

EC330B

OPERATOR'S MANUAL

# EC330B



**VOLVO**

Volvo Construction Equipment

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**VOLVO**

**California**

**Proposition 65 Warning**

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

**California**

**Proposition 65 Warning**

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

**Wash hands after handling.**

# EC330B

# OPERATOR'S MANUAL

## Foreword

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

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

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

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

We continually strive to improve our products and to make them more efficient through changes to their design. We retain the right to make these improvements on products which have already been delivered.

We also retain the right to change data and equipment, as well as instructions for service and maintenance without prior notice.

## Safety regulations

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

**NOTE : This manual has been adapted to cover all markets. Disregard optional or special equipment included for various markets, which are not applicable to your machine.**



### WARNING!

The symbol above appears at various points in the manual together with a warning text. It means:

**Warning, be alert! Your safety is involved! It is the obligation of the operator to make sure that all warning decals are in place on the machine and that they are readable. Accidents may otherwise occur.**


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

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This symbol, which is shown at various places in the Operator's Manual together with a warning statement, means:



**WARNING!**

**Warning, be alert! Your safety is involved!**

**To ignore the risks may lead to an accident, serious injuries or death.**

**It is the obligation of the operator to make sure that all warning decals are in place on the machine and that they are readable. Accidents may otherwise occur.**

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

## **Handling and maintenance of the machine**

Volvo Construction Equipment is responsible only if:

- the machine has been used in a correct way and been maintained in accordance with the instructions contained in the Operator's Manual and Service Manuals.
- prescribed service and prescribed inspections have been carried out at the stated points in time.
- the recommended lubricants according to the manual have been used.
- fitted security seals are unbroken or that adjustments and refitting of security seals has been carried out by an authorized dealer workshop.
- all modifications and repairs performed, and methods used, have been prescribed by Volvo.
- only Volvo genuine spare parts/accessories, or genuine spare parts/accessories which meet Volvo's requirements, have been used.



**WARNING!**

**An operator of an excavator must have sufficient knowledge and instructions before he/she operates the machine.**

**An untrained operator can cause serious injuries or even death.**

**Never use an excavator which has no Operator's Manual.**

**Understand the warning plates and symbols on the machine and its operator instructions before you begin to use the machine.**

## Communication equipment, installation

### **IMPORTANT!**

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

### **Protection from electromagnetic interference**

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

### **Mobile telephones**

To obtain the best functionality, mobile telephones should be permanently installed in the electrical system of the excavator, with a permanently antenna fixed on the cab, installed as advised by the manufacturer. If a portable mobile telephone is used, note that this can constantly transmit information to its base station, even when the telephone is not used. For this reason, it should not be located right beside electronic equipment in the machine, such as directly on a control panel etc.

### **Guidelines**

The following guidelines must be followed during installation:

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



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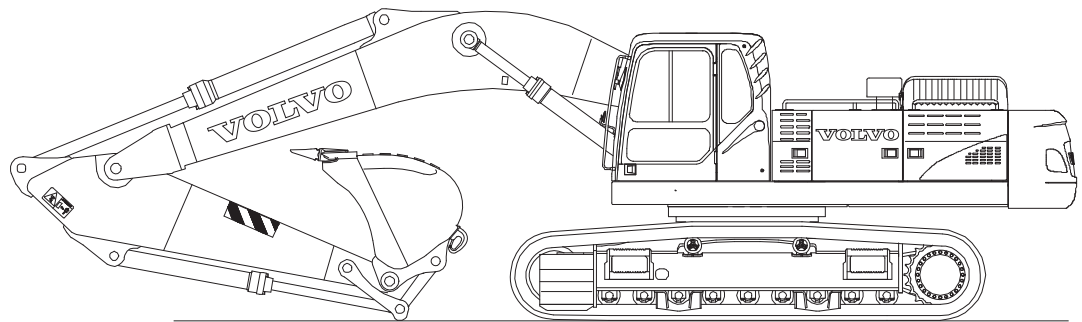
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## Presentation



S82006

## General

### Intended use

The machine is intended to be used in the way described in this manual. If the machine is used in another way or in potentially dangerous environments, e.g. explosive atmosphere or areas with dust containing asbestos, special safety regulations must be followed and the machine be equipped for such use.

Contact the manufacturer/ dealer for further information.

### Engine

The engine is a straight six-cylinder, four stroke, direct injection diesel with 9.6 liter cylinder volume, turbo charged, intercooled and electronic controller fuel injection, EMS (Engine Management System) with a cast iron block and cylinder head. Volvo engine D12CECE2

### Electrical system

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

Engine speed is controlled by a rotary switch that incrementally changes rpm, and an auto idle system that automatically engages low idle when the machine is not operated for 5 seconds or more.

Engine condition can be checked via the VECU (Vehicle Electronic Control Unit) by the data connection between EMS (Engine Management System) and VECU.

### Hydraulic pump

The hydraulic pump assembly consists of two pumps connected by a splined coupling. The two pumps are driven simultaneously as the engine rotation is transmitted to the front drive shaft.

The pump consist of rotary group, swash plate group and valve block group.

The displacement of the pump is controlled by the regulator, and engine output power is effectively utilized by the proportional solenoid valve.

## Main control valve

The control valve consists of two 5-spool blocks and an intermediate block connected by screws. They contain six main spools for digging units, three spools for conflux and straight travel, a spool for the option unit, a main relief valve, port relief valves, holding valves and check valves. These are remotely controlled by the servo hydraulic system.

## Track motor and gearbox

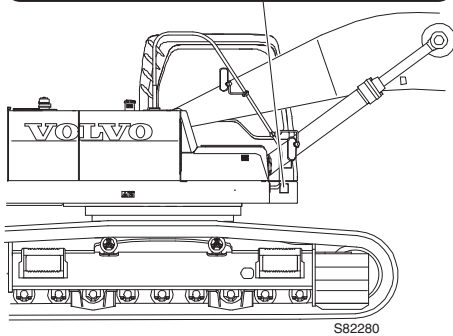
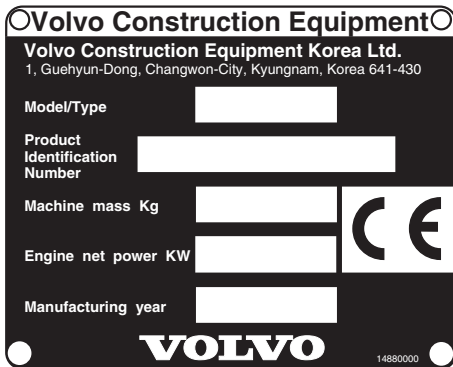
The track motor is a variable axial piston motor that consists of a housing, a rotary group and a port plate. The housing contains the swash angle control screw. The rotary group consists of the cylinders and the pistons. The port plate consists of the counterbalance valve, the check valves, the relief valves and the displacement changeover valve.

The gearbox has a three-stage planetary mechanism has three sets of sun gears, planetary gears and pinion gears, driven by the splined output shaft of the track motor mounted directly to the gearbox. The gearbox also houses the spring applied, hydraulically released parking brake assembly.

## Swing motor and gearbox

The swing motor is a fixed axial piston motor. The rotary group consists of a cylinder block and nine pistons located in the cylinder. The cover section has relief valves, an anti-cavitation valves and anti-rebound valves. The housing has a delay valve and a disk type brake.

The gearbox is composed of the sun gear, the planetary gear, the pinion gear and the housing. The power supplied to the output shaft of the swing motor reduces motor speed through the sun gear and the planetary gear, developing high torque that is transmitted to the pinion gear.



## CE marking and Declaration of Conformity

### NOTE :

**Applies only to machines marketed within the EU/ EEA.**

This machine is CE marked. This means that, when delivered to the customer, the machine meets the applicable "Essential Health and Safety Requirements", according to the EU Machine Safety Directive. Any person carrying out an alteration that affects the safety of the machine, is responsible for the consequences.

The machine is supplied together with a Declaration of Conformity with the EU Machine Safety Directive. The documentation is a valuable document, which should be kept safe and always be kept in the machine.

If the machine is used for purposes, or with other special bodies or add-ons, other than described in these instructions, safety must at all times and in each case be maintained. The person carrying out such action is also responsible for the action, which, in some cases, may require a new CE marking and the issue of a new Declaration of Conformity in compliance with the EU Machine Safety Directive.

**Volvo Construction Equipment is only responsible for a machine which is used with approved equipment and spare parts specified by Volvo Construction Equipment.**

## 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 on "Electromagnetic compatibility", 89 / 336 / EEC, provides 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.

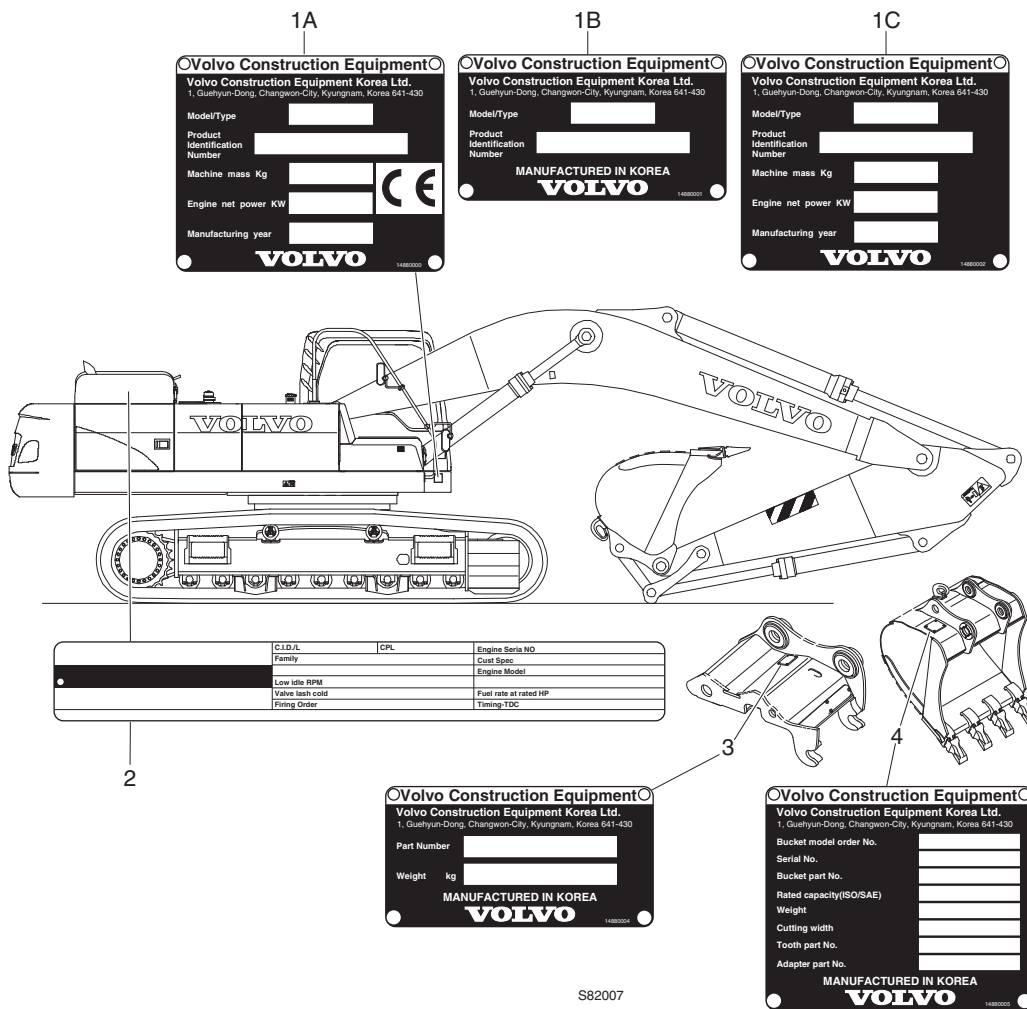
If other electronic equipment is fitted to this machine, the equipment must be CE marked and tested on the machine with regard to electromagnetic interference.

## Plates and decals

### Product plates

This illustration and text below show which product plates are found on the machine.

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



- 1 Product plate with **Product Identification Number, PIN** for the complete machine (shows the model, serial numbers, machine weight, engine output and when applicable CE approval). The plate is positioned on the right side of the upper frame.
  - 1A:** Product plate, version for EU market
  - 1B:** Product plate, version for North America, International market
  - 1C:** Product plate, version for Middle East market
- 2 The engine type designation, part and serial numbers are stamped into both sides of the cylinder block.

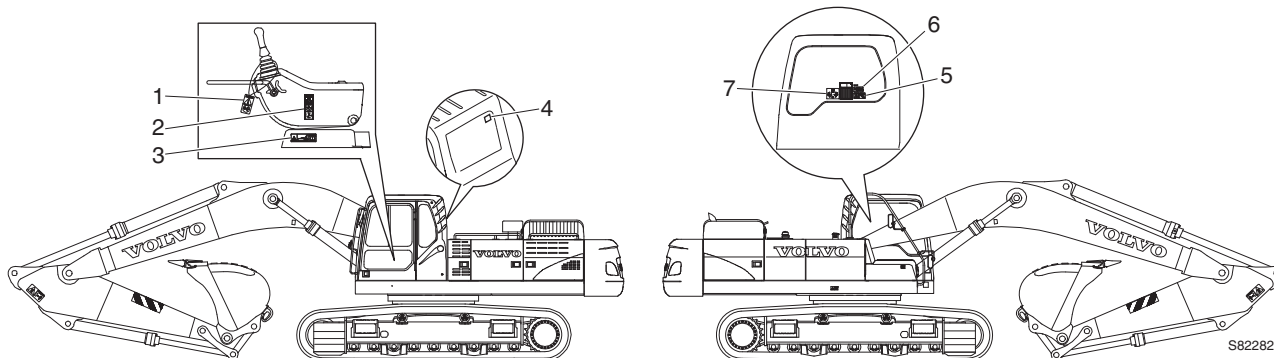
- 3 The quickfit nameplate is attached on the outside of the quick-fit. (shows part number and weight)
- 4 The bucket nameplate is attached on the top of the bucket. (shows the bucket model order Number, serial number, bucket part number, rated capacity, weight, cutting width, tooth part number and adapter part number)



### Information and warning plates

The following depicts various warning and information texts that may be affixed to the machine and their mounting location. The operator must know and pay attention to the warning and safety information on each decal and plate. Decals / plates that are lost, damaged, illegible, painted over or not clearly visible must be replaced immediately.

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



#### 1 Do not start the engine



S80606

#### 2 Safety locking

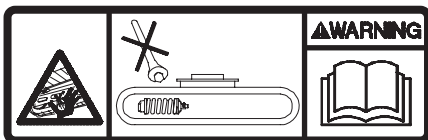
See *Safety locking system* on page 60.



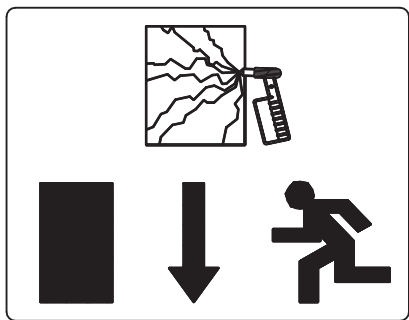
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#### 3 Do not unscrew the recoil spring

See *Inspecting and adjusting the track slack* on page 166.



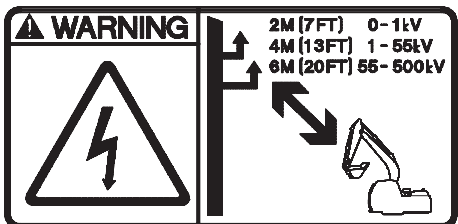
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S80954

### 4 Emergency exit

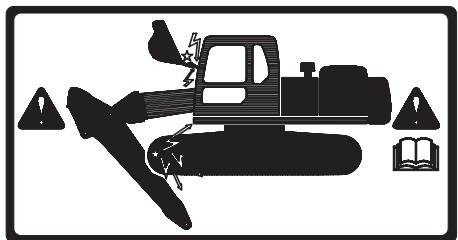
See *The emergency hammer (B) should be used in emergency situations for:* on page 65.



S80602

### 5 Warning, high voltage

See *Never operate close to a high tension power line* on page 76.



S82004

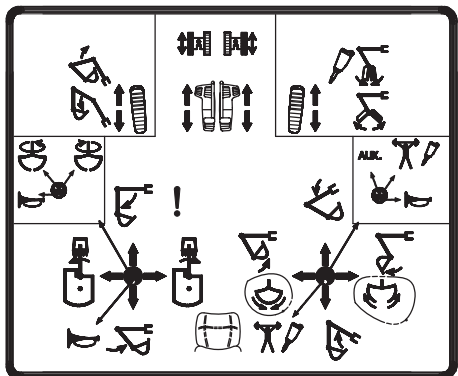
### 6 Warning when operating the optional attachment

If the excavator is equipped with an adjustable boom or quickfit bucket, the digging arm with its boom fully retracted can damage the driver's cab.



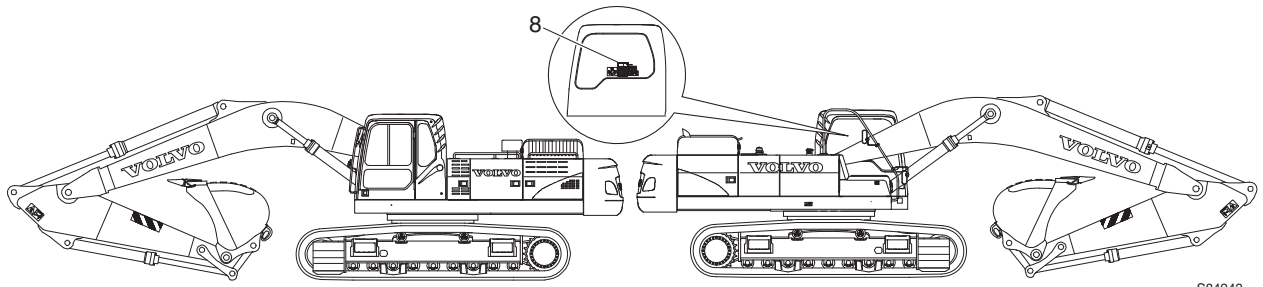
**WARNING!**

If the machine is equipped with any other attachments (quickfit, hammer, large bucket,...), that may damage the operator cab and other structure.



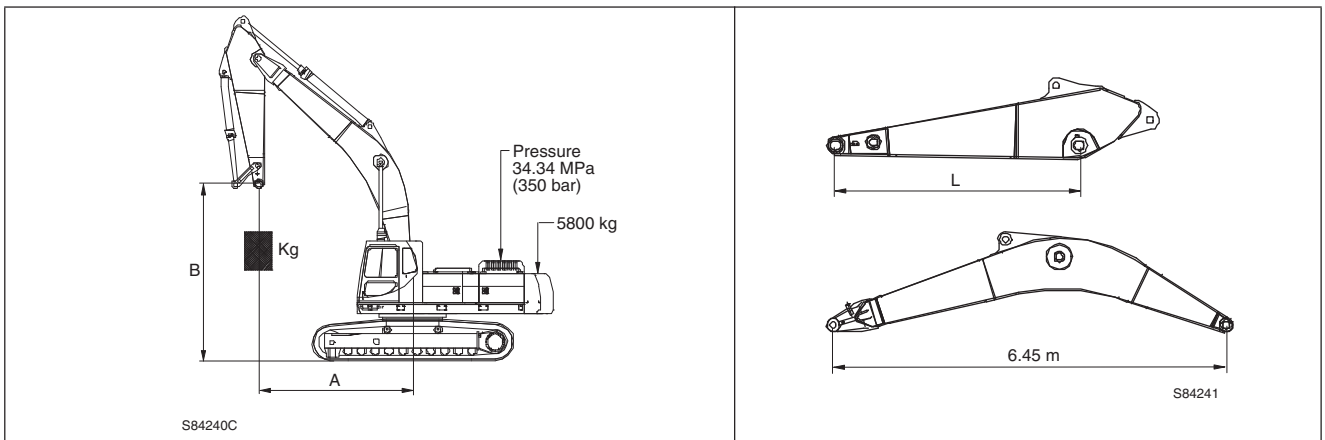
S81209

### 7 Operating optional attachments



S84243

**8 Lifting capacity table**  
Shoe 600 mm (kg)

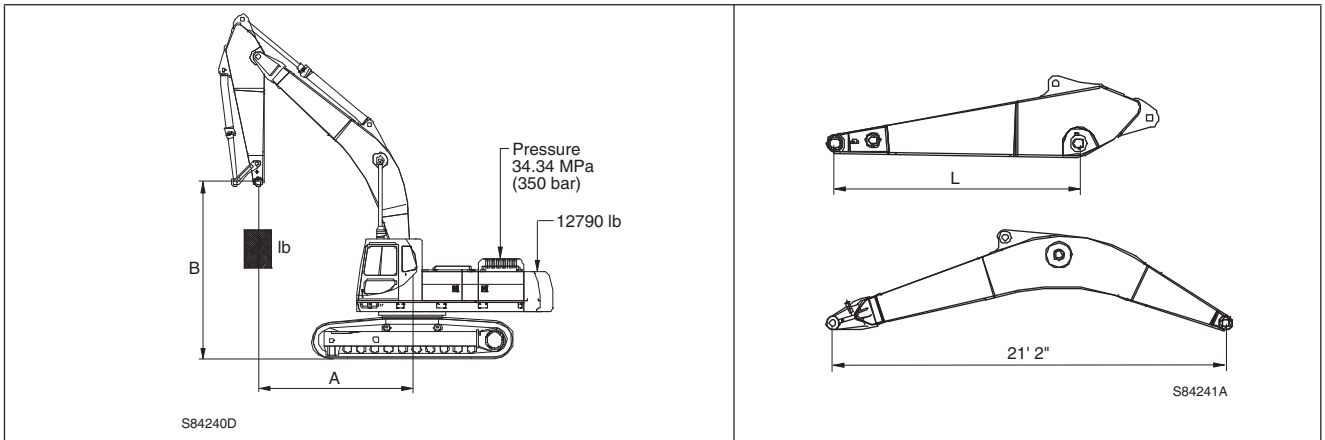


L	A	0.0 m		1.5 m		3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		Maximum					
	B																				
2.6 m	7.5 m															*8870	7040				
	6.0 m									*10780	9060	9690	6260			*8590	5600				
	4.5 m							*15940	13380	*12380	8600	9480	6070			7610	4870				
	3.0 m							*20110	12190	13090	8090	9200	5830			7090	4500				
	1.5 m							*15570	11550	12620	7690	8960	5600			6960	4380				
	0.0 m							*20140	11390	12370	7470	8800	5460			7180	5460				
	-1.5 m					*14290	*14290	20240	11430	12310	7420	8770	5430			7870	4910				
	-3.0 m					*25570	23930	*19860	11630	12440	7530					9430	5860				
-4.5 m					*20920	*20920	*16010	12030							*12040	8230					
3.2 m	7.5 m											*7920	6580			*7120	6240				
	6.0 m											*8050	6510			*6920	5130				
	4.5 m							*12290	*12290	*9890	8910	*8710	6290	7200	4650	*6990	4540				
	3.0 m							*15880	12700	*11600	8360	9400	6010	7070	4530	6590	4220				
	1.5 m							*18490	11830	12840	7890	9120	5750	6930	4400	4670	4110				
	0.0 m							*19440	11480	12500	7590	8910	5570	6830	4310	6630	4190				
	-1.5 m																				
	-3.0 m					*13820	*13820	*19200	11420	12370	7480	8820	5490			7160	4510				
-4.5 m					*16340	*16340	*21900	*21900	*17960	11550	12420	7520	8880	5550	8300	5210					
-6.0 m					*20830	*20830	*15380	11870	*11540	7760					*9990	6790					
3.9 m	9.0 m															*6060	*6060				
	7.5 m											*8000	6760			*5650	5340				
	6.0 m											*8370	6620	*6980	4780	*5520	4480				
	4.5 m									*10230	9090	*9230	6350	7240	4660	*5560	3990				
	3.0 m							*16260	13020	*12290	8440	9440	6010	7050	4490	*5760	3710				
	1.5 m							*19870	12840	12840	7840	9070	5680	6860	4310	5760	3600				
	0.0 m							*8400	*8400	20030	11200	12360	7420	8790	5420	6700	4170	5870	3650		
	-1.5 m							*8840	*8840	*13010	*13010	19760	10990	12110	7210	8630	5280	6630	4100	6250	3870
	-3.0 m							*13770	*13770	*18880	*18880	19810	11030	12080	7180	8610	5260			7060	4370
	-4.5 m							*19650	*19650	*27110	23010	*19370	11290	12260	7340	8810	5440			8760	5410
-6.0 m							*20590	*20590	*14990	11830									*11060	8120	

\* Power booster ON

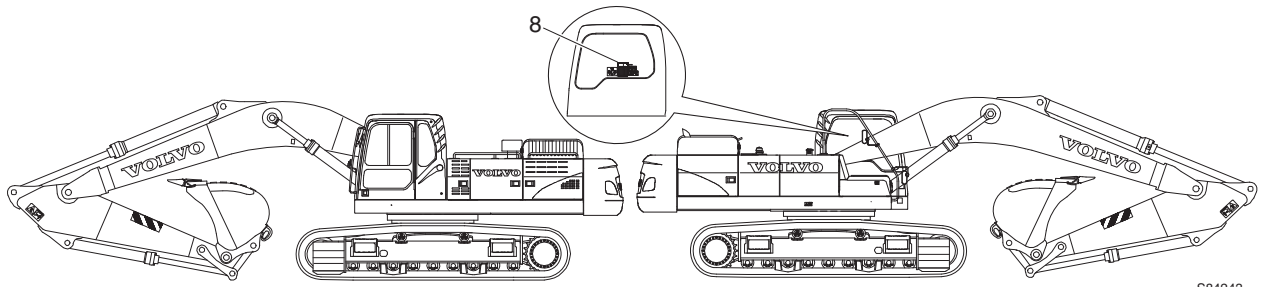


Shoe 23.6 in (lb)



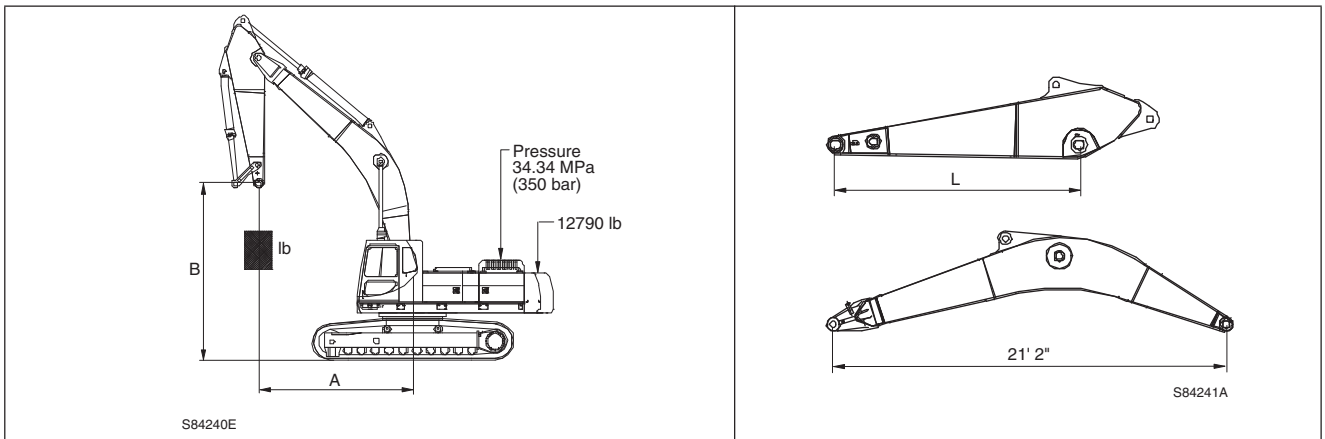
L	A	0.0 ft		5.0 ft		10.0 ft		15.0 ft		20.0 ft		25.0 ft		30.0 ft		Maximum				
	B																			
8' 6"	25 ft									*20050	19990					*19670	15890			
	20 ft									*23460	19510	20800	13450			*18980	12490			
	15 ft								*34150	28910	*26800	18570	20390	13080			16860	10790		
	10 ft								*43120	26370	28170	17480	19820	12560			15660	9940		
	5 ft								*38070	24910	27160	16600	19290	12080			15340	9660		
	0 ft								43230	24520	26600	16110	18950	11780			15830	9920		
	-5 ft					*32520	*32520	43320	24590	26470	16000	18900	11730				17390	10860		
	-10 ft					*57130	51140	*43020	25020	26760	16250						20950	13020		
-15 ft					*44960	*44960	*34250	25940								*26490	18580			
10' 6"	25 ft											*16010	14100			*15760	14040			
	20 ft											*17650	14010			*15280	11440			
	15 ft								*26390	*26390	*21430	19230	*18990	13560			*15400	10060		
	10 ft								*34110	27460	*25090	18060	20260	12980	15210	9760	14570	9330		
	5 ft								*39890	25540	27640	17040	19650	12420	14920	9490	14280	9080		
	0 ft								*42110	24730	26900	16390	19210	12020	14730	9310	14630	9250		
	-5 ft					*31280	*31280	*41640	24590	26610	16140	19020	11860				15820	9970		
	-10 ft					*36620	*36620	*49630	*49630	*38910	24870	26730	16240	19180	12000			18420	11570	
-15 ft					*44880	*44880	*33070	25590	*24590	16790						*22040	15250			
-20 ft																				
12' 1"	25 ft											*17720	14490			*12520	11980			
	20 ft											*18350	14240	*13560	10220	*12180	9980			
	15 ft										*22170	19600	*20130	13680	15560	10020	*12240	8840		
	10 ft								*34950	28120	*26600	18220	20330	12960	15170	9660	*12680	8210		
	5 ft								*42860	25540	27630	16930	19540	12250	14760	9280	12710	7960		
	0 ft								*19100	*19100	42910	24130	26580	16010	18930	11690	14440	8980	12940	8050
	-5 ft					*19720	*19720	*29390	*29390	42300	23640	26040	15540	18580	11380	14300	8850	13800	8560	
	-10 ft					*30830	*30830	*42720	*42720	42410	23730	25980	15490	18560	11370			15650	9690	
-15 ft					*44210	*44210	*58790	49240	*41790	24310	26400	15850					19580	12100		
-20 ft							*43640	*43640	*31640	25570							*24340	18620		
-25 ft																				

\* Power booster ON



S84243

Shoe 31.5 in (lb)



S84240E

S84241A

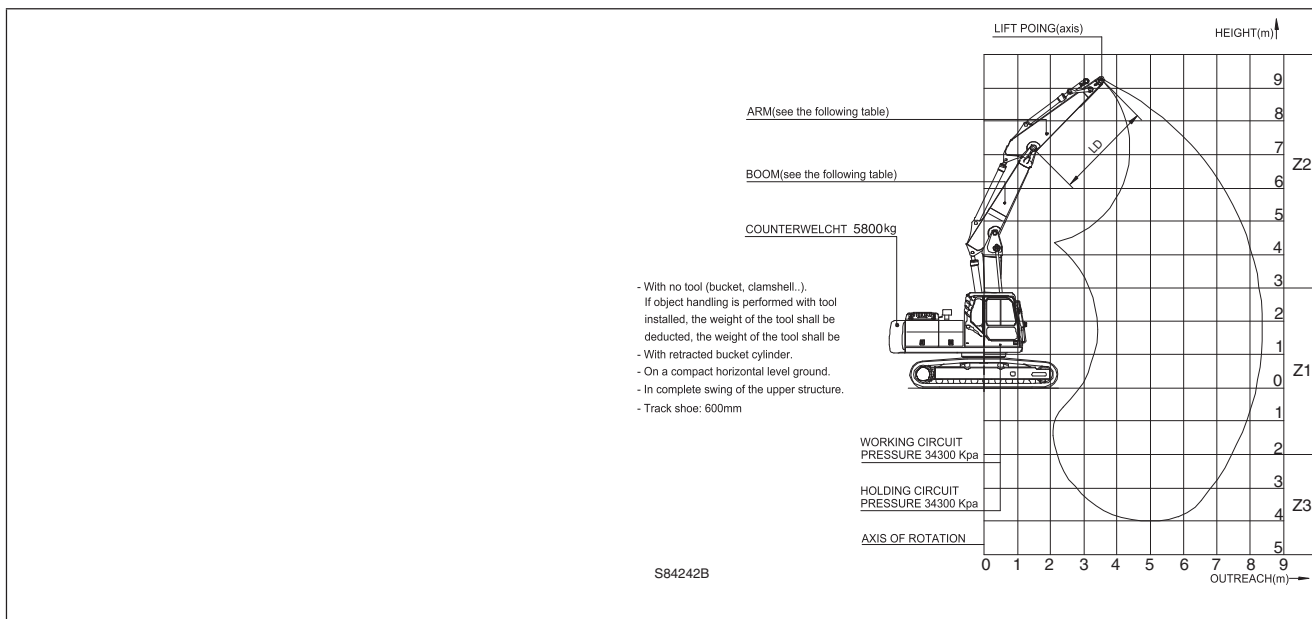
L	A	0.0 ft		5.0 ft		10.0 ft		15.0 ft		20.0 ft		25.0 ft		30.0 ft		Maximum	
	B																
8' 6"	25 ft									*20050	20490					*19670	16310
	20 ft									*23460	20010	21410	13820			*18980	12850
	15 ft																
	10 ft									*34150	29640	*26800	19060	21010	13450		
	5 ft									*43120	27100	29010	17970	20430	12930		
	0 ft									*38070	25640	28000	17090	19910	12460		
	-5 ft																
	-10 ft																
10' 6"	-15 ft																
	25 ft																
	20 ft																
	15 ft																
	10 ft																
	5 ft																
	0 ft																
	-5 ft																
12' 1"	-10 ft																
	-15 ft																
	-20 ft																
	25 ft																
	20 ft																
	15 ft																
	10 ft																
	5 ft																
0 ft																	
-5 ft																	
-10 ft																	
-15 ft																	
-20 ft																	
-25 ft																	

\* Power booster ON

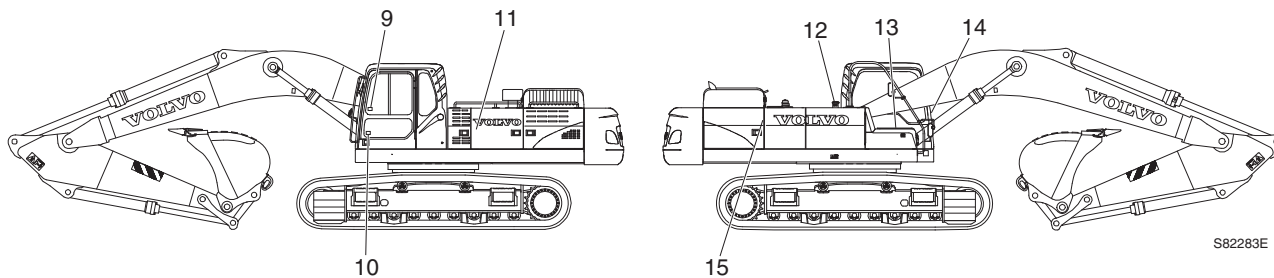
**Shoe 600 mm (kg)**

**Working conditions:**

- With no tool (bucket, clamshell.).  
If object handling is performed with tool installed, the weight of the tool shall be deducted, the weight of the tool shall be
- With retracted bucket cylinder.
- On a compact horizontal level ground.
- In complete swing of the upper structure.
- Track shoe: 600 mm



		OUTREACH IN METERS - LOADS IN kg						
		OUTREACH (m)	3.0 m	4.5 m	6.0 m	7.5 m	9.0 m	
BOOM length 6.45 m	ARM (LD)	LD=2.6	Z2	-	11390	7690	5830	-
			Z1	14290		7420	5430	-
			Z3	20920		7530	-	-
		LD=3.2	Z2	-	11420	8360	6010	4530
			Z1	13820		7480	5490	4310
			Z3	20830		7520	5550	-
		LD=3.9	Z2	-	10990	8440	6010	4490
			Z1	8400		7210	5280	4100
			Z3	18880		7180	5260	-

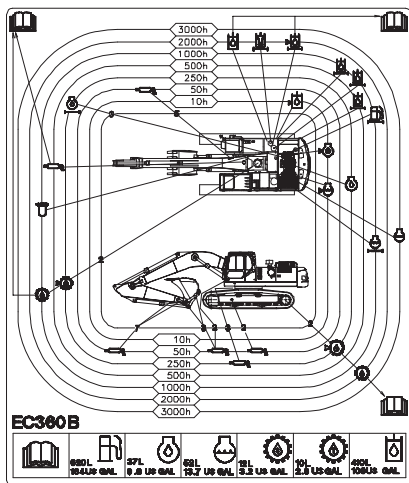


S82283E



S82002

9 Cab door window breakage



S83013

10 Lubrication and service chart

See *Lubrication and service chart* on page 172.



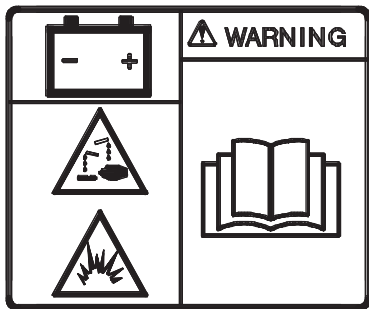
S80605A

11 Warning for rotating parts



S80607

### 12 Do not smoke during fueling

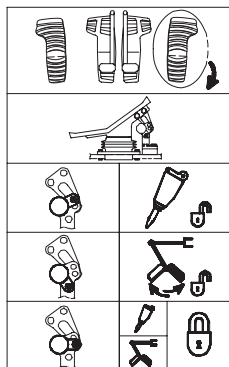


S80721

### 13 Battery

See **Batteries** on page 128.

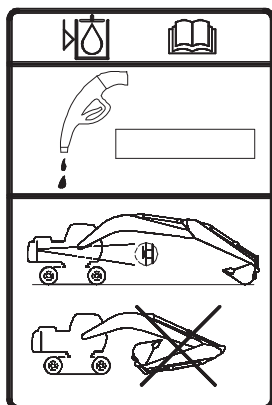
Risk for explosion, corrosive burns and electric shock.



S82300A

### 14 Optional pedal

See **Optional pedal position** on page 56.



S80716

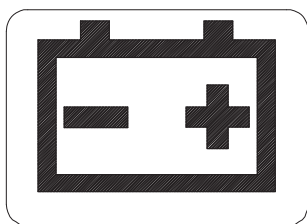
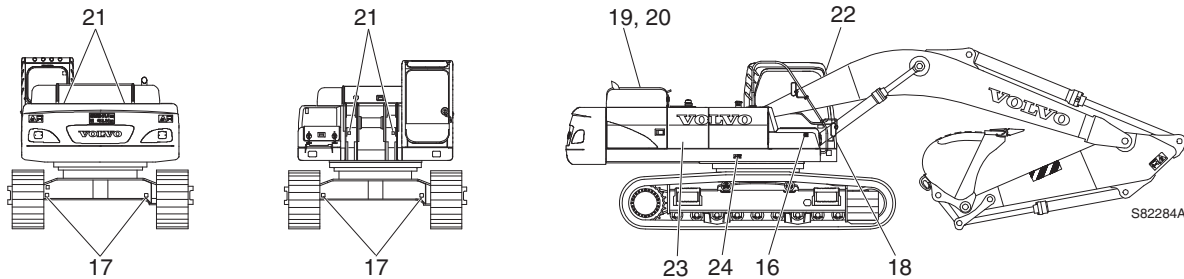
### 15 Position of checking hydraulic oil level

ISO VG #46: Standard

ISO VG #32, VG #68: Option

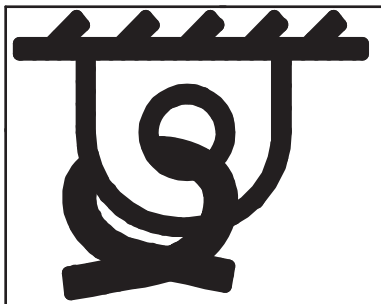
See **Recommended lubricants** on page 177.

# 20 Presentation Plates and decals



S82035

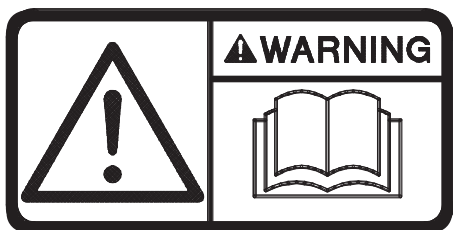
## 16 Battery position



S80719

## 17 Anchoring lug

Towing is prohibited. See *Transporting the machine* on page 77.



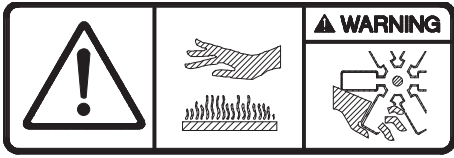
S80598

## 18 Read the operator's manual



S80715

## 19 Warning, hot and pressurized coolant



S80605

### 20 Warning for rotating and/or hot parts



S80717

### 21 Lifting point for lifting the machine

See *Lifting machine* on page 83.



S80601

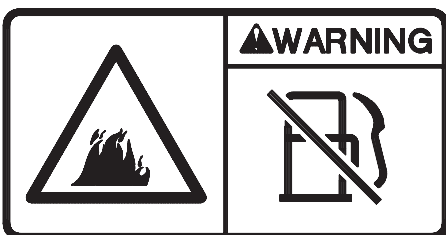
### 22 Locking the front window



S80718

### 23 Handling accumulator

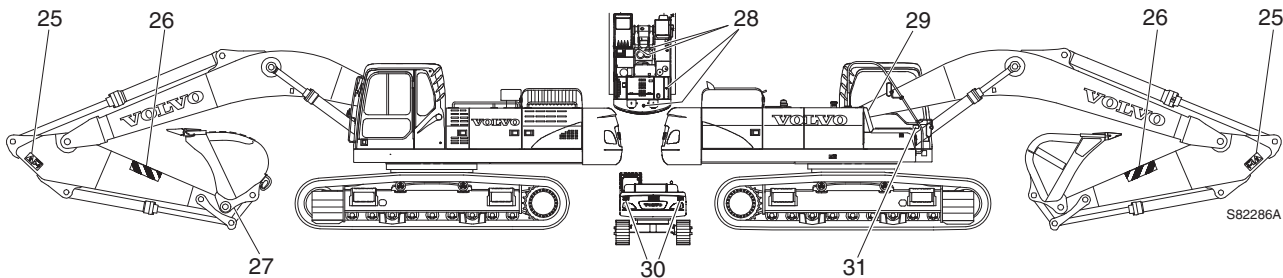
See *Handling accumulator* on page 160.



S80608

### 24 Risk of fire when fueling

Shut off in case of fire



S82286A



S80579A

**25 Excavator's working area**

Do not stand in the vicinity of a raised load.



S81230A

**26 Notice attachment**



S80471

**27 Read the operator's manual before operating quickfit**

See *Hydraulic quickfit (s1) (option)* on page 87.

If other working attachments are required or for more information, please contact your Volvo dealer.



S80720

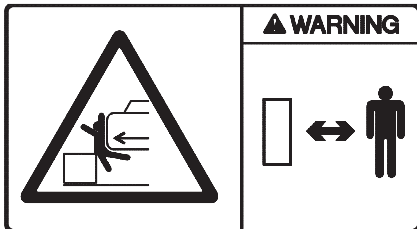
**28 Do not step or walk**





S80603

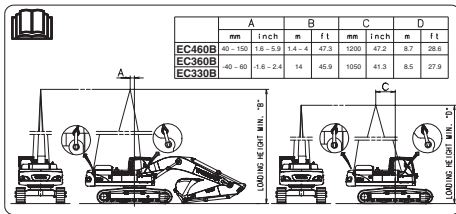
### 29 Warning, risk of slipping or falling



S80596

### 30 Excavator's working area

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



S82003C

### 31 Machine rigging

See *Lifting machine* on page 83.

## Service

### General

If the machine is to operate as economically as possible, it must be thoroughly maintained. Intervals for maintenance and lubrication apply to the machine under normal environmental and operating conditions. The maintenance work described in this Operator's Manual is carried out by the operator. Further adjustments and repairs should be carried out by an authorized dealer workshop.

### Delivery inspection

Before the machine left the factory, it was tested and adjusted. Before delivery to you, the dealer carried out an additional further check, "Delivery Inspection", according to our instructions.

### Warranty inspection

It is important that during the first period of operation the machine is subjected to further checks, such as check-tightening of bolts, checking settings and other minor adjustments.

Therefore, two warranty inspections should be carried out. The first after 100 operating hours and the second at 1000 operating hours.

The times for these inspections may be changed by Volvo Construction Equipment without prior notice.

### Maintenance service

#### Condition test and maintenance programme

In addition to actions which are taken according to the maintenance program in the manual, the authorized dealer workshop can offer a maintenance system, based on condition tests which give information about the general condition of the machine.

Further information about these systems can be obtained from the nearest authorized dealer workshop.

## General information

### The USA federal clean air act

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

The Federal regulations implementing the Clean Air Act for non road engines, 40 C.F.R. Section 89.1003(a)(3)(i) reads as follows:

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

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

**The law provides a penalty of up to \$2,500 for each violation.**

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

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

### Customer Assistance

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



### **Normal non-road engine use**

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

### **Non-road engine maintenance**

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

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

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

### **Service performed by your local dealer**

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

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

## Preventive maintenance

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

## Fuel system

### Fuel Recommendations:

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

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

In cold weather conditions, below 32 °F (0 °C), the use of lighter distillate or higher cetane level fuel are recommended (final boiling point max. 660 °F (349 °C) and cetane min 45.)

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

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

- Visually check unions and hose connections.

### Check the condition of the fuel hoses for:

- Aging
- Cracks
- Blisters
- Scuffing

### Check the condition of the fuel tank:

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

### Check the turbocharger:

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





# Instruments and controls

## General



### WARNING!

**Do not operate the machine before you learn the position and function of instruments and operating controls and completely understand how they are used!**

**Carefully read through the following section, and also the chapter on Operating Instructions.**

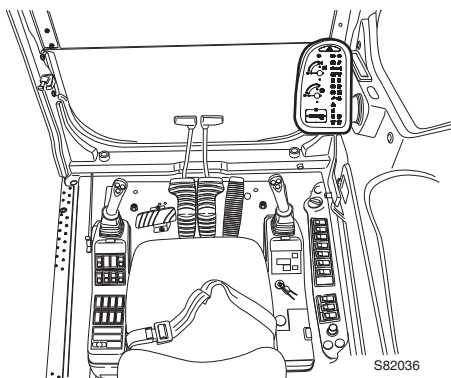
Glance at the instruments and control lamps now and then. By noticing abnormal readings in time, necessary action can be taken to prevent serious damage.

**If red control lamps light up - stop the machine immediately!**

**If amber warning lamps light up** - measures may be required depending on the function concerned.

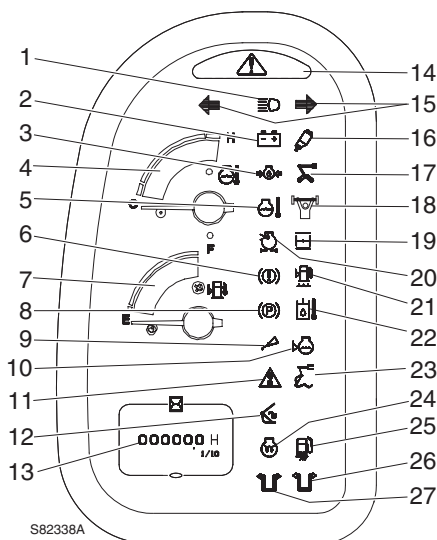
**The remaining lamps** - indicate that the respective function is engaged/connected.





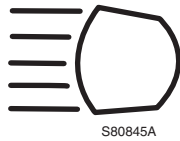
## Overview

- 1 Work lights lamp (not applicable on EC330B)
- 2 Battery charge warning lamp
- 3 Engine oil pressure warning lamp
- 4 Engine coolant temperature gauge
- 5 Engine coolant temperature warning lamp
- 6 Brake oil pressure temperature warning lamp (not applicable on EC330B)
- 7 Fuel level gauge
- 8 Parking brake lamp (not applicable on EC330B)
- 9 Automatic lubricating pilot lamp (option)
- 10 Coolant level lamp
- 11 Overload warning lamp (option)
- 12 Quickfit lamp (option)
- 13 Hour meter indicator
- 14 Central warning lamp
- 15 Left/Right turn signal lamp (not applicable on EC330B)
- 16 Hammer selecting indicator lamp (option)
- 17 Shear selecting indicator lamp (option)
- 18 Power booster lamp
- 19 Oscillation lock lamp (not applicable on EC330B)
- 20 Air cleaner clogging warning lamp
- 21 Water separation indicator lamp (not applicable on EC330B)
- 22 Hydraulic oil temperature warning lamp
- 23 Float position control lamp (option)
- 24 Air preheating lamp
- 25 Fuel heater lamp (not applicable on EC330B)
- 26 Emergency steering readiness lamp (not applicable on EC330B)
- 27 Emergency steering operating lamp (not applicable on EC330B)

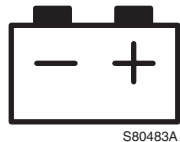




## Description of instrument panel



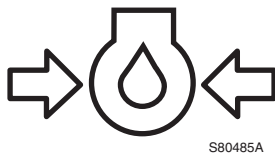
- 1 Work lights lamp not applicable on EC330B)**  
Control lamp (blue)



- 2 Battery charge warning lamp**  
Control lamp (red)  
Included in the central warning system

The lamp should be ON when the engine is running, indicating that the batteries are being charged. If the lamp lights up when the engine is running, this shows that the charging system is faulty.

The lamp is ON when the start key is turned to "ON" ① position before the engine is started.



- 3 Engine oil pressure warning lamp**  
Control lamp (red)

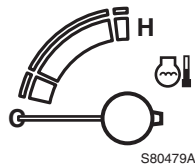
Included in the central warning system

The lamp is ON and the buzzer sounds, if the oil pressure in the engine is too low.

**If this happens, stop the engine immediately and investigate the cause.**

When required, contact an authorized dealer workshop.

The lamp is ON when the start key is turned to "ON" ① position before the engine is started.



- 4 Engine coolant temperature gauge**

If the pointer enters the red sector, the indicator lamp on the right of the gauge (5) is ON and the central warning lamp flashes. If this happens, run the engine at low idling for a few minutes.

If the pointer remains in the red sector, stop the engine and investigate the cause.





S80484B

### 5 Engine coolant temperature warning lamp

Control lamp (red)

Included in the central warning system

The lamp is ON and the buzzer sound, if the engine coolant temperature is abnormally high.

**If this happens, stop working immediately and investigate the cause.**

When required, contact an authorized dealer workshop.

The lamp is ON when the start key is turned to "ON" (Ⓢ) position before the engine is started.



#### WARNING!

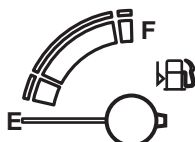
Engine coolant is dangerously hot immediately after the engine stops. Wait until the engine coolant has cooled down, before opening the radiator cap. Release internal pressure by opening the cap slowly.



S80848A

### 6 Brake oil pressure temperature warning lamp not applicable on EC330B)

Control lamp (red)



S80480A

### 7 Fuel level gauge

The gauge shows the level in the fuel tank. If the gauge moves down into the red area and the warning lamp on the right of the gauge lights up, the machine should be refuelled in order to avoid air entering the system.

If the tank has been run empty, See **Bleeding fuel system of air** on page 138.

For the capacity of the fuel tank, See **Specifications** on page 180.



S80849A

### 8 Parking brake lamp No function on EC330B)

Control lamp (red)



S80488A

### 9 Automatic lubricating pilot lamp (option)

Control lamp (red)

The lamp is ON, if the grease tank is empty or the high pressure system is abnormal. (If needed, automatic lubricating system should be installed by Volvo dealers or distributors at local site)



S80099A

**10 Coolant level lamp**

**Control lamp (red)**

The lamp is ON if the coolant level becomes too low. If this happens, check and add coolant.

See **Checking coolant level**



S80490A

**11 Overload warning lamp (option)**

**Control lamp (red)**

**Included in the central warning system**

The lamp is ON and the buzzer sounds, if there is overload condition while operating with attachment.



S80491A

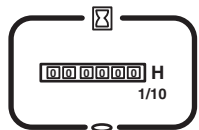
**12 Quickfit lamp (option)**

**Control lamp (red)**

**Included in the central warning system**

The lamp is ON and the buzzer sounds, if the two quickfit switches on the right and left panel are pressed simultaneously.

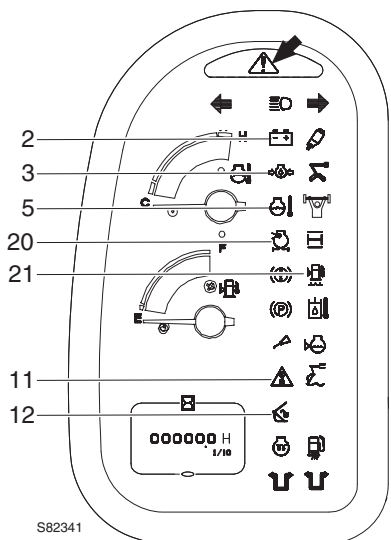
See **Quickfit switch (option)** on page 40.



S80481A

**13 Hour meter indicator**

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



S82341

**14 Central warning lamp**

**Control lamp (red)**

The central warning lamp flashes when a fault occurs in either of the following functions.

- 2 Battery charge warning lamp
- 3 Engine oil pressure warning lamp
- 5 Engine coolant temperature warning lamp
- 11 Overload warning lamp (option)
- 12 Quickfit lamp (option)
- 20 Air cleaner clogging warning lamp
- 21 Water separation indicator lamp (option)

Buzzer sound at the same time as the central warning lamp flash, if any of 3, 5, 11, 12 faults are indicated.

**NOTE :**

**If the lamp flashes while operating - immediately stop the machine and investigate the cause.**

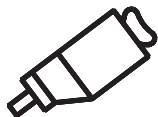




S80843A

**15 Left/Right turn signal lamp Not applicable on EC330B)**

**Control lamp (green)**



S82250

**16 Hammer selecting indicator pilot lamp (option)**

**Control lamp (green)**

The lamp is ON, if the boost/hammer/shear selecting switch is set to hammer position. See **Boost / hammer / shear selector switch** on page 39.

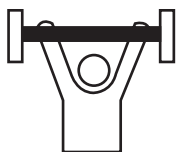


S82342

**17 Shear selecting indicator pilot lamp (option)**

**Control lamp (green)**

The lamp is alight, if the boost/hammer/shear selecting switch is selected to shear position. See **Boost / hammer / shear selector switch** on page 39.



S80492B

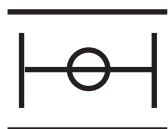
**18 Power booster lamp**

**Control lamp (green)**

The lamp is ON, when the boost solenoid is ON.

The boost solenoid is ON:

- When F mode is selected.
- When exclusive travel operation is selected.
- For 9 seconds, when the boost/hammer/shear select switch is set to boost position and the button of the right operating lever is pressed. See **Boost / hammer / shear selector switch** on page 39.



S80964

**19 Oscillation lock lamp Not applicable on EC330B)**

**Control lamp (amber)**




S80486A

**20 Air cleaner clogging warning lamp**

**Control lamp (amber)**

**Included in the central warning system**

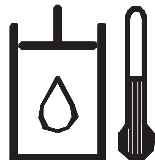
If the lamp is ON while engine is running, the air cleaner element must be changed or cleaned, See **Air cleaner** on page 140.

The lamp is ON when the start key is turned to "ON"  position before the engine is started.



S80489B

**21 Water separation indicator lamp not applicable on EC330B)**



S82252

**22 Hydraulic oil temperature warning lamp**

Control lamp (amber)

The lamp is ON, if the hydraulic oil temperature is abnormally high.

**If this happens, stop the working immediately and investigate the cause.**

When required, contact an authorized dealer workshop.



S83062

**23 Float position control lamp (option)**

Control lamp (green)

See *Float with three button lever* on page 54.

See *Float position (option)* on page 106.



S80487A

**24 Air preheating lamp**

Control lamp (amber)

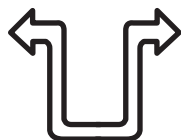
In cold weather, the lamp is ON when the start switch is turned to "ON" ① position for preheating. The lamp is OFF if preheating is completed when the start switch is "ON". This lamp is always OFF when the start switch is turned to START (Ⓜ) position.



S80489A

**25 Fuel heater lamp (not functional)**

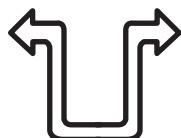
Control lamp (green)



S80965

**26 Emergency steering readiness lamp Not applicable on EC330B)**

Control lamp (green)

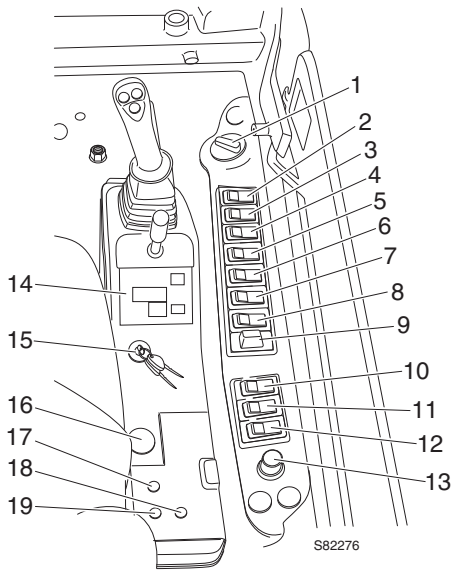


S80965

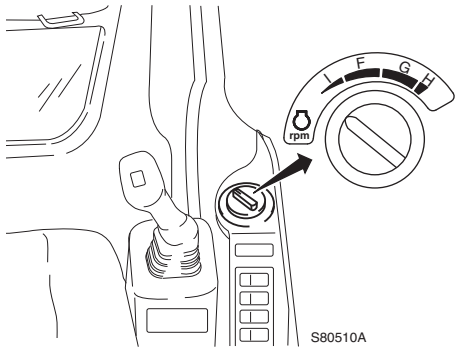
**27 Emergency steering operating lamp Not applicable on EC330B)**

Control lamp (amber)

### Right instrument panel



- 1 Engine speed control switch
- 2 Working lights switch
- 3 Power maximum mode selector switch
- 4 Auto idle selector
- 5 Travel speed selector switch
- 6 Boost/hammer/shear selector switch
- 7 Quickfit switch (option)
- 8 Quickfit audible warning switch (option)
- 9 Recirculation air sensor (option)
- 10 Upper wiper switch
- 11 Washer switch
- 12 Lower wiper switch (option)
- 13 Cigarette lighter
- 14 Machine display unit
- 15 Start switch
- 16 Flow control switch (option)
- 17 One/two pump select switch (option)
- 18 Emergency engine speed control switch
- 19 Automatic / manual selector switch



### 1 Engine speed control switch

This switch is used to select the engine speed. Turning this switch, the engine speed will change incrementally. According to the selected engine speed, working mode will be set automatically and setting mode is displayed on the display unit. See **Machine display unit** on page 41.

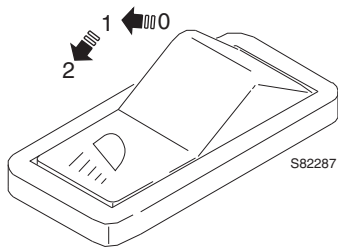
#### Except North America

Mode		Switch step	Engine speed ( $\pm 40$ rpm) (no load/load)	Power shift current ( $\pm 10$ mA)	Remarks
			D12CEDE2		
Power max	P	9	1800/ 1700 over	210/var	
Heavy	H		1700/ 1600 over		
General	G1	8	1600/ 1500 over	300/var	
	G2	7	1500/1400 over		
	G3	6			
Fine	F1	5	1400/ –	530	
	F2	4	1300/ –		
	F3	3	1200/ –		
Idle	I1	2	1000/ –	665	
	I2	1	700/ –		

#### North America

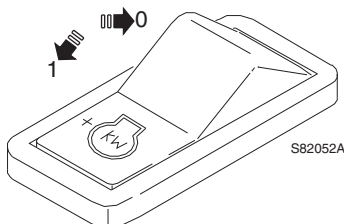
Mode		Switch step	Engine speed ( $\pm 40$ rpm) (no load/load)	Power shift current ( $\pm 10$ mA)	Remarks
			D12CECE2		
Heavy	H	9	1800/ 1700 over	210/var	
General	G1	8	1700/ 1600 over		
	G2	7	1600/ 1500 over	300/var	
	G3	6	1500/ 1400 over		
Fine	F1	5	1400/ –	530	
	F2	4	1300/ –		
	F3	3	1200/ –		
Idle	I1	2	1000/ –	665	
	I2	1	700/ –		





### 2 Working lights switch

- Position 0 Lights OFF
- Position 1 Instrument panel lamp and boom working lights ON.
- Position 2 Instrument panel lamp, boom working lights and deck working lights ON.

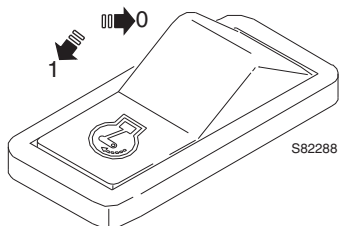


### 3 Power maximum mode selector switch

- Position 0 Power maximum mode DEACTIVATED
  - Position 1 Power maximum mode ACTIVATED
- At 9 step of the engine speed control switch,
- Position 0 H mode
  - Position 1 P mode

If the machine is not operated in the **P** mode for 5 seconds or more, the engine speed automatically goes down to idling if the Auto idle selector switch is activated (in position 1). If the machine is operated again, it is returned to **P** mode.

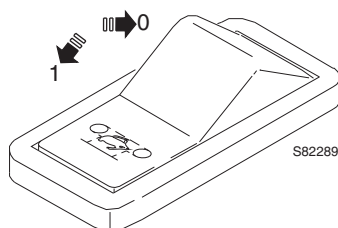
At the **P** mode, it become **H** mode if 9 step is selected after turning the engine speed control switch to another step.



### 4 Auto idle select switch

When this switch is turned to auto idling position (1), if the operating levers, the travel levers (pedals), and the engine speed selection switch are not operated for 5 seconds or more, the engine speed will be lowered automatically to reduce fuel consumption. If any one of the above is operated, the engine speed returns to the setting speed of the engine speed control switch.

- Position 0 Auto idling DEACTIVATED
- Position 1 Auto idling ACTIVATED



### 5 Travel speed select switch



**WARNING!**

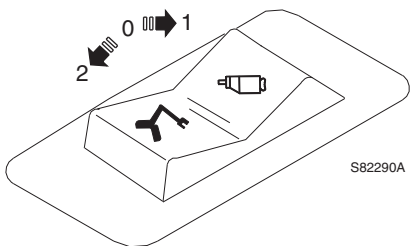
**Make sure to stop the machine, before changing the travel mode.**

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

**Use low speed fixed when loading the machine onto a trailer.**

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





**6 Boost / hammer / shear selector switch**

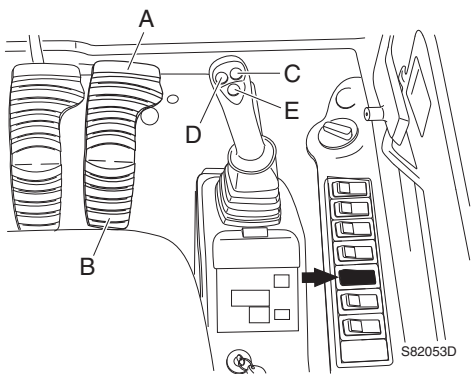
See 2 **Operating lever (right)** on page 54.

**If X1 (hammer / shear) is not equipped**

- Position 0 **Boost mode**  
If button (C) on the right operating lever is pressed, digging power is increased for 9 seconds.
- Position 1 **Hammer mode**  
In this mode, boost doesn't function.
- Position 2 **Shear mode**  
If button (C) is pressed, digging power is increased for 9 seconds.

**If X1 (hammer / shear) is fitted**

**If X1 (hammer / shear) pedal control is fitted**



- Position 0 **Boost mode**  
Button (E) is Horn in all position (position 0, 1 & 2)  
Button (D) is Spare in all position (position 0, 1 & 2)  
If button (C) is pressed, digging power is increased for 9 seconds.  
In this mode, X1 (hammer / shear) doesn't function.
- Position 1 **Hammer mode**  
If pedal forward (A) is pressed, the X1 will work. (Low pressure)  
If pedal backward (B) is pressed, the X1 will not work.  
If button (C) is pressed, the X1 will not work.  
In this mode, boost doesn't function.
- Position 2 **Shear mode**  
If pedal forward (A) or backward (B) is pressed, the X1 will work. (High pressure)  
If button (C) is pressed, digging power is increased for 9 seconds.

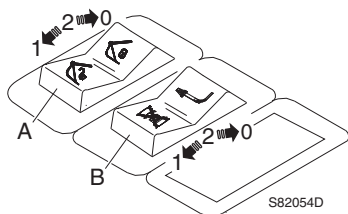
**If X1 (hammer / shear) 1-switch control is fitted**

- Position 0 **Boost mode**  
Button (E) is Horn in all position (position 0, 1 & 2)  
Button (D) is Spare in all position (position 0, 1 & 2)  
If the button (C) is pressed, digging power is increased for 9 seconds.  
In this mode, X1 (hammer / shear) doesn't function.
- Position 1 **Hammer mode**  
If button (C) is pressed, the X1 will work. (Low pressure)  
In this mode, boost doesn't function.
- Position 2 **Shear mode**  
If button (C) is pressed, digging power is increased for 9 seconds.  
In this mode, X1 (hammer / shear) doesn't function.

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

- Position 0 **Boost mode**  
If button (E) is pressed, digging power is increased for 9 seconds.  
In this mode, X1 (hammer / shear) doesn't function.
- Position 1 **Hammer mode**  
If the button (C) is pressed, the X1 will work. (Low pressure)  
If the button (D) is pressed, the X1 will not work.  
In this mode, boost doesn't function.
- Position 2 **Shear mode**  
If button (C or D) is pressed, the X1 will work. (High pressure)  
If button (E) is pressed, digging power is increased for 9 seconds.





**7 Quickfit switch (option)**

**IMPORTANT**

This function is activated by pressing the quickfit switch on the left and right instrument panels simultaneously,

See **Quickfit switch (option)** on page 46.

Switch (A) in position 0 Quickfit closed

Switch (A) in position 1 Quickfit open

Switch (A) in position 2 Quickfit neutral

When both switches are in **position (1)** simultaneously, the quickfit unit is opened, the buzzer is activated, the quickfit indicator and the central warning lamp are ON.

After installing quickfit unit, when the both switches are at **position (0)**, then the quickfit warning lamp and the central warning lamp are OFF.

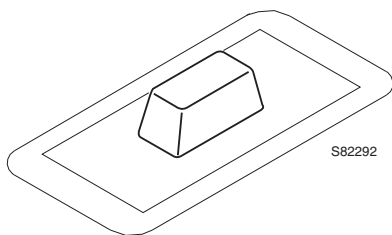
**8 Quickfit audible warning switch (option)**

Switch (B) in position 0 Quickfit audible warning is switched (B) ON

Switch (B) in position 1 Quickfit audible warning is switched (B) OFF

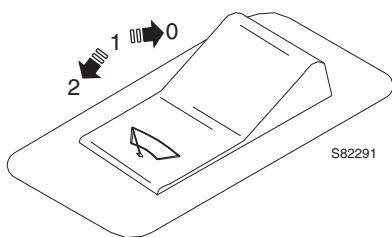
Switch (B) in position 2 Quickfit audible warning is switched (B) Neutral

When the quickfit switches are switched to open the quickfit and if the quick audible switch is in **position (0)**, the buzzer sounds, and if in **position (1)**, the buzzer does not sound.



**9 Recirculation air sensor (option)**

This sense room temperature when automation air conditioner is applied.



**10 Upper wiper switch**

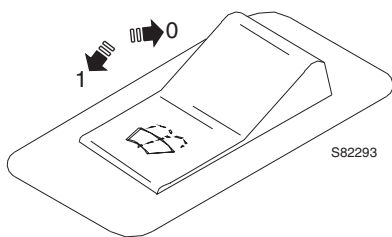
Position 0 Upper wiper switched OFF

Position 1 Upper wiper switched ON intermittently

Position 2 Upper wiper switched ON

**IMPORTANT**

Lifting the front window while the wiper motor is running, immediately stops the operation.



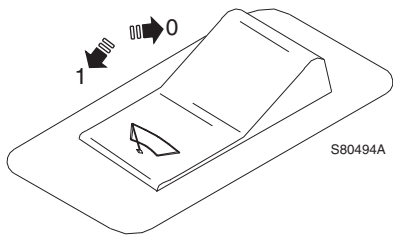
**11 Washer switch**

Position 0 Washer switched OFF

Position 1 Washer switched ON

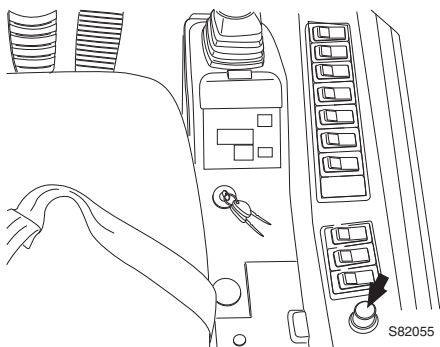
**IMPORTANT**

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



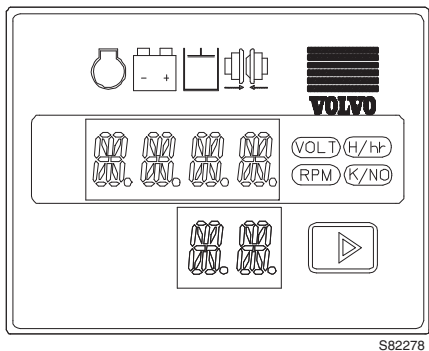
**12 Lower wiper switch (option)**

- Position 0 Wiper switched OFF
- Position 1 Wiper switched ON



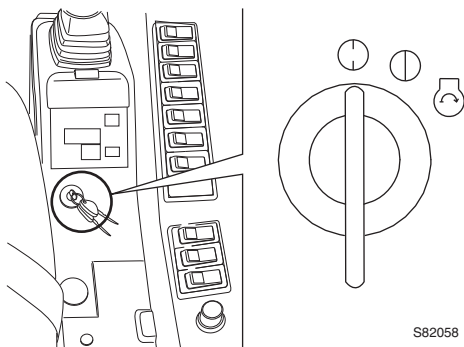
**13 Cigarette lighter**

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



**14 Machine display unit**

It is possible to select any menu or function you would like to see on the display unit.  
See **Display unit** on page 49.

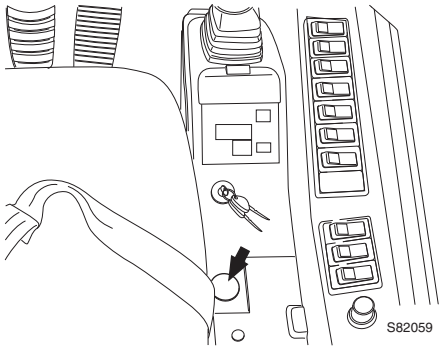


**15 Start switch**

- This switch has three positions:
- ⊕ : Off position
  - ⊖ : Running (preheating) position
  - ⚙ : Starting position

See **Start switch** on page 94.

# 42 Description of instrument panel

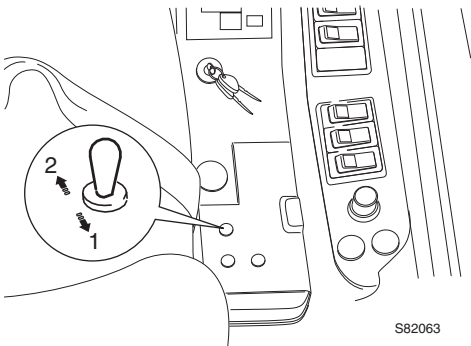


## 16 Flow control switch (option)

This switch is used to set pump flow while optional equipment like a hammer or shear is operating (if equipped).

Flow control switch step	Pump flow setting lpm (gallon)	Flow control current ( $\pm 10$ mA)
9	275 (73)	300
8	250 (66)	360
7	220 (58)	390
6	190 (50)	420
5	160 (42)	450
4	130 (34)	480
3	100 (26)	510
2	70 (19)	545
1	40 (11)	600

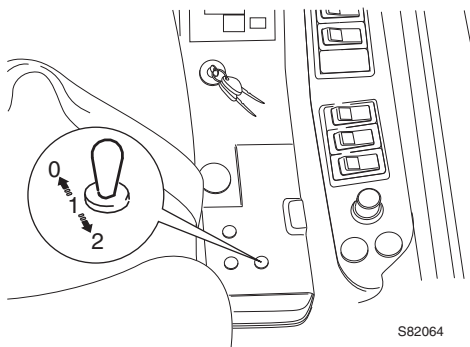
- Pump flow setting is at rated engine speed, one pump flow control.
- This is changed in accordance with engine rpm.



## 17 One/two pump selecting switch (option)

This switch can be selected when the boost/hammer/shear switch is set to hammer or shear.

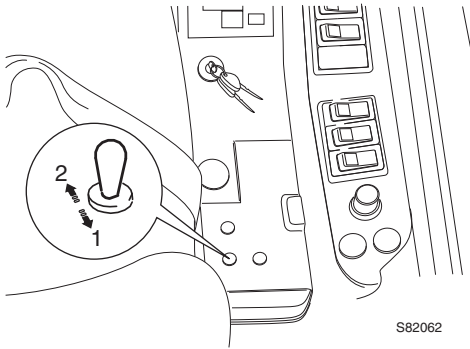
- Position 1 One pump activated
- Position 2 Two pump activated



## 18 Emergency engine speed control switch

If the engine speed control switch on page 37 does not work, set "Auto/Manual select switch" to Manual position and use this emergency switch.

- Position 0 Engine stop  
(When the starting is not OFF, even though the start switch is turned to OFF position)  
If the switch is at this position for more than three seconds, the engine will shut down.
- Position 1 Idle speed  
Engages idle I2 mode (no load)
- Position 2 High speed  
Engages H mode (no load) of engine speed,  
Exception: G1 mode for North America.



S82062

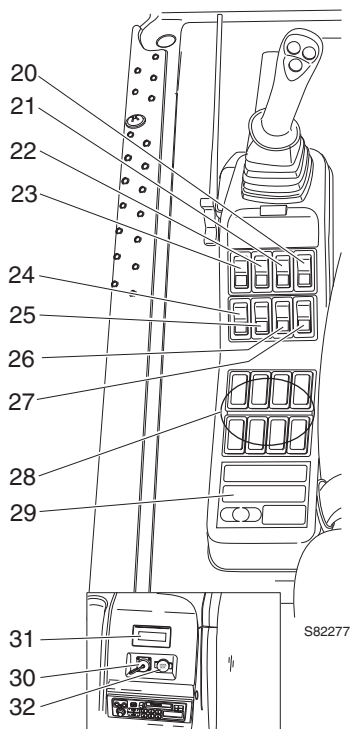
### 19 Automatic / manual selector switch

- Position 1    Manual controlled
- Position 2    Auto controlled

If the V-ECU malfunctions, this switch must be switched to Manual position.

After changing damaged part, set this switch to automatic position.

To turn manual mode to auto mode after changing or repairing damaged part, the machine must be restarted.

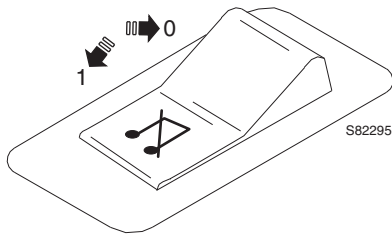


S82277

### Left instrument panel

- 20 Mute switch (option)
- 21 Extra work lamp switch (option)
- 22 Beacon switch (option)
- 23 Room lamp switch
- 24 Seat heater switch (option)
- 25 Overload warning switch (option)
- 26 Travel warning sound stop switch (option)
- 27 Quickfit switch (option)
- 28 Unassigned
- 29 Air conditioner/heater switch
- 30 Service socket
- 31 Engine heater diesel (option)
- 32 Power socket

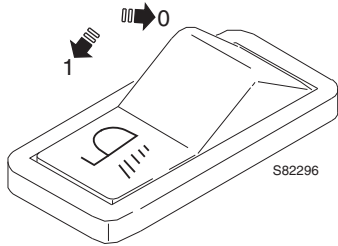




**20 Mute switch (option)**

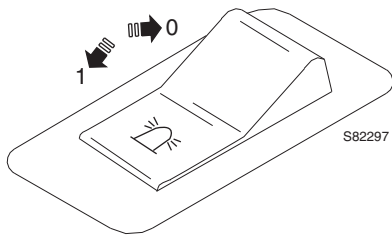
This switch is used to mute the sound of one speaker at a time.

- Position 0 OFF
- Position 1 ON



**21 Extra work lamp switch (option)**

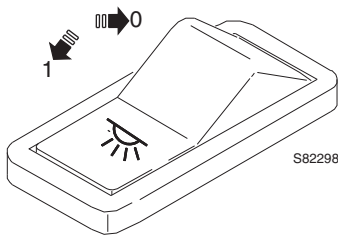
- Position 0 Extra work lamp (three lamps on Cab and one lamp on counterweight) switched OFF
- Position 1 Extra work lamp switched ON



**22 Beacon switch (option)**

This switch is used to operate the lamp that show the status of machine working.

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



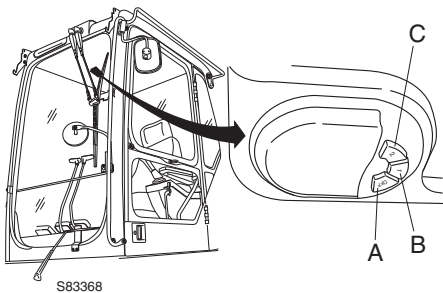
**23 Room lamp switch**

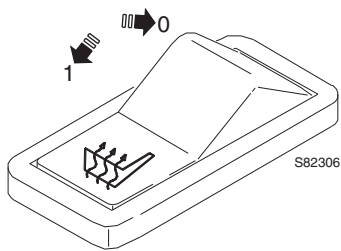
Only when this is at "ON" position, the buttons(A, B, C) connected to the cab light will work.

- Position 0 cab light switched OFF
- Position 1 cab light switched ON

Position 1 cab light ON: Press button B, when button A is pressed.  
 Position 1 cab lights ON: Press button C, when button A is pressed.

Cab light also be ON or OFF by pressing button A when cab light switch is ON position and one of B or C button is pressed.





**24 Seat heating switch (option)**

This is used to warm for switching on and off the heating of the seat.

- Position 0    Seat heating OFF
- Position 1    Seat heating ON

The seat heating functions when this switch is in position (1) and the temperature is under 11 °C ~ 17 °C (52 °F ~ 63 °F). The seat heating stops when the temperature is up to 22 °C ~ 28 °C (72 °F ~ 82 °F). and reworks when the temperature turns down under 11 °C ~ 17 °C (52 °F ~ 63 °F) by the first thermostat. If the first thermostat malfunctions, the second thermostat cuts off the seat heating at 29 °C ~ 32 °C (84 °F ~ 90 °F).



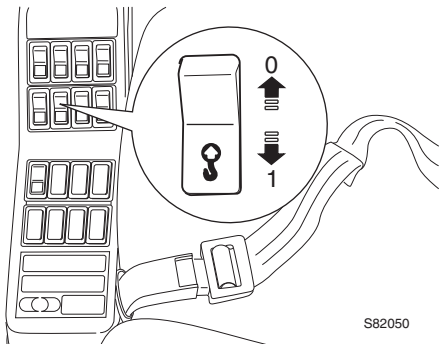
Position the seat heater switch OFF for fire prevention when the seat heating is not needed (when leaving the operator's seat).



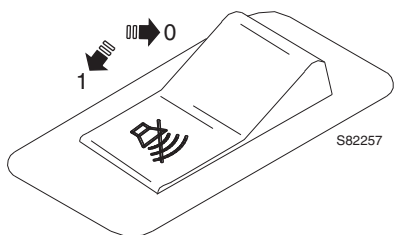
**25 Overload warning switch (option)**



When the overload warning lamp is ON, stop the lifting operation and reduce the load. If not, it can cause a serious accident, perhaps even a fatal accident.



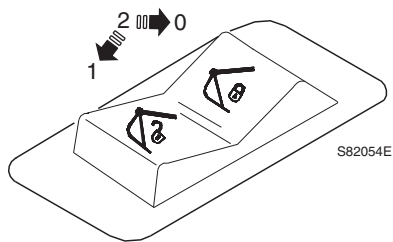
- Position 0    Warning lamp & Buzzer switched OFF
  - Position 1    Warning lamp & Buzzer switched ON
- If an overload happens, the warning lamp comes ON and the buzzer sounds.



**26 Travel warning sound stop switch (option)**

This switch is used to mute the sound of speaker at a time.

- Position 0    Travel warning sound DEACTIVATED
- Position 1    Travel warning sound ACTIVATED



S82054E

### 27 Quickfit switch (option)

#### IMPORTANT

This function is activated by pressing the quickfit switch on the left and right instrument panels simultaneously, See *Quickfit switch (option)* on page 40.

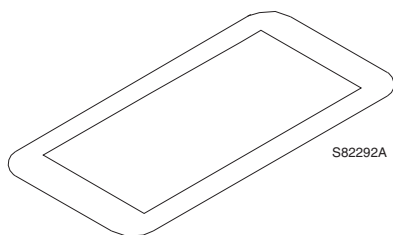
Switch (A) in position 0 Quickfit closed

Switch (A) in position 1 Quickfit open

Switch (A) in position 2 Quickfit neutral

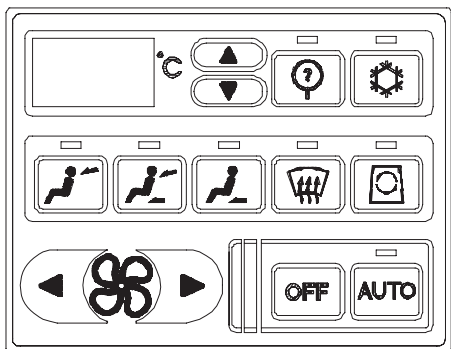
When both switches are in **position (1)** simultaneously, the quickfit is opened, the buzzer is activated, quickfit warning and central warning lamp are ON.

After installing quickfit and when both switches are in **position (0)**, then the quickfit warning and central warning lamps are OFF.



S82292A

### 28 Unassigned

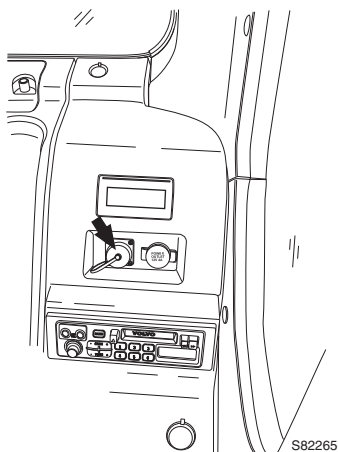


S82057

### 29 Air conditioner/heater switch

This switch is used to activate air conditioner/heater.

Detailed contents: See *Air conditioner/heater (option)* on page 67.



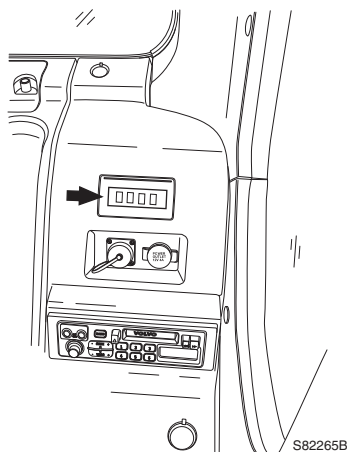
S82265

### 30 Service socket

The service socket (VCADS Pro, SDU, MNTRIS) is positioned to the left, above the radio.

Contact an authorized dealer workshop.





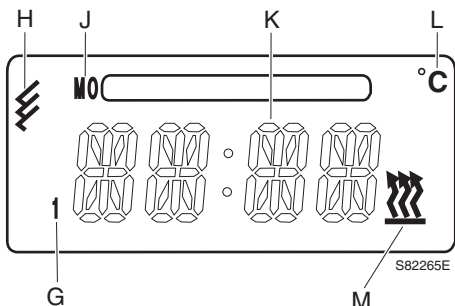
**31 Engine diesel heater (option)**

In cold weather, this auxiliary heater can be switched on manually or preset to activate at various times to warm the cab and heat the engine for easier starting.

- |                           |                               |
|---------------------------|-------------------------------|
| A Time setting switch     | G Memory indicator            |
| B Program switch          | H Symbol for remote control   |
| C Heating ON / OFF switch | J Program day                 |
| D Backward switch         | K Current time / program time |
| E Forward switch          | L Temperature display         |
| F Display window          | M Heating indicator           |

**Setting current time and date**

- 1 Press time setting switch (A) until the time in display window (F) begins to flash.
- 2 Adjust the current time by pressing backward switch (D) and forward switch (E).  
After a few second, the current time (K) stops blinking, which means the current time is set.
- 3 When current time (K) has stopped flashing, the program day (J) flashes, then adjust the day by pressing backward switch (D) and forward switch (E). The current date is set when it stops flashing.

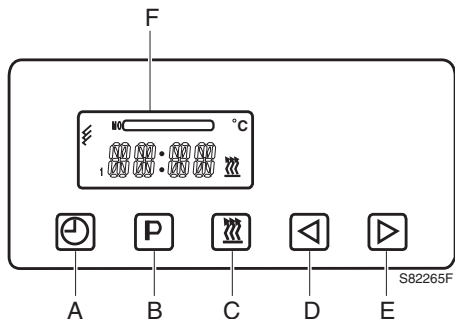


**Operating heater (direct)**

- 1 Press heating ON / OFF switch (C), heating indicator (M) and current time / program time (K) will come ON.
- 2 The initial setting time is for a duration of 120 minutes and this time can be adjusted by pressing switches (D or E). Heating time can be set up to 120 minutes.
- 3 Press heating ON / OFF switch (C) to OFF to change the heating time.
- 4 Press backward switch (D) until current time / program time (K) flashes in display window (F).
- 5 Now adjust the operating time by pressing forward switch (E) and backward switch (D) as current time / program time (K) flashes. The heating time is set when it stops flashing.

**Stopping heater**

- 6 Press heating ON / Off switch (C), then heating indicator (M), stops the heater; however the fan will continue to operate until the unit is cool enough to safely shut down.

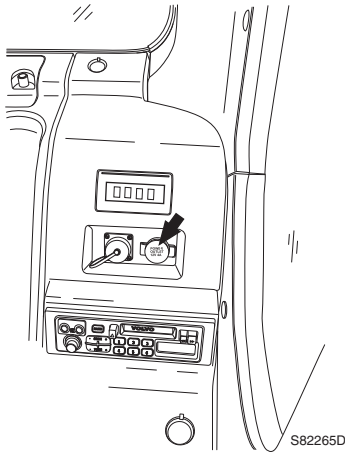


**Presetting heating time starting**

The preset heating time can be selected for 3 different times every day or once a week.

- 1 Each preset time can be certified when program switch (B) is pressed.
- 2 Press program switch (B) and memory indicator changes to 1.
- 3 Preset the time by pressing forward switch (E) or backward switch (D), when current time / program time blinks.
- 4 Repeat the above steps and memory indicator (G) will change to 2 and then to 3.

Heating ON / OFF switch (C) only blinks in the display window (F), when memory indicator (G) is ON and at one of the preset operating times.



**32 Power socket**

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

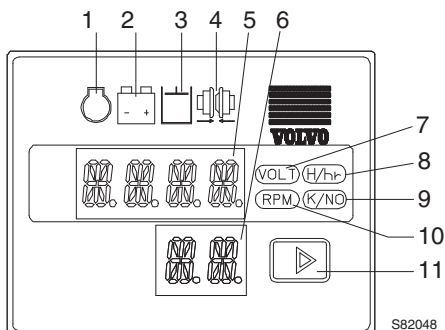
# Display unit

## General

The purpose of the display unit is to give the operator improved information about the functions which are monitored by the E-ECU and V-ECU. In case of an error the display unit will show an error code.

### When starting the engine:

- All the indicating lamps are ON for one second and then turn off
- Main display window (5) is shown "WAIT" signal shortly and then changed to engine RPM to be set.
- Mode display window (6) is shown the current mode to be set. **See Engine speed control switch on page 37.**



## Description of display unit

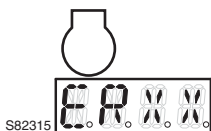
### 1 Engine system warning lamp

#### Control lamp (amber or red)

Amber: Indicating a warning situation

Red: Indicating a critical situation

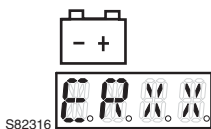
This lamp is ON if the engine system is abnormal and an error code is displayed on main display window (5).



### 2 Electric system warning lamp

#### Control lamp (red)

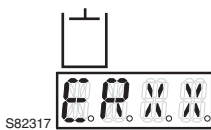
This lamp is ON if the electric system is abnormal and an error code is displayed on the main display window (5).



### 3 Hydraulic system warning lamp

#### Control lamp (red)

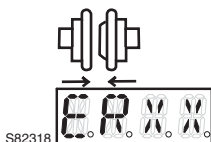
This lamp is alight if the hydraulic system is abnormal and the error code is displayed on the main display window (5).

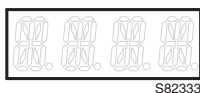


### 4 Controller and communication system warning lamp

#### Control lamp (red)

This lamp is ON if the controller and communication system is abnormal and an error code is displayed on the main display window (5).



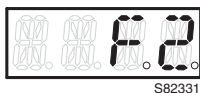


**5 Main display window**

If the machine has an abnormal condition, an error code is displayed in the window.

If there are multiple error codes, they are displayed alternately and when pressing item selector switch (11), the error code is disappeared.

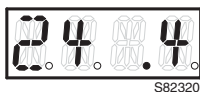
If the machine functions are normal, the engine speed is displayed in the window. When pressing **Item selector switch (11)**, the displayed data is changed.



**6 Mode display window**

The engine speed mode is displayed on the window as I2, I1, F3, F2, F1, G3, G1, H, P. (P: Except North America)

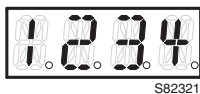
See *Engine speed control switch on page 37.*



**7 Voltage indicating lamp**

**Control lamp (red)**

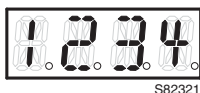
This lamp is ON when pressing item selecting switch (11), and the battery voltage is displayed on main display window (5).



**8 Hammer operating hour indicating lamp (option)**

**Control lamp (red)**

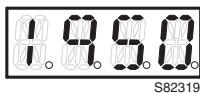
This lamp is ON when pressing item selecting switch (11), and the hammer operating hour is displayed on main display window (5).



**9 Key number indicating lamp**

**Control lamp (red)**

This lamp is ON when pressing item selecting switch (11), and the key number is displayed on main display window (5).



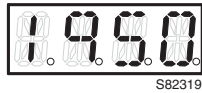
**10 Engine speed indicating lamp**

**Control lamp (red)**

This lamp is ON when pressing item selecting switch (11), and the engine speed is displayed on main display window (5).

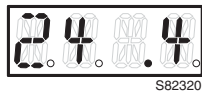
### 11 Item selecting switch

When pressing this switch in series, figures on main display window (5) change in series and the indicating lamp in question is ON.



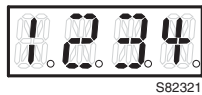
#### Engine rpm

Engine speed indicating lamp (10) is ON



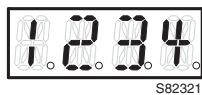
#### Battery voltage

Voltage indicating lamp (7) is ON.



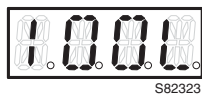
#### Hammer operating hour (option)

indicating lamp (8) is ON



#### Key number

indicating lamp (9) is ON



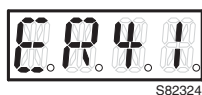
#### Setting pump flow (option)

The maximum flow of pump can be set by turning the flow control (See ) switch with monitoring the value of MDU(Machine Display Unit)

How to see the set value on the MDU in US gallon:

- Turn the flow control switch, the value will be displayed on the MDU in **L** units (litres).
- Press and hold down the ► key on the MDU until the value changes to **G** units (US gallon).
- MDU will always display the set value in **G** unit later on.

To see the litres per minute units next time (if it is necessary), repeat the above operation until it displays the value in **L** units



#### Error code

If machine functions are abnormal.

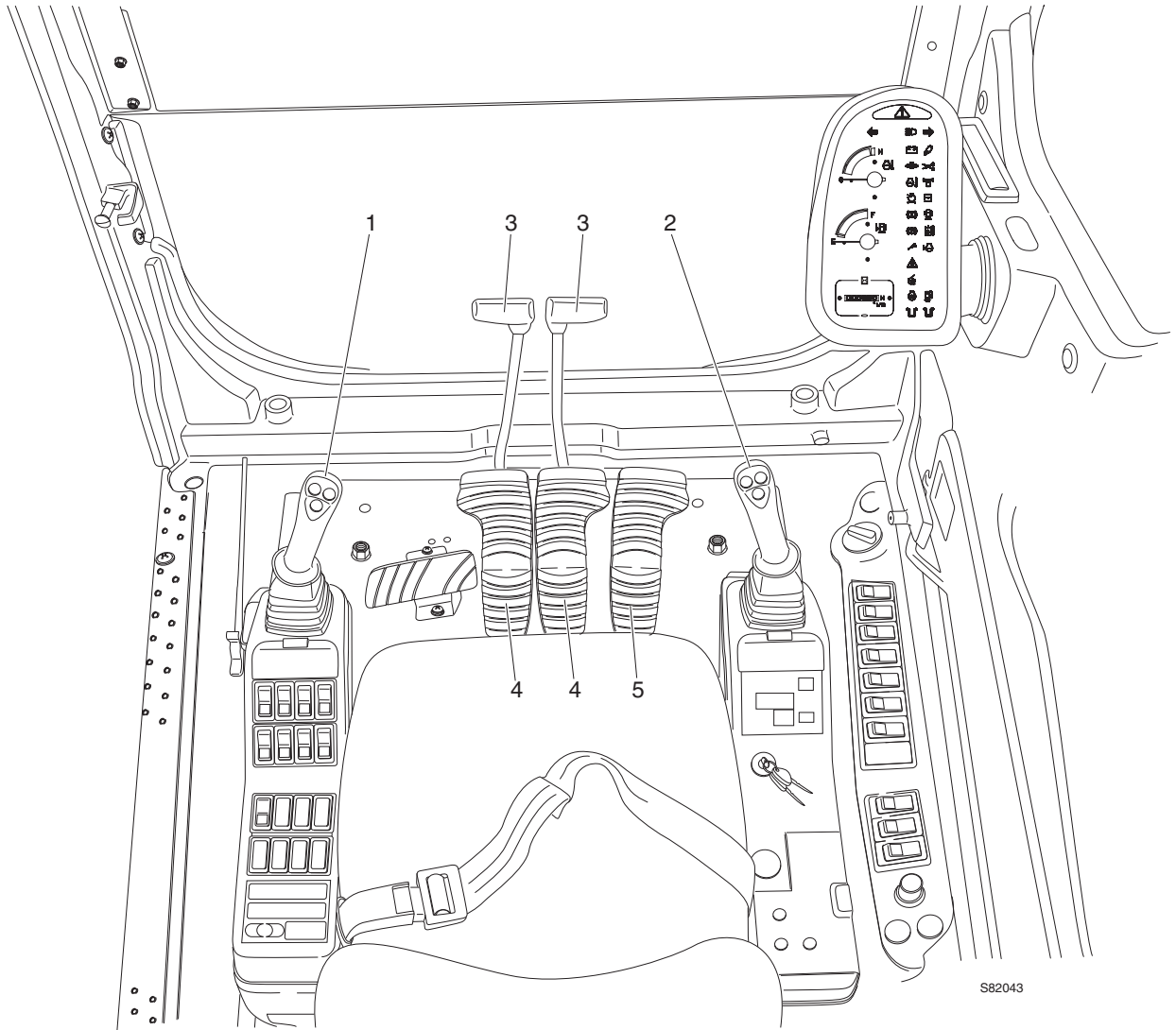


### Diagnosis content

Group	Contents	Error code
<b>Controller &amp; communication</b>	V-ECU	ER11
	E-ECU	ER12
	J1939 (fast link)	ER13
	J1587 (slow link)	ER14
<b>Electric</b>	Battery-Volt	ER21
<b>Hydraulic</b>	Power shift valve	ER31
	Flow control valve	ER32
<b>Engine</b>	Engine oil temperature sensor	ER41
	Boost temperature sensor	ER42
	Engine speed sensor	ER43
	Boost pressure sensor	ER44

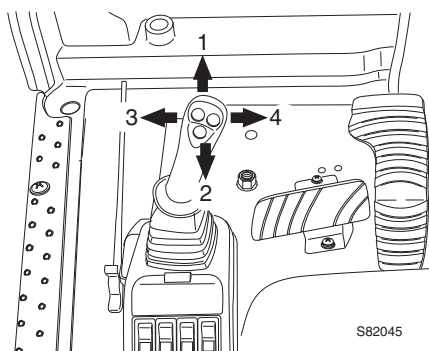
– If data can not be received through MDU, display ER13/ER14

# Controls



S82043

- |                           |                                   |
|---------------------------|-----------------------------------|
| 1 Operating lever (left)  | 4 Travel pedals                   |
| 2 Operating lever (right) | 5 Optional pedal (hammer / shear) |
| 3 Travel levers           |                                   |

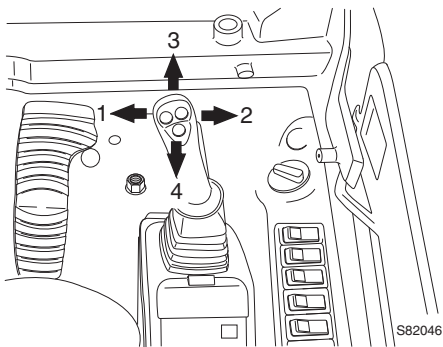


S82045

## 1 Operating lever (left)

This lever is for swing and arm.

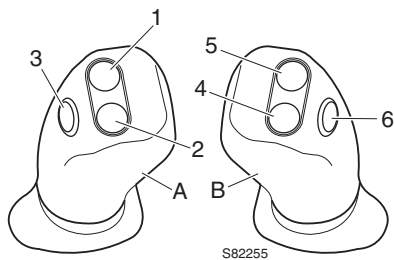
- 1 Arm out
- 2 Arm in
- 3 Left swing
- 4 Right swing



**2 Operating lever (right)**

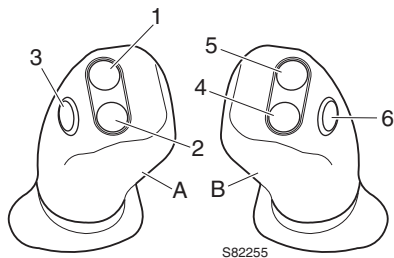
This lever is for boom and bucket.

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



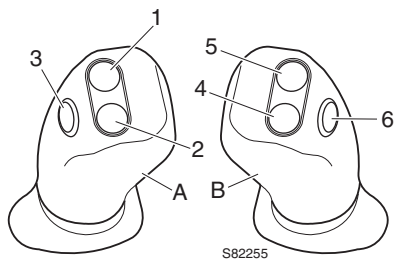
**Three button lever**

- A Left operating lever
- B Right operating lever
- 1 Rotator button
- 2 Rotator button
- 3 Horn button
- 4 Unassigned
- 5 Boost / hammer
- 6 Horn button



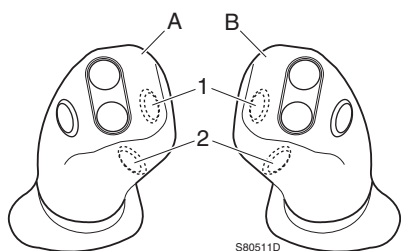
**Thumb with three button lever**

- A Left operating lever
- B Right operating lever
- 1 Rotator button
- 2 Rotator button
- 3 Horn button
- 4 Thumb bucket
- 5 Thumb bucket / hammer button
- 6 Boost button



**Float with three button lever**

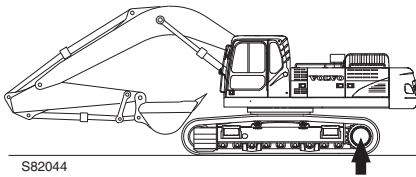
- A Left operating lever
- B Right operating lever
- 1 Rotator button
- 2 Rotator button
- 3 Horn button
- 4 Unassigned
- 5 Boost / hammer button
- 6 Float ON / OFF button



**Five button lever**

- A Left operating lever
- B Right operating lever
- 1 Unassigned
- 2 Unassigned



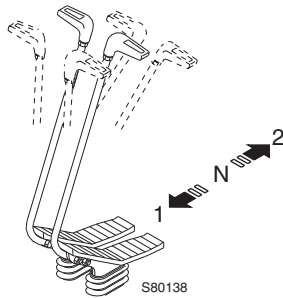


### 3, 4 Travel levers and pedals



Keep your feet clear of the travel pedals when working. Know the track direction before operating travel pedals (levers). Travel operation will be reversed, when the sprocket is at the front.

This is used to move and stop the machine.

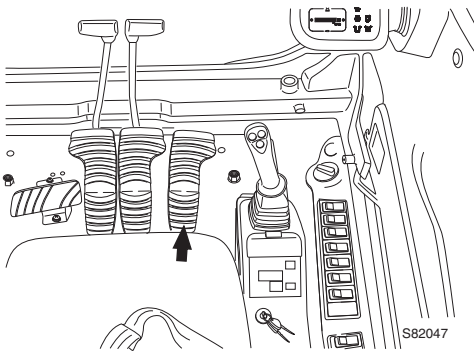


N Neutral (machine stops.)

- 1 Forward (push the lever forward or press down on the pedal forward to advance the machine)
  - 2 Reverse (pull the lever backward or press down on the pedal backward to reverse the machine)
- See *Travel direction control* on page 99.

### 5 Optional pedal

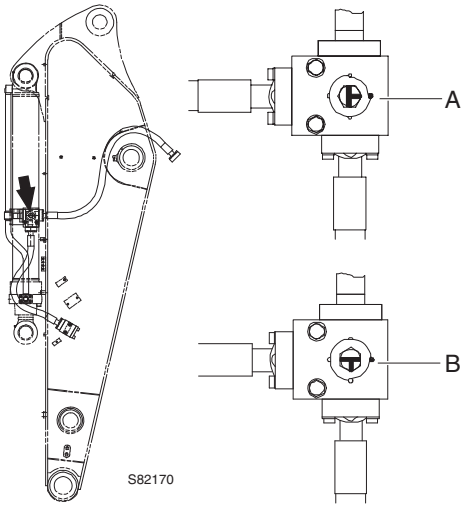
Detailed contents: See *Selecting valves for optional parts* on page 56.



## Selecting valves for optional parts

### 1 Bucket/clamshell valve position

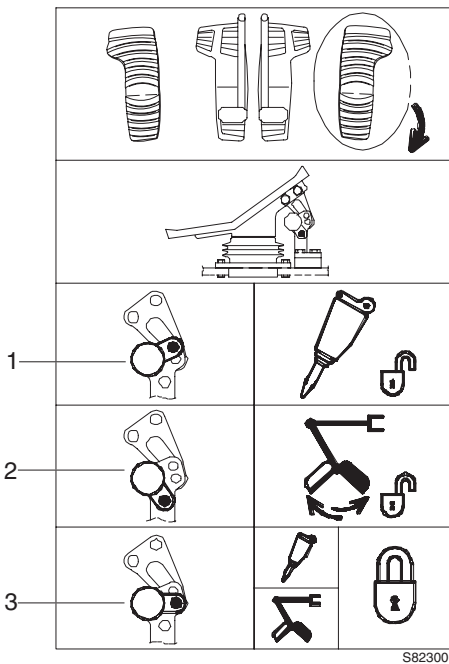
Select the correct position by turning the nut with a wrench.

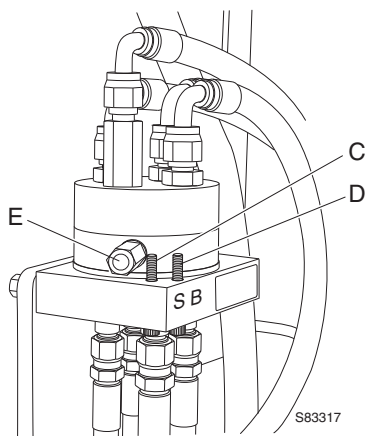


- A Bucket position
- B Clamshell position

### 2 Optional pedal position

- Position 1 Operating hammer (if equipped)
- Position 2 Operating Shear or Crusher (if equipped)
- Position 3 Operating lock (if equipped)





### 3 Changing machine control pattern (option)

Position S ISO type

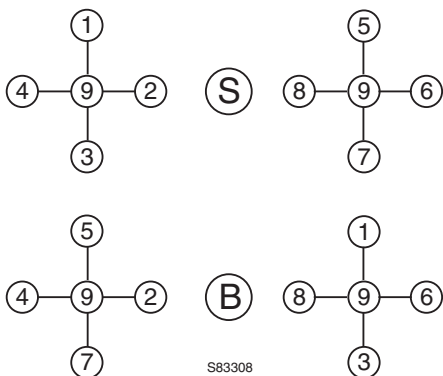
Position B Backhoe loader type

Pattern change valve is equipped only on certain machines.



Whenever a change is made to the machine control pattern. Warning decal attached in air cleaner room should be carefully read before changing pattern change valve. Certify pattern change decal and be aware of pattern of attachment before operating machine.

Be sure that pattern change valve in air cleaner room is changed correctly.



The machine control pattern can easily be changed to the ISO system or to the backhoe loader hydraulic system by changing position of pattern change valve (if fitted), Use the following procedure to change the position of the pattern change valve (Machine standard position is ISO pattern type (S).

The pattern change valve is located at the front left of the air cleaner room.

- 1 Loosen bolt (C) and (D), move lever (E) to **S** (ISO type) position or to the **B** (Backhoe loader type) position. by 45° turning.
- 2 After you set the machine control pattern, tighten bolt (C) and (D) in order to secure lever (E).

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.



Stick Out (1): Move the control lever to this position in order to move the stick outward.



Slew Right (2): Move the control lever to this position in order to slew the superstructure to the right.



Stick In (3): Move the control lever to this position in order to move the stick inward.



Slew Left (4): Move the control lever to this position in order to slew the superstructure to the left.



## Selecting valves for optional parts

---



Boom Lower (5): Move the control lever to this position in order to lower the boom.



Bucket Dump (6): Move the control lever to this position in order to dump the bucket.



Boom Raise (7): Move the control lever to this position in order to raise the boom.



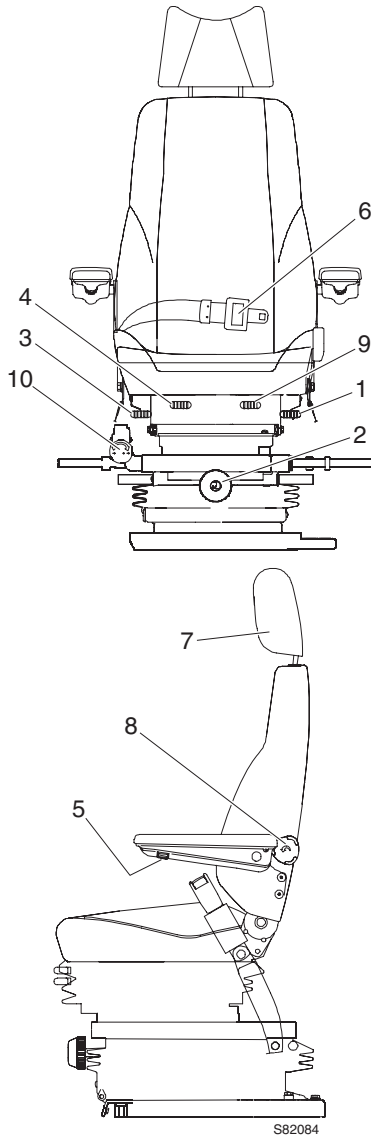
Bucket Close (8): Move the control lever to this position in order to close the bucket.

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

Two functions may be performed at the same time by moving a control lever diagonally.

## Operator seat

### Mechanical suspension seat



#### WARNING!

**For one seated occupant.  
Do not adjust seat when an excavator is in operation.  
Keep clear of moving parts.  
Installation & maintenance should be carried out by  
authorized & competent personnel only.**

- 1 Seat inclination adjustment
- 2 Weight adjustment
- 3 Backrest inclination adjustment
- 4 Slide adjustment
- 5 Armrest angle adjustment
- 6 Seat belt
- 7 Headrest restraint adjustment
- 8 Lumber support adjustment
- 9 Horizontal position adjustment
- 10 Height position adjustment

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

### Air suspension seat (option)

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.

### Seat belt



#### WARNING!

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

- If the seat belt needs to be washed:
  - Use a mild soap solution
  - Allow the belt to dry while it is fully pulled out, before rolling it up.
  - Make sure the belt is fitted in a correct way.
- Modifications to the belt or its mountings are not permitted.
- The seat belt is intended for one adult person only.
- Change the belt every third year regardless of its condition.

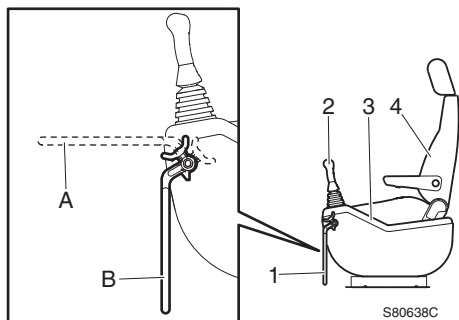
# Safety locking system



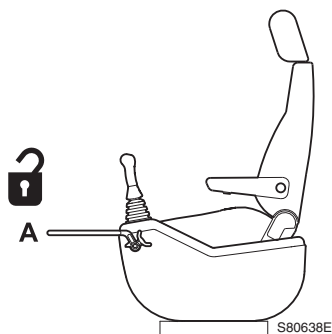
## WARNING!

Move the safety locking lever down to lock the system securely.

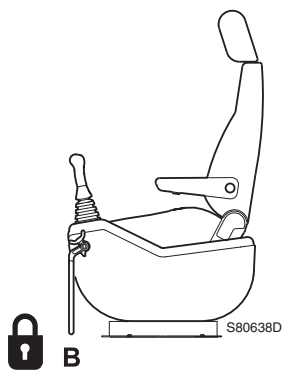
Unless the safety locking lever is on the "Locked" (B) position, operating levers can be operated by careless touch, which could cause serious injury.



- 1 Safety locking lever
- A Unlocked position **when this lever is put at this position the engine can not be started)**
- B Locked position **when this lever is put at this position the engine can be started)**
- 2 Left control lever
- 3 Left control console
- 4 Backrest



Safety locking lever "Unlocked" (A) position for working condition. **When this lever is put at this position the engine can not be started.**

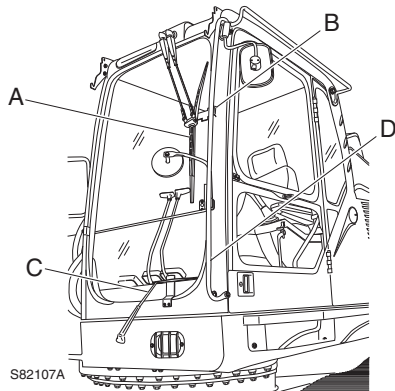


This system is used to **LOCKOUT** the attachment, swing and travel unit. Place the safety locking lever equipped on the left control console to "Locked" (B) position to lock out the hydraulic control levers.

**When this lever is put at this position the engine can be started.**

## Cab window

Move the safety locking lever down to lock the hydraulic system securely, See **Safety locking system on page 60**. before opening or closing the window.



### Opening the window

- 1 Lower the attachment to the ground and stop the engine.
- 2 Pull both latches (E) while holding both grips (F) and move upward in order to unlatch the window from lock (G).

**NOTE :**

**Stop lifting as soon as the window is unlatched.**

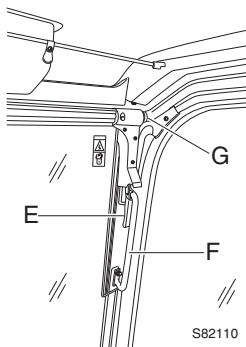
- 3 Hold both grips (F) only and pull the window upward and rearward and fix it in the locked position.

**NOTE :**

**Do not hold latches (E) while lifting the front window to avoid possible injury to your hand.**

### Closing the upper window

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



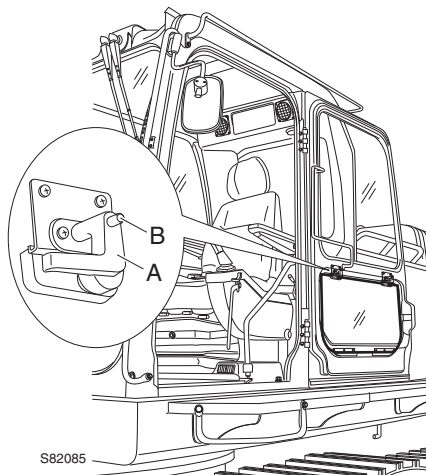
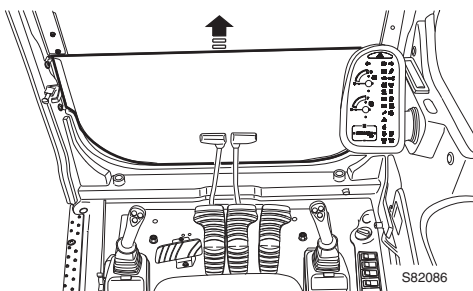
### Removing the lower window

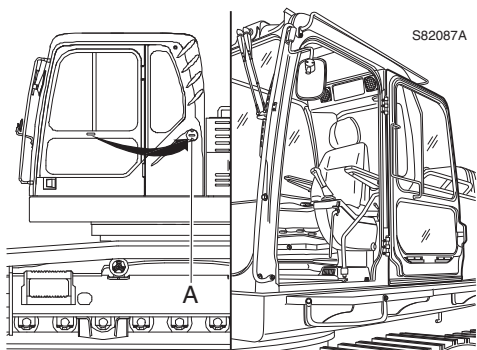
- 1 Open the upper window  
See **Opening the window** on page 61.
- 2 Grip the upper part with both hands, and pull it upward.
- 3 Store the removed window at the right, inside of cab.

**Ensure that the lower window is locked in the storing position.**

**To release the lock, turn lock lever (A) to the right and simultaneously push button (B).**

**Be careful not to drop the window when releasing the lock.**



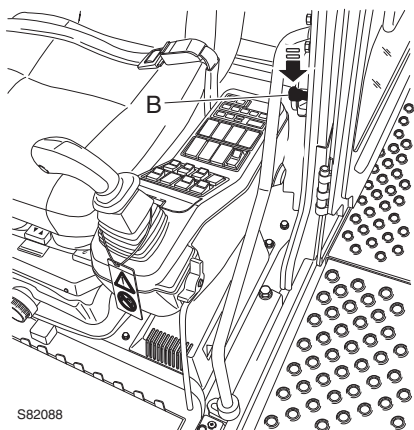


### Door lock system

It is used to keep the operator's cab door open.

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

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

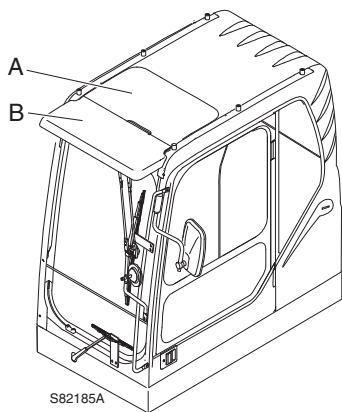


### Roof window and rain visor



**WARNING!**

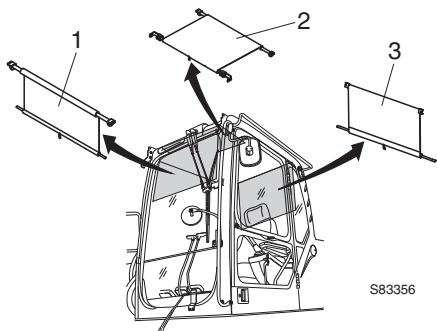
Do not clean the rain visor (B: if equipped) and roof window (A) with thinner, it will damage the polished surface.



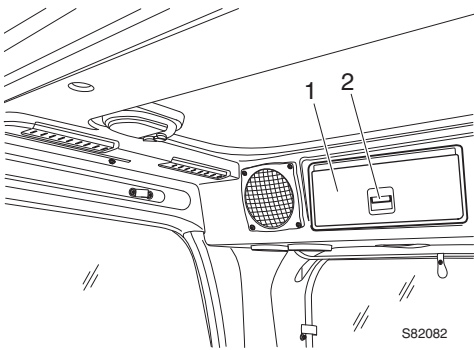
### Sun shade

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

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







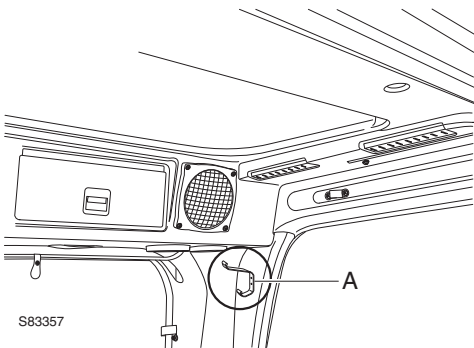
### Glove compartment

- 1 Glove
- 2 Latch



### WARNING!

Do not keep tools or a weighty thing in the glove. They can be dropped out of the glove by vibration of the machine or their weights when the equipment is operated, which may cause accidents, perhaps even fatal accidents.



### Coat hook

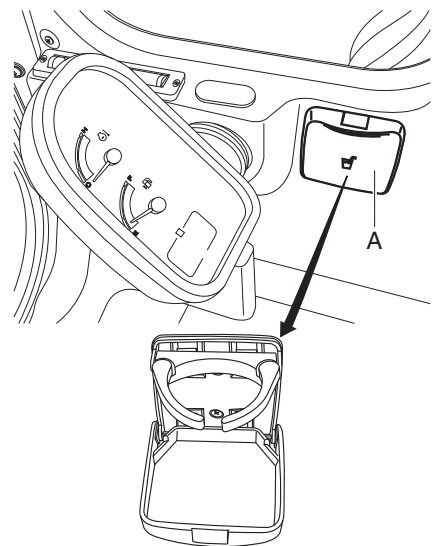
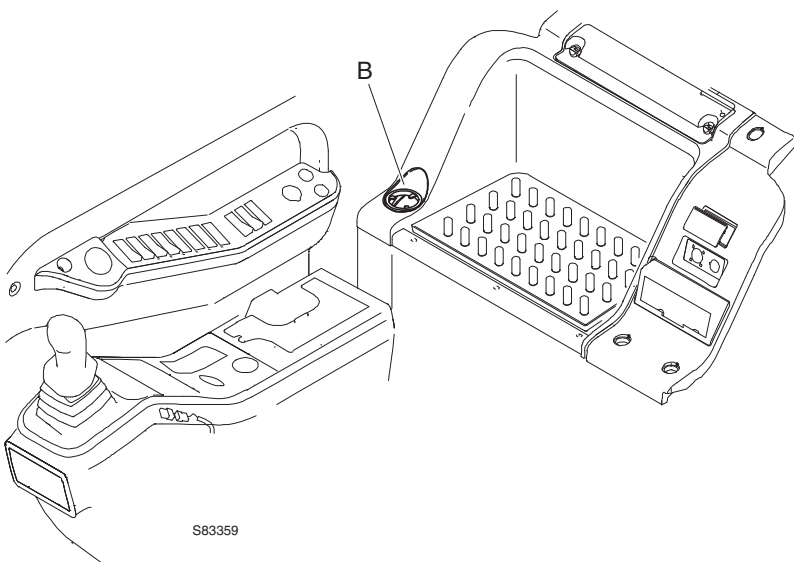
The coat hook (A) is inside the cab on left side.

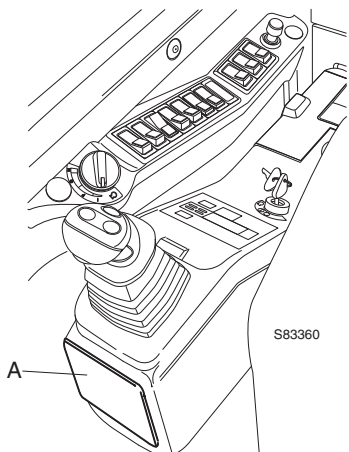
### NOTE :

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

### Cup and drink holder

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



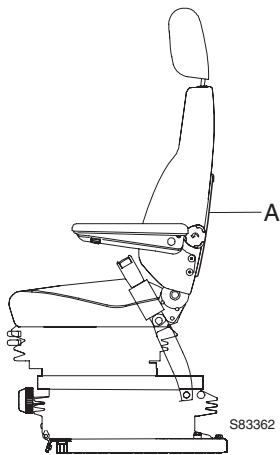


### Ashtray

Pull the top edge of the ashtray in order to open the ashtray. To remove the ashtray, pull the ashtray upward out of the console.

**NOTE :**

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

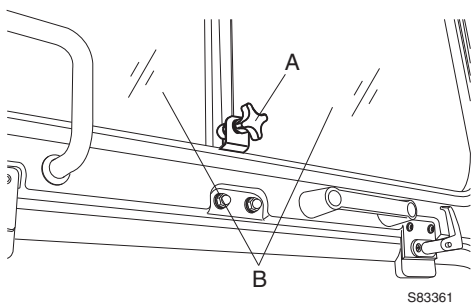


### Operator manual storage

A storage compartment (A) is located at the rear side of backrest of operator seat. Operator manual should be always kept in the storage compartment.

**NOTE :**

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



### Window fix

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

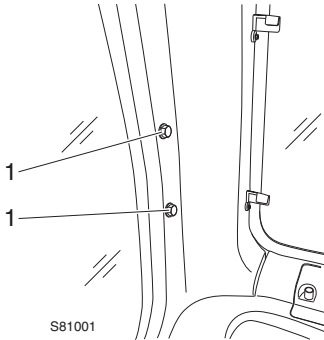
- A Window fixer
- B Windows

## Fire extinguisher and emergency exit

### Fire extinguisher (option)

Mount fire extinguisher as follows.

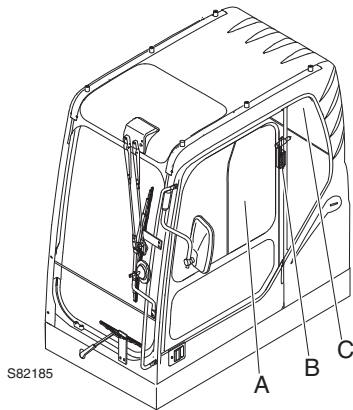
Remove two bolts (1) installed in the rear right side of cab interior and install the fire extinguisher.



### Emergency exit

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

The cab has two emergency exits, the door and the rear window. Regardless if the rear window is the fixed type or sliding type, break the glass with the hammer attached to the rear left side of cab interior.



- A Door
- B Hammer
- C Rear window



## Fuel accessory pump



### WARNING!

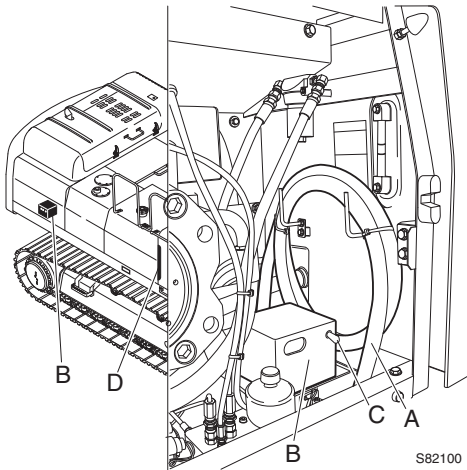
Stop the engine when fuelling.

### IMPORTANT

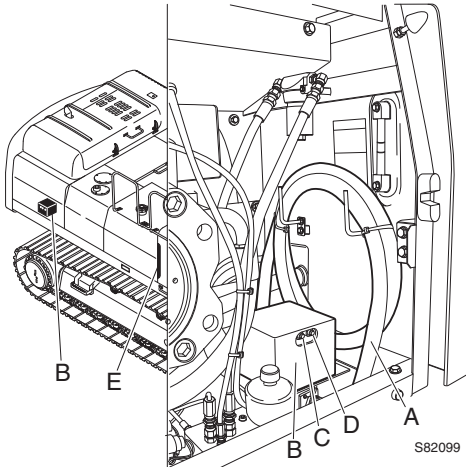
Never let the fuel filler pump idle. The pump may be damaged.

The pump is installed in the tool box. Use it when filling the fuel tank.

- 1 Connect the hose attached to the fuel pump to fill the fuel tank.
- 2 Operate the switch to start the pump.
- 3 Fill fuel while watching the fuel sight gauge.



- A Fuel filler pump hose
- B Fuel filler pump
- C Operating switch (ON / OFF)
- D Fuel level gauge



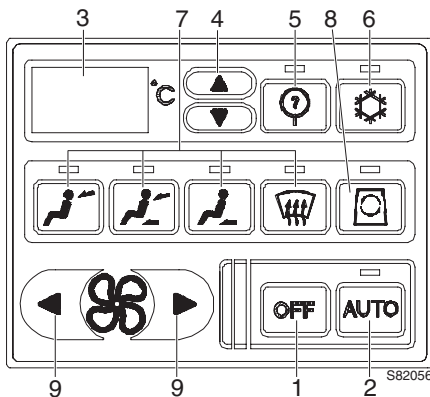
### Auto shut-off controller (option)

- 1 Connect the hose attached to the fuel pump to fill the tank.
  - 2 Press the green start button (C). Provided the tank is not full, pump will run (ON position).
- At any time during the refuelling operation or when the drum has been emptied the pump may be stopped by pressing the red button (D).
  - 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.

- A Fuel filler pump hose
- B Fuel filler pump
- C Green start button
- D Red (stop) button
- E Fuel level gauge

## Air conditioner/heater (option)

The heating and air conditioning system is ON and ready for operation when the electrical power is ON. This system operates when the automatic button is pressed.



### 1 Power switch

Press this switch to stop operating this system.

### 2 Automatic / manual switch

#### Automatic mode

- Lamp of automatic button (A) is ON
- Button for automatic air temperature control in accordance with the preset temperature(16 °C ~ 32 °C).
- This is changed to the manual mode when operating any button except temperature control button (4) and when system problem happens.
- This is changed to the failure mode if there is any problem in the system.

#### Manual mode

- Lamp of automatic button (A) is OFF.
- To control temperature in nine steps.  

<u>C4</u>	<u>C3</u>	<u>C2</u>	<u>C1</u>	H0	<u>H1</u>	<u>H2</u>	<u>H3</u>	<u>H4</u>
Cooling mode				→ heating mode				

 (These are controlled by temperature control buttons (4))

### 3 Display window

#### Auto mode

The display shows the preset temperature(16 °C ~ 32 °C).

#### Manual mode

To display C4 → C3 → C2 → H0 → H1 → H2 → H3 → H4

#### Failure mode

When the diagnosis button (5) is pushed for more than 3 seconds and if there are any problems in the system, an error code is displayed in display window (3).

When required, contact an authorized dealer workshop.

### 4 Temperature control buttons

When pressing or while pressing the buttons (up or down buttons), the preset temperature is adjusted.

The temperature is shown in display window (3).

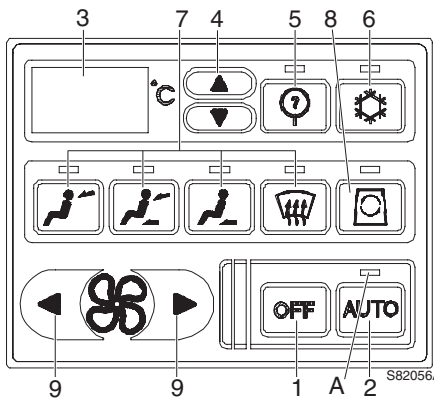
**To certify the temperature by fahrenheit, press 3 buttons (diagnosis button (5), 2 temperature control buttons (4)) more than 5 seconds simultaneously.**

**To return to the centigrade, redo the above.**

### 5 Diagnosis button

When pressing this button, error code of the air conditioning and heating system is shown in display window (3).





**6 Compressor ON/OFF switch**

The cooling system operates only when fan speed control button (9) is ON.

**7 Air flow selector button**

Ventilation is available in four modes.

**8 Recirculation button**

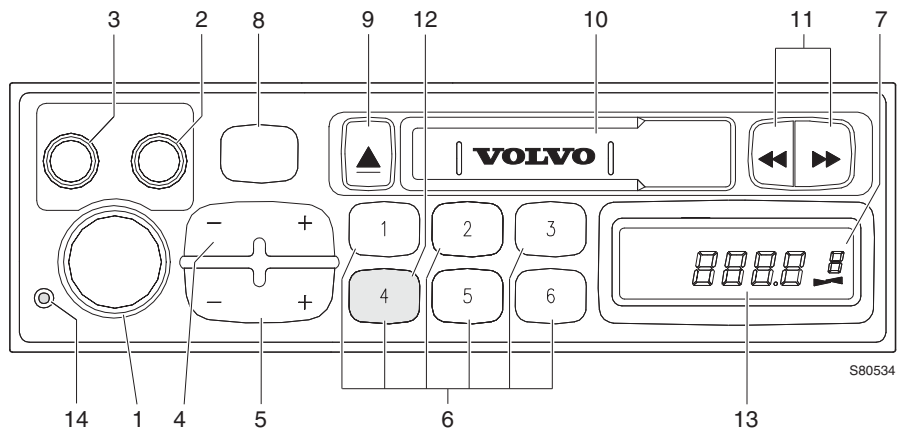
To circulate inside air or to draw in outside air.  
When the lamp is ON, it is to circulate inside air.  
When the lamp is OFF, it is to draw outside air.

**9 Fan speed selector button**

When pressing the left or right end of the button to decrease or increase the fan speed, the related lamp lights up and the fan speed changes.

OFF → 1st step → 2nd step → 3rd step → 4th step

## Radio and cassette player



- 1 Power/volume
- 2 Bass/treble
- 3 Balance
- 4 Seek/scan
- 5 Tune
- 6 Preset button
- 7 LCD for radio
- 8 Band selection button
- 9 Tape eject button
- 10 Cassette door
- 11 FF (▶▶)/REW (◀◀) button
- 12 Metal selection button
- 13 LCD for cassette
- 14 Power indicator





# Operating instructions

## Introduction

This chapter contains operating and safety instructions that must be followed to ensure proper, safe machine handling/operation.

However, these instructions do not relieve the operator from complying with national, provincial, state, municipal laws and regulations governing transportation safety, traffic safety, industrial safety and labour welfare.



## Running-in instructions

### General

#### IMPORTANT

##### **Check oil pressure and temperature often.**

During the running-in period, that is to say the first 50 hours, the machine must be operated with a certain amount of care. The reason for this is that all bearing surfaces should acquire hard, smooth surfaces which increase the service life considerably.

The following running-in instructions and intervals apply during the running-in period.

### Engine

The oil should be changed and the three filters replaced after 500 hours of operation when CH-4 class is used (250 Hours when CG-4 class is used). Thereafter the oil should be changed and the oil filters replaced **every 500 hours (or 250 hours)**.

#### **The conditions for the 500 (or 250) hour interval between oil changes are:**

- The three oil filters should be replaced each time the oil is changed.
- The oil filters should meet Volvo Construction Equipment specifications, which is the case with genuine parts from Volvo Construction Equipment.
- The sulphur content of the engine fuel must not exceed 0.3 percent by weight.
- The oil should be of a quality grade according to **Recommended lubricants** on page 177.
- The correct oil viscosity for the ambient air temperature is selected according to diagram. See **Recommended lubricants** on page 177.

**If any of these conditions cannot be met, or if the machine operates in an acidic or particularly dusty environment, the oil should be changed and filters replaced every 250 hours.**

### Hydraulic system

- The hydraulic return filter, drain filter and servo filter must be changed after 250 hours operation.  
Thereafter drain filter should be changed every 500 hours and servo filter and return filter should be changed every 1000 hours.
- The oil of swing drive case and track drive case should be changed after 500 hours operation.  
Thereafter the oil of swing drive case should be changed every 1000 hours.  
The oil of track drive case should be changed every 2000 hours.  
See **Recommended lubricants** on page 177.

## Safety and responsibility

### Operator duties

The operator should know and pay attention to the specific requirements and risks at his or her work site and discuss this with the rules stated below to learn how to avoid serious personal injuries and property damage.

### Responsibility for others

Operate the machine so that risks of accidents and injuries are avoided. An operator has an obligation and duty to prevent accidents.

When the machine is operating, no person may enter its working area without having first notified the machine operator. Any person who has to be within the working area of the machine to carry out some work must exercise care and not pass unnecessarily behind the machine or into the danger area.

**If a person is within the working area of the machine, the operator must observe extreme caution and care. The operator may only operate the machine when he or she can see the person, or the person has given clear indications of where he or she is.**

### Damage

It is the duty of the operator to report damage or wear which could endanger the safe operation of the machine.

### Operator qualifications



**WARNING!**

Only trained personnel may operate the machine.



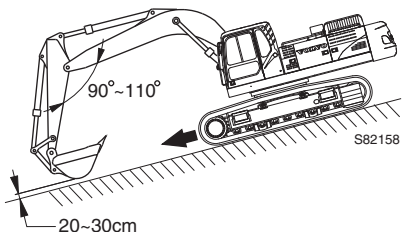
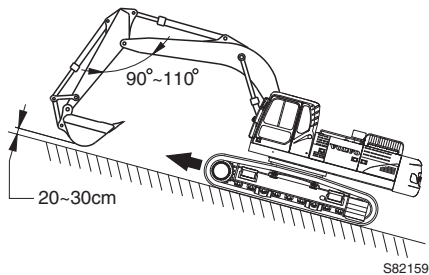
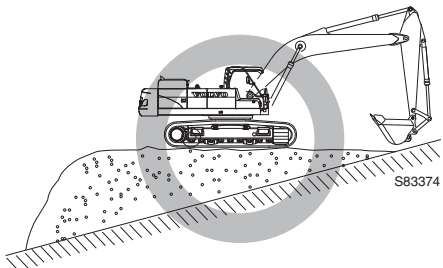
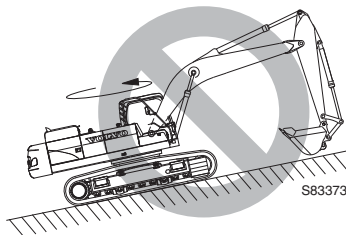
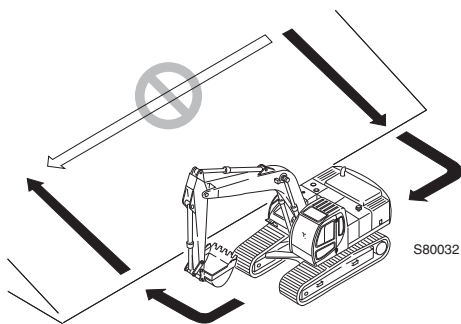
**WARNING!**

**It is not permitted to sit or stand in a place on the machine, so that it possibly interferes with the operator's ability to handle the machine properly and safely.**

### Machine knowledge

During inspections, maintenance and repair work on the machine, only a person with knowledge of the operation of the machine and its instruments, may be in the cab.





### Working on a slope



#### WARNING!

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

Do not descend backward on 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.

Do not perform swing work or operation of attachments.

The machine can turn over due to unbalance.

Especially, do not swing a loaded bucket. In unavoidable case, pile up earth on the slope, and make the machine level and stable.

Do not travel on a slope of 30 ° or more.

### Caution on a slope

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.

Be careful when opening or closing the doors on a slope, operational force may be changed rapidly.

Make sure to keep the doors closed.

When operating up on a slope of 15 ° or more, position the machine as illustrated.

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

When operating down on a slope of 15 ° or more, position the machine as illustrated and travel at low speed.

### In case of shoes slipping

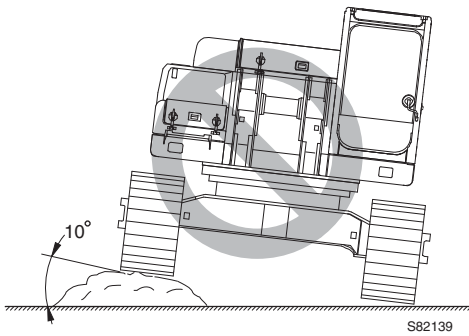
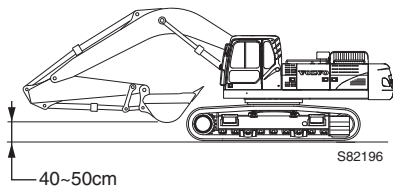
If the shoes slip on a slope, thrust bucket into the ground, and pull the arm in to assist the track drive to move the machine up the slope.

### In case of engine failure

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

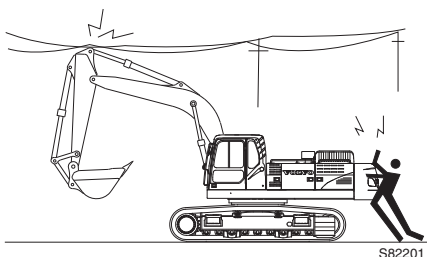
### Caution during traveling

In case of travelling on flat ground, retract the attachment and raise it 40 - 50 cm from the ground.



In case of travelling on uneven ground, operate the machine so as not to lean to one side more than 10 °.





### Never operate close to a high tension power line

You can receive an electric shock if the machine approaches close to a high tension power line. Physical contact is not necessary to draw current from the power line!

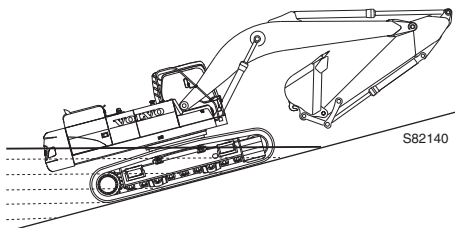
If working near a high tension power line, prohibit everyone from approaching the machine.

Contact the electricity supply company prior to working near overhead power lines.

For safety reasons, maintain the following minimum distance between the machine and the power line.

Voltage	Minimum distance to power line
0 ~ 1 KV	2 m (7 ft)
1 ~ 55 KV	4 m (13 ft)
55 ~ 500 KV	6 m (20 ft)

If the attachment comes into contact with the power line, stay in the cab, and if the machine remains functional, try to break the circuit by moving the attachment away from the power line.

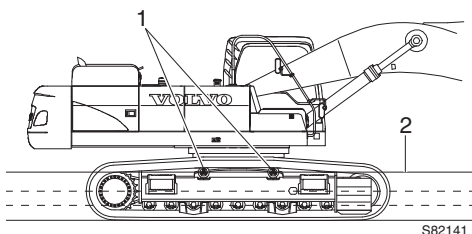


### Permissible depth of water



**WARNING!**

**When traveling out of water, if the rear of the upper body is under water, the engine fan may be damaged. Be careful in this situation.**



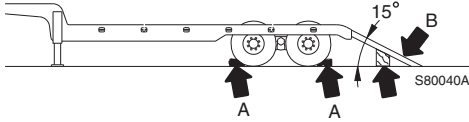
Permissible working depth in water is the center of upper rollers. Do not fully submerge the upper rollers.

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

- 1 Upper roller
- 2 Water level

## Transporting the machine

### Loading and unloading



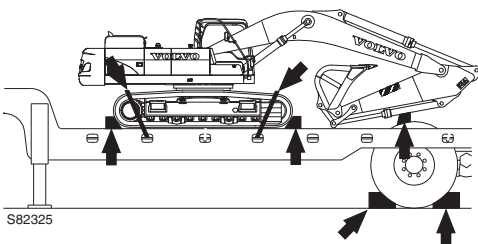
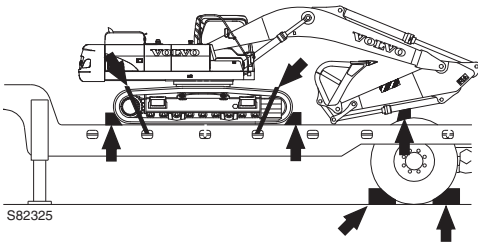
### WARNING!

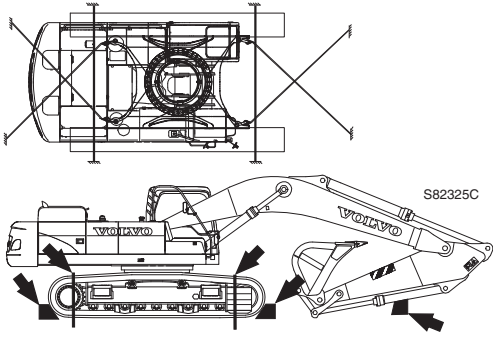
When transporting the machine, obey the relevant laws governing the weight, height, length and securing of a load. Choose a firm, level place, and keep ample distance from the road shoulder.

Remove grease, oil, mud, ice etc. from the planks and trailer bed to prevent the machine from slipping sideways. The auto idle switch on page 38 should be OFF to prevent any possibility of automatically increasing engine speed which may occur when you operate the control levers and / or travel pedals with auto idle switch ON.

Operate the engine at low speed, and set machine travel speed to LOW.

- 1 Apply the brake of the trailer.
- 2 Insert blocks (A) in front of and behind the trailer tyres.
- 3 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.
- 4 Check whether the right and the left loading ramps are of the same height.
- 5 Set the travel speed at Low speed.
- 6 Turn the auto idle switch OFF.
- 7 Operate the engine at LOW speed.
- 8 Decide the direction and travel slowly onto the loading ramps and trailer bed / platform.
  - 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.
- 9 Load the machine on the trailer properly and ensure it is firmly secured.





### Securing the machine

- 1 Move the safety bar down to lock the systems securely, See **Safety locking system on page 60.**
- 2 Stop the engine and remove the ignition key.
- 3 Turn OFF the battery master switch, See **Mute switch (option) on page 44.**
- 4 Lock the door and the access covers.
- 5 Cover the exhaust pipe to prevent turbocharger damage.
- 6 Block each track and secure the machine with tie downs of adequate load rating so that the machine cannot move.



## Protection from falling or scattering materials

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

Install front guards when working with a breaker.

In mining applications, FOPS shall be adopted.

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

For other work, install the necessary guards as appropriate where falling or scattering materials are capable of entering the operator's cab.

Ensure that non-essential personnel keep a safe distance from both the machine and falling/scattering materials.

Release the bolts (A,B), and then FOG & FOPS are tilted

**Fasten the bolts (A,B) by regulated torque with pushing FOG & FOPS after cleaning or maintenance.**

A : Bolts regulated torque  $2.3 \pm 0.23 \text{ kg}\cdot\text{m}$  ( $5.57 \pm 1.0 \text{ lb}\cdot\text{ft}$ )

B+C: FOG (Falling Object Guard)

$73 \text{ kg}\cdot\text{m}$  ( $162 \text{ lb}\cdot\text{ft}$ )

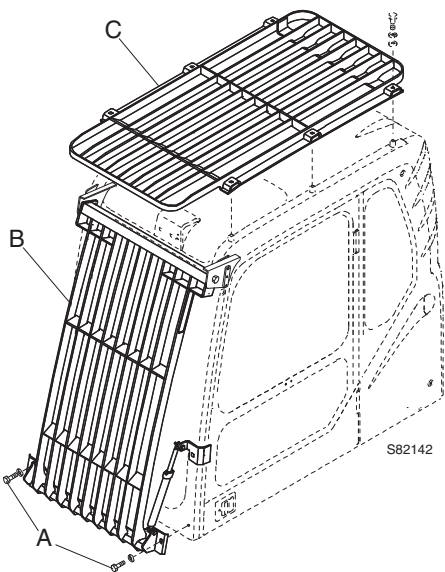
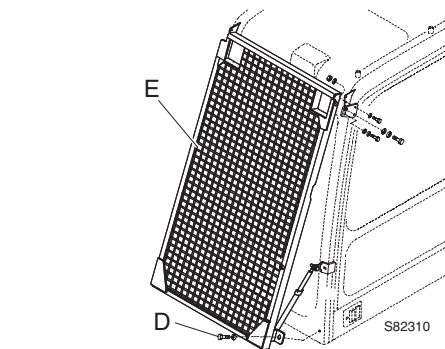
C : FOPS (Falling Object Protection Structure)

$80 \text{ kg}\cdot\text{m}$  ( $177 \text{ lb}\cdot\text{ft}$ )

D : Bolts regulations worker  $2.3 \pm 0.23 \text{ kg}\cdot\text{m}$  ( $5.57 \pm 1.0 \text{ lb}\cdot\text{ft}$ )

E : Front net

$30 \text{ kg}\cdot\text{m}$ ,  $67 \text{ lb}\cdot\text{ft}$ )



### WARNING!

Don't operate the machine while FOG (Falling Object Guard), FOPS (Falling Object Protection Structure) are tilted. Otherwise, FOG & FOPS can be damaged by the bucket.

## Caution for optional working attachment

Read this manual and the attachment manual before operating with attachments.

Do not use any attachment not authorized by your Volvo dealer.

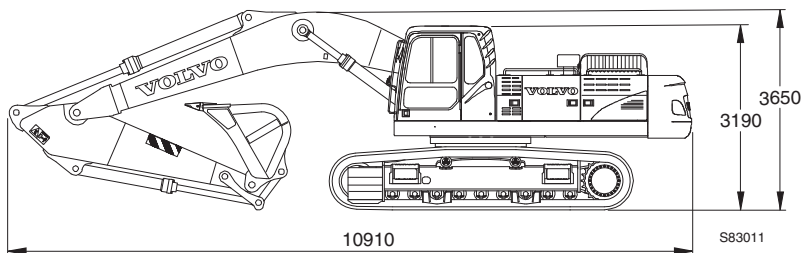
Accidents or machine damage from unauthorized attachments shall be considered as user's own responsibilities.

## Disassembling for transportation

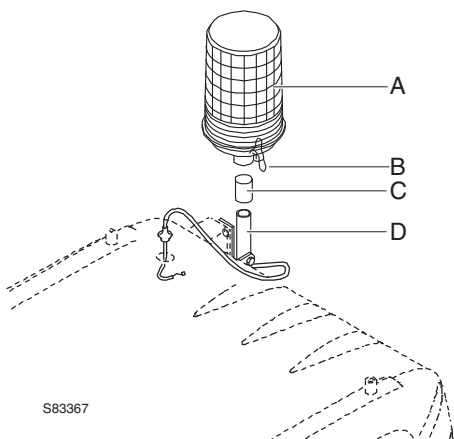
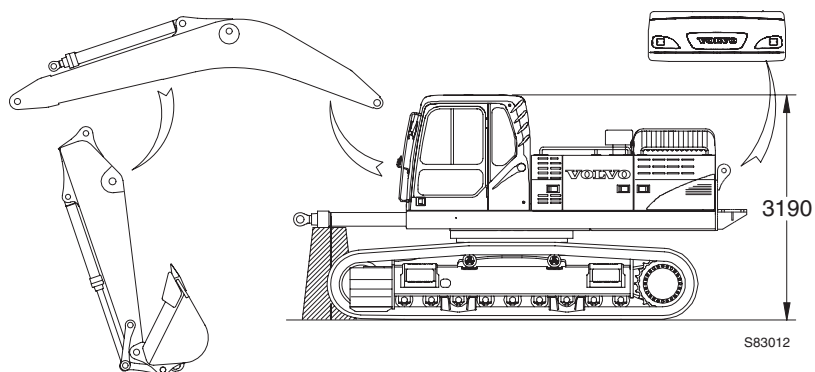
**NOTE :**

If any country (state) has its own regulation for machine weight limitation of transportation, disassemble the related parts for transportation.

Complete dimensions.



Parts to be disassembled for transportation.



### Rotating beacon lamp (option)

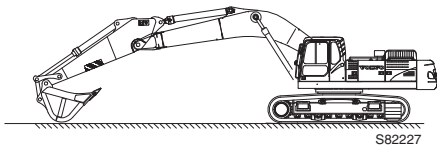
When transporting the machine, dismantle rotating beacon lamp (A) not to be damaged.



- 1 Loosen the wing nut (B) and dismantle the rotating beacon lamp (A).
- 2 Keep the rotating beacon lamp (A) in the cab during transportation.
- 3 Put the rubber cover (C) on the bracket (D).

## Disconnecting hydraulic hoses and lines



Immediately after operating the machine, the hot hydraulic oil can cause severe burns on unprotected skin. Hydraulic pressure can remain in the hydraulic system. Serious injury can result if this remaining pressure is not released before any service is done on the hydraulic system.



- 1 Position the machine on even, firm and level ground.
- 2 Retract the bucket cylinder and arm cylinder completely.
- 3 Lower the boom to the ground as shown.
- 4 Stop the engine.
- 5 Move the safety bar down to lock the system securely, See **Safety locking system on page 60**.
- 6 Turn the engine start switch to ON  position. Do not start the engine.
- 7 Pull up the safety bar, Move the left and right operating levers, respectively to the full extension in all directions to remove internal pressure from the hydraulic circuits.
- 8 Turn the start switch to OFF  position.
- 9 Release internal pressure in the hydraulic tank through the air breather of the hydraulic tank.
- 10 Disconnect hoses and lines.  
**Treat oil in an environmentally safe way!**
- 11 Dismantle the components (boom, arm, counterweight etc.)



## Disassembling components for transportation

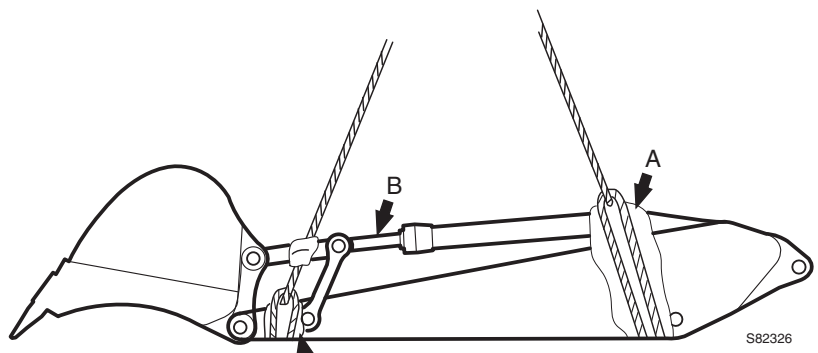
### IMPORTANT

Follow the disconnecting hydraulic hoses and lines' procedure before disassemble the components.

### Bucket and Arm with bucket cylinder

Use cable sheaths (A) to protect the lifting cable from being damaged by the edges of the arm.

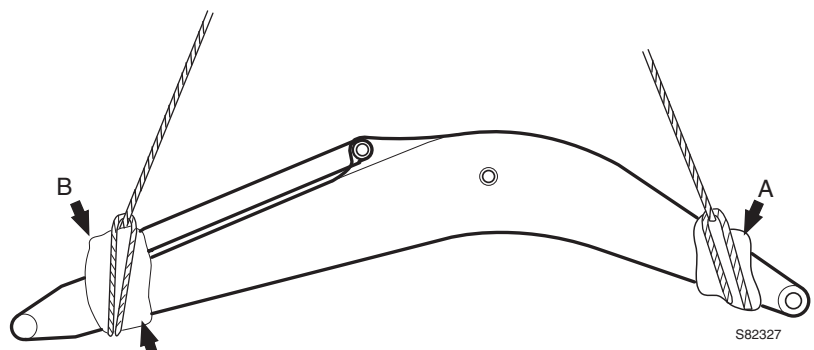
Protect the piston rod (B) and the cylinder tube.



### Boom with Arm cylinder

Use cable sheaths to protect the lifting cable from being damaged by the edges of the boom.

Secure piston rod (B) of the arm cylinder to the cylinder tube.



### Counterweight

See *Counterweight removal and installation* on page 84.

## Lifting machine

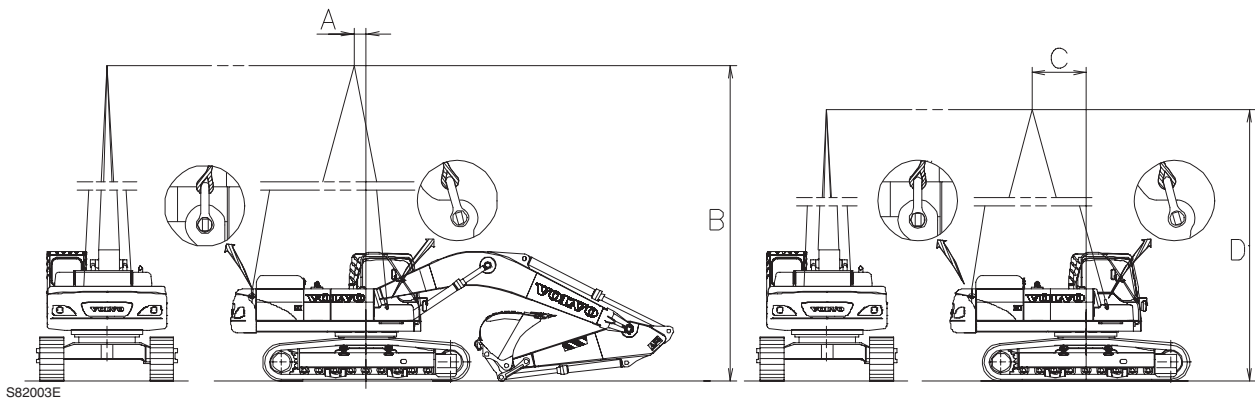


### WARNING!

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

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

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



S82003E

	A		B		C		D	
	mm	inch	m	ft	mm	inch	m	ft
EC330B	-40~60	-1.6~2.4	14	45.9	1050	41.3	8.5	27.9

Lift the machine on flat, firm and level ground.

- 1 start the engine, and set the attachment as illustrated. Position the upper structure boom forward over the idlers.
- 2 **Move the safety locking lever down to lock the system securely, See *Safety locking system on page 60.***
- 3 Stop the engine, check the safety around the machine, then close and lock the front window cab door, and engine hood securely.
- 4 As shown in the illustration, connect lifting cables or slings with sufficient strength for the machine weight at the lifting points correctly.
- 5 After installation of all hoisting equipment, lift the machine a little to check its balance, if satisfactory, lift it slowly and evenly.

## Counterweight removal and installation

### Standard machine

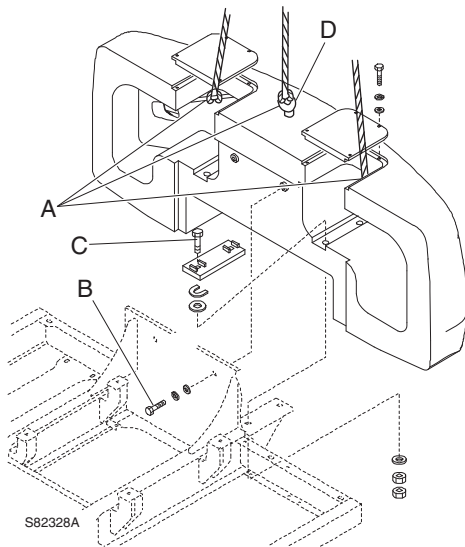


#### WARNING!

Move the safety locking lever down to lock the system securely, See *Safety locking system on page 60.* and attach a warning tag (do not start the engine) to the left operating lever.

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

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



### Counterweight removal

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.
- 2 Keep the service position.
- 3 Pull the safety locking lever securely, See *Safety locking system on page 60.*
- 4 Remove two covers and a plug from the top of counterweight.
- 5 As shown in the illustration, connect the lifting cables or slings after fastening eye bolt (D) with sufficient strength for the counterweight(8,500 kg) at the lifting points (A) correctly.
- 6 Disassemble six bolts (B, C).
- 7 Lift the counterweight enough.
- 8 Place the counterweight onto suitable support.

### Counterweight installation

- 1 Position the machine on flat, firm and level ground, free from any obstructions or interference.
- 2 Keep the service position.
- 3 Pull the safety locking lever securely.
- 4 As shown in the illustration, connect the lifting cables or slings after fastening eye bolt (D) with sufficient strength for the counterweight(8,500 kg) at the lifting points (A) correctly.
- 5 Lift the counterweight enough to fasten with bolts on the brackets.
- 6 Assemble six bolts (B, C).
- 7 Disconnect the lifting cables or slings for the counterweight at the lifting points(A).

8 Cover two covers and a plug from the top of counterweight.

Tightening torque of bolts

B: bolts:  $90.2 \pm 9$  kg·m

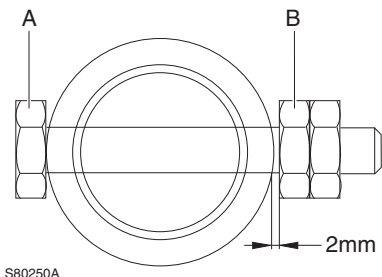
C: bolts:  $135 \pm 5$  kg·m

D: eye bolt specification: M48-P5



# Changing bucket

## Remove bucket

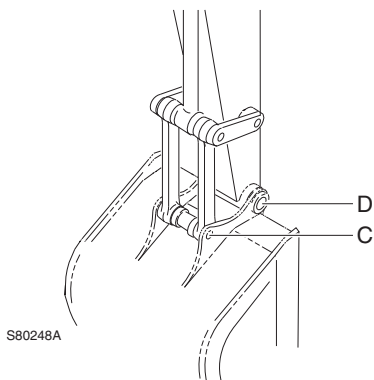


**WARNING!**

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

Support the removed bucket to stabilize it.

- 1 Lower the bucket lightly onto the ground.
- 2 Remove lock bolt (A) and nut (B) of each pin
- 3 Remove pin (C and D), then remove the bucket.



### IMPORTANT

Keep the pins clean and do not damage O-ring (E).

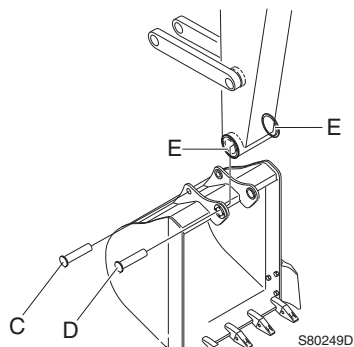
## Install bucket



**WARNING!**

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

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



### IMPORTANT

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



## Hydraulic quickfit (s1) (option)

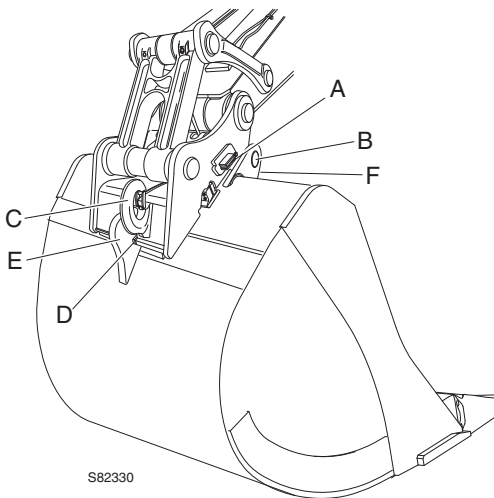
The quickfit consists of a flat plate assembly which is fitted to the arm end and bucket link. There are two hooks (F) on the plate, for the front pins (B) on the bucket.

There is a lifting hook (C) on the quickfit. With the bucket removed, the permitted load increases and the operator's field of vision is improved.

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

When 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 left side of the quickfit, which is pulled in when the locking wedge is in the locked position and pushed out when the locking wedge is released.



S82330

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

 **WARNING!**

When attaching or disconnecting a quickfit, make sure nobody enters the working area.

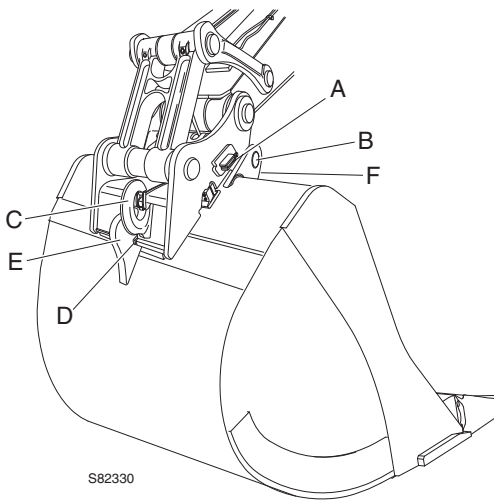
 **WARNING!**

If the central warning lamp and quickfit indicator light up the quickfit is open, and if the bucket is still in the quickfit, the arm must not be manoeuvred. If this should be necessary anyway, use the greatest possible care, since the bucket can suddenly loosen and fall off.

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



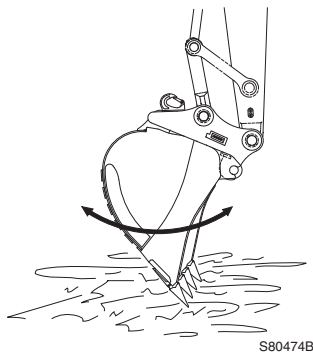
S80471



## Removaing bucket

- A: Red indicator pin
- B: Bucket pins
- C: Lifting hook
- D: Locking wedge
- E: Bucket rear hook
- F: Hooks for gripping attachment

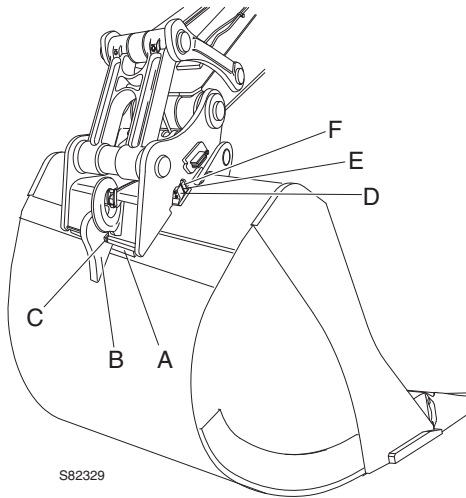
- 1 Position the machine on even, firm and level ground with the bucket resting on the ground.
- 2 Press the two quickfit switches, See **Quickfit switch (option)** on page 40.  
If quickfit is open, the central warning lamp and quickfit warning lamp are ON, and the warning buzzer is audible.
- 3 When red indicator pin (A) on the quickfit is completely extended, carefully free the bucket from the quickfit by operating the bucket cylinder to its end position, (bucket out). If the red indicator pin (A) is not extended, increase the hydraulic pressure to the lock cylinder by carefully moving the bucket cylinder to its outer end position (bucket in), and keeping it under pressure for about a second.
- 4 Disconnect the bucket by moving the arm outward and raising the boom.



## Installation of bucket

- 1 Press the two quickfit switches, See **Quickfit switch (option)** on page 40. and **Quickfit switch (option)** on page 40.
- 2 Check that red indicator pin (A) is fully extended.
- 3 Operate the arm to such a position that the two hooks on the quickfit engage the front pin of the bucket.
- 4 Turn the quickfit slowly towards the bucket, by moving the bucket cylinder (bucket in) until the quickfit mates up correctly against the bucket.
- 5 Check that the quickfit is correctly aligned against the tip of the bucket, if necessary, adjust with arm or boom movements.
- 6 Check that red indicator pin (A) is completely pulled into the quickfit.  
In case of a satisfactory installation, the warning lamp will be OFF.
- 7 **Do the following tests to check that the quickfit is firmly fastened.**
  - Press the bucket to the ground.
  - Operate the bucket cylinder in and out to check that locking wedge (D) is securely seated.  
If you are not sure, check that locking wedge (D) has gone into the hook.

## Adjustment attachment



- A: Shims
- B: Bucket hook
- C: Locking wedge
- D: Screw holder
- E: Spacer
- F: Attachment bracket



- 1 Remove any shims between screw holder (D) and the mating plates.
- 2 Hook the bucket on and lock it in accordance with the instructions for installing a bucket.

### IMPORTANT

#### Check whether spacer and shim are fitted correctly.

- 3 Check locking wedge (C) position and the way the quickfit butts up against the mating plates.
- 4 Calculate any adjustment to the plate shims as follows:
  - Remove the bucket in accordance with the instructions for removing a bucket.
  - Fit the requisite number of shims beneath the mating plates.  
Fit thicker shims, if the locking wedge goes too far into the hook.  
Fit thinner shims, if the locking wedge does not go far enough into the hook.
  - Install the bucket.
  - Check that the locking wedge position is in accordance with the specified tolerances.
  - Measure, and install the requisite number of shims between the screw holder and the mating plates.

## Selecting track shoe

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

## Hose rupture valves (option)

### General

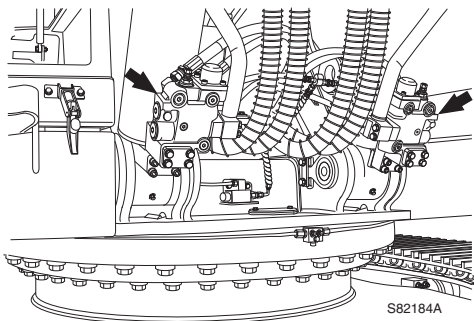


**WARNING!**

Do not dismantle the hose rupture valve yourself. It is a pressure-loaded valve, if dismantling is attempted the components inside the valve and which are under spring tension may be expelled with great force causing personal injury or injury to others.

Contact an authorized Volvo CE dealer workshop, if problems occur.

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



The hose rupture valves are mounted directly in the inlet port of each boom cylinder.

### Boom lowering after hose rupture

**Never stand beneath a raised boom.**

There are three cases when you have to lower the boom mechanically.

#### 1 Engine running

Lower the boom with the right operating lever in the usual way. Collect the oil from the ruptured hose in a suitable vessel.

#### 2 Engine stopped

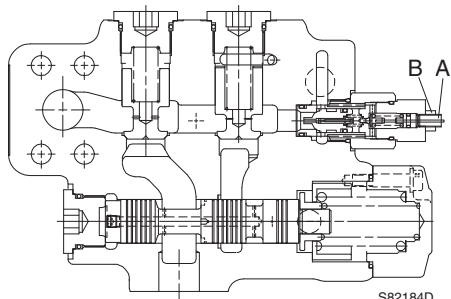
The servo hydraulic pressure is maintained by a pressure accumulator for a few minutes, which permits the operator to lower the boom in the usual way. Do not wait too long to lower the boom, the pilot pressure will reduce at a speed depending on your machine's condition and equipment. Collect the oil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

#### 3 Engine stopped and no servo hydraulic pressure

- 1 Loosen lock nut (B) with a 13 mm spanner and turn adjusting screw (A) with a 4 mm L-wrench counter-clockwise slowly.

**Before turning the adjusting screw, mark its position to facilitate assembling later (pressure setting 365 kgf / cm)**

The boom will then slowly be lowered to the ground.



**WARNING!**

If the adjusting screw is screwed out completely, the oil under pressure may cause personal injury, and an uncontrolled boom drop

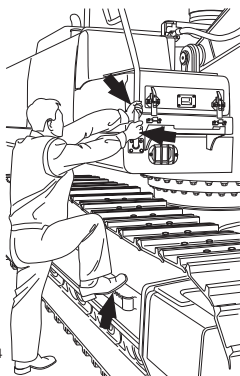
- 2 Turn adjusting screw (A) to its original position.
- 3 Hold adjusting screw (A) securely and tighten lock nut (B).
- 4 Contact an authorized Volvo CE dealer workshop.

## Before operating

### General rules



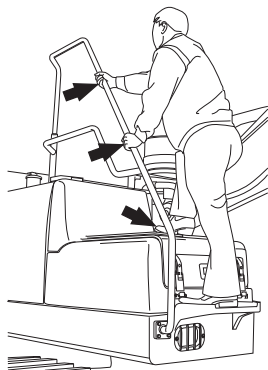
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S82103



S82105



#### WARNING!

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

#### – Read and understand:

- This Operator's Manual before you begin to operate the machine
- Plates and instructions which are attached to the machine before you begin to operate or service the machine.

- Faults and defects which affect the safety must be remedied before starting.

#### NOTE:

**The machine should stand in the service position when the checks are carried out, See *Service position on page 120.***

- When starting the engine indoors, make sure that the extraction capacity of the ventilation system is sufficient.
- Always sit in the seat when starting the engine.
- The door must be closed when operating.
- Never operate the machine for long periods without ventilation (to avoid lack of oxygen).
- Use the lap type seat belt for all operations. This applies both to operator and any passenger.
- Never operate the machine while under the influence of alcohol, medicine or other drugs.
- To avoid getting hands or fingers pinched - keep your hands away from where there is a risk they could get pinched (covers, doors, windows etc.).
- When you are entering or leaving the machine, always face the machine and use the steps and hand-holds. Always use the three point approach, i.e. two hands and one foot, or one hand and two feet. **Do not jump!**
- Do not climb on surfaces which are not intended for this.
- Only use the surfaces which are provided with anti-slip material.
- Suitable clothing for safe handling should be worn.
- Wear a hard hat for increased head protection.
- The cab has two escape routes: through the door or via the rear right side window. Smash the window pane with the emergency hammer. See **Emergency exit** on page 65.
- **Never use** communication equipment, e.g.a mobile telephone, which is not correctly installed in the cab, while the machine is running. The communication equipment signals may interfere with important electronics in the electrical system of the machine. A mobile telephone must be connected to the electrical system of the machine and connected to an external, permanent aerial according to the instructions of the manufacturer.
- **Do not overload the machine. Overloading impairs safety.**

## Procedures before starting

### IMPORTANT

**Always walk around the machine before starting and check that there are no persons in the immediate vicinity of the machine.**

- 1 Place the machine in the service position. See **Service position on page 120**.
- 2 Carry out daily maintenance. See **Lubrication and service chart** on page 172.
- 3 Adjust the seat so that you comfortably and safely can operate all controls and pedals.
- 4 Check instruments and control lamps. See **Checking instruments, warning and control lamps** on page 95.
- 5 Check that head lamps, windscreen wipers/washer, reflectors etc. are in a serviceable condition.
- 6 Check that there are no leaks.
- 7 Check that there are no faulty or loose parts which can cause damage.
- 8 Check that there is fuel in the tank\*
- 9 Check that engine hood and guard plates are closed.

\* If the fuel tank has been run dry or if air for any other reason has entered the fuel system, this must be bled before the engine can be started. See **Bleeding fuel system of air** on page 138.

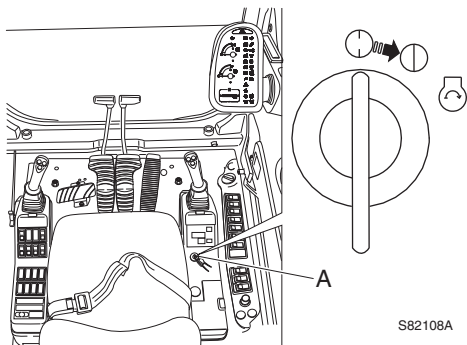
## When starting

- 1 Clean/defrost the windows.
- 2 Always sit in the operator seat when you are starting the engine/the machine, See **Starting engine** on page 96.
- 3 Fasten the seat belt before all operation.
- 4 Do not move off until the central warning lamp has gone out.
- 5 Check that all gauges, controls and instruments are functioning.
- 6 Check that no persons are near the machine before you move the machine.
- 7 **Sound the horn.**
- 8 Finally, move the safety locking lever up to be able to operate the working and travelling hydraulics.



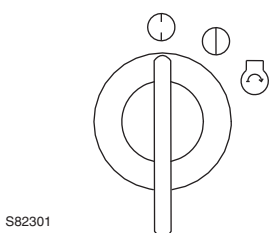
### Start switch

The start switch (A) has three position.



### Stop position

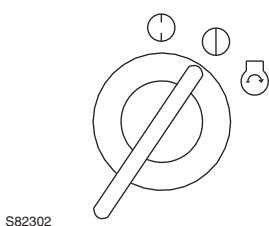
The engine stops immediately.



### Running (preheating) position

When the switch is in this position:

- The electronics is started up
- The electronics is up and running
- The preheating will be connected.

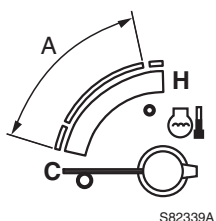


### IMPORTANT

Do not repeat to turn on and off the ignition key under engine cooled (below 20 °C).

The preheating function still remains if you repeat to turn on and off the ignition key when the engine is under 20 °C, which may damage and fire cable.

Preheat the machine fully (by when the pointer of cooling gauge on the instrument is within the range of 'A') to repeat to turn on and off the ignition key for service or other purpose.

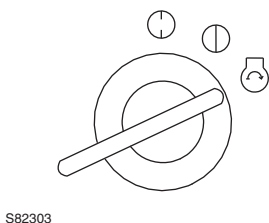


### Starting position

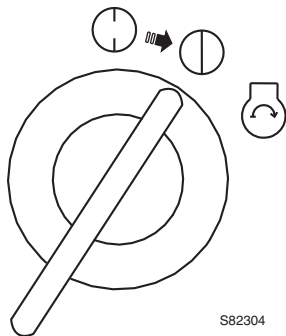
When the switch is in this position

- The starter motor will be engaged.

See **Safety locking system on page 60.**







S82304

### Checking instruments, warning and control lamps

Turn the switch to running (Ⓡ) position, then the following control lamps should light up:

The lamps are ON for three seconds and the buzzer sounds twice.

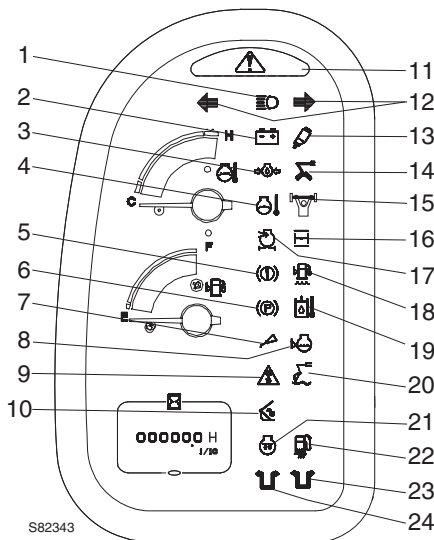
Battery charge warning and engine oil pressure warning lamps still light up before starting.

If any of these lamps does not light up, either the lamp is faulty or there is a fault in the electrical system.

All lamps should be OFF when the engine is running

If any of these lamps are not ON, either the lamp is faulty or there is a fault in the electrical system.

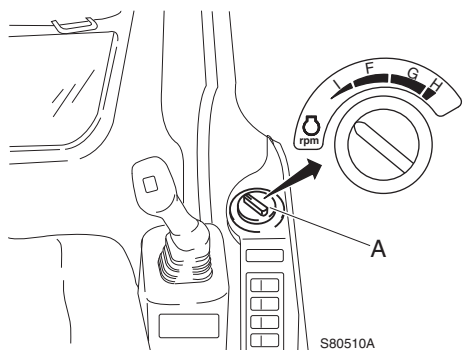
All lamps should be OFF when the engine is running.



S82343

Number	Color	Name
1	Blue	Work lights lamp
2	Red	Battery charge warning lamp
3	Red	Engine oil pressure warning lamp
4	Red	Engine coolant temperature warning lamp
5	Red	Brake oil pressure warning lamp
6	Red	Parking brake lamp
7	Red	Automatic lubricating pilot lamp
8	Red	Coolant level lamp
9	Red	Overload warning lamp
10	Red	Quickfit lamp
11	Red	Central warning lamp
12	Green	Left/Right turn signal lamp
13	Green	Hammer selecting indicator lamp
14	Green	Shear selecting indicator lamp
15	Green	Power boost lamp
16	Amber	Oscillation lock lamp
17	Amber	Air cleaner clogging warning lamp
18	Amber	Water separator indicator lamp
19	Amber	Hydraulic oil temperature warning lamp
20	Green	Float operating indicator lamp
21	Amber	Air preheating lamp
22	Green	Fuel heater lamp
23	Green	Emergency steer readiness lamp
24	Amber	Emergency steer operating lamp





## Starting engine

See *Safety locking system* on page 60.



After checking for personnel and obstructions around the machine, start the engine and sound the horn. Do not operate the operating levers and switches when starting.

### IMPORTANT

Do not hold the key at the STARTING (⌚) position for more than 20 seconds, as this could seriously damage the starting system. After 2 minutes try to start the engine again.

If abnormal sounds, excessive vibration, or abnormal operation occurs, turn the key to STOP (⊖) position to stop the engine immediately.

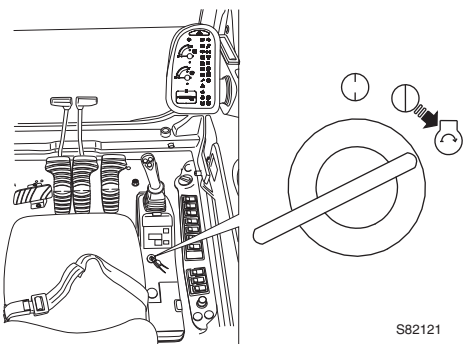
**NOTE :** Make sure the safety bar is in the downward (lock-out) position, otherwise the engine cannot be started.

### At temperature above 0°C (+32°F)

- 1 Turn engine speed selection switch (A) to the low speed position. See *Engine speed control switch* on page 37.
- 2 Turn the key to the starting position (⌚). See *Start switch* on page 94.
- 3 Release the key when the engine has started.

#### If the engine dose not start:

- 4 Wait until the engine has stopped completely.
- 5 Turn the key back to the stop position (⊖) before a new starting attempt is made.

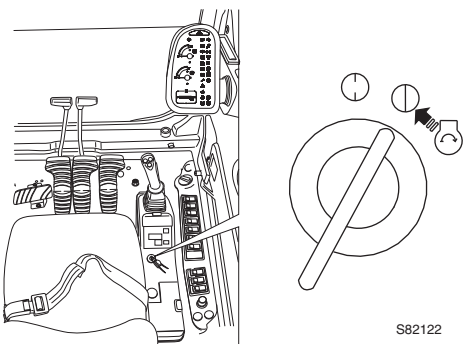


### At temperature below 0°C (+32°F)

- 1 Turn engine speed selection switch (A) to the low speed position. See *Engine speed control switch* on page 37.
- 2 Turn the key to the running (preheating) position (⌚). See *Start switch* on page 94.
- 3 After preheating indicator is OFF, turn the key to the starting position (⌚)
- 4 Release the key when he engine has started.

#### If the engine dose not start:

- 5 Wait until the engine has stopped completely.
- 6 Turn the key back to the stop position (⊖) before a new starting attempt is made.



## Procedures in cold weather

During the cold season or at temperatures below 0°C (+32°F), note the following points:

- Make sure that the freezing point of the coolant corresponds to the weather conditions. See **Coolant with antifreeze and corrosion protection** on page 145.
- Use recommended lubricating oil for winter use. See **Recommended lubricants** on page 177.
- Fill the fuel tank after work has finished for the day, to counteract the formation of condensation water in the tank
- When the engine has started, run it at low speed and light loading until the oil in the engine and hydraulic system has warmed up and become more fluid to provide proper lubrication.

### IMPORTANT

When it is very cold (below -15°C/+5°F) the machine must not be put to hard work immediately after the engine has been started. Allow the engine to idle for 10~15 minutes.

### NOTE :

Start with booster batteries. See **Starting with booster cable** on page 129.



# Operating machine

## Operating attachment

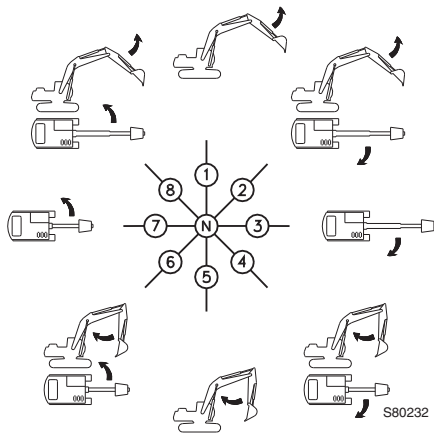


### WARNING!

While auto idling, if an operating lever is operated, the engine speed returns to its original speed.

### Left operating lever

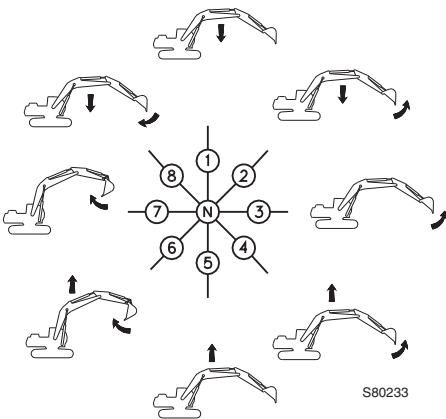
This lever controls swing and arm.



- N Neutral (upper frame and arm are maintained at rest position.)
- 1 Arm out
- 2 Arm out and right swing
- 3 Right swing
- 4 Arm in and right swing
- 5 Arm in
- 6 Arm in and left swing
- 7 Left swing
- 8 Arm out and left swing

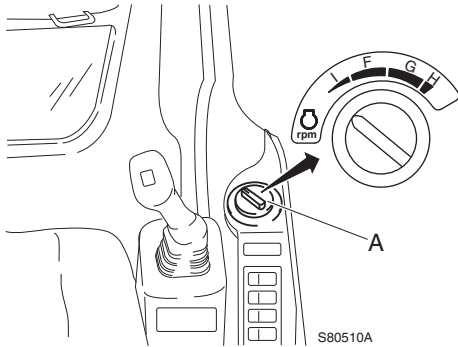
### Right operating lever

This lever controls boom and bucket.



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

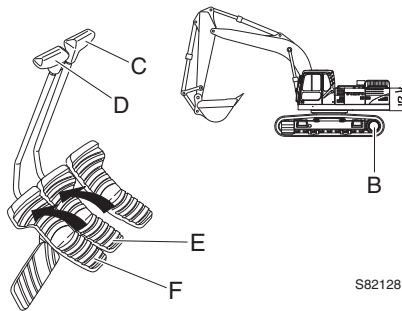
## Travel direction control



**Check the track direction before operating travel levers or pedals. If the sprocket is at the front of the machine, travel levers (pedals) must be operated in the opposite direction. Do not change the travel direction rapidly. Especially, in case of stationary direction change, stop the machine.**

### Forward travel

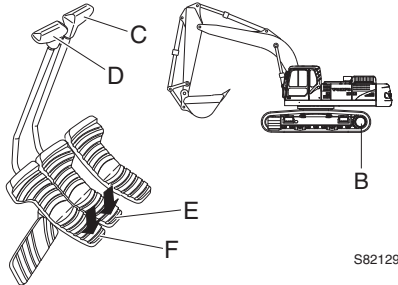
- 1 Turn engine speed selection switch (A) to the high position to increase engine speed.
- 2 When sprocket (B) is at the rear of the machine, push lever (C and D) forward slowly or press the front of pedal (E and F) slowly.



When sprocket (B) is at the front of the machine, pull lever (C and D) backward slowly or press the rear of pedal (E and F) slowly.

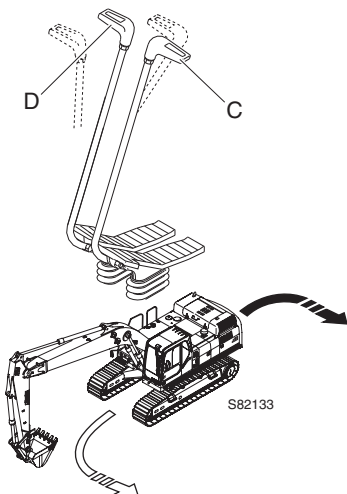
### Reverse travel

- 1 Turn engine speed selection switch (A) to the high position to increase engine speed.
- 2 When sprocket (B) is at the rear of the machine, pull lever (C and D) backward slowly or press the rear of pedal (E and F) slowly.



When sprocket (B) is at the front of the machine, push lever (C and D) forward slowly or press the front of pedal (E and F) slowly.





### Left turning

**When the sprocket is at the rear of the machine:**

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

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

**When the sprocket is at the front of the machine,**

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

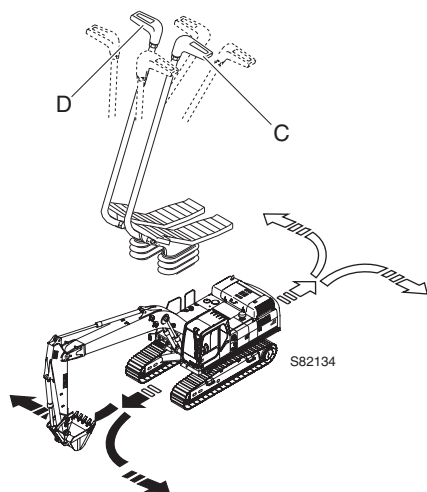
### Right turning

Push left lever (C) forward, the L/H track rotates forward and the machine **travels forward** as it turns to the **right**.

Pull right lever (D) backward, the R/H track rotates in reverse and the machine **travels forward** as it turns to the **right**.

**When the sprocket is at the front of the machine,**

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



### Counter-rotation

**When the sprocket is at the rear of the machine:**

Pull 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 right lever (D) backward, the R/H track rotates reverse; simultaneously push left lever (C) forward, the L/H track rotates forward and the machine **turns on the spot** quickly to the **right**.

**When the sprocket is at the front of the machine,**

Operate right lever (C and D) in the opposite direction as to above.

## After operating



### WARNING!

When you are entering and leaving the machine, always face the machine and use the steps or hand holds to avoid slipping. Always use the three-point stance, i.e. two hands and one foot or two feet and one hand when climbing up onto or descending from the machine. Do not jump!

## Stopping machine

### IMPORTANT

Select level ground to park the machine.

- 1 Put the left and right operating levers to neutral position.
- 2 Turn the engine speed control switch to low idle speed position.
- 3 Lower the bucket to the ground, keeping the bottom of the bucket parallel to the ground.
- 4 **Move the safety locking lever down to lock the hydraulic system securely. See *Safety locking system* on page 60.**

## Stopping engine

### IMPORTANT

Run the engine at low idle speed for a few minutes before stopping it to safeguard lubrication of the turbocharger.

- 1 Turn the starting switch to stop (⏻) position

### NOTE :

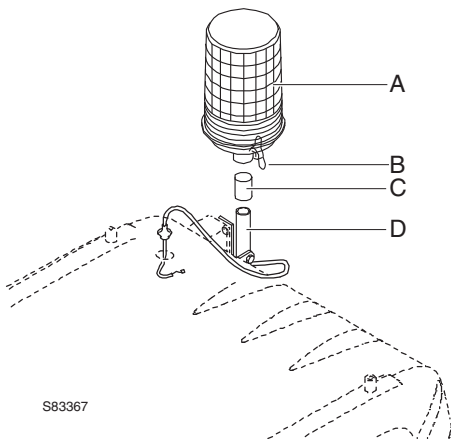
If the machine is to be left for any length of time, the current should be turned OFF with the battery master switch. See *Long-term parking* on page 102.

## Rotating beacon lamp (option)

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

- 1 Dismantle the rotating beacon lamp (A) with loosening the wing nut (B) Loosen the wing nut (B) and dismantle the rotating beacon lamp (A).
- 2 Keep the rotating beacon lamp (A) in the cab during transportation.

Put the rubber cover (C) on the bracket (D).



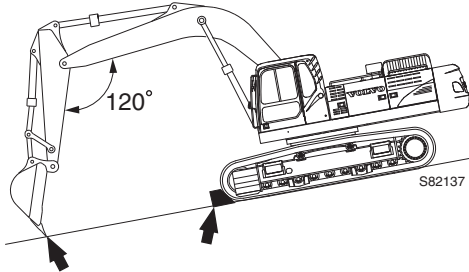
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## Parking

### General

#### IMPORTANT

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



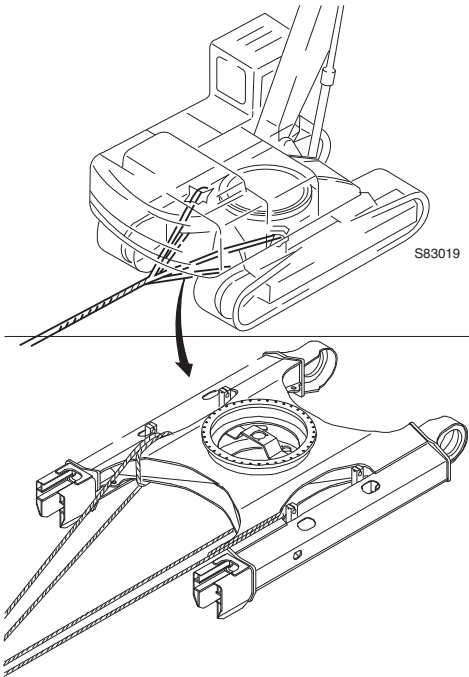
- Pay attention to the weather and take the appropriate steps so that the machine does not freeze to the ground, sink or suffer any other consequences.
- Place switches and operating controls in the switched off/neutral position.
- Move the safety locking lever down to lock the system securely. **See *Safety locking system on page 60.***
- Close windows, lock the cab door and all covers.
- Turn OFF the battery master switch.

### Long-term parking

Follow the instructions as for parking and in addition:

- Check the machine for leakage of oil or water, and defects of the attachments and the tracks.
- Remove soil deposits and debris from the tracks and rollers.
- With rust proof exposed components, lubricate the machine thoroughly.
- Fill fuel and hydraulic tanks to the maximum marks.





## Towing method



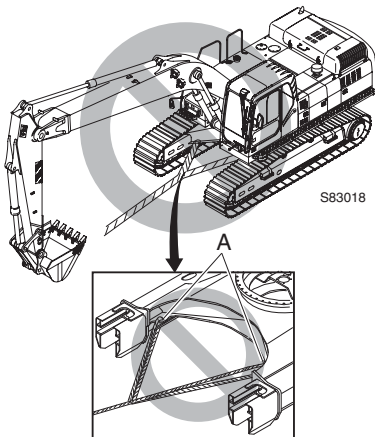
### WARNING!

Use a wire rope of sufficient strength for the towing.

### Towing for heavy objects

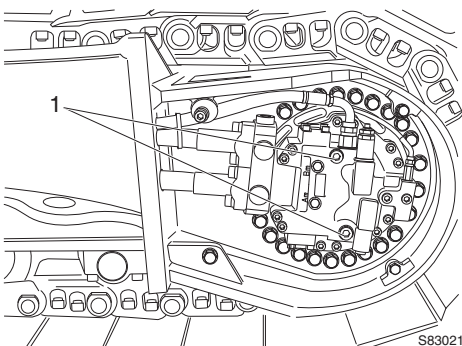
In the event of slipping into swampy ground or towing heavy objects, attach a wire rope to tow the machine as shown in the illustration.

Put wood blocks between the wire rope and the machine to protect the machine and wire rope from damage.



### NOTE :

Do not use shackle holes (A) to tow the machine. The holes are only for anchoring when transporting the machine. See *Transporting the machine* on page 77.



### Manual release of negative brake

When pulling the machine due to track motor and gearbox trouble, the negative brake should be released.

1 Remove two plugs ( ) in the valve casing. Screw in 2 cap-screws M16 (130 mm) to tap into the brake piston. Pull out the piston and the brake will be released.

1 Plug for brake release.

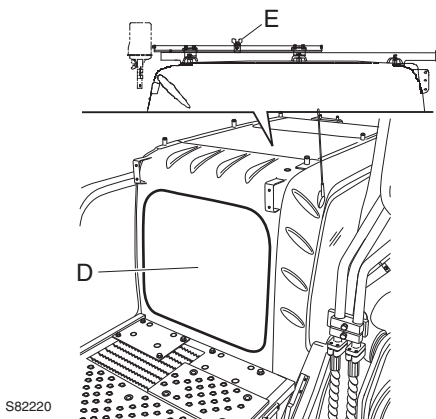
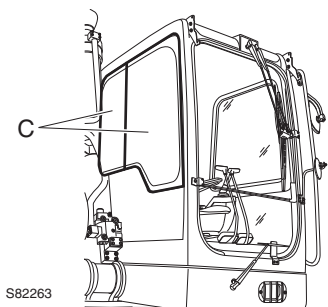
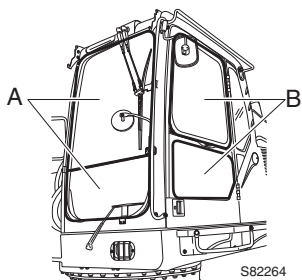
2 When the negative brake is released, but the motor does not rotate. If it is impossible to operate the machine due to the failure of the pump, connect the pressure measuring ports (refer to the figure) Am and Bm with a short hose and tow the machine slowly.

### Anti-vandalism (option)

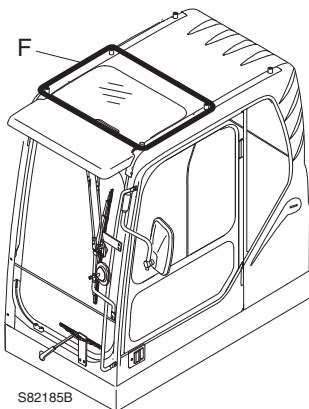
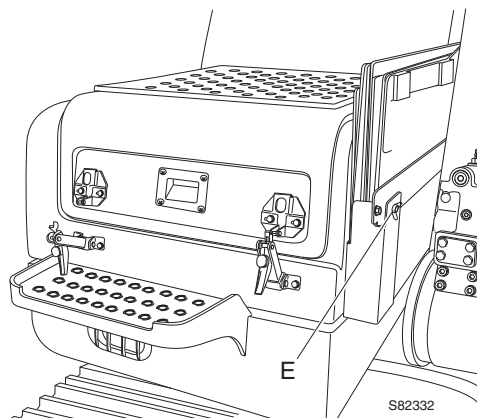
Anti-vandal covers are stored in two places, on the cab and by the tool box.

Four covers stored by the tool box are installed at front windows (A) and door windows (B)

Three covers stored on the cab are installed at right side window (C) and rear window (D).



#### Secure the wing bolt (E)



### Sunlight protection

Don't drop it when it is installed



**WARNING!**

Don't step on the sunlight protection (F)

- F 11.3 kgf·m (81.6lb·ft), Thickness 2
- Bolt: EA

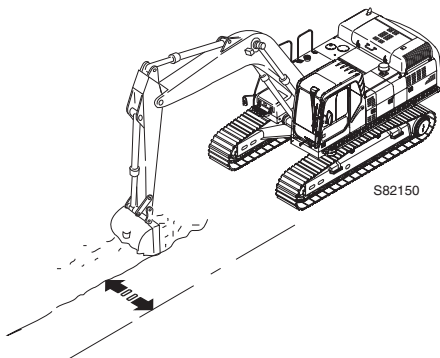
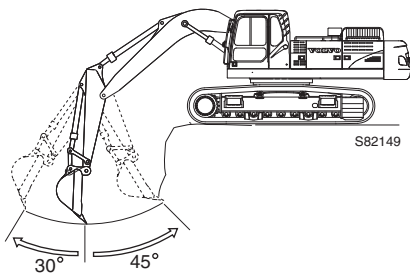
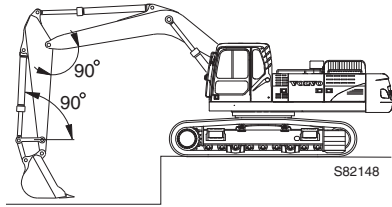
## Work with bucket

The excavator is a multi-task machine capable of being fitted with a multitude of special attachments to perform many types of work. Only the simplest operations are described below.

### Backhoe work

For digging work at a lower level than the machine is located. When the angle between bucket cylinder and links, arm cylinder and arm is set to  $90^\circ$  respectively, the working efficiency of each cylinder will be at its maximum.

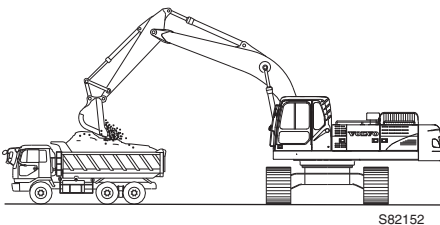
In case of digging, take advantage of this angle to improve the work efficiency. When digging the useful movement of the arm is  $30^\circ$  forward and  $45^\circ$  rearward. There may be a little difference according to digging depth. Do not use the cylinder up to its stroke end, but only within this range.



### Ditching work

Install a proper bucket for ditching. Place the machine over where the ditch is to be to work effectively.

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



### Loading work

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

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





### Float position (option)



Always make sure that the boom operating lever is in the neutral position before activating the float position.

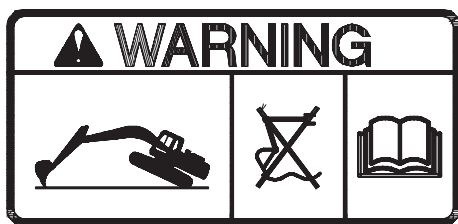
Do not select the float position mode while the track or tracks are elevated:

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:

Releasing the float position mode while the lever for boom operating lever forward (boom down position) and bucket or tool is on the ground 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.



Float position means that both the boom cylinders' piston and piston rod sides are connected to the hydraulic tank. The boom then "floats" and it is only the weight of the equipment and the load that lower the boom when the boom operating lever is pushed forward. The boom lifting is not affected by float position.

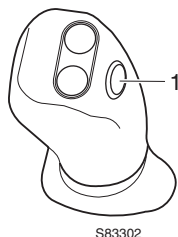
Float position gives better fuel economy, faster excavation cycle, less wear and less vibration. When the float position is engaged, the oil flow of the machine can be used for other purposes than lowering the boom, such as the arm and bucket. These functions then become faster and more efficient.

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

Float position is only in operation when you push the boom operating lever forward. If the attachment is to follow the ground, the boom operating lever must therefore be held forwards all the time the arm and bucket are operated. The boom can then move upward and downward freely, depending on the state of the ground.

- Select the float position using button 1 on the boom operating lever (the float position control lights up on the instrument panel). See **Float with three button lever** on page 54.
- Use the float position for all normal excavation.

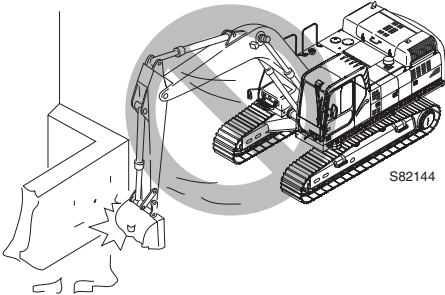
Deselect the float position by pressing the button 1 again (the light goes out)



## When working, do not

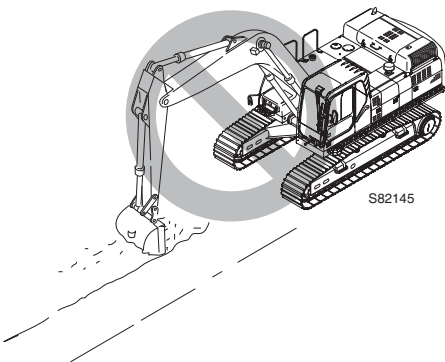
### Do not strain the slewing mechanism

Do not use the slewing force for raking over the ground, demolition of buildings or thrusting bucket teeth into the ground. This operation may cause damage to the machine and attachments.



### Do not work with the travelling motors

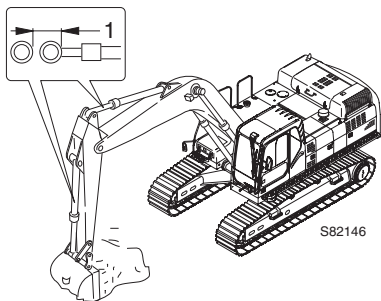
Do not dig by using the travelling motors, and thrusting bucket teeth into the ground. This can overload the rear of the machine and damage the track drive.



### Do not 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.

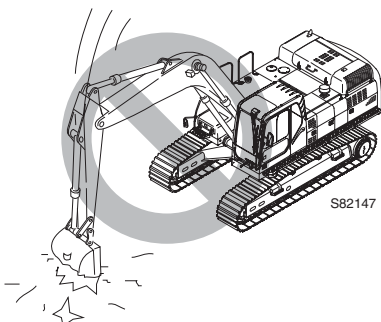
Work with as much clearance (1) as possible.

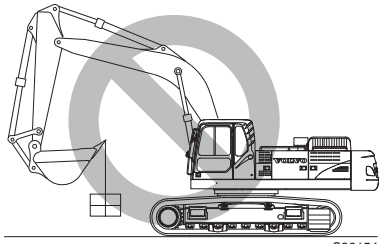


### Do not work by slamming the bucket into the ground

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.

Also it is very dangerous.

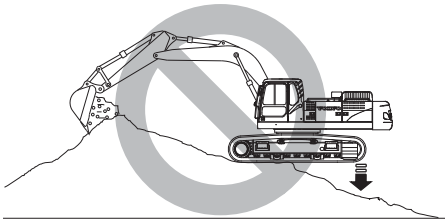




S82154

### Do not carry out lifting work

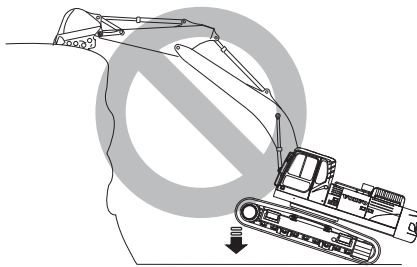
Basically, using this machine as a crane is prohibited. There may be municipal, provincial, state or national regulations governing lifting work. If permitted a properly installed rated bucked hook and certified slings / shackles is required. Contact an authorized Volvo CE dealer workshop.



S83323B

### Working by drop force of the machine body

Do not operate by dropping the machine body.



S83324B

### Digging rocks

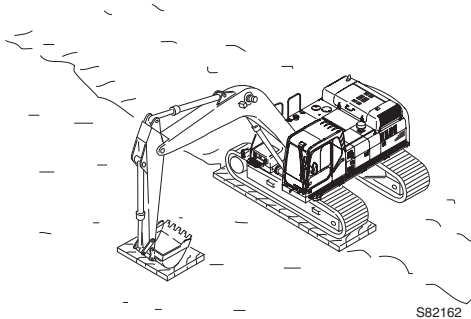
Break the hard rock area using a hammer, and then perform digging to avoid damaging the machine and to improve work efficiency.

## Escaping from swampy ground

Be very careful when working on swampy ground.

### In case that one track gets bogged

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



S82162

#### IMPORTANT

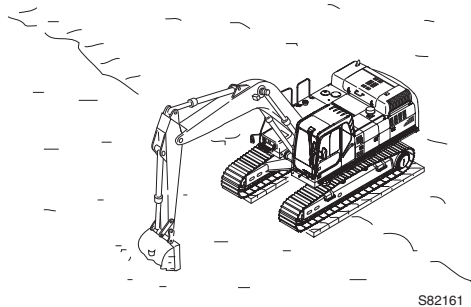
When raising the machine using boom or arm, use the bottom of the bucket. (Do not use the bucket teeth.)

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

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

### In case both tracks get bogged

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



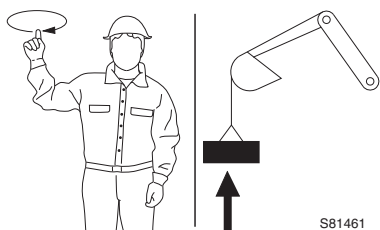
S82161



## Signalling diagram

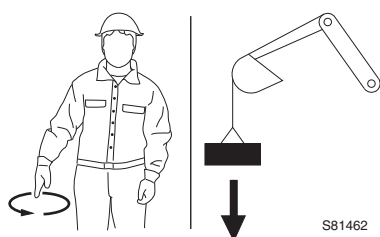
For manual signalling to operator of a mobile excavator as per SAE J1307.

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 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.



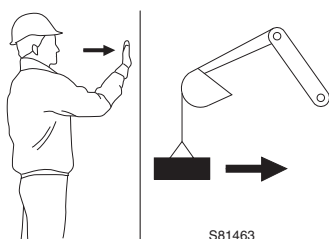
### Raise load vertically

With either forearm vertical, fore finger pointing up, move hand in small horizontal circle.



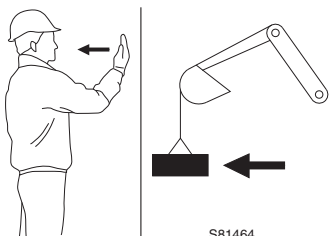
### Lower load vertically

With either arm extended downward, forefinger pointing downward, move hand in small horizontal circle.



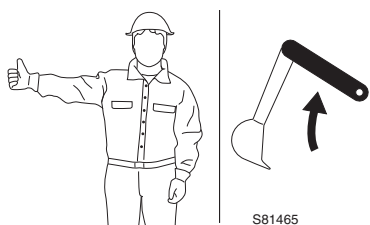
### Move load in horizontally

With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.



### Move load out horizontally

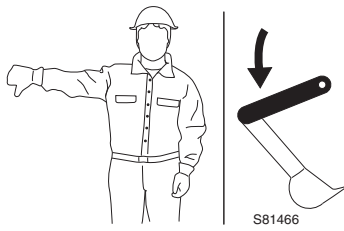
With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.



### Raise boom

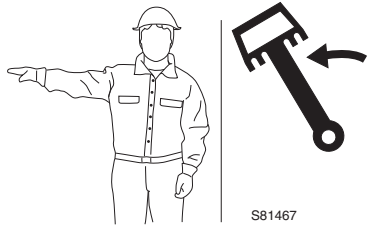
With either arm extended horizontally, fingers closed, point thumb upward.





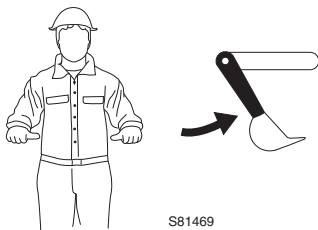
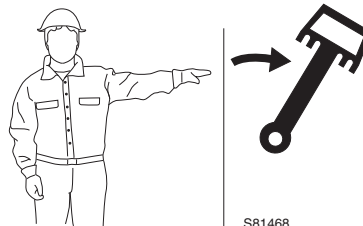
**Lower boom**

With either arm extended horizontally, fingers closed, point thumb downward.



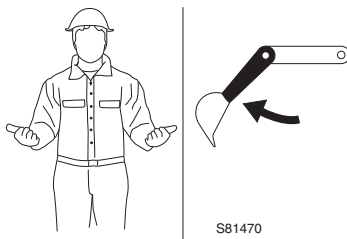
**Swing**

With either arm extended horizontally, point with forefinger to direction of swing rotation.



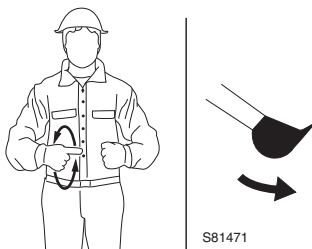
**Dipper arm inward**

With both hands clenched, point thumbs inward.



**Dipper arm outward**

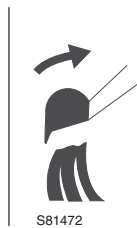
With both hands clenched, point thumbs outward.



**Close bucket**

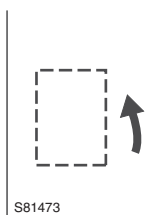
Hold one hand closed and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at closed hand.





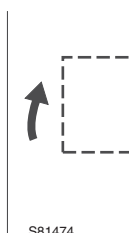
### Open bucket

Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.



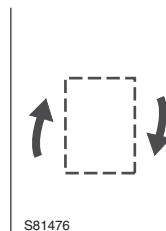
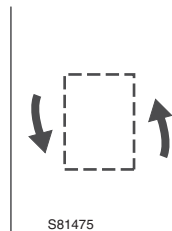
### Turn

Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.



### Counter rotate

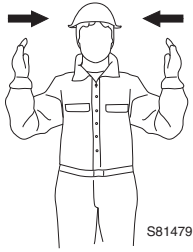
Place hand on head indicating side or reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.



### Travel

Move fists in vertical circle about each other in direction of track or wheel rotation.





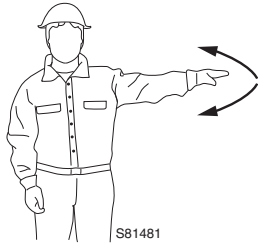
**This far to go**

With hands raised and open inward, move hands laterally, indicating distance to go.



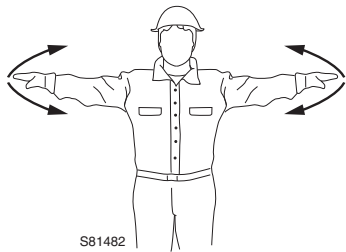
**Move slowly**

Place one hand motionless in front of hand giving motion signal. Raise load slowly is shown.



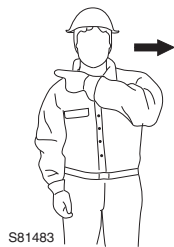
**Stop**

With either arm extended laterally, hand open downward, move arm back and forth.



**Emergency stop**

With both arms extended laterally, hands open downward, wave arms back and forth.



**Stop engine**

Draw thumb or forefinger across throat.



## Lifting objects

### Lifting

**IMPORTANT** In some countries, using the machine for lifting work may be prohibited. It is the owner's / operator responsibility to be familiar with and comply with all national, state, municipal regulations governing this type of work. Contact your Volvo CE dealer for more information.

#### Use your common sense

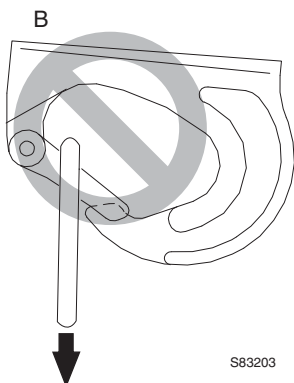
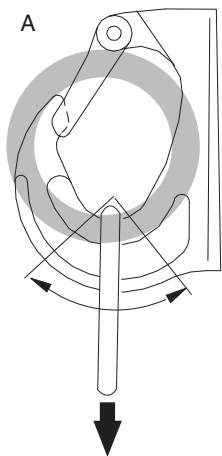
Ground conditions are very important. Operate on solid, flat, level ground to ensure the highest level of control and safety. If ground conditions are unstable, e.g. loose gravel, sand or water, do not work with loads close to the rated load maximums given on the machine load chart.

Do not slew the machine abruptly with a suspended load; the effects of centrifugal force will impair machine stability. Do not use the slew or arm-in operation to drag a load.



### WARNING!

To prevent an accident and personal injury, do not exceed the rated load capacity of the machine. If the machine is not on even, level ground, load capacities are reduced. It is prohibited to load the safety latch of the hook while lifting operation.



S83203

The lifting hook 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 permissible lifting area of the hook base when manoeuvring the arm and bucket.

**A** Permissible lifting angle

**B** Prohibited lifting angle

**The lifting hook is designed to lift a maximum load of 15,000kg (33069 lb).**

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

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

**NOTE :** Use of a safety lift hook not recommended by Volvo CE could result in structural damage to the machine. Consult your Volvo CE dealer regarding the installation of a local bucket.



### WARNING!

Don't operate equipment while someone is hanging on the bucket or attachments, on or in the bucket. Otherwise which may lead to an accident, serious injuries or death.

## Optional parts

### IMPORTANT

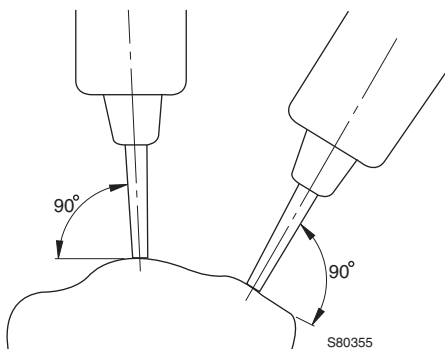
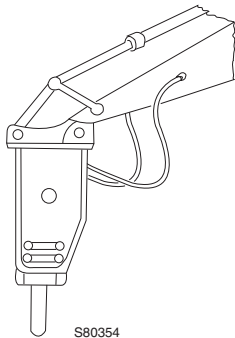
Select the proper attachment in accordance with the machine on which the attachment is installed. The type of attachment which is able to be installed varies with the machine type. Contact an authorized Volvo dealer workshop.

### Hydraulic hammer

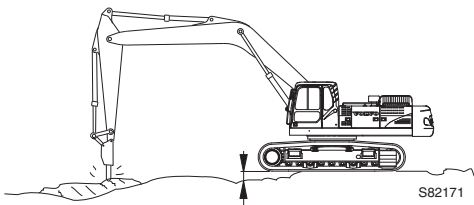
#### Main works

- Breaking stone
- Demolition work
- Road repairing

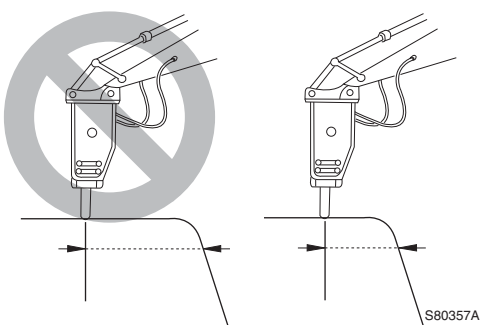
It is widely used for demolition of buildings, breaking road surfaces, tunneling work, smashing slag, and breaking or cutting stone.



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

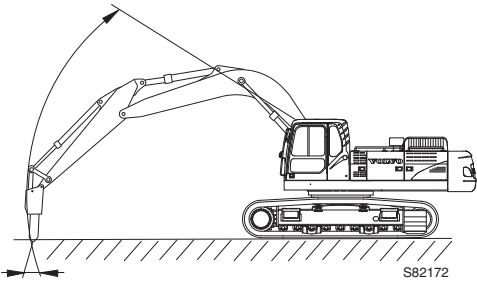


When striking, press the chisel firmly onto the surface, and lift the frame about 5 cm. Never raise the machine unnecessarily high.

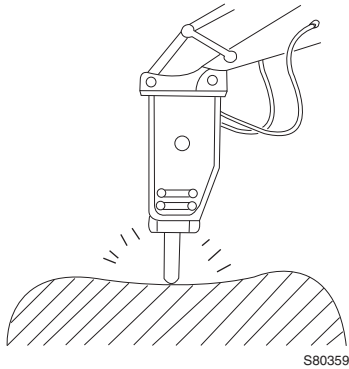


If the surface is struck repeatedly but it does not break within 1 minute, move the chisel nearer one end and strike again.

# 116 Operating instructions Optional parts



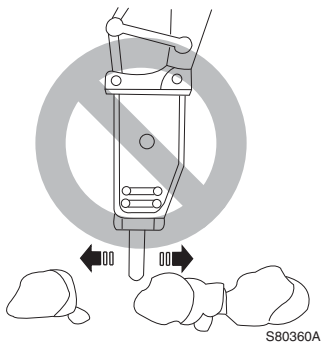
The striking direction of chisel and the direction of breaker body are deviate slightly. Therefore, adjust the bucket cylinder so that the direction of body and chisel is always the same.



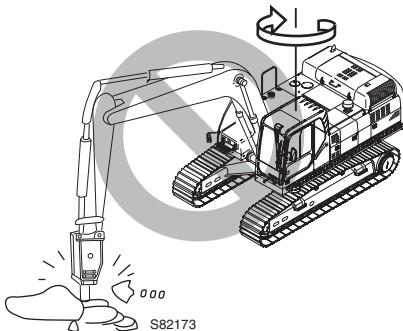
Press the chisel firmly against the surface so idle striking is avoided.

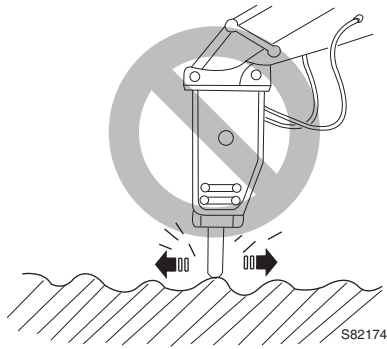
## Caution during hammer operation

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

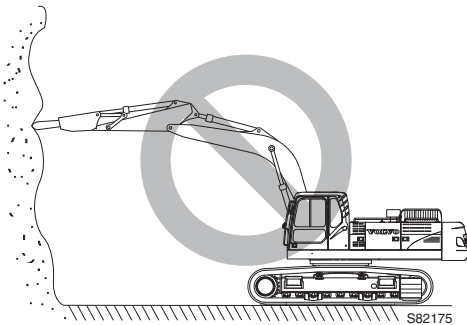


Do not slew the hammer against the rocks, concrete etc

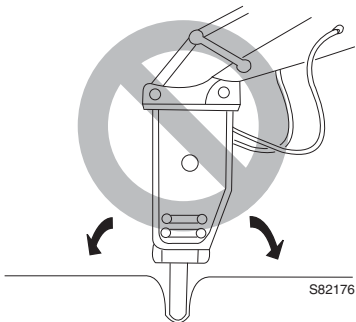




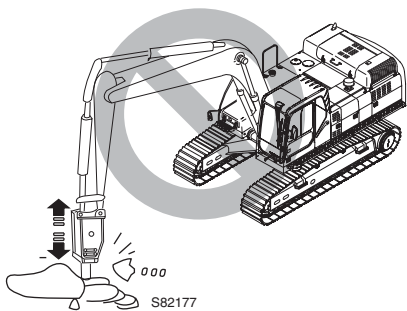
Do not move the chisel while it is striking a blow.



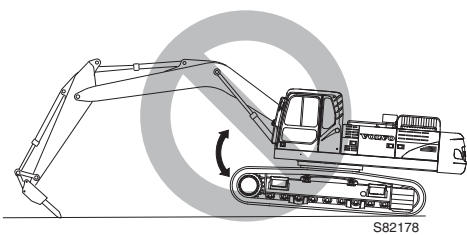
Do not strike horizontally, or in an upward direction.



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



Do not hoe the chisel.



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







# Safety when servicing

## Introduction



### WARNING!

Any person who does not follow the safety instructions and pays attention to the warnings given in this Operator's Manual, must make sure that his or her working method is safe. Otherwise there is great risk of serious accidents, which, at the worst, could be fatal.

### NOTE :

This section deals with general safety rules which should be followed when checking and servicing the machine. Safety rules and warning texts for operating the machine are given in the respective sections in the Operator's Manual.

This section is intended as a guide to the correct handling of the machine. Therefore, carefully read these instructions before servicing the machine. Keep the Operator's Manual in the machine for handy reference.

We have taken many hours in designing and producing the safest and most efficient machine possible. However, this is in vain if the individual, who is about to use or carry out service on the machine, does not read the safety instructions or does not bother to follow them as for example:

- does not re-install guards
- steps on slippery parts of the machine instead of using a ladder
- grasp hold of hoses instead of handholds
- uses the wrong tool for the job.

In order to maintain safe and efficient function, always use Volvo Construction Equipment genuine spare parts.

Machines rarely cause accidents, whereas incorrect handling often does.

A safety conscious person and a well maintained machine make a safe, efficient and profitable combination.



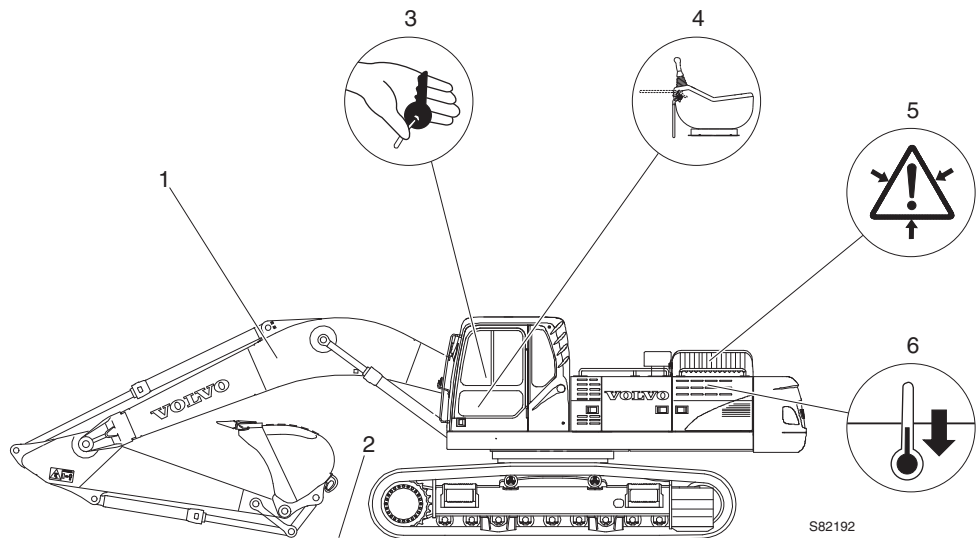
## Service position



### WARNING!

If you have to work on a machine before it has cooled down, beware of hot fluids and components which can cause burns.

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



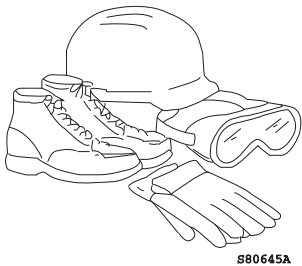
- 1 Position the machine on even, firm and level ground.
- 2 Attachment resting on the ground.
- 3 Engine turned off and the ignition key removed.
- 4 **Move the safety locking lever down to lock the system securely, See *Safety locking system on page 60.***
- 5 Pressurized lines and vessels should have the pressure released gradually to avoid risks.
- 6 Allow the machine to cool \*.

\* If you have to work on a machine before it has cooled down, beware of hot fluids and components which can cause burns.

## General

### **WARNING!**

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

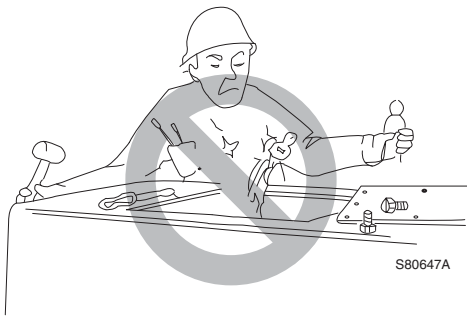
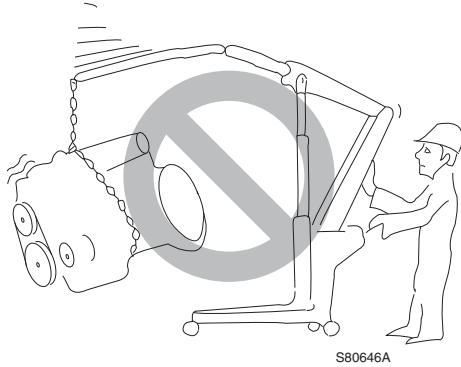


- Read all plates and decals on the machine and in the Operator's Manual before carrying out service on the machine. Each of the instructions contain important information about the handling and service of the machine.
- No work may be carried out on the machine, unless the person doing so has acquired the right knowledge and training to do so.
- Service work, which is not carried out in the correct way, is dangerous.  
Make sure you have sufficient knowledge, correct information, correct tools and correct equipment to carry out the service in a correct way.  
Repair or change broken tools and equipment.
- Avoid spillage when emptying/draining oil or fuel. Where fluid cannot be drained directly into a vessel, use a pump or connect a hose for safe handling. Oil, which is spilled onto the ground, will harm the environment and also cause a fire.  
Used oil and other liquids should always be taken care of by a disposal firm authorized for this purpose.
- A machine which is used within a contaminated area (polluted environment and/or insanitary area) should be equipped in a special way. In addition to this, special safety regulations apply when servicing such a machine.
- Check that all slip protections are firmly fixed. If they are not, they should be fastened or replaced,
- When using high pressure for washing, the jet should not be directed at anti-slip surfaces which are glued on.
- Make sure that stepping surfaces, service areas, handholds and anti-slip surfaces are free from oil, diesel fuel, dirt or ice and that they are replaced if they are damaged or missing.  
**Never step on parts of the machine which are not prepared or intended for this.**
- Never wear loose-fitting clothing, e.g. a scarf or jewelry, which can get caught and cause injury, when you are working on the machine.
- Always wear a hard hat, safety glasses, gloves, protective shoes and other protective articles when the work so requires.
- Always stop the engine to service the machine, unless otherwise instructed on plates or in this manual.

### **WARNING!**

**Don't operate equipment while someone is hanging on the bucket or attachments, on or in the bucket. Otherwise which may lead to an accident, serious injuries or death.**





**! WARNING!**

If you have to carry out work on the machine before it has cooled down: Be careful with hot liquids and hot parts of the machine to avoid burns.

- When changing oil in the engine and hydraulic system, remember that the oil may be hot and can cause burns.
- When you are lifting or supporting parts of the machine, use equipment with a lifting capacity which is at least as great as the weight of the part in question.
- All lifting devices, e.g. straps, slings, ratchet blocks etc. must comply with national regulations for lifting devices. Volvo Construction Equipment will not accept any responsibility if any lifting devices, tools or working methods are used other than those described in this publication.
- When looking for leaks, use a piece of paper or wood, not your hand.
- Release the pressure in the hydraulic systems, before commencing work.
- Stop the engine before opening the engine hood, radiator casing etc. Make sure that no tools or other objects, which may cause damage, have been forgotten in the machine.
- Make sure that all covers on the machine are in position before the engine is started and the machine again is put to work.
- All pressurized vessels must be opened very carefully so that any remaining pressure is released slowly.

When the engine is stopped, there is a remaining accumulated pressure in the system. If a system is opened without having first released the pressure, liquid under high pressure will jet out.

Also the check-tightening of leaking couplings and connections should only be done after all the pressure in the system has been completely released.

- **The hydraulic system:** must be isolated from all actuation of external forces.
- Disused accumulators should first be punctured before they are discarded as otherwise they may explode at a later stage.
- Never set a relief valve to a higher pressure than that recommended by the manufacturer.
- When installing a two-way radio, a mobile telephone or similar equipment, the installation should be carried out according to the instructions of the manufacturer in order to eliminate interference with the electronic system and components intended for the function of the machine.
- Do not stand in front of or behind the machine when the engine is running.
- After the service work has been completed, close and secure engine hood and all guard plates.
- Measures to be taken in connection with electric welding, See **Electric welding** on page 150.

## Handling lines, tubes and hoses



### **WARNING!**

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

Do not bend high pressure lines.

Do not strike high pressure lines.

Do not install any lines that are bent or damaged.

Check lines, tubes and hoses carefully.

Leaks may cause fires. Consult your Volvo CE dealer for the repair or for replacement parts.

Do not use your bare hand to check for leaks.

Tighten all connections. Consult your Volvo CE dealer for the recommended tightening torque.

### **Replacing lines, tubes and hoses**

If any of the following conditions are found, replace the parts.

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

### **IMPORTANT**

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



## Measures to prevent fire



### WARNING!

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

**NOTE :** If a high-pressure jet machine is used for cleaning, take great care as the electrical components and electrical leads can become damaged even at fairly low water pressure and temperature. Protect electrical components and leads in a suitable manner. The engine should be shut down and the battery master switch turned OFF.

- There is always a risk of fire. Find out which type of fire extinguisher to use, where it is kept and learn how to use it.
- At the slightest sign of fire, if the circumstances permit and bearing in mind your own safety, take the following steps;
  - Drive the machine away from the danger area caused by the fire.
  - Lower the attachment to its parking position. See **Parking** on page 102.
  - Turn the starting switch to the "STOP" (⊖) position.
  - Leave the cab.
  - Turn OFF the battery master switch.
  - Put out the fire and notify the fire brigade if required.
- If the machine is provided with an hand-held fire extinguisher, it should be of the ABC type. The designation ABC means that it is possible to extinguish fires in both firm 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 class III at least 15 seconds. A hand-held fire extinguisher ABE I (in the North America ABC type) normally corresponds to a power content of 4 kg (8.8 lb) (EN-grade 13A89BC), the EN 3-1995 standard, parts 1, 2, 4 and 5.
- Do not smoke or have an open flame near a machine when filling with fuel or when the fuel system has been opened.
- Diesel fuel oil is flammable and should not be used for cleaning, instead use an approved solvent.
- Remember that certain solvents can cause skin rashes and are usually flammable. Do not inhale solvent vapor.
- Starting aids are flammable. Store such starting aids in a cool, well ventilated location. Remember that such aids must not be used in connection with preheating of the induction air.



- Keep the work-place where the service is to be carried out clean. cleanliness is of decisive importance for trouble-free operation of systems in the machine. Oil or water make floor and steps slippery and also dangerous in connection with electrical equipment or electrically powered tools. Oily clothes or clothes impregnated with grease are a serious fire hazard.
- Check daily that the machine and equipment, e.g. belly (guard) plates, are free from dirt and oil. In this way the risk of fire is reduced and it is easier to detect faulty or loose components.
- Keep the machine extra clean when working in sensitive environment, i.e. saw mills, rubbish dumps or similar. To reduce the accumulation of easily combustible material when operating in such environments, the machine should be equipped with suitable equipment (for example silencer guard, radiator screen, high-capacity cyclone precleaner etc.).
- Any fire fighting equipment installed on the machine should be maintained in working order. Such extra equipment should be considered as an addition to the measures the operator can take in case of fire. The equipment should not be considered as a replacement for the operator's own fire fighting efforts.
- Check that electric leads have not been damaged by chafing and that they cannot be damaged in that way. This applies particularly to unfused leads, for example between:
  - The batteries
  - Battery and start motor
  - Alternator and start motor
  - Lead to induction air preheating element.
- When unfused leads have been disconnected, it is important to check that they are connected and clamped in such a way that they cannot be exposed to chafing. Unfused leads must not lie against oil and fuel lines.
- When fitting any extra equipment, make sure that all leads (circuits) are connected across a fuse and routed and clamped so that there is no risk of chafing.
- Check that there is no damage to fuel and hydraulic hoses caused by chafing.
- Welding and grinding may only be carried out on the machine when it is placed in a clean area and not in places filled with compressed air or flammable liquid as in tank, hydraulic pipes or similar.  
Take extra care when welding and grinding near flammable objects. See also "Risk in connection with polymer materials" A fire extinguisher should be kept handy.
- Components such as batteries, plastic objects and other material which could possibly be a danger to the environment must not simply be discarded. Make sure that such refuse is taken care of in an environmentally friendly way.



## Risks in connection with polymer materials

### Working on painted surfaces



#### WARNING!

All paint decomposes when heated and forms a great number of compounds. These substances may be irritating and after long or frequent exposure may constitute a serious health hazard.

#### NOTE :

**Always use a respirator during all removal of paint.**

- When welding and cutting, the paint finish must first be removed from an area with a radius of at least 10 cm (4 in) from the point of welding or cutting. Paint which is heated gives off poisonous gases.
- Never weld directly on a painted surface. 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.
- Remove the paint from the area where work is to be carried out by sand blasting.  
If the paint cannot be removed by sand blasting, it must be removed in some other way, e.g. with a paint stripper.

#### NOTE :

When using paint stripper, use a portable air extractor, an approved respirator and protective gloves.

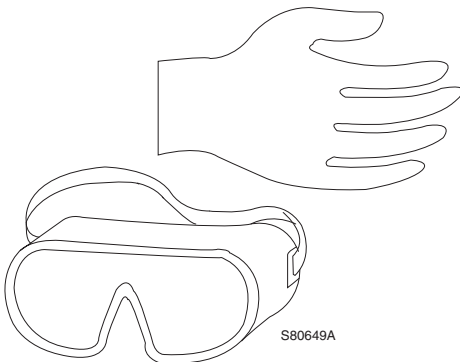
- A high-speed grinding machine also heats the paint and must only be used in conjunction with a portable air extractor.

### Rubber and plastics

#### NOTE :

**Polymer materials can, when heated, form compounds which are dangerous to health and environment.**

- Do not weld or cut near polymer materials (plastics and rubber components) without first having protected them from the heat.
- Never burn polymer materials when scrapping them.
- Take care when handling machines which have burnt or been exposed to intense heat.
- Always use gloves, protective goggles and an approved respirator.





## Fluor rubber



### **WARNING!**

Certain seals which are designed to withstand high operating temperatures (e.g. engines, main control valve hydraulic motors and pumps) may be made from fluor rubber. When heated to high temperatures, fluor rubber decomposes to hydrogen fluoride and hydrofluoric acid, which is strongly corrosive. Hydrofluoric acid cannot be rinsed or washed off the skin, but causes very severe burns which take a very long time to heal. As a rule, injured tissue must be removed surgically.

Quite a long time may pass (several hours) after contact with the acid and before any symptoms appear and there is no immediate warning. The acid may remain on the machine parts for a very long time (several years) after a fire.

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

The area around a part which has been very hot and which may be made of fluor rubber should be decontaminated by thorough and ample washing with lime water (a solution or suspension of calcium hydroxide, that is slaked lime in water). After the work has been completed the gloves should be washed in lime water and then discarded.

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

## Check list

**If a machine has been damaged by fire or been exposed to intense heat, the following protective measures must under all circumstances be followed:**

- Use thick, protective gloves made of rubber and wear goggles which are certain to protect your eyes.
- As a precaution, seals (O-rings and other oil seals) should always be handled as if they were made of fluor rubber.
- Never touch burnt components when there is a risk of contact with melted polymer material. First wash thoroughly with plenty of lime water (a solution or suspension of calcium hydroxide, i.e. slaked lime in water).
- If you suspect that you have come into contact with burnt fluor rubber, the skin area should be treated with Hydrofluoric Acid Burn Jelly or something similar. Seek medical advice. Symptoms after contact with burnt fluor rubber may not appear until several hours afterwards.
- Discard protective gloves, rags etc. which may have come into contact with burnt fluor rubber.

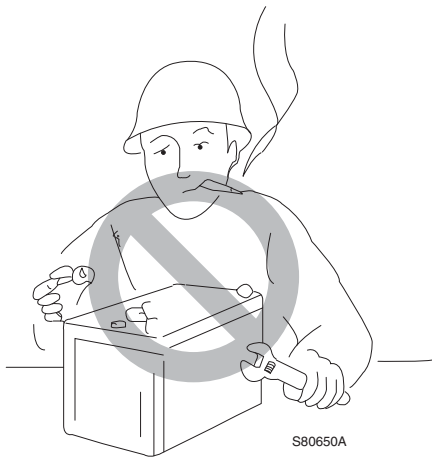


## Batteries

### Rules for batteries

#### IMPORTANT

**Batteries contain substances which are harmful to health and the environment. Scrapped batteries must therefore be taken care of in accordance with relevant local/national regulations.**



- Batteries give off explosive gases. Never smoke around any batteries.
- Electrolyte is corrosive. Avoid splashes of electrolyte on unprotected skin. If electrolyte has splashed onto any part of your body, flush with water for 10-15 minutes.
- Begin by disconnecting the earth (ground) lead in order to remove a battery. To reduce the risk of sparks which can cause fire, always connect the earth lead last when installing a battery.
- Never tilt a battery excessively in any direction, otherwise the battery electrolyte may leak out.
- When charging batteries, follow the instructions on the next page.
- When using a spare battery to aid starting the engine, follow the instructions on this page.
- Do not connect a discharged battery to a fully charged battery. The current surge can cause the batteries to explode.
- Make sure that metal objects (such as tools, rings, watch straps etc.) do not come into contact with the battery terminals. There is risk of injury and fire. Always reinstall the pole stud and terminal protections to the batteries.
- When using another vehicle as a booster, do not allow the vehicles to touch. Electrical systems can be damaged on either vehicle.
- First start the engine in the vehicle which has the booster battery, let the engine idle a few minutes, then start the engine in the vehicle with the discharged battery.
- Do not boost start a frozen battery, personal injury can result.
- Do not boost start when a maintenance free battery indicator dot is yellow or bright colour.
- Do not boost start when the electrolyte level is below the top of the lead plates.
- Batteries contain substances which are harmful to health and the environment. Scrapped batteries must therefore be taken care of in accordance with relevant local/national regulations.

## Starting with booster cable



### WARNING!

Because of current surge the batteries may explode if a fully charged battery is connected to a discharged battery. Such an explosion can cause injuries.

When starting with booster batteries **check** that the booster batteries or other power source has the same voltage as the standard batteries.

### Proceed as follows:

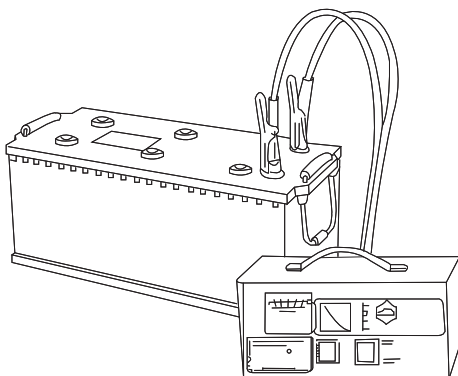
- 1 Turn OFF the battery master switch.
- 2 Remove the protections from the battery pole studs.
- 3 Connect two 12 V batteries as follows:
- 4 Connect one of the jump leads between (+) terminal on the battery of the machine and the (+) terminal on the booster battery.
- 5 Connect the other jump lead between the (-) terminal of the booster battery and a grounding point on the machine.
- 6 Connect the batteries of the machine by turning ON the battery master switch.
- 7 Start the engine with the ignition key in the cab.
- 8 When the engine has started, first disconnect the jump lead from the chassis connection on the machine 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.

## Charging batteries



### WARNING!

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



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- 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.
- The battery electrolyte contains corrosive sulphuric acid. Any electrolyte that is spilled on the skin should be removed immediately. Wash with soap and plenty of water. Should you get splashes of electrolyte in your eyes or on any other sensitive part of your body, rinse immediately in plenty of water and contact a doctor immediately.

## Air conditioning

### Refrigerant

#### General

Refrigerant R134a is used in the air conditioning units. When R134a is used, there is also a type plate near the receiver drier.

R134a has no potentially depletion properties that will affect the ozone layer of the atmosphere, but **R134a adds to the green house effect and must never intentionally be released into the open air.** R134a is moderately dangerous to health.

#### Personal competence and accreditation (licensing)

Service workshops must be accredited or licensed to handle refrigerants.

At a licensed workshop there should be at least one person in a supervisory position with certified competence.

Accreditation should be applied for through the appropriate national agency according to the applicable national laws.

For handling refrigerants for example for air conditioning units, there is, as an alternative to certified competence, a certificate of competence issued after having passed a written test set by the Nature Preservation Office.

#### Equipment for service

Pressure vessels, filling station, vacuum pump and hoses etc. which are used for servicing a system filled with **one type of refrigerant must never come into contact with another type of refrigerant.** Even very small quantities of for instance R12 has a greatly decomposing effect on R134a. This in turn may destroy the components in the refrigeration unit.

#### Personal protective equipment

**When there is a risk of contact:**

- Use close-fitting protective goggles, protective gloves and protect bare skin (risk of frost-bite).
- Do not wear contact lenses.

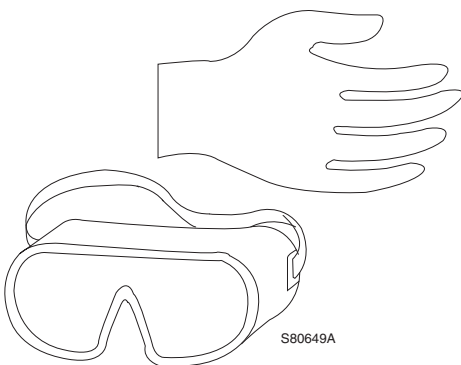
#### Health risks

When touching the refrigerant in liquid form it can cause **frost-bite.**

The gas can at low concentration **have some effect especially on the nervous system.**

In large amounts the gas may **have a narcotic effect.**

Because of the risk of explosion, the gas cylinders containing refrigerant must not be exposed to a temperature higher than +40 °C (+104 °F).



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## First aid measures in case of accidents

- If accidental contact with escaping refrigerant has occurred, take the following measures:
  - Refrigerant, when in the form of a gas, and when heated can, at low concentrations, have an effect, most particularly on the nervous system. At high concentration, the gas has a narcotic effect. In both cases, move personnel from the danger area out into the fresh air. If someone is seriously affected, seek medical advice.
  - If large amounts of liquid refrigerant has come into contact with unprotected skin, the injured area should be carefully warmed with lukewarm water or covered with warm clothes. Seek medical advice if there are remaining symptoms.
  - If liquid refrigerant has come into contact with a person's eyes, rinse the eyes with lukewarm running water. Seek medical advice if there are remaining symptoms.
- Take the greatest care in all work with refrigerant.
- The AC system contains pressurized refrigerant. It is not allowed to purposely release refrigerant into the environment. If the air conditioning system has to be opened, the refrigerant must first be collected in a special pressure vessel for re-use or alternatively destruction.
- The AC system is pressurized and refrigerant can unintentionally leak. Never disconnect hoses and never remove the filler plug on the compressor. If a leak is suspected, do not try to refill the system. Contact an authorized Volvo dealer workshop for them to take action.
- When carrying out work with emptying (discharging) or refilling (charging) refrigerant, **equipment specially intended for this work must be used.**
- The refrigerant vapour is heavier than air and will therefore sink to the floor.
- Smoking, welding or other open flame are not permitted in the place where work with refrigerant is carried out. The refrigerant vapour could then be ignited, forming a poisonous gas which is very dangerous to inhale. The gases formed when heated have a pungent smell at high concentrations.



The gases can cause severe damage to lungs even at low concentrations, when no smell is apparent. the symptoms may arise several hours (even up to 24 hours) after exposure to the gases.

## Use handholds and steps for climbing on / off



### WARNING!

Always observe this caution for safety.

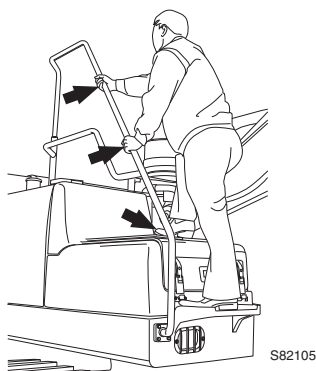
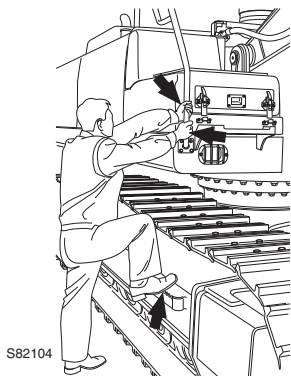
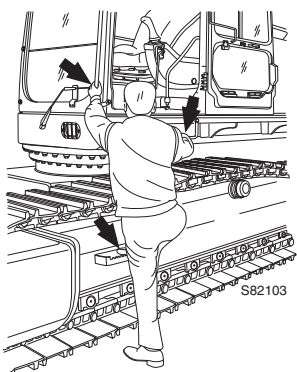
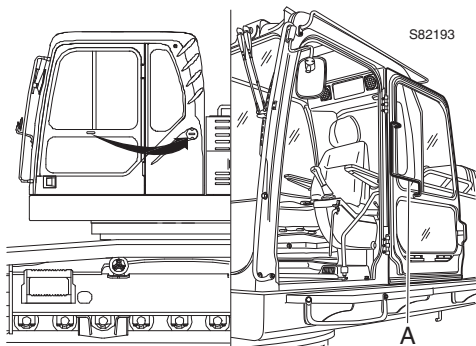
Don't jump on/off a machine. Especially, never get on / off a moving machine.

Never grasp the control lever to get on / off.

Use handholds and steps when entering or leaving the machine. Use the three-point grip, i.e. two hands and one foot or two feet and one hand. Always face the machine.

Always wipe mud and oil off all footboards, handrails and your footwear. Especially, clean the windows, rear view mirrors and lights.

Don't use hand rail (A) of the cab door as a support. This hand rail is not strong enough to be used as a use as an access or exit hand rail. Only use this hand grip to close the door.



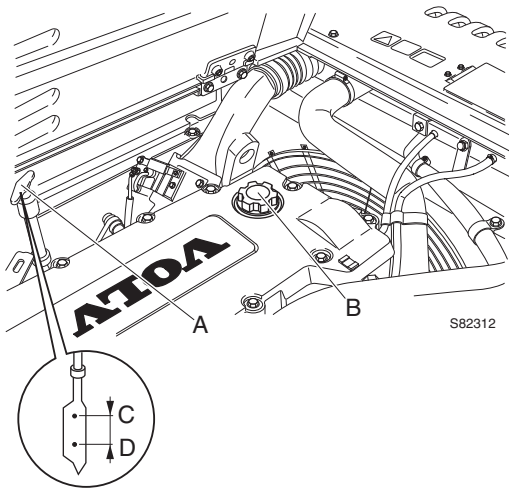
## Service and maintenance

### Engine

#### Checking engine oil level

Check the oil level daily.

- 1 Open the engine hood.
- 2 Pull out dipstick (A), and wipe it with a clean cloth.
- 3 Push it in again, and pull it out.
- 4 If the oil level is between **C** and **D** it is normal. If the oil level is below **D** mark, refill to proper oil level through filler port (B).  
Engine oil: See **Recommended lubricants** on page 177.



- A Dipstick
- B Filler port
- C High oil level mark
- D Low oil level mark

#### Changing engine oil



#### WARNING!

Take care when changing oil.

Hot oil can cause burns on unprotected skin.

Change oil every 500 hours when CH-4 class is used.

(250 hours when CG-4 class is used)

Conditions for intervals of 500 hours to apply are that:

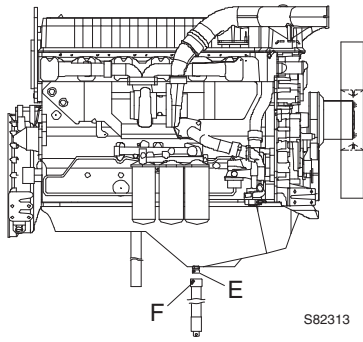
- The three oil filters should be replaced each time the oil is changed.
- The oil filters meet the Volvo Construction Equipment specifications, which is the case with genuine parts from Volvo Construction Equipment.
- The sulphur content of the engine fuel must not exceed 0.3 percent by weight.
- The oil used is according to on  
page 177.
- Correct oil viscosity for the ambient temperature is selected.  
See on page 177.

If any of these conditions cannot be met, or if the machine is operated in an acid or particularly dusty environment, the oil should be changed and the filters replaced every 250 hours.

If sulphur content > 0.5 % then 125 hours drain interval must be practiced.

Maximum 6 months between oil change.

If the oil grade is lower than ACEA-E3 or API CE, 125 hours drain interval must be practiced.



### Changing oil

- 1 Place the machine in the service position.
- 2 Put a container (above 50 liter) under the protecting cap (E) at the bottom of the engine oil pan.
- 3 Remove protecting cap (E) and attach drain hose (F) provided as a service tool with machine.
- 4 Drain the oil.
- 5 Disconnect the hose and install the protecting cap.
- 6 Fill oil through oil filler cap.

Oil capacity when changing is approx. **46.4 liters (12.2 US gal)** including filters.

For oil grade, See \_\_\_\_\_ on page 177.

**Take care of waste oil/fluids in an environmentally safe way!**



## Replacing engine oil filter

Replace the oil filters each time the oil is changed, i.e. **every 500 hours (CH-4 class: every 500 hours, CG-4 class: every 250 hours)**. See *Change oil every 500 hours when CH-4 class is used*. on page 133.

**The oil filters are of the disposable type, i.e. they cannot be cleaned, but should be replaced as one unit.**

### Removing

- 1 Use a suitable tool.

### Installing

- 2 Fill filters (A) with oil.  
Oil capacity of each filter is approx. 1.25 liter (0.33 US gal).
- 3 Coat the gasket with oil.
- 4 Screw on the filter by hand until the gasket just touches the sealing surface.
- 5 Then tighten the filter a further 1/2 a turn.

### After installing

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

### NOTE :

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

### IMPORTANT

**After replacing oil filters, the engine must run at low idling for at least one minute. It is important that the filters are filled with oil before it is installed. This is to ensure lubrication immediately after starting.**



### WARNING!

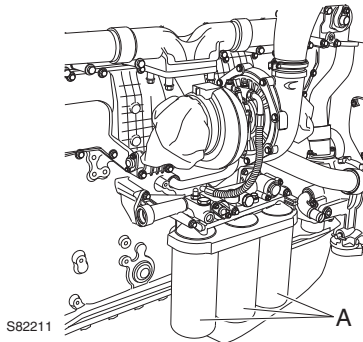
**Take care of waste oil/liquids in an environmentally safe way!**

## Valve clearance

### Valve clearance, adjusting

**Check the valve clearance every 2000 hours.**

The work should be carried out by an authorized Volvo dealer workshop.



## Fuel system

### Fuel tank

Clean fuel is essential for trouble-free running of the diesel engine. The fuel tank holds 565 liters (149.3 US gal).

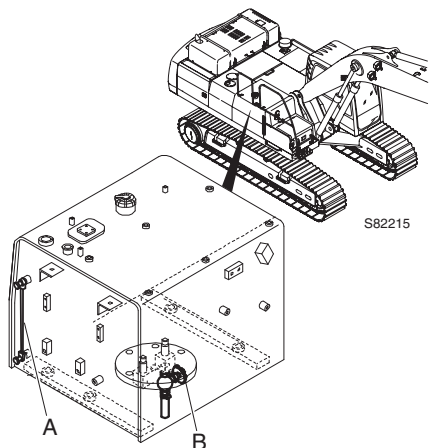
Carefully clean around the filler cap before removing it. Avoid spilling fuel when filling as this attracts dirt. During the cold season keep the tank full to prevent water condensing in the tank.

For fuel quality, See **Recommended lubricants** on page 177.

**NOTE :** Be careful not to damage fuel tank level gauge (A) by being stained from thinner or oil.

**Drain the sediment every 100 hours.**

Remove drain valve (B) at the bottom of the tank and drain off any sediment.



### Changing fuel filter

When using the fuel to meet the legal requirements, change the fuel filter every 1000 hours. For example of national and international standards for marketed fuels: DIN EN970/BS2869 A1 and A2/ASTM D975 1D and 2D. If in a situation to use lower quality fuels, replacing cycle of the fuel filter may be shortened.

Replacing cycle of the fuel filter should be less than half time in the situation using the fuel that contains over 0.5% sulphur content, over 0.01% water or sediment.

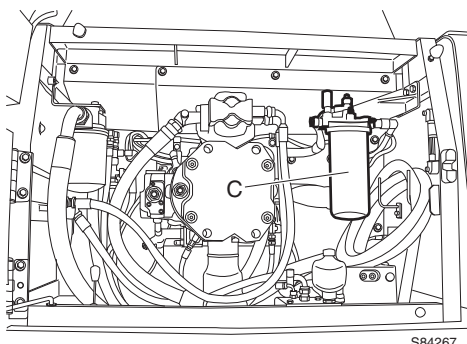
The filter is the disposable type, i.e. it cannot be cleaned, but must be replaced.

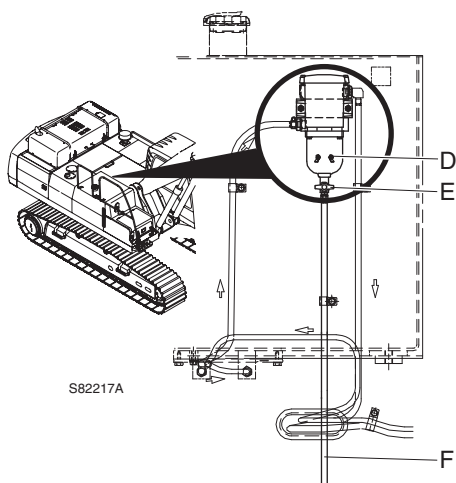
#### Removing

- 1 Use a suitable tool for removing fuel filter (C).

#### Installing

- 2 Coat the gasket with diesel fuel.
- 3 Screw on the filter by hand until the gasket just touches the sealing surface.
- 4 Then tighten the filter a further 1/2 a turn.
- 5 Bleed for air, See **Bleeding fuel system of air** on page 138.





## Draining water from water separator

**Check the water daily.**

**Drain the water, put a vessel under drain hose (F).**

The water separator is designed to remove water from the fuel supply to the engine. When water is visible over drain level (D), open drain valve (E) to drain water.



## Bleeding fuel system of air



### WARNING!

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

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

### IMPORTANT

Do not attempt to start the engine under any circumstances until the system has been bled, otherwise the injection pump can be seriously damaged.

### General

- 1 Clean around bleeder nipples (B) on the fuel filter housing.

### NOTE :

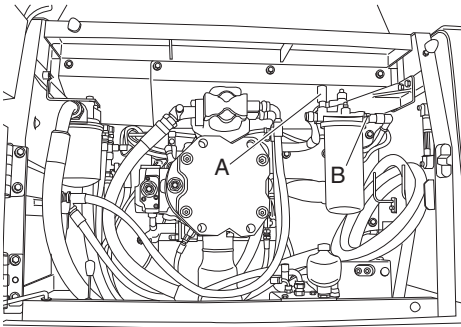
Do not spill fuel on electrical components.

### Fuel filter

- 2 Connect a transparent plastic hose to the fuel filter housing bleeder nipple (B).
- 3 Open bleeder nipple (B) and pump with hand pump (A) until the fuel, which flows out, is free from air bubbles.
- 4 Tighten bleeder nipple (B) while fuel flows out.

### After air bleeding

- 5 Run the engine at raised idling speed for approx. 10 minutes.
- 6 Check after starting there are no leaks.



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## Intercooler

The engine is provided with an air-to air type intercooler. The intercooler lowers the temperature of the induction air by approximately 100°C (212°F). The induction air then becomes more dense, so that more fuel can be injected and combusted. This will result in a higher engine output, but the colder air also leads to less stress on valves and pistons.

## Turbocharger

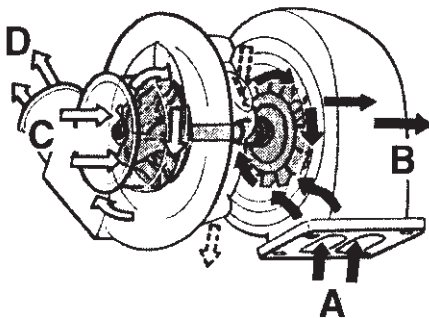
### IMPORTANT

**Leave the engine running at low idling speed for at least half a minute after start and a few minutes before it is stopped. This is to safeguard the lubrication of the turbocharger.**

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

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

**Only an authorized dealer workshop may carry out work on the turbocharger.**



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

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## Air cleaner

### General

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.

#### IMPORTANT

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

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

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

### Cover for air cleaner

#### Cleaning of cover for air cleaner

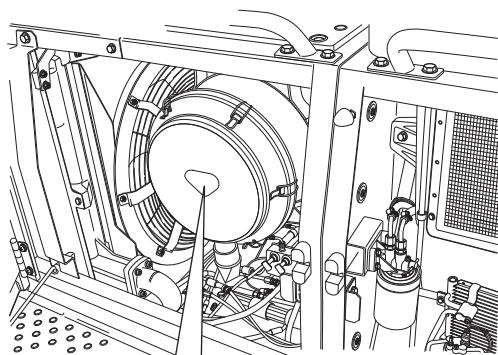
The cover for the air cleaner should be cleaned **when the air cleaner clogging warning lamp lights up.**

#### NOTE :

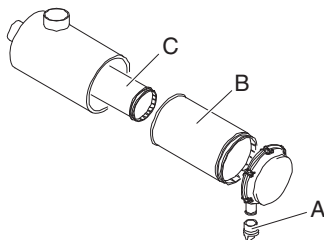
**Under dusty and wet conditions, the cover should be cleaned daily.**

#### Proceed as follows:

- 1 Remove valve (A) from the air cleaner.
- 2 Empty and clean the valve.
- 3 Reinstall the valve on the air cleaner.



S82216



### Primary filter (B)

#### General

Replace or clean at least every 2000 hours or when the warning lamp is ON.

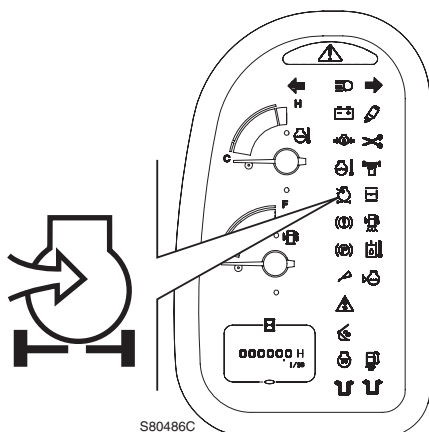
The filter may be cleaned, at the most, six times. Thereafter, the filter should be replaced. Also replace the filter if it is damaged.

If the control lamp is still ON after replacing/cleaning, the secondary filter must be replaced.

#### NOTE :

**The secondary filter must not be cleaned but only replaced, See *Changing secondary filter* on page 141.**

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.



S80486C

## Cleaning primary filter

### Mechanical cleaning

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

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

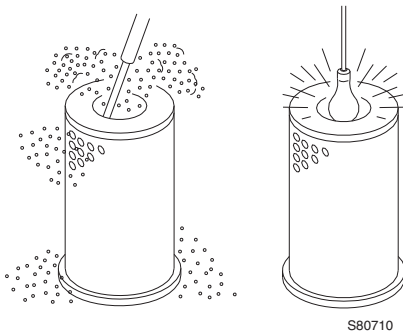
### Cleaning with compressed air

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

### Checking filter

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

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



S80710

## Changing primary filter

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

## Secondary filter

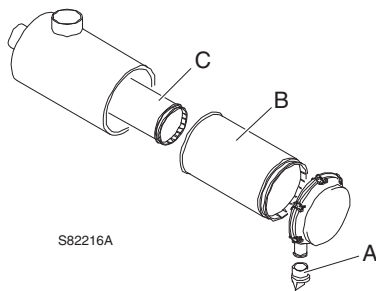
### Changing secondary filter

The secondary filter (C) works as a protective filter in case the primary filter should be damaged. If the filter indicator lamp remains ON even though the primary filter has been replaced or cleaned, this indicates that the secondary filter has become clogged.

**NOTE : The secondary filter should then be replaced - never cleaned.**

Replace the secondary filter when the primary filter is replaced, Never remove the secondary filter unless it is to be replaced.

The secondary filter should be removed carefully and with precision so that no impurities enter the engine. Carefully check that the new secondary filter is correctly installed.



S82216A



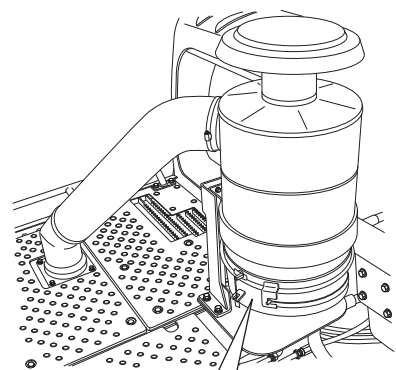
## Oil bath Air cleaner (option)

### Checking screen filter service

Check the outside, inside oil (9.4Liters) cup daily.

The removable and fixed filters are the most sensitive operational parts of the air cleaner. Unless they are kept clean, the air cleaner cannot function properly. A plugged filter not only leads to excessive engine wear, but can also cause loss in engine power.

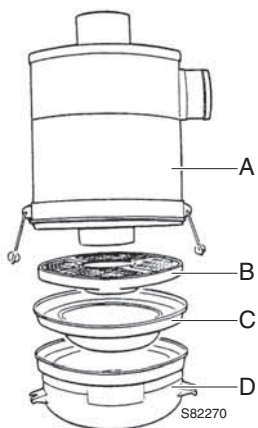
The removable screen filter assembly (if used) should be removed from the oil cups and inspected daily or at each oil cup service.



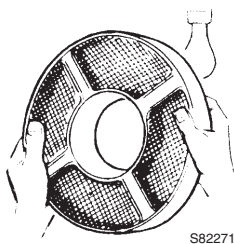
- A Air cleaner housing
- B Screen filter
- C Inner oil cup
- D Oil cup

### Servicing the body assembly

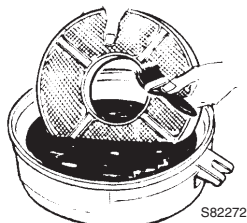
The lower portion of the body assembly should be inspected each time the air cleaner is serviced. If there is any sign of build-up or plugging, the body assembly should be removed and cleaned. At least once a year, remove the body assembly and perform the following service steps:



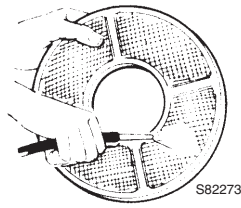
- 1 Remove the oil cup and removable filter (if used).
  - Reassemble inner cup in outer cup and refill both cups to indicated oil level. (9.4 liters)
  - The same oil specified for the engine crankcase is generally acceptable.
- 2 Inspect filter with the aid of a lamp
  - Hold it up to a strong light. An even, bright pattern of light through the wire element means it is clean.



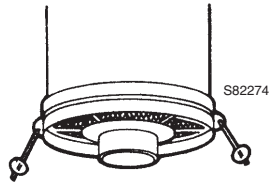
- 3 Wash filter if needed
  - If element is plugged with dirt, lint or chaff (even partially), wash thoroughly with solvent.





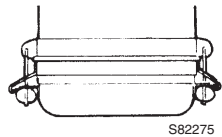


4 Dry thoroughly with compressed air



5 Inspect body

- Each time the oil cup is serviced, inspect lower portion of body assembly and center tube for structural integrity. Replace broken, cracked, or missing parts.



6 Reassemble

- Reassemble filter assembly (if used) with serviced oil cups and air cleaner body. Be sure the oil cup is tight to body assembly.



## Cooling system

### General

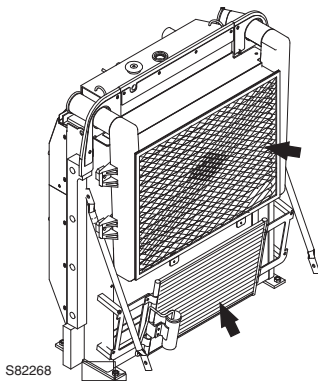
If the engine temperature becomes too high even though the coolant level is correct, the radiator should be cleaned.

#### IMPORTANT

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

If the engine temperature still remains high, contact an authorized dealer workshop for remedial action.

### Cleaning radiator, oil cooler and condenser fins



#### WARNING!

**Compressed air, steam or water can cause personal injury. Wear safety goggles or a face mask. Do not use steam to clean the air condenser.**

#### Clean all fins every 500 hours.

- 1 Remove any mud, dust or leaves attached to the radiator fins and oil cooler fins with compressed air. Clean radiator lower part with compressed air after tilting air conditioner and detaching the lower clogging net.
- 2 Clean the lower part of the radiator with compressed air after tilting the air conditioner and detaching the lower clogging net.
- 3 Check the rubber hose for wear and cracks. If damaged, replace it. Check the hose clamp for looseness.

#### IMPORTANT

**When using compressed air, keep the nozzle at a distance from the fins to prevent a damage. If the fins are damaged, this may cause leakage or overheating. Under dusty environment conditions, check a every day regardless of the maintenance interval.**

## Coolant

### Coolant with antifreeze and corrosion protection

#### Anti-freeze

Check the antifreeze properties every 500 hours.

When delivered from the factory, the cooling system is filled with a mixture of water and concentrated Volvo Construction Equipment antifreeze, which lowers the freezing point and raises the boiling point of the coolant.

#### Corrosion protection

Volvo Construction Equipment concentrated antifreeze contains active anti-corrosion additives in order to protect the engine and radiator. These additives have a limited durability.

**Therefore, change the coolant every 3000 hours or every two years if a coolant filter is installed.**

#### NOTE :

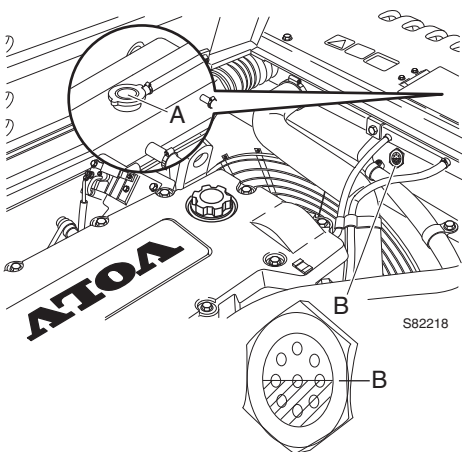
**The Volvo Construction Equipment concentrated anti-freeze must not be mixed with any antifreeze or additives of another make. The mixing may have a negative effect.**

The antifreeze content must not be less than 40%.

The cooling system capacity when changing is approx. **65.4 liters (17.2 US gal)**.

40% lowers the freezing point to -25 °C (-13 °F).

50% lowers the freezing point to -37 °C (-35 °F).



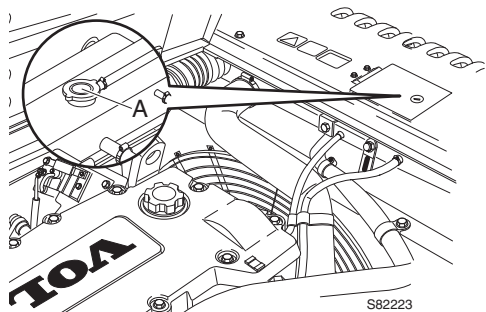
## Checking coolant level

Check the coolant level daily.



**Immediately after operating the engine, the coolant is very hot. Do not open the radiator cap until it has cooled down, then open the cap slowly to release the internal pressure.**

- 1 Open the engine hood.
- 2 Check the coolant level (B).  
If the level is in the center of gauge (B), the level is normal.
- 3 If the coolant is invisible in the sight gauge, refill through (A) up to B level.



### Changing coolant

Change the coolant every 2000 hours.

#### Draining coolant

- 1 Remove the radiator bottom cover and put a container under drain cock (B).
- 2 Loosen radiator cap (A)
- 3 Open cock (B).

**NOTE :**

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

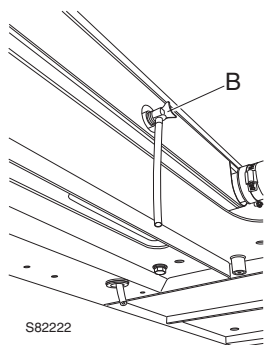


#### **WARNING!**

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

#### Flushing

- 1 After draining, close cock (B).
- 2 Refill through (A) with clean tap water.
- 3 Start up engine and run at low idle for about 10 minutes.
- 4 Stop the engine and drain the water.



#### Filling coolant

The cooling system capacity when changing is approx. **65.4 liters (US 17.2 gal)**

- 1 After flushing, close cock (B) and remove cap (A) open.
- 2 Fill the recommended coolant through (A).
- 3 Run the engine at low idle for about 5 minutes.
- 4 Stop the engine and refill the coolant to the proper level on the check gauge.
- 5 Install the cap.

**IMPORTANT**

Never fill cold coolant in a warm engine. This can cause cracking in the cylinder block and cylinder head. Failure to change coolant will cause clogging of the cooling system and the risk of the engine seizing.

## Changing coolant filter



### WARNING!

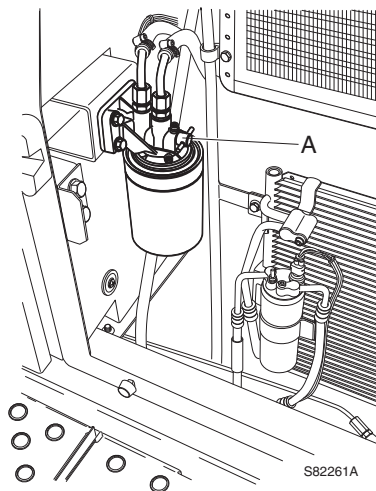
Take care of waste oil/liquids in an environmentally safe way!

Take care when replacing the filter, hot coolant can cause severe burns on unprotected skin.

If the engine is started with the engine hood open, no person is allowed at the front end of the machine.

The filter should be replaced **every 1000 hours**, provided Volvo Construction Equipment original anti-freeze is used.

To gain access to the filter, let down the belly plate. Filter (A) is positioned down to the right on the engine.



### Removing

- 1 Turn the handle on shut-off valve (A) until it is horizontal (the coolant circuit through the filter is now closed).
- 2 Loosen the filter with a suitable tool (filter pliers or similar).

### Installing

- 3 Coat the gasket with petroleum jelly.
- 4 Fill the filter with coolant.
- 5 Screw on the filter until the gasket just touches the sealing surface. Then tighten the filter a further 1/2 a turn
- 6 Open the valve. The handle should now be vertical.

### After installing

- 7 Wipe around the filter head and the filter until dry.
- 8 Start up and run the engine until warm.
- 9 Stop the engine and check that the gasket seals. If it does not, remove the filter and check the sealing surface.

**NOTE :** Usually it does not help to tighten the filter further.

## Water pump, belt tension



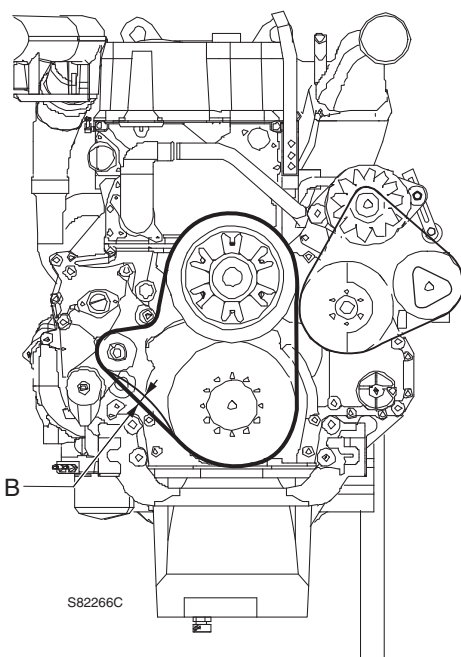
### WARNING!

The engine must be stationary when checking the belt tension, rotating parts can cause injuries.

Check the belt every 250 hours.

### Adjusting:

At correct belt tension, it should be possible to depress the belt approx. 15 mm (0.6 in). if above 15 mm, replace the belt with a new one



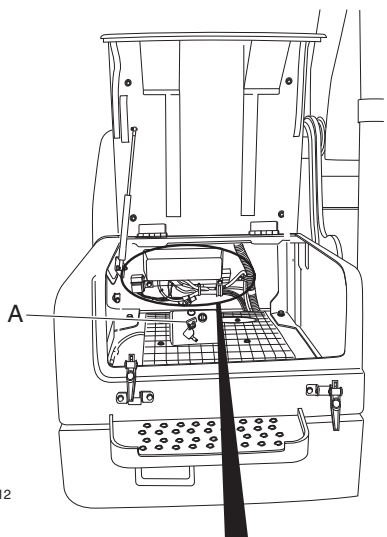
## Electrical system

### Master switch

**IMPORTANT**

The machine is provided with an alternator. The battery master switch must therefore always remain turned ON while the engine is running. If it is turned OFF, or if the start switch is turned OFF while the engine is running, the alternator may be damaged.

Battery master switch (A) is located inside of the tool box which is located on the right side of the machine. After finishing work for the day, the battery master switch should be turned OFF..



S82112

### Slow blow fuse

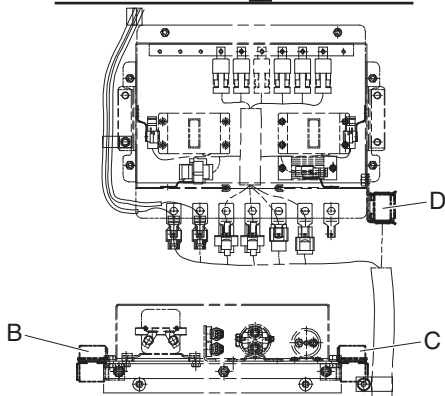
These fuses are master fuses for the electrical systems.

B: 40 A (2 EA)

C: 140 A

D: 80 A (2 EA)

If the electrical system does not work after repairing the electrical system, check these slow blow fuses.



### Battery electrolyte level

Check the electrolyte level daily.



**WARNING!**

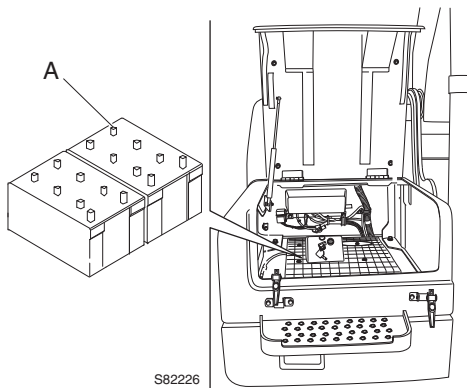
Battery gas (hydrogen) is flammable. Do not expose to sources of fire such as open flame, cigarettes, or sparks. If battery electrolyte is splashed onto clothes or skin, immediately flush with clean water. If battery electrolyte is splashed into the eyes, immediately flush with large amounts of clean water and consult a doctor.

### Checking electrolyte level

- 1 Open the cover of the battery box on the right side of the machine.
- 2 Loosen cap (A)  
The electrolyte level should stand approx. 10 mm (0.4 in) above the cell plates.

**If the level is too low**

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



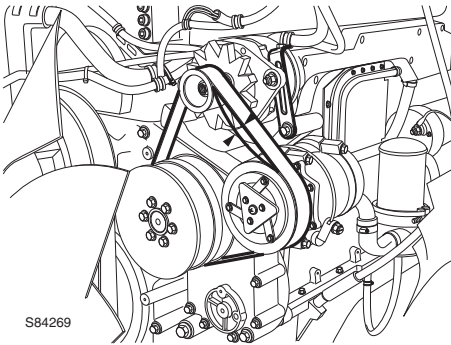
S82226

## Rules for batteries

See **Batteries** on page 128.

## Charging batteries

See **Charging batteries** on page 129.



## Alternator

### Alternator belt tension

Check the belt tension daily.



### WARNING!

The engine must be stationary when checking the belt tension, rotating parts can cause injuries.

## Checking

Press the center between the fan pulley and the alternator pulley with a force of 10 kgf. If the slack is 9.5 ~ 12.7 mm, the tension is normal.

## Adjusting

The belt tension will be adjusted automatically by the auto tensioner.

If the belt tension is abnormal, check for damage of the auto tensioner, or belt specification.

## Sensitivity of alternator

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

### Disconnection

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

### Battery connection

- The battery terminals must never be confused. Each terminal is clearly marked with a (+) or a (-) sign respectively. If the cables are wrongly connected, the alternator rectifier will be ruined immediately.
- When disconnecting batteries, first break the circuit using the battery master switch. See **Master switch** on page 148.

### Electric welding

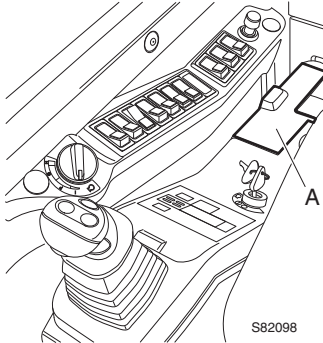
- Before electric welding is carried out on the machine or any attachment installed to the machine, the current must be turned OFF at the battery master switch.
- Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units.
- When disconnecting and reconnecting, the leads should be without current (the battery master switch turned off).
- Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.
- Before welding, remove all paint from an area of at least 10 cm (4 in) around the point of welding. Paint which is heated gives off unhealthy gases.
- All paint decomposes when heated and forms a great number of compounds, which may cause irritation and be dangerous to ones health after repeated or prolonged exposure.
- 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. Therefore, never weld directly on a painted surface.



## Electrical distribution box

### General

The machine has an electrical distribution box (A) installed to the right of the operator seat. The electrical distribution box contains most of the fuses and relays of the machine.



### WARNING!

**Never install a fuse with a higher ampere rating than that stated on the decal (risk of damage or fire on the circuit board).**

**If a fuse blows repeatedly in the same position, the cause of the fault has to be investigated.**

Fuses and relays positioned in the electrical distribution box are easily accessible after the cover on the electrical distribution box has been opened. The inside of the cover is provided with a decal showing which appliance is connected to the respective fuses. This is also shown in the figure below.



Fuse capacity and symbol related circuits

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	
10A	10A	20A	10A		10A	10A	20A	25A	25A	10A	15A	10A	5A	20A	
F16	F17	F18	F19	F20	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	
15A	5A	10A	20A	10A	15A		5A	5A	10A	10A	20A	10A	10A	10A	

S82029

No.	Capacity	Appliance / circuit	No.	Capacity	Appliance / circuit
<b>F1</b>	10A	Instrument panel	<b>F16</b>	15A	Start switch
<b>F2</b>	10A	Working lights (deck)	<b>F17</b>	5A	Cab light
<b>F3</b>	20A	Working lights (boom)	<b>F18</b>	10A	Radio and cassette
<b>F4</b>	10A	Wiper & washer	<b>F19</b>	20A	Auxiliary heater
<b>F5</b>	-	-	<b>F20</b>	10A	Power outlet
<b>F6</b>	10A	Cigarette lighter	<b>F21</b>	15A	Fuel filler pump
<b>F7</b>	10A	Horn	<b>F22</b>	-	-
<b>F8</b>	20A	Air conditioner	<b>F23</b>	-	-
<b>F9</b>	25A	Extra working lights (rear, counterweight)	<b>F24</b>	5A	Engine RPM manual control
<b>F10</b>	25A	Extra working lights (front)	<b>F25</b>	10A	V-ECU (vehicle electronic control unit)
<b>F11</b>	10A	Rotating warning beacon	<b>F26</b>	10A	Seat heater & Air suspension seat
<b>F12</b>	15A	Safety solenoid	<b>F27</b>	20A	Hammer, Booster, Shear
<b>F13</b>	10A	V-ECU (vehicle electronic control unit)	<b>F28</b>	10A	Quickfit, Rotator solenoid valve
<b>F14</b>	5A	Machine display unit	<b>F29</b>	10A	Travel alarm
<b>F15</b>	20A	E-ECU(engine electronic control unit)	<b>F30</b>	10A	Auto greasing

## Hydraulic system

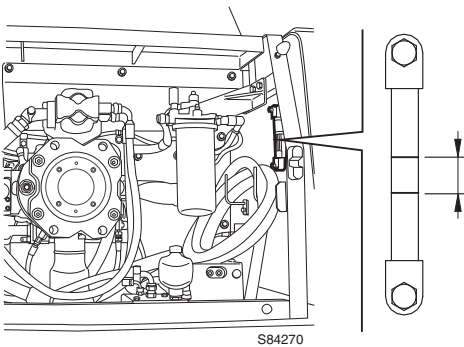
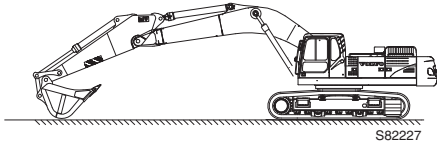
### IMPORTANT

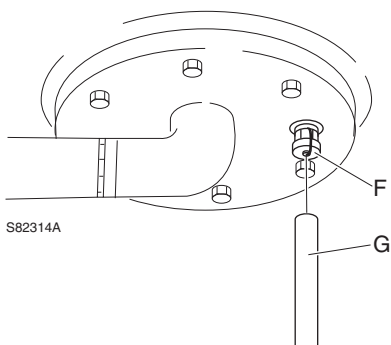
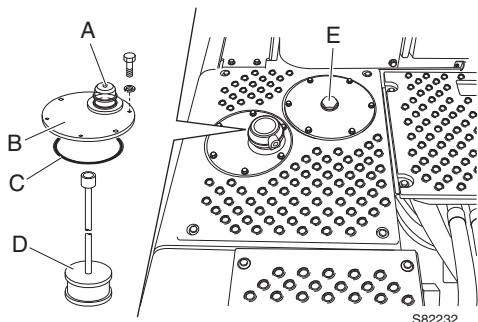
Exercise cleanliness when filling oil and in all work on the hydraulic system.

### Checking hydraulic oil level

#### Check the oil level daily

- 1 Retract the bucket cylinder completely, retract the arm cylinder completely and lower the boom to the ground.
- 2 Move the safety locking lever down to lock the system securely, See **Safety locking system on page 60.**, and stop the engine
- 3 Move the safety locking lever securely. Move the left and right operating lever, respectively to their full stroke in all directions to release internal pressure from the hydraulic circuits.
- 4 Open the right side of upper structure, and check the oil level by sight gauge.
- 5 If the level is in the center of the gauge, the level is OK. If the level is low, open the cover on the tank to add hydraulic oil.





## Changing hydraulic oil

Change the hydraulic oil every 2000 hours



### WARNING!

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

- 1 Swing the superstructure so that drain plug (F) at the bottom of the hydraulic tank is located between the left and right tracks.
- 2 Extend the bucket cylinder completely, retract the arm cylinder completely and lower the boom to the ground.
- 3 Move the safety locking lever down to lock the system securely, See **Safety locking system on page 60.** and stop the engine.
- 4 Release the internal pressure of the tank through air breather (A).
- 5 Unscrew cover (B).
- 6 Remove O-ring (C) and strainer (D).
- 7 Place a container under the engine pan.
- 8 Remove the protecting cap for drain plug (F) and attach drain hose (G), which is the same hose as that used for draining engine oil.
- 9 Drain the oil.
- 10 Disconnect the hose and install the protecting cap.
- 11 After cleaning the magnetic rings of strainer (D) thoroughly, re-install it.
- 12 Fill oil and re-install cover.
- 13 Check the oil level in the sight gauge.

The total oil capacity when changing is approx.620 liter (163.8 US gal.)

For oil grade, See **Recommended lubricants** on page 177.

## Bio oil

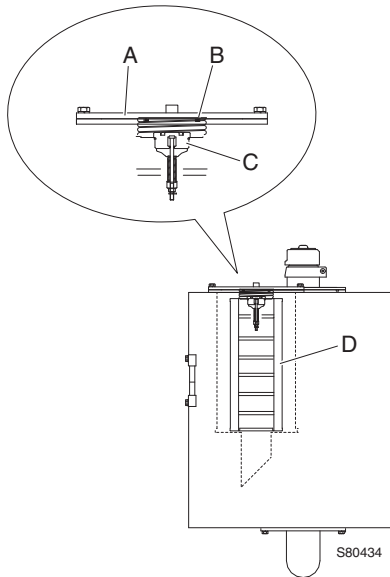
When changing from a mineral oil to a bio oil, please contact your authorized dealer workshop.

## Replacing hydraulic oil return filter

Replace the return filter after the first 250 hours and then every 1000 hours.



Before removing cover (A), release the internal pressure of the tank.

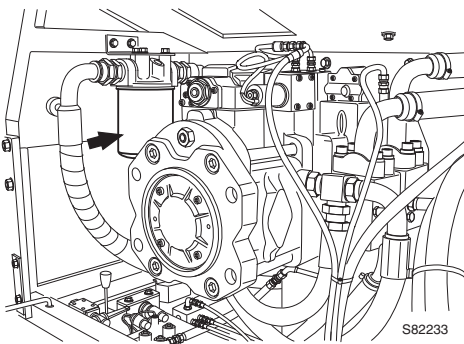


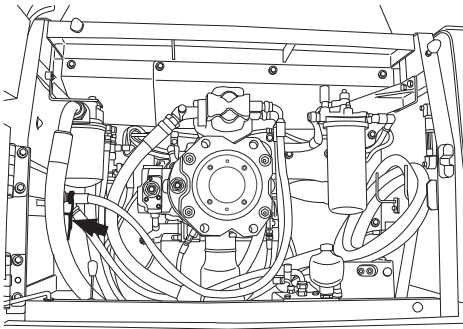
- 1 Unscrew cover (A)
- 2 Remove O-ring (B), spring (C) and bypass valve (D), and then pull out filter.
- 3 Clean the dismantled parts.
- 4 Install a new filter and all parts.  
When mounting cover (A), fasten the bolts while pressing down on the cover.
- 5 Run the engine at low idle speed for 10 minutes to remove the air.
- 6 Stop the engine.

## Replacing cartridge for drain filter

Replace the cartridge for the drain filter after the first 250 hours and then every 500 hours.

- 1 Place a container under the drain filter, and turn the filter counterclockwise to remove it.
- 2 Fill the new filter with oil, thinly coat O-ring with oil.



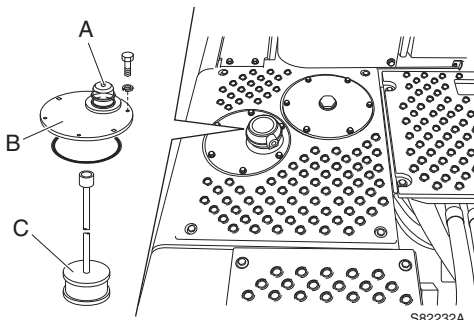


S84271

### Replacing element in the pilot filter

Replacing the element in the pilot filter after the first 250 hours and then every 1000 hours.

- 1 Place a container under the filter
- 2 Remove the filter bowl
- 3 Replace the inner element of the pilot filter.

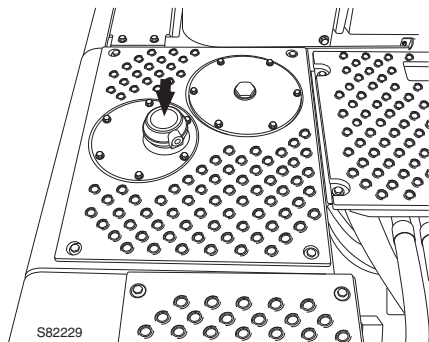


S82232A

### Cleaning and changing strainer

Clean the strainer every 2000 hours.

- 1 Press breather (A) to release the internal pressure at the tank.
- 2 Unscrew cover (B), and pull out strainer (C).
- 3 Clean or replace the strainer according to operating hours.



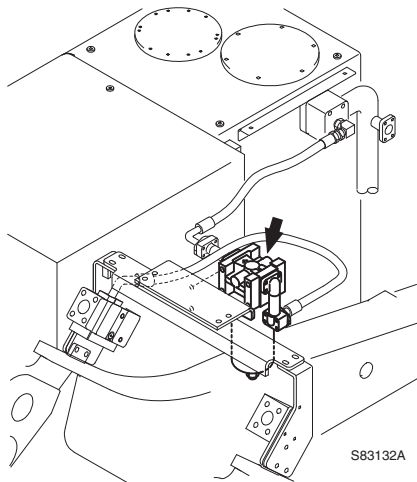
S82229

### Replacing element in the air breather on hydraulic tank

Replace the element in the air breather every 2000 hours or when necessary.

In dusty working environments, the air breather will become blocked after a short period of time.

- 1 Open the cover of air breather.
- 2 Replace the element of air breather with new one.

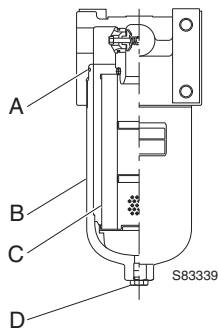


## Replacing element in the return filter for hammer circuit (option)

Replace the element in the return filter for hammer circuit every 200 hours. (on the basis of hammer working hours)

- 1 Stop the engine.
- 2 Loosen drain plug (D) to drain hydraulic oil from case (B).
- 3 Remove the filter case (B) by using a wrench.
- 4 Remove the filter element (C).
- 5 Inspect O-ring (A) for any damage.
- 6 Replace damaged O-ring.
- 7 Install a new filter element.
- 8 Install the filter case.
- 9 Install the drain plug.

**Tightening torque for the drain plug (D): 4 kg·m**  
**Tightening torque for the filter case (B): 10 kg·m**



## Swing drive unit

### General

#### IMPORTANT

**Always clean around the oil level gauge before you check the oil level. Dirt in the oil damages the swing drive case.**

It is very important that the oil level is always correct and that it is checked at working temperature.

#### Therefore remember:

- The swing drive case may not drive correctly and thus be damaged if there is **too little oil**.
- **Too much oil** makes the oil foam, which causes the swing drive case to overheat.

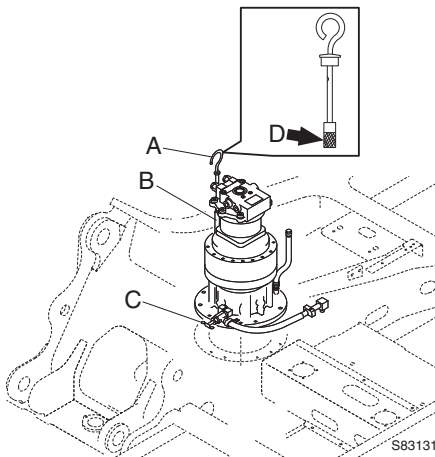


#### WARNING!

**Immediately after operating the machine, the oil is hot. Allow the oil to cool.**

### Checking oil level of swing drive unit

Check the oil level every 250 hours.



- 1 Pull out oil dipstick (A), and wipe it with a clean cloth.
- 2 Insert oil dipstick (A) again.
- 3 Pull out dipstick (A) again, and check the level. If the level is in the center of "D", the level is correct.

If the oil is below the correct level, top up with the oil through oil filler hole (B) to the correct level.

Oil specification: See **Recommended lubricants** on page 177.

If the oil is above the proper level, loosen drain valve (C), and drain the oil to adjust to the proper level. Then close drain valves (C).

### Changing oil of swing drive unit

Change the oil after the first 500 hours and then every 1000 hours.

- 1 Find a container for receiving the drained oil.
- 2 Place the container under the valve on the swing drive unit for receiving the drained oil.
- 3 Remove protecting cap and connect drain hose, which is the same hose as that used for engine oil draining.
- 4 Close drain valve (C).
- 5 Pull out oil dipstick (A), and fill oil to the correct level through oil filler hole (B).
- 6 Check the oil level again and if necessary, top up.
  - Wait about 5 minutes for checking accurately after filling oil.

Oil specification: See **Recommended lubricants** on page 177.



## Track drive unit

### General

#### IMPORTANT

**Always clean around the check plug before you check the oil level. Dirt in the oil damages the track drive case.**

It is very important that the oil level is always correct and that it is checked at working temperature.

#### Therefore remember:

- The track drive case may not drive correctly and thus be damaged if there is too little oil.
- Too much oil makes the oil foam, which causes the track drive case to overheat.



#### WARNING!

**Immediately after operating the machine, the oil is hot. Allow the oil to cool. Residual pressure in the drive unit, may cause the plug to be dislodged suddenly and oil to jet out.**

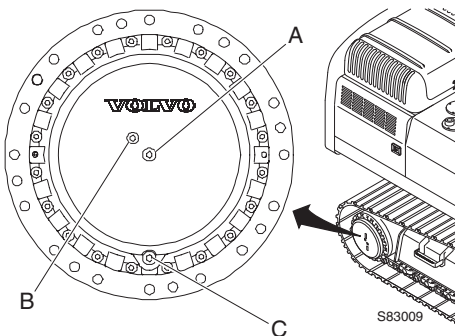
### Checking oil level in track drive unit

Check the oil level every 250 hours.

- 1 Turn the case so that drain plug (A) is at the bottom.
- 2 Remove oil level check plug (B). 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 level check plug (B).

Oil specification: See **Recommended lubricants** on page 177.



### Changing oil in track drive unit

Change the oil after the first 500 hours and every 2000 hours.

- 1 Find a container (above 11 litres) for receiving the drained oil.
- 2 Turn the case so that drain plug (A) is at the bottom.
- 3 Place a container under drain plug (A).
- 4 Remove drain plug (A) and oil level check plug (B) and drain the oil.
- 5 Check the O-ring on the plugs, if damaged, replace it.
- 6 Install drain plug (A).
- 7 Fill the oil to the correct level through oil level check plug hole (B).

Oil specification: See **Recommended lubricants** on page 177.

Install the filling port plug (B)

## Handling accumulator



### WARNING!

The accumulator is charged with high pressure nitrogen gas.

To prevent serious accidents, perhaps even fatal accidents, handle with care and observe the following:

Do not hit, drill, or weld the accumulator.

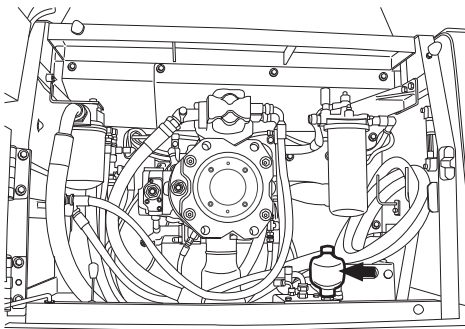
Keep it away from open flame or other high heat sources.

Ask your authorized Volvo CE dealer workshop to discharge the pressure in the accumulator prior to disposal.

If you operate the operating lever downward after the engine stops, the accumulator allows the attachment to move under its own weight.

After stopping the attachment.

Move the safety locking lever down to lock the system securely, See *Safety locking system on page 60*.



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### Operation of accumulator (in emergency)

- 1 Stop the engine by turning the starting key to STOP (⏻) position.
- 2 Turn the starting key to Running (⏻) position.
- 3 Put the operating lever to boom down position to lower the attachment by its own weight.

### Accumulator releasing pressure

- 1 Completely lower the attachment to the ground.
- 2 Keep all the attachments such as hammer closed.
- 3 After stopping the engine, turn the start switch to Running (⏻) position. Even after performing the above, the pressure has not been released completely. Loosen the hose connection slowly when you disconnect the accumulator. And step aside in case oil should jet out.
- 4 Move the safety bar up to unlock the system.
- 5 To release the pressure in the control circuits, move the operating levers and pedals forward / rearward and left / right to their respective end positions.
- 6 Turn the start switch to STOP (⏻) position.
- 7 Move the safety locking lever down to lock the system securely, *Safety locking system on page 60*.

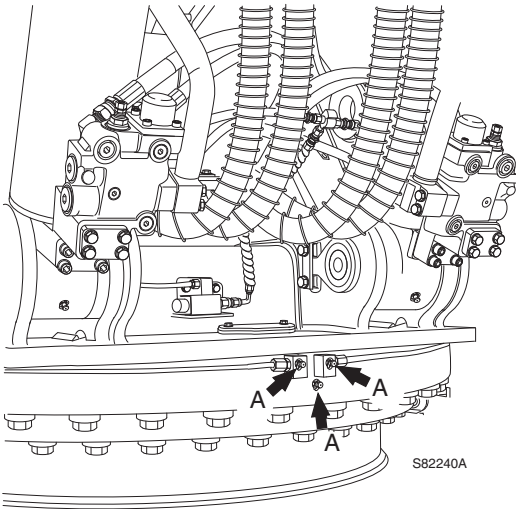
Even after performing the above, the pressure has not been eliminated completely. Loosen the hose connection slowly when you disconnect the accumulator. And step aside from the oil ejection direction.

## Swing gear and bath, greasing

### Greasing swing gear bearing

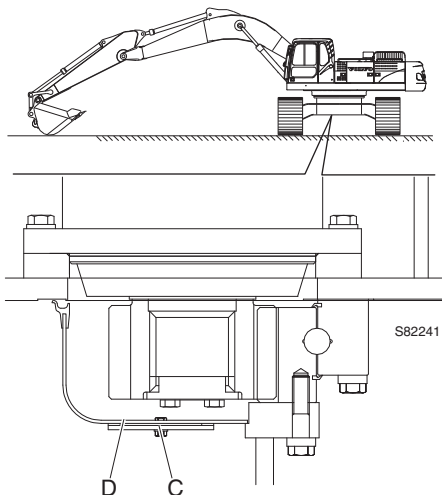
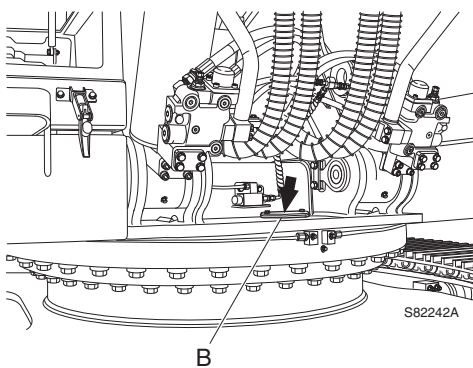
Grease the swing gear every 250 hours. Park the machine on a level surface.

- 1 Park the machine on level ground.
- 2 Lower the bucket to the ground.
- 3 Turn the ignition key to STOP (⊘) position.
- 4 Move the safety locking lever down to lock the system securely. See **Safety locking system on page 60**.
- 5 Grease the grease via the three grease nipple (A) using a hand or power grease gun.
- 6 Start the engine. Raise the bucket several inches off the ground and rotate the superstructure 40° (1/9 turn).
- 7 Lower the bucket to the ground.
- 8 Repeat the procedure three times, beginning with step 3.
- 9 Apply grease to the swing bearing until grease can be seen escaping from the swing bearing seals.
- 10 Take care not to supply excessive a mount of grease.
- 11 After greasing, clean off the superfluous grease completely.



### Checking grease of swing bath

- 1 Park the machine on a level surface.
- 2 Lower the bucket to the ground.
- 3 Turn the starting key to STOP (⊘) position.
- 4 Move the safety locking lever down to lock the system securely. See **Safety locking system on page 60**.
- 5 Remove bolts and cover (B).
- 6 Check the level and condition of the grease.
- 7 Fill with grease if needed.
- 8 Inspect the seal. Replace the seal if damaged.
- 9 Install the cover.



If the grease is contaminated or discoloured with water, remove bolt (C) and drain cover (D) and change the grease.

The amount of grease required is **about 36 liter (9.5 US gal)**.



# 162 Swing gear and bath, greasing

## Greasing excavator unit

Grease a new machine every 10 hours or daily only during the first 100 hours.

After the first 100 hours of operation, grease the excavator unit every 50 hours or weekly.

**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.

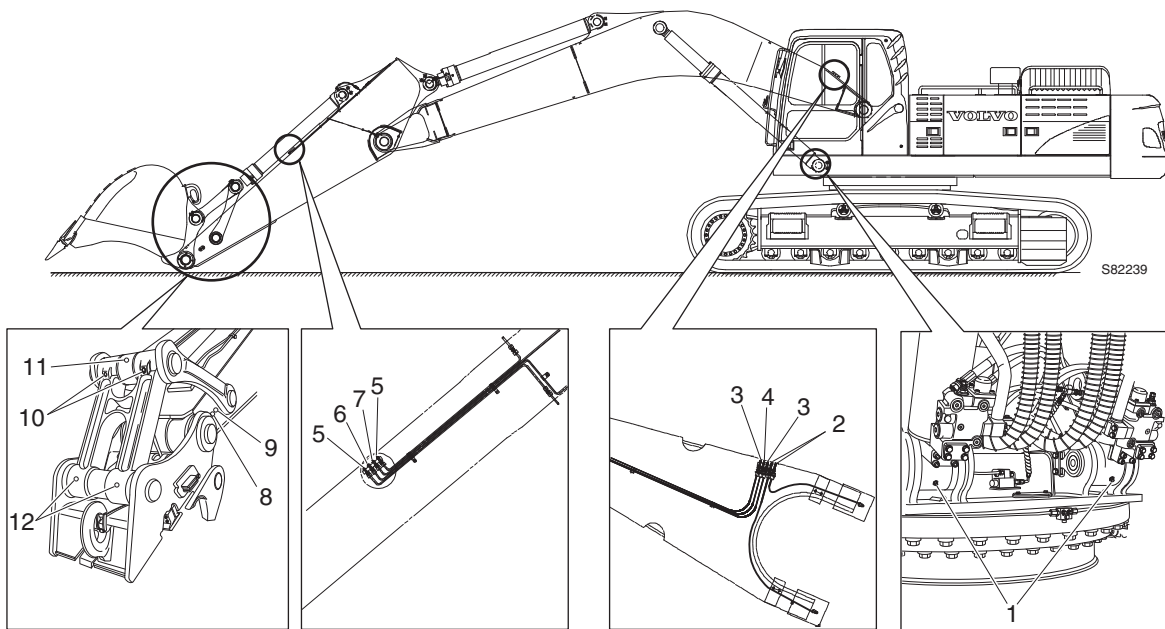
When greasing by hand, lower the attachment to the ground as illustrated, and stop the engine.

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.

Grease specification: See **Recommended lubricants** on page 177.



- |   |  |
|---|--|
| 1 Boom cylinder mounting pin (2 points) | 7 Bucket cylinder mounting pin (1 point)               |
| 2 Boom mounting pin (2 points)          | 8 Pin between of arm and bucket (1 points)             |
| 3 Boom cylinder rod end pin (2 points)  | 9 Pin between of arm and link (1 point)                |
| 4 Arm cylinder mounting pin (1 point)   | 10 Pin between of connecting rod and link (2 points)   |
| 5 Pin between boom and arm (2 points)   | 11 Bucket cylinder rod end pin (1 point)               |
| 6 Arm cylinder rod end pin (1 point)    | 12 Pin between of bucket and connecting rod (2 points) |

## Refilling grease to attachment

Service the new machine Every 10 Service Hours or Daily only within the initial 100 service hours.

After the initial 100 service hours of operation, service the attachment linkage Every 50 Service Hours or Weekly.

**NOTE :**

Under severe operating conditions where mud, water, and abrasive material may enter the bearings, or after hydraulic hammer use, the attachment linkage should also be serviced Every 10 Service Hours or Daily.

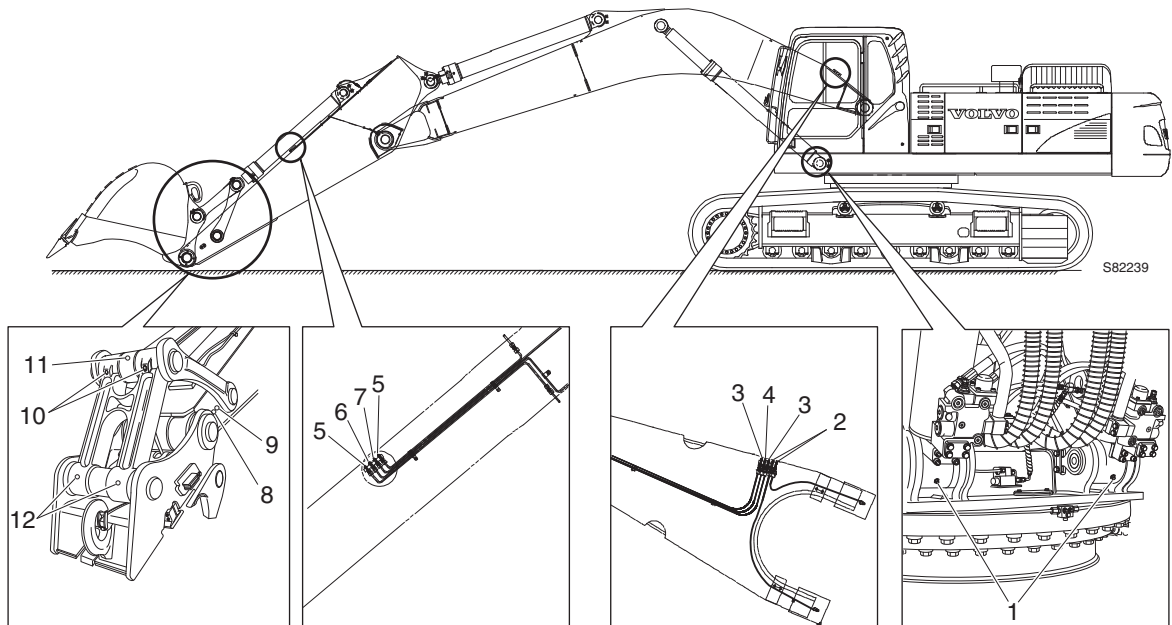
In manual refilling, lower the attachment to the ground as illustrated, and stop the engine.

Refill the grease through the grease fittings using a hand or power grease gun.

After refilling grease, clean off the overflow grease.

Immediately after working under water, refill new grease to the submerged parts like the bucket pins to remove the old grease, regardless of the grease refilling cycle time.

Grease specification: See **Recommended lubricants** on page 177.



- 1 Boom cylinder mounting pin (2 points)
- 2 Boom mounting pin (2 points)
- 3 Boom cylinder rod end pin (2 points)
- 4 Arm cylinder mounting pin (1 point)
- 5 Connecting pin of boom and arm (2 points)
- 6 Arm cylinder rod end pin (1 point)
- 7 Bucket cylinder mounting pin (1 point)
- 8 Connecting pin of arm and bucket (1 points)
- 9 Connecting pin of arm and link (1 point)
- 10 Connecting pin of connecting rod and link (2 points)
- 11 Bucket cylinder rod end pin (1 point)
- 12 Connecting pin of bucket and connecting rod (2 points)

# 164 Swing gear and bath, greasing

## Recommended grease

Product name Manufacturer	Region	
	General region	The tropics
ESSO	ESSO EP2	BEACON Q2
CALTEX	MULTIFAX EP2	MARFAK ALL PURPOSE 2
GULF	GULF CROWN EP2	GULFCROWN EP2 (SPECIAL)
MOBIL	MOBILUX EP2	MOBILUX EP2 (SPECIAL)
SHELL	ALVANIA EP2	RETINAX HDX-2
TOTAL	MULTIS EP2	MULTIS HT2
CASTROL	SPHEEROL EPL2	MOLY

**NOTE :**  
The tropics: Generally, the ambient temperature is above 40 °C.

## Mixability of types of grease with different additives

Mixing available table

	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

## Air conditioner

### IMPORTANT

The system contains HFC (R134a) under pressure. By law, HFC must not be deliberately released. Repairs and re-filling of the refrigerant system must only be done by trained personnel. Contact your authorized Volvo Construction Equipment workshop.

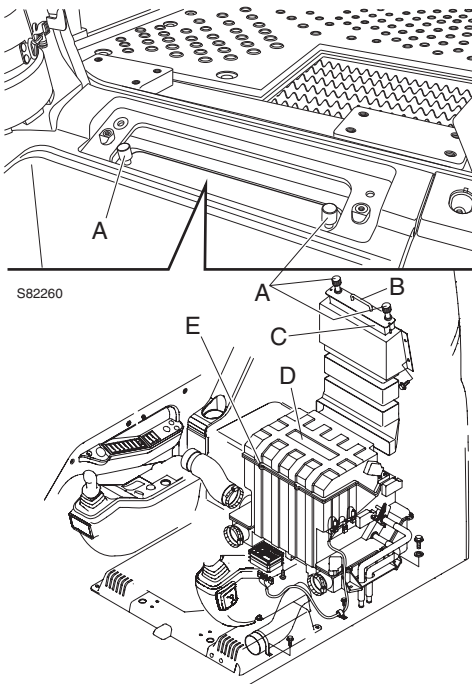
**Change air conditioner/heater filter every 1000 hours or 6 months**

If the air conditioner filter is clogged, the air flow will be reduced and cooling / heating capacity will also be reduced.

Therefore, clean it periodically.

Installing and dismantling the filter

- 1 Unscrew bolts (A).
- 2 Pull filter lever (B) for air conditioner ambient filter (C), push the latches (E), open the cover and take out the main filter (D).
- 3 Clean the filter with compressed air.
- 4 If the filter is damaged or heavily contaminated, replace it with a new one.
- 5 Check for damage.
- 6 Install the filter, and assemble it in reverse order.



S82260

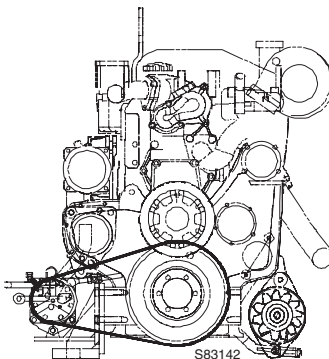
## Adjusting air conditioner belt tension

### IMPORTANT

If the belt tension is not correct, the performance of the compressor is reduced and the belt and the compressor may be damaged.

Press belt in the middle between the pulleys with a force of 10 kgf·m. If it is depressed about 7-10 mm, the belt tension is correct.

Loosen nut (A) of idler pulley, and adjust the belt tension with adjusting bolt (B).



S83142

## Track slack

### Inspecting and adjusting the track slack

Check the slack every 100 hours.



#### WARNING!

When two persons are working, the operator should follow the sign of the maintenance worker.

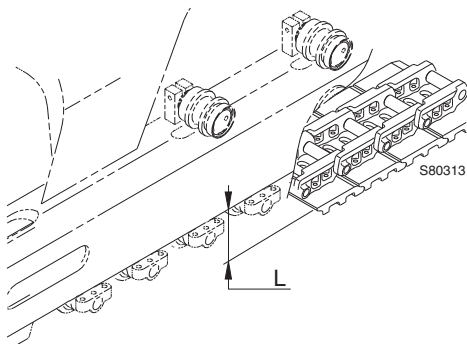
For inspecting the track tension, the track must be lifted off the ground.

Be very careful that the machine does not drop or move while measuring.

The degree of wear condition of track link pins and bushings varies with the working condition or the characteristics of soil. Check the track slack often and keep to 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, causing 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 / removal of the material.

Therefore thoroughly clean the undercarriage at least daily or more often according to job-site soil conditions.

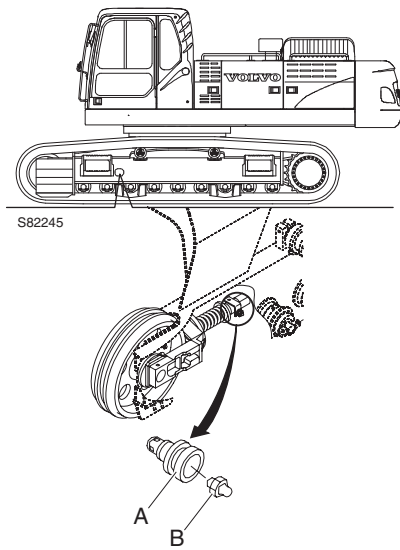


#### Inspection

- 1 Raise the track by using boom and arm. For this movement, operate the lever slowly.
- 2 Measure (L), the clearance between the bottom of track frame and the upper surface of track shoe.
- 3 Adjust the track slack according to the soil characteristics.  
The standard track slack according to the soil characteristics.

Working condition	Clearance (L mm)
General soil	340 – 360
Rocky ground	320 – 340
Moderate soil like gravel, sand, snow, etc.	360 – 380





## Track slack, adjusting



### WARNING!

Valve (A) may suddenly dislodge due to the high pressure of the compressed grease in the cylinder. When loosening valve (A), do not loosen it more than one turn.

Do not loosen other parts except valve (A). Step aside from the trajectory path of the valve. If the tension can not be adjusted by the way shown in this manual, contact an authorized Volvo CE dealer workshop.

### Tightening track tension - reducing slack

- 1 Fill the grease through grease nipple (B) using a high pressure grease gun.
- 2 To check the slack, move the machine forward and rearward.
- 3 Check the slack again. If the slack is not correct, adjust it again.

### Loosening track tension - increasing slack

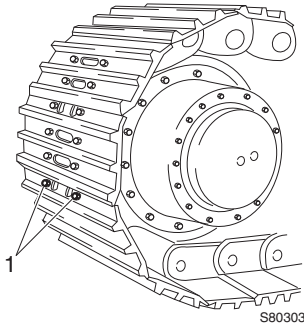


### WARNING!

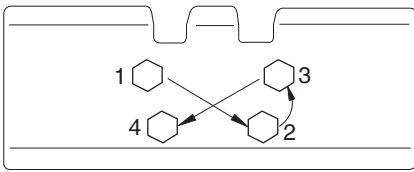
Valve (A) may suddenly dislodge due to the high pressure of the compressed grease in the cylinder. When loosening valve (A), do not loosen it more than one turn.

Do not loosen other parts except valve (A). Step aside from the trajectory path of the valve. If the tension can not be adjusted by the way shown in this manual, contact an authorized Volvo CE dealer workshop.

- 1 Loosen valve (A) gradually to drain the grease.  
Do not loosen valve (A) more than one turn.  
If the grease does not drain smoothly, move the machine forward and rearward. Don't use the nipple (B) to drain the grease, the nipple can be ejected suddenly by internal high pressure in the cylinder.
- 2 Close valve (A), but do not tighten excessively, the fitting may be damaged.  
To check the slack, move the machine forward and rearward.
- 3 Check the slack again. If the slack is not correct, adjust it again.



S80303



S80304

## Tightening track shoe bolts

### Check the shoe bolts daily.

If track shoe bolts (1) are loose, the track shoes are likely to be damaged. Therefore check for looseness and tighten the bolts to specified torque, 105 ~ 115 kgf·m.

### Retightening

After tightening with a torque of 105 ~ 115 kgf·m, check whether the nut and the shoe are in full contact with the mating surfaces of the link.

### Tightening order:

Tighten the bolts in the order as shown in the figure.

## Replacing bucket teeth

Replace the bucket teeth before the adaptors wear away.



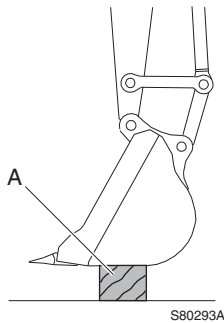
### WARNING!

**When changing the bucket teeth, always:**

**Lower the bucket to the ground, position to the easiest posture for working, stop the engine.**

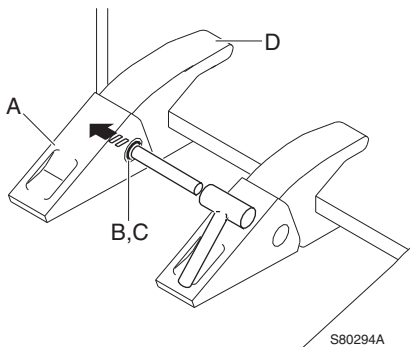
Place a block (A) under the bucket, then lower the bucket keeping it horizontal.

Stop the engine and **Put the safety locking lever down to lock the system securely, See Safety locking system on page 60.**



### WARNING!

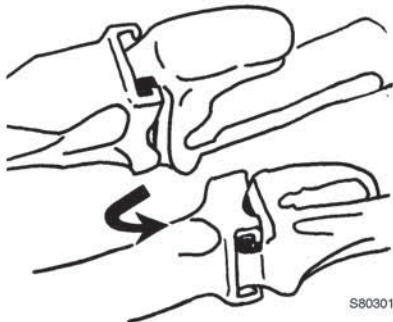
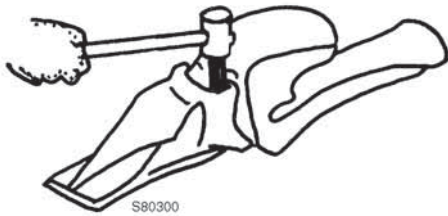
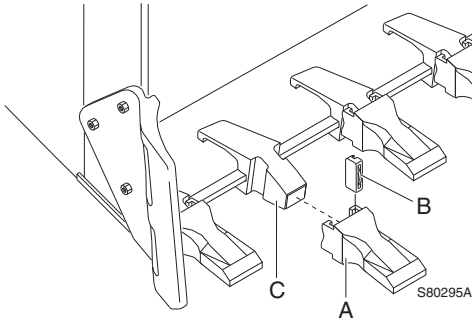
**Before removing the locking pins always wear eye protection.**



### Standard type (transverse pin), K-bucket

- 1 Drive out pin (B) using a hammer and punch, being careful not to damage lock washer (C).
- Use a round bar with a smaller diameter than the pin as a punch.
- 2 Clean the surface of adapter (D), insert a new lock washer (C) in the correct place, and install a new tooth (A).
- 3 Drive pin (B) into the pin groove, through lock washer (C) until the pin is flush with the tooth.





### Heavy excavating (vertical pin), ESCO

- 1 Drive out locking pin (B) using a hammer and punch. Turn tooth (A) counter-clockwise and pull it off.
- 2 Thoroughly clean adapter (C), remove all mud and rust. Push a new tooth (A) onto adapter (C) and turn it clockwise until the tooth is properly seated, ensuring that the retaining pin hole and groove are aligned.
- 3 After fitting the tooth, insert a new lock pin (B) into the pin hole and groove and lightly tap it into position.
- 4 Check the following after changing the bucket tooth.
  - Check if the inserted locking pin is flush with the surface of the tooth.
  - If required, slightly knock locking pin (B) inserted at one direction upper face of the tooth direction to make it flush with.
  - Slightly knock the tip of the tooth upward and downward and sideways in both directions.
- 5 Replace the rubber pin and locking pin at the same time as replacing the tooth. By doing so, it is possible to prevent the tooth from working loose.

# Lubrication

## General

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:

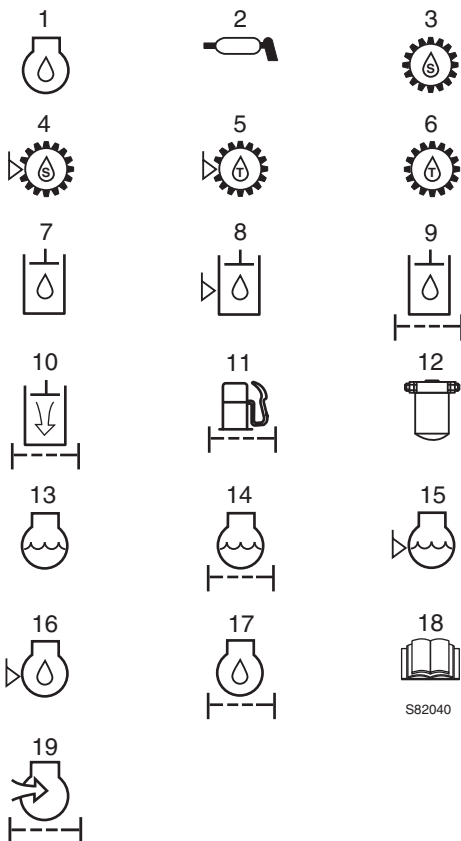
- To supply grease to the bearing, to reduce wear between the pin and the bearing.
- To replace old, dirty grease. The grease stored inside the outer seal collects dirt and water and prevents them from penetrating into the bearing.

### IMPORTANT

Wipe off grease nipples and the grease gun before greasing, to avoid introducing sand and dirt particles with the grease.

## Symbol key for "Lubrication and service chart"

These standard symbols are used in the Lubrication and service chart, see the adjacent table.

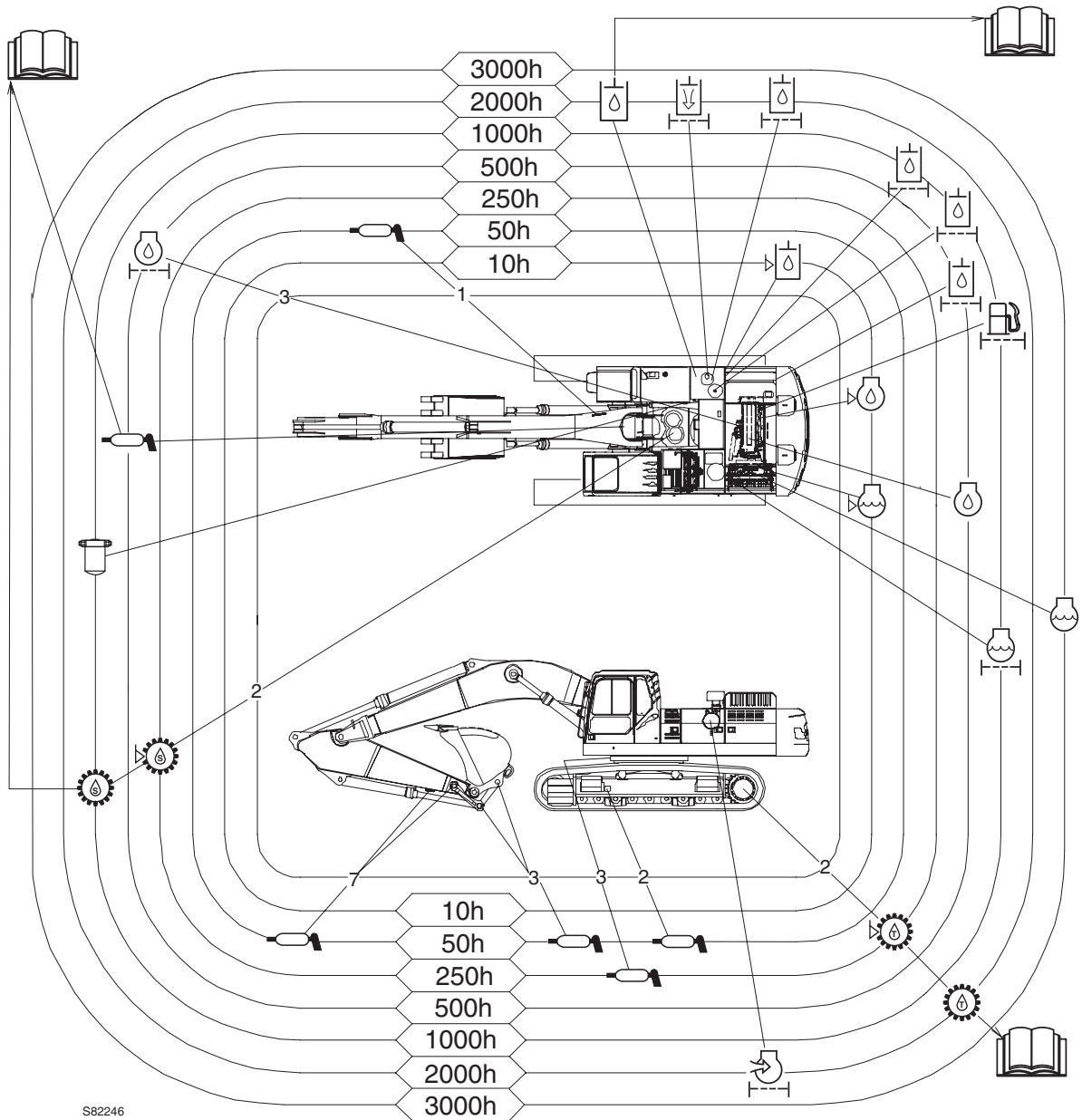


- 1 Engine oil filling point
- 2 Grease lubrication point
- 3 Swing ring gear oil
- 4 Swing ring gear oil check
- 5 Track drive gear oil check
- 6 Track drive gear oil
- 7 Hydraulic oil filling point
- 8 Hydraulic oil level
- 9 Hydraulic oil filter
- 10 Hydraulic oil tank breather filter
- 11 Fuel filter
- 12 Water separator
- 13 Engine, coolant
- 14 Engine, coolant filter
- 15 Engine coolant level
- 16 Engine oil level
- 17 Engine oil filter
- 18 Operator manual
- 19 Air cleaner filter

S82040

# Lubrication and service chart

10 (daily), 50, 250, 500, 1000, 2000 and 3000 hour services



**Checks, oil changes and lubrication**

Measure	page
<b>Daily = every 10 hours</b>	
<b>Check:</b>	
Engine oil level	133
FGA Air cleaner outside, inside separator	142
Coolant level	145
Draining water from water separator	137
Battery electrolyte level	149
Alternator belt tension	149
Hydraulic oil level	153
Tightening of track shoe bolts	168

Measure	page
<b>Daily = every 50 hours</b>	
<b>Lubricate:</b>	
Refilling grease to attachment	163

Measure	page
<b>Every 100 hours</b>	
<b>After you have carried out Daily service:</b>	
<b>Adjust:</b>	
Adjusting the track tension	166
<b>Clean: (if required)</b>	
Sediment from fuel tank	136

Measure	page
<b>Every 200 hours</b>	
<b>After you have carried out Daily service:</b>	
<b>Change:</b>	
Element of return filter for hammer circuit	157



# 174 Lubrication and service chart

Measure	page
<b>Every 250 hours</b>	
<b>After you have carried out Daily and 100 hour services:</b>	
<b>Check:</b>	
Water pump, belt tension	147
Oil level of swing drive case	158
Oil level of track drive case	159
<b>Lubricate:</b>	
Refilling grease to swing gear bearing	161

Measure	page
<b>Every 500 hours</b>	
<b>After you have carried out Daily, 100 and 250 hour services:</b>	
<b>Check:</b>	
Density of anti-freeze	145
Grease of swing ring gear	161
<b>Change:</b>	
Engine oil and filter (First change after 100 hours)	135
Hydraulic cartridge of drain filter (First change after 250 hours)	155
<b>Clean:</b>	
Radiator, oil cooler and condenser fin	144



Measure	page
<b>Every 1000 hours</b> <b>After you have carried out Daily, 100, 250 and 500 hour services:</b>	
<b>Clean:</b> Strainer (hydraulic tank)	156
<b>Change:</b> Coolant filter	147
Fuel filter	136
Water separator element	137
Hydraulic element of pilot filter (First change after 250 hours)	156
Oil of swing drive case (First change after 500 hours)	158
Hydraulic oil return filter (First change after 250 hours)	155

Measure	page
<b>Every 2000 hours</b> <b>After you have carried out Daily, 100, 250, 500 and 1000 hour services:</b>	
<b>Check:</b> Valve clearance, adjusting	135
<b>Change:</b> Air cleaner primary filter (B)	140
Air cleaner secondary filter	141
Hydraulic oil	154
Element of air breather (hydraulic tank)	156
Oil of track drive case (First change after 500 hours)	159
<b>Clean:</b> Air breather element on hydraulic tank (if required)	156

Measure	page
<b>Every 3000 hours</b> <b>After you have carried out Daily, 100, 250, 500,1000 and 2000 hour services:</b>	
<b>Change:</b> Coolant	146



# 176 Periodic replacement of safety critical parts

## Periodic replacement of safety critical parts

To ensure safety at all times when operating or driving the machine, the operator of the machine must always carry out periodic maintenance. To further improve safety, the operator should also carry out periodic replacement of the parts given in the table.

These parts are closely connected to safety and fire prevention. With these parts, the material changes as time passes, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately. If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses. 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 such parts at the same time. Ask your Volvo CE dealer to replace the safety critical parts.

Inspection interval	Item
Daily	Fuel / hydraulic hose - leakage of connections and end fittings
Monthly	Fuel / hydraulic hose - leakage, damage of connections and end fittings
Yearly	Fuel / hydraulic hose - leakage, damage, deformity and aging of connections and end fittings

Safety critical parts for periodic replacement		Replacement interval	
Engine	Fuel hose	Every 2 years or 4000 hours, which occurs first	
	Heater hose		
	Turbocharger lubricating oil hose		
Hydraulics	Body		Pump, inlet hose
			Pump, outlet hose
			Swing line hose
	Attachments		Boom cylinder hose
			Arm cylinder line hose
			Bucket cylinder line hose
Seat belt		Every 3 years	

# Specifications

## Recommended lubricants

Reservoir	Kind of fluid	Ambient temperatures									Specification
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122°F 50°C	Capacity / (gal)
											Total amount
Engine oil pan	Engine oil	SAE 10W									46.5 (12.2)
		SAE 10W-30									
		* SAE 15W-40									
		SAE 30									
		SAE 40									
Hydraulic oil tank	** Hydraulic oil	ISO VG 32									220 (58.1)
		* ISO VG 46									
		ISO VG 68									
	**** Bio oil	Bio oil VG 32									
		Bio oil VG 46									
Slewing drive unit	*** Gear oil	* SAE 90 and API GL4 or GL5									6.0 (1.6)
Track drive unit		SAE 140 and API GL4 or GL5									2 x 5.5 (2.9)
Fuel tank	Diesel fuel	ASTM D975 No.1									620 (163.8)
		* ASTM D975 No.2									
Slewing ring gear	Grease	* Multi purpose NLGI2									36 (9.5)
Pins and bushes	Grease	Multi purpose NLGI2									-
		* Molybdenum disulphide NLGI2									
Cooling system	Coolant	Add anti-freeze * (Water 50 %, Anti-freeze 50 %)									65.4 (17.2)

\*: Filled at factory.

\*\* : Anti-wear hydraulic oil with high viscosity index 160 or more.

\*\*\*: With EP additive

\*\*\*\*: Bio degradable oil base synthetic ester.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

ISO: International Standardization Organization

API: American Petroleum Institute

Total amount: Total amount of oil including oil for components and oil in piping

Refill amount: Amount of oil needed to refill reservoir during periodic inspection and maintenance.



**Caution:**

When starting the engine in an ambient temperature below 0°C (+32 °F), be sure to use engine oil SAE 10W, SAE 10W-30 and SAE 15W-40, even though the ambient temperature may rise about 10°C (+50 °F) during the day.

Use API grade CH-4 engine oil and sulphur content in the fuel not exceeding 0.3 % by weight for 500 hours drain interval.

Otherwise the engine oil and filter should be changed / replaced every 250 hours.

If sulphur content > 0.5 % then 125 hours drain interval must be practiced.

Maximum 6 months between oil change.

If the oil grade is lower than ACEA-E3 or API CE, 125 hours drain interval must be practiced.

Only genuine Volvo CE coolant should be used.

## Capacities, Intervals between changes

### Capacities

	Total	
	Liters	US gal
Engine oil including Filter	46.4	12.2
Cooling system	65.4	17.2
Hydraulic tank	220	58.1
Swing gearbox (each)	6	1.59
Track gearbox (each)	5.5	1.45
Fuel tank	620	163.8
Swing ring gear	36	9.5
Oil bath air cleaner oil	9.4	2.48

### Intervals between changes

#### Changing oil and fluid

	Hours	Page no.
Engine	500	133
Oil bath air cleaner oil	(when required)	142
Changing coolant	3000	146
Hydraulic oil	2000	154
Oil of swing drive unit	1000 (1st 500)	158
Oil of track drive unit	2000 (1st 250)	159

#### Changing filter

	Hours	Page no.
Engine oil filter	500(CH-4)	135
Fuel filter	1000	136
Water separator	1000	137
Air cleaner primary filter (B)	2000	140
Air cleaner secondary filter	2000	141
Coolant filter	1000	147

#### Hydraulic system

Catridge of drain filter	500 (Initial 250)	155
Oil return filter	500 (Initial 250)	155
Element of pilot filter	1000 (Initial 250)	156
Clean strainer (hydraulic tank)	1000	156
Suction strainer (hydraulic tank)	2000	156



## Specifications

### Engine

Maker	Volvo D12CECE2
Type	4-stroke, 6-cylinder, straight, water cooled, direct injection, diesel engine, turbocharger, after cooled
Rated output	250 PS/ 1700 rpm
Maximum torque (Net)	138 kgf·m/ 1275 rpm
Bore × Stroke	120.65 mm × 140 mm
Total displacement	12.13 l
Compression ratio	18.5 : 1
Low idle (No-load)	700 ± 40 rpm
High idle (No-load)	1800± 40 rpm
Firing order	1- 5 - 3 - 6 - 2 - 4
Lubrication	Forced circulation
Oil Pressure (Low speed)	Min. 70 kpa (warm engine)
Oil Pressure (Rated)	300 ~ 600 kpa (warm engine)
Valve clearance	Intake 0.2 mm Exhaust 0.5 mm

### Fuel system

Nozzle pressure	25 + 0.8/0 Mpa
Fuel injection pump	EUI (Electronic unit injector)
Fuel consumption (rated)	211 g/kw·hr

### Electrical system

Starter	6.6 kW
Battery	12 V × 2 ea
Horn sound level at 7m	100 ± 5 dB
Head light type	Halogen (70 W)

### Hydraulic system

#### Main pump

Model	K3V180DTP
Displacement	2 x 185 cc/rev
Type	Variable swash plate, Axial piston pump

#### Pilot pump

Type	Fixed gear
Displacement	15.2 cc/rev
Relief pressure	40 kgf/cm <sup>2</sup> (569 psi)

**Main control valve**

Model	KMX32N
Main relief pressure	320/ 350 kgf/cm <sup>2</sup> (STD/ Boost pressure) 4550/ 4980 psi (STD/ Boost pressure)
Port relief pressure	365 kgf/cm <sup>2</sup> (5190 psi) (Boom/ Arm/ Bucket) 150/ 365 (Option STD/ High)

**Track motor and reduction gear**

**Track motor**

Model	KDB172 - 172/125B
Type	Variable swash plate piston motor
Rated pressure	370 kgf/cm <sup>2</sup> (5260 psi)

**Gear box**

Type	3 stage planetary
Brake type	Wet disc, spring applied, hydraulic release

**Swing motor and reduction gear**

**Swing motor**

Model	MFC250
Type	Fixed swash plate, piston motor
Rated pressure	260 kgf/cm <sup>2</sup> (3697 psi)

**Gear box**

Type	2-stage, planetary
------	--------------------

**Control pedals**

Model	RCVD8C
Stroke	12.4 degree
Operating force	108 kgf·cm (94 lbf·in)

**Control levers**

Model	PV48K
Stroke	Forward and Backward: 25 degree Right and Left: 19 degree
Operating force	Forward and Backward: 29 kgf·cm Right and left: 25 kgf·cm



## Sound and vibration levels

### Noise level in operator's cab

Sound pressure level (LpA) Enclosed Cab, (see decal value inside the cab)

The sound is measured according to **ISO 6396** and **98/37/EC**, including applicable amendments.

Sound power level (LwA) around the machine (see decal value inside the cab)

The sound is measured according to **ISO 6395** and **2000/14/EC**, including applicable amendments.

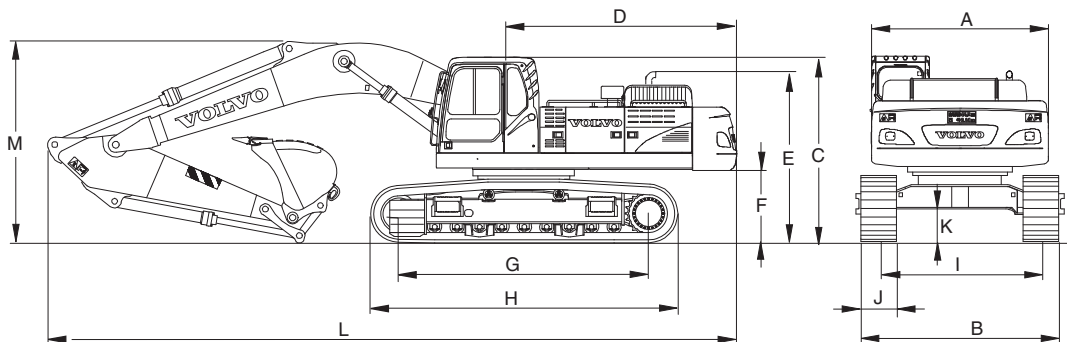
### Whole body vibration

The weighted root mean square acceleration to which the operator is exposed via the seat is less than **0.65m/s<sup>2</sup> RMS** under normal operating conditions according to **ISO8041**.

Measuring is carried out according to **BS6841**.



## Dimensions



S82247

Description	Unit	LC				
		6.2 m Boom 20' 4"	6.45 m Boom 21' 2"			
		2.6 m Arm 8' 6"	2.6 m Arm 8' 6"	3.2 m Arm 10' 6"	3.9 m Arm 12' 10"	
A. Overall width of superstructure	mm ft-in	2990 9' 10"	2990 9' 10"	2990 9' 10"	2990 9' 10"	
B. Overall width	mm	3190	3190	3190	3190	
B. Overall width (Nath America)	mm ft-in	3390 11' 1"	3390 11' 1"	3390 11' 1"	3390 11' 1"	
C. Overall height of cab		3190 10' 6"	3190 10' 6"	3190 10' 6"	3190 10' 6"	
D. Tail swing radius (casting counterweight)		3390 11' 1"	3390 11' 1"	3390 11' 1"	3390 11' 1"	
E. Overall height of engine hood		2700 8' 10"	2700 8' 10"	2700 8' 10"	2700 8' 10"	
F. *Counterweight clearance		1210 3' 12"	1210 3' 12"	1210 3' 12"	1210 3' 12"	
G. Tumbler length		4020 13' 2"	4020 13' 2"	4020 13' 2"	4020 13' 2"	
H. Track length		4946 16' 3"	4962 16' 3"	4962 16' 3"	4962 16' 3"	
I. Track gauge		2590 8' 6"	2590 8' 6"	2590 8' 6"	2590 8' 6"	
J. Shoe width		mm	600	600	600	600
J. Shoe width (Nath America)		mm ft-in	800 32"	800 32"	800 32"	800 32"
K. *Min. ground clearance	500 1' 8"		500 1' 8"	500 1' 8"	500 1' 8"	
L. Overall length	10910 35' 10"		11160 36' 7"	11070 36' 4"	11120 36' 6"	
M. Overall height of boom		3650 11' 12"	3580 11' 9"	3350 10' 12"	3590 11' 9"	

\* Without shoe grouser

**LC: Long crawler**

**NLC: Narrow long crawler**

# 184 Bucket & Arm combination

## Bucket & Arm combination

### Volvo bucket and LC undercarriage

Description		Direct fit -GP bucket		Quick fit -GP bucket	
Bucket capacity: SAE : CECE		1380 / 1.81yd <sup>3</sup> 1210 / 1.58 yd <sup>3</sup>	1450 / 1.90 yd <sup>3</sup> 1300 / 1.70 yd <sup>3</sup>	1380 / 1.81 yd <sup>3</sup> 1210 / 1.58 yd <sup>3</sup>	1450 / 1.90 yd <sup>3</sup> 1300 / 1.70 yd <sup>3</sup>
Cutting width mm		1325 mm 52.17 inches	1405 mm 55.31 inches	1325 mm 52.17 inches	1405 mm 55.31 inches
Weight		1110 kg	1315 kg	1100 kg	1310 kg
No of teeth		4	5	4	5
Application		General purpose			
Boom 6.2 m + Arm 2.6 m		C	C	C	D
Boom 6.45 m + Arm options	2.6 m	5800 kg Counterweight	C	C	D
	3.2 m		C	D	D
	3.9 m		D	E	E

- A: Applicable for general purpose up to 2000 kg/m<sup>3</sup>
- B: Applicable for general purpose up to 1800 kg/m<sup>3</sup>
- C: Applicable for general purpose up to 1500 kg/m<sup>3</sup>
- D: Applicable for general purpose up to 1200 kg/m<sup>3</sup>
- E: Not available

### Volvo bucket and LC undercarriage

Description		Direct fit -GP bucket		Quick fit -GP bucket	
Bucket capacity: SAE : CECE		1380 / 1.81yd <sup>3</sup> 1210 / 1.58 yd <sup>3</sup>	1450 / 1.90 yd <sup>3</sup> 1300 / 1.70 yd <sup>3</sup>	1380 / 1.81 yd <sup>3</sup> 1210 / 1.58 yd <sup>3</sup>	1450 / 1.90 yd <sup>3</sup> 1300 / 1.70 yd <sup>3</sup>
Cutting width		1325 mm 52.17 inches	1405 mm 55.31 inches	1325 mm 52.17 inches	1405 mm 55.31 inches
Weight		1110 kg	1315 kg	1100 kg	1310 kg
No of teeth		4	5	4	5
Application		General purpose			
Boom 6.2 m + Arm 2.6 m		B	C	C	C
Boom 6.45m + Arm options	2.6 m	6700 kg Counterweight	B	C	C
	3.2 m		B	C	D
	3.9 m		C	D	D

- A: Applicable for general purpose up to 2000 kg/m<sup>3</sup>
- B: Applicable for general purpose up to 1800 kg/m<sup>3</sup>
- C: Applicable for general purpose up to 1500 kg/m<sup>3</sup>
- D: Applicable for general purpose up to 1200 kg/m<sup>3</sup>
- E: Not available

**Maximum permitted buckets for direct fit**

Undercarriage		Unit	LC			
Monobloc Boom			6.2 m Boom 20'4"	6.45 m Boom 21'2"		
Dipper Arm			2.6 m Arm 8'6"	2.6 m Arm 8'6"	3.2 m Arm 10' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m <sup>3</sup> 2530 lb/yd <sup>3</sup>	Counterweight 5800 kg 12790 lb	/ yd <sup>3</sup>	2300 3.01	2200 2.88	2075 2.71	1800 2.35
GP bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			2000 2.62	1925 2.52	1825 2.39	1575 2.06
RB bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			1850 2.42	1775 2.32	1675 2.19	1450 1.90
RB bucket 2.0 t/m <sup>3</sup> 3370 lb/yd <sup>3</sup>			1725 2.26	1650 2.16	1550 2.03	1350 1.77

**Maximum permitted buckets for quick fit**

Undercarriage		Unit	LC			
Monobloc Boom			6.2 m Boom 20'4"	6.45 m Boom 21'2"		
Dipper Arm			2.6 m Arm 8'6"	2.6 m Arm 8'6"	3.1 m Arm 10' 2"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m <sup>3</sup> 2530 lb/yd <sup>3</sup>	Counterweight 5800 kg 12790 lb	/ yd <sup>3</sup>	2175 2.84	2050 2.68	1950 2.55	1675 2.19
GP bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			1900 2.49	1800 2.35	1700 2.22	1475 1.93
RB bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			1750 2.29	1650 2.16	1575 2.06	1350 1.77
RB bucket 2.0 t/m <sup>3</sup> 3370 lb/yd <sup>3</sup>			1625 2.13	1550 2.03	1450 1.90	1250 1.64



# 186 Bucket & Arm combination

## Maximum permitted buckets for direct fit

Undercarriage		Unit	LC			
Monobloc Boom			6.2 m Boom 20'4"	6.45 m Boom 21'2"		
Dipper Arm			2.6 m Arm 8'6"	2.6 m Arm 8'6"	3.2 m Arm 10' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m <sup>3</sup> 2530 lb/yd <sup>3</sup>	Counterweight 5800 kg 12790 lb	/ yd <sup>3</sup>	2500 3.27	2400 3.14	2275 2.98	1975 2.58
GP bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			2200 2.88	2100 2.75	1975 2.58	1725 2.26
RB bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			2025 2.65	1925 2.52	1825 2.39	1600 2.09
RB bucket 2.0 t/m <sup>3</sup> 3370 lb/yd <sup>3</sup>			1875 2.45	1800 2.35	1700 2.22	1475 1.93

## Maximum permitted buckets for quick fit

Undercarriage		Unit	LC			
Monobloc Boom			6.2 m Boom 20'4"	6.45 m Boom 21'2"		
Dipper Arm			2.6 m Arm 8'6"	2.6 m Arm 8'6"	3.1 m Arm 10' 2"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m <sup>3</sup> 2530 lb/yd <sup>3</sup>	Counterweight 5800 kg 12790 lb	/ yd <sup>3</sup>	2375 3.11	2275 2.98	2125 2.98	1850 2.42
GP bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			2075 2.71	1975 2.58	1875 2.45	1625 2.13
RB bucket 1.8 t/m <sup>3</sup> 3030 lb/yd <sup>3</sup>			1925 2.52	1825 2.39	1725 2.26	1500 1.96
RB bucket 2.0 t/m <sup>3</sup> 3370 lb/yd <sup>3</sup>			1775 2.32	1700 2.22	1600 2.09	1775 2.32

## Boom & Arm

### Boom

Description		6.2 m 20' 4"	6.45 m 21' 2"
Length	mm ft-in	6460 21' 2"	6700 21' 12"
Height		1740 5' 9"	1800 5' 11"
Width		820 2' 8"	820 2' 8"
Weight *	kg lb	3230 7120	3010 6640

\* Includes cylinder, piping and pin

### Arm

Description		2.6 m 8' 6"	3.2m HD 10' 6"	3.9 m 12' 10"
Length	mm ft-in	3780 12' 5"	4360 14' 4"	5080 16' 8"
Height		1145 3' 9"	1145 3' 9"	1140 3' 9"
Width		560 1' 10"	560 mm, 1' 10"	560 1' 10"
Weight *	kg lb	1975 4350	1850 4080	2165 4770

\* Includes cylinder, linkage and pin



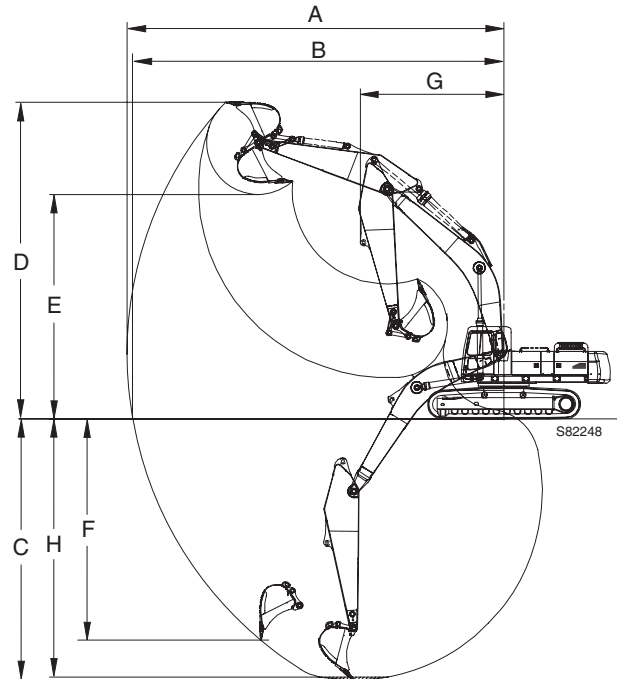
**188 Digging force with direct fit bucket**

**Digging force with direct fit bucket**

Description		Unit	6.2 m Boom 21'4"	6.45 m Boom 22'12"		
			2.6m Arm 8'6"	2.6m Arm 8'6"	3.2m Arm 10'6"	3.9m Arm 12'10"
Bucket radius		mm in	1810 71"	1623 64"	1623 64"	1623 64"
Breakout force	Normal, SAE	kN (kg) lb	208.0 21300 46970	192.0 19600 43220	192.0 19600 43220	192.0 19600 43220
	Power boost, SAE	kN (kg) lb	228.0 23300 51380	209.0 21400 47190	209.0 21400 47190	209.0 21400 47190
	Normal, ISO	kN (kg)	236.0 24100	215.0 22000	215.0 22000	215.0 22000
	Power boost, ISO	kN (kg)	258.0 26400	236.0 24100	236.0 24100	236.0 24100
Tearout force	Normal, SAE	kN (kg) lb	182.0 18600 41010	190.0 19400 42780	157.0 16100 35500	137.0 14000 30870
	Power boost, SAE	kN (kg) lb	200.0 20400 44980	207.0 21200 46750	172.0 17600 38810	150.0 15300 33740
	Normal, ISO	kN (kg)	188.0 19200	195.0 19900	161.0 16500	140.0 14300
	Power boost, ISO	kN (kg)	206.0 21000	213.0 21800	176.0 18000	153.0 15600
Rotation angle, bucket		deg	164	177	177	177

# Working ranges

## Direct fit bucket



Description	Unit	6.2 m Boom 20' 4"	6.45 m Boom 21' 2"		
		2.6 m Arm 8' 6"	2.6 m Arm 8' 6"	3.2 m Arm 10' 6"	3.9 m Arm 12' 10"
A. Maximum digging reach	mm ft-in	10480 34' 5"	10540 34' 7"	11060 36' 3"	11700 38' 5"
B. Maximum digging reach on ground		10250 33' 8"	10320 33' 10"	10850 35' 7"	11500 37' 9"
C. Maximum digging depth		6700 21' 12"	6770 22' 3"	7370 24' 2"	8080 26' 6"
D. Maximum cutting height		10110 33' 2"	10100 33' 2"	10260 33' 8"	10530 34' 7"
E. Maximum dumping height		6860 22' 6"	7170 23' 6"	7360 24' 2"	7630 25' 0"
F. Maximum vertical wall digging depth		4880 16' 0"	4900 16' 1"	5290 19' 5"	5920 19' 5"
G. Maximum front swing radius		4160 13' 8"	4390 14' 5"	4340 14' 3"	4320 14' 2"
H. Minimum digging depth (8' level)		6530 21' 5"	6570 21' 7"	7190 23' 7"	7930 26' 0"







Date	Hours	Signature	Notes







Date	Hours	Signature	Notes













Date	Hours	Signature	Notes

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