

# **OPERATOR'S MANUAL**

**TAD1341GE, TAD1342GE, TAD1343GE, TAD1344GE, TAD1345GE  
TAD1350GE, TAD1351GE, TAD1352GE, TAD1353GE, TAD1354GE, TAD1355GE  
TAD1340VE, TAD1341VE, TAD1342VE, TAD1343VE, TAD1344VE, TAD1345VE  
TAD1350VE, TAD1351VE, TAD1352VE, TAD1353VE**

**ENG** This Operator's Manual may be ordered in a different language free of charge up to 12 months after delivery, via internet.

<http://manual.volvopenta.com/coupon/>

If internet access isn't possible, please contact your Volvo Penta dealer.

**GER** Diese Betriebsanleitung kann bis zu 12 Monate nach der Lieferung über Internet kostenlos in einer anderen Sprache bestellt werden.

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Si no se tiene acceso a internet, contacten al su concesionario Volvo Penta.

**ITA** Il manuale per l'operatore può essere ordinato tramite Internet, in varie lingue e per consegna gratuita, entro 12 mesi dalla consegna del prodotto

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<http://manual.volvopenta.com/coupon/>

Εάν δεν είναι δυνατή η πρόσβαση στο ιαδίκτυο, παρακαλούμε επικοινωνήστε με το δικό σας αντιπρόσωπο της Volvo Penta.

**RUS** Данное руководство по эксплуатации можно бесплатно заказать на другом языке по Интернету в течение 12 месяцев после доставки.

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**TUR** Bu Kullanım Kılavuzu, teslimden 12 ay sonrasında kadar internet yoluyla ücretsiz olarak farklı bir dilde sipariş edilebilir.

<http://manual.volvopenta.com/coupon/>

İnternet mümkün değilse, lütfen Volvo Penta yetkili satışınızla temas geçin.

**CHI** 本操作手册可通过互联网以不同的语言进行订购，交付后可免费使用达12个月。

<http://manual.volvopenta.com/coupon/>

如果无法访问互联网，请与沃尔沃遍达经销商联系。

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Caso o acesso à internet não for possível, contatar seu distribuidor Volvo Penta.

**JPN** このオペレーターズ マニュアルの他言語版が、発行後最高12か月間、インターネットより無料で発注可能です。  
<http://manual.volvopenta.com/coupon/>  
インターネットにアクセスできない場合は、担当のボルボペンタディーラーまでご連絡ください。

#### CALIFORNIA PROPOSITION 65 WARNING

Engine exhaust, some of its constituents, and a broad range of engine parts are known to the State of California to cause cancer, birth defects, and other reproductive harm. Additionally, lubricants, fuels, and other fluids used in engines (including any waste created through the wearing of engine parts) contain or produce chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Battery posts, terminals, and related accessories contain lead and lead compounds. Wash your hands after handling. Used engine oil contains chemicals that have caused cancer in laboratory animals. Always protect your skin by washing thoroughly with soap and water.

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# Foreword

Volvo Penta engines are used all over the world. They are used in all possible operating conditions. This is not a coincidence. After 100 years as an engine manufacturer the Volvo Penta name has become a symbol of reliability, technical innovation, top-of-the-range performance and long service life. We also believe that this is what you demand and expect of your Volvo Penta engine.

We would like you to read this operator's manual thoroughly and follow the instructions we give on running and maintenance. Pay strict attention to the safety instructions contained in the manual.

We would also like to welcome you to our worldwide network of dealers and service workshops to assist you with technical advice, service requirements and replacement parts. Please contact your nearest authorized Volvo Penta dealer for assistance.

**Find your nearest dealer and a lot of other useful information by paying us a visit on our website at [www.volvopenta.com](http://www.volvopenta.com)**

# Safety Information

Read the Operator's Manual through very carefully before you start the engine or do any maintenance or service. It has to do with your safety; an incorrect operation can lead to personal injury and damage to products or property. This chapter describes how safety precautions are presented in the Operator's Manual and on the product. It also gives you an introduction to the basic safety rules for using and looking after the engine. If anything remains unclear or if you are unsure of something, contact your Volvo Penta dealer for assistance.

## **IMPORTANT!**

Always follow local safety instructions and regulations.

**NOTICE!** Check that you have received the correct Operator's Manual before you read on. If not, please contact your Volvo Penta dealer.



This symbol is used in the Operator's Manual and on the product, to call your attention to the fact that this is safety information. Always read such information very carefully.

**Safety texts in the Operator's Manual have the following order of priority:**



### **DANGER!**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



### **WARNING!**

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



### **CAUTION!**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

### **IMPORTANT!**

Indicates a situation which, if not avoided, could result in property damage.

**NOTICE!** Used to draw your attention to important information that will facilitate the work or operation in progress.



This symbol is used on our products in some cases and refers to important information in the Operator's Manual. Make sure that warning and information symbols on the engine are clearly visible and legible. Replace symbols which have been damaged or painted over.

## **Safety rules for operation**

### **Daily checks**

Make it a habit to give the engine and engine compartment a visual check before the engine is started and after operations, once the engine has stopped. This helps you to quickly discover fuel, coolant or oil leakages or any other abnormality that has occurred, or is about to occur.

### **Carbon monoxide poisoning**

Only start the engine in a well-ventilated area. When operating in a confined space, exhaust fumes and crankcase gases must be ventilated.

### **Operation**

The engine must not be operated in environments which contain explosive media since none of the electrical and mechanical components are explosion proof.

Approaching a running engine is a safety risk. Hair, fingers, loose clothes, or dropped tools can catch on rotating components and cause severe injury.

When engines are supplied without safety guards, all rotating components and hot surfaces must be protected after installation in their application, if necessary for personal safety.

### **Fuel filling**

There is always a risk of fire and explosion when filling fuel. Smoking is forbidden, and the engine must be stopped.

Never overfill the tank. Close the tank cap securely.

Only use fuel recommended in the Operator's manual. The wrong grade of fuel can cause serious malfunctions, power loss or engine shutdown.

### **Cooling System**

Avoid opening the coolant filling cap when the engine is hot. Steam or hot coolant can spray out and cause burns. At the same time the pressure built up is lost.

If the filler cap, coolant hose etc., have to be opened or removed when the engine is hot, undo the filler cap slowly and carefully, to let the pressure out before removing the filler cap completely and starting work. Note that the coolant can still be hot and cause scalding.

### **Hot surfaces and fluids**

A hot engine always increases the risk for burns. Be on your guard against hot surfaces: exhaust manifold, turbocharger, oil sump, charge air pipe, engine pre-heater, hot coolant and hot lubricating oil in pipes, hoses etc.

## Care and maintenance

### Competence

Never carry out a job if you are not entirely sure how to do it. Contact your Volvo Penta dealer and ask for assistance instead.

Literature for more major tasks is available from your Volvo Penta dealer.

### Prevent start

Prevent the engine from being started by removing the ignition key and disconnecting the power with the main switch. Lock them in the "Off" position.

If the instrument panel does not have an ignition key, the engine compartment must be lockable, to prevent unauthorized persons from starting the engine. Alternatively, a lockable main switch may be used.

### Stopping the engine

Stop the engine before opening or removing the engine hatch/hood. Service and maintenance work must be done with the engine stopped unless otherwise specified.

Fix a notice by the operator position to say that work is in progress.

Working with, or approaching a running engine is a safety risk. Hair, fingers, loose clothes, or dropped tools can catch on rotating components and cause severe injury. Volvo Penta recommends that all service work which requires the engine to be running be done by an authorized Volvo Penta workshop.

### Lifting the engine

The lifting eyes fitted on the engine must be used for lifting. Always check that the lifting devices are in good condition and that they have the correct capacity for the lift (engine weight together with auxiliaries, if fitted). The engine must be lifted with an adjustable lifting boom for safe handling. All chains or cables must be parallel to each other and should be as square as possible to the top of the engine. Note that auxiliary equipment installed on the engine could change its center of gravity. Special lifting devices may then be needed to obtain the correct balance and safe handling. Never carry out work on an engine that is **only** suspended in a hoist.

### Fuel and lubrication oils

Always protect your hands when searching for leaks. Fluids which leak under pressure can force their way into body tissue and cause severe injury. There is a risk of blood poisoning (septicemia).

Only use the fuel recommended in the Operator's Manual. The wrong grade of fuel can cause malfunctions or engine shutdown.

Always change the oil, oil filter and fuel filter at the specified intervals.

### Before re-starting

Re-install all guards which have been removed during service work, before re-starting the engine. Make sure that there are no tools or other objects left behind on the engine.

Never start a turbocharged engine without the air filter in place. The rotating compressor turbine in the turbocharger can cause severe injury. There is also a risk that foreign objects are sucked in, causing damage to the machinery.

## Fire and explosion

### Fuel and lubrication oil

All fuel, most lubricants and many chemicals are flammable. Always read and observe the advice on the packages.

Work on the fuel system must be done with the engine cold. Fuel leakage and spills on hot surfaces or electrical components can cause fires.

Store oil and fuel-soaked rags and other flammable material in a fireproof manner. Oil-soaked rags can self-ignite in certain circumstances.

### Spare parts

Components in fuel systems and electrical systems on Volvo Penta engines are designed and manufactured to minimize the risk of explosions and fire, in accordance with applicable legal requirements. Using spare parts other than those by Volvo Penta approved spare parts may cause an explosion or fire.

## Electrical System

### Disconnect the power

Before any work is done on the electrical system, the engine must be stopped and the power switched off at the main switch(es). Any external power supply for engine heaters, battery chargers or other auxiliary equipment connected to the engine must be disconnected.

### Electric welding

Remove the positive and negative cables from the batteries. Then disconnect all cables connected to the alternator. Disconnect both connectors from the engine control module.

Always connect the welder ground clamp to the component to be welded, and as close as possible to the weld site. The clamp must never be connected to the engine or in such a way that current can pass through a bearing.

**When welding is completed:** Always connect the cables to the alternator **and engine control unit connector before** reconnecting the battery cables.

### Batteries

Batteries contain and give off an oxyhydrogen gas, especially during charging. This gas is easily ignited and highly explosive.

Smoking, open flames or sparks must never occur in or near to batteries or the battery compartment.

Incorrect connection of a battery cable or start cable can cause a spark which can be enough to make the battery explode.

### Start spray

Never use start spray or similar preparations to aid starting an engine with air pre-heating (glow plugs / starting heater). They may cause an explosion in the inlet manifold. Danger of personal injury.

### Batteries

Batteries contain a highly corrosive electrolyte. Protect your eyes, skin and clothes during charging and other handling of batteries. Always use protective goggles and gloves.

If acid comes into contact with your skin, wash at once with soap and a lot of water.

If you get battery acid in your eyes, flush at once with a lot of cold water, and get medical assistance at once.

# Introduction

The Operator's Manual contains the information required for the correct, safe operation and maintenance of your Volvo Penta engine. We recommend therefore that you read the manual carefully and learn to handle the engine and other equipment in a safe manner before starting the engine.

The Operator's Manual describes the engine and equipment sold by Volvo Penta. The specifications, design information and illustrations used in the Operator's Manual are not definitive. We reserve the right to make changes without prior notice.

Differences in appearance and function of the controls and instruments may occur in certain variants. In such cases, refer to the Operator's Manuals for the applications concerned.

When ordering service or spares, always specify the engine and transmission identification number. Refer to *Technical Data page 73*.

## Warranty

Your new Volvo Penta industrial engine is covered by a limited warranty, under the conditions compiled in the Warranty Information.

Please note that AB Volvo Penta's liability is limited to the specification in the Warranty Information. Read it carefully, as soon as possible after delivery. It includes important information about service, maintenance, which it is the responsibility of the owner to know, check and carry out. If this is not done, AB Volvo Penta may fully or partly refuse to honour its warranty undertakings.

**Please contact your Volvo Penta dealer if you have not received the Warranty Information or Service Book.**

## Breaking in

**The engine must be broken in during its first 10 operating hours, as follows:**

Run the engine in normal operations. However, full load may not be applied other than for short periods. Never run the engine for long stretches at constant speeds during this period.

Higher oil consumption is normal during the first 100-200 hours of operation. For this reason, check the oil level more frequently than the normal recommendation.

When an disengageable clutch is installed, it should be checked more carefully during the first days.

Adjustments may be necessary to compensate bedding-in of the friction plates.

## Maintenance and replacement parts

Volvo Penta engines are designed for maximum reliability and long life. They are not only built to withstand a demanding environment, but also to have the smallest possible environmental impact. These qualities will be maintained through regular servicing and the use of genuine Volvo Penta replacement parts or replacement parts approved by Volvo Penta.

Volvo Penta has a world-wide network of authorized dealers. They are Volvo Penta product specialists, and have the accessories, genuine parts, test equipment and special tools needed for high quality service and repair work.

**Always observe the maintenance intervals in the manual, and remember to note the engine/transmission identification number when you order service and spare parts.**

## Fuel, oils and coolant

Only use fuel and oils of the grades recommended in the Operator's Manual. Other grades may cause operational malfunctions, increased fuel consumption and over time even shorten the life of the engine. Always change the oil, oil filter and fuel filter at the specified intervals.

Future warranty claims related to the engine and accessories may be declined if an unsuitable coolant has been used, or if the instructions for coolant mixture have not been followed.

## Environmental care

All of us like to live in a clean, healthy environment, where we can breathe clean air, see healthy trees, have clean water in lakes and seas, and enjoy sunlight without fearing for our health. Unfortunately, this cannot be taken for granted these days, but it is something we all must work to achieve.

Volvo Penta has special responsibility as an engine manufacturer, and for this reason environmental care is a natural cornerstone of our product development. Volvo Penta currently has a broad engine program in which great progress has been made in reducing exhaust emissions, fuel consumption and engine noise etc.

We hope that you will be keen to preserve these qualities. Always follow the directions in the Operator's Manual about fuel grades, operation and maintenance, to avoid unnecessary environmental effects. Contact your Volvo Penta dealer if you notice any changes such as increased fuel consumption or increased exhaust smoke.

Remember always to hand in environmentally hazardous waste such as drained oil, coolant, old batteries, etc. for treatment at a recycling facility.

Our united efforts can make a valuable contribution to the environment.

## Certified engines

**If you own an emission-certified engine used in an area where exhaust emissions are regulated by law, it is important to be aware of the following:**

Certification means that an engine type has been checked and approved by the relevant authority. The engine manufacturer guarantees that all engines of the same type conforms to the certified engine.

This places special demands on the care and maintenance you provide your engine in that

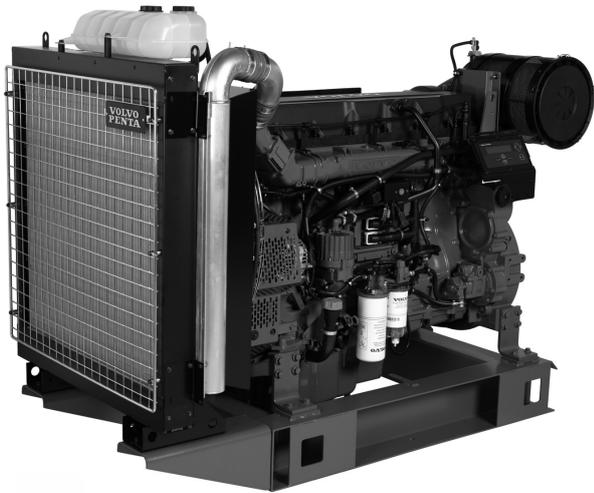
- Maintenance and service intervals recommended by Volvo Penta must be complied with.
- Only genuine Volvo Penta replacement parts may be used.
- Service on injection pumps, pump settings and injectors must always be carried out by an authorized Volvo Penta workshop.
- The engine must not be converted or modified, except with accessories and service kits that Volvo Penta has developed for the engine.
- No installation changes to the exhaust pipe and engine air inlet ducts may be made.
- Any warranty seals may be broken only by authorized persons.

The general instructions in the Operator's Manual concerning operation, service and maintenance apply.

**NOTICE!** Late or inadequate maintenance/service or the use of spare parts not approved by Volvo Penta will invalidate AB Volvo Penta's responsibility for the engine specification being in accordance with the certificated variant.

Damages and/or costs arising from this will not be compensated by Volvo Penta.

# Presentation



## Engines

This Operator's Manual refers to industrial engines:

TAD1341GE, TAD1342GE, TAD1343GE,  
TAD1344GE, TAD1345GE

TAD1350GE, TAD1351GE, TAD1352GE,  
TAD1353GE, TAD1354GE, TAD1355GE,

TAD1340VE, TAD1341VE, TAD1342VE,  
TAD1343VE, TAD1344VE, TAD1345VE

TAD1350VE, TAD1351VE, TAD1352VE,  
TAD1353VE

They are in-line, six-cylinder, direct injection industrial diesel engines. All of the engines are equipped with electronically controlled fuel management (EMS), turbocharger, charge air cooler, thermostatically controlled cooling systems and electronic speed control.



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## EMS (Engine Management System)

EMS is an electronic system with CAN communication (Controller Area Network) for diesel engine control. The system has been developed by Volvo Penta and includes fuel regulation and diagnostic functions. The system consists of a control unit, injectors, a number of sensors that supply the control unit with information, and connectors for diagnostics and functional checks. The engine can be connected to a communication interface comprising a CAN link and a serial link.

### Input/Output signals

The information from the sensors provides precise data about prevailing operating conditions and allows the processor in the control module to, among other things, calculate correct injection amount, injection timing and check the engine's condition.

### Fuel regulation

The engine fuel requirement is analyzed up to 100 times per second. The engine injection volume and injection timing are controlled electronically via the fuel valves in the injectors. The control unit receives signals from sensors and monitors in order to determine when the fuel valve must open and close. This means the engine always receives the correct fuel volume under all operating conditions, which means lower fuel consumption and the lowest possible exhaust emission.

### Diagnostic function

The purpose of the diagnostic function is to detect and locate any malfunctions in the EMS system, as well as to protect components from damage.

If a malfunction is detected, this is announced by warning lamps, a flashing diagnostic lamp or a text message on the instrument panel, depending on the equipment fitted. If a fault code is displayed it is used for guidance in any fault tracing. Fault codes can also be read by Volvo's VODIA tool at authorized Volvo Penta workshops.

If there is a serious malfunction, the engine will be shut down completely or the control unit may reduce power output (depending on the application). Fault codes are registered as an aid to fault tracing.

# Instruments and Controls

## Display Control Unit

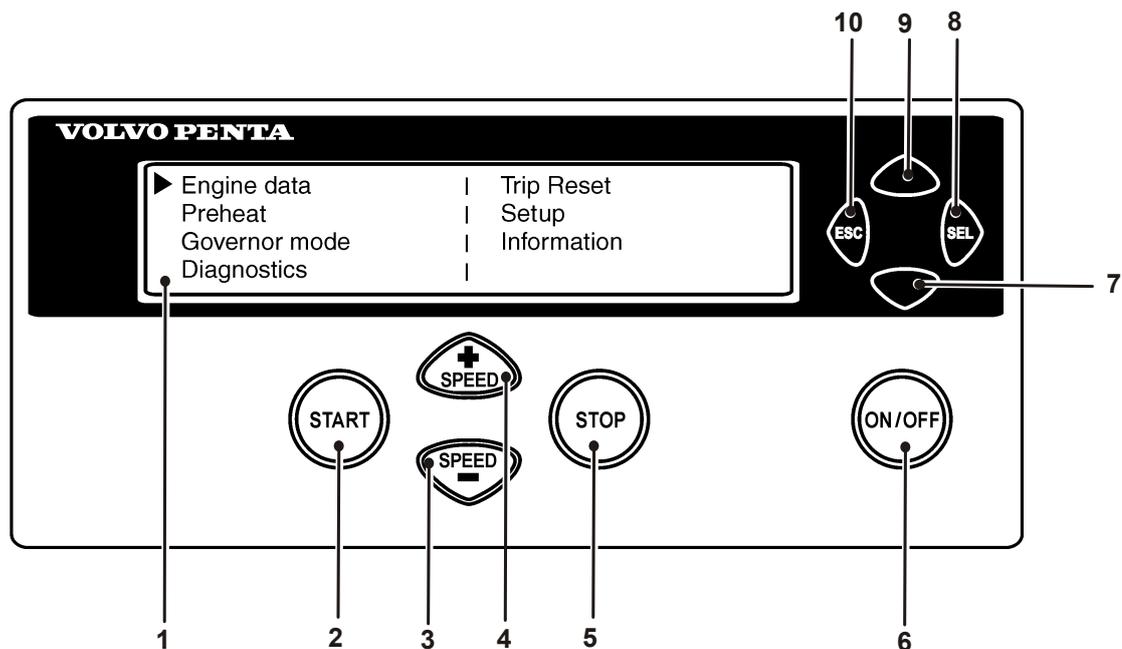
The DCU control panel is available as an optional accessory for the EMS (Engine Management System) electronic control system.

The DCU is a digital instrument panel which communicates with the engine control unit. The DCU has several functions, such as engine control, monitoring, diagnostics, and parameter setting.

The menus in the DCU system can be used to check, and in some cases to set, a number of different functions in the EMS system.

**NOTICE!** Settings and what engine data that appears in the display may vary depending on installation and engine model.

**NOTICE!** The menus and illustrations shown here are the English version. The language can be changed, however; refer to the *Setup* menu.



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### Start

When the DCU panel is started, the “Engine Data” menu is displayed; press “ESC” to come to the main menu.

- |   |                               |    |  |
|---|-------------------------------|----|--|
| 1 | LED display                   | 6  | ON/OFF. Starts and stops the system    |
| 2 | START. Starts the engine      | 7  | Scroll downwards in menus              |
| 3 | SPEED - . Reduces engine rpm  | 8  | SEL. Selects in menus                  |
| 4 | SPEED +. Increases engine rpm | 9  | Scroll upwards in menus                |
| 5 | STOP. Stops the engine        | 10 | ESC. Return to previous menu selection |

▶ <b>Engine data</b>		Trip Reset
Preheat		Setup
Governor mode		Information
Diagnostics		

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▶ <b>Eng speed</b>	rpm		Boost prs	kpa
Cool tamp	c		Boost tmp	C
Oil pres	kpa		Oil temp	C
Eng hours	h		Batt Volt	V

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## Menus

There are several sub-menus under each main menu. There is not space for all the menu choices on the display. To scroll through the menus, use the **7** and **9** buttons on the display. Press the **SEL** button **8** to make a selection. Refer to the illustration on the previous page.

**NOTICE!** The **Setup** menu can be used to select the language that you want to use on the display.

## Main menu

- **Engine data**, current engine data
- **Preheat**, manual activation of pre-heating. Must be activated with temperatures below 0°C (32°F)
- **Governor mode**, activation of droop
- **Diagnostics**, shows fault codes as text
- **Trip reset**, resets trip data
- **Setup**, parameter setting
- **Information**, shows the currently applicable hard/software, data sets and engine identification for the engine and DCU data

## Engine data

shows relevant engine data.

- Engine speed, can be controlled with the **SPEED+** and **SPEED-** buttons (rpm)
- Charge pressure (kPa)
- Coolant temperature (°C)
- Charge air temperature (°C)
- Oil pressure (kPa)
- Oil temperature (°C)
- Engine hours (h)
- Battery voltage (V)
- Fuel consumption (l/h)
- Instantaneous fuel consumption (trip fuel) (l)

\*\*\* Preheat \*\*\*  
Press SEL to request preheat

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\*\*\* Governor mode \*\*\*  
Droop mode

P0002066

\*\*\* Diagnostics 7/9 \*\*\*  
20.0h Engine oil pressure  
signal failure Inactive

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\*\*\* Trip Data Reset \*\*\*  
Press SEL to reset trip data

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## Preheat

manual activation of pre-heating. When it is activated, the EMS system senses at start-up if pre-heating is needed. For automatic pre-heating, refer to the *Setup / Preheat on ignition* menu.

**NOTICE!** Must be activated with temperatures below 0°C (32°F).

The pre-heating time is adjusted to suit the engine temperature, and can last for up to 50 seconds both before and after starting. Refer also to *Starting procedure EMS 2*.

- Press **SEL**, the text **Preheat requested** will be shown
- The display automatically returns to the **Engine Data** menu.

## Governor mode

activates/shuts off droop. To set the droop level, refer to the *Setup / Governor gradient or Governor droop* menu.

- Select **Isochronous mode** or **Droop mode** with the SEL button.

## Diagnostics

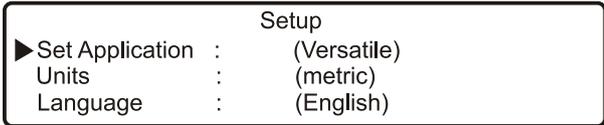
shows the error list containing the 10 latest active and inactive faults. The fault codes are shown as text on the display.

- Scroll through the fault list with the arrow keys.

## Trip Data reset

resets trip data, such as fuel consumption.

- Press the **SEL** button to reset trip data



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### Setup

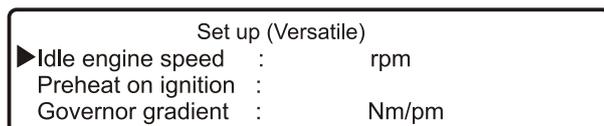
parameter setting in the engine's control systems. Different menus appear under **Customer parameter**, depending on whether **Versatile** or **Gen set** has been selected from **Set application**. See below.

The parameters that can be set/selected (choice is made with the SEL button) are:

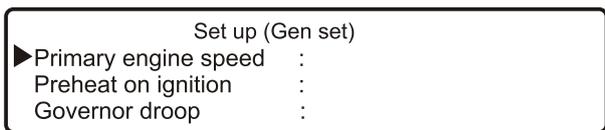
- **Set application**, setting **Versatile** or **Gen set**. Depending on the selection made here, different menus will appear under **Customer parameter**.
- **Unit**, setting of units (metric or US imperial).
- **Language**, setting the language used on the display. Choose between English, French, German and Spanish.
- **Stop energized to**, setting of external stop input. Activated by **Stop** or **Run**.  
**Stop**: The stop input must be connected to voltage to stop the engine.  
**Run**: The stop input must be connected to voltage to run the engine.
- **Customer parameter**, setting alarm limits. Refer to *Customer parameter / Versatile and Customer parameter / Gen set*.
- **Throttle input setting**, setting of engine-speed control and voltage limits. Refer to *Throttle input setting*.
- *Display setting*, setting the display. refer to *Display setting*.

### Customer parameter / Versatile

- **Idle engine speed** - setting idle speed.
- **Preheat on ignition** - activation of automatic preheating. The engine control system senses if preheating is needed and activates it directly at switch-on.
- **Governor gradient (Nm/rpm)** - setting of droop level, when activated. For activation, refer to *Governor droop* in the main menu.
- **Oil temp warning limit (°C)** - setting alarm limit for oil temperature.
- **Coolant temp warning limit (°C)** - setting alarm limit for coolant temperature.



P0002070



P0002071

### Customer parameter / Gen set

- **Primary engine speed** - selection of engine rpm, 1500 or 1800 rpm.
- **Preheat on ignition** - activation of automatic pre-heating. The engine control system senses if pre-heating is needed and activates it directly at switch-on.
- **Governor droop (%)** - setting of droop level, when activated. For activation, refer to "Governor droop" in the main menu.
- **Overspeed limit (%)** - setting of limit for overspeed alarm, % of set engine rpm.
- **Overspeed shutdown** - activation of engine shut-down with overspeed alarm. Refer to "Overspeed limit" to activate the alarm limit for the excess rpm alarm.
- **Oil temp warning limit (°C)** - setting alarm limit for oil temperature.
- **Coolant temp limit (°C)** - setting alarm limit for coolant temperature.

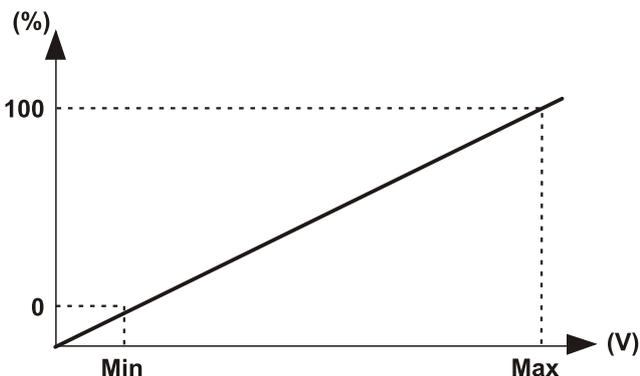


P0002955

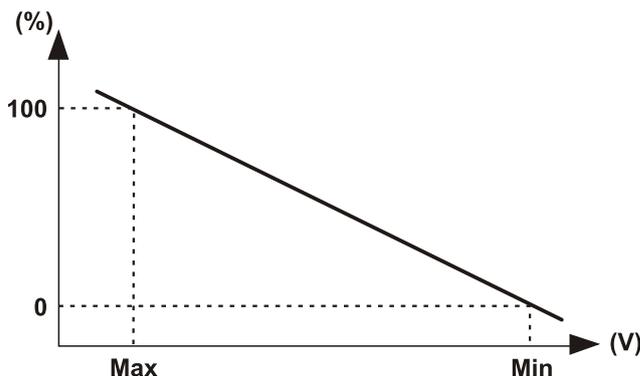
### Throttle input setting

rpm control setting (throttle operation).

- **Set throttle mode** - OFF - engine rpm is controlled via the DCU panel.  
ext throttle input - engine speed is controlled with a potentiometer (accelerator).  
ext voltage input - engine rpm is controlled by an external unit.
- **Set idle voltage (V)** - idle voltage level setting.
- **Set max voltage (V)** - full throttle voltage level setting.

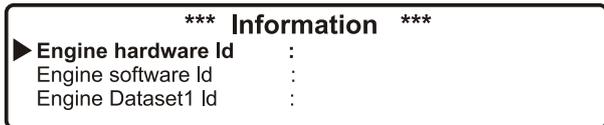


P0002074





P0002075



P0002076

## Display setting

settings for the display. Adjustment is made with the **7** and **9** buttons; see DCU panel illustration.

- **Set contrast (%)** - contrast setting.
- **Set backlight time (sec)** - time setting (in seconds) for display backlighting on, lighting is then shut off if the panel is not used.
- **Set backlight brightness** - display backlighting brightness setting.

## Information

shows the data for the engine and DCU.

- **Engine hardware Id** - engine control unit part number.
- **Engine software Id** - engine control unit software part number.
- **Engine dataset1 Id** - engine data set 1 part number.
- **Engine dataset2 Id** - engine data set 2 part number.
- **Vehicle Id** - chassis number.
- **DCU hardware Id** - DCU part number.
- **DCU software Id** - DCU software part number.
- **DCU dataset1 Id** - DCU data set 1 part number.
- **DCU dataset2 Id** - DCU data set 2 part number.

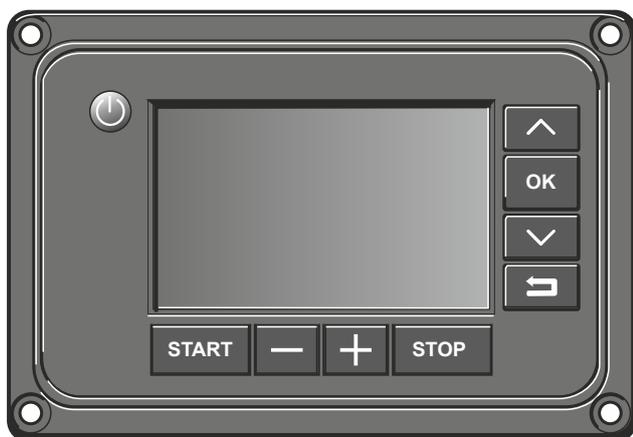
## DCU II (Display Control Unit)

The Volvo Penta DCU II instrument panel communicates with the engines control unit and has a number of functions as control, monitoring and diagnostics.

**NOTICE!** Settings and the type of engine data presented on the display may vary depending on the installation and engine model.

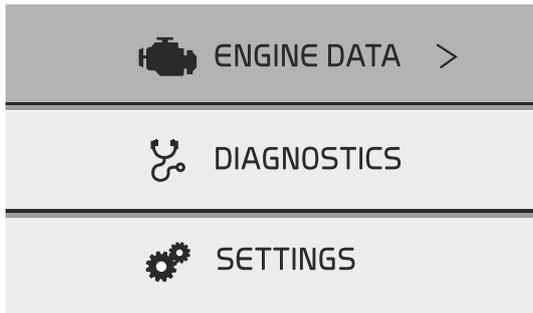
Depending on the installation the DCU II can also be used as presentation display only.

**NOTICE!** The menus and illustrations shown here are the English version. Refer to the section *Settings* to change the display language.



P0018811

-  Turn On/Off the ignition
-  Start the engine
-  Reduce engine rpm
-  Increase engine rpm
-  Stop the engine
-  Scroll upwards in menus
-  Select and confirm in menus
-  Scroll downwards in menus
-  Return to previous menu selection



P0018295

## Display

The DCU II basic view shows three main menus.

- **ENGINE DATA** (ENGINE DATA), shows current engine data.
- **DIAGNOSTICS** (DIAGNOSTICS), shows active fault codes.
- **SETTINGS** (SETTINGS), shows display and engine settings.

Press **OK** to proceed in the submenus and scroll using the panel arrow buttons.

Press **←** to return to previous menu.

## Status bar

The status bar with symbols for active malfunctions is shown in the top right of the display.

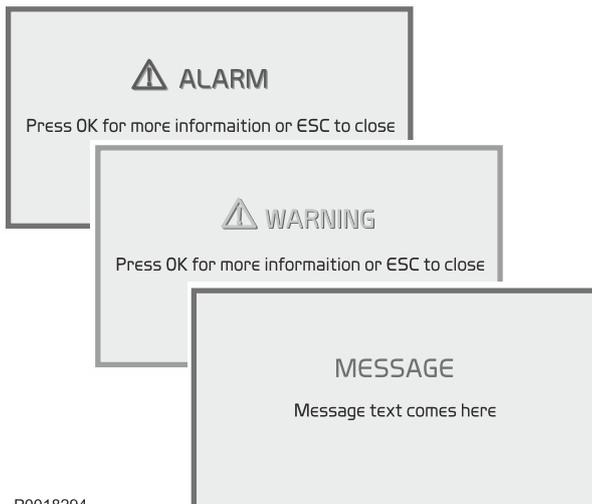
	Emission related malfunction
	EMS system malfunction

## Alarms and messages

Messages to the operator are of three types, color coded according to degree of severity.

When a message is shown on the display, press **OK** to reach the diagnostic menu to get more information regarding registered faults and instructions for remedial actions.

- **ALARM** (ALARM), red text, the system has detected a serious fault — consult a Volvo Penta workshop immediately.
- **WARNING** (WARNING), yellow text, the system has detected a fault — consult a Volvo Penta workshop as soon as possible.
- **MEDDELANDE** (MESSAGE), blue text, non-critical engine message for the operator.



P0018294

ENGINE DATA	
Engine Hours	1536h
Fuel Rate	112 l/h
Oil Pressure	1,5 kPa
Oil Temperature	65 C ✓
Engine Speed	<b>1500</b> rpm

P0018291

DIAGNOSTICS	
<input checked="" type="radio"/> Coolant level low	>
<input type="radio"/> Oil temp sensor fsilure	
<input type="radio"/> DTC 3	Coolant level low 50000h
<input type="radio"/> DTC 4	Check coolant system for leakage.
<input type="radio"/> DTC 5	Fill coolant needed.
critical-Service immediatly SPN III FMI I	

P0018293

## Menus

### ENGINE DATA (ENGINE DATA)

Engine data shown may vary depending on the engine installation.

- **Engine Hours** (Engine Hour) (tim)
- **Engine Speed** (Engine Speed) (rpm)
- **Coolant Temperature** (Coolant Temperature) (°C)
- **Oil Pressure** (Oil Pressure) (kPa)
- **Fuel Rate** (Fuel Rate) (l/h)  
Current fuel consumption.
- **Boost Temperature** (Boost Temperature) (°C)
- **Boost Pressure** (Boost Pressure) (kPa)
- **Oil Temperature** (Oil Temperature) (°C)

### DIAGNOSTICS (DIAGNOSTICS)

If the system detects a malfunction, the driver is informed via a pop-up message on the display. The fault codes are listed in the diagnostics menu; active fault codes are at the top of the list and are denoted by a green dot. For more information regarding cause and remedies, use the arrow button to scroll to the fault concerned and press **OK**. This will also provide information about number of engine hours when the fault became active and the SPN and FMI codes.



P0018292

## SETTINGS (SETTINGS)

### Display (Display)

- **Set backlight time** (Set backlight time). On/OFF, sets backlight to run in standby mode. *On* is the default setting.
- **Set backlight brightness** (Set backlight brightness). Adjust display backlight brightness using the panel arrow buttons.
- **Set Instrument Brightness** (Set Instrument Brightness). Sets backlighting in the display instrument.
- **Change background color** (Change background color). Select background color, gray or white.

### Language (Language)

Sets the display language; chooses between English, French, German, Spanish and Chinese.

### Save/Restore (Save/Restore)

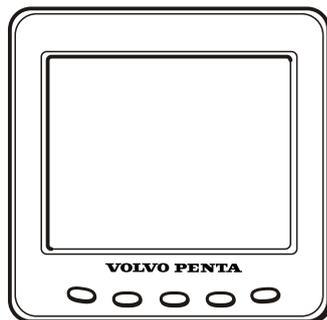
- **Save current configuration** (Save current configuration). Save the current display settings.
- **Restore last configuration** (Restore last configuration). Restore the last displayed settings saved.
- **Restore default configuration** (Restore default configuration). Restores *all* display setting menus to factory settings.

### IMPORTANT!

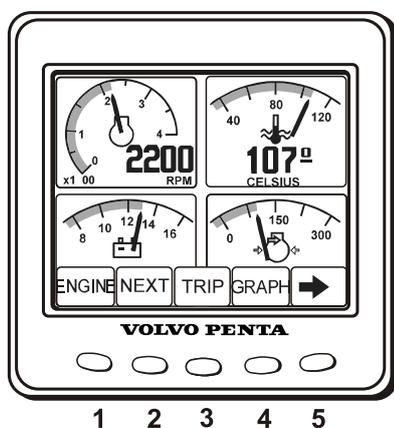
The settings in the following menu do not normally need to be changed; should a change be necessary it must be carried out by an authorized Volvo Penta technician. Refer to the installation manual for further engine information.

#### Authorized Volvo Penta dealer or OEM only

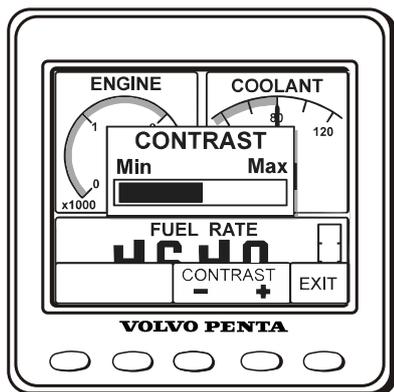
- I/O Status (I/O Status)
- CAN Termination (CAN Termination)
- Stop Logic DCU (Stop Logic DCU)
- Potentiometer supply (Potentiometer supply)
- Speed Control (Speed Control)
- Control display unit (Control display unit)
- Genset/VE (Genset/VE)
- Buzzer (Buzzer)
- Information (Information)



P0002061



P0002382



P0002403

## DU (Display Unit)

The DU is a computerized instrument panel which shows engine working values on an LCD screen. In the display it is possible to show multiple windows with different information, i. g. engine rpm, coolant temperature, fuel consumption and fault messages.

At start up, the display performs a self-test. If a constant signal is heard, the system has discovered a malfunction. The display will work but may act in an unexpected way.

The DU is connected between the engine control unit and the CIU or DCU.

### Display modes

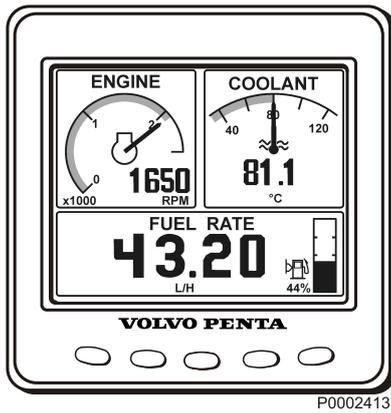
Press any of button 1–4 to view the function menu for the buttons, appearing in the lower part of the display. To leave the menu, wait a few seconds or press button 5 (EXIT).

- 1 Engine
- 2 Multi
- 3 Trip
- 4 Graph
- 5 Exit

### Contrast

In the display modes Engine, Trip and Graph, it is possible to adjust the contrast.

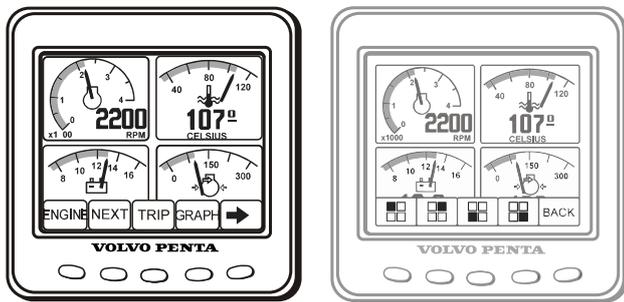
Press button 5 outside the menu and then + (button 4) or – (button 3) to adjust the contrast.



P0002413

### Engine

Rpm and coolant temperature is shown in the upper part of the display. In the lower part it will show trip computer and a fuel level indicator, if these function are installed.

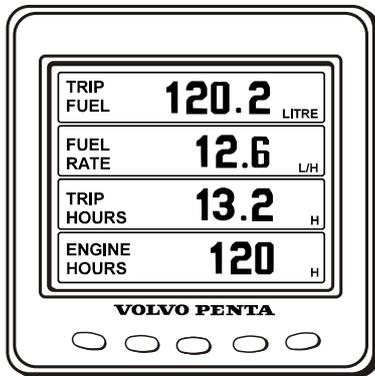


P0014208

### Multi

In the multi mode, button 2, the information can be shown in four windows, analogue or digital. The display toggles between the two when button 2 is pressed repeatedly.

By pressing button 5, the right arrow, you choose what information to be shown in the different windows. Press repeatedly on the button that correspond to the window, until desired information is shown.



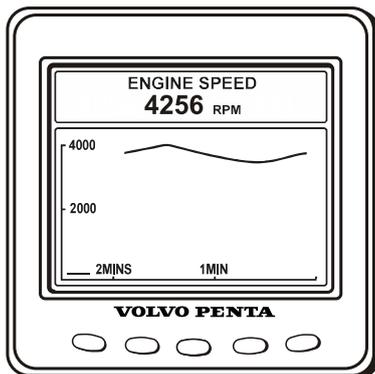
P0002418

### Trip

To display the trip computer press button 3, Trip

- Trip Fuel**, since last reset
- Fuel Rate**, fuel consumption
- Trip hours**, since last reset
- Engine hours**, total amount of operating hours

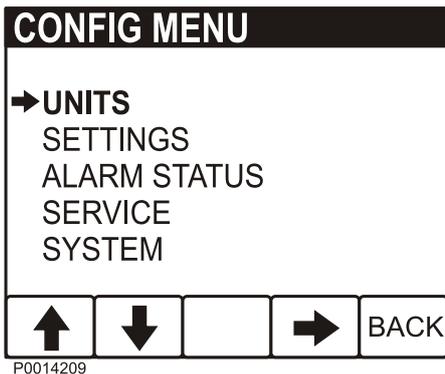
Reset by pressing button 3 for three seconds until a beep is heard.



P0014207

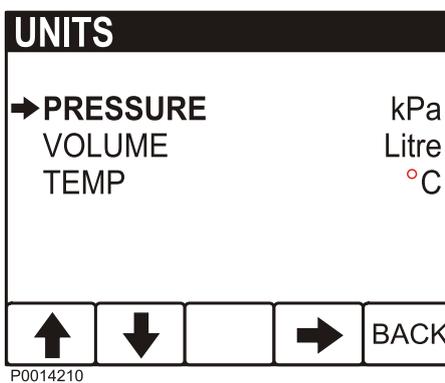
### Graph

The information is shown as graphs. Press button 4 repeatedly to choose what information will be shown. The time interval is set in the Configuration menu. If the connection is broken there will be a straight line in the display.



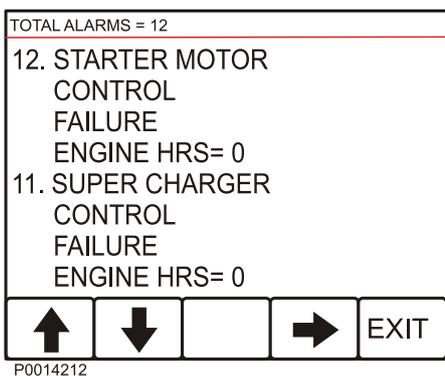
## Configuration menu

Press button 5 for three seconds to enter the Configuration menu. Navigate with the up and down arrows, select with the right arrow.



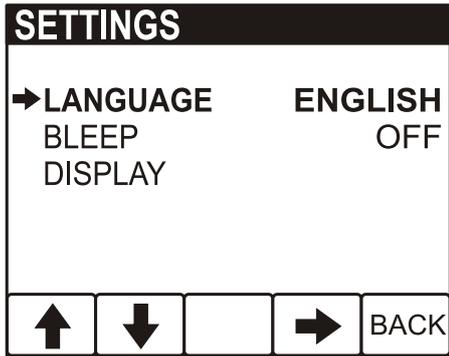
## Units

- PRESSURE; kPa, PSI
- VOLUME; LITRE, GAL, Imperial GAL.  
Fuel rate is adjusted according to volume unit, L/H, GAL/H, IGAL/H.
- TEMPERATURE; °C, °F



## Alarm Status

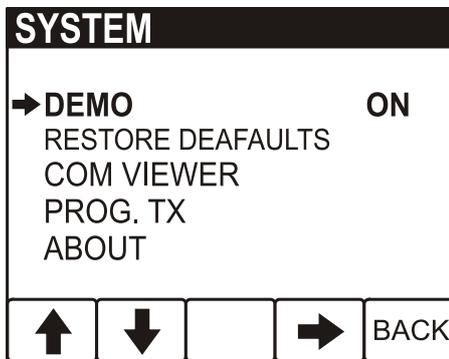
List of active alarms, refer to *Reading fault codes via the DU (Display Unit)*



P0014211

**Settings**

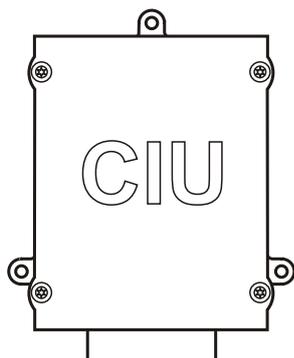
- LANGUAGE; setting of what language is to be used in the display.
- BLEEP; On/Off, setting if pressing the instrument buttons will be followed by a beep or not.
- DISPLAY; setting of ENGINE RPM gauges  
RPM ENGINE, 2500–9000 RPM, in steps of 500 RPM  
GRAPH RANGE, 2 minutes– 8 hours in the following steps,  
2MINS, 10MINS, 30MINS, 60MINS, 2HRS, 4HRS, 8HRS



P0014213

**SYSTEM**

- DEMO, switches the DEMO mode ON/OFF.
- RESTORE DEEFAULTS, reset all configuration to default values.
- COM VIEWER, displays latest message on communication ports
- PROG TX, transfers content of the application on Flash memory to other CAN units on the same CAN bus.
- ABOUT, displays  
ID NO – display serial number  
EEPROM – number of write on EEPROM  
VERS – software version number  
CHK – Flash memory checksum  
PART No – Volvo software part number  
SOURCE – source of received data  
LABLE – Allocated Label on the same bus.



P0002060

## CIU (Control Interface Unit)

The CIU is a "translator" between the control unit (EMS) and the customer's own control panel. The CIU has two serial communication links, one fast and one slow.

The fast one is a so-called CAN link. All data related to instruments, indication lamps, connectors and potentiometers is controlled by this link.

The slow link manages diagnostic information for flashing codes etc.

## Easy Link Instruments

The following Easy Link instruments are available:

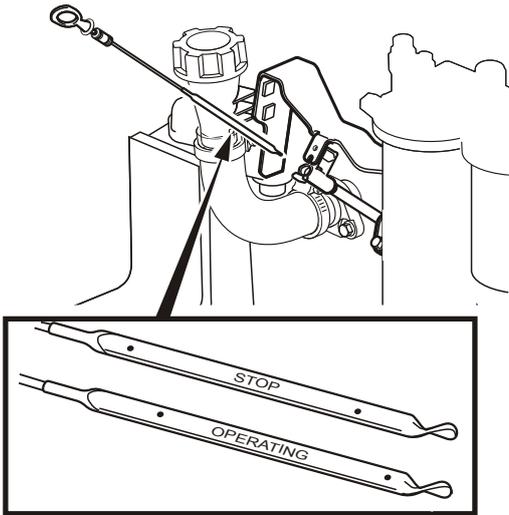
- Tachometer / hours counter (fault codes are also displayed on the tachometer display when the diagnostic button is pressed)
- Coolant temperature
- Oil pressure
- Oil temperature
- Battery voltage
- Alarm panel
- Turbo pressure

# Starting

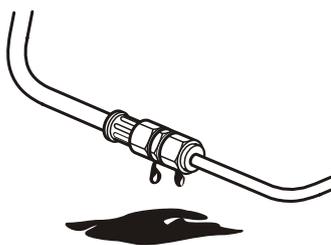
Make it a habit of giving the engine and engine room a visual check before starting. This will help you to discover quickly if anything abnormal has happened, or is about to happen. Also check that instruments and warning displays show normal values after you have started the engine.

## **WARNING!**

Never use start spray or similar agents to start an engine. This may cause an explosion in the inlet manifold. Danger of personal injury.



P0004311



P0002078

## Before Starting

- Check that the oil level is between the MIN and MAX marks.

**NOTICE!** The oil level can be read both when the engine is stopped (the STOP side of the dipstick) and with the engine running (the OPERATING side of the dipstick).

For filling refer to *Oil level, checking and topping up*.

- Open the fuel valves.
- Check the fuel pre-filter; refer to *Draining condensate, fuel system* page 54.
- Check the coolant level and that the radiator is not blocked externally. Refer to *Coolant Level, Checking and Topping Up* page 58 and *Charge Air Cooler, External Cleaning* page 59

## **WARNING!**

Do not open the coolant filler cap when the engine is hot, except in emergencies, this could cause serious personal injury. Steam or hot fluid could spray out.

- Check that no leakage of oil, fuel or coolant is present.
- Turn the main switch(es) on.
- Move the engine speed control to idle, and open the disengageable clutch/gearbox if installed.

## **IMPORTANT!**

Never break the circuit with the main switch while the engine is running, as this may damage the alternator.

## Starting the Engine

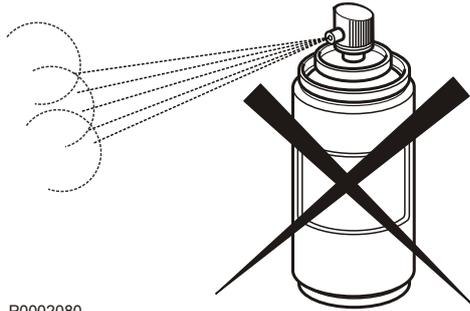
The pre-heating time is adjusted to suit the engine temperature, and can last for up to 50 seconds both before and after starting.

The starter motor connection time is maximized to 20 seconds. After that, the starter motor circuit is temporarily cut to protect the starter motor against overheating.

## Starting in Extreme Cold

Certain preparations must be made to enable engine starting in extreme cold, and in some cases to make starting possible at all:

- Use a winter grade fuel (of a well-known make) that is approved for the prevailing temperature. This reduces the risk of paraffin wax precipitation in the fuel system. At extremely low temperatures, we recommend the use of a fuel heater.
- Use a synthetic engine oil of a viscosity recommended for the prevailing temperature to achieve satisfactory lubrication. Refer to *Viscosity page 70*. Synthetic lubricants are able to handle a wider temperature range than mineral-based lubricants.
- Pre-heat the coolant with a separately-installed electric engine heater. In extreme cases, a diesel-fired engine heater may be necessary. Ask your Volvo Penta dealer for advice.
- Make sure the cooling system is filled with a glycol mixture. Refer to *Maintenance page 56*.
- The batteries must be in good condition. Cold weather reduces battery capacity. Increased battery capacity may be necessary.



P0002080

## Never Use Start Spray

### **WARNING!**

Never use start spray or similar agents to start an engine. This may cause an explosion in the inlet manifold. Danger of personal injury.

## Starting Using Auxiliary Batteries

### **WARNING!**

Explosion hazard. Batteries contain and give off an explosive gas which is highly flammable and explosive. A short circuit, open flame or spark could cause a violent explosion. Ventilate well.

- 1 Check that the auxiliary batteries are connected (series or parallel) so that the rated voltage corresponds to the engine system voltage.
- 2 First connect the red (+) jumper cable to the auxiliary battery, then to the flat battery. Then connect the black (-) jumper cable to the auxiliary battery and to a location that is **somewhere away from the discharged battery**, e.g. the main switch negative terminal or the negative terminal on the starter motor.
- 3 Start the engine.

### **WARNING!**

Do not touch the connections during the start attempt: Risk of arcing.

Do not bend over any of the batteries either.

- 4 Remove the cables in the reverse order.

### **IMPORTANT!**

The ordinary cables to the standard batteries must not be loosened under any circumstances.

# Operation

Correct operating technique is very important for both fuel economy and engine life. Always let the engine warm up to normal operating temperature before operating at full power. Avoid sudden throttle openings and operation at high engine rpm.

## Reading the Instruments

Check all instruments directly after starting, and then regularly during operation.

**NOTICE!** On engines in continuous operation, the lubrication oil level must be checked at least every 24 hours. Refer to *Oil level, checking and topping up*.

## Alarms

If the EMS receives abnormal signals from the engine, the control unit generates fault codes and alarms, in the form of lamps and audible warnings. This is done by means of CAN signals to the instrument.

More information about fault codes and fault tracing can be found in the chapter. *Fault Handling*.

## Maneuvering

### Operation at low load

Avoid long-term operation at idle or at low load, since this can lead to increased oil consumption and eventually to oil leakage from the exhaust manifold, since oil will seep past the turbocharger seals and accompany the induction air into the inlet manifold at low turbo pressure.

One consequence of this is carbon build-up on valves, piston crowns, exhaust ports and the exhaust turbine.

At low loads, the combustion temperature may become so low that complete combustion cannot be ensured, resulting in possible fuel dilution of lubricating oil and eventually leakage from the exhaust manifold.

If the following points are done as a complement to normal maintenance, there will be no risk of malfunctions caused by operation at low load.

- Reduce operation at low load to a minimum. If the engine is regularly test-run without load once a week, the duration of this operation should be limited to 5 minutes.
- Run the engine at full load for about 4 hours once a year. In this way carbon deposits in the engine and exhaust system are given the chance to burn up.

# Engine Shutdown

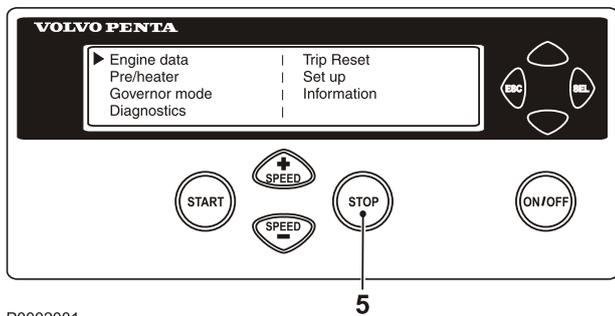
During longer breaks in operation, the engine must be warmed up at least once every two weeks. This prevents corrosion in the engine. If you expect the engine to remain unused for two months or more, it must be preserved: Refer to the chapter *Storage* page 65.

## Before Engine Shutdown

Let the engine run for a few minutes without any load before stopping it. This allows engine temperature equalization and prevents boiling once stopped and also allows the turbochargers to cool down. This contributes to long, fault-free service life.

## Stop the Engine

- Disengage the clutch (if possible).
- Depress the **STOP**-button (5).



## Extra Stop

For location of the extra stop, please refer to *Maintenance* page 47.

### **WARNING!**

Working with or approaching a running engine is a safety risk. Watch out for rotating components and hot surfaces.



P0002078

## After Engine Shutdown

- 1 Check the engine and engine compartment for leaks.
- 2 Turn off the main switches before any long stoppage.
- 3 Carry out maintenance in accordance with the schedule.

### For longer breaks in operation

During longer breaks in operation, the engine must be warmed up at least once every two weeks. This prevents corrosion in the engine.

If you expect the engine to be unused for two months or more, it must be conserved. Refer to the chapter *Storage page 65*.

### IMPORTANT!

If there is a risk of freezing, the coolant in the cooling system must have adequate antifreeze protection.

Refer to the chapter *Maintenance page 56*.

A poorly-charged battery can freeze and burst; refer to *Battery, Charging page 64*.

# Fault Handling

## Diagnostic Function

The purpose of the diagnostic function is to monitor and control the engine and EATS, as well as to protect components from damage.

If a malfunction is detected the diagnostic function informs of the occurred fault in the form of a fault code. The fault code provides guidance when fault tracing. All fault codes and fault messages can be found in the *Fault Code Register*.

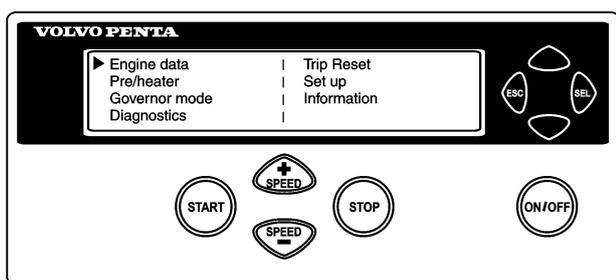
The operator is warned that there is a malfunction via the instruments. Depending on the instrumentation in use, the fault message is shown in various ways. Fault codes can also be read out by the Volvo Penta diagnostic tool.

Depending on the severity of the fault, the diagnostic function will take various actions to protect the engine (e.g. torque derate, idle speed only, engine shut down etc. )

Eng speed	700 rpm	Boost prs	4 kpa	^
Cool Temp	90 °C	Boost tmp	59 °C	
Oil Pres	480 kpa	Oil Temp	87 °C	
!! ENGINE WARNING !!				
				v

Eng speed	700 rpm	Boost prs	4 kpa	^
Cool Temp	90 °C	Boost tmp	59 °C	
Oil Pres	480 kpa	Oil Temp	87 °C	
Press SEL for information				
				v

P0014037



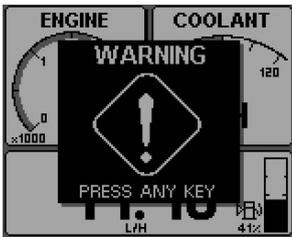
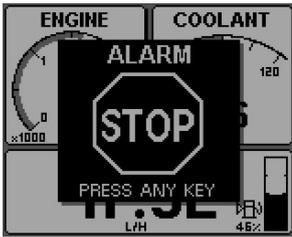
P0014039

## DCU (Display Control unit)

- 1 When a fault is detected the following text is displayed:  
**!! ENGINE WARNING !!** alternating with **Press SEL for information.**
- 2 Reduce engine speed to idle or shut down the engine.
- 3 Press the **SEL** button to get to the fault list.  
The fault list shows:
  - hours of operation
  - fault messages
  - active/non-active faults
- 4 Look up the fault code in the *Fault Code Register* and take the necessary actions.
- 5 Press **ESC** to leave the fault list.

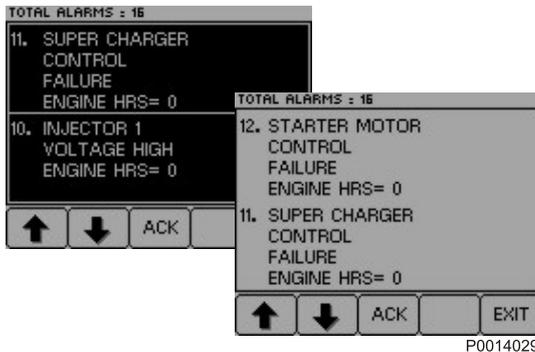
**NOTICE!** To get to the fault list when no fault codes are set, press the **SEL** button and select **Diagnostics** from the menu.

## DU (Display Unit)



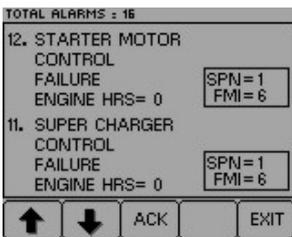
P0014030

- 1 If the system detects a fault, a pop-up is shown on the display. Depending on the severity of the fault the following text will appear  
**ALARM STOP / PRESS ANY KEY** or **WARNING! / PRESS ANY KEY**; a buzzer will sound.
- 2 Reduce engine speed to idle or shut down the engine.



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- 3 Press the SEL button to get to the fault list. The fault list shows fault messages and the number of hours of operation when the fault occurred.
- 4 Press **ACK** to acknowledge the fault code. The display background changes color (and the buzzer stops). The fault must be acknowledged before it can disappear from the fault list.
- 5 Look up the fault code in the *Fault Code Register* and take the necessary actions.



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- 6 Press button 4 for at least three seconds to view SPN and FMI codes.
- 7 Press **EXIT** to leave the fault list.

## CIU (Control Interface Unit)

When the system detects a malfunction, the diagnostics lamp flashes. If the diagnostics button is pressed and then released, a fault code is flashed out.

The fault code consists of two groups of flashes, separated by a pause of two seconds. A fault code is obtained by counting the number of flashes in each group.

### Example

•• pause •••• = fault code 2.4

The fault code is stored and can be read off as long as the malfunction remains. Information about causes, effects and actions required is available in the Fault Code chapter.

### Do as follows to read off the fault code:

- 1 Press the diagnostics button.
- 2 Release the diagnostics button and note down the fault that is flashed out.
- 3 Repeat items 1–2. A new fault code will be flashed out if more faults are stored. Repeat until the first fault code reappears.

**NOTICE!** When the first fault code reappears, all fault codes have been read off.

If the diagnostics button is pressed after the fault has been rectified and the fault codes have been erased, code 1.1 “No fault” will be displayed.

## Easy Link Instruments

- 1 When a malfunction is detected this is reported by the diagnostic lamp which starts to flash.
- 2 Press the diagnostics button. The fault code is shown as text in the tachometer display.
- 3 Look up the fault code in the *Fault Code Register* and take the necessary actions.
- 4 When the fault has been rectified, the fault code disappears from the display and the diagnostics lamp goes out.

## Erasing fault codes

The memory of the diagnostic function is reset when the power to the engine is disconnected. When the power is switched on again, the diagnostic function will check if there are any malfunctions in the system. If so a new fault codes is registered.

If a malfunction has not been corrected it will be registered once again and has to be acknowledged again. The Volvo Penta diagnostic tool VODIA must be used to erase a fault code.

## Fault Tracing

A number of symptoms and possible causes of engine malfunctions are described in the table below. Always contact your Volvo Penta dealer if any problems occur which you cannot solve by yourself.

**NOTICE!** Read through the safety advice for care and maintenance work in the chapter *Safety Information page 3* before you start work.

<b>Symptoms and possible causes</b>	
The diagnosis button lamp flashes	Please refer to <i>Alarm handling</i>
Engine cannot be stopped	2, 5
Starter motor does not rotate	1, 2, 3, 4, 5, 6, 7, 23
Starter motor rotates slowly	1, 2
Starter motor rotates normally but the engine does not start	8, 9, 10, 11,
Engine starts but stops again	8, 9, 10, 11, 12
Engine does not reach correct operating speed at full throttle	9, 10, 11, 12, 20, 23, 24
Engine runs roughly	10, 11
High fuel consumption	12, 14, 23
Black exhaust smoke	12
Blue or white exhaust smoke	14, 21
Too low lubrication oil pressure	15
Excessive coolant temperature	16, 17, 18, 19
Too low coolant temperature	19
No, or poor charge	2, 22

- 1 Discharged batteries
- 2 Poor contact/open circuit in electrical wiring
- 3 Main switch turned of
- 4 Main fuse faulty
- 5 Faulty ignition lock
- 6 Faulty main relay
- 7 Faulty starter motor-/solenoid
- 8 No fuel:
  - fuel cocks closed
  - fuel tank empty/wrong tank connected
- 9 Blocked fuel fine-filter/pre-filter (due to contaminations, or stratification in the fuel at low temperature)
- 10 Air in the fuel system
- 11 Water/contamination in fuel
- 12 Insufficient air supply to the engine:
  - blocked air filter
  - air leakage between the turbo and the engine intake manifold
  - dirty compressor part in the turbocharger
  - faulty turbo compressor
  - poor engine compartment ventilation
- 13 Coolant temperature too high
- 14 Coolant temperature too low
- 15 Oil level too low
- 16 Coolant level too low
- 17 Air in coolant system
- 18 Faulty circulating pump
- 19 Defective thermostat
- 20 Blocked charge air cooler
- 21 Oil level too high
- 22 Alternator drive belt slips
- 23 High back pressure in the exhaust system
- 24 Break in "Pot+" cable to throttle

# Fault Code Register

TAD1340VE, TAD1341GE, TAD1341VE,  
TAD1342GE, TAD1342VE, TAD1343GE,  
TAD1343VE, TAD1344GE, TAD1344VE,  
TAD1345GE, TAD1345VE, TAD1350GE,  
TAD1350VE, TAD1351GE, TAD1352GE,  
TAD1353GE, TAD1354GE, TAD1355GE

## Fault codes, engine

	SPN	PID	PPID	SID	PSID	Flash code Electrical fault/Value fault	FMI
Coolant Water Pressure	20	20					
Percent Accelerator Pedal Position	91	91				2.7/- (EMS) 2.8/- (CIU)	9
Fuel delivery pressure <i>Maintenance page 54</i>	94	94				3.6/3.8	1, 3, 5, 7
Water in fuel indicator <i>Draining condensate, fuel system page 54</i>	97	97				2.9/2.1	0, 3, 4
Engine Oil Level <i>Oil level, checking and topping up page 52</i>	98	98				5.9/5.7	1, 3, 4, 5
Engine oil filter diff pressure	99						
Engine Oil Pressure <i>Oil level, checking and topping up page 52</i>	100	100				3.1/6.6	1, 3, 5, 18
Boost pressure	102	102					0, 3, 5, 16
Boost temperature	105	105				3.2/6.2	0, 4, 5, 16
Boost pressure	106	106				3.4/3.5	0, 3, 5, 16
Air filter pressure	107	107				5.5/5.5	0, 3, 4, 5
Ambient air pressure	108	108				-/-	2, 3, 4
Coolant Temperature <i>Coolant Level, Checking and Topping Up page 58</i>	110	110				3.3/6.1	0, 4, 5, 16
Coolant Level <i>Coolant Level, Checking and Topping Up page 58</i>	111	111				2.3/2.2	1, 3, 5
Crankcase pressure	153	153				7.8/7.7	0, 2, 3, 5
Battery voltage <i>Battery, Charging page 64</i>	158	158				-3.9 (EMS) -6.9 (CIU)	1, 3, 4
Injection control pressure	164	164				8.3	2, 4, 5
Ambient Air Temperature Sensor	171	171					14
Ambient Air Temperature Sensor	172	172				7.9/-	4, 5
Engine Oil Temperature <i>Oil level, checking and topping up page 52</i>	175	175				3.7/5.8	0, 4, 5, 16
Engine Speed	190	190				-2.6	0, 16
Throttle position	608		98			-/-	9
Throttle calibrated position	608		132			2.8/-	9
SAE J1708 Data Link	608			250		9.2/-	
SAE J1939 Data Link	608				201		9

	SPN	PID	PPID	SID	PSID	Flash code Electrical fault/Value fault	FMI
+5V sensor supply	620			232		9.3/-	3, 4
Inlet Air Temperature	626	45				5.4/-	3, 4, 5
Program memory	628			240		9.9/-	2, 12
Controller error	629			254		9.9/- (EMS) 9.8/- (CIU)	8, 12
Calibration Memory EEPROM	630			253		9.9/- (EMS) 9.8/- (CIU)	2, 12, 14
Camshaft sensor	636			21		2.5/-	2, 3, 8
Flywheel sensor	637			22		2.4/-	2, 3, 8
SAE J1939 Data Link	639			231		6.5/- (EMS) 6.4/- (CIU)	2
Cooling fan control	647			33			3, 4, 5
Fuel Injector, Cylinder #1	651			1		7.1/-	3, 4, 5, 12
Fuel Injector, Cylinder #2	652			2		7.2/-	3, 4, 5, 12
Fuel Injector, Cylinder #3	653			3		7.3/-	3, 4, 5, 12
Fuel Injector, Cylinder #4	654			4		7.4/-	3, 4, 5, 12
Fuel Injector, Cylinder #5	655			5		7.5/-	3, 4, 5, 12
Fuel Injector, Cylinder #6	656			6		7.6/-	3, 4, 5, 12
Starter motor relay	677			39		4.6/-	3, 4, 5
Injection Control Pressure Regulator	679				42	8.3/-	3, 4, 5, 6,
Pressure Release Valve	679				97	8.3	0, 7, 11, 14
Starter element	729			70		8.6	3, 4, 5
Stop Input, EMS	970		6			4.8/- (EMS)	4
Fan speed	975	26					3
Compression break	1072		122				1, 3, 4, 5
+5V sensor supply	1079			232		9.3/-	3, 4
+5V sensor supply 2	1080			211		9.3/-	3, 4
ECU temperature	1136		55			8.4	16
Exhaust gas temperature	1184	173				4.9/1.9	0, 4, 5, 16
Wastegate Valve	1188			32			3, 4, 5
SAE J1939 Data Link	1231				232		2
SAE J1939 Data Link	1231				229		9
Rail pressure system	1239				96	8.3	0, 1, 4, 7, 12, 16
Engine synchronizing	1377		98				9
Main relay output	1485		5			5.1/-	
Starter Output	1675		3				0, 3, 4, 5, 10
Starter Output	1675			39			0, 3, 4, 5, 10
Data Link	2017				201		9
Internal EGR	2791		19			8.5	3, 4, 5, 7
Starter Output	2898		3				3, 4, 5

	SPN	PID	PPID	SID	PSID	Flash code Electrical fault/Value fault	FMI
Starter Output	2899		3				3, 4
Thermostat bypass valve	2988		332				3, 4, 5
Exhaust gas temperature sensor #1	3241		386				0, 7, 4, 5
Sensor Supply Voltage #1 (+5V DC)	3509			232			3, 4
Sensor Supply Voltage #2 (+5V DC)	3510			211			3, 4
Piston cooling oil pressure	4811		8				1, 2, 3, 5, 18
Piston cooling pressure	520192					6.8/6.7	1, 3
Starter input sensor	520194		4			4.7/- (EMS) 5.2/- (CIU)	
Stop Input, CIU	520195		6			5.3/- (CIU)	4
Frequncy select input			113				
Diagnostic request switch input			259				
Oil pressure warning lamp status			260			4.1/-	
Coolant level warning lamp status			261			4.5/-	
Diagnostic lamp status			262				
Run indication lamp status			263			4.3/-	
Over speed indication lamp status			264			4.4/-	
Coolant temperature warning lamp output			7			4.2/-	

**Fault codes, engine**

SPN	Component	FMI
20	Coolant Water Pressure	1, 3, 5, 18
51	Engine Throttle position (cold)	3, 5, 7, 12, 13
91	Accelerator Pedal position	0, 9, 19
94	Fuel delivery pressure <i>Maintenance page 54</i>	3, 5, 12, 18
97	Water in fuel indicator <i>Draining condensate, fuel system page 54</i>	0, 4, 12
98	Engine Oil Level <i>Oil level, checking and topping up page 52</i>	1, 4, 5, 18
99	Engine oil filter diff pressure	0
100	Engine Oil Pressure <i>Oil level, checking and topping up page 52</i>	1, 3, 4, 5, 18
101	Crankcase pressure	0, 3, 5
102	Boost pressure	0, 3, 4, 5, 16
105	Boost temperature	0, 4, 5, 16
107	Air filter pressure	0, 3, 4, 5, 12
108	Ambient air pressure	5
110	Coolant Temperature <i>Coolant Level, Checking and Topping Up page 58</i>	0, 4, 5, 16
111	Coolant Level <i>Coolant Level, Checking and Topping Up page 58</i>	1, 3, 4, 5, 18
131	Exhaust back pressure	3, 5, 12
158	ECU battery potential <i>Battery, Charging page 64</i>	0,1, 2
172	Ambient Air Temperature Sensor	4, 5
173	Exhaust gas temperature	0, 16
175	Engine Oil Temperature <i>Oil level, checking and topping up page 52</i>	0, 3, 4, 5, 16
190	Engine Speed	0, 16
626	Preheat relay	3, 4, 5
628	Program memory	2
636	Camshaft sensor	7, 8, 9
637	Crankshaft sensor	2, 8, 9
639	CSWC J1939 Network #1	2
647	Cooling fan control	3, 4, 5
651	Fuel Injector, Cylinder #1	3, 5
652	Fuel Injector, Cylinder #2	3, 5
653	Fuel Injector, Cylinder #3	3, 5
654	Fuel Injector, Cylinder #4	3, 5
655	Fuel Injector, Cylinder #5	3, 5
656	Fuel Injector, Cylinder #6	3, 5
677	Starter motor relay	3, 4, 5, 6
729	Preheater	5, 6, 7, 12
970	Engine stop switch	3, 4, 5, 11, 14
1188	Wastegate Valve	3, 4, 5

SPN	Component	FMI
1485	ECM main relay	7
1639	Fan speed	3
1668	CSWC J1939 Network #4	2
2017	CSWC Source Address 17	9
2036	CSWC Source Address 36	9
2659	Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate	18
2791	Internal EGR	7
3241	Exhaust gas temperature	19
3364	Catalyst Tank Reagent Quality	2, 17
3464	Engine throttle actuator (cold) Engine throttle actuator	3, 4, 5, 7, 10, 12
3509	Sensor Supply Voltage #1 (+5V DC)	3, 4
3510	Sensor Supply Voltage #2 (+5V DC)	3, 4
3511	Sensor Supply Voltage #3 (+5V DC)	3, 4
520193	Sea Water Pressure	1, 3, 4, 5, 18
520335	ECU battery potential	5
520416	Lost Communication with Reductant Control Module on Engine Subnet	9
520567	Exhaust Temperature - Wet	0, 3, 4, 5, 16
520570	Oil filter pressure	3, 4, 5, 11
520688	Exhaust Temperature - Dry	0, 3, 4, 5, 16
520689	EGR "A" / Volvo Compression Brake (VCB) Control Circuit	3, 4, 5
520690	EGR "A" Control / Engine Turbocharger Wastegate Actuator 1 Position	3, 5
520691	Torque Speed Control 1 Received With Errors	14

# Maintenance Schedule

Your Volvo Penta engine and its equipment are designed for high reliability and long life. It is built so as to have minimal environmental impact. If given preventive maintenance, according to the maintenance schedule, and if Volvo Penta original spares are used, these properties are retained and unnecessary malfunctions can be avoided.

## CAUTION!

Read the chapter on Maintenance before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and correct manner.

**NOTICE!** The oil change interval may under certain conditions be increased to 1000 hours. To see if the engine complies Volvo Penta oil analysis needs to be performed. Contact your Volvo Penta dealer for further information.

When both operation and calendar time are specified, perform the maintenance job at the interval which is reached first.

Volvo Penta reserves the right to adjust service interval and content after the printing the Operator's Manual. The current document can be found at Publication Search/Service Protocol at [www.volvopenta.com](http://www.volvopenta.com).

FSI = First Service Inspection  
 S1, S2, S3 = Special Interval Service  
 A - F = Type of service (regular service)

C = Clean  
 R = Replace  
 A = Adjustment  
 L = Lubrication  
 I = Inspection (includes, if necessary, cleaning, adjustment, lubrication and change)

## FSI = First Service Inspection

<b>After the first 100-200 hours</b> <sup>(1)</sup>	
Inspection with VODIA (Diagnostic Tool) <sup>(2)</sup>	I
Coolant level and antifreeze mixture	I
Drive belts, belt tensioner and idler wheels	I
Air Filter	I
Fuel pre-filter, draining water / contamination	C
<b>Start and warm up engine</b>	
Engine and transmission, abnormal noises	I
Engine and transmission, oil / fuel / water leakage	I

1) Or within 180 days of the date of delivery, or the end of the first season, whichever comes first.

2) Readout if any fault codes and LVD

## S1

<b>Every 150-600 hours / at least every 12 month</b> <sup>(1) (2)</sup>	
Engine Oil and Oil Filters / By-pass filter	R

1) Oil change intervals vary, depending on oil grade, sulfur content of the fuel and running conditions.

2) TAD1351VE, TAD1352VE, TAD1353VE: Every 125-500 Hours / at Least Every 12 Months

## S2

<b>Oil Analysis</b>	
See dealer's information SB 17-0-2	I

## S3

<b>After the first 1000 hours</b>	
Valve clearance	I

**A**

Every 500 hours /		At least every (month)		
		12	24	48
Inspection with VODIA (Diagnostic Tool) <sup>(1)</sup>	I	•		
Coolant level and antifreeze mixture	I	•		
Drive belts, belt tensioner and idler wheels	I	•		
Batteries, electrolyte level	I	•		
Air Filter	I	•		
Fuel pre-filter, draining water / contamination	C	•		
<b>Start and warm up engine</b>				
Engine and transmission, abnormal noises	I	•		
Engine and transmission, oil / fuel / water leakage	I	•		

1) Readout if any fault codes and LVD

**B**

Every 1000 hours /		At least every (month)		
		12	24	48
Fuel pre-filter, filter insert	R	•		
Fuel fine filter	R	•		
Air Filter	R	•		
Engine and transmission, inspect hoses and cable clamping	I	•		
Engine and transmission, cleaning / painting	I	•		

**C**

Every 2000 hours /		At least every (month)		
		12	24	48
Valve clearance	I			
Drive Belts	R			•
Air Filter, Tank Breather	R		•	
Air Filter, Compressor (Does not apply to all models.)	R		•	
AdBlue®/DEF filter (Does not apply to all models.)	R		•	
Turbocharger, inspect / clean as required	I		•	

**D**

Every 8000 hours /		At least every (month)		
		12	24	48
Coolant VCS (yellow) <sup>(1)</sup>	R			•

1) Different types of coolant must not be mixed with each other.

# Maintenance

This chapter describes the most common maintenance items, see *Maintenance Schedule page 44* for service intervals.

**NOTICE!** Service points which are not described here must be performed by an authorized Volvo Penta workshop.



## **CAUTION!**

Read the chapter on Maintenance before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and correct manner.



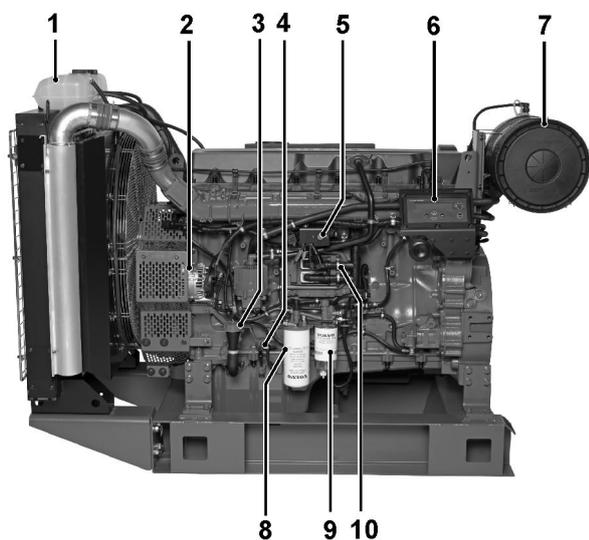
## **WARNING!**

Care and maintenance work should be done with the engine stopped unless otherwise specified. Stop the engine before opening or removing the engine hatch/hood. Make it impossible to start the engine by removing the start key and cutting the system voltage with the main switches.

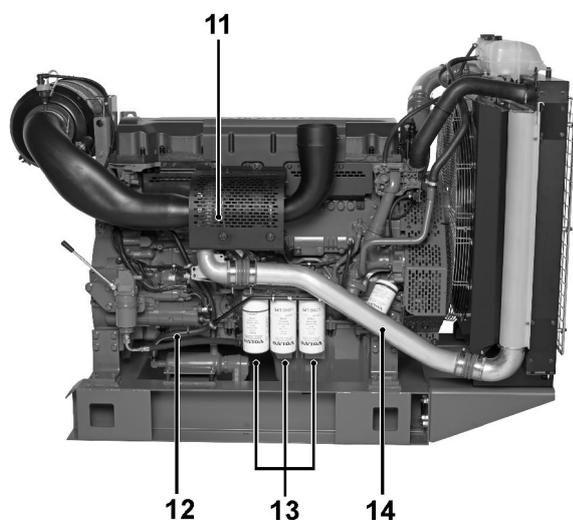
Read about security measures for maintenance and service in the chapter *Safety Information page 3* before you begin.

## Orientation

TAD1340VE, TAD1341GE, TAD1341VE,  
TAD1342GE, TAD1342VE, TAD1343GE,  
TAD1343VE, TAD1344GE, TAD1344VE,  
TAD1345GE, TAD1345VE, TAD1350GE,  
TAD1350VE, TAD1351GE, TAD1352GE,  
TAD1353GE, TAD1354GE, TAD1355GE



- 1 Expansion tank
- 2 Alternator
- 3 Oil filler cap, engine
- 4 Oil dipstick
- 5 Emergency Stop Switch
- 6 Control Panel
- 7 Air Filter
- 8 Fuel Filter
- 9 Fuel pre-filter with water separator
- 10 Control Unit, EMS
- 11 Turbo
- 12 Starter motor
- 13 Oil filter
- 14 Coolant Filter

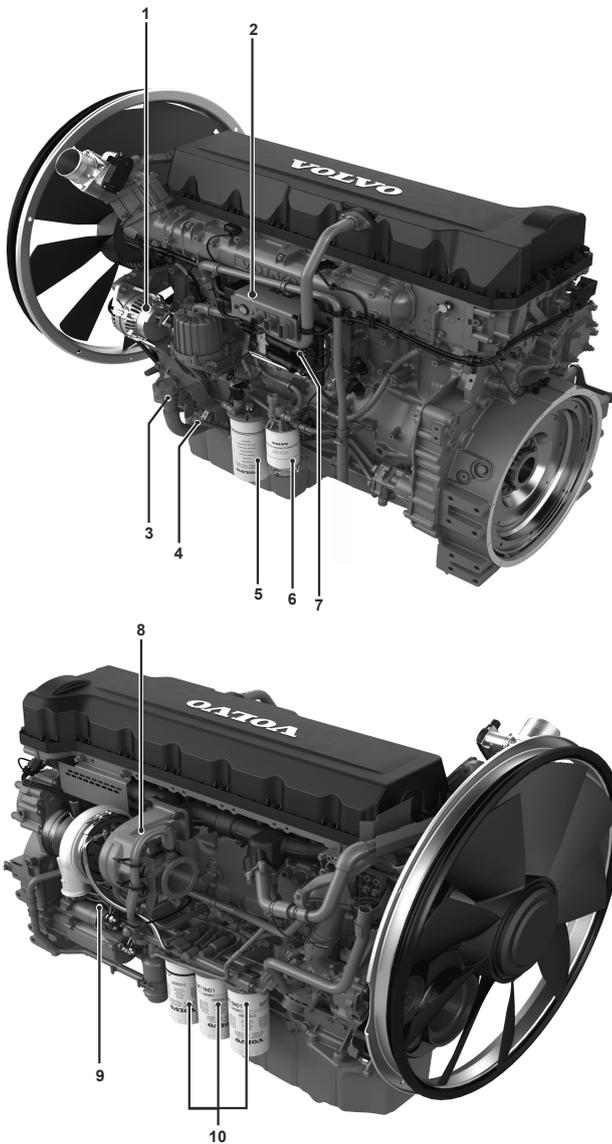


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## Orientation

TAD1351VE, TAD1352VE, TAD1353VE

- 1 Alternator
- 2 Emergency Stop Switch
- 3 Oil filler cap, engine
- 4 Oil dipstick
- 5 Fuel Filter
- 6 Fuel pre-filter with water separator
- 7 Control Unit, EMS
- 8 Turbo
- 9 Starter motor
- 10 Oil filter



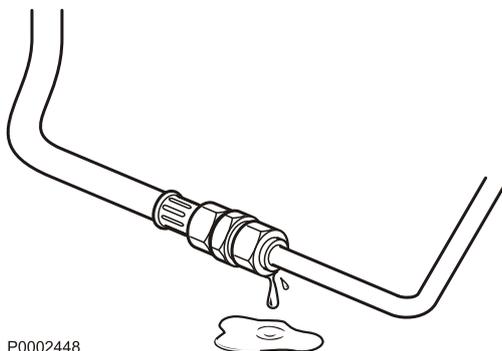
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## Engine, General

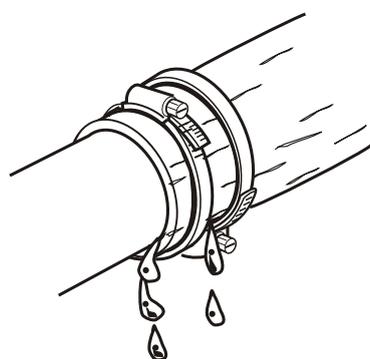
### General inspection

Make it a habit to give the engine and engine compartment a visual inspection before starting the engine and after operation once the engine has stopped. This will help you to discover quickly if anything abnormal has happened, or is about to happen.

Look especially carefully at oil, fuel and coolant leakage, loose bolts, worn or poorly tensioned drive belts, loose connections, damaged hoses and electrical cables. This inspection only takes a few minutes and can prevent serious malfunctions and expensive repairs.



P0002448



P0002455

### **⚠ WARNING!**

Accumulations of fuel, oil and grease on the engine or in the engine room is a fire hazard and must be removed immediately they are detected.

### **⚠ WARNING!**

If an oil, fuel or coolant leak is detected, the cause must be investigated and the fault rectified before the engine is started.

### **IMPORTANT!**

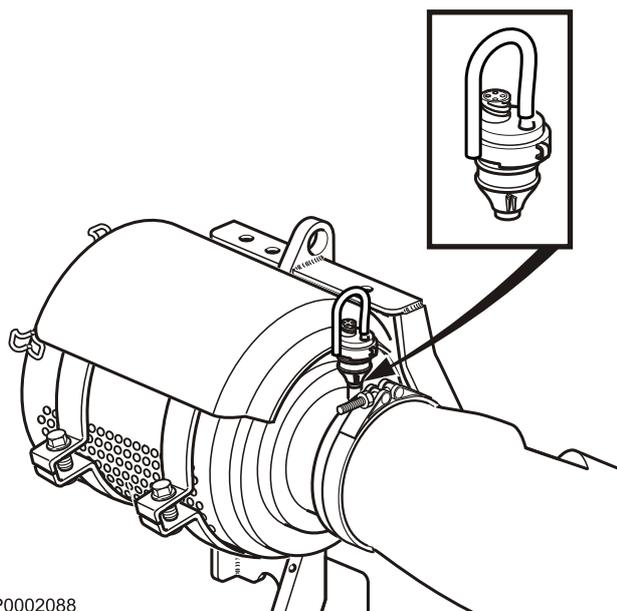
Remember the following when washing with a power washer: Never aim the water jet at radiators, charge air cooler, seals, rubber hoses or electrical components.

## Air Filter, Check and Change

The engine is equipped with electronic air filter indication.

The control unit provides an output signal which is announced as a warning on the instrument panel. The warning indicates a pressure drop in the air filter, which must then be checked and possibly changed.

- Scrap the old filter. No cleaning or re-use is permissible
- In continuous operation, the filter should be checked every 8 hours. For operations in extremely dirty environments such as coal mines and rock crushing mills, special air filters must be used.



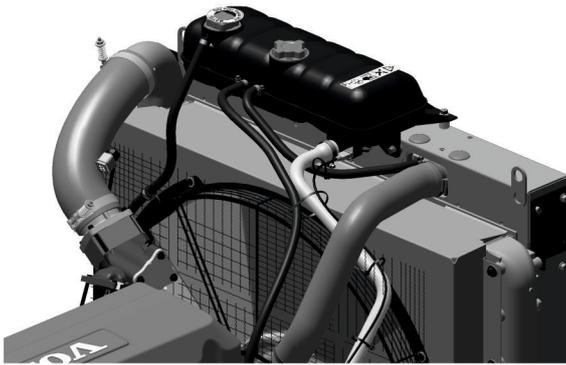
P0002088

## Charge Air Pipe, Leakage Check

Inspect the condition of the charge air hoses, hose unions and clamps for cracks and other damage. Change as necessary.

### IMPORTANT!

Clamps must be tightened using a torque wrench to  $9 \pm 2$  Nm ( $6.6 \pm 1.5$  lbf.ft.).



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## Drive Belt and Alternator Belt, Inspection

Inspections must be carried out after operations, while the belts are hot.

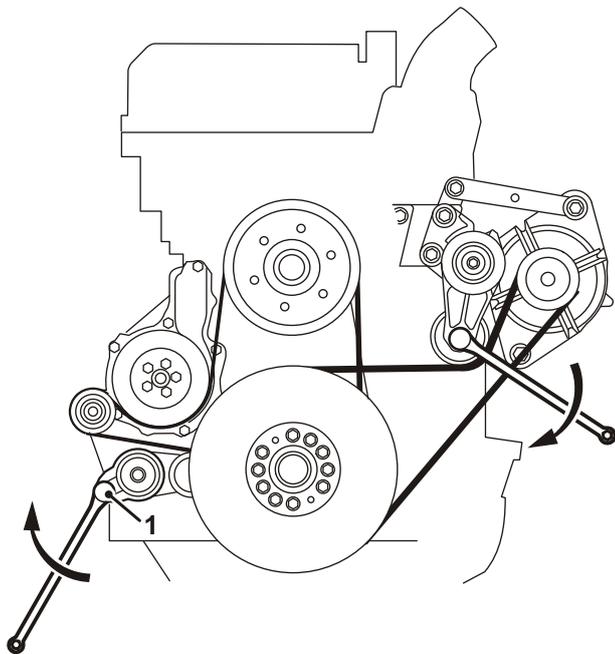
You should be able to depress the alternator belt and the drive belt about 3-4 mm between the pulleys.

The alternator belts and drive belts have automatic belt tensioners and do not need to be adjusted.

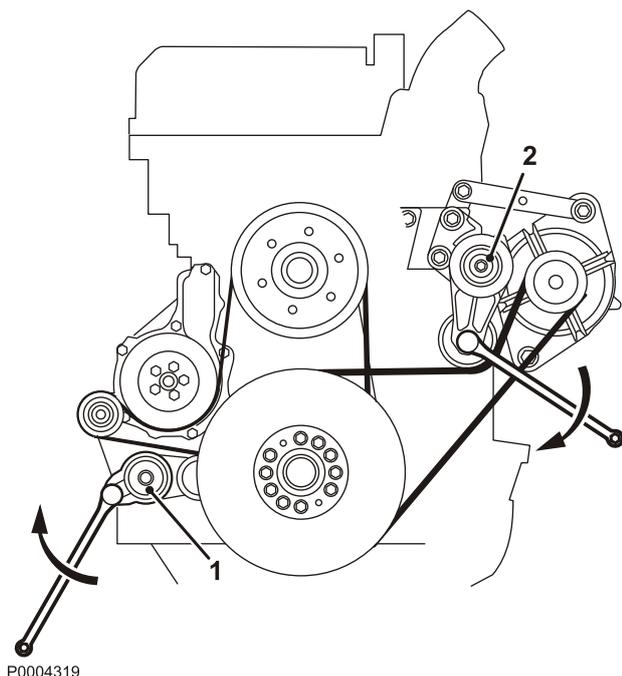
Check the condition of the drive belts. Replace as necessary; refer to *Alternator Belt, Change* page 51 and *Drive Belt, Change* page 50.

## Drive Belt, Change

- 1 Disconnect the main switch(es) and check that the engine is not connected to system voltage.
- 2 Remove the fan guard and fan ring round the cooling fan.
- 3 Remove the belt guard.
- 4 Place a 1/2" square wrench in the belt tensioner (1). Lift the wrench and remove the drive belt.
- 5 Thread the drive belt round the fan and remove it.
- 6 Check that the pulleys are clean and undamaged.
- 7 Thread the new drive belt over the fan.
- 8 Lift the 1/2" wrench and install the new drive belt.
- 9 Install the belt guards.
- 10 Install the fan guard and fan ring round the cooling fan.
- 11 Start the engine and perform a function check.



P0004320



## Alternator Belt, Change

### IMPORTANT!

Always replace a drive belt that seems worn or is cracked.

- 1 Disconnect the main switch(es) and check that the engine is not connected to system voltage.
- 2 Remove the fan guard and fan ring round the cooling fan.
- 3 Remove the belt guard.
- 4 Place a 1/2" square wrench in the belt tensioner (1). Lift the wrench up and lift the water pump drive belt off.
- 5 Place a 1/2" square wrench in the belt tensioner (2). Press the wrench down and remove the alternator belt.
- 6 Check that the pulleys are clean and undamaged.
- 7 Press the 1/2" wrench in the belt tensioner (2) down and install the new alternator drive belt.
- 8 Lift the 1/2" wrench in the belt tensioner (1) and re-install the water pump drive belt.
- 9 Install the belt guards.
- 10 Install the fan guard and fan ring round the cooling fan.
- 11 Start the engine and perform a function check.

## Lubrication System

Oil change intervals may vary according to the lubrication oil grade, fuel sulfur content and running conditions. **Refer to Technical data, Lubrication system.**

The oil change interval may under certain conditions be increased. To see if the engine complies Volvo Penta oil analysis needs to be performed. Contact your Volvo Penta dealer for further information.

**NOTICE!** Oil change intervals must never exceed a period of 12 months.

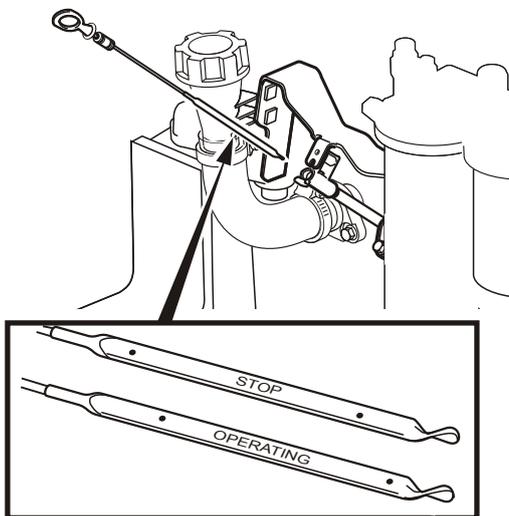


P0002089

## Oil level, checking and topping up

The oil level must be inside the marked area on the dipstick and must be checked daily before the first start.

- Top up with oil via the filler opening, please refer to *Maintenance page 47*.  
Check that the correct level has been achieved. If the engine is stationary, wait for a few minutes to allow the oil to run down into the oil pan.
- The oil level can be read both when the engine is stationary (the STOP side of the dipstick) and with the engine running (the OPERATING side of the dipstick).  
Do not fill up above the maximum oillevel. Only use a recommended grade of oil, please refer to *Technical Data page 69*.
- The oil level sensor only measures the oil level at the time when the ignition is turned on. In other words, not continually during operation.



P0004311

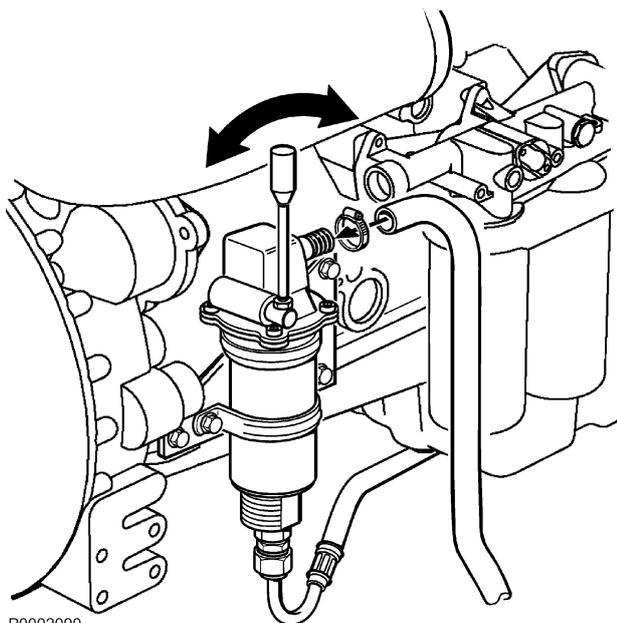
## Engine Oil, Change

### **⚠ WARNING!**

Hot oil and hot surfaces can cause burns.

Oil changes must be done when the engine is hot.

- 1 Connect the drain hose to the oil drain pump and check that no leakage can occur.
- 2 Pump the oil out (or remove the bottom drain plug and drain the oil).  
Collect all the old oil and old filters, and hand them to a re-cycling station for destruction.
- 3 Remove the drain hose (or install the bottom drain plug).
- 4 Fill with engine oil.  
For change volume, please refer to *Technical Data* page 69.



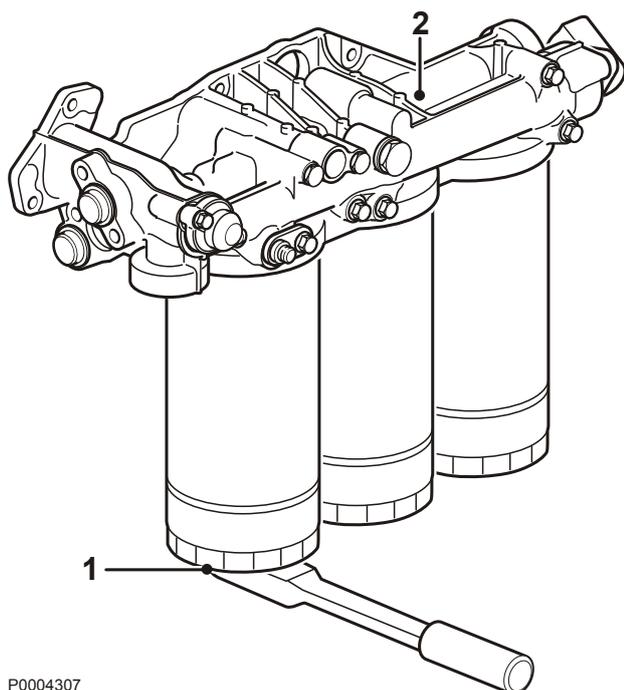
P0002090

## Oil Filter/By-pass Filter, Change

### **⚠ WARNING!**

Hot oil and hot surfaces can cause burns.

- 1 Clean the oil filter bracket (2).
- 2 Remove all oil filters with a suitable oil filter extractor (1).
- 3 Clean the mating surface of the oil filter bracket. Make sure that no remnants of old oil seal are left behind. Carefully clean round the inside of the protective rim (2) on the oil filter bracket.
- 4 Put a thin layer of engine oil on the seal rings of the new oil filters.
- 5 Install the new oil filters. Tighten the two full-flow filters (on the right of the illustration) 1/2–3/4 of a turn after they bottom. Tighten the bypass filter 3/4–1 turn after it bottoms.
- 6 Top up with engine oil, start the engine and let it run for 20–30 seconds.
- 7 Stop the engine, check the oil level and top up as required.
- 8 Check the sealing round the oil filters.



P0004307

## Fuel System

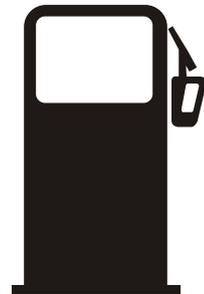
### **WARNING!**

Fire hazard. When carrying out work on the fuel system make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause a fire. Store fuel soaked rags so that they cannot cause fire.

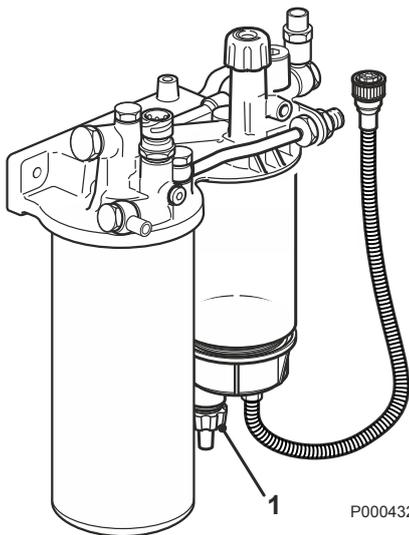
**IMPORTANT!** Only use the grades of fuel recommended in the fuel specification below, refer to *Technical Data page 71*. Always observe the greatest cleanliness during re-fueling and work on the fuel system.

### **IMPORTANT!**

All work on the engine injection system must be done by an authorized workshop.



P0002101



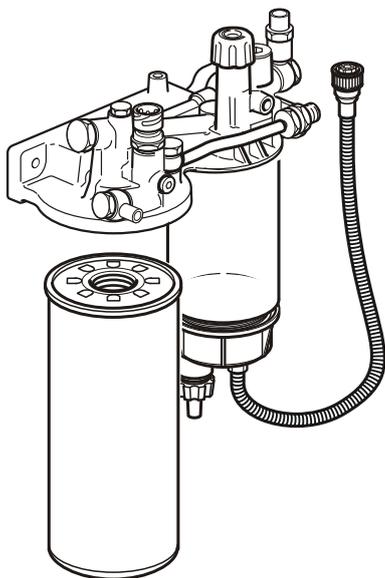
P0004327

## Draining condensate, fuel system

- 1 Put a collection vessel under the fuel filter to collect the condensate and fuel.
- 2 Open the drain nipple (1) in the base of the fuel pre-filter.
- 3 Tighten the drain tap (1) when fuel without water starts to run out.

## Engine Fuel Filter Replacement

The fuel filter shall be replaced while the engine is cold.



P0004325

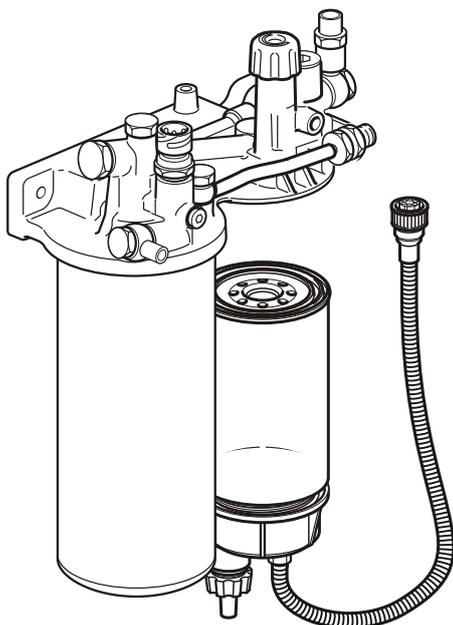
### **⚠ WARNING!**

Fire hazard. When carrying out work on the fuel system make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause a fire. Store fuel soaked rags so that they cannot cause fire.

Do not fill the new fuel filter with fuel before assembly. There is a risk that contamination could get into the system and cause malfunctions or damage.

- 1 Clean round the fuel filter.
- 2 Remove the filter with a suitable filter remover. Collect any spilled fuel in a collection vessel.
- 3 Clean the filter mating surface on the filter bracket.
- 4 Lubricate the seal with diesel fuel and install the new fuel filter. Tighten the fuel filter in accordance with the instructions on the fuel filter.
- 5 Where necessary, bleed the fuel system; refer to *Bleeding the Fuel System page 55*.
- 6 If a water trap is installed, change the filter in it at the same time as the fuel filter, and clean the water trap in the plastic bowl under the filter with a soft rag.

### **Fuel Pre-filter, Change**



P0004326

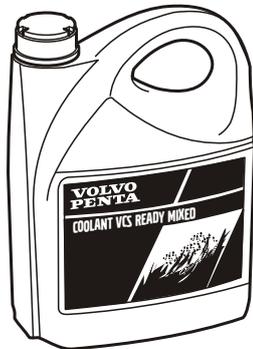
- 1 Undo the cable from the water trap sensor.
- 2 Remove the water trap filter from the filter bracket. Collect any spilled fuel in a collection vessel.
- 3 Remove the lower part of the water trap from the filter.
- 4 Clean the lower part of the water trap with a soft rag. Check that the drain hole in the lower part is not blocked.
- 5 Install a new seal on the lower part and lubricate the seal with diesel fuel. Re-install the lower part of the filter.
- 6 Lubricate the seal with diesel fuel. Screw the filter onto the filter bracket by hand until the rubber seal just touches the mating surface. Then tighten a further half turn, no more.
- 7 Connect the cable to the water trap sensor.
- 8 Where necessary, purge the fuel system; refer to *Bleeding the Fuel System page 55*.

### **Bleeding the Fuel System**

The system does not need to be bled unless it has been run completely dry. Purging is then done with the hand pump on the fuel filter bracket.

## Cooling System

The engine's internal cooling system makes sure the engine works at the right temperature. It is a closed system that must always be filled with a mixture of concentrated coolant and water in order to protect the engine against internal corrosion, cavitation and bursting due to freezing.



P0013077

Coolant of a suitable chemical composition must be used all year round. This also applies in areas where there is never any risk of freezing, to provide the engine with full corrosion protection. The use of anti-corrosion agents alone is not permitted in Volvo Penta engines. Never use water alone as a substitute for coolant.

The corrosion protection additives become less effective over time, which means that the coolant must be changed at regular intervals; refer to *Maintenance Schedule*. The cooling system must be flushed whenever the coolant is changed; refer to the *Cooling System, Cleaning page 61* section.

Volvo Penta coolants have been prepared to work best with Volvo Penta engines and offer excellent protection against corrosion, cavitation damage, and bursts due to freezing. Only coolants of this quality are adapted to, and approved by, Volvo Penta.

### IMPORTANT!

Volvo Penta engines are delivered with either Volvo Penta Coolant (green) or Volvo Penta Coolant VCS (yellow); both are available as concentrates and Ready Mixed.

We recommend that the coolant supplied with the engine on delivery be used. Future warranty claims related to engine and accessories may be denied if an unsuitable coolant has been used, or if the instructions for coolant mixture have not been followed. Engines using yellow Volvo Penta Coolant VCS must have a yellow decal with the text VOLVO COOLANT VCS on the expansion tank.

- The two types of Volvo Penta coolant may **never** be mixed with each other as this will affect the anti-corrosion properties.
- Coolant filters may not be used together with Volvo Penta Coolant VCS.

### Ready Mixed

The ready-mixed coolant protects the engine from corrosion damage, cavitation damage and bursts due to freezing down to

-28 °C (-18 °F) Volvo Penta Coolant (green).

-24 °C (-11 °F) for Volvo Penta Coolant VCS (yellow).

## Coolant, Mixing

### **WARNING!**

All coolant is hazardous and harmful to the environment. Do not consume. Coolant is flammable.

### **IMPORTANT:**

Different types of coolant must not be mixed with each other.

The concentrated coolant must be mixed with pure water (distilled or de-ionized water) according to specifications; refer to *Water Quality* page 72.

### **Mix: 40% concentrated coolant and 60% water**

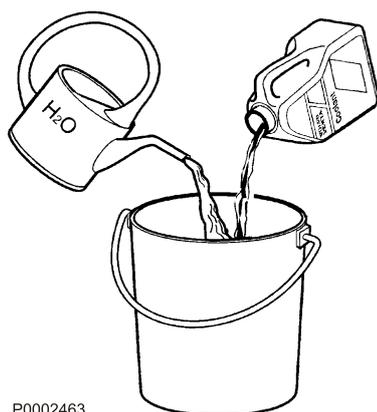
This mixture prevents against internal corrosion, cavitation and bursts due to freezing down to  
-28°C (-18°F) Volvo Penta Coolant (green).  
-24°C (-11°F) Volvo Penta Coolant VCS (yellow).

At 60% glycol concentration, the freezing point is lowered to

-54°C (-65°F) Volvo Penta Coolant (green).  
-46°C (-51°F) Volvo Penta Coolant VCS (yellow).

Never mix in more than 60% of the concentrated coolant. A greater volume of concentrate entails a reduced cooling effect with the risk for overheating and reduced anti-freeze protection.

It is extremely important that the system be filled with the correct coolant concentration. Mix in a separate clean vessel before filling the cooling system. Make sure that the liquids mix.



P0002463

## Coolant Level, Checking and Topping Up

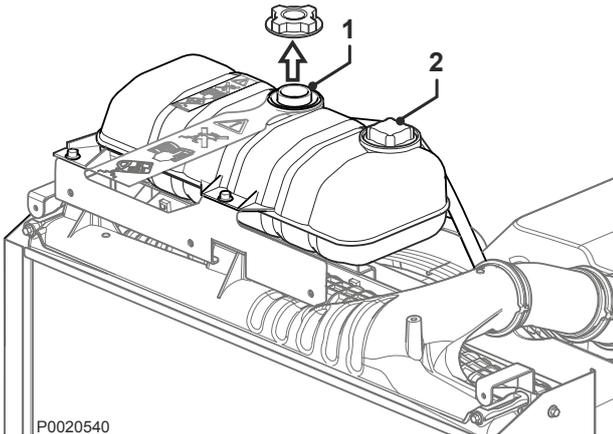
Coolant filling must be performed with the engine stopped. Check the coolant level daily before starting.

### IMPORTANT!

Only use the coolant recommended by Volvo Penta. Top up with the same type of coolant as already used in the system. Different types of coolant must not be mixed.

### ⚠ WARNING!

Do not open the coolant filler cap when the engine is hot, except in emergencies, this could cause serious personal injury. Steam or hot fluid could spray out.



P0020540

- 1 Only open the filler cap (1). Do not open the pressure cap (2).
- 2 Check that the coolant level is above the MIN mark on the expansion tank.
- 3 Top up with coolant as required, so that the level is between the MIN and MAX marks. Fill slowly, to allow air to flow out.

### Filling a completely empty system

**NOTICE!** Mix the correct amount of coolant in advance, to ensure that the cooling system is completely filled. Refer to Technical Data, Cooling System, for the correct coolant volume.

Do not open the pressure cap (2).

- 1 Check that all drain points are closed.
- 2 Open filler cap (1).
- 3 Fill with coolant, so that the level is between the MIN and MAX marks. Fill slowly, to allow air to flow out.

**NOTICE!** Do not start the engine until the system is completely filled and bled.

- 4 Start the engine when the cooling system has been completely filled and bled. Open any bleeding nipples a short while after starting, to allow trapped air to escape. If a heating unit is connected to the engine cooling system, the heat control valve must be opened and the installation vented during filling.
- 5 Stop the engine after about an hour and check the coolant level. Top up as necessary.

## Coolant, Draining

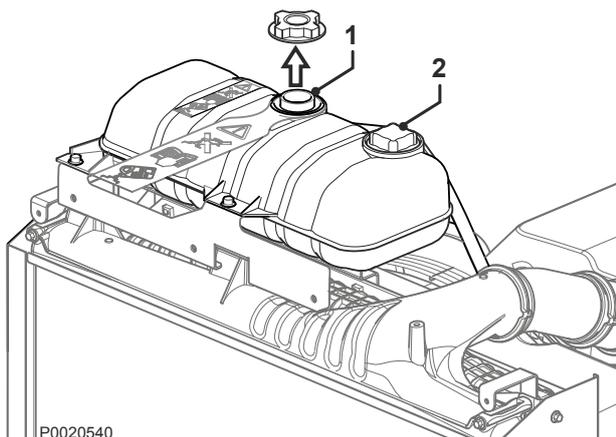
### **WARNING!**

Do not open the coolant filler cap when the engine is hot, except in emergencies, this could cause serious personal injury. Steam or hot fluid could spray out.

### **IMPORTANT!**

On engines which are to be put in storage, the engine cooling system must **not** be drained. The coolant contains corrosion-inhibiting additives.

- 1 Stop the engine.
- 2 Remove the filler cap (1). Do not open the pressure cap (2).
- 3 Open all drain points. Drain the coolant from the radiator and engine block, using the drain hose. The drain nipples are situated under the radiator on the right side of the engine block.
- 4 Check that all coolant drains out. Deposits may be found inside the drain plug/tap, and need to be cleared away. There is otherwise a risk that coolant could remain and cause damage due to freezing. Check whether the installation has any further taps or plugs at the lowest points of the cooling water pipes.
- 5 Shut any taps and check that the spring-loaded covers on the nipples close completely. Install the rubber plugs.

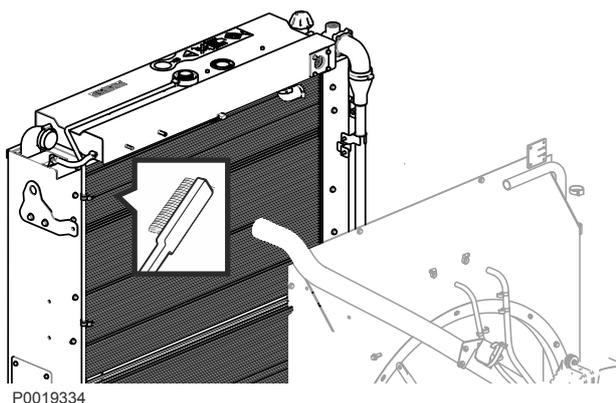


## Charge Air Cooler, External Cleaning

Remove guards as necessary, to access the radiator. Clean with water and a mild detergent. Use a soft brush. Be careful not to damage the radiator vanes. Reinstall removed parts.

### **IMPORTANT!**

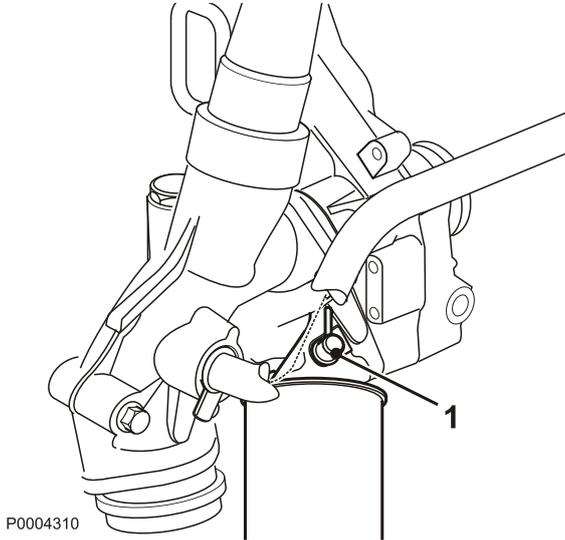
Do not use a pressure washer.



## Coolant Filter, Change

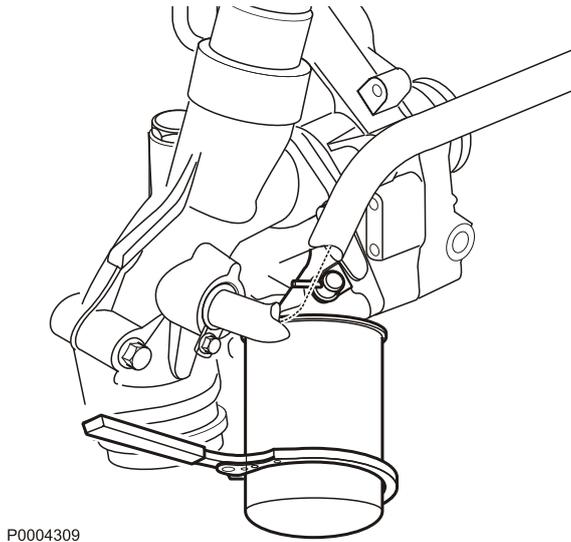
**NOTICE!** Only applies to engines using Volvo Penta Coolant (green). Engines using Volvo Penta Coolant VCS are not fitted with coolant filters.

### Open



- 1 Turn the tap (1) 90° to stop the flow through the coolant filter.
- 2 Remove the coolant filter with a suitable extractor. Make sure that no residue from the old seal remains in the housing.
- 3 Put a thin layer of engine oil on the new coolant filter seal. Screw the coolant filter on by hand until the seal comes into contact with the mating surface of the filter bracket. Then tighten the coolant filter a further 1/2 turn.
- 4 Turn the tap (1) 90° to release the flow through the coolant filter again.
- 5 Start the engine and carry out a leakage check.
- 6 Switch the engine off and check the coolant level. Refer to *Coolant Level, Checking and Topping Up* page 58.

### Closed



## Cooling System, Cleaning

Cooling performance is reduced by deposits in the radiator and cooling galleries. The cooling system should be cleaned out when the coolant is changed.

### IMPORTANT!

Cleaning must not be done if there is any risk of the cooling system freezing, since the cleaning solution does not have any antifreeze properties.

### IMPORTANT!

It is extremely important that the correct concentration and volume of coolant is added to the system. Mix in a separate clean vessel before filling the cooling system. Make sure that the liquids mix.

- 1 Empty the cooling system. Refer to *Coolant, Draining page 59*.
- 2 Put a hose into the expansion tank filling hole and flush with clean water, as specified by Volvo Penta—refer to section Water quality in *Technical Data page 72* until the water draining out is completely clear.
- 3 If there should still be some contamination left after flushing for a long time, cleaning can be done with coolant. Otherwise, continue as in item 8 below.
- 4 Fill the cooling system with 15-20 % mixture of concentrated coolant. Use only Volvo Penta recommended concentrated coolant mixed with clean water.
- 5 Drain the coolant after 1-2 days of operation. Remove the filler cap and possibly the lower radiator hose to increase the speed of emptying. To prevent suspended material from settling back in the system emptying should be done rapidly, within the space of 10 minutes, when the engine has not been standing still for a long time.
- 6 Flush the system immediately and thoroughly with clean hot water to prevent dirt from settling in the inner areas. Flush until the water that runs out is completely clean. Make sure that any heater controls are set to full heating during emptying.
- 7 If contamination should still be left after a long period of flushing, cleanout using Volvo Penta radiator cleaner, followed by finishing-off with Volvo Penta neutralizer. Carefully follow the instructions on the package. Otherwise, continue as in item 8 below.
- 8 When the cooling system is completely free from contamination, close the drain taps and plugs.
- 9 Fill up with Volvo Penta recommended coolant, following the instructions in the chapters entitled *Maintenance page 56* and *Coolant Level, Checking and Topping Up page 58*.

## Electrical System

The engine is equipped with a 2-pole electrical system and an alternator. System voltage is 24V.

### **WARNING!**

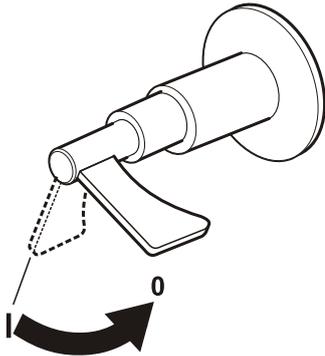
Always stop the engine and break the current using the main switches before working on the engine.

## Main switch

### **IMPORTANT!**

Never disconnect the current with the main switches when the engine is running, the alternator and electronics could be damaged.

The main switches must never be switched off before the engine has stopped. If the circuit between the alternator and the battery is disconnected when the engine is running, the alternator and electronics can be damaged. For the same reason the charging circuits must never be re-connected with the engine running.



P0002576

## Fuses

The engine is equipped with a 10 A circuit breaker which cuts the current if overloaded.

The circuit breaker is located on the left-hand side of the engine *Location of Sensors*.

The engine stops if the fuse trips. If the circuit breaker trips frequently, an authorized Volvo Penta workshop should be contacted to investigate the cause of the overload.

## Electrical Connections

Check that electrical connections are dry, free from oxide, and that they are securely tightened.



P0002107

## Battery, Maintenance

### ⚠ WARNING!

Risk of fire and explosion. Never allow an open flame or electric sparks near the battery or batteries.

### ⚠ WARNING!

Never confuse the positive and negative poles on the batteries. Risk of arcing and explosion.

### ⚠ WARNING!

The battery electrolyte contains extremely corrosive sulfuric acid. Protect your skin and clothes when charging or handling batteries.

Always use protective goggles and gloves. If battery electrolyte comes into contact with unprotected skin wash off immediately using plenty of water and soap. If battery acid comes in contact with the eyes, flush immediately with plenty of water and obtain medical assistance without delay.

## Connecting and disconnecting the battery

### Connecting

- 1 Connect the + cable (red) to the + pole on the battery.
- 2 Connect the – cable (black) to the – pole on the battery.

### Disconnecting

- 1 Remove the – cable (black).
- 2 Remove the + cable (red).

### Cleaning

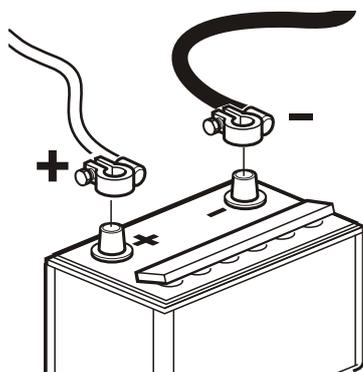
Keep the batteries clean and dry. Contamination and oxide on the batteries and battery poles can cause stray currents, voltage drop and discharge, especially in wet weather. Remove oxidation from the battery poles and terminals, using a brass brush. Tighten the terminals securely and grease them with terminal grease or petroleum jelly.

### Filling

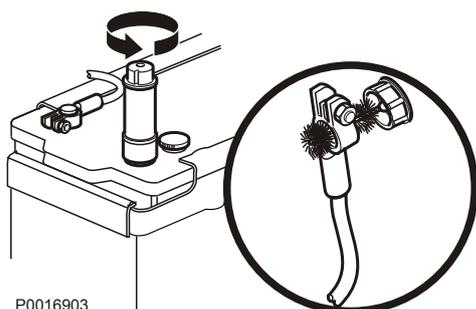
The electrolyte level should be 5–10 mm (0.2– 0.4”) above the cell plates in the battery. Top up with distilled water as required.

After filling, the battery should be charged for at least 30 minutes by running the engine at idle.

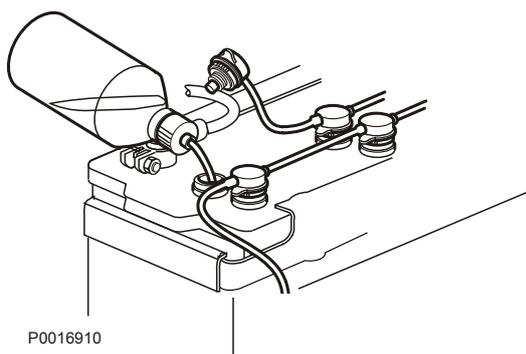
Some maintenance-free batteries have special instructions, which must be followed.



P0016902



P0016903



P0016910



P0002107

## Battery, Charging

### ⚠ WARNING!

Risk of fire and explosion. Never allow an open flame or electric sparks near the battery or batteries.

### ⚠ WARNING!

The battery electrolyte contains extremely corrosive sulfuric acid. Protect your skin and clothes when charging or handling batteries.

Always use protective goggles and gloves. If battery electrolyte comes into contact with unprotected skin wash off immediately using plenty of water and soap. If battery acid comes in contact with the eyes, flush immediately with plenty of water and obtain medical assistance without delay.

### ⚠ WARNING!

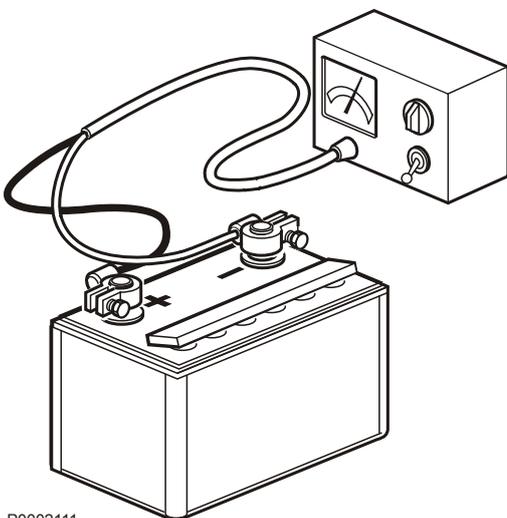
Never confuse the positive and negative poles on the batteries. Risk of arcing and explosion.

### IMPORTANT!

Observe the instruction manual for the battery charger carefully. To avoid the risk of electrochemical corrosion when an external charger is connected, the battery cables should be removed from the batteries before the charger is connected.

Always switch off the charging current before the charging clips are removed.

- Charge batteries if they have become discharged. During charging, unscrew the cell plugs but leave them in the plug holes. Ventilate well, especially if the batteries are charged in an enclosed space.
- If the engine is not used for a longer period of time, the batteries should be fully charged, then possibly trickle charged. Refer to the battery manufacturer's recommendations). Batteries are damaged by being left discharged, and can also freeze and burst more easily in cold weather.
- Special instructions apply to **boost charging**. Boost charging can shorten battery life, and should therefore be avoided.



P0002111

# Storage

To prevent the engine and other equipment from being harmed during long (2 months or more) periods out of service, it must be conserved. Because it is of utmost importance that the conservation be performed correctly, we have compiled a checklist covering the most important points. Before taking the engine out of service for long periods, it should be checked by a Volvo Penta dealer for possible need of overhaul or repair.

## CAUTION!

Read the chapter on Maintenance before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and correct manner.

## WARNING!

Conservation oils can be flammable and dangerous to inhale. Ensure good ventilation. Use a protective face mask when spraying.

## IMPORTANT!

Remember the following must be considered when cleaning with a high-pressure water jet: Never point high-pressure water jets directly at seals, rubber hoses or electrical components. Never use the high-pressure function when washing the engine.



P0002089

- **For up to 8 month's stoppage:**  
Change the oil and oil filter on the engine, then run the engine until warm.
- **More than 8 month's stoppage:**  
Conserve the lubrication and fuel systems with conservation oil. Refer to the section *Conservation of the lubrication and fuel systems for more than 8 months' stoppage*.
- Make sure the coolant has adequate antifreeze properties. Top up as necessary. Alternatively, you can drain the coolant (also drain the coolant filter).
- Drain any water and contamination from the fuel filters and fuel tank. Fill the fuel tank completely, to avoid condensation.
- Disconnect the battery cables, clean and charge the batteries. Trickle charge the batteries while the equipment is in storage. **A poorly charged battery can freeze and burst.**
- Clean the outside of the engine. Do not use a high pressure washer for engine cleaning. Touch up paint damage with Volvo Penta original paint.
- Check and rust-proof any control cables.
- Put a note on the engine with the date, type of conservation and the conservation oil used.
- Cover the air filter, exhaust pipe and engine if necessary.

## Bringing out of storage

- Remove any covers from the engine, air filter and exhaust pipe.
- Fill the engine with the correct grade of oil into the engine, as necessary, refer to *Technical Data, Lubrication System*. Install a new oil filter if the filter was not changed during conservation.
- Install new fuel filters and bleed the fuel system.
- Check the drive belt(s).
- Check the condition of all rubber hoses, and retighten the hose clamps.
- Close the drain taps and install any drain plugs.
- Check the coolant level. Top up as necessary.
- Connect the fully charged batteries.
- Start the engine and warm it up at fast idle with no load.
- Check that no oil, fuel or coolant leakage occurs.

## Conservation of the lubrication and fuel systems for more than 8 months' stoppage:

- Drain the engine oil and fill up with **conservation oil\*** to just over the MIN marking on the dipstick.
- Connect the fuel suction and return hoses to a 1/3 full jerrican containing **conservation oil\*** and 2/3 diesel fuel.
- Bleed the fuel system.
- Start the engine and run at a fast idle until about 2 liters (0.6 US gal) of the fluid in the jerrican have been used. Stop the engine and re-connect the fuel suction and return lines.
- Drain the conservation oil from the engine.
- Follow the other instructions on the previous page.

\* Conservation oils are sold by oil companies.

# Technical Data

## Engines

<b>Type designation</b>	<b>TAD1341/42/43/44/45GE</b>
Power, prime/stand-by	Refer to the sales literature
Torque, Prime/Standby	Refer to the sales literature
No. of cylinders	6
Bore, mm/inch	131/5.16
Stroke, mm/inch	158/6.22
Displacement, dm <sup>3</sup> /in <sup>3</sup>	12,78/779.7
Weight, wet (only engine, excluding cooling system), kg/lb	1325/2921
Weight, wet (inkl. ), kg/lb	1790/3946
Firing order	1-5-3-6-2-4
Compression ratio	18.1:1
Low idle, rpm	900
High idle, rpm	1500/1800

<b>Type designation</b>	<b>TAD1350/51/52/53/54/55GE</b>
Power, prime/stand-by	Refer to the sales literature
Torque, Prime/Standby	Refer to the sales literature
No. of cylinders	6
Bore, mm/inch	131/5.16
Stroke, mm/inch	158/6.22
Displacement, dm <sup>3</sup> /in <sup>3</sup>	12,78/779.7
Weight, dry (only engine, excluding cooling system), kg/lb	1295/2855
Weight, wet (only engine, excluding cooling system), kg/lb	1325/2921
Firing order	1-5-3-6-2-4
Compression ratio	18.1:1
Low idle, rpm	900
High idle, rpm	1800

<b>Type designation</b>	<b>TAD1340/41/42/43/44/45VE, TAD1350VE</b>
Power, prime/stand-by	Refer to the sales literature
Torque, Prime/Standby	Refer to the sales literature
No. of cylinders	6
Bore, mm/inch	131/5.16
Stroke, mm/inch	158/6.22
Displacement, dm <sup>3</sup> /in <sup>3</sup>	12,78/779.7
Weight, wet (engine only), kg/lb	1325/2921
Weight, wet (Power Pac), kg/lb	1790/3946
Firing order	1-5-3-6-2-4
Compression ratio	18.1:1
Idle, rpm	
TAD1340–44VE, TAD1350VE	550–900
TAD1345VE	600–1200

<b>Type designation</b>	<b>TAD1351/52/53VE</b>
Power, prime/stand-by	Refer to the sales literature
Torque, Prime/Standby	Refer to the sales literature
No. of cylinders	6
Bore	131 mm (5.16 inch)
Stroke	158 mm (6.22 inch)
Displacement	12,78 dm <sup>3</sup> (780 in <sup>3</sup> )
Weight, wet (Engine)	1325 kg (2921 lb)
Weight, wet (Power Pac)	1790 kg (3946 lb)
Firing order	1-5-3-6-2-4
Compression ratio	18.5:1
Idling speed	600–900

## Lubrication System

<b>Oil Change Volume</b>	
Oil capacity including oil filters, approx.:	36 liters (9.5 US gal)
<b>Oil pressure, hot engine:</b>	
Operating Speed	370-520 kPa (54-75 psi)
Idle, min	270 kPa (39 psi)
<b>Oil filter</b>	
Full flow filter	2
By-pass filter for engine oil	1
<b>Lube Oil Pump</b>	
Type	Gear driven
<b>Oil</b>	
Oil capacity including oil filters, approx.:	
Oil pan, standard	36 liters (9.51 US gal)
Oil pan, aluminum	52 liters (13.74 US gal)
<b>Oil pressure, hot engine:</b>	
at operating speed	300-650 kPa (44-94 psi)
<b>Oil filter</b>	
Full flow filter	2
By-pass filter	1
<b>Lube Oil Pump</b>	
Type	Gear driven

### Oil recommendations

Engine Designation	Oil quality	Sulfur content in fuel, by weight		
		up to 0,5 %	0,5 – 1,0 %	more than 1,0 % <sup>1)</sup>
Oil change interval, reached first in operation:				
TAD1340–45VE TAD1350VE TAD1341–45GE TAD1350–55GE	VDS-2 <sup>2)</sup> VDS-3	600 hours or 12 months	300 hours or 12 months	150 hours or 12 months
TAD1351–53VE	VDS-3 VDS-4	500 hours or 12 months	250 hours or 12 months	125 hours or 12 months

**NOTICE!** Mineral based oil, either fully or semi-synthetic, can be used on condition that it complies with the quality requirements above.

1) If sulphur content is > 1.0% by weight, use oil with TBN > 15.

2) The oil must also comply with at least one of the following specifications: ACEA:E7, ACEA:E5, Global DHD-1, API:CI-4 eller API:CH-4.

**VDS = Volvo Drain Specification**

**ACEA = Association des Constructeurs Européenne d'Automobiles**

**API = American Petroleum Institute**

**Global DHD = Global Diesel Heavy Duty**

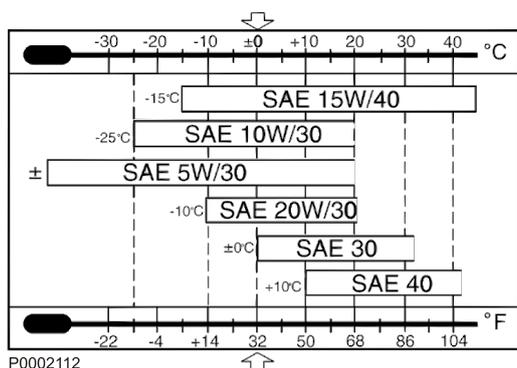
**TBN = Total Base Number**

### Viscosity

Select the viscosity according to the table.

The temperature values refer to stable ambient temperatures.

\* SAE 5W/30 refers to synthetic or semi-synthetic oils.



## Fuel System

<b>Feed pump</b>	
Feed pressure at 900 rpm	min 100 kPa (14.5 psi)
Feed pressure at 1800 rpm	min 300 kPa (43,5 psi)
Feed pressure at full load	min 300 kPa (43,5 psi)
<b>Bypass valve</b>	
Opening pressure	400-550 kPa (58–80 psi)

### Fuel specification

The fuel must comply with national and international standards for commercially supplied fuels, such as:

**EN 590** (with nationally adapted environmental and cold weather requirements)

**ASTM D 975 No 1-D och 2-D**

**JIS K 2204**

**Sulfur content:** Complying with legal requirements in each country. If the sulfur content exceeds 0.5 weight-percent, the oil change intervals shall be changed, refer to *Technical Data page 69*.

In some countries, higher quality requirements are set due to environmental reason, e.g. in Sweden (Environmental Class 1). These fuels show better emissions performance than the standard ones and can therefore be recommended. Due to lower density and/or viscosity, some of these environmental fuels can slightly decrease the maximum power output and also increase the volumetric fuel consumption.

### Biodiesel (FAME)

Vegetable oil esters (Fatty Acid Methyl Esters, FAME), also called "biodiesel", are increasingly available as a blending component in diesel fuels. Volvo Penta accepts the same FAME content as in major on-road fuels EN 590 and ASTM D975; i.e. today up to 7%, without any specific additional service requirements. Please contact your Volvo Penta Dealer for further information.

For engines produced after 1 Jan 2009 Volvo Penta accepts, with specific service requirements,

- max 30% FAME blend (FAME component in accordance with EN 14214 and diesel fuel in accordance with EN 590)
- max 20% FAME blend (FAME component in accordance with ASTM D6751 and diesel fuel in accordance with ASTM D975)

#### NOTICE!

Higher FAME blends will negatively impact performance, emissions and fuel consumption.

#### NOTICE!

Engines for emergency applications, e.g. genset standby, must only run with market diesel fuel with minimum FAME content.

#### NOTICE!

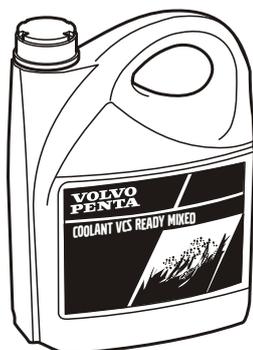
In case of cold starting problems shift to diesel fuel. Do not to use FAME below -10°C.

#### NOTICE!

Raw vegetable or animal oils do not meet EN 14214 and are not allowed as fuels or fuel blending components.

## Cooling System

Type	Pressurized, sealed
Pressure cap, max opening pressure	70 kPa (10.2 psi)
<b>Coolant</b>	
Volume (engine)	20 liters (5.28 US gal)
Volume (engine+radiator and hoses)	
Radiator, standard	44 liters (11.6 US gal)
Radiator, HD (Heavy Duty)	58 liters (15.3 US gal)
<b>Thermostat</b>	
Qty	1 pc
Opening temperature	82°C (180°F)



P0013077

### Coolant

Volvo Penta Coolant VCS and VCS Ready Mixed (yellow) are based on Organic Acid Technology, OAT.

Volvo Penta Coolant and Coolant Ready Mixed (green) are silicate based.

### IMPORTANT:

Different types of coolant must not be mixed with each other.



P0002094

## Water Quality

### ASTM D4985:

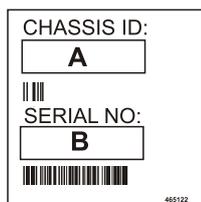
Total solid particles	<340 ppm
Total hardness	<9,5° dH
Chloride	<40 ppm
Sulfate	<100 ppm
pH value	5.5–9
Silica (acc. ASTM D859)	<20 mg SiO <sub>2</sub> /l
Iron (acc. ASTM D1068)	<0.10 ppm
Manganese (acc. ASTM D858)	<0.05 ppm
Conductivity (acc. ASTM D1125)	<500 µS/cm
Organic content, COD <sub>Mn</sub> (acc. ISO8467)	<15 mg KMnO <sub>4</sub> /l

## Electrical System

System voltage	24V
Alternator	
voltage/max. current	28V/80A
power app.	2200W
Battery capacity	2 pcs. series connected 12 V, max. 220 Ah
Battery electrolyte specific gravity at +25 °C:	
fully charged battery	1.28 g/cm <sup>3</sup> (1.24 g/cm <sup>3</sup> )*
battery recharged at	1.20 g/cm <sup>3</sup> (1.20 g/cm <sup>3</sup> )*

\* Note. Applies to batteries with tropical acid.

## Identification Numbers



P0002051

- A Chassi ID
- B Serial number



P0015924

- A Engine Designation
- B Specification number
- C Serial number

# VOLVO PENTA

Declaration for the installation of partially-completed machinery in accordance with Machinery Directive 2006/42/EC

**Engine Manufacturer:**

AB Volvo Penta  
Gropegårdsgatan, SE 405 08 Gothenburg, Sweden

Description of engine 4-cycle diesel engine. Engine types covered by this declaration:

TAD540VE	TAD840VE	TAD940VE	TAD1140VE	TAD1340VE	TAD1341GE	TAD1640VE-B	TAD1640GE
TAD541VE	TAD841VE	TAD942VE	TAD1141VE	TAD1341VE	TAD1342GE	TAD1641VE	TAD1641GE
TAD542VE	TAD842VE	TAD943VE	TAD1142VE	TAD1342VE	TAD1343GE	TAD1641VE-B	TAD1642GE
TAD550VE	TAD843VE	TAD950VE	TAD1150VE	TAD1343VE	TAD1344GE	TAD1642VE	TAD1650GE
TAD551VE	TAD850VE	TAD951VE	TAD1151VE	TAD1344VE	TAD1345GE	TAD1642VE-B	TAD1651GE
TAD552VE	TAD851VE	TAD952VE	TAD1152VE	TAD1345VE	TAD1350GE	TAD1643VE	TWD1643GE
TAD570VE	TAD852VE	TAD940GE	TAD1170VE	TAD1350VE	TAD1351GE	TAD1650VE	TWD1652GE
TAD571VE	TAD853VE	TAD941GE	TAD1171VE	TAD1351VE	TAD1352GE	TAD1650VE-B	TWD1653GE
TAD572VE	TAD870VE		TAD1172VE	TAD1352VE	TAD1353GE	TAD1651VE	TWD1663GE
	TAD871VE			TAD1353VE	TAD1354GE	TAD1660VE	TWD1672GE
	TAD872VE			TAD1360VE	TAD1355GE	TAD1661VE	TWD1673GE
	TAD873VE			TAD1361VE	TAD1371VE	TAD1662VE	
				TAD1362VE	TAD1372VE	TAD1670VE	
				TAD1363VE	TAD1373VE	TAD1671VE	
				TAD1364VE	TAD1374VE	TAD1672VE	
				TAD1365VE	TAD1375VE		

Fundamental health and safety requirements applied to, and fulfilled by, the above-mentioned engines are described in the following items in Annex I:

1.1.3, 1.1.5, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.13, 1.6.1, 1.6.2, 1.6.4, 1.7.1, 1.7.1.1, 1.7.1.2, 1.7.4, 1.7.4 and 1.7.4.3.

The relevant technical documentation is compiled as described in part B of Annex VII.

Relevant information concerning the partially completed machinery will be provided in suitable form upon justified requests from competent national authorities. The individual authorized to compile the relevant technical documentation is the signer of this declaration.

The harmonizing standards applied are:

EN ISO 12100–1: Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology.

EN ISO 12100–2: Safety of machinery – Basic concepts, general principles for design – Part 2: technical principles.

EN 1679–1: Reciprocating internal combustion engines – Safety – Part 1: Compression ignition engines.

The partially completed machinery also complies with the following relevant Directive:

2004/108/EC – Electromagnetic Compatibility (EMC) Directive.

Applied standards: EN 61000–6–1, EN 6100–6–2, EN 61000–6–3, EN 61000–6–4, EN 12895, EN-ISO 14982 and EN 13309.

For engines equipped with the Volvo Penta Start/Stop System the responsibility for the functional safety of the system lies with the machine manufacturer performing the integration.

The engines covered by this declaration may not be put into operation before the completed machinery into which they are to be installed has been declared to conform with the provision of Machinery Directive 2006/42/EC.

**Name and function:**

Jonas Holmberg, Laws and Regulation

(The identity of the individual authorized to sign on behalf of the engine manufacturer or the latter's authorized representative.)

**Signature and title:**



Date and place of issue: (yyyy-mm-dd) 2014–12–16 Gothenburg

LR-06/14–01

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