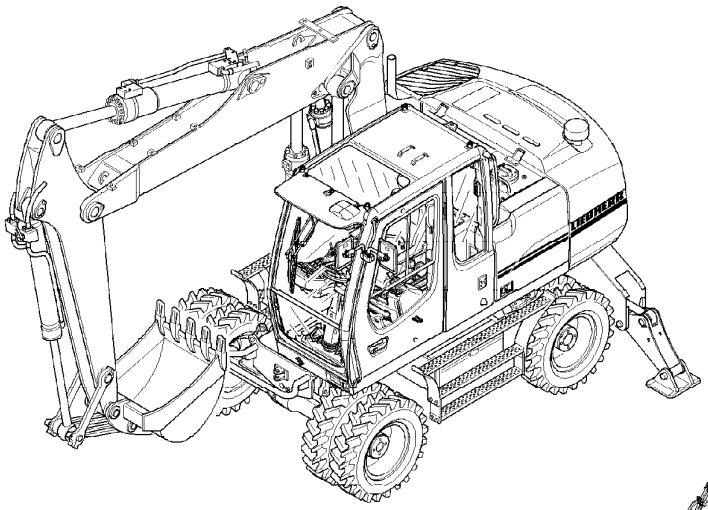
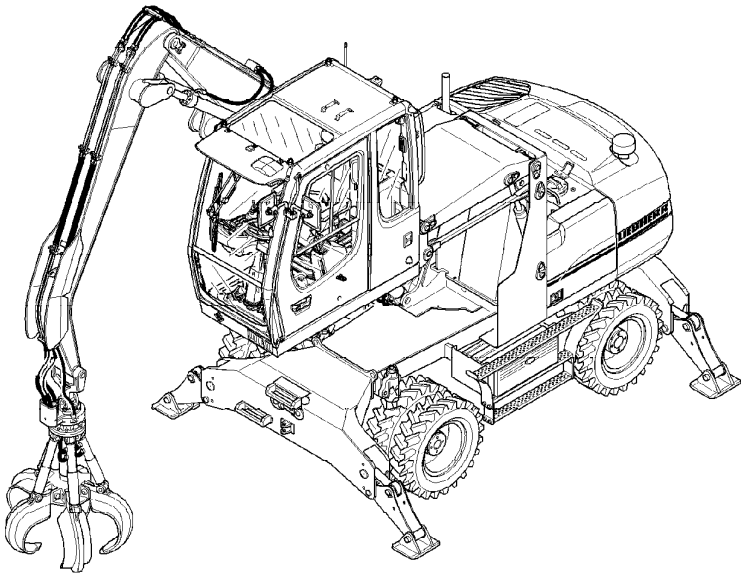
Operation and Maintenance Manual

A 316 Litronic
A 316 Litronic Industrial

from Serial No. on 2001





– Never lay under the machine if it is raised with work equipment and has not been correctly and securely supported with hardwood beams.

Avoidance of fire and explosions

– Switch off the engine when refuelling.
– Do not smoke or use a naked flame when refuelling and charging the batteries.
– Always start the engine in accordance with the operating instructions.
– Check the electrical system regularly.
– Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
– Do not transport any combustible liquids anywhere on the machine other than in the tanks provided for this purpose.
– Check all lines, hoses and screwed joints regularly for leakage and damage.
– Rectify leakages immediately and replace damaged components.
– Oil spraying out of leaking areas can easily cause a fire.
– Ensure that all holds and shields are correctly installed to guard against vibration, abrasion and heat accumulation.
– Do not use cold start materials (ether) in the vicinity of heat sources, naked flames or in inadequately ventilated areas.
– Do not use any starting aids containing ether to start diesel engines with preheating or flame glow systems. There is a risk of EXPLOSION.
– Familiarize yourself with the location and operation of fire extinguishers on the machine and with local fire warning and fire abatement options.

Transporting the machine safely

– Due to transport restrictions, use only suitable means of transport and lifting devices with sufficient load-carrying capacity.
– Park the machine on a flat surface and wedge the crawler or wheels securely.
– If required, detach a part of the machine's working equipment during transportation.
– The ramp used to drive the machine up onto the flatbed trailer should not exceed an inclination of 30° and should have a wooden cover to prevent sliding back.
– The undercarriage chassis should be swept clean, i.e. before driving up the ramp, clean any snow, ice and mud from the crawler / wheels of the machine.
– Align the machine precisely with the loading ramp.
– Attach the hand lever for fine-tune driving (crawler excavator) onto the accelerator pedals.
– Ensure that a spotter gives the machine operator the required signal.
– Prepare the placing block to ensure against rolling back when the machine is driving up onto the flatbed.
– Tilt the equipment up and drive up the loading ramp. While doing this, always hold the equipment securely over the loading area, drive very carefully up the ramp and onto the transportation vehicle.
– Rotate the upper structure carefully to the rear and lower the equipment. Due to restrictions during transport on hoe equipment, tilt the arm in and dismantle the bucket during transportation.
– After loading the machine onto the flatbed trailer, the upper structure must be secured facing the chassis using the stop bolts (only A devices).
– Secure the chassis and the remaining individual parts using chains and blocks to prevent slipping.
– Before you leave the machine, reduce pressure on all pressure lines, remove the ignition key and tilt up the safety lever.
– Lock all cab and panel doors.
– Before transportation, find out all details about the route to be travelled, particularly as they relate to width, height and weight restrictions.
– Pay particular attention when driving under electrical lines and bridges and through tunnels.
– When unloading the machine, take the same amount of care as was taken when it was loaded. Remove all chains and blocks. Start the engine as per the operating instructions. Drive carefully off the trailer's loading area and down the ramp. Hold the working equipment as securely as possible over the ground while doing this. Have a spotter guide you.

Bringing the machine safely into service

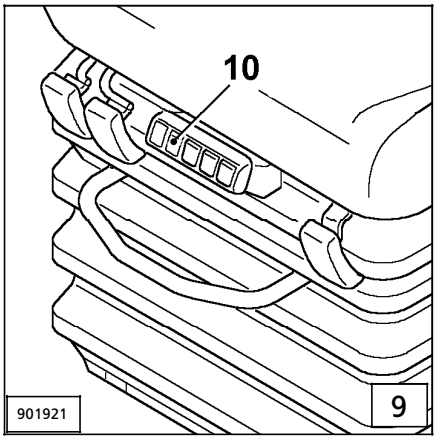
– Carry out a careful inspection tour around the machine each time before starting it.
– Check the machine for loose bolts, cracks, wear, leakage and damage.
– Never attempt to operate a damaged machine.
– Ensure that any damage is immediately rectified.
– Ensure that all hoods and covers are closed, but that locks are unlocked.

NOTES:

NOTICES:

SEAT HEATING (optional) (fig. 9)

Heating for the seat is switched on and off via tumbler switch **10**. Upon reaching a selected temperature, the seat heating switches off automatically.



SAFETY BELT (fig. 11)

CAUTION

Before start-up of the hydraulic excavator, the operator must put on the safety belt
Condition, functioning and securing of the belt should be checked regularly and damaged parts replaced immediately if safety is to be guaranteed.

The safety belt may not be worn twisted.

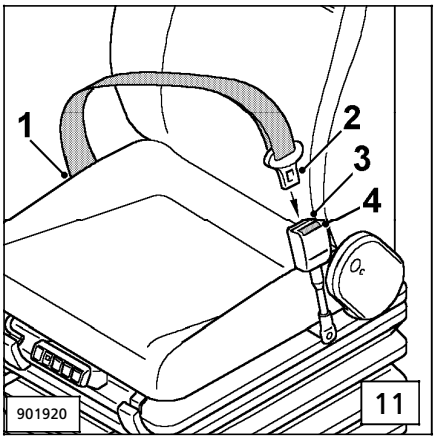
PUTTING ON THE SAFETY BELT

The safety belt is automatic. Adjusting the length of the belt is not necessary.

- Pull out harness and locking bar **2** from the roller mounting **1**.

Should the belt be pulled out too suddenly, it may become blocked by the roller mounting

- Push the locking bar into the belt lock **3**, until properly latched in. Also, ensure the belt does not become twisted.



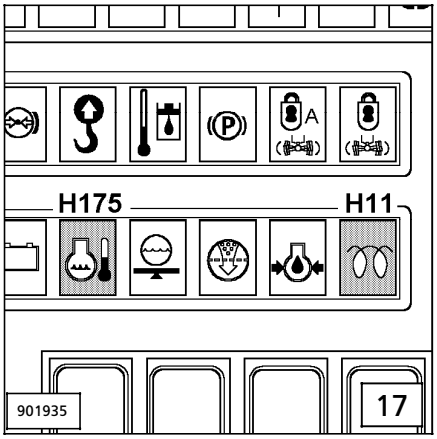
UNLOCKING THE SAFETY BELT

- Push the locking device **4** at the belt end down with the thumb.
- The safety belt slides back automatically into the roller mounting **1**.

STARTING PROCEDURE AT AMBIENT TEMPERATURES BELOW 0°C

Starting up with temperature controlled, automatic pre-heating improves the starting response of the diesel engine at low temperatures.

- Turn ignition key to position **-1-**. Indicator lamp **H11** lights up (fig. 17).
- At the end of the automatic pre-heating procedure, indicator lamp **H11** is extinguished (fig. 17). Turn ignition key to start position **-3-**.
- As soon as the engine is running properly, release the ignition key.
- All indicator lamps must be extinguished. (Should this not occur, see Functional Descriptions in chapter 3.)



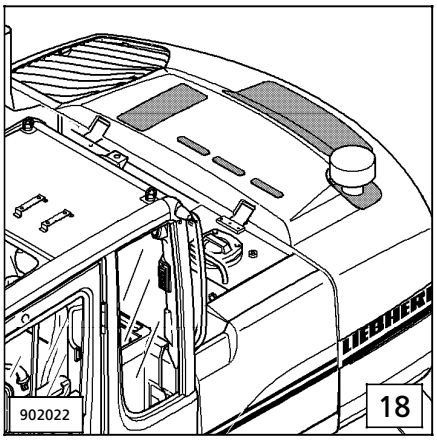
OVERHEATING OF THE ENGINE

Should the engine begin to overheat, indicator lamp **H175** lights up (fig. 17) while at the same time, an acoustic warning signal sounds.

In this event, the engine must be shut down immediately.

See also the Operating and Maintenance Manual "Deutz-Motor".

In order to guarantee optimum conditions for the engine, the engine cover must be cleared of ice and snow around the areas of the cooling air suction and the combustion air before every start-up (fig. 18).



NOTES AFTER STARTING THE ENGINE

DANGER

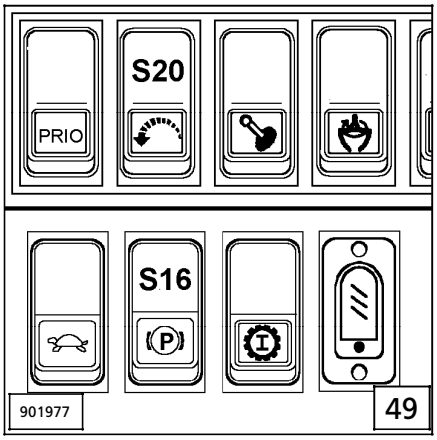
- **Only run the engine in enclosed spaces if there is sufficient ventilation. Open doors and windows to provide an ample fresh air supply.**

NOTE

- **Raise the engine and the hydraulic oil to operating temperature. If oil temperature is low, control response is slow.**
- **Move the excavator carefully into open space and then check that the travel and swing brakes function properly.**
- **Check control of the attachment for proper functioning.**

TRAVELLING DOWNHILL SLOPES

The hydraulic excavator is equipped with a brake valve, effected automatically, preventing the hydraulic travel drive over speeding.



NOTE

Before travelling inclines, the "AUTOMATIC IDLE" S20 must be switched off (fig. 49). The indicator lamp in the switch may not light up.

Inclines should be travelled with max. speed of the diesel engine. Speed should be regulated via the accelerator pedal.

TRAVELLING INCLINES EXCEEDING 10%

- Inclines exceeding 10% may only be travelled 1st gear.

CAUTION

Stop before the incline and select 1st gear.

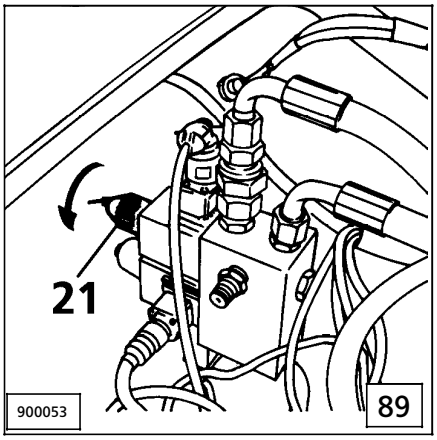
DANGER

When leaving the operator's cab and/or shutting down the hydraulic excavator, parking brake S16 (fig. 49) should be applied.
Due to the locking of the parking brake, no safe shut-down can be guaranteed (pressure loss due to leakage).

TOWING WITH THE ENGINE RUNNING

The screw (pos. 21) should be screwed into thegear shift valve (fig. 89).

The holding brake must be open during towing operation. Actuate push button **S16** (fig. 90).
Indicator lamp **S16** as well as indicator lamp **H20** may **not** light up during towing operation.



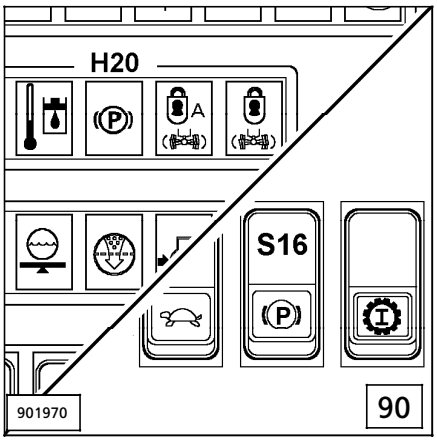
TOWING WITH ENGINE TURNED OFF

DANGER

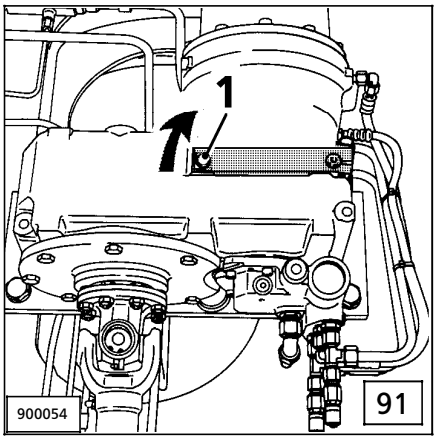
When the diesel engine is turned off, and the holding brake is mechanically released, ALL the brakes of the excavator no longer function !

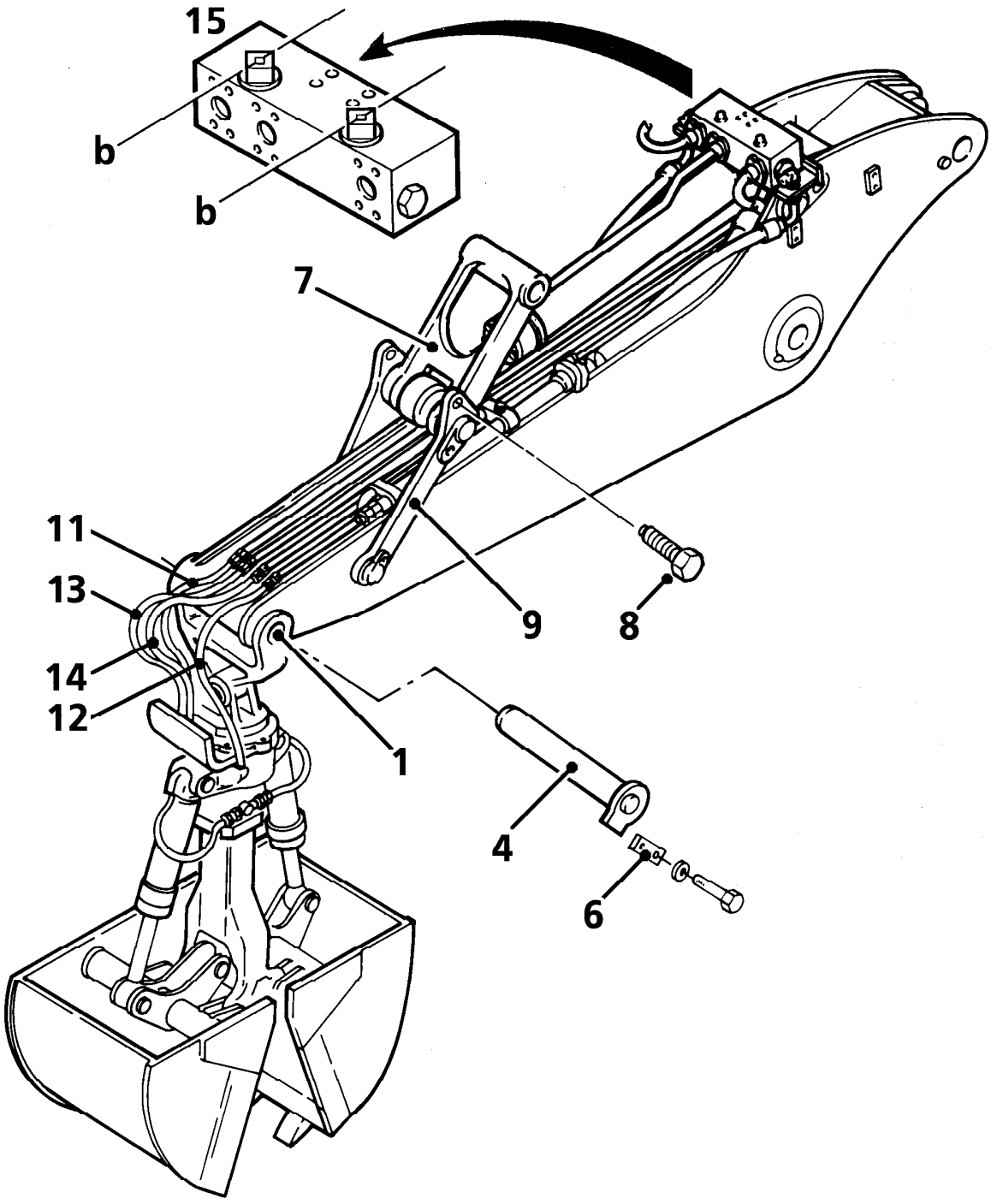
The steering is not operational when the diesel engine is switched off!

The hydraulic excavator may only be towed directly from the danger area!



If no battery power and/or brake pressure is available, then the parking brake must be released manually. Move the lever (fig. 91), loosen the hex head screw (pos. 1) and secure it with hex head screw in this changed position.





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LUBRICANT and OPERATING MATERIALS SPECIFICATIONS

NOTES ON LUBRICANT AND OPERATING MATERIALS CHART AND ON LUBRICATION SCHEDULE

The amounts indicated on the lubricant and operating materials chart and on the lubrication schedule located in the operator's cab are guidelines.
Check level in appropriate aggregate after every oil change or refill.

DIESEL ENGINE LUBRICANTS

Lubricant regulation for diesel engines is based on the following specifications and regulations:

API Classification : CG-4, CF-4, CH-4
(American Petroleum Institute)

ACEA (CCMC) Classification : E2-96, E3-96, (D4, D5), E4-98
(Association des Constructeurs Européens de l'Automobile)

Intervals for Oil Change

First oil and filter changes after 500 operating hours, when using original filling oil, quality E3/96. Further filter changes every 500 operating hours and oil change depending on climate zone, sulphur content in fuel and oil quality according to sulphur chart below.
If indicated operating hours are not reached, change engine oil and filter at least once a year.

INTERVALS IN OPERATING HOURS		**Turbo Engine**	
Working conditions	Sulphur content in fuel	Oil Quality CH-4 CG-4 CF-4 E2-96 (D4)	 E3-96 (D5) E4-98 E5-99
Normal climates down to -10°C	to 0.5 % over 0.5 %	250 h 125 h	500 h 250 h
under -10°C	to 0.5 % over 0.5 %	125 h -	250 h 125 h

FUEL

Diesel fuels should comply with the minimum requirements for fuel specifications indicated below. Sulphur content may not exceed 0.5 % by weight.

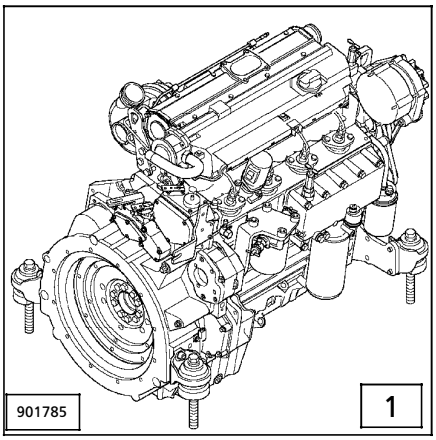
Higher sulphur contents influence oil change intervals and engine life.

LUBRICITY

By reducing sulphur content, the question of engine fuel lubricity arose. It has been clearly shown that engine fuels with the maximum allowable sulphur content (in Europe 0.05% by volume) can cause damage to the injector systems (especially in the case of distributor injection pumps).

DIESEL ENGINE

See Deutz-Operating and Maintenance Manual.



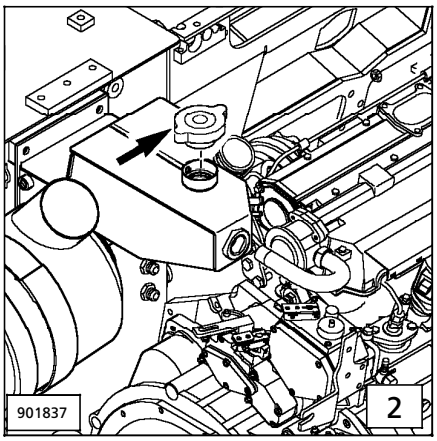
COOLING SYSTEM

CHECK COOLANT LEVEL

DANGER

The engine cooling system is very hot and under pressure at or near operating temperature.
Avoid contact with the coolant or components containing coolant.
There is a risk of burns.
Only check the coolant level when the sealing cover on the expansion tank has cooled enough to be opened by hand.
Open the cover carefully at first allowing the excess pressure to first be released!

The coolant must be visible in the filler stub pipe of the compensator reservoir (fig. 2).
Check engine, ventilator and cooler for damage and clean if necessary.
After filling the cooling system, allow engine to run for a few minutes with the heater on. Recheck coolant level.
Ex-works, the coolant contained antifreeze effective in temperatures down to -37°C (this corresponds to about. 50% antifreeze).
The system must be filled with antifreeze all year round and each time it is refilled.
Filling amount: see Lubrication Chart.

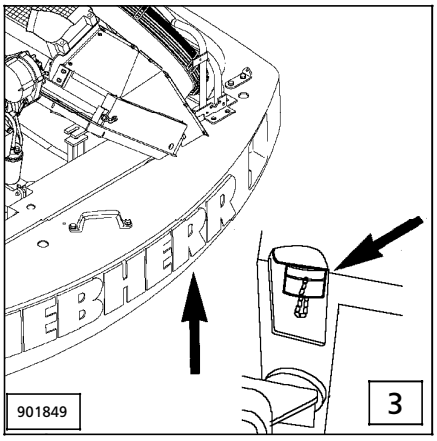


REPLACING THE COOLANT

Replace the coolant of the entire cooling system at least every two years.

NOTE

CHANGE THE COOLANT ONLY WHEN THE ENGINE IS COLD.



TO BLEED THE COOLANT

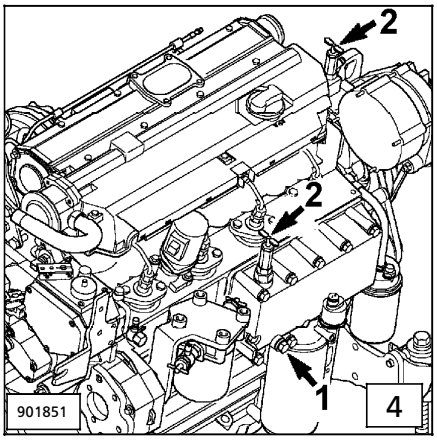
Slowly open the radiator cover of the compensator reservoir (fig. 2). Unscrew cap of the drain valve on the underside of the water cooler (fig. 3) and fix drain hose from the tool kit.
Unscrew supplementary drain hose from the oil cooler plate of (fig. 4, pos. 1) and open water taps (pos. 2).

TO ADD COOLANT

Remove drain hose on water cooler and close valve. Screw in drain hose to engine oil cooler plate. Open water taps. Add coolant to the compensator reservoir until coolant is visible in the stub filler pipe. Switch heater to "warm", allow engine to warm up, then check coolant level and top up if necessary.

NOTE

Should the cooling system become contaminated, clean the complete cooling system with a commercially approved detergent.



– Only personnel with special training and experience may work on hydraulic equipment.
– When searching for leakage, wear protective gloves. A fine jet of liquid under pressure can penetrate the skin.
– Do not unscrew any lines or connections before you have set aside the equipment, switched off the engine and depressurized the hydraulic system. After switching off the engine, you must operate all pilot control devices (joystick and pedals) in all directions with the start key in contact position in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.

Electrical system

– Check the electrical system regularly.
Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
– Only use original fuses with approved current strength.
– For machines with electrical neutral and high tension leads:
  • switch the machine off immediately in the event of malfunctions in the power supply.
– Work on the machine's electrical equipment may only be carried out by skilled electrical personnel or by trained personnel under the supervision of an electrician in accordance with electrical regulations.
– When working on live parts, ensure that a second person is available to operate the emergency-off or the main switch and overvoltage release. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
– When working on neutral and high tension subassemblies, after releasing the voltage, briefly disconnect the supply cable at earth and electronic devices such as capacitors using an earthing rod.
– First test the released parts to make sure that they are off circuit, earth them and then disconnect them briefly. Insulate adjacent live parts.
– Disconnect the battery before working on the electrical system or carrying out any electric arc welding on the machine.
First disconnect the negative, then the positive pole. When reconnecting, proceed in the reverse order.

Hydraulic accumulator

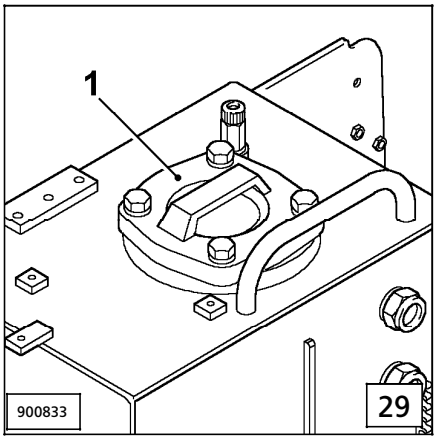
– All work on the hydraulic accumulators must be carried out by trained specialist personnel.
– Inexpert assembly and handling of hydraulic accumulators can cause serious accidents.
– Do not operate damaged hydraulic accumulators.
– Before working on a hydraulic accumulator, you must reduce the pressure in the hydraulic system (hydraulic system including hydraulic tank), as described in these operating instructions.
– Do not carry out welding or soldering or do any mechanical work on the hydraulic accumulator. The hydraulic accumulator can be damaged by heat penetration and can be made to rupture by mechanical working. RISK OF EXPLOSION!
– Only charge the hydraulic accumulator with nitrogen. There is a RISK OF EXPLOSION if oxygen or air is used.
– The accumulator body can become hot during operation; there is a risk of burning.
– New hydraulic accumulators must be charged with the pressure required for the purpose of use before installation.
– The operating data (minimum and maximum pressure) are marked permanently on hydraulic accumulators. Ensure that this marking remains visible.

Hydraulic hoses and sheathed cables.

– It is forbidden to carry out repair work on hydraulic hoses and sheathed cables!
– All hoses, sheathed cables and bolt connections must be checked regularly every 2 weeks for externally visible damage and any possible damage must be immediately checked for leakage.
Any damaged parts must be removed immediately! Spurting oil can lead to injury and burns.
– Even with correct storage and permitted load, hoses and sheathed cables are subject to the natural aging process. This restricts their duration of use.
  • Incorrect storage, mechanical damage and unauthorized load are the most common causes of failure.
  • In relation to duration of use, current norms, regulations and guidelines pertaining to hoses and sheathed cables at place of use must be adhered to.
  • Use at the limit range of permissible load can shorten duration of use (e.g. high temperatures, frequent movement cycles, extremely high pulse frequencies, multiple shift

RETURN FILTER (Fig. 29, Pos. 1 and Fig. 31) **:**

The magnetic rod **2** (Fig. 31) of the return filter is to be cleaned at determined intervals (see maintenance chart), or the glass filter insert **5** is to be replaced.

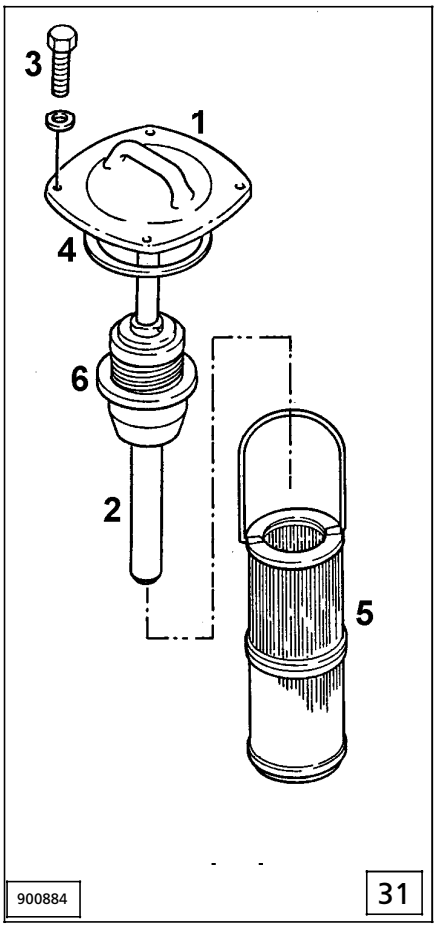


NOTE

When working in dusty conditions, observe the special guidelines for filter change, see page 5.8!

Cleaning the magnetic rod, changing the filter element (fig. 31)

Remove four screws **3** on the filter cover and pull off the cover **1** with magnetic rod **2**.
Carefully clean magnetic rod **2**.
Remove the old filter element **5**, and insert the new filter, push it down lightly. Add the bracket again on the side of the tank ring.



CAUTION

The element must be positioned vertically in the tank.

Center the cover with bypass cage **6** on the filter element. Make sure it is positioned correctly and make sure the seal ring **4** is not damaged.

After each replacement of filter cartridge **5** of the return filter, the integrated pressure filter **9** in the control pilot oil unit is to be cleaned (Fig. 32)

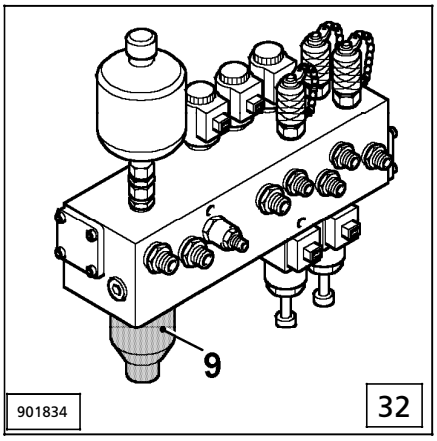
SERVO FILTER (Rear of hydraulic tank)
(Fig. 32)

Cleaning the pressure filter

Remove the filter housing, take out the filter element and clean the filter housing.

Re-fitting a new filter element

Insert new filter element, lubricate thread, mount filter housing and tighten by hand.



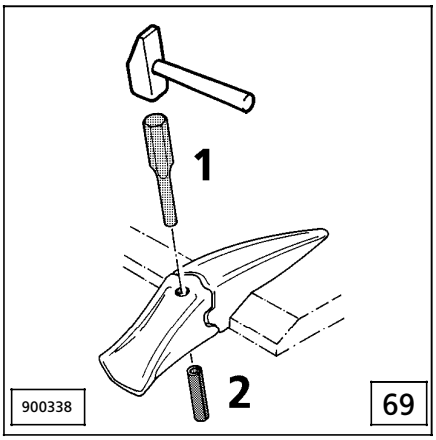
REPLACEMENT OF BUCKET TEETH

Visually check the teeth for wear at regular intervals.

Heavily worn teeth require much more digging force than teeth that are not worn.

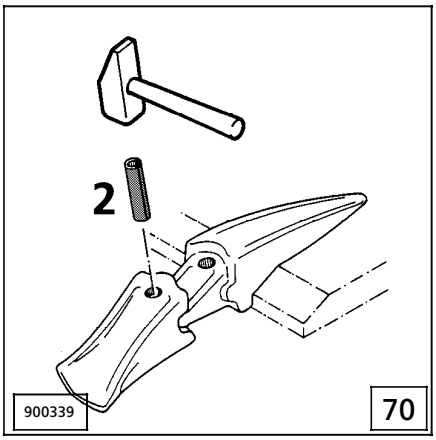
Always replace teeth as soon as they reach their wear limit, so the tooth adapter is not damaged.

Never work with a missing bucket tooth!

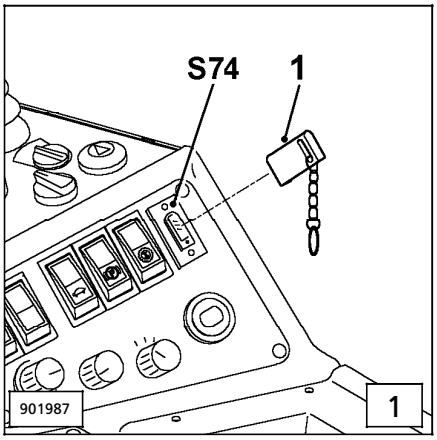


INSTALLATION AND REMOVAL OF NEW TOOTH

- Hit the tension pin 2 with a hammer and punch 1 (fig. 69) to remove the pin.
- Remove the old tooth.
- Push the new tooth on the adapter .
- Insert the tension pin 2, using the hammer (fig. 70).



TRAVEL LOCK



To commission the hydraulic excavator, proceed as follows:

1. Place coded key **1** into coded lock **S74** (fig. 1) and then remove it again.
2. LED display extinguishes.
3. The hydraulic excavator can be started within 9 seconds using the ignition key.
4. If the hydraulic excavator is not started within 9 seconds, the coded key must be inserted into the coded lock again.

If the hydraulic excavator is switched off via the ignition, then any theft protection switches on automatically after approx. 30 seconds.

NOTE

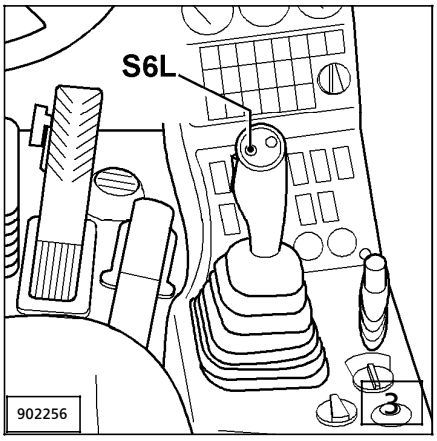
As long as theft protection has not been deactivated via the coded key, the hydraulic excavator cannot:

- be started,
- supply the servo circuit with hydraulic oil,
- release the parking brake.

To reorder a coded key, enter the code number indicated on the code card provided (check format).

TRAVEL ALARM

(fig. 3)



Whenever the foot pedal is actuated, the travel alarm switches on automatically and signals this acoustically.
This signal can be shut off via pressure switch **S6L** (fig. 3) at the earliest approx. 10 seconds after beginning travel.
As soon as the travel pedal is reactuated, however, the travel is activated again.