

VOLVO CONSTRUCTION EQUIPMENT

OPERATOR'S MANUAL

EC140C

EC140C



VOLVO
Volvo Construction Equipment

Ref.No. VOE21B1003517 English
Printed in Korea CST
Volvo, Eskilstuna

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.

EC140C

Foreword

This Operator 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 is always 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 types, EC140C, unless otherwise stated.

Model	EC140C
Serial no.	CHW 110482~
	KON -
	ASH -

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 this without committing ourselves to introducing 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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Identification numbers

Make a note below of the identification numbers of the machine and its components. Always use this information when contacting the manufacturer and when ordering spare parts.

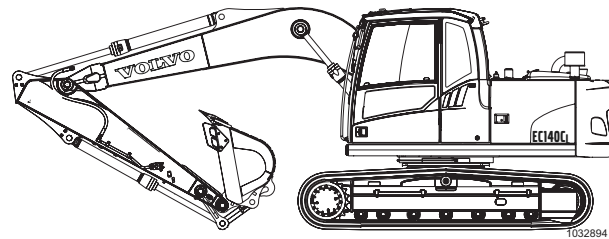
Manufacturer:	Volvo Group Korea Co. Ltd. 1,Guehyun-Dong, Changwon-City, Kyungnam, Korea
Machine PIN (Serial number)	
Engine	
Main pump	
Swing motor	
Travel motor	
Main control valve	

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Presentation



Intended use

The machine is intended to be used under normal conditions for the applications described in this manual. If it is used for other purposes or in potentially dangerous environments, for example explosive atmosphere 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

Be conscious of the environment while operating and maintaining the machine. Always follow national environmental legislation applying to all handling of the machine.

Engine

The Volvo diesel engine delivers lower emissions, along with superior performance and fuel efficiency. The EPA Tier 3 compliant engine uses precise, high pressure fuel injectors, turbo charger and air to air intercooler and electronic engine controls to optimize machine performance.

Electrical system

The electrical system consists of engine starting system, charging system, machine monitoring system, engine/ pump control system and air conditioning system.

The machine is equipped with a high capacity electrical system well protected. Waterproof double-lock harness plugs are used to secure corrosion-free connections. The main relays and solenoid valves are shielded to prevent damage. The master switch is standard.

Automatic idling system reduces engine speed to idle when the levers and pedals are not activated for 5 seconds resulting in less fuel consumption and low cab noise level.

Cab

The operator's cab has easy access via a wide door opening. The cab is supported on hydraulic dampening mounts to reduce shock and vibration level. These along with sound absorbing lining provide low noise levels. The cab has excellent all-round visibility. The front windshield can easily slide up into the ceiling, and the lower front glass can be removed and stored in the side door.

Integrated air-conditioning and heating system

The pressurized and filtered cab air is supplied by an automatically-controlled fan. The air is distributed throughout the cab from 14 vents.

Ergonomic operator's seat

The adjustable seat and joystick console move independently to accommodate the operator. The seat has 12 different adjustments plus a seat belt for the operator's comfort and safety.

Anti-theft device (optional equipment)

An installed anti-theft device makes it more difficult to steal the machine. Volvo CE supplies anti-theft devices as optional equipment. If your machine is not yet equipped with one, check the possibilities of having such a device installed by your dealer.

Hydraulic system

The hydraulic system, also known as the "Automatic Sensing Work Mode" is designed for high-productivity, high-digging capacity, high-maneuvering precision and excellent fuel economy. The summation system, boom, arm and swing priority along with boom, arm and bucket regeneration systems provide optimum performance.

- 1 Summation system : Combines the flow of both hydraulic pumps to ensure quick cycle times and high productivity.
- 2 Boom priority : Gives priority to the boom up function for faster cycle times during loading and deep excavations.
- 3 Arm priority : Gives priority to the arm operating function for faster cycle times during digging and dumping.
- 4 Swing priority : Gives priority to the swing function during trenching application to improve productivity.
- 5 Regeneration system : Prevents cavitation and provides flow to other functions during simultaneous operations for maximum productivity.
- 6 Power boost : All digging and lifting forces are increased.
- 7 Holding valves : Boom and arm holding valves are provided to minimize cylinder drifting while holding loads.

Modifications

Modifications to this machine including the use of unauthorized attachments, accessories, assemblies or parts may affect the integrity of the machine and/or the ability of the machine to perform as designed. Persons or organizations making unapproved modifications assume all liability resulted from or related to the modification, including any adverse affect on the machine.

No modifications of any kind should be made to this product unless the specific modification has been officially approved in writing by Volvo Construction Equipment. Volvo Construction Equipment reserves the right to reject any and all warranty claims resulted from or are related to unauthorized modifications.

Modifications are officially approved if at least one of the following conditions is met:

- 1 The attachment, accessory, assembly or part is manufactured or distributed by Volvo Construction Equipment and installed in a factory approved manner as described in the publications available from Volvo Construction Equipment; or
- 2 The modification has been approved in writing by the Product Line Engineering Department of Volvo Construction Equipment.

Logged machine data

The machine is equipped with a software system, which records various information about the machine and this information is transferred from the machine to Volvo and used by Volvo and its authorized workshops in the product development process and for possible malfunction detection.

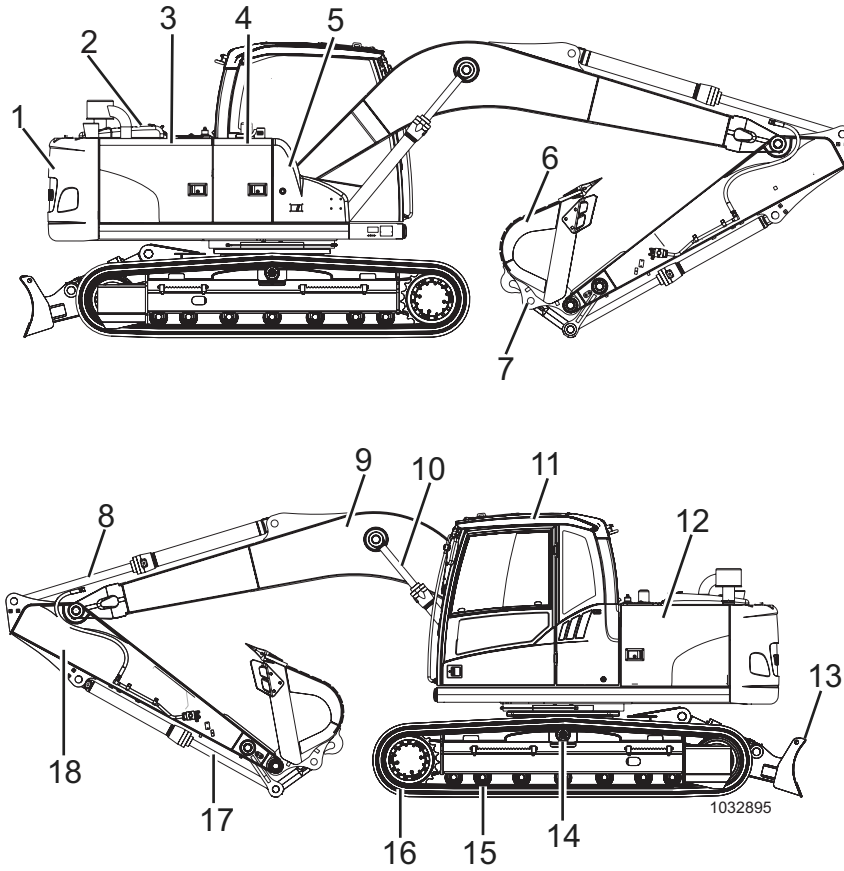
Questions regarding this information can be directed to your dealer.

CareTrack (optional equipment)

The machine can be equipped with CareTrack, a telematics system developed by Volvo Construction Equipment. The system collects machine data which can be wirelessly transferred to a computer. The data shows machine position, operating hours, fuel consumption, alarms, etc. (may vary by machine model and/or subscription). 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. It also allows the customer to restrict the operating area of the machine, by using virtual fences. This helps eliminate unauthorized machine usage and theft. For further information, contact your Volvo Construction Equipment dealer.

Machine view



1	Counterweight	10	Boom cylinder
2	Rear hood	11	Cab
3	Rear side cover	12	Left side cover
4	Fuel tank	13	Dozer blade
5	Front cover	14	Upper roller
6	Bucket	15	Bottom roller
7	Attachment bracket	16	Sprocket
8	Dipper arm cylinder	17	Bucket cylinder
9	Boom	18	Dipper arm



S88453

CE marking, EMC directive

CE marking

(Declaration of Conformity)

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

This machine is CE marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements", which are given in the EU Machinery Safety Directive, 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.

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", 89/336/EEC, 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.

Communication equipment, installation

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

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. If a portable mobile telephone is used, note that it can constantly transmit information to its base station, even when the telephone is not used. For this reason, it should not be placed beside electronic equipment in the machine, such as directly on a control panel etc.

Guidelines

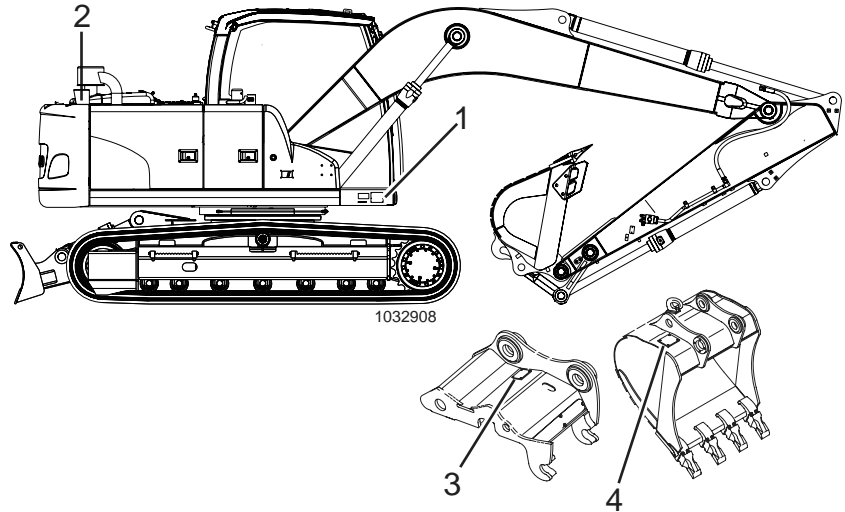
The following guidelines must be followed during installation:

- The antenna placement must be chosen to give good adaptation to the surroundings.
- The antenna cable must be of the coaxial type. Be careful to ensure that the cable is undamaged, that the sheath and braid are not split at the ends, the braid covers the connector ferrules and has good galvanic contact with them.
- The mating surface between the antenna mounting bracket and the bodywork must have clean metal surfaces, with all dirt and oxide removed. Protect the mating surfaces against corrosion after installation to maintain good galvanic contact.
- Remember to separate interfering and interfered cables physically. Interfering cables consist of the communication equipment's supply cables and antenna cable. Interfered cables are those which are connected to electronic devices in the machine. Install the cables as close as possible to earthed (grounded) sheet metal surfaces, since the sheet metal has a shielding effect.

Product plates

Please refer to the figure below to locate the product plate (1), engine plate (2), and attachment plates (3 and 4).

Always use the Product Identification Number (PIN) provided on the vehicle and/or engine plates for troubleshooting purposes and/or when ordering spare parts.



1 Product plate

This plate with Product Identification Number, **PIN**, for the complete machine indicates the model designation, serial number and when applicable, machine weight, engine power, manufacturing year and CE approval. The plate is positioned on the right side of the upper frame.

2 Engine

The engine type designation, part and serial numbers are stamped on the top of valve cover.

3 Attachment bracket (quick fit)

This nameplate is attached on the outside of the bracket and indicates the part number and weight.

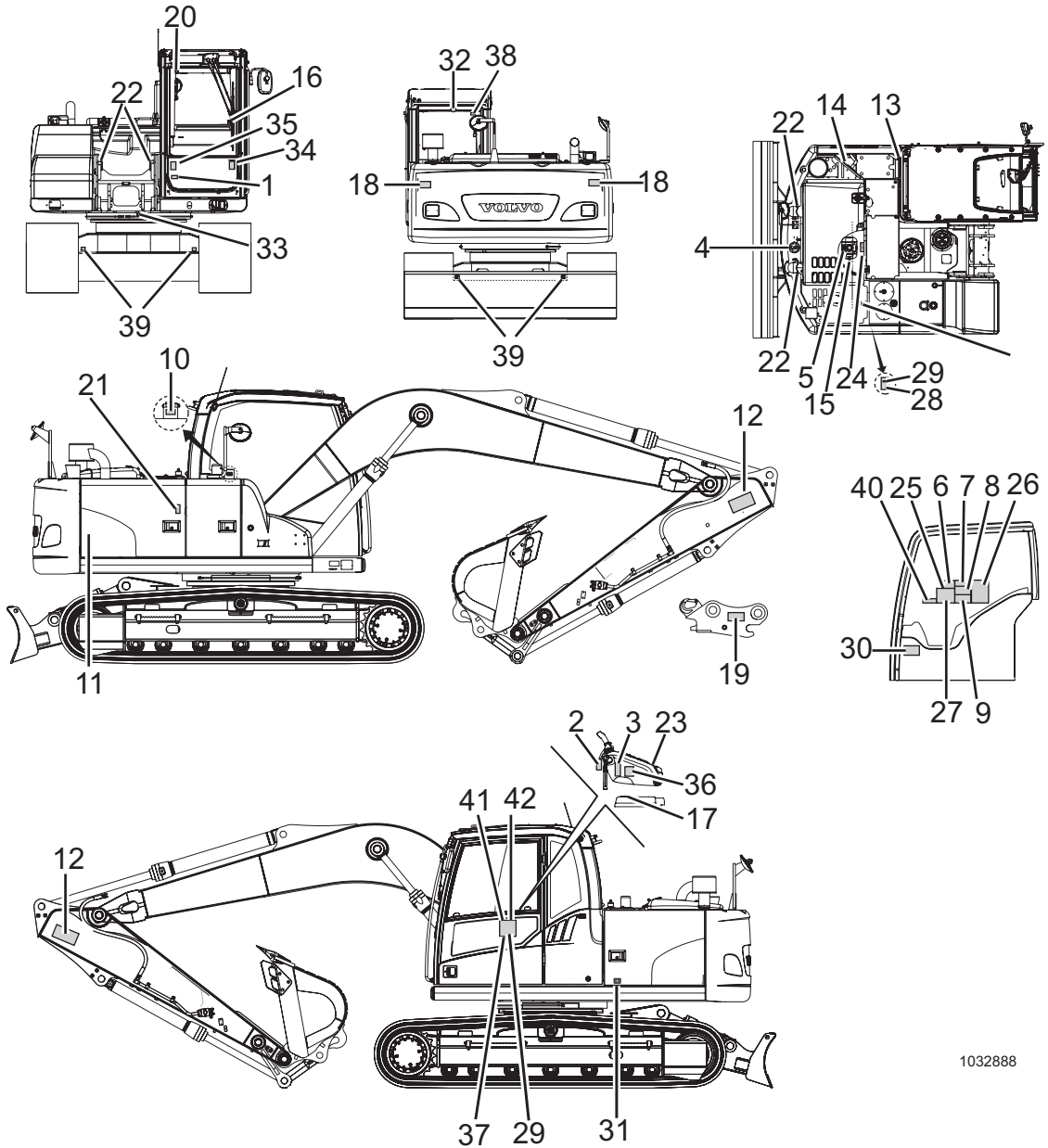
4 Bucket

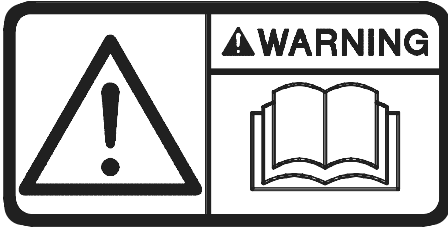
This nameplate is attached on the top of the bucket and indicates the bucket model order number, serial number, bucket part number, rated capacity, weight, cutting width, tooth part number, and adapter part number.

Information and warning plates/decals

Information and warning plates / decals are affixed to the machine on strategic locations to remind operators and maintenance personnel specific safety precautions. All decals are not installed on all machines, as they are market and machine dependent. The decals must be kept free from dirt, so that they can be read and understood. If a decal is lost or becomes illegible, it must be replaced immediately. The part number (order number) is given on the respective decals and in the Parts Catalogue.

The word **WARNING** is given on the warning decals for North America.





S80598

- 1 **WARNING!** First read the Operator's manual before operating the machine.



S87340

- 2 **WARNING!** Do not start the engine.



S82335

- 3 **WARNING!** When leaving the excavator, move the control lockout lever down to lock the system securely.



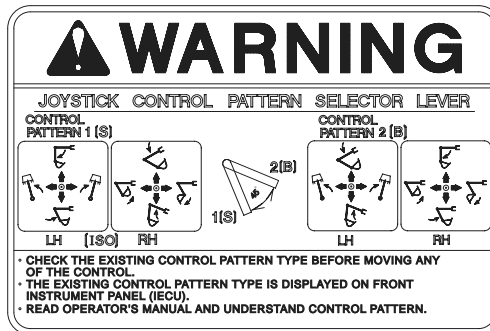
S80720

- 4 **WARNING!** Do not step or walk.



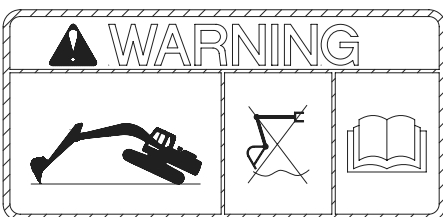
S87343

- 5 **WARNING!** Hot and pressurized coolant.



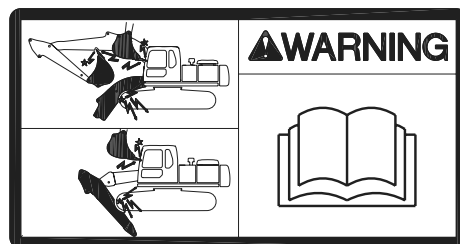
S87466

- 6 **WARNING!** Pattern change (optional).



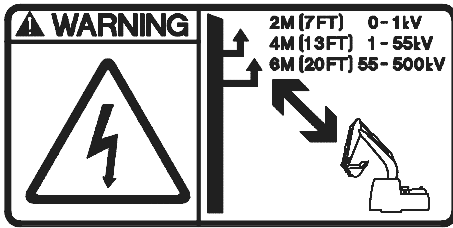
S87760

- 7 **WARNING!** Boom floating (optional). Do not use boom floating function while machine is jacked-up.



- 8 **WARNING!** Operating the optional attachment. Equipment may strike the cab or machine.

14 Information and warning plates/decals



S80602A

9 WARNING! High voltage. Keep sufficient distance from electrical power lines.



S87338

10 WARNING! Do not smoke during fuelling. Risk of fire when fueling.



S87345

11 WARNING! Handling accumulator. Risk for explosion.



S80579A

12 WARNING! Do not stand in the vicinity of a raised load/boom.



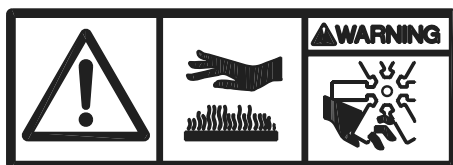
S87346

13 WARNING! Risk of slipping or falling.



S87347

14 WARNING! Battery - risk for explosion, corrosive burns and electric shock.



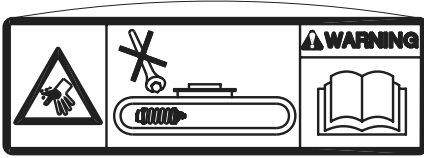
S87348

15 WARNING! Hot surfaces and rotating parts/fan.



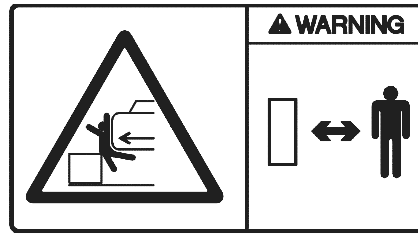
S87342

16 WARNING! Insert safety lock before getting into hazardous area. Lock the front window.



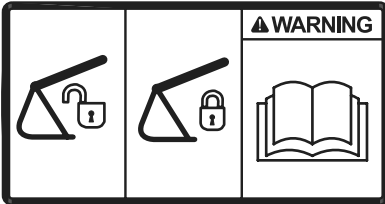
S87341

17 WARNING! Do not unscrew the recoil spring.



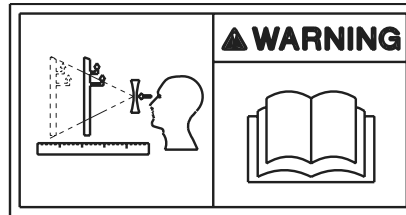
S80596

18 WARNING! Do not enter the excavator's working area. Risk for crushing!



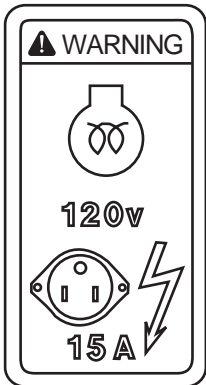
S87349

19 WARNING! Read the Operator's manual before operating the attachment bracket (quick fit, optional).



S86582

20 WARNING! Risk of visual distortion through roof window. Real distance should be reconsidered.



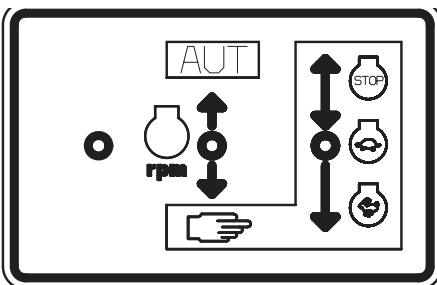
S87356

21 WARNING! Location and specification of diesel heater (optional).



S80717

22 Lifting point



S87350

23 Auto / Manual switches.



11445056

1020820

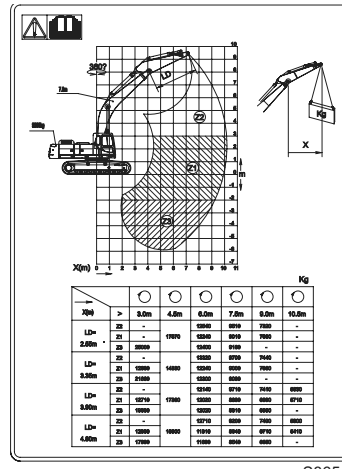
24 Coolant information

EC140C 주요 제원

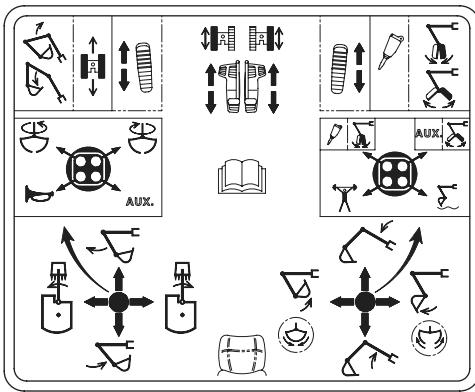
차 중	21500 kg	무 수 폭	600 mm	
최 고 속 도	5.5 km/hr	안 전 브레이크심장거리	2390 mm	
등 판 능 력	35° 무부하	계 탑능력심장거리	3660 mm	
외 관	전 장	9690(9750) mm	도 트 력 노 이	800 mm
	전 폭	2990 mm	식 집 치 업	0.44 kg/cm ²
	전 고		분 갈 이	5700 mm
최저치상고	460 mm	최 대굴석반경	9940(9540) mm	
엔 진 출 력	150/1800 ps/rpm	최 대굴석깊이	6730(6330) mm	
비 평 적	0.69<0.88> m ³	*선택사항 - () : 선택암 장착시 제원 - < > : 선택버킷 장착시 제원		
캐 산 적	0.92<1.22> m ³			
선 회 속 도	11.4 rpm			

1032859

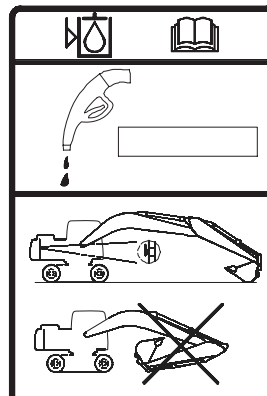
25 Machine specifications (optional).



26 Lifting capacity



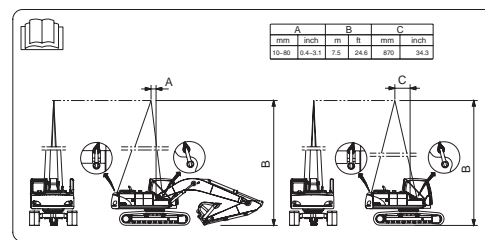
27 Operating the attachments (optional).



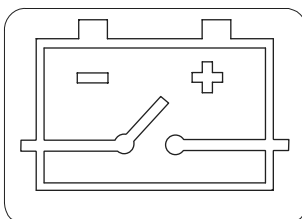
28 Position of checking hydraulic oil level.



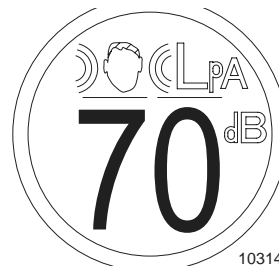
29 Type of hydraulic oil filled from factory (optional).



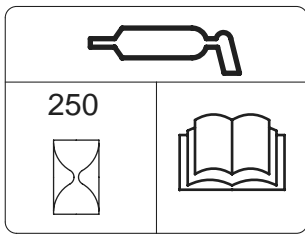
30 Machine lifting instructions.



31 Battery disconnect switch.

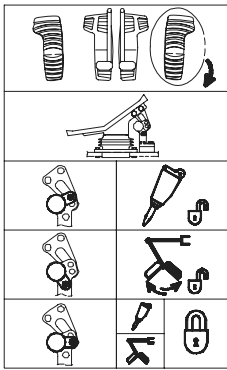


32 Noise level, internal cabin noise (optional).



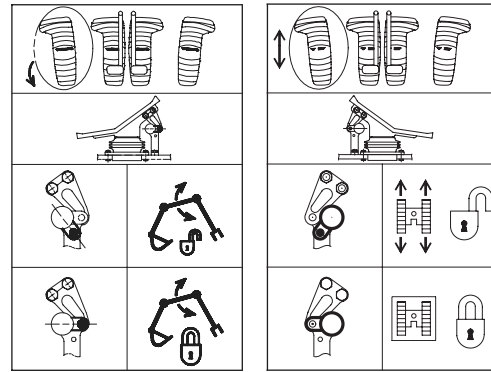
S86518

33 Greasing point and interval.



S82300C

35 Optional pedal operation (optional).



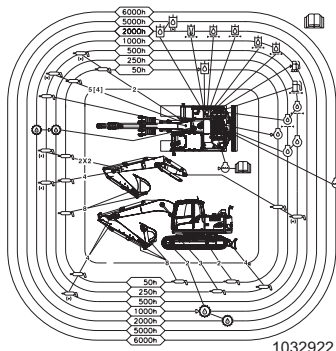
S87445

34 Optional pedal operation (optional).



1032927

36 Noise level, outdoor noise.



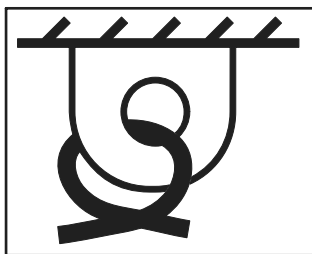
1032922

37 Lubrication chart.



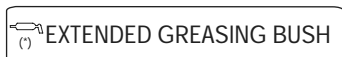
S87355

38 Emergency exit.



S86584

39 Attaching point for lashing/ tying down.



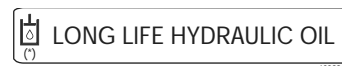
1032211

41 Extended greasing bush

Mode	Applications	
H	Heavy duty	Maximum productivity, High Speed.
G	General	Most general application, Optimum speed.
F	Fine control	Maximum lifting force, Precise control speed.
I	Idle	Warm-up, Low idle speed.

S87467

40 Mode application (optional).



1032210

42 Long life hydraulic oil

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 C.F.R. Section 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 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 \$2,500 for each violation.

An example of a prohibited modifications 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 Federal Standards.

Customer Assistance

Volvo CE wishes to help assure that the Emission Control System Warranty is properly administered. In 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 your nearest Volvo CE 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 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 CE recommends that the purchaser use the service programme for the non-road engine, known as Preventive 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 CE 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 qualified 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 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. This will aid your local dealer in efforts to decrease service time on your machine.

Preventive maintenance

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 receive 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 sulphur 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.

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 sulphur dioxide into the ambient air, the sulphur content of the fuel should be the lowest available. The diesel fuels recommended for use in Volvo engines should meet ASTM designation: D975 No. 1D (C-B) or No. 2D (T-T); with a cetane level above 42 and sulphur content not exceeding 0.5 percent by weight.

Check for fuel leaks (with the engine running at fast idle):

- Visually check unions and hose connections.

Check the condition of the fuel hoses for:

- Aging
- Cracks
- Blisters
- Scuffing

Check the condition of the fuel tank:

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

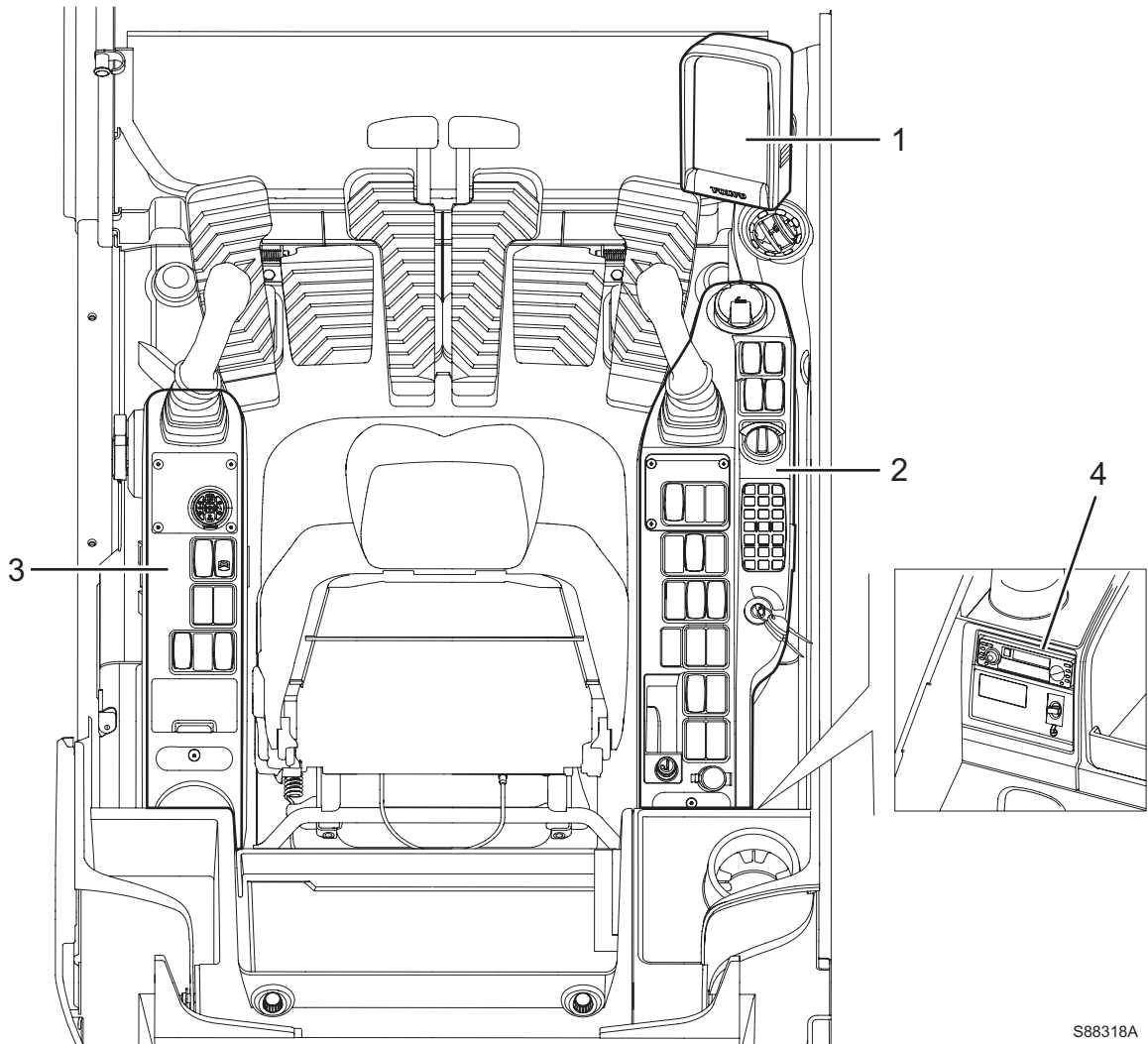
Check the turbocharger:

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

Instrument panels

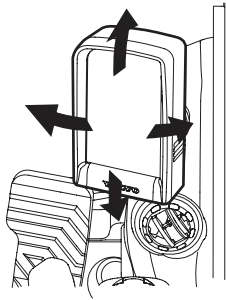
**WARNING!**

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



S88318A

1	Front instrument panel
2	Right instrument panel
3	Left instrument panel
4	Rear instrument panel



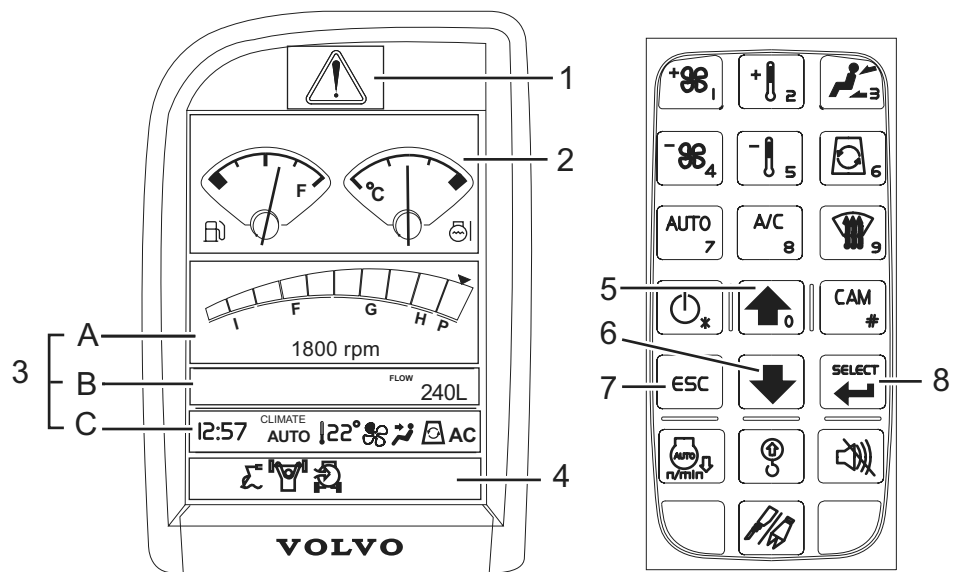
Adjustable directions of I-ECU

Front instrument panel (IECU)

The front instrument panel can be adjusted for operator's comfort.

NOTE! Prevent machine damage by taking proper action. Read thoroughly and understand the instructions in this section to familiarize yourself with the front instrument panel before attempting machine operation.

NOTE! The front instrument panel is designed to display one of supported languages. Refer to page 33 for details on how to set the language, and page 34 to set the units.



S88324

IECU		Keypad	
1	Central warning lamp screen	5	Arrow up
2	Gauge screen	6	Arrow down
3	Main screen	7	ESC button
4	Indicator screen	8	Select button
A	Engine speed screen		
B	Mode screen		
C	Time and ECC screen		



A



B

S87117

A Warning (with red colour)

B Check (with yellow colour)

1 Central warning lamp

There are two types of central warning lamp: warning (red) and check (amber).

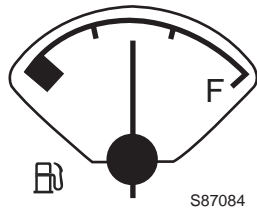
IMPORTANT! If the lamp flashes or lights up while operating the machine, follow the instruction of the shown message.

For more information, see page 36.

2 Gauges

The gauges are always shown unless warning message is activated.

Fuel level



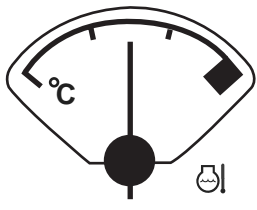
S87084

The gauge shows the level in the fuel tank and it has a red mark on the left end indicating that the fuel level is low. When the gauge is in this region, the oil left is about 10% of total tank capacity. Refuel the machine immediately in order to avoid air entering the system.

If the machine runs out of fuel during operation, refuel and refer to **page 146** for proper instructions to bleed the air out of the fuel system.

The capacities of fuel tank, see **page 186**.

Engine coolant temperature



S87062A

The gauge shows the temperature of the engine coolant and it has a red mark on the right end meaning "engine overheated".

IMPORTANT! If the temperature becomes abnormally high, the pop up screen will light up, see **page 35**. If this happens, turn off the engine immediately and investigate the cause.

3 Engine speed

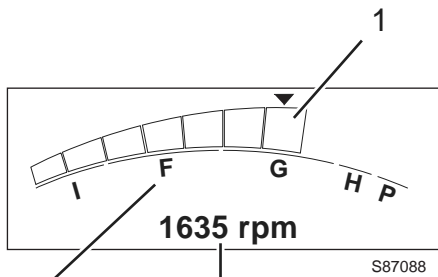
Engine speed screen is displayed when the "Menu screen" is not shown in "Main screen". For main menu screen, see **page 27**.

The "Engine speed step" selected on "Engine speed control switch" is displayed on an engine speed graph that is a segmented rainbow-coloured bar graph.

The actual speed is displayed below the engine speed graph (maximum four-digit number).

When the engine is turned off, engine speed is displayed as "0", but if there is no available engine speed information on the network, "----" is displayed instead of engine speed value.

NOTE! Engine speed and working mode may vary according to the optional equipment.

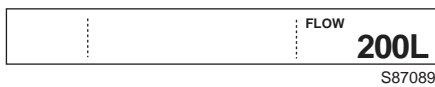


S87088

- 1 Engine speed step
- 2 Working mode index
- 3 Actual engine speed

4 Mode screen

Calculated value for X1 flow option is displayed on the segment called "Flow segment". Refer to **page 30** for flow setting instructions.



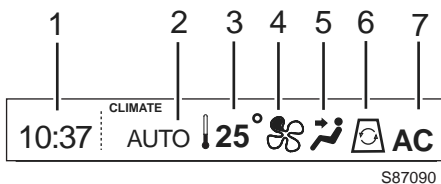
S87089

Flow rate for X1

5 Time and ECC

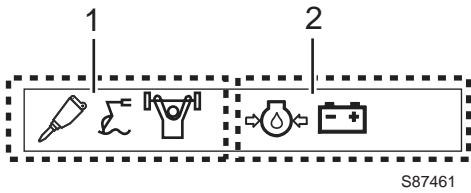
Time segment displays current time. Refer to **page 33** for instructions on how to set current time in the main screen.

ECC segment displays the status of the ECC (Electronic Climate Control unit). This includes temperature setting, fan speed, airflow direction, circulation, and air-conditioning status. Refer to **page 39** for more details.



S87090

- 1 Time
- 2 Air conditioner mode
- 3 Temperature
- 4 Fan speed
- 5 Air flow direction
- 6 Air flow circulation
- 7 Air-conditioning status



- 1 Function indicators
- 2 Warning indicators



Fixed indicators and positions

6 Indicators

Indicator screen displays indicators as symbols that represent important meaning to inform the users easily and quickly.

Indicators are divided into two, function indicator and warning indicator.

- Indicators fill the space from left to right.
- An Indicator that has higher priority is put on the left side of the one that has lower priority.
- Indicators in both sides can extended their displaying area to the other side if there is no indicator in the other side.
- When the all area is filled and there are more indicators to display, indicators keep replacing the others so that the user can see all indicators.

Indicators and their priorities are as follows,

(Function indicators)



S87104

1 Air preheating



S87102

2 Power boost selected



S87118

3 Hammer selected (optional)



S87118A

4 Shear selected (optional)



S87112

5 Overload indicator (optional)



S87101

6 Float position (optional)



S87132

7 Working light



S87130

8 Rototilt selected



S87130

Service mode selected (fixed position)



S87133

Message indicator (fixed position)



S87189

Pattern changer status (fixed position)



S87140

Pattern changer status (fixed position)

(Warning indicators)



S87106

1 Low engine oil pressure



S87105

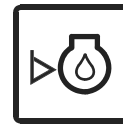
2 Low coolant level



S87112

3 Overload (optional)

Warning! Stop the lifting operation and reduce the load.



S87119

4 Low engine oil level



S87111

5 Open attachment bracket (quick fit, optional)

Stop the work immediately if the bucket is still attached to the bracket



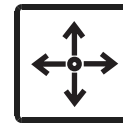
S87110

6 Wrong battery charge



S87107

7 High engine coolant temperature



S87134

8 Pattern changer warning



S87103

9 Clogged engine air filter



S87143

10 Auto lubrication warning



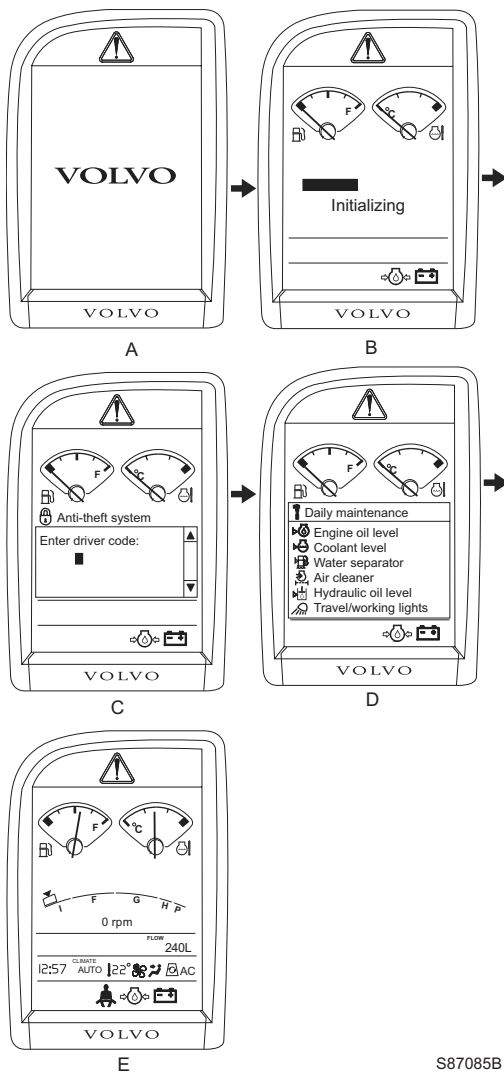
S87101

11 Low fuel level



S87108

12 High hydraulic oil temperature



- A Volvo logo
 B Initializing
 C Anti-theft system (optional)
 D Daily maintenance
 E Ordinary screen

S87085B

Booting sequence

Initial booting sequence is done as follows.

A Volvo logo

If the user turns the ignition key to ON position, the Volvo logo on the I-ECU screen lights up for a few seconds.

B Initializing

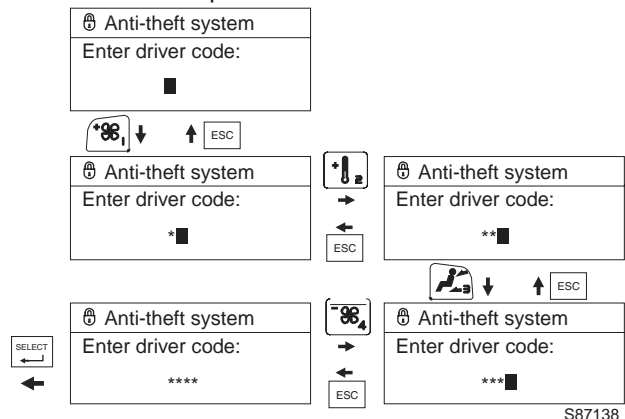
After the Volvo logo lights up, the user can see the status of initialization process that is required by the operating system. At this step, I-ECU will initialize all internal devices and its operating system.

NOTE! It takes a few seconds for the system to turn on the initial status; however, if the battery disconnect switch is turned off, it will take a few seconds longer for the system to initiate after the switch is turned back on. The machine can be turned on and engine mode can be changed during this period.

C Anti-theft system (Anti-theft system)

The optional anti-theft system is only displayed if this optional equipment is selected.

- **Enter driver code (Enter driver code):** To display this screen on booting sequence, certain time should be passed after turning off the engine. The default time is 15 seconds and it is changeable. Contact your Volvo CE dealer to activate/deactivate this function. After entering the driver code (4 digits 0–9), SELECT button should be pressed.



S87138

D Daily maintenance (Daily maintenance)

The user can see the daily maintenance items once a day. This screen is dismissed by pressing ESC button or SELECT button and disappears automatically after 5 seconds if there is no button input.

- Engine oil level (Engine oil level)
- Coolant level (Coolant level)
- Water separator (Water separator)
- Air cleaner (Air cleaner)
- Hydraulic oil level (Hydraulic oil level)
- Travel/Working lights (Travel/working lights)

E Ordinary screen

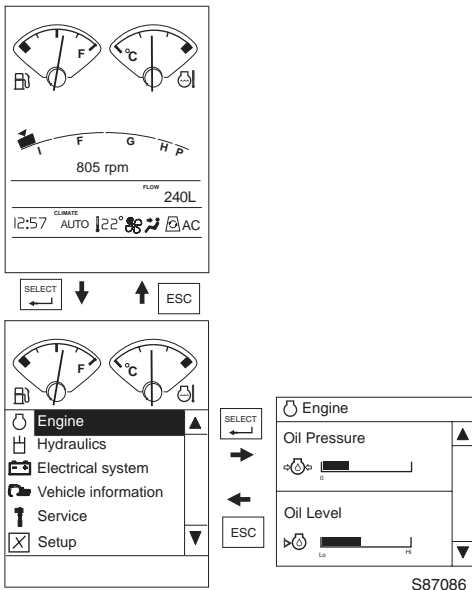
After the booting is completed, the ordinary screen is displayed.

NOTE! Indicator for seat belt will be displayed for 3 seconds in "Daily maintenance" screen or ordinary screen. Fasten the seat belt before operating the machine.

Main menu

The main menu is reached by pressing the SELECT button on the keypad.

Scroll the list by using the arrow buttons on the keypad. When a folder is highlighted, its sub screens are shown when pressing the SELECT button. Use the arrow buttons to scroll between the sub screens. Interrupt the action at any time by pressing the ESC button on the keypad.

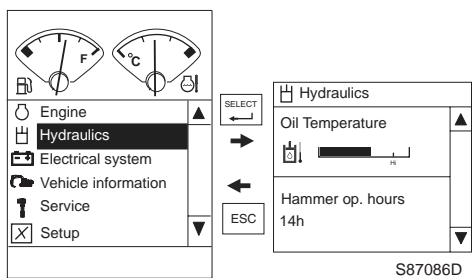


1 Engine (Engine)

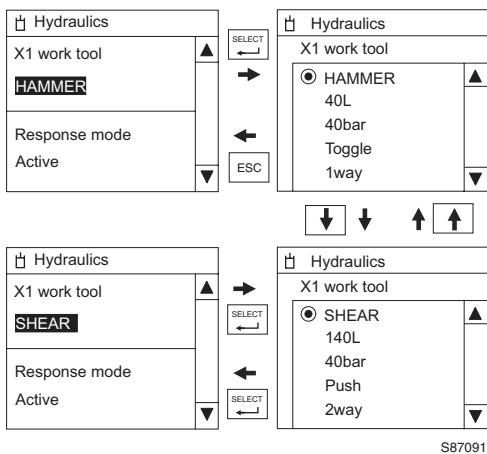
- **Oil pressure (Oil pressure):** This shows the measured value of the engine oil pressure. When the bar graph is green, the value is ok, within normal operation range. When the bar graph is red, the value is abnormal.
- **Oil level (Oil level):** This shows the measured value of the engine oil level. When the bar graph is green, the value is ok, within normal operation range. When the bar graph is yellow, the value is abnormal.

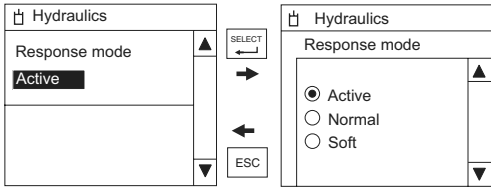
2 Hydraulics (Hydraulics)

- **Oil temperature (Oil temperature):** This shows the measured value of hydraulic oil temperature. When the bar graph is green, the value is ok, within normal operation range. When the bar graph is red, the value is abnormal.
- **Hammer op. hours (Hammer op. hours):** This shows the counted value of hammer operating time in the unit of hour.

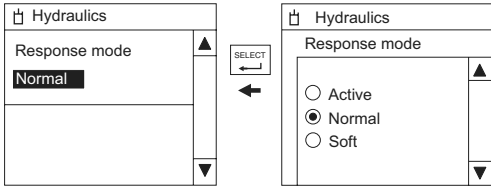


- **X1 work tool (X1 work tool):** This informs the operator which tool is selected at the moment. It also allows the operator to select a preset tool showing the name and settings of each tool. When pressing the arrow button, another preset work tool is displayed. When pressing the SELECT button for another tool, the screen reverts the screen to the former screen displaying the name of the newly selected tool.

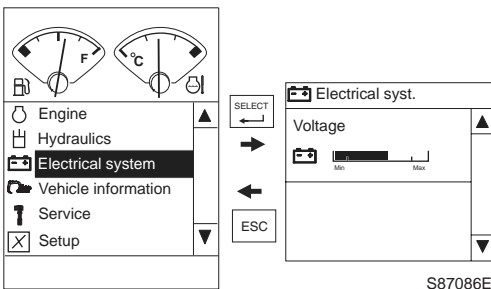




S87092



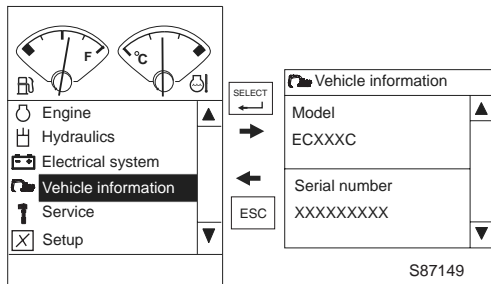
- **Response mode (Response mode):** This informs the operator which response mode is selected at the moment. It also allows to select a response mode from 3 different modes. The operator can select a response mode from the three modes with the arrow buttons. When pressing the SELECT button, the marked response mode is set. The screen reverts to the former screen displaying the name of the newly selected item.
 - Active (Active)
 - Normal (Normal)
 - Soft (Soft)
- Operator can adjust the movement sensitivity of attachments when operating the levers. "Active" mode is the most sensitive.



S87086E

3 Electrical system (Electrical system)

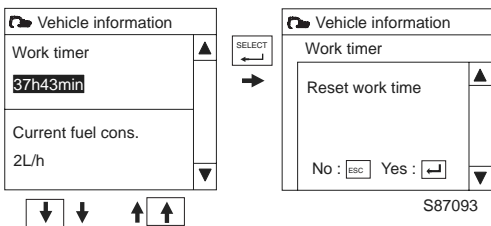
- **Voltage (Voltage):** This shows the measured value of voltage of the battery. When the bar graph is green, the value is ok, within normal operation range. When the bar graph is red, the value is abnormal.



S87149

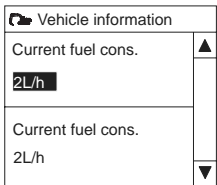
4 Vehicle information (Vehicle information)

- **Model (Model):** This shows the model name of the machine.
- **Serial number (Serial number):** This shows the serial number of the machine.

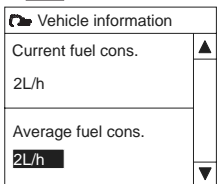


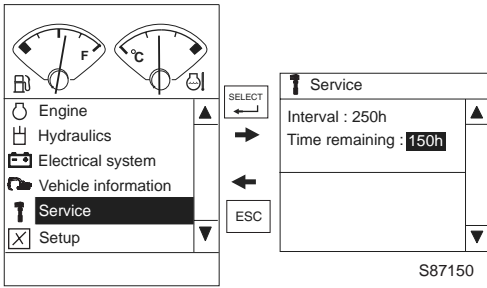
S87093

- **Work timer (Work timer):** This shows the counted working time.
 - Reset work time (Reset work time): Work time can be reset by pressing the SELECT button when the "Work timer" value is highlighted. Pressing SELECT button results in a "Yes/No (Yes/No)" question on the screen. Press ESC button for "No (No)" or SELECT button for "Yes (Yes)".

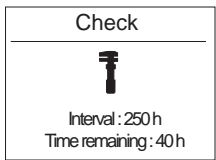


- **Current fuel cons. (Current fuel cons.):** This shows the calculated fuel consumption at the time.
- **Average fuel cons. (Average fuel cons.):** This shows the calculated average fuel consumption at the time.
- **Ambient temp (Ambient temp):** This shows the measured ambient temperature.





S87150



S87152

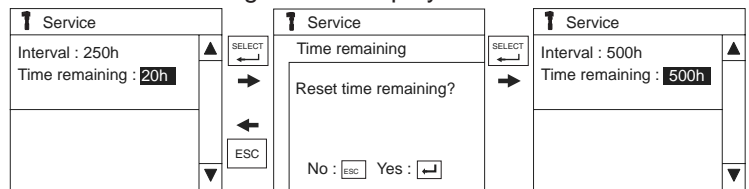
(Check screen for maintenance)

5 Service (Service)

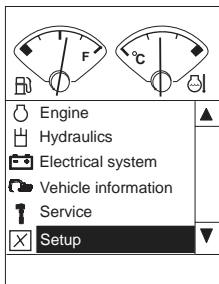
- **Interval (Interval):** This shows the value of service interval with the unit of hours. First interval is 250 h and then the service interval is every 500 h.
- **Time remaining (Time remaining):** This shows the value of remained time for next service.

When the "Time remaining" reaches at 40 h, 20 h and 0 h, check screen with "Interval" and "Time remaining" will pop up on I-ECU. Service the maintenance items which should be serviced in that interval. For the service interval and maintenance items, see page 174.

- **Reset time remaining? (Reset time remaining?):** After servicing the maintenance items, the time can be reset. Pressing SELECT button results in a "Yes/No (Yes/No)" question on the screen. Press ESC button for "No (No)" or SELECT button for "Yes (Yes)". When the time is reset, the next service interval and "Time remaining" will be displayed.



S87144



S87151

6 Setup (Setup)

There are sub items, "X1 work tool", "X3 Operation", "Language", "Units", "Time/Date", "Display light" and "Keypad backlight".

Refer to page 30 for more details.

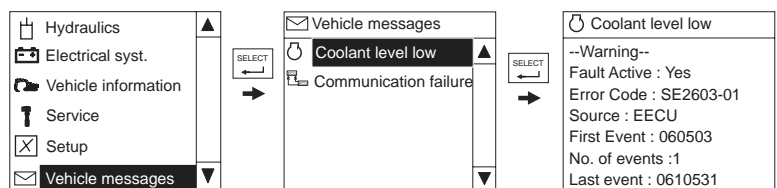
7 Vehicle message (Vehicle message)

This shows the headlines of messages. There are no errors or warning messages in normal operation.

If an abnormal condition is sensed, then the message will display the specific error/failure. Contact your Volvo CE dealer service department for advise if needed.

When pressing the SELECT button to view detail information about a headline, the displayed information replaces the whole "main screen". The contents of information include,

- Fault Active (Fault Active)
- Error Code (Error Code)
- Source (Source)
- First Event (First Event)
- No. of events (No. of events)
- Last event (Last event)



S87094

Setup (Setup)

1 X1 work tool (X1 work tool)

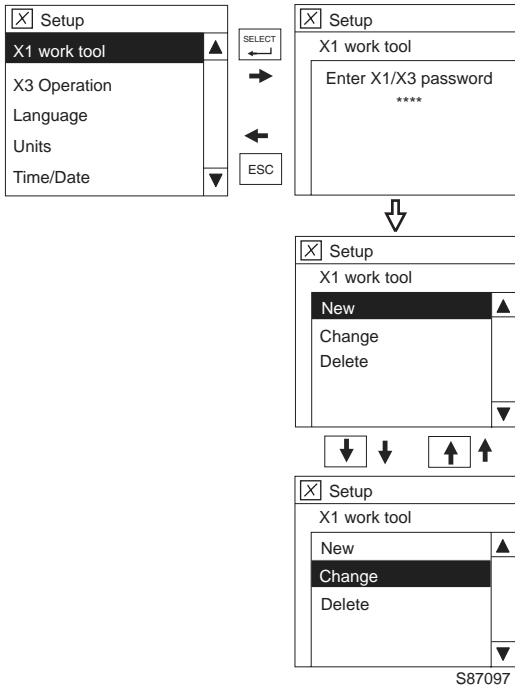
This is to preset the X1 setting so that operators use it just by selecting the tool from the list.

Enter X1/X3 password (Enter X1/X3 password): Enter the password to proceed the setting for X1 tools. The password screen is displayed when the password is ever set by VCADS Pro.

There are 3 sub items which are,

- New (New)
- Change (Change)
- Delete (Delete)

Use the arrow buttons to place the cursor (highlighting bar) on the required item, and then press the SELECT button.



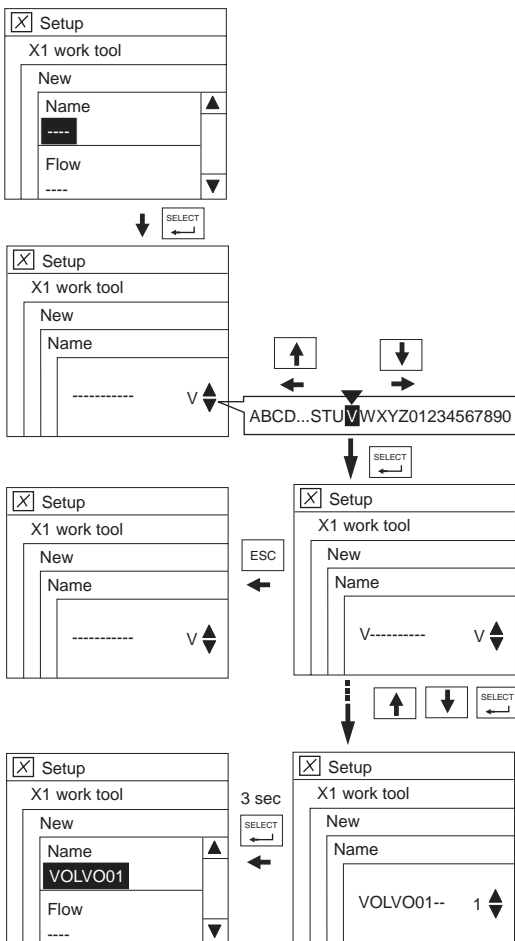
S87097

New (New)

The New setting is used to add new X1 tools. Follow the steps from 1 through 7, described below, to set and "Save" the parameters for the new attachment desired.

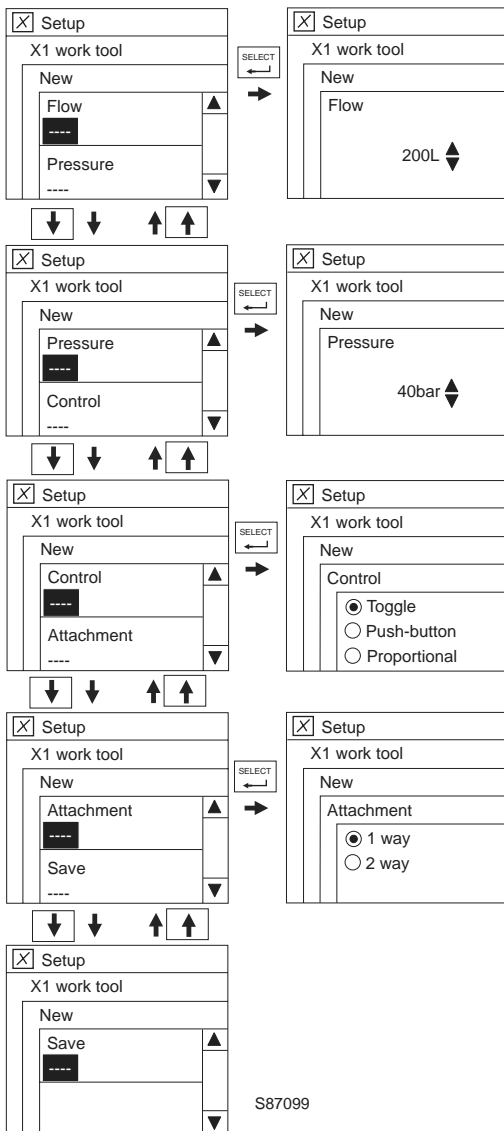
NOTE! If "Save" procedure described in 7 is not done, all settings are cancelled automatically.

- 1 Select "New" after entering "X1 work tool".
- 2 **Name (Name):** Enter the name of the tool.
 - Use the arrow UP and arrow DOWN button to select the characters (A,B...Z,0,1...9).
 - Use SELECT button to enter the selected character.
 - Use ESC button to delete the character entered.
 - Press SELECT button more than 3 seconds to save the name.
 - Press ESC button more than 3 seconds to escape without saving the name.

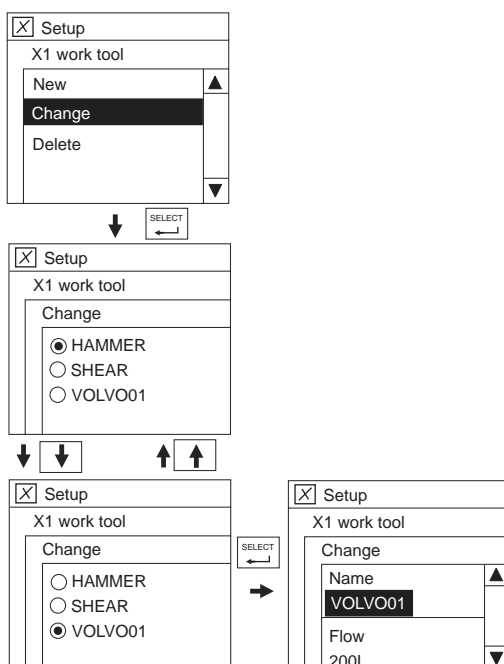


S87098

Entering the name



S87099



S87100

3 **Flow (Flow)**: Set the flow rate when this optional function is selected.

- Select the preferred flow rate value using arrow buttons.
- Save the selected value using the SELECT button. Use ESC button to escape without saving.

4 **Pressure (Pressure)**: Set the pressure when this optional function is selected.

- Select the preferred pressure value using arrow buttons.
- Save the selected value using the SELECT button. Use ESC button to escape without saving.

5 **Control (Control)**: Choose the control type.

- Select the preferred control type using arrow buttons.
- Save the selected item using the SELECT button. Use ESC button to escape without saving.

For the information of control types, see page 38.

- Toggle (Toggle)
- Push-button (Push-button)
- Proportional (Proportional)

6 **Attachment (Attachment)**: Choose the 1 way (1 way) or 2 way (2 way) control.

- Select the preferred setting using arrow buttons.
- Save the selected item using the SELECT button. Use ESC button to escape without saving.

7 **Save (Save)**: Save the setting.

- Select "Save" and press the SELECT button to save all the setting including "Name", "Flow", "Pressure", "Control", and "Attachment".

NOTE! After entering the new settings, the "Save (Save)" procedure should be done to record the new parameters into the system memory. If "Save" procedure is not done, all the settings will be cancelled automatically.

- If some items are not set up, the error message "Fill out all items (Fill out all items)" will appear.

8 The added X1 tool is newly listed.

Change (Change)

This is to modify the setting of preset X1 tools.

1 Select "Change" after entering "X1 work tool".

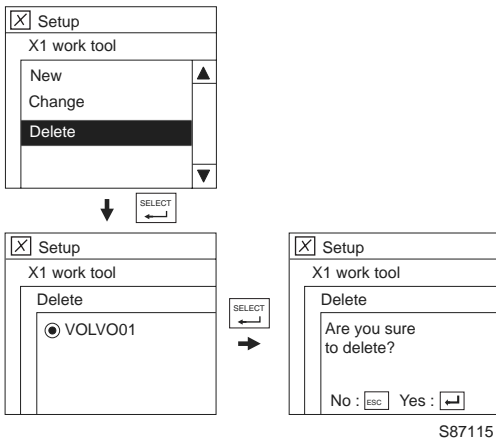
2 Select the tool to be modified using the arrow buttons and press the SELECT button.

3 Follow the same procedures from 2 to 7 explained in "New" section described above to change the setting.

4 There are some restrictions to modify the setting:

- The "Name" of two default X1 tools "HAMMER" and "SHEAR" are not modifiable.
- The "HAMMER" can not be "2 way".

The modified X1 tool is listed.



Delete (Delete)

To delete the preset "X1 work tool" proceed as follows:

- 1 Select "Delete" after entering "X1 work tool".
- 2 Select the tool to delete using arrow buttons and press the SELECT button.

NOTE! Current preset X1 tool and default tools are not displayed.

Are you sure to delete ? (Are you sure to delete ?): Confirming message is displayed on the screen, press the SELECT button for "Yes (Yes)" or the ESC button for "No (No)".

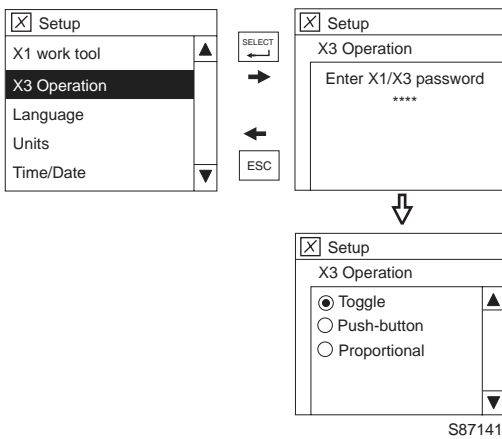
2 X3 Operation (X3 Operation)

Enter X1/X3 password (Enter X1/X3 password): Enter the password to proceed the setting for X3 tools. The password screen is displayed when the password is ever set by VCADS Pro.

Place the mark at the preferred item from the three listed with the arrow button.

When the SELECT button is pressed, the marked item is set. The screen reverts to the former screen displaying the newly selected item.

Refer to **page 38** for more detailed information on control types.

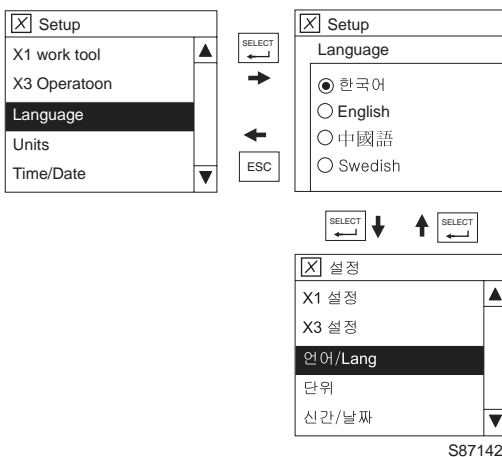


3 Language (Language)

Supported languages are listed in the screen in the form of their own languages.

Use the arrow buttons to scroll up and down to find your specific language. Press the SELECT button to select the chosen. The screen reverts to the former screen displaying the newly selected language

When the operator sets a language that is not english, "Lang" is written in both the selected languages and English.

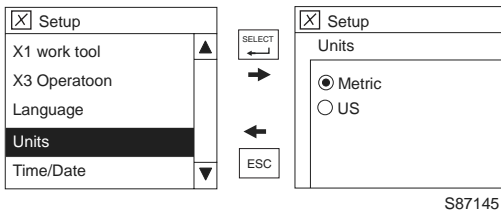


4 Units (Units)

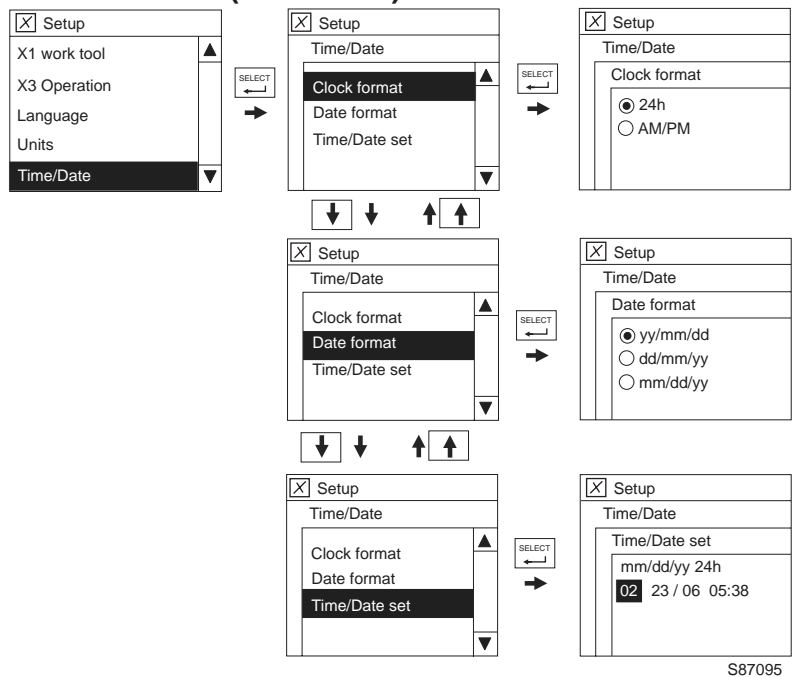
Two unit systems is displayed: "Metric" and "US". Operator can select one of the two using the arrow button and save it by pressing SELECT button.

The units stored in I-ECU are as follows.

Items	Metric	US
Time	h	h
Fluid rate	l/h	USgal/h
Volume	L	USgal
Voltage	V	V
Current	A	A
Temperature	°C	°F
Revolution	rpm	rpm
Speed	km/h	mph
Pressure	bar	psi
Distance	km	mile



5 Time/Date (Time/Date)



- **Clock format (Clock format):** The items "24h" and "AM/PM" decide how the I-ECU describes the time, 24-hour-system or 12-hour-system.
- **Date format (Date format):** The items "yy/mm/dd", "dd/mm/yy", and "mm/dd/yy" decide how the I-ECU describes the date. "yy" means year, "mm" means month, and "dd" means day.
- **Time/Date set (Time/Date set):** This is to adjust the time and date. The preset clock and date format is shown in the first row of the screen. Operator can adjust the time and date with arrow, ESC and SELECT buttons. SELECT and ESC buttons are used to proceed or go back the cursor. Arrow buttons are used to adjust each segment of the time and date.

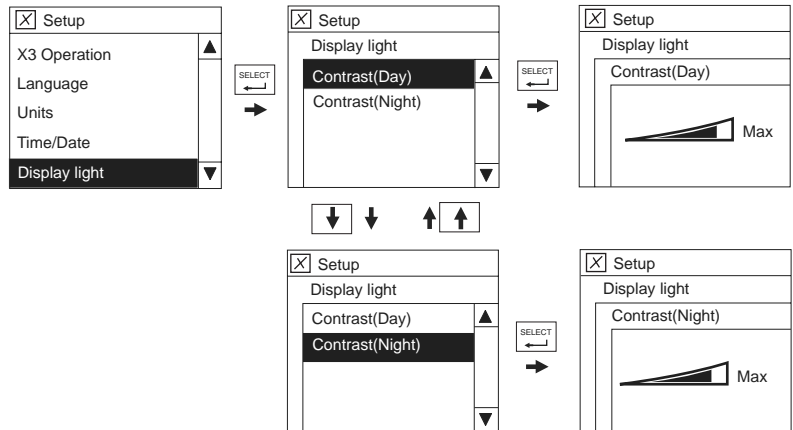
6 Display light (Display light)

This is to change the contrast of the I-ECU. The adjusting bar in the screen is controlled by arrow buttons and the value is set by SELECT button.

The contrast is adjustable for day and night independently.

- **Contrast(Day) (Contrast(Day))**
- **Contrast(Night) (Contrast(Night))**

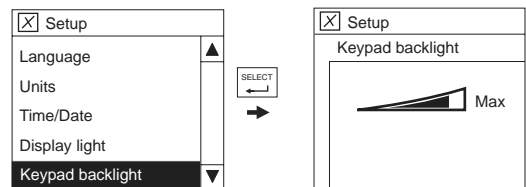
When adjusting the "Contrast(Night)", the working lamp of the machine should be turned on.



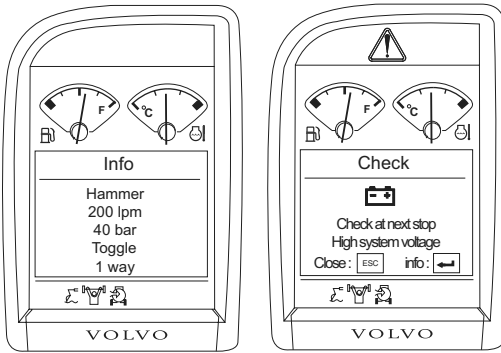
S87096

7 Keypad backlight (Keypad backlight)

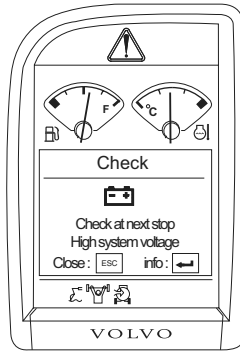
The brightness of the keypad backlight is changed by the adjustment. The adjusting bar in the screen is controlled by arrow buttons and the value is set by SELECT button.



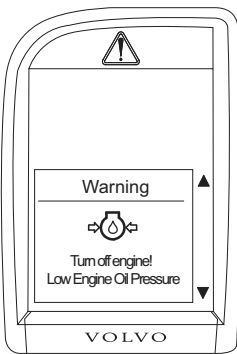
S87096A



A



B



C

S87087

Pop-up screens

A	Info	Info screen
B	Check	Check screen
C	Warning	Warning screen

Pop-up screens

The pop-up screens are divided into three groups:

1 Info screen

- This screen is to give useful information about the machine.
- The main screen is replaced by a green-outlined box with title of "Info". The buzzer alarm sounds on only 1 time.
- The "Info screen" disappears automatically in 2 seconds.

2 Check screen

- This screen is to inform the operator when a partial failure of the machine is detected.
- The main screen is replaced by a yellow-outlined box with title of "Check". The buzzer alarm sounds 4 times.
- To get more information about the message on the screen, press the SELECT button. To go back to the user's screen, press the ESC button.

3 Warning screen

- This screen is to warn the operator when the electronic system senses a machine malfunction or a safety related failure. Stop the machine immediately and investigate the cause.
- The whole I-ECU screen is replaced by a red-outlined box with title of "Warning".
- A warning alarm sounds when the "Warning screen" pops up.
- When the ESC button is pressed, the warning sound will stop and the central warning lamp will be turned off. To dismiss the "Warning screen", ESC button should be pressed again. The message will not appear again as long as the power is switched on even though the error signal is still valid.
- To get more information about the message, refer to the "Vehicle message" in the main menu.

NOTE! When error messages related with common rail pressure problem happen, buzzer and central warning will keep going on regardless of any key operations. Contact your Volvo CE dealer.

Error messages related with common rail pressure

- 1 E-ECU Common rail pressure sensor : SE2309-0/1/2/4/5
- 2 E-ECU Effective torque common rail : PPID435-0/1
- 3 E-ECU Rail pressure system : PSID96-0/1/4/7/12
- 4 E-ECU Pressure release valve : PSID97-0/7/11/14
- 5 E-ECU CR fuel control unit(FCU) : PWM2303-3/4/5/6/13

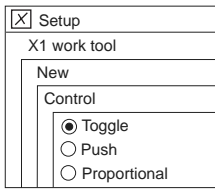
Warning

Turn off battery sw Engine air heater	Turn off engine Boost temp high	Turn off engine Engine oil press low
Turn off engine Engine error	Turn off engine Engine oil temp high	Turn off engine Eng coolant temp high
Turn off engine Eng coolant level low	Quick fit failure	Computer failure
Hydraulic oil Temperature high	High system voltage	Stop machine Pattern signal failure
Travel alarm Relay failure	Stop lifting Reduce load	Low system voltage

Check

Interior temperature Sensor failure	Ambient temperature Sensor failure	Climate system error
Engine air heater failure	Fuel filter clogged Check at next stop	Water in fuel Check at next stop
Engine error Check at next stop	Engine oil temp high	Eng air filter clog Check at next stop
Engine oil level low Check at next stop	Engine speed Sensor failure	Communication failure
Fuel level low Check at next stop	Fuel level Sensor failure	Generator Voltage failure
Clock failure	Error in X1 setting Set X1 work tool	Error in X3 setting Set X3 operation
Cooling fan failure	Battery relay failure Check at next stop	Auto lubrication System

Hydraulic system failure	Start lock RE failure Check at next stop	Float position failure
RPM switch failure	Hammer select failure	Start key failure
Fuse-Relay failure Check at next stop	Fuse-PWM failure Check at next stop	Fuse-Solenoid failure Check at next stop
Hydraulic oil temp Sensor failure	X1 PWM input failure	X3 PWM input failure
Shear select failure	Dozer blade pressure sensor failure	Boom up pressure sensor failure
Boom down pressure sensor failure	Bucket pressure sensor failure	Swing pressure sensor failure
Arm in pressure sensor failure	Arm out pressure sensor failure	Travel left pressure sensor failure
Travel right pressure sensor failure	X1 pressure sensor failure	X2 pressure sensor failure
Quick fit failure		



S87146

Control types for X1 and X3

Control types for X1 and X3 operation

- Toggle
- Push
- Proportional

If a machine has a "proportional control option" for X1 or X3, the user can set one of these 3 types. Otherwise the user is only allowed to set one of 2 types that are "Toggle" or "Push". Refer to **page 63** for more details on optional levers.

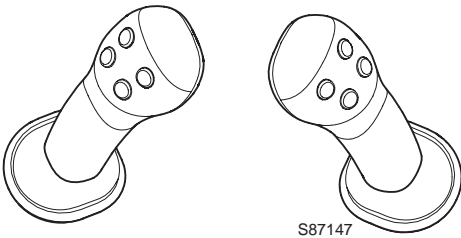
Control using on/off switch on the control lever

1 Toggle type in I-ECU

Actuator for X1 or X3 is activated by pressing the on/off switch on the control lever and it will stay active even when the switch is released. The actuator will be deactivated when the same switch is pressed again or the other switch for opposite direction is pressed.

2 Push type in I-ECU

Actuator for X1 or X3 is activated while the on/off switch is pressed (On position). The function will be deactivated when the on/off switch is released.



S87147

Control lever with on/off switch

Control using proportional switch on the control lever

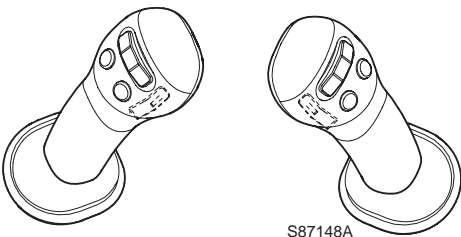
1 Toggle and Push-button type in I-ECU

These controls with proportional switch are similar as the ones with on/off switch but it has a special point to activate the actuator because the proportional switch also has a proportional value.

In toggle type, the actuator will be activated by moving the proportional switch to one direction and it will be deactivated when the switch is moved to same direction again or to opposite direction.

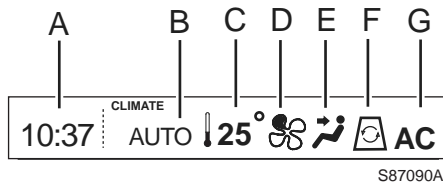
2 Proportional type in I-ECU

Actuator for X1 or X3 is activated proportional to the movement of the proportional switch.

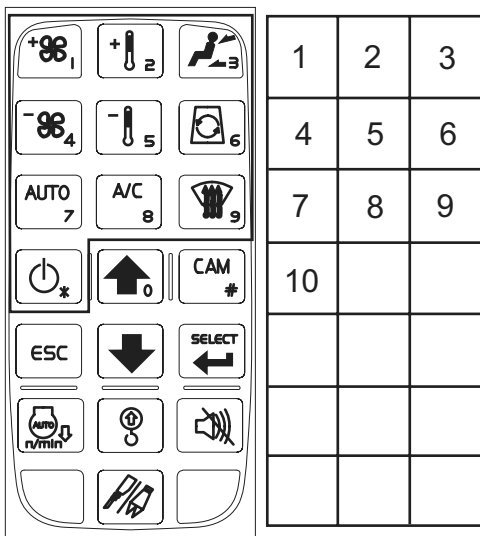


S87148A

Control lever with proportional switch



- A Time
- B Air conditioner mode
- C Temperature
- D Fan speed
- E Air flow direction
- F Air flow circulation
- G Air-conditioning status



- 1 Fan speed control button +
- 2 Temperature control button +
- 3 Air flow direction button
- 4 Fan speed control button -
- 5 Temperature control button -
- 6 Air flow circulation button
- 7 Auto mode selection button
- 8 A/C button
- 9 Defroster selection button
- 10 HVAC system on/off button

HVAC (Heating, Ventilation, Air-Conditioning) system

The machine can be equipped with different kinds of system, for example, with air conditioning unit or heater with air conditioning unit. Before operating the system, check the detail information of your machine.

Fan speed control

Press buttons 1 or 4 to increase or decrease the fan speed.

When pressing any of these two switches, the auto mode will be automatically switched to manual mode.

Temperature control

Press buttons 2 or 5 to raise or lower the temperature.

Default setting value is 22°C and setting range is 16°C ~ 32°C. If the temperature sensor in cabin is malfunction, auto mode shall be turned off.

See page 33 for details on how to switch the unit of temperature from degrees Centigrade to Fahrenheit.

Air flow direction

Press button 3 to select the direction of the air flow.

When pressing the button, auto mode will be automatically changed to manual mode.

Air flow circulation

Press button 6 to select the circulation of the air flow; recycle the air inside the cab or draw fresh air from the outside into the cab.

When the defrost mode is activated, the fresh air mode is automatically selected.

Auto mode

Press button 7 to select auto mode for temperature setting.

Required temperature can be changed with buttons 2 and 5.

A/C

Press button 8 to activate the air conditioning.

Defroster

Press button 9 to activate the defroster. The fresh air mode is automatically selected.

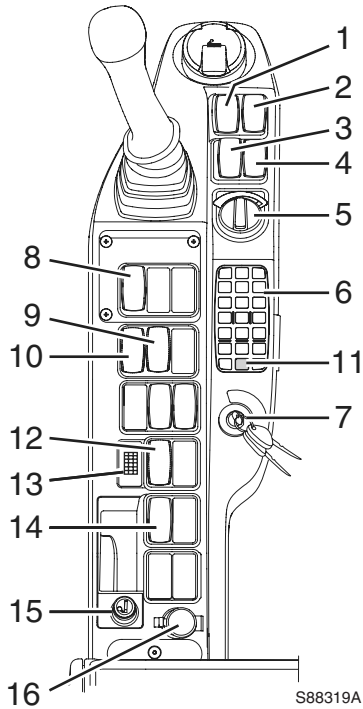
In auto mode, if this button is pressed, mode shall be changed to manual mode.

HVAC system on / off

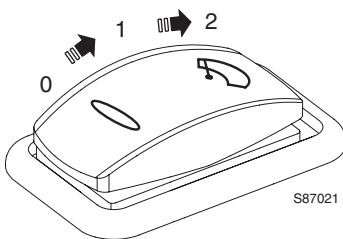
Press button 10 to turn the HVAC system on or off. All settings remains if the system is turned off.

NOTE! Even if HVAC system is turned off, when ECC (Electronic Climate Controller) gets auxiliary heater signal, ECC turn on the cooling fan setting 1st step in manual mode.

Right instrument panel



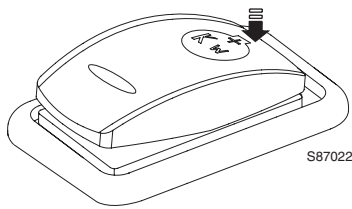
1	Upper wiper switch	9	Working lamps switch
2	Power maximum mode switch (optional)	10	Extra work lamps switch (optional)
3	Lower wiper switch (optional)	11	Hammer / shear selection button (optional)
4	Washer switch	12	Beacon switch (optional)
5	Engine speed / work mode control switch	13	Cabin air temperature sensor
6	Key pad	14	Water separator heater switch (optional)
7	Ignition key	15	Cigarette lighter
8	Travel speed switch	16	Power socket



1 Upper wiper switch

- Position 0 Upper wiper is switched OFF
- Position 1 Upper wiper is switched ON intermittently
- Position 2 Upper wiper is switched ON continuously

IMPORTANT! Do not lift the front window while the wiper motor is running.



2 Power maximum mode switch (optional)

Lower end of switch pressed down = power maximum mode ACTIVATED (the switch is automatically returned).

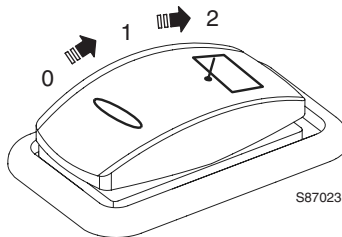
At 9 step of the engine speed control switch

Normal condition = H mode

Lower end of switch pressed down = P mode

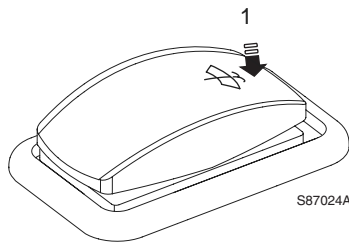
If the machine is not operated in the **P** mode for more than 5 seconds and the auto idle selector switch is activated, the engine speed automatically goes down to idle mode. When the machine is operated again, it is returned to **P** mode again.

At the **P** mode, it become H mode if 9 step is selected after turning the engine speed control switch to another step.



3 Lower wiper switch (optional)

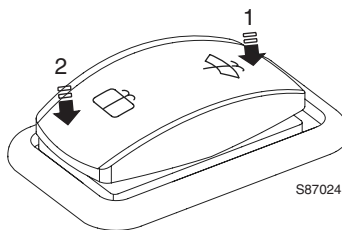
- | | |
|------------|---|
| Position 0 | Upper wiper is switched OFF |
| Position 1 | Upper wiper is switched ON intermittently |
| Position 2 | Upper wiper is switched ON continuously |



4 Washer switch (upper only)

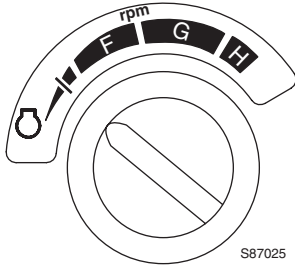
Press down 1 Washer for upper window ON
The switch is automatically returned.

IMPORTANT! Never press the washer switch for more than 20 seconds. Do not use if the washer fluid container is empty.



Washer switch with lower wiper (optional)

Press down 1 Washer for upper and lower window ON
Press down 2 Washer for lower window ON
The switch is automatically returned.



5 Engine speed / work mode control switch

Nine (ten in cases where P mode is used) different throttle positions are available through the control of this switch.

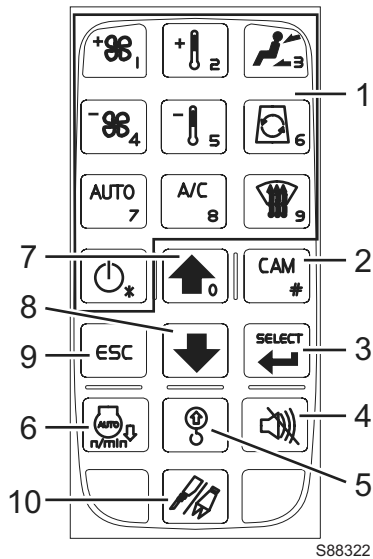
Turning this switch, the engine speed will change incrementally. According to the selected engine speed, working mode will be set automatically and setting mode is displayed on the main screen in front instrument panel.

Except North America

Mode		Switch step	Engine speed (± 40 rpm) no load/load	Remarks
Power max	P	9	2100 / 2000	For maximum productivity during hard digging and trenching
Heavy	H		2000 / 1900	For slightly hard operations
General	G1	8	1900 / 1800	For economical operation during general applications
	G2	7	1800 / 1700	
	G3	6	1700 / 1600	
Fine	F1	5	1600	For Maximum lifting power and moderate control
	F2	4	1500	
	F3	3	1400	
Idle	I1	2	1100	For low idle, warm-up, and very precise operation
	I2	1	950	

North America

Mode		Switch step	Engine speed (± 40 rpm) no load/load	Remarks
Heavy	H	9	2100 / 2000	For maximum productivity during hard digging and trenching
General	G1	8	2000 / 1900	For economical operation during general applications
	G2	7	1900 / 1800	
	G3	6	1800 / 1700	
Fine	F1	5	1700	For Maximum lifting power and moderate control
	F2	4	1600	
	F3	3	1500	
Idle	I1	2	1100	For low idle, warm-up, and very precise operation
	I2	1	950	



- 1 HVAC control buttons
- 2 Rearview camera button
- 3 Select button
- 4 Buzzer stop button
- 5 Overload warning button
- 6 Auto idle button
- 7 Arrow up button
- 8 Arrow down button
- 9 ESC button
- 10 Hammer / shear selection button

6 Key pad

1) HVAC control buttons

HVAC control buttons are used to control the HVAC system. See page 39.

2) Rearview camera button

Rearview camera button turns on/off "Rearview camera screen" when this optional camera is equipped. When the rearview camera screen is turned on, whole I-ECU screen displays only view from the optional "rearview camera".

3) Select button

This button is used to confirm the item or setup the user select.

4) Buzzer stop button

Buzzer stop button is used to activates or deactivates "Travel alarm" function of V-ECU.

5) Overload warning button

Overload warning button activates or deactivates "Overload warning" function. This button is to display symbol and to make alarm if the "overload signal" is detected.

- First event of overloading : The pop up message will be displayed and a warning alarm sounds. The warning indicator also displayed on indicator screen. The pop up message will disappear only when the ESC button is pressed.
- When the event occurs again when operating the machine : A warning alarm sounds and the indicator is displayed. When reducing the load, the alarm and indicator will be off.

6) Auto idle button

Auto idle button activates or deactivates "Auto idle" function of V-ECU.

The engine speed will be lowered automatically to idle mode to reduce fuel consumption if any of control levers, travel levers (pedals) or engine speed control switch are not operated for 5 seconds. If any one of the above is operated, the engine speed returns to the speed set with the engine speed control switch.

7) Arrow up button

This button is used to scroll between items and adjust the each segment on the screen.

8) Arrow down button

This button is used to scroll between items and adjust the each segment on the screen.

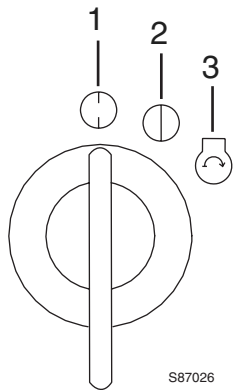
9) ESC button

This button is used to go back to the previous screen or to escape without saving.

The ESC button is also used to turn off the warning lamp and sound.

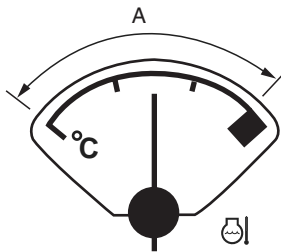
10) Hammer / shear selection button

This button is used to activate hammer / shear fuction.



S87026

- 1 Stop position
- 2 Running (preheating) position
- 3 Starting position



S87062

7 Ignition key

This ignition key has three positions. Make sure to activate the battery disconnect switch before trying to start engine.

Stop position (1)

Turn key to position 1 to stop engine.

Running (preheating) position (2)

The machine is equipped with automatic engine preheating system. When the ignition key is turned to position 2, the vehicle's electronic system will be active; thus, activating the engine automatic preheating system.

IMPORTANT! ! The automatic preheating function remains active as long as the engine temperature is below 20 °C (68 °F). Once the ignition key is turned ON (Position 2), warm up the engine fully. **DO NOT** turn the ignition key OFF and back ON repeatedly while the engine temperature is under 20 °C (68 °F). Failure to do so could result in overheating of the preheating function wire harness causing cable fire. Make sure that the engine temperature gauge is within the "A" range, as shown in the figure, before turning the ignition key OFF and ON again for service or troubleshooting.

Starting position (3)

When the ignition key is turned to position 3, the starter will be engaged to run the engine, provided that the battery disconnect switch has been activated. The starter will not turn as long as the control lockout lever is unlocked (up) position. Refer to **page 69** for details on the control lockout lever.

8 Travel speed switch

- Position 0 Travel at LOW speed only
 Position 1 Travel at LOW or HIGH by automatic shift in accordance with the travel condition

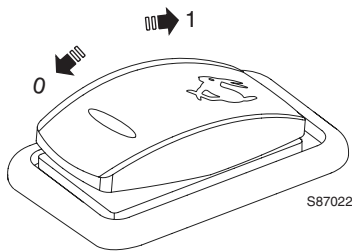
IMPORTANT! Make sure to stop the machine before changing the travel speed.

Travel at low speed on a slope, soft ground or confined place.

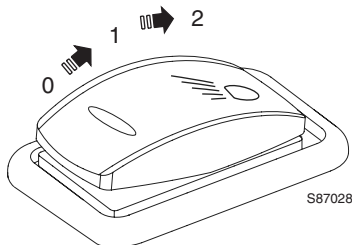
Manually select the low travel speed before loading or unloading machine on a trailer.

9 Working lamps switch

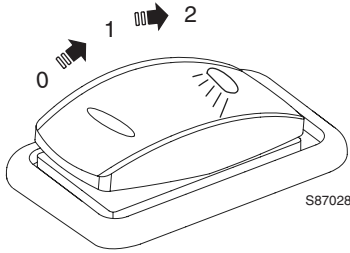
- Position 0 Working lamps are switched OFF
 Position 1 Instrument panel lamp and deck working lamps ON.
 Position 2 Instrument panel lamp, deck working lamps and boom working lamps ON.



S87022

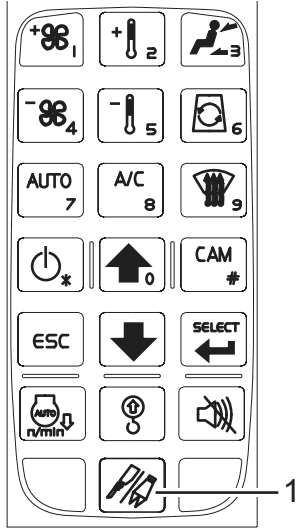


S87028



10 Extra working lamps switch (optional)

- Position 0 Extra work lamps are switched OFF
- Position 1 Extra work lamps are switched ON (cab front)
- Position 2 Extra work lamps are switched ON (cab front, cab rear and counterweight))



11 Hammer / shear selection button (optional)

Hammer / shear selection button is located on the key pad.

Before operating below functions, hammer / shear selection button should be activated.

NOTE! This instruction can be changed according to the types of operating lever. For more information about operating lever, see page 63.

NOTE! Select the X1 tool on the I-ECU, see page 27 for details.

If a pedal is provided with X1 (hammer/shear) option.

NOTE! The pedal should be adjusted whether it is used for hammer or shear. Refer to page 66 for details.

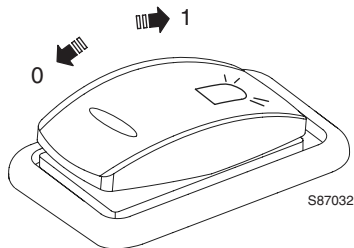
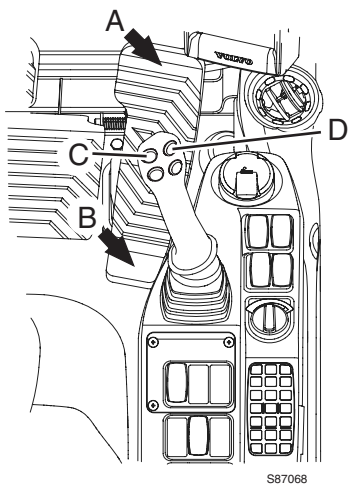
- 1 Hammer mode
 - The X1 system will work when the pedal is pressed forward (A).
 - The X1 system will work when the button (C) is pressed.
- 2 Shear mode
 - The X1 will work when the pedal is pressed forward (A) or backward (B).

If X1 (hammer / shear) 1-switch control is fitted

- 1 Hammer mode
 - The X1 will work when the button (C) is pressed.
- 2 Shear mode
 - X1 will not work.

If X1 (hammer / shear) 2-switch control is equipped

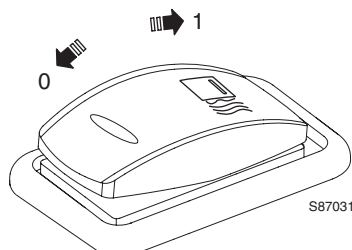
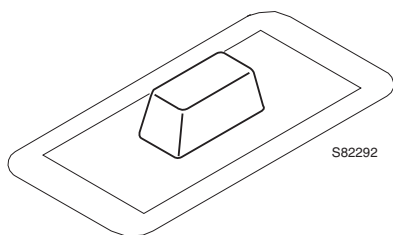
- 1 Hammer mode
 - The X1 system will work when the button (C) is pressed.
 - The X1 system will not work when the button (D) is pressed.
- 2 Shear mode
 - The X1 system will work when buttons (C) and (D) are pressed.



12 Beacon switch (optional)

This switch is used to activate the beacon light when the swing system is activated.

- Position 0 Beacon is switched OFF
- Position 1 Beacon is switched ON



13 Cabin air temperature sensor

This sense the room temperature when the automatic air conditioner is equipped.

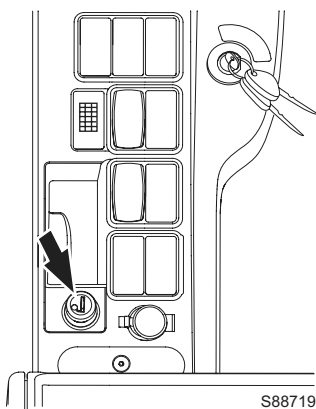
14 Water separator heater switch (optional)

The fuel can be heated up by the coil in the water separator. This switch is used to warm up the fuel.

Before starting the engine in cold weather, rotate the ignition key to the running position and turn this switch on for 2 or 3 minutes.

Position 0 Fuel heating OFF

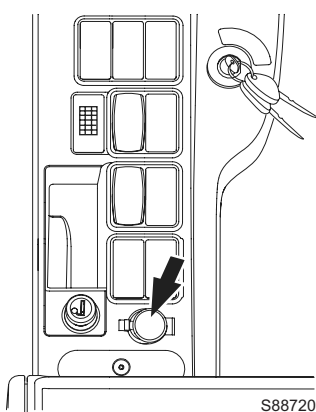
Position 1 Fuel heating ON



15 Cigarette lighter (optional)

Press it down, and in a few seconds it will return to the original position. At this moment, it is ready to use (24V).

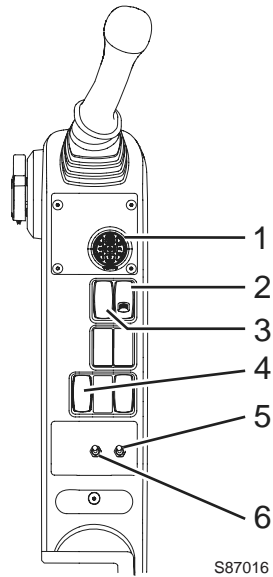
IMPORTANT! The power for the cigarette lighter socket is 24 V. Do not plug in any 12 V device into the cigarette lighter socket.



16 Power socket

This socket is for electrical appliances like mobile phone charger.
Capacity: under 12 V (4A)

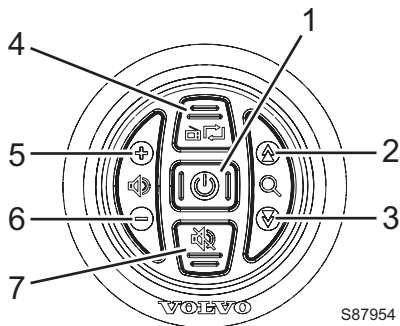
Left instrument panel



S87016

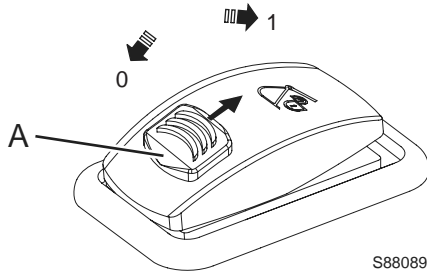
1	Remote switch for radio / CD and MP3 player (optional)
2	Attachment bracket (quick fit) switch (optional)
3	Audible warning and confirm switch for attachment bracket (quick fit) (optional)
4	Room light switch
5	Engine limp home switch
6	Switch for automatic or manual control

1 Remote switch for radio / CD and MP3 player



S87954

- 1 Power
- 2 Search up
- 3 Search down
- 4 Select radio /CD/AUX
- 5 Volume up
- 6 Volume down
- 7 Mute



S88089

A Locker

2 Attachment bracket (quick fit) switch (optional)

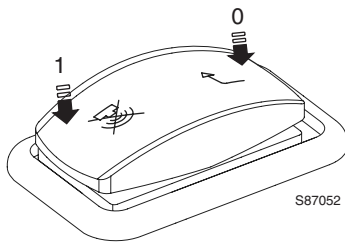
Position 0 Attachment bracket closed (quick fit, locked position)

Position 1 Attachment bracket open (quick fit, unlock position)

NOTE! The locker (A) must be pushed up first to activate this switch to unlock position.

When the switch is in **position (1)**, the attachment bracket unit is opened and the buzzer sounds. The warning indicator is displayed on the indicator screen of I-ECU.

After installing the attachment bracket unit and when the switch is in **position (0)**, the buzzer sound and the warning screen will be turned off.



S87052

3 Audible warning and confirm switch for attachment bracket (quick fit) (optional)

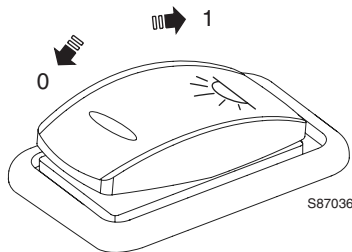
Position 0 Confirm switch ON

Position 1 Audible warning is switched OFF

The switch is automatically returned.

When the switch for attachment bracket is open position, the buzzer sounds. Press the switch to position (1) to cancel the buzzer sound.

The buzzer and warning indicator will be off when pressing the switch to **position (0)** for confirming.



S87036

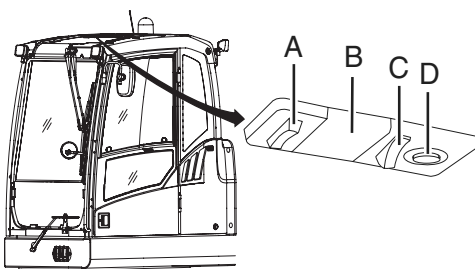
4 Cab light switch

Only when this switch is at "ON" position (1), the switch (A) connected to the cab light will work.

The reading light (D) can be turned on by switch (C) regardless of cab light switch.

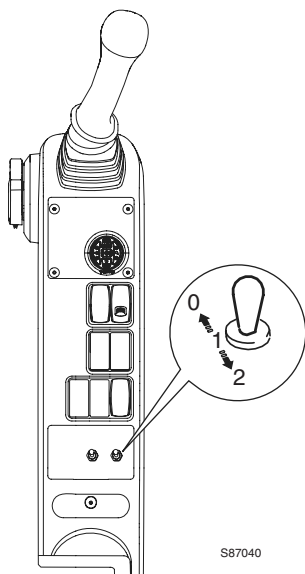
Position 0 Cab light is switched OFF

Position 1 Cab light is switched ON



S87037

- A Switch for cab light
- B Cab light
- C Switch for reading light
- D Reading light



5 Engine limp home switch

Position 0 Engine stop

If the engine keeps running after turning the ignition key off, push this switch forward and hold it for more than 3 seconds to shut down the engine.

Position 1 Low idling speed (I2 mode)

Position 2 High idling speed (H mode)

Exception: **G1** mode for North America.

This switch is used when the engine speed control switch does not work because of engine speed control switch failure (SW2701-12), V-ECU failure (SID 253-12) or communication failures (PSID201-9 and PID 91-9 occur simultaneously).

When this happens, the engine speed will be down to low idling speed automatically. In this case, the performance in I2 or H mode is obtained, but move the machine to safe area for repair. Contact Volvo CE dealer and repair the damaged part as soon as possible.

If the V-ECU failures except above cases occur, any loaded work will not be obtained. First set "Automatic / manual switch" to manual position (see automatic/manual switch below) and move the machine to safe area. Contact Volvo CE dealer and repair the damaged part as soon as possible.

6 Switch for automatic or manual control

Position 1 Manually controlled

Position 2 Automatically controlled

If the V-ECU malfunctions, set this switch to manual position (1) and change the engine rpm to low idling speed or high idling speed by using the limp home switch above.

When this manual mode, do not operate the machine for any loaded work and move the machine to safe area for repair. Contact Volvo CE dealer and repair the damaged part as soon as possible.

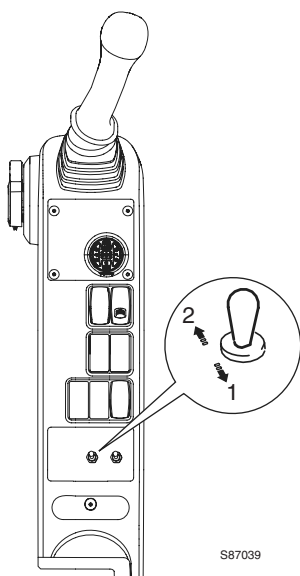
NOTE! In low idling speed, the engine may be turned off by excessive load. In this case, turn on the engine again and set the engine speed to high idling speed.

After the damaged part has been repaired, set the switch to position (2).

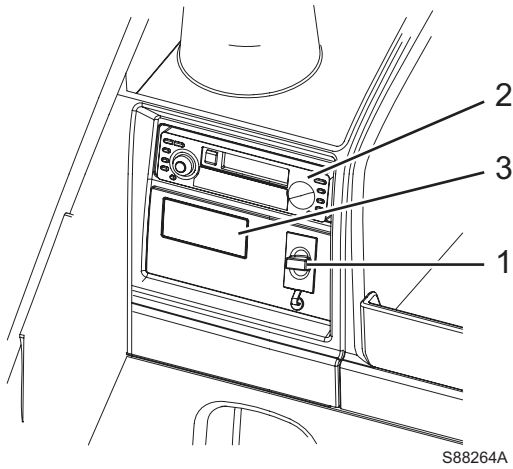
Make sure the ignition switch is in the OFF (engine shut down) position before changing the position of this switch from manual to automatic.

IMPORTANT! In manual mode, the engine can be started by the ignition key even if the control lockout lever is up position.

IMPORTANT! In manual mode, the straight travel movement may not be obtained when the travel function and attachment operation are performed simultaneously. Be careful when moving the machine from work site or loading the machine on the trailer.



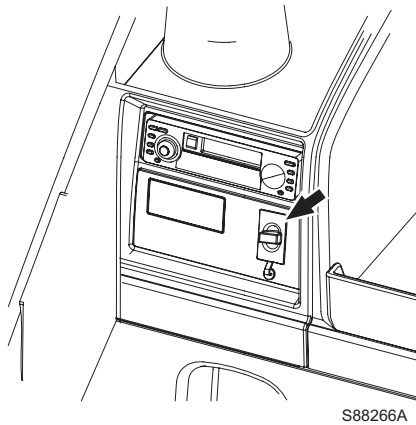
Rear instrument panel



1	Service socket
2	Radio / CD and MP3 player (optional)
3	Cab auxiliary heater (optional)

1 Service socket

This socket is for service tool (MATRIS and VCADS Pro).



2 CD and MP3 player with radio (optional)

1 Radio setting method by region

- **Europe:** Press the FM/AM button, and then press preset 6 for 2 seconds.

NOTE! Setting is completed when "EU" message is shown.

- **North America:** Press the FM/AM button, and then press preset 4 for 2 seconds.

NOTE! Setting is completed when "NA" message is shown.

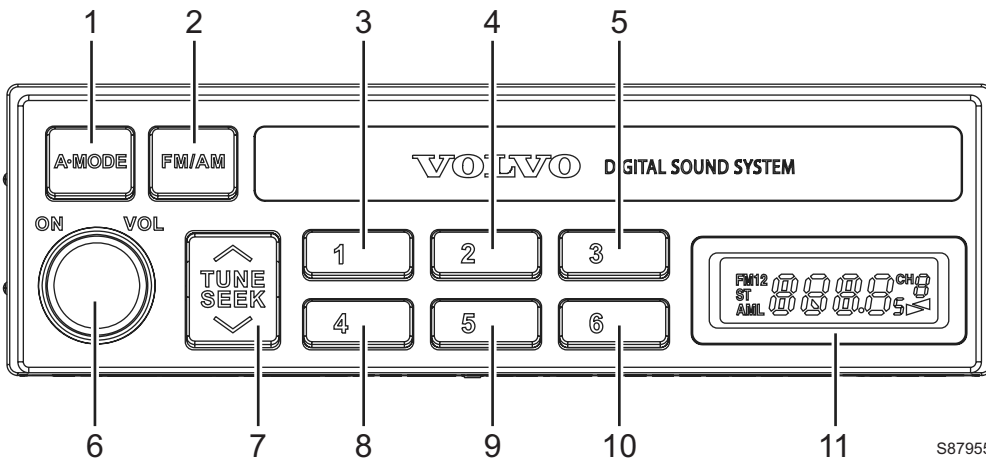
- **The others:** Press the FM/AM button, and then press preset 5 for 2 seconds.

NOTE! Setting is completed when "INT" message is shown.

2 Tuning ranges

	Band	Frequency
Europe	FM	87.50 ~ 108.00 MHz
	AM (MW)	531 ~ 1629 KHz
	LW	144 ~ 288 KHz
North America	FM	87.50 ~ 108.00 MHz
	AM	530 ~ 1710 KHz
The others	FM	87.50 ~ 108.00 MHz
	AM	531 ~ 1629 KHz

Radio



S87955

1	Audio mode	7	SEEK (TUNE)
2	FM / AM	8	Preset 4
3	Preset 1	9	Preset 5
4	Preset 2	10	Preset 6
5	Preset 3	11	LCD panel
6	Power / Volume		

■ Audio mode button (1)

- Pressing this button allows operations of all functions related to the audio tone.
- If the button is pressed while the audio is operating will change the tone function in the following order.
BASS → MIDDLE → TREBLE → BALANCE → Current State → BASS.

■ Radio (FM / AM) button (2)

- As the button used to select FM/AM bands, press the button to change the bands in the following order.
FM1 → FM2 → AM → FM1
- If the audio is turned OFF while the ignition switch is positioned onto ACC (1st gear) or ON (2nd gear), pressing the button will turn the audio ON to begin operation.

■ Preset memory buttons (3, 4, 5, 8, 9 and 10)

Press the buttons (3, 4, 5, 8, 9 or 10) shortly for less than 1.5 seconds to conveniently listen to the preset broadcast stations. In addition, when listening to a station through TUNE or SEEK function not previously stored as a preset station, press the desired preset button number for over 1.5 seconds to save the current broadcast as a preset button.

■ Power button and Volume controller (6)

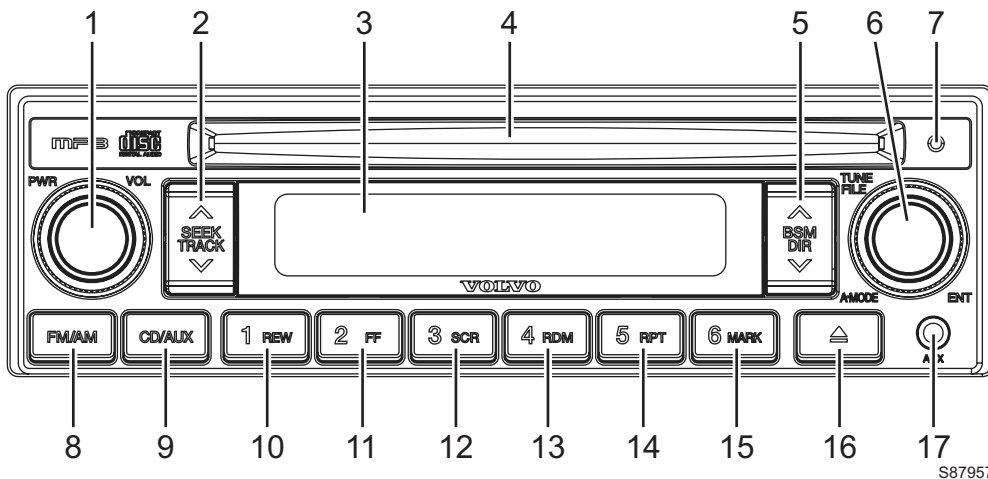
- This button is used to turn the audio on or off.
- Pressing this button while the audio is operating will turn the audio off.
- Turn the volume controller in a clockwise direction to increase the volume and counter-clockwise direction to decrease the volume. (The volume level will become displayed on the LCD panel when operating the volume controller.)

■ SEEK (TUNE) button (7)

If the button is pressed, the frequency will automatically change and find the next frequency to begin broadcast. (Press the upper end of the button to automatically find a higher frequency or press the lower end of the button to automatically find a lower frequency for broadcast.)

NOTE! If a frequency cannot easily be found, please use the TUNE button. (Press TUNE button for 1.5 seconds or longer.)

CD and MP3 player with radio



1	Power / Volume	7	CD indicator	13	Preset 4 / RDM
2	Track Up / Down	8	FM / AM	14	Preset 5 / RPT
3	LCD panel	9	CD / AUX	15	Preset 6 / MARK
4	CD insert slot	10	Preset 1 / REW	16	Disc eject
5	BSM (Best Station Memory)	11	Preset 2 / FF	17	Auxiliary jack
6	Search controller and Selection	12	Preset 3 / SCR		

■ Power button and Volume controller (1)

- This button is used to turn the audio on or off.
- Pressing this button while the audio is operating will turn the audio off.
- Turn the volume controller in a clockwise direction to increase the volume and counter-clockwise direction to decrease the volume. (The volume level will become displayed on the LCD panel when operating the volume controller.)

■ TRACK Up / Down button (2)

- If the upper end of the button is pressed while the CD is playing, the beginning of the next song will begin playing.
If the upper end of the button is pressed for a prolonged period (over 0.8 second), the tracks will continuously be changed.
- If the lower end of the button is pressed while the CD is playing, the beginning of the current song will begin playing.
If repressed, the beginning of the previous song will begin playing. If the lower end of the button is pressed for a prolonged period (over 0.8 second), the tracks will continuously be changed.

■ LCD panel (3)

The LCD panel displays the song state and disc information such as, TRACK, number, CD, RPT, RDM, and track time.

■ CD insert slot (4)

- This slot is used to insert or eject discs. If the audio is turned OFF while the ignition switch is positioned onto ACC (1st gear) or ON. (2nd gear)

IMPORTANT! Please insert the disc with the label side facing up.

■ BSM (Best Station Memory) button (5)

If the button is pressed, The six frequencies with the most superior reception are saved. Here, preset (1 ~ 6) are saved in order starting from the lowest frequency. And preset 1 will begin playing automatically. If there are no available stations to store in preset upon operating BSM, the previously broadcast frequency will be returned.

■ Search controller and Selection button (6)

- If the search controller is rotated clockwise or counter-clockwise while playing a CD, the "TRACK" number will change on the LCD.
- Find the desired track and press the knob to play the selected song. (If a track is not selected after 5 seconds of searching tracks, the search function will become terminated.)
- Turning the knob while a radio broadcast is being received will allow the frequency to be manually adjusted. Turn the knob in clockwise direction to increase the frequency and counter-clockwise direction to decrease the frequency.
- Pressing this controller allows operations of all functions related to the audio tone.
- When in tone control mode, turning the controller will allow the tone to be adjusted.

■ CD indicator (7)

With the ignition switch is positioned onto ACC (1st gear) or ON (2nd gear), the CD indicator will light up when there is a disc within the device even if the device is turned off. The indicator will not light when there is no CD in the device.

■ Radio (FM / AM) button (8)

- As the button used to select FM/AM bands, press the button to change the bands in the following order.
FM1 → FM2 → AM → FM1
- If the audio is turned OFF while the ignition switch is positioned onto ACC (1st gear) or ON (2nd gear), pressing the button will turn the audio ON to begin operation.

■ CD / AUX selection button (9)

- The CD will begin playing if the button is pressed while the radio is operating. (If there is no CD in the audio, "NO DISC" will become displayed on the LCD for 5 seconds.)
- If the audio is turned off while the ignition switch is positioned onto ACC (1st gear) or ON (2nd gear), pressing the button will turn the audio on and begin playing the CD. (However, a disc must already be inserted in the audio.) Inserting a CD will turn the audio on and begin playing the CD.

■ Fast Up / Down button (10, 11)

While a disc is playing, press the FF button (11) for a prolonged period to fast forward the track or press the REW button (10) for a prolonged period to rewind. Releasing the button will terminate the function and play the song from the current position.

■ SCR (Scroll) button (12)

Press this button to scroll (Page Up) to view long file names.

■ RDM (Random) button (13)

- If the button is pressed, the songs can be played in random order. ("RDM" will be displayed on the LCD).
- Pressing the button again will terminate the function.

■ RPT (Repeat) button (14)

- If the button is pressed, the song which the user desires to hear repeatedly can be repeatedly played. ("RPT" will be displayed on the LCD).
- Pressing the button again will terminate the function.

■ MARK button (15)

- This function is a Bookmark function which allows the user to store the desired songs (maximum of 100 songs).
- Pressing this button for over 1.5 seconds will save the currently displayed song.
- Press again for over 1.5 seconds to delete the saved song.
- Pressing this button for less than 1.5 seconds will play the saved song.

■ Disc eject button (16)

- With a disc already inserted in the audio, press the button to eject the disc. If there is no disc in the audio, "NO DISC" will become displayed on the LCD for 5 seconds. (Pressing the button will eject the disc even when the power or ignition switch is turned off.)

NOTE! Forced EJECT function:

Press the button for over 3 seconds to eject the disc by force. (This function is used when ejecting discs which do not eject normally caused by some abnormality.)

Cautions upon playing a disc

- 1 Make sure to store discs in cases in order to protect them from scratches or foreign substances.
- 2 When handling discs, lightly grasp the outer edges or the center of the disc to prevent unnecessary damage.
- 3 Do not use flammable substances such as benzene and thinners, cleaners, or anti-static sprayer used for analog discs.
- 4 Be cautious not to insert foreign substances into the disc insert slot.
- 5 The read and play time may slight differ in accordance to the WRITING environment depending on the type of CD-R, CD-RW, DISC & CD-WRITER.
- 6 Be cautious not to damage, stick tape or paper on the label side of the disc. Use a soft cloth to wipe away finger prints or dust off of the play side of the disc.

NOTE! Some compact discs applied with copy-protected technologies not in accordance to International Audio CD standard specifications (RED BOOK) will not operate on this device.

Cautions upon playing an MP3

- Supported audio formats

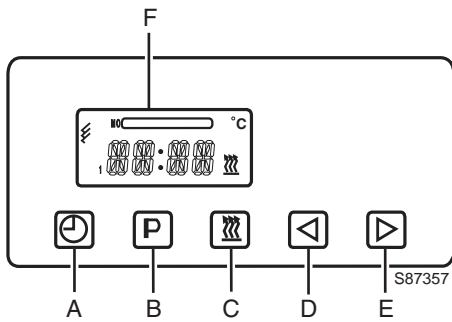
File system	ISO 9660 Level 1
	ISO 9660 Level 2
	Romeo/Joliet (128 characters)
Compressed audio specification	MPEG1 Audio Layer3
	MPEG2 Audio Layer3
	MPEG2.5 Audio Layer3
	Windows Media Audio Ver 7.X and 8.X

NOTE! Files formats which are not in accordance to the specification above may not be properly supported as file names and other information may not become displayed.

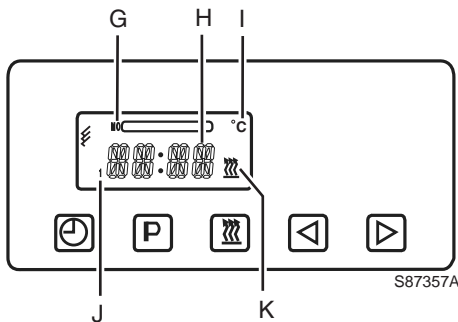
IMPORTANT! Cautions upon burning a CD

- When creating a multi-session disc, make certain to close the session prior to CD burning. Although there are no problems with product performance, additional reading time may be required (approximately 25 seconds) while the device confirms that the session is properly closed. (Reading time may vary according to the number of folders or files.)
- The device may become damaged when the extensions of MP3/WMA files are changed or when files which are not MP3/WMA files are changed to the MP3/WMA extension.
- Please follow legal methods for burning compact discs as the recording of copyright files is prohibited by law.
- In the case of CD-R/CD-RWs not satisfying production specification, the use of such discs for prolonged periods of time may be the cause of damage to the device.

- Please write compact discs with folder and file names within 32 characters. (Although names longer than 32 characters will not affect product performance, the full name may not properly become displayed.)
- Please use lower recording speeds upon burning compact discs. Recording at higher speeds may induce errors during the burning process and result in skipping.



- A Time setting button
- B Program button
- C Heating ON / OFF button
- D Backward button
- E Forward button
- F Display window



- G Day of the week
- H Time
- I Temperature display
- J Memory indicator
- K Heating indicator

3 Cab auxiliary heater (optional)

As a starting aid in cold weather, this auxiliary heater can be set to start at a preset time to warm the cab and heat the engine.

Setting time and day of the week

- 1 Press time setting button (A) until the time (H) in display window (F) begins to flash.
- 2 Adjust the current time by pressing backward button (D) and forward button (E). When the current time (H) stops blinking in a few seconds, the current time is set.
- 3 When the current time (H) has stopped flashing, the day of the week (G) starts to flash. Adjust the day by pressing backward button (D) and forward button (E). When the current day stops blinking in a few seconds, the current date is set.

Heater operation without presetting with engine shut off (ignition key in stop position)

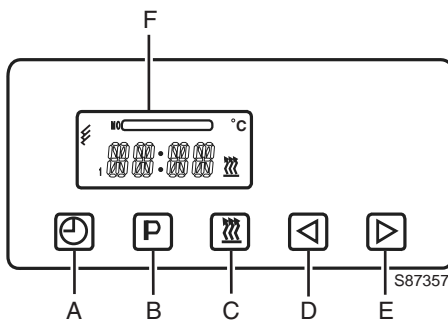
- 1 Briefly press heating ON / OFF button (C). Heating indicator (K) and heating duration time (H) will be shown.
- 2 The initial setting time is for a duration of 120 minutes and this time can be changed temporarily or permanently by pressing switches (D or E).
 - Temporarily : Use buttons (D or E) and set the time between 1 and 120 minutes.
 - Permanently : Do not press button (C). Press button (D) until the heating indicator appears and flashes. Stop pressing the button and change the time with buttons (D or E). The time can be set between 10 and 120 minutes. When the heating indicator disappears, the new heating duration time is set.
- 3 Stop the heater by briefly pressing button (C). The heating indicator disappears and the fan continues to run to cool down the heater.

Heater operation without presetting with ignition key in running position

- 1 Briefly press button (C). heating indicator (K), time (H) and day of the week (G) are shown. The heater will continue to operate for as long as the ignition remains switched on. If the ignition is switched off, the heater will continue to run for 15 minutes. This time can be changed with buttons (D or E). The time can be set between 1 and 120 minutes.
- 2 Stop the heater by briefly pressing button (C). The heating indicator disappears and the fan continues to run to cool down the heater.

Presetting heating switch-on time

Three switch-on times within the next 24 hours or one switch-on time within seven days can be preset. **Only one switch-on time can be selected at any given time!**



- A Time setting button
- B Program button
- C Heating ON / OFF button
- D Backward button
- E Forward button
- F Display window

Checking and selecting memory

First memory - press button (B) once.

Memory indicator : 1 (initial setting 12.00)

Second memory - press button (B) twice.

Memory indicator : 2 (initial setting 12.00)

Third memory - press button (B) three times.

Memory indicator : 3 (initial setting 12.00)

Neutral position - no memory is activated

Press button (B) until the memory indicator disappears.

Starting heater within 24 hours

The day of the week is automatically obtained and does not need to be set.

Presetting switch-on time

- 1 Continue pressing button (B) until the required memory indicator (1, 2, 3) flashes.
- 2 Briefly press buttons (D or E) and release.
- 3 The preset switch-on time flashes. Use button (D or E) to set the time when the heater should start. (Setting is only possible as long as the switch-on time flashes on the display)
- 4 Renewed setting : press button (B)

Starting heater later than 24 hours (max. seven days)

Presetting switch-on time

- 1 Continue pressing button (B) until the required memory indicator (1, 2, 3) flashes.
- 2 Briefly press buttons (D or E) and release.
- 3 The preset switch-on time flashes. Use button (D or E) to set the time when the heater should start. (Setting is only possible as long as the switch-on time flashes on the display)

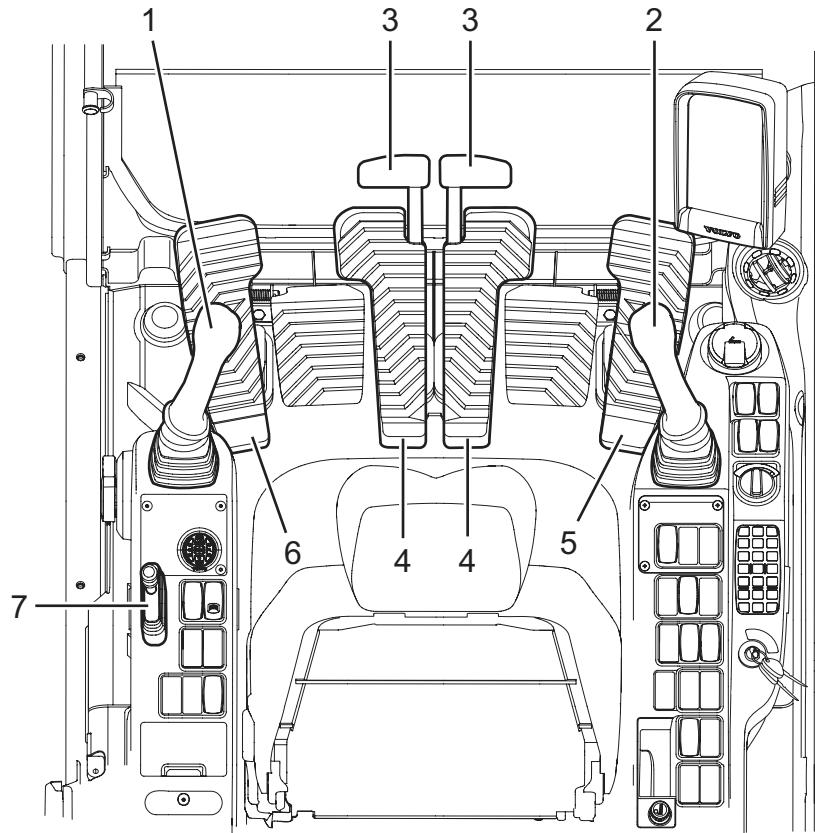
Presetting day of the week

- 1 The preset day starts to flash approx. five seconds after the switch-on time has been set.
- 2 Use buttons (D or E) to set the day when the heating should start.
- 3 The selected time and day are stored as soon as the time display disappears and when the display is changed over to indicate the current time. The memory indicator indicates the selected memory.

Checking the selected memory setting

The preset switch-on time of the displayed memory is shown for approx. five seconds. This is then either turned off or the time is displayed (with ignition on). The display of the selected time and selected day can be recalled for approx. five seconds by pressing button (B) once.

Other controls Levers and pedals



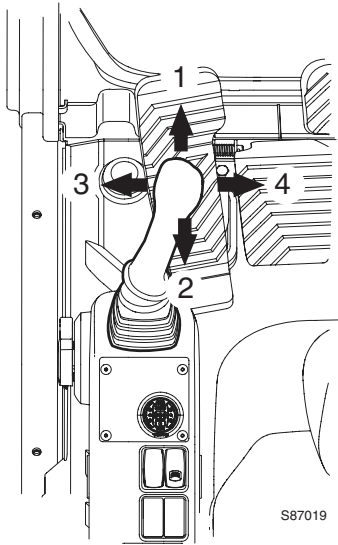
S88267

1	Left control lever
2	Right control lever
3	Travel levers
4	Travel pedals
5	Optional pedal (X1)
6	Optional pedal (Straight travel) Optional pedal (2-piece boom)
7	Dozer blade lever

The control levers of this machine is set from factory to operate in ISO/SAE standard operating pattern for optimum machine performance.

Some machines may have the optional pattern control change valve. Refer to **page 68** for more details.

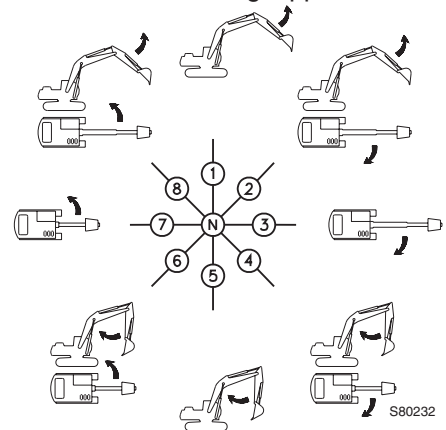
On machines equipped with the optional pattern control change valve, the indicator of chosen pattern will be shown on the I-ECU.



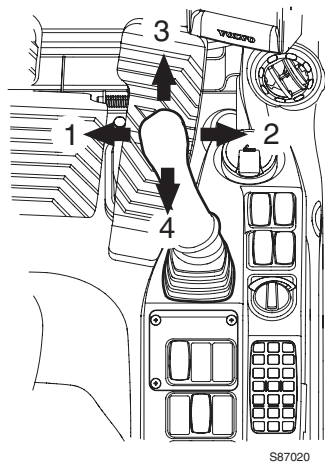
- 1 Dipper arm out
- 2 Dipper arm in
- 3 Left swing
- 4 Right swing

1 Left control lever

This lever is for swing upper structure and moving dipper arm.



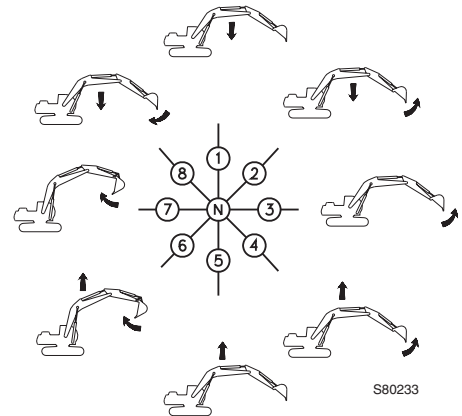
- N Neutral (superstructure and dipper arm in neutral position)
- 1 Dipper arm out
- 2 Dipper arm out and swing superstructure right
- 3 Swing superstructure right
- 4 Dipper arm in and swing superstructure right
- 5 Dipper arm in
- 6 Dipper arm in and swing superstructure left
- 7 Swing superstructure left
- 8 Dipper arm out and swing superstructure left



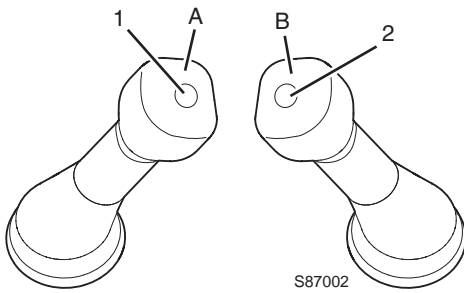
- 1 Bucket in
- 2 Bucket out
- 3 Boom lower
- 4 Boom raise

2 Right control lever

This lever is for moving boom and bucket.



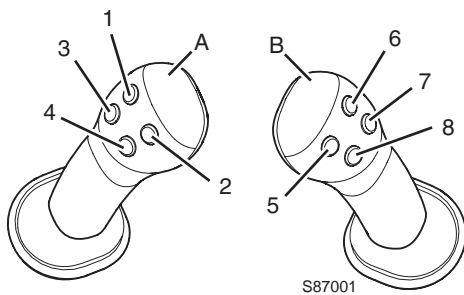
- N Neutral (boom and bucket are maintained at rest position)
- 1 Lower boom
- 2 Lower boom and bucket out
- 3 Bucket out
- 4 Raise boom and bucket out
- 5 Raise boom
- 6 Raise boom and bucket in
- 7 Bucket in
- 8 Lower boom and bucket in



Control lever with one buttons

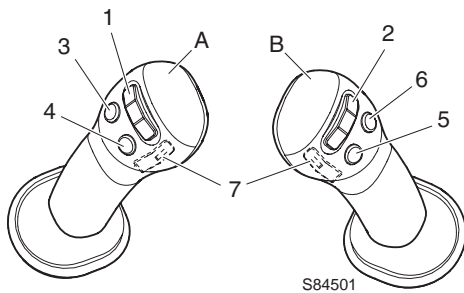
- A Left operating lever
- B Right operating lever
- 1 Horn button
- 2 Boost / hammer

NOTE! When the hammer select switch is activated, the boost function does not work.



Control lever with four buttons

- A Left operating lever
- B Right operating lever
- 1 Rotator button
- 2 Rotator button
- 3 Horn button
- 4 Unassigned
- 5 Hammer / Shear button
- 6 Shear / Unassigned
- 7 Float button
- 8 Boost button



Control lever with three buttons and proportional switch

- A Left operating lever
- B Right operating lever
- 1 Proportional switch
- 2 Proportional switch
- 3 Horn button
- 4 Unassigned
- 5 Boost button
- 6 Float button
- 7 Unassigned

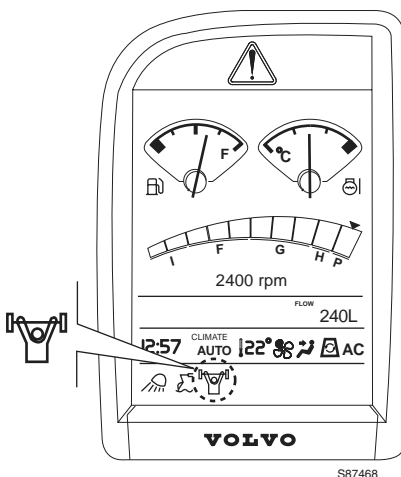
NOTE! Before operating the joystick controls for X1 or X3 operation, make sure to read and understand the different control types for the different buttons and switches, refer to page 38 for details.

Power boost function

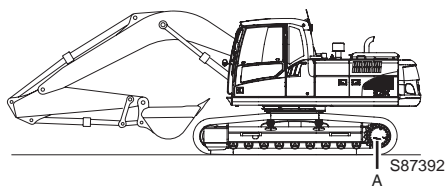
The power boost is designed to increase arm / bucket forces, and lifting capacities. When digging in P, H or G modes in extremely hard digging conditions, it is recommended to press the power boost button before starting the digging cycle.

Digging force will be increased for 9 seconds, which is sufficient time for the operator to load the bucket. After the 9-second period, the power boost is turned off automatically to increase attachment speed in the dumping cycle.

The power boost indicator is shown on the indicator screen of IECU whenever it is activated. In F-mode, the power boost is activated continuously for maximum lifting capacity.



Indicator for power boost



A Sprocket

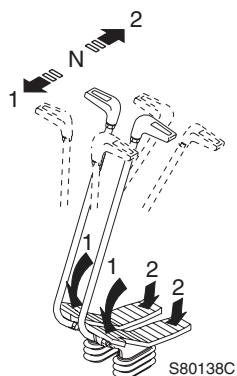
3-4 Travel levers and pedals

These are used to move and stop the machine.

IMPORTANT! In this manual, to determine front, forward, reverse, right, and left is with travel motors position behind the operator's cab. Always know the position of the travel motors before operating the travel control levers/pedals.

If you want to travel the machine continuously, keep in mind below operating conditions.

Ground conditions	Operation
Flat, normal or soft soil	Do not travel continuously for more than 2 hours. If you want to travel for more than 2 hours at high speed, stop for more than 20 minutes and travel to forward direction (to idler side). Otherwise, tracks rollers and idlers can be overheated to cause oil leakage.
Uneven or tough soil (mixed of gravels, stones, boulders, other obstacles or on a slope)	Travel the machine at low speed and do not travel continuously for more than 1 hour. If you want to travel for more than 1 hour, stop for more than 20 minutes and travel to forward direction. Otherwise, tracks rollers and idlers can be overheated to cause oil leakage.

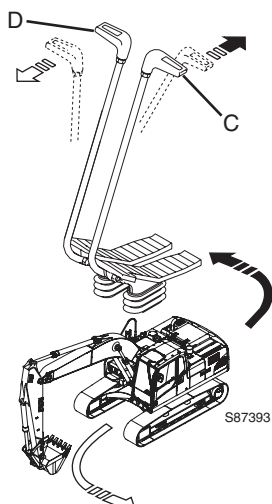


N Neutral (machine stops)

- 1 Forward
Push the lever forward or press down front end of the pedal to advance the machine, when the sprocket is at the rear of the machine.
- 2 Reverse
Pull the lever rearward or press down rear end of the pedal to reverse the machine, when the sprocket is at the rear of the machine.

NOTE! When the sprockets are at the front side of the machine, the machine will be moved to the opposite direction as to above.

- The distance the travel levers/pedals are pulled or pushed determines the travel speed of the machine. That is, if the levers/pedals are pushed or pulled fully, the machine will travel at the maximum speed, provided that the high travel speed has been selected and the engine RPM is at full throttle position.
- The machine brakes are engaged automatically when the travel controls are moved to the neutral position. To reduce the travel speed, slowly return the travel controls to the center (neutral) position.
- In cold weather, the travel function may be heavier than normal due to the oil viscosity.



Left turn

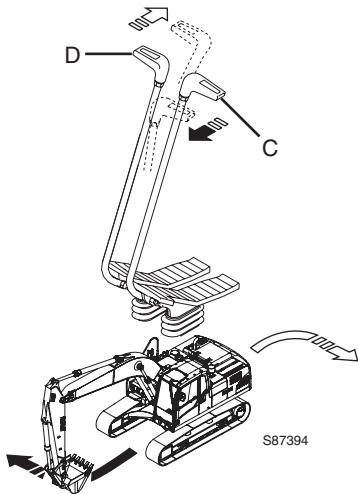
- 1 When the sprockets are at the rear side of the machine

Push the right lever (D) forward, the RH track rotates forward and the machine travels forward as it turns to the left.

Pull the left lever (C) backward, the LH track rotates in reverse and the machine travels backward as it turns to the left.

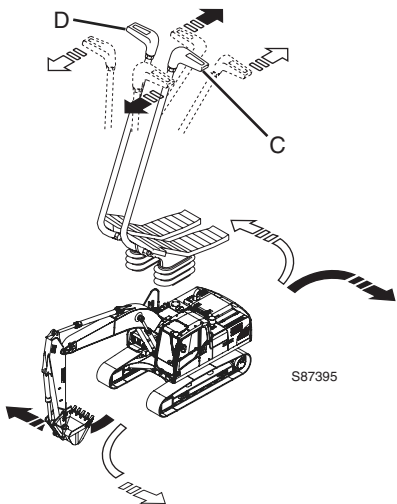
- 2 When the sprocket is at the front side of the machine

Operate levers (C or D) in the opposite direction as to above.



Right turn

- 1 When the sprockets are at the rear side of the machine
 Push the left lever (C) forward, the /LH track rotates forward and the machine travels forward as it turns to the right.
 Pull the right lever (D) backward, the R/H track rotates in reverse and the machine travels backward as it turns to the right.
- 2 When the sprocket is at the front side of the machine
 Operate levers (C or D) in the opposite direction as to above.



Spin turn

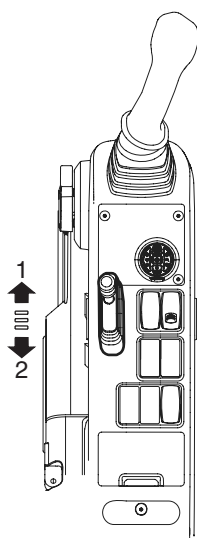
- 1 When the sprockets are at the rear side of the machine
 Pull the left lever (C) backward, the L/H track rotates in reverse; simultaneously push right lever (D) forward, the R/H track rotates forward and the machine turns on the spot quickly to the left.
 Pull the right lever (D) backward, the R/H track rotates in reverse; simultaneously push left lever (C) forward, the L/H track rotates forward and the machine turns on the spot quickly to the right.
- 2 When the sprocket is at the front side of the machine
 Operate levers (C or D) in the opposite direction as to above.

5 Optional pedal (X1)

See page 66.

6 Optional pedal (straight travel or 2-piece boom)

See page 66.



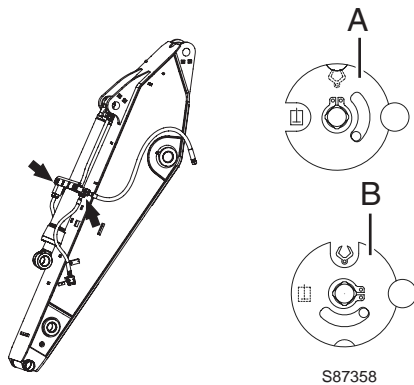
7 Dozer blade lever

- Position 1 Dozer blade lower
- Position 2 Dozer blade raise

Optional parts

1 Bucket / grapple valve position

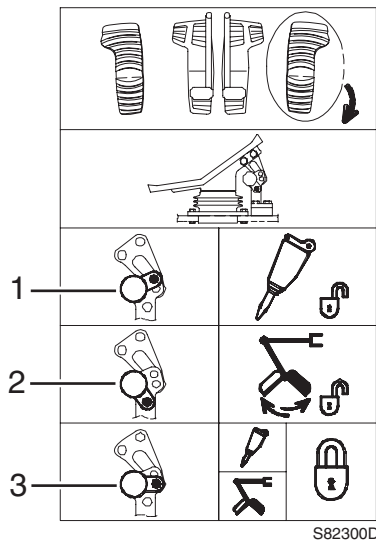
Select the correct position by turning the nut with a wrench.



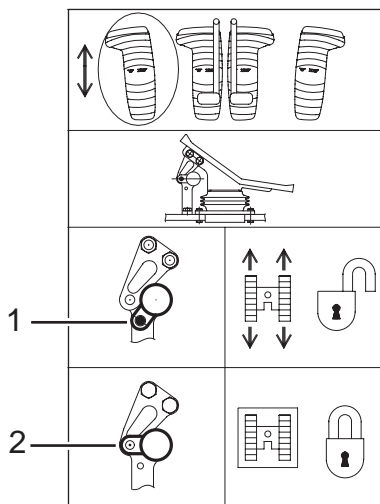
- A Bucket position
- B Grapple position

2 Optional pedal (X1)

- Position 1 Operating hammer
- Position 2 Operating Shear or Crusher
- Position 3 Lock the pedal



IMPORTANT! When the machine is not operated with this optional pedal, ensure that the pedal is locked position in order to prevent undesired operations.

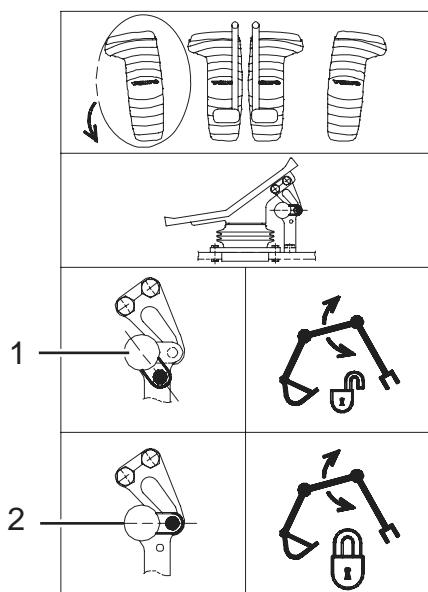


S86506A

3 Optional pedal (straight travel)

- Position 1 Operating straight travel
- Position 2 Lock the pedal

IMPORTANT! When the machine is not operated with this optional pedal, ensure that the pedal is locked position in order to prevent undesired operations.

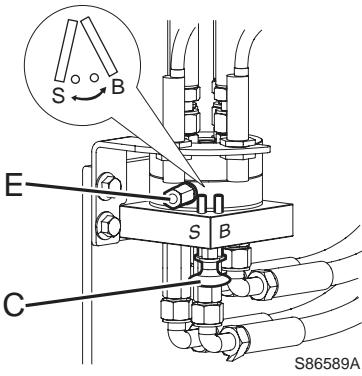


S84531

4 Optional pedal (adjustable boom)

- Position 1 Operating the adjustable boom
- Position 2 Lock the pedal

IMPORTANT! When the machine is not operated with this optional pedal, ensure that the pedal is locked position in order to prevent undesired operations.



5 Changing control pattern of the machine (optional equipment)

Position S ISO/SAE type
Position B Backhoe loader type



WARNING!

Warning decal attached on the machine regarding pattern change should be carefully read before changing the pattern change valve. Certify pattern change decal and be aware of pattern of attachment before operating machine.

The machine control pattern can easily be changed to the ISO/SAE system or to the backhoe loader hydraulic system by changing the position of pattern change valve (if fitted).

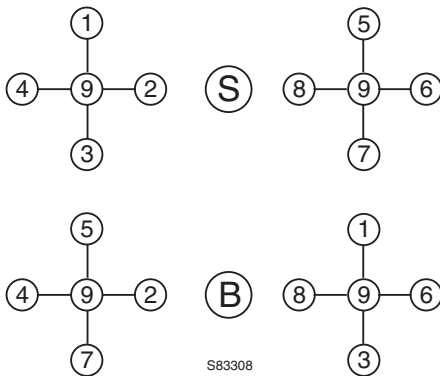
Use the following procedure to change the position of the pattern change valve (The standard position of machine is ISO/SAE pattern type (S)).









1 Pull the knob (C) down and move the lever (E) to **S** (ISO/SAE type) position or to the **B** (Backhoe loader type) position by turning.

2 After you set the machine control pattern, release the knob.

The patterns on the left side of the illustration show the possible configurations for the left control lever.

The patterns on the right side of the illustration show the possible configurations for the right control lever.



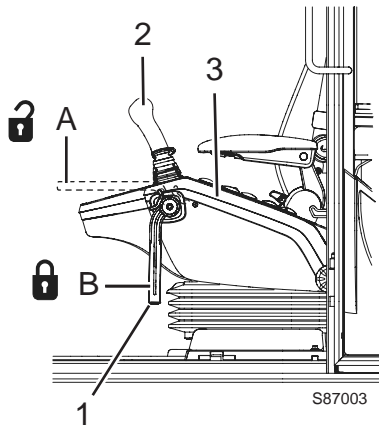
 <p>S83309</p> <p>Dipper arm out (1): Move the control lever to this position in order to move the dipper arm outwards.</p>	 <p>S83310</p> <p>Swing right (2): Move the control lever to this position in order to swing the superstructure to the right.</p>	 <p>S83311</p> <p>Dipper arm in (3): Move the control lever to this position in order to move the dipper arm inwards.</p>
 <p>S83312</p> <p>Swing left (4): Move the control lever to this position in order to swing the superstructure to the left.</p>	 <p>S83313</p> <p>Boom lower (5): Move the control lever to this position in order to lower the boom.</p>	 <p>S83314</p> <p>Bucket dump (6): Move the control lever to this position in order to dump the bucket.</p>
 <p>S83315</p> <p>Boom raise (7): Move the control lever to this position in order to raise the boom.</p>	 <p>S83316</p> <p>Bucket close (8): Move the control lever to this position in order to close the bucket.</p>	<p>HOLD (9): When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the superstructure will stop.</p>

Control lockout system



WARNING!

Move the control lockout lever down to lock the hydraulic system securely. Unless the control lockout lever is on the "Locked" position (B), operating levers can be operated by careless touch, which could cause serious injury.



- 1 Control lockout lever
- 2 Left control lever
- 3 Left control console
- A Unlocked position
- B Locked position

Unlocked position (A)

The control lockout lever is in "Unlocked" position (A) for working and travelling operations.

When the control lockout lever is in this position the engine can not be started.

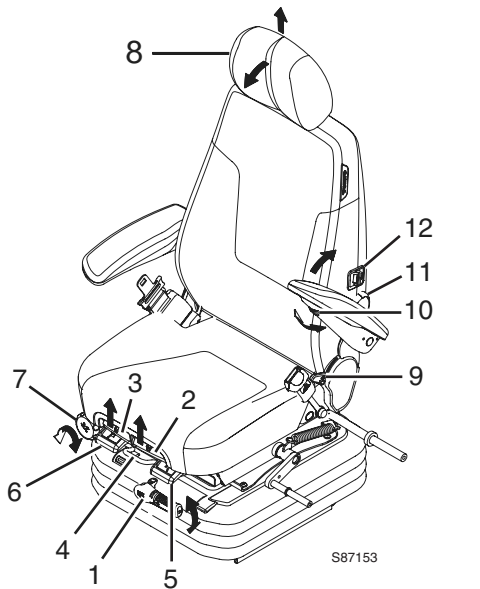
Locked position (B)

The control lockout lever is used to **lock out** the attachment, swing and travel unit.

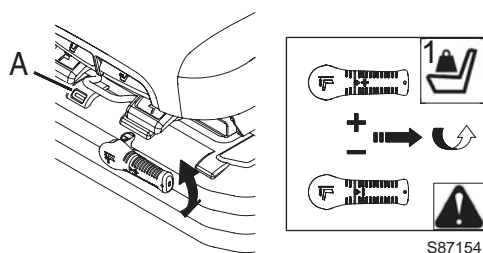
Place this lever on the left control console to "Locked" position (B) to lock out the hydraulic control levers and pedals.

When the control lockout lever is in this position the engine can be started.

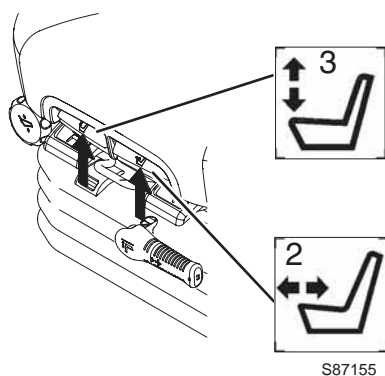
IMPORTANT! In manual mode, the engine can be started by the ignition key even if the control lockout lever is up position.



- 1 Seat height and weight adjustment
- 2 Fore and aft adjustment, seat cushion
- 3 Angle adjustment, seat cushion
- 4 Horizontal adjustment, top seat
- 5 Horizontal adjustment, top seat and consoles
- 6 X-Isolator adjustment
- 7 Height adjustment, consoles
- 8 Headrest adjustment
- 9 Backrest angle adjustment
- 10 Armrest adjustment
- 11 Lumbar support adjustment



A Ride indicator



Operator comfort

Operator seat

The operator seat meets the requirements according to EN ISO7096. The operator seat is designed to provide maximum comfort and reduce vibration to the operator during normal machine operation.



WARNING!

Do not adjust seat when an excavator is in operation.



WARNING!

To prevent injury, no objects should be placed within the moving area of operator's seat.



WARNING!

Move the control lockout lever down to lock the hydraulic system securely when adjusting the seat. Operating levers can be operated by careless touch, which could cause serious injury.

IMPORTANT! Installation and maintenance should be carried out by authorized and competent personnel only.

IMPORTANT! Before operating the machine, make sure that all adjustments are correctly engaged to obtain maximum comfort and to eliminate the risk of accident.

NOTE! The seat is intended for use by one seated occupant only.

Mechanical suspension seat

1 Seat height and weight adjustment

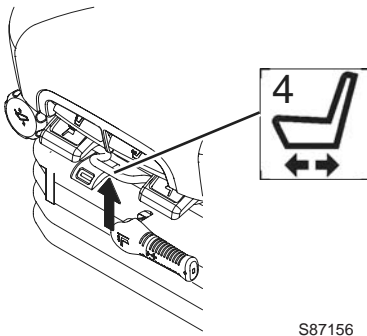
Adjust the seat to the driver's weight by turning the weight adjusting handle. The set weight should be within the green zone of the ride indicator.

2 Fore and aft adjustment, seat cushion

Lift lever (2) and adjust the seat cushion fore and aft.

3 Angle adjustment, seat cushion

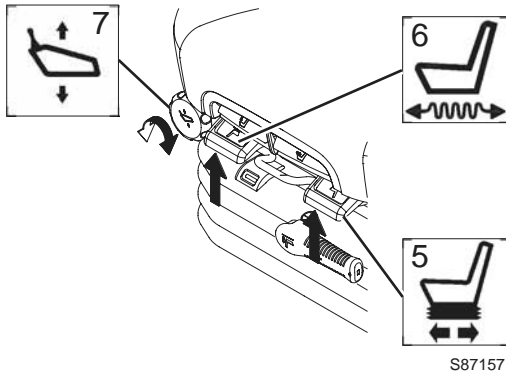
Lift lever (3) and adjust the angle of the seat cushion. It may be necessary to reduce occupant pressure on the seat cushion when performing this adjustment.



4 Horizontal adjustment, top seat

It is possible to move the seat forwards and backwards relative to the control consoles. Lift handle (4) and move the seat so that the consoles are in the desired position relative to the seat.

The locking lever must latch in the desired position. It should not be possible to move the seat into another position when it is locked.



5 Horizontal adjustment, top seat and consoles

The seat and consoles can be adjusted forwards and backwards. Lift lever (5) and move the seat and consoles to the desired position.

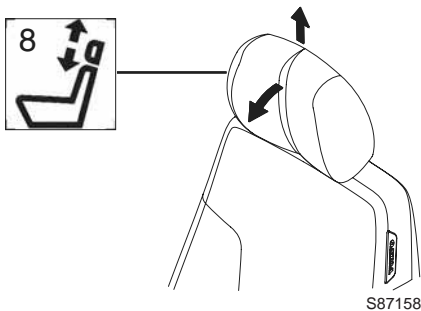
The locking lever must latch in the desired position. It should not be possible to move the seat into another position when it is locked.

6 X-Isolator adjustment

It is possible to adjust the seat to provide fore and aft isolation. Lift lever (6) to activate the isolator, push down to deactivate this adjustment.

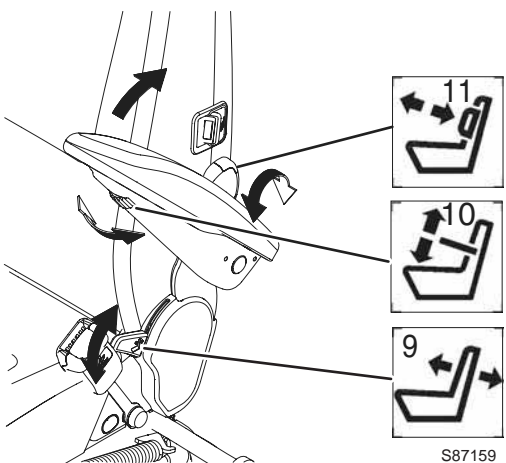
7 Height adjustment, consoles

Rotate handle (7) and adjust the height of the control consoles.



8 Headrest adjustment

The headrest can be adjusted for height by pulling up or down. End stops limit the movement. It can be also adjusted for angle by pushing forwards or backwards. End stops limit the movement.



9 Backrest angle adjustment

Pulling up control handle (9) releases the backrest latch. The back of the seat can then be reclined backwards or forwards to the desired position. Releasing the handle allows the backrest to move to a latching position.

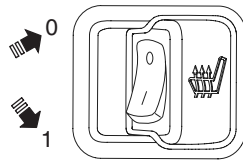
The locking lever must latch in the desired position. It should not be possible to move the backrest into another position when it is locked.

10 Armrest adjustment

Inclination of the armrest can be changed by turning the adjustment knob (10) mounted on the underside of the armrest. The armrests can be manually tipped up if required.

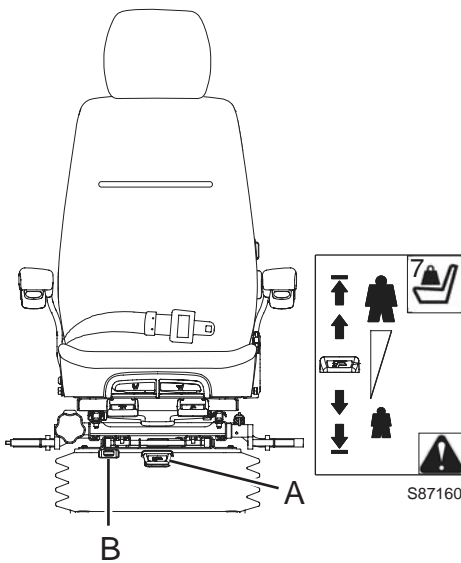
11 Lumbar support adjustment

Rotate the knob (11) in the direction of the arrow to increase the amount of lumbar support (five positions). Further rotation in the same direction causes the lumbar support to return to minimum.

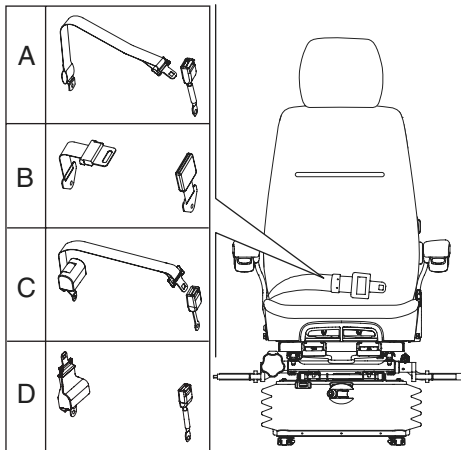


S87397

- 0 Seat heating, OFF
 1 Seat heating, ON



S87160



S87053

- A Strap lap type (2 inches)
 B Strap lap type (3 inches)
 C Retractable type (2 inches)
 D Retractable type (3 inches)

12 Seat heating switch (optional equipment)

This is used to warm up the operator seat.

The seat heating will activate when this switch is in position (1) and the temperature is under 10 °C. The seat heating stops when the temperature is up to 20 °C, and will activate again when the temperature turns down under 10 °C again by the first thermostat. If the first thermostat malfunctions, the second thermostat cuts off the seat heating at 25 °C.

IMPORTANT! Position the seat heating switch OFF for fire prevention when the seat heating is not needed (when leaving the operator's seat).

Air suspension seat (optional equipment)

The operator seat is also available with air suspension for even better comfort. The adjusting possibilities are the same as for a mechanical suspension seat except adjustment of air suspension.

To adjust air suspension of the seat,

- 1 Turn the ignition key "ON" or start engine.
- 2 Lift operator's weight off the seat.
- 3 Lift and hold the lever (A) until air bag is completely inflated.
- 4 Sit and push down the lever (A) to deflate.
- 5 Stop deflating when seat starts lowering. The set weight should be within the green zone of the ride indicator.

NOTE! After adjusting the suspension with operator's weight, the suspension height should be in the position within suspension stroke.

Seat belt



WARNING!

Change the belt immediately if it is worn, damaged or if the machine has been involved in an accident where the belt had to take some strain.

- n Modifications to the belt or its mountings are not permitted.
- n The seat belt is intended for one adult person only.
- n Change the belt every three year regardless of its condition.

When the seat belt needs to be washed:

- Use a mild soap solution
- Allow the belt to dry while it is fully pulled out, before retracting it.
- Make sure the belt is fitted in a correct way.

IMPORTANT! There is a knife-equipped hammer for emergency exit. In emergency situation the seat belt will not release from buckle, cut the seat belt using the knife.

Front window, opening

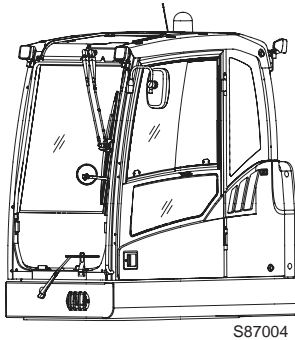
IMPORTANT! Move the control lockout lever down to lock the hydraulic system securely before opening or closing the window.

- 1 Lower the attachment to the ground and stop the engine.
- 2 Push both buttons (E) in order to unlatch the window from the locked position (G) while holding both grips (F), and then move the window upward.

NOTE! Stop lifting as soon as the window is unlatched.

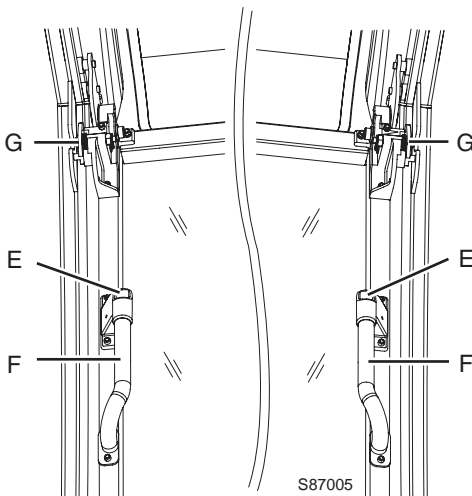
- 3 Hold both grips (F) only and pull the window upward and rearward, and then fix it in the locked position.

IMPORTANT! If the window is broken, it must be replaced immediately. Use the Volvo genuine part when changing the window.



Front window, closing

- 1 Lower the attachment to the ground and stop the engine.
- 2 Push the both buttons (E) with holding both grips (F) to move the window out of the lock position.
- 3 Grip handle (F) only and **pull the window downward slowly**.
- 4 Fix the window securely and tighten in the locked position (G).

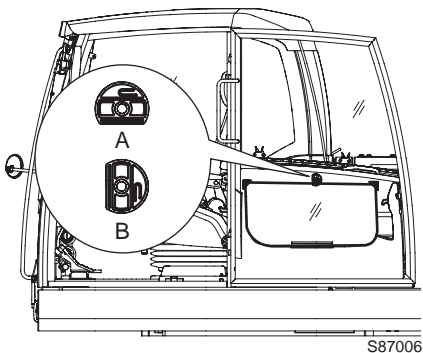
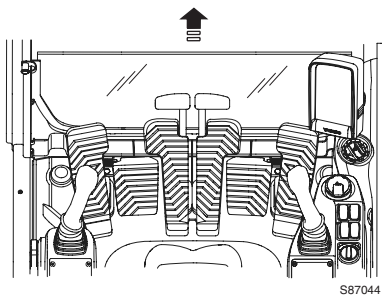


Lower window, removing

- 1 Open the front window.
- 2 Grip the upper part of lower window with both hands and pull it upward.
- 3 Put the removed window in the storing position inside the cab door.
- 4 Turn the locking handle to lock position (B).

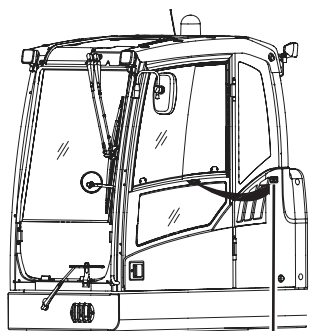
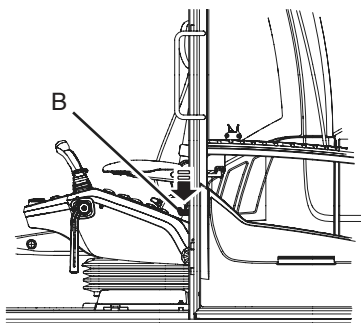
NOTE! Ensure that the lower window is locked correctly in the storing position.

NOTE! Be careful not to drop the window when releasing the locking handle.



Locking handle for lower window

- A Unlock position
- B Lock position

A
S87007

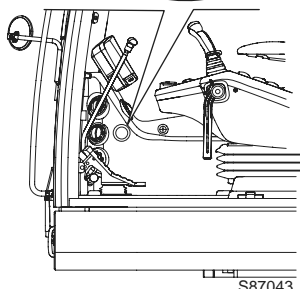
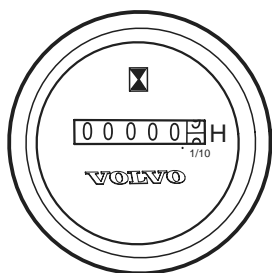
S87008

Door lock

It is used to keep the cab door secure in the open position.

- 1 Push the door against outside of the cab.
- 2 Ensure it is securely fixed to the lock (A)

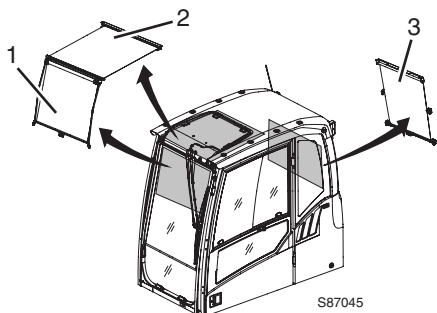
Press the lever (B) inside the cab to release the door.



S87043

Hour meter

The hour meter shows the total number of hours the engine has operated. It records the hour only when the engine is running.

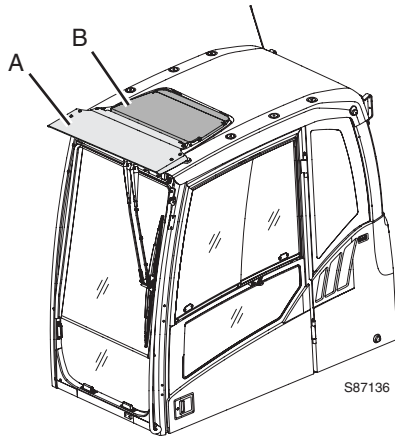


S87045

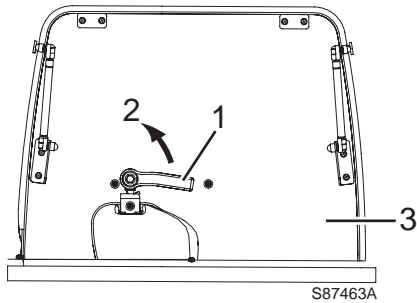
Sun shade

Use the front, roof and rear sun shades to protect from the sun light coming in through windows.

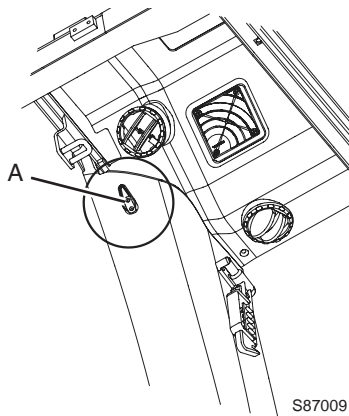
- 1 Front sun shade
- 2 Roof sun shade
- 3 Rear sun shade



- A Rain shield
- B Sunlight protection



- 1 Handle
- 2 Open direction
- 3 Roof hatch



Rain shield and sunlight protection

A rain shield prevents rain from falling on the operator's feet when front window is open.

A sunlight protection on the roof reduces incoming light and heat radiation further.

When installing the sunlight protection roof, consider other optional equipment, for example, rain shield, anti-vandal kit and so on.

Roof hatch, open

- 1 Grip the handle (1) and turn it to open direction (2).
- 2 Open the roof (3).

IMPORTANT! It should be closed tightly not to be opened when transporting the machine.

NOTE! Cabin with fixed roof hatch is provided as an optional equipment. In this case, there is no handle and gas spring.

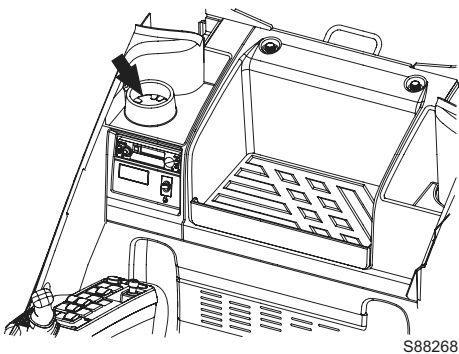
Coat hook

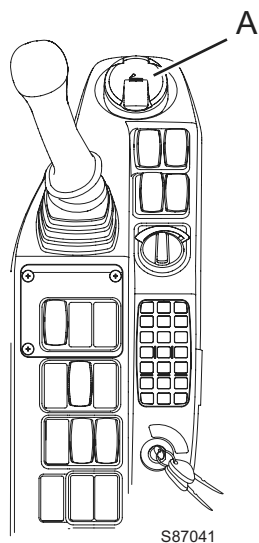
The coat hooks (A) are inside the cab.

NOTE! Do not hook any item that may obstruct the view of the operator.

Cup and drink holder

Use the cup and drink holder to hold a soft drink can in place.



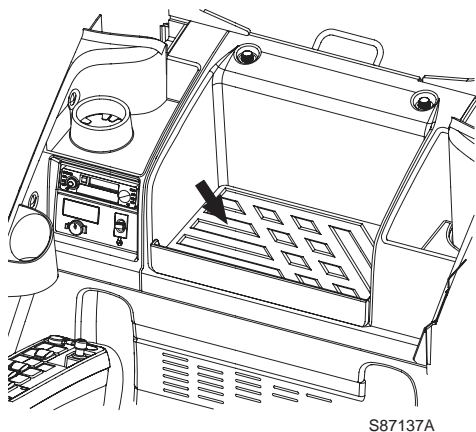


Ashtray (optional)

Pull the top edge of the ashtray (A) in order to open it.
Pull the ashtray upward out of the console when cleaning it.

NOTE! Make sure that you close the ashtray after use in order to prevent any possibility of fire.

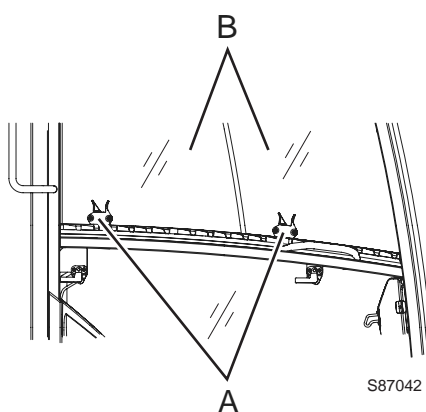
NOTE! The ashtray can be put into the cup and drink holder.



Storage compartment

A storage compartment is located at the rear side of operator seat.

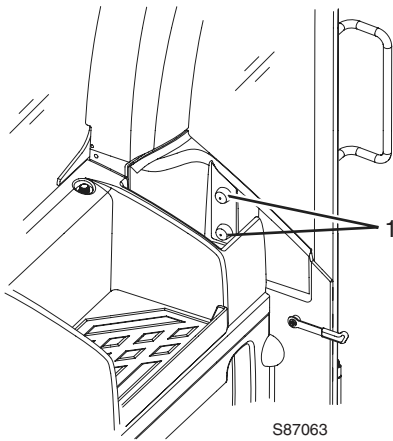
NOTE! Do not store tools in the storage compartment.
This could damage the compartment.



Window fixer

Fix the windows with window-fixer to prevent them from shaking from machine operation.

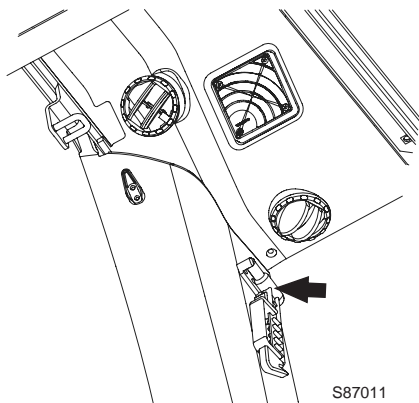
- A Window fixer
- B Windows



Fire extinguisher (optional equipment)

Mount fire extinguisher as follows,

Remove two bolts inside of caps (1) installed on the rear side in a cab and then install the fire extinguisher.

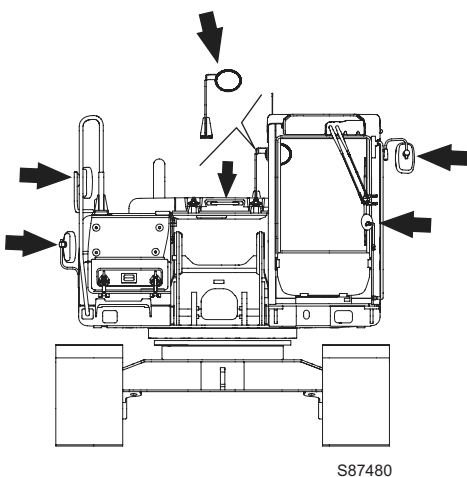


Emergency exit

The cab has two emergency exits, the door and the rear window. Regardless of the rear window types, break the glass with the hammer attached on the rear side in a cab.

IMPORTANT! The hammer must not be removed or used for other purposes than in an emergency situation. A missing hammer must be replaced immediately.

Hammer



Visibility of operator

The machine has many equipments for operator to minimize visibility hazards. Using these equipments, the operator always has to survey its field of vision when operating the machine.

- Mirrors.
- Mirror on counterweight (optional).
- Rear view camera (optional) : see **page 80**.

IMPORTANT! Modifications of the machine configuration by the user of the machine which will result in a restriction of the machine visibility have to be verified according to the regulation by authorized Volvo dealer. Refer to page 7 for detail information about restriction of modifications.

ROPS (Roll Over Protective Structure)

The cab is designed to ensure minimum crash protection space according to currently being developing by International Standard Organization.

Do not jump out of cabin if the machine should roll over. Keep stay in seat wearing seat belt.

Protection from falling or scattering materials (optional equipment)

Install the necessary protection guards according to working conditions where falling or scattering materials are capable of entering the operator's cab.

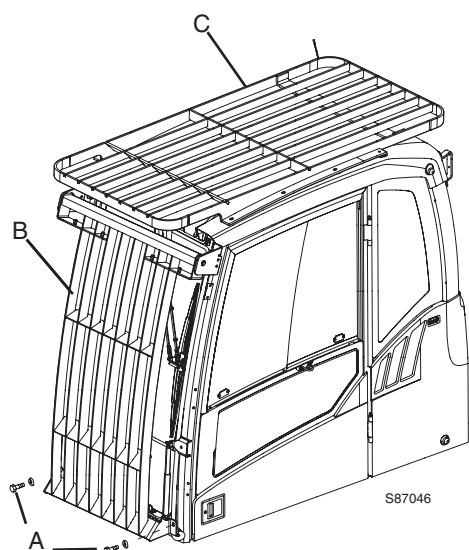
Install front guards when working with a breaker.

In mining applications, FOPS shall be adopted.

The above recommendations are based on standard working, install the necessary additional protection guards in accordance with job site conditions and local government regulations.

Prevent persons from entering or remaining in the dangerous area.

IMPORTANT! Always, check clearance between bucket and Cab/FOG/FOPS guard. Slowly cycle bucket to check for interference with the Cab/FOG/FOPS guard. Pay close attention when quick couplers are used and/or when buckets have lifting eyes welded.



- A Bolts
- B+C FOG
- C FOPS

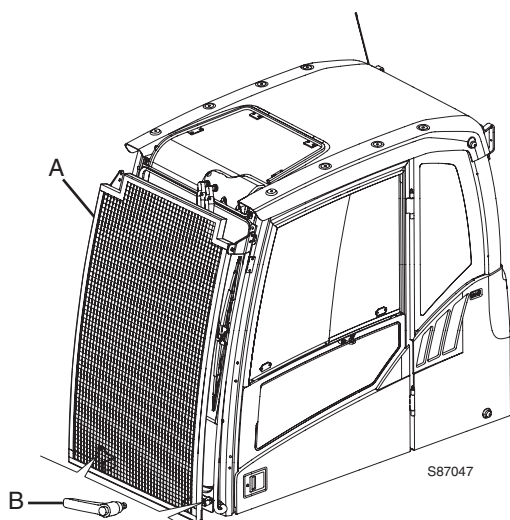
Front window with FOG, cleaning

- 1 Remove the bolts (A), and then tilt the FOG.
- 2 Clean the front window
- 3 Fasten the bolts (A) with regulated torque by pushing the FOG.

IMPORTANT! Do not operate the machine while FOG (Falling Object Guard) is tilted. Otherwise, FOG can be damaged by the bucket.

Front window with safety net, cleaning

- 1 Remove the handle (B), and then tilt the net.
- 2 Clean the front window
- 3 Fasten the handle (B) by pushing the net.



- A Safety net
- B Handle

Anti-vandalism (optional equipment)



WARNING!

Clean mud, grease, oil, and/or debris from track surface, steps, walkways, and working platforms before installing the anti-vandalism covers. Failure to do so may result on injury due to falling.

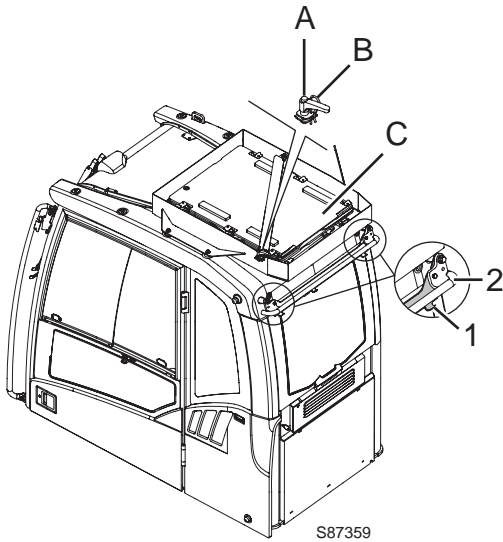
Anti-vandal covers are stored on the cab.

The handle (A) should be tightened and the pin (B) should also be in right position not to be loosen when operating the machine.

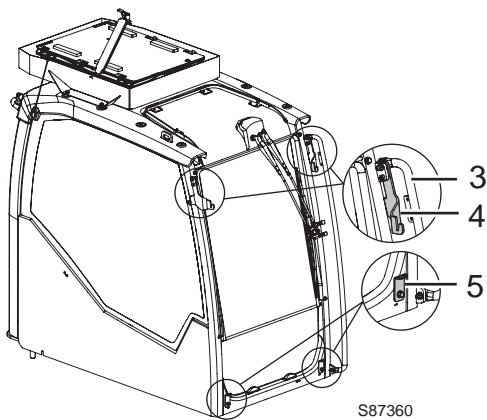
Four brackets are needed to install the covers.

- To install the rear bracket (1), remove the rear handrail (2) and reinstall it with rear bracket.
- Install the front bracket (4). On the right side, remove the front handrail (3) and reinstall it with front bracket.
- Install the lower bracket (5).

NOTE! When storing the covers (C), make sure that the locking screws do not cause interference between covers.



- A Handle
- B Pin
- C Cover assy
- 1 Rear bracket
- 2 Rear handrail

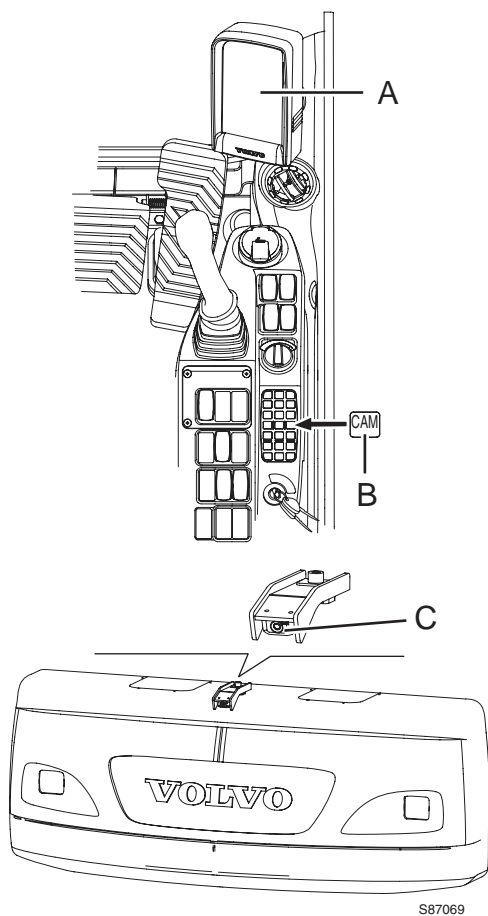


- 3 Front handrail
- 4 Front bracket
- 5 Lower bracket

Rear view camera (optional equipment)

Operator can see the rear view on the I-ECU (A) by pressing the button (B) on the keypad.

When the rearview camera is turned on, whole I-ECU screen displays only view from "Rearview camera". Press the button again to get back to original display.



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- A I-ECU
- B Button for rear view camera
- C Rear view camera

HVAC system

See page 39.

Radio / CD and MP3 player

See page 51

Operating instructions

This chapter contains rules which must be followed in order to operate the machine safely. However, these rules are to be followed in conjunction with laws or other national regulations applicable to road safety and labour welfare.

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

Running-in instructions

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

Safety rules when operating

Operator obligations

- The operator should operate the machine in such a way that the risk of accidents is minimised for both operator and persons present at the work site.
- The operator must be thoroughly familiar with how to operate and maintain the machine and should undergo adequate training on the machine.
- The operator must follow the Operator's Manual rules and recommendations, but also pay attention to any statutory and national regulations or specific requirements or risks which apply at the work site.
- The operator must be thoroughly rested and must never operate the machine when under the influence of alcohol, medicine or other drugs.
- The operator is responsible for any load while working with the machine.
 - There must be no risk of the load falling off while operating.
 - Refuse to take a load which is an obvious safety risk.
 - Respect the stated maximum load for the machine. Pay attention to the effect of different distances to the centre of gravity and the influence of different attachments.
- The operator must be in control of the working area of the machine.
 - Prevent persons from walking or standing under raised excavating equipment, unless it has been made safe or supported.
 - Prevent persons from entering or remaining in the danger area, i.e. a distance of at least 7 m in all directions from operating machines. The operator may allow a person to remain in the danger area, but should then observe caution and operate the machine only when the person is visible or has given clear indications of where he or she is.
 - Prevent persons from being in the cab of a vehicle which is placed so that there is a risk that the cab may be hit by other machines or falling objects, e.g. stones or logs. This does not apply if the cab is sufficiently strong or protected to withstand the impact of such external forces.
 - Make sure you know the weight limitation of working ground.

The operator may only take an instructor on board, if there is an approved place for the same.



WARNING!

An operator of and the management for a construction machine are responsible for the working area of the machine and must turn away any person who is not authorised to be there when the machine is operating. The operator must keep a good lookout forwards and rearwards to avoid the risk of running into persons or objects.



WARNING!

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

Operator's safety

- The machine must be operational, i.e. faults which can cause accidents must be rectified.
- Suitable clothing for safe handling and a hard hat should be worn.
- A loose mobile telephone must not be used, as it may interfere with important electronics. The mobile telephone must be connected to the electrical system of the machine and have a fixed external aerial fitted according to the instructions of the manufacturer.
- 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 lap type seat belt or the three-point belt, if the machine is equipped with this.
- 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.
- Check that the attachment is properly attached and locked.
- The vibration (shaking) which arises when operating may be harmful to the operator. Reduce this by:
 - adjusting the seat and tightening the seat belt.
 - picking the smoothest operating surface for the machine (levelling the surface when necessary).
 - adapting your speed.
- The cab is designed to meet the requirements for falling objects, the weight of which agrees with testing methods according to "FOPS".
- In case of travelling on uneven ground, do not let the machine lean more than 10° to one side.
- The cab has two emergency exits, the door and the rear window.
- Only walk and step on surfaces which are provided with anti-slip protection.
- During electrical storms, do not attempt to enter or exit the machine.
 - If you are off the machine, stay well away from the machine until the storm passes.
 - If you are in the cab, remain seated with the machine stationary until the storm passes. Do not touch controls or anything metal.
- In all kinds of works (travelling, digging, loading, hammering, and so on), place the idler side in front to reduce the travel drive damage due to incorrect operating position.



Measures before operating



WARNING!

Breaking these rules may lead to an accident or serious injuries.

- Read the Operator's manual.
- Carry out daily service, **see page 174**. In cold weather, make sure that the freezing point of the coolant is sufficiently low and that the lubricating oil is intended for winter use.
- Clean / scrape ice off the windows.
- Clean the dust around engine, battery and cooler.
- Check the level of hydraulic fluid, refill if required.
- Check that there is sufficient fuel in the fuel tank.
- Check that there are no faulty, loose parts or leaks, which can cause damage.
- Check that the battery disconnected switch is switched on.
- Check for cracks on frame and tracks.
- Check that hoods and covers are closed.
- Make sure fire extinguisher if equipped is fully charged.
- Inspect steps and handholds for damage or loose parts. Make necessary repairs if needed.
- Check that there are no persons in the vicinity of the machine.
- Adjust the operator seat and fasten the seat belt.
- Adjust and clean the mirrors.
- Inspect working and other lights for proper operation.
- Inspect the failure of gauges in the instrument panels.
- Check the function of the attachment bracket (optional attachment).

Starting

NOTE! Make sure the control lockout lever is in downward (lockout) position, otherwise the engine can not be started.



WARNING!

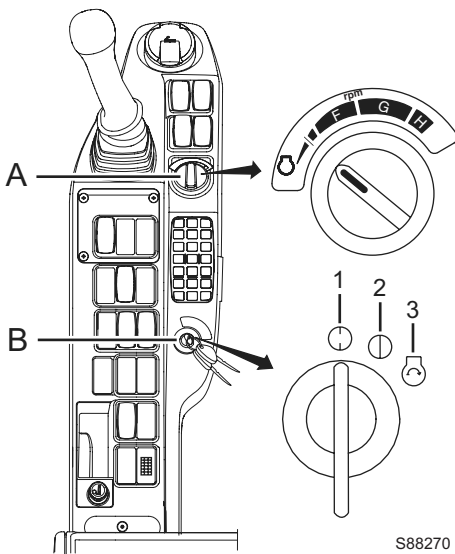
Check that no personnel or obstructions are around the machine before starting the engine.

IMPORTANT! Do not hold the key at the starting position for more than 20 seconds, which cause serious damage to the starting system. If the engine does not start, turn the key back to stop position and wait a couple of minutes before the next starting attempt.

IMPORTANT! If abnormal sounds, excessive vibration, or abnormal operation occur, turn the key to stop position immediately to stop the engine.

IMPORTANT! Wait until the electronic system is completely shut down before restarting.

- 1 Turn the engine speed control switch (A) to the low speed position and turn the key to running position.
- 2 Sound the horn and let other workers and bystanders know you are starting the machine. For the booting sequence, see **page 26**.
- 3 Turn the key to the starting position.
- 4 Release the key when the engine has started.
- 5 Warm up the machine.



- A Engine speed control switch
 B Ignition key
 1 Off position
 2 Running (preheating) position
 3 Starting position



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Air preheating indicator

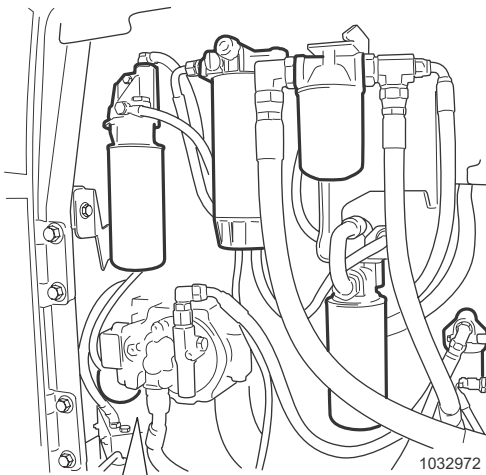
Cold starting


- 1 Turn engine speed control switch (A) to the low speed position.
- 2 Turn the key to the running (preheating) position and keep it there while the preheating is working. The preheating indicator will be displayed on the indicator screen of I-ECU.
- 3 When the preheating is finished, sound the horn and let other workers and bystanders know you are starting the machine. For the booting sequence, see **page 26**.
- 4 Turn the key to the starting position.
- 5 Release the key when the engine has started.
- 6 Warm up the machine. Run at low speed and with a light load until the oil in the engine and hydraulic system has warmed up.

IMPORTANT! At temperature below -15°C , allow the engine to idle for 10-15 minutes before operating.

Use recommended lubricating oil for winter use. See **page 181**.

During the cold season, fill the fuel tank after work has finished for the day to counteract the formation of condensation water in the tank.



A — 
 A Engine block heater

Engine block heater (optional equipment)

This equipment is used to reduce the engine load which cause the wear in the engine when starting the machine in cold weather region.

IMPORTANT! The machine may be equipped with this heater either for 110 volt or 220 volt. Specifications between the external power source and block heater should be checked.

Starting with booster batteries



WARNING!

The batteries may explode, if a discharged or frozen battery is connected directly to a fully charged battery, or if the cables are connected wrongly.

When starting with booster batteries, check that the booster batteries or other power source have the same voltage as the batteries of the machine. If the batteries in another machine are used the engine of that machine must be turned off.

IMPORTANT! Never use a battery charger for starting while it is connected to the mains. This may cause serious damage to electronic control units.

- 1 Turn OFF the battery disconnect switch.
- 2 Remove the protections from the battery pole studs.

Connect two 12 V batteries as follows :

- 3 Connect one of the jump leads between (+) terminal on the battery of the machine and the (+) terminal on the booster battery.
- 4 Connect the other jump lead between the (-) terminal of the booster battery and a grounding point on the machine.

IMPORTANT! Do not ground on lower structure of machine. This may cause extensive damage on the swing bearing.

- 5 Connect the batteries of the machine by turning on the battery disconnect switch.
- 6 Start the engine with the ignition key in a cab.
- 7 Leave the batteries connected for 5-10 minutes after starting the engine.
- 8 Disconnect the jump lead from the chassis connection 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 Re-install the battery pole stud protections.

Warming up

The oil in the hydraulics of the machine is used for operating the hydraulic cylinders of the equipment as well as the hydraulic motors for travelling and swinging. When the oil is cold it is viscous.

The hydraulic functions of the machine therefore operate slower than when the oil is warm.

If one or more of the machine functions are forced against the end-of-stroke position without having first warmed up the system, this may result in malfunctions.

NOTE! During the warming up, the operating control lockout lever must be in its unlocked position.



WARNING!

At very low temperature, the hydraulic system of the machine may response slowly. Therefore, take care before the system has reached operating temperature, unexpected movements may occur.

Hydraulic system, warming up

IMPORTANT! It is forbidden to speed up the warming up of the oil. Forced warming up may damage the machine.

- 1 Start the engine and leave it running at low idling for five minutes.
- 2 Then increase the speed to approx. 1200 rpm.
- 3 Extend the bucket cylinder using lever operation and allow the bucket to move its end position.
- 4 Then carry out a number of boom, arm, swinging and travel movements with the machine to distribute the warmed-up hydraulic oil to the respective hydraulic cylinders and motors.

Carry out these movements until the hydraulic system has reached working temperature / rapid working movements.

Travelling a short distance

Moving the machine a short distance (e.g. when loading onto or off a trailer) may be done without a complete warm-up. This operation must be done with great care. Under these conditions the engine speed must not exceed 1200 rpm and the travel speed control should be in the low speed position.

Stopping and parking

Stopping

- 1 Select as level ground as possible to park the machine.
- 2 Lower the attachment to the ground.
- 3 Leave the engine running at low idling speed for approx. 30 seconds before shutting off the engine. Otherwise the lubrication of the turbocharger may be jeopardised, resulting in shorter service life and great risk of bearing seizure.
- 4 Turn the ignition key to stop position.
- 5 Move the control lockout lever down to lock the hydraulic system securely.
- 6 If the machine is to be left for any length of time, the battery disconnect switch should be turned off.

Keep in mind that the theft and burglary risk can be minimised by:

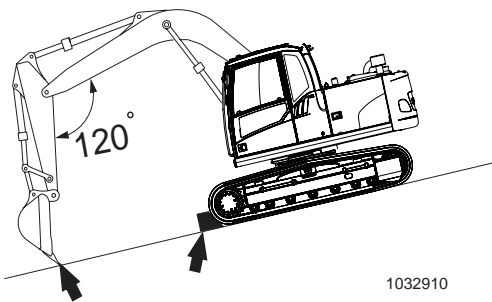
- Removing the ignition key when the machine is left unattended.
- Locking doors and covers after working hours.
- Turning off the current with the battery disconnect switch and removing the handle of the switch.
- Parking the machine where the risk of theft, burglary and damage is minimised.
- Removing all valuables from the cab such as cellular phone, computer, radio and bags.
- Chaining the machine.

By etching in the PIN-number or the national licence plate number of the machine on its windows, it is easier to identify stolen machines.

Parking

IMPORTANT! Select level ground to park the machine. If it is unavoidable to park on a slope, put a wood block under each track and thrust the bucket teeth into the ground.

- 1 Park the machine with proper condition that the piston rods of the attachments will be protected against moisture, dust and damage.
- 2 Follow the paragraphs 3 - 6 above of "Stopping".
- 3 Close and lock all windows, doors and all covers.



Long-term parking

Follow the instructions as for parking and in addition to that:

- 1 Wash the machine and touch up the paint finish to avoid rusting.
- 2 Check the machine for leakage of oil or water, and defects of the attachments and the tracks. Replace or repair all damaged or worn parts.
- 3 Treat exposed parts with anti-rust agent, lubricate the machine thoroughly and apply grease to unpainted surfaces like cylinders.
- 4 Fill the fuel tank and the hydraulic oil tank to the maximum marks.
- 5 Make sure that the freezing point of the coolant is sufficiently low (in cold weather).
- 6 Place the machine on level, firm ground where there is no risk of freezing, landslide or flooding.
- 7 When storing machines in extreme cold temperatures, remove batteries and store them at room temperature. Make sure to place the batteries over a wooden/plastic/rubber surface.
- 8 Cover the exhaust pipe (for parking out-of-doors).

IMPORTANT! Start the machine for one hour once a month and run all cycles of functions to operating temperature.

Check after long-term parking

- All oil and fluid levels
- Tension of all bolts
- Air cleaner
- Hydraulic hoses
- Seals

Transporting the machine

IMPORTANT! Loading, positioning, slinging and securing for transporting the machine on a trailer or other vehicle should be comply with the local or national laws and regulations.

IMPORTANT! The operator performing any works for transportation must be familiar with and be understood both operating information and related laws.

IMPORTANT! Please contact authorized personnel or Volvo CE dealer for any information that you may require.

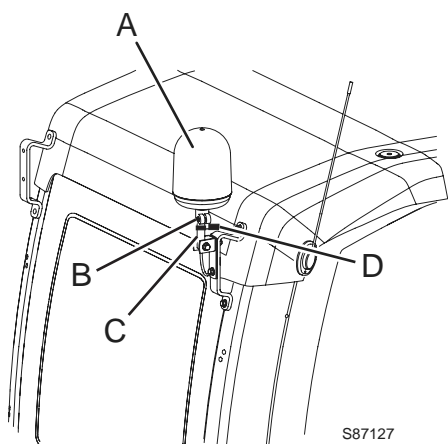
Machine and components, weight and dimension

Weight and dimension are very useful to estimate the method how the machine is supposed to be transported. To comply with the laws and regulations in certain region, use the specifications of the machine, see page 193.

Rotating beacon lamp, disassembling (optional equipment)

When transporting the machine, disassemble the rotating beacon lamp (A) not to be damaged.

- 1 Loosen the bolt (B) and disassemble the rotating beacon lamp (A) and the wire connector for it.
- 2 Keep the rotating beacon lamp (A) in the cab during transportation.
- 3 Put the rubber cover (D) on the bracket (C).

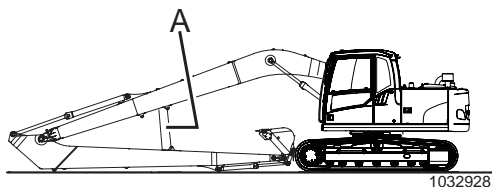


Sunlight protection, closing

The sunlight protection may be opened while transporting the machine because of vibration. Therefore it should be closed tightly not to be opened.

Transporting the machine with long attachments

Although arm is folded, cylinders are given excessive forces caused by self-gravity of attachments. Insert a stay (A) between arm and boom for transporting.



Loading and securing the machine



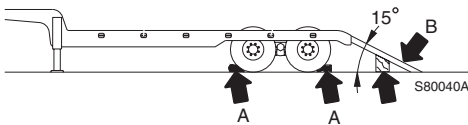
WARNING!

Do not lift the disassembled component with a person in the cab or on other components.



WARNING!

Remove grease, oil, mud, ice etc. from the planks and trailer bed to prevent the machine from slipping sideways.



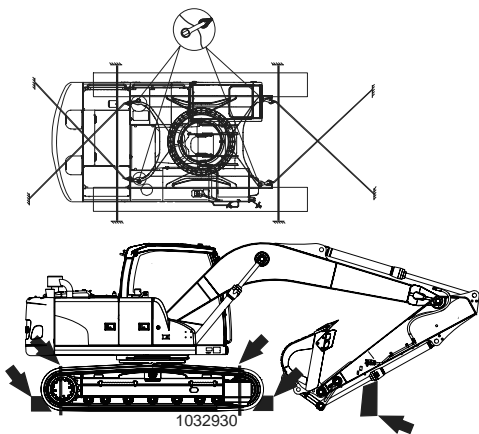
IMPORTANT! Auto idle switch should be off to prevent any possibility from increasing engine speed automatically when you operate the control levers and/or travel pedals with auto idle switch ON.

IMPORTANT! Operate the engine at low speed and set travel speed to low.

- 1 Place the trailer on a firm and level ground.
- 2 Apply the brake of the trailer.
- 3 Insert blocks (A) in front of and behind the tyres of trailer.
- 4 Fix loading ramps (B) securely.
 - Make sure that the strength, width, length and thickness of the planks are safe for loading.
 - Make sure that the angle of loading ramp is 15° or less.
- 5 Check whether the right and the left loading ramps are of the same height.
- 6 Decide the direction and travel slowly onto the loading ramps and trailer bed / platform. Block each track and secure the machine with tie downs of adequate load rating so that the machine cannot move.
 - Load the machine so that the bucket cylinder rod does not contact the trailer.
 - Never operate any lever other than the travel levers (pedals) while the machine is on the loading ramp.

IMPORTANT! Do not over extend the arm and/or bucket cylinder. Allow some hydraulic cushion. Failure to do so could cause severe damage to the cylinders.

- 7 Stop the machine.
- 8 When some parts of machine are disassembled, load the disassembled components on the trailers properly. If necessary, put the blocks behind or below the components.
- 9 Remove the ignition key
- 10 Turn OFF the battery disconnect switch.
- 11 Lock the door and the access covers.
- 12 Cover the exhaust pipe to prevent turbocharger from damage.
- 13 Ensure that the machine or disassembled components are firmly secured.



Lifting the machine



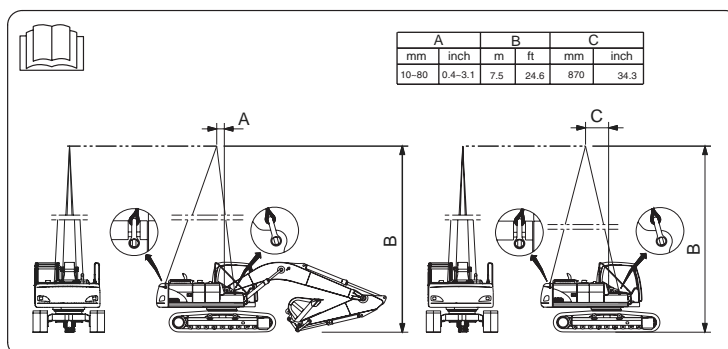
WARNING!

Do not lift the machine with a person in the cab or on the machine.

Use certified cables, slings, shackles and hooks with adequate load rating.

Always use proper lifting equipment. Failure to do so could result in severe equipment damage and/or serious injury.

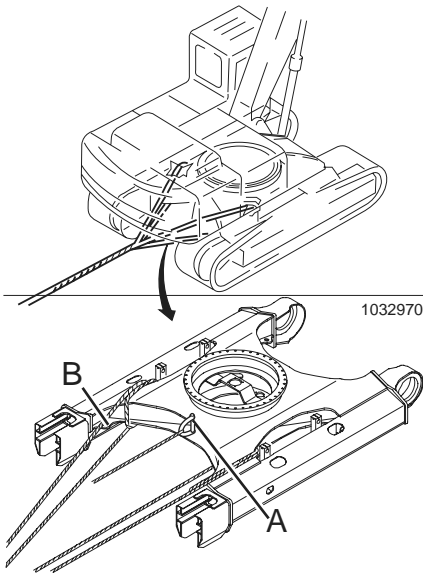
Always lift the machine as shown below. Improper rigging can allow the load to shift and cause injury or damage.



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NOTE! Lift the machine on flat, even and level ground.

- 1 Start the engine, and arrange the bucket, arm and boom as illustrated. Position the superstructure boom forward over the idlers.
- 2 **Move the control lockout lever down to lock the system securely, see page 69.**
- 3 Stop the engine, check the safety around the machine.
- 4 Close and lock the front window cab door and engine hood securely.
- 5 As shown in the decal for lifting, connect lifting cables or slings with sufficient strength for the machine weight at the lifting points correctly.
- 6 After installation of all hoisting equipment, lift the machine a little to check its balance, if satisfactory, lift it slowly and evenly.



Retrieval and towing the machine



WARNING!

Use wire ropes which are sufficiently strong for towing.

Retrieval device is used when the machine is in the event of slipping into swampy ground or being disabled.

- 1 Attach a wire rope to be retrieved or to tow the machine as shown in the illustration. Ensure that the towing linkage is properly connected, adequate for the purposes.
- 2 Towing speed for short distances is maximum 2 km/h and use other transportations for long distance.
- 3 Keep the tow line angle as small as possible.
- 4 Angle for pulling should not exceed 20° from the horizontal line of tow lope and longitudinal axis of the machine. Be careful there should not be also interference with parts of the machine.

There is a hole (A) on the lower frame to fit the shackle only for towing light objects.

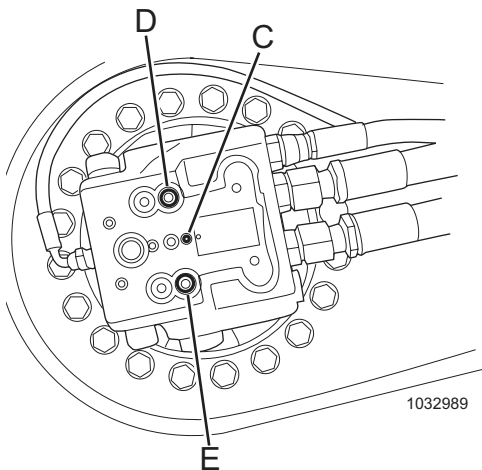
- 1 The shackle must be used for the hole.
- 2 Permissible forces of the hole (A) for retrieval and towing is 65000 N.

NOTE! Do not use shackle holes (B) to retrieve or tow the machine. The holes are only for anchoring when transporting the machine, see page 90.

Manual release of travel brake

If it is impossible to operate the machine due to the failure of the component in the travel motor, the travel brake should be released.

- 1 Apply hydraulic pressure of 40 kg/cm² (569 psi) at center port (C) of the travel motor.
- 2 Connect a hydraulic hose between port (D) and (E) after removing plugs.



Operating techniques

The excavator is a multi-task machine capable of being fitted with multitude special attachments to perform many types of work. This chapter contains information and instructions regarding the best operating practices to improve efficiency, including examples on how the most common attachments are used. It is important that the correct technique is used to obtain safe and efficient use of the machine.

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.

Rules for digging



WARNING!

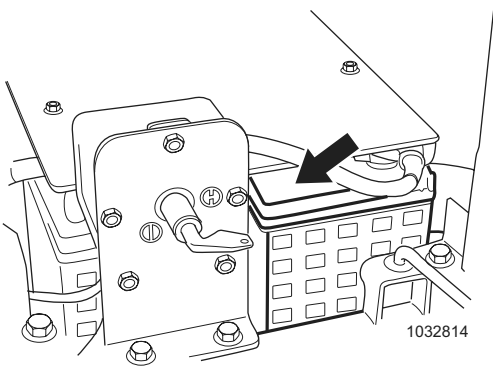
When digging, the operator must be seated in the operator seat. No person may be on the outside of the superstructure, on the tracks or in the doorway, when the machine is being operated.

First read the safety rules for operating, see **page 82**.

- Always prepare work by carefully studying drawings and regulations that apply to the site. Also study the ground conditions and what the risk areas on the site look like. Turn off gas, electricity and water supplies, if this is necessary. Mark the position of cables and pipes.
- Fence off the area around the machine, if there is a risk that people may get too close. Pay attention to a swinging machine.
- Look after your workmates! Make sure that they take care. No persons, apart from the operator, may be present within the working area of the machine. Teach them to be on their guard against collapsing banks and rolling stones and to be prepared to dash for safety. Changes in stress in a bank immediately prior to a landslide are indicated by small streams of loose material just where the cracks are forming.
- If the machine is provided with optional equipment, which is operated with the pedals, the operator must assure him or her self of that the anticipated movements are obtained when actuating the pedals. An unexpected movement may entail risk of an accident.
- A cab provided with protective grill over the roof window meets the requirements for falling object guard in accordance with stated testing methods (FOPS/ISO 3449). Use the falling object guard when there is risk of heavy, falling objects.

IMPORTANT! With certain attachment combinations there is a risk that the attachment may strike the cab. Avoid damage by being careful when working close to the machine.

- Never swing the bucket or load above people.
- Never use the bucket for chopping.
- If uncontrolled movements should occur, first release levers and pedals, then shut off the engine immediately by turning the ignition key to the stop position.
- If red warning lamps light up and/or the buzzer is sounding, the engine must be stopped immediately and the cause investigated.
- The machine must not be equipped with a larger bucket/attachment than permitted.



Battery disconnect switch

- When using equipment which generate knocks or vibrations, e.g. hammer, the hydraulic cylinders must not be operated closer than 10 cm from their end-of-stroke positions.
- In case of fire, the battery disconnect switch should be turned off, if possible. It is positioned outside the tool box on the left side of the machine.

Loading on to a vehicle



WARNING!

Make sure that no persons are standing near the vehicle, which is being loaded. Stones may fall off during the loading.

- If possible, position the machine higher than the vehicle to be loaded.
- Place the vehicle to be loaded so that the machine does not have to swing and lift more than necessary.
- Make sure that the driver of the vehicle to be loaded stays outside the working area of the machine and never swing the bucket over the cab of the vehicle to be loaded.
- Do not load the vehicle unevenly and avoid unnecessary spillage when loading. Do not make the load so high that earth and stones fall over the platform sides.
- Release the load carefully.

When working, do not:

- use the slewing force for raking over the ground, demolition of buildings or thrusting bucket teeth into the ground. It may cause damage to the machine and attachments.
- dig by using the travelling motors or thrusting bucket teeth into the ground. This can overload the rear of the machine and damage the track drive.
- extend the hydraulic cylinder to its end of stroke. This can overload the stop in the cylinder and shorten the life span of the machine. Work with as much clearance as possible.
- work by slamming the bucket into the ground. Do not perform digging by dropping the boom, or using the bucket instead of a pick. Striking digging or continuous striking can overload the rear of the machine or damage the attachment. It is also very dangerous.
- carry out lifting work. Basically, using this machine as a crane is prohibited. However, local or national regulations may allow it on some markets. If permitted, a properly installed rated bucked hook and certified slings / shackles are required. Contact a workshop authorised by Volvo CE.
- operate by dropping the machine body.

Whole body vibrations

Whole-body vibration emission on construction machinery are affected by a number of factors, such as 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, the result can be a range of different vibration levels for the same type of machine. For cab specifications, see **page 190**.

Guidelines for reducing vibration levels on earth-moving machines

- Use the proper type and size of machine, with optional equipment and attachments for the application.
- Keep the terrain and haul roads in good condition.
 - Remove any large rocks or obstacles.
 - Fill any ditches and holes.
 - Provide equipment and schedule time to maintain terrain conditions.
- Adjust the speed and travel path to minimize the vibration level.
 - Drive around obstacles and rough terrain conditions.
 - 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.
- Keep the seat maintained and adjusted.
 - Adjust the seat and its suspension according to the weight and size of the operator.
 - Inspect and maintain the seat suspension and adjustment mechanisms.
 - Use the seat belt and adjust it correctly.
- Steer, brake, accelerate, shift gears, and move the attachments smoothly.
- Minimize vibrations for long work cycle or long distance traveling.
 - Use suspension systems if available.
 - If no suspension system is available, reduce speed to prevent bouncing.
 - Transport machines when there are long distances between worksites.

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

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

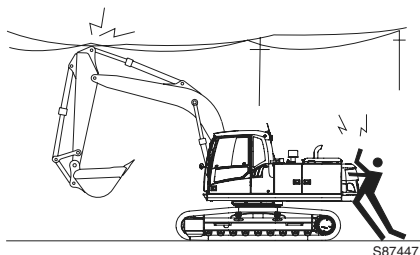
- Adjust the seat and controls to achieve good posture.
- Adjust the mirrors to minimize twisted posture.
- Provide breaks to reduce long periods of sitting.
- Avoid jumping down from the machine.
- Minimize repeated handling and lifting of loads.
- Maintain reasonable weight and physical condition.

Working within dangerous area

High voltage overhead power line

High voltage is lethal and the current sufficiently strong to destroy both machine and attachments. Your life is in danger if you come into contact with or close to high voltage power lines. Always contact the power company responsible before beginning any work near high voltage power lines. Go through the special instructions issued by the power company for work/presence near the power lines.

Regard all power lines as if they were live even if they are supposed to be without current. Working when the machine or its load at any time is closer than the minimum safety distance to a power line, is taking a very serious risk.



- Remember that the voltage of the power line determines the safety distance. Electrical flash-over may occur and damage machine and operator at fairly great distances from the power line.
- Find out what action to take if a person has been exposed to an electric shock.

IMPORTANT! Also when transporting the machine, take overhead power lines into consideration.

IMPORTANT! There can be a visual distortion through roof window. Real distance should be reconsidered.

Voltage	Minimum distance to power line
0 ~ 1 KV	2 m
1 ~ 55 KV	4 m
55 ~ 500 KV	6 m



WARNING!

Make sure that the machine does not come into contact with power lines while the power is switched on. Injuries will arise if part of your body should come into contact with a machine which is conducting electrical power.

Underground cables and pipes

Make sure that authorities or companies responsible for cables and pipes have been contacted and that their instructions are followed. Also check which rules apply to ground personnel regarding exposing cables and pipes. Normally only the service companies' own personnel may expose and arrange provisional suspension of cables.

Make use of a signal man when you cannot see the actual point where you are working or when the position of the pipe or cable is critical, see page 124. The position of the pipe or cable may deviate from the drawing or distances may be incorrectly determined. Regard all electrical cables as live.

Overhead railway power lines

Loading and unloading is only permissible between the boundary signs. The signs may be mounted directly on the power line or on special posts.

- Contact authorised railway personnel to obtain permission to load or unload.
- After any breaks in the work, always contact the railway personnel again.



WARNING!

Bear in mind that the power line over the adjacent track may be live.

Operating under ground

- Special equipment, e.g. certified engine is required within the EU and in EES countries. Talk to your dealer.

Working in confined spaces

- Check that there is sufficient room for machine and load.
- Move slowly.

Operating (working) on public roads

- 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.
- when moving the machine with a suspended load, special attention must be observed. when required, request the help of a signal man.
- Rotating warning beacon may be used:
 - on attached or connected implement, which is wider than the vehicle itself.
 - When the vehicle constitutes a hindrance or danger to other traffic.
 - When working on or by the side of the roadway.

Working in low light conditions

- When working in low light conditions, use head light.
- In buildings, tunnels, etc., switch on the lights.
- Do not operate the machine when visibility is poor such as a heavy fog, snow or rain.

Working in other dangerous areas

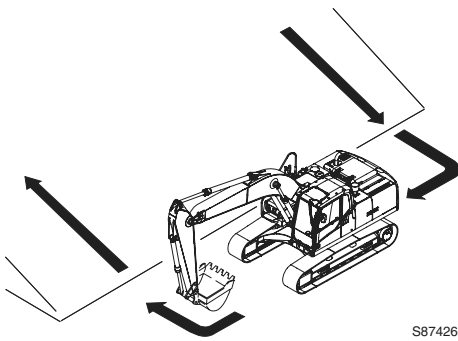
- Observe great care at marked danger areas.
- Do not operate too close to the edge of a quay, ramp, etc.

Working on slopes

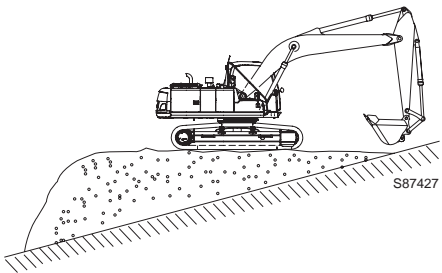
IMPORTANT! Operation of this machine on an incline or slope may cause the machine to become unstable or unbalanced. Avoid jeopardizing the engine lubrication. The maximum climbing ability for this machine is 70% grade (35 °), limited by engine lubrication. However, it depends on the load of material. Operate controls carefully to prevent sudden movements which may cause the machine to slide or tip over.

Caution on a slope

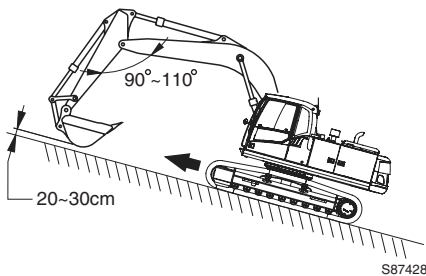
- Be careful when opening or closing the doors on a slope, operational force may be changed rapidly. Make sure to keep the doors closed.
 - Do not descend backward on a slope.
 - Operate the travel function slowly when approaching or descending a slope.
 - Do not change direction or travel a cross on a slope. Change direction on level ground, if necessary first come down to level ground and make a detour.
-
- If the machine slides, immediately lower the bucket to the ground. The machine can turn over due to unbalance. Especially, do not swing with loaded bucket. In unavoidable case, pile up earth on the slope, and then make the machine level and stable.
-
- While travelling on a slope, keep the angle between boom and arm at 90 - 110 °, raise the bucket 20 - 30 cm from the ground



S87426



S87427



S87428

In case of shoes slipping

If the shoes slip on a slope, thrust bucket into the ground, and pull the arm in to assist the track drive to move the machine up the slope.

In case of engine failure

In case of engine shut down while travelling on a slope, put the travel lever to neutral position and lower bucket down to the ground, then start the engine.

If the engine shuts down on a slope, do not operate the swing function, since the superstructure may be swung under its own weight and cause tipping or side slipping.

Escaping from swampy ground

Be very careful when working on swampy ground.

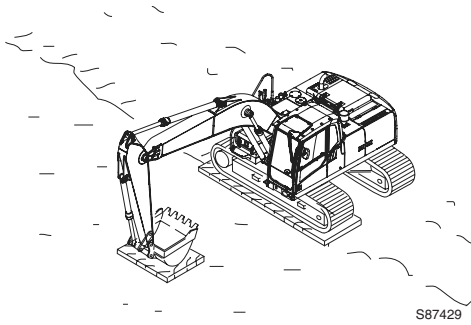
In case that one track gets bogged

If one track gets bogged down, raise this track using the bucket and put a plank under the track.

IMPORTANT! When raising the machine using boom or arm, use the bottom of the bucket. Do not use the bucket teeth.

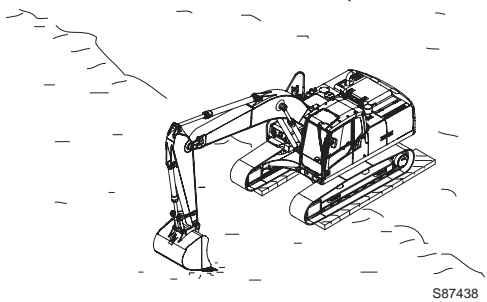
Set the angle between boom and arm at $90^\circ \sim 110^\circ$.

After working in water or escaping from swampy ground, replenish the grease to the attachment pins or the areas affected by the water. Check the idler, rollers and track drive case oil, if contaminated, change the oil.



In case both tracks get bogged

In case that both tracks get bogged down, put planks under each track. Thrust the bucket into the ground, pull with the arm as when digging, and move the travel lever forward to escape.



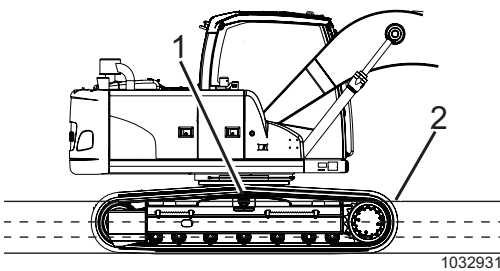
Permissible depth of water

IMPORTANT! Be careful when the rear of the upper body is under water, the engine fan may be damaged.

Permissible working depth in water is the center of the upper roller.

Do not fully submerge the upper roller.

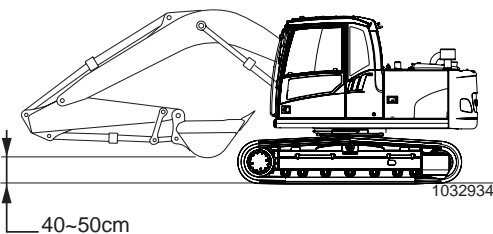
Upon leaving the water, make sure all the grease is replenished in the areas affected by the water, e.g. bucket pin etc., remove the old grease completely regardless of the maintenance period. Also check the oil in the travel drive for contamination, and if necessary, replace it.



- 1 Upper roller
- 2 Water level

Travelling on uneven ground

- In case of travelling on uneven ground, reduce travel speed and operate the machine so as not to lean to one side more than 10° .
- In case of travelling on flat ground, retract the attachment and raise it 40 - 50 cm from the ground.



Working in cold weather

Read the advice for starting, see **page 85**.

The windows must be free from ice and snow before putting the machine to work.

- Watch out for ice on the machine causing slippery conditions. Step only onto anti-slip surfaces.
- Use an ice scraper on a long handle or a ladder when removing ice from the windows.



WARNING!

Avoid contact between unprotected skin and very cold metal objects, as the skin may freeze to the metal.



WARNING!

In very low temperatures the hydraulic system of the machine will response slowly. Therefore, take care before the system has reached operating temperature, so that accidents are avoided.



WARNING!

Disconnect the electrical engine heater before servicing the machine. There may be risk of burns and electrical shock.

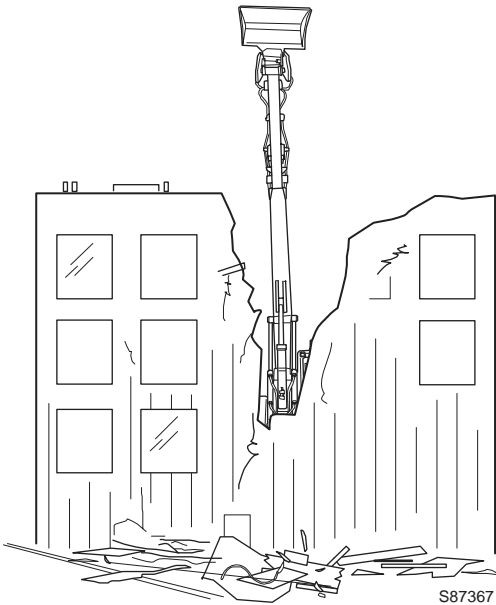
Demolition work

The machine is often used for demolition work. Be extremely careful and study the work site thoroughly. Use fall protection over the cab against falling objects.

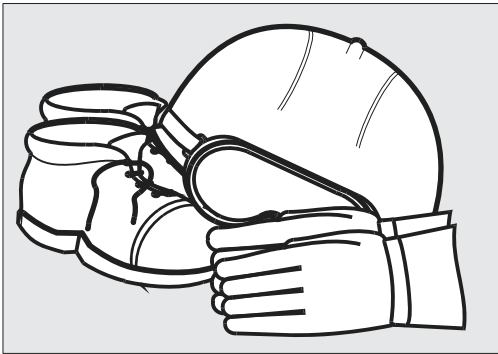
- Make sure that the material, on which the machine is standing, cannot collapse or slide.
- Operate the machine on firm level ground, if necessary prepare the area with another machine first.
- Do not work close to free-standing walls, which may fall over the machine.
- At all times be aware of where your workmates are. Do not work if anyone is dangerously close to the demolition object.
- Leave sufficient space in front of the machine for debris to fall to the ground and not hit the cab.
- Fence off the dangerous part of the work site.
- Spray water over the demolition site to prevent harmful dust from spreading.

Boots with steel reinforcements in the soles and toe caps, protective goggles and a hard hat are obvious protective items to be worn on a demolition site.

If the machine is equipped with special demolition equipment, read the supplied instruction booklet about the safety risks that might occur and how the demolition equipment is used.



S87367



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Working with bucket

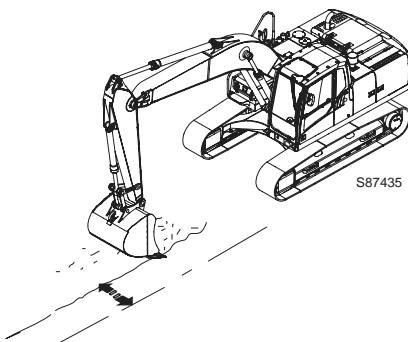
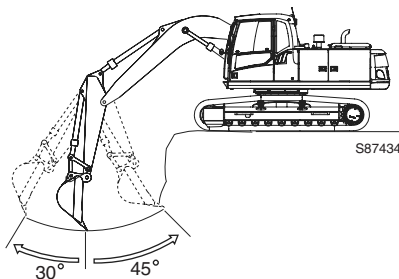
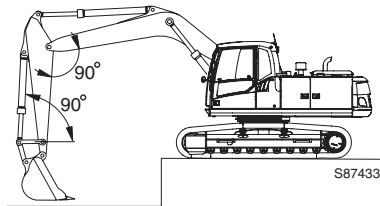
IMPORTANT! Select the proper attachment to suit the machine on which it will be installed. The type of attachment varies with the machine type. Contact a workshop authorised by Volvo CE.

The machine is prepared for several different type of optional equipment to perform many types of work. Only the simplest operations are described below.

Backhoe work

Backhoe work is digging the material at a lower level than the machine is located.

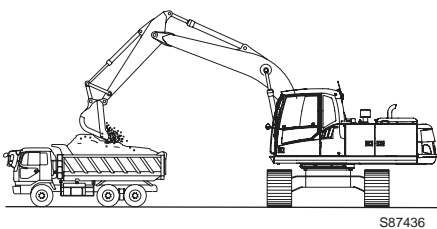
When the angle between bucket cylinder and links, dipper arm cylinder and dipper arm is set to 90° respectively, the working efficiency of each cylinder will be at its maximum. Take advantage of this angle to improve the work efficiency. The range for effective digging is when the dipper arm is between 30° forward and 45° rearward. There may be a little difference according to digging depth. Do not use the cylinder up to its stroke end, but only within this range.



Ditching work

Install a proper bucket for ditching. Place the machine where the ditching is performed effectively.

In case of a wide ditch, dig both sides in first, and then dig the center area.



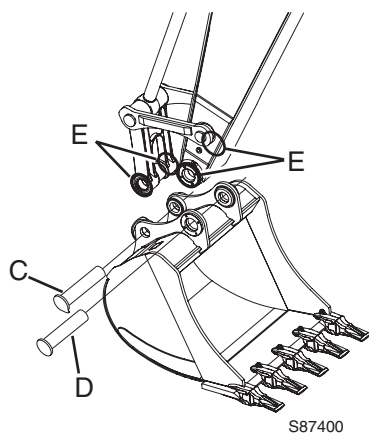
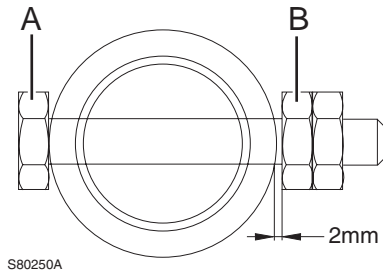
Loading work

Position the hauler or truck so as to achieve a small slewing movement and good visibility for the operator to work effectively.

Also load over the rear side of the dump truck rather than over the side, as this makes the operator work easier and increases efficiency.

Bucket, changing

Bucket, removal



WARNING!

While striking the bucket pin with a hammer, metal chips may fly into your eyes. Always wear goggles, safety helmet and gloves while working.

- 1 Lower the bucket lightly on the ground.
- 2 Remove the lock bolt (A) and nut (B) of each pins.
- 3 Remove pins (C and D) and code rings (E), then remove the bucket.

IMPORTANT! Block the removed bucket to stabilize it. Keep the pins clean and do not damage code rings (E).

Bucket, installation

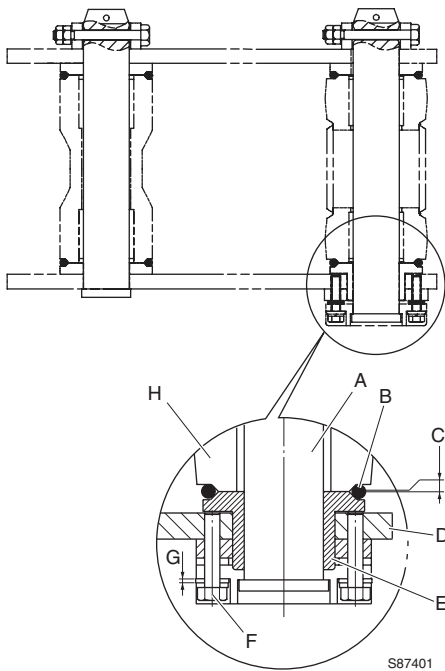


WARNING!

Do not insert your fingers into the pin bores to check alignment, a serious accident could occur.

- 1 Align the dipper arm and links to the bucket.
- 2 Put code rings (E) at the holes for the dipper arm and link. Align the holes between bucket and dipper arm and links.
- 3 Apply grease to the holes.
- 4 Insert pins (C and D).
- 5 Install lock bolt (A) and nut (B) of each pins.

IMPORTANT! Leave a clearance of minimum 2 mm between pin and nut, and grease the pins.



- A Pin
- B Code ring
- C Clearance
- D Bucket
- E Bushing
- F Screw
- G Shim
- H Arm

Bucket clearance, adjustment

- 1 Park the machine on a level, firm surface and lower the bucket on the ground.
- 2 Slowly operate the slew control lever until the right arm boss and bucket boss are in full face to face contact (no gap).



WARNING!

Be careful when operating the lever, the machine may swing. Therefore, there should be no one around the bucket.

- 3 Move the control lockout lever down to prevent the digging unit from moving
- 4 Stop the engine.
- 5 Slide code rings (B) out of the way to check the clearance.
- 6 Measure clearance (C) between bushing (E) and arm (H).
- 7 Loosen screws (F). Add or remove shims to obtain the correct clearance. (Use the same quantity of split shims on each half.)
- 8 After adjusting the shim, tighten screws (F) to specified torque, 27 kgf·m.
- 9 Check clearance (C) again, adjust if required.
- 10 Slide code rings (B) back into position.

NOTE! Original shim quantity (G) is 12 (= 6 × 2).

NOTE! Keep removed shims in the tool box as spares. Adjust clearance (C) each time a bucket is installed on the machine.

NOTE! If the specified clearance can not be achieved after removing all shims, change bushing (E) with new one.

NOTE! Bucket clearance standard (C) = 0.5 ~ 2.0 mm.

NOTE! Lubricate bushing (E) outer diameter with an anti-seize compound or grease.

Working with long range attachment



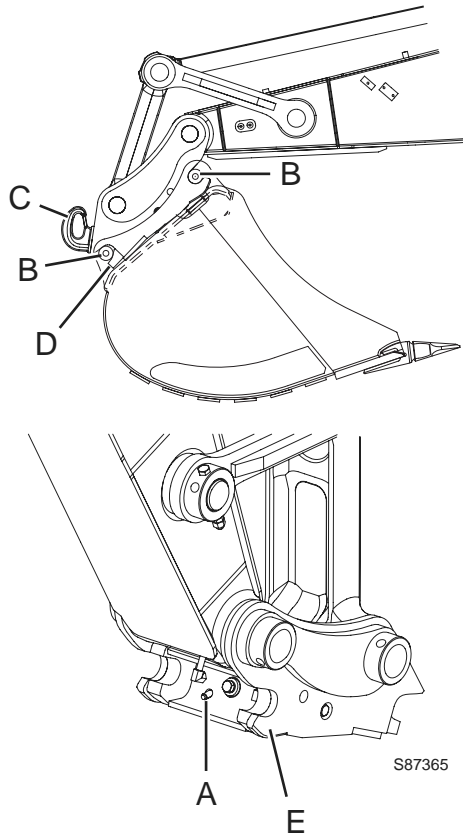
WARNING!

Due to the length of the attachment, there is a risk that the attachment may strike the cab. It needs to be used with care in order to avoid damage to the machine/attachment or personal injury.

IMPORTANT! Do not use any attachment not authorized by Volvo CE.

Long range attachments can be used in clearing and dredging lump of clay accumulated in the river and reminders of waste water effectively.

- Do not use long-range attachment in general excavating, because it is designed for excavating small amounts.
- Operate the machine smoothly in order to keep stability and safety when travelling.
- Do not stop the machine abruptly, which may cause heavy joggling of the attachment. It also causes excessive force to the attachments which finally may damage the machine.
- Never use power boost switch of attachments.
- Boom, dipper arm and bucket have big inertial power compared to standard equipments. Therefore, do not operate the machine at the ends of stroke of each cylinder.
- Do not travel the machine or raise the main body with the bucket grounded. It may give excessive force to pin around the bucket.



- A Red indicator pin
- B Bucket shafts
- C Lifting hook
- D Locking wedge
- E Hooks for gripping attachment

Hydraulic attachment bracket (SQF S6)



WARNING!

Attachment bracket extends the length of the arm and with the certain attachments could hit the cab in some positions. It needs to be used with care in order to avoid damage to the machine/attachment or personal injury.



WARNING!

When attaching or disconnecting a bucket from the attachment bracket, make sure nobody enters the working area.

The attachment bracket consists of flat mounting plates assembly which are attached to the end of dipper arm and bucket link. There are two hooks (E) on the plate for the pins (B) on the bucket.

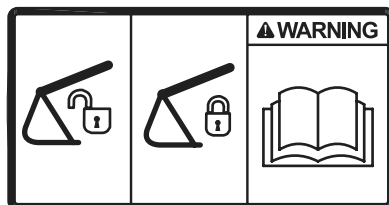
There is a lifting hook (C) on the attachment bracket.

The attachment bracket is equipped with a double-acting hydraulic cylinder. The bracket locking wedge (D) is fitted to its piston rod. Servo pressure acts on the piston of the lock cylinder, locking the bucket in place against bucket shaft (B). This means that the locking wedge adjusts itself and provides gap-free locking.

When locking wedge (D) is released, the servo pressure is transferred to the piston rod side. If necessary, the release pressure can be increased by loading the bucket cylinder in its end position.

There is a red indicator pin (A) on the bracket, which is pulled in when the locking wedge is in the locked position and pushed out when the locking wedge is released.

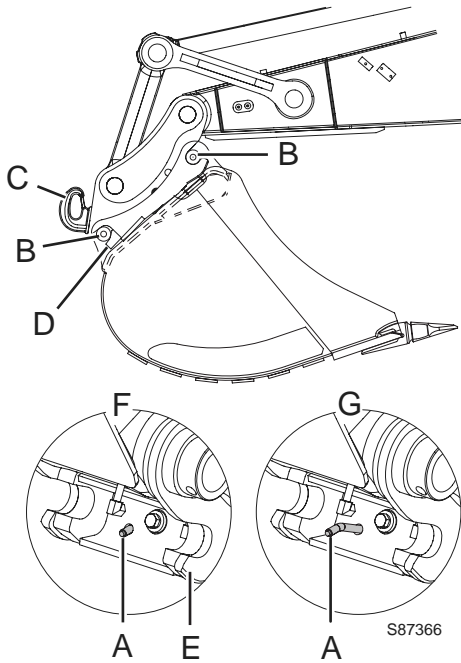
With the aid of the lifting hook the machine can be used for lifting operations. As the hook is positioned on the attachment bracket, it can be used without bucket. This improves visibility for the operator and increases the maximum permissible load.



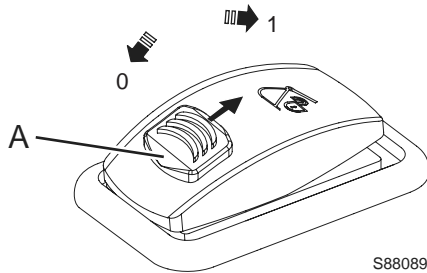
WARNING!

If the attachment bracket (SQF S6) is open, the warning indicator lights up. Working with the attachment bracket open is prohibited.

Shut-off valves must not be installed on the pipes leading to the cylinder of attachment bracket. If the pressure in the cylinder drops, the bucket may fall off.

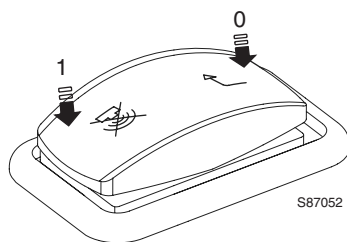


- A Red indicator pin
- B Bucket shafts
- C Lifting hook
- D Locking wedge
- E Hooks for gripping attachment
- F Indicator pin fully retracted : lock position
- G Indicator pin fully extended : unlock position



Attachment bracket (quick fit) switch

- A Locker
- 0 Lock position
- 1 Unlock position



Audible warning and confirm switch

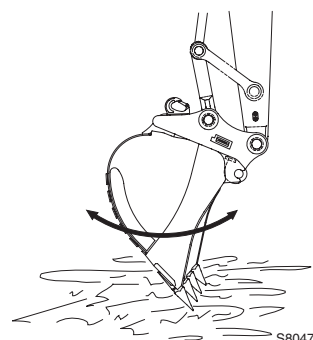
- 0 Confirm switch ON
- 1 Audible warning is switched OFF

Bucket, removal

- 1 Position the machine on even, firm and level ground with the bucket resting on the ground.
- 2 Press the attachment bracket (quick fit) switch (unlock position). See page 48. If the bracket is open, the warning indicator on the I-ECU is ON, and the warning buzzer is audible.
- 3 When the red indicator pin (A) on the bracket is completely extended, make free carefully the bucket from the attachment bracket by operating the bucket cylinder to its inner end position (bucket out). If the red indicator pin (A) is not extended, increase the hydraulic pressure to the lock cylinder by carefully moving the bucket cylinder to its outer end position (bucket in), and keeping it under pressure for about a second.
- 4 Disconnect the bucket by moving the arm outward and raising the boom.

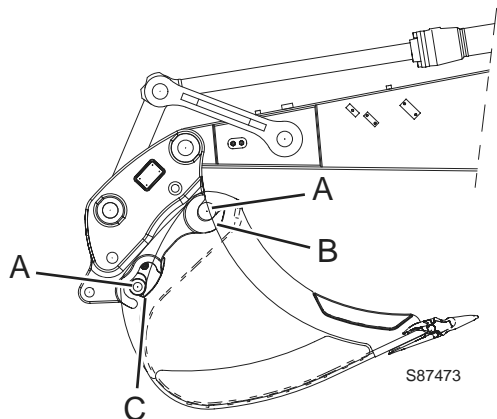
Bucket, installation

- 1 Press the attachment bracket (quick fit) switch (unlock position), See page 48.
- 2 Check that the red indicator pin (A) is fully extended.
- 3 Operate the arm to such a position that the two hooks on the attachment bracket engage the front pin of the bucket.
- 4 Turn the attachment bracket slowly towards the bucket by moving the bucket cylinder (bucket in) until this bracket mates up correctly against the bucket.
- 5 Check that the attachment bracket is correctly aligned against the tip of the bucket, if necessary, adjust with arm or boom movements.
- 6 Press the attachment bracket switch (lock position).
- 7 Check that red indicator pin (A) is completely retracted into the attachment bracket.
In case of confirming by confirm switch on the left instrument panel, the warning lamp will be OFF.
- 8 Do the following tests to check that the attachment bracket is firmly fastened.
 - Press the bucket to the ground.
 - Operate the bucket cylinder in and out to check that locking wedge (D) is securely seated.
If you are not sure, check that locking wedge (D) has gone into the hook.



Hydraulic attachment bracket (UQF)

(Optional)



- A Bucket pins
- B Gripping hook
- C Locking hook



WARNING!

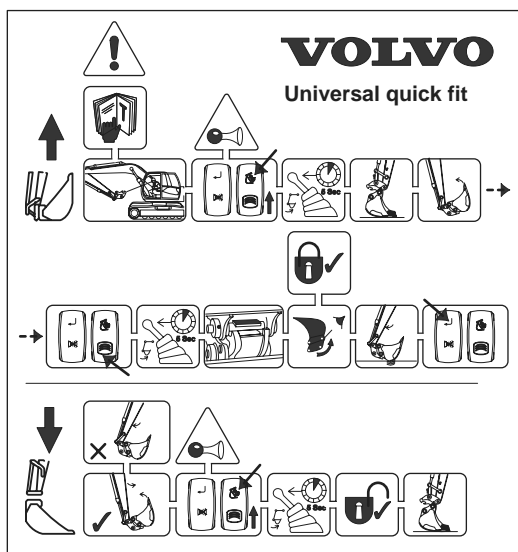
When attaching or disconnecting a bucket from the attachment bracket, make sure nobody enters the working area.

The attachment bracket is equipped with a double-acting hydraulic cylinder. The locking hook (C) is fitted to its piston rod. The hydraulic pressure acts on the piston of the lock cylinder, locking the bucket in place against rear bucket pin (A). This means that the locking hook adjusts itself and provides gap-free locking.

When locking hook (C) is released, the hydraulic pressure is transferred to the piston rod side.

When checking the conditions of attachment bracket from the cab if it is locked or unlocked position, slowly curl out the bucket / attachment and dipper arm.

With the aid of the lifting eye, the machine can be used for lifting operations. As the lifting eye is positioned on the attachment bracket, it can be used without bucket. This improves visibility for the operator and increases the maximum permissible load.

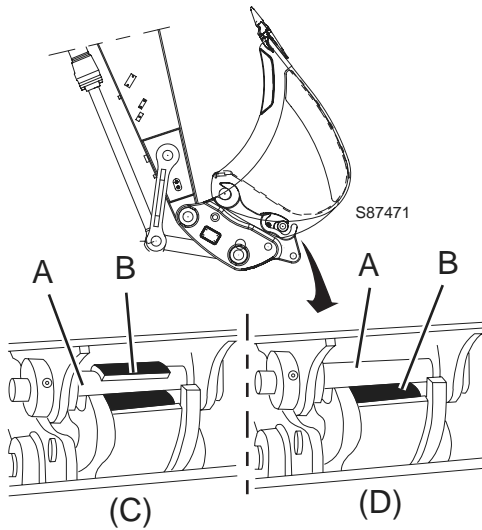


Decal in cab

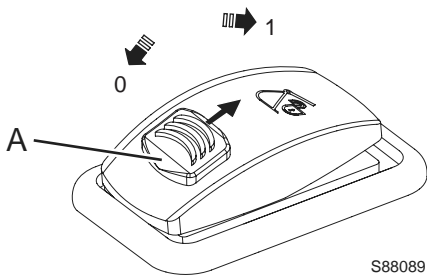


WARNING!

If the attachment bracket (UQF) is open, the warning indicator lights up. Working with the attachment bracket open is prohibited.

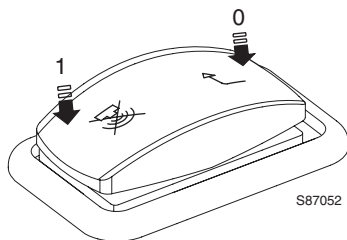


- A Bucket pin
- B Locking hook
- C Locking hook fully extended : lock position
- D Locking hook fully retracted : unlock position



Attachment bracket (quick fit) switch

- A Locker
- 0 Lock position
- 1 Unlock position



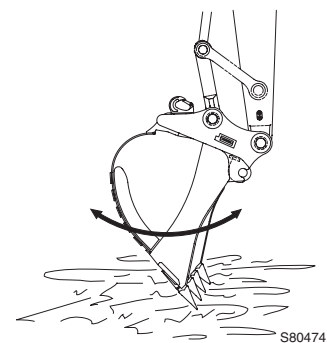
- Audible warning and confirm switch
- 0 Confirm switch ON
 - 1 Audible warning is switched OFF

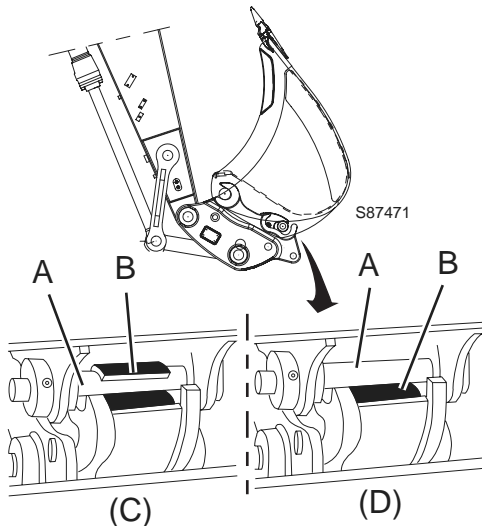
Bucket, installation

- 1 Place the bucket / attachment and dipper arm in the fully curled position so that operator can see the condition of the attachment bracket (unlocked position)
- 2 Press the attachment bracket (quick fit) switch (unlock position), See page 48. The warning indicator on the I-ECU is ON, and the warning buzzer is audible. Check that the locking hook (A) is fully retracted.
- 3 Operate the arm to such a position that the gripping hook on the attachment bracket engage the front pin of the bucket.
- 4 Turn the attachment bracket slowly towards the bucket by moving the bucket cylinder (bucket in) until this bracket mates up correctly against the bucket.
- 5 Continue to curl the attachment bracket until the bucket is lifted off the ground and fully curl the bucket.
- 6 Press the attachment bracket (quick fit) switch (lock position). Hold the bucket in lever for approx. 5~10 seconds to allow the locking hook to fully engage and clamp the bucket pin.
- 7 Check that the locking hook (B) is completely extended. In case of confirming by confirm switch on the left instrument panel, the warning lamp and sound will be OFF.

NOTE! If it is not possible to view this from the cab then get out of the cab and stand in a safe place to visually inspect before operating the machine.

- 8 Do the following tests to check that the attachment bracket is firmly fastened.
 - Press the bucket to the ground.
 - Operate the bucket cylinder in and out to check that locking hook (B) is securely seated. If you are not sure, check that locking hook (B) has gone into the pin again.
 - In case of confirming by confirm switch on the left instrument panel, the warning lamp will be OFF.
- 9 If the locking hook is correctly engaged, the bracket is ready for operation. If it is not correctly engaged, place the bucket/attachment on the ground and release the bucket/attachment pins, and then repeat steps from 1 to 8.





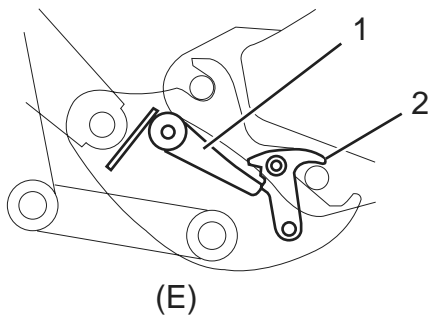
- A Bucket pin
- B Locking hook
- C Locking hook fully extended : lock position
- D Locking hook fully retracted : unlock position

Bucket, removal

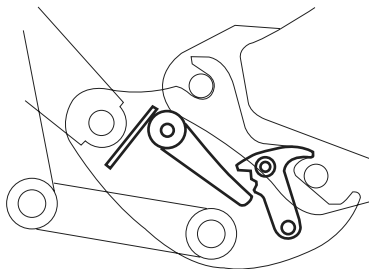
- 1 Place the bucket / attachment and dipper arm in the fully curled position so that operator can see the condition of the attachment bracket (locked position).
- 2 Press the attachment bracket (quick fit) attachment bracket (quick fit)switch (unlock position). See **page 48**. If this bracket switch is on unlock position, the warning indicator on the I-ECU is ON, and the warning buzzer is audible. Hold the hydraulics for 5~10 seconds to allow the hook to fully retracted. The locking bar should be sitting free from the hook notches and the bucket/attachment can now be released.
- 3 When the locking hook (B) on the bracket is completely retracted, lower the boom until the bucket is on the ground and make free carefully the bucket from the attachment bracket by operating the bucket cylinder to its inner end position (bucket out).
- 4 Disconnect the bucket by moving the arm outward and raising the boom.

If the attachment bracket will not release the bucket / attachment it is likely that the blocking bar has become 'nipped' hence the locking hook will not retract (E). The reason for this is that the bucket / attachment was not fully curled in step 1. To rectify, press the attachment bracket switch back to the lock position. Hold the hydraulics for 5 ~ 10 seconds to allow the hook to engage. Ensure the blocking bar is free from debris or any other foreign body that may cause it to jam and then repeat steps 1 ~ 4 ensuring the dipper arm is fully curled and the bucket fully crowded.

IMPORTANT! Do not try and force the bucket off if blocking bar is nipped, this may cause damage to the internal parts.



(E)



(F)

S87476

- E Blocking bar is nipped
- F Correct position of the blocking bar and hook allowing release of bucket
- 1 Blocking bar
- 2 Locking hook

Hose rupture valves (optional equipment)

IMPORTANT! The hose rupture valve is pressure-loaded. So do not dismantle the hose rupture valve yourself. Contact an authorized Volvo CE dealer workshop when problems occur on these valves.



WARNING!

The components inside the valve and under spring tension may be expelled with great force and may cause personal injuries. Never stand beneath a raised boom.

Attachment lowering after hose rupture

1 When engine is running

Lower the boom or arm with the operating levers in the usual way. Collect the oil from the ruptured hose in a suitable vessel.

2 When engine is stopped

The servo hydraulic pressure is maintained by a pressure in accumulator for a few minutes, which permits the operator to lower the boom or arm in the usual way with operating levers. Do not wait too long to lower the boom, the pilot pressure will reduce at a speed depending on your machine's condition and equipment. Collect the oil from the ruptured hose in a suitable vessel.

3 When engine is stopped and with no servo hydraulic pressure



WARNING!

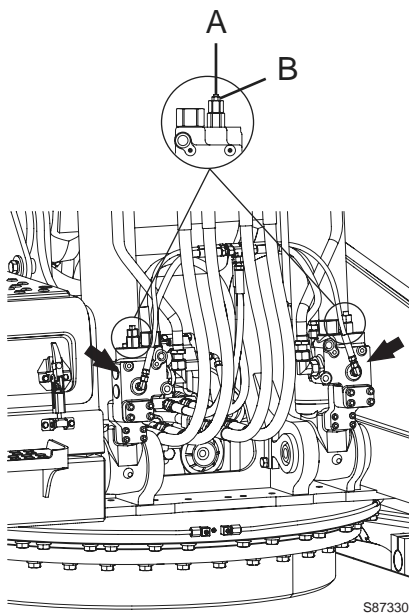
Hydraulic oil is hot, poisonous and under high pressure. Oil which jets out can penetrate your skin and cause severe injury. People who are injured by a jet of hydraulic oil need medical attention at once.

- Loosen lock nut (B) and turn adjusting screw (A) counter-clockwise slowly.
Before turning the adjusting screw, mark its position to facilitate assembling later (setting pressure : 365 kgf / cm²)
The boom will then slowly be lowered to the ground.
- Turn adjusting screw (A) to its original position.
- Hold adjusting screw (A) securely and tighten lock nut (B).
- Contact an authorized Volvo CE dealer workshop.



WARNING!

Do not loosen the adjusting screw completely, the oil under pressure may cause personal injury, and an uncontrolled boom drop.



S87330

Hose rupture valves

A Adjusting screw

B Lock nut

Boom float position (optional equipment)

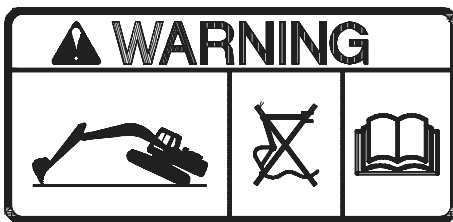
Float position means that both the boom cylinders' piston and piston rod sides are connected to the hydraulic tank. The boom then floats with the weight of the attachments when operating the boom lever forward. The boom lifting is not affected by float position.

Float position gives better fuel economy, faster excavation cycle, less wear and less vibration. When the float position is engaged, the hydraulic oil of the machine can be used for other purposes than lowering the boom, such as the dipper arm and bucket. These functions then become faster and more efficient.

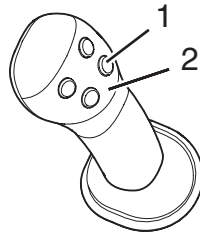
Keep the following in mind.

- Always make sure that the boom operating lever is in the neutral position before activating the float position.
- Do not select the float position mode while the track or tracks are elevated. Selecting the float position mode and operating the boom operating lever forward (boom down position) while the track or tracks are elevated could cause the machine to drop down suddenly.
- Do not release float position mode while the boom operating lever forward (boom down position) and bucket or tool is on the ground. This could cause the machine to tilt up suddenly.
- Do not attempt to lift the track or tracks while the machine is in float position mode.

Use the float position when the attachment has to follow the irregular ground, such as for bedrock clearance, grapple handling and when unloading barges and flatbeds. Float position also makes unloading more manageable.



S83369



S87072

- 1 Float On / Off button
- 2 Control lever with four buttons

- 1 Select the float position using button 1 on the right control lever in order to activate the float function. The control lever should have the float function, see page 62. The float operation indicator on the front instrument panel lights up.
- 2 Float position is only in operation when you push the boom operating lever forward. When the attachment is to follow the ground, the boom operating lever must therefore be held forwards all the time. The boom can then move upward and downward freely depending on the state of the ground.
- 3 Deactivate the float position by pressing the button 1 again. The indicator on the instrument panel will go out.



S83062

Indicator on the instrument panel

Counterweight



WARNING!

Personal injury can occur from a counterweight falling during removal and installation. Do not allow personnel under or around the counterweight during removal and installation.

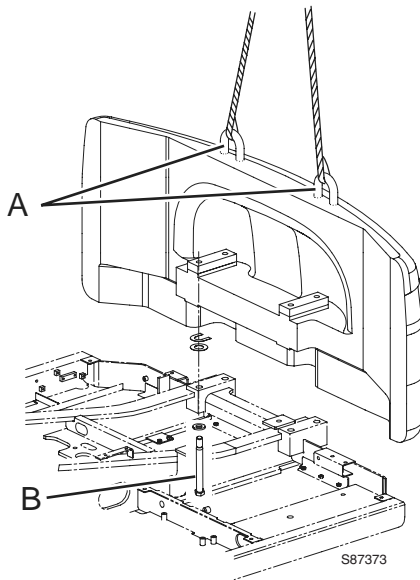
Use certified cables and shackles of adequate load rating. Improper lifting can allow the load to shift and cause injury.

Counterweight, removal (for casting type)

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.

IMPORTANT! Move the control lockout lever down to lock the system securely, see page 69. Attach a warning tag (do not start the engine) to the left operating lever.

- 2 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight at the lifting points (A) correctly.
- 3 Disassemble four bolts (B).
- 4 Lift the counterweight fully to remove it.
- 5 Place the counterweight on suitable supports.



- A Lifting points
B Bolt

Counterweight, installation (for casting type)

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.

IMPORTANT! Move the control lockout lever down to lock the system securely, see page 69. Attach a warning tag (do not start the engine) to the left operating lever.

- 2 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight at the lifting points (A) correctly.
- 3 Lift the counterweight enough to fasten with bolts on the brackets.

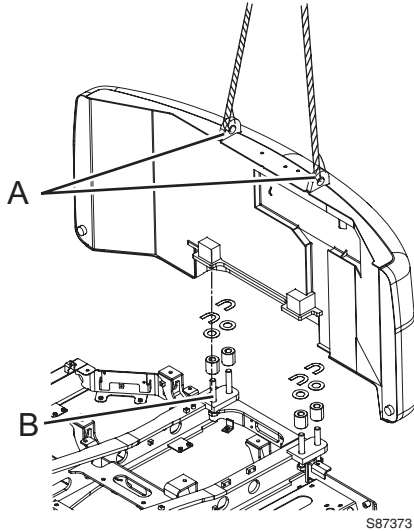


WARNING!

Do not insert your fingers between machine and counterweight, a serious accident could occur.

- 4 Assemble four bolts (B).
- 5 Disconnect the lifting cables or slings from the counterweight at the lifting points (A).

Tightening torque of bolts (B) : 137.7±5.1 kgf m (1350±50 N m)



- A Lifting points
B Bolt

Counterweight, removal (for fabrication type)

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.

IMPORTANT! Move the control lockout lever down to lock the system securely, see page 69. Attach a warning tag (do not start the engine) to the left operating lever.

- 2 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight at the lifting points (A) correctly.
- 3 Disassemble four bolts (B).
- 4 Lift the counterweight fully to remove it.
- 5 Place the counterweight on suitable supports.

Counterweight, installation (for fabrication type)

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.

IMPORTANT! Move the control lockout lever down to lock the system securely, see page 69. Attach a warning tag (do not start the engine) to the left operating lever.

- 2 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight at the lifting points (A) correctly.
- 3 Lift the counterweight enough to fasten with bolts on the brackets.



WARNING!

Do not insert your fingers between machine and counterweight, a serious accident could occur.

- 4 Assemble four bolts (B).
- 5 Disconnect the lifting cables or slings from the counterweight at the lifting points (A).

Tightening torque of bolts (B) : 143 ± 14.3 kgf m (1400 ± 140 N m)

Selecting track shoe

Grouser	Use	Precautions when using
<p style="text-align: center;">A</p> <p style="text-align: center;">500 mm 600 mm 600 mm (HD) 700 mm (HD)</p>	<p>Rocky ground, normal soil</p>	<p>Travel in low speed when travelling on rough ground with obstacles such as large boulders and fallen trees.</p>
<p style="text-align: center;">B</p> <p style="text-align: center;">700 mm 800 mm</p>	<p>Soft ground</p>	<p>Travel in high speed only on flat ground. When it is impossible to avoid travelling over obstacles, lower the travel speed to approximately half of low speed.</p> <p>NOTE! Cannot be used on rough ground where there are large obstacles such as boulders or fallen trees.</p>
<p style="text-align: center;">C</p> <p style="text-align: center;">900 mm</p>	<p>Extremely soft ground (swampy ground)</p>	<p>Use only for ground where “A” and “B” are impossible to use. Travel in high speed only on flat ground. When it is impossible to avoid travelling over obstacles, lower the travel speed to approximately half of low speed.</p> <p>NOTE! Cannot be used on rough ground where there are large obstacles such as boulders or fallen trees.</p>

Lifting objects

If the machine is used to lift objects within an area that is governed by the European Machinery Directive 98/37/EC and its amendments, the machine must be equipped with following safety working devices.

- A load hooking device.
- A hose rupture valve on the boom or in some countries hose rupture valve on both boom and arm is required depending on risk assessment. See **page 115**.
- A overloading warning device. See **page 43**.

IMPORTANT! It is the owner's or operator's responsibility to be familiar with and comply with all national, state, municipal regulations governing this type of work. Contact your Volvo CE dealer for more information.

Keep the following in mind to ensure the highest level of controllability and safety when lifting.

- Operate on solid, flat, level ground.
- If ground conditions are unstable, e.g. loose gravel, sand or water, do not work with loads close to the rated load maximums given on the machine load chart.
- Do not swing the excavator abruptly with a suspended load, the effects of centrifugal force will impair machine stability.
- Do not use the swing or arm-in operation to drag a load.
- Do not operate the machine while someone is hanging on or in the bucket or attachments

1 Load hooking device on bucket or attachment bracket

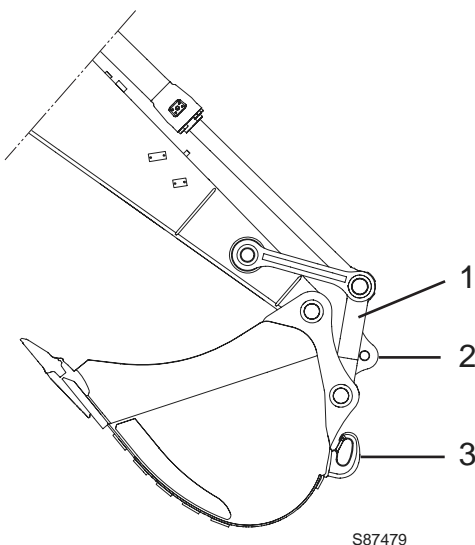
The lifting device whether mounted on a bucket or other attachment must not be subjected to lateral loads. The load must be applied longitudinally to the hook.

Always ensure that the load lies within the marked permissible lifting load of lifting device base when manoeuvring the arm and bucket.

Exceeding these limits can cause serious injury. Remember that the operator is responsible in case of an accident.

NOTE! This represents the capacity of the hook and not the rated load capacity of the machine which varies according to ground conditions, reach, track position etc.

IMPORTANT! The use of load hooking device not recommended by Volvo could result in structural damage to the machine. Consult your Volvo Construction Equipment dealer for detailed information when mounting a safety hook to a local sourced bucket.



- 1 Connecting rod
- 2 Lifting device on connecting rod
- 3 Lifting device on bucket

2 Load hooking device on connecting rod

Lifting device on connecting rod is designed to lift the maximum load as the one described on catalog.

Hydraulic hammer

IMPORTANT! Do not operate the hammer until you read and understand operation and maintenance guide.

IMPORTANT! Do not perform any service or maintenance until you read and understand hammer service manual.

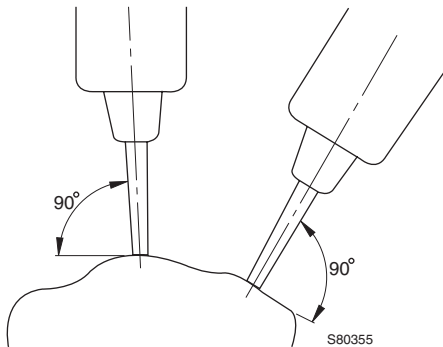
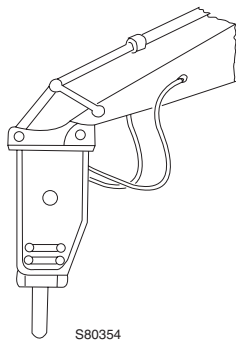
When hammers are used, install the Volvo external hydraulic filter in the hammer return line circuit. Contact your Volvo dealer for detailed information regarding this option.

Protect your equipment main hydraulic system from any hammer failure. Refer to **page 166** for details on specific maintenance for machines equipped with hammers.

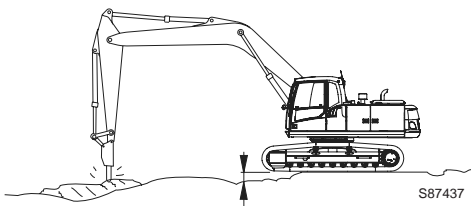
Main works

- Breaking stone
- Demolition work
- Road repairing

It is widely used for demolition of buildings, breaking road surfaces, tunneling work, smashing slag, and breaking or cutting stone.

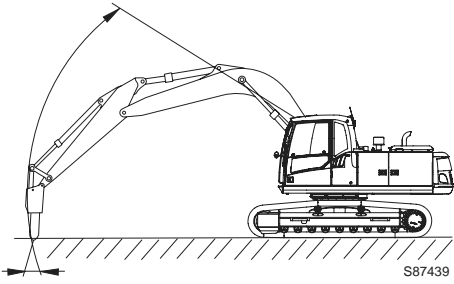


Press the chisel firmly onto the surface at a right angle as shown.

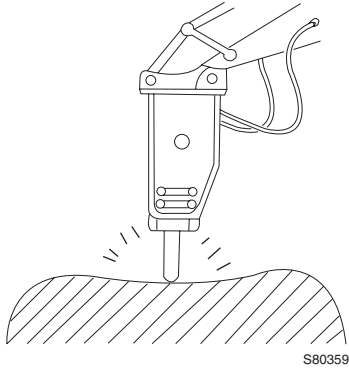


When striking, press the chisel firmly onto the surface, and lift the frame about 5 cm. Never raise the machine unnecessarily high.

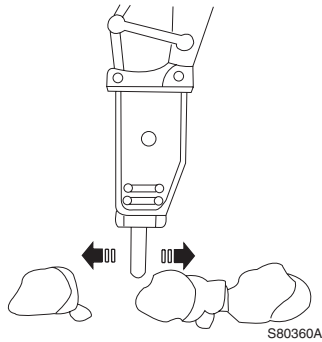
If the surface is struck repeatedly but it does not break within 1 minute, move the chisel nearer one end and strike again.



The striking direction of chisel and the direction of breaker body are deviate slightly. Therefore, adjust the bucket cylinder so that the direction of body and chisel is always the same.

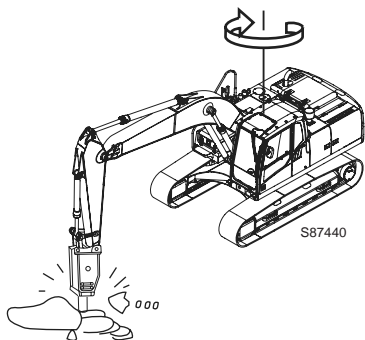


Press the chisel firmly against the surface so idle striking is avoided.

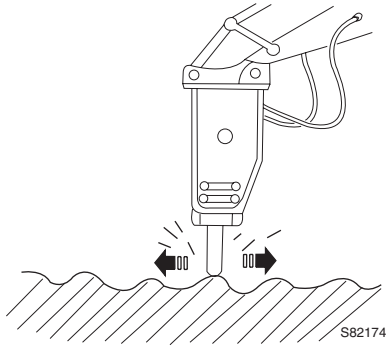


Caution during hammer operation

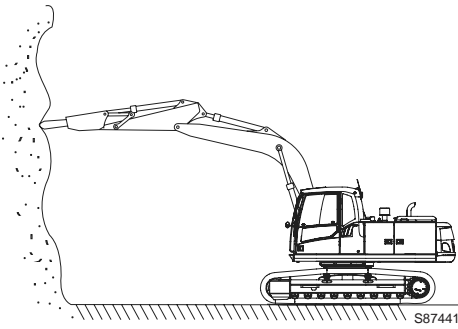
Do not operate the cylinder to its end of stroke, leave about 5 cm.



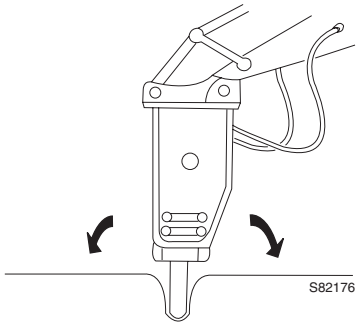
Do not slew the hammer against the rocks, concrete etc.



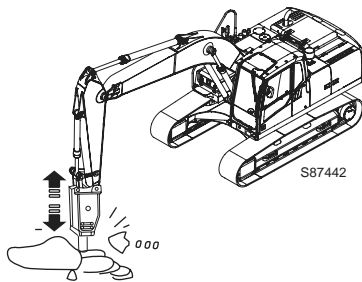
Do not move the chisel while it is striking a blow.



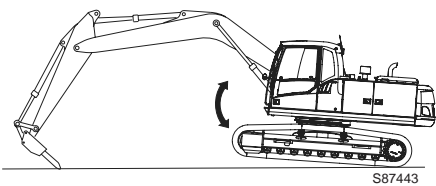
Do not strike horizontally, or in an upward direction.



Do not bend with the chisel to make a hole in the ground.



Do not hoe the chisel.



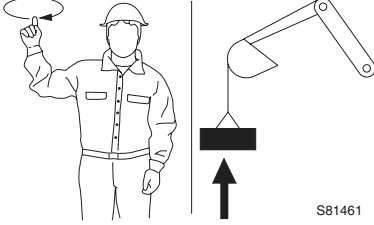
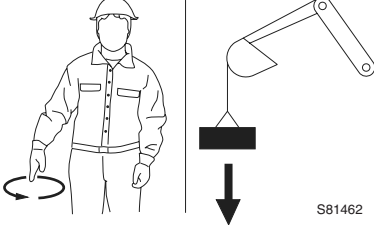
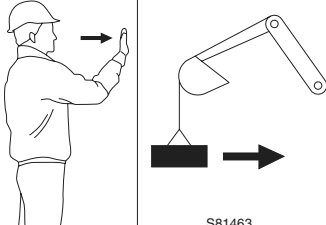
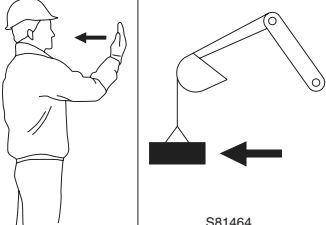
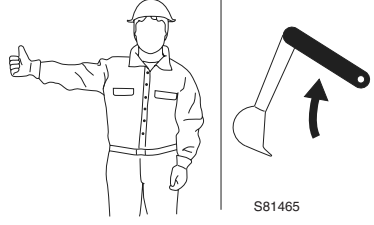
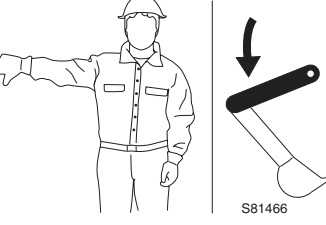
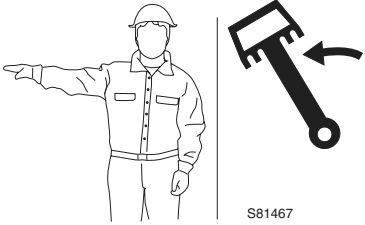
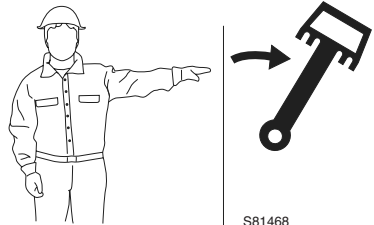
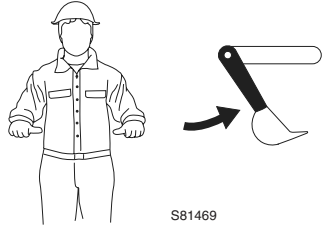
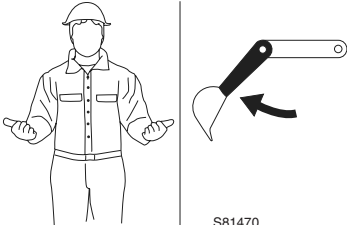
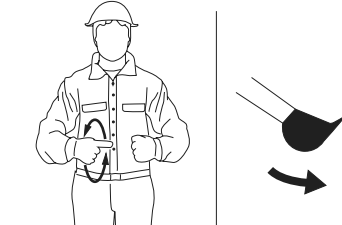
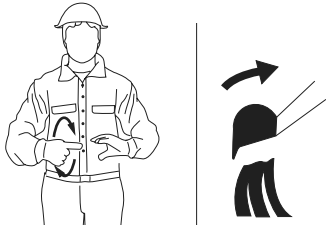
Do not raise the machine by extending the bucket cylinder to maximum.



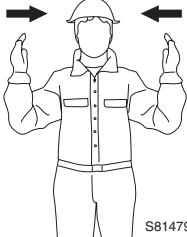


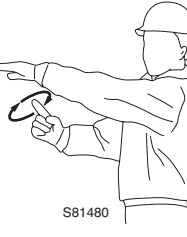

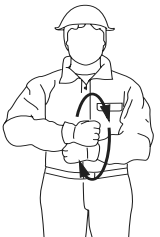
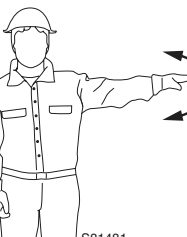
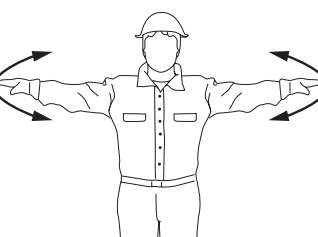
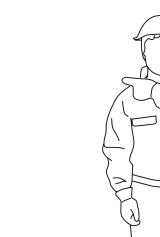
Signalling diagram

Manual signalling to operator of a mobile excavator as per SAE J1307.

The primary use of hand signals is for a signalman to direct the lifting, handling, and placement of loads attached to working equipment. Hand signal usage may also be applicable to earthmoving operations and/or machine travel when the operator's visibility is obstructed.

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

 <p>S81461</p>	 <p>S81462</p>	 <p>S81463</p>
<p>RAISE LOAD VERTICALLY With either forearm vertical, forefinger pointing up, move hand in small horizontal circles.</p>	<p>LOWER LOAD VERTICALLY With either arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>	<p>MOVE LOAD IN HORIZONTALLY With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.</p>
 <p>S81464</p>	 <p>S81465</p>	 <p>S81466</p>
<p>MOVE LOAD OUT HORIZONTALLY With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.</p>	<p>RAISE BOOM With either arm extended horizontally, fingers closed, point thumb upward.</p>	<p>LOWER BOOM With either arm extended horizontally, fingers closed, point thumb downward.</p>
 <p>S81467</p>	 <p>S81468</p>	 <p>S81469</p>
<p>SWING With either arm extended horizontally, point with forefinger to direction of swing rotation.</p>	<p>DIPPER ARM INWARD With both hands clenched, point thumbs inward.</p>	
 <p>S81470</p>	 <p>S81471</p>	 <p>S81472</p>
<p>DIPPER ARM OUTWARD With both hands clenched, point thumbs outward.</p>	<p>CLOSE BUCKET Hold one hand closed and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at closed hand.</p>	<p>OPEN BUCKET Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.</p>

 <p>S81473</p>	 <p>S81474</p>	 <p>S81479</p>
<p>TURN Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.</p>		<p>THIS FAR TO GO With hands raised and open inward, move hands laterally, indicating distance to go.</p>
 <p>S81475</p>	 <p>S81476</p>	 <p>S81480</p>
<p>COUNTER ROTATE Place hand on head indicating side or reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.</p>		<p>MOVE SLOWLY Place one hand motionless in front of hand giving motion signal. Raise load slowly is shown.</p>
 <p>S81477</p>	 <p>S81478</p>	 <p>S81481</p>
<p>TRAVEL Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.</p>		<p>STOP With either arm extended laterally, hand open downward, move arm back and forth.</p>
 <p>S81482</p>	 <p>S81483</p>	
<p>EMERGENCY STOP With both arms extended laterally, hands open downward, wave arms back and forth.</p>		<p>STOP ENGINE Draw thumb or forefinger across throat.</p>

Safety when servicing

This section deals with the safety rules which should be followed when checking and servicing the machine. It also describes the risks when working with unhealthy material and ways to avoid personal injuries.

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

Service position

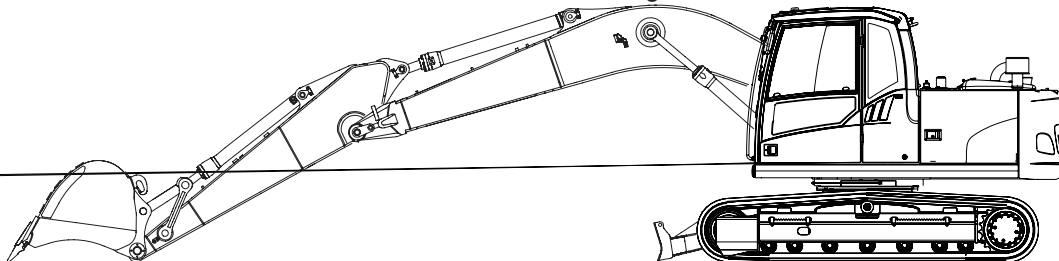
Before you begin any service work, park the machine for service position as any of positions shown below.

- 1 Position the machine on even, firm and level ground.
- 2 Put the attachment on the ground. Put the dozer blade on the ground if equipped.
- 3 Turn off the engine. After releasing the system and tank pressure, remove the ignition key. See **page 164**.
- 4 Make sure the control lockout lever is down to lock the system securely, see **page 69**.
- 5 Pressurized lines and vessels should have the pressure released gradually to avoid risks.
- 6 Allow the machine to cool.

A suitable position is stated in the description for the different service operations. If no particular position is stated, the machine should be parked in service position A.

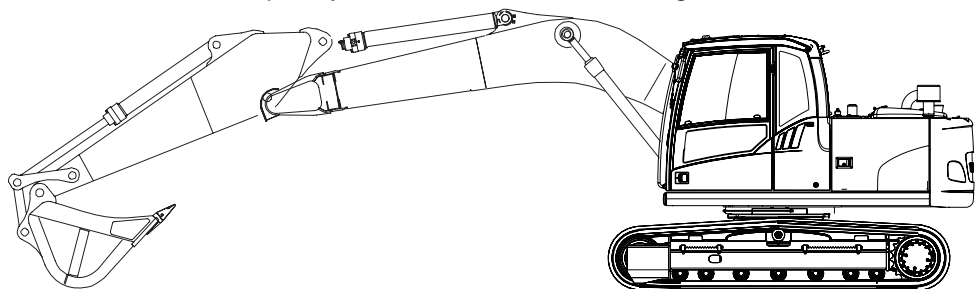
Service position A

Retract the bucket and dipper arm cylinder completely, and then lower the boom on the ground.



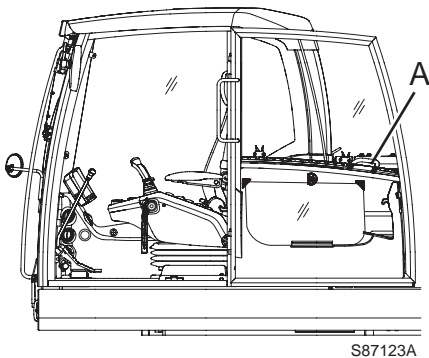
Service position B

Extend the bucket cylinder completely, retract the arm cylinder completely and lower the boom on the ground.



WARNING!

If work has to be carried out on the machine before it has cooled down, be careful with hot liquids and hot parts of the machine to avoid burns.



S87123A



S87135A

Entering and leaving machine



WARNING!

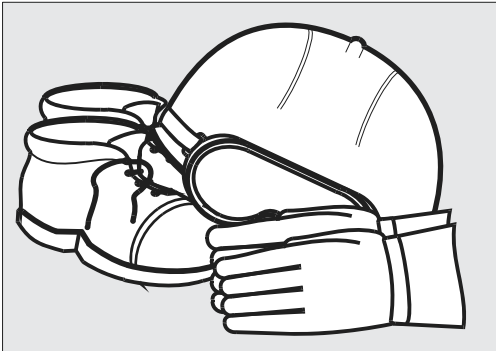
Use the stepping surfaces when carrying out service on the machine. Other surfaces are not safe and personal injury may occur.

- Use steps and handholds when entering or leaving the machine. Use the three-point grip, that is, two hands and one foot or two feet and one hand. Always face the machine - do not jump.
- Keep steps, stepping surfaces, handholds and your footwear clean from mud and oil.
- Never grasp the control lever to enter or leave the machine.
- Do not use the hand grip of the cab door as a support when entering, leaving and climbing the machine. It should only be used for closing the door.

Before service, read

Preventing personal injury

- Read the Operator's Manual before the service work is started. It is also important to read and follow information and instructions on plates and decals.
- Do not wear loose-fitting clothing or jewellery, which can get caught and cause injury.
- Always wear a hard hat, protective goggles, gloves, protective shoes and other protective articles when the work so requires.
- Make sure that the ventilation is sufficient when starting the engine indoors.
- Do not stand in front of or behind the machine when the engine is running.
- If service work has to be carried out under raised lifting arms, these must first be secured. (Engage the control lever lockout and apply the parking brake if the machine is equipped with one).
- Turn off the engine before opening the rear door and engine cover.
- When the engine is stopped, there is a remaining accumulated pressure in the pressurised systems. If a system is opened without having first released the pressure, liquid under high pressure will jet out.
- When checking for leaks, use paper or hardboard, not your hand.
- Make sure that stepping surfaces, handholds and anti-slip surfaces are free from oil, diesel fuel, dirt and ice. Never step on parts of the machine that are not intended for this.
- It is important to use correct tools and equipment. Broken tools or equipment should be repaired or changed.



S86569

Preventing machine damage

- When lifting or supporting the machine or parts of the machine, use equipment with a sufficient lifting capacity.
- Lifting devices, tools, working methods, lubricants and parts prescribed in the Operator's Manual should be used. Volvo CE will not accept any responsibility otherwise.
- Make sure that no tools or other objects, which may cause damage, have been forgotten in or on the machine.
- Release the pressure in the hydraulic system before starting the service work.
- Never set a relief valve to a higher pressure than that recommended by the manufacturer.
- Machines, which are used within a polluted or in another way insanitary area should be equipped for this kind of work. Special safety regulations apply when servicing such a machine.
- When installing two-way radio, mobile telephone or similar equipment, the installation should be carried out in accordance with the manufacturer's instructions in order to eliminate interference with the electronic system and components intended for the function of the machine, see **page 10**.
- Measures to be taken in connection with electric welding, see **page 155**.
- Make sure that all covers on the machine are in position before the engine is started and the machine is put to work.

Preventing 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.

Fire prevention



WARNING!

If the 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 what kind of fire extinguisher is used on your working site and how to use it. If the machine is equipped with a fire extinguisher, it should be kept inside the cab on the left side of the operator.

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

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

Fire prevention measures

- Do not smoke or have an open flame near a machine when filling with fuel or when the fuel system is opened and in contact with the surrounding air.
- Diesel fuel oil is flammable and must not be used for cleaning. Use conventional car care products meant for cleaning or degreasing. Also bear in mind that certain solvents can cause skin rashes, damage to the paint finish and constitute fire hazard.
- Keep the place clean where the service is to be carried out. Oil and water can make the floor slippery and is also dangerous in connection with electrical equipment or electrically powered tools. Oily and greasy clothes are a serious fire hazard.
- Check daily that the machine and the equipment, e.g. underbelly plates are free from dust and oil. Besides reducing the risk of fire, it is also easier to detect faulty or loose components.

NOTE! Take great care if a high-pressure wash is used for cleaning. Electrical components and electrical leads can be damaged even at a moderately high pressure and temperature. Protect electrical leads in an appropriate way.

- Take extra care when cleaning a machine working in a fire-sensitive environment, e.g. saw-mill and refuse dumps. The risk of spontaneous combustion can be further reduced by installing insulation of the silencer guard.
- It is important that the fire extinguisher is maintained in order to work when it is needed.

- 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 also 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 jeopardised, take the following steps at the slightest sign of fire:

- 1 Stop the machine, if the machine is in motion.
- 2 Lower attachments to the ground.
- 3 Move the control lockout lever to locked position, if so equipped.
- 4 Turn the ignition key to stop position.
- 5 Exit the cab.
- 6 Call the fire brigade.
- 7 If possible to access safely, turn off the battery disconnect switch.
- 8 Attempt to put out the fire, if possible. Otherwise, move away from the machine and out of the danger zone.

Actions after fire

When handling a machine which has been damaged by fire or been exposed to intense heat, the following protective measures must be followed:

- Use thick, protective gloves made of rubber and wear goggles.
- Never touch burnt components with your bare hands in order to avoid contact with melted polymer materials. First wash thoroughly with plenty of lime water (a solution consisting of calcium hydroxide, i.e. slaked lime in water).
- Handling heated fluoro-carbon rubber, see **page 134**.

Handling hazardous materials

Heated paint



WARNING!

All paint decomposes when heated and forms compounds which may be irritating and after long or frequent exposure also very unhealthy.

Heated paint gives off poisonous gases. Therefore, paint must be removed from an area with a radius of at least 10 cm before carrying out welding, grinding or gas cutting. 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 respiratory protective equipment and protective goggles
- Paint remover or other chemicals
 - use a portable air extractor, respiratory protective equipment and protective gloves
- Grinding machine
 - use a portable air extractor, respiratory protective equipment and protective gloves and goggles

Never burn painted parts after they have been discarded. They should be disposed of by a licensed disposal plant.

Heated rubber and plastics

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 respiratory protective equipment.

Heated fluoro-carbon rubber



WARNING!

Certain seals which are designed to withstand high operating temperatures, e.g. in engine, main control valve, hydraulic motor and pumps may be made from fluoro-carbon rubber. When heated to high temperatures, fluoro-carbon rubber decomposes to hydrogen fluoride and hydrofluoric acid, which is strongly corrosive on skin and respiratory tracts.

When handling a machine which has been damaged by fire or been exposed to intense heat, the following measures should be taken:

- Use thick, rubber gloves and wear protective goggles.
- Discard gloves, rags and other items that have been in contact with heated fluoro-carbon rubber after first having washed these items in lime water (a solution of calcium hydroxide, i.e. slaked lime in water).
- The area around a part which has been very hot and which may be made of fluoro-carbon rubber should be decontaminated by thorough and ample washing with lime water.
- As a precaution, all seals (O-rings and other oil seals) should be handled as if they were made of fluoro-carbon rubber.
- The hydrofluoric acid may remain on the machine parts for several years after a fire.
- If swelling, redness or a stinging feeling appears and one suspects that the cause may be contact with heated fluoro-carbon rubber, contact a medical doctor immediately. Several hours may pass, however, before any symptoms appear and there is no immediate warning.
- The acid cannot be rinsed or washed off from the skin. Treat instead with Hydrofluoric Acid Burn Jelly or similar before contacting a medical doctor.

Refrigerant

NOTE! All kinds of service on the air conditioning unit must be carried out by accredited workshops by, or under the guidance of, a person in a leading position with certified competence.



WARNING!

Refrigerant R134a easily causes frost-bite if it comes into contact with bare skin. When heated, gases are formed, which can be harmful to lungs and nervous system.

The air conditioning unit of the machine is filled with refrigerant R134a at the factory. R134a has no harmful influence on the ozone layer, but contributes, however, to the greenhouse effect and must therefore never intentionally be released into open air.

IMPORTANT! R134a must never be mixed with another kind of refrigerant, e.g. R12, as this leads to a breakdown of the unit.

In case of contact with escaping refrigerant, the following measures should be taken:

- If a leak is suspected, leave the risk area and contact an accredited workshop to get information about measures.
- The gases formed by heated refrigerant, may be harmful to lungs and nervous system even at low concentrations when no smell is apparent. High concentrations have a narcotic effect. Exposed persons should be removed from the risk area and out into the fresh air. Seek medical advice, if the symptoms remain.
- When fluid, the refrigerant may cause frost-bite. Warm carefully the injured area with lukewarm water or warm clothes. Seek medical advice, if the symptoms remain.
- Seek medical advice, if liquid refrigerant has come into someone's eyes.

Batteries**WARNING!**

Batteries contain sulphuric acid, which is strongly 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 the protections are always installed over the battery pole studs.
- 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 for explosion.
- When removing a battery, disconnect the ground cable first and when installing, connect the ground cable last in order to reduce the risk of sparks.
- Discarded batteries must be taken care of according to national environmental requirements.
- Charging batteries, see **page 155**.
- Starting with booster batteries, see **page 86**.

Crystalline silica (quartz) dust



WARNING!

Avoid exposure to dust containing crystalline silica particles as it can cause serious injury to the lungs (silicosis).

Crystalline silica is a basis component of sand and granite. Therefore, many activities at construction and mining sites, such as trenching, sawing and boring, produce crystalline silica dust. This dust can cause silicosis.

The employer or working site management should provide the operator with information about the presence of crystalline silica in the work site along with specific work instructions and precautions and also necessary personnel protection equipment.

Also check the local / national regulations regarding silica / silicosis.

Handling lines, tubes and hoses



WARNING!

If oil or fuel leaks from high pressure hoses, it may cause serious injury through fire or defective actuation. If any damage to the hoses or loose bolt is found, stop operations immediately and contact an authorized Volvo CE dealer.

- Do not bend high pressure lines.
- Do not strike high pressure lines.
- Do not install any lines that are bent or damaged.
- Check lines, tubes and hoses carefully.
- Do not use your bare hand to check for leaks.
- Tighten all connections. Consult your Volvo CE dealer for the recommended tightening torque.

If any of the following conditions are found, replace the parts. Consult your Volvo CE dealer.

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Strengthening wires are exposed.
- Outer coverings are ballooning.
- Flexible part of the hoses are kinked.
- End fittings are displaced.
- Foreign material is embedded in the coverings.

IMPORTANT! Make sure that all clamps, guards and heat shields are installed correctly. During machine operation, this will help to prevent vibration, rubbing against other parts and excessive heat.

Service and maintenance

If the machine is to function satisfactorily and at lowest possible cost, it requires careful maintenance.

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.

Service history

After each completed service at a workshop authorised by Volvo CE, the service history should be filled in, see **page 211**. Service history is a valuable document, which can be referred to when for example selling the machine.

Arrival and Delivery Inspections

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 a workshop authorised by Volvo CE.

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 by a workshop authorised by Volvo CE. 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.

At these inspections there are, among other measures, oil and fluid changes, which must be carried out before the ordinary intervals.

Maintenance

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



S86524

Task	100h	250h	500h	1000h	2000h	4000h	8000h
1. General							
2. Engine							
3. Hydraulic system							
4. Drive shaft							
5. PTO							
6. Transmission							
7. Final drive							
8. Axles							
9. Brakes							
10. Steering							
11. Lights							
12. Safety							
13. Tyres							
14. Lubrication							
15. Electrical system							
16. Other							

S86570

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! Daily clean the areas on the machine where dust, chips and similar may collect in order to minimise the risk of fire, see page 131.

IMPORTANT! Mud may damage or worn out functional parts on the undercarriage. Therefore, all parts must be cleaned regularly to be free of clay.

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 80 °C (176 °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 suffer more from rust 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.

Touching up paint finish

- Check if there are any damaged areas of the paint finish.
- At first clean the machine.
- Rectify any damage to paint finish in a professional way.

Cleaning engine compartment

Machines operating in dusty environment or environment exposed to fire hazards e.g., wood-processing, woodchip handling or grain handling and animal feed industries require daily attention and cleaning of the engine compartment and surrounding areas.

When operating in other environments, inspection and cleaning is required at least once a week.



WARNING!

The engine must not be running when cleaning as rotating parts may cause injuries.

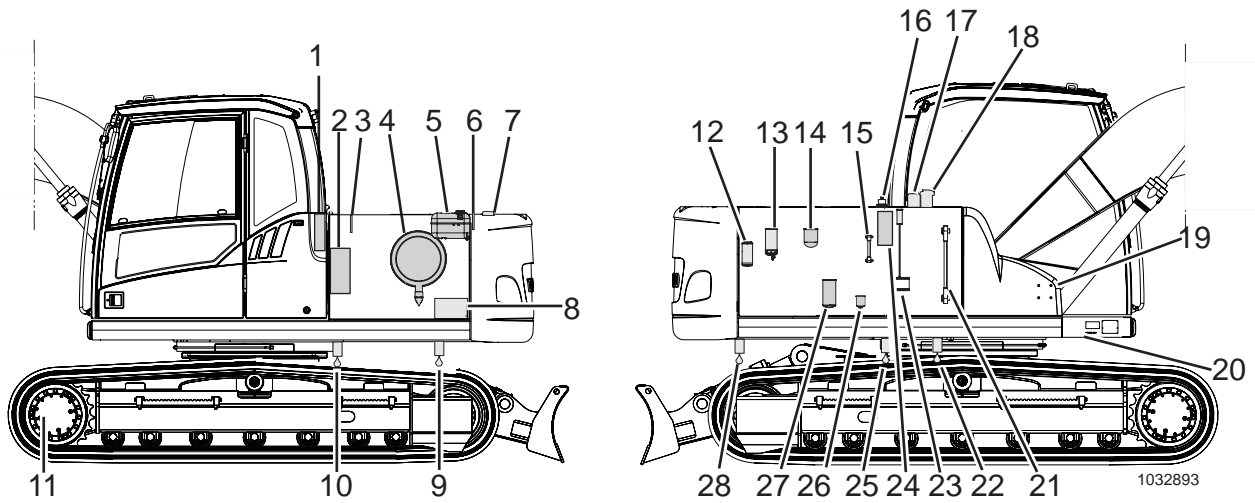
Loose material is removed with for example compressed air.

Cleaning should preferably be carried out at the end of the working shift before the machine is parked.

Use personal protective equipment such as protective goggles, gloves and respirator.

After cleaning, check and rectify any leaks. Close all covers and hoods.

Service points



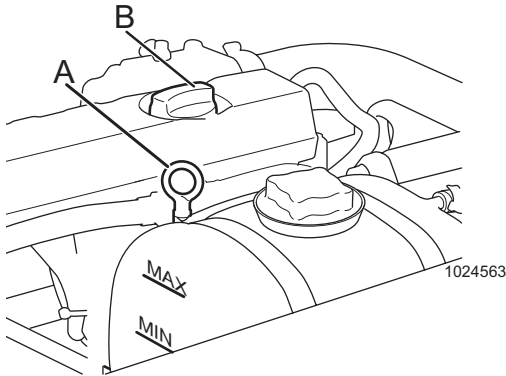
1	Cab, ambient filter	15	Hydraulic oil, level checking
2	Electrical distribution box	16	Air breather filter on hydraulic tank
3	Swing drive unit oil, checking and filling	17	Air ventilation filter on fuel tank
4	Engine air cleaner	18	Fuel, filling
5	Coolant, level checking and filling	19	Swing bath grease checking and filling
6	Engine oil, checking	20	Swing bath grease, draining
7	Engine oil, filling	21	Fuel, level checking
8	Battery	22	Fuel, draining
9	Coolant, draining	23	Hydraulic tank suction strainer and filling
10	Swing drive unit oil, draining	24	Hydraulic oil return filter
11	Track motor oil, checking and filling	25	Hydraulic oil, draining
12	Secondary fuel filter	26	Hydraulic pilot filter
13	Primary fuel filter with water separator	27	Engine oil filter
14	Hydraulic drain filter	28	Engine oil, draining

Engine



WARNING!

Do not lubricate, adjust or repair the machine when the engine is running. Never open the engine cover until the engine has been stopped.



- A Oil dipstick
B Filler port

Engine oil level, checking

Check the oil level if the check screen for low engine oil level pops up on the front instrument panel. Aside from this, check the oil level every 50 hours.

- 1 Open the engine hood.
- 2 Pull out oil dipstick (A) and wipe it with a clean cloth.
- 3 Push it in and pull it out again.
- 4 If the oil level is within the marked area, it is normal. If the oil level is low, top up through filler port (B). Recommended engine oil, see page 181.

Engine oil, changing



WARNING!

Take care when changing oil, as hot oil can cause burns on unprotected skin.

Change the oil every 500 hours.

NOTE! Maximum interval between oil change is twelve months.

The conditions for the 500 hours interval between oil change are as follows :

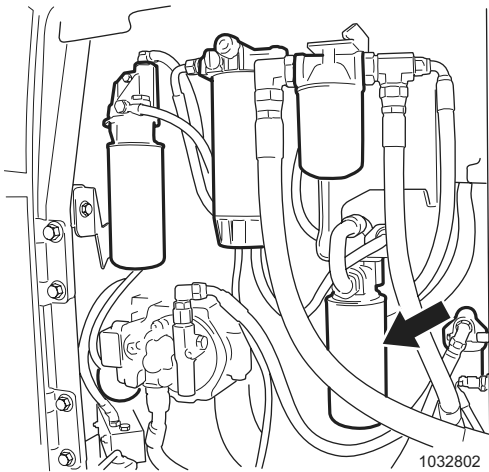
- The oil filters should be replaced every time the oil is changed.
- The oil filter is genuine Volvo filter.
- The sulphur content in the diesel fuel must not exceed 0.3 percent by weight. For other sulphur content, see page 182.
- The oil used is of a certain quality grade, see page 182.
- The correct oil viscosity for the ambient temperature is selected, see page 181.

If any of these conditions cannot be met, or if the machine is operated in an acid or particularly dusty environment, the oil should be changed and the filters replaced more often. Contact a Volvo CE dealer.

- 1 Remove the filler cap.
- 2 Put a suitable sized container under the draining point at the bottom of the engine oil pan.
- 3 Remove the protecting cap of the draining valve and attach the draining hose provided as a service tool with machine.
- 4 Drain the oil into the container.
- 5 Disconnect the hose and install the protecting cap.
- 6 Fill oil through the filler port and put the filler cap back.
- 7 Check the oil level on the dipstick.

Oil capacity for changing, see page 186.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



Engine oil filter

Engine oil filter, replacing

Replace the oil filter every time the oil is changed.

The oil filter is a disposable type, i.e. it cannot be cleaned, but should be replaced.

- 1 Remove the filter by using a suitable filter wrench.
- 2 Fill the new filter with engine oil.
- 3 Clean the filter housing base and apply a light coat of engine oil to the gasket of the new filter.
- 4 Screw on the filter by hand until the gasket just touches the sealing surface.
- 5 Tighten the filter a further 1/2 turn.
- 6 Start the engine and check that the gaskets are sealed. If not, remove the filter and check the sealing surface.

IMPORTANT! It is important that the filter is filled with oil before it is installed. This is to ensure lubrication of the engine immediately after starting.

IMPORTANT! Run the engine at low idling for at least one minute after replacing the oil filter.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.

Fuel system

Clean fuel is essential for a trouble-free diesel engine.

Fuel, filling



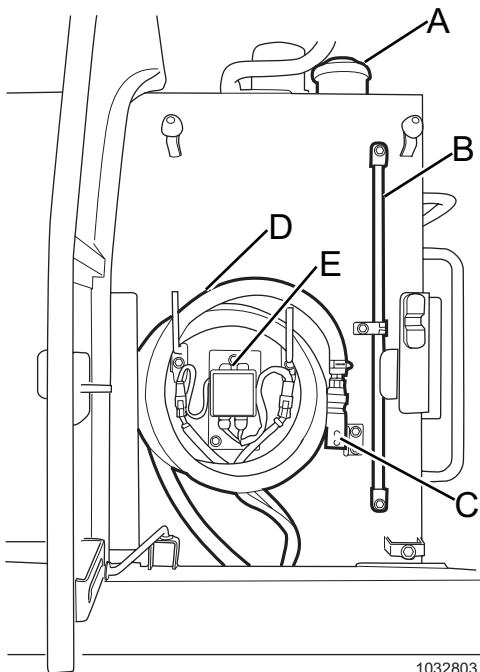
WARNING!

Stop the engine when refuelling.



WARNING!

The engine heater must not be switched on when filling fuel. There is a risk of fire and explosion with possible injuries as a consequence.



1032803

- A Fuel filler cap
- B Fuel level gauge
- C Strainer cover
- D Pump hose
- E On and off switches

- 1 Carefully clean around filler cap (A) on the fuel tank before removing it.
- 2 Fill the fuel in the tank watching fuel level gauge (B).

Avoid spilling the fuel when filling, which attracts dirt. If fuel is spilled, clean it up immediately.

During the cold season, fill up the fuel tank to prevent water condensing in the tank.

For the capacity of fuel tank, see page 186.

For fuel quality, see page 181.

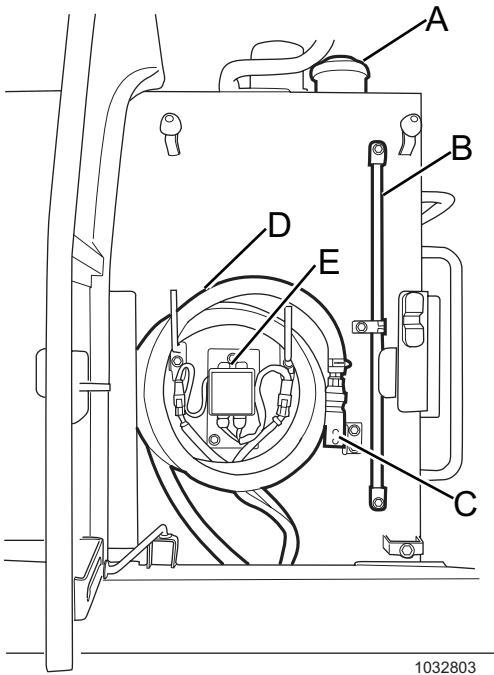
NOTE! Be careful not to damage the level gauge on the fuel tank by being stained from thinner or oil.

Filling with electrical pump (optional equipment)

The pump is positioned inside the right, front cover.

- 1 Remove the strainer cover (C) which is installed to protect the strainer from dust at the end of pump hose (D).
- 2 Put the hose with strainer into the fuel barrel.
- 3 Start the pump with switch (E).
- 4 Fill fuel while watching the fuel level gauge.
- 5 Stop the pump with the switch when the fuel is filled.
- 6 Fold the hose and reinstall the strainer cover.

IMPORTANT! Never let the fuel filler pump idle. The pump may be damaged.



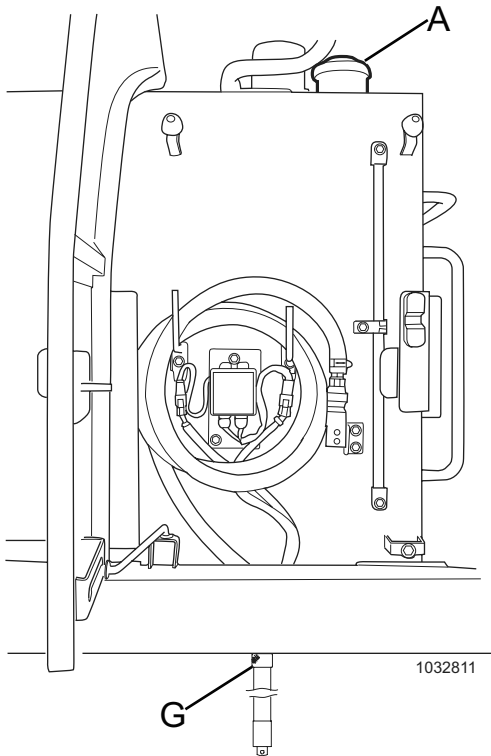
1032803

- A Fuel filler cap
- B Fuel level gauge
- C Strainer cover
- D Pump hose
- E Start and stop buttons

Filling with auto shut-off control (optional equipment)

This pump is provided with an electronic overfilling protection.

- 1 Remove the strainer cover (C) which is installed to protect the strainer from dust at the end of pump hose (D).
- 2 Put the hose with strainer into the fuel barrel.
- 3 Press green start button (E). The pump will run as long as the tank is not full.
 - At any time during the refuelling or when the drum has been emptied, the pump may be stopped by pressing the red button.
 - The pump will automatically stop when the fuel level sensor is actuated.
The pump cannot be restarted until the fuel from the tank is used.
- 4 Fold the hose and reinstall the strainer cover.



1032811

- F Draining valve

Fuel tank, draining

Drain the sediment when required. If the machine is run with fuel of low quality, the fuel tank needs to be drained more often.

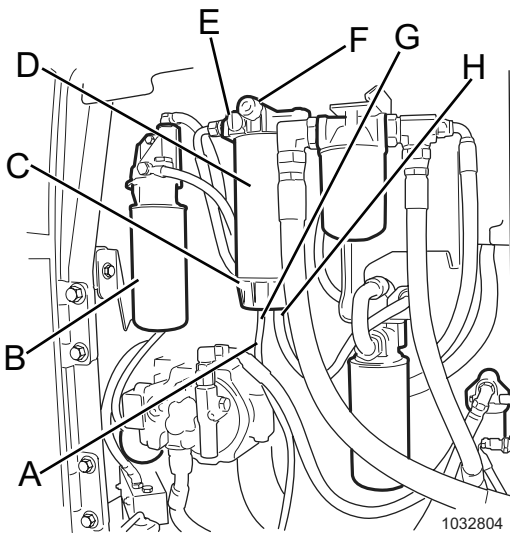
- 1 Open fuel filler cap (A).
- 2 Place a suitable sized container under the fuel tank.
- 3 Remove the protecting cap of draining valve (G).
- 4 Attach the draining hose provided as a service tool with machine and drain off any sediment.
- 5 Disconnect the draining hose and install the protecting cap.
- 6 Close the fuel filler cap.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.

Fuel filters, replacing

Replace the fuel filters every 500 hours or if the check screen for low fuel level pops up on the front instrument panel.

- 1 Push in pump knob (F) and turn it to the left until the spring is pressed out.
- 2 Stop the fuel flow by turning shut-off lever (E) slightly clockwise.
- 3 Put the end of hose (A) from water separator (C) into a container.
- 4 Open drain valve (G) on the water separator and let the fuel run out.
- 5 Close the valve on the water separator.
- 6 Disconnect sensor (H).
- 7 Remove primary fuel filter (D) with the aid of an oil filter tool if necessary.
- 8 Remove the water separator, clean it and check the condition of the O-ring, replace if damaged.
- 9 Install the new primary fuel filter with the cleaned water separator. Put a film of oil on the gasket first. Tighten the filter until the gasket touches the sealing surface. Then tighten 1/2 to 3/4 turn further by hand.
- 10 Remove secondary fuel filter (B) with the aid of an oil filter tool if necessary.
- 11 Apply fuel to the rubber seal and tighten the new filter until the rubber seal just touches the sealing surface. Tighten further 1/2 turn by hand.
- 12 Fill the filters with fuel by pressing the pump knob, but make sure the shut-off lever is closed. The filters are filled when the resistance is strong.



- A Hose
- B Secondary fuel filter
- C Water separator
- D Primary fuel filter
- E Shut-off lever
- F Pump knob
- G Drain valve
- H Sensor

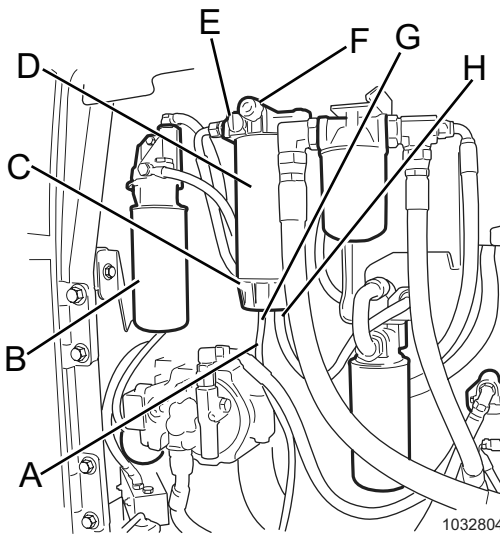
IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.

Water separator, draining

Check and drain the water in the water separator when the check screen for water in fuel pops up on the front instrument panel.

- 1 Place a suitable sized container under draining hose (A).
- 2 Open drain valve (G) and drain the sediment into a container.
- 3 Close the drain valve.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



F Pump knob

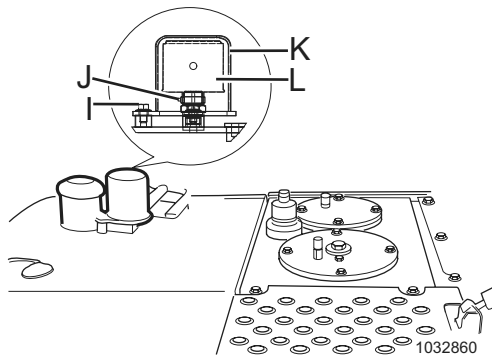
Fuel system, air bleeding

Air must be bled out of the fuel injection system whenever the machine runs out of fuel while the engine is running.

IMPORTANT! Do not attempt to start the engine under any circumstances until the air in the system has been bled out completely, otherwise the injection pump can be seriously damaged.

NOTE! Do not spill fuel on electrical components.

- 1 Fill fuel through the filler cap.
- 2 Push pump knob (F) until there is a resistance.
- 3 Start the engine and let it run in idle for 3 minutes.
- 4 Check for leakages.



- I Screws
- J Clamp
- K Protection cover
- L Air ventilation filter

Air ventilation filter on fuel tank, replacing

Replace the air ventilation filter every 2000 hours.

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

- 1 Disassemble protection cover (K) after loosening two screws (I).
- 2 Remove air ventilation filter (L) after loosening clamp (J).
- 3 Tighten the new air ventilation filter with the clamp.
- 4 Assemble the protection cover.

Intercooler

The engine is provided with an air to air type intercooler to reduce the induction air temperature.

When air temperature is reduced, the oxygen content in the inducted air increases; therefore, combustion is more effective resulting in higher engine output.

Turbocharger

IMPORTANT! Leave the engine running at low idling speed for at least half a minute after start and a few minutes before it is stopped. This is to safeguard the lubrication of the turbocharger.

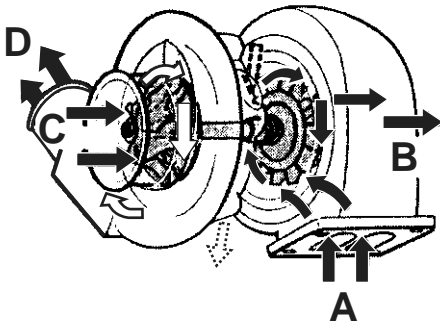
The turbocharger is lubricated and cooled through the engine lubrication system.

Importance for the function of the turbocharger is that:

- lubrication and cooling is safeguarded by
 - not racing the engine immediately after it has been started.
 - the engine is allowed to run at low idling for at least 30 seconds before it is turned off.
- engine oil is changed and the filters are replaced at prescribed intervals.
- the air cleaner is serviced regularly and the exhaust system and lubricating oil lines do not leak.

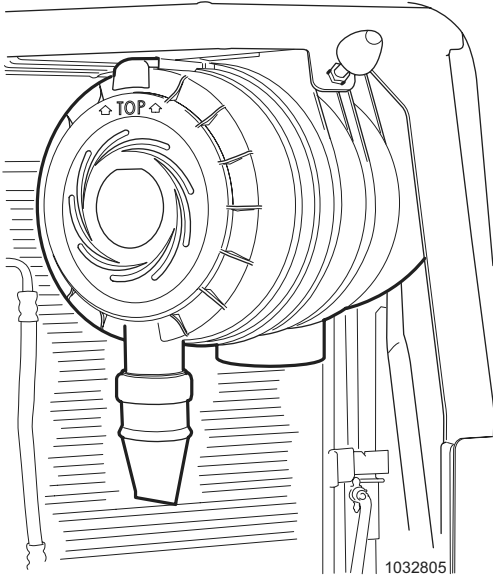
If any jarring noises can be heard or if the turbocharger vibrates, it must be reconditioned or changed immediately.

Only an authorized dealer workshop may carry out work on the turbocharger.

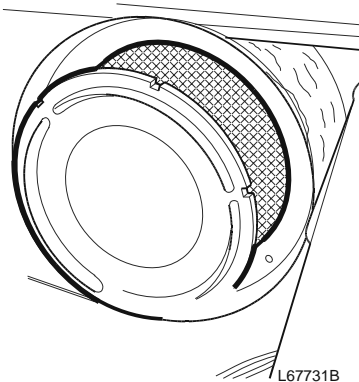


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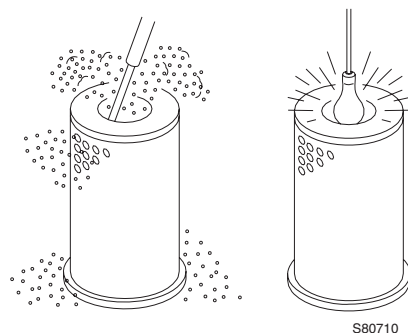
- A Exhaust in
- B Exhaust out
- C Air in
- D Air out



Engine air cleaner



Primary filter



Engine air cleaner

The engine air cleaner prevents dust and other impurities from entering the engine. The air first passes through 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. Always have a spare filter at hand and keep it well protected from dirt.

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

Primary filter, cleaning or replacing

Clean the filter when the check screen for clogged engine air filter pops up on the front instrument panel. The filter may be cleaned, at the most, five times. Thereafter or after maximum 1 year, the filter should be replaced. Also replace the filter if it is damaged.

If the indicator is still alight after replacing or cleaning the primary filter, the secondary filter must be replaced.

As the length of time between filter replacements depends entirely on the operating environment of the machine, it may sometimes be necessary to replace the filter more often.

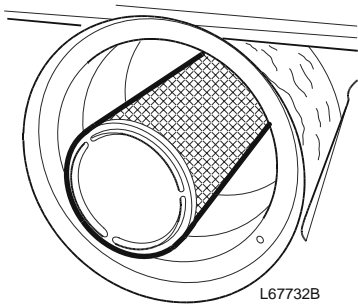
- 1 Remove the cover by pulling out the yellow strap and turning the cover counter-clockwise.
- 2 Press with both thumbs on the primary filter at the same time as you pull it out. This is to prevent the secondary filter from coming out together with the primary filter.
- 3 Carefully tap the end of the primary filter against a soft and clean surface.

NOTE! Do not tap against a hard object.

- 4 If using compressed for cleaning, the max. pressure is 500 kPa (5 bar). Do not hold the nozzle closer than 3–5 cm.
- 5 Blow the filter from the inside along the folds.
- 6 Check the filter with the aid of a lamp.
- 7 If there is the smallest hole, scratch, crack or other damage, the filter must be discarded.
- 8 Install the primary filter.
- 9 Clean the cover and valve before installing the cover.

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

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



Secondary filter

Secondary filter, changing

Replace the secondary filter every 3rd time the primary filter is replaced or at least every 2 years.

If the indicator is still alight even though the primary filter has been cleaned or replaced, the secondary filter should be replaced.

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

NOTE! The secondary filter must always be replaced, never cleaned.

NOTE! Never remove the secondary filter unless it is to be replaced.

- 1 The secondary filter should be removed carefully and with precision so that no impurities enter the engine.
- 2 Carefully check that the new secondary filter is correctly installed.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.

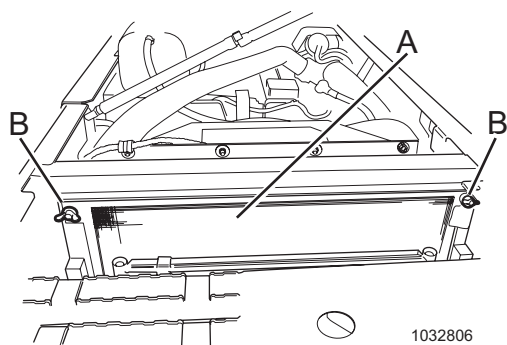
Cooling system

IMPORTANT! If the warning screw for high coolant temperature pops up on the front instrument panel, the engine should be turned off immediately, see page 35.

Charge air cooler, radiator, hydraulic oil cooler, air conditioner condenser, cleaning

The cleaning interval depends on the environmental condition that the machine is operating in. Therefore, clean all fins when required or at least every 500 hours.

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



A Radiator
B Wing nuts



WARNING!

Compressed air, steam or water can cause personal injury. Wear safety goggles or a face mask.

- 1 Open the engine hood and remove the bolts holding the cover above radiator (A).
- 2 Remove the two wing nuts (B) and lift the net up.
- 3 Use compressed air to clean the net and fins.

NOTE! Do not use steam to clean the air conditioning condenser.

- 4 Reinstall the nets and tighten the bolts.

IMPORTANT! When using compressed air, keep the nozzle at a distance from the fins to prevent a damage. If the fins are damaged, this may cause leakage or overheating. Under dusty environment conditions, check it more often regardless of the maintenance interval.

If the engine temperature still remains high after cleaning the cooler, contact a workshop authorized by Volvo CE.



Coolant

Check the coolant contents (%) every 2000 hours or every year.

The cooling system is filled with Volvo Coolant VCS, which fulfils the highest requirements regarding freeze-, corrosion-, and cavitation protection. To avoid damage to the engine, it is very important that Volvo Coolant VCS is used when filling or changing the coolant.

Volvo Coolant VCS is yellow and a decal by the filling point shows that the system is filled with this coolant (see picture).

IMPORTANT! Volvo Coolant VCS must not be mixed with other coolants or corrosion protection as this may result in engine damages.

The cooling system capacity when changing, see page 186.

If concentrated Volvo Coolant VCS and clean water (see page 182) is used, the table below shows the approximate amount of concentrated coolant needed for freezing protection. The content of Volvo Coolant VCS must never be less than 40% of the total mixture.

If in doubt of the water's quality, use the ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant.

IMPORTANT! If the ready-mixed Volvo Coolant VCS is used, do not mix with other ready-mixed coolants as this may damage the engine.

Freeze protection down to	Content of concentrated coolant
-25 °C	40%
-35 °C	50%
-46 °C	60%

Coolant level, checking

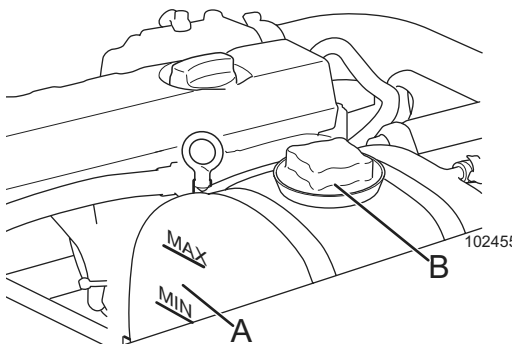
Check the coolant level if the warning screen for low coolant level pops up on the front instrument panel, see page 35.



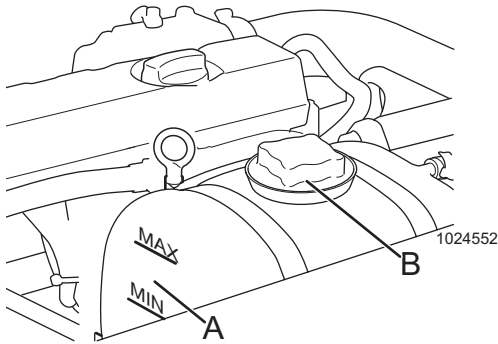
WARNING!

Immediately after operating the engine, the coolant is very hot. Do not open the expansion tank cap until it has cooled down. After cooling it, open the cap slowly to release the internal pressure.

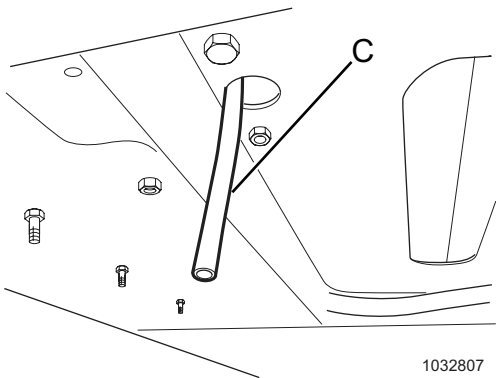
- 1 Open the engine hood.
- 2 Check coolant level (A) on the expansion tank. If the coolant level is lower than "MIN" marking on the tank, top up the coolant through expansion tank cap (B) between "MIN" and "MAX" level.



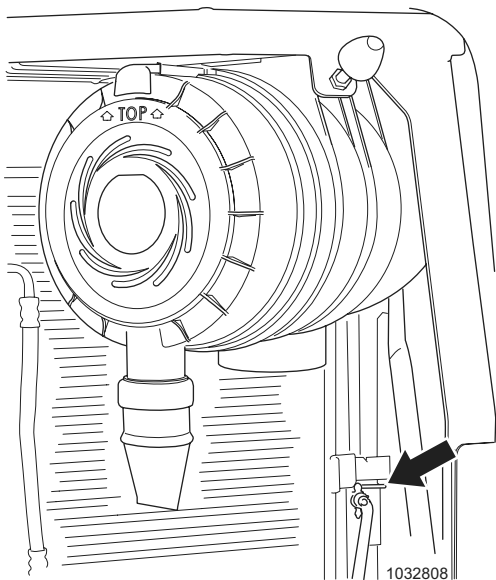
- A Coolant level on expansion tank
B Expansion tank cap



- A Coolant level on expansion tank
- B Expansion tank cap



- C Coolant draining hose



Lever

Coolant, changing

Change the coolant every 6000 hours or every fourth year.

IMPORTANT! Volvo Coolant VCS must not be mixed with other coolants or corrosion protection as this may result in engine damages.

Draining



WARNING!

Immediately after operating the engine, the coolant is very hot. Do not open the expansion tank cap until it has cooled down, then open the cap slowly to release the internal pressure.

- 1 Remove expansion tank cap (B).
- 2 Put a suitable sized container under the hole for the draining hose. Make sure that the end of draining hose (C) is placed in the hole.
- 3 Turn out the lever and drain the coolant into the container.
- 4 Remove the undercover.
- 5 Remove the protection cap of the drain valve and attach a draining hose for draining coolant from the return pipe.

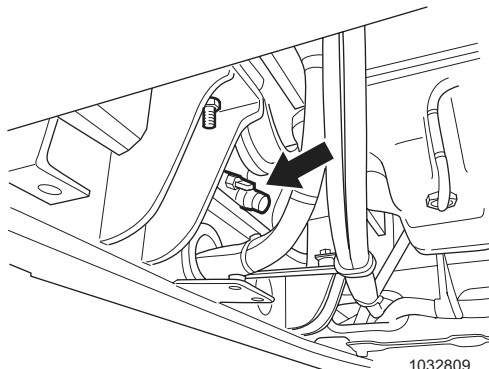
NOTE! The cooling system does not become safe against frost even after draining. There may be pockets of water left.

- 6 After draining, remove the hose and install the protection cap.
- 7 Fill coolant through the expansion tank cap.
- 8 Run the engine at low idle for about 5 minutes.
- 9 Stop the engine and refill the coolant to the proper level on the expansion tank.
- 10 Install the expansion tank cap.

For the capacity of cooling system, see page 186.

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.

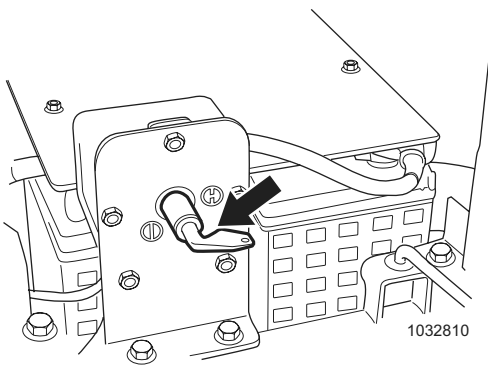
IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



Drain valve on return pipe

Electrical system

Battery disconnect switch



Battery disconnect switch

IMPORTANT! The battery disconnect switch must always remain turned on while the engine is running. If it is turned off while the engine is running, the electrical system may be damaged.

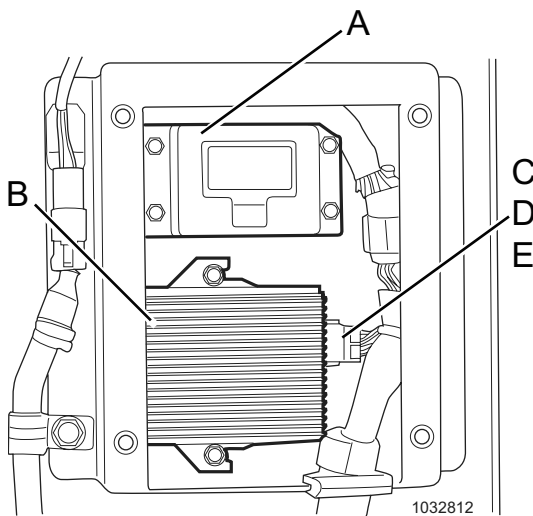
The battery disconnect switch is located inside the cover on the left side.

When welding, servicing of electrical system or after finishing work of the day for safety, the battery disconnect switch should be turned off.

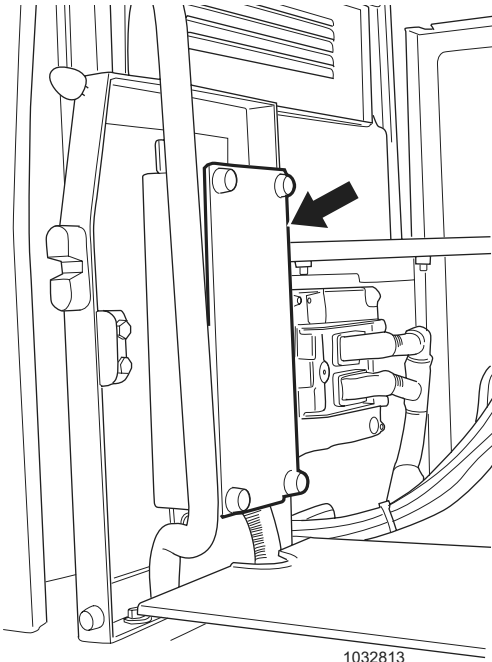
Circuit break fuses and converter

The box for electrical items such as wiper control unit, circuit break fuses, voltage converter, and preheater relay is installed under the front cover on the right side.

When current with large capacity flows, the circuit break fuse disconnects the circuit to protect components.



- A Wiper control unit
- B Voltage converter
- C Circuit break fuse (150A)
- D Circuit break fuse (80A)
- E Preheat relay



Electrical distribution box

Electrical distribution box

The electrical distribution box containing relays and fuses is located inside the cover on the left side. A decal which shows the exact position and specification of respective relay and fuse is provided on the inside of the box cover, see **page 189**.

IMPORTANT! Never install a fuse with a higher ampere rating than that stated on the decal (risk of damage or fire on the circuit board).

NOTE! If a fuse blows repeatedly in the same position, the cause of the fault has to be investigated.

Batteries, rules

See **page 135**.

Battery electrolyte level, checking

Check the electrolyte level every 250 hours (more often at temperature above +15 °C).

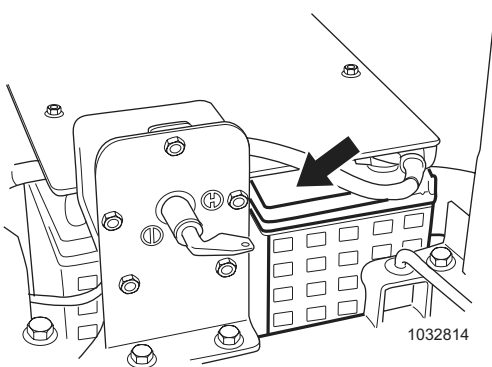


WARNING!

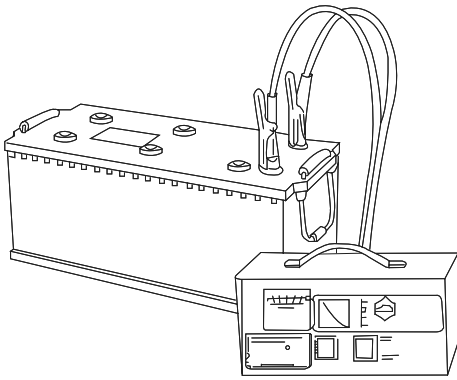
Battery gas (hydrogen) is flammable. Do not expose to sources of fire such as open flame, cigarettes or sparks. If battery electrolyte is splashed onto clothes or skin, immediately flush with clean water. If battery electrolyte is splashed into the eyes or on any other sensitive part of your body, immediately flush with large amounts of clean water and consult a doctor.

The batteries are located inside the cover on the left side.

- 1 Ensure the battery disconnect switch is in off position and remove the battery cover.
- 2 Loosen a cap. The electrolyte level should stand approximately 10 mm above the cell plates.
- 3 Top up with distilled water when required.
- 4 Operate the machine after topping up, so that the water is mixed in with the battery electrolyte. This is more important in cold weather.
- 5 Check that cable terminals and pole studs are clean, well tight and coated with petroleum jelly or similar product.



Battery



S80651A

Battery, 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 are formed. A short circuit, open flame or a spark near the battery can cause a powerful explosion.

- Always turn off the charging current before the charging lead clips are removed.
- Ventilate well, especially if the battery is charged in a confined space.

Starting with booster batteries, see page 86.

Electric welding



WARNING!

All paint decomposes when heated and forms a great number of compounds, which may cause irritation and be dangerous to one's health after repeated or prolonged exposure.

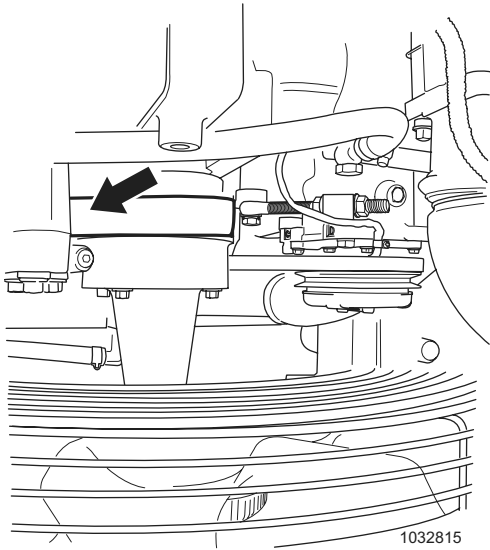
The following measures should be taken before starting electric welding on the machine or attachments connected to the machine.

- 1 Turn off the electric power with the battery disconnect switch.
- 2 Disconnect the batteries, both the plus and minus terminal.
- 3 Disconnect the electronic units; V-ECU, E-ECU, I-ECU, ECC and so on. For further information, contact a workshop authorized by Volvo CE.
- 4 Connect the welding equipment's ground connection as close to the welding point as possible and make sure that the current does not pass across a bearing.

See also page 133.

IMPORTANT! Fire extinguisher should be on hand close to working area.

NOTE! The weld will be related with inferior quality and strength, never weld directly on a painted surface.



Alternator belt

Belt tension for alternator, checking

Check the belt every 500 hours.



WARNING!

The engine must be stationary when checking the belt tension. Rotating parts can cause injuries.

- 1 Inspect belt for cracks, wear or other damage.
- 2 The belt tension will be adjusted automatically by the belt tensioner. If the distance (D) is less than 3 mm, the belt must be changed.

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

- 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.
- The battery terminals must never be confused. 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. See **page 153**.

Track drive unit

IMPORTANT! Always clean around the check plug before you check the oil level. Dirt in the oil damages the track drive unit.

It is very important that the oil level is always correct and that it is checked at working temperature.

- **Too little oil** may lead to insufficient lubrication of the track drive unit and cause costly damage.
- **Too much oil** may lead to oil foaming, and cause the track drive unit to overheat.



WARNING!

Immediately after operating the machine, the oil is hot. Allow the oil to cool. Residual pressure in the drive unit, may cause the plug to be dislodged suddenly and oil to jet out.

Oil level in track drive unit, checking

Check the oil level every 1000 hours.

- 1 Put the case so that filling plug (B) is at the top.
- 2 Remove level plug (C). If the oil is about to overflow from the hole, the level is correct.

If the oil is low, top up oil to the correct level through the filling plug.

For oil specification, see **page 181**.

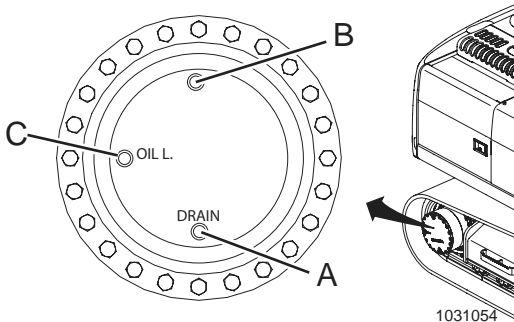
Oil in track drive unit, changing

Change the oil after the first 500 hours and then every 2000 hours.

- 1 Put the case so that draining plug (A) is at the bottom.
- 2 Place a container under the draining plug for receiving the drained oil.
- 3 Remove filling plug (B) and the draining plug and drain the oil.
- 4 Remove the level plug (C).
- 5 Check the O-ring on the plugs, if damaged, replace them.
- 6 Install the draining plug.
- 7 Fill oil to the correct level through the filling hole. If the oil is about to overflow from the level hole, the level is correct.
- 8 Install the other plugs.

For oil specification, see **page 181**.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see **page 130**.



- A Draining plug
- B Filling plug
- C Level plug

Swing drive unit

IMPORTANT! Always clean around the oil level gauge before you check the oil level. Dirt in the oil damages the swing drive unit.

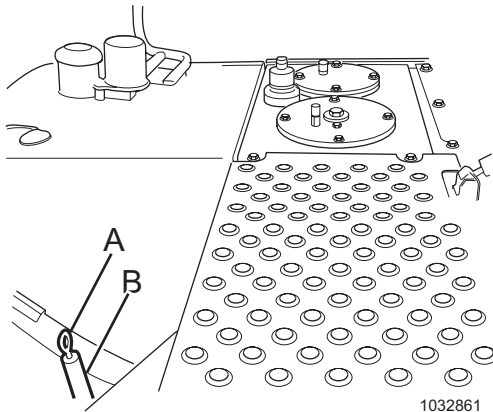
It is very important that the oil level is always correct and that it is checked at working temperature.

- **Too little oil** may lead to that the swing drive unit does not work correctly and thus be damaged.
- **Too much oil** makes the oil foam, which causes the swing drive unit to overheat.



WARNING!

Immediately after operating the machine, the oil is hot. Allow the oil to cool.



- A Oil dipstick
B Filler tube

Swing drive unit oil level, checking

Check the oil level every 250 hours.

- 1 Pull out oil dipstick (A) and wipe it with a clean cloth.
- 2 Insert oil dipstick and pull it out again.
- 3 Check the oil level. If the level is in the centre of “C”, the level is correct.
- 4 If the level is low, top up oil through oil filler tube (B) to correct level.
- 5 If the level is high, follow the procedure for changing oil below.

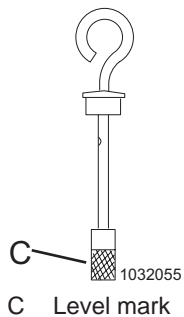
For oil specification, see **page 181**.

Oil of swing drive unit, changing

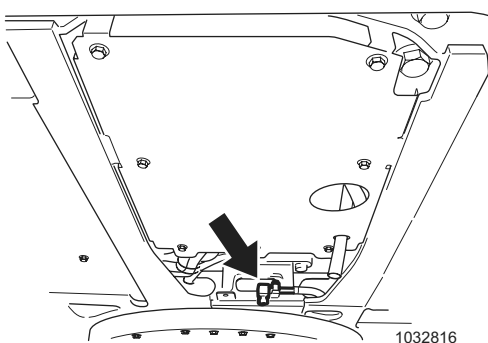
Change the oil after the first 500 hours and then every 1000 hours.

- 1 Remove the cover under the draining point.
- 2 Place a suitable sized container under the valve on the swing drive unit.
- 3 Remove the protection cap of the drain valve.
- 4 Attach the draining hose provided as a service tool with machine and drain the oil.
- 5 Disconnect the draining hose.
- 6 Install the protection cap.
- 7 Pull out oil dipstick (A), and fill oil to the correct level through oil filler tube (B).
- 8 Wait for about 5 minutes and check the oil level again and if necessary, top up.

Take care of waste oil/liquids in an environmentally safe way, see page 130.



- C Level mark



Drain valve

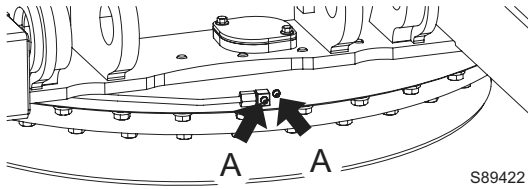
For oil specification, see **page 181**.

Swing gear and bath

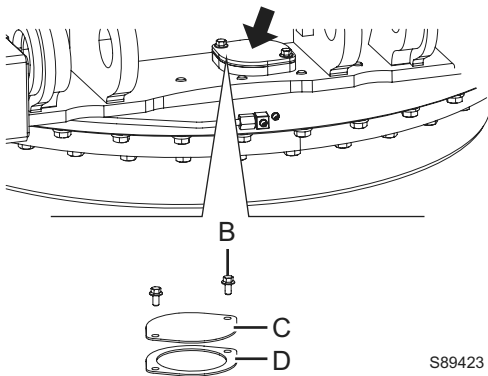
Swing gear bearing, greasing

Grease the swing gear every 250 hours.

- 1 Park the machine on level ground and lower the bucket to the ground.
- 2 Turn the ignition key to stop position.
- 3 Move the control lockout lever down to lock the system securely, see page 69.
- 4 Fill grease in grease nipples (A) at two points using a hand or power grease gun.
- 5 Start the engine. Raise the bucket off the ground and rotate the superstructure 40 ° (1/9 turn).
- 6 Lower the bucket to the ground.
- 7 Repeat the procedure two times more, beginning with step 2.
- 8 Apply grease to the swing bearing until grease can be seen from the swing bearing seals. Take care not to supply excessive amount of grease.
- 9 After greasing, clean off the superfluous grease completely.



A Grease nipples

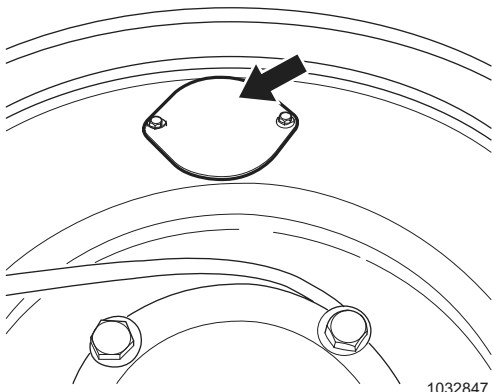


Swing bath grease checking and filling

Swing bath, grease checking

Check the oil condition and level every 1000 hours.

- 1 Park the machine on a level ground and lower the bucket to the ground.
- 2 Turn the ignition key to stop position.
- 3 Move the control lockout lever down to lock the system securely, see page 69.
- 4 Remove the bolts (B) and cover (C) and check the level and condition of the grease. Fill if needed.
- 5 Inspect the cover seal (D), replace if damaged.
- 6 Install the cover.



Swing bath grease draining

If the grease is contaminated or discoloured with water, remove the cover under the swing unit and drain the grease.

Track unit

Track tension, checking

Check the track tension every 100 hours.



WARNING!

When inspecting the track tension, the track must be lifted off the ground. Be very careful that the machine does not drop or move while measuring.

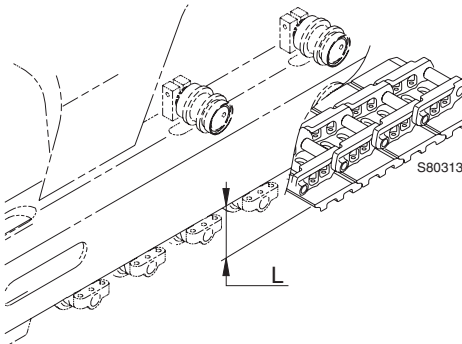
NOTE! When two persons are working, the operator should follow the sign of the maintenance worker.

The degree of wear condition of track link pins and bushings varies with the working condition or the characteristics of soil. Check the track tension often and keep it to the specified value.

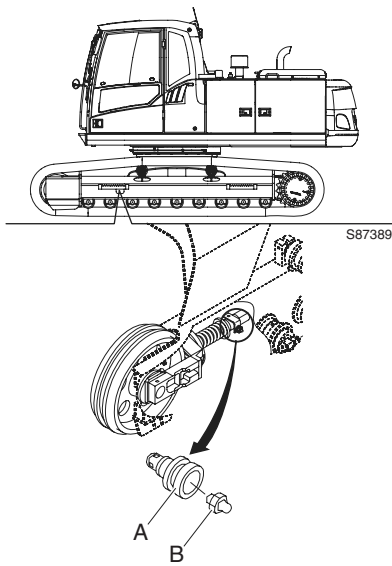
When working in wet sand or clay, it sticks to and packs between moving undercarriage components. This can prevent mating parts from properly engaging each other, which cause interference and high loads. Due to abrasive particles in the material it significantly accelerates wear rates of the sprockets, pins / bushings, idlers and track links as the track load and tension increase. Generally, packing effects cannot be controlled except by constant cleaning or removal of the material.

Therefore thoroughly clean the undercarriage at least daily or more often according to soil conditions in job-site.

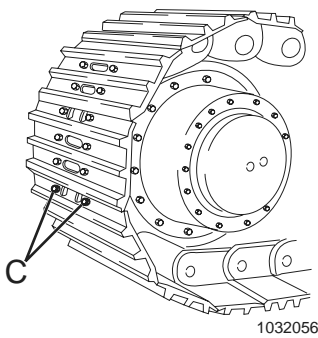
- 1 Slew the superstructure to the side and raise the track by using boom and arm. For this movement, operate the control lever slowly.
- 2 Turn the track slowly in forward and reverse direction several time. Stop the track while moving in the reverse direction.
- 3 Measure the track slack (L), at the centre of track frame. The track slack is the clearance between the bottom of track frame and the upper surface of track shoe.
- 4 Adjust the track tension according to the soil characteristics as recommended in the table below.



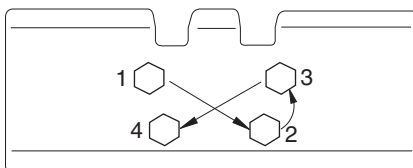
Working condition	Clearance (L) mm
General soil	260–280
Rocky ground	240–260
Moderate soil like gravel, sand, snow, etc.	280–300



- A Valve
B Grease nipple



- C Shoe bolt



Order to tighten the bolts

Track tension, adjusting

IMPORTANT! Valve (A) may suddenly dislodge due to the high pressure of the compressed grease in the cylinder. Therefore, when loosening the valve, do not loosen it more than one turn.

IMPORTANT! Do not loosen other parts except the valve. Step aside from the trajectory path of the valve. If the tension can not be adjusted by the way shown in this manual, contact a workshop authorised by Volvo CE.

Tightening track tension (reducing slack)

- 1 Fill grease through grease nipple (B) by using a grease gun with high pressure.
- 2 Check the tension by moving the machine forward and rearward.
- 3 Check the tension again. If not correct, adjust it again.

Loosening track tension (increasing slack)



WARNING!

Do not use the grease nipple (B) to drain the grease, as the nipple can be ejected suddenly by internal high pressure in the cylinder.

- 1 Loosen valve (A) gradually to drain the grease, but not more than one turn. If the grease does not drain smoothly, move the machine forward and rearward.
- 2 Close the valve, but do not tighten excessively as the fitting may be damaged.
- 3 Check the tension by moving the machine forward and rearward.
- 4 Check the tension again. If not correct, adjust it again.

Track shoe bolts, checking

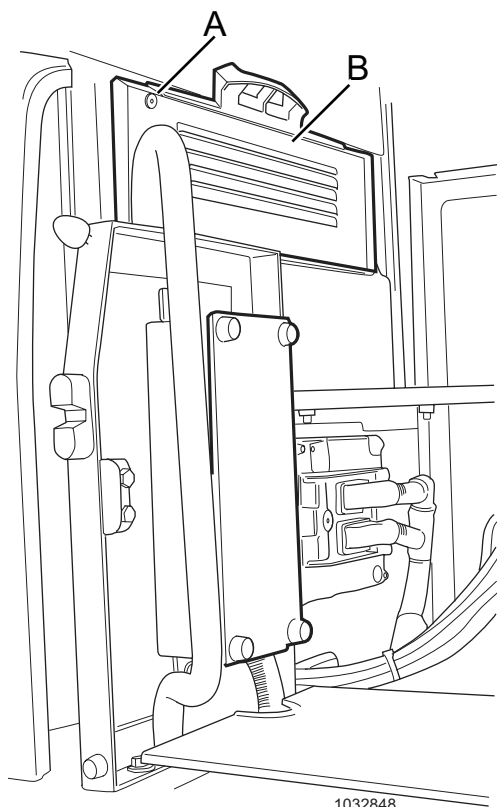
Check the shoe bolts daily.

If track shoe bolts (C) are loose, the track shoes are likely to be damaged.

- 1 Slew the superstructure to the side and raise the track using boom down operation.
- 2 Turn the track slowly in forward and reverse direction several times. Check for missing, loose or damaged shoe bolts and shoes. If needed, tighten the bolts to specified torque, 58 ± 5 kgf m (568 ± 49 N m).

IMPORTANT! It is extremely important that loose track shoe bolts and nuts are completely removed to clean threads. Clean track shoe surface before installing and tightening bolts.

- 3 After tightening, check whether the nut and the shoe are in full contact with the mating surfaces of the link.



Ambient filter

- A Screw
- B Cover

Cab

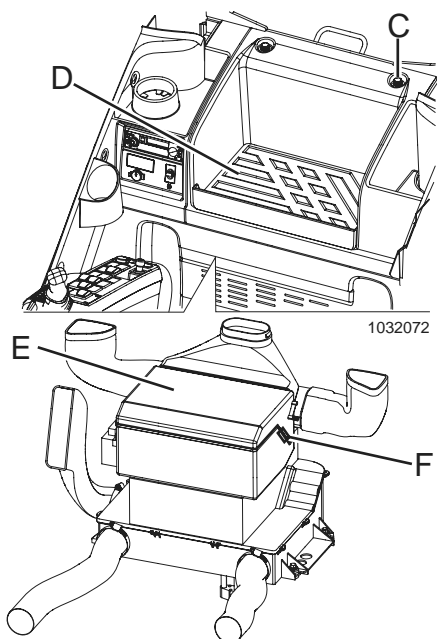
Ambient filter, cleaning or replacing

Clean the ambient filter every 250 hours and replace it every 2000 hours.

Dusty or contaminated air requires that the filter is cleaned or replaced more often.

- 1 Turn screw (A) counter clock-wise to unlock cover (B). Use an L wrench.
- 2 Tilt the cover out and take out the ambient filter.
- 3 Clean the filter with compressed air.
- 4 If the filter is damaged or heavily contaminated, replace it with a new one.
- 5 Install the filter and lock the cover.

Take care of filters/oils/liquids in an environmentally safe way, see page 130.



- C Bolts (4 EA)
- D Rubber mat
- E Cover
- F Latches (4 EA)

Air conditioning

Let personnel at a workshop authorised by Volvo CE check the air conditioning every 1000 hours.

Safety when handling refrigerant, see page 134.

Air conditioning main filter, cleaning or replacing

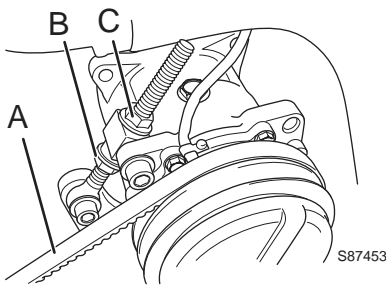
Clean the main filter every 500 hours and replace it every 3000 hours.

- 1 Unscrew 4 bolts (C). Two are under rubber mat (D).
- 2 Disconnect the wire harness of the air conditioner.
- 3 After opening the 4 latches (F), open cover (E) and take out the main filter.

NOTE! Refer to the information plate attached on the top of the cover when disassembling the cover.

- 4 Clean the filter with compressed air.
- 5 If the filter is damaged or heavily contaminated, replace it with a new one.
- 6 Install the filter, and assemble in reverse order.

Take care of filters/oils/liquids in an environmentally safe way, see page 130.



- A Air conditioning compressor belt
- B Nut
- C Adjustment nut

Air conditioning compressor belt, checking tension

Check the belt tension daily.

At correct belt tension, it should be possible to depress the belt approx. 15 mm. Adjust if necessary.

- 1 Loosen nut (B).
- 2 Adjust the tension with adjustment nut (C).
- 3 Tighten the nut.

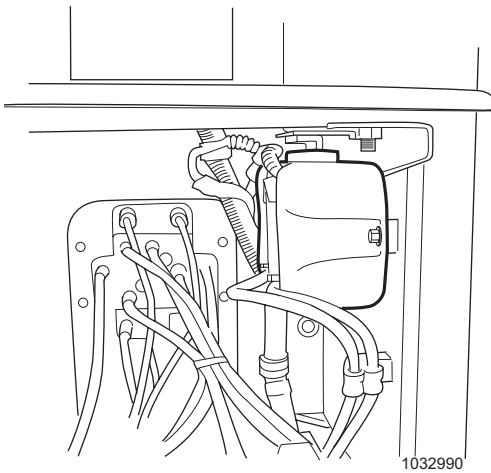
Air conditioning condenser, cleaning



WARNING!

Do not use steam to clean the condenser.

Clean the air conditioning condenser fins every 500 hours or when required, see page 150.



Washer reservoir

Washer reservoir

Check the fluid level daily.

NOTE! When the temperature is below freezing point, anti-freeze should be added to the washer fluid. Follow the manufacturer's recommendations as regards the ambient temperature.

Hydraulic system

IMPORTANT! Any work on the system requires great demands on cleanliness. Even very small particles can cause damage or clog up the system. Therefore, wipe areas in question clean before any work is carried out.

The pressure-limiting valves for the hydraulic system are set to the correct value at the factory. If the valves are altered by any person other than a workshop authorized by Volvo CE, the guarantee from the manufacturer will be void.



WARNING!

Take care when handling the hydraulic oil. Hot oil can cause burns on unprotected skin.

Hydraulic oil

IMPORTANT! Volvo genuine hydraulic oil approved by Volvo CE must be used. For the specification, see page 181.

IMPORTANT! Do not mix different brands of hydraulic oil as this can lead to damage in the hydraulic system.

Hydraulic bio oil

When changing from a mineral oil to a bio oil, the oil must be drained as much as possible and it is required to flush the hydraulic system. Contact a workshop authorized by Volvo CE.

Hydraulic system, releasing pressure

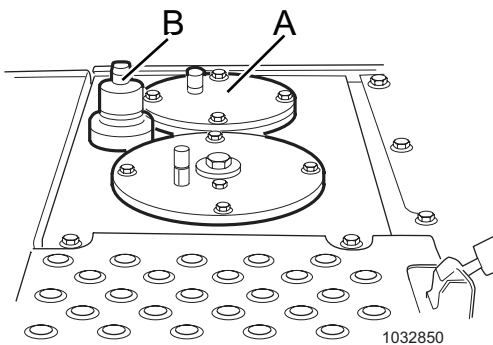


WARNING!

Release the internal pressure of the tank and hydraulic lines before removing any components of the hydraulic system. The work must be carried out immediately. Otherwise leakage may cause high pressure to build up in the hydraulic circuits. If the work cannot be completed within a short time after the pressure in the system was released, the system pressure must be released again.

Use the greatest caution when working on the hydraulic system.

- 1 Place attachment on ground and turn off the engine.
- 2 Turn the ignition key to running position (Do not start the engine).
- 3 Keep the control lockout lever up (unlocked position) and move all control levers and pedals to release main system pressure from all lines.
- 4 Turn the ignition key to stop position, remove the key and tag the machine to indicate that the unit is under service.
- 5 Lower the control lockout lever (locked position)
- 6 Press pressure relief valve (B) on hydraulic tank breather (A) to release tank pressure.



A Hydraulic tank breather
B Pressure relief valve

Hydraulic oil level, checking

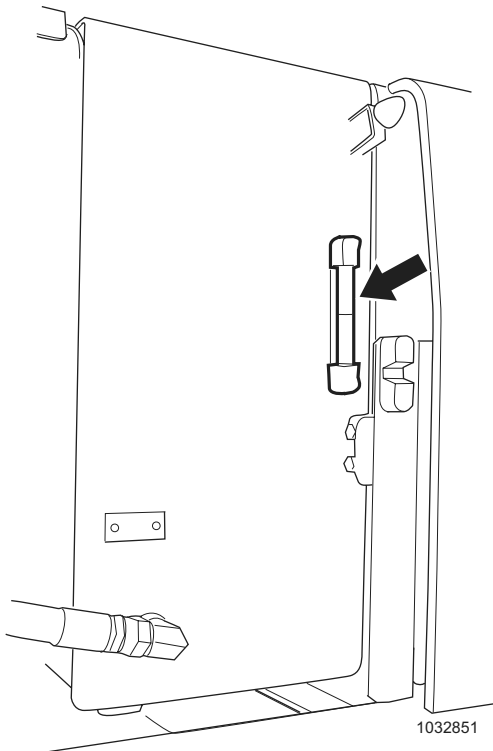
Check the oil level every 50 hours.

- 1 Place the machine in service position B, see page 127 and release the pressure, see page 164.
- 2 Move the control lockout lever down to lock the system securely and turn off the engine.
- 3 Open the rear cover on the right side of the machine and check the oil level in the sight gauge. If the level is in the centre of the gauge, the level is correct.
- 4 If the level is low,
 - Unscrew the screws on cover (A). Make sure that the pressure is released before removing the cover.
 - Remove the cover and the spring.
 - Top up the oil. To top up the oil efficiently, press the pressure relief valve (B) again.
 - Check the level.
 - If the level is normal, clean the dismantled parts and install them.

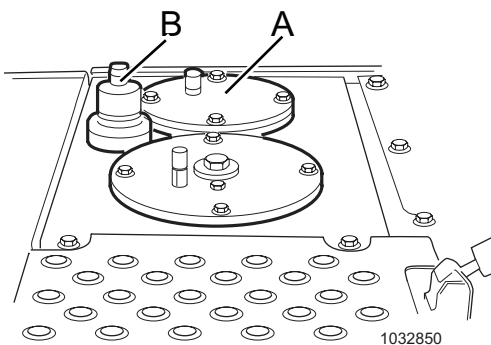
IMPORTANT! When refilling the oil, use the same oil as the system is filled with.

- 5 If the level is high,
 - Place a suitable sized container under the hydraulic tank.
 - Remove protecting cap (C) and attach drain hose (D), which is the same hose as that used for draining engine oil.
 - Drain the oil into a container.
 - Disconnect the drain hose and install the protecting cap.

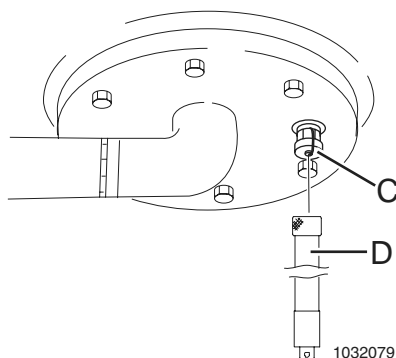
IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



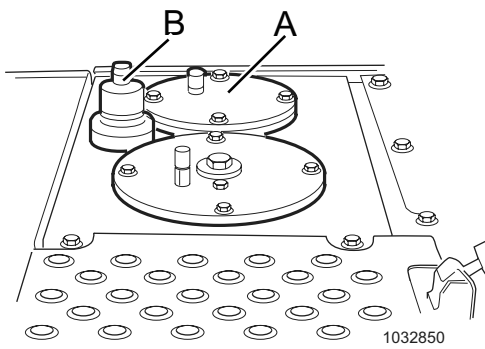
Hydraulic oil level gauge



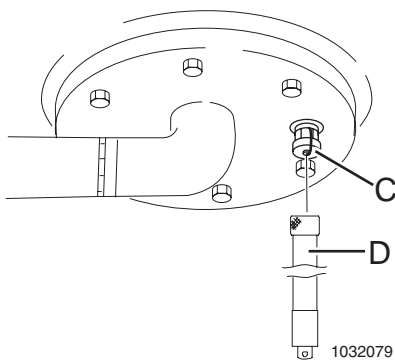
A Cover
B Pressure relief valve



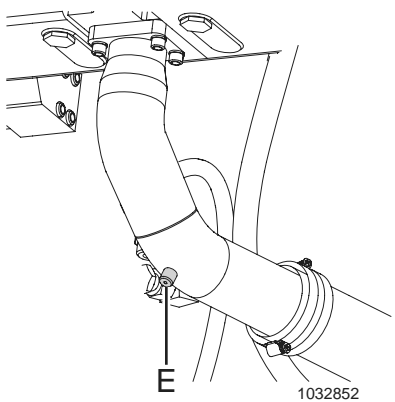
C Protecting cap
D Drain hose



A Cover
B Pressure relief valve



C Protecting cap
D Drain hose



E Drain plug on the suction pipe from the hydraulic tank

Hydraulic oil, changing

Refer to the table below for changing the hydraulic oil.

Hydraulic oil	Change interval
Mineral oil	every 2000 hours
Bio oil	every 5000 hours
Long life hydraulic oil	every 5000 hours

IMPORTANT! When using the hydraulic hammer, refer to the table below for changing the hydraulic oil.

Frequency of hammer use	Change interval
50%	every 1000 hours
100%	every 600 hours

IMPORTANT! When filling or changing the oil, use the same oil as the system is filled with.



WARNING!

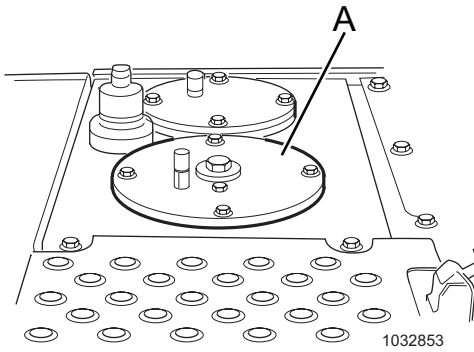
Take care when changing oil. Hot oil can cause burns on unprotected skin.

- 1 Swing the superstructure so that the protecting cap at the bottom of the hydraulic tank is located between the left and right tracks.
- 2 Retract the bucket cylinder and the arm cylinder completely, and then lower the boom to the ground.
- 3 Move the control lockout lever down to lock the system securely and turn off the engine.
- 4 Release the internal pressure, see page 164.
- 5 Remove cover (A) and the O-ring after removing the screws.
- 6 Place a suitable sized container under the hydraulic tank.
- 7 Remove the protecting cap (C) and attach drain hose (D), which is the same hose as that used for draining engine oil.
- 8 Drain the oil into a container.
- 9 Disconnect the drain hose and install the protecting cap.
- 10 Place a suitable sized container under the drain plug (E) on the suction pipe from the hydraulic tank.
- 11 Remove the drain plug and drain the oil into a container.
- 12 After draining, install the drain plug.
- 13 After cleaning the magnetic rings of strainer thoroughly, re-install it.
- 14 Fill oil and install the cover.
- 15 Check the oil level in the sight gauge.
- 16 Perform a test run to check for any leaks.

For the information of oil capacity when changing, see **page 186**.

For oil grade, see page 181.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see **page 130**.



A Hydraulic oil return filter, cover

Hydraulic oil return filter, replacing

Replace the return filter after the first 500 hours and then every 2000 hours.

IMPORTANT! When using the hydraulic hammer, refer to the table below for changing the return filter.

Frequency of hammer use	Change interval
50%	every 500 hours
100%	every 300 hours

NOTE! Observe the greatest possible cleanliness throughout the entire operation.



WARNING!

Release the internal pressure of the tank before removing the cover.

- 1 Place the machine in service position B, see page 127 and release the internal pressure, see page 164.
- 2 Clean the area around cover (A).
- 3 Remove the bolts and remove the cover.
- 4 Remove the O-ring, spring and bypass valve, and then pull out the strainer and the filter.
- 5 Clean the dismantled parts. Replace the strainer and O-ring if they are damaged.
- 6 Install a new filter and all disassembled parts. When mounting the cover, fasten the bolts while pressing down the cover.
- 7 Run the engine at low idle speed for 10 minutes to remove the air.
- 8 Stop the engine.

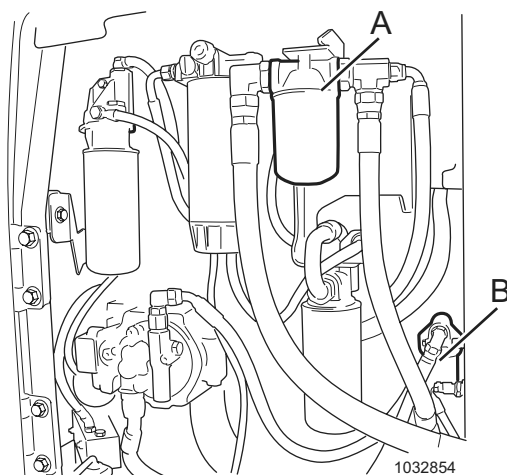
IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.

Hydraulic drain filter, replacing

Replace the cartridge for the drain filter after the first 500 hours and then every 1000 hours.

- 1 Place the machine in service position B, see page 127 and release the internal pressure, see page 164.
- 2 Place a container under drain filter (A), and turn the filter counter clockwise to remove it.
- 3 Fill the new filter with oil and thinly coat O-ring with oil.
- 4 Install the new filter.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



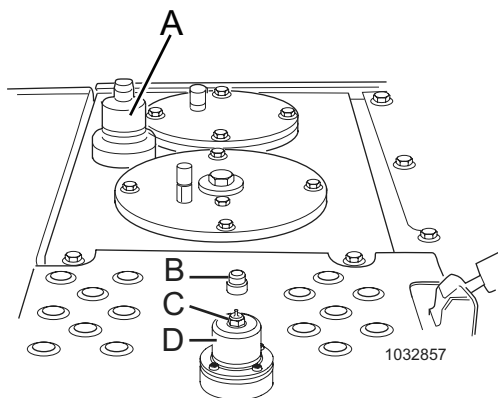
A Drain filter
 B Pilot filter

Pilot filter, replacing

Replace the element in the pilot filter after the first 500 hours and then every 1000 hours.

- 1 Place a container under pilot filter (B).
- 2 Remove the filter bowl.
- 3 Replace the inner element of the pilot filter.
- 4 Reinstall the filter bowl.

IMPORTANT! Take care of filters/oils/liquids in an environmentally safe way, see page 130.



- A Air breather
- B Rubber cover
- C Nut
- D Filter case

Air breather filter on hydraulic tank, replacing

Replace the element in the air breather (A) every 2000 hours.

In dusty working environments, the air breather will become blocked after a short period of time.

NOTE! The filter cannot be cleaned but must be replaced.

- 1 Place the machine in service position B, see page 127 and release the internal pressure, see page 164.
- 2 Remove rubber cover (B).
- 3 Unscrew nut (C) and remove filter case (D).
- 4 Replace the element of the air breather with a new one.
- 5 Reinstall the filter case and tighten the nut.
- 6 Install the rubber cover.

Accumulator, handling



WARNING!

The accumulator is charged with highly pressured nitrogen gas. Handle it with care. Otherwise, it cause serious accidents or injuries.

- Do not hit, drill or weld the accumulator.
- Keep it away from open flame or other highly heated sources.
- If you operate the operating lever downward just after the engine stops, the accumulator allows the attachment to move by its own weight.
- After releasing the pressure in accumulator, move the control lockout lever down to lock the system securely, see **page 69**.

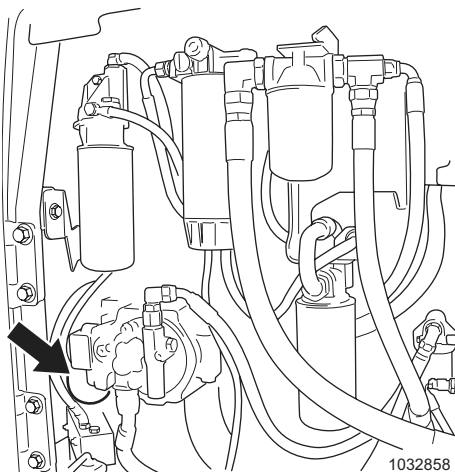
Operation of accumulator (in emergency)

- 1 Turn off the engine.
- 2 Turn the ignition key to running position.
- 3 Move the control lockout lever up to unlock the system, see **page 69**.
- 4 Put the control lever to boom down position to lower the attachment by its own weight.
- 5 Move the control lockout lever down to lock the system securely.

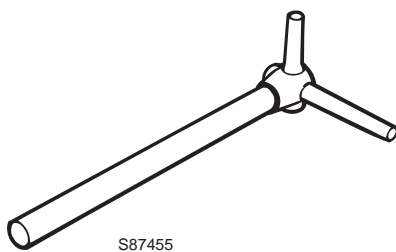
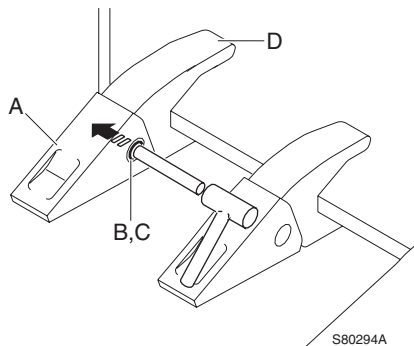
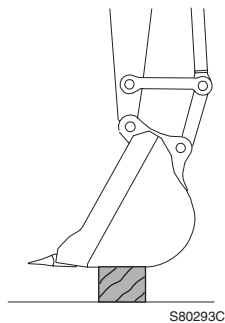
Accumulator pressure, releasing

- 1 Lower the attachment completely to the ground and keep attachments such as hammers closed.
- 2 After turning off the engine, turn the ignition key to running position.
- 3 Move the control lockout lever up to unlock the system.
- 4 To release the pressure in the control circuits and accumulator, move the control levers and pedals forwards / backwards and left / right to their respective end positions.
- 5 Turn the ignition key to stop position.
- 6 Move the control lockout lever down to lock the system securely.
- 7 To release the pressure completely, loosen the hose connection slowly when you disconnect the accumulator. Step aside in this case oil should jet out.

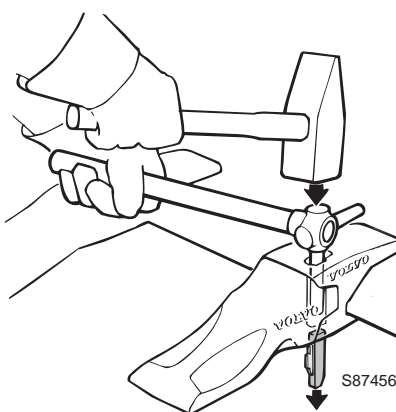
Ask a workshop authorized by Volvo CE to discharge the pressure in the accumulator prior to disposal.



Accumulator



Special tool



Knock out the locking device

Bucket

Bucket teeth, replacing

Replace the bucket teeth before the adaptors wear away.



WARNING!

Wear eye protection when removing the locking pins.

Standard type (transverse pin), Korea

- 1 Lower the bucket horizontally and place it on a block.
- 2 Stop the engine and move the control lockout lever down to lock the system securely.
- 3 Drive out pin (B) by using a hammer and punch. Be careful not to damage locking washer (C). Use a round bar with a smaller diameter than the pin as a punch.
- 4 Clean the surface of adapter (D) and insert a new locking washer in the correct place, and then install a new tooth (A).
- 5 Drive the pin into the pin groove until the pin is flush with the tooth.

For Volvo tooth system (VTS)

Replace the bucket teeth before the adaptors wear away.



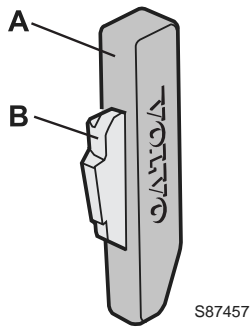
WARNING!

Wear protective glasses, gloves, work shoes and respirator for your personal safety.

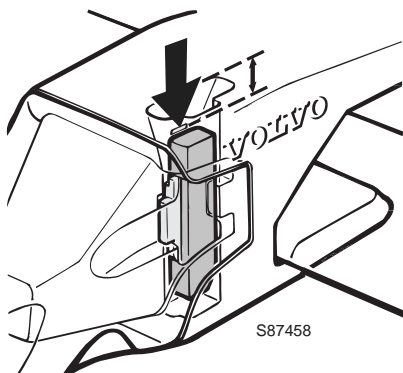
A special tool may be ordered to facilitate the replacement of the teeth. The tool is available in different sizes depending on tooth size. Contact your dealer for further information.

Removing tooth

- 1 Lower the bucket horizontally on a block and angle it slightly upward.
- 2 Stop the engine and move the control lockout lever down to lock the system securely.
- 3 Clean the opening for tooth adapter locking device.
- 4 Knock out the locking device with a hammer and the tool or other suitable drift.
- 5 Remove tooth.



Locking device
 A Steel pin
 B Lock retainer



The locking device should be just below the scored line

Installing tooth

- 1 Clean the front part of the tooth adapter and the hole for the locking device.
- 2 Install the tooth so that the guide lugs fit in the tooth adapter recesses.
- 3 Replace lock retainer (B) with a new part.
- 4 Install the locking device so that the chamfered part points downward and the lock retainer points forward.
- 5 Knock down the locking device with a hammer until it is level with the upper part of the tooth adapter.
- 6 Knock down the locking device further with a hammer and the tool or other suitable drift until the upper part is just below the scored line in the hole.

NOTE! Replace the steel pin in connection with replacement of tooth adapter.

Excavator unit, greasing

Grease the excavator unit every 10 hours or daily only during first 100 hours.

Normal bushing: After first 100 hours of operation, grease the excavator unit every 50 hours or weekly and dozer blade unit (point 18–20) every 250 hours.

Extended greasing bushing: After first 100 hours of operation, grease the boom and arm linkage (point 1–7) every 500 hours or every 3 months.

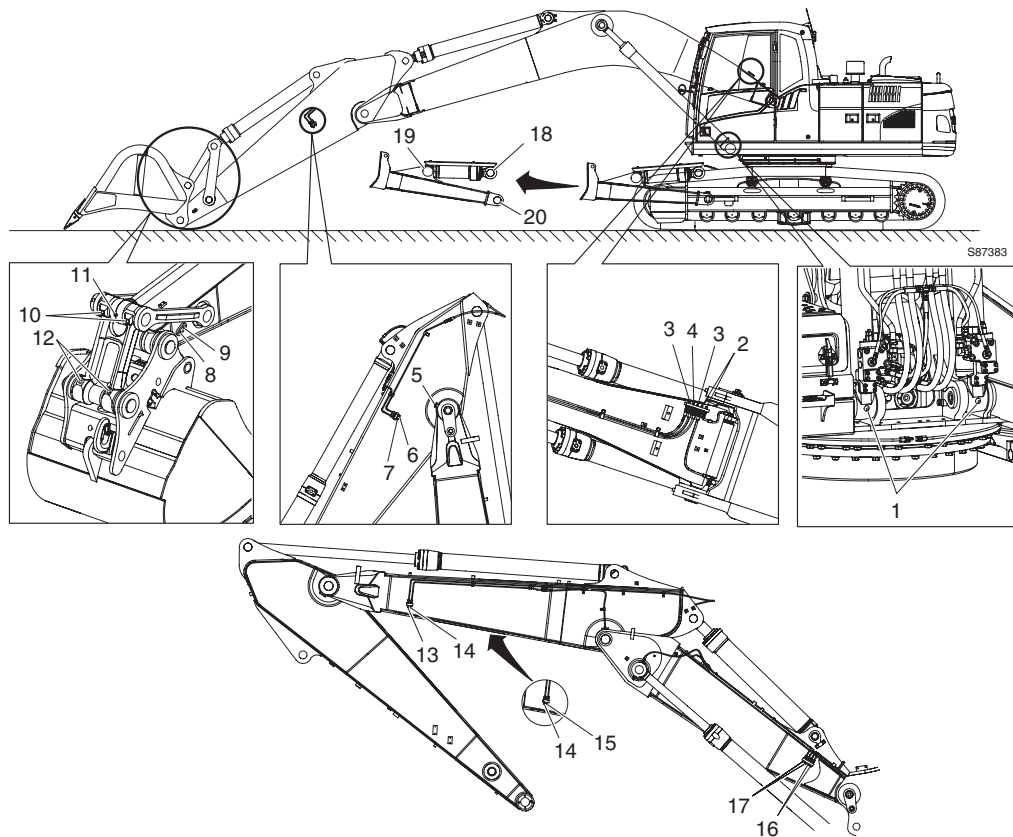
NOTE! Under severe operating conditions where mud, water, and abrasive material may enter the bearings, or after using the hydraulic hammer, the excavator unit should be greased every 10 hours or daily.

When greasing by hand, lower the attachment to the ground as illustrated, and stop the engine.

Grease through the grease nipples using a hand or power grease gun.

After greasing, clean off the superfluous grease.

Immediately after working under water, grease the submerged parts such as the bucket pins to remove the old grease, regardless of the grease interval. For grease specification, see **page 181**.



- | | |
|---|---|
| 1 Boom cylinder mounting pin (2 points) | 11 Bucket cylinder rod end pin (1 point) |
| 2 Boom mounting pin (2 points) | 12 Pin between bucket and connecting rod (2 points) |
| 3 Boom cylinder rod end pin (2 points) | 13 Second boom cylinder rod end pin (1 point) |
| 4 Arm cylinder mounting pin (1 point) | 14 Pin between boom and second boom (2 points) |
| 5 Pin between boom and arm (2 points) | 15 Arm cylinder mounting pin (1 point) |
| 6 Arm cylinder rod end pin (1 point) | 16 Boom mounting pin (2 points) |
| 7 Bucket cylinder mounting pin (1 point) | 17 Boom cylinder rod end pin (2 points) |
| 8 Pin between arm and bucket (1 points) | 18 Dozer blade cylinder rod end pin (2 points) |
| 9 Pin between arm and link (1 point) | 19 Dozer blade cylinder mounting pin (2 points) |
| 10 Pin between connecting rod and link (2 points) | 20 Dozer blade mounting pin (2 points) |

Lubrication

Lubrication is an important part of preventive maintenance. The service life of bushings, bearings and bearing 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 in order to reduce wear between the pin and the bearing.
- To replace old and dirty grease. The grease stored inside the outer seal collects dirt and water and prevents them from penetrating into the bearing.

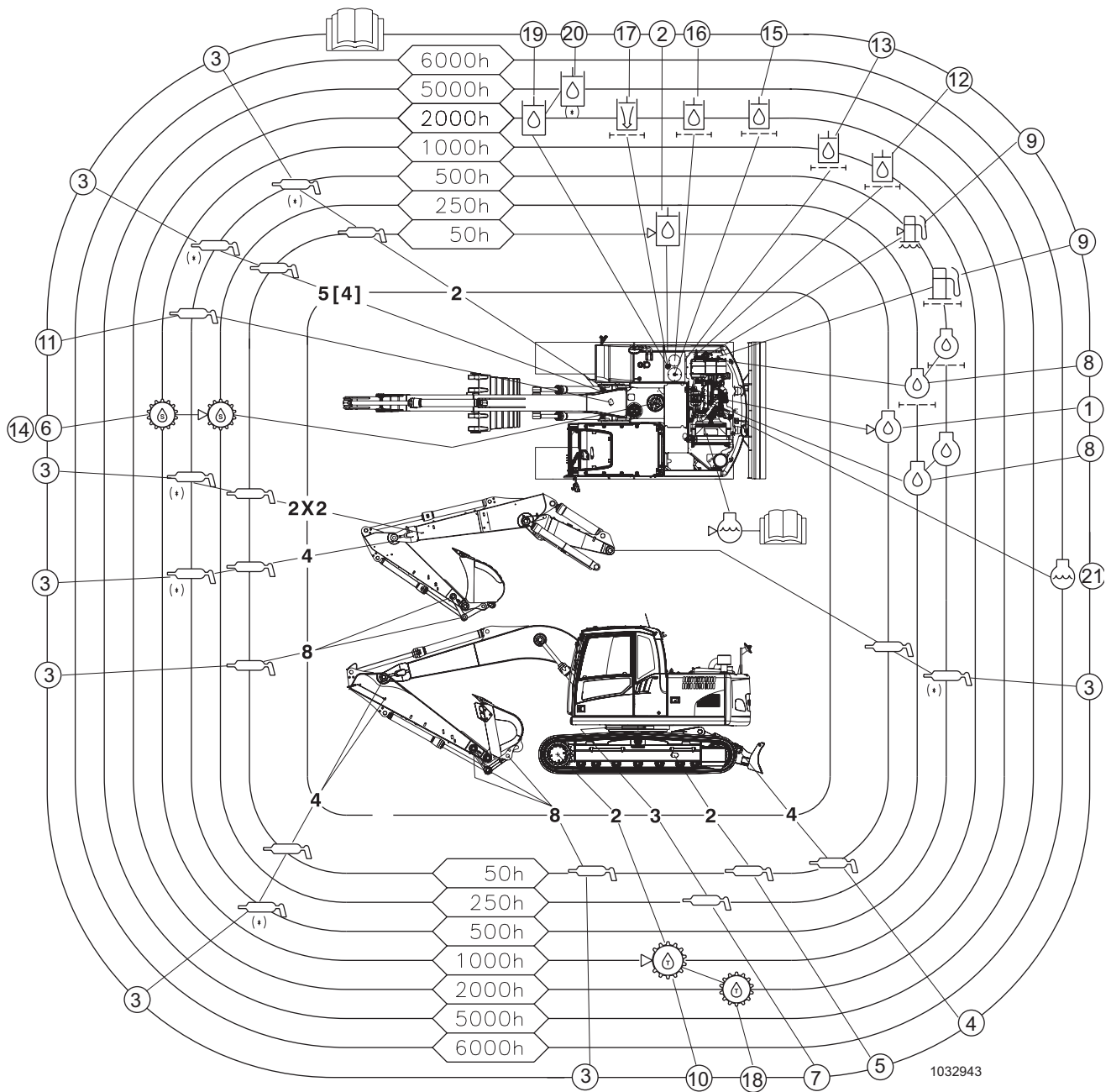
IMPORTANT! Wipe off the grease nipples and the grease gun before greasing, to avoid introducing sand and dirt particles with the grease.

Symbol key for "Lubrication and service chart"

These standard symbols are used in the Lubrication and service chart, see the adjacent table.

1 	2 	3 	4 Engine oil
4 	5 	6 	2 Grease lubrication
7 	8 	9 	3 Swing drive gear oil change
10 	11 	12 	4 Swing drive gear oil check
13 	14 	15 	5 Track drive gear oil check
16 	17 	18 	6 Track drive gear oil change
19 			7 Hydraulic oil
			8 Hydraulic oil level
			9 Hydraulic oil filter
			10 Hydraulic oil tank breather filter
			11 Fuel filter
			12 Water separator
			13 Engine, coolant
			14 Engine, coolant filter
			15 Engine coolant level
			16 Engine oil level
			17 Engine oil filter
			18 Operator manual
			19 Air cleaner filter

Lubrication and service chart



Measure	Item	Page
When required		
Check coolant level (according to the signal on I-ECU)		151
Check and drain water separator (according to the signal on I-ECU)		145
Drain sediment from fuel tank		144

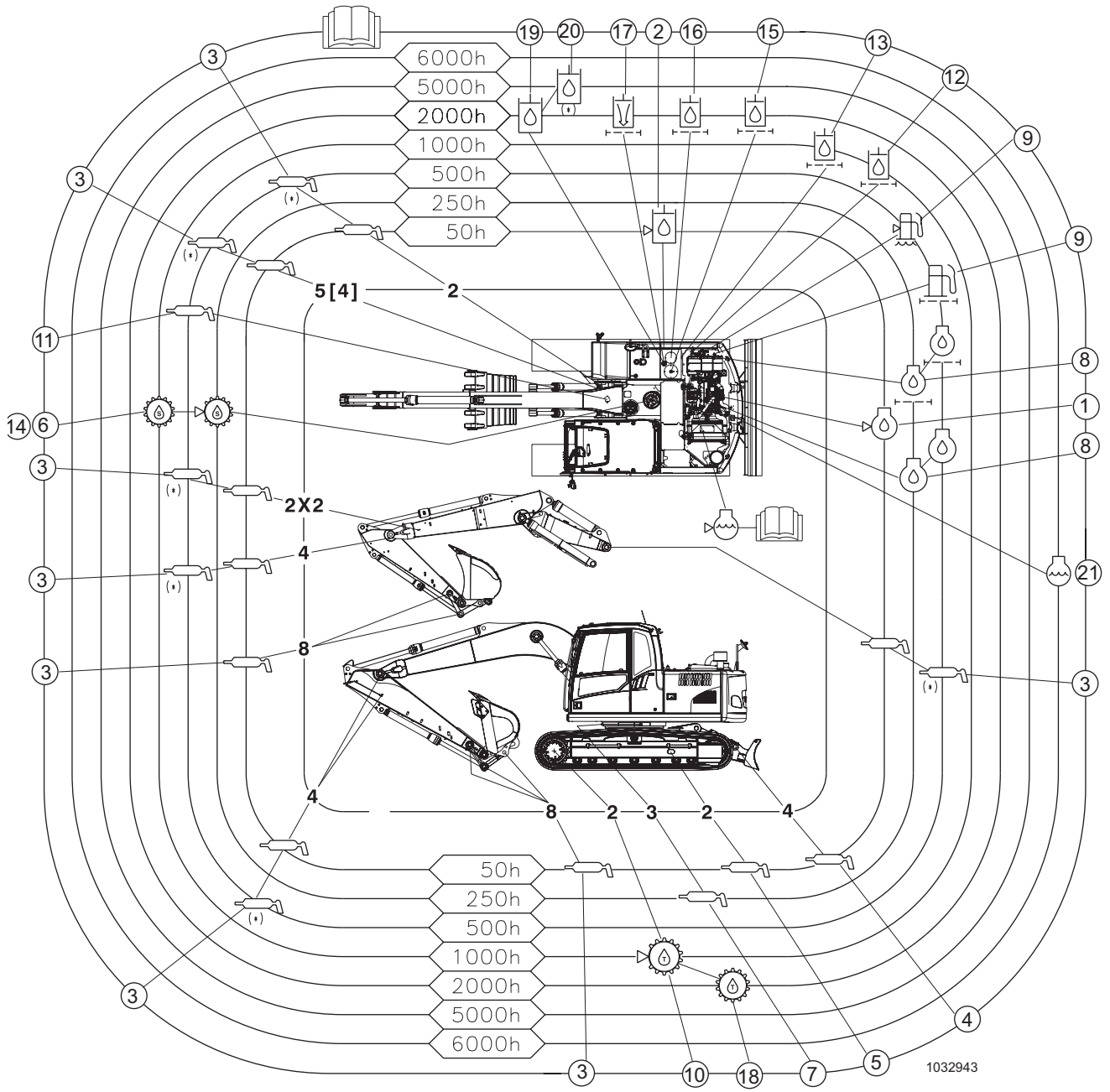
DAILY (every 10 hours)		
Check track shoe bolts		161
Check washer fluid level		163
Check belt tension for compressor		163

Every 50 hours		
Check engine oil level (or according to the signal on I-ECU)	1	141
Check hydraulic oil level	2	165
Lubricate attachment (500 hours with extended greasing bush)	3	172
Lubricate dozer blade unit	4	172
Lubricate recoil spring to adjust track tension	5	161

Every 100 hours after carrying out Daily and 50 hours services		
Check track tension		160

Every 250 hours after carrying out Daily, 50, 100 and 200 hours services		
Check battery electrolyte level		154
Check oil level of swing drive unit	6	158
Clean cab ambient filter		162
Lubricate swing gear bearing	7	159

Every 500 hours after carrying out Daily, 50, 100, 200 and 250 hours services		
Change engine oil and oil filter	8	142
Replace fuel filters	9	145
Check belt tension with auto tensioner		156
Clean the charge air cooler, radiator, hydraulic oil cooler and condenser fins (or when required)		150
Clean main filter of air conditioner		162



Measure	Item	Page
Every 1000 hours after carrying out Daily, 50, 100, 200, 250 and 500 hours services		
Check oil level of track drive unit	10	157
Check swing bath grease	11	159
Replace hydraulic pilot filter (first change : 500 hours)	12	168
Replace hydraulic drain filter (first change : 500 hours)	13	167
Change oil of swing drive unit (first change : 500 hours)	14	158

Every 2000 hours after carrying out Daily, 50, 100, 200, 250, 500 and 1000 hours services		
Check coolant content (or every year)		151
Clean suction strainer of hydraulic tank (or when required)	15	167
Replace hydraulic oil return filter (first change : 500 hours)	16	167
Change the primary filter of air cleaner (maximum 1 year) (Change the secondary filter every 3rd time primary filter is replaced or at least every 2 years.)		148 149
Replace cab ambient filter		162
Replace filter of airbreather in hydraulic tank	17	168
Replace filter of airbreather in fuel tank		146
Change oil of travel drive unit (first change : 500 hours)	18	157
Change hydraulic oil	19	166

Every 3000 hours after carrying out Daily, 50, 100, 200, 250, 500, 1000 and 2000 hours services		
Replace the main filter of air conditioner		162

Every 5000 hours after carrying out Daily, 50, 100, 200, 250, 500, 1000, 2000 and 3000 hours services		
Change hydraulic oil (Long life hydraulic oil)	20	166

Every 6000 hours after carrying out Daily, 50, 100, 200, 250, 500, 1000, 2000 and 3000 hours services		
Change coolant	21	152

178 Lubrication and service chart

Periodic replacement of critical parts for safety

To ensure safety at all times when operating or driving the machine, the operator of the machine must always carry out periodic maintenance. To further improve safety, the operator should also carry out periodic replacement of the parts given in the table.

These parts are closely connected to safety and fire prevention. With these parts, the material changes as time passes, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. It is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately. If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same time as the hoses. When replacing the hoses, always replace the O-rings, gaskets, and other related parts at the same time. Ask your Volvo CE dealer when replacing the critical parts for safety.

Inspection interval	Item
Daily	Fuel / hydraulic hose - leakage of connections and end fittings
Monthly	Fuel / hydraulic hose - leakage, damage of connections and end fittings
Yearly	Fuel / hydraulic hose - leakage, damage, deformity and aging of connections and end fittings

Safety critical parts for periodic replacement		Replacement interval	
Engine	Fuel hose	Every 2 years or 4000 hours, which occurs first	
	Heater hose		
	Turbocharger lubricating oil hose		
Hydraulics	Body		Pump, inlet hose
			Pump, outlet hose
			Swing line hose
	Attachments		Boom cylinder hose
			Arm cylinder line hose
			Bucket cylinder line hose
Seat belt		Every 3 years	

Maintenance under special environmental conditions

Conditions	Maintenance	Related page
Water or near the ocean	Before operating, check the tightness of plugs and all drain hoses and cocks.	
	After working, replenish the grease to the attachment pins or the areas affected by the water.	103
	When operating the machine, make sure to check and lubricate attachment points affected by water regularly.	
	After working near the ocean, clean the machine thoroughly with fresh water and service the electrical parts to prevent from corrosion. It is highly recommended to use dielectric grease in all harness connecting points for better sealing and to prevent corrosion.	
Freezing weather	After working, fill up the fuel tank to prevent water from condensing in the tank.	
	Use the recommended lubricants.	181
	Fully charge the batteries regularly, electrolyte may freeze. Ventilate well especially when the batteries are charged in a confined space.	
	When storing machines in extreme cold temperatures, remove batteries and store them at room temperature.	89
	Before parking, remove the mud and the dirt from the tracks.	
Demolition work	Use fall protection over the cab against falling objects.	105
Low fuel quality	Drain the sediments in fuel tank at shorter service intervals.	144
	Change the oil and oil filter at shorter service intervals.	182
Dusty atmosphere	Check regularly that hose and pipe connections from the air cleaner to the engine induction manifold do not leak.	138
	Clean the air filter at shorter service intervals.	148
	Clean the clogging net for radiator and oilcooler at shorter service intervals.	150
	Clean the areas on the machine where dust, chips and similar may collect at shorter service intervals in order to minimize the risk of fire.	138
	Pay attention to and clean the engine compartment and surrounding areas regularly.	139
Rocky ground	Use a suitable track for the ground conditions. If in doubt, contact your closest Volvo dealer for proper advice	119
	Use a suitable attachment for the ground conditions such as a heavy duty bucket.	
Hammer operation	Change the hydraulic oil and return filter of hammer circuit (if installed) at shorter service intervals.	166

Specifications Recommended lubricants

System	Oil grade	Recommended viscosity at varying ambient temperature									
		°C	-30	-20	-10	0	+10	+20	+30	+40	+50
		°F	-22	-4	+14	+32	+50	+68	+86	+104	+122
Engine	Engine oil see next page.	SAE5W-30									
		SAE 10W-30									
		*SAE 15W-40									
		SAE 30									
		SAE 40									
Track reduction gearbox	Gear oil (with EP additive) API GL4 or GL5	*SAE 90									
		SAE 140									
Swing gearbox	Gear oil (with EP additive) API GL4 or GL5	*SAE 90									
		SAE 140									
Swing ring gear (Bath and Ball)	Grease	Multi purpose EP-grease NLGI 2									
Hydraulic system	Hydraulic oil (Anti-wear hydraulic oil with high viscosity index 160 or more)	ISO VG32 HV									
		*ISO VG46 HV									
		ISO VG68 HV									
	Bio oil (based on synthetic ester)	Bio oil VG32									
		Bio oil VG46									
	Long life hydraulic oil	ISO VG32									
ISO VG46											
ISO VG68											
Pin and bushing	Grease (Multi purpose EP(Extreme Pressure) grease NLGI 2)	*ISO-L-XBCFB2									
Fuel	Diesel fuel	ASTM D975 No.1									
		*ASTM D975 No. 2									
Cooling system	Volvo Coolant VCS	Volvo Coolant VCS should be used only, see next page.									
Air conditioner system	Refrigerant	HFC R134a									
		°C	-30	-20	-10	0	+10	+20	+30	+40	+50
		°F	-22	-4	+14	+32	+50	+68	+86	+104	+122

* : Installed at factory.

NOTE! When starting the engine in an ambient temperature of lower than 0°C, be sure to use engine oil of SAE 5W-30, SAE 10W-30 and SAE 15W-40, even though the ambient temperature goes up to 10°C more or less in the day time.

NOTE! The fuel should at least meet the legal requirement, and national and international standards for marketed fuels, for example : EN590 (with nationally adapted temperature requirements), ASTM D975 No 1-D and No 2-D, JIS KK 2204.

NOTE! The content of Volvo coolant must not be less than 40% of the total mixture.

Engine oil

Oil grade	Sulphur content in the fuel		
	< 0.3 %	0.3 % ~ 0.5 %	> 0.5 %
	Oil changing interval		
Volvo Ultra Diesel Engine Oil or VDS-3 or VDS-2 + ACEA-E7 or VDS-2 + API CI-4 or VDS-2 + EO-N Premium plus	500 hour	250 hour	125 hour
VDS-2	250 hour	125 hour	75 hour
VDS + ACEA-E3 or ACEA : E7, E5, E4 or API : CI-4, CH-4, CG-4	125 hour	75 hour	50 hour

Coolant

Only use the Volvo Coolant VCS when filling and changing coolant. Do not mix different coolants or corrosion protection as this may result in engine damages. If using concentrated Volvo Coolant VCS and clean water, the mixture should contain 40–60% concentrated coolant and 60–40% clean water. The content of coolant must not be less than 40% of the total mixture, see table below.

Freeze protection down to	Content of concentrated coolant
–25 °C	40%
–35 °C	50%
–46 °C	60%

The concentrated Volvo Coolant VCS 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	Description	Value
Total number of solid particles	< 340 ppm	Silica	< 20 mg SiO ₂ /litre
Total hardness	< 9.5 ° dH	Iron	< 0.10 mg Fe/litre
Chloride	< 40 ppm	Manganese	< 0.05 mg Mn/litre
Sulphate	< 100 ppm	Electrical conductivity	< 500 µS/cm
pH value	5.5–9	Organic content, COD-Mn	< 15 mg/litre

If in doubt of the water's quality, use the ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant. Do not mix with other ready-mixed coolants as this may result in engine damages.

Hydraulic oil

Only Volvo genuine hydraulic oil approved by Volvo CE must be used. Do not mix different brands of hydraulic oil as this can lead to damage in the hydraulic system.

NOTE! For the hydraulic oil specification, see page 181.

	Ambient temperature											
	°C	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60
	°F	-40	-22	-4	+14	+32	+50	+68	+86	+104	+122	+140
Oil grade		(B)			(A)			(C)				
			(B)		(A)				(C)			
					(B)		(A)					

(A) : Ambient temperature recommended for general use of hydraulic system and components.

(B) : Ambient temperature guide for machine operation from a hydraulic oil viewpoint only, it does not guarantee the completion machine for other conditions like engine starting performance. In this range a warming-up period is needed to obtain proper performance.

(C) : Ambient temperature range to operate machine under special conditions, not a recommendation for general use conditions.

Additional recommendation for severe cold areas

A field solution for severe cold condition of ambient temperature between -40 °C and +20 °C.

Type : Anti-wear type hydraulic oil

Viscosity characteristic

Viscosity index : More than 130

Kinematic viscosity : Less than 5,000cSt at -40 °C, more than 5.6cSt at +90 °C

NOTE! This value is approximately equivalent to ISO Viscosity grade #22.

NOTE! It is minimum theoretical recommendation without the guarantee of machine condition.

Fuel quality requirements

The fuel should at least meet the legal requirements, national and international standards for marketed fuels, for example: EN590 (with nationally adapted temperature requirements), ASTM D 975 No 1-D and 2-D, JIS KK 2204.

Sulphur content

According to legal requirements (the sulphur content must not exceed 0.5 percent by weight).

Bio-diesel fuel

Vegetable oils and / or esters, also called "bio-diesel", (for example 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 of nitrogen oxide, (thereby not meeting legal requirements)
- Short 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 handing 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 a longer period

Warranty condition

The warranty does not cover damage caused by an intermix of more than 5% of bio-diesel fuel.

Recommended grease

Manufacturer	Product name	
	Recommendations	Alternatives*
VOLVO	Ultra Grease Moly EP 2	Super Grease Lithium EP 2
CALTEX	Molytex EP	Multifak EP2
GULF	Gulflex Moly EP	Gulfcrown EP2
EXXONMOBIL	Beacon EP2 Moly	Beacon EP2
SHELL	Retinax HDX2 / Alvania HDX2	Retinax EP2 / Alvania EP2
TOTAL	Multis MS2	Multis EP2
CASTROL	Pyro LM	Pyroplex Red

* Alternatives are not recommended when the ambient temperature is above 40 °C.

Mixability of types of grease with different additives

	Mixability of types of grease with additives					
	Lithium	Calcium	Lithium complex	Calcium complex	Aluminium complex	Clay
Lithium	√	√	√			
Calcium	√	√	√			√
Lithium complex	√	√	√	√		
Calcium complex			√	√		
Aluminium complex			√		√	
Clay		√			√	√

√: Acceptable

Service capacities and intervals

Change capacities

Oils and other liquids	Change capacities
Engine oil, including filter	16.5 litres (4.3 US gal.)
Coolant	21.3 litres (6 US gal.)
Hydraulic tank	95 litres (25.1 US gal.)
Hydraulic system, total	160 litres (42.4 US gal.)
Swing gearbox	3.8 litres (1 US gal.)
Track gearbox (each)	2.2 litres (0.6 US gal.)
Fuel tank	260 litres (69 US gal.)
Swing ring gear	9 litres (2.4 US gal.)

Intervals between filter replacements

Filter	Hours
Engine oil filter	500*
Fuel filter	500
Water separator	500
Air cleaner, primary filter	Every 1 year
Air cleaner, secondary filter	Every 2 years
Air conditioner / heater main filter	3000
Air conditioner / heater ambient filter	2000
Cartridge of drain filter, hydraulic system	1000**
Return oil filter, hydraulic system	2000**
Element of pilot filter, hydraulic system	1000**
Breather filter, fuel tank	2000
Breather filter, hydraulic tank	2000

*For conditions which have to be met, see **page 141**.

** First replacement : 500 hours.

Intervals between oil and liquid changes

Oil/liquid	Hours
Engine oil	500*
Oil bath precleaner oil	When required
Coolant	6000
Hydraulic oil	2000
Long life hydraulic oil	5000
Swing drive unit oil	1000**
Track drive unit oil	2000**

*For conditions which have to be met, see **page 141**.

** First replacement : 500 hours.

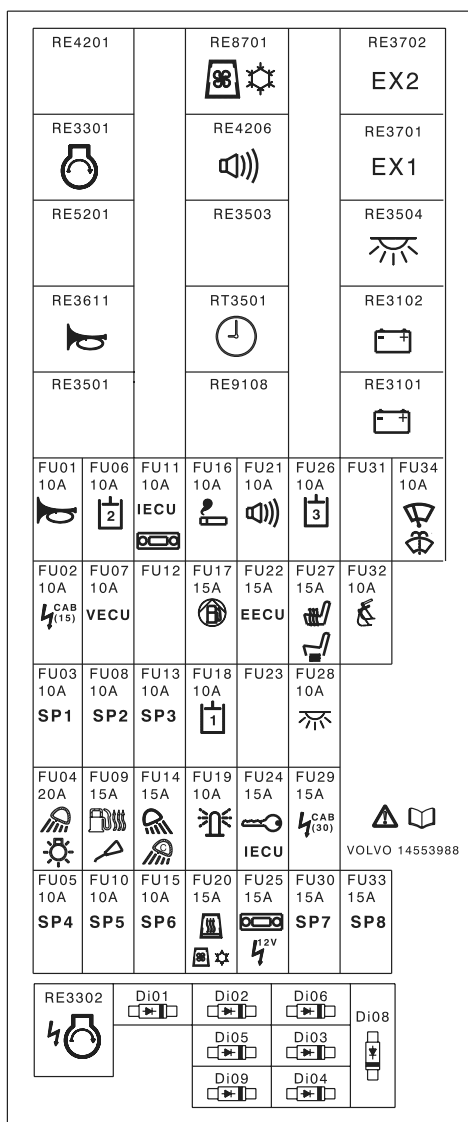
Engine, specifications

Make	Volvo D4E EBE3
Type	4-stroke, 6-cylinder, straight, water cooled, direct injection, diesel, turbocharged, inter cooled
Rated output (Net)	69 kW (92 hp) at 2000 rpm
Maximum torque	472 N m (354 lb ft) at 1600 rpm
Bore × Stroke	101 mm × 126 mm (3.98 in x 4.96 in)
Total displacement	4 litres (246 cu.in)
Compression ratio	18 : 1
Low idle (no load)	950 rpm
High idle (no load)	2100 rpm
Firing order	1-3-4-2
Lubrication	Forced circulation
Oil pressure max. warm engine, high idling speed	400–500 kPa
Oil pressure min. warm engine, low idling speed	60 kPa
Fuel injection type	DCR (Deutz Common Rail System)

Electrical system, specifications

System voltage	24 V
Starter	5.5 kW
Batteries	2 x 12 V

Alternator	28 V / 80 A
Horn sound level at 7 m	93 dB
Head light type	Halogen (70 W)



S87129

Decal on the electrical distribution box

No.	Capacity	Appliance / Circuit
RE3301 RE3302	Relay	Starter
RE3611	Relay	Horn
RE8701	Relay	Air conditioner
RE4206	Relay	Travel alarm
RE3501	Relay	Timer
RE3504	Relay	Interior light
RE3102	Relay	Main 1
RE3101	Relay	Main 2
FU01	10A	Horn
FU02	10A	Power outlet
FU03	10A	Spare
FU04	20A	Working light (Boom, deck)
FU05	10A	Spare
FU06	10A	Hydraulic option
FU07	10A	V-ECU
FU08	10A	Spare
FU09	15A	Water separator heater, Auto greasing
FU010	10A	Spare
FU011	10A	I-ECU
FU013	10A	Spare
FU014	15A	Working light (Cab, CWT)
FU015	10A	Spare
FU016	10A	Cigarette lighter
FU017	15A	Fuel filler pump
FU018	10A	Travel speed, boost, control lockout lever
FU019	10A	Rotating warning beacon
FU020	15A	Auxiliary heater, Air conditioner
FU021	10A	Travel alarm
FU022	15A	E-ECU
FU024	15A	Start switch / I-ECU
FU025	20A	Radio/Cassette, Power outlet
FU026	10A	X1 option / Boom float
FU027	15A	Seat heater, air suspended seat heater
FU028	10A	Interior light
FU029	15A	Auto greasing, Power outlet
FU030	15A	Spare
FU032	10A	X3 / Quick fit
FU033	15A	Spare
FU034	10A	Wiper & washer

Cab, specifications

Operator seat

This machine is equipped with an operator seat, which meets the criteria of EN ISO 7096.

Vibration and sound information

Hand-arm vibrations

Weighted root mean square (RMS) acceleration emission of the machine to which the arm are subjected for an 8 hours and at typical operating conditions of the machine equipped with mechanical suspension seat, is as follow. Measuring was carried out according to ISO 5349-1, ISO 5349-2 and ISO 8041 : 1990

- Excavating, mining (quarry), transfer movement and hydraulic breaker application is less than $2.5 \text{ m/s}^2 \text{ A}(8)$

Whole-body vibrations

Weighted root mean square (RMS) acceleration emission of the machine to which the body are subjected for an 8 hours and at typical operating conditions of the machine equipped with mechanical suspension seat, is as follow. Measuring was carried out according to ISO 2631-1 : 1997 and ISO 8041 : 1990

- Excavating, mining (quarry) and hydraulic breaker application is less than $0.5 \text{ m/s}^2 \text{ A}(8)$
- Transfer movement (traveling) is $0.5 \sim 0.9 \text{ m/s}^2 \text{ A}(8)$

NOTE! These whole body vibration values was determined at particular operating and terrain conditions and it is therefore not representative for the various conditions in accordance with the intended use of the machine. Consequently this whole body vibration emission value declared by the manufacturer in accordance with European Standard is not intended to determine the whole body vibration exposure to the operator using this machine.

To ensure that the whole-body vibration emission during machine use is kept to a minimum, see **page 98**.

Sound information

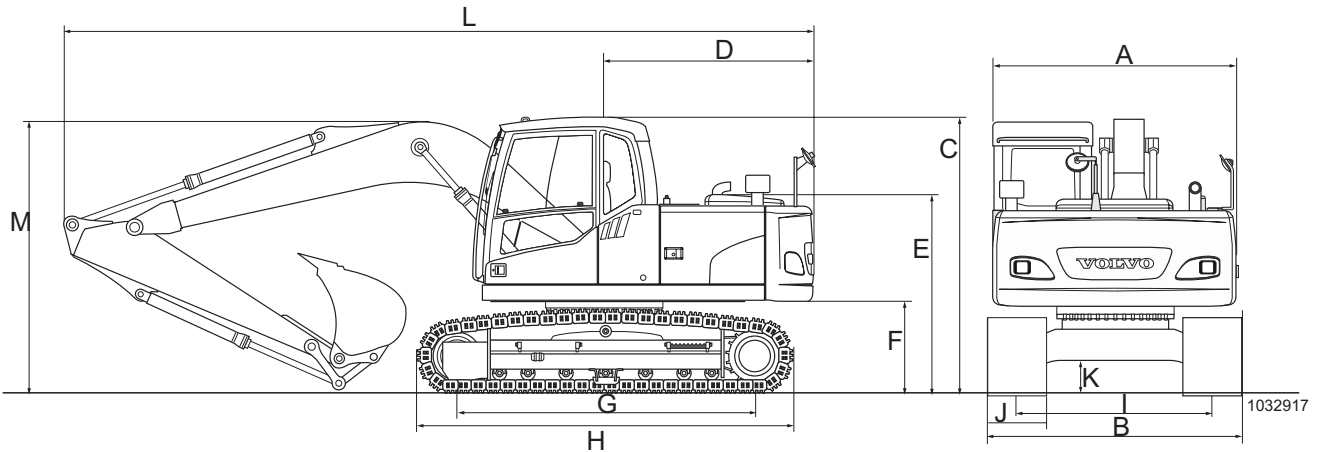
Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	70 LpA dB(A)
Sound power level (LwA) around the machine (Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)	100 LwA dB(A)

Hydraulic system, specifications

Main pump	
Model	K7V63DTP
Displacement	2 x 59 cc/rev
Type	Variable displacement axial piston pump
Pilot pump	
Displacement	10 cc/rev
Type	Gear pump
Relief pressure	3.9 MPa (40 kgf/cm ² , 569 psi)
Main control valve	
Model	BK22
Main relief pressure (STD / Boost pressure)	32.4 / 34.3 MPa (330 / 350 kgf/cm ² , 4694 / 4980 psi)
Port relief pressure	35.8 MPa (365 kgf/cm ² , 5190 psi) : (Boom/ Arm/ Bucket) 210 / 365 kgf/cm ² : (Option STD / High)
Control pedals	
Model	RCVD8C
Stroke	12.4 degree
Operating torque	108 kgf·cm (94 lbf·in)
Control levers	
Model	PV48K
Stroke	Forward and backward: 25 degree Right and left: 19 degree
Operating torque	Forward and backward: 25 kgf·cm (Semi-long) / 22.6 kgf·cm (Multi-SW) Right and left: 22.6 kgf·cm (Semi-long) / 20.6 kgf·cm (Multi-SW)

Track motor	
Model	TM22VC
Type	Variable swash plate, piston motor
Rated pressure	350 kgf/cm ² (4980 psi)
Brake type	Wet disc, spring applied, hydraulic released
Gear box, track motor	
Type	2-stage planetary
Swing motor	
Model	M2X63
Type	Fixed displacement piston motor with mechanical brake
Rated pressure	250 kgf/cm ² (3560 psi)
Gear box, swing motor	
Type	2-stage planetary

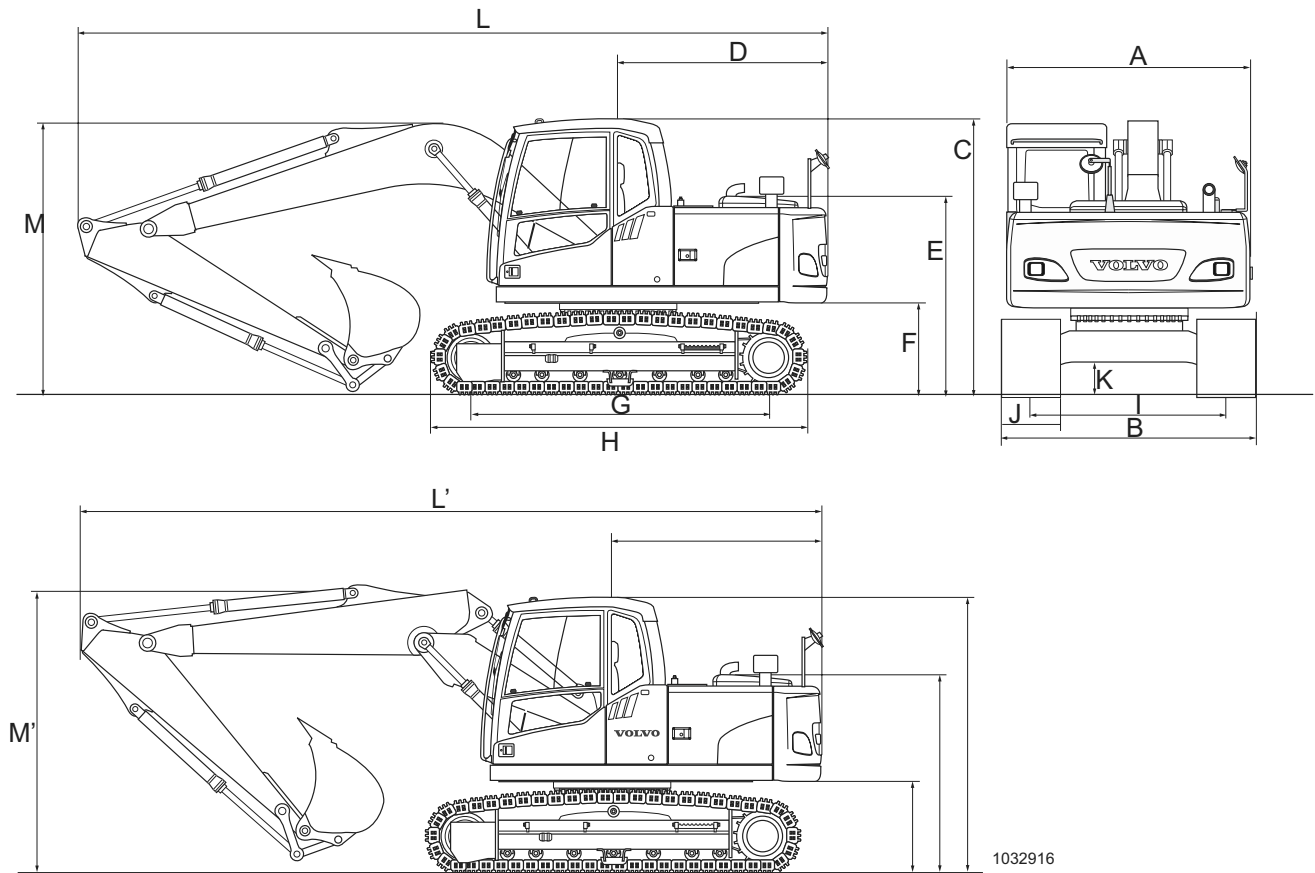
Dimensions



EC140C

Description	Unit	4.6 m (15' 1") Mono boom		
		2.1 m Arm 6' 11"	2.5 m Arm 8' 2"	3.0 m Arm 9' 10"
A. Overall width of superstructure	mm	2490 8' 2"	2490 8' 2"	2490 8' 2"
B. Overall width		2690 8' 10"	2690 8' 10"	2690 8' 10"
C. Overall height of cab		2800 9' 2"	2800 9' 2"	2800 9' 2"
D. Tail swing radius		2200 7' 2"	2200 7' 2"	2200 7' 2"
E. Overall height of engine hood		2020 6' 8"	2020 6' 8"	2020 6' 8"
F. *Counterweight clearance		920 3'	920 3'	920 3'
G. Tumbler length		2870 9' 5"	2870 9' 5"	2870 9' 5"
H. Track length		3590 11' 9"	3590 11' 9"	3590 11' 9"
I. Track gauge		1990 6' 6"	1990 6' 6"	1990 6' 6"
J. Shoe width		700 28"	700 28"	700 28"
K. *Min. ground clearance		436 1' 5"	436 1' 5"	436 1' 5"
L. Overall length		7700 25' 3"	7700 25' 3"	7580 24' 10"
M. Overall height of boom		2710 8' 11"	2830 9' 3"	3210 10' 6"

* Without shoe grouser

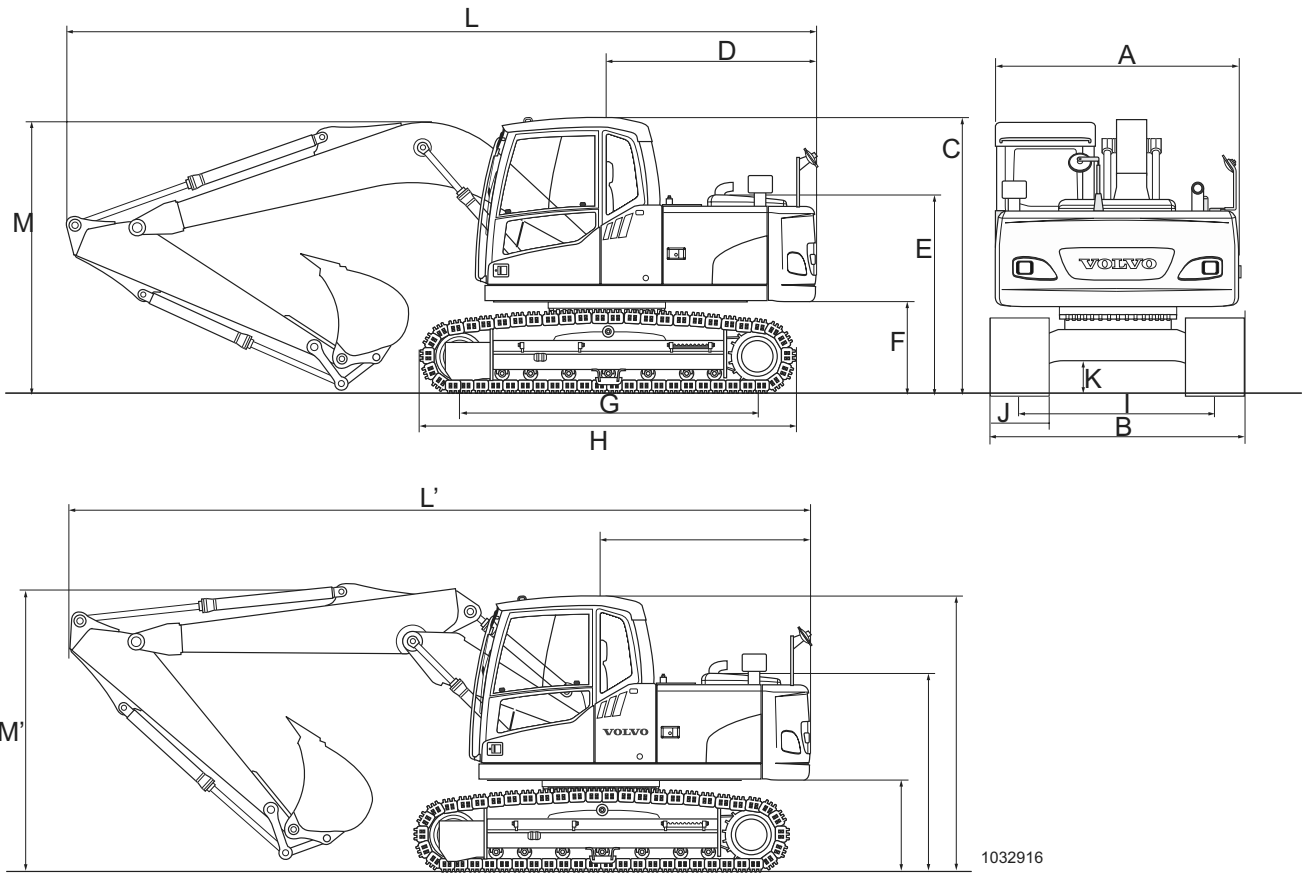


EC140CL

Description	Unit	4.6 m (15' 1") Mono boom and 2-piece boom		
		2.1 m Arm 6' 11"	2.5 m Arm 8' 2"	3.0 m Arm 9' 10"
A. Overall width of superstructure	mm	2490 8' 2"	2490 8' 2"	2490 8' 2"
B. Overall width		2590 8' 6"	2590 8' 6"	2590 8' 6"
C. Overall height of cab		2800 9' 2"	2800 9' 2"	2800 9' 2"
D. Tail swing radius		2200 7' 2"	2200 7' 2"	2200 7' 2"
E. Overall height of engine hood		2020 6' 8"	2020 6' 8"	2020 6' 8"
F. *Counterweight clearance		920 3'	920 3'	920 3'
G. Tumbler length		3040 9' 12"	3040 9' 12"	3040 9' 12"
H. Track length		3760 12' 4"	3760 12' 4"	3760 12' 4"
I. Track gauge		1990 6' 6"	1990 6' 6"	1990 6' 6"
J. Shoe width		600 24"	600 24"	600 24"

K. *Min. ground clearance	mm	436 1' 5"	436 1' 5"	436 1' 5"
L. Overall length		7700 25'3"	7700 25'3"	7580 24'10"
L'. Overall length		7680 25'2"	7620 25'0"	7380 24'3"
M. Overall height of boom		2710 8' 11"	2830 9' 3"	3210 10' 6"
M'. Overall height of boom		2720 8' 11"	2950 9' 8"	3350 10' 12"

* Without shoe grouser



1032916

EC140CLM

Description	Unit	4.6 m (15' 1") Mono boom and 2-piece boom		
		2.1 m Arm 6' 11"	2.5 m Arm 8' 2"	3.0 m Arm 9' 10"
A. Overall width of superstructure	mm	2490 8' 2"	2490 8' 2"	2490 8' 2"
B. Overall width		2690 8' 10"	2690 8' 10"	2690 8' 10"
C. Overall height of cab		2994 9' 10"	2994 9' 10"	2994 9' 10"
D. Tail swing radius		2200 7' 2"	2200 7' 2"	2200 7' 2"
E. Overall height of engine hood		2214 7' 3"	2214 7' 3"	2214 7' 3"
F. *Counterweight clearance		1113 3' 8"	1113 3' 8"	1113 3' 8"
G. Tumbler length		3000 9' 10"	3000 9' 10"	3000 9' 10"
H. Track length		3790 12' 5"	3790 12' 5"	3790 12' 5"
I. Track gauge		1990 6' 6"	1990 6' 6"	1990 6' 6"
J. Shoe width		700 28"	700 28"	700 28"

K. *Min. ground clearance	mm	580 1'11"	580 1'11"	580 1'11"
L. Overall length		7670 25' 2"	7680 25' 2"	7650 25' 1"
L'. Overall length		7700 25' 3"	7670 25' 2"	7490 24' 7"
M. Overall height of boom		2780 9' 1"	2900 9' 6"	3160 10' 4"
M'. Overall height of boom		2820 9' 3"	2990 9' 10"	3370 11' 1"

* Without shoe grouser

Ground pressure, EU

Standard undercarriage

Description	Shoe width (mm)	Boom (m)	Arm (m)	Bucket (kg)	Counter-weight (kg)	Operating weight (kg)	Ground pressure (kPa)
EC140C Triple grouser	500	4.6	3.0	444	2100	12760	40.2
	600					12840	33.3
	700					13050	29.4
	700 (HD)					13180	29.4
EC140CL Triple grouser	500	4.6	2.5	444	2450	13270	41.2
	600					13450	35.3
	600 (HD)					13540	35.3
	700					13670	30.4
	700 (HD)					13800	30.4
	750					13850	29.4

With dozerblade

Description	Shoe width (mm)	Boom (m)	Arm (m)	Bucket (kg)	Counter-weight (kg)	Operating weight (kg)	Ground pressure (kPa)
EC140CL Triple grouser	500	4.6	2.5	444	2450	14250	44.1
	600					14440	37.3
	600 (HD)					14530	38.2
	700					14660	32.4
	700 (HD)					14790	33.3
	750					14840	30.4

Ground pressure, North America

Standard undercarriage

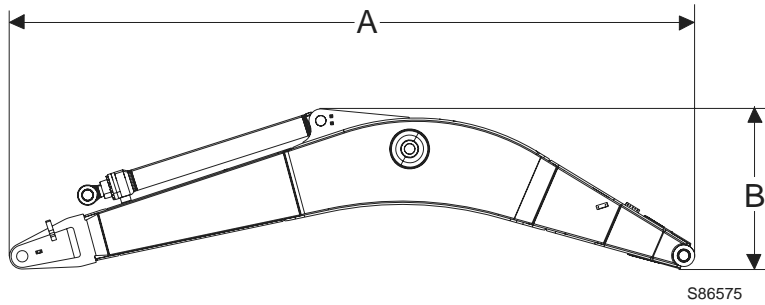
Description	Shoe width (mm/in)	Boom (m/ft-in)	Arm (m/ft-in)	Bucket (kg/lb)	Counter-weight (kg/lb)	Operating weight (kg/lb)	Ground pressure (kPa/psi)
EC140CL Triple grouser	500/20	4.6/ 15' 1"	2.5/ 8.2"	444/979	2100/4630	12750/28110	40.2/5.8
	600/24					12940/28530	34.3/5.0
	700/28					13160/29020	29.4/4.3
	750/30					13340/29410	27.5/4.0

With dozerblade

Description	Shoe width (mm/in)	Boom (m/ft-in)	Arm (m/ft-in)	Bucket (kg/lb)	Counter-weight (kg/lb)	Operating weight (kg/lb)	Ground pressure (kPa/psi)
EC140CL Triple grouser	500/20	4.6/ 15' 1"	2.5/ 8.2"	444/979	2100/4630	13740/30300	43.1/6.3
	600/24					13930/30720	36.3/5.3
	700/28					14150/31200	31.4/4.6
	750/30					14330/31600	30.4/4.4
EC140CLM Triple grouser	600/24	4.6/ 15' 1"	2.5/ 8.2"	444/979	2100/4630	14560/32100	38.2/5.5
	700/28					14770/32570	33.3/4.8
	800/31					15150/33410	29.4/4.3
	900/35					15380/33910	26.5/3.8

Components, specifications

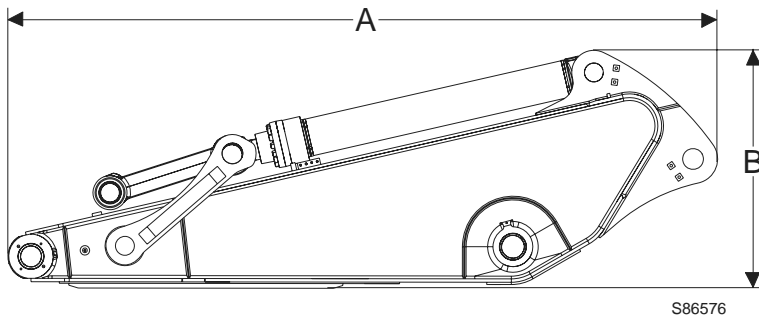
Boom



Description	Unit	4.6 m 15' 1" (mono boom)	4.6 m 15' 1" (2-piece boom)
Length (A)	mm ft in	4770 15' 8"	4765 15' 8"
Height (B)		1370 4' 6"	1225 4'
Width		545 1' 9"	545 1' 9"
Weight *	kg lb	1100 2430	1400 3090

* Includes cylinder, piping and pin

Arm



Description	Unit	2.1 m 6' 11"	2.5 m 8' 2"	3.0 m 9' 10"
Length (A)	mm ft-in	2800 9' 2"	3195 10' 6"	3690 12' 1"
Height (B)		710 2' 4"	675 2' 3"	750 2' 6"
Width	mm in	275 11"	275 11"	275 11"
Weight *	kg lb	555 1220	625 1380	685 1510

* Includes cylinder, linkage and pin

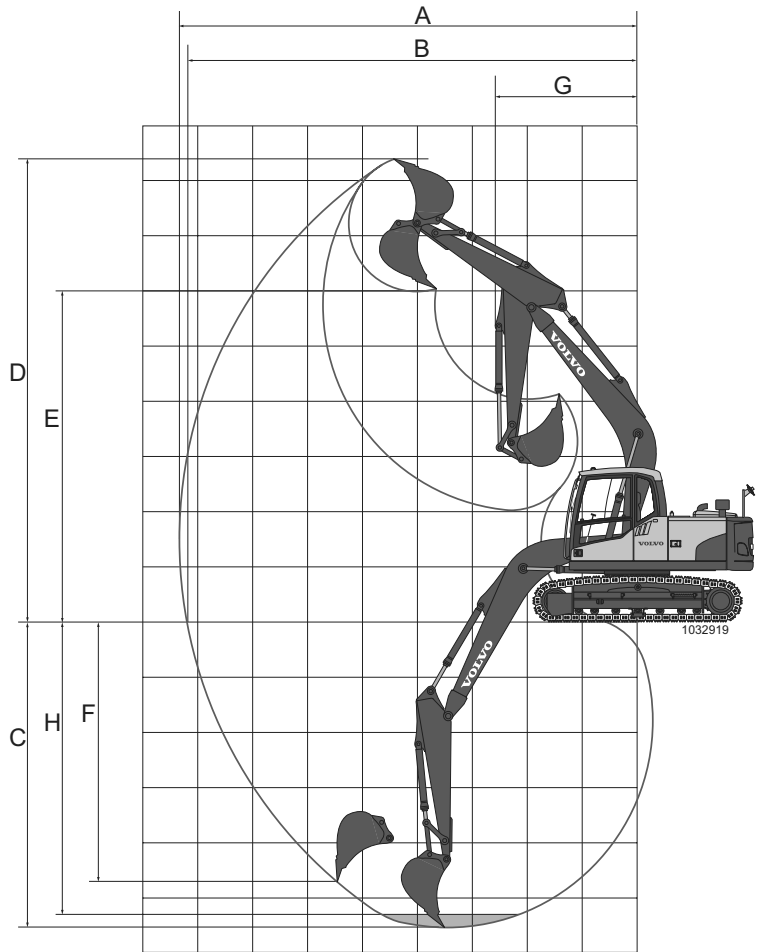
Digging forces with direct-fit bucket

EC140C/EC140CL/EC140CLM

Description		Unit	4.6 m (15' 1") Mono boom and 2-piece boom		
			2.1 m Arm 6' 11"	2.5 m Arm 8' 2"	3.0 m Arm 9' 10"
Bucket radius		mm in	1250 49"	1250 49"	1250 49"
Breakout force	Normal, SAE	kN (kg) lb	82.4 8400 18520	82.4 8400 18520	82.4 8400 18520
	Power boost, SAE		87.3 8900 19620	87.3 8900 19620	87.3 8900 19620
	Normal, ISO	kN (kg) lb	93.2 9500 20950	93.2 9500 20950	93.2 9500 20950
	Power boost, ISO		98.1 10000 22050	98.1 10000 22050	98.1 10000 22050
Tearout force	Normal, SAE	kN (kg) lb	69.6 7100 15660	61.8 6300 13890	54.9 5600 12350
	Power boost, SAE		73.5 7500 16540	65.7 6700 14770	58.8 6000 13230
	Normal, ISO	kN (kg) lb	71.6 7300 16100	63.7 6500 14330	56.9 5800 12790
	Power boost, ISO		75.5 7700 16980	67.7 6900 15210	59.8 6100 13450
Rotation angle, bucket		deg	174	174	174

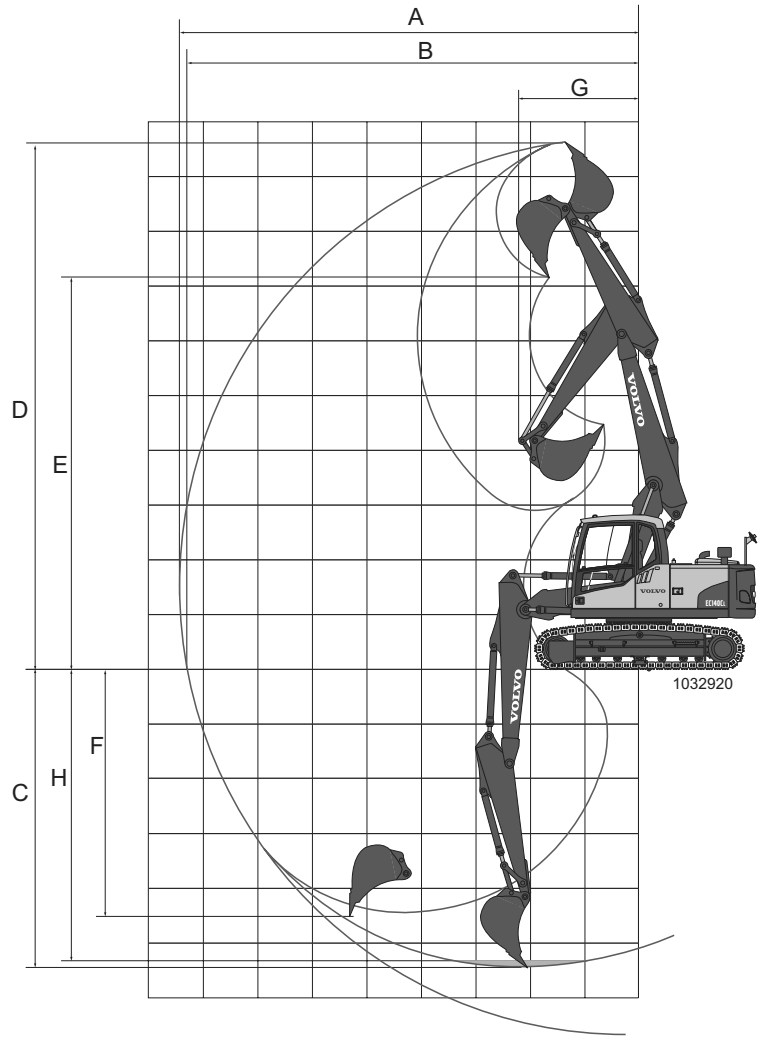
Working ranges

EC140C/EC140CL Mono boom



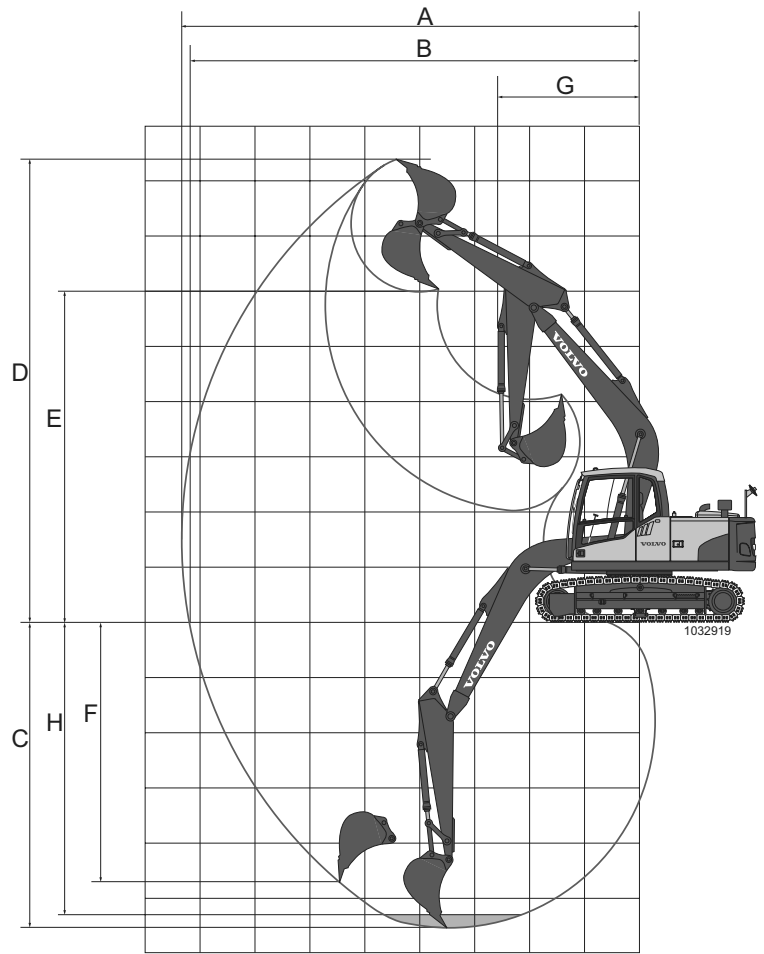
Description	Unit	4.6 m (15' 1") Mono boom					
		2.1 m dipper arm 6' 11"		2.5 m dipper arm 8' 2"		3.0 m dipper arm 9' 10"	
A Maximum digging reach	mm ft in	7960	26' 1"	8330	27' 4"	8820	28' 11"
B Maximum digging reach on ground		7810	25' 7"	8190	26' 10"	8690	28' 6"
C Maximum digging depth		5130	16' 10"	5530	18' 2"	6030	19' 9"
D Maximum cutting height		8160	26' 9"	8390	27' 6"	8740	28' 8"
E Maximum dumping height		5740	18' 10"	5980	19' 7"	6320	20' 9"
F Maximum vertical wall digging depth		4580	15'	4960	16' 3"	5500	18' 1"
G Minimum front swing radius		2570	8' 5"	2630	8' 8"	2840	9' 4"
H Maximum digging depth (8° level)		4870	15' 12"	5310	17' 5"	5850	19' 2"

EC140C, EC140CL 2-piece boom



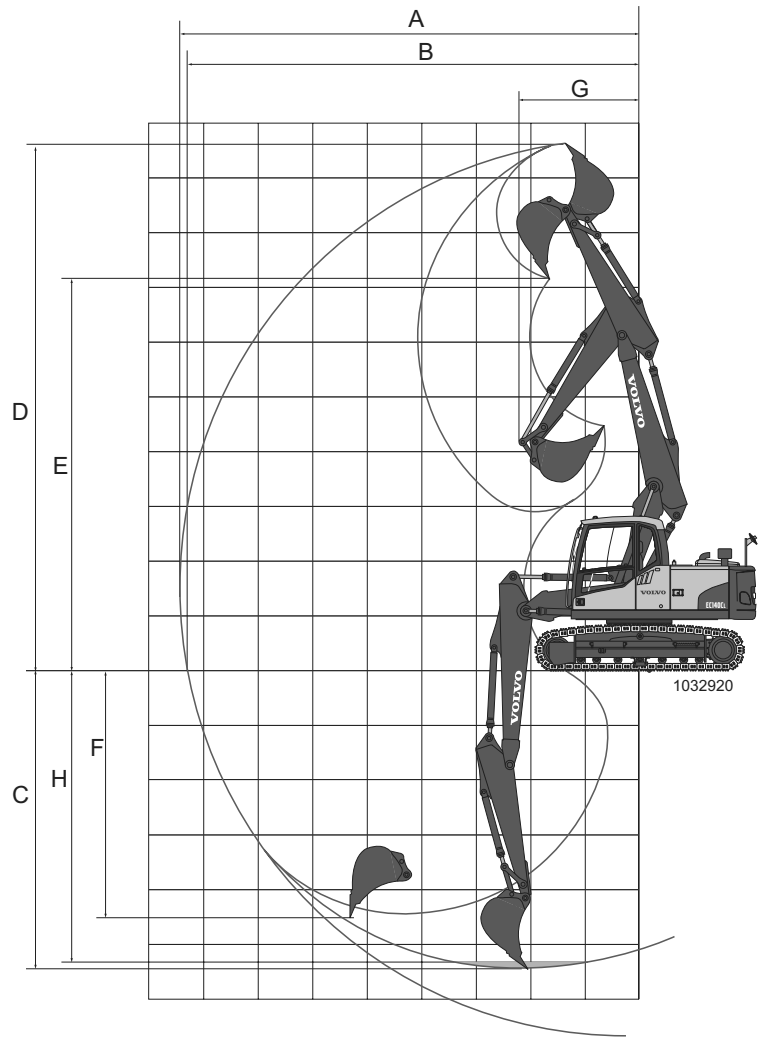
Description	Unit	4.6 m (15' 1") 2-piece boom					
		2.1 m dipper arm 6' 11"		2.5 m dipper arm 8' 2"		3.0 m dipper arm 9' 10"	
A Maximum digging reach	mm ft in	8050	26' 5"	8440	27' 8"	8930	29' 4"
B Maximum digging reach on ground		7910	25' 11"	8300	27' 3"	8800	28' 10"
C Maximum digging depth		5050	16' 7"	5450	17' 11"	5950	19' 6"
D Maximum cutting height		9250	30' 4"	9610	31' 6"	10080	33' 1"
E Maximum dumping height		6790	22' 3"	7150	23' 5"	7630	25' 0"
F Maximum vertical wall digging depth		4290	14' 1"	4680	15' 4"	5180	16' 12"
G Minimum front swing radius		1960	6' 5"	2210	7' 3"	2640	8' 8"
H Maximum digging depth (8' level)		4930	16' 2"	5340	17' 6"	5850	19' 2"

EC140CLM Mono boom



Description	Unit	4.6 m (15' 1") Mono boom		
		2.1 m dipper arm 6' 11"	2.5 m dipper arm 8' 2"	3.0 m dipper arm 9' 10"
A Maximum digging reach	mm ft in	7960 26' 1"	8330 27' 4"	8820 28' 11"
B Maximum digging reach on ground		7770 25' 6"	8150 26' 9"	8650 28' 5"
C Maximum digging depth		4940 16' 2"	5340 17' 6"	5840 19' 2"
D Maximum cutting height		8350 27' 5"	8590 28' 2"	8930 29' 4"
E Maximum dumping height		5940 19' 6"	6170 20' 3"	6510 21' 4"
F Maximum vertical wall digging depth		4380 14' 4"	4770 15' 8"	5310 17' 5"
G Minimum front swing radius		2570 8' 5"	2630 8' 8"	2840 9' 4"
H Maximum digging depth (8' level)		4680 15' 4"	5110 16' 9"	5650 18' 6"

EC140CLM 2-piece boom



Description	Unit	4.6 m (15' 1") 2-piece boom					
		2.1 m dipper arm 6' 11"		2.5 m dipper arm 8' 2"		3.0 m dipper arm 9' 10"	
A Maximum digging reach	mm ft in	8050	26' 5"	8440	27' 8"	8930	29' 4"
B Maximum digging reach on ground		7870	25' 10"	8260	27' 1"	8760	28' 9"
C Maximum digging depth		4860	15' 11"	5260	17' 3"	5760	18' 11"
D Maximum cutting height		9440	30' 12"	9800	32' 2"	10280	33' 9"
E Maximum dumping height		6980	22' 11"	7340	24' 1"	7820	25' 8"
F Maximum vertical wall digging depth		4100	13' 5"	4480	14' 8"	4990	16' 4"
G Minimum front swing radius		1960	6' 5"	2210	7' 3"	2640	8' 8"
H Maximum digging depth (8' level)		4740	15' 7"	5140	16' 10"	5650	18' 6"









Lifting capacity

EC140C

Shoe: 700 mm, counterweight: 2100 kg

At the dipper arm end, without bucket.

For lifting capacity including bucket, simply subtract actual weight of bucket from the values.



	Lifting point	1.5 m		3 m		4.5 m		6 m		7.5 m		Max. Reach									
																		Max.			
		kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	m	ft
Boom: 4.6m GP Dipper arm: 2.1m	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	*4780	*10537	*4780	*10537	9310	20524	5470	12059	4620	10185	2960	6525	-	-	-	-	-	-	-	-
-3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Boom: 4.6m GP Dipper arm: 2.5m	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	*4400	*9700	*4400	*9700	*9280	*20458	5500	12125	4650	10251	2990	6591	3050	6724	2010	4431	-	-	-	-
-3 m	*8610	*18981	*8610	*18981	*8680	*19135	5590	12323	4690	10339	3030	6679	-	-	-	-	-	-	-	-	
-4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Boom: 4.6m GP Dipper arm: 3.0m	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	*3820	*8421	*3820	*8421	*8390	*18496	5410	11926	4600	10141	2940	6481	3000	6613	1960	4321	-	-	-	-
-3 m	*7060	*15564	*7060	*15564	*9080	*20017	5460	12037	4600	10141	2940	6481	3030	6679	1990	4387	-	-	-	-	
-4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

1032179

Working pressure with Power Boost = 36 MPa

The above values are in compliance with ISO standard 10 567. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load, with the machine on firm, level ground.

Load capacities marked with an asterisk (*) are limited by machine's hydraulic lifting capacity rather than tipping load.

 :Across undercarriage,  :Along undercarriage, H : Lifting hook related to ground level

Specifications












208 Lifting capacity

EC140CL

Shoe: 500 mm, counterweight: 2450 kg

At the dipper arm end, without bucket.

For lifting capacity including bucket, simply subtract actual weight of bucket from the values.

	Lifting point	1.5 m				3 m				4.5 m				6 m				7.5 m				Max. Reach				
																								Max.		
		kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	m
Boom: 4.6m GP Dipper arm: 2.1m	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	4790	*10560	4790	*10560	9350	*20613	5890	12985	5340	11773	3200	7055	-	-	-	-	-	-	-	-	-	-	-	-	-
	-3 m	-	-	-	-	8140	*17945	6020	13272	5420	11949	3280	7231	-	-	-	-	-	-	-	-	-	-	-	-	-
Boom: 4.6m GP Dipper arm: 2.5m	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	4390	*9678	4390	*9678	9280	*20458	5840	12875	5310	11706	3180	7011	3460	7628	2140	4718	-	-	-	-	-	-	-	-	-
	-3 m	8600	*18959	8600	*18959	8620	*19003	5930	13073	5350	11795	3210	7077	-	-	-	-	-	-	-	-	-	-	-	-	-
Boom: 4.6m GP Dipper arm: 3.0m	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-1.5 m	3810	*8399	3810	*8399	8390	*18496	5750	12676	5260	11596	3130	6900	3410	7518	2090	4608	-	-	-	-	-	-	-	-	-
Boom: 2-pcs 4.6m Dipper arm: 2.1m	-3 m	7050	*15542	7050	*15542	9020	*19885	5800	12787	5270	11618	3130	6900	3440	7584	2120	4674	-	-	-	-	-	-	-	-	
	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boom: 2-pcs 4.6m Dipper arm: 2.5m	-1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boom: 2-pcs 4.6m Dipper arm: 3.0m	-1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1.5 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1032925

Working pressure with Power Boost = 36 MPa

The above values are in compliance with ISO standard 10 567. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load, with the machine on firm, level ground.

Load capacities marked with an asterisk (*) are limited by machine's hydraulic lifting capacity rather than tipping load.



:Across undercarriage,



:Along undercarriage, H : Lifting hook related to ground level

Service history

Service 100 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Warranty inspection	

Service 500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 1000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Warranty inspection <input type="checkbox"/> Service and maintenance	

Service 1500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 2000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 2500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 3000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 3500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 4000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 4500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 5000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 5500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 6000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 6500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 7000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 7500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 8000 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

Service 8500 hours		Type of service	Signature and stamp
Date	Hours	<input type="checkbox"/> Service and maintenance	

214 Service history

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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