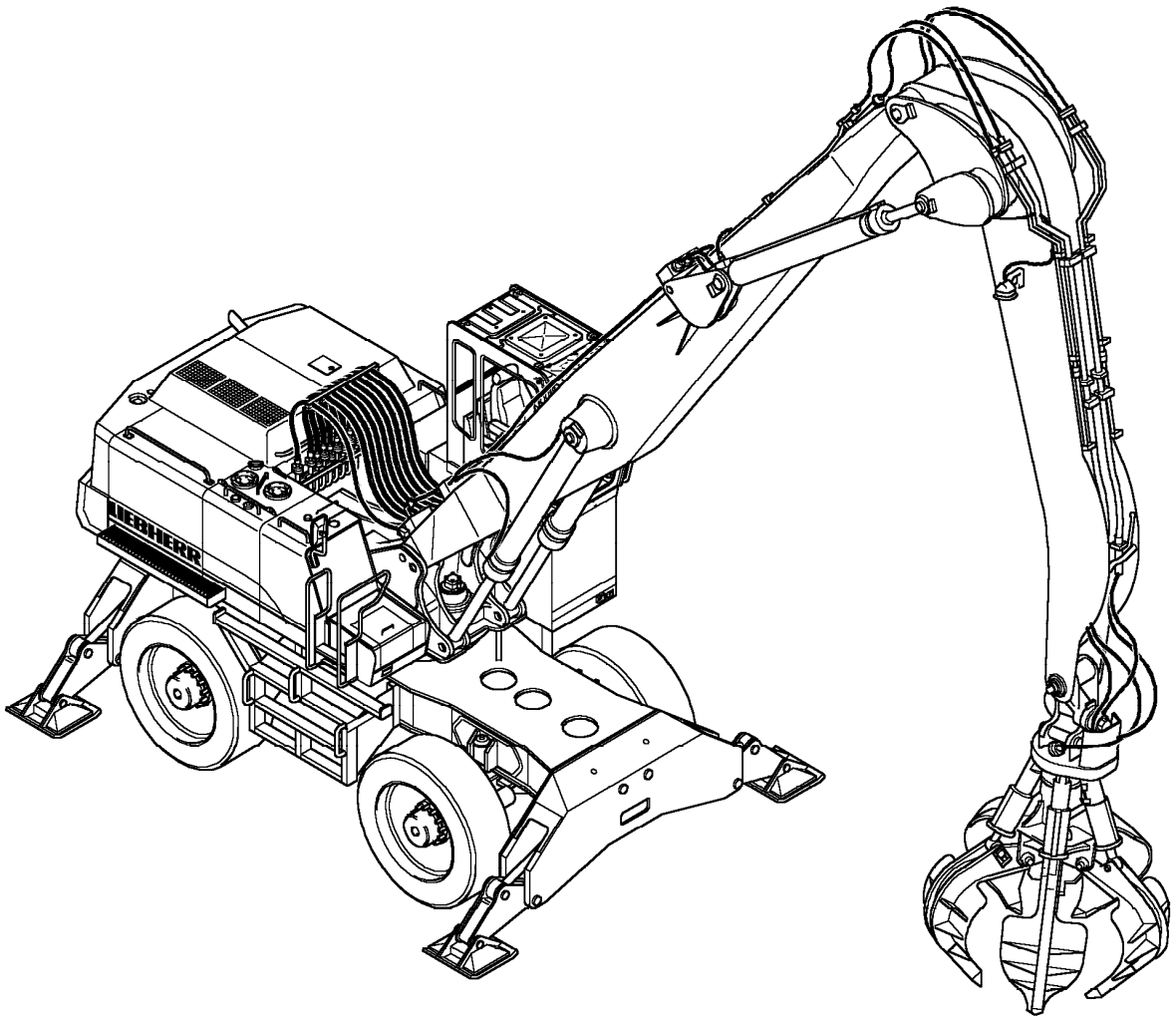
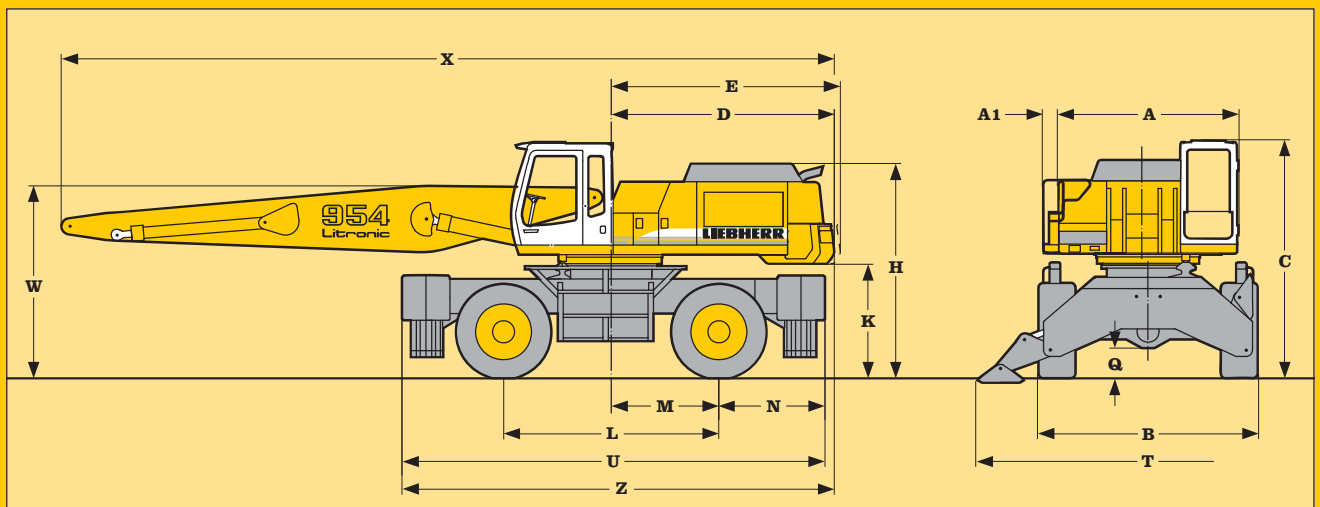
Operation and Maintenance Manual

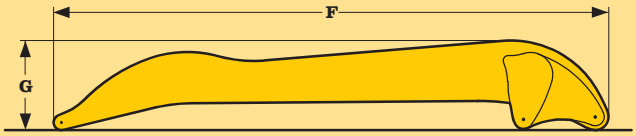
A954B-HD
Litronic

from Serial No. on 12183





Tires ∅ 1600 mm, width 600 mm



Industrial sticks

	mm
A	3000
A1	270
B	3705
C	3970
D	3730
E	3830
H	3650
K	1930
L	3600
M	1800
N	1775
Q	505
T	5690
U	7075
Z	7230

E = tail radius

With industrial-type straight boom	m	8,80	10,30
W	mm	3350	3350
X	mm	13000	14500

Industrial-type stick	m	7,00	8,00	9,50
F	mm	7300	8300	9800
G	mm	1300	1300	1300

Dimensions are with attachment over steering axle

Dimensions

– 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.

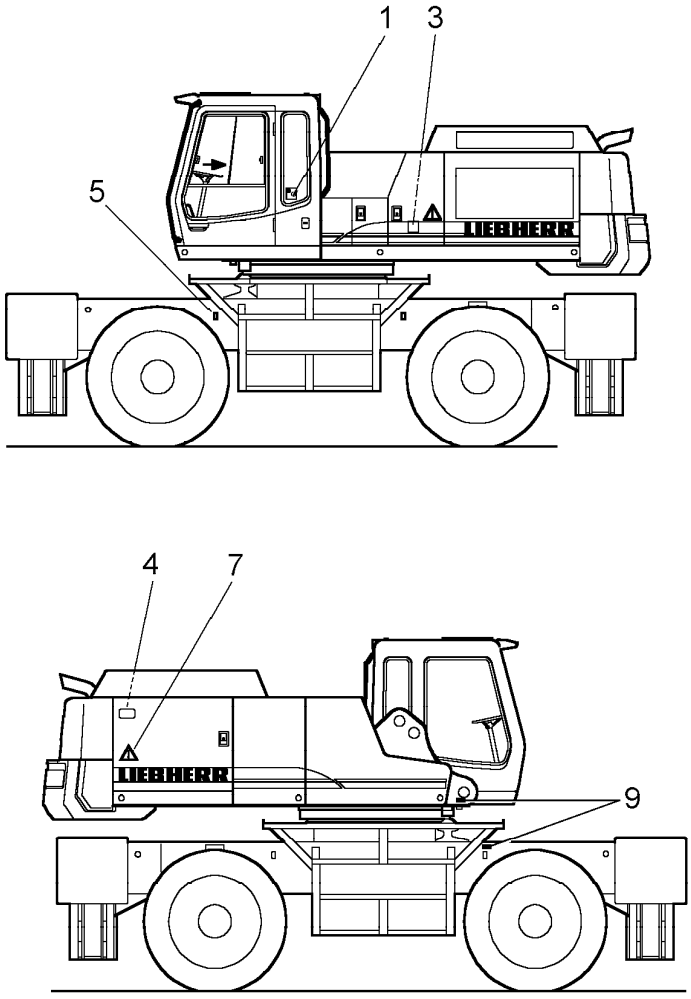
Bringing the machine safely into service

– 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.

SIGNS ON THE HYDRAULIC EXCAVATOR

Your hydraulic excavator has several kinds of signs.

- Warning Signs: Warnings on accident risks with potentially serious or fatal injuries.
- Notices: Indicate specific points of control, maintenance and properties of the excavator.
- Identification Tags: Contents and location are described hereafter.
  Order numbers are contained in the spare parts list



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1 Notice Sound Power Level L_{WA}
3 Notice External Start
4 Lubrication Chart Diesel Engine
5 Notice Latch Points
7 Warning Sign Danger Zone
9 Identification and Registration Number Tag

S38 **SPECIAL FUNCTION**

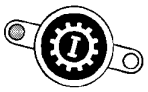
Assignment according to the type of accessory

S39 **SPECIAL FUNCTION**

Assignment according to the type of accessory

S41 **BEACON (Additional Equipment)**

First push (of the button): On – Second push: Off



S42 **no funktion**

S56 **HIGH LIFT MODE (Additional Equipment)**

When this function is turned on (light diode in the button is on), the forces on the working attachment are increased, and the movements of the machine become slow at the same time.

S85 **no funktion**

S86 **MODE SELECTION**

→ page 4.4

P4 **ENGINE SPEED GAGE**

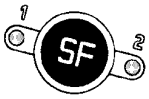
The LED connection P4 provides the engine speed display..
It divides the entire engine speed range into 10 RPM levels

S228 **ENGINE SPEED INCREASE**

→ page 4.5

S229 **ENGINE SPEED REDUCTION**

→ page 4.5



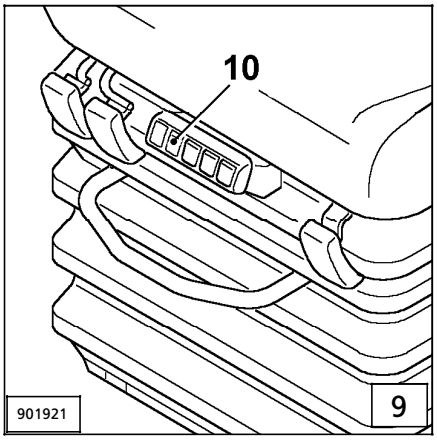
S354 **no funktion**

ERROR CODES FOR ELECTRICAL ERRORS IN THE EXCAVATOR'S ELECTRONICS

	Error Indicated		Error Code
Other Errors	Coding socket is missing		**E 302**
	No CAN-bus connection between the keyboard and the BST board (a message also appears if the BST is not ready to operate, e.g. if there is no power supply, etc.).		**E 303**
	No CAN-bus connection between the keyboard and the ESP01 board (a message also appears if the ESP01 is not ready to operate)		**E 305**
	No CAN-bus connection between the keyboard and the ESP02 board) (a message also appears if the ESP02 is not ready to operate		**E 306**
	No connection to keyboard, display, or keyboard does not function properly		**E 308**
	No compatible software for keyboard / display		**E 309**
	Sensor handle 1	Short + 24 V Ground/Cable defect	**E 442** **E 443**
	Sensor handle 2	Short + 24 V Cable defect	**E 445** **E 446**
	Fuel tank sensor	Ground Short + 24 V or cable defect	**E 456** **E 458**

SEAT HEATING (optional) (fig. 9)

Heating for the seat is switched on and off via tumbler switch **10.** Upon reaching the preset 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.

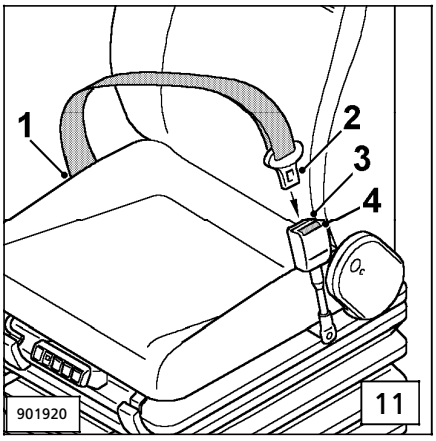
PUTTING ON THE SAFETY BELT

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

- Pull out belt 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**.

MACHINE START UP SAFETY

- Before excavator start up, perform a thorough walk around inspection.
- Visually inspect the excavator, look for loose bolts, cracks, wear, any leaks and any evidence of vandalism.
- Never start or operate an unsafe excavator.
- Report all defects to your foreman or supervisor and make sure they are corrected immediately.
- Make sure all covers and doors are closed and locked and all warning decals are on the machine.
- Make sure all windows, as well as inside and outside mirrors are clean, and secure all doors and windows to prevent any unintentional movement.
- Be certain that the area surrounding the excavator is free of other personnel, and that no one is working on or under the excavator before starting the engine.
- After entering the cab, adjust the operator's seat and controls, the inside and outside mirror, the armrests and fasten and adjust the seat belt. Be certain that all controls can be reached comfortably.
- All noise protection devices on the machine must be functional during operation.

– Face the machine when getting in or out and always use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
– If you are able to reach the door handle with your free hand, open the doors before you climb any higher. External influences, such as wind, can make it more difficult to open doors. Because of this, always use your hand for control when opening doors. Ensure that the door is latched open to prevent it slamming open and shut.
– Now continue to climb up and sit down in the operator's seat as soon as you enter the cab. Close the doors and fasten the safety belt.
– When getting out of the machine, proceed as carefully as when you climbed into the machine.
– Stop the machine on level, horizontal ground. The upper structure should be positioned with the chassis in such a way that the steps and ladders are aligned with each other.
– Unfasten the safety belt. Position yourself with your face toward the machine when getting out and use three-point support. Climb down until you can close the doors safely. Always use your hand for control when closing the doors.
– Now climb down to the ground.

Protection from vibration

– Vibrational loads on mobile building machinery are mainly the result of the type and method of use. The following parameters in particular are decisive influences:
  • Terrain conditions: Uneven areas and potholes;
  • Operational techniques: Speed, steering, brakes, controlling the machine's control elements when driving and working.
– To a large extent, the machine operator determines the vibrational loads since he selects the speed, gearbox ratio, working method and route himself. This means that there is a wide range of different vibrational loads for the same machine type.

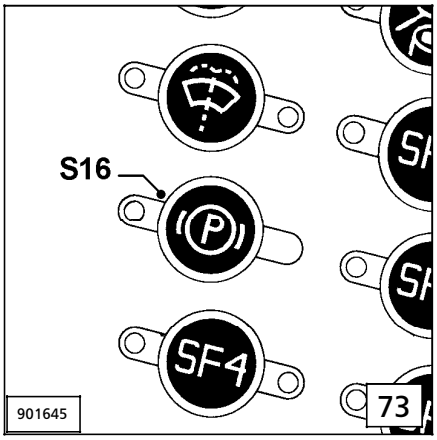
Whole-body vibrational load for the machine operator can be reduced if the following recommendations are observed:

– Select suitable machines, equipment parts and auxiliary devices for each part of the job.
– Use a machine that has a suitable seat (i.e. for earth-moving machinery such as hydraulic excavators, this should be a seat which corresponds with EN ISO 7096).
– Keep the seat in good condition and adjust it as follows:
  • The seat and its damping action should be adjusted depending on the weight and height of the operator.
  • Check the seat's damping action and adjustment mechanisms regularly and ensure that these seat characteristics remain as per the seat manufacturer's instructions.
– Check the maintenance status of the machine, particularly with respect to: tyre pressure, brakes, steering, mechanical connections etc.
– Do not steer, brake, accelerate, shift gears, move or load the machine's equipment jerkily.
– To reduce vibrational load, adjust the machine speed to suit the route as follows:
  • Reduce speed when driving on difficult terrain;
  • Drive around obstacles and avoid driving on very difficult terrain.
– Keep the terrain on which the machine is working and driving in good condition:
  • Remove large stones and obstacles;
  • Fill in ruts and holes;
  • Have machines ready to prepare and maintain suitable ground conditions and calculate in sufficient time to carry out any work required.
– Drive longer distances (e.g. on public roads) at an appropriate (medium) speed.
– Use special auxiliary systems (if available) which reduce vibration for machines that are driven frequently.
  If such auxiliary systems are not available, regulate speed to avoid "oscillating" the machine.

Towing with the Engine Running

Before the excavator is towed, release the parking brake by pushing switch **S16** (fig. 73).

The parking brake indicator light may **not** light up during towing.

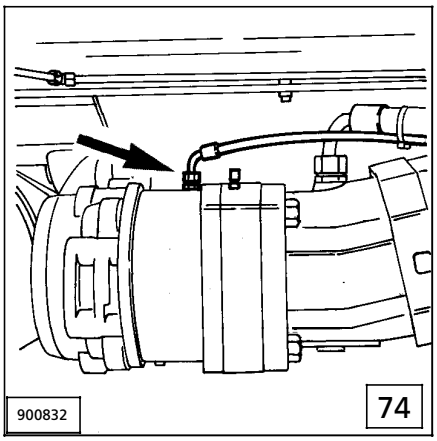


TOWING WITH THE ENGINE TURNED OFF

DANGER

When the Diesel engine is turned off, and the parking brake released, the total brake system is non-functioning!
Tow the machine only from a danger area!

The steering wheel is not operational when the Diesel engine if turned off!



If no battery power and/or no brake pressure is available, then the parking brake must be released manually.
Remove hose on turn fitting (fig. 74).

With a manual oil pump, actuate the brake piston externally until max. 30 bar.

Displacement volume aprrox. 0.25 ltr.

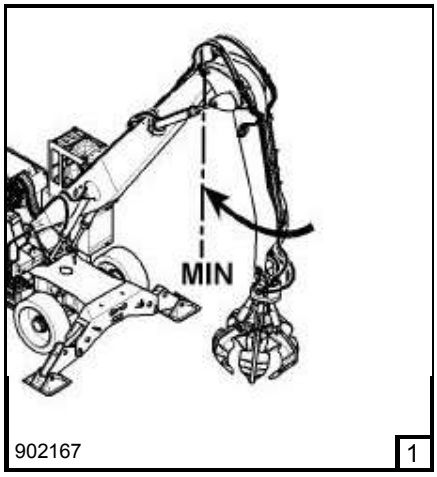
STICK-CYLINDER SHUT-OFF

Extensive heights and radii can be achieved when manoeuvring the industrial boom.

When the industrial stick is moved, it may come into very close proximity of the operator's cab with the suspended load and may also present a danger to the operator's cab and to the operator himself as a result of the operator's negligence.

In order that this be avoided, a limit switch shuts down the "Retract industrial stick" movement automatically.

The correct shut-off point is determined via the position of an adjustable switch block on the industrial stick.



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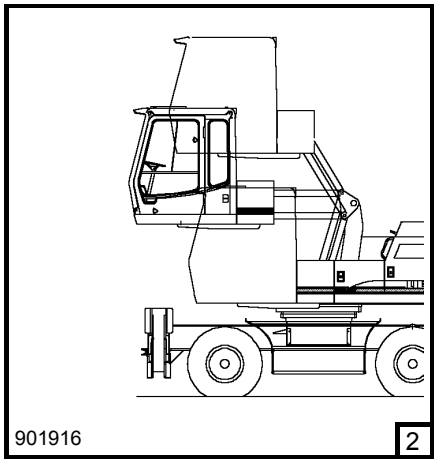
DANGER

There is a danger that the attachment comes into too close a proximity with the operator's cab:

- **By modifying the adjustment of a hoist limitation to a greater shut-off height.**
- **By allowing the working tool to oscillate (e.g. grapple), or due to varying dimensions of the working tool in an open and in a closed condition .**
- **By delaying the shut-off. The shut-off time can be prolonged depending on oil temperature, type of attachment, retraction speed and nature of grapple content.**

A safe distance of at least 1.5 m to the point of danger is to be maintained. Take this into consideration when setting the stick cylinder shut-off.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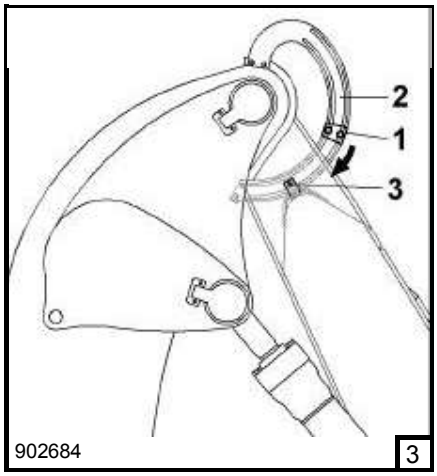
CAUTION

Risk of damage! The hydraulic excavator could begin swaying! Avoid any rapid movements of the industrial stick when manoeuvring it anywhere near the shut-off point.



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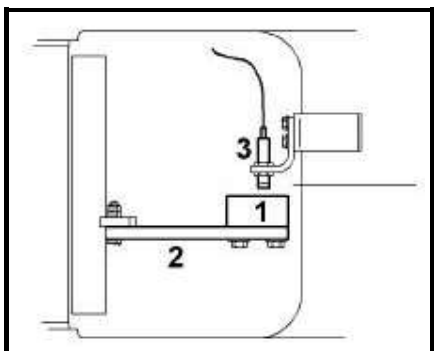
NOTE

If a current hoist limitation must be readjusted, it is imperative that the stick cylinder shut-off is checked, and if necessary, also adjusted.

SETTING THE LIMIT SWITCH

- If available, activate the hoist limitation.
- Raise the industrial boom to the shut-off point of the hoist limitation or all the way upwards.
- If the excavator features an operator's cab adjustable in height, manoeuvre the cab into the furthest position forward possible (fig. 2).
- Retract the industrial stick to the desired shut-off point.
- Loosen the fastening screws of the switch block **1** slightly.
- Push the switch block onto the guard **2** until it is positioned centrally to the proximity switch **3** in the industrial boom.
- Tighten screws again.



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GEAR OILS:

Gear oils must correspond to the following specifications

API - GL -4 and MIL -L -2105 for viscosity grade SAE 80

API - GL -5 and MIL -L -2105 B, C or D for viscosity grade SAE 90 .

Motor oils used in the gears must correspond to the following specifications

API CG-4, CF-4, CF for viscosity grade SAE 20.

An oil for viscosity grade SAE 80 W 90 can also be used for viscosity grades SAE 80 and SAE90 corresponding to MIL-L-2105 D.

GREASE FOR SWING RING ROLLER RACES AND GENERAL LUBRICATION POINTS :

This grease must meet **KP 2k** specification in NL GI classification per DIN 51818 and DIN 51825 or EP 2 per NF-T-60 132.

The grease must be lithium based, with a VKA value of at least 2300 N per DIN 51350 or ASTM D 2596.

GREASE FOR SWING RING TEETH

This grease must comply with following recommandations:

- be of consistency classification 2 in NL-GI viscosity per DIN 51818,
- have a VKA value of at least 4000N per DIN 51350 or ASTM D 2596,
- show a water resistance of 1-90 perDIN 51807.

We recommend the use of: **Grease CRL**

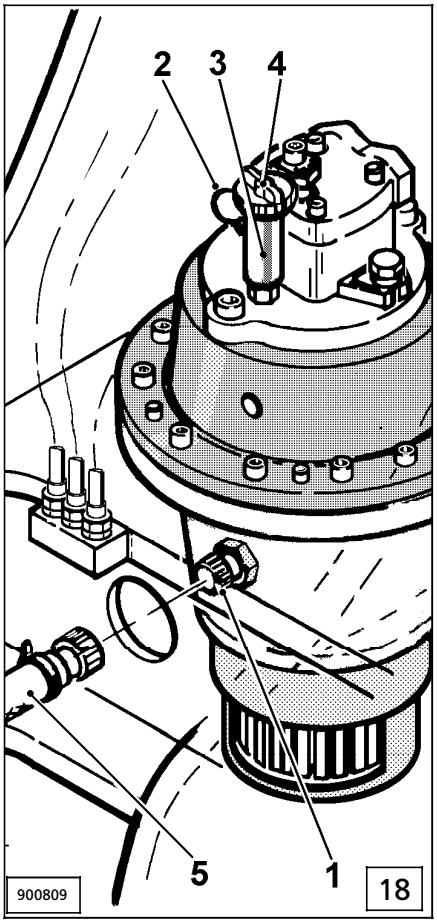
CONTACT SPRAY FOR SLIP RINGS : CRAMOLIN

LUBRICATION FOR PISTON, PISTON NUT AND PISTON BEARING MOUNTING ON THE HYDRAULIC CYLINDERS: GLEITMO 800

SPECIAL-ANTI-CORROSIVE AGENT FOR INSTALLATION LOCATIONS OF SEALING ELEMENTS ON THE HYDRAULIC CYLINDERS: CASTROL - TARP

CHANGING THE OIL IN THE SWING GEAR

Fig. 18
Pos. **1** shows the oil drain valve
Pos. **2** the oil dipstick
Pos. **3** the oil filler neck
Pos. **4** the sealing cover with integrated vent valve
Pos. **5** the drain hose



DRAINING THE OIL

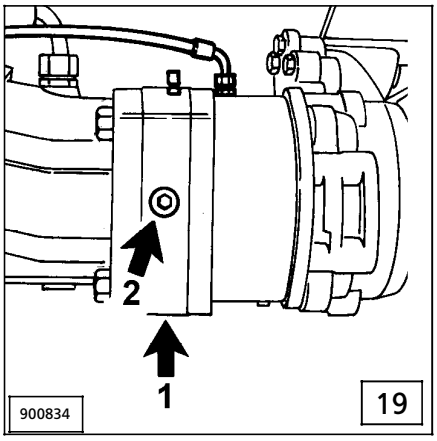
Remove the sealing cover **4**, unscrew the cover of the drain plug **1** above the opening in the middle sheet metal at the front of the upper-carriage's deck, screw the drain hose **5,** included in delivery, onto the drain plug and let the oil drain into a suitable container.
Finally, remove the hose **5** and screw the cover onto the drain plug again.

ADDING OIL

Add oil via the filling neck **3** until the level reaches the upper marking on the dipstick **2** and close the cover **4** .

CHANGING THE OIL IN THE PARKING BRAKE

Fig. 19
Pos. **1** shows the drain plug
Pos. **2** the oil filler and oil level plug



TO DRAIN THE OIL

Remove the oil filler plug **2** and the oil drain plug **1** and drain the oil into a suitable container. Reinsert the oil drain plug **1**.

TO ADD OIL

Add oil until oil level reaches the borehole **2**.
Reinsert oil level plug **2**.

– 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

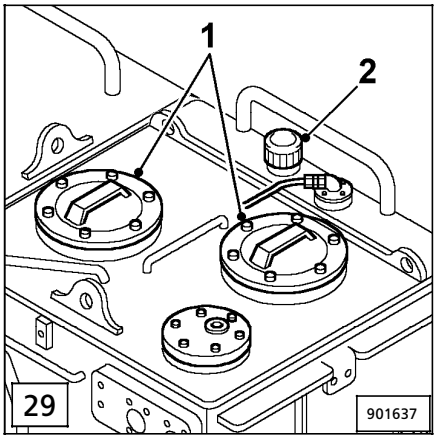
– Check the electrical system regularly.
Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
– Only use original fuses with approved current strength.
– For machines with electrical neutral and high tension leads:
  • switch the machine 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.

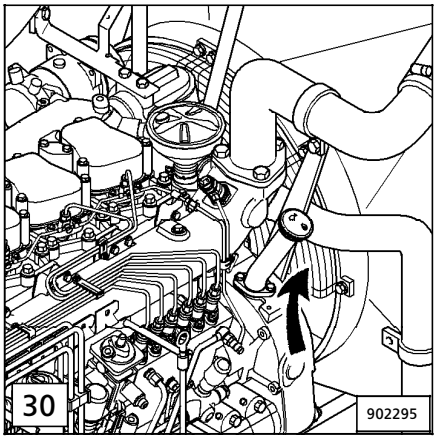
Hydraulic accumulator

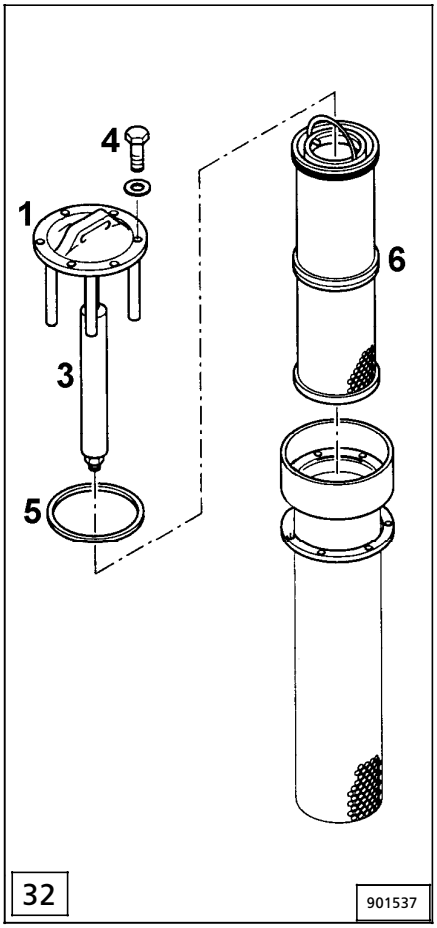
– All work on the hydraulic accumulators must be carried out by trained specialist personnel.
– Inexpert assembly and handling of hydraulic accumulators can cause serious accidents.
– Do not operate damaged hydraulic accumulators.
– Before working on a hydraulic accumulator, you must reduce the pressure 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







THE HYDRAULIC SYSTEM

Maintenance of the hydraulic system is limited to the hydraulic tank.
None of the other components in the hydraulic system require special maintenance.
However, hydraulic lines and hoses must be regularly checked for leaks.

⚠ DANGER

Never check for leaks with your bare hands. Fluid escaping from a small hole can have enough force to penetrate the skin.

Cleanliness in the hydraulic system is especially important. For this reason, the given maintenance intervals to replace the return filter, to clean the oil cooler, and to change the oil need to be strictly observed.

⚠ DANGER

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

Note the following:

- **Lower the working attachment to the ground.**
- **Turn the engine off.**
- **Move servo controls (both joysticks and pedal) in all directions (with ignition key in contact position) .**
- **Then turn out the bleeder filter (fig. 31, pos. 2) by one turn.**

At or near operating temperature, engine and hydraulic oil is hot and can be under pressure.Do not allow your skin to come into contact with hot oil or components containing hot oil.

OIL COOLING SYSTEM

A clean oil cooler is a prerequisite for optimum hydraulic oil cooling. When working under normal working conditions, clean the cooling fins (fig. 30) regularly with air or steam from the inside out. (see maintenance chart)

LOCATION OF THE FUSES

F1	2 A	Parking-/rear light left (not active)
F2	2 A	Parking-/rear light right (not active)
F3	7,5 A	Reserve
F4	15 A	Servo and safety lever for accessories, travel
F5	15 A	Special functions 2 - 3 - 4* / Reserve
F6	15 A	Special function 1* / Oscillating axle
F7	15 A	Roof floodlight for attachment
F8	7,5 A	Parking brake / Servo / Creeper gear
F9	7,5 A	Windshield wipers
F10	7,5 A	Pre-heating / Windshield washing system / Rotating beacon* / Grapple*
F11	15 A	Reserve
F12	15 A	Reserve
F13	15 A	Excavator control
F14	15 A	Emergency control
F15	7,5 A	Brake pressure switch (without function)
F16	7,5 A	Directional indicator (without function)
F17	15 A	Reserve
F18	15 A	Reserve
F19	7,5 A	Cigarette lighter
F20	15 A	Reserve
F21	15 A	Ignition / Clamp 30
F22	7,5 A	Interior lights / Horn
F23	7,5 A	Headlights-right
F24	7,5 A	Headlights-left

F250	2 A	Keyboard clamp 15
F251	2 A	Keyboard clamp 30

*Special equipment

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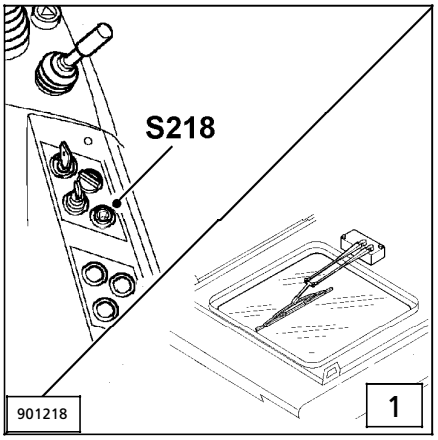
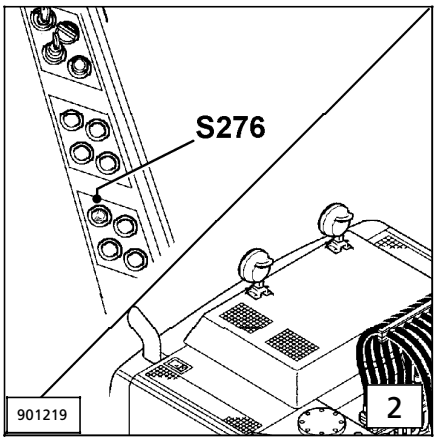
WINDSHIELD WIPER - CAB COVER S218

The windshield wiper for the cab cover is switched on via switch **S218** .



FLOODLIGHT - COUNTERWEIGHT S276

The additional floodlights on the counterweight are switched on via switch **S276** .



COVER FLOODLIGHT

Is switched on in combination with equipment floodlights via switch **S10** .

1. Actuation: Equipment floodlight on
   Cab floodlight off
2. Actuation: Equipment floodlight off
   Cab floodlight on
3. Actuation: Equipment and cab floodlight on
4. Actuation: Both floodlights off.