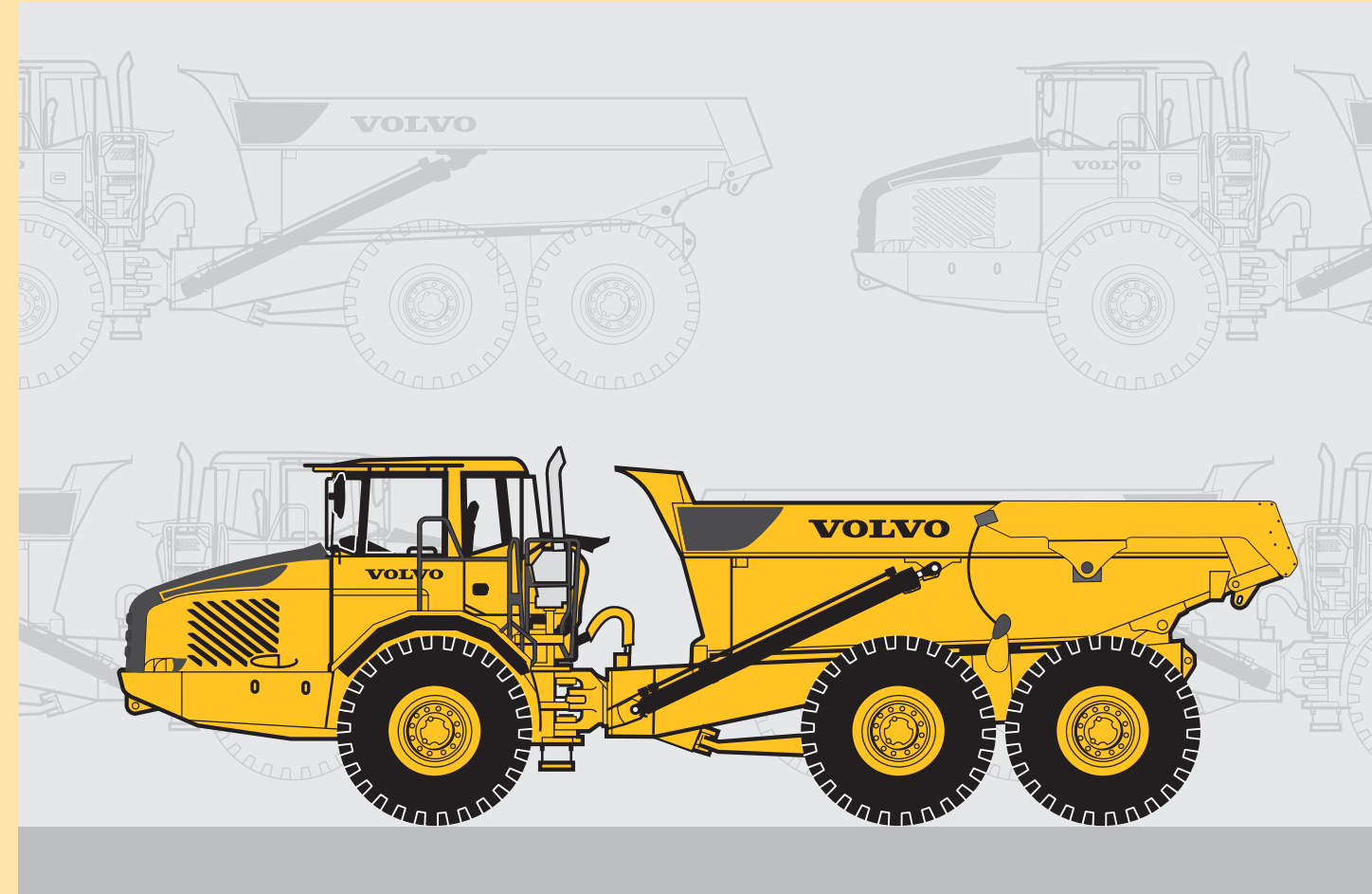


# A35E/A35EFS/A40E/A40EFS

A35E/A35EFS/A40E/A40EFS



**VOLVO**  
Volvo Construction Equipment

Ref.No. VOE21C1003521 English  
Printed in Sweden CST

**MORE CARE. BUILT IN.**



**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.**

# A35E/A35E FS / A40E/A40E FS

## Foreword

This Operator's Manual is intended as a guide for the correct use and maintenance of the machine. Therefore, study it carefully before starting and operating the machine, or before carrying out any preventive maintenance.

Keep the manual in the cab so that it always is at hand. Replace it immediately if it is lost.

The manual describes the applications for which the machine primarily is intended and is written to apply for all markets. We therefore ask you to disregard the sections which are not applicable to your machine or to the work for which you use your machine.

**NOTE! The information in the manual applies to machine models A35E, A35E FS, A40E and A40E FS, unless otherwise stated.**

Many hours are spent on design and production to make a machine that is as efficient and safe as possible. The accidents which occur in spite of this, are mostly caused by the human factor. A safety conscious person and a well maintained machine make a safe, efficient and profitable combination. **Therefore, read the safety instructions and follow them.**

We continually strive to improve our products and to make them more efficient through changes to their design. We retain the right to do this without committing ourselves to introduce these improvements on products, which have already been delivered. We also retain the right to change data and equipment, as well as instructions for service and other maintenance measures without prior notice.

## Safety regulations

It is the operator's obligation to know and follow the applicable national and local safety regulations. The safety instructions in this manual only apply to cases when there are no national or local regulations.



### WARNING!

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

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

## OPERATOR'S MANUAL

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Operating techniques



Safety when servicing

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Ref.No. VOE21C1003521

The original language is Swedish

Printed in Sweden, 2009.03

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## 2 Identification numbers

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### Identification numbers

State the identification number of the machine and the components below. The number should be stated when contacting the manufacturer and when ordering spare parts. Update the list when a component is replaced. The position of the plates is shown on page 11.

|                                          |                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Manufacturer                             | Volvo Construction Equipment AB<br>Hauler & Loader Division<br>Carl Lihnell's väg<br>SE-360 42 BRAÅS<br>Sweden |
| Machine Product<br>Identification Number |                                                                                                                |
| Engine                                   |                                                                                                                |
| Transmission                             |                                                                                                                |
| Dropbox                                  |                                                                                                                |
| Front axle                               |                                                                                                                |
| Front bogie axle                         |                                                                                                                |
| Rear bogie axle                          |                                                                                                                |
| Cab                                      |                                                                                                                |

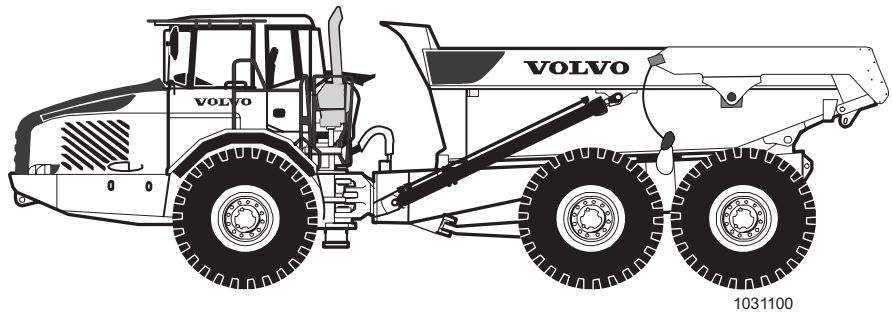
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## Presentation



Volvo A35E/A35E FS 6×6 is a three-axle, sprung hauler with articulated frame steering and a load capacity of 33.5 tonnes (36.9 sh tons) or 20.5 m<sup>3</sup> (26.8 yd<sup>3</sup>).

Volvo A40E/A40E FS 6×6 is a three-axle, sprung hauler with articulated frame steering and a load capacity of 39 tonnes (43.0 sh tons) or 24 m<sup>3</sup> (31.4 yd<sup>3</sup>).

All machines have 4-wheel drive with 6-wheel drive, which can be engaged and disengaged.

### Intended use

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

### Environmental requirements

Bear the environment in mind during all operation, and when servicing and maintaining the machine. Always follow local and national environmental legislation that apply to all handling of the machine.

### Engine

The machine is equipped with a straight, six-cylinder, four-stroke, diesel engine. The engine is a direct-injection, turbocharged low-emission engine with intercooler.

### Electrical system

The machine has four control units (ECUs). The I-ECU (for the instrumentation) is integrated with the display unit, warning lamps and instruments and provides the operator with information via these. The V-ECU (for the machine) receives signals from sensors on the machine and these are sent to the I-ECU. The T-ECU controls the transmission. The E-ECU controls the engine.

Machines with Full Suspension have one further V-ECU.

## Power transmission

**The transmission** is fully automatic and of the planetary gear type. It has a torque converter with free-wheeling stator and automatic direct drive clutch (lockup) in all gears. The machine has nine forward and three reverse gears.

**The dropbox** has a differential, which distributes the torque equally between the front and rear axles, thus reducing tyre and road wear as well as fuel consumption. The longitudinal differential is provided with a locking function.

**The drive axles** are provided with a differential and hub reduction gears of the planetary gear type. All drive axles have a differential lock.

## Brakes

### Service brakes

The machine is provided with dual-circuit, all-hydraulically controlled wet brakes, with one brake circuit for the tractor unit and one for the trailer unit. The brake units are fully encased, oil-cooled, disc brakes with external cooling.

### Exhaust retarder / engine retarder

Depending on the setting of certain switches exhaust brake and engine braking are available to decrease wear of the brakes.

### Parking brake

The parking brake is of the spring brake type, which acts on the propeller shaft. As the differential lock in the dropbox is engaged at the same time as the parking brake, the latter will act on the two front axles. The spring brake has a separate compressed-air circuit for releasing the brake.

## Steering system

The steering system is self-compensating, hydro-mechanical and has a secondary steering function. A ground-dependent pump on the dropbox allows the steering to function even if the engine should stop.



## Cab

The cab has a heating and ventilation system with defrosting for the windows. Air conditioning is available as an option. The cab has two emergency exits, the door and the rear right side window, which must be broken with the hammer kept in the cab, if the window has to be used as an exit.

## FOPS and ROPS

The cab is approved as a protective cab according to the standards FOPS and ROPS, see page 188. FOPS is an abbreviation of Falling Object Protective Structure (roof protection) and ROPS is an abbreviation of Roll Over Protective Structure (rollover protection).

Never carry out any unauthorised alterations 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 alteration with personnel at the Volvo Engineering Department. This department will decide whether the alteration may cause the approval to become void.

## Modifications

Modifications to this machine including the use of unauthorised attachments, accessories, units or parts that may affect the machine integrity (condition) and/or the ability of the machine to function in the way for which it is designed. Persons or organisation who carry out unauthorised modifications, assume all responsibility for consequences, which arise because of the modification or can be attributed to the modification, including damaging affect on the machine.

No modifications of any kind may be carried out on this product unless each specific modification having first been approved in writing by Volvo Construction Equipment. Volvo Construction Equipment reserves the right to decline all warranty claims which have arisen because of or can be traced to unauthorised 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 made 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 respective product line at Volvo Construction Equipment.

## Additional structures

All modifications of the basic product may affect its stability. For example this applies when installing body height extension.

If the warranty is to apply, the additional structures must have been approved by Volvo CE.

### **Anti-theft device (optional equipment)**

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

### **Logged machine data**

The machine is equipped with a software system that registers and stores various types of information. The information can be transferred to Volvo CE in order to be used for product development purposes and for troubleshooting. The stored information contains among other items travelling speed, fuel consumption and various temperatures. Volvo CE and its authorised workshops will make use of this information.

### **CareTrack (optional equipment)**

The machine can be equipped with CareTrack, a telematics system developed by Volvo Construction Equipment. The system stores machine data, e.g., the machine's position, operating hours, fuel consumption, fuel level, that is available for wireless transmission to a computer. CareTrack 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 geographic fences. This helps eliminate unauthorised machine usage and theft. For further information, contact a Volvo Construction Equipment dealer.

**CareTrack is only available on certain markets. Contact your dealer for more information.**

### **Body height extension for light material (optional equipment)**

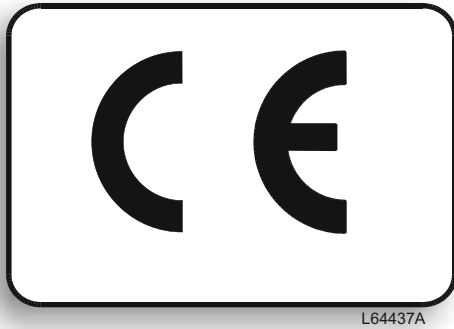
It is possible to equip the machine with body height extension in order to transport light material.

The body height extension is attached directly to the ordinary dump body and while it is mounted, only light material may be transported in the dump body.

### **Full Suspension (FS-system)**

A35E FS and A40E FS are equipped with Full Suspension, which is an all-hydraulic suspension system. Machines with Full Suspension do not have ordinary bogie members, rubber elements and shock absorbers. Instead frame and wheel axles on the machine are connected through six double-acting hydraulic cylinders.

The suspension is adapted according to ground conditions and load, which increases the operator comfort.



## CE marking, EMC directive

### CE marking

**(The Declaration of Conformity only applies to machines marketed within the EU/EEA).**

This machine is CE marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements", which are given in EU's so-called Machine Safety Directive, 98/37/EC.

Any person carrying out changes that affect the safety of the machine, is also responsible for the same.

As proof that the requirements are met, the machine is supplied with an EU Declaration of Conformity, issued by Volvo CE for each separate machine. This EU declaration also covers attachments manufactured by Volvo CE. The documentation is a valuable document, which should be kept safe and retained 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 at all times and in each separate case be maintained. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE marking and the issue of a new EU Declaration of Conformity.

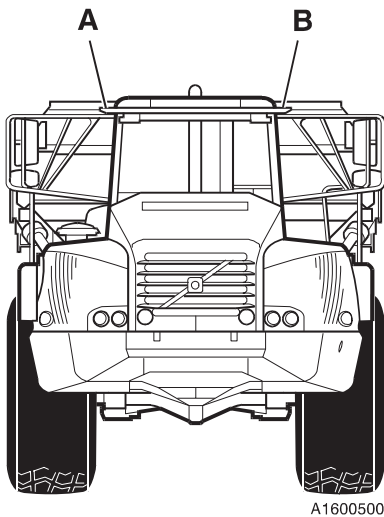
### The EU EMC Directive

The electronic equipment of the machine may in some cases cause interference to other electronic equipment, or suffer from external electromagnetic interference, which may constitute safety risks.

The EU EMC directive about "Electromagnetic compatibility", 2004/108/EC, provides a general description of what demands can be made on the machine out of a safety point of view, where permitted limits have been determined and given according to international standards.

A machine or device which meets the requirements should be CE marked. Our machines have been tested particularly for electromagnetic interference. The CE marking of the machine and the declaration of conformity also cover the EMC directive.

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



A Radio aerial  
B Telephone aerial / Two-way radio

## Communication equipment, installation

**IMPORTANT!** All installation of optional communication equipment must be carried out by trained professionals and in accordance with the Volvo CE instructions applicable to the machine.

### Protection against electromagnetic interference

This machine has been tested in accordance with EU directive 89/336/EEC governing electromagnetic interference. It is therefore very important that all non-approved electronic accessories, such as communication equipment, should be tested before installation and use, since they can cause interference to the electronic systems of the machine.

### Mobile telephones

To obtain the best functionality, mobile telephones should be permanently installed in the electrical system of the machine, with a permanent aerial fixed on the cab and installed as advised by the manufacturer. Note, that if a portable mobile telephone is used, it can constantly transmit information to its base station, even when the telephone is not used. For this reason, it must not be placed close to other electronic equipment in the machine, e.g. directly on a control panel or similar.

### Guidelines

The guidelines given below must be followed during installation:

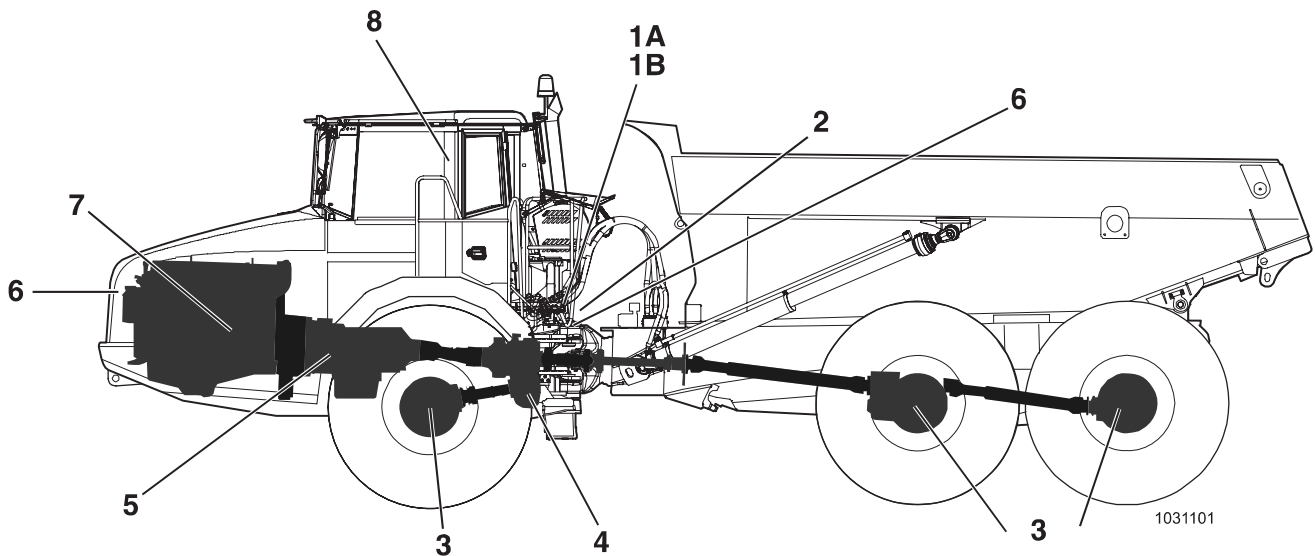
- The position of the aerial must be selected so that it is well adapted to the environment.
- The aerial downlead must be of the coaxial cable type. Make sure that the cable is undamaged, that the screen is not split up at the ends, but thoroughly encased in the connector and has a good galvanic contact with the same.
- The mating surface between the aerial mounting bracket and the bodywork must be clean metal surfaces, with all dirt and oxide removed. Protect the mating surfaces against corrosion after installation, to maintain good galvanic contact.
- Remember to keep interfering cables and those which may suffer from interference apart. Interfering cables are the power supply cables and the aerial cable to the communication equipment. Cables, which may suffer interference, run to and from electronic control units on the machine. Install cable harnesses as close to grounded plate surfaces as possible, as these have a screening effect.

## Plates and decals

### Product plates

The principle diagram below shows the product plates that are located on the machine.

When ordering spare parts and when making enquiries by telephone or correspondence, the model designation and **Product Identification Number (PIN)** should be stated.



- 1 Product plate with **Product Identification Number, PIN** for the complete machine (shows the model, product and serial numbers, machine weight, engine output and when applicable CE-approval). The plate is positioned on the left side of the tractor unit frame by the steering joint.  
**1A:** Product plate variant for markets outside the USA.  
**1B:** Product plate variant for the USA market only.
- 2 The serial number of the machine is stamped into the frame on the right side of the tractor unit, by the steering joint.
- 3 The serial number of the drive axles is positioned on the axle housing.
- 4 The serial number of the dropbox is positioned at the back of the box to the right.
- 5 The transmission type designation and serial number are positioned on its left side.
- 6 The decal "Important engine information" is positioned at the front end of the engine and on the left side of the tractor unit frame by the steering joint.
- 7 The engine type designation, part and serial numbers are stamped into both sides of the cylinder block.
- 8 Cab type, type approval and serial number are positioned on the left side in the cab.

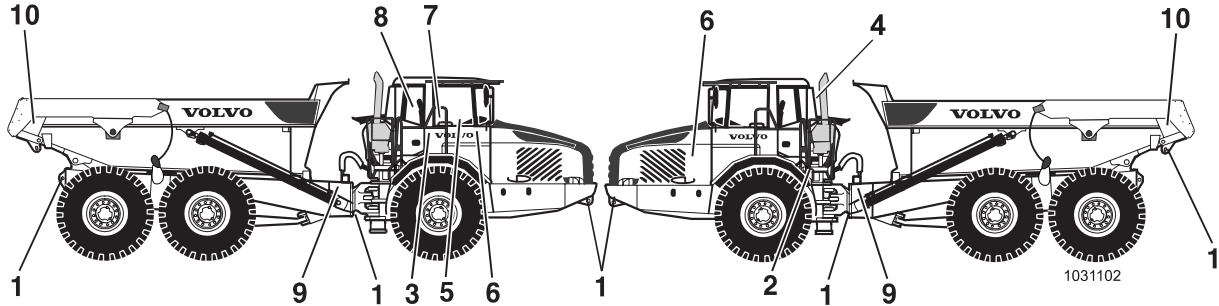
# 12 Plates and decals

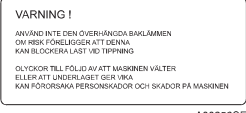
## Information and warning plates

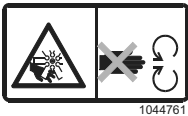
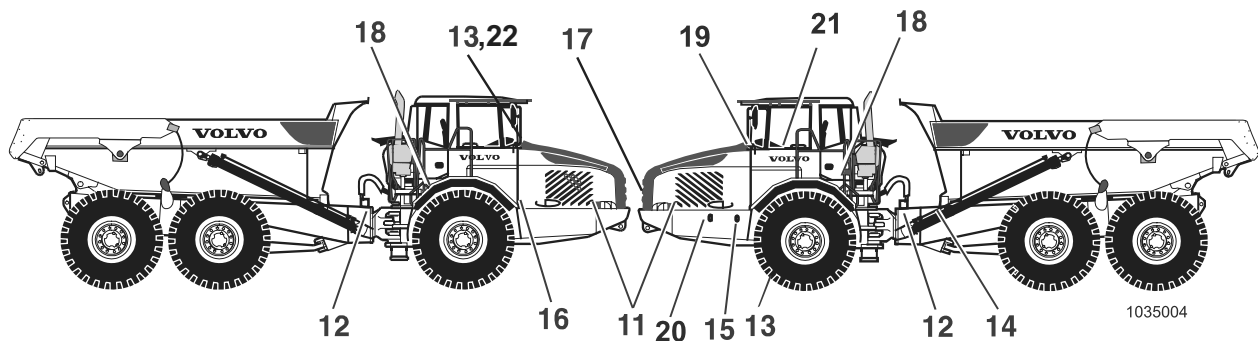
In the following is shown which warning texts and information texts that can be found on the machine. The machine operator should know and pay attention to warnings and information which are stated on decals and plates. Decals/plates which have disappeared, been damaged, painted over or are no longer legible for other reasons, should be replaced immediately.

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

**NOTE! The text "WARNING" appears on the warning decals on North America.**



|                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>1 Attaching point for lashing. (+ decal for FS-machine)</p>                                                                                                                                                                                             |  <p>2 Battery disconnect switch</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|  <p>3 Avoid directing water jet against air intakes.</p>                                                                                                                                                                                                  |  <p>4 WARNING! The machine must not carry a heavier load than what is stated on the decal (optional equipment on machines with body height extension for light materials).</p>                                                                                                                                                                                                                                                                                                                                           |
|  <p>5 WARNING! Do not operate downhill with the gear selector in neutral. Only change gear with the accelerator released.</p>                                                                                                                             | <div> <p><b>NOTICE: R134a AC-SYSTEM</b><br/>System designed acc. to SAE J639 rev.nov91<br/>Caution: System to be serviced by VCE qualified personnel.<br/>See VCE service instruction.</p> </div> <div> <p><b>Volvo Construction Equipment</b><br/>LUFTKOND. FYLLED MED 2.3-0.1 KG R134a<br/>ÖPPNINGSTRYCK SÄKERHETSVENTIL 38±3 BAR<br/>AIR COND. CHARGED WITH 2.3-0.1 KG R134a<br/>HIGH PRESSURE RELIEF VALVE SETTING 38±3 BAR</p> </div> <p>6 Air conditioning filled with R134a. Opening pressure, safety valve (optional equipment).</p> |
|  <p>7 WARNING! Do not use the overhung tail gate (optional equipment), if there is a risk that it may block the load when tipping. Accidents caused by the machine overturning or the ground giving way can cause injuries and damage to the machine.</p> |  <p>8 Emergency exit</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  <p>9 WARNING! Risk of crushing – articulated frame steering</p>                                                                                                                                                                                          |  <p>10 WARNING! Do not remain within the working area of a reversing machine.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                        |



11 WARNING! Rotating fan.



12 WARNING! Do not lean in under raised dump body, unless it is blocked.



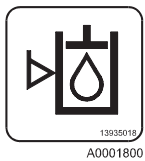
13 Brake system under pressure

tyre pressure in cold condition only (bar)

| tyre                           | front             | rear              |
|--------------------------------|-------------------|-------------------|
| Brigantone 28.5 R22.5 - 15.2   | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Brigantone 28.5 R22.5 - 15.5 S | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Good Year 28.5 R22.5 - 15.5 S  | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Good Year 28.5 R22.5 - 15.5 S  | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Good Year 28.5 R22.5 - 15.5 S  | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Good Year 28.5 R22.5 - 15.5 S  | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Michelin 28.5 R22.5 - 15.5 S   | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |
| Michelin 28.5 R22.5 - 15.5 S   | 350 kPa = 5.0 psi | 400 kPa = 5.8 psi |

Käyttöön otettaessa VCS:llä tarkistettava öljynpaine ja öljyn lämpötila.

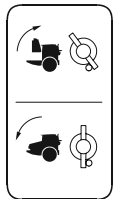
14 Tyre pressure



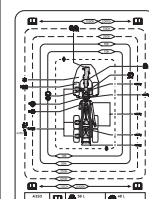
15 Hydraulic oil



16 Fuel



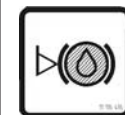
17 Engine hood



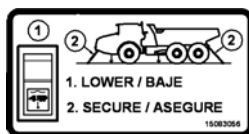
18 Service decal



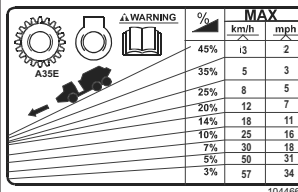
19 WARNING! Only use Volvo coolant VCS – read the Operator's Manual.



20 Brake cooling oil



21 Before transporting an FS-machine on another vehicle, lower the machine to bottom position.



22 Retarder decal (on page 85 the decal is shown in larger format and for each machine model).



## The USA Federal Clean Air Act

The Federal Clean Air Act Section 203.a (3) prohibits the removal of air pollution control devices or the modification of an EPA-certified non-road engine to a non certified configuration.

The Federal regulations implementing the Clean Air Act for non-road engines, 40 CFR 89.1003(a)(3)(i), reads as follows:

### **The following acts and the causing thereof are prohibited:**

For a person to remove or render inoperative a device or element of design installed on or in a non-road engine vehicle or equipment in compliance with the regulations under this part prior to its sale and delivery to the ultimate purchaser or for a person knowingly to remove or render inoperative such a device or element of design after the sale and delivery to the ultimate purchaser.

The law provides a penalty of up to \$2,750 for each violation.

An example of a prohibited modification is the recalibration of the fuel system so that the engine will exceed the certified horsepower or torque.

You should not make a change to an EPA-certified non-road engine that would result in an engine that does not match the engine configuration certified to meet the Federal Standards.

### **Customer Assistance**

Volvo Construction Equipment wishes to help assure that the Emission Control System Warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control System Warranty, you should contact the nearest Volvo Construction Equipment Regional office for assistance.



### **Normal Non-Road Engine Use**

The Maintenance Instructions are based on the assumption that this conventional machine will be used as designated in the Operator's Instruction Manual and operated only with the specified fuel and lubrication oils.

### **Non-Road Engine Maintenance**

The non-road engine is of conventional design and any local dealer may perform the necessary non-road engine emission control maintenance defined in this manual.

Volvo recommends that the purchaser use the service program for the non-road engine, known as Preventative Maintenance, including the recommended engine emission control maintenance.

In order to document that the proper regular maintenance has been performed on the non-road engine, Volvo recommends that the owner keep all records and receipts of such maintenance. These records and receipts should be transferred to each subsequent purchaser of the non-road engine.

### **Service Performed By Your Local Dealer**

Your local dealer is best suited to give you good, dependable service since he has trained service technicians and is equipped with genuine original manufacturer's parts and special tools as well as and the latest technical publications. Discuss your servicing and maintenance requirements with your local dealer. He can tailor a maintenance program for your needs.

For regular, scheduled service or maintenance, it is advisable to contact your local dealer in advance to arrange for an appointment to ensure availability of the correct equipment and service technician to work on your machine. In this way you will aid your local dealer in efforts to decrease service time on your machine.

### **Preventive Maintenance Program**

To retain the dependability, noise level and exhaust emission control performance originally built into your conventional non-road engine, it is essential that the non-road engine receives periodic service, inspections, adjustments and maintenance.

### **Fuel system**

Fuel Recommendations:

The fuel used must be clean, completely distilled, stable and non-corrosive. Distillation range, cetane level and sulfur content are most important when selecting fuel for optimum combustion and minimum wear.

Engine working conditions and ambient temperature influence the selection of the fuel with respect to cold handling properties and cetane levels.

If the machine is to operate in cold weather conditions, below 32 °F (0 °C), the use of lighter distillate or higher cetane level fuel are recommended. (Final boiling point max. 660 °F (349 °C) and cetane min. 45).

To avoid excessive deposit formation and to minimize the emissions of sulfur dioxide into the ambient air, the sulfur content of the fuel should be the lowest available. The diesel fuels recommended for use in Volvo engines should meet ASTM designation: D 975 No. 1D (C-B) or No. 2D (T-T) with a cetane level above 42 and sulfur content not exceeding 0.05 percent by weight.

**Check for fuel leaks** (while the engine is running at fast idle):

- Visually check unions and hose connections.

Check the condition of fuel hoses for:

- Ageing
- Cracks
- Blisters
- Scuffing

Check the condition of the fuel tank:

- Drain water condensation.
- Check for cracks.
- Check for leaks.
- Check the mounting.

Check the turbocharger:

- Visually check for leaks in the intake hoses and exhaust pipe of the turbocharger.

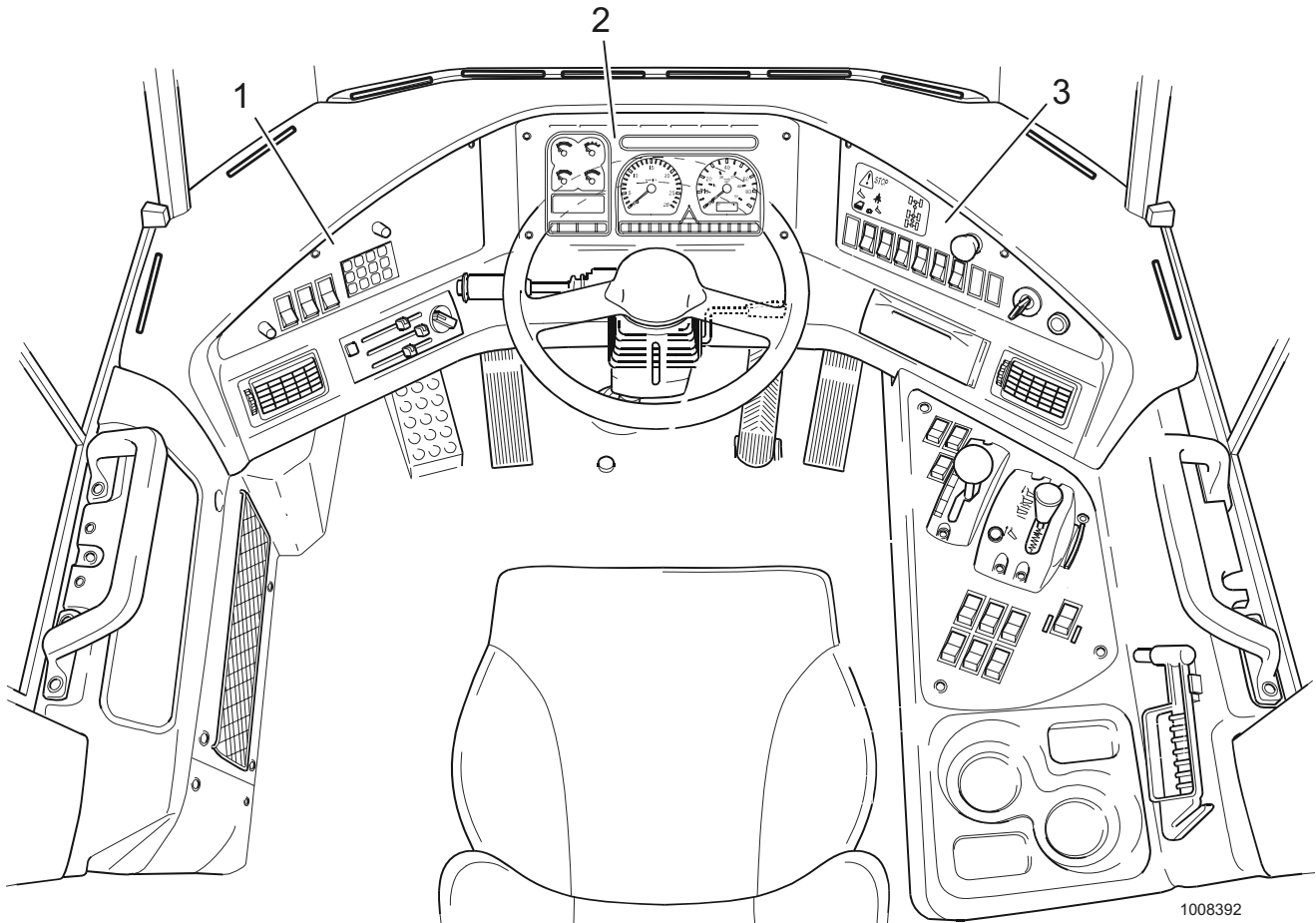
## Instrument panels



### WARNING!

Do not operate the machine until you are thoroughly familiar with the position and function of the various instruments and controls. Read through the Operator's Manual thoroughly – Your safety is involved!

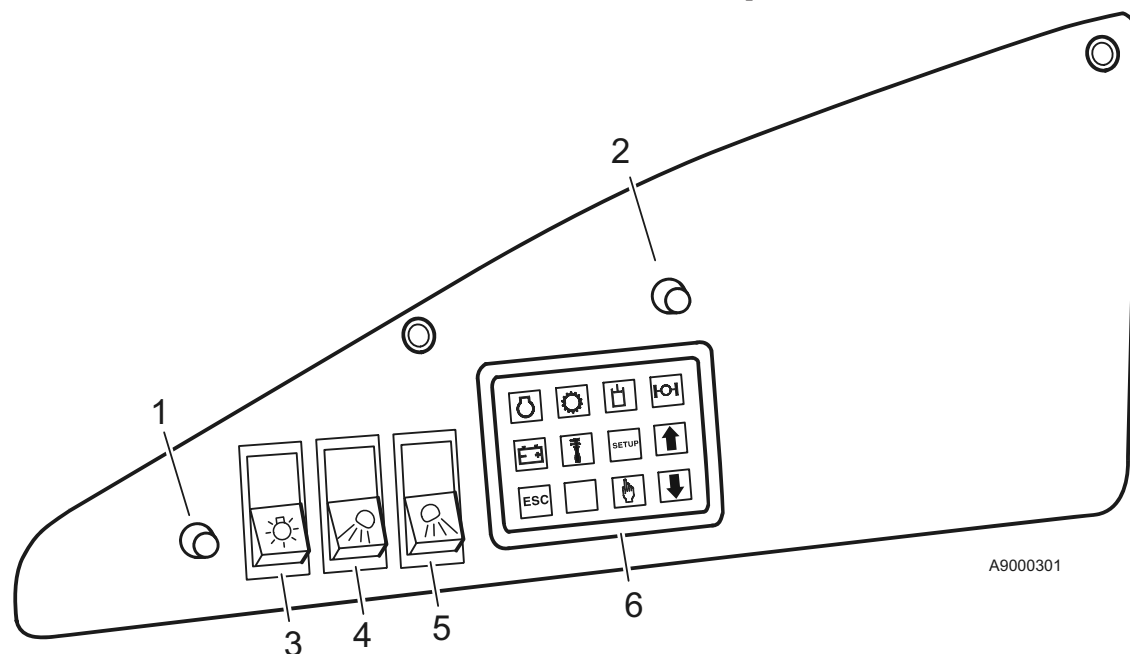
Keep the manual in the cab so that it always is at hand.



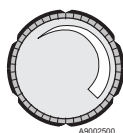
1008392

|   |                         |   |                        |
|---|-------------------------|---|------------------------|
| 1 | Left instrument panel   | 3 | Right instrument panel |
| 2 | Centre instrument panel |   |                        |

## Left instrument panel

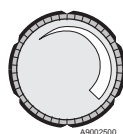


|   |                               |   |                                           |
|---|-------------------------------|---|-------------------------------------------|
| 1 | Rheostat, lights in switches  | 4 | Front working lights (optional equipment) |
| 2 | Rheostat, instrument lighting | 5 | Rear working lights (optional equipment)  |
| 3 | Travel lights                 | 6 | Keypad for display unit                   |



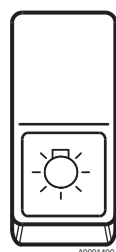
### 1 Rheostat, lights in switches

Regulates steplessly the light intensity in all switches.



### 2 Rheostat, instrument lighting

Regulates steplessly the light intensity for the centre instrument panel.



### 3 Travel lights

Upper end of switch pressed in = lights are off

Switch in centre position = parking and instrument lighting switched on

Lower end of switch pressed in = travel and instrument lighting switched on



A9001500

#### 4 Front working lights (optional equipment)

Upper end of switch pressed in = lights are off

Lower end of switch pressed in = front working lights switched on.

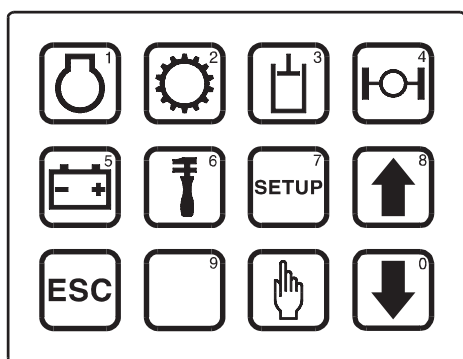


A9001600

#### 5 Rear working lights (optional equipment)

Upper end of switch pressed in = lights are off

Lower end of switch pressed in = rear working lights switched on.



A1300700

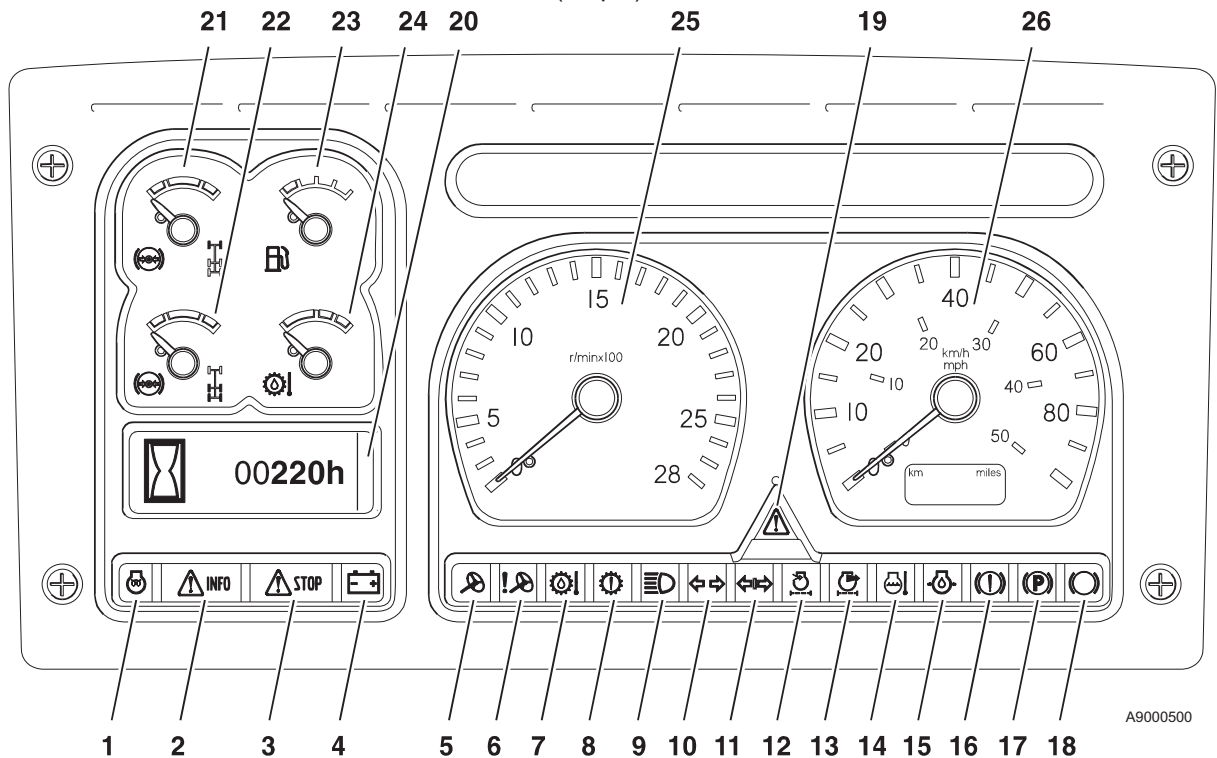
#### 6 Keypad for display unit

With this keypad it is possible to select any menu or function you would like to see on the display unit (positioned within the main instrument), see page 28.

## Centre instrument panel

If, during the start-up sequence, any of these lamps do not light up when the ignition key is turned to running position (1), the lamp is faulty or a fault has occurred in the electrical system. This should be dealt with before start.

All lamps should go out when the engine starts, apart from the parking brake lamp, which does not go out until a pressure of 570 kPa (83 psi) has been reached.



|    |                                              |    |                                            |
|----|----------------------------------------------|----|--------------------------------------------|
| 1  | Preheating connected                         | 14 | Coolant temperature high                   |
| 2  | Central warning, amber                       | 15 | Engine oil pressure low                    |
| 3  | Central warning, red                         | 16 | Brake system oil pressure low              |
| 4  | Charging faulty                              | 17 | Parking brake applied                      |
| 5  | Secondary steering system out of order       | 18 | Service brakes applied                     |
| 6  | Primary steering system out of order         | 19 | Central warning, amber                     |
| 7  | Transmission oil temperature high            | 20 | Display unit                               |
| 8  | Transmission sensor malfunctioning or faulty | 21 | Brake circuit oil pressure in tractor unit |
| 9  | High beams switched on                       | 22 | Brake circuit oil pressure in trailer unit |
| 10 | Direction indicators, tractor unit           | 23 | Fuel gauge                                 |
| 11 | Direction indicators, trailer unit           | 24 | Transmission oil temperature               |
| 12 | Engine air filter clogged                    | 25 | Tachometer                                 |
| 13 | Is not used                                  | 26 | Speedometer/odometer                       |



A1345000

### 1 Preheating connected

Lights when the engine preheating element is connected.

Flashes if the engine coolant temperature is below 0 °C (+32 °F), and the ignition key is in position 1, preheating it is recommended.



A1345200

### 2 Central warning (INFO), amber

Lights/flashs in case of the existence of abnormal condition.

Measures may have to be taken depending on the function concerned – investigate the cause at the next stop. See page 37.

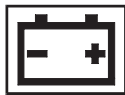


A1345300

### 3 Central warning (STOP), red

**NOTE!** If the lamp flashes while operating – stop the machine immediately and investigate the cause.

See page 37.



A1345400

### 4 Charging faulty

Lights when the alternator does not provide charging voltage.



A1345500

### 5 Secondary steering system out of order

Lights if the secondary steering system is out of order.



A1345600

### 6 Primary steering system out of order

Lights if the primary steering system is out of order.

**NOTE!** Stop the machine and investigate the cause.



A1345700

### 7 Transmission oil temperature high

Lights if the transmission oil temperature is too high.



A1345800

### 8 Transmission sensor malfunctioning or faulty

Lights in case of malfunction or faulty sensor in the transmission.

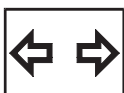
**NOTE!** Stop the machine, stop the engine and contact workshop authorised by Volvo CE.



A1345900

### 9 High beams switched on

Lights when the high beams are on.



A1346000

### 10 Direction indicators, tractor unit

Flashes when the direction indicators have been activated.

Indicates that the tractor unit direction indicators are working.



A1363300

### 11 Direction indicators, trailer unit

Flashes when the direction indicators have been activated.  
Indicates that the trailer unit direction indicators are working.



A1346100

### 12 Engine air filter clogged

Lights if the engine air filter is clogged – replace or clean the filter.



A1346200

### 13 Exhaust emission control

Is not used.



A1346300

### 14 Coolant temperature high

Lights if engine coolant temperature is too high.



A1346400

### 15 Engine oil pressure low

Lights if engine oil pressure is too low.



A1346500

### 16 Brake system oil pressure low

Lights if the hydraulic oil pressure in the brake system is too low.



A1346600

### 17 Parking brake applied

Lights when the parking brake is applied.



A1346700

### 18 Service brakes applied

Lights when the service brakes are applied.



A1345100

### 19 Central warning, amber

Lights/flashes in case of the existence of abnormal condition.  
Measures may have to be taken depending on the function concerned – investigate the cause at the next stop. See page 37.

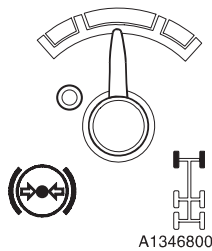


A9000600

### 20 Display unit

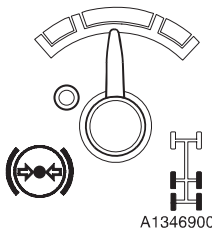
An LCD screen shows many different screens (menus) regarding the condition and state of the machine. Through the display unit you can yourself, with the aid of the keyboard on the left instrument panel, select which menu you want to see, see page 28.





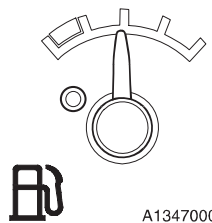
### 21 Brake circuit oil pressure in tractor unit

Shows the hydraulic oil pressure in the tractor unit brake circuit.



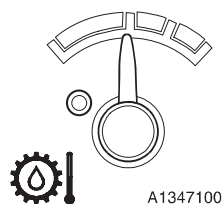
### 22 Brake circuit oil pressure in trailer unit

Shows the hydraulic oil pressure in the trailer unit brake circuit.



### 23 Fuel gauge

Shows the level in the fuel tank.



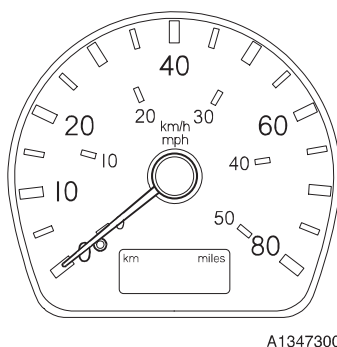
### 24 Transmission oil temperature

Shows the oil temperature in the transmission.



### 25 Tachometer

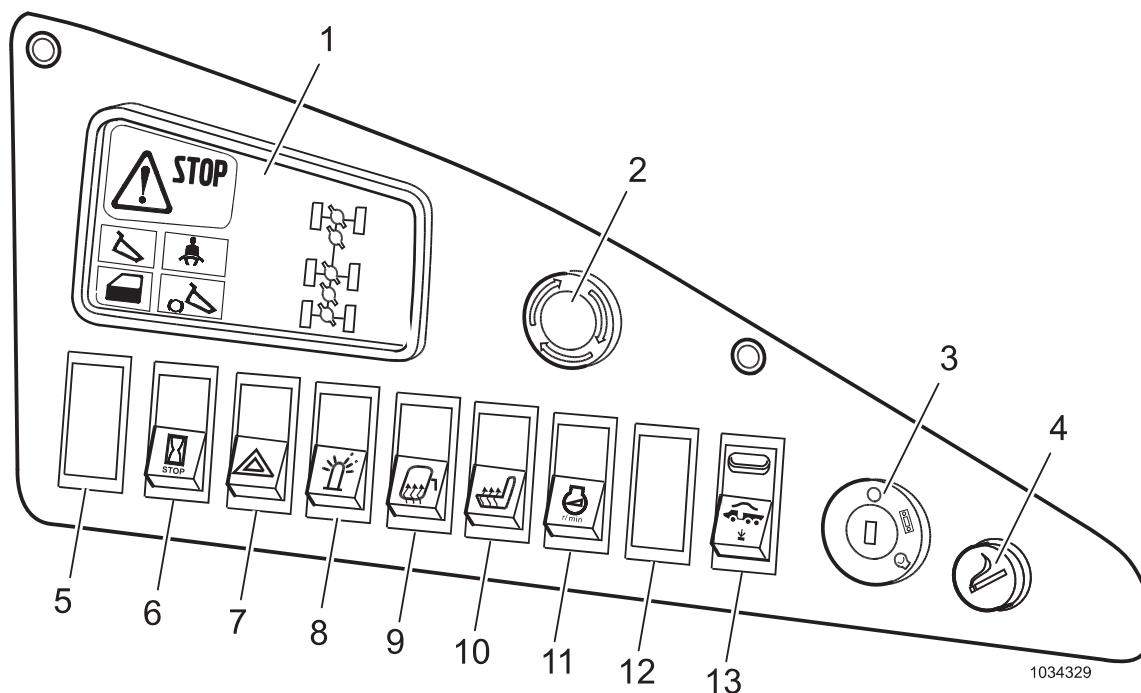
The tachometer is graduated from 0–28/min.  $\times 100$ , which means that, for example, 20 on the scale corresponds to 2000 revolutions per minute.



### 26 Speedometer, odometer

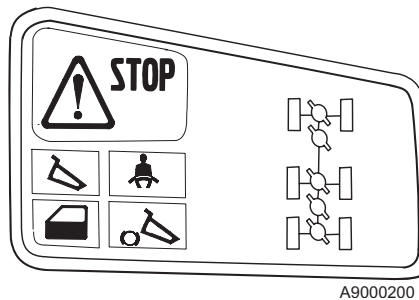
The speedometer shows a speed of 0–80 km/h (0–50 miles/h) and also has a digital odometer, graduated in km (miles).

## Right instrument panel



|   |                                   |    |                                                            |
|---|-----------------------------------|----|------------------------------------------------------------|
| 1 | Control lamps                     | 8  | Rotating warning beacon (optional equipment)               |
| 2 | Safety stop, engine               | 9  | Electrically heated rear view mirrors (optional equipment) |
| 3 | Ignition switch                   | 10 | Electrically heated seat (optional equipment)              |
| 4 | Cigarette lighter                 | 11 | Raised engine speed (optional equipment)                   |
| 5 | Unassigned                        | 12 | Unassigned                                                 |
| 6 | Delayed stop (optional equipment) | 13 | FS-system (if the machine is an FS-machine)                |
| 7 | Hazard flashers                   |    |                                                            |

## 1 Control lamps



### Red central warning (STOP)

**NOTE!** If the lamp flashes while operating – stop the machine immediately and investigate the cause.

See page 37.



### Raised dump body

Lights when the dump body is raised. Does not light when the dump body is in operating position (i.e. when the dump body is resting against the trailer unit frame).



### Seat belt reminder

Flashes if the operator is sitting in the seat and forgotten to fasten the seat belt with the engine running.



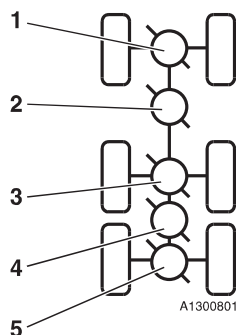
### Door open

Lights when the door is open. When the door is open, the maximum speed of the machine is limited.



### Load and dump brake

Lights when the load and dump brake function is engaged. See page 69.

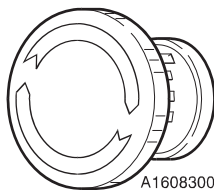


### Indicator for differential locks / 6-wheel drive

The lamps in the indicator light when the respective function is engaged.

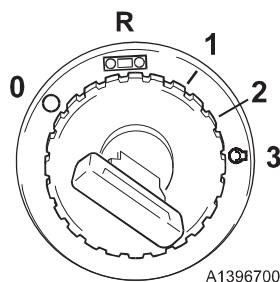
- 1 Transverse differential lock, front axle
- 2 Longitudinal differential lock
- 3 Transverse differential lock, front bogie axle
- 4 6-wheel drive
- 5 Transverse differential lock, rear bogie axle

Machines equipped with ATC, see page 49.



## 2 Safety stop, engine

The safety stop stops the engine under all circumstances.

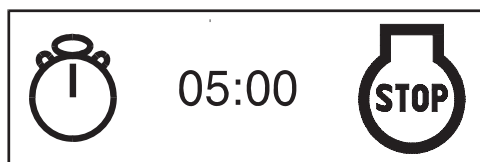


A1396700

### 3 Ignition switch

The ignition switch has five positions as shown in the figure.

|                         |                                                                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turned off position (0) | The engine will stop immediately unless the function "Delayed engine stop" has been activated (optional equipment), see below.                                                                                                        |
| Radio position (R)      | Certain electrical equipment will be supplied with electricity.<br>The engine will stop if the key is turned from running position (1), unless the function "Delayed engine stop" has been activated (optional equipment), see below. |
| Running position (1)    | The electronics starts up and goes into running mode.<br>The anti-theft device (if installed) will be connected.<br>The safety stop may be connected.                                                                                 |
| Preheating position (2) | The preheating will be connected.                                                                                                                                                                                                     |
| Starting position (3)   | The starter motor will be engaged after a delay of a couple of seconds.                                                                                                                                                               |



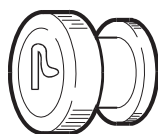
A1364500

Delayed stop (count-down in progress)



A1364600

Delayed stop (count-down completed)



A1396800

### Delayed stop (optional equipment)

When the ignition key is turned from position 1 to position R or 0 and the switch for "Delayed engine stop" (see point 6 below) is switched on, the engine will run for a further three minutes. This time may be changed with VCADS Pro or service display unit Contronic.

The function will be activated if the following conditions are met:

- gear selector in neutral (N position)
- ignition key in position 0 (turned off)
- the switch is switched on.

If the operator changes his or her mind and wants to continue operating, the ignition key should be turned back to position 1 before the electronics has closed down and the engine stopped.

When the function is activated it is not possible to:

- engage a gear
- change the engine speed (the accelerator pedal is disconnected).

### 4 Cigarette lighter

The cigarette lighter socket may also be used as a 24 V DC (15 A) power socket.

### 5 Unassigned

### 6 Delayed stop of engine (optional equipment)

Upper end of switch pressed in = delayed stop deactivated

Lower end of switch pressed in = delayed stop activated (lamp in switch lights) and the function will be connected if the following conditions are met:

- gear selector in neutral (N position)
- the ignition key in position 0 (turned off) or position R (radio position)
- the switch is switched on.



A9002900

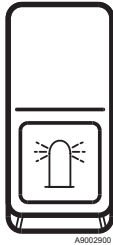


## 7 Hazard flashers

**NOTE! Must only be used if the machine has to be stopped in a way which constitutes a danger to other road users.**

Upper end of switch pressed in = hazard flashers turned off

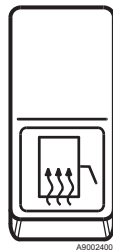
Lower end of switch pressed in = hazard flashers switched on



## 8 Rotating warning beacon (optional equipment)

Upper end of switch pressed in = rotating warning beacon switched off

Lower end of switch pressed in = rotating warning beacon switched on



## 9 Electrically heated rear view mirrors (optional equipment)

Upper end of switch pressed in = heating switched off

Lower end of switch pressed in = heating switched on



## 10 Electrically heated seat (optional equipment)

Upper end of switch pressed in = heating switched off

Lower end of switch pressed in = heating switched on



## 11 Raised engine speed (optional equipment)

Upper end of switch pressed in = raised engine speed turned off

Lower end of switch pressed in = raised engine speed switched on  
The operating speed control function will be engaged provided that the following conditions are met:

- The function operating speed is activated from the service display unit or VCADS Pro.
- No gear engaged (transmission in neutral).
- Lower end of switch pressed in.

## 12 Unassigned

## 13 FS-system

Upper end of switch pressed in = system operating position / normal position

Lower end of switch pressed in = system in bottom position





A1363000

Machine hours



A9006400

Screen, starting sequence



1031106

Operating information



A9006400

Screen, closing down sequence

## Display unit

On the display unit, located on the centre instrument panel, is shown starting sequence, component information, operating information, alarm screens and error codes.

### When starting the electronics, the screen will display:

#### Machine hours

When the battery disconnect switch is switched on and the ignition switch is in position 0, the screen shows accumulated number of machine hours. If the machine is equipped with anti-theft device, see page 41.

#### Initial display

When the ignition switch is turned from position 0 via R to 1, the electronics will start up. Control lamp test is carried out. Initial display is shown on the display unit as an increasing number of rectangles.

The precondition is that the function "Delayed engine stop" (optional equipment) is deactivated, see page 26.

This sequence takes a few seconds. Thereafter the electronics is ready for the engine to be started and the ignition key can be turned to starting position (3).

#### Operating information

When the start-up of the electronics is completed, the Operating Information screen will be shown.

### When stopping the electronics, the screen will display:

When the ignition key is turned from position 1 to R or 0, the electronics of the machine will be closed down in a controlled way. This will be shown on the display unit screen as a reducing number of rectangles, after which the engine stops. This sequence takes a few seconds.

When the ignition switch is turned off, the screen with accumulated number of machine hours will be shown.

If the function "Delayed engine stop" (optional equipment) is activated, see page 26, the engine will not stop until "the delay time" has elapsed. If the ignition key during this time is turned from position 0 to running position 1, the delay is interrupted.

## Keyboard for display unit

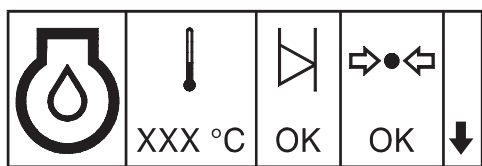
With the aid of the keyboard on the left instrument panel the operator may obtain information about the status of the machine, make settings and enter the code for anti-theft device.

|                                                                                                                |                                                                                                             |                                                                                                               |                                                                                                              |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1<br><br>ENGINE               | 2<br><br>TRANS-<br>MISSION | 3<br><br>HYDRAULICS        | 4<br><br>AXLES/<br>BRAKES |
| 5<br><br>ELECTRICAL<br>SYSTEM | 6<br><br>SERVICE           | 7<br><br>SETUP<br>SETTINGS | 8<br><br>ARROW UP         |
| <br>REVERT                    | 9<br>                      | <br>SELECT/<br>ACKNOWLEDGE | 0<br><br>ARROW DOWN       |

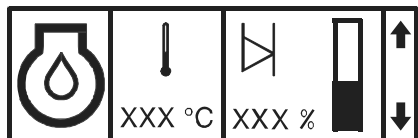
## Component information

Information about the machine components is obtained by pressing the respective keys. Use the arrow keys for browsing between the images.

Changing the setting of units, time and date is carried out with the SETUP key, see page 33.



A1361700



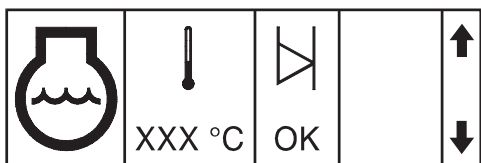
1014647

### Engine

The screens shown below become available after pressing the engine key. Change screen with the arrow keys.

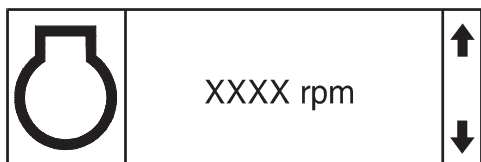
| Engine oil  |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| Temperature | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level       | OK / <u>  </u> (low) / -- (incorrect value)                                         |
| Pressure    | OK / <u>  </u> (low) / -- (incorrect value)                                         |

| Engine oil  |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| Temperature | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level       | % within the measuring range                                                        |



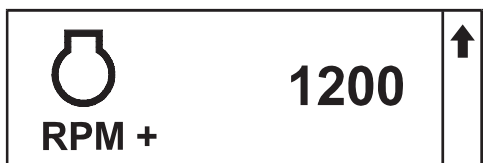
A1361800

| Coolant     |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| Temperature | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level       | OK / $\underline{\vee}$ (low) / -- (incorrect value)                                |



A1361900

| Engine speed |     |
|--------------|-----|
| Engine rpm   | rpm |



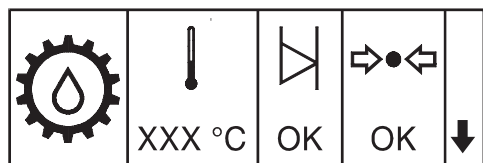
A1617900

| Setting operating speed<br>(only shown if the function is available) |     |
|----------------------------------------------------------------------|-----|
| Set operating speed<br>(raised)<br>To change, see<br>page 35         | rpm |



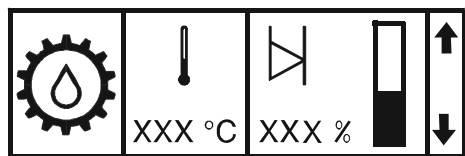
### Transmission

The screens shown below become available after pressing the transmission key. Change screen with the arrow keys.



A1362000

| Transmission oil |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|
| Temperature      | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level            | OK / $\underline{\vee}$ low) / $\wedge$ (high) / -- (incorrect value)               |
| Pressure         | OK / $\underline{\vee}$ (low) / -- (incorrect value)                                |



1012033

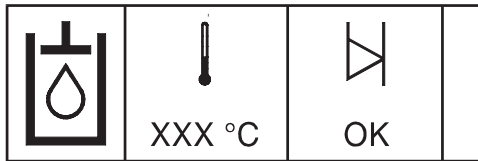
| Transmission oil |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|
| Temperature      | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level            | % within the measuring range                                                        |



1031210

| Gear     |                                          |
|----------|------------------------------------------|
| Position | shows the gear selector control position |





A1362300

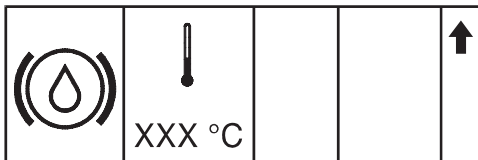
### Hydraulics

The screen shown below becomes available after pressing the hydraulics key.

#### Hydraulic oil

|             |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| Temperature | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
| Level       | OK / <u>V</u> (low) / – – (incorrect value)                                         |

Via the same screen and browsing downwards it is possible to control the FS-system via the operator display unit, see page 36.



A1362400

### Axles/Brakes

The screen shown below becomes available after pressing the axles/brake key.

#### Brake cooling oil

|             |                                                                                     |
|-------------|-------------------------------------------------------------------------------------|
| Temperature | °C/°F (in case of minus degrees the minus sign will be shown at the first position) |
|-------------|-------------------------------------------------------------------------------------|



A1362500

### Electrical system

The screen shown below becomes available after pressing the electric system key.

#### Voltage

|                 |   |
|-----------------|---|
| Current voltage | V |
|-----------------|---|



A1362600

### Service

The screen shown below becomes available after pressing the service key.

#### Service

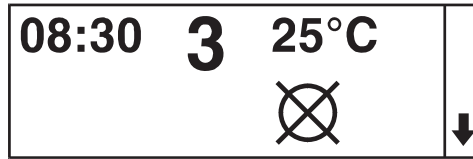
|                           |                   |
|---------------------------|-------------------|
| Next service              | 250/500/1000/2000 |
| Time left to next service | h                 |

Acknowledgement of service, see page 35.



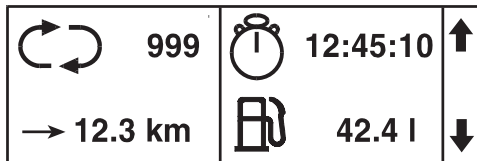
### Operating information

The screen below will be shown when the engine has been started.



1031107

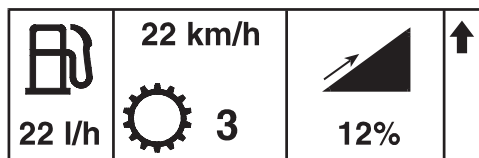
| Operating information |                              |  |                                |
|-----------------------|------------------------------|--|--------------------------------|
| Time                  | 12-display /24-display       |  | Activated exhaust brake        |
| Gear position         | N/1/2/3/4/5/6/7/8/9/R1/R2/R3 |  | Activated gear-shift inhibitor |
| Outside temperature   | °C / °F                      |  | Error code is active           |
|                       | Activated engine braking     |  | Next Service                   |



A1361400

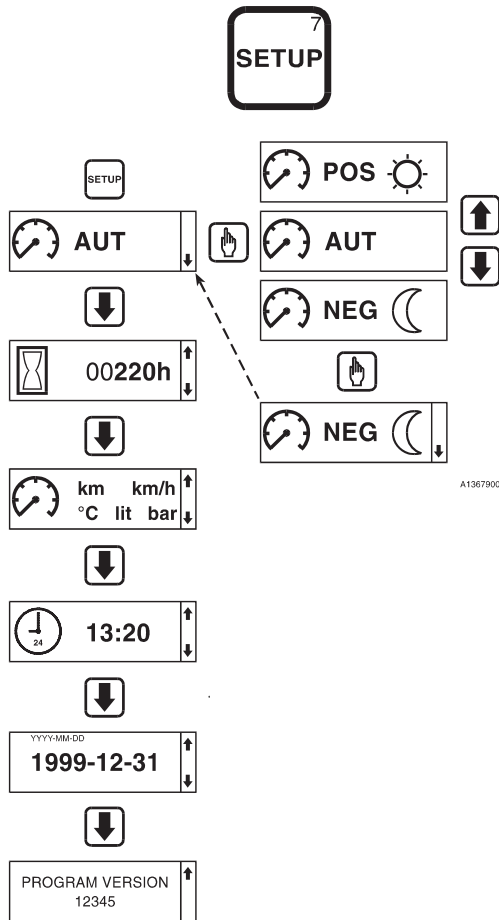
The adjacent screen is shown after pressing the arrow-down key.

| Accumulated values after setting to zero |                                                                                                                                                           |   |                                           |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------|
|                                          | Number of operated cycles including dumping after zero setting (To count as one cycle there has to be an interval of three minutes between each dumping). | → | Travelling distance after setting to zero |
|                                          | Operating time after setting to zero                                                                                                                      |   | Fuel consumption after setting to zero    |



1031108

| Current values   |                                |  |                                     |
|------------------|--------------------------------|--|-------------------------------------|
|                  | Fuel consumption (l/h / gal/h) |  | Gear (N/1/2/3/4/5/6/7/8/9/R1/R2/R3) |
| Travelling Speed | km/h/mph                       |  | Inclination longitudinally (%)      |

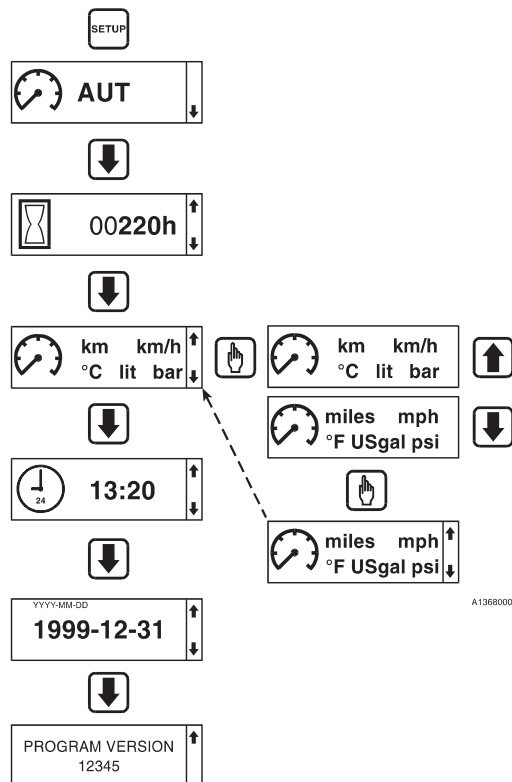


## Setting / setting to zero / acknowledgement

The settings below are made with the SETUP key.

### Setting display mode

- 1 Press the SETUP key.
- 2 Press the select/acknowledge key.
- 3 Browse with the arrow keys to the required setting. (The setting procedure may at any time be interrupted with the ESC key.)  
 POS = positive display screen  
 AUT = automatic display screen  
 NEG = negative display screen
- 4 Acknowledge with the select/acknowledge key.

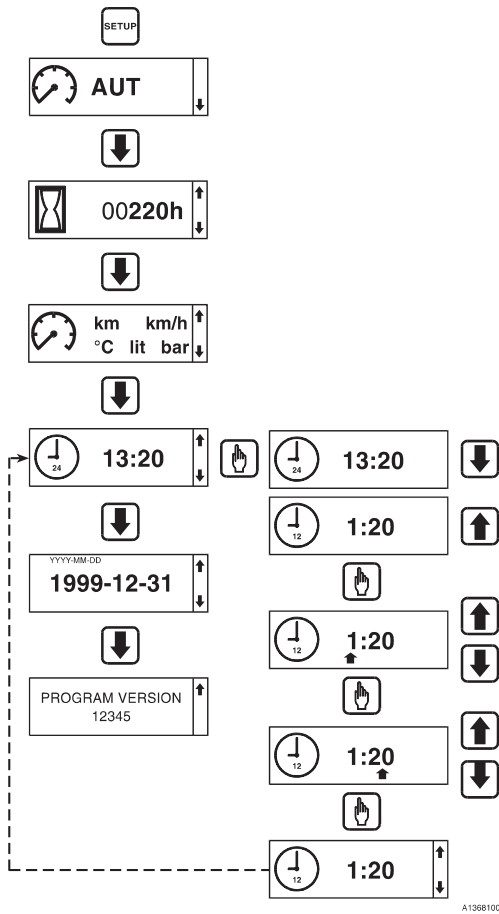


### Setting units

- 1 Press the SETUP key.
- 2 Press the arrow down key to the unit screen.
- 3 Press the select/acknowledge key.
- 4 Browse with the arrow keys to the required setting. (The setting procedure may at any time be interrupted with the ESC key.)  
 SI/metric = km, km/h, °C, lit, bar  
 Non-metric = miles, mph, °F, US gal, psi
- 5 Acknowledge with the select/acknowledge key.

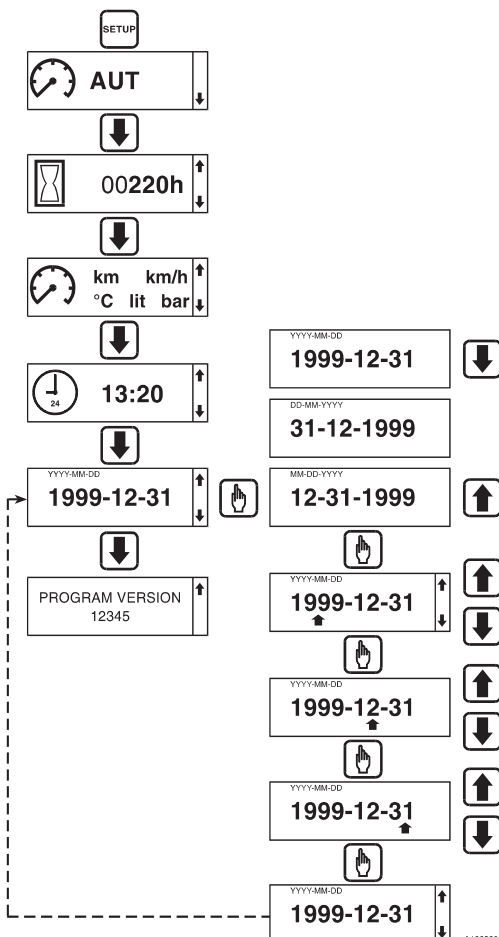
# 34 Instrument panels

## Display unit



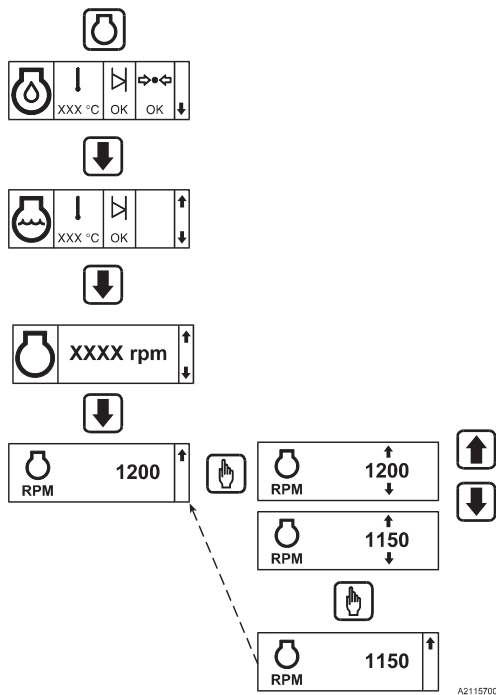
### Setting time

- 1 Press the SETUP key.
- 2 Press the arrow down key to the time screen.
- 3 Press the select/acknowledge key.
- 4 Browse with the arrow keys to the required setting. (The setting procedure may at any time be interrupted with the ESC key.)  
24-hour display (13:20)  
12-hour display (1:20)
- 5 Acknowledge with the select/acknowledge key.
- 6 Cursor is placed by hour. Set the hour(s) with the arrow keys.
- 7 Acknowledge with the select/acknowledge key.
- 8 Cursor is placed by minute. Set the minute(s) with the arrow keys.
- 9 Acknowledge with the select/acknowledge key.



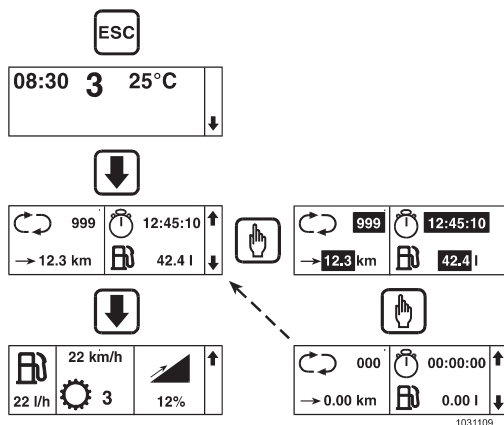
### Setting date

- 1 Press the SETUP key.
- 2 Press the arrow down key to the date screen.
- 3 Press the select/acknowledge key.
- 4 Browse with the arrow keys to the required setting. (The setting procedure may at any time be interrupted with the ESC key.)  
Year-Month-Day  
Day-Month-Year  
Month-Day-Year
- 5 Acknowledge with the select/acknowledge key.
- 6 Cursor is placed by Year. Set the year with the arrow keys.
- 7 Acknowledge with the select/acknowledge key.
- 8 Cursor is placed by Month. Set the month with the arrow keys.
- 9 Acknowledge with the select/acknowledge key.
- 10 Cursor is placed by Day. Set the day with the arrow keys.
- 11 Acknowledge with the select/acknowledge key.



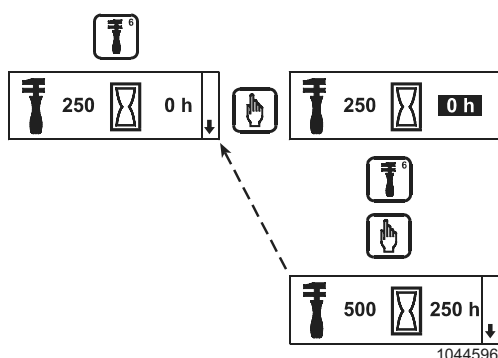
### Setting operating speed (raised speed) (optional equipment)

- 1 Press the engine key.
- 2 Browse with the arrow down key to the screen for operating speed.
- 3 Press the select/acknowledge key.
- 4 Browse with the arrow keys to the required setting. (The setting procedure may at any time be interrupted with the ESC key.)  
The range for the operating speed is 800–1600 rpm. Each step represents 50 rpm. (The range can be altered with VCADS Pro.)
- 5 Press the select/acknowledge key.



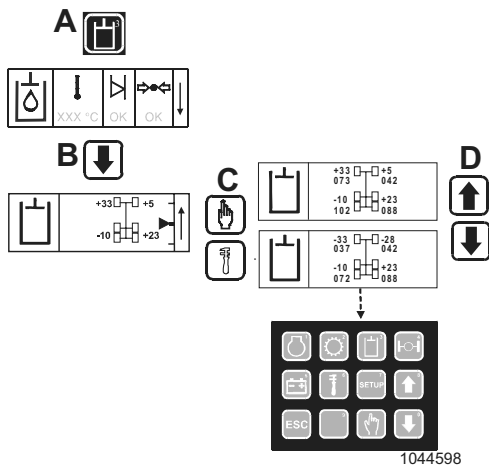
### Zero setting cycle counter

- 1 Press the ESC key.
- 2 Press the arrow down key to the screen which shows values before the zero setting.
- 3 Press the select/acknowledge key. The numerals are shown in reverse image (The zero setting procedure may at any time be interrupted with the ESC key.)
- 4 Acknowledge with the select/acknowledge key.



### Acknowledging service interval

- 1 Press the service key.
- 2 Press the select/acknowledge key. The numerals are shown in reverse image (The acknowledgement may at any time be interrupted with the ESC key.)
- 3 Acknowledge by first pressing down the service key and then within five seconds pressing down the select/acknowledge key.
- 4 The next interval (scheduled service) is shown next to the service symbol and the count-down restarts.



### Forced raising/lowering of FS-system

The hydraulic suspension system Full Suspension can be force-controlled manually with the aid of the keypad for the operator display unit. To be able to force-raise the machine, the engine must be running for the hydraulic pump to supply oil and the electronics of the machine must be functional. To be able to force-lower, the engine need not be running, however, the electronics of the machine must be functional.

**NOTE! For carrying out service and repairs, the service position, which is especially adapted for machines equipped with Full Suspension, must be used, see page 89.**

- 1 Press on the hydraulics key (A).
- 2 Press on the arrow down key (B) to the screen "Full Suspension position display".
- 3 Press on the select/acknowledge key (C) and then on the service key to access the screen "Forced control".
  - Press on the arrow up key (D) to raise. All solenoid valves, which are connected to the raising function, open and remain open for 5 seconds.
  - Press on the arrow down key (D) to lower. All solenoid valves, which are connected to the lowering function, open and remain open for 5 seconds.

As a safety measure, all solenoid valves for the raising/lowering function close immediately, if the keys ARROW UP or DOWN are actuated again or if any other key is actuated within 5 seconds.

### Showing of the latest error codes and alarms

To be able to access the showing of inactive errors, the engine must be turned off. Inactive warning and errors are shown inverted relative to the display setting. If inverted display already has been selected, the inactive errors will be shown in the standard display mode.

The ten last shown alarms / error codes, which then have become inactive, are to be saved on the list.

It the inactive alarms / error codes are shown in reversed chronological order as they were shown to the operator.

A condition for an alarm / error code to take up a new position in the list is that it has not been stored previously during the same 24 hours.



A1363800

Example of alarm screen



A1345200

Amber central warning



A1345300

Red central warning

## Alarm screens

The alarm screen will be shown as long as the error remains.

If amber central warning lights up when the alarm screen is shown, the cause must be investigated at the next stop. The alarm will be repeated next time the engine is started, if it still is active.

Acknowledgement of the alarm is done with the select/acknowledge key.

If red central warning flashes when the alarm screen is shown, the machine should be stopped and the cause investigated immediately. Values may be checked by using the respective component keys on the keyboard, but the alarm screen returns ten seconds after the last pressing of a key. When required, contact a workshop authorised by Volvo CE.

In certain cases also the buzzer sounds at the same time as the red central warning flashes.

If more than one alarm occurs at the same time, these will be shown one after the other. If any of the alarms causes red central warning to flash and in some cases also the buzzer to sound, only this alarm (these alarms) will be shown.

It is not possible to browse between different levels, e.g. between orange and red. Reds are always predominant.

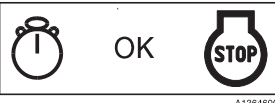
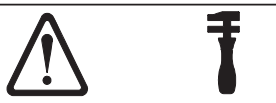
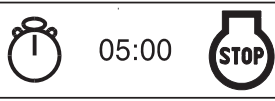
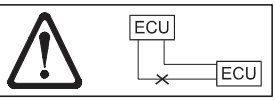
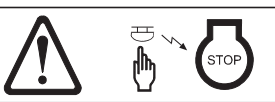
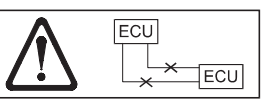
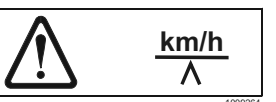
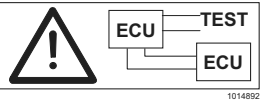
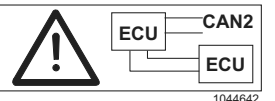
## Engine

|                                             |                                         |                                            |
|---------------------------------------------|-----------------------------------------|--------------------------------------------|
| <br>A1363700<br>High engine oil temperature | <br>A1392900<br>Water in fuel           | <br>A1393200<br>Engine, high/low speed     |
| <br>1012794<br>Fuel level low               | <br>A1364200<br>Engine overspeeding     | <br>A1363800<br>Engine oil level low       |
| <br>A1393000<br>Engine air filter clogged   | <br>A1363900<br>Engine oil pressure low | <br>A1364000<br>Coolant temperature high   |
| <br>A1392800<br>Fuel filter clogged         | <br>A1364100<br>Coolant level low       | <br>A1393100<br>Intercooler clogged        |
| <br>102790<br>Fuel pressure low             | <br>1031111<br>High crankcase pressure  | <br>1015455<br>Request working speed (rpm) |

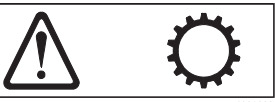
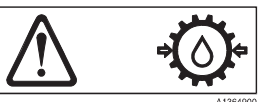
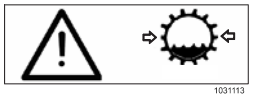
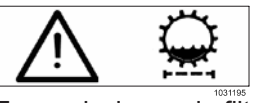
# 38 Instrument panels

## Display unit

### Electrical system

|                                                                                                                                                                    |                                                                                                                                                                    |                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>A1365900</p> <p>Low/high system voltage<br/>Alternator, charging function</p> |  <p>A1364600</p> <p>Delayed stop (count-down completed)</p>                       |  <p>A1393700</p> <p>Time for service has been exceeded</p> |
|  <p>A1364500</p> <p>Delayed stop (count-down in progress)</p>                     |  <p>A1393500</p> <p>Reduced performance between ECUs, information bus (J1708)</p> |  <p>A2115900</p> <p>Starting/stopping electronics</p>      |
|  <p>A1393300</p> <p>Engine safety stop</p>                                        |  <p>A1393600</p> <p>Reduced performance between ECUs, control bus (J1939)</p>     |  <p>1009264</p> <p>High speed</p>                          |
|  <p>1014892</p> <p>ECU in test mode</p>                                          |  <p>1044642</p> <p>Service info CAN</p>                                          |                                                                                                                                               |

### Power transmission

|                                                                                                                                                                                                                                                  |                                                                                                                                          |                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>A1393800</p> <p>Converter, lockup slippage<br/>Transmission high torque transfer<br/>Transmission clutch slippage<br/>Gear selector control, function</p> |  <p>A1365100</p> <p>Transmission overspeeding</p>     |  <p>A1364700</p> <p>Transmission oil temperature high</p> |
|  <p>A1364800</p> <p>Transmission oil level incorrect (high/low)</p>                                                                                           |  <p>A1364900</p> <p>Transmission oil pressure low</p> |  <p>1031113</p> <p>Transmission main oil pressure low</p> |
|  <p>1031195</p> <p>Transmission main filter clogged</p>                                                                                                       |  <p>1017661</p> <p>Malfunction ATC</p>                |                                                                                                                                                |



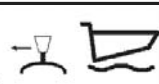
**Brakes**

|                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                            |                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   <p>A1365700</p> <p>Brake cooling oil temperature high</p>   |   <p>A1394300</p> <p>Accumulated brake pressure (servo pressure) low</p> |   <p>1012063</p> <p>Parking brake not applied</p> |
|   <p>A1365800</p> <p>Low/critical brake cooling oil level</p> |   <p>1033927</p> <p>Low speed of brake cooling oil pump</p>              |                                                                                                                                                                                                                         |

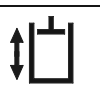
**Cab**

|                                                                                                                                                                                                         |                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   <p>A1394400</p> <p>Door is open</p> |   <p>A1394500</p> <p>Seat belt not fastened</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Hydraulic system**

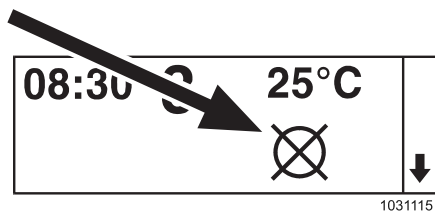
|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   <p>A1394600</p> <p>Steering pressure from ground-dependent / engine-dependent pump low/incorrect</p> |   <p>A1365400</p> <p>Hydraulic oil level low</p>                                                           |   <p>1044650</p> <p>Activate float mode</p> |
|   <p>A1365300</p> <p>Hydraulic oil temperature low/high</p>                                            |   <p>A1395000</p> <p>Tipping control <b>not</b> in holding position, risk of crushing during dump body</p> |   <p>A1394900</p> <p>Dump body is up</p>    |

**Full Suspension (FS-system)**

|                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   <p>1035076</p> <p>Full Suspension not in normal position</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# Instrument panels

## Display unit



### Error code screens

The error code screen indicates that a part of the system is out of order. The cause must be investigated at the next stop. When required, contact a workshop authorised by Volvo CE.

### Engine

|                                                     |                                                    |                                          |
|-----------------------------------------------------|----------------------------------------------------|------------------------------------------|
| XX22XX-XX<br>A1366100<br>Lubrication and oil system | XX25XX-XX<br>A1366300<br>Inlet and exhaust systems | XX27XX-XX<br>A1366500<br>Engine controls |
| XX23XX-XX<br>A1366200<br>Fuel system                | XX26XX-XX<br>A1366400<br>Cooling system            |                                          |

### Electrical system

|                                                            |                                                     |                                                                   |
|------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------|
| XX32XX-XX<br>A1367300<br>Alternator and charging regulator | XX36XX-XX<br>A1367500<br>Other electrical equipment | XX38XX-XX<br>A1367700<br>Instruments, sensors and warning systems |
| XX33XX-XX<br>A1367400<br>Starting system                   | XX37XX-XX<br>A1367600<br>Leads and fuses            |                                                                   |

### Power transmission

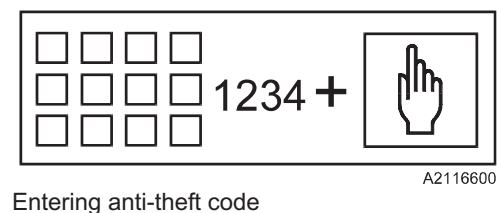
|                                                  |                                                   |                                      |
|--------------------------------------------------|---------------------------------------------------|--------------------------------------|
| XX42XX-XX<br>A1366600<br>Transmission, hydraulic | XX43XX-XX<br>A1366700<br>Transmission, mechanical | XX46XX-XX<br>A1367000<br>Drive axles |
|--------------------------------------------------|---------------------------------------------------|--------------------------------------|

## Brakes

|                                                                                                                                                    |                                                                                                                                         |                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>XX52XX-XX</p> <p>A1367100</p> <p>Brake system, hydraulics</p> |  <p>XX55XX-XX</p> <p>A2107500</p> <p>Parking Brake</p> |  <p>XX59XX-XX</p> <p>A1367200</p> <p>Brakes, miscellaneous</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|

## Hydraulics

|                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>XX91XX-XX</p> <p>A1366800</p> <p>Working hydraulics and servo system</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|



Entering anti-theft code

## Anti-theft device (optional equipment)

**NOTE! The anti-theft code can be changed with VCADS Pro.**

This equipment protects against unauthorised starting of the engine. When the function is activated, the correct four-digit code must be entered to make it possible to start the engine.

The function is deactivated at factory.

**NOTE! The anti-theft device remains until the current is interrupted with the battery disconnect switch.**

**Use the keyboard on the left instrument panel when entering code.**

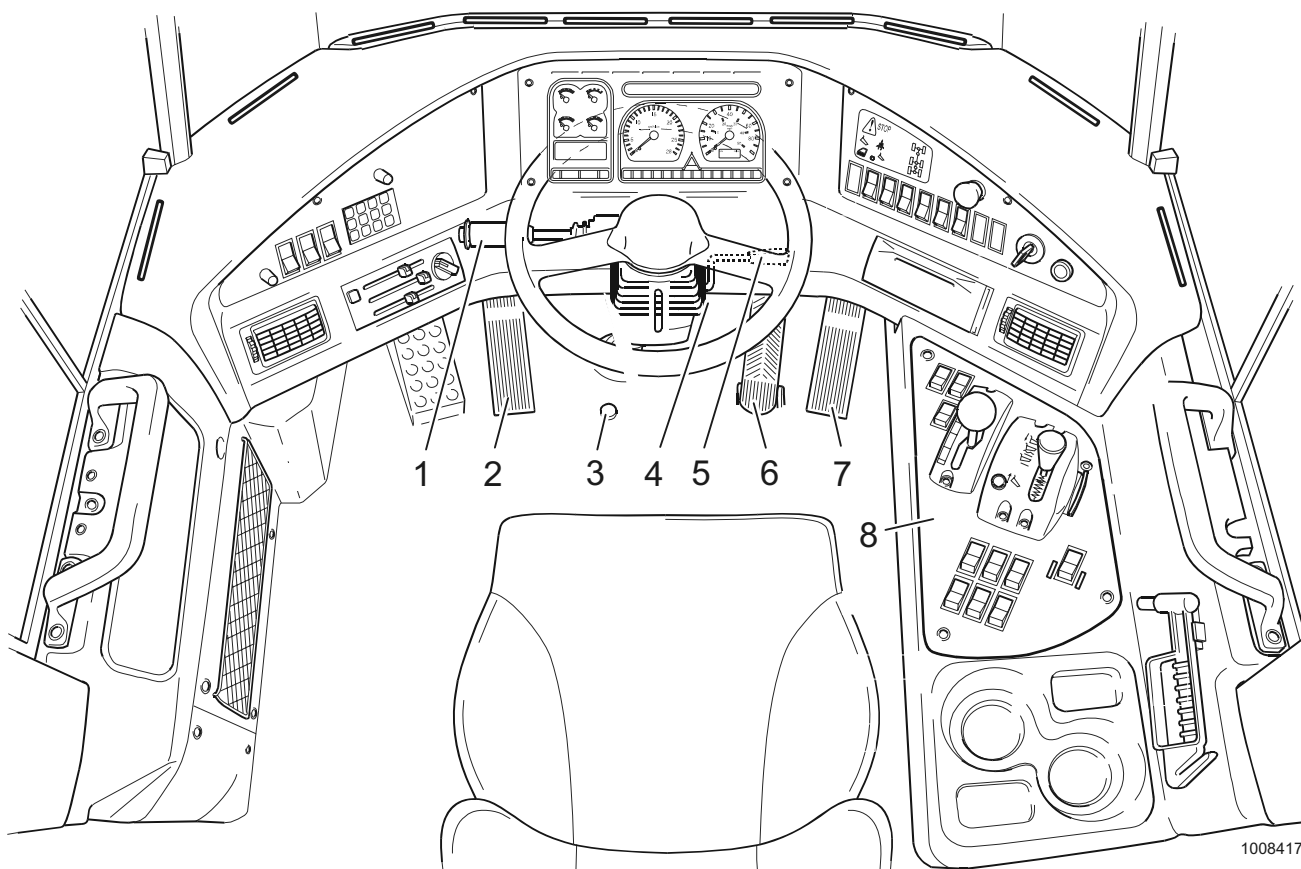
- 1 Enter the four-digit code and press the select/acknowledge key.
- 2 When the entering has been completed, the initial display will be shown.

If the wrong entry is made at any position, go back by pressing ESC.



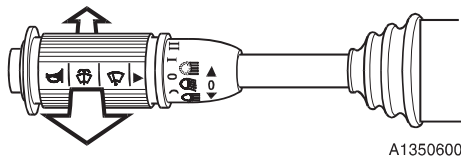
## Other controls

### Controls



1008417

|   |                                      |   |                           |
|---|--------------------------------------|---|---------------------------|
| 1 | Controls, steering column            | 5 | Steering wheel adjustment |
| 2 | Retarder / exhaust brake             | 6 | Brake pedal               |
| 3 | Differential locks and 6-wheel drive | 7 | Accelerator pedal         |
| 4 | Service socket                       | 8 | Control panel             |

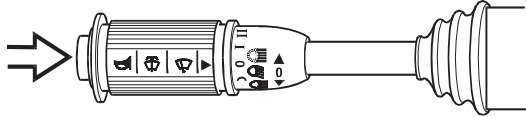


A1350600

## 1 Controls, steering column

### Headlight dipper

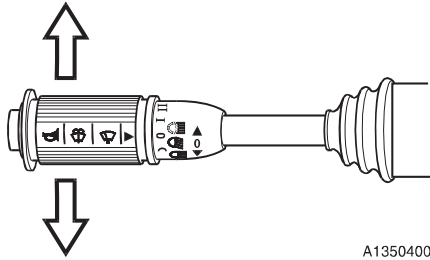
|                  |                   |
|------------------|-------------------|
| Control upward   | Headlight flasher |
| Centre position  | Low beams         |
| Control downward | High beams        |



A1350500

### Horn

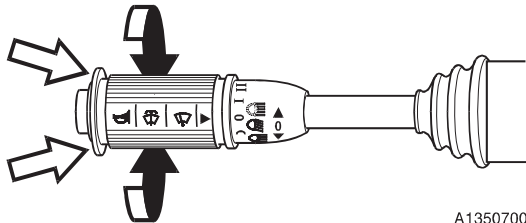
The horn sounds when the button is pressed in.



A1350400

### Control, direction indicators

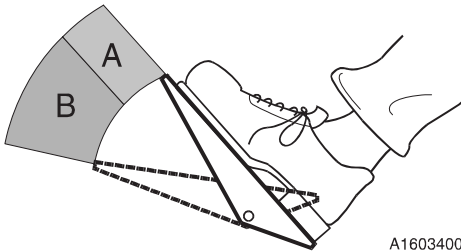
|                  |                            |
|------------------|----------------------------|
| Control forward  | Right direction indicators |
| Control rearward | Left direction indicators  |



A1350700

### Windscreen wiper

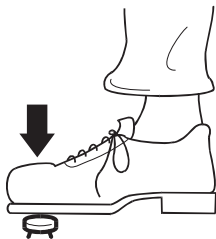
|                    |                                          |
|--------------------|------------------------------------------|
| Position J         | Intermittent wiper                       |
| Position 0         | Neutral position, wiper turned off       |
| Positions I and II | Windscreen wiper (two speeds)            |
| Ring pressed in    | Washer with automatic wiping 3–4 strokes |



A1603400

## 2 Retarder / exhaust brake

|         |                                            |
|---------|--------------------------------------------|
| Range A | Stepless retarder with exhaust brake       |
| Range B | Full exhaust brake together with retarder. |



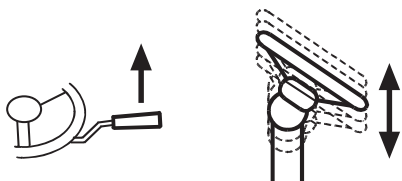
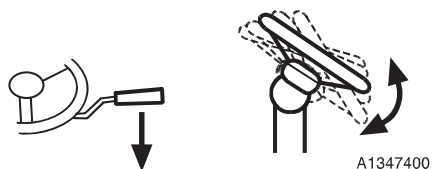
A1603500

## 3 All differential locks and 6-wheel drive

The differential locks and the 6-wheel drive can be engaged by pressing down the foot control (the lamps in the indicator on the right instrument panel are alight). The differential locks remain engaged for as long as the foot switch is pressed down. See also page 66.

## 4 Service socket

Service sockets for MATRIS and VCADS Pro are positioned in the cab, to the right under the steering wheel, to allow readings by service personnel.

**A****B**

## 5 Steering wheel adjustment

The steering wheel is adjustable as to its inclination and vertical position.

A Control upward

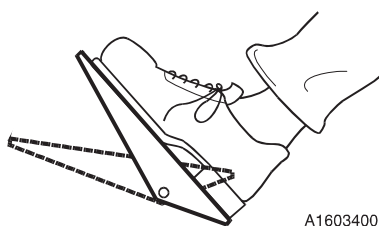
The steering wheel may be raised or lowered.

B Control downward

The steering wheel can be angled to different positions.

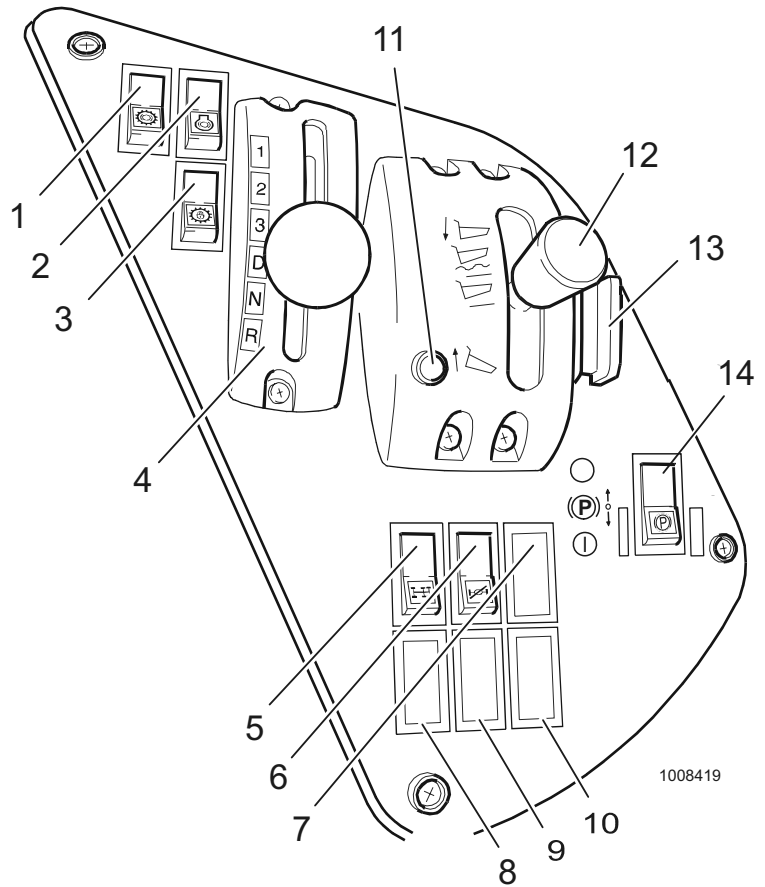
## 6 Brake pedal

Brake pedal, service brakes.



## 7 Accelerator pedal

The accelerator pedal also provides possibility for exhaust brake when the pedal is fully let up, depending on switch position, see page 47.

**8 Control panel**

1008419

|   |                                                                                                        |    |                                      |
|---|--------------------------------------------------------------------------------------------------------|----|--------------------------------------|
| 1 | Unassigned                                                                                             | 8  | Unassigned                           |
| 2 | Exhaust braking in accelerator pedal                                                                   | 9  | Unassigned                           |
| 3 | Gear-shift inhibitor                                                                                   | 10 | Unassigned                           |
| 4 | The gear selector                                                                                      | 11 | Load and dump brake                  |
| 5 | Longitudinal differential lock and 6-wheel drive<br>(if the machine is equipped with ATC, see page 49) | 12 | Tipping control                      |
| 6 | Transverse differential lock and 6-wheel drive<br>(if the machine is equipped with ATC, see page 49)   | 13 | Lock-out control for tipping control |
| 7 | Unassigned                                                                                             | 14 | Parking brake                        |



## 1 Unassigned



## 2 Exhaust brake / engine braking in accelerator pedal

Upper end of switch pressed in = limited engine braking deactivated

Lower end of switch pressed in = limited engine braking in accelerator pedal activated and the function will be engaged automatically when the accelerator pedal is released. See also page 69.

|           |                     |
|-----------|---------------------|
| Gears 1–3 | 0% engine braking   |
| Gear 4    | 35% engine braking  |
| Gear 5    | 65% engine braking  |
| Gears 6–9 | 100% engine braking |

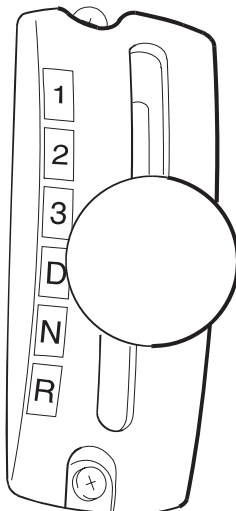
## 3 Gear-shift inhibitor

Press the switch to engage the gear-shift inhibitor. The switch has a spring return action. See also page 64.



## 4 Gear selector

**NOTE! Never leave the machine with the gear selector in forward or reverse, while the engine is running.**



### Gear position

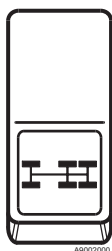
|            |                                                                           |
|------------|---------------------------------------------------------------------------|
| Position 1 | 1st gear                                                                  |
| Position 2 | Automatic shifting between 1st and 2nd gear                               |
| Position 3 | Automatic gear shifting between 1st, 2nd and 3rd gear                     |
| Position D | Aut. shifting between 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th and 9th gear |
| Position N | Neutral position                                                          |
| Position R | Aut. shifting between 1st, 2nd and 3rd reverse gear                       |

## 5 Longitudinal differential lock and 6-wheel drive

Upper end of switch pressed in = longitudinal differential lock disengaged

Lower end of switch pressed in = longitudinal differential lock engaged

**NOTE! Switch missing if machine is equipped with ATC.**





## 6 Transverse differential lock, front axle

Upper end of switch pressed in = transverse differential lock disengaged

Lower end of switch pressed in = transverse differential lock engaged

**NOTE! Switch missing if machine is equipped with ATC.**

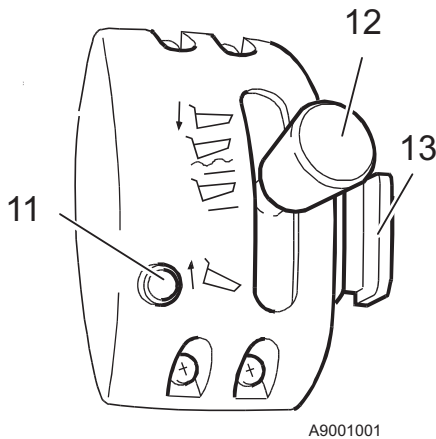
## 7-10 Unassigned

## 11 Load and dump brake

Press the button to apply the wheel brakes when loading and unloading. This is to save having to use the parking brake unnecessarily.

At the application of the load and dump brake, the transmission is automatically shifted to neutral.

For the application and release of the load and dump brake to take place, a number of conditions have to be met, see page 69.



## 12 Tipping control

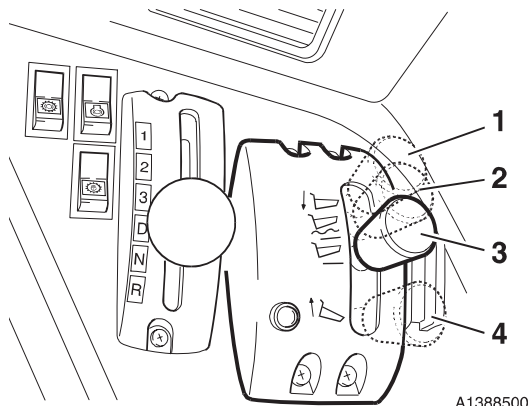
**The tipping control has four positions:**

- |            |                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------|
| Position 1 | Lowering with hydraulic pressure. This position has a spring return action – must be kept in position by hand. |
| Position 2 | Floating position, the dump body rests on the trailer unit frame                                               |
| Position 3 | Holding position, the dump body is kept stationary in the current position                                     |
| Position 4 | Tipping (dumping) position                                                                                     |

**NOTE! During loading and operating (travel) the lever must be in floating position (2).**

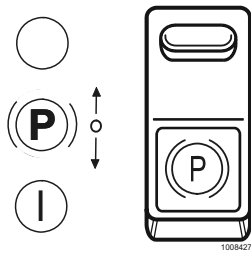
**NOTE! If the operator leaves the operator seat, the tipping control automatically moves to holding position.**

See also page 76.



## 13 Lock-out control for tipping control

The purpose of lock-out control is to lock the tipping control in holding position.



## 14 Parking brake

Upper end of switch pressed in = parking brake released

Lower end of switch pressed in = parking brake applied

### Application

**IMPORTANT! The parking brake should not be applied until the machine is completely stationary.**

- 1 Place the gear selector to neutral.
- 2 Press in the lower end of the switch.
- 3 Turn the ignition key to position 0.

If the engine is turned off without the parking brake having first been applied with the switch, the parking brake will be applied automatically.

The application of the parking brake causes the longitudinal differential lock to be engaged automatically (lamp on the right instrument panel lights up). In addition, the transmission becomes locked in neutral – no gear can be selected.

### Releasing

Slide down the catch on the switch and press in the upper end of the switch.

**Releasing (if the parking brake has been applied automatically):**

Apply and then release the parking brake with the switch.

### Emergency brake

- In an emergency the parking brake serves as an auxiliary brake.
- Should the brake pressure be lost in both service brake circuits at the same time, the parking brake is applied automatically.

## ATC (Automatic Traction Control) (optional equipment)

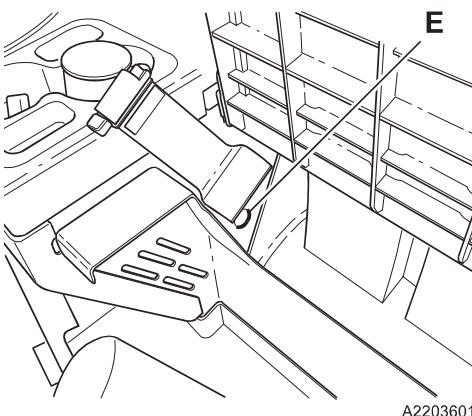
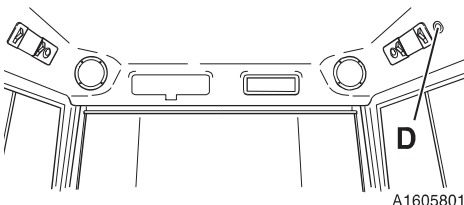
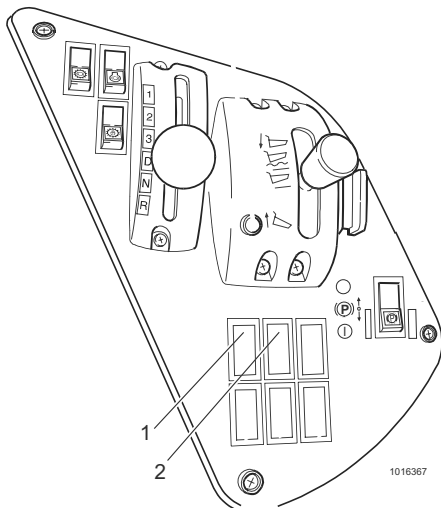
If the machine is equipped with ATC, the following switches are missing:

- 1 Longitudinal differential lock and 6-wheel drive
- 2 Transverse differential lock, front axle

For information on ATC, see page 67.

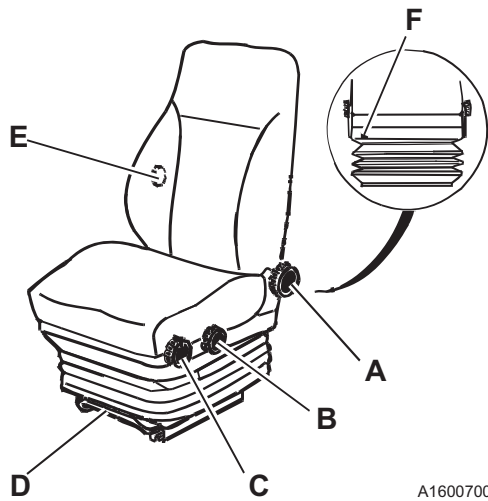
## Power socket

Electrical power for optional equipment can be taken from a 12 V socket (D) on the overhead panel and under the instructor seat in the storage space from a 24 V socket (E). 12 V is only available if the machine is provided with a voltage converter.

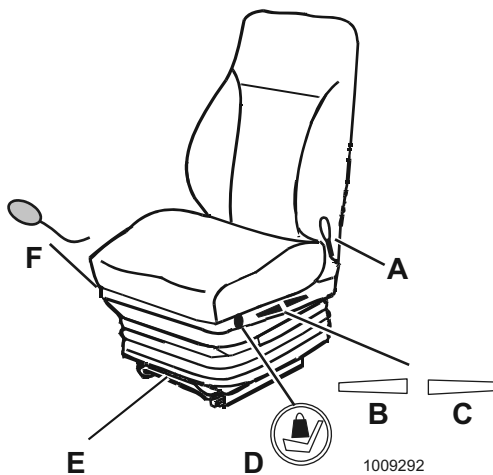


D Power socket 12 V

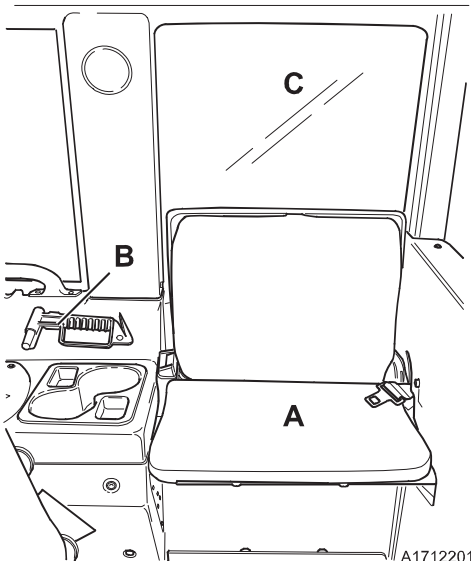
E Power socket 24 V



A1600700



1009292



A1712201

- A Instructor seat
- B Emergency hammer
- C Emergency exit

## Operator comfort

### Operator seat

It is important that the operator seat is adjusted in a correct way in order to provide the best possible comfort.

#### Mechanical operator seat, adjusting

- A Backrest inclination
  - B Seat inclination
  - C Seat height
  - D Longitudinal adjustment
  - E Lumbar support
  - F Height limitation with locking function
    - full height adjustment = control to the right
    - limited height adjustment = control at centre
    - transporting position (never use when operating (travelling)) = lever to the left
- Electrically heated seat (optional equipment)

#### Seat with air suspension, adjusting

- A Backrest inclination
  - B Seat height at front
  - C Seat height at rear
  - D Adjustment according to weight
  - E Longitudinal adjustment
  - F Lumbar support
- Electrically heated seat (optional equipment)

### Instructor seat

The cab is equipped with a collapsible instructor seat (A). This is intended for an instructor to be able to travel temporarily on the machine in order to instruct or train operators in how to operate and handle the machine in the best possible way.

The instructor must use seat belt.

When an instructor is travelling on the machine, it must be driven with the greatest care (low travelling speed) and on as level ground as possible. The work site should then in advance be levelled and bumps and holes be eliminated so as to avoid unnecessary shaking and sudden movements.

**IMPORTANT! The instructor seat is not intended for passengers.**

#### To fold down the backrest:

- 1 First lift up the seat cushion.
- 2 Fold down the backrest and then fold down the seat cushion.

**IMPORTANT! When the instructor seat is not used, it should be collapsed and folded down.**

## Seat belt

The seatbelt supplements the safety construction in the cab or the open operator's station and must be used to prevent the operator from being thrown from the cab if the machine should roll over. Using the seatbelt also helps the operator maintain control of the machine in case it rocks violently or gets in to other difficulties.

- The seatbelt with associated parts must be inspected at regular intervals. Change the entire seatbelt immediately if it is worn, has loose threads, or if the buckles or roller do not work.
- Change the seat belt if the machine has been involved in an accident where the belt has been subjected to high loads or stress.
- Change the seatbelt every 3rd regardless of its appearance or condition.
- Never make any changes to the belt or its mountings.
- The seatbelt is only intended for one adult.
- Keep the seatbelt rolled up (retracted) when it is not used.
- Clean using only warm water, not soap or any other cleaner. Let the belt dry completely pulled out before letting it wind back on the roller. Make sure that the seatbelt is installed correctly.

## Storage space

Swing up the seat cushion of the instructor's seat to gain access to the storage space.

## Emergency hammer

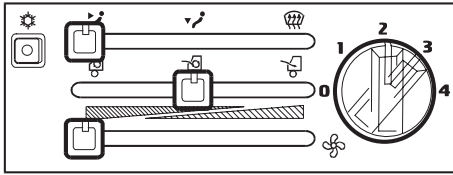
**The emergency hammer (B) should be used in emergency situations for:**

- breaking the emergency exit's window pane.
- cutting the seatbelt with the knife on the back of the hammer.

## Emergency exit

The cab has an emergency exit, the rear right side window (C). If the emergency exit is to be used, the backrest on the instructor seat must be folded down before breaking the window.

**IMPORTANT! When the instructor seat is not used, it should be collapsed and folded down.**



A1379800

## Ventilation system

### Heating and ventilation system

The control panel for heating and ventilation is positioned under the left instrument panel.

The system is of the integrated type, i.e. filtered fresh air, heated air or cooled air come out of the same nozzles.

### General about heating and ventilation

- Keep the door closed.
- Direct the air flow away from unprotected skin.
- Adjust the fan speed until the air flow in the cab feels comfortable.

For settings in different weather conditions, see page 53.

### Air conditioning (optional equipment)

**Air conditioning will be switched on if:**

- The switch is pressed in
- The fan control is at least in position 1.

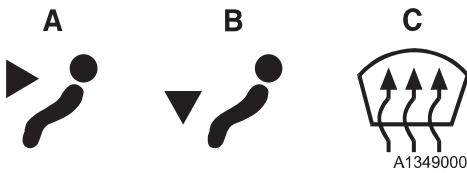
### Air distribution control

Stepless regulation of where the air enters the cab.

A All air goes through the instrument panel ventilation's nozzles.

B Most of the air goes through nozzles at the floor.

C Defroster, all air is directed at the windows.



A1349000

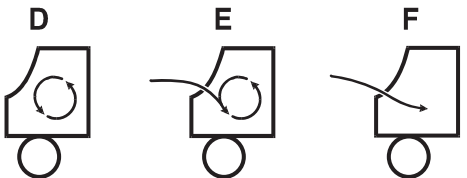
### Fresh air control

Stepless regulation of the amount of air recirculated within the cab.

D 90% recirculation.

E 50% fresh air and 50% recirculation. Preferably used when the machine is equipped with air conditioning.

F 90% fresh air. Used when you want heating (during the cold season) and during defrosting.



A1349100

### Temperature control

Stepless regulation of temperature in cab.

Cold Furthest to the left (blue)

Warm Furthest to the right (red)

### Fan control

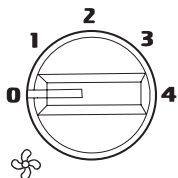
Position 0 Fan switched off.

Position 1 ¼ of full fan speed – used for heating.

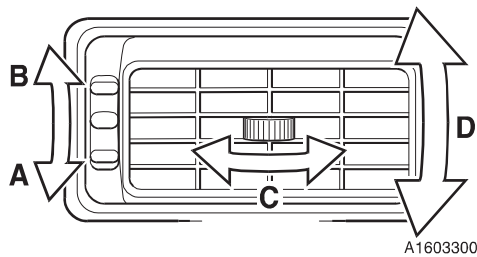
Position 2 Half fan speed – used for heating or air conditioning.

Position 3 ¾ of full fan speed – used for air conditioning.

Position 4 Full fan speed – used for defrosting.



A1349200



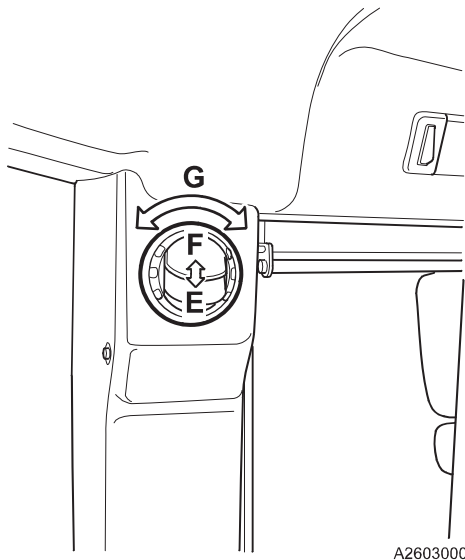
### Ventilation nozzle

#### Instrument panel

- A closed
- B open
- C directing flow horizontally
- D directing flow vertically.

#### B post (cab corner post)

- E closed
- F open
- G direction of flow.



### Air conditioning (optional equipment)

**IMPORTANT! Make sure that the compressor starts up a couple of times during the week so that its seals are lubricated.**

For health reasons you should not lower the temperature in the cab more than 6 °C (11 °F) below the outside temperature.

#### In damp weather

Before switching off the air conditioning, slightly raise the temperature to avoid misting in damp weather.

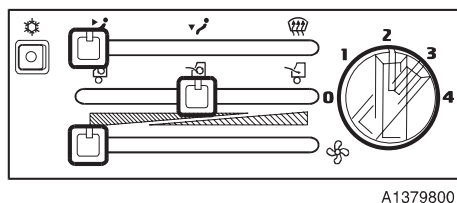
#### Short rain showers

Do not switch off the air conditioning during short rain showers, as the windows may mist up when the air conditioning stops. The air conditioning only works when the engine is running and performs best when the windows are closed.

Ask a workshop authorised by Volvo CE to check the air conditioning once a year.

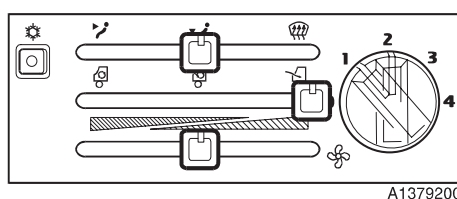
### Climate control system, adjusting

These instructions 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.



#### Summer

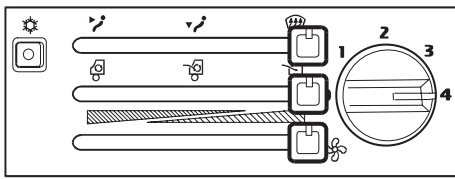
Adjustment for machines with or without air conditioning. On machines with air conditioning the switch should be pressed in.



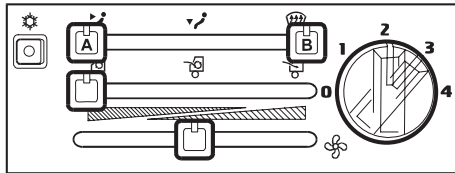
#### Winter

Adjustment for machines with or without air conditioning. On machines with air conditioning the switch should not be pressed in.

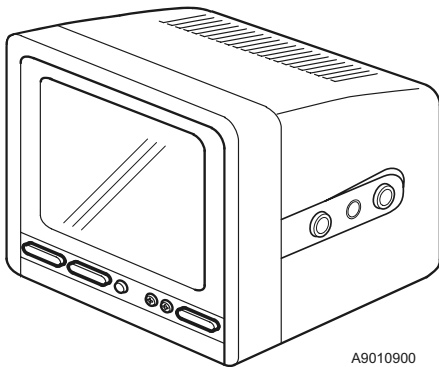




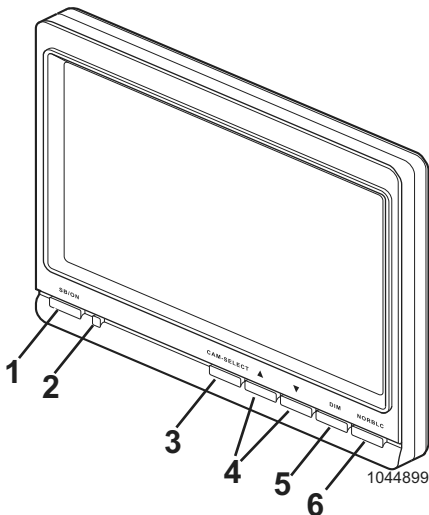
A1379100



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1044899

### Defroster

Adjustment for machines with or without air conditioning. On machines with air conditioning the switch should be pressed in.

### Dehumidification

The adjustment applies to machines with air conditioning. The switch for the air conditioning should be pressed in.

The air distribution control should be in position **A** or **B**.

### Rear vision camera (optional equipment)

The camera at the rear on the machine, together with the monitor in the cab provide the operator with a better view rearward.

The lens on the camera should be cleaned with a damp rag when required.

The rear vision camera is connected when the ignition switch is in position 1, running position.

There is a switch on the monitor for selecting viewing only when reversing or all the time when operating both forward and rearward.

### Rear vision system, colour (optional equipment)

The rear vision camera, together with the monitor in the cab, provide the operator with a better view to the rear.

The lens on the rear vision camera should be cleaned with a damp rag when required.

#### 1 **SB / ON.**

**ON:** The monitor is on all the time when the start key is in operating position.

**SB:** The monitor is only on when the gear selector is in reverse. The distance indicator is shown. This mode is recommended as normal mode in order to not distract when operating forwards.

#### 2 **LED.** Is alight when the monitor is on. Halved brightness when the monitor is in stand-by position.

#### 3 **CAM-SELECT.** Used to adjust the camera.

The menu with different adjustments is shown if the button is pressed and held in approx. 2 seconds, on the condition that the gear selector is not in reverse.

Press the button again to access the desired adjustment.

Hold in the button for approx. 2 seconds to close the menu. It also closes automatically after 10 seconds.

#### 4 **▼/▲** Used to adjust volume under "VOICE " in the "INPUT " menu. The buttons are also used to scroll in the menu.

#### 5 **DIM.** Used to adjust light intensity in the monitor.

#### 6 **NOR/BLC.** A sensor senses the light around the camera and automatically adjusts the light intensity on the monitor. Do not cover over the sensor.



# Operating instructions

This chapter contains rules which must be followed to make working with the machine safe. However, these rules do not relieve the operator from following laws or other national regulations for traffic safety, industrial safety and labour welfare.

To avoid the risk of accidents, alertness, judgement and respect for applicable safety regulations is a condition.

## Running-in instructions

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

After eight hours operation, the wheel nuts should be check-tightened. This applies also after changing a wheel, see page 143.

### Warranty inspections

In addition to the ordinary maintenance intervals, service actions shall be done at the 100 and 1000 hour warranty inspection, respectively.

These service actions, such as changing oil and other fluids, must be carried out by an authorised workshop, if the warranty is to apply.

See under "Service and maintenance" regarding which oil and fluid changes must be carried out during the running-in period and what else applies according to the Service Programme and the Warranty Inspections.

## Visibility



### WARNING!

**Some attachments and equipment may affect the operator's visibility. Pay attention to dead angles, where there is no visibility, when operating on work sites and on public roads. When needed, use a signal man.**

It may be impossible to obtain visibility all around the machine. To achieve acceptable visibility, optional devices can be used, e.g., warning systems, mirrors, and surveillance cameras (CCTV).

To minimise risks caused by limited visibility, rules and procedures shall be established by the management on the work site. For example:

- Make sure that operators and workers on the site have received thorough safety instructions.
- Control the traffic flow of machines and other vehicles. If possible, avoid reversing.
- Limit the machine's operating area.
- Use a signal man to help the operator.
- Make available equipment for two-way communication as needed.
- Make sure that workers on the site communicate with the operator before approaching the machine.
- Use warning signs.

The standard ISO 5006 "Earthmoving machinery – Operator's field of view") covers the operator's visibility around the machine and is intended to be used to measure and evaluate visibility. Compliance with this standard is a requirement in EU-countries and gives improved visibility around the machine.

The machine is tested according to methods and criteria for this standard. The method used to evaluate visibility cannot cover all points regarding operator visibility, but it does give information to determine if optional devices for indirect visibility are needed, e.g., warning systems.

The test was conducted on machines with standard equipment and standard attachments. If the machine is modified or equipped with other equipment or attachments, resulting in reduced visibility, it shall be tested again according to ISO 5006.

If other equipment or attachments are used and visibility has been reduced, the operator must be informed.

**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 devices are in good condition, clean, and correctly adjusted.
- Check that the horn, back-up warning signal, and the rotating beacon (optional equipment) work as intended.
- Check if the management has established rules and procedures for the work site.
- Always pay attention around the machine to identify any obstacles.

## Safety rules when operating

### Operator duties

- The machine operator must operate the machine in such a way that the risk of accidents is minimised both for the operator, other road users and persons present at 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 when operating on public roads as well as during work.
  - There must be no risk of the load falling off while operating.
  - Refuse any load that is an apparent safety risk.
  - Respect the rated load capacity of the machine. Pay attention to the effect of different distances to the centre of gravity and any optional attachments.
- Avoid operating with the dump body raised on ground where there is a risk of overturning, for example on steep inclines or soft ground.
- The machine operator must be in control of the machine's working area.
  - Prevent persons from entering the risk zone, that is, the area around the machine and at least 7 m beyond the attachment's max. reach. The operator may allow a person to enter the area, but must be careful and operate the machine only when that person can be seen or clearly indicates their whereabouts.
  - Prevent any person from being in the cab of a parked vehicle, if there is a risk that the cab can be struck by attachments or falling objects, e.g., rocks or logs. Does not apply if the cab is of adequate strength or protected to handle the object's impact.
- The machine operator may only be accompanied by an instructor if there is a specific seat for a passenger.
- **The following applies for machines equipped with Full suspension:**
  - Before raising or lowering takes place, the operator must make sure that machine damage or personal injuries are avoided.



The danger area around an operating machine forms a circle with a radius of least 7 m (23 ft).

### NOTE! Risk of crushing.

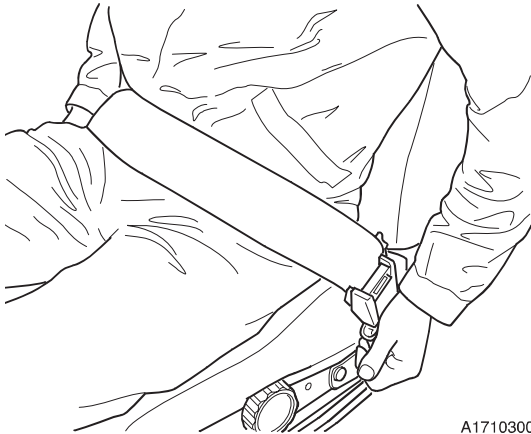
- Always follow local safety regulations and procedures in case of narrow escapes or actual accidents.

### Accidents

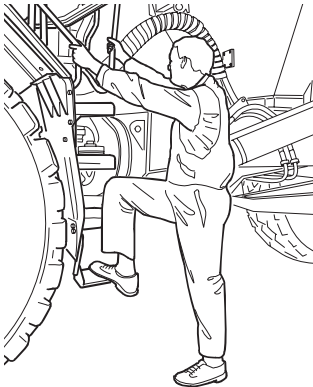
- Accidents and also incidents should be reported to the site management immediately.
- If possible leave the machine in position.
- Only take necessary action so as to reduce the effect of damage, especially personal injuries. Avoid action which may make an investigation more difficult.
- Wait for further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

### Machine operator safety

- The machine must be operational, i.e. faults which can cause accidents must be rectified.
- Suitable clothing for safe handling and hard hat should be worn.
- A loose mobile phone should not be used as it may cause interference with important electronics. The mobile phone shall be permanently connected to the machine's electrical system and with a permanent aerial on the outside of the machine, installed according to the manufacturer's instructions.
- Always sit in the operator seat when starting the engine/machine.
- Keep your hands away from areas where there is a risk of crushing, e.g. covers, door and window.
- Always use the seat belt.
- Use steps and handholds when entering or leaving the machine. Use the three-point grip, 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 when the machine is moving.
- The vibration (shaking) which arises when operating may be harmful to the operator. Reduce this by:
  - adjusting the seat.
  - selecting the most even ground.
  - adapting the travelling speed.
- The cab is for the protection of the machine operator and it meets the requirements for Roll Over Protective Structures according to the testing standard "ROPS". Therefore, hold firmly onto the steering wheel if the machine should roll over – Do not jump!
- The cab is also designed to meet the requirements for falling objects, the weight of which agrees with testing methods according to "FOPS".
- The cab has two emergency exits, the door and the right side window.
- Only walk or stand on surfaces, which are provided with anti-slip pads, see page 90.
- 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 inside the cab, stay there with the machine stationary until the thunderstorm has passed. Do not touch any controls or anything made of metal.



A1710300



#### **WARNING!**

It is forbidden to sit or stand anywhere on the machine, which might impede the operator's ability to manoeuvre the machine.

## **Working within dangerous areas**

### **Working within areas where there are pipes, power lines or cables**

- It is the duty of the employer to know and mark the position of pipes for gas, water, sewage or power lines or cables on the work site and to inform the operator about these. Failure to do so may have legal consequences. When required, local authorities and/or communication and power companies should be contacted regarding maps, drawings and advice.
- Cables and power lines must be protected against damage in a suitable way. Electric cables should, if possible, have the power turned off.
- Information about where the gas and water can be turned off should be made available, so that they can be quickly turned off, if they are ruptured.

**NOTE! In case of critical closeness to cables, pipes or overhead wires, it may be necessary to take another way.**

### **High voltage overhead power line**

Observe great care when working in the proximity of high voltage overhead power lines, as electrical flash-over may damage the machine and injure the operator at fairly great distances from the power line. Bear the following in mind:

**The distance sideways** between machine and power line must be:

- at least 2 m (6.5 ft) in case of low voltage.
- 4 m (13 ft) in case of high voltage of at the most 40 kV (line normally supported on fixed insulators).
- 6 m (20 ft) in case of high voltage above 40 kV (line normally carried on suspended insulators).

**The distance vertically** between machine and overhead power line must be:

- at least 2 m (6.5 ft) in case of low voltage.
- 4 m (13 ft) in case of high voltage.

### **Operating under ground**

- A specific set of regulations may apply to underground operations and may require special equipment. Talk to your dealer.

### **Working in confined areas**

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

### **Working near danger areas**

- Observe great care near marked danger areas.
- Do not operate too close to the edge of a quay, ramp etc.

### **Travelling and operating (working) on a public road**

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 bear in mind that the machine, in comparison with the rest of the traffic, is a slow moving and wide vehicle, which may cause obstruction. Bear this in mind and pay attention to the traffic behind you. Facilitate overtaking.

Working lights, rotating beacon or hazard flashers must not to be used when travelling on public roads unless local regulations have other provisions.

Road signs, traffic restricting arrangements and other safety devices, which may be required when considering traffic speed and intensity or other local conditions, must be used.

Rotating beacon may be used:

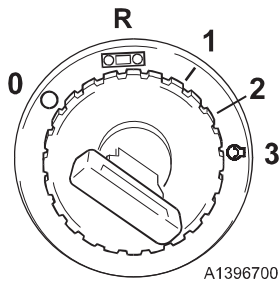
- when the vehicle constitutes a hindrance or danger to other traffic
- when working on or by the side of the roadway.

## **Measures before operating**

- 1 Perform daily service, see page 155. (Make sure that the coolant has required freezing protection in cold weather and that the lubrication oil is intended for use in winter.)
- 2 Clean/scrape the windows.
- 3 Check that there are no faulty/loose parts or leaks which can cause damage.
- 4 Check that the battery disconnect switch is switched on.
- 5 Check that the steering frame joint lock has been disconnected.
- 6 Check that the wheels are not blocked.
- 7 Check that engine hood and guard plates are closed.
- 8 Check that there are no persons in the vicinity of the machine, see page 57.
- 9 Adjust the operator seat (see page 50) and the steering wheel (see page 45).
- 10 Fasten the seat belt.
- 11 Check that there is sufficient fuel in the tank.

### **After operating**

- Fill the fuel tank, as this will counteract the formation of condensation water.



## Starting engine



### WARNING!

Make sure that no person are close to the steering joint when the engine is running. There is a risk of crushing.

**IMPORTANT! Run the engine at low idling speed for at least half a minute after start. This is to ensure the lubrication of the turbocharger.**

If the machine is equipped with anti-theft device, see page 41.

- 1 Place the gear selector to neutral.
- 2 Turn the key in the ignition switch to running position (1) so that a system test can take place, the duration of which is 4–5 seconds.
- 3 At the same time check that all lamps light up and that the gauges indicate.
- 4 Turn the ignition key to starting position (3). If the engine does not start, turn the key back to the "0" position, before making a new starting attempt.
- 5 Check that all control and warning lamps are extinguished.
- 6 Check that the FS-system is in operating position (if your machine is equipped with FS-system).
- 7 Sound the horn.
- 8 Hold the machine with the service brakes.
- 9 Select gear position.
- 10 Release the parking brake.
- 11 Increase the engine speed.

### At temperatures below 0 °C (+32 °F)

**IMPORTANT! Run the engine at low idling speed for at least half a minute after start. This is to ensure the lubrication of the turbocharger.**

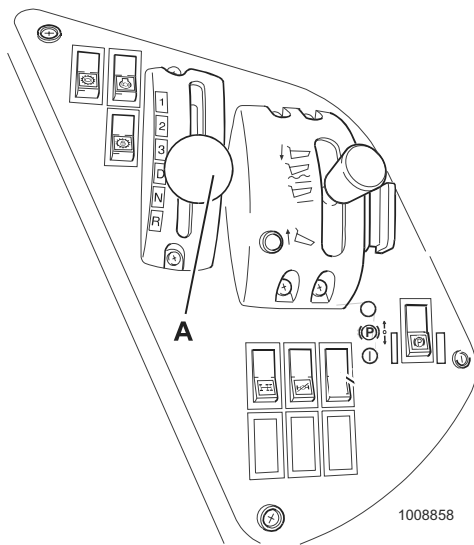
- 1 Place the gear selector to neutral.
- 2 Turn the key in the ignition switch to running position (1) so that a system test can take place, the duration of which is 4–5 seconds.
- 3 At the same time check that all lamps light up and that the gauges indicate.
- 4 If the control lamp for preheating is flashing, turn the ignition key to preheating position (2). Keep the ignition key in this position until the control lamp is extinguished.
- 5 Turn the ignition key to starting position (3). If the engine does not start, turn the key back to the "0" position, before making a new starting attempt.
- 6 Check that all control and warning lamps are extinguished.
- 7 Check that the FS-system is activated (if your machine is equipped with FS-system).
- 8 Sound the horn.
- 9 Hold the machine with the service brakes.
- 10 Select gear position.
- 11 Release the parking brake.
- 12 Increase the engine speed.



### WARNING!

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





A Gear selector control

## Gear shifting



### WARNING!

**Never leave the machine with the gear selector in forward or reverse, while the engine is running.**

The transmission has neutral position, nine forward and three reverse speeds. All with automatic direct drive clutch (lockup).

The gear-shifting system is fully automatic, but the automatic control can be limited by the operator via the gear selector control.

The electronics of the transmission registers the travelling speed of the machine, acceleration and the engine loading. Based on these parameters the electronics controls the gear shifting automatically providing the best comfort, fuel consumption and performance.

### Gear position D

- Normal gear position for operating forwards. See also Overspeed Protection on page 65.

### Gear positions 1, 2 and 3

- Limits upshifting from gears 1, 2, and 3. However, upshifting is allowed to prevent overspeeding.

### Gear position N

Neutral position

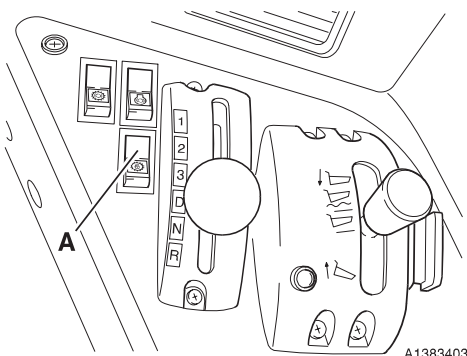
### Gear position R

Reverse gear.

### Gear-shift inhibitor

Is used for preventing gearshift hunting in certain situations, that is to say repeated up- and downshifts at short intervals.

The gear-shift inhibitor is disconnected by again pressing the button or when there is a risk of overspeeding.



A Gear-shift inhibitor

**Safety functions during gear shifting**

The machine is provided with safety functions which protect the engine and transmission via the electronic control unit of the transmission in the event of an operator error.

**These functions are:**

- The engine can only be started with the gear selector in the neutral position (N position).
- The gear selector control may be moved from the N position to different gear positions, but no gear will be engaged, if the engine speed exceeds 18.3 r/s (1,100 rpm) (stationary machine). If the engine speed is above 1100 rpm it will be lowered automatically to 1100 rpm before a gear is engaged.
- When the parking brake is applied, no gear will be engaged.
- When delayed stop has been connected (count-down has started), it is not possible to engage a gear (optional equipment).

**If the gear selector control is moved to the N position while operating:**

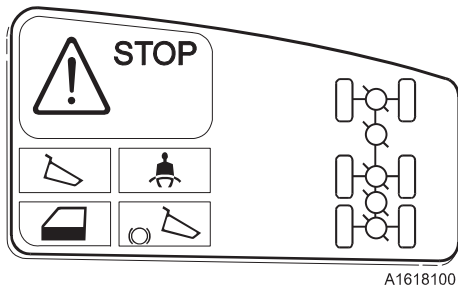
- If the speed is above 7 km/h (4.3 mph) the transmission will not shift from the engaged gear.
- If the speed is below 7 km/h (4.3 mph) the transmission will shift into Neutral.

**If the gear selector control is moved past the N position (change of travelling direction while operating):**

- If the speed is above 7 km/h (4.3 mph) the transmission will not shift from the engaged gear.
- If the speed is between 2 km/h and 7 km/h (1.6 and 4.3 mph) the transmission will shift into Neutral.
- If the speed is below 2 km/h (1.6 mph) and the engine speed is below 18.3 r/s (1100 rpm) a new gear may be selected.

**Overspeed protection**

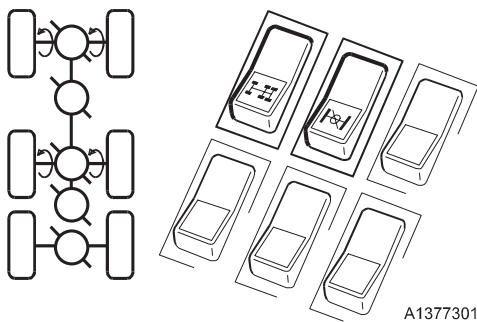
- If there is a risk of the engine overspeeding, an upshift is made to the next higher gear, irrespective of the position of the gear selector and the gear-shift inhibitor.



A1618100

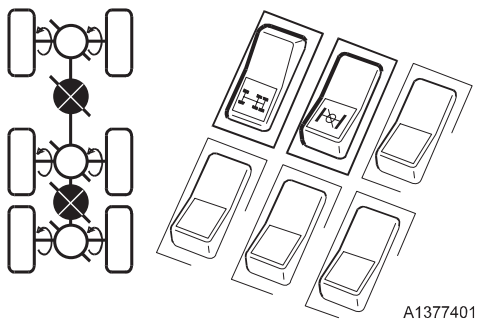
Right instrument panel

Indicator, differential locks / 6-wheel drive



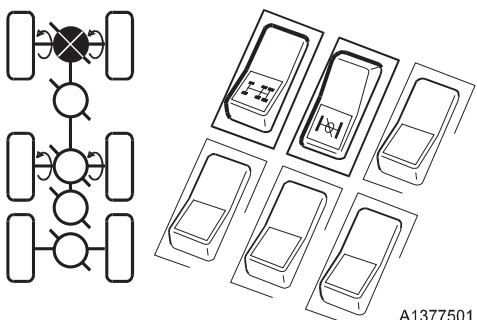
A1377301

4-wheel drive without differential locks



A1377401

Longitudinal differential lock/6-wheel drive



A1377501

Transverse differential lock, front axle

## Operating with differential locks



### WARNING!

We warn especially against the method of trying to traverse slippery ground by force with chains on one drive side only. This oblique traction power causes extreme wear to the power transmission and you may also lose control of the machine and cause an accident with consequent personal injuries.

**NOTE!** The differential lock must never be engaged when one of the wheels is spinning.

**IMPORTANT!** Do not use drive and differential locks on more wheels than what is required by the situation. Incorrect use can cause unnecessary tyre wear, increased fuel consumption and impair the manoeuvrability.

When operating with anti-slip devices (snow chains), the differential locks and the 6-wheel drive should not be engaged.

### Operation (without differential locks)

- During operation four wheels on the machine are driving and then there is no drive to the rear bogie axle.
- All differential locks are disengaged.
- No control lamps on the instrument panel are alight.

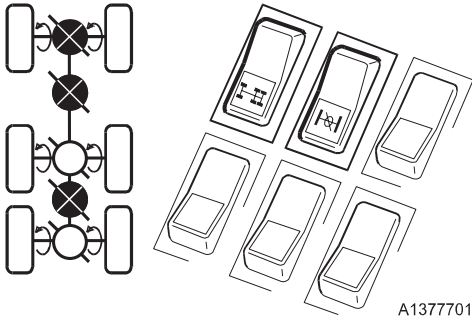
### Longitudinal differential lock / 6-wheel drive

- Engagement of the longitudinal differential lock automatically causes the 6-wheel drive to be engaged as well.
- The longitudinal differential lock and 6-wheel drive (6x6) is used when operating on soft and slippery ground and on steep inclines.
- Engagement and disengagement can be made while operating regardless of travelling speed.
- The control lamp for longitudinal differential lock / 6-wheel drive on the instrument panel will be alight.
- The control lamp in the switch will be alight.

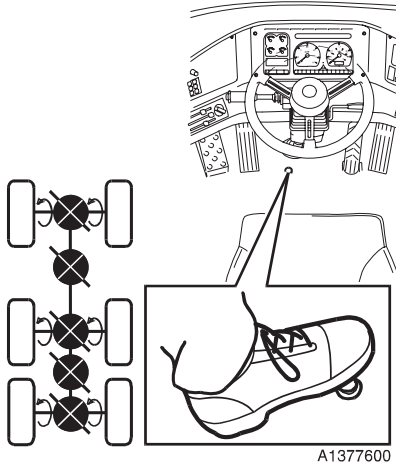
**NOTE!** The longitudinal differential lock / 6-wheel drive must be disengaged when operating on good ground and at high travelling speed.

### Transverse differential lock, front axle

- Only use the transverse differential lock on the front axle separately when the ground is very slippery but firm to maintain the best possible steering ability of the machine.
- Disengage the lock when operating on firm ground.
- The control lamp on the instrument panel for the differential lock on the front axle will be alight.
- The control lamp in the switch will be alight.



Longitudinal differential lock / 6-wheel drive  
and transverse differential lock, front axle



All differential locks / 6-wheel drive

### Longitudinal differential lock / 6-wheel drive + transverse differential lock, front axle

- Provides the best possible traction with maintained steering ability on soft and slippery ground.
- Disengage the lock when operating on firm ground.
- Both the control lamp for the longitudinal differential lock and the control lamp for the differential lock on the front axle, will be alight on the instrument panel.
- The control lamp in the switches will be alight.

### All differential locks / 6-wheel drive

- Is used when operating where maximum traction force is required.
- The following control lamps on the instrument panel will be alight.
  - Longitudinal differential lock/6-wheel drive
  - Differential lock, front axle
  - Differential lock, bogie axle (front)
  - Differential lock, bogie axle (rear)

- The control lamp in the switches for the differential locks will be alight, even if the switches are in position 0.

**NOTE! The steering ability of the machine is reduced.**

For engagement and disengagement of the differential locks, see page 47.

### ATC (Automatic Traction Control) (optional equipment)

The longitudinal differential lock and 6-wheel drive on the machine are controlled automatically. The differential lock and 6-wheel drive are controlled independent of each other.

The machine has two possible drive combinations:

- Automatic mode.
- All differential locks and 6-wheel drive are engaged with the foot control.

#### Automatic mode

Used for all types of operating conditions.

The machine senses wheel speed and steering angle, and the longitudinal differential lock and 6-wheel drive are engaged automatically, independent of each other.

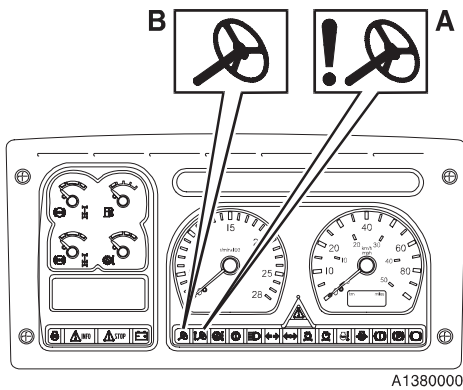
No control lights for differential locks or 6-wheel drive are lit on the instrument panel at engagement or disengagement.

#### All differential locks and 6-wheel drive

Is used when operating where maximum traction force is required.

Control lights for all differential locks and 6-wheel drive are lit on the instrument panel.

**NOTE! The steering ability of the machine is reduced.**



A1380000

- A Control lamp (red) engine-dependent pump (primary steering system)
- B Control lamp (amber) ground-dependent pump (secondary steering system)

## Steering

The steering system is a self-compensating, hydro-mechanical system and provided with a secondary steering function via a ground-dependent pump positioned on the dropbox. This ensures steering down to approx. 3 km/h (1.9 mph) even if the engine should stop.

During all forward operation the control lamp (red) for engine-dependent pumps and the control lamp (amber) for ground-dependent pump (the secondary steering) should be extinguished.

### If the red lamp (A) for the engine-dependent pumps is alight:

The hydraulic pumps have stopped functioning (e.g. the engine has stopped). The steering will work down to approx. 3 km/h (1.9 mph). The steering pressure is obtained from the ground-dependent pump when operating forward.

### If the amber lamp (B) for the ground-dependent pump is alight:

The hydraulic pump has stopped functioning. The steering functions as normal, but if the engine-dependent pumps should now stop functioning, the steering of the machine will be made completely inoperable.

**If any of the lamps are alight, stop the machine immediate and contact a workshop authorised by Volvo CE.**

## Secondary steering

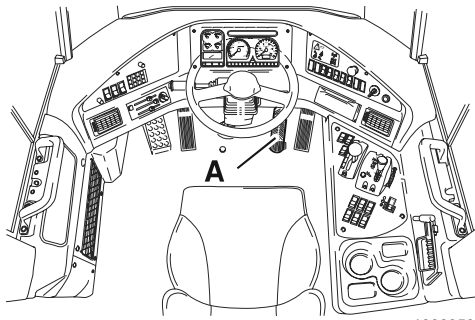
The machine is provided with a secondary steering system which is ground-dependent (it is provided with a ground-dependent pump). This means that the secondary steering works down to approx. 3 km/h (1.9 mph) when operating forward.

## Testing the secondary steering system

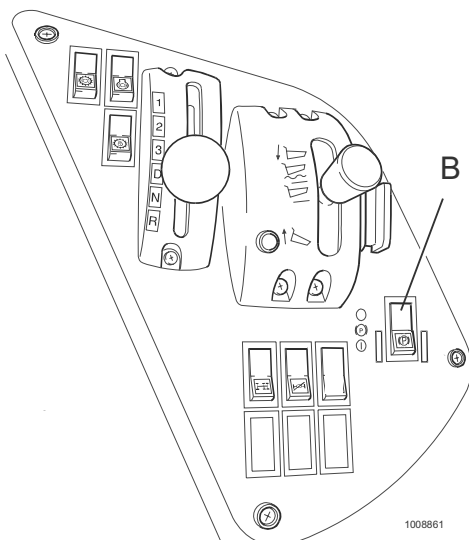
**Test the secondary steering system every 2000 hours.**

Run the machine on a road where there is no other traffic, stop the engine by pressing in the emergency stop when the machine is moving at approx. 10 km/h (6 mph). The steering should function down to a speed of approx. 3 km/h (1.9 mph).

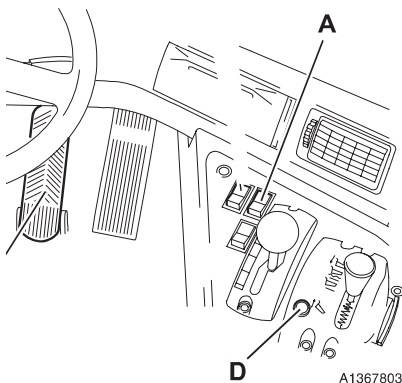
**NOTE! The pressure in the brake system should be at maximum level before testing.**



A Service brakes



B Parking brake



A Switch, engine braking

D Switch, load and dump brake

## Braking

### Service brakes



#### WARNING!

**In case of a faulty brakes, stop the machine immediately and contact a workshop authorised by Volvo CE for action to be taken.**

The service brakes are divided into two separate circuits. If a fault arises in one of the circuits, the machine can still be braked with the intact circuit.

If brake action is lost in both brake circuits, apply the exhaust brake and the parking brake and stop the machine.

### Parking brake

**The parking brake should not be applied until the machine is completely stationary.**

Application and release, see page 49.

The parking brake is self adjusting (no after-adjustment is necessary).

**NOTE! When the parking brake is applied, it is not possible to engage a gear.**

### Emergency brake

- In an emergency situation the parking brake may be used as an emergency brake (if the parking brake is used as an emergency brake, the load and dump brake will be engaged automatically if the speed is above 2 km/h (1 mph)).
- The parking brake will be applied automatically, if the brake pressure should be lost in both the front and rear circuits.

### Engine retarding

**Will be connected if:**

- switch (A) is switched on, see also page 47.
- the accelerator pedal is fully released
- the engine speed exceeds 18.3 r/s (1100 rpm)
- the engine temperature exceeds 70 °C (158 °F).

**Will be disconnected if:**

- the accelerator pedal is pressed down
- the switch is switched off.

### Load and dump brake

The load and dump brake activates the service brakes and puts the transmission in neutral. This is to facilitate loading and dumping.

This function can only be activated at speeds below 5 km/h (3.1 mph).

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

## Stopping machine

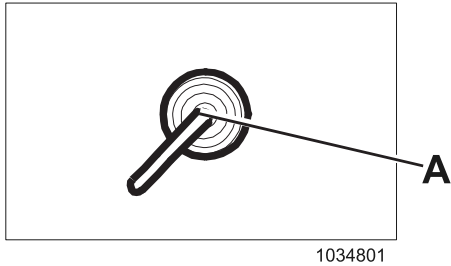


### WARNING!

**When you are entering and leaving the machine, always face the machine and use the steps or hand holds to avoid slipping. Always use the "three-point" grip, i.e. both hands and one foot or both feet and one hand, when entering or leaving. Do not jump!**

- 1 Release the accelerator pedal.
- 2 Brake and put the gear selector control in neutral, when the machine is stationary.
- 3 Apply the parking brake.
- 4 Let the engine run at idle speed for at least 1/2 minute before it is stopped to ensure lubrication and cooling of the turbocharger.
- 5 Turn the ignition key to position 0 (turned off).





A Battery disconnect switch

## 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.
- 2 Make sure that the dump body is lowered or made safe. Avoid parking a loaded machine.
- 3 Check that switches and controls are in the "off" position or in neutral.
- 4 Apply the parking brake.
- 5 Close windows, remove the ignition key and lock the door to the cab.
- 6 **Turn off the battery disconnect switch (A)**, which is positioned on the left side of the cab under the entry step.

### Long-term parking

- 1 Carry out the measures as described above. Remember that the ground on which the machine is to stand may shift depending on the weather. Therefore take suitable action.
- 2 Lower the FS-system right down, if the machine is equipped with an FS-system.
- 3 Wash the machine and touch up the paint finish to avoid rusting.
- 4 Rustproof exposed components, lubricate the machine thoroughly, grease all unpainted surfaces (tipping cylinders, steering cylinders).
- 5 Check the tyre pressure.
- 6 Fill the fuel and hydraulic oil tanks to the max. marks.
- 7 Cover the exhaust pipe (applies when parking out-of-doors)
- 8 Drain water from the compressed-air reservoirs
- 9 Remove the fuse for the voltage converter (fuse 41). Otherwise there is a risk that the batteries will be discharged.

Remember that the risk of theft and break-in can be minimised if one:

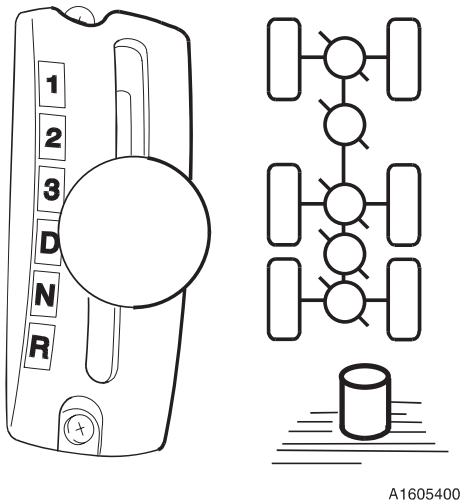
- removes the ignition key when the machine is left unattended
- locks doors and covers after the end of the working shift
- turns off the current with the battery disconnect switch and removes the handle for the switch
- avoids parking the machine in places with high risk of theft, break-ins and malicious damage
- chains the machine to an immobile object.

It is easier to identify stolen machines if PIN number or registration number is etched onto the windows.

### After the long-term parking check

- all oil and fluid levels
- all belt tensions
- tyre pressure
- air cleaner.
- battery status.





## What to do if the machine gets stuck

### Step 1 (by operating in zigzag / "duck's waddle")

- 1 Engage all differential locks with the foot button.
- 2 Keep an even engine speed and avoid wheel spin.
- 3 Steer alternately full lock to the right and full lock to the left. When you have reached full lock in one direction, continue operating in that direction until the machine is just about to stop, before turning to full lock in the other direction.

If the machine becomes stationary after 3–4 turns, or if it sinks deeper, abort and proceed to step 2.

### Step 2 (by rocking loose)

- 1 Release the accelerator to stop the wheels from spinning.
- 2 Engage the differential locks.
- 3 Select gear position D and accelerate.
- 4 Release the accelerator and brake.
- 5 Select gear position R and accelerate again.
- 6 Repeat this procedure until the machine has "rocked" loose.

If the machine still is stuck, abort and proceed to step 3.

### Step 3

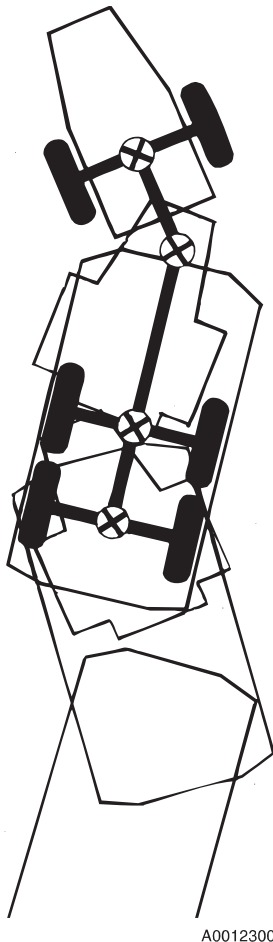
- 1 Get towing assistance from a crawler tractor, a loader or an excavator.
- 2 If you do not succeed in dumping the load because of the risk of overturning, make use of a supporting machine during the dumping operation.
- 3 Remove the dumped material with the aid of the supporting machine.
- 4 Lower the dump body.
- 5 Allow the assisting machine to lift and push at the rear of the dump body at the same time as the hauler is operated according to step 1 until it is free.

### Step 4

#### Getting unstuck with towing assistance

If the hauler has not bogged down, but the wheels are simply spinning, it can be towed with the aid of a tow bar, wire rope or chain connected to the towing eyes or pushed by another machine.

See also page 73.



## Recovering/towing



### WARNING!

- The greatest care must be taken in connection with towing to avoid serious injury.
- Before taking any steps in preparation for recovering or towing, the parking brake must be applied and the wheels blocked to prevent the machine from rolling.
- If the engine cannot be started, the brake and steering functions will be limited. In this case, towing should be restricted to emergencies only and over the shortest possible distance by knowledgeable personnel (see under Towing). If possible, transport the machine on a trailer.

During recovering / towing the engine should be running, if possible, to provide braking and steering.

### Recovering

- Use a towbar, wire rope or chain connected to the towing eyes at the front or rear on the machine to tow the machine to a suitable location or passable road.

### Towing

- If the machine after recovering must be towed to a workshop, use a towbar or wire rope connected to the front towing eyes.
- If there are no brakes on the machine to be towed, a towbar must always be used.
- The vehicle or machine which does the towing, must be at least as heavy as the towed machine, and have sufficient engine and braking capacity to be able to pull and stop both machines on any uphill or downhill slope.
- Towing should always be done over the shortest possible distance.
- Highest travelling speed during all circumstances is 10 km/h (6 mph).

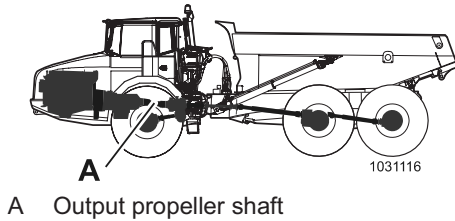
**NOTE! It is not possible to start the engine by towing.**

### Case 1 (with engine running)

The gear selector should be in neutral and the parking brake in running position. The machine can be towed 10 km (6 miles) without taking special precautions.

### Case 2 (with engine not running)

As the transmission does not receive any lubrication when the engine is not running, the propeller shaft between transmission and dropbox must be removed. In that way lubrication to the dropbox is maintained at the same time as the machine can be steered.



A Output propeller shaft

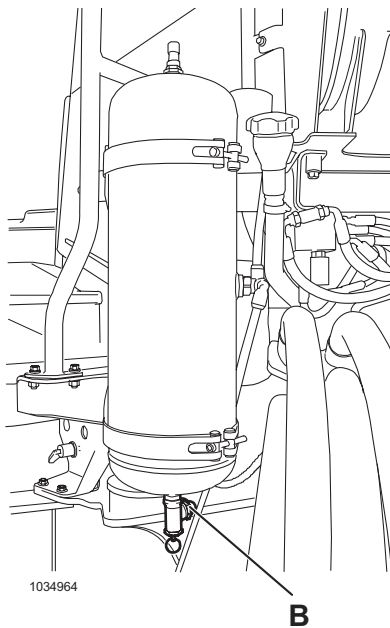
### Removing propeller shaft

- 1 Place the machine in service position, see page 89.
- 2 Block the wheels so that the machine cannot start rolling and then release all brakes.
- 3 Release the parking brake.
- 4 Make sure that the front or rear wheels are slightly above the ground, before removing the bolts from the propeller shaft.

### Filling compressed-air system

When required, the compressed-air system can be filled through filler valve (B), by using compressed air from another machine.

The filler valve is positioned to the left behind the cab.



B Filler valve

### After recovering / towing

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

- 1 Place the machine on level ground.
- 2 Apply the parking brake.
- 3 Block the wheels to prevent the machine from rolling.

## Manual release of parking brake



### WARNING!

After the parking brake has been released manually it will not work. The machine must only be towed, if it is connected to the towing vehicle by a towbar.

If the parking brake cannot be released with the switch because of insufficient compressed air, the brake can be released manually.

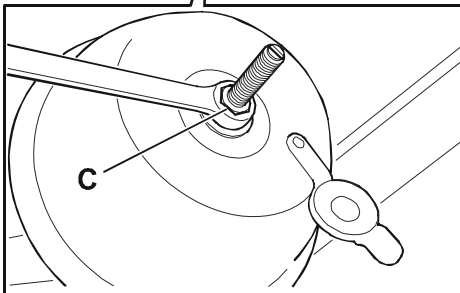
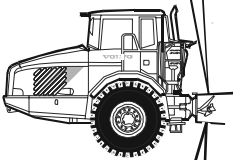
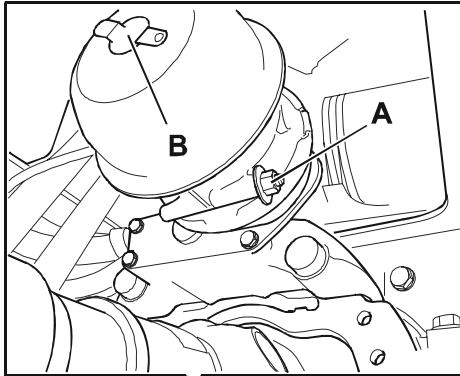
#### Proceed as follows:

- 1 Block the wheels or prevent the machine from rolling in another way.
- 2 Remove the jacking bolt (A) from the storage location.
- 3 Remove cover (B) from the cylinder housing.
- 4 Insert the jacking bolt in the cylinder housing (C) and turn the jacking bolt  $\frac{1}{4}$  of a turn clockwise to lock it.
- 5 Release the parking brake by screwing in the jacking bolt clockwise until the brake pads no longer are applied.

**NOTE!** If the machine is left without restored parking brake, this shall be indicated by attaching a tag to the steering wheel stating that the parking brake is disabled.

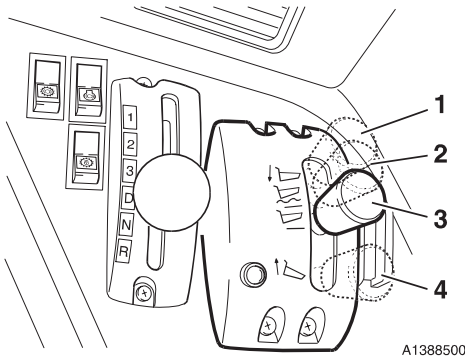
#### Restoring parking brake after manual release

- 1 Block the wheels or prevent the machine from rolling in another way.
- 2 Start the engine and leave it running until the compressed-air system has reached the correct working pressure, see page 185.
- 3 Release the parking brake with the switch on the control panel.
- 4 Screw the jacking bolt counter-clockwise until it is loose.
- 5 Install the cover on the cylinder housing and reinstall the jacking bolt in its retainer.
- 6 Then check the function of the parking brake.



A1610300

- A Jacking bolt
- B Cover
- C Cylinder housing



Tipping control

- 1 Lowering with pressure
- 2 Floating position
- 3 Holding position
- 4 Tipping (dumping) position)

## Tipping

**When dumping, the following points should be observed:**

- Steer the machine so that it is straight and with the trailer unit on level ground.
- Ensure that no persons are near the machine.

If conditions permit, dumping may be carried out while moving.

## Tipping control

### Dump body lowered by hydraulic pressure = position 1

This position is used when the dump body is in such a position that it will not lower under its own weight.

Move the control to position 2 when the dump body begins to lower under its own weight.

### Floating position = position 2

**NOTE! During loading and transporting this position should be selected.**

This position is used for all operation with empty or loaded dump body. This position can be used when the dump body is in such a position that it will lower under its own weight.

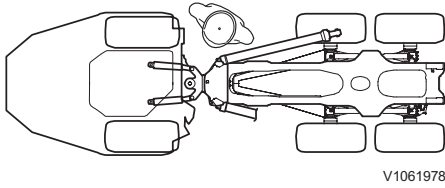
**NOTE! If the operator leaves the operator seat, the tipping control automatically moves to holding position.**

### Holding position = position 3

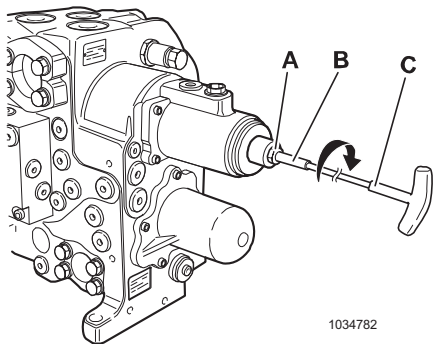
Is used for interrupting the tipping or lowering movements. The dump body stops in the current position.

### Tipping (dumping) position = position 4

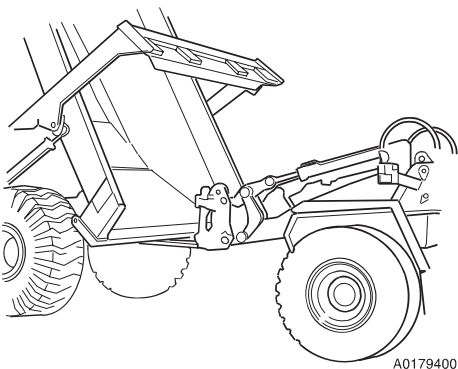
Is used when tipping (dumping). Keep the tipping control in this position. Reduce the engine speed before the dump body reaches its top position.



The position of the operator during emergency lowering



- A Jam nut
- B Emergency-lowering screw
- C Allen key



## Dump body, emergency lowering

The operation of the dump body, i.e. tipping and lowering, is controlled with servo pressure.

If the engine should stop with the dump body in the raised position and the starter motor, for some reason, does not work, there will be no servo pressure for operating the tipping valve and the dump body must be lowered manually. The emergency lowering bolt is located on the steering and tipping valve.



### WARNING!

Use the greatest caution when carrying out emergency lowering, as it is not possible to place the machine in service position.

**NOTE!** Emergency lowering must be carried out from outside the machine where the dump body is in full view of the operator during the entire lowering.

**It is possible to emergency-lower the dump body in the following way:**

The steering and tipping valve is located under the cab.

- 1 From outside the machine, loosen the jam nut on the emergency-lowering screw and screw the screw inwards. Ring spanner and Allen key are included in the tool set for the machine.

**NOTE!** The bolt can be turned approx. 8–9 turns before actuating the tipping valve spool (count the number of turns). Continue to turn the screw so that it displaces the valve spool into the lowering/floating position (i.e. lowering without pressure).

- 2 This will cause the dump body to slowly lower unless it is near its top position and the machine is leaning backwards. In this case the dump body needs aid to lower through the action of an excavator or wheel loader, which lifts at rear edge of the dump body.
- 3 Reset the screw to its original position.

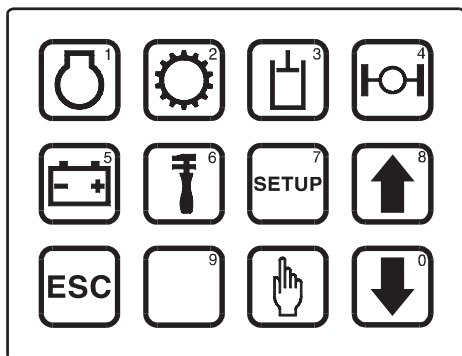
## Full Suspension, emergency lowering

The control of the FS-system, i.e. raising and lowering, is by way of hydraulics. If the engine should stop with the system in the raised position and the starter motor, for some reason, does not work, there is no pressure for operating the system.

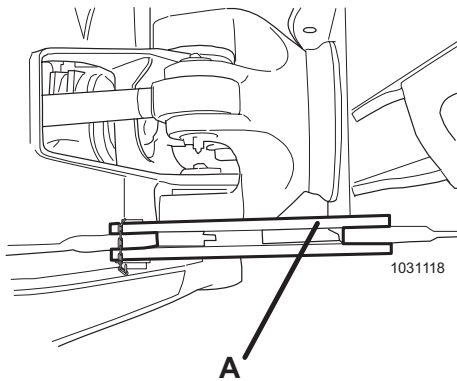
**NOTE! In order to carry out service and repairs on the machine, the FS-system must be in the lowered /bottom) position.**

When the engine is not running, but the electronics system is functional, the FS-system can be lowered via the operator display unit and the keyboard, see page 36.

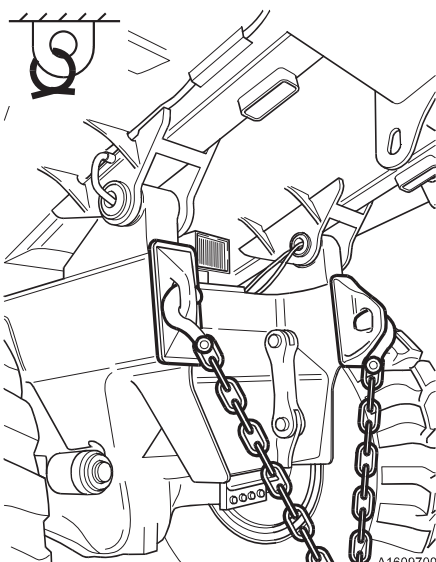
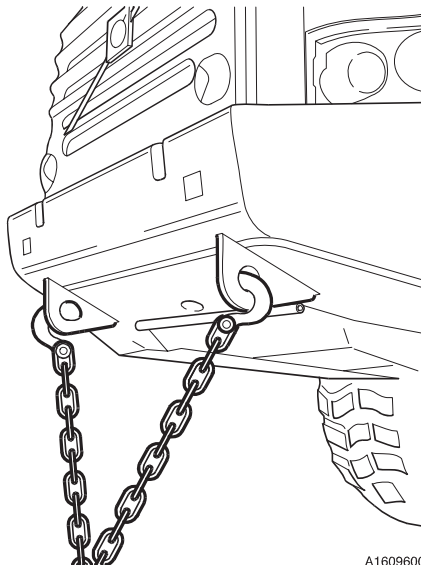
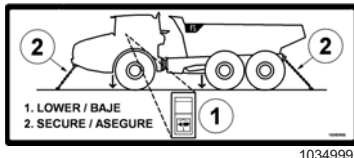
If the electronics system is not functioning, contact a workshop authorised by Volvo CE for aid with emergency lowering.



A1300700



A Steering joint lock



## Transporting the machine



### WARNING!

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

### Steering joint lock

During service work, lifting and transporting the machine on another vehicle, the steering joint should be locked.

- 1 Place the machine so that it is straight and turn off the engine.
- 2 Remove the pin from the transporting position lug and swing the joint lock (A) over to the locked position.
- 3 Install and secure the pin.



### WARNING!

Make sure that no person are close to the steering joint when the engine is running. There is risk of injuries by crushing.

### Transporting on another vehicle

- If the machine is driven up onto another vehicle, the steering joint must not be locked. Lock the steering joint when the machine is in position on the transporting vehicle.
- The transporting vehicle must be securely braked and the wheels blocked.
- If the machine is lifted, however, the steering joint should be locked.

### Lashing the machine for transportation

- Lock the steering joint with the steering joint lock when the machine is in position on the transporting vehicle.
- Apply the parking brake and block the wheels.
- Lash the machine through the towing eyes front and rear and against the platform on the transporting vehicle, so that the machine cannot slide, tip or begin to roll.
- In addition to this, follow national regulations.
- Do not forget to unlock the steering joint and secure the steering joint lock in the bracket intended for this purpose, before operating the machine again.

**IMPORTANT!** If the machine is equipped with an FS-system, the system must always be in the lowered position during all service and lifting and when transporting the machine.

**IMPORTANT!** If the machine is equipped with an FS-system, the lashing must be loosened before the FS-system is activated. Great risk of machine damage and personal injury.



## Lifting machine

The lifting tool is optional equipment to be used for lifting the machine. They are intended for a machine weight of max. 33500 kg (A35E/A35E FS) / 39000 kg (A40E/A40E FS).

**IMPORTANT!** If the machine is equipped with FS-system, it must be lowered right down before lifting is carried out.



### WARNING!

Never remain under the machine when it is suspended in the air.



### WARNING!

Do not lift the machine using the eyes on the dump body.

## Lifting tool, (optional equipment)



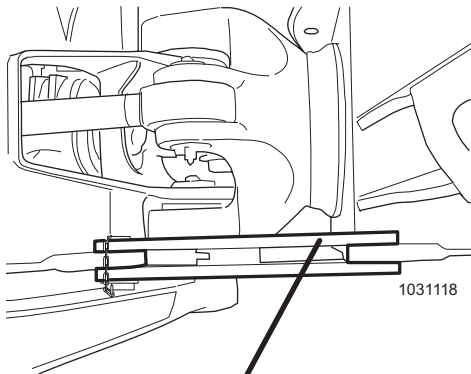
### WARNING!

The lifting tool must only be installed together with the special nuts supplied together with the tool, otherwise the tool may loosen causing serious damage. When removing the tool, the ordinary wheel nuts must be reinstalled.

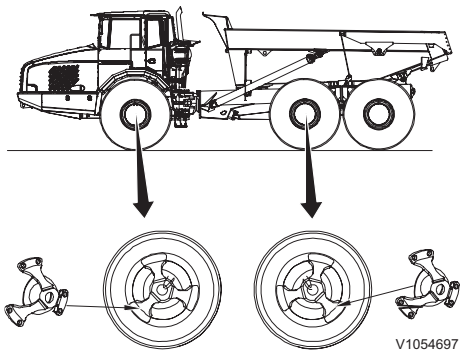
- It is important that correct lifting tools and nuts are used.
- The combination of rim and tyres determines which tool and nuts are to be used, see below.
- It is important that the lifting tool is installed in a correct way.
- The lifting tool should only be installed on the machine for when lifting and transporting. Remove the tool after use.
- The nuts, which belong to the lifting tool, should preferably be stored on the tool, when they are not used.
- The ordinary wheel nuts should not be stored on the tool when the tool is installed on the machine.
- The lifting tool is marked with two decals that state which tool and nuts should be used in combination with a certain rim and tyre. The part number is also stamped-in on the lifting tool itself.

| Lifting tool      | Nut               |
|-------------------|-------------------|
| Part No. 15011655 | Part No. 11193630 |

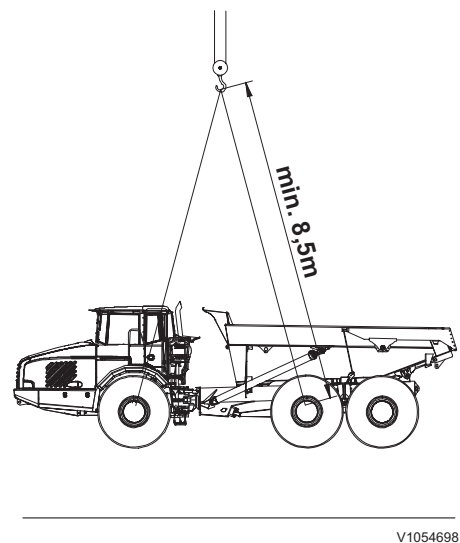
**Tightening torque for nuts for lifting tool, 200 Nm (148 lbf ft).**



- 1 Place the machine on level ground.
- 2 The engine must be turned off and the battery disconnect switch turned off.
- 3 Lock the steering joint with the steering joint lock.

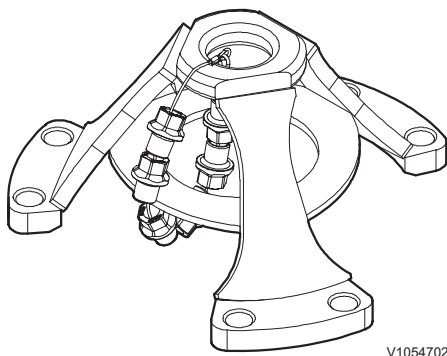


- 4 Install the lifting tool to front axle and the front bogie axle and tighten the nuts crosswise to **200 Nm (148 lbf ft)**.



- 5 Connect four lifting slings to the lifting tools.  
**The four lifting slings must be of the same length and at least 8.5 m (28 ft).**

- 6 Lift the machine using the lifting eyes of the wheels.
- 7 Lower the machine.
- 8 Remove the steering frame lock before moving the machine.



Storing lifting tool

- 9 Remove the lifting tool and store the associate nuts on the wire.

## **Operating techniques**

The following pages contain advice and instructions on how to operate the machine. It is important that the correct operating techniques are used to obtain safe and efficient use of the machine.



## Whole body vibrations

Whole-body vibration emissions on construction machinery are affected by a number of factors, such as the working mode, ground conditions, speed, etc.

To a large extent the operator can influence the actual vibration levels, because the operator controls the speed of the machine, its working mode, the travel path, etc.

Therefore, this may result in several different vibration levels for the same type of machine. For cab specifications, see page 188.

### Guidelines for reducing vibration levels on earthmoving machines

- Use the proper type and size of machine, with optional equipment and attachments for a certain application.
- Make sure that the ground is kept in good condition.
  - Remove larger stones and obstacles.
  - Fill in any ditches and holes.
  - Provide equipment and schedule time for maintaining terrain conditions.
- Adjust the machine speed and choose a suitable travel path to minimise the vibration level.
  - Travel around obstacles and uneven ground.
  - Reduce the speed when it is necessary to go over rough terrain.
- Maintain machines according to the manufacturer's recommendations.
  - Tire pressures.
  - Brake and steering systems.
  - Controls, hydraulic system and linkages.
- Make sure that the operator seat is maintained and correctly adjusted:
  - Adjust the seat and its suspension according to the operator weight and height.
  - Inspect and maintain the operator seat suspension and adjustment mechanism.
  - Use the seat belt and adjust it correctly.
- Minimise vibrations during long work cycle or long distance travelling.
  - Transport machines when there are long distances between work sites.

Back pain associated with whole-body vibrations may be caused by other risk factors.

The following guidelines can be effective to minimise risks of back pains:

- Adjust the seat and controls to achieve good posture.
- Adjust the mirrors to minimise twisted posture.
- Provide breaks to reduce long periods of sitting.
- Avoid jumping down from the machine.
- Maintain reasonable weight and physical condition.



## Transport operation



### WARNING!

As the trailer unit frame is pivoted, relative to the tractor unit frame, around a longitudinal, horizontal axis, you will not feel, if the trailer unit should begin to tip over sideways. Therefore, great care must be exercised when operating the machine. Avoid operating fast round bends, on uneven ground and on downhill.

When operating through a bend at high speed, you must always bear in mind that there is a risk of overturning. The risk of overturning increases when the centre of gravity of the load is high or displaced to one side or if the bends are sharp, cambered the wrong way or the surface is slippery.

- For all operation on roads with moderate inclines select gear position D. The machine will then shift gears automatically depending on need for traction power.
- Utilise the maximum speed of the machine with sound judgement.
- Always adapt the speed to the road conditions and the traffic situation in order to operate safely and comfortably.
- Pay attention to the trailer unit's movements while operating.
- On no account must there be any risk of part of the load falling off when transporting.
- Do not forget to disengage all differential locks, if you are operating on a good road (firm surface).
- Also remember that the machine, when fully loaded, may weigh as much as 70 tonnes. This requires a long braking distance, especially if the road is slippery or you are travelling at high speed.

## Operating on inclines

### Uphill operation

The automatic transmission normally makes sure that the correct tractive force is provided in proportion to the incline.

Under certain conditions, the transmission may start “gear hunting”. This means that the transmission changes up and down between two gears at short intervals.

The gear-shift hunting is caused by that there is not sufficient power for operating in the higher gear, but enough for upshifting from the lower gear.

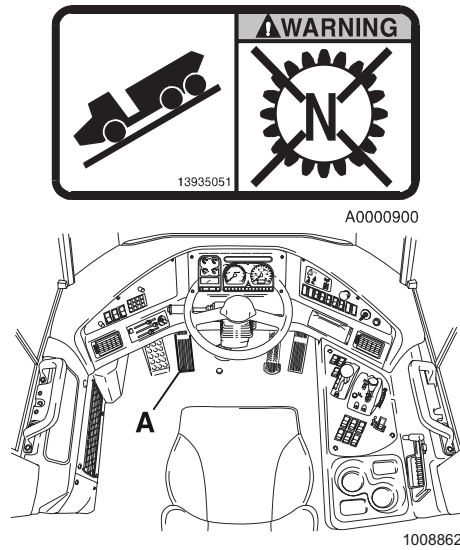
**It is possible to prevent gear-shift hunting in two ways:**

1 Select the next lower gear.

or

2 Activate the gear-shift inhibitor function with the switch on the control panel.

Always engage the longitudinal differential lock / 6-wheel drive when operating in difficult terrain, see page 86.



A Retarder pedal

The diagram shows a truck on a hill with a gear icon and a warning sign. The text 'A35E' is visible. The table below provides the maximum permitted speed for different incline percentages.

| %   | MAX  |     |
|-----|------|-----|
|     | km/h | mph |
| 45% | 13   | 2   |
| 35% | 5    | 3   |
| 25% | 8    | 5   |
| 20% | 12   | 7   |
| 14% | 18   | 11  |
| 10% | 25   | 16  |
| 7%  | 30   | 18  |
| 5%  | 50   | 31  |
| 3%  | 57   | 34  |

1044669

A35E

Max. permitted speed when operating downhill

The diagram shows a truck on a hill with a gear icon and a warning sign. The text 'A40E' is visible. The table below provides the maximum permitted speed for different incline percentages.

| %   | MAX  |     |
|-----|------|-----|
|     | km/h | mph |
| 45% | 13   | 2   |
| 35% | 6    | 4   |
| 25% | 8    | 5   |
| 20% | 12   | 8   |
| 14% | 18   | 11  |
| 10% | 27   | 17  |
| 7%  | 43   | 27  |
| 5%  | 50   | 31  |
| 3%  | 57   | 35  |

1044670

A40E

Max. permitted speed when operating downhill



### WARNING!

- Do not permit engine revs above 35 r/s (2100 rpm) when operating downhill.
- When operating down a steep incline with a full load, it may happen that the exhaust brake and the engine braking function together do not provide sufficient retardation and this leads to an increasing travelling speed. If this happens, also the service brakes must be used.
- The machine must not be allowed to roll with the gear lever in neutral.

To avoid unnecessary stress to the transmission, the following operating instructions should be followed:

- **Rule:** Select the same gear for operating downhill as you would for operating up the same hill.  
**If you do not follow this rule, you may lose control of the machine.**
- Lower the speed before the downhill.
- Plan downhill operation so that in the first instance the retarder pedal is used, in order not to overuse the service brakes on the machine.



A1602700

## Off-road operation

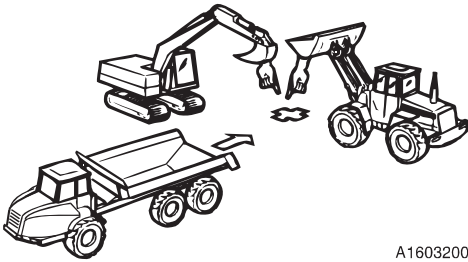
Different types of terrain require different operating techniques. Check out the ground beforehand, if you are uncertain and want to avoid getting stuck.

- Obtain permission from the management to operate outside the transporting route.
- Where the ground is particularly soft and space permitting, choose a new track for each run. In this way you avoid making deep tracks.

**NOTE! Avoid operating across steep slopes and over sharp stones and tree stumps.**



## Loading



A1603200

- 1 Place the hauler in the indicated place. Make use of the advantages of the articulated steering and place the machine at the best angle for loading. Use the rear view mirrors and keep eye contact with the loader operator while reversing.
- 2 Apply the load and dump brake, see page 48.
- 3 Always make sure that the tipping control is in "Floating position" when loading. If this is not the case, the whole load will be resting on the tipping cylinders instead of on the frame.

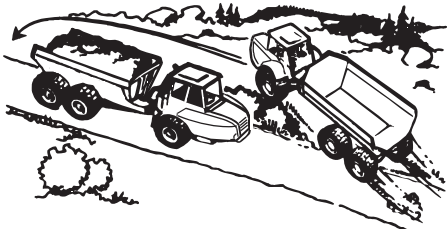
**NOTE! Remember that it is you as the operator of the hauler, who is responsible for the size and weight of the load, see page 57.**

Before moving off, make sure that no part of the load, e.g. stumps or stones, can fall off and cause injury or damage. Protruding objects must be removed.

## Body height extension (optional equipment)

Machines equipped with body height extension for light material may only be used for light material. The stability of the machine may be jeopardised if other heavier material is loaded in the dump body. Keep a lower speed when transporting because the centre of gravity lies higher than on machines without body height extension.

Decal for maximum load is located on a window in the cab.



A1602800

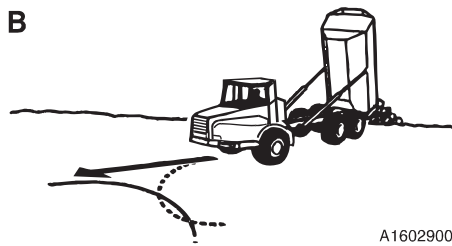
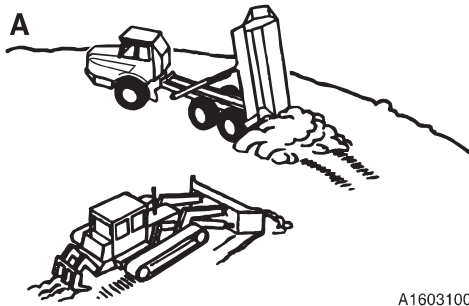
## Transporting with load

**Volvo haulers** have very good off-road characteristics, which are often utilised to shorten transporting distance and time.

You must follow indicated transporting paths. If you consider that it is possible to take cross-country shortcuts, or go off the road to facilitate meeting oncoming traffic, you must always obtain the management's permission to do so.

The condition of the transporting road is of great importance to the capacity of the hauler. If the transporting road is long and poorly maintained, try to influence the management into maintaining the road at a better standard, so that you can keep a higher speed, which means a higher capacity.

## Dumping load



### WARNING!

For all dumping, check out the firmness and inclination of the ground. When dumping over an edge, do not reverse further out than the rear axle is still on firm ground. Check the firmness of the edge.

The way of dumping depends on the condition of the load.

**Method A:** This is the quickest way to unload where the site is large and the load is to be bulldozed over an edge.

**Method B:** Reverse out as close to the edge as possible so that most of the load falls over the edge. The saving is that one avoids having a dozer on the unloading site.

Always watch the rear view mirrors while reversing. Do not stop until the wheels on the rear axle reach the edge. Avoid driving in the same tracks to reduce the risk of getting stuck. Save some of the load and deposit it on the edge.

**Method C:** When dumping in a heap: reverse up and dump as high up as possible in the heap.

**Method D:** If a road embankment or a slightly elevated surface is to be built up, make use of the machine's off-road manoeuvrability at the dump site.

### The following applies for all dumping.

- Before you raise the dump body, make sure that no persons are close to the hauler.
- Do not raise the dump body while reversing, if the ground is uneven.
- If the machine is placed across a steep incline, move the machine before dumping the load.
- Place the machine so that it is straight. Engage the load and dump brake, see page 48. Move the dump lever backwards to dumping position and increase the engine speed.
- Reduce the engine speed just before the dump body reaches its top position.
- Move the hauler forward a few metres, before you lower the dump body. Move the tipping control to floating position.

**Never operate further than necessary with the dump body raised. Never make steering movements with the hauler, if the entire load has got stuck and the dump body is raised.**

# Safety when servicing

## Service position

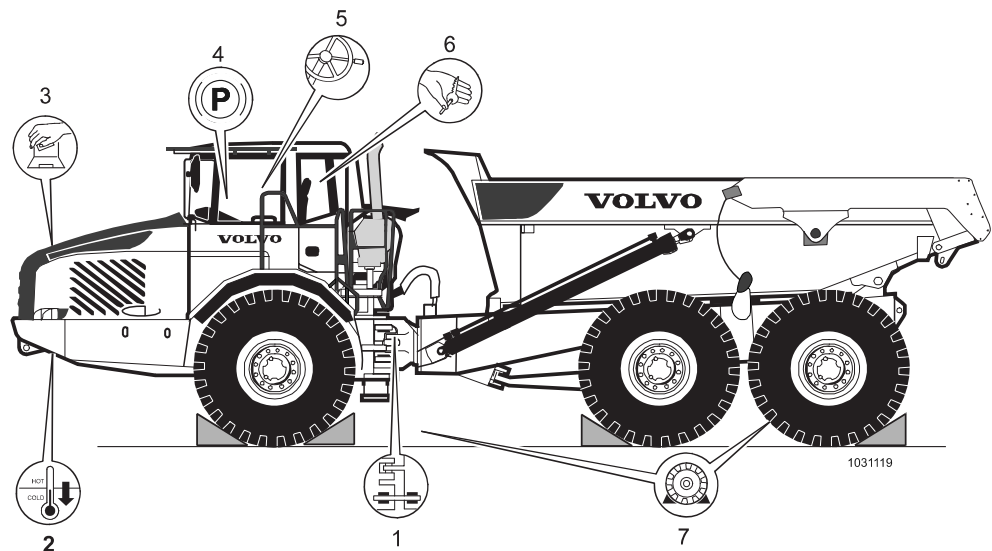


### WARNING!

If work has to be carried out on the machine before it has cooled down, care must be observed with regard to hot liquids and hot machine parts – risk of burns.

**IMPORTANT!** If the machine is equipped with FS-system, make sure that the system is in the lowered position before beginning any service work.

**Before you begin any service work**, the machine should be placed on level ground and prepared for service as shown below:



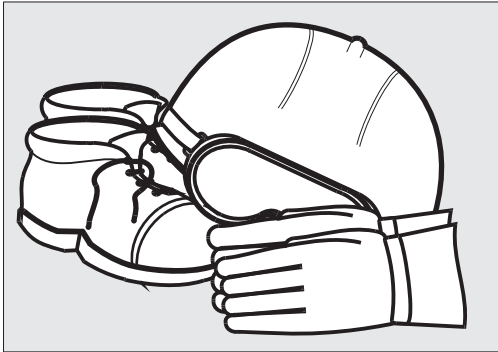
- 1 Lock the steering joint with the steering joint lock. Lower the dump body onto the frame.  
For service with the dump body up, secure with the dump body lock or the dump body support, see page 94. Lock the dump lever with the lock-out control, see page 48.
- 2 Let the machine cool.
- 3 Carefully release the pressure in pressurised lines and pressure vessels. When work is required on the brake system (or the FS-system, if the machine is equipped with such a system) no plugs or pressure lines may be loosened before the pressure in the system has been released, see page 138.
- 4 Apply the parking brake.
- 5 A yellow-black warning label or a red flag should be attached to the steering wheel while service is being done.
- 6 Stop the engine and take out the ignition key (does not apply when checking the oil in the transmission).
- 7 Block the wheels in a suitable way (with, for example, wedges).

**NOTE!** For work on and with the FS-system, contact a workshop authorised by Volvo CE.

## Before service, read

### Prevent personal injuries

- Read the Operator's Manual before beginning any service work. It is also important to read and follow the information and instructions given on plates and decals.
- Do not wear loose-fitting clothes or jewellery, which may catch and lead to injury.
- Always wear a hard hat, safety glasses, gloves, protective shoes and other protective articles when the work so requires.
- Make sure that there is sufficient ventilation when starting the engine indoors.
- Do not stand in front of or behind the machine while the engine is running.
- For service work with the dump body up, secure with the dump body lock or the dump body support, see page 94. Lock the dump lever with the lock-out control.



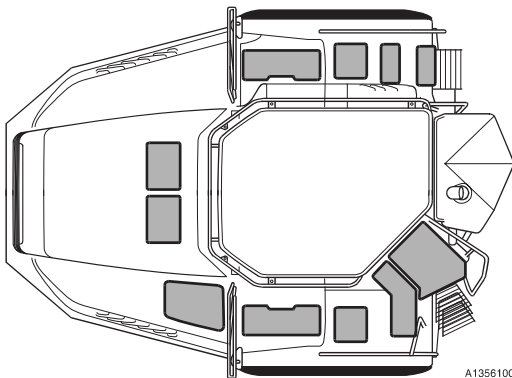
L64527A

**IMPORTANT! Always lean in under the dump body from one side when the dump body lock is to be locked or unlocked.**

- Stop the engine before opening engine hood, radiator casings and similar covers.
- When the engine has been stopped, there is still accumulated pressure in the pressurised systems. If a system is opened without having first released all pressure, liquid under high pressure will jet out.

**IMPORTANT! If the machine is equipped with FS-system, make sure that the system is in the lowered position before beginning any service work.**

- When looking for possible leaks, use a piece of paper or stiff board, not your hand.
- Make sure that stepping surfaces, handholds and slip protected surfaces are free from oil, diesel fuel, dirt and ice. Never step on surfaces on the machine that are not intended for this.
- It is important that correct tools and equipment are used. Defective tools or defective equipment must be repaired or replaced.



A1356100

Slip protection

### Prevent machine damage

- When lifting or supporting the machine or parts of the machine, make sure that the equipment you are using has sufficient lifting capacity.
- Lifting devices, tools, working methods, lubricants and spare parts prescribed in the Operator's Manual must be used. Volvo CE will not accept any responsibility if this is not followed.
- Make sure that no tools or other objects, which may cause damage, are left inside or on the machine.
- Release the pressure in the hydraulic system before beginning service work.

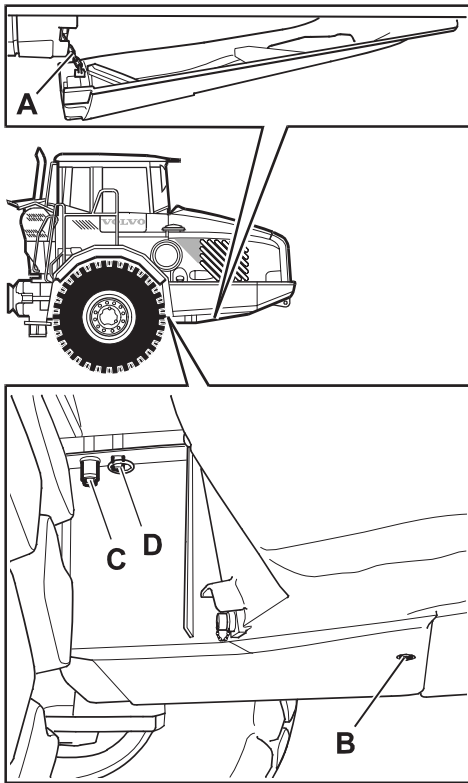
- Never adjust a reducing valve to a higher pressure than what is recommended by the manufacturer.
- Machines, which are used within a contaminated or in any other way unhealthy area, must be equipped for such work. Special safety regulations apply when servicing such a machine.
- When installing two-way radio, mobile telephone or similar equipment, the installation must be carried out according to the instructions from the manufacturer in order to eliminate interference with the electronic system and components intended for the function of the machine, see page 10.
- Measures during electric welding, see page 124.
- Make sure that all covers on the machine are in position before starting the engine and putting the machine to work.

### **Prevent environmental influence**

Be conscious of the environment when carrying out service and maintenance. Oil and other liquids dangerous to the environment and released into the environment will cause damage. Oil degrades very slowly in water and sediment. One litre of oil can destroy millions of litres of drinking water.

**NOTE! In common for all points below is that all waste is to be handed over to a treatment and disposal firm approved by the authorities.**

- When draining, oils and liquids must be collected in suitable vessels and steps taken to avoid spillage.
- Used filters must be drained of all liquid before they are passed on as waste. Used filters from machines which work in environments with asbestos or other dangerous dust, must be placed in the bag supplied with the new filter.
- Batteries contain substances dangerous to the environment and health. Used batteries must therefore be handled as waste dangerous to the environment.
- Consumables, e.g. used rags, gloves and bottles may also be contaminated with oils and liquids dangerous to the environment and must in that case be treated as waste dangerous to the environment.



A1609300

- A Chain
- B Lower bolt
- C Upper bolt
- D Pin

## Preparations before service

### Guard plates, lowering

For certain service work it is necessary to hinge down or remove the guard plates.

**Place the machine in service position, see page 89.**

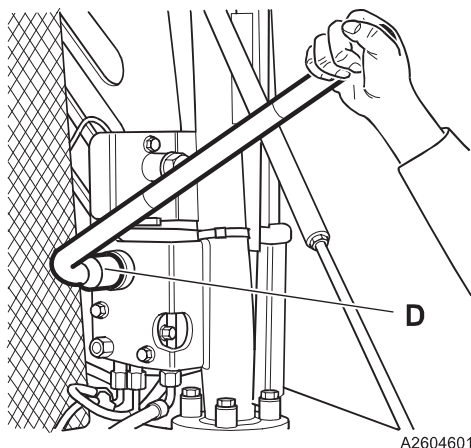
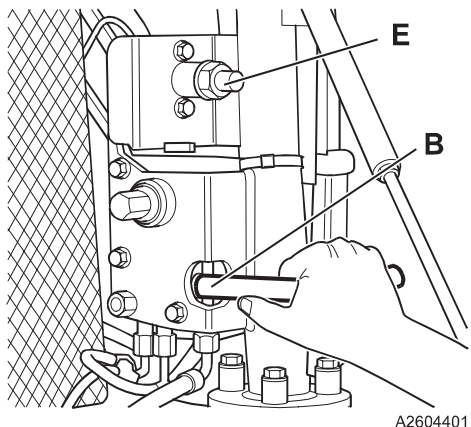
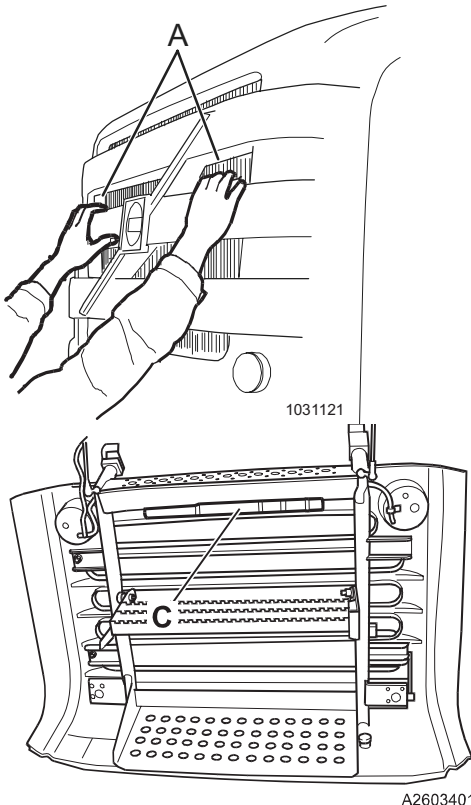
### Front guard plate

- 1 Remove the bolts at the rear part of the plate (2 pcs.). The plate is heavy and therefore secured with a chain (A) to prevent it from falling down.
- 2 Remove the pin for the chain and carefully let down the plate.

### Rear guard plates

**Lower one plate at a time.**

- 1 First unscrew the lower bolt (B).
- 2 Hold onto the edge at the same time as the two upper bolts (C) are removed.
- 3 Remove pin (D) and let down the plate.
- 4 Proceed in the same way with the other guard plate.



Hydraulic pump

- A Catches, front grille
- B Valve
- C Socket wrench with extension
- D Switch

## Engine hood

### Opening

- 1 Press in catches (A).
- 2 Let down the front grille (a gas spring takes up its weight).
- 3 Turn the hydraulic pump valve (B) to the downward position with a socket wrench placed by the hydraulic pump. Turn clockwise to end position.

### Manual opening

- 4 Take out extension (C) which is placed in the front grille and join it up with the socket wrench.
- 5 Engage socket wrench (D) with the pump and begin to pump until the engine hood has reached its upper end position.

### Electric opening (optional equipment)

- 6 Place the socket wrench on switch (E) and turn clockwise to end position. The switch has a spring return action.
- 7 Keep the socket wrench in this position. Release the socket wrench when the engine hood has reached its upper end position.

### Lowering

- 8 Turn the hydraulic pump valve (B) to the upward position with a socket wrench placed by the hydraulic pump. Turn counter-clockwise to end position.

### Manual lowering

- 9 Take out extension (C) which is placed in the front grille and join it up with the socket wrench.
- 10 Engage socket wrench (D) with the pump and begin to pump until the engine hood has reached its lower end position.

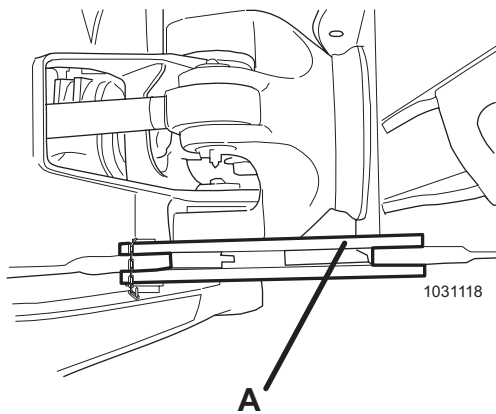
### Electric lowering (optional equipment)

- 11 Place the socket wrench on switch (E) and turn clockwise to end position. The switch has a spring return action.
- 12 Keep the socket wrench in this position. Release the socket wrench when the engine hood has reached its lower end position.

### After lowering

- 1 Put the socket wrench and extension back in their storage position.
- 2 Hinge up the front grille.
- 3 Check that the catches for the front grille engage properly.





A Steering joint lock

## Steering joint lock



### WARNING!

The steering joint lock must be in the locked position during all work on the steering joint.

- 1 Remove the pin from the transporting position lug and swing the joint lock (A) over to the locked position.
- 2 Install and secure the pin.

**NOTE!** The steering joint must not be locked when operating the machine.

## Dump body lock



### WARNING!

When working with a raised dump body, the dump body must be secured with the dump body lock or the dump body support.

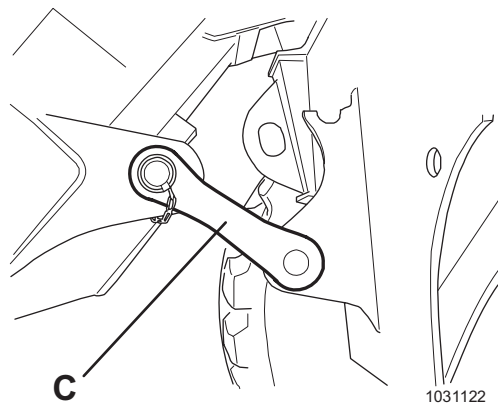
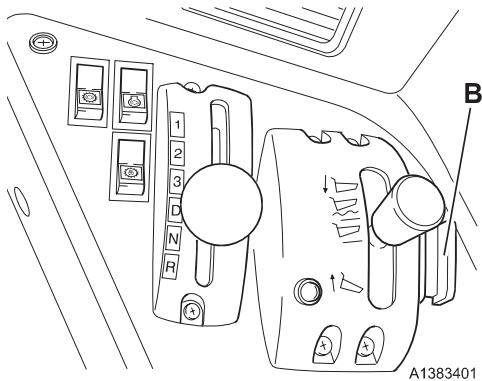
**Secure the dump body as follows:**

- 1 Tip up the dump body to max. tipping (dumping) angle.
- 2 Lock the dump body with the dump body lock (C) or lower the dump body down against a dump body support.
- 3 Lock the tipping control in "HOLDING POSITION" with lock-out control (B).

**When work has been completed:**

- 4 Disconnect dump body lock (C) or remove the dump body support.
- 5 Disengage lock-out control (B) from the tipping control.
- 6 Lower the dump body.

**IMPORTANT!** Always lean in under the dump body from one side when the dump body lock is to be locked or unlocked.



B Lock-out control for tipping control

C Dump body lock

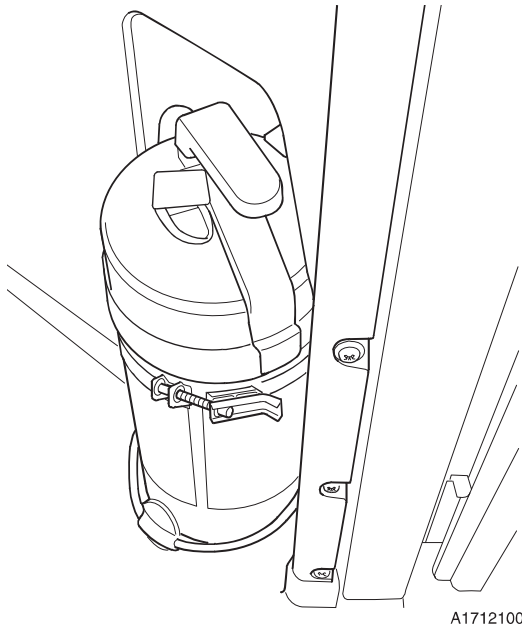


## Fire protection



### WARNING!

If a machine is used in an environment, where the risk of fire is particularly high, e.g. in explosive environment, special equipment is required.



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.

If the machine is to be provided with a hand-held fire extinguisher, it should be of the ABE (in North America ABC) type. The designation ABE means that it is possible to extinguish fires in both solid and liquid organic material and that the fire extinguishing compound does not conduct electricity. The efficiency class I means that the time the extinguisher is effective must not be less than 8 seconds, class II at least 11 seconds and class III at least 15 seconds.

A hand-held fire extinguisher ABE I normally corresponds to an extinguishing powder content of 4 kg (8.8 lb) (EN-grade 13A89BC), the EN 3-1995 standard, parts 1, 2, 4 and 5.

### Preventive fire protection

- Do not smoke and make sure that there is no open flame near the machine when filling with fuel or when the fuel system has been opened and in contact with the surrounding air.
- Diesel fuel is flammable and must not be used for cleaning. Use car care products intended for cleaning or degreasing. Also bear in mind that certain solvents may cause skin rash, damage the paint finish and constitute a fire hazard
- Keep the place where the service is to be carried out clean. Oil and water may make the floor slippery and are also dangerous in connection with electrical equipment or electrical tools. Oily or greasy clothes are a serious fire hazard.
- Check daily that the machine and the equipment, e.g. underbody plates are free from dust and oil. In addition to that the risk of fire is reduced it will be easier to detect faulty or loose components.

**NOTE! Observe great care when using high-pressure wash when cleaning. Electrical components and electrical cables may be damaged even at moderately high pressure and temperature. Protect electrical leads in an appropriate way.**

- Take extra care when cleaning a machine that is used in a fire-sensitive environment, e.g. sawmill and refuse dumps. The risk of spontaneous combustion can be further reduced by, for example, installing insulation around the silencer guard.
- It is important that the fire extinguisher is maintained so that it works when it is required.

- Check that fuel lines, hydraulic and brake hoses and electrical cables have not been damaged by chafing or are not in danger of being damaged in that way because of 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 lie 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. Exercise care with such work in the proximity of such places. A fire extinguisher should be kept near to hand.

### **Actions in case of fire**

**If the circumstances permit and your own safety is not endangered, take the following steps at the slightest sign of fire:**

- 1 Stop the machine if it is moving.
- 2 Turn the ignition switch to the stop position.
- 3 Leave the cab.
- 4 Call the fire brigade.
- 5 Turn off the current with the battery disconnect switch unless it jeopardises your safety.
- 6 If possible try to extinguish the fire. Otherwise leave the machine and the danger area.

### **Actions after fire**

**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 protective goggles and thick protective gloves made of rubber.
- 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 of heated fluorocarbon rubber, see page 98.

## Handling hazardous substances

### Heated paint



#### **WARNING!**

**All paint decomposes when heated and forms compounds, which may cause irritation and in case of prolonged or repeated exposure be very health-impairing.**

When heated, paint gives off poisonous gases. Therefore, the paint must be removed from an area of at least 10 cm (4 in) from the spot where welding, grinding or gas cutting 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.

**Fluorocarbon rubber which has been heated****WARNING!**

Certain seals, which are intended to withstand high operating temperatures, e.g. in engines, control valves, hydraulic motors and pumps, may be made from fluorocarbon rubber. When heated to high temperatures, fluorocarbon rubber decomposes to hydrogen fluoride and hydrofluoric acid, which is very corrosive to skin and respiratory tracts.

**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 fluorocarbon 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 fluorocarbon 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 fluorocarbon 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 fluorocarbon 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 of the air conditioning unit must be carried out at accredited workshops by, or under the supervision of, a person in a position of authority with certified competence.**

**WARNING!**

The refrigerant R134a easily causes frostbites, when it comes into contact with bare skin. When heated gases are formed and these may be harmful to lungs and the nervous system.

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.

**IMPORTANT! R134a must never be mixed with any other kind of refrigerant, e.g. R12, as this will cause the unit to fail.**

**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 frostbite. 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.

## Batteries



### **WARNING!**

**Batteries contains sulphuric acid, which is very corrosive to skin.**

- 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 pole stud protections always are in place.
- 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 123.
- Starting with booster batteries, see page 124.

**Dust of crystalline silicon dioxide (silica dust)****WARNING!**

**Avoid exposure to dust containing crystalline silicon dioxide, as it may cause serious damage to the lungs (silicosis).**

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 management of the work site should inform the operator about any occurrence of crystalline silicon dioxide on the work site and provide special work instructions, necessary protective equipment and what actions are to be taken.

Also check local/national regulations regarding crystalline silicon dioxide and silicosis.



L52168B

# Service and maintenance

For the machine to function satisfactorily and at lowest possible cost, a thorough maintenance is required.

## Lubrication and service chart

The section "Lubrication and Service Chart" describes the maintenance work, which the operator can carry out. If certain operations require trained workshop personnel and special equipment, this will be indicated. See "Lubrication and service chart" page 155.

## Service history

After every completed service at an authorised workshop, the Service History shall be filled in, see page 195. The Service History is a valuable document that can be referred to, e.g., when 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 applicable form, which must be signed.

## Delivery instructions

When handing the machine over, the dealer must give the buyer "Delivery instructions" according to applicable form, which must be signed, if the warranty is to apply.

## Service programmes

The Service Programme should be used in connection with warranty inspections and during maintenance carried out by an authorised dealer workshop.

The intervals recommended between checks, oil changes and lubrication apply provided that the machine is used under normal environmental and operating conditions.

## Warranty inspection

Two Warranty Inspections should be carried out at an authorised dealer workshop. The first within 100 operating hours and the second at the latest at 1000 operating hours.

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

During these inspections, oil and other liquids have to be changed before the end of the regular intervals.

## Maintenance

Regarding intervals for other maintenance, see the Service Programme or the Lubrication and Service Chart in this section.

**MAINTENANCE OF STORED MACHINES**  
Machines manufactured by Volvo Construction Equipment

**ARRIVAL AND DELIVERY INSPECTION**  
Machines manufactured by Volvo Construction Equipment

**DELIVERY INSTRUCTIONS**  
Machines manufactured by Volvo Construction Equipment

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## Cleaning the 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.

**IMPORTANT! Avoid using strong cleaning agents or chemicals in order to minimise the risk of damage to the paint finish.**

**NOTE! Clean the areas on the machine where dust, chips and similar may collect daily in order to minimise the risk of fire.**

### 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 wash is used, keep a distance of at least 20–30 cm (8–12 in) between nozzle and machine surface. Too high push and too short distance may cause damage. Protect electrical leads in an appropriate way.
- 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.

## Paint finish maintenance

- Machines which are used in corrosive environment are more prone to rusting than others. As a preventive measure it is recommended that the paint finish should be maintained every sixth months.
- 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 Dinitrol 447 (or corresponding) may be applied under the mudguards where mechanical wear is expected.

## Touch-up painting

Machines which are used in corrosive environment are more prone to rusting than others. As a preventive measure, damaged paint finish must be touched up and anticorrosive treatment carried out every sixth month.

- 1 Wash the machine with tepid water. If high-pressure wash is used, the nozzle must be kept at a certain distance to the machine. The water temperature must not exceed 60 °C (140 °F).
- 2 Allow the machine to dry and then lubricate it.
- 3 Check if any areas of the paint finish are damaged. If this is the case – rectify these.



## Engine

### Engine oil

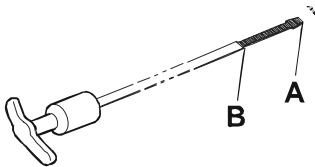
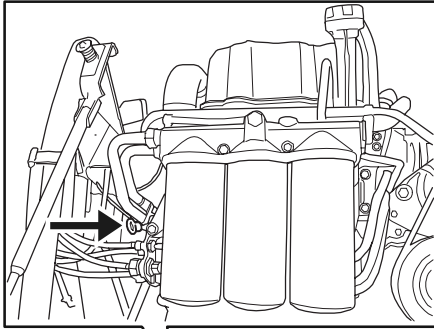
The engine oil level can be read off on the information display unit, see page 29. If the engine oil level is low, an alarm display is shown, see page 37.

### Engine oil, checking after topping up or changing

- The level should be between the marks on the dipstick. The difference between the MIN. and MAX. marks on the dipstick is approx. 8 litres (2.1 US gal).
- Try to maintain the level at maximum, but do not overfill.

### Engine oil, changing

Replace engine oil every 500 hours.



Dipstick

A Min.

B Max.



#### WARNING!

Take care when changing oil. Hot oil can cause burns on unprotected skin.

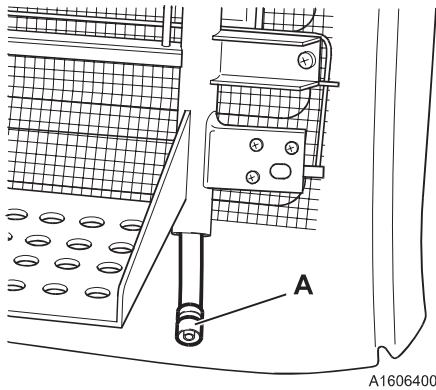
Conditions for intervals of 500 hours to apply are that:

- the oil filters are replaced every time the oil is changed.
- the oil filters are Volvo original “Long Life” filter and “By-pass” filter.
- the oil is of a certain quality grade, see page 167.
- the correct oil viscosity for the ambient air temperature is selected according to diagram, see page 167.

Follow the recommended change intervals in the table on page 168 according to the oil grade that is used and the fuel's sulphur content.

Engine oil of a grade that only meets API CF-4 or an oil grade lower than ACEA-E2 or API-CD must not be used.

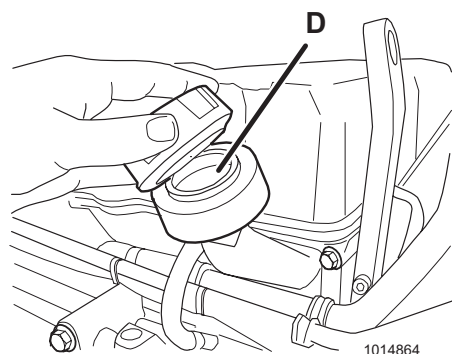
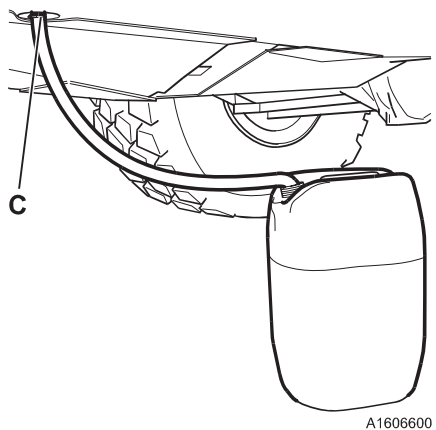
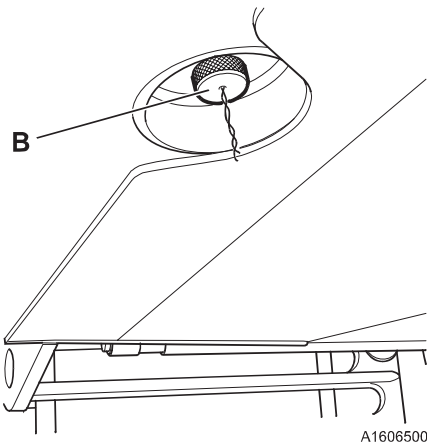
The oil must be changed at least every **sixth** month, regardless of the number of operated hours.



## Draining

- 1 Place the machine in service position, see page 89.
- 2 Let down the front grille.
- 3 Detach draining hose (A) from the front grille.
- 4 Remove protective cap (B) from over draining connection (C).
- 5 Connect the draining hose to the draining connection.
- 6 Drain the oil.
- 7 Disconnect the hose from the draining connection.
- 8 Install the protective cap over the draining connection on the oil sump.
- 9 Change engine oil filter, see page 105.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



## Filling

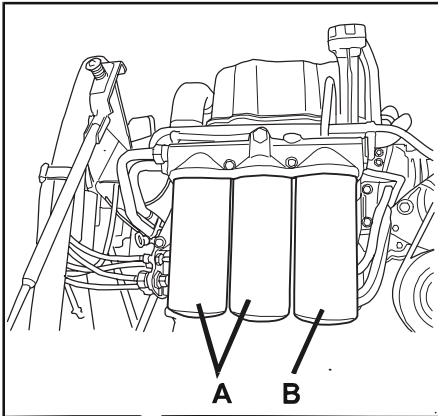
- 1 Fill with oil through oil filler pipe (D).
- 2 Put the draining hose back in the front grille.
- 3 Hinge up the front grille.

### Oil capacity when changing:

A35E/A35E FS: approx. 49 litres (12.9 US gal) including filter.

A40E/A40E FS: approx. 54 litres (14.3 US gal) including filter.

For oil quality grades, see page 167.



- A Full-flow filters
- B Part-flow filter

## Engine oil filters, replacing

Replace the engine oil filters every time the oil is changed, i.e. every 500 hours.

The filters are of the disposable type, i.e. they cannot be cleaned, but must be replaced as whole units.

### Removing

- 1 Use a suitable tool.

### Installing

- 2 Fill the filter with oil. Oil capacity of each filter is approx. 1.25 litres (2.6 US pint).

**IMPORTANT! It is important that the filters are filled with oil before they are installed. This is to ensure lubrication immediately after start.**

- 3 Coat the gasket with oil.
- 4 Screw on the filter by hand until the gasket just touches the sealing surface.
- 5 Then tighten the filter a further 1/2 a turn.

**NOTE! Usually it does not help to tighten the filter harder.**

### After installing

- 6 Start the engine and check that the gaskets seal. If it does not, remove the filter and check the sealing surface.

**IMPORTANT! After replacing oil filters, the engine must run at low idling for at least one minute.**

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

## Fuel system

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

### Fuel system, air bleeding



#### WARNING!

**Make sure that fuel under high pressure cannot come into contact with unprotected parts of your body when working with fuel injection equipment.**

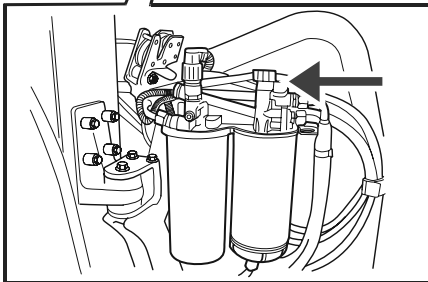
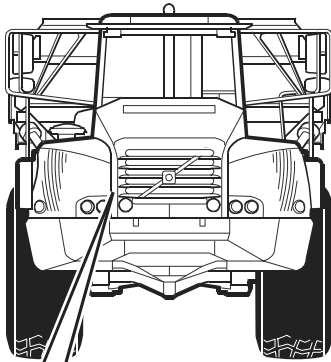
If the tank has been run dry or if air has got into the system for other reasons, the system must be bled for air.

**IMPORTANT! Under no circumstances must starting attempts be made before the system has been bled. The fuel feed pump may be seriously damaged.**

- 1 Pump with the hand pump until a resistance can be felt in the pump.

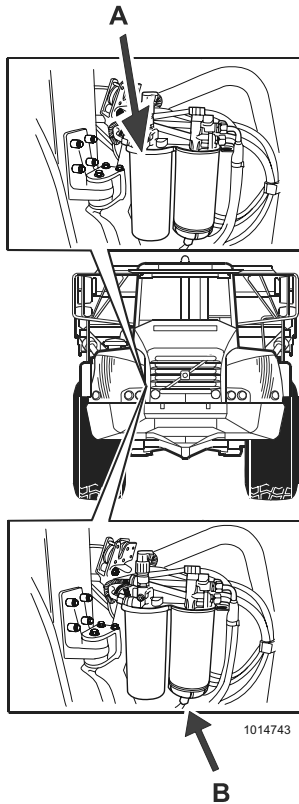
**NOTE! No nipple is to be opened.**

- 2 Start the engine and leave it running at low idling for approx. five minutes. The engine speed must not be raised, as any air, which is left in the system, may be forced into the cylinder head.
- 3 Check that there are no error codes shown on the display unit.

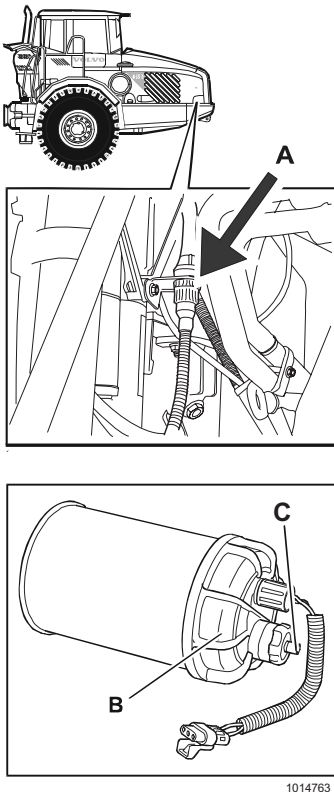


Hand pump

1014742



- A Secondary fuel filter  
B Primary fuel filter with water trap



- A Connector  
B Plastic bowl  
C Draining screw

## Fuel filters, replacing

Replace the fuel filters every 500 hours or when replacing the engine oil filter.

If the fuel filters become clogged earlier, an alarm screen is shown, see page 37 and the filters should then be replaced.

### Removing secondary fuel filter (A)

- 1 Use a suitable tool for removing the fuel filter.

### Installing

- 2 Coat the gasket with diesel fuel.
- 3 Screw on the filter by hand until the gasket just touches the sealing surface.
- 4 Then tighten the filter a further  $\frac{1}{2}$  a turn.

### Removing primary fuel filter (B)

- 1 Disconnect connector (A) from the cable harness.
- 2 Unscrew the filter by hand or use a suitable tool.
- 3 Detach the plastic bowl (B) from the filter.

### Installing

- 4 Install the plastic bowl on the new filter.
- 5 Coat the gasket with diesel fuel.
- 6 Screw on the filter by hand until the gasket just touches the sealing surface.
- 7 Then tighten the filter a further  $\frac{1}{2}$  a turn.
- 8 Reinstall the connector to the cable harness.
- 9 Bleed the system according to instructions on the previous page.

Take care of filters/oils/liquids in an environmentally safe way, see page 91.

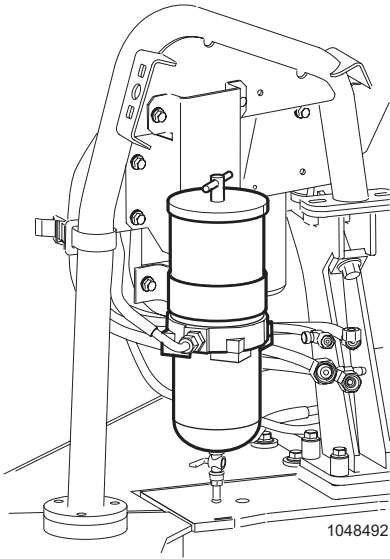
## Water trap

An alarm display is shown if there is water in the fuel, see page 37. Drain the water trap as follows.

### Water trap, draining

- 1 Connect a draining hose to draining screw (C) at the bottom of the water trap.
- 2 Slacken the water draining screw.
- 3 Tighten the water draining screw, when only clean fuel is running out.

Take care of filters/oils/liquids in an environmentally safe way, see page 91.



Fuel prefilter

## Fuel prefilter, changing (optional equipment)

Change the filter insert every 250 hours. More frequent changes may be needed depending on fuel consumption and fuel grade.

Change shall also take place in connection with changing primary and secondary fuel filters after an alarm for clogged filter, see page 107.

## Draining

Drain the filter daily. Also drain when the water trap is drained after an alarm for water in fuel, see page 107.

- 1 Drain the water trap of water and any other impurities by turning the valve at the bottom of the filter. Collect the water in a container.
- 2 Turn back the valve when only clean fuel runs out.

## Removing and cleaning

- 1 Remove the filter cover by turning the T-handle counter-clockwise.
- 2 Carefully remove the filter insert with a twisting movement.
- 3 Clean the water bowl with soapy water on a clean, soft rag or brush. Do not use solvents or abrasive cleaners.
- 4 Rinse and dry the water bowl thoroughly.

## Installing

- 5 Install the new filter insert and press it all the way down.
- 6 Fill with clean diesel fuel all the way up.
- 7 Change the gasket for the cover and the T-handle's O-ring if needed. Brush diesel on the gasket and the O-ring.
- 8 Install and fasten the filter cover with the T-handle.

## Fuel, filling

If the fuel level is low, an alarm display is shown, see page 37. Fill with fuel to prevent air from getting in to system.

**NOTE!** Carefully clean fuel tank cap (A) and the area around it before removing the cap.

- Avoid spilling when refuelling, as spilled fuel collects dirt.
- During the cold season, keep the fuel tank full to prevent water condensing in the tank.

### Fuel tank capacity:

A35E/A35E FS 480 litres (127 US gal).

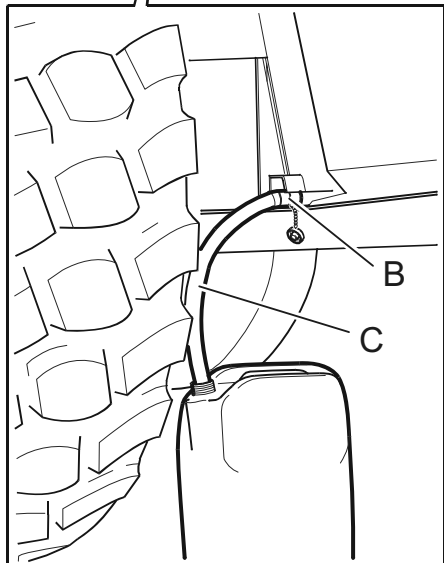
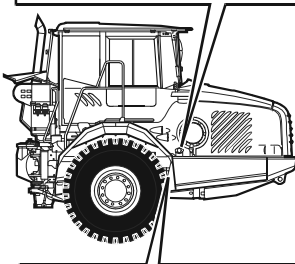
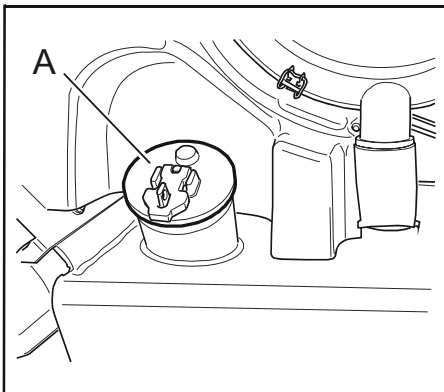
A40E/A40E FS 545 litres (144 US gal).

For fuel quality, see page 170.

## Fuel tank, draining sludge

- 1 Remove the protective cap (B) over the drain connection (located under the underbody skid plate on the right side).
- 2 Use the same drain hose (C) as for engine oil, drain any sediment and sludge.
- 3 Reinstall the protective cap.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



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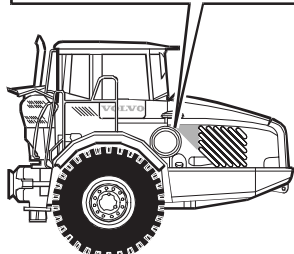
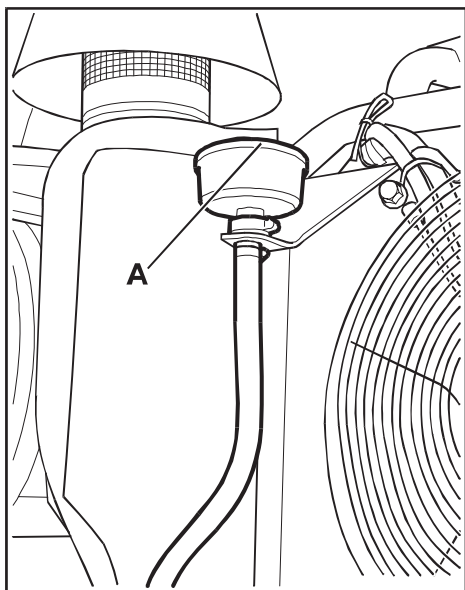
- A Fuel tank cap
- B Drain plug, fuel tank
- C Draining hose

## Fuel tank, replacing breather filter

Replace the breather filter every 1000 hours.

The filter is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

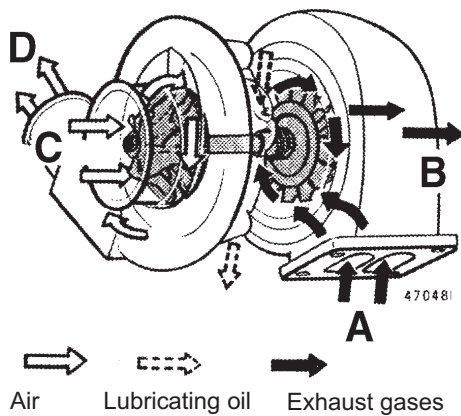
- 1 Remove cover (A).
- 2 Replace the filter insert.
- 3 Reinstall the cover.



A1613000

A Cap, breather filter





Turbocharger, function

- A Exhaust in
- B Exhaust out
- C Air in
- D Air out

## Intercooler

The engine is provided with an air-to-air type intercooler. The intercooler lowers the temperature of the induction air by approximately 100 °C (212 °F). The induction air will then have a higher density, as a result of which more fuel can be injected and combusted. This results in higher engine output, but the colder air causes less stresses on valves and pistons.

## Turbocharger

**IMPORTANT! Run the engine at low idle for at least half a minute after start and a few minutes before it is stopped. This is to ensure lubrication of the turbocharger.**

The turbocharger is lubricated and cooled through the engine lubrication system. A vital condition for the function of the turbocharger is that engine oil and filter are changed and replaced at regular intervals. The maintenance of the air cleaner and the tightness of the exhaust system and the lubrication lines are also important for the function.

If noise or vibrations are confirmed in the turbocharger, change it immediately.

**Only a workshop authorised by Volvo CE may carry out work on the turbocharger.**

## Air cleaner

The air cleaner prevents dust and other impurities from entering the engine. The air first passes the primary filter and then the secondary filter.

The degree of engine wear depends largely on the cleanliness of the induction air. Therefore, it is very important that the air cleaner should be checked regularly and maintained correctly. Observe great cleanliness when working with the air cleaner and filters.

**IMPORTANT! Do not, under any circumstances, run the engine without a filter or with a damaged one.**

Check regularly that hose and pipe connections from the air cleaner to the engine induction manifold do not leak.

**Always have a spare air filter at hand and keep it well protected from dirt.**

### Primary filter, cleaning/replacing

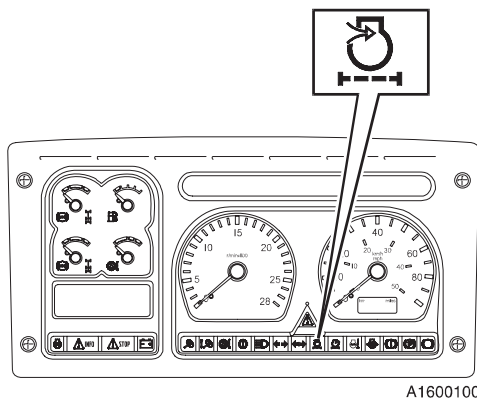
Clean or replace the filter every 1000 hours. If the control lamp lights up earlier and an alarm screen is shown, see page 37, cleaning or replacement must be carried out immediately. The time between cleaning/replacement depends entirely on the working environment of the machine.

The filter may be cleaned, at the most, five times. Thereafter the filter must be replaced. Also replace the filter, if it is damaged.

If the control lamp continues to light after cleaning/replacement, the secondary filter must be replaced, see page 113.

**NOTE! At the same time clean the air cleaner cover. Under dusty and wet conditions, the cover should however be cleaned more often.**

Take care of filters/oils/liquids in an environmentally safe way, see page 91.



A1600100

### Mechanical cleaning

- 1 Carefully tap the end of the primary filter against a soft and clean surface.

**NOTE! Do not tap against a hard object.**

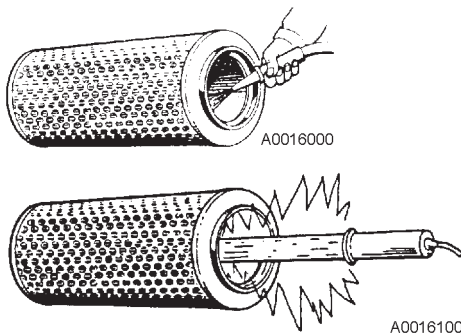
### Cleaning with compressed air

- 1 Use clean and dry compressed air with a max. pressure of 500 kPa (5 bar) (73 psi). Do not hold the nozzle closer than 3–5 cm (1–2 in).
- 2 Blow the filter clean from the inside along the folds.

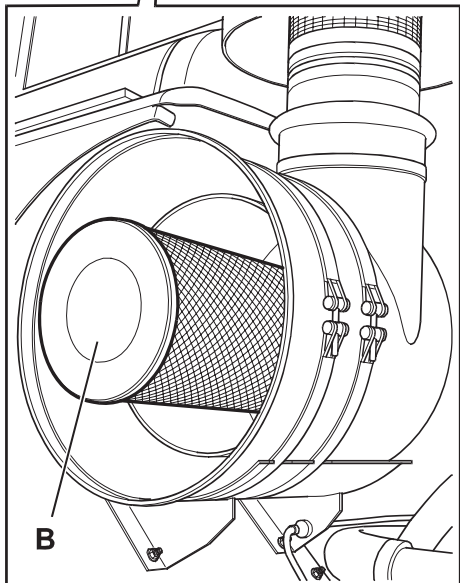
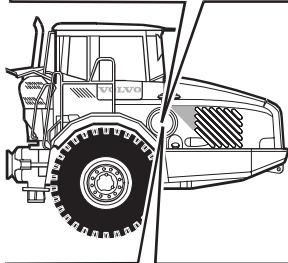
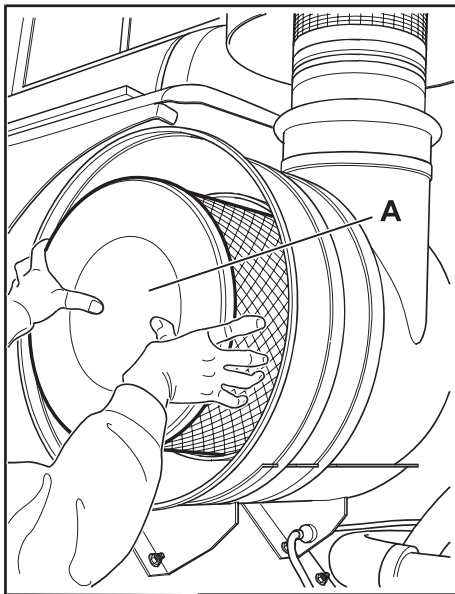
### Checking filter

- 1 Check the filter with the aid of a lamp.
- 2 If there is the smallest hole, scratch, crack or other damage, the filter must be discarded.

**NOTE! To discover damage more easily, this check should be made in a darkened room.**



A0016100



A1618000

- A Primary filter
- B Secondary filter

## Replacement

Press with both thumbs on the primary filter (A) at the same time as you pull it out. This is to prevent the secondary filter from coming out together with the primary filter.

## Secondary filter, replacing

**Replace the secondary filter every 2000 hours or every third time the primary filter is replaced. Replacement must also be carried out if the control lamp continues to light after the primary filter has been cleaned or replaced.**

- The secondary filter (B) works as a protective filter in case the primary filter should be damaged.
- Never remove the secondary filter unless it is to be replaced.
- The secondary filter should be removed carefully and with precision so that no impurities enter the engine. Carefully check that the new secondary filter is correctly installed.

## Additional air cleaner

For machines operating under especially dusty conditions, it is recommended that an optional air cleaner should be fitted. This will provide further safety against engine damage.

### EON-filter (optional equipment)

The EON filter is installed instead of the standard primary filter.

Replace the filter when the control lamp lights.

**NOTE! The filter should not be cleaned.**

### Oil bath air cleaner (optional equipment)

The oil bath air cleaner is installed in series with the existing standard primary filter.

A35E and A35E FS have one oil bath air cleaner.

A40E and A40E FS have two oil bath air cleaners.

The particle separating ability of the oil-bath air cleaner is between 90 and 95% which, in practice, means that the primary air cleaner fitted as standard, will act as a backup filter, with a change interval which is at least twice as long.

### Oil bath air cleaner, checking

**Check the oil in the bowl every 50 hours (more often when required).**

If the oil is contaminated by sludge and viscous, or if sludge deposits are found on the underside of the filter insert, the oil must be changed.

If there are areas on the lower filter insert covered in sludge or if there are dry spots, the upper filter insert should also be removed and cleaned.

### Oil bath air cleaner, maintenance

**Clean the filter inserts every 2000 hours.**

Clean housing and the filter inserts with diesel fuel. Avoid using petrol (gasoline), as any remaining petrol may cause the engine to surge when it is started later.

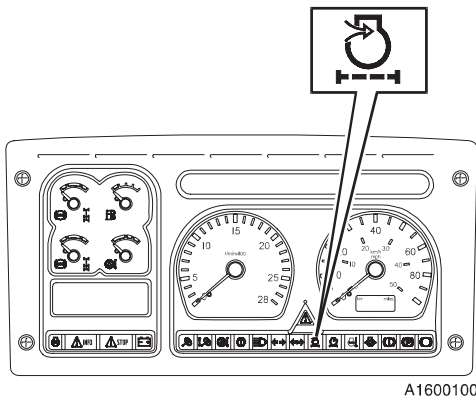
### Oil bath air cleaner, changing oil

**Change oil every 250 hours.**

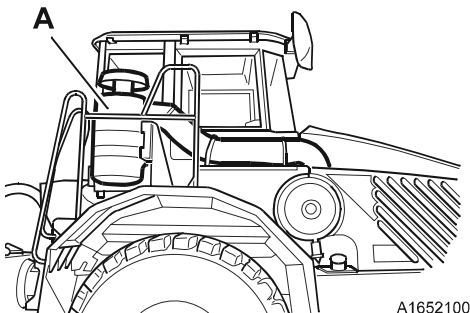
Fill up the bowl with oil of the same viscosity as that in the engine. The oil should reach up to the "Normalölstand" mark, but not higher.

**Capacity when changing: approx. 9.0 litres (2.4 US gal).**

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

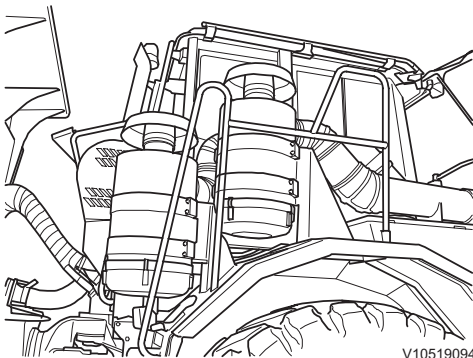


A1600100



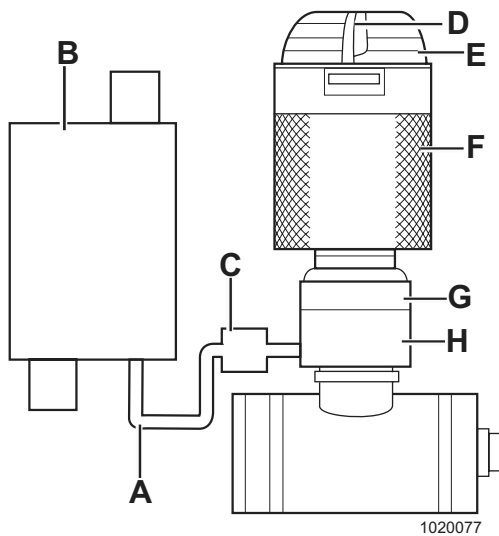
A1652100

A Oil bath air cleaner A35E/A35E FS

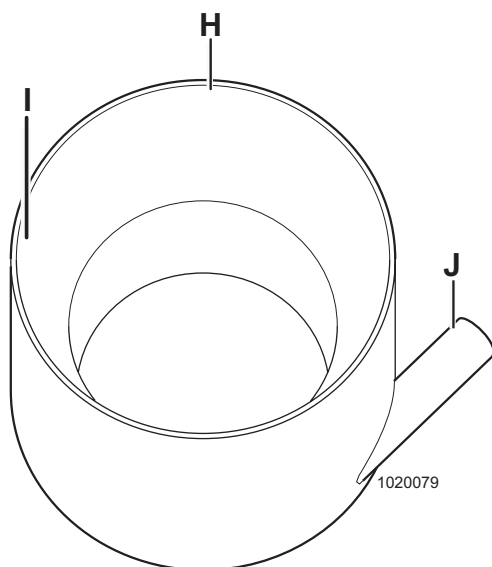


V10519094

Oil bath air cleaner A40E/A40E FS



- A Outlet pipe
- B Silencer
- C Non-return valve
- D Ejector port
- E First stage
- F Netting
- G Tapered adapter
- H Second stage



- H Second stage
- I Bowl for collecting dirt
- J Connection for outlet pipe

## Engine air precleaner, two-stage (optional equipment)

The precleaner is located over the engine hood, on the end of the air inlet pipe. The first stage (E) separates larger impurities which then are returned immediately to the ambient air. The second stage (H) traps remaining impurities in a bowl (I) and these are removed via an outlet pipe (A) out through the silencer (B).

**Clean the precleaner every 250 hours. If the main filter needs to be cleaned or changed more often than every 1000 hours due to the machine's operating conditions, it is an indication that the precleaner also needs to be cleaned more often.**

### Cleaning the engine air precleaner



#### WARNING!

**Always use safety glasses and suitable clothing when using compressed air.**

- 1 Disconnect the outlet pipe (A) from the second stage (H).
- 2 Start the engine and run at high idle.
- 3 Check if the suction (vacuum pressure) in the outlet pipe is acceptable by placing a piece of paper over the end of the pipe.
  - If the paper stays in place, the suction is strong enough.
  - If the suction is not strong enough, check that there is nothing blocking the air flow in the pipe. If there is no obstruction in the pipe, disconnect the pipe from the silencer. Check the suction in the pipe's connection on the silencer. If there is still no suction, change the silencer.
- 4 Turn off the engine.
- 5 Check that the flap is loose (rattles) in the non-return valve (C) by shaking it.
- 6 Loosen the clamp and separate the tapered adapter (G) from the second stage (H).
- 7 Check if there is dirt in the second stage.
- 8 Clean the bowl (I) and the connection for the outlet pipe (J) with compressed air if there is dirt.
- 9 Reconnect the outlet pipe to its connection.
- 10 Turn the precleaner (E, F, G) upside down.
- 11 Insert your hand and spin the rotor.



#### WARNING!

**Be careful when inserting your hand, the stop plates in the precleaner may be sharp. Do not use compressed air on the rotor, this may cause personal injury.**

- If the rotor spins freely, turn the precleaner and blow with compressed air out through the ejector port (D).
  - If the rotor does not spin, contact a workshop authorised by Volvo CE.
- 12 Blow away any dirt from the netting around the first stage.
- 13 Assemble the cleaner in the reverse order.
- 14 Start the engine and run at high idle.
- 15 Check with a piece of paper that there is positive pressure at the ejector port. If the piece of paper blows away from the ejector port on the precleaner's first stage, then the function is satisfactory. If the precleaner does not work to satisfaction, contact a workshop authorised by Volvo CE.

## Cooling system

The radiator is a side-mounted, cross-flow radiator with a hydraulically driven cooling fan. A hydraulic pump installed on the engine drives the hydraulic motor of the fan.

The fan speed is automatically adapted to the engine speed and its need of cooling.

If the engine temperature becomes too high even though the coolant level is correct, the radiator should be cleaned.

If the engine temperature still is too high, contact a workshop authorised by Volvo CE for action to be taken.

## Coolant

The cooling system is filled with Volvo Coolant VCS. To avoid damage to the engine, it is very important to continue using the same coolant, when topping up or changing, as the system was filled with previously.

**IMPORTANT! To avoid damage to the engine, different kinds of coolant must not be mixed with each other.**

**Cooling system capacity when changing: approx. 90 litres (23.8 US gal)**

**Total capacity: approx. 100 litres (26.4 US gal)**

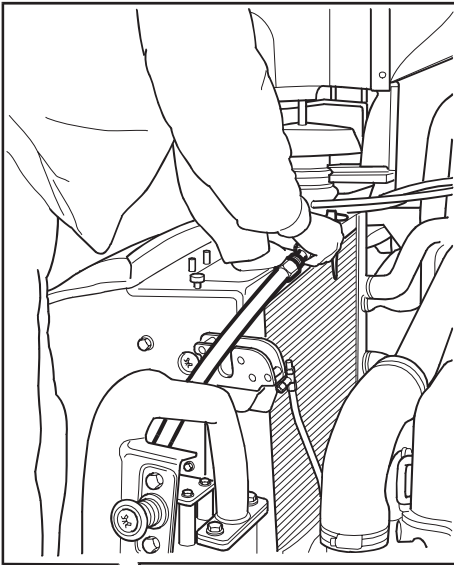
If concentrated coolant and clean water (see page 169) are used, the table below shows the approximate amount of concentrated coolant that is required to achieve freeze protection. The amount of concentrated coolant must never be less than 40% of the total mixture.

If there is doubt as to the quality of the water, use ready-mixed coolant.

**IMPORTANT! If ready-mixed coolant is used, it is very important that the correct kind is used. The engine may be damaged if different coolants are mixed.**

| Freeze protection down to | Content of concentrated coolant |
|---------------------------|---------------------------------|
| -25 °C (-13 °F)           | 40 %                            |
| -35 °C (-31 °F)           | 50 %                            |
| -46 °C (-51 °F)           | 60 %                            |





## Radiator, cleaning



### WARNING!

Stop the engine before cleaning the radiator.

Clean the radiator every 500 hours.

- 1 Let down the front grille.
- 2 Open up the engine hood. The radiator is positioned on the right side in the engine compartment.
- 3 Blow the radiator clean with compressed air.

**IMPORTANT!** Take care so as not to damage the fins on the radiator core.

## Coolant, checking

The coolant level can be read off on the information display unit, see page 30. If the coolant level is low, an alarm display is shown, see page 37. If the coolant temperature is high, the control light is on and an alarm display is shown, see page 37. Take appropriate action.

Check the anti-freeze properties every 500 hours.



### WARNING!

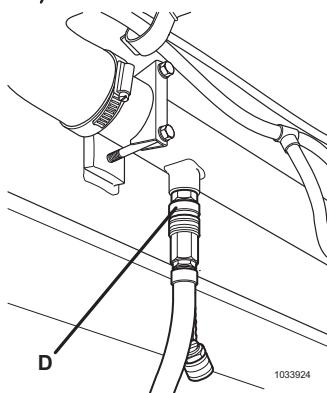
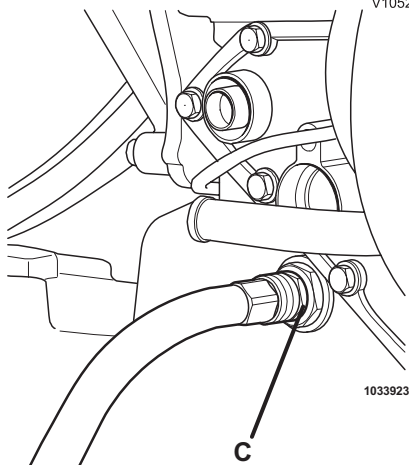
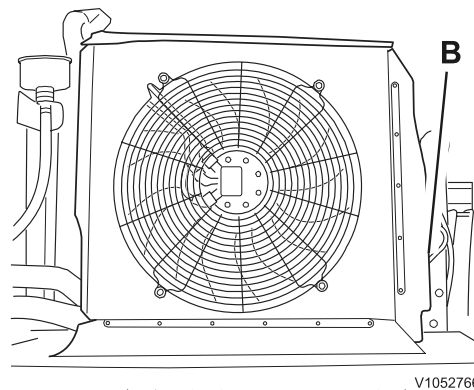
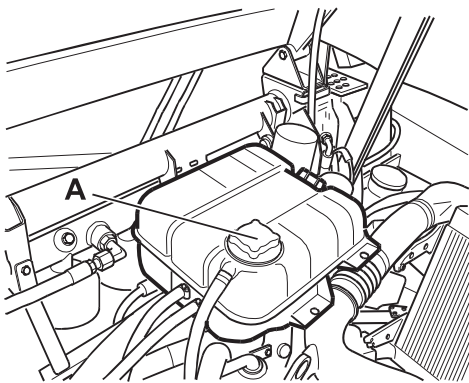
There is a danger of scalding when removing the expansion tank cap (radiator cap), as the cooling system is pressurised when hot.

## Coolant, checking after topping up or changing

The expansion tank should be filled to 2/3, i.e. up to the max. mark, when the engine is cold.

The coolant level must never be below the minimum mark.





- A Expansion tank
- B Draining hose
- C Draining nipple, at rear
- D Draining nipples, right side

## Coolant, changing

**IMPORTANT!** To avoid damage to the engine, different kinds of coolant or corrosion protection must not be mixed with each other, see page 117.

Change coolant every 6000 hours or every fourth year.

## Draining

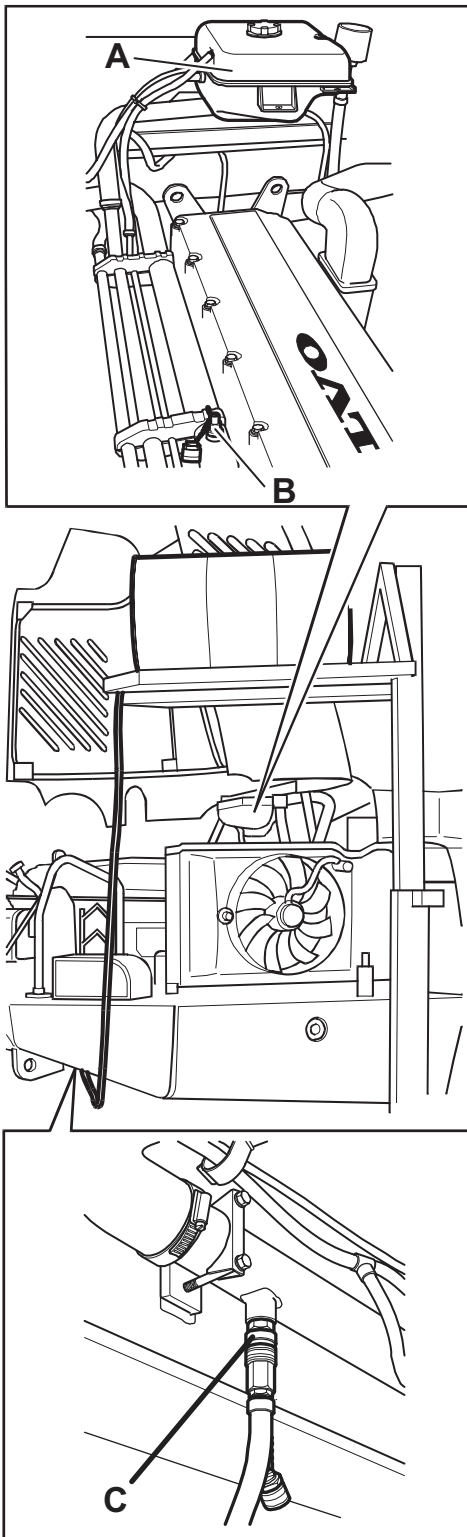
- 1 Remove the expansion tank cap (A).
- 2 Bend down hose (B) by the right side of the radiator and press in the clamp on the draining nipple so that coolant flows out.
- 3 Let down the belly plate. Connect the draining hose to the nipple at the rear on the engine (C).
- 4 Connect a hose to draining nipple (D) (2 pcs) down on the right side of the engine.

**NOTE!** The cooling system does not become safe against frost even after draining. There may be pockets of water left.

Take care of filters/oils/liquids in an environmentally safe way, see page 91.

## Filling

Filling with coolant is done through the expansion tank.



1033926

- A Expansion tank
- B Bleeder nipple
- C Filler/Draining nipple

### Filling coolant in a system which has been drained

Coolant is filled through draining nipple (C) near the bottom on the right side of the engine.



#### WARNING!

If the engine is started with the radiator in the swung out position, no person may be on or near the right fender.

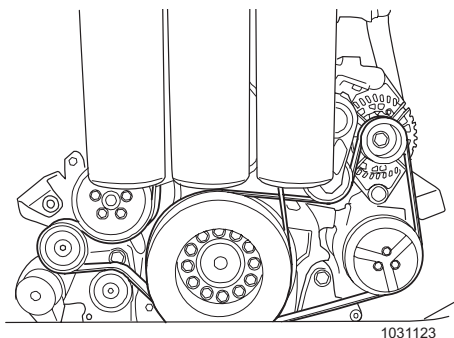
- 1 The engine should be stationary and the heater control set to warm.
- 2 The cap for expansion tank (A) should be removed.
- 3 Bleeder nipple (B) should be kept open until coolant flows out.
- 4 Fill with coolant up to maximum level in the expansion tank.
- 5 Take the machine for a test drive to remove all air from the cooling system.
- 6 Top up until the cooling system is completely full.
- 7 The level should be checked after the engine has been run warm and then allowed to cool.

**IMPORTANT! Never fill cold coolant in a warm engine. This can cause cracking in the cylinder block and cylinder head.**

**Failure to change coolant will cause clogging of the cooling system and the risk of the engine seizing.**

**Cooling system capacity when changing: approx. 90 litres (23.8 US gal)**

**Total capacity: approx. 100 litres (26.4 US gal)**



## Water pump, checking belt



### WARNING!

- The engine must be stationary when checking the belt tension – rotating parts can cause injuries.
- The engine must never be run when the belts are completely slack.

**Check the condition of the belt every 2000 hours.**

The belt is self adjusting.

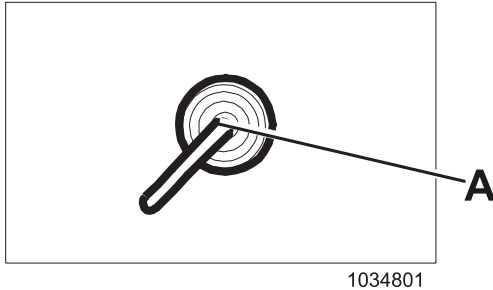
## Electrical system

Check lights and control lamps daily.

### Battery disconnect switch

**IMPORTANT!** The battery disconnect switch must not be turned off, when the engine is running.

Battery disconnect switch (A) is positioned on the left side of the cab under the entry step. After finishing work for the day, the battery disconnect switch should be turned off.



1034801

A Battery disconnect switch

### Batteries

The batteries are connected in series and positioned on the left side of the machine.

### Batteries, checking electrolyte level

**Check the electrolyte level every 500 hours.** At temperatures above approx. +20 °C (+68 °F) check more often.

The electrolyte level should be approx. 10 mm (0.4 in) above the cell plates.

#### Filling

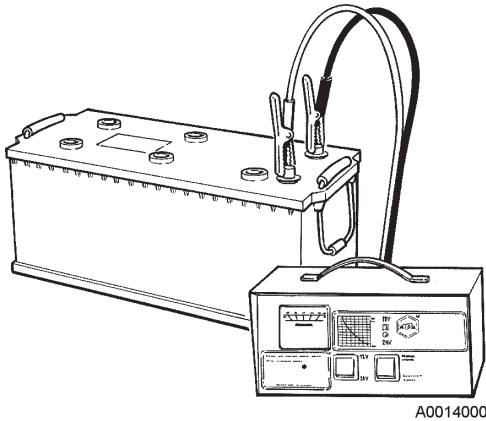
- 1 Fill with distilled water.
- 2 Operate the machine after topping up, so that the water is mixed in with the battery electrolyte. This is particularly important in cold weather.
- 3 Check that the cable terminals and pole studs are clean, well tightened and coated with petroleum jelly or similar.

## Checking state of charging

The state of charge of the batteries is checked with a hydrometer. When there is risk of frost, it is particularly important that the batteries do not become discharged, as the electrolyte in a flat battery may freeze and thus destroy the battery.

Operating with faulty batteries is not allowed.

## Batteries, charging

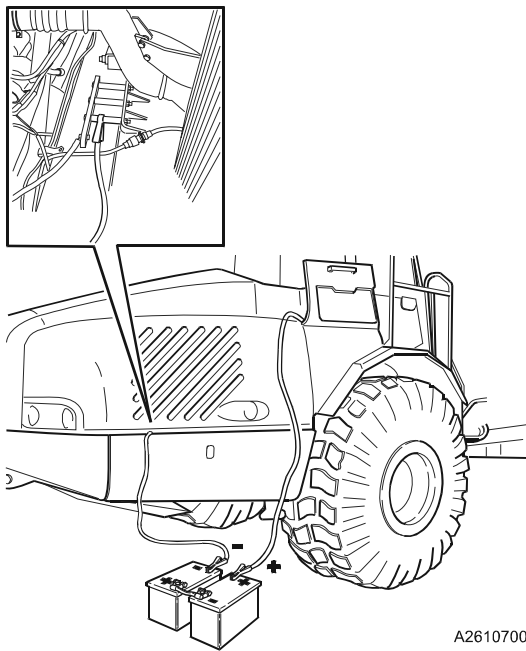


### WARNING!

During rapid charging of batteries, always remove the cell caps. When a battery is being charged, an explosive mixture of oxygen and hydrogen gas is formed. A short circuit, an open flame or a spark in the neighbourhood of the battery can cause a powerful explosion.

- Always switch off the charging current before the charging lead clips are disconnected.
- Ventilate well, particularly if the battery is being charged in a confined space.
- The battery electrolyte contains corrosive sulphuric acid. Electrolyte spilled on bare skin must be removed immediately. Wash with soap and plenty of water. Should you get splashes of electrolyte in your eyes or on any other sensitive part of your body, rinse immediately in plenty of water and contact a doctor immediately.

- 1 Disconnect the cables from the battery pole studs.
- 2 Remove the cell caps.
- 3 Top up with distilled water when required.
- 4 Connect the charging lead clips with plus to the positive pole and minus to the negative pole.
- 5 Make sure that the battery charger is set to the correct voltage.
- 6 Switch on the charger.



## Starting with booster batteries



### WARNING!

Because of current surge the batteries may explode if a charged battery is connected to a completely discharged battery and this may cause injuries.

**IMPORTANT!** The booster batteries or another power source must have the same rated voltage as the batteries on the machine.

**NOTE!** Under no circumstances may a switched-on battery charger be connected to the batteries on the machine when an attempt at starting the engine is made, as this may damage the electronic system in the machine.

- 1 Turn off the battery disconnect switch
- 2 Remove the protections from the battery pole studs.
- 3 Connect two 12 V batteries in series.
- 4 Connect one of the jump leads between the (+) terminal on the battery of the machine and the (+) terminal on the booster battery.
- 5 Connect the other jump lead between the (–) terminal on the booster battery and a grounding point on the machine according to the adjacent figure.
- 6 Connect the batteries of the machine by turning on the battery disconnect switch.
- 7 Wait for a couple of minutes and then start the engine with the ignition key in the cab.
- 8 When the engine has started, first disconnect the jump lead from the grounding point on the machine and then disconnect the other end of the jump lead from the (–) terminal on the booster battery.
- 9 Finally disconnect the jump lead between the (+) terminals.
- 10 Reinstall the insulating caps on the battery terminals.

## Welding

**NOTE!** Before carrying out any electric welding on the machine, all connectors must be disconnected from all ECUs.

- The current must be disconnected with the battery disconnect switch.
- The battery cables must be disconnected from the battery pole studs.
- All connectors must be disconnected from all ECUs. When disconnecting and reconnection the ECUs, the leads must be without current (the battery disconnect switch turned off and the battery cables disconnected).
- Contact a workshop authorised by Volvo CE for more accurate information on how to proceed.

## Alternator

The alternator installation is sensitive to incorrect connection, therefore, always follow the instructions below:

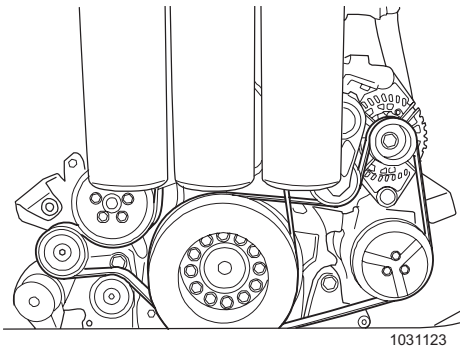
### Disconnecting

- Battery and alternator cables must not be disconnected while the engine is running. A fault may then arise in the alternator and the electronics.
- Disconnect and insulate the battery cables before carrying out any work on the alternator equipment.

### Battery connection

- The connecting terminals on the battery must under no circumstances be confused. The respective pole studs have a stamped-in (+) or (–) sign. If the cables are wrongly connected, the alternator rectifier will be ruined immediately.
- When disconnecting batteries, first break the circuit using the battery disconnect switch.

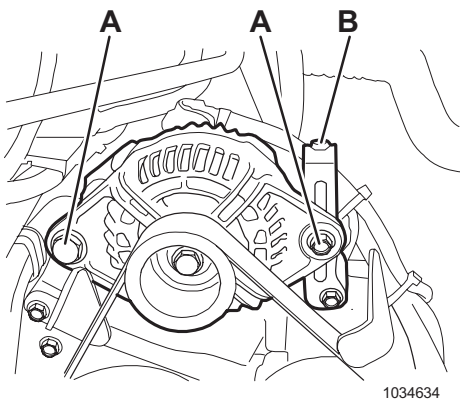
## Alternator, belt tension



### WARNING!

- The engine must be stationary when checking the belt tension – rotating parts can cause injuries.
- The engine must never be run when the belts are completely slack.

Check the condition of the belt for the first time at 250 hours (also after replacement) and then every 2000 hours.



- A Bolts  
B Adjusting screw

### Adjusting, A35E/A35E FS

- 1 Loosen bolts (A) on the alternator.
- 2 Adjust with adjusting screw (B) so that the belt can be pressed in approx. 8 mm.
- 3 Tighten bolts (A) on the alternator.

### Adjusting, A40E/A40E FS

Self-adjusting belt tension.

## Electrical distribution box

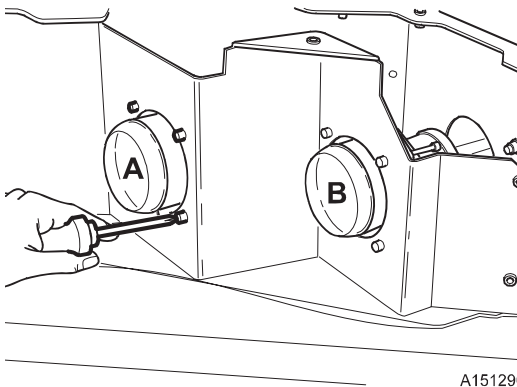
The machine has an electrical distribution box installed in the cab on the left cab wall. The electrical distribution box contains most of the fuses and relays of the machine, see page 180.

If a fault should occur in one of the relays, this can temporarily be overcome, by replacing the faulty relay with one that has a less important function. The relays are identical and interchangeable.



### WARNING!

- **Never install a fuse with a higher rating than that given on the decal (there is a risk of damage or fire on the circuit board).**
- **If the same fuse is triggered repeatedly, the cause must be investigated.**

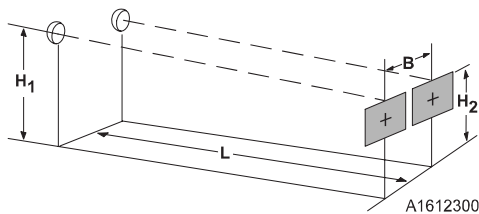


- A High beams  
B Low beams

## Headlights, adjusting

The setting of headlights is of great importance, particularly when operating on public roads during darkness. The low beams from the headlights are of the asymmetrical type.

- 1 Place the machine in service position, see page 89. The battery disconnect switch shall be turned on.
- 2 On machines with FS-system the suspension system should be in normal position.
- 3 Open the engine hood.
- 4 Turn on high beam (A) or low beam (B).
- 5 Adjust the beam with the three adjusting screws.



| Dimensions | Low beams              | High beams             |
|------------|------------------------|------------------------|
| <b>B</b>   | 1730 mm (5 ft 8.1 in)  | 1430 mm (4 ft 8.3 in)  |
| <b>H1</b>  | 1559 mm (5 ft 8.1 in)  | 1559 mm (5 ft 8.1 in)  |
| <b>H2</b>  | 1299 mm (5 ft 8.1 in)  | 1559 mm (5 ft 8.1 in)  |
| <b>L</b>   | 5000 mm (16 ft 4.8 in) | 5000 mm (16 ft 4.8 in) |

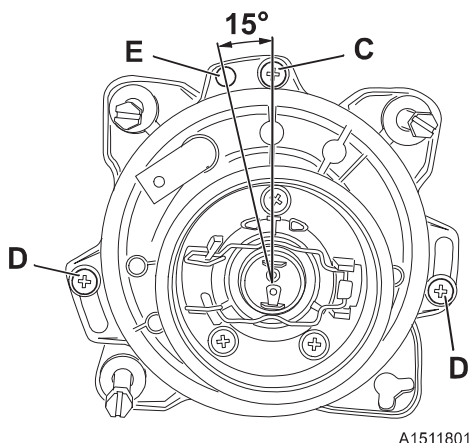
- 6 Turn off the high or low beams.
- 7 Close the engine hood.

## Left/right hand traffic, adjusting

The headlight is supplied adjusted for right-hand traffic.

### Adjusting for left-hand traffic

- 1 Remove screw (C).
- 2 Loosen screws (D).
- 3 Turn the back piece so that hole (E) aligns with screw hole (C).
- 4 Install screw (C).
- 5 Tighten screws (D).



- C Screw  
D Screws  
E Hole



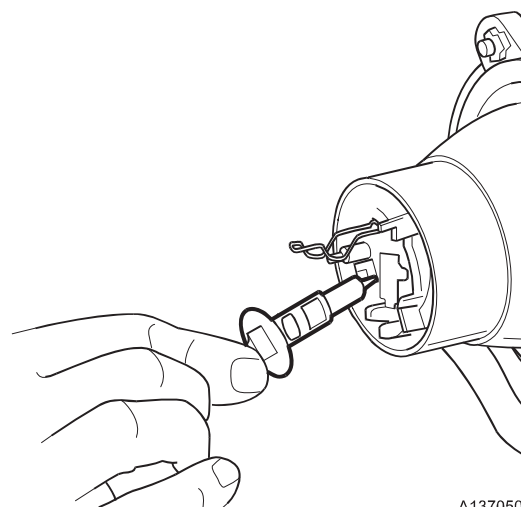
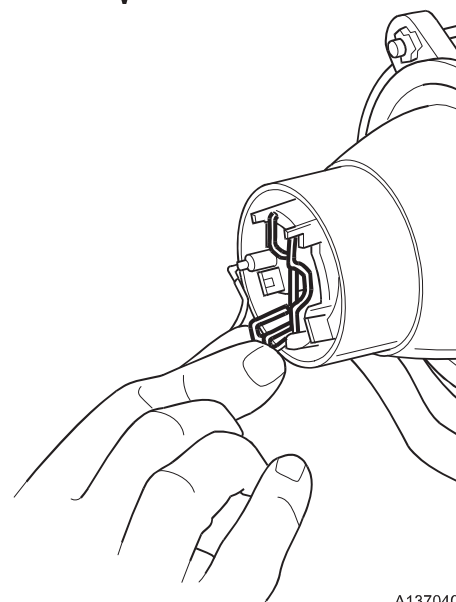
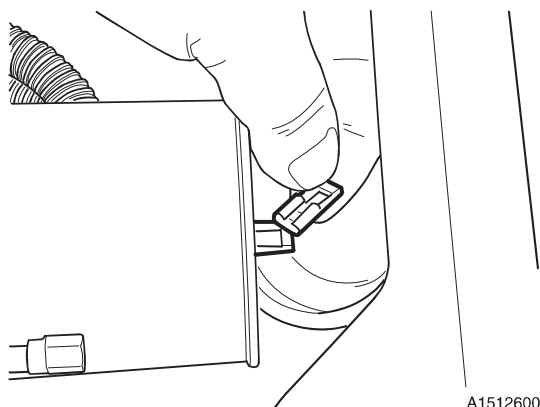
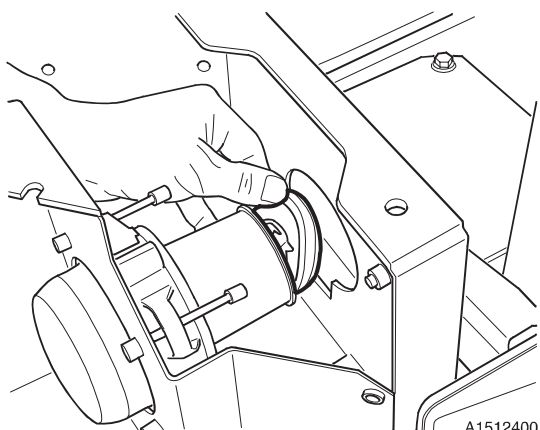
## Light bulb, replacing

- 1 Place the machine in service position, see page 89.
- 2 Open the engine hood.
- 3 Loosen rubber boot over the electrical terminals.

**NOTE! When installing, make sure that the draining tube on the rubber boot points downwards.**

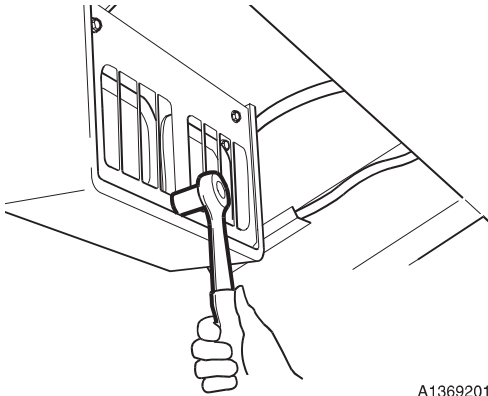
- 4 Disconnect the cable terminal from the light bulb.
- 5 Undo the locking clamp.
- 6 Replace the light bulb (70 Watt, socket H1).

**NOTE! Do not touch the glass bulb on the new light bulb with your fingers.**

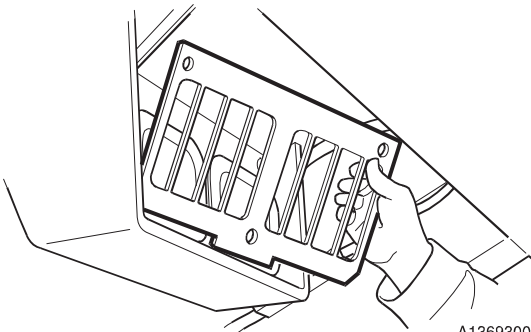


## Bulb insert, replacing

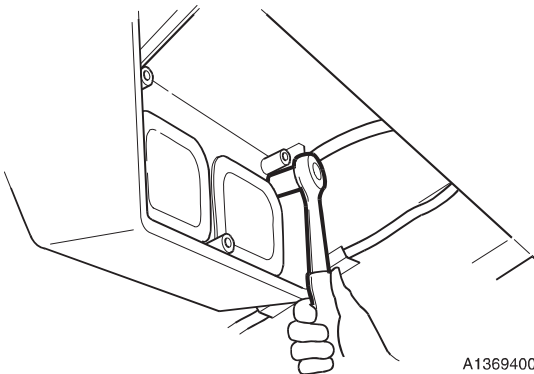
- 1 Remove the protective grille (three bolts).
- 2 Remove the plate with the bulb inserts (two bolts).
- 3 Remove the bulb insert from the plate. Push the rubber moulding out through the hole.
- 4 Split the connector for the bulb insert.
- 5 Remove the rubber moulding from the bulb insert.



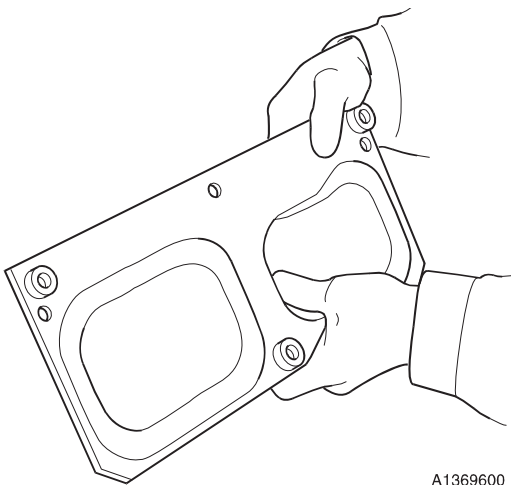
A1369201



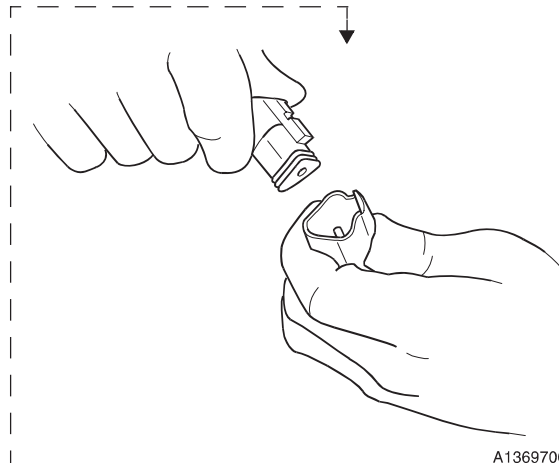
A1369300



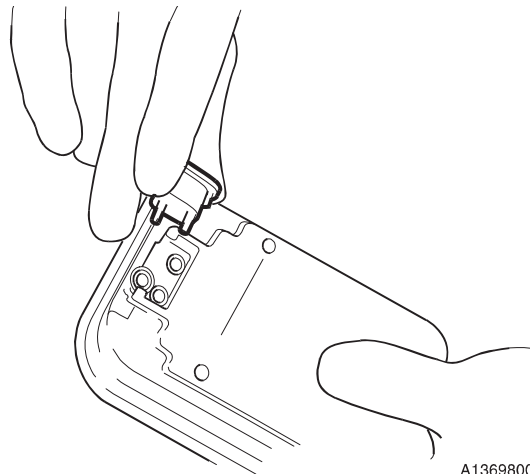
A1369400



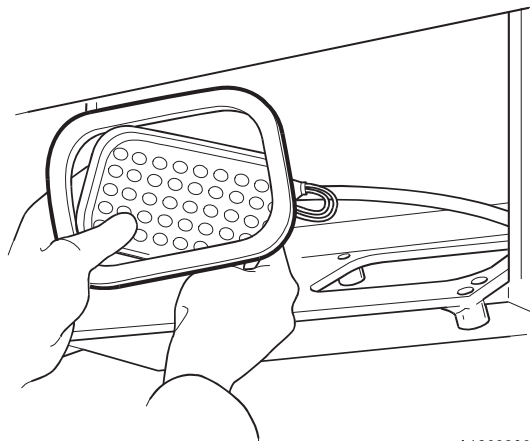
A1369600



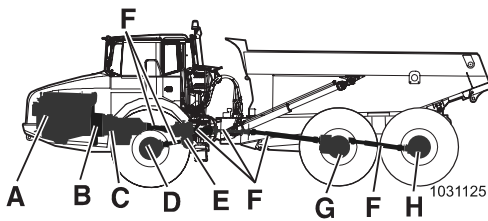
A1369700



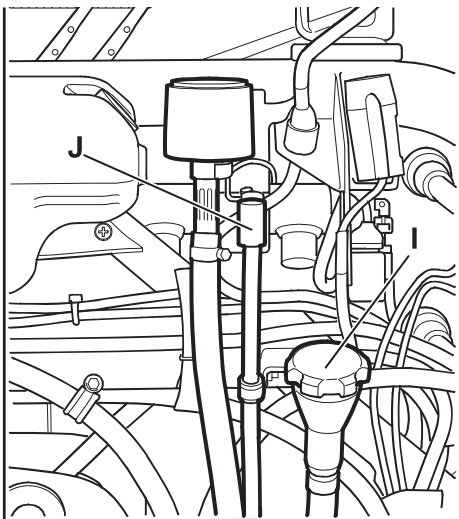
A1369800



A1369900



- A Engine
- B Flywheel housing with power take-off
- C Transmission
- D Front drive axle
- E Dropbox
- F Propeller shafts
- G Front bogie axle
- H Rear bogie axle



## Power transmission

### Transmission oil

The oil level can be read off on the information display unit, see page 30. If the oil level is incorrect (low or high), an alarm display is shown, see page 38. If the temperature in the transmission is high, the control light is on and an alarm display is shown, see page 38.

### Transmission oil, checking level after topping up or changing

**IMPORTANT!** Always clean around the dipstick before you check the oil level. Dirt in the oil damages the transmission.

#### Remember:

- The transmission may not drive correctly and thus be damaged if there is too little oil.
- Too much oil makes the oil foam, which causes the transmission to overheat.

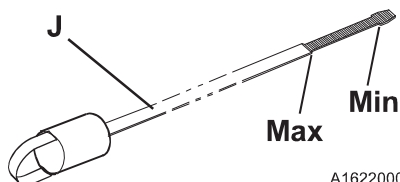
Check the oil when its temperature is approx. 60 °C (140 °F), suitably at the end of the working shift.

- 1 Place the machine in service position, see page 89.
- 2 Start the engine and let it idle.
- 3 Move the gear selector to neutral.
- 4 Wait for approx. one minute to allow the oil level to stabilise before checking.

**NOTE!** Use a rag which does not give off fluff, for wiping the dipstick.

- 5 The oil level should stand 40–70 mm (1.6–2.8 in) above the minimum mark on the dipstick. The corresponding reading on the display unit is 40–70%.
- 6 Top up when necessary, but do not overfill.

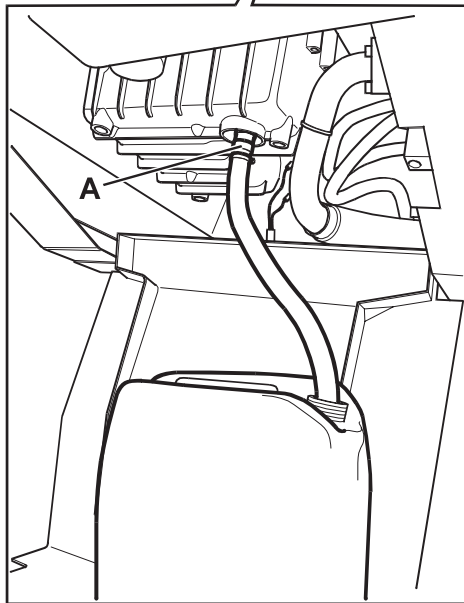
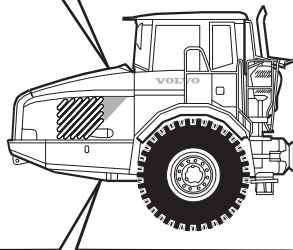
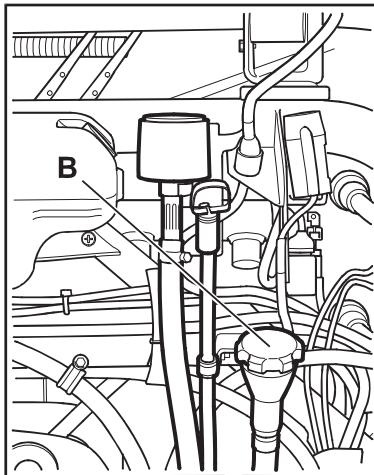
The difference on amount of oil between the MIN. and MAX. marks on the dipstick is approx. 7 litres (1.8 US gal).



A1622000

#### Transmission

- I Oil filler pipe
- J Dipstick



A1607700

A Draining connection

B Oil filler pipe

## Transmission oil, changing

Change oil every 1000 hours. A first change of oil and replacement of oil filter should be carried out at the 100 hour warranty inspection.



### WARNING!

Take care when changing oil. Hot oil can cause burns on unprotected skin.

Conditions for the 1000 hour interval to apply are that:

- the two oil filters are replaced every time the oil is changed.
- the oil filters meet the Volvo CE specifications, which is the case with genuine parts from Volvo CE.
- use oil according to recommendation on page 167
- the correct oil viscosity for the ambient air temperature is selected according to diagram, see page 167.

## Draining

- 1 Place the machine in service position, see page 89.
- 2 Lower the guard plates.
- 3 Remove the protective cap over the draining connection (A) on the oil sump.
- 4 Connect the draining hose and drain the oil. The draining hose is kept inside the front grille which can be lowered.
- 5 Remove the draining hose and put it back inside the front grille.
- 6 Reinstall the protective cap over the draining connection.
- 7 Change main oil filter and lubrication oil filter, see page 131.

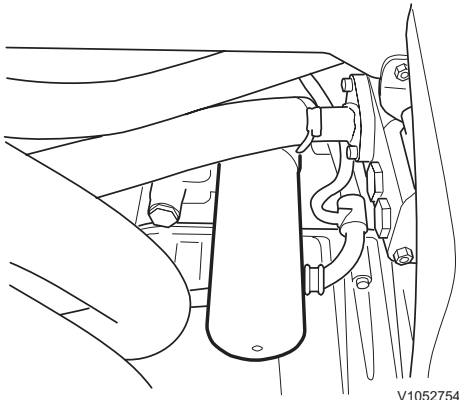
## Filling

- 8 Fill with new oil through filler pipe (B).
- 9 Check the level.
- 10 Raise the guard plates.

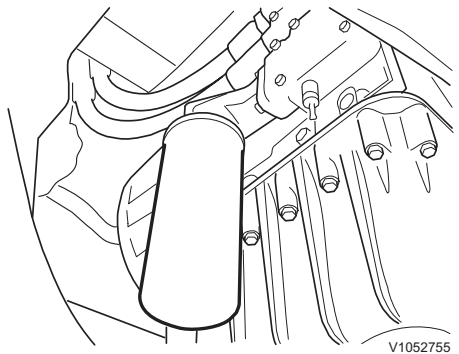
**Capacity when changing: approx. 34 litres (9.0 US gal) including filters**

For oil grade see page 167.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



Main oil filter, positioned on the right side of the transmission



Lubricating oil filter, positioned on the left side of the transmission

## Main oil filter and lubricating oil filter, replacing

Replace the filters every 1000 hours in connection with changing oil. The filters are of the disposable type, i.e. they cannot be cleaned, but must be replaced.

**NOTE!** Always replace both filters at the same time.

### Removing

Let down the guard plates to gain access to the filters. The main oil filter is on the right side and the lubricating oil filter is on the left side of the transmission.

- 1 Use a suitable tool for removing the filters.

### Installing

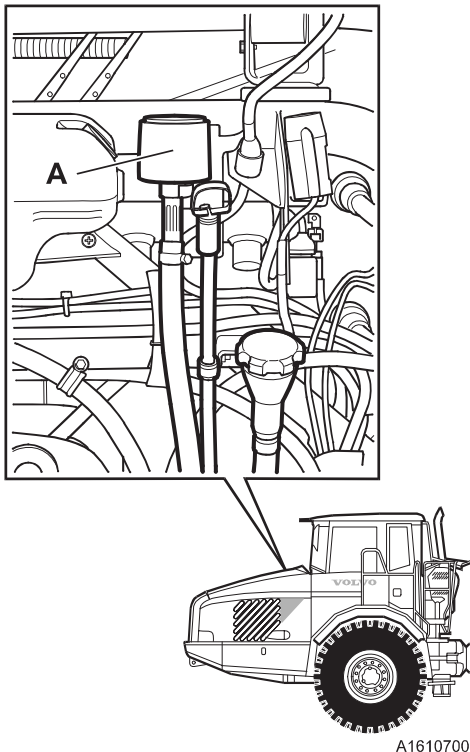
- 2 Fill the filters with oil. Oil capacity of each filter is approx. 1 litre (0.26 US gal).
- 3 Coat the gasket with oil.
- 4 Then screw on the filters until the gasket just touches the sealing surface.
- 5 Then tighten the filters a further  $\frac{1}{2}$  a turn.

### After installing

- 6 Start the engine and check that the gaskets seal. If it does not, remove the filter and check the sealing surface.

**NOTE!** Usually it does not help to tighten harder.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



A Breather filter

## Transmission, replacing breather filter

Replace the breather filter every 2000 hours.

The filter is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

- 1 Undo the clamp and remove filter (A).
- 2 Move the clamp over to the new filter and install it.

## Suction strainer in power take-off, cleaning



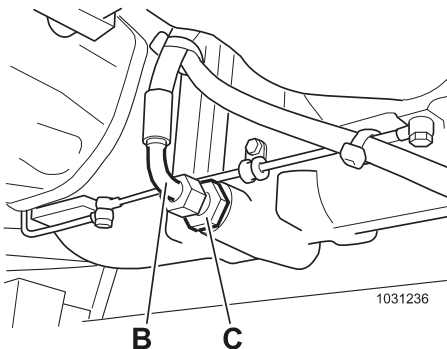
### WARNING!

Hot oil can cause severe burns on unprotected skin.

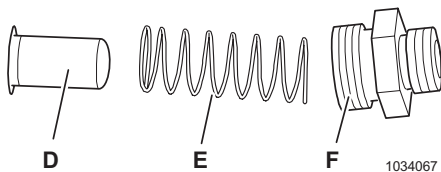
The suction strainer shall be cleaned every 2000 hours.

Suction strainer (B) is located at the front on the power take-off on the flywheel housing.

- 1 Lower the guard plate and leave it suspended by the chain.
- 2 Unscrew pipe (B).
- 3 Unscrew adapter (C).



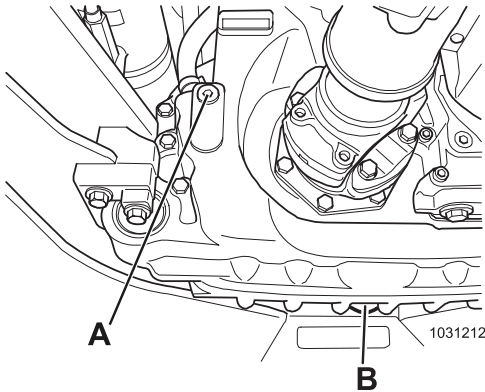
B Pipe  
C Adapter



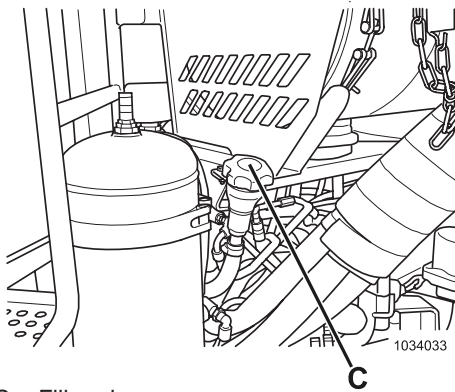
D Suction strainer  
E Spring  
F Adapter

**NOTE! Approx. 2 dl (8 fl oz) of oil will run out.**

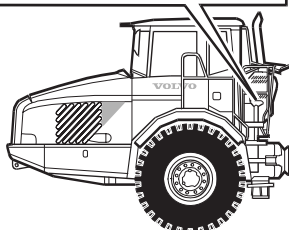
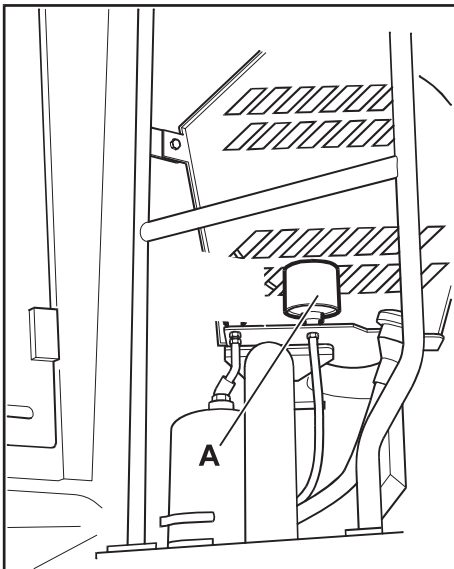
- 4 Take out the strainer and clean it.
- 5 Reinstall the strainer, adapter and pipe.
- 6 Raise the guard plate.



A Level plug  
B Drain plug



C Filler pipe



A Breather filter

## Dropbox, checking oil level

Check the oil level at regular intervals.

- 1 Place the machine in service position, see page 89.
- 2 Unscrew level plug (A). The oil level should be up to the hole.

## Dropbox, checking for leaks

Check that there are no leaks every 250 hours.

- 1 Place the machine in service position, see page 89.
- 2 Carry out a visual check for leaks.

## Dropbox oil, changing

Change oil every 2000 hours. A first and a second oil change shall take place at the 100 hour and 1000 hour warranty inspections.



### WARNING!

Take care when changing oil. Hot oil can cause burns on unprotected skin.

- 1 Place the machine in service position, see page 89.
- 2 Remove plug (B) and drain the oil.
- 3 Reinstall the plug after draining.
- 4 Fill with new oil through filler pipe (C) to the left at the back on the cab.
- 5 After the oil has been changed, the oil level should be checked after a short period of operation.

Capacity when changing: approx. 8.5 litres (2.2 US gal)

For oil quality grades, see page 167.

Take care of filters/oils/liquids in an environmentally safe way, see page 91.

## Dropbox, replacing breather filter



### WARNING!

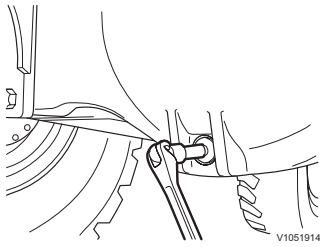
Hot oil can cause severe burns on unprotected skin.

Replace the breather filter every 2000 hours. The filter is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

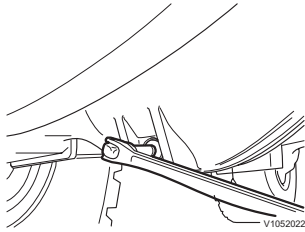
- 1 Undo the clamp and remove filter (A).
- 2 Move the clamp over to the new filter and install it.

Take care of filters/oils/liquids in an environmentally safe way, see page 91.

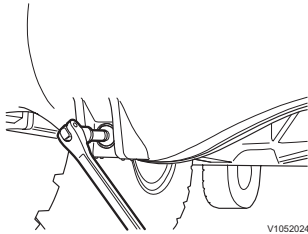




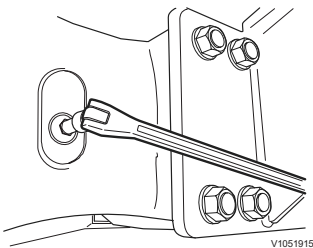
Draining, front axle



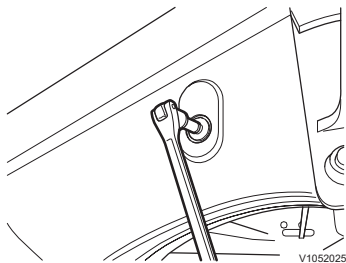
Draining, front bogie axle



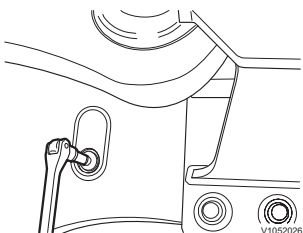
Draining, rear bogie axle



Level and filler plug, front axle



Level and filler plug, front bogie axle



Level and filler plug, rear bogie axle

## Drive axles, checking for leaks

**Check that there are no leaks every 250 hours.**

- 1 Place the machine in service position, see page 89.
- 2 Carry out a visual check for leaks.

## Drive axles, changing oil

**Change oil every 2000 hours. The first oil change must be carried out at the 1000 hour warranty inspection.**

- 1 Drain the oil by removing the drain plug on the respective axle housing.
- 2 Reinstall the plug when all oil has run out.
- 3 Fill with new oil in the respective axle housing through the filler plug hole.

### Level and filler plug

Drive axle, tractor unit: right side, at the front

Front bogie axle: left side, at the back

Rear bogie axle: right side, at the back

### Capacity when changing,

Front axle: 26 litres (6.9 US gal)

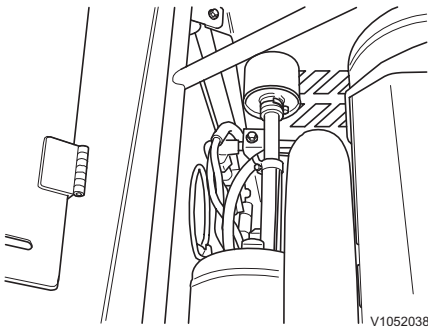
Front bogie axle: 28 litres (7.4 US gal)

Rear bogie axle: 26 litres (6.9 US gal)

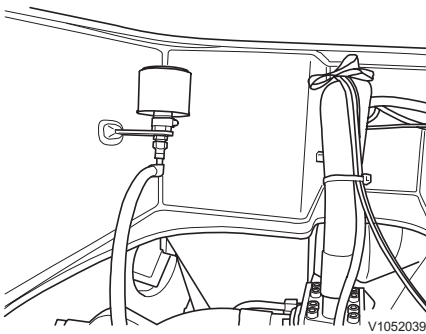
For oil quality grades, see page 167.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

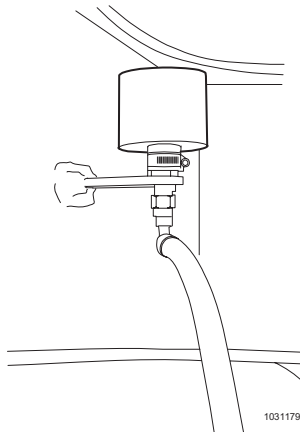




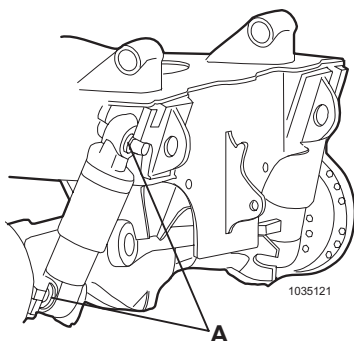
Breather filter front axle and dropbox



Breather filter, front bogie axle



Breather filter, rear bogie axle



A Rubber bearings

## Drive axles, replacing breather filters

Replace the drive axle breather filters every 2000 hours. The filter is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

- 1 Undo the clamp and remove the filter.
- 2 Move the clamp over to the new filter and install it.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

## Full Suspension checking rubber bearings

Check the rubber bearings for all six FS-cylinders for the first time at **4000 hours**.

Then check every **1000 hours**.

If the rubber bearings are worn or heavily cracked, contact a workshop authorised by Volvo CE for repairs.

**NOTE! Neglected checks of the rubber bearings may lead to damaged cylinders and shortened service life of the machine.**

## Frame joint bearing, lubricating with grease

Applies to machines from and incl. serial no.:

A35E/A35EFS – 10836

A40E/A40EFS – 12450

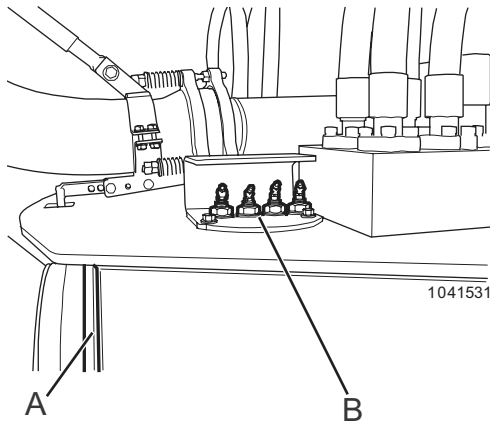
## Frame joint bearing, checking

Check the bearing every 2000 hours.

## Frame joint bearing, checking and adjusting clearance

Check and adjust the frame joint bearing clearance every 2000 hours.

The work should be carried out at a workshop authorised by Volvo CE.



1041531

A Frame joint bearing (between hitch and trailer unit)

B Grease nipples

## Manual greasing

Lubricate the frame joint daily.

- 1 Wipe off old grease from around frame joint bearing (A).
- 2 Wipe off grease nipples (B) and the grease gun before starting to grease.
- 3 Pump 2 to 3 strokes at each grease nipple or until clean grease is forced out and can be seen by the seal.
- 4 Wipe off the grease nipples after greasing is completed.

## Automatic lubrication

The machine can be equipped with an automatic lubrication system that lubricates the frame joint according to a pre-selected lubrication cycle, see page 162.

## Frame joint bearing, lubricating with oil

Applies to machines up to serial number:

A35E/A35EFS – 10836

A40E/A40EFS – 12450

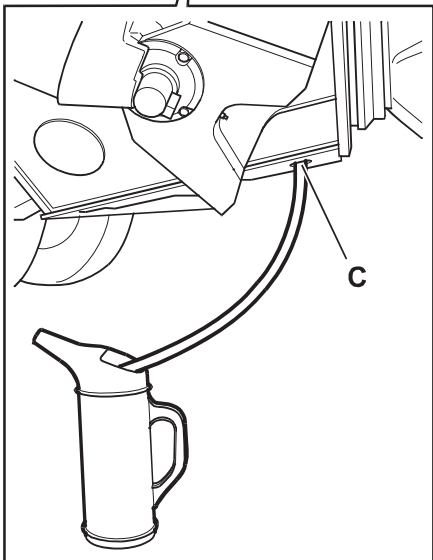
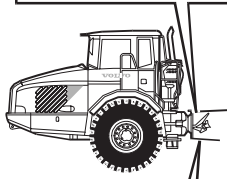
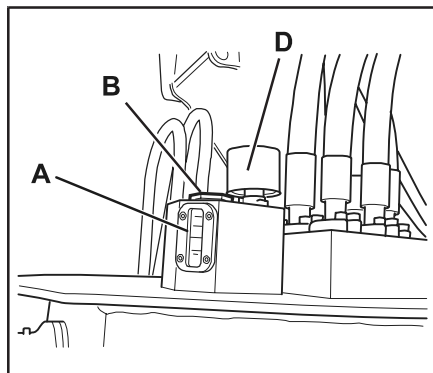
### Checking

Check the bearing every 2000 hours.

### Checking and adjusting clearance

Check and adjust the frame joint bearing clearance every 2000 hours.

The work should be carried out at a workshop authorised by Volvo CE.



1034017

- A Sight glass
- B Cover
- C Draining connection
- D Breather filter

### Checking oil level

Check the oil level every 250 hours.

- 1 Place the machine in service position, see page 89.
- 2 Read off the oil level on sight glass (A).

### Changing oil

Change oil every 2000 hours. The first oil change must be carried out at the 1000 hour warranty inspection.

- 1 Place the machine in service position, see page 89.
- 2 Remove cover (B) above the sight glass.
- 3 Connect the draining hose to draining connection (C) on the frame joint and drain off the oil.
- 4 Remove the draining hose.
- 5 Remove the bleeder screw.
- 6 Fill reservoir (B) with new oil.
- 7 Check the level in the sight glass.

**NOTE! Fill in stages, as otherwise there is a risk that the oil will overflow.**

- 8 Install the cover and wipe off any spillage.

**Capacity when changing: approx. 3 litres (0.8 US gal)**

For oil quality grades, see page 167.

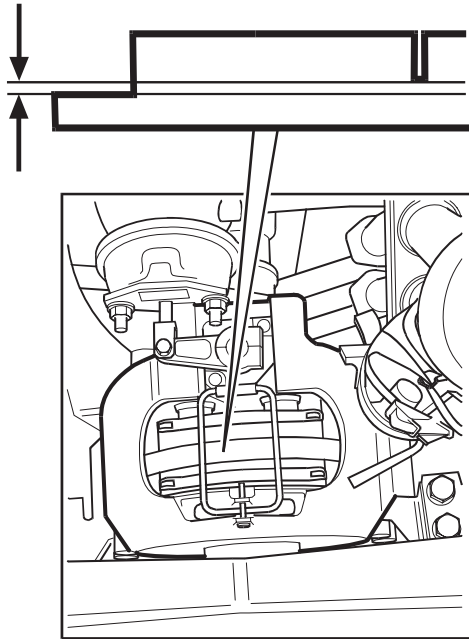
Take care of filters/oils/liquids in an environmentally safe way, see page 91.

### Changing breather filter

Replace the breather filter every 2000 hours. Filter (D) is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

- 1 Undo the clamp and remove the filter.

Move the clamp over to the new filter and install it.



Brake lining, min. thickness 5 mm (0.20 in)

## Brake system

The brake system, apart from the parking brake, which is controlled by compressed air, is all-hydraulic and has the oil tank in common with the hydraulic system. Instructions for checking oil level, changing oil and replacing filters can, therefore, be found in the hydraulics section on page 149 (apart from replacing pressure-oil filter, which can be found on the next page).



### WARNING!

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

## Parking brake, checking brake linings

Check the brake lining wear every 1000 hours.

The minimum measure for the parking brake linings is 5 mm (0.20 in).

**NOTE!** If the linings are worn down below 5 mm (0.20 in), the brake disc may be damaged.

## Parking brake, adjusting

The parking brake is self adjusting. No after-adjustment is required.

## Brake system, pressure release

Before carrying out any work on the brake system of the machine the pressure must be fully released. This is done according to the instructions below.

- 1 Stop the engine.
- 2 Depress the brake pedal several times (approx. 30–40 times) until the flow through the foot brake valve ceases (When the hissing sound has stopped and the pedal feels “spongy”).

**NOTE!** The system may still be pressurised even though a pressure gauge shows 0, depending on where the gauge is connected.

## Checking accumulators

Contact a workshop authorised by Volvo CE.

## Brake system, replacing pressure-oil filter



### WARNING!

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

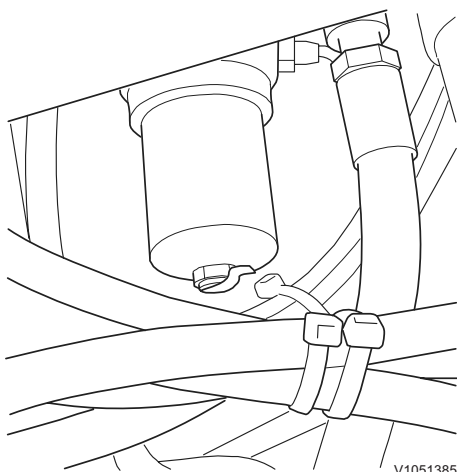
Replace the filter every 2000 hours.

### Removing

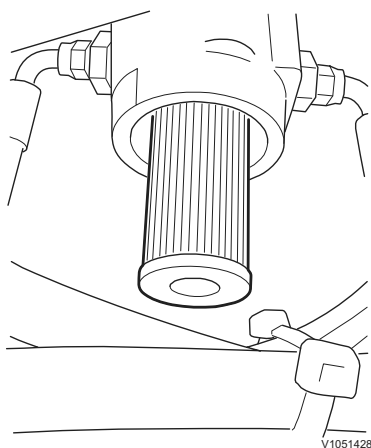
- 1 Use a socket and ratchet handle or suitable tool for removing the filter cover.
- 2 Remove the filter.

### Installing

- 3 Install the new filter.
- 4 Screw on the cover.



Pressure-oil filter, cover



Pressure-oil filter

## Service brakes, checking brake discs

Check the brake lining wear every 2000 hours. The first check should be carried out after 500 hours.

**NOTE!** This applies under normal operating conditions. For harder type of operation, the brake linings must be checked more often.

To be able to check the brake disc wear, the brake pedal must be kept in the depressed position and therefore two persons are required to carry out the check.

The measuring is done on a brake indicator which is positioned in the brake back-plate on each brake drum.

- 1 Place the machine in service position, see page 89.
- 2 Apply the parking brake.
- 3 Start the engine and run it until the control lamp for low brake pressure is extinguished.
- 4 Press down the brake pedal and keep the pedal in the depressed position during the entire check.

### Proceed as follows with each brake:

- 1 Remove the protective cap from the brake indicator.
- 2 Carefully press in the indicator as far as possible with a small screwdriver. Then measure the distance from the face of the nipple in to the indicator. Make a note of the measurement.
- 3 The brake linings are worn out when measurement **X** equals 0 mm.

### A35E/A35E FS, (X in the table designates new linings)

|                  |                                                           |
|------------------|-----------------------------------------------------------|
| Front axle       | $X = 6.8 \pm 0.1 \text{ mm } (0.27 \pm 0.004 \text{ in})$ |
| Front bogie axle | $X = 3.4 \pm 0.1 \text{ mm } (0.13 \pm 0.004 \text{ in})$ |
| Rear bogie axle  | $X = 3.4 \pm 0.1 \text{ mm } (0.13 \pm 0.004 \text{ in})$ |

### A40E/A40E FS, (X in the table designates new linings)

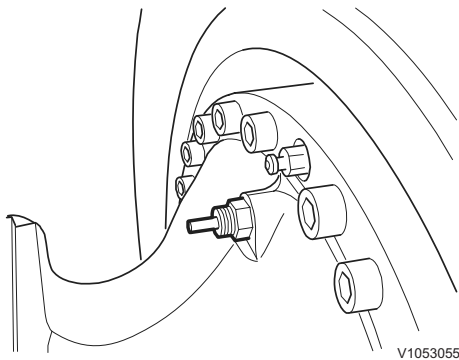
|                  |                                                           |
|------------------|-----------------------------------------------------------|
| Front axle       | $X = 6.8 \pm 0.1 \text{ mm } (0.27 \pm 0.004 \text{ in})$ |
| Front bogie axle | $X = 4.5 \pm 0.1 \text{ mm } (0.18 \pm 0.004 \text{ in})$ |
| Rear bogie axle  | $X = 4.5 \pm 0.1 \text{ mm } (0.18 \pm 0.004 \text{ in})$ |

**If the linings are worn out, contact a workshop authorised by Volvo CE.**

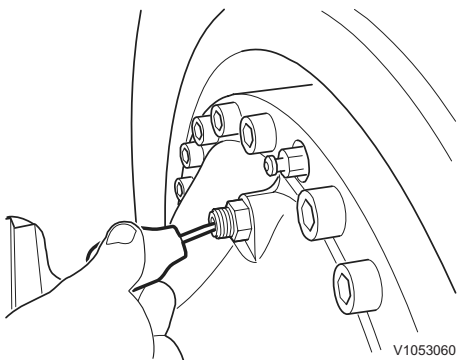
- 4 Let up the brake pedal. **Pay attention and prevent the machine from moving.**
- 5 Replace the protective cap on the brake indicator. Tightening torque 30 Nm (3 kgf m) (22 lbf ft).

## Brake piston, adjusting stroke clearance

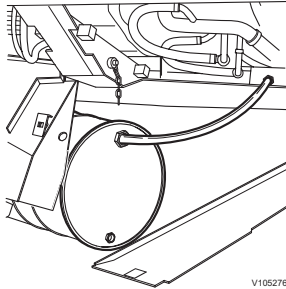
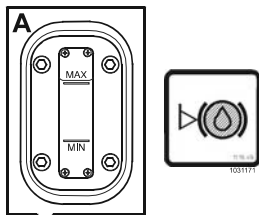
The stroke clearance of the brake piston is self adjusting.



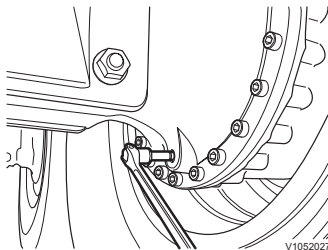
Brake indicator after the protective cap has been removed.



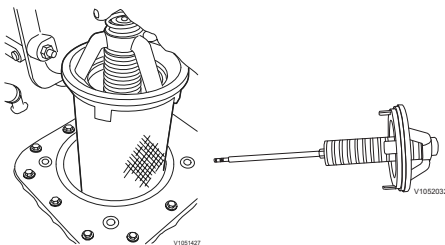
Position of indicator pin below surface



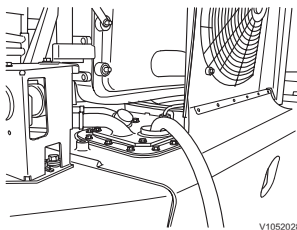
Draining connection



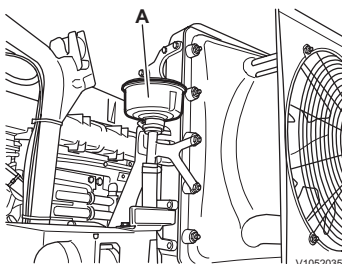
Draining point, hub



Oil filter and magnetic rod



Brake cooling oil tank, filling point



Breather filter, brake cooling oil

## Brake cooling oil, checking level after topping up or changing

Check the oil level every 250 hours.

The level should stand 3/4 up within the measuring range on sight glass (A), which is located on the left side of the machine.

## Brake cooling oil, changing

Change oil every 2000 hours.

- 1 Place the machine in service position, see page 89.
- 2 Connect the draining hose to the draining connection and drain off the oil.
- 3 Remove the draining hose, when all the oil has run out.
- 4 Drain the brake cooling oil from the hubs.
- 5 Remove the cap from the brake cooling oil tank (positioned on the left side of the machine). Remove the oil filter from the insert and then clean the magnetic rings.
- 6 Install a new oil filter in the insert. Reinstall the insert in position in the oil tank and install the cover.
- 7 Remove the filler plug from the cover and then fill with oil through the hole until the max. level in sight glass (A) has been reached.
- 8 Start the engine and leave it running a few minutes to fill the system with oil.
- 9 Stop the engine, read off at the sight glass and fill with more oil if it is required.
- 10 Install the plug.

**Capacity when changing: approx. 210 litres (55.4 US gal)**

For oil grade, see page 167.

## Brake cooling oil, replacing oil filter

Replace the oil filter every 1000 hours.

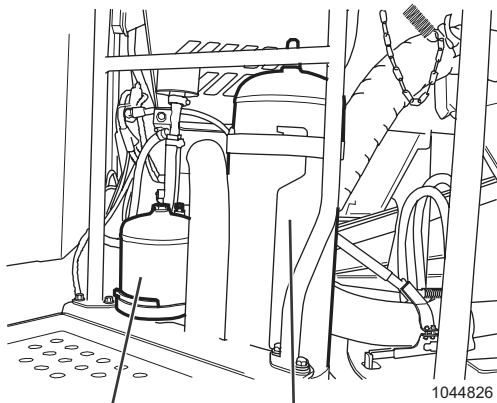
- 1 Remove the cap from the brake cooling oil tank (positioned on the left side of the machine). Remove the oil filter from the insert and then clean the magnetic ring.
- 2 Install a new oil filter in the insert. Reinstall the insert in position in the oil tank and install the cover.

## Brake cooling oil, replacing breather filter

Replace the brake cooling oil tank breather filter (A) every 1000 hours. The filter is of the disposable type, i.e. it cannot be cleaned, but must be replaced.

- 1 Remove the cover.
- 2 Replace the filter insert.
- 3 Reinstall the cover.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



A Air reservoir  
B Air reservoir

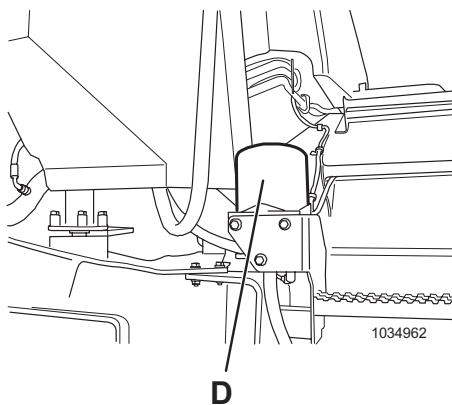
## Compressed-air system

### Air reservoirs, draining

The machine is equipped with two compressed air tanks, a 4-litre tank (A) and a 20-litre tank (B) located on the left side behind the cab.

The air reservoirs are kept free from condensation water through an air drier.

In case of a fault in the air drier, the 20 litre reservoir can be drained through valve (E) manually.

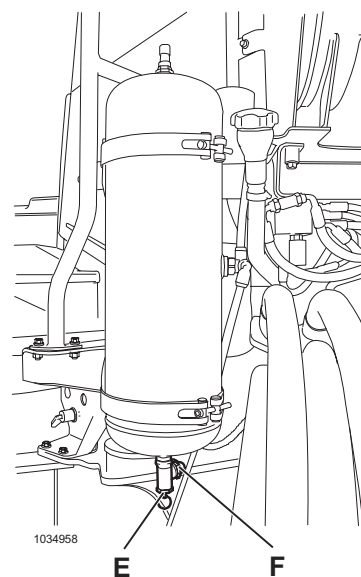


D Drier cartridge

### Compressed-air system, replacing drier cartridge

Replace the drier cartridge (D) in the air drier every 2000 hours.

The drier filter is positioned on the right side of the machine, behind the cab.



Air reservoir  
E Drain valve  
F Filler valve

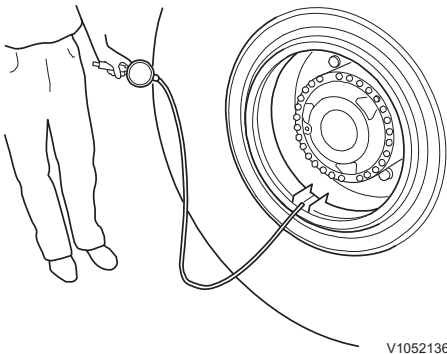
### Compressed-air system, filling

When required, the compressed-air system can be filled through filler valve (F), by using compressed air from another machine.

The filler valve is positioned to the left behind the cab.



## Tyres



V1052136



### **WARNING!**

Make sure that you stand to one side of the tyre when inflating a tyre fitted on a split rim. Tyres fitted on such a rim may explode causing injury or death. Use a self attaching air chuck with a hose long enough to enable you to be out of the trajectory path when filling the tyre with air.

### Tyres, checking air pressure

Check the air pressure every 500 hours.

Regarding recommended air pressure, see page 187.

### Tyres, checking wear

Check the tyre wear every 500 hours.

### Tyres, inflating

Filler valve (A) on the machine may preferably be used for inflating tyres or cleaning in connection with maintenance work. The filler valve is positioned to the left behind the cab.

#### **Connecting hose:**

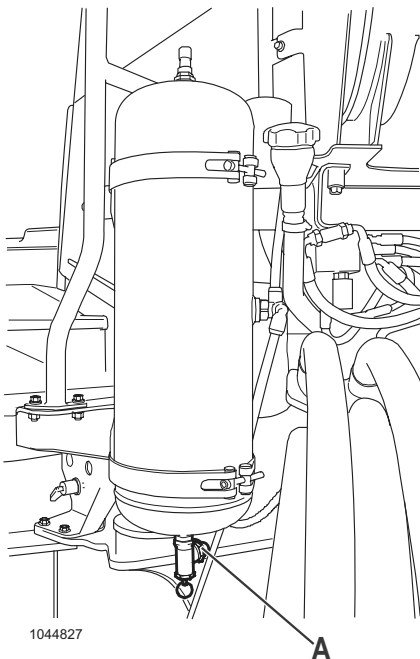
- 1 Remove the cover.
- 2 Connect the hose.

### Wheel nuts, check-tightening

After replacement of a wheel or if a wheel has been removed for other reasons, The wheel nuts must be check-tightened after 3 hours of operation.

Tightening torque: 800 Nm (590 lbf ft)

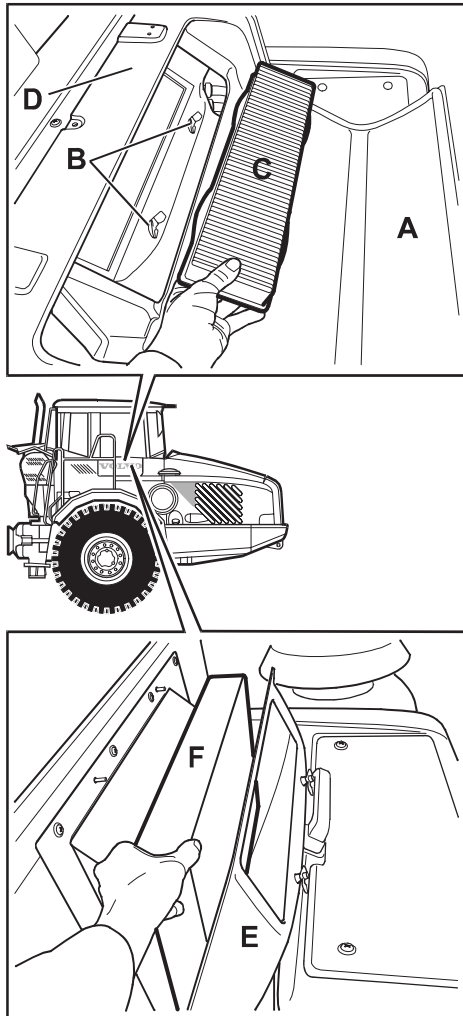
**NOTE!** Try to avoid mixing tyres from different manufacturers or tyres with different type designations on the same axle, as this may lead to unnecessary wear of the drive train and also alter the properties of the machine.



1044827

**A**

A Filler valve



A1644000

- A Cover
- B Nuts
- C Prefilter
- D Side guard
- E Casing
- F Main filter

## Cab

### Cab, ventilation filters

The machine is equipped with two ventilation filters in the cab, one prefilter and one main filter. The clogging up of the filters is entirely dependent on the working environment of the machine. The prefilter should be checked and cleaned when required.

**IMPORTANT!** The cab filters are only intended to separate particles (dust) from the air. Any dangerous gases are not trapped by the filter.

### Cab, replacing prefilter

Replace the filter every 1000 hours.

- 1 Remove cover (A).
- 2 Slacken nuts (B).
- 3 Remove prefilter (C).

### Cab, cleaning prefilter

Carefully shake the filter without damaging it – avoid cleaning with compressed air, vacuum cleaner or water.

**IMPORTANT!** Use personal protective equipment, e.g. approved respirator, when cleaning the filter.

### Cab, replacing main filter

Replace the filter every 2000 hours.

- 1 Remove side guard (D).
- 2 Detach casing (E).
- 3 Remove main filter (F).

**NOTE!** The main filter should not be cleaned, but must be replaced.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

## Asbestos filter (optional equipment)



### **WARNING!**

**If it is dangerous dust, e.g. toxic or contains asbestos, special measures must be taken to prevent the dust from spreading further.**

The filter is especially intended for use in environments where there may be asbestos dust, but it is of course effective against all other kinds of dust when the operator needs highly filtered air in the cab.

The filter is approved according to DOP MIL standard 282 and fulfils the requirements according to the Swedish Work Environment Authority's regulations "Asbestos" AFS 1996:13. It also fulfils the requirements according to EN 1822:1 filter class H13.

Pay attention to the national regulations regarding work in the environment in question.

### **Advice for operating in environments where dust / asbestos dust is present**

- Enter and leave the machine away from the asbestos-contaminated area to avoid asbestos dust being brought into the cab.
- Keep clothes and shoes clean from dust as far as possible.
- Tidy and vacuum-clean the cab often and use personal protective equipment, for instance respirator (dust mask) intended for asbestos contaminated areas.
- The cab door must be closed. It is particularly important that the tightness (the seals) of the cab is (are) preserved/maintained.
- The cab should be ventilated through its ventilation system, which also provides excess pressure in the cab.
- Replace filters (main filter and prefilter) every 1000 hours or more often when required. Take care not to damage the new filters. When installing check that the edge of the filter forms a tight seal.
- Handling of used filters must be done bearing the health hazard and the environment in mind. Before the filters are discarded at the place intended for asbestos waste, the filters must be placed in the tight-sealing plastic bag which is supplied with all new filters.

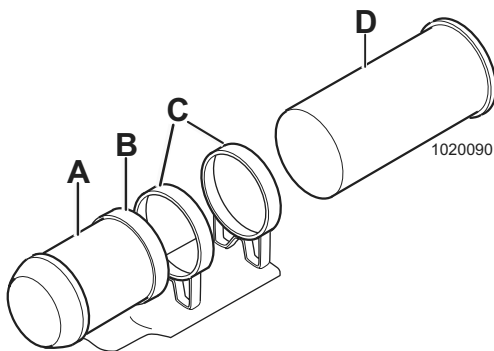
## Cab air precleaner (optional equipment)

Change the system's filter every 1000 hours.



### WARNING!

Always use safety glasses and suitable clothing when using compressed air.

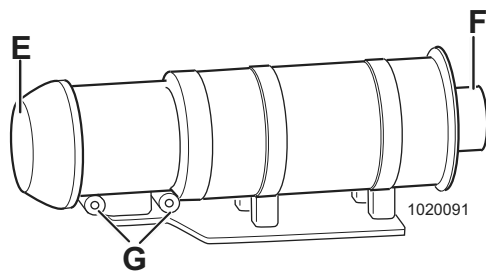


- A Precleaner
- B Worm clamp
- C Clamps
- D Filter casing

### Cleaning cab air precleaner

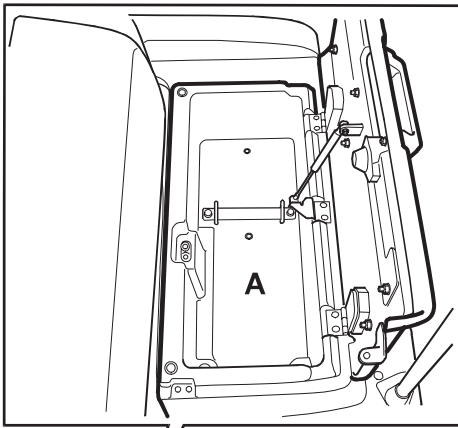
- 1 Loosen the worm clamp (B) that holds the filter casing (D).
- 2 Loosen the clamps (C) that hold the filter casing in place and move the filter casing away from the precleaner (A).
- 3 Remove the filter casing from the air cleaner and leave the pipe for the outlet on the filter casing in place.
- 4 Remove the rain cap (E) and blow away any dirt with compressed air.
- 5 Blow out through the two ejector ports (G) and inside the precleaner. Make sure that dirt has not collected in the precleaner.
- 6 Check that the fan inside the precleaner rotates by looking straight into the inlet when the fan motor is running. The fan blades shall rotate counter-clockwise.
- 7 Loosen the worm clamp that holds the pipe (F) for the outlet on the filter casing and remove the pipe from the air filter.
- 8 Install the pipe in the new filter casing and reinstall the worm clamp.

**IMPORTANT! Make sure that no dirt gets in to the pipe. Also make sure that the outside of the pipe, to be inserted in the air filter, is kept clean.**



- E Rain cap on inlet
- F Outlet to evaporator housing
- G Ejector ports

- 9 Reinstall the filter casing in reverse order. If you detect that there is some system malfunction, contact a workshop authorised by Volvo CE.



## Toolbox

Toolbox (A) is positioned on the right side of the cab.

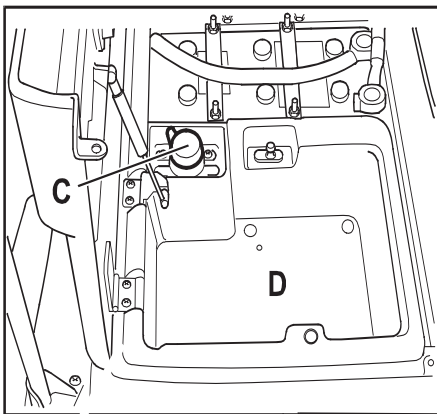
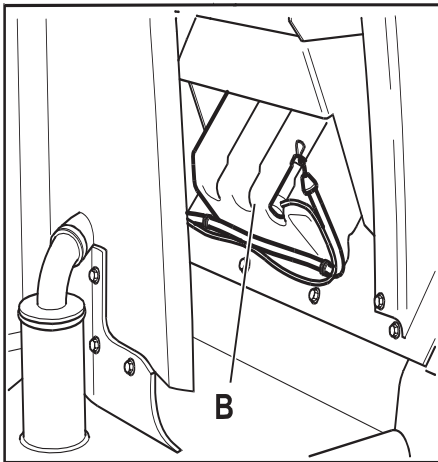
## Windscreen washer reservoir

The windscreen washer reservoir (B) is positioned on the left side of the cab under the battery box.

Top up when required (C).

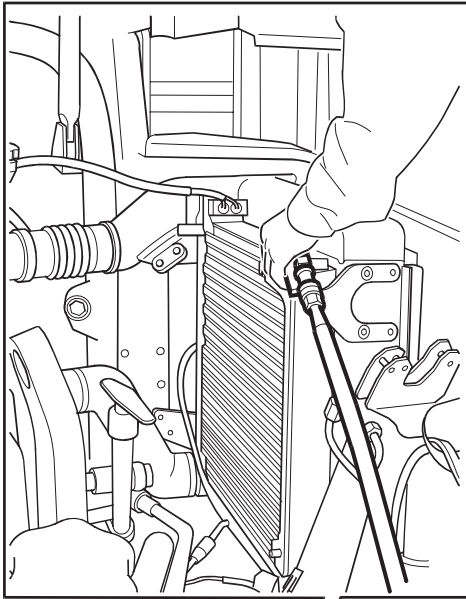
## Boot box

Boot storage box (D) is positioned on the left side on the cab behind the battery box.



A1612100

- B Window washer reservoir
- C Filling point
- D Boot box



## Air conditioning (optional equipment)

### Condenser, cleaning

**Clean the condenser every 500 hours or as needed.**

- 1 Place the machine in service position, see page 89.
- 2 Let down the front grille.
- 3 Open up the engine hood.
- 4 The condenser is positioned on the right side in the engine compartment.
- 5 Blow the condenser clean with compressed air.

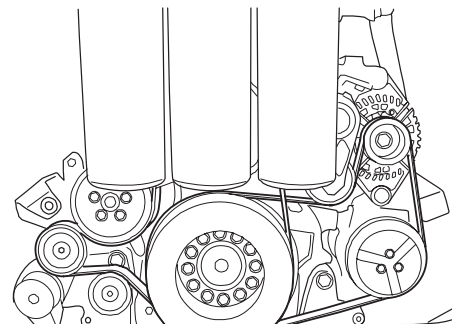
In order to prevent leakage and to safeguard the lubrication of the seals in the compressor for the air conditioning, the air conditioning should be run for approx. five minutes once a month. It is important that the operator of the machine is made aware of this.

**NOTE! At temperatures below freezing, 0 °C (+32 °F), the unit must be run indoors, if possible, as the power supply to the compressor lead is switched off by the thermostat whenever the evaporator temperature is below +1 °C (+34 °F).**

**Make sure that the exhaust gases are extracted or removed in a suitable way.**

Mind the hoses between compressor, condenser and evaporator. There is always a certain excess pressure in the system. Therefore, never disconnect hoses and never remove the oil filler plug on the compressor, except during repairs to the system.

Ask a workshop authorised by Volvo CE to check the air conditioning once a year.



1031123

## Compressor, checking belt tension



### WARNING!

- The engine must be stationary when checking the belt tension – rotating parts can cause injuries.
- The engine must never be run when the belts are completely slack.

**Check the condition of the belt for the first time at 250 hours (also after replacement) and then every 2000 hours.**

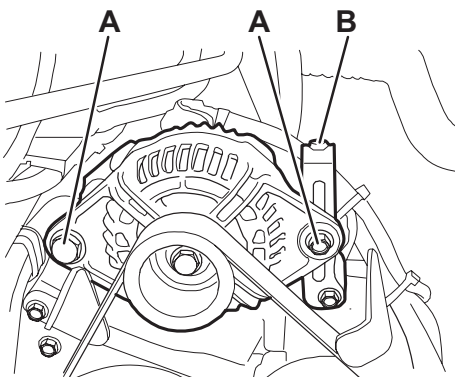
The compressor and the alternator have the belt in common.

### Adjusting, A35E/A35E FS

- 1 Loosen bolts (A) on the alternator.
- 2 Adjust with adjusting screw (B) so that the belt can be pressed in approx. 8 mm.
- 3 Tighten bolts (A) on the alternator.

### Adjusting, A40E/A40E FS

Self-adjusting belt tension.



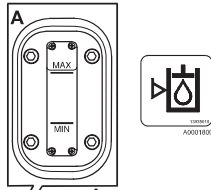
1034634

A Bolts

B Adjusting screw

## Hydraulic system

**IMPORTANT!** Exercise cleanliness when filling oil and in all work on the hydraulic system



### Hydraulic oil

The hydraulic oil level is read off on the sight glass located on the left side of the machine.

The oil level can also be read off on the information display unit, see page 31. If the oil level is too low, an alarm display is shown, see page 39. If the temperature in the transmission is too high or low, the control light is on and an alarm display is shown, see page 39.

### Hydraulic oil, checking level after topping up or changing

- 1 Place the machine in service position, see page 89.

**NOTE!** If the machine is equipped with an FS-system, the machine must be in normal position and the dump body must be empty.

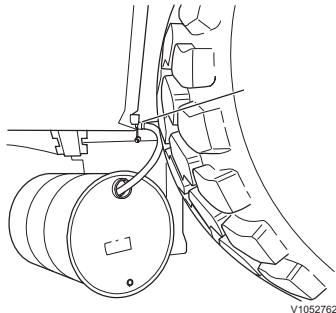
- 2 The oil level should be checked before the engine is started.
- 3 The oil level should be 3/4 up within the measuring range between the lines on the sight glass (A).

**NOTE!** If the machine is provided with biologically degradable hydraulic oil, the same type of oil must be used when topping up and when changing hydraulic oil. Different types of biologically degradable hydraulic oils must not be mixed.

### Hydraulic oil, changing

Change oil every 4000 hours if the system is filled with hydraulic oil or Volvo Biodegradable Hydraulic Oil.

Change oil every 2000 hours, if the system is filled with any other biologically degradable hydraulic oil.



Draining hydraulic oil



### WARNING!

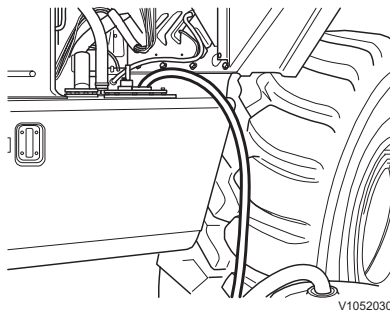
Take care when changing oil. Hot oil can cause burns on unprotected skin.

- 1 Place the machine in service position, see page 89.
- 2 Lower the guard plate
- 3 Drain the oil by removing the drain plugs (2 pcs) at the bottom of the hydraulic tank and at the rear end by the wheels (draining of sludge and condensation water is done through the same holes).
- 4 Fill oil through the hydraulic oil filter after removing the filler plug.
- 5 Reinstall the plug.

**Capacity when changing A35E/A40E: approx. 245 litres (64.7 US gal)**

For oil quality grades, see page 167.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**



Filling point, hydraulic oil



**If the machine is equipped with FS-system:**

- 1 Place the machine in the service position (level position), see page 89.
- 2 Make sure that the FS-system is in bottom position, see page 27. Let the engine run at idle for approx. 3 minutes so that the accumulators are drained of oil and pressure.
- 3 Carry out draining according to the above method.
- 4 Fill oil through the hydraulic oil filter after removing the filler plug.

**5 Reinstall the plug.**

- 6 Start the engine and activate the FS-system to normal position by using the switch, see page 27.
- 7 When the FS-system is in normal position, stop the engine and check the oil level and top up when required.

**Capacity when changing A35E FS/A40E FS: approx. 275 litres (72.6 US gal)**

For oil quality grades, see page 167.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

**Bio oil**

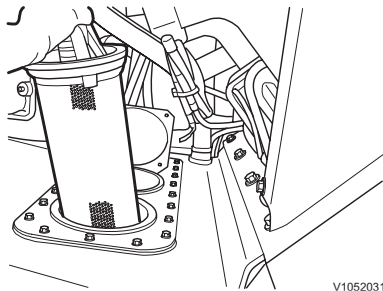
When changing from a mineral oil to a bio oil, please contact a workshop authorised by Volvo CE.

**Hydraulic system, return oil filter and magnetic rods**

**IMPORTANT! Exercise cleanliness when filling oil and in all work on the hydraulic system**

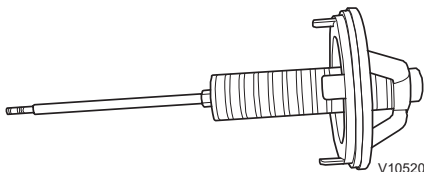
**Replace the return oil filters and clean the magnetic rods every 2000 hours. A first change of the return oil filters as well as cleaning of the magnetic rods shall take place at the 1000 hour warranty inspection.**

- 1 Detach the covers.
- 2 Remove the filters which are of the disposable type.
- 3 Clean the magnetic rods thoroughly and install new filters.
- 4 Check the O-rings.
- 5 Reinstall the covers.



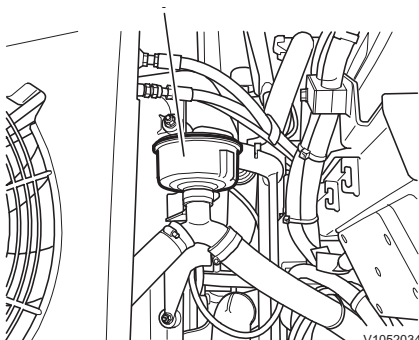
V1052031

Return oil filters



V1052032

Magnetic rod



V1052034

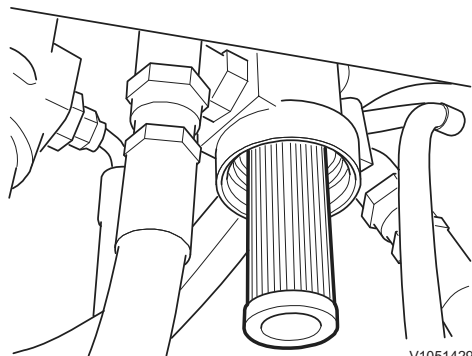
Breather filter, hydraulic system

**Hydraulic system, breather filter**

**Replace breather filter (D) every 1000 hours.**

- 1 Remove the cover.
- 2 Replace the filter insert.
- 3 Reinstall the cover.





Return oil filter, cooling fan

## Cooling fan, replacing return oil filter

**IMPORTANT!** Exercise cleanliness when filling oil and in all work on the hydraulic system.

**Replace oil filter every 2000 hours.**

The filter is positioned on the right side of the machine behind the cab wall

### Removing

- 1 Use a socket and ratchet handle or other suitable tool to remove the filter cover.
- 2 Remove the filter.

### Installing

- 3 Install the new filter.
- 4 Screw on the cover.

**Take care of filters/oils/liquids in an environmentally safe way, see page 91.**

## Dump body



### WARNING!

Keep away from the area under the dump body when it is raised, unless it has been secured with the dump body lock and the tipping (dumping) control has been blocked with the lock-out control, see pages 48 and 94.

Check the dump body rubber cushions, which fit up against the top of the trailer unit frame, every 1000 hours. A first check should be carried out after 100 hours and also after replacing.

### Rubber cushions, checking and adjusting vertically

Before checking, the respective rubber cushions and the top of the frame should be cleaned.

The dump body must be empty and lowered onto the frame and the tipping control in position 2 operating position (lowering/floating position). When adjusting, it is important that any clearance and compression becomes the same on both sides of the trailer unit frame.

The front cushions (A) should have the same clearance between cushion and frame, 8–12 mm (0.31–0.47 in).

The rear rubber cushions (B), positioned over the bogie, should fit up against the body and be compressed to the same extent on both sides.

Adjust with shims under the rear rubber cushions (B).

Use shims according to the Parts Catalogue for adjusting the rubber cushions and the sideways guides.

**IMPORTANT!** It is important that the area around and under the rubber cushions is kept clean. Dirt, which collects here, considerably increases the risk of damage to the machine, primarily to the frame.

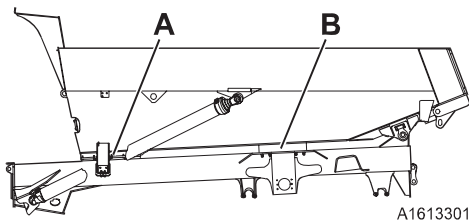
### Adjusting washers, checking and adjusting dump body sideways

At the rear attachment of the dump body, the tipping joint, a 1 mm (0.04 in) clearance is permissible at each tipping joint bearing. Adjust with adjusting washers (A).

For adjusting the axial clearance of the tipping joint, use adjusting washers.

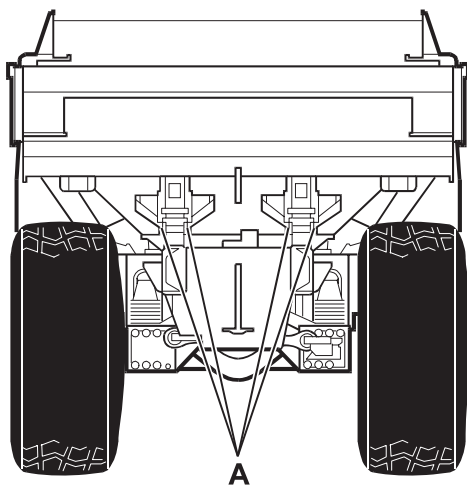
At the front side guide of the dump body, a clearance of max. 1 mm (0.04 in) on either side is permissible. Adjust with shims.

After any adjustment, check that the end surface of the horizontal lock screws does not protrude outside the guide plate. Otherwise there is a risk of damage to the side guide or rear frame.



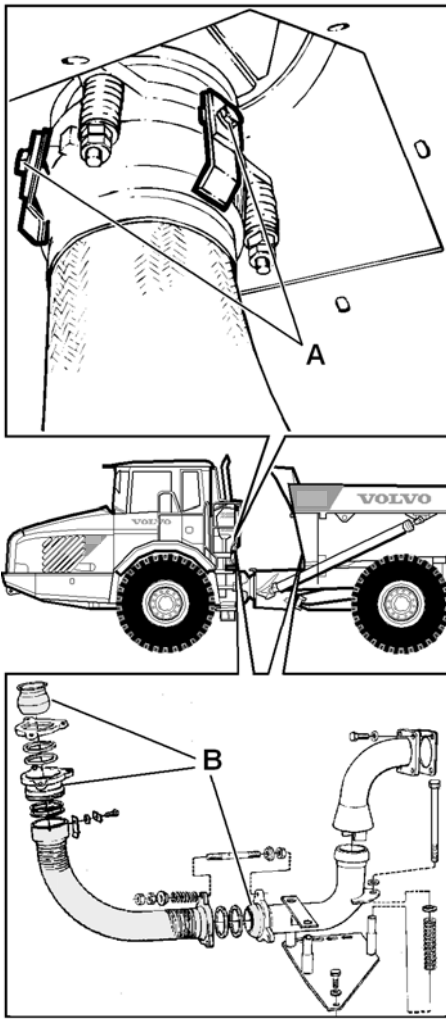
A1613301

- A Front rubber cushions
- B Rear rubber cushions



A1651000

- Dump body, rear attachment
- A Adjusting washers



A1611100

- A Bolts for lock plate  
B Surfaces to be cleaned and lubricated

### Exhaust heated dump body (optional equipment)

In order to prevent excavated material from freezing to the body, the machine can be equipped with a flexible tube between the tractor unit and the dump body, so that exhaust gases from the engine can be used for warming up the dump body. The flexible tube is provided with an over-load protection (A).

#### If the tube works loose:

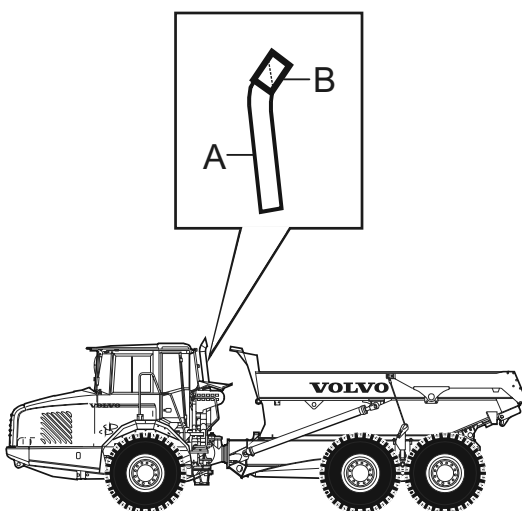
- 1 Slacken the bolts for locking tabs (A).
- 2 Reposition the tube.
- 3 Tighten the bolts.

### Maintenance of exhaust flexible tube

Clean and lubricate the marked parts (B) every 1000 hours to make sure the function is operational in case the trailer unit might overturn.

Lubricate the surfaces with some lubricant.

**NOTE!** It is important that the lubricant is allowed to dry properly (for at least 20 minutes) before the exhaust-pipe and the flexible exhaust tube are joined together.



1006476

- A Exhaust pipe  
B Pipe end with restriction

It is important that the engine has the correct back pressure in the exhaust system.

The exhaust pipe (A) must be left in place and provided with a pipe end (B), which is provided with a restriction.

## General inspection of machine

All earthmoving machines are to a great extent exposed to strains and wear. Therefore it is essential that they are checked and investigated regularly regarding structural damage and that all systems are functioning correctly.

It is important that regular inspections are carried out to minimise the risk of accidents and break downs. The intervals between these inspections depend on factors such as the age of the machine, type of application, additional structures, loading, the condition of the transporting road and the kind of routine service that has been carried out on the machine. Haulers, which are working under particularly severe operating conditions, require more frequent inspections, but we recommend that these inspections are carried out for the first time at 6000 hours and then every 2000 hours up to and including 12000 hours and thereafter every 1000 hours.

**A workshop authorised by Volvo CE should preferably carry out the inspections.**

If the machine has been involved in a collision or any kind of accident, it must be taken out of operation immediately and carefully investigated, regardless of when the last inspection was carried out.

In order to be able to carry out a correct inspection, it is important that the hauler is thoroughly cleaned.

Early detection and repair of faults ensure continued function of the machine and improve its availability while at the same time the risk of accidents is reduced. The correct repair of frames and other supporting elements require knowledge of the materials, the design of the frame parts and the manufacturer's recommended repair technique. If the need of repairs arises it is recommended that you get in touch with your Volvo CE distributor, who is qualified to carry out the repairs that may be needed. We do not recommend that repairs are carried out by others than an authorised Volvo CE distributor.

The front and rear frames, the hitch and the dump body must be carefully inspected regarding crack formations and defects. This applies particularly to the welded construction elements.

**The areas, which are dealt with here are particularly important, but this does not mean that other parts may be disregarded. The entire structure must be carefully examined.**

## Lubrication and service chart

### Greasing bearings

Lubrication is an important part of preventive maintenance. The service life of bushings, bearings and bearings pins can be extended considerably, if the machine is lubricated in a correct way. A lubrication chart makes lubrication work easier and reduces the risk of forgetting greasing points.

#### Lubrication has two main purposes:

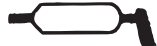
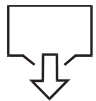
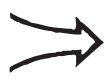
- To supply grease to the bearing to reduce wear between the pin and the bushing.
- To replace old, dirty grease. The grease stored inside the outer seal collects dirt and water, and prevents them from penetrating into the bearing.

Therefore grease the vehicle at the recommended intervals. Pump 2–3 strokes or until clean grease comes out and becomes visible by the bearing. Plain bearings should be greased until clean grease is forced out.

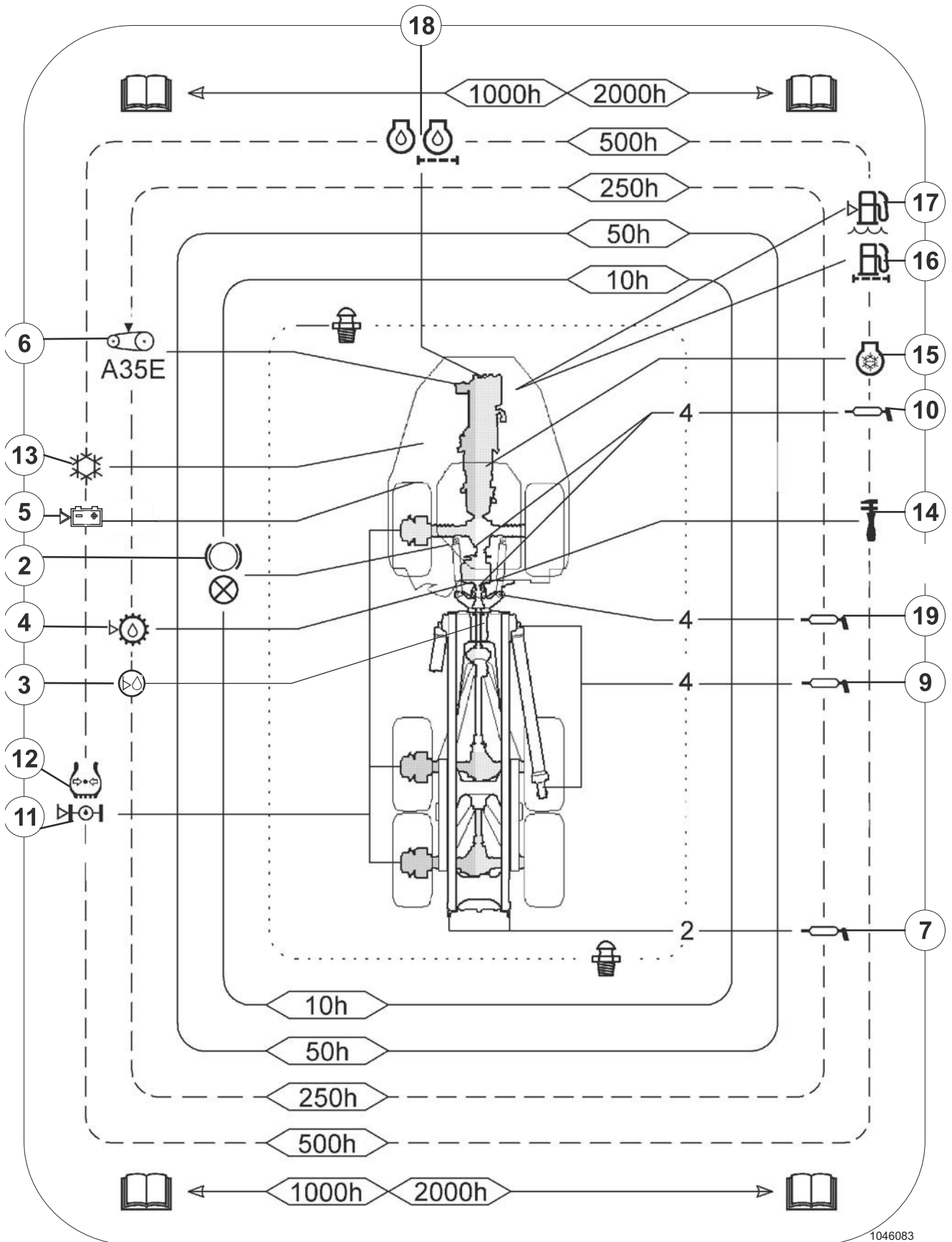
**Wipe off grease nipples and the grease gun before greasing to avoid introducing sand and dirt particles with the grease.**

### Symbol key for “Lubrication and service chart”

These standard symbols are used in the Lubrication and service chart, see the adjacent table.

|                                                                                     |                           |                                                                                     |              |                                                                                       |                                     |
|-------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|-------------------------------------|
|  | Lubrication point, grease |  | Pressure     |  | Maintenance/Engineer                |
|  | Lubrication point, oil    |  | Transmission |  | Tyres                               |
|  | Oil/liquid                |  | Filter       |  | Brake                               |
|  | Water                     |  | Control lamp |  | Hydraulic system                    |
|  | Fuel                      |  | Draining     |  | Engine                              |
|  | Anti-freeze               |  | Level check  |  | Differential and hub reduction gear |
|  | Air                       |  | Belt tension |  | Battery                             |

10 hour, 50 hour, 250 hour, and 500 hour service



| Measure                                                                                                      | Page | Item |
|--------------------------------------------------------------------------------------------------------------|------|------|
| <b>DAILY (every 10 hours)</b>                                                                                |      |      |
| Check the brake function                                                                                     |      | 2    |
| Check function of control lamps, operating controls, travel and working lights, and that there are no leaks. |      | 2    |
| Lubricate frame joint*                                                                                       | 136  |      |

| Measure                                                                                                   | Page | Item |
|-----------------------------------------------------------------------------------------------------------|------|------|
| <b>EVERY 50 HOURS</b><br><b>After carrying out Daily service</b>                                          |      |      |
| Check the oil in oil bath air cleaner (optional equipment)                                                | 114  |      |
| <b>Warranty inspection should be carried out after the first 100 hours according to Service Programme</b> |      |      |

| Measure                                                                        | Page        | Item |
|--------------------------------------------------------------------------------|-------------|------|
| <b>EVERY 250 HOURS</b><br><b>After carrying out Daily and 50 hour services</b> |             |      |
| Check oil level, frame joint bearing**                                         | 137         | 3    |
| Check for leaks from dropbox (visual check)                                    | 133         | 4    |
| Check oil level, brake cooling oil                                             | 141         |      |
| Check belt tension, alternator and AC compressor (optional equipment)***       | 125 and 148 | 6    |
| Lubricate steering joints and steering cylinder rear bearings                  |             | 10   |
| Lubricate tipping joint bearings                                               |             | 7    |
| Lubricate tipping cylinder bearing                                             |             | 9    |
| Grease propeller shafts, dropbox                                               |             | 19   |

| Measure                                                                             | Page | Item |
|-------------------------------------------------------------------------------------|------|------|
| <b>EVERY 500 HOURS</b><br><b>After carrying out Daily, 50 and 250 hour services</b> |      |      |
| Check brake discs, wear.                                                            | 140  | 11   |
| Check air pressure and wear, tyres                                                  | 143  | 12   |
| Check condenser                                                                     | 148  | 13   |
| Check steering joint bearings                                                       |      | 14   |
| Check anti-freeze, coolant                                                          | 118  | 15   |
| Check electrolyte level, battery                                                    | 122  | 5    |
| Change fuel filter****                                                              | 107  | 16   |
| Change filter, water trap****                                                       | 107  | 17   |
| Change oil and oil filter, engine*****                                              | 105  | 18   |
| Grease propeller shaft, dropbox – front axle                                        |      | 10   |

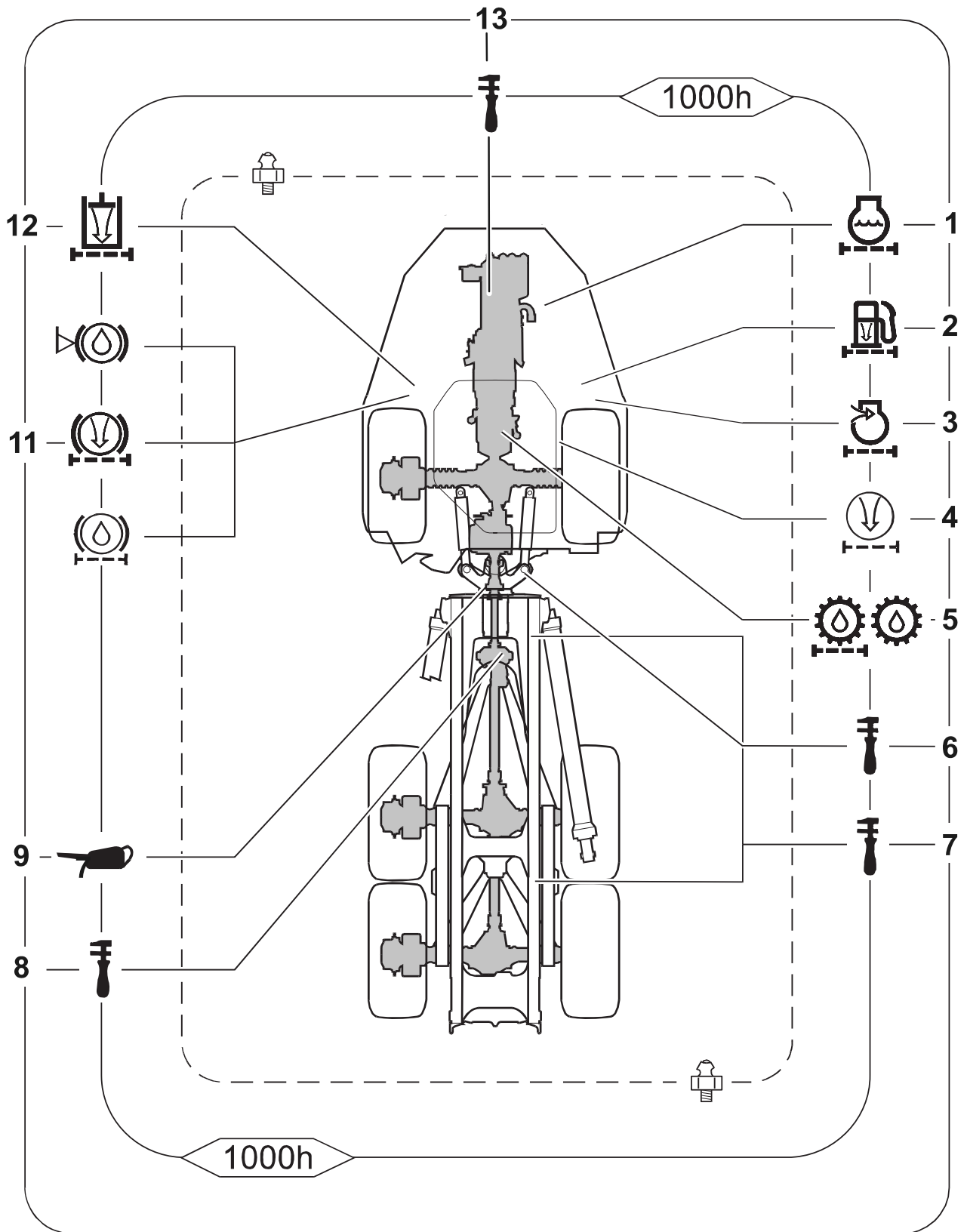
\*) Manual greasing

\*\*) Oil lubrication

\*\*\*) Check for the first time at 250 hours and then every 2000 hours.

\*\*\*\*) Or when changing the engine's oil filter. If the filter becomes clogged earlier, it must be replaced.

\*\*\*\*\*) For conditions for the interval of 500 hours to apply, see page 103.





| Measure                                                                                                    | Page | Item |
|------------------------------------------------------------------------------------------------------------|------|------|
| <b>Warranty inspection should be carried out after the first 1000 hours according to Service Programme</b> |      |      |
| <b>EVERY 1000 HOURS</b>                                                                                    |      |      |
| <b>After carrying out Daily, 50, 250 and 500 hour services</b>                                             |      |      |
| Check play in bearings and pivot pins, steering cylinder attachment.<br>Contact authorised workshop.       |      | 6    |
| Check rubber cushions, dump body                                                                           | 152  | 7    |
| Check brake linings, parking brake                                                                         | 138  | 8    |
| Check rubber bearings on the FS-cylinders*                                                                 | 135  |      |
| Replace breather filter, fuel tank                                                                         | 110  | 2    |
| Change or clean primary filter in air cleaner                                                              | 112  | 3    |
| Replace prefilter, cab                                                                                     | 144  | 4    |
| Change oil and replace filters, transmission (main oil filter and lubricating oil filter)                  | 130  | 5    |
| Replace return oil filter, brake cooling system                                                            | 141  | 11   |
| Replace breather filter, brake cooling oil tank                                                            | 141  | 11   |
| Replace breather filter, hydraulic tank                                                                    | 150  | 12   |
| Lubricate ball joints, exhaust flexible tube for body heating                                              | 153  | 9    |
| Clean cover, air cleaner                                                                                   | 113  | 3    |
| Clean ball joints, exhaust flexible tube for body heating                                                  | 153  | 9    |
| Clean magnetic rod, brake cooling system**                                                                 | 141  | 11   |

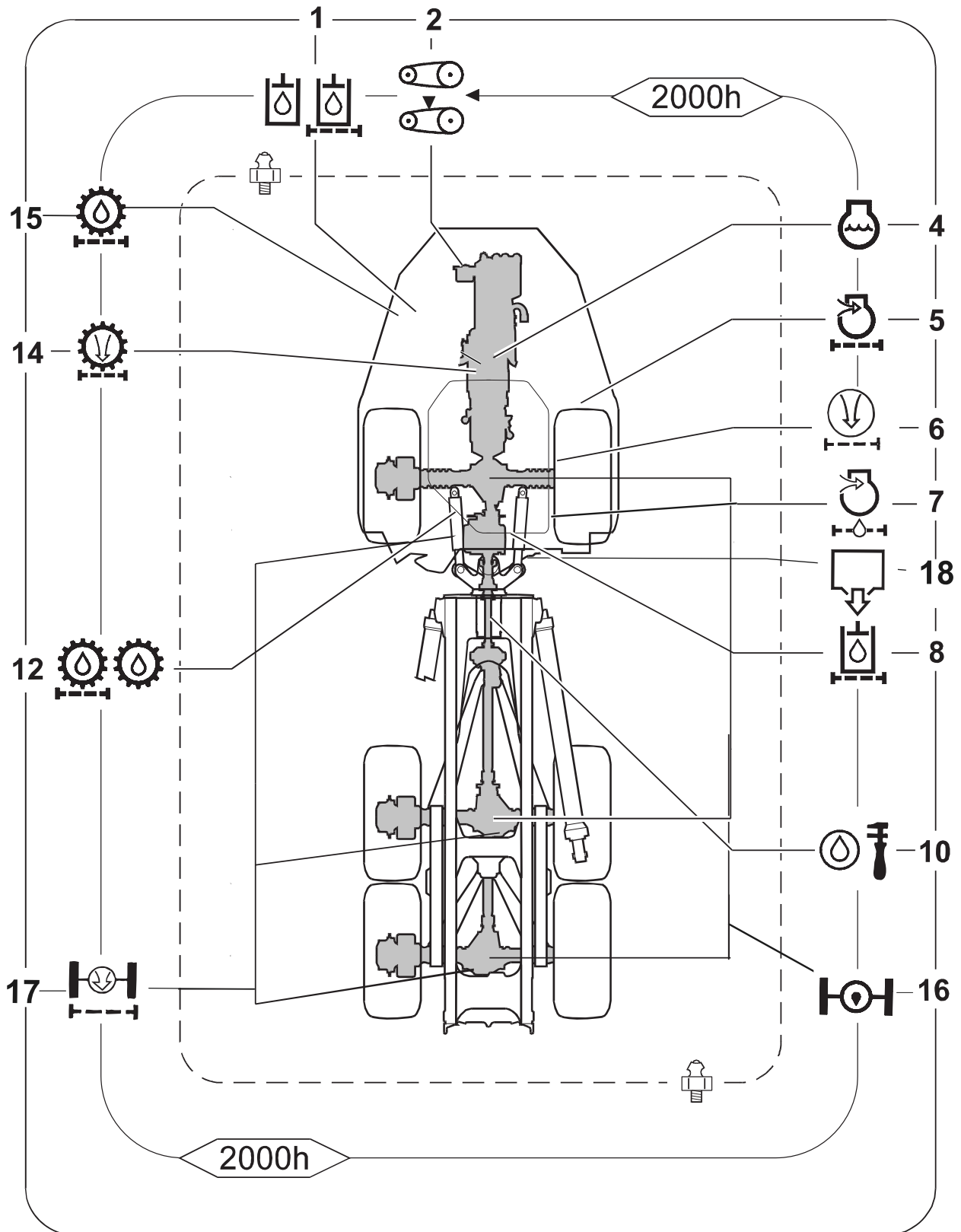
\*) For the first time at 4000 hours and then every 1000 hours.

\*\*) Included in warranty service. Contact workshop authorised by Volvo CE.

## 160 Lubrication and service chart

### Checks, oil changes and lubrication

Intervals: every 2000 hours (for symbol key, see page 155)



| Measure                                                                                         | Page     | Item |
|-------------------------------------------------------------------------------------------------|----------|------|
| <b>EVERY 2000 HOURS</b><br><b>After carrying out Daily, 50, 250, 500 and 1000 hour services</b> |          |      |
| Check belt tension, water pump                                                                  | 121      | 2    |
| Check frame joint bearing                                                                       | 136, 137 | 10   |
| Change oil, frame joint bearing*****                                                            | 137      | 10   |
| Change breather filter, frame joint bearing*****                                                | 137      | 10   |
| Check steering joint bearings*                                                                  |          |      |
| Change oil, hydraulic / brake systems**                                                         | 149      | 1    |
| Replace return oil filter, hydraulic / brake systems                                            | 150      | 1    |
| Change brake cooling oil                                                                        | 141      |      |
| Change coolant***                                                                               | 119      | 4    |
| Replace secondary filter                                                                        | 113      | 5    |
| Replace main filter, cab                                                                        | 144      | 6    |
| Replace filter insert, oil bath air cleaner (optional equipment)                                | 114      | 7    |
| Replace return oil filter, cooling fan                                                          | 151      | 8    |
| Replace pressure-oil filter, hydraulic / brake systems.                                         | 139      | 8    |
| Change oil, dropbox                                                                             | 133      | 12   |
| Replace breather filter, dropbox                                                                | 133      | 12   |
| Replace breather filter, transmission                                                           | 132      | 14   |
| Change oil, drive axles                                                                         | 134      | 16   |
| Replace breather filter, drive axles                                                            | 135      | 17   |
| Replace drier cartridge, compressed-air system                                                  | 142      | 18   |
| Lubricate covers, hinge, joints and locks                                                       |          |      |
| Clean magnetic rods, hydraulic system                                                           | 150      | 1    |
| Clean suction strainer, power take-off                                                          | 132      | 15   |
| Adjust clearance, frame joint****                                                               |          | 10   |

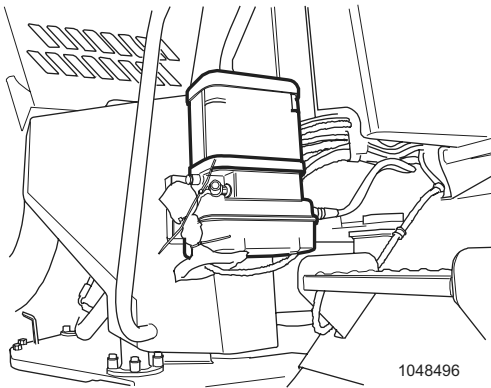
\*) Check every 6000 hours. Checking should be carried out by workshop authorised by Volvo CE.

\*\*) Change oil every 4000 hours if the system is filled with hydraulic oil or Volvo Biodegradable Hydraulic Oil.  
Change oil every 2000 hours, if the system is filled with any other biologically degradable hydraulic oil.

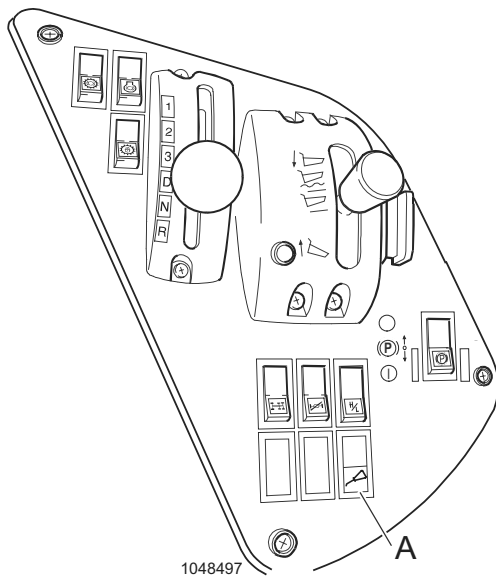
\*\*\*) Change coolant every 6000 hours.

\*\*\*\*) Contact workshop authorised by Volvo CE.

\*\*\*\*\*) Oil lubrication.



Reservoir for lubricant



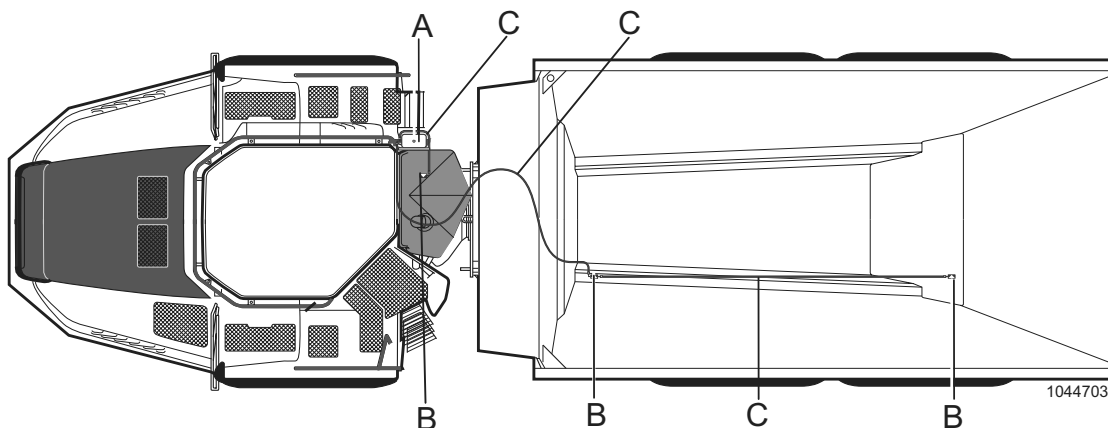
A Control light for lubrication in progress

## Central lubrication

The machine can be equipped with a central lubrication system that automatically greases a number of points according to a pre-selected lubrication cycle. The lubrication system shall be inspected at regular intervals and should be coordinated with other maintenance and checking.

### Check the following at regular intervals:

- that there is enough lubricant in the reservoir. Fill as needed, see below.  
**NOTE! Too low level of lubricant results in high risk of air getting in to the system (most common cause of malfunction).**
- that the system works. Perform the system test on page 165.
- that the lubricant reservoir is not damaged.
- that the connections seal tight.
- that the quick-couplings' dust caps are installed and not damaged.
- that the grease lines are not damaged and well fastened.
- that the greasing point is greased (that lubricant is forced out at the bearing).



|   |              |
|---|--------------|
| A | Reservoir    |
| B | Dosage block |
| C | Main line    |

### Filling lubricant

Lubricant shall be filled before the level is below the min. marking on the reservoir.

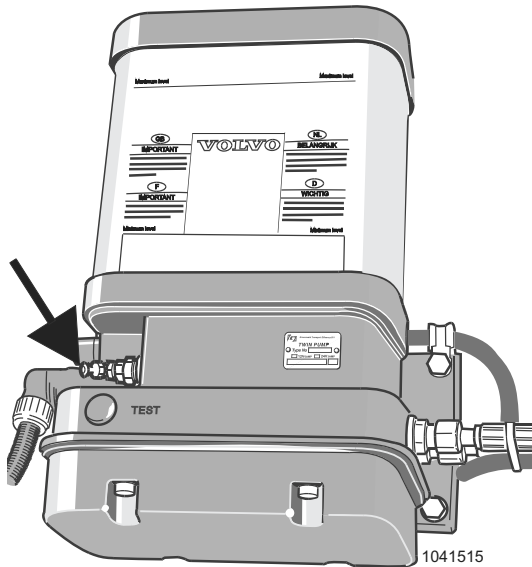
There is a filling connection (grease nipple) on the pump, to which a hand pump or industrial pump can be connected for filling.

**NOTE!** If an industrial pump is used, clean the filter between the connection and pump at regular intervals. A partially clogged filter cracks easily, resulting in high risk that small particles get in to the lubrication system. In turn, this may lead to till malfunctions in the lubrication system.

**Proceed as follows:**

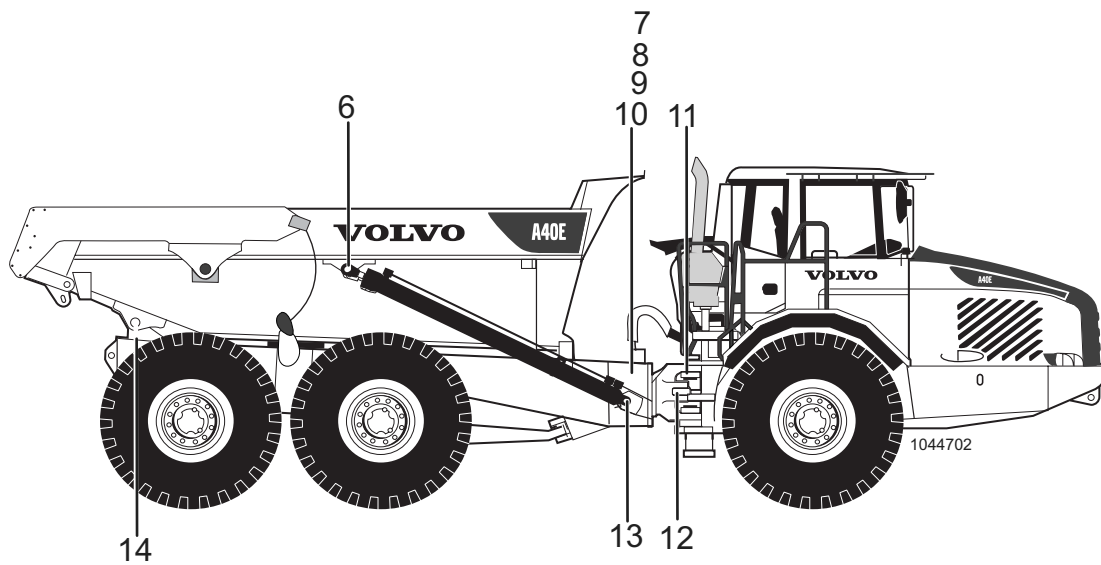
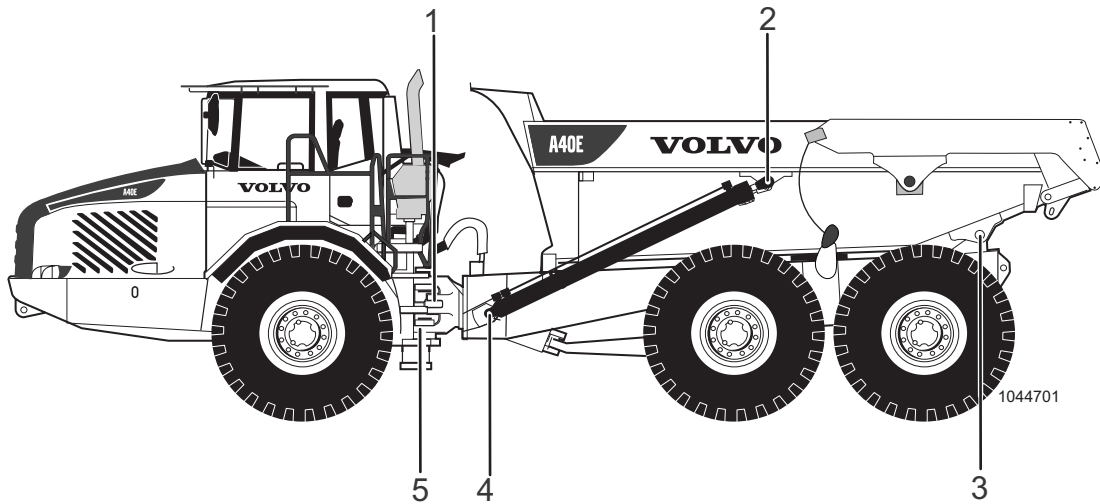
- 1 Clean thoroughly on the filling connection and the coupling on the filler hose.
- 2 Fill the filler hose with grease before starting to fill. This prevents air from getting in to the system.
- 3 Remove the protective cap on the filling connection and connect the coupling on the filling connection.
- 4 Fill lubricant to the max. level on the reservoir.\*) If it is difficult to pump in lubricant, either the filter behind the filling connection may be clogged or there may be dirt in the nipple itself. Clean the filter, change the nipple if needed, and try again.
- 5 Reinstall the protective cap.
- 6 Store the grease pump in a dust-free space, so that it is not exposed to dirt.

\*) If the reservoir is filled above max. level, the excess lubricant is drained through the breather hole on the left side of the reservoir. Air under the plate in the reservoir is also drained through the breather hole.



Filling connection

## Grease points



|   |                      |      |                                                      |
|---|----------------------|------|------------------------------------------------------|
| 1 | Steering cylinder    | 7-10 | Frame joint bearing (between hitch and trailer unit) |
| 2 | Upper hoist cylinder | 11   | Steering joint                                       |
| 3 | Dump joint           | 12   | Steering cylinder                                    |
| 4 | Lower hoist cylinder | 13   | Lower hoist cylinder                                 |
| 5 | Steering joint       | 14   | Dump joint                                           |
| 6 | Upper hoist cylinder |      |                                                      |

### Lubricant recommendation

The system requires that the lubricant is clean and can be pumped at the ambient temperature. Therefore, use lubricants of recommended NLGI grease class. Lower grease grade may result in reduced lubrication performance and increased wear.

- Do not mix different types of lubricant. Change all lubricant, not only in the reservoir.
- No graphite or Teflon additives are permitted in the lubricant.
- Use of molybdenum disulphide ( $\text{MoS}_2$ ) is only allowed if:
  - the lubricant is of very high quality and does not contain more than 5%  $\text{MoS}_2$ .
  - the lubrication system is checked at regular intervals for reliable function.
  - the main lines are flushed at least once a year.

| Lubricant recommendation |                     |                      |
|--------------------------|---------------------|----------------------|
| Lowest temperature       | Highest temperature | Lubricant type, NLGI |
| Above -25 °C (-13 °F)    | +80 °C (176 °F)     | 2                    |
| Below -25 °C (-13 °F)    | 0 °C (32 °F)        | 0 / 1                |
| Below -25 °C (-13 °F)    | +80 °C (176 °F)     | Synthetic 2          |
| Below -25 °C (-13 °F)    | 0 °C (32 °F)        | Synthetic 0 / 1      |

**NOTE! Special tools are needed to troubleshoot, adjust, and repair the control unit. Therefore, contact qualified service personnel when needed.**

### System test

A system test can be performed to check the lubrication system's function or to get extra lubrication, e.g., after washing. The test button used to start a system test is located on the front of the pump.

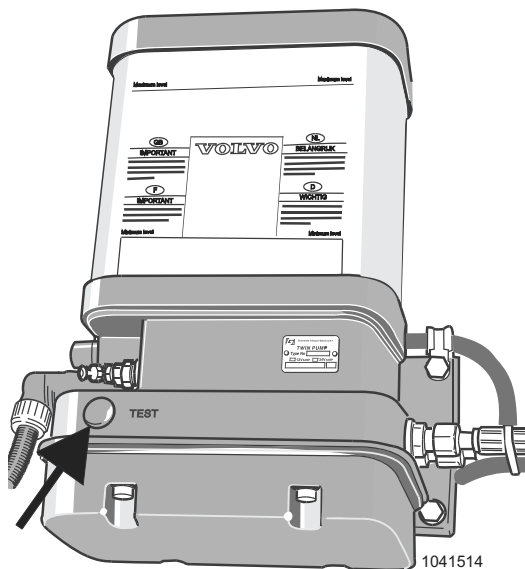
A test cycle can only be run when the pump is between two normal lubrication cycles (not when lubrication cycle is in progress).

#### Single lubrication test cycle

The pump only runs **one lubrication cycle** via **one** main line. **Can be used after washing to get extra lubrication.**

- 1 Turn the ignition key to position 1 (operating position).
- 2 Press in the test button for 2–6 seconds.
- 3 The lubrication cycle starts.
- 4 The test cycle finishes automatically.

**If the lubrication test cycle has been used to get extra lubrication after washing, the test button should be pressed in one more time to lubricate the other main line.**



Test button

**Continuous lubrication test cycle**

The pump runs an **unlimited number of lubrication cycles**, that is, continuously pumps lubricant, alternating between **both** main lines. **Used when bleeding air from the system.**

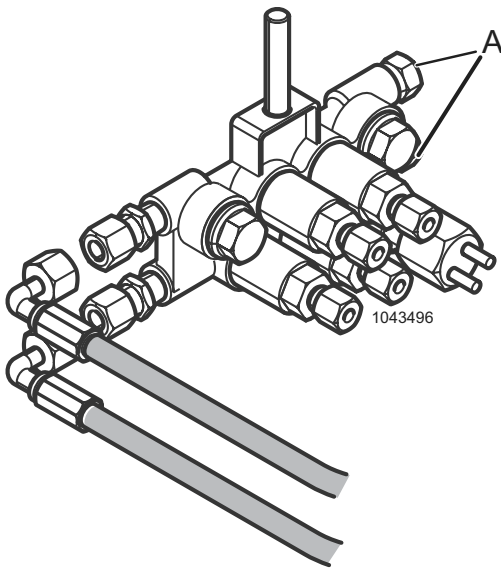
- 1 Turn the ignition key to position 1 (operating position).
- 2 Press in the test button for longer than 6 seconds.
- 3 The lubrication cycle starts.
- 4 End the test cycle by turning the start key to position 0.

**The test cycle does not end automatically.**

**Bleeding air from the system**

**The pump may not be activated for longer than five minutes.**

- 1 Make sure that the lubricant reservoir is filled to the max. marking.
- 2 Remove the plugs for the main lines (A), one at a time, in the dosage block that is farthest from the pump unit.
- 3 Turn the ignition key to position 1 (operating position).
- 4 Press the test button for more than 6 seconds, which corresponds to a continuous test cycle.
- 5 When lubricant free from air comes out of the main line, air bleeding is done for that main line.
- 6 Turn the start key to 0-position and install the plug.
- 7 Follow points 2–6 to bleed air from the other main line.
- 8 Test the system with the method “Single lubrication test cycle”, see previous page.

**Cleaning with high-pressure washer**

Normally, water cannot get in to the system. However, the risk is higher when using a high-pressure washer. The pump unit should be protected since water that gets in to the system cannot get out by itself, instead it may cause malfunctions. After high-pressure washing, run a “Single lubrication test cycle” to get extra lubrication.



# Specifications

## Recommended lubricants

The viscosity indications are according to SAE J 300 MAR93.

Other mineral oils can be used if they conform to our viscosity recommendations and meet our quality requirements.

The approval of Volvo CE is required, if any other oil base quality (e.g. biologically degradable oil) is to be used.

Regarding questions about oils and lubricants please contact a workshop authorised by Volvo CE.

In case of lower ambient temperatures than in this recommendation, please contact a workshop authorised by Volvo CE for information.

|                                                  | Oil grade                                                                                                                                      | Recommended viscosity at varying ambient temperatures                                                                                        |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ENGINE</b>                                    | <b>Volvo Ultra Diesel Engine Oil</b><br>or<br>Engine oil<br>VDS-3 or<br>ACEA-E7 + VDS-2 or<br>API CI-4 + VDS-2 or<br>EO-N Premium plus + VDS-2 | °C -30 -20 -10 0 +10 +20 +30 +40 +50<br>°F -22 -4 +14 +32 +50 +68 +86 +104 +122<br>SAE 5W/30<br>SAE 10W/30<br>SAE 15W/40<br>SAE 30<br>SAE 40 |
|                                                  |                                                                                                                                                | 1020035                                                                                                                                      |
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|                                                  |                                                                                                                                                |                                                                                                                                              |
| <b>AXLES</b>                                     | <b>Volvo Super Gear oil</b><br>Volvo Transmission oil 97316<br>GO101, 75W-90                                                                   | °C -30 -20 -10 0 +10 +20 +30 +40 +50<br>°F -22 -4 +14 +32 +50 +68 +86 +104 +122<br>GO101                                                     |
|                                                  |                                                                                                                                                | 1015380                                                                                                                                      |
|                                                  |                                                                                                                                                |                                                                                                                                              |
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|                                                  |                                                                                                                                                |                                                                                                                                              |
| <b>FRAME JOINT</b>                               | Lubricating with grease<br><b>Grease</b><br>See page 169<br><br>Lubricating with oil<br><b>Volvo Transmission Oil</b><br>SAE 80W-90            | °C -30 -20 -10 0 +10 +20 +30 +40 +50<br>°F -22 -4 +14 +32 +50 +68 +86 +104 +122<br>SAE 80W-90                                                |
|                                                  |                                                                                                                                                | 1012444                                                                                                                                      |
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| <b>DROPBOX</b>                                   | <b>Volvo Super Gear oil</b><br>Volvo Transmission oil 97316<br>GO101, 75W-90                                                                   | °C -30 -20 -10 0 +10 +20 +30 +40 +50<br>°F -22 -4 +14 +32 +50 +68 +86 +104 +122<br>GO101                                                     |
|                                                  |                                                                                                                                                | 1015380                                                                                                                                      |
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| <b>BRAKE COOLING,<br/>HUB REDUCTION<br/>GEAR</b> | <b>Volvo Super Wet Brake<br/>Transaxle Oil</b><br><br>Volvo Transmission oil 97304<br>WB 102                                                   | °C -30 -20 -10 0 +10 +20 +30 +40 +50<br>°F -22 -4 +14 +32 +50 +68 +86 +104 +122<br>WB 102                                                    |
|                                                  |                                                                                                                                                | 1012448                                                                                                                                      |
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|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------|-----|-----|-----|-----|-----|-----|------|------|--|
| TRANSMISSION     | <b>Volvo Automatic Transmission Fluid</b><br>Volvo Transmission Oil 97341                                                                                                                                                                                                                                                                                        | °C      | -30                          | -20 | -10 | 0   | +10 | +20 | +30 | +40  | +50  |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  | °F      | -22                          | -4  | +14 | +32 | +50 | +68 | +86 | +104 | +122 |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         |                              |     |     |     |     |     |     |      |      |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         | Volvo Transmission Oil 97341 |     |     |     |     |     |     |      |      |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         |                              |     |     |     |     |     |     |      |      |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  | 1015381 |                              |     |     |     |     |     |     |      |      |  |
| HYDRAULIC SYSTEM | <b>Volvo Super Hydraulic Oil</b><br><br>Swedish norm SS 15 54 34<br><br>alternatively<br><br>international norm<br>Vickers 35 VQ/25 test<br>viscosity acc. to ISO 3448<br>grade acc. to ISO 6743-4<br><br><b>NOTE!</b> As an alternative, <b>Volvo biodegradable hydraulic oil</b> is also available. Contact your local Volvo service workshop for information. | °C      | -30                          | -20 | -10 | 0   | +10 | +20 | +30 | +40  | +50  |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  | °F      | -22                          | -4  | +14 | +32 | +50 | +68 | +86 | +104 | +122 |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         |                              |     |     |     |     |     |     |      |      |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         | V46/AV 46                    |     |     |     |     |     |     |      |      |  |
|                  |                                                                                                                                                                                                                                                                                                                                                                  |         | V68/AV 68                    |     |     |     |     |     |     |      |      |  |
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## Engine oil

| Oil grade                     | Sulphur content of the fuel |           |           |
|-------------------------------|-----------------------------|-----------|-----------|
|                               | < 0.3 %                     | 0.3–0.5 % | > 0.5 %   |
|                               | Oil change interval         |           |           |
| Volvo Ultra Diesel Engine oil | 500 hours                   | 250 hours | 125 hours |
| VDS-3                         |                             |           |           |
| VDS-2 plus ACEA-E7            |                             |           |           |
| VDS-2 plus API CI-4           |                             |           |           |
| VDS-2 plus EO-N Premium plus  | 250 hours                   | 125 hours | 75 hours  |
| VDS-2                         |                             |           |           |
| VDS plus ACEA-E3              | 125 hours                   | 75 hours  | 50 hours  |
| ACEA: E7, E5, E4              |                             |           |           |
| API: CI-4, CH-4, CG-4         |                             |           |           |

## Grease

Grease on a lithium base together with EP additives and consistency No. NLGI- 2 without molybdenum disulphide additive ( $\text{MoS}_2$ ).

## Coolant

Use the same coolant as the system was filled with previously. To avoid damage to the engine, different kinds of coolant must not be mixed with each other.

When using concentrated coolant 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 | Content 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 $\text{SiO}_2$ /litre |
| Iron                            | < 0.10 mg Fe/litre            |
| Manganese                       | < 0.05 mg Mn/litre            |
| Electrical conductivity         | < 500 $\mu\text{S/cm}$        |
| Organic content, COD-Mn         | < 15 mg/litre                 |

If there is doubt as to the quality of the water, use ready-mixed coolant. To avoid damage to the engine, different kinds of ready-mixed coolant must not be mixed with each other.

## 170 Recommended lubricants

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### Fuel system

**Quality requirements:** The fuel should at least meet the current legal requirements, national and international standards for marketed fuels, e.g. EN590 (with nationally adapted temperature requirements), ASTM D 975 No. 1-D and 2-D, JIS KK 2204.

**Sulphur content:** According to current legal requirements (the sulphur content must however not exceed 0.3 percent by weight), see also page 103.

Bio-diesel fuel

Vegetable oils and / or esters, also called "bio-diesel", (e.g. rape-seed methyl ester RME fuel), which are offered on certain markets both as pure products and as mixed into the diesel fuel.

Volvo CE accepts a maximum intermix of 5% bio-diesel fuel in the diesel fuel, ready mixed from the oil companies.

A higher intermix than 5% of bio-diesel fuel may cause:

- Increased emission by nitrogen oxide, (thereby not meeting legal requirements)
- Shorter service life of engine and injection system
- Increased fuel consumption
- Altered engine output
- Shortening the engine oil change interval to a half
- Shortened service life of rubber materials in the fuel system
- Less good cold handling properties of the fuel
- Limit storage time for the fuel, which may cause clogging up of the fuel system if the machine is laid up for longer periods

### Warranty condition

The warranty does not cover damage caused by an intermix of more than 5% of bio-diesel fuel.

## Capacities and intervals between changes

| Capacities                                           | When changing            |
|------------------------------------------------------|--------------------------|
| Engine incl. filter, A35E/A35E FS                    | 49 litres (12.9 US gal)  |
| Engine incl. filter, A40E/A40E FS                    | 54 litres (14.3 US gal)  |
| Cooling system                                       | 90 litres (23.8 US gal)  |
| Transmission incl. filter and cooler                 | 34 litres (9.0 US gal)   |
| Dropbox                                              | 8.5 litres (2.2 US gal)  |
| Front axle                                           | 26 litres (6.9 US gal)   |
| Front the bogie axle                                 | 28 litres (7.4 US gal)   |
| Rear bogie axle                                      | 26 litres (6.9 US gal)   |
| Frame joint bearing (between hitch and trailer unit) | 3 litres (0.8 US gal)    |
| Hydraulic system A35E/A40E                           | 245 litres (64.7 US gal) |
| Hydraulic system A35E FS/A40E FS                     | 275 litres (72.6 US gal) |
| Brake cooling oil                                    | 210 litres (55.4 US gal) |
| Oil bath air cleaner (optional equipment)            | 9 litres (2.4 US gal)    |

|                         | Total                     |
|-------------------------|---------------------------|
| Fuel tank, A35E/A35E FS | 480 litres (127 US gal)   |
| Fuel tank, A40E/A40E FS | 545 litres (143.9 US gal) |

## Oil and fluid changes

|                                           | Hours    | Page |
|-------------------------------------------|----------|------|
| Engine                                    | 500*     | 103  |
| Oil bath air cleaner (optional equipment) | 250      | 114  |
| Coolant                                   | 6000**   | 117  |
| Transmission                              | 1000***  | 130  |
| Dropbox                                   | 2000     | 133  |
| Drive axles                               | 2000     | 134  |
| Frame joint                               | 2000     | 137  |
| Brake cooling oil                         | 2000     | 141  |
| Brake/Hydraulic oil                       | 4000**** | 149  |

\*) For conditions which have to be met, if the interval is to apply, see page 103.

\*\*) Change coolant every 6000 hours or every fourth year.

\*\*\*) For conditions which have to be met, if the interval is to apply, see page 130.

\*\*\*\*) For conditions which have to be met, if the interval is to apply, see page 149.

# 172 Capacities and intervals between changes

## Filter replacements

### Engine

|                               | Hours | Page |
|-------------------------------|-------|------|
| Oil filters                   | 500   | 105  |
| Secondary fuel filter         | 500*  | 107  |
| Primary fuel filter           | 500*  | 107  |
| Primary filter, air cleaner*  | 1000  | 112  |
| Secondary filter, air cleaner | 2000  | 113  |
| Breather filter, fuel tank    | 1000  | 110  |

\*) If the filter gets clogged earlier, it must be changed. EON-filter can be installed instead of the standard primary filter and should be changed when the control light comes on, see page 114.

### Transmission

|                        |      |     |
|------------------------|------|-----|
| Main oil filter        | 1000 | 131 |
| Lubricating oil filter | 1000 | 131 |
| Breather filter        | 2000 | 132 |

### Dropbox

|                 |      |     |
|-----------------|------|-----|
| Breather filter | 2000 | 133 |
|-----------------|------|-----|

### Drive axles

|                 |      |     |
|-----------------|------|-----|
| Breather filter | 2000 | 135 |
|-----------------|------|-----|

### Brake system

|                                         |      |     |
|-----------------------------------------|------|-----|
| Pressure-oil filter                     | 2000 | 139 |
| Breather filter, brake cooling oil tank | 1000 | 141 |
| Oil filter, brake cooling oil tank      | 1000 | 141 |

### Compressed-air system

|                 |      |     |
|-----------------|------|-----|
| Drier cartridge | 2000 | 142 |
|-----------------|------|-----|

### Cab

|                |      |     |
|----------------|------|-----|
| Pre filter     | 1000 | 144 |
| Primary filter | 2000 | 144 |

### Hydraulic system

|                                     |      |     |
|-------------------------------------|------|-----|
| Breather filter, hydraulic oil tank | 1000 | 150 |
| Return oil filters                  | 2000 | 150 |
| Return oil filter, cooling fan      | 2000 | 151 |

## Engine, specifications

|                                                                                       | A35E/A35E FS                                                                                                         | A40E/A40E FS                                                                                                           |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Designation                                                                           | D12D                                                                                                                 | D16E                                                                                                                   |
| Flywheel output at 30 r/s (1800 rpm)<br>SAE J1995 Gross<br>SAE J 1349 Net<br>DIN 6271 | 313 kW (426 hp)<br>309 kW (420 hp)<br>309 kW (420 hp)*                                                               | 350 kW (476 hp)<br>346 kW (471 hp)<br>346 kW (471 hp)***                                                               |
| Torque at 20 r/s (1200 rpm)<br>SAE J1995 Gross<br>SAE J 1349 Net<br>DIN 6271          | **<br>2100 N m (214 kgf m) (1549 lbf ft)<br>2056 N m (210 kgf m) (1517 lbf ft)<br>2056 N m (210 kgf m) (1517 lbf ft) | ****<br>2525 N m (258 kgf m) (1862 lbf ft)<br>2493 N m (254 kgf m) (1839 lbf ft)<br>2493 N m (254 kgf m) (1839 lbf ft) |

\*) with the cooling fan running at basic speed. With the fan at maximum speed the output is 301 kW (409 hp) which coincides with DIN 70020.

\*\*) with the cooling fan running at basic speed. With the fan at maximum speed the torque is 2010 N m (205 kgf m) (1483 lbf ft) which coincides with DIN 70020.

\*\*\*) with the cooling fan running at basic speed. With the fan at maximum speed the output is 331 kW (450 hp) which coincides with DIN 70020.

\*\*\*\*) with the cooling fan running at basic speed. With the fan at maximum speed the torque is 2374 N m (242 kgf m) (1751 lbf ft) which coincides with DIN 70020.

|                                                     |                                          |                                          |
|-----------------------------------------------------|------------------------------------------|------------------------------------------|
| Number of cylinders                                 | 6                                        | 6                                        |
| Cylinder bore                                       | 130.17 mm (5.125 in)                     | 144 mm (5.669 in)                        |
| Stroke                                              | 150 mm (5.91 in)                         | 165 mm (6.496 in)                        |
| Cylinder capacity, total                            | 12 litres (732 in <sup>3</sup> )         | 16 litres (4.2 US gal)                   |
| Compression ratio                                   | 18.5:1                                   | 18.5:1                                   |
| Order of injection                                  | 1-5-3-6-2-4                              | 1-5-3-6-2-4                              |
| Idling speed, low                                   | 10 ±0.8 r/s (650 ±50 rpm)                | 10 ±0.8 r/s (650 ±50 rpm)                |
| Idling speed, high                                  | 35 r/s (2100 rpm)                        | 35 r/s (2100 rpm)                        |
| Valve clearance, cold engine<br>inlet<br>exhaust    | 0.20 mm (0.008 in)<br>1.60 mm (0.063 in) | 0.20 mm (0.008 in)<br>1.60 mm (0.063 in) |
| Oil pressure, min. Warm engine, low idle, 1200 rpm  | 365 kPa (52.9 psi)                       | 370 kPa (53.7 psi)                       |
| Oil pressure, max. Warm engine, high idle, 1800 rpm | 475 kPa (68.9 psi)                       | 440 kPa (63.8 psi)                       |

## Air cleaner

|            |                                                              |
|------------|--------------------------------------------------------------|
| Type       | Dry filter together with secondary filter                    |
| Pre filter | Cyclone cleaner<br>Oil bath air cleaner (optional equipment) |

**174 Fuel system, specifications**

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**Fuel system, specifications****Feed pump**

|                                |                         |
|--------------------------------|-------------------------|
| Type                           | Gear pump               |
| Make                           | Bosch                   |
| Feed pressure, at idling speed | 350–450 kPa (51–65 psi) |

**Cold-starting device**

|                                          |                    |
|------------------------------------------|--------------------|
| Type                                     | Electrical element |
| Power, electrical element                | 2 kW               |
| Time relay (integrated), engagement time | Variable           |

**Unit injectors**

|                                                                           |       |
|---------------------------------------------------------------------------|-------|
| Electronically controlled regarding injection amount and injection timing |       |
| Number of                                                                 | 6 pcs |



## Cooling system, specifications

### Cooling fan

|      |         |
|------|---------|
| Type | 8-blade |
|------|---------|

### Thermostat

|                   |                            |
|-------------------|----------------------------|
|                   |                            |
| Type              | Piston-type thermostat     |
| Number of         | 1                          |
| Begins to open at | 82 °C (180 °F)             |
| Fully open at     | 92 °C (198 °F)             |
| Pressure          | 50 kPa (0.5 bar) (7.3 psi) |

**176 Electrical system, specifications****Electrical system, specifications**

|                       | <b>A35E/A35E FS</b>            | <b>A40E/A40E FS</b>            |
|-----------------------|--------------------------------|--------------------------------|
| System voltage        | 24 V                           | 24 V                           |
| Batteries             | 2 pcs 12 V connected in series | 2 pcs 12 V connected in series |
| Battery voltage       | 12 V                           | 12 V                           |
| Battery capacity      | 170 Ah each                    | 225 Ah each                    |
| Chassis connection    | Negative terminal              | Negative terminal              |
| Alternator, output    | 1540 W                         | 1540 W                         |
| Current, max.         | 80 A                           | 80 A                           |
| Starter motor, output | 7.5 kW (10.2 hp)               | 7.5 kW (10.2 hp)               |

**Battery electrolyte density**

|                                  |                         |
|----------------------------------|-------------------------|
| Fully charged battery            | 1.28 kg/dm <sup>3</sup> |
| The battery should be charged at | 1.25 kg/dm <sup>3</sup> |

**Bulbs**

The light bulbs must be of the highest quality; shake-proof and with long service life.

**Tractor unit**

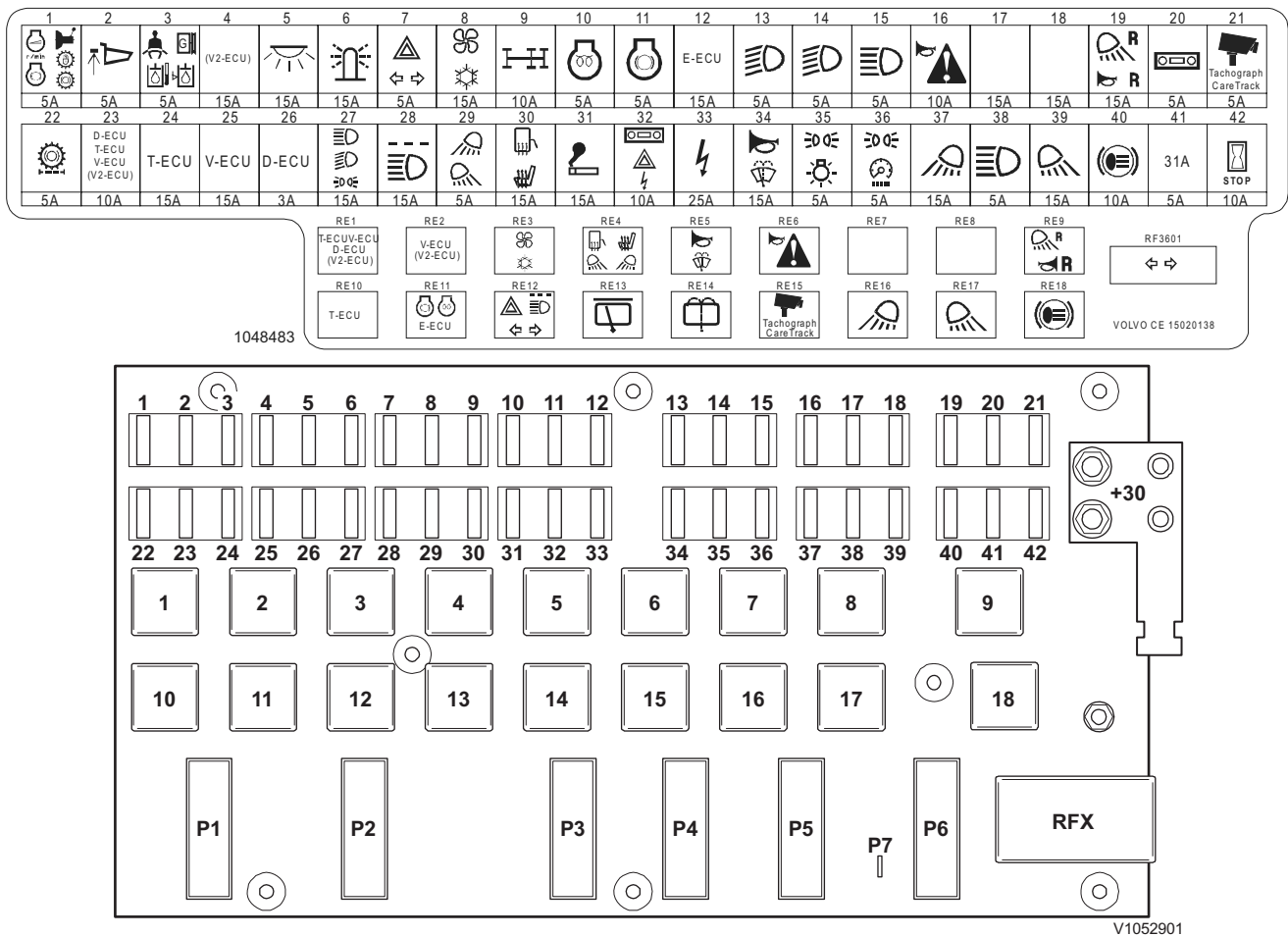
|                                              | <b>Watt</b> | <b>Socket</b>                      |
|----------------------------------------------|-------------|------------------------------------|
| Headlamps                                    | 70 W        | H7                                 |
| Parking lights                               | 5 W         | Ba 15s                             |
| Direction indicators                         | 21 W        | Ba 15s                             |
| Working lights (optional equipment)          | 70          | H3                                 |
| Instrument lighting                          | 1.2 W       | Glass socket and integrated holder |
| Switch                                       | 2 W         | Ba 9s                              |
| Main instrument, control lamps               | 1.2 W       | Glass socket and integrated holder |
| Main instrument, lighting                    | 1.2 W       | Glass socket and integrated holder |
| Rotating warning beacon (optional equipment) | 70 W        | H1                                 |

**Trailer unit**

|                      |      |                                            |
|----------------------|------|--------------------------------------------|
| Tail lights          | 1 W  | LED                                        |
| Stop lights          | 7 W  | LED                                        |
| Direction indicators | 21 W | Ba 15s (The whole insert must be replaced) |
| Reversing lamp       | 70 W | H3                                         |

## Fuses

## Electrical distribution box



| Mark-<br>ing | Rated<br>current | Description                                                                                                                                                                                                                                                                                                                                                                               | Mark-<br>ing | Rated<br>current | Description                                               |
|--------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|-----------------------------------------------------------|
| 1            | 5 A              | Switch exhaust brake, engine brake, switch brake pedal, increased engine rpm, shift lock-out, load and dump brake, dump lever lock-out position<br>Position sensor throttle pedal, position sensor gear selector, position sensor retarder pedal, position monitor low range/high range, position monitor throttle pedal, position monitor retarder pedal, position monitor parking brake | 12           | 15 A             | E-ECU, Feed 28VD C E-ECU (including function engine stop) |
| 2            | 5 A              | Position monitor dump body                                                                                                                                                                                                                                                                                                                                                                | 13           | 5 A              | Low beam, right                                           |
| 3            | 5 A              | Position monitor seatbelt, position monitor seat cushion, position monitor shut-off valve hydraulic oil tank, pressure monitor return oil filter hydraulic oil, pressure monitor return oil filter cooling fan oil, socket service display unit                                                                                                                                           | 14           | 5 A              | Low beam, left                                            |
| 4            | 15 A             | Switch parking brake                                                                                                                                                                                                                                                                                                                                                                      | 15           | 5 A              | High beam, right                                          |

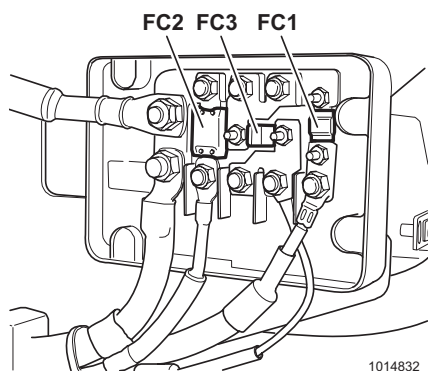
**178 Electrical system, specifications**

| Mark-<br>ing | Rated<br>current | Description                                                                                                                                                                                        | Mark-<br>ing | Rated<br>current | Description                                                 |
|--------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|-------------------------------------------------------------|
| 5            | 15 A             | Interior lighting, interior lighting (left/right rear), interior lighting (right front), position monitor door                                                                                     | 16           | 10 A             | Buzzer, central warning                                     |
| 6            | 15 A             | Rotating beacon                                                                                                                                                                                    | 17           | 15 A             | Unassigned                                                  |
| 7            | 5 A              | Direction indicators, flashing hazard lights                                                                                                                                                       | 18           | 15 A             | Unassigned                                                  |
| 8            | 15 A             | Fan climate control system (AC), relay climate control system (AC), monitor refrigerant pressure, monitor refrigerant temperature<br>Solenoid valve control compressor climate control system (AC) | 19           | 15 A             | Back-up (reversing) lights, back-up warning, back-up camera |
| 9            | 10 A             | Switch transverse diff. lock (front axle), longitudinal diff. lock/6×6, all diff. locks/6×6<br>Position monitor longitudinal diff. lock                                                            | 20           | 5 A              | Voltage converter                                           |
| 10           | 5 A              | Preheating induction air                                                                                                                                                                           | 21           | 5 A              | Back-up (reversing) camera                                  |
| 11           | 5 A              | Exhaust brake, exhaust gas recirculation                                                                                                                                                           | 22           | 5 A              | Pressure monitor oil filter, transmission                   |

|    |      |                                                                                                                                                                                                                                                                                                                                                                |    |      |                                                                                                                                                                      |
|----|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | 10 A | V-, T-, and D-ECU, feed 28 VDC<br>Light load and dump brake<br>Control lights activation red central warning 2, engaged transverse differential lock (front axle), engaged longitudinal differential lock, engaged all differential locks/6×6, engaged transverse differential lock (front bogie axle), engaged transverse differential lock (rear bogie axle) | 33 | 25 A | Electric power outlet 28 VDC                                                                                                                                         |
| 24 | 15 A | T-ECU, feed 28 VDC                                                                                                                                                                                                                                                                                                                                             | 34 | 15 A | Switch windshield wiper, relay interval wiper, motor windshield wiper, switch windshield washer, relay windshield washer, motor windshield washer, switch horn, horn |
| 25 | 15 A | V-ECU, feed 28 VDC                                                                                                                                                                                                                                                                                                                                             | 35 | 5 A  | Running lights left/right front, front fender and rear<br>Control guide lights switch<br>Guide light switch                                                          |
| 26 | 3 A  | D-ECU, feed 28 VDC                                                                                                                                                                                                                                                                                                                                             | 36 | 5 A  | Running lights, instrument lighting                                                                                                                                  |
| 27 | 15 A | Switch headlights<br>Main fuse for guide lights, running lights, high and low beams for fuses 13–15, 35, 36, and 38                                                                                                                                                                                                                                            | 37 | 15 A | Work lights front                                                                                                                                                    |
| 28 | 15 A | Headlight flasher                                                                                                                                                                                                                                                                                                                                              | 38 | 5 A  | High beam left, D-ECU signal for activating high beam                                                                                                                |

|    |      |                                                                                                                                                                                                                  |    |      |                   |
|----|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|-------------------|
| 29 | 5 A  | Switch work lights front/rear, relay work light front/rear, work lights front/rear left/right                                                                                                                    | 39 | 15 A | Work lights rear  |
| 30 | 15 A | Switch electrically heated rear-view mirrors<br>Heating coil rear-view mirrors left/right lower/upper<br>Switch seat cushion heater, heating coil seat cushion heat, switch and control light turn-around wheels | 40 | 10 A | Stop lights       |
| 31 | 15 A | Cigarette lighter                                                                                                                                                                                                | 41 | 5 A  | Ground tachograph |
| 32 | 10 A | Voltage converter, switch flashing hazard lights, flasher relay, tachograph                                                                                                                                      | 42 | 10 A | Delayed stop      |

### Other fuses

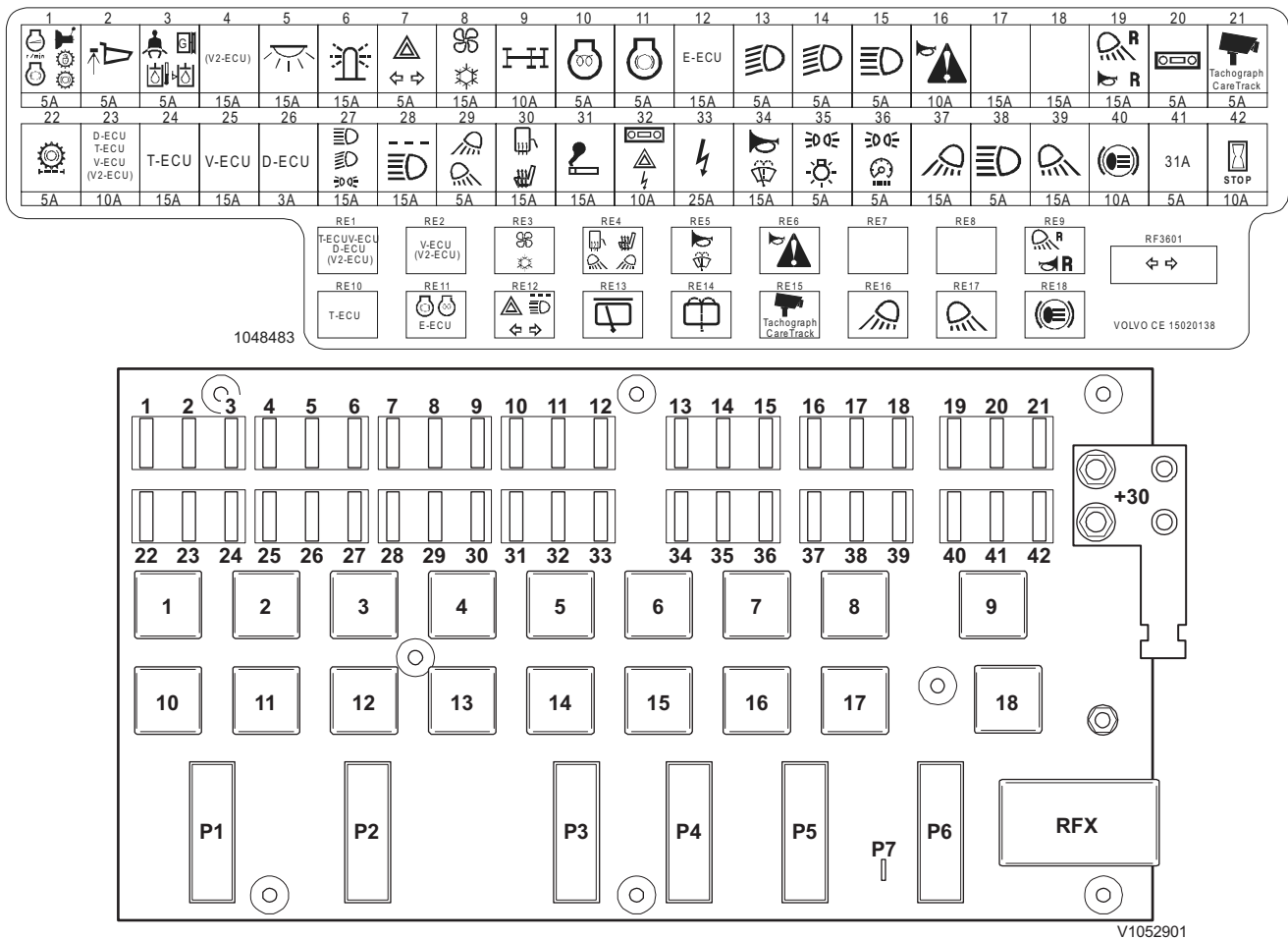


In fuse box on battery bracket over washer reservoir

| Marking | Rated current | Description (fuse rail) | Marking | Rated current | Description (blade fuse)                                |
|---------|---------------|-------------------------|---------|---------------|---------------------------------------------------------|
| FC1     | 50 A          | Main fuse               | FH5     | 5 A           | Load and dump brake (located under right control panel) |
| FC2     | 150 A         | Heating coil preheating |         |               |                                                         |
| FC3     | 40 A          | Motor hood pump         |         |               |                                                         |

## Relays

## Electrical distribution box

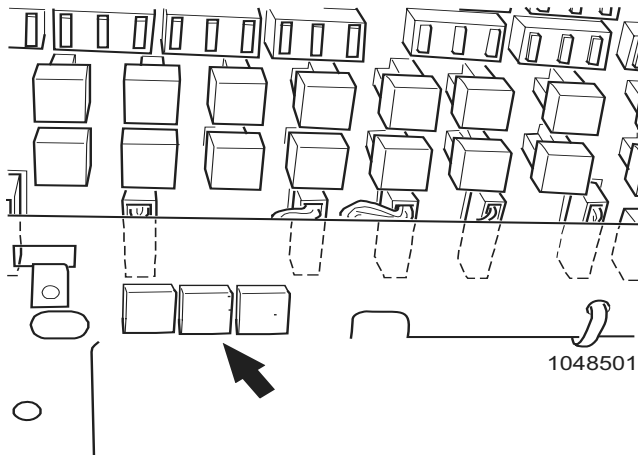
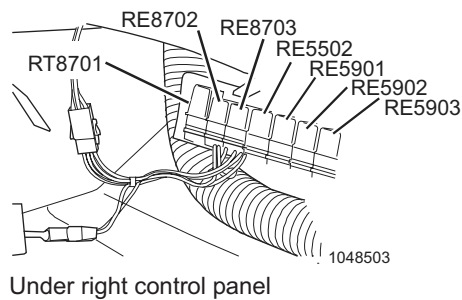
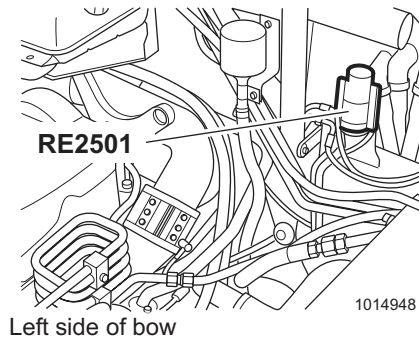


V1052901

| Marking | Designation | Description                                                               | Marking | Designation | Description                                                                |
|---------|-------------|---------------------------------------------------------------------------|---------|-------------|----------------------------------------------------------------------------|
| 1       | RE3701      | Feed 28 VDC D-, T, V-, and V2-ECU, Fuses FU1, FU2, FU3, FU22, FU23        | 11      | RE3705      | Feed 28 VDC E-ECU, preheating of induction air, exhaust brake, engine stop |
| 2       | RE3702      | Feed 28 VDC V- and V2-ECU, Steering RE3703, RE3705 Fuses FU4, FU25        | 12      | RE3604      | Direction indicators, hazard flashers and headlight flasher                |
| 3       | RE8701      | Fan and climate control system, Differential locks                        | 13      | RE3601      | Windscreen wiper                                                           |
| 4       | RE3503      | Electrically heated rear view mirrors, working lights, seat, fuel warming | 14      | RE3602      | Windscreen washer                                                          |
| 5       | RE3605      | Windscreen wipers, windscreen washer and horn                             | 15      | RE3606      | Rear vision camera, tachograph                                             |
| 6       | RE3603      | Buzzer central warning                                                    | 16      | RE3501      | Working lights front                                                       |
| 7       | RE          | Unassigned                                                                | 17      | RE3502      | Working lights rear                                                        |

| Marking | Designation | Description                                           | Marking | Designation | Description          |
|---------|-------------|-------------------------------------------------------|---------|-------------|----------------------|
| 8       | RE          | Unassigned                                            | 18      | RE5201      | Stop lights          |
| 9       | RE4201      | Reversing light, reversing alarm and reversing camera | RFX     | RF3601      | Direction indicators |
| 10      | RE3703      | Feed 28 VDC T-ECU                                     |         |             |                      |

### Other relays



Down low in electrical distribution box on left side

| Marking | Description                           | Marking | Description                                                           |
|---------|---------------------------------------|---------|-----------------------------------------------------------------------|
| RE2501  | Preheating induction air              | RE5902  | Load and dump brake                                                   |
| RT8701  | Time relay for AC-engagement at start | RE5903  | Load and dump brake                                                   |
| RE8702  | Climate control system (AC)           | RE3301  | Starter motor (down low in electrical distribution box)               |
| RE8703  | Climate control system (AC)           | RE3704  | Delayed stop (down low in electrical distribution box)                |
| RE5502  | Parking brake                         | RE8704  | Climate control system (AC) (down low in electrical distribution box) |
| RE5901  | Load and dump brake                   |         |                                                                       |

**182 Power transmission, specifications****Power transmission, specifications****Transmission**

|                        |                                                                                       |
|------------------------|---------------------------------------------------------------------------------------|
| Type                   | Automatic planetary type transmission with nine forward gears and three reverse gears |
| Designation            | PT2509                                                                                |
| Torque converter, type | Single stage with free-wheeling stator and automatic direct drive clutch (lockup)     |

**Dropbox**

|                |                                       |
|----------------|---------------------------------------|
| Make           | Volvo                                 |
| Designation    | IL2                                   |
| Power take-off | 1 for ground-dependent hydraulic pump |
| Drive          | 4-wheel drive in permanent engagement |

**Differential locks**

|              |                |
|--------------|----------------|
| Longitudinal | In dropbox     |
| Transverse   | In drive axles |

**Drive axles**

|                           | Tractor unit | Front bogie axle | Rear bogie axle |
|---------------------------|--------------|------------------|-----------------|
| Make                      | Volvo        | Volvo            | Volvo           |
| Designation, A35E/A35E FS | ARB/H35      | ARB/H35          | ARB/H35         |
| Designation, A40E/A40E FS | ARB/H40      | ARB/H40          | ARB/H40         |

**Differential carrier assembly**

|                         | Tractor unit | Front bogie axle | Rear bogie axle                          |
|-------------------------|--------------|------------------|------------------------------------------|
| Make                    | Volvo        | Volvo            | Volvo                                    |
| Gear ratio A35E/A35E FS | 2,833        | 2,833            | 2,833                                    |
| Gear ratio A40E/A40E FS | 3,091        | 3,091            | 3,091                                    |
| Differential lock       | Dog clutch   | Dog clutch       | Dog clutch                               |
| 6-wheel drive (6×6)     |              |                  | Drive via dog clutch in front bogie axle |

**Hub reduction gear**

|            | Tractor unit   | Front bogie axle | Rear bogie axle |
|------------|----------------|------------------|-----------------|
| Type       | Planetary gear | Planetary gear   | Planetary gear  |
| Gear ratio | 6,0            | 6,0              | 6,0             |

**Wheel nuts**

|                    |                      |
|--------------------|----------------------|
| Tightening torques | 800 N m (590 lbf ft) |
|--------------------|----------------------|



**Speed ranges (max.)**

| <b>Gear</b>    | <b>A35E/A35E FS</b>  | <b>A40E/A40E FS</b>  |
|----------------|----------------------|----------------------|
| <b>Forward</b> |                      |                      |
| 1st gear       | 6.2 km/h (3.9 mph)   | 5.8 km/h (3.6 mph)   |
| 2nd gear       | 9.0 km/h (5.6 mph)   | 8.4 km/h (5.2 mph)   |
| 3rd gear       | 11.0 km/h (6.8 mph)  | 10.4 km/h (6.5 mph)  |
| 4th gear       | 16.0 km/h (9.9 mph)  | 14.9 km/h (9.3 mph)  |
| 5th gear       | 23.0 km/h (14.3 mph) | 21.6 km/h (13.4 mph) |
| 6th gear       | 29.1 km/h (18.1 mph) | 27.3 km/h (17.0 mph) |
| 7th gear       | 38.5 km/h (23.9 mph) | 36.0 km/h (22.4 mph) |
| 8th gear       | 50.9 km/h (31.6 mph) | 47.6 km/h (29.6 mph) |
| 9th gear       | 57.0 km/h (35.4 mph) | 57.0 km/h (35.4 mph) |
| <b>Reverse</b> |                      |                      |
| 1st gear       | 6.9 km/h (4.3 mph)   | 6.5 km/h (4.1 mph)   |
| 2nd gear       | 10.0 km/h (6.2 mph)  | 9.4 km/h (5.8 mph)   |
| 3rd gear       | 18.0 km/h (11.2 mph) | 18.0 km/h (11.2 mph) |

## 184 Brake system, specifications

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### Brake system, specifications

#### Service brakes

|      |                                                                                                         |
|------|---------------------------------------------------------------------------------------------------------|
| Type | Dual circuit, all-hydraulic, wet brakes. One circuit for the tractor unit and one for the trailer unit. |
|------|---------------------------------------------------------------------------------------------------------|

#### Parking Brake

|      |                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type | Air-mechanically and spring operated disc brake acting on the trailer unit propeller shaft. Acting on both front axle and front bogie axle through the dropbox. |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Compressed-air system, specifications

### Air-pressure regulator

|                  |                                         |
|------------------|-----------------------------------------|
| Cut-in pressure  | 810–730 kPa (8.1–7.3 bar) (117–106 psi) |
| Cut-out pressure | 830–870 kPa (8.3–8.7 bar) (120–126 psi) |

### Compressor

|      |                                   |
|------|-----------------------------------|
| Type | Single cylinder piston compressor |
|------|-----------------------------------|

### Compressed-air reservoirs

|                                                         | Number of |
|---------------------------------------------------------|-----------|
| 4 litres (0.14 ft <sup>3</sup> ) regeneration reservoir | 1         |
| 20 litres (0.7 ft <sup>3</sup> ) circuit reservoir      | 1         |

### Safety valve

|                  |                   |
|------------------|-------------------|
| Opening pressure | 930 kPa (135 psi) |
|------------------|-------------------|

## Steering/hydraulic system, specifications

|                                      |                                       |
|--------------------------------------|---------------------------------------|
| Type of steering                     | Hydro-mechanical articulated steering |
| Steering lock                        | 2 × 45°                               |
| Number of steering wheel revolutions | 3.4 revolutions                       |
| Pressure, max.                       | 25 MPa (3626 psi)                     |

## Tipping system

|               | A35E/A35E FS  | A40E/A40E FS  |
|---------------|---------------|---------------|
| Make          | Volvo         | Volvo         |
| Number of     | 2 pcs         | 2 pcs         |
| Type          | Double-acting | Double-acting |
| Tipping time  | 12 seconds    | 12 seconds    |
| Lowering time | 10 seconds    | 10 seconds    |
| Tipping angle | 70°           | 72°           |

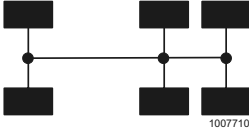
## Full Suspension

|                                    | A35E FS          | A40E FS          |
|------------------------------------|------------------|------------------|
| Number of cylinders                | 6                | 6                |
| Cylinder bore, front axle          | 115 mm (4.45 in) | 115 mm (4.45 in) |
| Cylinder bore, rear axles          | 150 mm (5.91 in) | 150 mm (5.91 in) |
| Piston rod diameter, front axle    | 90 mm (3.54 in)  | 90 mm (3.54 in)  |
| Piston rod diameter, rear axles    | 110 mm (4.33 in) | 110 mm (4.33 in) |
| Stroke, front axle                 | 230 mm (9.10 in) | 230 mm (9.10 in) |
| Stroke, rear axles                 | 230 mm (9.10 in) | 230 mm (9.10 in) |
| Number of accumulators, front axle | 2                | 2                |
| Number of accumulators, rear axles | 4                | 4                |

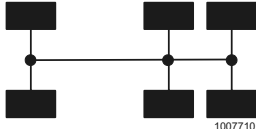
## Tyre sizes and recommended air pressure

If other tyres are used for than those stated, the tyre manufacturer should be contacted regarding information about the correct tyre pressure.

### A35E/A35E FS

| Tyre air pressure with a load of 32.5 tonnes |           | A35E/A35E FS 6X6                                                                   |            |
|----------------------------------------------|-----------|------------------------------------------------------------------------------------|------------|
| Tyres                                        |           |  |            |
| Bridgestone 26.5 R25 VLT                     | kPa (psi) | 375 (54.5)                                                                         | 450 (65.0) |
| Bridgestone 26.5 R25 VLT-S                   | kPa (psi) | 375 (54.5)                                                                         | 400 (58.0) |
| Good Year 26.5 R25 RL-2+                     | kPa (psi) | 375 (54.5)                                                                         | 450 (65.0) |
| Good Year 26.5 R25 TL-3A+                    | kPa (psi) | 375 (54.5)                                                                         | 450 (65.0) |
| Good Year 26.5 R25 GP-4B                     | kPa (psi) | 375 (54.5)                                                                         | 450 (65.0) |
| Good Year 800/65 R29 GP-4D                   | kPa (psi) | 330 (48.0)                                                                         | 450 (65.0) |
| Michelin 26.5 R25 XADN                       | kPa (psi) | 350 (51.0)                                                                         | 400 (58.0) |
| Michelin 26.5 R25 XADT                       | kPa (psi) | 350 (51.0)                                                                         | 400 (58.0) |
| Michelin 775/65 R29 XAD                      | kPa (psi) | 300 (44.0)                                                                         | 375 (54.5) |

### A40E/A40E FS

| Tyre air pressure with a load of 37 tonnes |           | A40E/A40E FS 6X6                                                                     |            |
|--------------------------------------------|-----------|--------------------------------------------------------------------------------------|------------|
| Tyres                                      |           |  |            |
| Bridgestone 29.5 R25 VLT                   | kPa (psi) | 300 (44.0)                                                                           | 400 (58.0) |
| Bridgestone 29.5 R25 VLT-S                 | kPa (psi) | 350 (51.0)                                                                           | 375 (54.5) |
| Good Year 29.5 R25 RL-2+                   | kPa (psi) | 300 (44.0)                                                                           | 400 (58.0) |
| Good Year 29.5 R25 GP-4B                   | kPa (psi) | 300 (44.0)                                                                           | 400 (58.0) |
| Good Year 875/65 R29 GP-4D                 | kPa (psi) | 315 (45.5)                                                                           | 375 (54.5) |
| Michelin 29.5 R25 XADN                     | kPa (psi) | 325 (47.0)                                                                           | 400 (58.0) |
| Michelin 29.5 R25 XADT                     | kPa (psi) | 325 (47.0)                                                                           | 400 (58.0) |
| Michelin 875/65 R29 XAD65-1                | kPa (psi) | 275 (40.0)                                                                           | 350 (51.0) |

## Cab, specifications

| General                                                                                                                                       |                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| The cab is fitted on rubber elements, is insulated and has a flat floor with rubber mat.                                                      |                                                                     |
| Tested and approved as a protective cab according to ISO 3471-1994 ROPS and SAE J1040 - MAY94 (ROPS). FOPS tested according to ISO 3449-1992. |                                                                     |
| Cab interior fittings and upholstery                                                                                                          | Fire retardant (fire resistant) measured according to ISO 3795-1989 |
| Number of emergency exits                                                                                                                     | 1 (right side window)                                               |

| Heating and ventilation                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The basic version of the machine is provided with a heating and ventilation system with defrosting for all windows and the best possible air distribution. The cab fan is a double radial fan with four speeds. Air conditioning is available as optional extra. |

| Operator seat                                             | This machine is equipped with an operator seat, which meets the criteria of EN ISO 7096. |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------|
| Height adjustment (rapid adjustment)                      | 100 mm (4 in)                                                                            |
| Longitudinal adjustment                                   | 160 mm (6.3 in)                                                                          |
| Adjustment for driver weight                              | 40–130 kg (88–287 lb)                                                                    |
| Adjustment of backrest, (adjustable backrest inclination) | 12°                                                                                      |
| Upholstery                                                | Fire resistant                                                                           |
| Lap type seat belt with reel                              | Yes                                                                                      |

## Vibration and sound information

### Hand-arm vibrations

Emission of hand-arm vibration during real operating conditions at its intended use is less than  $2.5 \text{ m/s}^2$  RMS (root mean square) acceleration according to ISO 8041.

### Whole body vibrations

Emission of Whole-Body Vibration during real operating conditions at its intended use is according to the table below.

| Typical operating conditions | Vibration emission value<br>$a_{w,eqx}$<br>( $\text{m/s}^2$ RMS) | Vibration emission value<br>$a_{w,eqy}$<br>( $\text{m/s}^2$ RMS) | Vibration emission value<br>$a_{w,eqz}$<br>( $\text{m/s}^2$ RMS) |
|------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| Loading                      | 0.29                                                             | 0.41                                                             | 0.24                                                             |
| Transporting with load       | 0.64                                                             | 0.89                                                             | 0.67                                                             |
| Dumping                      | 0.49                                                             | 0.42                                                             | 0.30                                                             |
| Transporting without load    | 0.82                                                             | 1.02                                                             | 0.81                                                             |

The following vibration directions are defined:

x = longitudinally

y = lateral

z = vertical

The values for whole body vibrations stated above have been taken from ISO/CEN Technical Report.

**NOTE! These whole-body vibration emission values were determined at particular operating and terrain conditions and is therefore not representative for all the various conditions in accordance with the intended use of the machine and should not alone be used to determine the whole-body vibration exposure to the operator using the machine. For this purpose the information in ISO/CEN Technical Report is recommended.**

To ensure that the whole-body vibration emission during machine use is kept to a minimum, see page 82.

### Sound information

|                                                                                                                                                                                                             | A35E/A35E FS  | A40E/A40E FS  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|
| Sound pressure level (LpA) at operator position<br>(Measurement according to ISO 6396)                                                                                                                      | 74 LpA dB(A)  | 74 LpA dB(A)  |
| Sound power level (LwA) around the machine<br>(Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)                                                   | 112 LwA dB(A) | 112 LwA dB(A) |
| Sound power level (LwA) around the machine<br>(Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)<br><b>With sound absorbing optional equipment</b> | 109 LwA dB(A) | 110 LwA dB(A) |

## Weights

### A35E/A35E FS

| The weights apply with 26.5 R25* tyres      |                      |                      |
|---------------------------------------------|----------------------|----------------------|
| Service weight                              | A35E                 | A35E FS              |
| Front axle                                  | 14700 kg (32408 lb)  | 14800 kg (32628 lb)  |
| Bogie                                       | 13400 kg (29542 lb)  | 13700 kg (30203 lb)  |
| Total (incl. operator and full fuel tank)** | 28100 kg (61950 lb)  | 28500 kg (62832 lb)  |
| Maximum permissible load on front axle      | 17700 kg (39110 lb)  | 17800 kg (39242 lb)  |
| Maximum permissible load on bogie           | 43900 kg (96783 lb)  | 44200 kg (98326 lb)  |
| Load capacity (payload)                     | 33500 kg (73854 lb)  | 33500 kg (73854 lb)  |
| Total weight, max.                          | 61600 kg (135805 lb) | 62000 kg (136686 lb) |

\*) With 775/65 R29 tyres the weight is 200 kg (441 lb) more per axle.

\*\*) If the machine is equipped with body height extension for light material, the service weight will be 2391 kg (5271 lb) more.

### A40E/A40E FS

| The weights apply with 29.5 R25* tyres      |                      |                      |
|---------------------------------------------|----------------------|----------------------|
| Service weight                              | A40E                 | A40E FS              |
| Front axle                                  | 15700 kg (34613 lb)  | 15800 kg (34833 lb)  |
| Bogie                                       | 14500 kg (31967 lb)  | 14800 kg (32628 lb)  |
| Total (incl. operator and full fuel tank)** | 30200 kg (66580 lb)  | 30600 kg (67461 lb)  |
| Maximum permissible load on front axle      | 19650 kg (43321 lb)  | 19750 kg (43541 lb)  |
| Maximum permissible load on bogie           | 49550 kg (109239 lb) | 49850 kg (109900 lb) |
| Load capacity (payload)                     | 39000 kg (85980 lb)  | 39000 kg (85980 lb)  |
| Total weight, max.                          | 69200 kg (152560 lb) | 69600 kg (153442 lb) |

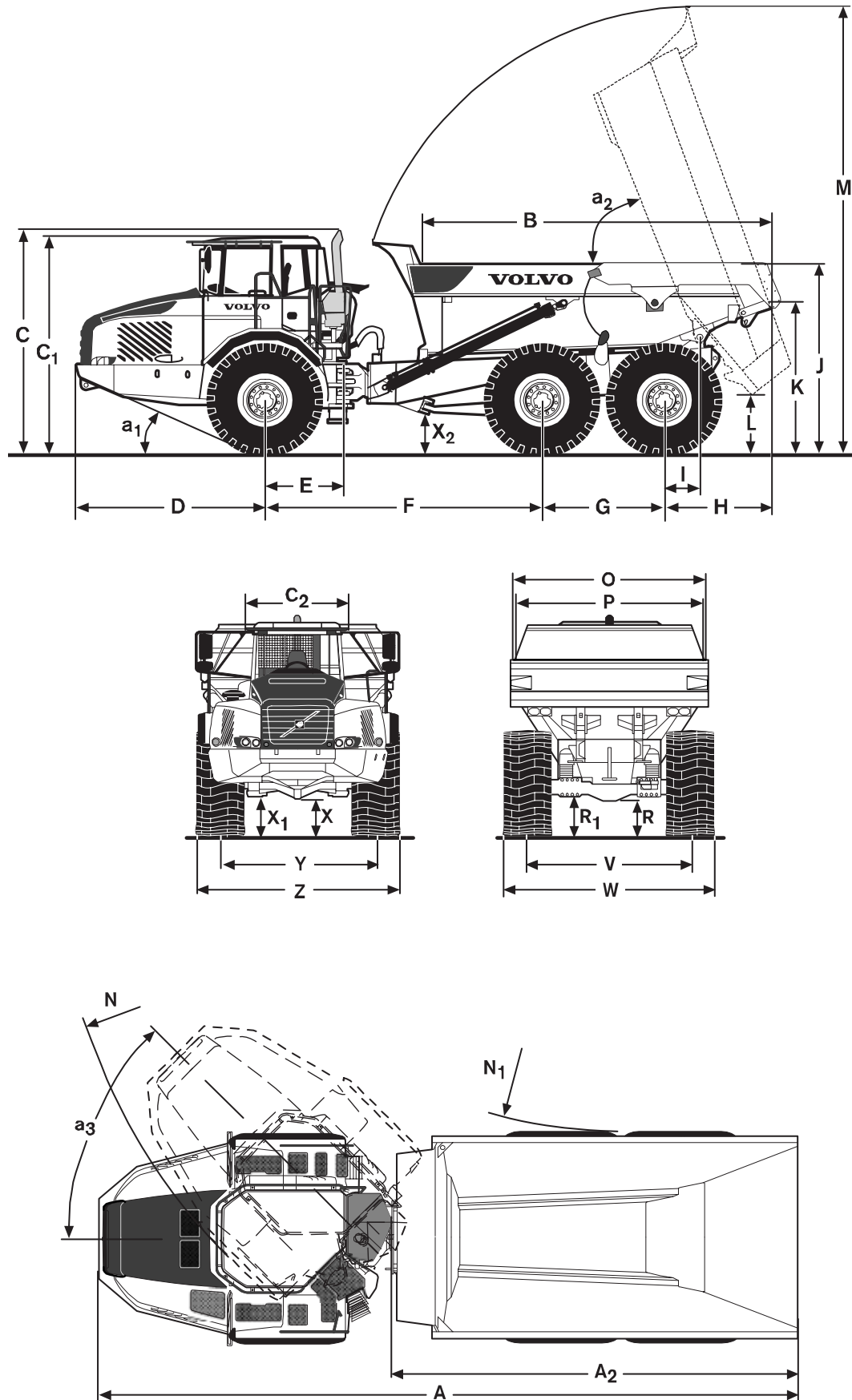
\*) With 875/65 R29 tyres the weight is 300 kg (661 lb) more per axle.

\*\*) If the machine is equipped with body height extension for light material, the service weight will be 2506 kg (5525 lb) more.



## Dimensional drawing, A35E/A40E

The letters in the figures refer to the text on the next page.



# 192 Dimensional drawing, A35E/A40E

| The dimensions apply to an empty machine with 26.5 R25 tyres (A35E) and 29.5 R25 tyres (A40E) |                |                         |                          |
|-----------------------------------------------------------------------------------------------|----------------|-------------------------|--------------------------|
| Dimensions                                                                                    |                | A35E                    | A40E                     |
| Overall length                                                                                | A              | 11182 mm (36 ft 8.2 in) | 11265 mm (36 ft 11.5 in) |
| Overall length, trailer unit                                                                  | A2             | 6242 mm (20 ft 5.7 in)  | 6404 mm (21 ft 0.1 in)   |
| Dump body length, standard body                                                               | B              | 5531 mm (18 ft 1.8 in)  | 5820 mm (19 ft 1.1 in)   |
| Overall height across exhaust pipe                                                            | C              | 3716 mm (12 ft 2.3 in)  | 3768 mm (12 ft 4.3 in)   |
| Height to roof of cab                                                                         | C1             | 3545 mm (11 ft 7.6 in)  | 3596 mm (11 ft 9.6 in)   |
| Width across cab                                                                              | C2             | 1769 mm (5 ft 9.6 in)   | 1769 mm (5 ft 9.6 in)    |
| Overall height across spill guard, lowered dump body****                                      |                | 3951 mm (12 ft 11.6 in) | 4155 mm (13 ft 7.6 in)   |
| Overhang, towing eyes                                                                         | D              | 3101 mm (10 ft 2.1 in)  | 3101 mm (10 ft 2.1 in)   |
| Distance, front axle – steering centre                                                        | E              | 1278 mm (4 ft 2.3 in)   | 1278 mm (4 ft 2.3 in)    |
| Wheel base, drive axles                                                                       | F              | 4578 mm (15 ft 0.2 in)  | 4518 mm (14 ft 9.9 in)   |
| Wheel base, bogie axles                                                                       | G              | 1820 mm (5 ft 11.7 in)  | 1940 mm (6 ft 4.4 in)    |
| Overhang, rear                                                                                | H              | 1683 mm (5 ft 6.3 in)   | 1706 mm (5 ft 7.2 in)    |
| Overhang, frame                                                                               | I              | 650 mm (2 ft 1.6 in)    | 495 mm (1 ft 7.5 in)     |
| Loading height                                                                                | J              | 2939 mm (9 ft 7.7 in)   | 3152 mm (10 ft 4.1 in)   |
| Loading height                                                                                | J****          | 3739 mm (12 ft 3.2 in)  | 4002 mm (13 ft 1.6 in)   |
| Height to dump body                                                                           | K              | 2314 mm (7 ft 7.1 in)   | 2455 mm (8 ft 0.7 in)    |
| Free tipping height                                                                           | L              | 899 mm (2 ft 11.4 in)   | 841 mm (2 ft 9.1 in)     |
| Overall height, tipped dump body                                                              | M              | 7246 mm (23 ft 9.3 in)  | 7284 mm (23 ft 10.8 in)  |
| Overall height, tipped dump body                                                              | M****          | 7246 mm (23 ft 9.3 in)  | 7449 mm (24 ft 5.3 in)   |
| Outer turning radius                                                                          | N              | 8826 mm (28 ft 11.5 in) | 8885 mm (29 ft 1.8 in)   |
| Inner turning radius                                                                          | N1             | 4426 mm (14 ft 6.3 in)  | 4335 mm (14 ft 2.7 in)   |
| Outside width, dump body                                                                      | O              | 3106 mm (10 ft 2.3 in)  | 3374 mm (11 ft 0.8 in)   |
| Outside width, dump body                                                                      | O***           | 3305 mm (10 ft 10.1 in) | 3497 mm (11 ft 5.7 in)   |
| Inside width, dump body                                                                       | P              | 2870 mm (9 ft 5.0 in)   | 3074 mm (10 ft 1.0 in)   |
| Lowest ground clearance, trailer unit                                                         | R              | 580 mm (1 ft 10.8 in)   | 628 mm (2 ft 0.7 in)     |
| Ground clearance axle, trailer unit                                                           | R1             | 668 mm (2 ft 2.3 in)    | 716 mm (2 ft 4.2 in)     |
| Track width, trailer unit                                                                     | V              | 2534 mm (8 ft 3.8 in)   | 2636 mm (8 ft 7.8 in)    |
| Track width, trailer unit                                                                     | V*             | 2625 mm (8 ft 7.3 in)   | ----                     |
| Overall width, trailer unit                                                                   | W              | 3258 mm (10 ft 8.3 in)  | 3432 mm (11 ft 3.1 in)   |
| Overall width, trailer unit                                                                   | W*)**          | 3410 mm (11 ft 2.3 in)  | 3570 mm (11 ft 8.6 in)   |
| Lowest ground clearance, tractor unit                                                         | X              | 521 mm (1 ft 8.5 in)    | 576 mm (1 ft 10.7 in)    |
| Ground clearance axle, tractor unit                                                           | X1             | 602 mm (1 ft 11.7 in)   | 657 mm (2 ft 1.9 in)     |
| Ground clearance, hitch                                                                       | X2             | 754 mm (2 ft 5.7 in)    | 806 mm (2 ft 7.7 in)     |
| Track width, tractor unit                                                                     | Y              | 2534 mm (8 ft 3.8 in)   | 2636 mm (8 ft 7.8 in)    |
| Track width, tractor unit                                                                     | Y*             | 2625 mm (8 ft 7.3 in)   | ----                     |
| Overall width, tractor unit                                                                   | Z              | 3258 mm (10 ft 8.3 in)  | 3432 mm (11 ft 3.1 in)   |
| Overall width, tractor unit                                                                   | Z*)**          | 3410 mm (11 ft 2.3 in)  | 3470 mm (11 ft 4.6 in)   |
| Approach angle                                                                                | a <sub>1</sub> | 23.3°                   | 24.3°                    |
| Tipping angle                                                                                 | a <sub>2</sub> | 70°                     | 72°                      |
| Max. steering lock                                                                            | a <sub>3</sub> | 45°                     | 45°                      |

\*) A35E with 775/65R29 tyres (optional equipment)

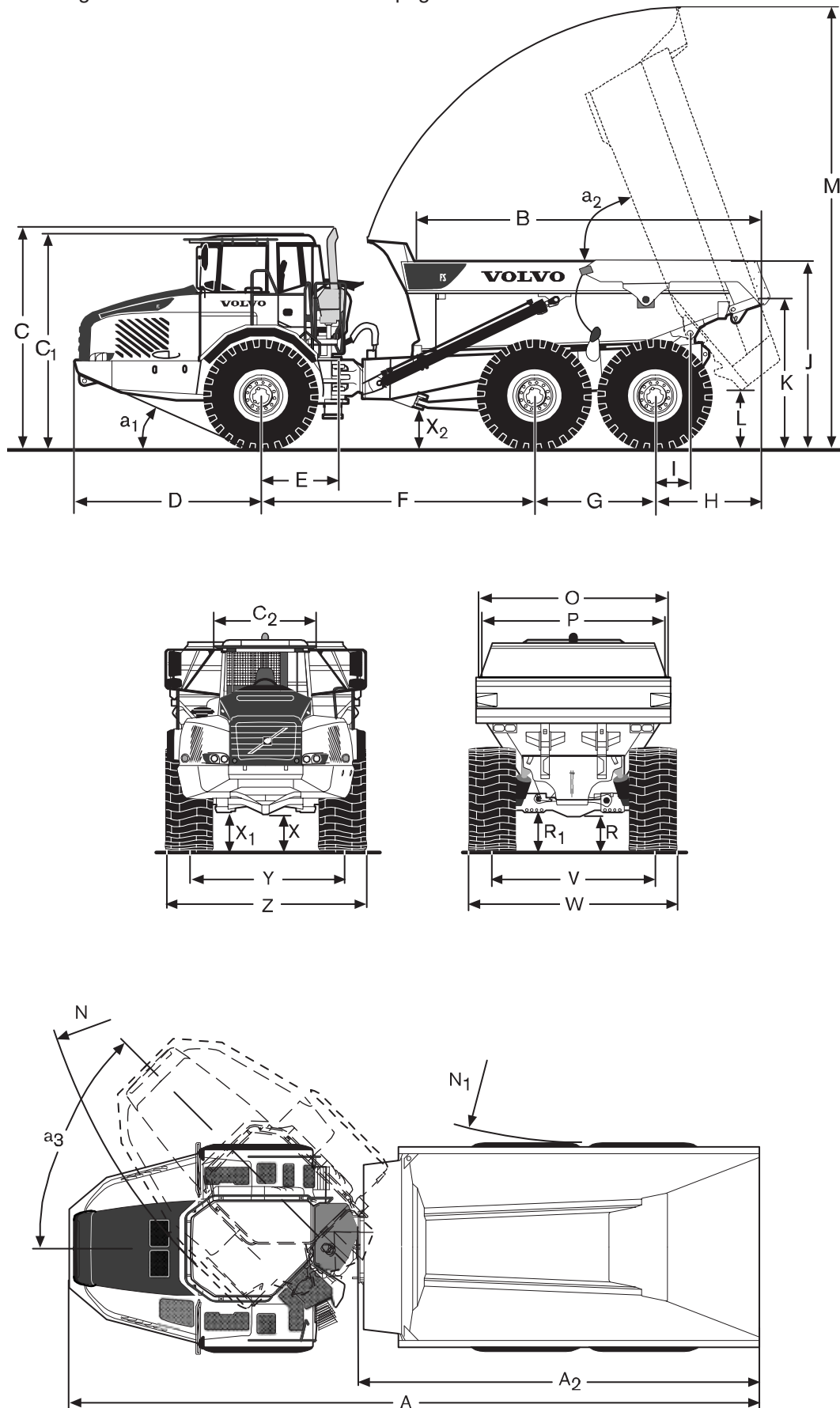
\*\*) A40E with 875/65R29 tyres (optional equipment)

\*\*\*) With overhung tail gate

\*\*\*\*) Applies to machines with body height extension for light material

## Dimensional drawing, A35E FS/A40E FS

The letters in the figures refer to the text on the next page.



# 194 Dimensional drawing, A35E FS/A40E FS

The dimensions apply to an empty machine with 26.5 R25 tyres (A35E FS) and 29.5 R25 tyres (A40E FS)

| Dimensions                                               |                | A35E FS                 | A40E FS                  |
|----------------------------------------------------------|----------------|-------------------------|--------------------------|
| Overall length                                           | A              | 11182 mm (36 ft 8.2 in) | 11265 mm (36 ft 11.5 in) |
| Overall length, trailer unit                             | A2             | 6242 mm (20 ft 5.7 in)  | 6404 mm (21 ft 0.1 in)   |
| Dump body length, standard body                          | B              | 5531 mm (18 ft 1.8 in)  | 5820 mm (19 ft 1.1 in)   |
| Overall height across exhaust pipe                       | C              | 3716 mm (12 ft 2.3 in)  | 3768 mm (12 ft 4.3 in)   |
| Height to roof of cab                                    | C1             | 3545 mm (11 ft 7.6 in)  | 3596 mm (11 ft 9.6 in)   |
| Width across cab                                         | C2             | 1769 mm (5 ft 9.6 in)   | 1769 mm (5 ft 9.6 in)    |
| Overall height across spill guard, lowered dump body**** |                | 3951 mm (12 ft 11.6 in) | 4188 mm (13 ft 8.9 in)   |
| Overhang, towing eyes                                    | D              | 3101 mm (10 ft 2.1 in)  | 3101 mm (10 ft 2.1 in)   |
| Distance, front axle – steering centre                   | E              | 1278 mm (4 ft 2.3 in)   | 1278 mm (4 ft 2.3 in)    |
| Wheel base, drive axles                                  | F              | 4578 mm (15 ft 0.2 in)  | 4518 mm (14 ft 9.9 in)   |
| Wheel base, bogie axles                                  | G              | 1820 mm (5 ft 11.7 in)  | 1940 mm (6 ft 4.4 in)    |
| Overhang, rear                                           | H              | 1683 mm (5 ft 6.3 in)   | 1706 mm (5 ft 7.2 in)    |
| Overhang, frame                                          | I              | 650 mm (2 ft 1.6 in)    | 495 mm (1 ft 7.5 in)     |
| Loading height                                           | J              | 2939 mm (9 ft 7.7 in)   | 3152 mm (10 ft 4.1 in)   |
| Loading height                                           | J****          | 3739 mm (12 ft 3.2 in)  | 4002 mm (13 ft 1.6 in)   |
| Height to dump body                                      | K              | 2314 mm (7 ft 7.1 in)   | 2455 mm (8 ft 0.7 in)    |
| Free tipping height                                      | L              | 899 mm (2 ft 11.4 in)   | 841 mm (2 ft 9.1 in)     |
| Overall height, tipped dump body                         | M              | 7246 mm (23 ft 9.3 in)  | 7284 mm (23 ft 10.8 in)  |
| Overall height, tipped dump body                         | M****          | 7246 mm (23 ft 9.3 in)  | 7449 mm (24 ft 5.3 in)   |
| Outer turning radius                                     | N              | 8826 mm (28 ft 11.5 in) | 8885 mm (29 ft 1.8 in)   |
| Inner turning radius                                     | N1             | 4426 mm (14 ft 6.3 in)  | 4335 mm (14 ft 2.7 in)   |
| Outside width, dump body                                 | O              | 3106 mm (10 ft 2.3 in)  | 3374 mm (11 ft 0.8 in)   |
| Outside width, dump body                                 | O***           | 3305 mm (10 ft 10.1 in) | 3497 mm (11 ft 5.7 in)   |
| Inside width, dump body                                  | P              | 2870 mm (9 ft 5.0 in)   | 3074 mm (10 ft 1.0 in)   |
| Lowest ground clearance, trailer unit                    | R              | 580 mm (1 ft 10.8 in)   | 628 mm (2 ft 0.7 in)     |
| Ground clearance axle, trailer unit                      | R1             | 610 mm (2 ft 0.0 in)    | 658 mm (2 ft 1.9 in)     |
| Track width, trailer unit                                | V              | 2534 mm (8 ft 3.8 in)   | 2636 mm (8 ft 7.8 in)    |
| Track width, trailer unit                                | V*             | 2625 mm (8 ft 7.3 in)   | ----                     |
| Overall width, trailer unit                              | W              | 3258 mm (10 ft 8.3 in)  | 3432 mm (11 ft 3.1 in)   |
| Overall width, trailer unit                              | W*)**          | 3410 mm (11 ft 2.3 in)  | 3570 mm (11 ft 8.6 in)   |
| Lowest ground clearance, tractor unit                    | X              | 521 mm (1 ft 8.5 in)    | 576 mm (1 ft 10.7 in)    |
| Ground clearance axle, tractor unit                      | X1             | 602 mm (1 ft 11.7 in)   | 657 mm (2 ft 1.9 in)     |
| Ground clearance, hitch                                  | X2             | 754 mm (2 ft 5.7 in)    | 806 mm (2 ft 7.7 in)     |
| Track width, tractor unit                                | Y              | 2534 mm (8 ft 3.8 in)   | 2636 mm (8 ft 7.8 in)    |
| Track width, tractor unit                                | Y*             | 2625 mm (8 ft 7.3 in)   | ----                     |
| Overall width, tractor unit                              | Z              | 3258 mm (10 ft 8.3 in)  | 3432 mm (11 ft 3.1 in)   |
| Overall width, tractor unit                              | Z*)**          | 3410 mm (11 ft 2.3 in)  | 3470 mm (11 ft 4.6 in)   |
| Approach angle                                           | a <sub>1</sub> | 23.3°                   | 24.3°                    |
| Tipping angle                                            | a <sub>2</sub> | 70°                     | 72°                      |
| Max. steering lock                                       | a <sub>3</sub> | 45°                     | 45°                      |

\*) A35E with 775/65R29 tyres (optional equipment)

\*\*) A40E with 875/65R29 tyres (optional equipment)

\*\*\*) With overhung tail gate

\*\*\*\*) Applies to machines with body height extension for light material

## Service history

|                          |       |                                                                     |                     |
|--------------------------|-------|---------------------------------------------------------------------|---------------------|
| <b>Service 100 hours</b> |       | Type of service<br><br><input type="checkbox"/> Warranty Inspection | Signature and stamp |
| Date                     | Hours |                                                                     |                     |
|                          |       |                                                                     |                     |

|                          |       |                                                                         |                     |
|--------------------------|-------|-------------------------------------------------------------------------|---------------------|
| <b>Service 500 hours</b> |       | Type of service<br><br><input type="checkbox"/> Service and maintenance | Signature and stamp |
| Date                     | Hours |                                                                         |                     |
|                          |       |                                                                         |                     |

|                           |       |                                                                                                                         |                     |
|---------------------------|-------|-------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Service 1000 hours</b> |       | Type of service<br><br><input type="checkbox"/> Warranty Inspection<br><input type="checkbox"/> Service and maintenance | Signature and stamp |
| Date                      | Hours |                                                                                                                         |                     |
|                           |       |                                                                                                                         |                     |

|                           |       |                                                                         |                     |
|---------------------------|-------|-------------------------------------------------------------------------|---------------------|
| <b>Service 1500 hours</b> |       | Type of service<br><br><input type="checkbox"/> Service and maintenance | Signature and stamp |
| Date                      | Hours |                                                                         |                     |
|                           |       |                                                                         |                     |

|                           |       |                                                                         |                     |
|---------------------------|-------|-------------------------------------------------------------------------|---------------------|
| <b>Service 2000 hours</b> |       | Type of service<br><br><input type="checkbox"/> Service and maintenance | Signature and stamp |
| Date                      | Hours |                                                                         |                     |
|                           |       |                                                                         |                     |

|                           |       |                                                                         |                     |
|---------------------------|-------|-------------------------------------------------------------------------|---------------------|
| <b>Service 2500 hours</b> |       | Type of service<br><br><input type="checkbox"/> Service and maintenance | Signature and stamp |
| Date                      | Hours |                                                                         |                     |
|                           |       |                                                                         |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 3000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 3500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 4000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 4500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 5000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 5500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 6000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 6500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 7000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 7500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 8000 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

|                           |       |                                                  |                     |
|---------------------------|-------|--------------------------------------------------|---------------------|
| <b>Service 8500 hours</b> |       | Type of service                                  | Signature and stamp |
| Date                      | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                           |       |                                                  |                     |

| Service 9000 hours |       | Type of service                                  | Signature and stamp |
|--------------------|-------|--------------------------------------------------|---------------------|
| Date               | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                    |       |                                                  |                     |

| Service 9500 hours |       | Type of service                                  | Signature and stamp |
|--------------------|-------|--------------------------------------------------|---------------------|
| Date               | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                    |       |                                                  |                     |

| Service 10000 hours |       | Type of service                                  | Signature and stamp |
|---------------------|-------|--------------------------------------------------|---------------------|
| Date                | Hours | <input type="checkbox"/> Service and maintenance |                     |
|                     |       |                                                  |                     |



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