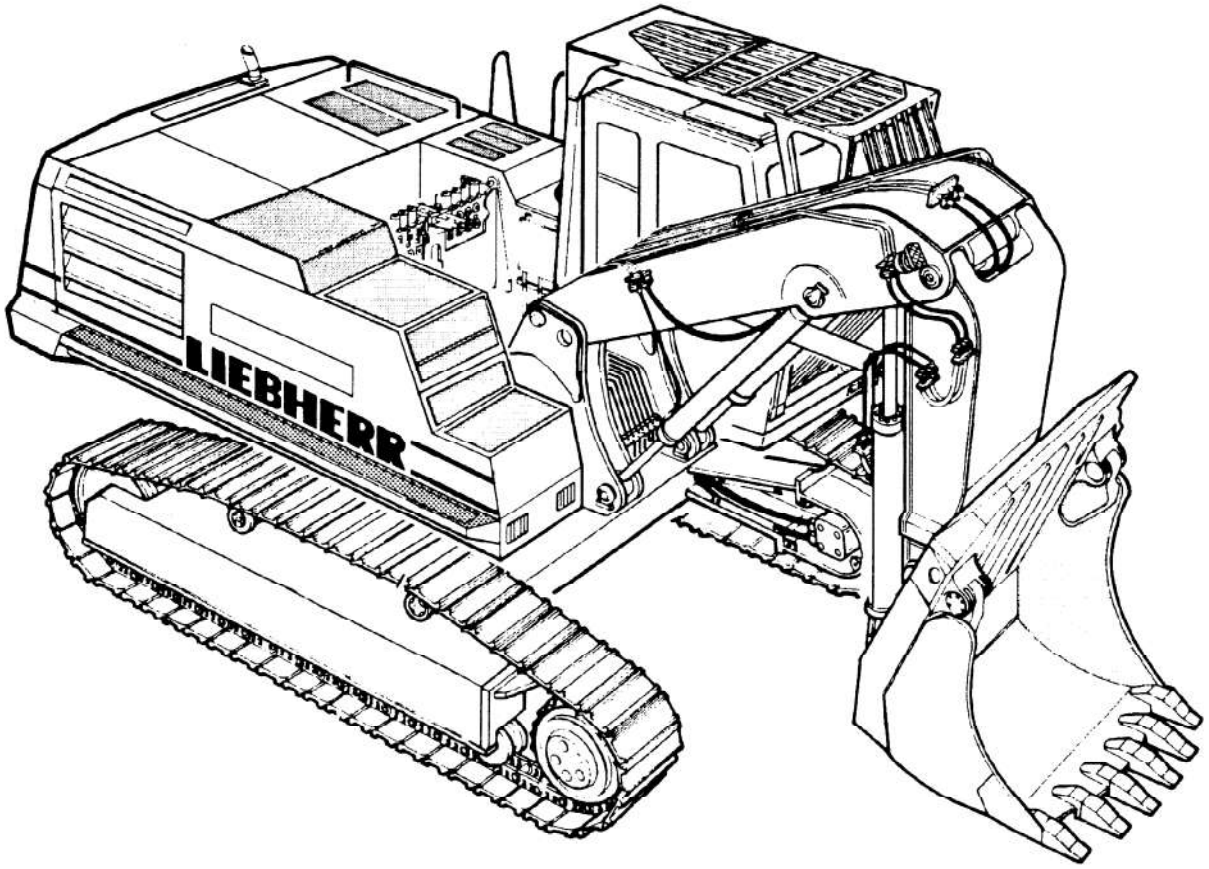
Operation and Maintenance Manual

R 974

Litronic



Diesel Engine

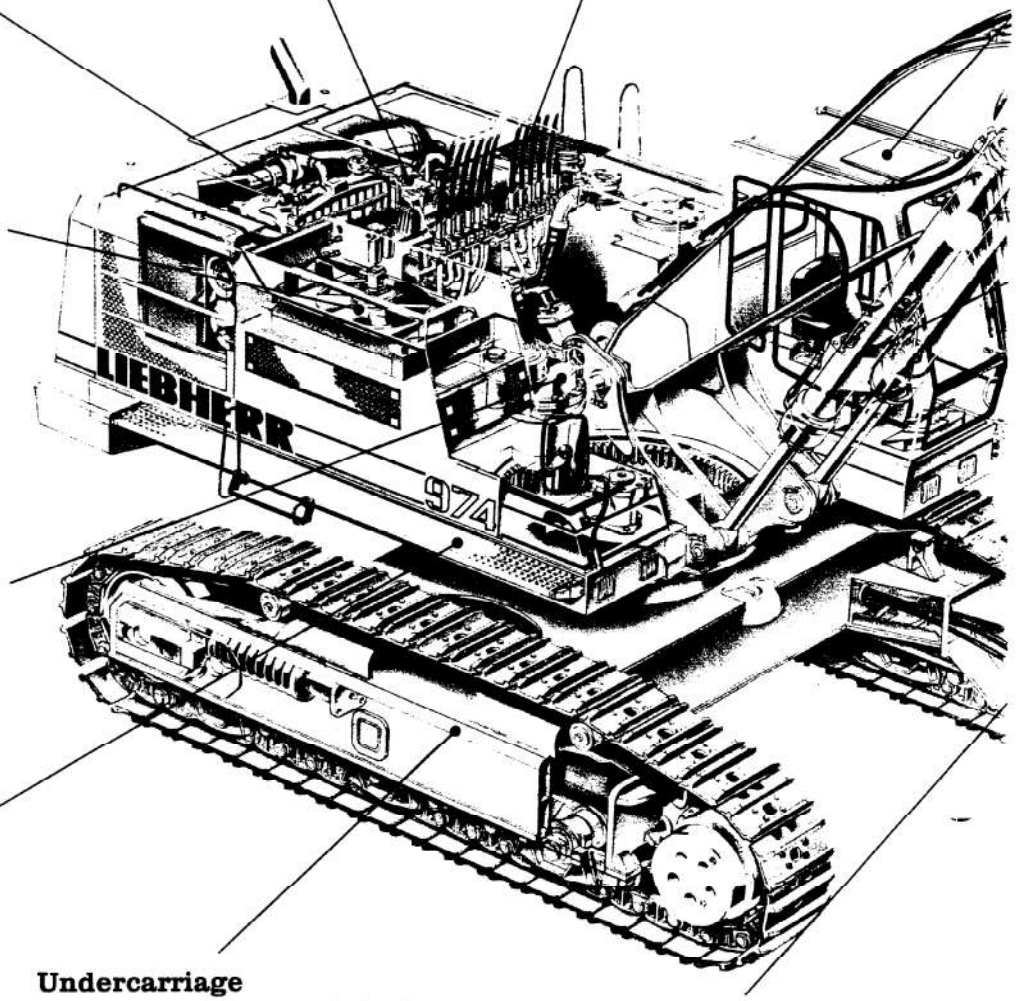
The heavy-duty, water-cooled and turbo-charged Cummins diesel engine is a powerful unit with high power reserves. Its low operating RPM results in lower fuel consumption, reduced emissions and a longer engine life.
The electronic "engine speed sensing pump regulation" protects the engine from overload, independent of external influences, and allows full utilization of the engine's available horsepower throughout its RPM range.

Hydraulic Pumps

Two, splitter box mounted, variable flow axial piston pumps for attachment and travel functions, and one reversible swash plate pump, for the closed-loop swing circuit.
An automatic oil flow optimizer assures efficient power distribution to individual functions.
Flow compensation reduces pump flow to a minimum, when joystick levers and foot pedals are in neutral. Energy loss and component wear are reduced, due to pressure compensation when maximum pressure is reached.

Control Valves

The valve blocks are easily accessible in the center of the upper structure.
Hydraulic lines between pumps, valve blocks, attachment and undercarriage are short and as straight as possible, to reduce flow resistance.



Hydraulic Oil Cooler

Optimum operating temperatures are assured, even in the most severe applications, through the use of an independent hydraulic oil cooler with thermostatically-regulated cooling fan.

Swing Drive

Acceleration of the upper is applied via an axial piston motor flanged to a Liebherr planetary reduction gear with self-adjusting air-over-hydraulic swing brake. Swing pump and motore are linked in an independent closed-loop circuit with swing torque control. High swing torque produces fast, powerful swing acceleration for short cycle times. The sealed, Liebherr manufactured triple roller swing ring has internal teeth for excellent protection from outside contamination.

Catwalks

Catwalks are standard on both sides of the upper frame and allow easy access to all upper components. Full-size, lockable doors and covers allow "walk-in" access to internal machine components.

Undercarriage

An overall low center of gravity for the machine is achieved through favorable weight distribution of the machine's undercarriage, upper structure and attachment. This low center of gravity, combined with a wide undercarriage base, provides excellent stability for smooth, precise work and efficient transmission of the high dig and break-out forces. It also increases the life expectancy of undercarriage components. Standard bolt-on track chain guides on each side frame protect and improve the life expectancy of track components.

Travel Drive

The final drive consists of a Liebherr axial piston motor and a planetary reduction gear. The compact unit and all hydraulic lines are integrated into the track frame for best protection. Maintenance-free, spring applied wet multi-disc brakes provide a safe work environment, even in the most difficult circumstances. Fast travel speed and high drawbar pull provide fast site changes, no matter what the terrain.

Technical Description

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 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 my 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 our 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.

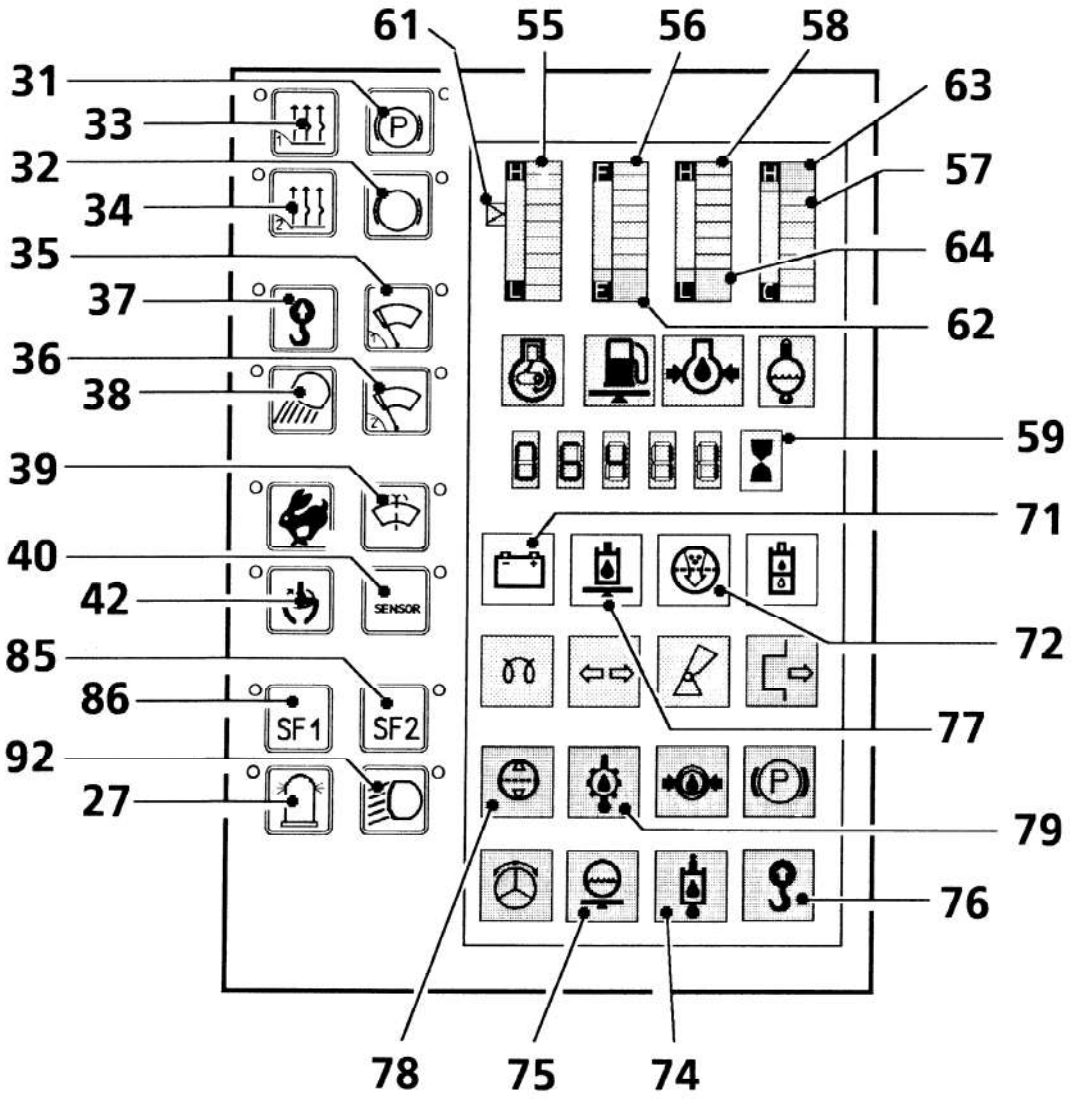
- Observe all danger and safety guidelines.

- 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 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.

CONTROL AND INSTRUMENT PANEL



Control Switches

27	Beacon*
31	Travel brakes
32	Swing brake
33	Heater: low
34	Heater : high
35	Windshield wiper : low
36	Windshield wiper : high
37	Overload warning device *
38	Head lights
39	Windshield washer *
40	Sensor Control *
42	Rotating grapple * or float position boom *
85	Fuel preheater (Thermoline)*
86	Cold starting aid
92	Auxiliary floodlights*

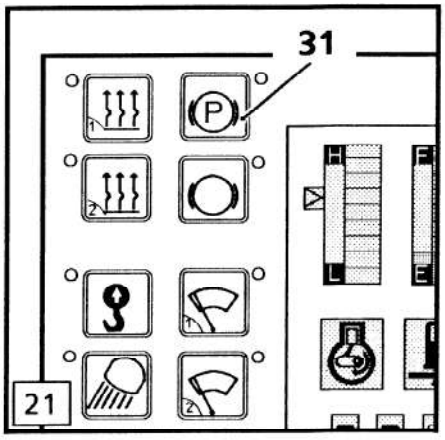
* Optional installation

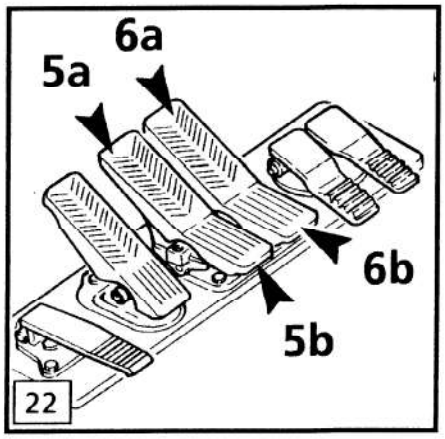
Measuring Instruments

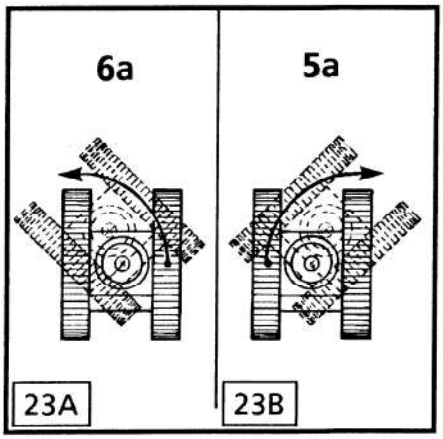
55	Tachometer
56	Fuel gauge
57	Engine coolant temperature gauge
58	Engine oil pressure
59	Hour meter

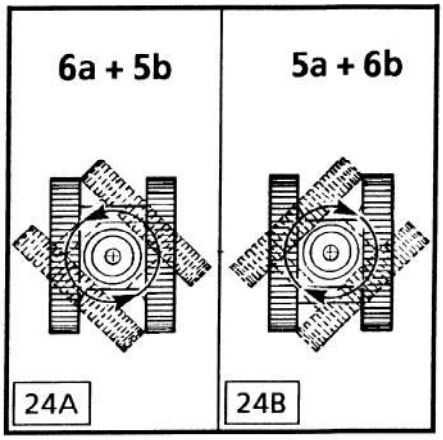
Indicator Lights

61	Indicator - ECO- speed control
62	Low fuel
63	Coolant temperature
64	Low oil pressure
71	Charge Indicator light
72	Air filter contamination
74	Hydraulic oil temperature
75	Coolant level
76	Overload warning device *
77	Hydraulic oil level
78	High pressure filter contamination
79	Splitterbox oil temperature









TRAVEL FUNCTIONS

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

TO RELEASE THE TRAVEL BRAKES

The travel brakes are controlled by push button 31 (Fig. 21). If the brakes are applied, the button lights up with a red light.

STRAIGHT TRAVEL

- **Travel forward :**
Push both foot pedals equally forward with your toes (Fig. 22, pos. 5a and 6a).

- **Travel reverse :**
Push both foot pedals equally downward with your heels (Fig. 22, 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. 23 A) :
Push the right foot pedal forward (pos. 6a).

- **To turn right forward** (Fig. 23 B) :
Push the left foot pedal forward (pos. 5a)

⚠ CAUTION

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

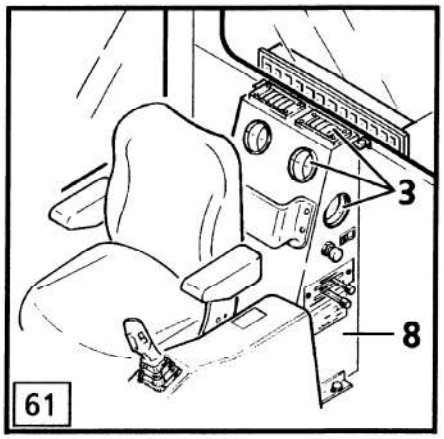
COUNTER ROTATION (Fig. 22)

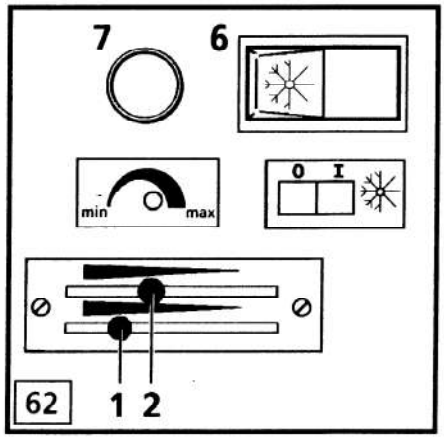
- **To turn left** (Fig. 24A) :
Push the right pedal forward (pos. 6a) and at the same time push the left pedal down with your heel (pos. 5b).

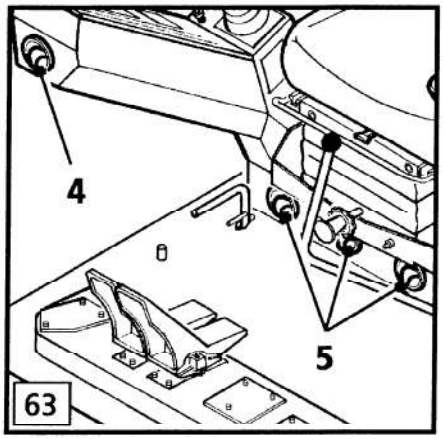
- **To turn right** (Fig. 24 B) :
Push the right pedal down with your heel (pos. 6b) and at the same time push the left pedal forward (pos. 5a).

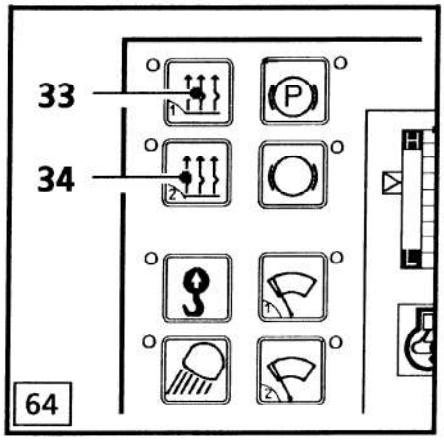
⚠ DANGER

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









THE HEATER AND AIR CONDITIONER

(Optional equipment)

FRESH AIR VENTILATION

For fresh air cab ventilation close the shut off valves on the Diesel engine (fig. 53).

Push lever 1 (fig. 62) all the way backward to close off the hot water supply.

Push button 33 or 34 to select desired air flow (fig. 64).

The fresh air flows into the cab both via vents 3 (fig. 61) on the air conditioner 8 and via vents 4 and 5 (fig. 63) on the seat console and on the instrument panel.

Move the lever 2 to regulate the amount of fresh air entering the cab.
With lever 2 pushed backward to the stop the cab is ventilated only with recirculated air.

HEATER OPERATION

Open the shut off valves on the Diesel engine (fig. 53).

The amount of water flowing through the heat exchanger can be regulated by moving lever 1(fig. 62).
The warm water flow is maximum when the lever is pulled forward to the stop.

AIR CONDITIONER OPERATION

Close the shut off valves on the Diesel engine and push back to the stop the lever 1.

Start air conditioner compressor and condenser fan by pushing rocker switch 6 (fig. 62).
The air conditioner should only be turned on after the engine is running. This will prevent an overload on the starter and batteries.

Adjust the cold air temperature by turning the thermostat pos. 7 (fig. 62).

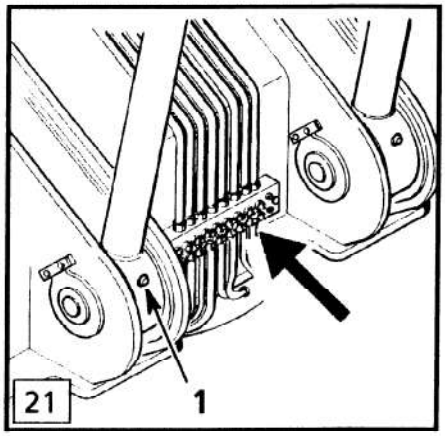
At high ambiant temperature, close the vent 4 to avoid an unnecessary heating of the cab air along the windshield.

The air conditioner may also be switched on in winter season to dehumidify the cab by extremely high air moisture.
In this case reduce the warm water flow via lever 1 and switch on the air conditioner for a short time, until the inside of the cab is free of condensation.

FOR HEATER AND AIR CONDITIONER OPERATION

The desired air flow is selected by pushing button 33 or 34 (fig. 64).

The best heating, resp. cooling effect is reached by recirculating air, this means when the lever 2 is pushed back to the stop.

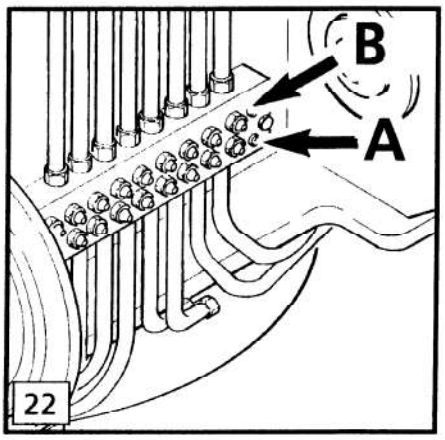


TO LUBRICATE THE ROLLER BEARING RACES

The roller bearing races must be lubricated daily. If the machine is used in multi shift service, or around the clock, they have to be lubricated at every shift change.

Add several strokes of grease with the grease gun into each of the grease fittings on the bottom row of the lube plate on the swing ring (Fig. 22, pos. A).

See the lubricant chart for grease specification.



LUBRICATION OF ATTACHMENT BEARING POINTS

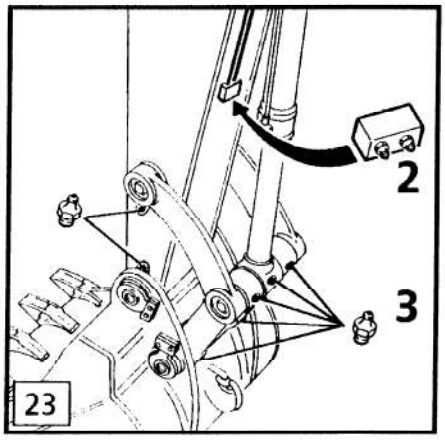
The boom bearing points (except two lube points on the bottom of the boom cylinder, fig. 21, pos. 1) are easily accessible on the top row of the swing ring lube plate (fig. 22, pos. B).

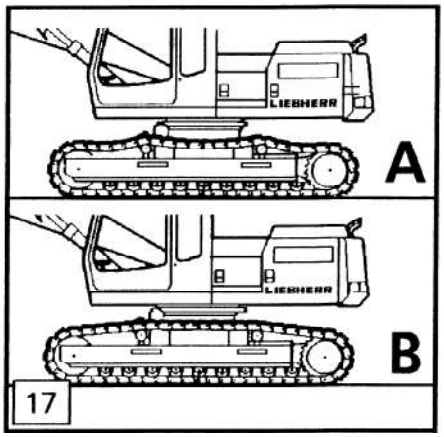
The stick bearing points are all combined on the underside of the stick (fig. 23, pos. 2).

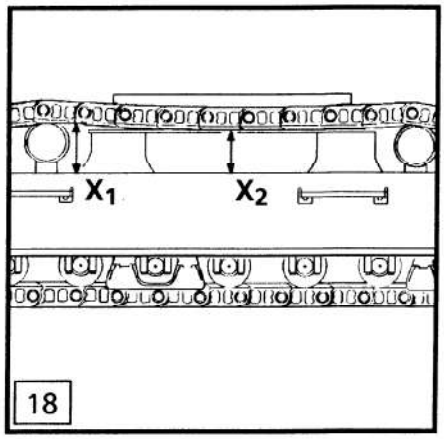
The lubrication points on the bucket are installed separately (fig. 23, pos. 3).

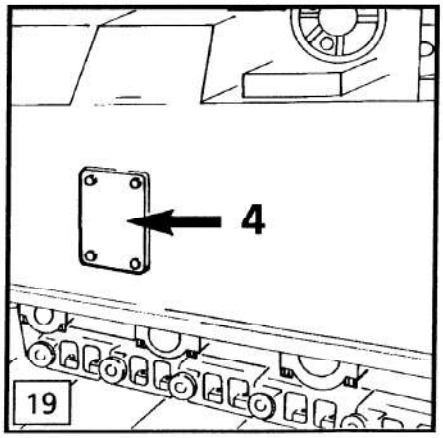
Add grease daily or after every shift change on every grease fitting, until clean grease runs out of the bearing points.

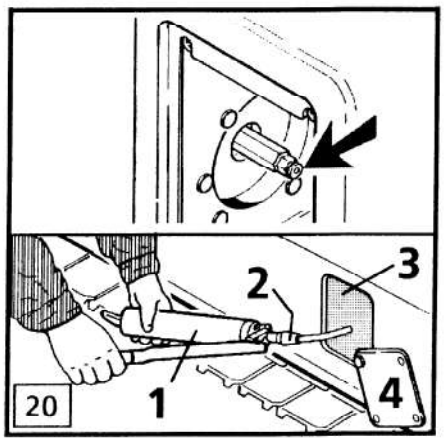
See the lubricant chart for grease specification.











THE TRACK COMPONENTS

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

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

TIGHTENING THE TRACK TENSION

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

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

The track chain tension is correct when the slack between both carrier rollers is about 1.2" (30 mm).

To check the chain slack (fig. 18) :

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

To tighten a track :

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

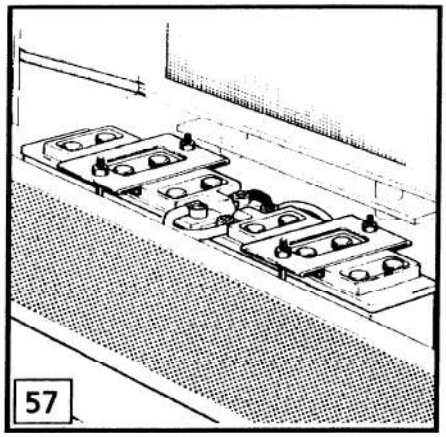
Attach a special fitting 2 to grease gun 1 (Fig. 20).
Connect the grease gun to cylinder 3.

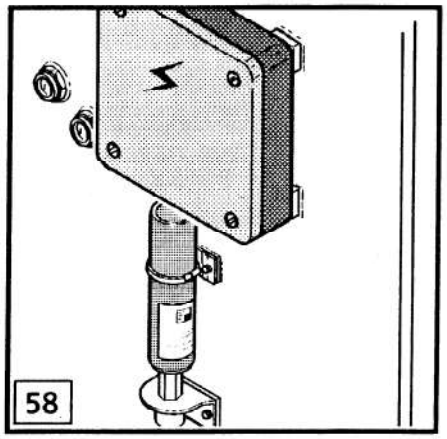
Pump grease into cylinder 3 until the track chain is properly tensioned.

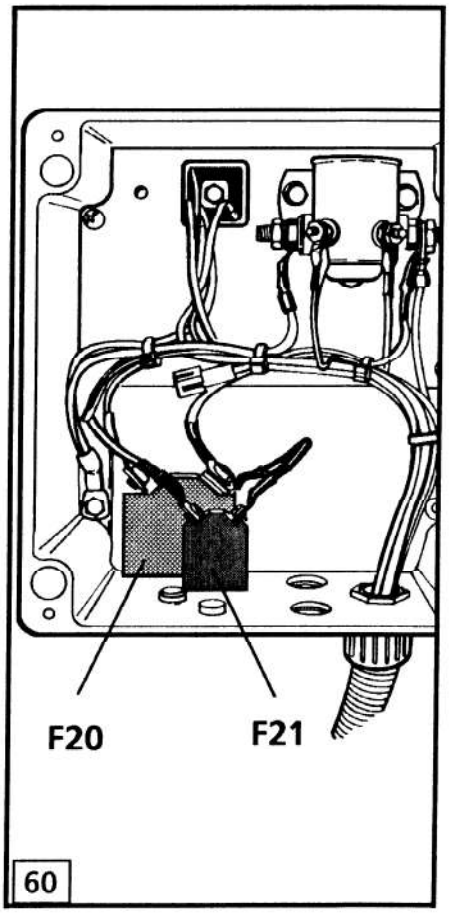
To release track tension, carefully release some grease from the grease cylinder by loosening and turning the grease fitting counterclockwise.

⚠ DANGER

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







THE ELECTRICAL SYSTEM

To insure troublefree operation of your machine, the electrical system must be in good condition. The gauges, indicators and components of the electrical system should be checked daily for proper function.
Always replace burnt out fuses and bulbs. DO NOT repair fuses.
Check for bare and damaged wires which could cause damage to the electrical system or a fire. Check for loose, dirty or corroded connections.

IMPORTANT :

When performing repairs on the electrical system, or before using an arc welder on the machine, the negative battery terminal should be disconnected first and reconnected last.
Cover the electrical components (especially the alternator) when washing the excavator to protect it from water.

BATTERY MAINTENANCE

In order for the batteries to function properly, it is important to keep them clean at all times.

The battery poles and cable clamps in particular should be cleaned regularly and then coated with acid resistant grease (Fig. 58).

To check the electrolyte level, open battery compartment door, lift up rubber cover and remove caps.
The electrolyte level should be 1/2" (10 - 15 mm) above the plates.
If the electrolyte level is low, add distilled water.

Regularly check the specific gravity with a hydrometer. A fully charged battery should have a value of 1.28 kg/l (31.5°).

Batteries with a lower value should be recharged. Reinstall caps, check mounting security of batteries and close the battery compartment door.

⚠ DANGER

Wear protective gloves and safety glasses when handling batteries!
Keep sparks and open flame away from battery.
Battery fumes are highly flammable and explosive.
Batteries contain acid which should not be touched. In case of contact, flush with water and get medical attention.

ARRANGEMENT OF THE CIRCUIT BREAKERS AND FUSES

The circuit breakers F 20 (main circuit), F 22 (starter circuit) and F 21 for the optional fuel pump are located in the electrical box mounted to the rear of the hydraulic tank (fig. 58 and 60).

All other fuses are located on the printed circuit in the electrical box of the left joystick (Fig. 64). Remove the four screws and lift off the cover to get to the box.

⚠ CAUTION

Use only original replacement fuses. If fuses blow frequently, the defect in the affected circuit must be checked and corrected. Never repair a blown fuse!