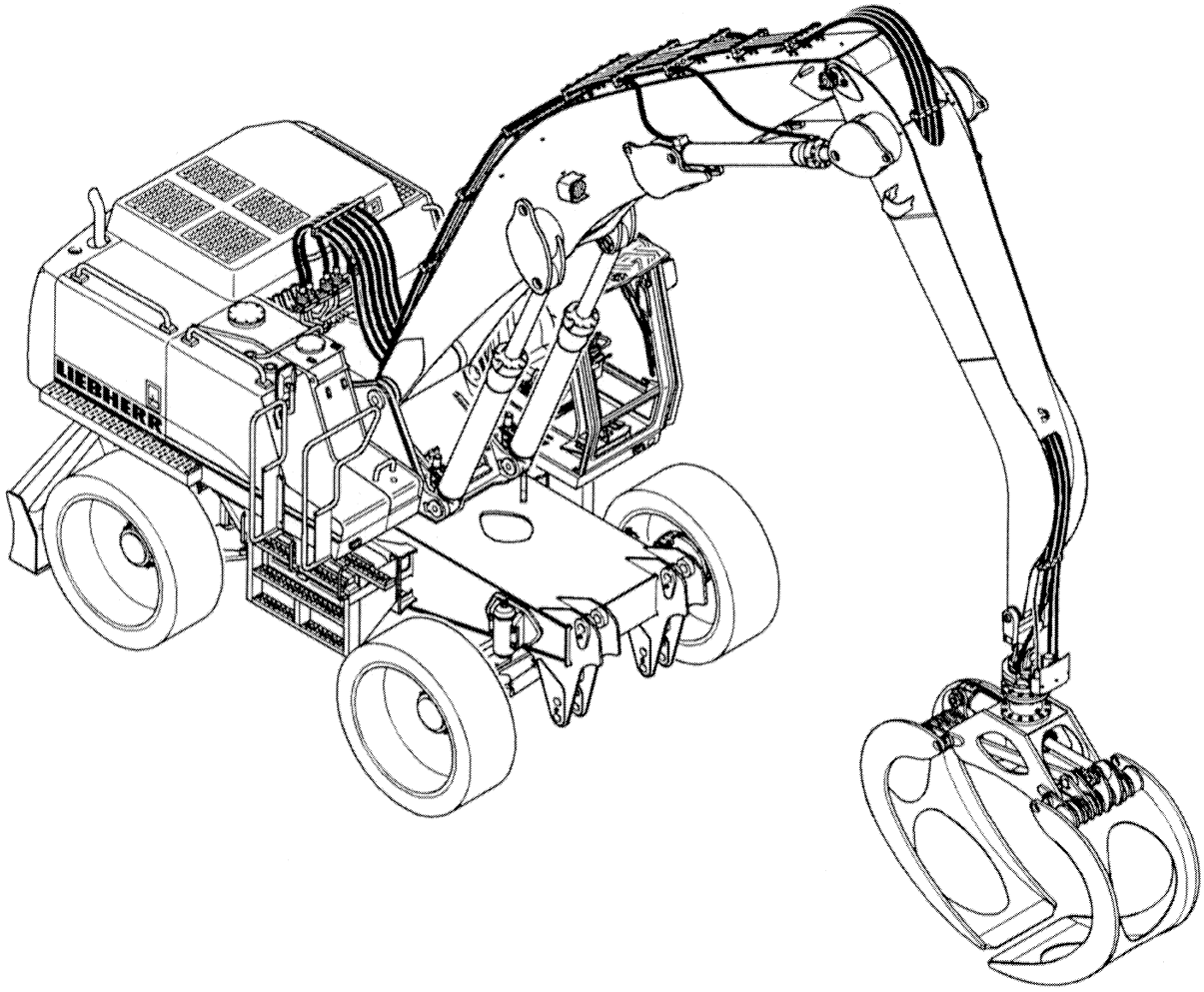
# Operation and Maintenance Manual

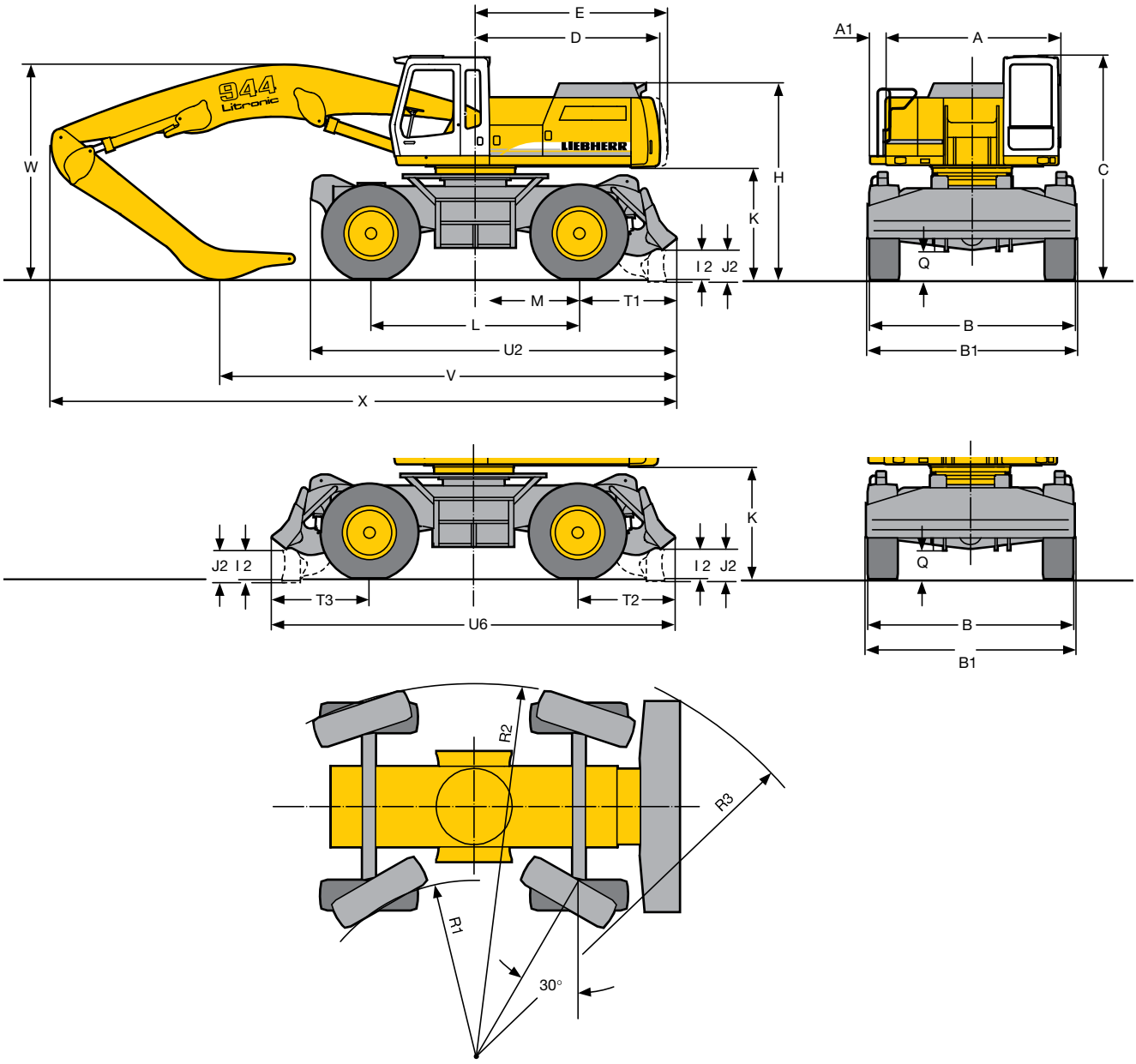
# A944B-HD Litronic

## LOGGING MACHINE

from Serial No. on 12000



# Dimensions




| | mm |
|---|---|
| A | 3000 |
| A1 | 270 |
| B | 3545 |
| B1 | 3600 |
| C | 3860 |
| D | 3200 |
| E | 3330 |
| H | 3390 |
| I2 | 510 |
| J2 | 550 |
| K | 1950 |
| L | 3600 |

| | mm |
|---|---|
| M | 1800 |
| Q | 520 |
| T2 | 1690 |
| T3 | 1690 |
| U2 | 6320 |
| U6 | 6980 |
| V | 7900 |
| W | 3850 |
| X | 11000 |
| R1 | 3000 |
| R2 | 6390 |
| R3 | 7030 |

E = tail radius

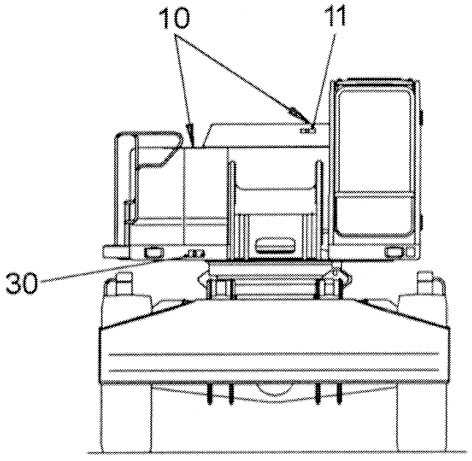
Dimensions are with attachment over steering axle

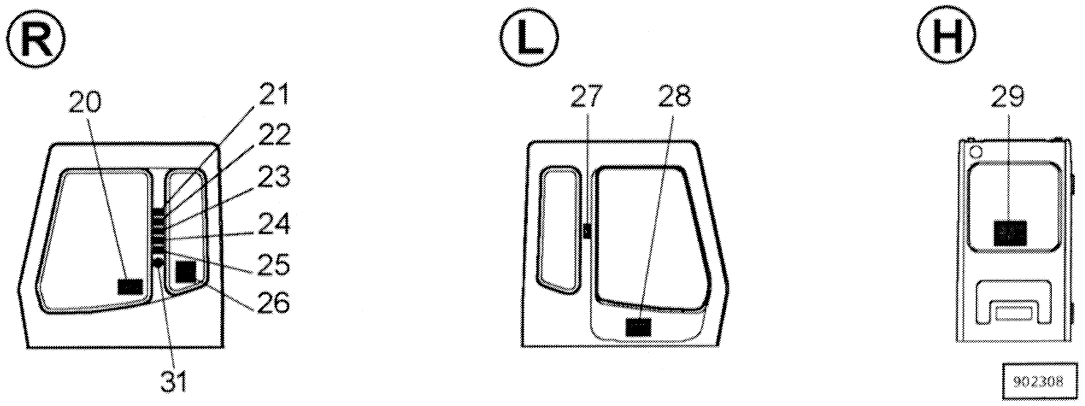
**Tires 18.00-25**

– Maintain a safe distance from electrical aerial lines. Do not allow the equipment to come near cables when working near electrical aerial lines. Risk of fatality! Inform yourself about required safety distances.
– The following actions must be carried out in the event of any transfer of electricity:
  • do not move the machine or its equipment,
  • do not leave the driver's control station,
  • warn people standing outside the area not to approach or touch the machine,
  • have the power supply turned off.
– Before moving the machine, always ensure that any attachments are safely secured.
– When driving onto public roads, paths and squares, observe current traffic regulations and if necessary, ensure that the machine has been made safe as per regulations beforehand.
– Always turn on the lights in conditions of poor visibility or darkness.
– Do not permit any passengers in the machine.
– Only work when seated properly and with the safety belt securely fastened.
– Report all function faults and ensure that all necessary repairs are carried out immediately.
– Assure yourself that no one is endangered when you start the machine moving.
– Before you start working, test the brake system in accordance with the regulations given in the operating instructions.
– Never leave the driver's seat while the machine is moving.
– Never leave the machine unattended while the engine is running.
– The machine must be positioned, moved and operated in such a way that it is stable and that there is no danger of overturning. Only known loads may be moved with the equipment; this applies particularly when using the grab.
– Position the upper structure in the longitudinal direction when moving and hold the load as close to the ground as possible.
  EXCEPTION: see USE WHEN LOADING AND UNLOADING
– Adjust your driving speed to suit local conditions.
– Avoid any working movements which may tip the machine. Should the machine start to tip or slide sideways, however, turn the upper structure to face downhill and lower the equipment at the same time.
– As far as possible, work downhill or uphill and not side on to the slope.
– Only drive downhill at the permitted speed or you could lose control of the machine.
– Always shift down to a lower running step before a slope. When doing this, the diesel engine must run at maximum speed and the speed may only be reduced using the accelerator pedals.
– When loading a truck, ensure that the truck driver vacates the cab even if a stoneguard is present.
– For demolition work, digging and crane operations etc., always use protective devices specifically designed for the purpose.
– For terrain which is difficult to gain an overview of and whenever necessary, ask for the assistance of a spotter. Only permit one person to give you signals.
– Only permit experienced personnel to attach loads and give signals to the machine operator. The spotter must be positioned within the visual range of the operator or be in voice contact with him.
– Depending on the equipment combination, there is a risk of collision between the work tool and the cab, the cab protection or the boom cylinders. The greatest degree of care must be taken to avoid damage when the hoe teeth come within this area.

## Safe use when loading and unloading (particularly when loading and unloading wood)

– According to use, it can be necessary when working with a grab to move with the equipment raised and the load lifted up; this applies, for example, when loading and unloading wood.
– Here, the centre of gravity of the machine will be displaced upwards in the vertical direction. The driving characteristics of the machine will thus be influenced persistently, e.g. through reduction of the dynamic stability.
  The following instructions are therefore to be observed at all times:
  • Adjust vehicle handling to suit the altered machine characteristics and environmental conditions.
  • Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
  • Avoid sudden speed changes, such as braking, accelerating and changing direction.
  • Only rotate the upper structure when the chassis is stationary.
  • Only rotate the upper structure after you have picked up the load.
  • Only move the machine when you have picked up and lifted the load and rotated the upper structure to the driving position.
  • There is a danger of possible swinging movement and dropping of the load when the equipment is raised.




10 Prohibition sign
11 Warning Sign Engine Shut Down

20 Sign Control Symbols
21 Warning Sign Attachment
22 Notice Accident Prevention
23 Notice Parking Brake
24 Notice Operating Brake
25 Notice Steering
26 Lifting Capacity Chart
27 Notice Safety Lever
28 Lubrication Chart
29 Notice Latching and Lifting Points
30 ID Hydraulic Excavator
31 Notice Safety Belt

H2 INDICATOR LAMP: LOW ENGINE OIL PRESSURE

This indicator lamp lights up whenever during operation the engine oil pressure falls below a specified level.

The low oil pressure is signaled acoustically via the buzzer at the same time.

Put the engine into low idle immediately, let it run for approx. 5 seconds longer and then shut it off.

H12 INDICATOR LAMP: BATTERY CHARGE

This indicator lamp lights up whenever the ignition key is put in contact position and extinguishes as soon as the engine is started.

When in operation this indicator lamp lights up whenever the alternator v-belt or the electrical loading system is malfunctioning.

Then the engine must be shut off and the malfunction eliminated.

H19 INDICATOR LAMP: TURN SIGNALS

Lights up after using the turn signal switch to indicate the direction of travel and when the hazard lights are activated.

H20 INDICATOR LAMP: PARKING BRAKE

Lights up when the parking brake is applied and/or if the release pressure of the parking brake is too low.

H23 ACCUMULATOR PRESSURE (OPERATING BRAKE)

Lights up when there is not sufficient accumulator pressure. The brakes are **not** ready to function properly.
Stop the excavator immediately and check the brake system.

Will be stored under error code E 510.

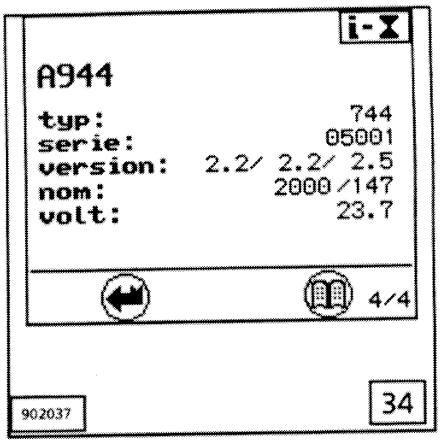
H24 INDICATOR LAMP: STEERING FLOW GAUGE

**no function**

Fig. 34 provides information on

- The state of development of the control currently installed,
- The excavator identified plus its model and serial numbers.

Both details on the "nom" line are the nominal engine speeds and the number of teeth on the diesel engine




## MENU i-I/O

### a) INFORMATION ON HYDRAULIC PUMPS

**Monitors 1 and 2** (fig. 36 and 37)

These information monitors provide information on the hydraulic pumps' operating position.

Monitor 1 (fig. 36) displays for each pump:

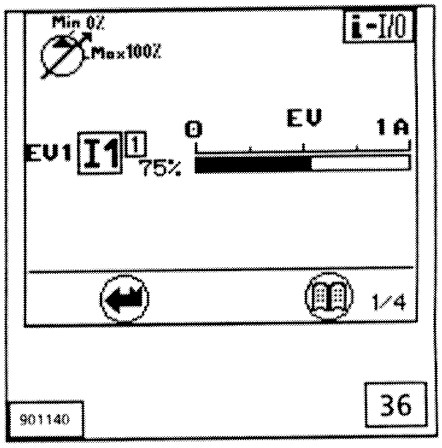
- whether a signal for flow limitation is activated for the pumps, if yes, the symbol **"R"** is shown in the TI area of the display, see main monitor.

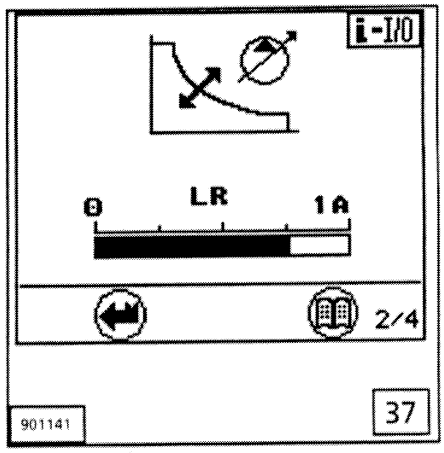
  In fig. 36, for example, the flow limiter I1 is activated which limits the pumps to 75% of the maximum flow.

  When there are several flow limits activated simultaneously, the one with the lowest value determines the operation of the hydraulic pump.

- a bar diagram with the current value which determines the temporary pivot of the pump.

The present current value of the LR magnet (current value for power adjustment) is represented on monitor 2 (fig. 37).

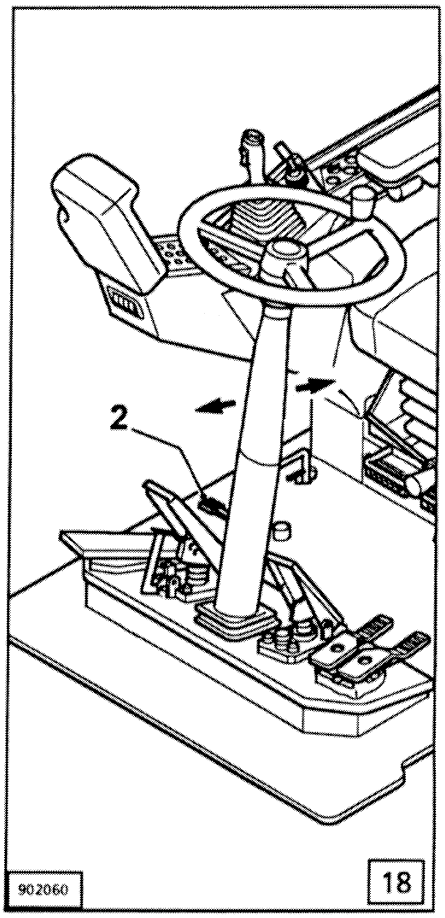


## ADJUSTABLE STEERING COLUMN (fig. 18 )

The steering column in the hydraulic excavator can be adjusted forward/backward.

- Push the unlocking lever 2 up.
- Adjust the steering column to the desired position.
- By releasing the lever the steering column can be stopped in any position desired.




## FRONT WINDOW (figs.19 and 20)

Unlatch the window using locking clip Pos. 1 (push in and down).

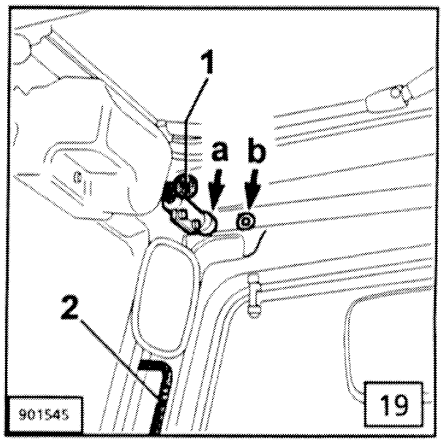
Latch the front window into the various screen settings with locking clip Pos. 2 (see below) and lock again with locking clip Pos. 1.

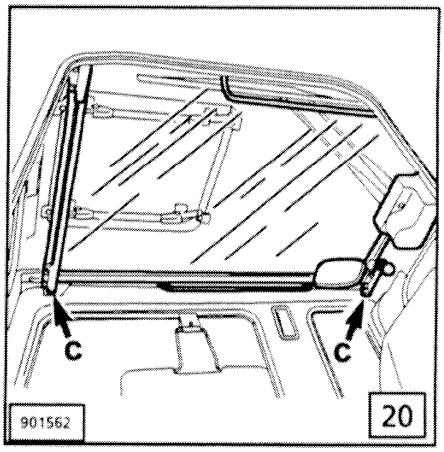
**Latch holes for the three screen settings :**

Window closed: Pos. a

Ventilation position: Pos. b

Window open: Pos. c



## STARTING PROCEDURE AT AMBIENT TEMPERATURES DOWN TO 0°C

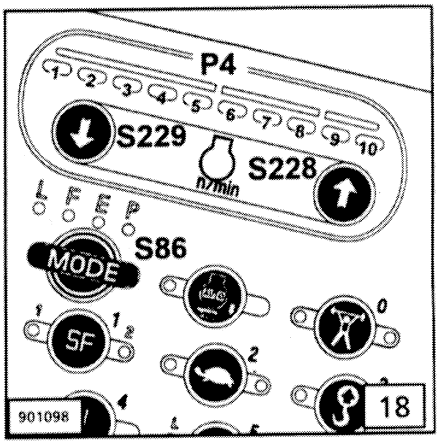
If the engine and the batteries are in good condition, the engine can be started without the flame glow plug.

- turn the ignition key to position –3-.
- as soon as the engine is running properly, release the ignition key.
- all indicator lamps and gauges must be extinguished. (if this is not the case, see Function Descriptions in chapter 3)
- when the engine is started, the buzzer sounds briefly until the engine oil pressure is established.

## ENGINE SPEED ADJUSTMENT AND FUNCTION MODES

RPMs can be read on the LED chain P4 (fig. 18). It is divided into 10 RPM levels.

Adjusting the RPMs occurs either via arrow key **S228** and **S229** or via the mode switch **S86.**




### ADJUSTING THE RPMS VIA THE ARROW KEYS

Pushing the arrow key increases the engine speed to the next RPM level. If engine speed is "manually" adjusted (via arrow keys), the corresponding RPM level lights up as well as the corresponding LED mode.

A blinking LED signifies a mode was not selected correctly.


### ADJUSTING THE RPMS VIA THE MODE PRESELECTION

Four (4) different modes can be selected via the mode switch **S86**:

| | | | |
|---|---|---|---|
| L | LIFT Mode | = | RPM level 5 |
| F | FINE Mode | = | RPM level 10 |
| E | ECO Mode | = | RPM level 8 |
| P | POWER Mode | = | RPM level 10 |

The corresponding mode is shown via one of the 4 LEDs. The mode selected is saved when the engine is shut off and indicated by a blinking LED the next time the engine is started.

After starting the diesel engine, the RPM preselection is either on level 1 (low idle of the diesel engine) or on level 3 whenever a warm-up phase for the diesel engine is required.

By activating mode switch **S86**, the desired energizing conditions are confirmed, the corresponding RPMs and power are accepted by the diesel engine which is running and the corresponding indicator lamp lights up continuously.

In modes E and P, the diesel engine operates at maximal power, in modes L and F, the hydraulic power is reduced.

## TRAVELLING DOWNHILL SLOPES

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

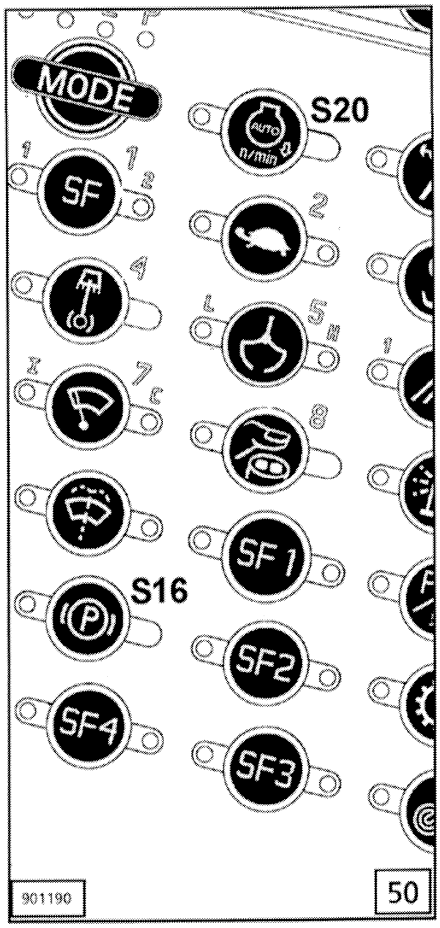
NOTE

**Before travelling inclines, the "AUTOMATIC IDLE" S20 must be switched off (fig. 50). 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.

DANGER

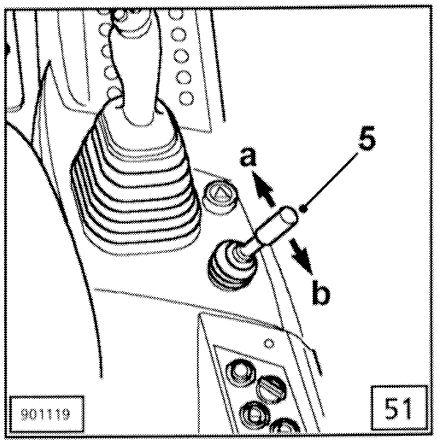
**When leaving the operator's cab and/or shutting down the hydraulic excavator, parking brake S16 should be applied.**
**Due to the locking of the parking brake, no safe shut-down can be guaranteed (pressure loss due to leakage).**




## PLATE SUPPORT

Actuation of the support is resulted via control lever **5** (fig. 51).

- Activating the control lever forwards "**a**" means lower plate.
- Activating the control lever backwards "**b**" means lift plate.




## INDIVIDUAL CONTROL OF BLADE SUPPORT

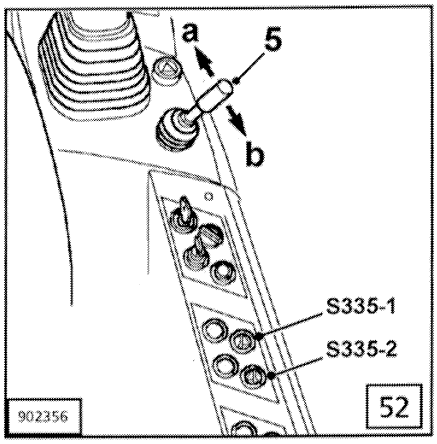
(Additional Equipment)

Actuation of the blade support's individual control is resulted via switches **S335-1** and **S335-2** and via control lever **5** (fig. 52).

**S335-1** = **Front support**

**S335-2** = **Rear support**

- Press corresponding switch **S335-1 or S335-2** (light emitting diode in the switch lights) and raise "**a**" or lower "**b**" blade via control lever **5.**
- Should both switches **S335-1 and S335-2** be pressed, both blades at front and rear can be lowered "**a**" or raised "**b**".



# MACHINE TRANSPORTING SAFETY

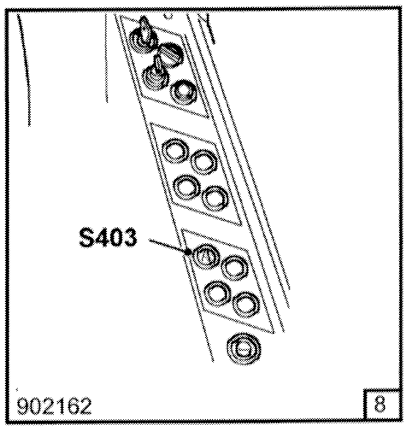
- Use only suitable transporting and lifting devices with sufficient lifting capacity.
- Park the excavator on firm and level ground and block the chains or wheels.
- If necessary, remove part of the attachments during transport.
- When loading the excavator on a flatbed trailer or railroad car, be sure that the loading ramp incline is less than 30° and covered with wooden planks to prevent skidding.
- Remove all snow, mud and ice from track components before moving up the ramp.
- Before loading, secure the uppercarriage to the undercarriage with the lock pin .
- Align the excavator with the loading ramp.
- Attach the manual control levers to the foot pedals for sensitive control.
- Have another person guide and signal the operator.
- Have blocks or wedges ready to block the excavator, if necessary, to prevent it from rolling backwards.
- Retract the attachment as far as possible and lower the attachment as close as possible to the loading surface and carefully drive up the ramp and onto the flatbed trailer.
- When the excavator is on the trailer, release the uppercarriage lock pin, turn the uppercarriage back and lower the attachment. If the backhoe attachment is attached, tilt the stick and bucket in and relock the uppercarriage.
- Carefully secure the uppercarrige and other parts with chains, wedges and blocks to prevent slipping .
- Release the hydraulic pressure, remove the ignition key, raise the safety lever, close and lock the cab and secure all other doors and leave the excavator.
- Close all cab doors, covers and other doors of the excavator.
- Carefully check out the transport route. Make sure that width, height and weight allowances are within the permitted limits.
- Check that there is sufficient clearance underneath all bridges, underpasses, utility lines and in tunnels.
- During the unloading procedure, proceed with the same care and caution as during the loading procedure. Remove all chains and wedges. Start the engine as outlined in the Operation and Maintenance Manual. Carefully drive off the loading platform. Keep the attachment as close as possible to ground level. Have another person guide and signal to the operator.

## SHUNTING THE STICK CYLINDER SHUT-OFF

Should the industrial stick be manoeuvred out beyond a shut-off point, the stick cylinder shut-off must be shunted via switch **S403** (fig. 8).

Shunting can only be activated if movement of the industrial stick has already been shut off.

After actuating switch **S403,** the stick can be manoeuvred beyond the shut-off point into the off-limits area for 10 seconds.




**Shunting after shut-off via the minimum value** (figs. 9 and 10):

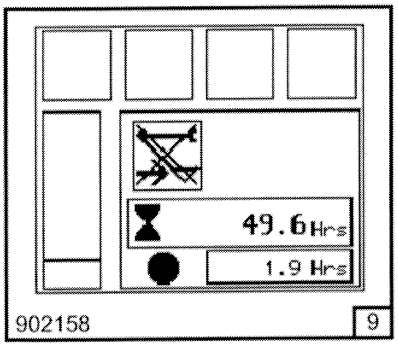
**DANGER**

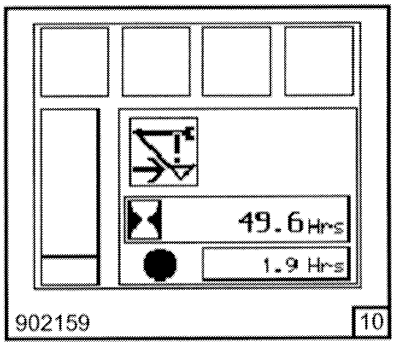
**Danger of injury and risk of damage!**

**With switch S403 actuated, there is a danger that the attachment encroaches the immediate vicinity of the operator's cab.**

The symbol shut-off due to minimum limit value is displayed:

- Actuate switch **S403**.
  The symbol for shunting of the minimum limiting value is displayed. A warning tone (buzzer) sounds.
  The industrial stick can be manoeuvred beyond the shut-off point for 10 seconds.

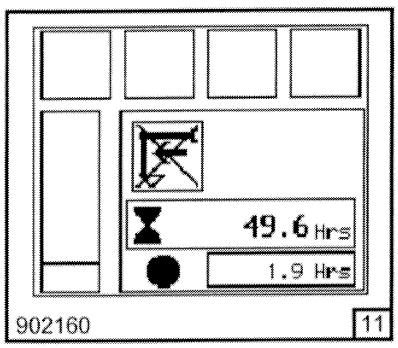


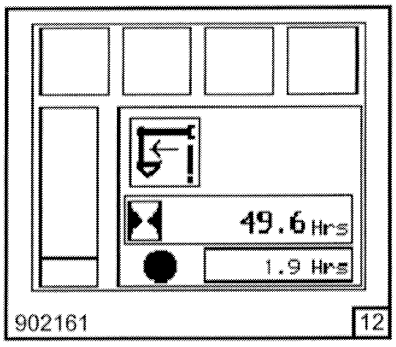




**Shunting following shut-down via the maximum value** (figs. 11 and 12):

The symbol for shut-off via the maximum limiting value is displayed.

- Actuate switch **S403**.
  The symbol for shunting of the maximum limiting value is displayed. A warning tone (buzzer) sounds.
  The industrial stick can be manoeuvred beyond the switch-off point for 10 seconds.



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 GEAR 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.

CONTACT SPRAY FOR SLIP RINGS :

"CRAMOLIN"

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

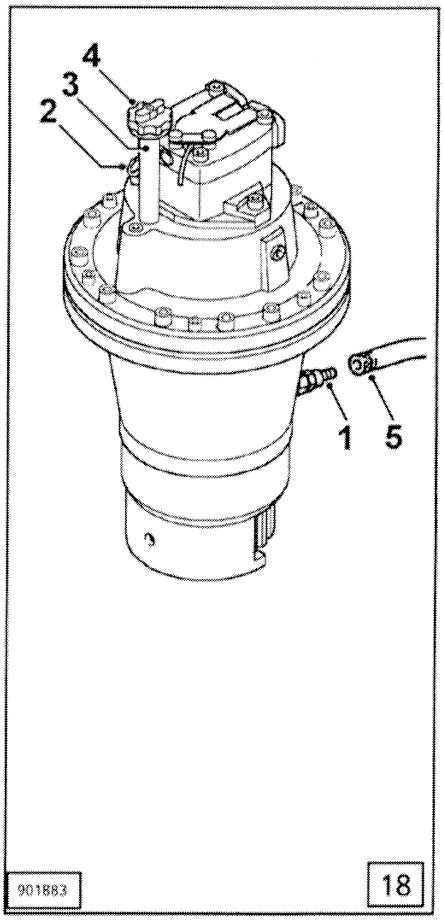
GLEITMO 800

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

CASTROL - TARP

## CHANGING OIL IN THE SWING GEAR

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




TO DRAIN THE OIL

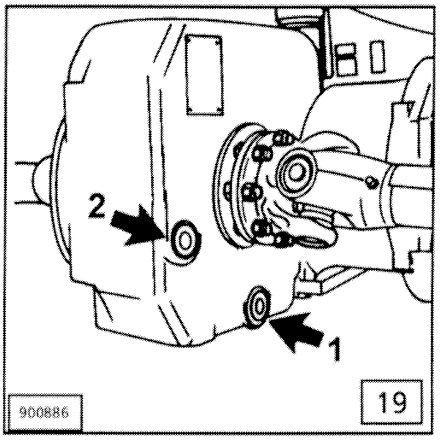
Remove sealing cover 4, unscrew cover of drain plug 1 via the opening on the bottom cover of the slewing platform, screw drain hose 5, included in delivery, to the drain plug and allow oil to drain into a suitable container.
Then remove the hose 5 and screw cover of drain plug 1 on again.

TO ADD OIL

Add oil via the filler neck 3 until reaching the upper marking on the dipstick 2 and close cover 4 once again.

## CHANGING OIL IN THE TRANSMISSION

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




TO DRAIN THE OIL

Remove oil filler plug 2 and oil drain plug 1 and allow oil to flow into a suitable container.
Screw in oil drain plug 1 once again.

TO ADD OIL

Add oil until reaching the level of the borehole 2.
Screw in oil level plug 2 again.

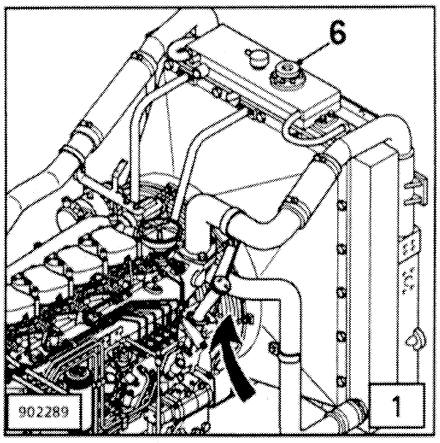
# THE DIESEL ENGINE

COOLING CIRCUIT (fig. 1)

Check cooler grid in accordance with Maintenance Chart intervals and if necessary, clean with compressed air or steam jet (from the inside out, see arrow).

Replace excess pressure valve **6**, and sealing cover of cooling system should any leaks be detected.

Check condition and seals of connecting hoses between water cooler and engine and all heating hoses regularly.

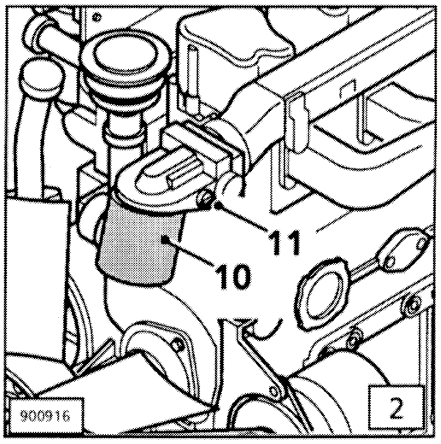



CHANGING THE WATER FILTER (fig. 2)

The water filter contains a paste additive which provides the correct anti-corrosion properties of the coolant.

The water filter (pos. 10) must be replaced every 500 operating hours:

- Close stop valve 11 on the filter housing,
- Unscrew the filter element,
- Lightly oil the sealing ring on the new filter element,
- Screw in the new filter element until the sealing ring is sitting on the filter head; then tighten the filter element **by hand** for 1/2 - 3/4 of a turn.
  **(Do not use any tools for tightening).**
- Open stop valve again (ON).

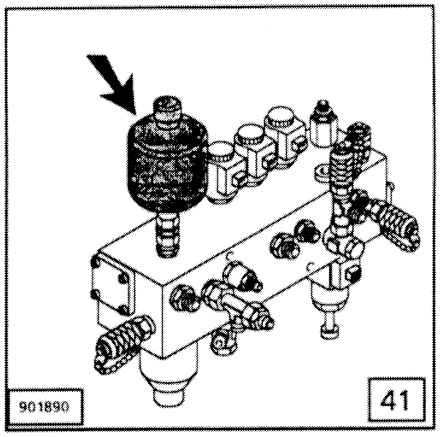


## THE SERVO CONTROL SYSTEM

The transmitter units require no special maintenance. The pipe network, as well as connections to all components (hydraulic accumulator, pressure limitation valve, pressure filter...) are to be inspected regularly for leaks.

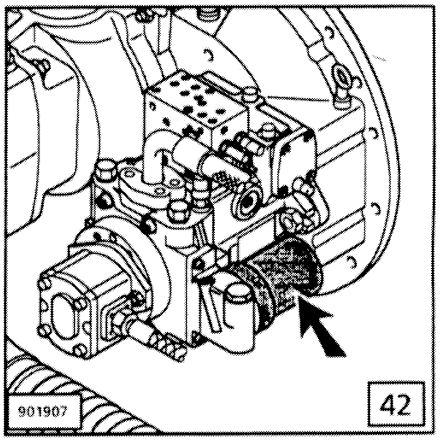
**⚠ DANGER**

**The hydraulic accumulator (fig. 41) keeps the servo control system pressurised even after the engine has been switched off .**
**Before any intervention in the servo control system, control pressure must inevitably be relieved as follows: Lower the attachment to the ground, switch off engine and then actuate both joysticks (ignition key in contact position).**




## CHARGE FILTER OF THE SWING GEAR CIRCUIT (fig. 42)

Insert of the charge oil filter mounted on the swing gear pump is to be replaced in accordance with determined intervals (see Maintenance Chart).



## AIR CONDITIONER PLANT

Operate the air conditioner every second week for about 10 minutes regardless of the season.

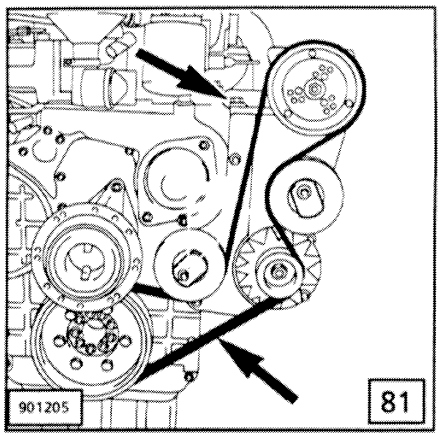
During the warm season, perform following checks or maintenance works every 500 operating hours :

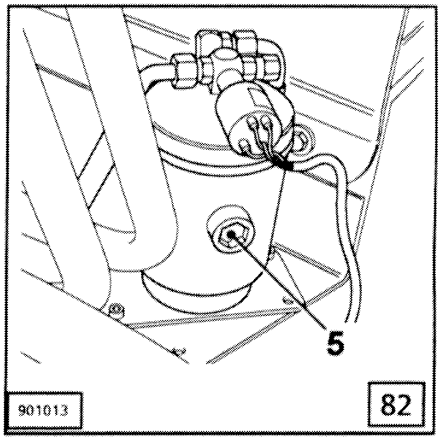
- check the condensator heat exchanger for clogging, and if necessary blow it out from inside (fan side) using pressure air or steam jet until the cooler core is clean. A chocked exchanger core would cause the pressure to increase in the coolant circuit and the air conditioner to be automatically turned off.
- check and retighten the mounting screws of the compressor and its support to the Diesel engine (fig. 81),
- check for tension and good condition of the compressor driving belt (fig. 81),
- check the coolant level at the sight glas **5** (fig. 82) of the coolant receiver unit: if the white float ball **6** (fig. 83) is in the bottom of the sight glas it indicates a lack of coolant and the installation must be refilled.
- determine the degree of moisture in the driing substance inside the drier while checking the colour of the indicator pearl 7 (fig. 83) in the sight glas: the degree of moisture is correct as long as the pearl is blue, at the contrary if the pearl is rose coloured, the drier / receiver unit is saturated with humidity and must be replaced immediately.
- visually check the condition of the refrigerant drier / receiver. If mechanical damage or rust formation is noticed (also at mounting console or hose connections) the receiver must be replaced (Pressure reservoir).

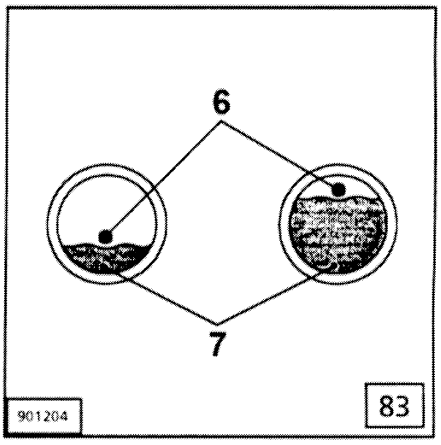
In the both last cases and at least once a year, the drier / receiver unit must be replaced by a qualified air conditioner mechanic.
The coolant circuit must then be drained and refilled, and the lube oil for the airco compressor must also be replaced.

In addition, the following maintenance works must be performed at least once a year by an air conditioner specialist:

- check the function of the motors for the evaporator fans,
- check the airco electrical circuit for good connections,
- check the thermostat inside the evaporator unit for correct adjustment,
- retighten all hose connections and check the hoses for damage.



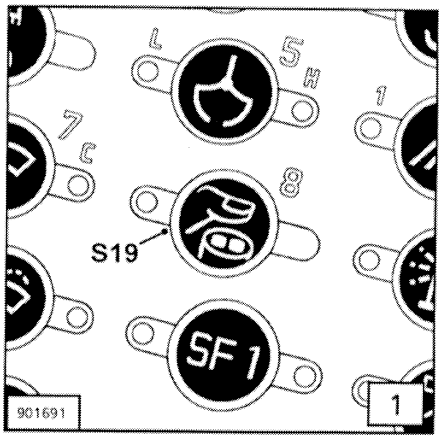



## ACTIVATION OF AN AUXILIARY CONTROL CIRCUIT

Special attachments (rotating grapple, stick with quick-change head...) can be activated via an auxiliary hydraulic control circuit.

The control circuit is activated via the **S19** switch.

Control of the additional device is resulted via both buttons installed in the grip of the left-hand joystick **4** .



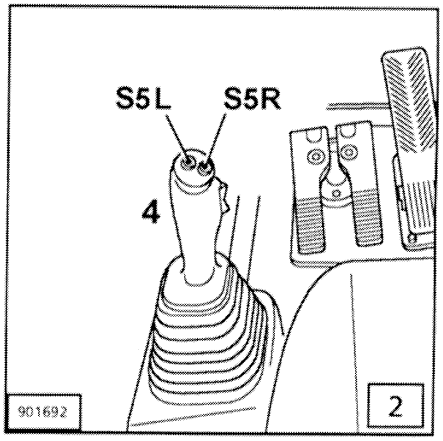

## ROTATING GRAPPLE

- Apply the **S19** switch (fig. 1) for the rotating device (light emitting diode in the switch lights up)

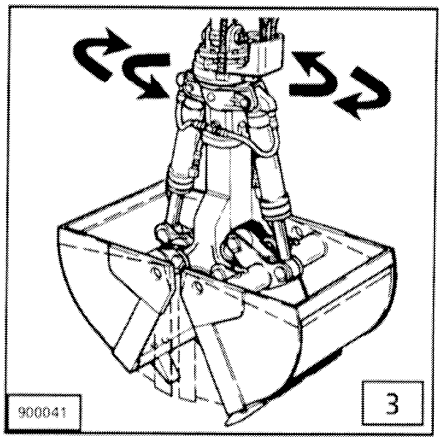
LEFT JOYSTICK **4** (fig. 2)

- KEY "S5R" =
  Rotates the grapple to the right (clockwise, fig. 3)
- KEY "S5L" =
  Rotates the grapple to the left (anti-clockwise, fig. 3)

The grapple will continue to rotate as long as the keys are being applied.




**USA - version, see page 7.4**




## ROTATING GRAPPLE (LEFT AND RIGHT)

(fig. 4)

- Press the inner button on the left joystick to rotate the grapple to the left.
- Press the inner button on the right joystick to rotate the grapple to the right.