

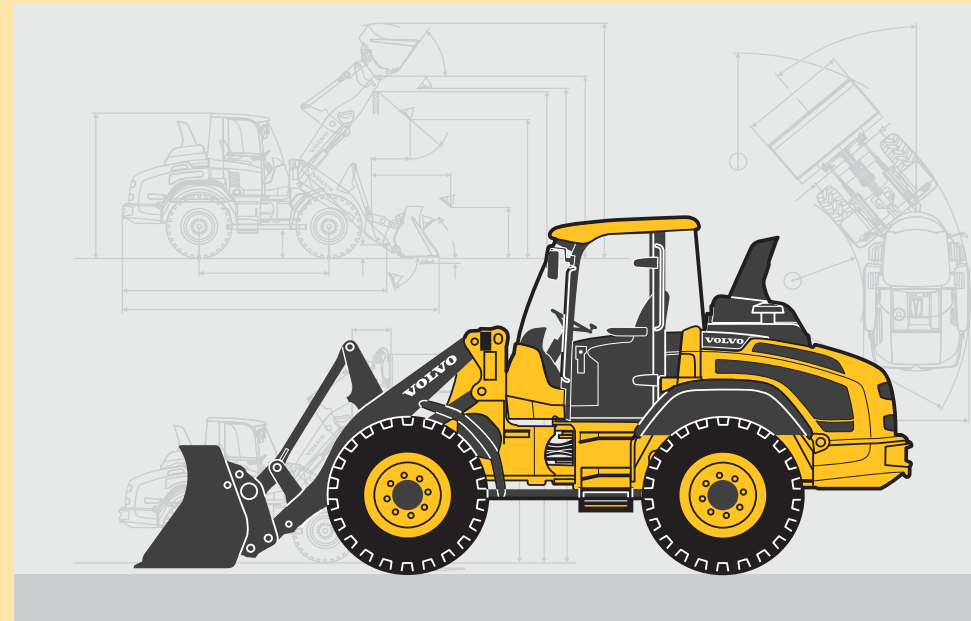


VOLVO CONSTRUCTION EQUIPMENT

OPERATOR'S MANUAL

# L45H/L50H

L45H/L50H



**VOLVO**

Volvo Construction Equipment

Ref. No. 20044395\_A English  
2016.01  
Volvo, Eskilstuna

English





**California  
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

**California  
Proposition 65 Warning**

Battery posts, terminals and other related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and other reproductive harm.

**Wash hands after handling.**



## L45H/L50H

### Foreword

This operator's manual is intended as a guide for the correct use and maintenance of the machine. Read this manual carefully before you start and move the machine or before you carry out any preventive maintenance.

Keep this manual in the lockable storage compartment so that it is always available for easy reference. Replace it immediately if it is lost.

The operator's manual describes the applications for which the machine was primarily designed. It has been written to be valid on all markets. Therefore, please ignore any sections which do not relate to your machine or to the work that you do not perform with your machine.

#### NOTE!

If the manual covers more than one machine, the information relates to all machines unless otherwise specified.

When designing this machine, much time has been invested in achieving the best possible efficiency and safety. But accidents do happen, and most of them can be attributed to human error. A safety-conscious person and a well-maintained machine make up a reliable, powerful, and profitable combination. **Therefore, read the safety instructions and follow them.**

We constantly strive to develop and improve the efficiency of our products by making changes to their design. We reserve the right to make design modifications to the products even after they have been delivered. Also, we reserve the right to change data and equipment, as well as the service and maintenance instructions, without prior notice.

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## Foreword

## 2

**Safety regulations**

The machine operator is responsible for being aware of and complying with the relevant, legally prescribed, national and regional safety instructions. The safety instructions in this operator's manual are applicable as basic requirements, but national or local regulations that are more strict should be followed.

 **DANGER**

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, ***will result in death or serious injury***. Danger is limited to the most extreme situations.

 **WARNING**

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, could result in ***death or serious injury***.

 **CAUTION**

The safety symbol combined with this signal word indicates a hazardous situation which, if not avoided, could result in ***moderate or minor injury***.

**NOTICE**

Indicates a potentially hazardous situation which may result in machine damage.

**NOTE!**

Used in order to refer to installation, operating, or maintenance information which is important but not danger-related.

**Get to know the capacity and limits of your machine!**



## Identification numbers

In order to avoid queries when ordering spare parts or in case of enquiries by phone or in writing please make a note of the machine data on the page below.

Manufacturer:	Volvo Construction Equipment Germany GmbH Max-Planck-Straße 1 54329 Konz, Germany
Model/Type:	
Product identification number:	
Year of manufacture:	

### Model specific information

The information in the manual applies to all machine models unless otherwise stated.

### Contact information

Please send any comments about the Operator's Manual to [om@volvo.com](mailto:om@volvo.com)



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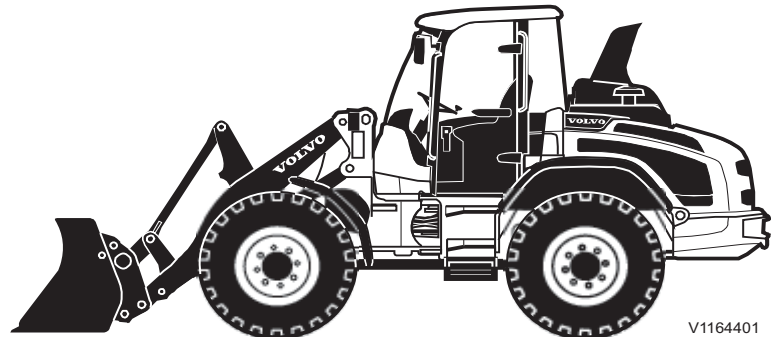
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## Presentation



### Intended use

The basic machine is intended to be used under normal conditions, that is, outdoors, above ground, up to 2000 metres (6562 ft) above sea level, off-road, for earthmoving operations, at an ambient temperature between  $-25\text{ }^{\circ}\text{C}$  ( $+13\text{ }^{\circ}\text{F}$ ) and  $+45\text{ }^{\circ}\text{C}$  ( $+139\text{ }^{\circ}\text{F}$ ) with only the operator in the cab. Conditions that deviate from this are also described in the Operator's Manual. For use on public roads the machine must be adapted according to governing national legislation.

If it is used for other purposes or in potentially dangerous environments, e.g., explosive and/or flammable environments or areas with dust containing asbestos, special safety regulations must be followed and the machine must be equipped for such use and handling. Contact the manufacturer/dealer for more information.

The machine is designed for a max. total weight (incl. equipment and attachments), see page 297. The max. weight applies when the machine is equipped for certain applications approved by Volvo. If the maximum weight is exceeded, safety is compromised. In addition, no warranties on the part of the manufacturer will apply. However, always pay attention to national regulations for travelling on public roads.

### Operating underground

The need for ventilation of the exhausts shall be checked before the machine is used in tunnels or other underground operations. Other legislation and rules may be applicable, such as national and labour laws.

## Environmental requirements

Be aware of the environment when operating and during service and maintenance of the machine. Always follow local and national environmental legislation applicable to all handling of the machine.

## Frame

Articulating frame concept with oscillating rear axle suspension. Front and rear frame designed for maximum ground clearance with robust articulation joint bearings.

## Engine

The machine is equipped with a straight four-cylinder, four-stroke, turbocharged diesel engine with Common Rail fuel direct injection and intercooler.

Engines intended for the USA fulfil US EPA Tier 4 Final and California Tier 4 Final.

Engines intended for the EU fulfil EU's Stage IV emission legislation.

### NOTE!

Machines with engines for the USA-market may not be sold or used within the EU, and machines with engines for the EU-market may not be sold or used within the USA, unless the engine is replaced by an engine valid for the applicable market. Which market the engine is designed for is shown on the exhaust decal (see page 24).

In order to reduce nitrogen oxides, particles, hydrocarbons, and carbon monoxide, the engine features external, cooled exhaust gas recirculation (EGR) and an exhaust aftertreatment system (EATS).

The exhaust system is certified as spark arrester according to Directive 97/68/EC and EN 1834.

## AdBlue®/DEF information

AdBlue®/DEF is needed to reduce emissions of nitrogen oxides (NO<sub>x</sub>). AdBlue®/DEF is filled in a separate tank on the machine which is completely separated from the fuel tank. AdBlue®/DEF may not be filled in the diesel tank, and diesel may not be filled in the AdBlue®/DEF-tank.



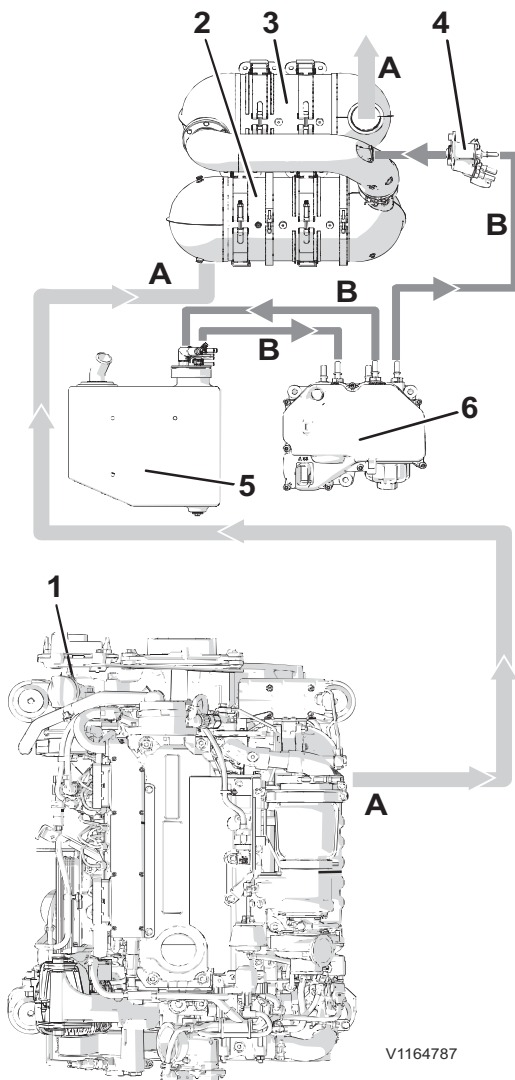
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For distribution of AdBlue®/DEF (only applies to market USA):

- Volvo CE Customer Support: 1-877-823-1111 (office hours)
- [www.volvoce.com](http://www.volvoce.com) (outside of office hours)

For distribution of AdBlue®/DEF (all other markets), contact your local Volvo dealer for more information.

See page 251 for information about topping up AdBlue®/DEF.



- A Exhausts
- B AdBlue®/DEF
- 1 Engine
- 2 Diesel particulate filter (DPF)
- 3 SCR catalytic converter
- 4 Injector for AdBlue®/DEF
- 5 AdBlue®/DEF tank
- 6 Pump for AdBlue®/DEF

## Exhaust aftertreatment system

### Exhaust aftertreatment system

The engine features an exhaust aftertreatment system (EATS) in the form of two mufflers. The first one contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF) to reduce emissions of particulate matter (PM). The second one contains a selective catalytic reduction catalyst (SCR) to reduce nitrogen oxide (NOx) emissions.

The SCR uses diesel exhaust fluid, called AdBlue® or diesel exhaust fluid (DEF), to reduce the NOx emissions. An AdBlue®/DEF injection system is used to add this fluid to the exhaust.

During the regeneration process the exhaust temperature may increase also at the outlet of the end-pipe. Due to the increased temperature, the regeneration process is not automatic but it is started manually. The operator receives an indication via the machine's information display unit when the filter needs a regeneration.

## Electrical system

The system voltage of electrical systems is 24 Volts. The two 12 Volt batteries, connected in series, are located in the engine compartment, on the left hand side. The battery disconnect switch is located behind the upper step of the cab entrance. Mainly, the relays and fuses are located in the electrical distribution box behind the driver's seat. For further locations and specifications, see page 284.



## Brake system

The brake system consists of the service brake and the parking brake system.

The service brake system is hydraulic and uses the hydraulic oil tank.

Inching-brake pedal for hydrostatic braking via transmission and subsequent hydraulic operation of the service brakes.

**Service brakes:** Inboard wet disc brakes:

- On rear axle. Front axle braking via propeller shaft.

**Parking brake:**

Dry disc brake on input shaft of front axle mechanically operated via lever.

## Steering system

Articulated frame steering with dampened end stops. Hydrostatic load-sensing steering system with two double-acting steering cylinders.

The secondary steering pump is standard on certain markets and is recommended for machines that are going to be operated on public roads.

Comfort Drive Control (CDC) is also available as optional equipment.

## Cab

The cab has air conditioning and a heating and ventilation system with defrosting for all windows.

## Emergency exit

The cab has one emergency exit. The rear window to be smashed with emergency hammer.

## FOPS and ROPS

The cab is approved as a protective cab according to the FOPS and ROPS standards, see page 294. FOPS is an abbreviation of Falling Object Protective Structure and ROPS is an abbreviation of Roll Over Protective Structure.

If any part of the cab's protective structure is affected by any remaining deformation or failures, the cab shall be inspected immediately and



necessary actions shall be taken. Contact Volvo or a Volvo dealer for an inspection and action.

Never perform any unauthorized modifications to the cab, e.g., lowering the roof height, drilling, welding on brackets for fire extinguisher, radio aerial, or other equipment, without first, via a dealer, having discussed the modifications with personnel at Volvo Construction Equipment's Engineering Department. This department will decide whether the modification may cause the approval to become void.

## Hydraulic system

The hydraulic system is load-sensing, which means that the oil in the system is supplied in proportion to the position of the control levers for the hydraulic functions. When the hydraulic control levers are in neutral position, consequently no oil is supplied.

The steering system has priority supply from the variable displacement pump for the work hydraulic. The auxiliary pump feeds the brake system and the fan drive. The combined suction and return flow filter serves the hydrostatic transmission pump. Thermostatically controlled oil flow to the integrated oil cooler.

## Equipment

The machine can be provided with different types of optional equipment, depending on the requirements of different markets. Examples are Comfort Drive Control (CDC), BSS (Boom Suspension System), secondary steering, separate attachment locking, automatic engine shut-down, and automatic greasing system.

## Modifications

Modifications of this machine, including the use of unauthorized attachments, accessories, units, or parts, may affect the machine's integrity (condition) and/or the machine's ability to function in the way for which it is designed. Persons or organizations performing unauthorized modifications assume all responsibility for consequences that arise due to modifications or can be attributed to modifications, including damages to the machine.





No modifications of any kind may be performed on this product unless each specific modification first has been approved in writing by Volvo Construction Equipment. Volvo Construction Equipment reserves the right to reject all warranty claims that have arisen due to or can be traced to unauthorized modifications.

Modifications may be considered to be officially approved, if at least one of the following conditions has been met:

- 1 The attachment, the accessory, the unit, or the part has been manufactured or distributed by Volvo Construction Equipment and has been installed according to the factory-approved method described in a publication available from Volvo Construction Equipment; or
- 2 The modification has been approved in writing by the Engineering Department for the relevant product line at Volvo Construction Equipment.

## Anti-theft device

### (Optional equipment)

Installed theft protection makes it more difficult to steal the machine. Volvo CE can supply theft protection as optional equipment. If your machine is not equipped with such an option, look into the possibility of having one installed by your dealer.

## Logged machine data

The machine is equipped with software systems that register and store various types of information. The information can be transferred to Volvo to be used for product development purposes and when troubleshooting. Stored information includes, among others, travel speed, fuel consumption, and various temperatures. Volvo and its authorised workshops will make use of this information.

## CareTrack

The machine may be equipped with CareTrack, a telematics system developed by Volvo Construction Equipment. The system stores machine data, e.g., machine position, operating hours, fuel consumption, fuel level, that can be sent by wireless transmission to a computer. CareTrack



## Presentation

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is available in different versions, depending on the required information level.

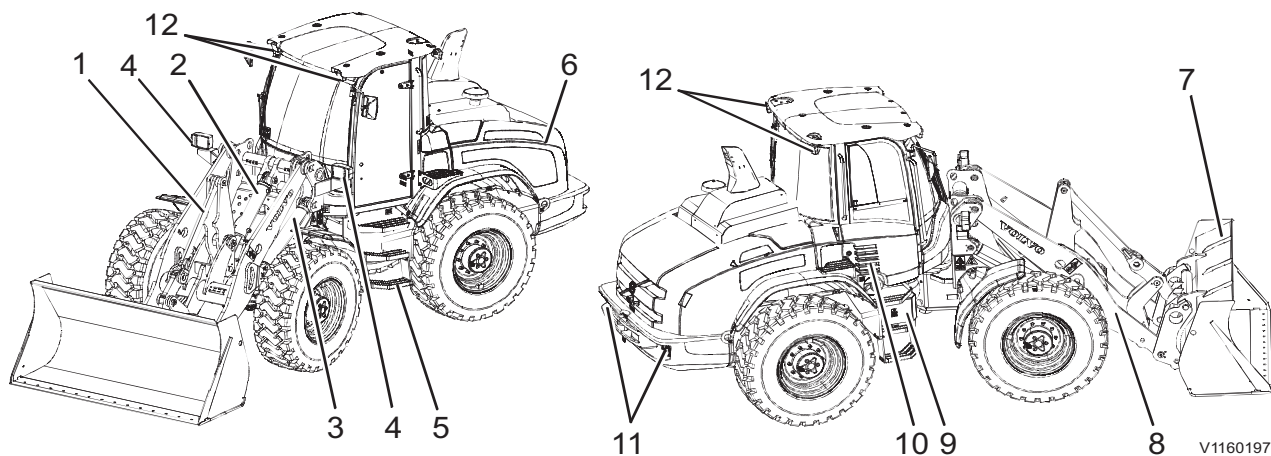
CareTrack makes it easier to plan for service and reduces costly downtime. Productivity is improved by knowing if machines are being operated correctly and how much fuel is being consumed. CareTrack also allows the customer to restrict the operating area of the machine, by using virtual fences. This helps to eliminate unauthorized machine use and theft. For further information, contact a Volvo Construction Equipment dealer.

The CareTrack system transmits data, in the same way a mobile phone does, with a maximum output rate of 10 W. The transmitter is always on and the operator cannot switch it off.

Local precautions and restrictions applicable to mobile phones, for example safety distance, also apply to the CareTrack system.

## Machine view

The terms left-hand and right-hand, when used in this manual, indicate the sides of the machine as seen from the operator seat facing the front of the machine.



1	Tilt linkage	7	Bucket
2	Tilt cylinder	8	Lifting arms
3	Lift cylinder	9	Filling points for fuel and AdBlue®/DEF
4	Front lights with direction indicators	10	Cab filter cover
5	Steps, lower step with flexible suspension	11	Rear lights with direction indicators and back-up lights
6	Engine hood	12	Working lights, front and rear



V1054128

## CE-marking, EMC-directive

### CE-marking

#### (Declaration of Conformity)

This machine is CE-marked. This means that, when delivered to the customer, the machine meets the applicable "Essential Health and Safety Requirements" according to EU's so-called Machine Safety Directive, 2006/42/EC.

The person making any changes that affect machine safety is also responsible for the same.

As proof of that the requirements are met, an EU Declaration of Conformity and a sound certificate regarding sound level in dB(A) are supplied with the machine. The sound certificate includes both measured external values and guaranteed sound level. These declarations are issued by Volvo for each individual machine. This EU declaration also covers attachments manufactured by Volvo. The documentation is valuable and should be kept safe and **saved for at least ten 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, safety must be ensured all times and in each separate case. A modification may in certain cases require new CE-marking and issuing of a new EU declaration of conformity. The person performing the modification is responsible for this.

### EU's EMC-directive

The machine's electronic equipment may in some cases cause interference with other electronic equipment, or be subjected to external electromagnetic interference which may result in safety risks.

The EU EMC-directive on "Electromagnetic compatibility", 2004/ 108/EC, provides a general description of what requirements can be made of the machine from a safety perspective, where limit values have been established in international standards.

A machine or device must meet the standards in order to be CE-marked. Our machines are tested especially for electromagnetic interference. The



Presentation  
**CE-marking, EMC-directive** 19

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machine's CE-marking and the declaration of conformity also include the EMC-directive.

If other electronic equipment is installed on this machine, the equipment must be CE-marked and tested on the machine for electromagnetic interference.

### **Declaration of Conformity**

The following pages show an example of a general translated copy of the declaration of conformity for machine and a general translated copy of the declaration of conformity for attachments in the category **“interchangeable equipment”** (attachments that can be changed by operator).

**NOTE! Declaration of conformity only applies within the European Union.**



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CE-marking, EMC-directive

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Valid for Volvo Wheel Loaders

**EU DECLARATION OF CONFORMITY FOR MACHINES (IIA)**

Volvo Construction Equipment Germany GmbH, D-54329 KONZ, Germany, hereby declares that the product:

Manufacturer	Volvo Construction Equipment
Type:	Wheel loader LYYYY
Product identification number (PIN):	*VCELXXXXXXXXXXXXXXXX*

for which this declaration is intended, meets the relevant regulations for "Essential Health and Safety Requirements" according to:

European Council's directive 2006/42/EC for machines,

European Council's directive 2000/14/EC for noise emission to the environment from outdoor equipment

European Council's directive 2004/108/EC for electromagnetic compatibility, as well as amendments of these for machines, and other applicable directives.

Governing harmonised standards:

EN 474-1:2006+A1:2009 Earthmoving machines – Safety general requirements,

EN 474-3:2006+A1:2009 Earthmoving machines – Requirements for Loaders.

This declaration only covers the machine in the condition in which it was introduced on the market, and does not include components that have been retrofitted or work after this which has been done by the end-user.

Authorized issuer's signature and person authorized to compile the technical file which has been established in the European Community:

.....  
Signature / Clarification of signature (print)

.....  
Occupation or title

.....  
Address and date of issue

Signature of authorised representative in the European Community with authorisation to complete the manufacturing process and produce the manufacturer's declaration of conformity (if applicable)

.....  
Signature / Clarification of signature (print)

.....  
Occupation or title

.....  
Address and date of issue

This declaration covers attachments that have been developed, designed/approved,





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CE-marking, EMC-directive

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Valid for attachments in the category "interchangeable equipment" (attachments that can be changed by operator) for Volvo Wheel Loaders

**EU DECLARATION OF CONFORMITY FOR MACHINES (IIA)**

Volvo Construction Equipment Germany GmbH, D-54329 KONZ, Germany, hereby declares that the product:

Manufacturer	Volvo Construction Equipment
Model / Type number *):	YYYYY
Serial number:	XXXXXXXXXX

for which this declaration is intended, meets the relevant regulations for "Essential Health and Safety Requirements" according to:

European Council's directive 2006/42/EC for machines and supplements for machines, and other applicable directives.

Governing harmonised standards:

EN 474-1:2006+A1:2009 Earthmoving machines – Safety general requirements,  
EN 474-3:2006+A1:2009 Earthmoving machines – Requirements for loaders.

This declaration only covers the machine in the condition in which it was introduced on the market, and does not include components that have been retrofitted or work after this which has been done by the end user

Authorized issuer's signature and person authorized to compile the technical file which has been established in the European Community:

.....  
Signature / Clarification of signature (print)

.....  
Occupation or title

.....  
Address and date of issue

Signature of authorised representative in the European Community with authorisation to complete the manufacturing process and produce the manufacturer's declaration of conformity (if applicable)

.....  
Signature / Clarification of signature (print)

.....  
Occupation or title

.....  
Address and date of issue

**The machine owner must save this declaration for at least ten years after delivery.**



## Communication equipment, installation

### **NOTICE**

All installation of optional electronic communication equipment must be performed by trained professionals and in accordance with the Volvo Construction Equipment instructions.

#### **Protection against electromagnetic interference**

This machine has been tested according to EC directive 2004/108/EEC concerning electromagnetic interference. Therefore it is very important that all non-approved electronic accessories, such as communication equipment, are tested before they are installed and used since they can interfere with the machine's electronic system.

#### **Guidelines for installing aerial (antenna)**

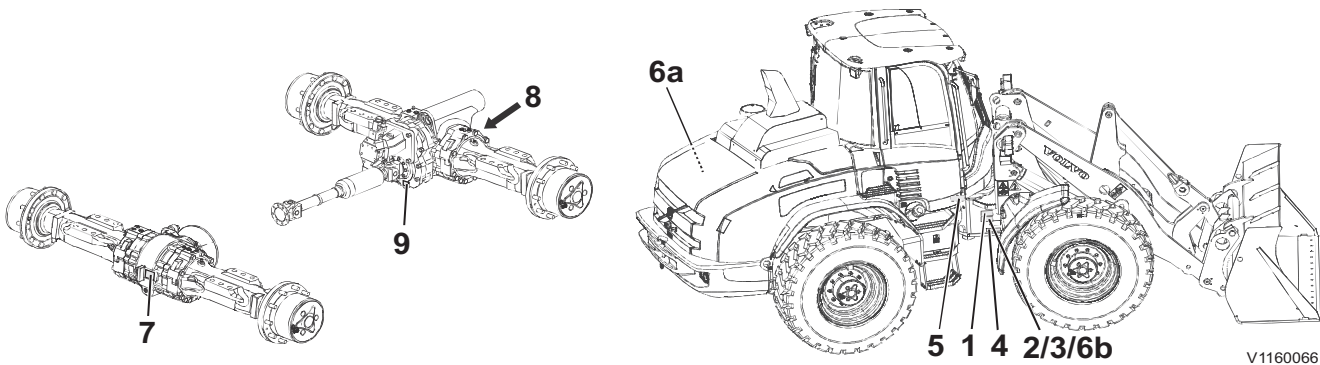
The following guidelines should be followed when installing:

- The aerial placement must be chosen to give good adaptation to the surroundings.
- The aerial cable must be of the coaxial type. Make sure that the cable is undamaged, that the screen is not split up at the ends, but thoroughly encased in the connector and has good galvanic contact with the same.
- The surface between the mounting bracket for the aerial and the point of attachment must be free from dirt and oxide. Apply corrosion protection to the surfaces after installation so that good galvanic contact is maintained.
- Make sure that cables which may cause interference are separated from those that may be subjected to interference. Interfering cables are the power supply cable and the aerial cable to the communication equipment. Cables that may suffer from interference are connecting cables for the machine's electronics. Install cable harnesses as close as possible to grounded metal surfaces since these have a screening effect.

## Product plates

With the aid of the product plates, shown below, it is possible to identify the machine and its components. The Product Identification Number, PIN, indicates the model designation, engine code and serial number of the machine. Make a note on page 3 of the identification numbers.

When ordering spare parts, and in all telephone enquiries or correspondence the PIN must always be quoted.



1	<b>PIN product plate</b> The plate is located on the right-hand side of the front frame and shows manufacturer's name and address, machine type/model, machine PIN (Product Identification Number, machine weight, engine power, year of manufacture, made in, assembled in, and CE-mark (if CE-marked)).	5	<b>Cab</b> The plate is located behind the filter cover (on the right-hand side). It shows the manufacturer's name and address, product number, machine model designation, max. machine weight, cab serial number and ROPS/FOPS certificate number.
		6	<b>Engine and Exhaust decal</b> The engine's type designation and component number.
		6a	The decal is located on the crankcase of the engine.
		6b	Supplementary exhaust decal is located on the right-hand side of the front frame, near to the PIN product plate.
2	<b>Additional type plate (Germany only)</b> The plate is located on the right-hand side of the front frame and shows the machine type, machine PIN (Product Identification Number), permissible axle loads and year of manufacture.	7	<b>Front axle</b> The manufacturer's name and address with product and serial numbers.



Presentation  
Product plates **25**

<b>3</b>	<p><b>Additional type plate (Italy only)</b> The plate is located on the right-hand side of the front frame and shows the machine type, EU approval number, permissible axle loads and data for trailer brake (if applicable).</p>	<b>8</b>	<p><b>Rear axle</b> The manufacturer's name and address with product and serial numbers.</p>
<b>4</b>	<p><b>Primary marking</b> Machine PIN stamped-in on the right-hand side of the front frame.</p>	<b>9</b>	<p><b>Transmission</b> The manufacturer's name and address with product and serial numbers.</p>

26 Presentation  
Information and warning decals

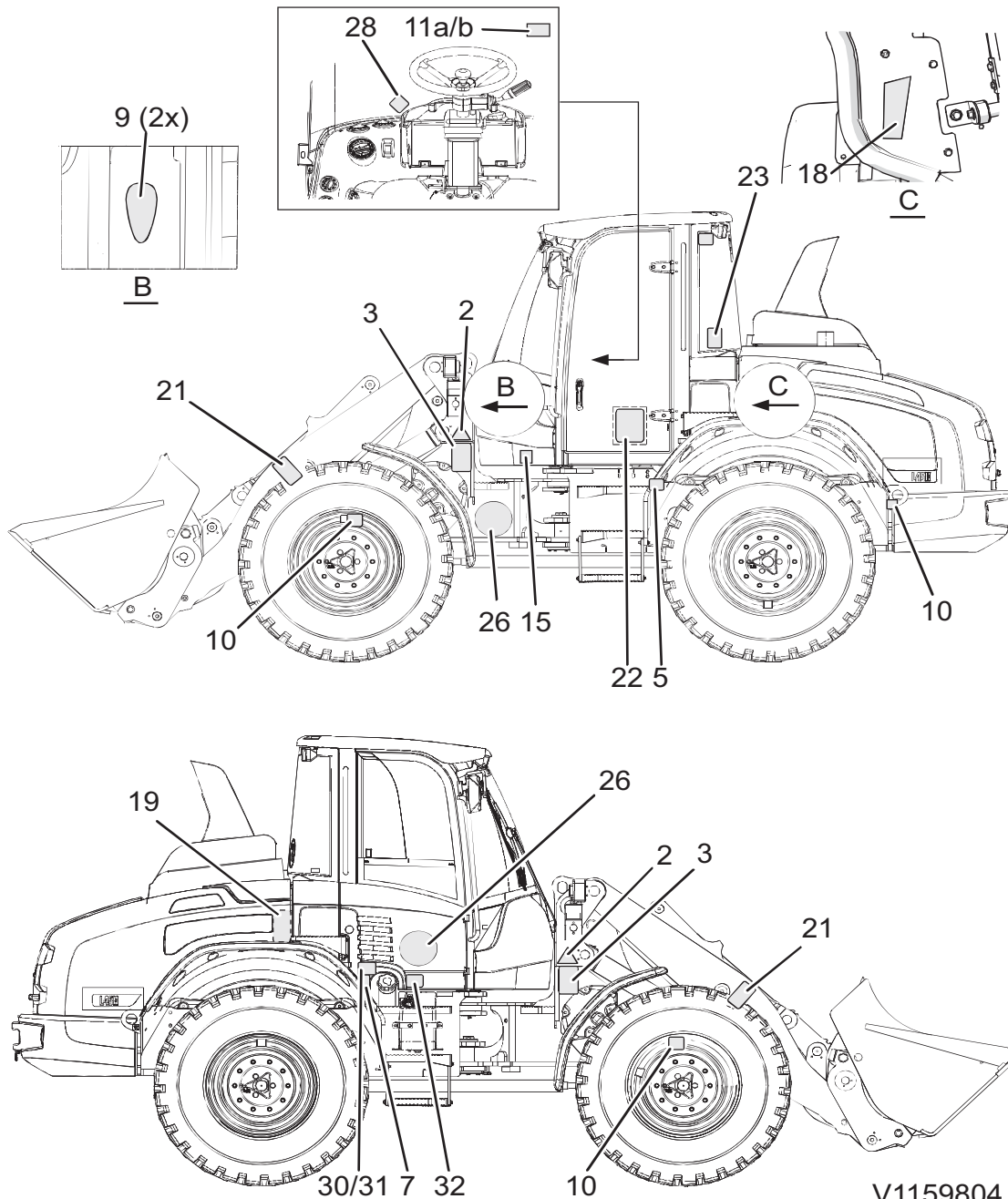
## Information and warning decals

The operator should know and pay attention to the information and warning plates/decals that are located on the machine. All decals are not installed on all machines, since they are market-dependent and machine-dependent.

The decals/plates must be kept free from dirt, so that they can be read and understood. If they have been lost or no longer are legible, they must be replaced immediately. The part number (order number) is shown on each decal/plate and in the Parts Catalogue.

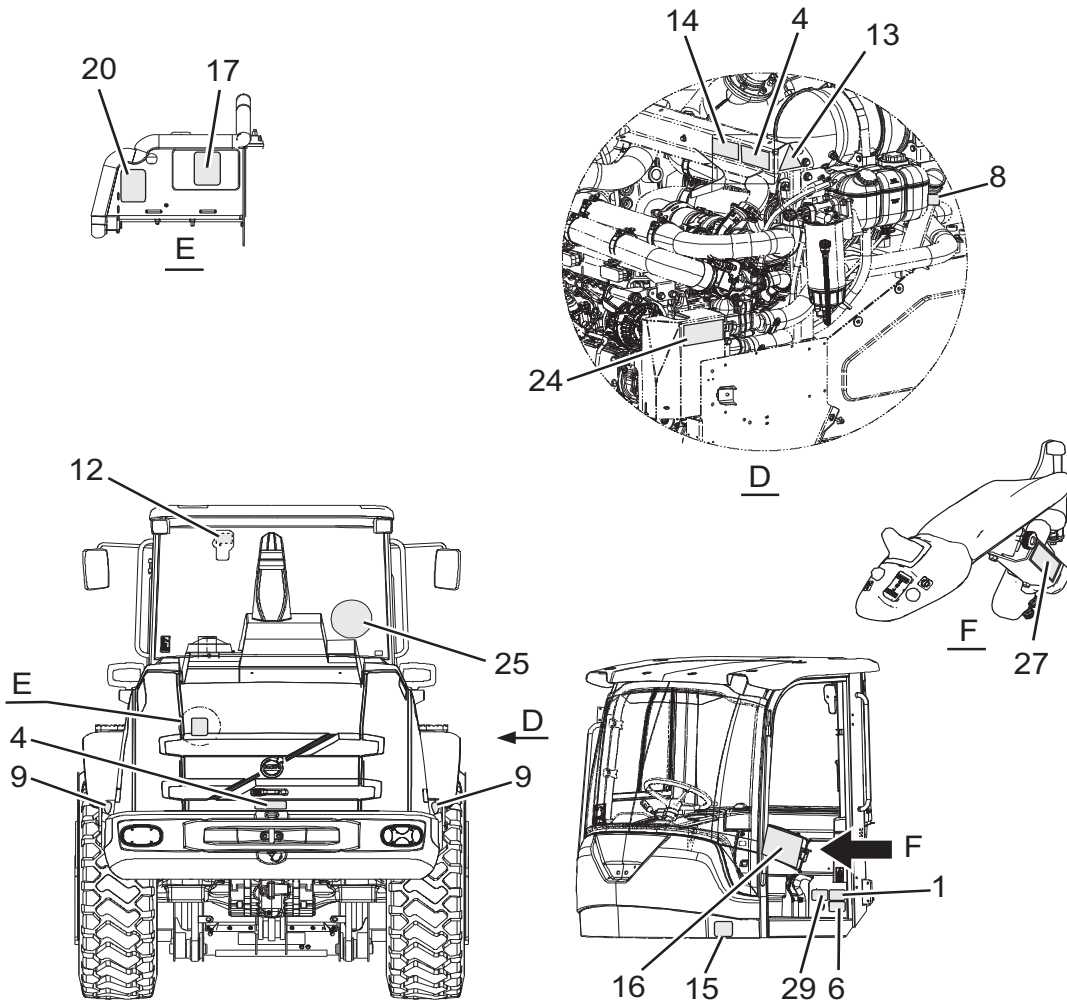
**NOTE!**

On the machine, the text WARNING! only appears on the warning decals for North America.

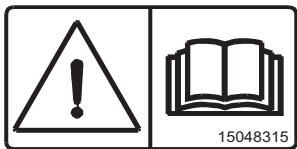




Presentation  
Information and warning decals 27



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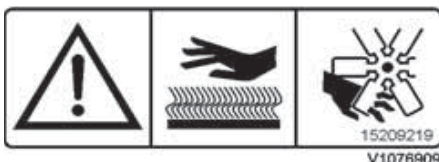
1 WARNING! First read the Operator's Manual. Spare part number in USA: 13935003.



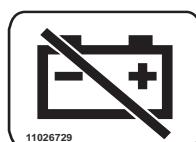
2 WARNING! Safety alert symbol: Danger area in the immediate vicinity of the machine.



3 WARNING! Risk of crushing in frame joint area. Stay a safe distance from the machine. (Spare part number in USA: 13935000)



V1076909



V1111790



V1083190

28 Presentation  
Information and warning decals

4 WARNING! Hot surfaces and rotating parts. (Spare part number in USA: 15209044)

5 Battery disconnecter.

6 WARNING! Before welding: Read the Operator's Manual.



7 Fuel, fill point.



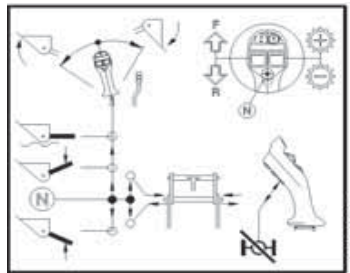
8 Hydraulic oil, fill point.



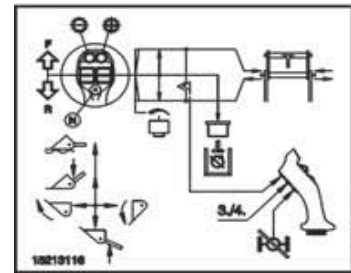
9 Lifting point.



10 Attaching point for tie-down.



11a Control functions on a single lever with Aux lever.



11b Control functions on a single lever with integrated auxiliary hydraulic functions.



12 Emergency exit.



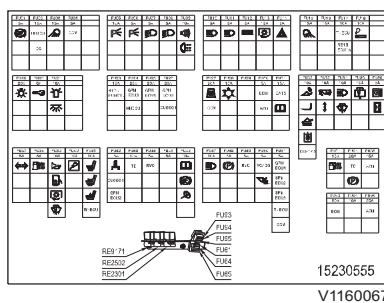
13 WARNING! Hot coolant.



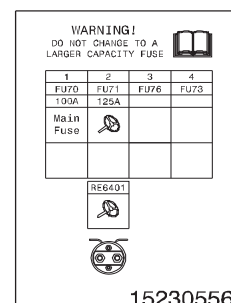
14 Only use Volvo coolant VCS.



15 WARNING! Pressurized system.

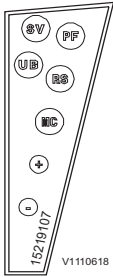


16 Fuses and relays in cab.

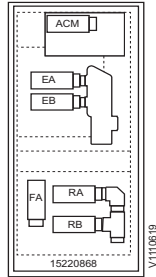


17 Fuses and relays in engine compartment.

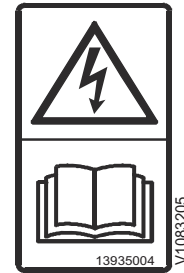
Presentation  
Information and warning decals



18 Electrical sockets on left side of cab.



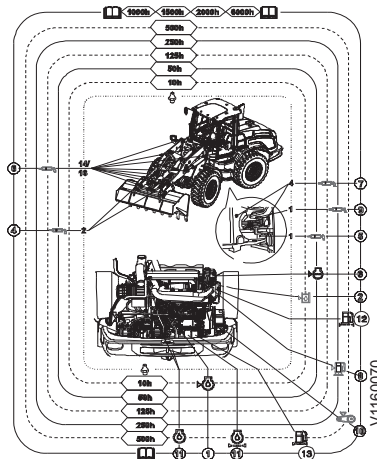
19 Electrical sockets on right side of cab.



20 WARNING! Before connecting jump-start cables - read the Operator's Manual. (Spare part number in USA: 15048257)



21 WARNING! Do not walk under raised lift arms. Stay a safe distance from the machine. Spare part number in USA: 15624249.



22 Lubrication and service chart.



23 Sound power level outside the machine.



24 Refrigerant R134a (optional with AC).



25 20 km/h (only Germany).



26 20 km/h (only Germany).

30 Presentation  
Information and warning decals



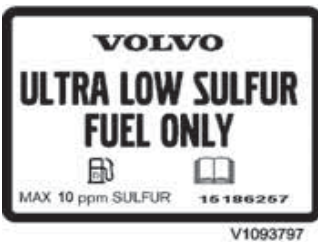
27 Activated Comfort Drive Control (CDC) is prohibited when operating on public roads - use the steering wheel.



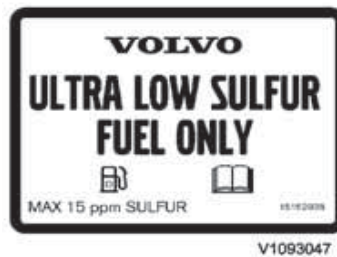
28 WARNING! Check that the attachment is locked. (Spare part number in USA: 13935000)



29 Power lines, min. clearance.



30 Fuel decal (only EU) / Max. 10 ppm SULPHUR.



31 Fuel decal (only US) / Max. 15 ppm SULPHUR.



32 AdBlue®/DEF, filling. See page 251.



# Instrument panels

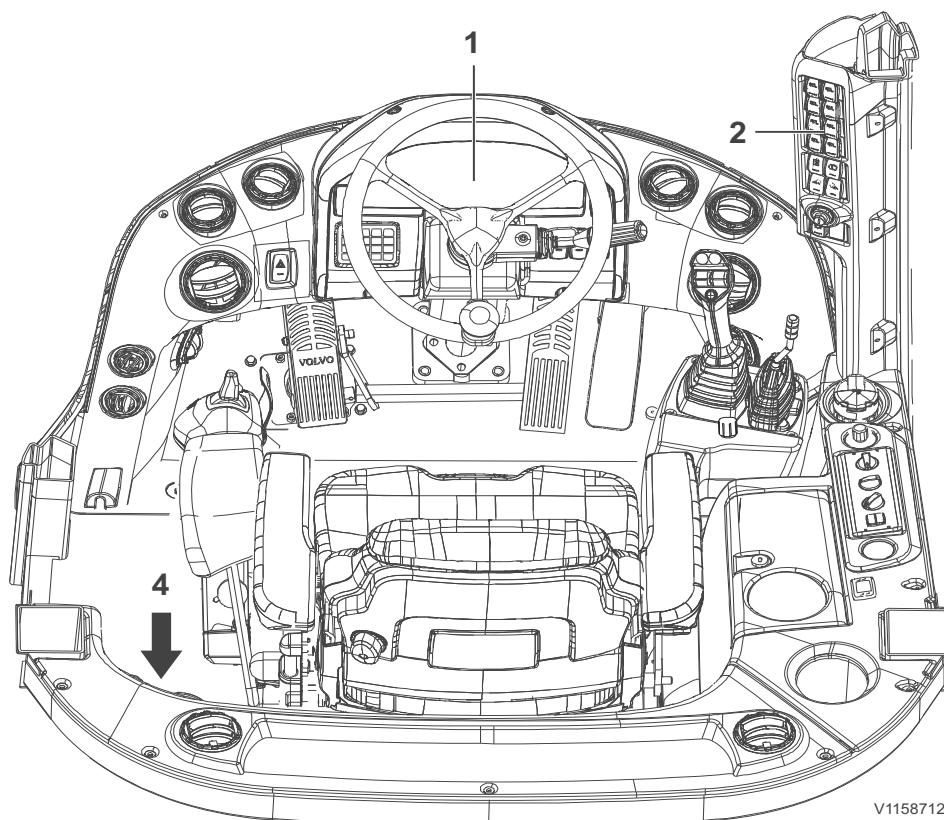
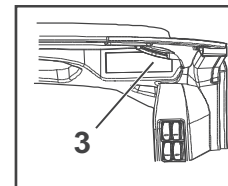
## WARNING

Risk of serious injury.

Operating the machine without sufficient skills and knowledge of the content in the Operator's Manual could lead to loss of machine control and could cause serious injuries including death.

**Carefully read through the Operator's Manual and learn the warning signs, symbols and operating instructions before attempting to operate the machine.**

Keep the manual in the cab so that it is always at hand.



V1158712

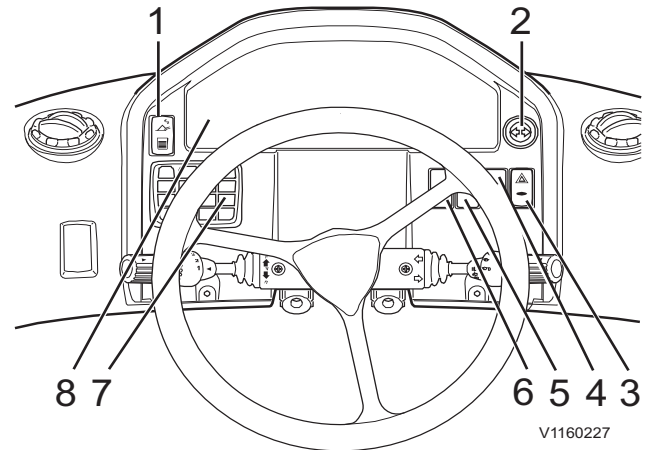


## Instrument panels

32

1	Instrument panel, front (information panel, switches, and keypad)
2	Cab post panel (switches and ignition switch)
3	Ceiling panel (e.g. for optional radio)
4	Rear cab wall with power socket 24V, electrical distribution box with fuses and relays, socket for service tool.

## Instrument panel, front



1	Separate attachment lock
2	Direction indicator for trailer (optional equipment)
3	Hazard flashers
4	Extra work light rear (optional equipment)
5	Extra work light front (optional equipment)
6	Spare
7	Keypad for display unit
8	Information display unit



V1085707

Separate attachment lock



Check that the attachment is locked securely

### 1 Separate attachment lock

This switch must be pressed for safety reasons when the attachment lock is to be unlocked.

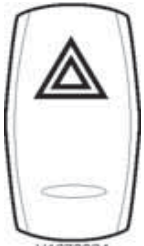
Rocker switch.

- Switch, upper part pressed in = ready for unlocking.

A question will be shown on the display unit, asking if a check that the attachment is locked has been performed. Make sure that the attachment is locked safely and that the locking pins protrude to the outside. If so, acknowledge by pressing the ESC-key on the keypad.



V1157870



V1070024

Hazard flashers

## WARNING

Risk of crushing.

Falling attachments could result in severe injury or death.

**Make sure the attachment bracket is properly locked before starting work.**

For information about connecting and disconnecting attachments, see page 170.

### 2 Direction indicator for trailer (optional equipment)

Both arrows flash if a trailer is connected when the standard direction indicators are used for indicating the direction.

### 3 Hazard flashers

Two-position switch.

- Switch, upper part pressed in = On, all direction indicators on the machine will flash together with the light in the switch and together with the control light for direction indicators. The hazard flashers can be used even if the ignition is in the Off position.
- Switch, lower part pressed in = Off

### 4 Extra work light, rear (optional equipment)

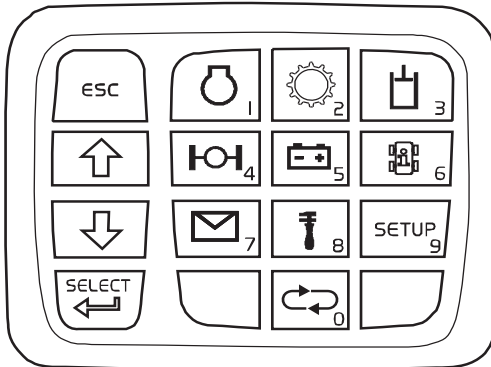
Two-position switch:

- Switch, upper part pressed in = On, extra work light rear is on when reverse gear is selected.
- Switch, lower part pressed in = Off

### 5 Extra work lights front (optional equipment)

Three-position switch:

- Switch, upper part pressed in = On (independent of the setting for the standard front work lights).
- Switch in middle position = On if the standard front work lights are on.
- Switch, lower part pressed in = Off



V1134987

Keypad

## 6 Spare

## 7 Keypad for display unit

More information about the keypad is available on page 44.

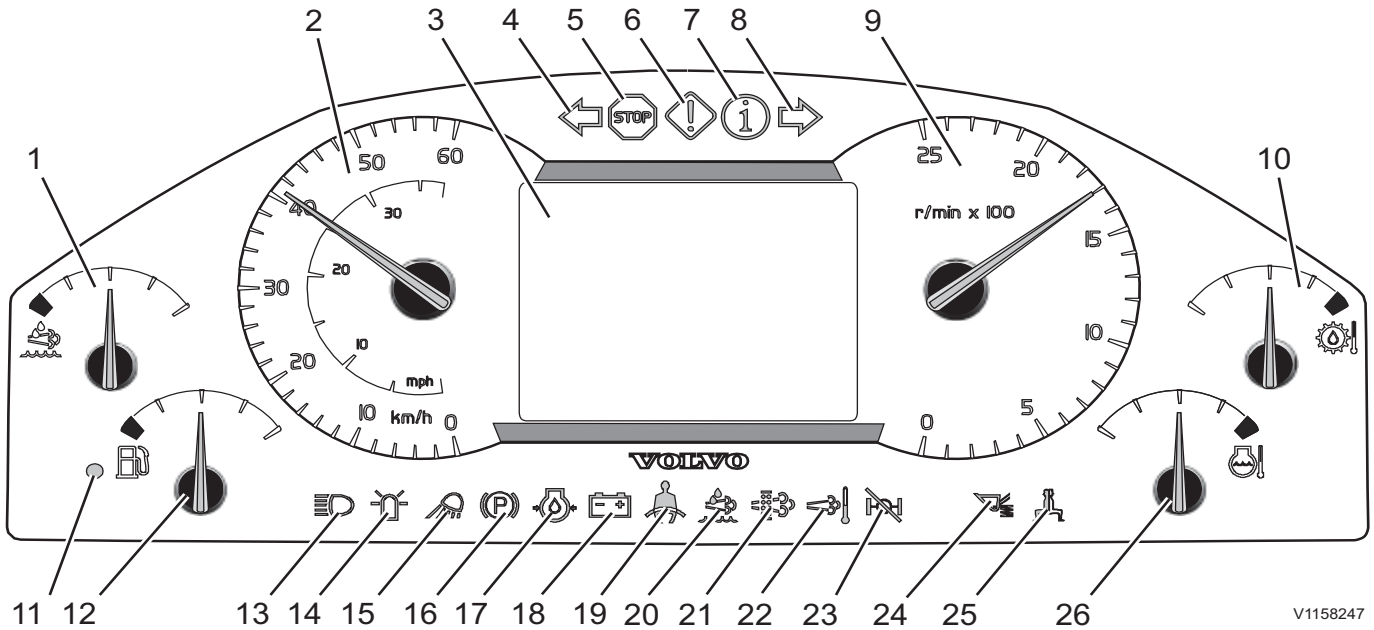
## 8 Information display unit

Current operating information, vehicle messages, and alarm texts are shown on the display unit. Using the keypad on the front instrument panel, the operator can also see information about machine status and make settings.

When the start key is turned to position 1, a test program runs to verify the system, all control lights turn on for two seconds, the pointers in the gauges move to indicate the correct value for fuel level and temperature.

If the machine is equipped with theft protection (optional equipment), the display unit will show a request for the code to be entered, see page 58. After the correct code has been entered, the test program will start.

Instrument panels  
36 Instrument panel, front

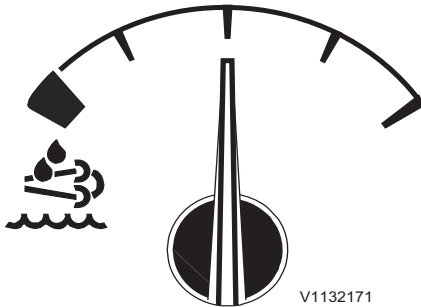


V1158247

1	AdBlue®/DEF, level	14	Rotating beacon (amber)
2	Speedometer	15	Work lights (amber)
3	Display	16	Parking brake applied (red)
4	Direction indicator, left (green)	17	Low engine oil pressure (red)
5	Central warning (red)	18	Battery charging (red)
6	Central warning (amber)	19	Seatbelt not fastened (red)
7	Information symbol (blue)	20	AdBlue®/DEF, warning (amber)
8	Direction indicator, right (green)	21	Regeneration needed (amber)
9	Tachometer	22	High exhaust temperature, during regeneration (amber)
10	Transmission oil temperature	23	Engaged differential lock (green)
11	Fuel level low (amber)	24	Activated Boom Suspension System (green)
12	Fuel level	25	Activated Comfort Drive Control (green)
13	High beams (blue)	26	Coolant temperature

## Instrument panels Instrument panel, front

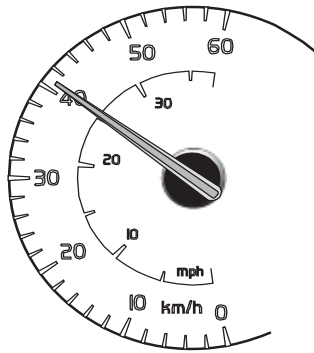
37



V1132171

### 1 AdBlue®/DEF level

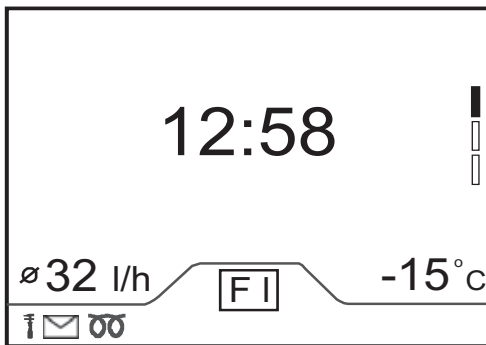
When the gauge indicates empty, the warning light to the left of the gauge is turned on. If the level drops even more, a message is also shown on the display. The machine should be topped up with AdBlue®/DEF as soon as possible, see page 251 for topping up.



V1135088

### 2 Speedometer

The speedometer shows the machine's current ground speed and is graded from 0 and up to 60 km/h (0 – 37.5 mph).



V1158700

### 3 Display

In addition to alarm texts, the display also shows start sequence, operating information, and settings; see page 41.



V1106831

### 4 Direction indicator, left (green)

The light flashes when the lever is moved forwards; see page 66. Irregular flashing indicates a defective bulb, which should be replaced.



V1137747

### 5 Central warning (red)

The light flashes in case of abnormal operating values or malfunctions. Alarm text is shown on the display unit. The buzzer will continue to sound until the required action has been performed.



V1106824

### 6 Central warning (amber)

The light flashes when a function is engaged or disengaged, or when a function needs to be kept under observation (e.g., clogged filter). Alarm text is shown on the display unit. The buzzer sounds four times.

Instrument panels  
Instrument panel, front



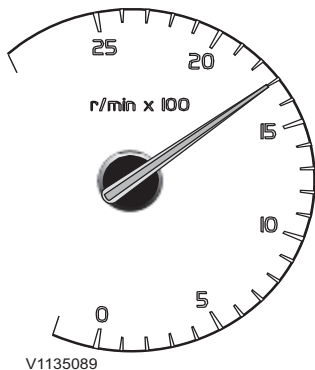
**7 Information symbol (blue)**

Indicates a deviation of some kind. Alarm text is shown for 7 seconds on the display unit. The buzzer sounds twice.



**8 Direction indicator, right (green)**

The light flashes when the lever is moved forwards; see page 66. Irregular flashing indicates a defective bulb, which should be replaced.



**9 Tachometer**

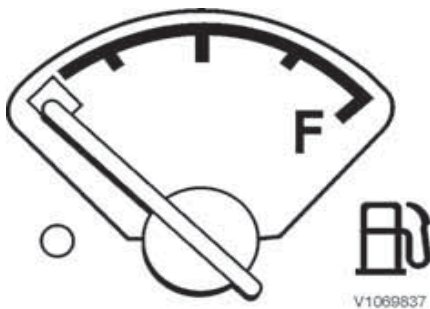
The tachometer shows the current engine speed (rpm). It is graded from 0 to 2,500 rpm (25 stands for 25 x 100 rpm, that is, 2,500 rpm).



**10 Transmission oil temperature**

The warning light is activated if the gauge's needle enters the red field. As a protective action, the engine speed is limited at the same time.

Stop the machine and check for the cause. The buzzer sounds and an alarm text is shown on the display unit if a directional gear is selected.



**11/12 Fuel level**

When the gauge indicates empty, the light to the left of the gauge turns on and a message is shown on the display. The machine should be refuelled as soon as possible to prevent air from entering the system. If the tank has been run dry, the fuel system must be bled, see page 254.



**13 High beams (blue)**

The indicator light is on when the high beams are activated, see page 66.



**14 Rotating beacon (amber)**

The light is on when the rotating beacon is activated. See page 111.



**15 Work lights (amber)**

The indicator light is on when the work lights are activated, see page 111.





V1069829

#### 16 Applied parking brake (red)

The light is on when the parking brake is applied. The buzzer sounds continuously and an alarm text is shown on the display if a directional gear is engaged.



V109176€

#### 17 Low engine oil pressure (red)

### NOTICE

#### Risk of machine damages

An instrument warning light and buzzer could indicate a serious malfunction.

Stop the machine immediately and investigate the cause of the signal.

The indicator light is on if the engine's oil pressure is too low.



V1069830

#### 18 Battery charging (red)

If the indicator light turns on during operation, the cause must be corrected, otherwise the batteries may be damaged.



V1158253

#### 19 Seatbelt not fastened (red)

- The indicator light is on when the seatbelt is not fastened.
- If a directional gear is selected, a red warning ("STOP, fasten your seatbelt") comes on.
- The buzzer sounds if the machine is being driven without the seatbelt fastened.



V1135402

#### 20 AdBlue®/DEF, warning (amber)

The indicator light is on with a fixed light at low level, poor quality, or incorrect metering of AdBlue®/DEF. The light starts to flash at a higher warning level.



V1083505

#### 21 Regeneration needed (amber)

The indicator light is on when the diesel particulate filter is full and it is time to run a regeneration, see page 134.



V1091802

#### 22 High exhaust temperature, during regeneration (amber)

### CAUTION

Risk of thermal hazard.

The exhaust temperature is rising above the normal operation level during a regeneration.

**Make sure that the machine is in a safe environment during regeneration.**

The indicator light is on when regeneration of the diesel particle filter is in progress and indicates that the temperature of the exhausts from the outlet pipe is higher than normal. Do not turn off the engine as long as the light is on.

Instrument panels  
Instrument panel, front



V1069835

**23 Engaged differential lock (green)**

The light is on when the differential lock is engaged.



V1069834

**24 Activated Boom Suspension System (green)**

The light is on with a fixed light when the Boom Suspension System is activated.



V1069836

**25 Activated Comfort Drive Control (green)**

The light is on when Comfort Drive Control (CDC) is activated. It is possible to steer and shift gears from the armrest to the left of the operator's seat. When the speed exceeds 20 km/h (12.4 mph) the light starts to flash.

**NOTE!**

The standard gear selector should be in neutral position.

Other instructions, see page 129.



V1069839

**26 Coolant temperature**

The warning light is activated if the gauge's needle enters the red field. As a protective action, the engine speed is limited at the same time.

Run the engine at low idle for a few minutes. If the gauge continues to indicate within the red sector, stop the engine and investigate the cause.

The buzzer sounds and an alarm text is shown on the display unit if a directional gear is selected.

## Display unit

The display shows current operating information, vehicle messages, and alarm texts. With the keypad on the front instrument panel the operator can also get information about the machine's status and make settings.

When the ignition key is turned to position 1, a test programme starts to verify the system, all control lamps light up for two seconds, the pointers in the gauges then move to indicate the correct value for fuel level and temperature.

If the machine is equipped with anti-theft device, the display shows a request for the code to be entered, see page 58. After the correct code has been entered, the test program starts.

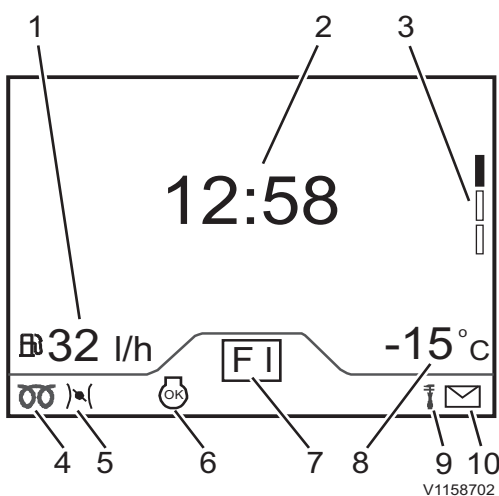
### Operating Information display screen

When the engine is started and in normal operating mode, operating displays are shown on the display unit. There are three versions of operating displays; operating display 1, operating display 2, and operating display 3. When the machine is started, the operating display that was active when the electronics were shut down the last time is always shown. When the machine is started for the first time, operating display 1 is always shown. To alternate between operating displays, use the arrow keys.

#### Operating display 1

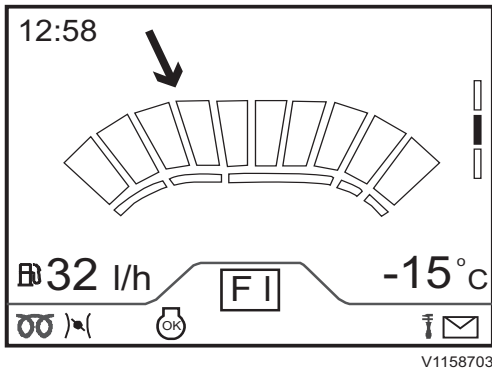
The symbols in operating display 1 show the following:

- 1 Fuel consumption in litres per hour (average consumption)
- 2 Digital clock
- 3 When operating display 1 is shown, it is possible to use the arrow down key on the keypad for the operating information display unit (see page 44) select operating display 2
- 4 Engine's preheating or afterheating is activated
- 5 Hand throttle is activated
- 6 Symbol is show when engine shutdown is permitted
- 7 Gear indication shows active gear
- 8 Ambient temperature

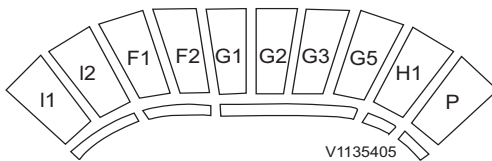


Operating display 1

## 42 Instrument panels Display unit



Operating display 2



- 9 Information available for retrieval, use key with this symbol
- 10 Vehicle message available for retrieval, use key with this symbol

If any information is missing or fails to appear, --- will be shown.

### Operating display 2

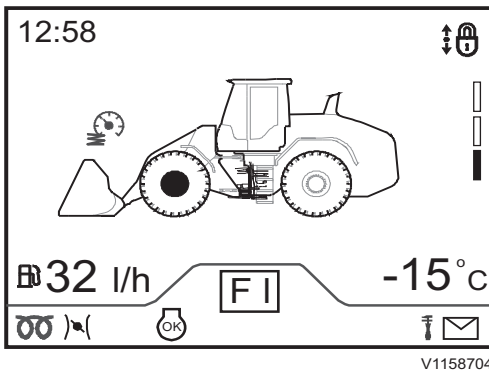
Operating display 2 shows the same information as the operating display except that throttle application is shown.

When this operating display is active, select the 'arrow up' key to switch to operating display 1 or the 'arrow down' key to switch to operating display 3.

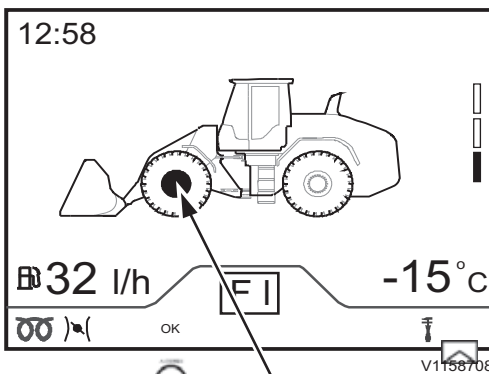
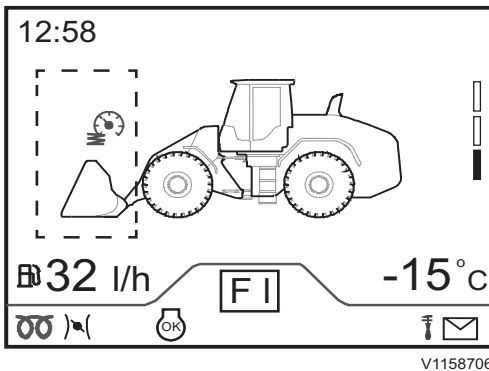
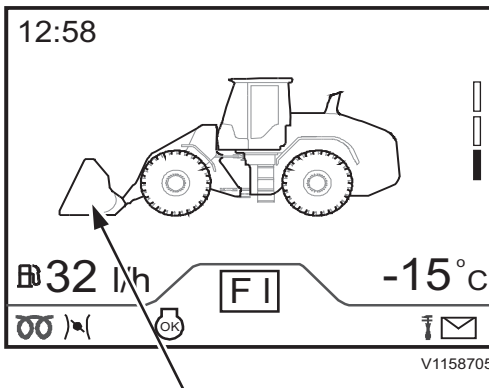
If any information is missing or fails to appear, --- will be shown.

### Explanation of previous figure (operating display 2)

Throttle application (acceleration)										
Segment	I1	I2	F1	F2	G1	G2	G3	G5	H1	P
Colour	Dark blue		Light blue		Green			Yellow	Orange	
Operating Interval	Low idle	High idle	ECO-mode					Power mode	Power mode	



Operating display 3 (all functions shown here)



### Operating display 3

Operating display 3 shows a wheel loader. This figure shows, e.g., if the Boom Suspension System (BSS) is activated. This enables the operator to get a quick overview of which functions are activated (white symbols) and which are engaged (green symbols).

- Activated function (white symbol): The function is activated to enable use by the machine (but is not engaged by the machine)
- Engaged function (green symbol): The function is activated and is being used by the machine (is engaged by the machine)

### Attachment lock

There are two positions for the attachment lock:

- Red bucket = attachment lock is open
- Neutral bucket = attachment lock is closed

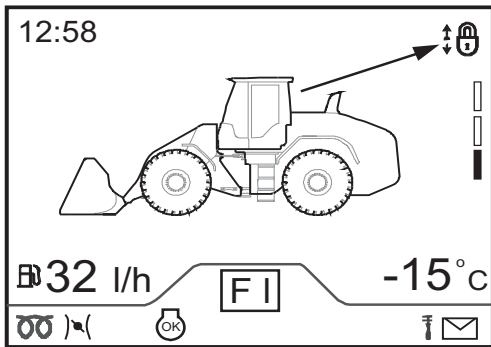
### Speed-dependent Boom Suspension System (BSS)

- White symbol = speed-dependent Boom Suspension System is activated
- Green symbol = speed-dependent Boom Suspension System is engaged

### Differential lock

- Yellow-highlighted symbol = differential lock is activated

## 44 Instrument panels Display unit



V1158709

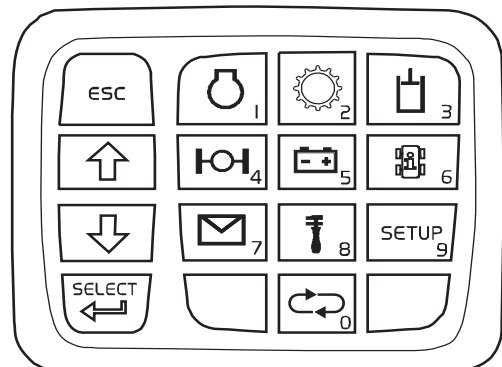
### Lever lockout

- White symbol = lever lockout is activated (and disengages the control levers' hydraulic function from accidental activation)

### Keyboard for display unit

Using the keypad, the operator can access information about the machine's status and make settings.
















Changing display screen is only possible if the speed is below 20 km/h (12.4 mph).



V1134987



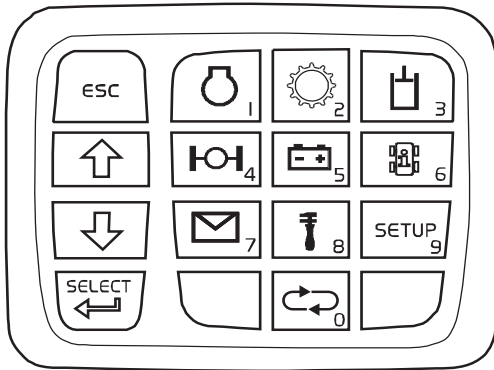
Instrument panels  
Display unit

	 <b>Engine</b> 1	 <b>Transmission</b> 2	 <b>Hydraulics</b> 3
	 <b>Axles / Brakes</b> 4	 <b>Electrical system</b> 5	 <b>Vehicle information</b> 6
	 <b>Vehicle messages</b> 7	 <b>Service</b> 8	 <b>Settings</b> 9
 		 <b>Cycle information</b> 0	

The SELECT key is also used to obtain more information when an information message or check message is shown on the display unit.

The digit farthest down to the right on each key corresponds to the digit that should be entered when performing different settings, e.g., the date. On machines equipped with anti-theft device, the digits are used to enter the correct code.

46 Instrument panels  
Display unit



V1134987

- 1 Engine
- 2 Transmission
- 3 Hydraulic system
- 4 Axles
- 5 Electrical system
- 6 Machine information
- 7 Messages
- 8 Service
- 9 Setup
- 10 Cycle information

### Information

Information about the machine's status is obtained by pressing the relevant key (0–9) on the keypad. For each key, a number of menus and submenus are available. Settings can be made in the submenus.

To scroll between the menus, **press arrow down or arrow up on the keypad.**








Settings can be made when there is an arrow pointing to the right. Press the SELECT key to enter a submenu.

To go back, press the ESC-key.

### ENGINE


 <b>Coolant temperature</b> XX °C/°F <small>V1155467</small>	Shows the coolant temperature.
 <b>Oil pressure</b> XX bar/psi <small>V1155997</small>	Shows the engine oil pressure.
 <b>Air filter</b> Normal <small>V1155637</small>	Shows the engine air filter status. <b>NOTE!</b> A text message will be shown if the air filter is clogged
 <b>Engine rpm</b> XXX rpm <small>V1155642</small>	Shows the current engine speed.
 <b>Working idle speed</b> Off <small>V1155642</small>	Shows the current setting. Press SELECT to enter a submenu where a new setting can be made.




 <b>Idle Speed Select</b> <small>r/min V1155642</small>	<p>The engine will run at the selected working idle speed when:</p> <ul style="list-style-type: none"> <li>- Comfort Drive Control (CDC) is affected</li> <li>- Any control for the hydraulics is affected</li> <li>- Gear is selected</li> <li>- Throttle is applied</li> </ul>
 <b>Off</b>	<p>The working idle speed should be adapted to how the machine is used and how quick hydraulic response is wanted. A higher working idle speed means quicker response from the hydraulics, but also higher fuel consumption.</p>
 <b>900 — 1500</b>	<p>Scroll with the arrow keys and press SELECT.</p> <ul style="list-style-type: none"> <li>- Off: The function is off (engine's base idle speed is selected)</li> <li>- 900 — 1,500 rpm: Working idle speed can be set from 900 up to 1,500 rpm (in steps of 50 rpm). To return to earlier menus, press ESC.</li> </ul> <p><b>NOTE!</b> Unless Comfort Drive Control (CDC), any control for hydraulics, gear, or throttle is affected, the engine goes to base idle speed after 5–6 seconds.</p>
 <b>Automatic Engine shutdown</b> <small>V1155750</small>	<p>Shows the current setting. Press SELECT to enter a submenu where a new setting can be made.</p>
 <b>Off</b>	<p>Scroll with the arrow keys and press SELECT.</p>
 <b>On</b>	<p>If the function is activated (on), automatic engine shutdown takes place after a predetermined time (five minutes is default setting) if all of the following conditions are met:</p> <ul style="list-style-type: none"> <li>- The machine is standing still</li> <li>- The parking brake is applied</li> <li>- The engine is running at low idle</li> <li>- The gear is in neutral</li> <li>- The engine is not regenerating.</li> </ul> <p><b>NOTE!</b> The predetermined time can be changed with Tech Tool.</p>
 <b>Regeneration mode</b> <b>Manual</b> <small>V1155860</small>	<p>Shows the current setting. Press SELECT to enter a submenu where a new setting can be made.</p>

48 Instrument panels  
Display unit

<input checked="" type="radio"/> Manual	Scroll with the arrow keys and press SELECT.
<input type="radio"/> Automatic	


 Rev. cooling fan Manual <span style="float: right;">▶</span>	Shows the current setting. Press SELECT to enter a submenu where a new setting can be made.
--	--

<input type="radio"/> Short	Scroll with the arrow keys and press SELECT. The following must be fulfilled to enable reversal of the cooling fan, which may be important to consider: - Hydraulic oil temperature must exceed 0 °C (32 °F) - Air conditioning does not request increased cooling - Charge-air temperature must not be too high - Cooling fan does not request increased speed for engine brake
<input type="radio"/> Long	
<input checked="" type="radio"/> Manual	
<input type="radio"/> OFF	


 Rev. cooling fan Off <span style="float: right;">▶</span>	Shows the current setting, Off, or the duration of the interval in minutes. Press SELECT to enter a submenu where a new setting can be made.
---	---

<input checked="" type="radio"/> Off	Scroll with the arrow keys and press SELECT. For manual reversing, choose Reversing and the cooling fan will start to reverse. It will the stop automatically.
<input type="radio"/> Reversing	


**TRANSMISSION**

 Oil temperature XX °C/°F	Shows the current transmission oil temperature.
--	---

**HYDRAULIC SYSTEM**

 Oil temperature XX °C/°F	Shows the current hydraulic oil temperature.
--	--

**ELECTRICAL SYSTEM**


 Voltage XX V	Shows the current battery voltage.
--	------------------------------------



**MACHINE INFORMATION**

Model LXXX	Shows the machine model.
Serial no. 12345678912	Shows the serial number.
Machine hrs XXX h	Shows the machine hours.
Time XX:XX	Shows the current time.
Date YYYYMMDD	Shows the current date.

**VEHICLE MESSAGES**

 Vehicle messages <small>V115998</small>	Shows the current machine messages.
--	-------------------------------------

**SERVICE**

Next service	▶ Shows the current setting. Press SELECT to enter a submenu with more information.
Resid. time XX h	Shows the number of operating hours remaining to the next service.
Interval XXX h	Shows the interval of the next service.
Central lubrication	▶ Press SELECT to enter a submenu where the current setting is shown.
Light	▶ Shows the current setting. Press SELECT to enter a submenu where the current setting is shown.
<input checked="" type="radio"/> Light	Scroll with the arrow keys and press SELECT.
<input type="radio"/> Normal	
<input type="radio"/> Heavy	

**SETUP**

Anti-theft system	▶ Press SELECT to enter a submenu.
-------------------	------------------------------------



50 Instrument panels  
Display unit

 V1156031 Anti-theft system Pin-code menu ▶	Press SELECT to enter PIN-code.
--	---------------------------------

Enter owner PIN code 0 _ _ _ _ _ <small>V1156033</small>	Use the keys to enter the PIN-code. Wrong code is shown if the PIN-code is not correct.
Wrong code	

 V1156031 Anti-theft system One-time code ▶	Press SELECT to see the current 8-digit seed or to enter a new one-time code.
--	---

Current 8-digit seed: 12345678	The Current 8-digit seed is shown. Use the keys to Enter one-time code.
Enter one-time code: 0 _ _ _ _ _ <small>V1156036</small>	

Time / date ▶	Press SELECT to enter the following submenus: Set time, Set date, Time format and Date format.  Then press SELECT to set up these.
Language ▶	Press SELECT to change language.
Units ▶	Press SELECT to change to other units.
Display intensity ▶	Press SELECT to adjust the display intensity.
Keypad light ▶	Press SELECT to adjust the keypad light.

**OPERATIONAL DATA**

Operational Data	
Operating Time XX:XX	Shown in hours and minutes.
Distance XXXXX.X km	Shown in kilometres.
Cycles XXX	Shown in number of cycles.
Avg. consumption X.X l/h	Shown in litres per hour.
Total consumption XXX l	Shown in litres.



Inst. consumption X.X l/h	Shown in litres per hour.
Reset	<ul style="list-style-type: none"> <li>▶ The following can be done in this menu:</li> <li>Reset all</li> <li>Reset distance</li> <li>Reset cycle</li> <li>Reset fuel and time</li> <li>No reset</li> </ul>

### Alarm texts

The operator information is provided on the display unit in the form of alarm texts, which are divided into three classes: Warning, Check, and Information. For all classes, at machine speeds above 20 km/h (12.4 mph) the alarm text is shown for three seconds and then changes to previous display figure for three seconds. Alternating showing of the two displays continues as long as the problem situation remains, or until the specified alarm has been shown a certain number of times.

#### Information

- The information symbol is shown.
- The buzzer sounds two times.
- Alarm text is shown for seven seconds and then changes to operating display.
- Repair or contact a workshop authorized by Volvo for information.

#### Engine

Information		Information
Abort with ESC Automatic Engine shutdown		Regeneration not needed
DPF change will soon be required		

#### Transmission

Information		Information
Gear selector not in neutral		Machine Overspeed



**52 Instrument panels  
Display unit**

**Steering system**

Information		Information
Lever carrier deactivated CDC activated		Lever carrier not activated CDC activated
Lever carrier deactivated		Lever carrier activated

**Miscellaneous**

Information		Information
Lubricant level low Check at next stop		

**Check**

- The amber central warning symbol is shown.
- The buzzer sounds four times.
- Press SELECT to obtain more information about the malfunction.
- Alarm text is shown until confirmation is performed by pressing ESC.
- Repair or contact a workshop authorized by Volvo for information.

**Engine**

Check		Check
Engine failure		Preheating failure
Cooling fan system failure		Cooling fan reversal failure
Fuel level sensor		Fuel level low
Hand throttle failure		High temp. starter motor Wait 5 min. before start
High coolant temp. Engine		Water in fuel Empty cup
Injection system failure		Turbo Hot Shutdown
Emission system failure		Fuel filter clogged



Instrument panels  
Display unit

Possible fuel leakage	Air filter clogged Clean or replace
High coolant temp. Reduced engine function	Regeneration not possible System failure
Regeneration cancelled Derate soon	Start regeneration Parked regeneration possible
Regeneration cancelled	Keep machine parked Regeneration ongoing
Park soon Parked regeneration needed	Park machine Parked regeneration required Derate active
Refill AdBlue / Refill DEF AdBlue empty / DEF empty Full derate active	Refill AdBlue / Refill DEF AdBlue empty / DEF empty Derate active
Replace AdBlue / Replace DEF Wrong AdBlue quality / Wrong DEF quality Derate soon	Replace AdBlue / Replace DEF Wrong AdBlue quality / Wrong DEF quality Derate active
Replace AdBlue / Replace DEF Wrong AdBlue quality / Wrong DEF quality Full derate active	Park safely AdBlue empty / DEF empty Full derate soon
Park safely Wrong AdBlue quality / Wrong DEF quality Full derate soon	Check SCR system SCR system failure
Check SCR system SCR system failure Derate soon	Check SCR system SCR system failure Derate active
Park safely SCR system failure Full derate soon	Check SCR system SCR system failure Full derate active
Full engine power Temporarily restored	Regeneration Switch



**54** Instrument panels  
**Display unit**

<b>APPLY PARKING BRAKE</b> Regeneration needed		Regeneration cancelled Derate active
<b>CONTINUE OPERATION</b> Low temperature Regeneration pending		Moving regeneration Starting soon
Moving regeneration Ongoing		Delayed Eng. Shutdown

**Electrical system**

<b>Check</b> High system voltage		<b>Check</b> Low system voltage
<b>ECC failure</b>		<b>Relay failure</b>
<b>Electrical Lever Control</b>		<b>Battery not charging</b>

**Transmission**

<b>Check</b>		<b>Check</b>
<b>Gear sel. F/N/R failure</b> Check at next stop		<b>Gear sel. CDC failure</b> Check at next stop
<b>Gear sel. F/R failure</b> Check at next stop		<b>Gear sel. failure</b> Check at next stop
		<b>Reduced gearshift function</b>

**Axles**

<b>Check</b> Diff. lock failure		<b>Check</b>
------------------------------------	--	--------------

**Brakes**

<b>Check</b> Brake system failure		<b>Check</b>
<b>Brake pedal failure</b>		<b>Brake pedal sensor</b>
<b>Primary channel error</b>		<b>Secondary channel error</b>





**Steering system**

Check		Check
Secondary steer failure		CDC failure

**Hydraulics**

Check		Check
Hydraulic system failure		Attachment lock
Check attachment lock and confirm <sup>(1)</sup>		BSS Failure
Temperature sensor hydraulics		LS press sensor
Hydraulic oil filter clogged		

**Miscellaneous**

Check		Check
ECU Network Communication Interrupt		ECU Network Reduced Communication <sup>(2)</sup>
Parameter failure		Central lubrication failure
Wiper failure		Rear wiper failure
Accelerator pedal sensor		Ambient temperature sensor
Next service, interval		Unidentified failure
Reduced engine brake effort		Missing Pict
Reversing Alarm Circuit		'Limp Home' safety related failure <sup>(3)</sup>
CareTrack Failure		SID Failure
Main Switch Open		

1. Confirm with SELECT.

2. Reduced communication between ECUs. The machine can only be operated in first or second gear. Only operating information and alarms are available on the display unit.

3. Repair or contact a workshop authorized by Volvo for information.



### Warning

- The red central warning symbol is shown.
- The buzzer will sound until the required action has been performed.
- The alarm text will be shown until the required action has been performed.
- Repair or contact a workshop authorized by Volvo for information.

#### NOTE!

If the warnings below are shown, turn off the engine and then turn the starter key to position 1 to check the subsequent alarm text. If the machine must be moved to a safe place before turning off the engine, press the ESC-key to hide the warning messages for 30 seconds.

<b>Warning</b>		<b>Warning</b>
Stop vehicle		Stop vehicle Turn Off Engine

These two warnings are always followed by an additional alarm text. Follow the instructions on the screen and repair or contact a workshop authorized by Volvo. When a warning is shown, the engine should be turned off and the start key turned to position 1 in order to show the subsequent alarm text.

### Engine

<b>Warning</b>		<b>Warning</b>
High coolant temp. engine		High charge-air temp. engine
High boost pressure		Low engine oil pressure
Coolant level low <sup>(1)</sup>		Engine failure
High fuel temperature		High crankcase pressure
Air filter clogged Clean or replace		High turbo temp.
Emission system failure		Engine overspeed
Fuel injection system failure		Water in fuel Empty cup

1. The level is checked continuously during operation.



Park safely Service regeneration needed Derate active		Turbocharger compressor outlet temperature
Park machine Service needed Derate active		High exhaust system temperature
Reduce Engine Speed Parked regeneration needed		Reduce Engine Speed Parked regeneration required

**Transmission**

Warning		Warning
Transmission failure		

**Brakes**

Warning		Warning
Low brake pressure		Applied parking brake
Brake system failure		Park brake NOT applied

**Steering system**

Warning		Warning
Low steer pressure <sup>(1)</sup>		Steering system failure

**Hydraulics**

Warning		Warning
Attachment lock open		High hydraulic oil temperature

**Miscellaneous**

Warning		Warning
Reduce speed		Service needed
Emergency stop		Anti Theft Misconfigured

1. Only applies to machines equipped with secondary steering.

58 Instrument panels  
Display unit

Too Many Attempts Looked out time		
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## Theft protection

### (Optional equipment)

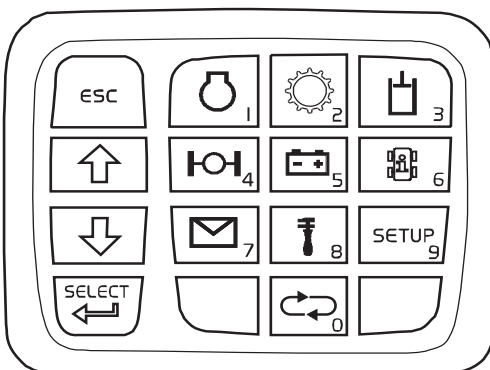
The anti-theft device prevents theft of the machine since:

- the engine does not start
- the gear selector does not work
- the parking brake cannot be released.

### When starting the engine

- 1 Turn the start key to position 1.
- 2 Wait until the following display figure is shown on the display unit.
- 3 Use the keypad to enter the four-digit PIN-code (for new machine set from factory).
  - When the correct code has been entered, the theft protection is deactivated and the engine can be started.
  - Use the ESC key to move the cursor to the left to change an incorrectly entered digit.
  - When the PIN-code has been entered, and any digit is incorrect, the system automatically returns to the position for the first digit. Enter the PIN-code again.

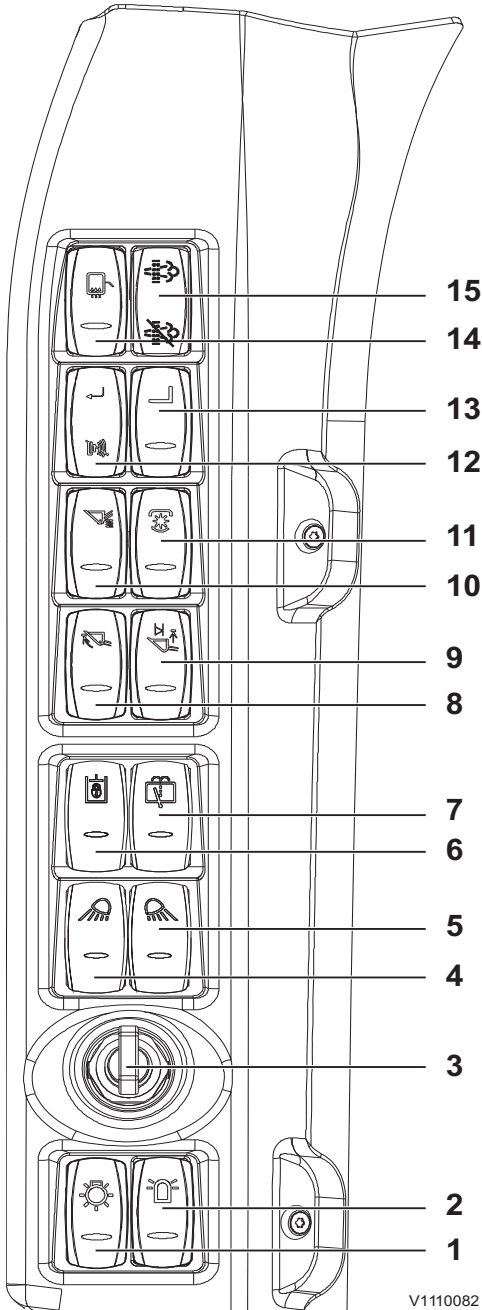
Theft protection
Enter code * * * *



V1134987

- The PIN-code can only be changed by a workshop authorized by Volvo.
- The engine can be restarted within 15 minutes after it was turned off without having to enter the code (factory setting). The time for restart can be changed from 1 to 180 minutes only by a workshop authorized by Volvo.

## Instrument panel, cab post



1	Headlights
2	Rotating beacon (optional equipment)
3	Ignition
4	Front work lights
5	Rear work lights
6	Working hydraulics / Control lever lockout
7	Wiper and washer, rear window
8	Bucket positioner (automatic tilt) (optional equipment)
9	Boom kick-out (automatic lift) (optional equipment)
10	Boom Suspension System (BSS) (optional equipment)
11	Water pump for road sweeper (optional equipment)
12	Back-up alarm (optional equipment)
13	Lift fork operation/Hose rupture protection (optional equipment)
14	Electrically heated rear-view mirrors (optional equipment)
15	Regeneration



### 1 Headlights

Three-position switch:

- Switch, upper part pressed in = headlights are on.
- Switch in middle position = parking lights and instrument lights are on.
- Switch, lower part pressed in = lights are off.

60 Instrument panels  
Instrument panel, cab post

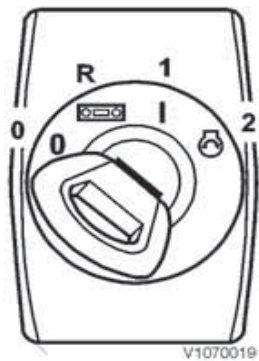


## 2 Rotating beacon (optional equipment)

Two-position switch:

- Switch, upper part pressed in = rotating beacon is on.
- Switch, lower part pressed in = rotating beacon is off.

Control light on the front instrument panel indicates that the rotating beacon is on.



## 3 Ignition

The ignition has 4 positions:

- 0 Off (key-turn engine stop)
- R Radio position
- 1 Running position
- 2 Engine start position



## 4 Front work lights

Three-position switch:

- Switch, upper part pressed in = outer pair (optional equipment) and inner pair of front work lights by cab roof are on.
- Switch, middle position = inner pair of front work lights by cab roof are on.
- Switch, lower part pressed in = front work lights by cab roof are off.

Control light on the front instrument panel indicates that the work lights are on.



## 5 Rear work lights

Three-position switch:

- Switch, upper part pressed in = rear work lights by cab roof are on when reverse gear is selected.
- Switch, middle position = rear work lights by cab roof are on.
- Switch, lower part pressed in = rear work lights by cab roof are off.

Control light on the front instrument panel indicates that the work lights are on.

### NOTE!

Work lights must be off when operating on public roads.



V1063374

## 6 Isolating working hydraulics/control lever

The control lever lockout is used in order to avoid involuntary activation of the control levers, for example, when servicing or transporting the machine.

Two-position switch:

- Switch, upper part pressed in = hydraulic functions of control levers are locked.
- Switch, lower part pressed in = hydraulic functions of control levers are unlocked.



V1070016

## 7 Wiper and washer, rear window

### NOTE!

For wiping, the front wiper must be on as well. Washing and wiping can take place without the front wiper being on.

Three-position switch:

- Switch, upper part pressed in (rocker switch) = washer is activated and the wiper makes a few strokes.
- Switch in centre position = Rear window wiper operates in intervals.

When the front wiper is on at the same time as reverse gear is engaged, the rear wiper will be on continuously.

- Switch, lower part pressed in = wiper and washer are off.

See page 259 for the washer fluid reservoir.



V1069880

## 8 Bucket positioner (automatic tilt) (optional equipment)

Two-position switch:

- Switch, upper part pressed in = Adjusting tilt position / bucket positioner activated.
- Switch, lower part pressed in = Hold (detent) function for tilt position / bucket positioner deactivated.



V1069881

## 9 Boom kick-out (automatic lift) (optional equipment)

Three-position switch:

- Switch, upper part pressed in = Adjusting lift height position / boom kick-out activated.
- Switch in middle position = Hold (detent) function for lift position activated.



V1083377

- Switch, lower part pressed in end = Hold (detent) function for lift position deactivated / boom kick-out deactivated.

### 10 Boom Suspension System (BSS) (optional equipment)

Two-position switch:

The Boom Suspension System (BSS) only works speed-dependent. If the speed drops below 3 km/h, then the BSS-function is disengaged.

This function can only be activated when the engine is running.

- 1 Lower the bucket or other attachment flat on the ground.
- 2 Switch, upper part pressed in = BSS activated. The control light for BSS in the central instrument starts to flash (BSS safety mode/position).
- 3 Lift up the attachment approx. 0.5 m (20 in) off the ground. The BSS control light on the central instruments turns off (BSS rest mode/position).
- 4 When the operating speed of 3 km/h (2 mph) has been reached, BSS is activated. The control light in the central instrument turns on with a fixed glow (BSS active mode/position).
- 5 When the attachment is lowered (almost to the ground) or the machine speed drops below the selected value, BSS changes back to rest mode.
- 6 BSS is turned off by pressing in the lower end of the switch or by turning off the engine.

#### NOTE!

BSS may not be activated while operating. BSS must be turned off during precision work with the attachment.



V1083378

### 11 Water pump for road sweeper (optional equipment)

Two-position switch:

- Switch, upper part pressed in = water pump activated.
- Switch, lower part pressed in = water pump deactivated.





V1157032

### 12 Back-up alarm (optional equipment)

Two-position switch:

- Switch, upper part pressed in = back-up alarm deactivated.
- Switch, lower part pressed in = back-up alarm activated.



V1063381

### 13 Lift forks/hose rupture protection (optional equipment)

Two-position switch:

- Switch, upper part pressed in = hose rupture protection activated.
- Switch, lower part pressed in = hose rupture protection deactivated.



V1070015

### 14 Electrically heated rear-view mirrors (optional equipment)

Two-position switch:

- Switch, upper part pressed in = electric heating activated.
- Switch, lower part pressed in = electric heating deactivated.



V1092165

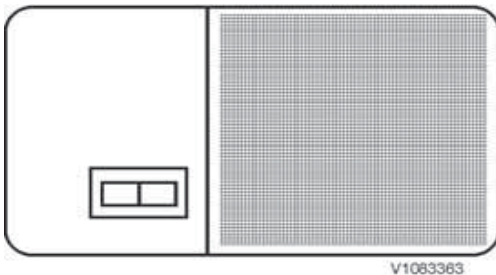
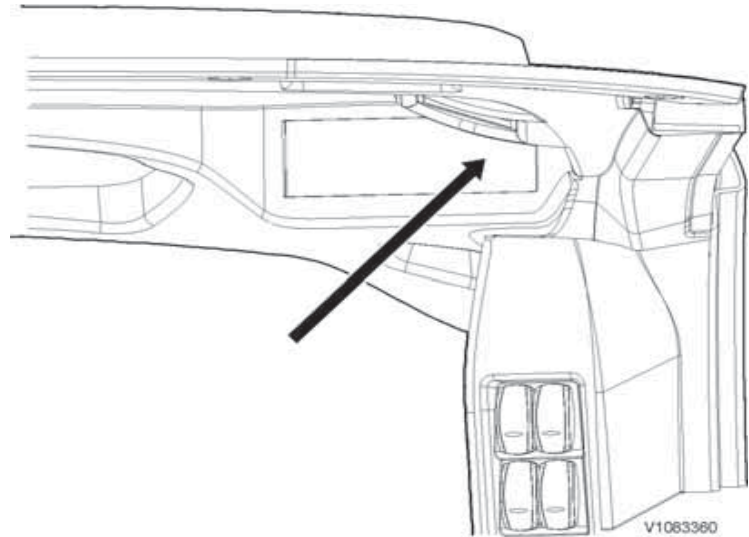
### 15 Regeneration

When the diesel particulate filter is full, a message is shown on the display to indicate that it is time to run a regeneration, see page 134.

- 1 Switch, upper part pressed in = Regeneration starts
- 2 Switch, lower part pressed in = Regeneration is cancelled

## Instrument panel, overhead

For optional equipment, e.g. radio.

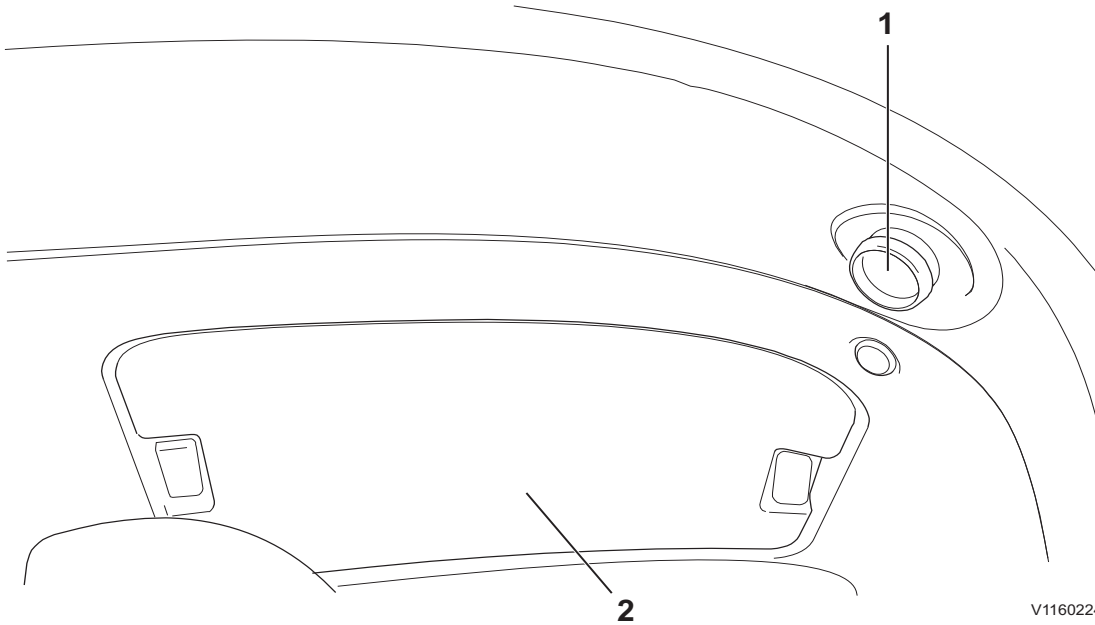


Interior lighting

## Interior lighting

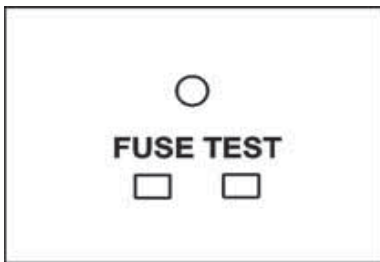
The lamp for interior lighting is located in the ceiling above the storage box.

## Instrument panel, rear



Rear cab wall

1	Power socket 24V
2	- Compartment for fuses and relays (behind the service cover) - Tech Tool service socket (behind the service cover)



Fuse test

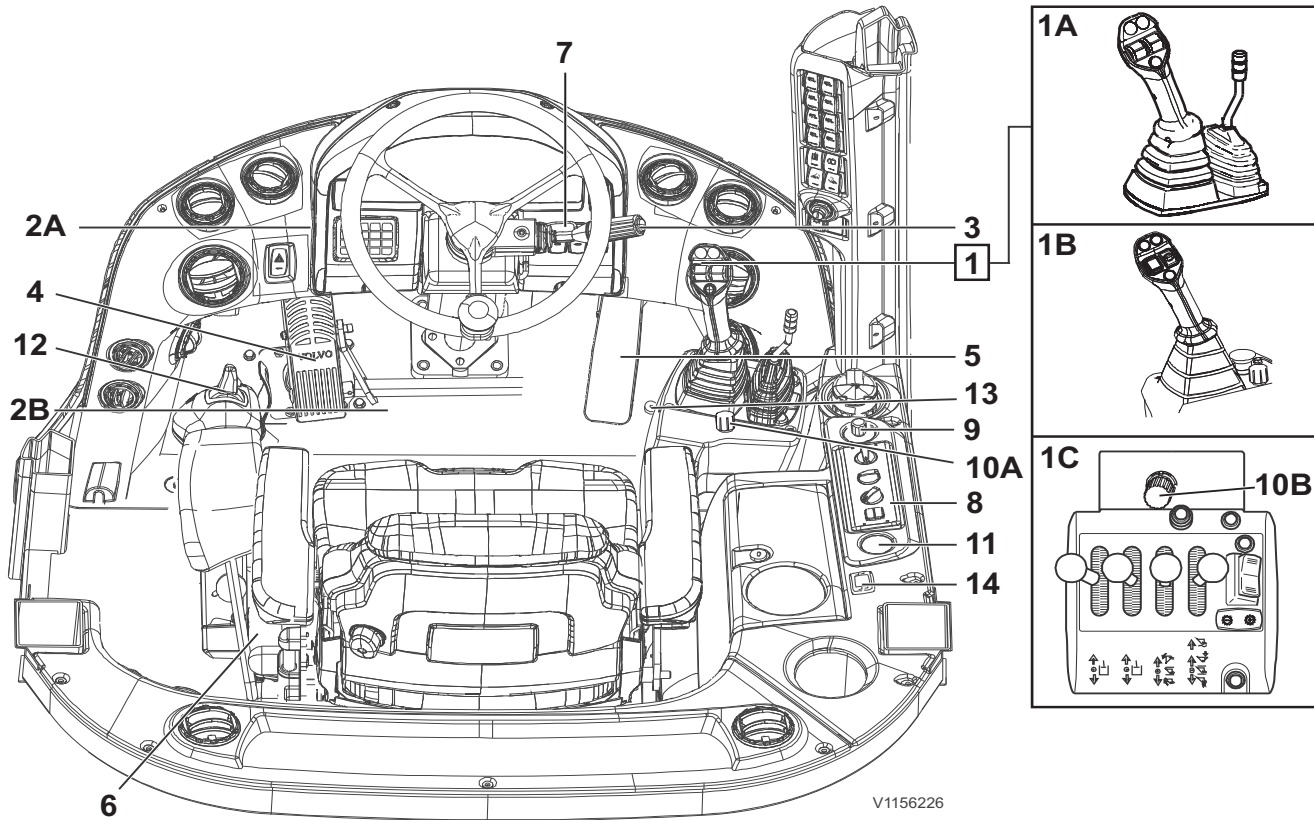
### Fuse test

In the compartment for fuses and relays it is possible to test the fuses.

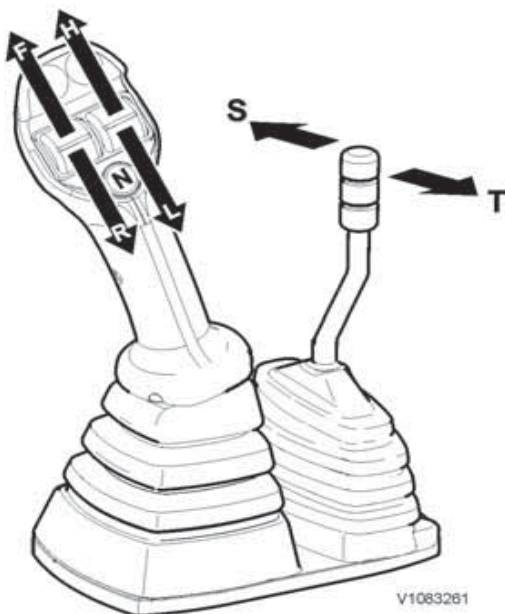
On the circuit board there is marking, FUSE TEST. In order to test whether a fuse has blown or not, hold it against the contact surface under the marking FUSE TEST.

If the fuse has not blown, the green light-emitting diode above the marking lights up.

## Other controls Controls



1	1A: Single control lever with Aux lever (optional equipment) 1B: Single control lever with integrated Aux hydraulic functions (optional equipment) 1C: 3- and 4-lever control (optional equipment)
2	2A: Travelling direction selection lever (only with control lever version 1C) 2B: Differential lock foot button (only with control lever version 1C)
3	Multi functional lever (light switch / direction indicators / warning horn / windscreen wiper/washer system)
4	Inching-brake pedal
5	Drive pedal/Accelerator pedal
6	Parking brake lever
7	Steering wheel, adjusting
8	Heating and ventilation with mechanical control (standard) / Climate control system (optional equipment)
9	Hand throttle control (optional equipment)
10	A: Hand-inching control (optional equipment) (only with control lever versions 1A and 1B) B: Hand-inching control (optional equipment) (only with control lever version 1C)
11	12 V socket (optional equipment with radio preparation)
12	Comfort Drive Control (optional equipment)
13	Flow adjustment knob (optional equipment with High-flow)
14	Control panel for aux. heating (fuel-powered)



### 1A Single control lever with Aux lever (optional equipment)

#### Travelling direction selection

The control knob is spring-centred.  
Forward: Roll the left control knob fully forward (F).  
Rearward: Roll the left control knob fully rearward (R).

#### NOTE!

The selected travel direction (F = Forward or R = Reverse) is shown on the display in the information panel when the parking brake is not applied, the parking brake lever is fully released, and the relevant control light is off.

Neutral: Press button (N) to go to neutral position.

#### NOTE!

N = neutral gear position is shown on the information panel's display unit.

#### Speed range selection

The control knob is spring-centred.

Upshift (Higher speed range): Roll the right control knob fully forward (H).

Downshift (Lower speed range): Roll the right control knob fully rearward (L).

**NOTE!**

The selected gear is shown on the information panel's display unit.

**NOTE!**

Always make sure that the parking brake is fully released and that the respective control lamp is out.

**NOTE!**

When the machine is equipped with foldable window, pay attention that Aux lever is not operated unintentionally.

**Controls for attachment locking and special hydraulics**

Neutral position: Not activated (spring-centred)

S Unlock/lower auxiliary hydraulics

T Lock/lift auxiliary hydraulics (with hold function)

**1B Single control lever with integrated Aux hydraulic functions (optional equipment)**

**Travelling direction selection**

The left control knob is spring-centred.

Forward: Roll the left control knob fully forward (F).

Rearward: Roll the left control knob fully rearward (R).

**NOTE!**

The selected travel direction (F = Forward or R = Reverse) is shown on the display in the information panel when the parking brake is not applied, the parking brake lever is fully released, and the relevant control light is off.

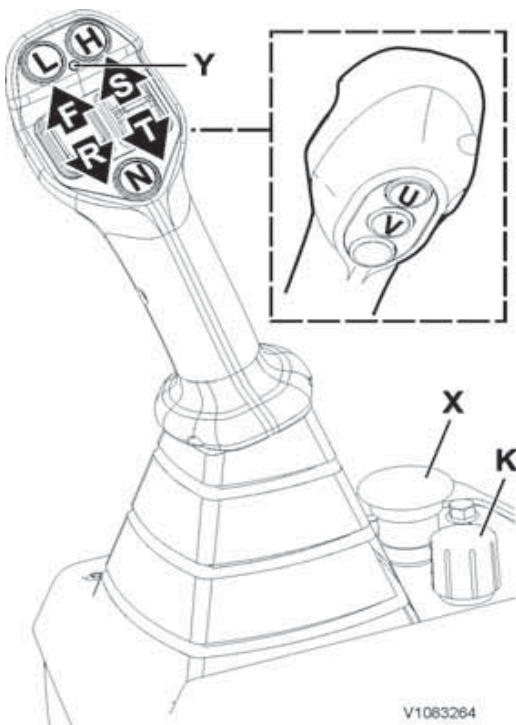
Neutral: Press button (N) to go to neutral position.

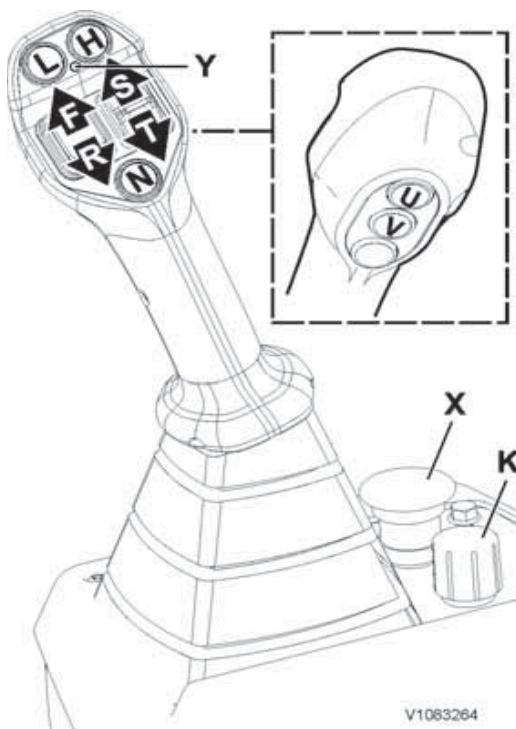
**NOTE!**

N = neutral gear position is shown on the information panel's display unit.

**Speed range selection**

Upshift (Higher speed range): Press button (H).





Downshift (Lower speed range): Press button (L).

**NOTE!**

The selected gear is shown on the information panel's display unit.

**NOTE!**

Always make sure that the parking brake is fully released and that the respective control lamp is out.

**Controls for Attachment locking and Aux hydraulics**

- Neutral position: Not activated (spring-centred)
- Unlocking / Lowering Aux hydraulics: Roll the right control knob forward (S) proportional to the demanded speed resp. oil flow.
- Locking / Lifting Aux hydraulics: Roll the right control knob backwards (T) proportional to the demanded speed resp. oil flow.

**NOTE!**

This control knob provides proportional control. The more the knob is moved out of neutral position the higher the attachment speed resp. the oilflow will be.

Detent function: Button (U) pressed in.

■ Activation:

- 1 Operate the roller control knob to the wanted position and hold it there.
- 2 Press the detent button and hold it there.
- 3 Release the roller control knob.
- 4 Release the detent button. The red LED control lamp (Y) in the handle lights up.

- Deactivation: Press the detent button when roller control knob is not operated at all. Alternatively just move the roller control knob in any direction S or T momentarily. The red LED control lamp (Y) in the handle extinguishes.

**NOTE!**

The detent function must not be used for locking or unlocking the attachment.

**NOTE!**

When detent function has been activated, the roller control knob returns to centre position.

- 4th hydraulic function: Button (V) pressed in. 4th hydraulic function can be used as long as the button is pressed in.

**Flow adjustment knob for attachment locking and Aux hydraulics**

The oil flow adjustment knob (K) provides adaptation of the max. demanded oil flow resp. attachment speed to the roller control knob position for both operating directions S and T.

When working for example with a grapple bucket, the max. oil flow can easily be adjusted. The full stroke of the roller control knob (S - T) is utilized for sensitive control of the attachment.

**NOTE!**

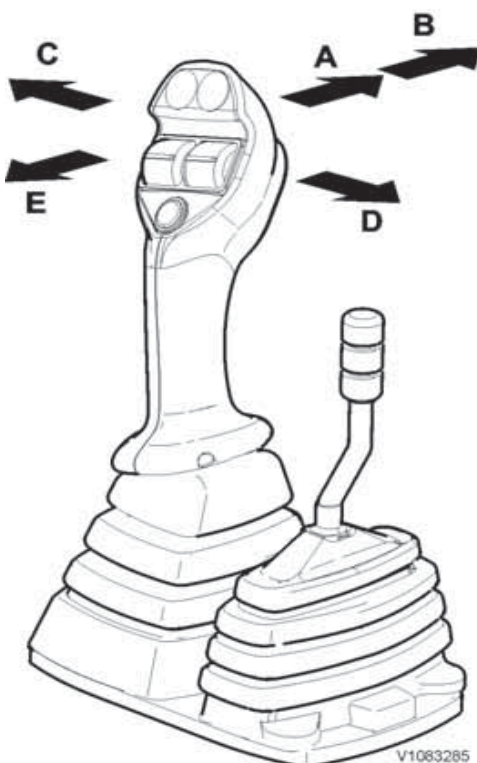
For safety reasons, the adjustment must only be executed when attachment locking or Aux hydraulics are operated.

- 1 Turn knob fully to the right (clockwise) to Min.
  - 2 Operate roller control knob fully in direction S or T and simultaneously increase oil flow by turning the knob counter-clockwise at the respective engine speed.
- Reduction of oil flow down to zero: Turn the knob clockwise.
  - Increase of oil flow up to max.: Turn the knob counter-clockwise.

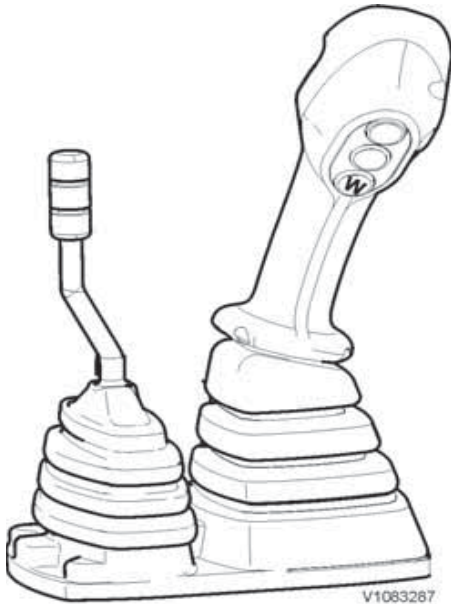
Hydraulic emergency stop button (X) can be pushed in to stop the movement of the attachment or Aux hydraulics. To deactivate the emergency stop, turn the button clockwise to release the spring-loaded button.

**Loader functions (control lever versions 1A and 1B)**

- Neutral position: Not activated (spring-centred)
- A Lowering
  - B Floating position (with detent function)
  - C Tilt back (with hold function, see page 80)
  - D Tilting forward
  - E Lifting (with detent function, see page 81)







W Differential lock button

### Differential lock function

#### (control lever versions 1A and 1B)

- Pressing and keeping the differential lock button (W) depressed, engages the differential lock on the front- and rear axle.

#### NOTE!

When releasing the button, the differential locks may eventually not disengage immediately (due to the friction on the contact areas caused by the differential torques). Then, interrupt the drive and do some steering operations so that the differential torque is reduced and the differential locks on front and rear axle disengage.

#### NOTE!

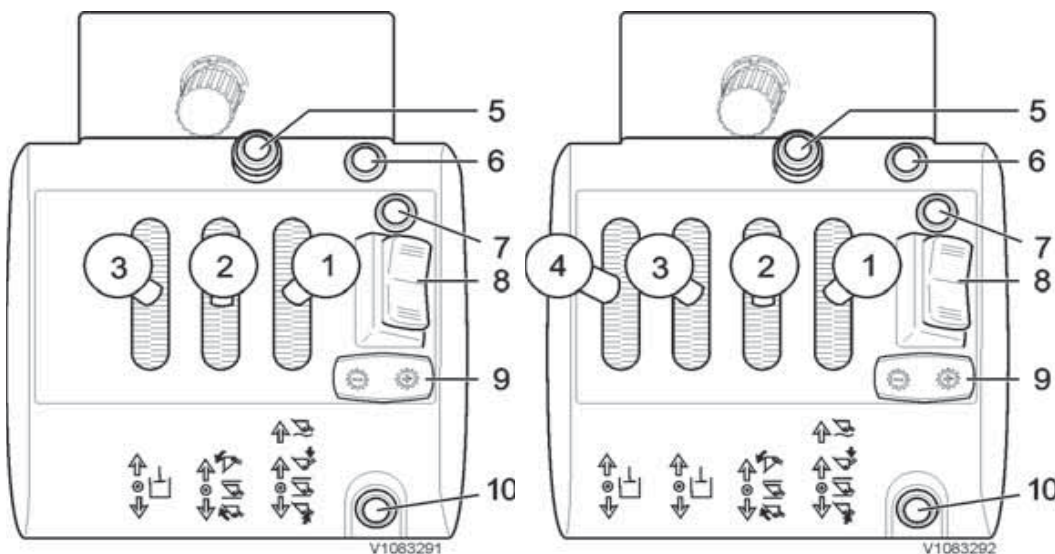
The differential lock should only be used when operating on slippery ground. When operating on firm ground, particularly when turning, the differential lock must be disengaged.

#### NOTE!

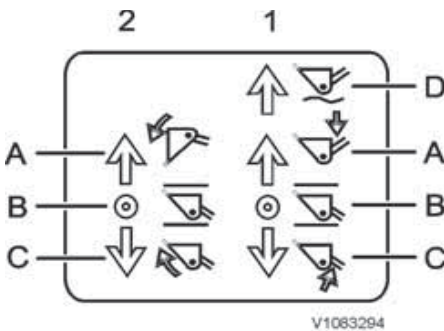
If the machine has become stuck and one of the wheels is spinning, the wheel must be stopped before engaging the differential lock. Otherwise the drive axle system may be damaged.

#### 1C 3-lever control (optional equipment)

#### 4-lever control (optional equipment)



72 Other controls  
Controls



- |                    |                    |
|--------------------|--------------------|
| 2                  | 1                  |
| A Tilt forward     | D Float position   |
| B Neutral position | Lower position     |
| C Tilt back        | B Neutral position |
|                    | C Lift position    |

**Lever (1) for the lifting function has four positions:**

- D Float position
- A Lower
- B Neutral: Not activated (spring-centred)
- C Lift (with hold function, see page 81)

**Lever (2) for tilting function has three positions:**

- A Tilt forward
- B Neutral: Not activated (spring-centred)
- C Tilt back (with hold function, see page 80)

**Lever (3) for attachment locking and 3rd hydraulic function has three positions:**

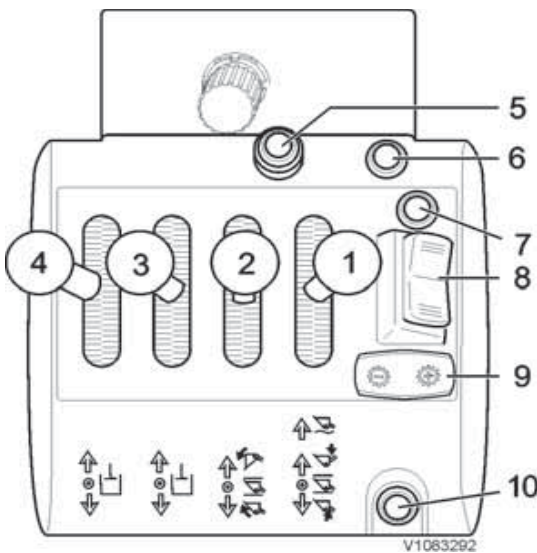
- A Unlock/lower 3rd hydraulic function
- B Neutral: Not activated (spring-centred)
- C Lock/lift 3rd hydraulic function (with hold function)

**Lever (4) for 4th hydraulic function has three positions:**

- A Lower 4th hydraulic function
- B Neutral: Not activated (spring-centred)
- C Lift 4th hydraulic function

**Differential lock (5)**

This provides an additional possibility (to the foot operating switch) for the activation of the differential lock, especially when the differential lock should be used during operation of the inching-brake pedal.



- Pressing and keeping the differential lock button depressed, engages the differential lock on the front- and rear axle.

**NOTE!**

When releasing the button, the differential locks may eventually not disengage immediately (due to the friction on the contact areas caused by the differential torques). Then, interrupt the drive and do some steering operations so that the differential torque is reduced and the differential locks on front and rear axle disengage.

**NOTE!**

The differential lock should only be used when operating on slippery ground. When operating on firm ground, particularly when turning, the differential lock must be disengaged.

**NOTE!**

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

**Horn (6)**

**Not used (7)**

**Directional gear F-N-R (8)**

- To be able to use the forward/reverse function on the control lever carrier, the activating button (10) must first be depressed.

After activation F/R is shown: in front of the selected directional gear on the display unit on the Operating Information screen

Switch in the forward position = Operating forward

Switch in centre position = Neutral

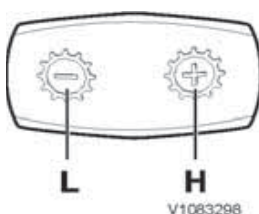
Switch in rearward position = Operating in reverse

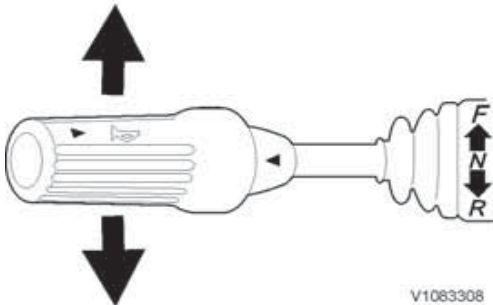
- If the ordinary gear selector control by the steering wheel is moved from neutral, while operating with the F/R switch, the gear selector at the steering wheel will override the switch.
- A new activation of the system requires that the activating button (10) is pressed again.

**Speed range selection (9)**

Upshift (Higher speed range): Press the right end of the switch (H).

Downshift (Lower speed range): Press the left end of the switch (L).





### Directional gear activation switch (10)

**NOTE!**

The ordinary selector control by the steering wheel and the switch on the control lever carrier must, when activating, be in neutral.

### 2A Selector lever for travel direction (only with control lever version 1C)

Lever in position F = Forward

Lever in position N = Neutral

Lever in position R = Rearward

### 2B Foot control for differential lock

**(only with control lever version 1C)**

- Pressing and keeping the differential lock foot button (see page 66) depressed, engages the differential lock on the front- and rear axle.

**NOTE!**

When releasing the button, the differential locks may eventually not disengage immediately (due to the friction on the contact areas caused by the differential torques). Then, interrupt the drive and do some steering operations so that the differential torque is reduced and the differential locks on front and rear axle disengage.

**NOTE!**

The differential lock should only be used when operating on slippery ground. When operating on firm ground, particularly when turning, the differential lock must be disengaged.

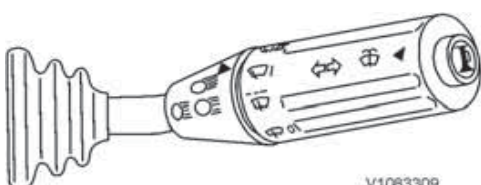
**NOTE!**

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

### 3 Multi functional lever

#### Direction indicator, warning horn

- Lever forward = Left hand direction indicator
- Lever backward = Right hand direction indicator
- Button depressed = Horn




### Head lights

- Lift the lever towards the steering wheel = High / low beams

### Windscreen washer system

- Push the ring towards the steering wheel = Windscreen washer system

### Windscreen wiper (turning of lever)

- Position  = Interval wiper
- Position 0 = Neutral position
- Position I = Windshield wiper, normal speed
- Position II = Windshield wiper, high speed

### 4 Inching-brake pedal

The inching-brake pedal enables matching of the travel speed of the wheel loader to the current travel situation, irrespective of the drive pedal position.

Actuating the inching-brake pedal while the drive pedal is fully kicked down (highest possible lifting speed of the bucket) reduces the travel speed to a minimum (approaching a truck).

### Wearless hydrostatic braking

Inching-brake pedal provides hydrostatic braking via the transmission on the first part of its operation, without wearing the service brakes. When pressing the brake pedal further, the service brakes will be applied.

### 5 Drive pedal/Accelerator pedal

Use the economical operating range whenever applicable. This can be easily followed by the Operating display 2 and the color-coded throttle application. See page 41.

#### NOTE!

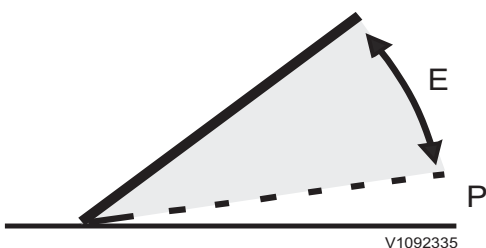
With the drive pedal both engine and travel speed is controlled.  
When the drive pedal is released during driving, the machine will decelerate to standstill.

### 6 Parking brake lever

With the parking brake lever the dry disc brake on the front axle is operated via a Bowden cable.

The control light is activated when the parking brake lever operated and has left its bottom position.

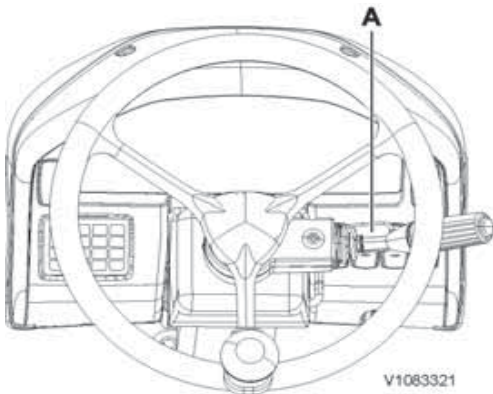
When a gear has been selected the operation of the parking brake lever will cause the transmission to neutral gear.



E = Economical operating range  
P = Power range



76 Other controls  
Controls



A Lock lever

### 7 Steering wheel, adjusting

#### Adjusting the steering wheel inclination

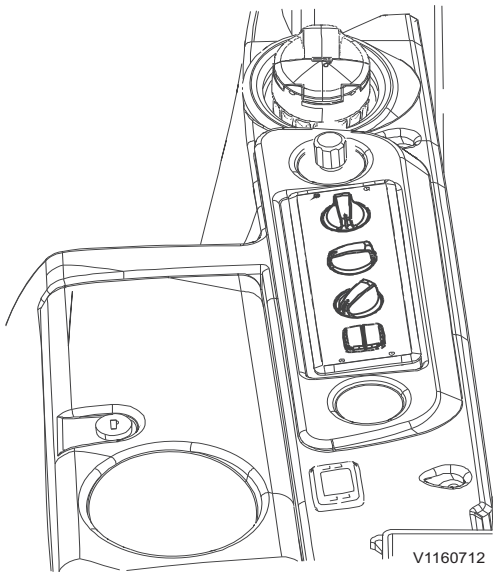
- Press locking lever (A) down and adjust the steering wheel inclination.

#### Adjusting the steering wheel height

- Pull locking lever (A) up and adjust the height of the steering wheel.

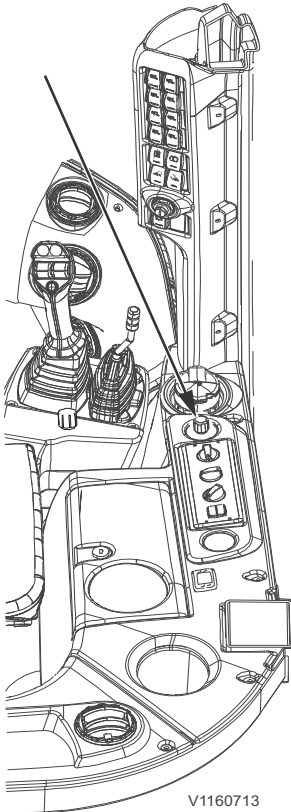
#### NOTE!

After adjusting, check that all control levers have sufficient clearance when operated.



### 8 Climate control system

For more information, see page 88.



Hand throttle control (optional equipment)

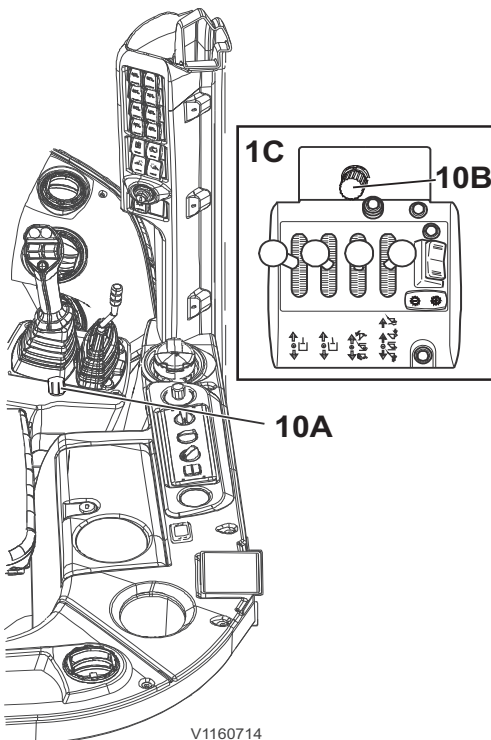
### 9 Hand throttle control (optional equipment)

Throttle application is transmitted electrically.

- Throttle application is changed by turning the control. Turning clockwise increases the speed.
- Depending on previous adjustment, the control may first have to be turned counter-clockwise and then clockwise in order to set the speed.
- When applying the drive pedal/accelerator pedal while the engine speed is set by the hand throttle, then the pedal will take over beyond the hand throttle setting. When the pedal is then released the engine speed will drop to the value set by the hand throttle.
- When starting the engine, the hand throttle is disengaged, regardless of previous setting.

#### NOTE!

The machine movement can be stopped with the inching-brake pedal at any time, independent of the hand throttle setting.



### 10A/B Hand control for inching (optional equipment)

- 10A: Only with control lever versions 1A and 1B
- 10B: Only with control lever version 1C

The hand-inching control (a turning knob) offers the possibility to match the travel speed of the machine to the application, independently from the position of the drive pedal.

The turning knob is located behind the control lever for lifting arms and bucket.

- Turn the hand-inching control counter-clockwise to the stop.
- Adjust the engine speed with the drive pedal or the hand throttle control to the required speed.
- Select the directional gear (Forward / Rearward).
- Turn the hand-inching control clockwise, until the desired travel speed is reached.

#### NOTE!

During normal operation of the machine the hand-inching control must be completely turned clockwise to the stop.

78 Other controls  
Controls



**11 12 V socket (optional equipment)**



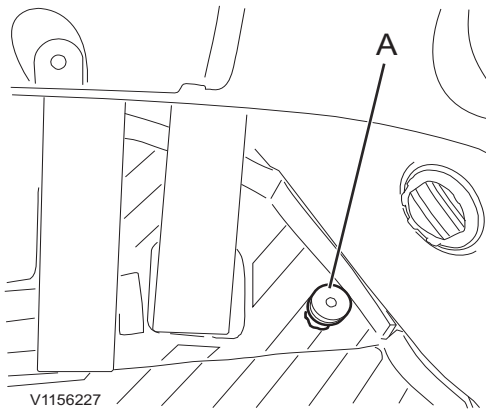
**12 Comfort Drive Control, CDC (optional equipment)**

The equipment consists of a folding armrest where the operating functions steering and forward/reverse are collected.

The functions are activated by lowering the armrest and pressing in the activation button (gear selector must be in neutral position).

A control light on the middle instrument panel is on when the system is activated.

Other instructions, see page 129.



**13 Flow adjustment knob, only with High-flow (optional equipment)**

This is part of the High-flow option when the machine is equipped with one of the following Control lever versions:

- 1A: Single control lever with Aux lever (optional equipment)
- 1C: 3-lever control (optional equipment)
- 1C: 4-lever control (optional equipment)

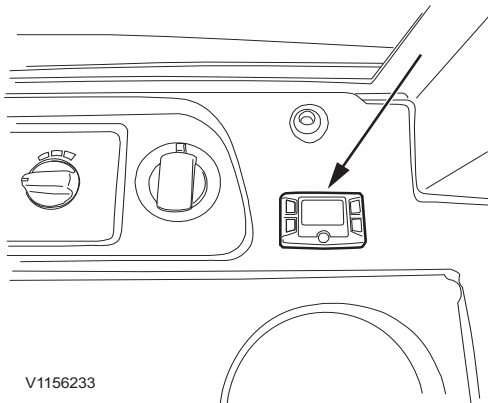
Not with 1B: Single control lever with integrated Aux hydraulic functions (optional equipment), because it is included there. See page 66.

The oil flow adjustment knob (A) provides adaptation of the max. oil flow resp. attachment speed.

Operate the lever for the 3rd hydraulic function carefully in direction T (to the rear) and check the attachment speed at the respective engine speed.

- Reduction of oil flow: Turn the knob clockwise.
- Increase of oil flow: Turn the knob counter-clockwise.





### 14 Control panel for CAB auxiliary heater (optional equipment)

The control panel, together with the climate control system, is used for the CAB auxiliary heater to warm up the cab, see page 93.

### Lifting fork operation / Hose rupture (optional equipment)

#### NOTE!

The switch (see left figure) for the control lever lockout of the working hydraulics must be in the unlocked position (lower end of the switch pressed in) for this function to work when activated.



Lift fork operation/Hose rupture protection is a safety function, which prevents uncontrolled lowering of the load in case of a hose rupture during lifting work (loading fork - loading hook operation).

- Switch, upper part pressed in = Lift fork operation / Hose rupture protection enabled.
- Switch, lower part pressed in = Lift fork operation / Hose rupture protection disabled.

### NOTICE

"Lowering or Tilting forward" is not possible after the engine has been shut down and ignition key is in running position (1).

Before starting maintenance or repair work after "Lifting fork operation / Hose rupture protection" has been used:

- 1 Disable "Lifting fork operation / Hose rupture protection" by pressing in the lower part of switch.
- 2 Unlock "Work hydraulics / Control lever lockout" by pressing in the lower part of switch.
- 3 Start the engine and let it run to load the accumulator with pressure.
- 4 Turn off the engine but leave the ignition key in position 1.

- 5 Move the control levers and knobs for the work hydraulics several times to their end-positions.

**NOTE!**

Work on hydraulic systems must only be performed by authorized personnel.

### Bucket positioner

The machine is equipped with a bucket positioner, which automatically adjusts the tilting position according to the adjusted loading position after the bucket has been dumped.

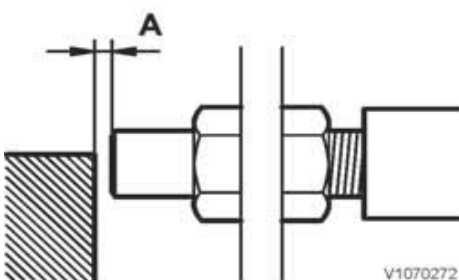
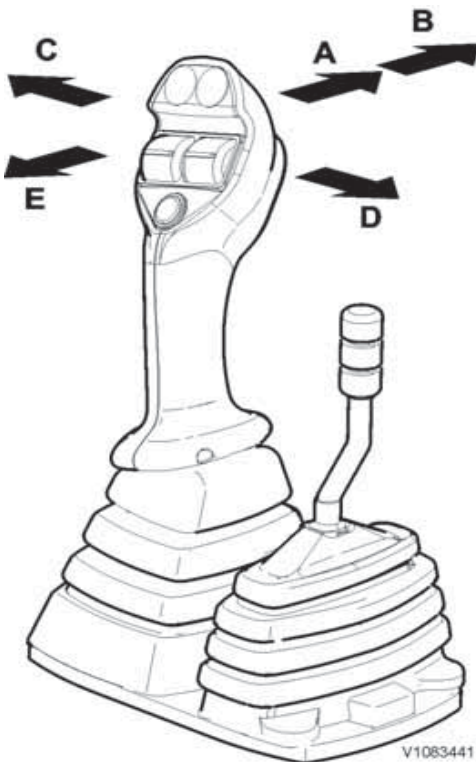
Activate the function with the switch, see page 59.

For activation after dumping the control lever for "Tilting backwards" must be fully operated so that the lever will be kept in this position by the detent function.

When the bucket has reached the pre-adjusted position, the detent will be released automatically and thereby the tilting backwards function will be stopped. The control lever returns to neutral position.

**NOTE!**

At every time the movement of the tilting backwards function can be stopped by pushing the control lever out of the detent position.



The bucket positioner is adjustable with the sensor on the tilt cylinder.



**NOTICE**

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.

**Bucket positioner switchable**

In some applications it is not desirable to have the attachment tilted backwards automatically. Therefore the bucket positioner function can be deactivated with the switch.

Deactivate the function with the switch, see page 59.

**Boom kick-out (optional equipment)**

Activate the function with the switch, see page 59.

The boom kick-out automatically adjusts the lifting position according to the adjusted lifting height.

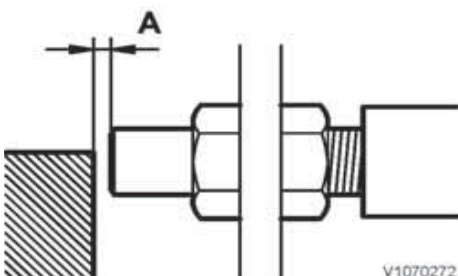
For activation after lowering the control lever must be fully moved to the rear (lifting) so that the lever will be kept in this position by the detent.

When the lifting arms have reached the pre-adjusted position, the detent will be released automatically and thereby the lifting function will be stopped. The control lever returns to neutral position.

**NOTE!**

At every time the movement of the lifting arms can be stopped by pushing the control lever out of the detent position.

The boom kick-out is adjustable with the sensor on the left side of the front frame.



**NOTICE**

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.

In some applications it is not desirable to have the lifting arms lifted automatically. Therefore the boom kick-out function can be deactivated.

Deactivate the function with the switch, see page 59.

### Back-up alarm (optional equipment)

The back-up alarm is used to warn people in the immediate vicinity of the machine when the machine is reversing or when the "rearwards" direction is selected.

- Select the Rearward gear. The back-up warning signal should be activated immediately.

**NOTE!**

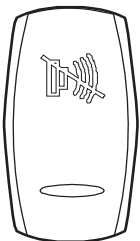
The back-up alarm remains active until the Rearward gear is changed to Forward or to Neutral gear.

### Back-up alarm switchable (optional equipment)

If sounding the back-up alarm horn is not permitted or not desired, e.g. on public roads or inside buildings, the back-up alarm can be disabled with the switch, see page 59.

**NOTE!**

In some countries, Germany for example, the back-up alarm must be deactivated when travelling/operating on public roads. Check national requirements.



V1157032

## Operator comfort

### Operator seat

The operator seat meets the criteria of EN ISO 7096. Briefly, this means that the seat is designed to minimise whole-body vibrations during machine operation. The amount of vibration depends on different factors, many of which are not related to the construction of the machine, such as ground conditions, speed and operating techniques. Note the following:

- Adjust the seat according to weight and height of the operator.
- Keep the ground on the work site in good condition.
- Choose the appropriate operating technique and speed for the existing circumstances.

### **WARNING**

Risk of serious injury!

Unexpected machine movement can cause the operator to be ejected from the machine, causing serious injuries.

**Operate the machine only while seated in the operator seat with the seat belt fastened.**

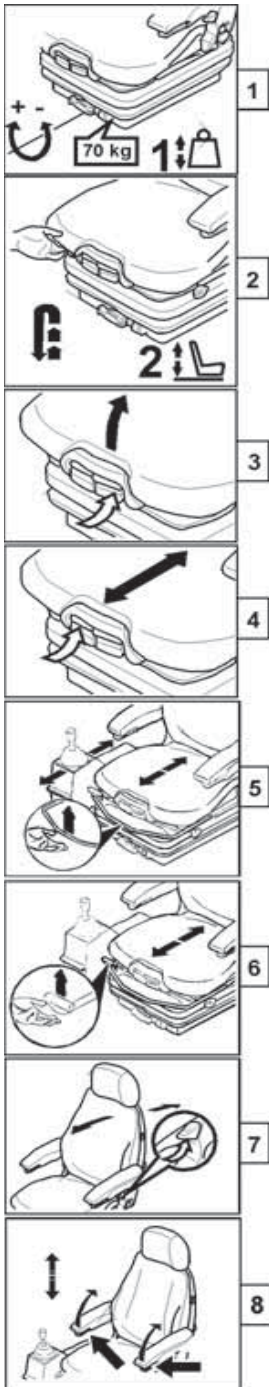
A correctly adjusted operator seat enhances the operator comfort and safety. An incorrectly adjusted seat may lead to injuries. The adjustments that could be made are:

- 1 **Weight adjustment:** Turn the lever until your weight is shown in the indicator.

#### **NOTE!**

Do not sit in the seat while adjusting.

- 2 **Height adjustment:** Lift the operator's seat to the desired height until it audibly snaps into place. When the seat has been raised above the highest setting (end-stop) it drops back down to its lowest position.
- 3 **Seat pan angle adjustment:** Pull the left handle upwards and push down or pull up the front part of the seat pan to adjust for desired angle.
- 4 **Seat depth adjustment:** Pull the right handle upwards and move the seat cushion forward or backwards to desired position.



V1083477



- 5 **Longitudinal (leg room) with control carrier:** Lift the lock handle and use the control carrier to adjust for desired position.
- 6 **Longitudinal (leg room) without control carrier:** Lift the lock handle and move the seat forward or backwards to desired position.

**NOTE!**

After longitudinal adjustment, the lock handle must latch with an audible click. Then, it should not be possible to move the operator seat.

- 7 **Backrest adjustment:** Pull up the lock catch and move the backrest to the desired position. Then release the lock catch.

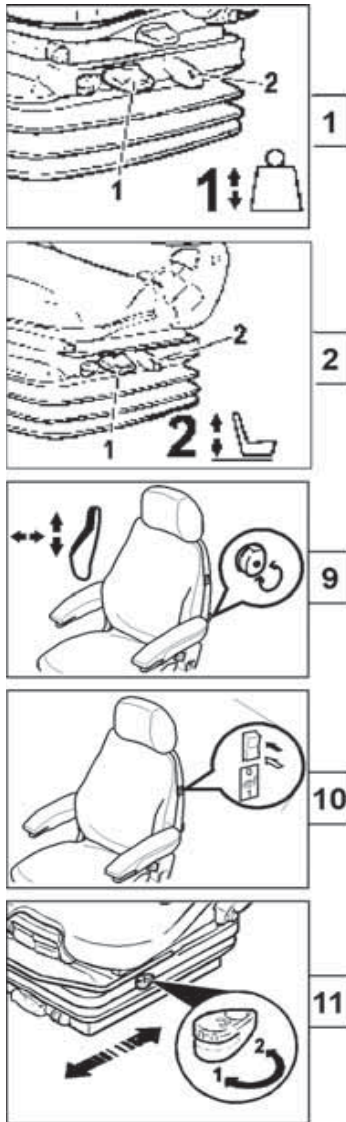
**NOTE!**

The backrest is spring-loaded to forward direction when the lock catch is pulled upwards.

**NOTE!**

It shall not be possible to move the backrest when the lock catch is in lowest position.

- 8 **Armrest on the seat, adjusting:** Operate the turning knob underneath the front end of the armrest (arrow) according to the desired position. The armrests can be folded up.



V1083515

## Air suspended seat (optional equipment)

The adjustments are carried out in the same way as for the mechanical seat (see page 83), except for the weight and height adjustment.

**1 Weight adjustment:** Push in or pull out lever (1) until indicator (2) shows green marking.

**2 Height adjustment:** Push down or pull up lever (1) fully to adjust the height.

### NOTE!

The green marking must be shown in indicator (2)

## NOTICE

Do not operate the function more than 60 seconds to avoid damage.

**9 Lumbar support (optional equipment):** Turn the adjustment knob to adjust for lumbar support.

### NOTE!

Do not press fully against the backrest during adjustment in order to maintain easy operation of the adjustment knob.

**10 Seat heater (optional equipment):**

- 0 = seat heater OFF
- 1 = seat heater ON

**11 Fore/aft isolator (optional equipment):** This function should be activated under certain driving conditions for the operator seat to better absorb shock impacts in the driving direction.

- 1 = activated
- 2 = deactivated

### NOTE!

After choosing position 1, push back the operator seat fully until the lock handle latches with an audible click.

### NOTE!

It shall not be possible to move the seat when the lock handle has latched.

## Armrest, adjusting

### Armrest on the lever console, adjusting

The armrest for the 3- and 4-lever control (optional equipment) and also the optional armrest for the

Single-lever control (optional equipment) can be adjusted up/down.

- 1 Loosen handle counter-clockwise and adjust to required height and angle.
- 2 Tighten the handle clockwise.

## Seat belt

### **WARNING**

Risk of serious injury!

Unexpected machine movement can cause the operator to be ejected from the machine, causing serious injuries.

**Operate the machine only while seated in the operator seat with the seat belt fastened.**

The seatbelt is critical to operator safety. It must always be worn and fastened when the machine is used to prevent the operator from being ejected out of the cab or off the operator platform if the machine rolls over, tips over, or is involved in an accident. A fastened seatbelt also helps the operator to maintain control of the machine if it moves suddenly or in an unexpected way. Failure to use the seatbelt when the machine is used can lead to serious injuries or fatal accidents. The seatbelt is only intended for one adult. Make sure that the seatbelt is reeled-in when not in use.

### **WARNING**

Risk of serious injury or death.

A damaged seat belt could cause serious injury or death.

**Check the seat belt and associated parts before start of machine operation.**

Check the seatbelt and associated parts every day. Make sure that fasteners and installation parts are well-tightened. Replace the whole seatbelt immediately if there is any wear, the belt is worn, frayed, has loose stitching, if the belt is deformed, or if the seatbelt's reel does not work. Replace the seatbelt if the machine has been involved in an accident where the belt has been stretched, strained, or subjected to high forces. Check fasteners and installation parts. It is forbidden to change or modify the belt or its attachments and



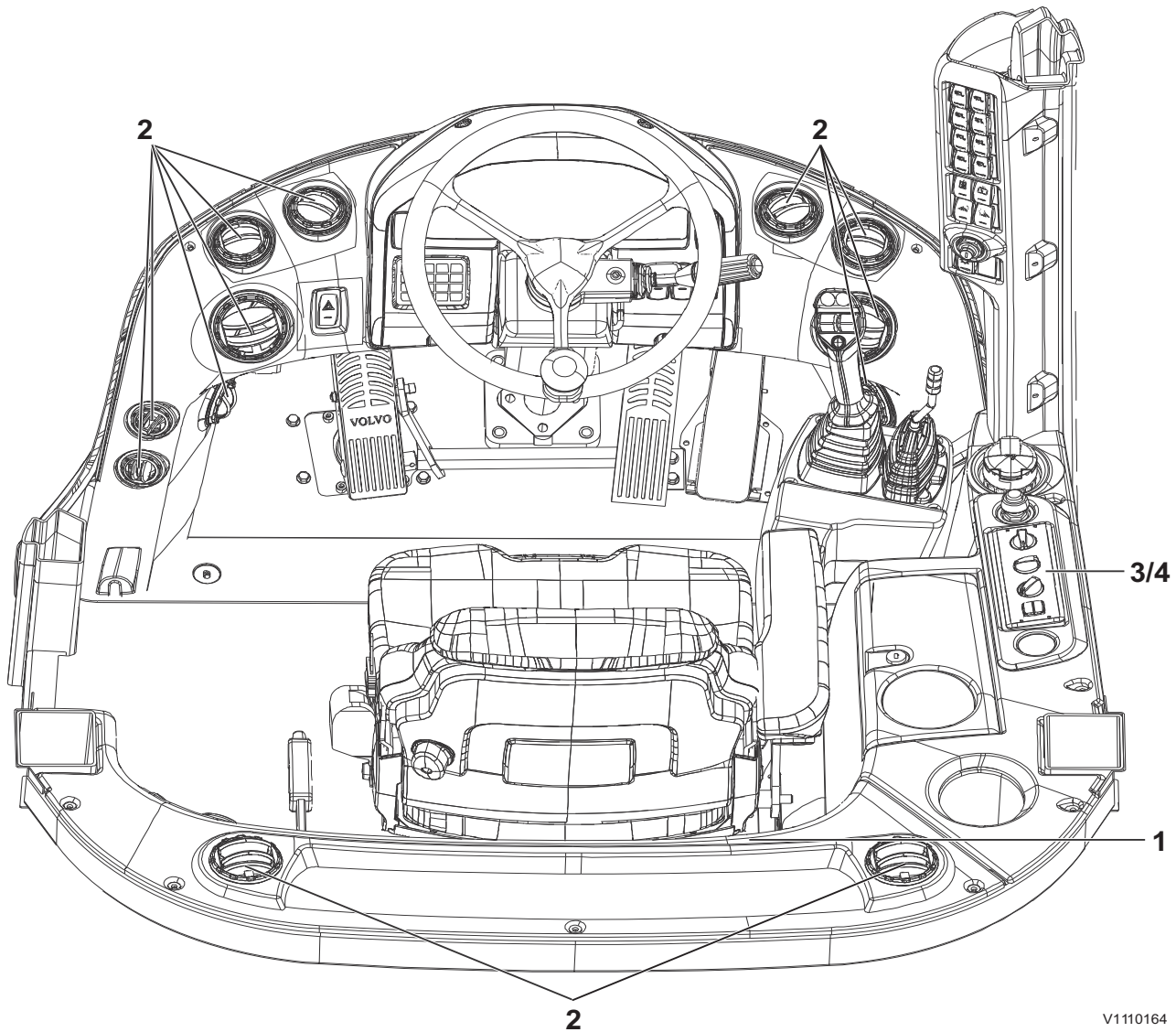


Other controls  
**Operator comfort** **87**

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fasteners. Only use warm water when cleaning, do not use cleaning agents or detergents. Let the belt dry while it is pulled out, before reeling it in. Volvo Construction Equipment recommends replacement of seatbelt units every 3rd year regardless of appearance.

## Climate control system



- 1 Temperature sensor for cab climate (only with climate control system, optional equipment)
- 2 Ventilation nozzles, front and rear
- 3/4 Climate control system

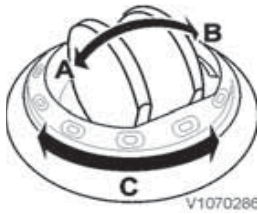
**1 Temperature sensor for cab climate (only with climate control system, optional equipment)**

**NOTE!**

Make sure that the space in front of the temperature sensor is clear. Do not point an air nozzle directly at the temperature sensor.

V1110164

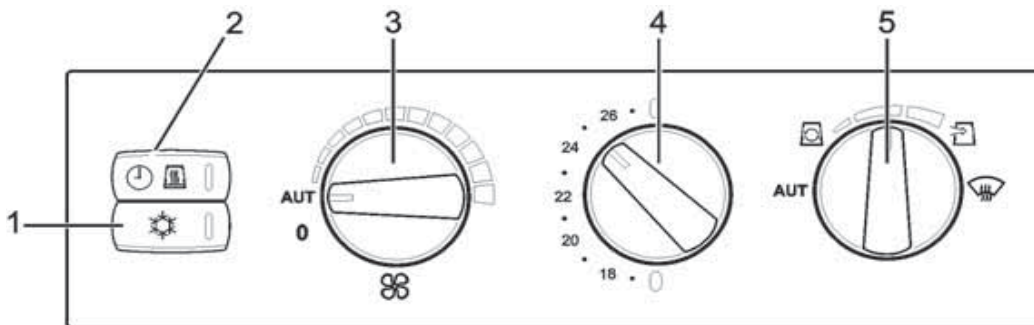
## 2 Ventilation nozzles



V1070286

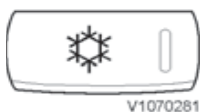
- A Open
- B Closed
- C Air flow direction

## 3/4 Climate control system



V1070244

- 1 Air conditioning (optional equipment)
- 2 Cab ventilation (standard) / Pause heating (optional equipment)
- 3 Fan control (standard)
- 4 Temperature control (standard)
- 5 Air distribution control (standard)



V1070281

1 Air conditioning

### 1 Air conditioning (optional equipment)

Press in the switch to switch on the air conditioning. The control lamp in the switch shows that the function is switched on.

If the control lamp starts to flash, the air conditioning has become turned off.

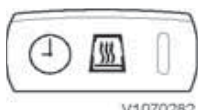
The cause may be clogged condenser, see page 243.

### NOTE!

(The switch is installed on machines without this optional equipment, but is then without any function.)

### 2 Cab ventilation (standard) / Pause heating (optional equipment)

Cab ventilation / Pause heating takes place with the aid of the cab fan at the same time as the engine is turned off and the ignition key is in position 0.



V1070282

2 Cab ventilation / Pause heating

Works even when the ignition key has been removed from the ignition switch.  
The battery disconnect switch must be switched on.

**Activation:**

Press in switch (2) to activate the cab ventilation/ pause heating.  
Activation can be done max. 1 minute before, or max. 15 seconds after the ignition key is turned to position 0, thus turning off the engine.  
The control lamp in the switch is alight and shows that the function is active.

**Warm outdoor climate, cab ventilation:**

The cab is ventilated while the machine is parked.  
Fan speed at position AUT is recommended.  
The time is max. 1,5 hours, depending on temperature conditions.

**Cold outdoor climate, pause heating (optional equipment):**

The engine coolant is circulated and thereby provides the cab with heating.  
The duration of the pause heating is as long as the temperature of the coolant is sufficiently high or up to 1 hour.  
Fan speed at position AUT is recommended.  
The temperature is adjustable with the temperature control.

**Deactivation is done or takes place:**

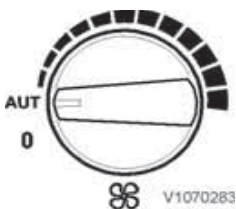
With switch (2).  
When the time has elapsed.  
When the engine is started.

**3 Fan control**

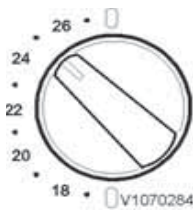
Position 0 = fan turned off.  
Position AUT = automatic control, stepless fan speed.  
Marked area = manual setting, fixed positions for fan speed.

**NOTE!**

If the cab door is opened while the fan control is in position AUT, the fan speed is reduced automatically in some cases.



3 Fan control



4 Temperature control



5 Air distribution control

#### 4 Temperature control

Position upward = max. heating, red marking.  
Position left = selection of required temperature.  
Position downward = max. cooling, blue marking.

#### 5 Air distribution control

Position AUT = automatic control.  
Position left, towards the symbol = maximum air recirculation.  
Marked area = mix of air recirculation and ambient air.  
Position right, towards the upper symbol = maximum ambient air.  
Position right = defroster, ventilation nozzles at the windows open and directed towards the windows.

### Climate control system, adjusting

The instructions below are basic recommendations. Each operator should experiment to achieve the best possible working environment in the cab, i.e. the right temperature without a draught.

For the best temperature control in the cab try to have as many nozzles open as possible.

#### Maximum recirculation set with the air distribution control

May be used as a setting for reducing the intake of malodorous air. This also reduces the accumulation of dust in the cab ventilation filters.

If the windows mist up, turn the control to Maximum ambient air. When needed, clean and check or replace the cab's ventilation filter, see page 260.

#### This is how you adjust ...

##### ... comfortable working temperature:

- All nozzles fully open.
- During warm outdoor climate – air conditioning switched on.
- Fan control in position AUT.
- Temperature control set to required temperature.
- Air distribution control in position AUT.

##### ... demisting all windows:

- The front nozzles directed towards the windscreen.



## Other controls Climate control system

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- Floor nozzles under instrument panel closed.
- The rear nozzles directed at the rear window/side window.
- The air distribution control in defroster position, which provides:
  - Maximum ambient air.
  - Maximum heating.
  - Maximum cooling, if the machine is equipped with air conditioning.
  - Highest fan speed.

When the required effect has been reached and the air distribution control is turned back to the required position, the climate control system returns to selected temperature and selected fan speed. Open the floor nozzles.

To reduce the risk of mist, keep the windows clean. Only use ordinary window cleaner for cleaning.

### **Provide for good ventilation**

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

Poorly ventilated air can cause tiredness (lack of oxygen).

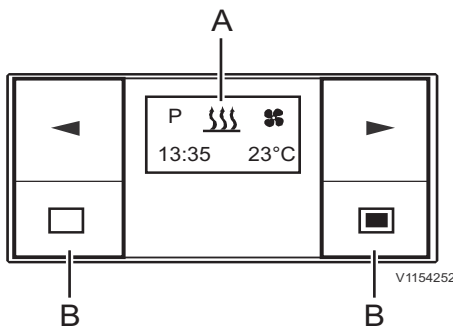
## CAB auxiliary heater, description

### (Optional equipment)

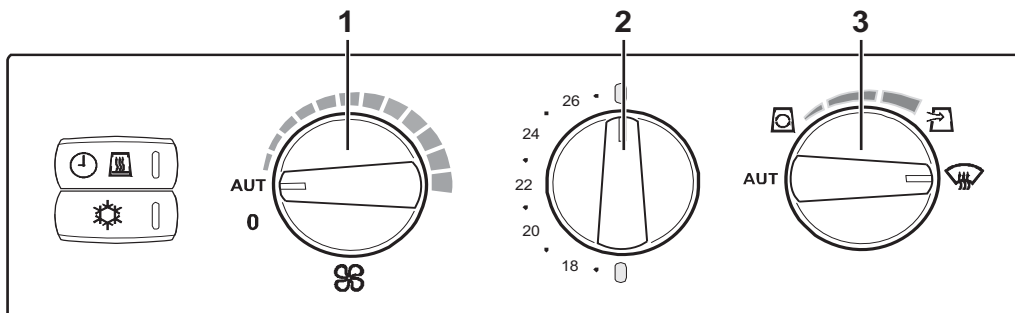
The auxiliary heater uses the diesel fuel to warm up the cab. For efficient heating, the ventilation nozzles should be fully open and directed at the windows, and the climate control system should be set as follows.

#### NOTE!

Setting of the climate control system should be done with the engine running or the ignition on.

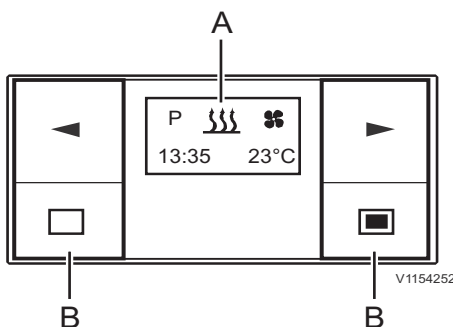


A Display window  
B Buttons



### Climate control system

- 1 Fan control in position AUT
- 2 Temperature control at maximum heating
- 3 Air distribution control in defrost position



A Display window  
B Buttons

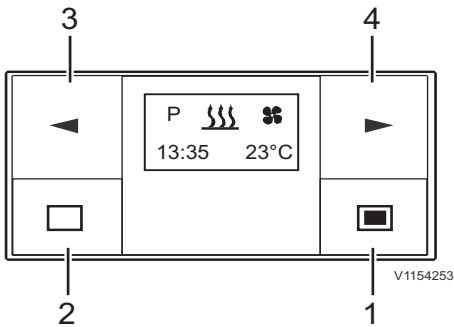
The auxiliary heater timer can be used to make the necessary settings for operation of the heater.

### Button functions

If the display is not lit, the timer must be activated. **SHORTPRESS** of one of the four buttons; the start display appears in the display unit, then continue with the operation or setting.

All functions can be set and, if necessary, changed with only 4 buttons.

## 94 Other controls Climate control system



- 1 Power on / confirm button
- 2 Power off / cancel / exit setting button
- 3 Backward button
- 4 Forward button

### 1 Power on / confirm button

#### ■ SHORTPRESS button

- if the display shows OFF → Timer On, the start display appears.
- A selected function is confirmed
- Inputs are confirmed

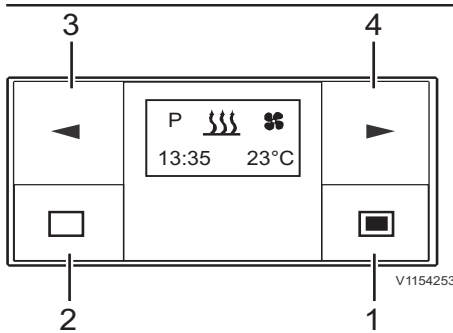
#### ■ LONGPRESS button : The button must be pressed for longer than 2 seconds.

- The heater is turned on immediately.



## Other controls Climate control system

95



- 1 Power on / confirm button
- 2 Power off / cancel / exit setting button
- 3 Backward button
- 4 Forward button

### 2 Power off / cancel / exit setting button

#### ■ SHORTPRESS button

- The displayed activated function ends, other activated functions are retained.
- With each SHORTPRESS, the display changes to a next higher level up to Timer OFF.
- The start display appears and no function is active: → Timer OFF.
- Timer is in submenu → the setting is exited, already set values are not saved.
- if the display shows OFF → Timer On, the start display appears.

#### ■ LONGPRESS button : The button must be pressed for longer than 2 seconds.

- All functions are ended.
- If the display shows OFF → Timer On, the start display appears.

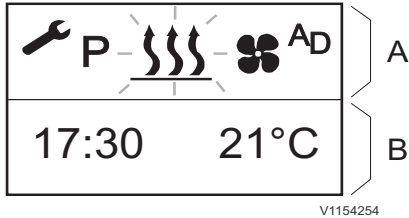
### 3 Backward button

- Timer is in the Main menu and the start display appears → in the Menu bar the next, left symbol appears in the middle and is flashing.
- Timer is in the submenu → the displayed value is changed (smaller) or the next selection is displayed.
- If the display shows OFF → Timer On, the start display appears.

### 4 Forward button

- Timer is in the Main menu and the start display appears → in the Menu bar the next, right symbol appears in the middle and is flashing.
- Timer is in the submenu → the displayed value is changed (larger) or the next selection is displayed.
- If the display shows OFF → Timer On, the start display appears.

96 Other controls  
Climate control system



Main menu  
A Menu bar  
B Status area



Submenu  
A Menu bar : activated function  
B Input area

Operation and setting/adjustment

Main menu

Menu bar

The following menu items can be selected.

Symbol	Function
	Heating ON / OFF
	Settings
<b>P</b>	Program / Preselection

Status area

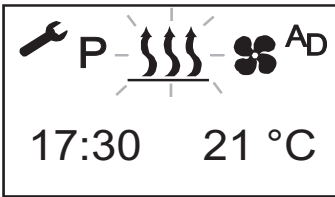
If no menu item is activated, the current time is displayed in the status area.

If a menu item is activated (heating, settings, or program / preselection), different information is displayed in the status area.

Submenu

In the submenu, the symbol of the selected menu item appears in the middle of the display. The corresponding set value is displayed flashing in the entry area and can be set using the Backward button (3) or Forward button (4) and confirmed with the Confirm button (1).

Other controls  
**Climate control system** 97



V1154256

**Start display after turning ON**

if no menu item is activated, the start display appears with a flashing heater symbol in the Menu bar, with the current time in the status area.

**Other possible actions are:**

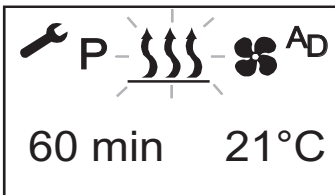
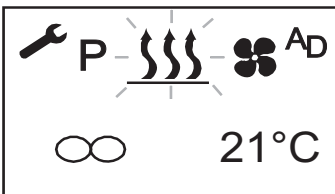
- Heating immediately with LONGPRESS button (1).
- Heating on with SHORTPRESS button (2), also confirm and set the operating time.
- Select a new menu item.

**Displays for activated menu items**

**1 Heating ON / OFF**

■ Heating immediately with LONGPRESS (without settings)

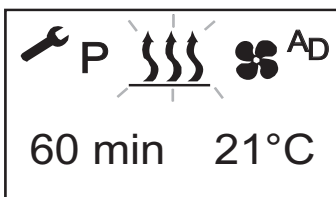
- 1 Press the LONGPRESS button (1) for longer than 2 seconds.
- 2 If LONGPRESS is pressed during heating mode, the display switches to the heating submenu. During heating mode it is possible to switch to another menu item.



V1154257

Other controls

98 Climate control system



V1160038

- Heating on with SHORTPRESS and with settings

- 1 Press the SHORTPRESS button (1) for less than 2 seconds.

**NOTE!**

The following settings and confirmations (operating time) are always required.

- 2 If necessary, use the BACKWARD or FORWARD button to set the operating time. Press the confirm button (1) to confirm the operating time.

- Heating OFF

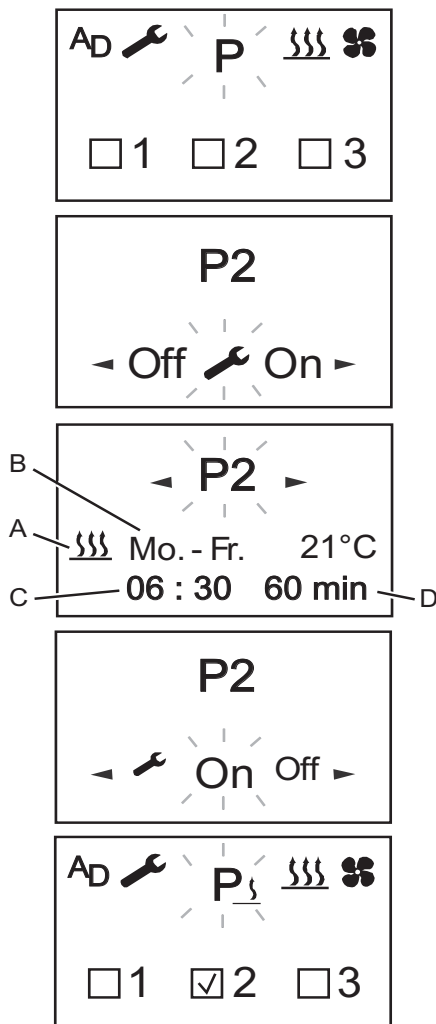
- Press the button (2) for longer than 2 seconds → all active functions are ended
- Press the button (2) for less than 2 seconds. → heater OFF.

The following actions are possible during the display 'heating off':

- Use the forward or backward button to select a menu item. Press the SHORTPRESS button (2), the start display appears.
- Press the SHORTPRESS button (1), the heating submenu is displayed.

## Other controls Climate control system

99



V1154261

- A Preset unit
- B Preset day
- C Departure time
- D Operating time (05:30 to 06:30)

### ■ Program preset times

The timer can be used to program 3 preset times. The 3 preset times can either all take place on one weekday or can be distributed among different weekdays. 3 weekday ranges are available to choose from, each of these can be started daily with a preset time.

### ■ Weekday ranges:

Sat-Sun: 2x Heating / ventilation

Mon-Fri: 5x Heating / ventilation

Mon-Sun: 7x Heating / ventilation

- If the system is activated with programmed weekday range, all weekdays are worked through consecutively; after that renewed programming is required.
- If the timer with a programmed weekday range Mon – Fri is activated on Wednesday, the heater heats or ventilates on Thursday and Friday, the heater is not operated on Saturday and Sunday. From Monday to Wednesday of the following week the operation is continued with the set defaults (5x heating / ventilation). After a weekday range has been worked through, renewed programming is required.

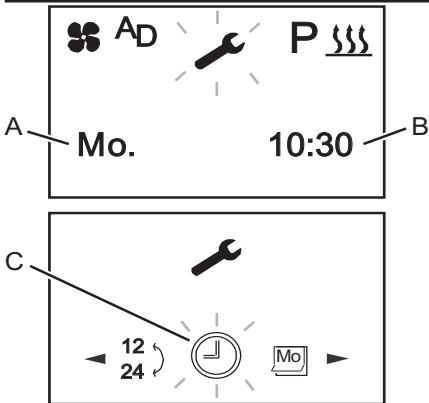
### ■ Program preset times

- 1 Use the backward or forward button to select the Program symbol in the menu bar.
- 2 Confirm the Program menu by pressing the confirm button (1).

If the Program symbol is marked with **P<sub>3</sub>**, a or several program memories is/are already activated.

Activated program memories are marked in the display with a .

## Other controls 100 Climate control system



V1154262

- A Current day
- B Current time
- C Settings submenu bar

### ■ Settings

This function is for setting current day and time.

- 1 Use the backward or forward button to select the setting symbol in the menu bar.
- 2 Confirm the setting menu by pressing the confirm button.
- 3 Use the backward or forward button to select the submenu for which the setting is to be changed.
- 4 Press the confirm button to confirm the setting value.

Other controls  
**Climate control system**    **101**

**Error messages**

In case of a problem, the following displays are possible:

Display	Description	Action
 <small>V1154443</small>	- Automatic detection is active. - The auxiliary heater's timer has been disconnected from the power supply and then reconnected.	Wait until automatic detection has finished, then set the time and weekday.
 <small>V1154444</small>	- No communication.	Check and, if necessary, replace the heater fuse. Contact a workshop authorized by Volvo.
 <small>V1154445</small>	- heater problem.	Contact a workshop authorized by Volvo.
 <small>V1154447</small>	- Voltage too low.	Charge battery, if necessary contact a workshop authorized by Volvo.

**NOTE!**

If you are unable to fix the problem or defect, contact a workshop authorized by Volvo.

## Operating instructions

This section contains rules that must be followed for safe work with the machine. However, these rules are to be followed in conjunction with laws and other national regulations applicable to road safety and labour welfare.

Alertness, judgement and respect for applicable safety regulations are conditions for avoiding risk of accidents.

### Running-in instructions

During the first 100 hours, the machine should be operated with particularly great care. During the running-in period it is important to check oil and fluid levels often.

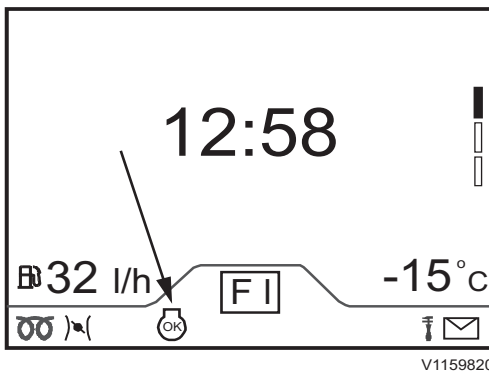
Wheel bolts should be check-tightened after 8 hours operation, see page 266.

### Delayed engine shutoff

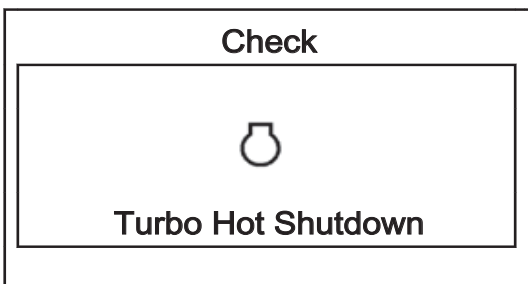
The function instructs the operator to not turn off the engine until the engine has idled for a certain time to prevent damage to the turbo. A symbol is shown on the display when engine shut-down is permitted.

#### NOTE!

If the operator turns off the engine before the symbol is shown on the display, an error message will be shown on the display at next start. The time it takes before engine shutdown is permitted depends on how hard the engine has been loaded.



Symbol shown when engine shutdown is permitted



### Engine protection - Software

The function informs the operator and limits the engine speed and torque and also the travelling speed of the machine in order to prevent any engine damage. Engine shutdown does not take place until





the speed has dropped to below 2 km/h (1.2 mph). This makes it possible always to be able to move the machine away from dangerous situations before engine shutdown takes place.

The function is monitored by the engine control unit E-ECU and depending on which component is causing the alarm any of the following functions will be activated:

- reduction of engine torque
- limiting engine speed
- limiting travelling speed of machine
- engine shutdown

### Auto engine shutoff (optional equipment)

Engine shutoff takes place after a predetermined time. The default setting is 5 minutes.

**The conditions required for engine shutoff to take place are that:**

- The machine is stationary.
- The engine is running at low idling.
- The gear selector is in neutral position.
- The hand-throttle is not actuated.
- The parking brake is applied.
- Regeneration (of Exhaust Aftertreatment System) is not activated.

When the conditions have been met and there is one minute left of the predetermined time, a message is shown on the display unit.

The count-down for the engine shutoff can then be interrupted by actuating the accelerator pedal, hand throttle or gear selector control.

#### **NOTE!**

The predetermined time can be adjusted with Tech Tool.

**When automatic engine shutoff has taken place:**

- The ignition key remains in position 1, running position.
- Lights or other connected current consuming devices remain connected.

## Propeller shaft

### NOTE!

- The propeller shaft must not touch the ground or any obstacles.
- Make sure there is no damage on the propeller shaft.
- Remove adhering dirt and wrapped-around material from the propeller shaft in order to prevent unbalance.
- If you are uncertain contact your dealer.

The propeller shaft design needs maintenance and provides lubricating grease nipples, two on the cross units and one for the length compensation.

In extreme and abrasive operating conditions, for example when the propeller shaft was taken under mud and water accidentally, the lubricating interval has to be reduced, and it may be necessary to grease even every week or day.

If working in water or on boggy ground, see page 165.

## Visibility

### **WARNING**

Risk of serious accidents.

Machine parts, equipment or load could obstruct the operator's view. Operating or driving with obstructed operator's view could cause serious accidents.

**Use a signal man if operator's view is obstructed.**

**The following information applies to machines delivered to countries within the EU and may also apply to machines delivered to other countries outside the EU.**

It may be impossible to obtain visibility to all areas around the machine. Optional devices and equipment such as warning systems, mirrors, back-



up alarm, and monitoring cameras (CCTV), etc., may be used to obtain acceptable visibility.

**NOTE!**

Some parts of the basic machine may restrict visibility, e.g., the cab's pillars and frames, exhaust pipe, engine hood, as well as optional equipment such as buckets, pallet forks, grapples, etc. The load that is handled with these attachments may also restrict visibility.

To minimize risks caused by restricted visibility, the management shall establish rules and procedures for the work site. For example:

- Make sure that operators and persons on the site have received thorough safety instructions.
- Conduct training for operators and staff on the site.
- Control traffic flow for machines and other vehicles.
- Restrict the machine's work area.
- Use a signal man to assist the operator. Use hand signals according to the signal diagram, see page 202.
- Make available equipment for two-way communication when needed.
- Make sure that persons on the site communicate with the operator before approaching the machine.
- Restrictions for maximum permitted speed as well as for reversing the machine over long distances.

**Visibility standards to meet EU's machine directive**

- The standard ISO 5006 "Earthmoving machinery – Operator's field of view" deals with the operator's visibility around the machine and is intended to be used to measure and evaluate visibility. Conforming to this standard is a requirement in EU-countries and offers improved visibility around the machine.
- The machine is tested according to methods and criteria according to this standard. The method used to evaluate visibility cannot include all aspects of the operator's visibility, but gives information to determine if optional equipment for indirect visibility is necessary, e.g., warning systems.
- The test was performed on a stationary machine without load, with standard equipment and

## Operating instructions

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The danger zone around operating machines is at least 7 m (276 in).

standard attachment, and with the bucket in carry position.

- ISO 14401 "Earthmoving machinery - Field of vision of surveillance and rear-view mirrors".
- ISO 16001 "Earthmoving machinery - Hazard detection systems and visual aids - Performance requirements and tests" (Earthmoving machinery - Visibility using cameras).

If the machine is modified or retrofitted with other equipment or attachments, which result in reduced visibility, it shall be tested again according to ISO 5006, ISO 14401, and ISO 16001, and provided with optional visibility-enhancing equipment as needed.

### Actions before and during operation

- Walk around the machine and check that there are no obstacles next to the machine.
- Check that mirrors and other visibility-enhancing equipment is in good condition, clean, and properly adjusted.
- Check that the horn, back-up warning signal, and the rotating beacon (optional equipment) work correctly.
- Check if the management has established rules and procedures for the work site.
- Always keep a look-out and pay attention to the area around the machine so that any obstacles can be identified.
- Prevent persons from entering or remaining in the danger zone, that is, the area around the machine and at least 7 m (276 in) beyond the attachment's maximal reach. The operator may allow a person into the danger zone, but then the operator must be very careful and only operate the machine when the person can be seen or has given clear indications of their whereabouts.

## Safety rules when operating

### Fuel, filling

#### **WARNING**

Risk of explosion!

The fumes in an empty fuel container are explosive. Severe personal injury or death could result. **Keep open flames and sparks away from fueling area.**

**Do not smoke.**

**Never cut or weld on fuel lines, tanks or containers.**

#### **Safety procedures during refuelling**

- Turn off the engine and turn off all electrical switches, cab heaters, and the battery disconnecter.
- Do not refuel in enclosed areas.
- Ensure that the refuelling area is well ventilated.
- Do not refuel with the engine running.
- Allow the engine to cool before refuelling.
- Use handholds and steps provided to get to the fuel tank, if applicable.
- Use care when removing the fuel tank cap.
- To prevent static electricity sparks from igniting the fuel vapours, maintain good ground contact by keeping the fuel nozzle in constant contact with the fuel tank's filler neck.  
Always ground the fuel nozzle against the filler neck to avoid sparks.
- Do not mix gasoline or any other non-specified material with diesel fuel. Highly combustible vapours may result.
- Use the correct fuel grade for the operating season.
- Do not fill the fuel tank to full capacity.
- Clean up any spilled fuel immediately.
- Install and tighten the fuel tank's cap.

#### **NOTE!**

Should the fuel tank cap be lost, replace it only with a genuine manufacturer's approved cap. Using a non-approved cap without proper venting may result in pressurization of the fuel tank.

108 Operating instructions  
Safety rules when operating

## Operator obligations

### WARNING

Risk of fatal accidents.

Unauthorised persons within the work area around the machine could lead to serious crushing injury.

- **Clear all unauthorised personnel from the working area.**

- **Keep a lookout in all directions.**

- **Do not touch control levers or switches during start.**

- **Sound the horn before beginning operation.**

- The machine operator must operate the machine in such a way that the risk of accidents is minimized both for the operator, other road users, and persons present on the work site.

- The machine operator must be thoroughly familiar with how to operate and maintain the machine and should preferably undergo required training on the machine.

- The machine operator must follow the rules and recommendations given in the Operator's Manual, but also pay attention to any statutory and national regulations or specific requirements or risks that apply at the work site.

- The machine operator must be thoroughly rested and must never operate the machine under the influence of alcohol, medicine, or other drugs.

- The machine operator is responsible for the machine's load both when operating on public roads as well as when working on site.

- There must be no risk of the load falling off while operating.

- Refuse to take a load that is an obvious safety risk.

- Respect the rated load capacity of the machine. Note the effect of varying distances to the centre of gravity and the effect of additional units.

- The machine operator must be in control of the machine's work area.

- Prevent persons from walking or standing under raised lift arms, unless they have been secured or supported.



1003919

The danger zone around operating machines is at least 7 m (275.5 in).

## Operating instructions Safety rules when operating 109

- Prevent persons from entering or remaining in the danger zone, that is, the area around the machine and at least 7 m (275.5 in) beyond the attachment's maximal reach.
- The machine operator is responsible for the machine not being used to transport or lift persons, unless it is equipped and approved for this purpose. Contact a dealer for more information.

### Accidents

#### **WARNING**

Risk of serious injury.

More than one person in the cab while operating could cause accidents and serious injury.

**Only the operator, seated in the operator's seat, may be in the cab when operating. All other persons must keep at a safe distance from the machine.**

- Accidents and also incidents should be reported to the site management immediately.
- If possible leave the machine in position.
- Only take necessary action so as to reduce the effect of damage, especially personal injuries. Avoid action which may make an investigation more difficult.
- Take part in the emergency plan for the working site or other instructions about measurements in case of accidents.
- Wait for further instructions from the site management.

### Machine operator safety

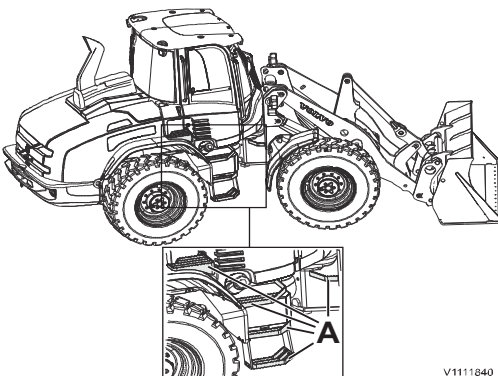
- Always use the lap-type seatbelt.
- Always sit in the operator's seat with the seatbelt fastened when starting the machine (engine) and when operating levers and switches.
- Check that the seatbelt is not worn, see page 86.
- The machine must be operational, i.e., defects that can cause accidents must be repaired.
- Wear suitable clothing for safe handling and a hard hat.



## 110 Operating instructions Safety rules when operating



- A loose mobile telephone may not be used, as it may interfere with important electronics. The mobile telephone shall be permanently connected to the machine's electrical system and with a fixed aerial on the outside of the machine.
- Keep your hands away from areas where there is a risk of crushing, e.g., covers, door and windows.
- Use steps and handholds when entering or leaving the machine. Use the three-point stance, i.e., two hands and one foot, or two feet and one hand. Always face the machine – do not jump!
- The door must be closed during work and transport operations.
- The vibration (shaking) that occurs when operating may be harmful to the operator. Reduce this by:
  - adjusting the seat and tightening the seatbelt.
  - choosing the smoothest operating surface for the machine (level the surface if needed).
  - adapt the machine's speed.
- The cab is for the protection of the machine operator and it meets the requirements for Roll Over Protective Structures according to the test standard (ROPS). Therefore, hold on firmly to the steering wheel if the machine should roll over – Do not jump!
- The cab is also designed to meet the requirements for falling objects, the weight of which corresponds to stated test methods (FOPS).
- Only walk and stand on surfaces with slip protection.
- Do not enter or leave the machine during a thunderstorm.
  - If you are outside the machine, keep a good distance away from the machine until the thunderstorm has passed.
  - If you are in the cab, remain seated with the machine stationary until the thunderstorm passes. Do not touch any controls or anything made of metal.
- Check that the attachment is properly attached and locked.



A Stepping surfaces



## Operating instructions Safety rules when operating 111



- The cab has one emergency exit, the rear window, which can be broken with the emergency hammer.

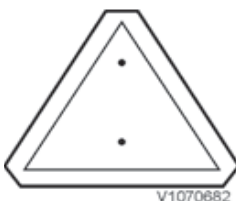
### Operating on public roads

- Road signs, barrier arrangements, and other safety devices that may be required when considering traffic speed, intensity, or other local conditions must be used.
- When moving a machine with a suspended load, special attention must be observed. When required, a signal man must be used.
- Rotating beacon may be used:
  - on machine during road maintenance work, e.g., snow removal.
  - on attached or connected implement that is wider than the machine itself.
  - when the machine is an obstacle or danger to other traffic.
  - when working on or by the side of the road.
  - follow local rules and regulations.



### Travelling on public roads

- As a machine operator you are considered to be a road user and therefore required to know and follow local regulations and national traffic regulations.
- It is important to remember that the machine, compared to other traffic, is a slow-moving and wide vehicle that may be an obstacle. Keep this in mind and pay attention to the traffic behind you. Facilitate overtaking.
- SMV-sign (Slow-Moving Vehicle) shall be used. It should be placed in a position at the rear on the machine where it is clearly seen, not inside the rear window or any other window. It should be located at a height of 0.6–1.8 m (23.6–70.9 in) above the ground measured from the bottom of the sign.
- The attachment should be empty, lowered to the transport position (30–40 cm (12–16 in) above ground) and fully tilted back.
- The front end of the material handling arm must be marked with a red flag.
- Lock the control levers with the control lever lockout.
- All work lights and any rotating beacon should be off.



SMV-sign

## Operating instructions 112 Safety rules when operating



- Hazard flashers may not be used except in emergency situations.
- Attachments and buckets that restrict visibility must not be used.
- Make sure that large attachments/buckets do not get in the way of the headlights. According to legislation, the machine's headlights must provide sufficient light and visibility in front of the machine.
- Additional tools such as buckets, shovels, and iron bars must be thoroughly secured with tensioning straps or chains.
- If a trailer is to be towed behind the machine, see page 151.
- The connecting device on the counterweight must not be used when recovering, towing, or when operating on roads. Follow national regulations.
- Comfort Drive Control (CDC) may not be used.

### **NOTICE**

Follow national and state regulations.

### **Safety rules in case of fire**

If your own safety is not immediately compromised, take the following actions.

#### **In case of fire on the work site**

- 1 If possible, move the machine away from the hazardous area.
- 2 Lower the attachment to the ground.
- 3 Turn off the engine by turning the start key counter-clockwise.
- 4 Leave the cab.
- 5 Turn off the main electric power with the battery disconnect switch located behind the steps on the machine's left side.
- 6 If possible, take active part in putting out the fire and call the fire department if needed.

#### **In case of fire in the machine**

If the machine is being operated:

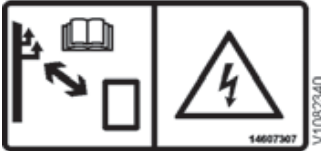
- 1 If possible, park in a fireproof location.
- 2 Lower the attachment to the ground.
- 3 Turn off the engine by turning the start key counter-clockwise.
- 4 Leave the cab.



Operating instructions  
**Safety rules when operating** 113

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- 5 If possible, turn off the main electric power with the battery disconnect switch located behind the steps on the machine's left side.
- 6 Try to put out the fire.
- 7 Call the fire department if needed.



## Power lines, minimum clearance

### DANGER

Risk of electrocution

Working near or making contact with overhead power lines may lead to electrical flashover and electrocution.

**Always keep the minimum clearance from overhead power lines.**

High voltage is lethal and could be powerful enough to destroy machine and attachments. Always contact the local authority before starting work near overhead power lines.

Operating the machine near overhead power lines requires special precautions.

- Consider all overhead power lines to be energised with electric power, even lines that are supposed to be without electric power.
- Contact with overhead power lines may cause a temporary power outage. The power may return automatically without any warning.
- There is a risk of electrocution if anyone touches both the machine and the ground at the same time.
- Always be aware of the very serious risk if the machine comes into contact with high voltage.
- Remember that the voltage in the power line determines the safety distance.
- Electrical flashovers may damage the machine and injure the operator at great distances from the power line.
- Always keep the minimum distance from overhead power lines.

### Minimum distance from overhead power lines

Voltage of overhead power lines Volt (V)	Minimum distance	
	m	ft
up to 50,000	3	10
50,000 to 69,000	4	13
69,000 to 138,000	5	16.4
138,000 to 250,000	6	20
250,000 to 500,000	8	26



Operating instructions  
**Safety rules when operating**      **115**

500,000 to 550,000	11	35
550,000 to 750,000	13	43
more than 750,000	14	46

Know the location and voltage of all overhead power lines on the work site before operating the machine.

Contact the local authority if there is any question about the power lines being energised or their voltage.

**Keep the following in mind to ensure safety when operating:**

- Know what to do if there is an electrical flashover that involves a person or machine.
- Operate the machine at slower than normal operation speed when working near power lines.
- Long-span power lines can sway and reduce the clearance.
- Be careful when travelling over uneven ground which could cause the machine to become unstable.
- Keep all persons away from the machine whenever it is close to power lines.
- Do not allow persons to touch the machine or its load before it is confirmed to be safe.
- When a machine is in contact with an overhead line, do not allow anyone to come near or touch the machine. Stay away from the machine and call for help.
- Never touch a person who is in contact with an energised power line.

**If your machine comes into contact with overhead power lines:**

- Stay in the operator seat while the machine is in contact with the power line.
- Warn personnel outside the machine to not touch any part of the machine and to stay away.
- Stay in the operator seat and lower any raised parts in contact with the overhead power lines, or drive the machine away from the overhead power lines if it is possible.
- If contact cannot be broken, stay in the operator seat until you know that the power is off.
- If you need to get out of the machine to call for help or because of fire, jump out as far as you can without touching any wires or the machine, stay upright, keep your feet together and hop to safety.



116      Operating instructions  
            Safety rules when operating

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Failure to follow this instruction could result in electrocution or death!

## Measures before operating

### WARNING

Risk of accidents.

Having the lever steering activated when operating on a public road could lead to accidents.

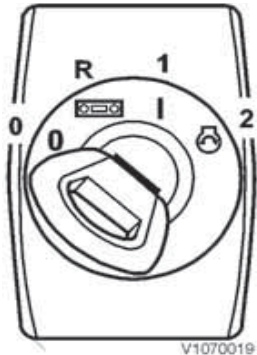
**Do not use the lever steering when operating on a public road. Use the steering wheel.**

- 1 Perform daily service, see page 229.
- 2 Clear the platform on the right side by the engine's air intake from snow.
- 3 Clean/scrape the windows.
- 4 Clean and adjust mirrors and cameras. See page *Mirrors, adjusting*.
- 5 Check that there are no defective/loose parts or leaks that can cause damage.
- 6 Check that the battery disconnecter is on.
- 7 Check that the wheels are not blocked.
- 8 Check that engine hood and inspection hatches are closed and that the radiator casing is closed and secured.
- 9 Check that there are no persons near the machine, see page 107.
- 10 Adjust the operator's seat, see page 83) and the steering wheel, see page 66.
- 11 Fasten the seatbelt.
- 12 Check that there is sufficient fuel in the tank.
- 13 If the machine is cold, warm up the hydraulic system, see page 121.

### After operating

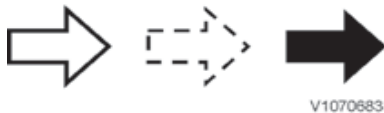
- Fill the fuel tank, as this will counteract the formation of condensation water.
- Make sure that there is enough anti-freeze in the cooling system (see page 275) and in the washer fluid at temperatures below 0 °C.

118 Operating instructions  
Starting engine

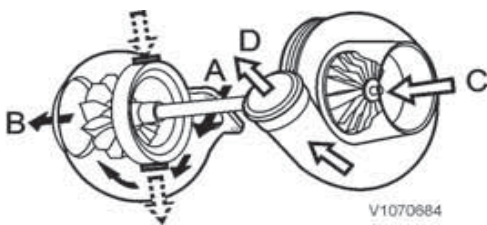


## Starting engine

- 1 Place the gear selector in neutral.
- 2 Turn the key in the ignition to running position (1) so that a system test is run for about 4–5 seconds.
- 3 At the same time check that all lights turn on and that the gauges indicate readings.
- 4 Turn the ignition key to starting position (2). If the engine does not start, turn the key back to the "0" position, before making a new start attempt.
- 5 Check that all control and warning lights are off when the engine has started.
- 6 Let the engine idle for at least 30 seconds.
- 7 Check that the attachment is securely fastened to the machine by pressing it against the ground.
- 8 Release the parking brake.
- 9 Select gear position and increase the engine speed.



Air      Lubrication      Exhaust  
         oil



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

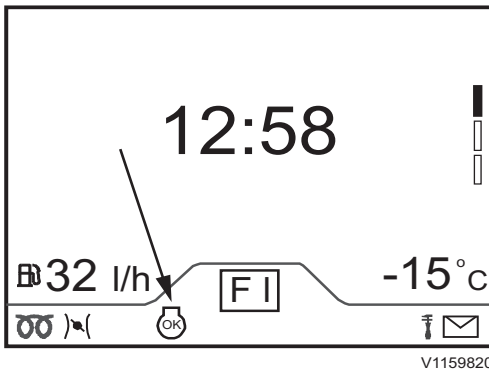
## Turbocharger

The turbocharger is lubricated by the engine's lubrication system.

**Important for the function of the turbocharger is that:**

- lubrication is safeguarded by
  - not racing the engine immediately after it has been started.
  - letting the engine idle until **the OK-symbol turns green in the display** before turning it off.





V1159820

'OK' symbol

- engine oil is changed and oil filters are changed at prescribed intervals.
- the air cleaner is serviced regularly and the exhaust system and lubrication oil lines do not leak.

Change the turbocharger immediately if it generates noise or vibrations.

**Work on the turbocharger should be done at a workshop authorized by Volvo.**

### Starting machine in cold weather (below 0° C, 32° F)

#### **WARNING**

Risk of explosion.

Spraying flammable starting aids into engine components could cause an explosion.

**Never use starting aids while attempting to start the engine.**

The preheating function is controlled by the engine control module (ECM).

- 1 Turn the start key to running position (1).
- 2 If there is a need of preheating, the function will be activated automatically.
- 3 A symbol lights up on the front information display unit showing that preheating is engaged, see page 41.
- 4 When the symbol turns off, the engine can be started by turning the start key to starting position (2).
  - Let the engine run at low idle for at least 60 seconds.
  - Racing the engine immediately after it has been started may also jeopardise lubrication and cooling of the turbocharger, resulting in high risk of bearing seizure.

#### **NOTE!**

Do not use the working hydraulics at full speed until the hydraulic oil is warm. To warm up the hydraulic system, see page 121.

## Starting with booster batteries

The following must be observed when starting with booster batteries:

### WARNING

Risk of explosion.

Batteries could explode due to the current surge if a fully charged battery is connected to a completely discharged or frozen battery.

**Do not boost start a machine with a completely discharged or frozen battery.**

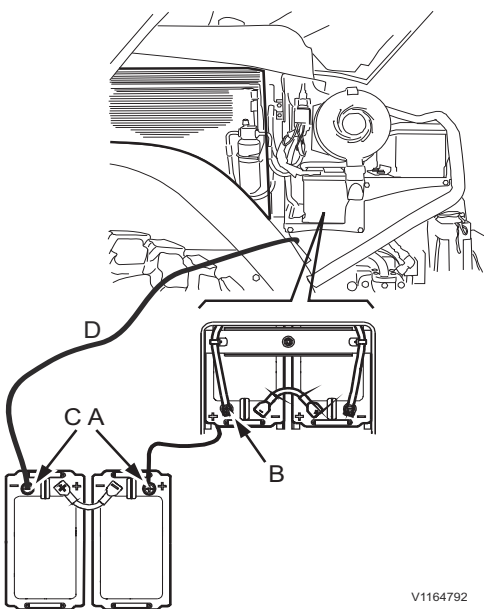
**Check that the booster batteries or other power sources have the same voltage as the standard batteries.**

- 1 Move the gear selector to neutral position.
- 2 Connect one of the start cables from (+) on the booster battery (A) to (+) on the machine's start battery (B).
- 3 Connect the other start cable from (-) on the booster battery (C) to, e.g., the ground point (bolt) below the battery box (on the fender plate of the rear frame) on the machine (D).
- 4 Make sure that the battery disconnecter is on.

### NOTE!

Install the cables 5-10 minutes before starting the engine.

- 5 Start the engine with the start key in the cab.
- 6 Leave the batteries connected 5–10 minutes after the engine has started.
- 7 First disconnect the start cable between, e.g., the ground point (bolt) below the battery box (on the fender plate of the rear frame) on the machine (D) and (-) on the booster battery (C).
- 8 Then disconnect the start cable between (+) on the machine's start battery (B) and (+) on the booster battery (A).
- 9 Reinstall the terminal caps on the battery terminals.



Principle illustration

V1164792

## Hydraulic system, warming up

### **WARNING**

Risk of crushing injury.

The hydraulic system could respond slowly at low temperatures and could cause unexpected machine movements.

**Operate carefully until the hydraulic system has reached operating temperature.**

### **NOTE!**

If the hydraulic oil temperature is below 0 °C (32 °F), let the engine run on low idle speed until the hydraulic oil temperature has reached 0 °C (32 °F).

The oil is viscous when it is cold, therefore the machine's hydraulic functions can move slower than when the oil is warm.


If one or several machine functions are run against their end-positions without first warming up the system, this can cause unexpected movements, machine damage, and malfunctions.

### **NOTICE**

**Do not rush warming of the oil, since forced warming can damage the machine.**

Warm up the hydraulic oil to operating temperature, 40 to 50°C (104 to 122°F). The temperature is checked on the display, see instructions below.

Warm-up can take place with or without attachment, but no load should be carried.

<b>Oil temperature</b>	
	XX °C/°F
<small>V1155932</small>	

- 1 Check that there is no load in the bucket or on the attachment and that the frame joint lock is disconnected.
- 2 Turn the start key to position 1 and make sure the parking brake is applied.
- 3 Press key 3 (hydraulics) on the keypad and check the temperature in the display.
- 4 Start the engine.

### **NOTE!**

Use the hydraulics carefully if the oil is cold.



## 122 Operating instructions Hydraulic system, warming up

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- 5 Tilt fully forward and lift the attachment to maximum lift height.
- 6 Tilt back fully and lower the attachment to the ground.
- 7 Turn the steering wheel alternately to left and right full lock. Use the 3rd hydraulic function carefully and alternating.
- 8 Repeat steps 5–7 until the oil has reached operating temperature.

## Gear shifting

There are various versions depending on the optional lever controls:

### 1A Single lever with Aux lever (optional equipment)

#### Travelling direction selection

The control knob is spring-centred.

Forward: Roll the left control knob fully forward (F).  
Rearward: Roll the left control knob fully backwards (R).

The display unit on the centre instrument will display the selected travelling directional (F = Forward or R = Rearward), when the parking brake is not operated and the parking brake lever is fully released downwards.

Neutral: Press button (N) to go to neutral position.

The display unit on the central instrument will display N = Neutral gear.

#### NOTE!

Never select N = Neutral gear before the travelling speed has been reduced to below 2 km/h. Otherwise the vehicle may decelerate hardly, and lifetime of transmission can be reduced.

#### Speed range selection

### WARNING

Risk of fatal accident.

The machine can begin to move.

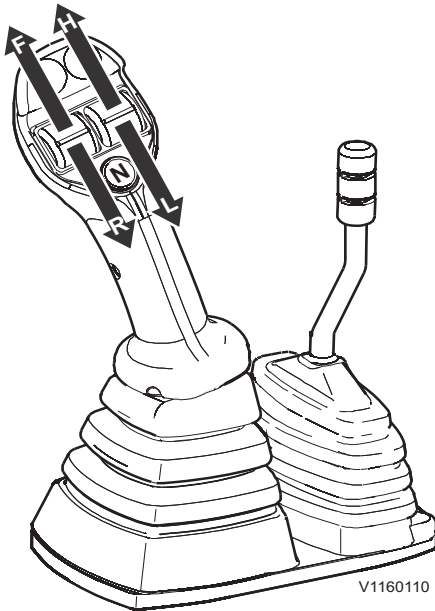
**Never leave the machine with the engine running unless gear shift lever is in the N (neutral) position and the parking brake applied.**

The control knob is spring-centred.

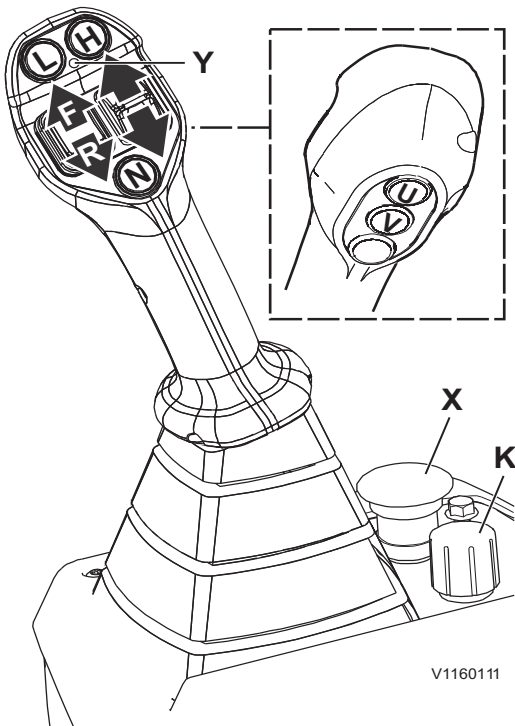
Higher speed range: Roll the right control knob fully forward (H).

Lower speed range: Roll the right control knob fully backwards (L).

The display unit on the central instrument will display the selected speed range together with the selected driving direction.



124 Operating instructions  
Gear shifting



Always make sure that the parking brake is fully released and that the respective control lamp is out.

**NOTE!**

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 firm ground.

**1B Single lever control with integrated Aux hydraulic functions (optional equipment)**

**Travelling direction selection**

The control knob is spring-centred.

Forward: Roll the left control knob fully forward (F).

Rearward: Roll the left control knob fully backwards (R).

The display unit on the centre instrument will display the selected travelling directional (F = Forward or R = Rearward), when the parking brake is not operated and the parking brake lever is fully released downwards.

Neutral: Press button (N) to go to neutral position.

The display unit on the central instrument will display N = Neutral gear.

**NOTE!**

Never select N = Neutral gear before the travelling speed has been reduced to below 2 km/h.

Otherwise the vehicle may decelerate hardly, and lifetime of transmission can be reduced.

**Speed range selection**

**! WARNING**

Risk of fatal accident.

The machine can begin to move.

**Never leave the machine with the engine running unless gear shift lever is in the N (neutral) position and the parking brake applied.**

The control knob is spring-centred.

Higher speed range: Press the right push button (H).

Lower speed range: Press the left push button (L).

The display unit on the central instrument will display the selected speed range together with the selected travelling direction.

Always make sure that the parking brake is fully released and that the respective control lamp is out.

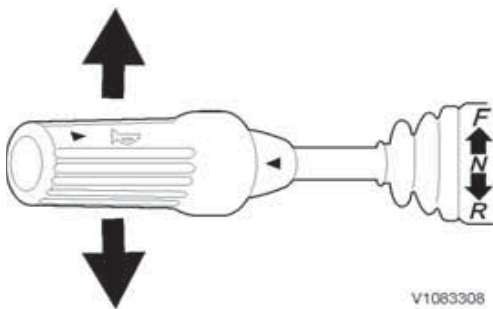
**NOTE!**

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 firm ground.

**1C 3-lever control (optional equipment)**

**4-lever control (optional equipment)**

**Travelling direction selection**



**! WARNING**

Risk of fatal accident.

The machine can begin to move.

**Never leave the machine with the engine running unless gear shift lever is in the N (neutral) position and the parking brake applied.**

The directional gear selector lever on the steering column is the priority selector:

Lever in position N = Neutral

Lever in position F = Forward

Lever in position R = Rearward

The display unit on the centre instrument will display the selected travelling directional (F = Forward or R = Rearward), when the parking brake is not operated and the parking brake lever is fully released downwards.

The display unit on the central instrument will display N = Neutral gear.

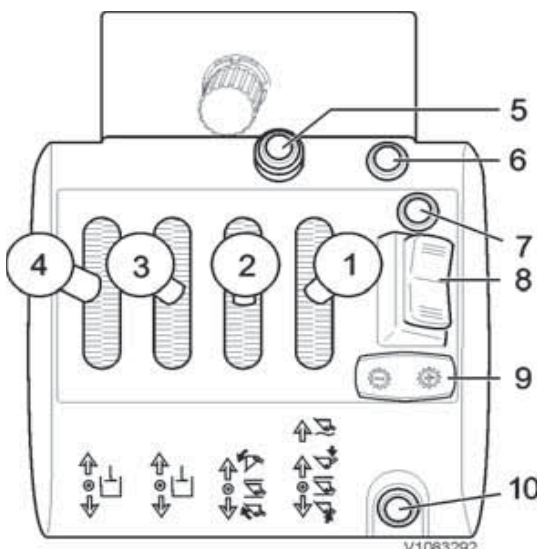
**NOTE!**

Never select N = Neutral gear before the travelling speed has been reduced to below 2 km/h.

Otherwise the vehicle may decelerate hardly, and lifetime of transmission can be reduced.

■ Optionally the Directional gear switch F-N-R on the control lever carrier of the 3 and 4 lever control (8) can be used:

The ordinary selector control at the steering wheel and the switch on the control lever carrier must, when activating, be in neutral.

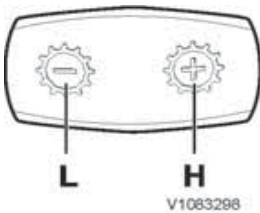


To be able to use the forward/reverse function on the control lever carrier, the activating button (10) must first be depressed.

After activation F/R is shown in front of the selected directional gear on the display unit on the Operating Information screen.

- Switch in the forward position = Operating forward
- Switch in centre position = Neutral
- Switch in rearward position = Operating in reverse
- If the ordinary gear selector control by the steering wheel is moved from neutral, while operating with the F/R switch, the gear selector at the steering wheel will override the switch.

A new activation of the system requires that the activating button (10) is pressed again.



#### Speed range selection (9)

Higher speed range: Press the right end of the switch (H).

Lower speed range: Press the left end of the switch (L).

Always make sure that the parking brake is fully released and that the respective control lamp is out.

The display unit on the central instrument will display the selected speed range together with the selected driving direction.

#### NOTE!

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 firm ground.

#### Max rimpull available in all selected speed ranges

In all speed ranges the transmission adjusts automatically its tractive power to the maximum, without active down-shifting by the operator. In general the speed ranges shall be used as follows:

Speed range 1 (0 to 5 km/h)

- Use at high engine rpm and when travel speed is controlled by hand-inching. Recommended for precise speed control, for example sweeper usage.





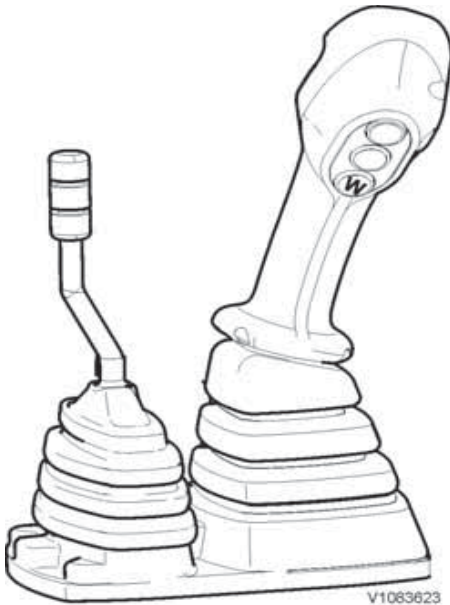
Operating instructions  
**Gear shifting** 127

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Speed range 2 (0 to 20 km/h)

- Mostly used speed range.

Recommended if stable speed is required in these speed ranges.



## Differential locks

To improve the traction of the machine on soft and slippery soil, the differential lock, which works on all four wheels, can be engaged by depressing and holding the push button (W) depressed (for control lever versions 1A and 1B) or by pushing down foot button (5) (for control lever version 1C, see page 66).

### NOTICE

The differential lock must only be engaged when the machine is standing. Make sure, that under no circumstances, the differential lock is activated when the wheels are turning with different speeds.

When the differential lock is engaged control light (13) lights up, see page 33.

If only one wheel of an axle turns although the differential lock switch is depressed, interrupt the drive and operate the steering to help the dog clutch to engage.

The differential lock may be disengaged while driving.

### NOTICE

When cornering on hard ground the differential lock must be switched off.

### NOTICE

The differential lock should only be used when operating on slippery ground. When operating on firm ground, particularly when turning, the differential lock must be disengaged.

### NOTICE

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

### NOTE!

If there is risk of getting stuck, engage the differential lock before the machine has got stuck.

For further information on the differential lock, see page 66.

## Steering

### NOTE!

In case the engine stops, stop the machine immediately and apply the parking brake.

The machine is frame-steered (articulated) and has a hydrostatic steering system.

### Secondary steering

The machine can be equipped with a secondary steering system. Follow national legislation and regulations.

If "Warning low steering pressure" appears in the display, stop the machine immediately and contact a workshop authorized by Volvo.

### Comfort Drive Control, CDC (optional equipment)



V1092474

Warning low steering pressure



V1074316

Comfort Drive Control (CDC) is deactivated by raising the armrest or by moving the gear selector from neutral position.



V1073748

15011374

130 Operating instructions  
Steering



**! WARNING**

Risk of accidents.

Having the lever steering activated when operating on a public road could lead to accidents.

**Do not use the lever steering when operating on a public road. Use the steering wheel.**

**NOTICE**

**When working in areas with risk of electromagnetic fields, EMF, Comfort Drive Control (CDC) shall always be deactivated.**

See page 163.

By changing between using lever steering and the steering wheel, the operator obtains a more varied movement pattern.

The system consists of a folding armrest where two functions are concentrated, i.e., steering and forward/reverse function. The system is activated with the button on the armrest (see the next page). The armrest must be lowered in order to be able to activate the function.

Comfort Drive Control (CDC) is deactivated by raising the armrest.

For adjustment of armrest for Comfort Drive Control (CDC), see page 66.

The CDC-function is also deactivated when the gear selector is moved from neutral position.

The control light on the instrument panel turns on when Comfort Drive Control (CDC) is activated. The light flashes if the speed is over 20 km/h (12.4 mph).

Very little physical effort is required to operate the joystick. The steering speed is proportional to the deflection (stroke) of the lever.

The function of the steering wheel always remains and has priority over the CDC-function. This means that if you attempt to steer to the right with the CDC and to the left with the steering wheel, the machine



V1069836

Control light, Comfort Drive Control



V1074316

Comfort Drive Control (CDC) is deactivated by raising the armrest or by moving the gear selector from neutral position.

will steer in the direction the steering wheel was moved.

**NOTE!**

Deactivate the CDC when the text "CDC failure" is shown on the display and bring the machine to a safe stop using the steering wheel.

**NOTE!**

When activating with CDC, the machine's max. speed is limited to 30 km/h (18.6 mph) but we recommend a speed of max. 20 km/h (12.4 mph).

**1 Activating (CDC)**

In order to be able to use the steering and forward/reverse functions from the armrest, the armrest must be lowered and the system activated with button 1.

Before activation is possible, these actions must also be performed:

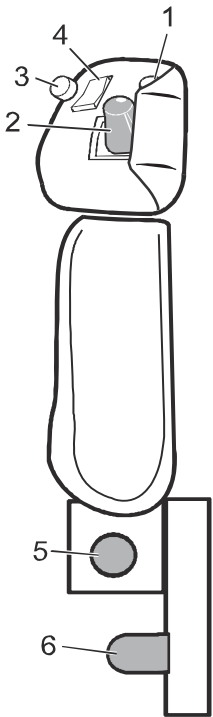
- The armrest must be lowered to its lowest position.

**NOTE!**

In certain positions the armrest must be moved to the right, in towards the seat in order to reach its lowest position.

- The directional gear selector on the armrest, the ordinary gear selector, and the F/N/R-control by the lever carrier must be in neutral position.
- The engine must be running, but the machine must be stationary.
- When the system is activated, a control light on the instrument panel is on.

132 Operating instructions  
Steering



V1055592

- 1 Activating CDC
- 2 Steering lever
- 3 Not used
- 4 Directional gear selector
- 5 Adjusting arm rest, sideways
- 6 Adjusting arm rest, vertically

**NOTE!**

Comfort Drive Control (CDC) is deactivated by raising the armrest. Comfort Drive Control (CDC) is also deactivated by moving the gear selector from neutral position.

**2 Joystick (steering lever)**

Very little physical effort is required to operate the joystick. The steering speed is proportional to the deflection (stroke) of the lever. The steering wheel's function always remains operational.

**3 Not used**

**4 Directional gear selector**

Switch, front part pressed down = Forward drive.  
Switch, rear part pressed down = Reverse drive.  
There is a neutral position between the forward and reverse positions.

**NOTE!**

The ordinary gear selector control always has priority, i.e., if the ordinary gear selector is actuated, the selection made from the armrest is cancelled.

**5 Adjustment armrest, sideways**

Loosen the lock knob and adjust the armrest sideways to desired position. Then tighten the lock knob.

**6 Adjustment armrest, height (vertically)**

Loosen the lock knob and adjust the armrest's height to desired position. Then tighten the lock knob.



## Braking

Brake smoothly. This is particularly important when operating with a load and on slippery ground.

### **NOTICE**

Do not apply the parking brake while the machine is moving. The parking brake should only be used when the machine has been stopped or as an emergency brake.

### **NOTE!**

When the parking brake is operated the transmission will be forced into Neutral gear.

For parking brake test, see page 247.

## Exhaust aftertreatment system

### Regeneration

#### **WARNING**

Risk of burns.

Engine and exhaust system components get very hot and can cause severe burns.

**Avoid contact with engine compartment covers, engine components and exhaust system until the engine is cooled down.**

The purpose of regeneration is to increase the temperature in the aftertreatment system so that any trapped substances, for example soot, are burned off to allow the system to regain its full capacity. There are two types of regeneration: passive and parked regeneration. Most of the regeneration is passive and does not involve any operator interaction.

#### **Passive regeneration**

A passive regeneration is what takes place during normal operation. When the engine is running, the heated exhaust heats the exhaust aftertreatment system. A passive regeneration does not involve any operator interaction. It takes place continuously and does not have any start or stop. However, regeneration effectiveness is increased by the temperature of the exhaust.

If the machine operating conditions do not permit a successful passive regeneration, there may be a need to restrict (throttle) the engine. One example would be if the engine has been idling a lot or has been running with very low loads. Restricting (throttling) makes the engine work harder, thus increasing the temperature of the exhaust. It is done in two stages. If the first stage is not enough to run passive regeneration the second stage will be used. No information is shown to the operator on the instrument panel until there is a need for a parked regeneration.

#### **Parked regeneration**

If the passive regeneration is not sufficient to reduce the soot load, or if too long time has passed since the last parked regeneration, a parked



## Operating instructions Exhaust aftertreatment system 135

regeneration is requested. A parked regeneration must be performed every 500 hours in order to ensure complete removal of the soot load. This will be performed at the engine oil change interval (before changing the engine oil) in the machine service program.

### NOTE!

If the regeneration is not performed within 625 hours since the last parked regeneration, a service regeneration with Tech Tool will be required. At the service interval  $500 \pm 50$  hours,  $1000 \pm 50$  hours,  $1500 \pm 50$  hours etc it is possible to start a parked regeneration from the machine display.

Parked regeneration requires operator interaction. No work can be performed with the machine during a parked regeneration which takes approximately 45 minutes to run.

A parked regeneration requires that:

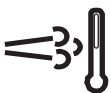
- The engine is running (during the entire parked regeneration)
- The engine has reached sufficient working temperature
- The machine is parked in a fireproof area
- The parking brake is applied (during the entire parked regeneration)

The HEST (High Exhaust Temperature) light is on, see symbol, to indicate that a parked regeneration is in progress and that the exhaust temperature is high. No further message is displayed. Do not turn off the engine when the HEST-light is on!

### NOTE!

**The machine must be in an area that is not heat-sensitive when the HEST-light is on.**

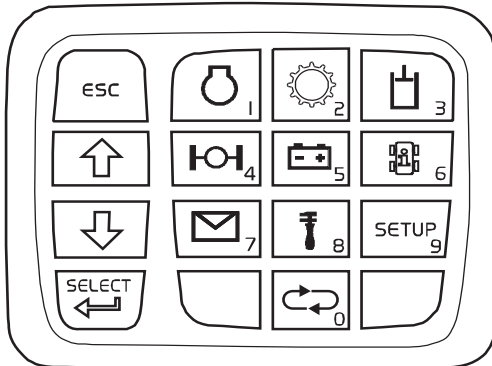
The engine speed will be changed to a predefined value and cannot be affected by the operator. The reason for this is that the engine speed and load levels must remain constant. It is not recommended to interrupt or cancel an ongoing parked regeneration other than in emergency situations. For example, if the parking brake is released, the regeneration will be interrupted immediately without warning and will have to be restarted to be run successfully. If the regeneration is not performed as requested for some reason, eventually the engine protection function, in the form of derate, is activated.



V1083542

HEST-light (High Exhaust Temperature)  
(shown when a parked regeneration is in progress)

## 136 Operating instructions Exhaust aftertreatment system



V1134987

### Start a parked regeneration

During normal operation, when the machine requests a parked regeneration, it can be started using the regeneration switch, see page 59. At the service interval  $500 \pm 50$  hours,  $1000 \pm 50$  hours,  $1500 \pm 50$  hours etc it is possible to start a parked regeneration from the machine display:

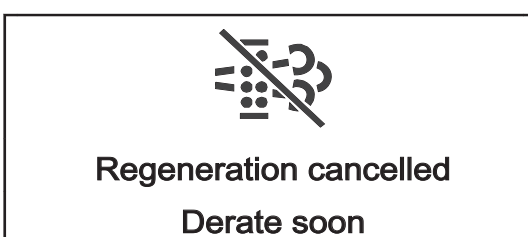
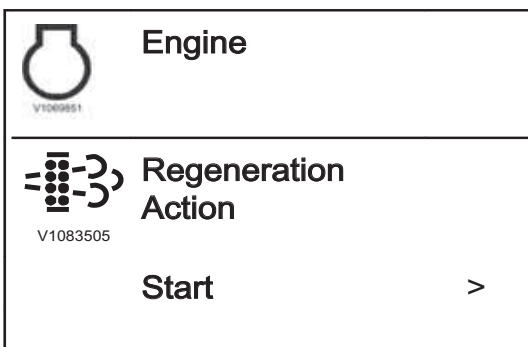
#### NOTE!

Make sure that following conditions are fulfilled:

- The engine is running (during the entire parked regeneration)
- The engine has reached sufficient working temperature
- The SCR system must be active (defrosted)\*
- The machine is parked in a fireproof area
- The parking brake is applied (during the entire parked regeneration)

\*) When operating under cold conditions it can take up to 100 minutes before the SCR system is defrosted.

- 1 Press and hold in key 8 (service) until the system enters service mode.
- 2 Press key 1 (engine).
- 3 Choose Regeneration action using the arrows, and press Select.
- 4 Choose Start using the arrows, and press Select.



### Cancel a parked regeneration

A parked regeneration can be cancelled using the switch, see page 59.

#### NOTE!

**Only** cancel a parked regeneration in case of an emergency.

A message, see figure, will appear in the display when regeneration is cancelled.



## Operating instructions Exhaust aftertreatment system 137

---

Regeneration is cancelled automatically when:

- a malfunction occurs
- the engine is turned off
- the parking brake is released.







### **Service regeneration**

If the parked regeneration is not performed within 625 hours since the last parked regeneration, the engine performance is significantly reduced and a service regeneration has to be performed. A service regeneration can also be required if a fault has occurred. Service regeneration is the same as parked regeneration, but has to be performed by a service technician with the Volvo service tool.







### **Possible consequences if the regeneration is not performed:**

- engine derate.
- higher fuel consumption.
- shorter service life of diesel particulate filter.
- damage to the aftertreatment system.



Operating instructions  
138 Exhaust aftertreatment system

Alarms that require specific action			
Text on display	Display indication	Alarm level	Action
PARK SOON Parked regeneration required	Warning, amber   V1128635	- buzzer sounds - amber central warning on	1 Park the machine in an area that is not heat-sensitive. Apply the parking brake. 2 Start regeneration.  <b>NOTE!</b> Regeneration is cancelled if the parking brake is released or the engine is turned off. <b>NOTE!</b> The idle rpm will be increased during the entire regeneration process.
START REGENERATION Parked regeneration possible	Warning, amber   V1128635	- buzzer sounds - amber central warning on	1 Park the machine in an area that is not heat-sensitive. Apply the parking brake. 2 Start regeneration.  <b>NOTE!</b> Regeneration is cancelled if the parking brake is released or the engine is turned off. <b>NOTE!</b> The idle rpm will be increased during the entire regeneration process.
KEEP MACHINE PARKED Regeneration in progress	Warning, amber   V1128635	- buzzer sounds - amber central warning on	1 Keep the machine parked.




Operating instructions  
Exhaust aftertreatment system 139

<p>Regeneration cancelled Derate soon</p>	<p>Warning, amber</p>   <p>V1135633</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Restart regeneration when possible.</li> </ol>
<p>PARK MACHINE Parked regeneration required Derate active</p>	<p>Warning, amber</p>   <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- engine derate is activated (but is restored after a completed regeneration)</li> </ul>	<ol style="list-style-type: none"> <li>1 Park the machine.</li> <li>2 Restart regeneration when possible.</li> </ol> <p><b>NOTE!</b> Regeneration is cancelled if the parking brake is released or the engine is turned off. <b>NOTE!</b> The idle rpm will be increased during the entire regeneration process.</p>
<p>Regeneration cancelled Derate active</p>	<p>Warning, amber</p>   <p>V1135633</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- engine derate is activated (but is restored after a completed regeneration)</li> </ul>	<ol style="list-style-type: none"> <li>1 Restart regeneration when possible.</li> <li>2 Restart regeneration when possible.</li> </ol>







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Exhaust aftertreatment system

<p>PARK SAFELY Service regeneration needed Derate active</p>	<p>Warning, red</p>  <p>V1128638</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- engine performance is significantly reduced (but is restored after a completed regeneration)</li> </ul>	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Contact a Volvo-approved workshop for regeneration.</li> </ol> <p><b>NOTE!</b> Regeneration is only possible using Volvo's service tool</p>
<p>PARK MACHINE Service required Derate active</p>	<p>Warning, red</p>  <p>V1128638</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- engine performance is significantly reduced</li> </ul>	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Contact a Volvo-approved workshop for replacement of the diesel particulate filter.</li> </ol> <p><b>NOTE!</b> The soot load can only be reset by authorized Volvo personnel</p>

The alarms in the table below can be shown in connection with the alarms in the table above.

<p>APPLY PARKING BRAKE Regeneration required</p>	<p>Warning, amber</p>  <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Park the machine in an area that is not heat-sensitive. Apply the parking brake.</li> <li>2 Start regeneration.</li> </ol>
<p>Regeneration not required</p>	<p>Warning, blue</p>  <p>V1088268</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- blue central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 No action required.</li> </ol>
<p>REDUCE ENGINE SPEED Parked regeneration required</p>	<p>Warning, amber</p>  <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Reduce the engine speed.</li> <li>2 Park the machine in an area that is not heat-sensitive. Apply the parking brake.</li> <li>3 Start regeneration.</li> </ol>

Operating instructions  
Exhaust aftertreatment system 141

<p>REDUCE ENGINE SPEED Parked regenerati on required</p>	<p>Warning, amber</p>   <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Reduce the engine speed.</li> <li>2 Park the machine in an area that is not heat-sensitive. Apply the parking brake.</li> <li>3 Start regeneration.</li> </ol>
<p>CONTINU E OPERATI ON Low temperatur e Regenerati on pending</p>	<p>Warning, amber</p>   <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Continue operation.</li> </ol>
<p>SERVICE REQUIRE D Regenerati on not possible System failure</p>	<p>Warning, amber</p>   <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<ol style="list-style-type: none"> <li>1 Park the machine.</li> <li>2 Turn off the engine.</li> <li>3 Service required.</li> </ol>

### Emission compliance

The aftertreatment system is monitored by diagnostic systems in the control units to ensure reduced emissions. If the system does not meet the emission requirements, it should not be possible to use the machine for work as usual. This takes place by a reduction of engine power (derate).

#### Engine power is reduced if:

- The level in the AdBlue®/DEF tank is too low
- AdBlue®/DEF is of low quality
- There is a problem/malfunction with the aftertreatment system

There are two levels of engine power reduction (derate) that are activated after a certain time depending on the type of problem, as well as if the malfunction reoccurs or not.

#### Restoring engine function

If the engine is restarted (by turning the ignition off and on) when engine power has been reduced,



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then full engine power (called restored engine function) can be obtained twice during derate level 1. This can be done in case of a danger or hazard and, e.g., if the machine has to be moved. This will not extend the time for activation of derate level 2.



## Exhaust aftertreatment system, alarms requiring special actions





### NOTE!

The display text will show "AdBlue®" in machines for the European market and "DEF" in machines for the US market.

AdBlue®/DEF level monitoring		
Display figure	Alarm level	Action
—	- solid symbol	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.</li> </ol>
Refill AdBlue  <small>V1126376</small> AdBlue empty Derate active	<ul style="list-style-type: none"> <li>- buzzer sounds 4 times</li> <li>- amber central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.</li> </ol>
Park safely  <small>V1126376</small> AdBlue empty Full derate soon	<ul style="list-style-type: none"> <li>- buzzer sounds continuously</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.</li> </ol>
Refill AdBlue  <small>V1126376</small> AdBlue empty Full derate active	<ul style="list-style-type: none"> <li>- buzzer sounds continuously</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- forced idle or torque and speed reduction (depending on market)</li> </ul>	<ol style="list-style-type: none"> <li>1 Turn off the engine.</li> <li>2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.</li> </ol>







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AdBlue®/DEF quality monitoring		
Display figure	Alarm level	Action
<p>Replace AdBlue</p>  <p>Wrong AdBlue quality Derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- solid symbol</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Replace AdBlue</p>  <p>Wrong AdBlue quality Derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Park safely</p>  <p>Wrong AdBlue quality Full derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Replace AdBlue</p>  <p>Wrong AdBlue quality Full derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- forced idle or torque and speed reduction (depending on market)</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>



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Exhaust aftertreatment system 145

SCR-system failure monitoring		
Display figure	Alarm level	Action
<p>Check SCR-system</p>  <p>SCR-system failure Derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- solid symbol</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Check SCR-system</p>  <p>SCR-system failure Derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Park safely</p>  <p>SCR-system failure Full derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Check SCR-system</p>  <p>SCR-system failure Full derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- forced idle or torque and speed reduction (depending on market)</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>

## Stopping

### NOTICE

Do not turn off the battery disconnect switch when the engine is running. The electrical system may be damaged.

- 1 Lower the engine speed.
- 2 Stop the machine with the service brake. When the machine has come to a complete stop, move the gear selector to neutral position.
- 3 Lower the attachment to the ground.

### NOTE!

Lower the boom immediately, max. 5 minutes after the engine has stopped. If more than 5 minutes have passed the engine shall be restarted. If this fails, contact service personnel or cordon of the area and post a guard.

- 4 Apply the parking brake.

### NOTE!

Do not turn off the engine until the symbol 'OK' is shown on the display (see figure).

- 5 Turn the start key counter-clockwise when the symbol indicating that engine shutdown is permitted turns on, then the control lights turn off and the engine turns off.

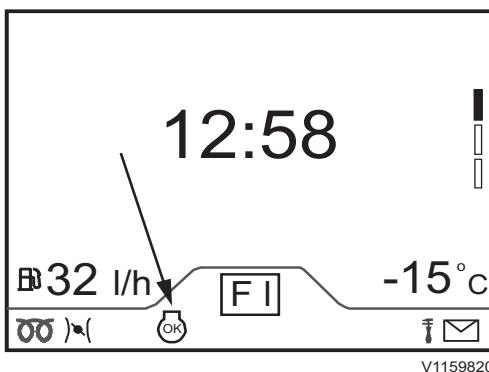
### NOTE!

It is important to not turn off the engine during a regeneration. This generates unnecessary heat stress on the components under the engine hood. Wait until the HEST-light has been turned off.

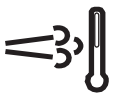
### NOTE!

The time it takes for the symbol showing that engine shutdown is permitted to be activated depends on how hard the engine has been loaded.

If the operator has to leave the cab with the engine running, care has to be taken so that the steering wheel is not turned inadvertently as the operator leaves the cab. This applies particularly if the steering wheel is provided with a knob.



Symbol shows when engine shutdown is permitted



V1083542

HEST (High exhaust temperature) light, regeneration in progress



**! WARNING**

Risk of falling.  
Careless mounting and dismounting of the machine could result in falling and injury.  
**Always use the three-point approach to access or leave the machine by using two hands and one foot or one hand and both feet. Use stepping surfaces and handholds. Always face the machine when entering or stepping down from the machine. Do not jump off!**



V1070691

## Parking

- 1 If possible, place the machine on level ground. If this is not possible, block the wheels so that the machine cannot start rolling. Lower the attachment against the ground.
- 2 Check that all switches and controls are in the "off" position or in neutral.
- 3 Apply the parking brake after the machine has come to a complete standstill.
- 4 Remove the keys.
- 5 Turn off the electric power with the battery disconnecter, if the machine is to be left unattended for some time.
- 6 Make sure that there is enough anti-freeze in the cooling system (see page 275) and in the washer fluid at temperatures below 0 °C when parking.
- 7 Lock all covers, engine hood, windows and the door.

Remember that the risk of theft and break-in can be minimized if one:

- removes the ignition key when the machine is left unattended.
- locks all covers, engine hood, windows and the door after end of the working shift.
- turns off the electric power with the battery disconnecter and removes the handle.
- avoids parking the machine in places with high risk of theft, break-ins and malicious damage.
- removes all valuable items from the cab, e.g., mobile telephone, computer, radio, and bags.

It is easier to identify stolen machines if PIN-number or registration number is etched onto the windows.



## Long-term parking and taking machine out of service

### **NOTICE**

If the machine is not going to be used every day, all cylinders should be protected against corrosion.

- The temperature may not be below -40 °C or above +70 °C.
- Check that the batteries are fully charged.
- Carry out the measures as described above.
- Wash the machine and touch up any damaged paint finish to avoid rusting.
- Treat exposed parts with rustproofing, lubricate the machine thoroughly and apply grease to unpainted surfaces (lift and tilt cylinders, etc.).
- Fill the fuel tank and the hydraulic oil tank to the max. marks.
- Cover the exhaust stack (parking outdoors).
- Remove the fuse for the voltage converter and radio. Otherwise there is a risk that the batteries will be discharged.
- Check the tire inflation pressure and protect the tires against strong sunlight.

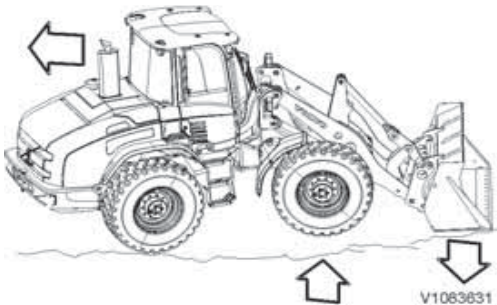
### Check after long-term parking and after machine has been out of service

- All oil and fluid levels
- Tension of all belts
- Tire inflation pressure
- Air cleaner
- Install the fuse for the voltage converter and radio

### **NOTE!**

If any protective agents (rustproofing, etc.) have been used on the machine to prepare for long-term parking, follow the manufacturer's instructions for safety measures and methods for removing.

150 Operating instructions  
Measures when getting stuck



## Measures when getting stuck

### What to do if the machine gets stuck

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

- 1 Engage the differential lock.
- 2 Select a low gear (1st or 2nd).
- 3 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:

- 1 Lift the front wheels, supporting the machine on the bottom of a flat bucket and reverse.
- 2 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.
- 3 Lift up the front wheels using the bucket. Manually fill the holes under the wheels with branches, pieces of wood or similar and reverse.
- 4 If the machine needs to be recovered, see page 151.

**NOTE!**

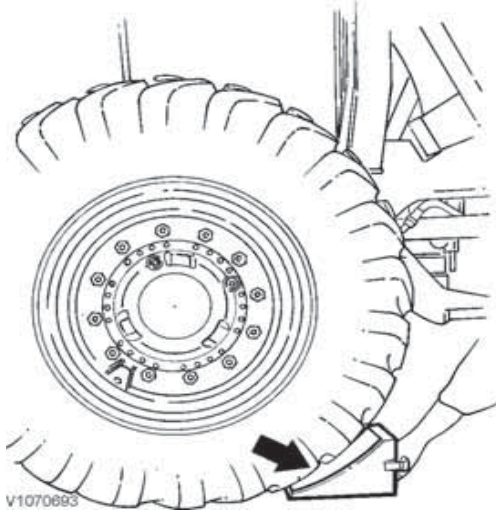
Follow the instructions for the propeller shaft, see page 103.

**NOTE!**

Respect operating instructions for differential lock, see page 128.



## Retrieving and towing



### WARNING

Risk of fatal accidents by runaway machine. Loss of braking function and steering function could cause serious injury or death by runaway machine. **If the engine cannot be started, towing must only be performed in an emergency situation by trained personnel and only the shortest possible distance with very low speed. If possible, transport the machine on a trailer.**

### Measures

- If possible, the engine should be running to make the brakes and steering operational.

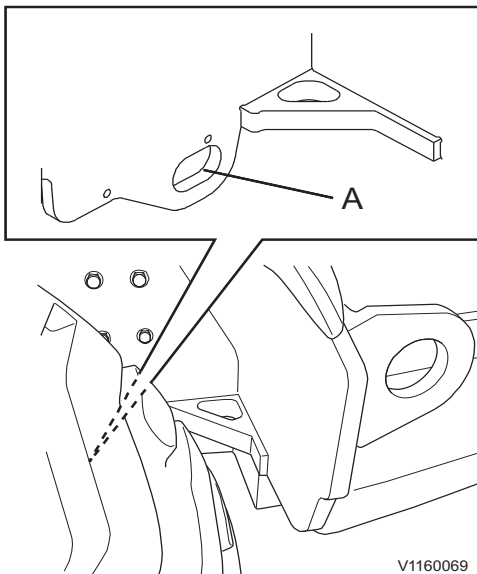
### NOTE!

The coupling device on the counterweight or the eyes behind the rear fenders must not be used when recovering or towing.

### Recovering

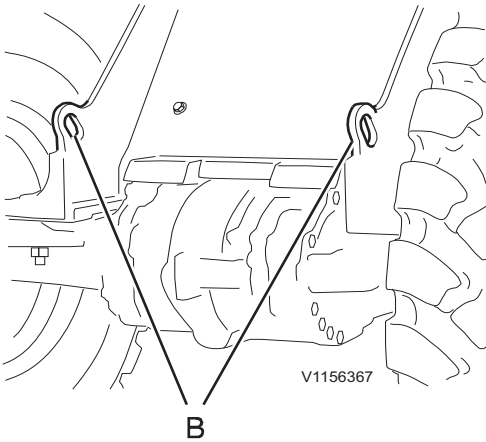
Use a towbar or other suitable means for pulling the machine to a suitable place or trafficable road.

- When recovering rearwards, use recovering eyes (A) (accessible from behind the rear wheels).



A Rear recovering eyes (one on each side)

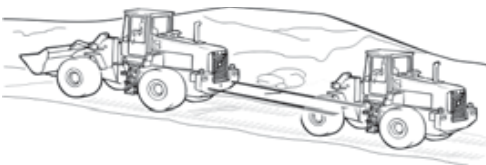
## Operating instructions 152 Retrieving and towing



B Front recovering eyes



Attaching point for lashing



Connected to eyes by front axle attachment

- When recovering forwards, use the eyes (B) by the front axle's attachment intended for lashing the machine.
- To avoid oblique loading, pull the machine straight rearwards/forwards. Try to distribute the load by connecting to both eyes.

Max towing capacity:

- Front: 130 kN (29225 lbf)
- Rear: 100 kN (22481 lbf)

### Towing

The towing vehicle or machine must weigh at least as much 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.

- Select neutral gear.
- Shut down the engine.
- Before towing the hydrostatic drive pump must be set into towing condition.

The high-pressure valves A and B must be relieved by taking the following steps:

- 1 Remove plastic caps from A and B.
  - 2 Loosen the counter-nut while maintaining the position of the adjusting screw.
  - 3 Turn the adjusting screw counter-clockwise by exactly two turns. Then tighten the counter-nut while maintaining the position of the adjusting screw.
- Connect the towing device in a corresponding way as when recovering.
  - Before start towing the parking brake must be released.
  - Do not further tow than absolutely necessary to get out of dangerous zone (max 1 km (0.625 miles)).
  - For longer distances the machine must be transported with a transport vehicle or trailer.

## Operating instructions Retrieving and towing 153

- The towing speed must not exceed 2 km/h (1.25 mph).

### NOTE!

For longer distances the machine must be transported with a transport vehicle or trailer.

- Connect in a corresponding way as when recovering.

### NOTE!

It is not possible to start the engine by towing.

Follow national regulations where required.

### After towing

### NOTE!

The high pressure relief valves must be adjusted to the original setting.

Before the towbar or wire rope is removed, the following safety measures should be taken:

- 1 If possible place the machine on level ground.
- 2 Apply the parking brake or block the wheels to prevent the machine from rolling.
- 3 Reset the high-pressure relief valves A and B to the original setting by taking the following steps:
- 4 Loosen the counter-nut while maintaining the position of the adjusting screw.
- 5 Turn the adjusting screw clockwise exactly two turns. Then tighten the lock nut while holding the adjusting screw in place. Tightening torque for the lock nuts: max.  $30 \pm 5$  Nm ( $22 \pm 4$  lb ft).
- 6 Put back the plastic caps onto A and B. In most cases the plastic caps need to be renewed.

### NOTE!

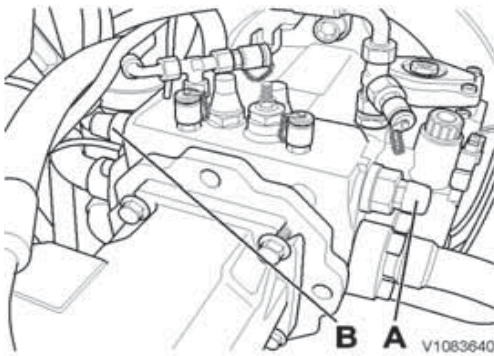
Before continuing operation of the machine the hydrostatic system must be de-aired after towing by a Volvo authorized service, in order to avoid damage.

### Towing device on counterweight

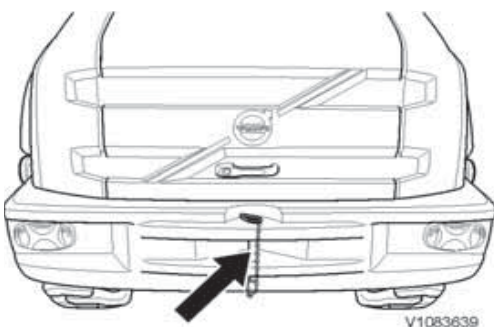
### NOTE!

The connecting device on the counterweight must not be used when recovering, towing, or when operating on a road. Follow national regulations.

Maximum temporary force on the towing device (towbar) on the counterweight including attachment bracket must not exceed a horizontal force of 50 kN (11220 lbf) and a vertical force of 5 kN (1120 lbf).

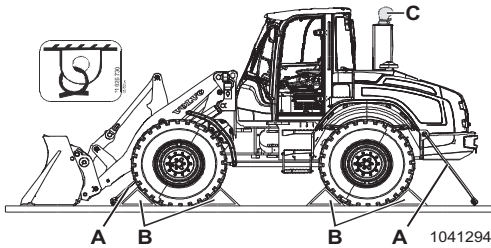


A High-pressure relief valve  
B High-pressure relief valve



Towing device on counterweight

154 Operating instructions  
Transporting machine



- A Attaching points for lashing
- B Block the wheels
- C Guard on exhaust pipe

## Transporting machine

### WARNING

Risk of serious injury.  
The machine could tilt while loading on to or unloading from the transporter. Tilting of the machine will cause the operator to fall off which could result in serious injury.  
**Ensure to approach the loading ramps squarely. Always use a signal person to assist while loading or unloading the machine.**

### WARNING

Risk of overturning.  
A machine can cause serious or fatal injuries if it rolls over while being driven onto the platform of a transport vehicle.  
**Make sure that the transport vehicle is braked with the wheels blocked. Secure the driving ramps steadily so that the machine cannot roll over or sway.**

#### NOTE!

To avoid air being forced down the exhaust pipe when transporting, it should be covered with suitable protection (C) (not plastic). Otherwise the turbocharger may be damaged.

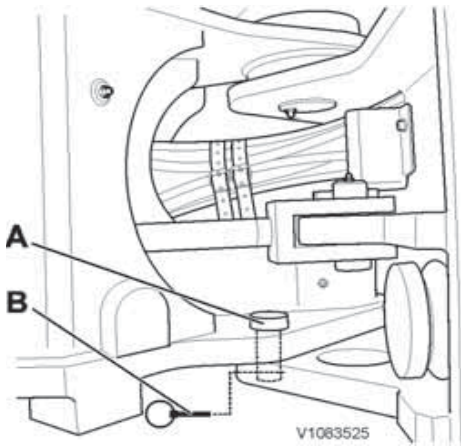
#### NOTE!

Tires shall have proper air pressure, see page 293.



Storage position for lock bolt (A) and locking pin (B).

## Operating instructions Transporting machine 155



Frame joint lock  
A Lock bolt  
B Locking pin

### On another vehicle

- If the machine is lifted up onto another vehicle, the frame joint must be locked.
  - Use the intended attaching points when lifting, see the figure later on.
  - Lock the frame joint with lock bolt (A) and locking pin (B).
- If the machine is driven up onto another vehicle, the frame joint must not be locked.
- The frame joint must be locked when the machine has been driven up on the trailer and reached final position.
- Tie down (lash) the machine.

### Tying down machine

- Block the wheels (B).
- Tie down (lash) the machine using attaching points (A) intended for this purpose, so that it cannot tip or begin to roll.

### Over ramp

- First check that the ramp is wide enough and has the required strength and that it will not be displaced.

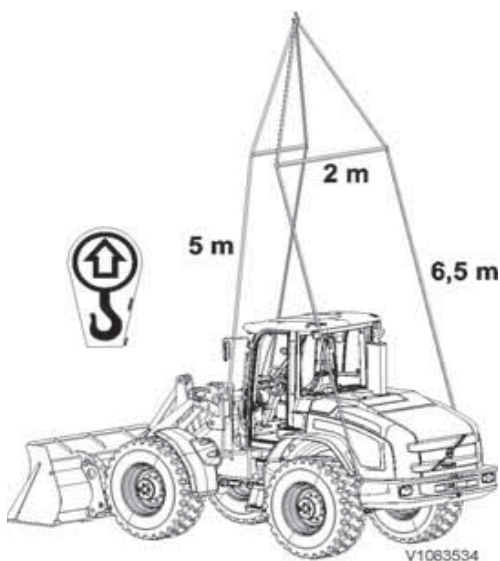
### In elevator or other confined space

- 1 Reverse the machine in.
- 2 Apply the parking brake and stop the engine before starting the elevator.

Also follow national or state regulations.

### Lifting machine

- 1 Lock the frame joint.
- 2 Lift the machine in the intended lifting eyes (see figure).



Attaching points when lifting



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Transporting machine

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### Securing cargo (machine) that has been loaded

See the following conditions for securing a machine that has been loaded.

#### Conditions for securing cargo

- The machine is subjected to a max. acceleration of; 0.8 g forward, 0.5 g backward, 0.5 g sideways, and 0.2 g upward.<sup>(1)</sup>
- Acceleration forward, backward, and sideways act individually and they are combined with 1 g downward.<sup>(1)</sup>
- Acceleration upward is not combined with other accelerations.<sup>(1)</sup>
- A safety factor of 1.25 has been used to compensate for uneven distribution of forces in the lashings. The arrangement can also withstand an acceleration of 1 g forward without safety factor.<sup>(1)</sup>
- The machine (with or without attachment) is manufactured by Volvo Construction Equipment.
- The machine has new or normally used rubber tires or wood-covered rims of pine or birch. If the wood-covering is made of birch, then rubber spacers shall be used between wood-covering and ground surface for the friction 0.5. If rubber spacers are not used the friction is only 0.2.
- The machine stands centred sideways ( $\pm 5$  cm (2 in)) and is supported on at least half of the tires' width.
- The parking brake is applied and functional, and can handle an inclination (grade) of at least 14°.
- The frame joint is locked.
- The machine is loaded and secured in such a way that no parts, i.e., painted surfaces or tires, can be damaged.
- The machine is loaded on a vehicle with trailer bed of wood, plyfa (plywood), grooved aluminium plates, unpainted or painted steel plates.
- The distance sideways between tie-down points on the load-carrying transport vehicle is approx. 2,500 mm (100 in).
- The lashings are pre-loaded to at least 4,000 N during the whole transport.

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1. The acceleration data meets the basic requirements in almost all road regulations and standards, however, certain countries may have national rules and guidelines that require other or supplementary blocking and/or lashing.



## Operating instructions Transporting machine 157

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- The tie-down points on the trailer have at least the same breaking strength as the lashings.
- The lashings are located symmetrically in pairs and are fastened in the intended tie-down points on the machine. Only one lashing shall be fastened to each tie-down point.
- It shall not be possible for the tie-down hooks to lose their grip if the lashings become slack.
- Safe loading in the chain (MSL/LC/SWL) is at least 50% of the breaking strength (MBL).
- Dampers should be used when short, vertical lashings are used on machines with rubber tires to reduce the jerking and shocks to which the chains may be subjected.
- When using blocks, these must be well fastened, have an angle of approx. 37° (3:4:5), a height of at least 25 cm (10 in), and be located in pairs; 1, 2, 3, or 4 pairs according to above tables with block placement.
- Placement of rubber tires/wood-covered rims against wheel slots corresponds to the use of blocks.
- Blocking of the bucket, lifting device, back of the machine, or the wheel pairs turned in the travel direction with at least half of the steering wheel radius against the swan neck or corresponding direction forward, prevents forward movements.
- Blocking of adequate height acting on the inside or outside of all four wheels prevents sideways movement.



## 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 operating techniques are used to carry out the work in a safe and efficient way.



## Eco driving

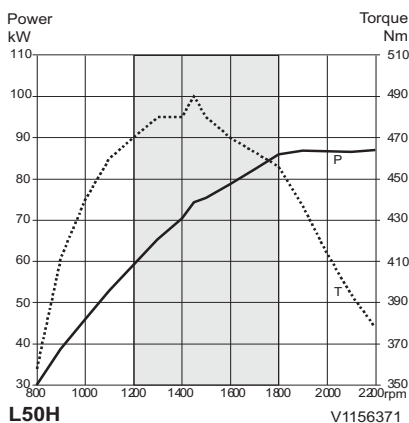
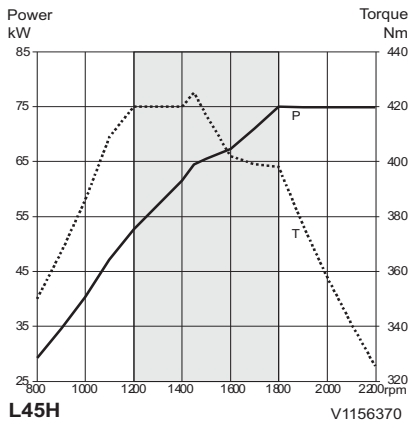
Low engine rpm should be maintained in all handling for optimal use of the system and minimal fuel consumption. Exceptions are:

- when filling the bucket, when engine rpm should be adapted to the material's resistance.
- during the acceleration phase in longer work cycles, e.g., load-carry. When transport speed is reached, ease off on the throttle.

Lift speed and power are sufficient already at low engine speed, which gives lower fuel consumption, lower sound level, and higher comfort with maintained high productivity.

A fuel-saving way of operating also means less machine wear and that you spare the environment. Always strive to:

- **Remain within the economical rpm range**  
See tables to the left. High engine rpm seldom means higher productivity, but most often higher fuel consumption. When filling the bucket, the rpm should be adapted to the material's resistance and during the acceleration phase in longer work cycles (e.g., load-carry) high throttle application can be used until transport speed is reached.
- **Adapt operating method to the application**  
Follow the recommendations for the applications included in the chapter.
- **Select attachment for the application**  
Using attachments made for the application can boost productivity at the same time as fuel consumption and machine wear are reduced. Follow the recommendations in the chapter.
- **Maintain correct air pressure in tires**  
On page 293 there are recommendations for air pressure in tires. Maintaining correct air pressure in tires reduces fuel consumption and machine wear.
- **Do not let the machine idle unnecessarily**  
However, follow recommendations for stopping the machine, see page 146, to ensure lubrication of the turbocharger.
- **Plan the work site**  
Assess and plan your work site and its layout according to the machines that are going to work there, this will make work more organized and



Economical engine speed (grey area)

- P = Power
- T = Torque



## 160 Operating techniques Eco driving

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effective. Keep the ground surface smooth and free from big stones and other obstacles.

■ **Cooperate**

Cooperate with other operators to enable maximal efficiency and effectiveness when working with the machines.

Contact your dealer for more information and for an opportunity to participate in a Volvo course within the area.



## Whole-body vibrations

Whole-body vibrations generated by construction machines are influenced by a number of factors, such as work methods, ground conditions, and machine speed, etc.

The operator can affect the actual vibration levels to a great extent, since it is the operator who controls the machine's speed, work method, and haul route. Therefore, the result can be a range of different vibration levels for the same type of machine. For cab specifications, see page 294.

### Guidelines for reducing vibration levels for earthmoving machines

- Use the proper type and size of machine, with tires, optional equipment and attachments for the application.
- Keep the ground and haul roads in good condition.
  - Remove any large rocks or obstacles.
  - Fill any ditches and holes.
  - Provide equipment and schedule time to maintain ground conditions.
- Adjust speed and haul route to minimize vibration levels.
  - Drive around obstacles and rough ground conditions.
  - Reduce the speed, if it is necessary to travel across uneven ground.
- Maintain machines according to the manufacturer's recommendations.
  - Tire pressure
  - Brake and steering systems.
  - Operating controls, hydraulic system, and linkage.
- Make sure that the operator's seat is maintained and correctly adjusted.
  - Adjust the seat and its suspension according to the operator's weight and height.
  - Check and maintain the seat suspension and adjustment mechanisms.
  - Use the lap-type seatbelt and adjust it correctly.
- Steer, brake, accelerate, shift gears, and operate the attachments smoothly.
- Minimize vibrations for long work cycles or long-distance travel.



## 162 Operating techniques Whole-body vibrations

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- Use Boom Suspension System if the machine is equipped with such a system.
- If the machine is not equipped with a Boom Suspension System, reduce speed to prevent bouncing and rocking.
- Transport the machine when there are long distances between work sites.

Backpain, suspected of originating from whole-body vibrations, may be caused by other risk factors. The following guidelines can be effective in minimizing risks of backpain:

- Adjust the seat and operating controls so that good posture is obtained.
- Adjust the mirrors to minimize twisting of the body.
- Plan for and take breaks in order to avoid long periods of sitting still in one position.
- Do not jump down from the machine.
- Minimize repeated handling and lifting of objects.

## Working within dangerous areas

- Do not operate too close to the edge of a dock, ramp, etc.
- Operate slowly in tight spaces and check that there is enough room for machine and load.
- Operating under ground requires special equipment, e.g., certified engine within the EU and EEA-countries. Talk to your dealer.
- Use the machine's lights when working in poor light conditions, e.g., indoors and in tunnels.
- The machine must be specially equipped when operating and working in a contaminated environment or health-hazardous area. Talk to your dealer. Also check the local regulations before you enter the area with the machine.

## Electrical magnetic field (EMF)

### Working in areas exposed to electromagnetic fields, EMF

#### **NOTICE**

When working in areas with risk of electromagnetic fields, EMF, Comfort Drive Control (CDC) shall always be deactivated.

- The site management (employer) has an obligation to know if there are areas where there are powerful electromagnetic fields and to inform the machine operator about these.
- The operator should seek information if the work site may be exposed to powerful electromagnetic fields.
- Electromagnetic fields, EMF, may affect the machine, if it is equipped with electric servo lever control and Comfort Drive Control (CDC). For Comfort Drive Control (CDC), see page 129.

## Underground cables and pipes

Make sure that authorities or companies responsible for cables and pipes have been contacted and that their instructions are followed. Also check which rules apply to ground personnel regarding exposing cables and pipes. Normally only the service companies' own personnel may expose and arrange provisional suspension of cables.



## 164 Operating techniques Working within dangerous areas

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Make use of a signal man when you cannot see the actual point where you are working or when the position of the pipe or cable is critical, see page 202. The position of the pipe or cable may deviate from the drawing or distances may be incorrectly determined. Regard all electrical cables as live.

### Working on slopes

#### **WARNING**

Risk of injury or death.

Machine could become unstable while operating on slopes or steep grades resulting in loss of control, tipover or rollover.

**Operate machine up or down slope. Avoid turning and operating across the slope. Exercise extreme caution when working on a steep grade.**

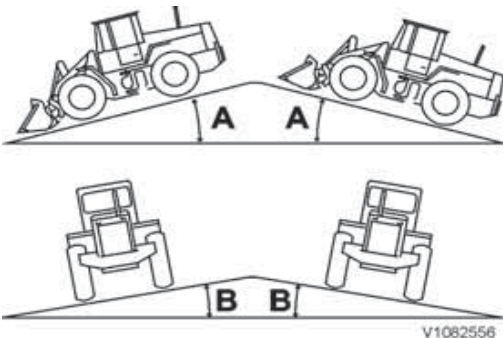
- When working on a slope or grade, pay attention to the current weather and ground conditions in order to not jeopardize safety.
- Be careful when opening the door since it may be difficult to control with the machine leaning at an angle. When closing the door, make sure that it closes completely.
- Operate slowly when approaching or running down a grade.
- Do not operate faster down a grade than the machine can run up the grade.
- Do not change travel direction when operating on a slope, and do not operate across a slope.
- If the machine slides, lower the bucket to the ground immediately. The machine may roll over if it becomes unbalanced. Do not turn with a load in the bucket if the machine does not stand completely stable. If absolutely necessary, pile up earth material on the slope so that the machine can be parked on a level and stable surface.
- If the engine stops when the machine is on a slope, lower the attachment to the ground.

**NOTICE**

Follow the recommendations for maximum permitted angle in the table below. Machine function may be compromised, e.g., lubrication, if recommendations are not followed. This may result in machine damage.

**Maximum permitted angle**

See the figure to the left to see how each angle (A and B) affect the machine.



Maximum permitted angle

- A Machine affected in fore-aft direction
- B Machine affected sideways

Machine affected in fore-aft direction (angle A)		Machine affected sideways (angle B)	
Continuou s effect	Temporary effect	Continuou s effect	Temporary effect
A = 15°	A = 25°	B = 10°	B = 20°

**Working in water and on boggy ground**

Do not exceed the maximum permitted water depth, reaching the lower foot step.

**NOTICE**

Check the water depth before taking the machine into the water.

**NOTICE**

The water may not reach over the bottom edge of seals for hubs, propeller shafts, and rear axle oscillation bearing.

**NOTE!**

The propeller shaft may need to be lubricated, see page 103.

When crossing a body of water with the machine, the water level may not reach higher than the wheel hub's centre. Pay attention if the water is turbid or cloudy, there may be hidden obstacles or dangerous deep hollows in the bottom. Refrain from operating in the area if you are not certain that it is safe to do so.

- After working in water, the grease points that have been under water must be greased to force out any water.

## 166 Operating techniques Working within dangerous areas

- Check that no water has penetrated the transmission or axles.

### Working where there is risk of landslip

Always check the ground conditions before beginning to work. If the ground is soft, great care must be taken when positioning the machine. Thawing of frozen ground, rain, traffic, piling and blasting are factors which increase the risk of landslip. The risk also increases on sloping ground.

- Do not operate too close to the edge of a steep slope or road bank. Take care when working in a place where the machine may tip.
- Take care when working on river banks or in other similar places where the ground is soft. There is a risk that the machine, because of its own weight and own vibrations, may sink and this could lead to accidents.
- Keep in mind that the ground conditions may have changed after heavy rain. Therefore, be careful when restarting work. This is particularly important when working near the edge of ditches, road verges or similar, as the ground may easily give way after it has been raining.

### Working in cold weather

#### **WARNING**

Risk of crushing injury.

The hydraulic system could respond slowly at low temperatures and could cause unexpected machine movements.

**Operate carefully until the hydraulic system has reached operating temperature.**

Read the advice for start, see page 118.

Follow the instructions for warming up the hydraulic system, see page 121.

The windows should be free from ice and snow before starting to use the machine. Acceptable visibility is always a 'must have' condition, see page 104.

- Watch out for slippery parts on the machine. Only step on slip-protected areas.
- Use an ice scraper to remove ice from the windows. If needed, use a scraper with a long handle or a ladder.





Operating techniques  
Working within dangerous areas 167

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 **WARNING**

Risk of frostbite.

Bare skin can freeze stuck to cold metal which could cause injury.

**Use personal protective equipment when handling cold objects.**

 **DANGER**

Risk of electrical shock.

Personal injury results if a body part comes into contact with a machine that conducts electric power.

**Disconnect the electrical engine heater before working on the machine.**



## Attachments



### WARNING

Risk of fatal accidents.

Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.

**Never use attachments for lifting or transporting persons.**

Using the correct attachment for a particular job is a deciding factor when it comes to the capacity of the machine. The machine has either a pin-on attachment or a hydraulically operated attachment bracket, which allows rapid changes of attachments.

Follow instructions in the Operator's Manual.

According to EU's machine directive there shall be a CE-marking on the machine's product plate (see figures) as well as a "Declaration of conformity".

This marking also covers attachments designed by Volvo and adapted for Volvo wheel loaders since they are an integrated part of the machine and adapted to the machine.



Attachments in the category "interchangeable equipment"<sup>1)</sup> (attachments that can be changed by operator) designed by Volvo are CE-marked and adapted for Volvo wheel loaders and are supplied with a "Declaration of Conformity" as well as instructions.

The machine owner is responsible for the attachments being approved for installation on the machine. The machine owner is responsible for the safety of the combination machine – attachment.


For more detailed information about selecting attachments, contact a Volvo dealer to get a copy of the attachment catalogue.

The machine is prepared for different attachments. In order to connect these hydraulically to the machine, the hydraulics must first be depressurized, see page 175.



**The machine's stability may vary depending on the attachments and the density of the material.**

Volvo Construction Equipment	
S-631 85 E SKILSTUNA, SWEDEN	
	MODEL No
	SUPPLIER
	SERIAL No
	MADE IN
	WEIGHT kg/lb
	CAPACITY m <sup>2</sup> /ft <sup>2</sup>
	MANUFACTURING YEAR
	MAX WORKING PRESSURE MPa/psi
<b>VOLVO</b>	


(Attachment plate valid within the EU) Shall be fastened on, e.g., attachment bracket, log grapple, log fork, material handling arm, and pallet fork frame.

Volvo Construction Equipment	
S-631 85 E SKILSTUNA, SWEDEN	
	MODEL No
	SUPPLIER
	SERIAL No
	MADE IN
	WEIGHT kg/lb
	CAPACITY m <sup>2</sup> /ft <sup>2</sup>
	MANUFACTURING YEAR
	MAX WORKING PRESSURE MPa/psi
<b>VOLVO</b>	

Shall be fastened on, e.g., attachment bracket, log grapple, log fork, material handling arm, and pallet fork frame.

Volvo Construction Equipment	
SE-631 85 E SKILSTUNA, SWEDEN	
	MODEL No
	SUPPLIER
	SERIAL No
	MADE IN
	MANUFACTURING YEAR
	ADAPTER KIT No
	POINT KIT No
	SEGMENT KIT No
	BOLT ON EDGE KIT No
	CUTTING EDGE PART No
	WEIGHT, wear parts excl. kg/lb
	CAPACITY, wear parts excl. m <sup>3</sup> /yd <sup>3</sup>
	MAX WORKING PRESSURE MPa/psi
<b>VOLVO</b>	

(Bucket plate valid within the EU) Both pin-on and hook-on. Shall be fastened on, e.g., bucket with hydraulically operated moving parts (side-tip and high-tip function), and bucket with thumb (clamping arm).

Volvo Construction Equipment	
SE-631 85 E SKILSTUNA, SWEDEN	
	MODEL No
	SUPPLIER
	SERIAL No
	MADE IN
	MANUFACTURING YEAR
	ADAPTER KIT No
	POINT KIT No
	SEGMENT KIT No
	BOLT ON EDGE KIT No
	CUTTING EDGE PART No
	WEIGHT, wear parts excl. kg/lb
	CAPACITY, wear parts excl. m <sup>3</sup> /yd <sup>3</sup>
	MAX WORKING PRESSURE MPa/psi
<b>VOLVO</b>	

Both pin-on and hook-on. Shall be fastened on all buckets without hydraulically operated moving parts. This plate is for general use.

1) "Interchangeable equipment" (attachments that can be changed by operator) means that the attachment requires the combination hydraulic attachment lock and together with hydraulic attachments, for example, a log grapple, a 3rd hydraulic function is needed, and in some cases also a 4th hydraulic function.

### Transporting attachments with another vehicle

Follow the tie-down/lashing instructions according to standard SS-EN 12195-1, as well as local transport rules.

### Rotating attachments

#### Hydraulically powered, rotating attachments

##### NOTE!

Read the safety rules before installing and using hydraulically powered, rotating attachments.

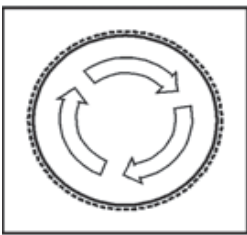
For location of the emergency stop, see page 59.

If the machine is used with hydraulically powered, rotating working parts, e.g., brush, bush clearer, sand spreader, the following general safety rules must be followed:

- The fitting of such attachment for the first time 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) 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.

Make sure that your dealer writes in such an attachment into the "Declaration of Conformity" for your machine as being an approved attachment.



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## Attachment brackets

### Separate attachment locking

#### **NOTICE**

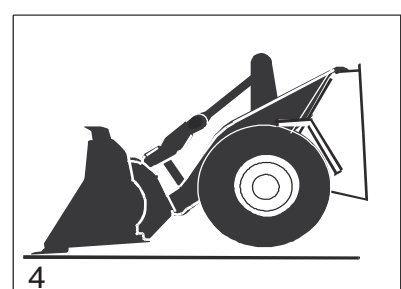
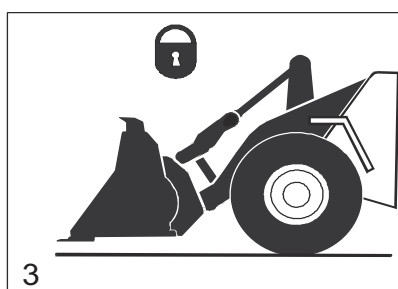
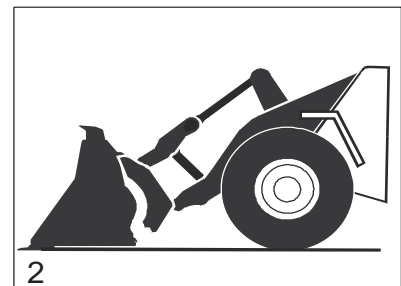
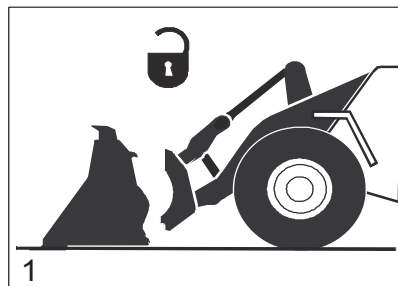
When changing to another attachment, the holes for the lock pins in the new attachment should be cleaned and lubricated.

#### **WARNING**

Risk of crushing.  
Falling attachments could result in severe injury or death.

**Make sure the attachment bracket is properly locked before starting work.**

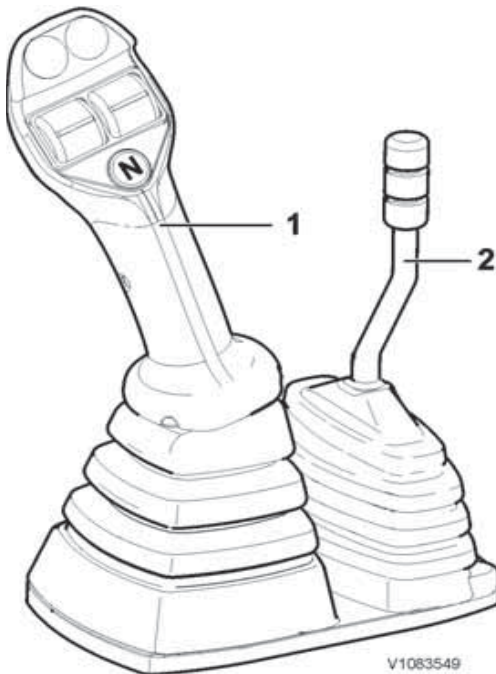
#### Connecting



## Operating techniques Attachment brackets 171



Attachment locking



Version 1A

### WARNING

Risk of crushing.

An unsecured attachment could fall and cause serious injury or death.

**Always ensure the attachment is properly secured by pressing the front part of the attachment to the ground until the machine is slightly lifted.**

- 1 Release the locking pins by first pressing the upper end of the switch (see page 33) and then push - control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C) - forward in order to retract the locking pins.

### NOTE!

A warning message, "Attachment lock open", is shown on the display.

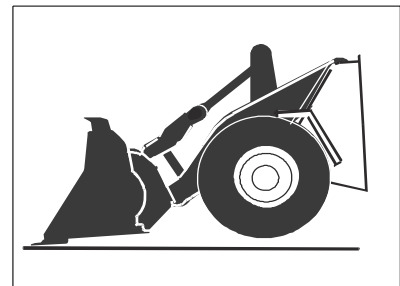
- 2 Tilt the attachment bracket forward approx. 15° and align the upper attaching points of the bracket with the upper attaching points on the attachment. Raise the lifting arms until the attachment rests in the bracket and tilt the bracket rearward until the attachment is level.
- 3 Lock the attachment by pulling - control lever 2 (version 1A) or right roller knob (version 1B) or lever 3 (version 1C) - rearward in order to move the locking pins out into locking position (locking pins protruding approx. 10 mm (0.4 in.)). The switch must not be pressed in. Check that the locking pins protrude to the outside.
- 4 Check that the attachment is properly locked by pressing the front edge against the ground. If it is locked, the front wheels will begin to rise. Confirm locking of the attachment by pressing in SELECT on the keypad.

172 Operating techniques  
Attachment brackets

**CAUTION**

Risk of crushing.  
Pressing the switch for the attachment lock could cause the attachment to fall off and cause personal injuries.

**Press the switch for the attachment lock only when changing attachments.**

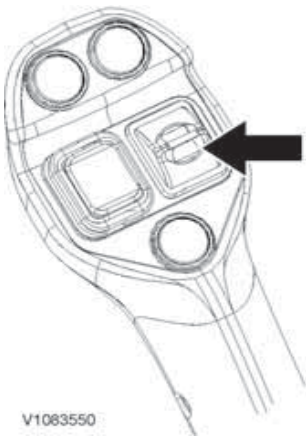


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**NOTE!**

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

**Disconnecting**

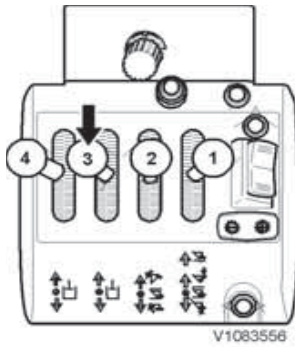


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Version 1B

- 1 The attachment should be in a level position just above the ground.
- 2 Release the locking pins by first pressing the upper end of the switch (see page 33) and then push - control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C) - forward in order to retract the locking pins.

## Operating techniques Attachment brackets 173



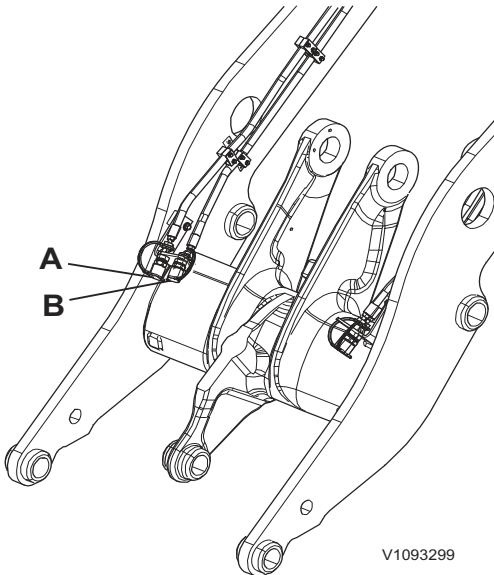
Version 1C

### NOTE!

A warning message, "Attachment lock open", is shown on the display.

- 3 Lower the lifting arms so that attachment bracket disengage from the attachment.
- 4 Reverse away from the attachment.

174 Operating techniques  
Hydraulic function, 3rd and 4th



V1093299

- A Connection, 3rd hydraulic function (outer)
- B Connection, 4th hydraulic function (inner)

## Hydraulic function, 3rd and 4th

(Optional equipment)

### WARNING

**Risk of crushing.**  
Sudden movement of attachments may cause serious injury or death to personnel near the machine.  
Quick-acting controls operate the optional attachments. Operate the controls carefully.

### NOTICE

When connecting or disconnecting hydraulic couplings, ensure that the couplings and the surrounding area are clean.

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

The illustration on the left shows connections for 3rd and 4th hydraulic function on the boom's right side. Connections on the boom's left side are found in the same position.

### Connecting

- 1 See page 170. Follow the instructions for connecting the attachment to the machine.
- 2 Place the attachment level on the ground.
- 3 Depressurize the 3rd and 4th hydraulic function, see page 175.
- 4 Clean the hydraulic couplings properly, on the machine as well as on the hoses of the attachment.

### NOTE!

Uncleaned hydraulic couplings may cause contamination, dirt and water to enter the hydraulic system. Risk of subsequent malfunctions or damages.

### NOTE!

Make sure the hoses are not damaged or twisted.





## Operating techniques

### Hydraulic function, 3rd and 4th 175

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- 5 Connect the attachment's hydraulic hoses to the machine.

**NOTE!**

Always check the control functions for the attachment before starting to work!

**Disconnecting**

- 1 Place the attachment level on the ground.
- 2 Depressurize the 3rd and 4th hydraulic function, see page 175.
- 3 Clean the hydraulic couplings thoroughly, both on the machine and the attachment.
- 4 Disconnect the attachment's hydraulic hoses from the machine.
- 5 Make sure that the attachment cannot fall over after disconnecting.
- 6 See page 170. Follow steps 2–4 to disconnect the attachment from the machine.

**Pressure release**

Residual pressure in the hoses makes it very difficult to disconnect or connect the quick-couplings.

This is facilitated, by releasing the pressure in the hydraulic system, when, for example, you want to disconnect a hydraulic hose:

- 1 Stop the engine.
- 2 Ignition switch in position 1.
- 3 Move the control for the relevant function back and forth several times, and hold it in its end-position for three seconds.

**NOTE!**

For pressure release of the 4th hydraulic function move the relevant levers - according to the control lever version. See page 174.

The pressure in hoses from timber grapples can be released in the following way:

- 1 Close the clamping arm fully.
- 2 Make a quick movement with the lever in the opposite direction.

The hoses become "slack" when the pressure is released.



176      Operating techniques  
Hydraulic function, 3rd and 4th

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**NOTICE**

The attachment should always rest on the ground when the pressure is released.

Excess pressure in a hydraulic attachment can be released by slackening the lock nut between the hose and the hydraulic pipe and then tightening it again. Meanwhile watch the attachment.

Collect the surplus oil.



## Loading

For loading functions, see page 66.

- For loading, the blocking of the working hydraulics must be deactivated.
- To pick up solid, cohesive materials it is recommended to quickly shift from tilting forward to tilting backwards when penetrating into the material. This eases entering of the bucket into the material.
- During the transport of the picked up material the bucket should not be higher than 0.5 m (20 in) above the ground.
- You should never drive longer distances with a high raised loaded bucket.
- When lever (1) is in "float position", the bucket rests on the ground "without force" and can be used e.g. to level the tracks when reversing.
- For information about bucket positioner, see page 80.
- For information about boom kick-out, see page 81.
- For information about Boom suspension system, see page 59.

## Buckets

When the machine is used with a bucket, a working load of 50 % of the tipping load for a fully steered machine is permissible. Depending on application and/or machine size the manufacturer often recommends a utilisation lower than 50%.

**For information about weight, volume, load, edge savers, etc., contact your dealer to obtain the attachment catalogue.**

Bucket teeth, changing, see page 265.

### **WARNING**

Risk of fatal accidents.

Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.

**Never use attachments for lifting or transporting persons.**

### **NOTE!**

Excavating or surface stripping must not be carried out at high speed, if the bucket is tilted more than 15°, and a fully tilted bucket must be avoided.

### **Choosing bucket**

- The choice of bucket is dependent on the condition of the material (hard/loose), its density (heavy/light) and on the tipping load of the machine.
- A too large bucket relative to the density of the material and the tipping load of the machine will give the impression that the machine is weak and unstable and will not increase the productivity.

### **Working with buckets**

To obtain efficient and safe operation it is important to bear the following points in mind:

- Select the correct bucket.
- Level the ground at the work site as far as possible and make sure the ground is firm.
- Avoid wheel spin by adapting the engine speed and by transferring as much weight onto the front wheels as possible. This is achieved by slightly raising the bucket after it has begun to enter the material.

- Work with a straight machine against the material to obtain the greatest penetrating ability. This also contributes to reduced tyre wear.

### Gravel and heap loading

- 1 Adjust the bucket so that it is level and lower it to the ground just in front of the gravel heap.
- 2 Enter the material. 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 tilt backward with short control lever movements.

If possible avoid tilting the bucket forward when filling it. Exaggerated lever movements causes wheel spin. Never move into the material at a high speed.

Suitable bucket:                      Straight bucket with or without teeth

### WARNING

Risk of crushing.  
Falling load could cause serious injury.  
**Always ensure that components are secured and supported with properly rated equipment.**

### Excavating

- When excavating and surface stripping, start by angling the bucket 2–3° downward.
- 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 with or without teeth (alt. levelling bucket)

Suitable gear:                        Gear selector in position 1

BSS:                                      Not activated

180 Operating techniques  
Buckets

**Transporting load (load – carry)**

- The bucket should be fully tilted backward and kept in the carrying position 30–40 cm (12–16 in) above the ground.
- 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 maximum speed:**                      **Approx. 15 km/h (9.3 mph)**

**NOTE!**

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

**Dumping load**



Risk of serious accidents.

Machine parts, equipment or load could obstruct the operator's view. Operating or driving with obstructed operator's view could cause serious accidents.

**Use a signal man if operator's view is obstructed.**

- If you are working on an incline, try to arrange so that the load can be dumped uphill. This affects the stability of the machine in a positive way.
- Keep the bucket as close to the platform or bin as possible to achieve a smooth dumping and better control of the positioning of the load.
- 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.

**Positioning of transporting vehicle**

- The positioning of the hauler (transporting vehicle) is of great importance for making the loading operation efficient.
- The operator should indicate where the transporting vehicle is to stand, suitably by "pointing" with the bucket. Having done so, the operator is then responsible for that the place is safe.

**Levelling**

- The bucket should lie flat against the ground. To be able to fill any hollows you should have



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material in and in front of the bucket when operating forwards.

- To finish off the levelling operation, keep the edge of the bucket slightly downward and reverse while pressing the bucket lightly against the ground.

**Suitable bucket:** Straight without teeth  
(alt. levelling bucket)

**BSS:** Not activated

### Multi-purpose bucket (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

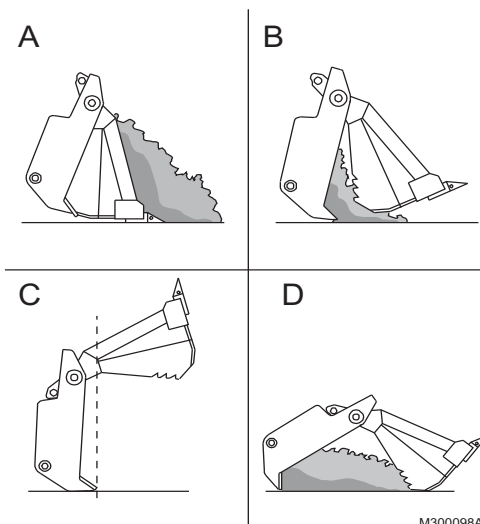
The multi-purpose (4-in-1) bucket is most suitable for all different types of earth moving operations as well as for levelling, scraping and gripping.

- The front flap is operated via control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C). See page 66 and forward.

#### NOTE!

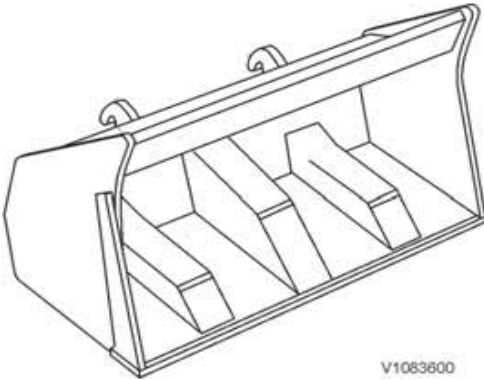
When levelling in rearward gear, the front bucket flap must only be partly opened, so that any obstructions, such as rocks or tree trunks do not damage or distort the front flap. The travel speed must be matched to the condition of the road.

- Material which is trapped between locking cylinder and rear clam must be immediately removed, as otherwise the piston rod of the cylinder may be damaged or bent.
- Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
- Grease the bearings for the clam bucket and the locking cylinders every **50 operating hours**. For quality of grease, see page 276.
- Always relieve the pressure in the hydraulic system before starting maintenance or repair work.
- Work in hydraulic systems must only be performed by authorized personnel.



- A Loading
- B Scraping
- C Levelling
- D Gripping

## 182 Operating techniques Buckets



### High tipping bucket (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

The high tipping bucket is a combination of carrier and bucket. During tilting the carrier acts like an extension of the lifting frame, thereby providing a high dumping height. During loading and transport the bucket is tilted backwards between the carrier and the bucket body is almost in the same position as a normal bucket, so that there are almost no disadvantages with respect to breakout force, lifting force and tipping load.

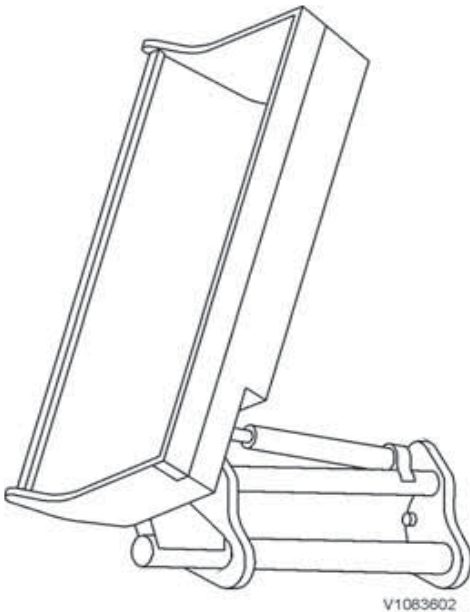
- The bucket cylinder is operated in the 'tilt function' by means of control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C). See page 66 and forward.
- For loading, transporting and lifting, tilt the bucket fully backwards.
- Empty the bucket only when the desired lifting height is reached.

#### NOTE!

Avoid tilting of the high tipping bucket with the standard tipping function, or if necessary tilt only with low tilting speed, so that the bucket remains fully tilted backwards on the carrier.

- Avoid tilting the high tipping bucket forward or backwards with full power against the end stops to prevent bucket and cylinders from being damaged.
  - Clean the carrier arms regularly from dirt deposits.
  - Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
  - Check the rubber buffers on the tipping back stops at regular intervals, replace if necessary.
  - Lubricate the bucket support and cylinder bearings every **50 operating hours**. For quality of grease, see page 276.
  - Always relieve the pressure in the hydraulic system before starting maintenance or repair work.
  - Work in hydraulic systems must only be performed by authorized personnel.





### Side tipping bucket (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

The side tip bucket is suited for all possible earth movements such as filling up service trenches without major turning manoeuvres.

- The bucket cylinder is operated in the "tilt function" by means of control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C). See page 66 and forward.
- For loading, transporting or lifting the load higher, the bucket must be tipped over until it is stopped by the support.
- When the end position is almost reached, the bucket must be emptied or inverted carefully (not at full power) to prevent the bucket and the cylinder from being damaged.

#### NOTE!

Wet or very dense material may affect the stability of the machine when the tip bucket is emptied. Therefore do not perform any unnecessary steering movements when the lifting arms are up and the bucket cylinder is fully extended.

### **WARNING**

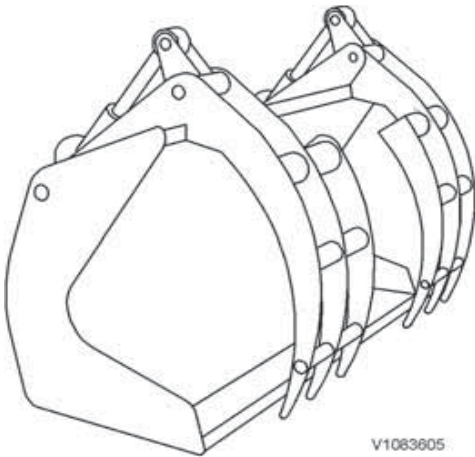
Risk of crushing.

The bucket is only attached in the front bucket pin. The bucket could fall and cause crushing injury.

**Keep a safe distance.**

- Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
- Lubricate the bucket support and cylinder bearings every **50 operating** hours. For quality of grease refer, see page 276.
- Always relieve the pressure in the hydraulic system before starting maintenance or repair work.
- Work in hydraulic systems must only be performed by authorized personnel.

## 184 Operating techniques Buckets

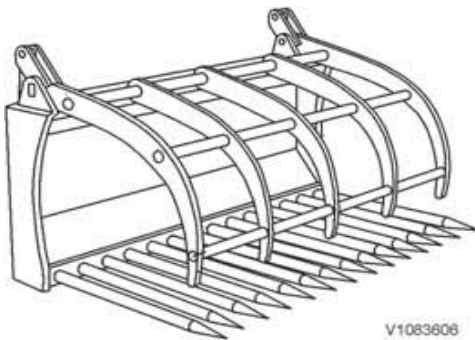


### Scrap bucket (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

The scrap bucket is most suitable for the loading of light metal scrap, e.g. aluminium scrap, tinplate and similar bulky material.



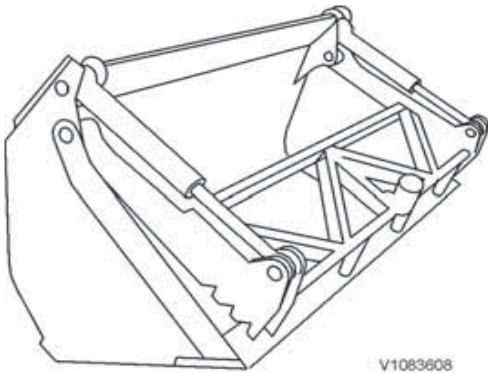
### Universal fork with hydraulic gripper (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

The universal fork is most suitable for the loading and transport of e.g. biological waste, tree branches, hay, manure and similar bulky materials.

- The clamshells are operated with control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C). See page 66 and forward.
- When entering into the material keep the gripper fully open, as otherwise the resulting very high pressure may cause leaks on hoses and seals.
- Do not operate the gripper with full power against the end stop. Due to the high opening/closing speed the cylinders may be damaged.
- Material which is trapped between cylinder and bucket must be immediately removed, as otherwise the piston rod of the cylinder may be damaged or bent.
- Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
- Grease the bearings on gripper and cylinders every **50 operating hours**. For quality of grease, see page 276.
- Always relieve the pressure in the hydraulic system before starting maintenance or repair work.
- Work in hydraulic systems must only be performed by authorized personnel.



V1083608

### Clamshell bucket (optional equipment)

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

The clamshell bucket (also called Mulch grab bucket) is most suitable for loading bulky material, e.g. biological waste, tree branches, bulky refuse as well as for manoeuvring the shredder machine.

- The clamshells are operated with control lever 2 (version 1A) or right roller control knob (version 1B) or lever 3 (version 1C). See page 66 and forward.
- When entering into the material keep the clamshells fully open, as otherwise the resulting very high pressure may cause leaks on hoses and seals.
- Do not operate the clamshells with full power against the end stop. Due to the high opening/closing speed the cylinders may be damaged.

#### NOTE!

In order to manoeuvre the shredder machine with the ball button tilt the clamshell bucket fully backwards and close the clamshell.

- Material which is trapped between cylinder and bucket must be immediately removed, as otherwise the piston rod of the cylinder may be damaged or bent.
- Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
- Grease the bearings on claws and cylinders every **50 operating hours**. For quality of grease, see page 276.
- Always relieve the pressure in the hydraulic system before starting maintenance or repair work.
- Work in hydraulic systems must only be performed by authorized personnel.

## Pallet forks

### NOTICE

Only pallet forks approved for the machine by Volvo may be used.

Pallet forks may only be used for the intended application; therefore they may not be used as pry bars to break out a stump, large rock, or similar. They may not be overloaded or loaded obliquely. They may not be used as lifting equipment together with chains or slings to lift objects.

Fork tine back frame and fork tines must be dimensioned to withstand loads which the lifting capacity of the machine permits.

Pallet forks and fork retainer must be kept free from dirt and rust and be well greased for best possible function.

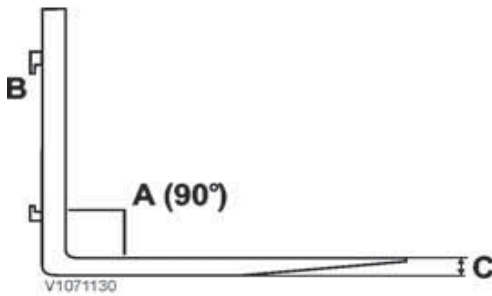
### NOTICE

With attached loading fork the machine must not be used in public traffic.

### NOTICE

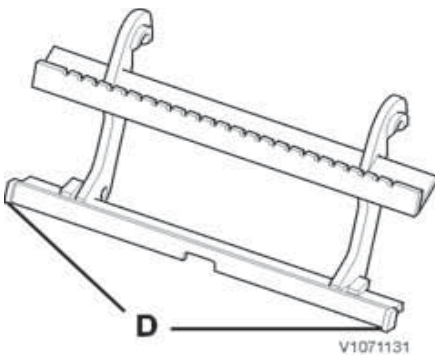
Make sure that the stops that prevent the fork arms from sliding off the fork frame are properly located. This is particularly important when the fork arms are moved sideways manually. Make sure that the fork arms are locked against the fork retainer, so that the fork arms are prevented from moving sideways.

- Check the pallet forks regularly as regards wear. It is particularly important to check the heel of the fork tine.
- Check that stops (D) for the fork arms are properly located.
- Check that the fork arms are locked against the fork frame.
- The fork tine should not be used any more if:
  - the fork tine has been worn down to 90% of its original thickness.
  - the angle between fork tine's point and shank has become greater than 93°.
  - the attaching eyes are worn or cracked.
- Do not use welding to repair cracks or wear.



Checking fork tines

- |   |                |
|---|----------------|
| A | Angle          |
| B | Attaching lugs |
| C | Thickness      |



Fork frame

- |   |      |
|---|------|
| D | Stop |
|---|------|

### Adjusting fork tines' position sideways

- 1 Place the fork tines just above ground level and tilt max. 15° forward.
- 2 Open the fork tines' lock and move the fork tines sideways to desired position.
- 3 Close the fork tines' lock so that the fork tines cannot move sideways.

### Working with pallet forks

The most important points when working with pallet forks are:

- The operator should have suitable training.
- The operator is responsible for not exceeding max. values for the load.
- The fork makes a semi-circular movement when lifting. Therefore, always start lifting some distance away from where the load is to be set down.
- The fork may not be raised other than when stacking and unloading.
- Keep the fork tines low and angled up when operating without a load.
- When stacking material the fork tines should be kept horizontal.
- Select a suitable route with the smoothest ground surface or, when needed, level off the ground surface.
- Adapt speed to the ground conditions.
- For better stability when working with pallet forks it is important to maintain the right and recommended air pressure in the tires.
- When handling a wide load it may be advantageous to move out the fork tines on the fork frame to increase stability of the load. Keep the center-of-gravity in mind and also make sure that the load is centered sideways.
- It may be advantageous to reverse the machine when operating with a heavy load on a downhill grade.



V1071133

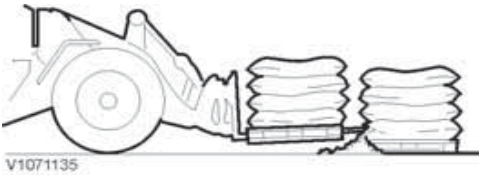


V1071134

#### NOTE!

For heavy-duty jobs requiring high breakout force, e.g., breaking out tree stumps and marble blocks – use attachments approved by Volvo.

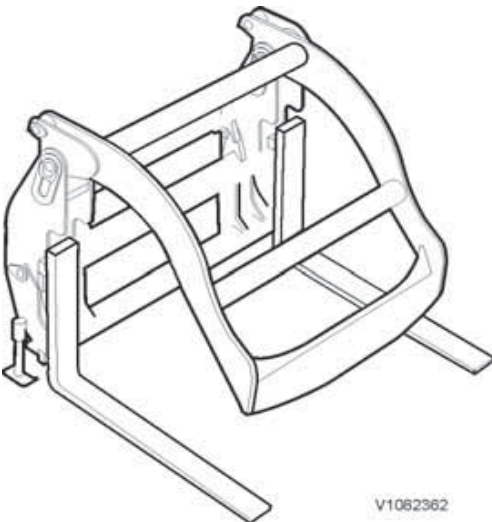
188 Operating techniques  
Pallet forks



V1071135



V1071136



V1082362



V1071137

**Picking up loads**

- Select suitable length of the fork tine so that it does not extend past the load. The pallet in front or material may be damaged since the fork tines have high penetration force.
- Place the load as close as possible to the fork's vertical shank.
- Pick up the load with the smallest possible angle of the pallet fork.
- Deviations from complete parallel movement may occur (see specifications) and this may affect use of the fork.

**Operating with loads**

- Keep the load low (30–40 cm) above the ground for best stability and visibility.
- Tilt back to hold the load safer.
- Reverse to the unloading site if the load reduces visibility.
- Adapt speed to current operating conditions.
- Use load supports when handling high loads.

**Combi forks (optional equipment)**

**NOTE!**

Always check the control functions for the attachment before starting to work.

The combi fork is a good alternative for material handling, when some holding of the load is required. A special combi fork frame is used where standard forks are mounted.

The combi fork is suitable for:

- Goods on pallets and round logs.
- Within the pulp industry and on building sites, where both pallet goods and compressed materials (recyclable paper, packaging materials, etc.) are handled.

**Approval and legal requirements**

Maximum permitted load according to CEN-standard EN 474-3 is stated in percent of the tipping load.

The percentages, which may not be exceeded, are as follows:

- Uneven ground: 60% of tipping load**
- Solid and even ground: 80% of tipping load**

It must be possible to control and handle the load hydraulically in all likely positions at the same time

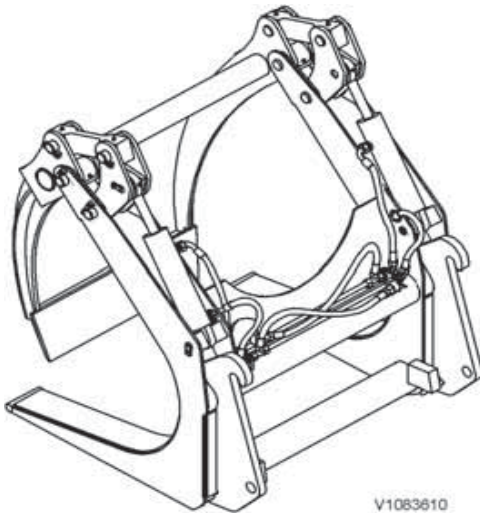


## Operating techniques Pallet forks 189

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as all other hydraulic circuits are loaded. The max. permitted load is determined either by the machine's stability or its hydraulic force, whichever is lowest.

In countries outside the EU/EEA other rules may apply. Therefore, always check which local rules apply.



## Timber grapples

(optional equipment)

### WARNING

Risk of crushing and cutting.

Sudden movement of machine or machine parts could cause serious injury.

**Before resuming operation ensure that the working area is cleared.**

#### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

**The log loader is a universal gripper. It is most suitable for loading and sorting timber logs.**

- The hydraulic gripper is operated with control lever 2 (version 1A, see page 66) or right roller control knob (version 1B, see page 66) or lever 3 (version 1C, see page 66).

#### NOTE!

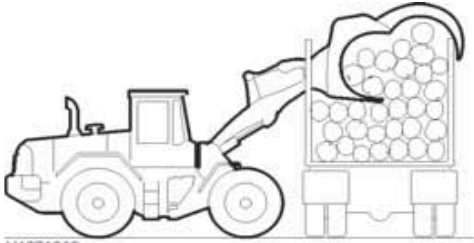
If the machine has been equipped with Boom suspension system (BSS), this system must not be engaged when a high degree of accuracy is required for loading or unloading.

#### NOTE!

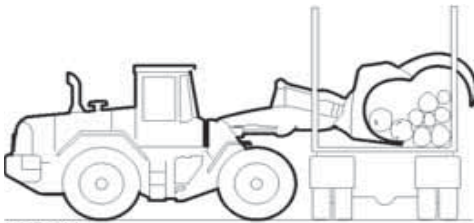
The big clearance radius when handling logs means that the operator must be very careful to avoid striking anyone or something close to the machine.

- Check hydraulic lines at regular intervals for leaks and visible external damage, replace if necessary.
- Grease the bearings on gripper and cylinders every **50 operating hours**. For quality of grease, see page 276.
- Always release the pressure in the hydraulic system before starting any maintenance or repair work.
- Work in hydraulic systems must only be performed by authorized personnel.

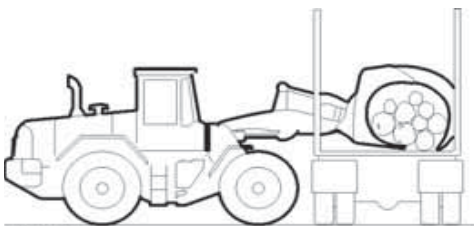




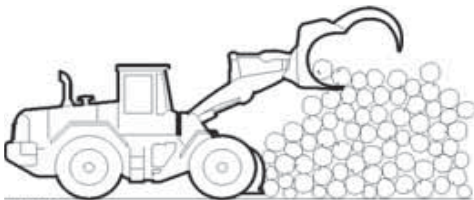
V1071313



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V1071316

## Working with timber grapples

### Unloading vehicle

Operate very carefully when filling the grapple to avoid damaging stakes and their attachments on the vehicle.

- 1 Approach the vehicle which is to be unloaded with a raised and fully open grapple.
- 2 Tilt the grapple forward and lay it down over the load.

Close the clamping arm and begin to tilt slightly upward. Then repeat alternate closing and upward tilting of the grapple until it is full.

#### NOTE!

Operate carefully when unloading a vehicle, especially when there are only a few logs left. If the grapple should grip around the far edge of the platform this could lead to damage.

### Loading vehicle with log grapples

- 1 Make sure that each log lies correctly in the grapple to avoid "crows nest".
- 2 Approach the vehicle to be loaded while at the same time raising the attachment so that the logs clear the stakes.
- 3 Lower the grapple until it is level on the bunks or the platform and deposit the bundle against the stakes on the far side.
- 4 Open the clamping arm fully and carefully reverse out.

### Stacking

For machines with Boom Suspension System it is recommended that speed-dependent function should be selected. The precision increases and the risk of "crows nest" reduces.

- 1 Keep the grapple as near the stack as possible to prevent logs falling down.
  - 2 Tilt the grapple slightly forward.
  - 3 Carefully open the clamping arm fully so that the logs start to roll out of the grapple.
  - 4 Then open the clamping arm completely and reverse carefully while lowering the grapple and holding back falling logs.
- The grapple's counterhold can be used as heel kick-out and therefore you do not have to tilt the grapple forward. The machine's lifting height is



used better and it is possible to build higher stacks. The heel kick-out can also be used as a counterhold when handling single logs.

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

<b>Suitable gear:</b>	<b>Gear selector in position 4</b>
APS settings <sup>(a)</sup>	<b>Light (<i>Light</i>) or Automatic</b>
<b>Boom Suspension System:</b>	<b>Speed-dependent position</b>

a) For selecting APS settings, see page 45 (in the table for "Transmission").

### Picking up from a stack

#### Low stack:

- 1 Keep the grapple tines flat against the ground with the grapple fully open.
- 2 Enter the grapple into the stack and close the clamping arm as far as possible.
- 3 Carefully reverse while closing the grapple further.

#### High stack:

- 1 Begin as high as possible and tilt the grapple tines slightly forward with the grapple fully open.
- 2 When the grapple is well into the stack, close it.
- 3 Follow through with the grapple so as to avoid logs falling down under the grapple tines.

**If logs fall between the grapple tines, carefully lower the load to the ground, reverse and try to pick up the load again. Make sure not to damage the logs.**

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

### Operating with tree-length logs

- Pay special attention that the centre of gravity of the logs is correctly positioned to maintain a satisfactory lateral side stability.
- Make use of a signal man when operating where visibility is limited, see page 202.



 **WARNING**

Risk of crushing.  
Swinging objects could cause serious injury.  
**Always ensure no persons are in the danger zone  
before lifting or moving objects.**

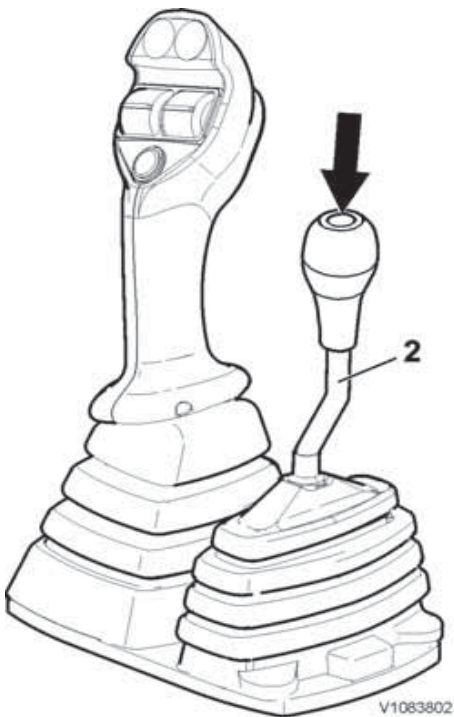
## Special hydraulics

### Hydraulic function, 4th switchable from 3rd

#### (optional equipment)

This equipment serves one hydraulic function at the time, 3rd or 4th. It is used when two auxiliary hydraulic functions are needed, for example road sweeper with hydraulic slewing device.

- Changing from 3rd to 4th hydraulic function = Pressing and holding the push button (arrow).
- Changing back from 4th to 3rd hydraulic = Releasing the push button (arrow).



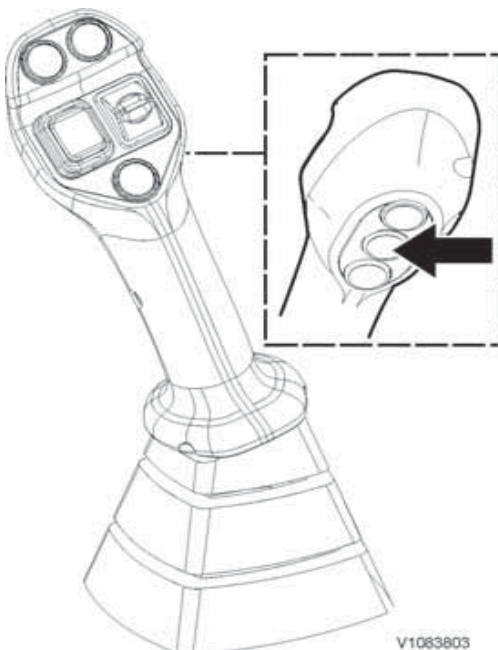
Version 1A

### Single control lever version 1B

#### NOTE!

Control lever version 1B provides flow adjustment, see page 66. This is affecting also the 4th hydraulic function, when changing from 3rd to 4th.

This version provides common flow adjustment for hydraulic function 3rd or 4th, depending on what is selected. For further information see page 174.



## Material handling arm

Material handling arm L45H (optional equipment)

### NOTICE

Only material handling arms approved with the machine by Volvo may be used.

### ! WARNING

Risk of fatal accidents.

Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.

**Never use attachments for lifting or transporting persons.**

### ! WARNING

Risk of crushing.

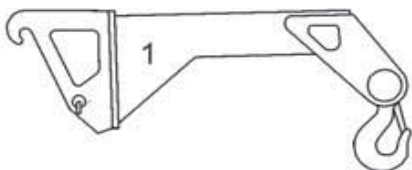
Unlocked attachments could become loose and fall and cause serious injury.

**Always make sure the attachment is locked before operating. Be aware of controls that could unlock and release attachments.**

### 1 Material handling arm, rigid

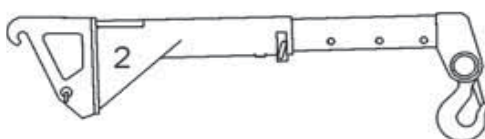
Effective load with Z-tool carrier: 1550 kg (3417 lbs)

Effective load with V-tool carrier: 1400 kg (3086 lbs)



### 2 Material handling arm, mechanically extendable

The material handling arm can be extended mechanically in 3 stages (of 200 mm (7.9 in) each) from a minimum length of 1060 mm (41.7 in) to a maximum length of 1660 mm (65.4 in).



V1083805

		Z- equipment carrier	V- equipment carrier
Effective load: at	1060 mm = (41.7 in) =	1550 Kg (3417 lbs)	1400 Kg (3086 lbs)
	1260 mm = (49.6 in) =	1450 Kg (3197 lbs)	1300 Kg (2866 lbs)



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Material handling arm

	1460 mm = (57.5 in) =	1350 Kg (2976 lbs)	1200 Kg (2646 lbs)
	1660 mm = (65.4 in) =	1250 Kg (2756 lbs)	1100 Kg (2425 lbs)

**NOTE!**

There is no end-stop beyond the length 1,660 mm (65.4 in), so there is a risk that the inner arm is pulled loose. The operator is responsible for the load being lifted not exceeding the max. load limits for the machine and the forks.

- Installation of material handling arm, see "Installation and removal of quick change attachment equipment without auxiliary hydraulics".

**NOTE!**

If the machine has been equipped with lifting arm suspension (BSS), this system must not be engaged when a high degree of accuracy is required for loading or unloading.

## Material handling arm L50H (optional equipment)

### NOTICE

Only material handling arms approved with the machine by Volvo may be used.

### WARNING

Risk of fatal accidents.

Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.

**Never use attachments for lifting or transporting persons.**

### WARNING

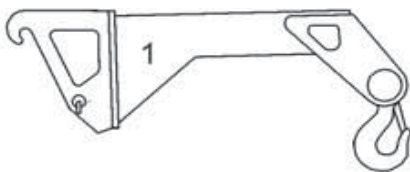
Risk of crushing.

Unlocked attachments could become loose and fall and cause serious injury.

**Always make sure the attachment is locked before operating. Be aware of controls that could unlock and release attachments.**

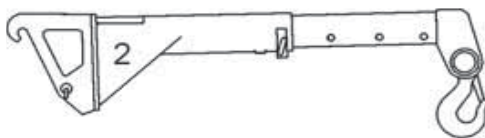
### 1 Material handling arm, rigid

Effective load with Z-tool carrier: 1800 kg (3968 lbs)  
Effective load with V-tool carrier: 1650 kg (3638 lbs)



### 2 Material handling arm, mechanically extendable

The material handling arm can be extended mechanically in 3 stages (of 200 mm (7.9 in) each) from a minimum length of 1060 mm (41.7 in) to a maximum length of 1660 mm (65.4 in).



V1083805

		Z- equipment carrier	V- equipment carrier
Effective load: at	1060 mm = (41.7 in) =	1800 Kg (3968 lbs)	1650 Kg (3638 lbs)
	1260 mm = (49.6 in) =	1700 Kg (3748 lbs)	1550 Kg (3417 lbs)

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Material handling arm

	1460 mm = (57.5 in) =	1600 Kg (3527 lbs)	1450 Kg (3197 lbs)
	1660 mm = (65.4 in) =	1500 Kg (3307 lbs)	1350 Kg (2976 lbs)

**NOTE!**

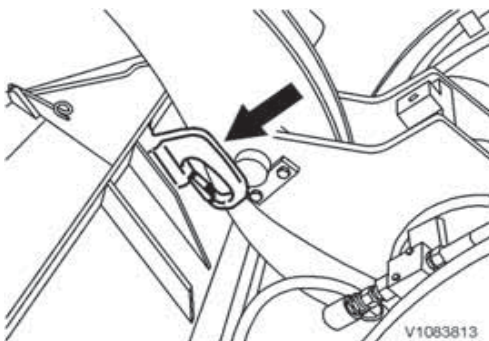
There is no end-stop beyond the length 1,660 mm (65.4 in), so there is a risk that the inner arm is pulled loose. The operator is responsible for the load being lifted not exceeding the max. load limits for the machine and the forks.

- Installation of material handling arm, see "Installation and removal of quick change attachment equipment without auxiliary hydraulics".

**NOTE!**

If the machine has been equipped with lifting arm suspension (BSS), this system must not be engaged when a high degree of accuracy is required for loading or unloading.

**Load hook on bucket back (optional equipment)**



The load hook (arrow) on the back of the bucket allows for the attachment of a rope or a chain to secure the load which is being lifted, transported or lowered.

The permitted effective load depends on the machine's size, bucket type, and the machine's configuration, and can be requested from Volvo upon submission of the above information. Due to the machine's design, the effective load may never exceed 2500 kg (5512 lbs).

**NOTE!**

If the machine has been equipped with lifting arm suspension (BSS), this system must not be engaged when a high degree of accuracy is required for loading or unloading.





## Road sweeping (optional equipment)

### NOTE!

For connecting and disconnecting hydraulic hoses for 3rd hydraulic function, see page 174. Always check the control functions for the attachment before starting to work.

- When using the machine on public roads check which local and national regulations concerning the attachment of road sweeping equipment must be complied with.
- The road sweeping machine is most suitable for sweeping paved surfaces, **but not for hazardous substances and health threatening dusts.**
- Connect the hydraulic hoses correctly so that the hoses are free and not squashed when starting the road sweeper.
- For road sweeping machines with water spraying device plug the electric plug for the water pump into the socket on the front frame.
- During operation make sure that the height adjustable supporting wheels are adjusted to such a height, that the horizontally adjusted broom drum only just touches the ground. The weight of the road sweeping machine must always rest on the supporting wheels and not on the brushes. If the brushes are adjusted too low the broom bristles will brake and the steering rollers will vibrate.
- All guards and safety devices must always be in place. During work the resting supports must be in raised position.
- The working speed should be 4-8 km/h (2.5-5 mph) (select speed range gear stage "1" [turtle]).
- Grease all lubrication points on the road sweeping machine after approx. 30 operating hours (for quality of grease, see page 276).
- The condition of hydraulic oil lines must be examined at least once every year, replace if necessary.



## Lifting objects

### **NOTICE**

Use a safe lifting device with the proper rated capacity for the job.

The lifting devices that are used shall be adapted to and approved for the machine on which they are used.

### **NOTICE**

Do not use damaged, broken or uncertified lifting devices.

### **NOTICE**

Various countries have their own regulations concerning the use of the machine for lifting work, e.g. lifting freely suspended loads. For more detailed information you should contact your authorised Volvo dealer.

### **NOTICE**

Observe the nominal loads that apply to the machine while transporting.

### Stability

The stability of machines at work changes and is subject to great variations.

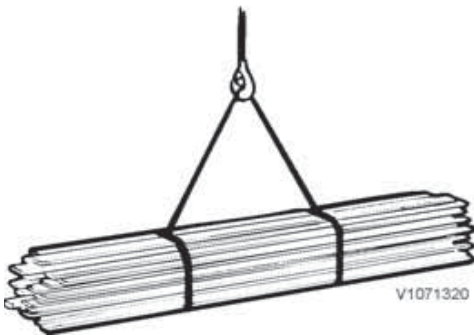
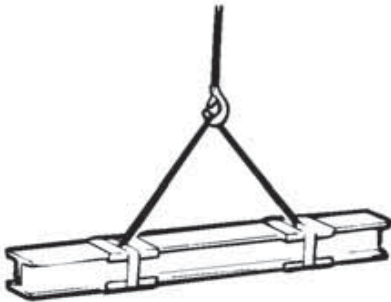
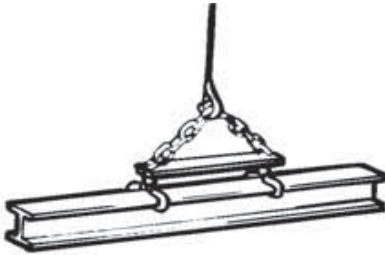
For work to be done safely, the operator must keep in mind and consider the special conditions at the time.

- Standing the machine on a horizontal, stable and secure surface is one prerequisite for high stability.
- Watch out for soft, uneven, or sloping ground, as well as ground where there is risk of landslides. Be very careful with loading the machine sideways and in connection with other similar high-risk work. If the machine stands on sloping ground, the centre of gravity is displaced and the machine may end up in a position where it rolls over.
- Make sure that the ground surface is stable and secure. Unstable ground, e.g. loose sand or wet earth can make work unsafe.

- Do not turn suddenly with a suspended load. Remember the centrifugal force.
- Operate the machine slowly and carefully.
- Make sure that visibility is not reduced by big loads. If needed, get help from a signal man.

### Slinging long loads

- Boards, planks, reinforcing irons or similar should have the sling(s) arranged so that the load cannot fall out.
- In general, girders should be lifted with a clamping device.
- Padding made from, for example, split compressed air hoses may be used in order to protect the slings.
- The slings should be well tightened.



### Running checks of lifting attachments

Continuous supervision should be carried out at regular intervals by a knowledgeable and experienced person and arranged by the employer. Should wear, cracks or other deficiencies, which may jeopardise the safety of the machine or the lifting equipment, be noticed during the running checks, the machine or the lifting equipment must not be used.

## Signalling diagram

If the operator's visibility is restricted, e.g., due to a big load, use a signal man.

The faster lifting, lowering, or movement that is required, the livelier the signal man's movements should be. If two or several operators use the same signal man, determine ahead of time how the lift is to be done and how signals shall be given to each operator.



**START**  
Arms extended horizontally with palms facing forward



**STOP**  
Right arm pointing up with palm facing forward



**END**  
Hands held together at chest height



**RAISE**  
Right arm pointing up with palm facing forward and hand moving slowly in a circle



**LOWER**  
Right arm pointing down with palm facing forward and hand moving slowly in a circle

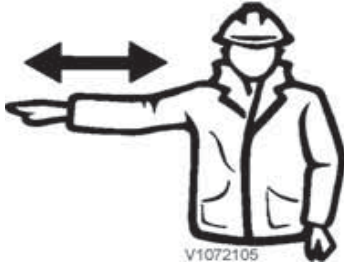


**VERTICAL DISTANCE**  
Hands indicate relevant distance



**MOVE FORWARD**

Both arms bent with palms facing up and underarms moving slowly and repeatedly up towards the body



V1072105

**MOVE BACK**

Both arms bent with palms facing down and underarms moving slowly and repeatedly down away from the body



V1072106

**DANGER (EMERGENCY STOP)**

Both arms up with palms facing forward



V1072109

**OPERATE IN INDICATED DIRECTION**

Arm extended horizontally with palm facing down and small movements back and forth slowly to the right

**OPERATE IN INDICATED DIRECTION**

Arm extended horizontally with palm facing down and small movements back and forth slowly to the left

**HORIZONTAL DISTANCE**

Hands indicate relevant distance





## Safety when servicing

This section deals with the safety rules that must be followed when checking and servicing the machine. Volvo will not accept any responsibility if other tools, lifting devices, or work methods described in this publication are used.

Other safety rules, information and warning texts are given in each section.

### NOTE!

Lifting and supporting of the machine may only be performed by trained personnel.

### WARNING

Risk of burns!

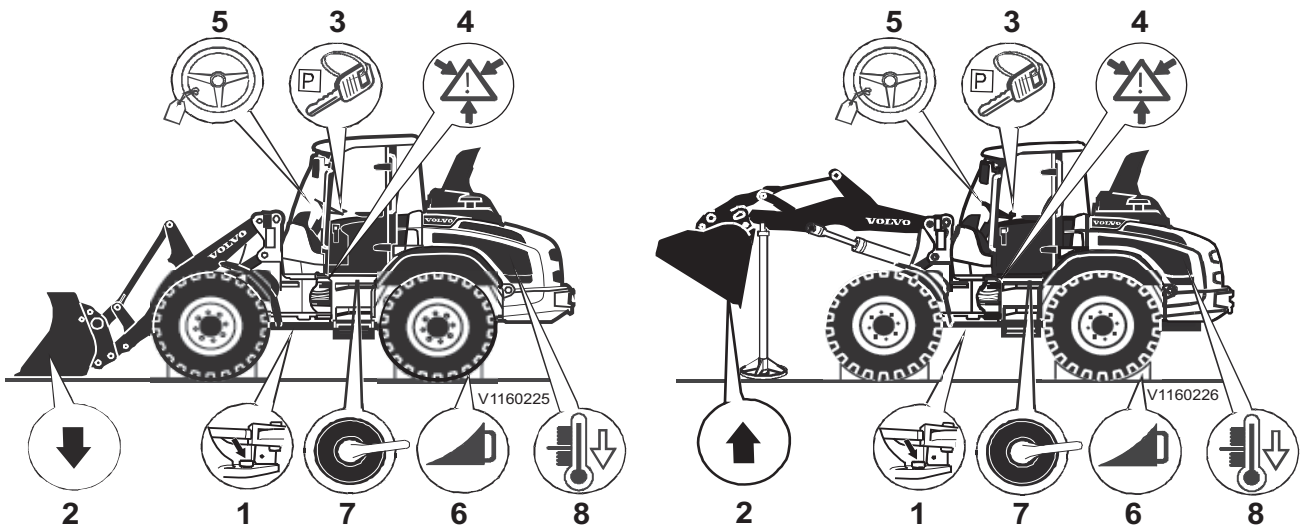
Hot machine parts could cause burns.

**Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.**

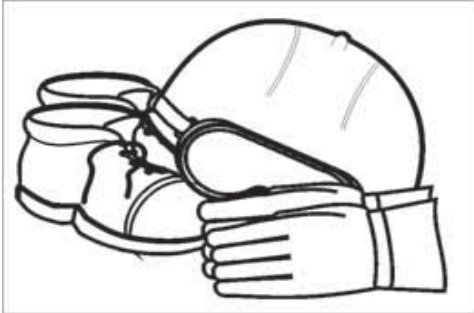
## Service position

**BEFORE** you begin service work the machine must be placed on level ground and prepared as shown below.

**AFTER** you have completed the service, any guard plates must be re-installed and all engine covers are to be closed and locked.



1	Lock the articulation joint.	5	Attach a black and yellow label to the steering wheel.
2	The attachment should be resting on the ground, or the loader arms should be safely supported.	6	Block the wheels in a safe way, e.g. with wheel blocks.
3	Apply the parking brake. Turn off the engine and leave the ignition key in position 1.	7	Switch off the battery disconnect switch.
4	Carefully release the pressure in pressure lines and accumulators to avoid risks.	8	Allow the machine to cool.



V1070879

## Before service, read

### Prevent personal injuries

- Read the Operator's Manual before the service work is started. It is also important to read and follow information and instructions on plates and decals.
- Do not wear loose-fitting clothing or jewellery, which can get caught and cause injury.
- Always use a hard hat, safety glasses, gloves, and protective footwear when required by the job.
- Make sure that the ventilation is sufficient when starting the engine indoors.
- Do not stand in front of or behind the machine when the engine is running.
- Turn off the engine before removing any protective covers or opening the engine hood.
- When the engine is stopped, there is a remaining accumulated pressure in the pressurised systems. If a system is opened without having first released the pressure, liquid under high pressure will jet out.
- Use a piece of paper or cardboard to check for leaks, never use your hand.
- Make sure that steps, handles, and slip-protected surfaces are free from oil, diesel fuel, dirt, and ice.
- Only step on parts of the machine provided with slip-protection.
- It is important to use correct tools and equipment. Broken tools or equipment should be repaired or changed.
- If service work has to be done under a raised attachment, first secure the attachment. Engage the control lever lock-out (safety bar), if installed, and apply the parking brake.

### Prevent machine damage

- When lifting or supporting the machine or parts of the machine, use equipment with a sufficient lifting capacity.
- Lifting devices, tools, working methods, lubricants and parts prescribed in the Operator's Manual should be used. Volvo CE will not accept any responsibility otherwise.
- Make sure that no tools or other objects, which may cause damage, have been forgotten in or on the machine.
- Release the pressure in the hydraulic system before starting the service work.





- Never set a relief valve to a higher pressure than that recommended by the manufacturer.
- Machines, which are used within a polluted or in another way insanitary area should be equipped for this kind of work. Special safety regulations apply when servicing such a machine.
- When installing two-way radio, mobile telephone, or similar equipment, the installation should be performed according to the manufacturer's instructions in order to eliminate interference with the electronic system and components intended for the machine's function, see page 23.
- Actions to be taken in connection with electric welding, see page 209.
- Make sure that all protective plates, covers, and hoods on the machine are in place before the engine is started and the machine is used.
- Use the 'three-point stance' (two feet and one hand) when cleaning or scraping the front windshield.

### Prevent environmental impact

Keep the environment in mind during service and maintenance. Environmentally hazardous oils and fluids, released into the environment, cause damage to the environment. Oil is broken down very slowly in water and sediment. One litre of oil is enough to contaminate millions of litres of drinking water.

#### NOTE!

Common for the following points is that all waste must be brought to a waste management company approved by the authorities.

- When draining, oils and liquids must be collected in suitable containers and steps taken to avoid spills.
- Used filters should be drained of all fluid before being deposited as waste. Used filters from machines operating in conditions with asbestos or other health-hazardous dust should be placed in the tight-sealing bag that accompanies the new filter.
- Batteries contain substances hazardous to personal health and the environment. Used batteries must be handled as environmentally hazardous waste.
- Consumables, e.g., used rags, gloves, bottles, and cans may also be contaminated by



208      Safety when servicing  
            Before service, read

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environmentally hazardous oils and fluids. These must also be handled as environmentally hazardous waste.

## Preparations before service

### Welding

#### **WARNING**

Risk of toxin inhalation.

Burning of painted, plastic or rubber parts produces gases that could damage respiratory tracts.

**Never burn painted or rubber parts or any plastics.**

#### **NOTICE**

**A fire extinguisher should be easily accessible during all welding work.**

#### **NOTICE**

**Before starting any electric welding, disconnect the battery connections. All connections to the control units (ECU) should be disconnected. Connect the welding unit's ground cable as close as possible to the welding point.**

- 1 Turn off the electric power with the battery disconnecter.
- 2 Disconnect the batteries, start with the minus terminal and then the plus terminal.
- 3 Unplug the electronic units. For more information, contact a workshop authorized by Volvo.
- 4 Connect the welding equipment's ground connection as close to the welding point as possible and make sure that the current does not pass across a bearing.
- 5 Provide for good ventilation.
- 6 Remove all paint from an area at least 10 cm (4 in) around the welding point.
- 7 After welding is finished, disconnect the ground cable.
- 8 Plug in the electronic units.
- 9 Connect the batteries.
- 10 Turn on the electric power with the battery disconnecter.

## Fire prevention

### **WARNING**

Risk of fire.

Operating in environments with flammable or other explosive particulates in the air could increase the risk of fire.

**Use special equipment and proper ventilation when operating in hazardous environments.**

There is always a risk of fire. Find out which type fire extinguisher that is used at your place of work and how it is used. A fire extinguisher is optional equipment and is available from your dealer. If the machine is equipped with a fire extinguisher, it should be located on the back part of the front fender.

If the machine is equipped with a portable fire extinguisher it should be of the type ABE (ABC in North America). The designation ABE means that it can be used to put out fires in both solid organic materials and fluids, and that the fire extinguishing agent does not conduct electricity. Efficiency class I means that the fire extinguisher must operate effectively for at least 8 seconds, efficiency class II at least 11 seconds, efficiency class III at least 15 seconds.

In general, a portable fire extinguisher ABE I corresponds to an effective content of 4 kg (8.8 lbs) (EN-class 13A89BC), standard EN 3-1995 part 1, 2, 4, and 5.

### **Fire prevention**

- Smoking or open flames are forbidden near a machine when filling with fuel or when the fuel system has been opened and has contact with the surrounding air.
- Diesel fuel is flammable and must not be used for cleaning. Instead use car care products intended for cleaning or degreasing. Also keep in mind that certain solvents may cause skin rash, damage the paint finish, and constitute a fire hazard.
- Keep the place clean where service work is to be done. Oil and water can make floors and steps slippery. This may also be dangerous in connection with using electrical equipment or



## Safety when servicing Fire prevention 211

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electrically powered tools. Oily or greasy clothes are a serious fire hazard.

- Check daily that the machine and equipment are free from dust and oil. This reduces the risk of fire and also makes it easier to detect loose or damaged parts.

### NOTE!

Be very careful when using a high-pressure washer for cleaning since electrical components and cable insulation may be damaged at relatively low pressure and temperature. Protect electrical components and cables in an appropriate way.

- Be extra thorough when cleaning a machine that is operated in fire-hazardous environments, e.g., sawmill and landfill sites. The risk of spontaneous combustion can be further reduced by, for example, installing insulation on the muffler.
- The fire extinguisher must be maintained so that it works when it is needed.
- Check that fuel lines, hydraulic hoses, brake hoses, and electrical cables have not been damaged by chafing or are not at risk of being damaged in that way due to incorrect installation or clamping. This applies particularly to unfused cables, which are red and marked R (B+) and routed:
  - between the batteries
  - between battery and starter motor
  - between alternator and starter motor

Electrical cables must not rest directly against oil or fuel lines.

- Do not weld or grind on components which are filled with flammable liquids, e.g. tanks and hydraulic pipes. Work carefully when doing these jobs close to such places. A fire extinguisher should be kept nearby.

### Actions in case of fire

**If conditions allow and it is possible without risking your own safety, take the following actions at the slightest sign of fire:**

- 1 Stop the machine if it is moving.
- 2 Lower the attachments to the ground.
- 3 Move the lever lockout to locked position.
- 4 Turn the start key to the stop position.
- 5 Leave the cab.
- 6 Call the fire department.



## 212 Safety when servicing Fire prevention

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- 7 Turn off the battery disconnecter, if it can be reached safely.
- 8 If possible try to put out the fire. Otherwise move away from the machine and the danger area.

### **Actions after a fire**

**When handling a machine that has been damaged by fire or has been exposed to intense heat, the following protective actions must be taken:**

- Use thick rubber gloves and wear protective goggles.
- Never touch burnt components with your bare hands to avoid contact with melted polymers. First wash thoroughly with plenty of lime water (a solution of calcium hydroxide, i.e., slaked lime in water).
- Handling heated fluor rubber, see page 213.

## Handling hazardous materials

### Heated paint

#### **WARNING**

Risk of toxin inhalation.

Burning of painted, plastic or rubber parts produces gases that could damage respiratory tracts.

**Never burn painted or rubber parts or any plastics.**

When heated, paint gives off poisonous gases. Therefore, the paint must be removed from an area of at least 10 cm from the spot where welding, grinding, or cutting with a torch is to be carried out. In addition to the health hazard, the weld will be of inferior quality and strength, which in the future may cause the weld to break.

#### **Methods and precautionary measures when removing paint**

- Blasting
  - use respirator and protective goggles
- Paint remover or other chemicals
  - use a portable air extractor, respirator and protective gloves
- Grinding machine
  - use a portable air extractor, respirator and protective gloves and protective goggles

Painted parts that have been discarded must never be burnt. They must be taken care of by an approved refuse handling plant.

#### **Rubber and plastics which have been heated**

Polymer materials can, when heated, form compounds which are dangerous to health and environment and must therefore never be burned when scrapped.

**If gas cutting or welding is to be carried out near such materials, the following safety instructions must be followed:**

- Protect the material from heat.
- Use protective gloves, protective goggles and an approved respirator.

## 214 Safety when servicing Handling hazardous materials

### Fluoro-carbon rubber which has been heated

#### **WARNING**

Risk of toxin inhalation.

Fluoro rubber seals when heated beyond their rated limits will release a very toxic gas that is corrosive to respiratory tracts.

**Move away from and do not inhale any smoke coming from the machine. Inhalation of toxic gas requires immediate medical attention.**

**When handling a machine which has been damaged by fire or been exposed to other intense heat, the following protective steps must under all circumstances be taken:**

- Use thick, gloves made of rubber and wear protective goggles.
- Discard gloves, rags etc. that been in contact with heated fluoro-carbon rubber after having first washed them in lime water (a solution by calcium hydroxide, i.e. slaked lime in water)
- The area around a part that has been very hot and which may be made of fluoro-carbon rubber must be decontaminated through thorough and ample washing with lime water.
- As a precautionary measure all seals (O-rings and other oil seals) must be handled as if they were made from fluoro-carbon rubber.
- The hydrofluoric acid may remain on the machine parts for several years after a fire.
- If swelling, redness or a burning sensation occurs and one suspects that the cause may be contact with heated fluoro-carbon rubber contact a medical doctor immediately. Symptoms may not appear until after several hours without any previous warning.
- The acid cannot be rinsed or washed away from the skin. In stead treat with Hydrofluoric Acid Burn Jelly or similar before contacting a doctor.

### Refrigerant

#### **NOTE!**

All types of service on the air conditioning unit must be done at accredited workshops by, or under the supervision of, a person in a supervisory position with certified competence.



## Safety when servicing Handling hazardous materials 215

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### **WARNING**

Risk of frostbite.

The refrigerant media is moderately hazardous to the health. In liquid form the refrigerant could cause frostbite. When in the form of a gas at high concentration it has an anaesthetic effect and at lower concentration it primarily affects the nervous system.

**Use personal protective equipment.**

The air-conditioning unit of the machine is filled with refrigerant R134a at the factory. R134a has no damaging effect on the ozone layer of the atmosphere, however, it contributes to the greenhouse effect and must therefore never purposely be released into the open air.

### **NOTICE**

**R134a must never be mixed with another kind of refrigerant, e.g. R12, as this leads to a breakdown of the unit.**

**In case of contact with escaping refrigerant, the following actions must be taken:**

- The gases, which are formed when refrigerant is heated may have seriously harmful effects on lungs and the nervous system even at low concentrations and when no smell is detectable. High concentrations have a narcotic effect. An exposed person must be moved out of the danger area out into the open air. Seek medical advice if there are remaining symptoms.
- In liquid form, the refrigerant may cause frost-bite. Carefully heat the injured area with lukewarm water or warm clothes. Seek medical advice, if there are remaining symptoms.
- Seek medical advice, if liquid refrigerant has come into contact with someone's eyes.
- If a leak is suspected, leave the dangerous area and contact an accredited workshop to obtain information about what action should be taken.

## 216 Safety when servicing Handling hazardous materials

### Batteries

#### WARNING

Risk of chemical burns.

Contact with battery acid causes serious chemical burns.

**Always wear personal protective gloves, goggles and clothing when handling batteries.**

- Do not smoke near batteries, as these give off explosive gases.
- Make sure that metal objects, e.g. tools, rings and watch straps, do not come into contact with the battery pole studs.
- Make sure that the battery terminals' caps always are installed.
- Do not tilt a battery in any direction. Battery electrolyte may leak out.
- Do not connect a discharged battery in series with a fully charged battery. Risk of explosion.
- When removing a battery, disconnect the ground cable first and when installing, connect the ground cable last to reduce the risk of sparks.
- Discarded batteries must be taken care of according to current national regulations.

Charging batteries, see page 256.

Starting with booster batteries, see page 118.

### Dust of crystalline silicon dioxide (silica dust)

#### WARNING

Risk of hazardous inhalation.

Working in environments containing dangerous dust can lead to serious health problems.

**Wear personal protective equipment when working in dusty environments.**

Crystalline silicon dioxide is a basic component part of sand and granite. Many activities on building sites and in mines, such as ditching, sawing and drilling, generate dust that contains crystalline silicon dioxide. This dust may cause silicosis (miner's consumption).

The employer or the work site management should inform the operator about the presence of any crystalline silicon dioxide on the work site and



## Safety when servicing Handling hazardous materials 217

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provide special work instructions and actions, as well as necessary protective equipment.

Also check local and national regulations on crystalline silicon dioxide and silicosis.

## Handling line, tubes and hoses

### **WARNING**

Risk of high pressure injection.

Oil or fuel leaks from high pressure hoses could cause serious injury caused by high pressure injection.

**If oil or fuel leaks from high pressure hoses or loose screws is found, stop operations immediately and contact an authorized Volvo dealer workshop.**

- Do not bend high pressure lines.
- Do not strike high pressure lines.
- Do not install any lines that are bent or damaged.
- Check lines, tubes and hoses carefully.
- Do not reuse hose, tube and fittings.
- Do not use your bare hand to check for leaks.
- Tighten all connections. Consult your Volvo CE dealer for the recommended tightening torque.

If any of the following conditions are found, replace the parts. Consult your Volvo CE dealer.

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Strengthening wires are exposed.
- Outer coverings are ballooning.
- Flexible part of the hoses are kinked.
- End fittings are displaced.
- Foreign material is embedded in the coverings.

### **NOTICE**

**Make sure that all clamps, guards and heat shields are correctly installed. This contributes to preventing vibrations, chafing against other parts and excessively strong generation of heat.**



## Maintenance

This section describes maintenance and service jobs that the operator can do. Other maintenance and service jobs require trained workshop personnel, special equipment, or spare parts, and should be done by a Volvo-authorized dealer.

The page 224 presents all the jobs and actions that are included in the machine's service program. This page also makes it clear which jobs in the service program can be done by the operator, and which ones should be done at a Volvo-authorized dealer.

### Exhaust control system

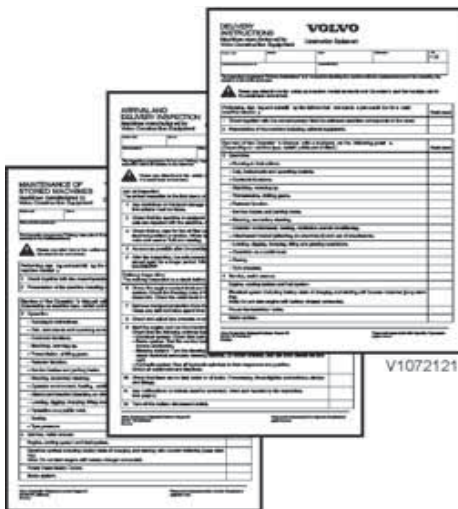
The exhaust control systems for your new Volvo Construction Equipment engine have been designed, manufactured, and tested using genuine parts, and they have been certified according to American federal and California regulations on exhaust control. According to these all spare parts that are to be used for maintenance, repairs, or replacement of exhaust control systems shall be parts from Volvo Construction Equipment. The owner may let any workshop or mechanic perform maintenance, replacement, or repair of exhaust control components and systems that have been certified by the US Environmental Protection Agency. The owner may choose to use other parts than genuine Volvo Construction Equipment parts for such maintenance, replacement, or repair without the warranty becoming invalid, but the warranty does not cover the cost of such services or parts.

### Service history

The service journal shall be filled in after every completed service at an authorized workshop, see page 307. The service journal is a valuable document which can be referred to when, e.g. selling the machine.

### Arrival and delivery inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer must also, if the warranty is to apply, carry out arrival and delivery inspections according to the applicable form, which must be signed.



## Delivery Instructions

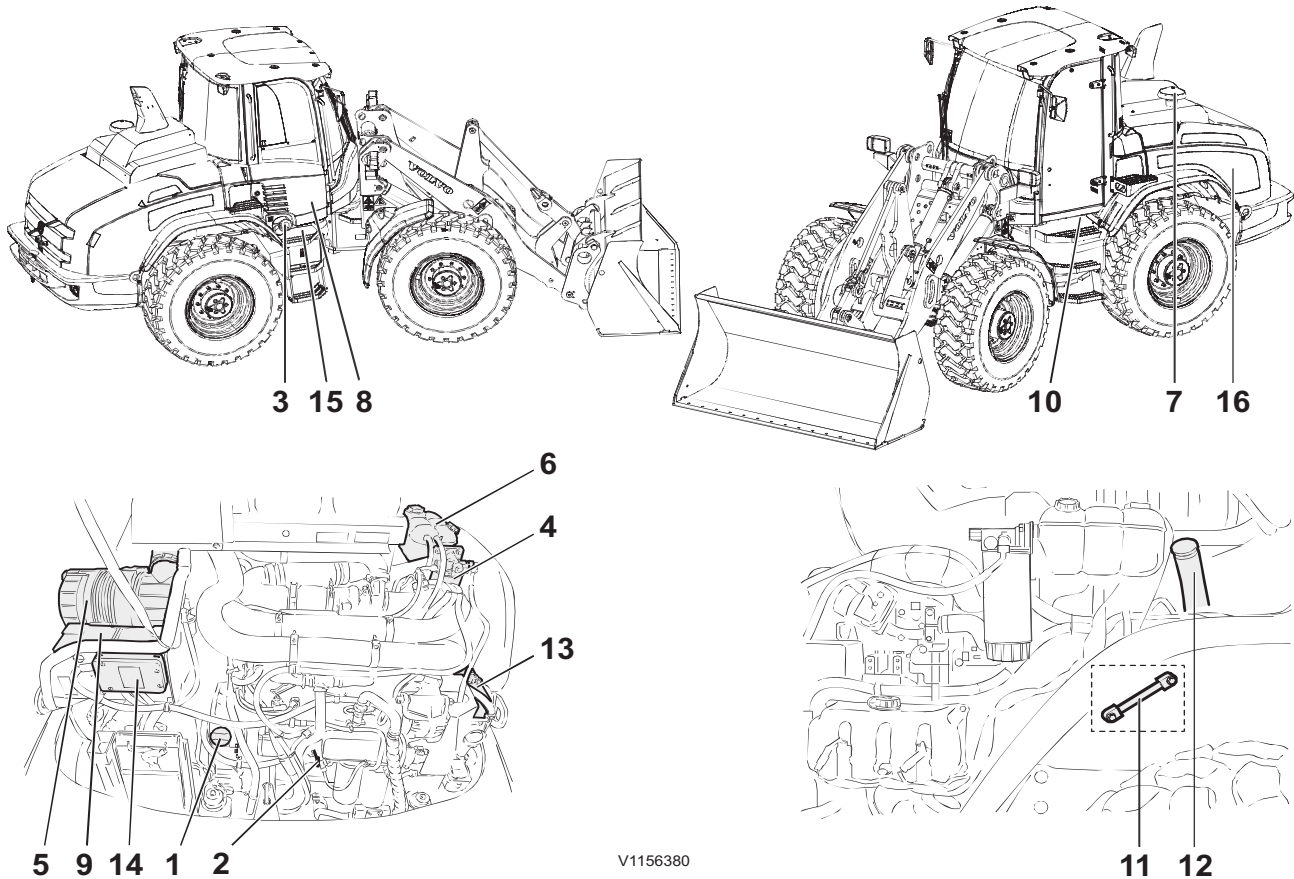
When handing the machine over, the dealer must give the buyer delivery instructions according to the applicable form, which must be signed, if the warranty is to apply.

## Service Programme

For any factory warranty to be valid, the machine shall be maintained according to the service program established by Volvo. The service program is continuous with fixed intervals. The operating time between intervals only applies if the machine is used in normal environment and operating conditions. Ask your Volvo dealer what is right for your specific machine.

An additional inspection at 1,000 hours is to be done by an authorized Volvo dealer, in addition to the continuous service program.

## Service points



1	Engine oil filling point	9	Batteries (under the engine hood)
2	Engine oil dipstick	10	Battery disconnect switch
3	Fuel filling point	11	Hydraulic oil level glass
4	Primary fuel filter	12	Hydraulic oil filling point
5	Engine air cleaner	13	Windscreen washer reservoir
6	Coolant filling point (expansion tank cap)	14	Fuses
7	Air filter intake resp. raw air intake (rain cap)	15	AdBlue®/DEF-filling point
8	Cab ventilation filters (behind the cover)	16	Hood grill (on each side of the hood)

## Lubrication and service chart

### Lubrication

The service life of bushings and pivot pins can be considerably extended by regularly greasing the machine in the correct way.

**The greasing of bearings has two main purposes:**

- Add grease to the bearing to reduce friction between the pin and bushing.
- Replace old grease that may contain dirt particles. The grease in the space inside the outer seal collects dirt and prevents dirt and water from penetrating into the bearing.



### NOTICE

**Wipe off grease nipples and grease gun before greasing, so that dirt and sand are not introduced through the grease nipples into the bearings.**

Grease the bearing until new clean grease is forced out through the outer seal. For recommended grease, see page 273.

Between 10–15 strokes with a normal handheld grease gun is required to grease a bearing in the boom.

### Symbol key

The following standard symbols are used in the lubrication and maintenance chart.



V1072393

Engine



V1072394

Transmission



V1072395

Hydraulic system



V1072396

Brake system



V1072397

Axles



V1072398

Fuel system



V1072402

Lubrication



V1072403

Grease nipple



V1072404

Oil/liquid



V1072405

Filters



V1072406

Air filter



V1072401

Level check





Maintenance  
**Lubrication and service chart** 223

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V1072500

**Battery**



V1072460

**Coolant**



V1072401

**Air conditioning**



V1072402

**Belt tension**



V1072409

**Control lights**



V1072410

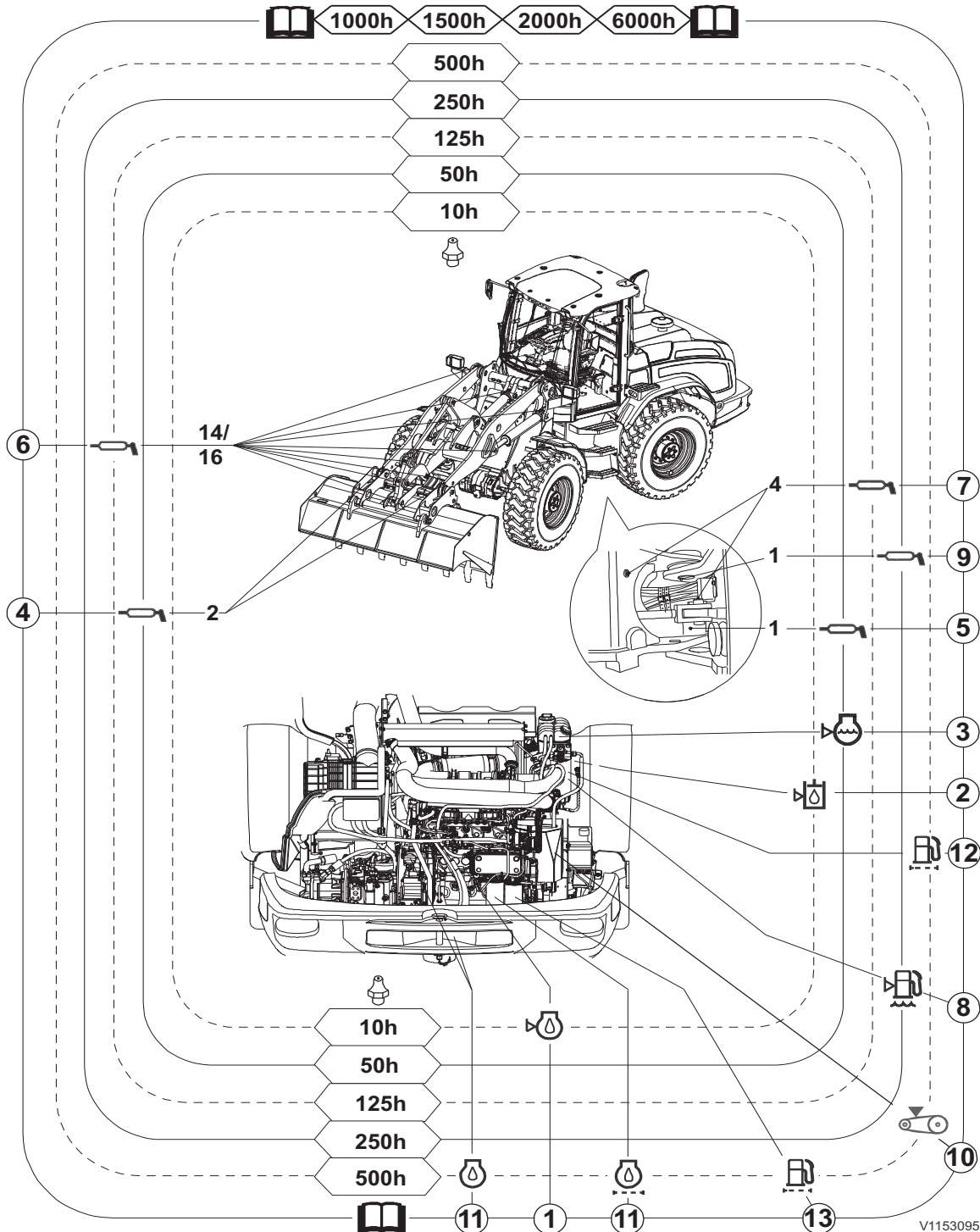
**Draining**

224 Maintenance  
Lubrication and service chart

Lubrication and service chart

Intervals:

Daily (every 10 hours), 50, 125, 250, 500, 1000, 1500, 2000, and 6000 hours (symbol explanation, see page 222).





Maintenance  
**Lubrication and service chart**     **225**

Pos.	Page	Action
		<b>DAILY (every 10 hours)</b>
	229	Test-run and check <i>Check headlights, work lights, back-up alarm, and function of the control lights.</i>
	233	Check oil-bath air cleaner's oil level
1	231	Check the engine oil level
2	230	Check the hydraulic oil level
	232	Check the fuel system's water trap
		<b>A = EVERY 50 HOURS</b> <b>After performing Daily service</b>
3	237	Check the coolant level
	235 237	Check tires (air pressure and damage) <sup>(a)</sup>
4	222	Grease the lower bucket pins <sup>(b)</sup>
5	235	Grease the frame joint, lower bearing <sup>(b)</sup>
		<b>B = EVERY 125 HOURS</b> <b>After performing Daily service and A-service</b>
6	239	Grease the boom <sup>(b)(c)</sup>
7	239	Grease the steering cylinder bearings <sup>(c)</sup>
		<b>C = EVERY 250 HOURS</b> <b>After performing Daily service, A-service, and B-service</b>
8	240	Drain the fuel system's water separator
9	240	Grease the frame joint's upper bearing <sup>(c)</sup>
		<b>D = EVERY 500 HOURS</b> <b>After performing Daily service, A-, B-, and C-service</b>
10		Check the belt tension for the alternator.
11	Contact a workshop authorized by Volvo	Change engine oil and engine oil filter <sup>(d)</sup> .
	243	Check the engine's radiator, the hydraulic oil cooler, the intercooler, and the air conditioning condenser <sup>(e)</sup>
	222	Grease the propeller shaft <sup>(c)</sup>
	245	Check the coolant level (every 500 hours or when message is shown in the display)
	246	Clean the reversible fan
		Check for leaks



**226**      **Maintenance**  
**Lubrication and service chart**

	Contact a workshop authorized by Volvo	Change the secondary fuel filter <sup>(f)</sup>
	Contact a workshop authorized by Volvo	Replace the primary fuel filter

- a) Check daily if there is a risk of damage to the tires, e.g., when handling sharp rocks.
- b) Grease daily in tough operating conditions.
- c) Grease every 50 hours in aggressive/corrosive conditions.
- d) At least once a year. For conditions that have to be met if the interval is to apply, see page 275
- e) Clean at regular intervals. When operating in very dusty conditions, check the radiator/coolers daily.
- f) At least once a year.



## Lubrication and service chart

**Intervals:**

Every 1000, 1500, 2000, and 6000 hours (symbol explanation, see page 222).

**Measures that can be carried out by the operator:**

<b>Page</b>	<b>EVERY 1000 HOURS</b>
<i>247</i>	Perform a brake test for the parking brake
<b>Page</b>	<b>EVERY 2000 HOURS</b>
<i>248</i>	Clean the steel mesh filter inserts
<b>Page</b>	<b>EVERY 4000 HOURS</b>
<i>86</i>	Check the seat belt



**228 Maintenance  
Lubrication and service chart**

Measures that should be carried out by a workshop at below stated intervals:

<b>EVERY 1000 HOURS</b>
Change the oil in the front axle (a)
Change the oil in the rear axle with transfer box (a)
Check the brake discs
Replace the primary air filter (main cartridge) <sup>(b)</sup>
Replace the cab ventilation pre filter
Drain the hydraulic system, condensation water and sludge
<b>EVERY 1500 HOURS</b>
Replace the hydraulic oil filter (a)
Replace the hydraulic system breather filter (a)
Change the hydraulic oil (a)(c)
<b>EVERY 2000 HOURS</b>
Replace the secondary air filter (safety cartridge) (d)
Replace the cab ventilation main filter (e)
Replace the fuel system breather filter
<b>EVERY 6000 HOURS</b>
Replace the AdBlue®/DEF filter
Clean the Diesel Particle Filter (DPF) every 6000 hours, or according to signal.
Change the coolant (f)

a) At least once a year.

b) Replace every 1000 hours or after cleaning max. 5 times.

c) When using external hydraulic equipment, e.g., road sweeper, drill, snow blower, or similar, the oil should be changed every 1000 hours.

d) Replace every 2000 hours or when the primary air filter has been replaced max. three times.

e) The interval between filter replacements can be increased or reduced depending on how dusty the operating conditions are.

f) Change coolant every 6000 hours or at least every fourth year.



## Maintenance service, every 10 hours

### Test-run and check

Performed daily.

#### Warning decals

- 1 Check that all warning decals are in place, are legible, and are not damaged, see page 26.

#### External check

- 1 Check that the machine does not have any external damage or defective/loose parts. Especially tires, hoses, and pipes.
- 2 Check that there are no visible leaks.
- 3 Clean/scrape windows and rear-view mirrors.
- 4 Check that the work lights and headlights are clean and intact.
- 5 Check that the back-up camera (optional equipment) is clean and intact.
- 6 Check that the frame joint lock has been disconnected.
- 7 Check that engine hood, underbody skid plates, and protective plates are closed.
- 8 Check all reflectors.
- 9 Check that the wheels are not blocked.
- 10 Check that the battery disconnecter is on.

#### Lights, instruments, and controls

- 1 Adjust the steering wheel and the operator's seat. For adjusting the operator's seat, see page 83.
- 2 Turn the ignition to position 1 (operating position) and check that all control lights turn on and that the gauges indicate readings.
- 3 Check that there is sufficient fuel and AdBlue®/DEF in the tanks.
- 4 Check function of the work lights and headlights.
- 5 Check that the lap-type seatbelt can be buckled up and is not damaged. Fasten the lap-type seatbelt.



## 230 Maintenance Maintenance service, every 10 hours

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- 6 Check that there are no persons near the machine, see page *107*.
- 7 Turn the ignition to position 2 (start position).
- 8 Check that all control and warning lights are off. When the parking brake is applied, the warning light for parking brake will be on.
- 9 Check that the horn works.

### **Brake system (service brake)**

- 1 Let the engine idle until the pressure has built up.
- 2 Check that the accumulated brake pressure in both circuits is normal.
- 3 Release the parking brake and press down the brake pedal all the way. Check that the machine does not activate an alarm.
- 4 Move off carefully and test-brake. The brakes should be applied smoothly and not generate any noise.

### **Brake system (parking brake)**

- 1 Check the function of the parking brake.

### **Steering system**

- 1 Turn to steering lock both to the right and left.
- 2 Check that the steering is free from clearance and noise.

### **Back-up alarm/Back-up camera (optional equipment)**

- 1 Move the gear selector to reverse position.
- 2 Check that the back-up (reverse) alarm works.
- 3 Turn off the engine.

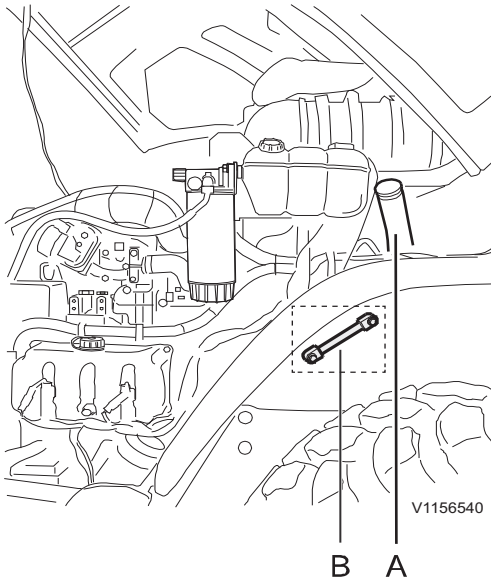
### **Actions after operating**

Fill the fuel tank, as this will counteract the formation of condensation water.

### **NOTE!**

Contact a Volvo-authorized workshop if there is a problem with any of the items above.





A Hydraulic oil filling point  
B Hydraulic oil level glass

## Hydraulic oil level, checking

Check the hydraulic oil level every 10 hours.

Travel/working and steering hydraulics work with one common oil household.

- 1 Place the machine on firm and level ground.
- 2 Lower the lifting arms to the ground.
- 3 Turn off the engine and apply the parking brake.
- 4 Open the engine hood.
- 5 Check the oil level in hydraulic oil level glass (B) which is located behind the fender. The level should be between the two marks in the glass.
- 6 If necessary, top up through hydraulic oil filling point (A).

### NOTE!

The hydraulic oil level glass is positioned behind the rear fender on the right-hand side of the machine.

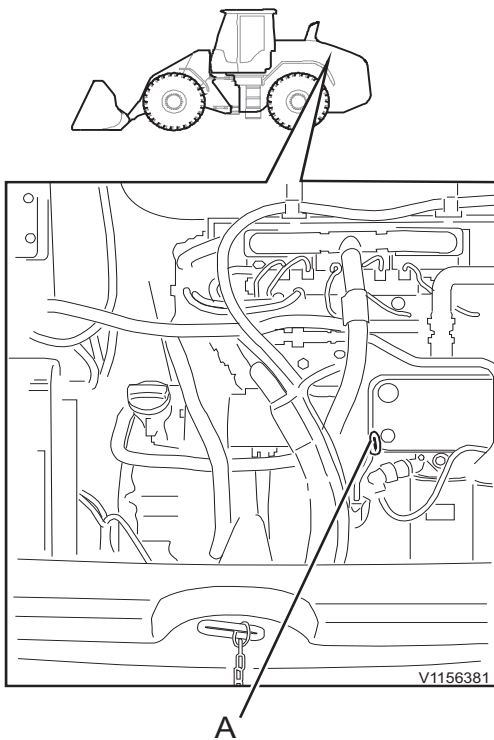
### NOTE!

If biologically degradable hydraulic oil is being used, the same type of oil must be used when topping up and when changing hydraulic oil. Different types of biologically degradable hydraulic oils may not be mixed. Mineral oil may not be used together with biologically degradable hydraulic oil. When changing from mineral oil to biologically degradable hydraulic oil, contact a workshop authorized by Volvo.

### NOTE!

For recommended lubricants, see page 273.

232 Maintenance  
Maintenance service, every 10 hours



1 Engine oil dipstick

### Engine oil level, checking

Check engine oil level every 10 hours.

The oil level should be checked before starting the engine.

- 1 Park the machine on level ground. Apply the parking brake.
- 2 Stop the engine.

#### **WARNING**

Risk of serious injury.

Rotating parts could cause serious cutting or crushing injury.

**Never open the engine hood when the engine is running.**

- 3 Open the engine hood.

#### **NOTE!**

The level check should be carried out when the oil has had time to run down to the bottom of the sump.

- 4 Pull the dipstick (A) out and wipe it clean with a lint-free cloth, re-insert it until it bottoms and pull it back out.

**The dipstick should be covered with oil up to the top marking (MAX).**

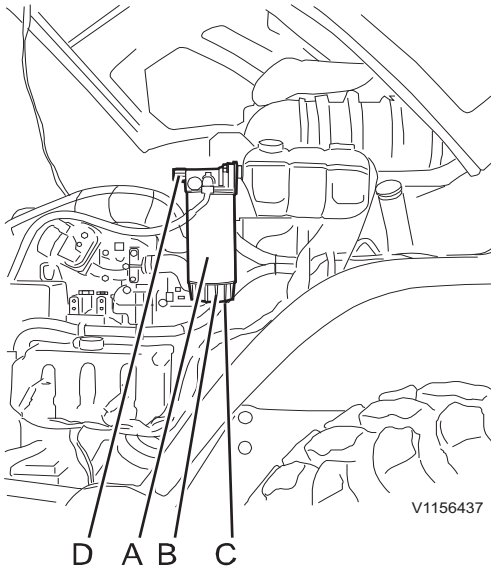
If the oil level is near or below the bottom marking (MIN), top up the oil immediately to avoid severe engine damage.

For quality of oil, see page 273.

#### **NOTE!**

Always make sure that the oil level is close to the MAX-marking when the machine is operated on grades or slopes.

Maintenance  
Maintenance service, every 10 hours **233**



Primary fuel filter

- A Filter element
- B Water trap
- C Drain nipple
- D Hand pump

### Water separator, checking

- Check the water separator every 10 hours. Drain if necessary.
- Take care of fuel spillage by using a plastic hose and a vessel.

Draining water from the fuel has to be done by hand. A non-return valve in the filter head prevents the fuel from running back to the tank.

Proceed as follows:

- 1 Connect a plastic hose to draining nipple (C) and place the end of the hose in a suitable draining container.
- 2 Loosen the draining nipple until fuel runs out through the hose.
- 3 Tighten the draining nipple after draining is completed.
- 4 Remove the hose.
- 5 Push hand pump (D) several times until water separator (B) is filled up and a resistance becomes noticeable.

**NOTE!**

The hand pump must not be used when the engine is running.

**Take care of filters/oils/liquids in an environmentally safe way, see page 206.**

### Oil bath air cleaner, checking

(optional equipment)

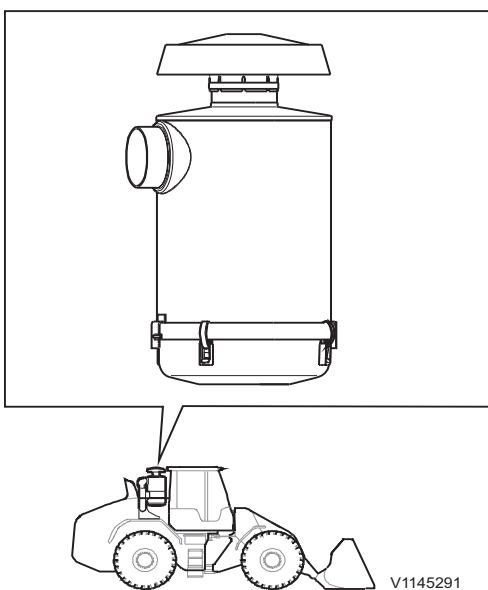
**NOTE!**

The oil-bath air cleaner may only be used together with the standard filter.

The oil-bath air cleaner is installed in series with the standard filter. The cleaning capacity of the oil-bath air cleaner is between 90-95%, which practically means that the standard filter will work as a secondary filter.

**Check the oil in the bowl every 10 hours (more often when needed).**

- 1 Place the machine in service position, see page 205.
- 2 Wait 5 minutes so that the oil runs down into the oil reservoir.
- 3 Loosen the oil reservoir with the lower filter insert and remove it.





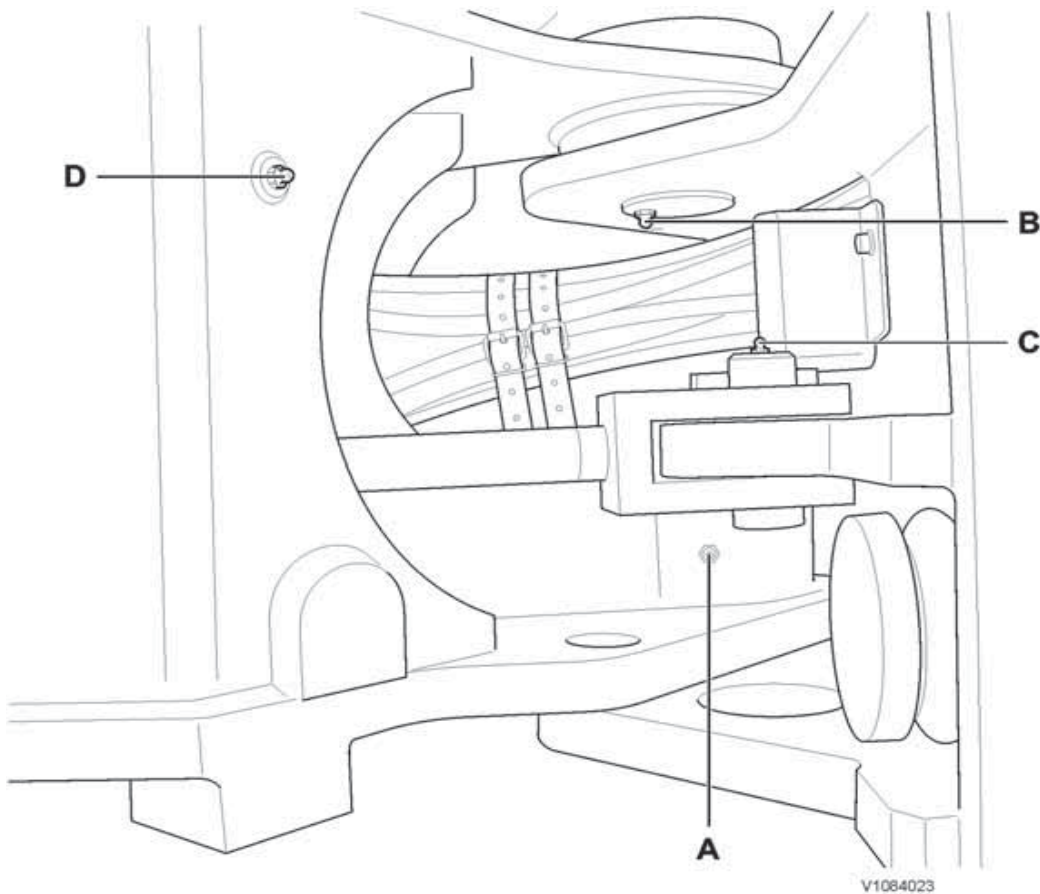
234 Maintenance  
Maintenance service, every 10 hours

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- 4 Check the oil's quality. The oil should be changed if it contains sludge and is thick. Contact a workshop authorized by Volvo.
- 5 Check the underside of the filter insert. The oil should be changed if there are sludge deposits. Contact a workshop authorized by Volvo.
- 6 Reinstall the oil reservoir.

## Maintenance service, every 50 hours

### Articulation joints, lubricating



- A Grease nipple, frame joint, lower bearing
- B Grease nipple, frame joint, upper bearing
- C Grease nipple, steering cylinders, rear bearings (one on each side)
- D Grease nipple, steering cylinders, front bearings (one on each side)

Grease the lower bearing every 50 hours.

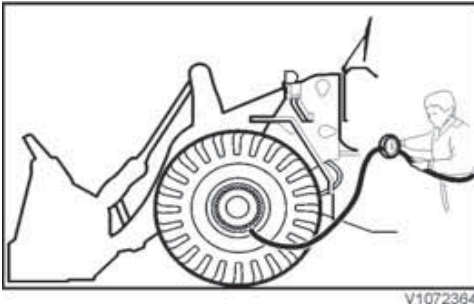
**NOTE!**

Grease daily in tough operating conditions.

For more information, see page 222.

236 Maintenance  
Maintenance service, every 50 hours

## Tyres, checking air pressure



### **! WARNING**

Risk of explosion.

Inflating a tyre could cause it to explode. An exploding tyre could lead to lethal injuries.

**Use a self-attaching air chuck with a hose long enough to enable the tyre to be inflated without standing in front of the rim and as far away as possible. Make sure no one stands in front of, or passes, the rim during inflation.**

Recommended air pressures should normally be followed, see page 293. Special ground conditions may require adjustment of the air pressure. Follow the tire supplier's instructions and do not exceed the maximum permitted air pressures.

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, before putting the machine to work for the first time.

### **! WARNING**

Risk of serious injuries.

Repairs on or welding of a rim with mounted and inflated tyre could cause the rim to crack or the tyre to explode. This could lead to serious personal injuries.

**Repair work on tyres and rims must be carried out by persons who have been especially trained for this.**

**The instructions stated below apply to an inflated tyre where the pressure needs to be increased. If the tyre has lost all pressure, a trained service engineer should be called in.**

- When checking the air pressure, the tyre should be cold and the machine be without a load.
- Ask all other persons to leave the danger area (in front of the rim).
- Stand by the tire's tread. Tire installed on a split rim may explode and cause injuries or, in the worst case, death.
- Use a long air hose (with a self-attaching air chuck) which allows you to stand outside the danger area.

## Maintenance

### Maintenance service, every 50 hours 237

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- Tyres on stored wheels (spare wheels) should be kept in a lying down position and only be inflated sufficiently to keep the rim parts in position.
- Do not re-inflate a tyre, if the machine has been operated with a tyre pressure that has been below 80% of the lowest recommended tyre pressure according to the specifications, or if the tyre and/or rim are obviously damaged or are suspected of being damaged.

### Tyres, checking wear

#### Check:

- that there is enough tread on the tire.
- the tread, so the cord is not visible.
- the sides of the tires, so that there are no deep cuts in to the cord.

### Coolant, checking level and refilling

Check the coolant level every 50 hours.

- 1 Turn off the engine and apply the parking brake.
- 2 Open the engine hood.

#### **WARNING**

Risk of crushing. Rotating parts may cause serious injury. Never operate the machine with any of the engine or cooling module compartment doors open.

#### **WARNING**

Risk of scalding and severe burns to unprotected skin.

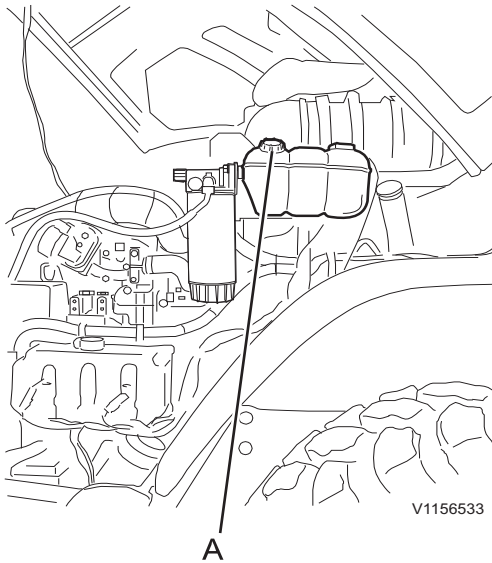
High-pressurised hot coolant may rush out of expansion tank and cause severe burns. Before removing the expansion tank pressure cap:

- Shut down the engine.
- Allow the engine to cool
- Turn the pressure cap slowly to release any pressure.

### Topping up coolant

If the alarm text for low coolant level is shown, the coolant must be topped up.

**238** Maintenance  
Maintenance service, every 50 hours



A Expansion tank cap

**NOTICE**

**Risk of machine damage.**  
Mixing different coolants and corrosion preventives could damage the engine.  
Use only Volvo Coolant VCS when filling the coolant system.

- 1 Turn off the engine and apply the parking brake.
- 2 Turn off the battery disconnecter.
- 3 Open the engine hood.
- 4 Let the cooling system cool down.
- 5 Slowly loosen the expansion tank cap (A).
- 6 Top up with coolant until the coolant level is between the markings MIN and MAX on the expansion tank.
- 7 Reinstall the expansion tank cap (A) tightly and check the system for leaks.

**Lifting frame, lubricating**

Grease the lower bucket pins every 50 hours.

**NOTE!**

Grease daily in tough operating conditions.

- 1 Lower the lift arms to the ground.
- 2 Turn off the engine and apply the parking brake.
- 3 Lift and tilt hydraulics should be without pressure.
- 4 Clean the grease nipples before greasing.
- 5 Lubrication is sufficient if grease comes out from the bearing.

For quality of grease, see page 273.

For more information, see page 222.





## Maintenance service, every 125 hours

### Steering cylinder bearings, lubricating

Grease the bearings every 125 hours.

#### **NOTE!**

Grease every 50 hours in aggressive/corrosive environment.

#### **Greasing bearings**

- 1 Lower the lift arms to the ground.
- 2 Turn off the engine and apply the parking brake.
- 3 Lift and tilt hydraulics should be without pressure.
- 4 Clean the grease nipples before greasing.
- 5 Lubrication is sufficient if grease comes out from the bearing.

For quality of grease, see page 273.

### Lifting frame, lubricating

Grease the boom every 125 hours

#### **NOTE!**

Grease daily in tough operating conditions.

#### **NOTE!**

Grease every 50 hours in aggressive/corrosive environment.

- 1 Lower the lift arms to the ground.
- 2 Turn off the engine and apply the parking brake.
- 3 Lift and tilt hydraulics should be without pressure.
- 4 Clean the grease nipples before greasing.
- 5 Lubrication is sufficient if grease comes out from the bearing.

For quality of grease, see page 273.

240 Maintenance  
Maintenance service, every 250 hours

## Maintenance service, every 250 hours

### Water separator, draining

- Check the water trap every 10 hours. Drain if necessary.
- Drain the water trap every 250 hours.
- Prevent fuel spills by using a plastic hose and a container.

Draining water from the fuel has to be done manually. A non-return valve in the filter head prevents the fuel from running back to the tank.

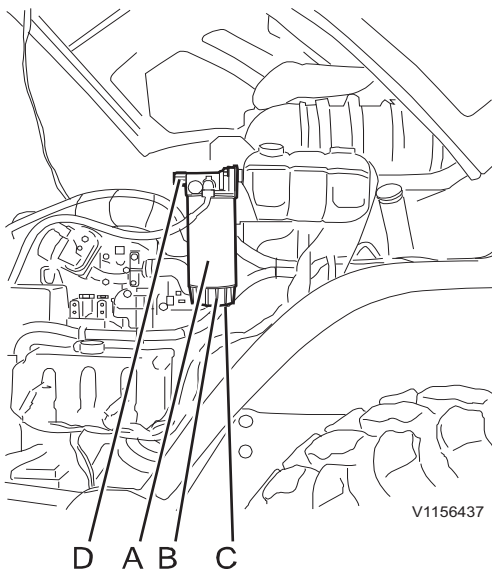
Proceed as follows:

- 1 Connect a plastic hose to drain nipple (C) and place the end of the hose in a suitable container.
- 2 Loosen the drain nipple until fuel runs out through the hose.
- 3 Tighten the drain nipple after draining is completed.
- 4 Remove the hose.
- 5 Pump with the hand pump (D) several times until the water trap (B) is filled and a resistance can be felt.

#### NOTE!

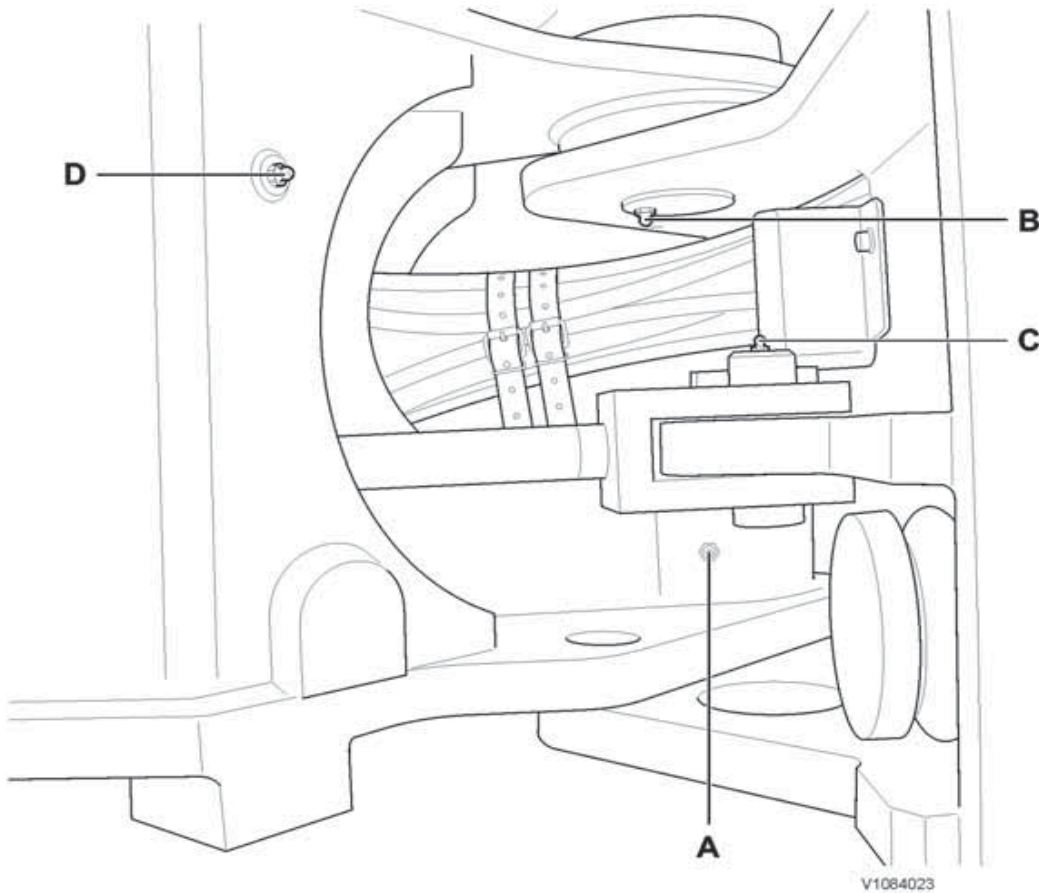
The hand pump must not be used when the engine is running.

Handle filters/oils/liquids in an environmentally safe way, see page 206.



- Primary fuel filter
- A Filter element
  - B Water trap
  - C Drain nipple
  - D Hand pump

### Articulation joints, lubricating



- A Grease nipple, frame joint, lower bearing
- B Grease nipple, frame joint, upper bearing
- C Grease nipple, steering cylinders, rear bearings (one on each side)
- D Grease nipple, steering cylinders, front bearings (one on each side)

Grease the upper bearing every 250 hours.

**NOTE!**

Grease every 50 hours in aggressive/corrosive environment.

For more information, see page 222.

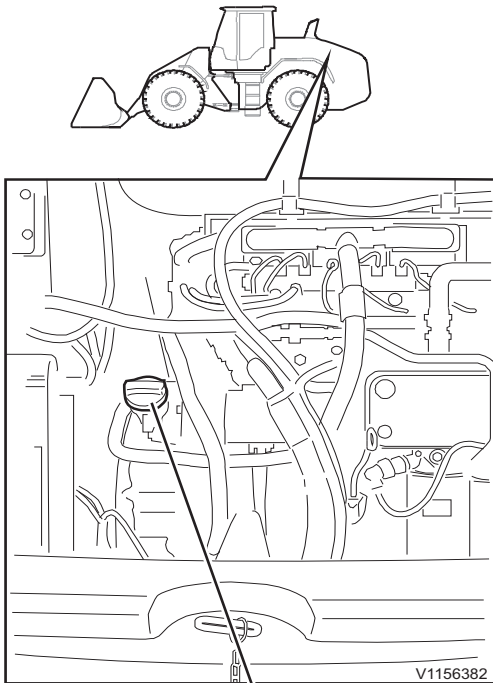


242 Maintenance  
Maintenance service, every 500 hours

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Maintenance service, every 500  
hours

Maintenance  
Maintenance service, every 500 hours **243**

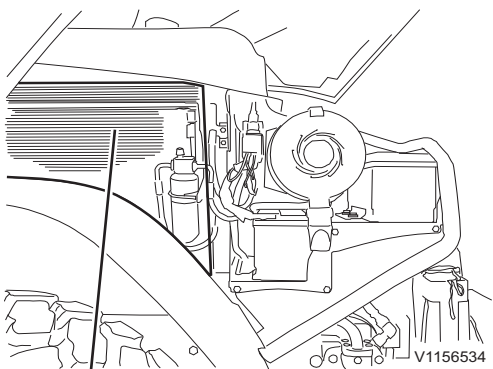


A

A Engine oil filling point

### Engine oil, filling

- 1 Fill with new oil through engine oil filling point (A). Change volume incl. filter: 11.5 litres (3.04 US gal). For quality of oil, see page 273.
- 2 Screw the cap back on.
- 3 Start the engine and let it run at low idle for two minutes.
- 4 Stop the engine.
- 5 The level check should be carried out when the oil has had time to run down to the bottom of the sump.
- 6 Check the oil level on the dipstick and top up to the MAXmarking if needed.



A

A Radiator, coolers, and condenser

### Cooler and condenser, cleaning

Clean the radiator, oil cooler, charge-air cooler, and the condenser (if AC is installed) every 500 hours.

**NOTE!**

The radiator, coolers, and condenser (if AC is installed) should be cleaned at regular intervals in order to ensure cooling. When operating in very dusty conditions, the radiator and coolers should be checked daily or at even shorter intervals.

**NOTE!**

Always clean the condenser and hydraulic oil cooler at the same time that the radiator is cleaned, see below.

244 Maintenance  
Maintenance service, every 500 hours

---

 **WARNING**

Risk of crushing and cutting.

Rotating parts could cause serious injury.

**Shut down the engine before cleaning the machine or any component of the machine.**

 **WARNING**

Risk of serious injury.

Compressed air, water jets or steam may cause damage to unprotected skin and eyes.

**Always wear personal protective gloves, goggles and clothing when using compressed air, water jets or steam.**

**NOTE!**

The condenser, the radiator core, and the hydraulic oil cooler core can be damaged if handled carelessly. Maintain a distance of at least 50 cm (20 in) when cleaning with a high-pressure washer.

- 1 Turn off the engine and apply the parking brake.
- 2 Turn off the battery disconnecter.
- 3 Remove the dirt from the engine hood's grill.
- 4 Open the engine hood and blow out remaining dirt from the engine hood grill (both sides), if needed.
- 5 Open the hatch and swing down the condenser (if AC is installed).
- 6 Blow clean the radiator, oil cooler, and charge-air cooler with compressed air from the outside; clean the condenser (if AC is installed) from the top.

Maintenance  
Maintenance service, every 500 hours **245**

- 7 Remove all dirt from the cooler compartment.  
Clean the engine compartment as well.

**NOTE!**

For easier access, the fender can be removed.

**NOTE!**

High-pressure washer must not be used!

**NOTE!**

The cores of the radiator, oil cooler, charge-air cooler, and condenser (if AC is installed) can easily be damaged if not handled carefully.

**NOTE!**

The grills in the engine hood are close-meshed to protect the radiator, coolers, and condenser from incoming dirt, e.g., small stones and leaves.

Particles will also be kept out to a certain extent. Therefore the grills should be cleaned regularly.

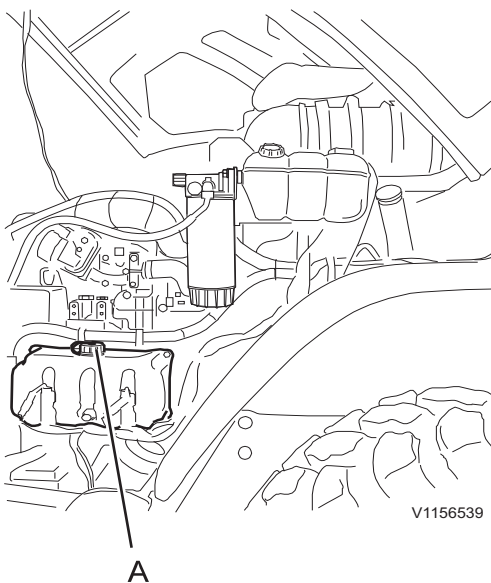
**NOTE!**

Check condition of the seals on the engine hood. Replace damaged or worn parts.

### Coolant, checking level and refilling

The cooling system is filled with Volvo Coolant VCS, which is in accordance with the highest requirements regarding anti-freeze, anti-corrosion and anti-cavitation properties. To avoid damage to the engine, it is very important that Volvo Coolant VCS is used when topping up or when changing coolant.

Volvo Coolant VCS is yellow and a decal by the fill point shows that the system is filled with this coolant (see picture).



A Cap for topping up

**WARNING**

Risk of scalding and severe burns to unprotected skin.

High-pressurised hot coolant may rush out of expansion tank and cause severe burns. Before removing the expansion tank pressure cap:

- Shut down the engine.
- Allow the engine to cool
- Turn the pressure cap slowly to release any pressure.

Check the coolant level every 500 hours or when message is shown on the display, see page 51.

## 246 Maintenance Maintenance service, every 500 hours

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The level should be between MIN and MAX markings on the expansion tank when the engine is cold.

### Filling

#### **NOTICE**

**Risk of machine damage.**

**Mixing different coolants and corrosion preventives could damage the engine.**

**Use only Volvo Coolant VCS when filling the coolant system.**

#### **NOTICE**

**Never fill a hot engine with cold coolant, as this may cause the cylinder block or the cylinder head to crack. Failure to change coolant will cause clogging of the cooling system and the risk of engine damage.**

#### **NOTE!**

For coolant specifications, see page 275.

- 1 Place the machine in service position, see page 205.
- 2 Open the cap on the expansion tank carefully and remove it.
- 3 Fill coolant to the MAX marking on the expansion tank and install the cap.
- 4 Restore the machine from service position.

### Reversible fan, cleaning

In very dirty conditions it is a good idea to clean the radiator often. If the machine is equipped with a reversible cooling fan, it is possible to set an interval during which the fan temporarily reverses direction to blow the radiator clean.

To check the setting of the reversible cooling fan, see menu on the display on page 45.

Setting is performed with the keypad under the menu Engine, page 44.



## Maintenance service, every 1000 hours

### Parking brake function, checking

#### **WARNING**

Risk of crushing!

Unexpected machine movement could lead to serious injury.

**Never perform parking brake test when persons are located in the danger zone.**

- 1 No load must be carried in/on the working attachment.
- 2 The working attachment should be kept in transport position.
- 3 Park the machine in a 20% slope.
- 4 Apply the parking brake. Leave the engine running.
- 5 Neutral position should be selected, see page 66.
- 6 Check that the parking brake is able to hold the machine from moving.

#### **NOTE!**

If the machine moves, the parking brake must be checked further. Contact a workshop authorized by Volvo.

248 Maintenance  
Maintenance service, every 2000 hours

## Maintenance service, every 2000 hours

### Pre-cleaner (optional equipment)

When working in a particularly dusty environment, we recommend the use of a pre-cleaner.

The pre-cleaner is installed on the air intake instead of the rain cap.

### **NOTICE**

The pre-cleaner or the rain cap must not be used as a step.

### Oil bath pre-cleaner (optional equipment)

In operating conditions with a high generation of dust we recommend the oil bath pre-cleaner.

The high particle-retaining ability of the oil bath pre-cleaner usually extends the replacement interval to approx. twice as long.

**Check the oil level daily.**

**The total oil capacity is 2,5 litres (0.66 US gal).**

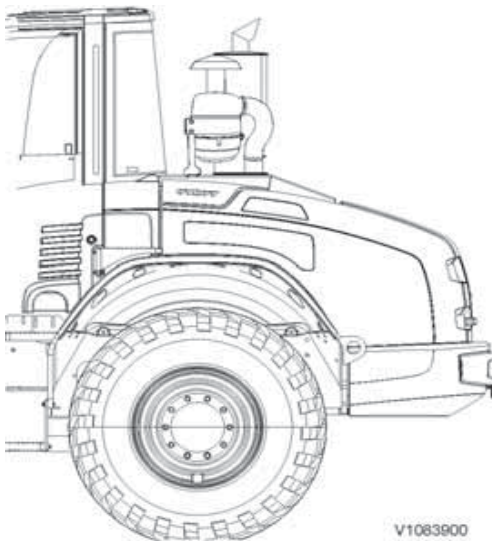
- Change oil and clean lower and upper steel mesh filter if:
  - the oil is dirty and viscous.
  - there is sludge deposits or dry spots on the underside of the lower steel mesh filter.
- The oil bowl, the lower and upper steel mesh filters should be washed in diesel fuel.
- Avoid using petrol (gasoline) for cleaning, as any remaining petrol can cause the engine to surge when it is started later.
- When filling or changing oil use oil with the same viscosity as in the engine.

**Clean the steel mesh filter inserts every 2000 hours.**

**Take care of filters/oils/liquids in an environmentally safe way, see page 206.**

### **NOTE!**

Check the air lines for leaks during every maintenance. Replace defective parts, tighten loose hose clamps.



Oil bath pre-cleaner (optional equipment)

## Maintenance service, when required

### Fuel, filling

#### **NOTICE**

Risk of machine damage.

Refueling of any other fluid but diesel in the fuel tank could cause machine damage.

Do not start the engine if you have filled other than pure diesel in the diesel tank.

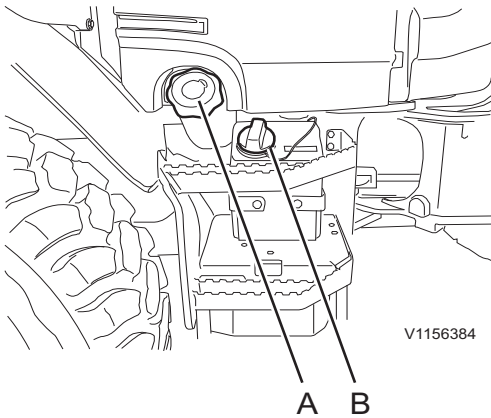
For fuel quality, see page 277

The fuel tank should be filled at the end of each work day. This prevents the formation of condensation water, as far as possible. The fuel filling point is located on the right-hand side of the machine.

- Thoroughly clean the area around the tank lid.
- Only fill with clean fuel! Clean fuel is essential for trouble-free operation of the diesel engine.

**Fuel tank capacity approx. 150 litres (39.6 US gal)**

**Adblue tank capacity approx. 20 litres (5.3 US gal)**



- A Fuel tank cap
- B AdBlue®/DEF tank cap

250 Maintenance  
Maintenance service, when required

---

 **WARNING**

Risk of fire.  
Burning fuel can cause fatal injuries.  
**Stop the engine before filling fuel.**

 **WARNING**

Risk of fire hazard.  
Regeneration operations generate hot exhaust and cause machine components to become hot.  
Hot exhaust and machine components can cause fire.  
**Perform regeneration operations in non-fire-hazardous areas.**

 **WARNING**

Risk of explosion!  
The fumes in an empty fuel container are explosive.  
Severe personal injury or death could result.  
**Keep open flames and sparks away from fueling area.**  
**Do not smoke.**  
**Never cut or weld on fuel lines, tanks or containers.**

A drop in engine power can be caused by a clogged fuel filter. If a fuel filter clogs too quickly, check the fuel for contamination. Clean the tank, make sure it is properly closed.

## Fuel system, draining

### **! WARNING**

Risk of fire.  
Burning fuel can cause fatal injuries.  
**Stop the engine before filling fuel.**

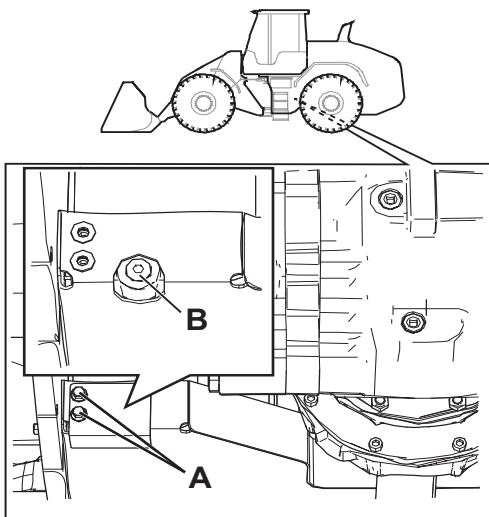
### **! WARNING**

Risk of high pressure injection.  
Working on the fuel injection system could lead to highly pressurised fuel jetting out causing severe injuries including death.  
**Wear protective equipment.**

### **NOTICE**

**Risk of machine damage.**  
Refueling of any other fluid but diesel in the fuel tank could cause machine damage.  
**Do not start the engine if you have filled other than pure diesel in the diesel tank.**

- Place a container under the fuel tank's drain plug. The fuel tank's volume is approx. 150 litres (39.6 US gal).
- Remove the screws (A) and the cover plate.
- Remove the drain plug (B) and drain all of the fuel.
- Wash the inside of the fuel tank with clean fuel.
- Replace the O-ring on the drain plug and smear some oil on it, or wet it with clean diesel fuel.
- Install the drain plug and tighten it carefully with 10-15 Nm.



A Screws for cover plate  
B Fuel tank, drain plug

### **NOTE!**

The fuel filters may also have to be changed.

**Handle filters/oils/liquids in an environmentally safe way, see page 206.**

252 Maintenance  
Maintenance service, when required

---

### AdBlue®/DEF, filling

#### **NOTICE**

Risk of machine damage.

A clogged AdBlue®/DEF filter can lead to difficulties filling the tank.

Filling AdBlue®/DEF in the tank with a damaged filter or without a filter in place can contaminate the AdBlue®/DEF fluid and seriously damage the aftertreatment system.

The filter might need to be removed, cleaned and put back in place before filling. Never damage the filter or fill AdBlue®/DEF without the filter in place. Turn to your local Volvo dealer for support.

#### **NOTICE**

Risk of machine damage.

Refilling fluids with anything other than what is specified in this manual could cause permanent damage to the catalyst system.

Only refill fluids with those specified in this procedure.

#### **NOTICE**

Risk of machine damage.

AdBlue®/DEF is highly corrosive. If the tank is overfilled, AdBlue®/DEF may leak out through the air vent pipe. If the tank is overfilled and the fluid in it freezes, the tank and hoses can be permanently damaged.

Do not overfill the tank. Always stop filling when the fluid level reaches the filling port or when an automatic filling nozzle shuts off.

#### **NOTE!**

Make sure that:

- the filler cap is sufficiently wiped clean before removing it
- the filling nozzle and devices in contact with the fluid are clean and free from any deposits and water
- no dirt and contaminations can enter the tank when removing the cap, during filling, or when the cap is re-fitted.

#### **Protective cover, opening**

- 1 Open the cab filter door (by using the black key).
- 2 Release the rubber lock.

## Maintenance Maintenance service, when required 253

- 3 Open up the protection cover against the rubber strip on the cab filter door.
- 4 Clean the inside of the protection cover, the filler cap and the surrounding.

### NOTE!

Place the filler cap during re-filling with the bottom in the protection cover.

### Protective cover, closing

- 1 Wipe the spilled fluid after filling.
- 2 Close the protection cover with the strap of the filler cap inside.
- 3 Attach the rubber lock.
- 4 Close and lock the cab filter door (by using the black key).

### NOTE!

Do not fill with any fluid other than that specified in ISO 22241-1 and do not reuse drained AdBlue®/DEF due to the risk of contamination.

**AdBlue®/DEF tank capacity: approx. 20 litres (5.3 US gal.).**

**AdBlue®/DEF quality, see page 278.**

If the AdBlue®/DEF level is low, an alarm indication is displayed, see page 52. Fill the AdBlue®/DEF tank with AdBlue®/DEF.

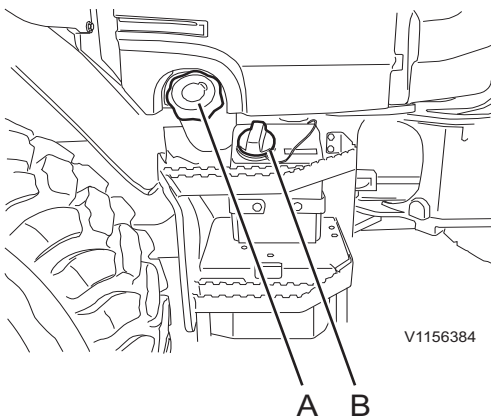
### NOTE!

AdBlue®/DEF filling equipment must be designed for a maximum filling rate of 40 litres/minute, and adjustable to a rate below 40 litres/minute. If filling problems occur and remain after the filling filter has been cleaned, please refer to the manual for the filling equipment and take the necessary action.

### NOTE!

Wipe clean the spill cup, and any spilled AdBlue®/DEF, after filling.

- AdBlue®/DEF is not classified as a hazardous substance but should still be handled with care. It is highly corrosive.
- If it comes into contact with the skin, rinse well with water.
- If it comes into contact with the eyes, rinse thoroughly for several minutes. Consult a doctor if necessary.
- If inhaled, breathe fresh air and contact a doctor if necessary.
- If swallowed, drink water and contact a doctor.



- A Fuel tank cap  
B AdBlue®/DEF tank cap

## 254 Maintenance Maintenance service, when required

- Do not allow AdBlue®/DEF to come into contact with other chemicals.
- AdBlue®/DEF is not combustible. If AdBlue®/DEF is exposed to high temperatures it will decompose into ammonia and carbon dioxide.
- AdBlue®/DEF must not be mixed into the diesel tank and diesel must not be mixed into the AdBlue®/DEF tank.

For distribution of AdBlue®/DEF (only valid for US market):

- Volvo CE Customer Support: 1-877-823-1111 (business hours)
- www.volvoce.com (outside business hours)

For distribution of AdBlue®/DEF (all other markets), please contact your local Volvo dealer for more information.

### Fuel system, bleeding

Prevent fuel spills by using a plastic hose or a container.

Manual bleeding of the fuel system may be necessary if:

- Service work has been done on the fuel system.
  - The engine has been run dry of fuel.
- 1 Open the engine hood.
  - 2 Turn off the main electric power with the battery disconnecter.
  - 3 Open the bleed nipple on the filter housing.
  - 4 Pump with the hand pump.

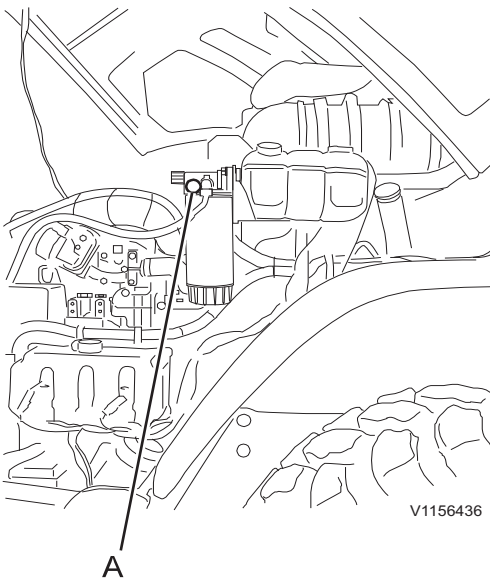
### Manual air bleeding

#### NOTE!

Air bleeding may not be performed using the starter motor.

First, make sure that there is enough fuel in the fuel tank.

- 1 Open the engine hood.
- 2 Turn off the main electric power with the battery disconnecter.
- 3 Pump 200–300 strokes until a resistance is felt in the pump. Press down and then turn the hand pump clockwise until it stops.
- 4 Turn on the main electric power with the battery disconnecter. Start the engine and let it idle for a few minutes. If the engine is difficult to start, use the hand pump to bleed air again.



V1156436

A Hand pump on filter head



## Maintenance Maintenance service, when required 255

5 After start, check that there are no leaks.

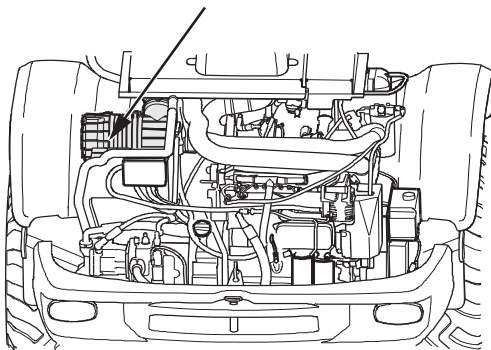
### **NOTE!**

The hand pump may not be used when the engine is running.

Handle filters, oils and liquids in an environmentally responsible way. See page 206.

### **Air cleaner primary filter, cleaning**

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



V1110373

Engine air cleaner

### **NOTICE**

**A damaged filter must always be replaced.**

### **Dust discharge valve**

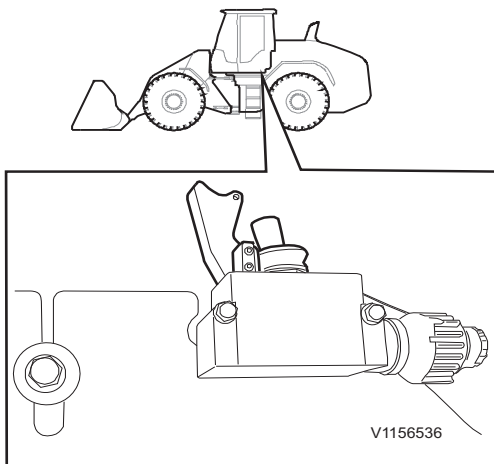
- Empty the dust discharge valve by squeezing the discharge slot.
- Remove any dust deposits by squeezing the upper part of the valve.

### **Cleaning of primary air filter**

**Always have a spare filter available and keep the filter well-protected from dirt.**

The filter can be cleaned according to instructions that are available from an authorized dealer workshop. However, after the filter has been cleaned five times or if it is damaged, it must be replaced.

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Maintenance service, when required



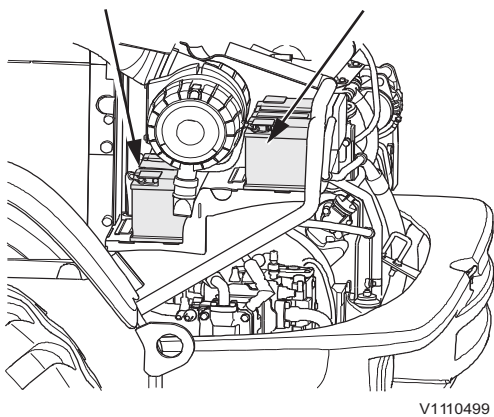
### Battery disconnect switch

ON: Toggle to the front, indicated by LED on.

OFF: Toggle to the rear, LED off.

**NOTE!**

The battery disconnecter has to be operated every time. Otherwise there is risk of discharging the batteries!

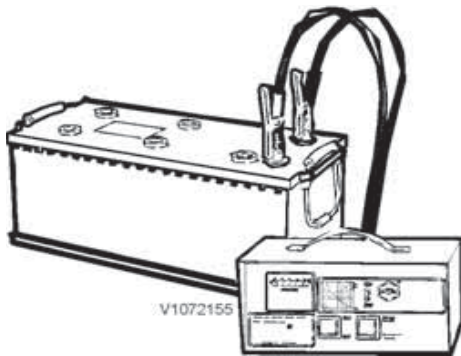


Batteries

### Batteries, charging

The original batteries installed in the machine is both completely impermeable and maintenance free. The batteries may only be replaced by batteries with identical technological characteristics. This rules out the danger of service personnel being affected by acid or acid vapour should the machine tip over.

- In order to remove the battery firstly disconnect the negative clamp (-). In order to install the battery firstly connect the positive clamp (+). Any contact made between a tool and the cable connecting the positive clamp and the frame may cause sparks.
- For longer storage periods disconnect the battery.



V1072155

### WARNING

Risk of serious injury.  
Short-circuit, open flames or sparks near a charging battery could lead to an explosion.  
**Switch off charge current before disconnecting charging cable clamps. Never charge a battery near open flames or sparks. Always charge a battery in well-ventilated areas.**

### WARNING

Risk of chemical burns.  
The battery electrolyte contains corrosive sulphuric acid which could cause severe chemical burns.  
**If electrolyte spilled on your bare skin, remove it immediately and wash the affected area with soap and plenty of water. If it gets into your eyes or any other sensitive body part, rinse with plenty of water and seek immediate medical attention.**

#### NOTE!

Check that the cable terminals and pole studs are clean, well tightened and coated with vaseline or similar.

#### NOTE!

Dispose old batteries environmentally.

For safety regulations, see page 213.

### Three-phase generator

- The connecting poles of the battery must never be mixed up by mistake. The poles are distinctly marked with (+) or (-). Incorrect connection immediately damages the rectifier in the generator.
- Check that the cable terminals and pole studs are clean, well tightened and coated with vaseline or similar.

### Welding

The following actions should be taken before starting electric welding on the machine or attachments connected to the machine:

- 1 Turn off the current with the battery disconnect switch.
- 2 Disconnect the batteries, start with the minus terminal and then the plus terminal.



## 258 Maintenance Maintenance service, when required

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- 3 Unplug the electronic units. For more information, contact a workshop authorized by Volvo.
- 4 Connect the welding equipment's ground connection as close to the welding point as possible and make sure that the current does not pass across a bearing.

See also page 210.

### Fuses and Relays

Most fuses and relays are located behind the rear cab wall, behind the operator's seat, and can be reached by opening the plastic cover. A decal on the inside of the cover shows which current consuming device is connected to each relay and fuse. For detailed information about fuses and relays, see page 284.

If a problem should occur in one of the relays, this can temporarily be overcome, by replacing the defective relay with one that has a less important function. Check thoroughly that the relays are identical.

### **NOTICE**

**Risk of fire.**

**An inappropriate fuse could result in damage or fire on the circuit board.**

**Never install a fuse with a higher amperage than what is stated on the decal.**

If the same fuse blows repeatedly, the cause must be investigated.

## Axles oil, checking level and refilling

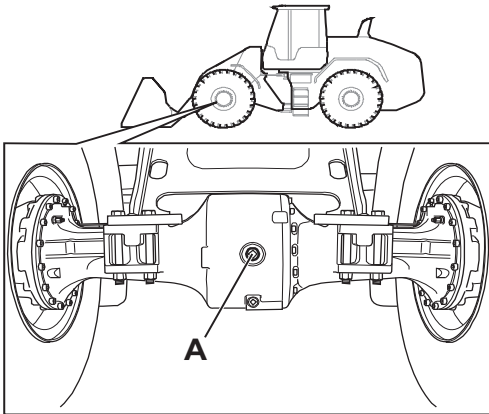
### Filling

Fill oil up to the edge by the level plug.

Operate the machine for a few minutes after filling.  
Check the level again, top up if needed.

**Take care of filters, oils and liquids in an environmentally safe way. See page 206.**

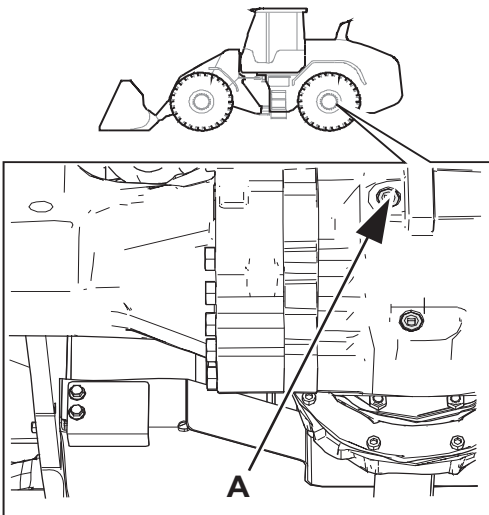
Oil grade, see page 273.



V1148848

Front axle

A Level check and fill point

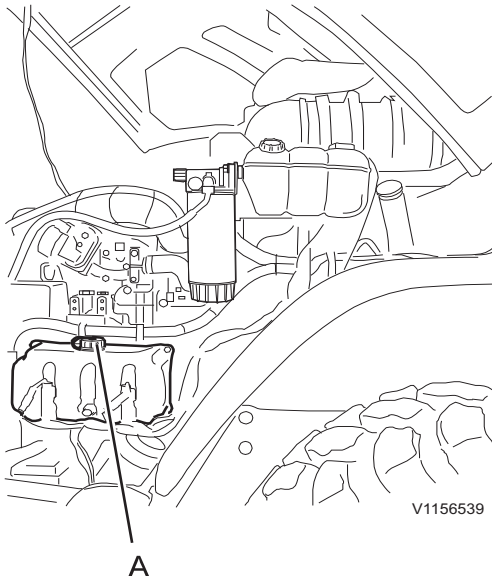


V1164616

Rear axle

A Level check and fill point

260 Maintenance  
Maintenance service, when required



A Washer reservoir

### Washer fluid, checking level and refilling

The reservoir is used for the windshield and the rear window washer.

- Fill up washer reservoir (A) when necessary.
- With temperatures around or below freezing make sure that a sufficient amount of anti-freeze is added.

**NOTE!**

Risk of machine damage! When screwing the cap onto the washer reservoir, tighten it gently by hand. Over-tightening may cause damage.

### Cab ventilation filters, cleaning

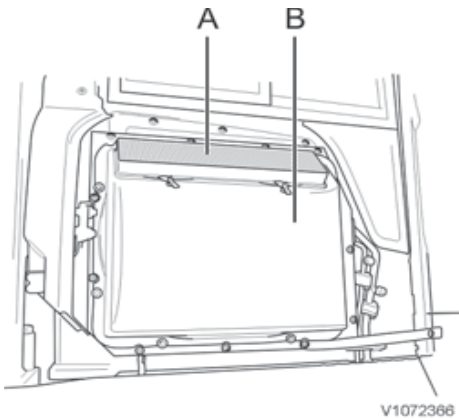
The cab's ventilation filter consists of a prefilter (coarse filter, green frame) and a main filter (particle filter, green frame). The machine is often used in dusty conditions and therefore it is delivered with filters that meet efficiency class F5 (prefilter) and F8 (main filter) according to EN 779:2002. The main filter reduces the risk of silicosis and reduces particles such as quartz in fine fractions, pollen, bacteria, and mould spores. The machine is delivered with filters of this classification, which also are recommended when changing. The recommendation is that the fan should always be on to bring clean air into the cab. Contact your dealer for more information.

**Clogging of the filters is entirely dependent on the machine's working environment, but the filters should be checked once a week.**

**NOTE!**

The cab filters are only intended to separate particles (dust) from the air. Dangerous gases are not trapped by the filters.

Maintenance  
Maintenance service, when required **261**



### Cleaning

1 Open the filter cover (side casing) carefully with the auxiliary key (also used for the fuel cap).

**NOTE!**

The window should be kept closed in order to prevent dust from entering the cab interior.

**NOTE!**

Before the filter cover is opened, make sure that the foldable window (optional equipment) on the right side is closed. Otherwise the seal on the window can be damaged.

2 Turn the fasteners to the side and remove the prefilter and discard it.

3 Turn the fasteners to the side and remove the cover. Remove the main filter and discard it.

4 Install a new main filter, the cover, and a new prefilter, and close the casing.

### Carbon filter (optional equipment)

The carbon filter (green frame) is a primary filter intended for use in conditions where odours from organic and sulphuric gases may need to be reduced. The filter meets the same particle efficiency class as the standard main filter.

### Asbestos filter (optional equipment)

**Change the asbestos filter every 1000 hours.**

**NOTE!**

The filter change intervals can be increased or decreased depending on how dusty the operating conditions are.

The asbestos filter (red frame) is a main filter especially intended for use in conditions where there may be asbestos dust. Of course, the filter is effective against all other kinds of dust when the operator requires highly filtered air in the cab.

The asbestos filter (red frame) is a main filter especially intended for use in conditions where there may be asbestos dust. Of course, the filter is effective against all other kinds of dust when the operator requires highly filtered air in the cab.

The filter meets the requirements according to EN 1822:1, filter class H13. Pay attention to any national regulations issued for work in the relevant environment.

## 262 Maintenance Maintenance service, when required

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When changing asbestos filter, the used asbestos filter shall be placed in the tight-sealing plastic bag that is supplied with each asbestos filter package. Do not shake the asbestos filter, just place it carefully in the supplied plastic bag. Seal the plastic bag and make sure that it is deposited in a suitable location for asbestos waste.

### **Advice for operating in environments where dust / asbestos dust is present**

- It is important that the cab is kept as free as possible from dust/asbestos dust:
  - Enter and leave the machine away from the area contaminated with asbestos.
  - Keep clothes and shoes clean from dust.
  - Tidy and vacuum-clean the cab often and use personal protective equipment, for instance respirator (dust mask) intended for asbestos contaminated areas.
  - Make sure that the cab door is kept closed while operating.
- The cab should be ventilated through its ventilation system, which also provides excess pressure in the cab.
- Change filters (main filter and prefilter) every 1000 hours or more often when necessary. Be careful with the new filter so that it is not damaged. When installing, check that the filter edge seals tight.
- With regards to the risks to personal health and the environment, used filters must be placed in the sealable plastic bag which is supplied together with new filters. The bag with the used filter should then be left at a location authorized to take care of asbestos waste.

### **Cleaning machine**

The machine should be cleaned regularly with conventional car care products in order to eliminate the risk of damage to the paint finish and other surfaces on the machine.



## Maintenance Maintenance service, when required 263

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### **NOTICE**

Avoid using strong cleaning agents or chemicals in order to minimise the risk of damage to the paint finish.

### **NOTE!**

Daily clean the areas on the machine where dust, chips, and similar may collect in order to minimize the risk of fire, see page 264.

### **Recommendations for cleaning the machine:**

- Place the machine in a place intended for cleaning.
- Follow the instructions supplied with the car care product.
- The water temperature must not exceed 60 °C (140 °F).
- If high-pressure washer is used, keep a distance of at least 20–30 cm (8–12 in) between the nozzle and the machine. Too high pressure and too short distance may cause damage. Protect electrical wiring in an appropriate way.

### **NOTICE**

If you are using a high-pressure wash, take care so that the decals do not loosen.

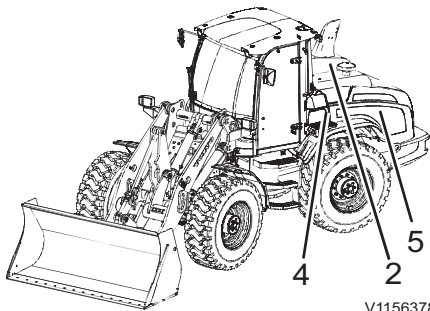
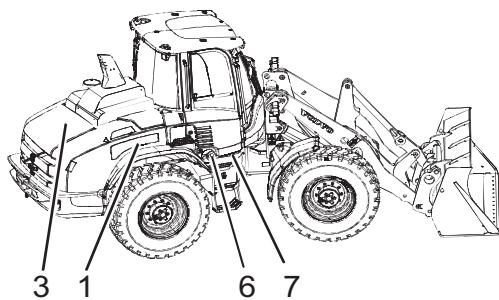
- Use a soft sponge.
- Finish by rinsing the whole machine with only water.
- Always lubricate the machine after washing.
- Touch-up the paint finish when required.
- If a decal is tattered or illegible it must be replaced immediately, see page 26 for more information.

## **Paint finish maintenance**

Machines used in corrosive conditions are more prone to rusting than others. As a preventive measure it is recommended that the paint finish should be maintained every sixth months. If there is any doubt whether the conditions are corrosive or not, contact your dealer.

- At first clean the machine.
- Apply Dinol 77B (or corresponding transparent waxy anti-rust agent) at a thickness of 70–80 µ.
- A protective layer of underseal Dinol 447 (or corresponding) may be applied under the mudguards where mechanical wear is expected.

## 264 Maintenance Maintenance service, when required



V1156378

Areas that need to be checked and cleaned:

- 1 The top of the hydraulic tank
- 2 Air intake, engine
- 3 Under the engine hood, accumulated debris on the engine's valve cover and other surfaces, especially on hot surfaces such as the DPF and burner, turbocharger, exhaust pipe, exhaust manifold, preheating coil, and alternator. See figure below of the engine compartment.  
Also check and clean by the starter motor, oil filler point, oil filters, and fuel filter
- 4 The space around cooling pack, to hydraulic oil tank, and to left-hand side wall of rear frame.
- 5 Inside cooling fins and casing
- 6 Fuel fill point
- 7 The top of the fuel tank and surrounding areas

### Touch-up painting

- Check if there are any damaged areas of the paint finish.
- At first clean the machine.
- Rectify any damage to paint finish in a professional way.

### Cleaning engine compartment

Machines operating in dusty, fire-hazardous environments, e.g., log handling, woodchip handling, grain handling, and animal feed industries, require daily inspection and cleaning of the engine compartment and surrounding areas.

When operating in other conditions, checking and cleaning is required at least once a week.

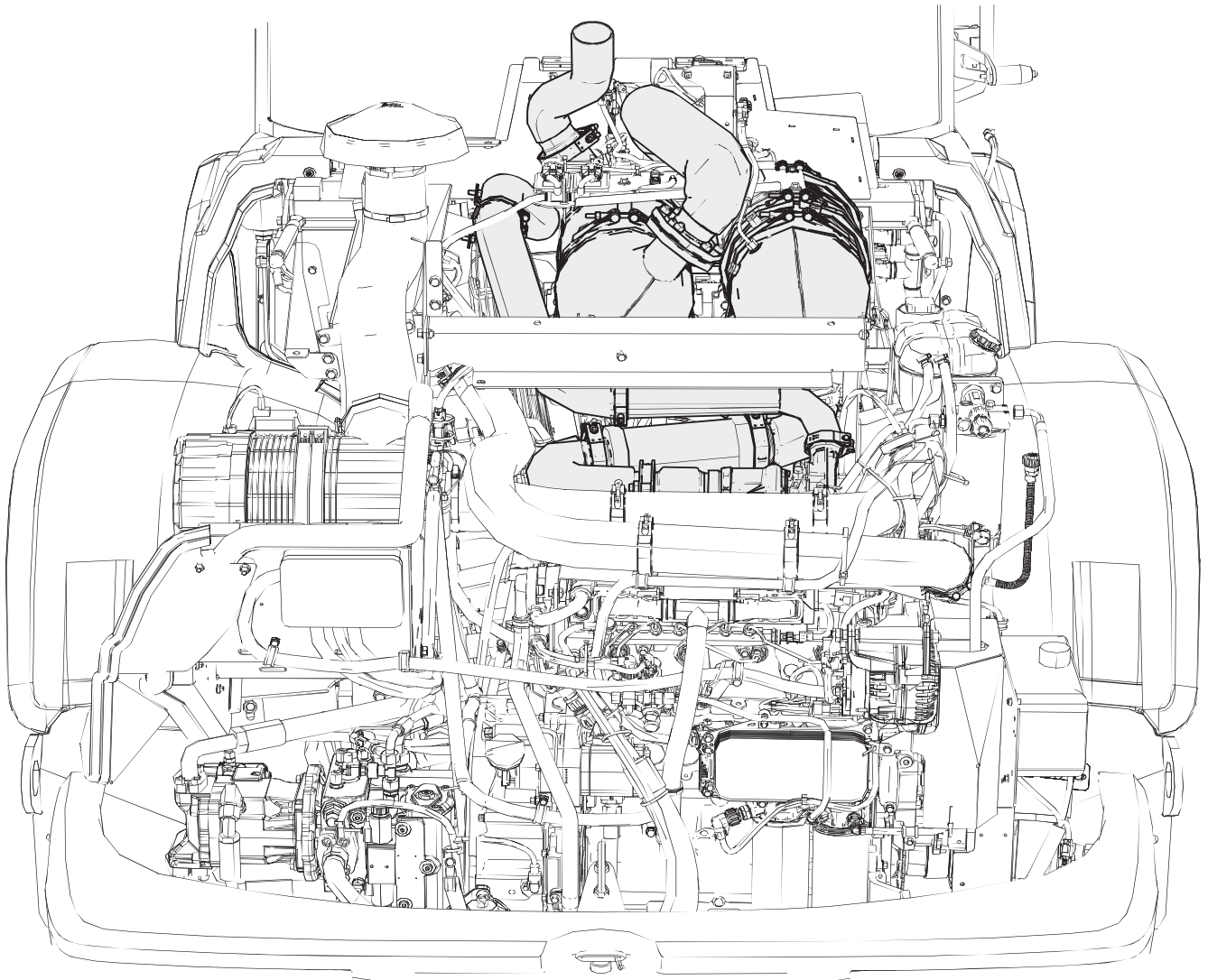
### WARNING

Risk of burns.

Engine and exhaust system components get very hot and can cause severe burns.

**Avoid contact with engine compartment covers, engine components and exhaust system until the engine is cooled down.**

- Preferably, the machine should be cleaned at the end of the work shift before it is parked.
- Use personal protective equipment such as protective goggles, gloves, and protective breathing equipment.
- Start with the highest areas on the machine and finish with the lowest on top of the fuel tank and areas near the fuel tank.
- Loose material is removed mechanically, and only in special cases using compressed air. If compressed air is used, wear suitable breathing protection.
- After cleaning, check and repair any leaks. Close all covers and hoods.



V1156379

Hot surfaces in the engine compartment

## Bucket teeth, replacing

### **WARNING**

Risk of splinter injury.

When striking metal objects with a hammer, flying metal chips could cause serious splinter injury to eyes and other body parts.

**Always wear personal protective equipment and eye protection when replacing bucket teeth.**

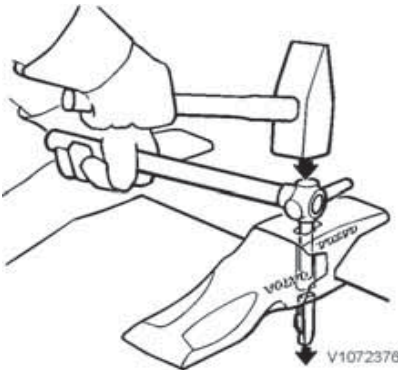
A special tool may be ordered to facilitate replacement of teeth. The tool is available in different sizes depending on tooth size. Contact your dealer for more information.



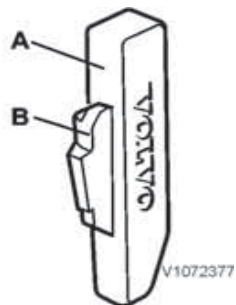
V1072375

Special tool

## 266 Maintenance Maintenance service, when required

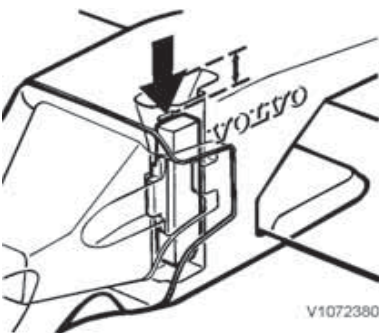


Drive out the lock device



Lock device

- A Steel pin
- B Lock retainer



The lock device should be just below the line marking.

### Removing tooth

- 1 Lower the bucket to the ground and angle it slightly upward.
- 2 Clean the opening for tooth adapter's lock device.
- 3 Drive out the lock device with a hammer and the special tool or another suitable drift.
- 4 Remove the tooth.

### Installing tooth

- 1 Clean the front part of the tooth adapter and the hole for the lock device.
- 2 Install the tooth so that the guide lugs fit in the tooth adapter's recesses.
- 3 Replace the lock retainer (B) with a new one.

- 4 Install the lock device so that the chamfered part points down and the lock retainer points forward.
- 5 Drive down the lock device with a hammer until it is level with the upper part of the tooth adapter.
- 6 Drive down the lock device further with a hammer and the special tool or another suitable drift until the upper part is just below the line marking in the hole.

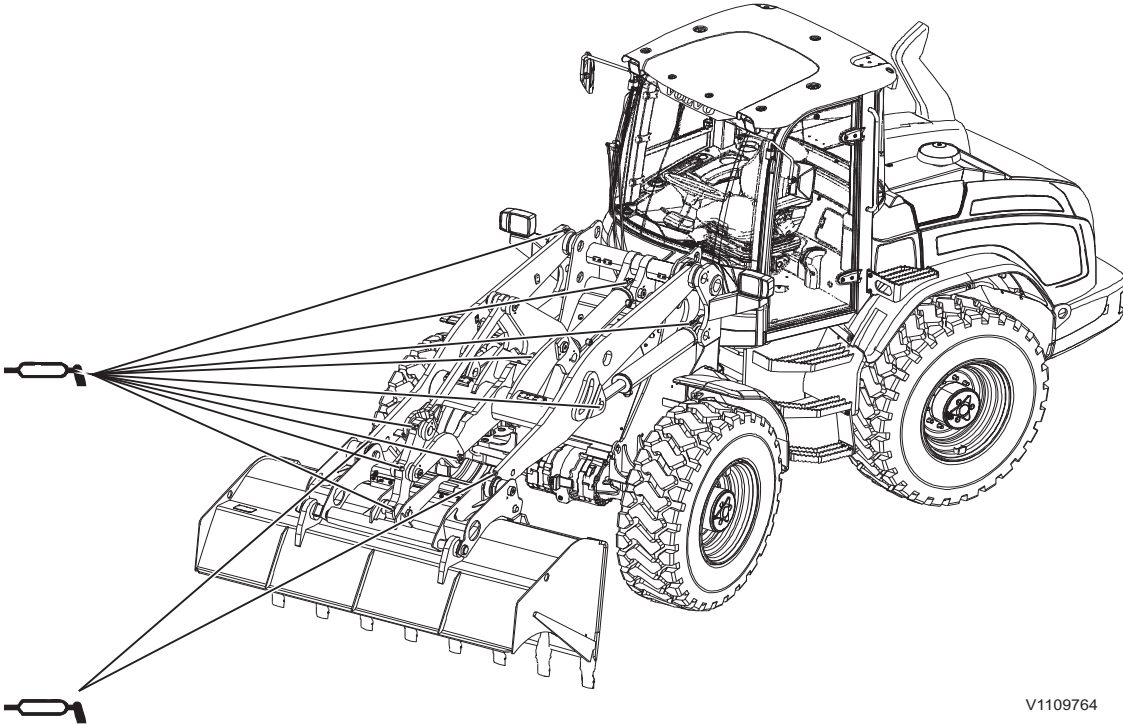
**Replace the steel pin in connection with replacement of tooth adapter.**

### Wheel bolts, checking tightening

After having changed a tyre or if the wheel has been removed and installed for any other reason, the wheel nuts must be check-tightened after eight hours of operation.

**Tightening torque: 560–600 Nm (413–443 ft lb)**

## Central lubrication system (Optional equipment)



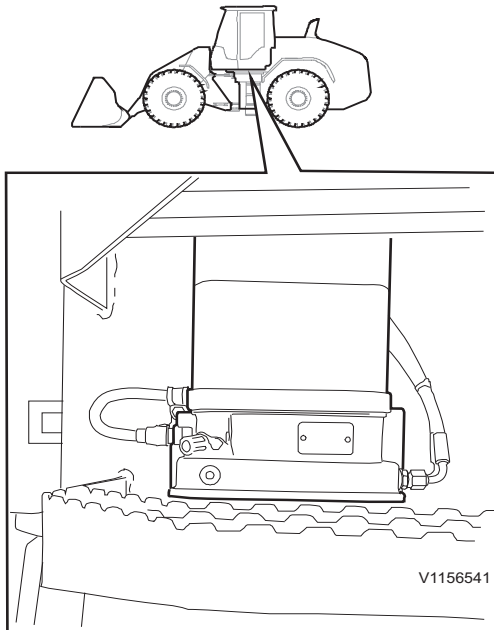
V1109764

The machine may be equipped with an automatic greasing system which automatically greases many points according to a preselected lubrication cycle. The automatic greasing system should be inspected regularly and should be co-ordinated with other regular maintenance and control.

Checking and setting of lubrication cycles takes place with the keypad and the display, see page 44.

**Check the following regularly:**

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Maintenance service, when required



Reservoir

- that there is sufficient grease in the reservoir. Top up when needed, see page 45.

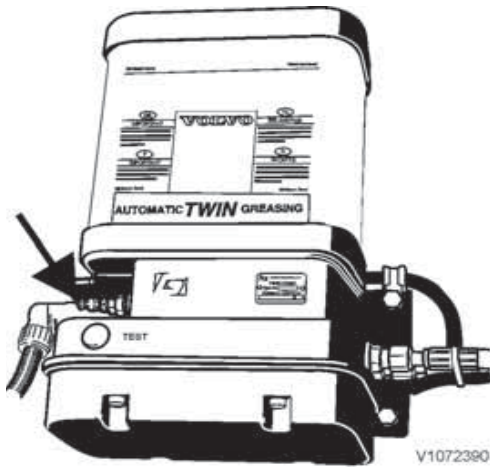
**NOTE!**

Too low lubricant level constitutes a great risk of air entering the system (the most common cause of operating problems).

- that the system functions. Run the system test that is described later on in the section.
- that the grease reservoir is undamaged.
- that the connections do not leak.
- that the dust caps on the quick-couplings are installed and undamaged.
- that the lubrication lines are undamaged and well secured.
- that all lubrication points are lubricated (that lubricant is forced out at bearings and joints).

**NOTE!**

Remember to lubricate by hand the lubrication points which are not included in the automatic greasing system. See the ordinary lubrication chart.



Filler connection

## Filling lubricant

Lubricant must be topped up before the level falls below the minimum marking on the reservoir.

### NOTE!

Let the level drop completely to the bottom every other time grease is filled so that old grease is not at the top of the reservoir.

on the pump unit there is a filler connection (grease nipple) to which a hand pump or an industrial pump is connected when filling.

### NOTE!

If an industrial pump is used, the filter between connection and pump must be cleaned regularly. A partly blocked filter can easily burst, with a consequent great risk of small particles entering the lubrication system. This may in turn lead to a breakdown in the lubrication system.

for information on type of grease, see lubricant recommendations on page 276.

### Proceed as follows:

- 1 Remove the protective cap. Carefully clean the filler connection and the connection on the filler hose.
- 2 fill the filler hose completely full with grease before beginning to fill. this will prevent air from entering the system.
- 3 Connect the connection on the filler connection.
- 4 Fill with lubricant to the maximum level on the reservoir.\*) If it is difficult to pump in the grease, either the filter behind the filler connection is blocked or there may be dirt in the filler nipple itself. Clean the filter, if required replace the nipple and try again.
- 5 Reinstall the protective cap.
- 6 keep the grease pump in a dust-free place, so that it will not be exposed to dirt.

\*) If the reservoir is filled above the maximum level, the surplus lubricant will be drained through the ventilation hole on the left side of the reservoir. Any air under the plate in the reservoir is also drained through the ventilation hole.

## Change of lubrication interval

If the preselected lubrication interval is not suitable for the operating and load conditions to which the



## 270 Maintenance Maintenance service, when required

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machine is subjected, the interval can be changed using the keypad and display, see page 44.

- 1 Turn the ignition key to position 1 (operating position).
- 2 Select "Service" with the keypad.
- 3 Select "Central lubrication" with the arrow keys and press SELECT.
- 4 Select "Interval" with the arrow keys and press SELECT.
- 5 Select the lubrication interval you want to change to with the arrow keys and press SELECT.
- 6 **Wait 45 seconds** before turning the start key to 0 (selected interval in display may go back to earlier interval, but the change will be in effect after after 45 seconds).

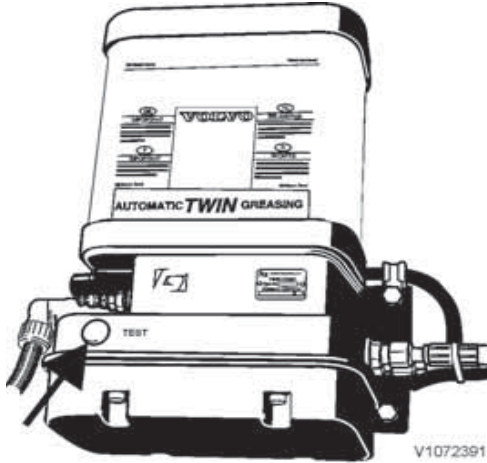
### NOTE!

If the start key is turned to position 0 within 45 seconds after the lubrication interval has been changed, then the latest selection of lubrication interval will be erased. Therefore, wait for at least 45 seconds after the setting has been made, before turning the start key to position 0.

- 7 Turn the start key to position 0 and wait until the display shuts down.
- 8 Turn the start key to position 1 (running position) and check that the correct lubrication interval is shown in the display.

To change lubrication interval again, the start key must be turned to position 0 and when the display shuts down, the start key can once again be turned to position 1 and new lubrication interval can be selected.





Test button

## System test

In order to check the function of the greasing system, or to initiate an extra lubrication cycle after, e.g., the machine has been washed, a system test can be run. The test button, which is used to begin a system test, is positioned at the front on the pump.

A test cycle can only be run when the pump is between two ordinary lubrication cycles (not during an ongoing lubrication cycle).

### Single test lubrication cycle

The pump only runs **one lubrication cycle**. Can be used **after washing to get extra lubrication**.

- 1 Turn the start key to position 1 (operating position).
- 2 Press in the test button for 2–6 sec.
- 3 The lubrication cycle starts.
- 4 The test cycle ends automatically.

**If the test lubrication cycle has been used to obtain an additional lubrication cycle after a wash, the test button should be pressed once more to lubricate the other main line.**

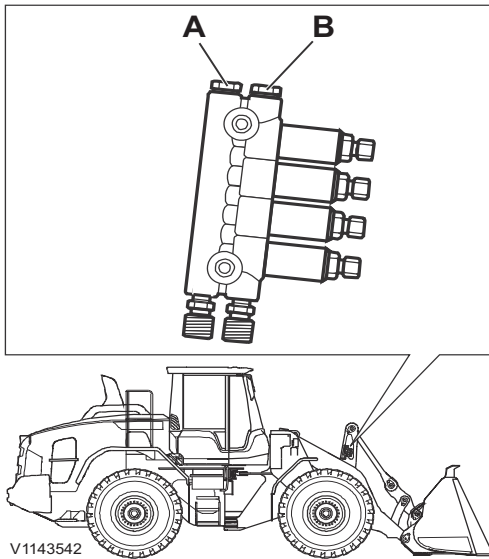
### Continuous test lubrication cycle

The pump runs **an unlimited number of lubrication cycles**, i.e., it continuously pumps out grease alternating between **both main lines**. **This is used for bleeding air from the system.**

- 1 Turn the start key to position 1 (operating position).
- 2 Press the test button for more than 6 sec.
- 3 The lubrication cycle starts.
- 4 End the test cycle by turning the ignition key to position 0.

**The test cycle does not end automatically.**

272 Maintenance  
Maintenance service, when required



V1143542

Principle illustration

- A Plug
- B Plug

### Central lubrication system, bleeding

- 1 Make sure that the grease reservoir is filled to the max. mark.
- 2 Remove the plug for one of the main lines in the metering block located farthest away from the pump unit (see figure).
- 3 Turn the start key to position 1 (operating position).
- 4 Start a **continuous lubrication test cycle**, see page 270.
- 5 Bleeding is finished in the relevant main line when air-free grease comes out from that main line.
- 6 Turn the start key to position 0 and install the plug for the relevant main line.
- 7 Follow steps 2–6 in order to bleed the other main line.
- 8 Run a single lubrication test cycle twice in a row to check that the system works, see page 270.

### Cleaning

Normally water cannot penetrate into the system. However, during a high-pressure wash the risk increases and the pump unit should be protected, as water, which has entered the system, does not disappear by itself, but could instead cause operating problems. After high-pressure washing, a **Continuous test lubrication cycle** should be run, see page 270) to obtain extra lubrication.

### Evaporator, cleaning

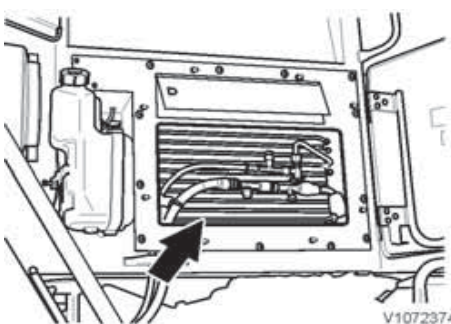
The evaporator can be reached when the cab filter has been removed.

**NOTE!**

High-pressure wash must not be used.

Clean the evaporator at regular intervals. A simpler cleaning operation can be carried out with the evaporator in place. Use a soft brush, not compressed air.

For more thorough cleaning, the evaporator must be loosened from its mountings and cleaned from the rear. Therefore, this ought to be carried out at a workshop authorised by Volvo.



V1072374

Evaporator (ventilation filters and plastic cover removed)



## Specifications Recommended lubricants

For questions about oils, lubricants, and extreme outdoor temperatures, contact your dealer for more information.

**NOTE!**

Keep in mind the type of engine with which the machine is equipped and follow the instructions that apply to that engine.

**NOTE!**

It is very important that instructions for oil grade are followed, otherwise deposits from the oil may clog the particle filter.

	Oil grade	Recommended viscosity at varying ambient temperatures																																																																																																				
<b>ENGINE</b>	Volvo Ultra Diesel Engine Oil VDS-4 or other approved VDS-4 engine oil	<table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>+14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 10W-30</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 15W-40</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 10W-40</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 5W-30</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 5W-40</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 30</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">SAE 40</td> </tr> </tbody> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	+14	+32	+50	+68	+86	+104	+122																		SAE 10W-30										SAE 15W-40										SAE 10W-40										SAE 5W-30										SAE 5W-40										SAE 30										SAE 40		
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	ACEA-E9 API:CJ-4 Follow recommended change intervals according to the oil's grade (quality class) and sulphur content in the fuel.	V1095849																																																																																																				

Follow recommended change intervals according to the oil's grade (quality class).

Oil grade	Sulphur content in fuel, in ppm	
	< 15 ppm	> 15 ppm is not allowed.
	Oil change interval	
Volvo Ultra Diesel Engine Oil VDS-4	500 hours	
ACEA: E9 API: CJ-4	250 hours	



274 Specifications  
Recommended lubricants

	Oil grade	Recommended viscosity at varying ambient temperatures																																																												
<b>HYDRAULIC SYSTEM</b> Steering hydraulics Brake hydraulics Working hydraulics Hydrostatic transmission	<b>Volvo Super Hydraulic Oil</b> Mineral oil based (HVLP) or Alternative: Volvo Biodegradable Hydraulic Oil (HEES) Do not mix with other and mineral oils. For further information contact your Volvo Service.	<table border="1"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>+14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3">ISO VG 32 HV</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3">ISO VG 46 HV</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3">ISO VG 68 HV</td> <td></td> </tr> </tbody> </table> <p style="text-align: right;">1052998</p>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	+14	+32	+50	+68	+86	+104	+122																	ISO VG 32 HV										ISO VG 46 HV										ISO VG 68 HV			
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<b>AXLES</b> Axle differential Axle planetary hubs Transfer box (TP-version only)	<b>Volvo Wet Brake Transaxle Oil (WB102)</b>	<table border="1"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>+14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3">Volvo Wet Brake Transaxle Oil (WB102)</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3">SAE 90/ LS</td> <td></td> </tr> </tbody> </table> <p style="text-align: right;">V1160229</p>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	+14	+32	+50	+68	+86	+104	+122																	Volvo Wet Brake Transaxle Oil (WB102)										SAE 90/ LS													
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<b>COOLING SYSTEM</b>	Volvo Coolant VCS																																																													



## Engine oil

**NOTE!**

It is very important that instructions for oil grade are followed, otherwise deposits from the oil may clog the particle filter (DPF)

Oil grade	Sulphur content in fuel, in ppm	
	< 15 ppm	
	Oil change interval	
Volvo Ultra Diesel Engine Oil VDS-4	500 hours	
ACEA: E9 API: CJ-4	250 hours	

## Coolant

Only use Volvo Coolant VCS when topping up or changing coolant. To avoid damage to engine and cooling system, different coolants or corrosion protection must not be mixed. When using concentrated Volvo Coolant VCS and clean water, the mixture should contain 40–60% concentrated coolant and 60–40% clean water. The amount of concentrated coolant must never be less than 40% of the total mixture, see table below.

Freeze protection down to	Mixed-in amount of concentrated coolant
-25 °C (-13 °F)	40%
-35 °C (-31 °F)	50%
-46 °C (-51 °F)	60%

The concentrated coolant must not be mixed with water that contains a high degree of lime (hard water), salt or metals.

**The clean water for the cooling system must also meet the following requirements:**

Description	Value
Total number of solid particles	< 340 ppm
Total hardness	< 9.5° dH
Chloride	< 40 ppm
Sulphate	< 100 ppm
pH value	5.5-9
Silica	< 20 mg SiO <sub>2</sub> /litre
Iron	< 0.10 mg Fe/litre
Manganese	< 0.05 mg Mn/litre
Electrical conductivity	< 500 µS/cm
Organic material, COD-Mn	< 15 mg/litre



276 Specifications  
Recommended lubricants

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If there is any doubt about the water quality use ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant. Do not mix with any other ready-mixed coolants since this may result in engine damage.

### Grease

#### Volvo Super Grease Lithium EP2

Or corresponding grease on lithium base with EP additives and consistency NLGI class 2.

If the machine is provided with automatic greasing system, other recommended lubricants apply.

### Automatic central lubrication

#### Recommended lubricants

The following requirements apply to grease to be used in the central greasing system:

- the grease may **not** contain graphite or PTFE (teflon)
- use is permitted of grease containing max. 5% molybdenum disulphide (MoS<sub>2</sub>)
- the following NLGI-class is recommended at operating temperature between:

Operating temperature range	NLGI-class
-20 °C (-4 °F) to +70 °C (158 °F)	2
<-20 °C (-4 °F) to 0 °C (32 °F)	0 / 1
<-20 °C (-4 °F) to +70 °C (158 °F)	synthetic 2
<-20 °C (-4 °F) to 0 °C (32 °F)	synthetic 0 / 1



## Fuel system

### Fuel

**Fuel recommendations for EU-certified engines (with recirculation of exhausts (EGR) and aftertreatment of exhausts) for models from year 2011.**

Diesel engines from 2011 and later are only intended to be run on sulphur-free fuel, with a maximum sulphur content of 10 ppm. Using any other fuel than sulphur-free fuel results in an engine with lower efficiency and shorter service life, permanent damage to advanced emission control devices and systems, inferior fuel economy, and possibly that the engine does not work at all. It is very likely that the manufacturer's warranties will become invalid and void when using unsuitable or incorrect fuels. Correct selection of fuel is decisive for good economy, performance, and engine life. Market fuel that meets EU's standard EN590 for diesel fuel oil should be used. Swedish Mk1-fuel that meets Swedish SS 155435 is also permitted. It is important that the fuel is not contaminated by dust or water since these can cause damage to the fuel system and also increase engine wear.

**Fuel recommendations for USA-certified engines (with recirculation of exhausts (EGR) and aftertreatment of exhausts) for models from year 2011.**

Diesel engines for model year 2011 and later are designed to only run on fuels with very low sulphur content, Ultra Low Sulphur Diesel (ULSD), with a maximum sulphur content of 15 ppm. Using any other fuel than ULSD results in an engine with lower efficiency and shorter service life, permanent damage to advanced emission control devices and systems, inferior fuel economy, and possibly that the engine does not work at all. It is very likely that the manufacturer's warranties will become invalid and void when using incorrect fuels, and use of other fuels than ULSD in diesel-powered machines is illegal and punishable by provisions of civil law and legislation. Correct selection of fuel is decisive for good economy, performance, and engine life. ASTM D 975 Number 2D ULSD should be used when climate conditions permit. ASTM D 975 Number 1D ULSD can be used in cold weather.



Mixtures of ASTM D 975-fuels Number 1D and Number 2D ULSD can be used to suit different climate conditions. It is important that the fuel is not contaminated by dust or water since these can cause damage to the fuel system and also increase engine wear.

**NOTE!**

**It is very likely that the manufacturer's warranties will become invalid and void when using unsuitable or incorrect fuels.**

**NOTE!**

**If you are unsure of what fuel is in the field tank, do NOT use it in a machine.**

**Bio-diesel fuel**

Vegetable oils and/or esters, also called "bio-diesel", (e.g., rape-seed methyl ester, RME fuel) are offered on certain markets both as pure products and as mixed into the diesel fuel. Volvo CE accepts max. 7% intermix of bio-diesel fuel in the diesel fuel, ready-mixed from the oil companies.





## AdBlue®/DEF

### NOTICE

**Risk of machine damage.**

In the short term, use of the wrong fluid can lead to reduced engine power. In the long term, it can lead to damage to the SCR-system and the catalyst. Reusing AdBlue®/DEF can lead to contamination. Damages caused by the use of incorrect fluids will not be covered by the warranty.

**Always use fluid specified in ISO 22241-1. Do not reuse drained AdBlue®/DEF.**

In order to fulfil US Tier 4 Final, California Tier 4 Final, and EUs Step IV emission requirements, Volvo has developed new engines. For reducing nitrogen oxides (NO<sub>x</sub>) these engines are equipped with a selective catalytic reduction system (SCR-system). A diesel exhaust fluid is needed for the process to work. The fluid is called AdBlue® in Europe and Asia, but in North America it is called Diesel Exhaust Fluid (DEF). When needed, the SCR-system warms up the AdBlue®/DEF-tank and lines.

The fluid is filled in a separate tank, which is completely separated from the fuel tank. AdBlue®/DEF may not be mixed in the fuel tank and fuel may not be mixed in the AdBlue®/DEF-tank.

AdBlue®/DEF consists of urea crystals (32.5%) and distilled water (67.5%). It is transparent, clear, and has a slight odour of ammonia. The fluid is not considered to be hazardous, but should still be handled with care. It is very corrosive, especially with copper and aluminium. For this reason, avoid spilling the fluid on electric cables and components. Always wipe up any spilled AdBlue®/DEF.

AdBlue®/DEF is not a combustible product. When exposed to high temperatures it will convert to ammonia and carbon dioxide. The fluid should not come into contact with other chemicals or be mixed with other chemicals.

AdBlue®/DEF is sensitive to both high and low temperatures. It should not be exposed to direct sunlight for any extended period of time. If the machine is not in use, AdBlue®/DEF starts to freeze at -11 °C (12 °F). The fluid volume in the tank increases, why it is important to follow the recommended fill volume. AdBlue®/DEF is not broken down or degraded in case it freezes. The SCR-system will thaw the fluid so that it regains its concentration with maintained quality. The machine will work normally during the time that the fluid melts.

At AdBlue®/DEF-temperatures above 20 °C (68 °F) the fluid starts to degrade. Then the fluid gives off ammonia, which is aggressive to, i.e., rubber. At temperatures above 75–80 °C (167–176 °F), ammonia production increases. However, high temperatures are permitted for a short time.

AdBlue®/DEF should be stored in a cool, dry, and ventilated place. The fluid may not be stored in direct sunlight. The recommended storage temperature for AdBlue®/DEF is between -11 °C (12 °F) and 25 °C (77 °F). Under these conditions, storage life is approx. two years. Long-term storage of AdBlue®/DEF at a temperature above 25 °C (77 °F) can reduce the lifetime of the fluid. A short time exposure to higher temperatures has no impact on the quality.



## Specifications

### 280 Fuel system

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#### **NOTE!**

If the machine is to be parked for an extended period of time (several months) in ambient temperatures above 40 °C (104 °F) the tank must be drained. This to prevent the fluid from having the wrong quality when starting the machine or that precipitates have a negative impact on the component parts.

#### **NOTE!**

If the tank has been drained completely it should be rinsed out with distilled water or new AdBlue®/DEF before new fluid is filled. Never reuse old fluid. If ordinary water is used when rinsing there is a risk that the system will generate an alarm due to wrong quality of AdBlue®/DEF.

AdBlue®/DEF is available in plastic container, barrel, IBC, or bulk.

For information on ordering AdBlue®/DEF (only applies to USA-market):

- Volvo CE Customer Support: 1-877-823-1111 (office hours)
- [www.volvoce.com](http://www.volvoce.com) (outside of office hours)

For information on ordering AdBlue®/DEF (other markets), contact your local Volvo dealer.

#### **Actions in case of contact with AdBlue®/DEF:**

- In case of skin contact, rinse thoroughly with water. The fluid may cause irritation of the skin.
- In case of eye contact, rinse thoroughly for several minutes. If needed, contact a doctor for advice.
- In case of inhalation, breathe fresh air and contact a doctor if needed.
- If swallowed, drink water and contact a doctor.



## Service capacities and change intervals

### Change capacities

Oils and fluids	Filling capacities
Engine, incl. filter	11.5 litres (3.0 US gal)
Oil bath air cleaner (optional equipment)	2.5 litres (0.7 US gal)
Front axle	17.5 litres (4.6 US gal)
Rear axle with transfer box (common oil household)	18.6 litres (4.9 US gal)
Hydraulic system, incl. tank	140 litres (37.0 US gal)
Hydraulic oil tank	90 litres (23.8 US gal)
Fuel tank	160 litres (42.3 US gal)
AdBlue®/DEF-tank	20 litres (5.3 US gal)
Coolant	20 litres (5.3 US gal)
Air conditioning	1.5 kg (3.3 lb)

### Change intervals

Oil and fluid changes	Change intervals *)
Engine oil (a)	500 operating hours
Front and rear axle with transfer box (b)	1000 operating hours
Hydraulic oil (c)	1500 operating hours
Coolant (VCS coolant) (d)	6000 operating hours

a) At least once every year. For conditions which have to be met, if the interval is to apply, see page 275.

b) At least once every year.

c) At least once every year.

d) Change coolant every 6000 hours or at least every fourth year.

Filter replacements	Change intervals *)
Engine, oil filter (a)	500 operating hours
Fuel filters, primary (b)	500 operating hours



Specifications  
**282 Service capacities and change intervals**

Fuel filters, secondary (c)	500 operating hours
AdBlue®/DEF-filter	500 operating hours
Air cleaner, primary filter (d)	1000 operating hours
Cab asbestos filter (optional equipment)	1000 operating hours
Cab ventilation prefilter	1000 operating hours
Hydraulic oil filter and breather filter (e) (f)	1500 operating hours
Cab ventilation main filter (g)	2000 operating hours
Fuel system, breather filter	2000 operating hours
Air cleaner, secondary filter (h)	2000 operating hours
AdBlue®/DEF-tank breather filter	4500 operating hours

a) At least once every year. For conditions which have to be met, if the interval is to apply, see page 275.

b) At least once every year, or when changing the engine oil filter, which may mean a shorter interval.

c) At least once every year, or when changing the engine oil filter, which may mean a shorter interval.

d) Replace at signal, every 1000 hours or at least once a year.

e) At least once every year.

f) When using external hydraulic equipment, e.g. road sweeper, drill, snow blower or similar, the oil should be changed every 1000 hours.

g) The interval between cab filter replacements can be increased or reduced depending on how dusty the working environment is.

h) Replace every 2000 hours or when the primary air filter has been replaced max. 3 times.

\*) These intervals apply under normal operating conditions and the recommended fuels and lubricants.



## Engine

Model	L45H	L50H
Make	In-line 4-stroke diesel engine with Common rail direct injection, turbo-charger and charge-air-cooler, Tier4f compliant with electronic control, passive regeneration with DPF and SCR.	In-line 4-stroke diesel engine with Common rail direct injection, turbo-charger and charge-air-cooler, Tier4f compliant with electronic control, passive regeneration with DPF and SCR.
Designation	D4J	D4J
Maximum power at rated rpm according to ISO 14396, gross	75 kW (102 hp)	87 kW (118 hp)
Maximum power at rated rpm according to ISO 9249, net	73 kW (99 hp)	85 kW (116 hp)
Maximum torque at 1450 rpm according to ISO 14396, gross	425 Nm (313 ft lb)	475 Nm (350 ft lb)
Maximum torque at 1450 rpm according to ISO 9249, net	416 Nm (307 ft lb)	466 Nm (344 ft lb)
Low idle speed	800 rpm	800 pm
High idle speed	2300 rpm	2300 rpm
Number of cylinders/design	4/in line	4/in line



284 Specifications  
Electrical system

## Electrical system

System voltage	24 V
Battery	2 pcs
Battery voltage	12 V
Battery, fully charged	12.75 V
Battery, discharge stop	10.5 V
Battery capacity	2 x 100 Ah
Battery, fully charged	12.75 V
Alternator, rated output	2.24 kW (3.0 hp)
Alternator, current rating	80 A
Starter motor output	5.5 kW (7.5 hp)

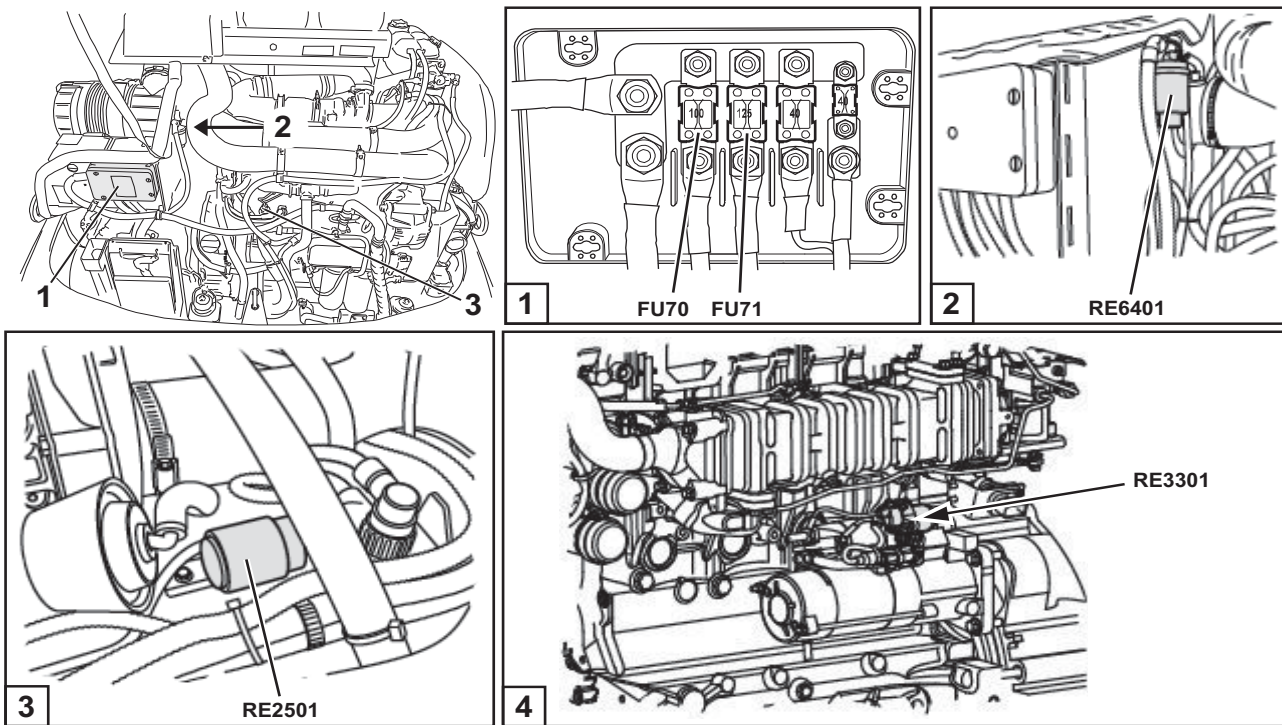
Bulbs	Watt	Socket
Head lights:	—	—
- Travel lights, low beam	65 W H7	PX 26 d
- Travel lights, high beam	70 W H3	PK 22 S
Parking lights, front/rear	T 4 W/R 10 W	BA 9 s/BA 15 s
Number plate light	R 10 W	BA 15 s
Tail lights	R 10 W	BA 15 s
Brake lights	P 21 W	BA 15 s
Direction indicators, front/rear	P 21 W/P 21 W	BA 15 s
Interior light	P 21 W	BA 15 s
Working lights	70 W H3	PK 22 s
Rotating warning beacon	70 W H1 and 5 W	PK 14.5 s
Backup lights	P 21 W	BA 15 s

### Relays and fuses in the engine compartment

**NOTE!**

Only use fuses with stated capacity (Ampere rating).

Risk of damaging or burning the printed circuit board!



V1160918

### Relays and fuses in the engine compartment

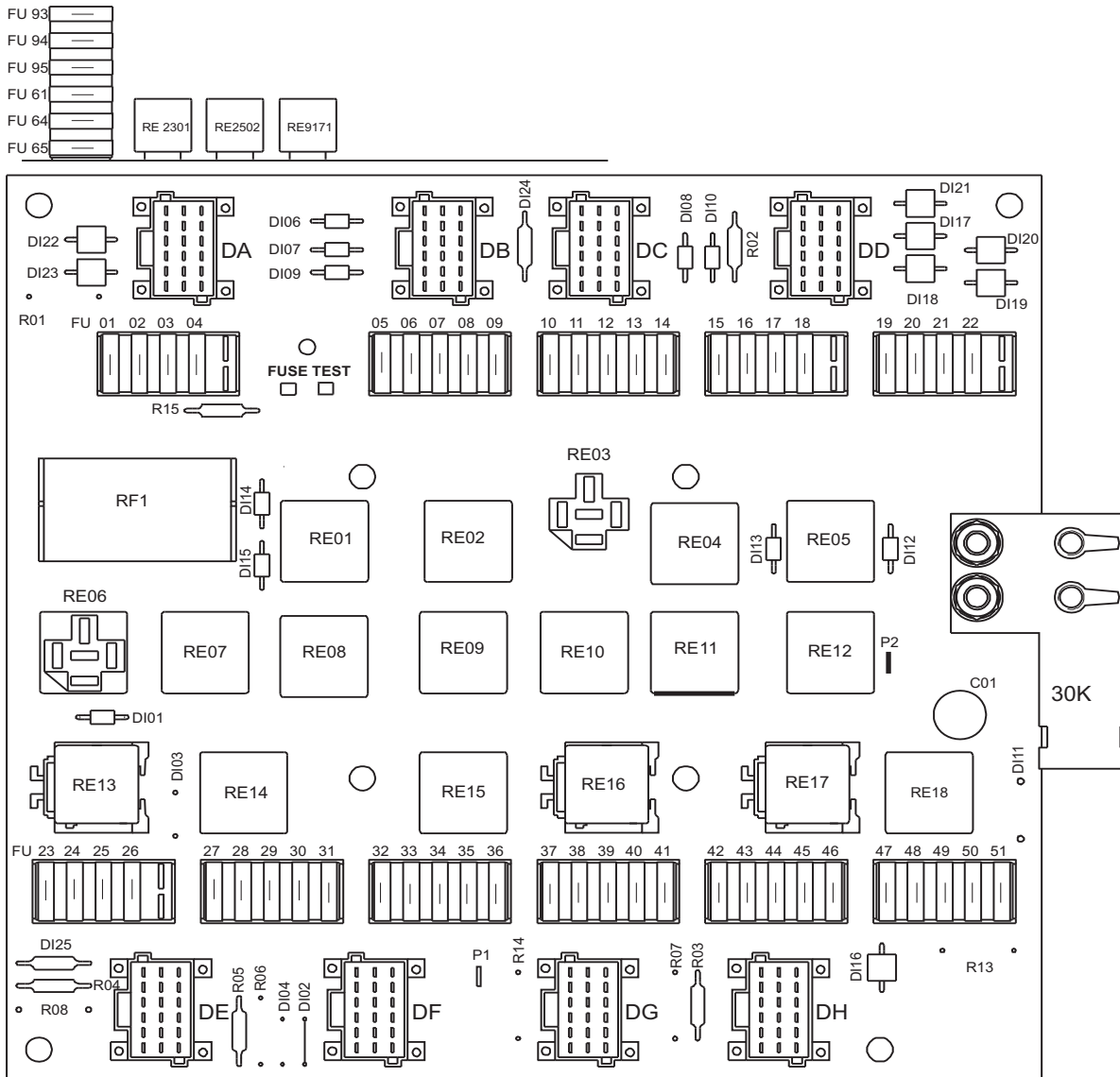
RE	A	Function	RE	A	Function
6401	150	Aux steering pump	3301	20	Starter motor
2501	20	Pre-heating induction air			

FU	A	Function	FU	A	Function
70	100	Cab power supply	71	125	Pre-heating



**286 Specifications**  
**Electrical system**

**Relays and fuses on the circuit board**  
**Relays**



V1159344

Relays					
RE	A	FUNCTION	RE	A	FUNCTION
01	20	Bucket positioner	12	20	ECU supply
02	20	Back-up alarm, reverse lights	13	40	ECU supply
03	20	Water pump on road sweeper	14	20	Voltage supply ECC (air conditioning), blower fan, pause heater
04	20	Working lights, cab rear	15	20	Windscreen wiper
05	20	Boom kick-out	16	40	15A feed
06	20	3rd and 4th hydraulic function	17	40	15B feed

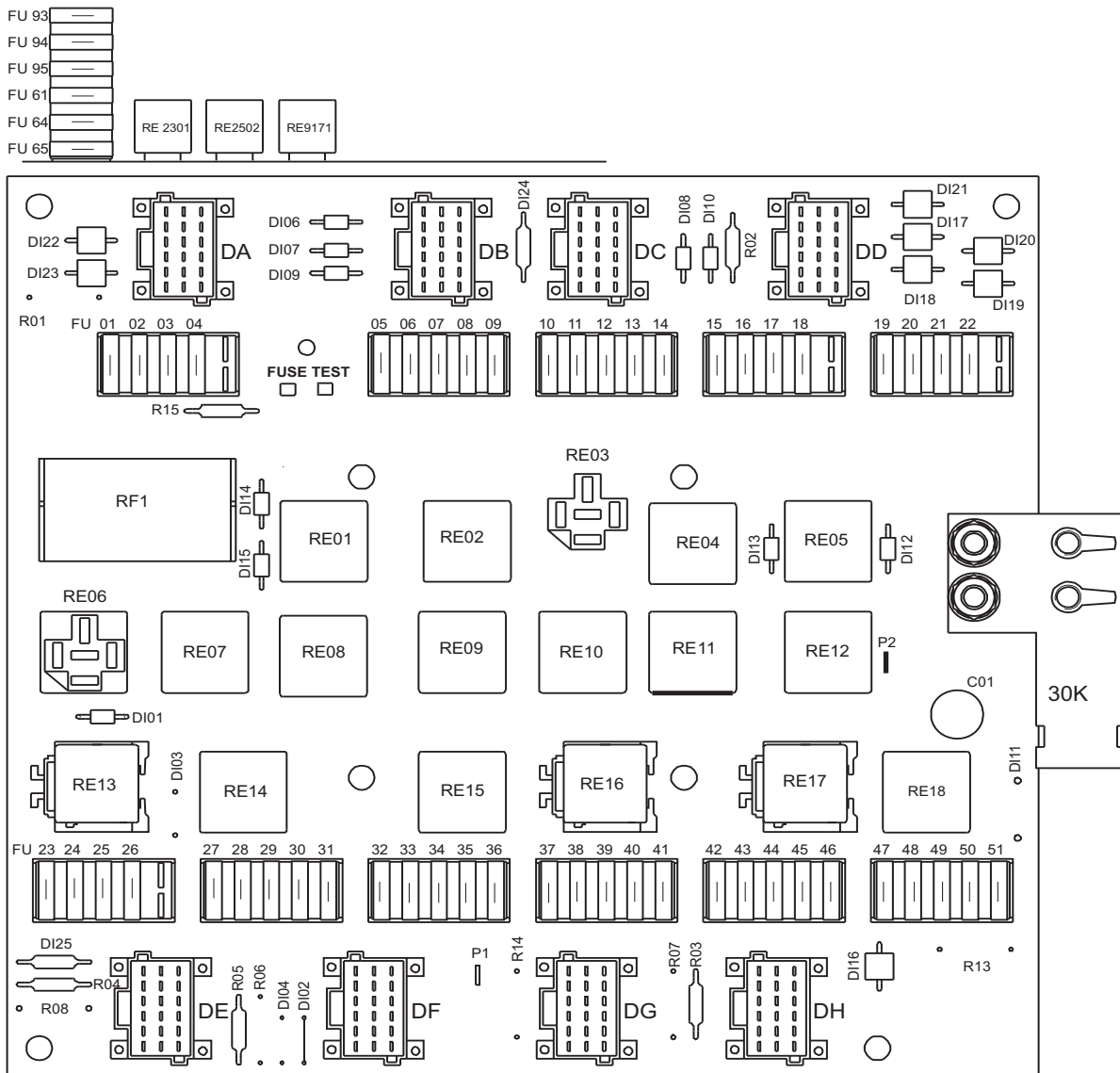




**Specifications**  
**Electrical system 287**

07	20	Working lights cab front	18	20	15EA feed, e.g. for Boom Suspension System (BSS)
08		Not used	RF	15	Flasher relay
09	20	Rear window wiper	RE	20	Fuel pre-filter heating
			23		
			01		
10	20	Stop lights	RE	20	Power supply for engine
			25		
			02		
11	20	Not used			

**Fuses**



V1159344

Fuses					
FU	A	FUNCTION	FU	A	FUNCTION



**288 Specifications  
Electrical system**

01	5	Brake lights	33	10	Hydraulic servo
02	10	HMICU, IC	34	10	High and low Beam, Windscreen Wiper and washer
03	15	Working lights cab front	35	10	Windshield wiper and washer rear
04	5	CCM	36	5	Alternator, hour counter
05	10	Position light front left and rear right, number plate, working lights (cab) front, cab rear	37	5	Direction indicators
06	5	Position light front right and rear left	38	5	Relay for Heated fuel prefilter
07	5	Low beam, left	39	10	Horn, electrically heated rearview mirrors, control of water pump on road sweeper
08	5	Low beam, right	40	10	Automatic greasing / Central lubrication
09	10	Reverse travel lights	41	10	Air suspension operator seat with seat heating, position sensor air suspension operators seat
10	5	High beam, right	42	5	Comfort Drive Control (CDC) (lever steering)
11	5	High beam, left	43	10	Transmission diagnostic
12	5	15RA supply radio, voltage converter	44	5	Rear view camera
13	15	Water pump on road sweeper	45	5	Not used
14	5	Hazard flashers, direction indicators	46	10	15EA sensor supply, brake accumulator pressure sensor, brake light switch, steering differential pressure monitor, hydraulic oil filter monitor
15	15	Working lights cab rear	47	10	Low beams
16	15	Not used	48	5	Parking brake (mechanical)
17	10	T-ECU, RE13 (ECUs)	49	5	Rear view camera
18	10	Power socket 24 Volt (lighter)	50	5	Boom Suspension System (BSS)
19	20	Travel lights, headlights	51	5	ECUs 15EA (voltage feed)
20	10	Ignition switch voltage supply	61	15	
21	10	Rotating warning beacon, interior lighting	64	5	Transmission diagnostic
22	5	Not used	65	15	Nox sensors
23	5	3rd and 4th hydraulic function	66	20	ECM supply
24	25	GPMECU3, HMICU	67	10	Not used
25	15	GPMECU1	68	25	ACM supply



Specifications  
**Electrical system**      **289**

26	15	CU6601, GPMECU2	74	15	Caretrack, voltage converter
27	20	CCM, Auxiliary Heater	75	15	Electronic battery disconnecting switch
28	10	AC compressor, cab pause heater water pump	FU 25 01	15 0	Engine pre-heating, heating flange (included in engine cable)
29	5	Not used	77	25	Auxiliary heater
30	5	ECM, ACM	79	20	Auxiliary heater
31	15	EGR, joystick supply, F-N-R, differential lock	93	20	ECM
32	10	Lock Work Hydraulics, Pallet fork, Attachment Locking	95	25	ACM



290 Specifications  
Transmission

## Transmission

### Hydrostatic travel system

Hydraulic pump, make	Volvo/Bosch Rexroth
Hydraulic pump, type	Axial piston pump, variable displacement
Hydraulic motor, make	Volvo/Bosch Rexroth
Hydraulic motor, type	Axial piston motor, variable displacement
<b>Travel speeds</b>	
1st speed range (forward/reverse)	0 - 5 km/h (0 - 3 mph)
2nd speed range	0-20 km/h (0-12 mph)

### Front axle

Make	Volvo/ZF
Type	Planetary axle, rigid
Differential lock, type	100%, dog clutch
Differential lock, operation	Electro-hydraulic

### Rear axle

Make	Volvo/ZF
Type	Planetary axle, oscillating
Differential lock, type	100%, dog clutch
Differential lock, operation	Electro-hydraulic



## Brake

Service brake, type	Oil-immersed disc brake in rear axle. Single circuit brake system with 1 pressure accumulator.
Service brake, disc thickness, new	5.5 mm (0.22 in)
Service brake, disc thickness, wear limit	4.5 mm (0.18 in)
Inching brake pedal	Hydraulic inching brake pedal for infinitely variable control of travel speed and service brake application.
Parking brake, type	Dry disc brake on front axle input flange. Hand lever operation.
Parking brake, disc thickness, new	12.7 mm (0.50 in)
Parking brake, disc thickness, wear limit	10.0 mm (0.39 in)



## Steering

Steering system, type	Articulated frame steering with Hydrostatic LS steering unit
Steering pump, type	Variable axial piston pump (working hydraulic pump)
Steering oil flow, max.	70 l/min (18.5 US gal/min)
Number of steering wheel revolutions, total	4.2
Steering cylinders	2 pcs., double-acting
Steering angle	±40°



## Wheels

Tires	L45G		L50G	
	Air pressures: bar / psi			
	front	rear	front	rear
15.5 - 25	3.5 (51)	2.5 (36)	3.5 (51)	2.5 (36)
15.5 R 25	3.25 (47)	2.5 (36)	3.5 (51)	2.5 (36)
17.5 - 25	3.0 (44)	2.5 (36)	3.5 (51)	2.5 (36)
17.5 R 25	3.0 (44)	2.5 (36)	3.5 (51)	2.5 (36)
440/80 R 24	3.0 (44)	2.5 (36)	3.25 (47)	2.75 (40)
500/70 R 24	2.75 (40)	2.0 (29)	3.0 (44)	2.25 (33)
540/65 R 24	2.25 (33)	2.0 (29)	2.5 (36)	2.25 (33)
600/55 - 26,5	1.75 (25)	1.25 (18)	2.0 (29)	1.25 (18)
15.5 R 25 VUT Bridgestone	3.75 (54)	3.25 (47))	4.25 (62)	3.5 (51)
*15.5 R 25 VSDL Bridgestone	3.75 (54)	3.25 (47))	4.25 (62)	3.5 (51)
17.5 R 25 VSW Bridgestone	3.0 (44)	3.0 (44)	3.5 (51)	3.0 (44)

\*) After approximately 6 km of road transport, the tires need to be cooled down 15 minutes.

The stated tyre pressures are guide values.

- If L4 or L5 tyres are used for loading-carrying operations, 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 tyre.

If other tires are used than those stated, the tire manufacturer should be contacted for information about the correct tire pressure.

All tires in the table are not available on all markets.

Contact your dealer for more information.

## Wheel nuts, tightening torque

Wheel bolts	
Tightening torque	560 – 600 Nm (413 – 443 lb ft)



## Cab

<b>General</b>	
The cab is installed on rubber pads, is insulated, and has a flat floor with rubber mat.	
Tested and approved as a protective cab and meets standards according to ISO 3471-1994 and SAE 1040-MAY 94 (ROPS), ISO 3449-2005 (FOPS).	
Number of emergency exits	2 (door and right side window)

<b>Heating and ventilation</b>
The basic version of the loader has a heating and ventilation system with defrosters for all windows and optimal air distribution (10 vents). Air conditioning is available as optional equipment.

<b>Operator seat</b>	
This machine is equipped with an operator's seat that meets the criteria for EN ISO 7096.	
Setting height (quick adjustment)	80 mm (3.15 in)
Setting fore-aft	160 mm (6.3 in)
Setting for operator's weight	40–130 kg (88–287 lbs)
Setting backrest (adjustable back angle)	12°
Upholstery	Flameproof
Lap type seat belt with reel	Yes

### Hand and arm vibrations

The hand and arm vibrations generated during real operating conditions, if the machine is used as intended, is less than 2.5 m/s<sup>2</sup> RMS (root mean square) acceleration according to ISO 8041.

### Whole-body vibrations

Whole-body vibrations generated during real operating conditions, if the machine is used as intended, is according to the following table.

Typical operating conditions	Vibration emission, value $a_{w,eqx}$ (m/s <sup>2</sup> RMS)	Vibration emission, value $a_{w,eqx}$ (m/s <sup>2</sup> RMS)	Vibration emission, value $a_{w,eqx}$ (m/s <sup>2</sup> RMS)
V-shaped loading and carrying work	0.6	0.6	0.6
Loading and carrying work	0.5	0.5	0.6
V-shaped loading and carrying work with pallet fork	0.5	0.5	0.5
Transporting operation	0.5	0.5	0.6





The following vibration directions are defined:

x = fore-aft

y = lateral

z = vertical

**NOTE!**

These values for generated whole-body vibrations were determined at special operating and ground conditions. Therefore they are not representative for all different conditions according to the intended use of the machine and should not be used as the only source to determine the whole-body vibrations to which an operator is exposed when using the machine. For this purpose, we recommend the information in ISO/CEN Technical Report.

To ensure that the generated whole-body vibrations are kept to the lowest possible value, see page 161.

**Sound information**

Sound pressure level (LpA) at operator's position (Measurement method according to ISO 6396)	70 dB(A) standard / 68 dB(A) optional
Sound power level (LWA) around the machine (Requirement of 2000/14/EC with applicable appendices and measurement method according to ISO 6395)	102 LwA dB(A)



296 Specifications  
Hydraulic system

## Hydraulic system

### Working hydraulics

Type	Closed-center LS system with flow sharing, main control valve pilot-operated
Axial piston pump, variable displacement	A4VG90DA
Hydraulic pump, flow, max	132 l/min (34.9 US gal/min) (L45H) 158 l/min (41.7 US gal/min) (L50H)
Tilt cylinder	1 pcs., double-acting
Lifting cylinders	2 pcs., double-acting

Cycle times	L45H	L50H
Lift-up (loaded)	4.8 sec.	4.7 sec.
Tipping	1.5 sec.	1.2 sec.
Lift-down (empty)	3.2 sec.	3.9 sec.



## Machine weights

### L45H

<p><b>Service weight</b> The operating weight is the machine's most common configuration + 10%. The machine's most common configuration includes:</p> <ul style="list-style-type: none"> <li>- Bucket (hook-on) 1.4 m<sup>3</sup> (1.8 yd<sup>3</sup>)</li> <li>- Tires 15.5 R25 L3</li> <li>- Standard boom with TPV attachment carrier</li> <li>- Operator and all fluids</li> </ul>	<p>9700 kg (21385 lb)</p>
<p><b>Max. machine weight</b> Max. machine weight (incl. equipment and attachment) (1)</p>	<p>9700 kg (21385 lb)</p>

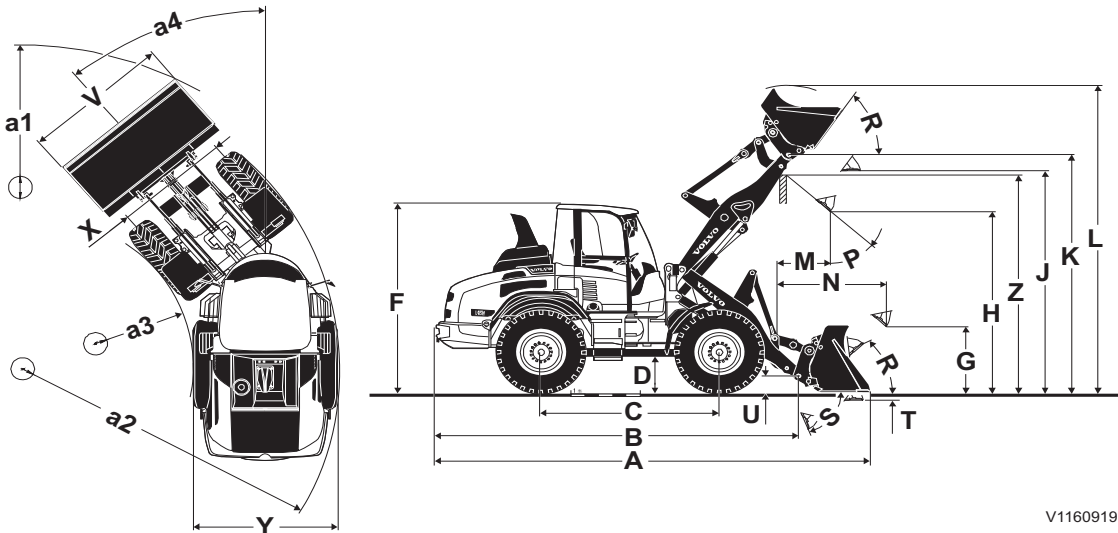
### L50H

<p><b>Service weight</b> The operating weight is the machine's most common configuration + 10%. The machine's most common configuration includes:</p> <ul style="list-style-type: none"> <li>- Bucket (hook-on) 1.6 m<sup>3</sup> (2.1 yd<sup>3</sup>)</li> <li>- Tires 17.5 R25 L3</li> <li>- Standard boom with TPV attachment carrier</li> <li>- Operator and all fluids</li> </ul>	<p>10500 kg (23148 lb)</p>
<p><b>Max. machine weight</b> Max. machine weight (incl. equipment and attachment) (1)</p>	<p>10500 kg (23148 lb)</p>

1. The machine is designed for a maximum machine weight acc. to the table. The max. weight applies when the machine is equipped for certain applications approved by Volvo. Safety will be jeopardized if the max. weight is exceeded. In addition, no manufacturer warranties are valid. However, always pay attention to national regulations for travelling on public roads.

## Dimensions

### L45H with attachment carrier type Z



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L45H with TP-Linkage, TPZ attachment carrier and 15.5-25 tires					
B	5325 mm	210 in	R	45°	
C	2650 mm	104 in	S	75°	
D	395 mm	16 in	U	255 mm	10 in
F	2950 mm	116 in	X	1750 mm	69 in
G	1000 mm	40 in	Y	2150 mm	85 in
J	3430 mm	135 in	Z	3360 mm	132 in
K	3685 mm	145 in	a <sub>2</sub>	4745 mm	187 in
O	55°		a <sub>3</sub>	2555 mm	101 in
P	45°		a <sub>4</sub>	±40°	

Data according to bucket type L45H with TP-Linkage, TPZ attachment carrier and 15.5-25 tires		Bucket type					
		Universal bucket		Light material bucket		4-in-1 bucket	High tipping bucket
Capacity heaped	m <sup>3</sup>	1.4	1.6	1.8	2.0	1.3	2.0
	yd <sup>3</sup>	1.8	2.1	2.4	2.6	1.7	2.6
Material density	kg/ m <sup>3</sup>	1900	1600	1400	1300	1900	1100
	lbs /yd <sup>3</sup>	3203	2697	2360	2191	3203	1854
Static tipping load straight	kg	6220	6120	6020	5890	6050	5260
	lbs	13713	13492	13272	12985	13338	11596
Static tipping load at full turn, 40°	kg	5500	5420	5330	5210	5350	4650
	lbs	12125	11949	11751	11486	11795	10251



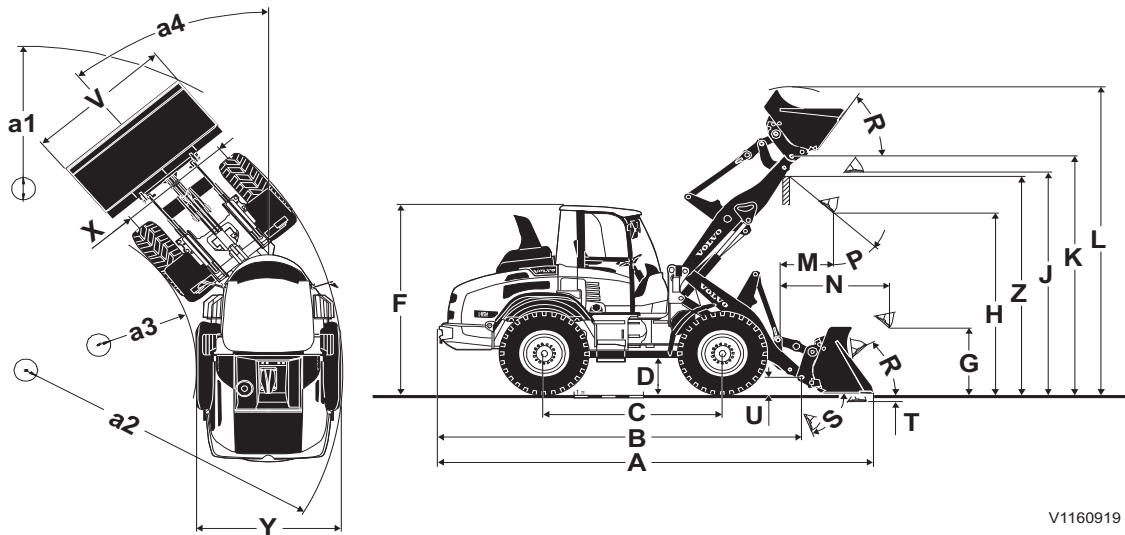
**Specifications**  
**Dimensions**      **299**

Hydraulic lifting capacity, max.	kN lbf	74.0 16636	72.5 16299	71.3 16029	69.5 15624	72.0 16186	62.0 13938
Breakout force	kN lbf	66.0 14837	60.5 13601	55.5 12477	50.0 11240	65.0 14613	– –
A Overall length	m m in	6260 246	6335 249	6415 253	6525 257	6270 247	6825 269
L Lift height, max.	m m in	4680 184	4750 187	4820 190	4890 193	4730 186	5610 221
V Bucket width	m m in	2250 89	2250 89	2250 89	2250 89	2250 89	2250 89
a1 Turning radius	m m in	10125 399	10165 400	10210 402	10275 405	10165 400	10590 417
T Digging depth	m m in	90 4	90 4	90 4	90 4	45 2	80 3
H Dump (tipping) height, 45°	m m in	2875 113	2815 111	2755 108	2675 105	2865 113	4140 163
M Reach at max. height	m m in	860 34	900 35	955 38	1030 41	850 33	1370 54
N Reach, max.	m m in	1685 66	1725 68	1780 70	1855 73	1670 66	2540 100
Operating weight	kg lbs	8670 19114	8710 19202	8700 19180	8730 19246	8920 19665	9120 20106

<b>Data with loading fork</b> Distance to centre of gravity 500 mm (20 in)		
Tipping load at full turn	kg (lbs)	4670 (19114)
Payload acc. to EN 474-3, 60/80%	kg (lbs)	2800/3730 (6173/8223)
Payload 80%, transport position, 40° full turn	kg (lbs)	4000 (8818)

300 Specifications  
Dimensions

L45GH with TP-Linkage, TPV attachment carrier (cast version)



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L45H with TP-Linkage, TPV attachment carrier (cast version) and 15.5-25 tires					
B	5320 mm	209 in	R	45°	
C	2650 mm	104 in	S	75°	
D	395 mm	16 in	U	255 mm	10 in
F	2950 mm	116 in	X	1750 mm	69 in
G	1000 mm	40 in	Y	2150 mm	85 in
J	3430 mm	135 in	Z	3445 mm	136 in
K	3685 mm	145 in	a <sub>2</sub>	4745 mm	187 in
O	55°		a <sub>3</sub>	2555 mm	101 in
P	45°		a <sub>4</sub>	±40°	

Data according to bucket type L45H with TP-linkage, TPV attachment carrier (cast version) and 15.5-25 tires		Bucket type					
		Universal bucket		Light material bucket		4-in-1 bucket	High tipping bucket
Capacity heaped	m <sup>3</sup>	1.4	1.5	1.8	2.0	1.2	2.0
	yd <sup>3</sup>	1.8	2	2.4	2.6	1.6	2.6
Material density	kg/ m <sup>3</sup>	1800	1700	1400	1200	1900	1000
	lbs /yd <sup>3</sup>	3034	2865	2358	2023	3203	1686
Static tipping load straight	kg	5940	5860	5710	5600	5580	4880
	lbs	13095	12919	12588	12346	12302	10759
Static tipping load at full turn, 40°	kg	5250	5190	5050	4960	4940	4320
	lbs	11574	11662	11133	10935	10891	9524



**Specifications**  
**Dimensions**      **301**

Hydraulic lifting capacity, max.	kN lbf	70.0 15736	69.4 15602	67.5 15175	66.0 14837	66.5 14950	57.5 12927
Breakout force	kN lbf	71.0 15961	69.4 15602	61.6 13848	55.8 12544	76.7 17243	– –
A Overall length	m m ft in	6370 251	6385 251	6505 256	6615 260	6295 248	6955 274
L Lift height, max.	m m ft in	4740 186	4790 189	4810 189	4940 194	4815 190	5695 224
V Bucket width	m m ft in	2250 89	2250 89	2250 89	2250 89	2250 89	2250 89
a1 Turning radius	m m ft in	10310 406	10320 406	10390 406	10460 409	10305 406	10675 420
T Digging depth	m m ft in	85 3	85 3	85 3	85 3	120 5	95 4
H Dump (tipping) height, 45°	m m ft in	2800 110	2780 109	2690 106	2610 103	2790 110	4230 167
M Reach at max. height	m m ft in	940 37	960 38	1040 41	1115 44	830 33	1500 59
N Reach, max.	m m ft in	1770 70	1785 70	1860 73	1935 76	1650 65	2685 106
Operating weight	kg lbs	8770 19335	8790 19379	8800 19401	8830 19467	8990 19820	9230 20349

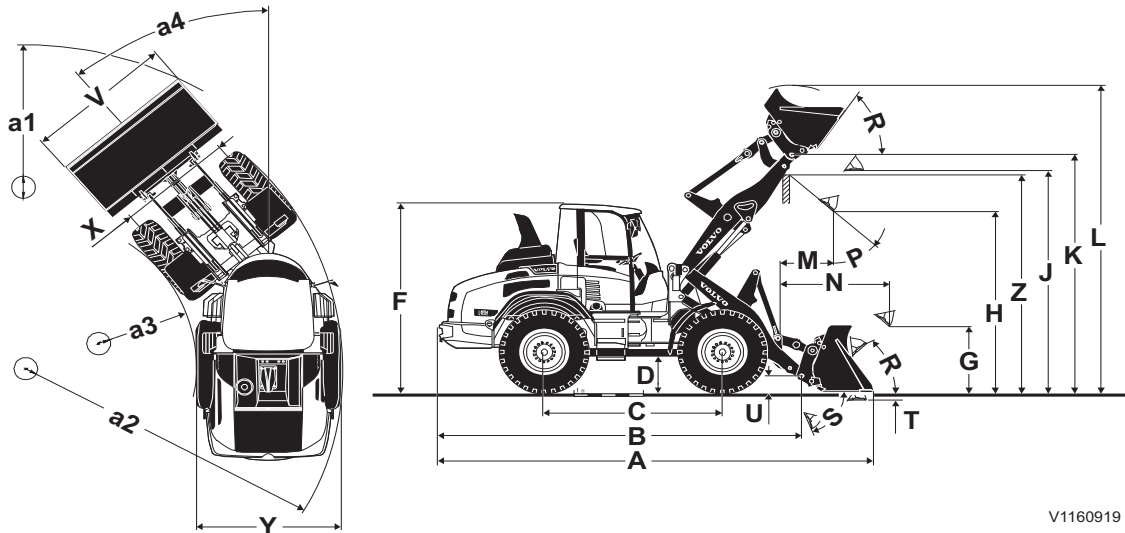
<b>Data with loading fork</b>		
Distance to centre of gravity 500 mm		
Tipping load at full turn	kg (lbs)	4380 (9656)



**302 Specifications  
Dimensions**

Payload acc. to EN 474-3, 60/80%	kg (lbs)	2620/3500 (5776/7716)
Payload 80%, transport position, 40° full turn	kg (lbs)	4000 (8818)

**L50H with attachment carrier type Z**



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L50H with TP-linkage, TPZ attachment carrier and 17.5-25 tires					
B	5385 mm	212 in	R	45°	
C	2650 mm	104 in	S	75°	
D	435 mm	17 in	U	255 mm	10 in
F	2980 mm	117 in	X	1730 mm	68 in
G	1000 mm	40 in	Y	2190 mm	86 in
J	3525 mm	139 in	Z	3455 mm	136 in
K	3780 mm	149 in	a <sub>2</sub>	4760 mm	187 in
O	55°		a <sub>3</sub>	2540 mm	100 in
P	45°		a <sub>4</sub>	±40°	

Data according to bucket type L50H with TP-linkage, TPZ attachment carrier and 17.5-25 tires		Bucket type					
		Universal bucket		Light material bucket		4-in-1 bucket	High tipping bucket
Capacity heaped	m <sup>3</sup>	1.6	1.8	2.0	2.5	1.4	2.3
	yd <sup>3</sup>	2.1	2.4	2.6	3.3	1.8	3.0
Material density	kg/ m <sup>3</sup>	1800	1600	1400	1100	1900	1100
	lbs /yd <sup>3</sup>	3033	2696	2360	1854	3202	1854
Static tipping load straight	kg	6840	6730	6600	6540	6770	5960





**Specifications**  
**Dimensions**      **303**

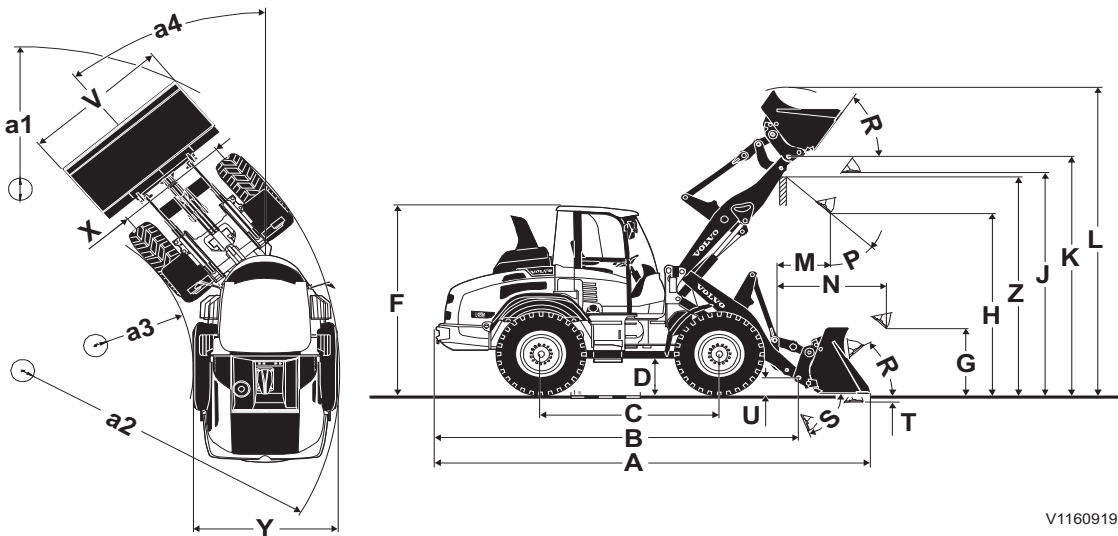
	lbs	15080	14837	14551	14418	14925	13140
Static tipping load at full turn, 40°	kg	6050	5960	5840	5970	6000	5280
	lbs	13338	13140	12875	13162	13228	11640
Hydraulic lifting capacity, max.	kN	90.0	88.5	86.5	85.0	88.5	78.0
	lbf	20233	19896	19446	19109	19896	17535
Breakout force	kN	74.0	68.0	61.0	53.0	71.0	–
	lbf	16636	15287	13713	11915	15691	–
A Overall length	m	6400	6480	6590	6740	6430	6890
	m						
	in	252	255	259	265	253	271
L Lift height, max.	m	4840	4900	4915	5170	4825	6200
	m						
	in	191	193	194	204	190	244
V Bucket width	m	2250	2250	2250	2250	2250	2250
	m						
	in	89	89	89	89	89	89
a1 Turning radius	m	10325	10370	10440	10530	10355	10635
	m						
	in	406	408	411	415	408	419
T Digging depth	m	100	100	100	95	60	95
	m						
	in	4	4	4	4	2	4
H Dump (tipping) height, 45°	m	2900	2845	2770	2660	2890	4230
	m						
	in	114	112	109	105	114	167
M Reach at max. height	m	880	930	1005	1100	890	1350
	m						
	in	35	37	40	43	35	53
N Reach, max.	m	1725	1775	1850	1950	1740	2540
	m						
	in	68	70	73	77	69	100
Operating weight	kg	9400	9440	9420	9470	9640	9850
	lbs	20723	20812	20768	20878	21253	21716

<b>Data with loading fork</b>		
Distance to centre of gravity 500 mm		
Tipping load at full turn	kg (lbs)	5100 (11244)

**Specifications**  
**304 Dimensions**

Payload acc. to EN 474-3, 60/80%	kg (lbs)	3060/4000 (6746/8818)
Payload 80%, transport position, 40° full turn	kg (lbs)	4000 (8818)

**L50H with attachment carrier type V, cast version**



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L50H with attachment carrier type V, cast version and 17.5-25 tires					
B	5380 mm	212 in	R	44°	
C	2650 mm	104 in	S	76°	
D	435 mm	17 in	U	255 mm	10 in
F	2980 mm	117 in	X	1730 mm	68 in
G	1000 mm	40 in	Y	2190 mm	86 in
J	3525 mm	139 in	Z	3535 mm	139 in
K	3780 mm	149 in	a <sub>2</sub>	4760 mm	187 in
O	54°		a <sub>3</sub>	2540 mm	100 in
P	45°		a <sub>4</sub>	±40°	

Data according to bucket type L50H with attachment carrier type V, cast version and 17.5-25 tires		Bucket type					
		Universal bucket		Light material bucket		4-in-1 bucket	High tipping bucket
Capacity heaped	m <sup>3</sup>	1,5	1,6	1,8	2,0	1,4	2,3
	yd <sup>3</sup>	2,0	2,1	2,4	2,6	1,8	3,0
Material density	kg/m <sup>3</sup>	1900	1700	1500	1300	1900	1000
	lbs/yd <sup>3</sup>	3203	3034	2528	2360	3203	1686



**Specifications**  
**Dimensions**      **305**

Static tipping load straight	kg	6560	6510	6400	6290	6080	5550
	lbs	14462	14352	14110	13867	13404	12236
Static tipping load at full turn, 40°	kg	5810	5750	5670	5570	5390	4910
	lbs	12809	12677	12500	12280	11883	10825
Hydraulic lifting capacity, max.	kN	86,5	86	84,5	83	81,5	73
	lbf	19446	19334	18996	18659	18322	16411
Breakout force	kN	72	69	64	58	65	—
	lbf	16186	15512	14388	13039	14613	—
A Overall length	m	6460	6495	6580	6690	6560	7030
	m						
L Lift height, max.	in	254	256	259	263	258	277
	m	4880	4900	4980	5235	4905	5915
V Bucket width	in	192	193	196	206	193	233
	m	2250	2250	2250	2250	2250	2250
a1 Turning radius	in	89	89	89	89	89	89
	m	10360	10385	10435	10505	10475	10740
T Digging depth	in	408	409	411	414	412	423
	m	95	95	95	95	130	105
H Dump (tipping) height, 45°	in	4	4	4	4	5	4
	m	2865	2845	2775	2695	2745	4330
M Reach at max. height	in	113	112	109	106	108	170
	m	965	1000	1040	1115	965	1505
N Reach, max.	in	38	39	41	44	38	59
	m	1810	1830	1890	1970	1810	2710
Operating weight	in	71	72	74	78	71	107
	kg	9480	9500	9490	9520	9740	9960
	lbs	20900	20944	20922	20988	21473	21958

<b>Data with loading fork</b>		
Distance to centre of gravity 500 mm (20 in)		
Tipping load at full turn	kg (lbs)	4810 (10604)



**306**      Specifications  
Dimensions

Payload acc. to EN 474-3, 60/80%	kg (lbs)	2880/3640 (6349/8025)
Payload 80%, transport position, 40° full turn	kg (lbs)	4000 (8818)



## Service history

Service 100 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> First 100 hours <input type="checkbox"/> Service and maintenance	

Service 500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 1000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> First 1000 hours <input type="checkbox"/> Service and maintenance	

Service 1500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 2000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 2500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 3000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 3500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 4000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	



**308 Specifications**  
**Service history**

Service 4500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 5000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 5500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 6000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 6500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 7000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 7500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 8000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 8500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		



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Service 9000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 9500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 10000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 10500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 11000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 11500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 12000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		



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