

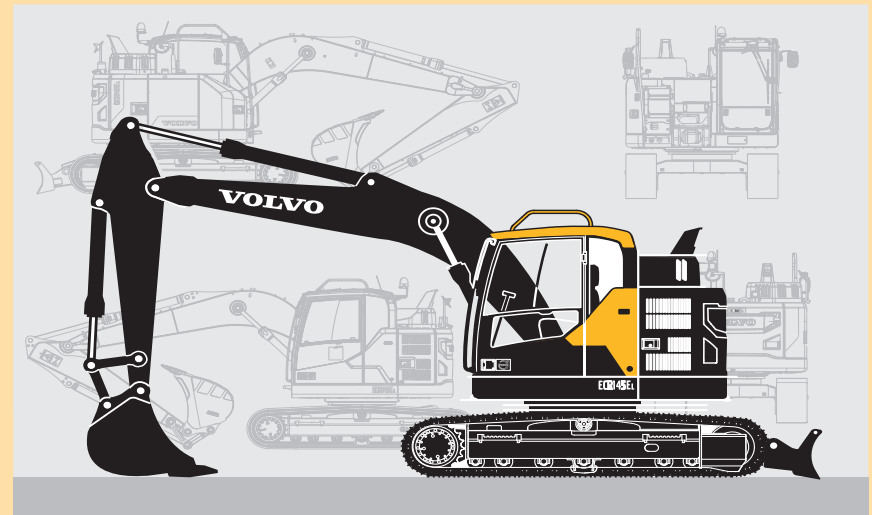


VOLVO CONSTRUCTION EQUIPMENT

operator's manual

# ECR145E

ECR145E



**VOLVO**  
Volvo Construction Equipment

Ref. No. 20043282-B English  
2016.12  
Volvo, Pyongtaek

English





# ECR145E

## Foreword

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

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

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

### NOTE!

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

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

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

## OPERATOR'S MANUAL

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## Safety regulations

The machine operator is responsible for being aware of and complying with the relevant, legally prescribed, national and regional safety instructions. The safety instructions in this operator's manual are applicable only in cases where no legislated safety instructions are in force.

### **DANGER**

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

### **WARNING**

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

### **CAUTION**

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

### **NOTICE**

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

### **NOTE!**

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

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



## Identification numbers

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.

<b>Manufacturer:</b>	Volvo Construction Equipment Korea LTD. 160, Doosanvolvo-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
Machine PIN (Serial number)	
Engine	
Main pump	
Swing motor	
Track motor	
Main control valve	

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



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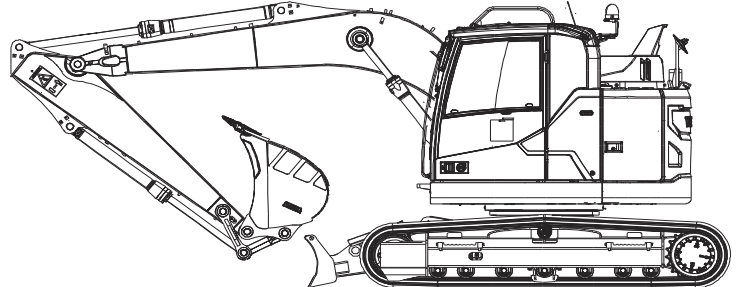
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## Presentation



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### 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, flammable environment or areas with dust containing asbestos and so on, special safety regulations must be followed and the machine be equipped for such use. Contact the manufacturer / dealer for further information.

### Environmental requirements

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

### Engine

The machine is equipped with a straight four-cylinder, four-stroke, turbocharged diesel engine with direct injection and charge-air cooler.

Engines for the US market meet US Tier 4 Final and California Tier 4 Final emission requirements.

Engines for the EU market meet EU Stage IV emission requirements.

#### **NOTE!**

Machines with engines for the US market may not be sold or used within the EU, and machines with engines for the EU market may not be sold or used within the USA, unless the engine is replaced with an engine valid for the applicable market. The market for which the engine is intended is indicated on the emission plate and by the engine's serial number (see page 26).



In order to reduce nitrogen oxides, particles, hydrocarbons and carbon monoxide, the engine includes external, cooled exhaust gas recirculation (EGR) and an exhaust aftertreatment system (EATS) with AdBlue®/DEF injection.

The exhaust aftertreatment system is a certified spark arrestor in accordance with Directive 97/68/EC and EN 1834.

### **AdBlue®/DEF information**

AdBlue®/DEF is needed for the reduction of nitrogen oxides (NOx). AdBlue®/DEF is filled in a separate tank on the machine that is completely separate from the fuel tank. AdBlue®/DEF must not be mixed into the diesel tank and diesel must not be mixed into the AdBlue®/DEF.

**For distribution of AdBlue®/DEF (only valid for US market):**

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

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

**See page 283 for information about filling AdBlue®/DEF.**



## Exhaust aftertreatment system

The engine features an exhaust aftertreatment system (EATS) in the form of two mufflers. The first one contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF) to reduce emissions of particulate matter (PM). The second one contains a selective catalytic reduction catalyst (SCR) to reduce nitrogen oxide (NO<sub>x</sub>) emissions. AdBlue®/DEF is injected into the exhausts in order to reduce NO<sub>x</sub>.

The DPF traps particles from the engine exhausts and, since it is continuously loaded with these particles from the exhausts, it needs to be regenerated in order to burn off the particles. Regeneration is also required to release trapped sulphur (SO<sub>2</sub>) and other substances that are trapped in the SCR and reduce the SCR's efficiency if they are not removed.

In order to ensure reduction of NO<sub>x</sub>-emissions, the EATS is monitored by the aftertreatment control module (ACM).

For more information, see page 166.



## 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

Automatic idling system reduces engine speed to idle when the levers and pedals are not activated for a certain period of time, resulting in less fuel consumption and low cab noise level.

## Automatic engine shut-down system

### (Optional equipment)

Automatic engine shut-down system is to stop the engine automatically when the machine is not operated for a certain period of time. Default time is set at 5 minutes and can be changed with Volvo's service tool only. Contact a workshop authorized by Volvo.

### Automatic engine shut-down conditions

- Control lockout lever is down.
- Engine speed control switch is not changed.
- DPF regeneration is not on progress.

1 minute before engine shut-down, info screen will be displayed on IC (Instrument Cluster) so that the operator can cancel engine shut-down by pushing the keypad ESC button or moving the control lockout lever up or changing engine speed control switch (at the control lockout lever down position).



## 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 8 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.



## FOPS and FOG

The cab is designed to meet the requirements for falling objects, the weight of which agrees with testing methods according to FOPS and FOG.

The cab is approved as a part of protective structure according to FOPS and FOG standards. (FOPS: ISO3449 (Level II), FOG: ISO10262:1998 (Level II) and SAE J1356)

FOPS is an abbreviation of Falling Object Protective Structure (top guard) and FOG is an abbreviation of Falling Object Guard (top guard and front guard).

## ROPS

The cab is approved as a part of protective structure according to ROPS standard (ISO12117-2).



## Hydraulic system

The hydraulics system, combined with the fully electronic control system and advanced ECO mode, has been optimized to work in harmony with engine to match the engine power, reduce power loss and improve controllability and response time.

- 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 dipper arm holding valves are provided to minimize cylinder drifting while holding loads.





## Track motor and gearbox

Each track is powered by an automatic two-speed shift travel motor. The track brakes are multi-disc, spring-applied and hydraulic released. The travel motor, brake and planetary gears are well protected within the track frame.

## Swing system

The swing system uses an axial piston motors, driving a planetary gearbox for maximum torque. An automatic holding brake and anti rebound valve are standard

## Equipment

The machine can be equipped with different types of optional equipment, depending on the requirements of different markets. Examples of such equipment are automatic engine shutdown, and automatic lubricating system (standard on certain markets).

## Modifications

Modifications to the machine, including use of unauthorized accessories and spare parts, may affect the machine's condition and its ability to function as it was designed. No changes of any kind may be performed without first obtaining written approval from Volvo Construction Equipment. Volvo Construction Equipment reserves the right to refuse all warranty claims that have resulted due to or can be attributed to unauthorized modifications.

The person who performs unauthorized modifications assumes all responsibility for consequences that arise due to the modification or can be attributed to the modification, including damage to the machine.

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

- 1 The attachment, the accessory, or the spare part has been made or distributed by Volvo Construction Equipment and has been installed according to approved method described in a publication available from Volvo Construction Equipment; or



- 
- - 2 The modification has been approved in writing by the Engineering Department at each product company within Volvo Construction Equipment.



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

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

### **Logged machine data**

The machine is equipped with a software system, 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**

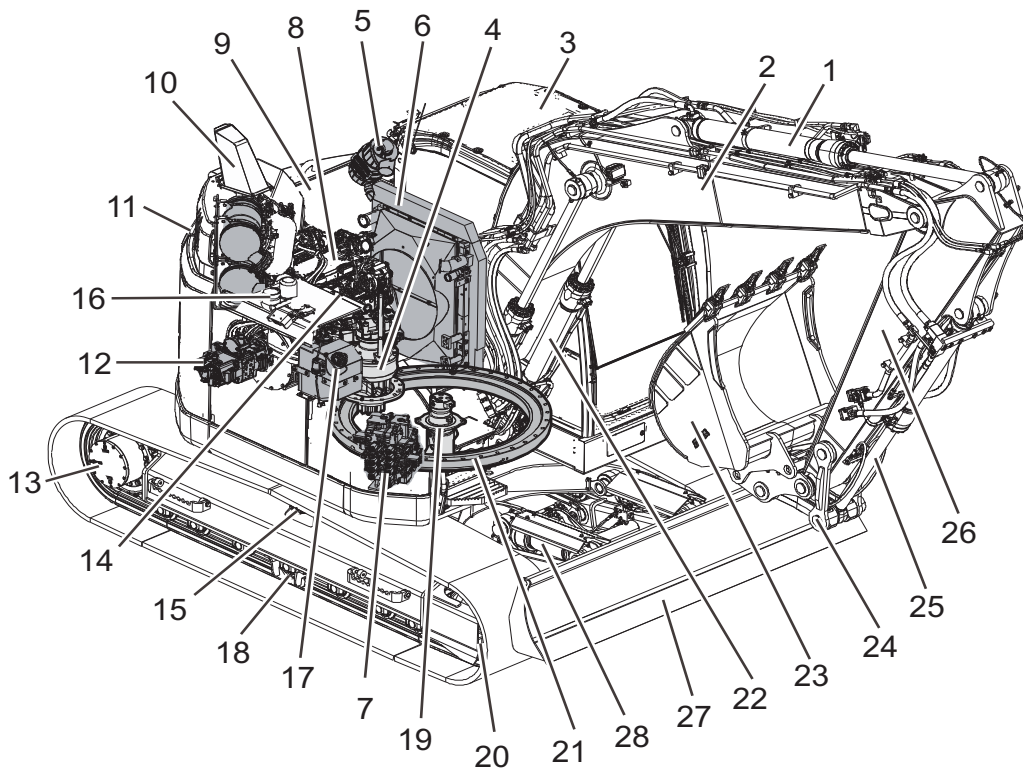
The machine may be equipped with CareTrack, a telematics system developed by Volvo Construction Equipment. The system stores machine data, e.g., machine position, operating hours, fuel consumption, fuel level, that can be sent by wireless transmission to a computer. CareTrack is available in different versions, depending on the required information level.

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

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

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

## Machine view



V1154316

1	Dipper arm cylinder	15	Top roller
2	Boom	16	Fuel tank
3	Operator cab	17	AdBlue®/DEF tank
4	Swing motor and gearbox	18	Bottom roller
5	Air cleaner	19	Turning joint
6	Charge air cooler, hydraulic oil cooler, and radiator	20	Idler
7	Main control valve	21	Swing ring gear
8	Engine	22	Boom cylinder
9	Rear hood	23	Bucket
10	Muffler	24	Link
11	Counterweight	25	Bucket cylinder
12	Main pump	26	Dipper arm
13	Track motor and gearbox	27	Dozer blade
14	Hydraulic tank	28	Dozer blade cylinder



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## 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, 2006/42/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", 2014/30/EC, provides a general description of what demands can be made on the machine out of a safety point of view, where permitted limits have been determined and given according to international standards.

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

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

## Declaration of Conformity

Below you find a generic copy of the Declaration of Conformity.

### NOTE!

The Declaration of Conformity is only applicable in the European Union.

### EC DECLARATION OF CONFORMITY FOR MACHINERY (IIA)

Volvo Construction Equipment, 160, Doosanvolvo-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea hereby declares that the product:

Make: Volvo Construction Equipment

Type: Hydraulic Excavator

Model: ECXXXX/EWXXXX/ECRXXXX/FCXXXX

Product Identification Number (PIN): VCEXXXXXXXXXXXXXXXX

Harmonized standards applied:

EN 474-1:2006 +A1:2009 Earth Moving machinery - Safety Part 1: General requirements,  
EN 474-5:2006+A1:2009 Earth Moving machinery - Safety Part 5: Requirements for hydraulic excavators.

to which this declaration relates, is in conformity with the Essential Health and Safety requirements of the:

Council Directive 2006/42/EC relating to Machinery,

Council directive 2000/14/EC relating to Noise Emission in the Environment by equipment for use out doors

Council directive 2014/30/EC on electromagnetic compatibility, and their Amendments relating to machinery, and other applicable Directives.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user



Signature of authorized issuer and person authorized to compile the technical file established in the community:

.....  
Signature / block capitals

.....  
Position or title

.....  
Address and Date of issue

Signature of authorized issuer on behalf of manufacturer (only if applicable)

.....  
Signature / block capitals

.....  
Position or title

.....  
Address and Date of issue

Signature of authorized representative in the Community empowered to complete the manufacturing process and draw up declaration of conformity of the manufacturer (only if applicable)

.....  
Signature / block capitals

.....  
Position or title

.....  
Address and Date of issue

This declaration includes attachments developed designed/approved, marked and marketed by above-mentioned manufacturer.

**The owner of the machine must retain this Declaration for at least ten years after delivery.**





24 Presentation  
CE-marking, EMC-directive

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**EC Declaration of Conformity relating to the noise emission in the environment by equipment used out; 2000/14/EC**

I, the undersigned Wisoo Suk (First name and Surname) hereby declare that construction equipment specified hereunder in positions 1-9 has been manufactured in conformity with EC type examination as shown below.

- 1 Manufacturer: Volvo Construction Equipment, 160, Doosanvolvo-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea
- 2 Category: Hydraulic Excavator
- 3 Make: Volvo Construction Equipment
- 4 Type: ECXXXX/ECRXXXX/EWXXXX/FCXXXX
- 5 Net installed power: XXXkW
- 6 Original technical documentation is kept by the Notified Body, 1067; AV Technology Ltd., AVTECH House, Birdhall Lane, Cheadle Heath, Stockport. SK3 0XU, UK.
- 7 Product Identification Number (PIN): VCECXXXXXXXXXXXXXX
- 8 Year of manufacture: XXXX
- 9 Sound values and separate directives
  - Machine type: XXXXXX
  - Measured sound power value, in dB(A): XXX
  - Guaranteed sound power value, in dB(A): XXX

The Volvo EC/ECR/EW/FCXXXX conforms to directive 2000/14/EC Annex VI Internal control of production with assessment of technical documentation and periodical checking, under the supervision of the Notified Body 1067

Manufactured at: Volvo Construction Equipment, 160, Doosanvolvo-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Korea

.....  
Place and Date

.....  
Signature

## Communication equipment, installation

### **NOTICE**

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

### **Protection against electromagnetic interference**

This machine has been tested in accordance with EU directive 2014/30/EC 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.

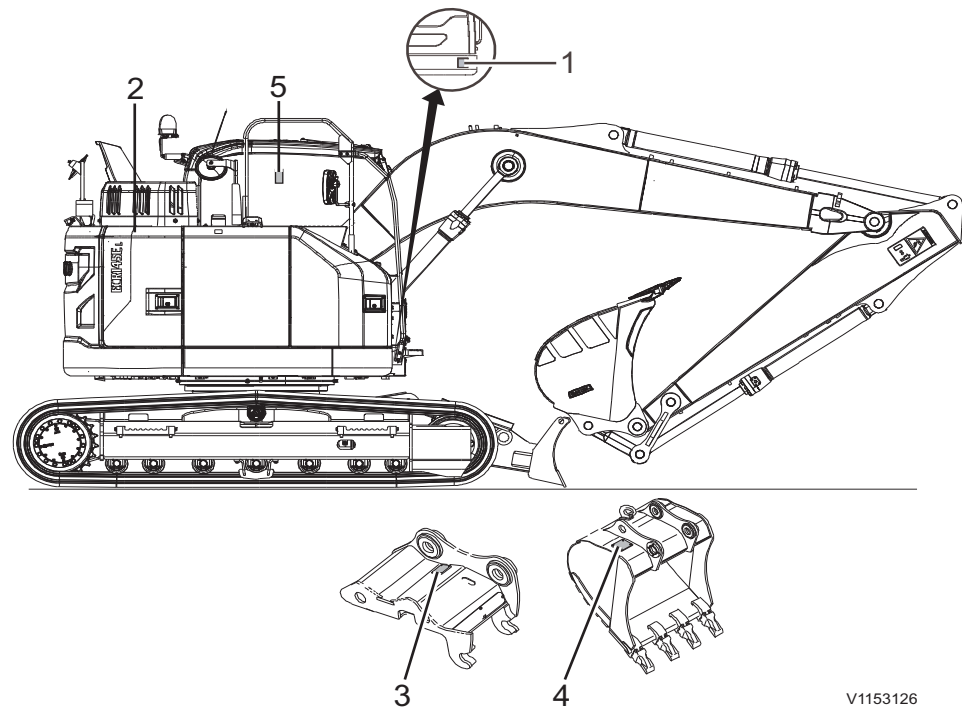
### **Guidelines**

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



V1153126

### 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 cab.

### 2 Engine

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



### **3 Attachment quick coupler**

This nameplate is attached on the outside of the quick coupler and indicates the supplier code, serial number, 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, supplier code, rated capacity, weight, cutting width, tooth part number and adapter part number.

### **5 Cab**

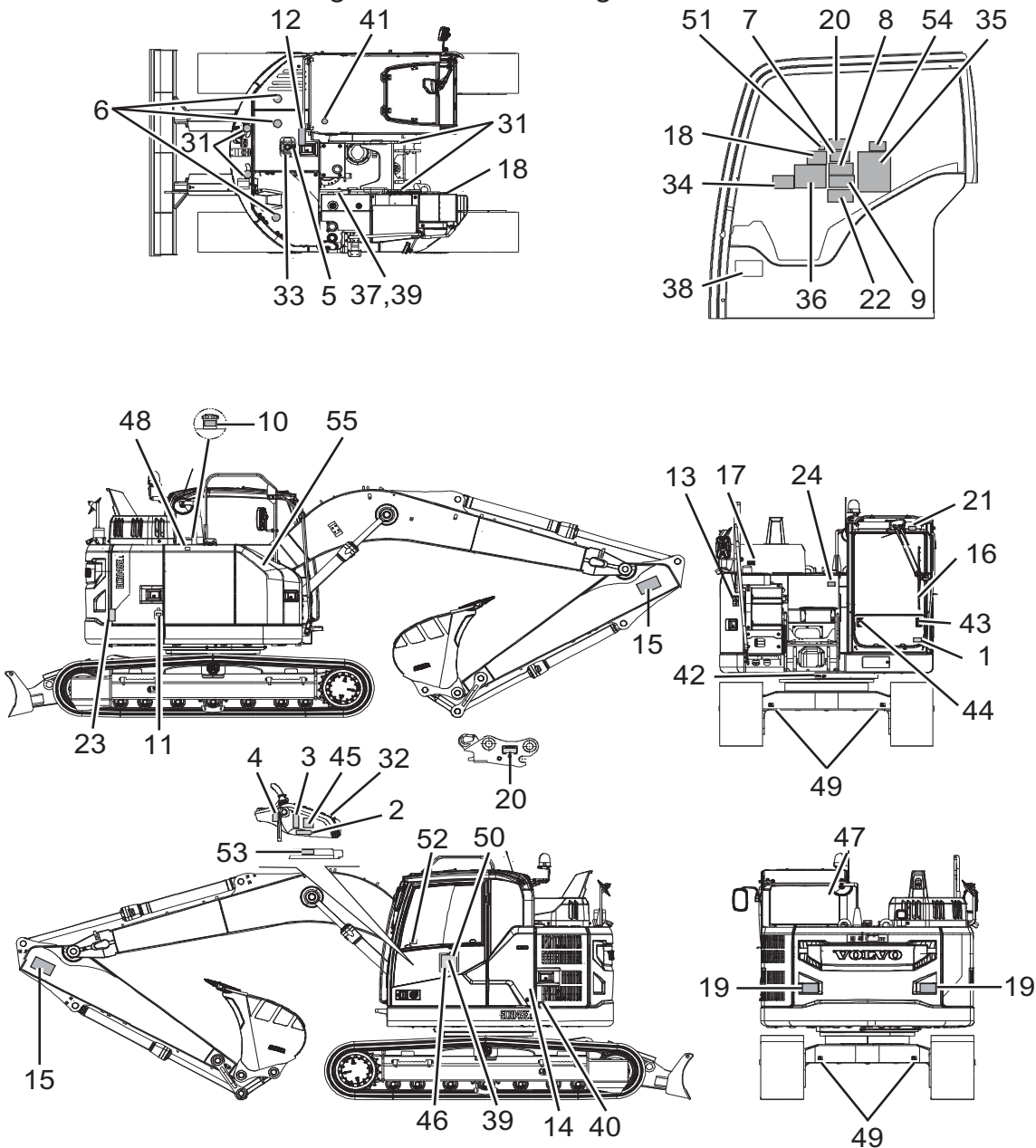
The nameplate is attached on the inside of the cab and indicates the product number, serial number, model type, and weight.

## Information and warning decals

Information and warning 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.

**NOTE!**

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

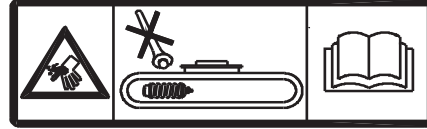


Warning decals



V1079477

- 1 WARNING! Read the Operator's manual.



V1065357

- 2 WARNING! High pressure, do not unscrew the recoil spring when tensioning tracks – read the Operator's manual. See page 297.



V1065342

- 3 WARNING! When leaving the machine, move the control lockout lever down to lock the hydraulic system.



V1079483

- 4 WARNING! Do not start the engine.



V1065344

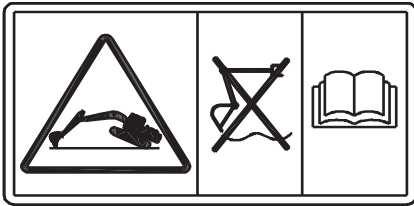
- 5 WARNING! Hot and pressurised coolant when opening radiator cap.



V1065343

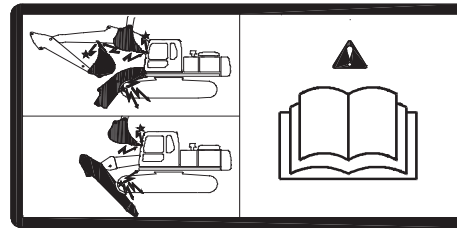
- 6 WARNING! Do not step on this surface.

30 Presentation  
Information and warning decals



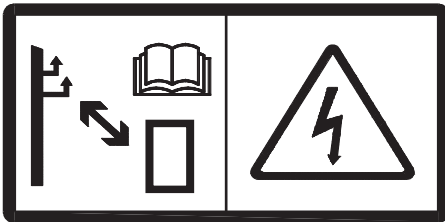
V1092982

7 WARNING! Do not use floating function while the machine is jacked up – read the Operator's manual. Boom floating (option). See page 202.



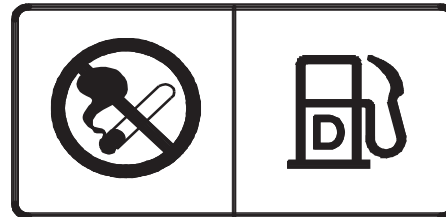
V1093037

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



V1079478

9 WARNING! High voltage, keep safe distance from electrical power lines. Read the Operator's manual. See page 193.



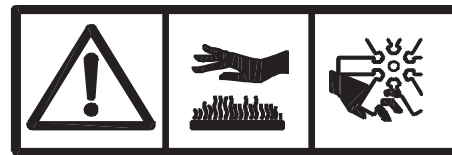
V1079484

10 WARNING! No smoking when fuel filling.



V1079480

11 WARNING! Risk of explosion – read the Operator's manual. See page 302.



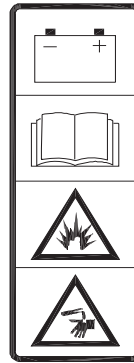
V1079479

12 WARNING! Hot surfaces and rotating parts



V1093038

13 WARNING! Risk of falling from machine.



V1077433

14 WARNING! Risk of electrical shock, corrosive burns and explosion – read the Operator's manual.



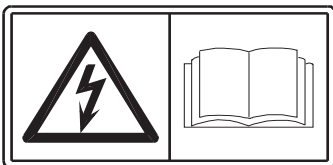
V1093039

15 WARNING! Raised attachment, keep a safe distance from the machine.



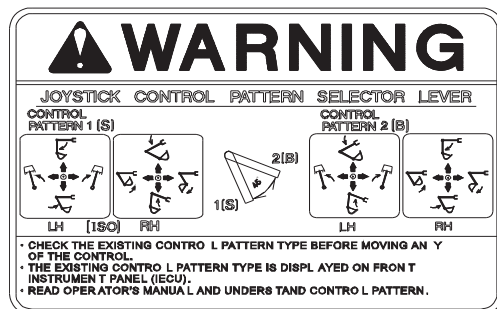
V1065355

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



V1134752

17 WARNING! Electric shock.

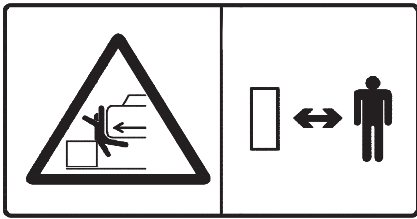


V1065345

18 WARNING! Pattern change valve selector (option). See page 99.

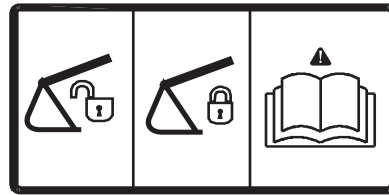


32 Presentation  
Information and warning decals



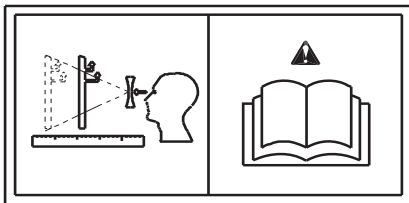
V1065358

19 WARNING! Crushing area, keep a safe distance from the machine.



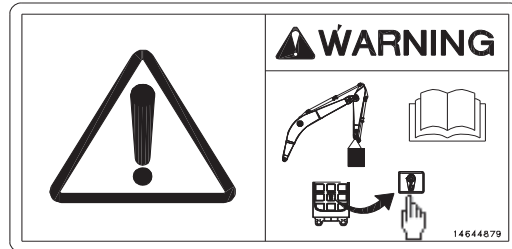
V1093043

20 WARNING! Before working after connecting and disconnecting attachment – read the Operator's manual. (Attachment quick coupler, option)



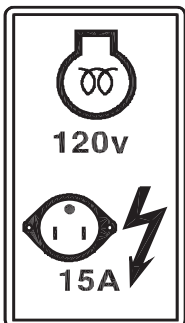
V1093040

21 WARNING! Risk of visual distortion through roof window – read the Operator's manual.



V1123383

22 WARNING! Overload warning button. See page 83.



V1093045

23 WARNING! Engine preheater (option).



V1080419

24 WARNING! Hot surfaces.

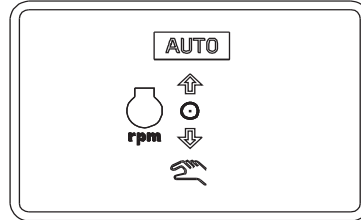
Presentation  
Information and warning decals

Information decals



V1065364

31 Lifting point.



V1137925

32 Engine limp home switch. See page 38.



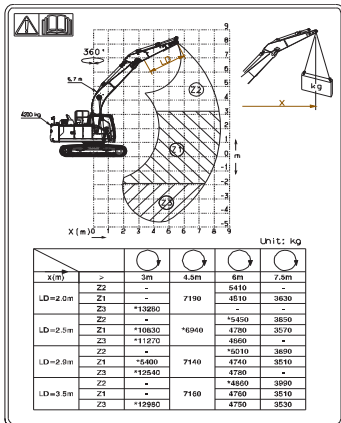
V1065366

33 Coolant information – read the Operator's manual. See page 279.

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

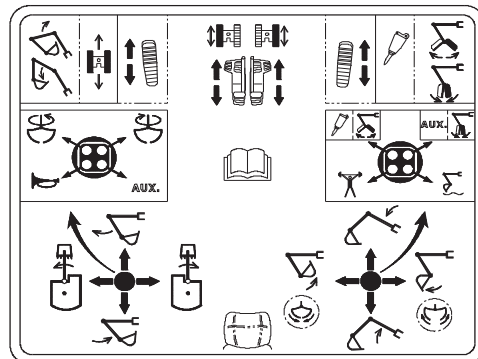
V1065367

34 Mode application (option).



V1148558

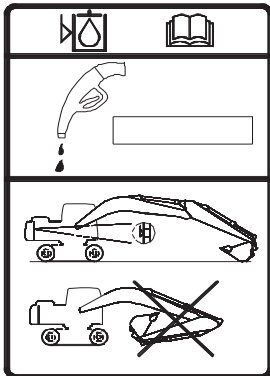
35 Lifting capacity (option). See page 350.



V1099522

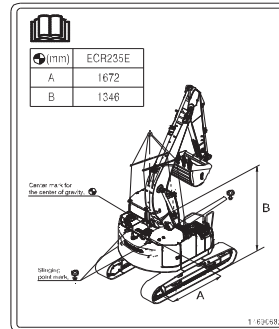
36 Lever and pedal functions (option).

34 Presentation  
Information and warning decals



V1065370

37 Machine position when checking hydraulic oil level.



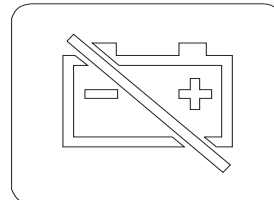
V1151243

38 Lifting instruction. See page 185.



V1093046

39 Type of hydraulic oil filled at factory (option).



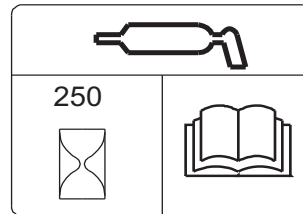
V1125755

40 Battery disconnect switch.



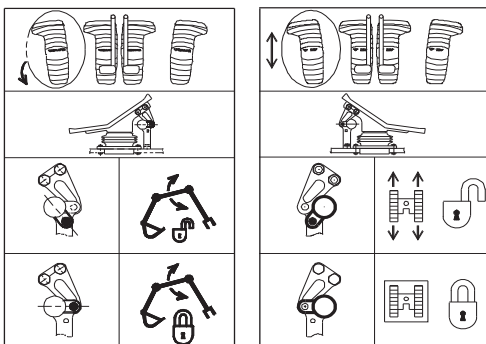
V1093052

41 Sound pressure level in cab (option).



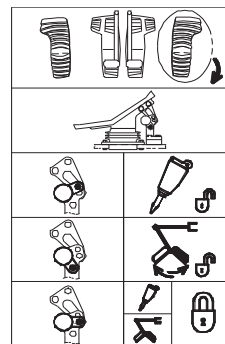
V1065375

42 Greasing interval – read the Operator's manual.



V1068020

43 Optional pedal operation (option).



V1065377

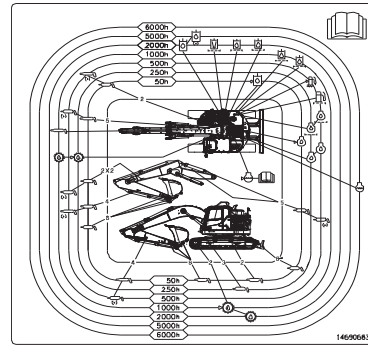
44 Optional pedal operation (option).

Presentation  
Information and warning decals



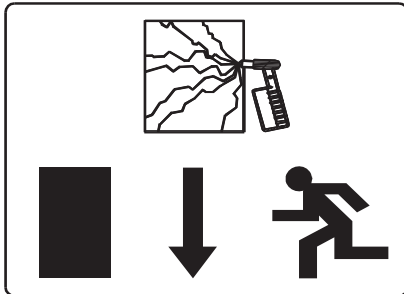
V1068021

45 Sound power level outside machine.



V1151242

46 Lubrication and service chart. See page 256.



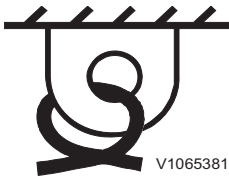
V1129244

47 Emergency exit.



V1099517

48 Sulphur content information. See page 313. (A: for North America, B: for Europe)



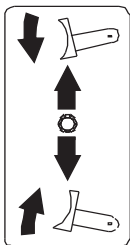
V1065381

49 Tie-down point.



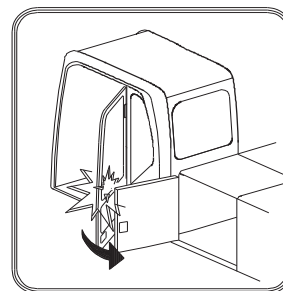
V1065382

50 Long life hydraulic oil. See page 307.



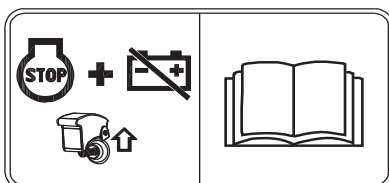
V1099577

51 Dozer blade.



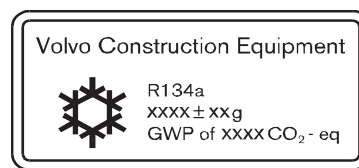
V1065356

52 Be careful when opening the cab door. Risk of cab door window damage.



V1137926

53 Emergency stop switch. See page 99.



V1178089

54 Refrigerant information. See page 272, 246 and 328.

36 Presentation  
Information and warning decals

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55 AdBlue®/DEF, filling. See page 283.

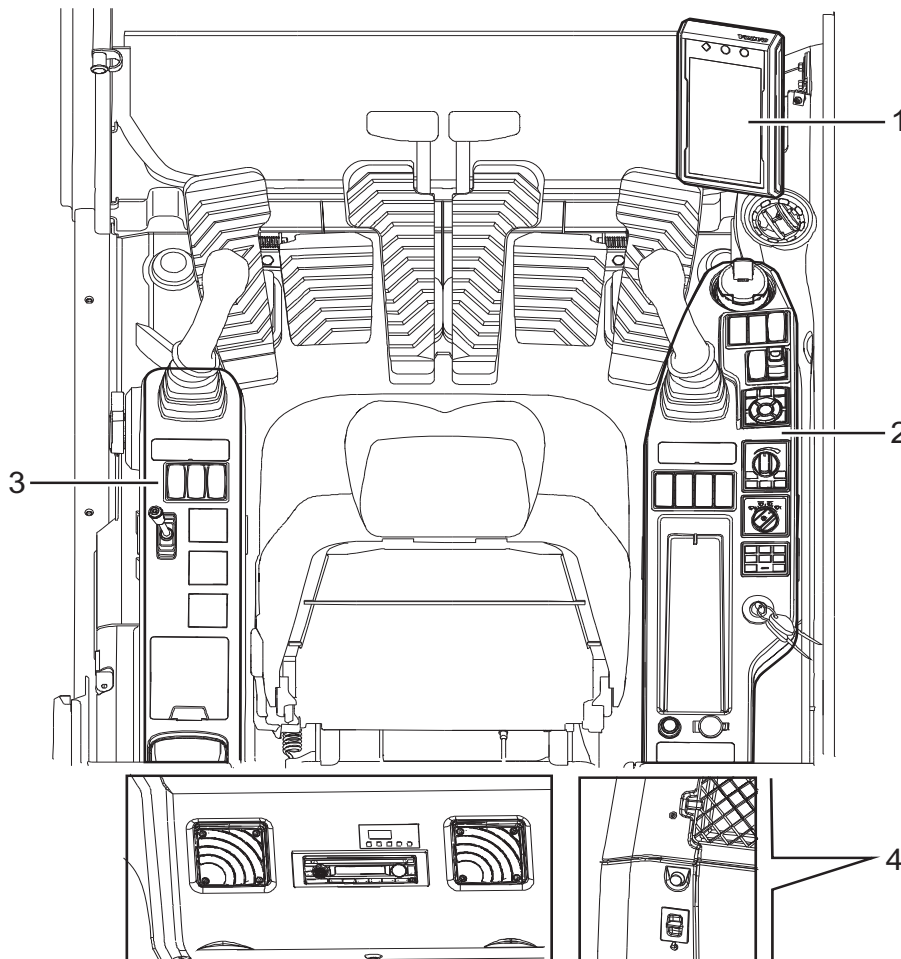
# Instrument panels

## WARNING

Risk of serious injury.

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

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

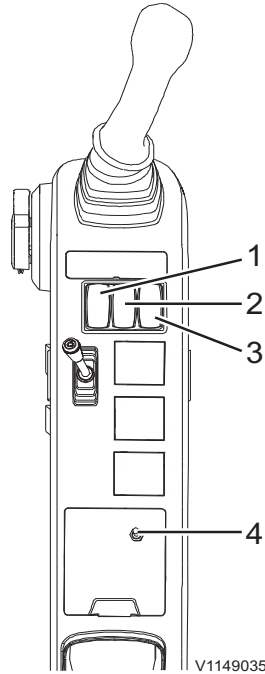


V1151246

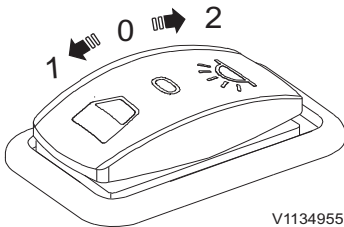
1	Front instrument panel (Instrument Cluster)
2	Right instrument panel
3	Left instrument panel
4	Rear instrument panel

38 Instrument panels  
Instrument panel, left

## Instrument panel, left

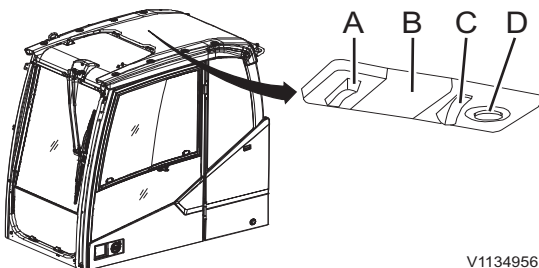


- 1 Interior light switch
- 2 Rotating beacon switch (optional equipment)
- 3 Attachment quick coupler switch, left (optional equipment)
- 4 Engine limp home switch

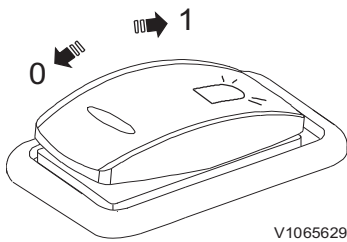


### 1 Interior light switch

- Position 0: Interior light is OFF
- Position 1: Interior light (B) will be turned on when the cab door is open. After closing the cab door, the interior light will be turned off automatically.
- Position 2: Interior light is ON



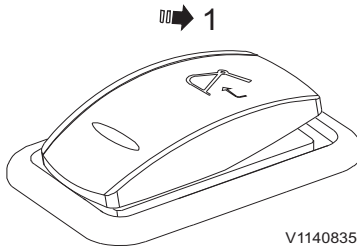
The switch (A) for the interior light will only work when this switch is in the "ON" position (2). The reading light (D) can be turned on with switch (C) regardless of the position of the interior light switch.



## 2 Rotating beacon switch (optional equipment)

- Position 0: Rotating beacon is OFF
- Position 1: Rotating beacon is ON

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



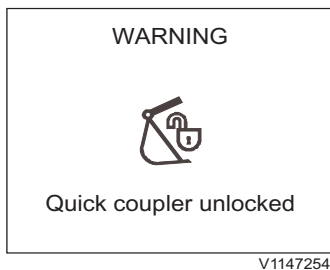
## 3 Attachment quick coupler switch, left (optional equipment)

This switch has 2 different functions of the attachment quick coupler according to the operating condition.

- Press down 1: Attachment quick coupler, opening control

The switch is returned automatically. Press the switch for more than 0.7 seconds to open the attachment quick coupler.

When the attachment quick coupler is open, the buzzer sounds and the warning message and indicator are displayed on the IC (Instrument Cluster).



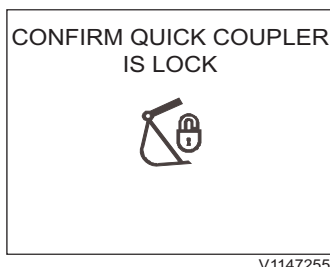
Warning! Quick coupler unlocked

### NOTE!

The attachment quick coupler switch for initiating on the right instrument panel must be pressed first to activate this switch. See page 83 for the operation.

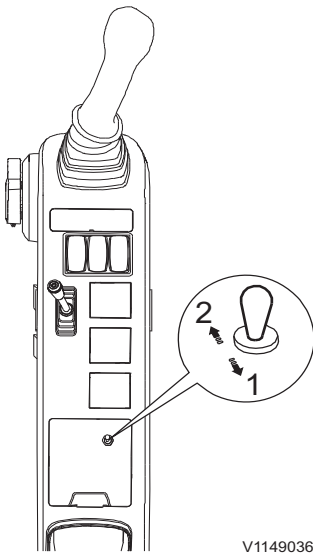
- Press down 1: Attachment quick coupler, confirming control

When the check message for confirming appears on the IC (Instrument Cluster), press the switch for more than 0.7 seconds to confirm that the attachment quick coupler is locked. Then the buzzer sound will be turned off and the check message and indicator will disappear.



Confirm quick coupler is locked





V1149036

#### 4 Engine limp home switch

- Position 1: Manually controlled
- Position 2: Automatically controlled

This switch is used when the engine speed control switch does not work due to failure of the engine speed control switch, GPMECU1 (General Purpose Machine Electronic Control Unit1) failure, or communication failures.

If the GPMECU1 malfunctions, set this switch to manual position (1). The engine rpm and the hydraulic flow will be set automatically to fixed performance. In this manual mode, do not operate the machine for any loaded work and move the machine to a safe area for repair. Contact a workshop authorized by Volvo and repair the damaged part as soon as possible.

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

#### NOTE!

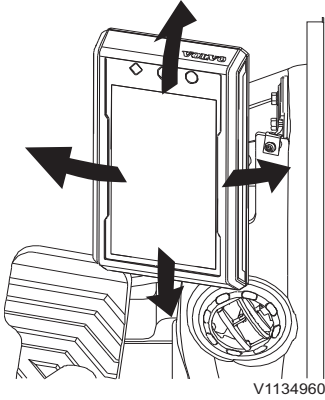
Make sure that the ignition switch is in the OFF (engine shutdown) position before changing the position of this switch from manual to automatic.

## Instrument panel, front

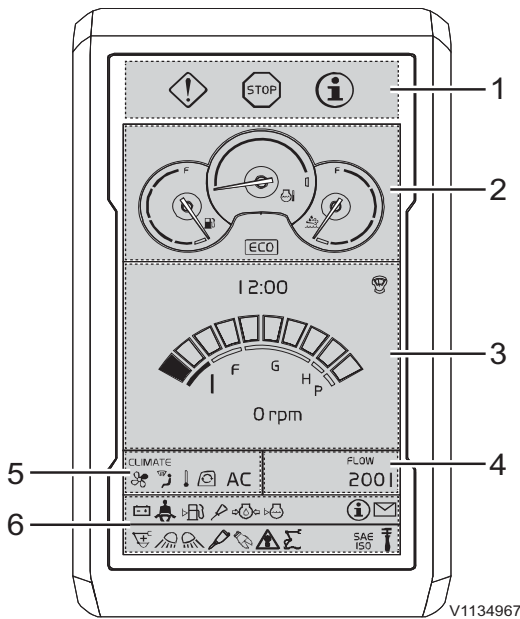
The front instrument panel can be adjusted for better operator comfort.

**NOTE!**

Prevent machine damage by taking correct action. Read thoroughly and understand the instructions in this section to familiarize yourself with the front instrument panel before trying to operate the machine.



Adjustable direction of IC (Instrument Cluster)



**NOTE!**

The front instrument panel is designed to display one of the supported languages. Refer to page 47 for details on how to set the language and the units.

- 1 Central warning light screen
- 2 Gauge screen
- 3 Time and engine speed screen
- 4 Hydraulic flow screen
- 5 CCM (Climate Control Module) screen
- 6 Indicator screen

## 42 Instrument panels Instrument panel, front



A



B



C

V1134961

- A Check, amber
- B Warning, red
- C Information, blue

### 1 Central warning light

There are three different types of light.

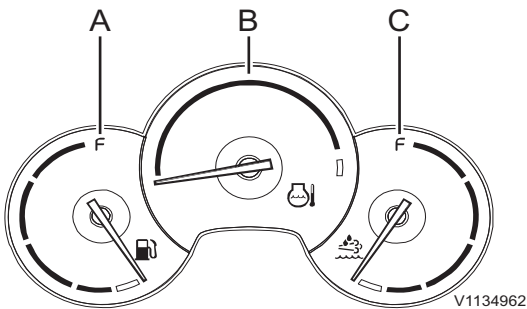
For more information, see page 47.

#### NOTE!

If the central warning light flashes or lights up while operating, follow the instructions on the display unit.

### 2 Gauges

The gauges are always shown unless a warning message is activated.



V1134962

- A Fuel level gauge
- B Engine coolant temperature gauge
- C AdBlue®/DEF level gauge

#### Fuel level gauge

The gauge shows the level in the fuel tank and it has a red mark indicating "fuel empty". When the gauge is in this area, the fuel 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 287 for correct instructions to bleed air from the fuel system.

Fuel tank capacity, see page 320.

#### Engine coolant temperature gauge

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

#### NOTE!

The red central warning light flashes, if the coolant temperature becomes abnormally high. Turn off the engine immediately and check the cause.

### AdBlue®/DEF level gauge

The gauge shows the level in the AdBlue®/DEF tank and it has a red mark indicating "AdBlue®/DEF empty". When the gauge is in this area, the AdBlue®/DEF left is about 10% of total tank capacity.

Capacity of AdBlue®/DEF tank, see page 320.

### 3 Time and engine speed

Time segment displays the current time. Refer to page 47 for instructions on how to set current time on the main screen.

Engine speed screen is displayed when the "Menu screen" is not shown in the "Main screen". For main menu screen, see page 47.

The "Engine speed step" selected on "Engine speed control switch" is displayed on an engine speed graph which is a segmented bar graph.

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

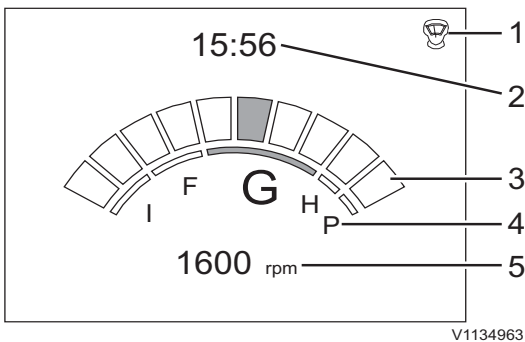
When the engine is off, engine speed is displayed as "0".

#### NOTE!

Engine speed and work mode may vary according to the optional equipment.

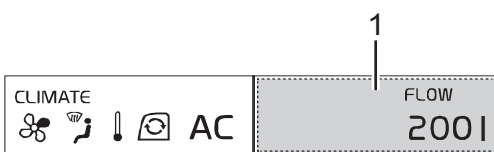
### 4 Hydraulic flow

Calculated value for X1 flow option is displayed on the segment called "Flow segment". Refer to page 47 for flow setting instructions.



V1134963

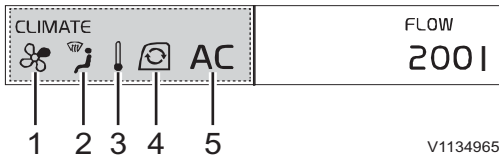
- 1 Joystick shortcut
- 2 Time
- 3 Engine speed step
- 4 Work mode index
- 5 Actual engine speed



V1134964

- 1 Flow rate for X1

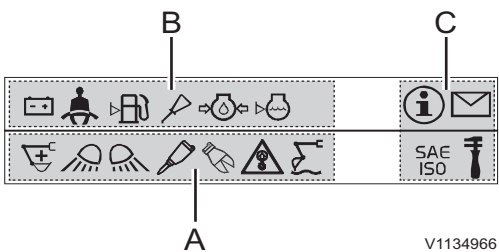
## 44 Instrument panels Instrument panel, front



- 1 Fan speed
- 2 Air flow direction
- 3 Temperature
- 4 Air flow circulation
- 5 Air conditioning status

### 5 CCM (Climate Control Module)

CCM segment displays the status of the CCM (Climate Control Module). This includes temperature setting, fan speed, air flow direction, circulation, and air conditioning status. Refer to page 120 for more details.



- A Function indicators
- B Warning indicators
- C Fixed indicators

### 6 Indicators

Indicator screen displays indicators as symbols that show users important information easily and quickly. Indicators are divided into three types; function indicator, warning indicator, and fixed indicator.

#### NOTE!

Fixed indicators are always displayed on the right side.

- 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 on both sides can extend their display area to the other side if there is no indicator on the other side.
- When the whole 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;

Table. Function indicators

 V1065463	 V1065465
1. Air preheating	2. Hammer selected (optional equipment)
 V1065466	 V1065467
3. Shear selected (optional equipment)	4. Overload indicator (optional equipment)
 V1065468	 V1129236
5. Boom float position (optional equipment)	6. Power boost selected
 V1065469	
7. Rototilt selected (optional equipment)	

Table. Warning indicators

 V1065475	 V1065476
1. Low engine oil pressure	2. Low coolant level
 V1065467	 V1065478
3. Overload warning (optional equipment) Stop the lifting operation and reduce the load.	4. Low engine oil level
 V1065479	 V1065480
5. Open attachment quick coupler (optional equipment) Stop work immediately if the bucket is still attached to the attachment bracket.	6. Wrong battery charge

46 Instrument panels  
Instrument panel, front











 V1065481	 V1065483
7. High engine coolant temperature	8. Pattern changer warning
 V1065484	 V1065488
9. Clogged engine air filter	10. Seat belt
 V1065486	 V1065487
11. Low fuel level	12. High hydraulic oil temperature

Table. Fixed indicators

 V1065471	 V1065472
1. Service mode selected (fixed position)	2. Message indicator (fixed position)
 V1065473	 V1065474
3. Pattern changer status (fixed position)	4. Pattern changer status (fixed position)

## Display unit

### Start sequence

Initial start sequence is performed as follows.

#### A Volvo logo

If the operator turns the ignition switch to the operating position, the Volvo logo on the IC (Instrument Cluster) screen lights up for a few seconds.

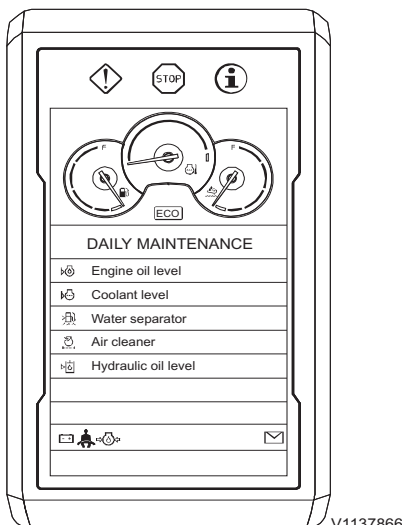


V1137865

#### B Daily maintenance

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

- Engine oil level
- Coolant level
- Water separator
- Air cleaner
- Hydraulic oil level



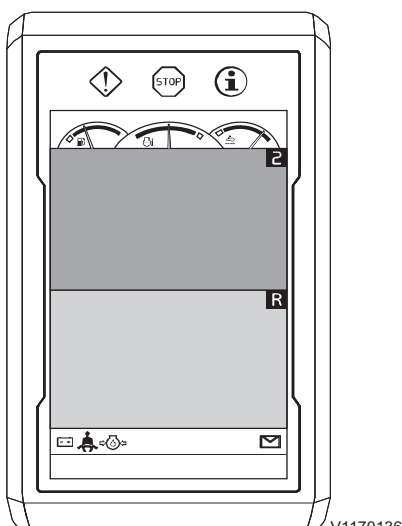
V1137866

#### C Initial camera screen (if installed)

All the cameras installed on the machine will be displayed on the IC (Instrument Cluster). The initial camera screen is dismissed by pressing the ESC button on the keypad.

#### NOTE!

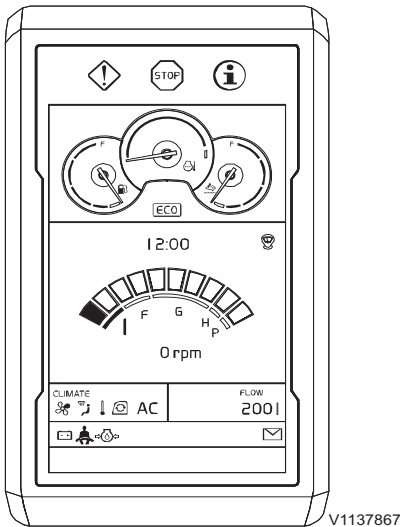
Press the camera button on the keypad for the camera views when operating the machine. For detailed information about camera control, see page 136.



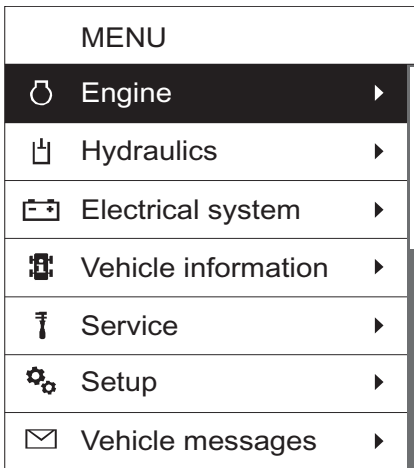
V1170136



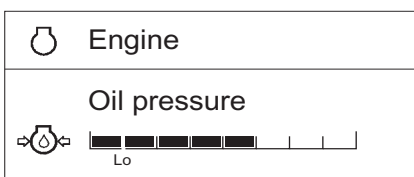
## 48 Instrument panels Display unit



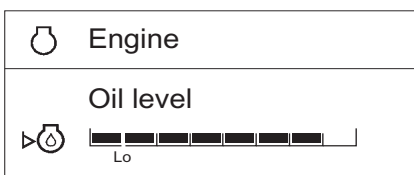
V1137867



V1137861



V1147256



V1147257

### D Main screen

After the initial camera screen is dismissed, the main screen is displayed.

#### NOTE!

Indicator for seat belt will be displayed for 3 seconds on the "Daily maintenance" screen or main screen. Fasten the seat belt before operating the machine.

### Main menu

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

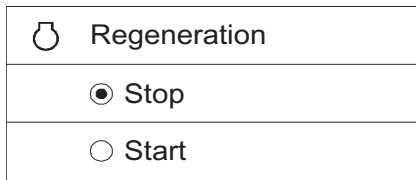
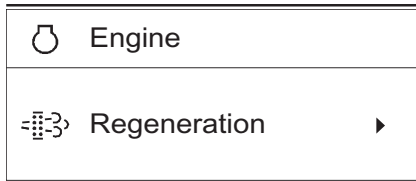
Scroll the list by using the arrow buttons on the keypad. When a folder is highlighted, its subscreens are shown when pressing the SELECT button. Use the arrow buttons to scroll between the subscreens. Cancel the action at any time by pressing the ESC button on the keypad.

### Subscreens

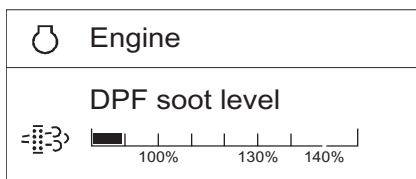
#### 1 Engine

- **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.

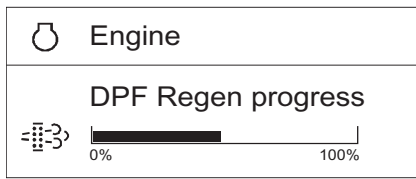
- **Oil level:** This shows the measured value of the engine oil level. When the bar graph is green, the value is OK, within normal operation range. When the bar graph is red, the value is abnormal.



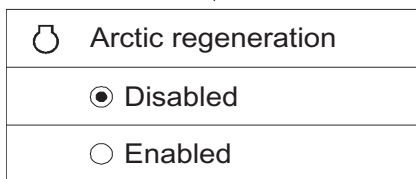
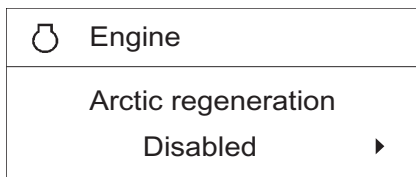
V1147258



V1147259



V1147260



V1147262

■ **Regeneration:** The operator can perform a regeneration with "Start" in the menu when the Diesel Particulate Filter has collected enough soot. When selecting "Stop" in the menu, the regeneration which is in progress will be cancelled. Refer to page 166 for more detailed information.

- Stop
- Start

■ **DPF soot level:** This shows the level of soot that has accumulated within the DPF.

**NOTE!**

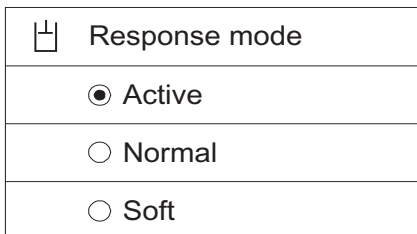
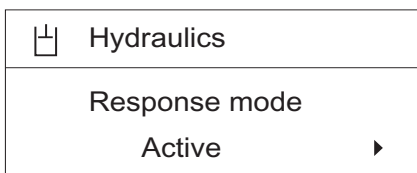
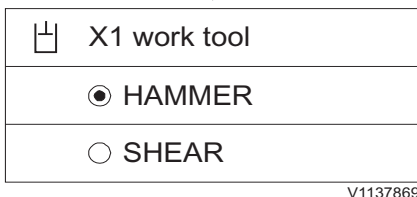
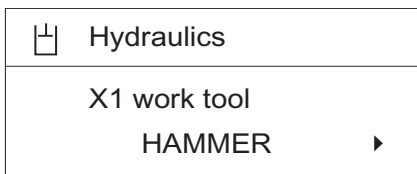
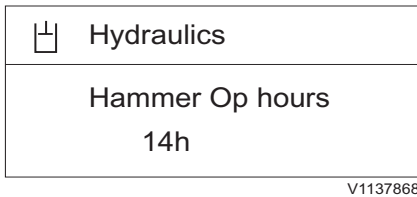
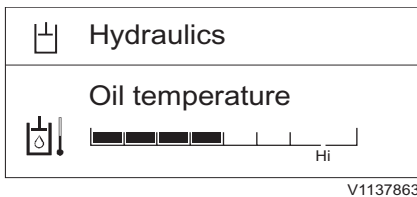
Contact a workshop authorized by Volvo for detailed information on the soot level.

■ **DPF Regen progress:** This shows the measured value of DPF regeneration progress. Regeneration is complete when the bar graph reaches 100%.

■ **Arctic regeneration (optional equipment):** Arctic regeneration mode is used for machines that operate in extreme cold climate areas where the machines need to be left running around-the-clock without operator presence. To use this optional mode, the parked regeneration mode should be selected in advance. When selecting "Enabled" in this menu, the parked regeneration is started automatically when needed without any further operator action. This function will only be active while in parked mode, regardless of regeneration mode and will be "Disabled" by default at startup or when leaving the parked mode. This means that the regeneration system can remain in an optimal mode, even after longer periods of idling.

- Disabled
- Enabled

## 50 Instrument panels Display unit



### 2 Hydraulics

■ **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 (optional equipment):** This shows the counted value of hammer operating time in the unit hours and it can not be reset to zero.

#### NOTE!

Refer to this "Hammer op. hours" for service interval when replacing the hammer return filter.

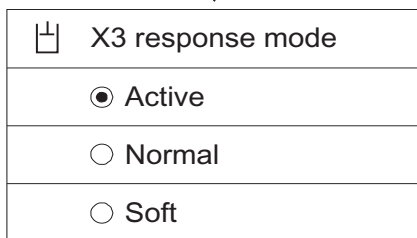
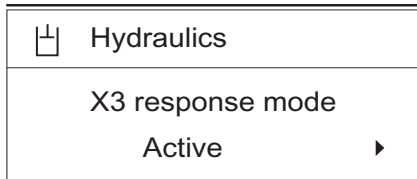
■ **X1 work tool (optional equipment):** This informs the operator which tool is selected at the moment. It also allows the operator to select a preset tool showing the name and settings of each tool. When pressing the arrow button, another preset work tool is displayed. When pressing the SELECT button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

■ **Response mode (optional equipment):** 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.

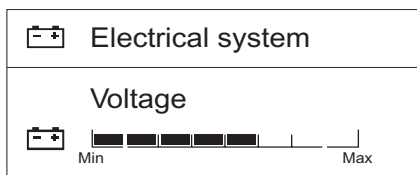
- Active
- Normal
- Soft

The operator can adjust the movement sensitivity of attachments when operating the levers. "Active" mode is the most sensitive.

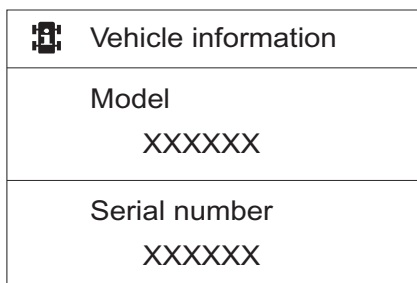
## Instrument panels Display unit 51



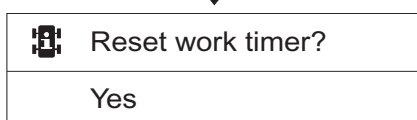
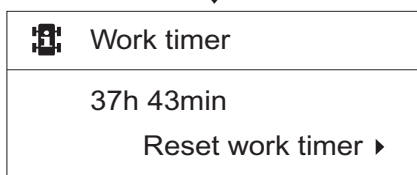
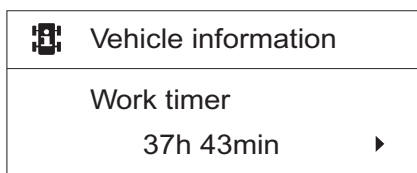
V1137870



V1137873



V1137874



V1140744

■ **X3 response mode (optional equipment):** This informs the operator which X3 response mode is selected at the moment. It also allows to select a response mode from 3 different modes. The operator can select a X3 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
- Normal
- Soft

The operator can adjust the movement sensitivity of attachments when operating the levers. "Active" mode is the most sensitive.

### 3 Electrical system

■ **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.

### 4 Vehicle information

■ **Model:** This shows the machine's model name.  
 ■ **Serial number:** This shows the machine's serial number.

■ **Work timer:** This shows the counted work time.

- Reset work timer: Work time can be reset by pressing the SELECT button when the "Work timer" value is highlighted. Press ESC button to "Cancel" or SELECT button to "Yes".

## 52 Instrument panels Display unit

	Vehicle information
Average fuel cons 15 l/h ▶	



	Average fuel cons
Reset fuel cons 15 l/h ▶	



	Reset fuel cons?
Yes	

V1140745

	Vehicle information
Current fuel cons	
	Lo ██████████   Hi
Ambient temperature 25.0 °C	

V1137877

■ **Average fuel cons.:** This shows the calculated average fuel consumption from the last 24 hours.

- **Reset fuel cons:** Fuel consumption can be reset by pressing the SELECT button when the "Average fuel cons" value is highlighted. Press the ESC button to "Cancel" or SELECT button to "Yes".

■ **Current fuel cons.:** This shows the calculated fuel consumption at the current time.

■ **Ambient temp:** This shows the measured ambient temperature.

## 5 Service

This subscreen shows the service items with "time remaining" value. Press the SELECT button to adjust interval or to check detail information.

### ■ Engine oil/filter

- Interval: This shows the value of engine oil/filter interval in the unit hours. According to engine oil/filter type, the operator can adjust engine oil/filter interval. The setting range is 50 ~ 500 hours.

🔑 Service
Engine oil/filter 450h ▶



🔑 Engine oil/filter
Interval: 500h Set interval ▶



🔑 Engine oil/filter
Set interval: ◆ 500h

V1137878

🔑 Engine oil/filter
Time remaining: 450h Reset time remain ▶


V1137879

🔑 Reset time remaining?
Yes


V1140746

- Time remaining: This shows the value for remaining time to next engine oil/filter service. When the "Time remaining" reaches 40 h, 20 h, and 0 h, the check screen with "Time remaining" and "Interval" will pop up on the IC (Instrument Cluster). Service the maintenance items which should be serviced in that interval. For the service interval and maintenance items, see page 321.
- Reset time remaining?: After servicing the maintenance items, the time can be reset. Press ESC button to "Cancel" or SELECT button to "Yes". When the time is reset, the next service interval and "Time remaining" will be displayed.  
If the operator does not replace the engine oil/filter and resets this value, it turns to zero and then to negative.


## 54 Instrument panels Display unit

 Service
Fuel filter/Water sep 450h ▶




 Fuel filter/Water sep
Interval: 500h Set interval ▶




 Fuel filter/Water sep
Set interval: ◆ 500h

V1137881

 Fuel filter/Water sep
Time remaining: 450h Reset time remain ▶

V1137882


 Reset time remaining?
Yes

V1140746


### ■ Fuel filter/Water sep

- Interval: This shows the value of fuel filter/ water separator interval with in the unit hours. The operator can adjust fuel filter/water separator interval. The setting range is 50 ~ 500 hours.


- Time remaining: This shows the value for remaining time for next fuel filter/water separator service. When the "Time remaining" reaches 40 h, 20 h, and 0 h, the check screen with "Time remaining" and "Interval" will pop up on the IC (Instrument Cluster). Service the maintenance items which should be serviced in that interval. For the service interval and maintenance items, see page 321.
- Reset time remaining?: After servicing the maintenance items, the time can be reset. Press ESC button to "Cancel " or SELECT button to "Yes". When the time is reset, the next service interval and "Time remaining" will be displayed. If operator does not maintain the parts and reset this value it turns to zero and then to negative.

 Service
Hydraulic oil 1500h ▶




 Hydraulic oil
Interval: 2000h Set interval ▶




 Hydraulic oil
Set interval: ◆ 2000h


V1137883

 Hydraulic oil
Time remaining: 1500h Reset time remain ▶

V1137884

 Reset time remaining?
Yes

V1140746

 Hydraulic oil
Hammer Op hours: 20h

V1137885


■ Hydraulic oil

- Interval: This shows the value of hydraulic oil interval in the unit hours. The operator can adjust the hydraulic oil interval. The setting range is 100 ~ 5000 hours.


- Time remaining: This shows the value for remaining time to next hydraulic oil service. When the "Time remaining" reaches 40 h, 20 h, and 0 h, the check screen with "Time remaining" and "Interval" will pop up on the IC (Instrument Cluster). Service the maintenance items which should be serviced in that interval. For the service interval and maintenance items, see page 321.
- Reset time remaining?: After servicing the maintenance items, the time can be reset. Press ESC button to "Cancel " or SELECT button to "Yes". When the time is reset, the next service interval and "Time remaining" will be displayed.  
If operator does not maintain the parts and reset this value it turns to zero and then to negative.
- Hammer op. hours: This shows the counted value of hammer operating time in the unit hours. "Hammer op. hours" is not adjustable. It is automatically reset to zero when "Time remaining" is reset and shows the hammer operating hours from the reset point.




## 56 Instrument panels Display unit

 Service
Hydraulic oil filter 1500h ▶




 Hydraulic oil filter
Interval: 2000h Set interval ▶




 Hydraulic oil filter
Set interval: ◆ 2000h


V1137886

 Hydraulic oil filter
Time remaining: 1500h Reset time remain ▶

V1137887

 Reset time remaining?
Yes

V1140746

 Hydraulic oil filter
Hammer Op hours: 20h

V1137888

### ■ Hydraulic oil filter

- Interval: This shows the value of hydraulic oil filter interval in the unit hours. The operator can adjust the hydraulic oil filter interval. The setting range is 100 ~ 2000 hours.

- Time remaining: This shows the value for remaining time to next hydraulic oil filter service. When the "Time remaining" reaches 40 h, 20 h, and 0 h, the check screen with "Time remaining" and "Interval" will pop up on the IC (Instrument Cluster). Service the maintenance items which should be serviced in that interval. For the service interval and maintenance items, see page 321.

- Reset time remaining?: After servicing the maintenance items, the time can be reset. Press ESC button to "Cancel " or SELECT button to "Yes". When the time is reset, the next service interval and "Time remaining" will be displayed.

If operator does not maintain the part and reset this value it turns to zero and then to negative.

- Hammer op. hours: This shows the counted value of hammer operating time in the unit hours. "Hammer op. hours" is not adjustable. It is automatically reset to zero when "Time remaining" is reset and shows the hammer operating hours from the reset point.

## 6 Setup

There are sub-items, "X1 work tool", "X3 Operation", "Auto idle time", "Overload pressure", "Anti-theft system", "Joystick shortcut", "Language", "Units", "Time/date", "Display light", and "Keypad backlight".

### ■ X1 work tool

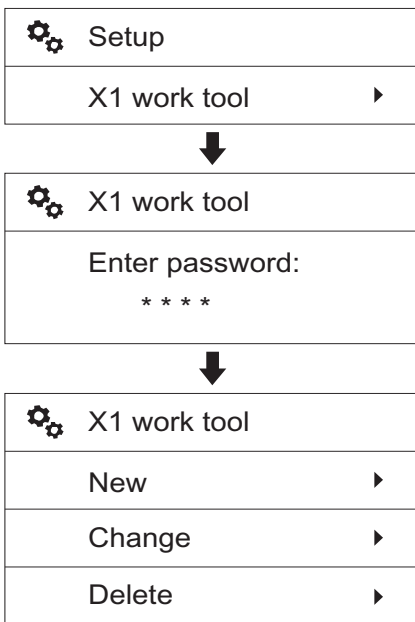
This is to preset the X1 setting so that operators can use it simply by selecting the tool from the list.

**Enter password:** Enter the password to proceed with the setting for X1 tools. The password screen is displayed whenever the password is set using Volvo's service tool.

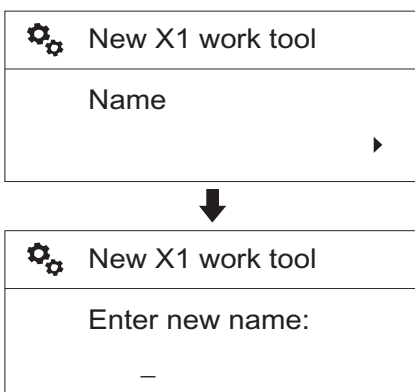
There are 3 sub-items which are,

- New
- Change
- Delete

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



V1137889



V1137890

### New

The New setting is used to add new X1 tools. Follow the steps from 1 through 8, described below, to set and "Save" the parameters for the new attachment.

### NOTE!

If the "Save" procedure described in 8 is not performed, all settings are cancelled automatically.

- 1 Select "New" after entering "X1 work tool".
- 2 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 the SELECT button to enter the selected character.
  - Press the SELECT button once again to save the name.
  - Use the ESC button to delete the entered character.

## 58 Instrument panels Display unit

	New X1 work tool
Flow	280 l



	New X1 work tool
Set flow:	◆ 280 l

V1137891

	New X1 work tool
Pressure	220 bar



	New X1 work tool
Set pressure:	◆ 220 bar

V1137892

	New X1 work tool
Control	Push



	New X1 work tool
<input checked="" type="radio"/>	Push
<input type="radio"/>	Toggle
<input type="radio"/>	Proportional

V1137893


- 3 Flow: Set the flow rate when this optional function is selected.
  - Select the preferred flow rate value using the arrow buttons.
  - Save the selected value using the SELECT button. Use the ESC button to cancel without saving.

- 4 Pressure: Set the pressure when this optional function is selected.
  - Select the preferred pressure value using the arrow buttons.
  - Save the selected value using the SELECT button. Use the ESC button to cancel without saving.


- 5 Control: Choose the control type.
  - Select the preferred control type using the arrow buttons.
  - Save the selected item using the SELECT button. Use ESC button to cancel without saving.

For information on control types, see page 82.


  - Push
  - Toggle
  - Proportional

 New X1 work tool
Pedal control Push ▶




 New X1 work tool
<input checked="" type="radio"/> Push
<input type="radio"/> Toggle
<input type="radio"/> Proportional


V1137894

 New X1 work tool
Attachment 1 way ▶



 New X1 work tool
<input checked="" type="radio"/> 1 way
<input type="radio"/> 2 way

V1137895

 New X1 work tool
Save

V1137896

- 6 Pedal control: Choose the pedal control type.
- Select the preferred control type using the arrow buttons.
  - Save the selected item using the SELECT button. Use ESC button to cancel without saving.

For information on control types, see page 82.

- Push
- Toggle
- Proportional

- 7 Attachment: Choose the 1 way or 2 way control.
- Select the preferred setting using the arrow buttons.
  - Save the selected item using the SELECT button. Use ESC button to cancel without saving.



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

**NOTE!**


After entering the new settings, the "Save" procedure should be performed to record the new parameters in the system memory. If the "Save" procedure is not performed, all the settings will be cancelled automatically.

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



- 9 The added X1 tool is newly listed.

 X1 work tool
Change 




 Change X1 work tool
<input type="radio"/> HAMMER
<input type="radio"/> SHEAR
<input checked="" type="radio"/> VOLVO


V1137897

 X1 work tool
Delete 



 Delete X1 work tool
<input checked="" type="radio"/> VOLVO



 Are you sure to delete?
Yes

V1140747

### 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 8 explained in "New" section described above to change the setting.
- 4 There are some restrictions when modifying the setting:
  - The "Name" of two default X1 tools "HAMMER" and "SHEAR" are not modifiable.
  - The "HAMMER" can not be "2-way".
- 5 The modified X1 tool is listed.

### Delete

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

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 the arrow buttons and press the SELECT button.

### NOTE!

Current preset X1 tool and default tools are not displayed.

- 3 Are you sure to delete?: Confirming message is displayed on the screen, press SELECT button to "Yes" or ESC button to "Cancel".

⚙️ Setup
X3 operation ▶



⚙️ X3 operation
Enter password: * * * *



⚙️ X3 operation
Control: Push ▶



⚙️ X3 operation
<input checked="" type="radio"/> Push
<input type="radio"/> Toggle
<input type="radio"/> Proportional

V1140748

⚙️ Setup
Auto idle time ▶



⚙️ Auto idle time
Set auto idle time: ◆ 5 s

V1137900

⚙️ Setup
Overload pressure ▶



⚙️ Overload pressure
Set overload press: ◆ 270 bar

V1137901

### ■ X3 Operation

**Enter password:** Enter the password to proceed with the setting for X3 tools. The password screen is displayed whenever the password is set using Volvo's service tool.

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 82 for more detailed information on control types.

### ■ Auto idle time

The basic concept of "Auto idle" is to reduce fuel consumption. The engine rpm will be lowered automatically to idle mode, if the Auto idle button is ON and any of control levers (pedals) or engine speed control switch are not operated for a certain time.

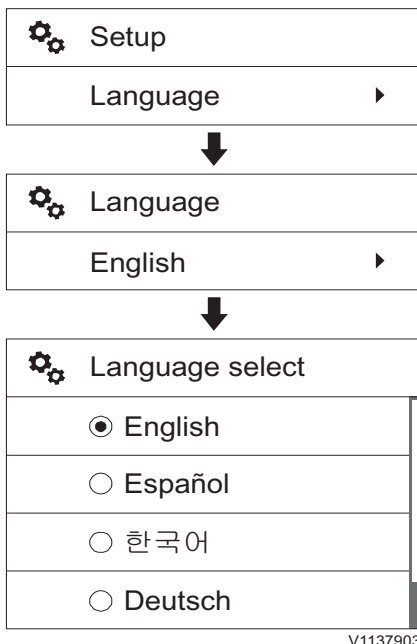
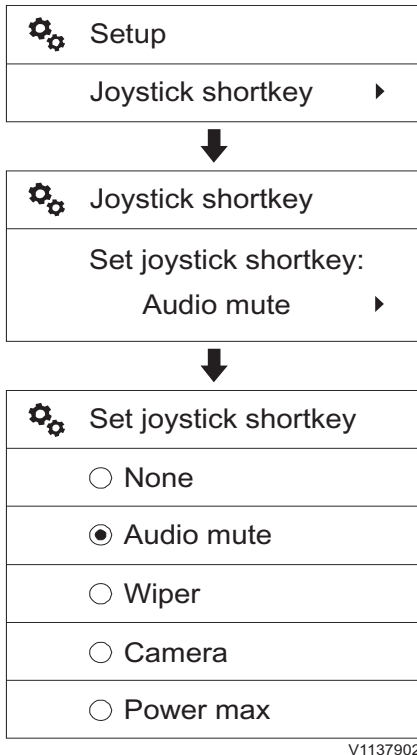
The operator can set Auto idle time from 3 seconds to 20 seconds.

### ■ Overload pressure: Set the overload pressure when this optional function is selected.

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

### ■ Anti-theft system: See page 73 for information.

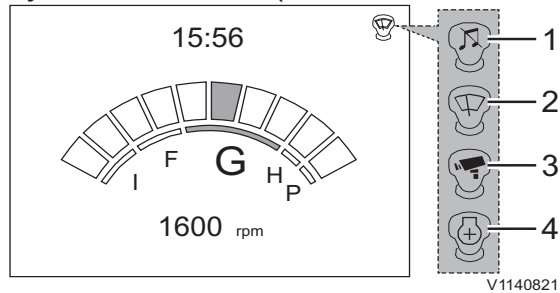
## 62 Instrument panels Display unit



■ **Joystick shortkey:** Operator can use a function easily with a button of the left control lever. See page 99 for the position of the button.

It also allows selection of a function from 5 different functions. The operator can select a function from 5 different functions with the arrow buttons. When pressing the SELECT button, the marked function is set. The screen reverts to the former screen displaying the name of the newly selected item.

Also the selected item is displayed with a symbol on the IC (Instrument Cluster).

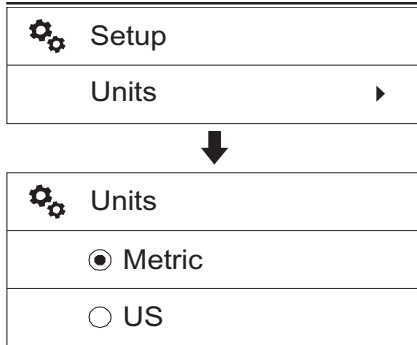


- 1 Audio mute
- 2 Wiper
- 3 Camera
- 4 Power max

■ **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 language. The screen reverts to the former screen displaying the newly selected language.



V1137904

■ Units

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

The units stored in the IC (Instrument Cluster) are as follows;

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



## 64 Instrument panels Display unit

⚙️ Setup
Time/date ▶



⚙️ Time/date
Date set 20140101 ▶



⚙️ Set date
yyymmdd: ◆ 20140101

V1137905

⚙️ Time/date
Time set 12:30 ▶



⚙️ Set time
24h: ◆ 12:30

V1137906

⚙️ Time/date
Date format yyymmdd ▶



⚙️ Date format
<input checked="" type="radio"/> yyymmdd
<input type="radio"/> mmddyyyy
<input type="radio"/> ddmmyyyy

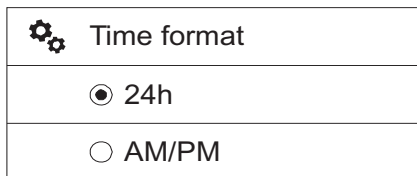
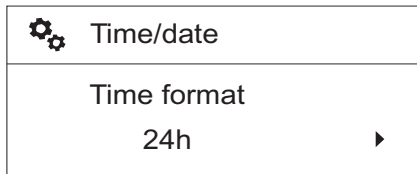
V1137907

### ■ Time/Date

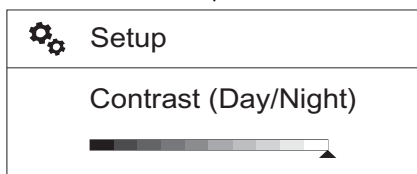
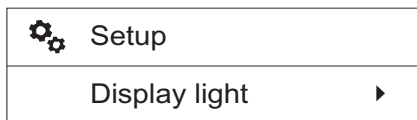
- Date set: This is for adjusting the date. The preset date format is shown in the first row of the screen. The operator can adjust the date with arrow, ESC, and SELECT buttons. SELECT and ESC buttons are used to move ahead or go back with the cursor. Arrow buttons are used to adjust each segment of the date.

- Time set: This is for adjusting the time. The preset clock format is shown in the first row of the screen. The operator can adjust the time with arrow, ESC, and SELECT buttons. SELECT and ESC buttons are used move ahead or go back with the cursor. Arrow buttons are used to adjust each segment of the time.

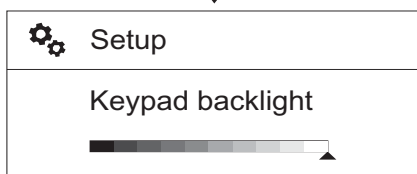
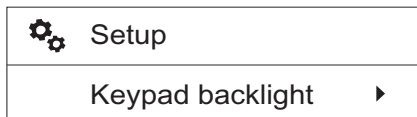
- Date format: The items "yyymmdd", "mmddyyyy", and "ddmmyyyy" decide how the IC (Instrument Cluster) shows the date. "yyyy" means year, "mm" means month, and "dd" means day.



V1137908



V1137909



V1137910

- Time format: The items "24h" and "AM/PM" decide how the IC (Instrument Cluster) describes the time, 24-hour-system or 12-hour-system.

#### ■ Display light

This is for changing the contrast of the IC (Instrument Cluster). The adjusting bar in the screen is controlled with the arrow buttons and the value is set with the SELECT button. The contrast is independently adjustable for day and night.

##### Contrast (Day/Night)

- When adjusting the "Contrast(Day)", the machine's work lights should be turned off.
- When adjusting the "Contrast(Night)", the machine's work lights should be turned on.

#### ■ Keypad backlight

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



## 66 Instrument panels Display unit

✉ Vehicle messages
🔧 Engine system ▶



✉ Check at next stop
🔧 System failure (Engine system)
Fault Active: Yes
Error Code: P203A86
Source: ECM
First Event: 20140101
No. Events: 2
Last Event: 20140101

V1137911

### 7 Vehicle messages

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 a workshop authorized by Volvo for advice, if needed.

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

The information content includes;

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



## Alarm texts

The information to the operator is provided on the display unit in the form of alarm texts, which are divided into three classes: Information, Check and Warning.

### Information

- This screen is to give useful information about the machine.
- The blue information symbol is shown.
- The buzzer sounds two times.
- Alarm text is shown for seven seconds and then changes to operating display.
- Repair or contact a workshop authorized by Volvo for information.

<b>Check at next stop</b>	
System failure (Auto lubrication)	Component failure (Boom light)
Component failure (Upper wiper)	Component failure (Rear light)
Component failure (Lower wiper)	Component failure (Front light)
Component failure (Deck light)	
<b>Fill up the tank</b>	
Fuel level low	



**Check**

- This screen is to inform the operator when a partial failure of the machine is detected.
- The amber central warning symbol is shown.
- The buzzer sounds four times.
- Press SELECT button to obtain more information about the malfunction.
- Alarm text is shown until confirmation is performed by pressing ESC button.
- Repair or contact a workshop authorized by Volvo for information.

Check at next stop	
Component failure (Fuel level sensor)	Component failure (Quick coupler sol)
Component failure (Overload ps. snr.)	Component failure (Hyd. oil temp. sensor)
Clock failure	Component failure (Boom up ps. Snr.)
Component failure (Boom down ps. Snr.)	Component failure (Arm in ps. snr.)
Component failure (Arm out ps. snr.)	Component failure (Bucket in ps. snr.)
Component failure (Swing ps. snr.)	Component failure (D/Blade pressure sensor)
Component failure (Travel left ps. snr.)	Component failure (Travel right ps. snr.)
Communication failure (CCM)	Component failure (X2 pressure sensor)
Component failure (P1 pressure sensor)	Component failure (P2 pressure sensor)
Component failure (X1 flow ctrl. valve)	Component failure (X1 pressure ctrl. valve)
Component failure (X1 conflux sol)	



Check at next stop	
Component failure (Hammer select sol)	Component failure (Cooling fan ctrl. valve)
Component failure (Travel straight PPRV)	Component failure (Boom conflux cut-off sol)
Component failure (Boom float sol)	Component failure (Power boost sol)
Component failure (Cooling fan direction sol)	Component failure (Dozer select sol)
Component failure (Pump 1 PPRV)	Component failure (Pump 2 PPRV)
Component failure (Program memory)	Component failure (CCM system)
CCM System voltage high	CCM System voltage low
CCM faulty operation	Component failure (Cab interior temp. sensor)
Component failure (Ambient air temp. sensor)	Component failure (Evaporator temp. sensor)
Component failure (Air outlet temp. sensor)	Component failure (Climate control panel)
Component failure (Condensor)	System failure (AC system)
Communication failure	Component failure (Slave CPU)
System failure (Back-end configuration)	Component failure (SIM card)
Component failure (GPS antenna)	CareTrack system volt low



**70 Instrument panels  
Display unit**

<b>Check at next stop</b>	
CareTrack system volt high	Component failure (Engine air filter)
Engine coolant level below	System failure (Engine system)
Extreme driving conditions	System failure (Fuel system)
Engine oil level low	Engine oil pressure low
System failure (Engine oil system)	System failure (Start relay / harness)
System failure (Engine emission system)	
<b>Stop machine Check the component</b>	
Component failure (X1 ctrl. prop. switch)	Component failure (X3 ctrl. prop. switch)
<b>Check alternator</b>	<b>Check the component</b>
Battery is not charged	Component failure (Travel alarm relay)
<b>Check the back-up batt</b>	
Component failure (Back-up battery)	Component failure (Program memory)
<b>Wait for starter To cool down</b>	
Starter motor over heated	



**Warning**

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

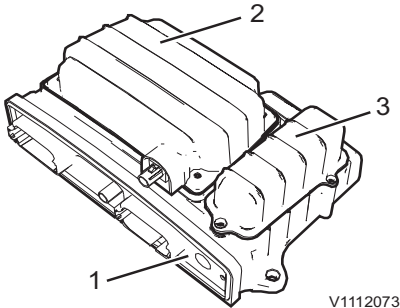
Stop machine Check the component	
Communication failure (IC)	Communication failure (GPMECU1)
Communication failure (ECM)	Communication failure (IC Ctrl. keypad)
Communication failure (WECU)	Communication failure (ACM)
Component failure (Battery relay)	System voltage high
System voltage low	Component failure (Pattern change signal)
Computer failure (Program memory)	Communication failure (HMICU)
Communication failure (Machine Ctrl. keypad)	Communication failure (X1 Elec pedal)
Component failure (X1 left PPRV)	Component failure (X1 right PPRV)
Component failure (X3 left PPRV)	Component failure (X3 right PPRV)
Component failure (X3 left sol)	Component failure (X3 right sol)





72 Instrument panels  
Display unit

<b>Stop machine</b> <b>Check the component</b>	
System failure (Engine system)	Boost temp. high Extreme driving conditions
Engine coolant temp. high Extreme driving conditions	Engine oil level low
Engine oil pressure low	Engine oil temp. high Extreme driving conditions
<b>Stop machine</b> <b>Refill coolant</b>	<b>Stop lifting</b> <b>Reduce load</b>
Engine coolant level below	Lifting pressure high
<b>Stop machine</b> <b>Check oil cooler system</b>	
Hyd. oil temp. high Extreme driving conditions	



V1112073

CareTrack unit

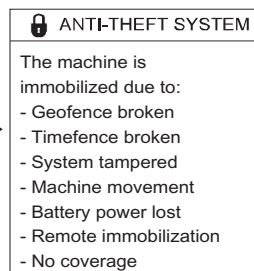
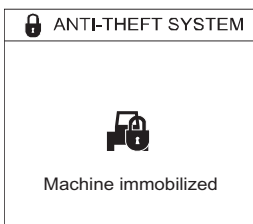
- 1 WECU
- 2 Satellite modem
- 3 Back-up battery

## CareTrack with anti-theft

### CareTrack with anti-theft (optional equipment)

CareTrack with anti-theft function works by WECU, web portal, Volvo's service tool (Tech Tool), GPMECU1, and IC (Instrument Cluster). The anti-theft function is to immobilize the machine according to the following conditions.

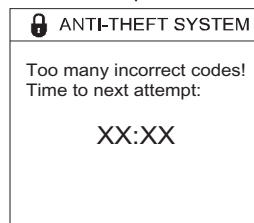
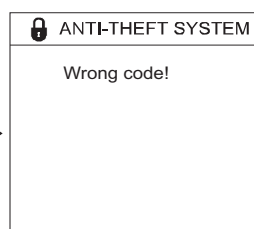
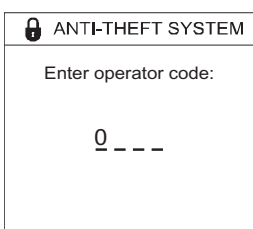
- Wrong code alarm
- Geofence broken
- Timefence broken
- System tampered
- Machine movement
- Battery power lost
- Remote immobilization
- No coverage
- ECU tampered



V1155509

### Machine immobilized information

This screen is to warn the operator when the machine is immobilized. To get more information about the message on the screen, press the SELECT button. To go back to the previous screen, press the ESC button.



V1137931

### Wrong code alarm

- When the machine is turned on, the authorization code display is shown if the anti-theft system is selected as an optional equipment. Wrong code display appears on the IC when the operator or machine owner has entered the wrong code. After 3 inputs of an incorrect code, the authorization will be limited for 5 minutes and a wrong code alarm will send to the CareTrack portal. The default code lock's delay time is 2 minutes and it can be changed with Volvo's service tool.

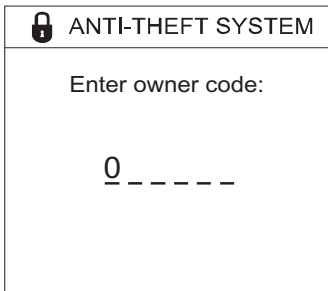
Enter operator code

Wrong code

Too many incorrect codes

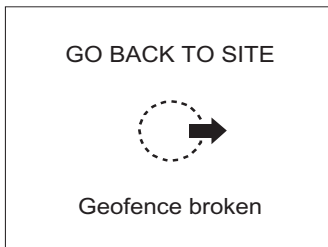
Time to next attempt

## 74 Instrument panels Display unit

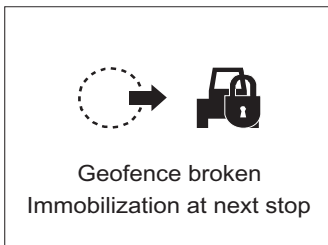


V1137932

Enter owner code



V1137933



V1137934

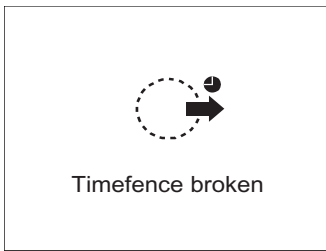
### NOTE!

When the delay time is shown, press and hold the SELECT button to enter the owner code.

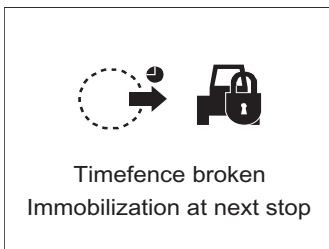
- There are 3 levels for authorizing machine operation.
  - Level 1: This is the operator code with 4 digits which are set by the machine owner in IC menu or CareTrack portal.
  - Level 2: This is a machine owner PIN code with 6 digits which are set using Volvo's service tool.
  - Level 3: This is a one-time code with 8 digits which are obtained from the CareTrack portal.

### Geofence broken

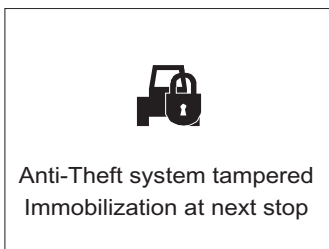
- When the machine owner activates a geofence in the CareTrack portal and the machine is outside the geofence, the geofence broken message will appear on the IC.
- When the machine owner activates a geofence and configures automatic immobilization in the CareTrack portal and the machine is outside the geofence, the geofence broken warning message will appear on the IC and the machine is immobilized at the next stop.
- WECU sends the warning message to the CareTrack portal.
- The warning condition is revoked when the machine is inside the geofence.



V1137935



V1137936



V1155538

### Timefence broken

- When the machine owner activates a timefence in the CareTrack portal and the machine is outside the timefence, the timefence broken message appears on the IC.

- When the machine owner activates a timefence and configures automatic immobilization in the CareTrack portal and the machine is outside the timefence, the timefence broken warning message appears on the IC and the machine is immobilized at the next stop.
- WECU sends the warning message to the CareTrack portal.
- The warning condition is revoked when the machine is inside the timefence.

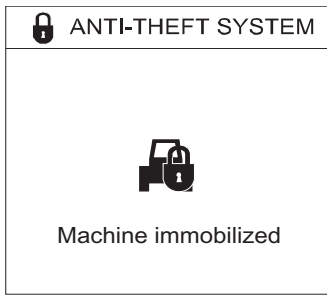
### System tampered

- GPS tampered
  - If the machine lost GPS antenna cable connection, the GPMECU1 informs the operator with the warning message on the IC and activates machine immobilization.
- GSM/3G tampered
  - If someone cuts the GSM/3G antenna, the GPMECU1 informs the operator with the warning message on the IC and activates machine immobilization.
- Open box detection
  - If someone tries to open the WECU enclosure, the GPMECU1 informs the operator with the warning message on the IC and activates machine immobilization.
- SIM card tampered
  - If someone removes or changes the SIM card, the GPMECU1 informs the operator with the warning message on the IC and activates machine immobilization.

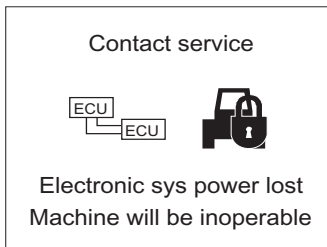
### NOTE!

WECU sends the warning message to the CareTrack portal.

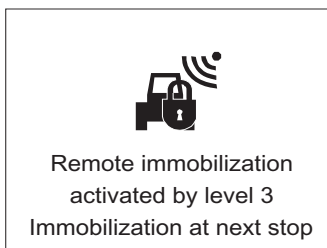
## 76 Instrument panels Display unit



V1139556



V1137938



V1137939



V1137940

### Machine movement

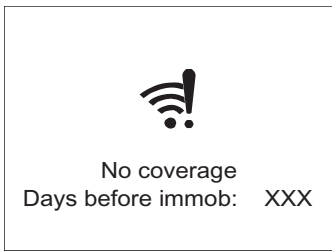
- If the machine moves 100 metres without its own power, the WECU detects the machine movement and the machine will be immobilized and WECU sends the warning message to the CareTrack portal.
- After the machine has been immobilized, the warning message will appear on the IC before the authorization code display.
- The machine owner or dealer can mobilize (de-immobilize) the machine with codes for Level 2 and Level 3.

### Battery power lost

- If the WECU is disconnected from battery power cable or detects the battery supply voltage lower than 8 V, the WECU operates on its own internal battery.
- The GPMECU1 activates machine immobilization and the red warning message will appear on the IC.
- WECU sends the warning message to the CareTrack portal.
- The warning condition is revoked when the trigger has disappeared.

### Remote immobilization

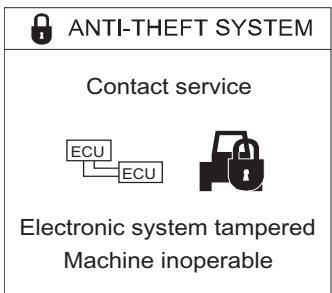
- If dealer (level 3 code owner) requests machine immobilization in the CareTrack portal, the remote immobilization warning message will appear on the IC and the machine is immobilized at the next stop.
- If machine owner requests machine immobilization in the CareTrack portal, the remote immobilization warning message will appear on the IC and the machine is immobilized at the next stop.



V1139554



V1137942



V1139558



V115510

### No coverage

- If the WECU has not been connected to the CareTrack portal for the number of days set by Volvo's service tool, the machine will be immobilized.
- The no coverage days warning will appear at every start with number of remaining days set by Volvo's service tool.
- The active trigger and no coverage counter can be reset using a one-time code or Volvo's service tool.
- If the machine gets a connection to the CareTrack portal, the machine will be mobilized (de-immobilized) and the coverage counter is reset.

### ECU tampered

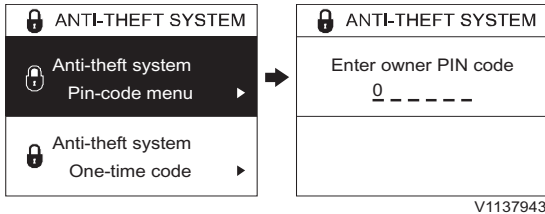
- When the machine is turned on, the WECU and GPMECU1 check the machine serial number of the other ECUs. If the machine's serial number is different, the GPMECU1 prevents machine start immediately and a warning message will appear on the IC.
- If the WECU is disconnected from key on cable and the machine is turned on, the GPMECU1 prevents machine start immediately and a warning message will appear on the IC.
- The warning condition is revoked when the trigger has disappeared.

## 78 Instrument panels Display unit

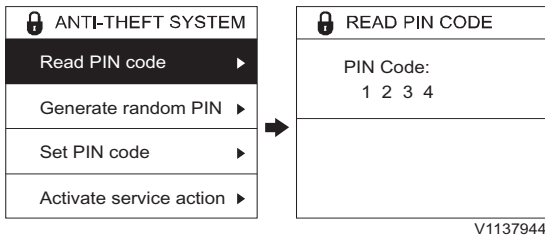
### Anti-theft system, setup menu

This menu is used for setting up the anti-theft system. This menu is divided into two sub-menus as follows.

- 1 **Pin-code menu:** The machine owner's PIN code is required to access this menu. (6 digits)

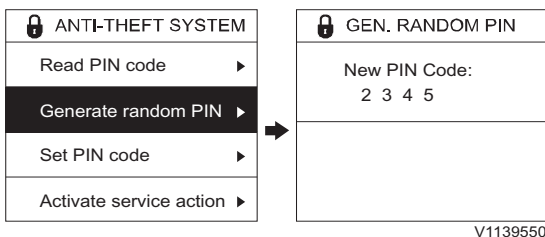


#### Enter owner PIN code



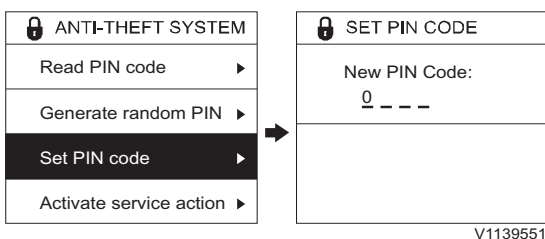
- **Read PIN code:** This sub-menu allows the machine owner to read the current PIN code. (4 digits)

#### PIN Code



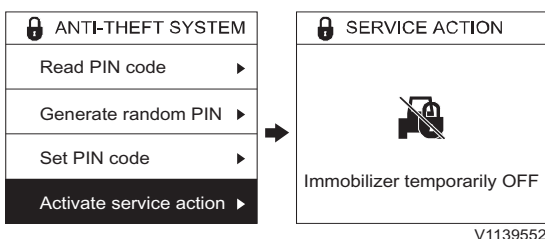
- **Generate random PIN:** This sub-menu allows the machine owner to generate a random PIN code. (4 digits)

#### New PIN Code



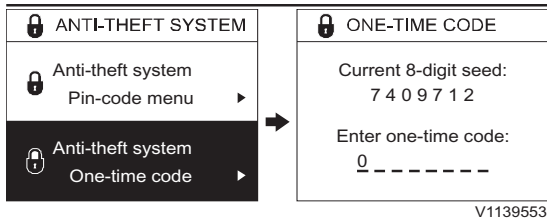
- **Set PIN code:** This sub-menu allows the machine owner to set a preferred PIN code. (4 digits)

#### New PIN Code



- **Activate service action:** This sub-menu is used for activating service actions such as moving the machine, replacing the machine battery and disconnecting the GPS antenna. This disables the anti-theft system except for remote immobilization, no coverage immobilization and machine serial number check, and the WECU informs the CareTrack portal. The anti-theft system will be activated when the ignition is turned on the next time.

#### Immobilizer temporarily OFF



Current 8-digit seed  
Enter one-time code

2 **One-time code:** This is used for setting a one-time code when the machine is immobilized with level 3 remote immobilization or no coverage warning condition. The machine owner gets the one-time code from the dealer. The dealer gets an 8-digit random code in the CareTrack portal with 8-digit seed (number shown on IC) and machine serial number.

### Alarm texts for anti-theft system

#### Information








- The blue information symbol is shown.
- The buzzer sounds two times.
- Alarm text is shown for seven seconds and then changes to operating display.

<p>GO BACK TO SITE</p> <p>Geofence broken</p> <p>V1137933</p>	<p>Timefence broken</p> <p>V1137935</p>	
<p>Go back to site Geofence broken</p>	<p>Timefence broken</p>	



**Check**

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

<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>Geofence broken Immobilization at next stop</p> <p style="font-size: small;">V1137934</p> </div> <p>Geofence broken Immobilization at next stop</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>Timefence broken Immobilization at next stop</p> <p style="font-size: small;">V1137936</p> </div> <p>Timefence broken Immobilization at next stop</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>Anti-Theft system tampered Immobilization at next stop</p> <p style="font-size: small;">V1155538</p> </div> <p>Anti-Theft system tampered Immobilization at next stop</p>
<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>No coverage Days before immob: XXX</p> <p style="font-size: small;">V1139554</p> </div> <p>No coverage Days before immob</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>No coverage Immobilization at next stop</p> <p style="font-size: small;">V1137942</p> </div> <p>No coverage Immobilization at next stop</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>Remote immobilization activated by level 3 Immobilization at next stop</p> <p style="font-size: small;">V1137939</p> </div> <p>Remote immobilization activated by level 3 Immobilization at next stop</p>
<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p>Remote immobilization activated by owner Immobilization at next stop</p> <p style="font-size: small;">V1137940</p> </div> <p>Remote immobilization activated by owner Immobilization at next stop</p>		



**Warning**

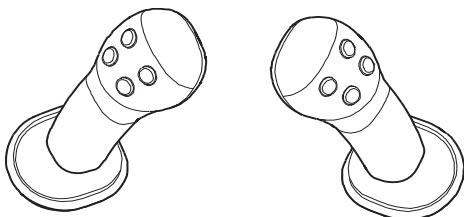
- The red central warning symbol is shown.
- The buzzer will sound until the required action has been performed.
- The alarm text will be shown until the required action has been performed.
- Repair or contact a workshop authorized by Volvo for information.

<p> ANTI-THEFT SYSTEM</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Machine immobilized</p> </div> <p style="text-align: right; font-size: small;">V1139556</p> <p>Machine immobilized</p>	<p> ANTI-THEFT SYSTEM</p> <p>The machine is immobilized due to:</p> <ul style="list-style-type: none"> <li>- Geofence broken</li> <li>- Timefence broken</li> <li>- System tampered</li> <li>- Machine movement</li> <li>- Battery power lost</li> <li>- Remote immobilization</li> <li>- No coverage</li> </ul> <p style="text-align: right; font-size: small;">V1155511</p> <ul style="list-style-type: none"> <li>- Geofence broken</li> <li>- Timefence broken</li> <li>- System tampered</li> <li>- Machine movement</li> <li>- Battery power lost</li> <li>- Remote immobilization</li> <li>- No coverage</li> </ul>	<p> ANTI-THEFT SYSTEM</p> <p>Contact service</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Electronic system tampered Machine inoperable</p> </div> <p style="text-align: right; font-size: small;">V1139558</p> <p>Contact service Electronic system tampered Machine inoperable</p>
<p> ANTI-THEFT SYSTEM</p> <p>Contact service</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Anti-Theft system tampered Machine immobilized</p> </div> <p style="text-align: right; font-size: small;">V1155510</p> <p>Contact service Anti-Theft system tampered Machine immobilized</p>	<p>Contact service</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Electronic sys power lost Machine will be inoperable</p> </div> <p style="text-align: right; font-size: small;">V1137938</p> <p>Contact service Electronic sys power lost Machine will be inoperable</p>	

82 Instrument panels  
Display unit

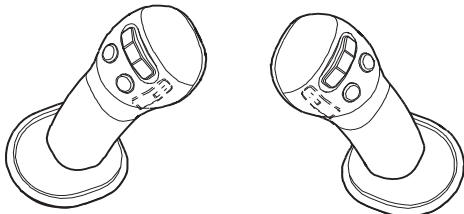
New X1 work tool
<input checked="" type="radio"/> Push
<input type="radio"/> Toggle
<input type="radio"/> Proportional

V1137912



V1065552

Control lever with on/off switch



V1065553

Control lever with proportional switch

## Control types for X1 and X3 operation

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 "Push" or "Toggle". Refer to page 99 for more details on optional levers.

- Push
- Toggle
- Proportional

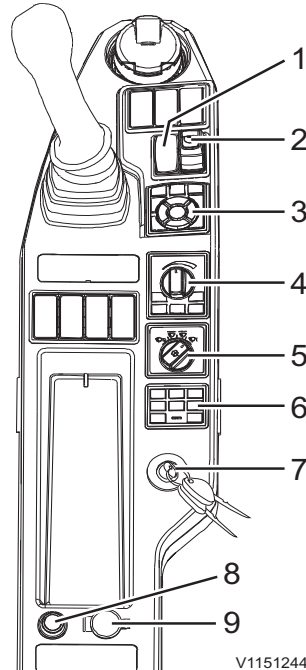
### Control using on/off switch on the control lever

- 1 Toggle type in the IC (Instrument Cluster)  
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 the IC (Instrument Cluster)  
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.

### Control using proportional switch on the control lever

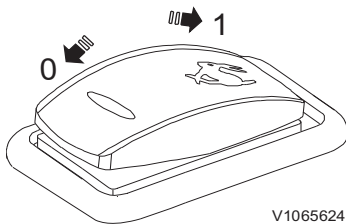
- 1 Toggle and Push-button type in the IC (Instrument Cluster)  
These controls with proportional switch are similar as the ones with on/off switch but it has a special point to activate the actuator because the proportional switch also has a proportional value.  
In toggle type, the actuator will be 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 the IC (Instrument Cluster)  
Actuator for X1 or X3 is activated proportional to the movement of the proportional switch.

## Instrument panel, right



V1151244

- 1 Travel speed switch
- 2 Attachment quick coupler switch, right (optional equipment)
- 3 IC (Instrument Cluster) control keypad
- 4 Machine control keypad
- 5 Wiper and washer control switch
- 6 Audio remote control switch with Bluetooth
- 7 Ignition switch
- 8 Cigarette lighter (optional equipment)
- 9 Power socket



V1065624

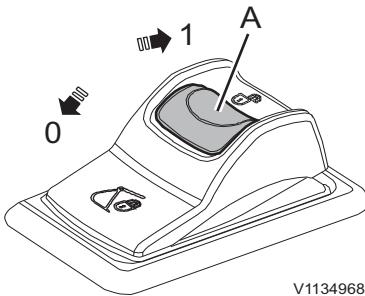
### 1 Travel speed switch

- Position 0: Travel at LOW speed only
- Position 1: Travel at LOW or HIGH by automatic shift according to travel condition

#### NOTE!

Stop the machine before selecting a different travel speed. Low speed should be selected for grades, on soft ground, in restricted spaces, and when the machine is loaded onto or unloaded from a transport vehicle.

## 84 Instrument panels Instrument panel, right



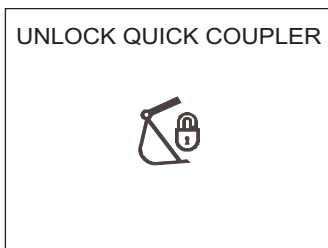
A Lock device

V1134968

### 2 Attachment quick coupler switch, right (optional equipment)

- Position 0: Attachment quick coupler, lock control
- Position 1: Attachment quick coupler, initiating control

Press down to release the red lock device (A) and then press the switch to position (1) to initiate the attachment quick coupler.



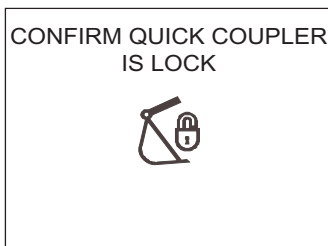
V1147253

Unlock quick coupler

When the attachment quick coupler is initiated, the buzzer sounds and the check message and indicator are displayed on the IC (Instrument Cluster).

#### NOTE!

The attachment quick coupler switch for activation on the left instrument panel must be pressed to open the attachment quick coupler. See page 38 for operation.



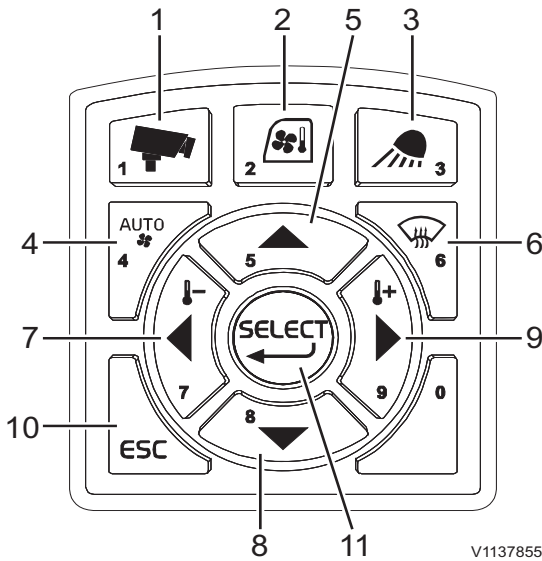
V1147255

Confirm quick coupler is locked

After installing the attachment quick coupler, press the switch to position (0) to close the attachment quick coupler. When the switch is in position (0), the buzzer sounds and the check message for confirming and indicator are displayed on the IC (Instrument Cluster).

#### NOTE!

Press the attachment quick coupler switch on the left instrument panel to confirm that the attachment quick coupler is locked. See page 38 for the operation.



- 1 Camera button
- 2 HVAC control button
- 3 Work lights control button
- 4 HVAC auto-mode select button
- 5 Arrow up button
- 6 Defroster select button
- 7 Arrow left button
- 8 Arrow down button
- 9 Arrow right button
- 10 ESC button
- 11 SELECT button

### 3 IC (Instrument Cluster) control keypad

#### 1) Camera button (if installed)

This button is used to control the camera screen in the IC (Instrument Cluster).

- A short press on the camera button shows the camera view with the gauges at the top of the screen.
- A long press on the camera button shows the camera configuration bar. For detailed information about camera control, see page 136.

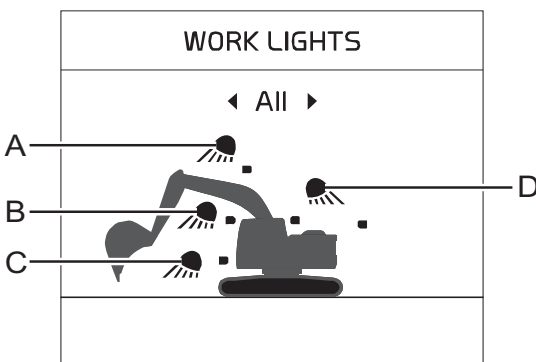
#### 2) HVAC control button

This button is used to control the HVAC system. See page 120.

#### 3) Work lights control button

This button is used to control the work lights on the boom, cab, deck, and counterweight.

- Press the button short to turn on or off the work lights. All settings remain if the system is turned off.
- Press and hold in the button to set the work lights. Use the arrow buttons to select the required work light, and then press the SELECT button on the IC control keypad to turn on or off the work light. When selecting "All", all work lights are turned on or off.



- A Boom work light
- B Cab front light
- C Deck work light
- D Cab rear and counterweight lights

**4) HVAC auto-mode select button**

This button is used to control the HVAC system. See page 120.

**5) Arrow up button**

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

**6) Defroster select button**

This button is used to activate the defroster. See page 120.

**7) Arrow left button**

This button is used to move the cursor to the left. Also press the button in order to decrease values.

**8) Arrow down button**

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

**9) Arrow right button**

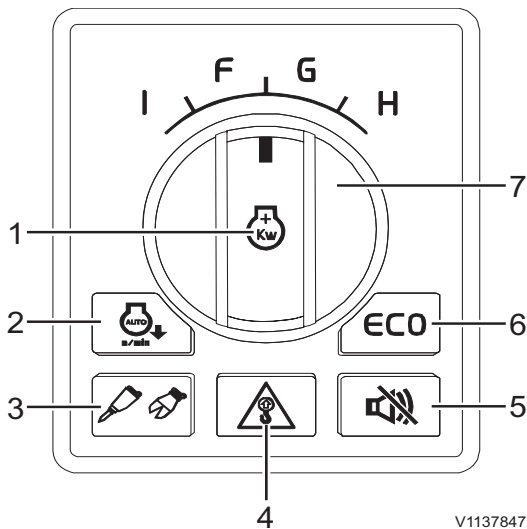
This button is used to move the cursor to the right. Also press the button in order to increase values.

**10) ESC button**

This button is used to go back to the previous screen or to cancel without saving. The ESC button is also used to turn off the warning light and sound.

**11) Select button**

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



- 1 Power max. mode switch
- 2 Auto idle button
- 3 Hammer/Shear button
- 4 Overload warning button
- 5 Travel alarm stop button
- 6 ECO button
- 7 Engine speed/Work mode control switch

#### 4 Machine control keypad

##### 1) Power max. mode switch

Press down this switch to activate power maximum mode.

**At step 9 of the engine speed control switch,**

Normal condition = H-mode

Press down the switch = P-mode

If the machine is not operated in 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 returns to P-mode again. In P-mode, it becomes H-mode if step 9 is selected after turning the engine speed control switch to another step.

##### 2) Auto idle button

Auto idle button activates or deactivates "Auto idle" function of the GPMECU1 (General Purpose Machine Electronic Control Unit1).

The engine speed will be reduced automatically to idle in order 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.

##### 3) Hammer/Shear button

This button is used to activate the hammer/shear function.

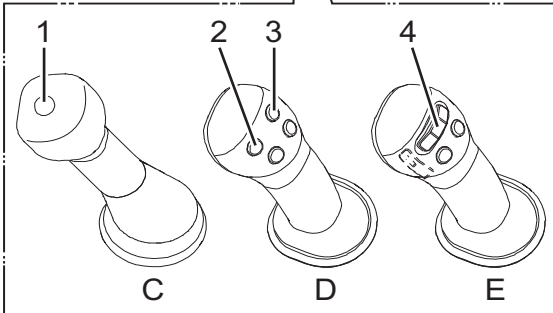
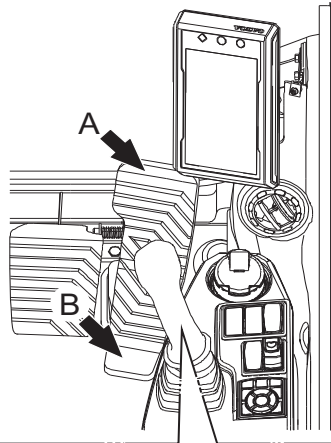
Before operating the functions below, the hammer/shear button should be activated.

#### NOTE!

This instruction can be changed according to the types of operating lever. For more information about operating levers, see page 99.



Instrument panels  
Instrument panel, right



V1137128

**NOTE!**

Select the X1 work tool on the IC (Instrument Cluster), see page 47 for details.

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

The pedal should be adjusted if it is used for hammer or shear. Refer to page 99 for details.

■ Hammer mode

Hammer will work when the pedal is pressed forward (A).

■ Shear mode

Shear will work when the pedal is pressed forward (A) or backward (B).

**If control lever with one button (C) is installed**

■ Hammer mode

Hammer will work when button (1) is pressed.

**NOTE!**

When the hammer/shear function is not activated if this button is pressed, the power boost will be activated.

**If control lever with four buttons (D) is installed**

■ Hammer mode

Hammer will work when button (2) is pressed.

**NOTE!**

There will be no response when button (3) is pressed.

■ Shear mode

Shear will work when button (2) or (3) is pressed.

**If control lever with proportional switch (E) is installed**

■ Hammer mode

Hammer will work when proportional switch (4) is moved to left side.

**NOTE!**

There will be no response when the proportional switch is moved to right side.

■ Shear mode

Shear will work when proportional switch (4) is moved to left or right side.

## Instrument panels Instrument panel, right

89

### 4) Overload warning button

Overload warning button activates or deactivates "Overload warning" function. This button is to display a symbol and to generate an 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 is also shown 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 shown. When reducing the load, the alarm and indicator will turn off.

### 5) Travel alarm stop button

Travel alarm stop button is used to activate or deactivate "Travel alarm" function of the GPMECU1 (General Purpose Machine Electronic Control Unit1). "Travel alarm" function is activated whenever the ignition switch is on.

#### NOTE!

When starting the machine travel, the travel alarm always sounds for 5 seconds even though the travel alarm stop function is activated.

### 6) ECO button

ECO function is a mode for fuel economy when working with the machine.

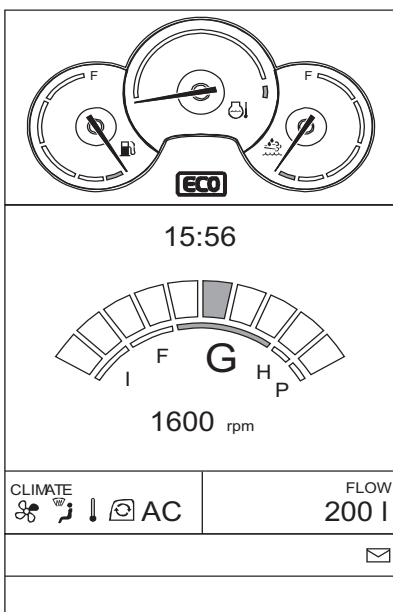
When pressing the ECO button on the keypad, then pump control works for fuel economy. The button will light up and also an ECO symbol is shown on the IC (Instrument Cluster) when activated. Press the button again to disable the function and the button light and symbol on the IC will turn off.

#### NOTE!

When the ignition switch is on, ECO mode is always activated automatically. (except North America region)

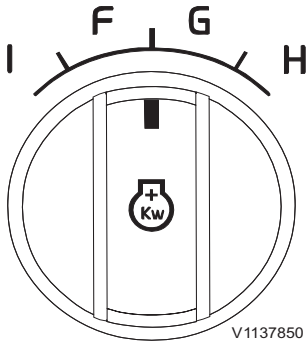
#### NOTE!

This mode is only available for P-, H-, G1-, G2-, G3-, and G4-mode of the engine speed/work mode control switch.



V1137848

90 Instrument panels  
Instrument panel, right



**7) 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, work mode will be set automatically and setting mode is displayed on the main screen in the front instrument panel.

**With P mode**

Switch step	Mode		Engine speed (no load/load) (±40 rpm)		Remarks
9	Power max.	P	Normal	2100 / 2000	For maximum productivity during hard digging and trenching
			ECO		
	Heavy	H	Normal	2000 / 1900	For moderately hard operations
			ECO		
8	General	G1	Normal	1900 / 1800	For economical operation during general applications
			ECO	1900 / 1710	
7		G2	Normal	1800 / 1700	
			ECO	1800 / 1615	
6		G3	Normal	1700 / 1600	
			ECO	1700 / 1520	
5		G4	Normal	1600 / 1500	
			ECO	1600 / 1425	
4	Fine	F1	Normal	1500 / 1400	For Maximum lifting power and moderate control
			ECO		
3		F2	Normal	1400 / 1300	
			ECO		
2	Idle	I1	Normal	1100 / 1000	For low idle, warm-up, and high-precision operation
			ECO		
1		I2	Normal	1000 / 900	
			ECO		

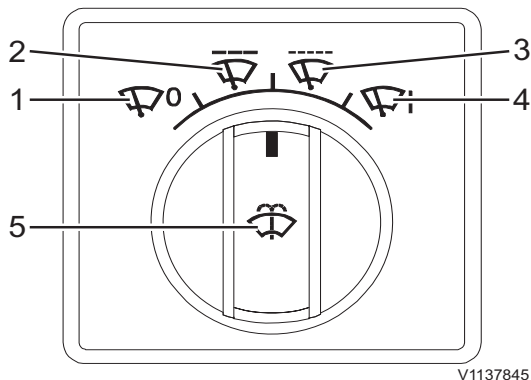


Instrument panels  
Instrument panel, right

Without P mode

Switch step	Mode			Engine speed (no load/load) (±40 rpm)	Remarks
9	Heavy	H	Normal	2100 / 2000	For maximum productivity during hard digging and trenching
			ECO		
8	General	G1	Normal	2000 / 1900	For economical operation during general applications
			ECO	2000 / 1805	
7		G2	Normal	1900 / 1800	
			ECO	1900 / 1710	
6		G3	Normal	1800 / 1700	
			ECO	1800 / 1615	
5		G4	Normal	1600 / 1500	
			ECO	1600 / 1425	
4	Fine	F1	Normal	1500 / 1400	For Maximum lifting power and moderate control
			ECO		
3		F2	Normal	1400 / 1300	
			ECO		
2	Idle	I1	Normal	1100 / 1000	For low idle, warm-up, and high-precision operation
			ECO		
1		I2	Normal	1000 / 900	
			ECO		

92 Instrument panels  
Instrument panel, right



V1137845

### 5 Wiper and washer control switch

Turn the wiper and washer control switch to the desired position.

#### 1) Wiper off

2) Wiper interval 1: After one operation, off for 5 seconds

3) Wiper interval 2: After one operation, off for 2 seconds

#### 4) Wiper continuous

5) Washer: Press down this switch to work the washer

### NOTICE

Do not keep the washer switch pressed in for more than 20 seconds. Do not use the washer, if the reservoir for washer fluid is empty.

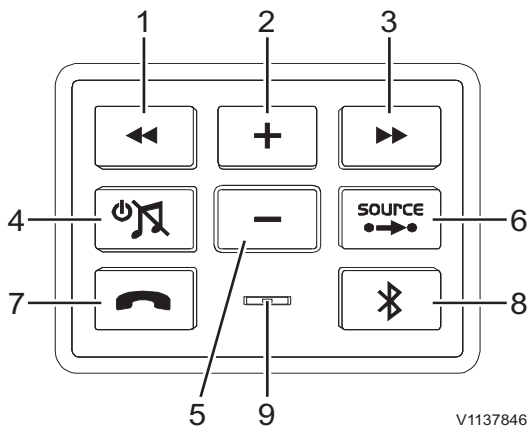
### NOTE!

When using the joystick shortkey;

- Press the joystick shortkey button briefly on the left control lever for the wiper operation.
- Keep pressing the button for the wiper and washer operation.

## Instrument panels Instrument panel, right

93



- 1 Auto-select channel button (downward)  
Music select button (backward)
- 2 Volume up button
- 3 Auto-select channel button (upward)  
Music select button (forward)
- 4 Power on/off, Mute toggle button
- 5 Volume down button
- 6 Source change button
- 7 Call button
- 8 Bluetooth button
- 9 Call mic

### 6 Audio remote control switch with Bluetooth

#### 1) Auto-select channel button (downward)

Press the button to search channels automatically. It searches the lower frequencies automatically and stops at a receivable frequency.

#### Music select button (backward)

It selects the previous song in the play list in your cell phone.

When music plays for more than 1 second, it turns back to the start of the song, and if you press the button again, it returns to the previous song.

#### 2) Volume up button

Press the button to increase the volume. Keep pressing it to increase volume gradually.

#### 3) Auto-select channel button (upward)

Press the button to search channels automatically. It searches the higher frequencies automatically and stops at a receivable frequency.

#### Music select button (forward)

It selects the next song in the play list in your cell phone.

#### 4) Power on/off, Mute toggle button

Press the button to turn On/Off the audio power and to change between Mute/Output.

- Press shortly → Mute/Press shortly → Unmute
- Keep pressing the button → Power off

#### 5) Volume down button

Press the button to reduce volume. Keep pressing it to reduce the volume gradually.

**6) Source change button**

By pressing the FM/AM button, the radio starts and radio modes change (RADIO/USB/AUX).

By pressing this button, you can change the source of music played by the audio system. When you press this button in Bluetooth mode, it changes into Connected Audio Control Mode.

**7) Call button**

Press Bluetooth (connected audio control mode) button for actions related to calls, including calling/hanging up/answering/rejecting.

When the phone rings, this button flashes green, and during a conversation, the light is on with fixed green.

- Not calling: Calling
- In calling: Hanging-up
- Flashing (phone ringing): Answering
- Keep pressing the button while flashing:  
Rejecting
- Call function of the button above calls the  
previous number

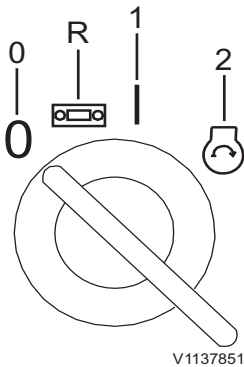
**8) Bluetooth button**

By pressing this button, the following functions will work according to the machine's Bluetooth connection status.

- Not connected: Requesting connection to the  
previously connected device
- Connected: Change to Bluetooth mode
- Keep pressing the button when connected:  
Disconnect Bluetooth

**9) Call mic**

When you talk using a hands-free device, you can hear a voice with this mic.



V1137851

- OFF position (0)
- Radio position (R)
- Operating (preheating) position (1)
- Start position (2)

## 7 Ignition switch

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

### OFF position (0)

Turn the ignition switch to position (0) to turn off engine.

### Radio position (R)

Turn the ignition switch to position (R) to turn on the radio.

### Operating (preheating) position (1)

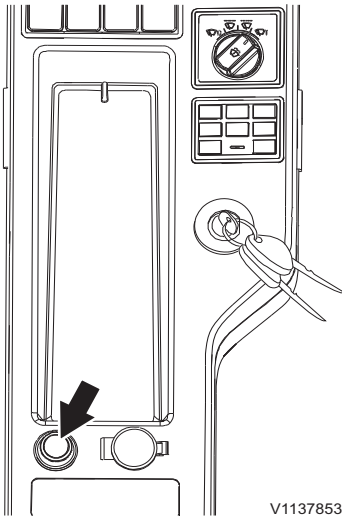
The machine is equipped with an automatic engine preheating system. When the ignition switch is turned to position (1), the vehicle's electronic system will be active, thus activating the automatic engine preheating system.

### Start position (2)

When the ignition switch is turned to position (2) the starter motor will be engaged to crank the engine, provided that the battery disconnect switch has been activated. The starter motor will not crank as long as the control lockout lever is in unlocked (up) position. Refer to page 114 for details on the control lockout lever.



Instrument panels  
96 Instrument panel, right

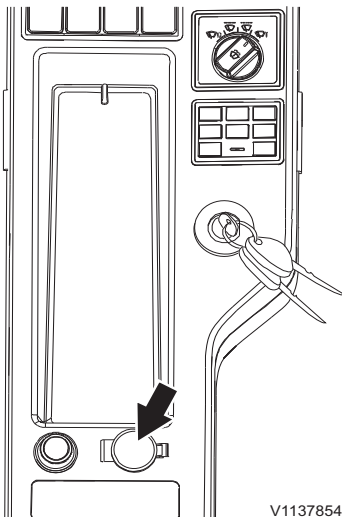


**8 Cigarette lighter (optional equipment)**

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

**NOTICE**

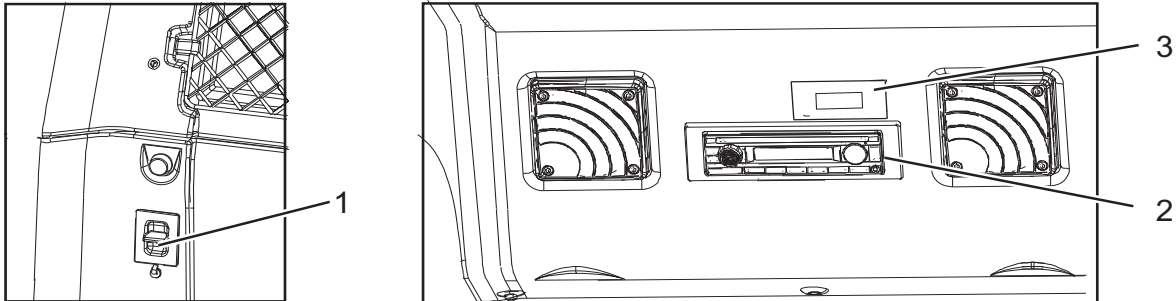
The voltage in the cigarette lighter socket is 24 V. Therefore, do not connect any 12 V appliances.



**9 Power socket**

This socket is for electrical appliances such as a mobile phone charger. Capacity: under 12 V (10 A)

## Instrument panel, rear



V1151245

- 1 Service socket
- 2 Audio system (optional equipment)
- 3 Auxiliary heater (optional equipment)

### 1 Service socket

This socket is for Volvo's service tools (MATRIS and Tech Tool).

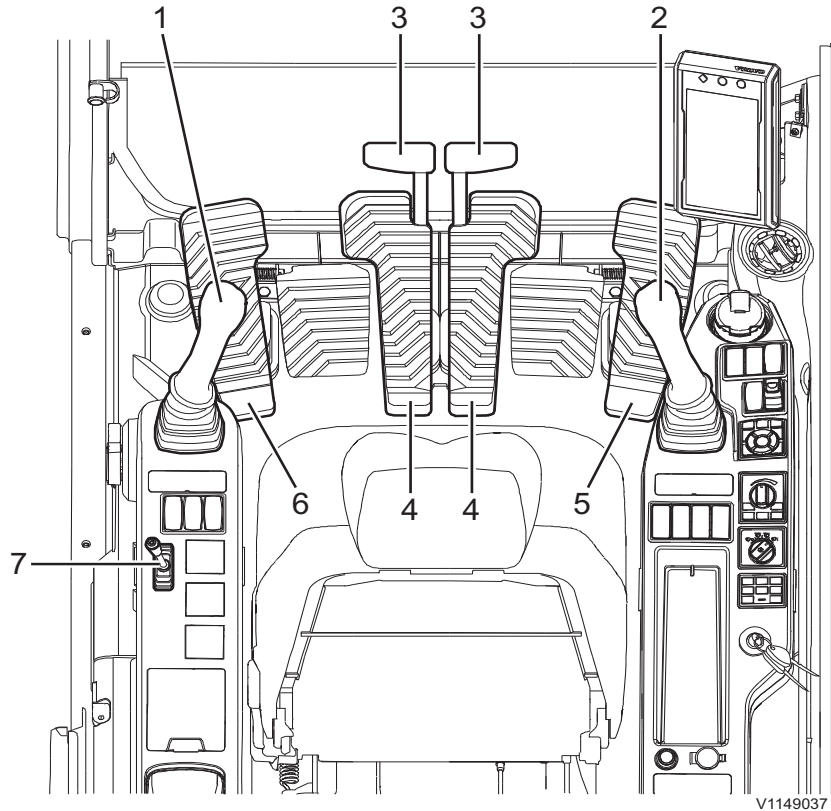
### 2 Audio system (optional equipment)

See page 130.

### 3 Auxiliary heater (optional equipment)

See page 138.

## Other controls



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 (Variable adjustable 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.

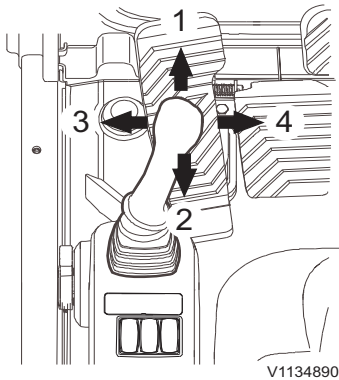
Some machines may have the optional pattern change valve. Refer to 99 for more details.

On machines equipped with the optional pattern change valve, the indicator of chosen pattern will be shown on the IC (Instrument Cluster).

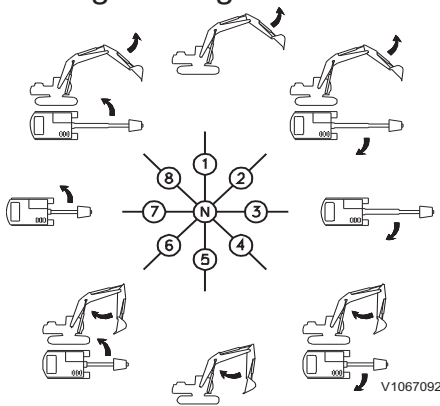
## Controls

### 1 Left control lever

This lever is for swing superstructure and moving dipper arm.



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

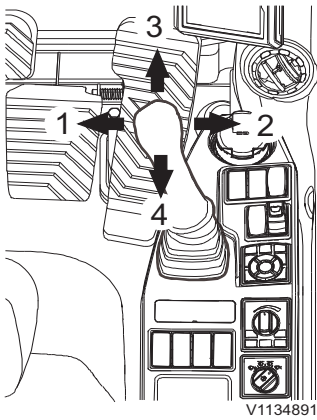


- N Neutral (superstructure and dipper arm in neutral position)
- 1 Dipper arm out
- 2 Dipper arm out and swing superstructure right
- 3 Swing superstructure right
- 4 Dipper arm in and swing superstructure right
- 5 Dipper arm in
- 6 Dipper arm in and swing superstructure left
- 7 Swing superstructure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

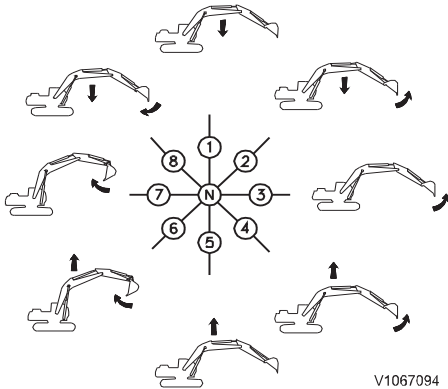
100 Other controls  
Controls

**2 Right control lever**

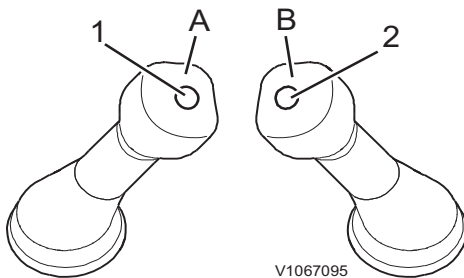
This lever is for moving boom and bucket.



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



- 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

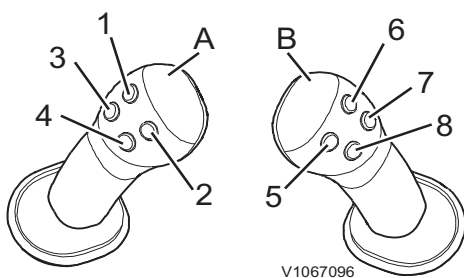


#### Control lever with one button

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

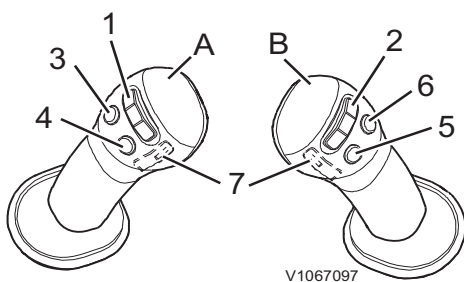
#### NOTE!

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 Joystick shortcut button
- 5 Hammer/shear button
- 6 Shear/unassigned
- 7 Float button
- 8 Boost button



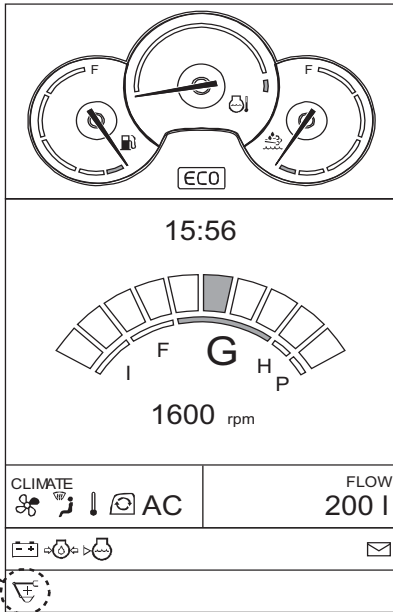
#### Control lever with three buttons and proportional switch

- A Left operating lever
- B Right operating lever
- 1 Proportional switch (rotator)
- 2 Proportional switch (hammer/shear)
- 3 Horn button
- 4 Joystick shortcut button
- 5 Boost button
- 6 Float button
- 7 Unassigned

#### NOTE!

Before operating the control levers for X1 or X3 operation, make sure to read and understand the different control types for the different buttons and switches, refer to page 82 for details.

102 Other controls  
Controls



V1134892

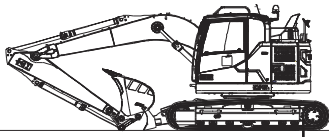
Indicator for power boost

**Power boost function**

The power boost is designed to increase dipper 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.

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



A V1154224

A Sprocket

- 3 Travel levers
- 4 Travel pedals

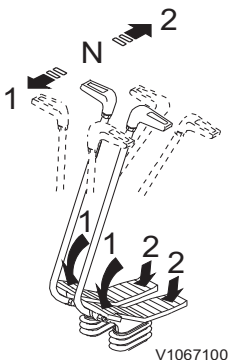
These are used to move and stop the machine.

**NOTICE**

In this Operator's Manual front, forward, rear, rearward, right and left are based on the premiss that the sprockets are placed behind the cab. Pay attention to this before control levers and pedals are used.

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. Otherwise, track rollers and idlers could be overheated and lead to oil leakage. <b>NOTE!</b> Travel the machine to forward direction (to idler side) to reduce wear to moving parts of the undercarriage.
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. Otherwise, track rollers and idlers could be overheated and lead to oil leakage. <b>NOTE!</b> Travel the machine to forward direction (to idler side) to reduce wear to moving parts of the undercarriage.



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.



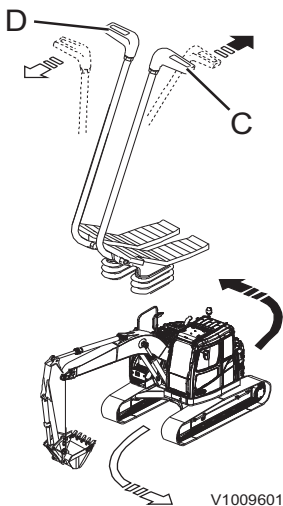
**NOTE!**

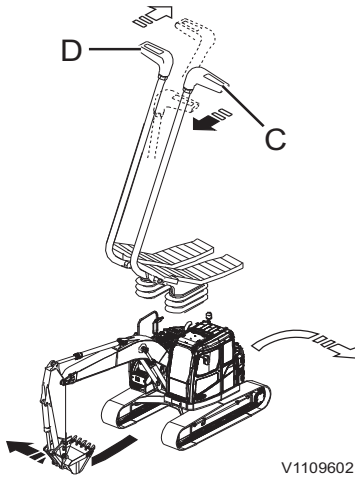
When the sprockets are at the front side of the machine, the machine will be moved to the opposite direction as to above.

- 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.

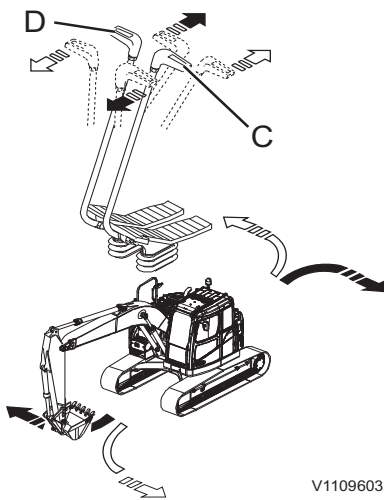




V1109602

### Right turn

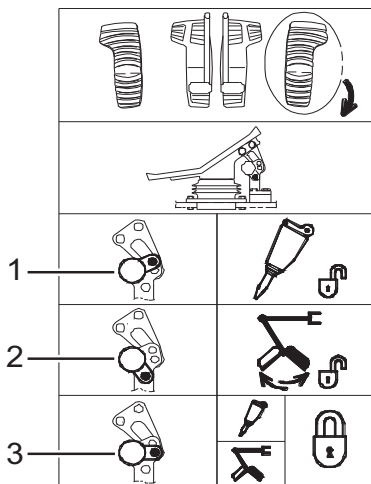
- 1 When the sprockets are at the rear side of the machine  
Push the left lever (C) forward, the L/H track rotates forward and the machine travels forward as it turns to the right.  
Pull the right lever (D) backward, the R/H track rotates in reverse and the machine travels backward as it turns to the 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.



V1109603

### 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.



V1067111

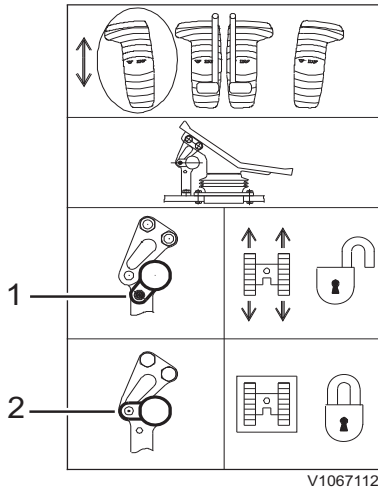
### 5 Optional pedal (X1)

- Position 1: Operating hammer  
Position 2: Operating shear or crusher  
Position 3: Lock the pedal

### NOTICE

Make sure that the pedal is in locked position when it is not used in order to prevent unwanted manoeuvres.

106 Other controls  
Controls



V1067112

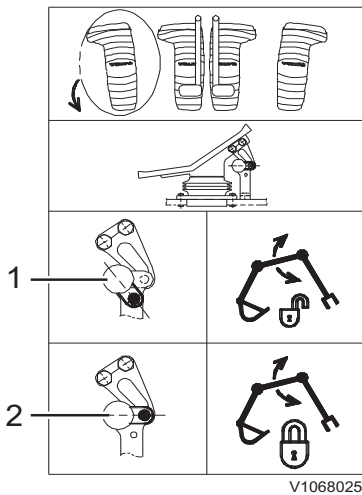
### 6 Optional pedal (straight travel)

Position 1: Operating straight travel

Position 2: Lock the pedal

#### **NOTICE**

Make sure that the pedal is in locked position when it is not used in order to prevent unwanted manoeuvres.



V1068025

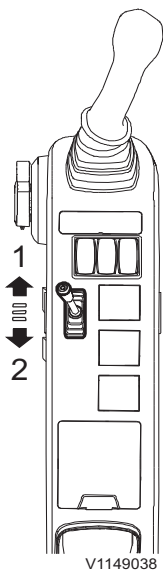
### Optional pedal (Variable adjustable boom)

Position 1: Operating variable adjustable boom

Position 2: Lock the pedal

#### **NOTICE**

Make sure that the pedal is in locked position when it is not used in order to prevent unwanted manoeuvres.



V1149038

### 7 Dozer blade lever (optional equipment)

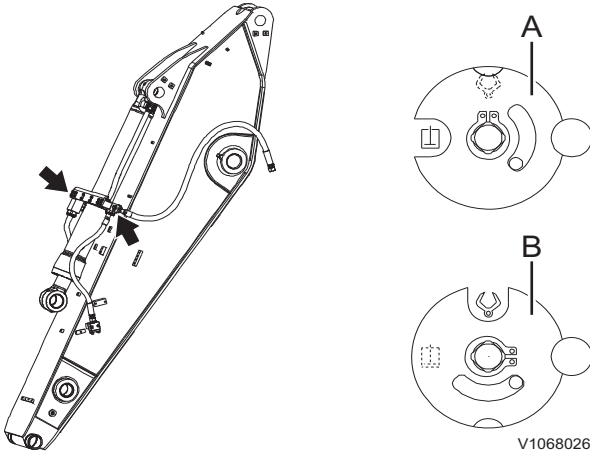
Position 1: Dozer blade lower

Position 2: Dozer blade raise

## Optional parts

### Bucket/grapple valve position

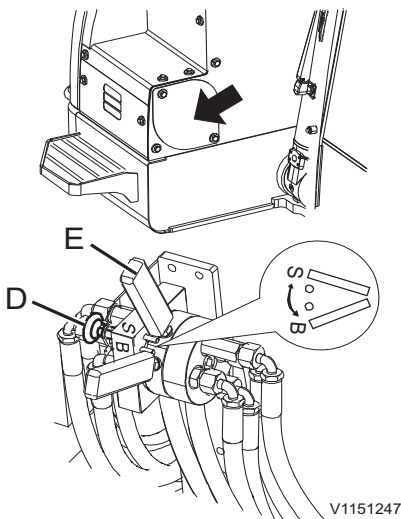
Select the correct position by turning the nut with a wrench.



- A Bucket position
- B Grapple position

### Changing control pattern of the machine (optional equipment)

- Position S: ISO/SAE type
- Position B: Backhoe loader type



### **WARNING**

Risk of serious accidents.  
Unfamiliar control patterns could cause confusion and accidents resulting in serious injury.  
**Use extreme caution when using the control levers after changing the control pattern and until you become familiar with the new pattern.**

### **NOTICE**

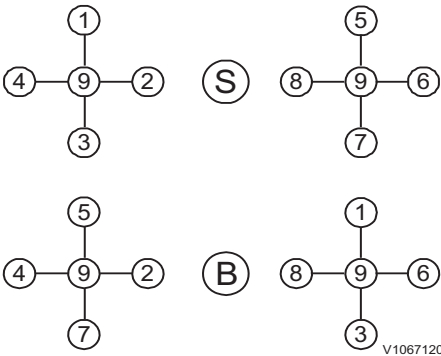
Selected control pattern is shown on the front instrument panel. It is important to check this before using the machine.

108 Other controls  
Controls

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).

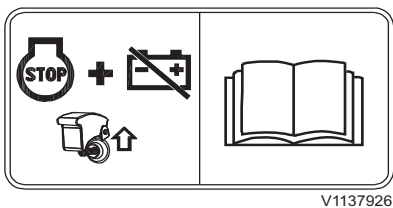
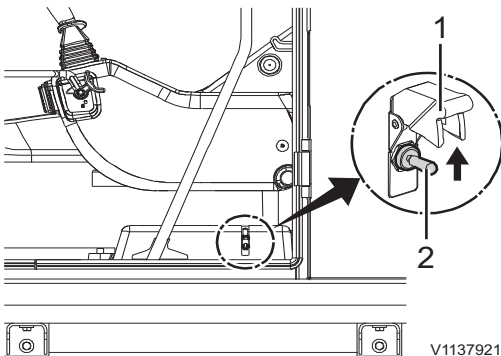
Use the following procedure to change the position of the pattern change valve (The standard position of machine is ISO/SAE pattern type (S)).

- 1 Pull the knob (D) 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>V1067121 Dipper arm out (1): Move the control lever to this position in order to move the dipper arm outwards.</p>	<p>V1067122 Swing right (2): Move the control lever to this position in order to swing the superstructure to the right.</p>	<p>V1067123 Dipper arm in (3): Move the control lever to this position in order to move the dipper arm inwards.</p>
<p>V1067124 Swing left (4): Move the control lever to this position in order to swing the superstructure to the left.</p>	<p>V1067125 Boom lower (5): Move the control lever to this position in order to lower the boom.</p>	<p>V1067126 Bucket dump (6): Move the control lever to this position in order to dump the bucket.</p>
<p>V1067127 Boom raise (7): Move the control lever to this position in order to raise the boom.</p>	<p>V1067128 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>



## Emergency stop switch

### NOTE!

Emergency stop switch must be used only in case of emergency situation.

If it is abused or misused by the operator, it could cause serious failure of the engine and machine. Never use the emergency stop switch for the purpose of shutting off the normal machine.

Turn the ignition switch to the OFF position. If the engine does not stop or in emergency, perform the following procedure.

- Open cover (1) and push switch (2) upward to stop the engine.

### NOTE!

This switch turns off the engine as well as the battery disconnect switch at the same time.

- Return the switch to the original position. The engine will be enabled to start.

### NOTE!

Do not operate the machine again until the malfunction has been corrected.



## Cab

### ROPS (Roll Over Protective Structure)

The cab is designed to ensure minimum crash protection space according to ROPS standard for excavator (ISO12117-2).

The installation of any additional equipments resulting in exceeding maximum tested machine weight on a ROPS identification plate, may void ROPS certification.

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

If any part of the cab's protective structure is affected by plastic deformation or failures, the cab shall be replaced immediately.

#### NOTE!

Never carry out any unauthorized alterations to the cab, for example lowering the roof height, drilling, welding on brackets for fire extinguisher, radio aerial or other equipment, without first having discussed the alteration with personnel at the Volvo Engineering Department. This department will decide whether the alteration may cause the approval to become void.

It is important that all parties concerned are aware of these regulations.



### 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.

#### FOG (Falling Object Guard) and FOPS (Falling Object Protective Structure)

FOG and FOPS should be adopted when the machine is expected to work in an area where materials are capable of falling to the cab. Especially, in mining applications, FOG shall be adopted.

#### Safety net

Install safety net to minimize the possibility of breaking windshield when working with a breaker.

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

Any damage can affect the strength of the structure. Contact authorized Volvo dealer for repairing safety structure after damage.

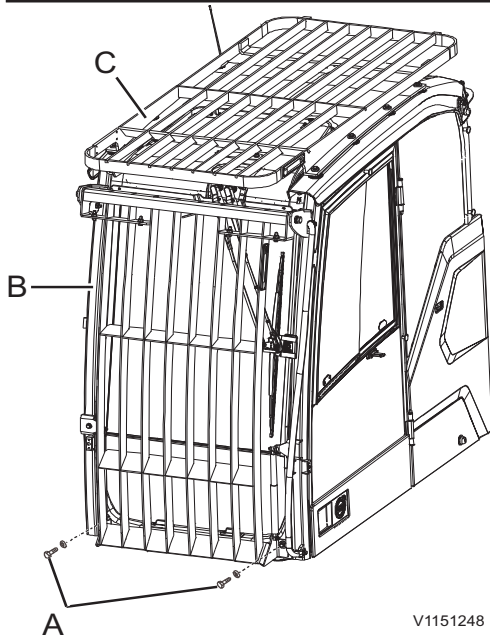
Prevent persons from entering or remaining in the dangerous area.

### **NOTICE**

Check the clearance between bucket and cab or spill guard by carefully moving the bucket as close to the cab as possible. The risk of the bucket knocking against the cab is greater if attachment quick coupler is used or if the bucket is provided with lifting eyes.



112 Other controls  
Cab



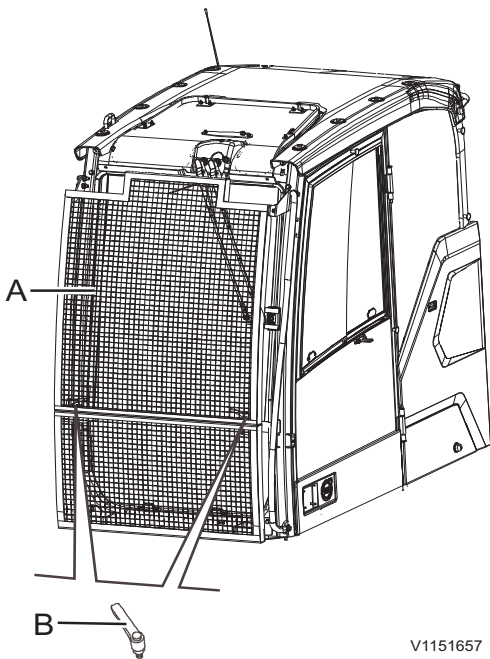
V1151248

- A Screws
- B+C FOG
- C FOPS

**Windshield with FOG, cleaning**

- 1 Remove the screws (A), and then tilt the FOG.
- 2 Clean the windshield.
- 3 Fasten the screws (A) with regulated torque by pushing the FOG. ( $48 \pm 5\text{Nm}$  /  $4.89 \pm 0.5 \text{ kgf m}$  /  $35.5 \pm 3.6 \text{ lbf ft}$ )

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

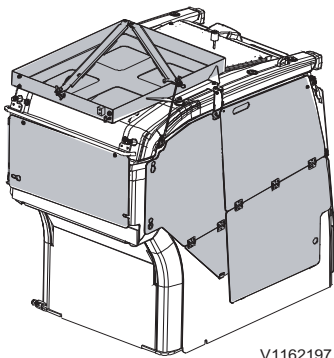
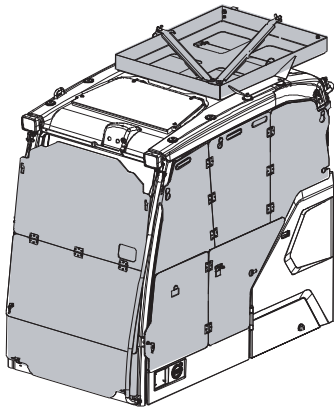


V1151657

- A Safety net
- B Handle

**Windshield with safety net, cleaning**

- 1 Remove the handle (B), and then take away the net.
- 2 Clean the windshield.
- 3 Install the net.
- 4 Fasten the handle (B) by pushing the net.



V1162197

### Anti-vandal kit (optional equipment)

**NOTE!**

Clean mud, grease, oil, and debris from track surface, steps, walkways, and working platforms before installing the anti-vandalism covers.

Anti-vandal covers are stored on the cab.

Brackets are needed to install the covers.

## Control lockout system

### WARNING

Risk of serious injury.

Uncontrolled touch of control lever can cause unexpected movement of machine or parts. This could result in serious injury.

**Always lock the control lockout lever before starting the engine or before leaving the operator's seat.**

#### Unlocked position (A)

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

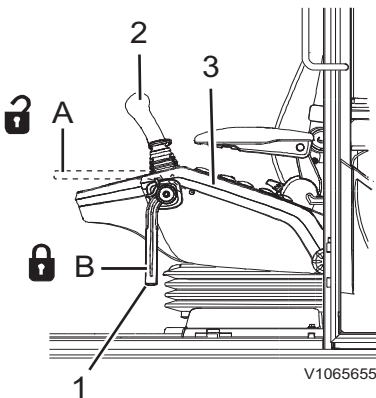
**When the control lockout lever is in this position the engine can not be started.**

#### 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.**



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

## Operator comfort

### Operator seat

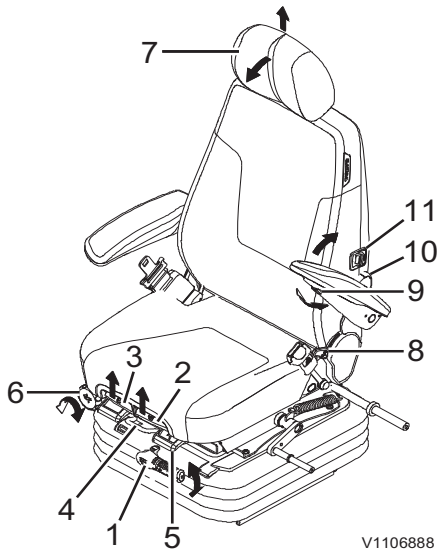
The operator seat meets the requirements according to EN ISO7096. The operator seat is designed to provide maximum comfort and reduce vibration to the operator during normal machine operation.

**NOTE!**

Adjusting the seat should always be done when the machine is stationary.

**NOTE!**

Make sure that no objects are placed within the moving area of the operator's seat.



V1106888

- 1 Weight adjustment
- 2 Fore & aft adjustment, seat cushion
- 3 Angle adjustment, seat cushion
- 4 Horizontal adjustment, top seat
- 5 Horizontal adjustment, top seat and consoles
- 6 Height adjustment, consoles
- 7 Headrest adjustment
- 8 Backrest angle adjustment
- 9 Armrest adjustment
- 10 Lumbar support adjustment
- 11 Seat heating switch

**WARNING**

Risk of serious injury.

Uncontrolled touch of control lever can cause unexpected movement of machine or parts. This could result in serious injury.

**Always lock the control lockout lever before starting the engine or before leaving the operator's seat.**

**NOTICE**

Installation and maintenance of the operator seat may only be carried out by authorised and competent personnel.

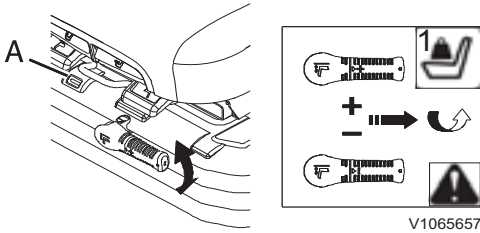
**NOTICE**

To obtain maximum comfort and eliminate the risk of accidents, you must make sure that all seat adjustments have been carried out correctly before starting the machine.

**NOTE!**

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

116 Other controls  
Operator comfort



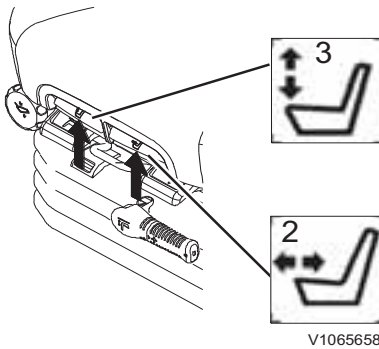
V1065657

A Ride indicator

## Mechanical suspension seat

### 1 Weight adjustment

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



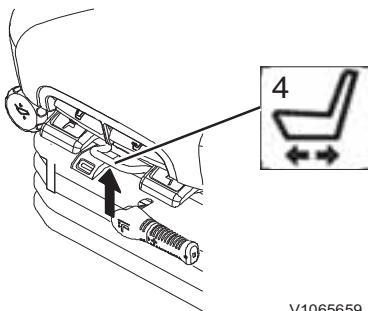
V1065658

### 2 Fore & aft adjustment, seat cushion

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

### 3 Angle adjustment, seat cushion

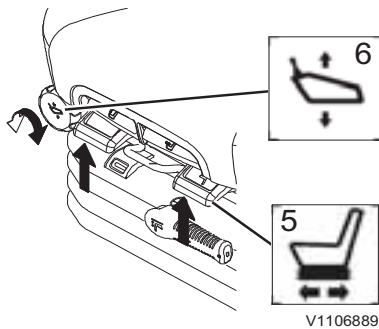
Lift the lever (3) and adjust the angle of the seat cushion. It may be necessary to reduce occupant pressure on the seat cushion when performing this adjustment.



V1065659

### 4 Horizontal adjustment, top seat

It is possible to move the seat forwards and backwards relative to the control consoles. Lift the 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.

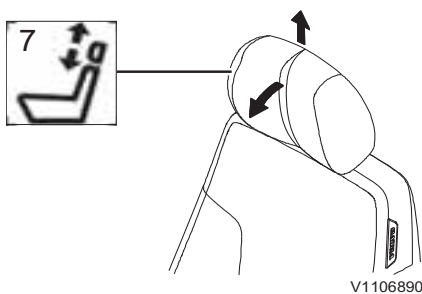


### 5 Horizontal adjustment, top seat and consoles

The seat and the consoles can be adjusted forwards and backwards. Lift the 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.

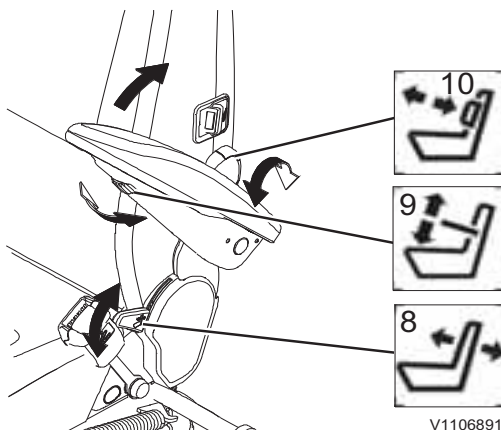
### 6 Height adjustment, consoles

Rotate the handle (6) and adjust the height of the control consoles.



### 7 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.



### 8 Backrest angle adjustment

Pulling up the control handle (8) 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 to possible to move the backrest into another position when it is locked.

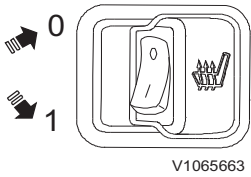
### 9 Armrest adjustment

Inclination of the armrest can be changed by turning the adjustment knob (9) mounted on the underside of the armrest. The armrests can be manually tipped up if required.

### 10 Lumbar support adjustment

Rotate the knob (10) 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.

118 Other controls  
Operator comfort



- 0 Seat heating, OFF
- 1 Seat heating, ON

11 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 26 °C (79 °F). The seat heating stops when the temperature is up to 36 °C ( 97 °F), and will activate again when the temperature turns down under 26 °C (79 °F) again.

**NOTICE**

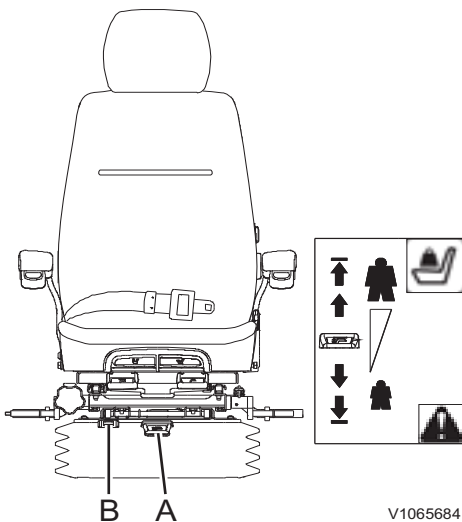
To reduce the risk of fire the seat heating must be switched off before you leave the seat.

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,

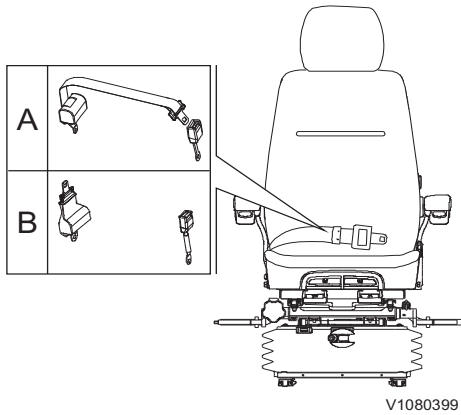
- 1 Turn the ignition switch "ON" or start engine.
- 2 Lift operator's weight off the seat.
- 3 Lift and hold the lever (A) until air bag is completely inflated.
- 4 Sit and push down the lever (A) to deflate.
- 5 Stop deflating when seat starts lowering. The set weight should be within the green zone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



- A Adjusting lever
- B Ride indicator

**NOTE!**

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



A Retractable type (2 inches)  
B Retractable type (3 inches)

## Seat belt

Fasten your seat belt when you start and do any operation.

### NOTE!

A seat belt that is damaged or has been stretched in an accident must be replaced immediately.

- Modifications to the belt or its mountings are not permitted.
- The belt is intended for one adult person only.
- 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.

## NOTICE

There is a knife on the hammer for the emergency exit. Cut off the seat belt with the knife, if the buckle cannot be undone.



## Climate control system

### HVAC system (Heating, Ventilation, Air Conditioning)

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

#### 1) HVAC control button

- Press the button briefly to turn on/off the HVAC system. All settings remain if the system is turned off.
- Press and hold in the button to setup the HVAC system.

#### NOTE!

Even if the HVAC system is turned off, when CCM (Climate Control Module) gets an auxiliary heater signal, the CCM turns on the cooling fan setting 1st step in manual mode.

#### 2) Arrow up button

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

#### 3) Defroster select button

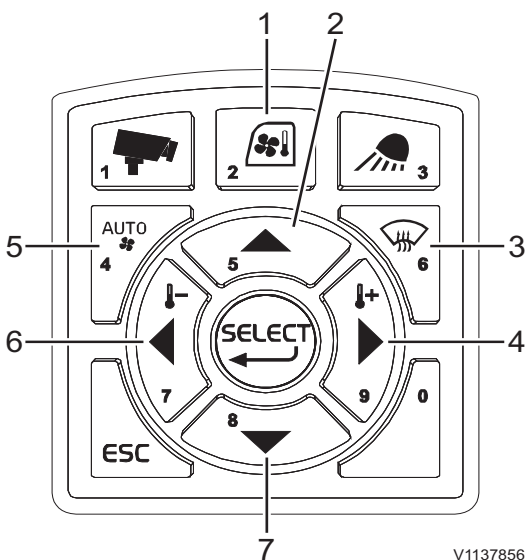
Press the button to activate the defroster. Fresh air mode is selected automatically. In auto mode, if this button is pressed, mode shall change to manual mode.

#### NOTE!

After 20 minutes, this setting is automatically returned to the previous mode.

#### 4) Arrow right button

This button is used to scroll between items and adjust each segment on the screen. Press this button in order to increase the temperature.



### 5) HVAC auto-mode select button

This button is used to select the auto-mode for temperature setting. Required temperature can be changed on the setup menu.

### 6) Arrow left button

This button is used to scroll between items and adjust each segment on the screen. Press this button in order to decrease the temperature.

### 7) Arrow down button

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

### HVAC setup

Press and hold in the HVAC control button (1) to setup the HVAC system.

#### A) Climate mode selection

This is for selecting climate mode. (auto, manual, or defrost)

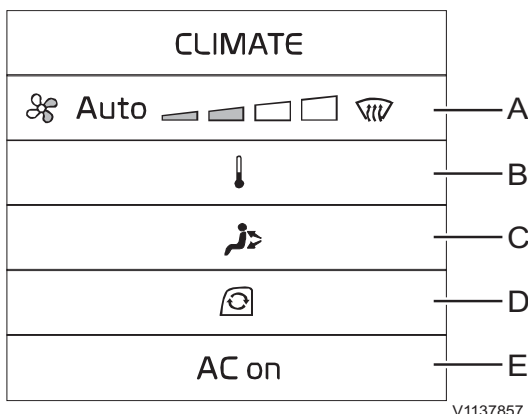
Mode selection and fan speed in manual mode are controlled with the arrow left or arrow right button.

#### B) Temperature control

■ **Auto mode:** Temperature can be adjusted with the arrow left or arrow right button. Default setting value is 22°C (71.6°F) and the setting range is 16°C ~ 32°C (60.8°F ~ 89.6°F). If the temperature sensor in cab fails, auto mode shall turn off.

**See page 47 for details on how to change the temperature unit from degrees Centigrade to Fahrenheit.**

■ **Manual mode:** Temperature is divided into 8 steps and it can be adjusted with the arrow left or arrow right button. According to the selected step, the temperature will be changed automatically.



V1137857



122      Other controls  
Operator comfort

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**C) Air flow direction**

This is for selecting the direction of the air flow.

**D) Air flow circulation**

This is for selecting the circulation of the air flow.  
(recycle the air inside the cab or draw fresh air from the outside into the cab)

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

**E) Air conditioner on/off**

This is for turning the air conditioner on/off.

## Windows

### Front windshield, opening

#### **NOTICE**

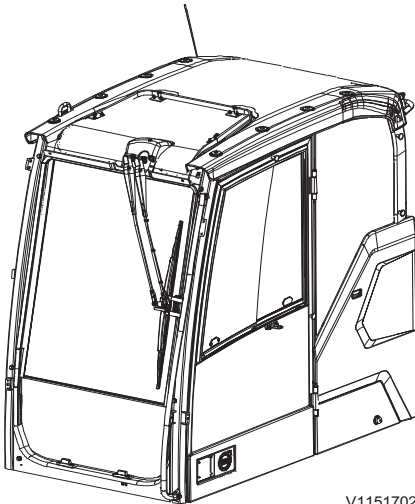
Move the control lockout lever down to its lower position before you open or close the windscreen.

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

#### **NOTE!**

Stop lifting as soon as the windshield is unlatched.

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



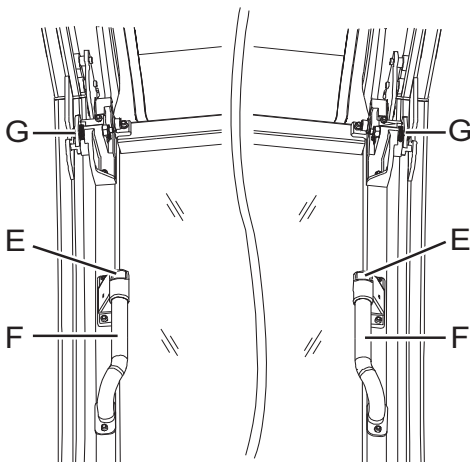
V1151702

#### **NOTICE**

If the windscreen is cracked, it must be replaced immediately. Only use windscreens recommended by Volvo. Get in touch with your dealer.

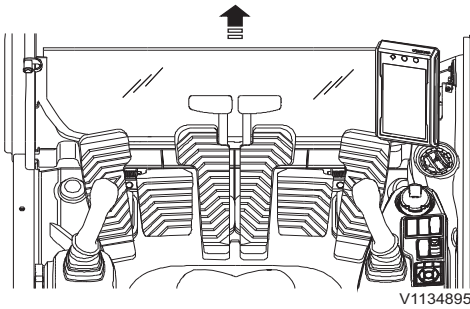
### Front windshield, closing

- 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 windshield out of the lock position.
- 3 Grip handle (F) only and pull the windshield downward slowly.
- 4 Fix the windshield securely and tighten in the locked position (G).



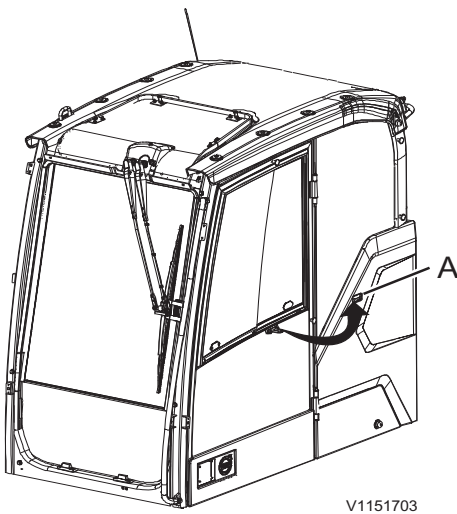
V1065687

Other controls  
124 Operator comfort



**Lower window, removing**

- 1 Open the front windshield.
- 2 Grip the upper part of lower windshield with both hands and pull it upward.
- 3 Put the removed windshield in safety place.

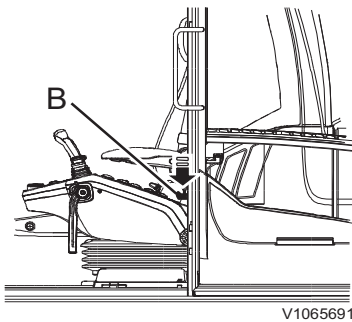


**Door**

Door lock (A) is used to keep the cab door secure in the open position.

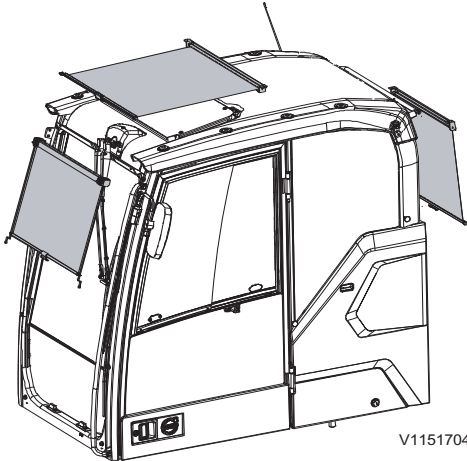
- 1 Push the door against outside of the cab.
- 2 Ensure it is securely fixed to the lock (A)

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



## Sun shade

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



V1151704

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

## Rain shield

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

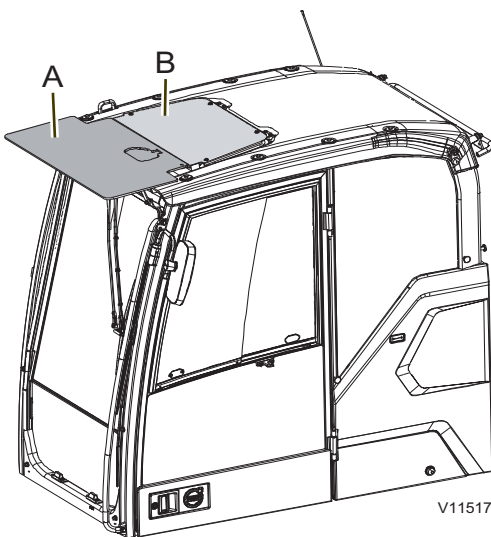
### **NOTICE**

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.

### Sunlight protection

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

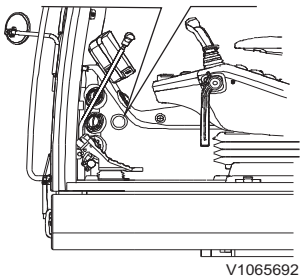
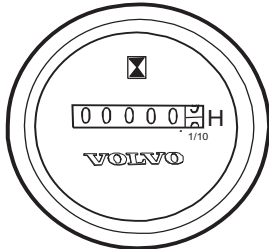
When installing the sunlight protection roof, consider other optional equipments, for example, rain shield, anti-vandal kit and so on.



V1151705

- A Rain shield
- B Sunlight protection

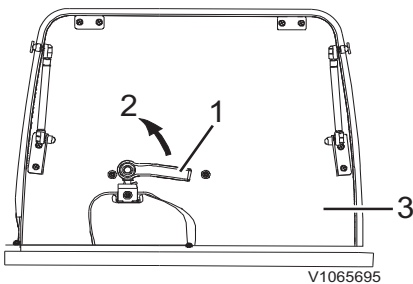
126 Other controls  
Operator comfort



V1065692

## 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.



V1065695

- 1 Handle
- 2 Open direction
- 3 Roof hatch

## Roof

### Roof hatch, open

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

### **NOTICE**

The roof hatch must be securely locked when transporting.

### **NOTE!**

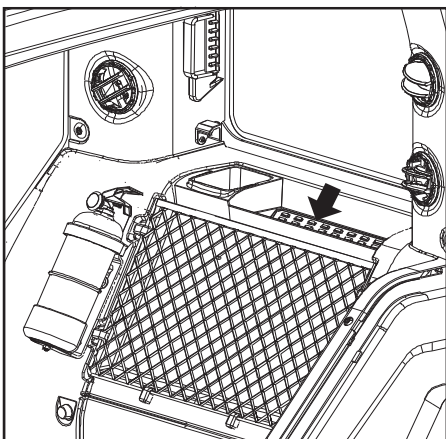
Cab with fixed roof hatch is provided as an optional equipment. In this case, there is no handle and gas spring.

## Storage compartment

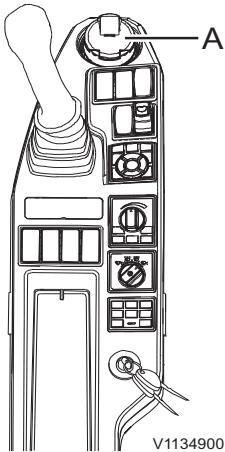
A storage compartment is located at the rear side of operator seat.

### **NOTE!**

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



V1151747



### Ashtray (optional equipment)

Pull the top edge of the ashtray (A) in order to open it.

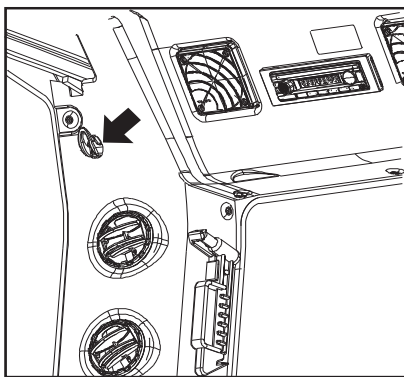
Pull the ashtray upward out of the console when cleaning it.

**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.



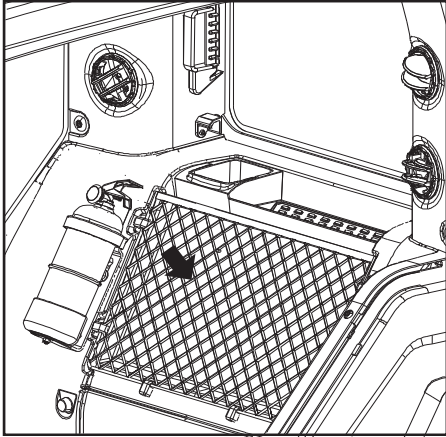
### Coat hook

The coat hook is inside the cab.

**NOTE!**

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

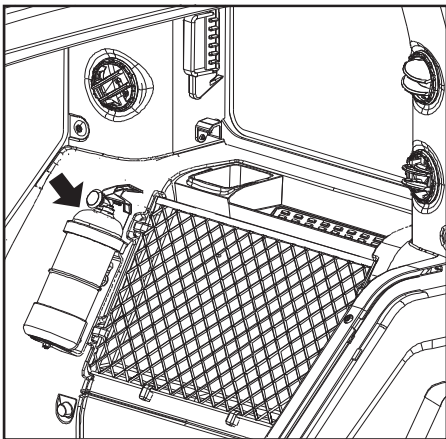




V1151751

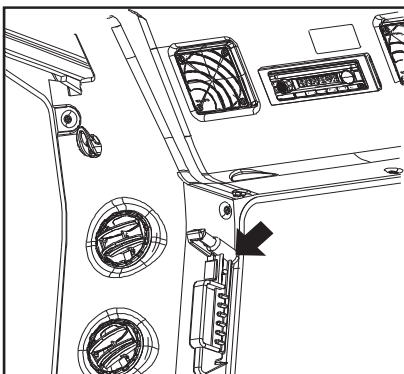
## Operator's manual, storage

Operator's manual storage is located at the backside of seat. Keep the manual in the storage so that it is always at hand.



V1151749

## Fire extinguisher, location (optional equipment)



V1151750

## Emergency exit

The cab has two emergency exits, the door and the rear windshield.

Regardless of the rear windshield types, break the glass with the hammer attached on the rear side in a cab.

Hammer

***NOTICE***

The hammer must not be removed from its position or be used at other occasions than in an emergency situation. If the hammer should be lost, it must be replaced immediately.

***NOTICE***

There is a knife on the hammer for the emergency exit. Cut off the seat belt with the knife, if the buckle cannot be undone.



## Audio system

- 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.

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

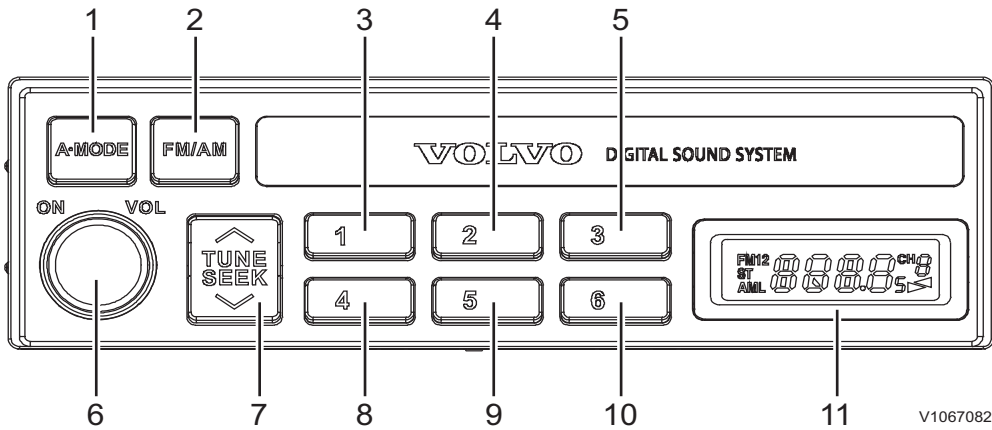
### NOTE!

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
Others	FM	87.50 ~ 108.00 MHz
	AM	531 ~ 1629 KHz

Radio only (optional equipment)



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 operation of all functions related to the audio system.
- If the button is pressed while the audio system is operating it will change the sound function in the following order.  
BASS → MIDDLE → TREBLE → BALANCE → Current State → BASS

■ Radio (FM / AM) button (2)

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



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Operator comfort

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

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

■ **Power button and Volume control (6)**

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

■ **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, use the TUNE button. (Press TUNE button for 1.5 seconds or longer.)

Radio and USB-MP3 Player (optional equipment)



1	SCR button	6	MENU button
2	On/Off button	7	USB socket
3	Volume control	8	AUX
4	Display	9	DISP button
5	Select button	10	Preset button 1-5

**1 SRC button**

Select memory bank or audio source.

- Short press: Switch among radio<sup>1</sup>, USB, AUX source.
- Long press: Activate Travel-Store function in radio mode. (Setting kept in FMT or AMT<sup>2</sup> memory bank)

**NOTE!**

Radio<sup>1</sup> is switched on as FM1, FM2, FMT, MW, LW, AM or AMT, MW, LW, AM or AMT are only available in respective tuner regions.

**NOTE!**

AMT<sup>2</sup> in tuner regions INTERNAL, N-AMERICA and JAPAN.

**2 On/Off button**

- Short press: Switch on audio system.
- Long press: Switch off audio system.
- In operation: Mute audio system.

**3 Volume control**

Adjust the volume

- In the menu: Change settings.
- Fast-Browse mode: Select folder and track.



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Operator comfort

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4 **Display**

5 **Λ / V button**

- In the menu: Select menu item.
- Radio mode: Start seek tuning.
- MP3/WMA/iPod mode: Change to next/previous folder.

**< / > button**

- In the menu: Change menu level.
- Radio mode: Adjust the stations.
- Other operating modes: Track selection.

6 **MENU button**

- Short press: Close menu.
- Long press: Start scan function.

7 **USB socket**

8 **AUX**

9 **DISP button**

Switch display.

10 **Preset button 1–5**

- Short press: Call up the stored station in radio mode.
- Long press: Store station on the current memory bank in radio mode.

■ **Area**

This audio system is designed for operation in different regions with different frequency ranges and station technologies. The factory default of the reception area is “EUROPE”. In addition, the reception areas are “N-AMERICA”, “INTERNAL” and “JAPAN” are available.

If you operate the audio system outside of internal, you may first have to set a suitable reception area in the menu:

- 1 Briefly press the MENU button to open the user menu.
- 2 Press the > button until the TUNER menu item is selected.
- 3 Press the Λ / V button until the “AREA” menu item is selected.
- 4 Press the > button to set the reception area.
- 5 Press the > button to confirm the selected area.



■ **iPod mode**

This audio system can play audio from iPod/iPhone device via USB socket.

- 1 Insert the iPod via USB extension cable in USB socket
- 2 Press the SRC button repeatedly until the USB source is displayed.

A connected iPod is selected as audio source as soon as the iPod has been recognized.

■ **Browse mode**

In browse mode, you can directly search for and select a certain track on the MP3/WMA data carrier without interrupting the current play back. In iPod mode, you can select and play a track using the categories "Now Playing", "All Tracks", "Playlist", "Genre", "Artist", "Album", "Composer", "Audiobook" and "Podcast".

■ **Selecting tracks in Browse mode**

- During iPod playback, press the 1LIST button to enter or exit the browse mode. It will show current playing tracks stored in the iPod, press button to view all category.
- Press the  $\wedge$  /  $\vee$  button once or several times to select a different folder.
- Press the > button to display the tracks of the selected folder. The first track of the folder is shown on the display.

**NOTE!**

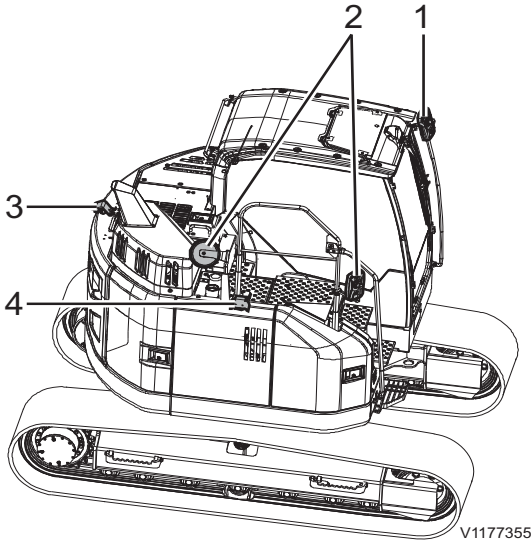
Press the < button returns you to the folder list.

- Press the  $\wedge$  /  $\vee$  button once or several times to select a different track.
- Press the > button to play the track. The playback starts. You are existing the browse mode.

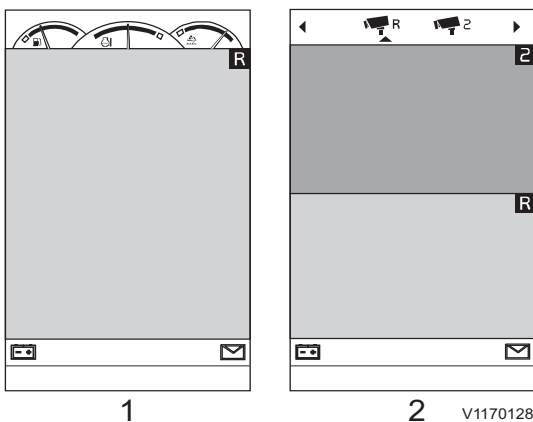
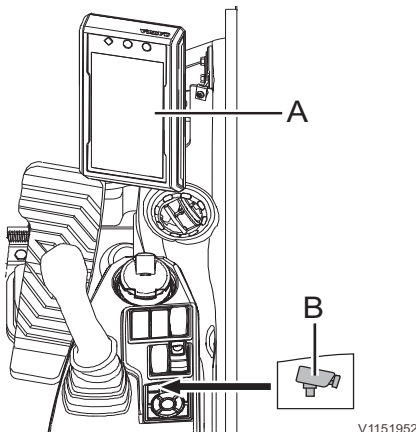
**NOTE!**

Fast searching is not available in Browse mode.





Mirrors and cameras (if installed)



1 Camera view with gauges  
2 Camera view with configuration bar

## Vision system

The machine has a lot of equipment for the operator to minimize visibility hazards. Using this equipment, the operator must always ensure good visibility of the surroundings when operating the machine.

- 1 Left mirror
- 2 Right mirrors

### NOTE!

Right mirrors are used as aids for better visibility.

- 3 Rear-view camera
- 4 Side-view camera

### NOTE!

Any modifications done to the machine that affect the operator's visibility must be verified by a Volvo dealer.

## Camera system (if installed)

The camera screen in the IC (Instrument Cluster) (A) is opened by pressing the camera button (B) on the keypad.

The camera button is illuminated when the camera view is displayed.

- A short press on the camera button shows the camera view with gauges (1):

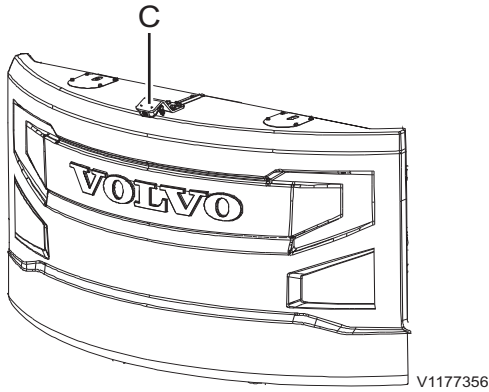
This camera view (1) shows the camera screen (depending on the selected configuration) with the fuel level, engine coolant temperature, and AdBlue®/DEF level.

- A long press on the camera button shows the camera view with configuration bar (2):

This camera view (2) shows the camera screen with the camera configuration bar at the top.

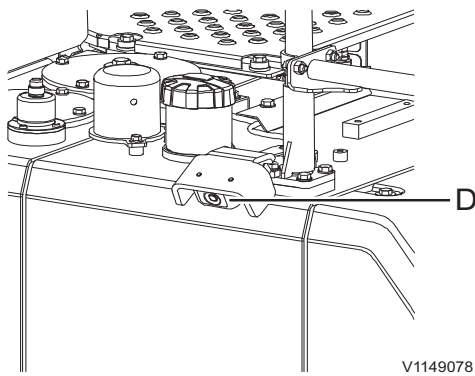
The camera configuration bar is used to show or hide camera views on the IC (Instrument Cluster). Press the camera button (B) on the keypad to rotate the camera views clockwise.

Select one of the camera icons and press SELECT on the keypad to show or hide this camera view.



### Rear-view camera (if installed)

The rear-view camera (C) is installed on top of the counterweight.



### Side-view camera (if installed)

The side-view camera (D) is installed on the guardrail on the machine's right side.

## Auxiliary heater

### (Optional equipment)

The auxiliary heater is used for heating the engine coolant by a fuel combustion unit while the engine is stopped. It consists of the fuel tank, fuel pump, water pump, the timer and the heating unit. The auxiliary heater facilitates the engine start and heating the cab in severe cold weather.

The heated coolant is circulated through the engine block → water pump → auxiliary heater → heater core → engine block.

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

### Button functions

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

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

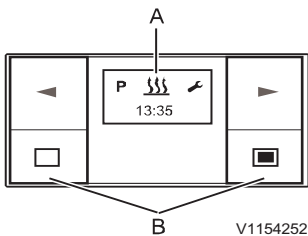
#### 1 Power on / confirm button

##### ■ SHORTPRESS button

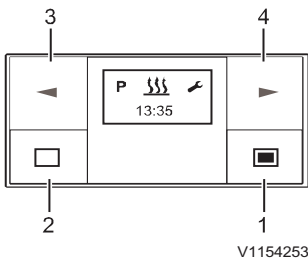
- if the display shows OFF → Timer On, the start display appears.
- A selected function is confirmed.
- Inputs are confirmed.

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

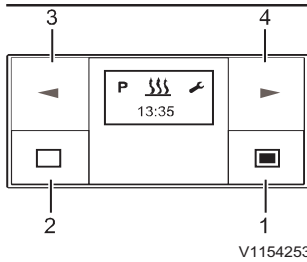
- The heater is switched on immediately if On or OFF appears in the display.



A Display window  
B Buttons



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



V1154253

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

## 2 Power off / cancel / exit setting button

### ■ SHORTPRESS button

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

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

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

## 3 Backward button

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

## 4 Forward button

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

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Operator comfort



V1154254

Main menu  
A Menu bar  
B Status area



V1154255

Submenu  
A Menu bar : activated function  
B Input area



V1154256

## Operation and setting/adjustment

### Main menu

#### Menu bar

The following menu items can be selected.

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

#### Status area

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

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

### Submenu

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

### Start display after switching ON

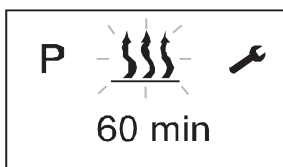
if no menu item is activated, the start display appears with a flashing heater symbol in the Menu bar, with the current time in the status area.

### Other possible actions are:

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



V1154257



V1154258

### 1 Heating ON / OFF

#### ■ Heating immediately with LONGPRESS (without settings)

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

#### ■ Heating on with SHORTPRESS and with settings

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

#### NOTE!

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

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

#### ■ Heating OFF

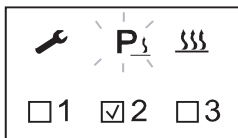
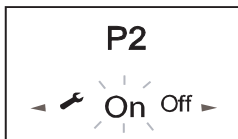
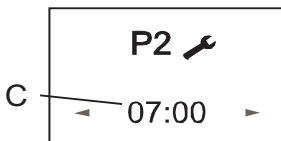
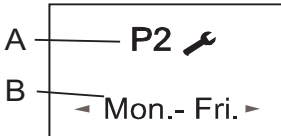
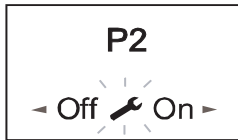
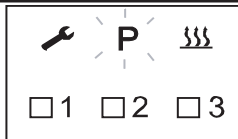
- Press the button (2) for longer than 2 seconds. → all active functions are ended.
- Press the button (2) for less than 2 seconds. → heater OFF.

After the heating off the start display appears. if the vehicle lighting is off the display lighting goes out after 10 seconds.

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

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

Other controls  
142 Operator comfort



V1154261

- A Preset unit
- B Preset day
- C Departure time
- D Operating time

2 General information on programming the preset time

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

■ Weekday ranges:

- Day: Once
- Sat-Sun: 2x Heating
- Mon-Fri: 5x Heating
- Mon-Sun: 7x Heating

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

■ Departure time operating mode (factory setting)

Under the following conditions the preselected heating mode is not started on the current day.

- The current day and the preselected day are identical.
- The current time lies within the time period, departure time minus operating time.

**Example:**

Current day / preselected day: Mon

Current time: 06:45

Departure time: 07:00

Operating time: 60 minutes

Duration: 06:00 to 07:00

The current time lies within the time period, the heater is not switched on.

The program will be run during the next week.

■ **Program preset times**

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

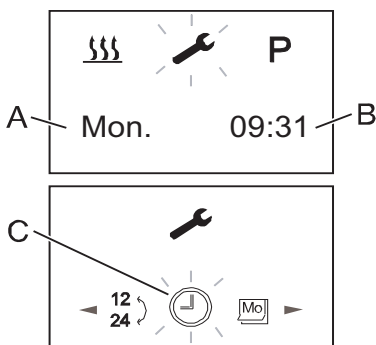
If the Program symbol is marked with **P**<sub>3</sub>, a or several program memories is/are already activated.

Activated program memories are marked in the display with a .

3 **Settings**

This function is for setting current day and time.

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



V1154262

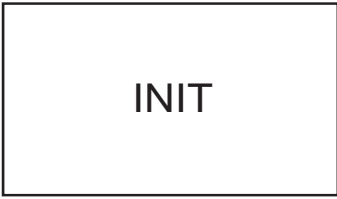

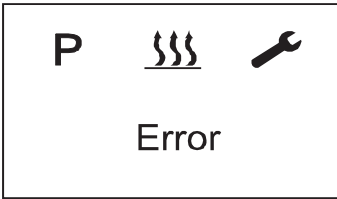
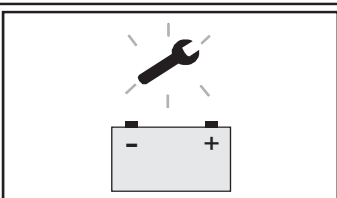
- A Current day
- B Current time
- C Settings submenu bar



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Operator comfort

**Error messages**

In the event of a fault the following displays are possible:

Display	Description	Remedy
 <p>V1154443</p>	<ul style="list-style-type: none"> <li>- Automatic detection is active.</li> <li>- The auxiliary heater timer has been disconnected from the power supply and then reconnected.</li> </ul>	<p>Wait until the automatic detection has finished, then set the time and weekday.</p>
 <p>V1154444</p>	<ul style="list-style-type: none"> <li>- No communication.</li> </ul>	<p>Check and if necessary renew the heater fuse. Contact a workshop authorized by Volvo.</p>
 <p>V1154445</p>	<ul style="list-style-type: none"> <li>- Heater fault.</li> </ul>	<p>Contact a workshop authorized by Volvo.</p>
 <p>V1154447</p>	<ul style="list-style-type: none"> <li>- Voltage too low.</li> </ul>	<p>Charge battery, if necessary contact a workshop authorized by Volvo.</p>

**NOTE!**

If you are unable to remedy the error or fault, contact a workshop authorized by Volvo.

### Winter season preparation for auxiliary heater

Operator should exhaust remaining summer diesel in fuel line of auxiliary heater before winter season comes. Remaining summer diesel can cause plugging in fuel line if temperature drops in sudden because of wax crystallization. Run auxiliary heater at least 15 minutes until remaining diesel is exhausted.

When operator runs machine in winter season, it is recommended to fill fuel tank over 70%. If fuel tank has much empty space, it makes moisture inside of fuel tank. It can go to fuel line of auxiliary heater and frozen moisture sometimes makes fuel feeding problem.

### Fuel quality requirements for auxiliary heater

If the heater is run from a separate fuel tank, comply with the following rules.

- If ambient temperatures over 0 °C;  
Use diesel fuel according to DIN EN 590.
- If ambient temperatures from 0 °C to -20 °C;  
Use winter diesel fuel according to DIN 590.
- If ambient temperatures from -20 °C to -40 °C;  
Use Arctic diesel or Polar diesel.

#### NOTE!

- Used oil is not allowed.
- After refuelling with winter or cold diesel or the listed blends, the fuel pipes and the metering pump must be filled with the new fuel by letting the heater run for 15 minutes.
- Volvo does not recommend mixing Kerosene with diesel due to unstable combustion which causes decrease of durability of auxiliary heater and makes bad exhaust gas.
- Volvo recommends to use commercial additives which improve wax crystallization of diesel fuel in cold weather if it is difficult to use Arctic diesel or Polar diesel.



### Operation with bio-diesel fuel

The heater is approved for operation with bio-diesel up to a temperature of -8 °C (the flowability reduces at temperatures below 0 °C).

#### NOTE!

- If operated with bio-diesel (100% operation and blends), the heating output of the heater reduces.
- A reduced heater life is to be expected if constantly operated with 100% bio-diesel.
- Standard diesel fuel contains up to 20% bio-diesel. This does not have any effect on the life of the heater.

Contact a workshop authorized by Volvo for detailed information.



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## 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.

## Visibility

### **WARNING**

Risk of serious accidents.

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

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

It may not be possible to provide direct visibility to all areas around the machine. To achieve acceptable visibility, additional devices such as warning systems, mirrors, and closed-circuit television cameras (CCTV) may be used.

In order to minimize hazards that may be caused by restricted visibility, rules or procedures shall be established by the job site management. For example:

#### **NOTE!**

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

- Ensure that operators and job site workers have received thorough safety instructions.
- Control the traffic patterns for the machine and other vehicles. Avoid travelling in reverse if possible.
- Restrict the machine's operating area.
- Use a signalman to help the operator. Use signals according to the signal diagram, see page 231.
- Provide two-way communication equipment if necessary.
- Ensure that job site workers communicate with the operator before approaching the machine.
- Use warning signs.



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Standard ISO 5006 "Earthmoving machinery- Operator's field of view" deals with the operator's visibility around the machine and is meant to be used for measuring and evaluating the visibility.

The machine is tested by methods and performance criteria according to this standard. The visibility method used may not include all aspects of the operator's visibility, but provides information for determining if additional devices for indirect visibility, such as warning systems, are necessary.

The test was performed on machines with standard equipment and attachment. If the machine is modified or fitted with other equipment or attachment, which results in impaired visibility, it should be re-tested according to ISO 5006.

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

Conforming to the standard is a requirement in EU-countries and provides for improved visibility around the machine.

## Operating instructions

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### Mirror and camera (if installed) settings

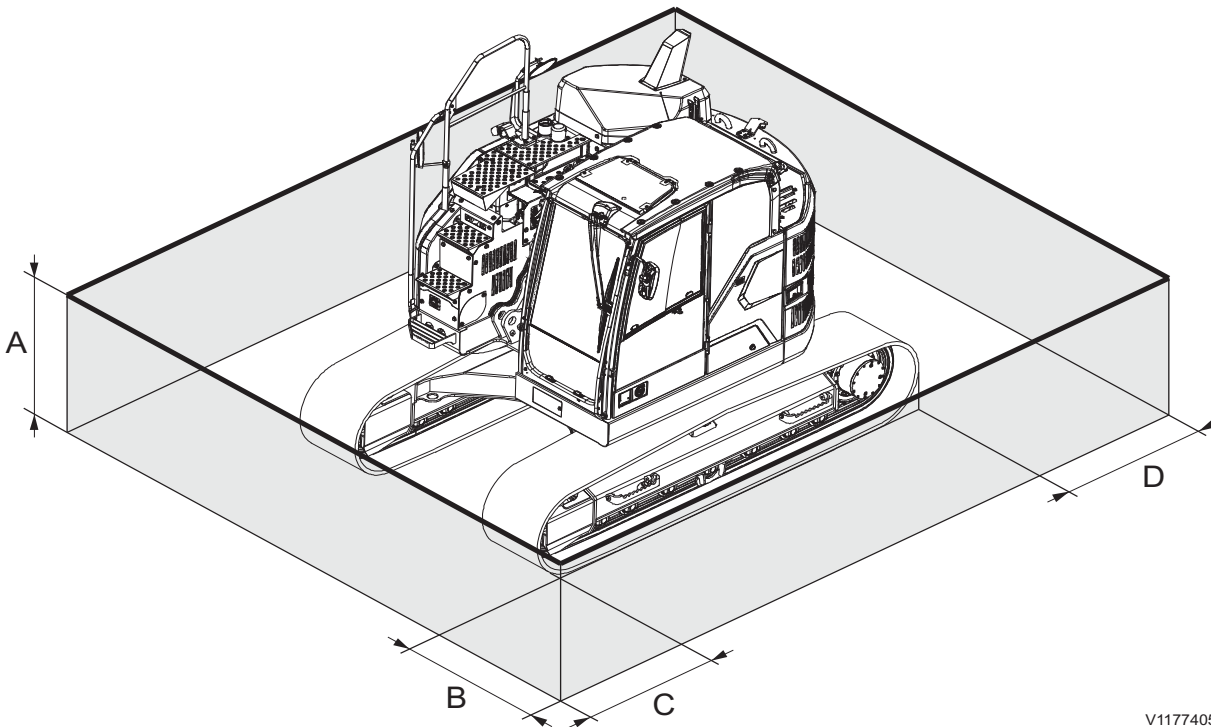
#### Mirrors, adjusting

ISO 5006 states that an imaginary boundary line around the machine must be visible to the operator.

- Park the machine straight and on level ground.
- Adjust the mirrors until the imaginary boundary line is visible to the operator, see figure below.

#### NOTE!

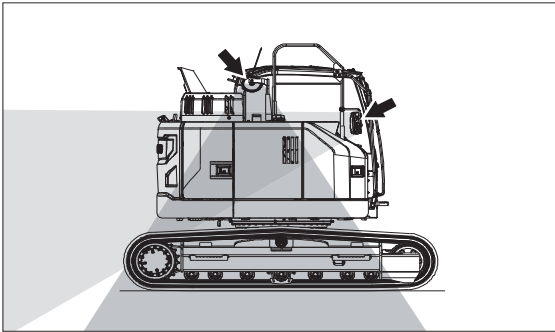
Cameras may be also used to create visibility on the rectangular boundary. (Cameras are not adjustable on the machine.)



V1177405

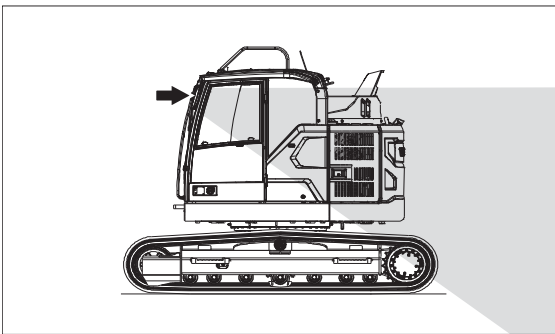
Close-up visibility boundary according to ISO 5006 (thick line)

- A 1.2 m (47.2 in)
- B 1.0 m (39.4 in)
- C 1.0 m (39.4 in)
- D 1.0 m (39.4 in)



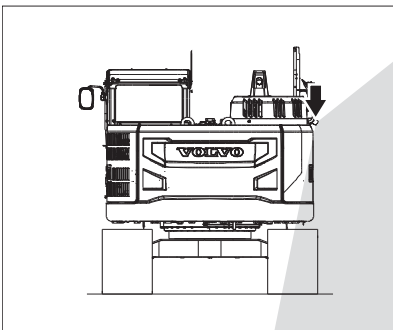
V1177426

Machine's right view



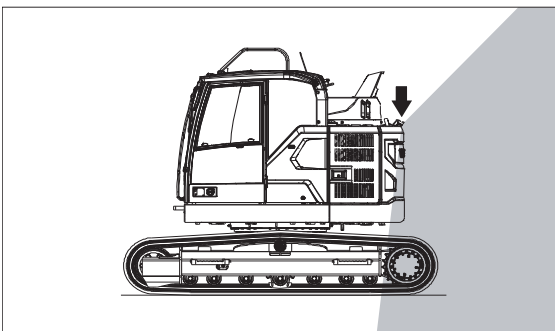
V1177427

Machine's left view



V1177429

Machine's rear view

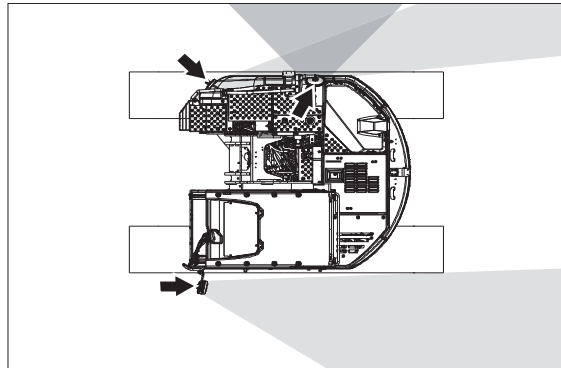


V1177430

Machine's left view

### Rear-view mirrors

Using the rear-view mirrors, check that you have as good visibility as possible towards the machine's superstructure and lower frame, and with as wide angle as possible. If not, adjust the rear-view mirrors until good visibility is obtained, see figures.



V1177428

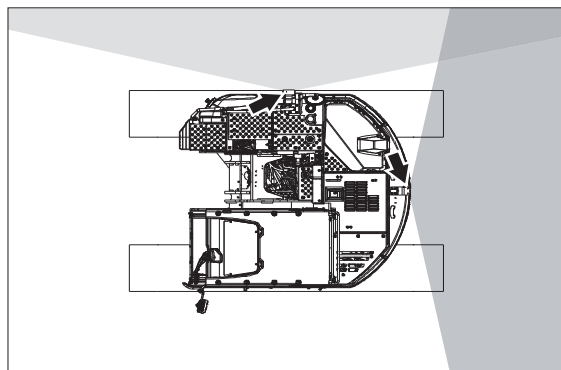
Machine's top view

### Rear-view and Side-view cameras (if installed)

Check the rear-view and side-view camera's display screens, which are focused on the visible areas, for good visibility.

#### NOTE!

Cameras are not adjustable on the machine.



V1177431

Machine's top view





## Operating instructions

152

### Measures before and during operation

- Walk around the machine and check that there are no obstacles next to the machine.
- Check that mirrors and other visibility-enhancing devices are in good condition, clean, and correctly adjusted.
- Clean the cameras, if cameras are installed.

#### NOTE!

When you have direct access to the cameras for cleaning, be sure to use an appropriate external ladder or an appropriate platform.

- Check that the horn, back-up/travel alarm and rotating beacon (optional equipment) are working correctly.
- Check if the management has established rules or procedures for the work site.
- Always pay attention around the machine to identify any obstacles.
- Prevent persons from entering or remaining in the work area, i.e., the area around the machine and at least 7 m (23 ft) beyond the maximum reach of the attachment. However, depending on the job site's organization, the operator may allow a person to remain in the work area, but must then observe caution and operate the machine only when the person can be seen or has given clear indications of where he or she is.  
Never allow any person to walk or stand under raised equipment or suspended loads.

## Safety rules when operating

### Operator obligations

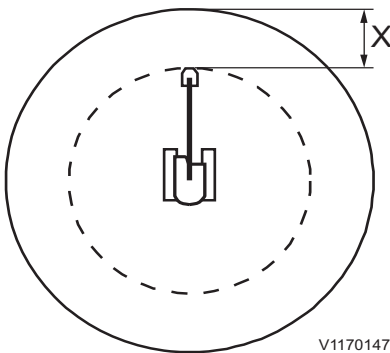
#### **WARNING**

Risk of fatal accidents.

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

- **Clear all unauthorised personnel from the working area.**
- **Keep a lookout in all directions.**
- **Do not touch control levers or switches during start.**
- **Sound the horn before beginning operation.**
- The operator must operate the machine in such a way that the risk of accidents is minimized for both the operator and persons present on 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 rules and recommendations in the Operator's Manual, but must also pay attention to any legislation and national regulations or specific requirements or risks that 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 effects of different attachments.

## 154 Operating instructions Safety rules when operating



- The operator must check that the mirrors and cameras (if installed) are in good condition, clean, and adjusted correctly for good visibility before operating the machine.

### NOTE!

Cameras (if installed) are not adjustable on the machine. Check that the camera screen is displayed correctly on the IC (Instrument Cluster) when pressing the camera button on the keypad.

- The operator must be in control of the machine's work area.
  - Prevent persons from walking or standing under raised excavating equipment or suspended loads, unless it has been made safe or supported.
  - Prevent persons from entering or remaining in the work area, i.e., the area around the machine and at least 7 m (23 ft) beyond the maximum reach of the attachment. However, depending on the job site's organization, the operator may allow a person to remain in the work area, but must then observe caution and operate the machine only when the person can be seen or has given clear indications of where he or she is.
  - Prevent persons from being in the cab of a vehicle that is in a location with a risk that the cab may be hit by other machines or falling objects, for example, stones or logs. This does not apply if the cab is sufficiently strong or is protected to withstand the impact of such external forces.
  - Make sure that you know the weight limitation of the ground on which the machine is working.

The operator may only take an instructor on board, if there is an approved instructor's seat in the machine.

### **WARNING**

Risk of fatal accidents.

Using attachments for lifting or transporting persons may lead to fatal accidents with serious crushing injury or death.

**Never use attachments for lifting or transporting persons.**



## Operating instructions Safety rules when operating 155

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### 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.

### Operator safety

- The machine must be operational, that is 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, for example 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, that is 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.

## 156 Operating instructions Safety rules when operating

- 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.
- When DPF regeneration;
  - Make sure that there is no flammable material around the machine, this is important to prevent risk of fire.
  - Move the machine to safety area, if there is a risk that people may get too close and then perform the regeneration.

### **WARNING**

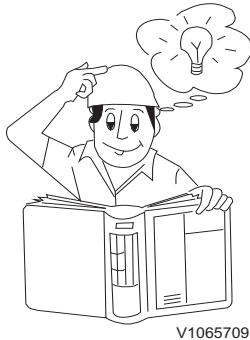
**Risk for fire.**

**Regeneration generates hot exhaust and causes hot exhaust pipe. Do not perform regeneration in a flammable environment.**

### **Operating 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.

## Measures before operating

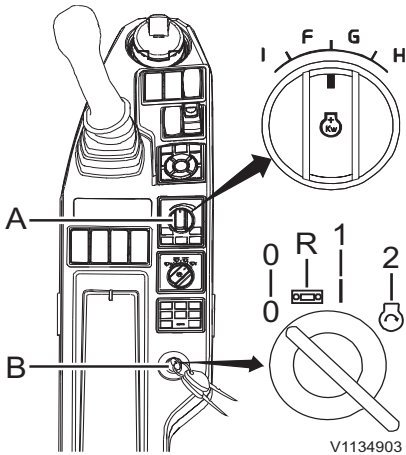


### NOTICE

The safety regulations and operating instructions issued by the manufacturer must be strictly observed.

- Read the Operator's manual.
- Carry out daily service, see page 256. 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.
- Travel alarm should be on before operating the machine.
- Inspect the failure of gauges in the instrument panels.
- Check the function of the attachment quick coupler (optional equipment).

158 Operating instructions  
Starting engine



A Engine speed control switch  
B Ignition switch

- Off position (0)
- Radio position (R)
- Operating (preheating) position (1)
- Start position (2)

## Starting engine

### NOTE!

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

### WARNING

Risk of fatal accidents.

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

- Clear all unauthorised personnel from the working area.
- Keep a lookout in all directions.
- Do not touch control levers or switches during start.
- Sound the horn before beginning operation.

### NOTICE

Do not keep the ignition switch in starting position for more than 20 seconds, as this may seriously damage the starting system. If the engine does not start, turn the switch back to stop position and wait a couple of minutes before the next starting attempt.

### NOTICE

If the engine sounds or runs strangely or if strong vibrations arise, the ignition switch must be turned to stop position immediately.

### NOTICE

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 operating position.
- 2 Sound the horn and let other workers and bystanders know you are starting the machine. For the startup sequence, see page 47.
- 3 Turn the key to the start position.
- 4 Release the key when the engine has started.
- 5 Warm up the machine.



V1065729

Preheating indicator

### Starting engine in cold weather

- 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 IC (Instrument cluster).
- 3 When the preheating is finished, sound the horn and let other workers and bystanders know you are starting the machine.
- 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.

### NOTICE

Run the engine at low idling speed for 10–15 minutes to warm the engine and the hydraulic system at temperatures below  $-15^{\circ}\text{C}$  ( $+5^{\circ}\text{F}$ ) before putting the machine to work.

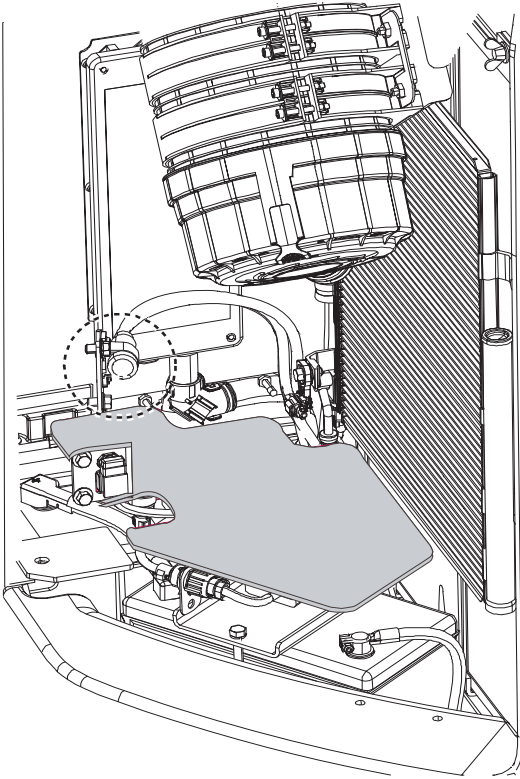
Use recommended lubricating oil for winter use.  
See page 307.

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.



## 160 Operating instructions Starting engine

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V1153466

Socket for 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.

#### **NOTICE**

The machine may be equipped with cylinder block heater for either 120 V or 240 V. Compare the specified voltage of the external power supply and with that of the cylinder block heater.

## Starting with booster batteries

### **WARNING**

Risk of explosion.

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

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

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.

### **NOTICE**

**Do not attempt to start the engine while the battery charger is still connected to the mains. This may cause serious damage to the 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.

### **NOTICE**

**Do not connect ground to the undercarriage on the machine. This may seriously damage the swing bearing.**



## 162      Operating instructions Starting engine

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- 5 Connect the batteries of the machine by turning on the battery disconnect switch.
- 6 Start the engine with the ignition switch 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

Machine may respond slowly at low temperatures. Operate carefully until the system has reached normal temperature. Otherwise unexpected movements may occur.

## Hydraulic system, warming up

The oil in machine's hydraulic system 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.

Therefore the machine's hydraulic functions operate slower than when the oil is warm.

Malfunctions may result if one or more of the machine functions are forced against end-position without first having warmed up the system.

### NOTE!

Operate the machine functions (travel, swing, and attachments) very slowly and carefully.

### WARNING

Risk of crushing injury.

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

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

### NOTICE

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

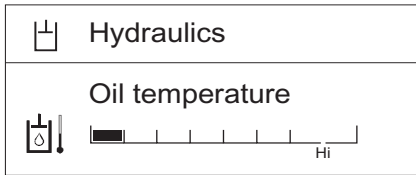
### WARNING

Risk of crushing.

**Sudden movement of attachments may cause serious injury or death to personnel near the machine.**

**Quick-acting controls operate the optional attachments. Operate the controls carefully.**

## 164 Operating instructions Hydraulic system, warming up



V1140828

Hydraulic oil temperature screen

- 1 Start the engine and let it run at low idle for 5 minutes.
- 2 Then increase engine speed to approx. 1,200 rpm.
- 3 Carefully follow the instructions given below.
  - If the green bar for hydraulic oil temperature covers more than one gradation, perform the next steps 4 and 5.
  - If the green bar for hydraulic oil temperature covers less than one gradation, raise the boom slightly from the ground and operate bucket-in and bucket-out using the control lever for 5 minutes (stop operation for 2-3 seconds after 1 operation, i.e. bucket-in or out). After 5 minutes, if the green bar for hydraulic oil temperature has not reached one gradation, operate bucket-in using the control lever and hold the control lever in that position for 10 seconds to reach relief pressure. Release the control lever for 5 seconds and then repeat the operation until the green bar has reached one gradation.
- 4 Run out the bucket cylinder using the control lever and let the bucket move to its end-position.
- 5 Then carry out a number of boom, dipper arm, swing, and travel movements with the machine to distribute the warmed hydraulic oil to all 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 (for example, 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 1,200 rpm and the travel speed control should be in low speed position.



## Operating

### **NOTICE**

In order not to jeopardise the lubrication of the engine, the machine must not be inclined more than 35 degrees in either direction. In addition it may be unsuitable to operate at this inclination as the machine may become unstable and unbalanced, depending on the load.

### **NOTE!**

Do not jack the track up more than 35 degrees using attachment. Otherwise counterweight can be damaged.

### **NOTE!**

If the machine is equipped with travel warning system, a warning alarm sounds when levers or pedals are actuated.

For more operating information, see page 99.

## Exhaust aftertreatment system

### Regeneration

#### **WARNING**

Risk of burns.

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

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

#### **NOTE!**

Some smoke might be seen coming from the exhaust stack during regeneration of the aftertreatment system on a machine run on diesel fuel with high sulfur content.

The purpose of regeneration is to raise the temperature in the aftertreatment system so that any trapped substances are burned off to allow the system to regain its full capacity.

#### **Normal operation**

During normal operation, passive regeneration occurs continuously.

## Operating instructions Exhaust aftertreatment system 167

### Parked regeneration

Parked regeneration may be necessary if

- previous regeneration steps have failed or have been cancelled repeatedly
- too much time has passed since the last regeneration
- the aftertreatment system has accumulated excessive amounts of particles or sulphur

No work can be performed during a parked regeneration. The engine speed is raised during a parked regeneration. It is not advisable to cancel a parked regeneration which is in progress, except in an emergency.

To start a parked regeneration, the operator must stop the machine, lower the control lockout lever to lock the system and select "Start" in the regeneration menu on the IC (Instrument Cluster).

#### NOTE!

The operator can start the regeneration immediately by pressing the SELECT button on the IC (Instrument Cluster) control keypad when an alarm indication for regeneration pops up on the IC (Instrument Cluster).

#### NOTE!

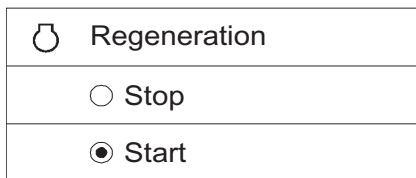
**The machine must be in a non-heat-sensitive area while the symbol is lit.**

### Service regeneration

If a requested regeneration is delayed for too long, the PM (particulate matter)-load in the DPF (diesel particulate filter) and the amount of sulphur in the SCR (selective catalytic reduction) will be too high for a safe parked regeneration. Then regeneration must be started with Volvo's service tool in order to perform a safe regeneration.

### Fuel consumption

During a parked regeneration, the fuel consumption may increase.



V1147263

Regeneration menu



## 168 Operating instructions Exhaust aftertreatment system

### Delaying regeneration

The operator can delay the regeneration by pressing the ESC button on the IC (Instrument Cluster) control keypad when an alarm indication for regeneration pops up on the IC (Instrument Cluster). The alarm indication will pop up again after 15 minutes or when the engine is restarted. Delayed regeneration may be useful if the machine is in a heat-sensitive environment.

#### NOTE!

It is important to not delay regeneration unnecessarily.

#### Possible consequences of delaying regeneration:

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

### Cancelling parked regeneration

#### NOTE!

Only cancel in an emergency.

- 1 Select "Stop" in the regeneration menu on the IC (Instrument Cluster).

An alarm indication on the instrument panel confirms that regeneration has been cancelled.

Regeneration is cancelled automatically when:






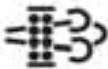
- a malfunction occurs
- machine operation starts and a parked regeneration is in progress
- the machine is turned off






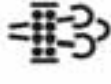


V1135633

Regeneration cancelled



Operating instructions  
Exhaust aftertreatment system 169

Alarms that require specific action			
Text on display panel	Display indication	Alarm level	Action
Park soon Parked regeneration needed	Warning, amber   <small>V1128635</small>	- buzzer sounds - amber central warning on	1 Park the machine in a non heat sensitive area. Move the control lockout lever down to lock the system. 2 Start regeneration.  <b>NOTE!</b> Regeneration is cancelled if the control lockout lever is set to unlocked position. <b>NOTE!</b> The idle speed increases during the entire regeneration process.
Start regeneration Parked regeneration needed Press [SELECT] to start	Warning, amber   <small>V1128635</small>	- buzzer sounds - amber central warning on	1 Park the machine in a non heat sensitive area. Move the control lockout lever down to lock the system. 2 Start regeneration.  <b>NOTE!</b> Regeneration is cancelled if the control lockout lever is set to unlocked position. <b>NOTE!</b> The idle speed increases during the entire regeneration process.
Keep machine parked Regeneratio n ongoing	Warning, amber   <small>V1128635</small>	- buzzer sounds - amber central warning on	1 Keep the machine parked.




Operating instructions  
170 Exhaust aftertreatment system

<p>Regeneration cancelled Derate soon</p>	<p>Warning, amber</p>   <p>V1135633</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<p>1 Restart regeneration when possible.</p>
<p>Park machine Parked regeneration required Derate active</p>	<p>Warning, amber</p>   <p>V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- engine derate is activated (but is restored after a completed regeneration)</li> </ul>	<p>1 Park the machine. 2 Restart regeneration when possible.</p>
<p>Regeneration cancelled Derate active</p>	<p>Warning, amber</p>   <p>V1135633</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- engine derate is activated (but is restored after a completed regeneration)</li> </ul>	<p>1 Restart regeneration when possible.</p>

Operating instructions  
Exhaust aftertreatment system 171

<p>Park safely Service regeneration needed Derate active</p>	<p>Warning, red</p> 	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- engine performance is significantly reduced (but is restored after a completed regeneration)</li> </ul>	<ol style="list-style-type: none"> <li>1 Park the machine in a non heat sensitive area. Move the control lockout lever down to lock the system.</li> <li>2 Switch off the engine.</li> <li>3 Contact a Volvo-approved workshop for regeneration.</li> </ol> <p><b>NOTE!</b> Regeneration is only possible using Volvo's service tool.</p>
<p>Park machine Service needed Derate active</p>	<p>Warning, red</p> 	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- engine performance is significantly reduced</li> </ul>	<ol style="list-style-type: none"> <li>1 Park the machine in a non heat sensitive area. Move the control lockout lever down to lock the system.</li> <li>2 Switch off the engine.</li> <li>3 Contact a Volvo-approved workshop to have the diesel particulate filter replaced.</li> </ol> <p><b>NOTE!</b> The soot load can only be reset by authorised Volvo personnel.</p>

Operating instructions  
172 Exhaust aftertreatment system

<p>Regeneration not needed</p>	<p>Warning, blue</p>  <p style="text-align: right; font-size: small;">V1088268</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- blue central warning on</li> </ul>	<p>1 No action required.</p>
<p>Continue operation Low temperature Regeneration pending</p>	<p>Warning, amber</p>  <p style="text-align: right; font-size: small;">V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<p>1 Continue operation.</p>
<p>Service needed Regeneration not possible System failure</p>	<p>Warning, amber</p>  <p style="text-align: right; font-size: small;">V1128635</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> </ul>	<p>1 Service required.</p>



## Emission compliance

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

### Engine power is reduced if:

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

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

### Restoring engine function

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

174 Operating instructions  
Exhaust aftertreatment system

### Exhaust aftertreatment system, alarms requiring special actions

**NOTE!**

The display text will show "AdBlue®" in machines for the European market and "DEF" in machines for the US market.

AdBlue®/DEF level monitoring		
Display figure	Alarm level	Action
—	- solid symbol	1 Turn off the engine. 2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.
Refill AdBlue  V1126376 AdBlue empty Derate active	- buzzer sounds 4 times - amber central warning on - flashing symbol - torque reduction	1 Turn off the engine. 2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.
Park safely  V1126376 AdBlue empty Full derate soon	- buzzer sounds continuously - red central warning on - flashing symbol - torque reduction	1 Turn off the engine. 2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.
Refill AdBlue  V1126376 AdBlue empty Full derate active	- buzzer sounds continuously - red central warning on - flashing symbol - forced idle or torque and speed reduction (depending on market)	1 Turn off the engine. 2 Fill AdBlue®/DEF in the AdBlue®/DEF tank.





Operating instructions  
Exhaust aftertreatment system 175

AdBlue®/DEF quality monitoring		
Display figure	Alarm level	Action
<p>Replace AdBlue</p> <p>Wrong AdBlue quality Derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- solid symbol</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Replace AdBlue</p> <p>Wrong AdBlue quality Derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Park safely</p> <p>Wrong AdBlue quality Full derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Replace AdBlue</p> <p>Wrong AdBlue quality Full derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- forced idle or torque and speed reduction (depending on market)</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>





Operating instructions  
176 Exhaust aftertreatment system

SCR-system failure monitoring		
Display figure	Alarm level	Action
<p>Check SCR-system</p>  <p>V1126376</p> <p>SCR-system failure Derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- solid symbol</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Check SCR-system</p>  <p>V1126376</p> <p>SCR-system failure Derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- amber central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Park safely</p>  <p>V1126376</p> <p>SCR-system failure Full derate soon</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- torque reduction</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>
<p>Check SCR-system</p>  <p>V1126376</p> <p>SCR-system failure Full derate active</p>	<ul style="list-style-type: none"> <li>- buzzer sounds</li> <li>- red central warning on</li> <li>- flashing symbol</li> <li>- forced idle or torque and speed reduction (depending on market)</li> </ul>	<p>1 Contact a Volvo-authorized dealer.</p>



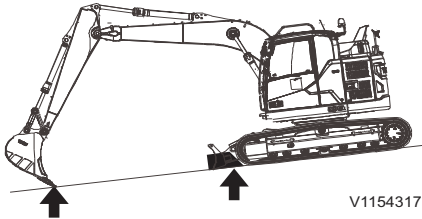
## Stopping

- 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. 2 minutes 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 switch 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 switch when the machine is left unattended.
- Locking doors and covers after working hours.
- Turning off the current with the battery disconnect 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

### NOTICE

Choose level ground for parking the machine. If the machine has to be parked on an incline, the tracks must be blocked with wooden blocks and the bucket teeth pressed 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).
- 9 Drain the AdBlue®/DEF tank. See page 317 for specifications.

**NOTICE**

Start the engine once a month and run it at low idling speed for one hour. Operate all function cycles when working temperature has been reached.

**Check after long-term parking**

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

## Retrieving and towing

### WARNING

Risk of personal injury.

Faulty or improper lifting equipment could cause the machine to break away from the lifting vehicle, causing accidents, serious injury or death.

**Use certified cables, lifting straps, slings, shackles and hooks with adequate load capacity and never lift the machine with a person in or on the machine.**

### WARNING

Risk of runaway machine.

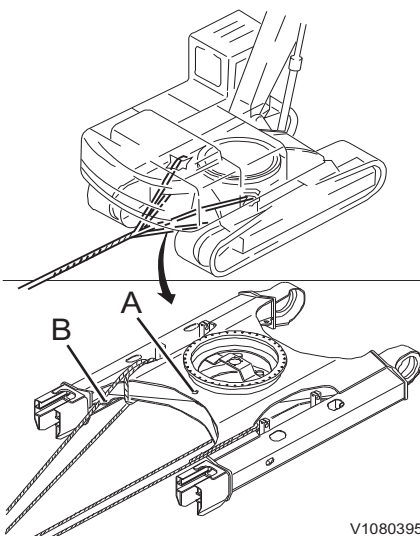
Improper towing methods or faulty equipment could cause the machine to break away from the towing vehicle, causing accidents, serious injury or death.

**Carefully follow the towing instructions and use only certified towing equipment with adequate load rating.**

### NOTE!

Only use the rear-mounted towing hook and the attaching point for a towing bar for towing the machine.

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



V1080395

- 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 distance 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.

## Operating instructions Retrieving and towing 181

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 (A).
- 2 Permissible forces of the hole (A) for towing is as follows.
  - 6,600 kg (14,550 lb)

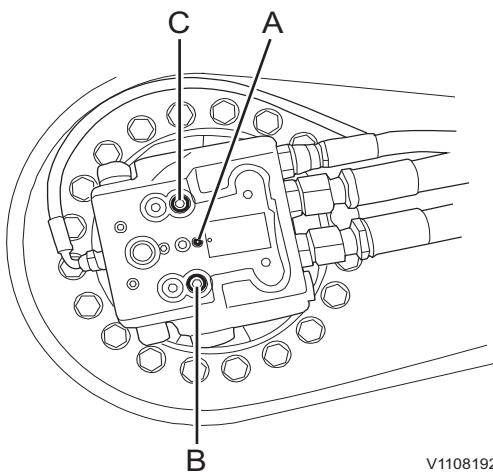
### NOTE!

Do not use shackle holes (B) to retrieve or tow the machine. These holes are only for anchoring when transporting the machine, see page 184.

### Manual release of travel brake

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

- 1 Apply hydraulic pressure of 40 kg/cm<sup>2</sup> (569 psi) at port (A) of the track motor.
- 2 Connect a hydraulic hose between port (B) and (C) after removing plugs.



V1108192

- A Brake released port
- B Pressure gauge port
- C Pressure gauge port



## Transporting machine

### Measurements before transporting machine

#### **NOTICE**

The person in charge of the transport must see to that loading, positioning, lashing and transporting the machine on a trailer or other vehicle is done according to applicable laws and regulations for the country or state in question. For further information, contact your dealer.

#### **NOTICE**

If vandal protection is installed on the machine, it should be removed before the machine is transported. Check local or national regulations.

### Total and disassembled specifications, weight and dimension

Weight and dimension are very useful to estimate the method how the disassembled parts are supposed to be transported. To comply with the laws and regulations in certain region, use the specifications of total and disassembled parts. See pages 339, 331 and 342.

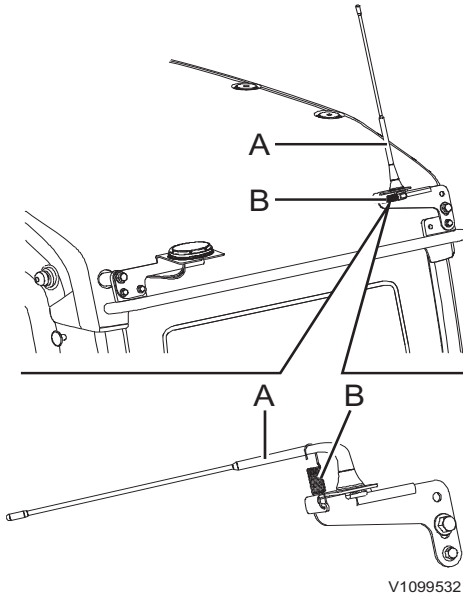
### Sunlight protection, closing

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

### Satellite antenna, folding (optional equipment)

When transporting the machine or using the machine in an area limited the height, the satellite antenna can be damaged.

Fold satellite antenna (A) using spring (B) like the figure. In this case, it may be limited for satellite communication of the machine.



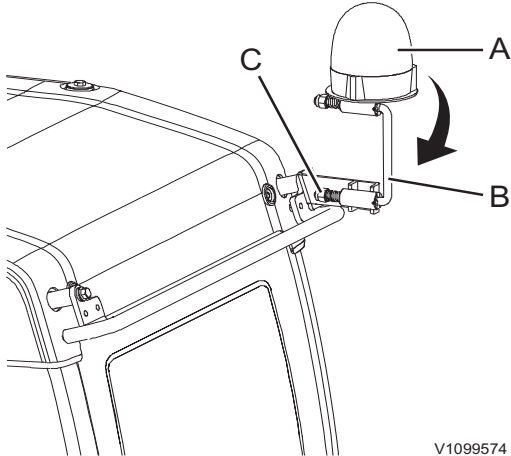
V1099532

- A Satellite antenna
- B Spring

### Rotating beacon lamp, folding (optional equipment)

When transporting the machine, fold bracket (B) with rotating beacon lamp (A) not to be damaged.

- 1 Loosen screw (C) and then turn down rotating beacon lamp (A).
- 2 Fasten the screw (C).



V1099574



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Transporting machine

## Tying down machine

### WARNING

Risk of crushing.

Material may fall off when loading a vehicle.

**Make sure that no persons are standing near the vehicle while loading.**

### NOTE!

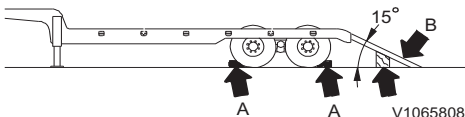
Make sure that loading ramps and platforms are free from oil, mud, ice and similar so that the machine does not begin to slip.

### NOTICE

The function for automatic idling must be deactivated with the button on the keyboard in order to avoid that the speed increases during loading and unloading of the machine.

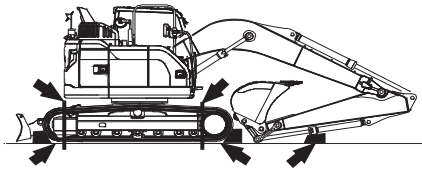
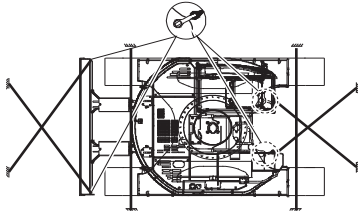
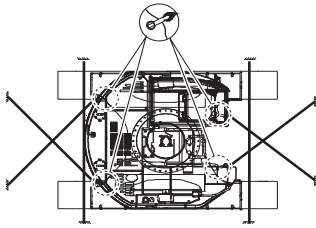
### NOTICE

Select low engine speed and low travelling speed for loading and unloading the machine.



- 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.

## Operating instructions Transporting machine 185



V1110979

- 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.

### NOTICE

Do not extend dipper arm or bucket cylinders to their end positions as they then run the risk of being damaged.

- 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 switch.
- 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.

186 Operating instructions  
Transporting machine

## Lifting machine

### WARNING

Risk of personal injury.  
Faulty or improper lifting equipment could cause the machine to break away from the lifting vehicle, causing accidents, serious injury or death.  
**Use certified cables, lifting straps, slings, shackles and hooks with adequate load capacity and never lift the machine with a person in or on the machine.**

### WARNING

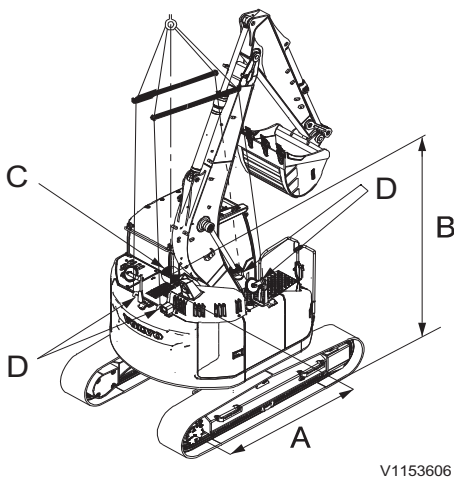
Risk of crushing.  
Falling load could cause serious injury.  
**Do not stand under a suspended load. Use appropriate loading and lifting equipment.**

### NOTE!

Incorrect or faulty equipment or improper lifting methods may cause accidents. Therefore, carefully follow the instructions given below.  
Lift the machine on flat, even and level ground.

- 1 Start the engine, and arrange the bucket, dipper 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 114.
- 3 Stop the engine, check the safety around the machine.
- 4 Close and lock the windshield, 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.
- 7 Maintain good visibility of the machine at all times during the lift. And continuously check that the machine is level.

⊕(mm)	ECR145E
A	1198
B	1408



V1153606

- A 1198 mm (47 inches)
- B 1408 mm (55 inches)
- C Center mark for the center of gravity
- D Lifting points



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## 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.

## Whole-body vibrations

Whole-body vibration emission on construction machinery are affected by a number of factors, such as working mode, ground conditions, speed, and so on.

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, and so on.

Therefore, the result can be a range of different vibration levels for the same type of machine. For cab specifications, see page 327.

### Guidelines for reducing vibration levels on earthmoving 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.
  - Track tensions. (crawler machine only)
  - Tire pressures. (wheel machine only)
  - Brake and steering systems. (wheel machine only)
  - 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.



## Operating techniques

### Whole-body vibrations 189

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- Steer, brake, accelerate, shift gears, and move the attachments smoothly. (wheel machine only)
- Minimize vibrations for long work cycle or long distance travelling.
  - 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.

## Rules for digging

### **WARNING**

Risk of serious injury.

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

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

First read the safety rules for operating, see pages 153, 154, 155, and 156.

- 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 10262). Use the falling object guard when there is risk of heavy, falling objects.



## NOTICE

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 switch 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.
- When using equipment which generate knocks or vibrations, for example hammer, the hydraulic cylinders must not be operated closer than 10 cm (4 in) from their end-of -stroke positions.
- In case of fire, the battery disconnect switch should be turned off, if possible. See page 251.

## Loading on to a vehicle

### WARNING

Risk of crushing.

Material may fall off when loading a vehicle.

**Make sure that no persons are standing near the vehicle while 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.





192      Operating techniques  
Rules for digging

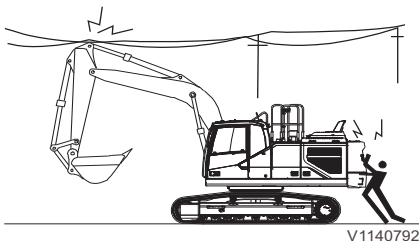
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**When working, do not:**

- use the swing 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 Construction equipment.
- operate by dropping the machine body.

## Working within dangerous areas

- Observe great care at marked danger areas.
- Do not operate too close to the edge of a quay, ramp, ditch and so on.
- Move slowly when working in confined spaces and check that there is sufficient room for machine and load.
- When working under ground, special equipment, for example certified engine is required within the EU and in EES countries. Talk to your dealer.
- When working in low light conditions, for example buildings and tunnels, use head light.
- Do not operate the machine when visibility is poor such as a heavy fog, snow or rain.
- When working in an area which is contaminated or dangerous to one's health, the machine must be especially equipped for this purpose. Talk to your dealer. Check also local regulations before entering the area.



V1140792

## High voltage overhead power line

### DANGER

Risk of electrocution

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

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

### DANGER

Risk of electrocution.

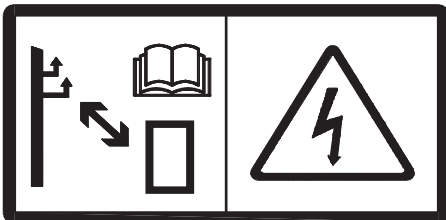
Contact with live parts will cause death or serious injury.

**Never touch live electrical parts.**

194 Operating techniques  
Working within dangerous areas

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.



V1079478

Voltage	Minimum distance to power line
0 ~ 50 kV	3 m (10 ft)
50 ~ 69 kV	4.6 m (15 ft)
69 ~ 138 kV	5 m (16.4 ft)
138 ~ 250 kV	6 m (20 ft)
250 ~ 500 kV	8 m (26 ft)
500 ~ 550 kV	11 m (35 ft)
550 ~ 750 kV	13 m (43 ft)
750 kV~	14 m (46 ft)

**NOTICE**

The operator should have secure visibility when working around the power lines.

**NOTICE**

When transporting the machine also take overhead power lines into consideration.



## Operating techniques

# Working within dangerous areas 195

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### **NOTICE**

**Remember that the roof window may distort how distance is perceived.**

- Keep the following in mind to ensure safety when operating.
  - Operate the machine slower than normal operation in the vicinity of power lines.
  - Consider the long-span power line, which can sway and reduce the clearance.
  - Pay attention when travelling over uneven ground that could cause the machine to lose balance.
  - Keep all persons away from the machine whenever it is close to power lines.
  - Prohibit persons from touching the machine or its load before it is confirmed to be safe.
- Find out what action to take if a person has been exposed to an electric shock.
- Procedure if a machine touches the power line.
  - The operator should stay inside the cab.
  - All other persons should keep away from the machine, ropes, and load.
  - The operator should try to remove the machine from contact by moving it in the reverse direction from that which caused the contact.
  - If the machine cannot be moved away from contact, the operator should remain inside cab until the lines have been de-energized.

196 Operating techniques  
Working within dangerous areas

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### Overhead railway power lines



Risk of electrocution

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

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



Risk of electrocution.

Contact with live parts will cause death or serious injury.

**Never touch live electrical parts.**

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.

### 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 231. The position of the pipe or cable may deviate from the drawing or distances may be incorrectly determined. Regard all electrical cables as live.

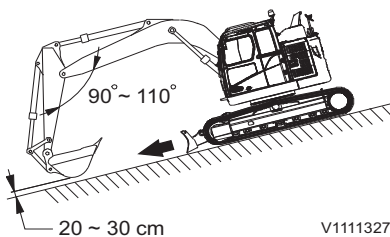
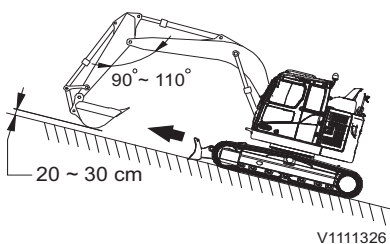
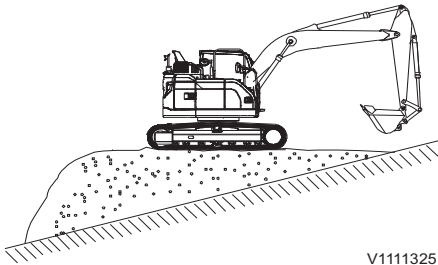
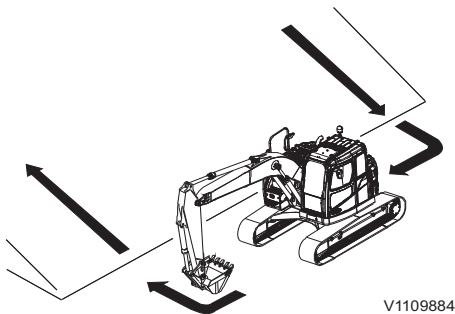
## Working on slopes

### NOTICE

In order not to jeopardise the lubrication of the engine, the machine must not be inclined more than 35 degrees in either direction. In addition it may be unsuitable to operate at this inclination as the machine may become unstable and unbalanced, depending on the load.

### 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 dipper arm at 90 - 110 °, raise the bucket 20 - 30 cm from the ground
- While travelling down on a slope, keep the angle between boom and dipper arm at 90 - 110 °, raise the bucket 20 - 30 cm from the ground and travel at low speed.



## 198 Operating techniques Working within dangerous areas

### In case of shoes slipping

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

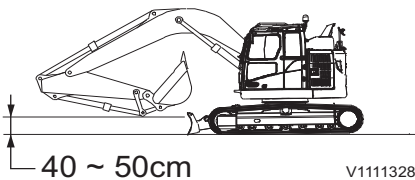
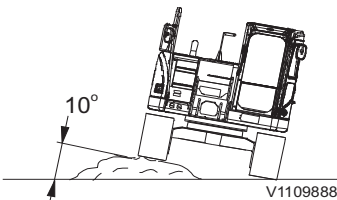
### In case of engine failure

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.

### 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.

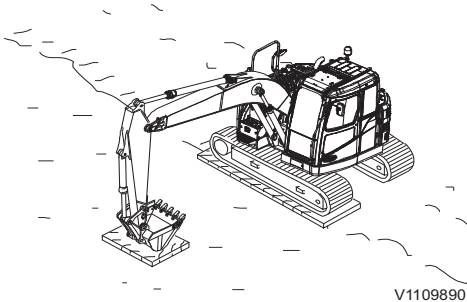
## Operating techniques Working within dangerous areas 199

### Working in water and on boggy ground

Be very careful when working on boggy 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.



V1109890

#### **NOTICE**

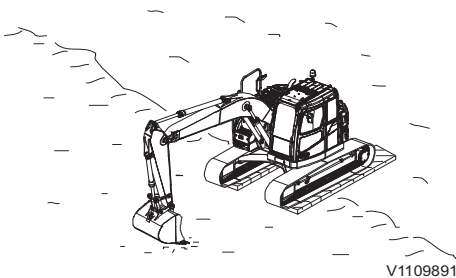
When the machine is lifted with the aid of the boom or the dipper arm, the bottom of the bucket should rest on the ground not the bucket teeth.

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

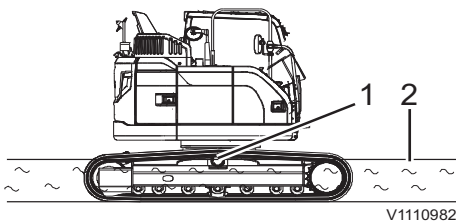
After working in water or escaping from boggy ground, replenish the grease to the attachment pins or the areas affected by the water. Check the idler, rollers and track drive case oil, if contaminated, change the oil.

#### 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 dipper arm as when digging, and move the travel lever forward to escape.



V1109891



V110982

- 1 Top roller
- 2 Water level

#### Permissible depth of water

#### **NOTICE**

Pay attention to the permissible water depth in order to avoid damage to the machine.

Permissible working depth in water is the center of top rollers.

Do not fully submerge the top rollers.

Upon leaving the water, make sure all the grease is replenished in the areas affected by the water, for example bucket pin and so on, 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.



## Working in cold weather

### DANGER

Risk of electrical shock.

Personal injury results if a body part comes into contact with a machine that conducts electric power.

**Disconnect the electrical engine heater before working on the machine.**

### WARNING

Risk of frostbite.

Bare skin can freeze stuck to cold metal which could cause injury.

**Use personal protective equipment when handling cold objects.**

### WARNING

Risk of crushing injury.

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

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

Read the advice for starting, see page 158.

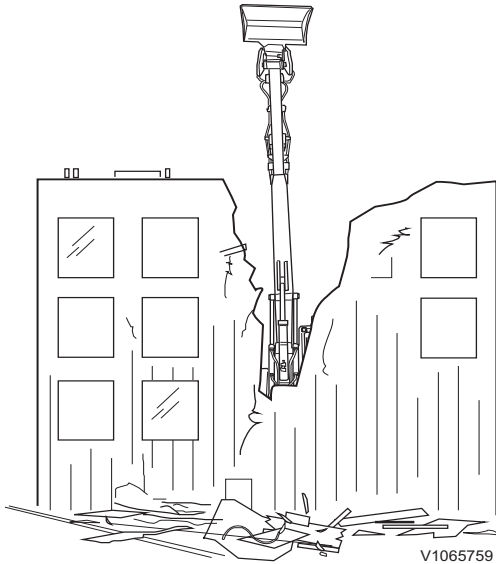
Use appropriate fluids for the ambient working temperatures. (see recommended fluids in specification section.)

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.

## Operating techniques

### Working within dangerous areas 201



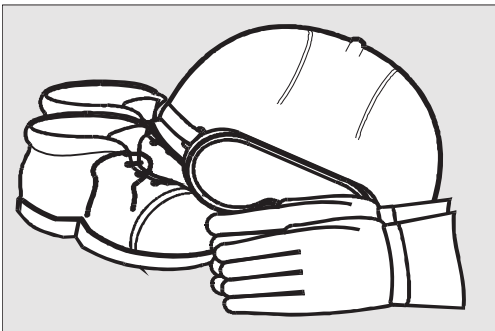
### Demolition work

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.



## Attachments

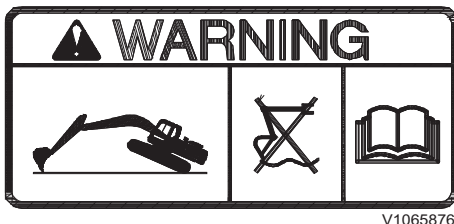
### Boom float position, description

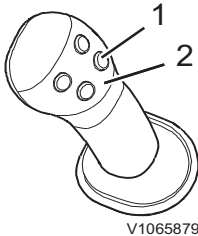
Float position means that both the boom cylinders' piston and piston rod sides are connected to the hydraulic tank. The boom then floats with the weight of the attachments when operating the boom lever forward. The boom lifting is not affected by float position.

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/or bucket operation. 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.





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



Indicator on the instrument panel

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.

- 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 99. 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.

**NOTE!**

When the boom float function is on, the function will remain even if the ignition switch is off and on again. The indicator on the instrument panel will be also displayed.

## Attachments, connecting and disconnecting

### Quick coupler

#### SQF S6 (optional equipment)

#### WARNING

Risk of crushing.  
Falling attachments could result in severe injury or death.

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

#### WARNING

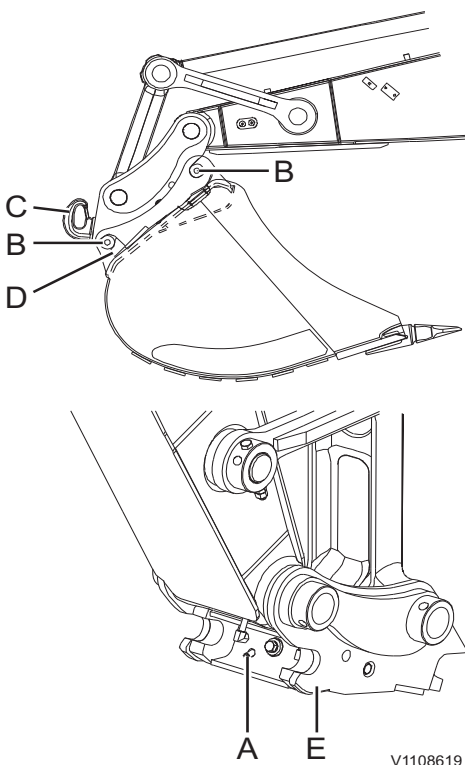
Risk of crushing.  
An unsecured attachment could fall and cause serious injury or death.

**Always ensure the attachment is properly secured by pressing the front part of the attachment to the ground until the machine is slightly lifted.**

The attachment quick coupler consists of flat mounting plates 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 lift hook (C) on the attachment quick coupler (optional).

The attachment quick coupler is equipped with a double-acting hydraulic cylinder. The quick coupler's lock 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 pin (B). This means that the lock wedge adjusts itself and provides gap-free locking.



V1108619

- A Red indicator pin
- B Bucket pins
- C Lift hook
- D Lock wedge
- E Hooks for gripping attachment

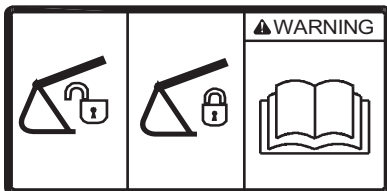
## Operating techniques

# Attachments, connecting and disconnecting 205

When the lock 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 quick coupler, which is pulled in when the lock wedge is in the locked position and pushed out when the lock wedge is released.

With the lift hook, the machine can be used for lifting operations. Since the hook is located on the attachment quick coupler, it can be used without bucket. This improves visibility for the operator and increases the maximum permissible load.



V1065833

### **WARNING**

The attachment quick coupler may be open regardless of what is indicated by the alarm signal or on the instrument panel. Therefore, always check that the attachment quick coupler is locked securely. Also read the instructions in the operator's manual.

### **WARNING**

Risk of crushing.

If the pressure in the attachment bracket cylinder drops, the attachment could fall off and cause serious crushing injury or death.

**Never install shut-off valves in the lines leading to the cylinder for the attachment bracket.**

206 Operating techniques  
Attachments, connecting and disconnecting

Bucket, removing

**WARNING**

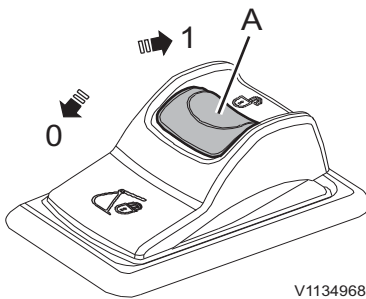
Risk of crushing!

Attachments that move unexpectedly can cause injuries.

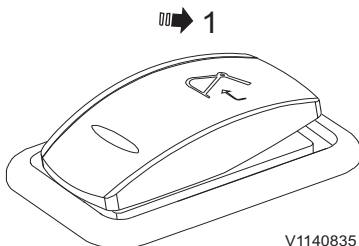
**Make sure people stay out of the working area when connecting or disconnecting attachments.**

- 1 Position the machine on even, firm and level ground with the bucket resting on the ground.
- 2 Press down to release the red lock device (A) on the right attachment quick coupler switch and then press the switch to position (1) to initiate the attachment quick coupler.

When the attachment quick coupler is initiated, the buzzer sounds and the check message and indicator are displayed on the IC (Instrument Cluster). See page 83 for more information.

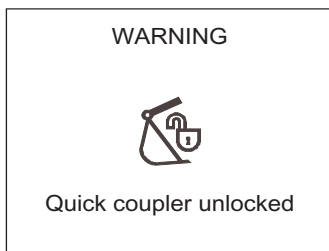


Attachment quick coupler switch, right



Attachment quick coupler switch, left

- 3 Press the left attachment quick coupler switch for more than 0.7 seconds to open the attachment quick coupler. The switch is returned automatically. See page 38 for more information.



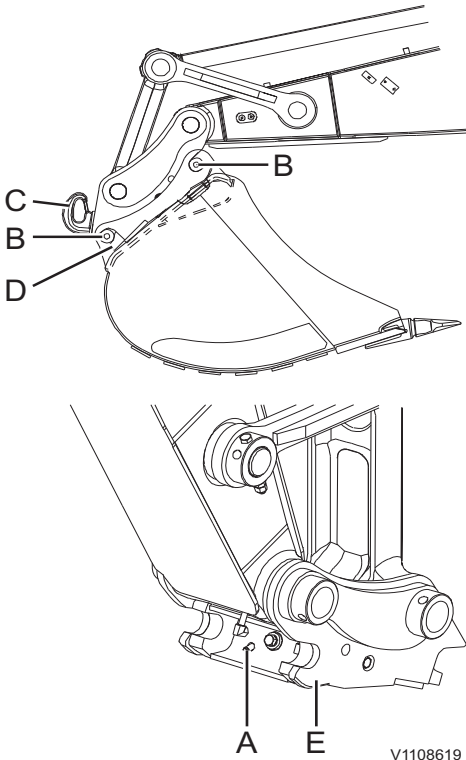
Warning! Quick coupler unlocked

**NOTE!**

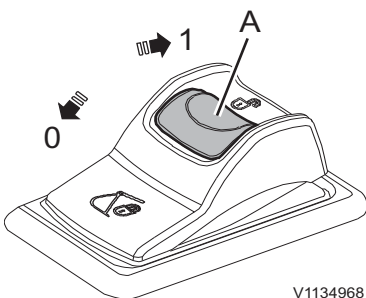
When the attachment quick coupler is open, the buzzer sounds and the warning message and indicator are displayed on the IC (Instrument Cluster).

## Operating techniques

# Attachments, connecting and disconnecting 207

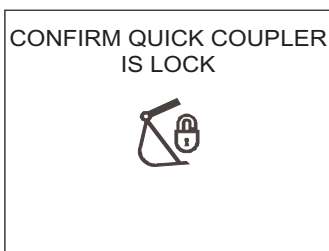


- A Red indicator pin
- B Bucket pins
- C Lift hook
- D Lock wedge
- E Hooks for gripping attachment



V1134968

Attachment quick coupler switch, right



V1147255

Confirm quick coupler is locked

- 4 When the red indicator pin (A) on the quick coupler is extended completely, carefully release the bucket from the attachment quick coupler by operating the bucket cylinder to its inner end position (bucket out).

**NOTE!**

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.

- 5 Disconnect the bucket by extending the dipper arm and raising the boom.

- 6 Press the right attachment quick coupler switch to position (0) to close the attachment quick coupler. See page 83 for more information.

**NOTE!**

When the switch is in position (0), the buzzer sounds and the check message for confirming and indicator are displayed on the IC (Instrument Cluster).

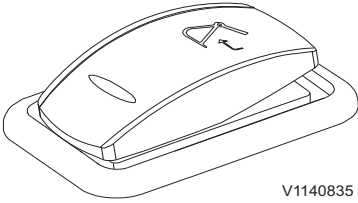


## Operating techniques

### 208 Attachments, connecting and disconnecting

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1



V1140835

Attachment quick coupler switch, left

- 7 Press the left attachment quick coupler switch for more than 0.7 seconds to confirm that the attachment quick coupler is locked. Then the buzzer sound will be turned off and the check message and indicator will disappear. See page 38 for more information.

## Operating techniques

# Attachments, connecting and disconnecting 209

### Bucket, installing

#### **WARNING**

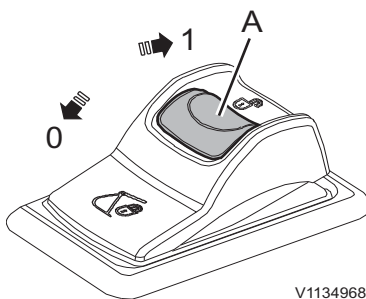
Risk of crushing!

Attachments that move unexpectedly can cause injuries.

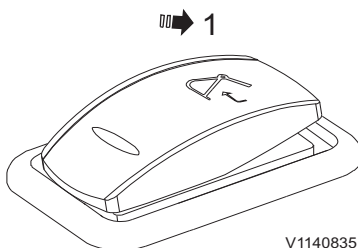
**Make sure people stay out of the working area when connecting or disconnecting attachments.**

- 1 Position the machine on even, firm and level ground.
- 2 Press down to release the red lock device (A) on the right attachment quick coupler switch and then press the switch to position (1) to initiate the attachment quick coupler.

When the attachment quick coupler is initiated, the buzzer sounds and the check message and indicator are displayed on the IC (Instrument Cluster). See page 83 for more information.

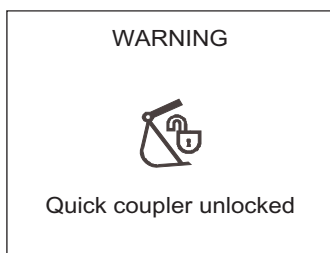


Attachment quick coupler switch, right



Attachment quick coupler switch, left

- 3 Press the left attachment quick coupler switch for more than 0.7 seconds to open the attachment quick coupler. The switch is returned automatically. See page 38 for more information.

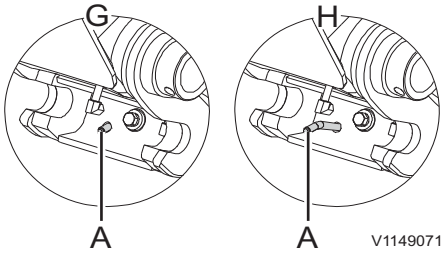


Warning! Quick coupler unlocked

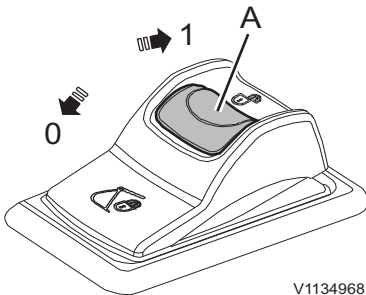
#### **NOTE!**

When the attachment quick coupler is open, the buzzer sounds and the warning message and indicator are displayed on the IC (Instrument Cluster).

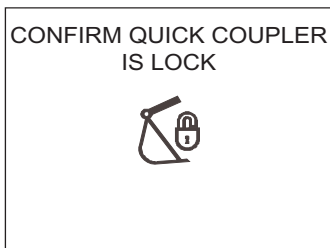
## 210 Operating techniques Attachments, connecting and disconnecting



- G Indicator pin fully retracted  
: lock position
- H Indicator pin fully extended  
: unlock position
- A Red indicator pin



Attachment quick coupler switch, right



Confirm quick coupler is locked

- 4 Check that the red indicator pin (A) is fully extended.

**NOTE!**

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.

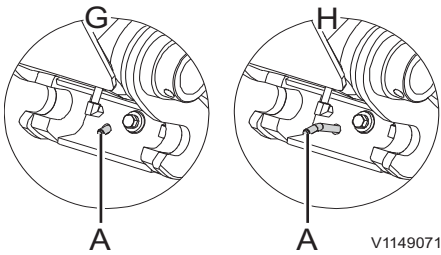
- 5 Operate the dipper arm to such a position that the two hooks on the attachment quick coupler engage the bucket's front pin.
- 6 Slowly turn the attachment quick coupler towards the bucket by moving the bucket cylinder (bucket in) until the quick coupler mates correctly against the bucket.
- 7 Check that the attachment quick coupler is correctly aligned against the tip of the bucket, if necessary, adjust with dipper arm or boom movements.
- 8 Press the right attachment quick coupler switch to position (0) to close the attachment quick coupler. See page 83 for more information.

**NOTE!**

When the switch is in position (0), the buzzer sounds and the check message for confirming and indicator are displayed on the IC (Instrument Cluster).

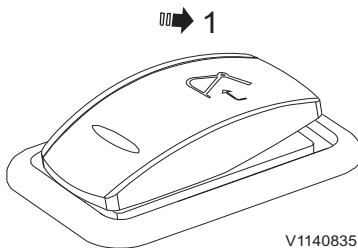
## Operating techniques

# Attachments, connecting and disconnecting 211



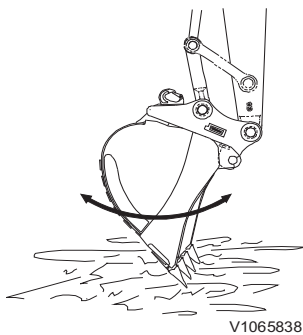
- G Indicator pin fully retracted  
: lock position
- H Indicator pin fully extended  
: unlock position
- A Red indicator pin

9 Check that red indicator pin (A) is fully retracted into the attachment quick coupler.



Attachment quick coupler switch, left

10 Press the left attachment quick coupler switch for more than 0.7 seconds to confirm that the attachment quick coupler is locked. Then the buzzer sound will be turned off and the check message and indicator will disappear. See page 38 for more information.



- 11 Do the following tests to check that the attachment quick coupler is fastened securely.
- Press the bucket against the ground.
  - Operate the bucket cylinder in and out to check that lock wedge (D) is seated securely. If you are not sure, check that lock wedge (D) has gone into the hook.
  - Do not use the machine if the attachment quick coupler is not working.
  - Contact a workshop authorized by Volvo if anything is wrong.

### ! WARNING

Risk of crushing.

If the red warning lamp for open attachment bracket lights up while working, the attachment could fall off and cause serious crushing injury or death.

**Stop working with the machine immediately and make sure the attachment bracket is properly locked before starting to work again.**

## 212 Operating techniques Attachments, connecting and disconnecting

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### Quick coupler

#### Universal attachment quick coupler (optional equipment)

#### **WARNING**

Risk of crushing.

Falling attachments could result in severe injury or death.

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

#### **WARNING**

Risk of crushing.

An unsecured attachment could fall and cause serious injury or death.

**Always ensure the attachment is properly secured by pressing the front part of the attachment to the ground until the machine is slightly lifted.**

The attachment quick coupler is equipped with a double-acting hydraulic cylinder. The hook for gripping the attachment is fitted to its piston rod. The hydraulic system's pressure acts on the lock cylinder's piston, locking the attachment in place against the rear bucket pin. This means that the hook adjusts itself and provides gap-free locking.

When checking from the cab if the attachment quick coupler is locked or unlocked, slowly curl out the bucket/attachment and dipper arm.

With the lifting eye, the machine can be used for lifting operations. Since the lifting eye is located on the attachment quick coupler, it can be used without bucket. This improves visibility for the operator and increases the maximum permissible load.

## Operating techniques

# Attachments, connecting and disconnecting 213

### Bucket, removing

#### **WARNING**

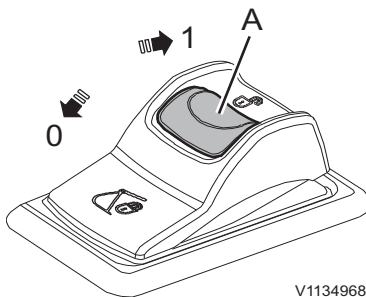
Risk of crushing!

Attachments that move unexpectedly can cause injuries.

**Make sure people stay out of the working area when connecting or disconnecting attachments.**

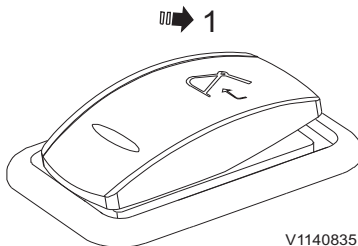
- 1 Place the machine on firm and level ground.
- 2 Curl in the bucket completely towards the dipper arm (to release the lock mechanism).
- 3 Press down to release the red lock device (A) on the right attachment quick coupler switch and then press the switch to position (1) to initiate the attachment quick coupler.

When the attachment quick coupler is initiated, the buzzer sounds and the check message and indicator are displayed on the IC (Instrument Cluster). See page 83 for more information.



V1134968

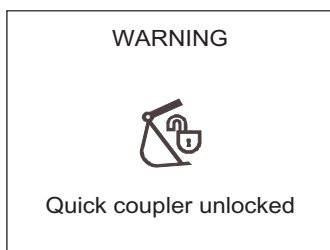
Attachment quick coupler switch, right



V1140835

Attachment quick coupler switch, left

- 4 Press the left attachment quick coupler switch for more than 0.7 seconds to open the attachment quick coupler. The switch is returned automatically. See page 38 for more information.



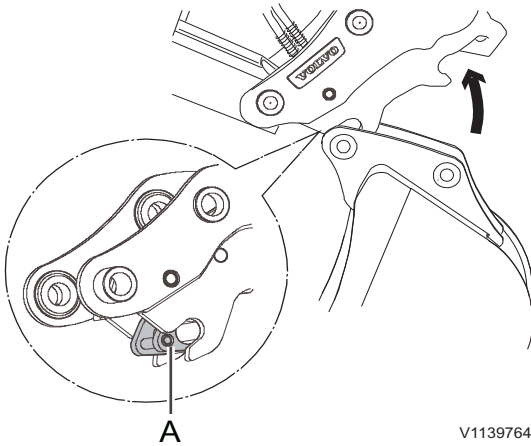
V1147254

Warning! Quick coupler unlocked

#### **NOTE!**

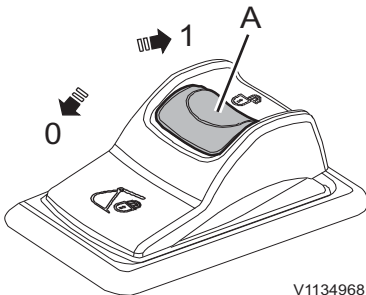
When the attachment quick coupler is open, the buzzer sounds and the warning message and indicator are displayed on the IC (Instrument Cluster).

## 214 Operating techniques Attachments, connecting and disconnecting



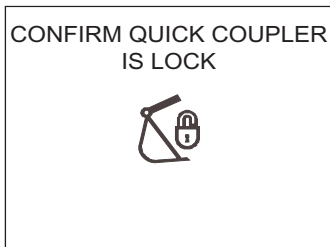
Attachment quick coupler, unhooking  
A Front lock device

V1139764



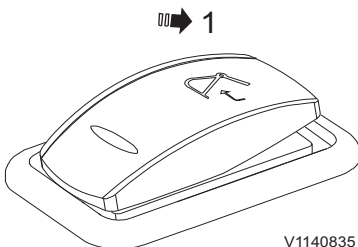
Attachment quick coupler switch, right

V1134968



Confirm quick coupler is locked

V1147255



Attachment quick coupler switch, left

V1140835

- 5 Make sure that the front lock device (A) is fully opened to unhook from the bucket pin. Otherwise, the bucket pin cannot disengage correctly.

**NOTE!**

If the front lock device (A) is not opened, 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.

- 6 Lower the bucket and curl out to lift up the attachment quick coupler from the bucket.
- 7 Place the bucket flat on the ground and unhook it.
- 8 Press the right attachment quick coupler switch to position (0) to close the attachment quick coupler. See page 83 for more information.

**NOTE!**

When the switch is in position (0), the buzzer sounds and the check message for confirming and indicator are displayed on the IC (Instrument Cluster).

- 9 Press the left attachment quick coupler switch for more than 0.7 seconds to confirm that the attachment quick coupler is locked. Then the buzzer sound will be turned off and the check message and indicator will disappear. See page 38 for more information.

## Operating techniques

# Attachments, connecting and disconnecting 215

### Bucket, installing

#### **WARNING**

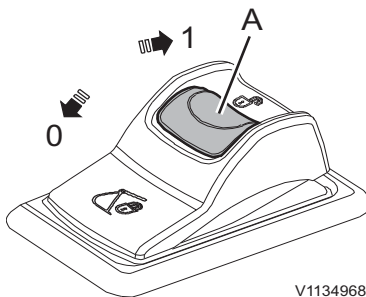
Risk of crushing!

Attachments that move unexpectedly can cause injuries.

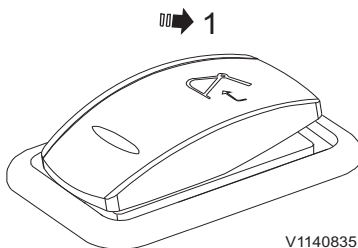
**Make sure people stay out of the working area when connecting or disconnecting attachments.**

- 1 Place the machine on firm and level ground.
- 2 Curl in the bucket completely towards the dipper arm (to release the lock mechanism).
- 3 Press down to release the red lock device (A) on the right attachment quick coupler switch and then press the switch to position (1) to initiate the attachment quick coupler.

When the attachment quick coupler is initiated, the buzzer sounds and the check message and indicator are displayed on the IC (Instrument Cluster). See page 83 for more information.

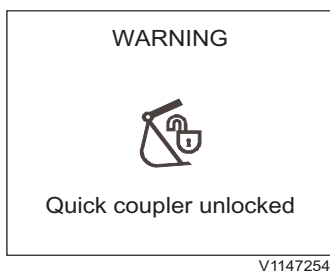


Attachment quick coupler switch, right



Attachment quick coupler switch, left

- 4 Press the left attachment quick coupler switch for more than 0.7 seconds to open the attachment quick coupler. The switch is returned automatically. See page 38 for more information.



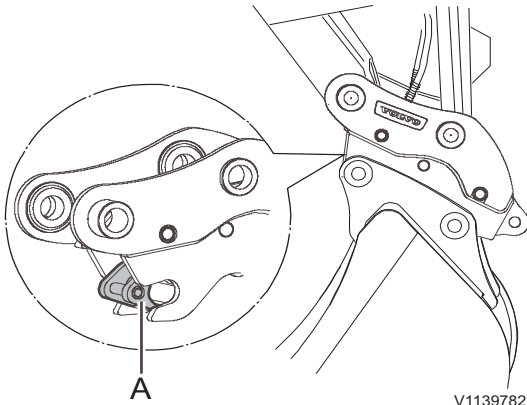
Warning! Quick coupler unlocked

#### **NOTE!**

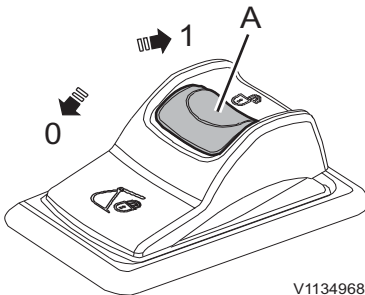
When the attachment quick coupler is open, the buzzer sounds and the warning message and indicator are displayed on the IC (Instrument Cluster).



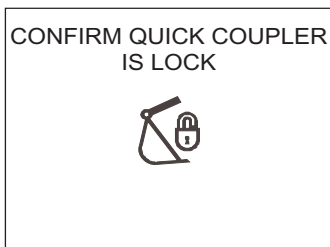
## 216 Operating techniques Attachments, connecting and disconnecting



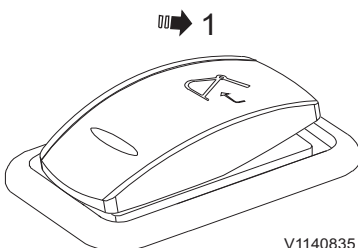
Bucket in locked position  
A Front lock device



Attachment quick coupler switch, right



Confirm quick coupler is locked



Attachment quick coupler switch, left

- 5 Make sure that the front lock device (A) is fully opened before hooking it onto the bucket pin. Otherwise, the bucket pin cannot be engaged correctly.

### NOTE!

If the front lock device (A) is not opened, 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.

- 6 Curl out the attachment quick coupler and hook it onto the bucket pin.
- 7 Slowly curl in the attachment quick coupler fully towards the bucket.
- 8 Press the right attachment quick coupler switch to position (0) to close the attachment quick coupler. See page 83 for more information.

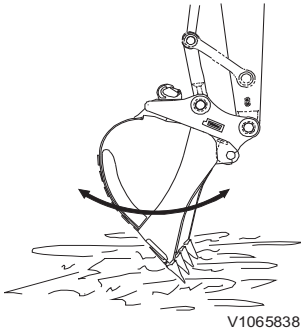
### NOTE!

When the switch is in position (0), the buzzer sounds and the check message for confirming and indicator are displayed on the IC (Instrument Cluster).

- 9 Visually check that the front lock device is fully engaged.
- 10 Lift and curl in the bucket fully towards the dipper arm and hold it there for approximately 5 seconds to ensure that the attachment quick coupler has locked securely to the bucket.
- 11 Press the left attachment quick coupler switch for more than 0.7 seconds to confirm that the attachment quick coupler is locked. Then the buzzer sound will be turned off and the check message and indicator will disappear. See page 38 for more information.

## Operating techniques

# Attachments, connecting and disconnecting 217



V1065838

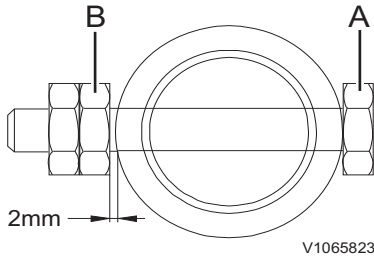
- 12 Do the following tests to check that the attachment quick coupler is fastened securely.
- Press the bucket against the ground. In this position, curl the bucket in and out to check that it is locked in the correct position.
  - If you are uncertain about whether the bucket is securely locked to the attachment quick coupler, get out and check that the front lock device is fully engaged.
  - Do not use the machine if the attachment quick coupler is not working.
  - Contact a workshop authorized by Volvo if anything is wrong.

### **WARNING**

Risk of crushing.

If the red warning lamp for open attachment bracket lights up while working, the attachment could fall off and cause serious crushing injury or death.

**Stop working with the machine immediately and make sure the attachment bracket is properly locked before starting to work again.**



## Buckets

### Bucket, changing Bucket, removal

#### **WARNING**

Risk of splinter injury.  
Striking the bucket pin with a hammer could cause metal chips to fly around and cause serious splinter injury.

**Always wear face and eye protection, hard hat and gloves while removing and installing the bucket pins.**

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

#### **NOTICE**

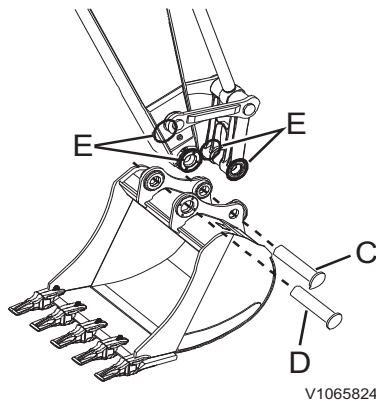
**Block the removed bucket to stabilise it. Keep the pins clean and do not damage the O-ring.**

### Bucket, Installation

#### **CAUTION**

Risk of cutting and crushing.  
Loose parts could cause crushing and cutting injury.  
**Never use your fingers for checking alignment between loose parts. Always use a tool.**

- 1 Align the dipper arm and links to the bucket.
- 2 Put O-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 screw (A) and nut (B) of each pins.



#### **NOTICE**

**Make sure that there is a clearance of at least 2 mm (0.08 in) between nut and pin boss. Lubricate the pin.**

## Working with buckets

### NOTICE

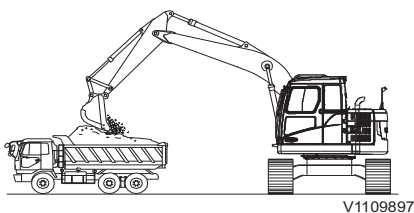
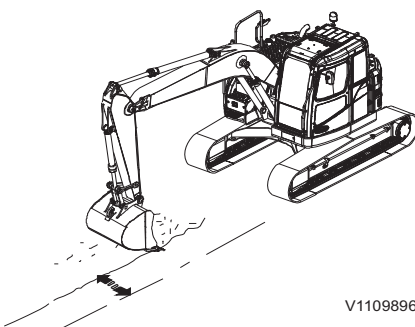
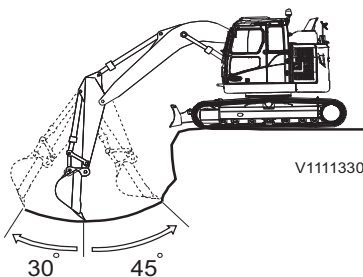
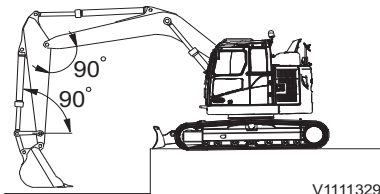
Select a suitable attachment that fits the machine on which it is to be installed. The types of attachments that can be installed vary with the machine type. Contact a workshop authorised by Volvo.

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  $90^\circ$  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  $30^\circ$  forward and  $45^\circ$  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 swing 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.

## Hammer

### NOTICE

Do not use the hammer before you have read and understood how it is to be used and maintained.

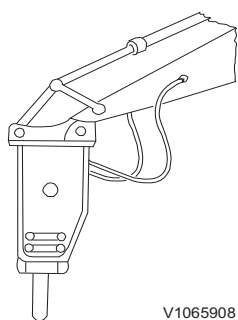
When hammers are used, install the Volvo external hydraulic filter in the hammer return line circuit. Contact your Volvo dealer for detailed information regarding this option.

### Main works

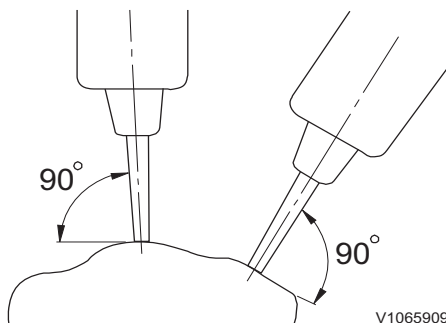
- Breaking stone
- Demolition work
- Road repairing

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

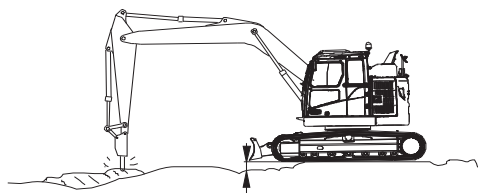
Press the chisel firmly onto the surface at a right angle as shown.



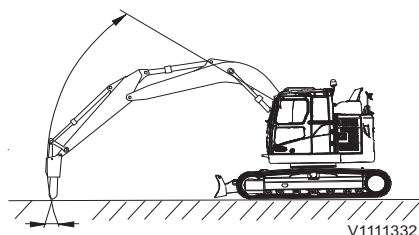
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V1065909



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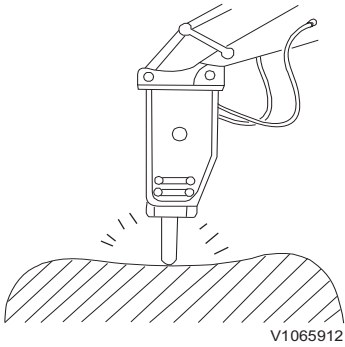
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When striking, press the chisel firmly onto the surface, and lift the frame about 5 cm. Never raise the machine unnecessarily high.

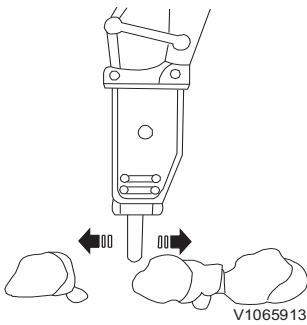
If the surface is struck repeatedly but it does not break within 1 minute, move the chisel nearer one end and strike again.

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.

Operating techniques  
**Hammer** 221

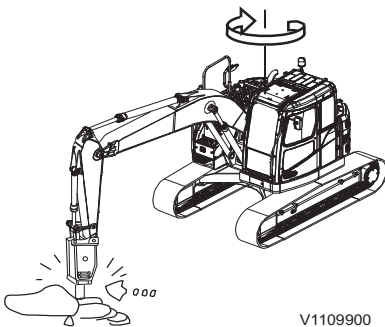


Press the chisel firmly against the surface so idle striking is avoided.

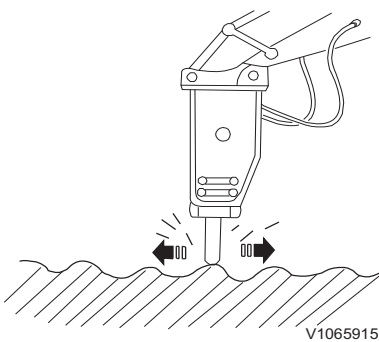


**Caution during hammer operation**

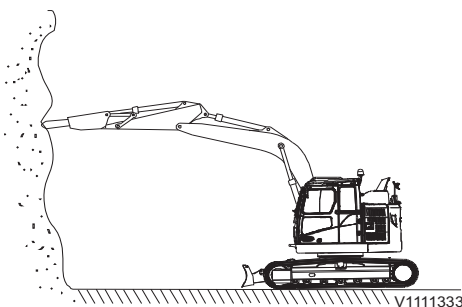
Do not operate the cylinder to its end of stroke, leave about 5 cm.



Do not swing the hammer against the rocks, concrete and so on.



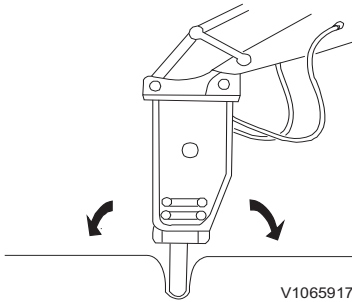
Do not move the chisel while it is striking a blow.



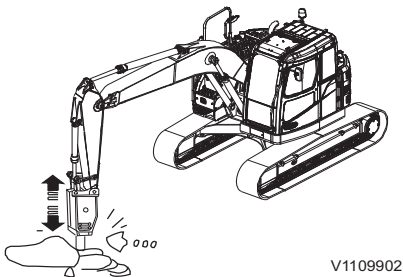
Do not strike horizontally, or in an upward direction.

222 Operating techniques  
Hammer

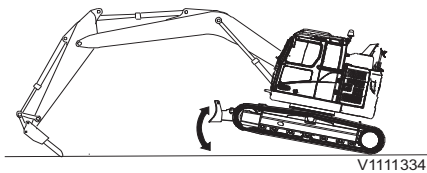
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Do not bend with the chisel to make a hole in the ground.



Do not hoe the chisel.



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



## Working with long range attachments

### **NOTICE**

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.

### **NOTICE**

Only attachments approved for the machine by Volvo may be used.

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 with long reach boom and arm.
- 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.



## Hose rupture valves

(Optional equipment)

### NOTICE

Do not dismantle the hose rupture valve as it is pressurised. Contact a workshop authorised by Volvo if problems arise.



### WARNING

Risk of serious injury.

Working under an attachment that is not properly supported could cause serious injury.

**Before working under an attachment, ensure the attachment is properly supported and the control lockout lever has been locked and the engine is shut off. Ensure that nobody enters the cab while working under the attachment.**

### Attachment lowering after hose rupture

#### When engine is running

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

#### 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 dipper arm in the usual way with operating levers. Do not wait too long to lower the boom, the servo hydraulic 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.

## Operating techniques Hose rupture valves 225

When engine is stopped and with no servo hydraulic pressure

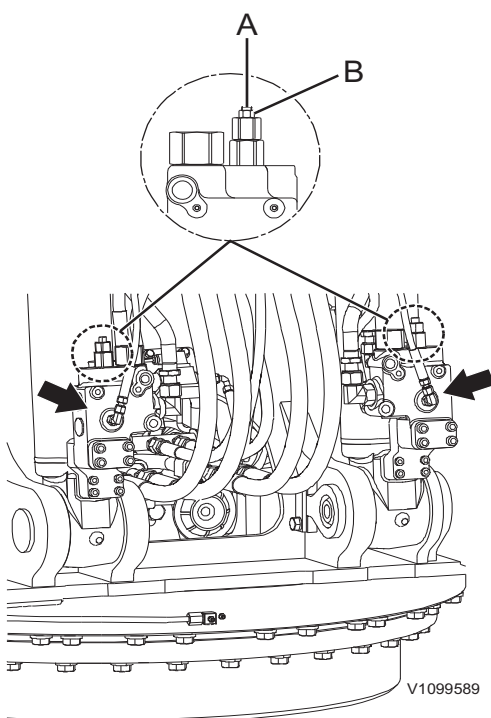
### WARNING

Risk of high pressure injection.  
The hydraulic oil is under high pressure.  
Discharging hydraulic oil will cause serious injury when injected into the skin.  
**Depressurize the hydraulic system before connecting or disconnecting hydraulic hoses.**

### NOTICE

Always use personal protective equipment, such as working gloves, overalls and face protection or protective goggles with side protection before you release excess pressure in a hydraulic hose or pipe connection.

- 1 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: 35.8 MPa, 365 kgf cm<sup>2</sup>, 5192 psi)**  
The boom will then slowly be lowered to the ground.
- 2 Turn adjusting screw (A) to its original position.
- 3 Hold adjusting screw (A) securely and tighten lock nut (B).
- 4 Contact an authorized Volvo Construction Equipment dealer workshop.



Hose rupture valves  
A Adjusting screw  
B Lock nut

## Selecting track shoes

Grouser	Use	Precautions when using
A 500 mm 600 mm	Rocky ground, normal soil	Travel in low speed when travelling on rough ground with obstacles such as large boulders and fallen trees.
B 700 mm 750 mm	Soft ground	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. <b>NOTE!</b> Cannot be used on rough ground where there are large obstacles such as boulders or fallen trees.
C Rubber shoe/ pad	Pavement	Use only on pavement <b>NOTE!</b> Cannot be used on rough ground

### Rubber shoe/pad usage

When using rubber shoe/pad, keep the following in mind.

#### 1 Rubber track tension

Correct tension adjustment is critical for optimum performance. If the tension is too low, detracking may occur and rubber shoe/pad may become damaged as a result. For more information about track tension checking, see page 266.

#### 2 Ground condition

- Use rubber shoe/pad only on pavement. Otherwise the durability is rapidly reduced due to the shoe/pad cut-off and wear especially on:
  - concrete crushed pieces
  - sand
  - reinforcing bars
  - projected pieces of glass
- Do not use rubber shoe/pad when travelling on concrete sideways, on rocky ground, or on stony river beds.
- Be careful not to slip on water, snow or sand. Especially be careful when loading and unloading the machine.
- Durability of the rubber track may not be guaranteed with special attachment mounted.



## Operating techniques Selecting track shoes **227**

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### 3 Driving techniques

- Driving slowly and turning with a large radius compared to fast small radius turns will extend shoe/pad life.
- High friction caused by fast turns on concrete surfaces can lead to detracking and rubber abrasion.

### 4 Storage, maintenance

- Keep rubber shoe/pad oil and grease free.
- If long-term storage of the rubber shoe/pad is required, store from direct sun light or rain.
- Rubber shoe/pad can operate problem-free within a temperature range of  $-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$ .



## Lifting objects

There may be local and/or national regulations that govern the use of machines which apply for lifting operations. Obey the local and/or national regulations. Contact your local Volvo dealer for more information.

If the machine is used to lift objects within an area that is governed by the European Machinery Directive 2006/42/EC and its amendments, the machine must be equipped with following working devices.

- A load hooking device.
- A hose rupture valve on the boom or in some countries hose rupture valve on both boom and dipper arm is required depending on risk assessment. See page 224.
- A overloading warning device. See page 83.

Safe lifting make great demands on the operator. Read the below recommended steps before starting any lifting.

- Use qualified and properly trained operators who have:
  - Specific machine knowledge and training.
  - Read and understand the operator's manual and its load charts. See page 350.
  - Specific machine knowledge and training how to properly rig the load.
  - Full responsibility for all aspects of the lift.
- Interrupt the lift if not fully confident of a safe lift.
- Select machine with sufficient capacity for the total expected load, reach and swing. Ideally, load should be less than the load listed on the load chart at maximum reach across the undercarriage.
  - Know the mass (weight) of the item to be lifted.
  - Know the start and finish positions, load lifting position and setting position.
  - Know the machine configuration, especially the dipper arm and boom lengths and counterweight mass.
  - Choose the correct lifting chart taking into account all attachments and rigging materials that will be used during the lift. The weight of the rigging materials and attachments, should be deducted from the load capacity.
- Warm up the machine to normal working temperatures.



- Position the machine on firm level ground.
- Properly set outriggers and blade when applicable.
- Visually inspect the rigging materials for defects, cracks, or any other damage before lifting objects.
- Once the load is properly rigged, ensure all ground workers are clear of the load and the machine. If guiding of the load is necessary, use ropes or other type of slings tied to the load to keep ground workers at a safe distance.
- Use a trained signalman to direct all aspects of the move.

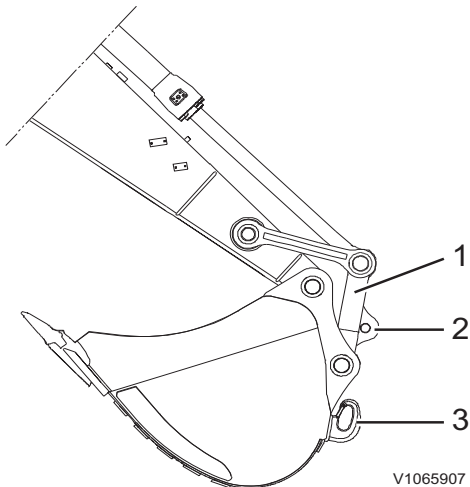
### **NOTICE**

**It is the responsibility of the owner or the operator to know and follow the local or national regulations that apply for lifting operations. For further information, contact your dealer.**

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, for example 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 dipper arm-in operation to drag a load.
- Do not operate the machine while someone is hanging on or in the bucket or attachments.

## 230 Operating techniques Lifting objects



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

### 1 Load hooking device on bucket or attachment quick coupler

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 when manoeuvring the dipper 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, travel position and so on.

#### NOTE!

Only use lifting device recommended by Volvo in order to avoid damage to the machine. Contact your dealer for information regarding other lifting device.

### 2 Load hooking device on connecting rod

Lifting device on connecting rod is designed to lift the marked permissible load on the lifting device.

## 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>V1065920</p>	<p>V1065921</p>	<p>V1065923</p>
<p><b>RAISE LOAD VERTICALLY</b> With either forearm vertical, forefinger pointing up, move hand in small horizontal circles.</p>	<p><b>LOWER LOAD VERTICALLY</b> With either arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>	<p><b>MOVE LOAD IN HORIZONTALLY</b> With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.</p>
<p>V1065924</p>	<p>V1065925</p>	<p>V1065926</p>
<p><b>MOVE LOAD OUT HORIZONTALLY</b> With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.</p>	<p><b>RAISE BOOM</b> With either arm extended horizontally, fingers closed, point thumb upward.</p>	<p><b>LOWER BOOM</b> With either arm extended horizontally, fingers closed, point thumb downward.</p>
<p>V1065927</p>	<p>V1065928</p>	<p>V1065929</p>



232 **Operating techniques**  
**Signalling diagram**

<p><b>SWING</b> With either arm extended horizontally, point with forefinger to direction of swing rotation.</p>	<p><b>DIPPER ARM INWARD</b> With both hands clenched, point thumbs inward.</p>	
<p>V1065930</p>	<p>V1065931</p>	
<p><b>DIPPER ARM OUTWARD</b> With both hands clenched, point thumbs outward.</p>	<p><b>CLOSE BUCKET</b> Hold one hand closed and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at closed hand.</p>	<p><b>OPEN BUCKET</b> Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.</p>
<p>V1065933</p>	<p>V1065934</p>	<p>V1065935</p>
<p><b>TURN THIS FAR TO GO</b> Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.</p>		<p><b>THIS FAR TO GO</b> With hands raised and open inward, move hands laterally, indicating distance to go.</p>
<p>V1065936</p>	<p>V1065937</p>	<p>V1065938</p>
<p><b>COUNTER ROTATE</b> 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><b>MOVE SLOWLY</b> Place one hand motionless in front of hand giving motion signal. Raise load slowly is shown.</p>
<p>V1065939</p>	<p>V1065940</p>	<p>V1065941</p>



Operating techniques  
**Signalling diagram 233**

<p><b>TRAVEL</b> Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.</p>		<p><b>STOP</b> With either arm extended laterally, hand open downward, move arm back and forth.</p>
<p><b>EMERGENCY STOP</b> With both arms extended laterally, hands open downward, wave arms back and forth.</p>	<p><b>STOP ENGINE</b> 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.

### **WARNING**

Risk of burns!

Hot machine parts could cause burns.

**Allow hot machine parts to cool before performing adjustments or service. Wear personal protective equipment.**

## Service position

### NOTE!

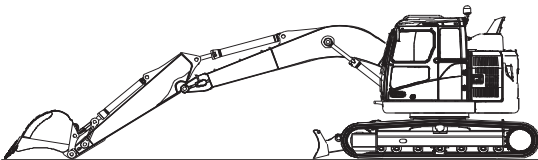
Before beginning any service work, the following measures must first be taken.

- 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 switch.  
See page 301.
- 4 Make sure the control lockout lever is down to lock the system securely, see page 114.
- 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

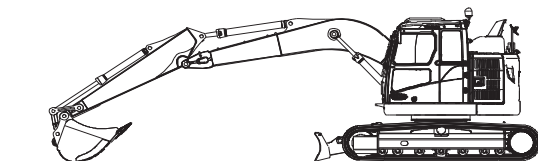
Retract the bucket and dipper arm cylinder completely, and then lower the boom on the ground.



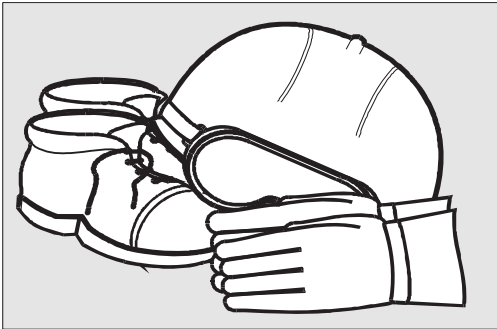
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### Service position B

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



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## 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 pressurized 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.



### 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 Construction Equipment 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 25.
- Measures to be taken in connection with electric welding, see page 289.
- 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, for example 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.

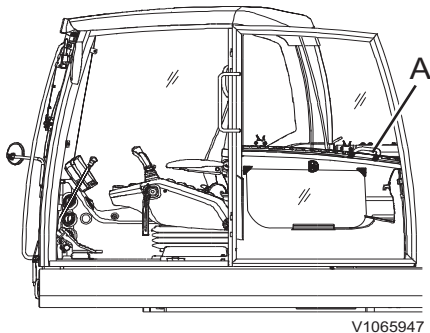
## Entering, leaving and climbing the machine

### Entering, leaving and climbing the machine

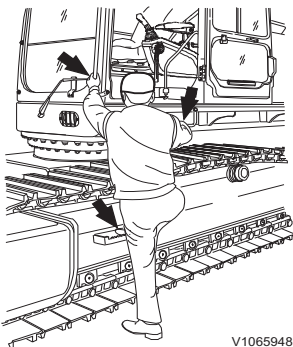
#### **NOTICE**

The safety regulations and operating instructions issued by the manufacturer must be strictly observed.

- Do not jump on/off a machine, especially never get on / off when the machine moves.
- Never grasp the control lever to get on / off.
- Use handholds and steps when entering, leaving or climbing the machine.
- Use the three-point grip, that is two hands and one foot or two feet and one hand.
- Always face the machine.
- Always wipe mud and oil off all footboards, handrails and your footwear, especially clean the windows, rear view mirrors and lights.
- Clean your boots and wipe your hands before getting on the machine.
- Do not use hand grip (A) of the cab door as a support when entering, leaving and climbing the machine. it is not strong enough to be used as a support. it should only be used for closing the door.



V1065947



V1065948





## Fire prevention

### NOTE!

Using the machine in environments with high risk of fire or explosion requires special training and equipment.

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 (8.8 lb) (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.



## Safety when servicing Fire prevention 241

- 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, for example 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, for example 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, for example 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 switch to stop position.
- 5 Exit the cab.
- 6 Call the fire brigade.
- 7 If possible to access safely, turn off the battery disconnect switch or emergency stop 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, that is slaked lime in water).
- Handling heated fluoro-carbon rubber, see page 243.

## Handling hazardous materials

### Heated paint

#### **WARNING**

Risk of toxin inhalation.

Burning of painted, plastic or rubber parts produces gases that could damage respiratory tracts.

**Never burn painted or rubber parts or any plastics.**

Heated paint gives off poisonous gases. Therefore, paint must be removed from an area with a radius of at least 10 cm (4 in) 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.

## 244 Safety when servicing Handling hazardous materials

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### Heated fluoro-carbon rubber

#### **WARNING**

Risk of serious injury.

At very high temperatures fluoro-carbon rubber forms substances which are very corrosive to skin and lungs.

**Always wear personal protective equipment.**

**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, that is 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.



## Safety when servicing Handling hazardous materials 245

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### Crystalline silica (quartz) dust

#### **WARNING**

Risk of hazardous inhalation.

Working in environments containing dangerous dust can lead to serious health problems.

**Wear personal protective equipment when working in dusty environments.**

Crystalline 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.



## 246 Safety when servicing Handling hazardous materials

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### Refrigerant

#### Environmental precautions

The air conditioning system of the machine is filled with R134a refrigerant at the factory. R134a refrigerant is a fluorinated greenhouse gas and contributes to global warming.

Do not release refrigerant into the environment. See page 328 for the amount of R134a refrigerant in your machine and its global warming potential.

#### Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician. Do not attempt to perform work on the air conditioning system.

Wear safety goggles, chemical resistant gloves (e.g., neoprene or butyl rubber) and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

#### Actions in case of exposure

**Eye contact:** Rinse with warm water and apply a light bandage. Seek medical attention immediately.

**Limited skin contact:** Rinse with warm water and apply a light bandage. Seek medical attention immediately.

**Extensive skin contact:** Rinse with warm water and carefully heat the area with warm water or warm clothing. Seek medical attention immediately.

**Inhalation:** Leave the area and find fresh air. Seek medical attention immediately.

## Handling line, tubes and hoses

### WARNING

Risk of high pressure injection.

Oil or fuel leaks from high pressure hoses could cause serious injury caused by high pressure injection.

**If oil or fuel leaks from high pressure hoses or loose screws is found, stop operations immediately and contact an authorized Volvo dealer workshop.**

- Do not bend high pressure lines.
- Do not strike high pressure lines.
- Do not install any lines that are bent or damaged.
- Check lines, tubes and hoses carefully. (leakage, damage, deformity and aging)
- Do not reuse hose, tube and fittings.
- Do not use your bare hand to check for leaks.
- Tighten all connections. Consult your Volvo Construction Equipment dealer for the recommended tightening torque.

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

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

### NOTICE

**Make sure that all clamps, guards and heat shields are correctly installed. This contributes to preventing vibrations, chafing against other parts and excessively strong generation of heat.**





V1068256

## Maintenance

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

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

### 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 Construction Equipment, the service history should be filled in, see page 378. Service history is a valuable document, which can be referred to when for example selling the machine.

### Arrival Inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer or distributor must also carry out arrival inspections according to the applicable form.

### Delivery Inspection

Before the machine leaves the factory, it is tested and adjusted. The dealer or distributor must also carry out delivery inspections according to the applicable form.



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## 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 Programme

For any factory warranty to be valid, the machine shall be maintained according to the service program established by Volvo. The service program is continuous with fixed intervals. The operating time between intervals only applies if the machine is used in normal environment and operating conditions. Ask your Volvo dealer what is right for your specific machine.

## Safety regulations

### **WARNING**

Risk of chemical burns.

The battery electrolyte contains corrosive sulphuric acid which could cause severe chemical burns.

**If electrolyte spilled on your bare skin, remove it immediately and wash the affected area with soap and plenty of water. If it gets into your eyes or any other sensitive body part, rinse with plenty of water and seek immediate medical attention.**

- Do not smoke near batteries as these give off explosive gases.
- Make sure that metal objects, for example 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 288.
- Starting with booster batteries, see page 161.

## Battery disconnect switch

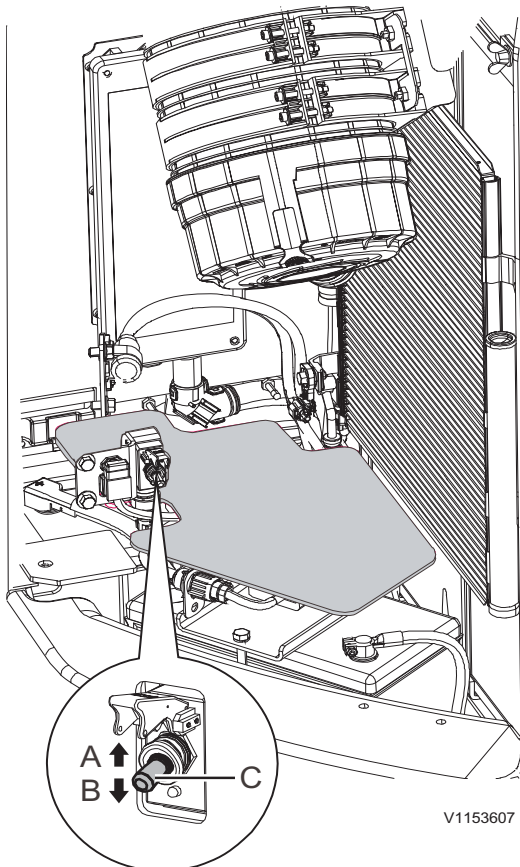
### **NOTICE**

Do not turn off the battery disconnect switch when the engine is running. The electrical system may be damaged.

Battery disconnect switch (C) is located inside the left side door of the machine. When welding, servicing of electrical system or after finishing work of the day for safety, the battery disconnect switch should be turned off.

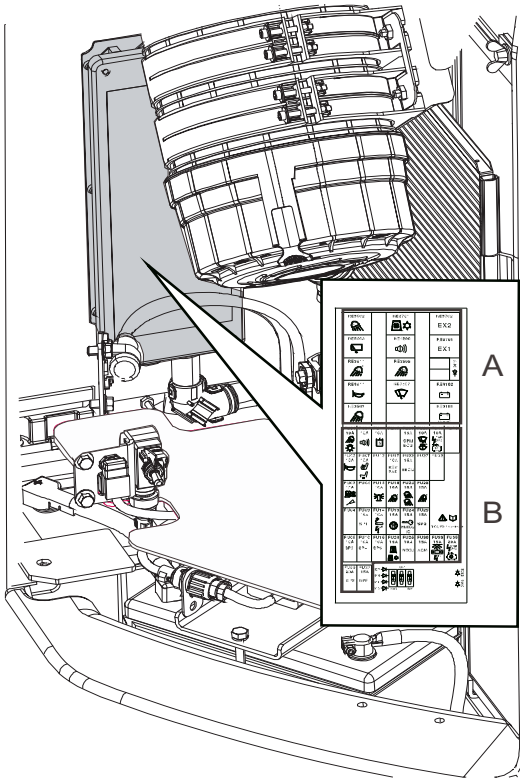
### **NOTE!**

Make sure that the indicator light goes out after turning off the battery disconnect switch. This may take a couple of minutes depending on the system status at the time.



V1153607

- A ON position
- B OFF position
- C Battery disconnect switch



V1153608

Electrical distribution box

- A Relays
- B Fuses

## Electrical distribution box

Relays and fuses are in the electrical distribution box which is located on the rear side of cab.

### NOTICE

Never install a fuse with a higher amperage than what is stated on the decal. Risk of damage or fire on the circuit board.

Relays and fuses are easily accessible after discovering the cover of box. A decal which shows the exact positions and specifications of respective relays and fuses is provided on the cover, see page 324.

### NOTE!

If a fuse blows repeatedly in the same position, the cause of the fault has to be investigated.



## Hydraulic system

### **NOTICE**

Any work on the hydraulic 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 service personnel at a workshop authorized by Volvo Construction Equipment, the guarantee from the manufacturer will be void.

## Hydraulic oil

### **NOTE!**

Hydraulic oil is hazardous to the environment. Immediately use barriers to contain spilled oil and follow local regulations concerning hazardous materials.

### **NOTICE**

Only hydraulic oil that is approved by Volvo may be used.

### **NOTICE**

Use the same hydraulic oil that is already in the system. The hydraulic system may be damaged if different brands of hydraulic oil are mixed.

### **Hydraulic bio oil**

- 1 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.
- 2 For the drain points and changing method, please contact the workshop authorized by Volvo Construction Equipment.



## Lubrication and service chart

### 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.

### **NOTICE**


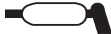







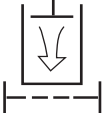



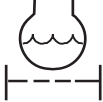




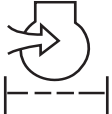
Wipe off grease nipples and grease gun before greasing, so that dirt and sand are not introduced through the grease nipples into the bearings.



Maintenance  
**Lubrication and service chart**     **255**

### Symbol key

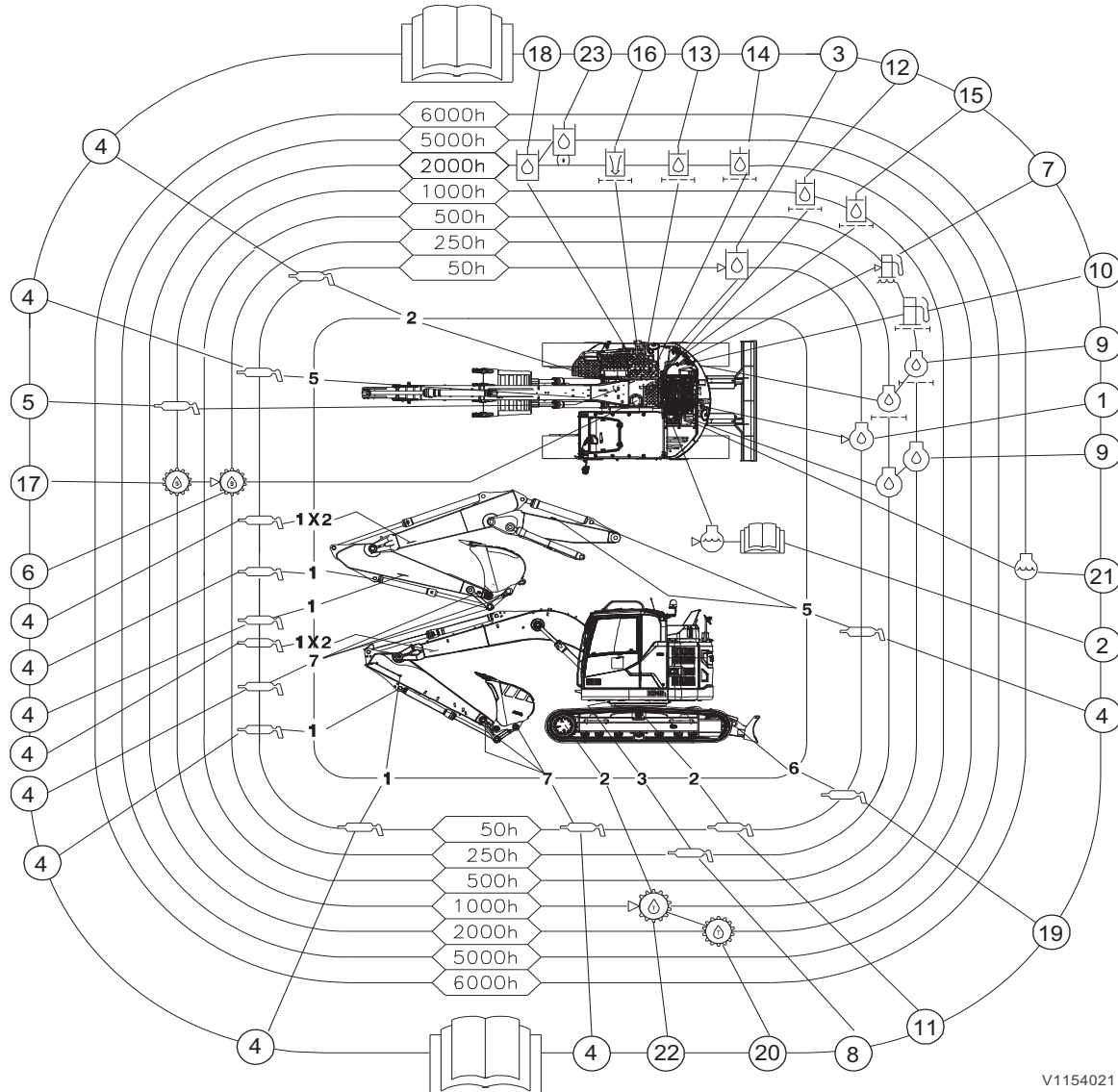
These standard symbols are used in the Lubrication and service chart, see the adjacent table.

		
1 Engine oil	2 Grease lubrication	3 Swing drive gear oil change
		
4 Swing drive gear oil check	5 Track drive gear oil check	6 Track drive gear oil change
		
7 Hydraulic oil	8 Hydraulic oil level	9 Hydraulic oil filter
		
10 Hydraulic tank, air 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		



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Lubrication and service chart

Lubrication and service chart



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Maintenance  
**Lubrication and service chart**    **257**

When required	Item	Page
Check the coolant level <sup>(1)</sup>	2	295
Check and drain the water separator <sup>(1)</sup>	-	286
Drain the sediment from fuel tank	Workshop job <sup>(2)</sup>	-
Clean the primary filter of air cleaner <sup>(1)</sup>	-	293

<b>DAILY (every 10 hours)</b>	Item	Page
Check the track shoe screws	-	262
Check the washer fluid level	-	263

<b>Every 50 hours</b>	Item	Page
Check the engine oil level, or <sup>(1)</sup>	1	264
Check the hydraulic oil level	3	265
Check the track tension	11	266
Lubricate attachments	4	268
Lubricate dozer blade unit	19	

<b>Every 250 hours after carrying out Daily and 50 hours services</b>	Item	Page
Check the oil level of swing drive unit	6	271
Clean the prefilter of air conditioner	-	272
Clean the main filter of air conditioner	-	
Lubricate the swing gear bearing	8	272

1. Check according to the signal on IC (Instrument Cluster)  
2. Contact a workshop authorized by Volvo



**258**      **Maintenance**  
**Lubrication and service chart**

Every 500 hours after carrying out Daily, 50 and 250 hours services	Item	Page
Perform the parked service regeneration to reset EATS before changing the engine oil	Workshop job (1)(2)	-
Change the engine oil and oil filter	9 Workshop job (2)	-
Change the fuel filter	10 Workshop job (2)	-
Change the water separator filter element	7 Workshop job (2)	-
Clean the radiator, oil cooler and condenser fins (3)	-	274
Check the battery condition	-	276
Check the belt tension for air conditioning (Initial interval : 100 hours)	Workshop job (2)	-

- 
1. Volvo's service tool is required
  2. Contact a workshop authorized by Volvo
  3. Or when required



Maintenance  
**Lubrication and service chart**      **259**

Every 1000 hours after carrying out Daily, 50, 250 and 500 hours services	Item	Page
Check the oil level of track drive unit	22	278
Check the swing bath grease	5	278
Change the hydraulic servo filter <sup>(1)</sup>	12 Workshop job <sup>(2)</sup>	-
Change the hydraulic oil drain filter <sup>(1)</sup>	15 Workshop job <sup>(2)</sup>	-
Change the oil of swing drive unit <sup>(1)</sup>	17 Workshop job <sup>(2)</sup>	-
Check the belt tension for alternator	Workshop job <sup>(2)</sup>	-

1. First change: 500 hours  
2. Contact a workshop authorized by Volvo



**260 Maintenance**  
**Lubrication and service chart**

Every 2000 hours after carrying out Daily, 50, 250, 500 and 1000 hours services	Item	Page
Check the coolant content <sup>(1)</sup>	Workshop job <sup>(3)</sup>	279
Clean the suction strainer of hydraulic tank <sup>(2)</sup>	13 Workshop job <sup>(3)</sup>	-
Change the primary filter of air cleaner <sup>(4)</sup>	-	279
Change the air breather filter on hydraulic tank	16 Workshop job <sup>(3)</sup>	-
Change the air ventilation filter on fuel tank	Workshop job <sup>(3)</sup>	-
Change the oil of track drive unit <sup>(5)</sup>	20 Workshop job <sup>(3)</sup>	-
Change the hydraulic oil (mineral oil)	18 Workshop job <sup>(3)</sup>	-
Change the prefilter of air conditioner Change the main filter of air conditioner	-	279
Change the hydraulic oil return filter <sup>(5)</sup>	14 Workshop job <sup>(3)</sup>	-
Check the valve clearance	Workshop job <sup>(3)</sup>	-

1. Or every year
2. Or when required
3. Contact a workshop authorized by Volvo
4. At least once a year
5. First change: 500 hours



Maintenance  
**Lubrication and service chart**     **261**

Every 4000 hours after carrying out Daily, 50, 250, 500, 1000 and 2000 hours services	Item	Page
Change the secondary filter every 3rd time primary filter is replaced <sup>(1)</sup>	-	281
Change the CareTrack backup battery (at least every 3 years)	Workshop job <sup>(2)</sup>	-

Every 5000 hours after carrying out Daily, 50, 250, 500, 1000, 2000 and 4000 hours services	Item	Page
Change the hydraulic oil (bio oil and long life hydraulic oil)	23 Workshop job <sup>(2)</sup>	-

Every 6000 hours after carrying out Daily, 50, 250, 500, 1000, 2000, 4000 and 5000 hours services	Item	Page
Change the coolant	21 Workshop job <sup>(2)</sup>	-
Change the AdBlue®/DEF pump unit filter	Workshop job <sup>(2)</sup>	-
Change the air breather filter on AdBlue®/DEF tank	Workshop job <sup>(2)</sup>	-

Every 8000 hours after carrying out Daily, 50, 250, 500, 1000, 2000, 4000, 5000 and 6000 hours services	Item	Page
Clean the diesel particulate filter	Workshop job <sup>(2)</sup>	-

1. Or at least every 2 years  
2. Contact a workshop authorized by Volvo

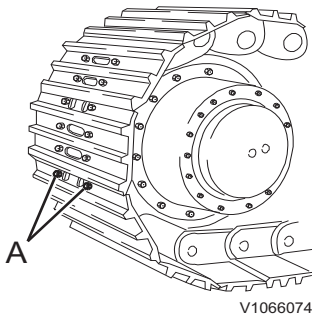
## Maintenance service, every 10 hours

### Track unit, checking shoe screws

Check the shoe screws daily.

If track shoe screws (A) are loose, the track shoes are likely to be damaged.

- 1 Swing the superstructure to the side and raise the track using boom down operation.
- 2 Turn the track slowly in forward and reverse direction several time. Check for missing, loose or damaged shoe screws and shoes. If needed, tighten the screws to specified torque below.
  - $42 \pm 4 \text{ kgf m}$  ( $412 \pm 40 \text{ N m}$ ) ( $303 \pm 29 \text{ lbf ft}$ )



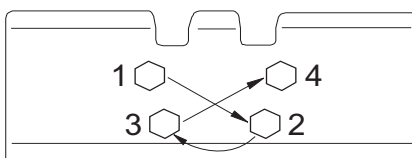
A Shoe screw

### NOTICE

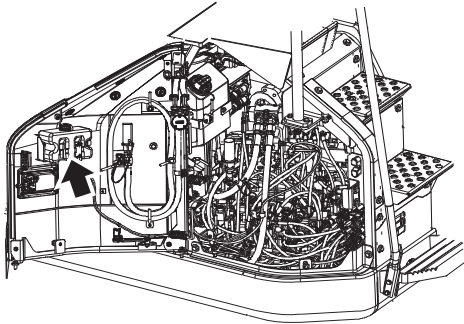
It is very important that loose track shoe screws and nuts are removed fully and that the threads are cleaned. Clean the track shoes before they are installed and the screws tightened.

- 3 After tightening, check whether the nut and the shoe are in full contact with the mating surfaces of the link.

Tighten the screws in the order as shown in the figure.



Order to tighten the screws



V1154022

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.

## Excavator unit, greasing

Grease the excavator unit every 10 hours or daily only during first 100 hours.

After first 100 hours of operation, grease the excavator unit every 50 hours or weekly.

See page 268.



## Maintenance service, every 50 hours

### Engine oil level, checking

#### **WARNING**

Risk of serious injury.

Moving parts could cause serious cutting or crushing injury.

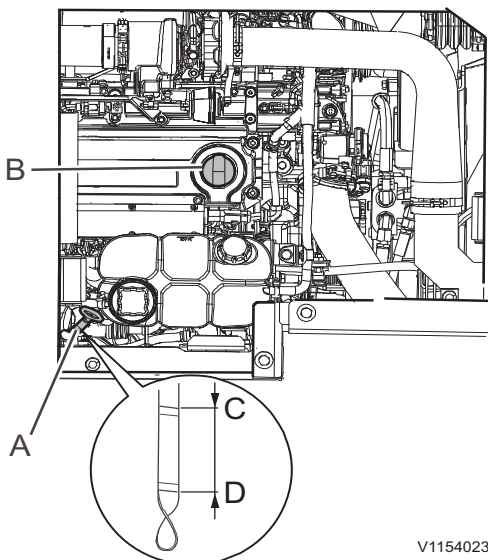
**Stop the engine before opening the engine hood and performing any work.**

Check the oil level when the check screen for low engine oil level pops up in the front instrument panel, see page 47. Aside from this, check the oil level every 50 hours.

#### **NOTE!**

Check the oil level when the machine has cooled down. (at least 30 minutes after turning off the engine)

- 1 Position the machine on even, firm and level ground.
- 2 Open the engine hood.
- 3 Pull out dipstick (A) and wipe it with a clean cloth.
- 4 Push it in and pull it out again.
- 5 If the oil level is between (C) and (D), it is normal. If the oil level is below (D), refill the oil to proper level through filler port (B). For the recommended engine oil, see page 307.

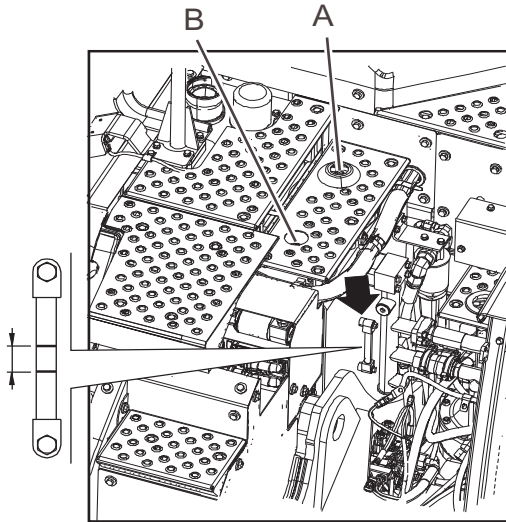


V1154023

- A Dipstick
- B Filler port
- C Oil level, High
- D Oil level, Low

## Hydraulic oil level, checking

Check the oil level every 50 hours.

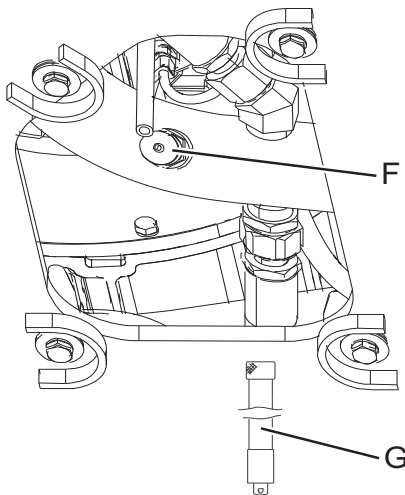


V1154024

- 1 Park the machine in service position B, see page 235.
- 2 Move the control lockout lever down to lock the system securely and stop the engine.
- 3 Check the oil level in the sight gauge. If the level is in the center of the gauge, the level is correct.
- 4 If the level is low,
  - Press breather (A) to release the internal pressure at the tank.
  - Unscrew the screws (B).
  - Top up the oil through the filling port (B). To top up the oil efficiently press air breather again.
  - Check the level.
  - If the level is normal, clean the dismantled parts and install them.

### NOTICE

Use the same hydraulic oil that is already in the system. The hydraulic system may be damaged if different brands of hydraulic oil are mixed.



V1154027

- 5 If the level is high,
  - Remove the undercover of main pump.
  - Place a suitable sized container.
  - Remove the protecting cap (F) and attach drain hose (G), which is the same hose as that used for draining engine oil.
  - Drain the oil into a container.

### NOTICE

Take care of filters, oils and liquids in an environmentally safe way.

- Disconnect the drain hose and install the protecting cap.

266 Maintenance  
Maintenance service, every 50 hours

## Track unit, checking tension

Check the track tension every 50 hours.

### **WARNING**

Risk of crushing.

Raised equipment may drop if the hydraulic system fails or if the control is operated. Falling equipment may cause serious injury or death.

**Always make sure that raised equipment is supported by a mechanical device before walking or working under it.**

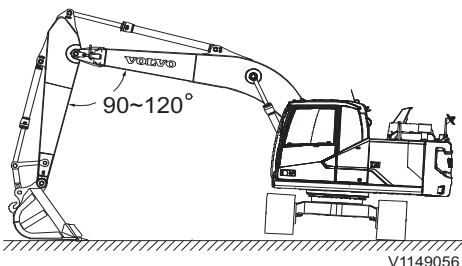
### **NOTE!**

To check the track tension, the track must be raised off the ground.

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.

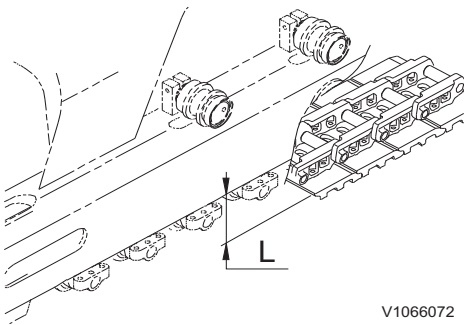
When working in wet sand or clay, it sticks to and packs between moving undercarriage components. This can prevent mating parts from properly engaging each other, which cause interference and high loads. Due to abrasive particles in the material it significantly accelerates wear rates of the sprockets, 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.



Maintenance  
**Maintenance service, every 50 hours** **267**

Therefore thoroughly clean the undercarriage at least daily or more often according to soil conditions in job-site.

- 1 Swing the superstructure to the side and raise the track by using boom and dipper arm. For this movement, operate the 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 center of track frame, 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.



V1066072

Recommended track tension is as below,

Working condition	Clearance ( L ) (mm) (in)
General soil	260 - 280 (10.2- 11.0)
Rocky ground	240 - 260 (9.4 - 10.2)
Moderate soil like gravel, sand, snow, and so on.	280 - 300 (11.0 - 11.8)



268 Maintenance  
Maintenance service, every 50 hours

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### Excavator unit, greasing

Grease the excavator unit every 50 hours or weekly.

During the first 100 hours, the excavator unit should be greased every 10 hours or daily.

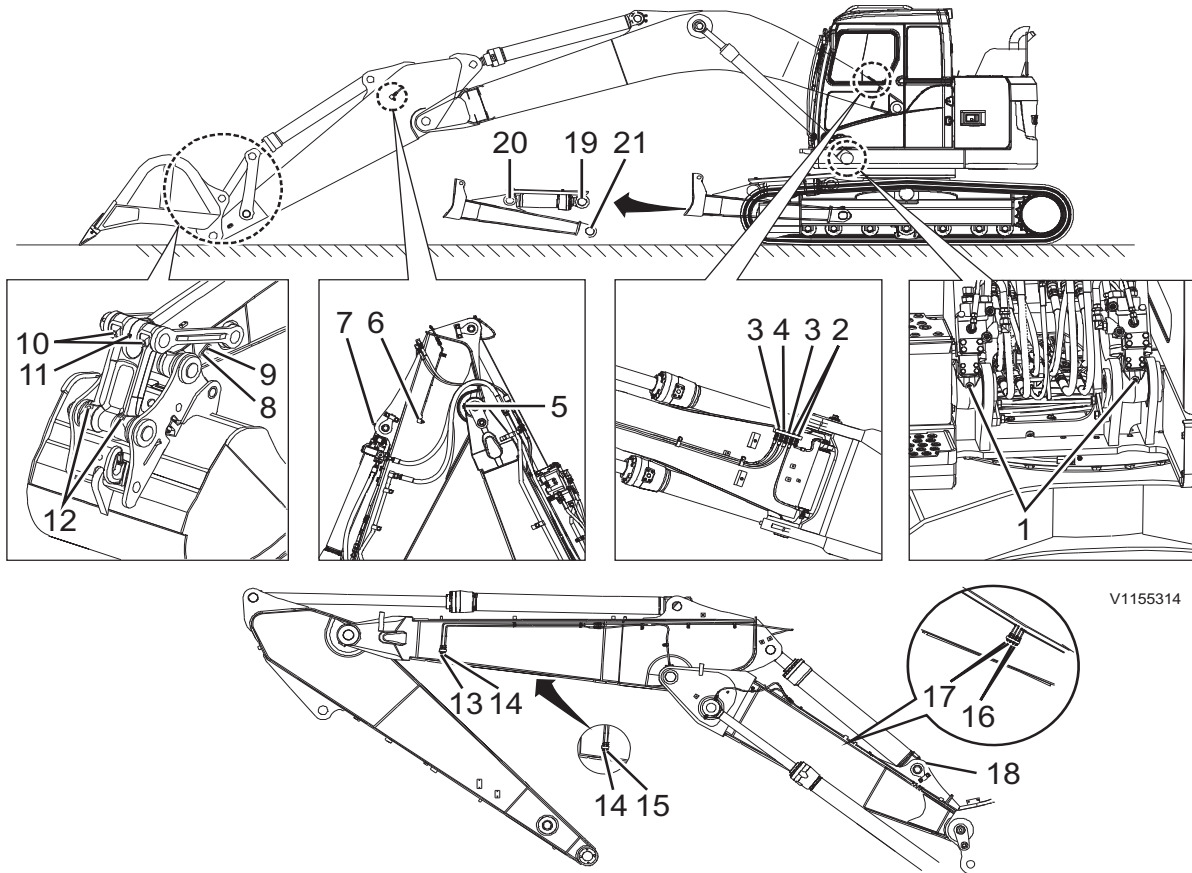
**NOTE!**

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 307.

Maintenance  
Maintenance service, every 50 hours 269



- |   |   |
|---|---|
| 1 Boom cylinder mounting pin (2 points)           | 12 Pin between bucket and connecting rod (2 points) |
| 2 Boom mounting pin (2 points)                    | 13 Second boom cylinder rod end pin (1 point)       |
| 3 Boom cylinder rod end pin (2 points)            | 14 Pin between boom and second boom (2 points)      |
| 4 Dipper arm cylinder mounting pin (1 point)      | 15 Dipper arm cylinder mounting pin (1 point)       |
| 5 Pin between boom and dipper arm (2 points)      | 16 Boom mounting pin (2 points)                     |
| 6 Dipper arm cylinder rod end pin (1 point)       | 17 Boom cylinder rod end pin (2 points)             |
| 7 Bucket cylinder mounting pin (1 point)          | 18 Second boom cylinder mounting pin (1 point)      |
| 8 Pin between dipper arm and bucket (1 point)     | 19 Dozer blade cylinder rod end pin (2 points)      |
| 9 Pin between dipper arm and link (1 point)       | 20 Dozer blade cylinder mounting pin (2 points)     |
| 10 Pin between connecting rod and link (2 points) | 21 Dozer blade mounting pin (2 points)              |
| 11 Bucket cylinder rod end pin (1 point)          |   |



270 Maintenance  
Maintenance service, every 250 hours

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## Maintenance service, every 250 hours

### Swing drive unit

#### **NOTICE**

Always clean around the oil dipstick before you check the oil level. Dirt in the oil damages the swing gearbox.

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 swing drive unit and cause costly damage.
- **Too much oil** may lead to oil foaming, and cause the swing drive unit to overheat.



#### **WARNING**

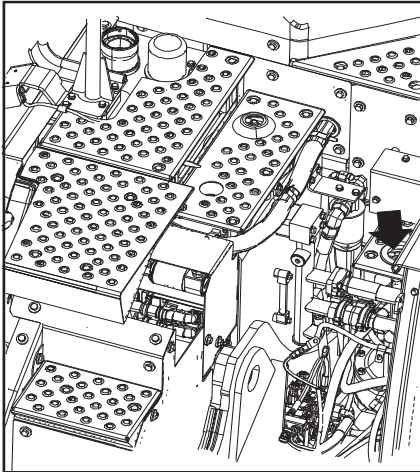
Risk of burns!

Hot liquids and machine parts can cause burns. **Allow the machine to cool before beginning any service.**

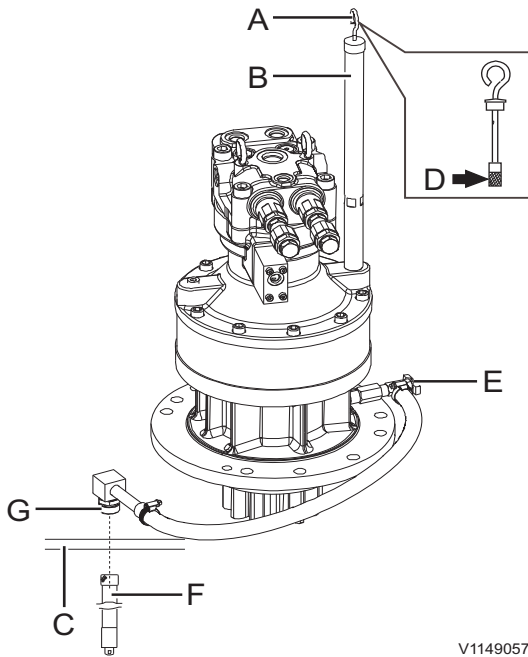
## Swing drive unit, checking oil level

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 center of "D", the level is correct.
- 4 If the level is low, top up oil through oil filler hole (B) to correct level.
- 5 If the level is high,
  - Open the drain valve (E).
  - Remove the under cover (C).
  - Place a suitable sized container under the protection cap (G).
  - Open the protection cap (G).
  - Attach the drain hose (F) and drain the oil to the correct level.
  - Disconnect the drain hose.
  - Close the protecting cap.
  - Close the drain valve.



V1154025

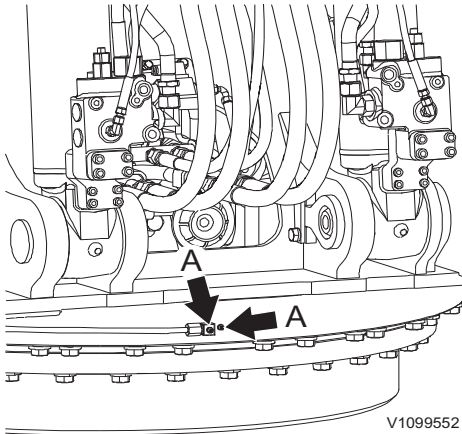


V1149057

For oil specification, see page 307.



272 Maintenance  
Maintenance service, every 250 hours



### Swing gear bearing, greasing

Grease the swing gear every 250 hours.

- 1 Park the machine on level ground.
- 2 Lower the bucket to the ground.
- 3 Move the control lockout lever down to lock the hydraulic system securely and stop the engine. See page 114.
- 4 Fill the grease in the grease nipples (A) using a hand or power grease gun.
- 5 Apply grease to the swing bearing until grease can be seen from the swing bearing seals.
- 6 Take care not to supply excessive amount of grease.
- 7 After greasing, clean off the superfluous grease completely.

### Air conditioning filter, cleaning and replacing

If the air conditioner filter is clogged, the air flow as well as the cooling and heating capacity will be reduced. Therefore, clean it periodically.

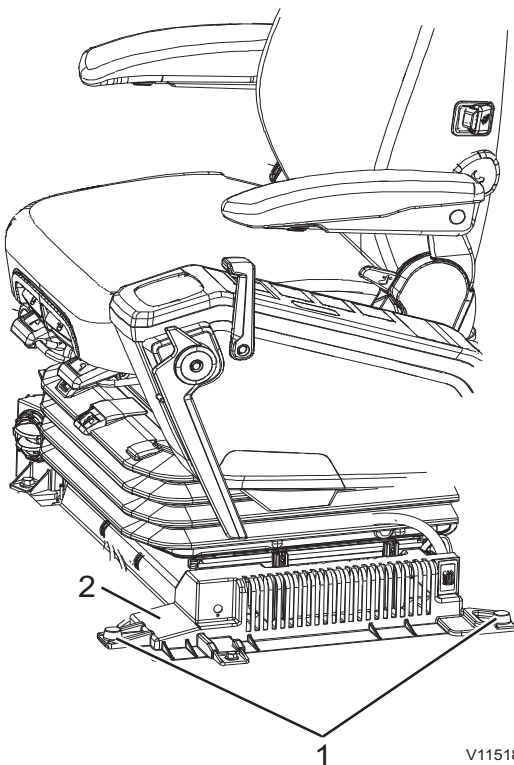
**NOTE!**

If the machine is operated in particularly dusty environment or in air with hazardous material to human such as asbestos, special filter should be used. Please contact Volvo Construction Equipment dealer for more information.

**NOTICE**

Refrigerant R134a adds to the greenhouse effect and may not be released.

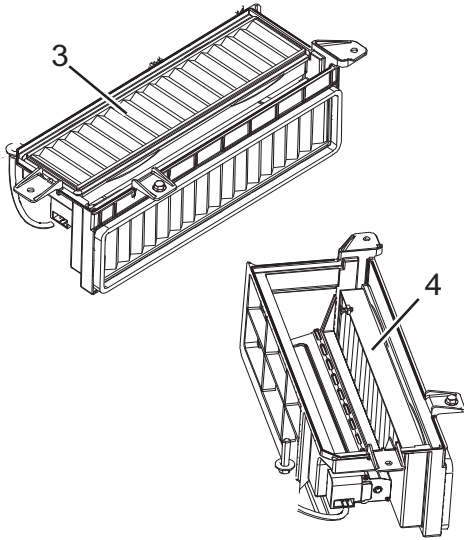
Clean the prefilter and main filter every 250 hours. Replace the prefilter and main filter every 2000 hours.



Maintenance

Maintenance service, every 250 hours 273

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V1152269

- 1 Remove screws (1) and cover (2).
- 2 Take out main filter (3) and clean it with compressed air.
- 3 Take out prefilter (4) and clean it with compressed air.
- 4 Install the filters, and assemble them in reverse order.

**NOTE!**

Clean the filter with compressed air with a maximum pressure of 0.2 Mpa (30 psi).

**NOTE!**

If the filter is damaged or heavily contaminated, replace it with a new one.



## Maintenance service, every 500 hours

### Radiator and coolers, cleaning

Cleaning interval depends on the environmental condition the machine is operating. 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.

#### **WARNING**

Risk of serious injury.

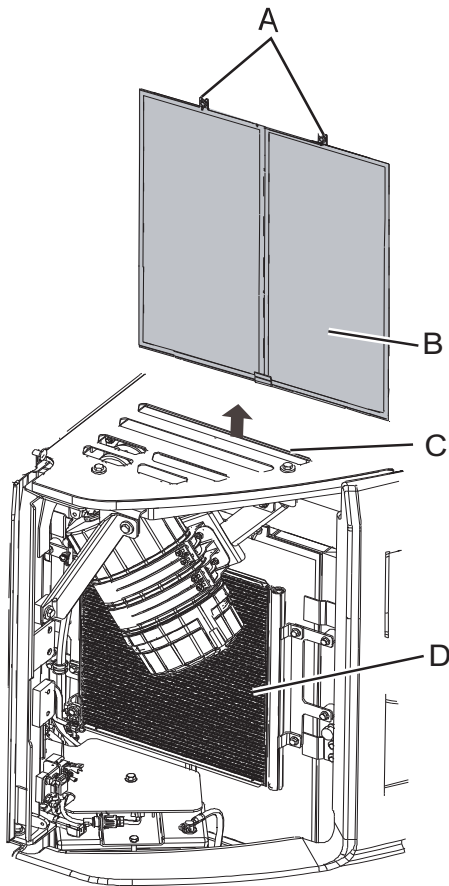
Compressed air, water jets or steam may cause damage to unprotected skin and eyes.

**Always wear personal protective gloves, goggles and clothing when using compressed air, water jets or steam.**

#### **NOTICE**

**DO NOT use steam to clean the condenser core. The refrigerant can overheat! When cleaning with water, protect the electrical components.**

Maintenance  
Maintenance service, every 500 hours **275**



V1154026

- A Wing nuts
- B Radiator screen
- C Hole
- D Condenser

- 1 Open the left side door of the machine.
- 2 Remove the leaves attached to condenser (D).
- 3 Remove wing nuts (A).
- 4 Pull out radiator screen (B) through hole (C).
- 5 Clean the radiator screen.
- 6 Clean any mud, dust or leaves attached to the radiator fins and oil cooler fins with compressed air or steam.
- 7 Check the rubber hose for wear and cracks. If damaged, replace it. Check the hose clamp for looseness.
- 8 Reinstall the screen with the wing nuts.

**NOTICE**

When using compressed air, keep the nozzle at a distance from the fins to prevent damage. Damaged fins may cause leakage or overheating.

If the engine temperature still remains high after cleaning the cooler, contact a workshop authorized by Volvo for remedial action.

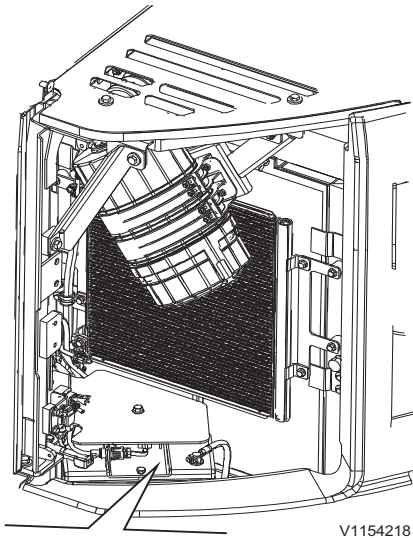
276 Maintenance  
Maintenance service, every 500 hours

### Battery condition, check

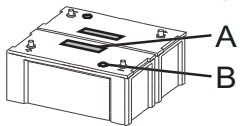
**NOTE!**

This type of battery is maintenance free (MF) so it is not possible to check the electrolyte level, only a battery condition check is available.

- 1 Ensure the battery disconnect switch is at off position and remove the battery cover.
- 2 Check the condition of battery through indicator (B) according to guidance on battery decal (A).



V1154218



A Battery decal  
B Indicator

Indicator color	
Green	Normal
Black	Need charging
White	Need checking

## Maintenance service, every 1000 hours

### Track drive unit

#### **NOTICE**

Always clean around the level plug before you check the oil level. Dirt in the oil damages the track gearbox.

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 damaged.
- **Too much oil** makes the oil foaming and cause the track drive unit to overheat.

#### **WARNING**

Risk of burns!

Hot liquids and machine parts can cause burns. **Allow the machine to cool before beginning any service.**

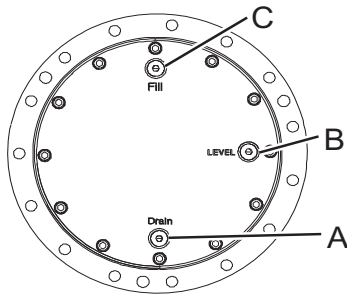
#### **WARNING**

Risk of high pressure injection.

Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the engine has not been running for some time.

**Always release the pressure before any kind of service of the hydraulic system is carried out.**

278 Maintenance  
Maintenance service, every 1000 hours



- A Drain plug
- B Level checking plug
- C Filling plug

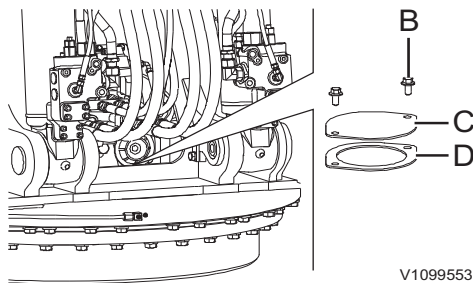
### Track drive unit, checking oil level

Check the oil level every 1000 hours.

- 1 Turn the case so that drain plug is located at the bottom.
- 2 Remove the level checking plug. If the oil is about to overflow from the hole, the level is correct.

If the oil is low, top up the oil to the correct level through the filling plug. (If necessary, turn the case so that filling plug is located at the top.)

For oil specification, see page 307.



### Swing bath, grease checking

Check the grease condition and level every 1000 hours.

- 1 Park the machine on a level ground and move the superstructure as shown in the figure.
- 2 Lower the bucket to the ground.
- 3 Turn the ignition switch to stop position.
- 4 Move the control lockout lever down to lock the system securely. See page 114.
- 5 Remove screws (B) and the cover (C).
- 6 Check the level and condition of the grease. Fill if needed.
- 7 Inspect the seal (D). Replace the seal if damaged.
- 8 Install the cover.

**NOTE!**

If the grease is contaminated or discoloured with water, contact a workshop authorized by Volvo for changing the grease.

## Maintenance service, every 2000 hours

### Engine air cleaner primary filter, replacing

See page 293.

### Air conditioning filter, cleaning and replacing

See page 272.

### Coolant

#### **NOTICE**

If the warning of high coolant temperature is shown on the display unit, the engine must be stopped immediately.

Check the coolant contents (%) every 2000 hours or every 1 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).

#### **NOTICE**

Volvo Coolant VCS must never be mixed with any other coolant or corrosion protection to avoid damage to the engine.

The cooling system capacity when changing, see page 320.

If concentrated Volvo Coolant VCS and clean water (see page 310) 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.



V1066019





280 Maintenance  
Maintenance service, every 2000 hours

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If in doubt of the water's quality, use the ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant.

**NOTICE**

In order to avoid damage to engine and cooling system, different brands of coolant or corrosion protection must not be mixed.

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



	Maintenance	
Maintenance service, every 4000 hours		281

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## Maintenance service, every 4000 hours

Engine air cleaner secondary filter, replacing

See page 295.

## Maintenance service, when required

### Engine oil level, checking

See page 264.

### Fuel, filling

#### WARNING

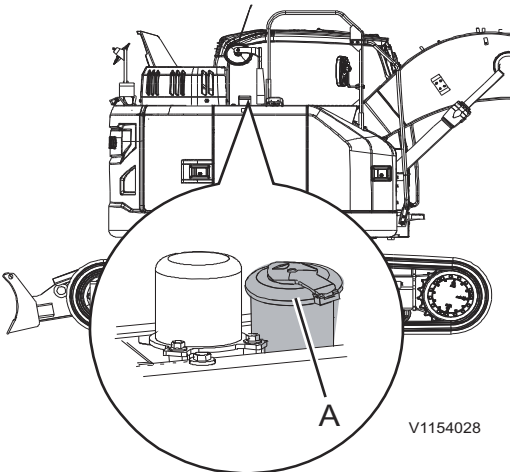
Risk of fire.  
Burning fuel can cause fatal injuries.  
**Stop the engine before filling fuel.**

#### WARNING

Risk of fire and explosion.  
A running auxiliary heater during fuel filling could cause fire and explosion.  
**Switch off the auxiliary heater before filling fuel.**

- 1 Carefully clean around the filler cap on the fuel tank before removing it.
- 2 Open the fuel filler cap (A) and fill the fuel in the tank.
- 3 Check the fuel level on IC (Instrument Cluster).  
See page 41.

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 320.**



A Fuel filler cap

## Maintenance Maintenance service, when required 283

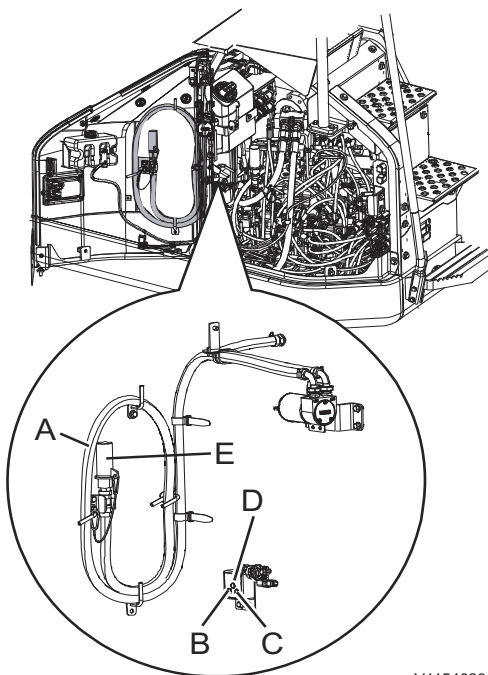
### Filling with auto shut-off controller (optional equipment)

Fuel filler pump is installed in the tool box. Use it when filling the fuel in a tank.

#### NOTE!

This pump is provided with an electronic overfilling protection.

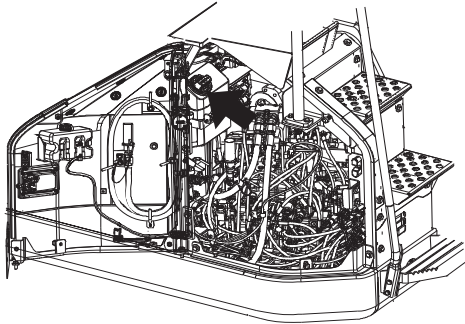
- 1 Remove the strainer cover (E) which is installed to protect the strainer from dust at the end of hose (A).
- 2 Put the pump hose with strainer into the fuel barrel.
- 3 Press the green start button (B). The pump will run as long as the tank is not full.
  - At any time during the refuelling or when the drum has been emptied, the pump may be stopped by pressing the red button (C).
  - 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.



V1154029

- A Fuel filler pump hose
- B Start button (green)
- C Stop button (red)
- D Manual control button
- E Strainer cover

284 Maintenance  
Maintenance service, when required



V1154030

AdBlue®/DEF tank cap

## AdBlue®/DEF, filling

### NOTICE

Risk of machine damage.

Refilling fluids with anything other than what is specified in this manual could cause permanent damage to the catalyst system.

Only refill fluids with those specified in this procedure.

### NOTICE

Risk of machine damage.

AdBlue®/DEF is highly corrosive. If the tank is overfilled, AdBlue®/DEF may leak out through the air vent pipe. If the tank is overfilled and the fluid in it freezes, the tank and hoses can be permanently damaged.

Do not overfill the tank. Always stop filling when the fluid level reaches the filling port or when an automatic filling nozzle shuts off.

### NOTE!

Do not fill with any fluid other than that specified in ISO 22241-1. We recommend that you do not reuse drained AdBlue®/DEF due to the risk of contamination.

AdBlue®/DEF tank capacity, see page 320.

### NOTE!

Be careful not to overfill AdBlue®/DEF more than the tank capacity, otherwise it could overflow from the air breather line of the tank.

AdBlue®/DEF quality, see page 317.

If the AdBlue®/DEF level is low, an alarm indication is displayed. Fill the AdBlue®/DEF tank with AdBlue®/DEF.

- AdBlue®/DEF is not classified as a hazardous substance but should still be handled with care. It is highly corrosive.
- If it comes into contact with the skin, rinse well with water.
- If it comes into contact with the eyes, rinse thoroughly for several minutes. Consult a doctor if necessary.
- If inhaled, breathe fresh air and contact a doctor if necessary.
- If swallowed, drink water and contact a doctor.



## Maintenance Maintenance service, when required 285

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- Do not allow AdBlue®/DEF to come into contact with other chemicals.
- AdBlue®/DEF is not combustible. If AdBlue®/DEF is exposed to high temperatures it will decompose into ammonia and carbon dioxide.
- AdBlue®/DEF must not be mixed into the diesel tank and diesel must not be mixed into the AdBlue®/DEF tank.

### **NOTE!**

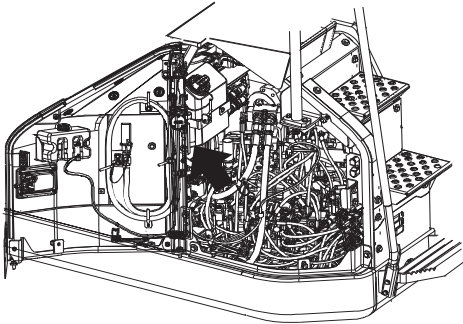
AdBlue®/DEF filling equipment must be designed for a maximum filling rate of 40 litres/minute, and adjustable to a rate below 40 litres/minute. If filling problems occur and remain after the filling filter has been cleaned, please refer to the manual for the filling equipment and take the necessary action.

For distribution of AdBlue®/DEF (only valid for US market):

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

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

286 Maintenance  
Maintenance service, when required



V1154215

Drain plug

### AdBlue®/DEF tank, draining

- 1 Park the machine on a level ground.
- 2 Lower the bucket to the ground.
- 3 Turn the ignition switch to stop position.
- 4 Move the control lockout lever down to lock the system securely. See page 114.
- 5 Remove drain plug using a L wrench from the tank.
- 6 Drain AdBlue®/DEF into a container.

### NOTICE

Take care of filters, oils and liquids in an environmentally safe way.

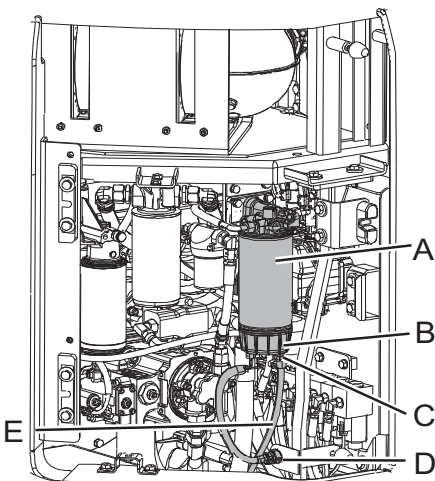
- 7 Install the drain plug to the tank.

### Water separator, draining

The water separator filter element is designed to remove the water from the fuel supplied to the engine.

Check and drain the water in the water separator filter element when the check screen for water in fuel pops up on the IC (Instrument Cluster).

- 1 Place a suitable sized container under drain hose (E).
- 2 Open the drain valve (C) and drain the sediment into a container.



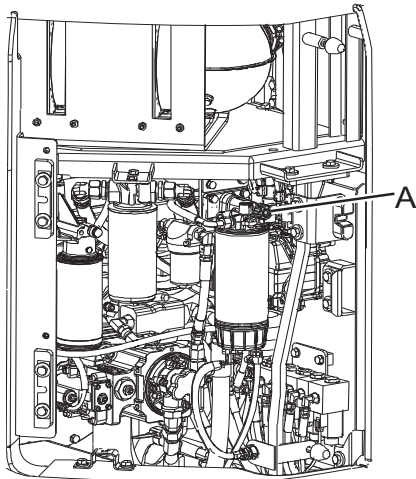
V1154216

- A Filter element
- B Bowl
- C Drain valve
- D Sensor connector
- E Drain hose

### NOTICE

Take care of filters, oils and liquids in an environmentally safe way.

- 3 Close the drain valve (C).



A Hand pump

## Fuel system, bleeding

Air must be bled out of the fuel injection system whenever the machine runs out of fuel while the engine is running.

### **NOTICE**

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

### **NOTE!**

Do not spill fuel on electrical components.

- 1 Turn hand pump (A) counterclockwise to unlock the plunger.
- 2 Pump hand pump (A) until a heavy resistance can be felt in the hand pump.
- 3 Push hand pump (A) fully and turn it clockwise to lock the plunger.
- 4 Start the engine and let it run in idle for 3 minutes.
- 5 If the engine is difficult to start, repeat (1) to (3).

### **NOTE!**

Do not use the hand pump when the engine is running.

- 6 Check for leakages.



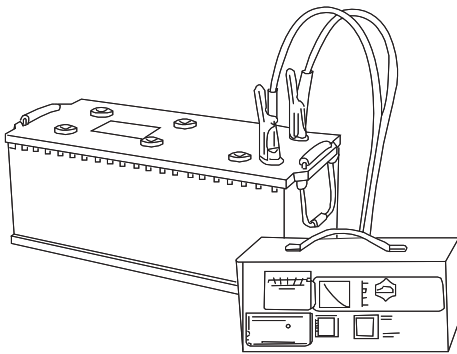
288 Maintenance  
Maintenance service, when required

## Batteries, charging

### WARNING

Risk of serious injury.  
Short-circuit, open flames or sparks near a charging battery could lead to an explosion.

**Switch off charge current before disconnecting charging cable clamps. Never charge a battery near open flames or sparks. Always charge a battery in well-ventilated areas.**



V1066032

### WARNING

Risk of chemical burns.  
The battery electrolyte contains corrosive sulphuric acid which could cause severe chemical burns.

**If electrolyte spilled on your bare skin, remove it immediately and wash the affected area with soap and plenty of water. If it gets into your eyes or any other sensitive body part, rinse with plenty of water and seek immediate medical attention.**

- 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.



## Welding

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 ; GPMECU1 (General Purpose Machine Electronic Control Unit1), EMS (Engine Management System), IC (Instrument Cluster), CCM (Climate Control Module) and so on. For further information, contact a workshop authorized by Volvo Construction Equipment.
- 4 Connect the welding equipment's ground connection as close to the welding point as possible and make sure that the current does not pass across a bearing.
- 5 Ventilate well, specially if the welding is performed in a confine space.
- 6 Remove all paint from an area of at least 10 cm (4 in) around the welding point.

### WARNING

Risk of toxin inhalation.

Burning of painted, plastic or rubber parts produces gases that could damage respiratory tracts.

**Never burn painted or rubber parts or any plastics.**

### NOTICE

**A fire extinguisher should be easily accessible during all welding work.**

### NOTE!

The weld will be related with inferior quality and strength, never weld directly on a painted surface.

## Cleaning machine

The machine should be cleaned regularly with conventional car care products in order to eliminate the risk of damage to the paint finish and other surfaces on the machine.

### **NOTICE**

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

### **NOTICE**

Soil and clay may damage or cause wear to moving parts of the undercarriage. Therefore, all parts must be cleaned regularly from of soil and clay.

### **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 240.

- 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 40 cm (16 in) between the seals and the nozzle. Keep a distance of 30 cm (12 in) between nozzle and other machine surface. Too high pressure and too short distance may cause damage.



## Maintenance Maintenance service, when required 291

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### NOTE!

Protect electrical leads in an appropriate way and be careful not to damage the cab prefilter when cleaning the machine.

### **NOTICE**

Do not spray with high pressure into the sealing of the slewing ring, the water may penetrate and affect the characteristics of the grease.

- 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  $\mu$ .
- A protective layer of underseal Dinitrol 447 (or corresponding) may be applied under the mudguards where mechanical wear is expected.

### Touch-up painting

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

## Cleaning engine compartment

### WARNING

Risk of serious injury.

Moving parts could cause serious cutting or crushing injury.

**Stop the engine before opening the engine hood and performing any work.**

### WARNING

Risk of burns.

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

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

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

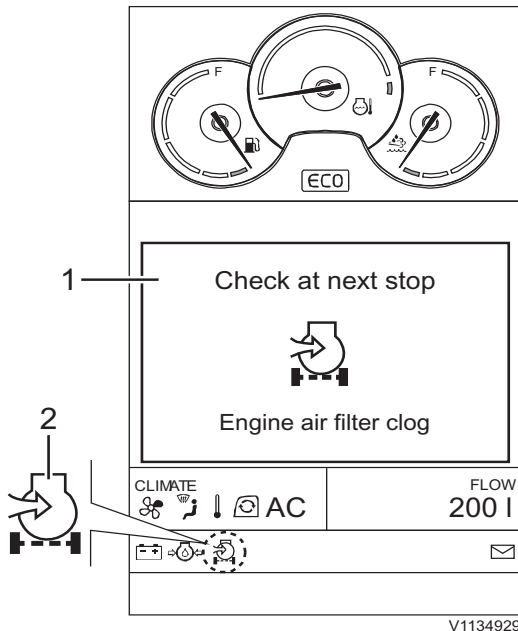
When operating in other environments, inspection and cleaning is required at least once a week.

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.



- 1 Check screen
- 2 Indicator

## Engine air cleaner

The 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.

### NOTICE

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.

## Engine air cleaner primary filter, cleaning and replacing

Clean the filter when the check screen for engine air filter clog pops up on the IC (Instrument Cluster). 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

### NOTE!

Do not clean the filter if the check screen does not pop up on the IC (Instrument Cluster).

### NOTE!

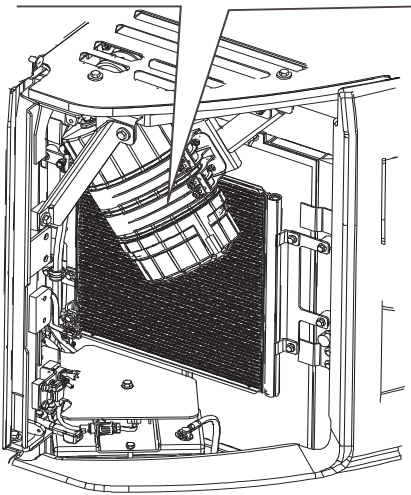
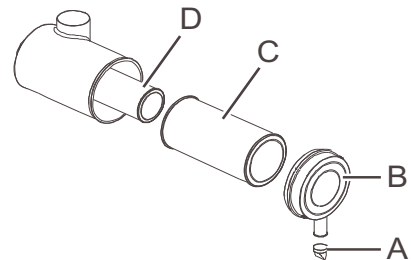
Use Volvo genuine air filters. Otherwise Volvo may not support the engine failures.

If the indicator is still a light after replacing or cleaning the primary filter, the secondary filter must be replaced.

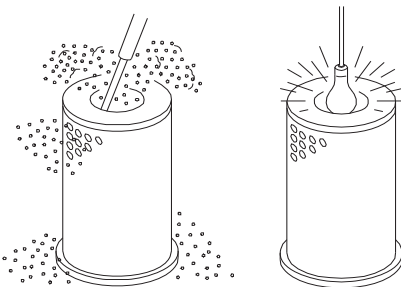
As the length of time between filter replacements depends entirely on the operating environment of the machine, it may sometimes be necessary to replace the filter more often.

## 294 Maintenance Maintenance service, when required

When cleaning the primary filter, mark it on the secondary filter to recognize primary cleaning times.



V1154219



V1066003

### Mechanical cleaning

- 1 Open the cover.
- 2 Press with both thumbs on primary filter (C) at the same time as you pull it out. This is to prevent the secondary filter (D) from coming out together with the primary filter.
- 3 Carefully tap the end of the primary filter against a soft and clean surface.
- 4 Install the primary filter and the cover.

### NOTE!

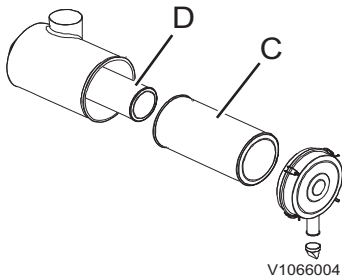
Do not tap against a hard object.

### Cleaning with compressed air

- 1 Use clean and dry compressed air with a max. pressure of 500 kPa (5 bar) (73 psi). Do not hold the nozzle closer than 3 ~ 5 cm (1 ~ 2 in).
- 2 Blow the filter from the inside along the folds.
- 3 Check the filter with the aid of a lamp.
- 4 If there is the smallest hole, scratch, crack or other damage, the filter must be discarded.
- 5 Install the primary filter and the cover.

### NOTE!

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



C Primary filter  
D Secondary filter

## Engine air cleaner secondary filter, replacing

Replace the secondary filter every 3rd time 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 (D) works as a protective filter in case the primary filter (C) 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.

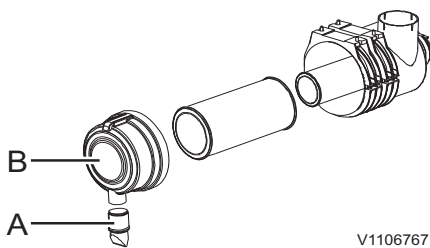
## NOTICE

Take care of filters, oils and liquids in an environmentally safe way.

## Engine air cleaner cover, cleaning

The cover for air cleaner should be cleaned when the primary filter is cleaned.

- 1 Remove the cover (B) and valve (A) from the air cleaner.
- 2 Empty and clean the cover and valve.
- 3 Reinstall them on the air cleaner.



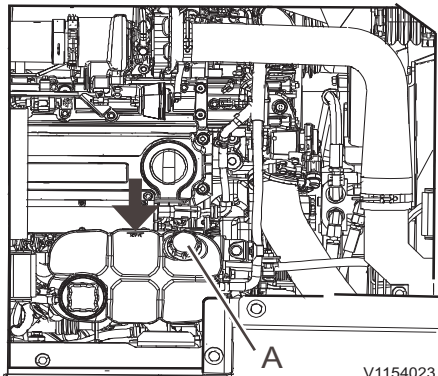
A Vacuator valve  
B Cover

## Radiator and coolers, cleaning

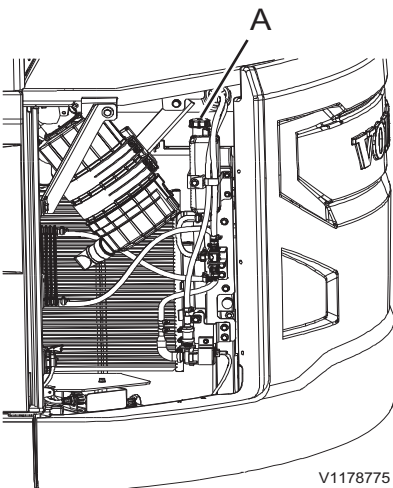
See page 274.



296 Maintenance  
Maintenance service, when required



Main reservoir (for engine system)  
A Filler cap



Sub reservoir (for SCR system)  
A Filler cap

### Coolant level, checking

Check the coolant level when the warning screen for low coolant level pops up on the IC (Instrument Cluster), see page 47.

**! WARNING**

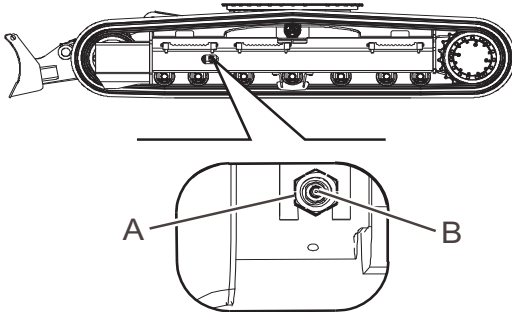
Risk of scalding and severe burns to unprotected skin.

High-pressurised hot coolant may rush out of expansion tank and cause severe burns. Before removing the expansion tank pressure cap:

- Shut down the engine.
- Allow the engine to cool
- Turn the pressure cap slowly to release any pressure.

- 1 Position the machine on even, firm and level ground.
- 2 Open the engine hood.
- 3 Check the coolant level.

If the coolant level is lower than "MIN" marking on the tank, top up the coolant through filler cap between "MIN" and "MAX" level.



V1154221

- A Valve
- B Grease nipple

## Track unit, adjusting tension

### NOTE!

Recoil spring cylinder is filled with pressurized grease. When adjusting the track tension or loosening the track, pay special attention. Keep face, hands and body away from the nipple and valve.

### Tightening track tension - reducing slack

- 1 Fill the grease through grease nipple (B) 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

- 1 Loosen the valve (A) gradually to drain the grease, but not more than one turn.  
If the grease does not drained smoothly, move the machine forward and rearward.

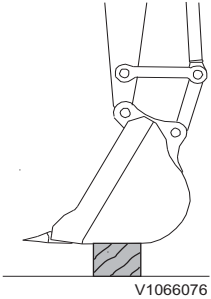
## NOTICE

### Risk of environmental pollution!

The grease in the track adjustment cylinder is under high pressure and large quantities of grease will be quickly released if the valve is loosened too much. Never loosen the valve by more than two turns when draining the grease.

- 2 Close the valve (A) but do not tighten excessively as the fitting may be damaged.
  - The valve (A) assembly, tightening torque: 7.0 kgf m (51 lbf ft) (69 N m)
- 3 Check the tension by moving the machine forward and rearward.
- 4 Check the tension again. If not correct, adjust it again.

298 Maintenance  
Maintenance service, when required



## Bucket teeth, replacing

Replace the bucket teeth before the adaptors wear away.

### WARNING

Risk of splinter injury.

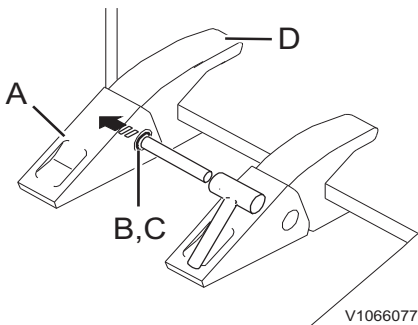
When striking metal objects with a hammer, flying metal chips could cause serious splinter injury to eyes and other body parts.

**Always wear personal protective equipment and eye protection when replacing bucket teeth.**

- Lower the bucket to the ground and position it to the easiest posture for working.
- Stop the engine before replacing the bucket tooth.

### For Korea tooth system (KTS)

- 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 the pin (B) using a hammer and punch. Be careful not to damage the 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 (C) in the correct place, and then install a new tooth (A).
- 5 Drive the pin (B) into the pin groove until the pin is flush with the tooth.



Maintenance  
Maintenance service, when required 299

For Volvo tooth system (VTS)

Replace the bucket teeth before the adaptors wear away.

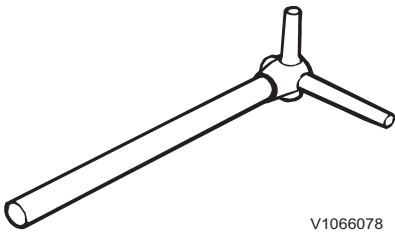
**WARNING**

Risk of splinter injury.

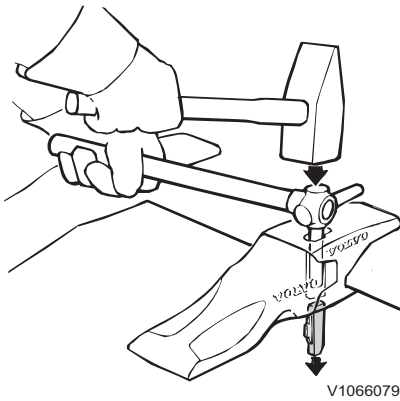
Striking the bucket pin with a hammer could cause metal chips to fly around and cause serious splinter injury.

**Always wear face and eye protection, hard hat and gloves while removing and installing the bucket pins.**

A special tool may be ordered to facilitate replacement of teeth. The tool are available in different sizes depending on tooth size. Contact your dealer for further information.



Special tool

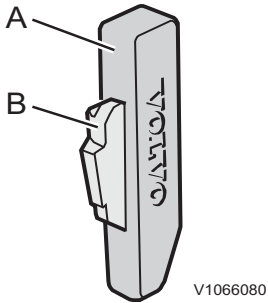


Knock out the locking device

**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.

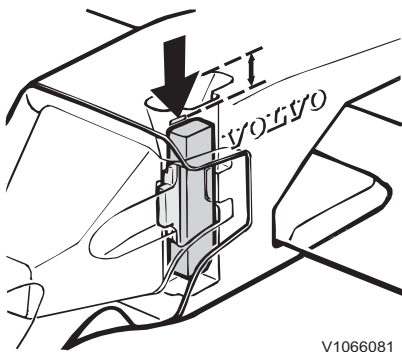
## Maintenance 300 Maintenance service, when required



Locking device

A Steel pin

B Lock retainer



The locking device should be just below the scored line

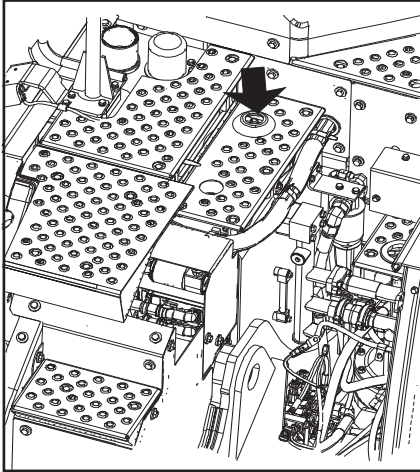
### Installing tooth

- 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.

## Hydraulic system, releasing pressure



V1154222

Breather on the hydraulic tank

### **WARNING**

Risk of high pressure injection.

Residual pressure in the hydraulic system could lead to oil under high pressure jetting out and cause serious injury, even if the engine has not been running for some time.

**Always release the pressure before any kind of service of the hydraulic system is carried out.**

Use the greatest caution when working on the hydraulic system. Remove system pressure and tank pressure:

- 1 Place attachment on the ground and shut down engine.
- 2 After engine is shut down, turn ignition switch to running position (Do not start 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 ignition switch to OFF 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 the pressure relief valve located on the hydraulic tank breather valve to release tank pressure.

302 Maintenance  
Maintenance service, when required

## Accumulator, handling

### **WARNING**

Risk of serious injury.

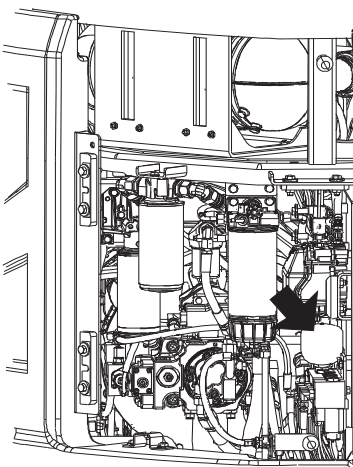
Accumulators are charged with highly pressured nitrogen. Improper handling could lead to an explosion causing serious injury.

**Work on an accumulator must only be done by qualified workshop personnel.**

- 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 114.

### Accumulator, emergency operation

- 1 Stop the engine by turning the ignition switch to stop position.
- 2 Turn the ignition switch to running position
- 3 Move the control lockout lever up to unlock the system, see page 114.
- 4 Put the operating 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.



V1154223

Accumulator



### Accumulator, pressure releasing

- 1 Lower the attachment or load completely to the ground.
- 2 If using X1 or X3 axillary hydraulic circuit, do not activate.
- 3 After turning off the engine, turn the ignition switch to operating position.
- 4 Move the control lockout lever up to unlock the system.
- 5 To release the pressure in the control circuits and accumulator, move the operating levers and pedals forward / rearward and left / right to their respective end positions.
- 6 Turn the ignition switch to stop position.
- 7 Move the control lockout lever down to lock the system securely.
- 8 To release the pressure completely, loosen the hose connection slowly when you disconnect the accumulator. Step aside in this case as oil should jet out.

**Ask your authorized Volvo Construction Equipment dealer workshop to discharge the pressure in the accumulator prior to disposal.**





**304 Maintenance**  
**Maintenance service, when required**

**Periodic replacement of critical parts for safety**

To ensure safety at all times when operating or driving the machine, periodic maintenance must always be carried out. To further improve safety, it is also recommended that periodic check or replacement of the parts given in the table below, is carried out.

These parts are closely connected to safety and fire prevention. 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. 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 as the hoses. When replacing the hoses, always replace the O-rings, gaskets, and other related parts at the same time. The replacements should be carried out by trained personnel at a workshop.

Safety critical parts for periodic replacement		Replacement interval	
Engine	Fuel hose	Every 2 years or 4000 hours, which occurs first	
	Heater hose		
Hydraulics	Body		Pump, inlet hose
			Pump, outlet hose
			Swing line hose
	Attachments		Boom cylinder hose
			Dipper 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.	<i>199</i>
	When operating the machine, make sure to check and lubricate attachment points affected by water regularly.	<i>263</i>
	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.	<i>282</i>
	Use the recommended lubricants.	<i>307</i>
	Fully charge the batteries regularly, electrolyte may freeze. Ventilate well especially when the batteries are charged in a confined space.	<i>288</i>
	When storing machines in extremely cold temperature, remove batteries and store them at room temperature.	<i>178</i>
	Before parking, remove the mud and the dirt from the tracks.	-
Demolition work	Use fall protection over the cab against falling objects.	<i>201</i>
Low fuel quality	Drain the sediments in fuel tank at shorter service intervals. <sup>(1)</sup>	-
	Change the engine oil and engine oil filter at shorter service intervals. <sup>(1)</sup>	-

1. Contact a workshop authorized by Volvo



**306 Maintenance**  
**Maintenance service, when required**

Dusty atmosphere	Check regularly that hose and pipe connections from the air cleaner to the engine induction manifold do not leak.	293
	Clean the air filter at shorter service intervals.	293
	Clean the clogging net for radiator and oil cooler at shorter service intervals.	295
	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.	290
	Pay attention to and clean the engine compartment and surrounding areas regularly.	292
Rocky ground	Use a suitable track for the ground conditions. If in doubt, contact your closest Volvo dealer for proper advice.	226
	Use a suitable attachment for the ground conditions such as a heavy duty bucket. <sup>(1)</sup>	-
Hammer operation	Change the hydraulic oil and return filter of hammer circuit at shorter service intervals. <sup>(1)</sup>	-

1. Contact a workshop authorized by Volvo



## Specifications Recommended lubricants

The Volvo lubricants have been specially developed to fulfil the demanding operating conditions, in which Volvo excavators are used in. The oils have been tested according to Volvo excavator specifications and therefore meet the high requirements for safety and quality. Other mineral oils can be used if they conform to our viscosity recommendations and meet our quality requirements. The approval of Volvo is required, if any other oil base quality (for example biologically degradable oil) is to be used.

System	Oil grade	Recommended viscosity at varying ambient temperature																																																																																										
Engine	Engine oil see page 309.	<table border="1"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>-14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td colspan="10" style="text-align: center;">SAE 10W/30</td> </tr> <tr> <td colspan="10" style="text-align: center;">*SAE 15W/40</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 10W/40</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 5W/30</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 5W/40</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 30</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 40</td> </tr> </tbody> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122	SAE 10W/30										*SAE 15W/40										SAE 10W/40										SAE 5W/30										SAE 5W/40										SAE 30										SAE 40									
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Track gearbox	Gear oil (with EP** additive) API GL4 or GL5	<table border="1"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>-14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td colspan="10" style="text-align: center;">*SAE 90</td> </tr> <tr> <td colspan="10" style="text-align: center;">SAE 140</td> </tr> </tbody> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122	*SAE 90										SAE 140																																																											
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Swing ring gear (Bath and Ball)	Grease	<table border="1"> <thead> <tr> <th>°C</th> <th>-30</th> <th>-20</th> <th>-10</th> <th>0</th> <th>+10</th> <th>+20</th> <th>+30</th> <th>+40</th> <th>+50</th> </tr> <tr> <th>°F</th> <th>-22</th> <th>-4</th> <th>-14</th> <th>+32</th> <th>+50</th> <th>+68</th> <th>+86</th> <th>+104</th> <th>+122</th> </tr> </thead> <tbody> <tr> <td colspan="10" style="text-align: center;">Multi purpose EP** grease NLGI 2</td> </tr> </tbody> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122	Multi purpose EP** grease NLGI 2																																																																					
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\*: Installed at factory

\*\* : Extreme Pressure

**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.



Specifications  
308 Recommended lubricants

System	Oil grade	Recommended viscosity at varying ambient temperature																														
Hydraulic system	Volvo Extra hydraulic oil	<table border="1"> <tr> <td>°C</td> <td>-30</td> <td>-20</td> <td>-10</td> <td>0</td> <td>+10</td> <td>+20</td> <td>+30</td> <td>+40</td> <td>+50</td> </tr> <tr> <td>°F</td> <td>-22</td> <td>-4</td> <td>-14</td> <td>+32</td> <td>+50</td> <td>+68</td> <td>+86</td> <td>+104</td> <td>+122</td> </tr> <tr> <td colspan="10"> </td> </tr> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122										
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Volvo Biodegradable hydraulic oil (based on synthetic ester)***	<table border="1"> <tr> <td>°C</td> <td>-30</td> <td>-20</td> <td>-10</td> <td>0</td> <td>+10</td> <td>+20</td> <td>+30</td> <td>+40</td> <td>+50</td> </tr> <tr> <td>°F</td> <td>-22</td> <td>-4</td> <td>-14</td> <td>+32</td> <td>+50</td> <td>+68</td> <td>+86</td> <td>+104</td> <td>+122</td> </tr> <tr> <td colspan="10"> </td> </tr> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122											
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°F	-22	-4	-14	+32	+50	+68	+86	+104	+122																							
Volvo Ultra hydraulic oil (Long life hydraulic oil)	<table border="1"> <tr> <td>°C</td> <td>-30</td> <td>-20</td> <td>-10</td> <td>0</td> <td>+10</td> <td>+20</td> <td>+30</td> <td>+40</td> <td>+50</td> </tr> <tr> <td>°F</td> <td>-22</td> <td>-4</td> <td>-14</td> <td>+32</td> <td>+50</td> <td>+68</td> <td>+86</td> <td>+104</td> <td>+122</td> </tr> <tr> <td colspan="10"> </td> </tr> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122											
°C	-30	-20	-10	0	+10	+20	+30	+40	+50																							
°F	-22	-4	-14	+32	+50	+68	+86	+104	+122																							
Pin and bushing	Grease (Multi purpose EP** grease NLGI 2)	<table border="1"> <tr> <td>°C</td> <td>-30</td> <td>-20</td> <td>-10</td> <td>0</td> <td>+10</td> <td>+20</td> <td>+30</td> <td>+40</td> <td>+50</td> </tr> <tr> <td>°F</td> <td>-22</td> <td>-4</td> <td>-14</td> <td>+32</td> <td>+50</td> <td>+68</td> <td>+86</td> <td>+104</td> <td>+122</td> </tr> <tr> <td colspan="10"> </td> </tr> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122										
°C	-30	-20	-10	0	+10	+20	+30	+40	+50																							
°F	-22	-4	-14	+32	+50	+68	+86	+104	+122																							
Fuel	Diesel fuel	<table border="1"> <tr> <td>°C</td> <td>-30</td> <td>-20</td> <td>-10</td> <td>0</td> <td>+10</td> <td>+20</td> <td>+30</td> <td>+40</td> <td>+50</td> </tr> <tr> <td>°F</td> <td>-22</td> <td>-4</td> <td>-14</td> <td>+32</td> <td>+50</td> <td>+68</td> <td>+86</td> <td>+104</td> <td>+122</td> </tr> <tr> <td colspan="10"> </td> </tr> </table>	°C	-30	-20	-10	0	+10	+20	+30	+40	+50	°F	-22	-4	-14	+32	+50	+68	+86	+104	+122										
°C	-30	-20	-10	0	+10	+20	+30	+40	+50																							
°F	-22	-4	-14	+32	+50	+68	+86	+104	+122																							
Cooling system	Volvo Coolant VCS	Volvo Coolant VCS should be used only, see page 310.																														
Air conditioner system	Refrigerant	HFC R134a																														

\*: Installed at factory

\*\* : Extreme Pressure

\*\*\*: If the machine is filled with Volvo Biodegradable hydraulic oil this oil must also be used when filling and changing. The mineral oil content in bio oil should not exceed 2% when changing from mineral oil to bio oil. Contact a workshop authorised by Volvo.

**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

An engine oil of quality class VDS-4 is mandatory for Tier 4 final and Stage IV machines, due to its low content of substances that would otherwise clog the diesel particulate filter.

The table below shows the oil drain interval valid for the engine.

Oil grade	Sulphur content in the fuel, ppm (10000 ppm = 1%)				
	< 15	15 - 500	500 - 3000	3000 - 5000	> 5000
	<b>Oil changing interval</b>				
Volvo Ultra Diesel Engine Oil, VDS-4 or other VDS-4 approved engine oil	500 hours	<b>Not applicable</b>			
ACEA: E9 API: CJ-4	250 hours	<b>Not applicable</b>			

- ACEA: European Automobile Manufacturers Association
- API: American Petroleum Institute

310 Specifications  
Recommended lubricants

### Coolant

Only use Volvo Coolant VCS when topping up or changing coolant. To avoid damage to engine and cooling system, different coolants or corrosion protection must not be mixed. When using concentrated Volvo Coolant VCS and clean water, the mixture should contain 40–60% concentrated coolant and 60–40% clean water. The amount of concentrated coolant must never be less than 40% of the total mixture, see table below.

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

The concentrated coolant must not be mixed with water that contains a high degree of lime (hard water), salt or metals.

The clean water for the cooling system must also meet the following requirements:

Description	Value
Total number of solid particles	< 340 ppm
Total hardness	< 9.5° dH
Chloride	< 40 ppm
Sulphate	< 100 ppm
pH value	5.5-9
Silica	< 20 mg SiO <sub>2</sub> /litre
Iron	< 0.10 mg Fe/litre
Manganese	< 0.05 mg Mn/litre
Electrical conductivity	< 500 µS/cm
Organic material, COD-Mn	< 15 mg/litre

If there is any doubt about the water quality, use ready-mixed Volvo Coolant VCS, which contains 40% concentrated coolant. Do not mix with any other ready-mixed coolants since this may result in engine damage.



## Hydraulic oil

Only use Volvo genuine hydraulic oil approved by Volvo Construction Equipment must be used. Do not mix different brands of hydraulic oil as this can lead to damage in the hydraulic system.

For the hydraulic oil specification, see page 307.

	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.





312 Specifications  
Recommended lubricants

**Grease**

Recommended grease for all digging equipment greasing points

Manufacturer	Product name	
	Recommendations	Alternatives*
VOLVO	Ultra Grease Moly EP2	Super Grease Lithium EP2
CALTEX	Molytex EP2	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



## Fuel system

### Fuel

#### 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. 1D and 2D, JIS KK 2204. Fuel specification varies according to the working temperature. Please contact authorized Volvo dealer.

#### Sulphur content

According to current USA legal requirement, the sulphur content in the diesel fuel must not exceed 0.0015 percent (15 ppm) by weight.

According to current EU legal requirements, the sulphur content in the diesel fuel must not exceed 0.001 percent (10 ppm) by weight.

#### Bio-diesel fuel

Vegetable oils and / or esters, also called "bio-diesel", (e.g. rape-seed methyl ester RME fuel), which are offered on certain markets both as pure products and as mixed into the diesel fuel.

Volvo Construction Equipment accepts a maximum intermix of 7% bio-diesel fuel in the diesel fuel, ready mixed from the oil companies. A higher intermix than 7% of bio-diesel fuel may cause:

- Increased emission by nitrogen oxide, (thereby not meeting legal requirements)
- Shorter service life of engine and injection system
- Increased fuel consumption
- Altered engine output
- Shortening the engine oil change interval to a half
- Shortened service life of rubber materials in the fuel system
- Less good cold handling properties of the fuel
- Limit storage time for the fuel, which may cause clogging up of the fuel system if the machine is laid up for longer periods

#### Warranty condition

The warranty does not cover damage caused by an intermix of more than 7% of bio-diesel fuel.

## Alternative fuels

This statement is only valid for Volvo branded engines, but also includes engines for DD25 and C-series Skid Steer Loaders where warranty is provided by Volvo.

Hydro-treated vegetable oil (HVO) and fatty acid methyl ester (FAME) biodiesel are both made from renewable raw materials such as vegetable oils and animal fats, but they are chemically processed in different ways.

### Hydro-treated vegetable oil (HVO)

HVO is created using a chemical process called hydro-treating. Hydro-treating creates an oxygen-free hydrocarbon product that is very similar to distillate diesel fuel and is well suited for use in diesel engines. HVO that conforms to CEN prEN 15940 is approved for use in all Volvo Construction Equipment diesel engines with no changes to maintenance intervals.

### Biodiesel

Biodiesel is a product made from renewable resources such as vegetable oils or animal fat. Biodiesel that has been chemically processed into fatty acid methyl ester (FAME) can be blended with distillate diesel fuel and used in some diesel engines. Unblended biodiesel is referred to as B100 because it is 100% biodiesel.

Rapeseed methyl ester (RME) is the most common type of FAME used in Europe. Soy methyl ester (SME) and sunflower oil methyl ester (SOME) are the most common types of FAME used in the US. Although use of FAME biodiesel is now a legal requirement in some markets, it is not as suitable for use in diesel engines as conventional diesel fuel or HVO (hydro-treated vegetable oil).

### Biodiesel fuel requirements

The FAME biodiesel blends specified in the table below are approved for use if:

- The biodiesel is pre-blended by the fuel supplier
- The biodiesel used in the blend conforms to EN14214 or ASTM D6751
- The distillate fuel used in the blend meets fuel sulphur requirements
- The distillate fuel used in the blend conforms to EN590 or ASTM D975



**Specifications**  
**Fuel system 315**

- B1-B5 biodiesel blends conform to EN590 or ASTM D975
- B6-B7 biodiesel blends conform to EN590 or ASTM D7467
- B8-B20 biodiesel blends conform to ASTM D7467

Engine emission designation	Engine size	Acceptable blend
EU Stage II / US Tier 2 * EU Stage IIIA / US Tier 3 * EU Stage IIIB / US Tier 4 interim EU Stage IV / US Tier 4 final	Below D4 / 4 litres	Up to B7
EU Stage II / US Tier 2 * EU Stage IIIA / US Tier 3 * EU Stage IIIB / US Tier 4 interim EU Stage IV / US Tier 4 final	D4–D8	Up to B7
EU Stage IIIB / US Tier 4 interim, equipped with High Sulphur Fuel Conversion Kit (only available in unregulated markets) EU Stage IV / US Tier 4 final, equipped with High Sulphur Fuel Conversion Kit (only available in unregulated markets)		
EU Stage II / US Tier 2 * EU Stage IIIA / US Tier 3 *	D9–D16	Up to B20
EU Stage IIIB / US Tier 4 interim EU Stage IV / US Tier 4 final	D11–D16	Up to B10
EU Stage IIIB / US Tier 4 interim, equipped with High Sulphur Fuel Conversion Kit (only available in unregulated markets) EU Stage IV / US Tier 4 final, equipped with High Sulphur Fuel Conversion Kit (only available in unregulated markets)		Up to B20
* As Tier 2 and Tier 3 emissions regulations ended in 2005 and 2010 respectively, engines produced since then typically <b>meet Stage II / Stage IIIA regulations</b> , allowing their sale in less regulated markets.		

**NOTE!**

Failures directly caused by the use of poor quality biofuel, or any other fuel not conforming to standards, are not factory defects and the manufacturer's warranty does not apply.

**Maintenance interval requirements**

Additional service actions and shorter maintenance intervals are mandatory when using biodiesel blends above B10.



**316 Specifications**  
**Fuel system**

<b>Every 10 hours</b>
<ul style="list-style-type: none"> <li>- Check the engine oil and change if it rises above the maximum fill level</li> <li>- Inspect the fuel system components and replace as necessary</li> </ul>
<b>Half of original interval</b>
<ul style="list-style-type: none"> <li>- Change the engine oil and filter</li> <li>- Replace the fuel filter(s)</li> </ul>
<b>Every year, regardless of operating hours</b>
<ul style="list-style-type: none"> <li>- Change the engine oil and filter</li> <li>- Clean the fuel tank</li> </ul>

**Effects of biodiesel on engine oil**

Using biodiesel can lead to increased oil dilution. Use engine oil analysis tools frequently to check for fuel dilution and monitor engine oil condition. Check the engine oil level daily. Always change the engine oil if the oil level rises above the maximum fill level.

**Effects of biodiesel on fuel systems**

Biodiesel dissolves and loosens some fuel system deposits. During the initial conversion to biodiesel, loosened deposits will travel to the fuel filters and require more frequent fuel filter replacements. Start with new fuel filters when using biodiesel for the first time.

Biodiesel is aggressive to some materials used in fuel system components. Inspect seals, hoses, rubber and plastic components every 10 hours. Repair or replace any components that are damaged, softened or leaking. Clean biodiesel from painted surfaces immediately to prevent paint damage.

Biodiesel is more sensitive to bacteria and water contamination than distillate diesel fuel.

- Use as much fuel as possible before refilling the fuel tank in order to prevent bacteria growth if a machine is in regular use, e.g. regularly uses up a tank of fuel within a week. In climates where condensation is a risk, or when the machine is working for short durations, keep the fuel tank full.
- Do not use biodiesel in machines with low utilization or operating time.
- Do not store machines for more than 4 weeks without flushing biodiesel out of the fuel system by operating the machine through at least one full tank of distillate diesel fuel.



- Always follow the manufacturer's storage recommendations and "best-before" dates for each delivery of biodiesel.

#### **Effects of biodiesel on exhaust after-treatment systems**

Biodiesel leaves higher levels of ash in diesel particulate filters and may require more frequent diesel particulate filter (DPF) regeneration and cleaning. Biodiesel can cause deviations in temperatures and functionality of the DPF burner and may cause fault codes or errors.

Biodiesel exhaust gas is aggressive to some materials used in selective catalytic reduction systems (SCR) and may require more frequent cleaning, repairing or replacing of SCR parts.

#### **Effects of biodiesel on cold weather operation**

Biodiesel has a high viscosity at temperatures below 0 °C (32 °F) and may cause problems starting the engine. Use a fuel heater or park machines in a heated building if possible.

#### **Effects of biodiesel on emissions compliance**

Engines are certified to comply with U.S. EPA, California and EU emissions standards based upon the use of test fuels with specifications established by these regulatory agencies. Alternative fuels, including biodiesel, that are not substantially similar to the required test fuels may adversely affect engine emissions compliance. As a result, Volvo does not warrant that the engine will conform to applicable Federal or California and EU emissions limits when operated on, or having previously being operated on, biodiesel or other alternative fuels that are not substantially similar to specified test fuels used for certification, nor if biodiesel / regular diesel is used in blends that exceed the recommendations.



318 Specifications  
Fuel system

## AdBlue®/DEF

### NOTICE

**Risk of machine damage.**

In the short term, use of the wrong fluid can lead to reduced engine power. In the long term, it can lead to damage to the SCR-system and the catalyst. Reusing AdBlue®/DEF can lead to contamination. Damages caused by the use of incorrect fluids will not be covered by the warranty.

**Always use fluid specified in ISO 22241-1. Do not reuse drained AdBlue®/DEF.**

In order to fulfil US Tier 4 Final, California Tier 4 Final, and EUs Step IV emission requirements, Volvo has developed new engines. For reducing nitrogen oxides (NO<sub>x</sub>) these engines are equipped with a selective catalytic reduction system (SCR-system). A diesel exhaust fluid is needed for the process to work. The fluid is called AdBlue® in Europe and Asia, but in North America it is called Diesel Exhaust Fluid (DEF). When needed, the SCR-system warms up the AdBlue®/DEF-tank and lines.

The fluid is filled in a separate tank, which is completely separated from the fuel tank. AdBlue®/DEF may not be mixed in the fuel tank and fuel may not be mixed in the AdBlue®/DEF-tank.

AdBlue®/DEF consists of urea crystals (32.5%) and distilled water (67.5%). It is transparent, clear, and has a slight odour of ammonia. The fluid is not considered to be hazardous, but should still be handled with care. It is very corrosive, especially with copper and aluminium. For this reason, avoid spilling the fluid on electric cables and components. Always wipe up any spilled AdBlue®/DEF.

AdBlue®/DEF is not a combustible product. When exposed to high temperatures it will convert to ammonia and carbon dioxide. The fluid should not come into contact with other chemicals or be mixed with other chemicals.

AdBlue®/DEF is sensitive to both high and low temperatures. It should not be exposed to direct sunlight for any extended period of time. If the machine is not in use, AdBlue®/DEF starts to freeze at -11 °C (12 °F). The fluid volume in the tank increases when frozen, this is why it is important to follow the recommended fill volume. AdBlue®/DEF does not break down or degrade when it freezes. The SCR-system will thaw the fluid so that it regains its concentration with maintained quality. The machine will work normally during the time that the fluid melts.

At AdBlue®/DEF-temperatures above 20 °C (68 °F) the fluid starts to degrade. Then the fluid gives off ammonia, which is aggressive to, i.e., rubber. At temperatures above 75–80 °C (167–176 °F), ammonia production increases. However, high temperatures are permitted for a short time.

AdBlue®/DEF should be stored in a cool, dry, and ventilated place. The fluid may not be stored in direct sunlight. The recommended storage temperature for AdBlue®/DEF is between -11 °C (12 °F) and 25 °C (77 °F). Under these conditions, storage life is approx. two years. Long-term storage of AdBlue®/DEF at a temperature above 25 °C (77 °F) can reduce the lifetime of the fluid. A short time exposure to higher temperatures has no impact on the quality.

**NOTE!**

If the machine is to be parked for an extended period of time (several months) in ambient temperatures above 40 °C (104 °F) the tank must be drained. This to prevent the fluid from having the wrong quality when starting the machine or that precipitates have a negative impact on the component parts.

**NOTE!**

If the tank has been drained completely it should be rinsed out with new AdBlue®/DEF before new fluid is filled. Never reuse old fluid. If distilled water or ordinary water is used when rinsing there is a risk that the system will generate an alarm due to wrong quality of AdBlue®/DEF.

**NOTE!**

Water of any kind should not be used when cleaning AdBlue®/DEF system or AdBlue®/DEF components since there is a risk that even a small amount of water remains in the system after cleaning. The only exceptions allowed are operations described in the service information made by Volvo.

AdBlue®/DEF is available in plastic container, barrel, IBC, or bulk.

For information on ordering AdBlue®/DEF (only applies to USA-market):

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

For information on ordering AdBlue®/DEF (other markets), contact your local Volvo dealer.

**Actions in case of contact with AdBlue®/DEF:**

- In case of skin contact, rinse thoroughly with water. The fluid may cause irritation of the skin.
- In case of eye contact, rinse thoroughly for several minutes. If needed, contact a doctor for advice.
- In case of inhalation, breathe fresh air and contact a doctor if needed.
- If swallowed, drink water and contact a doctor.





320 Specifications  
Service capacities and change intervals

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## Service capacities and change intervals

### Change capacities

Oils and other liquids	Change capacities
Engine oil, including filter	15.5 litres (4 US gal.)
Coolant (main reservoir)	26 litres (7 US gal.)
Coolant (sub reservoir)	2.2 litres (0.6 US gal.)
Hydraulic tank	59 litres (16 US gal.)
Hydraulic system, total	200 litres (53 US gal.)
Swing gearbox	3.9 litres (1 US gal.)
Track gearbox (each)	2.2 litres (0.6 US gal.)
Fuel tank	200 litres (53 US gal.)
Swing ring gear	9 litres (2.4 US gal.) (8.1 kg) (17.9 lb)
AdBlue®/DEF tank	15.5 litres (4 US gal.)



## Change intervals

### Filter changes

Filter	Hours
Engine oil filter	500
Fuel filter	500
Water separator filter element	500
Air cleaner, primary filter	After cleaning primary filter 5 times or every 2000 hours or maximum 1 year
Air cleaner, secondary filter	After changing primary filter 3 times or every 4000 hours or maximum 2 years
Air conditioner / heater main filter	2000
Cab prefilter	2000
Cartridge of drain filter, hydraulic system	1000 (a)
Return oil filter, hydraulic system	2000 (a) *
Element of servo filter, hydraulic system	1000 (a)
Air ventilation filter, fuel tank	2000
Air breather filter, hydraulic tank	2000
Air breather filter, AdBlue®/DEF tank	6000
AdBlue®/DEF pump unit filter	6000

a) First change: 500 hours

\* When using the hydraulic hammer;

- Frequency of hammer use (50%): change the return oil filter every 1000 hours
- Frequency of hammer use (100%): change the return oil filter every 500 hours



Specifications  
322 Service capacities and change intervals

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Oil and liquid changes

Oil/liquid	Hours
Engine oil	500
Coolant	6000
Hydraulic oil (mineral oil)	2000 *
Hydraulic oil (bio oil and long life hydraulic oil)	5000
Swing drive unit oil	1000 (a)
Track drive unit oil	2000 (a)

a) First change: 500 hours

\* When using the hydraulic hammer;

- Frequency of hammer use (50%): change the hydraulic oil every 1000 hours
- Frequency of hammer use (100%): change the hydraulic oil every 600 hours



## Engine

### Engine, specifications

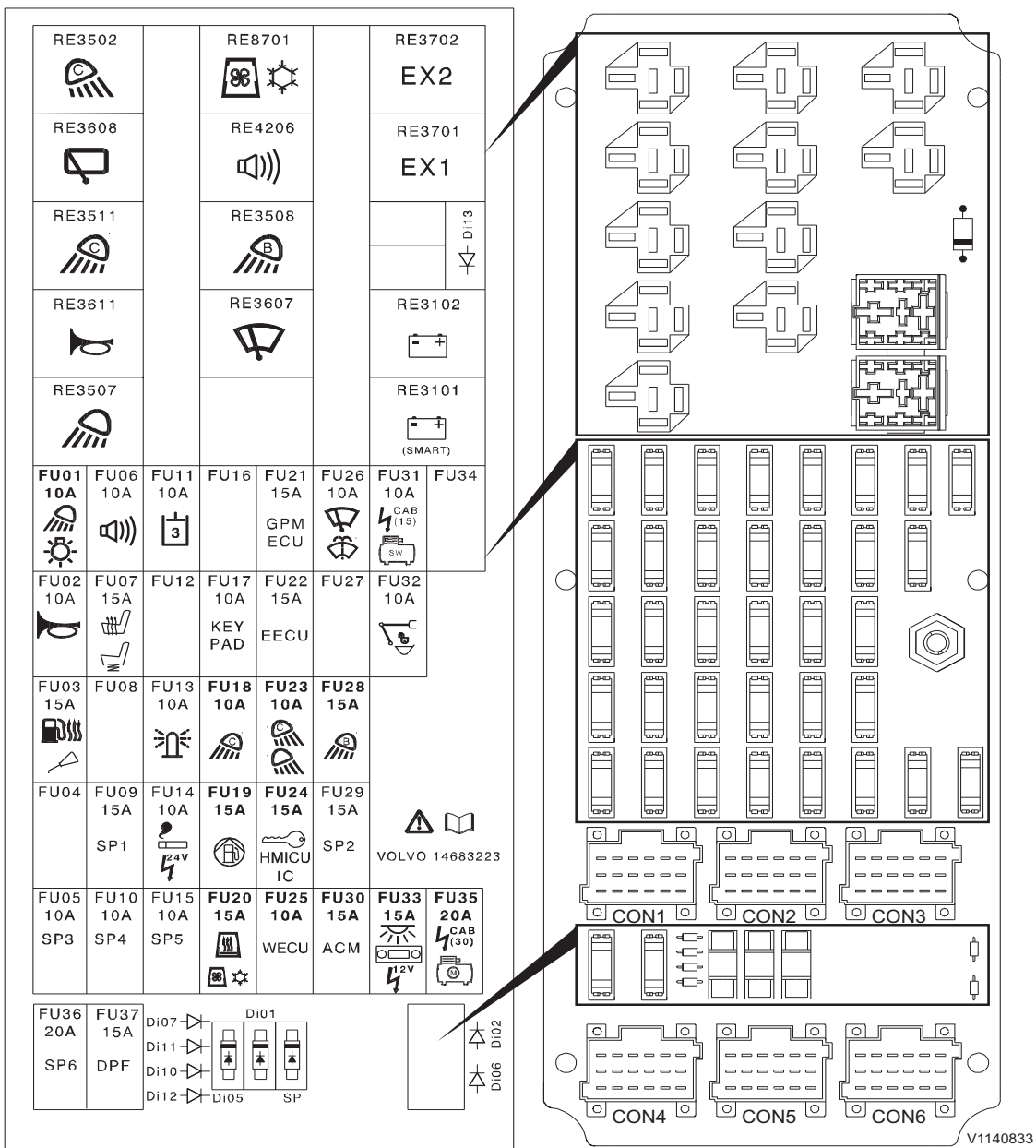
Number of cylinders	4
Cylinder bore	101 mm (3.98 in)
Stroke	126 mm (4.96 in)
Displacement	4.04 litres (247 in <sup>3</sup> )
Injection order	1-3-4-2
Compression ratio	16.6:1
Power output at 30 r/s (1800 rpm)	90 kW (122 PS, 121 HP) SAE J1995 Gross 89 kW (121 PS, 119 HP) ISO 9249 / SAE J1349 Net
Maximum torque	566 Nm (58 kgf m, 417 lbf ft) at 1500 rpm
Low idle	950 rpm
High idle	2100 rpm
Weight, engine (excluding cooling system)	464 kg (1023 lbs)



324 Specifications  
Electrical system

## Electrical system

System voltage	24 V
Starter	5.5 kW
Batteries	2 x 12 V
Alternator	28 V / 80 A
Horn sound level at 2 m	Min. 115 dB
Head light type	Halogen (70 W) LED (22 W)





### Relays

No.	Capacity	Appliance / Circuit
RE3502	Relay	Work light (Counterweight)
RE3608	Relay	Lower wiper
RE3511	Relay	Work light (Cab)
RE3611	Relay	Horn
RE3507	Relay	Work light
RE8701	Relay	Air conditioner
RE4206	Relay	Travel alarm
RE3508	Relay	Work light (Boom)
RE3607	Relay	Upper wiper
RE3702	Relay	Spare relay
RE3701	Relay	Spare relay
RE3102	Relay	Main 2
RE3101	Relay	Main 1

### Fuses

No.	Capacity	Appliance / Circuit
FU01	10A	Work light (Boom, Deck)
FU02	10A	Horn
FU03	15A	Water separator heater, Auto lubrication
FU04	-	-
FU05	10A	Spare
FU06	10A	Travel alarm
FU07	15A	Seat heater, Air suspended seat heater
FU08	-	-
FU09	15A	Spare
FU10	10A	Spare
FU11	10A	Hydraulic option 3
FU12	-	-
FU13	10A	Rotating warning beacon
FU14	10A	Cigarette lighter, Power socket (24V)
FU15	10A	Spare



**326**      Specifications  
**Electrical system**

No.	Capacity	Appliance / Circuit
FU16	-	-
FU17	10A	Keypad
FU18	10A	Work light (Cab)
FU19	15A	Fuel filler pump
FU20	15A	Auxiliary heater, Air conditioner
FU21	15A	GPMECU (General Purpose Machine Electronic Control Unit)
FU22	15A	EMS (Engine Management System)
FU23	10A	Work light (Counterweight)
FU24	15A	Ignition switch, HMICU (Human Machine Interface Control Unit), IC (Instrument Cluster)
FU25	10A	WECU (Telematics ECU)
FU26	10A	Wiper and washer
FU27	-	-
FU28	15A	Work light (Boom)
FU29	15A	Spare
FU30	15A	ACM (Aftertreatment Control Module)
FU31	10A	Power outlet
FU32	10A	Attachment quick coupler
FU33	15A	Interior light, Audio, Power outlet
FU34	-	-
FU35	20A	Power outlet
FU36	20A	Spare
FU37	15A	Diesel Particulate Filter



## Cab

### 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 is 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 m/s<sup>2</sup> A(8)

#### Whole-body vibrations

Weighted root mean square (RMS) acceleration emission of the machine to which the body is 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 m/s<sup>2</sup> A(8)
- Transfer movement (traveling) is 0.5 ~ 0.9 m/s<sup>2</sup> 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 188.

#### Sound information

Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	Standard: 71 LpA dB(A) Tropical: 72 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)	Standard: 100 LwA dB(A) Tropical: 101 LwA dB(A)





## Refrigerant

Type	Quantity	GWP <sup>(a)</sup>
R134a	0.8 kg (1.76 lb)	1144 CO <sub>2</sub> -eq

a) Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO<sub>2</sub>). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO<sub>2</sub>.



## Hydraulic system

Main pump		
Maximum flow rate	2 x 124 l/min (2 x 33 gpm)	
Type	Variable displacement, axial piston pump	
Servo pump		
Maximum flow	20 l/min (5.3 gpm)	
Relief pressure	3.9 MPa (40 kgf cm <sup>2</sup> , 569 psi)	
Main control valve		
Main relief pressure (Standard / Boost pressure)	32.4 / 34.3 MPa (330 / 350 kgf cm <sup>2</sup> , 4693 / 4980 psi)	
Port relief pressure	Boom / Dipper arm / Bucket: 35.8 MPa (365 kgf cm <sup>2</sup> , 5192 psi)	
2 stage port relief pressure (Standard)	Low / High: 20.6 / 35.8 MPa (210 / 365 kgf cm <sup>2</sup> , 2987 / 5192 psi)	
Preset relief pressure (Option)	Low / High: 9.8 / 35.8 MPa (100 / 365 kgf cm <sup>2</sup> , 1421 / 5192 psi)	
Control pedals		
Travel pedal	Stroke	5.5 mm (0.21 in)
	Operating force	10.6 Nm (1.08 kgf m) (7.84 lbf ft)
X1 pedal	Stroke	5.5 mm (0.21 in)
	Operating force	9.84 Nm (1.0 kgf m) (7.28 lbf ft)



**330 Specifications**  
**Hydraulic system**

<b>Control levers</b>		
One button type (Semi-long)	Angle	Forward and backward: 19° Right and left: 25°
	Operating force	Forward and backward: 2.21 Nm (0.23 kgf m) (1.63 lbf ft) Right and left: 2.45 Nm (0.25 kgf m) (1.81 lbf ft)
Four buttons type Three buttons and proportional switch type	Angle	Forward and backward: 19° Right and left: 19°
	Operating force	Forward and backward: 2.02 Nm (0.21 kgf m) (1.49 lbf ft) Right and left: 2.21 Nm (0.23 kgf m) (1.63 lbf ft)

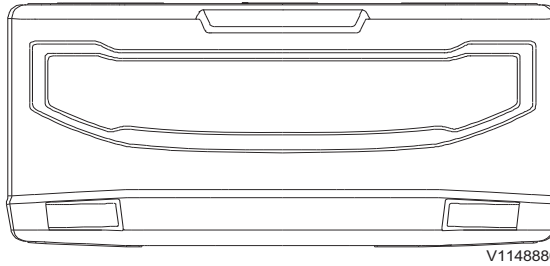
<b>Track motor</b>	
Type	Variable displacement axial piston motor with mechanical brake
Relief valve setting pressure	34.3 MPa (350 kgf cm <sup>2</sup> ) (4975 psi)
Brake type	Wet disc, spring applied, hydraulic released
<b>Track gearbox</b>	
Type	2-stage planetary

<b>Swing motor</b>	
Type	Fixed displacement axial piston motor with mechanical brake
Relief valve setting pressure	26.5 MPa (270 kgf cm <sup>2</sup> ) (3844 psi)
<b>Swing gearbox</b>	
Type	2-stage planetary

## Machine weights

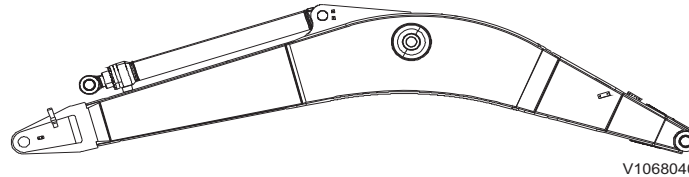
### Disassembled parts, weight

#### Counterweight, weight



Description	Unit	Counterweight
Weight	kg	3200
	lb	7055

#### Boom, weight

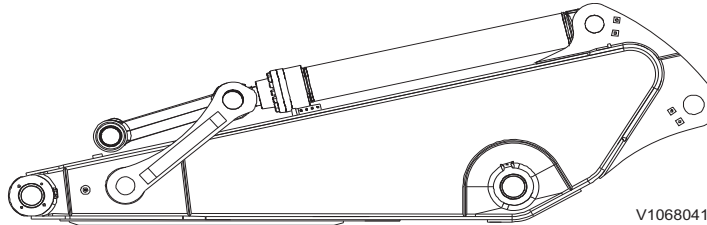


Description	Unit	Boom	
		4.6 m (15' 1")	4.72 m (15' 6")
Weight	kg	1130	1450
	lb	2490	3200

\* Includes cylinder, piping and pin

332 Specifications  
Machine weights

Dipper arm, weight



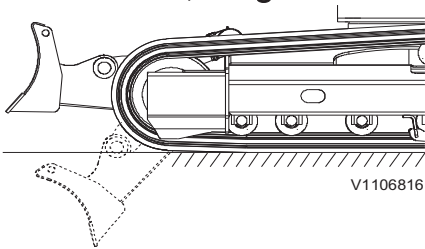
V1068041

Description	Unit	Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
Weight	kg	560	624	684
	lb	1230	1380	1510

\* Includes cylinder, linkage and pin

GP: General Purpose

Dozer blade, weight



V1106816

Description	Unit	Dozer blade
Weight	kg	460
	lb	1014



## Ground pressure

Without dozer blade  
 Boom (m/ft-in): 4.6/ 15' 1"  
 Arm (m/ft-in): 2.1 / 6' 11"  
 Bucket (l/kg/lb): 660 / 443 / 980  
 Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	14868/32780	44.1/0.45/6.4	2490/8'2"
	600 / 24	15066/33220	37.3/0.38/5.4	2590/8'6"
	750 / 30	15449/34070	30.4/0.31/4.4	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15133/33370	37.3/0.38/5.4	2590/8'6"
	700 / 28	15344/33830	32.4/0.33/4.7	2690/8'10"
Rubber pad	500 / 20	14903/32860	44.1/0.45/6.4	2490/8'2"
Add on rubber	500 / 20	15320/33780	46.1/0.47/6.7	2490/8'2"

With dozer blade  
 Boom (m/ft-in): 4.6/ 15' 1"  
 Arm (m/ft-in): 2.1 / 6' 11"  
 Bucket (l/kg/lb): 660 / 443 / 980  
 Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15741/34710	47.1/0.48/6.8	2490/8'2"
	600 / 24	15947/35160	39.2/0.4/5.7	2590/8'6"
	750 / 30	16677/36770	33.3/0.34/4.8	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16015/35310	40.2/0.41/5.8	2590/8'6"
	700 / 28	16229/35780	34.3/0.35/5.0	2690/8'10"
Rubber pad	500 / 20	15776/34790	47.1/0.48/6.8	2490/8'2"
Add on rubber	500 / 20	16192/35700	48.0/0.48/7.0	2490/8'2"



334 Specifications  
Ground pressure

Without dozer blade Variable adjustable boom (m/ft-in): 4.72/ 15' 6" Arm (m/ft-in): 2.1 / 6' 11" Bucket (l/kg/lb): 660 / 443 / 980 Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15257/33640	45.1/0.46/6.5	2490/8'2"
	600 / 24	15454/34080	38.2/0.39/5.5	2590/8'6"
	750 / 30	15838/34920	31.4/0.32/4.6	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15522/34230	38.2/0.39/5.5	2590/8'6"
	700 / 28	15733/34690	33.3/0.34/4.8	2690/8'10"
Rubber pad	500 / 20	15292/33720	45.1/0.46/6.5	2490/8'2"
Add on rubber	500 / 20	15708/34640	47.1/0.48/6.8	2490/8'2"

With dozer blade Variable adjustable boom (m/ft-in): 4.72/ 15' 6" Arm (m/ft-in): 2.1 / 6' 11" Bucket (l/kg/lb): 660 / 443 / 980 Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	16129/35560	48.0/0.49/7.0	2490/8'2"
	600 / 24	16336/36020	40.2/0.41/5.8	2590/8'6"
	750 / 30	16722/36870	33.3/0.34/4.8	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16403/36170	40.2/0.41/5.8	2590/8'6"
	700 / 28	16617/36640	35.3/0.36/5.1	2690/8'10"
Rubber pad	500 / 20	16164/35640	48.0/0.49/7.0	2490/8'2"
Add on rubber	500 / 20	16581/36560	49.0/0.5/7.1	2490/8'2"



Specifications  
**Ground pressure**      **335**

<b>Without dozer blade</b> Boom (m/ft-in): 4.6/ 15' 1" Arm (m/ft-in): 2.5 / 8' 2" Bucket (l/kg/lb): 660 / 443 / 980 Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	14920/32900	44.1/0.45/6.4	2490/8'2"
	600 / 24	15117/33330	37.3/0.38/5.4	2590/8'6"
	750 / 30	15501/34180	30.4/0.31/4.4	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15185/33480	37.3/0.38/5.4	2590/8'6"
	700 / 28	15396/33950	32.4/0.33/4.7	2690/8'10"
Rubber pad	500 / 20	14955/32980	44.1/0.45/6.4	2490/8'2"
Add on rubber	500 / 20	15371/33890	46.1/0.47/6.7	2490/8'2"

<b>With dozer blade</b> Boom (m/ft-in): 4.6/ 15' 1" Arm (m/ft-in): 2.5 / 8' 2" Bucket (l/kg/lb): 660 / 443 / 980 Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15792/34820	47.1/0.48/6.8	2490/8'2"
	600 / 24	15999/35280	39.2/0.4/5.7	2590/8'6"
	750 / 30	16385/36130	32.4/0.33/4.7	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16067/35430	40.2/0.41/5.8	2590/8'6"
	700 / 28	16280/35900	34.3/0.35/5.0	2690/8'10"
Rubber pad	500 / 20	15827/34900	47.1/0.48/6.8	2490/8'2"
Add on rubber	500 / 20	16244/35820	48.0/0.49/7.0	2490/8'2"





**336 Specifications**  
**Ground pressure**

Without dozer blade  
Variable adjustable boom (m/ft-in): 4.72/ 15' 6"  
Arm (m/ft-in): 2.5 / 8' 2"  
Bucket (l/kg/lb): 660 / 443 / 980  
Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15309/33760	45.1/0.46/6.5	2490/8'2"
	600 / 24	15506/34190	38.2/0.39/5.5	2590/8'6"
	750 / 30	15889/35040	31.4/0.32/4.6	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15574/34340	38.2/0.39/5.5	2590/8'6"
	700 / 28	15785/34810	33.3/0.34/4.8	2690/8'10"
Rubber pad	500 / 20	15344/33830	46.1/0.47/6.7	2490/8'2"
Add on rubber	500 / 20	15760/34750	47.1/0.48/6.8	2490/8'2"

With dozer blade  
Variable adjustable boom (m/ft-in): 4.72/ 15' 6"  
Arm (m/ft-in): 2.5 / 8' 2"  
Bucket (l/kg/lb): 660 / 443 / 980  
Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	16181/35680	48.0/0.49/7.0	2490/8'2"
	600 / 24	16387/36130	40.2/0.41/7.0	2590/8'6"
	750 / 30	16774/36990	33.3/0.34/4.8	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16455/36280	41.2/0.42/6.0	2590/8'6"
	700 / 28	16669/36760	35.3/0.36/5.1	2690/8'10"
Rubber pad	500 / 20	16216/35760	48.0/0.49/7.0	2490/8'2"
Add on rubber	500 / 20	16632/36670	49.0/0.5/7.1	2490/8'2"



Specifications  
**Ground pressure**      **337**

<b>Without dozer blade</b>				
Boom (m/ft-in): 4.6/ 15' 1"				
Arm (m/ft-in): 3.0 / 9' 10"				
Bucket (l/kg/lb): 660 / 443 / 980				
Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15034/33150	45.1/0.46/6.5	2490/8'2"
	600 / 24	15232/33590	38.2/0.39/5.5	2590/8'6"
	750 / 30	15615/34430	31.4/0.32/4.6	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15300/33740	38.2/0.39/5.5	2590/8'6"
	700 / 28	15510/34200	33.3/0.34/4.8	2690/8'10"
Rubber pad	500 / 20	15069/33230	45.1/0.46/6.5	2490/8'2"
Add on rubber	500 / 20	15486/34150	46.1/0.47/6.7	2490/8'2"

<b>With dozer blade</b>				
Boom (m/ft-in): 4.6/ 15' 1"				
Arm (m/ft-in): 3.0 / 9' 10"				
Bucket (l/kg/lb): 660 / 443 / 980				
Counterweight (kg/lb): 3200 / 7060				
Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15907/35070	47.1/0.48/6.8	2490/8'2"
	600 / 24	16113/35530	40.2/0.41/5.8	2590/8'6"
	750 / 30	16500/36380	32.4/0.33/4.7	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16181/35680	40.2/0.41/5.8	2590/8'6"
	700 / 28	16395/36150	35.3/0.36/5.1	2690/8'10"
Rubber pad	500 / 20	15942/35150	47.1/0.48/6.8	2490/8'2"
Add on rubber	500 / 20	16358/36070	49.0/0.5/7.1	2490/8'2"



**338 Specifications**  
**Ground pressure**

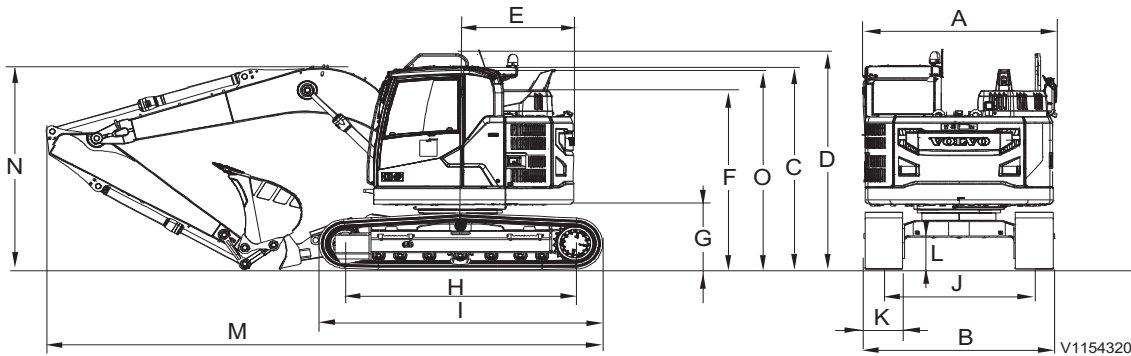
Without dozer blade  
Variable adjustable boom (m/ft-in): 4.72/ 15' 6"  
Arm (m/ft-in): 3.0 / 9' 10"  
Bucket (l/kg/lb): 660 / 443 / 980  
Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	15423/34010	46.1/0.47/6.7	2490/8'2"
	600 / 24	15620/34440	39.2/0.4/5.7	2590/8'6"
	750 / 30	16004/35290	31.4/0.32/4.6	2740/8'12"
Triple grouser (HD shoe)	600 / 24	15688/34590	39.2/0.4/5.7	2590/8'6"
	700 / 28	15899/35060	33.3/0.34/4.8	2690/8'10"
Rubber pad	500 / 20	15458/34080	46.1/0.47/6.7	2490/8'2"
Add on rubber	500 / 20	15874/35000	47.1/0.48/6.8	2490/8'2"

With dozer blade  
Variable adjustable boom (m/ft-in): 4.72/ 15' 6"  
Arm (m/ft-in): 3.0 / 9' 10"  
Bucket (l/kg/lb): 660 / 443 / 980  
Counterweight (kg/lb): 3200 / 7060

Description	Shoe width (mm/in)	Operating weight (kg/lb)	Ground pressure (kPa/kgf cm <sup>2</sup> /psi)	Overall width (mm/ft-in)
Triple grouser	500 / 20	16295/35930	48.0/0.49/7.0	2490/8'2"
	600 / 24	16502/36390	41.2/0.42/6.0	2590/8'6"
	750 / 30	16888/37240	33.3/0.34/4.8	2740/8'12"
Triple grouser (HD shoe)	600 / 24	16569/36540	41.2/0.42/6.0	2590/8'6"
	700 / 28	16783/16330	35.3/0.36/5.1	2690/8'10"
Rubber pad	500 / 20	16330/36010	49.0/0.5/7.1	2490/8'2"
Add on rubber	500 / 20	16747/36930	50.0/0.51/7.3	2490/8'2"

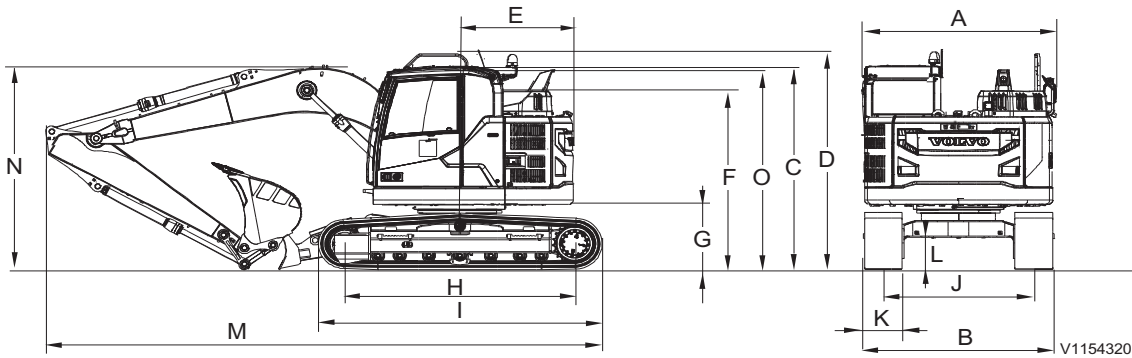
## Dimensions



Description	Unit	GP Boom			
		4.6 m (15' 1")			
		Dipper arm			
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	
A. Overall width of superstructure	mm ft-in	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		2895 (9'6")	2895 (9'6")	2895 (9'6")	
D. Overall height of guardrail		3075 (10'1")	3075 (10'1")	3075 (10'1")	
E. Tail swing radius		1495 (4'11")	1495 (4'11")	1495 (4'11")	
F. Overall height of engine hood		2545 (8'4")	2545 (8'4")	2545 (8'4")	
G. *Counterweight clearance		900 (2'11")	900 (2'11")	900 (2'11")	
H. Tumbler length		3040 (10'0")	3040 (10'0")	3040 (10'0")	
I. Track length		3750 (12'4")	3750 (12'4")	3750 (12'4")	
J. Track gauge		1990 (6'6")	1990 (6'6")	1990 (6'6")	
K. Shoe width		mm in	700 (2'4")	700 (2'4")	700 (2'4")
L. *Minimum ground clearance		mm ft-in	430 (1'5")	430 (1'5")	430 (1'5")
M. Overall length	7400 (24'3")		7405 (24'4")	7345 (24'1")	
N. Overall height of boom	2760 (9'1")		2900 (9'6")	3250 (10'8")	
O. Overall height of diffuser	2775 (9'1")		2775 (9'1")	2775 (9'1")	

\* Without shoe grouser

**340** Specifications  
Dimensions

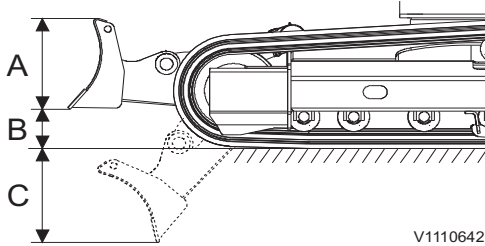


Description	Unit	VA Boom		
		4.72 m (15' 6")		
		Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
A. Overall width of superstructure	mm ft-in	2490 (8'2")	2490 (8'2")	2490 (8'2")
B. Overall width		2690 (8'10")	2690 (8'10")	2690 (8'10")
C. Overall height of cab		2895 (9'6")	2895 (9'6")	2895 (9'6")
D. Overall height of guardrail		3075 (10'1")	3075 (10'1")	3075 (10'1")
E. Tail swing radius		1495 (4'11")	1495 (4'11")	1495 (4'11")
F. Overall height of engine hood		2545 (8'4")	2545 (8'4")	2545 (8'4")
G. *Counterweight clearance		900 (2'11")	900 (2'11")	900 (2'11")
H. Tumbler length		3040 (10'0")	3040 (10'0")	3040 (10'0")
I. Track length		3750 (12'4")	3750 (12'4")	3750 (12'4")
J. Track gauge		1990 (6'6")	1990 (6'6")	1990 (6'6")
K. Shoe width	mm in	700 (2'4")	700 (2'4")	700 (2'4")
L. *Minimum ground clearance	mm ft-in	430 (1'5")	430 (1'5")	430 (1'5")
M. Overall length		7505 (24'7")	7470 (24'6")	7370 (24'2")
N. Overall height of boom		2710 (8'11")	2910 (9'7")	3470 (11'5")
O. Overall height of diffuser		2775 (9'1")	2775 (9'1")	2775 (9'1")

\* Without shoe grouser

Specifications  
Dimensions 341

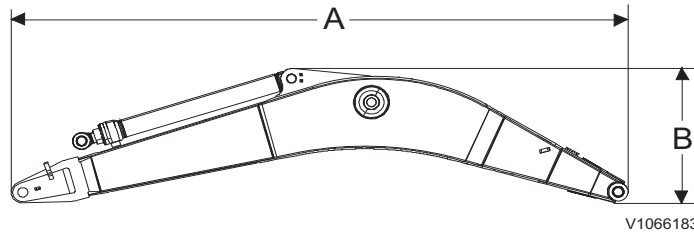
Dozer blade, dimension



Description	Unit	Dozer blade
A. Height	mm ft-in	585 1'11"
A. Width 500mm shoe		2490 8'2"
A. Width 600mm shoe		2590 8'6"
A. Width 700mm shoe		2690 8'10"
B. Lift height		478 1'7"
C. Digging depth		601 2'0"

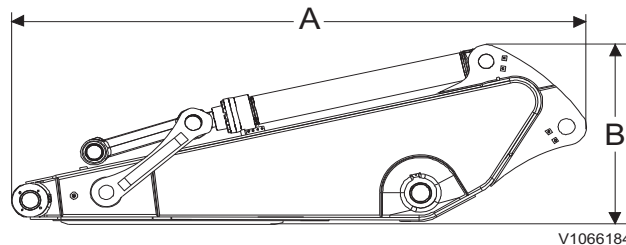
342 Specifications  
Dimensions

**Boom and dipper arm**



Description	Unit	Boom	
		4.6 m (15' 1") GP	4.72m (15' 6") VA
Length (A)	mm ft in	4770 15'8"	4885 16'0"
Height (B)		1370 4'6"	1135 3'9"
Width		545 1'9"	545 1'9"

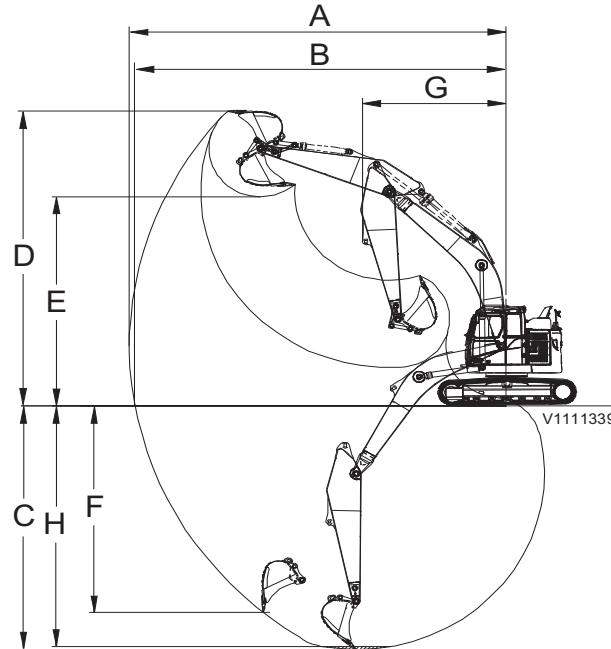
\* Includes dipper arm cylinder, piping and pin  
GP: General Purpose  
VA: Variable Adjustable



Description	Unit	Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
Length (A)	mm ft in	2790 9'2"	3195 10'6"	3690 12'1"
Height (B)		680 2'3"	675 2'3"	750 2'6"
Width		275 0'11"	275 0'11"	275 0'11"

\* Includes bucket cylinder, linkage and pin  
GP: General Purpose

## Working ranges

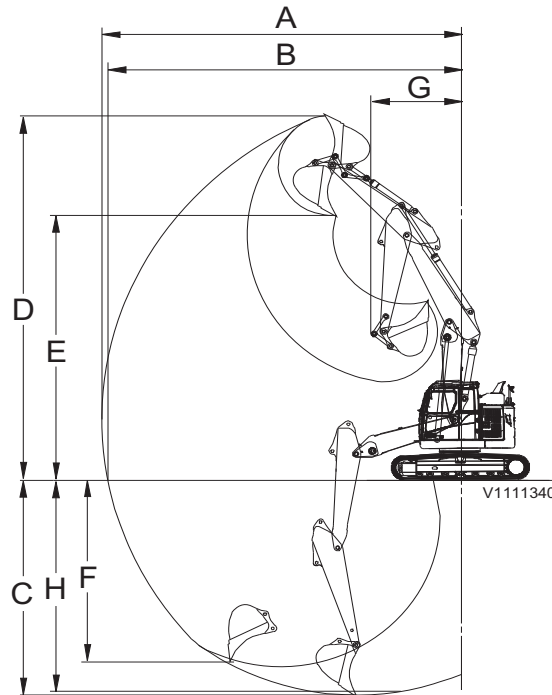


Description	Unit	Boom		
		4.6m (15' 1")		
		Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
A. Maximum digging reach	mm ft in	7990 26'3"	8360 27'5"	8850 29'0"
B. Maximum digging reach on ground		7840 25'9"	8215 26'11"	8720 28'7"
C. Maximum digging depth		5130 16'10"	5530 18'2"	6030 19'9"
D. Maximum cutting height		9090 29'10"	9415 30'11"	9860 32'4"
E. Maximum dumping height		6550 21'6"	6875 22'7"	7310 24'0"
F. Maximum vertical wall digging depth		3954 13'0"	4325 14'2"	4855 15'11"
G. Minimum front swing radius		1929 6'4"	2130 7'0"	2505 8'3"
H. Maximum digging depth (level the ground of 2.44 m (8'))		4880 16'0"	5310 17'5"	5850 19'2"

- Machine with direct fit bucket



344 Specifications  
Working ranges



Description	Unit	Variable adjustable boom		
		4.72m (15' 6")		
		Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
A. Maximum digging reach	mm ft in	8220 27'0"	8610 28'3"	9100 29'10"
B. Maximum digging reach on ground		8070 26'6"	8465 27'9"	8970 29'5"
C. Maximum digging depth		5235 17'2"	5640 18'6"	6145 20'2"
D. Maximum cutting height		9380 30'9"	9740 31'11"	10205 33'6"
E. Maximum dumping height		6830 22'5"	7190 23'7"	7660 25'2"
F. Maximum vertical wall digging depth		4155 13'8"	4523 14'10"	5015 16'5"
G. Minimum front swing radius		2330 7'8"	2590 8'6"	3010 9'11"
H. Maximum digging depth (level the ground of 2.44 m (8'))		5115 16'9"	5525 18'2"	6040 19'10"

- Machine with direct fit bucket



## Recommended bucket sizes

### Maximum permitted buckets

For direct-fit buckets : 600mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	925	850	725	850	800	700
		750	700	600	700	650	550
GP bucket 1.8 t/m <sup>3</sup>		825	750	650	750	700	600
		700	600	550	650	600	550
HD bucket 1.8 t/m <sup>3</sup>	775	700	625	725	675	575	
	750	700	600	700	650	550	
HD bucket 2.0 t/m <sup>3</sup>	725	650	575	675	625	550	
	700	650	550	650	600	550	

For Universal quick coupler buckets : 600mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	850	750	650	775	725	600
		700	650	550	650	600	500
GP bucket 1.8 t/m <sup>3</sup>		750	675	575	700	625	550
		600	550	500	550	500	450
HD bucket 1.8 t/m <sup>3</sup>	700	625	550	650	600	500	
	700	600	550	650	600	500	
HD bucket 2.0 t/m <sup>3</sup>	650	600	500	600	550	475	
	650	600	500	600	550	450	

**NOTE!**

Bucket size based on ISO 7451, heaped material with a 1:1 angle of repose.

**NOTE!**

"Maximum permitted sizes" are for reference only and are not necessarily available from the factory.

**NOTE!**

Bucket widths are less than bucket's tip radius.



Specifications  
346 Recommended bucket sizes

For S6 quick coupler buckets : 600mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	875	800	675	825	750	650
		750	650	550	700	600	550
GP bucket 1.8 t/m <sup>3</sup>		775	700	600	725	675	575
		650	600	500	600	550	450
HD bucket 1.8 t/m <sup>3</sup>	725	675	575	675	625	550	
	700	650	550	650	600	550	
HD bucket 2.0 t/m <sup>3</sup>	675	625	525	625	575	500	
	650	600	500	600	550	500	

For direct-fit buckets : 700mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	925	850	750	875	800	700
		750	700	650	750	650	600
GP bucket 1.8 t/m <sup>3</sup>		825	750	675	775	700	625
		700	650	550	650	600	500
HD bucket 1.8 t/m <sup>3</sup>	775	725	625	750	675	600	
	750	700	600	750	650	600	
HD bucket 2.0 t/m <sup>3</sup>	725	675	600	700	625	550	
	700	650	600	700	600	550	

**NOTE!**

Bucket size based on ISO 7451, heaped material with a 1:1 angle of repose.

**NOTE!**

"Maximum permitted sizes" are for reference only and are not necessarily available from the factory.

**NOTE!**

Bucket widths are less than bucket's tip radius.



Specifications  
**Recommended bucket sizes**     **347**

For Universal quick coupler buckets : 700mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	850	775	675	800	725	625
		700	650	550	650	600	500
GP bucket 1.8 t/m <sup>3</sup>		750	700	600	700	625	550
		600	550	500	600	500	450
HD bucket 1.8 t/m <sup>3</sup>	700	650	575	675	600	525	
	700	650	550	650	600	500	
HD bucket 2.0 t/m <sup>3</sup>	650	600	525	625	550	500	
	650	600	500	600	550	500	

For S6 quick coupler buckets : 700mm bucket							
Description	Unit	Boom					
		4.6 m (15' 1")			4.72 m (15' 6")		
		Dipper arm			Dipper arm		
		2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")	2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
GP bucket 1.5 t/m <sup>3</sup>	l / kg	875	825	700	825	750	675
		750	700	600	700	600	550
GP bucket 1.8 t/m <sup>3</sup>		775	725	625	750	675	600
		650	600	500	600	550	500
HD bucket 1.8 t/m <sup>3</sup>	725	675	600	700	625	550	
	700	650	600	700	600	550	
HD bucket 2.0 t/m <sup>3</sup>	675	625	550	650	575	525	
	650	600	550	650	550	500	

**NOTE!**

Bucket size based on ISO 7451, heaped material with a 1:1 angle of repose.

**NOTE!**

"Maximum permitted sizes" are for reference only and are not necessarily available from the factory.

**NOTE!**

Bucket widths are less than bucket's tip radius.



348 Specifications  
Digging forces

### Digging forces

Description		Unit	Boom		
			4.6 m (15' 1")		
			Dipper arm		
			2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
Bucket radius		mm ft-in	1274 4'2"		
Breakout force	Normal, SAE	kN	80.5	80.5	80.5
		kg	8210	8210	8210
		lb	18100	18100	18100
	Power boost, SAE	kN	85.4	85.4	85.4
		kg	8708	8708	8708
		lb	19200	19200	19200
	Normal, ISO	kN	91.1	91.1	91.1
		kg	9287	9287	9287
lb		20480	20480	20480	
Power boost, ISO	kN	96.6	96.6	96.6	
	kg	9850	9850	9850	
	lb	21720	21720	21720	
Tearout force	Normal, SAE	kN	69.5	62.1	55.3
		kg	7090	6328	5636
		lb	15630	13950	12430
	Power boost, SAE	kN	73.8	65.8	58.6
		kg	7520	6711	5977
		lb	16580	14800	13180
	Normal, ISO	kN	71.4	63.5	56.3
		kg	7283	6475	5745
lb		16060	14280	12670	
Power boost, ISO	kN	75.8	67.3	59.8	
	kg	7725	6866	6093	
	lb	17030	15140	13430	
Rotation angle, bucket		deg.(°)	175		



Specifications  
**Digging forces 349**

Description		Unit	Variable adjustable boom		
			4.72 m (15' 6")		
			Dipper arm		
			2.1 m (6' 11")	2.5 m (8' 2")	3.0 m (9' 10")
Bucket radius		mm ft-in	1274 4'2"		
Breakout force	Normal, SAE	kN	80.5	80.5	80.5
		kg	8210	8210	8210
		lb	18100	18100	18100
	Power boost, SAE	kN	85.4	85.4	85.4
kg		8708	8708	8708	
lb		19200	19200	19200	
Tearout force	Normal, ISO	kN	91.1	91.1	91.1
		kg	9287	9287	9287
		lb	20480	20480	20480
	Power boost, ISO	kN	96.6	96.6	96.6
kg		9850	9850	9850	
lb		21720	21720	21720	
Tearout force	Normal, SAE	kN	69.5	62.1	55.3
		kg	7090	6328	5636
		lb	15630	13950	12430
	Power boost, SAE	kN	73.8	65.8	58.6
kg		7520	6711	5977	
lb		16580	14800	13180	
Tearout force	Normal, ISO	kN	71.4	63.5	56.3
		kg	7283	6475	5745
		lb	16060	14280	12670
	Power boost, ISO	kN	75.8	67.3	59.8
kg		7725	6866	6093	
lb		17030	15140	13430	
Rotation angle, bucket		deg.(°)	175		

Specifications  
**350 Lifting capacities**

## Lifting capacities

For Europe  
ECR145E L without dozer blade

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
Boom: 4.6 m Dipper arm: 2.1 m Shoe: 500 mm Counterweight: 3200 kg	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	3820	-	-	-	-	*4220	3240	4.96
	4.5 m	-	-	*5220	*5220	*4360	3760	3790	2380	-	-	3770	2370	6.01
	3 m	-	-	*7560	6610	*5090	3580	3740	2330	-	-	3250	2030	6.55
	1.5 m	-	-	-	-	5640	3370	3650	2250	-	-	3090	1910	6.71
	0 m	-	-	*5520	*5520	5500	3240	3580	2190	-	-	3180	1950	6.52
	-1.5 m	*5200	*5200	*8140	5900	5460	3210	-	-	-	-	3620	2210	5.94
-3 m	-	-	*6040	6030	*4140	3290	-	-	-	-	*3610	2990	4.84	
Boom: 4.6 m Dipper arm: 2.5 m Shoe: 500 mm Counterweight: 3200 kg	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	2810	5.45
	4.5 m	-	-	*4420	*4420	*4000	3800	*3710	2400	-	-	*3220	2140	6.42
	3 m	-	-	*6780	6770	*4770	3610	3750	2330	-	-	2980	1850	6.93
	1.5 m	-	-	-	-	*5630	3380	3640	2240	-	-	2840	1750	7.08
	0 m	-	-	*6130	5840	5480	3220	3560	2160	-	-	2910	1780	6.90
	-1.5 m	*4770	*4770	*8600	5820	5420	3170	3530	2140	-	-	3260	1980	6.36
-3 m	*9220	*9220	*6790	5920	*4680	3210	-	-	-	-	*3560	2550	5.34	
Boom: 4.6 m Dipper arm: 3.0 m Shoe: 500 mm Counterweight: 3200 kg	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2410	-	-	*2830	2350	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2410	-	-	*2670	1850	6.95
	3 m	-	-	*5740	*5740	*4300	3630	*3650	2320	-	-	2650	1630	7.43
	1.5 m	-	-	-	-	*5260	3370	3610	2210	2570	1560	2530	1540	7.57
	0 m	-	-	*6540	5770	5430	3170	3510	2110	-	-	2580	1560	7.40
	-1.5 m	*4120	*4120	*8920	5670	5330	3080	3450	2060	-	-	2830	1710	6.90
-3 m	*7550	*7550	*7500	5740	*5090	3090	-	-	-	-	*3340	2100	5.98	
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



**Specifications**  
**Lifting capacities 351**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 500 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	3850	-	-	-	-	*3950	2930	5.27
	4.5 m	-	-	*5480	*5480	*5690	3770	3820	2380	-	-	3550	2200	6.26
	3 m	-	-	-	-	5910	3560	3760	2320	-	-	3090	1910	6.78
	1.5 m	-	-	-	-	5660	3340	3660	2230	-	-	2950	1800	6.94
	0 m	-	-	-	-	5510	3210	3590	2170	-	-	3040	1850	6.76
	-1.5 m	-	-	*6990	5880	*5410	3190	3590	2170	-	-	*3190	2090	6.20
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 500 mm</b> <b>Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	3910	-	-	-	-	*3210	2550	5.77
	4.5 m	-	-	*4100	*4100	*4890	3820	3850	2410	-	-	*2940	1990	6.69
	3 m	-	-	-	-	5960	3600	3770	2330	-	-	2830	1740	7.18
	1.5 m	-	-	-	-	5680	3350	3660	2230	-	-	2710	1650	7.32
	0 m	-	-	-	-	5490	3190	3570	2150	-	-	2780	1680	7.15
	-1.5 m	-	-	*7870	5790	5430	3140	3540	2120	-	-	3090	1870	6.63
<b>Boom: 4.72 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 500 mm</b> <b>Counterweight: 3200 kg</b>	-3 m	-	-	-	-	*3840	3200	-	-	-	-	-	-	5.66
	7.5 m	-	-	-	-	*3980	3890	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2430	-	-	*2640	2150	6.39
	4.5 m	-	-	-	-	*3730	*3730	3870	2410	-	-	*2440	1720	7.23
	3 m	-	-	-	-	*5060	3630	3760	2320	2630	1600	*2390	1520	7.68
	1.5 m	-	-	-	-	5680	3350	3630	2190	2580	1550	2410	1450	7.82
	0 m	-	-	-	-	5440	3140	3520	2090	2540	1510	2460	1470	7.66
-1.5 m	-	-	*7460	5630	5340	3050	3460	2040	-	-	2700	1610	7.18	
-3 m	-	-	*6170	5710	*4530	3070	*2830	2080	-	-	*2260	1960	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level













1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.







## Specifications 352 Lifting capacities

### ECR145E L with dozer blade down

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.6 m Dipper arm: 2.1 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	*4190	-	-	-	-	*4220	3600	4.96
	4.5 m	-	-	*5220	*5220	*4360	4180	*3980	2650	-	-	*3910	2640	6.01
	3 m	-	-	*7560	7420	*5090	3990	*4150	2600	-	-	*3930	2270	6.55
	1.5 m	-	-	-	-	*5850	3780	*4410	2520	-	-	*3960	2140	6.71
	0 m	-	-	*5520	*5520	*6120	3650	*4450	2460	-	-	*3980	2200	6.52
	-1.5 m	*5200	*5200	*8140	6690	*5670	3620	-	-	-	-	*3930	2490	5.94
	-3 m	-	-	*6040	*6040	*4140	3690	-	-	-	-	*3610	3350	4.84
<b>Boom: 4.6 m Dipper arm: 2.5 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	3120	5.45
	4.5 m	-	-	*4420	*4420	*4000	*4000	*3710	2680	-	-	*3220	2390	6.42
	3 m	-	-	*6780	*6780	*4770	4020	*3950	2610	-	-	*3240	2080	6.93
	1.5 m	-	-	-	-	*5630	3790	*4280	2510	-	-	*3440	1970	7.08
	0 m	-	-	*6130	*6130	*6060	3630	*4430	2440	-	-	*3730	2010	6.90
	-1.5 m	*4770	*4770	*8600	6610	*5820	3570	*4130	2410	-	-	*3730	2240	6.36
	-3 m	*9220	*9220	*6790	6710	*4680	3620	-	-	-	-	*3560	2870	5.34
<b>Boom: 4.6 m Dipper arm: 3.0 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2690	-	-	*2830	2620	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2680	-	-	*2670	2080	6.95
	3 m	-	-	*5740	*5740	*4300	4050	*3650	2600	-	-	*2670	1830	7.43
	1.5 m	-	-	-	-	*5260	3780	*4050	2480	*3120	1770	*2810	1740	7.57
	0 m	-	-	*6540	*6540	*5880	3580	*4320	2380	-	-	*3110	1760	7.40
	-1.5 m	*4120	*4120	*8920	6460	*5880	3490	*4220	2330	-	-	*3410	1930	6.90
	-3 m	*7550	*7550	*7500	6530	*5090	3500	-	-	-	-	*3340	2380	5.98
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

 : Along undercarriage,  : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 353**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m Dipper arm: 2.1 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	4270	-	-	-	-	*3950	3270	5.27
	4.5 m	-	-	*5480	*5480	*5690	4190	*4790	2660	-	-	*3580	2460	6.26
	3 m	-	-	-	-	*6320	3980	*4900	2600	-	-	*3500	2140	6.78
	1.5 m	-	-	-	-	*6780	3750	*4970	2510	-	-	*3630	2030	6.94
	0 m	-	-	-	-	*6530	3620	*4690	2450	-	-	*3750	2090	6.76
	-1.5 m	-	-	*6990	6680	*5410	3600	*3600	2440	-	-	*3190	2350	6.20
<b>Boom: 4.72 m Dipper arm: 2.5 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	4330	-	-	-	-	*3210	2850	5.77
	4.5 m	-	-	*4100	*4100	*4890	4230	*4570	2680	-	-	*2940	2230	6.69
	3 m	-	-	-	-	*6060	4020	*4760	2600	-	-	*2880	1960	7.18
	1.5 m	-	-	-	-	*6670	3770	*4930	2500	-	-	*2980	1860	7.32
	0 m	-	-	-	-	*6630	3600	*4790	2420	-	-	*3250	1900	7.15
	-1.5 m	-	-	*7870	6590	*5760	3550	*4030	2400	-	-	*3110	2110	6.63
-3 m	-	-	-	-	*3840	3610	-	-	-	-	-	-	-	5.66
<b>Boom: 4.72 m Dipper arm: 3.0 m Shoe: 500 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3980	*3980	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2710	-	-	*2640	2400	6.39
	4.5 m	-	-	-	-	*3730	*3730	*3990	2690	-	-	*2440	1940	7.23
	3 m	-	-	-	-	*5060	4050	*4530	2590	*3170	1800	*2390	1720	7.68
	1.5 m	-	-	-	-	*6410	3760	*4790	2470	*3760	1760	*2460	1640	7.82
	0 m	-	-	-	-	*6630	3550	*4800	2370	*3470	1720	*2640	1670	7.66
	-1.5 m	-	-	*7460	6430	*6040	3460	*4310	2320	-	-	*2910	1830	7.18
-3 m	-	-	*6170	*6170	*4530	3480	*2830	2350	-	-	*2260	2220	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 354 Lifting capacities

### ECR145E L without dozer blade

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	3870	-	-	-	-	*4220	3280	4.96
	4.5 m	-	-	*5220	*5220	*4360	3810	3840	2410	-	-	3830	2400	6.01
	3 m	-	-	*7560	6690	*5090	3620	3790	2360	-	-	3300	2060	6.55
	1.5 m	-	-	-	-	5720	3420	3700	2280	-	-	3130	1940	6.71
	0 m	-	-	*5520	*5520	5580	3290	3630	2220	-	-	3230	1980	6.52
	-1.5 m	*5200	*5200	*8140	5980	5540	3260	-	-	-	-	3680	2240	5.94
	-3 m	-	-	*6040	*6040	*4140	3330	-	-	-	-	*3610	3030	4.84
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	2850	5.45
	4.5 m	-	-	*4420	*4420	*4000	3850	*3710	2430	-	-	*3220	2170	6.42
	3 m	-	-	*6780	*6780	*4770	3650	3800	2370	-	-	3030	1880	6.93
	1.5 m	-	-	-	-	*5630	3430	3700	2270	-	-	2880	1780	7.08
	0 m	-	-	*6130	5920	5560	3270	3610	2200	-	-	2950	1810	6.90
	-1.5 m	*4770	*4770	*8600	5900	5500	3210	3580	2170	-	-	3310	2010	6.36
	-3 m	*9220	*9220	*6790	6000	*4680	3260	-	-	-	-	*3560	2590	5.34
<b>Boom: 4.6 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2440	-	-	*2830	2380	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2440	-	-	*2670	1880	6.95
	3 m	-	-	*5740	*5740	*4300	3680	*3650	2350	-	-	*2670	1650	7.43
	1.5 m	-	-	-	-	*5260	3420	3670	2240	2610	1590	2570	1560	7.57
	0 m	-	-	*6540	5850	5510	3220	3560	2140	-	-	2620	1580	7.40
	-1.5 m	*4120	*4120	*8920	5750	5410	3130	3510	2090	-	-	2880	1730	6.90
	-3 m	*7550	*7550	*7500	5820	*5090	3140	-	-	-	-	*3340	2130	5.98
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 355**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m Dipper arm: 2.1 m Shoe: 600 mm Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	3890	-	-	-	-	*3950	2970	5.27
	4.5 m	-	-	*5480	*5480	*5690	3820	3880	2410	-	-	*3580	2230	6.26
	3 m	-	-	-	-	5990	3610	3810	2350	-	-	3140	1930	6.78
	1.5 m	-	-	-	-	5740	3390	3710	2270	-	-	2990	1830	6.94
	0 m	-	-	-	-	5590	3260	3640	2200	-	-	3080	1880	6.76
	-1.5 m	-	-	*6990	5960	*5410	3240	*3600	2200	-	-	*3190	2120	6.20
<b>Boom: 4.72 m Dipper arm: 2.5 m Shoe: 600 mm Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	3950	-	-	-	-	*3210	2590	5.77
	4.5 m	-	-	*4100	*4100	*4890	3860	3910	2440	-	-	*2940	2010	6.69
	3 m	-	-	-	-	6040	3650	3820	2360	-	-	2870	1760	7.18
	1.5 m	-	-	-	-	5760	3400	3710	2260	-	-	2750	1670	7.32
	0 m	-	-	-	-	5570	3240	3620	2180	-	-	2820	1710	7.15
	-1.5 m	-	-	*7870	5870	5510	3190	3590	2150	-	-	*3110	1900	6.63
-3 m	-	-	-	-	*3840	3240	-	-	-	-	-	-	-	5.66
<b>Boom: 4.72 m Dipper arm: 3.0 m Shoe: 600 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3980	3940	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2460	-	-	*2640	2170	6.39
	4.5 m	-	-	-	-	*3730	*3730	3920	2440	-	-	*2440	1750	7.23
	3 m	-	-	-	-	*5060	3670	3820	2350	2670	1620	*2390	1550	7.68
	1.5 m	-	-	-	-	5760	3390	3680	2230	2620	1580	2450	1470	7.82
	0 m	-	-	-	-	5520	3190	3570	2120	2580	1540	2500	1490	7.66
	-1.5 m	-	-	*7460	5710	5420	3100	3520	2070	-	-	2740	1630	7.18
-3 m	-	-	*6170	5800	*4530	3120	*2830	2110	-	-	*2260	1990	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 356 Lifting capacities

### ECR145E L with dozer blade down

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	*4190	-	-	-	-	*4220	3720	4.96
	4.5 m	-	-	*5220	*5220	*4360	4310	*3980	2740	-	-	*3910	2730	6.01
	3 m	-	-	*7560	*7560	*5090	4130	*4150	2690	-	-	*3930	2350	6.55
	1.5 m	-	-	-	-	*5850	3910	*4410	2610	-	-	*3960	2220	6.71
	0 m	-	-	*5520	*5520	*6120	3780	*4450	2550	-	-	*3980	2280	6.52
	-1.5 m	*5200	*5200	*8140	6970	*5670	3750	-	-	-	-	*3930	2580	5.94
	-3 m	-	-	*6040	*6040	*4140	3830	-	-	-	-	*3610	3470	4.84
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	3230	5.45
	4.5 m	-	-	*4420	*4420	*4000	*4000	*3710	2770	-	-	*3220	2470	6.42
	3 m	-	-	*6780	*6780	*4770	4160	*3950	2700	-	-	*3240	2150	6.93
	1.5 m	-	-	-	-	*5630	3930	*4280	2600	-	-	*3440	2040	7.08
	0 m	-	-	*6130	*6130	*6060	3770	*4430	2530	-	-	*3730	2080	6.90
	-1.5 m	*4770	*4770	*8600	6880	*5820	3710	*4130	2500	-	-	*3730	2320	6.36
	-3 m	*9220	*9220	*6790	*6790	*4680	3750	-	-	-	-	*3560	2980	5.34
<b>Boom: 4.6 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2780	-	-	*2830	2710	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2770	-	-	*2670	2150	6.95
	3 m	-	-	*5740	*5740	*4300	4180	*3650	2690	-	-	*2670	1900	7.43
	1.5 m	-	-	-	-	*5260	3920	*4050	2570	*3120	1830	*2810	1800	7.57
	0 m	-	-	*6540	*6540	*5880	3710	*4320	2470	-	-	*3110	1830	7.40
	-1.5 m	*4120	*4120	*8920	6730	*5880	3620	*4220	2420	-	-	*3410	2010	6.90
	-3 m	*7550	*7550	*7500	6800	*5090	3630	-	-	-	-	*3340	2470	5.98
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
Lifting capacities **357**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	4410	-	-	-	-	*3950	3380	5.27
	4.5 m	-	-	*5480	*5480	*5690	4330	*4790	2750	-	-	*3580	2550	6.26
	3 m	-	-	-	-	*6320	4120	*4900	2690	-	-	*3500	2220	6.78
	1.5 m	-	-	-	-	*6780	3890	*4970	2600	-	-	*3630	2110	6.94
	0 m	-	-	-	-	*6530	3760	*4690	2540	-	-	*3750	2160	6.76
	-1.5 m	-	-	*6990	6960	*5410	3740	*3600	2540	-	-	*3190	2430	6.20
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	4470	-	-	-	-	*3210	2940	5.77
	4.5 m	-	-	*4100	*4100	*4890	4370	*4570	2770	-	-	*2940	2300	6.69
	3 m	-	-	-	-	*6060	4150	*4760	2700	-	-	*2880	2030	7.18
	1.5 m	-	-	-	-	*6670	3900	*4930	2590	-	-	*2980	1930	7.32
	0 m	-	-	-	-	*6630	3740	*4790	2510	-	-	*3250	1970	7.15
	-1.5 m	-	-	*7870	6860	*5760	3690	*4030	2490	-	-	*3110	2190	6.63
<b>Boom: 4.72 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 600 mm</b> <b>Counterweight: 3200 kg</b>	-3 m	-	-	-	-	*3840	3740	-	-	-	-	-	-	5.66
	7.5 m	-	-	-	-	*3980	*3980	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2800	-	-	*2640	2480	6.39
	4.5 m	-	-	-	-	*3730	*3730	*3990	2780	-	-	*2440	2010	7.23
	3 m	-	-	-	-	*5060	4190	*4530	2680	*3170	1870	*2390	1790	7.68
	1.5 m	-	-	-	-	*6410	3900	*4790	2560	*3760	1830	*2460	1710	7.82
	0 m	-	-	-	-	*6630	3690	*4800	2460	*3470	1790	*2640	1740	7.66
-1.5 m	-	-	*7460	6700	*6040	3600	*4310	2410	-	-	*2910	1900	7.18	
-3 m	-	-	*6170	*6170	*4530	3620	*2830	2440	-	-	*2260	*2260	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 358 Lifting capacities

### ECR145E L without dozer blade

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.6 m Dipper arm: 2.1 m Shoe: 700 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	3930	-	-	-	-	*4220	3340	4.96
	4.5 m	-	-	*5220	*5220	*4360	3870	3920	2450	-	-	3900	2440	6.01
	3 m	-	-	*7560	6810	*5090	3690	3870	2410	-	-	3370	2100	6.55
	1.5 m	-	-	-	-	5840	3480	3780	2330	-	-	3200	1980	6.71
	0 m	-	-	*5520	*5520	5690	3350	3710	2260	-	-	3290	2020	6.52
	-1.5 m	*5200	*5200	*8140	6100	5650	3320	-	-	-	-	3750	2290	5.94
	-3 m	-	-	*6040	*6040	*4140	3400	-	-	-	-	*3610	3090	4.84
<b>Boom: 4.6 m Dipper arm: 2.5 m Shoe: 700 mm Counterweight: 3200 kg</b>	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	2890	5.45
	4.5 m	-	-	*4420	*4420	*4000	3900	*3710	2470	-	-	*3220	2200	6.42
	3 m	-	-	*6780	*6780	*4770	3710	3830	2400	-	-	3050	1910	6.93
	1.5 m	-	-	*6310	6270	*5630	3480	3730	2310	-	-	2910	1810	7.08
	0 m	-	-	*6130	6020	5610	3320	3640	2230	-	-	2980	1840	6.90
	-1.5 m	*4770	*4770	*8600	5990	5550	3270	3620	2210	-	-	3340	2050	6.36
	-3 m	*9220	*9220	*6790	6090	*4680	3310	-	-	-	-	*3560	2630	5.34
<b>Boom: 4.6 m Dipper arm: 3.0 m Shoe: 700 mm Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2490	-	-	*2830	2430	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2480	-	-	*2670	1920	6.95
	3 m	-	-	*5740	*5740	*4300	3740	*3650	2400	-	-	*2670	1690	7.43
	1.5 m	-	-	-	-	*5260	3480	3740	2280	2660	1620	2620	1600	7.57
	0 m	-	-	*6540	5960	5630	3280	3640	2190	-	-	2670	1620	7.40
	-1.5 m	*4120	*4120	*8920	5870	5520	3190	3580	2140	-	-	2940	1770	6.90
	-3 m	*7550	*7550	*7500	5930	*5090	3200	-	-	-	-	*3340	2180	5.98
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
Lifting capacities **359**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	3960	-	-	-	-	*3950	3030	5.27
	4.5 m	-	-	*5480	*5480	*5690	3880	3950	2460	-	-	*3580	2280	6.26
	3 m	-	-	-	-	6110	3670	3890	2400	-	-	3200	1970	6.78
	1.5 m	-	-	-	-	5850	3450	3790	2310	-	-	3050	1870	6.94
	0 m	-	-	-	-	5700	3320	3720	2250	-	-	3150	1920	6.76
	-1.5 m	-	-	*6990	6080	*5410	3300	*3600	2250	-	-	*3190	2160	6.20
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	4020	-	-	-	-	*3210	2630	5.77
	4.5 m	-	-	*4100	*4100	*4890	3930	3980	2480	-	-	*2940	2050	6.69
	3 m	-	-	-	-	*6060	3710	3900	2400	-	-	*2880	1800	7.18
	1.5 m	-	-	-	-	5870	3470	3780	2300	-	-	2810	1710	7.32
	0 m	-	-	-	-	5680	3300	3700	2220	-	-	2880	1750	7.15
	-1.5 m	-	-	*7870	5990	5630	3250	3670	2200	-	-	*3110	1940	6.63
<b>Boom: 4.72 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	-3 m	-	-	-	-	*3840	3310	-	-	-	-	-	-	5.66
	7.5 m	-	-	-	-	*3980	*3980	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2510	-	-	*2640	2220	6.39
	4.5 m	-	-	-	-	*3730	*3730	*3990	2490	-	-	*2440	1780	7.23
	3 m	-	-	-	-	*5060	3740	3890	2390	2720	1650	*2390	1580	7.68
	1.5 m	-	-	-	-	5880	3460	3760	2270	2670	1610	*2460	1500	7.82
	0 m	-	-	-	-	5640	3250	3640	2170	2630	1570	2560	1530	7.66
-1.5 m	-	-	*7460	5830	5530	3160	3590	2120	-	-	2800	1670	7.18	
-3 m	-	-	*6170	5910	*4530	3180	*2830	2150	-	-	*2260	2030	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.





## Specifications 360 Lifting capacities

### ECR145E L with dozer blade down

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	-	-	-	-	-	-	*5360	*5360	2.84
	6 m	-	-	*4360	*4360	*4190	*4190	-	-	-	-	*4220	3860	4.96
	4.5 m	-	-	*5220	*5220	*4360	*4360	*3980	2840	-	-	*3910	2830	6.01
	3 m	-	-	*7560	*7560	*5090	4280	*4150	2800	-	-	*3930	2440	6.55
	1.5 m	-	-	-	-	*5850	4070	*4410	2710	-	-	*3960	2310	6.71
	0 m	-	-	*5520	*5520	*6120	3940	*4450	2650	-	-	*3980	2370	6.52
	-1.5 m	*5200	*5200	*8140	7280	*5670	3910	-	-	-	-	*3930	2680	5.94
	-3 m	-	-	*6040	*6040	*4140	3990	-	-	-	-	*3610	3610	4.84
<b>Boom: 4.6 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*4380	*4380	-	-	-	-	-	-	*4270	*4270	3.65
	6 m	-	-	-	-	*3750	*3750	-	-	-	-	*3440	3350	5.45
	4.5 m	-	-	*4420	*4420	*4000	*4000	*3710	2870	-	-	*3220	2570	6.42
	3 m	-	-	*6780	*6780	*4770	4320	*3950	2800	-	-	*3240	2240	6.93
	1.5 m	-	-	-	-	*5630	4080	*4280	2710	-	-	*3440	2120	7.08
	0 m	-	-	*6130	*6130	*6060	3920	*4430	2630	-	-	*3730	2170	6.90
	-1.5 m	*4770	*4770	*8600	7200	*5820	3870	*4130	2600	-	-	*3730	2410	6.36
	-3 m	*9220	*9220	*6790	*6790	*4680	3910	-	-	-	-	*3560	3100	5.34
<b>Boom: 4.6 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3460	*3460	-	-	-	-	*3360	*3360	4.55
	6 m	-	-	-	-	*3220	*3220	*3030	2880	-	-	*2830	2810	6.08
	4.5 m	-	-	-	-	*3510	*3510	*3350	2880	-	-	*2670	2240	6.95
	3 m	-	-	*5740	*5740	*4300	*4300	*3650	2790	-	-	*2670	1980	7.43
	1.5 m	-	-	-	-	*5260	4080	*4050	2670	*3120	1910	*2810	1880	7.57
	0 m	-	-	*6540	*6540	*5880	3870	*4320	2580	-	-	*3110	1910	7.40
	-1.5 m	*4120	*4120	*8920	7050	*5880	3780	*4220	2530	-	-	*3410	2090	6.90
	-3 m	*7550	*7550	*7500	7110	*5090	3790	-	-	-	-	*3340	2570	5.98
-4.5 m	-	-	*4580	*4580	-	-	-	-	-	-	*2830	*2830	4.37	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



**Specifications**  
**Lifting capacities 361**

	H	1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		Max. Reach		
														Max.
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	m
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.1 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	*6240	*6240	-	-	-	-	-	-	*5300	*5300	3.37
	6 m	-	-	*5290	*5290	*5480	4570	-	-	-	-	*3950	3500	5.27
	4.5 m	-	-	*5480	*5480	*5690	4490	*4790	2860	-	-	*3580	2650	6.26
	3 m	-	-	-	-	*6320	4280	*4900	2790	-	-	*3500	2310	6.78
	1.5 m	-	-	-	-	*6780	4050	*4970	2700	-	-	*3630	2190	6.94
	0 m	-	-	-	-	*6530	3920	*4690	2640	-	-	*3750	2250	6.76
	-1.5 m	-	-	*6990	*6990	*5410	3890	*3600	2640	-	-	*3190	2530	6.20
<b>Boom: 4.72 m</b> <b>Dipper arm: 2.5 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5m	-	-	*5310	*5310	-	-	-	-	-	-	*4030	*4030	4.12
	6 m	-	-	-	-	*4690	4630	-	-	-	-	*3210	3050	5.77
	4.5 m	-	-	*4100	*4100	*4890	4540	*4570	2880	-	-	*2940	2390	6.69
	3 m	-	-	-	-	*6060	4310	*4760	2800	-	-	*2880	2110	7.18
	1.5 m	-	-	-	-	*6670	4060	*4930	2700	-	-	*2980	2010	7.32
	0 m	-	-	-	-	*6630	3900	*4790	2620	-	-	*3250	2060	7.15
	-1.5 m	-	-	*7870	7180	*5760	3850	*4030	2590	-	-	*3110	2280	6.63
-3 m	-	-	-	-	*3840	*3840	-	-	-	-	-	-	-	5.66
<b>Boom: 4.72 m</b> <b>Dipper arm: 3.0 m</b> <b>Shoe: 700 mm</b> <b>Counterweight: 3200 kg</b>	7.5 m	-	-	-	-	*3980	*3980	-	-	-	-	*3180	*3180	4.96
	6 m	-	-	-	-	*3770	*3770	*3530	2910	-	-	*2640	2580	6.39
	4.5 m	-	-	-	-	*3730	*3730	*3990	2890	-	-	*2440	2090	7.23
	3 m	-	-	-	-	*5060	4350	*4530	2790	*3170	1950	*2390	1860	7.68
	1.5 m	-	-	-	-	*6410	4060	*4790	2670	*3760	1900	*2460	1780	7.82
	0 m	-	-	-	-	*6630	3850	*4800	2560	*3470	1870	*2640	1810	7.66
	-1.5 m	-	-	*7460	7020	*6040	3760	*4310	2510	-	-	*2910	1980	7.18
-3 m	-	-	*6170	*6170	*4530	3780	*2830	2550	-	-	*2260	*2260	6.30	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 362 Lifting capacities

For North America  
ECR145E L without dozer blade

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 1"</b> <b>Dipper arm: 6' 11"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	9090	-	-	-	-	*9380	8180	15.98
	15 ft	-	-	*11270	*11270	*9500	9000	-	-	-	-	*8630	5890	19.60
	10 ft	-	-	*16180	16010	*11030	8610	*9060	5610	-	-	*8650	5030	21.46
	5 ft	-	-	-	-	*12670	8160	*9570	5440	-	-	*8740	4730	22.03
	0 ft	-	-	*12930	*12930	*13260	7870	*9620	5310	-	-	*8770	4850	21.40
	-5 ft	*11730	*11730	*17690	14380	*12280	7810	-	-	-	-	*8660	5510	19.47
-10 ft	-	-	*12980	*12980	*8710	7990	-	-	-	-	*7930	7500	15.72	
<b>Boom: 15' 1"</b> <b>Dipper arm: 8' 2"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	6350	17.62
	15 ft	-	-	*9730	*9730	*8730	8190	*8170	5160	-	-	*7120	4760	20.95
	10 ft	-	-	*14530	*14530	*10340	7790	8070	5030	-	-	6600	4100	22.70
	5 ft	-	-	-	-	12190	7300	7850	4830	-	-	6260	3860	23.23
	0 ft	-	-	*14260	12560	11790	6960	7670	4670	-	-	6420	3930	22.64
	-5 ft	*10730	*10730	*18660	12510	11650	6830	7620	4620	-	-	7200	4390	20.83
-10 ft	*20870	*20870	*14620	12730	*10000	6940	-	-	-	-	*7840	5700	17.39	
<b>Boom: 15' 1"</b> <b>Dipper arm: 9' 10"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	5290	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5180	-	-	*5900	4130	22.72
	10 ft	-	-	*12100	*12100	*9340	7840	*7960	5000	-	-	5860	3600	24.34
	5 ft	-	-	-	-	*11400	7280	7790	4760	-	-	5580	3390	24.84
	0 ft	-	-	*15210	12410	11690	6840	7560	4550	-	-	5690	3440	24.29
	-5 ft	*9260	*9260	*19370	12190	11460	6640	7450	4450	-	-	6270	3770	22.61
-10 ft	*17050	*17050	*16170	12330	*10950	6670	-	-	-	-	*7350	4680	19.50	
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.

2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.

3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.

4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 363**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 6' 11"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	8270	-	-	-	-	*8810	6650	17.01
	15 ft	-	-	*11950	*11950	*12370	8130	8210	5120	-	-	7900	4910	20.45
	10 ft	-	-	-	-	12730	7700	8090	5010	-	-	6840	4220	22.24
	5 ft	-	-	-	-	12180	7220	7890	4820	-	-	6500	3980	22.78
	0 ft	-	-	-	-	11850	6940	7740	4690	-	-	6700	4080	22.18
	-5 ft	-	-	*15260	12640	*11710	6890	*7490	4700	-	-	*7010	4620	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	9300	-	-	-	-	*7140	6420	18.67
	15 ft	-	-	*9040	*9040	*10740	9130	*9950	5770	-	-	*6500	4950	21.84
	10 ft	-	-	-	-	*13140	8670	*10350	5620	-	-	*6350	4330	23.52
	5 ft	-	-	-	-	*14440	8130	*10690	5400	-	-	*6560	4110	24.04
	0 ft	-	-	-	-	*14380	7780	*10350	5230	-	-	*7150	4200	23.47
	-5 ft	-	-	*17120	14150	*12460	7670	*8600	5180	-	-	*6840	4670	21.72
-10 ft	-	-	-	-	*8120	7790	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	8290	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5190	-	-	*5870	4820	20.75
	15 ft	-	-	-	-	*8260	*8260	8320	5190	-	-	*5390	3830	23.63
	10 ft	-	-	-	-	*10950	7830	8110	4990	5640	3420	*5270	3370	25.19
	5 ft	-	-	-	-	12230	7230	7820	4730	5550	3340	5330	3190	25.67
	0 ft	-	-	-	-	11710	6770	7580	4510	5480	3270	5430	3240	25.14
	-5 ft	-	-	*17150	12100	11490	6580	7470	4410	-	-	5970	3560	23.52
-10 ft	-	-	*13260	12290	*9670	6630	*5710	4500	-	-	*4920	4370	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 364 Lifting capacities

### ECR145E L with dozer blade down

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 1"</b> <b>Dipper arm: 6' 11"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	9090	-	-	-	-	*9380	8180	15.98
	15 ft	-	-	*11270	*11270	*9500	9000	-	-	-	-	*8630	5890	19.60
	10 ft	-	-	*16180	16010	*11030	8610	*9060	5610	-	-	*8650	5030	21.46
	5 ft	-	-	-	-	*12670	8160	*9570	5440	-	-	*8740	4730	22.03
	0 ft	-	-	*12930	*12930	*13260	7870	*9620	5310	-	-	*8770	4850	21.40
	-5 ft	*11730	*11730	*17690	14380	*12280	7810	-	-	-	-	*8660	5510	19.47
	-10 ft	-	-	*12980	*12980	*8710	7990	-	-	-	-	*7930	7500	15.72
<b>Boom: 15' 1"</b> <b>Dipper arm: 8' 2"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	7060	17.62
	15 ft	-	-	*9730	*9730	*8730	*8730	*8170	5760	-	-	*7120	5320	20.95
	10 ft	-	-	*14530	*14530	*10340	8680	*8620	5620	-	-	*7130	4600	22.70
	5 ft	-	-	-	-	*12200	8180	*9290	5420	-	-	*7570	4350	23.23
	0 ft	-	-	*14260	*14260	*13140	7830	*9600	5260	-	-	*8230	4430	22.64
	-5 ft	*10730	*10730	*18660	14210	*12600	7710	*8860	5210	-	-	*8220	4950	20.83
	-10 ft	*20870	*20870	*14620	14430	*10000	7810	-	-	-	-	*7840	6410	17.39
<b>Boom: 15' 1"</b> <b>Dipper arm: 9' 10"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	5900	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5770	-	-	*5900	4630	22.72
	10 ft	-	-	*12100	*12100	*9340	8730	*7960	5590	-	-	*5890	4060	24.34
	5 ft	-	-	-	-	*11400	8160	*8800	5350	-	-	*6180	3840	24.84
	0 ft	-	-	*15210	14100	*12750	7720	*9360	5140	-	-	*6860	3890	24.29
	-5 ft	*9260	*9260	*19370	13880	*12730	7520	*9120	5040	-	-	*7530	4270	22.61
	-10 ft	*17050	*17050	*16170	14030	*10950	7550	-	-	-	-	*7350	5290	19.50
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 365**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 6' 11"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	9170	-	-	-	-	*8810	7400	17.01
	15 ft	-	-	*11950	*11950	*12370	9030	*9840	5710	-	-	*7910	5490	20.45
	10 ft	-	-	-	-	*13700	8590	*10640	5600	-	-	*7710	4740	22.24
	5 ft	-	-	-	-	*14700	8110	*10780	5420	-	-	*7980	4490	22.78
	0 ft	-	-	-	-	*14170	7820	*10110	5280	-	-	*8260	4600	22.18
	-5 ft	-	-	*15260	14350	*11710	7770	*7490	5290	-	-	*7010	5200	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	9300	-	-	-	-	*7140	6420	18.67
	15 ft	-	-	*9040	*9040	*10740	9130	*9950	5770	-	-	*6500	4950	21.84
	10 ft	-	-	-	-	*13140	8670	*10350	5620	-	-	*6350	4330	23.52
	5 ft	-	-	-	-	*14440	8130	*10690	5400	-	-	*6560	4110	24.04
	0 ft	-	-	-	-	*14380	7780	*10350	5230	-	-	*7150	4200	23.47
	-5 ft	-	-	*17120	14150	*12460	7670	*8600	5180	-	-	*6840	4670	21.72
-10 ft	-	-	-	-	*8120	7790	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>Shoe: 20"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5790	-	-	*5870	5400	20.75
	15 ft	-	-	-	-	*8260	*8260	*8730	5790	-	-	*5390	4310	23.63
	10 ft	-	-	-	-	*10950	8730	*9850	5590	*5950	3870	*5270	3810	25.19
	5 ft	-	-	-	-	*13890	8120	*10390	5330	*7560	3790	*5410	3630	25.67
	0 ft	-	-	-	-	*14360	7660	*10390	5110	*6500	3710	*5820	3690	25.14
	-5 ft	-	-	*17150	13800	*13070	7460	*9260	5000	-	-	*6410	4040	23.52
-10 ft	-	-	*13260	*13260	*9670	7510	*5710	5100	-	-	*4920	*4920	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 366 Lifting capacities

### ECR145E L without dozer blade

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 1"</b> <b>Dipper arm: 6' 11"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	8300	-	-	-	-	*9380	7460	15.98
	15 ft	-	-	*11270	*11270	*9500	8210	-	-	-	-	8530	5350	19.60
	10 ft	-	-	*16180	14450	*11030	7820	8160	5090	-	-	7300	4550	21.46
	5 ft	-	-	-	-	12320	7380	7980	4920	-	-	6910	4270	22.03
	0 ft	-	-	*12930	12810	12000	7100	7840	4790	-	-	7120	4380	21.40
	-5 ft	*11730	*11730	*17690	12860	11920	7030	-	-	-	-	8140	4970	19.47
-10 ft	-	-	*12980	*12980	*8710	7210	-	-	-	-	*7930	6780	15.72	
<b>Boom: 15' 1"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	6430	17.62
	15 ft	-	-	*9730	*9730	*8730	8290	*8170	5230	-	-	*7120	4830	20.95
	10 ft	-	-	*14530	*14530	*10340	7890	8180	5100	-	-	6700	4160	22.70
	5 ft	-	-	-	-	*12200	7400	7960	4900	-	-	6360	3920	23.23
	0 ft	-	-	*14260	12740	11970	7060	7790	4740	-	-	6520	3990	22.64
	-5 ft	*10730	*10730	*18660	12690	11830	6930	7730	4690	-	-	7310	4460	20.83
-10 ft	*20870	*20870	*14620	12910	*10000	7040	-	-	-	-	*7840	5780	17.39	
<b>Boom: 15' 1"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	5360	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5250	-	-	*5900	4190	22.72
	10 ft	-	-	*12100	*12100	*9340	7940	*7960	5070	-	-	*5890	3660	24.34
	5 ft	-	-	-	-	*11400	7380	7900	4830	-	-	5670	3450	24.84
	0 ft	-	-	*15210	12580	11860	6940	7670	4620	-	-	5780	3490	24.29
	-5 ft	*9260	*9260	*19370	12370	11630	6740	7560	4520	-	-	6370	3830	22.61
-10 ft	*17050	*17050	*16170	12510	*10950	6770	-	-	-	-	*7350	4750	19.50	
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



**Specifications**  
**Lifting capacities 367**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 6' 11"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	8370	-	-	-	-	*8810	6730	17.01
	15 ft	-	-	*11950	*11950	*12370	8230	8330	5180	-	-	*7910	4980	20.45
	10 ft	-	-	-	-	12900	7800	8210	5080	-	-	6940	4280	22.24
	5 ft	-	-	-	-	12350	7320	8010	4890	-	-	6600	4040	22.78
	0 ft	-	-	-	-	12030	7040	7860	4760	-	-	6800	4140	22.18
	-5 ft	-	-	*15260	12820	*11710	6980	*7490	4770	-	-	*7010	4680	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	8500	-	-	-	-	*7140	5840	18.67
	15 ft	-	-	*9040	*9040	*10740	8320	8400	5240	-	-	*6500	4480	21.84
	10 ft	-	-	-	-	13000	7870	8230	5090	-	-	*6350	3910	23.52
	5 ft	-	-	-	-	12390	7340	7990	4870	-	-	6070	3700	24.04
	0 ft	-	-	-	-	11990	6990	7810	4700	-	-	6220	3770	23.47
	-5 ft	-	-	*17120	12620	11860	6880	7760	4660	-	-	*6840	4200	21.72
-10 ft	-	-	-	-	*8120	7000	-	-	-	-	-	-	18.46	
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5260	-	-	*5870	4890	20.75
	15 ft	-	-	-	-	*8260	*8260	8440	5260	-	-	*5390	3890	23.63
	10 ft	-	-	-	-	*10950	7930	8220	5060	5730	3470	*5270	3420	25.19
	5 ft	-	-	-	-	12400	7330	7930	4800	5640	3390	5410	3250	25.67
	0 ft	-	-	-	-	11880	6870	7690	4580	5560	3320	5520	3300	25.14
	-5 ft	-	-	*17150	12270	11660	6680	7580	4480	-	-	6060	3620	23.52
-10 ft	-	-	*13260	12460	*9670	6730	*5710	4570	-	-	*4920	4430	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.





Specifications  
368 Lifting capacities

ECR145E L with dozer blade down

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
Boom: 15' 1" Dipper arm: 6' 11" shoe: 24" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	*9300	-	-	-	-	*9380	8450	15.98
	15 ft	-	-	*11270	*11270	*9500	9300	-	-	-	-	*8630	6090	19.60
	10 ft	-	-	*16180	*16180	*11030	8900	*9060	5810	-	-	*8650	5200	21.46
	5 ft	-	-	-	-	*12670	8450	*9570	5630	-	-	*8740	4900	22.03
	0 ft	-	-	*12930	*12930	*13260	8160	*9620	5510	-	-	*8770	5030	21.40
	-5 ft	*11730	*11730	*17690	14960	*12280	8100	-	-	-	-	*8660	5700	19.47
	-10 ft	-	-	*12980	*12980	*8710	8280	-	-	-	-	*7930	7780	15.72
Boom: 15' 1" Dipper arm: 8' 2" shoe: 24" Counterweight: 7060 lb	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	7290	17.62
	15 ft	-	-	*9730	*9730	*8730	*8730	*8170	5950	-	-	*7120	5500	20.95
	10 ft	-	-	*14530	*14530	*10340	8970	*8620	5820	-	-	*7130	4770	22.70
	5 ft	-	-	-	-	*12200	8470	*9290	5620	-	-	*7570	4510	23.23
	0 ft	-	-	*14260	*14260	*13140	8120	*9600	5450	-	-	*8230	4600	22.64
	-5 ft	*10730	*10730	*18660	14790	*12600	8000	*8860	5400	-	-	*8220	5130	20.83
	-10 ft	*20870	*20870	*14620	*14620	*10000	8100	-	-	-	-	*7840	6640	17.39
Boom: 15' 1" Dipper arm: 9' 10" shoe: 24" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	6100	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5970	-	-	*5900	4790	22.72
	10 ft	-	-	*12100	*12100	*9340	9030	*7960	5790	-	-	*5890	4210	24.34
	5 ft	-	-	-	-	*11400	8460	*8800	5540	-	-	*6180	3990	24.84
	0 ft	-	-	*15210	14680	*12750	8010	*9360	5330	-	-	*6860	4040	24.29
	-5 ft	*9260	*9260	*19370	14460	*12730	7810	*9120	5230	-	-	*7530	4440	22.61
	-10 ft	*17050	*17050	*16170	14610	*10950	7840	-	-	-	-	*7350	5490	19.50
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
Lifting capacities **369**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 11"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	9470	-	-	-	-	*8810	7640	17.01
	15 ft	-	-	*11950	*11950	*12370	9330	*9840	5910	-	-	*7910	5680	20.45
	10 ft	-	-	-	-	*13700	8890	*10640	5800	-	-	*7710	4910	22.24
	5 ft	-	-	-	-	*14700	8400	*10780	5610	-	-	*7980	4650	22.78
	0 ft	-	-	-	-	*14170	8110	*10110	5480	-	-	*8260	4770	22.18
	-5 ft	-	-	*15260	14940	*11710	8060	*7490	5490	-	-	*7010	5390	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	9600	-	-	-	-	*7140	6630	18.67
	15 ft	-	-	*9040	*9040	*10740	9430	*9950	5970	-	-	*6500	5130	21.84
	10 ft	-	-	-	-	*13140	8960	*10350	5810	-	-	*6350	4490	23.52
	5 ft	-	-	-	-	*14440	8430	*10690	5590	-	-	*6560	4260	24.04
	0 ft	-	-	-	-	*14380	8070	*10350	5420	-	-	*7150	4360	23.47
	-5 ft	-	-	*17120	14740	*12460	7960	*8600	5370	-	-	*6840	4840	21.72
-10 ft	-	-	-	-	*8120	8080	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 24"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5990	-	-	*5870	5580	20.75
	15 ft	-	-	-	-	*8260	*8260	*8730	5990	-	-	*5390	4470	23.63
	10 ft	-	-	-	-	*10950	9030	*9850	5790	*5950	4010	*5270	3960	25.19
	5 ft	-	-	-	-	*13890	8410	*10390	5520	*7560	3930	*5410	3770	25.67
	0 ft	-	-	-	-	*14360	7950	*10390	5300	*6500	3860	*5820	3830	25.14
	-5 ft	-	-	*17150	14390	*13070	7760	*9260	5200	-	-	*6410	4200	23.52
-10 ft	-	-	*13260	*13260	*9670	7810	*5710	5290	-	-	*4920	*4920	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 370 Lifting capacities

### ECR145E L without dozer blade

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
Boom: 15' 1" Dipper arm: 6' 11" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	8440	-	-	-	-	*9380	7590	15.98
	15 ft	-	-	*11270	*11270	*9500	8350	-	-	-	-	*8630	5450	19.60
	10 ft	-	-	*16180	14700	*11030	7960	8330	5190	-	-	7450	4640	21.46
	5 ft	-	-	-	-	12570	7520	8140	5020	-	-	7050	4360	22.03
	0 ft	-	-	*12930	*12930	12240	7240	8000	4890	-	-	7270	4470	21.40
	-5 ft	*11730	*11730	*17690	13110	12170	7170	-	-	-	-	8310	5070	19.47
-10 ft	-	-	*12980	*12980	*8710	7350	-	-	-	-	*7930	6910	15.72	
Boom: 15' 1" Dipper arm: 8' 2" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	6550	17.62
	15 ft	-	-	*9730	*9730	*8730	8430	*8170	5330	-	-	*7120	4920	20.95
	10 ft	-	-	*14530	*14530	*10340	8030	8350	5200	-	-	6830	4250	22.70
	5 ft	-	-	-	-	*12200	7540	8130	5000	-	-	6490	4000	23.23
	0 ft	-	-	*14260	12990	12210	7200	7950	4840	-	-	6650	4080	22.64
	-5 ft	*10730	*10730	*18660	12930	12070	7070	7900	4790	-	-	7470	4550	20.83
-10 ft	*20870	*20870	*14620	13160	*10000	7180	-	-	-	-	*7840	5900	17.39	
Boom: 15' 1" Dipper arm: 9' 10" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	5460	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5340	-	-	*5900	4270	22.72
	10 ft	-	-	*12100	*12100	*9340	8080	*7960	5170	-	-	*5890	3730	24.34
	5 ft	-	-	-	-	*11400	7520	8060	4930	-	-	5790	3520	24.84
	0 ft	-	-	*15210	12830	12110	7080	7840	4720	-	-	5900	3570	24.29
	-5 ft	*9260	*9260	*19370	12610	11880	6880	7720	4620	-	-	6500	3920	22.61
-10 ft	*17050	*17050	*16170	12760	*10950	6910	-	-	-	-	*7350	4860	19.50	
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 371**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 11"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	8510	-	-	-	-	*8810	6850	17.01
	15 ft	-	-	*11950	*11950	*12370	8370	8490	5280	-	-	*7910	5070	20.45
	10 ft	-	-	-	-	13140	7940	8370	5170	-	-	7080	4370	22.24
	5 ft	-	-	-	-	12590	7460	8170	4990	-	-	6740	4130	22.78
	0 ft	-	-	-	-	12270	7180	8020	4860	-	-	6940	4230	22.18
	-5 ft	-	-	*15260	13060	*11710	7120	*7490	4870	-	-	*7010	4780	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	8640	-	-	-	-	*7140	5940	18.67
	15 ft	-	-	*9040	*9040	*10740	8460	8570	5340	-	-	*6500	4570	21.84
	10 ft	-	-	-	-	*13140	8010	8390	5190	-	-	*6350	3990	23.52
	5 ft	-	-	-	-	12640	7480	8160	4970	-	-	6190	3780	24.04
	0 ft	-	-	-	-	12230	7130	7970	4800	-	-	6350	3850	23.47
	-5 ft	-	-	*17120	12870	12110	7020	7920	4750	-	-	*6840	4290	21.72
-10 ft	-	-	-	-	*8120	7140	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5360	-	-	*5870	4980	20.75
	15 ft	-	-	-	-	*8260	*8260	8600	5360	-	-	*5390	3970	23.63
	10 ft	-	-	-	-	*10950	8070	8380	5160	5850	3550	*5270	3500	25.19
	5 ft	-	-	-	-	12640	7470	8100	4900	5760	3470	*5410	3320	25.67
	0 ft	-	-	-	-	12120	7010	7850	4680	5680	3400	5640	3370	25.14
	-5 ft	-	-	*17150	12520	11900	6820	7740	4580	-	-	6190	3700	23.52
-10 ft	-	-	*13260	12710	*9670	6870	*5710	4670	-	-	*4920	4530	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 372 Lifting capacities

### ECR145E L with dozer blade down

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
Boom: 15' 1" Dipper arm: 6' 11" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	*9300	-	-	-	-	*9380	8760	15.98
	15 ft	-	-	*11270	*11270	*9500	*9500	-	-	-	-	*8630	6320	19.60
	10 ft	-	-	*16180	*16180	*11030	9250	*9060	6030	-	-	*8650	5410	21.46
	5 ft	-	-	-	-	*12670	8790	*9570	5860	-	-	*8740	5100	22.03
	0 ft	-	-	*12930	*12930	*13260	8500	*9620	5730	-	-	*8770	5230	21.40
	-5 ft	*11730	*11730	*17690	15630	*12280	8430	-	-	-	-	*8660	5940	19.47
-10 ft	-	-	*12980	*12980	*8710	8620	-	-	-	-	*7930	*7930	15.72	
Boom: 15' 1" Dipper arm: 8' 2" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	7560	17.62
	15 ft	-	-	*9730	*9730	*8730	*8730	*8170	6180	-	-	*7120	5710	20.95
	10 ft	-	-	*14530	*14530	*10340	9310	*8620	6040	-	-	*7130	4960	22.70
	5 ft	-	-	-	-	*12200	8810	*9290	5840	-	-	*7570	4690	23.23
	0 ft	-	-	*14260	*14260	*13140	8460	*9600	5680	-	-	*8230	4790	22.64
	-5 ft	*10730	*10730	*18660	15460	*12600	8340	*8860	5630	-	-	*8220	5340	20.83
-10 ft	*20870	*20870	*14620	*14620	*10000	8440	-	-	-	-	*7840	6910	17.39	
Boom: 15' 1" Dipper arm: 9' 10" shoe: 28" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	*6290	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	6190	-	-	*5900	4980	22.72
	10 ft	-	-	*12100	*12100	*9340	*9340	*7960	6010	-	-	*5890	4380	24.34
	5 ft	-	-	-	-	*11400	8800	*8800	5770	-	-	*6180	4150	24.84
	0 ft	-	-	*15210	*15210	*12750	8350	*9360	5560	-	-	*6860	4220	24.29
	-5 ft	*9260	*9260	*19370	15130	*12730	8140	*9120	5450	-	-	*7530	4630	22.61
-10 ft	*17050	*17050	*16170	15280	*10950	8180	-	-	-	-	*7350	5720	19.50	
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 373**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 11"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	9820	-	-	-	-	*8810	7930	17.01
	15 ft	-	-	*11950	*11950	*12370	9680	*9840	6140	-	-	*7910	5900	20.45
	10 ft	-	-	-	-	*13700	9230	*10640	6030	-	-	*7710	5100	22.24
	5 ft	-	-	-	-	*14700	8740	*10780	5840	-	-	*7980	4840	22.78
	0 ft	-	-	-	-	*14170	8450	*10110	5700	-	-	*8260	4970	22.18
	-5 ft	-	-	*15260	*15260	*11710	8400	*7490	5710	-	-	*7010	5610	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	9950	-	-	-	-	*7140	6880	18.67
	15 ft	-	-	*9040	*9040	*10740	9770	*9950	6200	-	-	*6500	5330	21.84
	10 ft	-	-	-	-	*13140	9310	*10350	6040	-	-	*6350	4670	23.52
	5 ft	-	-	-	-	*14440	8770	*10690	5820	-	-	*6560	4440	24.04
	0 ft	-	-	-	-	*14380	8410	*10350	5650	-	-	*7150	4540	23.47
	-5 ft	-	-	*17120	15420	*12460	8300	*8600	5600	-	-	*6840	5050	21.72
-10 ft	-	-	-	-	*8120	*8120	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 28"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	6220	-	-	*5870	5800	20.75
	15 ft	-	-	-	-	*8260	*8260	*8730	6220	-	-	*5390	4650	23.63
	10 ft	-	-	-	-	*10950	9380	*9850	6010	*5950	4180	*5270	4130	25.19
	5 ft	-	-	-	-	*13890	8760	*10390	5750	*7560	4100	*5410	3930	25.67
	0 ft	-	-	-	-	*14360	8290	*10390	5530	*6500	4030	*5820	4000	25.14
	-5 ft	-	-	*17150	15060	*13070	8100	*9260	5420	-	-	*6410	4380	23.52
-10 ft	-	-	*13260	*13260	*9670	8150	*5710	5520	-	-	*4920	*4920	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



## Specifications 374 Lifting capacities

### ECR145E L without dozer blade

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
Boom: 15' 1" Dipper arm: 6' 11" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	8490	-	-	-	-	*9380	7640	15.98
	15 ft	-	-	*11270	*11270	*9500	8400	-	-	-	-	*8630	5490	19.60
	10 ft	-	-	*16180	14790	*11030	8020	8390	5230	-	-	7500	4680	21.46
	5 ft	-	-	-	-	12660	7570	8200	5060	-	-	7110	4390	22.03
	0 ft	-	-	*12930	*12930	12330	7290	8060	4930	-	-	7320	4500	21.40
	-5 ft	*11730	*11730	*17690	13200	12260	7220	-	-	-	-	8370	5110	19.47
	-10 ft	-	-	*12980	*12980	*8710	7400	-	-	-	-	*7930	6960	15.72
Boom: 15' 1" Dipper arm: 8' 2" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	6590	17.62
	15 ft	-	-	*9730	*9730	*8730	8490	*8170	5370	-	-	*7120	4950	20.95
	10 ft	-	-	*14530	*14530	*10340	8080	8410	5240	-	-	6880	4280	22.70
	5 ft	-	-	-	-	*12200	7590	8190	5040	-	-	6540	4030	23.23
	0 ft	-	-	*14260	13080	12300	7250	8010	4880	-	-	6710	4110	22.64
	-5 ft	*10730	*10730	*18660	13030	12160	7130	7960	4830	-	-	7530	4580	20.83
	-10 ft	*20870	*20870	*14620	13250	*10000	7230	-	-	-	-	*7840	5940	17.39
Boom: 15' 1" Dipper arm: 9' 10" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	5500	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	5380	-	-	*5900	4300	22.72
	10 ft	-	-	*12100	*12100	*9340	8130	*7960	5210	-	-	*5890	3760	24.34
	5 ft	-	-	-	-	*11400	7570	8130	4960	-	-	5840	3550	24.84
	0 ft	-	-	*15210	12920	12200	7130	7900	4760	-	-	5950	3600	24.29
	-5 ft	*9260	*9260	*19370	12710	11970	6930	7780	4650	-	-	6560	3950	22.61
	-10 ft	*17050	*17050	*16170	12850	*10950	6960	-	-	-	-	*7350	4890	19.50
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
**Lifting capacities 375**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 6' 11"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	8560	-	-	-	-	*8810	6900	17.01
	15 ft	-	-	*11950	*11950	*12370	8420	8550	5320	-	-	*7910	5110	20.45
	10 ft	-	-	-	-	13230	7990	8430	5210	-	-	7130	4400	22.24
	5 ft	-	-	-	-	12690	7510	8230	5020	-	-	6790	4160	22.78
	0 ft	-	-	-	-	12360	7230	8080	4890	-	-	7000	4260	22.18
	-5 ft	-	-	*15260	13160	*11710	7180	*7490	4900	-	-	*7010	4820	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	8690	-	-	-	-	*7140	5980	18.67
	15 ft	-	-	*9040	*9040	*10740	8520	8630	5380	-	-	*6500	4610	21.84
	10 ft	-	-	-	-	*13140	8060	8450	5220	-	-	*6350	4020	23.52
	5 ft	-	-	-	-	12730	7540	8220	5010	-	-	6240	3810	24.04
	0 ft	-	-	-	-	12320	7180	8030	4840	-	-	6400	3880	23.47
	-5 ft	-	-	*17120	12960	12200	7070	7980	4790	-	-	*6840	4320	21.72
-10 ft	-	-	-	-	*8120	7200	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	5400	-	-	*5870	5020	20.75
	15 ft	-	-	-	-	*8260	*8260	8660	5390	-	-	*5390	4000	23.63
	10 ft	-	-	-	-	*10950	8120	8440	5190	5890	3580	*5270	3530	25.19
	5 ft	-	-	-	-	12730	7520	8160	4930	5810	3500	*5410	3350	25.67
	0 ft	-	-	-	-	12210	7070	7920	4710	5730	3420	5690	3400	25.14
	-5 ft	-	-	*17150	12620	11990	6870	7800	4610	-	-	6240	3730	23.52
-10 ft	-	-	*13260	12800	*9670	6920	*5710	4710	-	-	*4920	4560	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.





## Specifications 376 Lifting capacities

### ECR145E L with dozer blade down

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
Boom: 15' 1" Dipper arm: 6' 11" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*12520	*12520	8.39
	20 ft	-	-	*9600	*9600	*9300	*9300	-	-	-	-	*9380	8810	15.98
	15 ft	-	-	*11270	*11270	*9500	*9500	-	-	-	-	*8630	6360	19.60
	10 ft	-	-	*16180	*16180	*11030	9300	*9060	6070	-	-	*8650	5440	21.46
	5 ft	-	-	-	-	*12670	8850	*9570	5900	-	-	*8740	5130	22.03
	0 ft	-	-	*12930	*12930	*13260	8560	*9620	5770	-	-	*8770	5270	21.40
	-5 ft	*11730	*11730	*17690	15740	*12280	8490	-	-	-	-	*8660	5980	19.47
-10 ft	-	-	*12980	*12980	*8710	8670	-	-	-	-	*7930	*7930	15.72	
Boom: 15' 1" Dipper arm: 8' 2" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	*9980	*9980	-	-	-	-	-	-	*9730	*9730	11.29
	20 ft	-	-	-	-	*8310	*8310	-	-	-	-	*7650	7610	17.62
	15 ft	-	-	*9730	*9730	*8730	*8730	*8170	6220	-	-	*7120	5750	20.95
	10 ft	-	-	*14530	*14530	*10340	9370	*8620	6080	-	-	*7130	4990	22.70
	5 ft	-	-	-	-	*12200	8870	*9290	5880	-	-	*7570	4720	23.23
	0 ft	-	-	*14260	*14260	*13140	8520	*9600	5720	-	-	*8230	4820	22.64
	-5 ft	*10730	*10730	*18660	15560	*12600	8390	*8860	5670	-	-	*8220	5380	20.83
-10 ft	*20870	*20870	*14620	*14620	*10000	8500	-	-	-	-	*7840	6960	17.39	
Boom: 15' 1" Dipper arm: 9' 10" shoe: 30" Counterweight: 7060 lb	25 ft	-	-	-	-	-	-	-	-	-	-	*7580	*7580	14.38
	20 ft	-	-	-	-	*7130	*7130	-	-	-	-	*6290	*6290	19.70
	15 ft	-	-	-	-	*7660	*7660	*7360	6230	-	-	*5900	5020	22.72
	10 ft	-	-	*12100	*12100	*9340	*9340	*7960	6050	-	-	*5890	4410	24.34
	5 ft	-	-	-	-	*11400	8850	*8800	5810	-	-	*6180	4190	24.84
	0 ft	-	-	*15210	*15210	*12750	8410	*9360	5600	-	-	*6860	4250	24.29
	-5 ft	*9260	*9260	*19370	15240	*12730	8200	*9120	5490	-	-	*7530	4660	22.61
-10 ft	*17050	*17050	*16170	15390	*10950	8230	-	-	-	-	*7350	5760	19.50	
-15 ft	-	-	*9520	*9520	-	-	-	-	-	-	*6130	*6130	14.00	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



Specifications  
Lifting capacities **377**

	H	5 ft		10 ft		15 ft		20 ft		25 ft		Max. Reach		
														Max.
		lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	ft
<b>Boom: 15' 6"</b> <b>Dipper arm: 6' 11"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*12970	*12970	-	-	-	-	-	-	*12260	*12260	10.28
	20 ft	-	-	*11850	*11850	*12040	9870	-	-	-	-	*8810	7980	17.01
	15 ft	-	-	*11950	*11950	*12370	9730	*9840	6180	-	-	*7910	5940	20.45
	10 ft	-	-	-	-	*13700	9290	*10640	6070	-	-	*7710	5140	22.24
	5 ft	-	-	-	-	*14700	8800	*10780	5880	-	-	*7980	4870	22.78
	0 ft	-	-	-	-	*14170	8510	*10110	5740	-	-	*8260	5000	22.18
	-5 ft	-	-	*15260	*15260	*11710	8460	*7490	5750	-	-	*7010	5650	20.32
<b>Boom: 15' 6"</b> <b>Dipper arm: 8' 2"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	*11820	*11820	-	-	-	-	-	-	*9180	*9180	12.91
	20 ft	-	-	-	-	*10350	10010	-	-	-	-	*7140	6930	18.67
	15 ft	-	-	*9040	*9040	*10740	9830	*9950	6240	-	-	*6500	5370	21.84
	10 ft	-	-	-	-	*13140	9370	*10350	6080	-	-	*6350	4710	23.52
	5 ft	-	-	-	-	*14440	8830	*10690	5860	-	-	*6560	4470	24.04
	0 ft	-	-	-	-	*14380	8470	*10350	5690	-	-	*7150	4570	23.47
	-5 ft	-	-	*17120	15520	*12460	8360	*8600	5640	-	-	*6840	5080	21.72
-10 ft	-	-	-	-	*8120	*8120	-	-	-	-	-	-	-	18.46
<b>Boom: 15' 6"</b> <b>Dipper arm: 9' 10"</b> <b>shoe: 30"</b> <b>Counterweight: 7060 lb</b>	25 ft	-	-	-	-	*8390	*8390	-	-	-	-	*7180	*7180	15.79
	20 ft	-	-	-	-	*8400	*8400	*7300	6260	-	-	*5870	5840	20.75
	15 ft	-	-	-	-	*8260	*8260	*8730	6260	-	-	*5390	4680	23.63
	10 ft	-	-	-	-	*10950	9430	*9850	6050	*5950	4210	*5270	4160	25.19
	5 ft	-	-	-	-	*13890	8820	*10390	5790	*7560	4130	*5410	3960	25.67
	0 ft	-	-	-	-	*14360	8350	*10390	5570	*6500	4060	*5820	4030	25.14
	-5 ft	-	-	*17150	15170	*13070	8150	*9260	5460	-	-	*6410	4410	23.52
-10 ft	-	-	*13260	*13260	*9670	8210	*5710	5560	-	-	*4920	*4920	20.55	

: Along undercarriage, : Across undercarriage, H : Lifting hook related to ground level

1. Machine in "Fine Mode-F" (Power Boost), for lifting capacities.
2. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
3. Rated loads do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
4. Rated loads marked with an asterisk ( \* ) are limited by hydraulic capacity rather than tipping load.



378 Specifications  
Service history

### Service history

Service 500 hours		Type of service <input type="checkbox"/> First 500 hours <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 1000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 1500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 2000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 2500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 3000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 3500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 4000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		

Service 4500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		



Specifications  
**Service history**    **379**

Service 5000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 5500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 6000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 6500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 7000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 7500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 8000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 8500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 9000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		



**380**      Specifications  
Service history

Service 9500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 10000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 10500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 11000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 11500 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		
Service 12000 hours		Type of service <input type="checkbox"/> Service and maintenance	Signature and stamp
Date	Hours		



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