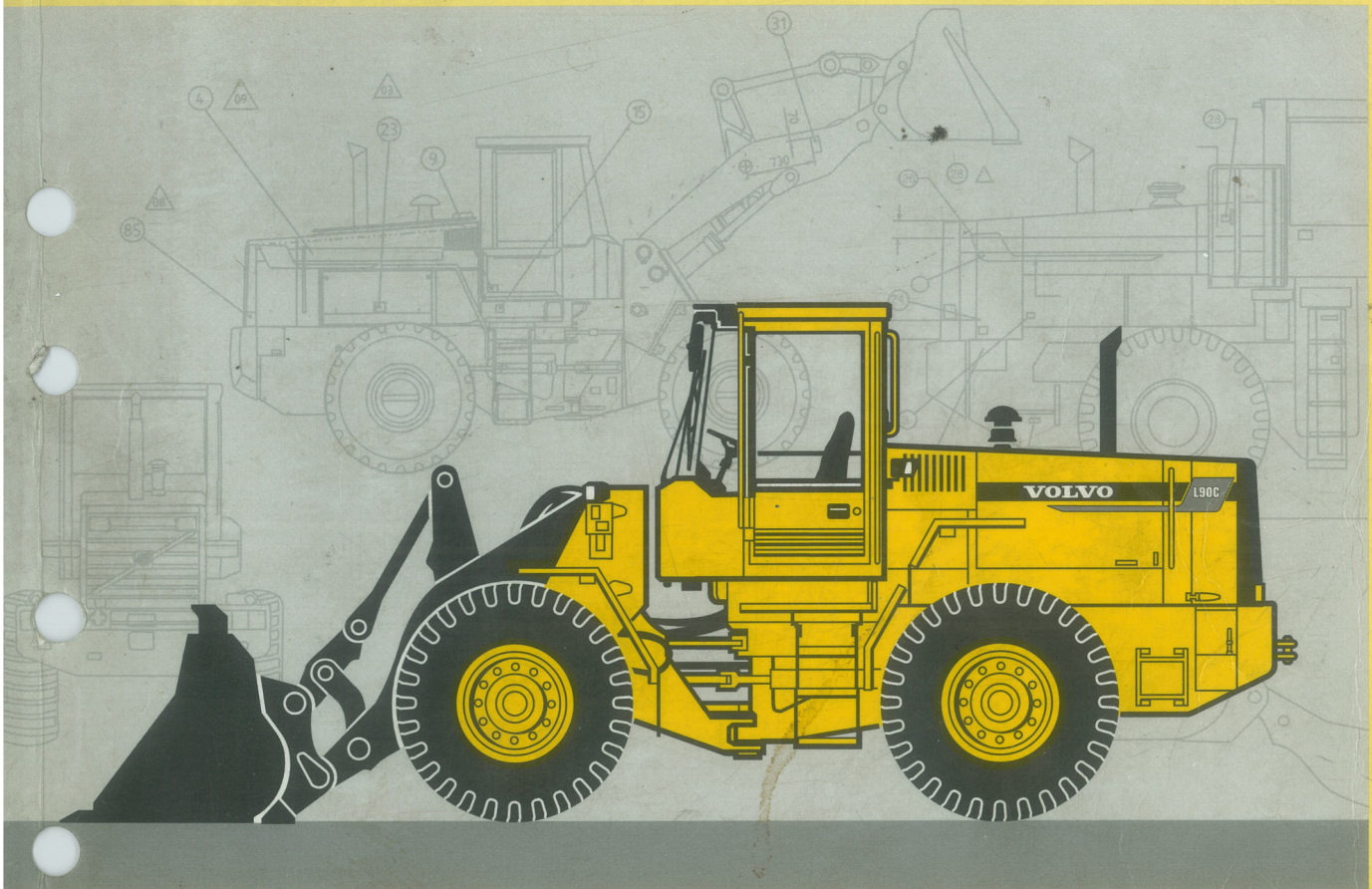


**L90C**



**VOLVO**

Weight of Volvo - 56, 2000 mm  
Scales

# Volvo/Volvo BM L90C

## OPERATORS MANUAL

### Foreword

This Operator's Manual is intended as a guide for the correct use and maintenance of the machine. The manual should always be kept in the vehicle. Carefully read the manual before starting and operating the machine or before carrying out any preventive maintenance.

We have taken many hours in designing and producing the safest and most efficient equipment possible. All this time may be wasted, if you do not read the safety instructions or if you do not follow them.

Make yourself familiar with all controls and instructions and keep this manual in the side compartment in the cab for handy reference. If the manual is lost, it should be replaced immediately.

Machines rarely cause accidents, whereas people do. A safety conscious person and a well maintained machine make a safe, efficient and profitable combination.

NOTE: This manual has been adapted to cover all markets, thus it may contain information about equipment not necessarily fitted to the version of the machine you have purchased.

We therefore ask you to disregard information which is not applicable to your machine.

We are continually striving to improve our products and therefore, we reserve the right to make changes and improvements to the design whenever we consider that these increase the efficiency of the product. However, this does not commit us to introduce these improvements on products which have already been delivered or are in service. We also retain the right to change data and equipment, as well as instructions for service and maintenance without prior notice.

### SAFETY REGULATIONS

Every country (State) has its own safety regulations. It is the obligation of the operator to know and follow these. This also applies to local regulations covering different types of work. Should the recommendations in this manual deviate from those of your country, your local safety regulations should be followed.



#### SAFETY ALERT SYMBOL

This symbol, which will appear at various points in the manual together with a warning statement, means **"Warning, be alert! Your safety is involved!"** It is the obligation of the operator to make sure that all warning decals are in place on the machine and that they are readable. Accidents may otherwise occur.

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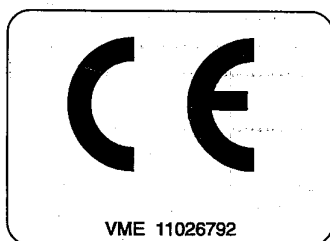
128

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**KNOW THE CAPACITY AND LIMITS OF YOUR MACHINE!**





### CE MARKING AND DECLARATION OF CONFORMITY

(Only applies to machines marketed within the EU/EEA)

This machine is CE marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements" which are given in the EU Machinery Safety Directive. If changes are made that affect the safety of the machine, the person carrying out the changes is responsible for the same. As proof of that the requirements are met the machine is supplied together with an EU Declaration of Conformity, issued by Volvo Wheel Loaders AB for each separate machine. This EU Declaration also covers attachments made by Volvo Wheel Loaders AB. This documentation is a valuable document which should be kept safe and retained for at least 10 years. The document should always accompany the machine when it is sold.

If the machine is used for other purposes or with other attachments than described in this manual, the safety must at all times and in each separate case be maintained. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE marking and the issue of a new Declaration of Conformity.

### EU EMC-DIRECTIVE

The electronic equipment of the machine may in some cases cause interference to other electronic equipment, or suffer from external electromagnetic interference, which may constitute safety risks. The EU EMC directive about "Electromagnetic conformity" provides a general description of which demands that can be made on the machine out of a safety point of view, where permitted limits have

been determined and given according to international standards. A machine which meets the requirements should be CE marked. Our machines have been tested particularly for electromagnetic interference. The CE marking of the machine and the declaration of conformity also covers the EMC directive.

If other electronic equipment is fitted to this machine, this equipment must be CE marked and tested on the machine as regards electromagnetic interference.

### UNAUTHORISED MODIFICATIONS OF THE ROLL OVER PROTECTIVE STRUCTURE (ROPS)

Never make any unauthorised modifications or alterations to the ROPS such as: lowering the height of the ceiling, drilling, welding on fire extinguisher brackets, radio aerial brackets, or other equipment. Such unauthorised modifications will affect the structural limits of the ROPS cab and will void the certification.

The Roll Over Protective Structure (ROPS) has been certified to meet specified test requirements according to ISO 3471 1994 and SAE 1040 APR 88.

The cab has also been tested and approved according to the FOPS standard as defined by ISO 3449 1992, SAE J231 JAN 81 and meets the requirements for "Overhead guards for high-lift rider trucks" ISO 6055 1979 and "Operator seat belt requirements" SAE J386 JUN 93.

Any planned modification or change must be reviewed in advance by our Engineering Department to determine if the modification or change can be made within the limits of the certifying tests.

It is important that each person in your organisation, including management, be made fully aware of these rules involving ROPS. Whenever anyone sees a machine ROPS with unauthorised modifications or changes, both the customer and manufacturer should be notified in writing.



#### WARNING!

**Modifications to or removal of material which affects sound, for example sound-insulating, sound-damping or sound-absorbing material is not permitted.**

**Nor is it permitted to make openings / holes in the cab or engine compartment, as this may affect the sound level in a negative way.**

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**OPERATION AND MAINTENANCE OF THE MACHINE****Volvo Construction Equipment is only responsible if:**

- the machine has been used in a correct manner and been maintained according to instructions in this Operator's Manual and the Service Manuals.
- the prescribed service and prescribed inspections have been carried out at the stated points in time.
- the recommended lubricants according to the manual have been used.
- no security seals have been broken by other than authorised persons.
- all modifications and repairs have been carried out and methods been followed in the way prescribed by Volvo.
- only Volvo genuine parts/accessories, or attachments which meet Volvo's requirements, have been used.

**WARNING!**

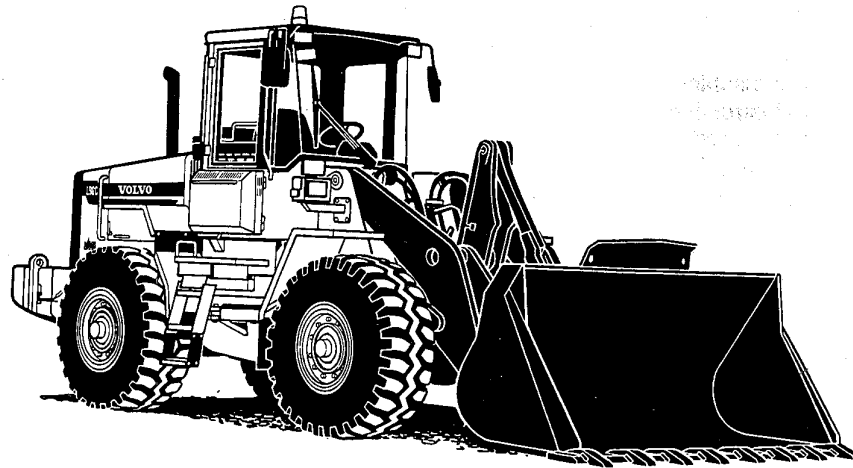
**A loader operator must have sufficient knowledge and instruction before he or she operates the machine.**

**Untrained operators may cause severe injuries or even fatalities.**

**Therefore, it is important that you read and follow the instructions in this Operator's Manual.**

**Never use a loader for which there is no Operator's Manual available.**

**Learn to understand the warning plates, symbols and operator instructions before you begin to operate the machine.**



## **Presentation**

### **Intended use**

The machine is intended to be used under normal conditions for the operations described in the Operator's Manual. If it is used for other purposes or in potentially dangerous environments, e.g. explosive atmosphere, areas with dust containing asbestos and so on, special safety regulations must be followed and the machine be equipped for such operations. Contact the manufacturer/dealer for further information.

### **ENGINE**

The engine is a six-cylinder, four-stroke, direct injection, turbocharged, diesel engine with the type designation Volvo TD63KBE.

### **POWER TRANSMISSION**

The transmission is electro-hydraulically controlled, where all gears are in constant mesh. Between engine and transmission there is an hydraulic torque converter which steplessly regulates the output torque. Front and rear axles have planetary reduction gears in the hubs, which reduce the strain on the respective drive shafts.

### **BRAKES**

The machine is provided with a dual-circuit, all-hydraulic brake system with one circuit for each drive axle. Each circuit meeting the requirements for secondary brake capability. The brakes are wet type disc brakes.

### **Parking brake**

The parking brake is a disc brake fitted externally on the front output shaft of the transmission. There are two types of the parking brake - mechanically or electrically controlled. (The latter is optional extra).

### **STEERING SYSTEM**

The machine has an hydrostatic steering system with a separate pump and two hydraulic cylinders.

### **CAB**

The cab is approved as a safety cab according to FOPS-ROPS stipulations and is provided with heating and ventilation and has air conditioning as an option. The cab is provided with emergency exits via the door, or the right side window which can be opened.

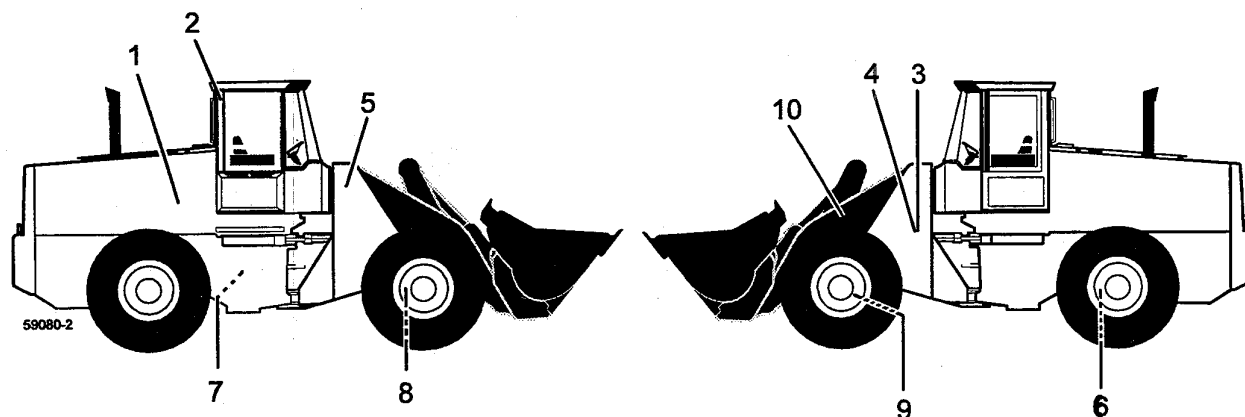
### **EQUIPMENT**

Depending on the market, the machine can be provided with different types of optional equipment. Examples of such equipment are: lever steering (CDC), Boom Suspension System, secondary steering, attachment locking, automatic greasing system, Loadtronic, etc.

### PRODUCT PLATES

The illustration and text below show which product plates the machine should be provided with.

When ordering spare parts, and in all telephone enquiries or correspondence the model designation and the Product Identification Number (PIN) must always be quoted.



#### 1 Engine

The engine type designation, part and serial numbers are stamped into the cylinder block below the turbocharger (on the right-hand side of the machine).

#### 2 Cab

Serial number, machine type, manufacturer's name and address, ROPS/FOPS number and max. machine weight are positioned on the rear right roof post inside the cab.

#### 3 Product Identification Plate

This plate shows machine type, manufacturer's name and address as well as Product Identification Number, i.e. PIN for the complete machine (PIN includes model designation, engine code and serial number) and is positioned on the left side of the front frame.

#### 4 Additional plate

The additional plate for the Product Identification Plate shows machine weight, engine power, year of manufacture and has a space for the CE mark (only within EU/EEA countries). It is positioned below the Product Identification Plate.

#### 5 Primary marking

The PIN, model designation, engine code and serial number are stamped into the right side of the front frame (showing the same PIN number as the Product Identification Plate).

#### 6 Rear axle

The rear drive axle component plate Component Identification Number CIN, with product and serial number and manufacturer is positioned on the right-hand side of the axle housing.

#### 7 Transmission

The transmission product and serial number and manufacturer is positioned on the right-hand side of the transmission (on the converter housing).

#### 8 Front axle

The front drive axle component plate Component Identification Number CIN, with product and serial number and manufacturer is positioned on the axle housing (above the differential lock connector).

#### 9 Differential carrier assembly

The differential carrier assembly product and serial number, CIN, and manufacturer are positioned on the lower part of the differential housing

#### 10 Lifting frame

The lifting frame product and serial number, and manufacturer are positioned on its left side.

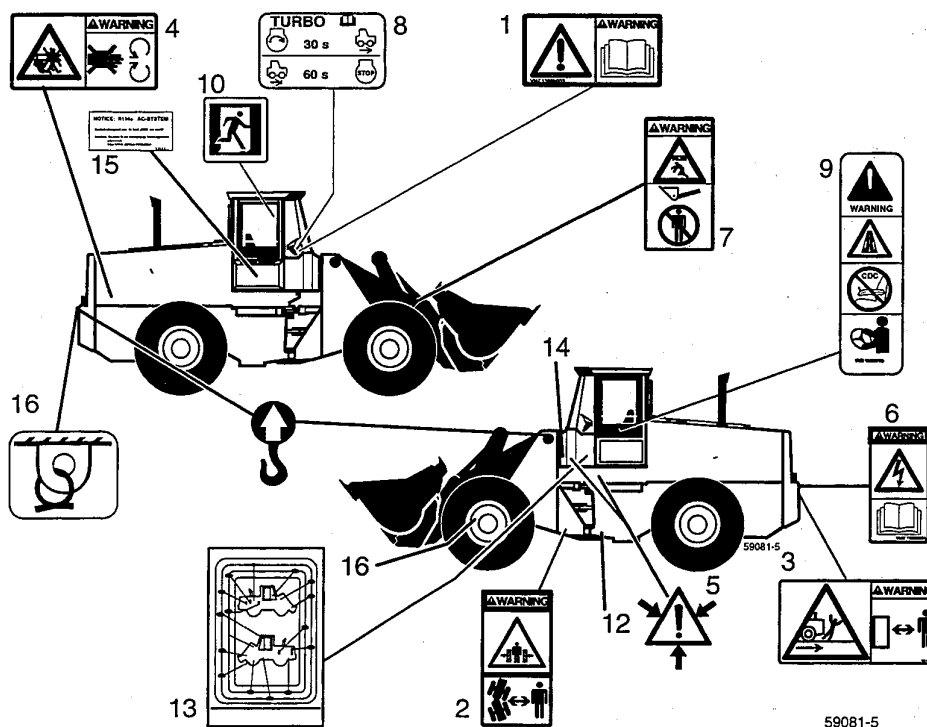


### Information and warning plates

The following text and illustrations describe which warning plates/decals without text and information texts that can be found on the machine.

The operator of the machine must know and follow warnings and information given on decals and plates. Decals/plates which have disappeared, been damaged, painted over, or for any other reason are no longer legible, must be replaced immediately.

The part number (order number) of the respective plates/decals can be found in the Parts Catalogue.



No.	Description	Position
1	Warning! Read the Operator's Manual first.	Cab (windscreen, right side)
2	Warning! Risk of crushing if machine is steered.	Frame joint, right and left side
3	Warning! Reversing machine	Rear (counterweight)
4	Warning! Rotating fan	Inside rear engine cover
5	Warning! Pressurised system	Front left side of cab and front left part of rear frame
6	Warning! Read the Operator's Manual before connecting the jump leads	Inside of battery boxes
7	Warning! Do not walk under raised attachment	Lifting arms, right and left sides
8	Run the engine at low idling...(turbocharger)	Cab (windscreen)
9	Warning! When operating on a public road it is prohibited to have the lever steering (CDC) activated – use the steering wheel.	Cab (on CDC arm rest)
10	Emergency exit (right side window)	Cab (front right window post)
11	Lifting eyes	Upper part of front frame and by rear counterweight (4 pcs)
12	Frame joint lock(only the USA)	The frame joint (right and left sides)
13	Lubrication and service chart	Front left side of cab
14	Permissible sound levels (internal sound pressure at operator position LpA and external sound power level around the machine LwA)	Left side of front frame
15	Refrigerant (AC)	Inside the cover for the ventilation filter
16	Points for tying down machine (when transporting it on other vehicle)	Front and rear frames (4 pcs)



### MAINTENANCE

If the machine is to work as economically as possible, thorough maintenance is necessary. The recommended intervals for maintenance and lubrication refer to normal working and environmental conditions. The maintenance work described in this manual can be carried out by the operator himself. For further adjustments and repairs the machine should be handed in to an authorised dealer workshop.

### INSPECTIONS

#### Delivery inspection

Before the machine left the factory it was tested and adjusted. In addition to this, your dealer has carried out a further check, the "Delivery Inspection", according to our instructions before the machine was handed over to you.

#### Follow-up inspection

It is especially important, however, that during the first period of operation, the machine is subjected to further checks. Retightening of bolts, checking adjustments and other minor measures have to be carried out.

Two follow-up inspections should be carried out:

The first within 100 operating hours, and the second should be carried just before the expiry of the warranty period, but not later than 1000 operating hours.

The carrying out of these inspections is a required condition if the warranty is to apply.

### MAINTENANCE SERVICE

#### Condition Test and Maintenance Programmes

In addition to the maintenance listed in the Maintenance Schedule in this manual, your authorised dealer offers a maintenance system based on condition tests which give an indication of the general condition of your machine. Further information about this maintenance system can be obtained from your nearest authorised dealer workshop.

**WARNING!**

Do not operate the machine until you are thoroughly familiar with the positions and functions of the various instruments and controls. Read through this manual carefully.

Your safety is involved!

Glance at the instruments now and then. Any abnormal readings will thus be noticed in time, so that necessary action can be taken to prevent serious damage.

If any of the red warning lamps light up or are alight, stop the machine immediately and take necessary action.

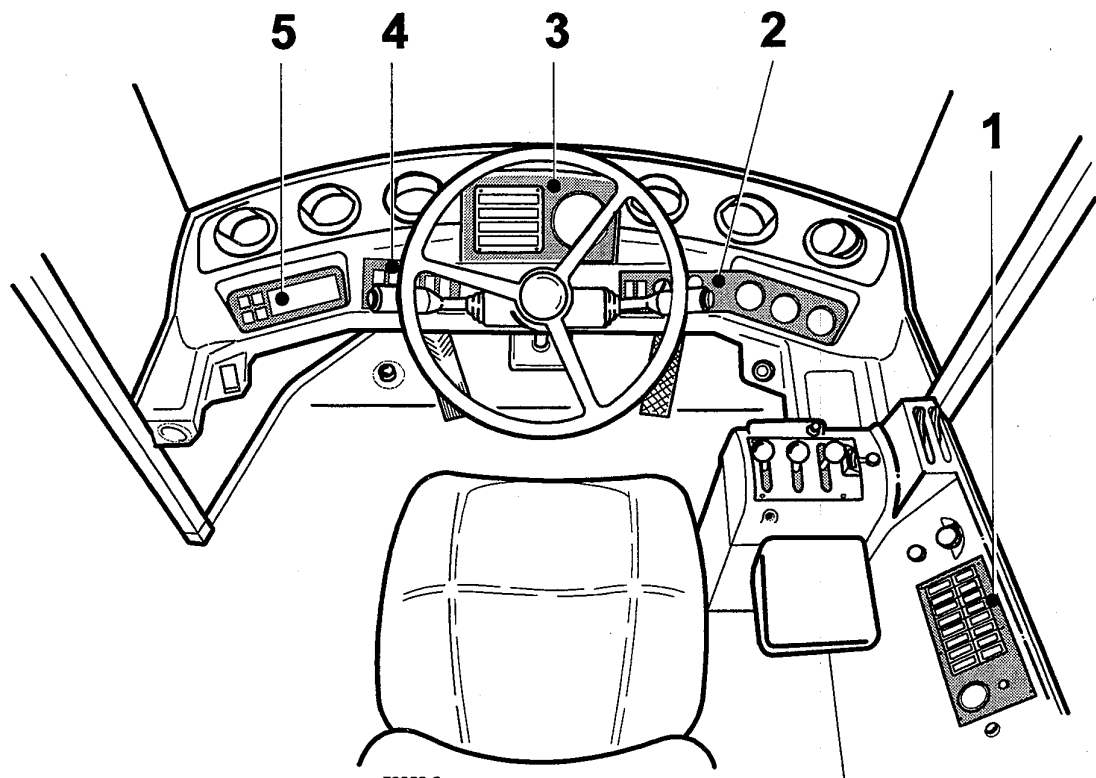
Remember that red warning lamps are for safety purposes.

If any amber control lamps light up or are alight, remedial action may be necessary depending on which function is involved.

Other control lamps (green, white, blue) show engaged functions.

The battery disconnect switch must be on and the key in the ignition switch turned to the running position, position 1, when checking the function of the instruments and controls.

See also checking instruments and control lamps, page 45.



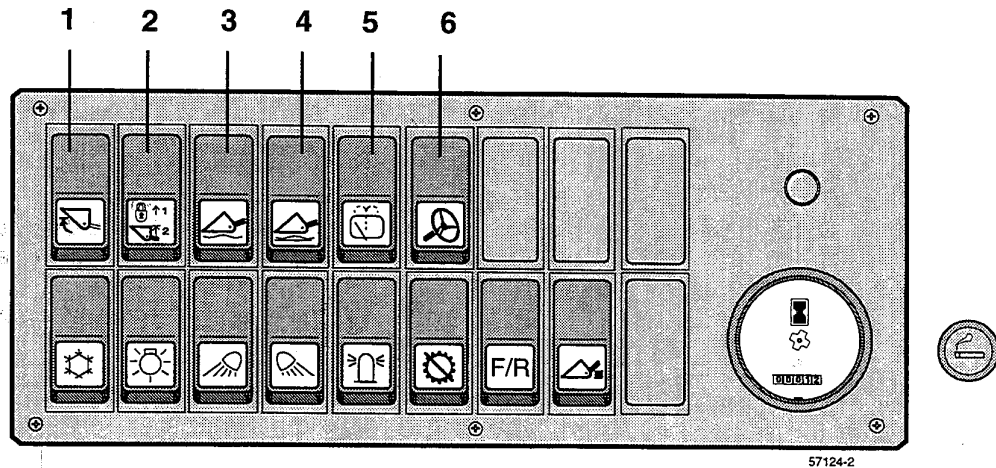
59082-3

**INSTRUMENT PANELS**

- 1 Right instrument panel (switches, gauges)
- 2 Front right instrument panel (gauges)
- 3 Centre instrument panel (control lamps, gauges)
- 4 Front left instrument panel (switches)
- 5 Display unit (Contronic)



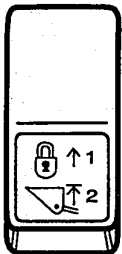
# 10 Instruments



Control lamps in switches light up when the function is switched on (applies to all switches which do not have a spring return action)

## 1 BUCKET POSITIONER

Lower end of switch pushed in = Bucket positioner engaged.  
For further information, see "Other controls".

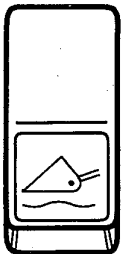


## 2 COMBINED SWITCH FOR DETENT POSITIONS LIFTING / BOOM KICK-OUT

Position 0 = Detent solenoid not activated

Position 1 = Detent position, lifting

Position 2 = Detent position, boom kick-out

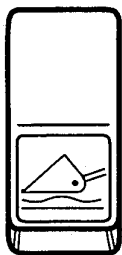


## 3 FLOATING POSITION

Lower end of switch pushed in = Floating position engaged, when the control lever for lifting/lowering has been moved to floating position.

Switch in neutral position = Normal lift/lowering function.

NOTE: With the switch in floating position, the lowering speed will be slower.



## 4 SINGLE-ACTING LIFTING FUNCTION

Lower end of switch pushed in = Single-acting lifting function is engaged.

The attachment can now rise, e.g. if it encounters uneven ground, but will return to the original position under its own weight.



5

**REAR WINDOW WIPER**

Lower end of switch pushed in to position 1 = Wiper connected.

Machines fitted with rear window washer: Lower end of switch pushed in to position 2 (spring return) = Rear window washer connected.

For washer reservoir, front and rear window, see under "MAINTENANCE".



6

**SECONDARY STEERING SYSTEM****Testing function****WARNING!**

Make sure that no persons are near the machine when testing the function of the secondary steering system, there is a risk that someone may be crushed between the front and the rear frame (this applies even if the engine is not running).

Before starting with a stationary machine, test the function of the system as follows:

Press down the lower end of the switch and turn the ignition key to the running position (position 1). The secondary steering pump starts and the amber control lamp (12) on the centre instrument panel lights up.

Turn the steering wheel and check that the steering works. Release the switch which then returns to the "0" position (if the red warning lamp lights up and flashes, the secondary steering cannot be restarted until the lamp has been extinguished).

**NOTE:** When testing the function of the secondary steering pump, the pump must not be engaged for more than one minute, as there is a risk of overheating.



12 Amber



7 Red

**Operator instructions**

When the primary steering system is operating, the control lamps (12 and 7) on the centre instrument panel should be extinguished.

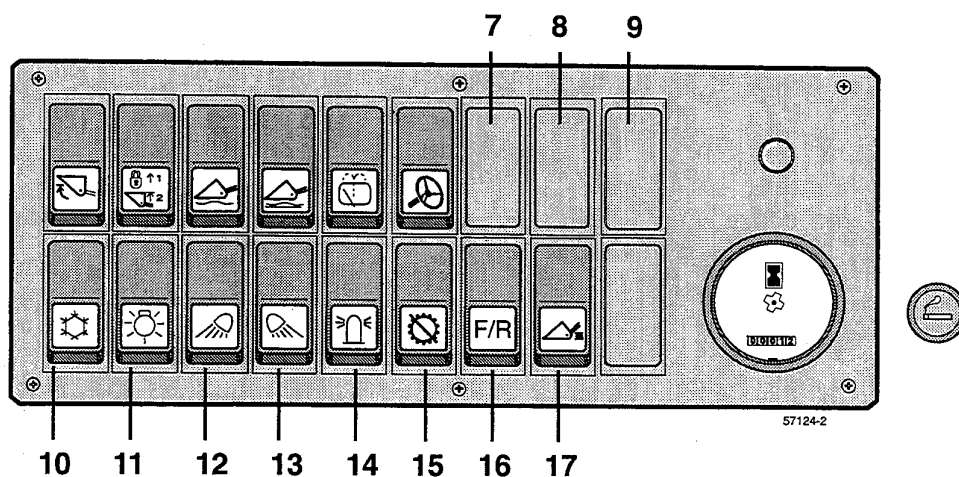
If a fault should arise in the primary steering system, the red warning lamp (7) lights up after which the amber control lamp (12) on the centre instrument panel also lights up to indicate that the secondary steering pump has started.

**NOTE:** The secondary steering pump is activated automatically when the steering wheel is turned if the primary steering pressure is lost and if the travelling speed is above 5 km/h (3 mph). Only use the secondary steering in an emergency.

**NOTE:**

If a fault has arisen in the primary steering system, steer the machine to a suitable place, brake and stop the machine and do not use it again until the fault has been rectified.

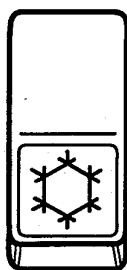
# 12 Instruments



**7**  
**UNASSIGNED**

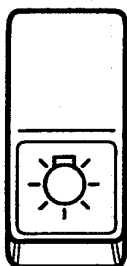
**8**  
**UNASSIGNED**

**9**  
**UNASSIGNED**



**10**  
**AIR CONDITIONING**

Lower end of switch pushed in = Air conditioning connected.  
For further instructions on the use of heating, ventilation and air conditioning, see under "Cab Comfort".



**11**  
**LIGHTS**

Lower end of switch pushed in to position 1 = Parking and instrument lights.

Lower end of switch pushed in to position 2 = Travelling lights (high or low beams) turned on. If the high beams are on, control lamp (16) on the centre instrument panel will be on.



**12, 13**  
**FRONT / REAR WORKING LIGHTS**

Lower end of switch pushed in to position 1 = Front / Rear working lights connected (depending on equipment).  
Control lamp (17) on the centre instrument panel indicates that the working lights are on.

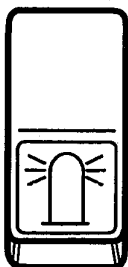
**(Extra front / rear working lights)**

Machines fitted with extra working lights:

Lower end of switch pushed in to position 2 = Ordinary working lights and extra working lights connected.

**NOTE: Working lights should be off when driving on public highways.**



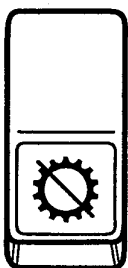


14

**ROTATING WARNING BEACON**

Lower end of switch pushed in = Rotating warning beacon connected.

See also "General operating rules" page 54.



15

**POWER TRANSMISSION DISENGAGE FUNCTION**

Lower end of switch pushed in = Power transmission will disengage when the brakes are applied.

Upper end of switch pushed in = The power transmission remains engaged even when the brakes are applied – This position is recommended as the normal position, as it provides a smoother operating cycle.

**WARNING!**

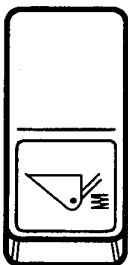
The transmission disengage function must not be activated while transporting on the highway.



16

**FORWARD – REVERSE**

When this switch is activated (spring return) it is possible to operate the machine with the forward/reverse switch on the control lever carrier, see also item 8 page 36.



17

**SWITCH / FUNCTION SELECTOR, BOOM SUSPENSION SYSTEM (BSS)**

This switch is used for switching between gear dependent and travelling-speed dependent BSS (Boom Suspension System).

**Upper end of switch pressed in** and if the BSS is activated (with switch 7 on the control lever carrier, page 36) = it will be gear dependent BSS.

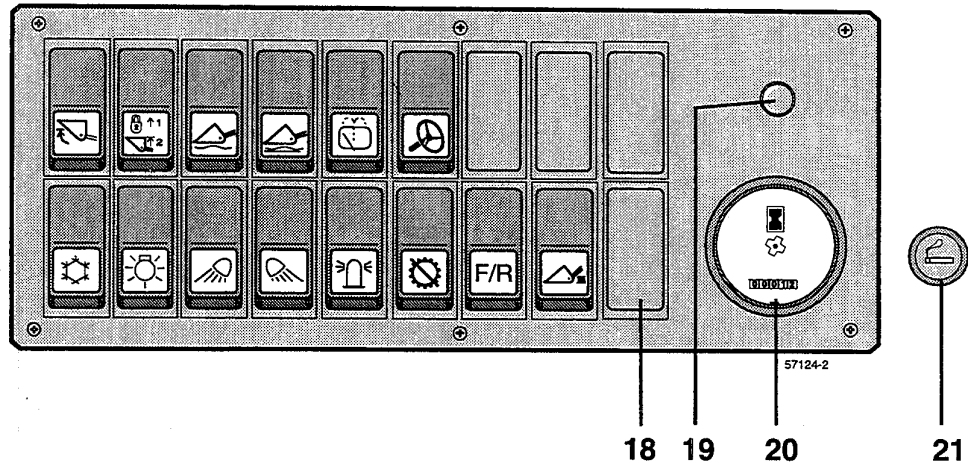
- The BSS will be engaged in gear positions 2, 3 and 4 and the control lamp on the front left panel will be illuminated.
- When downshifting to 1st gear takes place, the BSS will be disengaged and the control lamp will be flashing.

**Lower end of switch pressed in** and if the BSS is activated (with switch 7 on the control lever carrier, page 36) = it will be travelling-speed dependent BSS (regardless of the gear selector position).

- If a certain travelling speed is exceeded, the BSS will be engaged and the control lamp will be illuminated.
- Below a certain speed the BSS will be disengaged and the control lamp will be flashing.

The switch for activating BSS is shown on 36.

The control lamp for the Boom Suspension System is shown on page 19.



**18**  
**UNASSIGNED**

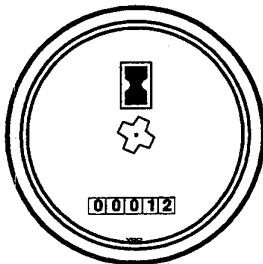
**19**  
**RHEOSTAT, INSTRUMENT LIGHTING**

This control is used for regulating the intensity of the instrument lighting (gauges and control lamps).  
Control turned clockwise = increased light intensity  
NOTE: Switch 11 must be switched on.



**20**  
**HOUR RECORDER**

The meter shows the number of hours the engine has been running.

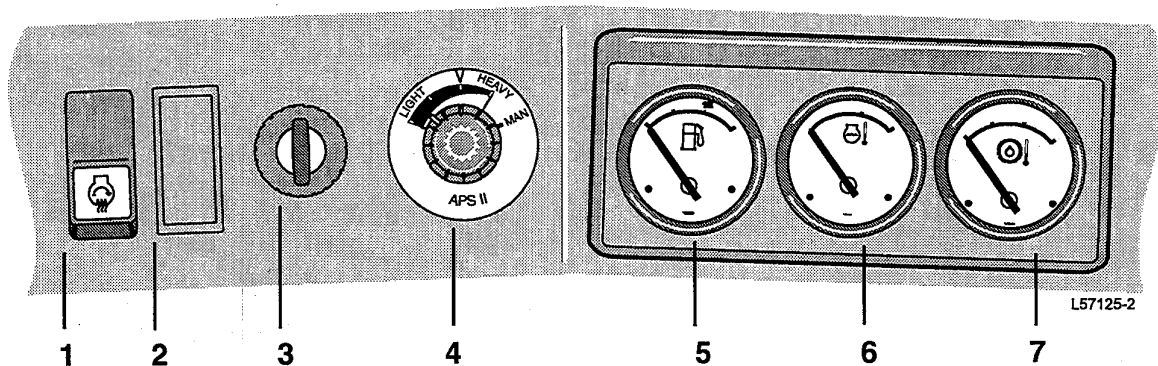


**21**  
**CIGARETTE LIGHTER**



Dotted lines for writing.



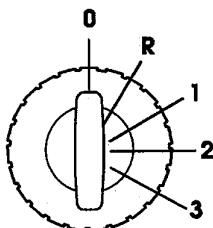


### PREHEATING ELEMENT

The switch is used for connecting a heating element in the induction manifold.  
 Lower end of switch pushed in at the same time as the ignition switch key is held in position 2 = The preheating element is connected.  
 Control lamp (14) on the centre instrument panel remains on while the preheating element is connected.

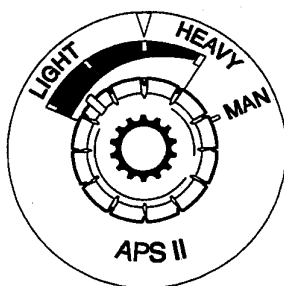
For cold-starting instructions, see under "Operating Instructions"

### 2 UNASSIGNED



### 3 IGNITION SWITCH

The ignition switch has five positions as shown in the figure  
 0 = Turned off (key-turn engine stop)  
 R = Radio position  
 1 = Running position  
 2 = Preheating element connected  
 3 = Starting position



### 4 MODE SELECTOR, GEAR-SHIFT MODULATION (APS II)

#### LIGHT (First position)

The machine shifts at low engine revolutions.  
 Suitable for transport operation without load.

#### LIGHT (Second position)

The machine shifts at slightly higher engine revolutions compared with the first position.  
 Suitable for transport operation and lighter loading/carrying operation.

#### NORMAL POSITION ▼

Is used during "Normal Handling" and operation.

#### HEAVY

The machine does not shift until higher engine revolutions have been reached.

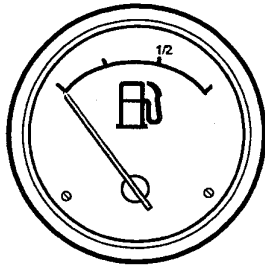
Suitable for heavier handling and "Tough Operation".

#### MAN (manual)

The machine starts and operates in the selected gear position. Upshifts and downshifts on the move are controlled manually.

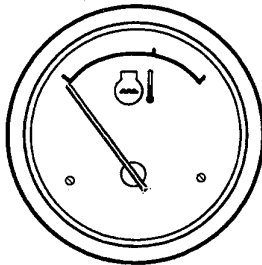
For gear changing instructions, see page 48.

**NOTE:** As a sign of correct function, the gauges will make an indication at "12 o'clock" for a few seconds after the ignition switch has been turned on and then take up the current position.



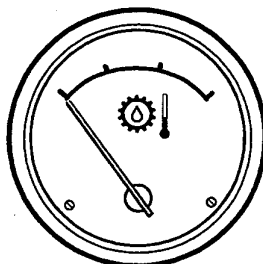
## **5 FUEL GAUGE**

The gauge shows the level in the fuel tank.  
For the capacity of the fuel tank, see Specifications.  
If the tank has been run empty, see "Bleeding fuel system", under section "Maintenance".



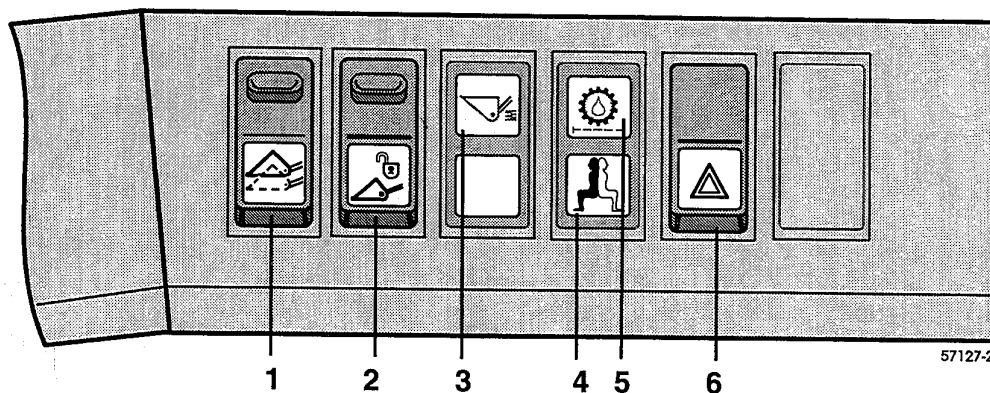
## **6 TEMPERATURE GAUGE, ENGINE COOLANT**

During normal operation the pointer should indicate within the green sector.  
If the pointer enters the red sector, run the engine at low idling for a few minutes.  
If the pointer remains in the red sector, stop the engine and investigate the cause.  
At too high an engine temperature the central warning lamp will flash and the buzzer sound.  
Control lamp ( number 4) for indicating high coolant temperature can be found on the centre instrument panel (the control lamp panel).



## **7 TEMPERATURE GAUGE, TRANSMISSION OIL**

During operation the pointer should indicate within the green sector.  
If the pointer enters the red sector, the machine should be stopped and the cause investigated.  
Warning for too high oil temperature is included in the central warning system.  
There is also a control lamp (number 8) for high oil temperature on the centre instrument panel (control lamp panel).



1

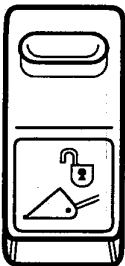
**RAISED PRESSURE – ATTACHMENT LOCKING**

When connecting or disconnecting an attachment, a higher hydraulic pressure is sometimes required.

Lower end of switch pushed in = raised pressure on locking pins when changing attachments.

**NOTE:** When the switch is activated, the tilting and lifting functions cannot be operated simultaneously.

The switch has a spring return function and therefore always returns to neutral. It is also provided with a catch to prevent involuntary actuation.



2

**SEPARATE ATTACHMENT LOCKING**

This equipment makes it possible for the operator to connect and disconnect attachments from the operator's seat.

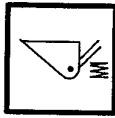
When disconnecting attachments, the switch must be activated (lower end of switch pushed in). A catch on the switch prevents involuntary activation.

**NOTE:** When the switch is not activated, the indicator points on the attachment bracket point straight upward, see further under OPERATING INSTRUCTIONS "Attaching attachments".

**NOTE:** When the switch is activated it is possible to operate the tilting and lifting functions simultaneously in order to align the attachment.

**WARNING!**

Before using the machine, check that the attachment is securely connected and locked to the attachment bracket by pressing the front end of the attachment against the ground.



## 3

**CONTROL LAMP, BOOM SUSPENSION SYSTEM****(Control lamp green)**

The control lamp indicates (lights) when the BSS is activated with switch 7 on page 36.

The lamp will light with a continuous light if the BSS is activated and:

- Switch (16) for gear-/speed-dependent BSS is in the gear-dependent position and either of gear positions 2, 3 or 4 have been selected.

or

- Switch (16) for gear-/speed-dependent BSS is in the speed-dependent position and if a certain speed is exceeded.

The lamp will **flash** if the BSS is activated and:

- Switch (16) for gear-/speed-dependent BSS is in the gear-dependent position and gear position 1 has been selected.

or

- Switch (16) for gear-/speed-dependent BSS is in the speed-dependent position and if the travelling speed is below a certain speed.



## 4

**LEVER STEERING, CDC****(Control lamp green)**

The lamp indicates that the lever steering is activated. It is then possible to steer the machine and select gears from the armrest to the left of the operator's seat.

NOTE: The ordinary gear selector control should be in neutral. For further instructions on lever steering, see under "Operating Instructions".



## 5

**CONTROL LAMP, TRANSMISSION OIL FILTER****(Control lamp amber)**

The lamp indicates high pressure drop across the filter.

**Only change the filter** if the lamp lights at the same time as the central warning flashes and the alarm text "Transmission Filter" is shown on the display unit.

The warning text is displayed for approx. 30 seconds and reappears once every hour.

**NOTE: The control lamp alone, (without the central warning), will also light when the machine has been newly started and before it has been warmed up.**

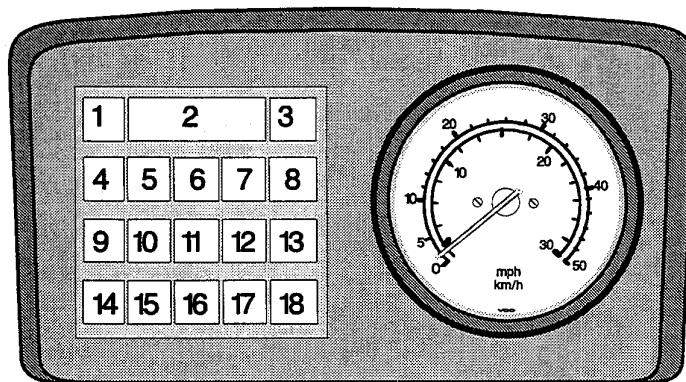
For changing oil filter see under "Maintenance".



## 6

**HAZARD WARNING FLASHERS****(Control lamp red)**

Lower end of switch pushed in = All direction indicators on the machine and the control lamp in the switch flash simultaneously. The hazard flashers can be used even if the ignition switch key has not been turned on.



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**NOTE:** When the ignition switch is turned on, control lamps 1 - 5, 7 - 9 and 13 will light up for three seconds as a test and the gauges indicate at "12 o'clock" for a few seconds.



## 1 ENGINE OIL PRESSURE

(Control lamp red)

The lamp lights up and the central warning flashes if the engine lubricating oil pressure becomes too low.

**If this happens, stop the engine immediately and rectify the fault.**

**Also included in the central warning system**



## 2 CENTRAL WARNING LAMP

The red central warning lamp flashes if any of the following faults occur:

- Temperature of transmission too high
- Pressure in transmission too low
- Overspeeding of engine/transmission
- Brake pressure too low
- Parking brake, (when gear selector is in forward or reverse)
- Engine oil pressure too low
- Engine coolant temperature too high
- When secondary steering system is activated (steering pressure too low)
- Axle temperature, front/rear, too high
- Transmission oil filter clogged up

## Buzzer

**The buzzer for the central warning sounds simultaneously with the flashing of the central warning lamp, if any of the following faults are indicated:**

- Engine coolant temperature too high
- Axle temperature too high
- Parking brake (if applied when operating)
- Overspeeding of engine/transmission
- Low brake pressure (when gear is engaged)



### 3 TRANSMISSION OIL PRESSURE

**(Warning lamp red)**

The lamp lights up if the oil pressure in the transmission becomes too low.

Stop and check the oil level or investigate other cause of the triggered warning – remedy before continuing operation.

**Also included in the central warning system**



### 4 ENGINE COOLANT TEMPERATURE

**(Warning lamp red)**

The lamp lights up if the engine coolant temperature becomes too high.

Stop and check the coolant level or investigate other cause of the triggered warning – remedy before continuing operation.

**Also included in the central warning system and the buzzer function**



### 5 LOW BRAKE PRESSURE

**(Warning lamp red)**

The lamp lights up if the brake pressure becomes too low or if one brake circuit does not work.

**Also included in the central warning system**

When starting the engine, the lamp will remain on until the operator has depressed the brake pedal hard once (checking the system).

If the lamp lights up while operating or if it remains on after the operator has depressed the pedal hard after starting the engine, there is a fault in the system.



#### **WARNING!**

**The machine must not be operated until the fault has been rectified and the control lamp has been extinguished.**



### 6 PARKING BRAKE

**(Warning lamp red)**

The red lamp indicates that the parking brake is applied.

**Also included in the central warning system and the buzzer function (when operating)**



### 7 PRIMARY STEERING SYSTEM

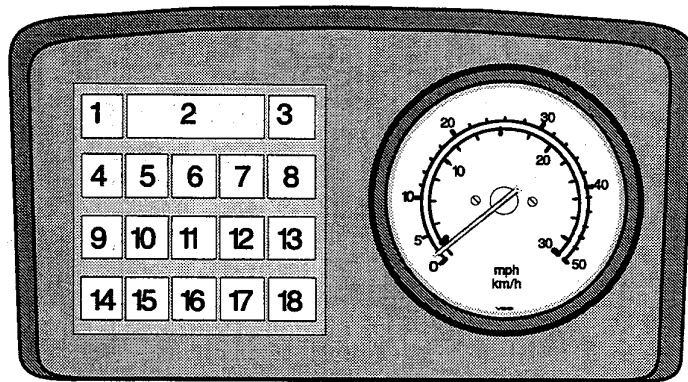
**(Warning lamp red)**

The red warning lamp indicates a fault in the primary steering system.



#### **WARNING!**

**If the warning lamp begins to light while operating, the machine must not be operated until the fault has been rectified and the warning lamp has been extinguished. Moving the machine slowly to the nearest suitable place where it can be parked and repairs may be carried out. For further instructions see item 6 "Right instrument panel". Also included in the central warning system.**



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**8**

### **TRANSMISSION OIL TEMPERATURE**

**(Warning lamp red)**

The lamp lights up when the temperature in the transmission becomes too high.

**Also included in the central warning system**

#### **NOTE:**

**Do not operate the machine until the fault has been rectified and the warning lamp has been extinguished.**



**9**

### **ENGINE AIR FILTER**

**(Control lamp amber)**

If the control lamp lights up while the engine is running, the air filter must be changed or cleaned, see under "Maintenance".



**10**

### **CHARGING**

**(Warning lamp red)**

The lamp should be extinguished when the engine is running, thus indicating that the batteries are being charged. If the lamp lights up, investigate and remedy the fault otherwise the batteries may be damaged.



**11**

### **DIRECTION INDICATORS**

**(Control lamp green)**

The lamp flashes when the direction indicator control is moved for turning left or for turning right, see also under "Other controls".

Uneven flashing pulses indicate a faulty bulb, which then should be changed.





## 12 SECONDARY STEERING

(Control lamp amber)

The lamp lights up when the secondary steering pump cuts in as a consequence of a fault in the primary steering system, see also "Switch, secondary steering", page 11.



## 13 AXLE TEMPERATURE

(Control lamp amber)

The lamp lights up if the temperature in the axles becomes too high.

If the temperature rises further the buzzer will begin to sound.

If the buzzer sounds: Operate the machine in such a way that the brakes are not applied for a while. The temperature in the axles will then drop to normal operating temperature.

**Also included in the central warning system and buzzer function.**



## 14 PREHEATING ELEMENT

(Control lamp amber)

The control lamp lights up when the preheating element is connected (switch 3 on the right instrument panel).

After 10–50 seconds (the time depends on the coolant temperature) the preheating element will be automatically disconnected and the lamp extinguished.

If necessary the preheating element will be automatically reconnected while starting and the lamp will light when the ignition key is turned to position 3 and the engine starts.

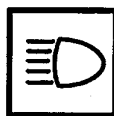
See also under "Starting cold engine" under "Operating Instructions".



## 15 ROTATING WARNING BEACON

(Control lamp amber)

The lamp indicates that the rotating warning beacon is connected (switch 13 on the right instrument panel). See also "General operating rules" on page 54.



## 16 HIGH BEAMS

(Control lamp blue)

The blue control lamp is on at the same time as the high beams.

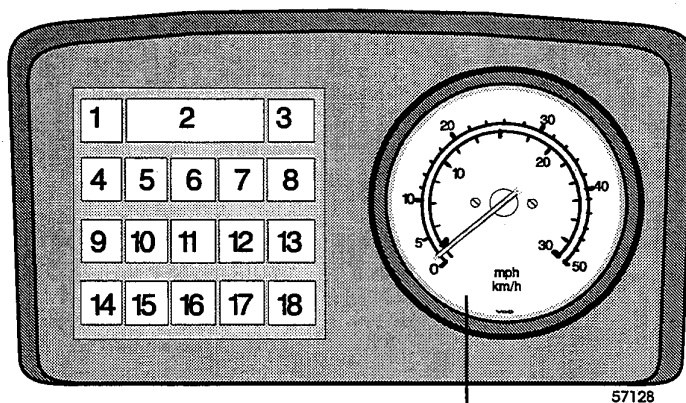
See also under "light switch" "Other controls".



## 17 WORKING LIGHTS

(Control lamp amber)

The lamp indicates that the working lights are on, see also "switches" 12 and 13 "Right instrument panel".



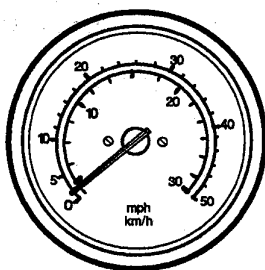
19



### 18 DIFFERENTIAL LOCK

(Control lamp amber)

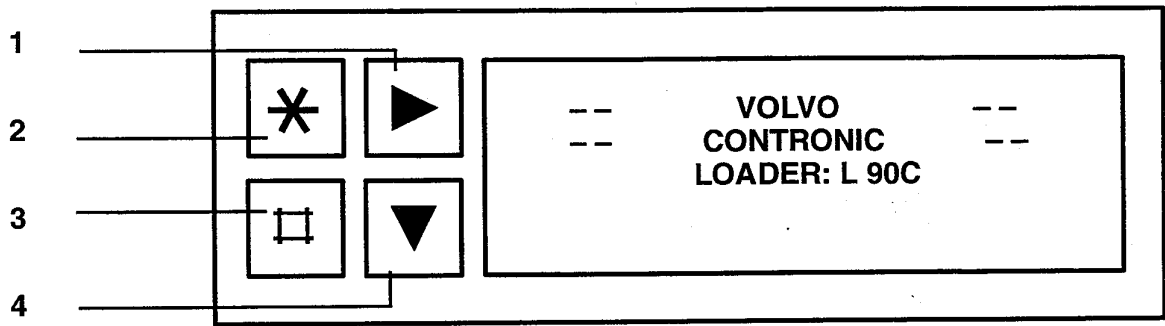
The control lamp is alight while the differential lock is engaged. The foot switch for the differential lock is positioned to the left of the steering wheel column.



### 19 SPEEDOMETER

The gauge is graded between 0 and 50 km/h.

### Contronic display unit



57129-2

- 1 Selecting function group
- 2 Affects the information
- 3 Affects the information
- 4 Selecting sub menu within the same function group

### Display unit

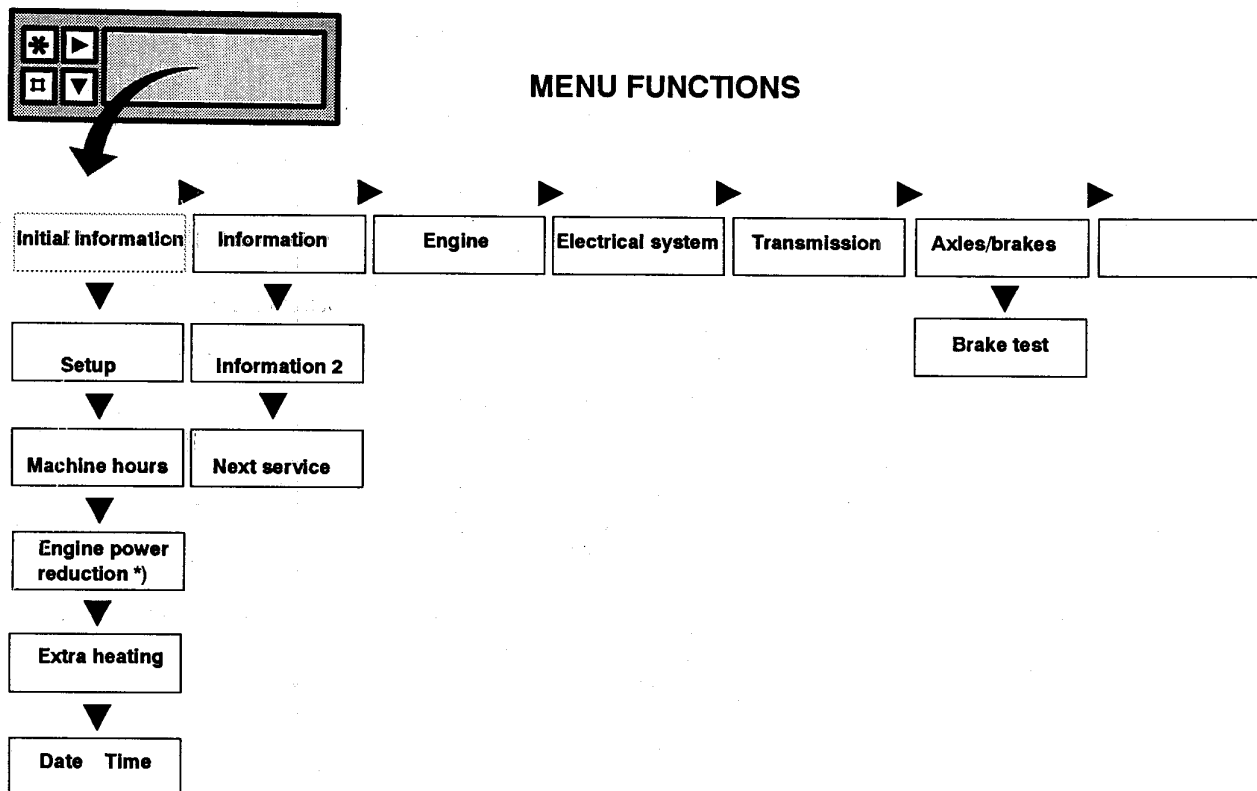
The display unit is connected to the electronic control unit ECU. The information about the monitored functions is given on the display screen in the form of words and numerical values.

NOTE: When starting, the initial display is shown for four seconds after which the previously selected screen will be displayed.

Further information is given below and on the next page.

### General

- The top line on the screen shows the name of the selected function and any alarm messages.
- Five different languages can be selected (English, Swedish, German, French, and Spanish)
- Two different sets of units can be selected (°C, km, bar or °F, mile, psi).



\*) "Engine Shut Down"

### Function groups

The information is divided into the following **function groups**:

- 1 Initial information
- 2 General information (engine speed, travelling speed, gear position)
- 3 Engine
- 4 Electrical system
- 5 Transmission
- 6 Axles / Brakes

and the following **sub groups**

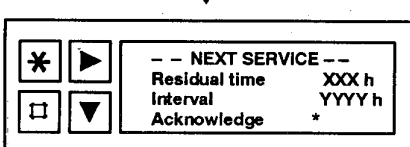
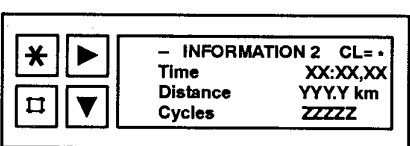
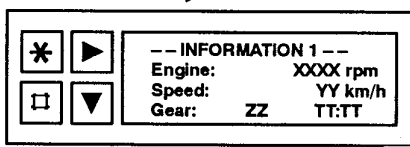
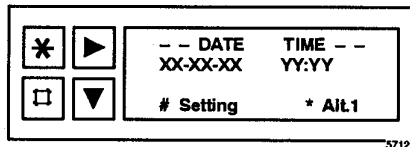
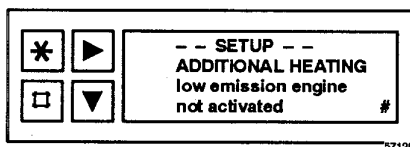
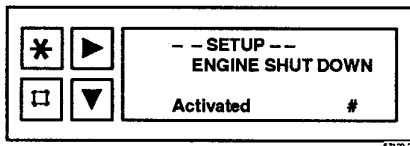
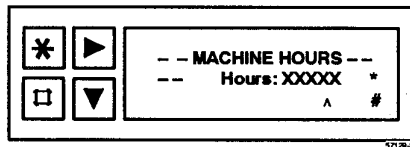
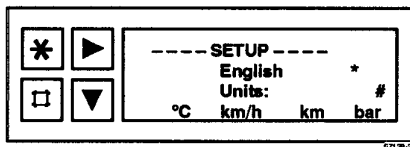
- Setup (language and units)
- Machine hours
- Engine power reduction (reducing engine speed in case of error indication)
- Extra heating of engine (preheating)
- Time and date
- Information 2 (stop watch, distance, cycles)
- Next service (time to next service, interval)
- Brake test



The key is used for changing function group



The key is used for changing sub group within the respective function group



## SETUP

### Language / unit setting

Units (line 4) = °C, km/h, km, bar, alternatively  
°F, mph, mile, psi.

\* = Selection of language

□ = Selection of units

This arrow indicates how to press in order to move from initial display to setup.

### Setup, machine hours

XX = number of hours

□ = Selection of digit to be changed

\* = Changes selected digit (max. 59999 hours)

NOTE: The machine hours should be set according to the ordinary hour counter of the machine.

### Setup, engine power reduction ("Engine Shut Down")

ACTIVATED = Function activated

NOT ACTIVATED = Function de-activated

□ = Activating/de-activating of function

### Setup, additional heating of engine

NOT ACTIVATED = The function extra preheating disconnected

ACTIVATED = The function additional preheating connected

□ = Activating/de-activating of function

### Setup, date / time

\* = Selection of display alternatives (six different alternatives)

□ = Setting time and date (changes are made in the same way as for setting operating hours)

XX= Date

YY= Real time (clock)

## GENERAL INFORMATION

### Operating information

XX = Engine speed

YY = Speed km/h alternatively mph

ZZ = Engaged gear (N, F1, F2, F3, F4, R1, R2, R3)

TT = Real time (clock)

### Stop watch, trip meter, cycle counter

XX = Time (hours, minutes, seconds)

YY = Distance (km alternatively miles)

ZZ = Number of F/R changes/2

\* = Setting to zero of time/distance/cycles

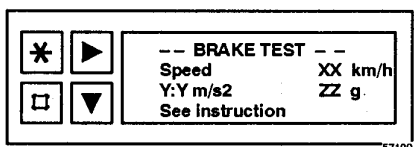
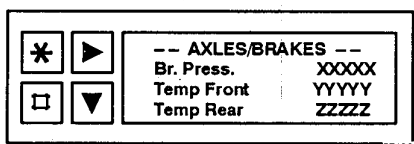
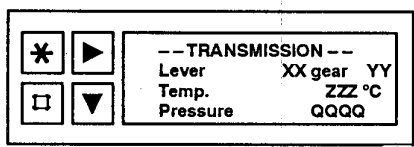
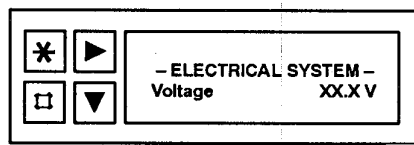
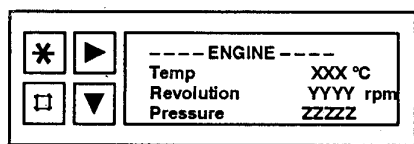
### Service interval

XX = Residual time to next service

YY = Next service interval (100, 250, 500, 1000, 2000)

When there are 8 hours left the display will show "NEXT SERVICE" on the alarm line.

\* = Deletes the alarm text



## ENGINE

XX = Temperature °C alternatively °F or ER if sensor is faulty

YY = Engine speed

ZZ = Normal/low/ER

Temperature shown down to 0°C

Below 0°C / 32°F the display will show <0 / <32

## ELECTRICAL SYSTEM

XX = Actual voltage

## TRANSMISSION

XX = Selector position (F1, F2, F3, FA, R1, R2, R3, RA, N)

YY = Engaged gear (F1, F2, F3, F4, R1, R2, R3, N)

ZZ = Temperature °C/°F or ER in case of faulty sensor

QQ = Normal/low/ER

Temperature shown down to 0°C

Below 0°C/32°F the display will show <0 / <32

## AXLES/BRAKES

XX = Normal / low

YY = Normal / high / ER

ZZ = Normal / high / ER

## BRAKE TEST (checking service brakes)

Used for checking the condition of the brakes, see under "Maintenance".

## ALARM MESSAGES

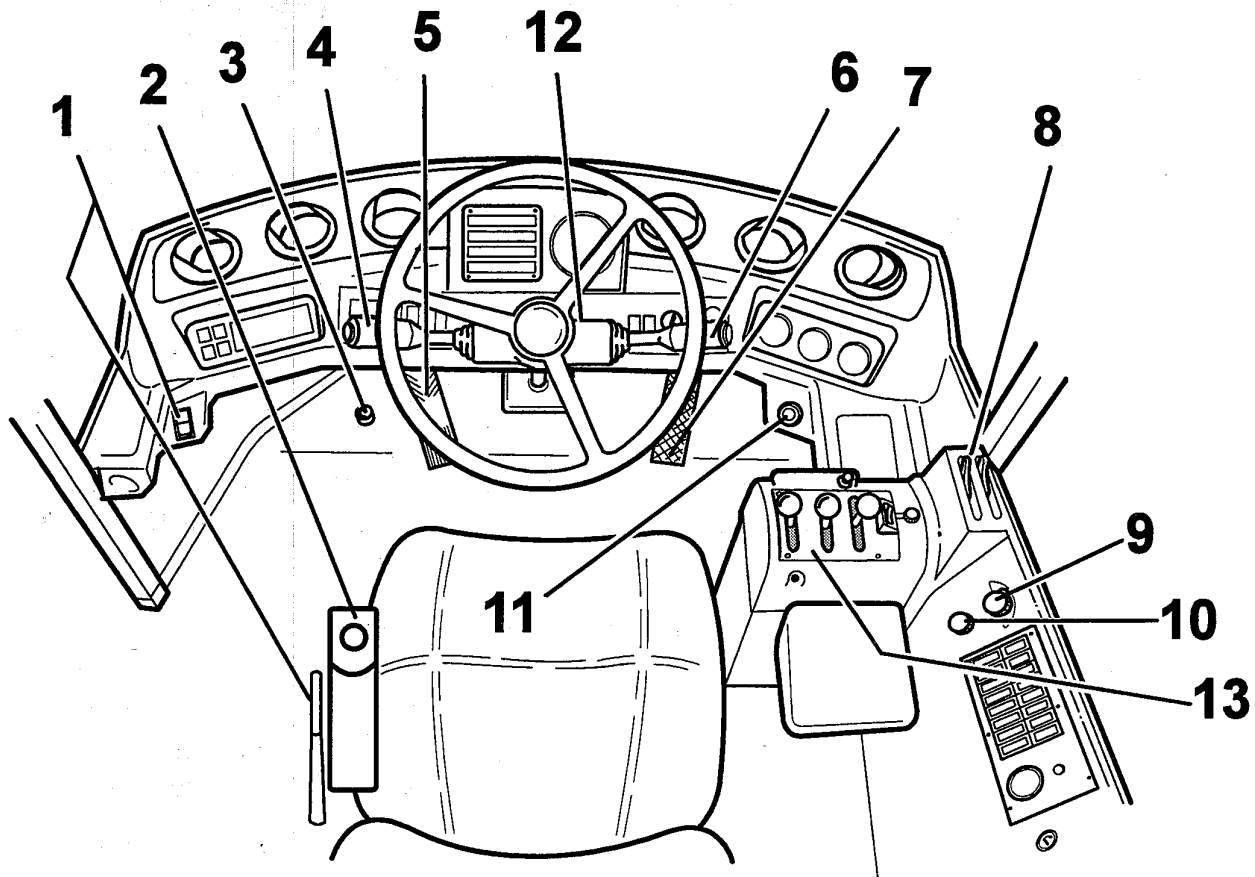
The alarm messages will replace the line regardless of the selected function group. The alarm text will be displayed for 1 second, then the selected function line will be displayed for 2 seconds and then the alarm text will be displayed again and so on. The alarm texts will be flashing as long as the error remains with the exception of some with memory function (M). Alarm messages with (M) function will remain on until the ignition key is turned off.

### Alarm texts

Engine temp. high	High speed
Engine temp. ER M	Brake pressure low
Engine pressure low	Axle temp. high
Engine pressure ER	Axle temp. ER M
Voltage high(>31V)	Parking brake applied
Voltage low (<19V)	Fuel level low (25%)
Transmission ER	Fuel level ER M
Transmission temp. high	Steering pressure low
Transmission temp. ER M	Steering pressure ER
Transmission pressure low	Clean air filter M
Transmission press. ER M	Air filter ER M
Transmission filter	Next service
Transmission filter ER	







- 1 Parking brake
- 2 Lever steering (CDC)
- 3 Differential lock
- 4 Gear selector control
- 5 Brake pedal (double on certain markets)
- 6 Headlight dipper, direction indicators, horn, windscreen wiper, windscreen washer
- 7 Accelerator pedal
- 8 Controls, heating and ventilation
- 9 Switch, fan control
- 10 Thermostat control, air conditioning
- 11 Hand-throttle control
- 12 Steering wheel adjustment
- 13 Control lever carrier for working hydraulics, kick-down button, engine braking switch, lever locking, switch for Boom Suspension System, switch forward/reverse, loud tone horn

**1****PARKING BRAKE**

When the parking brake is applied, warning lamp (6) on the centre instrument panel will be alight.

**Mechanically operated parking brake**

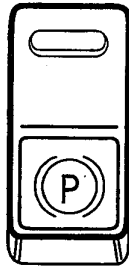
The parking brake is operated with the control to the left of the operator's seat.

**Electrically operated parking brake (optional extra)**

The parking brake is operated with the switch on the instrument panel.

- When the ignition switch key is turned to 0 (stopping the engine), the parking brake will be applied automatically.
- When the engine is restarted, the switch must first be set to position 1 (applied parking brake) and then to position 0 (released parking brake).

The switch has a catch to prevent involuntary application of the parking brake.

**Functions**

- The switch pressed down (position 1) and the engine running = Applied parking brake (the warning lamp lights with a strong red light).
- The switch in position 0 and the ignition key turned off (position 0) = Automatically applied parking brake.
- The switch in position 0 (from position 1) and the engine running = Released parking brake (the warning lamp lights with a faint red light).

**2****CDC (Comfort Drive Control)  
(lever steering) (Optional)**

The equipment has the following functions concentrated to a collapsible arm rest: activating button, steering, forward/reverse and kick-down. This means that during normal loading work the operator does not need to touch the steering wheel.

Control lamp (4) on the front left instrument panel is on when the lever steering system is activated.

For further information on operation and safety rules in connection with lever steering, see under "Operating instructions".

**3****DIFFERENTIAL LOCK**

The differential lock only affects the front axle. It is engaged by pressing down the foot switch. The lock remains engaged as long as the foot switch is depressed. The control lamp (18) on the centre instrument panel lights when the lock is engaged.



Control lamp, differential lock (18)

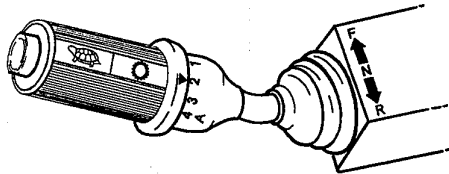
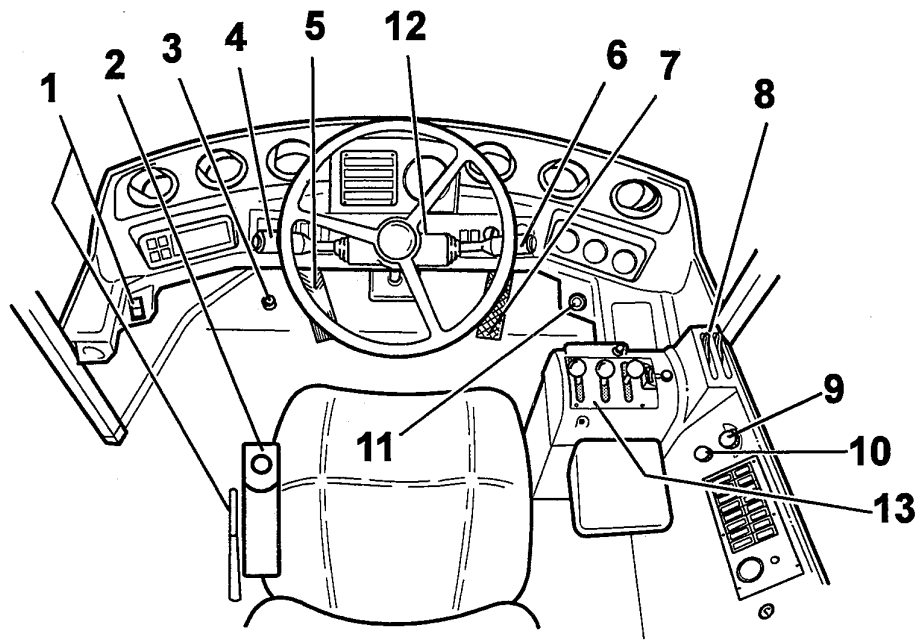
**Important!**

**The differential lock may only be used when operating on slippery ground.**

When operating on firm ground, especially when turning, the differential lock must be disengaged.

If the machine has become stuck and one of the wheels is slipping, the wheel must be stopped before engaging the differential lock, otherwise the drive axle system may be damaged.

If there is any danger of getting stuck – engage the differential lock **beforehand**.

**4****GEAR SELECTOR CONTROL****Speed gears**

Shifting between the different speed gears is done by turning the control to the required gear position.  
See also under "Operating instructions".

**Forward – Reverse**

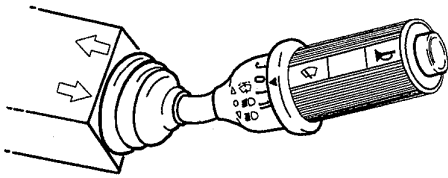
Selector forward (position F) = Operating forward  
Selector in centre position (position N) = Neutral  
Selector rearward (position R) = Operating rearward

**Kick-down button**

For instructions see under "Operating instructions, Automatic shifting".

**NOTE:** Never leave the machine with the selector in the forward or reverse position, if the engine is running.  
For further instructions on changing gear, see under "Operating instructions".

**5****BRAKE PEDAL**

**6****HEADLIGHT DIPPER, WINDSCREEN WASHER**

Away from steering wheel = High beams

Neutral position = Low beams

Towards steering wheel = Windscreen washer

**DIRECTION INDICATOR, HORN**

Control forward = Left indicators

Control rearward = Right indicators

Button pushed in = Horn

**WINDSCREEN WIPER**

Position J = Intermittent wiping

Position 0 = Neutral position

Position I and II = Windscreen wiper (two speeds)

**7****ACCELERATOR PEDAL****8****CONTROLS, HEATING AND VENTILATION****Temperature Control**

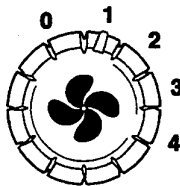
Control forward (blue) = cold

Control rearward (red) = warm

**Recirculation Control (reusing the air)**

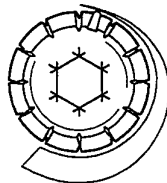
Control forward = a little air is recirculated

Control rearward = a lot of air is recirculated

**9****SWITCH, FAN CONTROL**

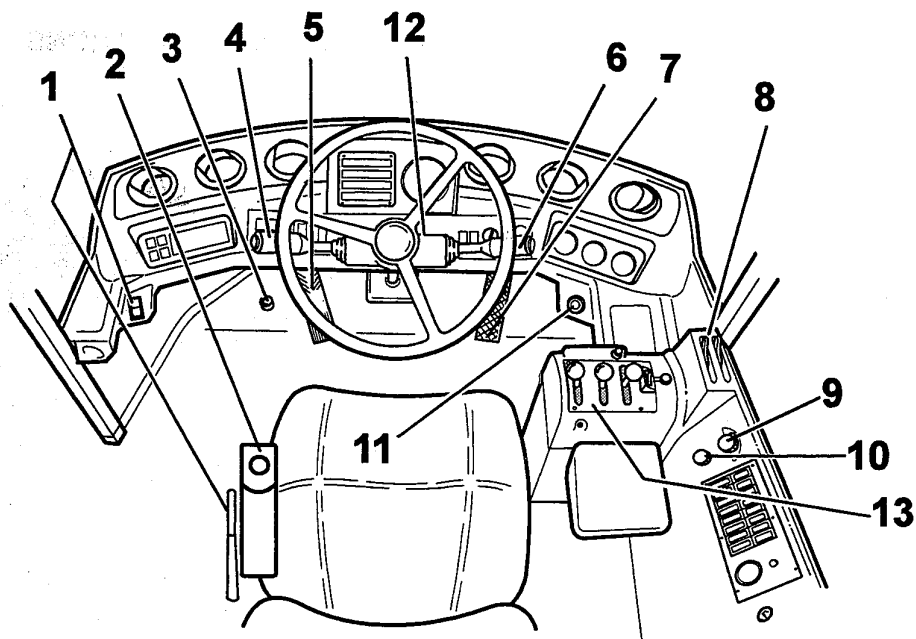
The control has four different output positions.

For further instructions on using heating and ventilation, see under "Operator comfort".

**10****THERMOSTAT CONTROL, AIR CONDITIONING**

Control clockwise = colder

For further instructions on the setting of the air conditioning, see under "Operator comfort".

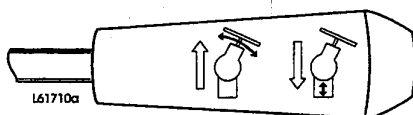


**11  
HAND-THROTTLE CONTROL**

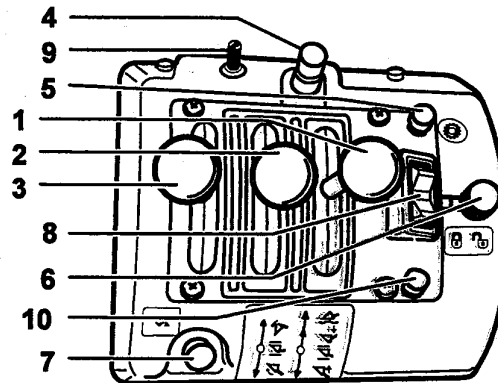
The control is positioned under the front right instrument panel.  
The engine speed is altered by pressing the button and lifting the control upward until the required engine speed is achieved.  
To disengage the control, press the button and move the control to the bottom position.

**12  
STEERING WHEEL ADJUSTMENT**

The control is positioned to the right under the steering wheel.  
Control downward = For adjustment of height  
Control upward = For adjustment of inclination



For correct setting, see "Before moving off" page 47.

**13 CONTROL LEVER CARRIER AND OPERATING FUNCTIONS****1 The lever for the lifting function has four positions: Lifting – Neutral – Lowering / Floating**

When the boom kick-out (automatic lifting) function is engaged the control lever automatically returns from lifting to neutral when the lifting arms reach a certain predetermined position. Regardless of whether the machine has boom kick-out function or not, there are detent positions for lifting and lowering / floating. Engagement of the floating position is done with switch (3) on the right instrument panel. See also under "Instruments".

**2 The tilting lever has three positions: Rearward – Neutral – Forward**

When the bucket positioner (automatic tilting) function is engaged the control lever automatically returns from the position for rearward tilting to neutral when the bucket reaches a predetermined position. See also adjusting boom kick-out and bucket positioner on page 37.

**3 Control lever 3rd and 4th hydraulic function**

This lever is used, for example, when the machine is fitted with attachment hydraulics.

**4 Kick-down button**

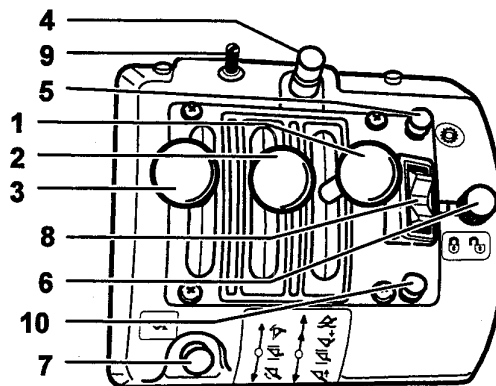
The kick-down function can be activated either from the control lever carrier or the gear selector control, see also "Gear selector control" item 4 page 32.

**5 Engine braking (retarding)**

The engine braking function is used to obtain an immediate downshift when operating downhill, or to prevent undesired upshifting. See further under "Operating Instructions", Automatic Power Shift.

**6 Lever locking**

The control is used for locking the control levers in neutral.



**NOTE!**

When servicing the machine or during precision operation, e.g. when connecting an attachment and using the 3rd function or the tilting function, the BSS should **not be activated**.

An involuntary lifting movement may occur without touching the lifting lever, if the system is activated.

## 7 Boom Suspension System

This function is used to prevent the machine from bouncing when transporting a load.

The engine must be running in order to activate the system. If the button is depressed, the function will be activated, if a certain travelling speed is exceeded or a certain gear is engaged, also see the switch for selection between gear or travelling speed dependent BSS on page 13.

The function is de-activated by again pressing the switch or if the engine is turned off.

The control lamp lights when the system is engaged and flashes when the system is disengaged.



**WARNING!**

When operating with a pallet fork or material handling arm, when great accuracy and precision is required, the Boom Suspension System must be in the gear-dependent position or be deactivated. Never use the kick-down function during precision operation while the BSS is activated.

## 8 Forward/Reverse selection

Switch in the forward position = operating forward

Switch in rearward position = operating in reverse

In order to activate the function, switch (16) on the right-hand instrument panel must first be activated, (see page 13), and the ordinary gear selector control must be in neutral.

**NOTE:** If the ordinary gear selector control is moved from neutral while operating with the F/R switch, the gear selector at the steering wheel will over-ride the switch.

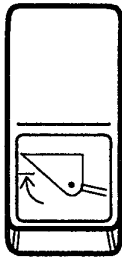
Switch 15 will have to be activated again in order to use the F/R switch.

## 9 3rd/4th function

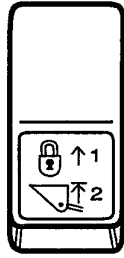
Switching between 3rd and 4th hydraulic function is done with switch 9, see figure.

## 10 Loud tone horn

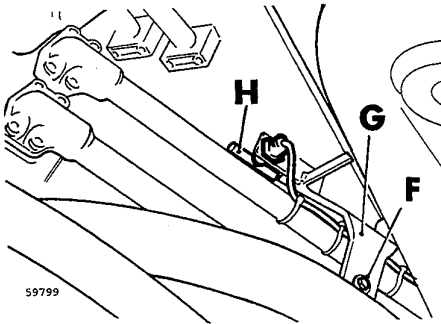
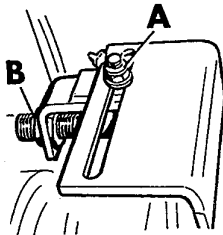




Tilting function



Lifting function



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**BOOM KICK-OUT AND BUCKET POSITIONER****Operation**

The automatic functions (kick-out) are switched on with the two switches.

When either of the control levers is moved to lifting or rearward tilting (crowding) (with activated switches) the respective lever is retained in a detent position until the movement of the lifting arms or the bucket has reached a predetermined position, after which the respective control lever returns to neutral.

**WARNING!**

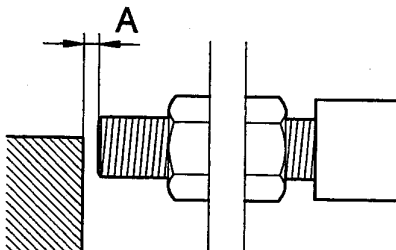
Before carrying out any adjustments, place the machine in the "Service position".

**ADJUSTMENTS****Adjusting****lifting height position – boom kick-out**

- Raise the lifting arms to the required position.
- Stop the engine. Leave the ignition key in the running position (1).
- Slacken the bolts for the bracket and move the sensor to its rearmost position.
- Actuate the switch for the boom kick-out.
- Move the lifting lever to the rear detent position.
- Move the sensor forward until the lifting lever returns to neutral.
- Tighten the bolts for the bracket.

**Adjusting****rearward tilting (crowding) – bucket positioner**

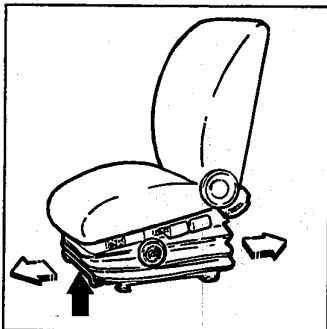
- Move the bucket to the required position.
- Stop the engine. Leave the ignition key in the running position (1).
- Slacken the nut for the sensor and displace it to its rearmost position.
- Actuate the switch for the bucket positioner.
- Move the tilting lever to the rear detent position.
- Displace the sensor forward until the tilting lever returns to neutral.
- Tighten the nut for the sensor.



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**Important!**

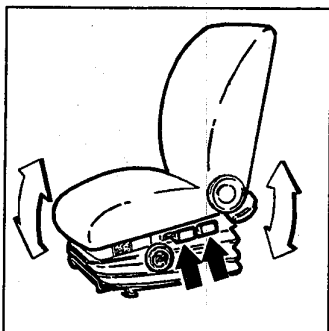
The distance (A) between the sensors and the actuating part of the machine should be 3–5 mm (0.12–0.20 in). See the adjacent figure.



### **OPERATOR'S SEAT**

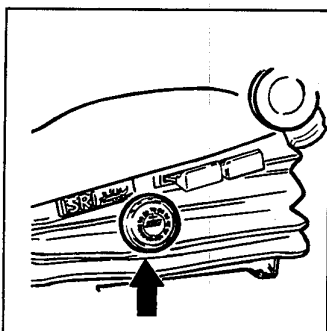
#### **Adjusting possibilities**

- Longitudinally
- Seat height and inclination
- Operator weight
- Backrest inclination



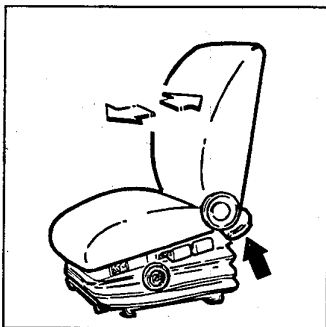
#### **LONGITUDINALLY**

Pull the clamp upward and move the seat.



#### **SEAT HEIGHT AND INCLINATION**

Pull the handles upward and lift or lower the front or rear end of the seat.



#### **ADJUSTING ACCORDING TO OPERATOR WEIGHT**

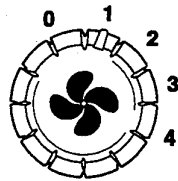
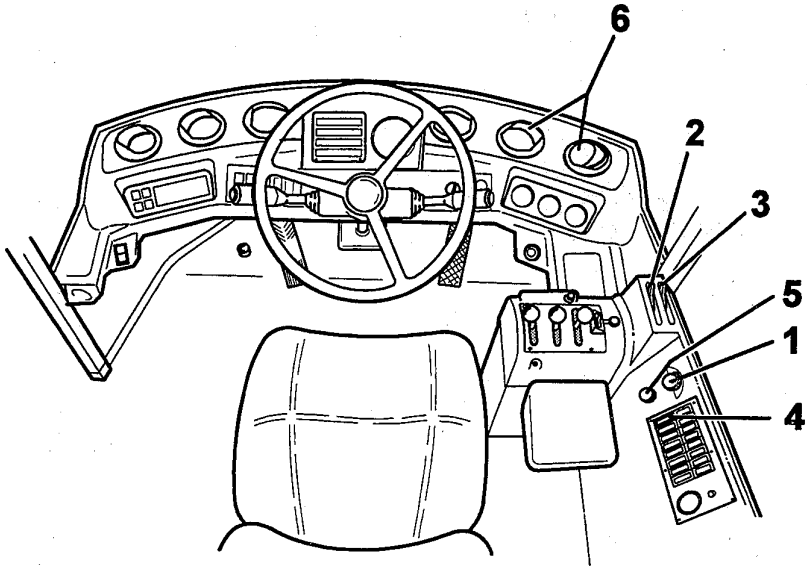
Adjust the suspension according to the weight of the operator.

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#### **BACKREST INCLINATION**

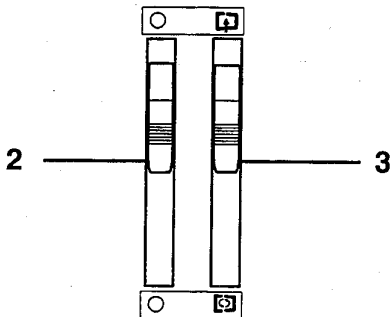
Pull the handle upward and adjust to the required inclination.

## HEATING, VENTILATION



### 1 FAN CONTROL

Position 0 = turned off  
Position 4 = max. speed

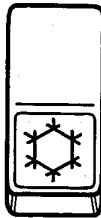


### 2 TEMPERATURE CONTROL

Control forward (blue) = cold  
Control rearward (red) = warm

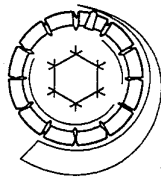
### 3 RECIRCULATION CONTROL

Control forward = small recirculation  
Control rearward = large recirculation



### 4 SWITCH, AIR CONDITIONING

Lower end of switch pushed in = air conditioning engaged.  
**NOTE:** If the pressure in the system becomes too high (e.g. if the condenser is clogged up) the air conditioning will cut out. Investigate and remedy the cause of the rise in pressure, before actuating the switch again to restart the system.



### 5 THERMOSTAT AIR CONDITIONING

Control clockwise = colder

### 6 VENTILATION NOZZLES

## **ADJUSTING HEATING AND VENTILATION**

**(without air conditioning)**

### **Air control in cab .....**

..... for max. warmth:

- All nozzles fully open.
- Temp. control (2) at MAX.
- Recirculation control (3) at MAX.
- Fan control (1) at MAX., i.e. speed 4.

In case of misting, see "..... demisting all windows".

..... for MAX. comfort:

- All nozzles fully open.
- When the temperature has risen to a comfortable level, move temp. control (2) until the required temperature is maintained.
- Recirculation control (3) at MIN.
- Fan control (1) at 1 or 2.

..... for MAX. fresh air:

- All nozzles fully open.
- Temp. control (2) at MIN.
- Recirculation control (3) at MIN.
- Fan control (1) at MAX., i.e. at speed 4.

### **Air control in cab .....**

..... for demisting all windows:

- Front nozzles directed toward front side windows.
- Floor nozzles under instrument panel closed.
- The rear nozzle directed toward the rear window / side window.
- Temp. Control (2) at MAX.
- Recirculation control (3) at MIN.
- Fan control (1) at MAX., i.e. at speed 4.

These instructions are only basic recommendations and each driver should experiment to achieve the best possible working environment in the cab, i.e. the right temperature without a draught.

### **Make sure of good ventilation**

**Do not operate the machine for longer periods without ventilation or with the cab fully closed without having the fan turned on.**

Lack of fresh air can cause drowsiness (lack of oxygen).

## AIR CONDITIONING

### Air control in cab .....

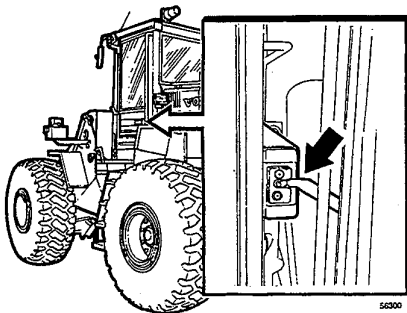
..... to cool the air quickly:

- All nozzles fully open.
- Temp. control (2) at MIN.
- Recirculation control (3) at MAX.
- Fan control (1) at MAX., i.e. speed 4.
- Thermostat (5) at MAX. cooling.
- Switch (4) pushed down, i.e. the air conditioning engaged.

### When the temperature has dropped sufficiently:

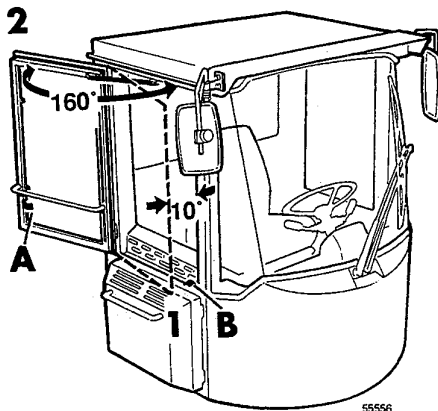
- Fan control (1) set to 1 or 2.
- Adjust thermostat (5) until the correct temperature is maintained.

These instructions are only basic recommendations and each driver should experiment so that the air conditioning is set to achieve the most comfortable temperature for working in without a draught.



## DOOR CATCH

The door can be secured in a ventilation position. The catch is secured in the lock on the side of the door and released with the ordinary door control.



## WINDOW CATCH

The right side-window can be opened to two positions.

### Position 1 (window open approx. 10°)

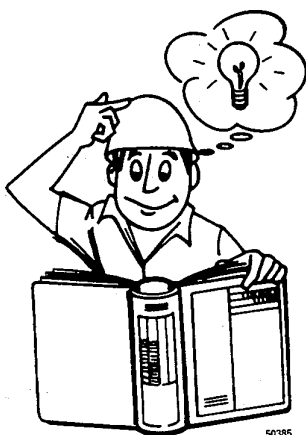
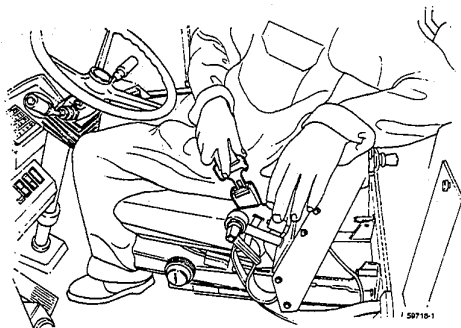
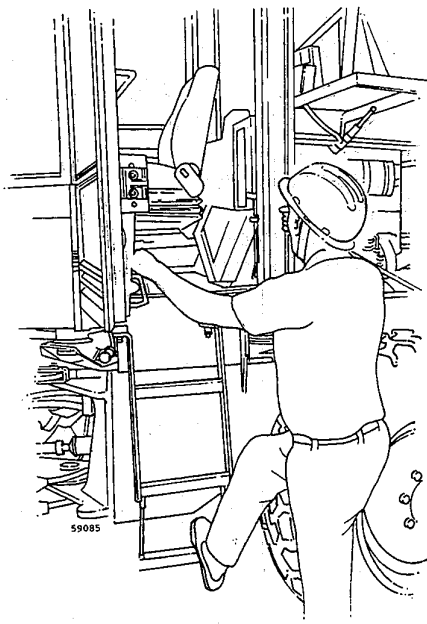
Lift up locking catch (A) open the window and secure it with the stop (B).

### Position 2 (window fully open, 160°)

Open the window until it stops against the stop on the side of the cab.

The window is provided with a gas-spring function and closes automatically the last bit. Mind your fingers when closing the window.

NOTE: The right side-window also serves as the emergency exit from the cab.



## OPERATING INSTRUCTIONS

### A FEW SIMPLE RULES BEFORE OPERATING

- Read and understand the Operator's Manual, before you start operating the machine.
- Before putting the machine to work, it must be operational, that is, all faults which may cause an accident must first be remedied.
- When entering or leaving the machine, always face the machine and use the steps and hand holds. Always use the "three-point" grip, i.e. both hands and one foot or both feet and one hand, when entering or leaving the machine. Do not jump!
- Always sit in the operator seat when starting the engine/machine.
- Do not climb or step on surfaces which are not intended for this. Only use the areas provided with an anti-slip surface. See also section "Safety rules when servicing".
- When operating the machine, the door should be closed or secured on the catch in the ventilation position.
- To avoid getting hands or fingers pinched when the machine is stationary (and particularly if the machine is slightly inclined) – keep your hands away from where there is a risk they could get pinched, such as covers, door, windows, etc.
- Use the seat belt during all operation.
- Check that the attachment is properly attached and locked.
- Do not use a mobile telephone, when it is not fitted to the machine, as it may interfere with important electronic functions of the machine. The mobile telephone should always be connected to the electrical system of the machine and have a fixed external aerial fitted according to the instructions of the manufacturer.
- Wear suitable clothing to allow safe operation.
- Wear a hard hat to increase head protection.
- Never operate the machine while under the influence of alcohol, medicine or other drugs.
- The cab has two emergency exits: the door and the right side-window which can be opened. The cab is for the protection of the operator and it meets the requirements for roll over protective structures according to the adopted standard for this (ROPS). Therefore, hold firmly onto the steering wheel if the machine should roll over. Do not jump! The cab is also designed to meet the requirements for falling objects according to given testing methods (FOPS).
- During all operations the machine may vibrate or shake to some extent and these movements may be harmful to the operator. Therefore operate the machine in such a way that your body is exposed to as little vibrations as possible.
  - Have the seat correctly adjusted and wear the seat belt well tightened.
  - Pick the smoothest path for the machine (level the surface when necessary).
  - Adapt your speed.

## **RUNNING-IN INSTRUCTIONS**

During the running-in period, that is to say the first 50 hours, the machine must be operated with a certain amount of care.

These running-in instructions and service intervals apply to the running-in period.

For other maintenance operations, see under "Basic Preventive Maintenance" and the "Maintenance Schedule".

## **ENGINE**

The engine oil and filter(s) should be changed after the first 50 hours. After that the oil and oil filter(s) should be changed every 250 hours.

**NOTE:** The conditions for changing oil at intervals of 250 hours are that:

- The oil filter(s) is (are) changed at every oil change.
- The oil filters are genuine Volvo filters.
- The diesel fuel sulphur content does not exceed 0.5 % by weight.
- The oil is of the API grade Service CD.
- The correct oil viscosity is used for the ambient temperatures according to the diagram "Recommended Lubricants".

If any of these conditions cannot be met, or if the machine operates under acid or particularly dusty conditions, the oil should be changed every 125 hours.

## **TRANSMISSION**

The oil filter for the transmission should be changed after the first 50 – 100 hours.

Thereafter change the oil every 2000 hours and change the oil filter every 1000 hours.

## **HYDRAULIC SYSTEM**

The hydraulic oil filter must be changed and the magnetic rod cleaned after 2000 hours of operation, after that the filter should be changed and the magnetic rod cleaned every 2000 hours (applies if a glass-fibre filter is fitted).

The hydraulic oil should be changed every 2000 hours if the system is filled with engine oil and every 4000 hours if the system is filled with hydraulic oil.

See "Recommended Lubricants" on page 124 for oil quality grades.

### **Important!**

- Check oil pressure and temperature often.
- Exercise the utmost cleanliness in all work with the engine, transmission and hydraulic and fuel systems.
- Close and lock the engine covers after the service work has been completed.

## 44 Procedures before starting

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### WALK-AROUND INSPECTIONS BEFORE STARTING

- Check that the machine is in the "Service position", see under "Safety rules when servicing".
- Check that there are no leaks.
- Also check that there are no broken or loose parts which can cause damage.
- Close engine and inspection covers before starting the engine. Also make sure that the radiator cowl has been lowered and locked.
- Always walk around the machine before starting to make sure that there are no persons in the immediate vicinity of the machine.
- The machine must not be started before the operator is sitting in the seat.

### Check

Carry out the daily service according to the **Lubrication and Service Chart**, then check the following points:

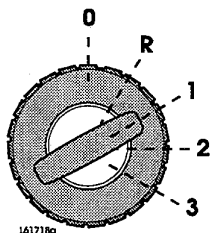
- that headlights, windscreen wipers / washer, reflectors etc. are in a serviceable condition, if not replace or remedy the function.
- that the battery disconnect switch is turned on.
- that there is fuel in the tank.\*
- that the operator's seat is adjusted for comfortable and safe operation of all controls.
- that the parking brake is applied.
- that the gear selector control is in neutral position (otherwise the engine cannot be started).
- that the control levers for the working hydraulics are in neutral.
- that the frame joint lock is disconnected.
- that the wheels are not blocked

**\*) If the fuel system has been**



**Instruments and control lamps**

Turn the Ignition key to the running position, position (1) which should cause the following control lamps to light up:



Ignition switch (running position)

**Red warning lamps**

- Secondary steering system (\*optional)
- Oil pressure engine
- Temperature engine
- Oil pressure transmission
- Temperature transmission
- Brake pressure (too low)
- Central warning
- Parking brake (applied)
- Charging

**Amber control lamps**

- Air filter
- Axle temperature

**Green control lamps**

- Boom Suspension System (BSS)
- Direction indicators

**Switches**

The switches for hazard warning flashers, rotating warning beacon and working lights, light with a faint light in the switches (guide light).

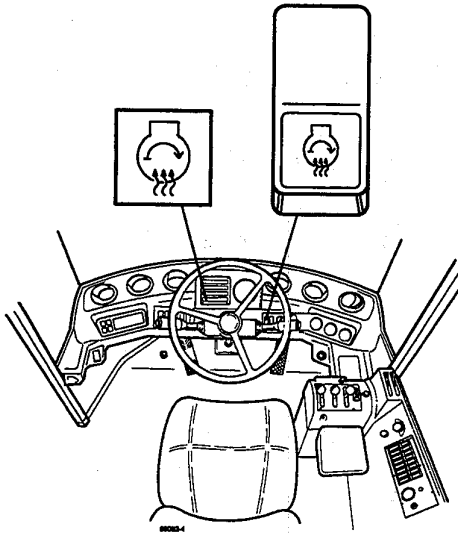
The guide light in all other switches are travelling-light dependent, i.e. they only light when the travelling lights are turned on.

- \* Machines equipped with secondary steering system, see section "Instruments".

**WARNING!**

Keep away from the frame joint when the engine is running. There is a risk that you could be crushed between the frames.

**NOTE:** The secondary steering allows steering movements even if the engine is NOT running.



A Switch, preheating element  
B Control lamp, preheating element

**WARNING!**

The engine may only be started with the key in the ignition lock.

**STARTING ENGINE****Starting warm engine or in warm weather**

- Turn the ignition switch key to the starting position (3).
- Release the key as soon as the engine has started.

**Starting cold engine**

(coolant temperature below +10 °C (+50 °F).

- The preheating element will be automatically engaged when starting. The heating-up period depends on the temperature of the coolant.

**Starting cold engine**

(at ambient temperatures down to -10 °C (+14 °F).

- Depress the accelerator pedal halfway.
  - Turn the ignition key to position (2), preheating position.
  - Push in the switch for the preheating element.
  - Release the ignition key and the switch.
  - The preheating is now engaged and the control lamp is on. (The preheating period depends on the temperature of the coolant).
  - When the control lamp goes out, turn the ignition key to starting position (3).
  - As the engine starts, the preheating element will be automatically reconnected and the control lamp will light up. (at temperatures below +10 °C (+50 °F).
- NOTE:** If the control lamp for the preheating element continues to light after a preheating period of 50 seconds, the element is still connected. Should this be the case, check the function of the element as there is a risk of overheating.
- When the engine has started, its speed should be rapidly reduced to slightly above low idling.
  - Run the engine at low idling for 30 seconds before operating to safeguard the lubrication/cooling of the turbocharger. To race the engine immediately after it has been started will endanger the lubrication/cooling of the turbocharger with the consequent risk of the bearings seizing.

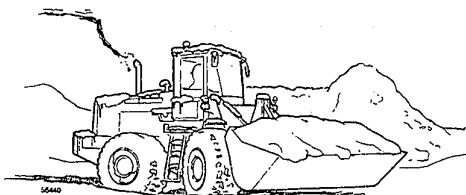
**If the engine does not start:**

- Wait until the engine has stopped completely.
- Turn the ignition key back to the "off" position before a new starting attempt is made.

When starting with booster batteries, see under "MAINTENANCE, Electrical system".

**WARNING!**

Starting gas (ether etc.) must not be used at the same time as the preheating element in the induction manifold.



## PROCEDURES FOR COLD WEATHER OPERATION

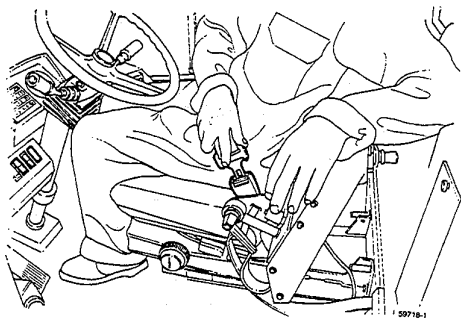
During the cold season or when the temperature is below 0 °C (32 °F) the following points should be noted:

- Make sure that the freezing point of the coolant corresponds to the weather conditions, see instructions, under "Maintenance".
- Use the recommended lubricating oil for winter use.
- Always fill the fuel tank at the end of the day's work in order to counteract the formation of condensation water in the fuel tank.
- After the engine has started, run it at low speed and with light loading until the oil in the engine, transmission, hydraulic system and axles has warmed up and become sufficiently fluid to provide proper lubrication.

**At extremely low temperatures, the machine must not be put to hard work immediately after it has been started.**

## BEFORE MOVING OFF

- Clean or defrost the windows before moving off
- If necessary adjust the steering wheel so it is not too high and inclined to approx. 45 °.  
This is to reduce static muscle strain in shoulders and neck.
- Always fasten the seat belt for all operation and keep both feet on the pedals. See also under "Seat belt" in "Safety rules when servicing".



**Start the engine as described on the previous page.**

- Do not move until the brake system control lamp has gone out. **Depress the brake pedal hard once to extinguish the warning lamp (checking that the system is operational). If the lamp remains on even after you depressed the brake pedal, there is a fault in one of the brake circuits. The fault must be investigated and remedied before you move off.**
- Do not move off until the central warning lamp has gone out.
- Check that all gauges, instruments and controls are operational.
- Raise the bucket or other attachment from the ground.
- Check that the attachment is securely fastened to the machine by pressing it against the ground.
- Check that no persons are near the machine before you move.
- Sound the horn.
- Select a gear.
- Move the selector control to forward or reverse.
- Release the parking brake and increase the engine speed.

## AFTER OPERATING

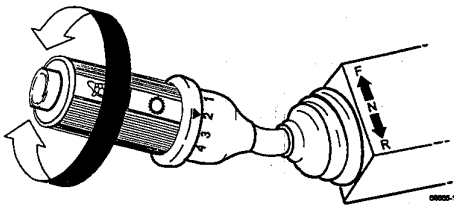
(When the machine is left unattended)

- Lower the attachment to the ground and if necessary block the wheels so that the machine cannot begin to roll.
- Apply the parking brake.
- Remove the ignition key.
- Close and lock door, windows and lockable engine covers.

## CHANGING GEAR

### (Shift modulation in position MAN)

In order to move off, first select a suitable gear and then the direction of travel, forward or reverse.



### Gear selector

#### Speed gears

The machine has four manual gear positions and they are selected by turning the control to the required position.

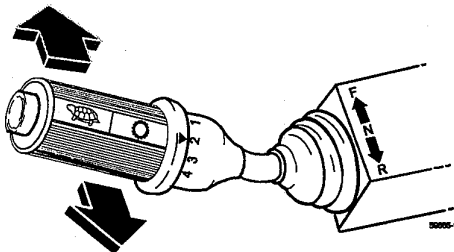
#### Directional gears

The directional gears are selected by moving the control forward or rearward.

Control in centre position = Neutral

Control in forward position = Forward drive

Control in rearward position = Reverse drive



### WARNING!

The selector control must, for reasons of safety, under no circumstances be moved to neutral when operating downhill — no engine braking effect!

Never leave the machine with the selector in forward or reverse while the engine is running — there is a risk that the machine may begin to move.

When changing from forward to reverse or vice versa, the speed of the machine and of the engine should be reduced as much as possible, particularly if the machine is working on a firm surface.

Do not change between Forward and Reverse at higher speeds than 2nd gear.

## AUTOMATIC POWER SHIFT (APS II)

### (Speed gear selector in position 3 or 4)

The shift modulation allows the operator to select different automatic shifting programmes (modes) depending on the operating conditions.

#### Position LIGHT

With the mode selector in the first of these two positions, shifting will take place at low engine revolutions.

If the mode selector is turned to the second position, the shifting point will be at slightly higher engine revolutions.

The first position is suitable for transport operations without load.

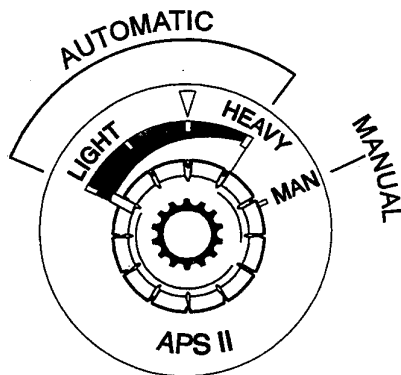
The second position is suitable for transport operations without load and lighter loading/carrying operations.

#### Position HEAVY

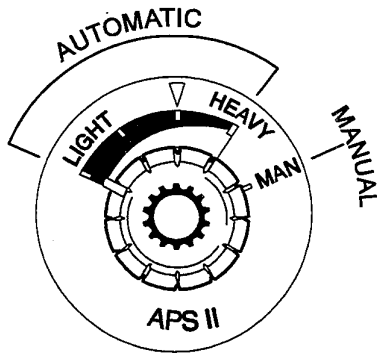
Means that shifting will take place at high engine revolutions and this should suitably be used for heavier handling and "Tough Operation".

#### Position MAN (manual)

The machine starts and operates in the selected gear position. Upshifts and downshifts on the move are controlled manually.



Normal position



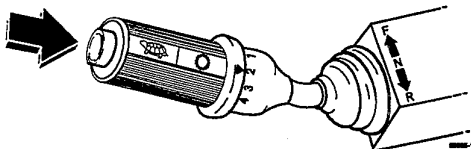
### Operating in Automatic Power Shift position

- Speed gear selector in positions 3 or 4.
- Shift mode selector within the automatic range (not the manual).
- Select travelling direction (forward or reverse).

- Accelerate and the machine will start in 2nd gear (the basic gear).

**NOTE:** If the machine is already moving, it will select 3rd gear automatically.

- Up and down shifts are made between 2nd, 3rd and 4th gear forward and between 2nd and 3rd in reverse.
- When the direction of travel has been changed the machine will start off in 2nd gear.
- For shifting to 1st gear, see kick-down function below.

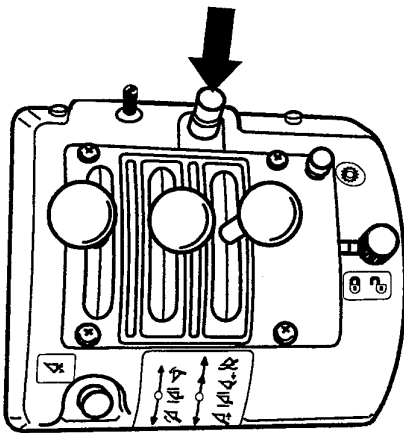


Kick-down button, gear selector control

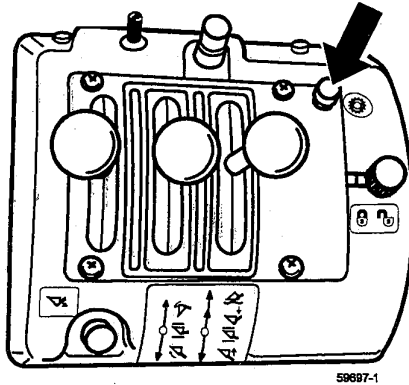
### Kick-down function

Kick-down is obtained, if the mode selector is within the automatic range, the speed gear selector is in either of positions 2, 3 or 4 and any of the kick-down buttons has been actuated.

- When the kick-down button is pressed in, 1st gear will be engaged if the travelling speed already is below 10 km/h (6.2 mph) or if the speed drops below 10 km/h (6.2 mph) within eight seconds after the button was actuated.
- When 1st gear has been engaged the buzzer will give off one short pip.
- 1st gear will remain engaged, unless a renewed activation of the kick-down function is done or if the engine speed becomes extremely high (at renewed activation 2nd gear will be engaged).
- If the direction of travel is changed, the machine will start off in 2nd gear, provided automatic shifting is selected.



Kick-down button, control lever carrier



Switch for engine braking / downshifting

**Engine braking / downshifting.**

With the aid of the switch for engine braking / downshifting it is possible to obtain an immediate downshift to the next lower gear or a downshift of two gears. This switch can also be used for preventing unwanted upshifting.

- If the switch is activated at higher travelling speeds, a downshift from 4th to 3rd gear is obtained.
- When the travelling speed is lower than 22 km/h (13.7 mph) a further activation of the switch will cause a downshift to 2nd gear.

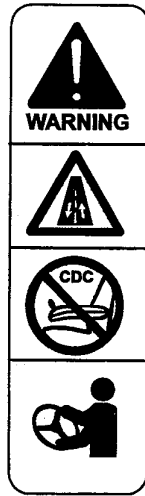
If the switch is kept in the pressed-in position, upshifting to the next higher gear is prevented. This function can be used when operating downhill or when approaching a vehicle which is to be loaded.

**NOTE:** If certain critical engine speeds or travelling speeds are exceeded, upshifting will take place

If the engine/transmission speed becomes too high, the central warning will begin to flash, the buzzer will sound and on machines with a display unit, the alarm text "too high speed" will be displayed.

**NOTE:** The frequency of the signals from the central warning and the buzzer is more rapid than when warning in connection with other functions.

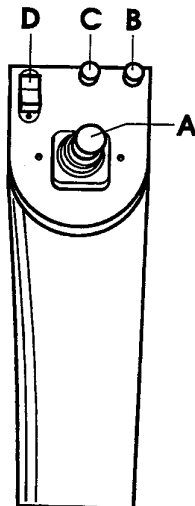
Under these circumstances, lower the travelling speed, or select a higher gear to reduce the engine/transmission speed.



L61719a



Control lamp CDC functions



- A Steering lever
- B Switch for CDC functions
- C Kick-down button
- D Switch for Forward/Reverse selection

## STEERING

The machine has articulated frame steering controlled by a hydrostatic steering system.

## CDC

**(Lever steering, Forward/Reverse selection, Kick-down)**

The system has the following functions concentrated to a collapsible arm rest: lever steering, forward/reverse selection and kick-down.

This means that during normal loading work, the operator does not need to touch the steering wheel.

The arm rest has to be in the lowered position and the system switched on with switch (B) to be able to use the CDC functions.

The control lamp on the front left instrument panel remains on while the CDC functions are activated.



## WARNING!

When operating on a public road, it is prohibited to use the lever steering – use the steering wheel.

Also when operating at high speeds (above 20 km/h = 12.4 mph) on a work site, always use the steering wheel in order to avoid accidents.

**The CDC functions will be automatically disconnected, if the gear selector control is moved from neutral.**

Small physical effort is required to operate the lever steering. The distance the lever is moved is proportional to the speed at which the steering system reacts. This means that it is possible to make very slight steering movements when one wishes to do so.

The steering wheel always remains functional when the steering lever is in neutral.

## OPERATOR INSTRUCTIONS

The arm rest must be lowered to be able to connect the CDC functions by depressing switch (B), see the figure. The control lamp on the front left instrument panel indicates that steering from the arm rest is possible.

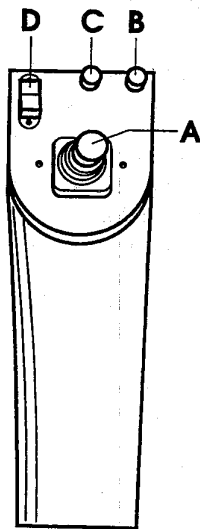
When the switch is in the disconnected position, the machine will **not obey any** commands from the arm rest controls.

## A

### STEERING LEVER

Switch on the lever-controlled steering by depressing switch (B) on the arm rest.

**The steering wheel function is active and operational while the lever steering is switched on.**



## **B SWITCH FOR CDC FUNCTIONS**

To be able to operate the lever steering (A), the forward/reverse selection (D) and the kick-down (C) on the arm rest, the CDC system must first be connected with switch (B) after the armrest has been lowered.

**NOTE: The ordinary gear selector control must be in neutral.**

When CDC functions are switched on with switch (B), it is possible to operate the forward, neutral and reverse positions with switch (D) (forward/reverse selection). If the ordinary gear selector control is actuated while the CDC functions are switched on, the ordinary gear selector control overrides any selection made by switch (D) (forward/reverse selection). To reconnect the CDC functions, the ordinary gear selector control must first be moved to neutral and the system again switched on with switch (B) on the arm rest.

**IMPORTANT!** For safety reasons, it is always possible to steer the machine with the steering wheel and change gears with the ordinary gear selector control by the steering wheel, regardless of whether the lever steering is activated or not.

## **C KICK-DOWN BUTTON**

With the kick-down button pushed in, the transmission will shift down to 1st gear, provided the automatic shifting range has been selected on the shift modulating control and if the speed gear selector control is in either of positions 2, 3 or 4. For further information on the kick-down function, see under "Changing gear".

## **D FORWARD/REVERSE SELECTION**

With the front end of the switch pushed down = forward drive.  
With the rear end of the switch pushed down = reverse drive.  
There is a neutral position between the forward and reverse positions.

## **BRAKING**

Apply the brakes gently. This is particularly important when operating with a load.

If required during the work cycle, the power transmission can be made to automatically disengage when the brakes are applied, see "Instruments", (switch for transmission disengage function).



## **WARNING!**

**The transmission disengage function must not be used when travelling on the road.**

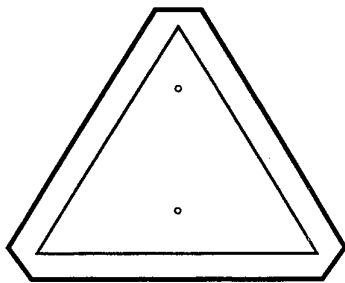


## GENERAL OPERATING RULES

The contents of the following pages are intended to be of assistance when operating the machine. These rules must be followed to ensure safe operation of the machine. However, these rules do not relieve the operator from taking into account local laws or other National safety regulations. Alertness, good judgement and respect for the safety regulations applying at different types of work sites and traffic regulations, are factors which make it possible to avoid risks of accidents and which will make it possible to operate the machine safely.

## DUTIES OF THE OPERATOR

The operator should know and pay attention to the specific requirements and risks at work sites and when travelling on public roads and discuss this with the work site management. The operator should therefore study the following pages to become aware of and observe how to avoid serious injury and damage.



SMV-plate (slow moving vehicle)

## SMV-plate (slow moving vehicle)

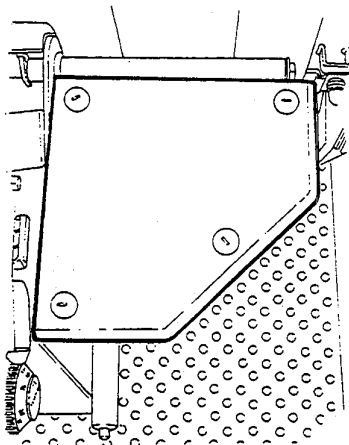
When travelling on public roads it is recommended that a SMV-plate should be displayed in a clearly visible position on the rear of the machine. Pay attention to national regulations. The plate should be positioned at a height of 0.6 – 1.8 m (2 – 6 ft) above the ground, measured from the lower edge of the plate. The plate must not be positioned inside the rear window or any other window. Follow national traffic regulations.

## Operator qualifications

Only trained personnel are allowed to operate the machine. For travelling on a public road the operator must hold a driving licence required for the machine according to National Rules and Regulations. In addition, he or she should have reached the age of 18 years and be familiar with the operation and maintenance of the machine. The operator should not operate the machine if he or she feels ill or is suffering from fatigue or is under the influence of alcohol or strong medicine.

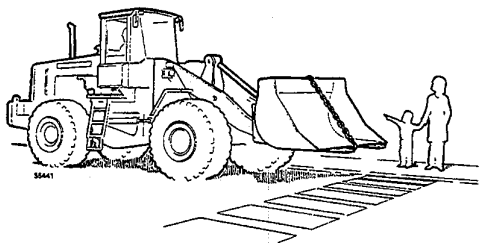
## Ride-on instructor

A ride-on instructor is only allowed on the machine, if it is provided with an additional place approved by the management.



## WARNING!

It is forbidden to sit or stand in an unsuitable place on the machine, i.e. on the attachment (bucket, fork, platform etc.) or any other mounted equipment so that the operator cannot handle the machine in a safe way.

**WARNING!**

When operating on a public road the lever steering (CDC) must not be switched on – use the steering wheel.

A trailer may normally only be used temporarily for road transports and then only for carrying supplies necessary for the operation of the machine (attachments, tools, fuel, oil or similar). Pay attention to national regulations.

**TRANSPORT OPERATION ON PUBLIC ROAD**

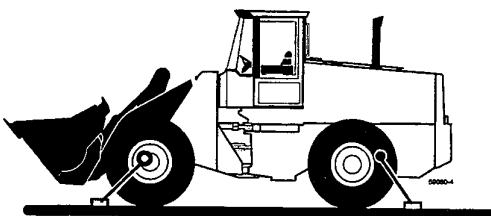
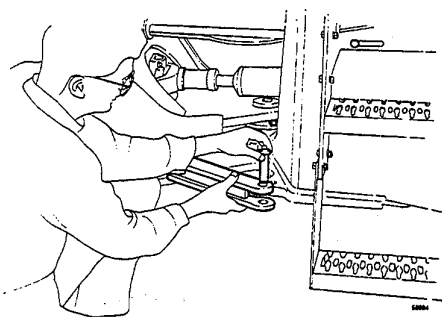
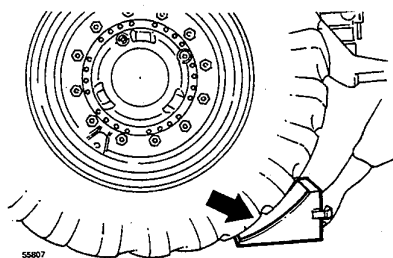
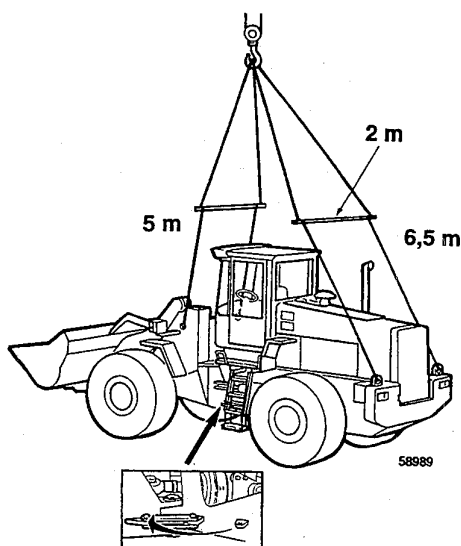
Responsibility, good judgement and consideration for others are the cornerstones of road safety. As a machine operator you are considered to be a road user and therefore, it is your duty to know and follow the applicable traffic regulations. It is important to bear in mind that the machine, in comparison with the rest of the traffic, is a wide, slow moving machine which may cause obstruction. Bear this in mind and pay attention to the traffic behind you. Facilitate overtaking.

**When travelling on a public road:**

- The attachment should be empty and lowered to the carry position (30–40 cm = 12–16 in above the ground) and tilted fully backward. When a material handling arm is fitted, its front end should be marked (carry a red flag).
- All working lamps and any rotating warning beacon should be switched off, unless otherwise permitted by local regulations.
- Rotating warning beacon may only be used when operating on the road, never when transporting along the road (check the local regulations).
- Hazard warning flashers may **not** be on when operating along a public road.
- Make sure that any hand tools, e.g. spades, iron bars etc., are properly secured.
- Make sure that additional buckets are properly secured with straps or chains.

**Travelling speed**

- Adapt the speed to the road conditions, visibility and load.
- Note that the reaction speed of the steering is affected by the speed of the engine. Therefore, adapt the speed of the machine before turning a corner.
- Carefully follow the applicable instructions for changing travelling direction, i.e. from forward to reverse and vice versa, so that the machine does not stop too suddenly.



- 1 Attaching eyes, front frame 2 pcs
- 2 Attaching eyes, rear frame 2 pcs (on inside of rear wheels)

## TRANSPORTING MACHINE ON ANOTHER VEHICLE

### The machine on the platform of another vehicle

- If the machine is lifted up onto another vehicle, the frame joint should be locked.
- If the machine is driven up onto another vehicle, the frame joint should not be locked.

### Lifting machine

- When lifting the machine, use the lifting eyelets intended for this purpose and lock the frame joint. The lifting eyelets are positioned as shown in the figure.

### Ramp

- Do not drive onto a ramp without first checking that it is sufficiently wide and that it can carry the machine and its load and that it will stay in place.

## ! WARNING!

If the machine is driven across from a loading dock onto the platform of a truck or trailer, make sure that this vehicle is securely braked, i.e. the wheels blocked and that there is no risk that the vehicle will tip or tilt in a dangerous way as the machine is driven across.

After the machine has been placed on the platform of the transporting vehicle, the frame joint should always be locked, the wheels blocked and the machine tied down, so that it can be transported in a safe way.

### Frame joint lock

When servicing or lifting the machine, the frame joint should always be locked.

- Place the machine so that it is straight and stop the engine.
- Take out the front or rear pin (depending on machine type) and swing over the frame joint lock to the intended locking position, insert and lock the locking pin.

### Tying down machine before transporting

When transporting the machine on another vehicle, the frame joint should be locked and the machine tied to the platform so that it cannot tip or move (roll).

#### Attaching points:

- 1 Attaching eyes on front frame (in front of front axle attachment)
- 2 Attaching eyes on rear frame (on the inside of the rear wheels)

Also follow national regulations.

### **Operating space**

Check that there is sufficient room for the machine, load and operator before entering narrow passages. Move slowly. Drive in the middle of a doorway which is too narrow to allow two machines to meet.

### **Danger zones**

Do not operate too close to the edge of a quay, ramp, platform etc.

Take care when operating near areas which are indicated as dangerous.

### **In an elevator or confined space**

Drive the machine into an elevator or confined space so that the load faces the exit.

Apply the parking brake and stop the engine before starting the elevator.

### **Position of attachment when travelling**

Travel with the attachment in the carry position (lowered), whether it is empty or loaded, except when loading or dumping the load.

### **Operating down or up a steep slope**

Never operate down a slope with the gear selector in neutral. Shift down while still approaching the slope and reduce the speed so that the machine can be handled safely under all circumstances.

When operating up or down a steep slope, make sure that the load is towards the top of the slope. Do not operate across slopes which are steeper than 17 °.

## **LOADING AND UNLOADING**

### **Responsibility for the load**

While operating, the operator is responsible for the load on the machine. Only handle the load if it is secure. There must be no risk of the load falling off while operating. The operator has a right and a duty to refuse a load which constitutes an obvious safety hazard.

### **Operating indoors**

The machine may only be operated inside buildings when there is no risk that there will be a dangerous concentration of exhaust gases, and if the building has been approved by a supervisor for such use. Avoid idling and follow issued safety instructions.

### **Floor load**

Do not exceed the max. permissible floor load.

### **Rated load**

The rated load capacity stated for the machine must be respected. Pay attention to the effect of different distances to the centre of gravity and the influence of different attachments.

### **Responsibility for others**

Operate the machine so that risks of injury are avoided. No person is allowed to walk or stand under a raised attachment whether it is empty or loaded, unless it has been mechanically locked or supported. An operator has the right and the duty to prevent this.

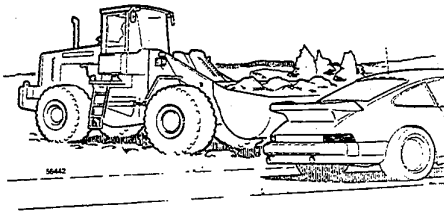
No person may enter the operating area of the machine when it is in operation without first notifying the operator. If a person has to enter the operating area of the machine in order to carry out a certain job, he or she must take great care.

If a person is within the operating area of the machine, the operator must take care and operate the machine only when he can see the person, or, if the person, through clear signals, has told the operator where he or she is. (See instructions under "Operating with bucket"). If a truck or other haulage vehicle is placed so that there is a risk that its cab, during loading, can be hit by the attachment of the loader or by falling objects (stones, timber trunks or similar), the cab must be vacated before loading begins unless the cab is sufficiently strong and protected to withstand the impact of falling objects or being hit.

### **Signal man**

The operator should watch a suspended load extra carefully when not assisted by a signal man.

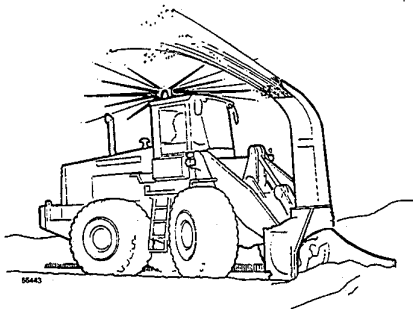
See also "Signalling diagram" (pages 75 and 76).



### **Operating machine on public road**

When operating the machine on a public road, street or other places which are open to traffic, such road signs, diversion and safety devices should be used, which are required according to the speed of the traffic, its density and other local circumstances.

**NOTE:** National and local regulations contain instructions on the use of road signs and devices for diversions and safety.



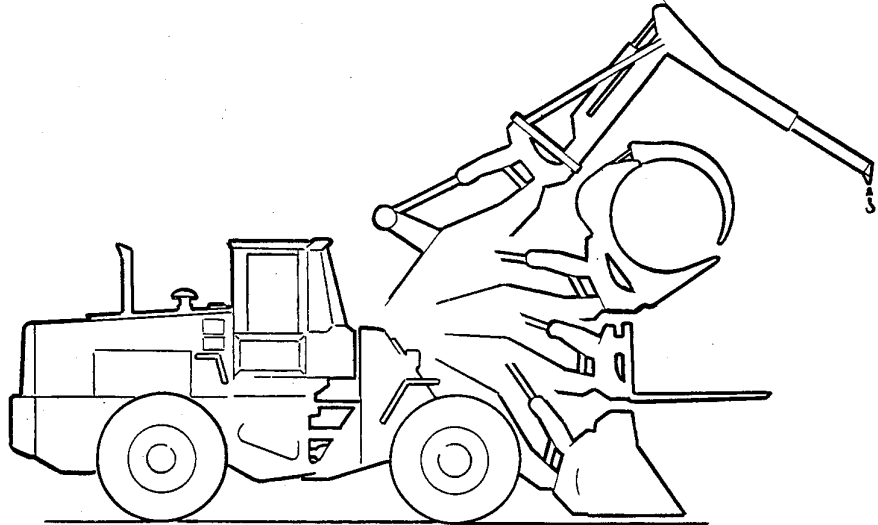
### **Rotating warning beacon**

A rotating warning beacon giving off an amber/yellow light may be used on the machine when it is used for road maintenance, e.g. snow clearing or for other operations when the width of the attachment, carried or towed, is greater than the machine itself. A warning beacon should also be used when the machine is working or positioned on the road or beside the road so that it constitutes a danger to other traffic. Wide vehicles or vehicles used for transporting wide machines may carry rotating warning beacons, provided that a special permit has been obtained for carrying out the transport. As a rule, special local or national regulations apply for such transports.

## Operating techniques

## OPERATING TECHNIQUES

The following pages contain advice and instructions on how to operate the machine and examples of how the most common attachments are used. It is important that the correct technique is used to obtain safe and efficient use of the machine.



55444

## ACCIDENTS

Accidents and injuries should be reported to the site management immediately. If possible leave the loader in position. Take necessary action so as to reduce the effect of damage especially injuries. Do not do anything that will make the injuries worse or make the investigation into the accident more difficult. Wait for further instructions from the site management. "Narrow escapes" should also be reported.

## POSITIONING OF HAULER

The positioning of the hauler (transporting vehicle) is of great importance for making the loading operation efficient. Therefore, always indicate where you want the hauler to stand. One way of doing this is by raising the bucket. Having done so you are then responsible for that the place is safe.

## GENERAL



### WARNING!

Never use an attachment before you have checked that it is securely locked — Your safety is involved.

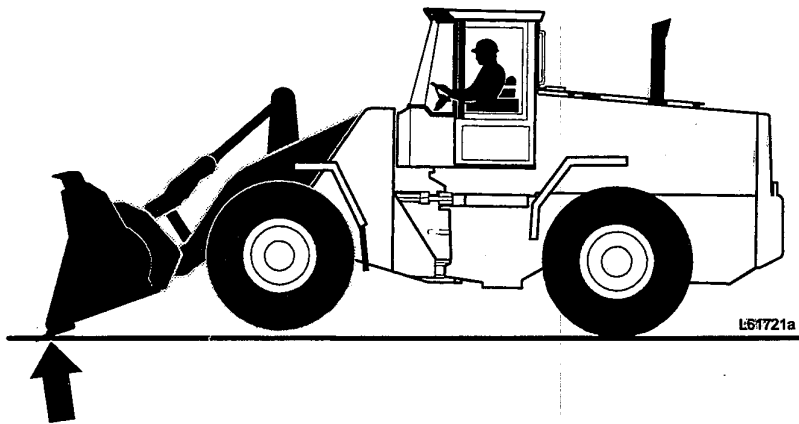
Make sure that the hydraulic oil in the attachment, which is to be connected, is not contaminated (strange particles, water etc.) and that it is of the same quality as that of the machine itself.

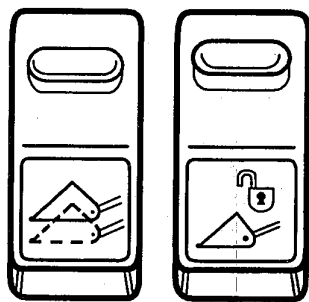


### WARNING!

Check that the attachment is securely locked by pressing its front end against the ground as shown in the figure.

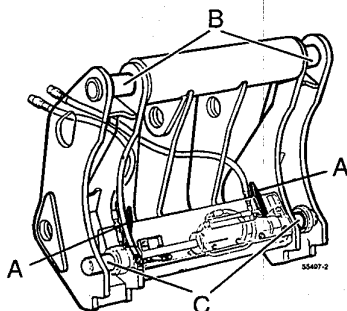
If you are uncertain as to whether the attachment is securely locked, you must visually check that the locking pins of the attachment bracket are in the locked position.





1  
2  
Switches for attachment locking

To safeguard the locking function:  
Make sure that the contact surfaces  
always are clean from paint, clay or other  
contamination.



A Indicator points (golden metallic)  
B Upper attaching points  
C Lower attaching points

## CONNECTING AND DISCONNECTING ATTACHMENT WHEN MACHINE IS FITTED WITH SEPARATE ATTACHMENT LOCKING

### Connecting

- Pull back the locking pins by activating switch (2).  
If necessary, raise the pressure with switch (1).  
Indicator points (A) lowered = locking pins in unlocked position.
- Tilt the attachment bracket forward approx. 15 ° and align the upper attaching points of the bracket with the upper attaching points on the attachment.
- Raise the lifting arms until the attachment rests in the bracket and tilt the bracket rearward until the attachment is level.
- Lock the attachment by activating switch (2). If necessary raise the pressure with switch (1).  
Indicator points vertical = locking pins in locked position.

Check that the attachment is properly locked by pressing the front edge against the ground. If the attachment is locked, the lifting arms will flex a little and begin to lift the front wheels off the ground.



### WARNING

When connecting attachments, the operator should make sure that the expected effect is obtained when moving the control levers – an unexpected movement may result in a risk of accident.

Always check the function before the machine is operated.

### Disconnecting

The attachment should be in a level position on the ground.

- Pull back the locking pins by activating switch (2). If necessary increase the pressure by activating switch (1).  
The indicator points are lowered when the locking pins are in the unlocked position.
- Lower the lifting arms so that they disengage from the attachment.
- Reverse away from the attachment.

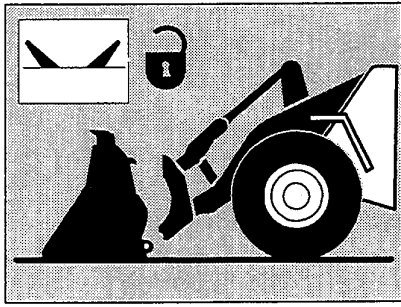


### WARNING!

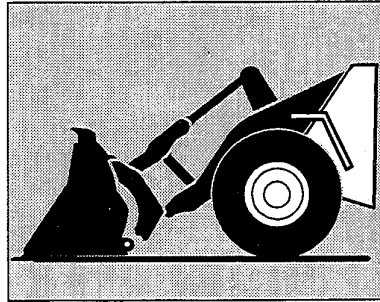
Switch (2) for attachment locking must only be actuated in connection with the changing of attachments.

Otherwise the pressure may be lost and as a consequence the attachment may work loose and cause injuries.

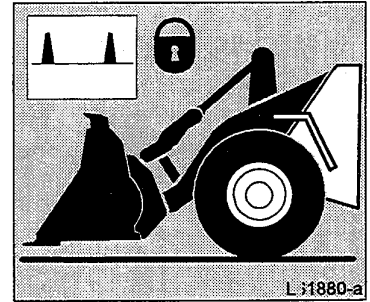




Attachment bracket locking pins in unlocked position



Tilt forward approx. 15 ° and hook the bracket into the upper attaching points on the attachment



Lift, tilt rearward until level and lock with the locking pins of the attachment bracket

## **PRESSURE RELEASE**

### **General about releasing pressure (draining)**

Residual pressure in the hoses makes it very difficult to part or join up the quick action coupling halves.

To facilitate this, make sure that there is no pressure in the hydraulic system when you want to disconnect an hydraulic hose.

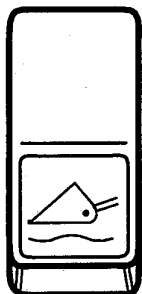
Stop the engine.

The pressure in the hydraulic lines is released by moving the hydraulic control levers forward and backward a few times.

**The attachment should always rest on the ground when releasing the pressure.**

**For timber grapples** the pressure in the system is released by closing the clamping arm fully and then making a rapid movement with the control lever in the opposite direction. The hoses become "slack" when the pressure is released.

If there is pressure in the hydraulic system of an attachment, the pressure can be released by slackening the lock nut between the hose and the hydraulic pipe.



Floating position

## ACCUMULATORS

(Brakes, Boom Suspension System and servo system)



### WARNING!

Even if the engine has been stopped, there is still an accumulated pressure in the system. If the system is opened, without having first released the pressure, oil under high pressure will jet out which could cause injuries.

Even retightening of leaking couplings and unions should not be done until the pressure in the system has been fully released.

### Brake system

- The brake system pressure is released by stopping the engine and depressing the brake pedal several (30–40) times.

### Boom Suspension System

- The pressure in the Boom Suspension System accumulators is released as follows:
  - 1 Move the gear selector to neutral
  - 2 Start the engine and run it at low idling
  - 3 Activate the BSS
  - 4 Lower the lifting arms to the ground
  - 5 Engage the floating position with the switch and move the lifting/lowering control lever to the floating position.

### Servo system

In case of loss of engine power, the pressure in the accumulator for the servo system is released by moving the hydraulic control levers forward and backward..



### WARNING!

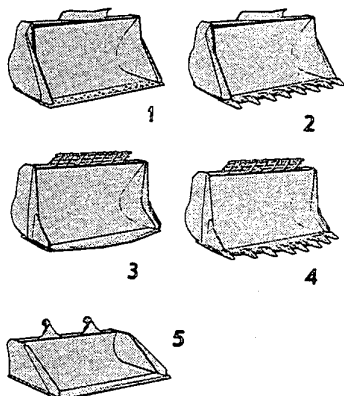
Discarded accumulators must not be thrown away unless they first have been taken care of by a workshop and carefully "punctured".

If a pressurised accumulator is heated, there is a risk that it may explode.

Volvo Construction Equipment	
S-631 B5 ESKILSTUNA SWEDEN	
SKOP/BUCKET MODEL	NO
TILLV/ SERIAL	NO
VOLYM/ RATED CAPACITY SAE	m <sup>3</sup> /yd <sup>3</sup>
LAST/ RATED LOAD	ton
MAX TRYCK/ PRESSURE	MPa
VIKT/ WEIGHT	kg
SKOPBREDD/ BUCKET WIDTH	mm
SKÄRV EDGE	PART NO
SPÄRSKÄRV EDGE SAVER	PART NO
TÄND/ TOOTH	PART NO
HÄLLARE/ ADAPTER	PART NO

The product plate fitted on every proprietary attachment constitutes your warranty that the attachment has been tested and approved as regards quality and function for the stated Volvo loader.

The plate is not only proof that it is a proprietary attachment, but at the same time it also constitutes a means of identification.



The five most common types of buckets

- 1 **Straight bucket without teeth**  
(Loose material, sand, earth, fertilizer).
- 2 **Straight bucket with teeth**  
(Hard material, gravel, clay, surface stripping).
- 3 **Spade-nose bucket without teeth.**  
For material which requires a good penetration force (gravel, finely blasted rock and ore).
- 4 **Spade-nose bucket with teeth**  
(Hard and rocky material, hard gravel and, blasted rock).
- 5 **Levelling bucket**  
(Finer stripping work, moving topsoil and levelling filling material).

**IMPORTANT!**

Check-tighten the bolted joint at the edge savers and segments to prescribed torque after approx. four hours operation. then check the torque now and then.

## ATTACHMENTS, GENERAL

Using the correct attachment for a particular job is a deciding factor when it comes to the capacity of the machine.

The machines have either direct-mounted attachments or attachments mounted in a bracket which allows rapid changes of attachments.

With varying requirements, e.g. material density or length of material, other attachments than those mentioned in this manual or the Attachment Catalogue may not be used, unless approval is obtained from your Volvo Wheel Loaders AB dealer.

**When selecting attachments, always follow recommendations from Volvo Wheel Loaders AB. If attachments other than those recommended by Volvo Wheel Loaders AB are used, then you yourself must take the responsibility for the safety of the combination of loader and attachment and consider national safety regulations.**

- With effect from January 1st 1995 the EU Machinery Directive applies and this is indicated with a "CE" mark on the product plate of the machine.  
Attachments designed by Volvo Wheel Loaders AB are an integrated part of the machine and adapted to the machine. The CE marking of the machine therefore also covers our attachments.  
Volvo Wheel Loaders AB bears no responsibility for attachments manufactured by other companies. Such attachments must be CE marked and accompanied by a Declaration of Conformity and user instructions.
- For more detailed information on choice of attachments, see the Attachment Catalogue and contact your dealer.

## BUCKET OPERATION – GENERAL

The choice of bucket depends on the type of material which is to be loaded, its density and also the capacity of the loader. You have to bear in mind whether the material which is about to be handled is hard or loose, heavy or light.

When the wheel loader is used with a bucket, a working load of 50 % of the tipping load for a fully steered machine is recommended. Depending on application, and/or machine size the manufacturer often recommends a utilisation lower than 50 %. This means that the size of the bucket must always be adapted to the density of the material to be handled. (See product plate on the attachment).

Tightening torque for edge savers and segments with bolted joints (bolt grade 10.9)		
Size	Tightening torque	
M16	275 ± 45 N m	209 ± 33 lbf ft
M20	540 ± 90 N m	398 ± 66 lbf ft
M24	900 ± 140 N m	664 ± 103 lbf ft
1 1/4"	2160 ± 345 N m	1593 ± 254 lbf ft

**Choosing size of bucket**

This diagram will give an indication as to the choice of bucket. If you use a bucket which is too big in relation to the weight of the material and the tipping load of your machine, the loader will feel weak and unstable.

It is wrong to think that one can increase the capacity of the loader by choosing a bigger bucket.

All necessary information regarding capacity, load, edge savers etc., can be found on the product plate on the attachment.

**WARNING!**

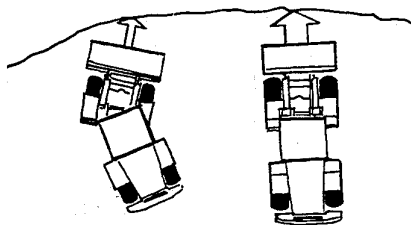
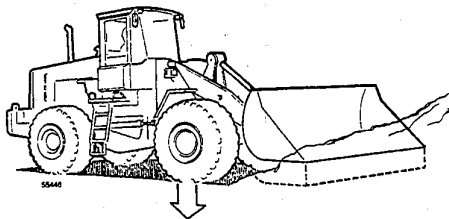
The bucket must not be used for transporting or lifting people – as this might lead to accidents.

**BUCKET OPERATION**

Here are five important points for obtaining efficient and safe operation.

- Correct bucket.
- Even ground on working site.
- High ground pressure of the front wheels.
- Avoid wheel spin – adjust the engine speed.
- The machine must be straight when approaching the material.

See also bucket diagram in the Specifications section



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High ground pressure of the front wheels is obtained by slightly raising the bucket after it has entered the material a little way. The risk of wheel spin is reduced, as the load on the front wheels is increased. The straighter the machine is, the greater its ability to penetrate the material. This also reduces tyre wear.

**GRAVEL AND HEAP LOADING**

Adjust the bucket so that it is level and lower it to the ground just in front of the gravel heap. Select 2nd gear and move into the material (when necessary use kick-down). When the machine has nearly come to a standstill because the maximum tractive effort of the machine has been reached, begin to raise the bucket while at the same time tilting backward with short control lever movements.

If possible avoid tilting the bucket forward when filling it. Large control lever movements cause wheel spin. Never move into the material at high speed.

Suitable bucket: Straight bucket with or without teeth.

Suitable gear: Gear selector in position 2 or 4.

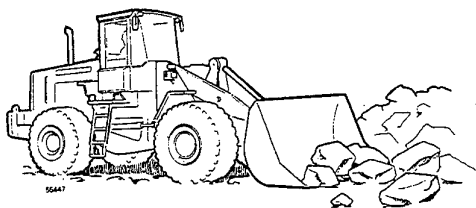
Mode selector in Normal position (at twelve o'clock).

Boom Suspension System:

Gear-dependent position

**WARNING!**

Pay attention to the risk of sliding material which can cause severe accident and injury if due care is not taken.

**ROCK LOADING**

Correct engine speed is of great importance – too high engine speed causes wheel spin.

Always enter the material head on to avoid oblique stresses which can harm the lifting arm system. The edge of the bucket must find its way in under and between the stones which means that you must operate in an "intelligent" way.

If a stone has become wedged, try a new angle of approach, but avoid exerting pressure on the corner of the bucket. Blasted pieces of rock are very sharp, therefore, there is considerable risk of damaging the tyres. This is best avoided by not moving up into the heap and by always picking up any rocks which have fallen out of the bucket.

**Suitable bucket:** Spade-nose bucket with or without teeth.

**Suitable gear:** Gear selector in position A (Position 4).

Mode selector in position HEAVY.

**Boom Suspension System:** In gear-dependent position.

**WARNING!**

Pay attention to the risk of falling rocks which can cause severe injury, if due care is not taken.

**TRANSPORTING LOAD (LOADING – CARRYING)**

When transporting a load, the bucket should be fully tilted backward and kept at a height of 30–40 cm (12–16 in) above the ground. Try to keep the transporting road even and free from stones and other objects. There is always spillage from a too full bucket. Even out the road on the way back if necessary.

**Suitable max. speed** is approx. 15 km/h (9.3 mph).

**Suitable gear:** Gear selector in position A (position 4).

Mode selector in position HEAVY

**Boom Suspension system:** In gear-dependent position

**NOTE:** Remember that the stability of a heavily loaded machine changes when it is steered.

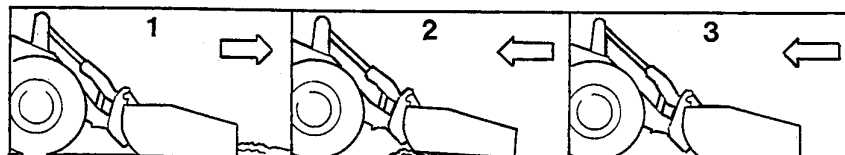
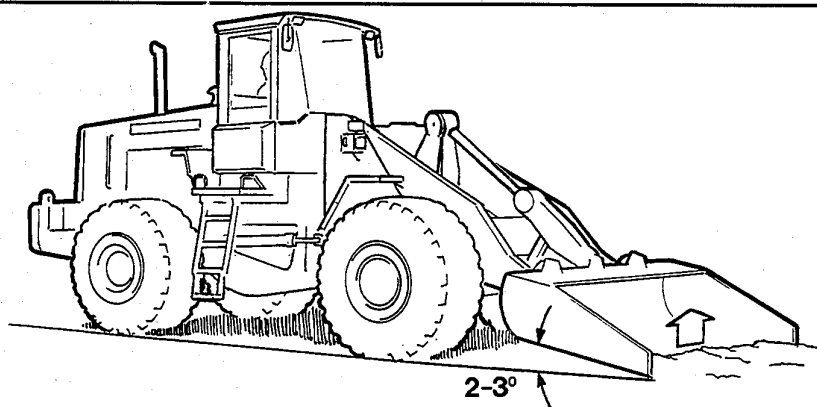
**WARNING!**

If visibility is obscured by the load or the attachment, great care must be taken. Walk around the machine before starting and make sure that no persons enter the operating area of the machine. Another way is to raise the load and then look out from under the load. If you are uncertain, operate at a low speed. If necessary, arrange for a signalling person to take charge and to help the operator under "tricky" circumstances. Great care must be taken to prevent injuries and damage to property.

**DUMPING LOAD**

When dumping, keep the bucket as close as possible above the body sides or silo. In this way the impact of the dumped material is kept as light as possible and it is easier to position the load. If the ground at the work site is sloping, try to approach the vehicle to be loaded from below. This affects the stability of the machine in a positive way.

When loading rock, try to fill the first bucket with as fine material as possible in order to soften the impact of subsequent larger pieces.



55450

### EXCAVATING

When excavating and surface stripping, start by angling the bucket 2 – 3 ° downward. Always operate in 1st gear and at low engine speed. Gradually increase the engine speed at the same time as you raise the bucket slightly. If the ground conditions are poor and the wheels tend to spin, use the differential lock.

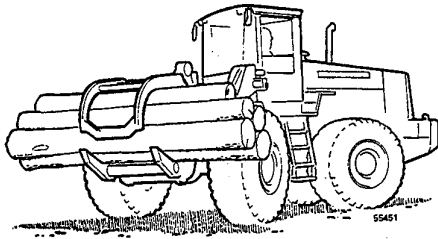
NOTE: You must never engage the differential lock when one of the wheels is spinning. Let up the accelerator until the wheel stops.

**Suitable bucket:** Straight bucket with or without teeth.  
**Suitable gear:** Gear selector in position A (position 4)  
Mode selector in Normal position (at twelve o'clock)  
**Boom Suspension System:** Deactivated.

### LEVELLING

- 1 When levelling, the bucket should lie flat against the ground. When you operate forward you should, if possible, have some material in the bucket and some in front of it in order to fill any hollows in the ground as you move along.
- 2 To finish off the levelling operation, keep the edge of the bucket slightly downward and reverse while pressing the bucket lightly against the ground.
- 3 The final touch can be done by reversing with the bucket flat against the ground and with the lifting/lowering lever in floating position. When carrying out levelling operation, a bucket with a straight edge and long bottom is preferable. It makes it easier and improves the quality of the work.
- 4 If a dozer blade, plough or sweeper etc. is used, it may be advantageous to have the single-acting lifting function engaged. This allows the attachment to follow any unevenness in the ground by "floating". This also helps to maintain the steering ability and the tractive force of the machine. The attachment always returns to the preset position.

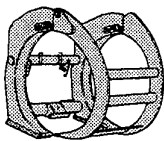
**Suitable bucket:** Straight bucket without teeth  
**Suitable gear:** Gear selector in position A (position 4)  
Mode selector in Normal position (at twelve o'clock)  
**Boom Suspension System:** Deactivated



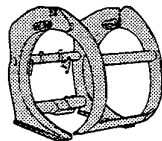
## TIMBER GRAPPLES – GENERAL

There are five main types of timber grapples:

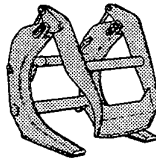
- A Unloading grapple** with short tines which makes it easier to fill the grapple when unloading a vehicle.
- B Sorting grapple** which has fairly long and straight tines which can be placed parallel with the ground so that the grapple can be easily filled when loading from a pile or sorting bin.
- C General purpose grapple** with longer fork tines than the sorting grapple and which can be used for handling whole trunks when sorting or grabbing single trunks when required.
- D Whole-trunk grapple** which is a wide grapple which also can handle single trunks. This grapple too has slightly longer tines than a sorting grapple.
- E Tropical grapple** which also is wide and which has two separate clamping arms (as an option) in order to get a secure grip on large, heavy logs.



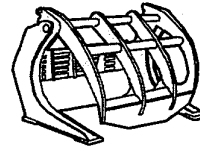
A



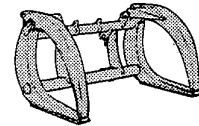
B



C



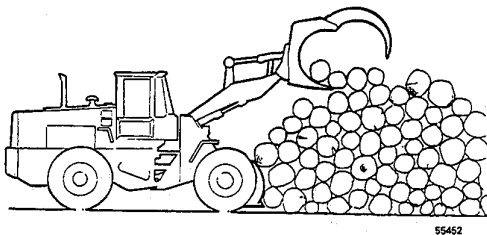
D



E

Suitable gear:

Gear selector in position **A** (position 4)  
Mode selector in position **LIGHT**  
or **NORMAL**



With effect from the 1st of January 1995 the CEN standard EN 474-3 applies within the EU. The standard concerns nominal operating load expressed as a percentage of the tipping load. In accordance with this Volvo Wheel Loaders AB have chosen to adapt its internal standard for stating the capacity of timber grapples.

The recommended maximum loads apply for combinations of timber grapples and wheel loaders which are equipped with approved counterweights for timber handling.

Any additional equipment to the attachment reduces the rated operating load.

## OPERATING WITH TIMBER GRAPPLES

### Stacking

On machines provided with Boom Suspension System (BSS), it is recommended that the function selection switch is set to travelling-speed dependent suspension, as this gives greater precision and reduces the risk of "crows nests".

- Do not use floating position when operating with timber grapples.

Keep the grapple as close to the stack as possible to prevent logs falling down between the stack and the machine. Tilt the grapple slightly forward and carefully open it so that the logs can roll out of the grapple. Reverse carefully and at the same time lower the grapple and hold it close to the load to prevent logs falling.

When using a grapple with heel/kick-out there is no need to tilt the grapple forward. With this grapple the lifting capacity of the machine is better utilised and one can build up higher stacks. The heel kick-out can also be used as a counter hold when handling single logs.

**Basic rule:** Make sure that the logs leave the grapple without dropping.

# 68 Loading, Unloading using timber grapples

## Picking up from a stack

**From a low stack** keep the grapple tines flat against the ground with the grapple fully open. Move towards and slightly into the stack. Close the grapple as much as possible. Carefully reverse while closing the grapple further.

**From a high stack** begin as high as possible, tilt the grapple tines slightly forward and push them into the stack with the grapple fully open. When the grapple is well into the stack, close it. Follow through with the grapple so as to avoid logs falling down under the grapple.

**If logs fall between the grapple tines, carefully lower the load to the ground, reverse and try to pick up the load again without damaging the logs.**

A heel/kick-out makes it possible to stack the logs higher and to keep the ground in front of the loader wheels clear of logs.

## OPERATING WITH WHOLE TRUNKS

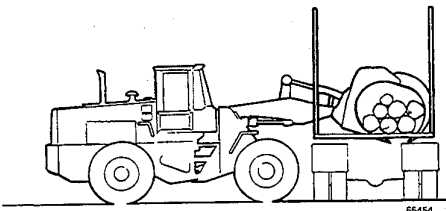
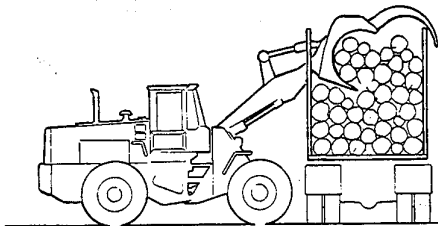
The handling of whole trunks requires special attention to the centre of gravity of the load so as to maintain the side-stability of the machine.



### WARNING!

The large clearance radius when handling timber and particularly when handling whole trunks means that the operator must take great care not to hit anyone or anything in the vicinity of the machine.

When operating with a restricted view, use a signalling person and read instructions under "Signalling Diagram".



## LOADING VEHICLE USING TIMBER GRAPPLES

While approaching the vehicle which is to be loaded, raise the grapple so that the logs clear the stakes. Lower the grapple onto the bunks or the platform, making sure that the underside of the grapple comes flat against the platform. Place the bundle against the stakes on the far side, open the grapple fully and reverse carefully.

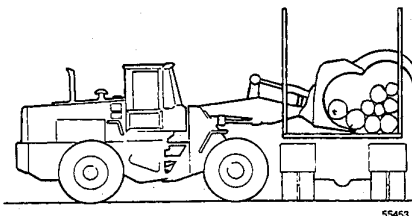
It is good practice to arrange the logs in a tidy bundle in the grapple, thus avoiding a "crow's nest" on the vehicle being loaded.

## UNLOADING VEHICLE USING TIMBER GRAPPLES

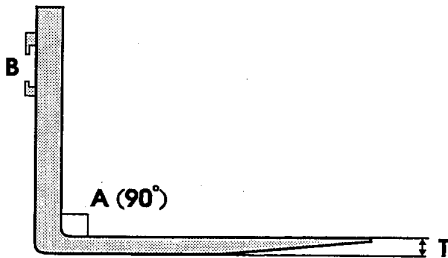
Approach the load with a raised and fully opened grapple. Tilt the grapple forward and lower it down over the load, close the grapple and begin to tilt the grapple slightly upward. Then repeat alternate closing and upward tilting of the grapple until it is full.

When filling the grapple, take great care so as not to damage the load stakes on the vehicle.

**NOTE:** Take great care when unloading a vehicle, particularly when there are only a few logs left. If the grapple should grip round the far edge of the platform it could cause damage.







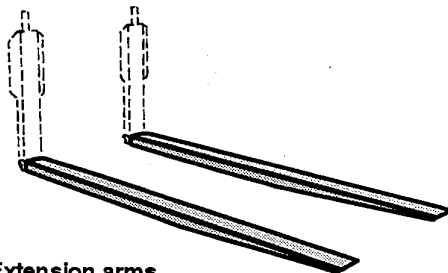
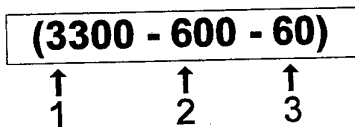
Check the fork tines for wear:  
A = Angle, fork tine / shank  
B = Attaching lugs  
T = Thickness of fork tine

Markings on fork tines from  
Volvo Wheel Loaders AB

- 1 Max. load per tine in kg\*
- 2 Distance to centre of gravity in mm for maximum load
- 3 Thickness of fork tine at delivery

\*) Must not be confused with rated operating load for the respective loader model according to load table on the next page.

(example of marking)



Extension arms

## OPERATING WITH PALLET FORKS – GENERAL

### IMPORTANT!

- Only pallet forks approved for the machine by Volvo Wheel Loaders AB must be used.
- The pallet forks must be checked regularly for wear (T = thickness). Check the heel of the tine particularly carefully.
- If the fork tine has been worn down to 90 % of its original thickness, or if the angle between the tine and the shank has become greater than 93 °, the tine must not be used any more.
- Inspect the attaching lugs for wear and cracks. If defects or play are discovered, the tine must not be used any more.
- Cracks or wear must not be made good by welding.
- When operating with pallet forks, the load table shown on the next page should be followed and the given values not exceeded.

**When operating on rough and uneven ground, e.g. off-road operation, the values for "Rough terrain" in the table on the next page should be followed.**

### Fork tine extensions

These are used when handling light materials with low density. The fork tine extensions are also marked with the maximum load.

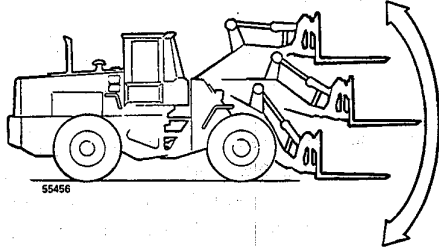
## FORK QUALITY

Fork tine back frame and fork tines must be dimensioned to cope with the loads which the lifting capacity of the loader permits. Further, the fork tines must be dimensioned to cope with three times the rated load (stamped into the fork tine) without any permanent deformation. Fork tines made by us meet these requirements and are classified together with the wheel loader according to applicable standards.

## COMBI-FORKS

The combi-fork is a good alternative for handling materials, where the load to some extent has to be held in place. For this purpose a special combi-fork back frame is used for fitting standard fork tines.

There are two versions of the combi-fork back frame: with one-piece or twin-arm clamp. The former is most suitable for handling palletised goods and round timber. The latter type is used in the pulp industry and on building sites, where both palletised goods and compressed material (waste paper, packaging material etc.) are handled. The two clamping arms together provide a secure grip on the load.

**OPERATING WITH PALLET FORKS**

During all operation with pallet forks there are some rules which must always be kept in mind. The most important are:

- An operator of a loader fitted with a pallet fork must be appropriately trained.
- The operator is always responsible for making sure that the load he/she takes on the fork does not exceed the permissible load for the machine and the fork in question.
- Bear in mind that the fork makes a semi-circular movement when lifting. Therefore, start raising the fork a little bit away from the place where the load is to be placed.
- Never carry loads higher than is absolutely necessary so as to maintain good vision and stability.
- The machine must not be operated with the load raised other than when stacking or depositing pallets.
- The travelling speed should be adapted to the ground conditions when transporting a load.
- Lift the load with the pallet fork inclined as little as possible.
- When stacking material, the fork shanks should be kept vertical.

**Suitable gear:** Gear selector in position A (position 4)  
Mode selector in position LIGHT

**Boom Suspension System:** Gear-dependent position

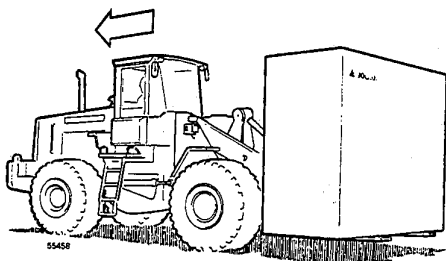
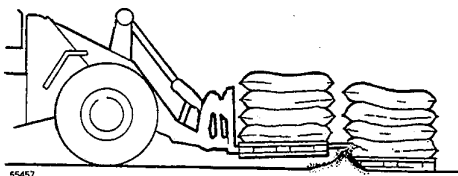
**NOTE!** When carrying out heavy work requiring great break-out force, e.g. breaking out tree stumps or carrying marble blocks etc. – use attachments approved by us for this type of work.

**Load table for pallet fork**

			Rated operating load capacity in kg at a load centre distance of					
Ground	Tyres	Counter-weight	500 mm	600 mm	700 mm	800 mm	900 mm	1200 mm
Rough terrain	20.5-25	–	3825	3700	3600	3475	3375	3100
		1	4050	3925	3800	3675	3575	3275
Firm and level ground	20.5-25	–	5075	4900	4750	4625	4475	4125
		1	5350	5175	5025	4875	4750	4300*

\*) Limited by the attachment

The maximum rated operating load capacity given in the table must be reduced, if any optional equipment is fitted to the attachment. For further information, see the Attachment Catalogue.



### Picking up a load

- Arrange the load so that it comes as far in on the fork and as close to the vertical shank as possible.
- There may be deviations from the complete parallel movement (see the Specifications) and this may affect the use of the fork.
- When transporting the load, tilt the front end of the fork slightly upward which will make the load more secure. If your vision is restricted, keep a speed which is low relative to the conditions. The penetrating force of the fork tines is very strong. Choose fork tines with a correct length so that they do not protrude outside the front of the load, otherwise the previously deposited pallet or load may be damaged.

- Keep the load low 30 – 40 cm (12 – 16 in) above the ground to achieve the best possible stability and vision.
- When operating without a load in the fork, the tines should be held low and tilted upward.

If the load obscures your vision, reverse the machine to the place where the load is to be placed. When handling high loads, use a special support!

In countries outside the EU and EEA other safety requirements may apply, therefore, always follow local regulations.

### Approval and legal provisions

The rated operating load capacity according to the new CEN standard EN 474-3 is determined as a percentage of the tipping load.

The percentage values, which must not be exceeded, are as follows:

- Uneven ground, rough terrain: 60 % of tipping load
- Firm and even ground: 80 % of tipping load

It must be possible to control and handle the load hydraulically in all foreseeable positions and with all relevant hydraulic circuits involved. The maximum permissible load capacity is either determined by the stability or the hydraulic capacity of the machine whichever is less.

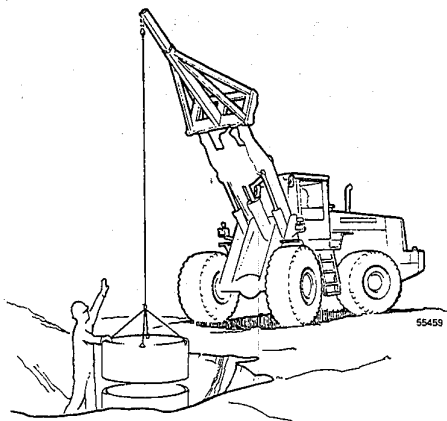
The adaptation of the new CEN standard means an increase in safety margin, as the maximum permissible operating load is decreased by approx. 15 % in relation to the former utilized national standard.

For countries outside the EU other regulations may apply. Therefore, always check which local rules apply.

- When moving the load, it should always be held as low as possible.
- The travelling speed should be adapted to the ground conditions.
- The load should be inclined as little as possible when lifted.
- When stacking keep the lower part of the fork tines horizontal.

### Counterweights and alternative tyres

Changes to the maximum permissible load for wheel loaders fitted with counterweights can be seen in the table on the previous page.



### MATERIAL HANDLING ARM – GENERAL

The max. permissible load for the machine using a material handling arm is shown in an "Operating Load Table" on the attachment. Do not exceed the given limits.

The rated operating load capacity given on the attachment applies when the machine is operated on firm and level ground and is, at the most, half of the tipping load. When operating on uneven ground, the load must be adapted to the ground conditions.

Every time the material handling arm is fitted to the machine, a so called mounting check must be carried out to make sure that the attachment is locked.

**Check that the attachment is locked by pressing it against the ground.**

In certain countries it is a legal requirement that regular checks are carried out by an authorised person, who should keep a special inspection diary over these checks.

**Only a material handling arm approved by Volvo Wheel Loaders AB together with the machine may be used.**

### POSITIONING OF MACHINE

Great care must be taken in positioning the machine. The following points should be observed:

Check that the surface under the wheels is level and firm. If the ground is soft, check with your supervisor for suitable means of supporting the wheels.

### Before operating

If the length of the material handling arm has been changed, check that the pins at the ends of the respective sections have been locked in a secure way (special locking pins).

### LOADING

Make sure that the table showing the max. permissible load for the respective arm length is followed. Also make sure that the pressure in the front tyres follow the recommendations, if the maximum permissible load is utilised frequently.

Do not lift until you know:

- where the load is to go.
- that it can be placed there.
- that the correct sling is used (wire, chain, etc.).
- that the sling is connected to the load in a correct way (see page 76).
- that you have been given the signal to lift, if a signal man is assisting (see pages 75–76).

The material handling arm must not be used for a heavier load than has been specified for that arm length.



### WARNING!

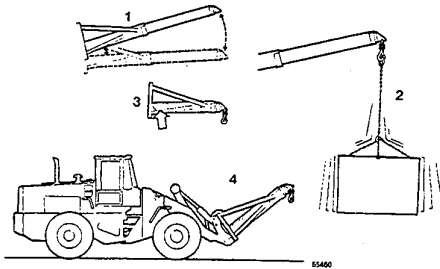
The moving or lifting of personnel with the aid of the material handling arm is not permitted – risk of injuries.

### Operating load table for material handling arm

Mechanical 92008		Tyres 20.5 R25
Arm extension	Reach*)	Max. permissible load without counterweight
Retracted	3.4 m (11 ft 2.6 in)	2300 kg (5072 lb)
Extended halfway	4.5 m (14 ft 7.2 in)	1840 kg (4057 lb)
Extended fully	5.6 m (18 ft 3.7 in)	1500 kg (3308 lb)

\*) From the front edge of the tyre to the lifting hook

Recommended tyre pressures for different operations, see page 121.



## OPERATING WITH MATERIAL HANDLING ARM

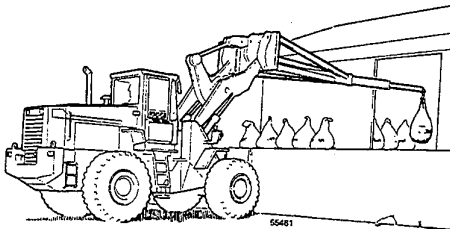
- 1 Remember that a **small** movement at the attachment bracket becomes a **large** movement at the outer end of the material handling arm.
- 2 Operate the machine and the material handling arm with gentle and careful movements, so that the load does not start to swing.
- 3 Never exceed the maximum permissible load of the material handling arm.  
**A loading table is displayed on one side of the attachment itself.**
- 4 When transporting on, for example a road, the material handling arm should not be extended and the front end should be tilted rearward.
- 5 Extending or shortening the arm length should be done manually (be aware of the risk of pinching).
- 6 Only use lifting attachments which are approved and which do not overload the machine.
- 7 When moving with a suspended load, keep it as low as possible. Use slings to stabilise or to prevent the load from swinging.

## WHILE OPERATING WITH A LOAD



### WARNING!

Remember that the stability, of the machine when straight, is reduced when turning.



- Keep your eyes on the load at all times. If, at any time, you cannot see the load, a signal man must be called in before starting the job, see "Signalling Diagram" on pages 75 and 76.
- Operate the arm as smoothly as possible.
- Do not move a load above persons, office and personnel huts.
- Under no circumstances should the arm be used for pulling up boards or planks which have been nailed down. Pulling obliquely must not be done.

**Suitable gear:** Gear selector in position A (position 4).  
Mode selector in position HEAVY or LIGHT

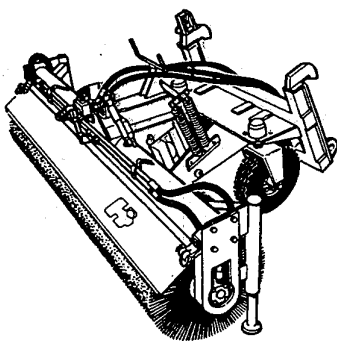
**Boom Suspension System:** Gear-dependent position or deactivated

**Try, as much as possible, to prevent the load from swinging.**

If necessary, slings should be connected sideways to prevent swinging.

A lift should not be carried out when the force of the wind and the bulk of the load are such, that you know from experience that the load cannot be handled with maintained safety.

If the wheel loader has to be moved with a suspended load, the load should be carried as low as possible up to the place where the load is to be deposited. The speed should be limited to 6 km/h (3.7 mph).



### **Operating with hydraulically powered rotating attachments**

**For attachments with hydraulically powered rotating working parts, e.g. brush, bush clearer, sand spreader etc., the following general safety rules should be followed:**

- The fitting of such an attachment must only be done by a trained person.
- Read, understand and follow the instructions supplied with the attachment.
- Always stop (turn off the hydraulic supply) for the rotating/moving part of the attachment before you leave the cab.
- When servicing or maintaining the attachment or in case of the working parts having come to a standstill while operating, the hydraulic hoses to the attachment must be disconnected in order to prevent accidental engagement of the hydraulic power, which might result in an accident.

Check that the attachment in question is CE marked, if the attachment is not made by Volvo Wheel Loaders AB. Make sure that the dealer has written the attachment into the "Declaration of Conformity" for your machine as being an approved attachment.



### **WARNING!**

**To avoid accidents, always find out from the manufacturer what instructions for safe handling apply BEFORE you fit and start using an hydraulically powered attachment.**

**Normally, a machine with a hydraulically powered attachment should be fitted with an emergency stopping device inside the cab. The stopping device turns off the power to the attachment and stops its movement.**

**SIGNALLING DIAGRAM**

Diagram for manual signalling to operator of lifting equipment. If a rapid lifting, lowering or moving movement is required, the arm movements should be carried out more lively. If two different machines are used for lifting the same load, there should be an agreement beforehand how the lift should be carried out and what signals should be given to the respective operators.



**START**  
Both arms are extended horizontally with the palms facing forward



**STOP**  
The right arm points upward with the palm facing forward



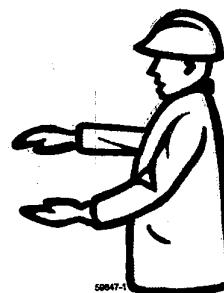
**END**  
Both hands are clasped at chest height



**RAISE**  
The right arm points upward with the palm facing forward and the hand slowly makes a circle



**LOWER**  
The right arm points downward with the palm facing forward and the hand slowly makes a circle



**HORIZONTAL DISTANCE**  
The hands indicate the relevant distance



**MOVE FORWARD**  
Both arms are bent with the palms facing upward, and the forearms make slow movements toward the body several times

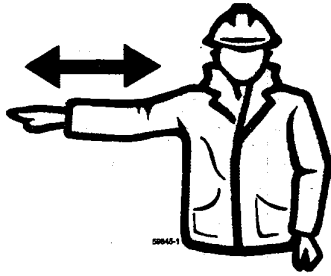


**MOVE BACKWARD**  
Both arms are bent with the palms facing downward, and the forearms make slow movements away from the body several times



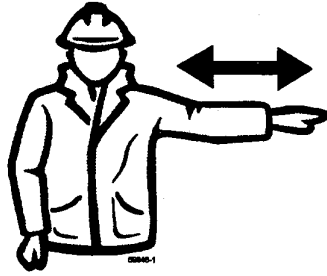
**DANGER (EMERGENCY STOP)**  
Both arms point upward with the palms facing forward

## 76 Signalling diagram, Stopping long loads



### RIGHT

The right arm is extended more or less horizontally with the palm facing downward and slowly makes small movements to the right



### LEFT

The left arm is extended more or less horizontally with the palm facing downward and slowly makes small movements to the left

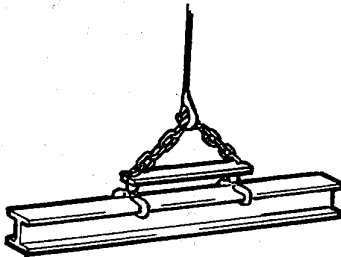


### VERTICAL DISTANCE

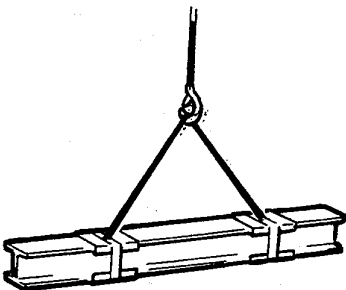
The hands indicate the relevant distance

## SLINGING OF LONG LOADS

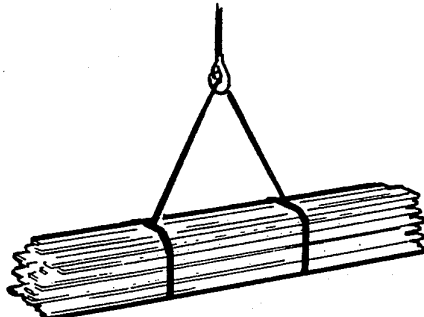
Boards, planks, reinforcing irons or similar should have the sling arranged so that they cannot fall out.



When lifting girders, a pair of girder scissors should preferably be used.



Place for example cut-up air hoses between the sling and sharp edges.



The sling should be well tightened.



**OPERATING WITH MACHINE ON SITE NEAR OVERHEAD WIRES OR UNDERGROUND CABLES AND PIPES**

Before the machine is operated, check with your employer to find out if there are any overhead or underground cables or gas, water or sewage pipes on the work site. The machine operator must be given clear information about this.

Make sure that all relevant and practical measures to help detect such lines are taken. Local authorities and/or communication and power companies should be contacted for guidance and advice. Failure to do so may lead to legal consequences.

Overhead wires and underground cables and pipes must be protected against damage in a suitable way. The electricity supply should be turned off when practical. Information about where the gas and water can be turned off should be made available, so that they can be quickly turned off if they are ruptured.

**NOTE:** If digging has to be carried out very close to cables, pipes or overhead wires, it may be necessary to dig by hand.

**OPERATING WITH MACHINE NEAR HIGH VOLTAGE OVERHEAD POWER LINES**

The distance between the machine and the live overhead power line should be at least 2 metres sideways in cases of low voltage and 4 metres in case of high voltage lines up to maximum of 40 kV (power line which usually has supporting and fixed insulators) and 6 metres in cases of high voltage power lines above 40 kV (lines normally carried in suspended insulators).

Regarding machines operating under a live overhead power line, the vertical distance between the highest point on the machine and the lowest point on the power line should be at least 2 metres in the case of low-voltage lines. If the power line carries high voltage the distance should be at least 4 metres. The lifting height of the attachment may have to be limited. This can be done by re-adjusting the lifting arm kick-out function.

The above given safety distances must be kept even in the case of the most unfavourable loading and unfavourable position of the attachment. Any springing movement of the machine must also be taken into account. A sideways swing of the lifting sling of at least 20 ° from the vertical line should be reckoned with and the sideways movement of the power line at a wind speed of 15 m/s should be borne in mind. The safety distance should also be calculated from any load carried in the attachment and the power line.

**NOTE:** By power line is meant a single conductor suspended on or from poles or other supports as well as accessories such as insulators, hooks and bars.

**WARNING!**

If the machine comes into contact with a high voltage line, the operator must remain in the seat and not leave the cab – If the machine is live and the operator tries to reach the ground his or her life is in danger.

Call for help by signalling in some way so that the power can be turned off.

**LIFTING ATTACHMENTS**

Lifting attachments such as chain slings, loading platforms, forks and clamps should be clearly marked with maximum permissible load and meet the requirements of Local and National Regulations.

Regarding regular checks, see the text below.

**WARNING!**

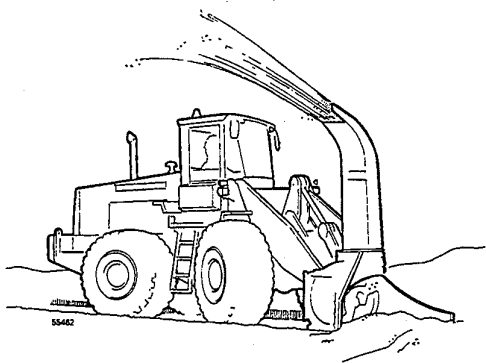
**Never attach a lifting device (chain, sling or similar) around the teeth on the bucket when lifting. If a tooth should break, there is a risk of serious injury.**

**Regular checks of lifting attachments**

Lifting attachments should be checked regularly while in use. These checks should be arranged through the employer and be carried out at regular intervals based on the operating conditions.

During the regular checks, attention should be paid to wear, cracks or other deficiencies which may jeopardise the safety of the machine or lifting attachment. If any of the above described faults is detected, the machine or the attachment must not be used.

These regular checks should be carried out by a well trained and experienced person.

**OTHER ATTACHMENTS**

Some attachments are only used for very special purposes, which often means that there are **special instructions** which must be followed. Never start operating with a special attachment, without first having found out which special instructions apply.

Find out how the attachments should be fitted and used and that they are approved for use with your machine (according to the Declaration of Conformity).

**OPERATING UNDER GROUND**

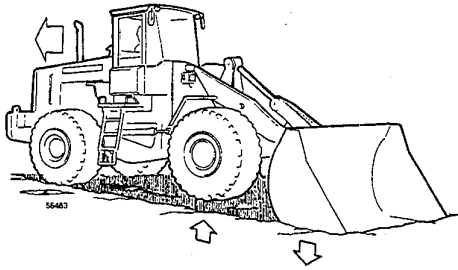
If the machine is operated under ground (in EU and EEA countries) special equipment is required, e.g. the engine should be certified.

Talk to your dealer.

### WHAT TO DO WHEN THE MACHINE GETS STUCK

If you have got stuck, it is usually best to reverse out. If you cannot reverse or drive forward, try the following:

- Engage the differential lock
- Select a low gear (1st or 2nd).
- Reverse and steer the machine fully to the left and then to the right alternately (like a duck's waddle).

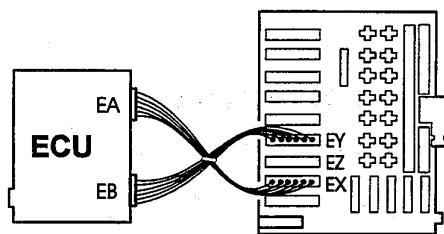


If only the front wheels have got stuck proceed in either of the following ways:

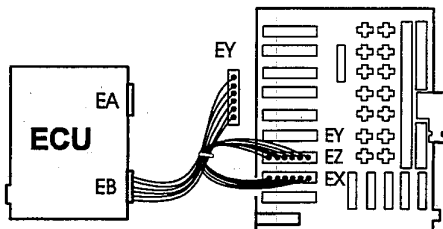
- Lift up the front wheels, supporting the machine on the bottom of a flat bucket and reverse.
- Steer to the right or to the left, press the bucket against the ground, lift up the front wheels and steer the other way, raise the bucket slightly and reverse.
- Lift up the front wheels using the bucket. Fill the holes under the wheels with branches, pieces of wood or similar and reverse.
- If the machine needs to be recovered, see "Recovering" page 82.

**IMPORTANT!** You must never engage the differential lock when one of the wheels is slipping. Lower the engine speed until the wheel has stopped. Then engage the differential lock.

# 80 Operating with ECU disconnected, Emergency release of parking brake



Normal connection



Connection when operating with ECU disconnected

EA and EB = Connectors on the ECU  
EZ = Connector socket on the circuit board

## OPERATING WITH THE ECU DISCONNECTED



### WARNING!

The machine may only be operated over a short distance and at low speed.

## Operating fault in the control unit (ECU)

In case of a fault in the control unit, it is possible temporarily to operate the machine and to change gears manually by taking the following action:

- Disconnect connector EY (blue leads) from the circuit board.
- Disconnect connector EA (yellow) from the control unit and connect it to connector socket EZ (yellow) on the circuit board.
- It is now possible manually to shift between four gears forward/reverse (three gears forward/reverse on certain markets).

NOTE: On machines equipped with secondary steering, only 1st and 2nd gear forward/reverse can be selected.

When disconnecting the control unit, several control functions will change and others will be lost. It is therefore important that an authorised dealer workshop should be contacted as soon as possible so the fault can be rectified.

## EMERGENCY RELEASE OF PARKING BRAKE



### WARNING!

Always block the wheels before releasing the parking brake, to prevent the machine from rolling.

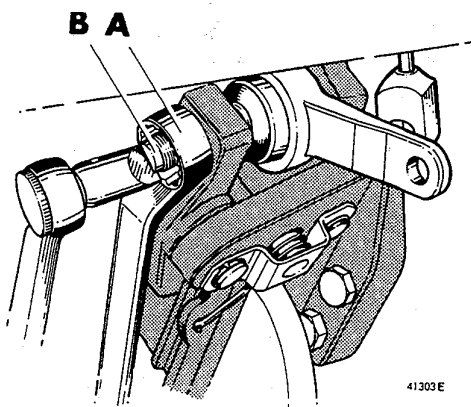
The work with releasing the parking brake must only be done by a person who has sufficient knowledge to consider the risks.

## Hydraulically operated parking brake.

In case of loss of pressure it is possible to release the parking brake by slackening lock nut (A) and turning adjusting screw (B) counter-clockwise until the parking brake has been released.

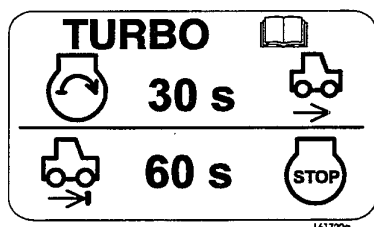
Contact an authorised dealer workshop to have the parking brake restored and adjusted.

NOTE! If the service brakes of the machine are not working, the machine must not be moved. In such a situation contact an authorised dealer workshop.



**STOPPING MACHINE**

- The machine is stopped in the following way:
- Lower the engine speed.
- Apply the brakes and when the machine is stationary move the gear selector to neutral.
- Lower the attachment to the ground.
- Apply the parking brake.

**Stopping engine**

- Run the engine at low idling a couple of minutes before stopping it in order to safeguard the lubrication and cooling of the turbocharger.
- Turn the ignition switch key counter-clockwise so that the control lamps go out and the engine stops.

**WARNING!**

When you are entering or leaving the machine, always face the machine and use the steps or hand holds to avoid slipping.

Always use the three-grip approach, i.e. two hands and one foot, or two feet and one hand when entering or leaving the machine.

- Do not jump!

**Parking**

When parking the machine, carry out the measures described above and:

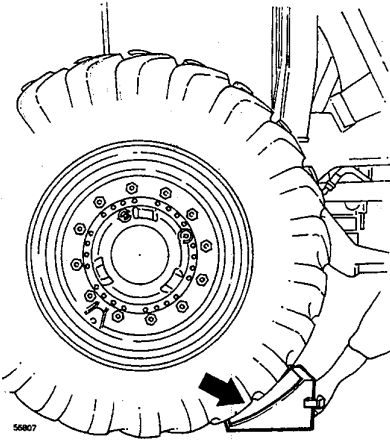
- Check that all switches and controls are in the "off"-position.
- Turn off the current supply with the battery disconnect switch, if the machine is to be left unattended for a while.
- Lock all covers, windows and door.
- Take out the keys.
- If possible, place the machine on level ground, or block the wheels so that the machine cannot start rolling.

**Long-term parking**

- Carry out the measures as under "Parking".
- Wash the machine and touch up the paint finish to avoid rusting.
- Treat exposed parts with anti-rust agent, lubricate the machine thoroughly and apply grease to unpainted surfaces like lifting and tilting cylinders etc.
- Check the tyre pressure
- Fill the fuel tank and the hydraulic oil tank to the max. marks.
- Cover the exhaust pipe, if the machine is to be parked out-of-doors for some time.

**After the long-term parking check:**

- All oil and fluid levels
- The tension of all belts
- The tyre pressure
- The air cleaner



## RECOVERING / TOWING

### Measures before recovering / towing

If possible, the engine should be running when recovering / towing to make the brakes and steering operational.



### WARNING!

Before taking any steps in preparation for recovering or towing, the parking brake must be applied and the wheels blocked to prevent the machine from rolling. The greatest care must be taken in connection with towing to avoid serious injury which at worst could be fatal.

### Recovering

- Use a tow bar which should be connected to the towing device at the rear on the machine to be towed and tow it to a suitable place or a trafficable road. NOTE: The lifting eyes must not be used for towing (only for lifting the machine).

### Towing

- If the machine has to be towed to a workshop, after it has been recovered, use a towbar connected to the towing device at the rear of the machine as described above, or a wire rope secured through the eyes on the front axle attachment.
- If the brakes of the machine to be towed are not functional (the engine cannot be started), a towbar should always be used!
- The towing vehicle or machine must always be at least as heavy as the machine to be towed and must have sufficient engine power and braking capacity to pull and brake both machines in any up or down hills.
- Do not tow further than absolutely necessary as otherwise the transmission may be damaged.
- When towing further than 10 km (6 miles) or when towing at a speed exceeding 10 km/h (6 mph), both the front and the rear propeller shafts must be removed, or, as an alternative, the machine must be transported on a trailer.

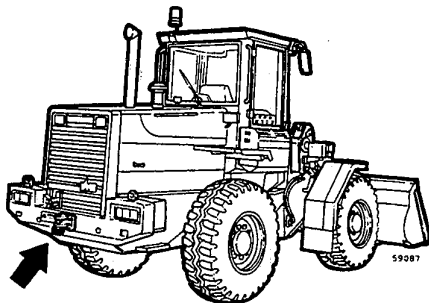
If a normally towed vehicle is to be towed, follow national regulations.

NOTE: It is not possible to start the engine by towing the machine.



### WARNING!

If the engine cannot be started:  
As the braking and steering functions will be limited in this situation, towing must only be done as an emergency, and over the shortest possible distance by trained personnel (see "Towing" above). If possible, transport the machine on a trailer.



When recovering / towing the maximum permissible values given on the plate apply (see also the Specifications).

### **Removing propeller shafts**

Place the machine in the service position!

- Block the wheels so that the machine cannot start rolling and then release all brakes.
- Raise the front or the rear wheels a few centimetres until they are just off the ground before the bolts for the propeller shaft flanges are removed.

### **After recovering/towing**

Before the towbar or wire rope is disconnected after towing/recovering, the following safety measures should be taken:

- Place the machine on level ground
- Apply the parking brake
- Block the wheels to stop the machine from rolling

## SAFETY RULES WHEN SERVICING

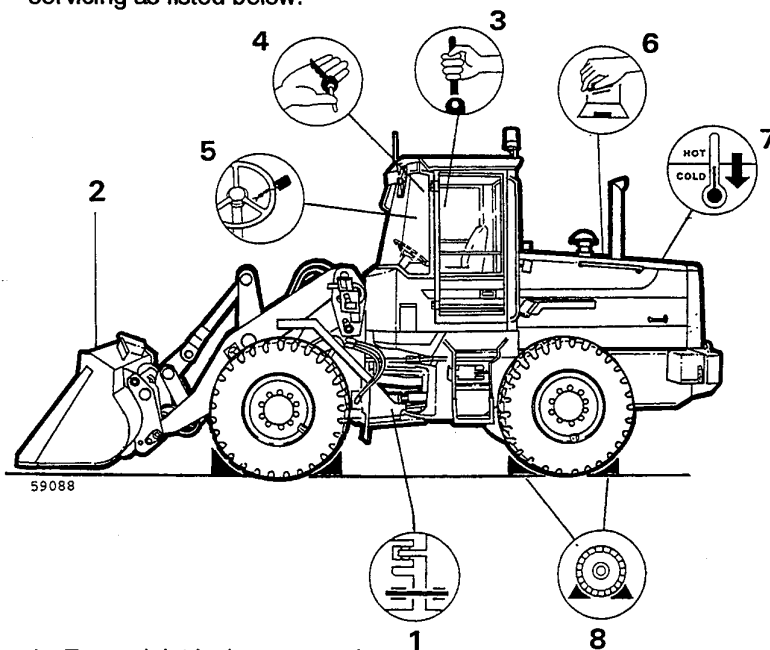
This section covers general safety rules when checking and servicing.

Further safety rules and warning texts are given within the respective sections.

### SERVICE POSITION

**BEFORE** you begin to work on the machine:

place the machine on a level surface and prepare it for servicing as listed below:



- 1 Frame joint lock connected.
- 2 Attachment resting on the ground.
- 3 Parking brake applied.
- 4 Engine stopped and ignition switch key removed.  
(Does not apply for checking oil level in transmission).
- 5 Yellow-black warning label (or red flag in the USA) attached to the steering wheel.
- 6 To avoid any risks, carefully and gradually unscrew any plugs in pressurised lines and vessels so that the pressure is released before removing any plugs.
- 7 Allow the machine to cool.
- 8 The wheels chocked in a suitable way (e.g. with wedges).

#### After completed service work:

Re-fit any guard plates which may have been removed and close and lock all engine covers.



### WARNING!

If work must be done on a warm machine, beware of hot fluids and components which can cause burns.

**NOTE:** When lifting the whole machine, the frame joint should be locked and the machine lifted at the eyelets intended for this purpose, see "General Operating Rules".  
When lifting with a jack, page 86.

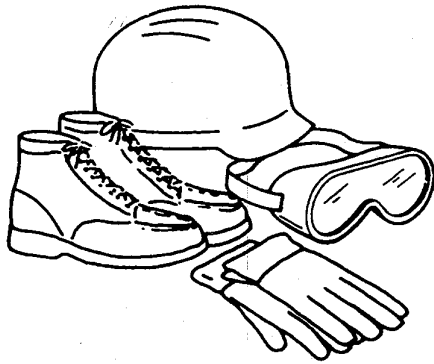




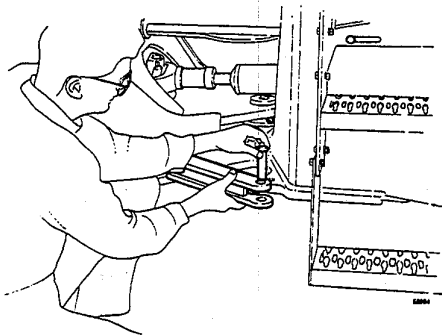
## SAFETY RULES WHEN SERVICING



- Read all plates and decals on the machine and in the manual before you start servicing the machine. Each of these contains important information about handling and servicing.
- No work must be carried out on the machine, unless you have the right knowledge and training to do so.
- Service which is not carried out in the correct way can be dangerous.  
Make sure that you have sufficient knowledge, the correct information, the correct tools and the right equipment in order to carry out the service in the correct way.  
Repair or change broken tools and faulty equipment.
- After topping up levels, checking or doing other service work, re-fit any guard plates, if removed, close and lock the engine covers.
- When emptying/draining oils or fuel, take necessary measures to avoid unnecessary spillage. In places where a vessel cannot be used for collecting the liquid – use a pump or connect a hose for safe handling. Oil released or spilled onto the ground will harm the environment and could also cause a fire.  
Waste oil/liquids should always be taken care of by a firm especially authorised to carry out such work.
- For safety reasons, always use a ladder when carrying out service work high up on the machine, e.g. changing headlight bulbs.
- Cleaning the outsides of the windows should be done in a safe way – either with a long-handled rubber scraper / brush or by working from a ladder.
- Work on installing a two-way radio, mobile telephone, lever steering or similar equipment should be done by a competent person.  
This is to eliminate interference with the electronic components essential for the functions of the machine.
- Do not wear loose-fitting clothing or jewellery when working on the machine.
- **Lap type seat belt**
  - If the seat belt needs to be washed: Use a mild soap solution when washing and allow the belt to dry while it is fully pulled out, before rolling it up. Make sure the belt is fitted in a correct way.
  - Change the belt immediately if it is worn, damaged or if the machine has been involved in an accident where the belt had to take some strain.
  - Changes to the belt or its mountings must never be made.
  - The seat belt is intended for only one grown up person.
  - Keep the belt rolled-up when not in use.
  - Change the belt every 3rd year regardless of its condition.



- Always wear a hard hat, safety glasses, gloves, protective shoes, approved respirator or dust mask and other protective articles called for by job conditions.

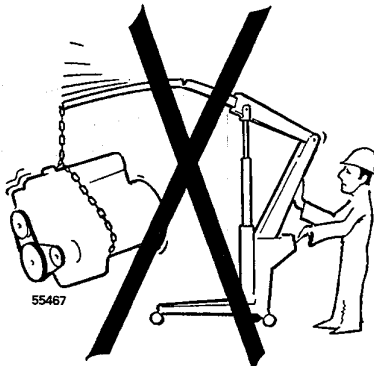


- When carrying out service work, the frame joint should always be locked.
  - Steer the machine so that it is straight and turn off the engine.
  - Take out the front or rear pin (depending on machine type) for the frame joint lock and swing the lock over to the intended locking position.
  - Insert and lock the pin.

- When working under raised lifting arms, the arms should be locked by mechanical means (lifting arm support) or the bucket tilted forward and resting on the ground to prevent the arms from lowering.

- Always stop the engine to service the machine, unless otherwise instructed on plates or in this manual.

- When changing oil in the engine, hydraulic system or transmission, remember that the oil may be hot and can cause burns.



- When lifting or supporting components, use equipment with a lifting capacity which is at least as great or more than the weight of the component.

- All lifting devices, e.g. strops, slings, ratchet blocks etc, must comply with national regulations for lifting devices. Volvo Wheel Loaders AB will not accept any responsibility if any lifting devices, tools or working methods are used other than those described in this publication.

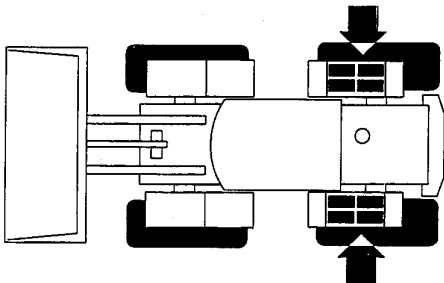
#### ■ LIFTING WITH A JACK

When using a jack, make sure the ground or floor is even and that it can take the expected load on the jack.

- Prevent the machine from rolling by applying the parking brake and by placing blocks on either side of wheels which are not to be raised off the ground.
- Always use a jack with a sufficient lifting capacity and when lifting, place the jack under the axle inside the wheel which is to be removed.

Make sure the jack is in the correct place and at the correct angle to the lifting point on the machine.

- Always place any supports in the safest possible way under the machine (axle) when the machine is in the raised position. Before a wheel is removed the load must be taken off the hydraulic jack and the axle lowered onto axle stands.



■ **ONLY STEP ON SURFACES PROVIDED WITH ANTI-SLIP PROTECTION**

Make sure that all service areas and hand holds are clean from oil, dirt or ice.

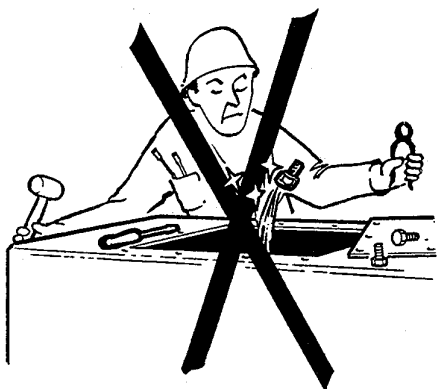
Avoid the risk of slipping by using the stepping areas provided with anti-slip protection.

Check at regular intervals that the anti-slip protections are properly secured.

When washing the machine using a high pressure jet, do not direct the jet directly at anti-slip material glued onto the machine, as this might cause the material to loosen.

Wipe off any oil spillage as this can also cause the anti-slip material to loosen.

The anti-slip surfaces should be replaced if they have become worn, have been painted over or worked loose.



- Stop the engine before opening engine covers or similar. Make sure that no tools or other objects which can cause damage are left in the machine.

- Release the pressure in the hydraulic system gradually before starting work. When connecting hydraulic hoses, check that the desired effect has been achieved, that is, check that the hydraulic function operates in the expected way.

- All pressurised vessels, components and systems must have the pressure released by being opened carefully, or by being operated in the instructed way, until the pressure has been drained.

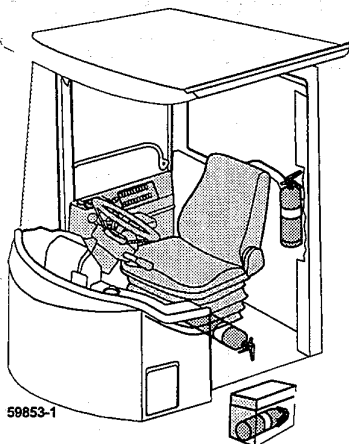
- Hoses and pipes which are not fitted with quick-action couplings may be pressurised even if the machine is stationary and the engine turned off. Therefore, only trained personnel may disconnect hoses and pipes.

- When looking for leaks, use a piece of paper or wood, not your hand.

- Never set a pressure-limiting valve to a higher pressure than that recommended by the manufacturer.

- Before starting the engine indoors, make sure that the ventilation is sufficient to cope with the exhaust gases.

- Do not stand in front of or behind the machine while the engine is running.

**FIRE PREVENTION MEASURES**

- There is always a risk of fire. Find out which type of fire extinguisher to use, where it is kept and how to use it. The fire extinguisher should be positioned in either of the indicated places (A) or externally in a box which can be locked.

At the slightest sign of fire, and if time allows, take the following steps:

- Move the machine away from the danger area.
- Lower the lifting arms to the ground.
- Stop the engine by turning the ignition switch key to the "O" position.
- Leave the cab.
- Turn off the battery disconnect switch.
- Start putting out the fire and notify the fire brigade if necessary.

If the machine is equipped with a fire extinguisher, it ought to be of the ABE type.

The designation ABE means that it can be used for fires in burning solid or liquid carbonaceous material and that the active compound in the extinguisher does not conduct electricity.

The effectiveness grade I means that the time the extinguisher is effective must not be less than 8 seconds, grade II at least 11 seconds and grade III at least 15 seconds.

A hand-held fire extinguisher ABE I normally corresponds to a powder content of 4 kg (8.8 lb) (EN-grade 13A89BC), see Swedish standard SS 1192-6:1985 (edition 6), and European standard EN 3-1995, part 1, 2, 4 and 5.

**WARNING!**

If the machine is operated in an environment where there is a great risk of fire for example explosive environment, special equipment will be required and in some cases certified equipment – talk to your dealer.



- It is forbidden to smoke or have an open flame near a machine when filling with fuel or when the fuel system has been opened.
- Diesel fuel oil is flammable and should not be used for cleaning, instead use an approved solvent.
- Remember that certain solvents can cause skin rashes and are usually flammable. Avoid inhaling solvent vapour.
- Store flammable starting aids in a cool, well ventilated location. Remember that such aids (starting gas) must not be used in connection with electric preheating of the induction air.



- Keep the work place clean. Oil or water on the floor makes it slippery and also dangerous in connection with electrical equipment or electrically powered tools. Oily or greasy clothes are a serious fire hazard.

- Check daily that the machine and equipment, e.g. underbody plates are free from dirt and oil. In this way the risk of fire is reduced and it is easier to detect faulty or loose components.

NOTE: If a high-pressure jet is used for cleaning, take great care as the insulation of electric leads can be damaged even at a moderately high pressure and temperature. Protect electrical leads in an appropriate way.

- Keep the machine extra clean when operating in a fire sensitive environment, i.e. saw mills, rubbish dumps or similar.  
To reduce the accumulation of easily combustible material, when operating in such environments, the machine should be equipped with, for example, a silencer guard and a high-capacity cyclone precleaner etc.

- Any fire fighting equipment installed on the machine should be maintained in working order. Such extra equipment should be considered an addition to the measures the operator can take in case of fire. The equipment should not be considered as a replacement of the operator's own fire fighting efforts.

- Check that the electric leads have not been damaged by chafing and that they cannot be damaged in any way. This applies particularly to unfused leads which are red and marked R (B+).

For example leads between:

- Batteries
- Battery and starter motor
- Alternator and starter motor
- Lead to induction-air preheating element

- When unfused leads have been disconnected, it is important to check that they are connected and clamped in such a way that they cannot be exposed to chafing. Unfused leads must not lie against oil or fuel hoses.



- When fitting optional equipment, make sure that all leads (circuits) are connected across a fuse and routed and clamped in such a way that there is no risk of chafing.
  
- Check that there is no damage to fuel lines, hydraulic and brake hoses caused by chafing.
  
- Welding and grinding may only be carried out on the machine when it is placed in a clean area and not in places which contain combustible liquids such as fuel tanks, hydraulic pipes or similar.  
Take extra care when welding and grinding near flammable objects.  
A fire extinguisher should be kept near to hand.  
Make sure the area is well ventilated and always use an approved respirator when welding.

#### WASTE HAZARDOUS TO THE ENVIRONMENT

- Components such as batteries, plastic objects and others which may constitute an environmental danger, should not just be thrown away, but taken care of in a correct way in order to protect the environment.

#### OPERATING IN CONTAMINATED AREA

- When operating the machine in an area which is contaminated or dangerous to one's health, the machine must be especially equipped for this purpose.  
In addition to this special safety rules apply to such operations and when servicing such a machine.

### **WORKING WITH PAINTED SURFACES**

When welding, grinding and gas cutting, the paint must first be removed up to a distance of at least 10 cm (4 in) from the point of welding or cutting.

Paint, which is heated, gives off harmful gases.

All paint decomposes when heated and forms a great number of new and different substances which can cause irritation and be very harmful to a person's health at long or frequent exposure.

In addition to the health danger, the welding joint will be of substandard quality which, in the future, could cause a break of the weld.

Therefore never weld directly on a painted surface.

#### **The following safety precautions must be taken:**

- Remove the paint from around the point where work is to be carried out by sand-blasting (use an approved respirator). If the area cannot be blasted, the paint must be removed in another way, e.g. by using a paint stripper.  
NOTE: If a paint stripper is used, a portable air extractor must be applied and an approved respirator and protective gloves used.
- A grinder with a high-speed disc also heats up the paint and must therefore only be used if a portable air extractor is fitted to the grinder (wear an approved respirator).

### **RUBBER AND PLASTICS**

(polymer materials) can, when heated, give off gases which are dangerous to health and environment.

Because of this never weld close to rubber or plastic parts.

#### **The following precautions must be taken:**

- Do not weld or cut close to polymer materials (plastics or rubber) without having first protected them from the heat.
- Never burn polymer materials when discarding them.
- Take care when handling machines which have been subjected to fire or other extreme heat.
- Always use protective gloves, goggles and an approved respirator.

**Fluor rubber**

Certain seals which have to withstand high operating temperatures (e.g. in engines, transmissions, axles, hydraulic motors and pumps) may be made from fluor rubber, which, when exposed to strong heat (fire), forms hydrogen fluoride and hydrofluoric acid. This acid is very corrosive and cannot be rinsed or washed away from the skin. It causes very severe burns which take a long time to heal.

It usually means that damaged tissue must be surgically removed. It may take some time (several hours) after having come into contact with the acid before any symptoms show. Consequently one does not receive an immediate warning. The acid may remain on the machine parts for a very long time (several years) after a fire.

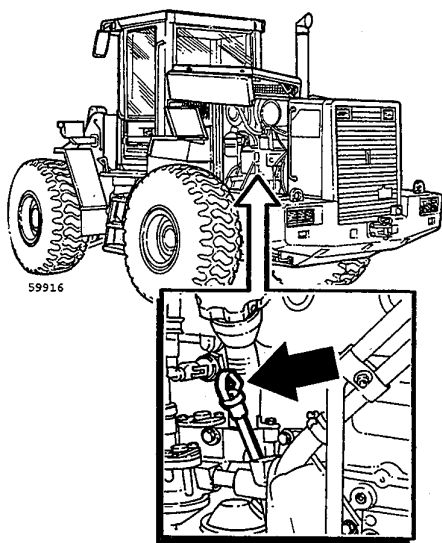
**If swelling, redness or a stinging feeling appears and one suspects that the cause may be contact with heated fluor rubber, contact a medical doctor immediately. If a machine, or part of a machine, has been exposed to fire or severe heat, it should be handled by specially trained personnel. In all handling of machines after a fire, thick rubber gloves and effective goggles must be used.**

The area around the part which has been exposed to extreme heat and which one suspects may be made of or contain fluor rubber, should be sanitised by thorough and ample washing with lime water (a solution or suspension in water of calcium hydroxide, i.e. slaked lime). After the work has been completed, the gloves should be washed in lime water and then discarded.

**Discarded items**

Never burn painted components or parts made from plastics or rubber after they have been discarded. Such parts should be taken care of by an approved refuse handling plant.





Oil dipstick

## BASIC PREVENTIVE MAINTENANCE

### ENGINE

#### Checking oil level

Check the oil level daily.

- When checking the oil level the machine should stand on level ground.
- Check the oil in the morning when it is cold and has had time to run down to the bottom of the sump.

The level should be in between the marks on the dipstick.

#### Changing engine oil



#### WARNING!

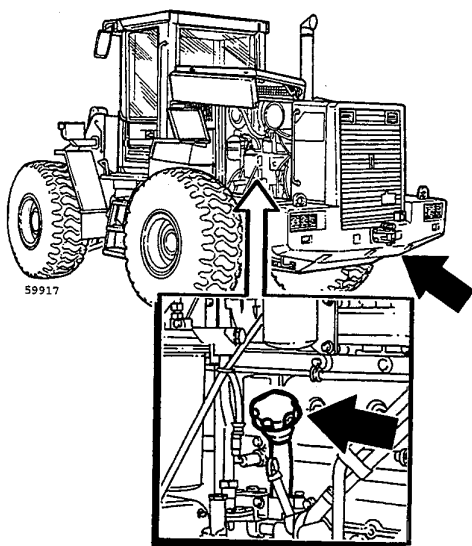
Take care when changing oil, hot oil can cause severe burns to unprotected skin.

Change oil every 250 hours.

NOTE: The conditions for changing oil at intervals of 250 hours are that:

- The oil filter(s) is (are) changed at every oil change.
- The oil filters are genuine Volvo filters.
- The diesel fuel sulphur content does not exceed 0.5 % by weight.
- That the oil is of the API grade Service CD.
- The correct oil viscosity for the ambient air temperature is used according to the diagram in "Recommended Lubricants".

If any of these conditions cannot be met, or if the machine is operating under acid or particularly dusty conditions, the oil should be changed every 125 hours.



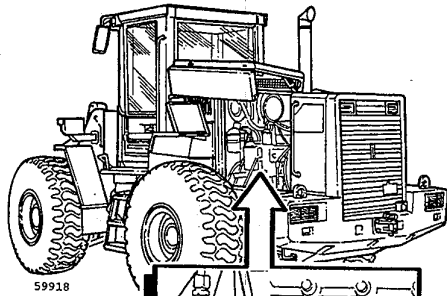
Drain plug and filler pipe for engine oil

#### Changing oil:

- Drain the oil while the engine is still warm.
- Fill with oil through the filler pipe.

Oil capacity including filter(s), approx. 16 litres (4.2 US gal). See "Recommended Lubricants" for oil quality grades.

Take care of waste oil and liquids in an environmentally safe way!



Engine oil filters



### Changing oil filters

Change the lubricating oil filters every time the oil is changed, i.e. **every 250 hours**.

The lubricating oil filters are of the disposable type, i.e. they cannot be cleaned, but should be changed as a whole unit.

**When removing the filters:** Use filter pliers.

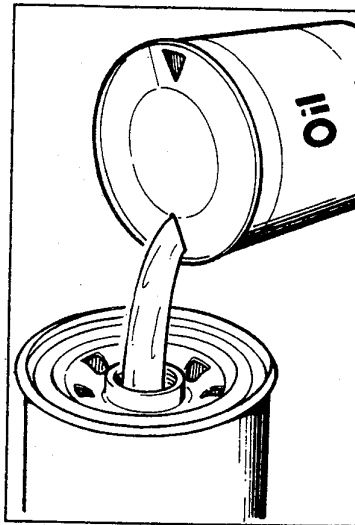
**When fitting:** Fill the filters with oil, apply oil to the gasket and screw on the filters until the gasket just touches the sealing surface.

– Then tighten a further half a turn by hand.

Start the engine and check that the gaskets seal. If they do not, remove the filters and check the sealing surface. Usually it does not help to tighten further.

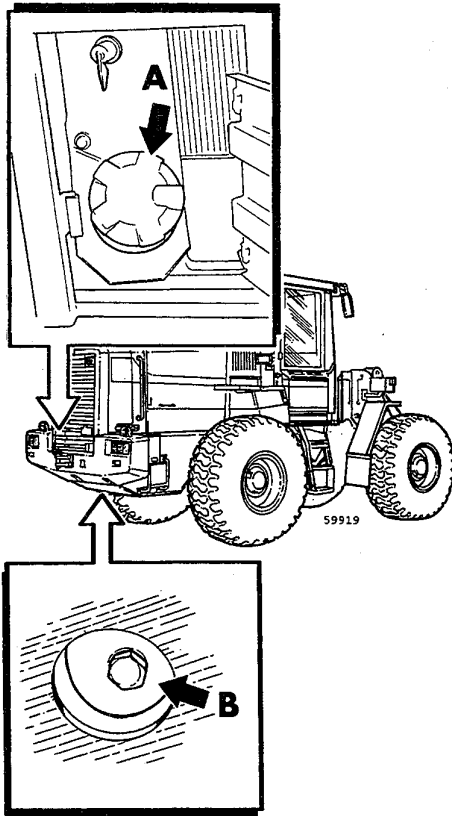
#### NOTE:

**After changing oil filters, the engine must be run at low idling for at least one minute to ensure satisfactory lubrication of the engine before the machine is operated.**



#### Important!

**It is important that the filters are filled with oil before they are fitted. This is to ensure that the engine receives lubricating oil right from the start.**



Fuel tank  
 A Filler pipe  
 B Plug for draining sludge

## FUEL SYSTEM

### Fuel tank

Clean fuel is essential for trouble-free running of the diesel engine.

Carefully clean around the filler cap before removing it. Avoid spilling fuel when filling as this attracts dirt. During the cold season keep the fuel tank full to prevent water condensing in the tank.

The fuel tank holds 210 litres (55 US gal).  
 For fuel quality, see "Recommended lubricants".

When required, remove the plug at the bottom of the fuel tank and drain off any sludge.

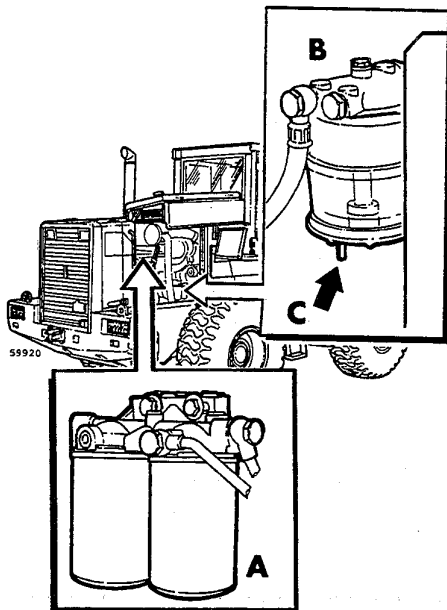
### Fuel filters

**Change fuel filters every 1000 hours.**

When fitting the filters, they should only be tightened by hand. The filter inserts should be changed by service personnel from an authorised dealer workshop.

### Additional fuel filters

If the machine is provided with additional fuel filters, these should be changed every 1000 hours.



A Fuel filters  
 B Water trap  
 C Drain plug, water trap

### Checking and cleaning water trap

Check the water trap **every 100 hours or more often when necessary**. See figure.

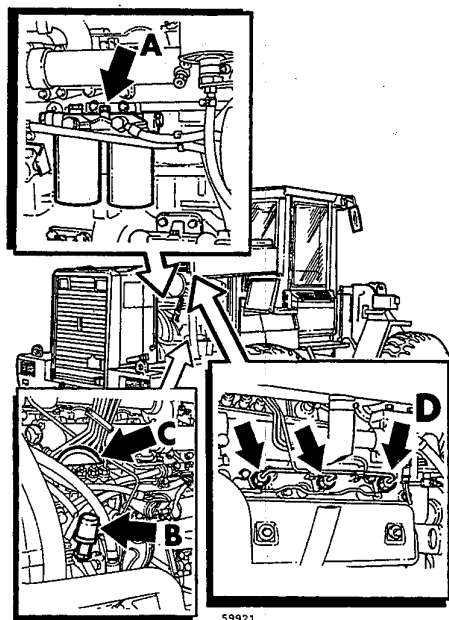
#### Draining:

- Unscrew draining plug (C) at the bottom and drain off sludge and condensation water.
- Clean when necessary.

#### Cleaning:

- Remove the water trap (B).
- Clean, fit and bleed the fuel system from air.

**Take care of waste oil and liquids in an environmentally safe way!**



- A Air bleeder screw, fuel filter head
- B Hand pump (feed pump)
- C Pressure equalizer
- D Delivery pipe

### Bleeding fuel system

If the tank has been run empty or if air has entered the fuel system in any other way, it must be bled.

**Under no circumstances may attempts be made to start the engine before the system has been bled, otherwise the fuel injection pump may be severely damaged.**

### Proceed as follows:

- Slacken bleeder screw (A) on the fuel filter head.
- Pump with hand pump (B) until fuel, free of air, flows out. Tighten the bleeder screw.
- Slightly slacken pressure equalizer (C) on the back of the fuel injection pump and repeat the hand priming as described above. Check that the sealing washer for the pressure equalizer is in the correct position and tighten the pressure equalizer.
- Slacken delivery pipes (D) at the injectors and prime with the hand pump until fuel, free from air, squirts out. Tighten the delivery pipe unions.

The engine is now ready to be started.

**Check after starting that there are no leaks.**

### Turbocharger

#### Important!

- Never race the engine immediately after it has been started.
- Run the engine at low idling a couple of minutes before stopping the engine, to safeguard lubrication and cooling of the turbocharger.

The turbocharger is lubricated and cooled through the engine lubricating system.

An essential condition for trouble-free service from the turbocharger is that the engine oil and the lubricating oil filter is changed at the prescribed intervals.

Maintenance of the air cleaner is also important and the tightness of the exhaust system and the lubrication lines.

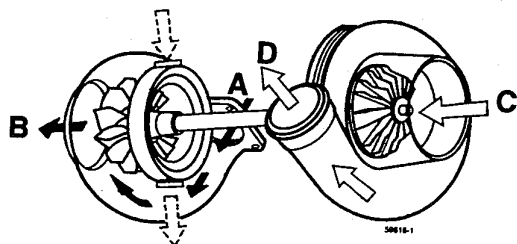
**CAUTION! Never race the engine directly after starting, and allow the engine to run at low idling speed for a few minutes before stopping it.**

**This is to ensure the lubrication and cooling of the turbocharger.**

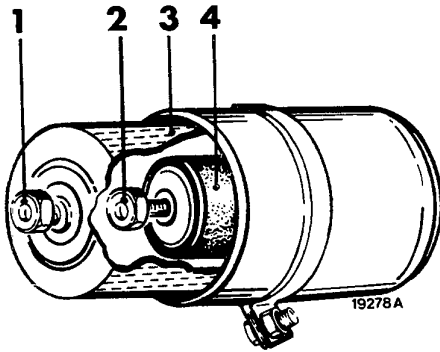
If any jarring noises can be heard, or if the turbocharger vibrates, it must be reconditioned or changed immediately.

**Only authorised workshops may carry out work on the turbocharger.**

Air      Oil      Exhaust



- A Exhaust inlet
- B To exhaust system
- C Air inlet
- D Compressed air



Air cleaner

- 1 Nut for primary filter
- 2 Nut for secondary filter
- 3 Primary filter
- 4 Secondary filter

## ENGINE AIR CLEANER

The air cleaner prevents dust and other impurities from entering the engine. The degree of engine wear depends largely on the cleanliness of the induction air, therefore it is very important that the air cleaner should be checked regularly and maintained correctly.

### Maintenance of primary filter

When the control lamp lights or every 1000 hours, the filter must be changed or cleaned. If the lamp still lights, the secondary filter must also be changed.

NOTE: The secondary filter must not be cleaned, see next page.

NOTE: As the length of time between filter changes depends entirely on the operating environment of the machine, it may sometimes be necessary to change the filter more often.

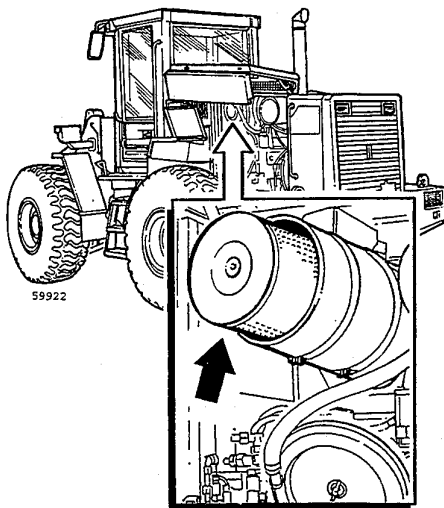


Control lamp, air cleaner

The filter can be cleaned according to instructions which your authorised dealer will give you.

However, after the filter has been cleaned five times or if it is damaged, it must be changed.

NOTE: Make a mark on the decal at the end of the secondary filter every time the primary filter is changed or cleaned.



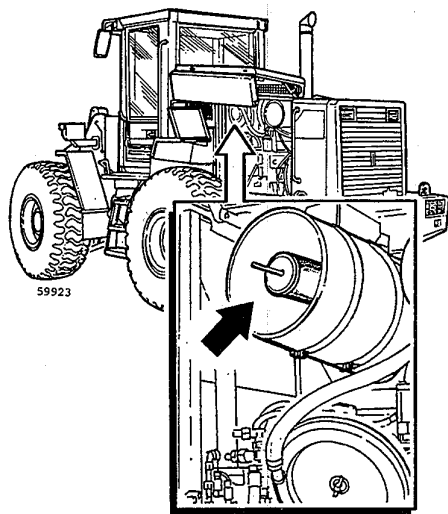
Primary filter

### Changing filter

In connection with changing the filter, the cover for the air cleaner should also be cleaned as this works as a container for particles which have not been trapped in the primary filter.

**On no account must the engine be run without a filter or with a damaged one.** Check that all hoses and pipe connections from the air cleaner to the engine induction manifold are tight. Check-tighten hose clips.

**Always have a spare filter handy and keep it well protected from dirt.**



Secondary filter

### Secondary filter

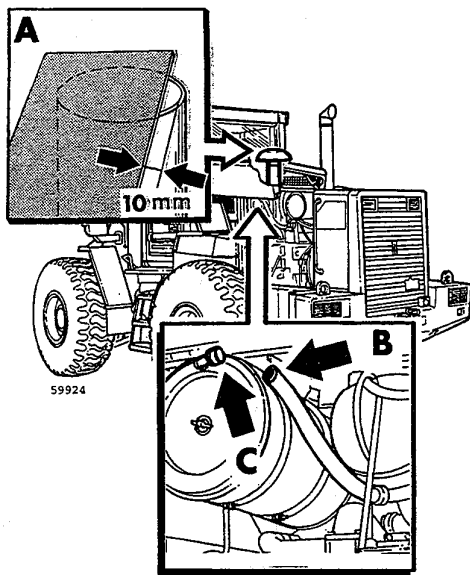
The secondary filter works as a protective filter if the primary filter should be damaged.

If the control lamp comes on, in spite of the fact that the primary filter has been changed or cleaned, this indicates that the secondary filter is blocked.

The secondary filter must always be changed, **never** cleaned.

**Also change the secondary filter when the primary filter has been changed three times or at least every 2000 hours.**

**Never remove the secondary filter unless it is to be changed.**



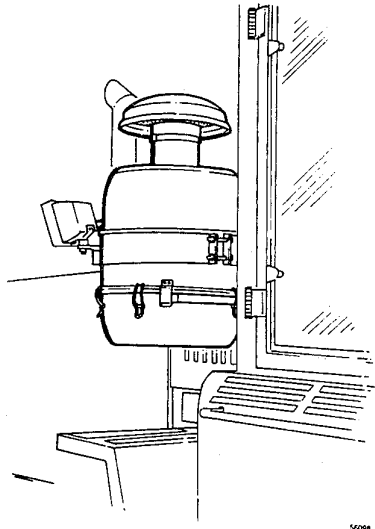
### Checking function of filter indicator

Check **every 1000 hours** that the filter indicator works as it should.

- Run the engine at low idling.
- Disconnect the air cleaner ejector hose (B) and plug opening (C).
- Remove the air intake cap (A) and cover the air intake with a stiff piece of cardboard.
- Leave an air slot of approx. 10 mm (0.4 in).
- Increase the engine speed gradually. The control lamp should light up just before the engine reaches approx. 16 r/s (1000 rpm).

Listen and feel for any air leakage.

- A Cap
- B Ejector hose
- C Plug



Oil-bath precleaner

### OIL-BATH TYPE PRECLEANER

For machines working under especially dusty conditions, we recommend the fitting of an oil-bath type precleaner in series with the existing standard dry-filter air cleaner. This will provide further safety against damage to the engine.

**The particle-retaining ability of the oil-bath cleaner is between 90 and 95%, which in practice, means that the standard dry-filter air cleaner will act as a secondary filter, with a change interval that is twice as long, that is 2000 hours.**

### Service of oil-bath precleaner

**Check the oil in the bowl daily.**

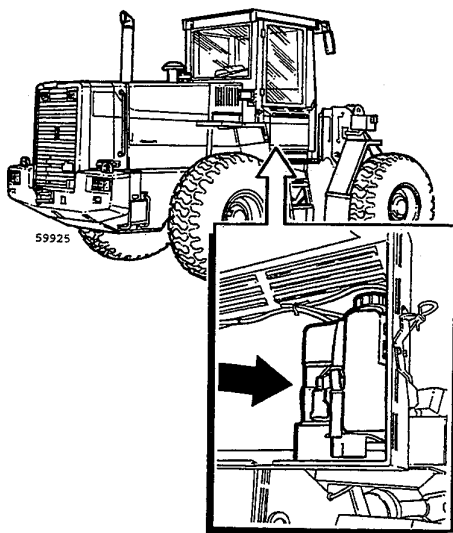
If the oil has become dirty and thick, or if there are sludge deposits on the underside of the steel mesh filter insert, the oil should be changed and the bowl and the lower steel mesh filter insert washed in clean diesel fuel.

Fill up the bowl with oil of the same viscosity as that in the engine. The oil should reach up to the "Normalölstand" mark, but not higher.

If there are any sludge-covered or dry spots on the lower steel mesh filter insert, also the upper filter insert should be removed and rinsed in diesel fuel.

Avoid using petrol (gasoline) for cleaning, as any remaining petrol can cause the engine to surge when it is started later.

**Clean the steel mesh filter inserts every 2000 hours.**



Washer reservoir, front and rear windows

### WASHER FLUID RESERVOIR, FRONT AND REAR WINDOWS

The washer fluid reservoir for the front and rear windows is fitted on the inside of the side cover (cab ventilation filter cover) on the right-hand side of the machine.

During the cold season make sure that there is sufficient washer fluid anti-freeze mixed into the water.

Top up when necessary.

## COOLING SYSTEM

The following measures must be carried out regularly to ensure that the cooling system operates without problems.

- Check coolant level.
- Check fan belt tension.
- Blow the radiator clean.

### Coolant with anti-freeze including anti-corrosion additives

#### Anti-freeze

When delivered from the factory, the cooling system is normally filled with mains water mixed with Volvo concentrated anti-freeze. This coolant mixture lowers the freezing point down to  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ ). If there is a risk that the ambient temperature will drop below this temperature, more anti-freeze should be added, see below.

#### Anti-corrosion additives

To protect the engine from corrosion and the radiator from clogging up, the concentrated anti-freeze contains active anti-corrosion additives. These additives have a limited durability, therefore the coolant must be changed **once a year or every 2000 hours**.

**NOTE:** Do not mix different makes of anti-freeze or additives as this can have a negative effect.

The anti-freeze content must not be less than 40 %.  
The capacity of the cooling system is approx. 53 litres (14 US gal).

40% (21.0 litres = 5.5 US gal)  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ )

50% (26.5 litres = 7.0 US gal)  $-37^{\circ}\text{C}$  ( $-35^{\circ}\text{F}$ )

### Coolant with only anti-corrosion additives

Coolant containing only anti-corrosion additives and mains water.

If the climate is such that anti-freeze is not required, the use of Volvo corrosion additives only is recommended.

- Mix approx. 3 litre (0.8 US gal) of anti-corrosion additive to 53 litres (14 US gal) of water.

The anti-corrosion protection should be **topped up every 400 running hours by adding 0.5 litre (1 pint) of anti-corrosion additives**. See "Recommended lubricants".

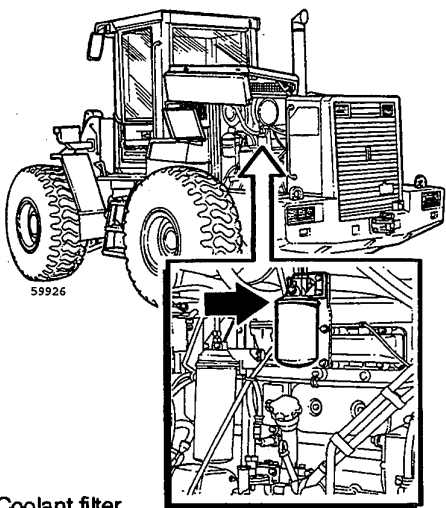
**NOTE:** Do not add any other make than Volvo anti-corrosion additives to the coolant.

## COOLANT FILTER

Machines fitted with a coolant filter are better protected against corrosion, therefore, **the coolant only needs to be changed every 3000 hours or every second year**.

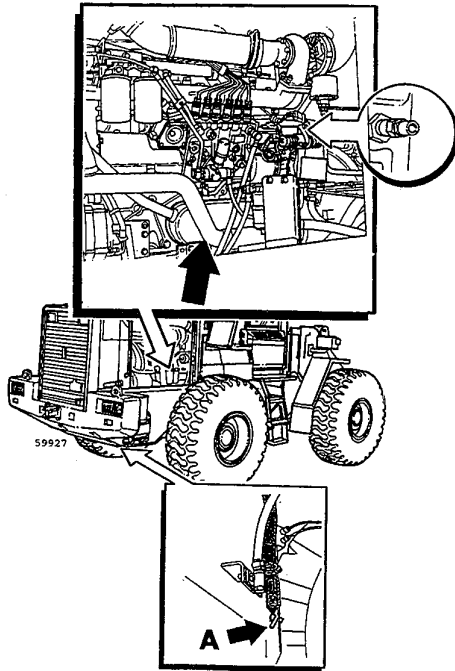
**The filter should be changed every 1000 hours.**

The filter cannot be cleaned, instead the whole unit must be changed.



Coolant filter





Draining coolant

### Checking coolant

#### Check the coolant level daily

The level should be at the MAX mark on the header tank.  
If necessary top up.

### Draining coolant



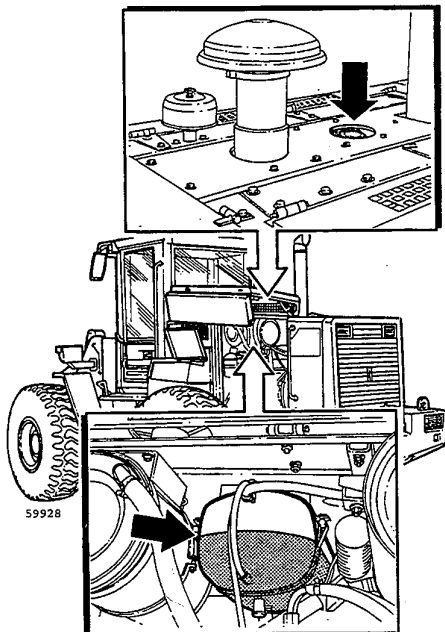
#### WARNING!

There is a risk of scalding when the header tank cap or radiator cap is removed because of the pressure in a hot cooling system.

- 1 Push in clamp (A) on the draining nipple so that the coolant flows out.
- 2 Open the draining valve on the cylinder block.
- 3 Remove the plug from the oil cooler

The header tank cap should be removed when draining the system.

Take care of waste oil and liquids in an environmentally safe way!



Filling and checking coolant

### Filling coolant in empty system

The most suitable place to stand when filling coolant is on the battery box.

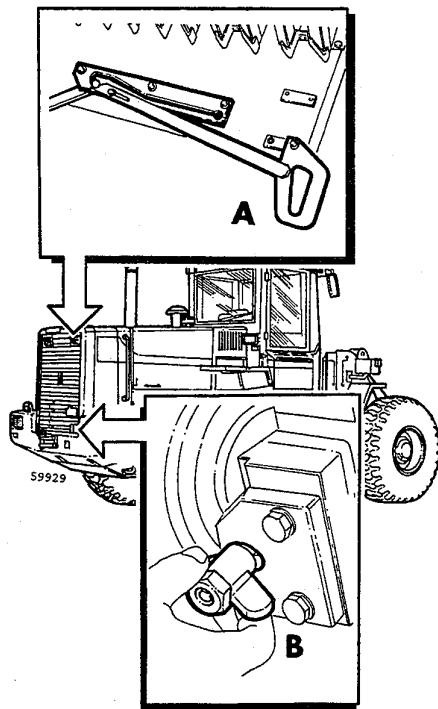
Fill with coolant through the header tank, see figure.

- The engine should not be running and the cab heater control set to warm.
- Fill with coolant to the MAX level in the header tank. Run the engine until it is warm and top up the coolant level until all air has been removed from the system.
- The level should be checked after the engine has been run warm and then allowed to cool.

NOTE: The system can also be filled through the draining nipple.

#### NOTE:

- Never fill a hot engine with cold coolant, as this may cause the cylinder block or the cylinder head to crack.
- If the coolant is not changed, the cooling system may clog up which can lead to the engine seizing.



Cleaning radiator  
A Locking handle  
B Lock nut

## CLEANING RADIATOR



### WARNING!

The engine must not be running when cleaning the radiator – rotating fan.

The radiator should be cleaned when necessary in order to safeguard the cooling of the engine. When operating under especially dusty conditions, the radiator should be checked daily.

#### Proceed as follows:

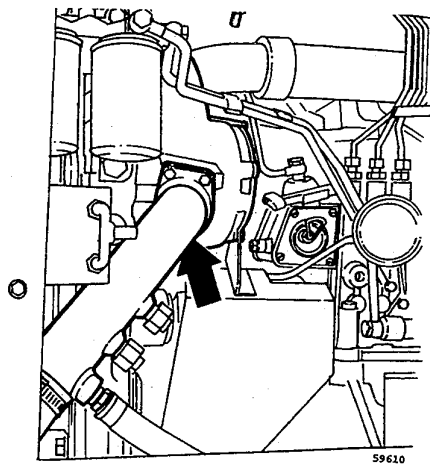
- Release the radiator cowl, lift it up and lock it in the open position.
- Unscrew locknut (B) and swing out the radiator 60°.
- Blow the radiator clean with compressed air.  
**NOTE: The radiator core can be easily damaged if not handled carefully.**
- When swinging the radiator back, make sure that the radiator hoses do not become pinched.
- The locking handle (A) should be lowered forward upward before it is possible to close the radiator cowl.

**NOTE:** Blow the hydraulic oil cooler clean at the same time.

## Checking coolant pump draining

Check **every 250 hours** that the draining hole for the coolant pump is not blocked. Clean the hole under the pump with a thin screwdriver or similar.

**NOTE:** When operating under especially dusty conditions, the check should be made more often.



Draining, coolant pump

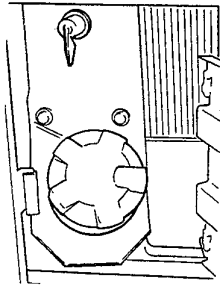
## Fan belt tension

Check the fan belt tension **every 250 hours**.

The two fan belts are self-adjusting.

The belts can be changed after the tension of the tensioning pulley has been released.

**NOTE:** Always change both belts at the same time.



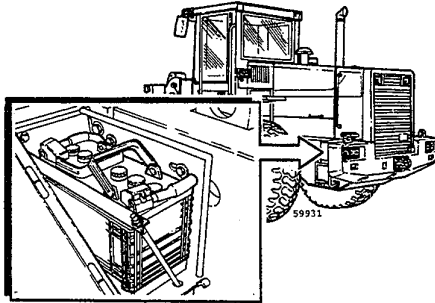
Battery disconnect switch

## ELECTRICAL SYSTEM

Check the travelling lights and control lamps daily.

### Battery disconnect switch

The battery disconnect switch is fitted on the rear left part of the machine (above the fuel filler). When the machine is left unattended, the battery disconnect switch should be turned off.



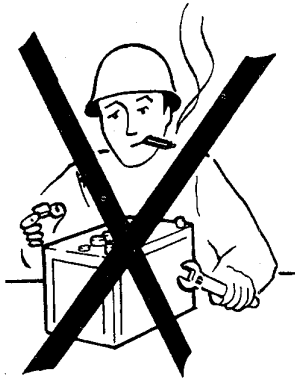
## BATTERIES

The batteries are connected in series and located in the battery box on the left side of the machine.

**Check once a week, more often at temperatures above +15 °C (+59 °F), that the level of the electrolyte stands approx. 10 mm (3/8 in) above the cell plates.**

If necessary top up with distilled water. Check that the cable terminals and pole studs are clean, well tightened and coated with petroleum jelly or similar.

The state of charge of the batteries is checked with a hydrometer. When there is a risk of frost, it is very important that the batteries do not become discharged as the electrolyte in a discharged battery is more likely to freeze and so destroy the battery.

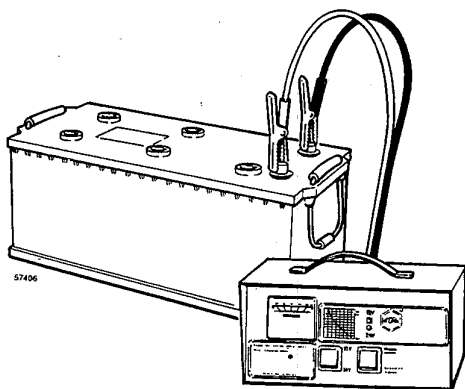


## A FEW SIMPLE RULES ABOUT BATTERIES

- Batteries give off explosive gases. Never smoke near batteries.
- The electrolyte is corrosive.
- Begin by disconnecting the earth lead when removing a battery. To reduce the risk of sparks which can cause fire, always connect the earth lead last when fitting a battery.
- Never tilt a battery in any direction, otherwise the battery electrolyte may leak out.
- When charging batteries, follow the instructions on the next page.
- When using a booster battery to aid starting the engine, follow the instructions on the next page.
- Do not connect a discharged battery in series with a fully charged one, otherwise the current surge can cause the batteries to explode.
- Make sure that metal objects (such as tools, rings, watch straps etc.) do not come into contact with battery terminals. The battery terminals should be provided with insulating caps. There is a risk of injury and fire.

**Batteries contain substances dangerous to health and the environment. They must therefore be disposed of according to local and national regulations.**

## CHARGING BATTERIES



### WARNING!

When a battery is being charged an explosive mixture of oxygen and hydrogen is formed. A short circuit, an open flame or a spark in the neighbourhood of the battery can cause a powerful explosion. Always turn off the charging current before disconnecting the charging clamps. Ventilate well, particularly if the battery is being charged in a confined space.

The battery electrolyte includes corrosive sulphuric acid. Any electrolyte that is spilled on the skin should be removed immediately. Wash with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive part of the body, rinse off immediately with plenty of water and contact a doctor immediately.

## STARTING WITH BOOSTER BATTERIES



### WARNING!

Due to current surge, batteries can explode causing injury, if a fully charged battery is connected to a completely discharged one.

When starting with booster batteries, the following should be noted:

- The gear selector control should be in neutral.
- The parking brake should be applied.
- Only the ignition key may be used for starting.

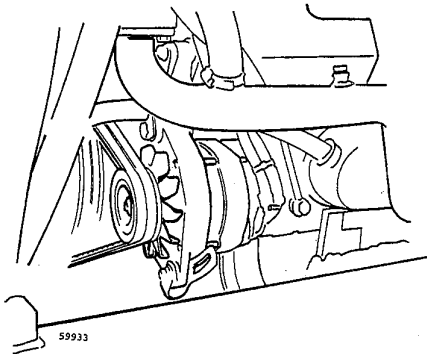
Check that the booster batteries or any other power source has the same voltage as the standard batteries.

### What to do:

- Never disconnect the cables to the standard batteries!
- Connect the (+) of the booster battery to the (+) on the starter motor. Then connect the other jump lead from the (-) on the booster battery to the frame of the machine, for example the starter motor attaching bolt or the frame member close to the starter motor.
- Start the engine with the ignition key in the cab.
- When the engine has started, first disconnect the jump lead between the machine frame and the negative (-) terminal of the booster battery. Then remove the jump lead between the positive (+) terminals.
- Re-fit the insulating caps on the battery terminals.

**ALTERNATOR**

Check the belt tension every 250 hours.

**WARNING!**

The engine must be turned off when checking the tension of the alternator belts.

**Adjusting alternator belts:**

- Slacken the nuts.
- Move the alternator outward until correct belt tension has been obtained. (Do not bend against the aluminium cover on the alternator).
- At correct tension it should be possible to deflect the belt approx. 15 mm (0.6 in), using a fairly hard pressure.

The alternator installation is sensitive to faulty connection, therefore always follow the instructions below:

**Disconnection**

Battery and alternator cables must not be disconnected while the engine is running. This can damage the alternator. Disconnect and insulate the battery cables before carrying out any work on the alternator equipment.

**Battery connections**

The battery terminals must never be confused with each other. Each terminal is clearly marked with a (+) or (-) respectively. If the cables are wrongly connected, the alternator rectifier is ruined immediately. When disconnecting batteries break the circuit using the battery disconnect switch.

**Electric welding**

Before electric welding is carried out on the machine or attachment fitted or connected to the machine, the electrical circuit on the machine must be switched off using the battery disconnect switch.

**Connect the welding equipment earth lead as close to the welding point as possible.**

See also under "Safety rules when servicing".

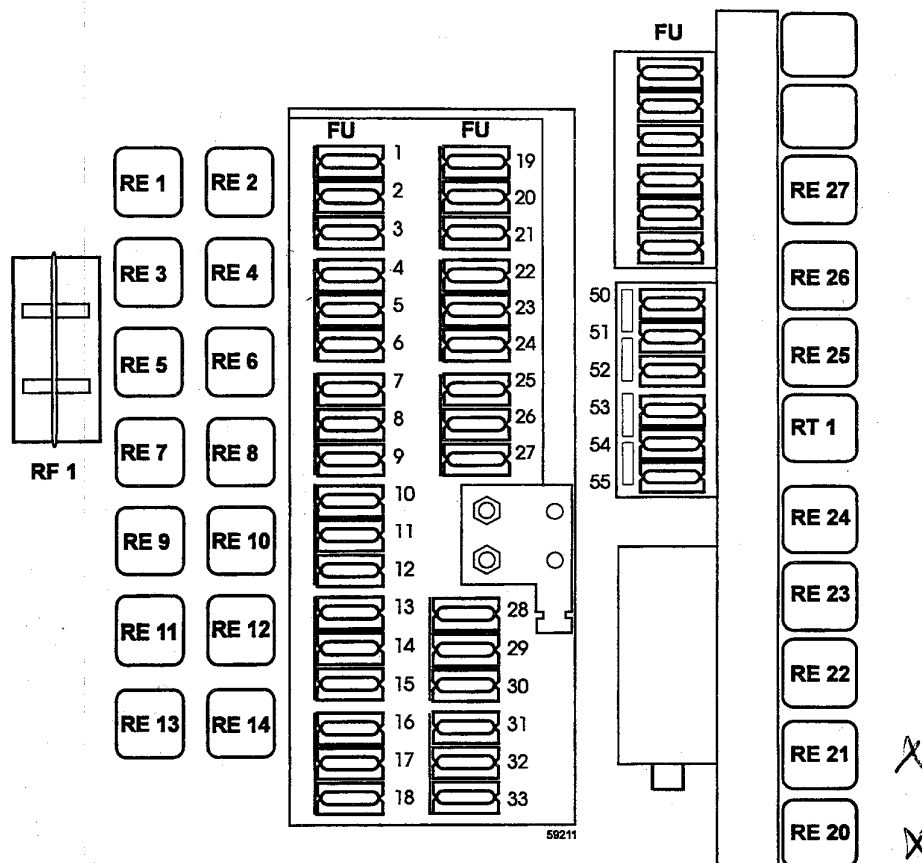
# 106 Electrical system

## RELAYS AND FUSES

Relays and fuses are fitted in the electrical distribution box behind the operator's seat. They are accessible after the door to the distribution box is opened or the back has been removed. On the inside of the door there is a decal showing which appliance is connected to the respective relays and fuses.

NOTE: Never fit a fuse with a higher rating than that given on the decal (there is a risk of damage or fire on the circuit board).

If any of the relays listed below (RE 1 – RE 14) should develop a fault, it can be replaced temporarily by another relay from a less important function.



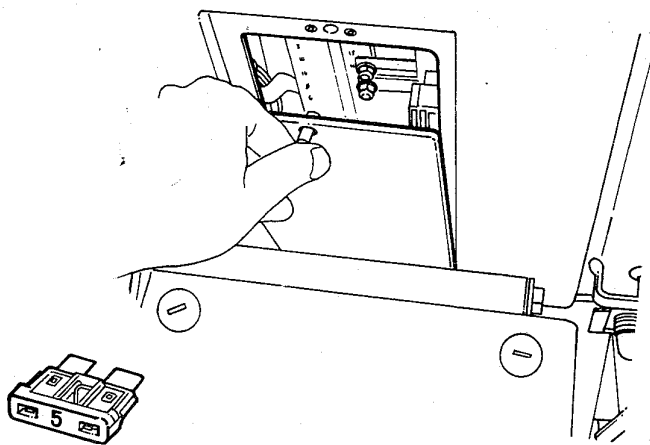
### Relays

RE 1	Bucket positioner	Separate sockets in distribution box	
RE 2	Boom kick-out	RE 20	Dual command (alternative forw./rev.)
RE 3-4	Unloading ignition switch	RE 21	Dual command (alternative forw./rev.)
RE 5	Working lights front, extra	RE 22	Boom Suspension System
RE 6	Secondary steering	RE 23	Air-suspended seat
RE 7	Engine power reduction	RE 25	Loud-tone horn
RE 8	Unassigned	RE 27	Transmission filter indication
		RE 28	Parking brake
RE 9	Reversing alarm	In arm rest	
RE 10	Intermittent wiper	RE 30	Lever steering (CDC)
RE 11	Delayed disengagement of speed gears when changing travelling direction	RE 31	Lever steering (CDC)
RE 12	Preheating	RE 40	Preheating engine (at heating element)
RE 13	Starter interlock	RE 41	Secondary steering (positioned by secondary steering pump)
RE 14	Unloading ignition switch/starter motor	Separate circuit board in distribution box	
		RE 44-47	AC, safety
		RE 48	AC, compressor
		RE 49	AC, unassigned
		RF 1	Flasher relay, direction ind. and hazard flashers

**WARNING!**

Never fit a fuse with a higher rating than that given on the decal on the inside of the cover door. There is a risk of fire on the circuit board.

Cover door, fuses

**Fuses (FU)**

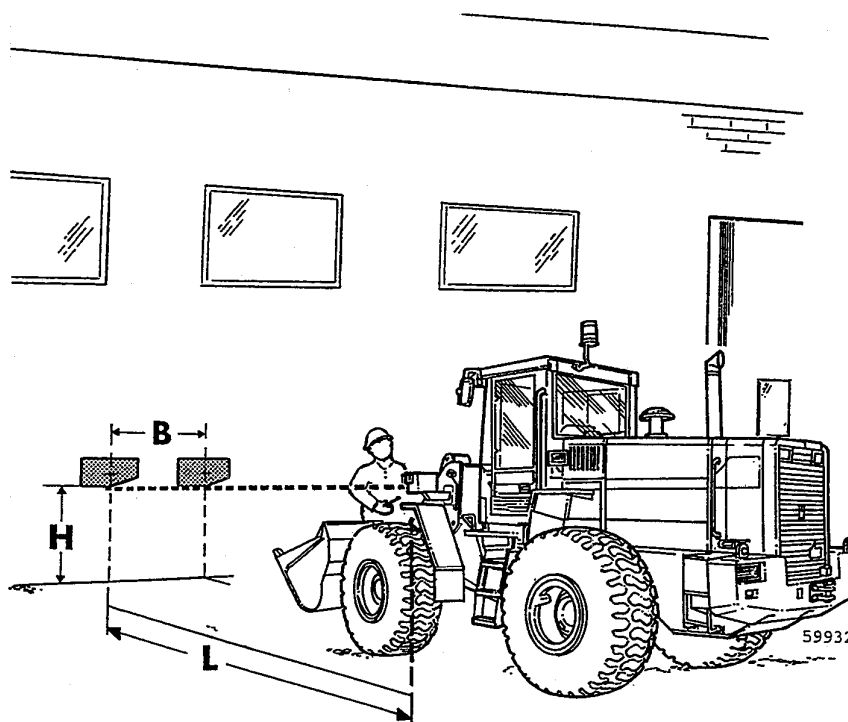
(position, see previous page)

FU 1	20 A	Cab fan	FU 23	5 A	High beam right
FU 2	10 A	Wiper and washer front, horn	FU 24	5 A	Secondary steering
FU 3	5 A	Wiper and washer rear window	FU 25	5 A	Low beam left
FU 4	10 A	Working lights front	FU 26	5 A	Low beam right
FU 5	20 A	Working lights rear, rotating warning beacon	FU 27	5 A	P-light front right / rear left instrument lighting
FU 6	10 A	Working lights extra front			
FU 7	5 A	Hazard flashers	FU 28	5 A	High beam left
FU 8	15 A	Travelling lights, parking lights	FU 29	5 A	Gear shifting
FU 9	10 A	Cigarette lighter	FU 30	5 A	Engine power reduction
FU 10	5 A	Switches, sensors	FU 31	10 A	Single-acting lifting function, boom suspension system
FU 11	5 A	Reversing alarm, cab light	FU 32	5 A	Heated seat
FU 12	10 A	Voltage converter	FU 33	5 A	Attachment locking, pressure draining
FU 13	5 A	Preheating	Fuse holder separate		
FU 14	10 A	Ignition switch	FU 50	15 A	Stop solenoid
FU 15	15 A	Starter interlock	FU 51	15 A	Loud-tone horn
FU 16	5 A	ECU control unit	FU 52	10 A	Air-suspended seat
FU 17	5 A	Voltage converter	FU 53		Unassigned
FU 18	5 A	Transmission disengagement, differential lock	FU 54	5 A	Loud-tone horn, air-suspended seat, transmission filter indication
FU 19	5 A	Parking lights front left / rear right	FU 55	5 A	P-brake
FU 20	5 A	Filter indication transmission oil filter, air-suspended seat, loud-tone horn	In-line fuses (outside cab)		
FU 21	5 A	Direction ind., stop lights	FH 1	5 A	Preheating, control lamp
FU 22	5 A	Bucket positioner and boom kick-out, floating position, extra hydraulic functions, engine braking	FH 2	5 A	Secondary steering
			FH 3		Preheating, element

### HEADLAMPS

The setting of the headlamps is of great importance particularly when operating on the public highway during darkness. The headlamps are of the asymmetrical type which means that they have to be very carefully adjusted.

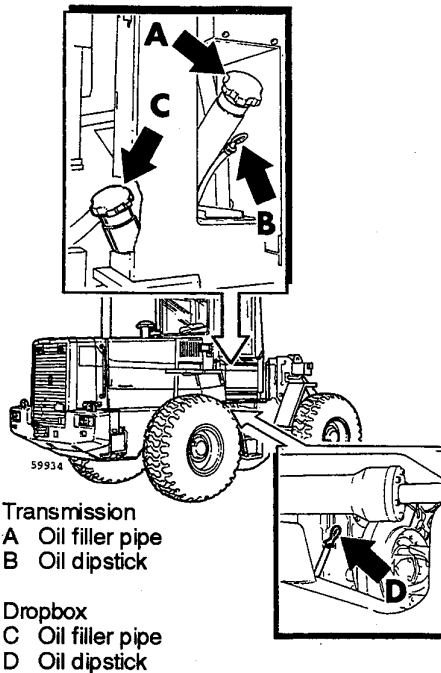
Adjust the upper boundary of the low beams to a height of (H) with the headlamps of the vehicle at a distance of (L) from a wall or screen. Check that distance (B) between the centres of the high beams is correct.



#### Headlamp setting measurements

L = 5000 mm (16 ft 4.8 in)  
H = 1550 mm ( 5 ft 1.0 in)  
B = 1640 mm ( 5 ft 4.6 in)





## TRANSMISSION / DROPBOX

### Checking oil level

The oil level should be checked **every 250 hours** as follows:

- Stand the machine on level ground with the engine running at low idling.
- Apply the parking brake.
- Move the gear selector to neutral.
- Preferably check the oil level at the end of the working shift when the oil is warm.
- The oil should be checked with the engine running at low idling.

The oil level should be between the two marks on the dipstick.

### Changing oil in transmission



#### WARNING!

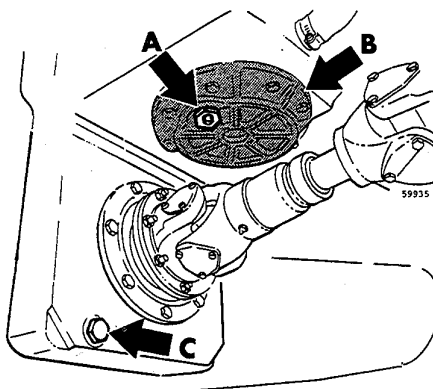
Take care when changing oil. Hot oil can cause severe burns on unprotected skin.

The oil should be changed **every 2000 hours**.  
Drain the oil by removing plugs (A and C).  
Fill with oil through the filler pipes, see figure.

Oil capacity when changing:

transmission	21.0 litres (5.5 US gal).
dropbox	4.7 litres (1.2 US gal).

See "Recommended lubricants" for oil quality grades.



- A Drain plug, transmission  
B Cover, suction strainer  
C Drain plug, dropbox

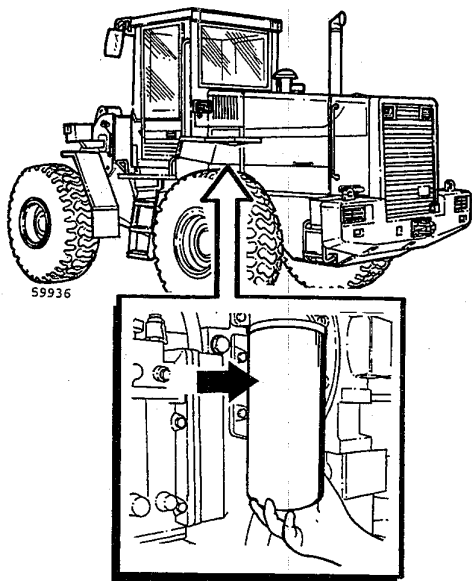
### Suction strainer

The suction strainer is placed at the bottom of the transmission housing and **should be cleaned every 2000 hours**. It can be cleaned after cover (B) has been removed. **After cleaning, fit a new gasket between the cover and the transmission housing. Also change the O-ring at the suction strainer connecting pipe.**

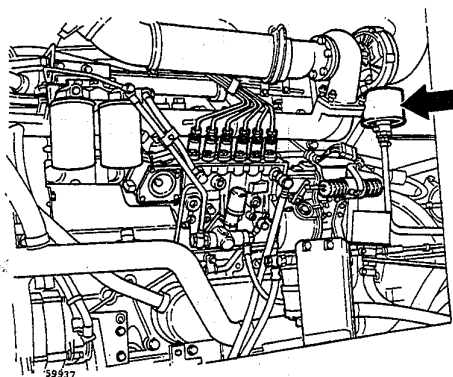
Fill with oil and check that the gasket is not damaged and that there is no leakage after the cover has been fitted.

**Take care of waste oil and liquids in an environmentally safe way!**

# 110 Transmission



Oil filter, transmission



Breather filter transmission

## Changing oil filter in transmission

The oil filter should be changed **every 1000 hours** or if the control lamp lights\*.

The oil filter is of the "spin-on" type and is accessible from underneath.

The oil filter is of the disposable type which means that it cannot be cleaned, but should be changed as a complete unit.

## Control lamp, transmission oil filter

When the filter becomes clogged to a certain degree, a control lamp in the cab will light up. (The control lamp indicates a large drop in pressure across the filter).

\*) The filter should only be changed, if the control lamp lights at the same time as the central warning lamp flashes and the alarm text "Transmission filter" is shown on the display unit. This warning is displayed for approx. 30 seconds (and is repeated at intervals of 1 hour).

NOTE: The filter indicator lamp only (without the central warning) will light when the machine has been newly started and before the oil has warmed up.



Control lamp, transmission oil filter

## Breather filter transmission, dropbox

The filter should be changed **every 2000 hours**

The filter is positioned inside the engine cover on the right-hand side of the machine, see figure. The breather filter cannot be cleaned, but should be changed as a complete unit.

## FRONT AND REAR AXLES

## Changing oil

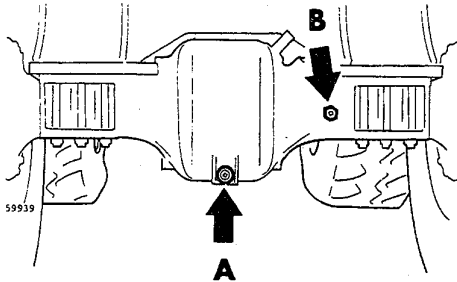
**WARNING!**

Take care when changing oil. Hot oil can cause burns to unprotected skin.

The oil level in the differential and hub reduction gears in the front and rear axles should be **checked every 250 hours** and the oil should be **changed every 1000 hours**.

Fill with oil up to the edge of the hole. Max. deviation – at the most 5 mm (0.16 in) below the hole.

**Operate the machine for a few minutes and check the oil level (topping up may be required).**



Front axle

A Level – filling

B Draining

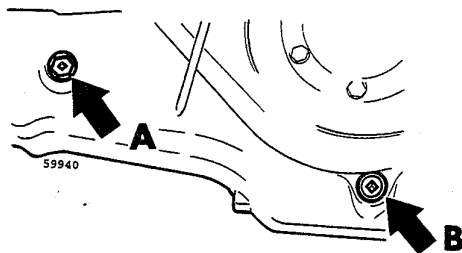
## Capacities

Oil capacity front axle (incl. differential and hubs) 36 litre  
(9.5 US gal)

Oil capacity rear axle (incl. differential and hubs) 41 litre  
(10.8 US gal)

Oil grade, see "Recommended lubricants".

**NOTE: When draining the oil, the hub reduction gears should also be drained.**



Rear axle

A Level – filling

B Draining

**Take care of waste oil and liquids in an environmentally safe way!**

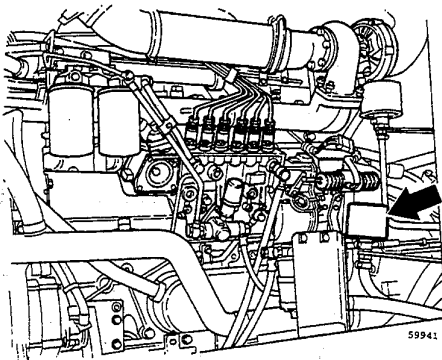
## Breather filters on drive axles

Change the drive axle breather filters every 2000 hours.

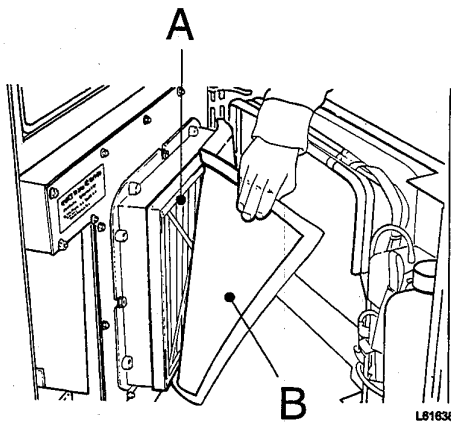
## Greasing propeller shafts

Grease every 500 hours

See also "Lubrication and Service Chart".



# 112 Cab ventilation filter



A Ventilation filter  
B Prefilter



## WARNING!

If the dust is dangerous, e.g. poisonous or contains asbestos, special measures must be taken to prevent the dust from spreading further.

## CAB VENTILATION FILTER

The filter is easily accessible for checking and cleaning by opening the cover and removing the filter. The clogging of the filter is entirely due to the working environment of the machine. Normally the filter should be checked once a week.

**NOTE!** The cab filter is only intended to trap dust particles. Any dangerous gasses are not stopped by the filter.

It is recommended that the ventilation filter (A) should be changed every 1000 hours.

The prefilter (B) should be cleaned when required.

**NOTE:** The interval between filter changes can be increased or reduced depending on how dusty the work site is.

## Cleaning cab ventilation filter:

Carefully shake the filters without damaging them – avoid cleaning with compressed air, vacuum cleaner, or water.

**NOTE:** Use personal protective equipment (approved respirator) when cleaning the filters.

## Asbestos filter

The filter is especially intended for use in environments where there may be asbestos dust, but it is of course effective against all other kinds of dust when the operator needs highly filtered air in the cab.

Test: The filter meets the requirements according to DOP MIL standard 282 and thereby also the requirements by the National Swedish Board of Occupational Safety and Health regulations "Asbestos" AFS 1992:2.

It also meets the requirements according to DIN 24184 filter class S. Observe the national regulations for work in the encountered environment.

## Advice for operating in environment where dust / asbestos dust is present

**The cab should be closed:** It is particularly important that the air-tightness of the cab is preserved / maintained and that the cab is kept closed while operating.

**Ventilation:** The cab should be ventilated through its ventilation system, which also provides excess pressure in the cab.

**Filter changes:** Change filters (main filter and pre filter) every 1000 hours or more often when required. Take care not to damage the new filter.

When fitting, check that the filter edge forms a tight seal.

**Used filters:** Handling of used filters must be done bearing the health hazard and the environment in mind. Before the filters are discarded at the place intended for asbestos waste, the filters must be placed in the tight-sealing plastic bag which is supplied with all new filters.

**Prevention:** Enter and leave the machine away from the asbestos-contaminated area to avoid asbestos dust being brought into the cab.

Keep clothes and shoes clean from dust as far as possible. Tidy and vacuum-clean the cab often and use personal protective equipment, for instance face mask intended for asbestos contaminated areas.





## **BRAKE SYSTEM**

The brake system is all hydraulic and uses the same oil tank as the working hydraulics and the steering system.

### **NOTE:**

For checking and changing oil, see under "Hydraulic system".



### **WARNING!**

Even if the engine has been stopped, there is still an accumulated pressure in the system. If the system is opened, without having first released the pressure, oil under high pressure will jet out which could cause injuries.

Even retightening of leaking couplings and unions should not be done until the pressure in the system has been fully released.

The brake system pressure is released by stopping the engine and depressing the brake pedal several (30 – 40) times.

Discarded accumulators must not just be thrown away, but should be taken care of by a workshop and "punctured".

There is a risk of explosion if an accumulator is heated.

## **Checking brake discs**

The wear of the brake discs should be checked every 1000 hours.

Checking and any work should be carried out by an authorised dealer workshop.

## **Bleeding brake system**

If bleeding of the brake system is necessary, this too should be done by an authorised VME workshop.



## **CHECKING PARKING BRAKE**



### **WARNING!**

Brake test and checking the parking brake should only be done within an area where it cannot cause accidents.

### **Checking:**

- Apply the parking brake.
- With 3rd gear engaged and engine at full speed, the machine should remain stationary.

### **Adjusting:**

#### **Mechanically operated parking brake**

- Release the parking brake.
- Adjust by turning the handle clockwise and then check again as described above.

**Do not turn the handle, if the brake is not to be adjusted as this may affect the braking action.**

**BRAKE TEST (checking service brakes)****(machines equipped with contronic display unit)**

The brake test is carried out with the aid of a computer programme which measures the average retardation of the machine. The test can be carried out by the operator, if the machine is equipped with a contronic display unit.

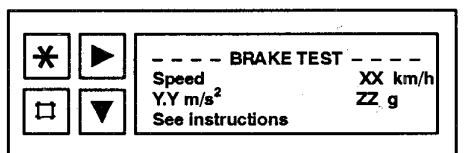
**WARNING!**

Brake test and checking the parking brake must only be done within an area where it cannot cause accidents.

**Preconditions**

- 1 Together with your supervisor, select a suitable area, where the brake test can be carried out without the risk of causing an accident (there is, for instance, a risk that someone may run into your machine from behind).
- 2 The machine should not be loaded during the brake test
- 3 The speed of the machine must exceed 20 km/h (12.4 mph) when the service brakes are applied.
- 4 The road or ground surface should be level and have good friction.

**Acceptable readings will only be obtainable if the test is carried out on dry tarmac, dry concrete or similar surface.**

**Procedure for measuring**

Make sure that the conditions as listed above apply.

▶ Select the function group AXLES/BRAKES on the display unit using the arrow key, see also page 24.

▼ Select the sub menu BRAKE TEST using the arrow key. Move off with the speed gear selector in position A and increase the speed of the machine. When the speed exceeds 20 km/h (12.4 mph) a short signal can be heard and the display unit will show 0.0 m/s<sup>2</sup> 0.00 g, which means that the correct speed for the test has been reached.

If the display unit instead shows X.X m/s<sup>2</sup> X.XX g, the speed is too low (below 20 km/h).

**To obtain credible and useful test results, the braking has to be done:**

- without the wheels locking or slipping.
- with as hard brake application as possible and without letting up the brake pedal.

**Result and evaluation**

The result of the brake test will be shown on the display unit when the machine has been stopped, i.e. when the speed has dropped to 0 km/h, and will remain on the display unit until the speed again exceeds 10 km/h (6.2 mph).

In order to exclude any locking of the wheels from the test, braking and retardation exceeding 8 m/s<sup>2</sup> (0.82 g force) will not be registered and instead the display unit shows

X.X m/s<sup>2</sup> X.XX g.

**MINIMUM VALUE FOR BRAKE TEST: 4.75 m/s<sup>2</sup> (0.48 g)**

If the registered retardation is less than 4.75 m/s<sup>2</sup> (0.48 g force) the test should be carried out again.

**If this test also shows a value below 4.75 m/s<sup>2</sup> (0.48 g force), the brake system should be checked by an authorised workshop.**

**AIR CONDITIONING**

**Check every 250 hours** that the compressor belt is correctly tensioned.

- When adjusting, slacken the nuts and move the compressor outward until the correct belt tension is obtained.

**When the belt is correctly tensioned, it should be possible to depress it by about 15 mm (0.6 in) by exerting a relatively high pressure.**

**WARNING!**

**The engine must not be running when checking the belt tension – rotating parts can cause injuries.**

To prevent leakage and to ensure lubrication of the seals in the air conditioning compressor, the unit should be run for five minutes at least once a month. It is important that the operator is made aware of this fact.

**NOTE: At temperatures below freezing, 0 °C (+32 °F), the unit must be run indoors, as the power supply to the compressor lead is switched off by the thermostat whenever the evaporator temperature is below +1 °C (+34 °F).**

**NOTE: Make sure that the exhaust gases are extracted or removed by ventilation in a suitable way.**

**Make sure the condenser is kept clean**

**Clean the condenser at regular intervals as follows:**

- Lift up the radiator cowl and swing out the radiator.
- Swing out the condenser from the radiator.
- Blow the condenser clean with compressed air.
- Check that the evaporator in the cab is clean.
- Make sure that the draining valve for condensation water opens as it should.  
Open the valve from the inside.

**NOTE: The valve will be damaged if a sharp object is used for cleaning the valve.**

- Ask an authorised dealer workshop to check the air conditioning once a year.

**NOTE: If the pressure in the system becomes too high because of a clogged condenser, the air conditioning will cut out. The condenser must first be cleaned before the system is restarted with the switch.**



**AIR CONDITIONING****Refrigerant (R134a)**

The pressurised system contains HFC – refrigerant R134a. It is illegal to purposely release refrigerant into the open air. Any service, refilling or emptying of the refrigerant circuit must only be carried out by a trained and accredited person.

**NOTE:** R134a must never be mixed with R12, as this would cause the cooling system to "fail".

**General**

The air-conditioning system of the machine is filled with refrigerant R134a at the factory. This refrigerant has been developed as an alternative to the earlier refrigerant R12 (Freon), as the R134a has less environmental impact. R134a has compared to R12 no potentially depleting properties that will affect the ozone layer of the atmosphere, but R134a adds to the greenhouse effect and must never intentionally be released into the open air.

**WARNING!**

Refrigerant R134a easily causes frostbite if it comes into contact with bare skin.

When heated, gasses are formed which can be harmful to the lungs and nervous system even at low concentrations when no smell is apparent.

The symptoms may arise several hours (even up to 24 hours) after exposure.

**Suspected leakage**

The system is pressurised and the refrigerant can unintentionally leak out. Never disconnect hoses and never remove the filler plug on the compressor.

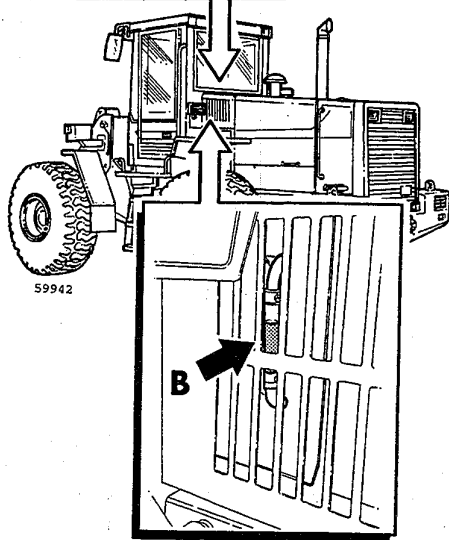
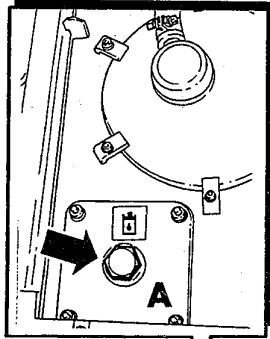
If a leak is suspected, the system must not be topped up – leave the area where the leak has taken place and contact your authorised dealer workshop for action to be taken.

**First aid measures:**

In case of accidental contact with escaping refrigerant, take the following measures:

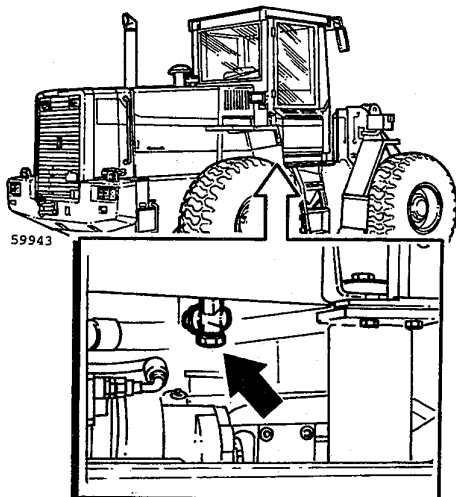
- Refrigerant in gas form and when heated can, in low concentrations, have an effect, particularly on the nervous system. In high concentrations the gas has a narcotic effect. In both cases move personnel from the danger area out into the fresh air. If someone is seriously affected contact a medical doctor.
- If large amounts of liquid refrigerant has come into contact with unprotected skin, the injured area should be carefully warmed with lukewarm water or warm clothes. Contact a medical doctor, if the symptoms persist.
- If liquid refrigerant has come into contact with someone's eyes – contact a medical doctor.

# 118 Hydraulic system



## Hydraulic oil tank

- A Oil filler  
B Level pipe



## HYDRAULIC SYSTEM

The same hydraulic oil tank is used for the working hydraulics and the brake and steering systems.

The pressure-limiting valve for the hydraulic system is set to the correct value at the factory. If the valve is altered by any person other than service personnel from an authorised workshop, the guarantee of the manufacturer will be void.

Filling of oil or other work on the hydraulic system requires a high degree of cleanliness.

Even very small particles can cause damage or clog up the system.

Wipe the area around the oil filler clean, before filling the tank with new hydraulic oil.

## Check the oil level daily

**NOTE:** The oil level should be checked when the lifting arms are in their lowest position and with the attachment flat on the ground.

The oil level should stand between the max. and min. marks in the sight glass (pipe).

Oil filling, see figure.

## Changing oil in hydraulic system

(working hydraulics, brake and steering systems)



## WARNING!

Take care when changing oil, hot oil can cause burns to unprotected skin.

Change oil every 2000 hours, if filled with engine oil

Change oil every 4000 hours, if filled with hydraulic oil

Oil capacity of the hydraulic system: 130 litres (34.3 US gal).

When changing, approx. 95 litres (25.1 US gal).

For oil grade, see "Recommended lubricants".

**NOTE:** When the hydraulic system of the loader is used for powering auxiliary hydraulic equipment, e.g. road sweeper, drill, snow blower or similar, the oil should be changed at shorter intervals, i.e. every 1000 hours.

## Oil changing is done as follows:

- Operate the machine so that the oil reaches normal working temperature.
- Stand the machine on level ground with the bucket (attachment) lowered to the ground.
- Stop the engine, release the pressure in the brake system (by depressing the brake pedal several times), and drain the hydraulic oil via the draining valve at the bottom of the tank.
- Fill with oil to correct level. Start the engine and operate the lifting and tilting cylinders to both end positions.

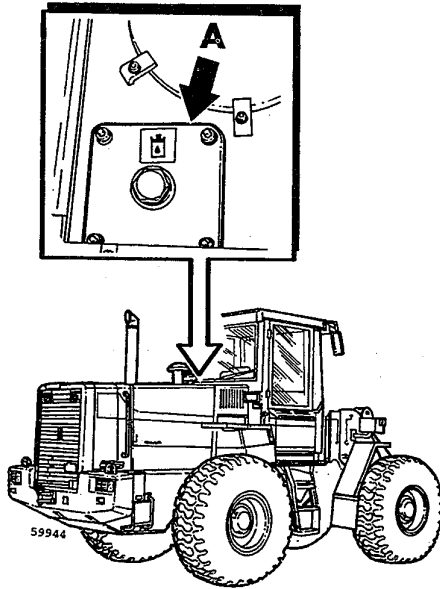
Take care so that no impurities enter the oil tank.

- Top up with oil if required.
- Check that there are no leaks.

Take care of waste oil and liquids in an environmentally safe way!

**Sludge draining, hydraulic oil tank**

Drain sludge and condensation water from the hydraulic oil tank via the draining valve, (see under "Changing oil") **every 500 hours.**



Changing return oil filter  
A Cover, return oil filter

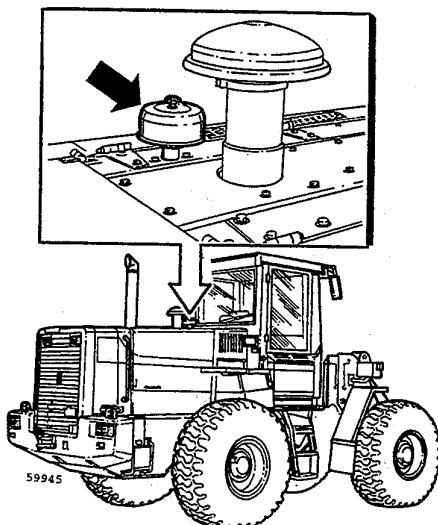
**Return oil filter, hydraulic system**

Change return oil filter (glass fibre filter) **every 2000 hours**

NOTE: For remaining earlier type (paper) filters the interval between changes is **1000 hours.**

**Change filter as follows:**

- Remove the cover.
- Lift out the filter and take it apart by removing the cotter pin, nut, spring retainer and the spring.
- Remove the filter which is of the disposable type, clean the magnetic rod thoroughly and fit a new filter. Check the sealing rings.



Breather filter, hydraulic oil tank

**Breather filter, hydraulic oil tank**

The filter should be changed **every 2000 hours.**

The filter cannot be cleaned, but should be changed as one unit.

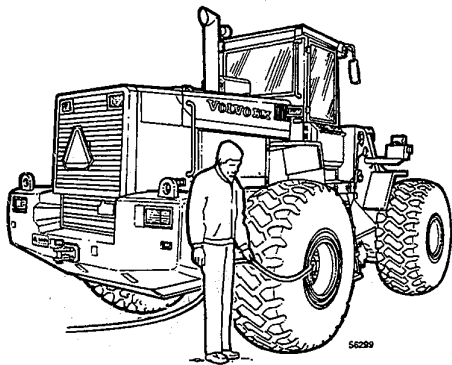
**RULES FOR INFLATING TYRES**

The recommended tyre pressure should normally be adhered to. Special operations may justify an adjusted pressure. In such cases, follow the instructions from the tyre manufacturer and do not exceed the max. permissible pressures given in the table on the next page.

The tyre pressure may have been raised before the machine was delivered from the factory. Therefore, check and adjust the tyre pressure according to recommendations on the next page, before putting the machine to work for the first time.

**WARNING!**

**To avoid serious accidents always follow the instructions given below when inflating tyres.**



- Make sure that you stand to one side of the tyre when inflating. A tyre fitted on a split rim may explode causing injury or death.
- Use a self attaching air chuck with a hose long enough to enable you to be out of the trajectory path when filling the tyre with air. See figure.
- Always use an inflation cage, safety cables or chains when inflating a tyre on a wheel which is not fitted on a machine.
- Do not cut or weld on the rim of a tyre which is inflated.
- Let the air out of the tyre before removing a foreign object from the tyre tread. Keep fingers away from bead breakers and hydraulic jacks and stay out of the trajectory path when removing foreign objects. If a bead breaker disengages, it will release with enough force to cause injury or death. Make sure that dirt and rust is removed from the locking groove before installing the locking ring.
- Never use wheel parts of different sizes together and never use damaged or faulty parts.
- Take great care when using reworked wheel parts. Incorrect welding, heating or brazing of the parts may cause it to be weak and result in failure of the part.
- Spare tyres should only be filled with enough air to keep the rim parts in place. An inflated tyre can fall apart if it is not installed on a machine (applies to some rim types).
- The machine should be without load when checking the tyre pressure.

**TYRES****Recommended tyre pressure for normal loading**

Tyre size	Material handling loading 10 km/h (6.2 mph)		Material handling Loading—Carrying max. 25 km/h (15.5 mph)		Timber handling max. 25 km/h (15.5 mph)	
	Front	Rear	Front	Rear	Front	Rear
<b>20.5-25/20</b> Bridgestone	350 kPa 51 psi x)	200 kPa 29 psi	450 kPa 65 psi	200 kPa 29 psi	525 kPa 76 psi	200 kPa 29 psi
<b>20.5-25/16</b> Good Year	270 kPa 39 psi xx)	180 kPa 26 psi	270 kPa 39 psi	180 kPa 26 psi	320 kPa 46 psi	180 kPa 26 psi
<b>20.5 R25*</b> Good Year	340 kPa 49 psi x)	200 kPa 29 psi	340 kPa 49 psi	200 kPa 29 psi	380 kPa 55 psi	200 kPa 29 psi
<b>20.5 R25*</b> Michelin	350 kPa 51 psi x)	200 kPa 29 psi	350 kPa 51 psi	200 kPa 29 psi	400 kPa 58 psi	200 kPa 29 psi
<b>20.5 R25*</b> Bridgestone	375 kPa 54 psi x)	250 kPa 36 psi	450 kPa 65 psi	250 kPa 36 psi	500 kPa 73 psi	250 kPa 36 psi

x) When operating with material handling arm: 450 kPa (65 psi)

xx) When operating with material handling arm: 350 kPa (51 psi)

The recommended tyre pressure is based on the rated load at each handling case.

In case of heavier loads, especially during timber handling or loading-carrying operations, a higher tyre pressure is required.

Contact the tyre retailer for information about the correct tyre pressure for the loads to be handled and the travelling distance to be covered.

If L4 or L5 tyres are used for loading or carrying, due attention must be paid to the transporting distances. Radial tyres are to be preferred for loading – carrying operations, as the build-up of heat is less in this type of tyres.

# BASIC PREVENTIVE MAINTENANCE

## 122 Maintenance schedule

### Maintenance Schedule

This schedule shows which measures should be taken at the respective services (number of engine operating hours).

Example: When the machine has been operated for 1500 hours the daily, 100, 250 and 500 hour services should be carried out according to the "Lubrication and Service Chart".

#### Services at certain intervals

Daily service should always be carried out first

- A Every 100 hours
- B Every 250 hours
- C Every 500 hours
- D Every 1000 hours
- E Every 2000 hours

Hour reading	Service interval	Hour reading	Service interval	Hour reading	Service interval
100	A <input type="checkbox"/>	3400	A <input type="checkbox"/>	6750	B <input type="checkbox"/>
200	A <input type="checkbox"/>	3500	ABC <input type="checkbox"/>	6800	A <input type="checkbox"/>
250	AB <input type="checkbox"/>	3600	A <input type="checkbox"/>	6900	A <input type="checkbox"/>
300	A <input type="checkbox"/>	3700	A <input type="checkbox"/>	7000	ABCD <input type="checkbox"/>
400	A <input type="checkbox"/>	3750	B <input type="checkbox"/>	7100	A <input type="checkbox"/>
500	ABC <input type="checkbox"/>	3800	A <input type="checkbox"/>	7200	A <input type="checkbox"/>
600	A <input type="checkbox"/>	3900	A <input type="checkbox"/>	7250	B <input type="checkbox"/>
700	A <input type="checkbox"/>	4000	ABCDE <input type="checkbox"/>	7300	A <input type="checkbox"/>
750	AB <input type="checkbox"/>	4100	A <input type="checkbox"/>	7400	A <input type="checkbox"/>
800	A <input type="checkbox"/>	4200	A <input type="checkbox"/>	7500	ABC <input type="checkbox"/>
900 A	<input type="checkbox"/>	4250	B <input type="checkbox"/>	7600	A <input type="checkbox"/>
1000	ABCD <input type="checkbox"/>	4300	A <input type="checkbox"/>	7700	A <input type="checkbox"/>
1100	A <input type="checkbox"/>	4400	A <input type="checkbox"/>	7750	B <input type="checkbox"/>
1200	A <input type="checkbox"/>	4500	ABC <input type="checkbox"/>	7800	A <input type="checkbox"/>
1250	AB <input type="checkbox"/>	4600	A <input type="checkbox"/>	7900	A <input type="checkbox"/>
1300	A <input type="checkbox"/>	4700	A <input type="checkbox"/>	8000	ABCDE <input type="checkbox"/>
1400	A <input type="checkbox"/>	4750	AB <input type="checkbox"/>	8100	A <input type="checkbox"/>
1500	ABC <input type="checkbox"/>	4800	A <input type="checkbox"/>	8200	A <input type="checkbox"/>
1600	A <input type="checkbox"/>	4900	A <input type="checkbox"/>	8250	B <input type="checkbox"/>
1700	A <input type="checkbox"/>	5000	ABCD <input type="checkbox"/>	8300	A <input type="checkbox"/>
1750	AB <input type="checkbox"/>	5100	A <input type="checkbox"/>	8400	A <input type="checkbox"/>
1800	A <input type="checkbox"/>	5200	A <input type="checkbox"/>	8500	ABC <input type="checkbox"/>
1900	A <input type="checkbox"/>	5250	B <input type="checkbox"/>	8600	A <input type="checkbox"/>
2000	ABCDE <input type="checkbox"/>	5300	A <input type="checkbox"/>	8700	A <input type="checkbox"/>
2100	A <input type="checkbox"/>	5400	A <input type="checkbox"/>	8750	B <input type="checkbox"/>
2200	A <input type="checkbox"/>	5500	ABC <input type="checkbox"/>	8800	A <input type="checkbox"/>
2250	AB <input type="checkbox"/>	5600	A <input type="checkbox"/>	8900	A <input type="checkbox"/>
2300	A <input type="checkbox"/>	5700	A <input type="checkbox"/>	9000	ABCD <input type="checkbox"/>
2400	A <input type="checkbox"/>	5750	B <input type="checkbox"/>	9100	A <input type="checkbox"/>
2500	ABC <input type="checkbox"/>	5800	A <input type="checkbox"/>	9200	A <input type="checkbox"/>
2600	A <input type="checkbox"/>	5900	A <input type="checkbox"/>	9250	B <input type="checkbox"/>
2700	A <input type="checkbox"/>	6000	ABCDE <input type="checkbox"/>	9300	A <input type="checkbox"/>
2750	AB <input type="checkbox"/>	6100	A <input type="checkbox"/>	9400	A <input type="checkbox"/>
2800	A <input type="checkbox"/>	6200	A <input type="checkbox"/>	9500	ABC <input type="checkbox"/>
2900	A <input type="checkbox"/>	6250	B <input type="checkbox"/>	9600	A <input type="checkbox"/>
3000	ABCD <input type="checkbox"/>	6300	A <input type="checkbox"/>	9700	A <input type="checkbox"/>
3100	A <input type="checkbox"/>	6400	A <input type="checkbox"/>	9750	B <input type="checkbox"/>
3200	A <input type="checkbox"/>	6500	ABC <input type="checkbox"/>	9800	A <input type="checkbox"/>
3250	AB <input type="checkbox"/>	6600	A <input type="checkbox"/>	9900	A <input type="checkbox"/>
3300	A <input type="checkbox"/>	6700	A <input type="checkbox"/>	10000	ABCDE <input type="checkbox"/>

## SERVICE GUIDE

Preventive maintenance, which you carry out yourself, is the most important. It includes lubrication and various checks and adjustments.

Most of these service measures are simple to carry out and do not require any further explanation. However, in some cases more detailed instructions are required and these are given in the section "Basic Preventive Maintenance".

**Maintenance schedule in running hours**

	Page	Daily	100	250	500	1000	2000	When required
<b>GENERAL</b>		X						
Check for leakage								
Check bolts and unions		X						
<b>Lubrication</b>	126	X <sup>1)</sup>	X					
Lifting arms, tilt and lifting cylinder								
Propeller shafts					X			
Hinges, doors and windows					X			
Frame joint, upper bearing			X					
Frame joint, lower bearing						X		
Steering cylinder bearings			X					
Rear axle bearing		X <sup>2)</sup>	X					
<b>ENGINE</b>	93							
Check oil level		X						
Change oil and filters				X				
Change fuel filters						X		
Check water trap			X					X
Change air cleaner primary filter						X		
Change air cleaner secondary filter							X	
Check filter indicator function						X		
Check oil level in oil-bath pre-cleaner		X						
Change filter inserts							X	
Check coolant level		X						
Check coolant pump draining				X				
Change coolant							X**	
Change coolant filter						X**		
<b>ELECTRICAL SYSTEM</b>	103							
Control lamps, lights		X						
Electrolyte level in battery			X					
Tension of belts				X				

\*\*\*) The coolant should be changed every 3000 hours if the machine is equipped with coolant filter.

- 1) Daily lubrication applies to the lower bucket pin when operating under difficult conditions. In normal environment, the lower bucket pin should be greased every 50 hours.
- 2) The rear axle bearing should be greased daily when operating under difficult conditions and in normal environment every 50 hours.

**BASIC PREVENTIVE MAINTENANCE**  
**124 Service guide**

**Maintenance schedule in running hours**

	Page	Daily	100	250	500	1000	2000	When required
<b>POWER TRANSMISSION</b>	110							
Check the oil level in transmission				X				
Change oil in transmission and clean suction strainer							X	
Change oil filter in transmission						X		
Change breather filter for transmission and drive axles							X	
Check oil level in drive axles				X				
Change oil in drive axles						X		
<b>BRAKE SYSTEM</b> (Oil and filter, see hydraulic system)	114							
Check brake discs						X		
<b>HYDRAULIC SYSTEM</b>	118							
Check oil level in the system		X						
Change oil in the hydraulic system							X*	
Drain sludge and condensation water from the hydraulic oil tank					X			
Change return oil filter in the hydraulic oil tank							X**	
Change breather filter for the hydraulic oil tank							X	
<b>OTHER FUNCTIONS</b>								
Clean the radiator								X
Check for oil/fluid leakage		X						
Check the cab ventilation filters			X					
Change the cab ventilation filters						X		
Check / top up washer reservoir								X
<b>AIR CONDITIONING</b>	116		X					
Belt tension, AC compressor				X				

\*) If the system has been filled with hydraulic oil, the oil should be changed every 4000 hours

If the system has been filled with engine oil, the oil should be changed every 2000 hours

\*\*) If a glass fibre filter is fitted, it should be changed every 2000 hours  
 (remaining earlier paper filters should be changed every 1000 hours)

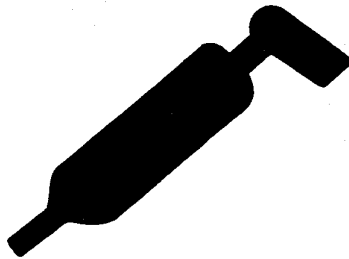


### Important when greasing bearings!

The service life of bushings and pivot pins can be extended considerably, if the machine is greased regularly and in the correct way.

The greasing of bearings has two main purposes:

- Add grease to the bearing to reduce friction between the pin and the bushing.
- Replace old grease which may contain dirt. The grease in the space inside the outer seal collects dirt and prevents dirt and also water from penetrating into the bearing.



Therefore, grease the bearing until new, clean grease is forced out through the outer seal.

Between 10 and 15 strokes with a normal hand-held grease gun is required to grease one of the bearings for the lifting arms. For the rear axle anchorage bearings many more strokes with the grease gun is required.

**Wipe off grease nipples and grease gun before greasing, so that dirt and sand is not introduced through the grease nipples.**

### SYMBOL KEY

These standard symbols are used in the Lubrication and Service Chart on the next page.



Engine



Transmission



Hydraulic system



Brake system



Axles



Fuel system



Battery



Coolant



Air conditioning



Lubrication



Oil/fluid



Filter



Air filter



Level check



Belt tension



Control lamps



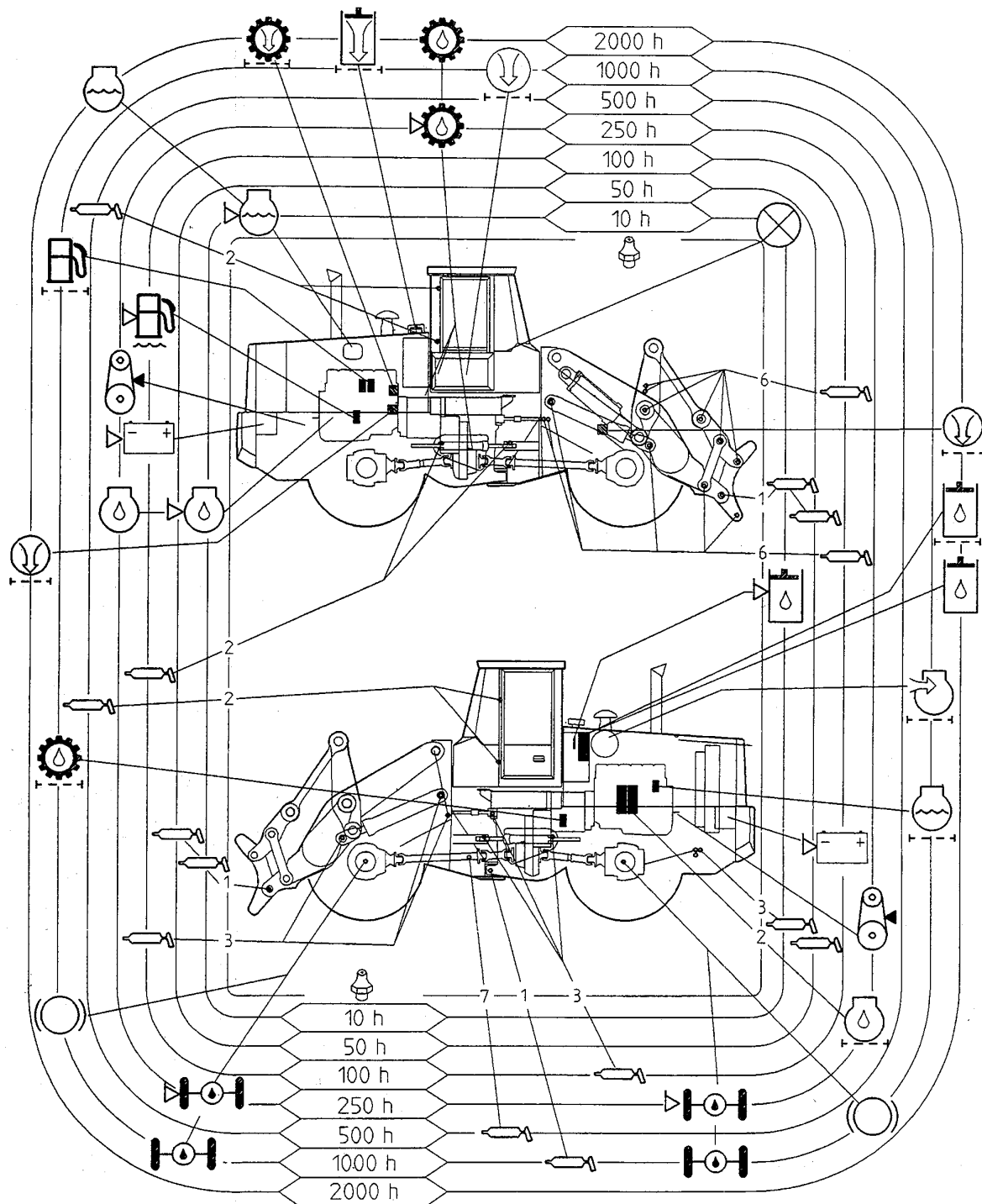
Draining

# 126 Lubrication and service chart

## CHECKS, OIL CHANGES AND LUBRICATION

Intervals:

Daily, 50, 100, 250, 500, 1000 and 2000 hours.



# BASIC PREVENTIVE MAINTENANCE

## Lubrication and service chart 127

Item	Measure	Page	Item	Measure	Page
<b>DAILY (Every 10 hours)</b>			<b>C = EVERY 500 HOURS</b> After carrying out daily, A and B services		
	<b>Check</b>		16	Drain sludge and condensation water from hydraulic oil tank	119
1	Oil level, engine	93		<b>Lubricate</b>	
2	Oil level, hydraulic system	118	17	Propeller shafts and support bearing	
3	Coolant level	101	18	Hinges cab door	
4	Control lamps (function)		19	Hinges side window	
	Oil level, oil-bath air cleaner	99			
	Travelling lights, working lights, reversing alarm, leakage check Check the tyre pressure				
<b>EVERY 50 HOURS</b> After carrying out daily service			<b>D = EVERY 1000 HOURS</b> After carrying out daily, A, B and C services		
9	Lifting frame, lower bucket pins <sup>1)</sup>		13	Change oil in front and rear axles	111
12	Bearing rear axle <sup>1)</sup>		5	Change oil filter in transmission	110
<b>A = EVERY 100 HOURS</b> After carrying out daily service			15	Check brake discs	114
	<b>Check</b>		20	Change air cleaner primary filter	97
6	Electrolyte level, batteries	103	21	Change fuel filter	95
7	Water trap	95	22	Change coolant filter	100
8	Air conditioning	116	24	Change breather filter, cab <sup>3)</sup>	112
	<b>Lubricate</b>			Lubricate	
9	Lifting frame			Frame joint, lower bearing	
10	Frame joint, upper bearing				
11	Bearing, steering cylinder				
<b>B = EVERY 250 HOURS</b> After carrying out daily service			<b>E = EVERY 2000 HOURS</b> After carrying out daily, A, B, C and D services		
			5	Change oil in transmission and clean suction strainer	109
1	Change oil and oil filter, engine <sup>2)</sup>	93	23	Change oil in the hydraulic oil tank <sup>4)</sup>	118
	<b>Check</b>		26	Change breather filter, hydraulic oil tank	119
13	Oil level, front and rear axles	111	20	Change air cleaner secondary filter	98
14	Tension of belts	102	3	Change coolant <sup>5)</sup>	101
	Check coolant pump draining hole	102	27	Change breather filter, transmission	110
			28	Change breather filter, axles	111
5	Oil level, transmission	109	23	Change hydr. syst. return oil filter <sup>6)</sup>	119
				Clean oil-bath precleaner filter inserts	99





- 1) During difficult operating conditions these should be greased daily
- 2) For conditions which have to be met, if the interval is to apply, see under "Basic Preventive Maintenance, engine"
- 3) Change the cab filter more often when necessary
- 4) If the system is filled with hydraulic oil, it should be changed every 4000 hours (2000 hours applies for engine oil)
- 5) NOTE! If the machine is fitted with a coolant filter, the coolant should be changed every 3000 hours.
- 6) Applies only if a glass fibre filter is fitted (for remaining earlier paper filters an interval of 1000 hours applies).


## Recommended lubricants


The viscosity indications are according to SAE J 300 MAR93.


Other mineral oils can be used if they conform to our viscosity recommendations and meet our quality requirements.

The approval of Volvo is required, if any other oil base quality (e.g. biologically degradable oil) is to be used.

	OIL GRADE	Recommended viscosity at ambient temperatures									
		°C	-30	-20	-10	0	+10	+20	+30	+40	+50
		°F	-22	-4	+14	+32	+50	+68	+86	+104	+122
<b>ENGINE</b>  *) For severe conditions ACEA E3-96 (CCMC-D5) is recommended to give optimum service life	<b>Engine oil</b> Volvo VDS API CE ACEA E1-96 (CCMC.D4) and ACEA E3 -96 (CCMC D5)*										
<b>AXLES HUB GEARS</b> 	<b>Volvo WB 101</b> For trade names and quality requirements of the oil, see "Specifications, axles"										
<b>TRANSMISSION DROPBOX</b> 	<b>Transmission fluid</b> which meets Allison C4 norm (DDAD C4) or <b>Engine oil</b> which meets Allison C4 norm (DDAD C4) or meets MIL 2104E)										
<b>HYDRAULIC SYSTEM</b> Steering system Brake system Working hydraulics 	<b>Hydraulic oil</b> Vickers 35 VQ/25 test Viscosity acc. to ISO Quality acc. to ISO HV										
	or <b>Engine oil</b> min. requirement API SE/CD  NOTE. As an alternative there is also a biologically degradable hydraulic oil (PANOLIN).										

 **grease**  
 Grease on lithium base with EP additives and consistency NLGI no. 2.  
 NOTE. If the machine has an automatic greasing system, other lubrication recommendations apply.

 **Cooling system**  
 Volvo original anti-freeze  
 Volvo original anti-corrosion additives  
 USA: Coolant norm ASTM D4985

 **Fuel system**  
 Quality requirements: The fuel should at least meet the legal requirements, and national and international standards for marketed diesel fuels, e.g.: EN590 (with nationally adapted temperature requirements), ASTM D 975 No. 1D and 2D, JIS KK 2204  
 Sulphur content: According to legal requirements (The sulphur content should not exceed 0.5 percent by weight)

## CAPACITIES

	When changing		Total	
	litre	US gal	litre	US gal
Engine, incl. filter	16	4.2		
Transmission and torque conv. incl. filter	26	6.9	38	10.0
Front axle	36	9.5		
Rear axle	41	10.8		
Hydraulic system (brakes, steering, working hydraulics)			130	34.3
Hydraulic oil tank	95	25.1		
Fuel tank			210	55.4
Cooling system			53	14.0
Oil-bath precleaner			5.4	1.4

Carry out checks according to maintenance programmes for the machine, see page 8.

## OIL AND FLUID CHANGES

	Hours	See page no.
Engine	250*	93
Front and rear axles	1000	111
Transmission, at the same time clean suction strainer	2000	109
Hydraulic system (working hydraulics, brake system and steering system)	2000/4000	118
Coolant	2000	101
Coolant (when coolant filter is fitted)	3000	100

## FILTER CHANGES

Engine, lubricating oil filters	250	94
Engine, air cleaner, primary filter	1000	97
Engine, coolant filter	1000	100
Fuel filters	1000	95
Additional fuel filters	1000	95
Return-oil filter, hydraulic oil tank	2000**	119
Transmission, oil filter	1000	110
Ventilation filter, cab	1000	112
Breather filter, transmission	2000	110
Breather filter, drive axles	2000	112
Engine, air cleaner, secondary filter	2000	98
Breather filter, hydraulic oil tank	2000	119
Filter inserts, oil-bath precleaner	2000	99

\*) For conditions which have to be met, if the interval is to apply, see under "Basic preventive maintenance".

\*\*) Applies only if a glass fibre filter is fitted.

## 130 Specifications

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### ENGINE

Designation  
Flywheel output at 35 r/s (2100 rpm)

Volvo TD63KBE  
113 kW (154 hp) SAE J 1349 net  
113 kW (154 hp) DIN 70020  
118 kW (162 hp) SAE J 1349 gross

Output gross at 35 r/s (2100 rpm)

Max. torque 18.3 r/s (1100 rpm)

690 N m (509 lbf ft) SAE J 1349 net  
695 N m (513 lbf ft) SAE J 1349 gross  
690 N m (509 lbf ft) DIN 70020

Number of cylinders

6

Cylinder bore

98.43 mm (3.875 in)

Stroke

120.00 mm (4.724 in)

Cylinder capacity

5.48 litre

Compression ratio

18.3 : 1

Order of injection

1-5-3-6-2-4

Idling speed, low

11.2 ±0.5 r/s ( 670 ±30 rpm)

Idling speed, high

39.7 ±1.0 r/s (2380 ±60 rpm)

Valve clearance (warm and cold engine)

inlet valve

0.40 mm (0.016 in)

exhaust valve

0.55 mm (0.022 in)

### Air cleaner

Air cleaning in three stages  
cyclone cleaner - primary filter - secondary filter

### Lubrication system

Oil pressure

395 - 545 kPa (3.95 - 5.45 bar) (57 - 79 psi)

Oil pressure, idling

130 kPa (1.3 bar) (19 psi)

### Fuel system

Injection pump

In-line pump

Pump timing

13 ° ±0.5 ° BTDC

Feed Pump

Piston pump

Feed pressure

130 - 180 kPa (1.3 - 1.8 bar) (19 - 26 psi)

Injectors

Multi-hole injectors

Opening pressure

24 MPa (240 bar) (3480 psi)

### Cold-starting device

Preheating coil

In the induction manifold

### Intercooler

Type

Water/air with separate water pump

### Cooling system

Type

Closed system

The radiator cap valve opens at

50 kPa (0.5 bar) (7.3 psi)

### Thermostat

Type

Piston-type thermostat

Begins to open at

82 °C (180 °F)

Fully open at

95 °C (203 °F)

## ELECTRICAL SYSTEM

System voltage	24 V
Batteries	2 pcs connected in series
Battery voltage	12 V
Battery capacity	2 x 140 Ah
Alternator	1680 W/60 A
Starter motor output	5.4 kW (7.3 hp)

## Battery electrolyte density kg/litre

Fully charged battery	1.275 - 1.285
The battery should be recharged at	1.250

## Bulbs

	Watt	Socket
Travelling lights, asymmetric	75/70	P 43t - 38 (H4)
Parking lights	4	BA 9 s
Tail lights	10	BA 15 s
Stop lights	21	BA 15 s
Direction indicators, rear	21	BA 15 s
Direction indicators, side	21	BA 15 s
Side lights	5	SV 8.5
Instrument lighting	2	BA 9 s
Control lamp panel	20x1.2	W 2 x 4.6 d
Cab light	24/21	Ba 15 s
Working lights, front halogen	70	PK 22 s (H3)
Working lights, rear halogen	70	PK 22 s (H3)
Switches, guide light	1.2	W 2 x 4.6 d
Speedometer/Tachometer	2	BA 9 s

## Fuses

Type	
Current rating	20 A
Current rating	15 A
Current rating	10 A
Current rating	5 A
Preheating	55 A

# 132 Specifications

## POWER TRANSMISSION

### Transmission

Type	Hydro-mechanical
Make	Volvo
Designation	HT 131
Torque converter	single stage
Torque multiplication	2.66:1
Number of gears forward/reverse	4/3

### Speed range

(tyres 20.5 R x 25)

1st	0 - 7.1 km/h	0 - 4.4 mph
2nd	0 - 13.3 km/h	0 - 8.3 mph
3rd	0 - 27.7 km/h	0 - 17.2 mph
4rd	0 - 38.2 km/h	0 - 23.7 mph

## Drive axles

Type	Fully floating drive shafts with planetary type hub reduction gears
Front axle, make	Volvo
Designation	AWB 30
Rear axle, make	Volvo
Designation	AWB 30
Differential lock	Electro-hydraulic
Control	Hydraulic via servo pressure

### Oil grade Volvo WB 101

Oil intended for axles with built-in wet brakes

### Requirements

Egenskap Property	Enhet Unit	Transmissionsolja Transmission oil Volvo WB 101		Provningmetod Test method
Densitet Density	kg/m <sup>3</sup>		Ange To be stated	ASTM D 1298
Flampunkt COC Flash point COC	°C	min	180	ASTM D 92
Lågsta flyttemperatur Pour point	°C	min	- 27	ASTM D 97
Viskositet vid 40 °C Viscosity at 40 °C	mm <sup>2</sup> /s (cSt)		Ange To be stated	ASTM D 445
Viskositet vid 100 °C Viscosity at 100 °C	mm <sup>2</sup> /s (cSt)	min max	9,0 12,5	ASTM D 445 Din Draft 51350
Viskositet vid 100 °C efter skjuvning 30 cykler Viscosity at 100 °C after shearing 30 cycles	mm <sup>2</sup> /s (cSt)	min	8,8	CEC-L-14-A-78
Viskositet vid 20 °C Viscosity at 20 °C	mPas	max	3500	ASTM D 2602
Rostskydd 24 h Rust protection 24 h			Ingen rost No rust	ASTM D 665A
API klass API class			GL-4	ASTM STP-512A
Additiv Additive			Lubrizol/Unizol LZ 9990A	
Fasta föroreningar Solid particles	klass code	max	18/13	ISO 4406



## Oils for Volvo Wheel Loaders AB axles, type AWB

Example of oils which meet the requirements as shown on the previous page

### Oil company

Q8  
MOBIL  
ESSO  
STATOIL  
AGROL

### Trade name

Q8 T2200  
MOBILGLUID 424  
TORQUE FLUID 56  
TRANSWAY WB  
AGROL HYBRAN

The following oils are approved only if the oil contains the additive Lubrizol LZ9990A (also appears under the name Unizol)

### Oil company

FUCHS  
CASTROL  
BP  
BP  
ELF

### Trade name

FUCHS RENEGEAR HYDRA MC- ZF 20W/40  
CASTROL POWERTRANS  
BP TRACTRAN 9  
HYDRAULIKÖLE TF-JD  
ELF TRACTELF BF12

## HYDRAULIC SYSTEM

### Type

#### Hydraulic oil pump

Flow at 36.7 r/s (2200 rpm) and 10 MPa  
(100 bar) (1450 psi)

Working pressure, high idling

Servo-assisted of the "Open Centre" type

212 litre (56 US gal) per minute

22.5 MPa (225 bar) (3263 psi)

### Control valve, type

Shock valve for tilting function, rearward

Shock valve for tilting function, forward

Shock valve for lifting function

### Open Centre

24.5 ±0.9 MPa (245 ±9 bar) (3553 ±131 psi)

17.5 ±0.9 MPa (175 ±9 bar) (2538 ±131 psi)

32.0 ±0.9 MPa (320 ±9 bar) (4641 ±131 psi)

### Servo pump, type

Flow at 35.0 r/s (2100 rpm) and 10 MPa  
(100 bar) (1450 psi)

Servo pressure (throughout the whole  
working range)

### Gear Pump

25 litre (6.6 US gal) per minute

3.0 – 4.0 MPa (30 – 40 bar) (435 – 580 psi)

## STEERING SYSTEM

### Type

Number of steering wheel turns, total

Steering arc

### Load-sensing hydrostatic

4.15 revolutions

±40 °

## Oil pump

### Type

Working pressure, max.

### Variable axial piston pump

21.0 ±0.35 MPa (210 ±3.5 bar) (3046 ±51 psi)

Flow at 35 r/s (2100 rpm)

and 10.0 MPa (100 bar) (1450 psi)

Shock valve opening pressure

91 litre (24 US gal) per minute

28 MPa (280 bar) (4061 psi)

## PERMISSIBLE PULLING POWER

Permissible temporary pulling power at rear towing device

Horizontally

Vertically

100 kN (22450 lbf)

35 kN ( 7858 lbf)

## 134 Specifications

### BRAKES

Service brakes, type	Dual circuit, all-hydraulic with disc brakes and chargeable accumulators
Brake lining area per wheel	1290 cm <sup>2</sup> (200 in <sup>2</sup> )
Brake disc, min. thickness	7.2 mm (0.28 in)
Brake disc, new disc	8.5 mm (0.33 in)
Accumulator capacity	2 x 1.0 litre (2 x 60 in <sup>3</sup> )
Parking brake, type	Mechanically or electrically operated disc brake, positioned externally on the front output shaft of the transmission
Brake linings thickness	10 mm (0.39 in)
thickness, min.	2 mm (0.08 in)
Electrically operated parking brake	
Accumulator capacity	1 x 0.5 litre (1 x 30 in <sup>3</sup> )

### CAB

#### General

The cab is mounted on rubber blocks, it is well insulated and has a flat floor with moulded rubber mat.

Tested and approved as a protective cab according to Swedish Labour Welfare Act 3 : 8 and meets standards according to ISO 3471-1994 and SAE J1040-APR 88 (ROPS), ISO 3449-1992 and SAE J231-JAN 81 ( FOPS) as well as ISO 6055-1981 (protective roof for rider trucks).

Cab interior fittings and upholstery	Flame retardant ISO 3795-1989
Number of emergency exits	2 (door and right side window).

### Heating and ventilation

The basic version of the loader is provided with a heating and ventilation system with defrosting for all windows and the best possible air distribution (14 outlets). The cab fan is a double radial fan and it has four speeds.

### Operator seat

Height adjustment (rapid adjustment)	100 mm (4 in)
Longitudinal adjustment	160 mm (6.3 in)
Adjustment for driver weight	40 - 130 kg (88 - 287 lb)
Adjustment of back-rest, (adjustable back-rest inclination)	12 °
Upholstery	Fire resistant
Lap type seat belt with reel	Yes

### SOUND AND VIBRATION INFORMATION

#### Sound pressure level (LpA) Enclosed Cab, (see decal value on the machine)

The sound is measured on a stationary machine under conditions according to ISO 6394 and (86/662/EEC).

#### Sound power level (LwA) around the machine (see decal value on the machine)

The sound is measured on a stationary machine under conditions according to ISO 6393 and 86/662/EEC.

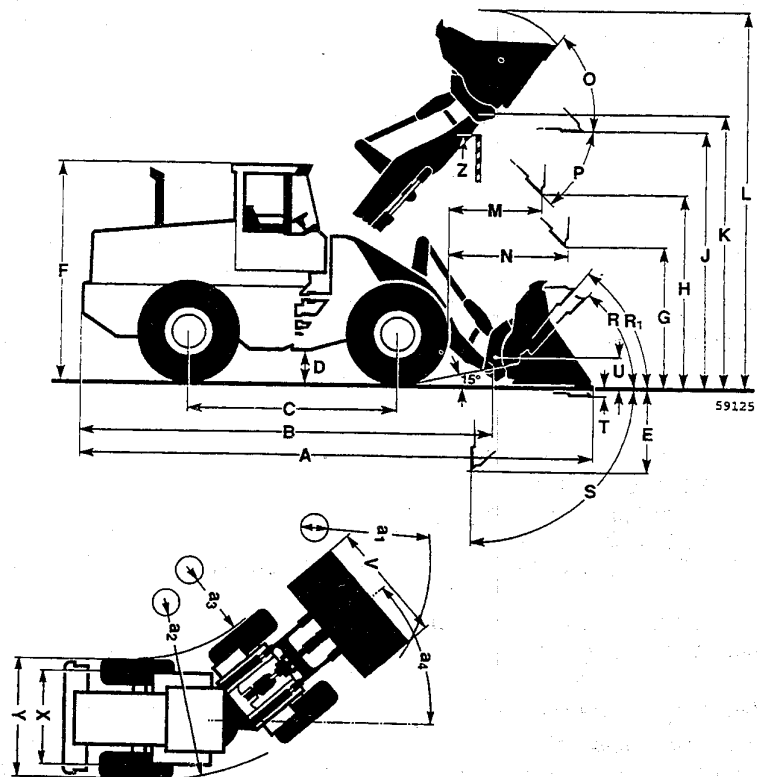
#### Whole body vibrations:

The weighted root mean square acceleration to which the operator is subjected through the seat is 0.7 – 1.3 m/s<sup>2</sup> under normal operating conditions according to ISO 8041. The measuring is carried out according to ISO 2631/1.

# DIMENSIONAL DRAWING

Specifications and dimensions comply in applicable parts with ISO 7131 1984, SAE J732 JUN 92, ISO 7546 1983, SAE J742 FEB 85, ISO 5998 1986, SAE J818 MAY 87.  
The data apply to a machine provided with a 2.2 m<sup>3</sup> (2.9 yd<sup>3</sup>) direct-mounted bucket and with 20.5 R x 25 radial tyres.

A	= *
B	= 6050 mm 19 ft 10.2 in
C	= 3000 mm 9 ft 10.1 in
D	= 410 mm 1 ft 4.1 in
E	= *
F	= 3270 mm 10 ft 8.7 in
G	= 2135 mm 7 ft 0.1 in
H	= *
J	= 3540 mm 11 ft 7.4 in
K	= 3820 mm 12 ft 6.4 in
L	= *
M	= *
N	= *
O	= 56°
P	= 45°
R	= 43°
R1	= 48°
carrying Position	
	= 67°
T	= 80 mm 0 ft 3.1 in
U	= 450 mm 1 ft 5.7 in
V	= *
X	= 1960 mm 6 ft 5.2 in
Y	= 2490 mm 8 ft 2.0 in
Z	= 3460 mm 11 ft 4.2 in
a <sub>1</sub>	= *
a <sub>2</sub>	= 5370 mm 17 ft 7.4 in
a <sub>3</sub>	= 2880 mm 9 ft 5.4 in
a <sub>4</sub>	= ±40°



\*) See table on the next page

## Bucket diagram

Type of appl.	Size of bucket	Material density t/m <sup>3</sup>									
		0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2
Rehandling *)	2.2 m <sup>3</sup> P										
	2.9 yd <sup>3</sup> H										
	2.2 m <sup>3</sup> H										
	2.9 yd <sup>3</sup> P										
	2.4 m <sup>3</sup> P										
	3.1 yd <sup>3</sup> H										
	2.4 m <sup>3</sup> H										
	3.1 yd <sup>3</sup> P										
Heavy duty	2.5 m <sup>3</sup> P										
	3.3 yd <sup>3</sup> H										
	2.5 m <sup>3</sup> H										
	3.3 yd <sup>3</sup> P										
Light material *)	2.6 m <sup>3</sup> P										
	3.4 yd <sup>3</sup> H										
	2.6 m <sup>3</sup> H										
	3.4 yd <sup>3</sup> P										
Hi tip *)	2.2 m <sup>3</sup> P										
	2.9 yd <sup>3</sup> H										
	4.0 m <sup>3</sup> H										
	5.2 yd <sup>3</sup> P										
Multi purp.	2.1 m <sup>3</sup> P										
	2.8 yd <sup>3</sup> H										
Side tip	2.1 m <sup>3</sup> P										
	2.8 yd <sup>3</sup> H										
Bucket fill 115%		675	1015	1350	1690	2025	2360	2700	3035	3370	3710
ISO/SAE 100% 95%											
		Material density lb/yd <sup>3</sup>									

\*) incl. counterweight 1

# 136 Specifications

## MACHINE CAPACITY

**A = Direct-mounted bucket without teeth**

**B = Bracket-mounted bucket without teeth**

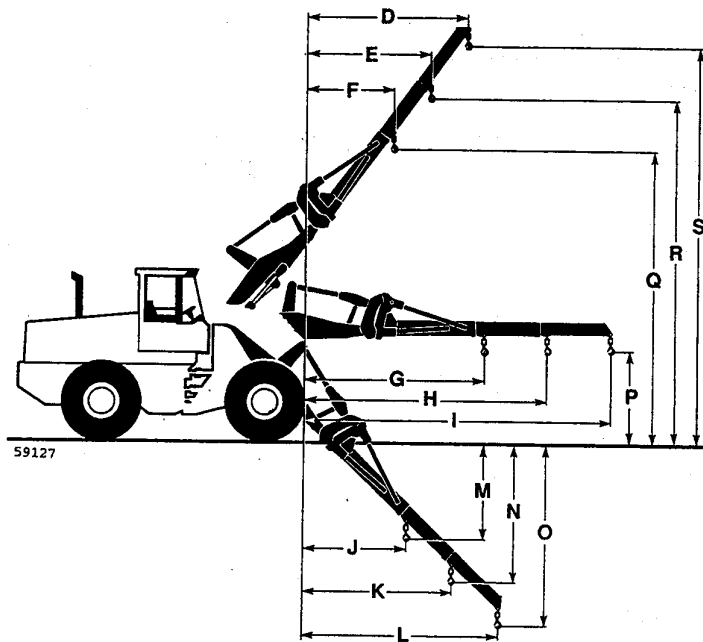
Attachment		A	B	A	B	A
Capacity	m <sup>3</sup> yd <sup>3</sup>	2.2 2.9	2.2 2.9	2.4 3.2	2.5 3.3	2.6 3.4
Lifting height						
(H) Max. discharging height with bucket tilted 45 ° forward	mm ft in	2740 8 11.9	2810 9 2.6	2770 9 1.1	2680 8 9.5	2730 8 11.5
Reach						
(M) Reach at max. discharging height under bucket tilted 45° forward	mm ft in	1230 4 0.4	1150 3 9.3	1190 3 10.8	1290 4 2.8	1230 4 0.4
(N) Max. reach at a discharging height of 2 m with attachment tilted 45 ° forward	mm ft in	1700 5 6.9	1650 5 5.0	1670 5 5.7	1720 5 7.7	1690 5 6.5
Overall length (A)	mm ft in	7380 24 2.6	7280 23 10.6	7330 24 0.6	7470 24 6.1	7400 24 3.3
Max. height (L)	mm ft in	5240 17 2.3	5180 16 11.9	5230 17 1.9	5320 17 5.4	5290 17 4.3
Clearance circle (a1)	mm ft in	11960 39 2.9	11900 39 0.5	11930 39 1.7	12010 39 4.8	11970 39 3.3
Width across attachment (V)	mm ft in	2650 8 8.3	2650 8 8.3	2650 8 8.3	2650 8 8.3	2650 8 8.3
Breakout force, tilting cylinder	kN lbf	116.6 26177	127.6 28646	122.0 27389	109.1 24493	116.4 26132
Tipping load straight	kg lb	9830 21675	10370 22866	10060 22182	10200 22491	10180 22447
Tipping load steered 35 °	kg lb	8730 19250	9250 20396	8960 19757	9120 20110	9060 19977
Tipping load fully steered	kg lb	8400 18522	8910 19647	8620 19007	8760 19316	8720 19228
Excavating depth at max. forward tilting (E)	mm ft in	1110 3 7.7	1020 3 4.2	1070 3 6.1	1190 3 10.9	1120 3 8.1
Machine weight	kg lb	14570 32127	14340 31540	14390 31730	14950 32965	14460 31884

Additional counterweights: Counterweight I (300 kg (662 lb)) may be used for all kinds of work for stabilising purposes. Counterweight II (500 kg (1103 lb)) must only be used for STABILISING PURPOSES during timber and pallet handling on level and hard ground.

### Material handling arm

Tyres: 20.5 R25  
Way of attaching Bracket-mounted  
Order no. 92008  
Weight 500 kg (1103 lb)  
A, B, C (permissible load, kg – see decal on the material handling arm)

D = 2840 mm	9 ft	3.8 in
E = 2230 mm	7 ft	3.8 in
F = 1670 mm	5 ft	5.7 in
G = 3380 mm	11 ft	1.1 in
H = 4410 mm	14 ft	5.6 in
I = 5550 mm	18 ft	2.5 in
J = 1920 mm	6 ft	3.6 in
K = 2650 mm	8 ft	8.3 in
L = 3450 mm	11 ft	3.8 in
M = 1790 mm	5 ft	10.5 in
N = 2520 mm	8 ft	3.2 in
O = 3320 mm	10 ft	10.7 in
P = 1530 mm	5 ft	0.2 in
Q = 5260 mm	17 ft	3.1 in
R = 6130 mm	20 ft	1.3 in
S = 7082 mm	23 ft	2.8 in

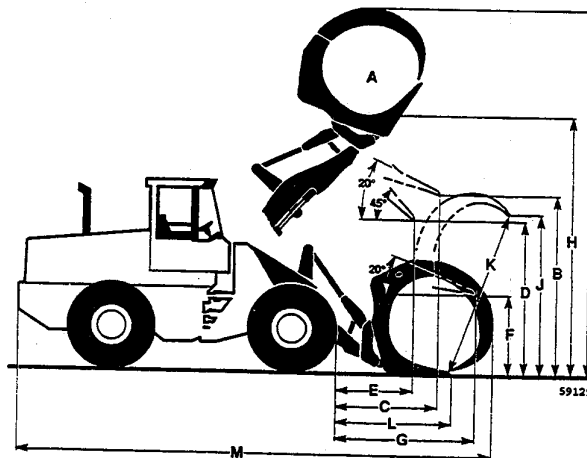


Machine weight: 14100 kg (31091 lb)  
Operating load table: see page 72.

### Timber sorting fork

Way of attachment Bracket-mounted  
Order no. 91743  
Machine weight 15030 kg (33141 lb)

A = 1.7 m <sup>2</sup>	18.3 ft <sup>2</sup>
B = 3310 mm	10 ft 10.3 in
C = 1820 mm	5 ft 11.7 in
D = 2750 mm	9 ft 0.3 in
E = 1470 mm	4 ft 9.9 in
F = 1470 mm	4 ft 9.9 in
G = 2610 mm	8 ft 4.8 in
H = 4380 mm	14 ft 4.4 in
I = 6110 mm	20 ft 0.6 in
J = 2400 mm	7 ft 10.5 in
K = 2590 mm	8 ft 6.0 in
L = 1990 mm	6 ft 6.3 in
M = 8210 mm	26 ft 11.2 in



# 138 Alphabetical index

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**VOLVO**

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