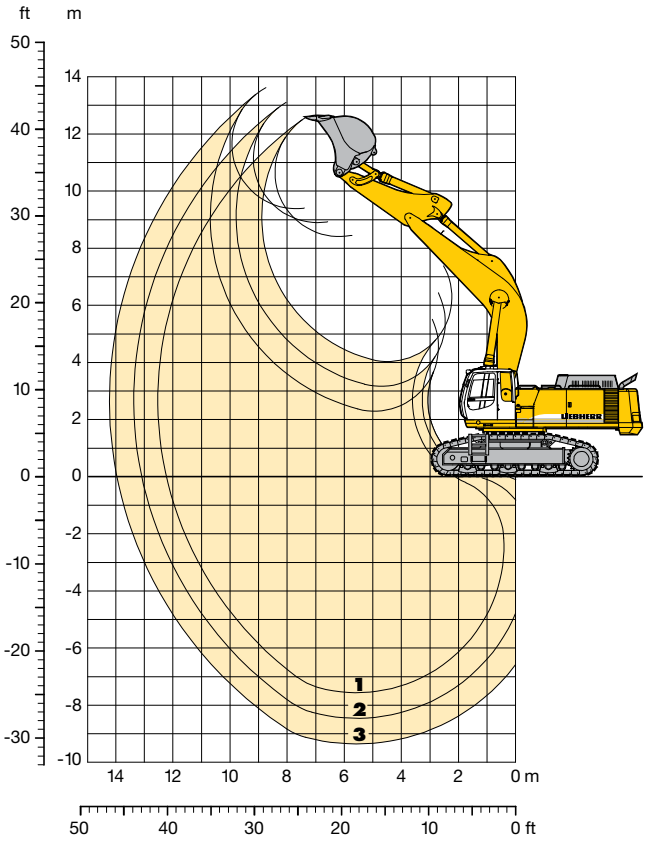
R 974 B

Litronic



Backhoe Attachment

with Gooseneck Boom 7,20 m



Digging Envelope		1	2	3
Stick lengths	m	2,90	3,80	4,70
Max. digging depth	m	7,55	8,45	9,35
Max. reach at ground level	m	12,25	13,10	13,95
Max. dump height	m	8,40	8,90	9,40
Max. teeth height	m	12,50	13,10	13,60
Digging force SAE	kN	344,6	292,2	253,5
	t	35,1	29,8	25,8
Digging force ISO	kN	357,3	301,2	260,2
	t	36,4	30,7	26,5
Breakout force SAE	kN	405	405	405
	t	41,3	41,3	41,3
Breakout force ISO	kN	444,8	444,8	444,8
	t	45,4	45,4	45,4

Operating Weight and Ground Pressure

Operating weight includes basic machine with gooseneck boom 7,20 m, stick 2,90 m and bucket 5,20 m³.

Undercarriage		HD			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	80800	81500	82500	82885	83630	84750
Ground pressure	kg/cm²	1,62	1,37	1,11	1,48	1,24	1,01

Buckets

Cutting width	mm	1750[2]	1750[1]	1900[2]	1900[1]	2100[2]	2100[1]	2250[2]	2250[1]	2500[3]	2500[4]
Capacity ISO 7451	m³	3,60	3,80	4,10	4,30	4,60	4,80	5,20	5,80	6,60	7,70
Weight	kg	4000	3750	4200	3930	4700	4250	4300	4200	4410	4520
Suitable for material up to a specific weight of											
with stick 2,90 m	t/m³	–	–	2,20	–	2,00	2,00	1,80	1,65	1,50	1,35
with stick 3,80 m	t/m³	2,20	–	2,00	2,00	1,80	1,80	1,65	1,50	1,35	1,20
with stick 4,70 m	t/m³	–	1,80	–	1,65	–	1,50	1,35	1,20	–	–

[1] Medium-duty bucket with teeth size V 61 SD (appropriate for materials up to classification 5, according to VOB, Section C, DIN 18300)
[2] Heavy-duty rock bucket with teeth size V 61 RYL (appropriate for materials above classification 6, according to VOB, Section C, DIN 18300)
[3] Loading bucket with teeth size 25 C
[4] Coal bucket with teeth size 20 C

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- 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.
  - Follow established lockout / tag out procedures where applicable.
  - 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 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 condenser, 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.

HYDRAULIC LINES AND HOSES

- Hydraulic lines and hoses may never be repaired!
- All hoses, lines and fittings must be checked daily, but at least every 2 weeks for leaks and any externally visible damage! Never check for leaks with your bare hands, use a sheet of paper or something else. Any damaged sections must be replaced immediately! Escaping oil can cause injuries and fires!
- Even if hoses and lines are stored and used properly, they undergo a natural aging process. For that reason, their service life is limited. Improper storage, mechanical damage and improper use are the most frequent causes of hose failures. Concerning the hoses, you must follow the safety regulations applicable to your work environment and job site and any federal, state and local safety requirements.
- Using hoses and lines close to the limit ranges of permitted use can shorten the service life (for example at high temperatures, frequent working cycles, extremely high impulse frequencies, multi shift or around the clock operations).
- Hoses and lines must be replaced if any of the following points are found during an inspection (see guidelines ISO 8331):
  - Damage on the external layer into the inner layer (such as chaffing, cuts and rips);
  - Brittleness of the outer layer (crack formation of the hose material);
  - Changes in shape, which differ from the natural shape of the hose or line, when under pressure or when not under pressure, or in bends or curves, such as separation of layers, blister or bubble formation, crushing or pliers.
  - Leaks;
  - Non observance of installation requirements;
  - Damage or deformation of hose fittings, which might reduce the strength of the fitting or the connection between hose and fitting;
  - Any movement of hose away from the fitting;
  - Corrosion on fittings, which might reduce the function or the strength of the fitting;

  When replacing hoses or lines, always use Original replacement parts.
- Route or install the hoses and lines properly. Do not mix up the connections!
- Always take care to avoid torsional strain when installing a new hose. On high pressure hydraulic hoses, the mounting screws must be first mounted on both hose ends (full flange or half clamp) and tightened only thereafter.

  On high pressure hoses having one curved end, always tighten first the screws on the curved hose end and only then the screws on the straight hose end.

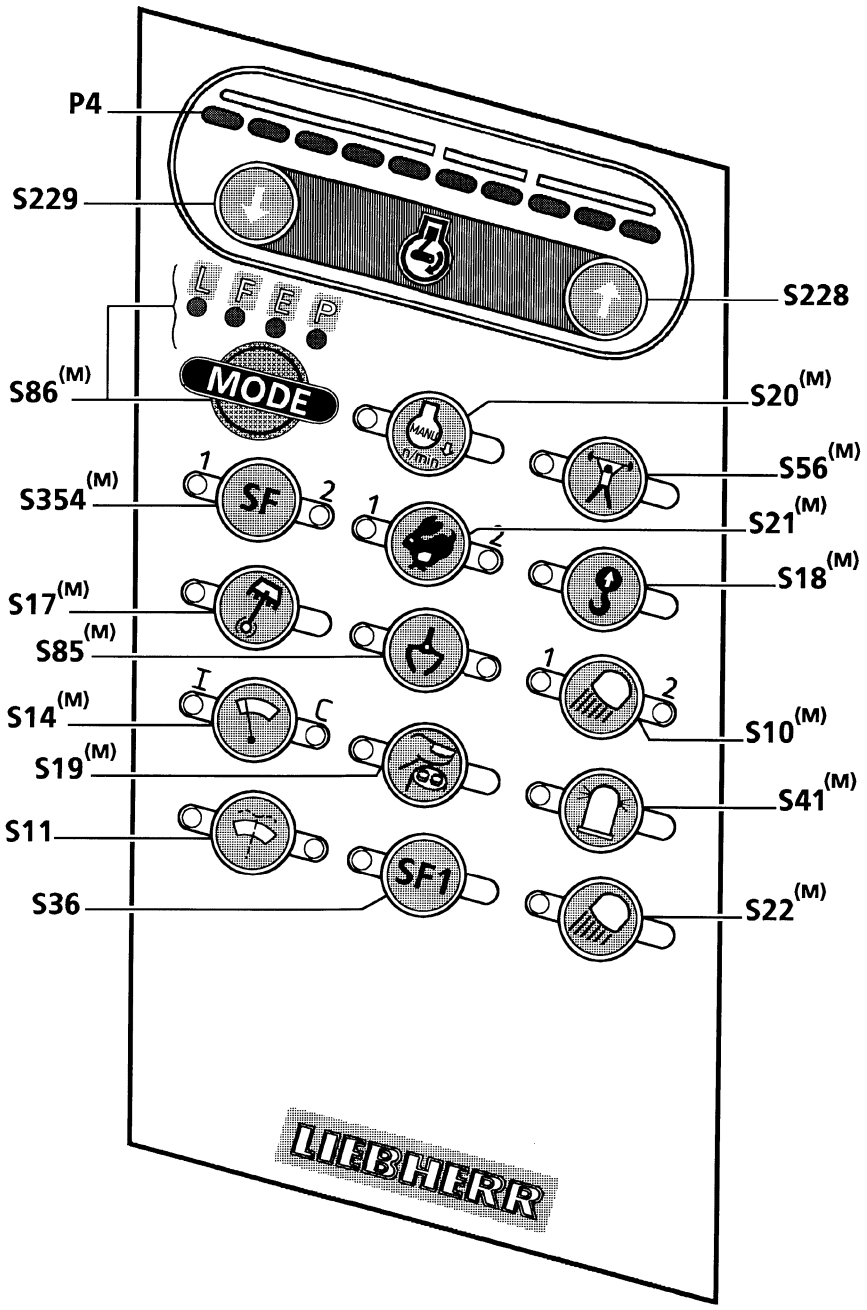
  Install and tighten the hose clips that may be mounted on the hose middle only when the both hose ends are already tightened.
- Always install hoses so to avoid any friction with other hoses and parts.

  We recommend to keep a distance between hose and other parts of at least one half of the hose outer diameter. Keep a minimum gap of 1/2 inch in any case.

  After mounting a hose connecting two parts that are movable to each other, check during the return to service that the hose is not rubbing in the whole moving range.

  Check daily that all flanges and covers are fixed correctly. It will prevent vibrations and damage during operation.

CONTROL UNIT



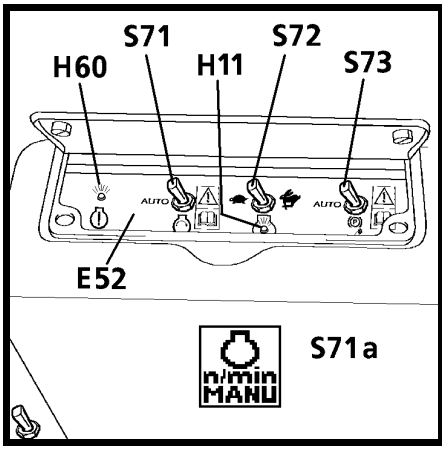
P4	LED indicator for engine RPM
S10	Lights on uppercarriage and working attachment
S11	Windshield washer
S14	Windshield wiper
S17	Swing brake
S18	Overload warning device *
S19	Rotating device*
S20	Automatic low idle
S21	Travel speed increase
S22	Auxiliary floodlights*
S36	Special function - not used -
S41	Beacon*
S56	Pressure cut-in stage boom*
S85	Grapple operation*
S86	Operation mode selection
S228	Engine RPM increase
S229	Engine RPM reduce
S354	Not used

* Optional installation

(M) The function of the push buttons marked with (M) are memorized when stopping the excavator.
This means that the controled function recovers the previous state (on, off, 1/2, L/H, ...) before the machine had been turned off.

Error codes for electrical errors of the electronic control system

Errorr-code	Related. EDC Errorr	Defective component	Default recognized
E 001 **E 003**	**3011** **3021**	Transmitter for engine oil pressure	Short to ground or Broken wire Short circuit + 24 V
E 004 **E 005** **E 006**		Transmitter for engine coolant level	Short to ground Short circuit + 24 V Broken wire
E 009	**3018** **3018** **3028**	Transmitter for engine coolant temperature	Short to ground Broken wire Short circuit + 24 V
E 010 **E 011** **E 012**		Transmitter for hydraulic oil level	Short to ground Short circuit + 24 V Broken wire
E 013 **E 014** **E 015**		Transmitter for hydraulic oil temperature	Short to ground Short circuit + 24 V Broken wire
E 016 **E 017** **E 018**		Switch for pumps splitterbox oil temperature	Short to ground Short circuit + 24 V Broken wire
E 022 **E 023** **E 024**		Signal for engine RPM between engine regulator and printing plate A1010	Short to ground Short circuit + 24 V Broken wire
E 027		Regulation solenoid valve -pump power control(LR)	Connection wire defective
E 033	**3009**	Regulation solenoid valve – Cooler fan RPM	Connection wire defective
E 036		Regulation solenoid valve Oil flow Pump P1 (EV1)	Connection wire defective
E 039		Regulation solenoid valve Oil flow Pump P 2 (EV2)	Connection wire defective
E 042		Regulation solenoid valve – Reserve (EV3)	Connection wire defective
E 045		Regulation solenoid valve – "Tool Control" (EV6)	Connection wire defective
E 063 **E 065**	**3019** **3029**	Transmitter for boost air temperature	Short to ground or Broken wire Short circuit + 24 V
E 071 **E 073**	**3012** **3022**	Transmitter for boost air pressure	Short to ground or Broken wire Short circuit + 24 V
E 074 **E 075**	**3008**	Starter of Diesel engine	Starting time too long Starter defective
E 076	**3059**	Actuator of injection pump	Default in fuel pump actuator compensation
E 077	**3058**	Actuator of injection pump	End stage of EDC – regulator defective
E 078		Regulator for Diesel engine	Hardware default
E 079		Regulator for Diesel engine	Software default
E 080	**3053**	Actuator of injection pump	Difference between actual and desired values of regulation stroke
E 081 **E 082**	**3001** **3002**	RPM transmitters for Diesel engine	RPM transmitter B12- 1 defective RPM transmitter B12- 2 defective
E 083	**3050** **3056**	Actuator of injection pump	Error in feedback of injection pump actuator
E 084	**3006**	Preglow system of Diesel engine	Preglow voltage too low
E 085	**3006**	Preglow system of Diesel engine	Preglow current too low
E 086	**3007**	Fuel solenoid valve	Connection wire or solenoid valve defec.
E 087	**3003**	RPM transmitters for Diesel engine	Measured RPM difference B12-1/B12-2



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OPERATION OF THE EXCAVATOR IN SAFETY MODE

The printed board E52 containing all necessary switches and lights for the safety operation of the excavator is situated at the rear end of the right side control desk. Thanks to this printed board, the excavator can, in case of a trouble in the main electronic circuit, be maintained operating temporarily and with some restrictions.

Switch S71 for engine start in safety mode

In normal operation, the engine is started via the main electronic circuit when the ignition key is turned to start position.

In case the engine can no longer be started or kept running due to troubles in the main control circuit of the excavator, it can be started in safety operation via the safety mode start switch S71. To start, turn the ignition key to start position, with the switch S71 tilted to the right, until the engine is started.

The engine can also be switched into safety operation automatically, as an exemple consecutively to a communication default in the control system.

In safety operation, the control light H11 is lighting up at the safety control board E52 and at the same time the warning symbol S71a appears on the monitoring display.

In safety operation the stop of the Diesel engine is achieved just like in normal operation, while turning back the ignition key to the "off" position.

In safety operation, the communication between the electronic control box of the engine and the main circuit of the excavator may be no longer established.

In case of the occurence of any operating error on the Diesel engine, the red warning light H60 lights up on the safety control board E52, at the same time a buzzer will sound inside the cab and the error code E525 is displayed on the screen.

In safety operation the followings remain guaranteed:

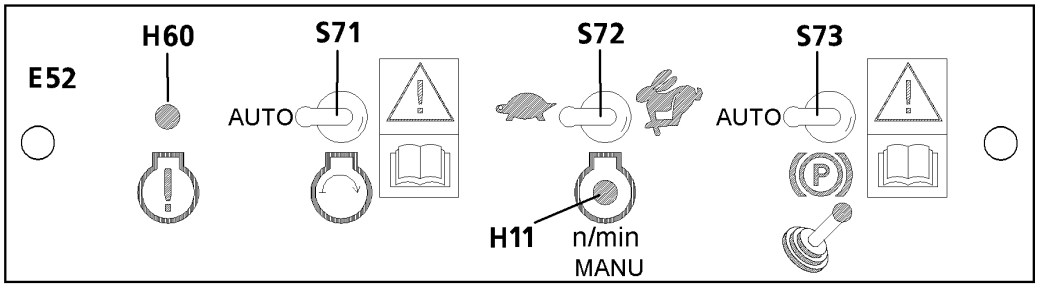
- the automatic engine power reduction in case of overheating of the engine coolant or of the charge air.
- the memorization of the occuring engine faults into the inner error memory of the control box of the engine.

At the opposite, the shutdown of the engine in case of low engine oil pressure and of overheating of the engine coolant or of the charge air is no longer ensured.

H11	Warning light / Diesel engine in safety mode
H60	Warning light / operating error on Diesel engine with safety mode turned on
E52	Printed board for safety operation
S71	Switch / engine start in safety mode
S72	Switch / RPM selection in safety mode
S71	Switch / servo pressure circuit in safety mode

CAUTION

In case the warning light H60 lights up, the operator must shut the engine down as soon as possible and recognized which error has occured.
It's the operator's own responsibility to decide if the machine can be maintained operating or not.

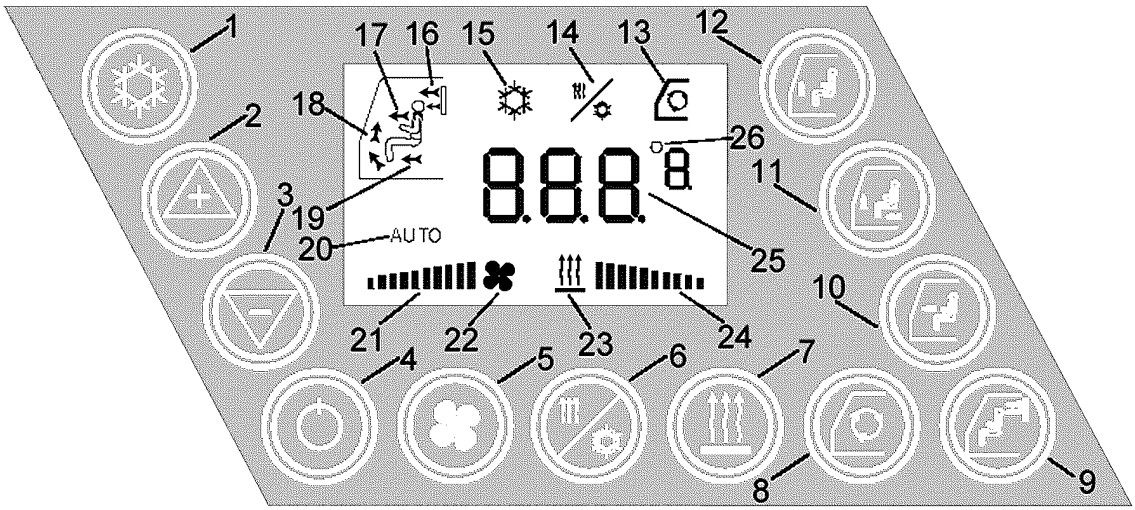


THE HEATER AND AIR CONDITIONER

As standard equipment the driver's cab is fitted with a heater and air conditioner unit (fig.76) which can be used for heating, cooling off and also as a fresh air ventilation for the cab.

The main functions of the control unit for this heater and air conditioner are described thereafter. For a more detailed description, refer to the pages 3.37 and followings at the end of this chapter.

THE CONTROL UNIT



Control Touches

1 - Touch - Air conditioner On / Off
2 - Touch - Increasing the set value for cab temperature, fan RPM, ...
3 - Touch - Reducing the set value for cab temperature, fan RPM, ...
4 - Touch-Control unit heater and air conditioner On / Off
5 - Commutation Touch - manual / automatic control for evaporator fan RPM
6 - Touch - REHEAT operation On / Off
7 - Commutation - Heater control manual / automatic
8 - Touch - Fresh air admission On / Off
9 - Touch - ventilation flap to cab rear side OPEN /CLOSED
10 - Touch - ventilat. flap to control board OPEN / CLOSED
11 - Commutation Touch - Lower ventilation flap in MIDDLE position / CLOSED
12 - Commutation Touch - Lower ventilation flap OPEN / in MIDDLE position

LCD Indication

13 - Symbol indicates recirculated air operation
14 - Symbol indicates REHEAT- operation
15 - Symbol indicates air conditioner on
16 - Symbol indicates ventilation flap to cab rear side OPEN
17 - Symbol indicates ventilation flap to control board OPEN
18 - Symbol indicates lower ventilation flap in MIDDLE position
19 - Symbol indicates lower ventilation flap OPEN
20 - Symbol indicates full automatic operation is ON
21 - Bar graph shows fan RPM (if manually adjusted)
22 - Symbol indicates manual fan control is ON
23 - Symbol indicates manual heating power control is ON
24 - Bar graph shows heating power (if manually adjusted)
25 - Indicates set value for temperature or error code
26 - Indicates the employed temperature unit - (°) or (F)

TURNING THE CONTROL UNIT ON

The heater and air conditioner is turned on via the touch (4). After turning on, the control unit will perform an auto-check for approx. 12 second.

Heater and fresh air ventilation of the cab are now operative. The control unit controls in automatic the heating power and the RPM of the fan inside the heater and air conditioner.

However heating power, respec. fan RPM can also be adjusted manually while actuating the touch (7) respec. (5) and adjusting immediately after the heating power respec. the fan RPM via the touches (2) and (3)

ADJUSTMENT OF DESIRED CAB TEMPERATURE

The 4 positions indication range (25) shows the set value for cab temperature.

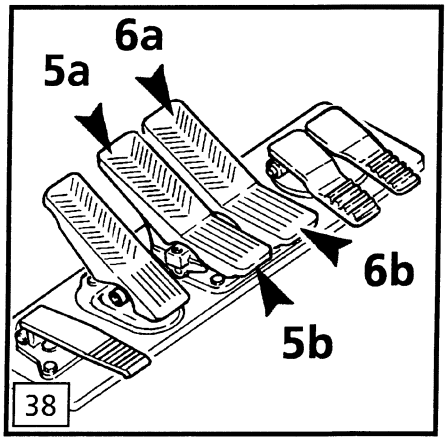
Use the touches (2) and (3) to increase or reduce this value.

RECIRCULATED AIR AND FRESH AIR OPERATION

The heater and air conditioner can be operated with 100% recirculated air, but also with a mixing of fresh air (F) and recirculated air (R).

TRAVEL FUNCTIONS

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



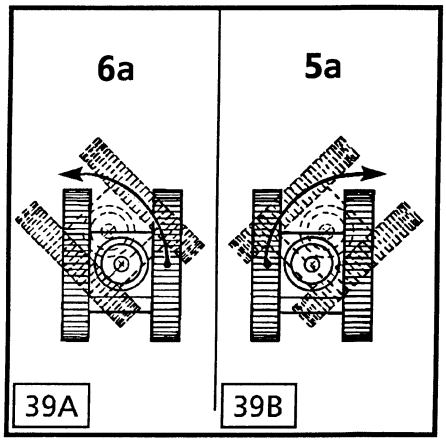
STRAIGHT TRAVEL

- **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!



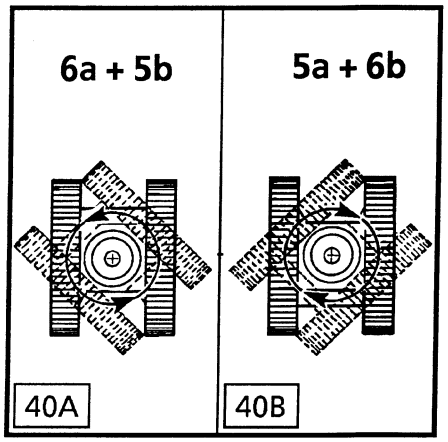
TO TURN OVER ONE TRACK

- **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!

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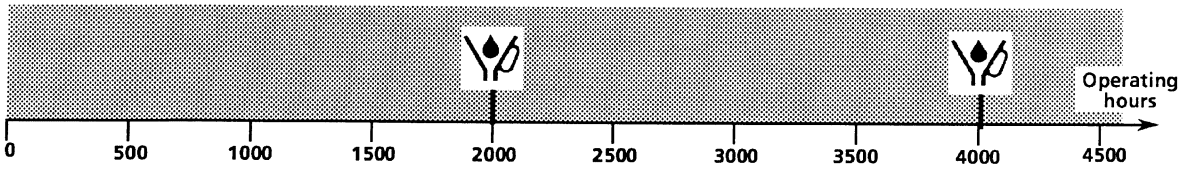
Hydraulic oil change intervals

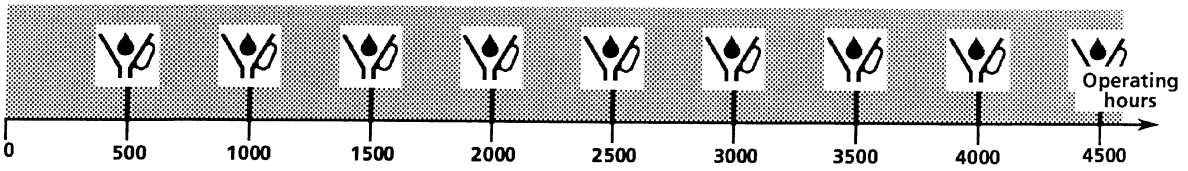
1. **Oil changes in preset intervals**

   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**

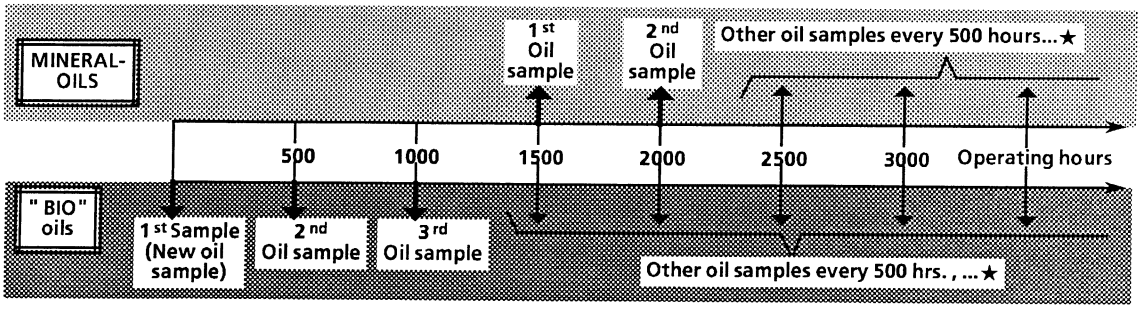


2. **Optimized oil change intervals determined through oil sample analysis reports**

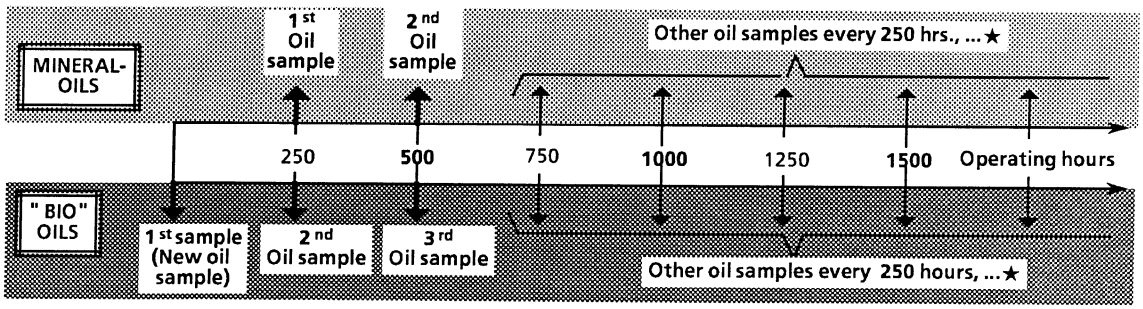
   Use this procedure to take oil samples in preset intervals. The intervals may be extended between two oil changes as long as the properties of the oil are still satisfactory.
   The time when the oil must be changed is determined by the lab report.

   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).

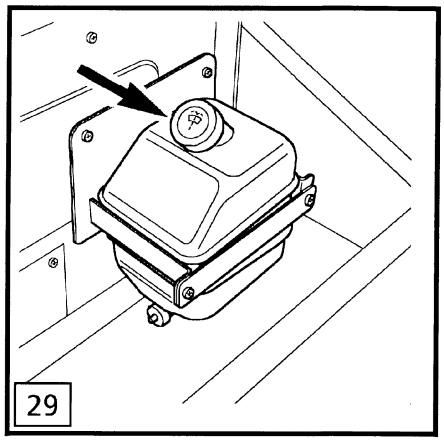
   a) **In standard applications**



   b) **In dust intensive applications**



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



CHECKING THE LEVEL IN THE RESERVOIR OF THE WINDSHIELD WASHER

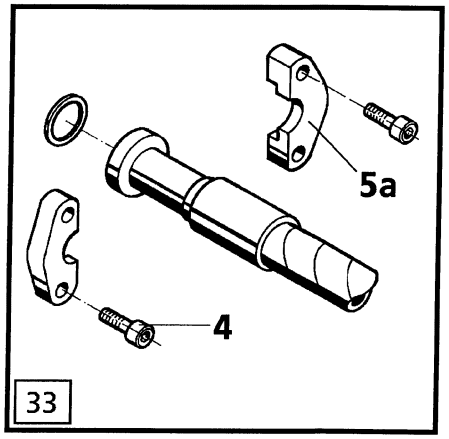
The tank for the windshield washing detergent is mounted outside, to the outer wall of the operator's cab.

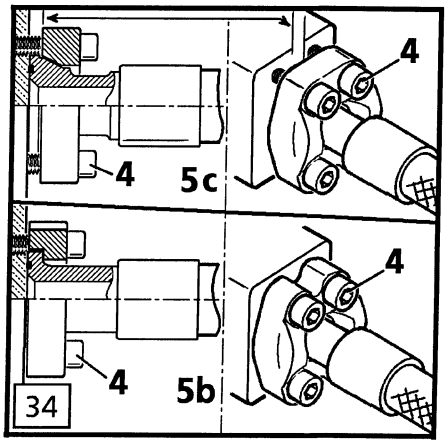
Regularly check the level in the windshield washer reservoir , and, if necessary, remove the cover at the filler neck (fig. 29), and refill the reservoir with standard windshield washing detergent .

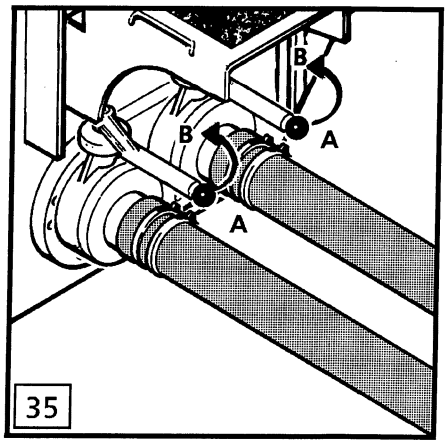
Quantity: see the lubricants chart.

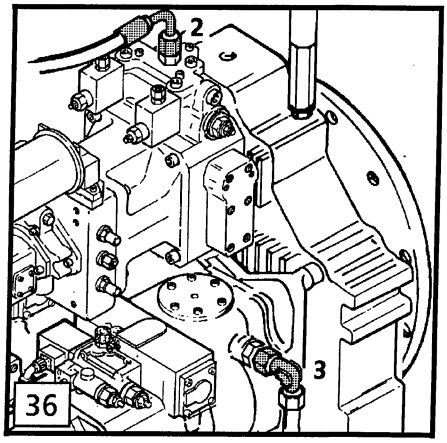
Interval : see the lubricants chart.

- Observe all product safety guidelines when handling oils, grease, and other chemical substances.
- Make sure service fluids and replacement parts are disposed of properly and in an environ-mentally sound manner.
- When using hot service fluids, be very careful. (They can cause severe burns and injury!).
- Operate combustion motors and fuel operated heaters only in well ventilated areas. Before operating these units, check ventilation. In addition, always follow applicable local regulations.
- Never try to lift heavy parts. Use appropriate lifting devices with sufficient load carrying capacity. When replacing or repairing parts or components, make sure they are mounted very carefully on lifting devices, to prevent any possible danger. Use only suitable and technically sound lifting devices, make sure that lifting tackle, wire cables, etc. has adequate load carrying capacity. Never position yourself, walk or work underneath suspended loads.
- Never use damaged lifting devices, or devices which are not sufficient to carry the load. Always wear gloves when handling wire cables.
- Ask only experienced personnel to attach loads and guide and signal the crane operator. The guide must be within the visibility range of the operator and / or must be in direct voice contact with the operator.
- When working overhead, use appropriate and safe ladders, scaffolding or other working platforms designated for that purpose. Never step on parts or components on the machine when maintaining or repairing items overhead. When working high above ground, make sure you are fitted with ropes and appropriate safety devices which will prevent a possible fall. Always keep handles, steps, railings, platforms and ladders free of dirt, snow and ice!
- When working on the attachments, for example when replacing the bucket teeth, makes sure the attachment is supported properly. Never use metal on metal support!
- For safety reasons, never open and remove a track chain unless having previously totally released the pretension of the chain tensioning unit.
- 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 with tilted down safety lever, 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.
- 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.
  - Follow established lockout / tag out procedures where applicable.
  - 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.









High pressure hoses with nominal size NW 20, NW 25, NW 32 and with SAE fittings are installed on your machine (fig. 33).

CAUTION

Any time a high pressure hoses is defective (bubbles, moisture, damage on the surface, etc...), it must be replaced. When installing the replacement hose, avoid any stress and strain on the hose.
Do not turn or twist the hose!

The following O-rings are needed for hydraulic hoses :

NW 20	25×3,53	Id. No. 7367610
NW 25	32,9×3,53	Id. No. 7367611
NW 32	37,7×3,5	Id. No. 7367612

The mounting screws on the SAE fittings for high pressure hoses must be tightened to the following torque values :

Screw 4 size	Torque value in **Nm** - Quality **10.9**		
	Half flange **5a**	Flat flange **5b**	Conical flange **5c**
M10	62	45	65
M12	108	70	110
M14	172	120	180
M16	264	170	250

Notice: tighten the screws 4 evenly and crosswise!

REMOVING THE SUCTION HOSE

If suction hoses have to be removed, the shut off valve at the hydraulic tank has to be closed.
Turn the valve by 90° to close (fig.35).

A - **Open**
B - **Closed**

After the tank pressure is relieved, remove the drain valve on the suction hose fitting on the side of the pump and drain the hydraulic oil from the pump into a suitable container.

After repair, be certain to return the valve to its original position, push it in its notch and retighten the bleeder filter of the hydraulic tank.

Bleed the hydraulic pumps.

BLEEDING THE HYDRAULIC PUMPS

Bleed the hydraulic pumps after any repairs on the pumps and/or after every oil change.

To bleed the swing pump, loosen the union at the leak oil hose (fig. 36, pos. 2) and let the air escape. As soon as hydraulic oil flows out of the hose, reconnect the leak oil hose.

To bleed the working pumps, loosen the unions 3, let the air escape and retighten the nuts as soon as hydraulic oil flows out.

Fill the pumps with hydraulic oil through the same connection or plug before initial start up, or after repairs or replacement.