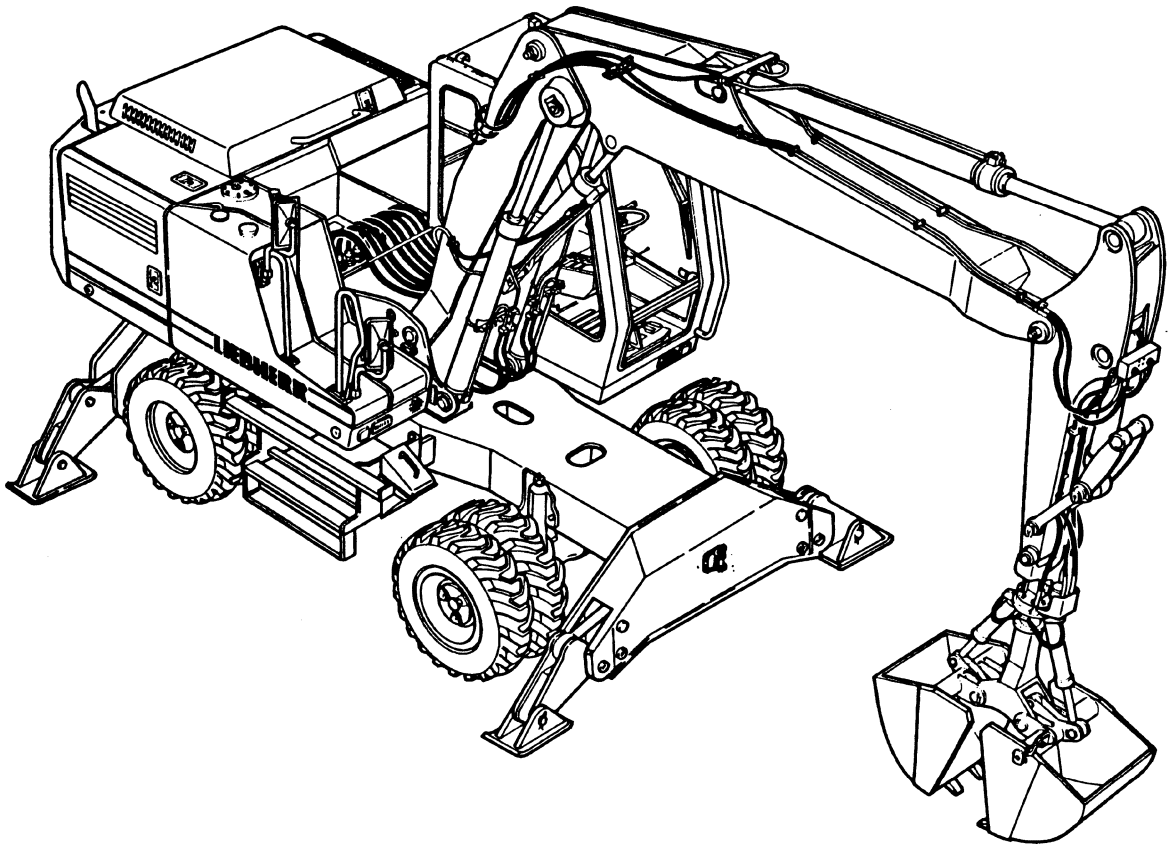
# Operation and Maintenance Manual

# A 912 Litronic

from Serial No. on **5001**



# 2. SAFETY INFORMATION

Working with an excavator can be dangerous, it could result in injury or death if proper precautions are not taken! **WE URGE YOU TO READ THIS MANUAL CAREFULLY!** This safety information is provided to operators and maintenance mechanics to ensure the safe operation and maintenance of the excavator. It is essential that you read and familiarize yourself with this information, which explains safety requirements and precautions and specific hazards of which you should be aware. This also applies to any personnel which might be working on the machine only occasionally, such as during set up or maintenance. It is essential that you read and familiarize yourself with this information, which explains safety requirements and precautions and specific hazards of which you should be aware.

- Careful adherence to these safety guidelines will permit safe operation and maintenance and potentially prevent personal injury to yourself and others, and possible damage to the excavator.
- Important safety notes such as **DANGER, CAUTION** or **NOTE** are used throughout this manual to emphasize important or critical instructions.
  In this manual, **DANGER, CAUTION** or **NOTE** are defined as follows :

**⚠ DANGER**

Denotes an extreme intrinsic hazard which could result in a high probability of death or serious injury if proper precautions are not taken.

**⚠ CAUTION**

Denotes a reminder of safety practices or directs attention to unsafe practices if proper precautions are not taken.

**☞ NOTE**

**NOTE** describes operation and maintenance procedures which should be followed to keep your excavator operation and to insure long machine life and/ or to facilitate certain procedures.

In addition to these instructions you must follow the safety regulations applicable to your work environment and job site and any federal, state and local safety requirements (A model excavators must also follow local and federal highway regulations).

For EC countries, guidelines 89 / 655 / EWG contain the minimum safety guidelines for users.

## DESTINED USE

The excavator with the standard backhoe, grapple or bucket attachment may only be used to loosen, pick up, move, load and dump soil, gravel, rock, or other material and to load trucks, barges, conveyor belts, or rock crushing systems.

Special guidelines are applicable for machines used for lifting applications and special safety devices must be installed.

Any other use above and beyond the applications described above, such as breaking out rock or demolishing buildings, pounding in posts etc. requires special attachments and safety devices.

Transporting personnel or loads etc. is not considered destined use and is therefore prohibited. The manufacturer / dealer is not responsible for any resulting damage. Any risk must be carried by the user himself.

Destined use is considered part of observing and adhering to all regulations and inspection and maintenance guidelines given in this Operation and Maintenance Manual.

# 3. CONTROLS AND INSTRUMENTATION

## THE OPERATOR'S SEAT

### ADJUSTMENT

Before adjusting the seat, tilt up the safety lever 1 (fig. 1) to relieve the servo pressure.

**Horizontal seat adjustment :**

To move the seat forward/ backwards without moving the two joysticks, pull the lever 1 (fig. 2) up and slide seat to desired position.

To move the seat forward/backward **with the joysticks,** pull the lever 2 (fig. 2) up.

**Seat suspension adjustment :**

The suspension should match the operator's weight.
To adjust the suspension, turn the adjustment ring at the knob 5 (fig. 3).

**Seat cushion tilt and height adjustment :**

The seat cushion can be brought in the desired position by moving the lever 4 (fig. 3).

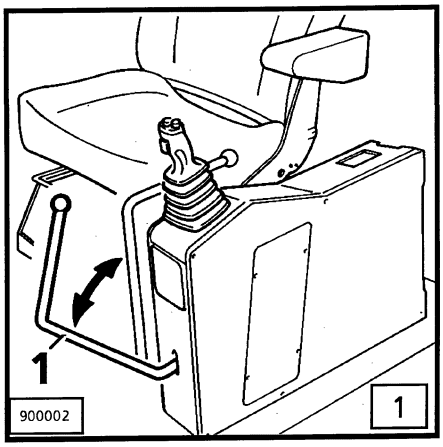
- Pull up the lever to raise or lower the front part of the cushion seat.
- Push down the lever to raise or lower the rear part of the cushion seat.

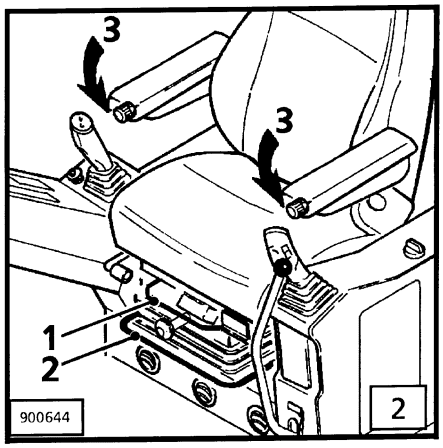
**Backrest tilt adjustment :**

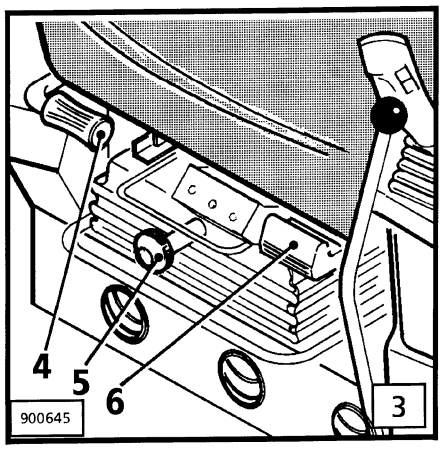
To adjust the backrest, pull the lever 6 (fig. 3) up and move the backrest to the desired position.

**Armrests adjustment :**

The height of the armrests can be adjusted for optimum operator comfort, by turning the knob 3 (fig. 2) .




### OSCILLATION ATTENUATION

When operating an ISO 7096 approved driver's seat during authorized application of the earthmoving machinery, the rated accelerated vibrations $a_{zw}$ (measured by ISO 2631 part 1) are assured to meet the protection requirements for whole body vibrations.

## ENTERING OR LEAVING THE CAB

Always use the steps, rails and handles provided to enter and leave the machine !

**⚠ CAUTION**

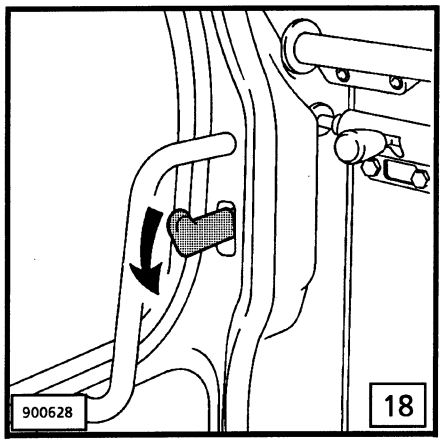
**NEVER JUMP OFF THE MACHINE !**

## CAB DOOR - LOCK

The cab door is held closed by the door lock (fig. 18).

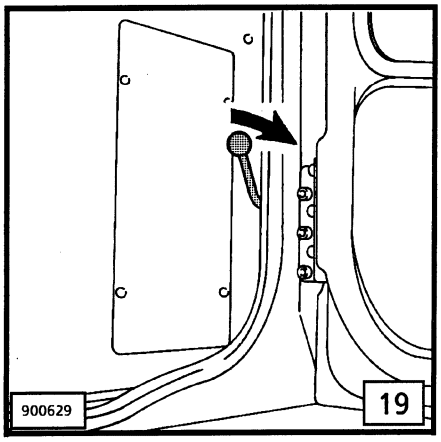
**To open the cab door:**

- Pull the lever on the door lock downward.




**To unlock the fully opened cab door:**

- Push the lever inside on the cab door to the front (fig. 19)

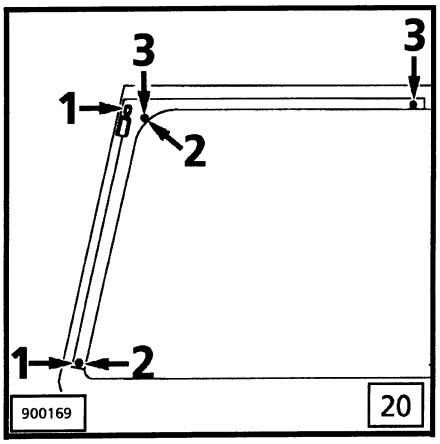



## FRONT WINDOW

(Move the sun visor). Push the locking bracket in. Push the front window slightly in to notch it in position and push the locking brackets apart to lock in place.

**Locking holes for three window positions:**

| | |
|---|---|
| Window closed: | Pos. 1 |
| Ventilation: | Pos. 2 |
| Window open: | Pos. 3 |



# MACHINE OPERATING SAFETY

- Familiarize yourself with job site rules. Be informed about traffic and hand signals and safety signs. Ask who is responsible for signaling.
  Check your surrounding for any obstacles in the working and movement range, check the load carrying capacity of the terrain, and secure the job site to shield it from any public highway traffic.
- Always keep a safe distance from overhangs, walls, drop offs, and unstable ground.
- Be alert of changing weather conditions, bad or insufficient visibility and of changing ground conditions.
- Be alert for utility lines, check the location of underground cables, gas and water lines, and work especially careful in that vicinity. If necessary and/ or if required, call local authorities to mark the location.
- Keep sufficient distance to electrical lines. When working in the vicinity of high voltage electrical lines, keep proper distance to assure that the attachment does not come close to the lines.
  DANGER! You must inform yourself about safe distances.
- In case you do touch a high voltage line by accident, proceed as follows:
  - do not leave the machine,
  - move the machine, if possible, from the danger zone until you obtain sufficient distance,
  - warn any personnel in the vicinity not to come close to the excavator and not to touch it,
  - instruct or initiate that someone turns off the voltage.
  - Do not leave the machine until you are absolutely sure that voltage in the line, which had been touched or damaged, has been turned off!
- Before moving the machine, make sure that the attachments and equipment is secured properly to avoid accidents.
- When traveling on public roads or highways, make sure to observe traffic regulations, and make sure that the machine meets federal and local public highway standards.
- Always turn on the lights if visibility is bad or if you are still working during dusk.
- Never allow other personnel on the excavator.
- Operate the excavator only while seated and with the seat belt fastened, if installed.
- Report any problems or needed repairs to your foreman or supervisor and make sure they are corrected immediately.
- Do not move the excavator until you are certain that no one is endangered by moving the excavator.
- On machines without negative brakes check the brake system before starting to work, as outlined in the **Operation and Maintenance Manual.**
- Never leave the operator's seat while the machine is still moving.
- Never leave the machine unattended, with the engine running.
- When moving the excavator, keep the upper-carriage in lengthwise direction and keep the load as close as possible to the ground.
- Prevent any working movements, which could tip the machine over. If the excavator begins to tip or slip on a grade, immediately lower the attachment and load to the ground and turn the excavator facing downhill.
  If possible, always operate the excavator with the attachment positioned uphill or downhill, never sideways.
- Always travel slowly on rough or slippery ground and on slopes.
- Always travel downhill at permissible speed, so you don't loose control over the machine. The engine must run at nominal speed, use only the foot pedals to brake and slow down the machine.
  Never shift during down hill travel, always shift to a lower gear before traveling downhill.
- Never load over an occupied truck. Request that the driver leave the cab, even if a rock protection is installed.
- For demolition work, clearing, crane operation, etc. always use the appropriate protection device designed for this specific application.
- If operating in visually obstructed terrain or whenever necessary, have another person guide you. Always have only one person signal you.
- Allow only experienced persons to attach loads or to guide operators. The guide must be visible by the operator and / or must be in voice contact with him.
- Depending on the attachment combination, it is possible for the bucket teeth to hit the cab, the cab protection or the boom cylinders. Be very careful when the bucket teeth get in this range to prevent any damage.

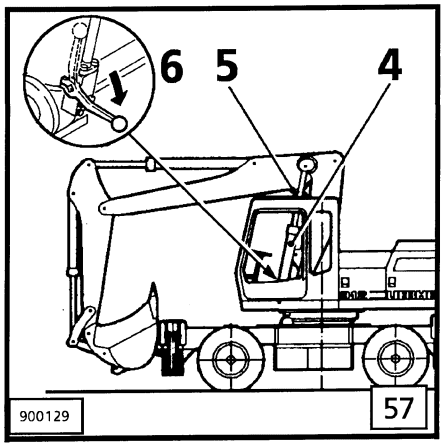
## HYDRAULICALLY ADJUSTABLE BOOM ( fig. 57 and 58 )

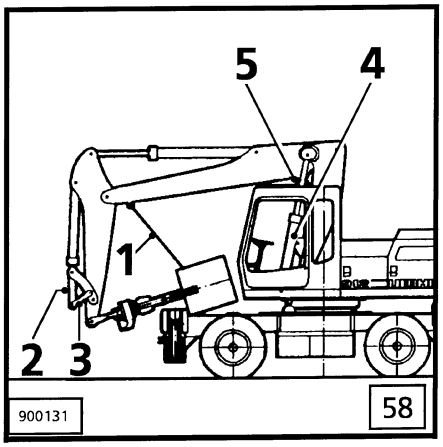
- Turn the uppercarriage in lengthwise direction (align over the steering axle) and lock it with the locking pin to the undercarriage (see page 4.13).
- Tilt in the bucket and bring the stick into a vertical position (fig. 57) or place the grapple with the help of the guy ropes 1 (fig. 58) onto the undercarriage. Do not remove the ropes during travel.
  Secure the connector 2 (fig. 58) to the bracket 3.
- Fully extend the basic boom cylinder 4 (fig. 57 and 58) and fully retract the adjustable boom cylinder 5.
- Secure the attachment by closing shut off valve 6 (fig. 57) to prevent the attachment from dropping further (does not apply if check valves are installed on the boom cylinders).
- Bring the outrigger / blade support into on road travel position (see page 4.10) and secure mechanically.
- Turn off control for working hydraulic

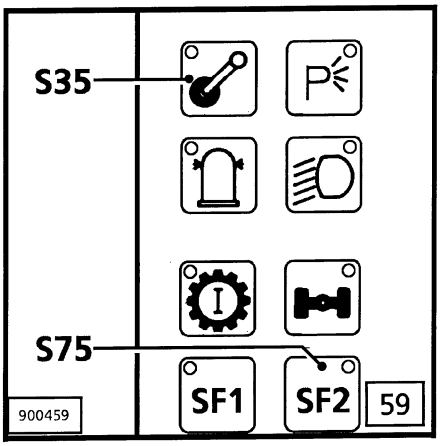
  Turn the joystick function off to prevent inadvertent movement of the attachment via the rocker switch **S35** (fig. 59). If the indicator light lights up, the joystick levers are functioning.
- When travelling on a road or public highway, turn the automatic foot brake / ascillating axle **S75** off (fig. 59).

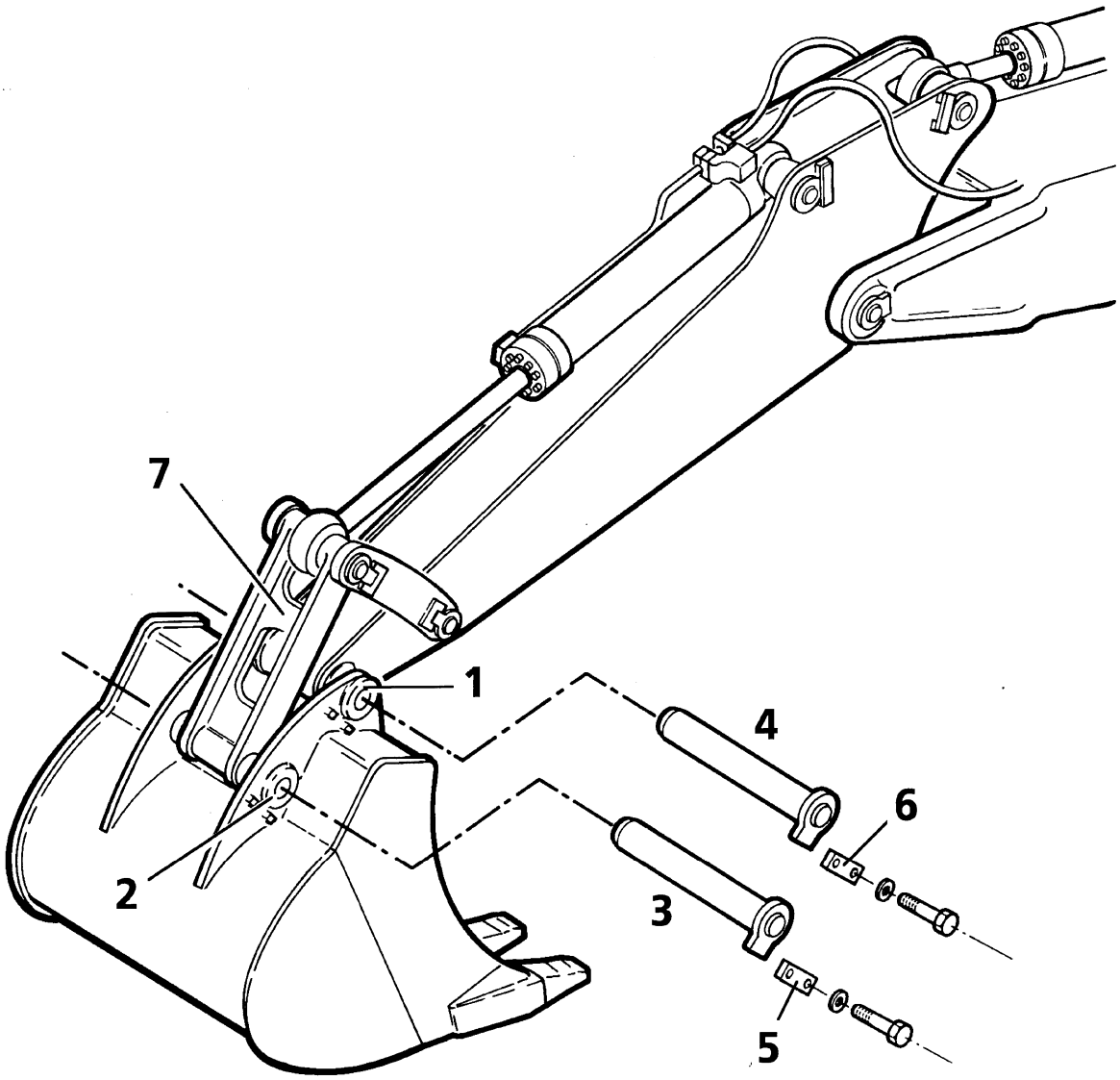
**⚠ CAUTION**

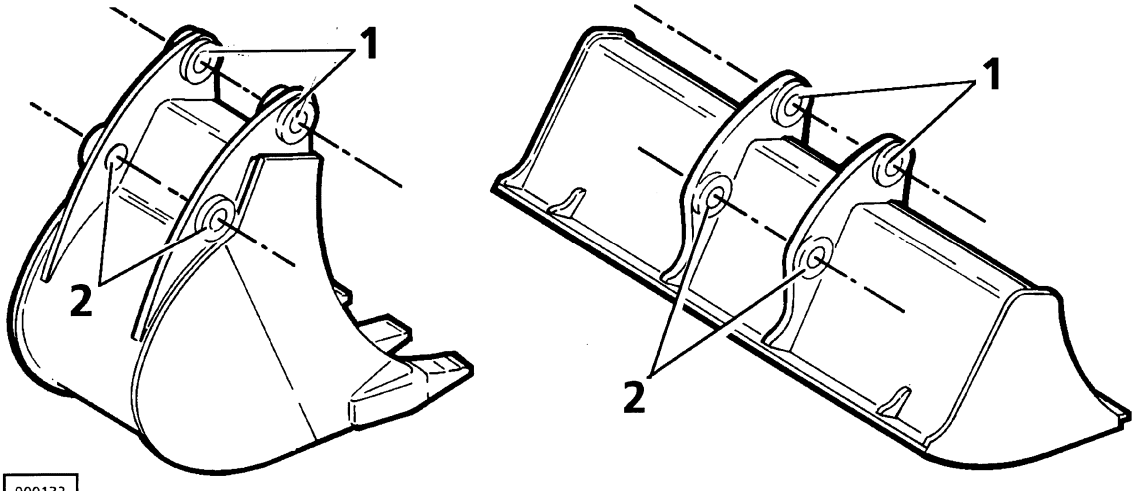
**THE SHUT OFF VALVE (POS. 6) MAY NOT BE UTILIZED AS A SHUT OFF VALVE FOR LOAD LIFTING WORK.**



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## FUEL :

Diesel fuel should meet the following minimum specifications. The sulfur content should not exceed 0.5 % .

A higher sulfur content can affect oil change intervals and engine service life .

### Flow improvers for Diesel fuels in very low temperatures

In ambient temperatures below 0°C, the flow properties in warm temperature type Diesel fuel can be insufficient due to paraffine clouding. The same can happen for cold weather type Diesel fuels below -15°C .

Often Diesel fuel is offered with an additive, for temperatures to -20°C .

To prevent problems, at even lower temperatures, the Diesel fuel should be mixed with normal gasoline or petroleum .

Adding normal gasoline should be seen as an emergency measure, and may not exceed 30 % in volume.

Super gasoline may not be used to mix with Diesel fuel.

When adding other fuels or additive to the Diesel fuel, the engine performance may drop. For that reason, keep any added mixtures as low as possible, depending on the ambient temperatures.

For safety reasons, always mix fuels in the fuel tank.

When refueling, add the lighter additive before the Diesel fuel. Then run the engine until the mixed fuel has been distributed throughout the complete fuel system.

See chart below for ratios.

### Additives to Diesel fuel (flow improvers)

Commercially available flow improvers can also improve Diesel fuel performance in cold temperatures. Read and observe all manufacturer's instructions and quantities when using additives.

### Permitted fuel specifications:

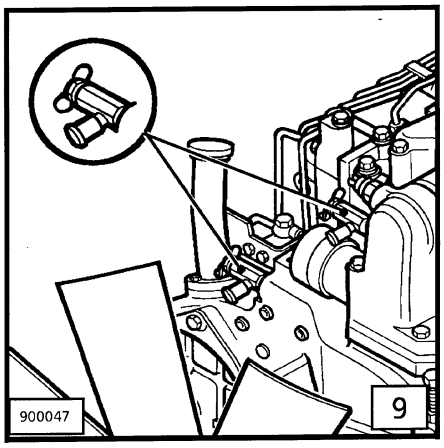
DIN EN 590
Nato Code F 54, F 75
BS 2869 : A1 and A2
ASTM D 975 - 88 : 1 D and 2

### Diesel fuels - mixture ratio (Vol.-%)

| Ambient temperatures °C | Summer Diesel fuel % | Additive % | Winter Diesel fuel % | | Additive % | |
|---|---|---|---|---|---|---|
| | | | - 15°C | - 20°C | - 15°C | - 20°C |
| 0 bis - 10 | 70 | 30 | 100 | 100 | - | - |
| - 10 bis - 15 | 50 | *50 | 100 | 100 | - | - |
| - 15 bis - 20 | - | - | 70 | 100 | 30 | - |
| - 20 bis - 25 | - | - | 50 | 70 | *50 | 30 |

* If more than 50% are required, use only petroleum (no regular gasoline) .

## TO ADD COOLANT AND VENT THE COOLING CIRCUIT




Close drain plug 1 on the radiator and drain plug 2 on the engine.

Open the shut off valves for the heater circuit on top of the Diesel engine (fig. 9) and the regulating valve on the heater.

Open plug 4 (fig. 5) and breather valve 5 (fig. 6) on top of the radiator.

Add coolant to the expansion tank. Close plug 4 and 5 as soon as it runs out.

Start the engine, run it in low idle for about 30 seconds. Turn the engine off. Vent via plug 5 and add more coolant to fill the expansion tank all the way.

Start the engine again and run it for about 20 minutes (if necessary, remove the coolant system cover to open the thermostats, but the overheat indicator on the display panel should remain below the red range. )

Run the engine one minute longer at low idle (if necessary, remove the cooling circuit cover again. Check the coolant level in the expansion tank and add more coolant if necessary.

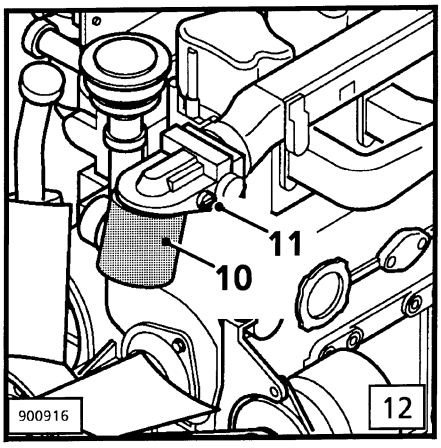
If the engine coolant level indicator actuates during operation, check the coolant level and add more coolant, if necessary. Repeat bleeding process as described above.

⚠ CAUTION

**When adding coolant, make sure the expansion tank if filled to the upper edge of the filler neck, add coolant until the coolant level in the filler neck no longer drops. (It is not possible to overfill the system).**

## CHANGING THE WATER FILTER

The water filter contains a paste-like corrosion protection additive which provides the right mixture for corrosion protection.




The water filter (picture 12, position 10) must be replaced every 500 operating hours:

- Close stop-valve 11 on the filter casing,
- Screw off the filter element,
- Lubricate the new filter element's sealant ring lightly,
- Screw on the new filter element until the sealant ring comes in contact with the filter head. Tighten the filter element round another $\frac{1}{2}$ to $\frac{3}{4}$ **by hand**.

  **(Do not use any tools for tightening)**.
- Open the stop-valve again (ON).

## HYDRAULIC LINES AND HOSES

- Hydraulic lines and hoses may never be repaired!
- All hoses, lines and fittings must be checked regularly, but at least 1 x per year for leaks and any externally visible damage! Any damaged sections must be replaced immediately! Excaping 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 lift is limited.
  Improper storage, mechanical damage and improper use are the most frequent causes of hose faulires.

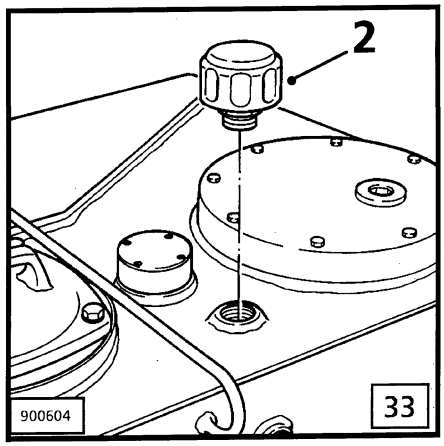
  The service life of a hose may not exceed six years, including a storage period of not more than 2 years (always check the manufacturer's date on the hoses).

  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:
  - Damage on the external layer into the inner layer (such as chaffings, 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;
  - 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;
  - Storage or service life has been exceeded.

  When replacing hoses or lines, always use Original replacement parts.
- Route or install the hoses and lines proberly. Do not mix up the connections!

### BLEEDER FILTER ON HYDRAULIC TANK

This filter (fig. 33, pos. 2) must be replaced every time the oil is changed (see maintenance plan)




**NOTE**

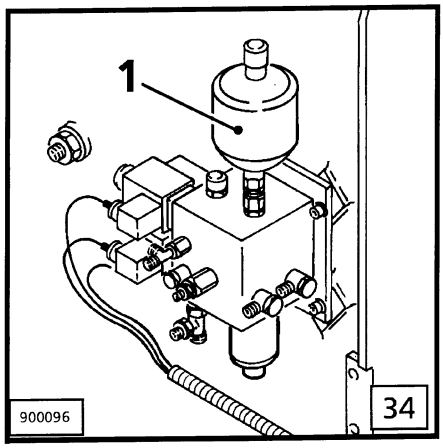
**When working in dusty conditions, observe the special guidelines for filter change, see page 5.7.**

## THE SERVO CONTROL SYSTEM

The servo control valves need no special maintenance. However, all tube and hose connections to all components, such as accumulator, pressure relief valves, filter etc., must be checked regularly for leaks.

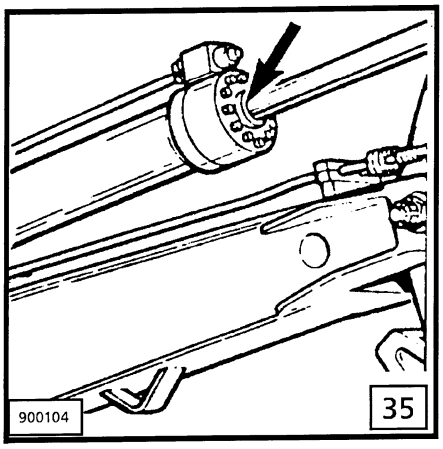
**DANGER**

**The accumulator 1 (fig. 34) keeps the servo control system pressurized even after the engine is turned off. Make sure the pressure is relieved before any repairs. Lower the attachment to the ground, turn the engine off, turn the ignition key to contact position and move the joystick several times to relieve the pressure.**




### HYDRAULIC CYLINDERS

**IMPORTANT:**
Before attempting to repair, replace or reseal hydraulic cylinders (fig. 35) or any other components, contact your LIEBHERR dealer.




### PISTON ROD PRESERVATION

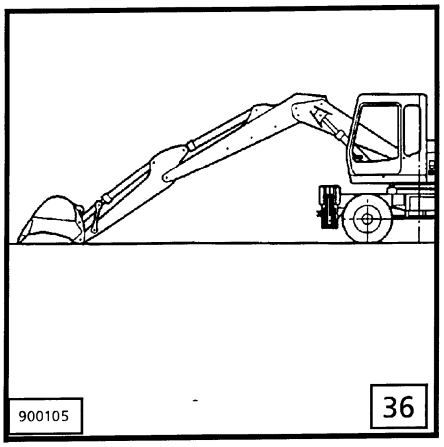
Corrosion is comparable to wear and tear. Therefore, if the machine is not being used for longer than 4 weeks or if the machine is transported by ship, the following should be done:

**Park or transport the excavator in a way so that the piston rods are retracted as much as possible (fig. 36).**

Lubricate all bearings, ball joints, hinges, exposed parts, cable connections and exposed cylinder rods with anti-corrosive grease (such as LIEBHERR CTK, Id. No. 861331301).

If the machine is transported by ship and exposed to sea water or during the winter and exposed to road salt, the preservation of the piston rods must be rechecked after the machine has been loaded since the anticorrosive grease may have been removed by the wiper ring.

If the machine is used during certain working applications which only require a short stroke, the cylinder should also be lubricated.



## TO REPLACE THE BUCKET TEETH

Check the bucket teeth regularly for wear. Increased power is needed if bucket teeth are worn.

Always replace the teeth before the adapter is damaged. Never work with a missing bucket tooth.

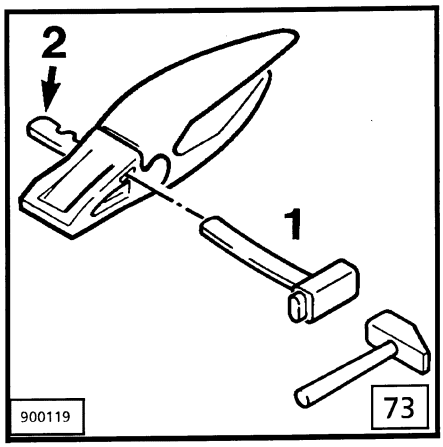
### TO REMOVE AND INSTALL A NEW TOOTH

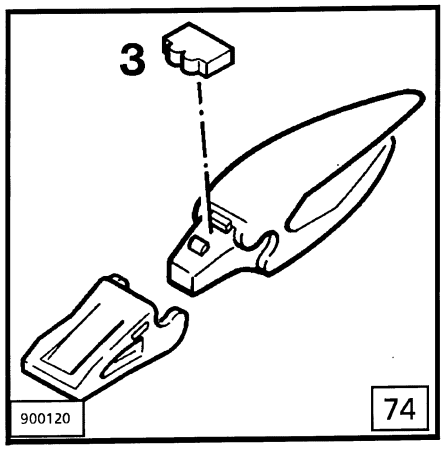
**⚠ DANGER**

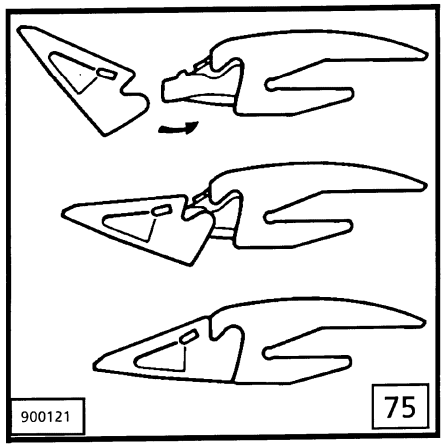
**Make sure there is no other personnel in the vicinity when knocking out a tooth lock pin!**

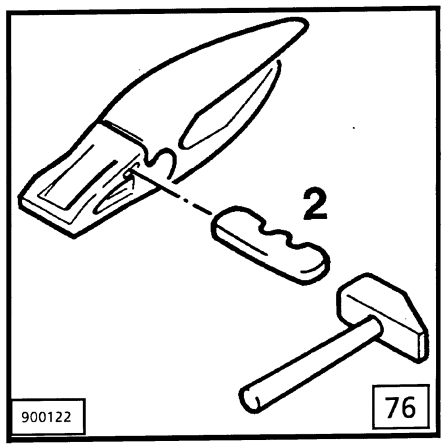
**Be sure to wear safety glasses!**

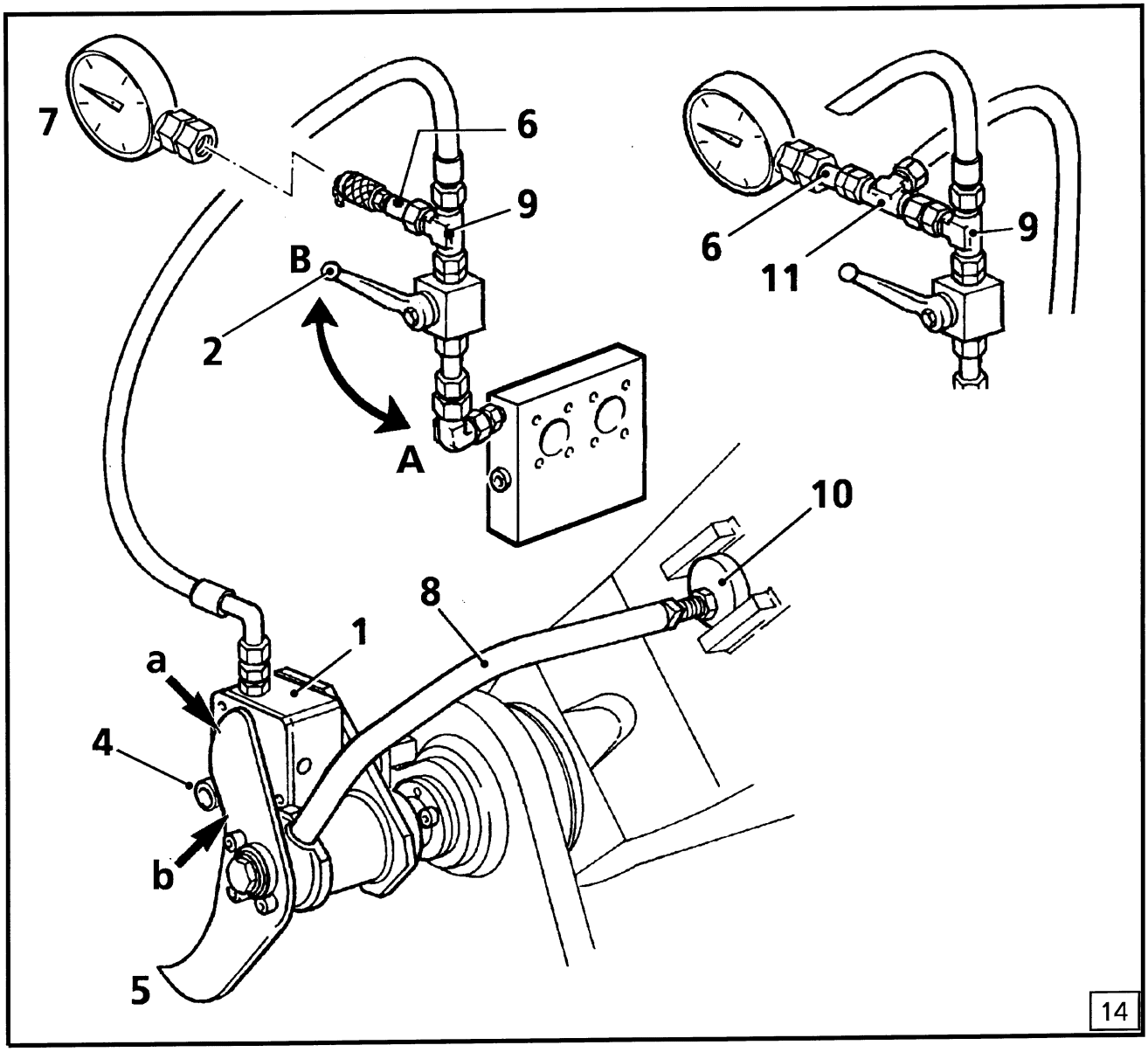
- Drive out pin 2 with a hammer and wedge 1 (fig. 73) and then remove the old tooth.
- Insert a new rubber wedge retainer 3 on the adapter (fig. 74).
- Push the new tooth on the adapter (fig. 75).
- Drive in wedge 2 with hammer (fig. 76).



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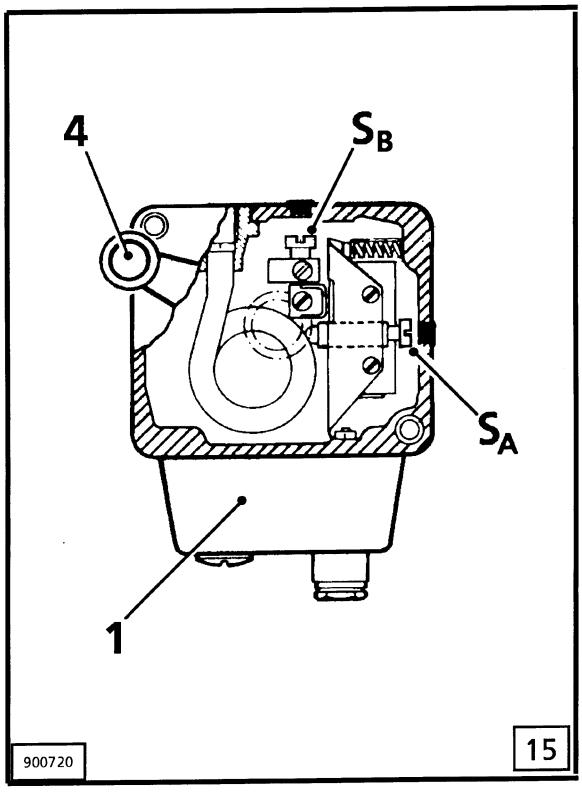


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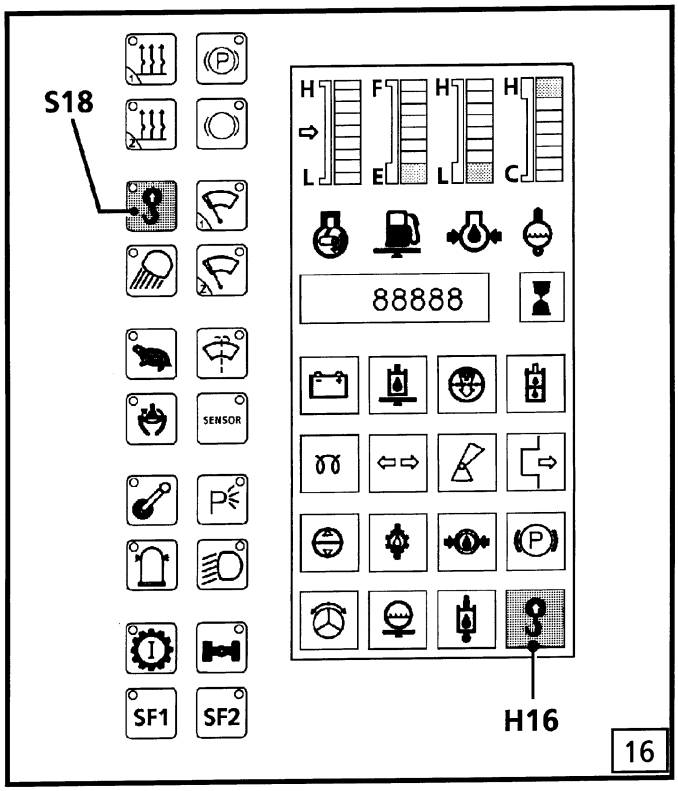


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## FOR HEATER AND AIR CONDITIONER OPERATION

The air flow is turned on by pushing switch **S12** or **S13** (fig. 5).

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