EC210B

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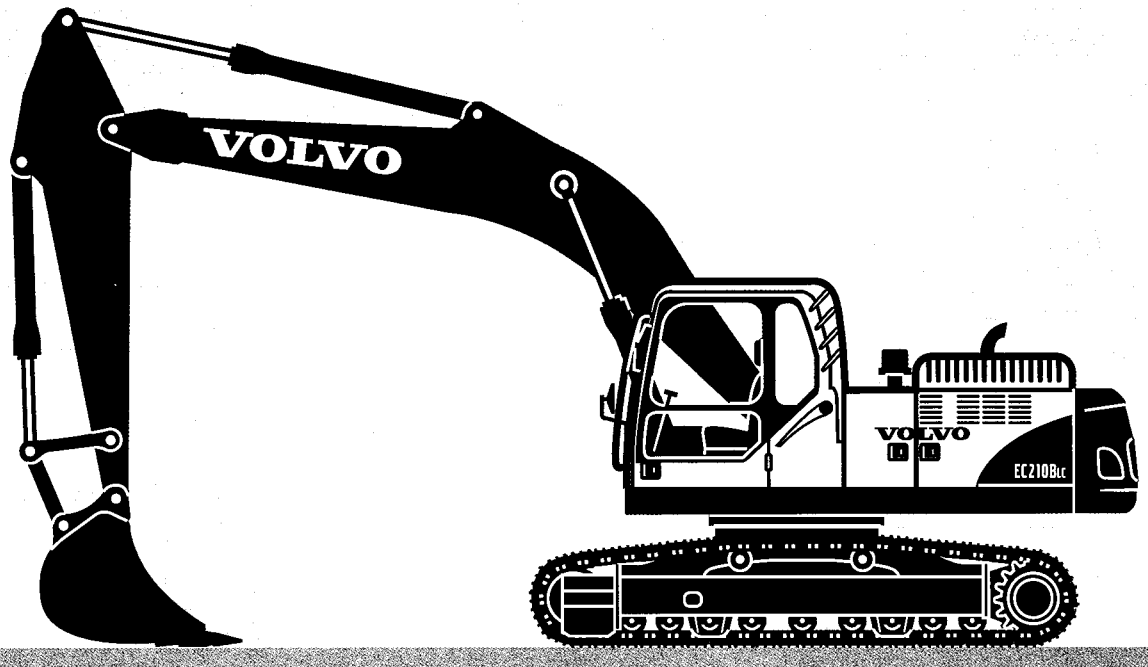

VOLVO

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.

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.**

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.

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.

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!

Contents
Presentation
Instruments and controls
Operating instructions
Safety when servicing
Service and maintenance
Specifications
Alphabetical index

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The original language is English.
Printed in Korea 2006.02

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.
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.

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

Mobile telephones

To obtain the best functionality, mobile telephones should be permanently installed in the electrical system of the 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 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.

4 Communication equipment, installation

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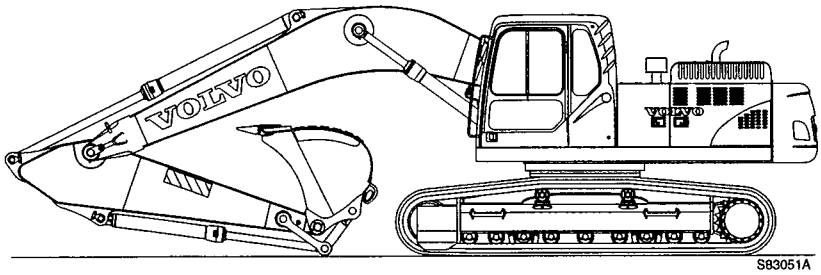
Presentation



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 5.7 liter cylinder volume, turbocharged, intorcooled and electronically controlled fuel injection by EMS (Engine Management System), Volvo engine D6DEAE2

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 V-ECU (Vehicle Electronic Control Unit) by the data connection between EMS (Engine Management System) and V-ECU.

IECU (Instrument Electronic Control Unit) consists of central warning lamp, two analog gauges, 21 indicators, MCD (Message Center Display), and four push buttons. IECU is installed inside the cab and displays vehicle information for the operator.

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 consists 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 a four spool block, a three spool 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 swash, axial piston design that includes the brake valve assembly and parking brake. The rear flange contains the counterbalance valve, check valves, crossover relief valves and displacement changeover valve.

The gearbox composed of sun gear, planetary gear, pinion gear and housing.

Swing motor and gearbox

The rotary group consists of cylinder block and nine pistons assembles located in the cylinder. Piston assemblies are guided by return plate and spring so they slide smoothly on the swash plate. The cover section has a relief valve for cushioning and an anti-cavitation valve to prevent cavitation.

Gearbox is composed of sun gear, planetary gear, pinion gear and housing. Power supplied to the output shaft of the swing motor reduces the motor speed through the sun gear and planetary gear and the high torque is transmitted to the pinion gear.

Cab

The cab has a heating and ventilation system with defrosting from front and rear windows. Air conditioning is available as an option. The cab have two emergency exits, the door and the rear window.

Anti-theft device (optional equipment)

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

FOPS and FOG

The cab is approved as a protective cab according to FOPS and FOG standards, see ***Protection from falling or scattering material*** on page 99. FOPS is an abbreviation of Falling Object Protective Structure (roof protection) and FOG is an abbreviation of Falling Object Guard.

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

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

Modifications

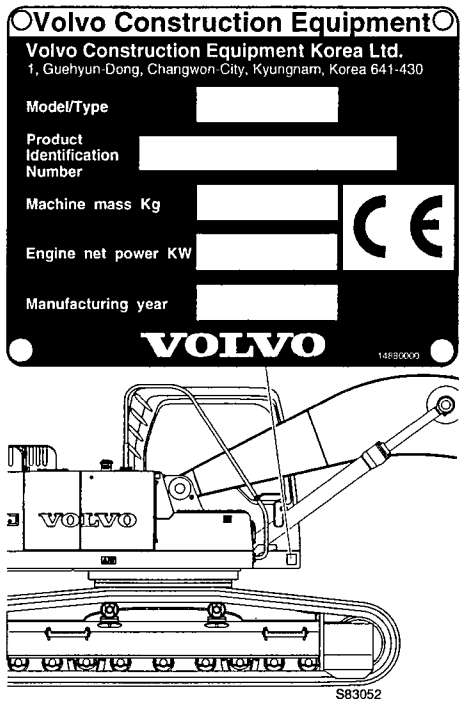
Modifications to this machine including the use of unauthorized attachments, accessories, assemblies or parts may affect the integrity of the machine and/or the ability of the machine to perform as designed. Persons or organizations making unapproved modifications assume all liability arising from or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

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

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

1 The attachment, accessory, assembly or part is manufactured or distributed by Volvo Construction Equipment and installed in a factory approved manner as described in the publications available from Volvo Construction Equipment; or

2 The modification has been approved in writing by the Product Line Engineering Department of Volvo Construction Equipment.



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 attachments than described in this manual, safety must at all times and in each separate case be maintained. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE marking and the issue of a new EU Declaration of Conformity.

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

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.

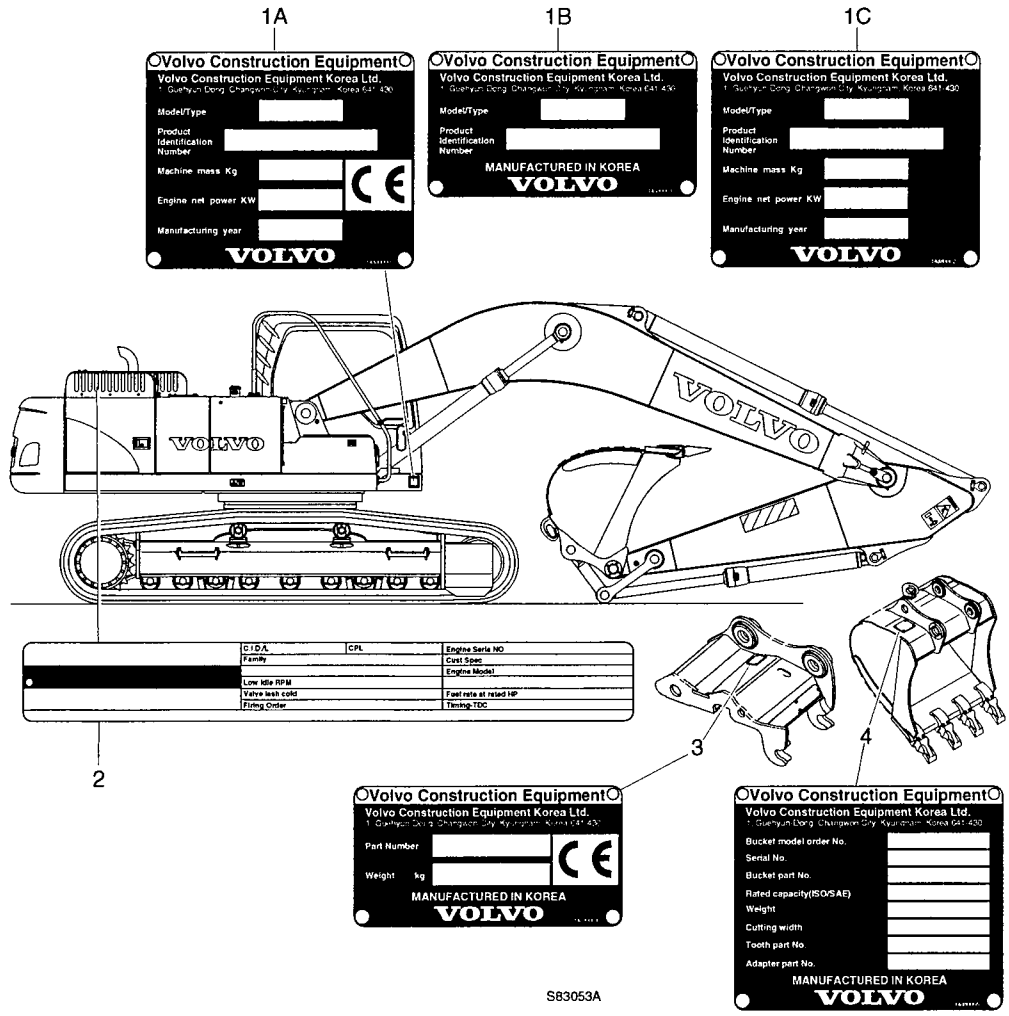
If other electronic equipment is fitted to this machine, the equipment must be CE marked and tested on the machine with regard to electromagnetic interference.

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 **P**roduct **I**dentification **N**umber (**PIN**) should be stated.



1 Product plate with **P**roduct **I**dentification **N**umber, **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.

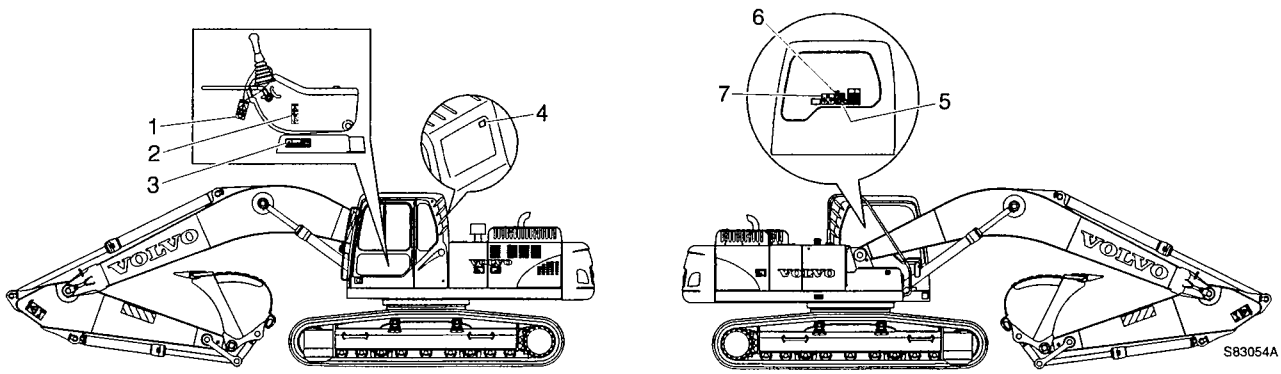
3 The quickfit nameplate is attached on the outside of the quickfit. (shows part number and weight)

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)

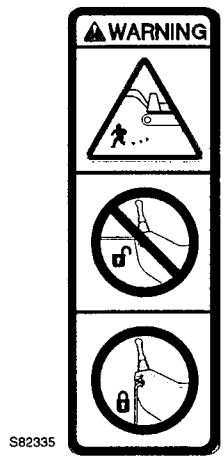
Information and warning plates

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.

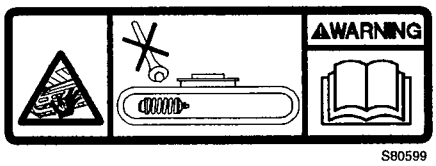


1 Do not start the engine



2 Safety locking

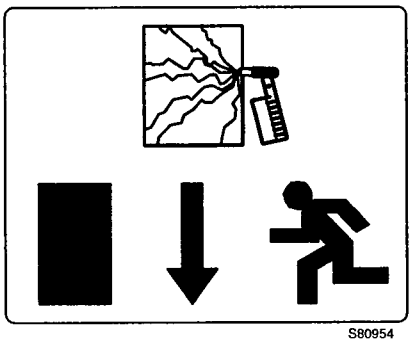
See ***Safety locking system on page 81.***



S80599

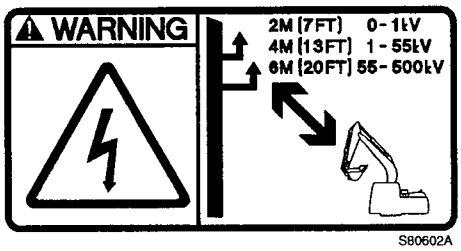
3 Do not unscrew the recoil spring

See ***Inspecting and adjusting the track slack*** on page 197.


S80954

4 Emergency exit

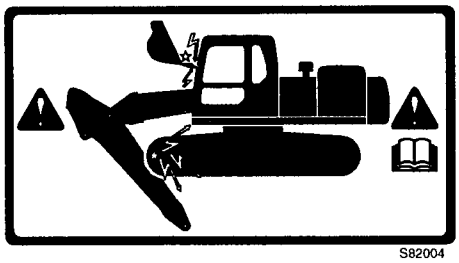
See ***The emergency hammer (B) should be used in an emergency situations.*** on page 86.



S80602A

5 Warning, high voltage

See ***Never approach a high voltage wire*** on page 98.

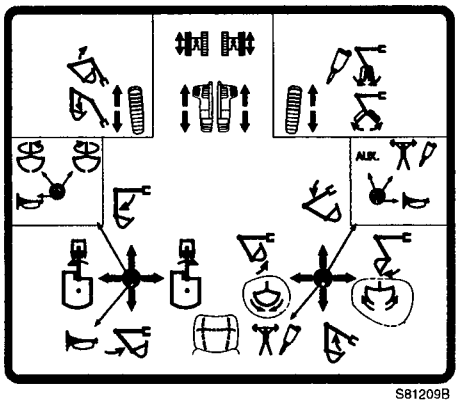

S82004

6 Warning when operating the optional attachment

If the machine is equipped with an adjustable boom or quickfit bucket, the digging arm with its boom fully retracted can damage the operator cab.

WARNING!

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



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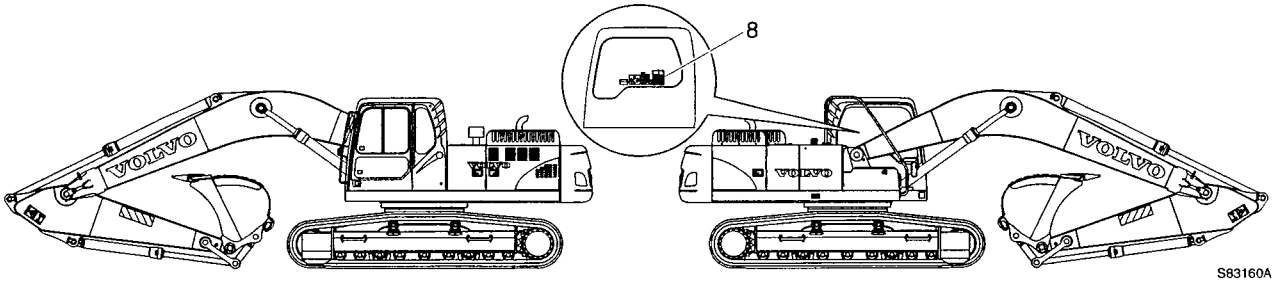
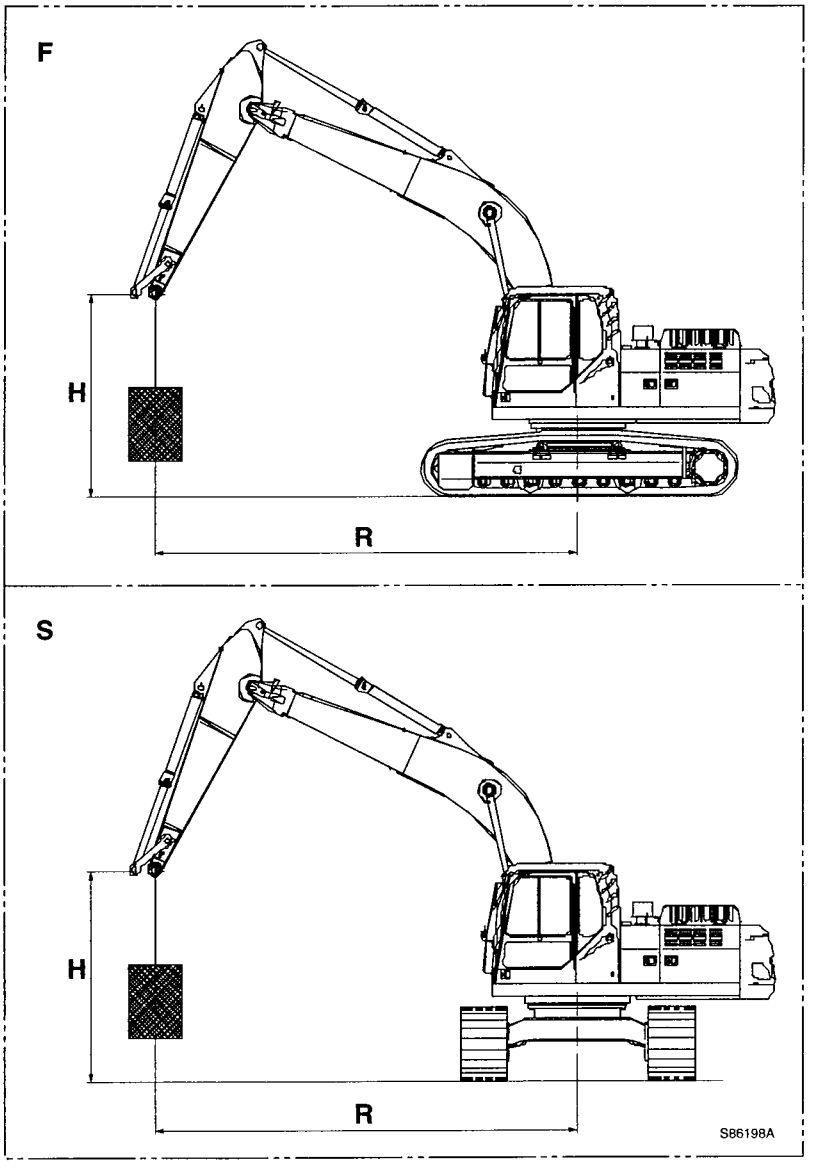
7 Operating optional attachments

8 Lifting capacity table





F : Lifting capacity over the front or rear of the machine
S : Lifting capacity over the side of the machine
H : Height
R : Reach
MR : Maximum reach

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 3 in (5.57 m)
Arm = 8 ft 2 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	MR	
25 ft	F	-	-	-	*16410	-	-	-	*13770	(@17,55 ft)
	S	-	-	-	*16410	-	-	-	*13770	
20 ft	F	-	-	-	*16540	*14620	-	-	*12500	(@21,91 ft)
	S	-	-	-	*16540	11300	-	-	9630	
15 ft	F	-	-	*25830	*18570	*15220	-	-	12210	(@24,49 ft)
	S	-	-	*25830	17290	11000	-	-	7890	
10 ft	F	-	-	-	*21510	*16350	11620	-	11020	(@25,84 ft)
	S	-	-	-	16010	10480	7460	-	7070	
5 ft	F	-	-	-	*23490	15940	11390	-	10630	(@26,17 ft)
	S	-	-	-	14900	9970	7250	-	6770	
0 ft	F	-	-	-	*23210	15550	11230	-	10920	(@25,51 ft)
	S	-	-	-	14370	9630	7110	-	6920	
-5 ft	F	-	-	*23850	*20790	15450	-	-	*11940	(@23,77 ft)
	S	-	-	*23850	14290	9540	-	-	7610	
-10 ft	F	-	-	-	*16040	*11340	-	-	*10450	(@20,69 ft)
	S	-	-	-	14560	9760	-	-	9370	
-15 ft	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86604

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 3 in (5.57 m)
Arm = 9 ft 6 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	MR	
30 ft	F	-	-	-	-	-	-	-	*12760	(@12,34 ft)
	S	-	-	-	-	-	-	-	*12760	
25 ft	F	-	-	-	*14060	-	-	-	*10000	(@19,43 ft)
	S	-	-	-	*14060	-	-	-	*10000	
20 ft	F	-	-	-	*14180	*13890	-	-	* 9160	(@23,43 ft)
	S	-	-	-	*14180	11510	-	-	8750	
15 ft	F	-	-	*17340	*17540	*14640	*11560	-	* 8950	(@25,85 ft)
	S	-	-	*17340	*17540	11180	7760	-	7310	
10 ft	F	-	-	-	*20680	*15920	11730	-	* 9130	(@27,14 ft)
	S	-	-	-	16340	10630	7550	-	6610	
5 ft	F	-	-	-	*23130	16050	11440	-	* 9680	(@27,45 ft)
	S	-	-	-	15130	10070	7300	-	6340	
0 ft	F	-	-	*12480	*23500	15600	11230	-	10160	(@26,82 ft)
	S	-	-	*12480	14440	9670	7100	-	6450	
-5 ft	F	-	-	*22470	*21680	15420	11200	-	11100	(@25,18 ft)
	S	-	-	*22470	14260	9510	7080	-	7020	
-10 ft	F	-	-	*22620	*17610	*12910	-	-	*10390	(@22,29 ft)
	S	-	-	*22620	14430	9630	-	-	8390	
-15 ft	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86605

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 3 in (5.57 m)
Arm = 12 ft 1 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	35 ft	MR	
30 ft	F	-	-	-	-	-	-	-	-	* 8690	(@17,74 ft)
	S	-	-	-	-	-	-	-	-	* 8690	
25 ft	F	-	-	-	-	*10060	-	-	-	* 7520	(@23,19 ft)
	S	-	-	-	-	*10060	-	-	-	* 7520	
20 ft	F	-	-	-	-	*10660	* 9170	-	-	* 7090	(@26,62 ft)
	S	-	-	-	-	*10660	8150	-	-	* 7090	
15 ft	F	-	-	-	*11120	*11870	*10980	-	-	* 7010	(@28,77 ft)
	S	-	-	-	*11120	11570	8000	-	-	6220	
10 ft	F	-	-	*26020	*18070	*14440	11900	-	-	* 7190	(@29,93 ft)
	S	-	-	*26020	17120	10940	7690	-	-	5670	
5 ft	F	-	-	*22590	*21400	*15990	11520	* 8230	-	* 7630	(@30,21 ft)
	S	-	-	*22590	15630	10250	7340	5510	-	5440	
0 ft	F	-	-	*16950	*23180	15640	11180	-	-	* 8420	(@29,64 ft)
	S	-	-	*16950	14550	9670	7040	-	-	5480	
-5 ft	F	-	*12100	*21640	*22830	15260	10980	-	-	9290	(@28,17 ft)
	S	-	*12100	*21640	14030	9340	6860	-	-	5830	
-10 ft	F	-	-	*28600	*20360	*15080	*10870	-	-	*10260	(@ 25,63 ft)
	S	-	-	27010	13970	9270	6880	-	-	6670	
-15 ft	F	-	-	-	*15280	*10800	-	-	-	* 900	(@21,65 ft)
	S	-	-	-	14290	9510	-	-	-	8600	
-20 ft	F	-	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	-	

S86606

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 8 in (5.7 m)
Arm = 8 ft 2 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H		R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	MR	
25 ft	F		-	-	-	-	-	-	-	*11850	(@18,03 ft)
	S		-	-	-	-	-	-	-	*11850	
20 ft	F		-	-	-	-	*11430	-	-	*11650	(@22,29 ft)
	S		-	-	-	-	11360	-	-	9460	
15 ft	F		-	-	-	*14260	*12380	-	-	*11810	(@24,83 ft)
	S		-	-	-	*14260	11050	-	-	7810	
10 ft	F		-	-	-	*18280	*14120	11660	-	10850	(@26,17 ft)
	S		-	-	-	16030	10550	7550	-	7030	
5 ft	F		-	-	-	*21890	*15930	11420	-	10480	(@26,49 ft)
	S		-	-	-	14990	10050	7330	-	6740	
0 ft	F		-	-	-	*23570	15580	11250	-	10740	(@25,83 ft)
	S		-	-	-	14500	9720	7180	-	6870	
-5 ft	F		-	-	*22490	*23420	15460	-	-	11830	(@24,12 ft)
	S		-	-	*22490	14420	9620	-	-	7520	
-10 ft	F		-	-	*30080	*21480	15650	-	-	14510	(@21,09 ft)
	S		-	-	28430	14640	9790	-	-	9150	
-15 ft	F		-	-	*22880	*16140	-	-	-	*14800	(@15,97 ft)
	S		-	-	*22880	15280	-	-	-	14000	
-20 ft	F		-	-	-	-	-	-	-	-	
	S		-	-	-	-	-	-	-	-	

S86607

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 8 in (5.7 m)
Arm = 9 ft 6 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	MR	
25 ft	F	-	-	-	-	-	-	-	* 9950	(@19,87 ft)
	S	-	-	-	-	-	-	-	* 9950	
20 ft	F	-	-	-	-	*10550	-	-	* 9210	(@23,79 ft)
	S	-	-	-	-	*10550	-	-	8610	
15 ft	F	-	-	-	-	*11630	*11090	-	* 9050	(@26,18 ft)
	S	-	-	-	-	11210	7850	-	7250	
10 ft	F	-	-	-	*17130	*13470	11750	-	* 9290	(@27,45 ft)
	S	-	-	-	16340	10680	7630	-	6580	
5 ft	F	-	-	-	*21040	*15430	11470	-	9810	(@27,76 ft)
	S	-	-	-	15200	10150	7380	-	6320	
0 ft	F	-	-	*11410	*23250	15620	11260	-	10020	(@27,14 ft)
	S	-	-	*11410	14570	9760	7180	-	6420	
-5 ft	F	-	*12760	*21340	*23610	15440	11200	-	10900	(@25,51 ft)
	S	-	*12760	*21340	14390	9600	7130	-	6950	
-10 ft	F	-	*23240	*31860	*22210	15530	-	-	12990	(@22,67 ft)
	S	-	*23240	28150	14520	9680	-	-	8240	
-15 ft	F	-	-	*25640	*18130	-	-	-	*14330	(@18,03 ft)
	S	-	-	*25640	15010	-	-	-	11630	
-20 ft	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86608

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 9259 lb (4200 kg)
Boom = 18 ft 8 in (5.7 m)
Arm = 12 ft 1 in without bucket
Shoe = 600 mm (24 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	35 ft	MR	
25 ft	F	-	-	-	-	-	-	-	-	* 7510	(@23,54 ft)
	S	-	-	-	-	-	-	-	-	* 7510	
20 ft	F	-	-	-	-	-	*8890	-	-	* 7140	(@26,92 ft)
	S	-	-	-	-	-	8210	-	-	* 7140	
15 ft	F	-	-	-	-	-	*9360	-	-	* 7090	(@29,05 ft)
	S	-	-	-	-	-	8040	-	-	6190	
10 ft	F	-	-	-	*13820	*11520	*10370	*7770	-	* 7310	(@30,19 ft)
	S	-	-	-	*13820	10960	7750	5730	-	5670	
5 ft	F	-	-	*19420	*18300	*13780	11530	8710	-	* 7790	(@30,47 ft)
	S	-	-	*19420	15640	10300	7410	5580	-	5440	
0 ft	F	-	-	*15890	*21620	15650	11200	-	-	8600	(@29,91 ft)
	S	-	-	*15890	14640	9750	7110	-	-	5470	
-5 ft	F	-	*11920	*20680	*23190	15280	11000	-	-	9170	(@28,45 ft)
	S	-	*11920	*20680	14160	9430	6930	-	-	5810	
-10 ft	F	-	*18820	*29020	*23040	15190	11000	-	-	10460	(@25,94 ft)
	S	-	*18820	27210	14090	934	6920	-	-	6600	
-15 ft	F	-	*27650	*30580	*20950	*15260	-	-	-	*13320	(@22,01 ft)
	S	-	*27650	27830	14350	9540	-	-	-	8420	
-20 ft	F	-	-	*22260	*15050	-	-	-	-	*14280	(@15,60 ft)
	S	-	-	*22260	*15050	-	-	-	-	14270	

S86609

NOTE : -
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Narrow Narrow Long Crawler (NNLC)
Counterweight = 10582 lb (4800 kg)
Boom = 18 ft 2 in (5.57 m)
Arm = 9 ft 6 in without bucket
Shoe = 500 mm (20 in)

(Unit : lbs)

H	R	0 ft	5tf	10 ft	15 ft	20 ft	25 ft	30 ft	MR ft	
25 ft	F	-	-	-	*16410	-	-	-	*13770	(@17,55 ft)
	S	-	-	-	*16410	-	-	-	12600	
20 ft	F	-	-	-	*16540	*14620	-	-	*12500	(@21,91 ft)
	S	-	-	-	16290	10250	-	-	8750	
15 ft	F	-	-	*25830	*18570	*15220	-	-	*12230	(@24,49 ft)
	S	-	-	*25830	15480	9960	-	-	7160	
10 ft	F	-	-	-	*21510	*16350	12210	-	11580	(@25,84 ft)
	S	-	-	-	14260	9460	6760	-	6410	
5 ft	F	-	-	-	*23490	16730	11970	-	11180	(@26,17 ft)
	S	-	-	-	13210	8960	6550	-	6130	
0 ft	F	-	-	-	*23210	16340	11820	-	11490	(@25,51 ft)
	S	-	-	-	12700	8640	6410	-	6250	
-5 ft	F	-	-	*23850	*20790	*15590	-	-	*11940	(@23,77 ft)
	S	-	-	23550	12630	8550	-	-	6870	
-10 ft	F	-	-	-	*16040	*11340	-	-	*10450	(@20,69 ft)
	S	-	-	-	12890	8770	-	-	8420	
-15 ft	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86610

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Narrow Narrow Long Crawler (NNLC)
Counterweight = 10582 lb (4800 kg)
Boom = 18 ft 3 in (5.57 m)
Arm = 9 ft 6 in without bucket
Shoe = 500 mm (20 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20ft	25 ft	30 ft	MR	
30 ft	F	-	-	-	-	-	-	-	* 12760	(@12,34 ft)
	S	-	-	-	-	-	-	-	* 12760	
25 ft	F	-	-	-	*14060	-	-	-	* 10000	(@19,43 ft)
	S		-	-	*14060	-	-	-	* 10000	
20 ft	F	-	-	-	*14180	*13890	-	-	* 9160	(@23,43 ft)
	S	-	-	-	*14180	10450	-	-	7950	
15 ft	F	-	-	*17340	*1754	*14640	*11560	-	* 8950	(@25,85 ft)
	S	-	-	*17340	15800	10130	7050	-	6640	
10 ft	F	-	-	-	*20680	*15910	12310	-	* 9130	(@27,14 ft)
	S	-	-	-	14570	9600	6850	-	5990	
5 ft	F	-	-	-	*23130	16840	12030	-	* 9680	(@27,45 ft)
	S	-	-	-	13420	9060	6600	-	5740	
0 ft	F	-	-	*12480	*23490	16390	11820	-	10690	(@26,82 ft)
	S	-	-	*12480	12770	8670	6410	-	5830	
-5 ft	F	-	-	*22470	*21670	*16150	*11690	-	*11490	(@25,18 ft)
	S	-	-	*22470	12590	8520	6380	-	6330	
-10 ft	F	-	-	*22610	*17610	*12910	-	-	*10390	(@22,29 ft)
	S	-	-	*22610	12760	8630	-	-	7560	
-15 ft	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86611

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Narrow Narrow Long Crawler (NNLC)
Counterweight = 10582 lb (4800 kg)
Boom = 18 ft 3 in (5.57 m)
Arm = 12 ft 1 in without bucket
Shoe = 500 mm (20 in)

(Unit : lbs)

H	R	0 ft	5 ft	10 ft	15 ft	20 ft	25 ft	30 ft	35 ft	MR	
30 ft	F	-	-	-	-	-	-	-	-	* 8690	(@17,74 ft)
	S	-	-	-	-	-	-	-	-	* 8690	
25 ft	F	-	-	-	-	*10060	-	-	-	* 7520	(@23,19 ft)
	S	-	-	-	-	*10060	-	-	-	* 7520	
20 ft	F	-	-	-	-	*10660	* 9170	-	-	* 7090	(@26,62 ft)
	S	-	-	-	-	*10660	7420	-	-	6580	
15 ft	F	-	-	-	*11120	*11870	*10980	-	-	* 7010	(@28,77 ft)
	S	-	-	-	*11120	10500	7270	-	-	5640	
10 ft	F	-	-	*26020	*18070	*14440	11310	-	-	* 7190	(@29,93 ft)
	S	-	-	*26020	15300	9900	6980	-	-	5140	
5 ft	F	-	-	*22590	*21400	15350	10930	* 8230	-	* 7630	(@30,21 ft)
	S	-	-	*22590	13880	9220	6640	4970	-	4920	
0 ft	F	-	-	*16950	22940	14720	10610	-	-	8280	(@ 29,64 ft)
	S	-	-	*16950	12860	8670	6340	-	-	4940	
-5 ft	F	-	*12100	*21640	22350	14350	10420	-	-	8830	(@ 28,17 ft)
	S	-	*12100	*21640	12370	8350	6160	-	-	5250	
-10 ft	F	-	-	*28600	*20360	14270	10440	-	-	10100	(@ 25,63 ft)
	S	-	-	22870	12310	8280	6180	-	-	6000	
-15 ft	F	-	-	-	*15280	*10800	-	-	-	* 9100	(@21,65 ft)
	S	-	-	-	12610	8520	-	-	-	7720	
-20 ft	F	-	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	-	

S86612

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.7 m
Arm = 2.9 m without bucket
Shoe = 500 mm

(Unit : kg)

H	R	0 m	1.5 m	3 m	4.5 m	6 m	7.5 m	9 m	MR	
7.5 m	F	-	-	-	-	* 4900	-	-	* 4470	(@ 6172 mm)
	S	-	-	-	-	* 4900	-	-	* 4470	
6 m	F	-	-	-	-	* 4800	-	-	* 4160	(@ 7309 mm)
	S	-	-	-	-	* 4800	-	-	3810	
4.5 m	F	-	-	-	-	* 5340	* 5040	-	* 4110	(@ 8005 mm)
	S	-	-	-	-	5150	3610	-	3230	
3 m	F	-	-	-	* 7950	* 6210	5410	-	* 4220	(@ 8374 mm)
	S	-	-	-	7490	4900	3500	-	2940	
1.5 m	F	-	-	-	* 9750	* 7120	5280	-	4410	(@ 8460 mm)
	S	-	-	-	6960	4650	3380	-	2830	
0 m	F	-	-	* 4920	*10740	7190	5180	-	4500	(@ 8271 mm)
	S	-	-	* 4920	6680	4470	3290	-	2870	
-1.5 m	F	-	* 5690	* 9380	*10890	7110	5140	-	4890	(@ 7786 mm)
	S	-	* 5690	* 9380	6600	4390	3260	-	3110	
-3 m	F	-	*10340	*14700	*10260	7140	-	-	5800	(@ 6944 mm)
	S	-	*10340	12990	6660	4430	-	-	3660	
-4.5 m	F	-	-	*11950	* 8490	-	-	-	* 6490	(@ 5579 mm)
	S	-	-	*11950	6880	-	-	-	5090	
-6 m	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86619

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.7 m
Arm = 2.5 m without bucket
Shoe = 600 mm

(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	MR	
7,5 m	F	-	-	-	-	-	-	-	* 5360	(@ 5625 mm)
	S	-	-	-	-	-	-	-	* 5360	
6 m	F	-	-	-	-	* 5190	-	-	* 5280	(@ 6856 mm)
	S	-	-	-	-	* 5190	-	-	4220	
4,5 m	F	-	-	-	* 6610	* 5680	* 5360	-	* 5360	(@ 7595 mm)
	S	-	-	-	* 6610	5130	3590	-	3520	
3 m	F	-	-	-	* 8500	* 6510	5420	-	4910	(@ 7983 mm)
	S	-	-	-	7420	4890	3500	-	3180	
1,5 m	F	-	-	-	*10140	* 7350	5300	-	4750	(@ 8073 mm)
	S	-	-	-	6940	4660	3400	-	3050	
0 m	F	-	-	-	*10880	7230	5220	-	4870	(@ 7874 mm)
	S	-	-	-	6730	4500	3320	-	3110	
-1,5 m	F	-	-	* 9840	*10800	7180	-	-	5350	(@ 7364 mm)
	S	-	-	*9840	6690	4460	-	-	3400	
-3 m	F	-	-	*13870	* 9930	7260	-	-	6520	(@ 6465 mm)
	S	-	-	13270	6790	4520	-	-	4110	
-4,5 m	F	-	-	*10700	* 7650	-	-	-	* 6720	(@ 4965 mm)
	S	-	-	*10700	7070	-	-	-	6150	
-6 m	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86613

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.7 m
Arm = 2.9 m without bucket
Shoe = 600 mm

(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	MR	
7,5 m	F	-	-	-	-	* 4900	-	-	* 4470	(@ 6172 mm)
	S	-	-	-	-	* 4900	-	-	* 4470	
6 m	F	-	-	-	-	* 4800	-	-	* 4160	(@ 7309 mm)
	S	-	-	-	-	* 4800	-	-	3850	
4,5 m	F	-	-	-	-	* 5340	* 5040	-	* 4110	(@ 8005 mm)
	S	-	-	-	-	5200	3650	-	3270	
3 m	F	-	-	-	* 7950	* 6210	* 5420	-	* 4220	(@ 8374 mm)
	S	-	-	-	7570	4950	3540	-	2970	
1,5 m	F	-	-	-	* 9750	* 7120	5320	-	4440	(@ 8460 mm)
	S	-	-	-	7040	4700	3420	-	2860	
0 m	F	-	-	* 4920	*10740	7260	5220	-	4540	(@ 8271 mm)
	S	-	-	* 4920	6760	4520	3330	-	2910	
-1,5 m	F	-	* 5690	* 9380	*10890	7170	5190	-	4930	(@ 7786 mm)
	S	-	* 5690	* 9380	6680	4450	3300	-	3140	
-3 m	F	-	*10340	*14700	*10260	7210	-	-	5850	(@ 6944 mm)
	S	-	*10340	13140	6740	4480	-	-	3710	
4,5 m	F	-	-	*11950	* 8490	-	-	-	* 6490	(@ 5579 mm)
	S	-	-	*11950	6950	-	-	-	5150	
-6 m	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86614

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.7 m
Arm = 3.9 m without bucket
Shoe = 600 mm

(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	10,5 m	MR	
7,5 m	F	-	-	-	-	-	-	-	-	* 3380	(@ 7272 mm)
	S	-	-	-	-	-	-	-	-	* 3380	
6 m	F	-	-	-	-	-	* 4010	-	-	* 3230	(@ 8256 mm)
	S	-	-	-	-	-	3820	-	-	3210	
4,5 m	F	-	-	-	-	-	* 4270	-	-	* 3220	(@ 8877 mm)
	S	-	-	-	-	-	3740	-	-	2790	
3 m	F	-	-	-	* 6410	* 5300	* 4750	* 3980	-	* 3320	(@ 9210 mm)
	S	-	-	-	* 6410	5080	3600	2670	-	2560	
1,5 m	F	-	-	* 8150	* 8470	* 6350	* 5320	4040	-	* 3530	(@ 9288 mm)
	S	-	-	* 8150	7250	4770	3440	2590	-	2460	
0 m	F	-	-	* 6940	* 9990	* 7240	5200	3970	-	3900	(@ 9116 mm)
	S	-	-	* 6940	6790	4520	3300	2530	-	2480	
-1,5 m	F	-	* 5330	* 9110	*10700	7100	5100	-	-	4150	(@ 8680 mm)
	S	-	* 5330	* 9110	6570	4370	3210	-	-	2630	
-3 m	F	-	* 8390	*12770	*10640	7050	5090	-	-	4710	(@ 7936 mm)
	S	-	* 8390	12700	6540	4330	3200	-	-	2980	
-4,5 m	F	-	*12260	*14180	* 9720	* 7120	-	-	-	5990	(@ 6779 mm)
	S	-	*12260	12980	6650	4410	-	-	-	3760	
-6 m	F	-	-	*10560	* 7240	-	-	-	-	* 6450	(@ 4917 mm)
	S	-	-	*10560	6970	-	-	-	-	6140	

S86615

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.57 m
Arm = 2.5 m without bucket
Shoe = 600 mm

(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	MR	
7,5 m	F	-	-	-	* 7440	-	-	-	* 6170	(@ 5483 mm)
	S	-	-	-	* 7440	-	-	-	6070	
6 m	F	-	-	-	* 7590	* 6670	-	-	* 5660	(@ 6740 mm)
	S	-	-	-	* 7590	5260	-	-	4300	
4,5 m	F	-	-	*12070	* 8580	* 6990	-	-	5500	(@ 7491 mm)
	S	-	-	*12070	8020	5100	-	-	3550	
3 m	F	-	-	-	* 9960	* 7530	5400	-	4980	(@ 7885 mm)
	S	-	-	-	7410	4860	3470	-	3200	
1,5 m	F	-	-	-	*10850	7400	5280	-	4820	(@ 7976 mm)
	S	-	-	-	6900	4620	3360	-	3070	
0 m	F	-	-	-	*10690	7220	5210	-	4950	(@ 7775 mm)
	S	-	-	-	6670	4460	3290	-	3140	
-1,5 m	F	-	-	*10430	* 9580	7170	-	-	* 5420	(@ 7257 mm)
	S	-	-	*10430	6630	4420	-	-	3440	
-3 m	F	-	-	-	* 7450	* 5400	-	-	* 4770	(@ 6342 mm)
	S	-	-	-	6750	4510	-	-	4210	
-4,5 m	F	-	-		-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86616

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.57 m
Arm = 2.9 m without bucket
Shoe = 600 mm

(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	MR	
9 m	F	-	-	-	-	-	-	-	* 5570	(@ 4044 mm)
	S	-	-	-	-	-	-	-	*5570	
7,5 m	F	-	-	-	* 6390	* 4660	-	-	*4490	(@ 6042 mm)
	S	-	-	-	* 6390	* 4660	-	-	*4490	
6 m	F	-	-	-	* 6440	* 6350	-	-	* 4140	(@ 7200 mm)
	S	-	-	-	* 6440	5350	-	-	3910	
4,5 m	F	-	-	* 8270	* 8130	* 6730	5560	-	* 4050	(@ 7906 mm)
	S	-	-	* 8270	* 8130	5190	3610	-	3290	
3 m	F	-	-	-	* 9570	* 7330	5450	-	* 4140	(@ 8280 mm)
	S	-	-	-	7570	4930	3510	-	2990	
1,5 m	F	-	-	-	*10690	7450	5310	-	* 4400	(@ 8366 mm)
	S	-	-	-	7010	4660	3380	-	2870	
0 m	F	-	-	* 5400	*10830	7240	5210	-	4610	(@ 8175 mm)
	S	-	-	* 5400	6700	4480	3290	-	2920	
-1,5 m	F	-	-	* 9860	* 9990	7160	5190	-	5020	(@ 7685 mm)
	S	-	-	* 9860	6620	4400	3270	-	3170	
-3 m	F	-	-	*10440	* 8170	* 6060	-	-	* 4740	(@ 6829 mm)
	S	-	-	*10440	6690	4450	-	-	3770	
-4,5 m	F	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	

S86617

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.

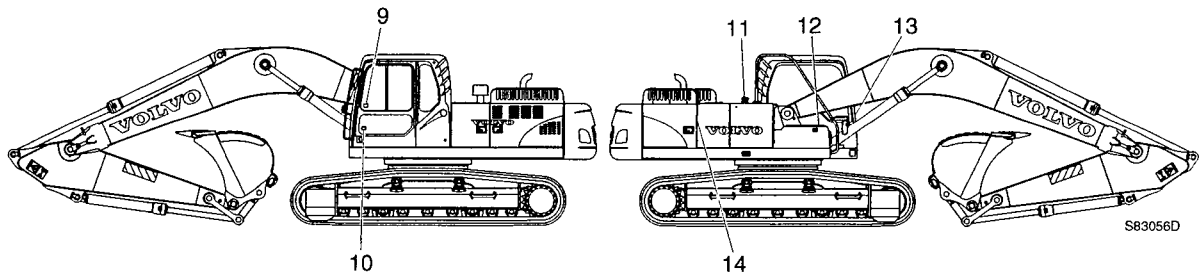
Long Crawler (LC)
Counterweight = 4200 kg
Boom = 5.57 m
Arm = 3.9 m without bucket
Shoe = 600 mm

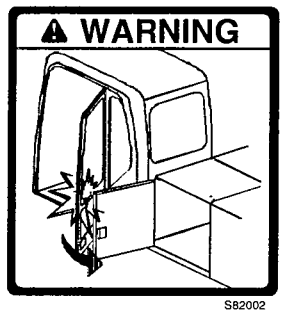
(Unit : kg)

H	R	0 m	1,5 m	3 m	4,5 m	6 m	7,5 m	9 m	10,5 m	MR	
9 m	F	-	-	-	-	-	-	-	-	* 3860	(@ 5604 mm)
	S	-	-	-	-	-	-	-	-	* 3860	
7,5 m	F	-	-	-	-	* 4630	-	-	-	* 3390	(@ 7169 mm)
	S		-	-	-	* 4630	-	-	-	* 3390	
6 m	F	-	-	-	-	* 4850	* 4350	-	-	* 3210	(@ 8165 mm)
	S	-	-	-	-	* 4850	3800	-	-	* 3210	
4,5 m	F	-	-	-	* 5070	* 5430	* 5090	-	-	* 3180	(@ 8793 mm)
	S	-	-	-	* 5070	5370	3720	-	-	2800	
3 m	F	-	-	*12130	* 8360	* 6650	5530	* 3710	-	* 3260	(@ 9129 mm)
	S	-	-	*12130	7940	5070	3570	2630	-	2570	
1,5 m	F	-	-	* 9430	* 9890	* 7370	5350	4030	-	* 3460	(@ 9208 mm)
	S	-	-	* 9430	7240	4750	3410	2560	-	2470	
0 m	F	-	-	* 7400	*10700	7270	5190	3960	-	* 3810	(@ 9034 mm)
	S	-	-	* 7400	6750	4480	3260	2500	-	2480	
-1,5 m	F	-	* 5410	* 9530	*10530	7090	5100	-	-	4200	(@ 8594 mm)
	S	-	* 5410	* 9530	6510	4330	3180	-	-	2640	
-3 m	F	-	-	*13220	* 9420	* 7000	5100	-	-	* 4660	(@ 7842 mm)
	S	-	-	12600	6480	4290	3180	-	-	3010	
-4,5 m	F	-	-	-	* 7170	* 5160	-	-	-	* 4170	(@ 6668 mm)
	S	-	-	-	6620	4390	-	-	-	3830	
-6 m	F	-	-	-	-	-	-	-	-	-	
	S	-	-	-	-	-	-	-	-	-	

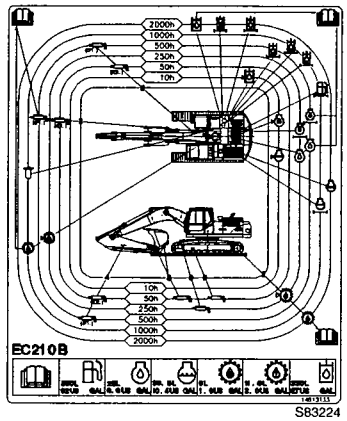
S86618

NOTE :
1. The above loads are in compliance with SAE and ISO Hydraulic Excavator Lift Capacity Standards.
2. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load.
3. Rated loads marked with an asterisk(*) are limited by hydraulic capacity rather than tipping load.





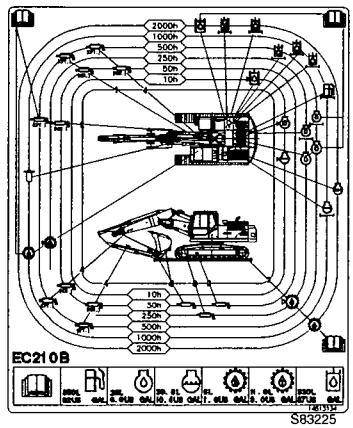
9 Cab door window breakage



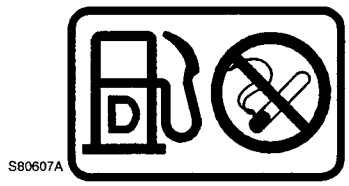
10 Lubrication and service chart

See ***Lubrication and service chart*** on page 204.

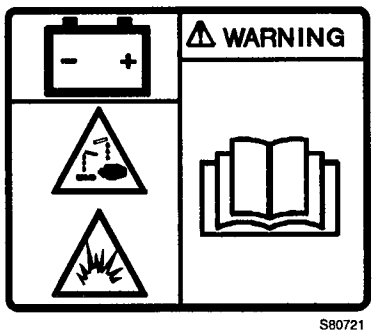
Service decal standard long boom



Adjustment of boom



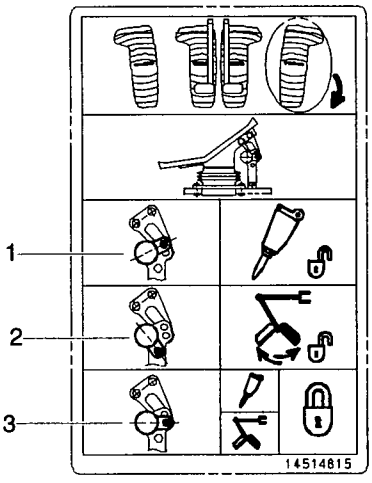
11 Do not smoke during fueling



12 Battery

See ***Batteries*** on page 156.

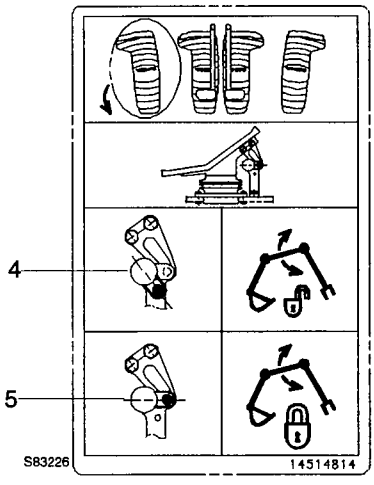
Risk for explosion, corrosive burns and electric shock.



13 Optional pedal

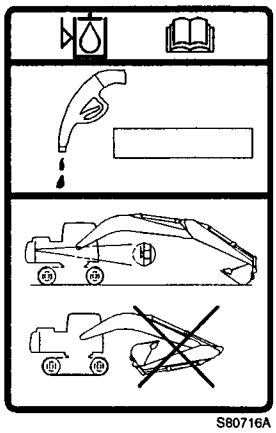
See ***Optional pedal position (X1)*** on page 76.

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



Adjustment

Position 4 Operation (if equipped)
Position 5 Operation lock (if equipped)

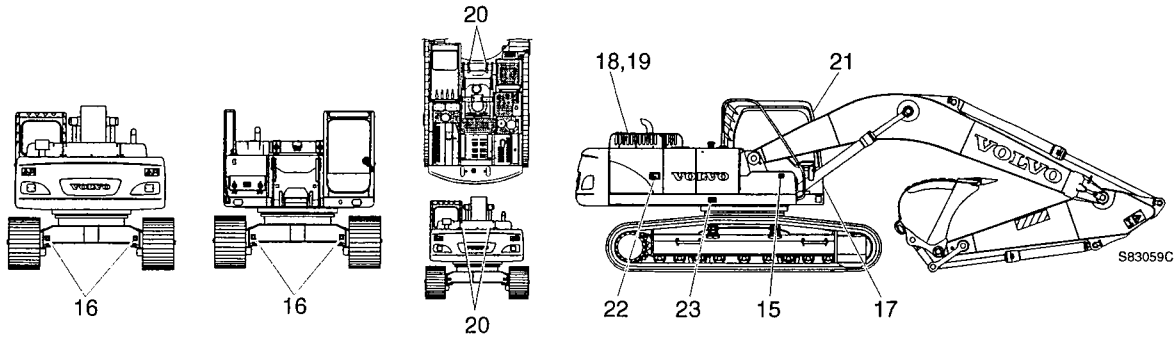


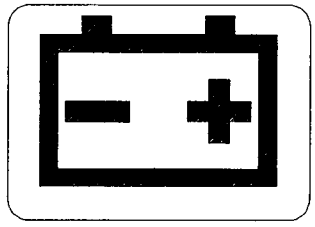
14 Position of checking hydraulic oil level

ISO VG #46: Standard

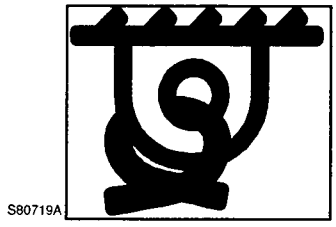
ISO VG #32, VG #68: Option

See ***Recommended lubricants*** on page 211.



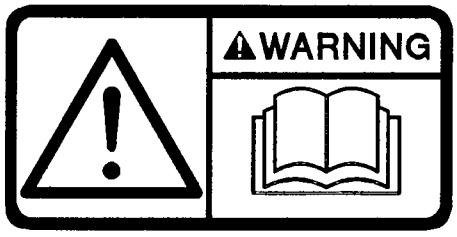


15 Battery position



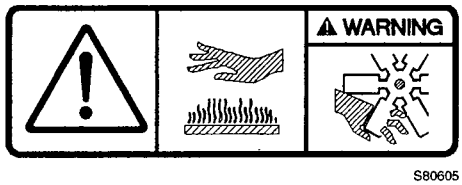
16 Anchoring lug

Towing is prohibited. See ***Transporting the machine*** on page 100.



17 Read the operator's manual

18 Warning, hot and pressurized coolant



19 Warning for rotating and/or hot parts

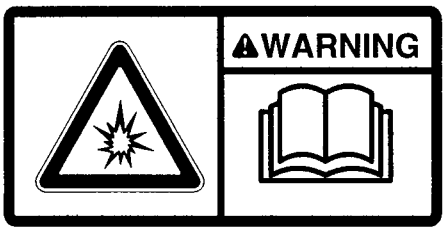

S80717

20 Lifting point for lifting the machine

See ***Lifting machine*** on page 105.

S80601

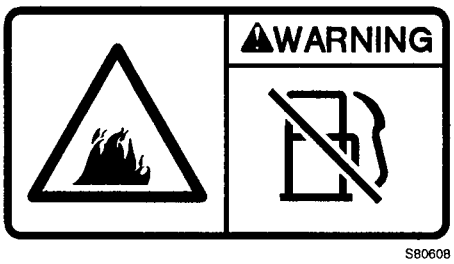
21 Locking the front window



S80718

22 Handling accumulator

See ***Handling accumulator*** on page 191.



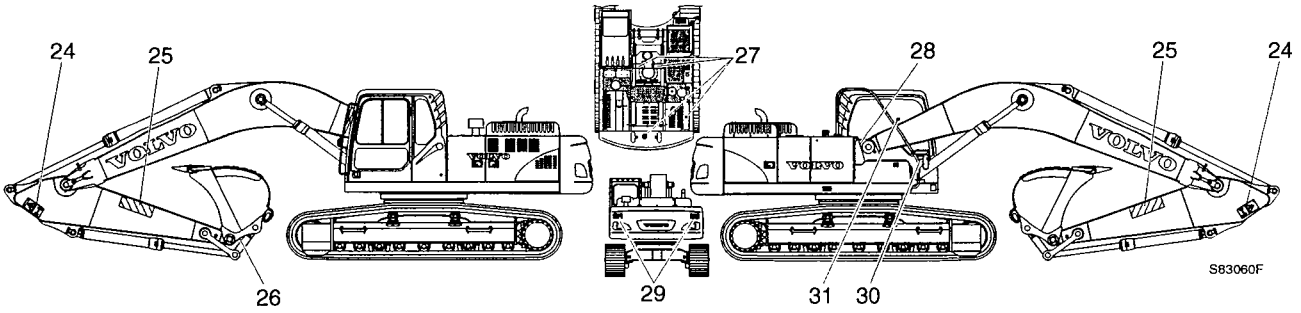
S80608

23 Risk of fire when fueling

Always stop the engine before refueling.

Do not refuel a machine near open flames or sparks.

Turn off master switch in case of fire.



24 Excavator's working area

Do not stand in the vicinity of a raised load.

25 Notice attachment

26 Read the operator's manual before operating quickfit

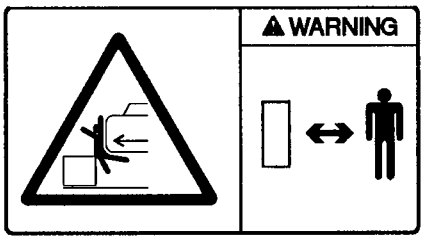
See *Hydraulic quickfit (s1)* on page 110.

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

27 Do not step or walk

S80603

28 Warning, risk of slipping or falling

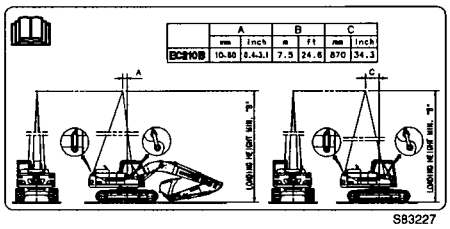


S80596

29 Excavator's working area

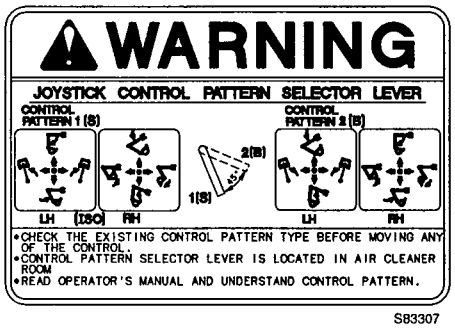
Do not enter the excavator's working area.

Risk for crushing!


S83227

30 Machine rigging

See ***Lifting machine*** on page 105.



S83307

31 Pattern changer

- Check the existing control pattern type before moving any of the control.
- Control pattern selector lever is located in air cleaner room.
- Read operator's manual and understand and control pattern.

See ***Changing machine control pattern*** on page 77.

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. ID (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.

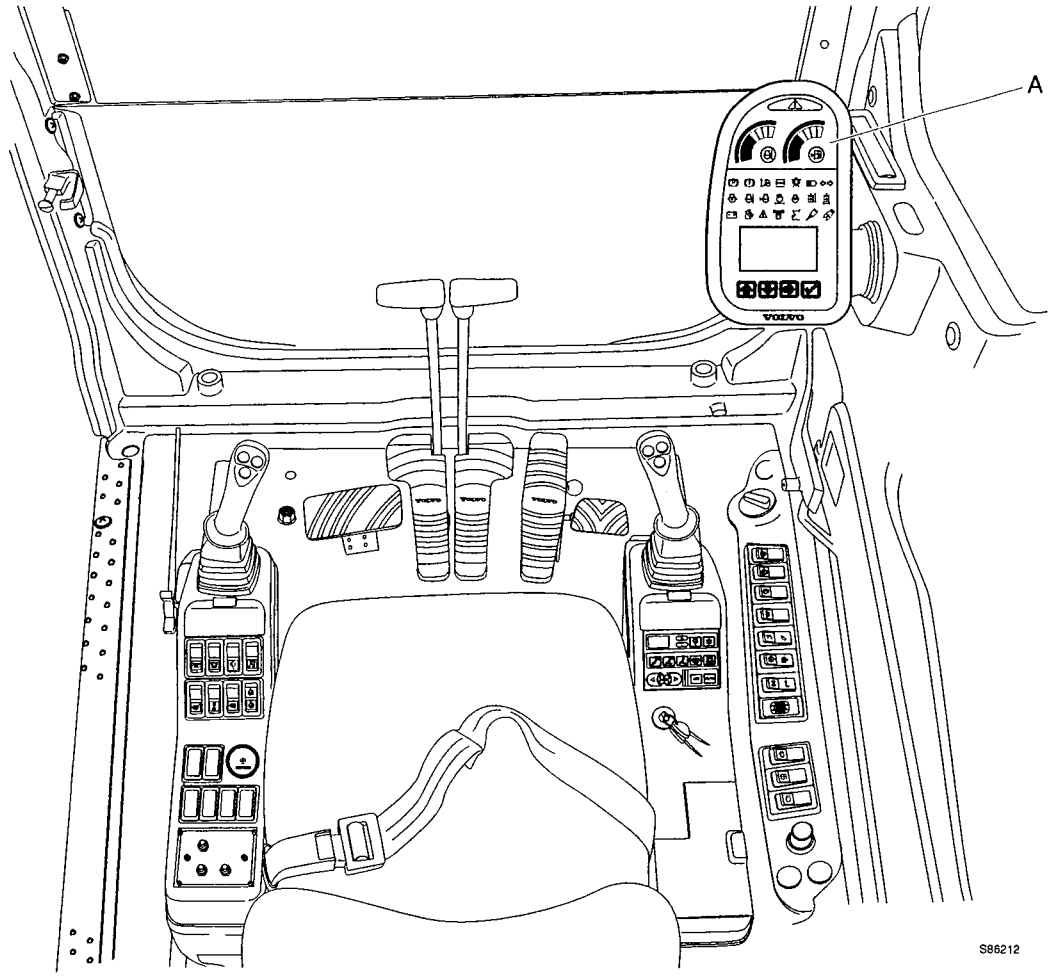
Glance at the instruments and control lamps now and then. By noticing abnormal readings in time, necessary action can be taken to prevent serious damage.

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.

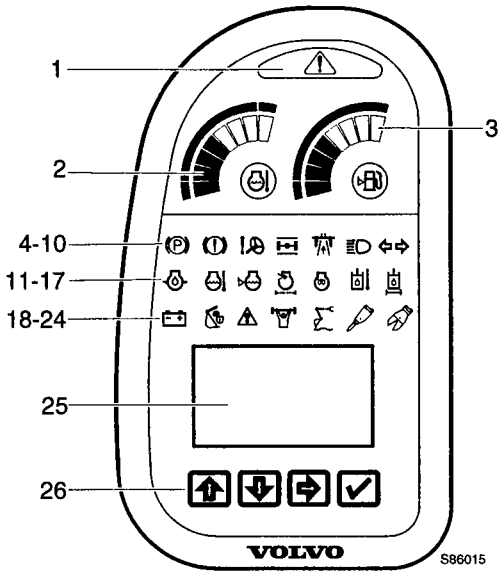
The remaining lamps - indicate that the respective function is engaged/connected.

Instrument panel



A : Front instrument panel (IECU)

Front instrument panel (IECU)



1 Central warning lamp
2 Engine coolant temperature gauge
3 Fuel level gauge
4 Parking brake indicator (not applicable)
5 Brake oil pressure warning indicator (not applicable)
6 Low steering pressure indicator (not applicable)
7 Axle lock indicator (not applicable)
8 Alignment indicator (not applicable)
9 Work lights indicator (not applicable)
10 Left / Right turn signal indicator (not applicable)
11 Engine oil pressure warning indicator
12 Engine coolant temperature warning indicator
13 Coolant level indicator
14 Air cleaner clogging warning indicator
15 Air preheating indicator
16 Hydraulic oil temperature warming indicator (not applicable)
17 Hydraulic oil filter clogging indicator (not applicable)
18 Battery charge warning indicator
19 Quickfit indicator (option)
20 Overload warning indicator (option)
21 Boost indicator
22 Float operation indicator (option)
23 Hammer indicator (option)
24 Shear selecting indicator (option)
25 MCD (Message Center Display)
26 Scroll / Confirm buttons

1 Central warning lamp

The central warning lamp blinks and the buzzer sounds at the same time when a fault occurs in either of the following functions.

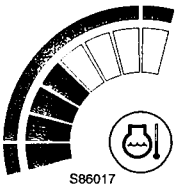
Alarm : buzzer sounds periodically

- Attachment bracket (quickfit)
- Engine oil pressure
- Engine coolant temperature
- Brake oil pressure

Caution : buzzer sounds once

- Air cleaner clogging
- Coolant level
- Battery charge

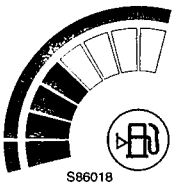
NOTE:
If the lamp flashes while operating - stop the machine immediately and investigate the cause.


S86017

2 Engine coolant temperature gauge

The gauge shows the temperature of the engine coolant. The more black bars, the higher is the temperature. If the temperature becomes abnormally high, the warning lamp will light up and the buzzer will sound.

If this happens, stop work immediately and investigate the cause.


S86018

3 Fuel level gauge

The gauge shows the level in the fuel tank. When the tank is full, all bars are black. When only one section remains, it starts to flash. Refuel the machine immediately in order to avoid air entering the system. Always refill the fuel tank at the end of every work day.

If the tank has been run empty, see ***Bleeding fuel system of air*** on page 169. For the capacity of the fuel tank, see ***Capacities, Intervals between changes/replacements*** on page 213.


S86019

4 Parking brake indicator (not applicable)

The lamp is alight when the parking brake is applied. Release the parking brake by selecting T-, W-mode with the mode selector. The parking brake can also be released by putting the control lockout lever in the upper position.


S86020

5 Brake oil pressure warning indicator (not applicable)

The lamp is alight, the central warning lamp blinks and the buzzer sounds when the brake pressure is too low or if one brake circuit does not work.


S86021

6 Low steering pressure indicator (not applicable)

The lamp is alight, the central warning lamp blinks and the buzzer begins to sound if a fault arises in the primary steering system.

WARNING!

The machine must not be operated until the fault has been rectified and the control lamp has extinguished.


S86022

7 Axle locking indicator (not applicable)

The lamp is alight when the axle is locked, so that is cannot pivot.


S86023

8 Alignment indicator (not applicable)

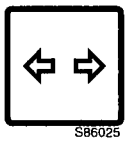
The lamp is alight when the superstructure is aligned with the undercarriage, provided that T-mode is selected. If the lamp starts to flash, it indicates that the two parts are no longer in alignment.

Stop the machine and put them in line again.


S86024

9 Working lights indicator (not applicable)

The lamp is alight when the high beams are switched on.


S86025

10 Left / Right turn signal indicator (not applicable)

The lamp flashes when the right or left direction indicators are switched on and hazard switch is pressed.


S86026

11 Engine oil pressure warning indicator

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the oil pressure in the engine becomes too low.

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


S86027

12 Engine coolant temperature warning indicator

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the engine coolant temperature becomes too high.

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


S86028

13 Coolant level indicator

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the coolant level becomes too low.


S86029

14 Air cleaner clogging warning indicator

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the air cleaner becomes clogged.

If this happens, clean or change the cleaner, see ***Air cleaner*** on page 171.


S86030

15 Air preheating indicator

The lamp is alight when the preheating is activated, see ***Starting engine*** on page 121.


S86031

16 Hydraulic oil temperature warning indicator (not applicable)

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the hydraulic oil temperature becomes too high.

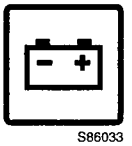
If this happens, stop the work immediately and investigate the cause.


S86032

17 Hydraulic oil filter clogging indicator (not applicable)

The lamp is alight, the central warning lamp blinks and the buzzer begins to sound, if the hydraulic oil filter becomes clogged.

If this happens, clean or change the filters, see ***Replacing hydraulic oil return filter*** on page 184.


S86033

18 Battery charge warning indicator

The lamp is alight, the central warning lamp blinks and the buzzer sounds, if the charging system malfunctions.

If this happens, stop the engine immediately and investigate the cause. Otherwise, the batteries may be damaged.


S86034

19 Quickfit indicator (option)

The lamp is alight, the central warning lamp blinks and the buzzer begins to sound when the quickfit is opened, provided that the two quickfit switches on the left instrument panel and the right wall panel are pressed simultaneously.

WARNING!

If the red warning lamp for open quickfit lights up on the front instrument panel, while the bucket is still attached to the bracket, the excavator equipment should not be operated. Should this still be necessary, the operating must be done with the utmost care, as the bucket may suddenly loosen.


S86039

20 Overload warning indicator (option)

WARNING!

If the overload warning lamp lights up, stop the lifting operation and reduce the load. Otherwise, serious accidents can happen.

The lamp is alight, the central warning lamp blinks and the buzzer begins to sound, if the attachment becomes overloaded, provided that the switch on the right instrument panel is pressed down.


S86040

21 Boost indicator

The lamp is alight when the power boost function has been selected with the right lever control.


S86041

22 Float operation indicator (option)

The lamp is alight when the float function has been selected with the right lever control.


S86036

23 Hammer indicator (option)

The lamp is alight when the hammer button on the right control lever is pressed while hammer of boost / hammer switch on the right instrument panel is selected.


S86042

24 Shear selecting indicator (option)

The lamp is alight when the shear switch on the right instrument panel has been pressed.

S86186

25 MCD (Message Center Display)

Start up screen

When the ignition key is turned to running position, the start up screen is shown. Five dots light up one by one and the machine model is shown during maximum two seconds. Let all dots light up before turning the ignition key to starting position.

S86187

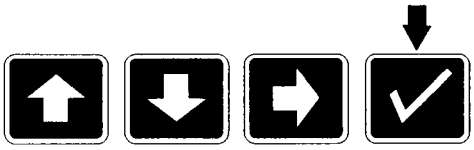
Shut down screen

When the ignition key is turned to stop position, the shut down screen is shown. Five dots are extinguished one by one and the machine model is shown during maximum three seconds.


S86038

26 Scroll / Confirm buttons

Use the three arrow buttons to scroll between the screens and the confirm button to confirm an alarm. While the start up screen is shown, the buttons are locked.


S86044

Error messages

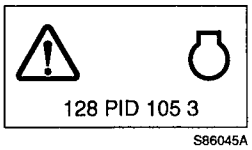
For some errors that may occur while operating, an error message is shown on the display unit on the front instrument panel. At the same time, a buzzer sounds and if the error is serious, the central warning lamp is alight. The buzzer is shut off by pushing the acknowledgement button once and the error message is removed by two pushes.

Each message includes a code, which is important to note, before contacting the workshop.

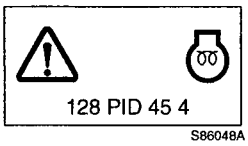
Contact the workshop if the following error messages appear.

Note the code first!

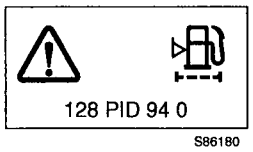
Engine



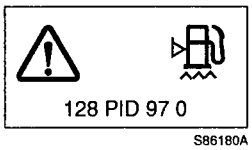
S86045A



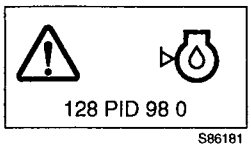
S86048A



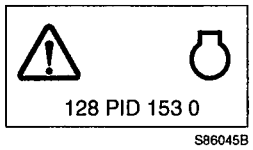
S86180



S86180A

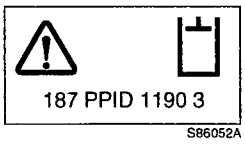


S86181



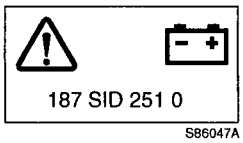
S86045B

Hydraulic



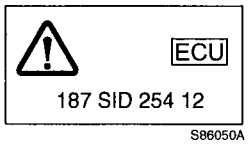
S86052A

Electric

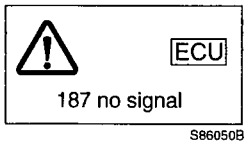


S86047A

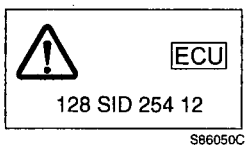
ECU



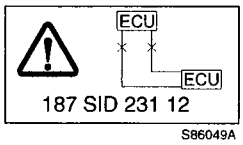
S86050A



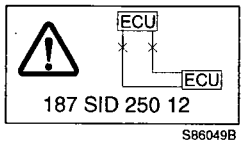
S86050B



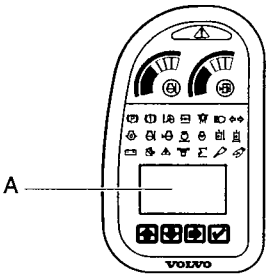
S86050C



S86049A



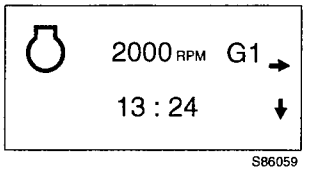
S86049B



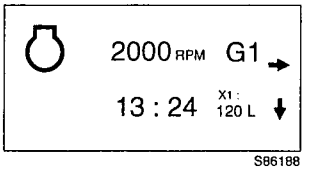
Operator information

After the start up screen has been extinguished, this default screen showing the engine speed appears on MCD (Message Center Display) (A).

Screen 1



Screen 1-1



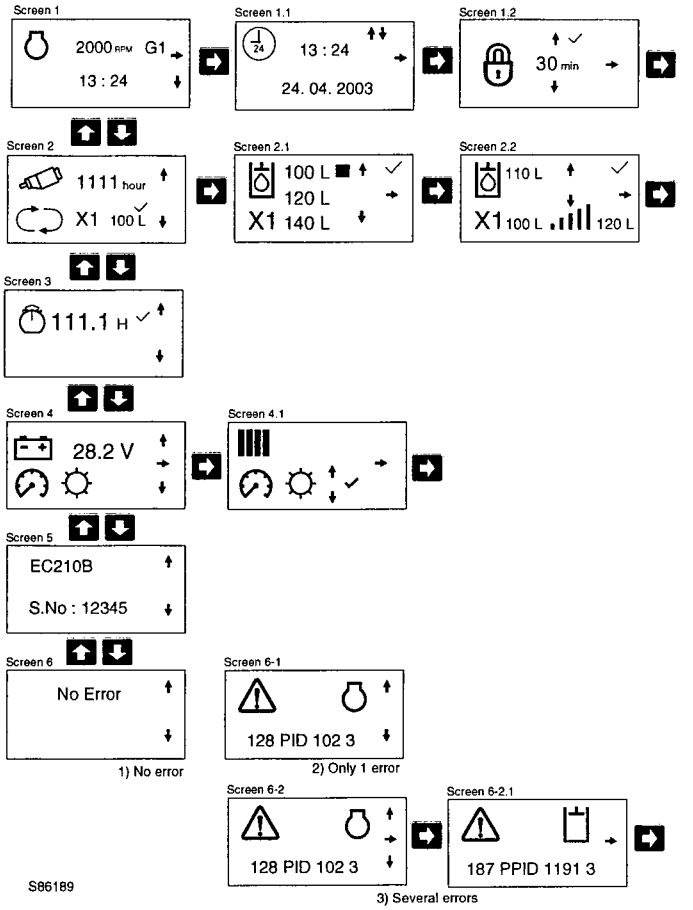
Default screen

After starting, this default is shown on MCD (Message Center Display).

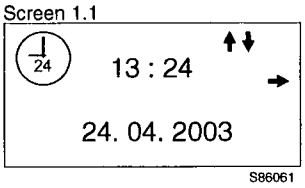
Engine speed and mode are displayed at first line.

Time is displayed at second line. The displayed time format is selectable on other screen. see ***Setup time and date*** on page 57.

Normal operating screen



Screen 1.1

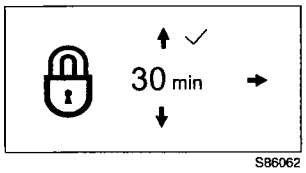


S86061

Press arrow right to go to screen 1.1 on the default screen 1.

– Time and date (the symbol shows if the 12 or 24 hours format is selected). For changing the format, ***Setup time and date*** on page 57.

Screen 1.2

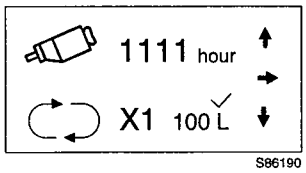


S86062

Press arrow right to go to screen 1.2.

– This is shown only when code lock is set. see ***Code lock (optional equipment)*** on page 58.

Screen 2

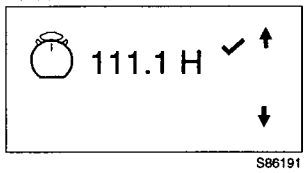


S86190

Press arrow down to go to screen 2.

– This is shown when X1 option equipment is attached.

Screen 3

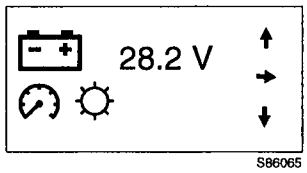


S86191

Press arrow down to go to screen 3.

– Engine running time
– Stop watch (reset by pressing the acknowledgement button for more than **1** second)

Screen 4

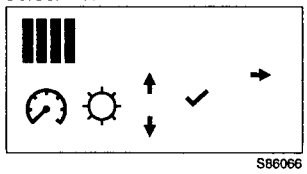


S86065

Press arrow down to go to screen 4.

– Battery voltage is shown

Screen 4.1

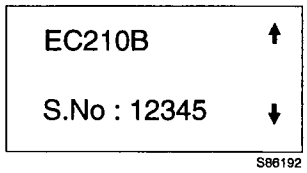


S86066

Press arrow right to go to screen 4.1.

– Contrast (change by pressing arrow) down (darker) or up (lighter)
– Keep the setting by pressing the acknowledgement button for more than **1** second.

Screen 5

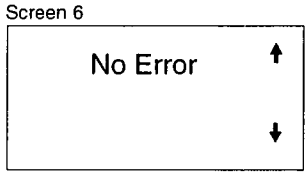


S86192

Press arrow down to go to screen 5.

– Model name and serial number are shown

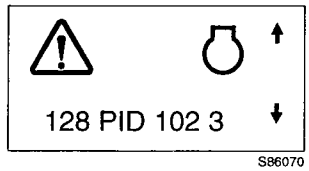
Screen 6



Press arrow down to go to screen 6, 6-1 or 6-2.

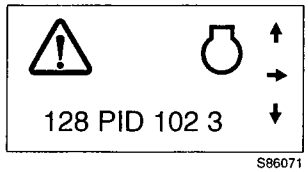
– Screen 6 is shown for no error

Screen 6-1



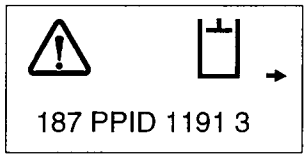
– Screen 6-1 is shown for only 1 error

Screen 6-2



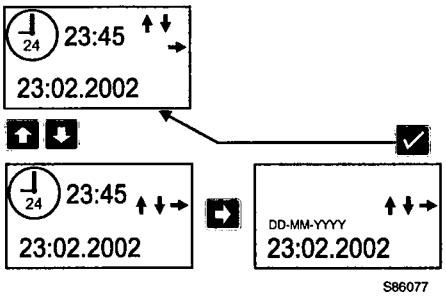
– Screen 6-2 is shown for several errors more than an error.

Screen 6-2.1

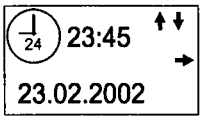


Press arrow right to go to screen 6-2.1

Press arrow right again and again to go to other error screens.

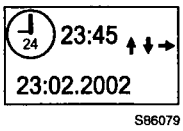


Setup time and date



– Time and date setup. Interrupt the setup by pressing the acknowledgement button for more than one second.

Press arrow up and arrow down at the same time for more than one second to get to the changing mode.



Change the time setting (24 or 12 hours format)

– When the symbol flashes, press arrow up or arrow down to get the other format.

Press arrow right to change the hours.

Change the hours

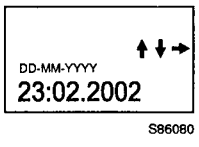
– When the hour flashes, press arrow up or arrow down to change hour.

Press arrow right to change the minutes.

Change the minute

– When the minute flashes, press arrow up or arrow down to change minute.

Press arrow right to change date.



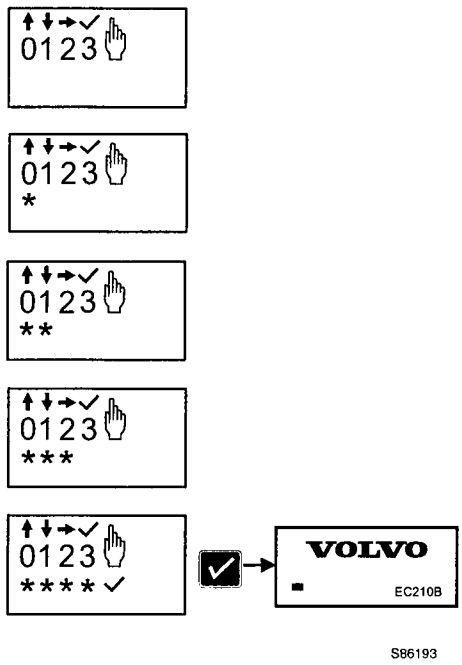
Change the date setting (DD-MM-YYYY, MM-DD-YYYY, YYYY-MM-DD)

– When the date flashes, press arrow up to change the date setting.

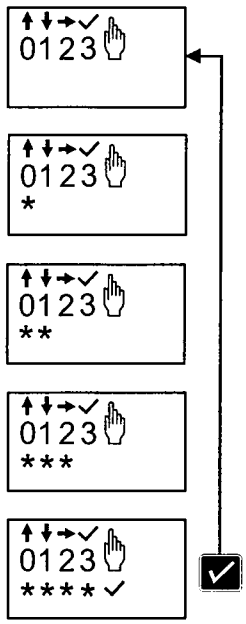
Press arrow right to change date, month or year.

Change the date, month or year

– When the first group of digits flashes, press arrow up or arrow down to make a change.
– Press arrow right to go to the next group of digits. Change with arrow up or down or press right to go to the next.
– Confirm by pressing the acknowledgement button for more than one second.



S86193



S86194

Code lock (optional equipment)

The machine can be equipped with theft protection in the form of a code lock which prevents start of the machine without the correct four-digit code.

NOTE:
Do not forget the code. It can only be programmed and changed via VCADS Pro. If you forget the code, contact your dealer.

Unlocking the code lock.

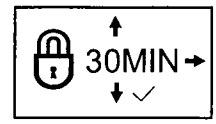
– Enter the four-digit code (consists of the digits 0, 1, 2 and 3) and press the acknowledgement button for more than 1 second.

If it is correct, the start up screen is shown.

If it is incorrect, the first screen is shown again. After four, failed attempts to enter the correct code, the system will be locked for ten minutes and the first screen is still shown if the ignition key is in running position. After ten minutes, another four attempts to enter the correct code are possible.

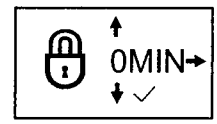
Code lock setting

The code lock setting of the code lock function is shown when pressing arrow right on the time/date screen (see previous page).



S86086

The code lock is unlocked for 30 minutes after the engine has been shut off. After this period, the code has to be entered again.

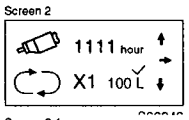


S86087

The code lock is locked as soon as the engine is shut off.

Changing the code lock setting

Change from one setting to another with arrow up or arrow down and press the acknowledgement button for more than 1 second.



S86247

X1 flow change

The displayed values of flow in the screen are the ones at rated rpm and with one pump.

Screen 2.1

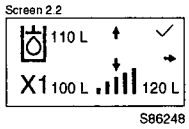
With this screen you can change X1 flow using either the ⬆ or ⬇ button.

Each step is 20 L. The selected flow is marked with a square.

To go to the fine adjustment, Press the scroll button. The screen will automatically change to screen 2.2

Any time you press the confirm button for **more than 1 seconds**, the current settings are saved and the screen goes to screen 2.

Any time you press the confirm button for **less than 1 seconds**, the screen goes to screen 2 without saving the settings.



S86248

Screen 2.2

With this screen you can make fine adjustments to the flow.

Each step is 5 L (example: 100, 105, 110, 115, 120)

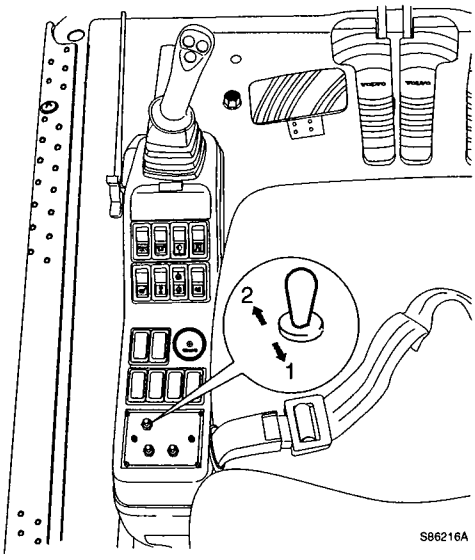
You can see also the selected flow beside the hydraulic symbol (110 L)

To go to the previous adjustment screen 2.1, push the scroll button.

Any time you press the confirm button for **more than 1 seconds**, the current settings are saved and the screen goes to screen 2.

Any time you press the confirm button for **less than 1 seconds**, the screen goes to screen 2 without saving the settings.

NOTE : The X1 flow value is stored in the V-ECU.



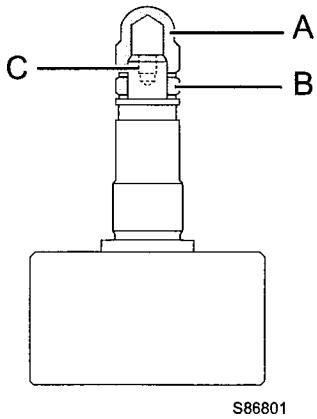
S86216A

1 One pump flow
2 Two pump flow

Flow setting with 2 pump flow

Flow adjustment is done at P1 pump only. P2 pump is always at 100% flow.

When pump selector switch, located on the left side panel, is positioned to 1 pump, the indicated flow is actual from P1 pump. When the pump selector switch is positioned to 2 pump flow, the total flow is the indicated flow from P1 pump plus 100% from P2 pump.



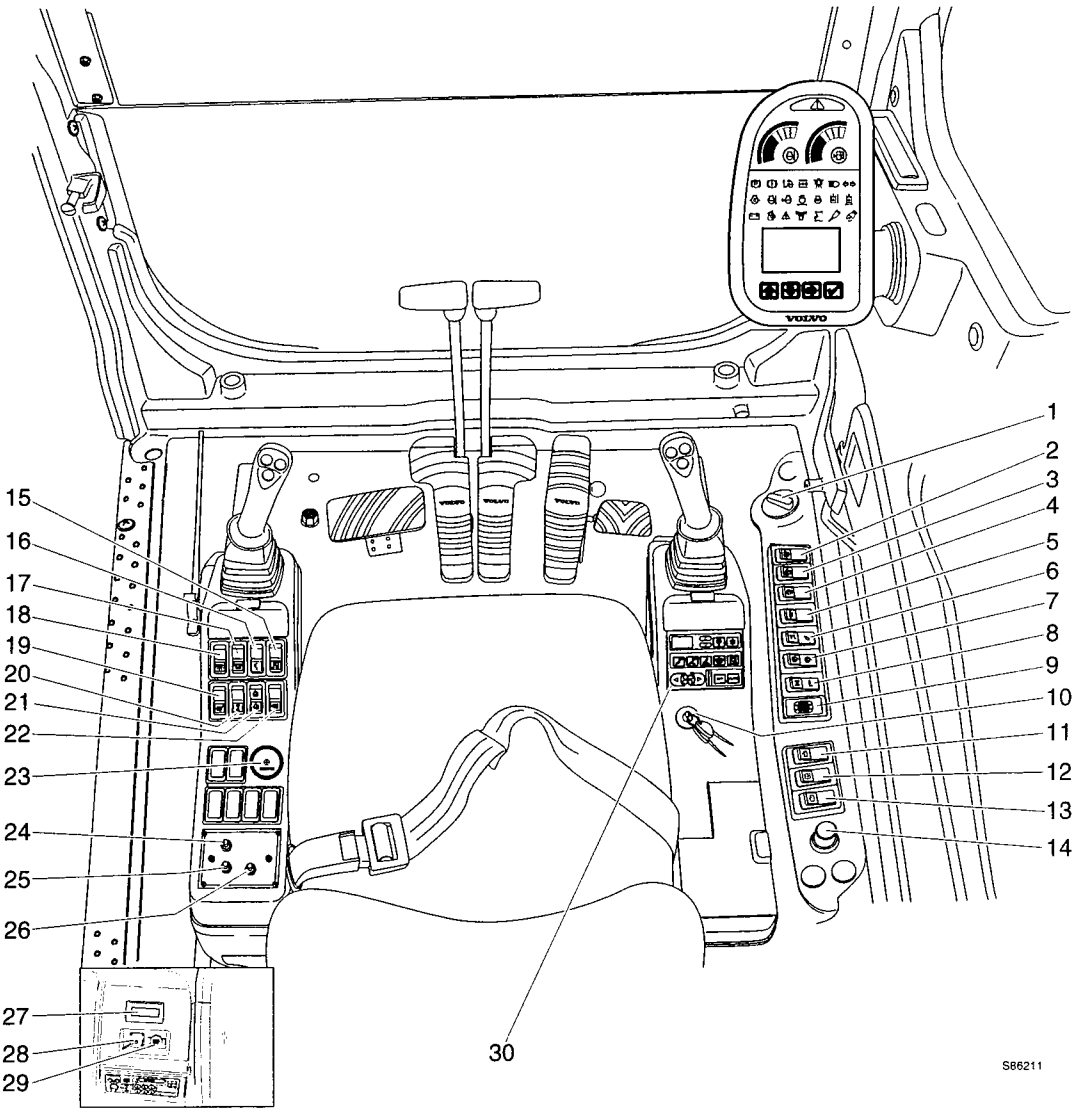
S86801

A Cap
B Adjusting nut
C Spindle

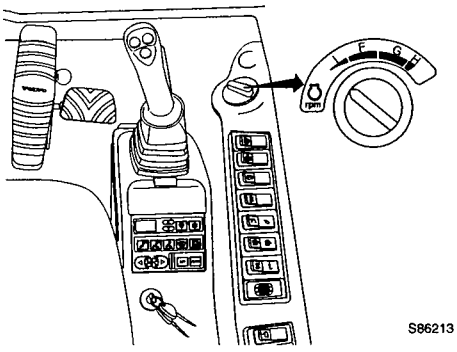
When the 2 pump control is operated with boom up operation, the appropriate flow can be adjusted to raise the boom up speed by the flow control valve attached beside the main control valve.

1 Open the cap (A).
2 Loosen the adjusting nut (B) and adjust the appropriate flow using the spindle (C).
3 Tighten the adjusting nut (B).
4 Reinstall the cap (A).

Switches



1 Engine speed control switch
2 Working lights switch
3 Power maximum mode selector switch
4 Auto idle selector switch
5 Travel speed selector switch
6 Boost / hammer / shear selector switch
7 Right quickfit switch (option)
8 Quickfit audible warning switch (option)
9 Recirculation air sensor (option)
10 Start switch
11 Upper wiper switch
12 Washer switch
13 Lower wiper switch (option)
14 Cigarette lighter
15 Mute switch (option)
16 Extra work lamp switch (option)
17 Beacon switch (option)
18 Cab light switch
19 Seat heating switch (option)
20 Overload warning switch (option)
21 Left quickfit switch (option)
22 Travel warning sound stop switch (option)
23 Hour meter
24 One / two pump selector switch (option)
25 Automatic / manual selector switch
26 Emergency engine speed control switch
27 Engine diesel heater (option)
28 Service socket
29 Power socket
30 Air conditioner/heater switch



1 Engine speed control switch

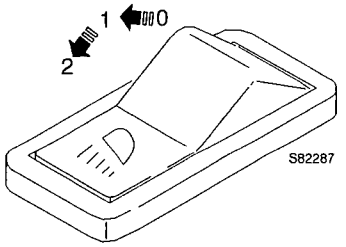
This switch is used to select the engine speed.
Turning this switch, the engine speed will change incrementally. According to the selected engine speed, working mode will be set automatically and setting mode is displayed on the message center display, See ***MCD (Message Center Display)*** on page 52.

Except North America

Mode		Switch step	Engine speed (±40 rpm) (no load/load)	Power shift current (±10 mA)	Remarks
			D6DEAE2		
Power max	P	9	2000/ 1900 over	215	For maximum productivity during hard digging and trenching
Heavy	H		1900/ 1800 over	250	For slightly hard operations
General	G1	8	1800/ 1700 over	290	For economical operation during general applications
	G2	7	1700/ 1600 over		
	G3	6	1600/ 1500 over		
Fine	F1	5	1500/ –	450	For Maximum lifting power and moderate control
	F2	4	1400/ –		
	F3	3	1300/ –		
Idle	I1	2	1000/ –	555	For warm-up and very precise operation
	I2	1	800/ –		

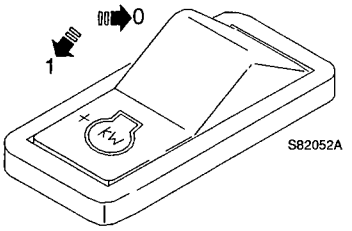
North America

Mode		Switch step	Engine speed (±40 rpm) (no load/load)	Power shift current (±10 mA)	Remarks
			D6DEAE2		
Heavy	H	9	2000/ 1900 over	220	For maximum productivity during hard digging and trenching
General	G1	8	1900/ 1800 over	260	For economical operation during general applications
	G2	7	1800/ 1700 over	300	
	G3	6	1700/ 1600 over		
Fine	F1	5	1500/ –	450	For Maximum lifting power and moderate control
	F2	4	1400/ –		
	F3	3	1300/ –		
Idle	I1	2	1000/ –	570	For warm-up and very precise operation
	I2	1	800/ –		



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

At 9 step of the engine speed control switch,

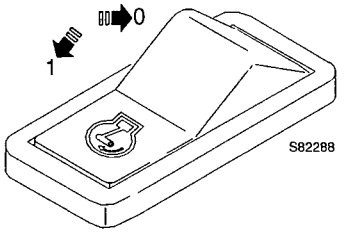
Position 0 Power maximum mode DEACTIVATED
Position 1 Power maximum mode ACTIVATED

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.

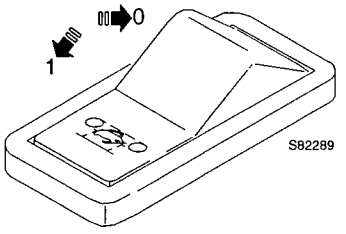
At the P mode, it become H mode if 9 step is selected after turning the engine speed control switch to another step.



4 Auto idle selector switch

When this switch is turned to auto idling position (1) and if the operating levers, the travel levers (pedals), and the engine speed control 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 speed set with the engine speed control switch.

Position 0 Auto idling DEACTIVATED
Position 1 Auto idling ACTIVATED

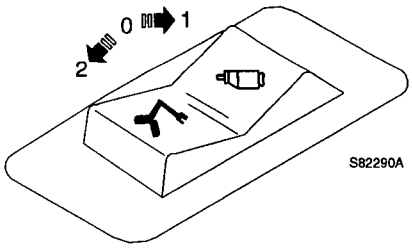


5 Travel speed selector switch

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,



S82290A

6 Boost / hammer / shear selector switch

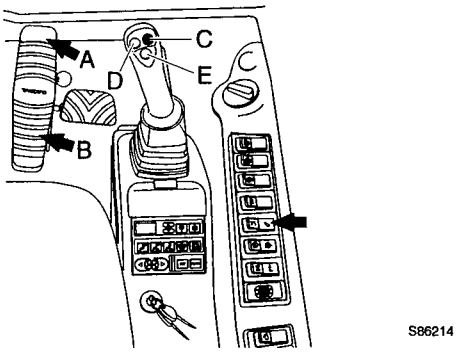
See *2 Operating lever (right)* on page 74.

If X1 (hammer / shear) is not equipped

Position 0 — Boost mode
If button (C) on the right operating lever is pressed, digging and lifting 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.



S86214

If X1 (hammer / shear) is fitted

If X1 (hammer / shear) pedal control is fitted

Button (E) is Horn in all position (position 0, 1 & 2)

Button (D) is Spare in all position (position 0, 1 & 2)

Position 0 — Boost mode
If button (C) is pressed, digging and lifting 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

Button (E) is Horn in all position (position 0, 1 & 2)

Button (D) is Spare in all position (position 0, 1 & 2)

Position 0 — Boost mode
If the button (C) is pressed, digging and lifting 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.

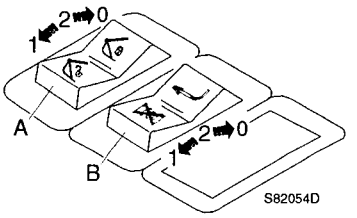
Position 2 — Shear mode
If button (C) is pressed, digging and lifting power is increased for 9 seconds.
In this mode, X1 (hammer / shear) doesn't function.

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

Position 0 — Boost mode
If button (E) is pressed, digging and lifting 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 and lifting power is increased for 9 seconds.



7 Right quickfit switch (option)

IMPORTANT
This function is activated by pressing the quickfit switch on the left and right instrument panels simultaneously,
See *Left quickfit switch (option)* on page 68.

Switch (A) in position 0 Quickfit closed
Switch (A) in position 1 Quickfit open
Switch (A) in position 2 Quickfit neutral

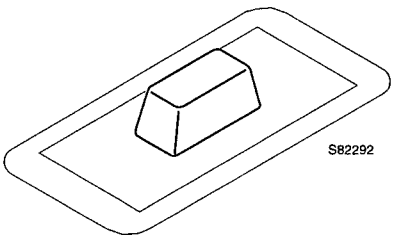
When both switches are in **position (1)** simultaneously, the quickfit unit is opened, the buzzer is activated, the quickfit indicator and the central warning lamp are ON.

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)

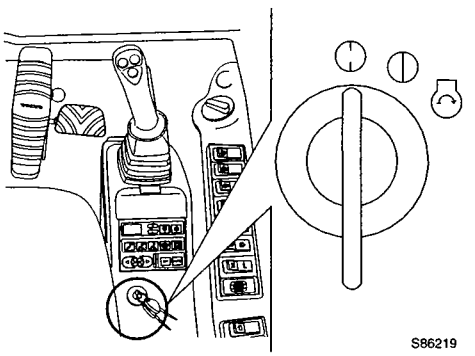
Switch (B) in position 0 Quickfit audible warning is switched (B) ON
Switch (B) in position 1 Quickfit audible warning is switched (B) OFF
Switch (B) in position 2 Quickfit audible warning is switched (B) Neutral

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.

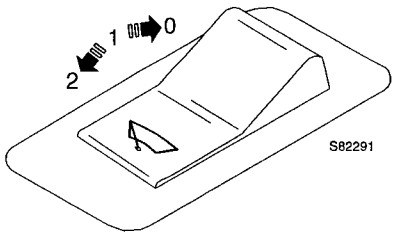


10 Start switch

This switch has three positions:

- : Off position
- : Running (preheating) position
- : Starting position

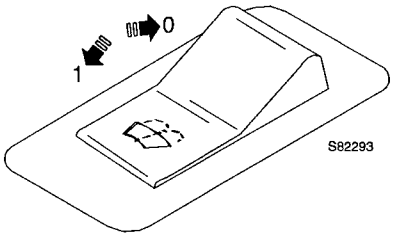
See ***Start switch*** on page 119.



11 Upper wiper switch

Position 0 Upper wiper switched OFF
Position 1 Upper wiper switched ON intermittently
Position 2 Upper wiper switched ON

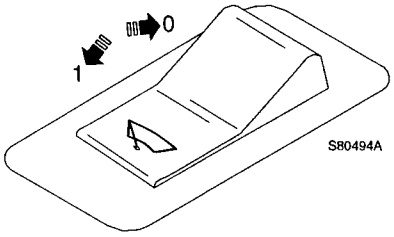
IMPORTANT
Lifting the front window while the wiper motor is running, immediately stops the operation.



12 Washer switch

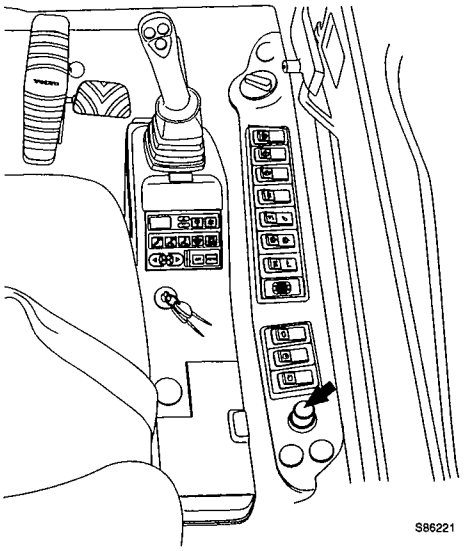
Position 0 Washer switched OFF
Position 1 Washer switched ON

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



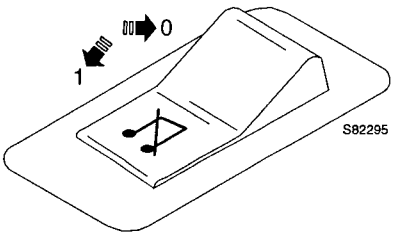
13 Lower wiper switch (option)

Position 0 Wiper switched OFF
Position 1 Wiper switched ON



14 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.

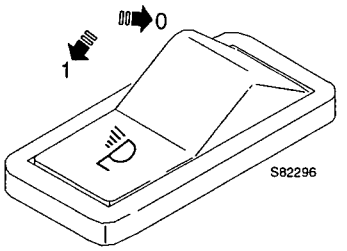


15 Mute switch (option)

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

Position 0 OFF

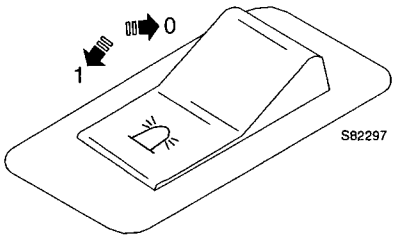
Position 1 ON



16 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

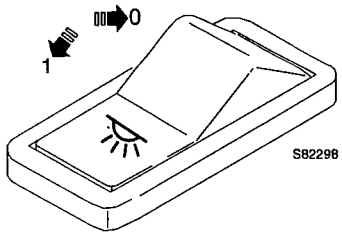


17 Beacon switch (option)

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

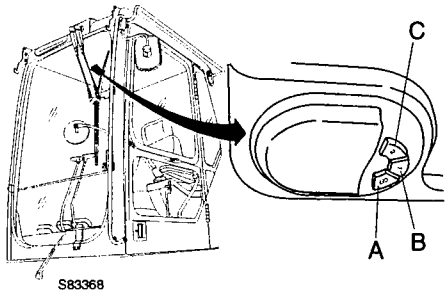


18 Cab light switch

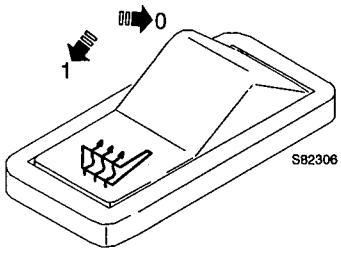
Only when this is at "ON" position, the buttons (A, B, C) connected to the cab light will work.

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.



19 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).

WARNING!

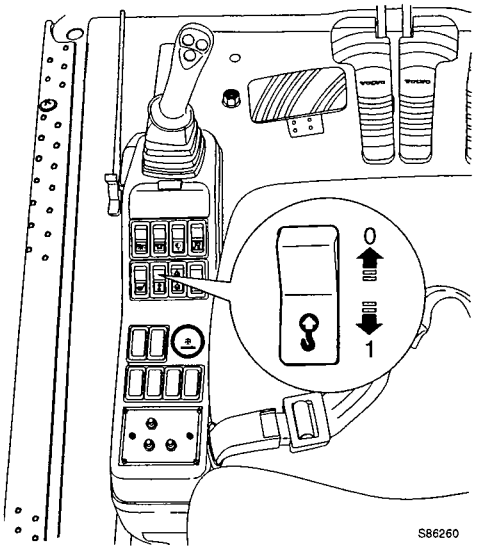
Position the seat heater switch OFF for fire prevention when the seat heating is not needed (when leaving the operator's seat).


S80490A

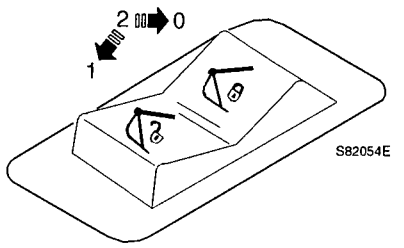
20 Overload warning switch (option)

WARNING!

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.



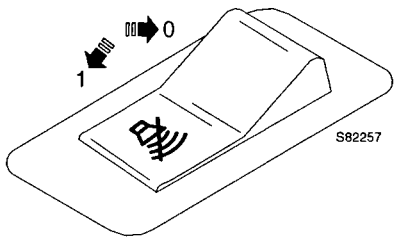
21 Left quickfit switch (option)

IMPORTANT
This function is activated by pressing the quickfit switch on the left and right instrument panels simultaneously,
See *Right quickfit switch (option)* on page 64.

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.

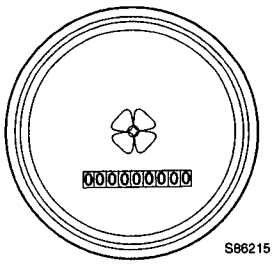
After installing quickfit and when both switches are in **position (0)**, then the quickfit warning and central warning lamps are OFF.



22 Travel warning sound stop switch (option)

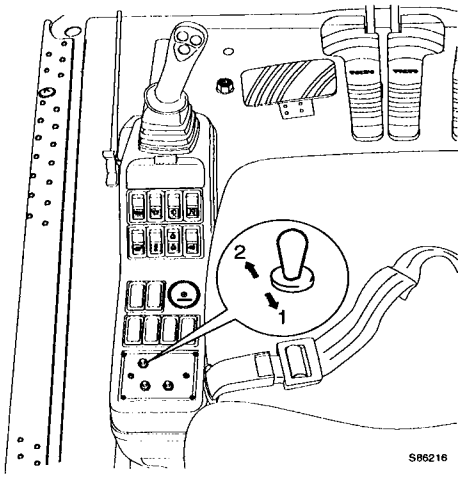
This switch is used to mute the sound of speaker at a time.

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



23 Hour meter indicator

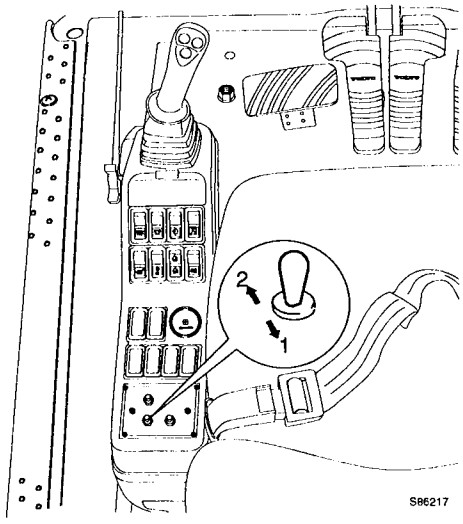
The hour recorder shows the total number of hours the engine has operated. It records only when the engine is running.



24 One/two pump selector 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



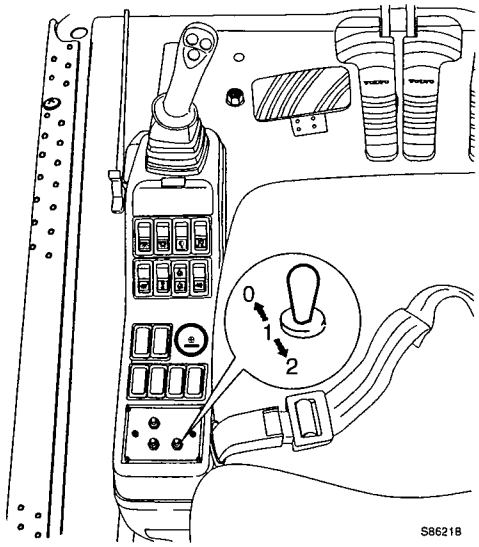
25 Automatic / manual selector switch

Position 1	Manual controlled
Position 2	Auto controlled

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

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

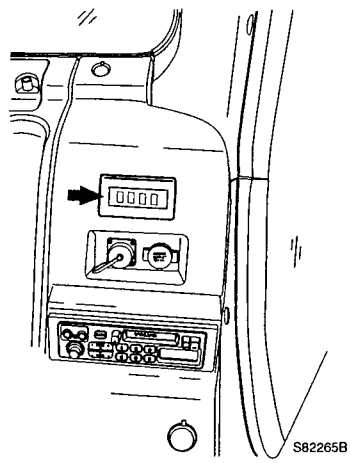
To turn manual mode to auto mode after changing or repairing damaged part, the machine must be restarted.



26 Emergency engine speed control switch

If the engine speed control switch on **page 61** does not work, set "Auto/Manual select switch" to Manual position and use this emergency switch.

Position 0	Engine stop (when the engine 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.



27 Engine diesel heater (option)

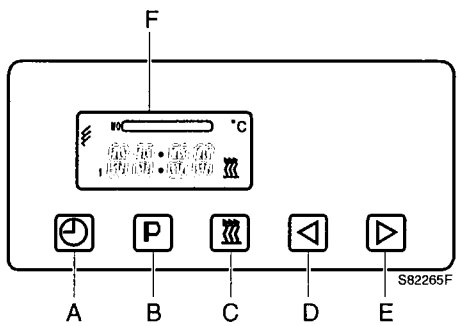
In cold weather, this auxiliary heater can be operated manually or preset to activated at various times to warm the cab, and heat the engine for easier starting.

Setting current time and date

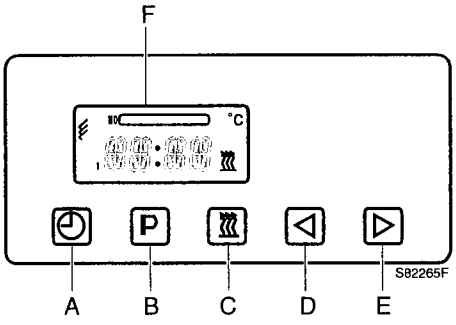
1 Press time setting switch (A) until the time in display window (F) begins to flash.

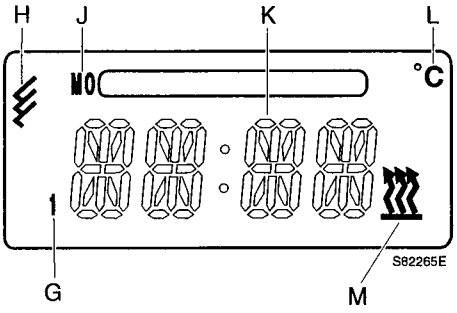
2 Adjust the current time by pressing backward switch (D) and forward switch (E).
After a few second, the current time (K) stops blinking, which means the current time is set.

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.



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





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.

Preset heating time method

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

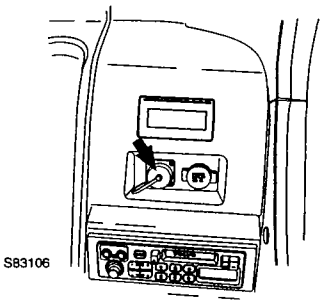
1 Each preset time can be certified when program switch (B) is pressed.

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.

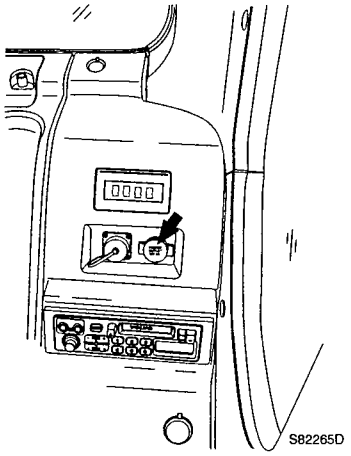
Heating ON / OFF switch (C) only blinks in the display window (F), when memory indicator (G) is ON and at one of the preset operating times.



28 Service socket

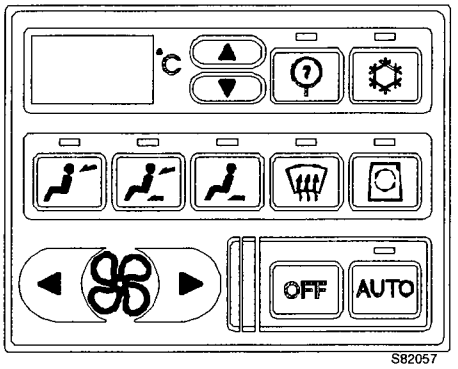
The service socket (VCADS Pro, SDU, MATRIS) is positioned to the left, above the radio.

Contact an authorized dealer workshop.



29 Power socket

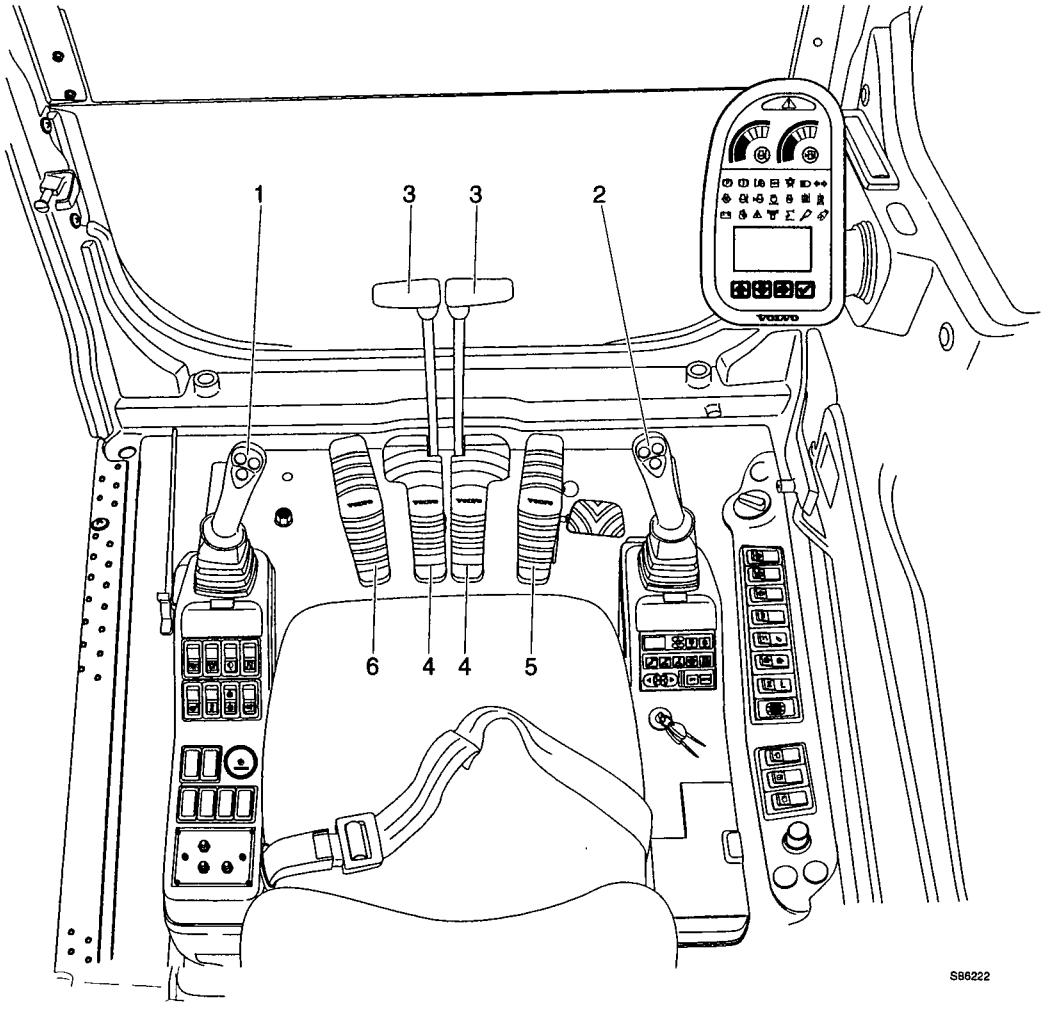
This socket is for electrical appliances like mobile phone charger.
Capacity: under 12 V (4A)



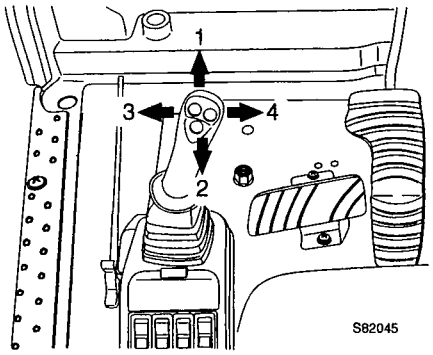
30 Air conditioner/heater switch

This switch is used to activate air conditioner/heater.
See ***Air conditioner/heater (option)*** on page 88.

Controls



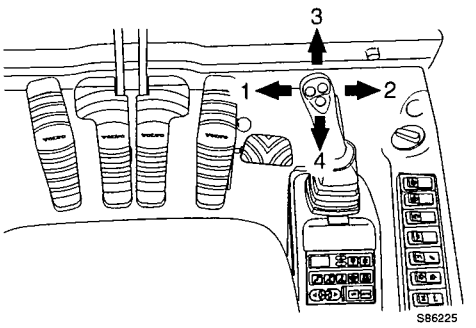
1 Operating lever (left)
2 Operating lever (right)
3 Travel levers
4 Travel pedals
5 Optional pedal (X1)
6 Optional pedal (adjustable boom)



1 Operating lever (left)

This lever is for swing and arm.

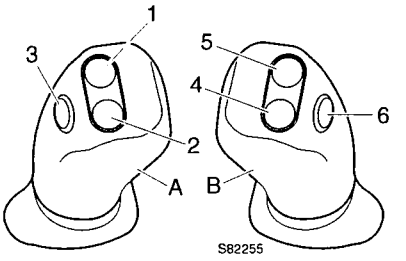
1 Arm out
2 Arm in
3 Left swing
4 Right swing



2 Operating lever (right)

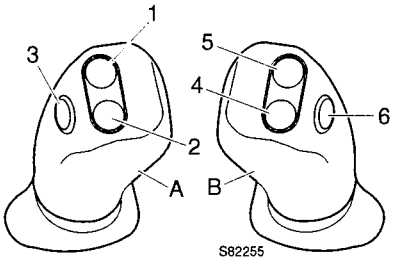
This lever is for boom and bucket.

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



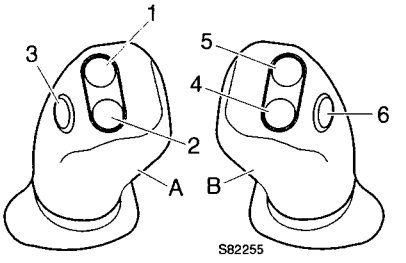
Three button lever

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



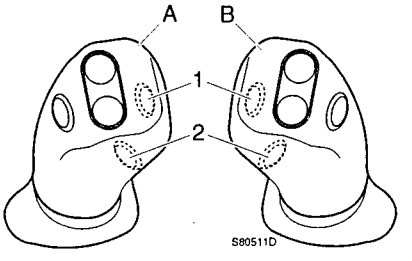
Thumb with three button lever

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



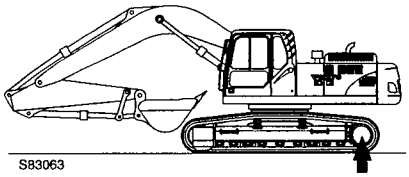
Float with three button lever

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

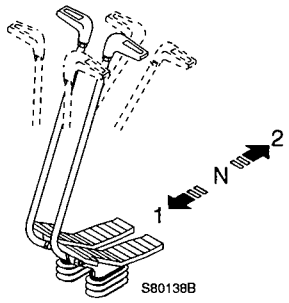
A Left operating lever
B Right operating lever
1 Unassigned
2 Unassigned


S83063

3, 4 Travel levers and pedals

WARNING!

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.



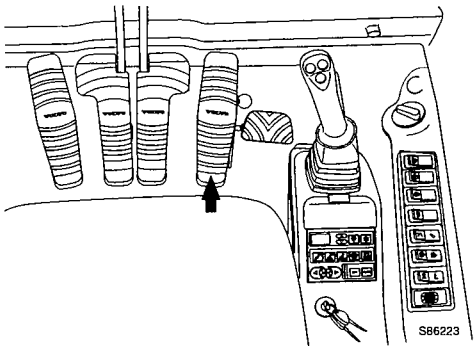
S80138B

This is used to move and stop the machine.

N Neutral (machine stops)

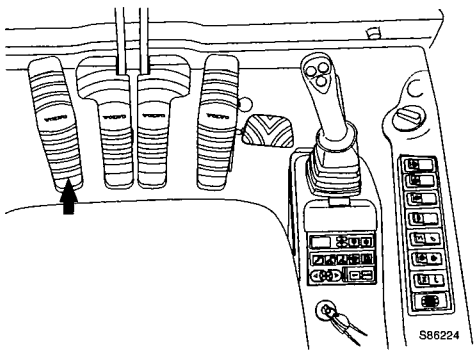
1 Forward
Push the lever forward or press down front end of the pedal to advance the machine, when the sprocket is at the rear of the machine.

2 Reverse
Pull the lever rearward or press down rear end of the pedal to reverse the machine. When the sprocket is at the rear of the machine.
See ***Travel direction control*** on page 124.


S86223

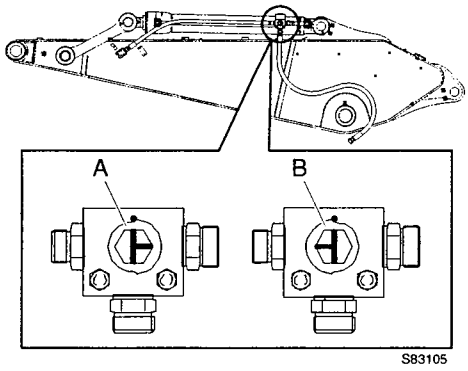
5 Optional pedal (X1)

See ***Selecting valves for optional parts*** on page 76.


S86224

6 Optional pedal (adjustable boom)

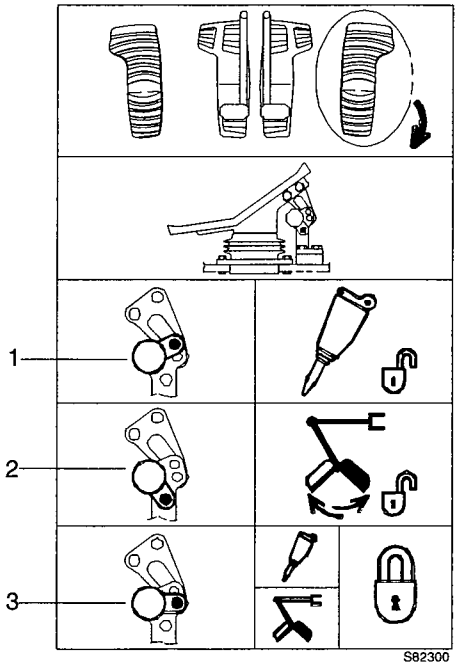
Selecting valves for optional parts



1 Bucket/clamshell valve position

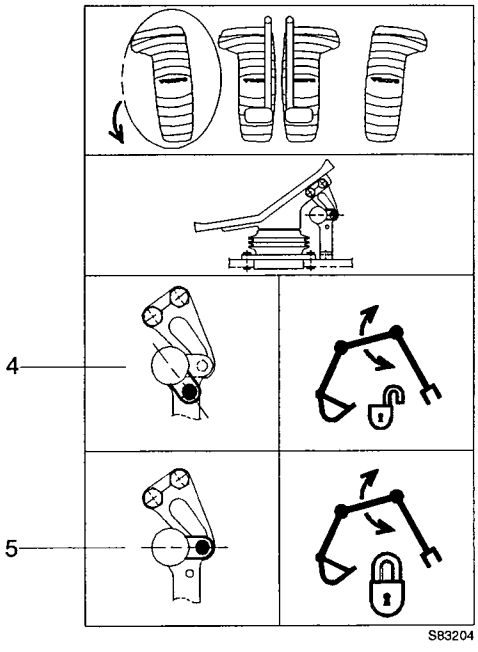
Select the correct position by turning the nut with a wrench.

A Bucket position
B Clamshell position



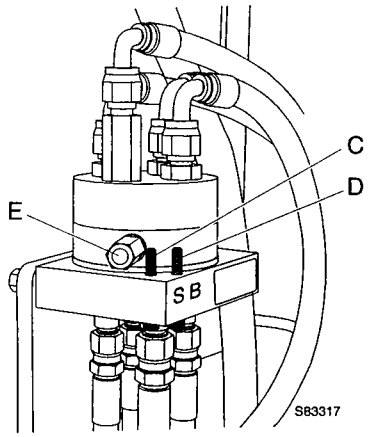
2 Optional pedal position (X1)

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



3 Optional pedal position (adjustable boom)

Position 4 Operation (if equipped)
Position 5 Operation lock (if equipped)

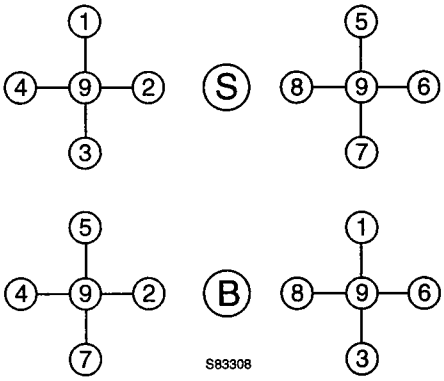


4 Changing machine control pattern

Position S ISO type
Position B Backhoe loader type
Pattern change valve is equipped only on certain machines.nes.

WARNING!

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.



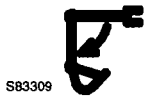
The machine control pattern can easily be changed to the ISO system or to the backhoe loader hydraulic system by changing position of pattern change valve (if fitted), Use the following procedure to change the position of the pattern change valve (Machine standard position is ISO pattern type (S).

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

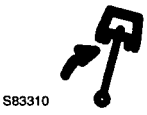
1 Loosen bolt (C) and (D), move lever (E) to **S** (ISO type) position or to the **B** (Backhoe loader type) position. by 45° turning.
2 After you set the machine control pattern, tighten bolt (C) and (D) in order to secure lever (E).

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.

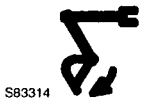
Selecting valves for optional parts


S83312

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


S83313

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


S83314

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


S83315

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


S83316

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.

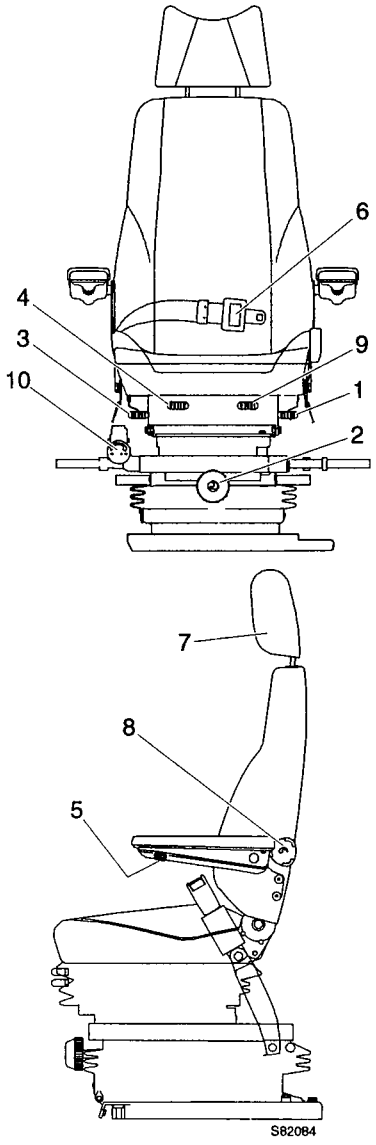
Operator seat

The operator seat meets the requirements according to EN ISO7096. This means that the seat is designed in order, in the best possible way, to minimise the whole body vibrations which the operator is exposed to while operating.

WARNING!

Do not adjust seat when an excavator is in operation.

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



1 Seat inclination adjustment
2 Suspension 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

Mechanical suspension seat

1 Seat inclination adjustment

Push the lever (1) down to adjust.

2 Suspension adjustment

Use the wheel (2). Set the wheel according to the weight of the operator.

3 Back rest inclination adjustment

Lift the lever (3) and press the back-rest rearward to required position.

4 Slide adjustment

Lift the lever (4) and push the seat forward or rearward.

5 Arm rest angle adjustment

Adjust the angle of the arm rest by turning the wheel.

6 Seat belt

7 Head rest restraint adjustment

8 Lumber support adjustment

9 Horizontal position adjustment

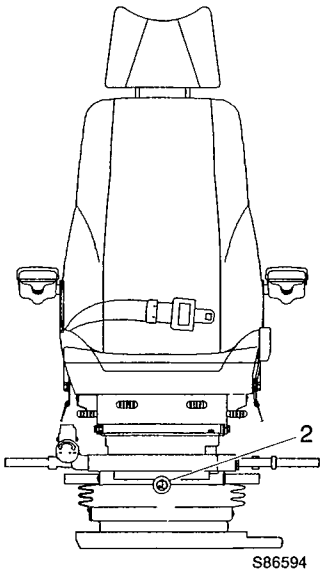
For longitudinal adjustment of the seat and consoles, lift the lever (9) and push the seat and consoles forward or rearward.

10 Height position adjustment

For height adjustment of the consoles, use the wheel (10).

NOTE! Never adjust the height of the seat with the suspension adjusting wheel.

IMPORTANT! The operator seat is adjusted in a correct way in order to obtain the best possible comfort.



Air suspension seat (optional equipment)

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

To adjust air suspension of the seat,

1 Turn the ignition key "ON" or start engine.
2 Lift operator's weight off the seat.
3 Press and hold the valve (2) until air bag is completely inflated.
4 Sit and pull on the valve (2) to deflate.
5 Stop deflating when seat starts lowering.

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

Seat belt

WARNING!

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

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

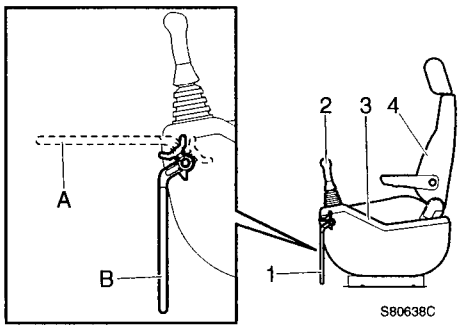
When the seat belt needs to be washed:

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

Safety locking system

WARNING!

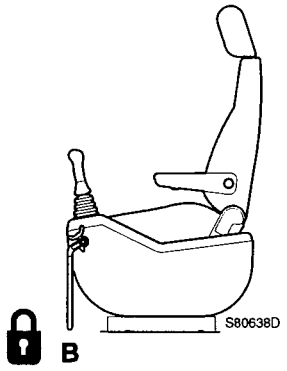
Move the safety locking lever down to lock the system securely.
Unless the safety locking lever is on the "Locked" position (B), operating levers can be operated by careless touch, which could cause serious injury.



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

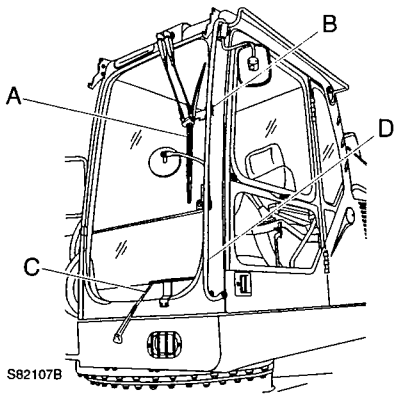
Safety locking lever **"Unlocked" (A)** position for working condition.

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 81.*** before opening or closing the window.

Opening the window

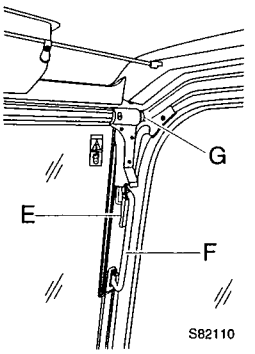
1 Lower the attachment to the ground and stop the engine.

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.



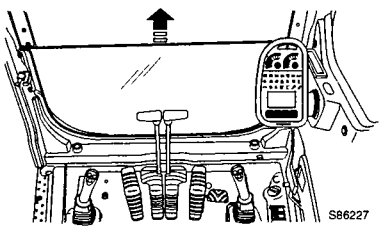
Closing the upper window

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 both locks (G).

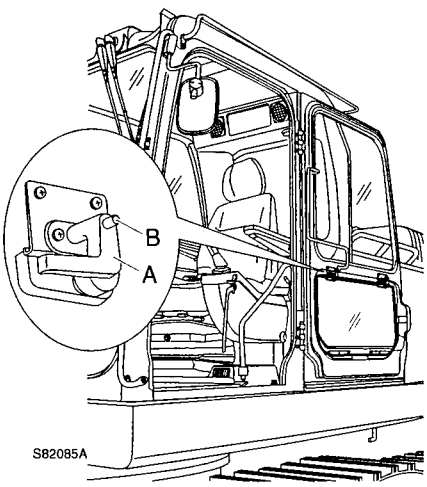


Removing the lower window

1 Open the upper window
See ***Opening the window*** on page 82.

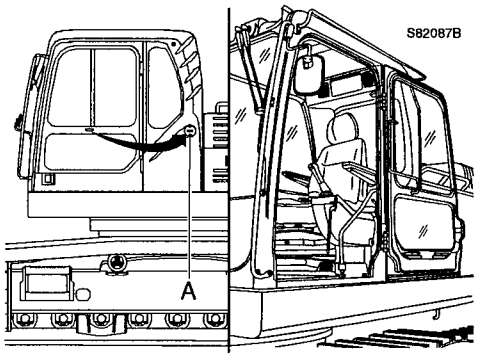
2 Grip the upper part with both hands, and pull it upward.

3 Store the removed window at the left, 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.

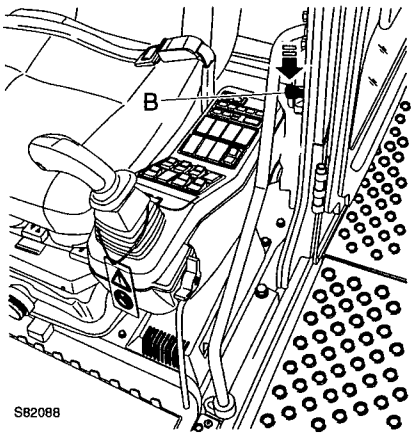


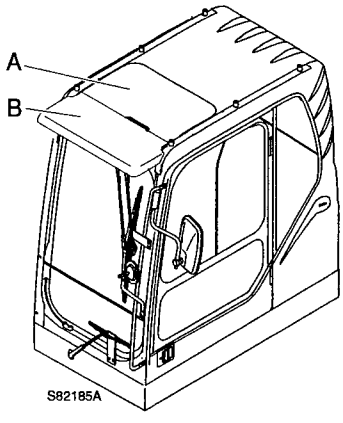
Door lock system

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

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.

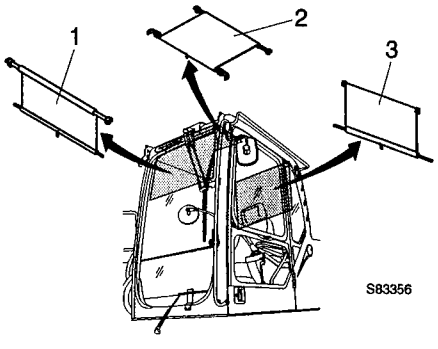




Roof window and surfaces

WARNING!

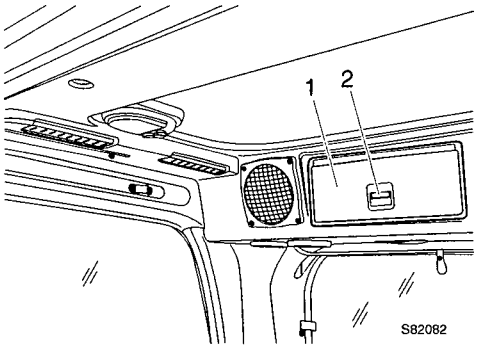
Do not clean the rain visor (B: if equipped) and roof window (A) with thinner, it will damage the polished surface.



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

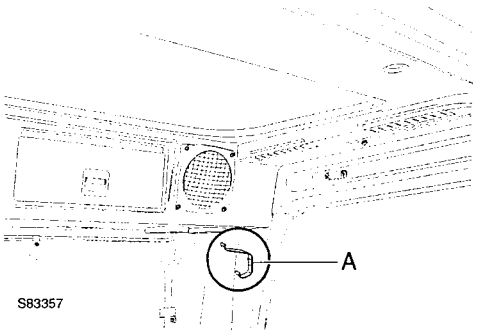


Glove compartment

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.



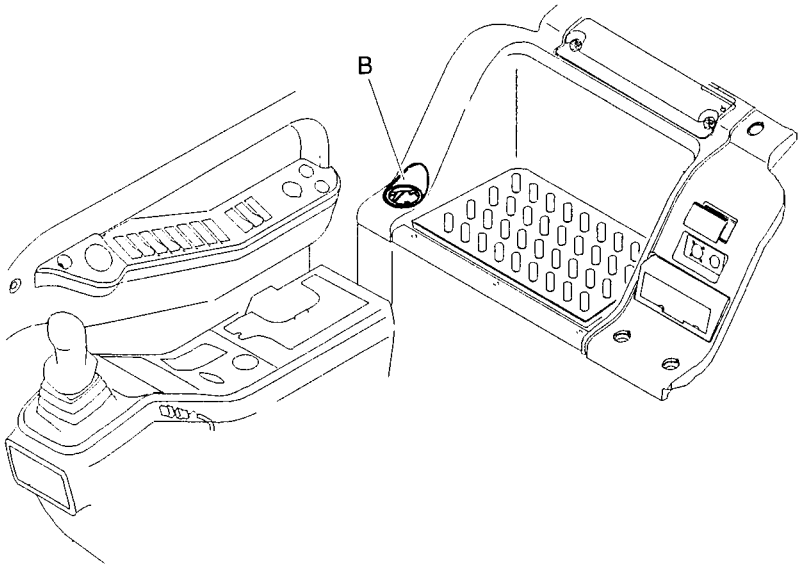
Coat hook

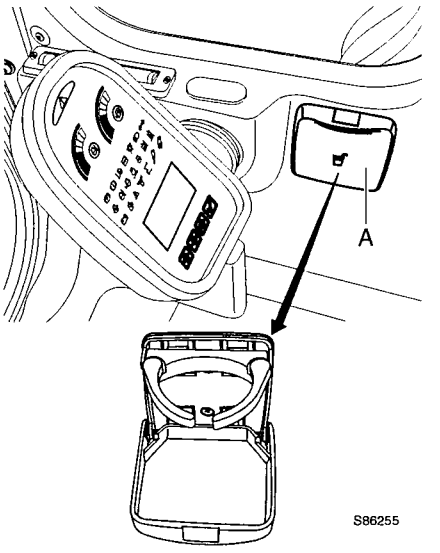
The coat hook (A) is inside the cab on left side.

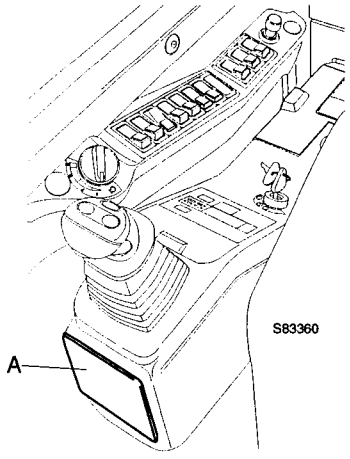
NOTE :
Do not hook any item that may obstruct the view of the operator.

Cup and drink holder

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



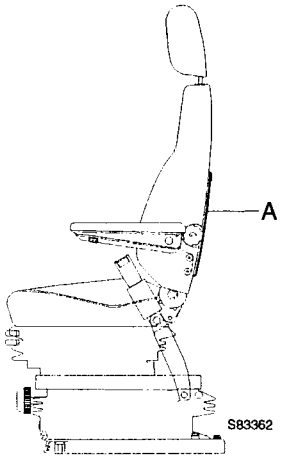




Ashtray

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.

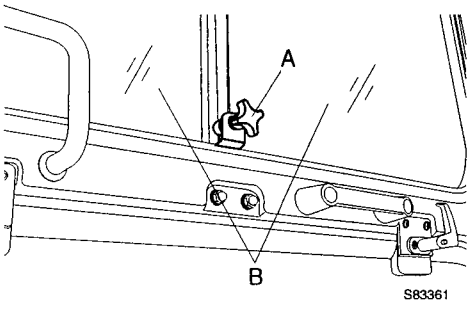
NOTE :
Make sure that you close the ashtray after use in order to prevent any possibility of a fire.



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.

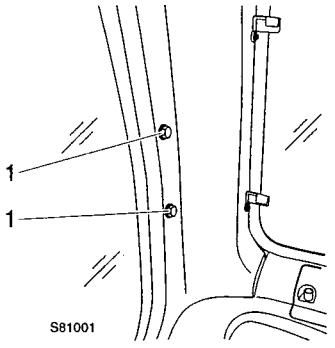


Window fix

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

A Window fixer
B Windows

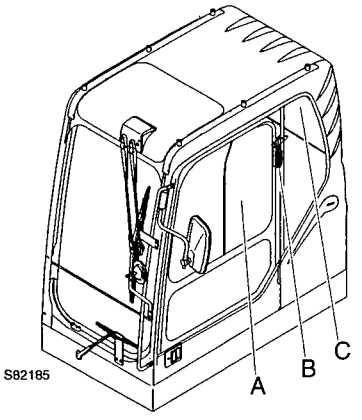
Fire extinguisher and emergency exit



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.

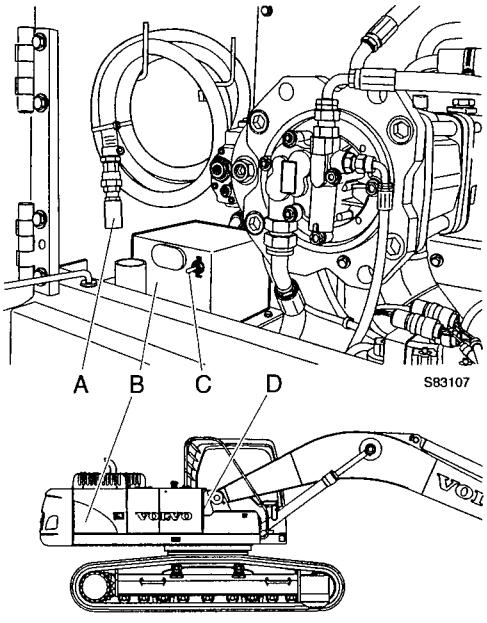


Emergency exit

The emergency hammer (B) should be used in an emergency situations.

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

A Door
B Hammer
C Rear window



Fuel accessory pump

WARNING!

Stop the engine when fuelling.

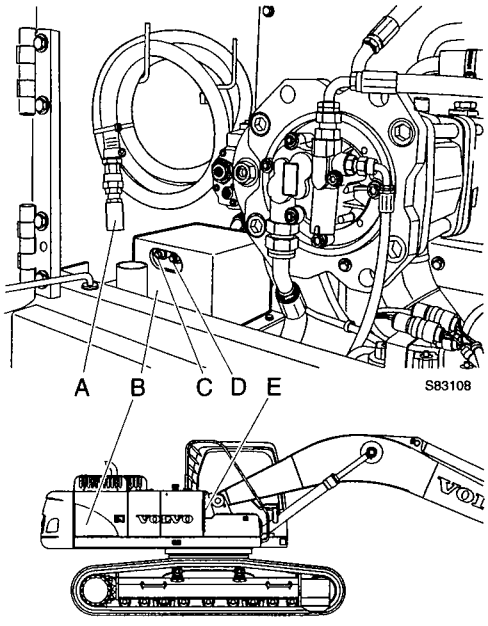
IMPORTANT

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

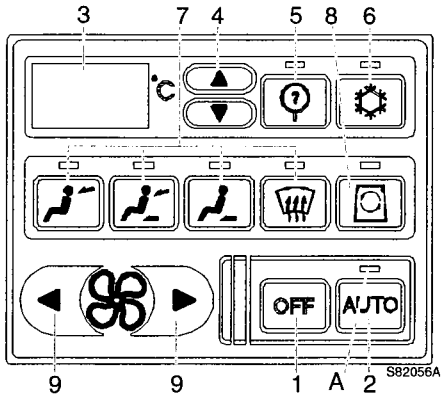


Auto shut-off controller

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.
  C4 C3 C2 C1 H0 H1 H2 H3 H4
  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

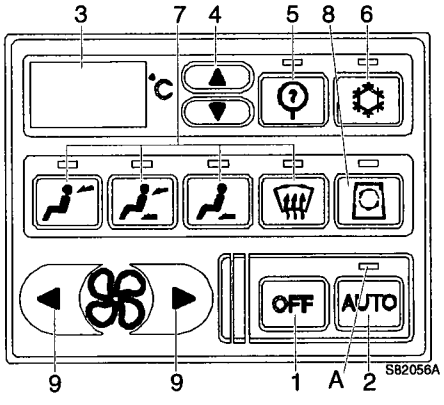
When the diagnosis button (5) is pushed for more than 3 seconds and if there are any problems in the system, an error code is displayed in display window (3).

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

he 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.

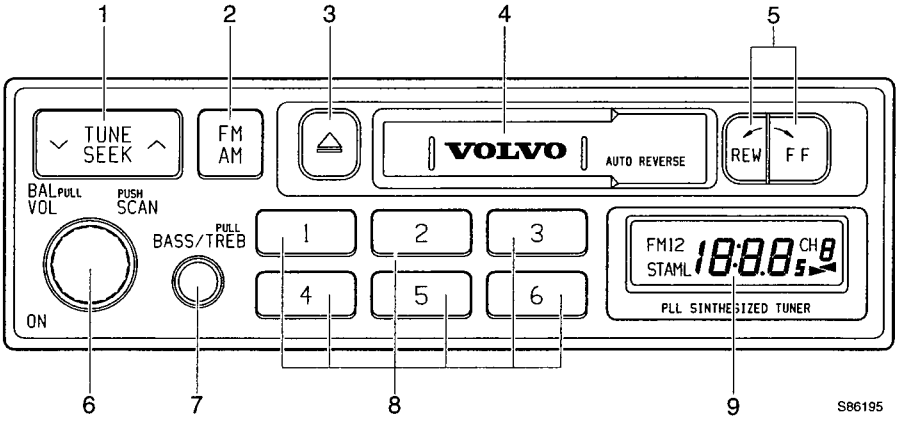
When the lamp is OFF, it is to draw outside air.

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 Tune / Seek / scan
2 Band selection button
3 Tape eject button
4 Cassette tape loading slot
5 FF (▶▶)/ REW (◀◀) button
6 Power / volume / balance / scan
7 Bass / treble
8 Preset (1 ~ 6)
9 Display

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 100 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 oil filters replaced **every 500 hours.**

The conditions for the 500 hour interval between oil changes are:

- The 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 211.
- The correct oil viscosity for the ambient air temperature is selected according to diagram. See ***Recommended lubricants*** on page 211.

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 the 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 and should be changed every 500 hours, return filter and servo 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 211.

Whole body vibrations

Whole-body vibration emission of construction machinery are decisively affected by a number of factors e.g., working mode, ground conditions and driving speed chosen by the operator.

To a large extent the operator determines the actual vibration levels, because he chooses the speed of the machine, its working mode and the travel path.

The result is therefore a wide range of different vibration levels for the same type of machine. (See ***Cab, specifications*** on page 216)

Guidelines for Reducing Vibration Levels on Earthmoving Machines

The following guidelines can help users of earthmoving machines to reduce the whole body vibration levels:

1 Use the right type and size of machine, equipment, and attachments for the application.

2 Keep the terrain where the machine is working and travelling in good condition.
   - Remove any large rocks or obstacles.
   - Fill any ditches and holes.
   - Provide machines and schedule time to maintain terrain conditions.

3 Adjust the machine speed and travel path to minimize the vibration level.
   - Drive around obstacles and rough terrain conditions.
   - Slow down when it is necessary to go over rough terrain.

4 Maintain machines according to the manufacturer's recommendations.
   - Tire pressures.
   - Brake and steering systems.
   - Controls, hydraulic system and linkages.

5 Keep the seat maintained and adjusted.
   - Adjust the seat and suspension for the weight and size of the operator.
   - Inspect and maintain the seat suspension and adjustment mechanisms.
   - Use the seat belt and adjust it correctly.

6 Steer, brake, accelerate, shift gears, and move the attachments smoothly.

7 Minimize vibrations for long work cycle or long distance travelling.
   - If no suspension system is available, reduce speed to prevent bouncing.
   - Haul machines long distances between work sites.

Whole body vibrations

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

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

- Adjust the seat and controls to achieve good posture.
- Adjust the mirrors to minimize twisted posture.
- Provide breaks to reduce long periods of sitting.
- Avoid jumping down from the cab or access system.
- Minimize repeated handling and lifting of loads.
- Keep up your physical status with relevant and regular exercises.

Safety and responsibility

Operator duties

The operator is obligated to be aware of any job site hazards and specific requirements for machine operation and personal safety. This is absolutely necessary to avoid serious personal, property damage and possibly a fatal accident.

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 work must exercise care and not pass unnecessarily behind the machine or in to 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!

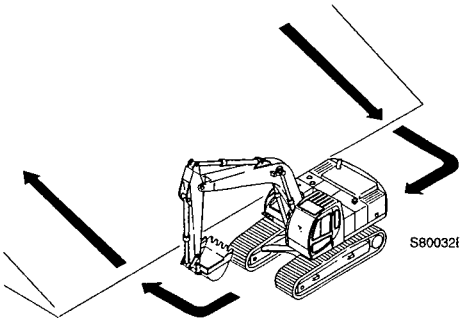
Only trained personnel may operate the machine.

WARNING!

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

Machine knowledge

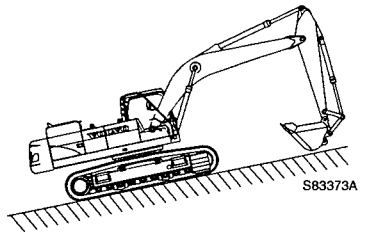
During inspections, maintenance and repair work on the machine, only a person with knowledge of the operation of the machine and its instruments, may be in the cab.



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 unbalanced.
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.

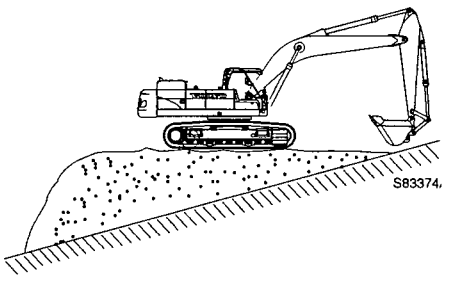


Caution on a slope

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.

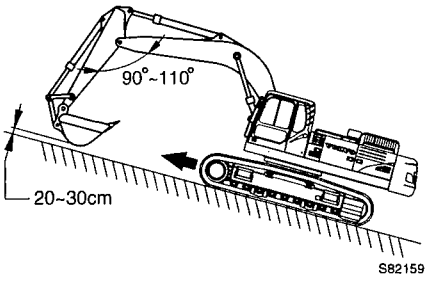
Be careful when opening or closing the doors on a slope, operational force may be changed rapidly.

Make sure to keep the doors closed.

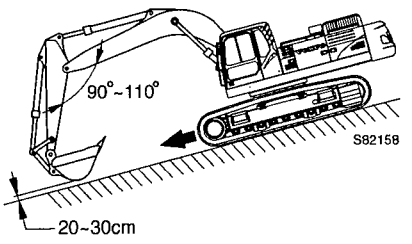


When operating up on a slope of 15 º or more, position the machine as illustrated.

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 º or more, position the machine as illustrated and travel at low speed.

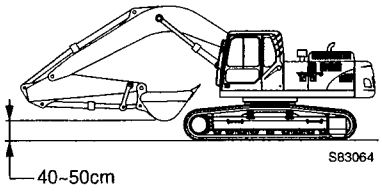


In case of shoes slipping

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.

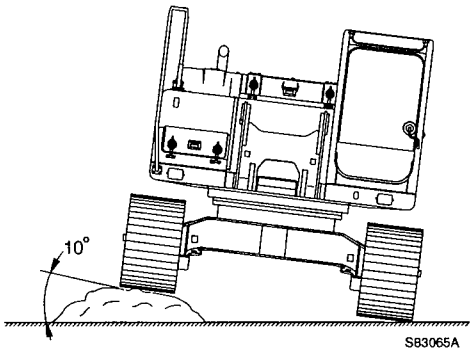
In case of engine failure

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.

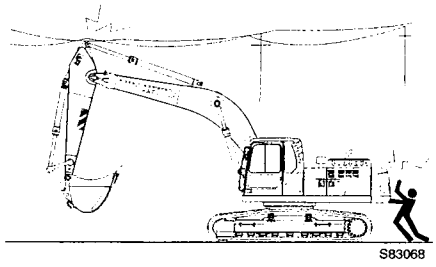


Caution during traveling

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



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


S83068

Never approach a high voltage wire

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!

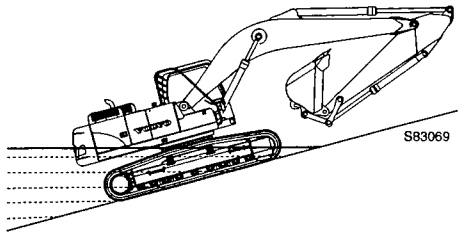
If working near a high tension power line, prohibit everyone from approaching the machine.

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	Min. clearance from electric line
0 ~ 1 KV	2 m (7 ft.)
1 ~ 55 KV	4 m (13 ft.)
55 ~ 500 KV	6 m (20 ft.)

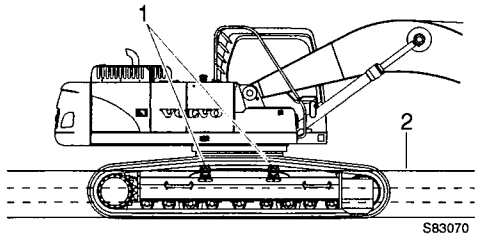
If the attachment comes into contact with the power line, stay in the cab, and if the machine remains functional, try to break the circuit by moving the attachment away from the power line.


S83069

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.



S83070

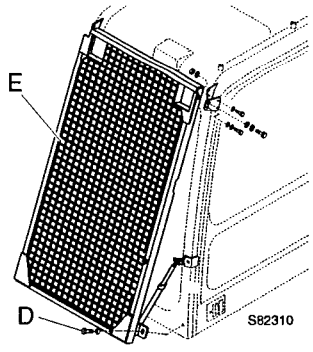
Permissible working depth in water is the center of upper rollers.

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



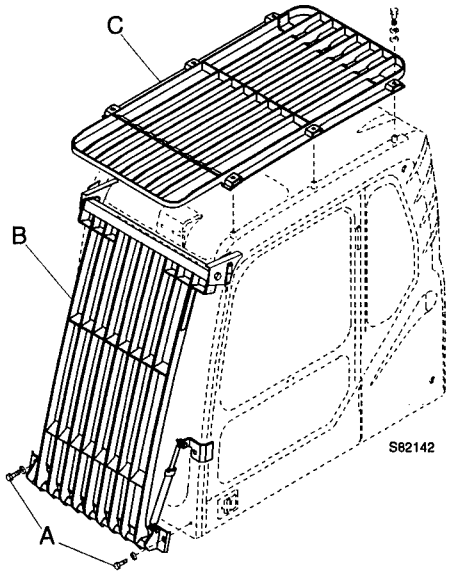
Protection from falling or scattering material

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 conditions. Install necessary additional protection guards in accordance with job site conditions.



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

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

Loosen bolts (A, D), so that FOG & FOPS can be tilted.

Fasten the bolts (A, D) to prescribed torque when reinstalling FOG& FOPS after cleaning or maintenance.

A : Bolts prescribed torque 2.3 ±0.23 kg·m (5.57 ±1.0 lb·ft)
B+C: FOG (Falling Object Guard)
153 kg·m (337 lb·ft)
C : FOPS (Falling Object Protection Structure)
80 kg·m (177 lb·ft)
D : Bolts regulations worker 2.3 ±0.23 kg·m (5.57 ±1.0 lb·ft)
E : Front net
30 kg·m, (67 lb·ft)

WARNING!

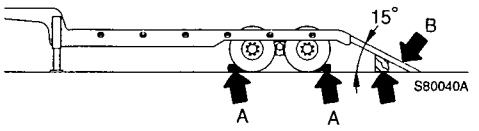
Don't operate the machine while FOG (Falling Object Guard), FOPS (Falling Object Protection Structure) are tilted. Otherwise, FOG & FOPS can be damaged by the bucket.

Caution for optional working attachment

Read this manual and the attachment manual before operating attachments.

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

Accidents or machine damage from the use of unauthorized attachments shall be considered to be the user's own responsibilities.



Transporting the machine

Loading and unloading

WARNING!

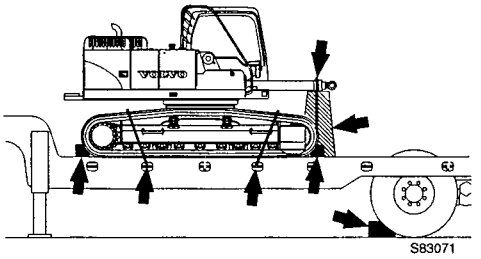
When transporting the machine, obey the relevant laws governing the weight, height, length and securing of a load.

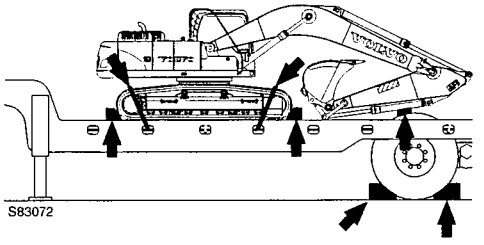
Choose a firm, level place, and keep ample distance from the road shoulder.

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

The auto idle switch 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.

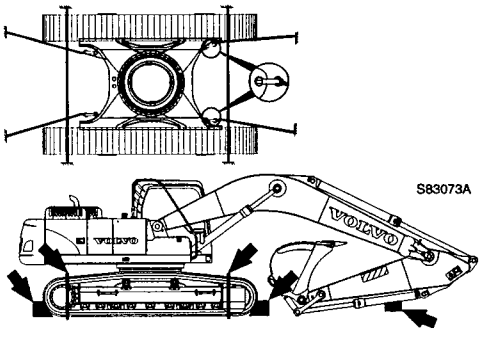
Operate the engine at low speed, and set machine travel speed to LOW.





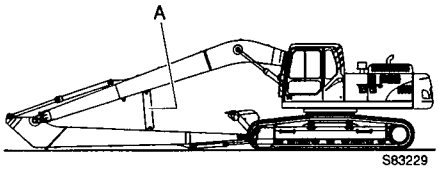
Loading the machine

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 15º 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 81.***
2 Stop the engine and remove the ignition key.
3 Turn OFF the battery master switch, See *Master switch* on page 177..
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.



Shipping the machine with installed attachments

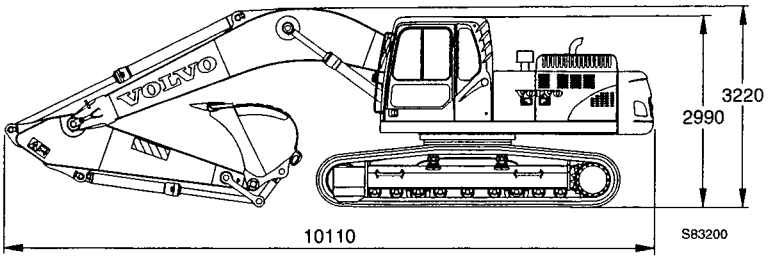
Although arm are folded when the machine is shipped with attachments, arm cylinders are given excessive forces caused by self-gravity.

Insert a stay (A) between arm and boom for shipment.

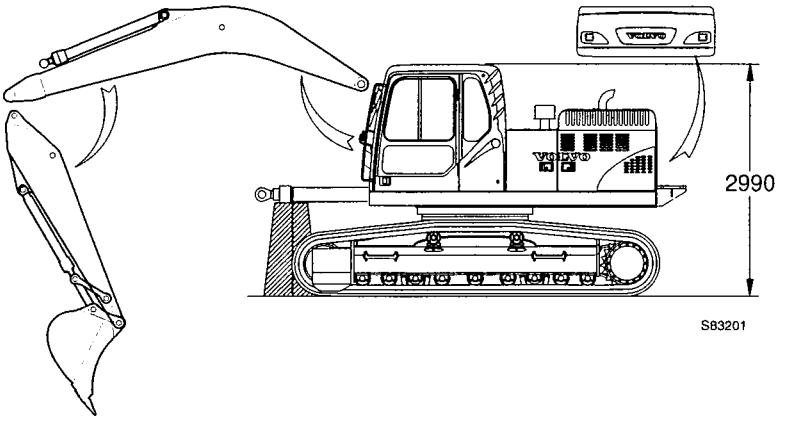
Disassembling for transportation

NOTE :
Obey all local, provincial, state, regulations governing load weight, width, height and length. Choose a route in consideration of overpass clearances, bridge and road limits, wide load prohibtions and travel hours.

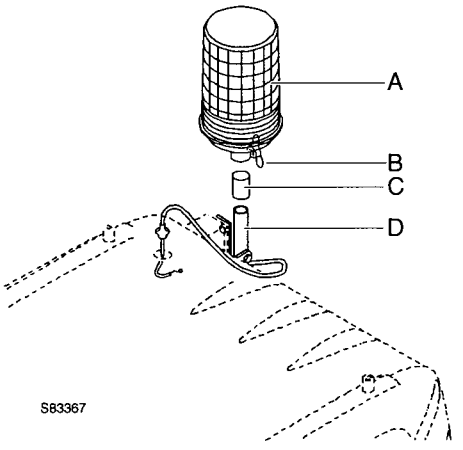
Complete dimensions.



Parts to be disassembled for transportation.



Rotating beacon lamp



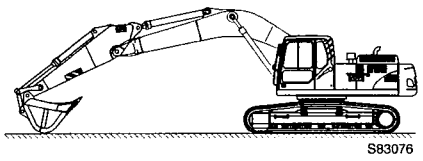
When transporting the machine, dismantle rotating beacon lamp (A) not to be damaged.

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

WARNING!

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


S83076

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 81.***
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.)

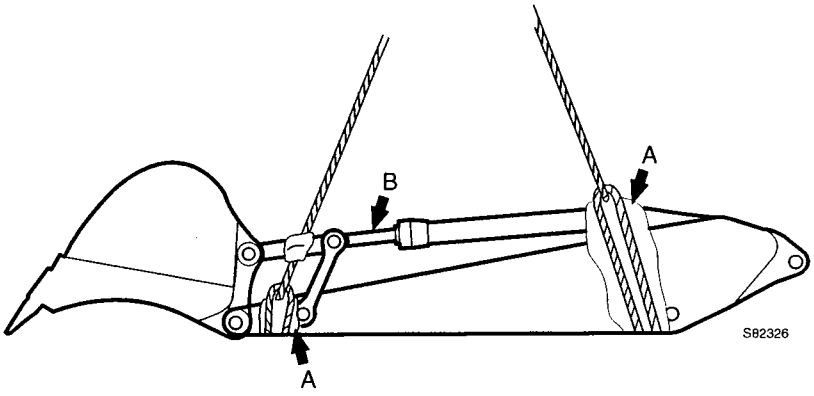
Disassembling components for transportation

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

Bucket and Arm with bucket cylinder

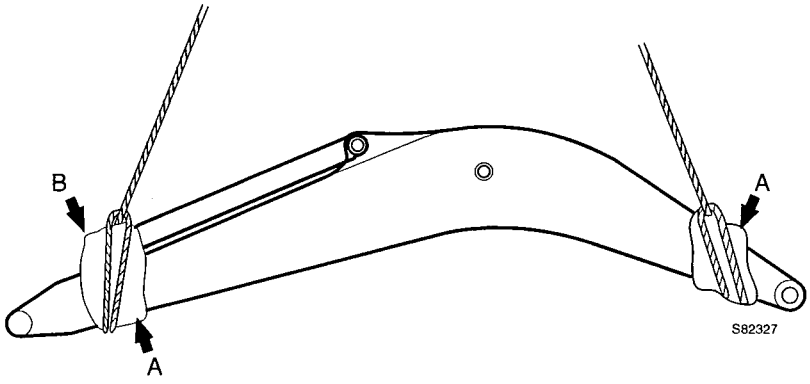
Use cable sheaths (A) to protect the lifting cable from being damaged by the edges of the arm.

Protect 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.



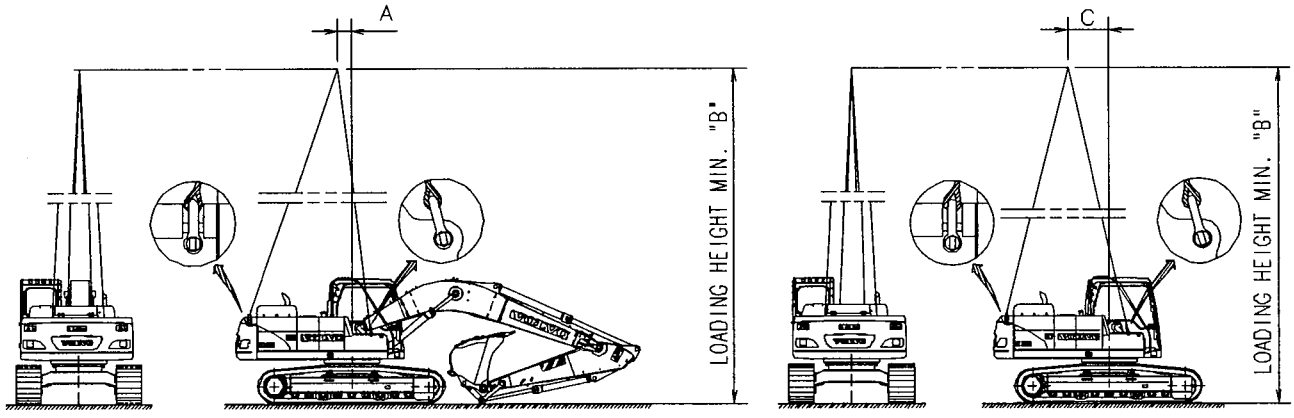
Counterweight

See ***Counterweight installation*** on page 106.

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.



S83228

	A		B		C	
	mm	inch	m	ft	mm	inch
EC210B	10~80	0.4~3.1	7.5	24.6	870	34.3

Lift the machine on flat, firm and level ground.

1 Start the engine, and arrange the bucket, arm and boom as illustrated. Position the superstructure boom forward over the idlers.
2 **Move the safety locking lever down to lock the system securely,** See ***Safety locking system on page 81.***
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.

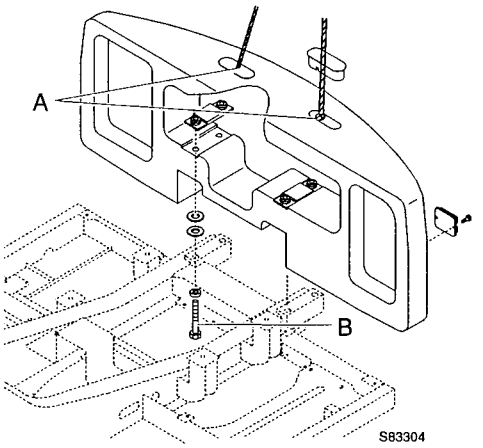
Counterweight installation

Standard machine

WARNING!

Move the safety locking lever down to lock the system securely, See *Safety locking system on page 81.* and attach a warning tag (do not start the engine) to the left operating lever.
Personal injury 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.

Except North America, International and Korea



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 81.***
4 Remove two plugs from the top of counterweight.
5 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight(4,200 kg) at the lifting points (A) correctly.
6 Disassemble four bolts (B).
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. See ***Safety locking system on page 81.***

4 As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight(4,200 kg) at the lifting points (A) correctly.

5 Lift the counterweight enough to fasten with bolts on the brackets.

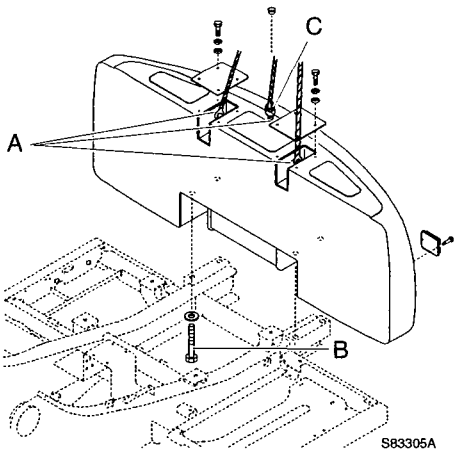
6 Assemble four bolts (B).

7 Disconnect the lifting cables or slings for the counterweight at the lifting points (A).

8 Cover two plugs from the top of counterweight.

Tightening torque of bolts

B: bolts: 135±5 kg·m



North America, International and Korea

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 81.***
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 (C) with sufficient strength for the counterweight(4,200 kg) at the lifting points (A) correctly.
6 Disassemble four bolts (B).
7 Lift the counterweight enough.
8 Place the counterweight onto suitable support.

Counterweight installation

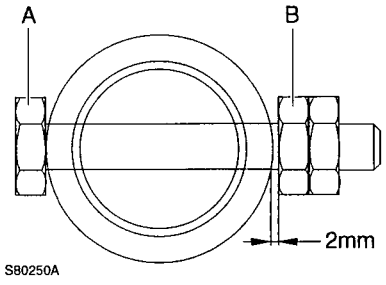
1 Position the machine on flat, firm and level ground, free from any obstructions or interference.
2 Keep the service position.
3 Pull the safety locking lever securely. See ***Safety locking system on page 81.***
4 As shown in the illustration, connect the lifting cables or slings after fastening eye bolt (C) with sufficient strength for the counterweight(4,200 kg) at the lifting points (A) correctly.
5 Lift the counterweight enough to fasten with bolts on the brackets.
6 Assemble four bolts (B).
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: 135±5 kg·m

C: eye bolt specification: M24-P3

Changing bucket

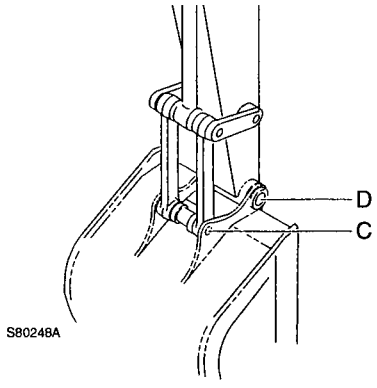


Remove bucket

WARNING!

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



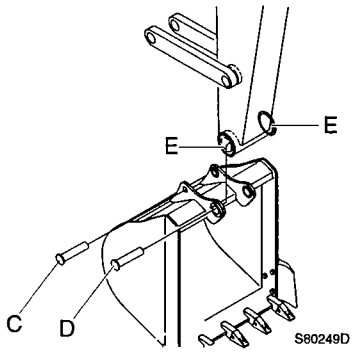
IMPORTANT
Keep the pins clean and do not damage O-ring (E).

Installing bucket

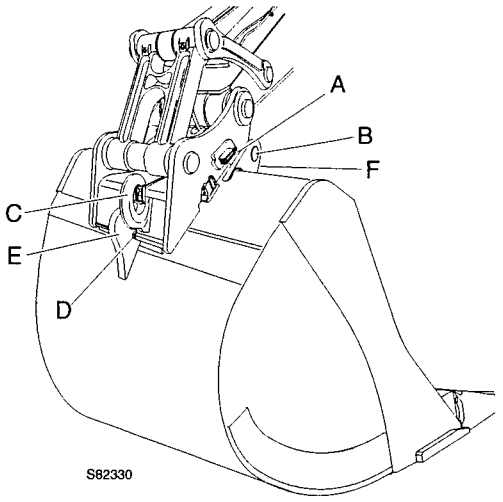
WARNING!

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)

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.

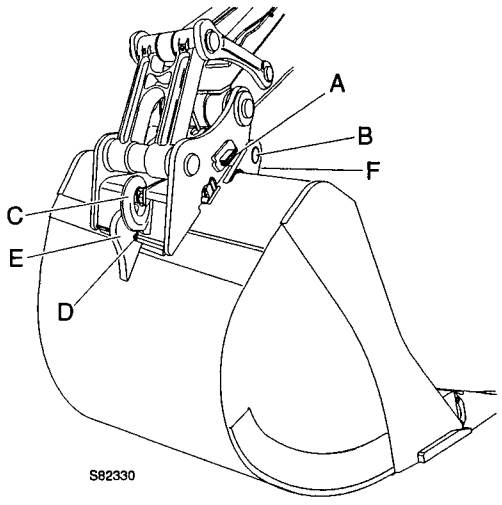
A: Red indicator pin
B: Bucket shafts
C: Lifting hook
D: Locking wedge
E: Bucket rear hook
F: Hooks for gripping attachment

WARNING!

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

WARNING!

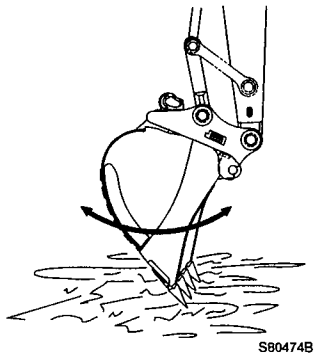
If the central warning lamp and quickfit indicator light up the quickfit is open, and if the bucket is still in the quickfit, the arm must not be manoeuvred. If this should be necessary anyway, use the greatest possible care, since the bucket can suddenly loosen and fall off.
Shut-off valves must not be installed on the pipes leading to the quickfit hydraulic cylinder. If the pressure in the cylinder drops, the bucket may fall off.



Removing bucket

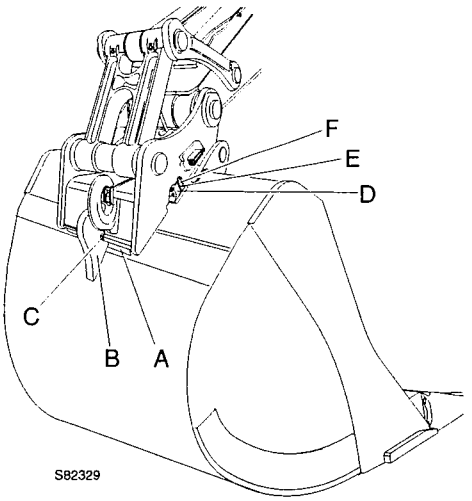
A: Red marker
B: Bucket pins
C: Lifting hook
D: Locking wedge
E: Bucket rear hook
F: Hooks for gripping attachment

1 Position the machine on even, firm and level ground with the bucket resting on the ground.
2 Press the two quckfit switches,See *Right quickfit switch (option)* on page 64.. and *Left quickfit switch (option)* on page 68. If quickfit is open, the central warning lamp and quickfit warning lamp are ON, and the warning is audible.
3 When red marker (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 marker (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 quckfit switches, See ***Right quickfit switch (option)*** on page 64. and ***Left quickfit switch (option)*** on page 68.
2 Check that red marker (A) is fully extended.
3 Operate the arm to such a position that the two hooks on the quickfit engage the front pin on 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 Press the two quickfit switches (lock position).
7 Check that red marker (A) is completely pulled into the quickfit. In case of a satisfactory installation, the warning lamp will be OFF.
8 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 of attachment

A: Shims
B: Bucket hook
C: Locking wedge
D: Screw holder
E: Spacer
F: Tool attachment

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.

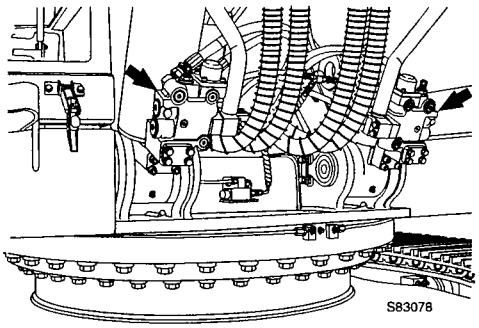
IMPORTANT
Check whether spacer and shim are fitted correctly.

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
A **500 mm** **600 mm**	Rocky ground, normal soil	Travel in low speed when traveling on rough ground with obstacles such as large boulders and fallen trees.
B **700 mm** **800 mm**	Soft ground	Travel in high speed only on flat ground. When it is impossible to avoid travelling over obstacles, lower the travel speed to approximately half of low speed. **WARNING!** **Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees.**
C **900 mm**	Extremely soft ground (swampy ground)	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. **WARNING!** **Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees.**

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 penerate 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.

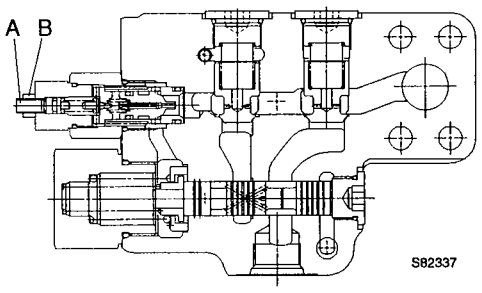
There are three cases when you have to lower the boom mechanically.

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

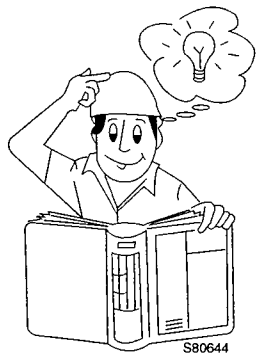
2 Turn adjusting screw (A) to its original position.

3 Hold adjusting screw (A) securely and tighten lock nut (B).

4 Contact an authorized Volvo CE dealer workshop.

Before operating

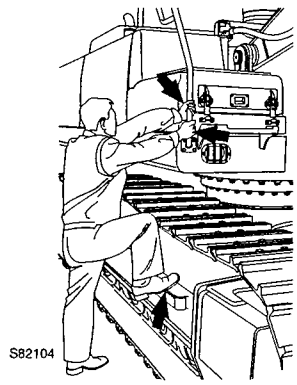
General rules

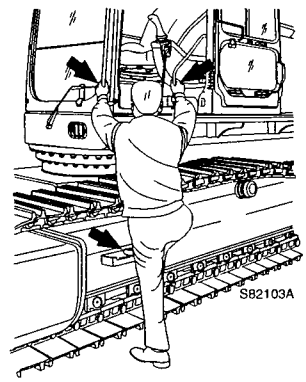


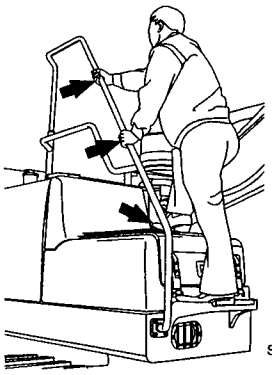
WARNING!

Breaking these rules may lead to an accident, serious injures.

- **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 146.***
- 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.
- 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.






S82105

- The cab has two escape routes: through the door or via the rear window. Smash the window pane with the emergency hammer. See ***Emergency exit*** on page 86.
- **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.

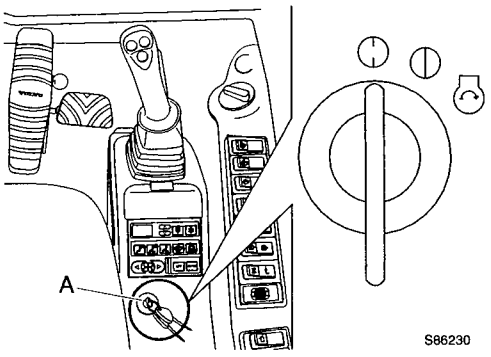
1 Place the machine in the service position. See ***Service position on page 146.***
2 Carry out daily maintenance. See ***Lubrication and service chart*** on page 204.
3 Adjust the seat so that you comfortably and safely can operate all controls and pedals.
4 Check instruments and control lamps. See ***Checking instruments, warning and control lamps*** on page 120.
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 169.

When starting

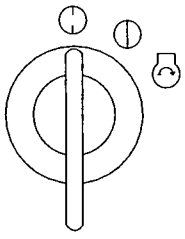
1 Clean/defrost the windows.
2 Always sit in the operator seat when you are starting the engine/the machine, See ***Starting engine*** on page 121.
3 Fasten the seat belt before all operation.
4 Do not move off until the central warning lamp has gone out.
5 Check that all gauges, controls and instruments 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



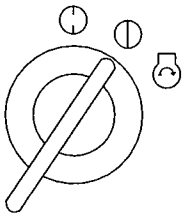
S86230

The start switch (A) has three position.


S82301

Stop position

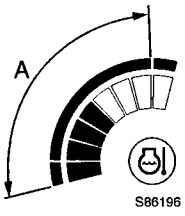
The engine stops immediately.


S82302

Running (preheating) position

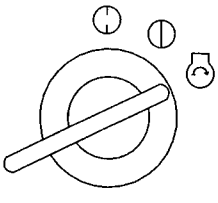
When the switch is in this position:

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



S86196

IMPORTANT
Do not repeat to turn on and off the ignition key under engine cooled (below 25 °C).
The preheating function still remains if you repeat to turn on and off the ignition key when the engine is under 25 °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.

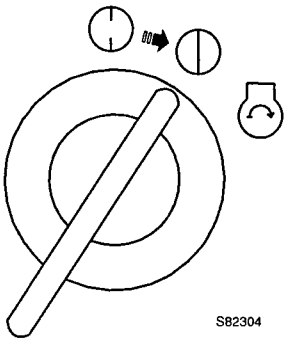

S82303

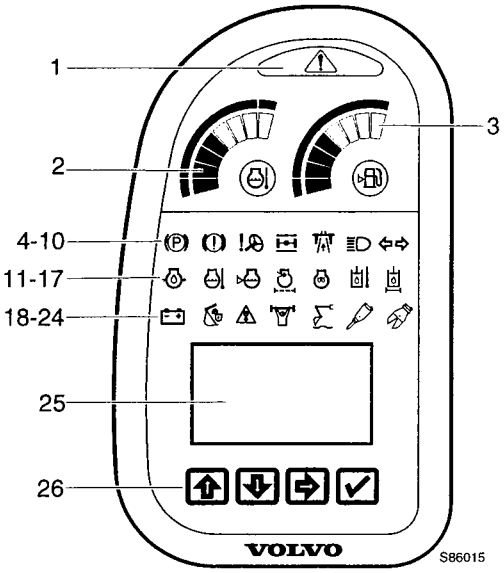
Starting position

When the switch is in this position:

- The starter motor will be engaged.
  See ***Safety locking system on page 81.***

Checking instruments, warning and control lamps



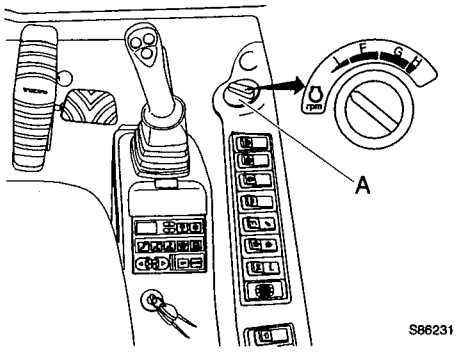


Turn the switch to running (⏀) position, then the following control lamps should light up:
The lamps are ON for three seconds and the buzzer sounds twice.
Battery charge warning and engine oil pressure warning lamps still light up before starting.
If any of these lamps does not light up, either the lamp is faulty or there is a fault in the electrical system.
All lamps should be OFF when the engine is running.

No	Color	Name	No	Color	Name
1	Red	Central warning lamp	14	Yellow	Air cleaner clogging warning indicator
2	-	Engine coolant temperature gauge	15	Yellow	Air preheating indicator
3	-	Fuel level gauge	16	Red	Hydraulic oil temperature warning indicator (not applicable)
4	Red	Parking brake indicator (not applicable)	17	Yellow	Hydraulic oil filter clogging indicator (not applicable)
5	Red	Brake oil pressure warning indicator (not applicable)	18	Red	Battery charge warning indicator
6	Red	Low steering pressure indicator (not applicable)	19	Red	Quickfit indicator (option)
7	Yellow	Axle lock indicator (not applicable)	20	Red	Overload warning indicator (option)
8	Green	Alignment indicator (not applicable)	21	Green	Boost indicator
9	Blue	Work lights indicator (not applicable)	22	Green	Float operating indicator (option)
10	Green	Left / Right turn signal indicator (not applicable)	23	Green	Hammer indicator (option)
11	Red	Engine oil pressure warning indicator	24	Green	Shear selecting indicator (option)
12	Red	Engine coolant temperature warning indicator	25	-	MCD (Message Center Display)
13	Red	Coolant level indicator	26	-	Scroll / Confirm buttons

Starting engine

See ***Safety locking system on page 81..***



WARNING!

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.

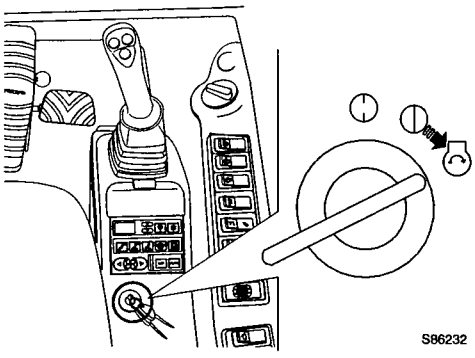
IMPORTANT

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 immediately to stop the engine.

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)

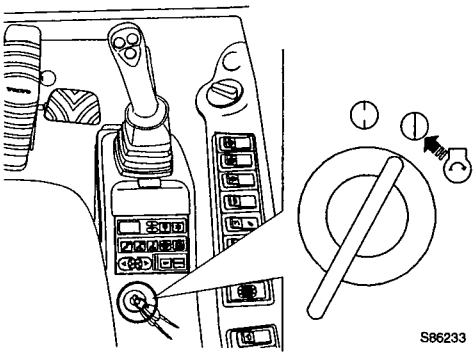


1 Turn engine speed selection switch (A) to the low speed position. See ***Engine speed control switch*** on page 61.
2 Turn the key to the starting position ( ). See ***Start switch*** on page 119.
3 Release the key when the engine has started.

If the engine does 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 61.
2 Turn the key to the running (preheating) position ( ). See ***Start switch*** on page 119.
3 After preheating indicator is OFF, turn the key to the starting position ( ).
4 Release the key when the 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*** on page 174.
- Use recommended lubricating oil for winter use. See ***Recommended lubricants*** on page 211.
- 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, 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.

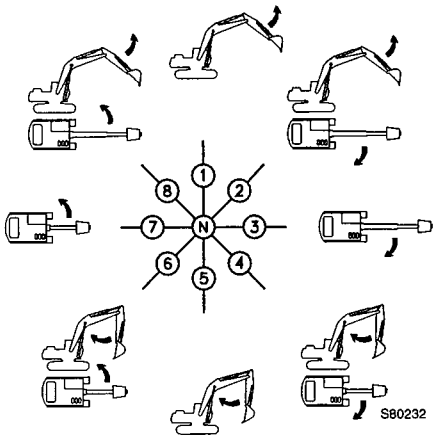
NOTE :
Start with booster batteries. See *Starting with booster batteries* on page 157.

Operating machine

Operating attachment

WARNING!

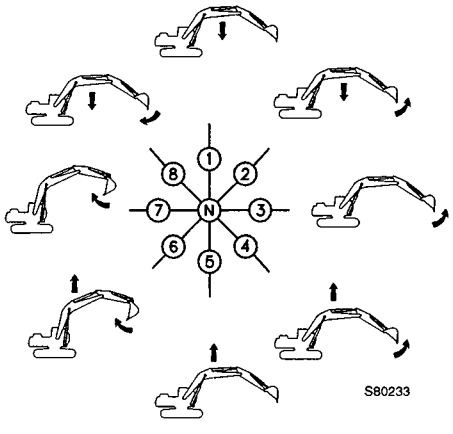
While auto idling, if an operating lever is operated, the engine speed returns to its original speed.



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

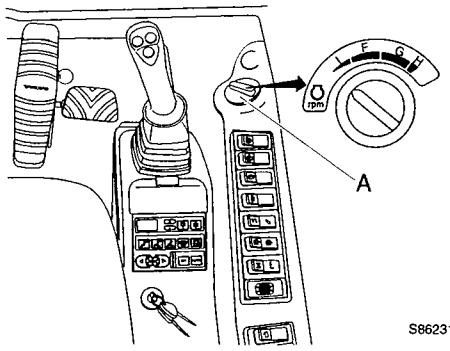


Right operating lever

This lever controls boom and bucket.

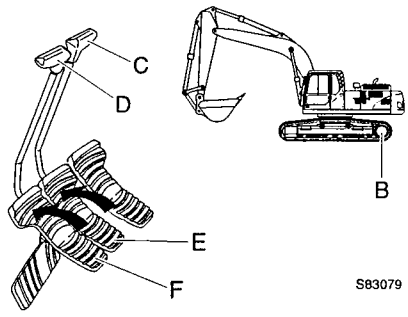
N Neutral (boom and bucket are maintained at rest position.)
1 Boom lower
2 Boom lower and bucket out
3 Bucket out
4 Boom raise and bucket out
5 Boom raise
6 Boom raise and bucket in
7 Bucket in
8 Boom lower and bucket in

Travel direction control



WARNING!

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.

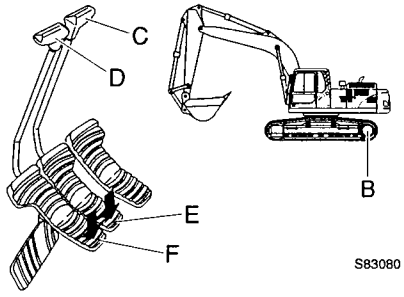


Forward travel

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.

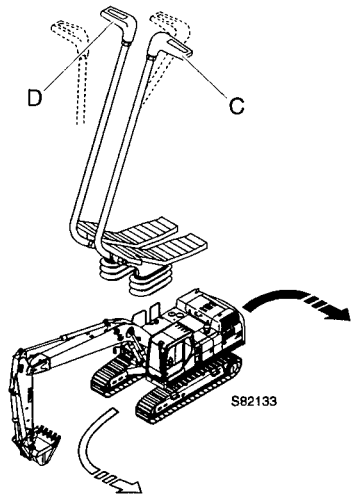


Reverse travel

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

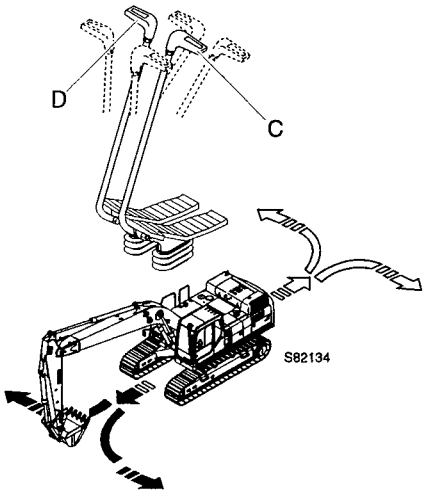
When the sprocket is at the rear of the machine:

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 tums 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.

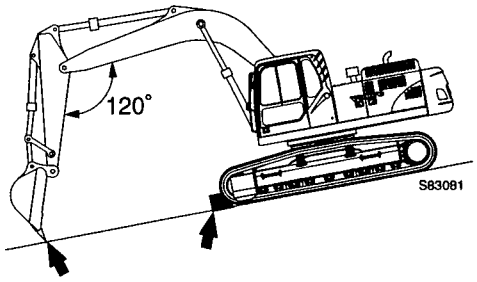
1 Put the left and right operating levers to neutral position.
2 Turn the engine speed control switch to low idle speed position.
3 Lower the bucket to the ground, keeping the bottom of the bucket parallel to the ground.
4 **Move the safety locking lever down to lock the hydraulic system securely, See *Safety locking system on page 81.***

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 127.



Parking

General

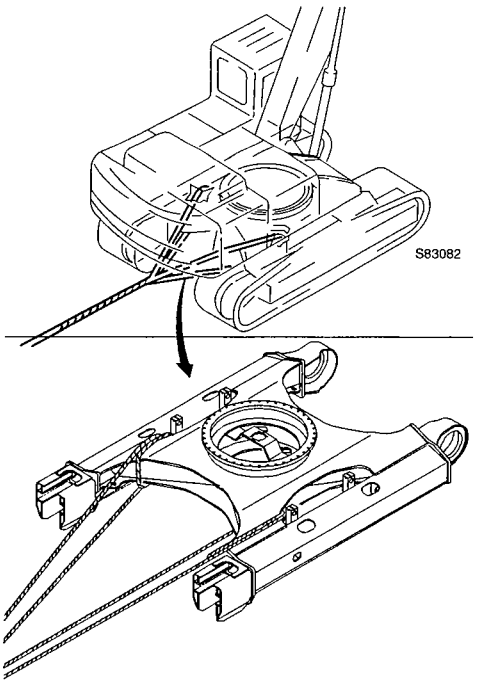
IMPORTANT
Select level ground to park the machine. If it is unavoidable to park on a slope, put a wood block under each track and thrust the bucket teeth into the ground.

- 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 81.***
- 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.
- Rust proof exposed components, lubricate the machine thoroughly.
- Fill fuel and hydraulic tanks to the maximum marks.



Towing method

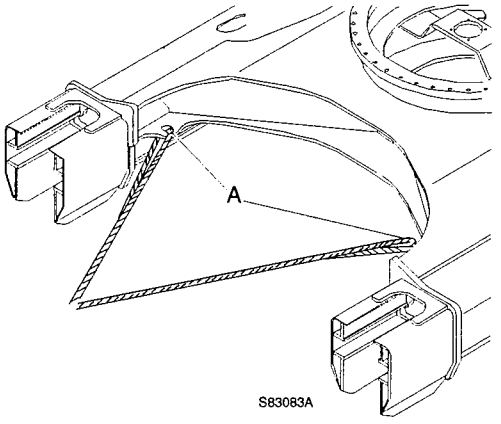
WARNING!

Use a wire rope of sufficient strength for the towing.

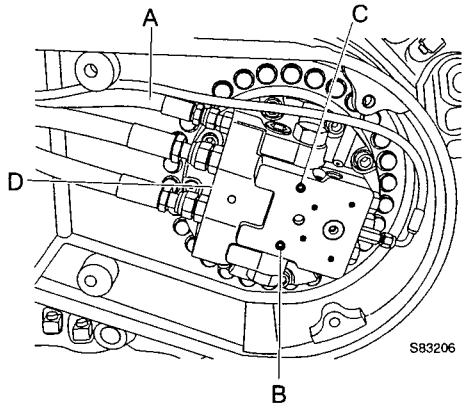
Towing for heavy objects

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 to tow the machine. The holes are only for anchoring when transporting the machine. See ***Transporting the machine*** **on page 100.**



Manual release of negative brake

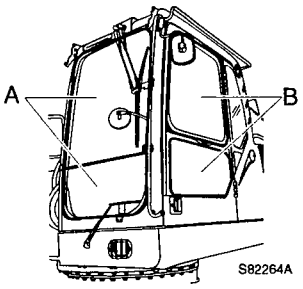
In case of towing the machine due to travel components trouble (motors and reduction gear):

1 Turn the hose (A) counterclockwise slowly until the oil flow evenly and free from air bubbles.

2 Apply hydraulic pressure of 40 kg/cm^2 at D port of the travel motor.

3 Loop a hydraulic hose between B and C port to release the parking brake.

Anti-vandalism



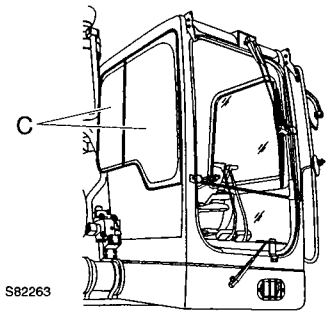
WARNING!

Be careful of installing anti-vandal covers, otherwise people can slip up which may do harm to people and cause damage to the machine.

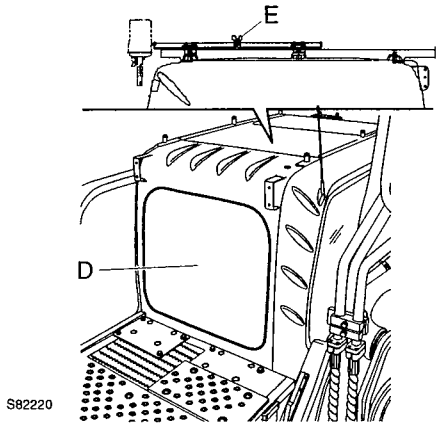
Anti-vandal covers are stored in two places, on the cab and by the tool box.

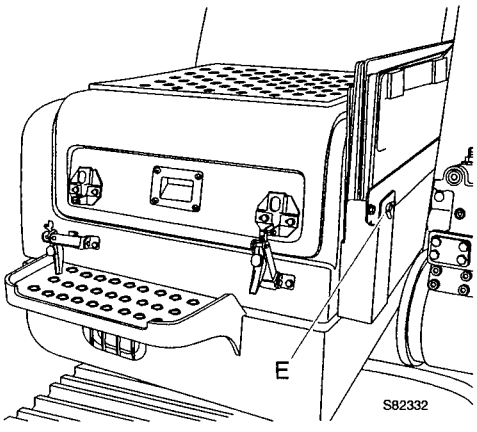
Four covers stored by the tool box are installed at front windows (A) and door windows (B)

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



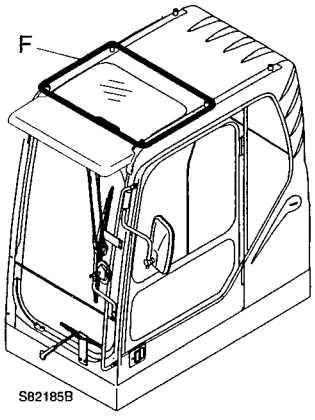
Secure the wing nut (E)





Sunlight protection

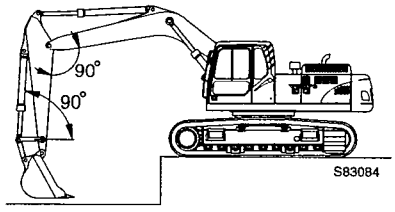
Don't drop it when it is installed.



WARNING!

Don't step on the sunlight protection (F)

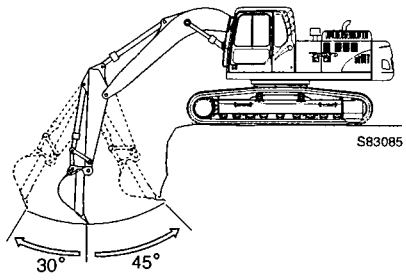
F Tightening torque: 10 kg·m (22.5 lb·ft), Thickness 2
Bolt: 4EA



Working with bucket

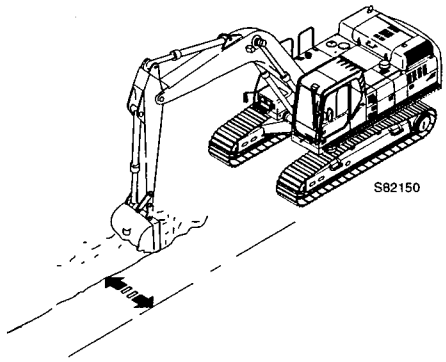
The excavator is a multi-task machine capable of being fitted with a multitude of special attachments to perform many types of work. Only the simplest operations are described below.

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 ° 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° forward and 45 ° rearward. There may be a little difference according to digging depth. Do not use the cylinder up to its stroke end, but only within this range.

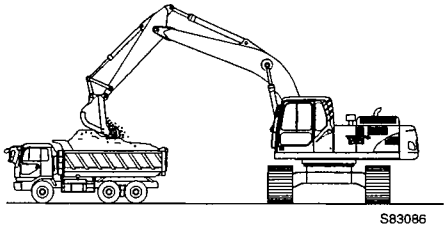
Ditching work



Install a proper bucket for ditching. Place the machine 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.

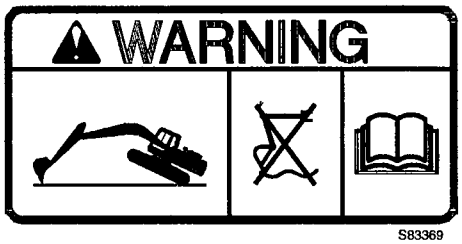
Also load over the rear of the dump truck, rather than over the side, as this makes the operator work easier and increases efficiency.


S83062

Float position

WARNING!

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.



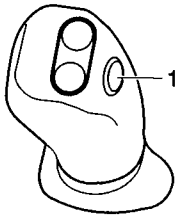
S83369

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.

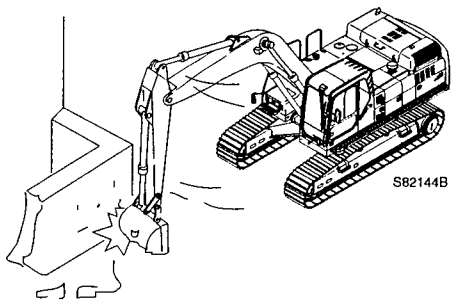


S83302

- Select the float position using button 1 on the boom operating lever (the float position control lights up on the instrument panel). See ***Thumb with three button lever*** on page 74.
- Use the float position for all normal excavation.

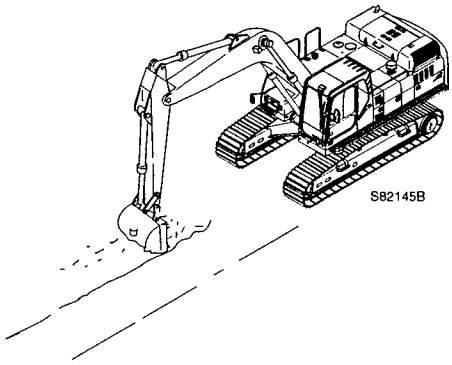
Deselect the float position by pressing the button 1 again (the light goes out)

When working, do not



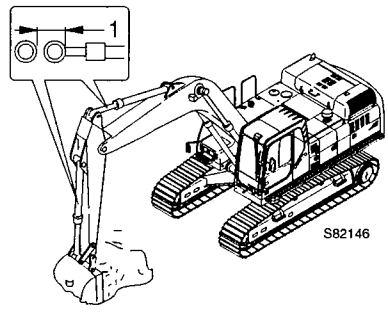
Do not strain the slewing mechanism

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

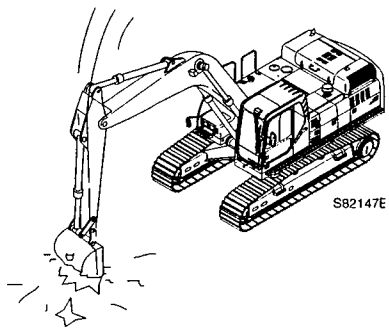
Do not dig by using the travelling motors, and thrusting bucket teeth into the ground. This can overload the rear of the machine and damage the track drive.



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.

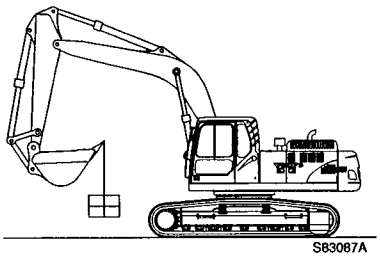
Work with as much clearance (1) as possible.



Do not work by slamming the bucket into the ground

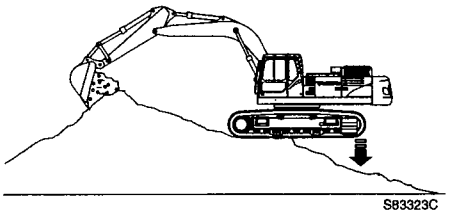
Do not perform digging by dropping the boom, or using the bucket instead of a pick. Striking, digging or deliberate striking can overload the rear of the machine or damage the attachment.

Also it is very dangerous.


S83087A

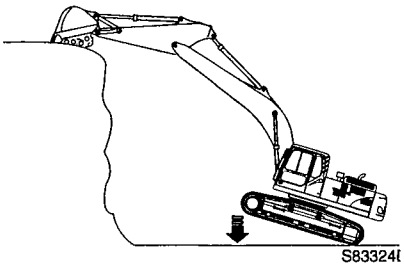
Do not carry out lifting work

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.


S83323C

Working by drop force of the machine body

Do not operate by dropping the machine body.

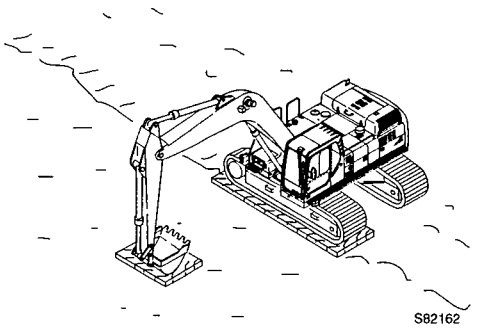

S83324

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.


S82162

In case one track gets bogged

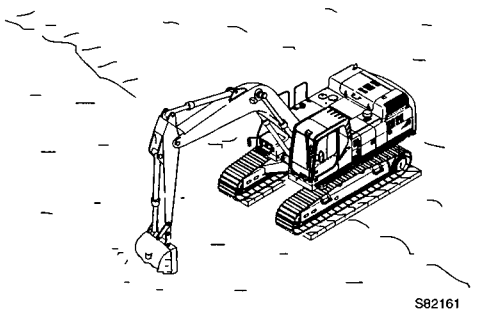
If one track gets bogged down, raise this track using the bucket and put a plank under the track.

IMPORTANT

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

Set the angle between boom and arm at 90 ° ~ 110 °.

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.


S82161

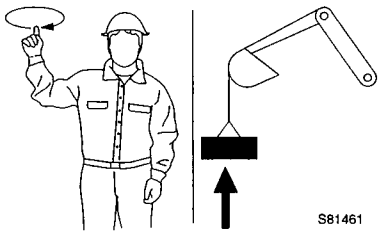
In case both tracks get bogged

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.

Signalling diagram

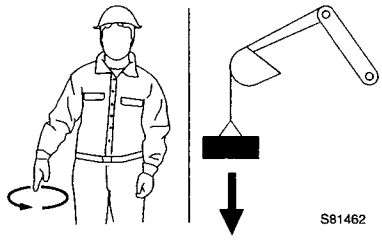
For manual signalling to operator of a mobile excavator as per SAE J1307.

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.



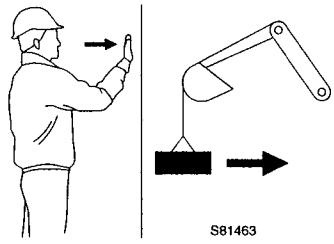
Raise load vertically

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



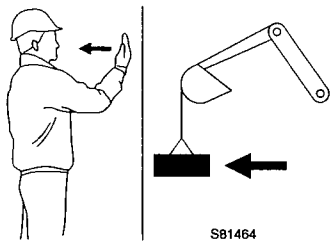
Lower load vertically

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



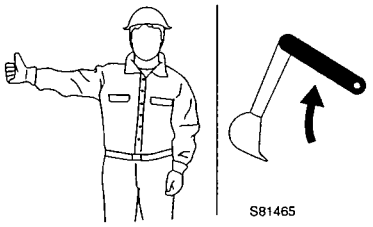
Move load in horizontally

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



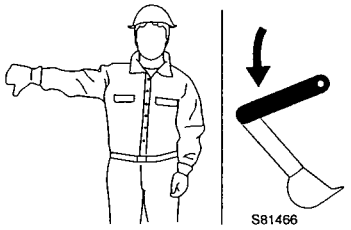
Move load out horizontally

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



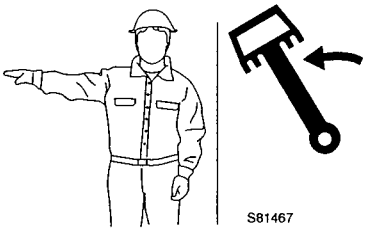
Raise boom

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



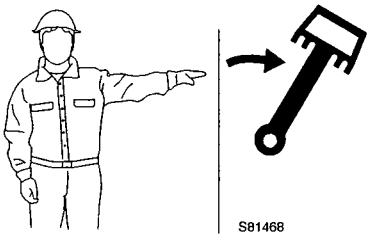
Lower boom

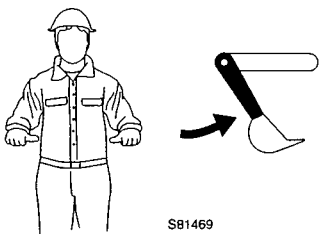
With either arm extended horizontally, fingers closed, point thumb downward.



Swing

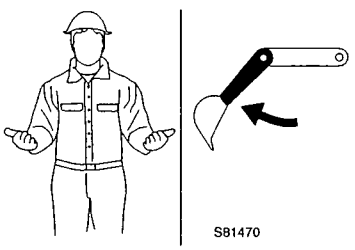
With either arm extended horizontally, point with forefinger to direction of swing rotation.





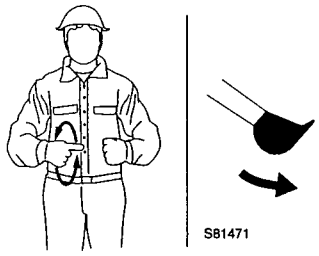
Dipper arm inward

With both hands clenched, point thumbs inward.



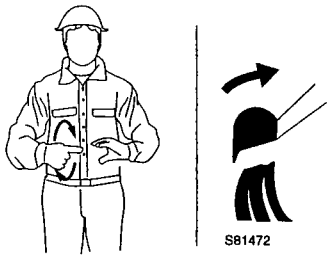
Dipper arm outward

With both hands clenched, point thumbs outward.



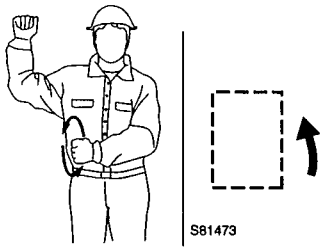
Close bucket

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



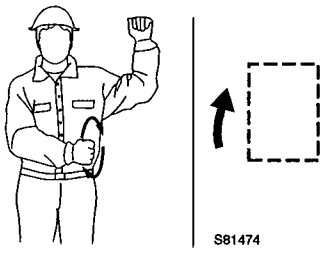
Open bucket

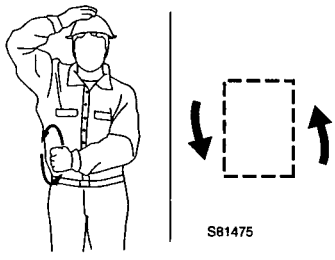
Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.



Turn

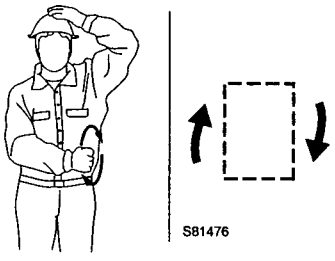
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.

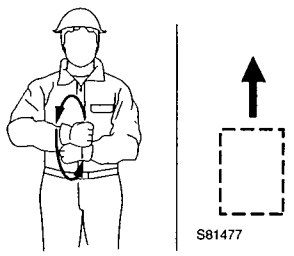




Counter rotate

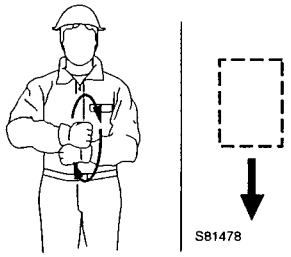
Place hand on head indicating side or reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.

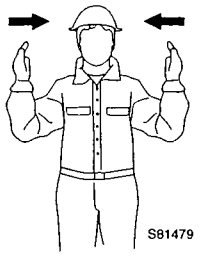




Travel

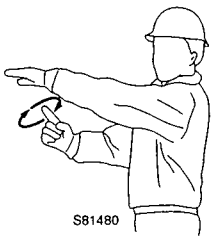
Move fists in vertical circle about each other in direction of track or wheel rotation.





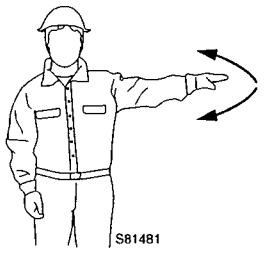
This far to go

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



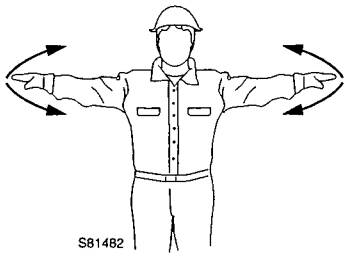
Move slowly

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



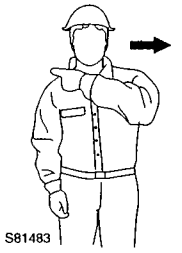
Stop

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

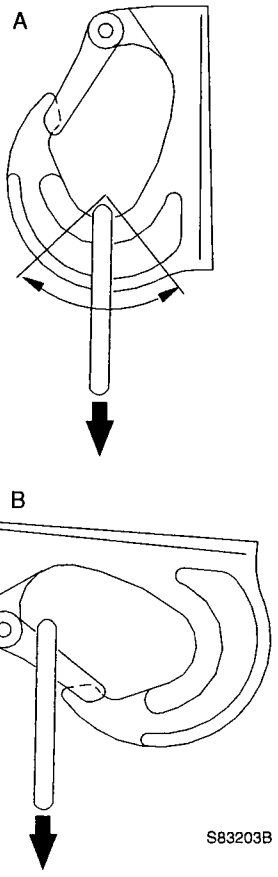
If the machine is used to lift objects within an area that is governed by the European Machinery Directive 98/37/EC and its amendments, the machine must be equipped with following safety working devices.

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

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

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

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



A Permissible lifting angle
B Prohibited lifting angle

1 Load hooking device

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.

The lifting hook is designed to lift a maximum load of 8,000kg.

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

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

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

2 Hose rupture valve (optional equipment)

See **page 114**

3 Overloading warning device (optional equipment)

See **page 51**

Optional parts

WARNING!

Don't step on the sunlight protection

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.

How to use long range attachment

Long-range attachment can be used in clearing and dredging lump of clay accumulated in the river and reminders of wastewater effectively. But be careful of using it otherwise it may cause damage to attachment or harm to person.

Notice

1 Do not use long-range attachment in general excavating, because it is designed for small amount excavating.

2 Boom and arm are very long, so operate the machine smoothly in order to keep stability and safety when traveling.

3 Stopping the machine abruptly may cause joggling of attachment heavily, excessive force to attachments, and finally damage to the machine. Operate it smoothly with enough caution.

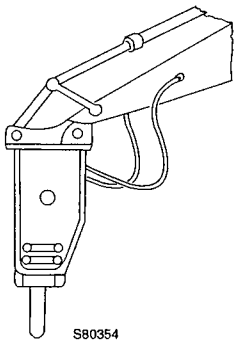
4 Never use boost switch and boost button of the right operating lever when installing long-range attachment.

5 Boom, arm and bucket have big inertial power compared with standard equipments. Do not allow operating the machine at the ends of stroke of each cylinder.

6 Maximum excavating height is high because boom and arm are long, and reach is long so be careful of traveling front upper part.

7 Do not travel the machine or raise the main body with the bucket grounded. It may give excessive force to pin around the bucket.

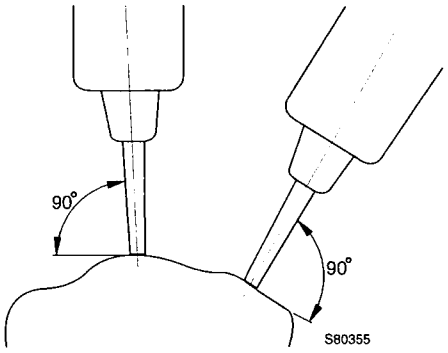
Hydraulic hammer



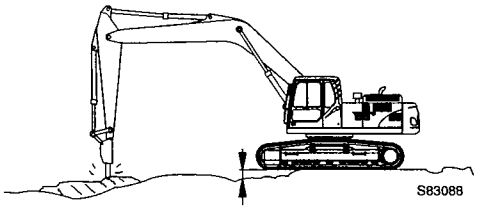
Main works

- Breaking stone
- Demolition work
- Road repairing

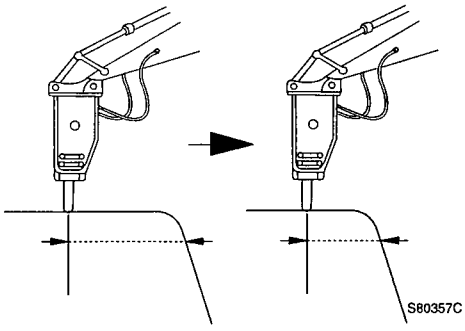
It is widely used for demolition of buildings, breaking road surfaces, tunneling work, smashing slag, and breaking or cutting stone.



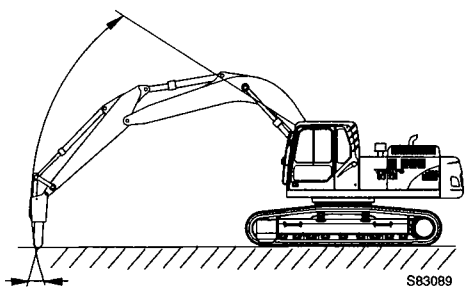
Press the chisel firmly onto the surface at a right angle as shown.



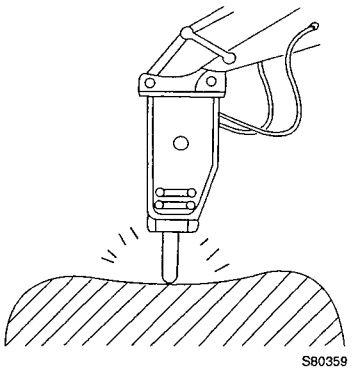
When striking, press the chisel firmly onto the surface, and lift the frame about 5 cm. Never raise the machine unnecessarily high.



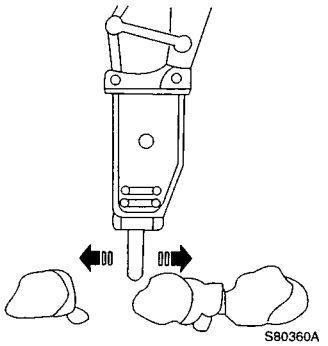
If the surface is struck repeatedly but it does not break within 1 minute, move the chisel nearer one end and strike again.



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.

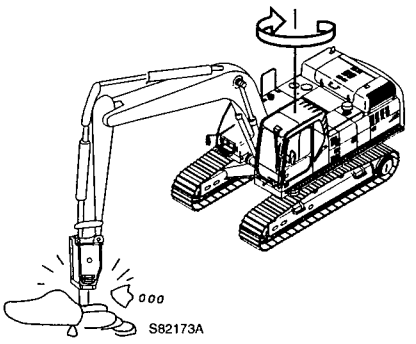


Press the chisel firmly against the surface so idle striking is avoided.

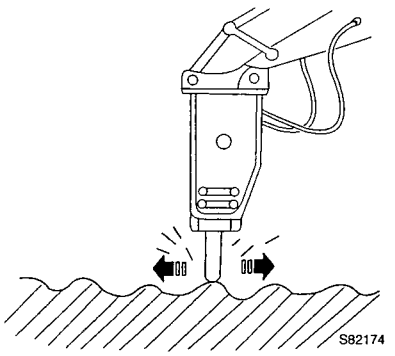


Caution during hammer operation

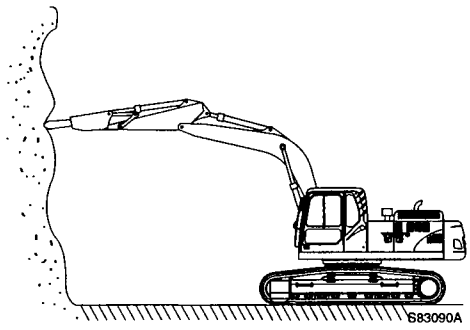
Do not operate the cylinder to its end of stroke, leave about 5 cm.



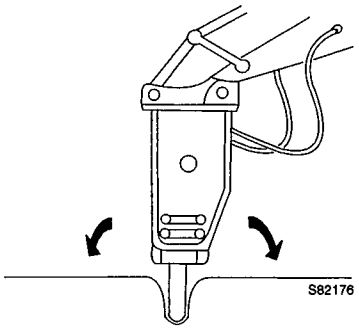
Do not swing the hammer against the rocks, concrete etc.



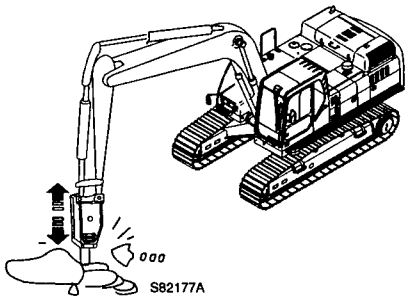
Do not move the chisel while it is striking a blow.



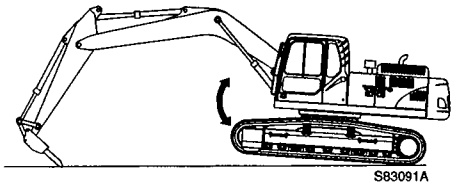
Do not strike horizontally, or in an upward direction.



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 handing 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.

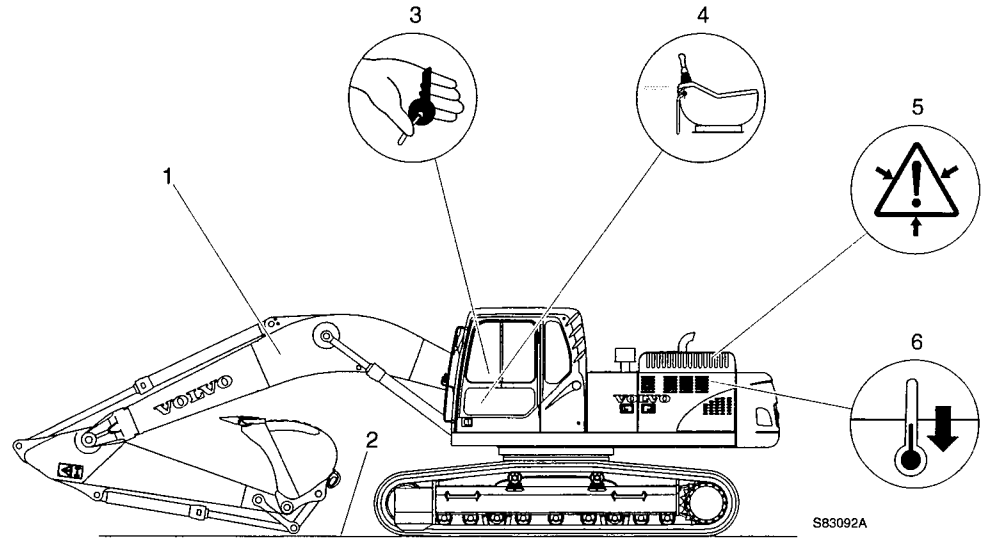
A safety conscious person and a well maintained machine make a safe, efficient and profitable combination.

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 81.***

5 Pressurized lines and vessels should have the pressure released gradually to avoid risks.

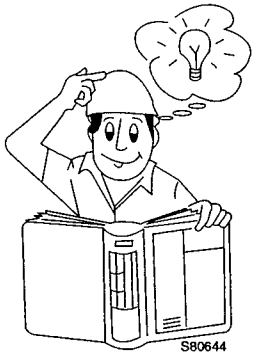
6 Allow the machine to cool *.

* 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.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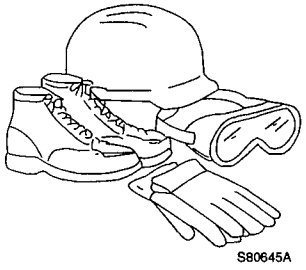

S80645A

- 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.

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 180.

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 127.
  - 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 file 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.

152 Measures to prevent fire

- 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 that 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!

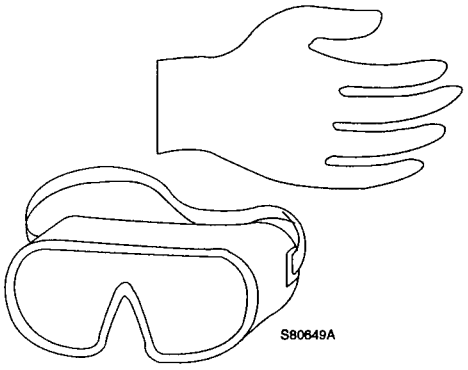
All paint decomposes when heated and forms a great number of compounds. These substances may be irritating and after long or frequent exposure may constitute a serious health hazard.

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 it so 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, before any symptoms appear and therefore 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 the next 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 re-install 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 batteries

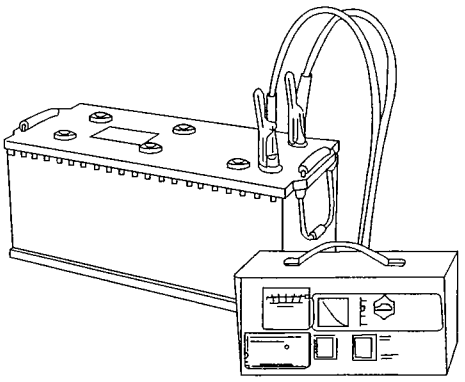
WARNING!

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 start switch 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.



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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.

- **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.

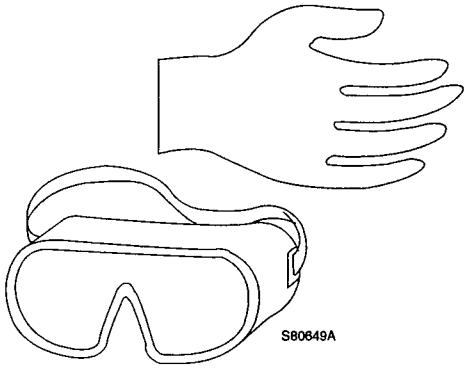
Equipment for service

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.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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).

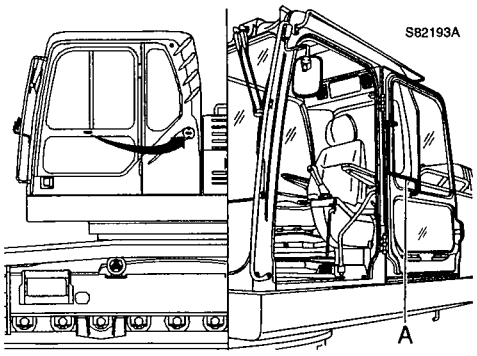
First aid measures in case of accidents

- 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 vapor 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 vapor 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.

WARNING!

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!

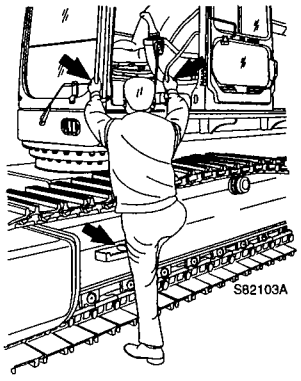
Always observe this caution for safety.

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

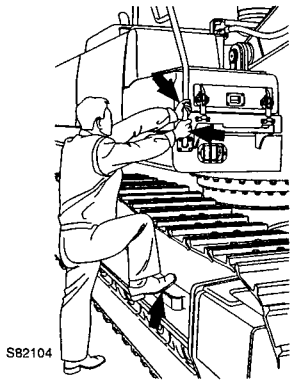
Never grasp the control lever to get on / off.

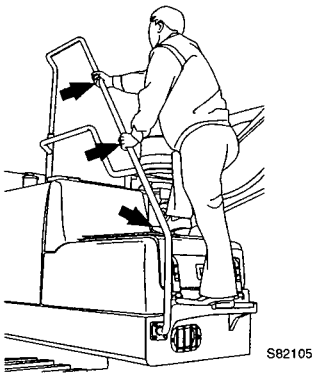
Use handholds and steps when entering or leaving the machine. Use the three-point grip, i.e. two hands and one foot or two feet and one hand. Always face the machine.

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

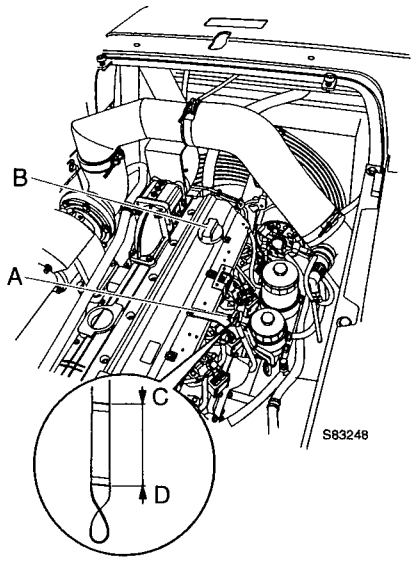


Don't use hand rail (A) of the cab door as a support.
This hand rail is not strong enough to be used as a use as an access or exit hand rail. Only use this hand grip to close the door.





162 Use handholds and steps for climbing on / off



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**, refill to proper oil level through filler port (B).
Engine oil: See ***Recommended lubricants*** on page 211.

A Dipstick
B Oil Filler port
C Maximum level
D Minimum level

Changing engine oil

WARNING!

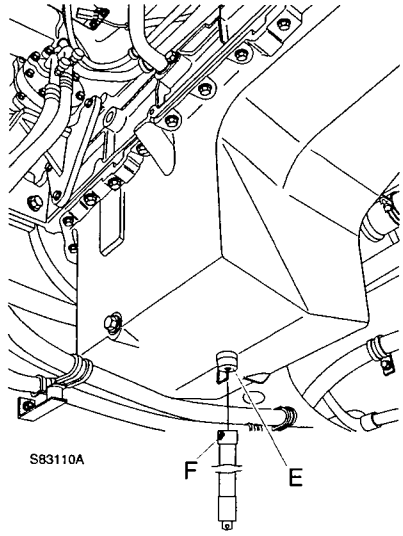
Take care when changing oil.
Hot oil can cause burns on unprotected skin.

Change oil every 500 hours when CH-4 class is used.
Conditions for intervals of 500 hours to apply are that:

- 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 ***Recommended lubricants*** on page 211.
- Correct oil viscosity for the ambient temperature is selected. See ***Recommended lubricants*** on page 211.

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.



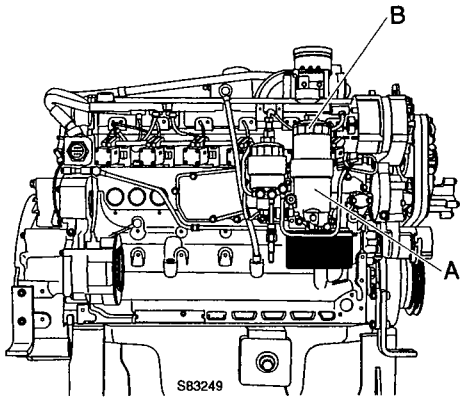
Changing oil

1 Place the machine in the service position.
2 Put a container (above 26 liter, 6.9 US gal) 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 port (B).

Oil capacity when changing is approx. 25 liters (6.6 US gal) including filters.

For oil grade, See ***Recommended lubricants*** on page 211.

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, if lower than CG-4 class: every 250 hours.** See ***Checking engine oil level*** **on page 163.**
The oil filter is of the disposable type, i e. it cannot be cleaned, but should be replaced as one unit.

Removing

1 Loosen and open engine oil filter cap (B)
2 Pull a used filter element out of the engine oil filter housing (A)
   – Use a suitable tool for removing oil filter element.

Installing

3 Put a new filter element into the engine oil filter housing (A).
4 Tighten the engine oil filter cap (B) on the engine oil filter housing (A).
   – Tightening torque is written on the engine oil filter cap (B)

After installing

5 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.

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

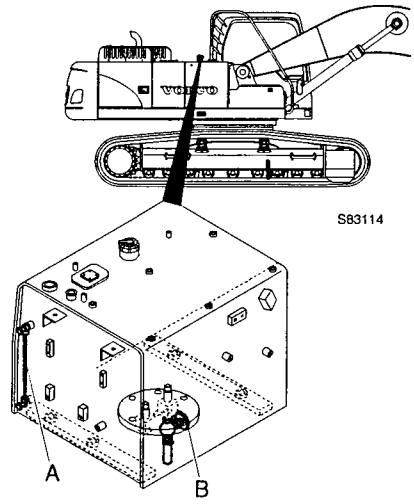
Valve clearance, adjusting

Check the valve clearance every 1500 hours.

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

Fuel system

Fuel tank



Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	~ 14275		

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

The fuel tank holds **350 liters (92.5US 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 211.

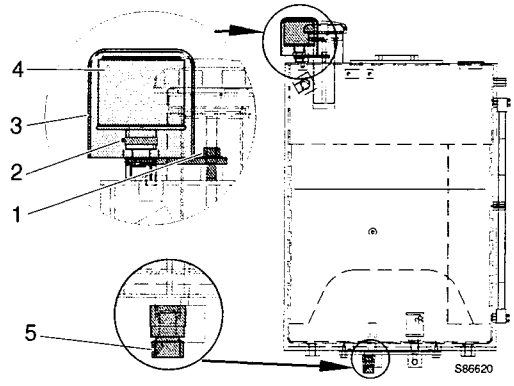
NOTE : Be careful not to damage fuel tank level gauge (A) by being stained from thinner or oil.

Drain off sediment every 100 hours.

1 Place a vessel under drain valve (B).

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

Air ventilation filter on fuel tank, changing



1 Screws
2 Clamp
3 Protection cover
4 Ventilation filter
5 Drain valve

Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	14276 ~		

Change the air ventilation filter every 2000 hours.

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

1 Disassemble the protection cover (3) after loosing 2 screws (1).

2 Remove the air ventilation filter (4) after loosing a clamp (2).

3 Replace the air ventilation filter (4), then tighten the filter (4) with clamp (2).

4 Assemble the protection cover (3) and tighten 2screws (1).

Drain off sediment every 100 hours.

1 Place a vessel under drain valve (5).

2 Connect the drain hose.

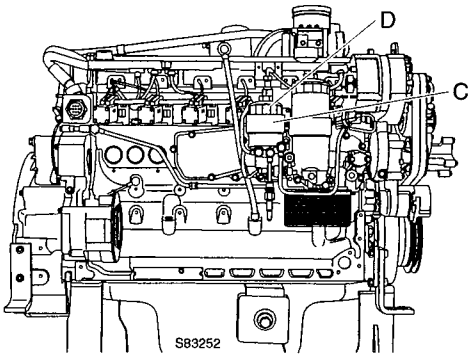
3 Open drain valve (5) at the bottom of the tank and drain off any sediment.

Changing fuel filter

When using the fuel to meet the legal requirements, change the fuel filter every 500 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.

Replace the fuel filter every 500 hours. If using fuel of lower quality, replace the filter more often.



Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	~ 14316		~ 30840

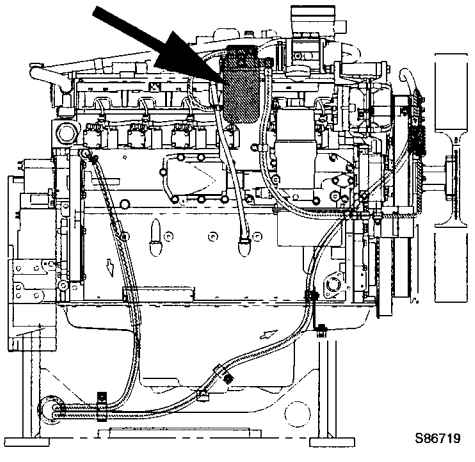
Removing

1 Loosen and open fuel filter cap (D).
2 Pull a used fuel filter element out of the fuel filter housing (C)
– Use a suitable tool for removing fuel filter element.

Installing

3 Put a new fuel filter element into the fuel filter housing (C).
4 Tighten the fuel filter cap (D) on the fuel filter housing (C).
– Tightening torque is written on the fuel filter cap (D)

Bleed for air, See *Bleeding fuel system of air* on page 169.



Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	14317 ~		30841 ~

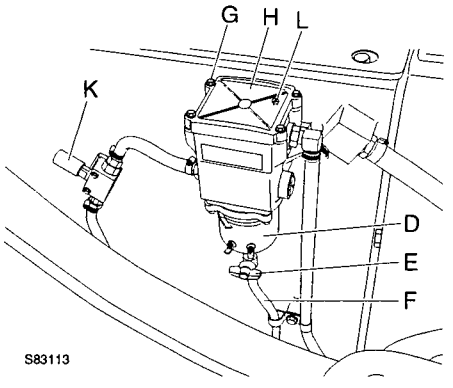
Removing

1 Use a suitable tool for removing fuel filter.

Installing

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

Bleed for air, See *Bleeding fuel system of air* on page 169.



Changing water separator element

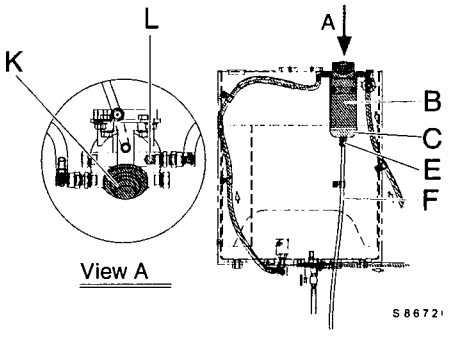
Change the water separator element every 500 hours.

Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	~ 13921		~ 30779

Place a vessel under drain hose (F) and drain the water.

Change the element after loosening 4 screws (G) and removing the cover (H)

Model	Manufacturing place and serial number		
	Korea	German	China
EC210B	13922 ~		30780 ~



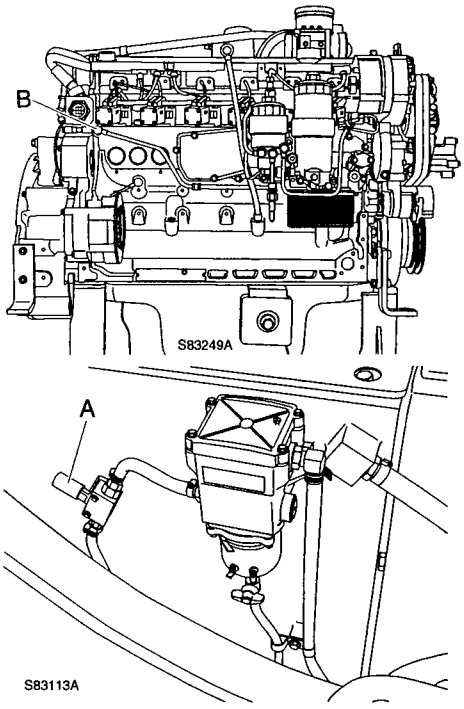
1 Remove the filter (B) including the bowl (C) assembly and drain valve (E).
2 Remove the bowl assembly and set it aside for reinstallation
3 Check the condition of the O-ring. Replace the O-ring if damaged.
4 Carefully install the bowl assembly with the new filter. Tighten it with hand only.
5 Clean the mounting surface of element, fill with fuel in the filter and apply a small amount of fuel to the gasket of the new filter.
6 Install the new filter until it contacts the mounting surface. Tighten the filter and bowl.

Draining water of water separator

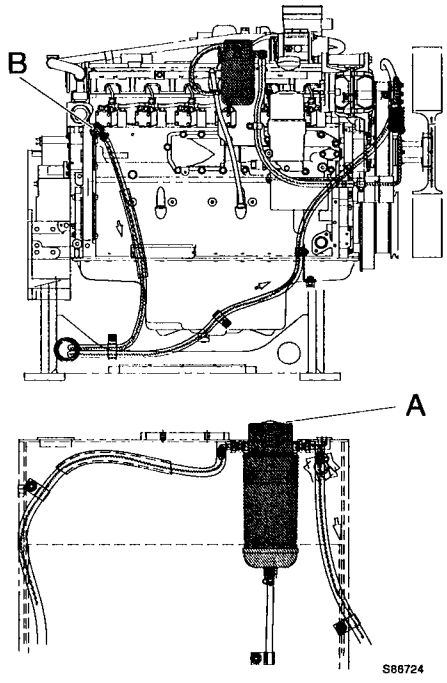
Place a vessel under drain hose (F) and drain the water.

Loosen the bleed screw (L) and open drain valve (E) to drain the water.

Bleeding fuel system of air



Old type



New type

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.

Model		Manufacturing place and serial number		
		Korea	German	China
Fuel filter	Old type	~ 14316		~ 30840
	New type	14317 ~		30841 ~
Water saperator	Old type	~ 14275		~ 30779
	New type	14276 ~		30780 ~

1 Clean around bleeder plugs on the cylinder head.

NOTE :
Do not spill fuel on electrical components.

2 Open bleeder plug (B) on the cylinder block.

3 Pump with hand pump (A) until the fuel, which flows out, is free from air bubbles.

4 Tighten bleeder plug (B) while fuel flows out.

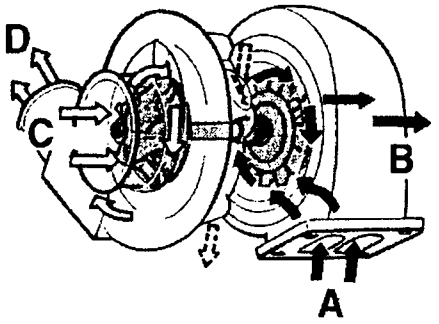
After air bleeding

5 Run the engine at raised idling speed for approx. 10 minutes.

6 Check after starting that there is no leak.

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.



S80653

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

Air cleaner

General

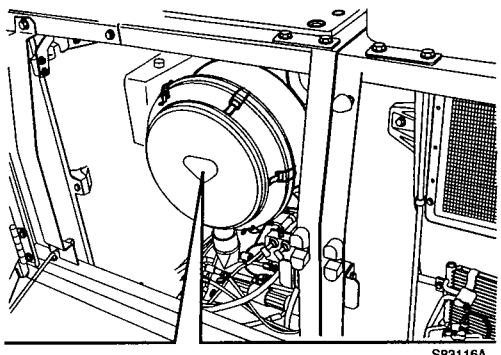
The air cleaner prevents dust and other impurities from entering the engine. The air first passes through the primary filter and then the secondary filter.

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.


S83116A

Cover for air cleaner

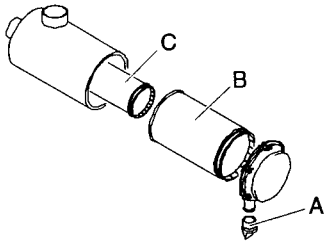
Cleaning of cover for air cleaner

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.



Primary filter (B)

General

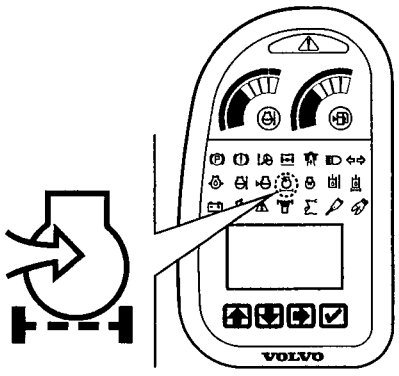
Replace or clean at least every 1000 hours or when the warning lamp is ON.

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

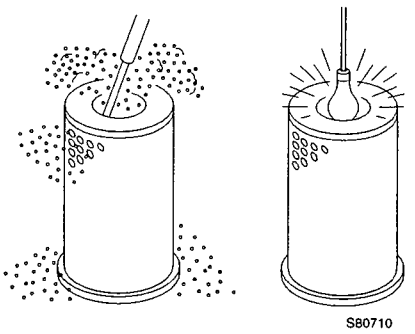
If the indicator lamp is still ON after cleaning, the filters must be replaced.

NOTE : The secondary filter must not be cleaned but only replaced, See ***Changing secondary filter*** **on page 172.**

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 filters more often.



S86197


S80710

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).

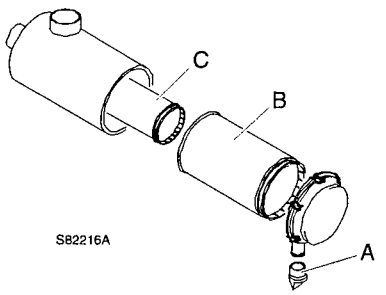
2 Blow the filter clean from the inside along the folds.

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.



Changing primary filter

Change the primary filter every 1000 hours.

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.

Changing secondary filter

Change the secondary filter every 2000 hours

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.

Cooling system

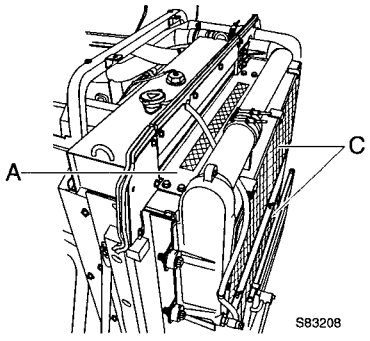
General

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

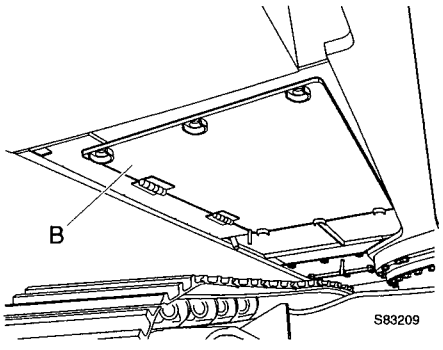


WARNING!

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 with compressed air after removing radiator top cover (A).
Clean radiator lower part with compressed air after removing radiator bottom cover (B) of upper frame.
2 Clean the nets (C) in front of the oil cooler, the charge air cooler and the condenser fins of the air conditioner.
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.

1020820

Coolant

Check the coolant properties every 500 hours.

The cooling system is either filled with Volvo Coolant VCS or Volvo Coolant. To avoid damage to the engine, it is very important to continue to use the same coolant, when filling or changing, as the system is filled with.

IMPORTANT! Do not mix different coolants or corrosion protection as this may result in engine damages.

To distinguish the coolant from each other

The cooling system is filled with Volvo Coolant VCS if

- it is yellow
- if a decal with the text "Volvo Coolant VCS" is put by the filling point (see picture).

The cooling system is filled with Volvo Coolant if

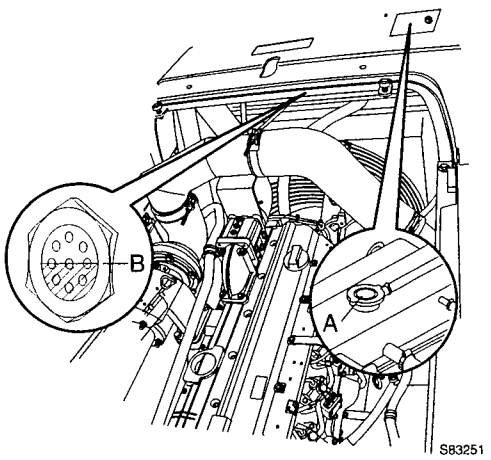
- it is green
- if the decal mentioned above, is not by the filling point.

If concentrated coolant and clean water (see page 212) is used, the table below shows the approximate amount of concentrated coolant needed for freezing protection. The content of coolant must never be less than 40% of the total mixture.

If in doubt of the water's quality, a ready-mixed coolant should be used.

IMPORTANT! If a ready-mixed coolant is used, do not mix with other ready-mixed coolants as this may damage the engine.

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



Checking coolant level

Check the coolant level daily.

WARNING!

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.
If the level is in the center of gauge (B), the level is normal.
3 If the coolant is not invisible in the sight gauge, top up through (A) up to " B " lower.

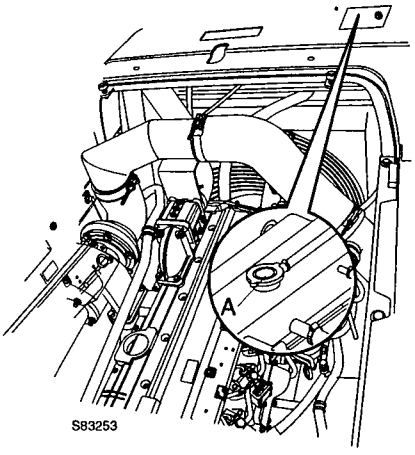
Changing coolant

IMPORTANT! Do not mix different coolants or corrosion protection as this may result in engine damages, see page 174.

Change the coolant every 6000 hours or every fourth year if the system is filled with Volvo Coolant VCS.

Change the coolant every 2000 hours if the system is filled with Volvo Coolant.

Change the coolant every 3000 hours or every second year if the system is filled with Volvo Coolant and equipped with a coolant filter.



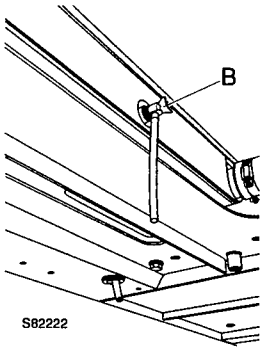
Draining coolant

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

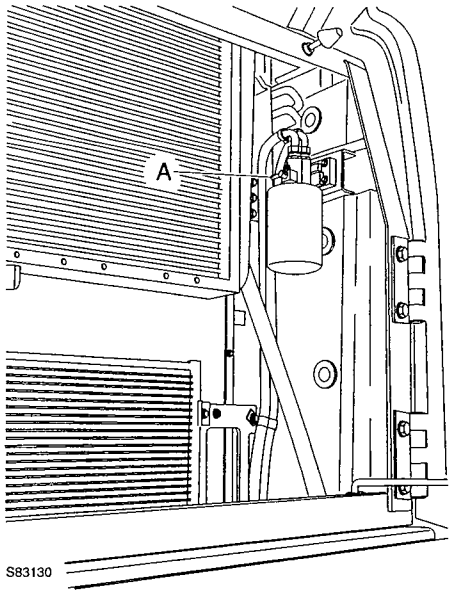
1 After draining, close cock (B).
2 Refill through (A) with clean tap water.
3 Start up engine and run at low idle for about 10 minutes.
4 Stop the engine and drain the water.

Filling coolant

The cooling system capacity when changing is approx. 27.5 liters (US 7.3 gal)

1 After flushing, close cock (B) and remove cap (A).
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 sight 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 (option)

IMPORTANT! Machine with Volvo Coolant VCS must not use together with the coolant filter.

Current Volvo coolant filter is not possible to use with Volvo coolant VCS due to the mismatch of the inhabitor systems.

WARNING!

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

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

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).

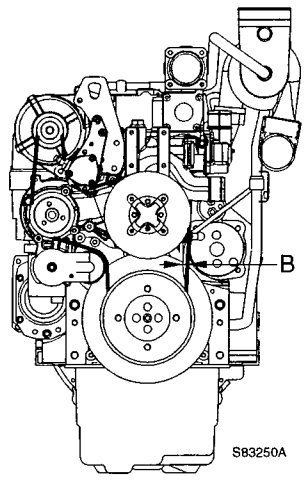
Installing

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 (A). 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 seal. If it leaks, remove filter and check the sealing surface.

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



Water pump & fan belt tension

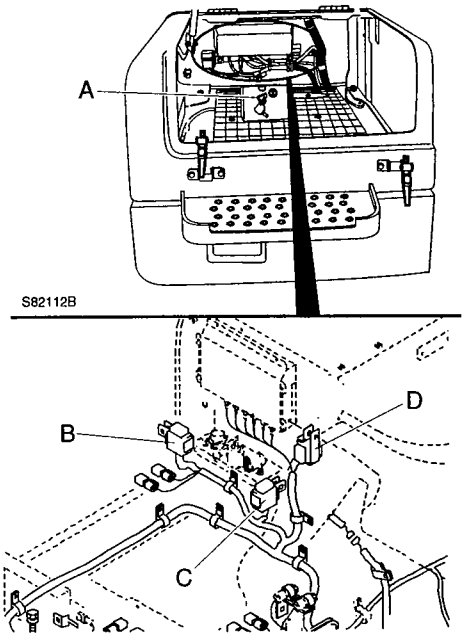
WARNING!

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

Check the belt every 500 hours or when the belt slip makes noise.

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

Slow blow fuse

These fuses are master fuses for the electrical systems.

A: Battery master switch

B: 40 A (2 EA)

C: 140 A

D: 80 A (2 EA)

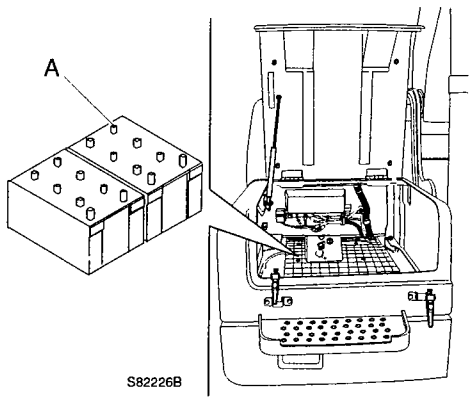
If the electrical system does not work after repairing the electrical system, check these slow blow fuses.

Battery electrolyte level

Check the electrolyte level every 250 hours.

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 topping up, so that the water is mixed in with the battery electrolyte. This is particularly important in cold weather.

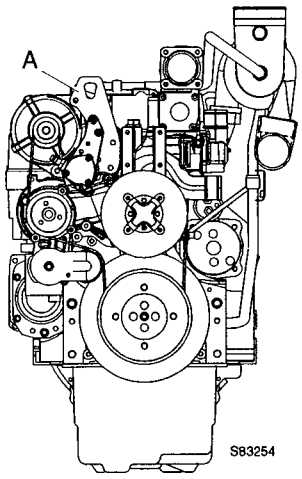
3 Check that cable terminals and pole studs are clean, well tightened and coated with petroleum jelly or similar.

Rules for batteries

See ***Batteries*** on page 156.

Charging batteries

See ***Charging batteries*** on page 158.



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

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.

Sensitivity of alternator installation

The alternator (A) 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.

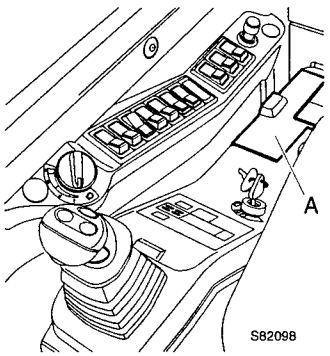
Battery connection

- 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 177.

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

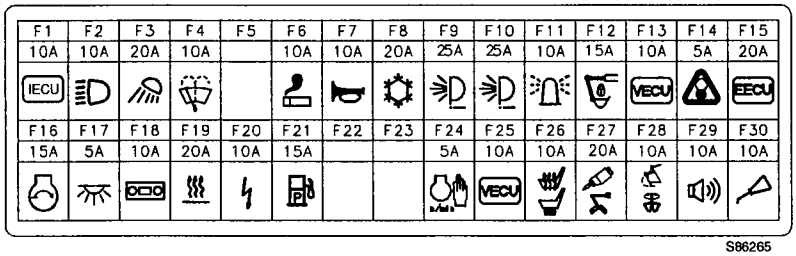
The machine has an electrical distribution box (A) installed to the right of the operator seat. The electrical distribution box contains most of the fuses and relays of the machine.

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.

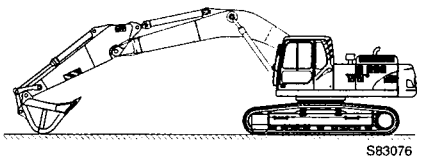
Fuse capacity and symbol related circuits

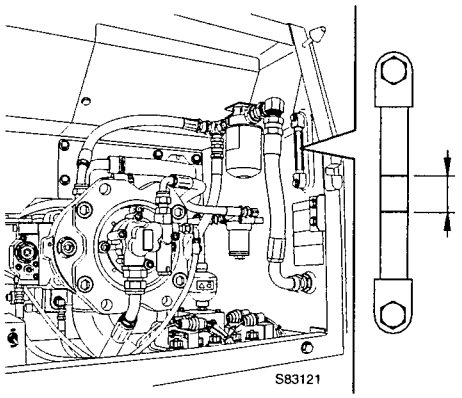
Fuses and relays positioned in the electrical distribution box are easily accessible after the cover on the electrical distribution box has been opened. The inside of the cover is provided with a decal showing which appliance is connected to the respective fuses. This is also shown in the figure below.



S86265

No.	Capacity	Appliance / circuit	No.	Capacity	Appliance / circuit
F1	10A	IECU (instrument electronic control unit)	**F16**	15A	Start switch
F2	10A	Work lamp (deck)	**F17**	5A	Cab lamp
F3	20A	Work lamp (boom)	**F18**	10A	Cassette radio
F4	10A	Wiper & washer	**F19**	20A	Auxiliary heater
F5	-	-	**F20**	10A	Power outlet
F6	10A	Cigar lighter	**F21**	15A	Fuel filler pump
F7	10A	Horn	**F22**	-	-
F8	20A	Air conditioner	**F23**	-	-
F9	25A	Work lamp (rear, counterweight)	**F24**	5A	Engine RPM manual control
F10	25A	Work lamp (front)	**F25**	10A	V-ECU (vehicle electronic control unit)
F11	10A	Beacon	**F26**	10A	Seat heater & Air suspension seat
F12	15A	Safety solenoid	**F27**	20A	Hammer, Booster, Shear
F13	10A	V-ECU (vehicle electronic control unit)	**F28**	10A	Quickfit, Rotator solenoid valve
F14	5A	Overload	**F29**	10A	Travel alarm
F15	20A	E-ECU(engine electronic control unit)	**F30**	10A	Auto greasing


S83076


S83121

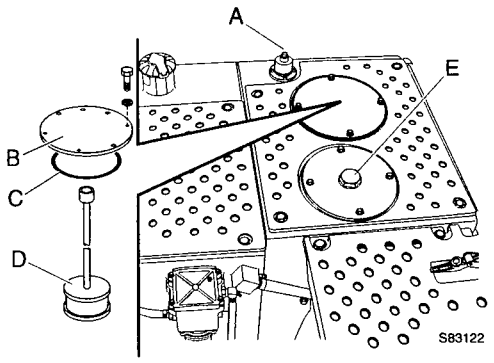
Hydraulic system

IMPORTANT
Exercise cleanliness when filling oil and in all work on the hydraulic system.

Checking hydraulic oil level

Check the oil level daily

1 Extract 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 81.*** and stop the engine
3 Turn the engine starting switch to ON (⏀) position.
Do not start the engine.
4 Turn the starting switch to OFF (⏀) position.
5 Release internal pressure of the hydraulic tank through the air breather of the hydraulic tank.
6 Open the right side of upper structure, and check the oil level by sight gauge.
7 If the level is in the center of the gauge, the level is normal.
If the level is low, open the cover on the tank to add hydraulic oil.



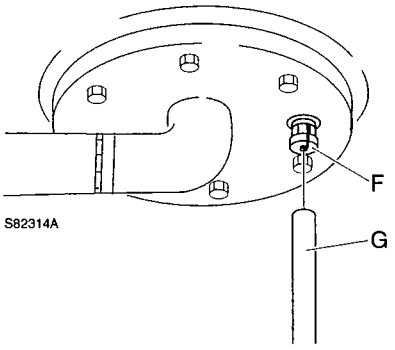
Changing hydraulic oil

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 81.*** 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 drain plug (F)
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 strainer (D) thoroughly, reinstall it.
12 Fill oil and re-install cover.
13 Check the oil level on the sight gauge.

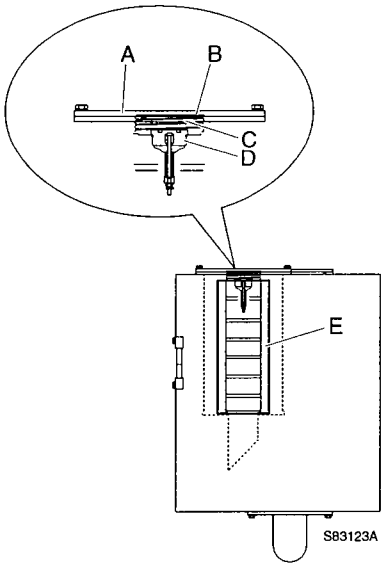


The total oil capacity when changing is approx. **160 liter (42 US gal.)**

For oil grade, See ***Recommended lubricants*** on page 211.

Bio oil

When changing from a mineral oil to a bio oil, please contact your authorized dealer workshop.



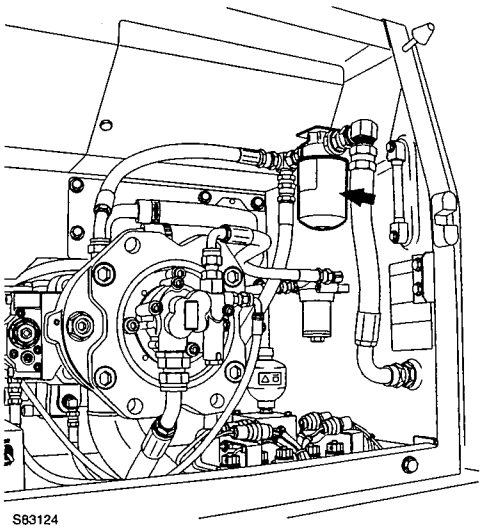
Replacing hydraulic oil return filter

Replace the return filter after the first 250 hours and then every 1000 hours.

WARNING!

Before removing cover (A), release the internal pressure of the tank.

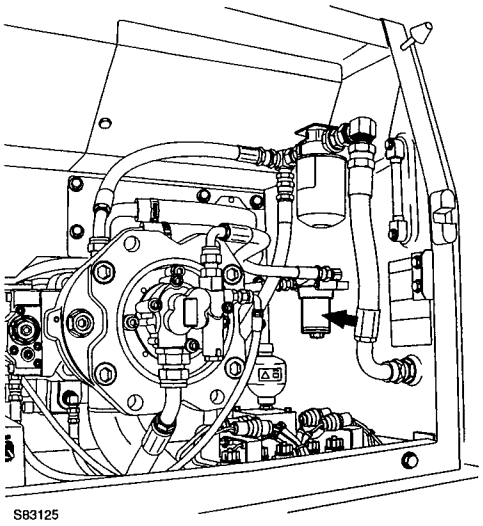
1 Unscrew cover (A)
2 Remove O-ring (B), spring (C) and bypass valve (D), and then pull out filter (E).
3 Clean the dismantled parts.
4 Install a new filter and all parts.
When mounting cover (A), fasten the bolts while pressing down on the cover.
5 Run the engine at low idle speed for 10 minutes to 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.

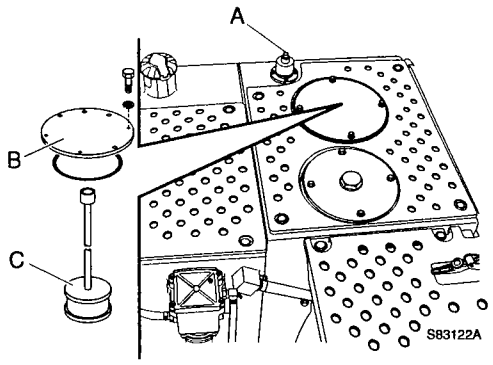
1 Place a container under the drain filter, and turn the filter counterclockwise to remove it.
2 Fill the new filter with oil, thinly coat O-ring with oil.



Replacing element in the pilot filter

Change the element in the pilot filter after the first 250 hours and then every 1000 hours.

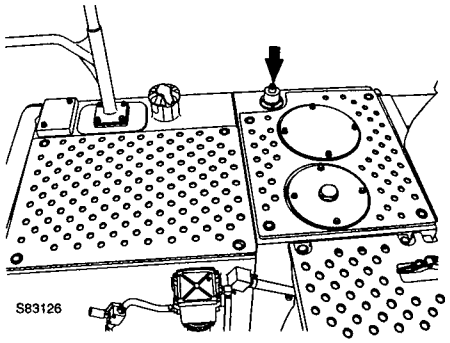
1 Place a container under the filter,
2 Remove the filter bowl,
3 Replace the inner element of the pilot filter.



Cleaning suction strainer

Clean the strainer every 2000 hours or replace when necessary.

1 Press air 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.

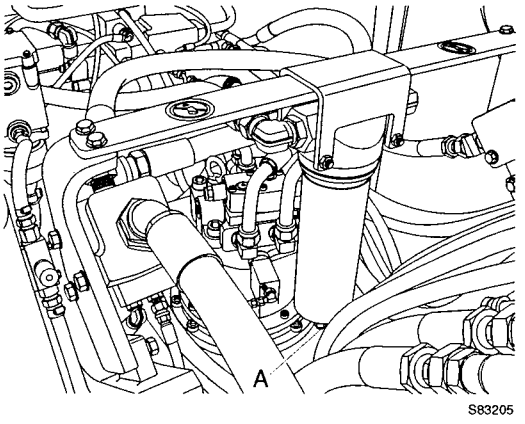


Replacing element in the air breather on hydraulic tank

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 Remove the air breather,
2 Replace the element of air breather with new one.

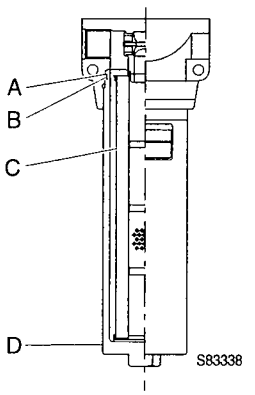


Replacing element in the return filter for hammer circuit

Replace the element of return filter for the hammer circuit every 200 hours (on the basis of hammer working hours).

1 Stop the engine.
2 Remove the filter case (D) by using a wrench.
3 Remove the filter element (C).
4 Inspect O-ring (A) and back up ring (B) for any damage.
5 Replace damaged items.
6 Install a new filter element.
7 Install the filter case.

Tightening torque for the filter case (D): 4 ~ 5 kgf·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 unit.

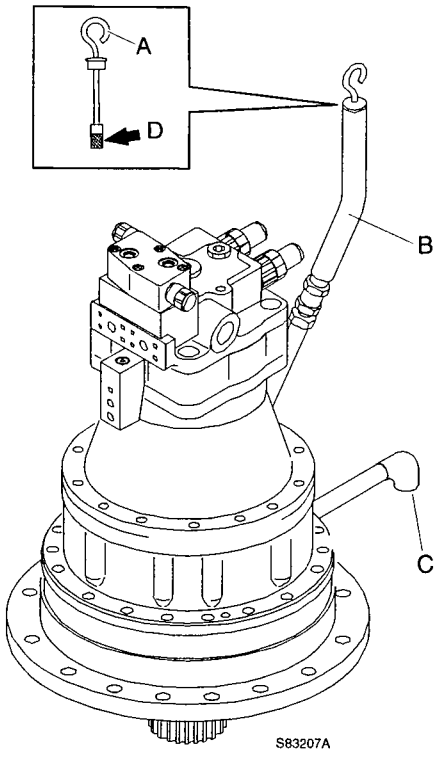
It is very important that the oil level is always correct and that it is checked at working temperature.

Therefore remember:

- The swing drive unit 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 unit 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 211.

If the oil is above the correct level, open drain valve (C), and drain the oil to adjust to the correct level. Then close drain valve (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 211.

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 unit.

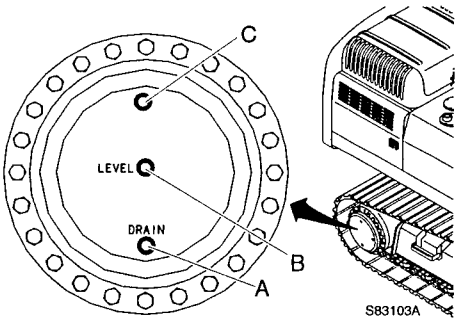
It is very important that the oil level is always correct and that it is checked at working temperature.

Therefore remember:

- The track drive unit 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 unit to overheat.

WARNING!

Immediately after operating the machine, the oil is hot. Allow the oil to cool. Residual pressure in the drive unit, may cause the plug to be dislodged suddenly and oil to jet out.



Checking oil level in track drive unit

Check the oil level every 250 hours.

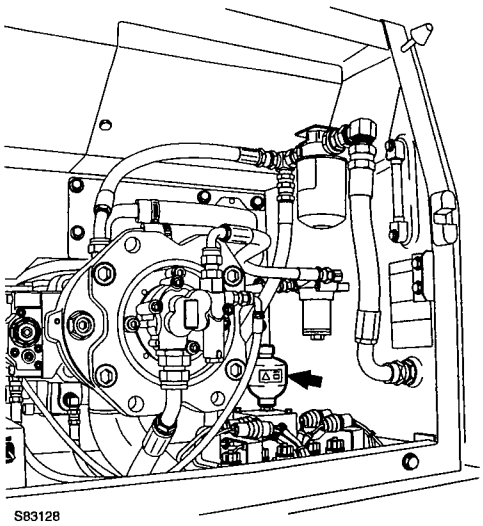
1 Turn the case so that drain plug (A) is at the bottom.
2 Remove oil level check plug (B). If the oil is about to overflow from the hole, the level is correct.

If the oil is low, top up the oil to the correct level, through the filling plug (C). Oil specification: See ***Recommended lubricants*** on page 211.

Changing oil in track drive unit

Change the oil initial 500 hours and every 2000 hours.

1 Find a container (above 7 liters) for receiving the drained oil.
2 Turn the case so that drain plug (A) is at the bottom.
3 Put a container under drain plug (A).
4 Remove drain plug (A), oil level check plug (B) and drain the oil.
5 Check the O-ring on the plug if damaged, change it.
6 Install drain plug (A)
7 Remove filling plug (C)
8 Fill the oil to the correct level through oil level check plug hole (C). Oil specification: See ***Recommended lubricants*** on page 211.
9 Install the level check plug (B) and oil filling plug (C)


S83128

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 81.***

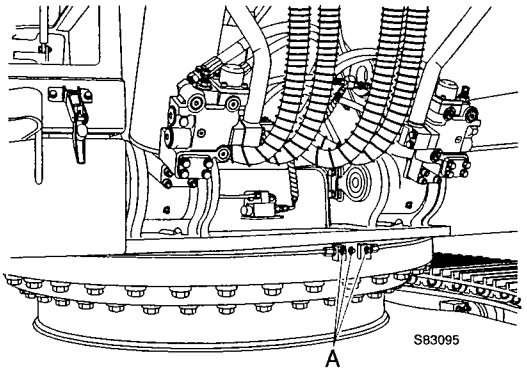
Operation of accumulator (in emergency)

1 Stop the engine by turning the ignition key to STOP (⏻) position.
2 Turn the ignition key to Running (⏻) position,
3 Move the operating lever to boom down position to lower the attachment under 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 starting 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, See ***Safety locking system on page 81.***

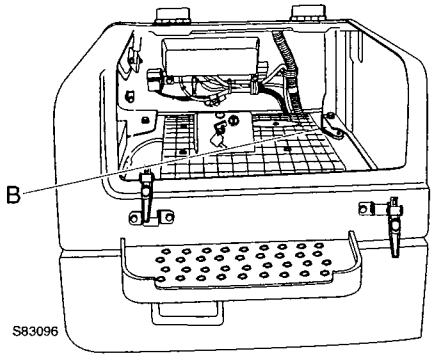
Swing gear and bath, greasing



Greasing swing ring gear bearing

Grease the swing ring gear bearing every 250 hours.

1 Park the machine on level ground.
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 81.***
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.

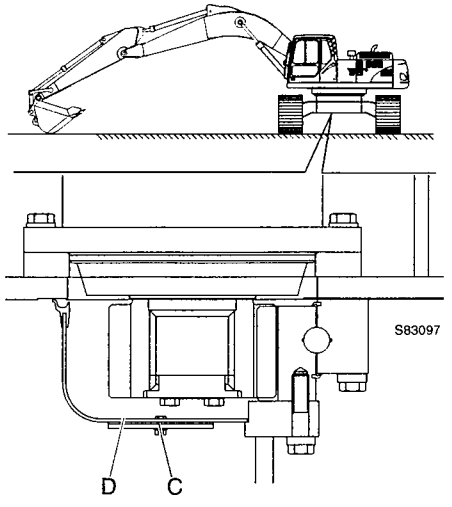


Checking grease of swing bath

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 81.***
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 17 liter (4.5 US gal).**



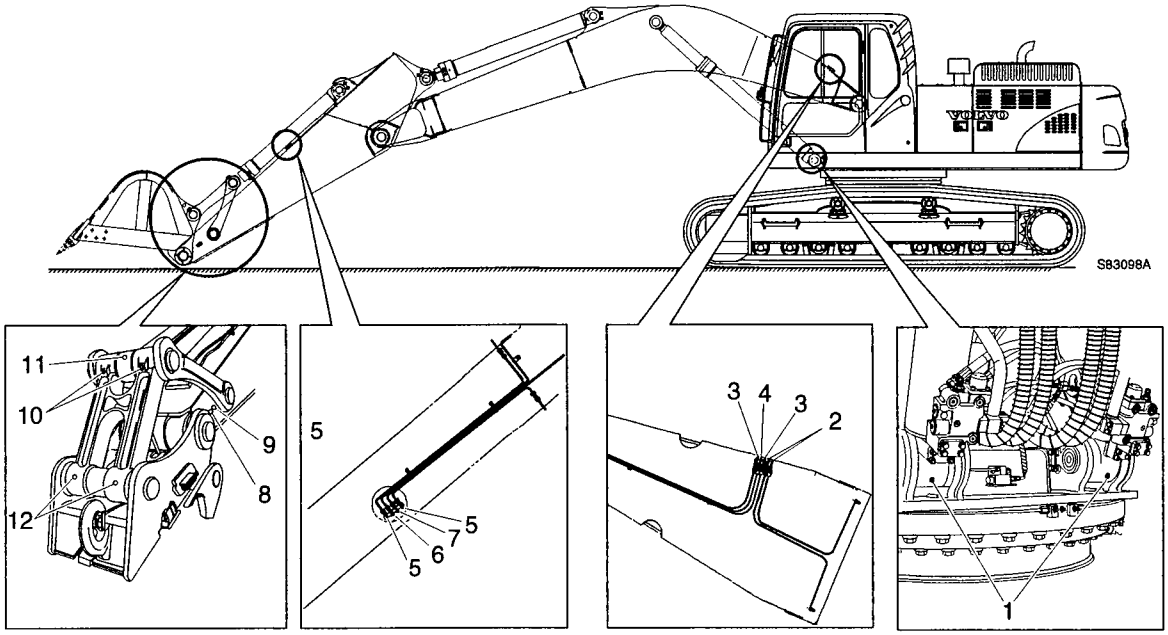
Refilling grease to attachment

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 211.



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 Pin between boom and arm (2 points)
6 Arm cylinder rod end pin (1 point)
7 Bucket cylinder mounting pin (1 point)
8 Pin between of arm and bucket (1 points)
9 Pin between of arm and link (1 point)
10 Pin between of connecting rod and link (2 points)
11 Bucket cylinder rod end pin (1 point)
12 Pin between of bucket and connecting rod (2 points)

Refilling grease to attachment

Long last bushing (Option)

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 boom and arm linkages (point 1 ~ point 7) Every 500 Service Hours or 3 months but the bucket linkages (point 8 ~ point 12) 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.

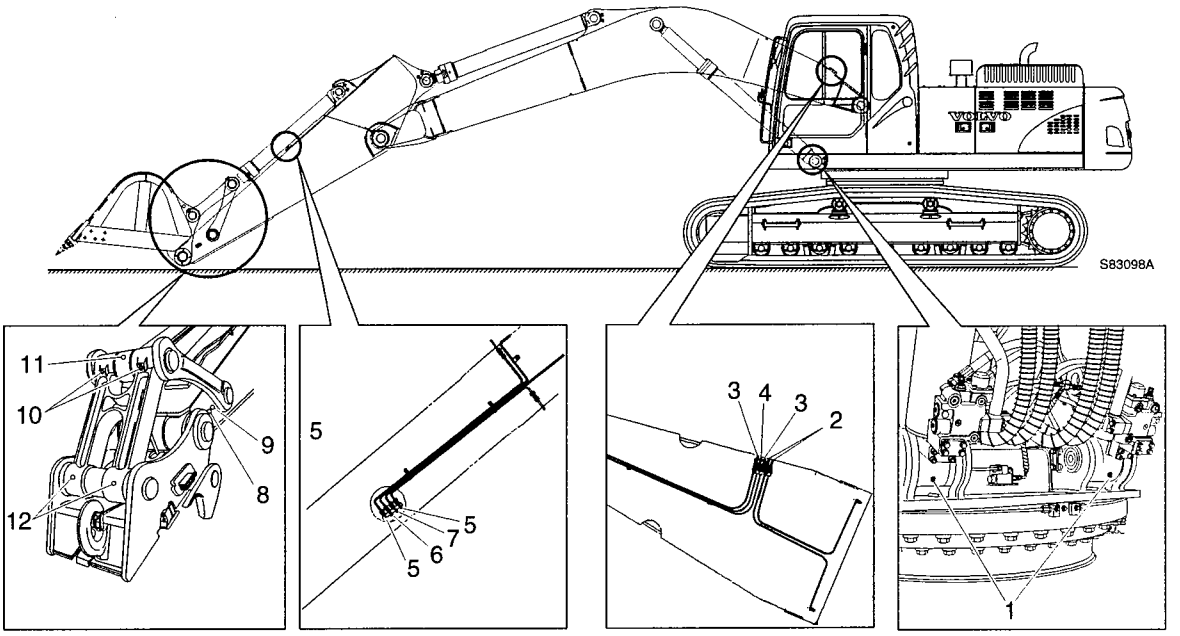
In manual refilling, lower the attachment to the ground as illustrated, and stop the engine.

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 211.



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 Pin between of boom and arm (2 points)
6 Arm cylinder rod end pin (1 point)
7 Bucket cylinder mounting pin (1 point)
8 Pin between of arm and bucket (1 point)
9 Pin between of arm and link (1 point)
10 Pin between connecting rod and link (2 points)
11 Bucket cylinder rod end pin (1 point)
12 Pin between bucket and connecting rod (2 points)

Recommended grease

Manufacturer	Product name	
	Recommendations	Alternatives*
CALTEX	Molytex EP	Multifak EP2
GULF	Gulflex Moly EP	Gulfcrown EP2
EXXONMOBIL	Beacon EP2 Moly	Beacon EP2
SHELL	Retinax HDX2 / Alvania HDX2	Retinax EP2 / Alvania EP2
TOTAL	Multis MS2	Multis EP2
CASTROL	Pyro LM	Pyroplex Red

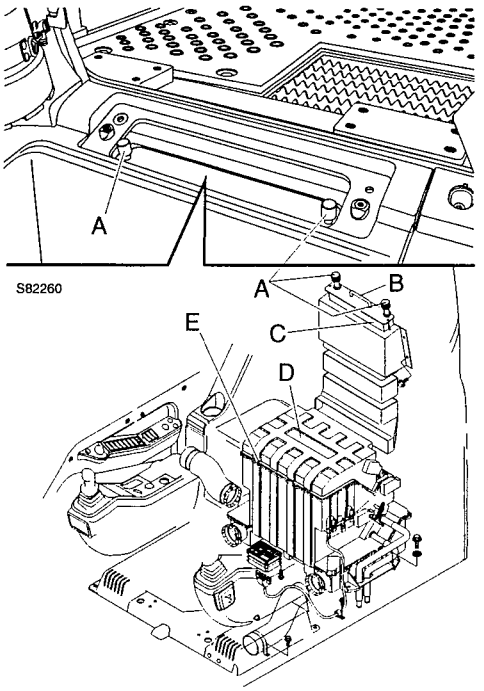
* Alternatives are not recommended when the ambient temperature is above 40 °C.

Mixability of types of grease with different additives

	Mixability of types of grease with additives					
	Lithium	Calcium	Lithium complex	Calcium complex	Aluminium complex	Clay
Lithium	√	√	√			
Calcium	√	√	√			√
Lithium complex	√	√	√	√		
Calcium complex			√	√		
Aluminium complex			√		√	
Clay		√			√	√

√: Acceptable

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.

Clean the ambient filter every 250hours and main filter every 500hours.

Change air conditioner/heater filter (ambient and main) every 1000 hours or 6 months

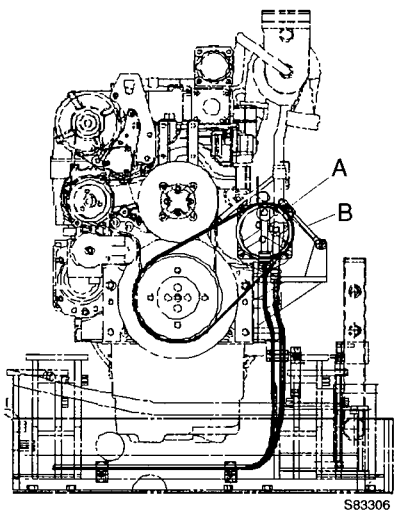
If the air conditioner filter is clogged, the air flow will be reduced and cooling / heating capacity will also be reduced.

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 Install the filter, and assemble it in reverse order.

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).

Track slack

Inspecting and adjusting the track slack

Check the slack every 100 hours.

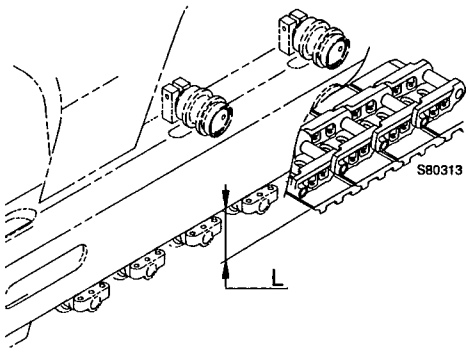
WARNING!

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.



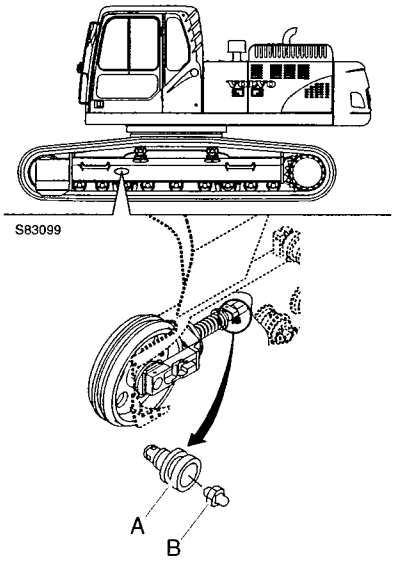
Inspection

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.

- Adjust the track slack according to the soil characteristics. The standard track slack according to the soil characteristics.

Working condition	L: Clearance (mm)
General soil	320 – 340
Rocky ground	300 – 320
Moderate soil like gravel, sand, snow, etc.	340 – 360



Track slack, adjusting

WARNING!

Valve (A) may suddenly dislodged 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

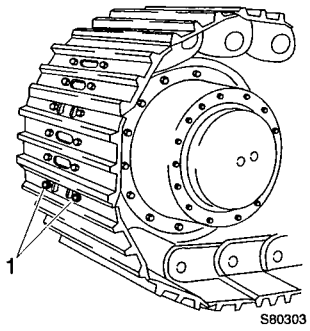
1 Fill the grease through grease nipple (B) using a high pressure grease gun.
2 To check the slack, move the machine forward and rearward.
3 Check the slack again. If the slack is not correct, adjust it again.

Loosening track tension - increasing slack

WARNING!

Valve (A) may suddenly dislodged 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 drained smoothly, move the machine forward and backward. 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

Tightening track shoe bolts

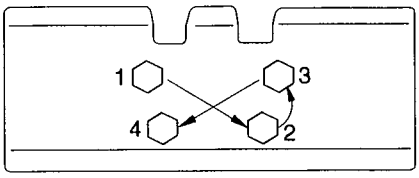
Check the shoe bolts daily.

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, 85 ± 5 kgf·m.

Retightening

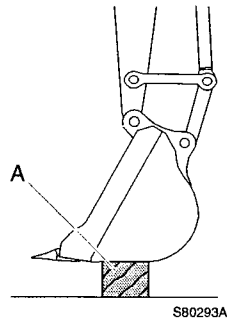
After tightening with a torque of 85 ± 5 kgf·m check whether the nut and the shoe are in full contact with the mating surfaces of the link.

Tightening order:
Tighten the bolts in the order as shown in the figure.



S80304

Replacing bucket teeth



Change the bucket teeth before the adaptors wear away.

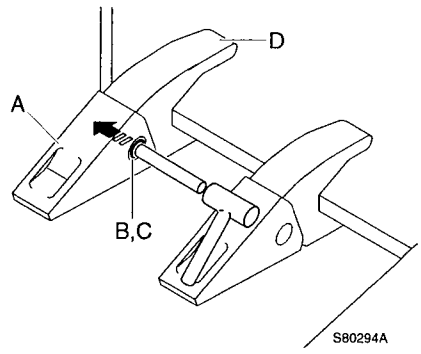
WARNING!

When changing the bucket teeth, always:
Lower the bucket to the ground, replace it in the easiest posture for working and 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 81.***

WARNING!

Before removing the locking pins, always wear eye protection.



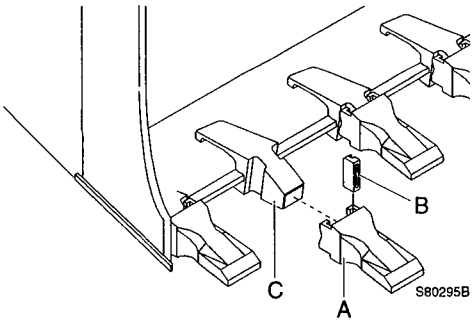
Standard type (transverse pin), Korea

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

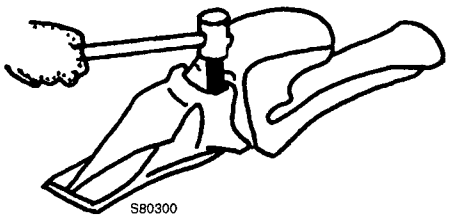
1 Drive out locking pin (B) using a hammer and punch.
Turn tooth (A) counter-clockwise and pull it off.

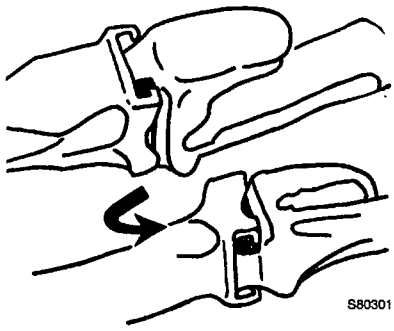
2 Thoroughly clean adapter (C), remove all mud and rust.
Push a new tooth (A) onto adapter (C) and turn it clockwise until the tooth is properly seated, ensuring that the retaining pin hole and groove are aligned.

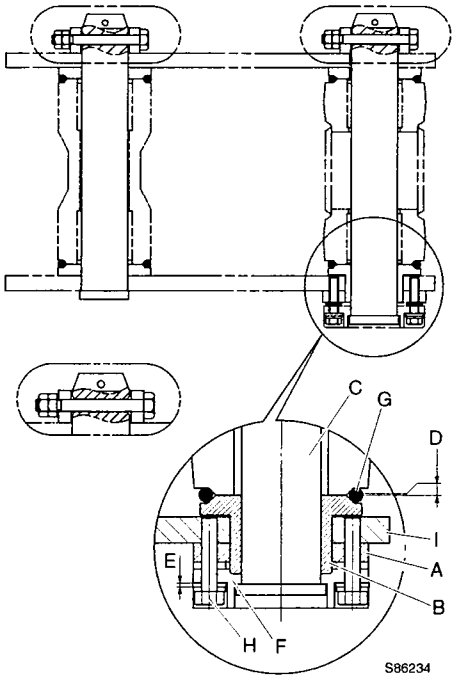
3 After fitting the tooth, insert a new lock pin (B) into the pin hole and groove and lightly tap it into position.

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 sideway 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.







Bucket, adjustment of bucket clearance

1 Park the machine on a level, firm surface and lower the bucket (A) to the ground.
2 Slide code rings (G) out of the way.
3 Slowly operate the slew control lever until the right arm boss and bucket boss are in full face to face contact (no gap).
4 Engage the safety control lever to prevent the digging unit moving and stop the engine.
5 Measure clearance (D) between bushing (B) and bucket bracket (I).
6 Loosen screws (H) and ADD or REMOVE shims to obtain the correct clearance. (Use the same quantity of split shims on each half.)
7 After the shim adjustment, tighten screws (H) to specified torque, 27 kgf·m (195 lbf·ft)
8 Check clearance (D), adjust if required.
9 Slide code rings (G) back into position.

NOTE :
Original shim quantity (E) is 12 (= 6 × 2).

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

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

NOTE :
Bucket clearance standard (D) = 0.5 ~ 2.0 mm (0.02 ~ 0.08 in)

NOTE :
Lubricate bushing (B) outer diameter with an anti–seize compound or grease.

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:

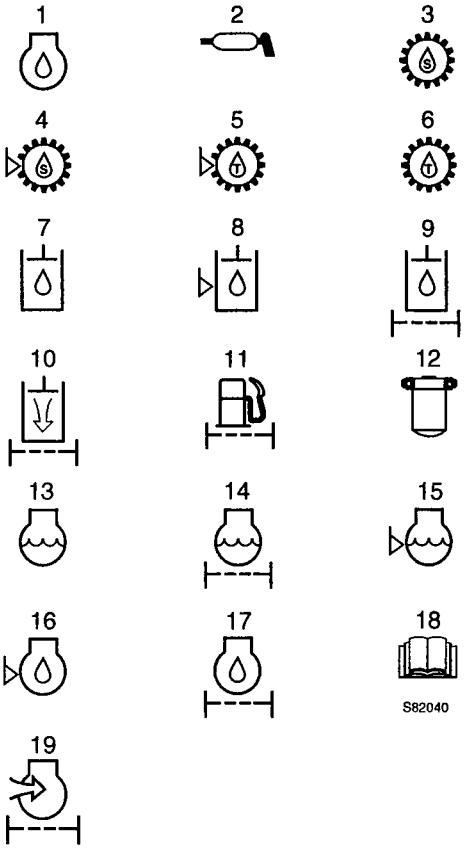
- To supply grease to the bearing, to reduce wear between the pin and the bearing.
- To replace old, dirty grease. The grease stored inside the outer seal collects dirt and water and prevents them from penetrating into the bearing.

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"

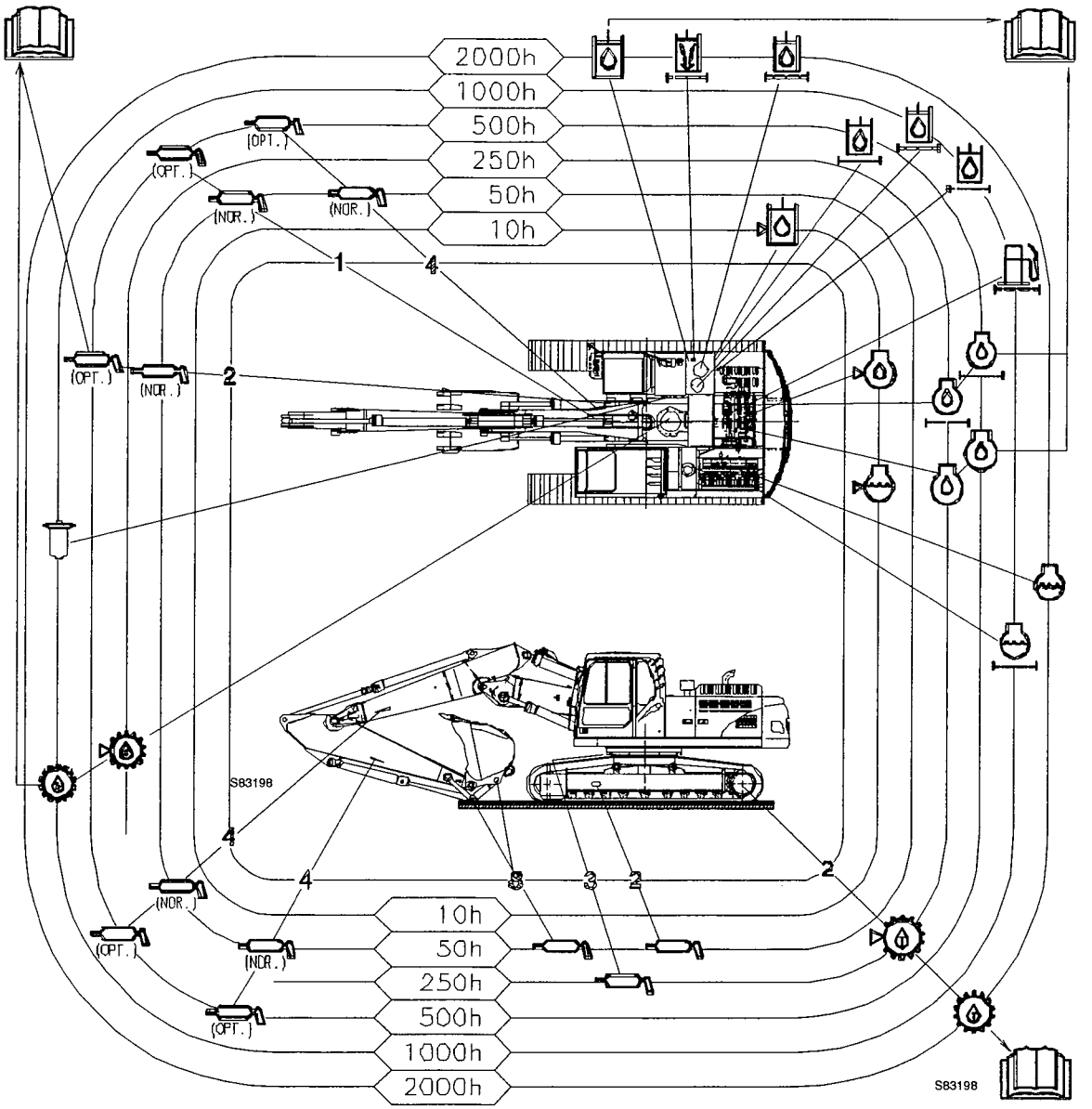
These standard symbols are used in the Lubrication and service chart, see the adjacent table.



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

Lubrication and service chart

10 (daily), 50, 250, 500, 1000 and 2000 hour services



Checks, oil changes and lubrication

Measure	page
Daily = every 10 hours	
Check:	
Engine oil level	163
Draining water from water separator	168
Coolant level	174
Alternator belt tension	179
Hydraulic oil level	182
Tightening of track shoe bolts	199

Measure	page
Daily = every 50 hours	
Lubricate:	
Grease to attachment	193

Measure	page
Every 100 hours **After you have carried out Daily and 50 hour services:**	
Check:	
Inspecting and adjusting track slack	197
Clean: (if required)	
Sediment from fuel tank	166

Measure	page
Every 200 hours **After you have carried out Daily, 50 and 100 hour services:**	
Change:	
Element of return filter for hammer circuit	186

Measure	page
Every 250 hours **After you have carried out Daily, 50, 100 and 200 hour services:**	
Check:	
Battery electrolyte level	178
Oil level of swing drive unit	188
Oil level of track drive unit	190
Lubricate:	
Grease to slewing gear bearing	192

Measure	page
Every 500 hours **After you have carried out Daily, 50, 100, 200, and 250 hour services:**	
Check:	
Density of anti-freeze	174
Grease of swing bath	192
Water pump, fan belt tension	176
Change:	
Engine oil and filter (CH-4) (First change after 250 hours)	163, 165 214 165
Fuel filter	167
Water separator element	168
Hydraulic cartridge of drain filter (First change after 250 hours)	184
Clean:	
Radiator, oil cooler and condenser fin	173

Measure	page
Every 1000 hours **After you have carried out Daily, 50, 100, 200, 250 and 500 hour services:**	
Change:	
Air cleaner primary filter	172
Coolant filter	176
Hydraulic oil return filter (First change after 250 hours)	184
Hydraulic element of pilot filter (First change after 250 hours)	185
Oil of swing drive unit (First change after 500 hours)	188

Measure	page
Every 1500 hours **After you have carried out Daily, 50, 100, 250, and 500 hour services:**	
Check:	
Valve clearance, adjusting	161

Measure	page
Every 2000 hours	
After you have carried out Daily, 50, 100, 200, 250, 500 and 1000 hour services:	
Change:	
Fuel tank air ventilation filter	166
Air cleaner secondary filter	172
Coolant (coolant filter not equipped machine)	175
Hydraulic oil	183
Air breather element on hydraulic tank (if required)	185
Oil of track drive unit (First change after 500 hours)	190
Clean:	
Suction strainer (hydraulic tank)	185

Measure	page
Every 3000 hours	
After you have carried out Daily, 50, 100, 200, 250, 500, 1000 and 1500 hour services:	
Change:	
Coolant (3000 hours if coolant filter is equipped) **(6000 hours : with VCS coolant)**	175

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

210 Periodic replacement of safety critical parts

Specifications

Recommended lubricants

System	Oil grade	Recommended viscosity at varying ambient temperature
	°C	-30 -20 -10 0 +10 +20 +30 +40 +50
	°F	-22 -4 +14 +32 +50 +68 +86 +104 +122
Engine	Engine oil VDS-3 or Global DHD-1 + VDS-2 or ACEA-E5 + VDS-2 or API CH-4 + VDS-2	SAE5W-30 SAE 10W-30 *SAE 15W-40 SAE 30 SAE 40
Track reduction gearbox	Gear oil (with EP additive) API GL4 or GL5	*SAE 90 SAE 140
Swing gearbox	Gear oil (with EP additive) API GL4 or GL5	*SAE 90 SAE 140
Swing ring gear (Bath and Ball)	Grease	Multi purpose EP-grease NLGI 2
Hydraulic system	Hydraulic oil (Anti-wear hydraulic oil with high viscosity index 160 or more)	ISO VG32 HV ISO VG46 HV ISO VG68 HV
	Bio oil (based on synthetic ester)	Bio oil VG32 Bio oil VG46
Pin and bushing	Grease (Multi purpose EP-grease NLGI 2)	*ISO-L-XBCFB2
Fuel	Diesel fuel	ASTM D975 No.1 *ASTM D975 No. 2
Cooling system	Coolant	Use the same coolant as filled before, see page 174.
Air conditioner system	Refrigerant	HFC R134a
	°C	-30 -20 -10 0 +10 +20 +30 +40 +50
	°F	-22 -4 +14 +32 +50 +68 +86 +104 +122

* : Installed at factory.

NOTE! When starting the engine in an ambient temperature of lower than 0°C, be sure to use engine oil of SAE 10W, SAE 10W–30 and SAE 15W–40, even though the ambient temperature goes up to 10°C more or less in the day time.

NOTE! The fuel should at least meet the legal requirement, and national and international standards for marketed fuels, for example : EN590 (with nationally adapted temperature requirements), ASTM D975 No 1D and 2D, JIS KK 2204.

NOTE! Sulphure content : According to current legal requirements (the sulphur content should not exceed 0.3 percent by weight)

The content of Volvo coolant must not be less than 40% of the total mixture.

Coolant

Use the same coolant as the system is already filled with, see page 174. Do not mix different coolants or corrosion protection as this may result in engine damages.

If using concentrated coolant and clean water, the mixture should contain 40–60% concentrated coolant and 60–40% clean water. The content of coolant must not be less than 40% of the total mixture, see table below.

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

The concentrated coolant must not be mixed with water that contains a high degree of lime (hard water), salt or metals.

The clean water for the cooling system must also meet the following requirements:

Description	Value
Total number of solid particles	< 340 ppm
Total hardness	< 9.5 ° dH
Chloride	< 40 ppm
Sulphate	< 100 ppm
pH value	5.5–9

Description	Value
Silica	< 20 mg SiO_2/litre
Iron	< 0.10 mg Fe/litre
Manganese	< 0.05 mg Mn/litre
Electrical conductivity	< 500 µS/cm
Organic content, COD-Mn	< 15 mg/litre

If in doubt of the water's quality, use a ready-mixed coolant. Do not mix different ready-mixed coolants as this may result in engine damages.

Capacities, Intervals between changes/replacements

Capacities

	Total	
	Liters	US gal
Engine oil including filter	25	6.6
Cooling system	27.5	7.3
Hydraulic tank	160	42
Hydraulic system total	275	72.6
Swing gearbox (each)	6.0	1.6
Track gearbox (each)	5.8	1.5
Fuel tank	350	92.4
Swing ring gear	17	4.5

Intervals between changes

Changing oil and fluid

	Hours	Page no.
Engine oil	500 (CH-4)	163
Changing coolant	-	175
Hydraulic oil	2000	183
Oil of swing drive unit	1000 (1st 500)	188
Oil of track drive unit	2000 (1st 500)	190

Changing filter

	Hours	Page no.
Engine oil filter	500 (CH-4)	165
Fuel filter	500	167
Water separator element	500	168
Air cleaner primary filter	1000	171
Air cleaner secondary filter	2000	172
Coolant filter	1000	176
Air conditioner/heater filter	1000	196
Hydraulic system		
Catridge of drain filter	500 (Initial 250)	184
Oil return filter	1000 (Initial 250)	184
Element of pilot filter	1000 (Initial 250)	185
Air breather element on hydraulic tank (if required)	2000	185

Specifications

Engine

Make	Volvo D6DEAE2
Type	4–stroke, 6–cylinder, straight, water cooled, direct injection, diesel engine, turbocharger, inter cooled
Rated output (Net)	145 PS/ 1900 rpm
Maximum torque (Net)	66 kgf·m/ 1425 rpm
Bore ×Stroke	98 mm × 126 mm
Total displacement	5.7 *l*
Compression ratio	18.4: 1
Low idle (No-load)	800 rpm ±40
High idle (No-load)	2000 rpm ±40
Firing order	1– 5 – 3 – 6 – 2 – 4
Lubrication	Forced circulation
Oil Pressure (Rated)	200 ~ 500 kPa
Valve clearance	Intake 0.3 mm Exhaust 0.5 mm

Fuel system

Nozzle pressure	25 MPa
Fuel injection pump	MVS
Fuel consumption (rated)	216 g/kw·hr

Electrical system

Starter	4.8 kW
Battery	12 V × 2 EA
Horn sound level at 7m	95 ± 5 dB
Head light type	Halogen (70 W)

Hydraulic system

Main pump

Model	K3V112DT
Type	Variable displacement axial piston pump

Pilot pump

Type	Fixed gear
Displacement	10 cc/rev
Relief pressure	40 kgf/cm^2 (569 psi)

Main control valve

Model	UX28
Main relief pressure	330/ 350 kgf/cm^2 (STD/ Boost pressure) 4690/ 4980 psi (STD/ Boost pressure)
Port relief pressure	355 kgf/cm^2 (5050 psi) (Boom/ Arm/ Bucket, option BL2) 150/ 365 (Option AL2, STD/ High)

Track motor and reduction gear

Track motor

Model	EM140
Type	Variable displacement axial piston motor
Rated pressure	350 kgf/cm^2 (4980 psi)

Gear box

Type	3 stage planetary
Brake type	Wet disc, spring applied, hydraulic release

Swing motor and reduction gear

Swing motor

Model	M2 x 120
Type	Fixed swash plate, piston motor
Rated pressure	270 kgf/cm^2 (3840 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

Cab, specifications

Operator seat

This machine is equipped with an operator seat, which meets the criteria of EN ISO 7096.

Vibration and sound information

Hand-arm vibrations

Emission of Hand-Arm Vibration during real operating conditions at its intended use is less than 2.5 m/s^2 RMS (root mean square) acceleration according to ISO 8041.

Whole-body vibrations

Emission of Whole-Body Vibration during real operating conditions at its intended use is less than 0.5 m/s^2 RMS (root mean square) acceleration, according to ISO 8041 for excavating.

Emission of Whole-Body Vibration during real operating conditions at its intended use is according to the table below.

Typical operation conditions	Vibration emission value $a_{w,eqx}$ (m/s^2 RMS)	Vibration emission value $a_{w,eqy}$ (m/s^2 RMS)	Vibration emission value $a_{w,eqz}$ (m/s^2 RMS)
Excavating	**0,3**	**0,2**	**0,3**
Hydraulic break application	**0,3**	**0,2**	**0,6**
Mining application	**0,5**	**0,3**	**0,6**
Transfer movement	**0,3**	**0,2**	**0,8**

The following vibration directions are defined:

X = fore and aft

Y = lateral

Z = vertical

The whole-body vibration values given above have been taken from ISO/CEN Technical Report XXXXXXX (under development).

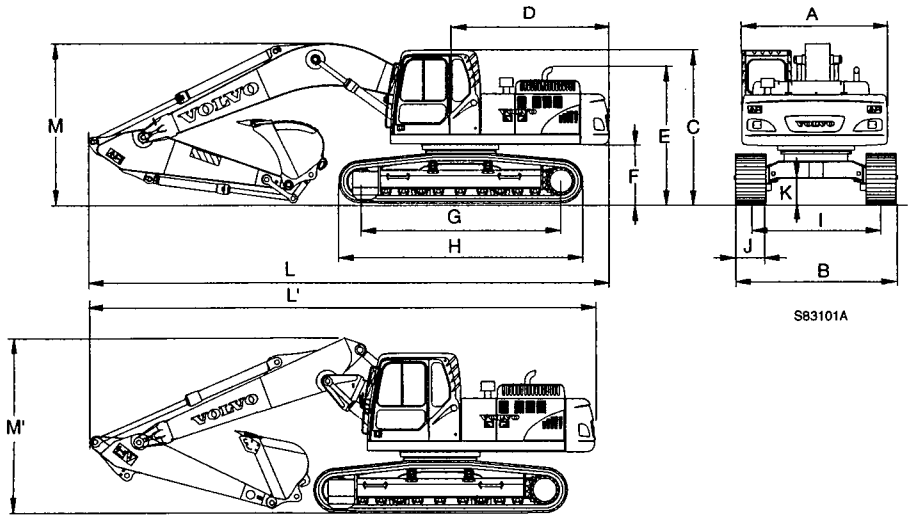
NOTE! These whole-body vibration emission values were determined at particular operating and terrain conditions and are therefore not representative for all the various conditions in accordance with the intended use of the machine and should not alone be used to determine the whole-body vibration exposure to the operator using the machine. For this purpose the information in ISO/CEN Technical Report XXXXXXX is recommended.

To ensure that the whole-body vibration emission during machine use is kept to a minimum, see **page 93**.

Sound information

Sound pressure level (LpA) at operator position (Measurement according to ISO 6396)	72 LpA dB(A)
Sound power level (LwA) around the machine (Measurement according to 2000/14/EC with applicable appendices and measuring method according to ISO 6395)	102 LwA dB(A)

Dimensions

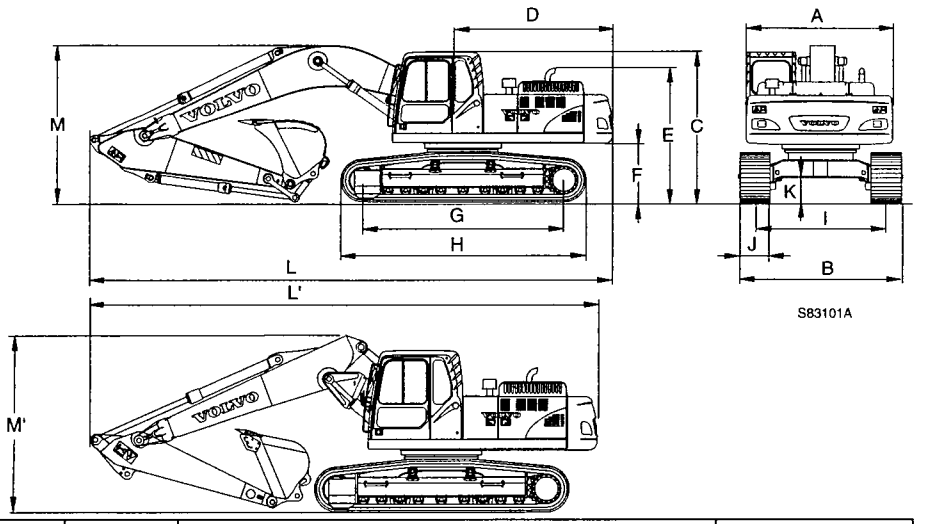


Description	Unit	LC		
		5.7 m Boom 18' 8"		
		2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	3.9 m Arm 12' 10"
A. Overall width of superstructure	mm ft in	2700 (8' 10")	2700 (8' 10")	2700 (8' 10")
B. Overall width	mm	2990	2990	2990
B. Overall width (North America)	mm ft in	3190 (10' 6")	3190 (10' 6")	3190 (10' 6")
		2890 (9' 5")	2890 (9' 5")	2890 (9' 5")
C. Overall height of cab		2930 (9' 7")	2930 (9' 7")	2930 (9' 7")
D. Tail swing radius (Casting Counterweight)		2750 (9' 0")	2750 (9' 0")	2750 (9' 0")
E. Overall height of engine hood		2331 (7' 8")	2331 (7' 8")	2331 (7' 8")
F. *Counterweight clearance		1025 (3' 4")	1025 (3' 4")	1025 (3' 4")
G. Tumbler length		3660 (12' 0")	3660 (12' 0")	3660 (12' 0")
H. Track length		4460 (14' 8")	4460 (14' 8")	4460 (14' 8")
I. Track gauge		2390 (7' 10")	2390 (7' 10")	2390 (7' 10")
J. Shoe width	mm	600	600	600
J. Shoe width (North America)	mm ft in	800 (2' 7")	800 (2' 7")	800 (2' 7")
		500 (1' 7")	500 (1' 7")	500 (1' 7")
K. *Minimum ground clearance		460 (1' 6")	460 (1' 6")	460 (1' 6")
L. Overall length		9650 (31' 7")	9590 (31' 5")	9570 (31' 4")
L'. Overall length (2 pieces boom)		9610 (31' 6")	9570 (31' 4")	9470 (31' 1")
M. Overall height of boom		3120 (10' 3")	3000 (9' 10")	3550 (11' 8")
M'. Overall height of boom (2 pieces boom)		3040 (9' 11")	2960 (9' 9")	3630 (11' 11")

*** Without shoe grouser**

LC: Long crawler

NLC: Narrow long crawler



Description	Unit	NLC			LR
		5.7 m Boom 18' 8"			8.85 m Boom 29' 0"
		2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	3.9 m Arm 12' 10"	6.25 m Arm 20' 6"
A. Overall width of superstructure	mm ft in	2540 8' 4"	2540 8' 4"	2540 8' 4"	2710 8' 11"
B. Overall width	mm	2540	2540	2540	3190
B. Overall width (North America)	mm ft in	2540 8' 4"	2540 8' 4"	2540 8' 4"	-
C. Overall height of cab		2930 9' 7"	2930 9' 7"	2930 9' 1"	2930 9' 7"
D. Tail swing radius (Casting Counterweight)		2750 9' 1"	2750 9' 1"	2750 9' 4"	2750 9' 0"
E. Overall height of engine hood		2331 7' 8"	2331 7' 8"	2331 7' 8"	2331 7' 8"
F. *Counterweight clearance		1025 3' 4"	1025 3' 4"	1025 3' 4"	1025 3' 4"
G. Tumbler length		3370 11' 1"	3370 11' 1"	3370 11' 1"	3660 12' 0"
H. Track length		4170 13' 8"	4170 13' 8"	4170 13' 8"	4460 14' 8"
I. Track gauge		2040 6' 8"	2040 6' 8"	2040 6' 8"	2390 7' 10"
J. Shoe width	mm	500	500	500	800
J. Shoe width (North America)	mm ft in	500 1' 8"	500 1' 8"	500 1' 8"	-
K. *Min. ground clearance		460 1' 6"	460 1' 6"	460 1' 6"	460 1' 6"
L. Overall length		9650 31' 8"	9590 31' 6"	9570 31' 5"	12810 42' 0"
L'. Overall length (2pieces boom)		9610 31' 6"	9570 31' 5"	9470 31' 1"	-
M. Overall height of boom		3120 10' 3"	3000 9' 10"	3550 11' 8"	3150 10' 4"
M'. Overall height of boom (2pieces boom)		3040 9' 12"	2960 9' 9"	3630 11' 11"	-

*** Without shoe grouser**
LC: Long crawler
NLC: Narrow long crawler
LR: Long reach

Bucket & arm combination

Volvo bucket and LC undercarriage

Description			Direct fit-GP bucket			Quick fit-GP bucket	
Bucket capacity: SAE : CECE			950 *l* 1.24 yd^3 860 *l*	1100 *l* 1.44 yd^3 990 *l*	1250 *l* 1.64 yd^3 1120 *l*	950 *l* 1.24 yd^3 860 *l*	1100 *l* 1.44 yd^3 990 *l*
Cutting width			1050 mm	1180 mm	1310 mm	1050 mm	1180 mm
Weight			765 kg	815 kg	880 kg	715 kg	762 kg
No. of teeth			4	4	5	4	4
Application			General purpose				
Boom 5.7 m + Arm 2.9 m		3700 kg Counterweight	B	C	D	C	C
Boom 6.0 m + Arm options	2.5 m		A	C	C	B	C
	2.9 HD m		B	C	D	C	C
	3.9 m		C	D	D	D	D

A: Applicable for general purpose up to 2000 kg/m^3
B: Applicable for general purpose up to 1800 kg/m^3
C: Applicable for general purpose up to 1500 kg/m^3
D: Applicable for general purpose up to 1200 kg/m^3
E: Not available

Volvo bucket and LC undercarriage

Description			Direct fit-GP bucket			Quick fit-GP bucket	
Bucket capacity: SAE : CECE			950 *l* 1.24 yd^3 860 *l*	1100 *l* 1.44 yd^3 990 *l*	1250 *l* 1.64 yd^3 1120 *l*	950 *l* 1.24 yd^3 860 *l*	1100 *l* 1.44 yd^3 990 *l*
Cutting width			1050 mm	1180 mm	1310 mm	1050 mm	1180 mm
Weight			765 kg	815 kg	880 kg	715 kg	762 kg
No. of teeth			4	5	5	4	5
Application			General purpose				
Boom 5.7 m + Arm 2.9 m		4200 kg Counterweight	A	C	C	B	C
Boom 6.0 m + Arm options	2.5 m		A	B	C	A	B
	2.9 HD m		B	C	C	B	C
	3.9 m		C	D	D	C	D

A: Applicable for general purpose up to 2000 kg/m^3
B: Applicable for general purpose up to 1800 kg/m^3
C: Applicable for general purpose up to 1500 kg/m^3
D: Applicable for general purpose up to 1200 kg/m^3
E: Not available

Maximum permitted buckets for direct fit (standard counterweight)

Undercarriage		Unit	LC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 3700 kg 8160 lb	l yd^3	1450 1.90	1350 1.77	1325 1.73	1150 1.50
GP bucket 1.8 t/m^3 3030 lb/yd^3			1250 1.64	1175 1.54	1150 1.50	1000 1.31
RB bucket 1.8 t/m3 3030 lb/yd^3			1100 1.44	1050 1.37	1025 1.34	900 1.18
RB bucket 2.0 t/m^3 3370 lb/yd^3			1025 1.34	975 1.28	950 1.24	825 1.08

Maximum permitted buckets for quick fit (standard counterweight)

Undercarriage		Unit	LC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 3700 kg 8160 lb	l yd^3	1375 1.80	1275 1.67	1250 1.64	1100 1.44
GP bucket 1.8 t/m^3 3030 lb/yd^3			1200 1.57	1125 1.47	1100 1.44	950 1.24
RB bucket 1.8 t/m^3 3030 lb/yd^3			1200 1.57	1125 1.47	1100 1.44	950 1.24
RB bucket 2.0 t/m^3 3370 lb/yd^3			1050 1.37	1000 1.31	975 1.28	850 1.11

Maximum permitted buckets for direct fit (option counterweight)

Undercarriage		Unit	LC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 4200 kg 9260 lb	l yd^3	1550 2.03	1450 1.90	1425 1.86	1250 1.64
GP bucket 1.8 t/m^3 3030 lb/yd^3			1350 1.77	1275 1.67	1250 1.64	1100 1.44
RB bucket 1.8 t/m3 3030 lb/yd^3			1200 1.57	1125 1.47	1100 1.44	950 1.24
RB bucket 2.0 t/m^3 3370 lb/yd^3			1100 1.44	1025 1.34	1000 1.31	900 1.18

Maximum permitted buckets for quick fit (option counterweight)

Undercarriage		Unit	LC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 4200 kg 9260 lb	l yd^3	1475 1.93	1375 1.80	1350 1.77	1175 1.54
GP bucket 1.8 t/m^3 3030 lb/yd^3			1300 1.70	1200 1.57	1175 1.54	1025 1.34
RB bucket 1.8 t/m^3 3030 lb/yd^3			1300 1.70	1200 1.57	1175 1.54	1025 1.34
RB bucket 2.0 t/m^3 3370 lb/yd^3			1150 1.50	1075 1.41	1050 1.37	900 1.18

Maximum permitted buckets for direct fit

Undercarriage		Unit	NLC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 4800 kg 10582 lb	l yd^3	1375 1.80	1300 1.70	1275 1.67	1125 1.47
GP bucket 1.8 t/m^3 3030 lb/yd^3			1200 1.57	1125 1.47	1050 1.37	975 1.28
RB bucket 1.8 t/m3 3030 lb/yd^3			1075 1.41	1000 1.31	975 1.28	850 1.11
RB bucket 2.0 t/m^3 3370 lb/yd^3			1000 1.31	925 1.21	900 1.18	800 1.05

Maximum permitted buckets for quick fit

Undercarriage		Unit	NLC			
Monobloc Boom			5.7 m Boom 18' 8"			
Dipper Arm			2.5 m Arm 8' 2"	2.9 m Arm 9' 6"	2.9 m HD Arm 9' 6"	3.9 m Arm 12' 10"
GP bucket 1.5 t/m^3 2530 lb/yd^3	Counterweight 4800 kg 10582 lb	l yd^3	1325 1.73	1225 1.60	1200 1.57	1050 1.37
GP bucket 1.8 t/m^3 3030 lb/yd^3			1150 1.50	1075 1.41	1050 1.37	925 1.21
RB bucket 1.8 t/m^3 3030 lb/yd^3			1025 1.34	950 1.24	925 1.21	800 1.05
RB bucket 2.0 t/m^3 3370 lb/yd^3			950 1.24	875 1.14	850 1.11	750 0.98

Boom & Arm

Boom

Description		5.7 m 18' 8"	5.7 m HD 18' 8"	5.57 m 2-pieces 18' 3"
Length	mm ft in	5910 19' 5"	5910 19' 5"	5780 18' 12"
Height		1585 5' 2"	1585 5' 2"	1570 5' 2"
Width		670 2' 2"	670 2' 2"	670 2' 2"
Weight *	kg lb	1785 3940	1890 4170	2090 4610

*** Includes cylinder, piping and pin**

Arm

Description		2.5 m 8' 2"	2.9 m 9' 6"	2.9 m 9' 6"	3.9 m 12' 10"
Length	mm ft in	3530 11' 7"	3900 12' 10"	3900 12' 10"	4940 16' 2"
Height		880 2' 11"	880 2' 11"	880 2' 11"	820 2' 8"
Width		440 1' 5"	440 1' 5"	440 1' 5"	440 1' 5"
Weight *	kg lb	975 2150	1000 2210	1085 2390	1135 2500

*** Includes cylinder, pin and linkage**

Digging forces with direct fit bucket

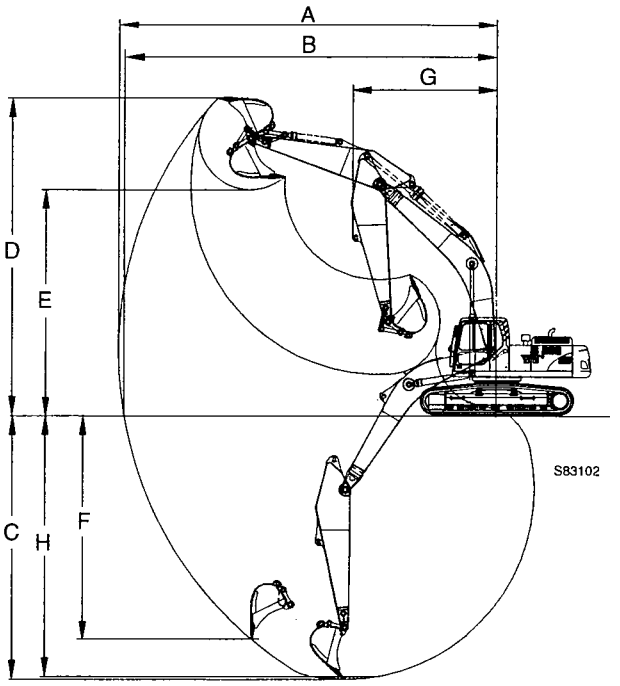
Description		Unit	5.57 m Boom 18' 3"		
			2.5m Arm 8' 2"	2.9 m Arm 9' 6"	3.9 m Arm 12' 10"
Bucket radius		mm ft in	1470 58"	1470 58"	1470 58"
Breakout force	Normal, SAE	kN (kg) lb	122.6 12500 27560	122.6 12500 27560	122.6 12500 27560
	Power boost, SAE	kN (kg) lb	130.4 133 00 29330	130.4 133 00 29330	130.4 133 00 29330
	Normal, ISO	kN (kg)	136.3 13900	136.3 13900	136.3 13900
	Power boost, ISO	kN (kg)	147.1 15000	147.1 15000	147.1 15000
Tearout force	Normal, SAE	kN (kg) lb	110.4 11260 24830	95.6 9750 21500	80.2 8180 18040
	Power boost, SAE	kN (kg) lb	117.2 11950 26350	103.0 10500 23150	86.3 8800 19400
	Normal, ISO	kN (kg)	113.7 11600 25580	98.2 10010 22070	81.9 8350 18410
	Power boost, ISO	kN (kg)	120.7 12310 27140	104.9 10700 23590	88.3 9000 19850
Rotation angle, bucket		deg	175	175	174

Digging forces with direct fit bucket

Description		Unit	5.7 m 2-pieces Boom 18' 8"			8.85 m Boom 5.57 m Arm 18' 3"
			2.5m Arm 8' 2"	2.9 m Arm 9' 6"	3.9 m Arm 12' 10"	
Bucket radius		mm ft in	1470 58"	1470 58"	1470 58"	1250 49"
Breakout force	Normal, SAE	kN (kg) lb	122.6 12500 27560	122.6 12500 27560	122.6 12500 27560	68.6 7000 15440
	Power boost, SAE	kN (kg) lb	130.4 133 00 29330	130.4 133 00 29330	130.4 133 00 29330	
	Normal, ISO	kN (kg)	136.3 13900	136.3 13900	136.3 13900	77.8 7930
	Power boost, ISO	kN (kg)	147.1 15000	147.1 15000	147.1 15000	
Tearout force	Normal, SAE	kN (kg) lb	110.4 11260 24830	95.6 9750 21500	80.2 8180 18040	44.1 4500 9920
	Power boost, SAE	kN (kg) lb	117.2 11950 26350	103.0 10500 23150	86.3 8800 19400	
	Normal, ISO	kN (kg)	113.7 11600 25580	98.2 10010 22070	81.9 8350 18410	44.7 4560
	Power boost, ISO	kN (kg)	120.7 12310 27140	104.9 10700 23590	88.3 9000 19850	
Rotation angle, bucket		deg	175	175	174	179

Working ranges

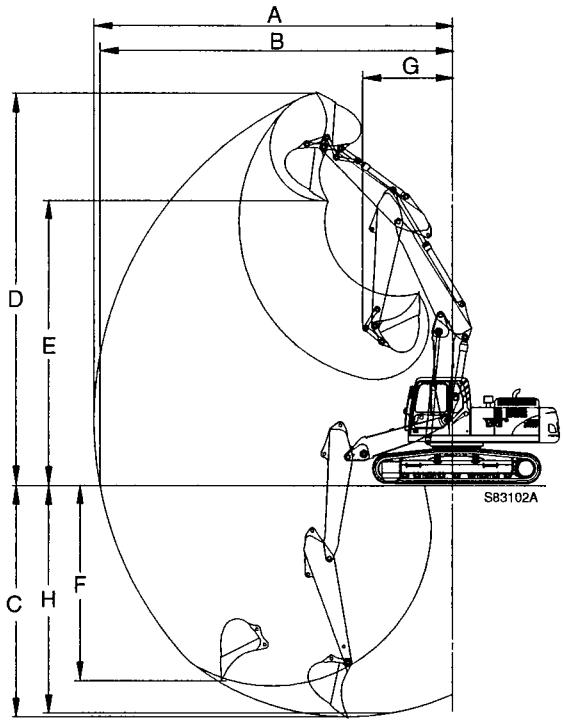
With direct fit GP bucket



Mono Boom

Description	Unit	5.7m Boom 18' 8"					
		2.5m Arm 8' 2"		2.9 m Arm 9' 6"		3.9 m Arm 12' 10"	
A. Maximum digging reach	mm ft in	9540	31' 4"	9940	32' 7"	10760	35' 4"
B. Maximum digging reach on ground		9350	30' 8"	9750	31' 12"	10610	34' 10"
C. Maximum digging depth		6330	20' 9"	6730	22' 1"	7730	25' 4"
D. Maximum cutting height		9220	30' 3"	9450	31' 0"	9620	31' 7"
E. Maximum dumping height		6430	21' 1"	6650	21' 10"	6850	22' 6"
F. Maximum vertical wall digging depth		5520	18' 1"	5830	19' 2"	6570	21' 7"
G. Minimum front swing radius		3670	12' 0"	3650	11' 12"	3640	11' 11"
H. Maximum digging depth (8' level)		6110	20' 1"	6510	21' 4"	7550	24' 9"

2-Pieces Boom



Description	Unit	5.57m Boom 18' 3"						8.85 m Boom 29' 0"	
		2.5m Arm 8' 2"		2.9 m Arm 9' 6"		3.9 m Arm 12' 10"		6.25 m Arm 20' 6"	
A. Maximum digging reach	mm ft in	9450	31' 0"	9840	32' 3"	10680	35' 0"	15810	51' 10"
B. Maximum digging reach on ground		9280	30' 5"	9680	31' 9"	10530	34' 7"	15710	51' 7"
C. Maximum digging depth		5930	19'5"	6300	20' 8"	7240	23' 9"	12100	39' 8"
D. Maximum cutting height		10390	34' 1"	10710	35' 2"	11180	36' 8"	13300	43' 8"
E. Maximum dumping height		7470	24' 6"	7780	25' 6"	8270	27' 2"	10950	35' 11"
F. Maximum vertical wall digging depth		4910	16' 1"	5320	17' 5"	6180	20' 3"	-	-
G. Minimum front swing radius		2740	8' 12"	2440	8' 0"	2840	9' 4"	-	-
H. Maximum digging depth (8' level)		5820	19' 1"	6200	20' 4"	7150	23' 5"	11990	39' 4"

Care and maintenance journal

Date	Hours	Signature	Notes

Date	Hours	Signature	Notes

Care and maintenance journal

Date	Hours	Signature	Notes

Date	Hours	Signature	Notes

Care and maintenance journal

Date	Hours	Signature	Notes

Date	Hours	Signature	Notes

Care and maintenance journal

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Care and maintenance journal

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Care and maintenance journal

Date	Hours	Signature	Notes

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