OPERATOR'S MANUAL

D4, D6

VOLVO
PENTA

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http://vppneuapps.volvo.com/manual/coupon/

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

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GRE Το παρόν Βιβλίο Χρήσης μπορεί να παραγγελθεί δωρεάν σε άλλη γλώσσα μέχρι 12 μήνες μετά την παράδοση,μέσω διαδικτύου.

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

RUS Данное руководство по эксплуатации можно бес-платно заказать на другом языке по Интернету в течение 12 месяцев после доставки.

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TUR Bu Kullanım Kılavuzu, teslimden 12 ay sonrasına kadar İnternet yoluyla ücretsiz olarak farklı bir dilde sipariş edilebilir.

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İnternet mümkün değilse, lütfen Volvo Penta yetkili satıcınızla tmasa geçin.

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如果无法访问互联网，请与沃尔沃遍达经销商联系。

CALIFORNIA PROPOSITION 65 WARNING

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

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

Content

Foreword

Volvo Penta marine engines are used all over the world. They are used in all possible operating conditions for professional as well as leisure purposes. 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 consider the advice we give on running and maintenance before your maiden voyage so that you will be ensured of fulfilling your expectations. Please pay attention to the safety instructions contained in the manual.

As owner of a Volvo Penta marine engine, we would also like to welcome you to a 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.

You will find your closest dealer at our home page on the Internet www.volvopenta.com - amongst other useful information about your Volvo Penta engine - we invite you to visit!

Safety Information

Read this chapter very carefully. It has to do with your safety. This describes how safety information is 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.

Check that you heave 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 attention to important information that will facilitate work or operations.

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.

Your new boat

Carefully read through the instructions and other information that come with the new boat. Learn to handle the engine, controls and other equipment in a safe and proper manner.
If this is your first boat or if it is a type of boat you are unfamiliar with, we recommend that you practice maneuvering the boat in your own good time, so that you get to know the boat's seakeeping and maneuvering qualities at different speeds, sea states and load conditions before casting off on the “real” maiden voyage.
Bear in mind that a person in charge of a boat under way bears the legal responsibility of knowing and following the regulations for passage and safety afloat. Learn which regulations apply to you and your waters by contacting the relevant authorities or maritime safety organization.
It is a good idea to complete some type of boat driver's course. We recommend that you contact a regional boat association or maritime safety organization to find a suitable course.

Daily checks

Make it a habit to give the engine and engine bay a visual inspection before operation, before starting the engine and after operation once the engine has stopped. This helps you to quickly discover fuel, coolant, or oil leakages, or any other abnormal event that has, or is about to, happen.

Maneuvering

Avoid extreme and sudden rudder movements and ahead/astern maneuvers. There is a risk of passengers and crew overbalancing or falling overboard.
A rotating propeller can cause serious injury. Ensure that nobody is in the water before selecting ahead/astern. Never pass close by bathers or areas where there is reason to believe that people may be in the water.
Avoid extreme stern drive trim as this can result in a serious reduction in steering ability.

Lanyard switch

We recommend that you install and use a lanyard switch (option), especially if you drive a boat capable of high speeds. The lanyard switch stops the engine if the driver overbalances and looses control of the boat.

Fuel filling

There is always a risk of fire and explosion when fueling. Smoking is forbidden, and the engine must be stopped.
Never over-fill the tank. Close the tank cap securely. Only use fuel recommended in the Operator's Manual. The wrong grade of fuel can cause malfunctions or engine shutdown. In diesel engines, fuel of poor quality can cause the control rod to stick and the engine to over-speed with the risk of engine damage and personal injury.

Do not start the engine

Do not start or run the engine if fuel or propane leaks are suspected in the boat, or in the vicinity of, or close to discharges of, explosive media etc. An explosive environment carries the risk of fire and/or explosion.

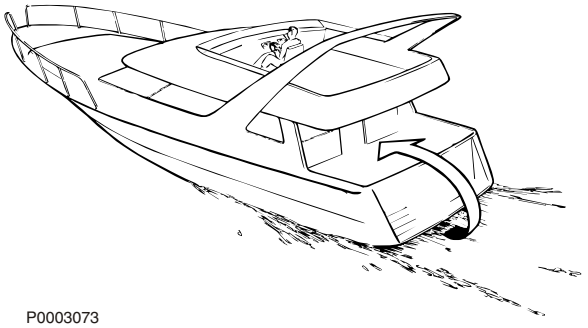
Accidents and incidents

Maritime rescue statistics show that inadequate engine and boat maintenance and a lack of safety equipment are often the causes of accidents and incidents afloat.
Make sure your boat's engine is maintained according to the instructions in the relevant manual and that the necessary safety equipment is on board and functional.

Carbon monoxide poisoning

When a boat moves forward an area of lower air pressure is formed behind the boat, so-called turbulence. In certain conditions, this turbulence can be powerful enough to draw the boat's own exhaust fumes into the cockpit or cabin, with the risk of carbon monoxide poisoning to those on board.
The turbulence problem is most pronounced on tall, broad-beamed boats with a transom stern. But even on other types of boats turbulence can be a problem in certain circumstances, e.g. under way with cockpit awnings rigged. Other factors that can increase the effect of turbulence are wind conditions, load distribution, swell, trim, open hatches and ventilators etc.

Most modern boats are however designed so that the turbulence problem is very rare. Should turbulence nevertheless occur, forward hatches and ventilators must not be opened. Strangely enough this will exacerbate the problem. Try instead changing the speed, trim or load distribution. Also try taking down or opening or in some other way changing the cockpit awning configuration. Contact your boat dealer for the best solution for your boat.



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Remember

- Safety equipment: Life jackets for everyone on board, communications equipment, distress rockets, fire extinguishers, first aid kit, life buoy, anchor, paddles, flashlights etc.
- Spare parts and tools: Impeller, fuel filter, fuses, tape, hose clamps, engine oil, propeller and tools for those jobs you might conceivably be forced to do.
- Take out the charts and study the planned course. Calculate the distance and the fuel consumption. Listen to the weather forecasts.
- Inform your relatives about your trip planning for longer voyages. Remember to inform of changed plans or delays.
- Inform those on board of the location of safety equipment and explain how it is used. Ensure that more than one person on board can start and drive the boat in a safe manner.

The list will need to be complemented as safety equipment requirements vary depending on boat type and how and where it is used etc. We recommend that you contact a regional boat association or maritime safety organization for more detailed maritime safety information.

Preparations

Knowledge

The operator's manual contains instructions on how to carry out general maintenance and service operations safely and correctly. Read the instructions carefully before starting work.

Service literature covering more complicated operations is available from your Volvo Penta dealer.

Never carry out any work on the engine if you are unsure of how it should be done, contact your Volvo Penta dealer who will be glad to offer assistance.

Stop the engine

Stop the engine before opening or removing engine hatches. Unless otherwise specified all maintenance and service must be carried out with the engine stopped.

To prevent accidental start of the boat engine, remove the ignition key, turn off the power supply to the engine at the main switches and lock them in the OFF position before starting work. Put up a warning sign in the control position that work on the engine is being carried out.

Approaching or working on an engine which is running is a safety risk. Loose clothing, hair, fingers or a dropped tool can be caught in the rotating parts of the engine and cause serious personal injury. Volvo Penta recommend that all servicing with the engine running should be undertaken by an authorized Volvo Penta workshop.

Lifting the engine

When lifting the engine, use the lifting eyes installed on the engine (reverse gear where installed). Always check that lifting equipment is in good condition and has sufficient load capacity to lift the engine (engine weight including reverse gear and any extra equipment installed). For safety's sake lift the engine using an adjustable lifting beam. All chains and cables should run parallel to each other and as perpendicular as possible in relation to the top of the engine. Bear in mind that extra equipment installed on the engine may alter its center of gravity. Special lifting equipment may then be required in order to maintain the correct balance and make the engine safe to handle. Never carry out work on an engine suspended on a hoist.

Before starting the engine

Reinstall all protective parts removed during service operations before starting the engine. Check that no tools or other items have been left on the engine.

Never start a turbocharged engine without installing the air cleaner (ACL). The rotating compressor in the Turbocharger unit can cause serious personal injury. Foreign objects can also be sucked in and cause mechanical damage to the unit.

Fire and explosion

Fuel and lubrication oil

All fuel, most lubricants and many chemicals are inflammable. Read and follow the instructions on the packaging.

When carrying out work on the fuel system, make sure the engine is cold. A fuel spill onto a hot surface or electrical components can cause a fire.

Store fuel soaked rags and other flammable material so that there is no danger of them catching fire. Fuel-soaked rags can self-ignite under certain conditions.

Do not smoke when filling fuel, oil or in proximity of a filling station or in the engine room.

Non-original components

Components used in the fuel and electrical systems on Volvo Penta products are designed and constructed to minimize the risk of fire and explosion.

Using spare parts other than by Volvo Penta approved spare parts can result in fire or explosion on board.

Batteries

The batteries contain and emit oxyhydrogen gas, especially during charging. This gas is easily ignited and highly volatile.

Do not under any circumstances smoke or use naked flame or allow sparks in the vicinity of the batteries or battery compartment.

An incorrect connection of a battery terminal cable or jump-start cable can cause a spark which in its turn can be sufficient to cause an explosion.

Start spray

Never use start spray or similar agents to start an engine equipped with air pre-heating (glow plugs/ starter element). This may cause an explosion in the inlet manifold. Danger of personal injury.

Hot surfaces and fluids

There is always a risk of burns when working with a hot engine. Beware of hot surfaces. For example: the exhaust pipe, turbo unit, oil pan, charge air pipe, starter element, hot coolant and hot oil in oil lines and hoses.

Carbon monoxide poisoning

Only start the engine in a well-ventilated area. If operating the engine in an enclosed space, ensure that there is proper ventilation in order to remove exhaust gases and crankcase ventilation emissions from the working area.

Chemicals

Most chemicals such as anti-freeze, rustproofing agent, inhibiting oil, degreasing agent etc. are hazardous to health. Read and follow the instructions on the packaging.

Some chemicals such as inhibiting oil are inflammable and dangerous if breathed in as well. Ensure good ventilation and use a protective mask when spraying. Read and follow the instructions on the packaging.

Store chemicals and other hazardous materials out of the reach of children. To protect the environment, please dispose of used or leftover chemicals at a properly designated disposal site for destruction.

Cooling system

There is a risk of flooding when working on the seawater system. Turn off the engine and close the sea cock (where installed) before starting work on the system.

Avoid opening the coolant filler cap when the engine is hot. Steam or hot coolant can spray out and cause burns.

If work must be carried out with the engine at operating temperature and the coolant filler cap or a cock open or a coolant hose disconnected, open the coolant filler cap carefully and slowly to release pressure before removing the cap completely. Note that the coolant may still be hot and can cause burns.

Lubrication system

Hot oil can cause burns. Avoid skin contact with hot oil. Ensure that the lubrication system is not under pressure before commencing work on it. Never start or operate the engine with the oil filler cap removed, oil can spray out.

Fuel system

Always use protective gloves when tracing leaks. Liquids ejected under pressure can penetrate body tissue and cause serious injury. There is a danger of blood poisoning.

Always cover the generator if it is located under the fuel filter. The generator can be damaged by spilled fuel.

Electronic Vessel Control (EVC)

The boat has a advanced control system. Never cut or modify connectors, wiring or splice of the components.

Installing non Volvo Penta components may cause the system to malfunction.

Service must be done by approved workshops.

Electrical system

Cutting off power
Always stop the engine and break the current using the main switches before working on the electrical system. Isolate shore current to the engine block heater, battery charger, or accessories mounted on the engine.

Batteries
The batteries contain an extremely corrosive electrolyte. 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 into contact with the eyes, flush immediately with plenty of water and obtain medical assistance without delay.

Introduction

This Operator's Manual has been prepared to give you the greatest possible benefit from your Volvo Penta marine engine. It contains the information you need to be able to operate and maintain the engine safely and correctly. Please read the Operator's Manual carefully and learn to handle the engine, controls and other equipment in a safe manner before you cast off on your maiden voyage.
Always have the Operator's Manual available. Store it safely and do not forget to hand it over to the next owner if you sell your boat.

The Operator’s Manual describes the engine and equipment sold by Volvo Penta. The illustrations in this book covers several varieties and might differ, the essential information is always correct though. Installations with e.g. different controls and instrumentation might occur, in these cases we refer to this products manual.

Warranty

Your new Volvo Penta marine engine is covered by a limited warranty, under the conditions compiled in the Warranty book.
Please note that AB Volvo Penta’s liability is limited to the specification in the Warranty book. Read it carefully, as soon as possible after delivery. It includes important information about warranty cards, 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 a Warrant book, a Service book or a customer copy of the warranty card.

Environmental care

All of us want to live in a clean, healthy environment. Where we can breathe clean air, see healthy trees, have clean water in lakes and seas, and be able to enjoy the sunlight without fearing for our health. Unfortunately, this is not self-evident these days, it is something all of us must work hard for.
As a manufacturer of marine engines, Volvo Penta has particular responsibility and for this reason, environmental care is a core value in our product development. Volvo Penta has a wide engine programme these days, where considerable progress has been made in reducing exhaust fumes, fuel consumption, engine noise etc.
We hope that you will be want to preserve these values. Always observe the advice in the Operator's Manual about fuel grades, operation and maintenance, to avoid unnecessary environmental impact. Please contact your Volvo Penta dealer if you notice any changes such as increased fuel consumption or increased exhaust smoke.

Moderate your speed and distance so that wake and noise do not disturb or damage animal life, moored boats, jetties etc. Leave the archipelago and harbours in the same state you would like to find them. Remember to always hand in drained oil, coolant, paint and wash residue, used batteries etc. for destruction at a recycling station.
If we all pull together, we can make a valuable contribution to the environment together.

Running in

The engine must be “run in” during its first 10 hours, as follows:
Use the engine in normal operation. Full load should only be applied for short periods. Never run the engine for a long period of time at constant speed during this period.
Higher oil consumption is normal during the running in period. For this reason, check the oil level more frequently than normally recommended.
After the first period of operation, the specified warranty inspection “First service inspection” can be done. For more information: Please refer to the Maintenance Schedule.

Fuel, oils and coolant

Only use the fuels and oils recommended in the Operator's Manual. Other grades can cause malfunctions, increased fuel consumption and eventually even shorten the life of the engine.
Always change the oil, oil filters and fuel filter at the specified intervals.
Future warranty claims related to engine and accessories may be refused if an unsuitable coolant has been used, or if the instructions for coolant mixture have not been followed.

Service and spare parts

Volvo Penta marine engines are designed for high reliability and long life. They are built to withstand a marine environment, but also to have the smallest possible environmental impact. Through regular service and use of by Volvo Penta approved spare parts, these qualities are retained.
Volvo Penta's world-wide network of authorised dealers is at your service. They are Volvo Penta product specialists, and have the accessories, original spares, test equipment and special tools needed for high quality service and repair work.
Always observe the maintenance intervals in the Operator's manual, and remember to note the engine/transmission identification number when you order service and spare parts.

Certified engines

If you own or operate an emission certified engine 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 made of the same type are equivalent to the certified engine.
This makes special demands on the care and maintenance you give your engine, as follows:

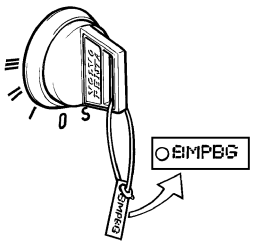
- Maintenance and service intervals recommended by Volvo Penta must be complied with.
- Only Volvo Penta original spares may be used.
- Service on injection pumps, pump settings and injectors must always be done by an authorised Volvo Penta workshop.
- The engine must not be converted or modified, except for the accessories and service kits which Volvo Penta has approved for the engine.
- Installation changes to the exhaust pipe and engine air inlet ducts must not be done.
- No seals may be broken by unauthorised personnel.

The general advice in the Operator's manual about operation, care and maintenance apply.

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.
Volvo Penta accepts no responsibility or liability for any damage or costs arising due to the above.

Instruments and Controls

This chapter describes the instruments, panels and controls Volvo Penta sells for your engine.
If you would like to complement your instrumentation, or if your boat is equipped with instruments not described here, we ask that you contact your Volvo Penta dealer.



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Ignition Lock

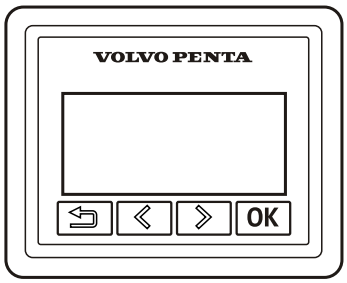
The start keys are supplied with a plate bearing the start code to be used when ordering spare keys. Keep the code beyond the reach of unauthorized people.

S = The stop position.
0 = The key can be inserted or removed.
I = Operating position. System power is connected.
II = Not used.
III = Start position. Starter motor is engaged.

There is always a main helm station on a boat. It is the only helm station with an ignition lock. The ignition must be switched on here in order for other helm stations to be used.
Read the starting instructions in the *Starting page 44* chapter to make sure you use the correct start procedure.

Control Panels

Volvo Penta panels and gauges can be installed in different combinations. There is always one information panel per driveline and helm station if no 7" screen is installed. The control panels can be used together with the tachometer and other accessory equipment.



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Information Panel

The information panel shows engine and operational information, messages and alarms.
There is one information panel per driveline and helm station if no 7" screen is installed.
The information shown can be set up according to personal preferences. Basic settings show:

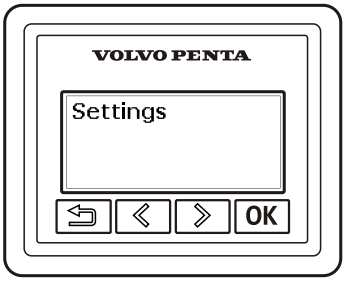
- Engine speed
- Oil pressure
- Coolant temp
- Battery voltage

Return to the previous menu by pressing the button. Hold the button down for more that 3 seconds to reach the main menu or browse back to it by pressing the button repeatedly.

Browse backwards and forwards through the information panel menus by pressing the buttons.
Hold down a button to scroll through a menu.

OK

Confirm a selection by pressing the button.



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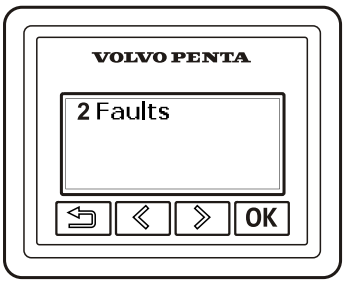
Settings

Browse to the settings menu and press “OK” to proceed to the submenu.
For further information about settings, refer to *Settings Menu page 114*.
To adapt information shown in the main menu to suit your personal preferences, refer to *My View page 114*.



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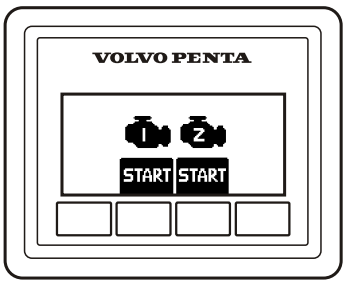
Fault messages

If the system discovers a fault, the word Fault is displayed on the screen. To see the what faults have been detected, press “OK”.
For further information on how to handle fault messages and recommended actions, refer to the *Fault Handling page 55* chapter.

Backlighting

Panel backlighting can be adjusted by pressing  simultaneously.

Start/Stop Panel



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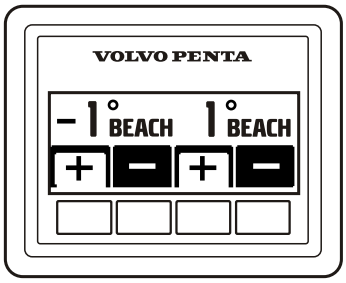
The start/stop panel is used for starting and stopping the engine frpm other stations than the main station.

To start the engine it is necessary for the start key at the main station to be in the ”**I**” operating position.

Read the starting instructions in chapter *Starting page 44* and *Engine Shutdown page 51* to ensure you use the correct start procedure.

Power Trim panel



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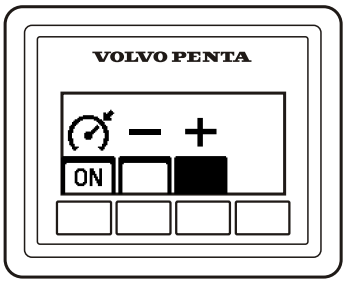
The Power Trim panel allows you to adjust the angle of the drive with respect to the transom.
For twin engine installations, the control panel can be used to make individual or simultaneous adjustments to the drives.

By trimming out the drive away from the transom, the bow will be ”raised” in relation to the horizontal axis and trimming in the drive will ”lower” the bow of the boat
+ Will trim the drive away from the transom, the bow will be ”raised” in relation to the horizontal axis.
– Will trim the drive away towards the transom, ”lower” the bow of the boat.

For further information on Power Trim refer to *Instruments and Controls page 31*.

Cruise Control



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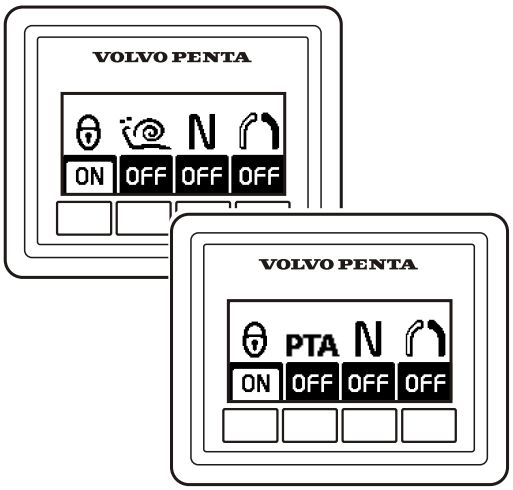
Switch on cruise control by pressing the button.
Make fine adjustments to the locked engine speed by pressing the + or – buttons to increase or reduce it.



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Station Panel

Activation

Activate the helm station with a single press of the button.
Further pressure locks the helm station.
To render the helm station inactive, hold the button down for 3 seconds.

Inactive helm station

Active helm station

Locked helm station

Low speed and Power Trim Assistant (PTA)

Depending on the installation the optional functions lowspeed or Power Trim Assistant are engaged with the button.

Low speed

For further information about the function, refer to *Optional page 42*.

PTA Power Trim Assistant (PTA)

For further information about the function, refer to *Instruments and Controls page 31*.

N Neutral button

The gearshift function can be disconnected so that the control lever only operates the throttle. The neutral button disengages the drive/reverse gear so that engine speed may be increased without driving the boat; (warm-up mode).

ON The drive is disengaged.

OFF Drive engaged for movement ahead/astern.

Single lever

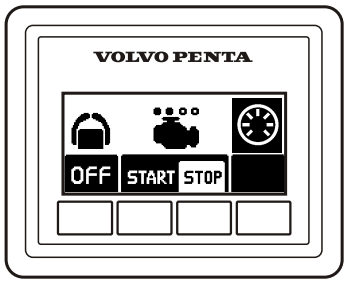
When the single-lever function is activated, the lever that is moved from its position first becomes the control lever for both engines. The other control lever has no function as long as the single-lever function is activated.
In order to activate the single-lever function, the control levers must in be roughly the same position, max 10% difference.

Docking Panel

When the boat is operated from a docking station engines, can be stopped and started and messages can be managed using the docking panel.
The joystick can be used for maneuvering when the docking station is activated; refer to the *Joystick page 40* section for further information.

Activation

Activate the helm station by depressing the on/off button. A further pressure on the button locks the helm station.
To switch off the function, hold the button down for 3 seconds.



P0012493

Twin instalation

Both engines in a twin instalation must be running before the docking station can be activated.

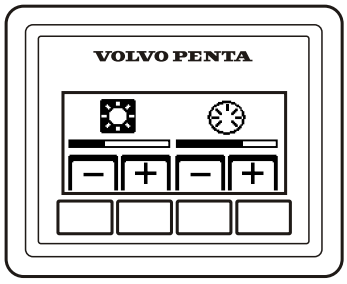

The helm station is inactive.


The helm station is active and the docking function is switched on.


The helm station is locked.

Start/Stop

Press the STOP and START buttons to stop and start all engines.
The circles above the engine symbols show which engines are running. An empty circle means an engine is running.



P0012494

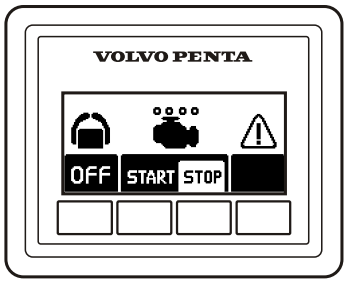
Contrast and backlighting

The button on the far right is used to adjust contrast and panel backlighting. The button is also used to confirm fault messages.


Backlighting


Contrast

Press the button to adjust the contrast and the backlighting.
Use + and – to increase or reduce the contrast or backlighting.
Adjustments affect all screens in the system.

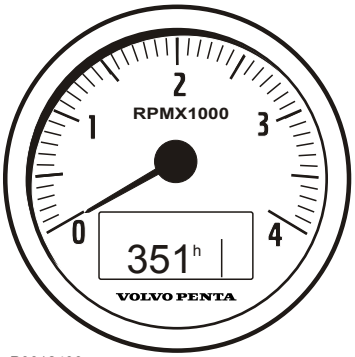


P0001308

Fault message

⚠ is displayed on the screen when the system discovers a fault.
All fault messages must be acknowledged. Acknowledge by pressing the button; if the fault is accompanied by an audible signal, the signal will silenced. Go to the information panel to get information regarding the alarm.

For further information on how to handle fault messages and recommended actions, refer to the *Fault Handling page 55* and *Fault Code Register* chapters.

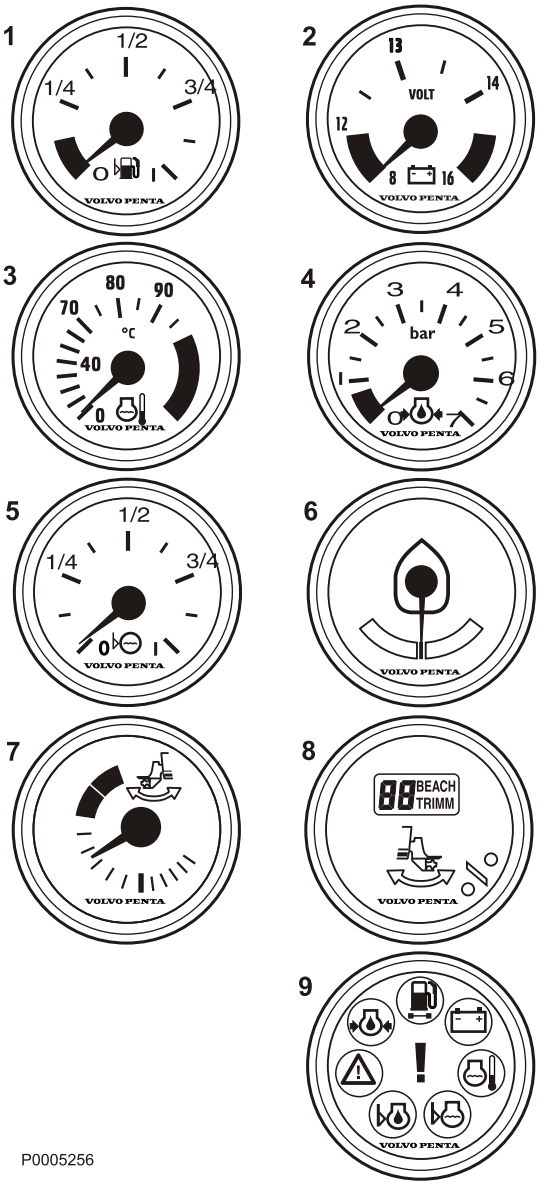


P0012490

Gauges

These instruments are sold as engine options by Volvo Penta.

The tachometer displays engine speed; multiply the value shown on the dial by 1,000 to get the number of engine revolutions per minute.
Engine hours is displayed in the tachometer window.
When a function is activated a symbol shows shortly in the dispaly.



P0005256

1 **Fuel level gauge**
The fuel level gauge shows the quantity of remaining fuel.

2 **Voltmeter, battery charging**
The meter shows the alternator charge current. During operations the charge voltage should be around 14 V. When the engine is stopped and electrical power switched on the battery voltage should be around 12 V.
If a 24 V system is installed, the charge voltage should be around 28 V during operations.

3 **Coolant temperature gauge**
The instrument shows engine coolant temperature. During operations coolant temperature should normally be between 75-95°C (167-203°F).

4 **Oil pressure gauge**
The oil pressure gauge displays engine oil pressure. During operations the oil pressure gauge should normally show 3-5 bar. At idle, lower values are normal.

5 **Fresh water level sensor**
Freshwater tank level gauge.

6 **Rudder position indicator**
The instrument shows rudder position.

7 **Trim indicator, analog, for Aquamatic engines**
The analog indicator shows the position of the stern drive in relation to the transom shield.

8 **Trim indicator, digital, for Aquamatic engines**
The digital indicator shows the position of the stern drive in relation to the transom shield.

9 **Alarm monitor**
The alarm monitor gives a visual warning to call attention to any alarms that occur.

4" Display

IMPORTANT!

Make a habit of protecting the screen with the protective cover when the boat is not in use. Prolonged exposure to strong sunlight can damage the screen and cause function faults.

The Volvo Penta 4" screen is controlled by means of buttons on the panel:

Return to the previous menu by pressing the button.

Press the button to adjust the display contrast.

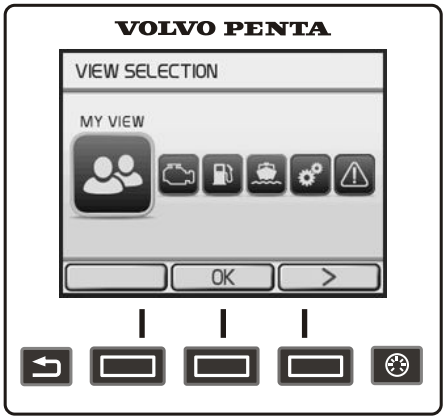
The image reverts automatically a short while after the button is released.

Menu button functions are shown on the display. Scroll back and forth or confirm a selection by pressing the appropriate button.

View Selection

The last selected view is shown on start. To return to the main menu, click . Navigate to the desired screen using the arrow buttons.

- **My View** Operating information
- **Engine View** Engine information
- **Fuel economy** Trip computer
- **Vessel** Information regarding the boat's installation
- **Settings** Settings, display and installed functions
- **Warning Manager** Shows system faults detected and describes remedial actions

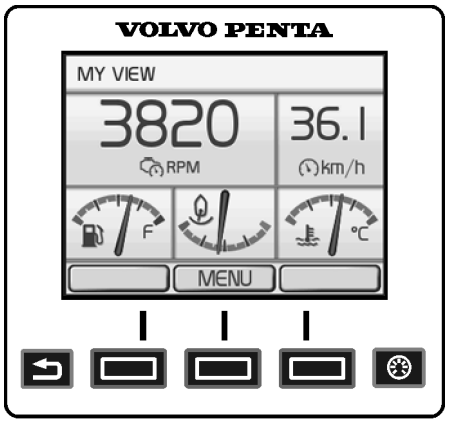


P0014727

View Selection

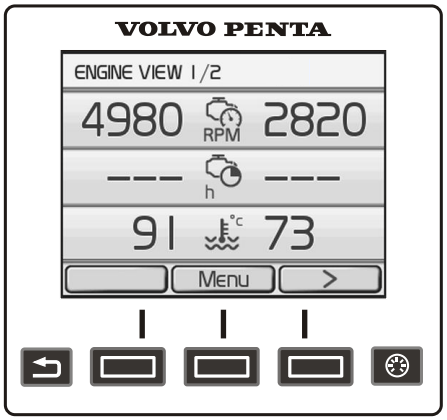
My View

Gauge and operations information is shown in the My View window.
Some functions are pre-set as quick selections. These can be switched on/off by pressing OK.
To change the gauge and information shown, refer to *Change gauge*. Functions are also switched on and off here.



P0014748

My View



Engine View

Engine View

Information concerning the engine and its transmission is shown in Engine View. The information is shown in two windows; switch between the windows by pressing the arrow buttons.
Up to six different pieces of operations data can be shown on the display. The information shown can be set under *Change gauge*.
Depending on the functions installed in the boat, the following can be displayed:

- Engine speed
- Engine hours
- Engine Coolant Temperature
- Battery Voltage
- Engine oil pressure
- Turbo pressure
- Exhaust Temperature
- Transmission Oil Pressure
- Transmission oil temperature
- Propeller Rotation
- Ahead speed
- Power Trim angle

Fuel

This is the boat's trip computer and information is shown in two windows, Current Fuel and Average fuel. Switch between screens by pressing the arrow buttons.

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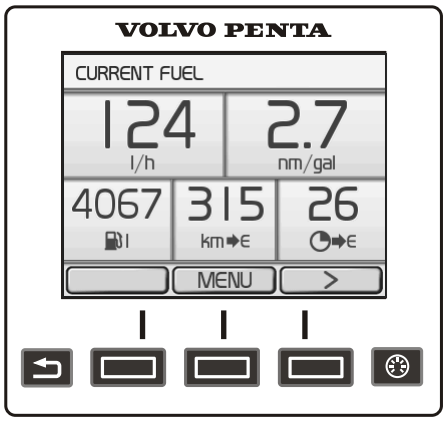
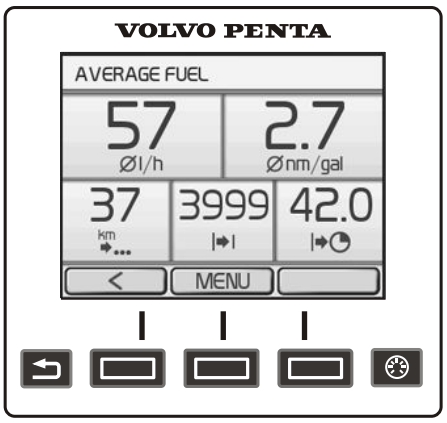


P0014717

Current Fuel

Current Fuel

- **Instant fuel rate**Current fuel consumption per hour.
- **Instant fuel economy** Based on current fuel consumption.
- **Remaining in tank** Amount of fuel remaining in the tank.
- **Distance remaining** Trip distance with fuel remaining in the tank based on current fuel consumption.
- **Time to empty** Operating time with fuel remaining in the tank based on current fuel consumption.

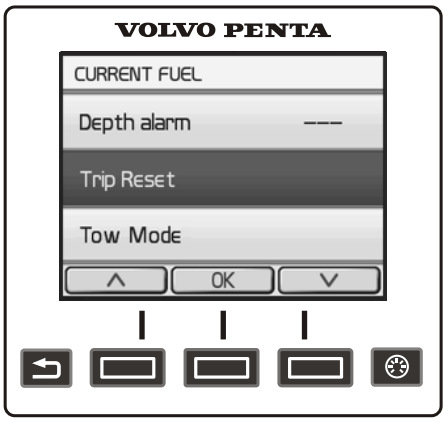


P0014740

Average fuel

Average fuel

- **Average fuel rate** Average fuel consumption since the last trip computer zero reset.
- **Average fuel economy** Average since the last trip computer zero reset.
- **Trip distance** Average fuel consumption per unit of distance since the last trip computer zero reset.
- **Trip fuel**, fuel consumption per unit since the last trip computer zero reset.
- **Trip hours** Time travelled since the last trip computer zero reset.

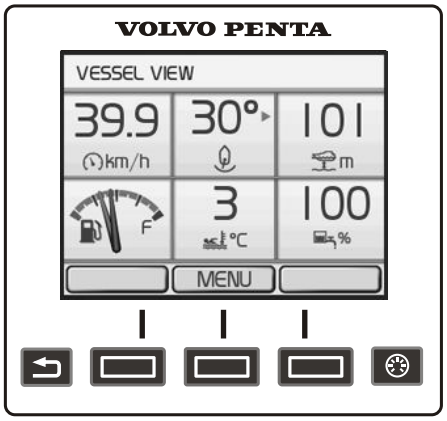


P0014741

Trip Computer Reset

Trip Computer Reset

To zero all values in the trip computer, press the MENU button and select Trip Reset.



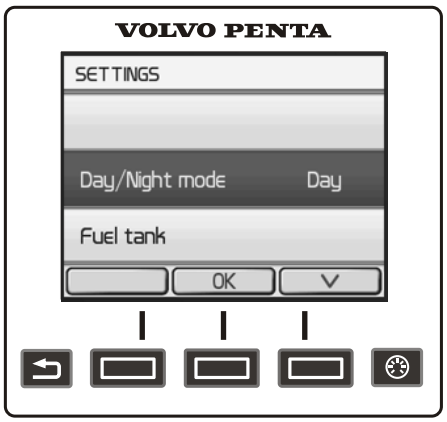
P0014719

Vessel

Vessel

Shows information regarding the boat's installation. The information shown can be set under *Change gauge*. Functions are also switched on and off here. Depending on the functions installed in the boat, the following can be displayed:

- **Boat Speed**
- **Rudder angle**
- **Depth** for setting echo sounder; refer to *Depth Alarm page 115*.
- **Fuel level**
- **Sea water temperature**
- **Freshwater level**
- **ACP Info** for further ACP information, refer to the *ACP* chapter.



P0014723

Settings

Settings

Display and various system function settings are done in the settings menu. The information shown varies depending on the installation.
Navigate to the desired setting or function and press OK to reach the sub menu.

Day/Night-Mode

Day shows dark text against a light background and Night light text against a dark background.

Fuel Tank

Fuel tank calibration and settings. For information regarding calibration, refer to *Fuel Tank page 120*.

Drive Type

The setting may only be made by authorized Volvo Penta personnel.

Toe-In/Toe-Out Adjustment

The setting may only be made by authorized Volvo Penta personnel.

Neutral Beep

Switches the beeper that sounds when the control is in the neutral position on and off.

Info Beep

Switches the signal that confirms when a function has been activated or deactivated on and off.

Info Beep level

Sets the volume (%) of the Info Beep that confirms when a function has been activated, or deactivated.

PTA Calibration

Calibration and resetting, PTA. For information regarding calibration, refer to *PTA Calibration page 119*.

Trip Reset

Zeroes all values in the trip computer.

ACP Mode

Setting the ACP protection position. For information on the ACP function, refer to *ACP*.

Depth Alarm

Setting the depth alarm function; refer to *Depth Alarm page 115*.

Display Contrast

Contrast adjustments affect all displays in the system.

Display Type

Select the engines for which the information will be shown in the display, and the type of installation the display forms part of.

Units

Setting the units (metric, US or Imperial) and distance units (km, NM or miles) distances will be shown in.

Language

Setting the language information will be shown in.

Speed Factor

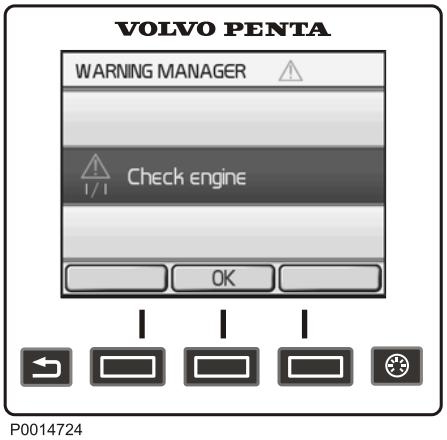
Setting the velocity factor; refer to *Speed Factor page 121*.

EVC Information

Information about components, software and functions installed. Installed functions are checkmarked.

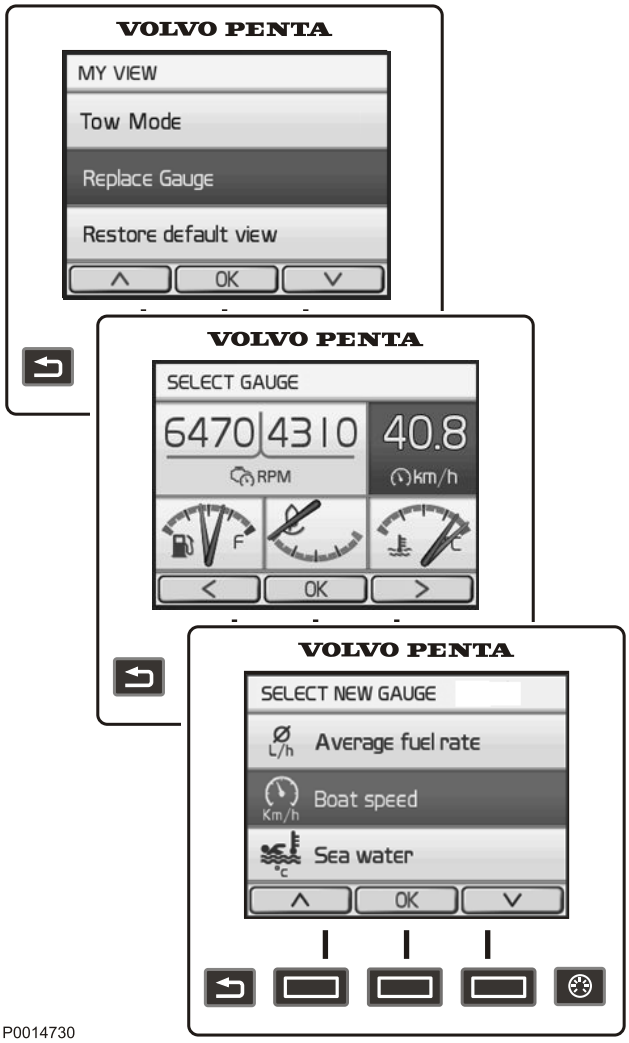
Warning Manager

If the system discovers a fault, the helmsman is informed by a message on the display. The fault message must be acknowledged by pressing OK.
All fault messages are stored in Warning Manager; the drivetrain affected is shown, the fault described and suitable actions suggested. For further information on different fault messages, refer to the *Fault Code Register page 58*.



P0014724

Warning Manager



P0014730

Replace gauge

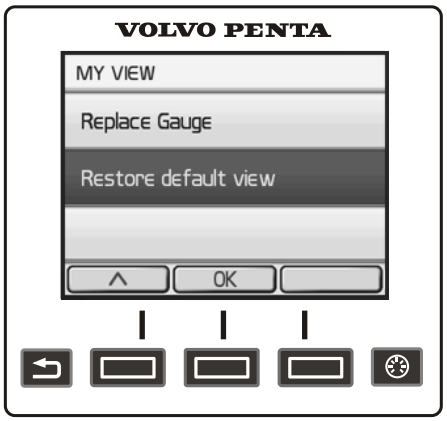
Replace gauge

In My View, Engine View and Vessel the owner can decide what information will be shown and where on the display. The procedure is the same for all views.

1 Press the MENU button and select Replace gauge.

2 Navigate using [<] [>] to the gauge for replacement and press [OK].

3 Select the gauge for replacement and press [OK].



P0014731

Restore Default View

Restore Default View

The display has a basic setting that it is always possible to return to.

1 Press the MENU button and select Restore Default View.

2 Press [OK].

P0001165

7" Display

The Volvo Penta 7" screen is controlled by means of buttons:

Turn to browse through submenus and to return to the main menu.

Return to the previous menu.

OK Confirms selection; also used to access submenus and the *Settings page 29*.

Controls boat instrument backlighting. The page automatically returns a few seconds after the button is released.

IMPORTANT!

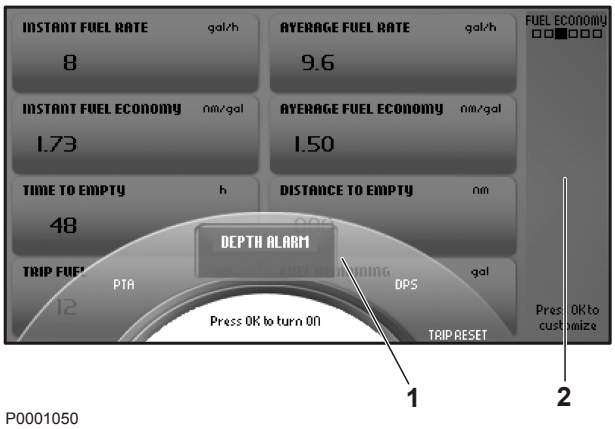
Make a habit of protecting the screen with the protective cover when the boat is not in use. Prolonged exposure to strong sunlight can damage the screen and cause function faults.

The status field (**2**) on the right of the screen displays the current view, active functions and repaired faults.

Pop-up

A number of pre-set functions can be switched on and off in a pop-up. Press OK and the functions will show in the lower part of the screen (**1**).
Turn to the desired function and press OK to confirm that the function is to be switched on or off.
Active functions are displayed by a symbol in he status field (**2**) on the right.

Trip Reset is also found here; refer to *Fuel economy page 27*.

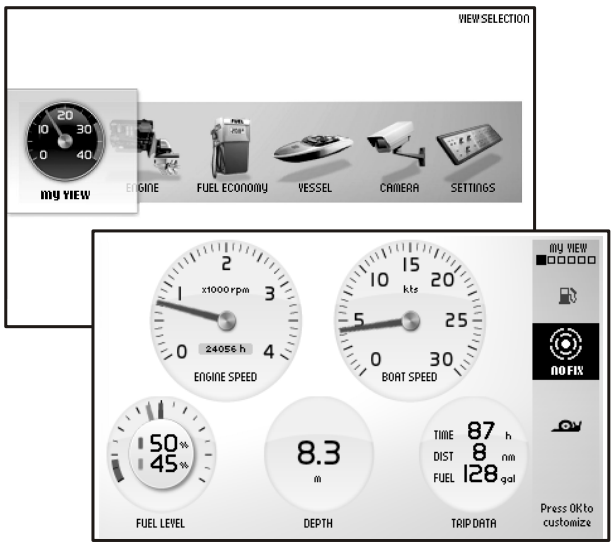


P0001050

1 Pop-up menu

2 Status field

My View



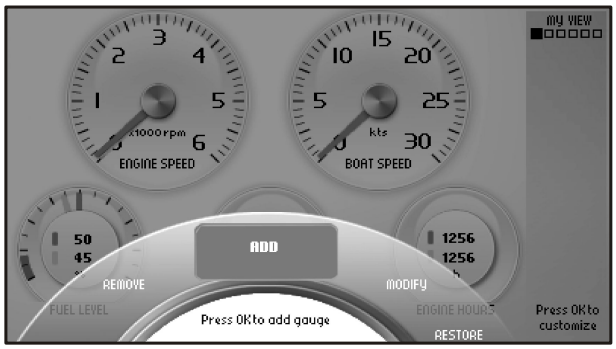
P0012481

Boat, engine and transmission data are displayed in My View as analog or digital instruments.
Selection of instruments to be displayed and their appearance is made under the ***Customize*** menu.
Information for up to three engines can be displayed on the same screen in boats with multiple engine installations; they are distinguished by different color dials in the instruments.

Customize

P0001187

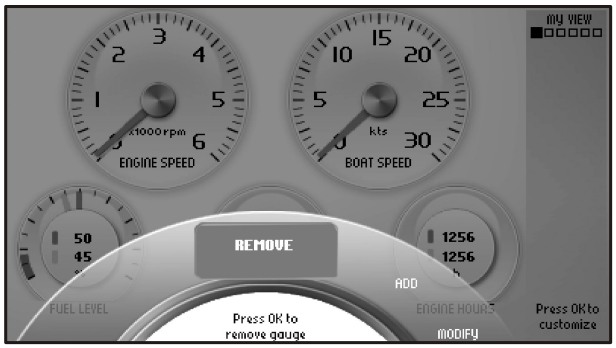
Press OK so that the ***Customize*** menu is displayed.
Press OK to access the submenus ***Add***, ***Remove***, ***Modify*** and ***Return to basic setting.***.
Use the knob to browse between menus.



P0001188

Adding instruments

Turn the knob to ***Add*** and press OK.
Select the desired information is displayed and confirm with OK. The new instrument will position itself at the bottom right corner.

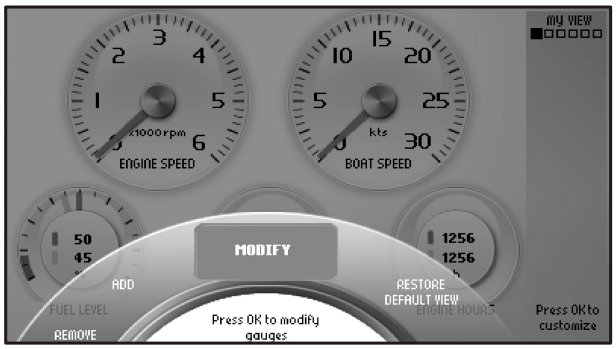


P0001184

Removing instruments

Turn to the ***Remove*** menu and press OK.

Turn to the instrument that is to be removed and confirm with OK.



P0001185

Changing instruments

Turn to the ***Modify*** menu and press OK.

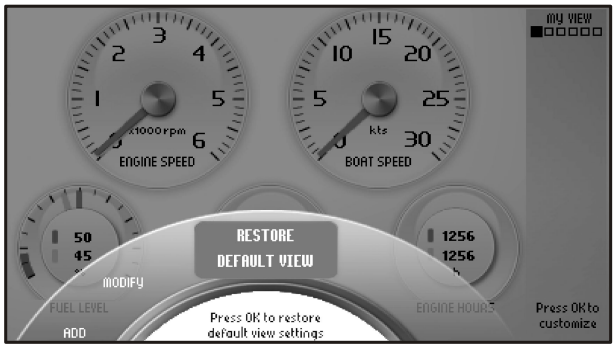
Select the instrument that is to be changed and press OK .

Choose between:

Remove, removes the instrument.

Replace, changes one instrument for another. Turn to the desired instrument and press OK.

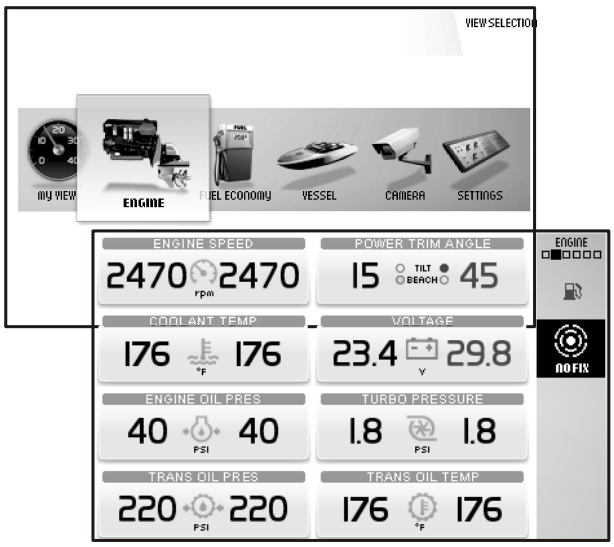
Analogue/Numeric, specify whether the instrument will be displayed as analog or digital.



P0001097

Restore Default View

The screen has a basic setting that can always be returned to by pressing ***Restore Default View*** in the ***Customize menu***.



P0012483

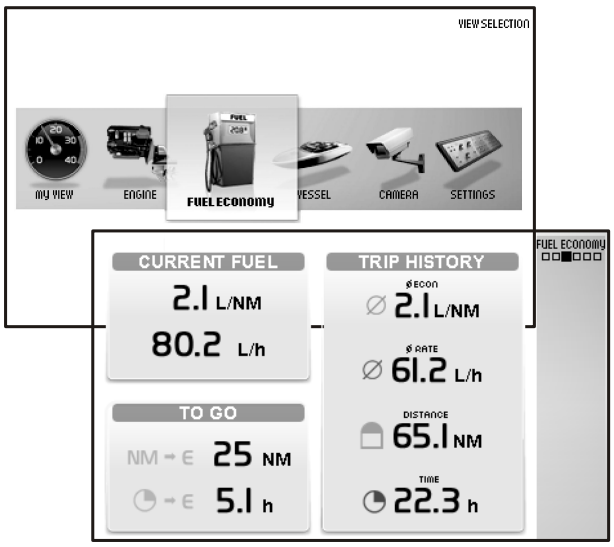
Engine

Information concerning the engine and its transmission is displayed in this view.

Depending on the functions installed in the boat, the following can be displayed:

- **Engine Speed**
- **Power Trim angle**, for further information refer to *Trim Controls* and PTA calibration in the *Settings Menu page 114* chapter.
- **Rudder angle**
- **Coolant Temperature**
- **Voltage**, battery voltage
- **Engine oil pressure**
- **Turbo pressure**
- **Engine hours**, total operating hours.

The information in this view cannot be changed.



P0012482

Fuel economy

This view functions as the boat's trip computer.

Depending on the functions installed in the boat, the following can be displayed:

Current Fuel

Instant fuel rate, based on current fuel consumption

Instant fuel economy, current fuel consumption per hour.

To Go

Distance remaining, trip distance with fuel remaining in the tank based on current fuel consumption.
Time to empty, operating time with fuel remaining in the tank based on current fuel consumption.

Trip History

Average fuel rate, average fuel consumption since the last trip computer zero reset.

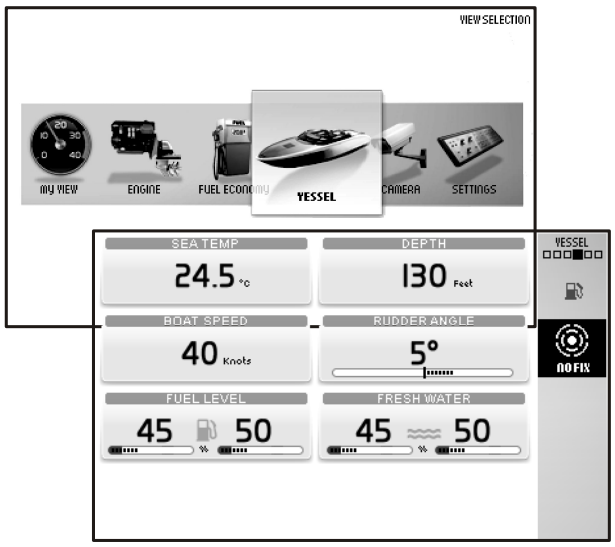
Average fuel economy, average since the last trip computer zero reset.

Trip distance, distance travelled since the last trip computer zero rest.

Trip Time, time travelled since the last trip computer zero rest.

To zero all values in the trip computer press OK.

The information in this view cannot be changed.



P0012480

Vessel

Information concerning boat installations is displayed in this view.

Depending on the functions installed in the boat, the following can be displayed:

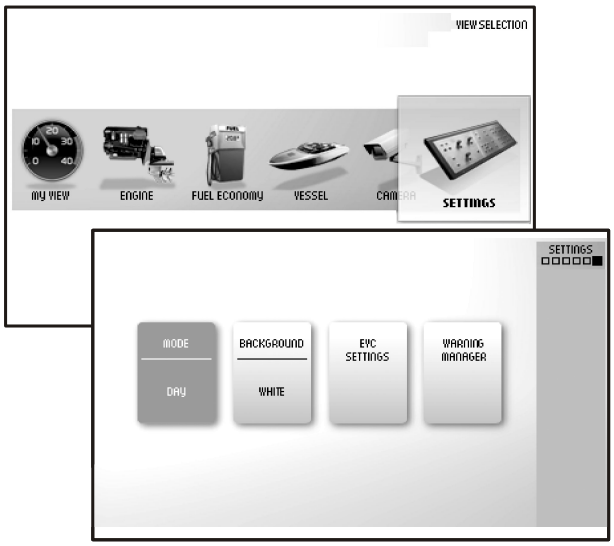
- **Sea water temperature**
- **Depth**, to set the echo sounder refer to *Depth Alarm* in the *Settings Menu page 114* chapter.
- **Boat Speed**
- **Rudder angle**
- **Fuel level**
- **Freshwater level**
- **ACP Info**, for further ACP information, refer to the *ACP* chapter.

The information in this view cannot be changed.

P0001175

Camera

It is possible to connect a camera to the screen (e.g. for monitoring the engine compartment or swimming platform).
If a camera is installed, images will be displayed in this view.



P0001098

Settings

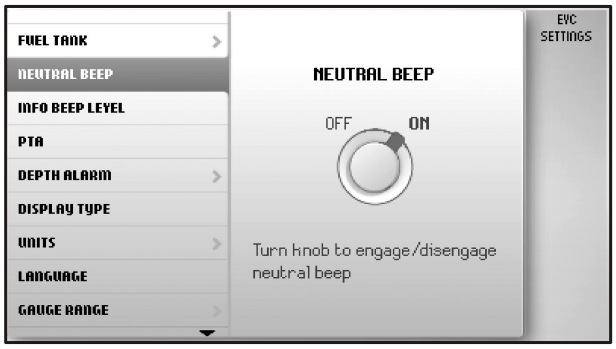
Screen settings and different function settings are made in this view. Turn to the desired menu and press OK to access the submenus.

Mode

Choose between the modes **Day** ((dark text on a white background) or **Night** (light text on a dark background). Press OK switch between modes.

Background

Choose between the background colors Gray, Aqua, White, Carbon and Red.



P0001043

EVC Settings

Press OK to access the settings menu.

Settings for screen, switching functions on and off, audible alarm settings, alarm limits, language and units. Information regarding boat installations is also found here.

Neutral Beep, switching on and off the beeper that sounds when the control is in the neutral position.

Info Beep Level, setting the volume of the signal that confirms when a function has been activated or deactivated.

Trip Computer Reset, zeroes all values in the trip computer.

Camera, choose to reverse image or show camera at dockingstation.

Display Type, select the engines for which operating data will be displayed and the type of installation the engines is part of.

Infodisplay Contrast adjusts the screen contrast at the station.

Units, setting of units (metric/U.S.) and distance (km. Nm. or miles).

Language, selecting the screen language.

Gauge Range, setting instrument maximum display range.

Boat Speed, 10 – 100 in steps of 10 knots.
Engine Speed, 2500/3000/4000/5000/6000 r/min.
Propeller speed, 1000/2000/3000 r/min.

EVC Information, this information cannot be changed.

Features, installed functions are marked blue.

Components, press OK to see installed components.

Software, information regarding the software ID number.

Calibration

The following is only displayed if the function is installed. For further information, refer to the relevant sections in the*Settings Menu page 114* chapter.

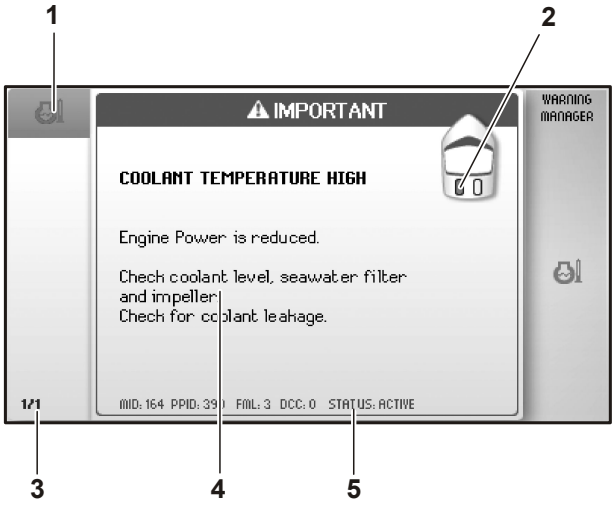
Speed Correction, setting the speed factor.

Depth, setting the echo sounder depth alarm. Follow the instructions on the screen.

Fuel Tank, fuel tank calibration. Follow the instructions on the screen.

ACP Info, setting the ACP protection position.

PTA, PTA calibration. Follow the instructions on the screen.



P0001049

1 Symbol

2 Shows on which drive line the fault is detected.

3 List of registered faults; turn the knob to browse.

4 Fault message with description and suggestion for action.

5 Service information.

Warning Manager

If the system discovers a fault, the operator is informed by a message on the screen. The fault message must be confirmed by pressing OK.

All faults are stored in the *Warning Manager*.
The fault message indicates the drivetrain affected, describes the fault and suggests suitable actions..

For further information on fault messages, refer to *Fault Handling page 55*.

Power Trim

Your Volvo Penta drive is equipped with a hydraulic trim system, Power Trim, that allows you to adjust the angle of the drive with respect to the transom from the helm station. The angle of the drive effects the boat's passage through the water and other characteristics, e.g. improved acceleration to planing and planing with a lower throttle opening. Trimming can also be used to give a more gentle passage in short seas.

Trim Ranges

To be able to use the information on the trim instrument, it is important to be aware of the three trim ranges and the way they are used.

Trim range

The trim range are used to provide the best comfort when driving – from starting to top speed.

Beach range

The beach range is used for driving at low speed in shallow water or where the depth is unknown.
The highest permitted engine speed when in the beach range is 1500 rpm.

IMPORTANT!

Make sure the drive's coolant inlet is never trimmed out of the water when operating in the beach range.

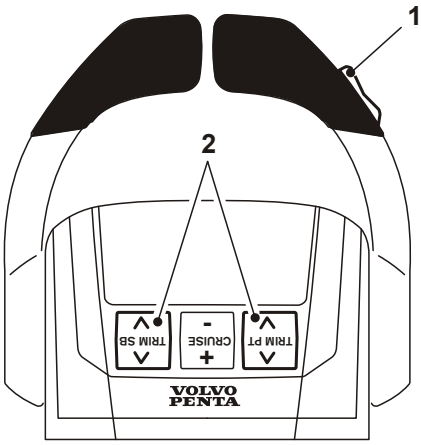
Lift range

The lift range is never used when sailing. It lifts the drive to maximum height and is used for e.g. transporting the boat on a trailer. Power Trim has an automatic stop that turns off the power when the end position is reached. The catch is released automatically when the stern drive is trimmed down.

⚠ WARNING!

The engine must not be run with the drive in the “lift” range.

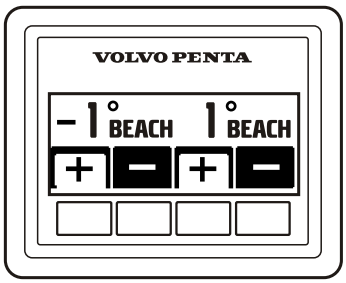
Trim Controls



P0013214

Top mount control for twin installation

The drive can be trimmed with the Power Trim panel or with the button at the side of the control (**1**).
For twin engine installations, the button at the side adjust the drives simultaneous. There is also a button for individuall adjustments to the drives (**2**) on the control for twin installations.



P0001189

Power Trim panel

The Power Trim panel is used for both single and twin engine installations. For twin engine installations, the control panel can be used to make individual or simultaneous adjustments to the drives.
The drive's angle and position is shown on the Power Trim panel. By trimming out the drive away from the transom the bow will be ”raised” in relation to the horizontal axis and trimming in the drive will ”lower” the bow of the boat.

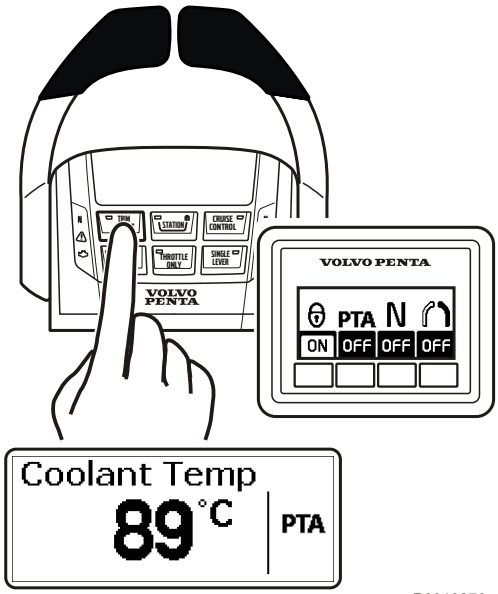
Trimming out the drive

On the Power Trim panel, press button + to trim the drive out, away from the transom. The bow will be ”raised” in relation to the horizontal axis.

Trimming in the drive

Press button – to trim the drive in, towards the transom. The bow will be ”lowered” in relation to the horizontal axis.

Power Trim Assistant



P0013276

The Power Trim Assistant, PTA, adjusts the trim angel automatically according to engine speed (rpm). It is possible to set five trim angles at five different engine speeds, idle speed included. To set the angles, please refer to *PTA Calibration page 119*.

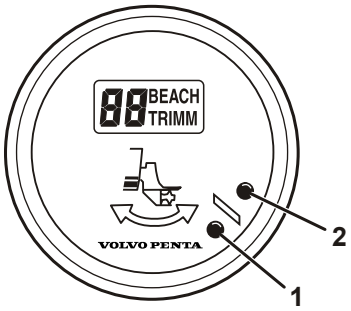
Press the PTA button on the helm station panel or the Trim Assist button on the control to activate or de-activate the function.

PTA is shown on the screen if the PTA function is active.

Trim Instruments

⚠ WARNING!

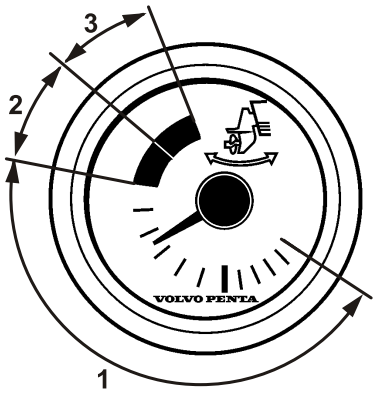
The engine must not be run with the drive in the “lift” range.



P0002443

Digital trim instrument

The trim instrument shows the drive trim setting. The angle of the drive is given in relation to a horizontal line. The lowest value indicates that the drive is fully trimmed down and the highest value that the drive is fully trimmed up. Note that the lowest value can vary from boat to boat, depending on the angle of the transom.
When the drive angle is within the trim range, the text ”TRIM” is shown on the display.
When the drive angle is within the beach range, lamp 1 lights orange and the text “BEACH” is shown on the display.
When the drive is in the lift range, the drive angle is greater than +30° and lamp 2 lights red. There is no text on the display.



P0002444

Analog trim instrument

The trim instrument shows the drive trim setting. The beach range is marked with an orange zone and the lift range with a red zone.

1 Trim ranges

2 Beach range (orange)

3 Lift range (red)

Maneuvering

The correct trim setting provides the best comfort when driving.
Every boat has its own unique characteristics and reacts differently to how you trim it. We can therefore only give general advice about how you reach the best trim angle for your boat. It can generally be said that when the boat feels well balanced, is easy to steer and comfortable to drive - than you have found the optimum trim angle.
Make a few trips at low speed to experience the effect of Power Trim and the different trim ranges, to see what effect they have on the boat. Note how long it takes for the boat to reach planing speed. Check the tachometer, speed and the response of the boat.

Trim the drive down

The bows are pressed down and the boat accelerates faster. It also provides better driving and steering response at speeds below the planing threshold.

Driving with ”bow down”

The ”bow down” position is normally used during acceleration up to planing speed, at low planing speeds or with a short sea. With full ”bow down”, the boat has a tendency to self-steer. You may have to compensate with the wheel to keep the boat on the right course. In this position, the bow of the boat tries to go deeper in the water. If the boat is driven at high speed or towards high waves, the bow will plough downwards into the water. The boat can start to steer with the bows or yaw suddenly so that passengers may be thrown overboard.

The boat's trim shall always be adjusted to give well balanced steering. Certain combinations of boat, engine and propeller can cause instability and/or self-steering tendencies when the boat is driven at or close to the maximum ”bow up” or ”bow down” positions. The stability and steering characteristics of the boat can also vary depending on the sea conditions. Contact your Volvo Penta dealer to correct these tendencies if your boat shows instability an/or self-steering tendencies.

At planing speed

Trim the drive to the angle that gives the most stable and comfortable feeling. If the boat has a twin installation, the drive can be trimmed to different angles to compensate for side winds and, to a certain degree, uneven load distribution.

Driving with ”bow down”

The ”bow up” position is normally used for driving at cruising speed, in short seas, or at full speed. With full ”bow up” the boat can have a tendency to self-steer. You may have to compensate with the rudder to keep the boat on the right course. In this position, the bow of the boat tries to lift out of the water. Excessive ”bow up” trim causes propeller cavitation, so that the propeller looses its grip. The engine speed increases without the boat speed increasing, in fact the boat might even sink.
Be careful when driving in short seas. Excessive ”bow up” trim may cause the boat to bounce quickly upwards, with the risk of throwing passengers overboard.

In short seas or heavy head seas

Trim the drive down so that the bow drops. This makes for a more comfortable journey. Refer to section *Driving with "bow down"*.

Driving in Beach range

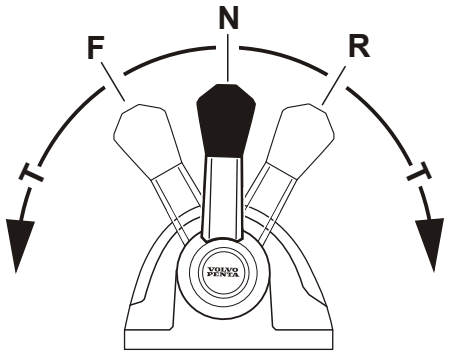
The beach range is used for driving at reduced speed in shallow water or where the depth is unknown.
The highest permitted engine speed when in the Beach range is 1500 rpm.

IMPORTANT!

Make sure the drive's coolant inlet is never trimmed out of the water when operating in the beach range..

Controls

This section describes the controls Volvo Penta sells for your engine. Contact your dealer if your boat is equipped with controls other than those described here, and you feel uncertain about their function.



P0012501

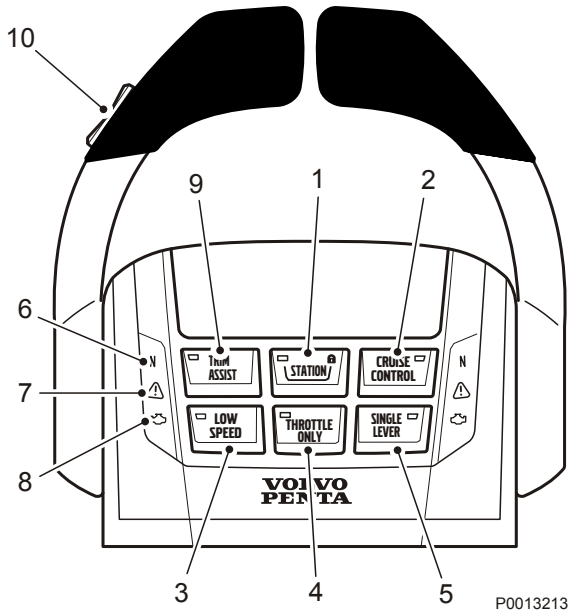
A single-lever control operates both gearshift and throttle functions with the same lever.
The engine can only be started with the control lever in the neutral position.

N = Neutral position. Reverse gear/drive disengaged and engine at idle.

F = Reverse gear/drive engaged for forward motion.

R = Reverse gear/drive engaged for rearward motion.

T = Engine rpm control (throttle).



P0013213

Engine and drive features are controlled with push buttons on the control. What buttons and functions available is depending on the installation.

1 STATION
The button lamp is lit if the helm station is active and lit. Refer to *Helm Stations page 49* for further information.

2 CRUISE CONTROL (optional)
Switch on cruise control by pressing the button. Fine tune the locked engine speed by increasing (**+**) or reducing (**-**) engine rpm with the button at the other side of the control.

3 LOW SPEED (optional)
See *Optional page 42* for information.

4 THROTTLE ONLY
Disconnects the shift function so that the control lever only affects engine speed; refer to "Disengaging shift function" in this chapter for further information.

5 SINGLE LEVER (optional)
Switch on the single-lever function by pressing the button. The lever that is moved from its position first becomes the control lever for both engines. The other control lever has no function as long as the single-lever function is activated. The button lamp lights up to show that the function is active. Exit the single-lever function by pressing the button again.

6 N

Neutral position. The symbol shows that the drive/ reverse gear is disengaged.

7 ⚠

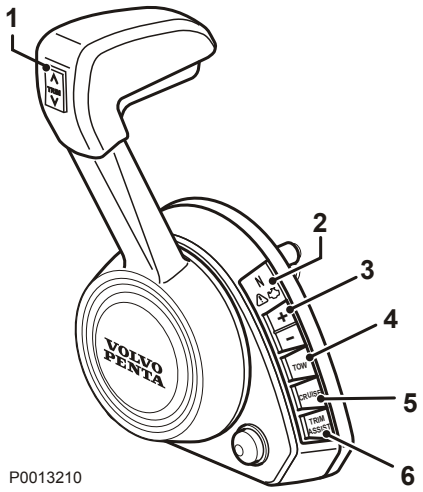
The warning triangle lights up if the system discovers a fault; refer to *Fault Handling page 55* for information.
The warning triangle lights up on the same side as the driveline with the indicated fault.

8 This function is not available.

9 TRIM ASSIST
The Power Trim Assistant, PTA, adjusts the trim angel automatically according to engine speed (rpm), see *Power Trim Assistant page 33* for information.

10 TRIM
Trim the drive out//in.
For twin engine installations the adjustment of the drives are synchronized. For further information see *Instruments and Controls page 31*.

Side-mounted control



1 TRIM
Trim the drive out//in.
For twin engine installations the adjustment of the drives are synchronized.
For further information on Power Trim see *Instruments and Controls page 31*.

2 N

Neutral position. The symbol shows that the drive/ reverse gear is disengaged.

⚠

The warning triangle lights up if the system discovers a fault; refer to *Fault Handling page 55* for information.

This function is not available.

3 + / -
Fine tune the locked engine speed for tow mode (**4**) or cruise control (**5**) by increasing (+) or reducing (-) engine rpm.

4 TOW MODE
Accelerates the boat to a preset rpm.
Switch on toe mode by pressing the button.
Fine tune the locked engine speed by increasing (+) or reducing (-) engine rpm with button (**3**).

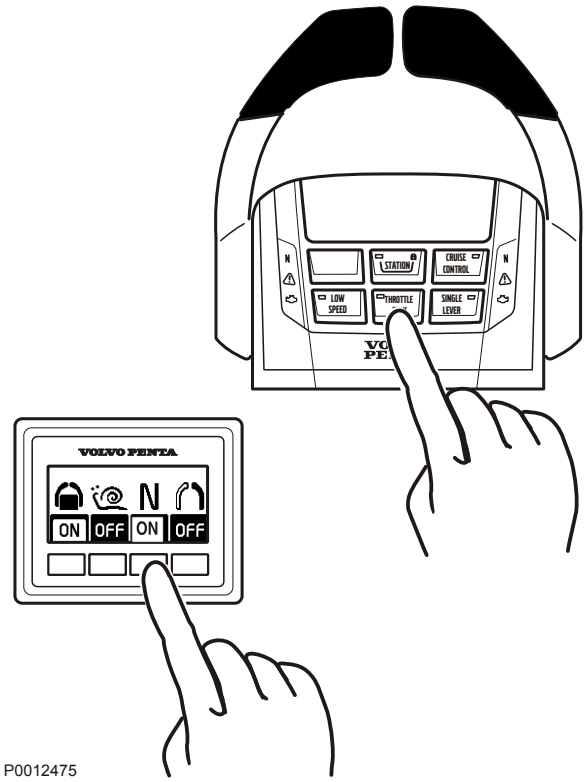
5 CRUISE CONTROL (optional)
Switch on cruise control by pressing the button.
Fine tune the locked engine speed by increasing (+) or reducing (-) engine rpm with button (**3**).

6 TRIM ASSIST (optional)
The Power Trim Assistant, PTA, adjusts the trim angel automatically according to engine speed (rpm), see *Power Trim Assistant page 33* for information.

7 THROTTLE ONLY
Disconnects the shift function so that the control lever only affects engine speed; refer to "Disengaging shift function" in this chapter for further information.

8 Neutral interlock
The neutral interlock prevents acidentally moving the throttle out of neutral.
Depress the interlock button to move control out of neutral.
The neutral interlock will automatically re-engage when the control handle is returned to the neutral position.

Disengaging the Shift Function



P0012475

The gearshift function can be disconnected so that the control lever only operates the throttle.

1 Put the control levers in neutral.

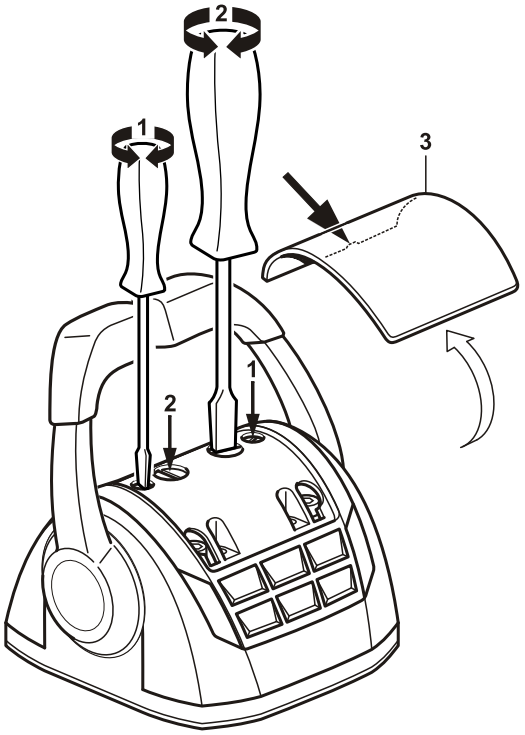
2 Press the control “Throttle Only” button or the neutral button (N) on the helm station panel.

3 Release the button. The N symbol on the control will light up as confirmation that the gearshift function is disengaged and that the lever will only affect engine revolutions.

To exit neutral mode, press the button again.

Adjusting the friction brake

Top mounted controls



P0012474

The control lever has a friction brake that can be adjusted for lighter or stiffer lever movement. Resistance in click mode can also be adjusted.

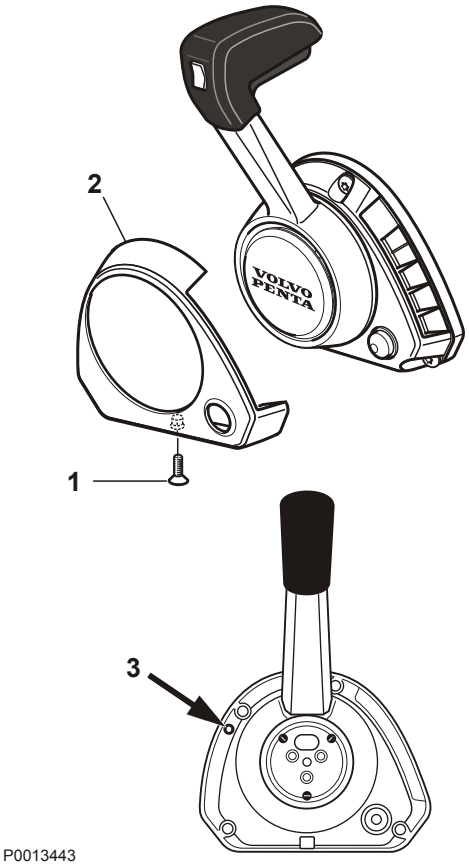
1 Switch off the engine.

2 Remove the cover (**3**).

3 Adjust the friction brake (**1**) and/or click mode (**2**) by turning the screw clockwise for stiffer lever movement, and counterclockwise for lighter lever movement.

4 Replace the cover.

Side-mounted control



P0013443

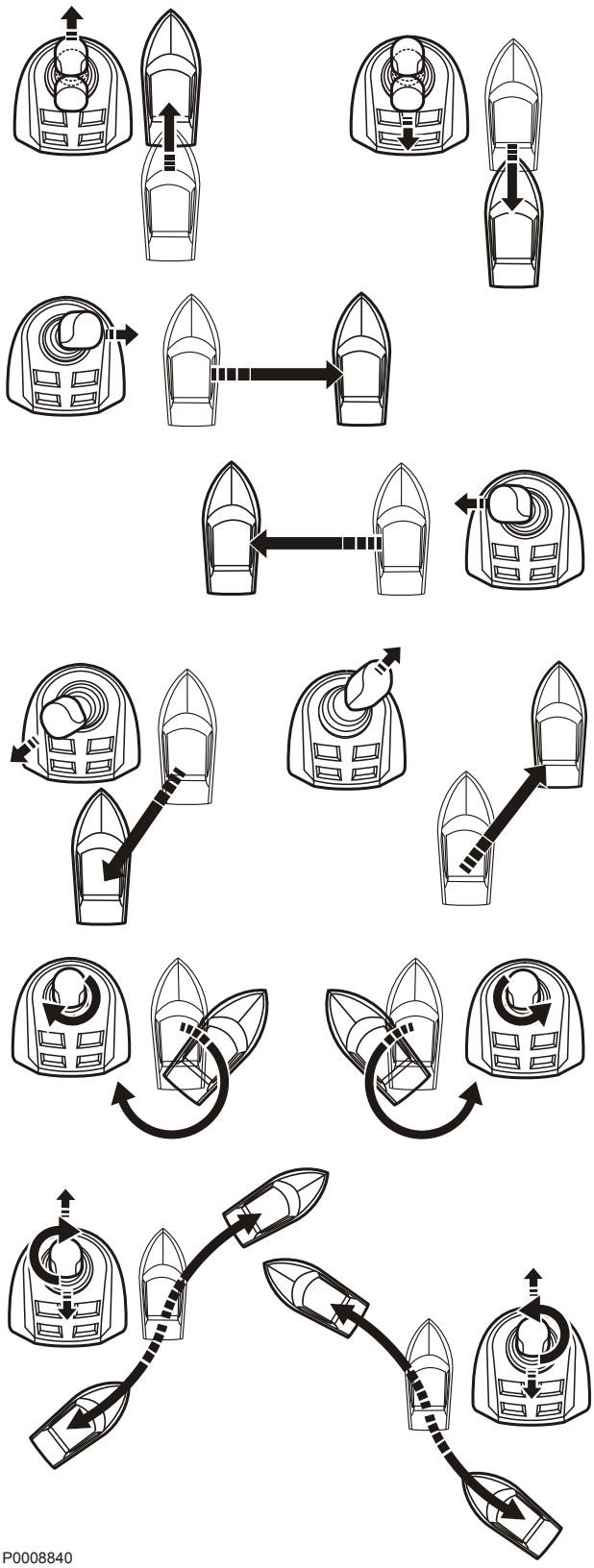
Adjust the resistance in the lever click mode.

1 Switch off the engine.

2 Unscrew the screw (**1**) and remove the cover (**2**).

3 Adjust the detention by turning the screw (**3**) with a 2.5 mm hex wrench. Turn the screw clockwise for an increased detent , and counterclockwise to decrease the detent.

4 Replace the cover.



P0008840

Joystick

The Volvo Penta Joystick is a control used for docking and maneuvering at low speed.

Learn to use the joystick and its functions in a safe and proper manner before beginning to use the function in confined marinas.

Maneuvering with the joystick

The boat is maneuvered by moving the joystick forward, aft, abeam or by twisting the top of the joystick; see illustration..

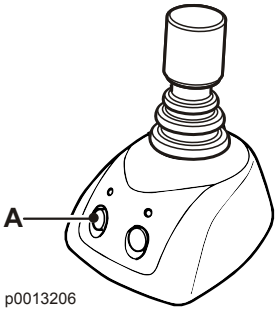
IMPORTANT!

The boat will continue to move in the selected direction even when the joystick has been released; compensate for this by moving the joystick in the opposite direction.

Docking

When the docking function is activated, engine revolutions are limited and the boat can only be steered by the joystick.
In order to activate the docking function, the following must be fulfilled:

- engines running
- control levers in neutral
- helm station active
- joystick in center position



p0013206

Activating the docking function

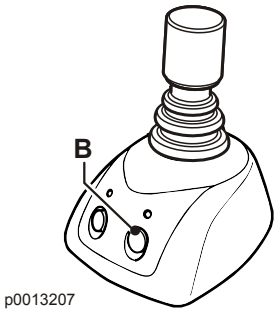
Activate docking mode by depressing the docking button (**A**) on the joystick.
An audible signal will confirm that docking mode is activated and the docking button lamp will light up.

Exiting the docking function

To exit the function, press the joystick docking button (**A**). An audible signal will sound twice to confirm that docking mode is deactivated, and the docking light will go out.

The docking function is also deactivated if the controls are moved from the neutral position.

High Mode



p0013207

If extra power, e.g. when there is a strong wind or strong current, the High Mode function may be engaged.

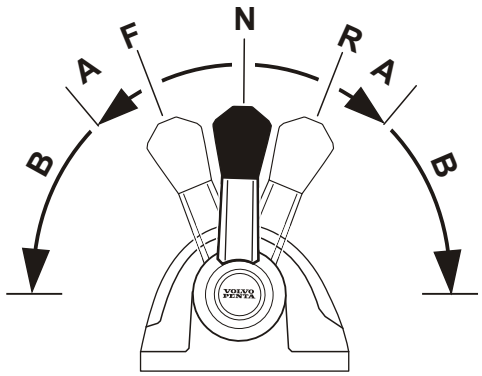
Activate High Mode

Activate the High Mode function by depressing button (**B**) on the joy stick.
An audible signal confirms that the function is activated and the high Mode button lights up.

Disengage High Model

Disengage the function by pressing the button again.
An audible signal will sound twice to confirm that docking mode is deactivated, and the light will go out.
The system is now in normal docking mode.

Optional



P0012499

Low speed

The Volvo Penta low speed function is available for engines with hydraulic transmissions.
Boats with powerful engines can have high speeds even at low revolutions; the low speed function reduces speed.

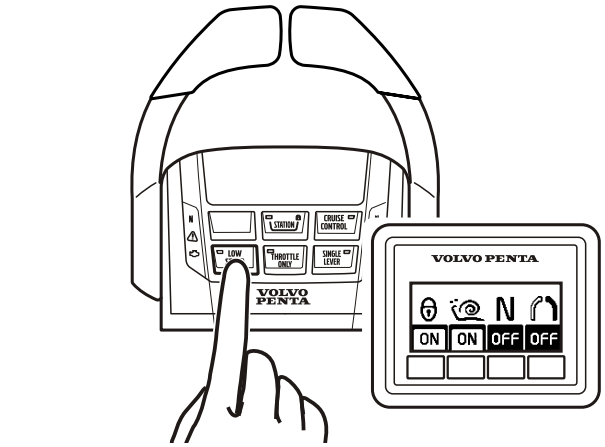
N = Neutral position.
Transmission is disengaged and engine revolutions are at idle.

F = Forward at idle.
The transmission is engaged for operations ahead and the engine is at idle; this involves maximum trolling in the transmission.

R = Reverse at idle.
The transmission is engaged for operations astern and the engine is at idle; this involves maximum trolling in the transmission.

A = Low speed engaged.
The transmission affects propeller revolutions. The engine is not affected.

B = Low speed disengaged.
The control affects engine speed and propeller revolutions.



A
Lowspeed
Activated

B
Coolant Temp
89 °C

C
Lowspeed
Deactivated

P0012978

Engaging the low speed function

1 Move the lever to the neutral position.

2 Press the Low Speed button on the control or on the helm station panel to activate the low speed function.
An audible signal and the message “Lowspeed activated” (**A**) will be displayed on screen to confirm that the function is on.

is shown on the screen if the low speed function is active (**B**).
When the low speed function is engaged a delay may occur when shifting.

Disengage the low speed function

1 Move the lever to the neutral position.

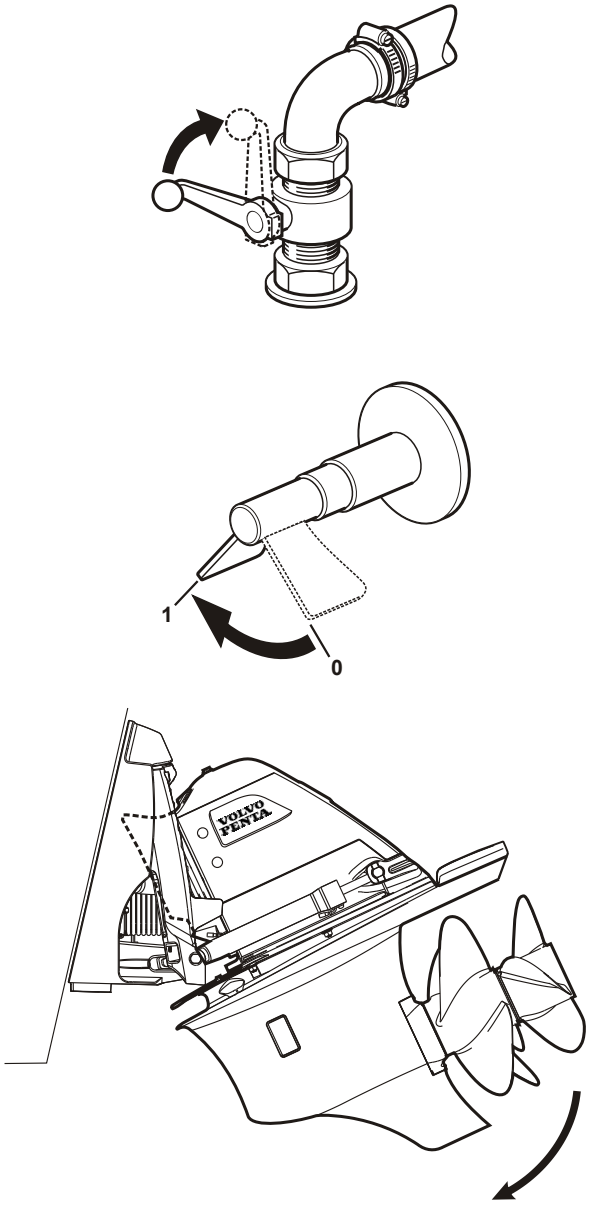
2 Press the Low Speed button on the control or on the helm station panel to disengage the low speed function.
Two audible signals confirm that the function is switched off and the “Lowspeed deactivated” (**C**)message is displayed on the screen.

Starting

Make a habit of visually checking the engine, engine bay and transmission before start. 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 when you have started the engine.
To minimize cold start smoke we recommend the installation of an engine heater or engine bay heater if temperatures below +5°C (41°F) are encountered.

⚠ WARNING!

Never use start spray or similar products as starting aid. Explosion risk!



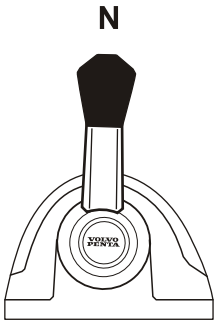
P0005850

Before Starting

- Check the engine and transmission oil level.
- Check the coolant level.
- Open the sea cock where fitted.
- Open the fuel cock.
- Turn the main switch(es) on.
  IMPORTANT!
  Never disconnect the current with the main switches when the engine is running. The alternator and electronics could be damaged.
- Start the engine bay fan, where fitted, and allow it to run for at least four minutes.
- Check that there is sufficient fuel for the planned trip.
- Lower the stern drive if it is up.

Starting the Engine

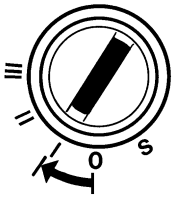
Shifting and adjusting speed is only possible at an active station.
On a boat with one station the station is always active.
On a boat with two or more stations the main station automatically becomes active when the engine is started up with the ignition key(s). If the engine(s) is/are started from another station this station automatically becomes active instead.



P0012457

Put the reverse gear in neutral

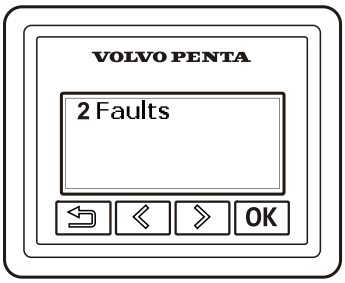
Put the drive in neutral by moving the control lever(s) to neutral at all stations.
Two lever control: Also check that the engine speed lever is in the idling position.



P0003022

Turn the ignition on

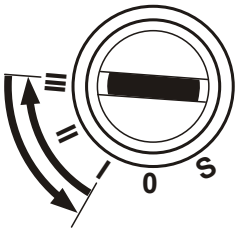
Turn the starter key to position. **I** to switch the ignition on.

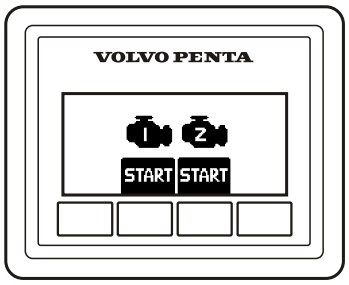


P0012800

Check the information display

If a fault is registered it will be shown in the information display, please refer to *Fault Handling page 55* for further information and recommended actions.





P0012497

Start the engine

If a station is locked the engines can only be started and stopped from this station.

Start using the ignition switch

Start using the ignition switch **III**. Release the key and let it spring back to position **I** as soon as the engine has started.
If repeated start attempts are needed, the key must be turned back to position **0** first.
Stop cranking if the engine does not start within 20 seconds.

Starting with the starter button

Press the starter button for each engine. Release the button as soon as the engine has started.
If you start from a secondary station, the starter key at the main control station must be in position **I**.
Stop cranking if the engine does not start within 20 seconds.

Overheating protection

If the starter motor is engaged for its maximum activation time (30 seconds), the starter motor circuit is cut automatically to protect the starter motor from overheating. If possible, leave the starter motor to cool for at least five minutes before making a new start attempt.

Read the instruments and warm the engine up

Allow the engines to idle for the first ten seconds.
Check that instruments and warning displays show normal values.
Check that no messages are displayed and no warning signs are showing. If a fault is registred, please refer to section *Fault Handling page 55* for further information and recomended actions.
Warm the engine up at low speed and low load, so normal operating temperature is reached before full power is used.

IMPORTANT!

Never race the engine when it is cold.

Operation

Learn to handle the engine, controls and other equipment in a safe and proper manner before casting off on your maiden voyage. Remember to avoid sudden and extreme rudder maneuvers and gear shifts. There is a risk for passengers and crew falling over or falling overboard.

⚠ WARNING!

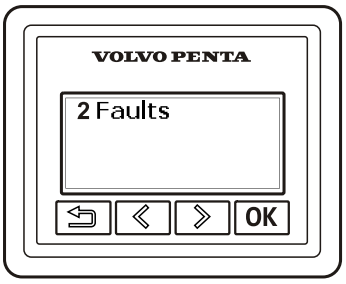
A rotating propeller can cause serious injury. Check that nobody is in the water before engaging ahead or astern. Never drive near bathers or in areas where people could be in the water.

Reading the Instruments

Read all instruments and alarm displays directly after starting, and then regularly during the voyage.

Alarms

Alarms and messages are shown in the information display, some alarms do also have a sound alarm. Is there an alarm instrument installed the lamp in question will flash.



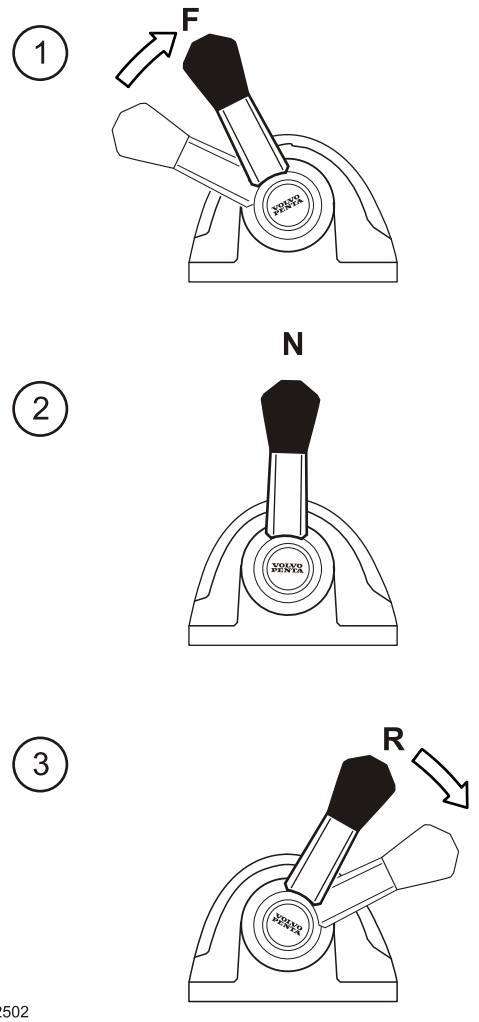
P0012800

1 Read the message.

2 Acknowledge the alarm by pressing OK.

3 Take the indicated actions, see chapter *Fault Code Register page 58*.

The fault will be stored as long as the fault remains. It is possible to read out the fault code at an upcoming service.



P0012502

Maneuvering

Shifting between forward and reverse should be done at idling. Shifting at higher engine speeds can be uncomfortable for passengers and cause unnecessary stress on the transmission or cause the engine to stop. If you attempt to shift gear at an excessive engine speed, a safety function cuts in automatically, and delays shifting until engine speed has fallen to 1500 rpm.

Always do a forwards/reverse operation as follows:

1 Reduce engine speed to idle and let the boat more or less lose way.

⚠ WARNING!

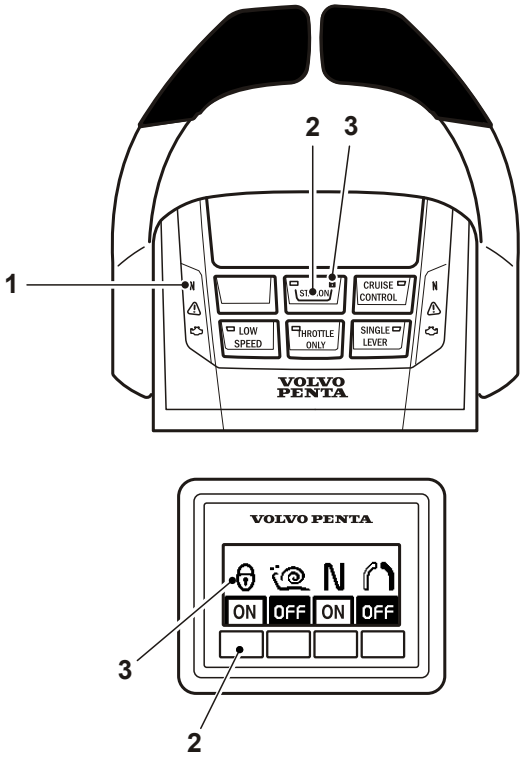
Never shift to reverse when the boat is planing.

2 Move the control lever to neutral with a rapid, distinct movement. Make a brief pause.

3 Then move the control lever to reverse with a rapid, distinct movement and increase engine speed.

IMPORTANT!

It is important all engines are running during reversing maneuvers, to avoid the risk of water entry via the exhaust pipe into the stationary engine.



P0012976

Helm Stations

Changing and activating helm stations

Helm station change

1 Move the control lever(s) to neutral.
The neutral lamp (**1**) on the control lights up when the drive is in neutral.

2 Unlock the helm station being vacated, if it is locked, by pressing (**2**). The padlock (**3**) is extinguished.

3 Activate the helm station being occupied by pressing (**2**).
The lamp in the control button will light up when the helm station is active.

If the helm station is inactive, the lamp will be extinguished.
If the padlock symbol (**3**) flashes, the helm station cannot be activated. Another helm station is active and locked, or unlocked with a drive selected (not in neutral).

Locking/unlocking helm stations

If a helm station is locked it is only possible to start and stop the engine or change helm stations from there. Lock or unlock an active helm station by depressing (**2**).
The padlock symbol (**3**) lights up when the helm station is locked.

P0003088

Cruising Speed

For best fuel economy operations at full must be avoided. We recommend a cruising speed that is at least 10% below the maximum engine revolutions at top speed (full throttle).
Depending on hull type, the choice of propeller, the load and sea state etc., the maximum revolutions at top speed may vary, but they should be within the full throttle range; refer to section *Engines*.

If the engine does not reach its maximum throttle rangeit can depend on a number of factors mentioned in the *Fault Handling page 57* section.
Select a propeller with greater pitch if actual enginerevolutions exceed the full throttle range. Contact your Volvo Penta dealer for advice.

Synchronizing Engine Speed

When driving with twin engines, both the operating economy and comfort will be increased when the engines are operating at the same engine speed (rpm). When the synchronization function is activated, the engine speed (rpm) of the starboard engine is automatically adjusted to that of the port engine. The synchronization function is activated automatically if the following conditions are met.

1 The engine speed levers for both engines are in (approximately) the same position.

2 The engine speed on both engines exceeds 800 rpm.

The synchronizer is disengaged as soon as the conditions are no longer met.

Engine Shutdown

Allow the engine to run at low idle, in neutral, for a few minutes after operations are completed. In this way after-boiling is avoided at the same time as temperature equalization takes place. This is especially important when the engine has been run at high rpm or under heavy load.

Stop the Engine

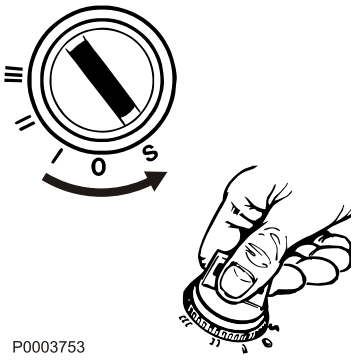
If a station is active and locked the engine(s) can only be started and stopped from that station.

IMPORTANT!

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

IMPORTANT!

Make sure the starter key is in 0-position or removed before main switches are switched off. Otherwise the alternator and electronics could be damaged.

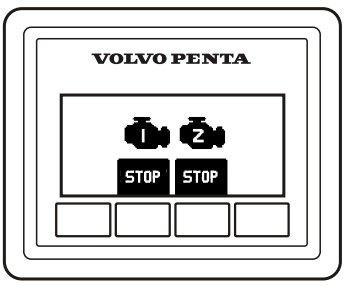


P0003753

Stop with key

1 Disengage the drive/reverse gear by putting the control lever in neutral.

2 Turn the key to stop position “**S**”. Keep the key turned until the engine stops. The key will automatically return to the “0” position when it is released and can then be removed.
The starter key must be in the “0” position or removed before main switches are switched off.

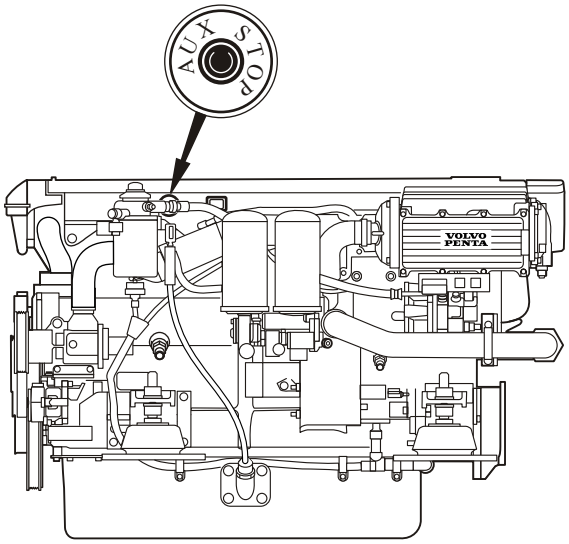


P0013099

Stopping with the stop button

1 Disengage the drive/reverse gear by putting the control lever in neutral.

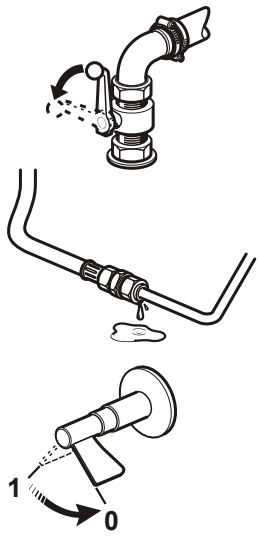
2 Push the stop button(s). Release the button(s) when the engine(s) has/have stopped.



P0003709

Auxiliary stop

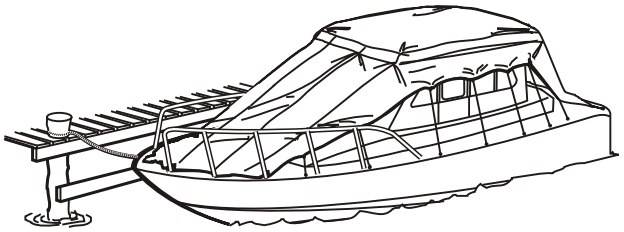
If the engine cannot be stopped in a normal procedure, it is possible to stop the engine via the auxiliary stop mounted on the side of the engine.



P0005914

After Engine Shutdown

- Check the engine and engine bay for leakages.
- Close the fuel tap.
- Close the sea cock where fitted.
- Take an hour meter reading and carry out preventive maintenance according to the maintenance schedule.
- Boats with stern drives: Trim the stern drive down to maximum to protect the trim ram piston's untreated surfaces from fouling.
  If there is a risk of the boat striking bottom with the stern drive, the drive must instead be trimmed up to the maximum lift position.
- Turn off the main switch before any long stoppage.



P0002451

Operation Break

Operation break with the boat in water

If the boat is not used, but left in the water, the engine must be warmed up at least once every fortnight. This prevents corrosion damage in the engine.
If you expect the boat to be unused for two months or more, it must be inhibited, please refer to *Short Term Storage*.

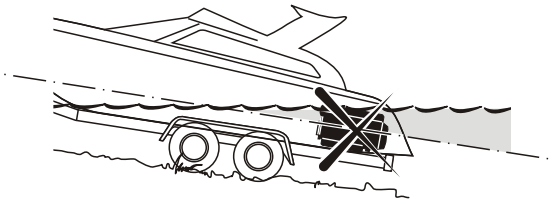
Operation break with the boat out of water

Where boats are kept laid up on land when not in use, there is a lower level of galvanic corrosion protection due to oxidation on the sacrificial anodes. Before launching the boat the sacrificial anodes on the drive and shield must be cleaned with emery paper to remove any oxidation.
If you expect the boat to be unused for two months or more, it must be inhibited, please refer to *Short Term Storage*.

IMPORTANT!

Use emery paper. Do not use a wire brush or other steel tools when cleaning, as these may damage the galvanic protection.

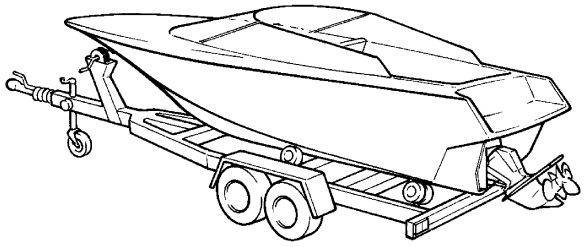
Laying Up and Launching



P0003798

IMPORTANT!

If the boat submerges significantly below the static waterline when it is laid up or launched there is a risk of water entering the engine through the exhaust system.



P0002453

Trailering Your Boat

Check local legislation in respect of boat transportation by trailer - there are differences in various national trailer regulations.

Boats with stern drives

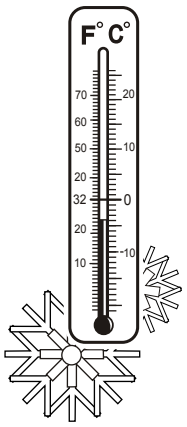
Trim the stern drive up to its "lift position" (maximum lift) before the boat is pulled onto the trailer for transportation. It is possible to trim the stern drive without starting the engine. When the stern drive has reached the highest lift position an automatic catch switches off the current to the trim pump. The catch is released automatically when the stern drive is trimmed down. Always secure the stern drive in the up position with a trailer kit (accessory) or similar so that it cannot fall onto the trailer during transportation.

⚠ WARNING!

The engine must not be run with the drive in the “lift” range.

Boats with reverse gear

Drain the water from the exhaust system to prevent water entering the engine while the boat is being transported by trailer.



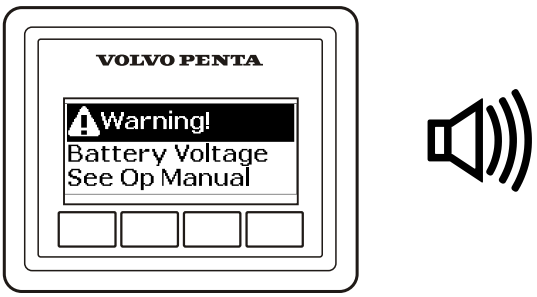
P0005905

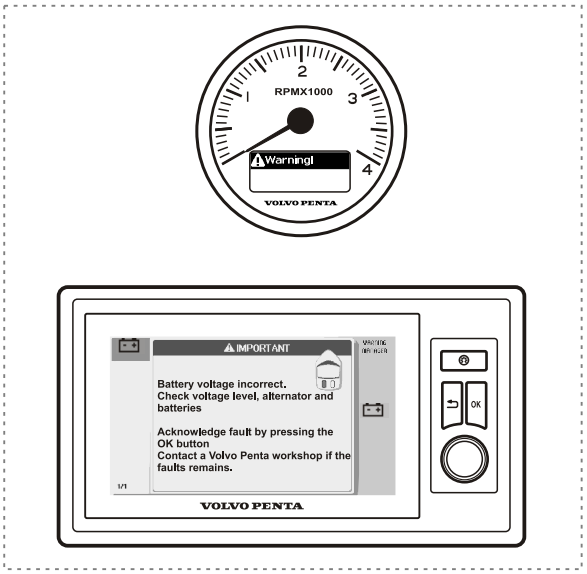
Cold Weather Precautions

If the engine bay cannot be kept frost free, the raw water system must be drained and the freshwater system coolant must have sufficient frost protection to prevent frost bursting; refer to *Seawater System, Draining page 88* and *Maintenance page 84* respectively for more detailed information.
Check the charge status of the battery. A poorly-charged battery can freeze and burst.

Fault Handling

Despite regular maintenance according to the maintenance schedule and perfect operation conditions faults may occur which must be attended to before the boat can travel further. This chapter describes alarms and fault handling.





P0012489

Alarm handling

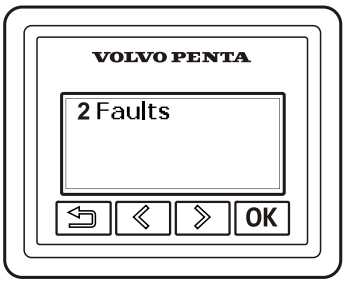
Message from engine and EVC system

If a malfunction is discovered the driver is warned by a buzzer sounding and a message showing in the display.
The message toggles between cause of fault and tasks to perform.

Information regarding ”cause of fault” and ”measures to take” is found in chapter *Fault Code Register*.

The engine, transmission and EVC system is monitored by the diagnostic function. Should the diagnostic function discover a malfunction it protects the engine and ensures continued operation by affecting the engine. Depending on how serious the malfunction is the effect on the engine varies.

- Minor malfunction which does not damage the engine or transmission.
  Affect on engine: None.
- Serious malfunction which will not immediately damage the engine or transmission e.g. high coolant temperature.
  Affect on engine: Engine power is reduced until faulty value becomes normal.
- Serious malfunction which will cause serious damage to engine or transmission.
  Affect on engine: Engine power is reduced.
- Serious malfunction which makes it impossible to control the engine or transmission.
  Affect on engine: Transmission is disengaged and engine speed is reduced.
  It is possible to perform emergency shifting, please refer to *In Case of Emergency page 64*.
- Serious malfunction on transmission or in the engine fuel injection system.
  Affect on engine: Engine is stopped.
  It is possible to perform emergency shifting, please refer to *In Case of Emergency page 64*. In emergency situations it is also possible to start the engine with gear engaged after acknowledging the alarm.



P0012800

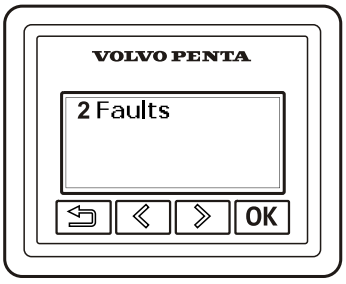
Acknowledge message

1 Push OK to ackowledge the alarm. The buzzer becomes silent.

2 Read the message.

3 Push OK again and the message disappears.

The alarm has to be acknowledged before the engine can be started.



P0012800

Faults list

If a fault is registered Faults (Faults) is displayed in the information panel together with the number of faults.

1 Press OK to get to the submenu.

2 Browse through the fault list using the arrows if more than one fault is registered.

3 Press OK twice to see information about the cause of the fault and the remedy.

4 Return to the previous menu by pressing ⏎.

Deleting faults from the list

Acknowledged faults that have been stored are deleted automatically when the ignition key is turned to the stop position. Stop the engine and check that the ignition key is in position 0 at all helm stations.
When system power is reconnected, the diagnostic function checks if there are any faults in the EVC system. If there are the fault message is shown on the display.
Faults that have been remedied or have disappeared are automatically deleted. Faults that have not been remedied must be acknowledged every time system power is switched on.

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 problems occur which you can not solve by yourself.

Read through the safety advice for care and maintenance work in chapter *Safety Information page 6* before starting work.

Symptoms and possible causes

Pop-ups are shown in the tachometer display	See chapter *Fault Code Register*
Starter motor not turning (or slow)	1, 2, 3, 24
Engine does not start	3, 4, 5, 6, 7, 24
Engine starts but stops again	6, 7, 24
Engine difficult to start	4, 5, 6, 7
Engine does not reach correct speed at wide open throttle (WOT)	5, 6, 7, 8, 9, 10, 11, 15, 18, 19, 20, 21, 24
Engine knocks	4, 5, 6, 7
Engine runs unevenly	4, 5, 6, 7, 10, 11, 17, 18, 20
Engine vibrates	15, 16
High fuel consumption	8, 9, 10, 12, 15, 21
Black exhaust smoke	10
Blue or white exhaust smoke	12, 21, 22
Low oil pressure	13, 14
Engine coolant temperature too high	17, 18, 19, 20, 21
No charge or poor charge	2, 23

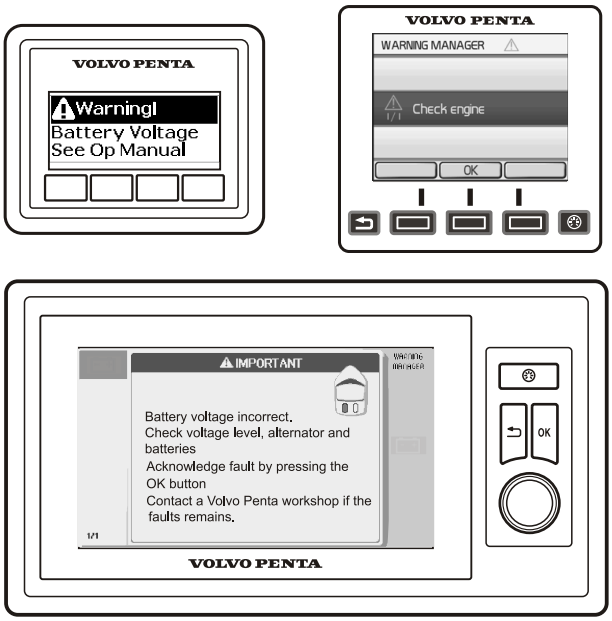
1. Flat batteries
2. Poor contact/open circuit in cables
3. Fuse tripped or faulty relay
4. Lack of fuel
5. Fouled fuel filter
6. Water/contaminants in the fuel
7. Leakage in the fuel system
8. Boat abnormally loaded
9. Fouling on underwater hull/propulsion unit/propeller
10. Insufficient air supply
11. Engine coolant temperature too high
12. Engine coolant temperature too low
13. Lubricating oil level too low
14. Blocked oil filter
15. Defective/incorrect propeller
16. Defective engine mounting
17. Too little coolant
18. Blocked seawater intake/pipe/filter
19. Circulation pump drive belt slipping
20. Defective impeller
21. Defective/incorrect thermostat
22. Lubricating oil level too high
23. Alternator drive belt slipping
24. Stored diagnostic fault codes
    The codes can only be read and erased by a service technician.

Fault Code Register

⚠ CAUTION!

Read the safety precautions for maintenance and service in the Safety Information chapter before starting work.

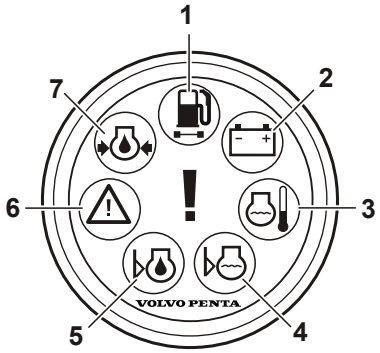
When a malfunction is discovered the helmsman is warned by a sound alarm and at the same time a message is shown in the display.
This chapter gives a more detailed description of the messages together with suggested actions to take.



P0014895

Message

If a malfunction is discovered a message is shown on the display. The message is presented in the list below together with a description of how the system might be affected and suggested actions to take.



P0004761

Alarm Display (optional)

If a lamp in the alarm monitor flashes a malfunction is detected.

1 Is the orange “water in fuel” lamp lit there is to much water in the water separator on the fuel pre-filter.

2 Is the charging lamp lit the alternator has stopped charging.

3 Is the coolant temperature lamp lit the coolant temperature is to high.

4 Is the orange coolant level lamp lit during operation the coolant level is to low.

5 Is the orange oil level lamp lit during operation the engine oil level is to low.

6 Is the red warning lamp lit during operation a serious malfunction has been discovered.
Is the orange warning lamp lit during operation a malfunction has been discovered.

7 Is the red oil pressure lamp lit during operation the engine oil pressure is to low.

Emergency Stop Switch

Reset auxiliary stop button.

Battery Voltage

Check belt tension. Refer to *Drive Belt, Check and Change page 75*.
Check battery fluid level. Refer to *Battery, Maintenance page 94*.

Check Control Lever

Shift and throttle incorrect.
Slip function not available.
Acknowledge fault by moving control to neutral and press OK-button.
Engine power is reduced. Gear automatically set to neutral.

Check Engine

Miscellaneous system faults. Engine performance might be affected.

Some possible explanations to the disturbance listed.

- Battery voltage incorrect.
  Check belt tension. Refer to *Drive Belt, Check and Change page 75*.
  Check battery fluid level. Refer to *Battery, Maintenance page 94*.
- Fuel pressure incorrect. Engine performance might be affected.
- Communication failure. Gear automatically set to neutral. Engine performance might be affected.
- Oil pressure too low.
  Engine power is reduced. Checking Engine Oil Level. Refer to *Oil level, checking and topping up page 78*.
  Check that no leakage occurs.

Please contact a Volvo Penta workshop if the fault remains.

Check EVC System

Internal fault in EVC system. Engine performance might be affected.

Some possible explanations to the disturbance listed.

- Limited or no steering. Please contact a Volvo Penta workshop.
- Shift and throttle unavailale. Gear automatically set to neutral. Engine power is reduced. Helm station has lost communication with engine. Use alternative helm station if possible.
- Control panel failure. Check if any button has stuck.

Please contact a Volvo Penta workshop if the fault remains.

Check Multilink

Limited instrumentation. Control unit has communication fault.

Check transmission

Gear automatically set to neutral. Gear shift not available until fault acknowledged. Acknowledge fault by moving control to neutral and press OK-button.
Gear shift malfunction. Engine is emergency stopped.
Gear shift malfunction.
Limited slip function.
Low speed not available.
Transmission oil pressure not available.
Transmission oil temperature not available.

Check Control Lever

Gear shift unavailable.
Acknowledge fault by moving control to neutral and press OK-button.

Check Steering Wheel

Limited or no steering.
Please contact a Volvo Penta workshop.

Coolant Level

Low coolant level. Check coolant level. Refer to *Coolant Level, Checking and Topping Up page 85*.
Check for coolant leakage.

Coolant Temperature

Coolant temperature too high.
Engine power is reduced.
Check coolant level. Refer to *Coolant Level, Checking and Topping Up page 85*.
Check that the seawater filter is not blocked. Refer to *Seawater Filter, Check and Cleaning page 91*.
Check the impeller in the seawater pump. Refer to *Impeller, Check and Change page 89*.
Check that no leakage occurs.

Engine Oil Level

Oil level too low.
NOTICE! In rough following seas or head seas, the system can incorrectly sense that the engine oil level is too low. If this happens, acknowledge the fault, and check the points below for safety reasons.
Check the oil level in the engine. Refer to *Oil level, checking and topping up page 78*.
Check that no leakage occurs.

Engine Oil Pressure

Oil pressure too low.
Engine power is reduced.
Check the oil level in the engine. Refer to *Oil level, checking and topping up page 78*.
Check that no leakage occurs.

Engine Speed

Engine performance might be affected.
Engine power is reduced.
Please contact a Volvo Penta workshop.

Fuel Pressure

Fuel pressure too low.
Check fuel level.
Check that the fuel filters are not blocked. Replace filters if necessary. Refer to *Maintenance page 81*.
Check for fuel leakage.

Helm Restarted

The engine has lost communication with a helm station.
Engine power is reduced.

Primary Battery

Poor batteries or charging. Refer to *Battery, Charging page 95*.

Sensor failure

Engine performance might be affected.
Please contact a Volvo Penta workshop if the fault remains.

Steering failure

Limited functionality.
Self test failed. Verify hydraulic steering oil level. Refer to *Oil level, checking and topping up page 100*.

Steering failure

Engine power is reduced. Limited steering
The helm station has lost communication with the steering actuator.
Please contact a Volvo Penta workshop.

Water in Fuel

Empty the water trap underneath the fuel filters. Refer to *Maintenance page 81*.

In Case of Emergency

Despite regular service in accordance with the planned maintenance schedule and perfect operating conditions, faults may occur that must be remedied before the boat can continue its trip. This chapter provides advice on how to remedy a number of conceivable faults.
When certain faults occur safety functions engage to protect the engine. The following may occur:

- Engine cannot be started.
- The gear is in neutral and engine rpm is limited.
- The engine stops.

If a fault occurs, confirm any fault alarm and take the necessary measures. Refer to this chapter, and the “Fault catalogue” chapter.

Running Aground

The automatic kick-up function releases the drive in the event of running aground or colliding with an object in the water. If the function has been triggered and the drive has kicked up, it must be trimmed back to its original position using the control buttons.
The kick-up function only protects the drive when travelling forwards. There is no protection for the drive when travelling backwards.

After running aground, check that the drive and propeller are not damaged and that the drive does not vibrate. If there is damage/vibration, the boat should be driven (if possible) slowly to a harbor and lifted out of the water.

Lift the boat ashore. Check the oil level in the drive. If the oil is gray-colored, water has entered and the drive must be inspected by an authorized Volvo Penta workshop. The same applies if there is damage to the drive. Replace the propeller if it is damaged.

To prevent galvanic corrosion, any paintwork damage on the drive and propeller shall be repaired before launching the boat again, refer to section *Storage page 113*.

Checking the tie rod

Check the tie rod that holds the drive together if you have run aground.
If the tie rod is bent, loose or damaged, it must be checked immediately by an authorized Volvo Penta workshop. Steer the boat to a harbor at low speed.

⚠ WARNING!

If the parallel strut (tie bar) shows signs of damage, run at reduced speed to harbor. The parallel strut is a vital safety component, damage may effect steering characteristics. In the worst case steering could be lost altogether. Never align or weld a damaged parallel strut. Please contact your nearest authorized Volvo Penta workshop for assistance.

P0002107

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.

⚠ WARNING!

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

1 Check that the auxiliary battery has the same voltage as the engine system voltage.

2 Connect the red positive cable to the plus (+) terminal on the discharged battery and then to the plus terminal on the auxiliary battery.

3 Connect the black start cable to the minus (–) terminal on the auxiliary battery and to a place a little distance away from the discharged battery, e.g. the start motor's negative terminal.

⚠ WARNING!

Under no circumstances may the black jumper cabel (–) come in contact with the positive connection on the starter motor.

4 Start the engine and let it run at fast idle for approximately 10 minutes to charge the batteries. Make sure there is no extra equipment connected to the electrical system.

⚠ WARNING!

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

⚠ WARNING!

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

Do not bend over any of the batteries either.

5 Turn off the engine. Remove the start cables in the exact opposite order to their connection.

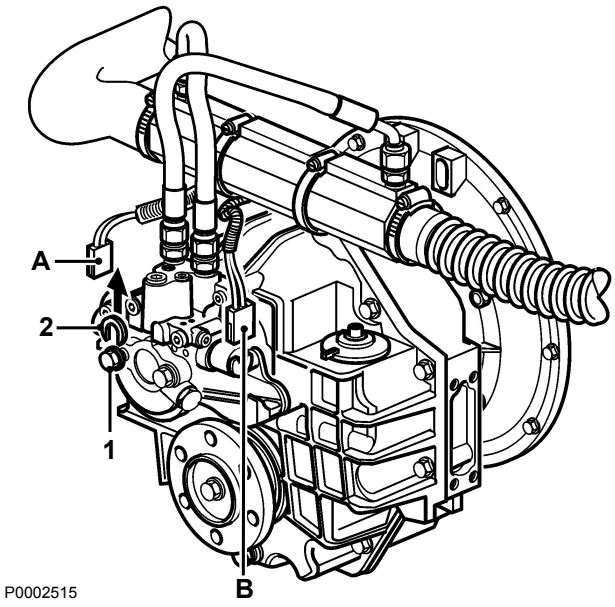
Emergency Shifting

If a fault occurs that prevents engaging gears with the control lever (shifting), it is possible to engage them manually.

Reverse gear

This description describes electronically shifted reverse gear.

Manual shifting of gears



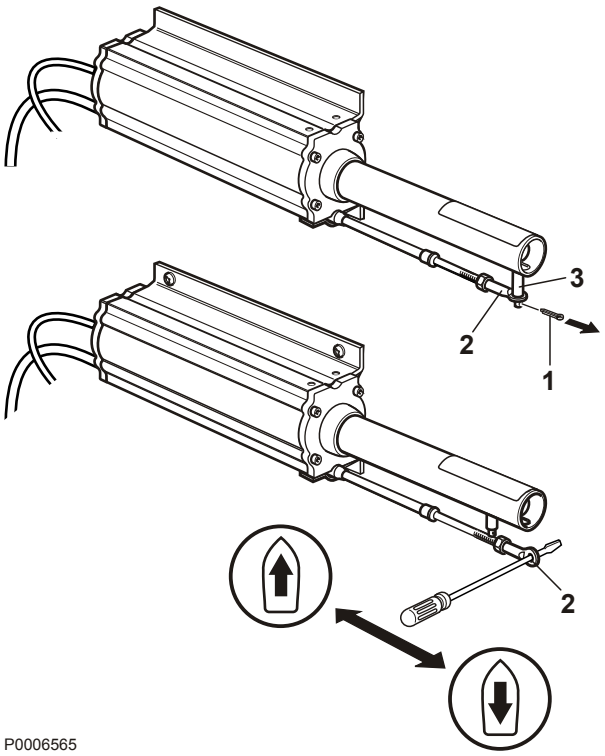
1 Stop the engine and remove the ignition key from the ignition lock.

2 Unscrew the screw (1) on the side where the cable harness marked A is connected.

3 Remove the washer (2) and tighten the screw.

4 Disconnect the wiring A and B from the solenoid valve connections.

The gears are now engaged for forward drive and cannot be disengaged by the control lever.



P0006565

Emergency Shifting, Drive

If a fault occurs which prevents the drive from being operated (shifted) with the control lever, it is possible to shift manually, using the description below.

⚠ WARNING!

In emergency shifting, the unit is locked in forwards operation. Please note that the drive can not then be disengaged with the control lever. Forward motion can only be cut off by stopping the engine with the ignition key or stop button..

Manual drive engagement

1 Stop the engine and take the starter key out of the starter switch.

2 Pull out the split pin (**1**) and lift the adapter (**2**) from the pin (**3**).

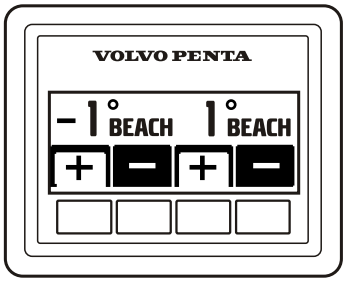
3 Place a screwdriver or similar tool in the adapter (**2**) hole and move the control wire horizontally.

Emergency Trimming

If a situation occurs that needs the drive to be trimmed over the trim limit, the drive can be emergency trimmed.

IMPORTANT!

When emergency trimming is performed, the automatic stop will not work. The drive can be trimmed outside the trim ranges, this can damage the boat and drive.



P0001189

1 Press the trim button on the control or power trim panel in the direction the drive needs to be trimmed. Release the button when the trim limit is reached.

2 Press the button again and hold it depressed for more than 5 seconds.The drive starts trimming.

Start after crash-stop

If the engine crash-stops, the following routine must be performed before the engine can be started again.

1 Move control lever(s) to neutral.

2 Acknowledge any alarms and turn the ignition off.

3 Wait until the system is completely shut down and all lamps are out.

4 Turn the ignitionon but do **not** start the engine.

5 Acknowledge any alarms. Start the engine.

Maintenance Schedule

Your Volvo Penta engine and its equipment are designed for high reliability and long life. The engines are built to withstand the marine environment, but also to have the smallest possible environmental impact. If the engine and transmission are serviced regularly according to the schedule, these qualities will be retained and unnecessary malfunctions will be avoided.

Warranty inspection
During the initial period of use a special warranty inspection - a First service inspection - must be carried out by an authorized Volvo Penta workshop. Instructions regarding when this must be done can be found in the **Warranty and service book**.

Extended protection for leisure use
Volvo Penta offers extended protection for marine diesel engines, including power trains, applicable only to leisure boats. For the warranty to be valid, all prescribed services must have been carried out at the owner's expense by an authorized Volvo Penta dealer or service workshop before the 12 month warranty period has expired. Further instructions are contained in the Warranty and service book.

C = Clean
R = Replace
A = Adjust
L = Lubricate
I = Inspect (Clean, Adjust, Lubricate or Replace if necessary)

FSI = First Service Inspection
A, B, C, D = Type of service (regular service)

FSI

First Service Inspection, after 50–100 running hours (1)	
Coolant level and antifreeze mixture	**I**
Fuel pre-filter, draining water / contamination	**I**
Drive belt (tension)	**I**
Outboard drive, corrosion protection	**I**
Outboard drive, oil level in Power Trim	**I**
Outboard drive, oil level in Power steering	**I**
Start and warm up engine	
Engine and transmission, oil / fuel / water leakage (at least 1200 rpm)	**I**
Power steering and Power Trim, function and leakage	**I**

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

Every 50-200 Hours / at Least Every 12 Months

Engine Oil and Oil Filters / By-pass filter (1)(2)(3)	**R**

1) Oil change intervals vary, depending on engine type, oil grade and sulfur content of the fuel. Se kapitel *Oil Grade and Oil Change Interval*.

2) Change the filters during each oil change.

3) The following service point shall be performed after this service point: *Engine and transmission, oil / fuel / water leakage (at least 1200 rpm)*

A

Every 200 hours / at Least Every 12th Month	
Coolant level and antifreeze mixture	**I**
Crankcase ventilation filter	**I**
Air Filter	**I**
Fuel pre-filter and fuel fine filter	**R**
Drive belts, wear and tension	**I**
Compressor, oil level	**I**
Seawater pump impeller	**I**
Sacrificial anodes: charge air cooler, heat exchanger and exhaust pipe (1)	**I**
Drive-unit and transom. Corrosion protection (sacrificial anodes)	**I**
Reverse gear, oil and filter	**R**
Engine with reverse gear. Propeller shaft seal	**I**
Outboard drive, oil	**R**
Outboard drive. Lubricate propeller shaft and check for damage and corrosion. Visual inspection of propeller shaft sealing.	**I**
Outboard drive, universal joint bellow	**I**
Outboard drive, steering cylinder bellow and ground strap	**I**
Outboard drive, steering positioning sensors	I
Outboard drive. Hydraulic cylinders, hoses and fittings	**I**
Outboard drive, rubber hoses and clamps	**I**
Outboard drive, exhaust bellow	**I**
Exhaust pipe / hose	**I**
Engine and transmission, oil / fuel / water leakage (at least 1200 rpm)	**I**
Engine and transmission, touch up paint as required	**I**
Batteries, electrolyte level	**I**

1) Once every year

B

Every 400 Hours / at Least Every 5 Years	
Outboard drive, fork bushings	**I**
Outboard drive, shift mechanism and cable	**I**
Outboard drive, pressure and vacuum testing(1)	**I**
Outboard drive, hydraulic valve oil and oil filter (Steering Control Unit)	**R**
Outboard drive. Lubricate propeller shaft splines and fasteners	**I**
Hydraulic tie-bar oil	**R**

1. Vacuum testing is unsuitable with the drive in water.

C

Every second year	
Outboard drive, universal joint bellow	**R**

D

Every 4 years	
Coolant	**R**

E

Every 800 Hours / at Least Every 5 Years	
Drive Belts	**R**
Drive belt, transmission	**I**
Compressor, oil	**R**
Turbo	**I**
Exhaust pipe / hose (1)	**R**

1) Replace hose every 5 years.

Every 800 Hours for Marine Commercial use **Every 800 hours for joystick installations** **Every 1200 hours for Marine Leisure use (without joystick)**	
Outboard drive, complete over haul incl. gears, shaft and U-joints	**I**
Outboard drive, shift cable(1)	**R**
Outboard drive, shift sliding sleeve	**R**
Outboard drive, shift yoke and linkage rod	**R**

1) Only use Volvo Penta XACT cable.

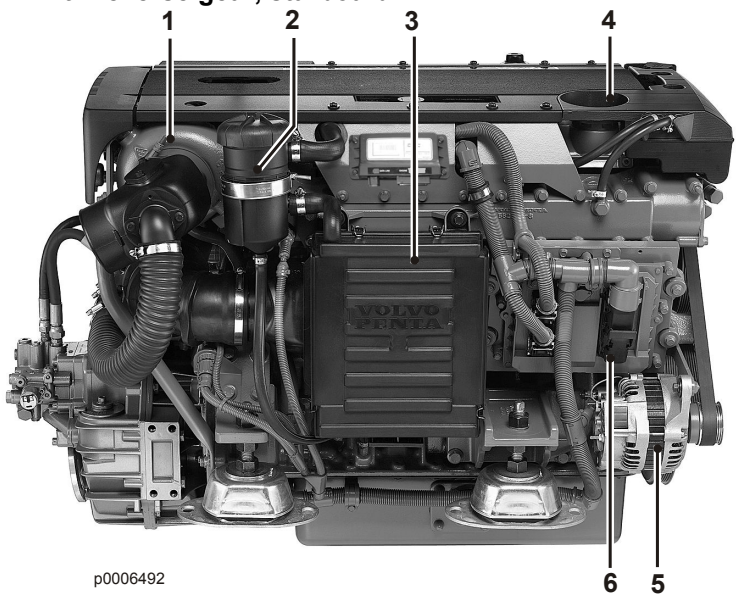
Maintenance

This chapter contains general technical information and instructions on how the prescribed maintenance items must be carried out. Read through the instructions carefully before starting work. The times when maintenance items must be carried are indicated in the *Maintenance Schedule page 67*.
Read through the safety precautions for maintenance and service in the *Safety Information page 4* chapter before work on the engine is begun.

⚠ WARNING!

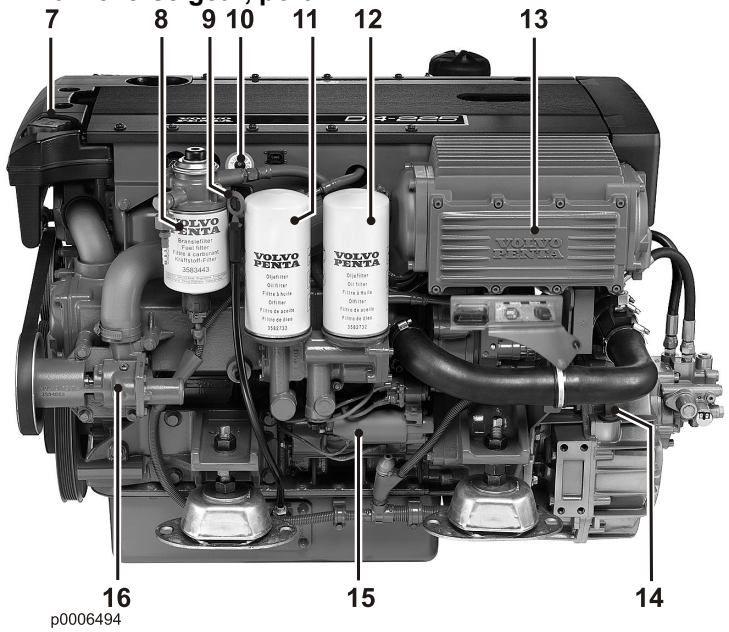
Care and maintenance work should be done with the engine stopped unless otherwise specified. Stop the engine before opening or removing the engine hatch/hood. Make it impossible to start the engine by removing the start key and cutting the system voltage with the main switches.

D4 with reverse gear, starboard



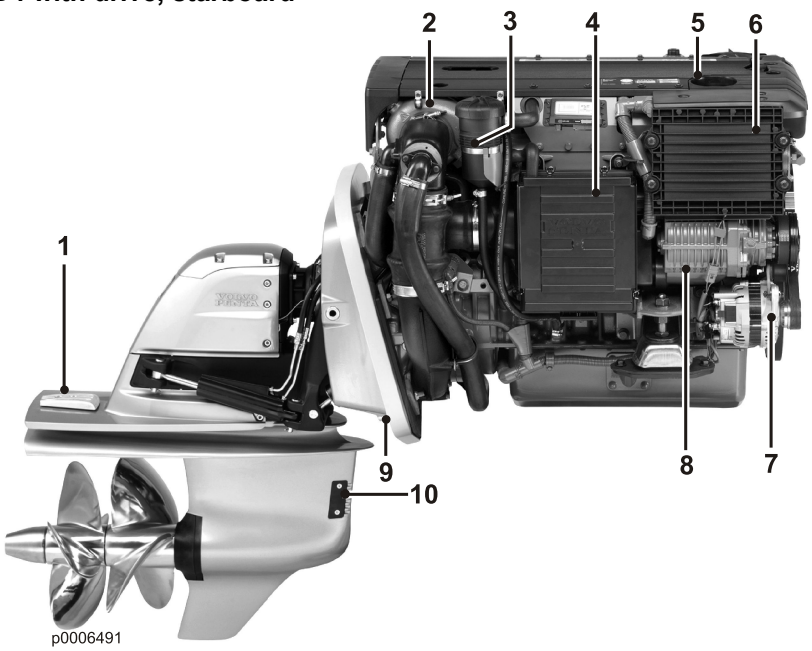
1 Turbocharger
2 Crankcase ventilation filter
3 Air filter
4 Oil filler cap
5 Alternator
6 Control unit

D4 with reverse gear, port



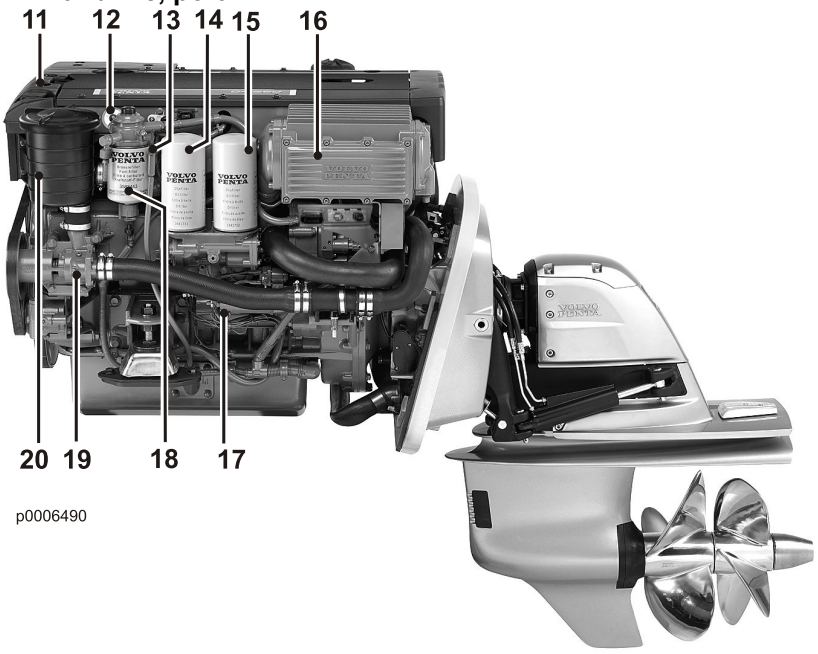
7 Expansion tank
8 Fuel filter
9 Oil dipstick (engine)
10 Aux stop
11 Oil filter by-pass
12 Oil filter
13 Charge air cooler
14 Oil dipstick (reverse gear)
15 Starter motor
16 Sea water pump

D4 with drive, starboard



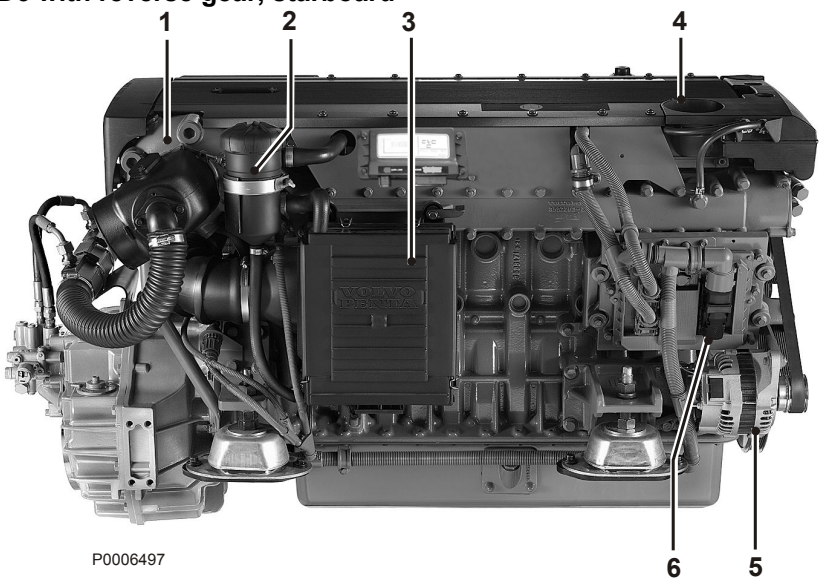
1 Zinc anode
2 Turbocharger
3 Crankcase ventilation filter
4 Air filter
5 Oil filler cap
6 Control unit
7 Alternator
8 Compressor
9 Zinc anode
10 Cooling water intake

D4 with drive, port



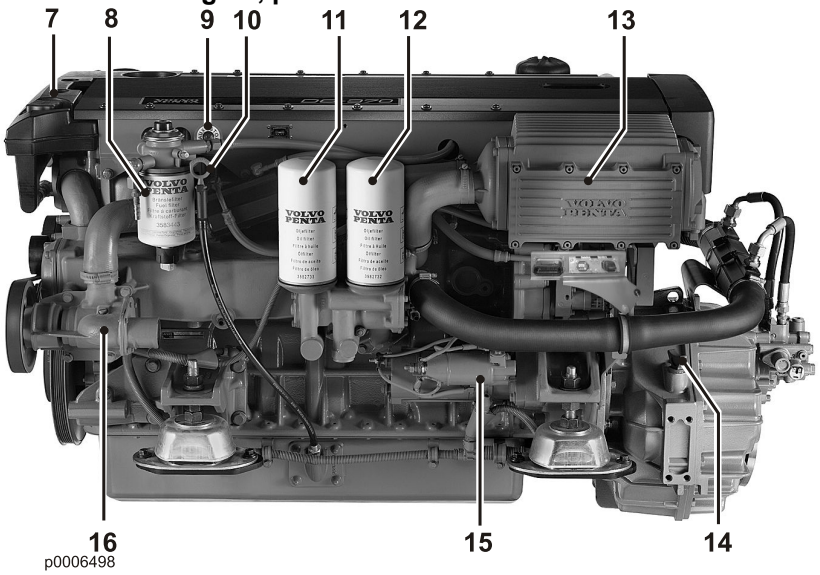
11 Expansion tank
12 Aux stop
13 Oil dipstick
14 Oil filter bypass
15 Oil filter
16 Charge air cooler
17 Starter motor
18 Fuel filter
19 Sea water pump
20 Sea water filter

D6 with reverse gear, starboard

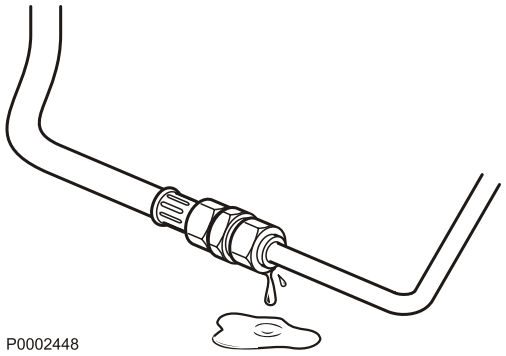


1 Turbocharger
2 Crankcase ventilation filter
3 Air filter
4 Oil filler cap
5 Alternator
6 Control unit

D6 with reverse gear, port



7 Expansion tank
8 Fuel filter
9 Aux stop
10 Oil dipstick (engine)
11 Oil filter by-pass
12 Oil filter
13 Charge air cooler
14 Oil dipstick (reverse gear)
15 Starter motor
16 Sea water pump

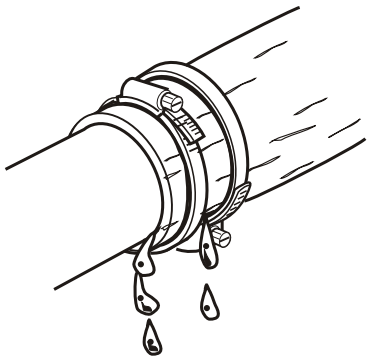


P0002448

Engine, General

General inspection

Make a habit of visually checking the engine and engine bay before starting, and after operations when you have stopped the engine. This will help you to discover abnormalities quickly, or if something is about to happen.
Look especially carefully for oil, fuel and coolant leakages, loose bolts, worn or poorly-tensioned drive belts, loose cable connections, damaged electrical cables and hoses. This inspection only takes a few minutes and can prevent serious malfunctions and expensive repairs.



P0002455

⚠ WARNING!

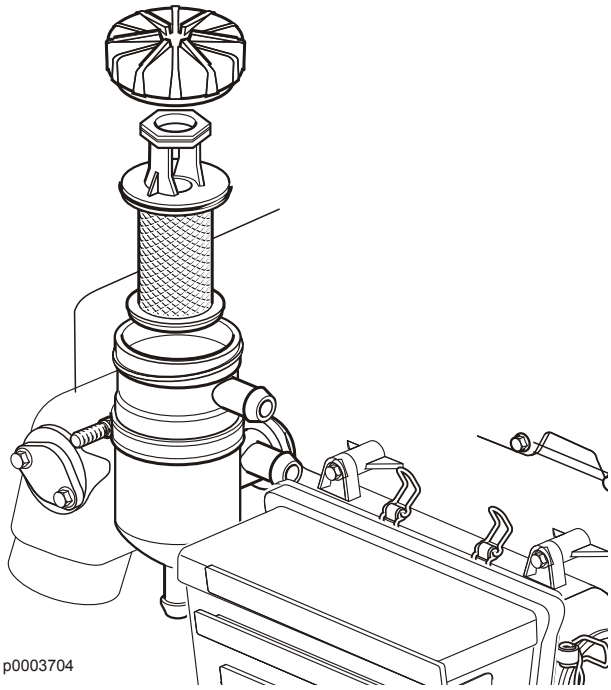
Accumulations of fuel, oil and grease on the engine or in the engine room is a fire hazard and must be removed immediately they are detected.

⚠ WARNING!

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

Never direct the jet from a high-pressure washer at seals, rubber hoses or electrical components. Never use the high pressure setting for engine cleaning.

Crankcase Ventilation, Filter Change


p0003704

1 Unscrew the cover and remove the old filter.

2 Clean the filter cover/housing as necessary. Be careful to prevent contamination from entering the engine.

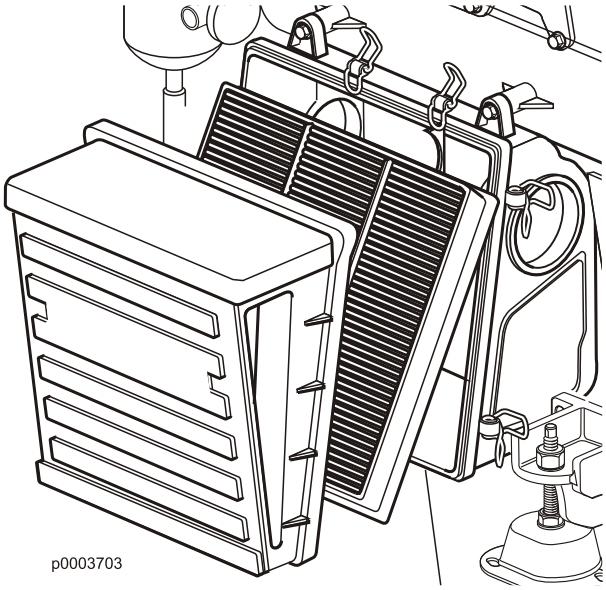
3 Install the new filter.

4 Screw the cover back in place.

IMPORTANT!

Scrap the old filter. They may not be cleaned.

Air Filter, Change


p0003703

1 Unscrew the air filter cover and remove the old filter.

2 Clean the air filter cover/housing as necessary. Be careful to prevent contamination from entering the engine.

3 Install the new filter and air filter cover.

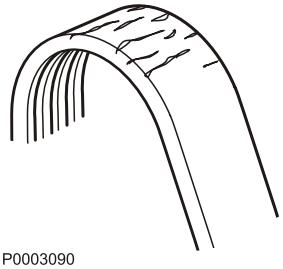
IMPORTANT!

Scrap the old filter. They may not be cleaned.

Drive Belt, Check and Change

⚠ WARNING!

Stop the engine before doing any maintenance work.



P0003090

General

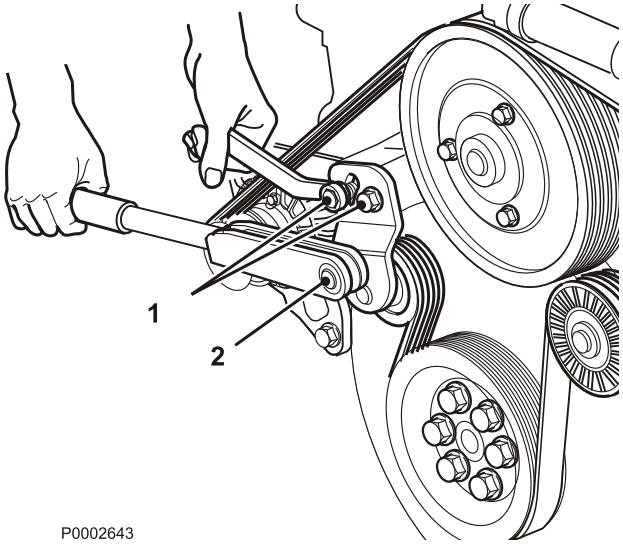
Check belt tensions and condition regularly. A belt that is tensioned too tightly may damage bearings, while a belt too-loosely tensioned may slip.

Check and adjust the belt after operation, while the belt is still warm.

IMPORTANT!

Always replace a belt that appears worn or has cracks (belts that work in pairs shall always be changed together).

Adjusting/replacement of drive belts



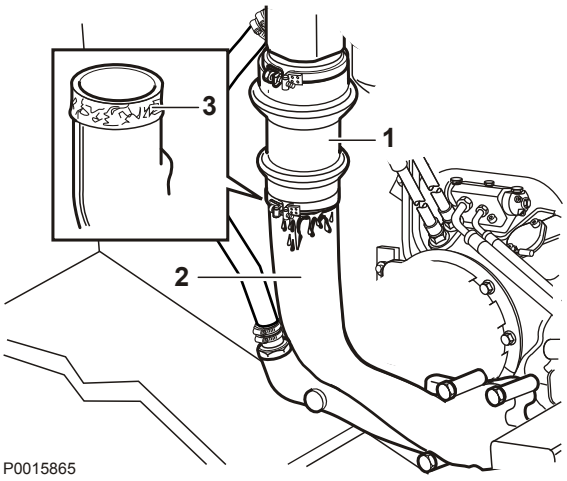
P0002643

The standard alternator and water pump are driven by a poly-V belt for the best function and lifespan. Replace/tension the belt as follows:

1 Loosen the screws (**1**) on the tension roller bracket. Remove and replace the belt as required.

2 Tension the belt by applying a torque to the tensioning roller square fitting (**2**) of **70 Nm** (52 lbf.ft). Lock the tensioning roller using screws (**1**). The screws must be tightened to **50 Nm** (37 lbf.ft).

3 Repeat the procedure when the engine is warm: Loosen screws (**1**) and tension the belt.



Checking exhaust line

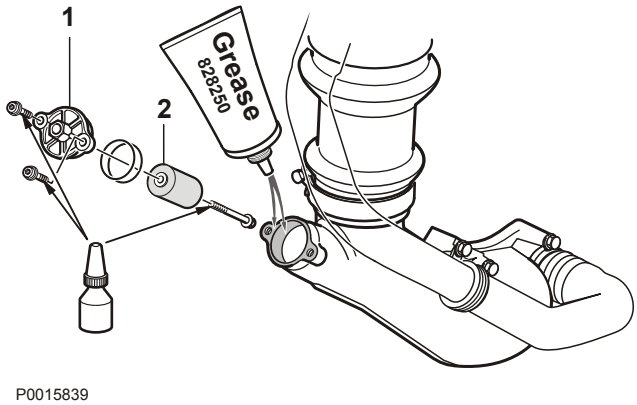
The exhaust line must be inspected every year, due to corrosion between the hose (**1**) and pipe (**2**).

⚠ WARNING!

Risk of water entering. The exhaust line must be inspected while the boat is on land. In case of serious corrosion damage, the pipe must be repaired or replaced with a new one.

1 Remove the hose clamps and remove the hose.

2 Inspect the contact surface (**3**). The pipe must be repaired or replaced if there is serious corrosion damage.



Exhaust pipe sacrificial anode, check

Applies to engines with a sacrificial anode fitted to the exhaust pipe.

⚠ WARNING!

Risk of water entering. The exhaust line must be inspected while the boat is on land. In case of serious corrosion damage, the pipe must be repaired or replaced with a new one.

The exhaust pipe sacrificial anode (**2**) must be checked yearly.

1 Loosen the sacrificial anode holding fixture (**1**) from the exhaust pipe.

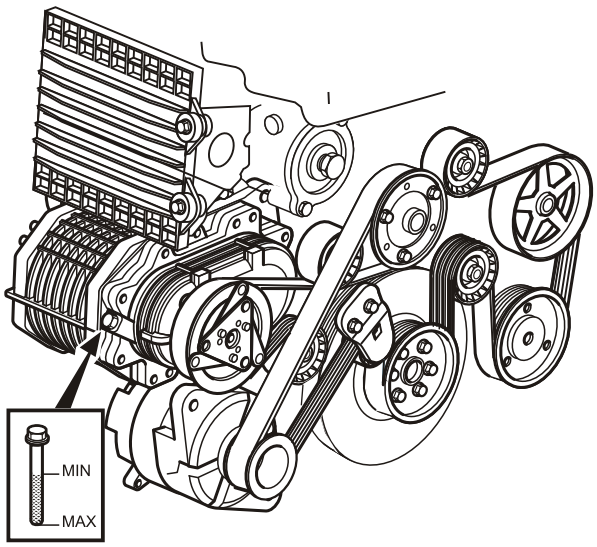
2 Check the sacrificial anode (**2**).
Replace with new anode when approximately 1/3 of the anode has corroded away.

3 Mount the sacrificial anode to the holding fixture.
Install the holding fixture with new O-ring.
Grease the sealing surface and screw threads generously with water resistant grease.

4 Check that no leakage occurs when launching the boat.

Use sacrificial anodes thus:

- Zinc in salt water.
- Magnesium in freshwater.
- Aluminum when the boat is used primarily in salt water and sometimes in brackish water.



P0002655

Compressor, checking oil

Checking and filling

1 Unscrew and lift up the oil dipstick. Dry the oil off. Screw the oil dipstick down as far as it will go and then unscrew and lift up.

2 Check that the oil level is between the MAX and MIN marks. Check that the dip stick is screwed fully home so that the reading is correct. If the dipstick is not screwed fully home, the oil level will be above the MIN mark even if the oil level is correct.

3 Fill with oil as required, use the dipstick hole. Oil quantity and grade, see section *Technical Data, Lubrication System*.

IMPORTANT!

The oil level shall be between the MAX and MIN marks on the dipstick.

Compressor, oil change

1 Run the engine until it reaches normal operating temperature.

2 Pull up the oil dipstick

3 Remove the plug and let the oil run out.

4 Replace the plug and fill with oil to the correct level.

Lubrication System

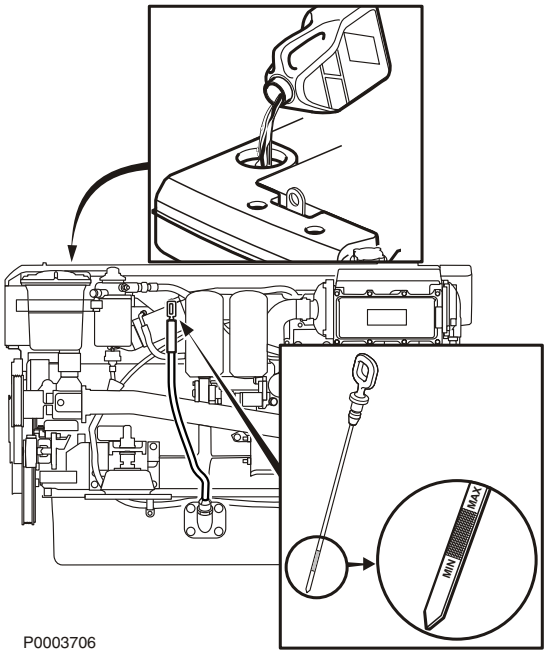
P0002089

Oil change intervals can vary depending on oil grade and sulphur content of the fuel, please refer to *Technical Data, Lubrication System*.

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

If you want longer oil change intervals than given in the table *Oil Grade and Oil Change Interval*, the condition of the oil must be checked by the oil manufacturers through regular oil testing.

Oil level, checking and topping up



P0003706

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

Check the oil level a while after the engine has been switched off. The oil in the engine needs some time to return to the sump before a correct oil level check can be performed.
Wait 15 minutes if the engine has been run at normal operating temperature. Wait an hour if the engine has been idling.

The oil level shall be between the MAX and MIN marks on the dipstick. Levels that are higher or lower than these marks can damage the engine.

IMPORTANT!

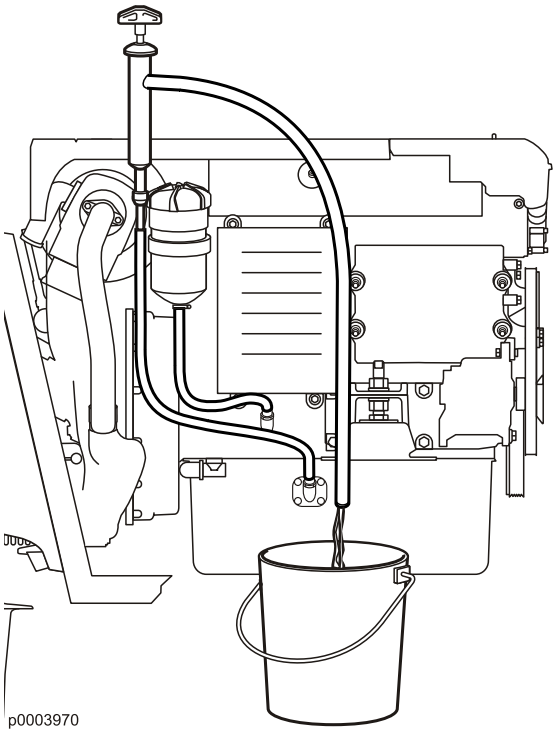
Do not fill over the limit for max. oil level. Use only oil of the recommended grade, refer to *Technical Data, Lubrication System*.

1 Fill the oil slowly via the filling hole on the top of the engine.

2 Wait 5 minutes to allow the oil time to reach the sump before checking the level again.

3 Then check the level again.

NOTICE! The volume between MAX and MIN is about 1.2 liter (0.3 US gal) for D4 and 3.5 liter (0.9 US gal) for D6.



Engine Oil, Change

Always follow the recommended oil change interval. Use only oils of the recommended grades; refer to *Oil Grade and Oil Change Interval*.

⚠ WARNING!

Hot oil and hot surfaces can cause burns.

1 Run the engine until warm so that the oil is easier to pump. Then stop the engine and wait 10 minutes.

2 Connect the oil suction pump to the draining pipe. Pump out the oil.

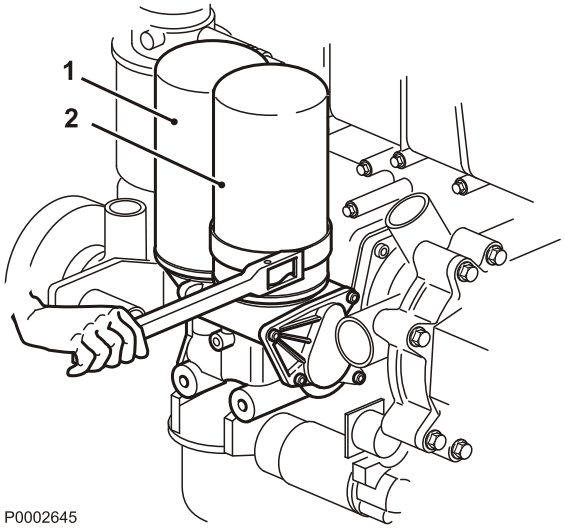
3 Replace the oil filter and by-pass filter at every oil change, see section*Oil Filter/By-pass Filter, Change page 80*.

4 Fill with oil to the correct level through the filling hole on the top of the engine. Oil quantity, see section *Technical Data, Lubrication System*.

5 Start the engine. Run the engine until it reaches normal operating temperature. The oil level shall be checked with the engine warm.
Check that the low oil pressure lamp goes out and that there are no leaks around the oil filter.

6 Turn off the engine. Wait ten minutes before checking the oil level. Top up as needed.

Hand in the old oil and oil filter to a re-cycling station.



P0002645

Oil Filter/By-pass Filter, Change

The oil filter and by-pass filter must be replaced at every oil change.
Deposit the old filter at a waste management facility.

⚠ WARNING!

Hot oil and hot surfaces can cause burns.

1 Put a suitable container under the filter to collect any spilled oil.

2 Clean the filter bracket.

3 Unscrew the by-pass filter (**1**) and the oil filter (**2**) with a suitable filter puller.

4 Check that the mating surfaces on the filter bracket are clean and that no remnants of the old gaskets are left.

5 Moisten the gaskets on the new filters with engine oil.

6 Screw on the filter by hand until the rubber gasket touches the filter bracket mating surface. Then tighten an additional 3/4 turn.

7 Start the engine, run at low idle, and check that no leakage occurs. Check the oil level after the engine has stopped.

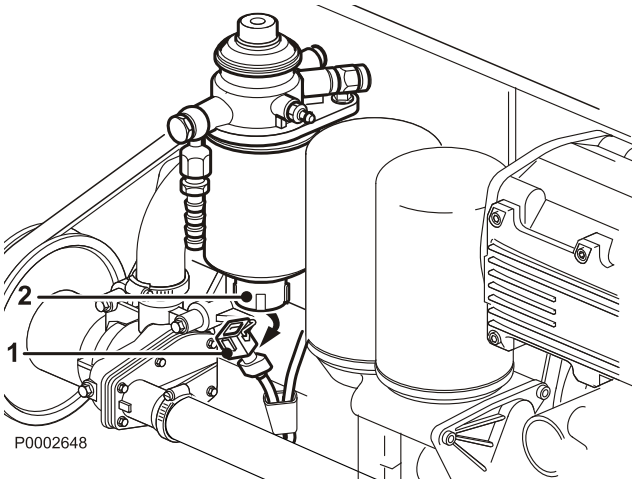
Fuel System

Only use the grades of fuel recommended in the fuel specification, see *Technical Data, Fuel System*.
Always observe the greatest cleanliness during refuelling and work on the fuel system.
All work on the unit injectors of the engine must be carried out by an authorized workshop.

⚠ 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 can not cause fire.

Engine Fuel Filter Replacement



1 Close the fuel tap(s).

2 Clean the filter bracket and install a suitable vessel under the filter.

3 Remove the connector piece (**1**) from the water separator (**2**). Unscrew the filter. Use a filter wrench if necessary.

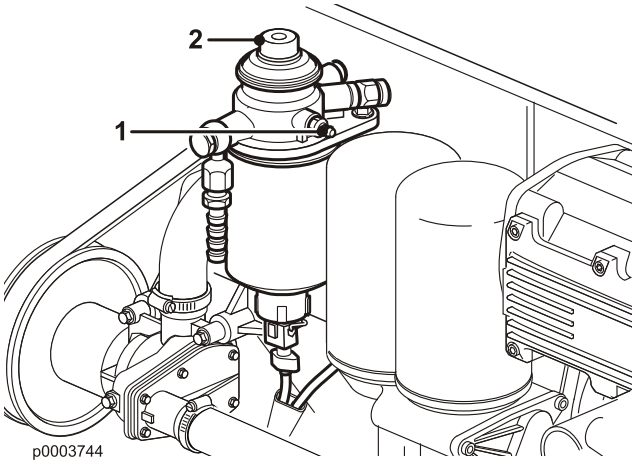
4 Clean the sealing surfaces on the filter holder. Make sure that the filter is clean and that the sealing rings are undamaged. Moisten the seal rings with engine oil.
IMPORTANT!
Do not fill the new filter with fuel before installation. Dirt may get into the system and cause damage and malfunctions.

5 Screw on the new filter by hand until the gasket just bottoms on the sealing surface. Then tighten a further 1/2 turn. Install the water separator and connect the union.

6 Open the fuel cock.

7 Bleed the fuel system, see section *"Fuel system, bleeding"*.

8 Start the engine and check that there are no leaks.



Fuel system, bleeding

The fuel system must be bled after a filter change, if the fuel tank has been run dry and after a long-term stoppage.

IMPORTANT!

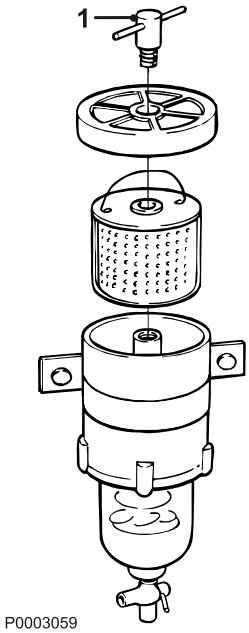
Never disconnect the pressure pipe.

1 Connect a transparent hose to the bleed nipple (**1**). Feed the hose to a container to avoid spillage.

2 Open the bleeding nipple and pump fuel with the hand pump (**2**) until the fuel is free from bubbles. Close and tighten the bleed nipple.

3 Pump a further 10 times on the hand pump. Resistance in the hand pump can feel heavy, but this is completely normal and necessary to bleed the system.

4 Remove the hose and fit the protective cap to the bleed nipple.



Fuel Pre-filter, Change

⚠ WARNING!

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

1 Close the fuel stop cock on the fuel tank. Place a container beneath the fuel filter.

2 Remove the cover by loosening screw (**1**).

3 Replace the insert and refit the cover.

4 Open the fuel stop cock and bleed the fuel system, see section *"Fuel system, bleeding"*.

5 Start the engine and check for leaks.

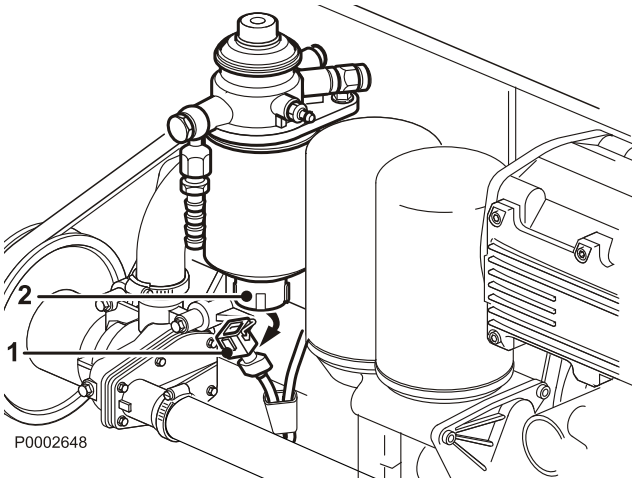
6 Hand in the scrapped filter at a recycling depot.

Water in Fuel

If the EVC system warns for too much water in the fuel filter, the water separator needs emptying.

IMPORTANT!

Do not continue operating if there is water in the water separator, it can damage the engine.



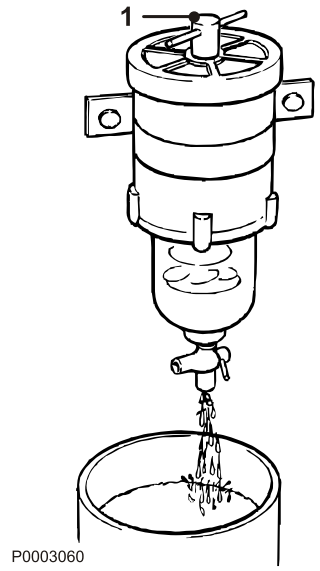
Draining the fuel filter

1 Stop the engine and remove the ignition key from the ignition lock.

2 Remove the connector piece from the water separator (1).

3 Place a container under the fuel filter and carefully unscrew the water separator (2). Let the water run out. When diesel runs out, screw in the water separator until it bottoms against the filter. Then tighten an additional 1/4 to 1/2 turn.

4 Refit the connecting piece (1).



Draining the fuel pre-filter (extra equipment)

1 Place a container beneath the fuel filter.

2 Open the bleed screw (1) on the fuel filter about 4 turns.

3 Drain the water and contaminants via the plug in the bottom of the filter.

4 Bleed the fuel system.

Freshwater System

The freshwater system is the engine's internal cooling system that ensures that the engine operates at the correct temperature. It is a closed system that must always be filled with a coolant mixture in order to protect the engine against internal corrosion, cavitation and frost bursting.

IMPORTANT!

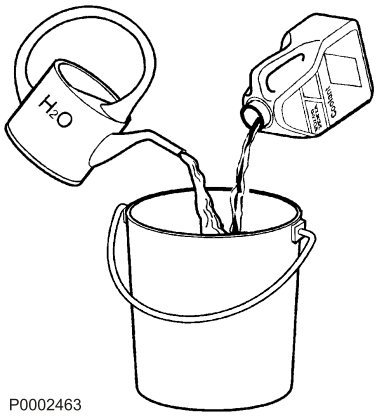
Coolant of a suitable chemical composition must be used all year round. This applies even when there is no risk for frost damage, so that the engine always has complete corrosion protection.
The use of anti-corrosion agents alone is not permitted in Volvo Penta engines. Never use water alone as the coolant.

P0013077

The corrosion protection additives become less effective over time, which means that the coolant must be changed at regular intervals; refer to *Maintenance Schedule page 67*. The cooling system must be flushed whenever the coolant is changed, refer to *Freshwater system, Flushing*.

Volvo Penta recommend ”Volvo Penta Coolant VCS, Ready Mixed” or the concentrate ”Volvo Penta Coolant VCS” mixed with pure water according to specifications, see *Water Quality*.

Volvo Penta Coolant VCS and VCS Ready Mixed are based on organic acid technology (OAT). Using other types of coolant, such as conventional or hybrid types, can drastically reduce the heat transfer and result in overheating of the engine.



P0002463

Coolant, Mixing

⚠ WARNING!

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

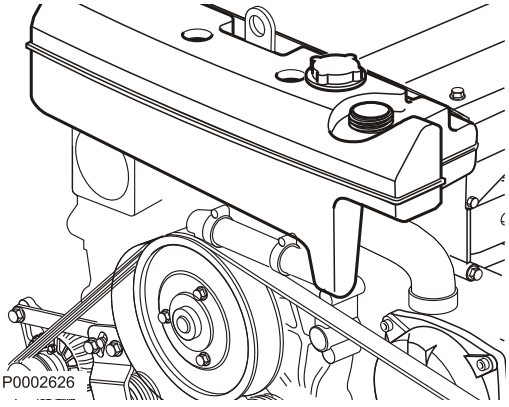
IMPORTANT!

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

Mix: 40% "Volvo Penta Coolant" (conc. coolant)and 60% water

This mixture protects against internal corrosion, cavitation and frost bursting down to –24°C (–11°F). At 60% glycol concentration, the freezing point is lowered to –46°C (–51°F).
Never mix more than 60% concentrate (Volvo Penta Coolant) in the coolant. A greater concentration provides reduced cooling effect with the risk for overheating and reduced frost protection.

The coolant must be mixed with distilled, deionized water. The water must fulfil the requirements specified by Volvo Penta; refer to *Water Quality*.
It is extremely important that the system is filled with the correct coolant concentration. Mix in a separate clean vessel before filling the cooling system. Make sure that the liquids mix.


P0002626

Coolant Level, Checking and Topping Up

⚠ WARNING!

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

1 Turn the filler cover slowly counter-clockwise and release any pressure from the system before removing the cover completely.

2 Top the coolant up as necessary. The coolant level shall be between the MAX and MIN marks on the expansion tank.

3 Screw the filler cover on.

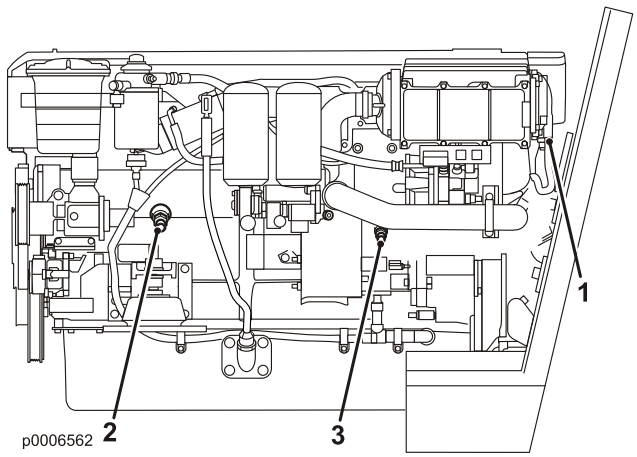
Freshwater System, Draining

⚠ WARNING!

Stop the engine and let it cool before starting work on the cooling system. Hot fluids and hot surfaces can cause burns.

⚠ WARNING!

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



1 Remove the filler cover on the expansion tank to speed up the coolant drainage.

2 Loosen the hose (**1**) mounted on the intercooler and connect to the drain cock (**2**) on the heat exchanger. Open the cock (**2**). Let all the coolant run out into a container.

3 Screw in the stop cock.

4 Move the hose to the drain cock (**3**) on the engine block and continue draining the coolant.

5 Close the cock and put the hose back on the intercooler.

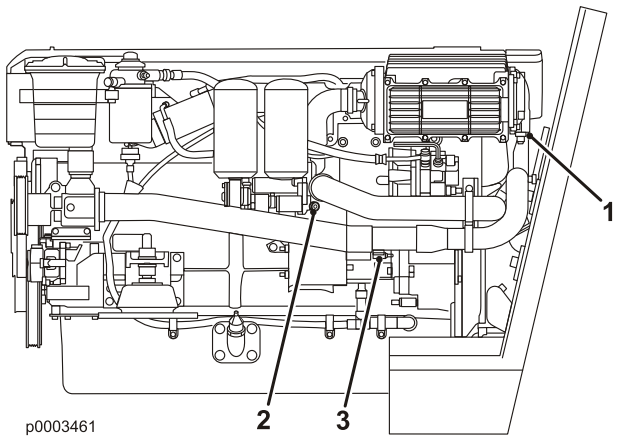
6 Collect the old coolant and hand it to a re-cycling station for disposal.

Seawater System

The raw water system is the engine's external cooling system. On engines with drives, the raw water pump sucks in water via the drive, through the control system's oil cooler to the raw water pump. The water then passes through the raw water filter before being pumped through the fuel cooler, intercooler, engine oil cooler and heat exchanger. Finally the water is fed out through the exhaust elbow, where it is mixed with the exhaust gases.
On engines with reverse gears, the raw water pump sucks in water via a raw water intake, after which the water passes a raw water filter (extra equipment) before being pumped through the intercooler, heat exchanger, engine oil cooler and gearbox oil cooler. Finally the water is fed out through the exhaust elbow, where it is mixed with the exhaust gases.

⚠ WARNING!

Risk of water entry. Water will flow into the boat if any hose, plug etc. located below the waterline is removed when the boat is in the water. Always close the sea cocks. If the boat does not have sea cocks the water flow must be blocked in a safe manner. If this is not possible, the boat must be drawn up on land before work starts.



Seawater System, Draining

⚠ WARNING!

Risk of water entry. Close the seawater cocks before doing any work on the seawater system.

To prevent frost damage, the raw water system must be drained during cold weather if there is a risk for frost. An alternative to draining is to keep the engine room warm using an approved heater fan.

Draining:

1 Close the sea cock where fitted.

2 Open the drain stop cock (**1**) by unscrewing it carefully.

3 Drain the coolant into a container. Screw in the stop cock by hand.

4 Move the hose on the stop cock (**1**) and connect to stop cock (**2**).
Open stop cock (**2**) and drain all coolant. Close the stop cock.

5 Move the hose to stop cock (**3**).
Open stop cock (**3**) and drain all coolant. Close the stop cock.

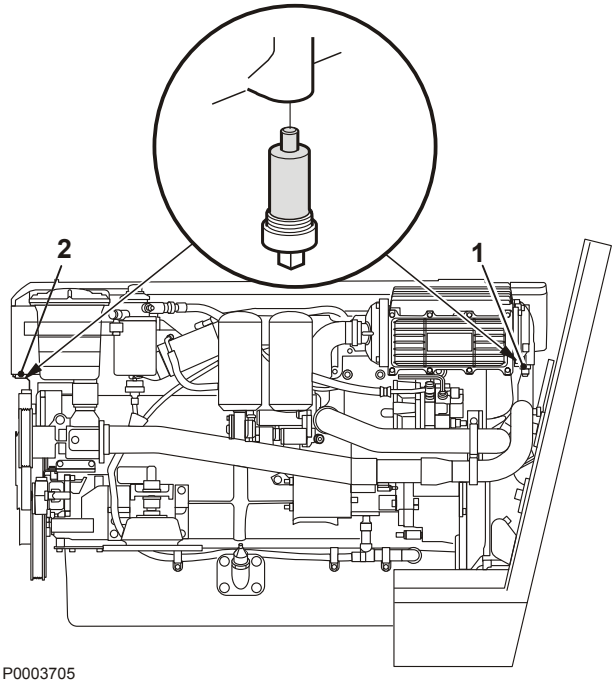
6 Refit the drain hose to stop cock (**1**).

7 Open the sea cock where fitted.

Zinc Anodes, Check and Change

⚠ WARNING!

Risk of water entry. Close the seawater cocks before doing any work on the seawater system.



P0003705

1 Close the sea cock(s).

2 Drain the raw water as described in *Seawater System, Draining page 88*.

3 Remove the zinc anodes from the heat exchanger (**1**) and intercooler (**2**).

4 Check the zinc anodes and replace if consumed to more than 1/3rd of original size. If not, clean the zinc anodes with Emery cloth to remove the oxide layer before re-installing them.
IMPORTANT!
Use emery paper. Do not use a wire brush or other steel tools when cleaning, as these may damage the galvanic protection.

5 Install the zinc anodes. Make sure there is good metallic contact between the anode and the metal contact point.

6 Close the drain cocks.

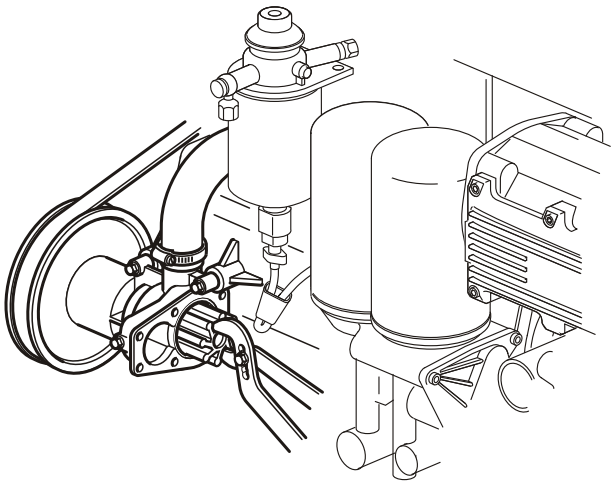
7 Open the sea cock(s), before starting the engine.

8 Check that there are no leaks.

Impeller, Check and Change

⚠ WARNING!

Risk of water entry. Close the seawater cocks before doing any work on the seawater system.



P0002636

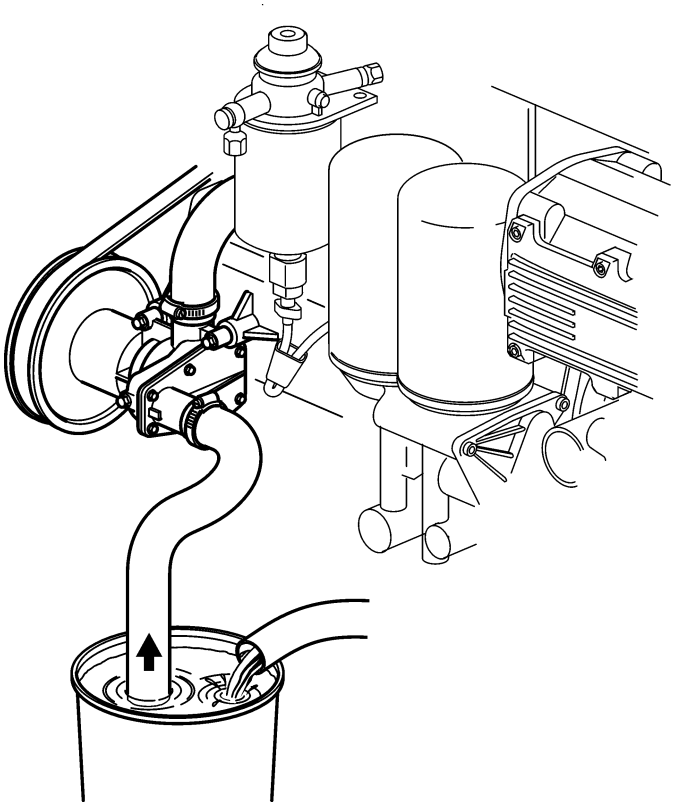
1 Remove the cover from the raw water pump and remove the impeller.
If the impeller is cracked or damaged it must be replaced.

2 If the pump shaft can be turned by hand, the flange must be replaced.

3 Lubricate the pump housing and inside of the cover with a little glycerin.
IMPORTANT!
The impeller will be damaged if other types of lubricant than glycerin are used.

4 Press the impeller in with an anti-clockwise rotating movement.

5 Fit the sealing washer on the center bearing of the shaft. Install the cover with a new O-ring.



Seawater System, Cleaning and Inhibiting

The raw water system must be flushed with fresh water, to prevent deposits and salt crystals from building up inside it. It must also be conserved when the boat is laid up for winter/out of season storage so that it is protected from internal corrosion.

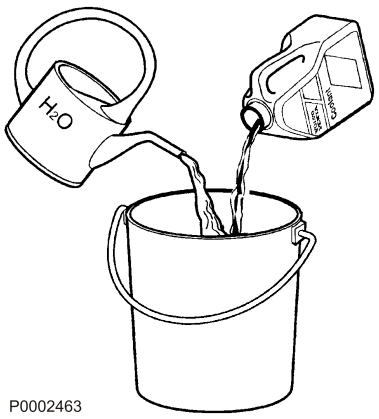
⚠ WARNING!

Risk of water penetration.

Cleaning and inhibiting the seawater system should be carried out with the boat on land.

⚠ WARNING!

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



P0002463

1 On boats with reverse gears, open the sea cock.

2 Disconnect the hose from the raw water pump and install a hose which goes to a bucket filled with fresh water. Arrange re-filling.
IMPORTANT!
The impeller will be damaged if it is run dry.

3 Check that there is no one near the propeller and no one will be splashed by the exhaust outlet.

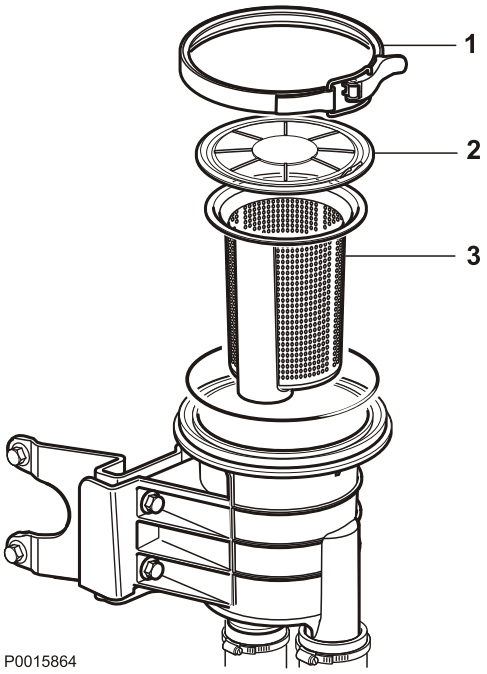
4 Set the control lever to neutral and start the engine. Let it run at fast idle for a few minutes. Stop the engine.

5 Fill a bucket with a mixture of 40% glycol and 60% fresh water, to conserve the system. Fix a container at the exhaust outlet.

6 Start the engine and let it idle. Stop the engine just before the mixture is used up. Repeat until the entire system has been flushed with the mixture.

7 Put the raw water hose back.

8 The system has now been conserved. The glycol mixture should remain in the system during storage.
Before launching the boat, drain the mixture and hand it to a re-cycling station for disposal



Seawater Filter, Check and Cleaning

⚠ WARNING!

Risk of water entry. Close the seawater cocks before doing any work on the seawater system.

If the water where the boat is used contains contaminants, seaweed, etc. the filter should be checked more frequently than stated in the maintenance schedule. Otherwise there is a risk that the filter may be blocked resulting engine overheating.

1 Close the sea cock.

2 Unscrew the cover (**1**) and remove the sealing plate (**2**).

3 Lift out the insert (**3**) and clean it.

4 Replace parts as illustrated.

5 Open the sea cock and check for leaks.

Electrical System

The engine is equipped with a 2-pole electrical system and an alternator. System voltage is 12V or 24V.

⚠ WARNING!

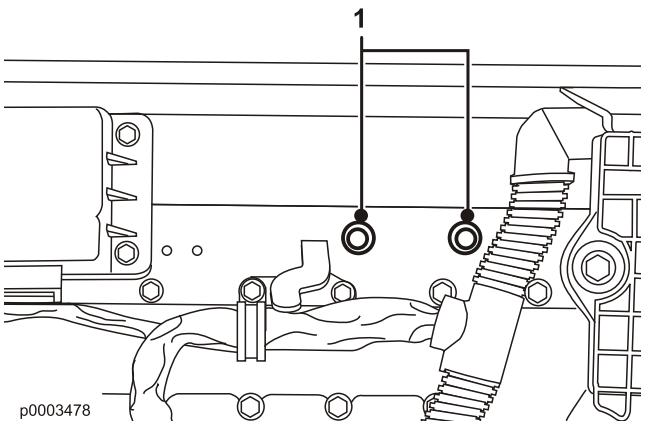
Always stop the engine and break the current using the main switches before working on the engine.

Fuses

12–volt system (engine)

The engine is fitted with automatic circuit breakers. The circuit breakers cut the power if the system is overloaded.

If it is not possible to start the engine or if the instrument stops working while running, the circuit breaker may have been activated.
Resetting will take place automatically.

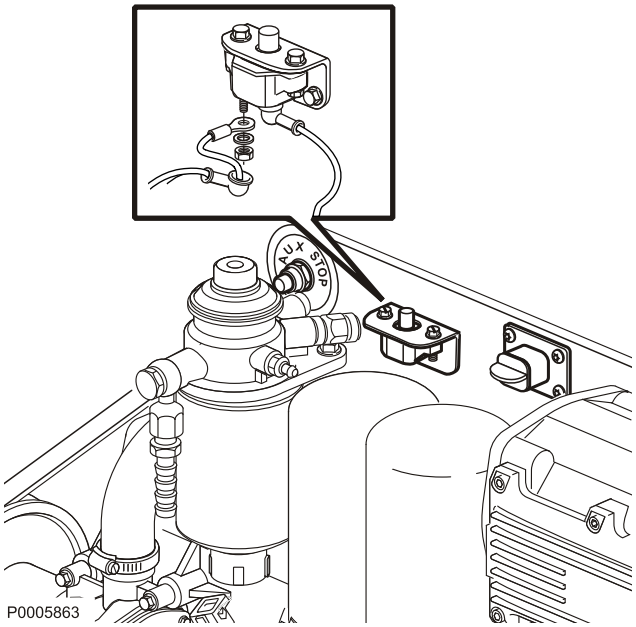


24–volt system (engine)

The engine is fitted with two automatic circuit breakers (**1**). The circuit breakers cut the power if the system is overloaded. If it is not possible to start the engine or if the instrument stops working while running, the circuit breaker may have been activated. Reset by pressing in the circuit breakers (**1**).

IMPORTANT!

Always investigate the cause of the overload. If the fuse trips frequently, contact an authorized Volvo Penta workshop.

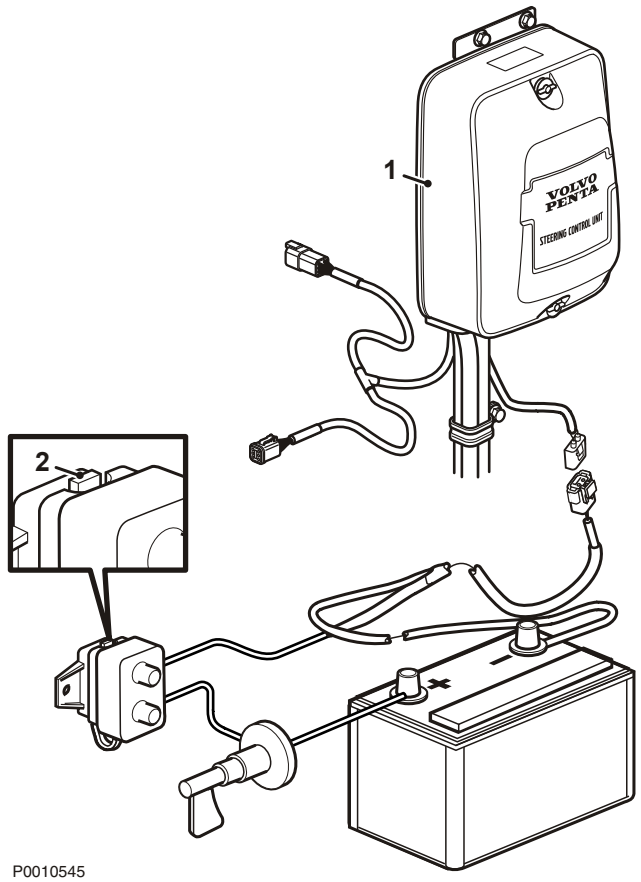


Power Trim

Engines fitted with a drive have an automatic circuit breaker for the Power Trim engine.
The circuit breaker cuts the power if the Power Trim system is overloaded. Reset by pressing in the circuit breaker.

IMPORTANT!

Always investigate the cause of the overload. If the fuse trips frequently, contact an authorized Volvo Penta workshop.



Electronic Steering System

Engines fitted with a drive wtih electronic steering are equipped with an automatic circuit breaker for the SCU (**1**). The circuit breaker is located near the battery or the engine's main battery switch.

The circuit breaker cuts the power if the electrical system for the SCU is overloaded. Reset by pressing in the circuit breaker (**2**).

IMPORTANT!

Always investigate the cause of the overload. If the fuse trips frequently, contact an authorized Volvo Penta workshop.

Electrical Connections

P0002479

Check that electrical connections are dry, free from oxide, and that they are securely tightened. Spray the connections as necessary with water-repellent spray (Volvo Penta universal oil).

Battery, Maintenance

P0002107

⚠ WARNING!

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

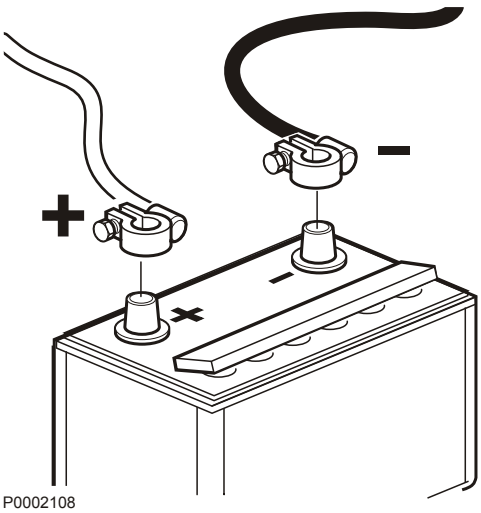
⚠ WARNING!

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 whas 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.



P0002108

Connecting and disconnecting the battery

Connecting

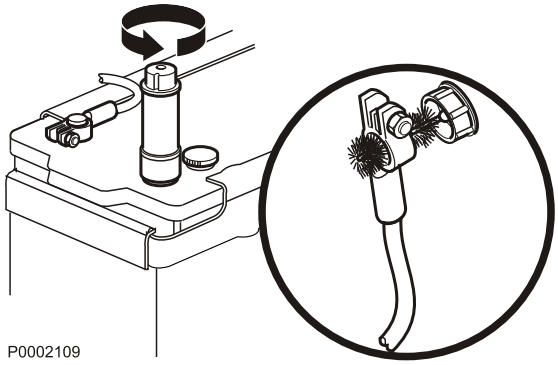
1 Connect the + cable (red) to the + pole on the battery.

2 Connect the – cable (black) to the – pole on the battery.

Disconnecting

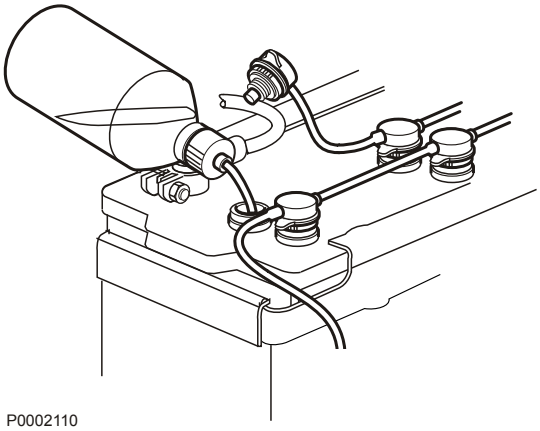
1 Remove the – cable (black).

2 Remove the + cable (red).


P0002109

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.


P0002110

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.


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.

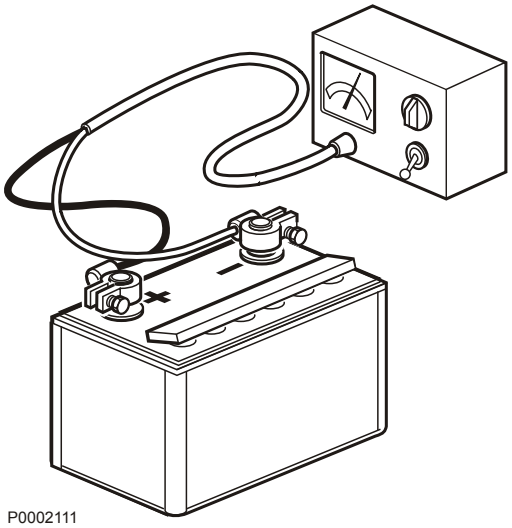
Always use protective goggles and gloves. If battery electrolyte comes into contact with unprotected skin whas off immediately using plenty of water and soap. If battery acid comes in contact with the eyes, flush immediately with plenty of water and obtain medical assistance without delay.

⚠ 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.



P0002111

- 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 (please refer to the battery manufacturer's recommendations). Batteries are damaged by being left discharged, and can also freeze and burst easier in cold weather.
- Special instructions apply to **boost charging**. Boost charging can shorten battery life, and should therefore be avoided.

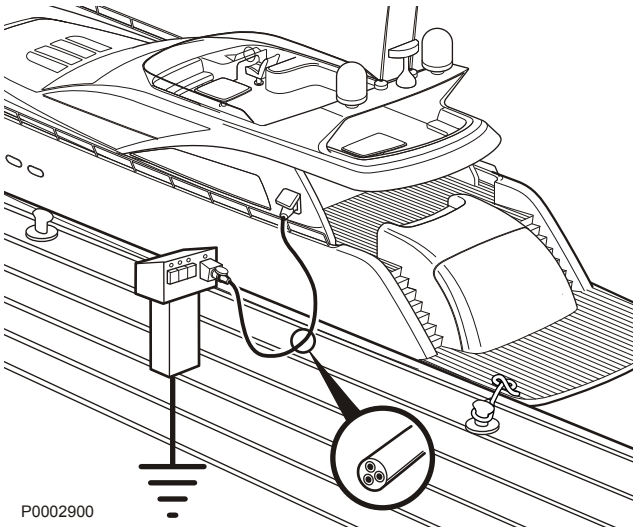
Electrical Installations

An incorrectly designed electrical installation may generate leakage current from the electrical system. Leakage current can in turn render galvanic protection inadequate in respect of propellers, propeller shafts, rudder posts, the keel etc., and may cause damage through electrochemical corrosion.

⚠ WARNING!

Work on the low voltage circuits in the boats should be done by a person with electrical training or knowledge. Installation or work on land current equipment must only be done by a competent electrician, in accordance with local regulations for mains electricity.

The following must always be heeded:



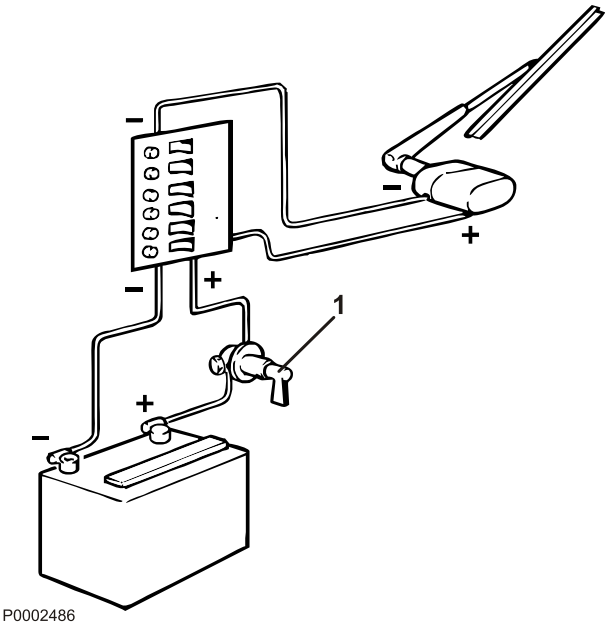
P0002900

1 If shore power is connected it must always be ground protected ashore, never in the boat. Furthermore, the shore power installation should be equipped with a ground fault circuit interrupter. The shore power installation (transformer, inverter, battery charger etc.) must be designed for marine use **where the high-tension side is galvanically separated from the low-tension side.**

2 Electrical cables must be run and clamped such that there is no risk of exposure to chafing, damp or bilge water.

3 Ground protection for radios, navigation instruments, rudder, boarding ladders or other equipment where separate cables for ground protection are present, must be clustered to a common ground connection that is not connected to the engine or reverser gear.

IMPORTANT!
The engine and reverse gear must never be used as earth planes.



P0002486

4 The start battery must have a main switch (**1**) connected to the battery's positive (**+**) side. The main switch must break the circuit to all equipment and be switched off when the boat is not in use.

5 If an auxiliary battery is used, a main switch must be placed between the auxiliary battery's positive (**+**) terminal and the circuit breaker panel for the boat's electrical equipment. The main switch must break the circuit to all equipment connected to the auxiliary battery and must be switched off when power is no longer required. All equipment connected to the auxiliary battery must have separate main switches.

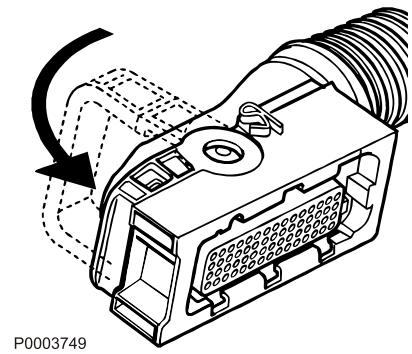
For simultaneous charging of two independent battery circuits a separate charging distributor (accessory) should be installed on the standard alternator.

Electrical Welding

Remove the positive and negative cables from the batteries, then disconnect all cables connected to the alternator.

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.

Also remove the connector for the EVC system from the control unit. Press the locking arm down and pull out the connector.



P0003749

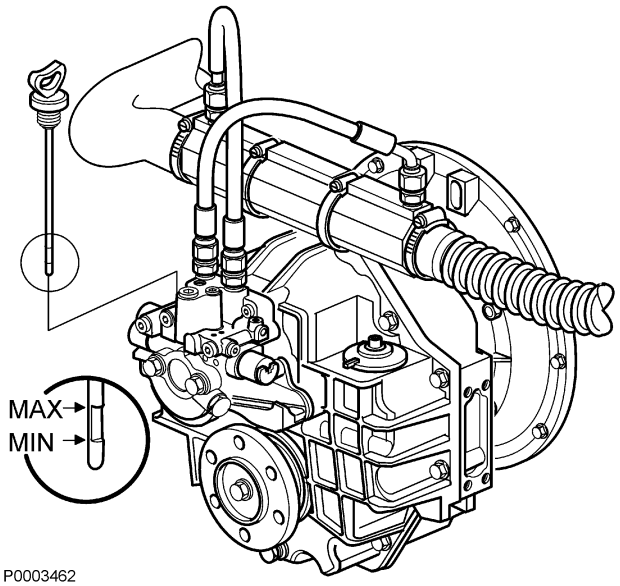
IMPORTANT!

After finished welding, re-connect the EVC connector and the alternator terminals before connecting the battery cables.

Reverse Gear

The reverse gear is hydraulic, which means that shifting between ahead/astern and neutral is performed hydraulically. The reverse gear lubrication system is equipped with an oil filter and oil cooler. The reverse gear uses solenoid valves for electronically controlled shifting.
Volvo Penta recommends that a seawater filter be fitted to guarantee the correct cooling water flow to the engine and reverse gear. Otherwise there is a risk of contaminants in the seawater blocking the reverse gear cooler and other cooling system components.

Oil level, checking and topping up



1 Start the engine and let it run on idle a few minutes.

2 Remove the dipstick by turning counter-clockwise.

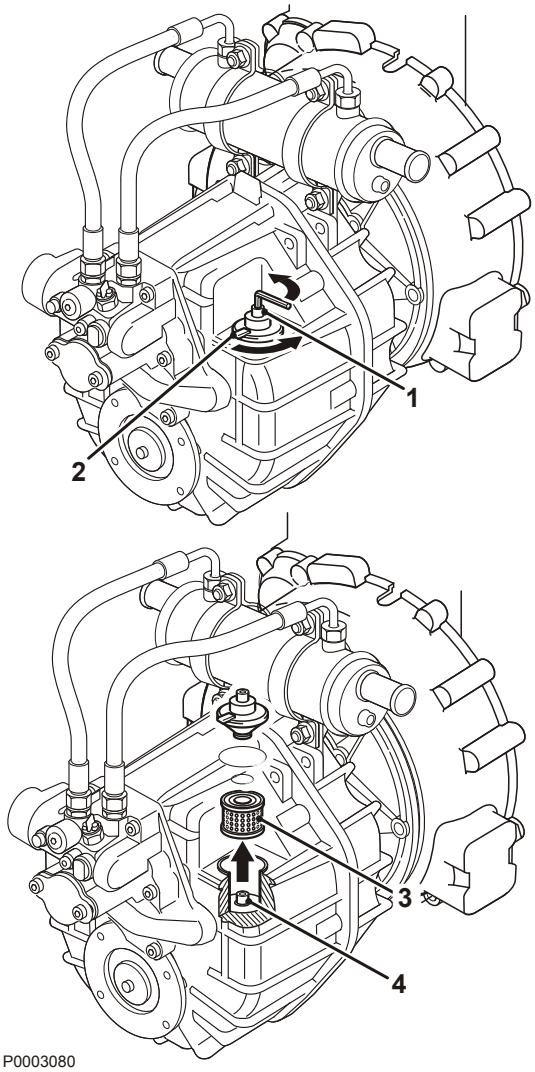
3 Wipe the dipstick and reinsert it in the reverse gear without screwing it in. Remove the dipstick and check the oil level. The correct oil level is between the MAX and MIN markings.

4 Top up the oil as required using the dip stick tube. Please refer to section *Technical Data page 128* for oil quality and capacity.

IMPORTANT!

Never over-fill the reverse gear. The oil level must always be within the recommended range.

Reverse Gear, Oil och Filter Change



P0003080

1 Clean around the cap (2) so that there is no risk of dirt falling into the filter housing.

2 Undo the Allen bolt (1) with a 6mm Allen key. Remove the cover (2). Change the O-rings in the cap; lubricate the new ones.

3 Remove the filter (3).

4 Use an oil drain pump to pump out the oil from the oil filter housing. Connect the hose to the suction tube (4) in the bottom of the housing. Suction hose maximum external diameter is 16 mm.

5 Measure out the correct quantity of oil and fill the reverse gear via the oil filter housing. Refer to the *Technical Data page 128* section for oil grade and quantity.
IMPORTANT!
Never over-fill the reverse gear. The oil level must always be within the recommended range.

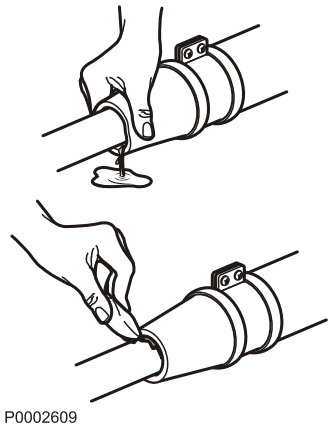
6 Install the new filter (3) in the filter housing.

7 Install the cover. Tightening torque: 5-8 Nm

8 Put the control lever in neutral. Start the engine and run it at 1500 rpm for a few minutes so that the reverse gear oil cooler fills with oil.

9 Stop the engine and check the oil level. Top up as needed

Propeller Shaft Sealing, Check


P0002609

If the boat is fitted with a Volvo Penta propeller shaft, the propeller shaft seals must be lubricated before launch and purged directly after launching.
Purge the glands by pressing them together, at the same time as they are pressed down onto the shaft. The press approximately 1 cm³ of water resistant grease into the seal.

Drive

The drive is protected against galvanic corrosion by several layers of paint, sacrificial anodes and ground braids. The ground braids maintain a connection between the different components of the drive. A broken connection can result in the rapid corrosion of an individual component even though the protection is otherwise effective. Check ground braids every year. Faulty electrical installation can also cause the break down of the galvanic protection. Damage due to electrolytic corrosion occurs rapidly and is often extensive. For further information see the chapter *Maintenance page 92*.

Always repair damage to paintwork immediately. Improperly applied paint or the wrong type of paint on the keel can put the corrosion protection system out of action. For further information on painting see section *Storage page 113*.

Oil level, checking and topping up

IMPORTANT!

Never over-fill the drive. The oil level must always be within the recommended range.

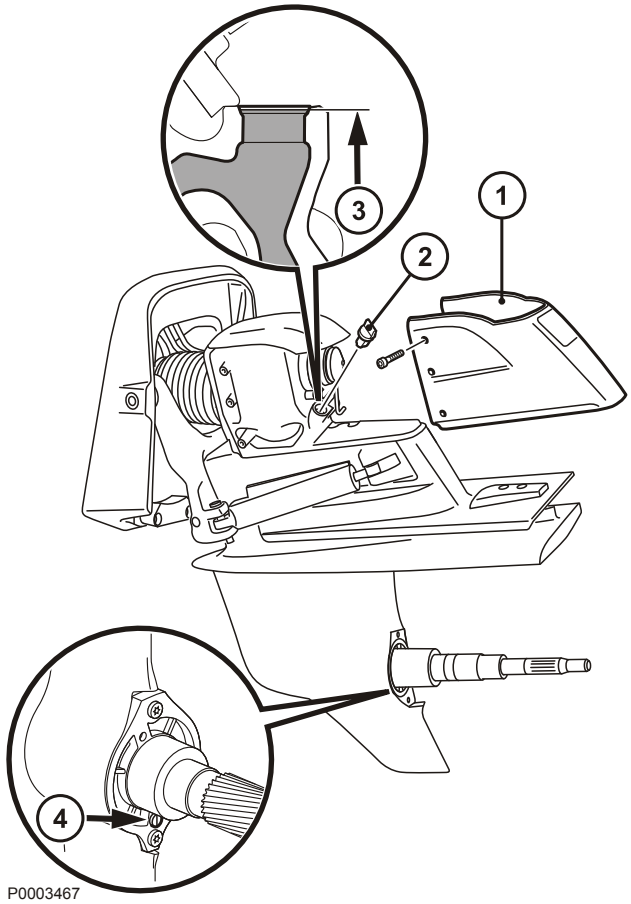
1 Trim up the drive to 35°. Remove the cover (1) and the plug (2).

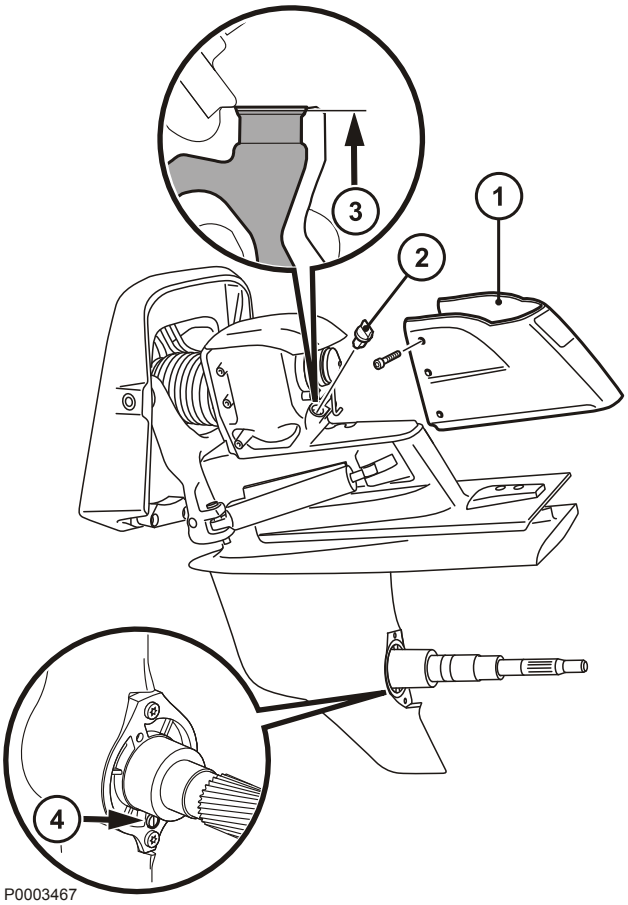
2 The oil level must always reach the oil filler cap (3) upper part.

3 If the oil level is low, fill oil through the oil filler cap upper part. For oil grade and quantity refer to the *Technical Data page 128* chapter.

4 Tighten the plug and installed cover.

The oil must have a golden brown nuance. If the oil is gray, water has entered the stern drive. In this case let a Volvo Penta workshop carry out checks on the stern drive.





P0003467

Transmission Oil, Change

1 Trim the drive to the vertical position. Remove the cover (**1**).

2 Remove the propeller.

3 Place a container under the drive. Remove the oil plug (**4**) and gasket from the stern drive housing. Allow the oil to begin to run out.

4 Carefully undo the plug (**2**). Then remove the plug completely. Allow all the oil to drain from the stern drive.

5 Reinstall the gasket. If the gasket is damaged it must be replaced with a new one. Screw the plug back (**4**).

6 Reinstall the propeller.

7 Trim up the drive to 35°.

8 Fill with oil. The oil level must always reach the oil filler cap (**3**) upper part. For oil grade and quantity refer to *Technical Data page 128*.

9 Lower the stern drive and raise it again to 35° to eliminate any air pockets.

10 Remove the oil filler cap and check the oil level. Fill with oil if the oil filler cap is not completely full.

11 Check that the plug is tightened. Fit the cover.

12 Hand the waste oil to a recycling depot.

The oil must have a golden brown nuance. If the oil is gray, water has entered the stern drive. In this case let a Volvo Penta workshop carry out checks on the stern drive.

Checking oil level, power trim

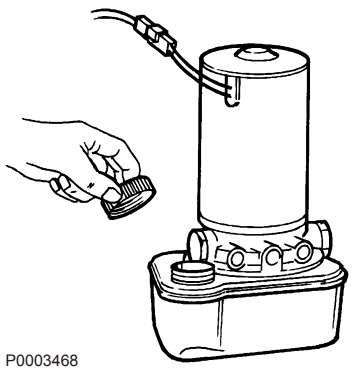
The Power Trim system is a closed center hydraulic system. Regular checks of the oil level are not necessary, but if functionality deteriorates check the fluid level in the Power Trim system.

1 Trim the stern drive in and out a little.

2 Check that the oil level is between the MAX and MIN marks on the oil reservoir.

3 Fill with ATF as necessary.

When emptying the system, refill with new oil and trim the stern drive in and out 6 to 10 times to expel air from the system. Check the oil level and top up if necessary.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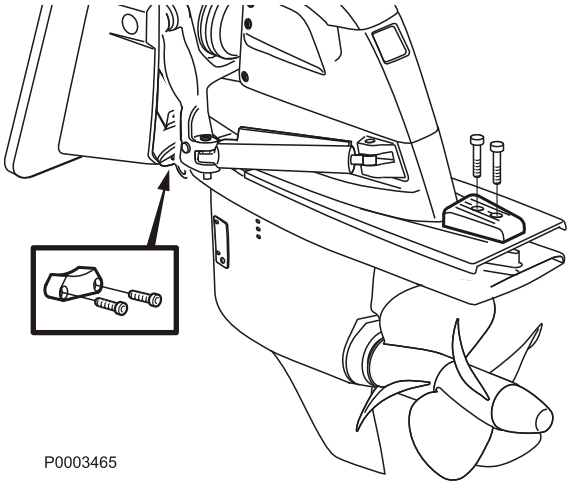

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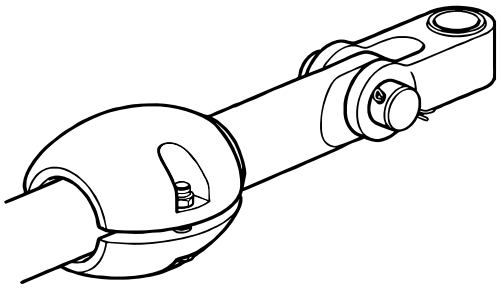


P0003466

Tie rod anode, twin installations (DPR)

Corrosion protection, checking and changing

Check the sacrificial anodes regularly. Replace with new anodes when approximately 1/3 of an anode has corroded away.
When the boat is stored ashore, corrosion protection deteriorates due to sacrificial anode oxidization. Even new anodes may have surface oxidation. Before launching the sacrificial anodes must be cleaned or polished with emery cloth.

IMPORTANT!

Use emery paper. Do not use a wire brush or other steel tools when cleaning, as these may damage the galvanic protection.

The stern drive is fitted with zinc anodes as standard, intended for use in salt water. If the stern drive is to be used principally in freshwater the sacrificial anodes must be magnesium.

Use sacrificial anodes thus:

- Zinc in salt water.
- Magnesium in freshwater.
- Aluminum when the boat is used primarily in salt water and sometimes in brackish water.

Replacing corrosion protection

1 Remove all the anode retaining screws.

2 Clean the contact surface.

3 Install the new sacrificial anodes and fasten them to ensure good metallic contact.

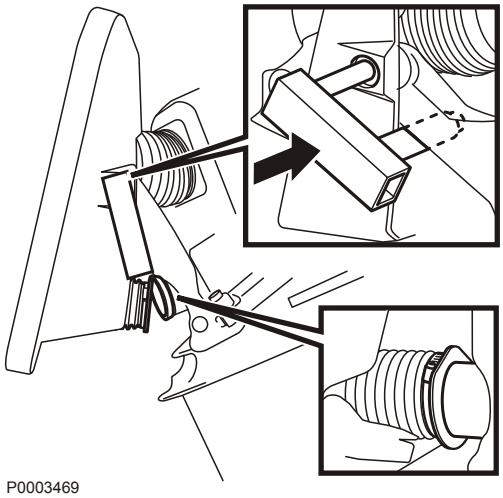
Drive Unit Bellows

Exhaust bellows, checks

⚠ WARNING!

Secure the drive unit in a raised position in such a way that it cannot fall when working on the drive bellows. A falling drive may cause serious injury.

Check the condition of the exhaust bellows annually. They must be replaced if there are signs of cracks or other defects. The stern drive can be prevented from falling by use of special tool 885800.



P0003469

1 Trim the drive out to maximum and install the special tool.

2 Inspect the bellows for damage. Replace bellows as necessary.

U-joint bellows

The U-joint bellows must be inspected annually. The bellows must be replaced if there are signs of cracks or other defects. In order to replace the U-joint bellows it is necessary to remove the stern drive from its support bracket. Removing the stern drive requires expertise and special tools. Contact your Volvo Penta workshop.

Propeller

For best performance and fuel economy, keep engine rpm within the maximum revolution range; refer to the *Engines* section. If maximum engine rpm exceeds the maximum recommended engine rpm the propeller must be replaced.
Damaged propellers must be replaced as soon as possible. If a boat must be driven with a damaged propeller, do so with extreme caution and only at reduced rpm.

⚠ WARNING!

Make sure the engine can not start during work on propeller(s); remove ignition key(s) and shift drive into forward or reverse.

Only G series propellers may be used with the DPH sterndrive.
Only GR series propellers may be used with the DPR sterndrive.

A tool for removing and reinstalling propellers is supplied with the transom shield kit.

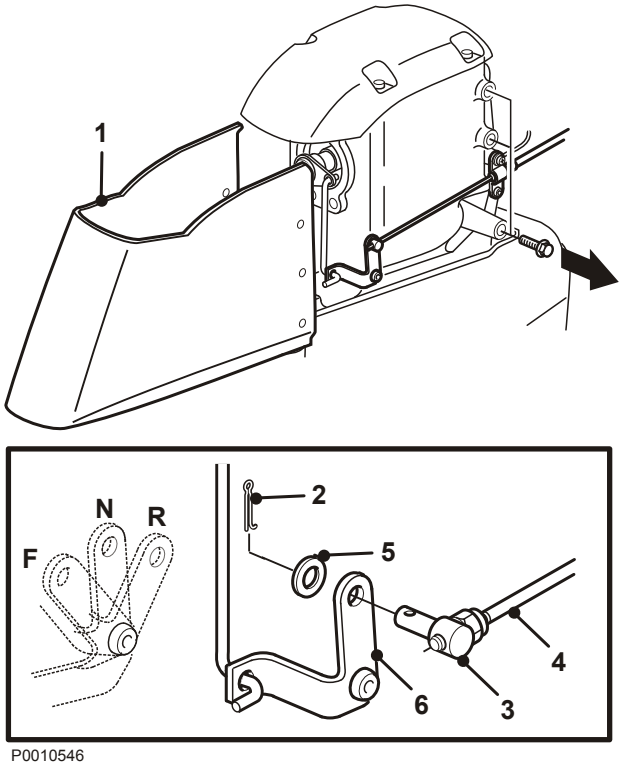
Removal

1 Lock the propeller shaft. This may be done in one of two ways:

a **Remove the gear shift cable from the sterndrive.**
Remove the six bolts and remove the cover (**1**) from the sterndrive.
Remove the cotter pin (**2**) from the wire swivel pin (**3**) to which the gear shift cable (**4**) is fastened.
Remove the swivel pin and washer (**5**) from the lever (**6**) without turning the pin.
Put the sterndrive into gear by hand by pulling the lever to either the forward position (**F**) or reverse position (**R**).
IMPORTANT!
Never use the EVC lever to put the sterndrive in gear.

b Select “NEUTRAL”. Place a block of wood between the cavitation plate and one of the propeller blades.

1a



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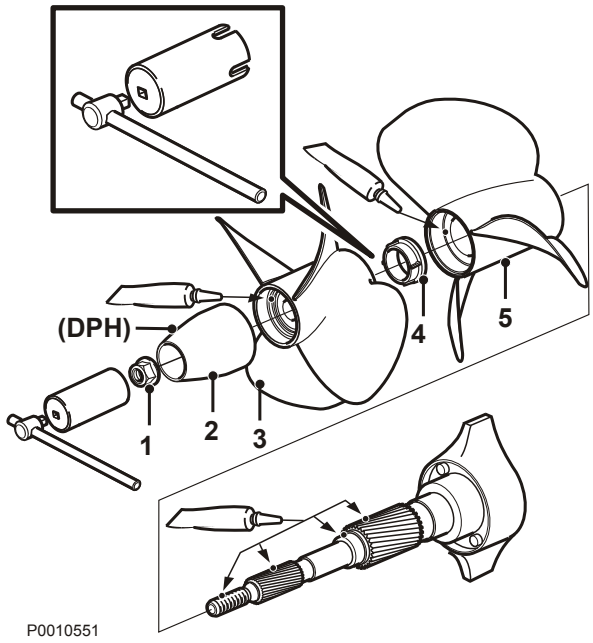


2 **DPH**
Unscrew the locknut (**1**) and remove the propeller cone (**2**) and the aft propeller (**3**).

DPR
Unscrew the locknut (**1**) and remove the aft propeller (**3**).

3 Unscrew the large locknut (**4**) with the aid of the special tool supplied. Remove the forward propeller (**5**).

4 Wipe dry and clean the propeller shaft.

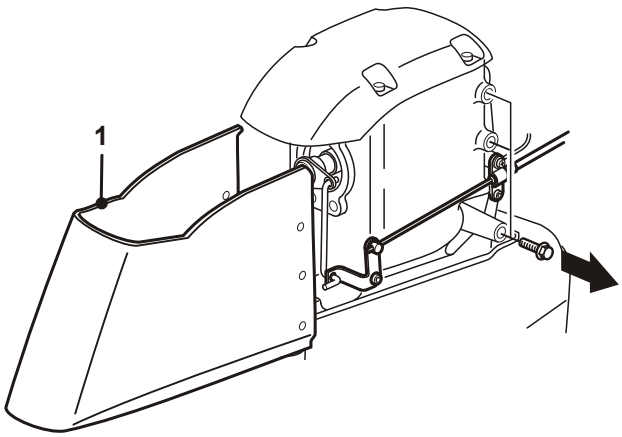
Installation

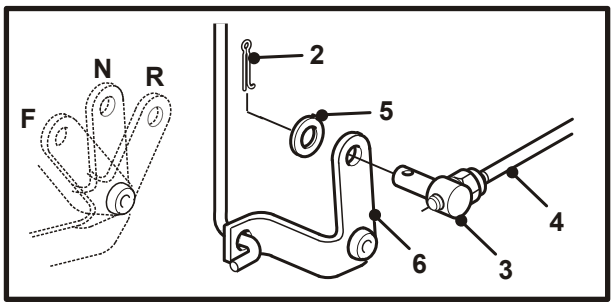
5 The propeller shaft must be locked according to items 1a or 1b once the forward propeller (**5**) is installed.
Brush Volvo Penta propeller shaft grease # 828250 onto the entire propeller shaft and the inside of the propeller hub.
Install the forward propeller (**5**) and nut (**4**). Tighten the nut using the special tool supplied to **200 Nm** (150 lbf.ft).

6 **DPH**
Install the forward propeller (**3**), propeller cone (**2**) and nut (**1**). Tighten the nut using a 30 mm (1.18”) socket to **100 Nm** (75 lbf.ft).

DPR
Install the aft propeller (**3**) and nut (**1**). Tighten the nut using a 30 mm (1.18”) socket to **100 Nm** (75–110 lbf.ft).

1a





P0010546

7 Remove the propeller shaft lock.

1a Put the sterndrive in “NEUTRAL” (**N**) by hand using the lever (**6**).
IMPORTANT!
Never use the EVC lever to put the sterndrive in “NEUTRAL”.

Attach the gear shift cable (**4**) swivel pin (**3**) and washer (**5**) to the lever with a **new**cotter pin (**2**). Bend out the cotter pin legs carefully.
Install the cover (**1**) on the sterndrive.

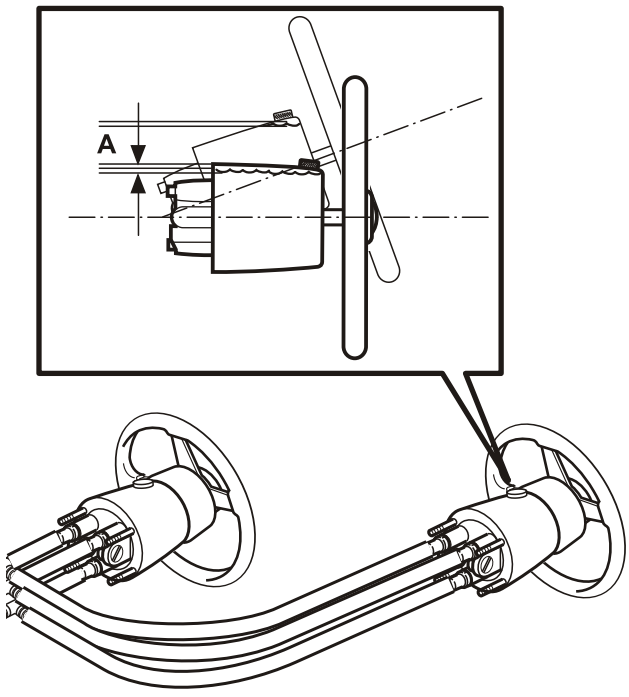
1b Remove the wood block from between the cavitation plate and the propeller blade.

8 The gear must be in “NEUTRAL” (**N**) before the engine is started.

Steering

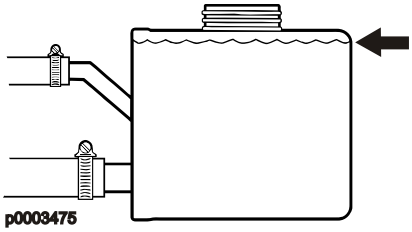
The stern drive is fitted with a hydraulic steering system with an auxiliary servo that functions even when the engine is not running.

Hydraulic steering, fluid level checks



P0003467

Check the fluid level every two weeks so that any changes are discovered. Check the helm pump level. The minimum level is **12 mm** (0.47") below the filler hole lower edge. If the boat has a flybridge the lower helm pump must not be opened; only check the level at the upper helm station.
The fluid level does not normally alter; annual consumption is negligible. If the level drops it is probably due to leakage or air in the system. The leakage must be traced and remedied immediately. Contact your Volvo Penta service center for repairs.
The steering system is filled with ATF oil. If the oil is red and does not contain visible contamination it does not need to be changed. If the oil is becoming black or contains visible contamination it must be changed. If the system has been dismantled for service it must be purged.



⚠ WARNING!

Use only by Volvo Penta recommended fluid and grade. Any non-appproved fluid may cause loss of steering or result in damage to the components used in the steering system.

Fluid level checks, servo pump

The steering servo tank has a transparent reservoir which makes checking the level possible without opening the cap. The fluid level must be just below the reservoir neck.
If fluid filling is required the snap connector must be removed before the cap is opened.

Hydraulic hoses

⚠ WARNING!

A leaking hydraulic hose can negatively affect steering, and at worst steering can be lost altogether.

Hydraulic hoses, checks

1 Check carefully that no wear or cracks are present on the steering system hydraulic hoses.

2 Check external hoses thoroughly as they are exposed. Damaged hoses must be replaced.

Parallel rod

Parallel rods, checks

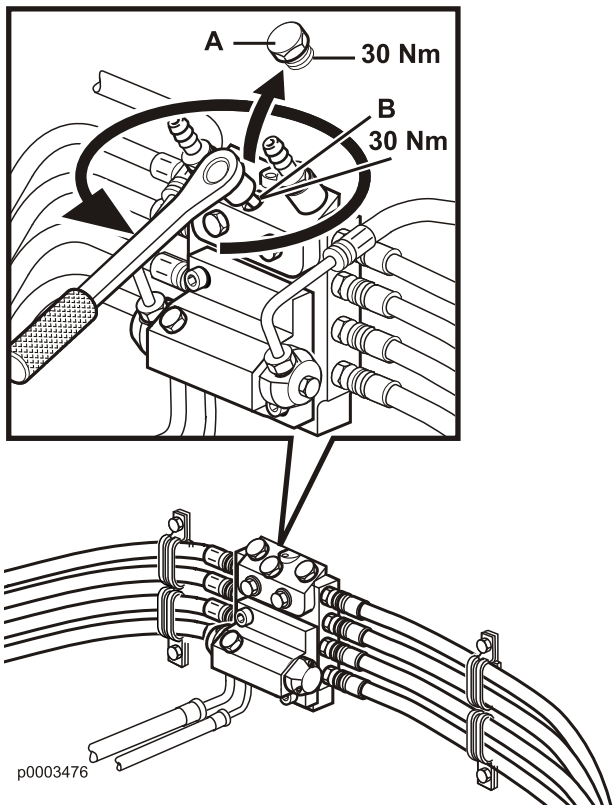
⚠ WARNING!

If the parallel strut (tie bar) shows signs of damage, run at reduced speed to harbor. The parallel strut is a vital safety component, damage may effect steering characteristics. In the worst case steering could be lost altogether. Never align or weld a damaged parallel strut. Please contact your nearest authorized Volvo Penta workshop for assistance.

Check the parallel rods connecting the two stern drives together, especially after running aground or striking an underwater object.
If a parallel rod is bent, loose or damaged it must be checked by your Volvo Penta workshop.

Parallel rod (hydraulic), adjustment

The parallel rod can be adjusted when the boat is in the water or on land.



Boat in the water:

1 Remove the lock bolt (**A**). Loosen the adjuster bolt (**B**) 1-2 turns.

2 With the engines running, turn the helm hard to one side, until the helm pump reaches the stop position. Both stern drives are then fully turned to one side.

3 Tighten the adjuster bolt (**B**), tightening torque **30 Nm** (22 lbf.ft) securely. Install the lock bolt (**A**). This procedure ensures the stern drives are in parallel to one another (straight ahead).

Boat ashore:

1 Remove the lock bolt (**A**). Loosen the adjuster bolt (**B**) 1-2 turns.

2 Align the stern drives in the desired direction (straight ahead recommended)

3 Tighten the adjuster bolt (**B**), tightening torque **30 Nm** (22 lbf.ft) securely. Install the lock bolt (**A**).

Storage

Have an authorized Volvo Penta workshop carry out checks on the engine and other equipment before the boat is put into winter storage. Make sure all necessary repairs and service are completed so that the boat is in top condition before the next season.

Conservation is performed to ensure that the engine and drive train are not damaged by non-use during winter storage. It is important that conservation is carried out in the correct manner, and that nothing is forgotten. For this reason, we have compiled a check list of the most important points.

⚠ CAUTION!

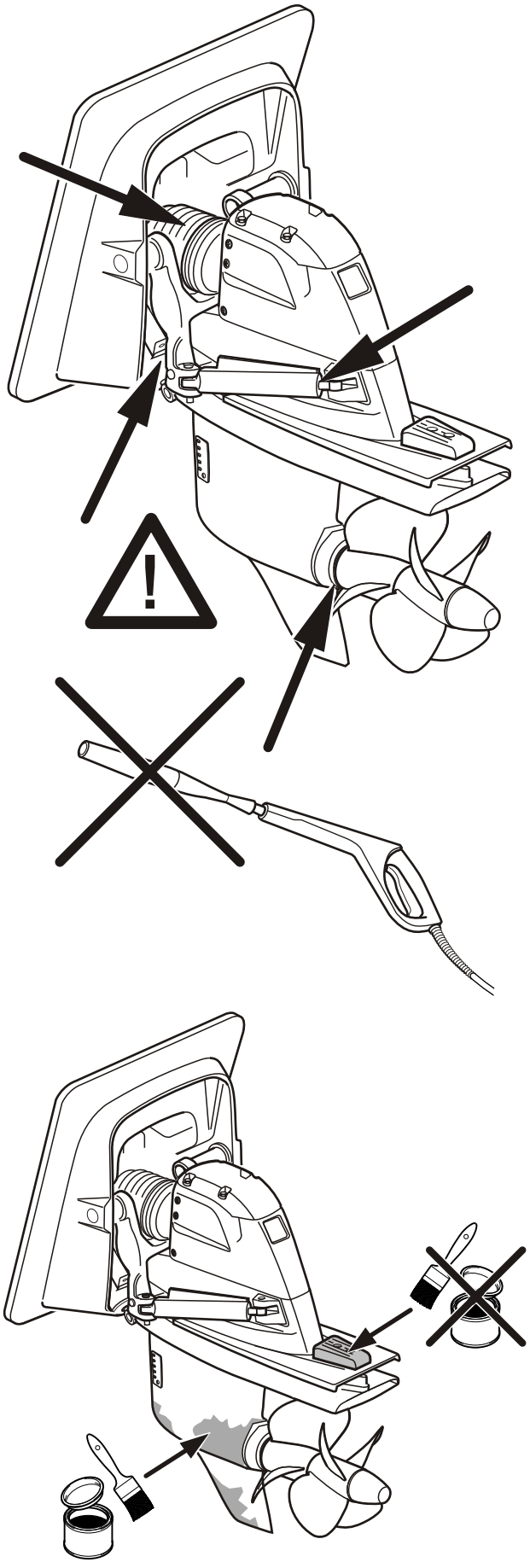
Read the chapter on Maintenance before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and correct manner.

The engine and other equipment must be inhibited to prevent damage if they are not to be used for two months or more. It is important that this is done in the correct manner, and that nothing is forgotten. For this reason, we have compiled a check list of the most important points.

Conservation

It is best to carry out the following while the boat is still in the water:

- Change engine oil and oil filters.
- Replace oil in the reverse gear.
- Change the fuel filter. Replace the fuel pre-filter if such is fitted.
- Run the engine until it reaches normal operating temperature.



P0003712

It is best to carry out the following when the boat is out of the water:

⚠ CAUTION!

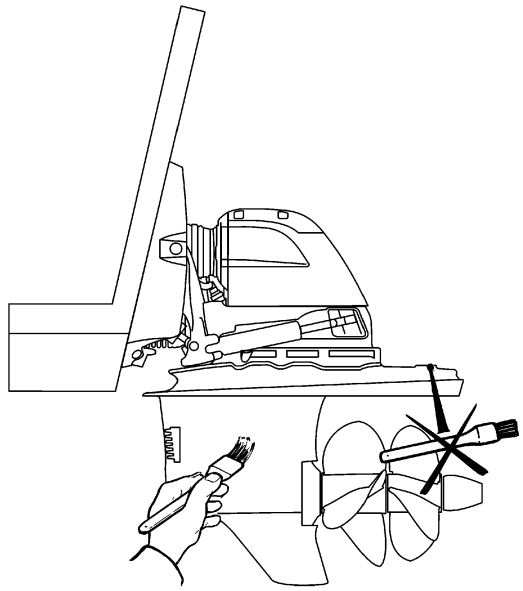
Is the boat equipped with Power Trim Assistant the function must be turned off before taking the boat out of the water.

This prevents automatic trimming of the drive/drives if any test runs are performed while the boat is on land.

- Clean the hull and stern drive immediately after the boat is taken out of the water (before they dry). Take care when cleaning with a high pressure jet. The water jet must not be directed at the exhaust and U-joint bellows, trim and steering cylinder seals, propeller shaft seals, hoses and suchlike.
- Change the oil in the drive.
- Cleaning the raw water filter.
- Cleaning and conserving the raw water system.
- Removing the impeller from the raw water pump. Store the impeller in a sealed plastic bag and keep cool.
- Check the glycol content of the engine coolant. Top up as necessary.
  IMPORTANT!
  The use of anti-corrosion agent alone in the engine cooling system does not protect against frost damage. If there is a risk of the engine being exposed to sub-freezing temperatures, the system must be drained.
- Empty the fuel tank of fuel, dirt and sludge. Fill the fuel tank completely, to avoid condensation.
- Clean the outside of the engine. Do not use a high pressure washer to clean the engine. Touch up any paint damage with Volvo Penta original paint.
- Check all control cables and treat with conservation agent.
- Make good an areas with paintwork damage with Volvo Penta original paint. Read the instructions about painting the stern drive in the section *"Painting the stern drive and boat bottom".*
- Disconnecting the batteries. Clean and charge the batteries. An insufficiently-charged battery can freeze and burst.
- Spraying the components of the electrical system with water-repellent spray.
- Removing the propeller for winter storage. Grease the propeller shaft with water resistant grease, VP part # 828250.

Bringing Out of Storage

- Check the oil level in the engine and stern drive/ reverse gear. Top up as necessary. If the system contains conservation oil this must be drained, and the system must then be filled with oil. For the correct oil grade, refer to *Technical Data, Lubrication System*. Replace oil filter.
- Drain any antifreeze from the raw water system.
- Install the impeller in the raw water pump. Replace the old one if it displays signs of wear; refer to the chapter *Impeller, Check and Change page 89*.
- Close and tighten drain taps and plugs.
- Check drive belt tensions and conditions.
- Check rubber hoses for condition and tighten hose clamps.
- Check the engine coolant and antifreeze. Top up as necessary.
- Connect the fully-charged batteries.
- Painting the sterndrive and hull bottom.
- Check the sacrificial anode on the stern drive. If less than 2/3 of the anode remain, it must be replaced. Clean with emery cloth shortly before launch.
  IMPORTANT!
  Use emery paper. Do not use a wire brush or other steel tools when cleaning, as these may damage the galvanic protection.
- Install the propellers
- Launch the boat. Check for leaks.
- Vent and grease the propeller shaft packing box (reverse gear).
- Start the engine. Check that there are no fuel, coolant or exhaust leaks and that all controls function.



P0003713

Painting the Drive and Underwater Hull

Drive

Varnish damages must be repaired before handling the drive with anti-fouling agents.
Most countries have introduced legislation controlling the use of anti-fouling agents. The paint with anti-fouling properties must be permitted to use in the waters where the boat is to be used. Check the legislation that applies where the boat is to be used. If paint with anti-fouling properties is not allowed we recommend that fine Teflon®* is applied onto the propulsion units coating varnish without previous sanding.

1 Sand down the metal surfaces lightly with sandpaper grain size 120. Use a more fine-grained paper on the painted surfaces.

2 Wash off with thinner or similar.

3 Glaze over and sand down possible pits.

4 Paint with Volvo Penta original primer and varnish. Let the paint dry.

5 Paint the drive with anti-fouling agent for aluminum drives according to the paint manufacturers instruction.

IMPORTANT!

The sacrificial anodes on the drive must not be painted or treated with Teflon. This also applies to stainless or bronze propellers.

*Teflon is a registered trademark from Du Pont Corp.

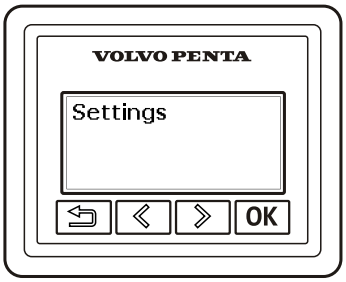
Underwater hull

All types of paints with anti-fouling properties are poisonous and cause damage to the marine environment. Avoid the use of such agents. Most countries have introduced legislation controlling the use of anti-fouling agents. Always abide by these regulations. In many cases it is completely forbidden to use them on pleasure boats.
For boats that are relatively easy to get out of the water we recommend only Teflon treatment combined with mechanical cleaning several times per season. For larger craft, this is not practicable. If the boat is in an area where the water quickly produces fouling, then anti-fouling paint must probably be used. In that case, use copper-based paint containing copper cyanide and not copper oxide.
Tin-based agents (TBT) must not be used. Check the legislation that applies where the boat is to be used. Wait for the paint to dry before launching the boat.

IMPORTANT!

Leave a 10 mm unpainted edge on the stern around the transom.

Calibration and Settings



P0012801

Settings

Settings Menu

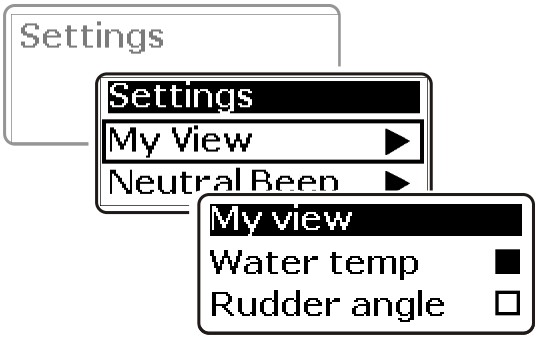
Settings and calibrations are managed in the Settings menu.

1 Navigate to the **Settings** menu.

2 Press [OK] to open the settings menu.

3 Navigate backwards and forwards in the settings menu by pressing [<] [>].

[⮌]
Return to the previous menu by pressing the button. Hold the button down for more than 3 seconds to get to the main menu.



P0012518

My View

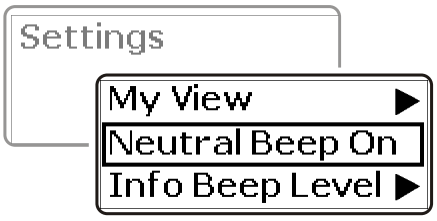
My View

In formation shown in the main menu can be adapted to suit personal preferences in **My View**.

1 Navigate from the settings menu to **My View**. Press [OK] to get to the submenu.

2 Navigate through the menu using [<] [>] to see available operating information.

3 Press [OK] to add or remove information for display in the main menu.



P0012519

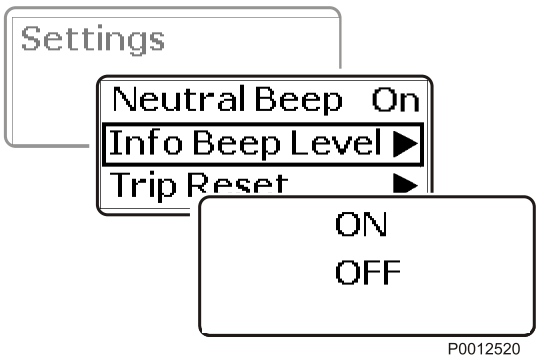
Neutral Beep

Neutral Beep

The neutral beep is an audible signal that sounds when the control is in the neutral position.
The setting must be entered at each helm station.

1 Navigate to **Neutral Beep** in the settings menu.

2 Press [OK] to switch the audible signal **On** or **Off**.



Information Beep

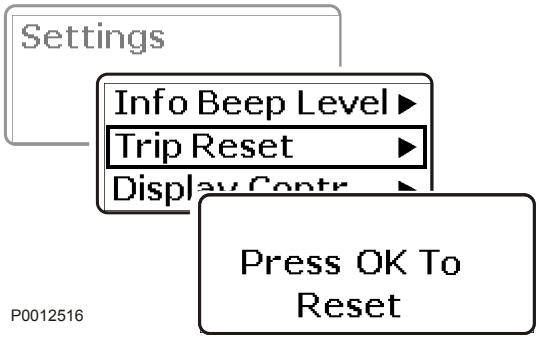
Information Beep

InfoBeep is an audible signal that sounds when there is a message from the system.

1 Navigate to **Information Beep** in the settings menu.

2 Press OK to switch the audible signal on or off. If there is a tachometer (accessory) installed, the volume can be adjusted with the aid of ≪ ≫. Press OK to confirm the selection. The setting is confirmed by an audible signal at the set level.

The screen will return automatically to the settings menu.

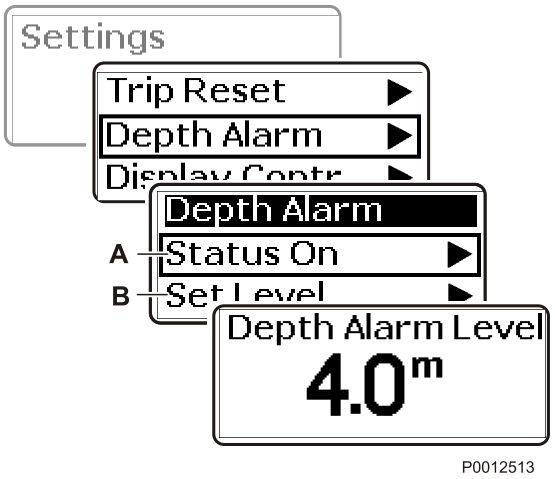


Trip Reset

Trip Reset

1 Navigate to **Trip Reset** in the settings menu.

2 Press OK twice to zero the trip information.



Depth Alarm Level

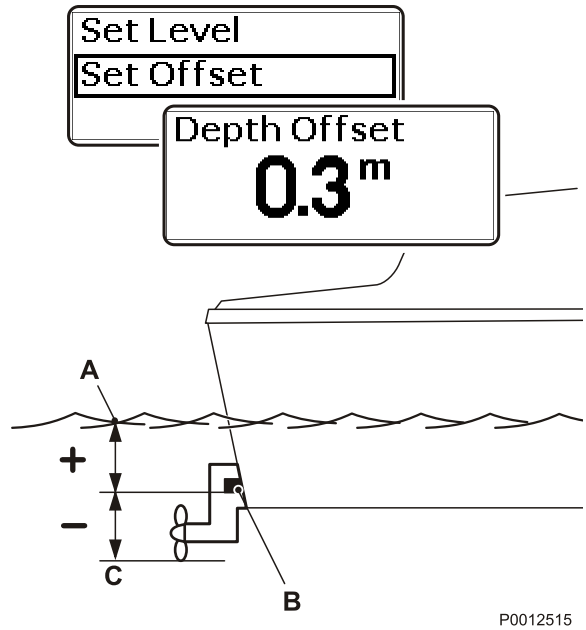
Depth Alarm

Setting the level for the depth alarm on Volvo Penta echo sounders.
The setting need only be made at one helm station.

1 Navigate to Depth Alarm in the settings menu. Press OK to proceed to the submenu.

2 Depth Alarm Off/On (A). Press OK to switch the alarm on or off.

3 Proceed to Set Level (B) and press OK. Use ≪ ≫ to set the limit where the alarm must begin sounding. Press OK to confirm the setting. The depth alarm is dependent on depth compensation; refer to the next section.



Set Offset

A Waterline

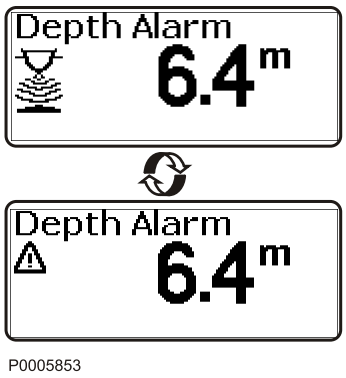
B Echo-sounder

C Lowest point

Set Offset

1 Go from the settings menu to Set Offset and press OK to reach the setting.

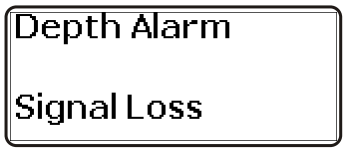
2 Use ◁ ▷ to set the depth compensation value so that it corresponds to the boat's lowest point or the waterline. The echo-sounder can be placed anywhere between these two points.
Set the echo-sounder/waterline or echo-sounder/lowest point distance to the depth to be displayed.
The distance between the echo-sounder (B) and the water line (A) has a positive (+) value.
The distance between the echo-sounder (B) and the boat's lowest point (C) has a negative (–) number.
Press OK to confirm the setting.



Depth Alarm

Depth Alarm

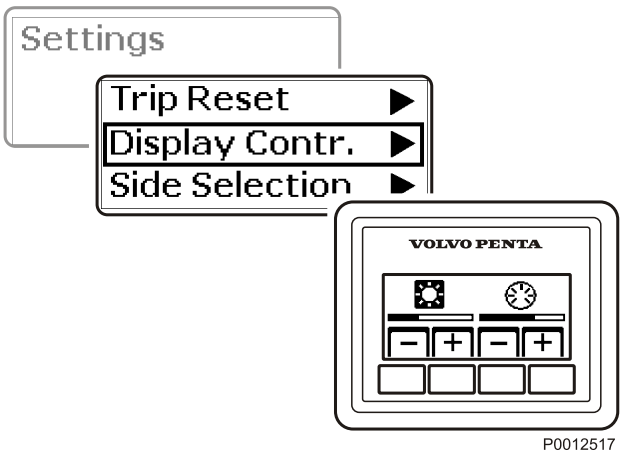
When the depth is less than the alarm setting a message will be shown on the display, followed by an audible signal.
The message will be displayed every 30 seconds until the depth exceeds the alarm level.
Confirm the alarm by pressing OK.



Depth Alarm / Signal Loss

Signal fault

If the signal from the depth alarm is lost, e.g. if the sensor is not working, a message is displayed stating that the signal has been lost.



Display Contrast

Display Contrast

Adjust the screen contrast.
The adjustment will affect all screens.

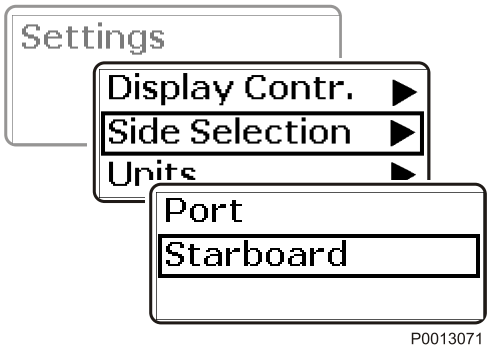
Backlighting

Contrast

1 Navigate to **Display Contrast** in the settings menu and press OK to open the submenu.

2 Use + and – to increase or reduce the contrast or backlighting.

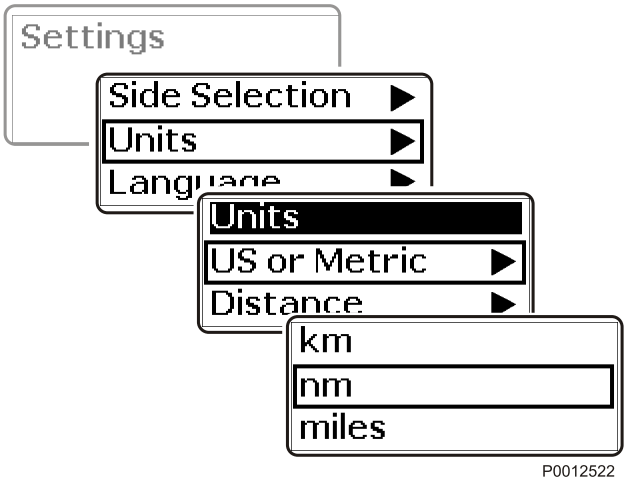
The screen will return automatically to the settings menu.



Side Selection

Side Selection

Set from which engine information is to be show in display.



Units

Units

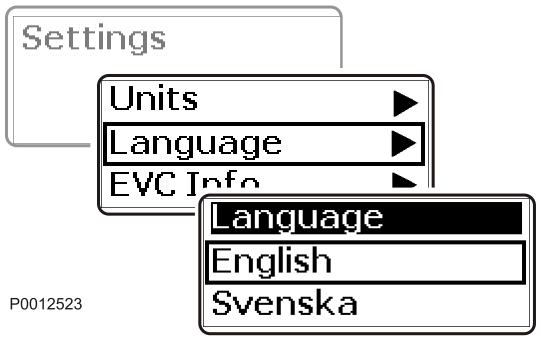
Setting the units information will be shown in.

1 Navigate to **Units** in the settings menu. Press OK to open the settings menu.

2 Open **US or Metric**, press OK and select American or metric units.

3 Navigate to **Distance**, press OK and then select kilometers, nautical miles or miles.

4 Press OK to confirm the selection.



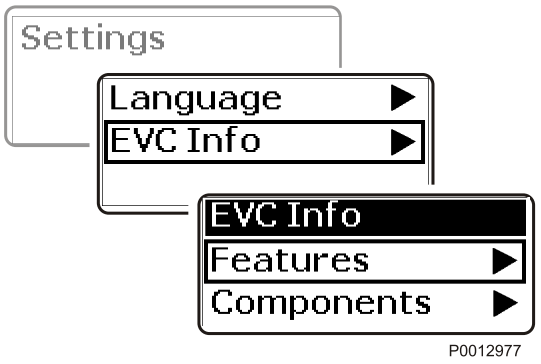
Language

Language

Setting the language the information of the screen will be shown in. There are 10 languages to choose from. On boats with several helm stations and several screens it is enough to select a language in one station for it to be displayed at all of them.

1 Navigate to **Language** in the settings menu. Press OK to open the language menu.

2 Navigate to the desired language and press OK to confirm the selection.
The screen will return automatically to the settings menu.



Components

EVC Info

Information regarding accessories, components and the type of software installed in the boat is displayed here.

1 Navigate to **EVC Info** in the settings menu and press OK to open the submenu.

2 **Features** shows the accessories that are installed. Press OK to open the submenu.

3 **Components** shows what hardware components are installed. Press OK to open the settings menu.

4 **Software** shows what software is installed. Press OK to open the submenu.

PTA Calibration

PTA (Power Trim Assistant) automatically adjusts the trim angle to boat speed. The system has a basic setting, but it is possible to set five different angles for five different speeds.

On boats with more than one station and with several displays it is enough to do the calibration on one display for it to be shown at all stations and on all displays. For installations with several engines the calibration needs to be made for each engine

1 Navigate from the settings menu to **PTA Calibration**. Press OK to get to the submenu.

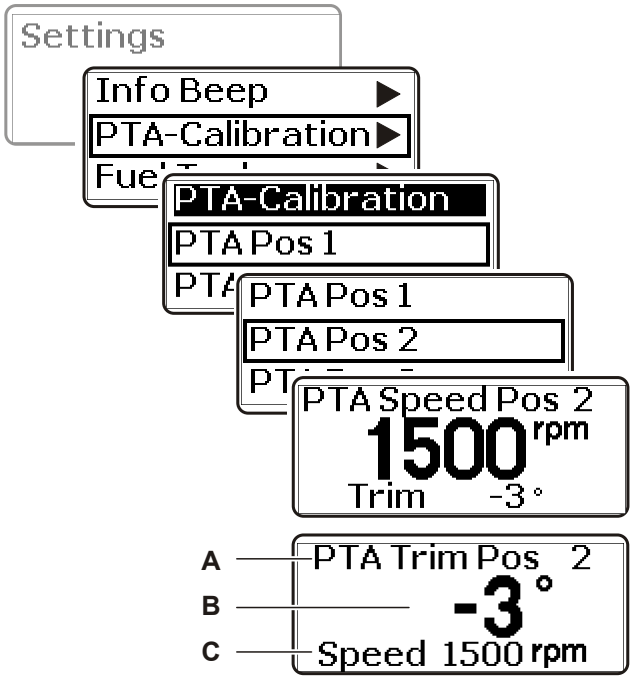
2 Use ⟨ ⟩ to set the trim angle for idle, PTA Pos 1.
Press OK to confirm the setting.

3 Proceed to **PTA Pos 2**.
Use ⟨ ⟩ to set the rpm.
Press OK to confirm the setting.

4 Use ⟨ ⟩ to set the trim angle.
Press OK to confirm the setting.

5 Repeat steps 4 to 5 for Pos 3, Pos 4 and Pos 5.

6 To return to basic settings, select **Defaults** and press OK to confirm return to basic settings.

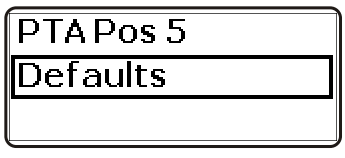


P0013204

A Trim position being set

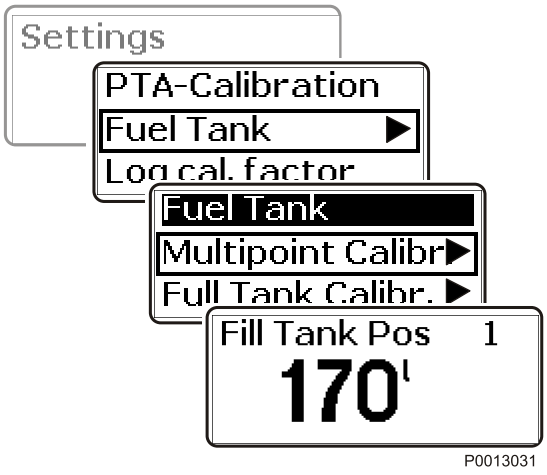
B Engine rpm

C Trim angle

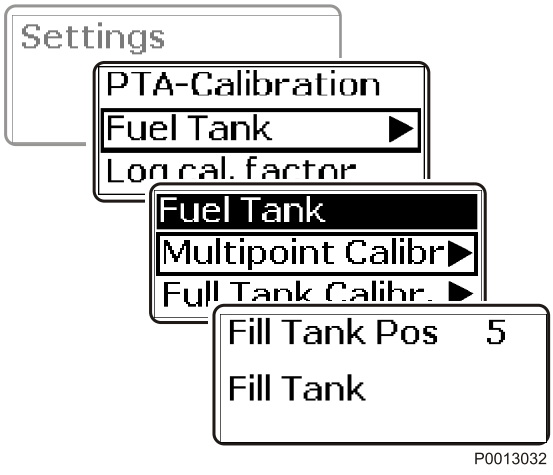


P0001232

Defaults



Fuel Multipoint Calibration



Full Fuel Tank Calibration

Fuel Tank

There are two alternative methods for calibrating the level sensor in the fuel tank.
Fuel Multipoint Calibration provides more precise results while Full Fuel Tank Calibration is an approximate method
Multipoint calibration is a prerequisite if the trip computer is to show fully accurate information.

Fuel Multipoint Calibration

In order for multipoint calibration to be carried out, the fuel tank may not be filled to more than 20% of its total capacity.

1 Turn to **Fuel Tank**in the settings menu and press OK to access the calibration menu.

2 Turn to **Multi Point Calibration** and press OK.

3 Calibration is carried out in 5 steps.
Fill the tank with the quantity shown in the display, POS).
Wait 10 seconds.
Press OK to confirm that the tank has been filled to the indicated level.

4 Fill the tank with the quantity shown in the display, POS 2.
Wait 10 seconds.
Press OK to confirm that the tank has been filled to the indicated level.

5 Repeat the procedure for POS 3 , POS 4 and POS 5. Confirm by pressing the wheel at each position. OK.

Full Fuel Tank Calibration

For this method the tank must be full and calibration of the fuel level sensor takes place in one step. This means that the fuel level value will be approximate, and therefore all trip data based on remaining fuel must be seen as approximate values.

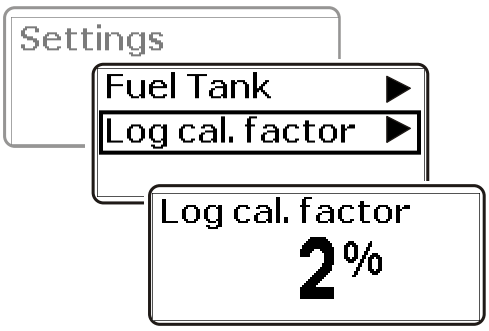
1 Turn to **Fuel Tank** and press OK to reach the submenu.

2 Select **Full Fuel Tank Calibration** and press OK.

3 Fill the fuel tank. Confirm that the fuel tank is full by pressing OK.

IMPORTANT!

Settings for Fuel Tank Volume, Empty Tank Calibration and Fuel Alarm Level should only be carried out by an authorized Volvo Penta workshop.



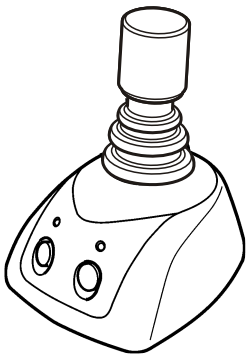
Speed Factor

Speed Factor

The speed factor must be set while the boat is under way. Compare the displayed boat speed value with GPS data (or another boat) and adjust the speed factor until the values agree.
The setting just needs to be done on one display for it to be shown at all stations and on all displays

1 Go from the settings menu to **Speed Factor** and press OK to reach adjustment.

2 Use ≪ ≫ to set the value
Press OK to confirm the setting.



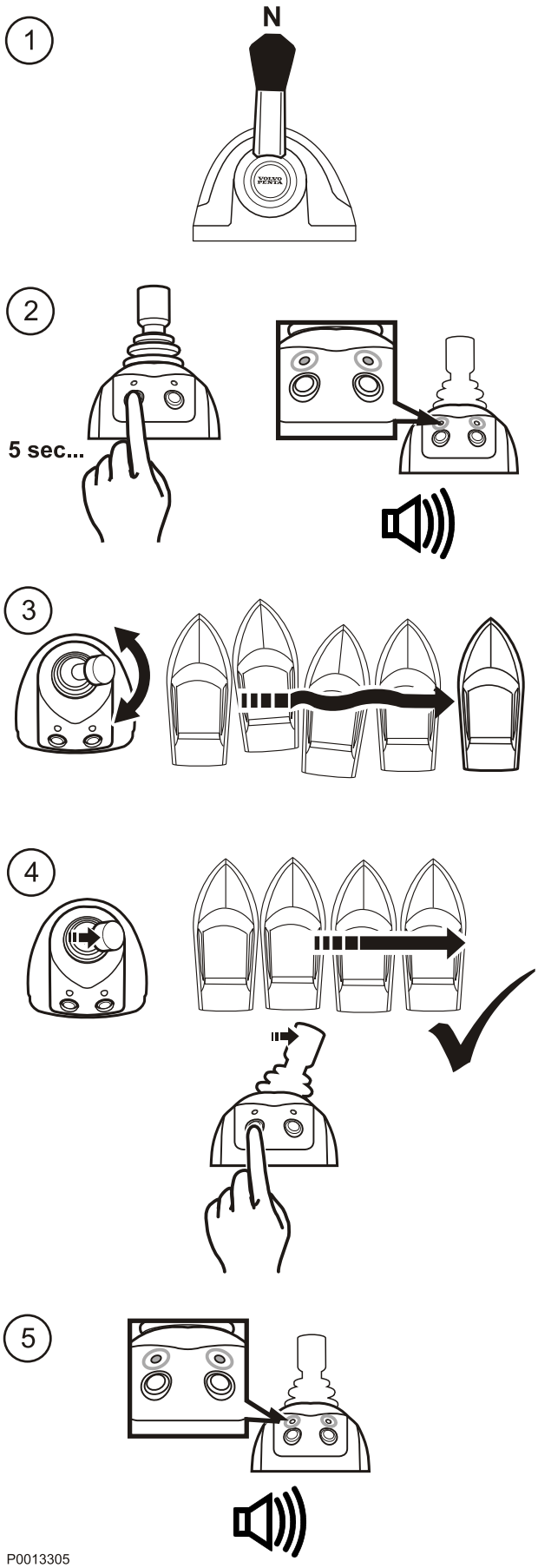
Joystick

Joystick calibration need only be carried out if boat movements do not correspond to joystick movements.

When calibrating the joystick the boat must be driven on open waters in safe conditions. Avoid calibrating in high winds or currents that can influence the result of the calibration.

Allow the boat to run for a fairly long distance during the calibration. Hold the joystick firmly in position.

Calibration can only be carried out at a helm station that is equipped with both a joystick and a control panel.
Calibration need only be done in one direction, port or starboard.



1 Turn the ignition on and move the control levers to neutral.

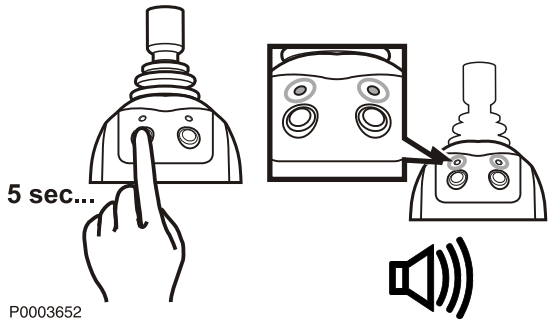
2 Start the engines.
Activate calibration mode by depressing the docking button for 5 seconds.
An audible signal confirms that docking mode is activated and both lamps on the joystick lights up.

3 Move the joystick sideways as far as it will go in one direction.
Correct boat movements by moving the joystick up and down, and by turning it.

4 When the boat is moving straight abeam, depress the docking button once again.

5 An audible signal will sound and both lamps on the joystick will flash to confirm that calibration is complete and stored. The system is now in docking mode.

When the joystick returns to the central position the lamps will stop flashing and will instead show continuously.



Resetting the calibration

1 Turn the ignition on and move the control levers to neutral.
Start the engines.

2 Activate calibration mode by depressing the docking button for 5 seconds.
An audible signal will confirm that docking mode is activated and the docking button lamp will light up.

3 Press the docking button. Calibration is now reset, which is confirmed by an audible signal.
The system is now in docking mode

Technical Data

Engine

Type designation	D4	D6
No. of cylinders	4	6
Displacement, dm³	3,7	5,5
Bore, mm	103	103
Stroke, mm	110	110
Compression ratio	17.5:1	17.5:1
Engine, dry weight, kg	483	580
Idling speed, rpm	700	600

Type designation	After market designation	Crankshaft power kW (hk)[2]	Propeller shaft kW (hk)[3]
D4-180I	D4-180I-E	132 (180)	128 (174)
D4-225I	D4-225I-E	165 (225)	160 (218)
D4-225A	D4-225A-E	165 (225)	158 (215)
D4-260I	D4-260I-E	191 (260)	186 (253)
D4-260A	D4-260A-E	191 (260)	184 (250)
D4-300I	D4-300I-E	221 (300)	212 (289) HS-63 214 (292) HS-80
D4-300A	D4-300A-E	221 (300)	214 (292)
D6-280I	D6-280I-E	206 (280)	201 (274)
D6-280A	D6-280A-E	206 (280)	198 (269)
D6-310I	D6-310I-E	228 (310)	223 (303)
D6-310A	D6-310A-E	228 (310)	219 (298)
D6-330I	D6-330I-E	243 (330)	237 (323)
D6-330 A	D6-330A-E	243 (330)	233 (317)
D6-370I	D6-370I-E	272 (370)	267 (363)
D6-370A	D6-370-E	272 (370)	261 (355)
D6-400A	D6-400-E	294 (400)	281 (382)
D6-435I	D6-435I-E	320 (435)	310 (422)

2. According to ISO 8665

3. According to ISO 8665

Lubrication System

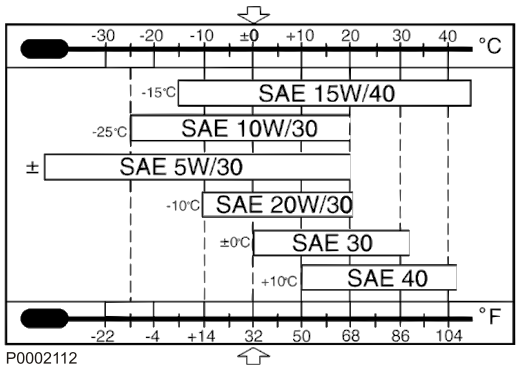
Engine:	D4	D6
Oil volume, (incl. oil filter)		
for all allowed installation inclinations	12 liters (3.2 US gals)	20 liters (5.3 US gals)
volume difference MIN – MAX	1.2 liters (0.3 US gals)	3.5 liters (0.9 US gals)
Oil pressure, hot engine,		
idling	125 kPa (18.1 PSI)	125 kPa (18.1 PSI)
at full speed	450 kPa (65.3 PSI)	450 kPa (65.3 PSI)
Oil, viscosity:	SAE 15W/40 (See table)	SAE 15W/40 (See table)

Oil grade [1]	**Sulphur content in fuel, by weight**	
	< 0.5 – 1.0%	**more than 1.0%** [2]
	Oil change interval: Reached first in operation:	
All engines: VDS-3 VDS-2 **and** ACEA E7 [3), 4)] or VDS-2 **and** Global DHD-1 [3)] or VDS-2 **and** API CH-4 [3)] or VDS-2 **and** API CI-4 [3)]	**200** hr. or 12 months	**100** hr. 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) Lowest recommended oil grade. Engine oil with higher oil grade is always possible to use.
2) If sulphur content is > 1.0% by weight, use oil with TBN > 15.
3) When oil quality specifications are joined by ”and” the engine oil must fulfill **both** requirements.
4) ACEA E7 has replaced ACEA E5, but if available ACEA E5 can be used.
5) ACEA E3 can be replaced by ACEA E4, E5 or E7.
6) API CG-4 can be replaced by API CI-4.

VDS = Volvo Drain Specification
ACEA = Association des Constructeurs Européens d'Automobiles
Global DHD = Global Diesel Heavy Duty
API = American Petroleum Institute
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.

Compressor, oil

	D4	D6
Oil volume	0.1 liters (0.2 US pint)	0.1 liters (0.2 US pint)
Oil grade	Volvo Penta, part no. 1141641	Volvo Penta, part no. 1141641

Fuel System

Fuel specification
The fuel must comply with national and international standards for commercially supplied fuels, such as:
EN 590 (with national environment and cold requirements)
ASTM D 975 No 1-D and 2-D
JIS KK 2204
Sulfur content: Complying with legal requirements in each country.

Low density fuel (urban diesel in Sweden and city diesel in Finland) can cause a loss of up to 5% of power and an increase in fuel consumption of about 2–3%.

Cooling System

Volume	
Fresh water system volume (ca)	D4: 13 litre (3.4 US gal) D6: 16.5 litre (4.4 US gal)
Thermostat	
The thermostats begins opening/fully open	82°C / 92°C (179.6°F / 197.6°F)

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_2/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_{Mn} (acc. ISO8467)	<15 mg $KMnO_4$/l

Electrical System

System voltage	12V	24V
Alternator, rated power, max		
voltage/max. amperage	14V/150A	28V/80A
output, approx.	2100W	2240W
Battery capacity	2 connected parallelly 12V, max. 88Ah	2 connected in series 12V, max. 88Ah
Battery electrolyte density at +25°C (77°F):		
fully charged battery	1.28 g/cm^3 = 0.0462 lb/in^3 (1.24 g/cm^3 = 0.0448 lb/in^3)*	1.28 g/cm^3 = 0.0462 lb/in^3 (1.24 g/cm^3 = 0.0448 lb/in^3)*
battery recharged at	1.24 g/cm^3 = 0.0448 lb/in^3 (1.20 g/cm^3 = 0.0434 lb/in^3)*	1.24 g/cm^3 = 0.0448 lb/in^3 (1.20 g/cm^3 = 0.0434 lb/in^3)*

NOTICE! * Applies to batteries with tropical acid.

Reverse gear (excluding oil cooler)

Type designation	HS45AE
Oil capacity	2.5 litre (0.7 US gal)
Oil quality	ATF (Dexron II, III)

Type designation	HS63AE
Oil capacity	4.0 litre (1.0 US gal)
Oil quality	ATF (Dexron II, III)

Type designation	HS63IVE
Oil capacity	4.0 litre (1.0 US gal)
Oil quality	ATF (Dexron II, III)

Type designation	HS80/85AE
Oil capacity	5.0 litre/ 5.5 litre (1.3 US gal/1.5 US gal)
Oil quality	ATF (Dexron II, III)

Type designation	HS80/85IVE
Oil capacity	7.0 litre (1.8 US gal)
Oil quality	ATF (Dexron II, III)

Sterndrive

Drive Type	DPH-B	DPH-C	DPR
Oil capacity	5.2 litre (1.37 US gal)	5.2 litre (1.37 US gal)	4.2 litre (1.11 US gal)
Oil volume difference MIN - MAX	0.2 litre (0.4 US gal)	0.2 litre (0.4 US gal)	0.2 litre (0.4 US gal)
Oil quality	VP 1141634 API GL5 synthetic		
Viscosity	SAE 75W/90	SAE 75W/90	SAE 75W/90
Viscosity D6-400	—	SAE 75W/140	—

Power Trim

Oil quality	ATF (Dexron II, III)

Steering

Oil quality	ATF (Dexron II, III)

Identification Numbers

There are type plates on the engine and transmission, marked with identification numbers. This information must always be used as reference when service and spare parts are ordered. You will probably find similar plates on your boat and its equipment. Note this information below, make a copy of the page and store it in a safe place, so that you can have the information available if the boat is stolen.

The appearance and location of the type plates is shown below. The figures in brackets refer to the location of the identification number on the type plate.

Engine

Product designation (**1**): .....
Serial number (**2**): .....
Product number (**3**): .....

Transmission

Product designation (**4**): .....
Gear ratio (**5**): .....
Serial number (**6**): .....
Product number (**7**): .....

Shield (drive)

Product designation (**8**): .....
Serial number (**9**): .....
Product number (**10**): .....

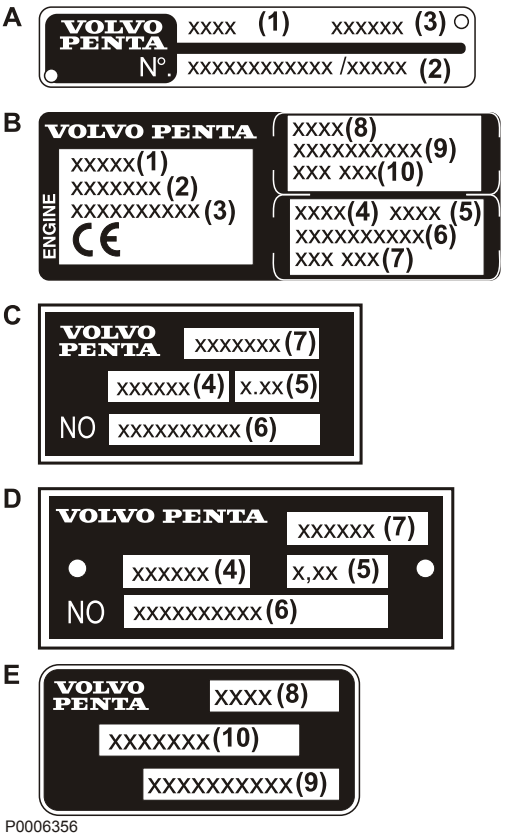
A Engine Plate

B Engine and transmission decal

C Reverse gear Plate

D Drive Plate

E Shield Plate



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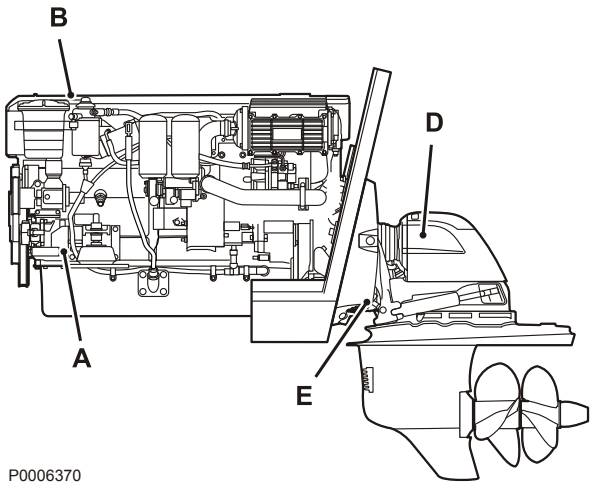

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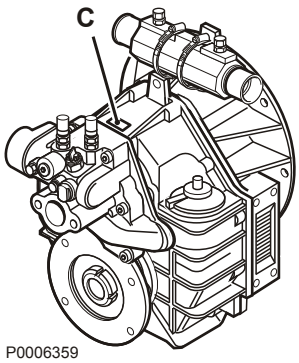

P0006359

Reverse gear

VOLVO PENTA

Declaration of Conformity for Recreational Craft Propulsion Engines with the exhaust emission requirements of Directive 94/25/EC as amended by 2003/44/EC

D4, D6

Engine manufacturer:

AB Volvo Penta
Gropegårdsgatan
405 08 Göteborg
Sweden

Body for exhaust emission assessment

International Marine Certification Institute
Rue Abbé Cuypres 3
B-1040 Bruxells
Belgium
ID Number:0609

Module used for exhaust emission assessment .....B+C

Other Community Directives applied .....EMC 2004/108/EC

Description of engine(s) and essential requirements

Engine type.....4 stroke diesel engine with stern drive with integral exhaust

Engine model(s) covered by this declaration	**EC Type certificate number**
D4-180	EXVOLV001
D4-210	EXVOLV001
D4-225	EXVOLV001
D4-260	EXVOLV001
D4-300	EXVOLV001
D6-280	EXVOLV001
D6-310	EXVOLV001
D6-330	EXVOLV001
D6-350	EXVOLV001
D6-370	EXVOLV001
D6-400	EXVOLV001
D6-435	EXVOLV001

Essential requirements	**Standards Used**	**Other normative document used**
Annex I.B – Exhaust Emissions		
Engine identification	Volvo Penta std	Annex I.B.1
Exhaust emission requirements	EN ISO 8178-1:1996	Annex I.B.2
Durability	Volvo Penta std	Annex I.B.3
Operator's manual	ISO 10240:2004	Annex I.B.4
EMC Directive	EN 61000-3-2, EN 61000-3-3, CISPR 25	

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the engine manufacturer that the engine(s) mentioned above complie(s) with all applicable essential requirements in the way specified and is in conformity with the type for which above mentioned EC type examination certificate(s) has been issued.

Name and function: Tom Tveitan, Laws and Regulations
(identification of the person empowered to sign on behalf of the engine manufacturer or his authorised representative)

Signature and title:
(or an equivalent marking)

Date and place of issue: (yr/month/day) 2011/04/29 Göteborg

PL-01/11

VOLVO PENTA

Declaration of Conformity for Recreational Craft Propulsion Engines with the sound emission requirements of Directive 94/25/EC as amended by 2003/44/EC

D4, D6

Engine manufacturer:

AB Volvo Penta
Gropegårdsgatan
405 08 Göteborg
Sweden

Body for sound emission assessment

International Marine Certification Institute
Rue Abbé Cuypres 3
B-1040 Bruxells
Belgium
ID Number:0609

Module used for sound emission assessment ..... Aa
Internal production control
Test according to Annex VI

Other Community Directives applied .....EMC 2004/108/EC

Description of engine(s) and essential requirements

Engine type.....4 stroke diesel engine with stern drive with integral exhaust

Engine model(s) covered by this declaration	**EC Type certificate number**
D4-210 drive DPH	SDVOLV002
D4-225 drive DPH	SDVOLV002
D4-260 drive DPH	SDVOLV002
D4-300 drive DPH	SDVOLV002
D6-280 drive DPH	SDVOLV003
D6-310 drive DPR/DPH	SDVOLV003
D6-330 drive DPR/DPH	SDVOLV003
D6-350 drive DPR/DPH	SDVOLV003
D6-370 drive DPR/DPH	SDVOLV003
D6-400 drive DPH	SDVOLV003

Essential requirements	**Standards Used**	**Other normative document used**
Annex I.C – Noise Emissions		
Sound emission levels	EN ISO 14509:2000/ prA1:2004	Annex I.C.1
Operator's manual	ISO 10240:2004	Annex I.C.2
EMC Directive	EN 61000-3-2, EN 61000-3-3, CISPR 25	

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Signature and title:
(or an equivalent marking)

Date and place of issue: (yr/month/day) 2011/04/29 Göteborg

PL-02/11

Operator's Manual Order

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

Please refer to the link below. On the web page, type in the publication number found in the bottom of this page (7–8 digits).

http://vppneuapps.volvo.com/manual/coupon/

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

All order information is stored internally at AB Volvo Penta and will not be shared with third parties.

Alphabetical index

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Z

VOLVO PENTA

AB Volvo Penta
SE-405 08 Göteborg, Sweden
www.volvopenta.com

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