

OWNER'S MANUAL

7.4GL/DP, 7.4GL/HS1

7.4Gi/DP, 7.4GSi/DPX

8.2GSi/DPX, 8.2GL/DPX, 8.2GL/HS1

Owner's Manual

Marine engines

7.4GL/DP • 7.4GL/HS1 • 7.4Gi/DP • 7.4GSi/DPX
8.2GSi/DPX • 8.2GL/DPX • 8.2GL/HS1

Contents

Safety information	2	Laying up	24
General information	4	Transporting on a trailer	24
Running-in	4	Laying up on land	24
Fuel and lubricants	4	Other product information	25
Spare parts	4	Maintenance and care	28
Warranty	5	Engine	28
Certificated engines	6	Lubrication system	30
High speed running – important	7	Cooling system	31
Safety equipment	7	Fuel system	36
Introduction	8	Ignition system	38
Type plates	10	Electrical system	39
Instrumentation	11	FDP, DPX drives	43
Controls	13	Reverse gear	49
Power Trim	14	Propellers	50
Trim controls and trim instrument	14	DP	50
Starting the engine	17	DPX	51
Preparations and starting	17	Maintenance schedule	52
Volvo Penta Xact™ power steering system, DPX .	18	Laying up/Launching	53
Operation	19	Inhibiting	53
Checking instruments	19	Bringing out of storage	54
Engine protection , 7.4Gi, 7.4GSi, 8.2GSi	19	Painting the drive and underwater hull	54
Cruising speed	20	Troubleshooting	55
Maneuvering astern	20	Technical data	56
Power Trim	20		
After use	23		
Cold weather precautions	23		

This Owner's Manual is intended for
markets outside North America only

Safety information

This Instruction Book contains the information you need to operate the engine correctly. Check that you have the correct Instruction Book for your engine.

⚠ WARNING! Read the book carefully before operating or servicing the engine. Incorrectly undertaken operations could result in personal injury, or damage to property or the engine. If you do not understand or are uncertain about any operation or information in this manual, please contact your Volvo Penta dealer who will be able to help you with an explanation or will demonstrate the operation.

IMPORTANT

You will find the following special warning symbols in this book and on the engine:

⚠ WARNING! If these instructions are not followed there is a danger of personal injury, extensive damage to the product or serious mechanical malfunction.

⚠ IMPORTANT! Used to draw your attention to something that can cause damage, product malfunction or damage to property.

NOTE! Used to draw your attention to important information that will facilitate work or operations.



Read instructions in the Instruction Book.

Below is a summary of the risks and safety precautions you should always observe or carry out when operating or servicing the engine:

⚠ Check that the warning or information decals on the engine are always clearly visible. Replace decals that have been damaged or painted over.

⚠ Always turn the engine off before starting service procedures. Avoid burns. Avoid hot surfaces and liquids in supply lines and hoses when the engine has just been turned off and is still hot.

Reinstall all protective parts removed during service operations before starting the engine. Make a point of familiarizing yourself with other risk factors, such as rotating parts and hot surfaces (exhaust manifold, turbocharger, charge pipe, starter element etc.).

Approaching a running engine is dangerous. Loose clothing or long hair can fasten in rotating parts and cause serious personal injury.

If the service operation requires that the engine is operating let your Penta authorized dealer carry out the work. If working in proximity of a running engine, careless movements or a dropped tool can result in personal injury.

⚠ Immobilize the engine by turning off the power supply to the engine at the main switch (switches) and lock it (them) in the OFF position before starting work. Set up a warning notice at the engine control position or helm.


⚠ Engine with turbocharger: Never start the engine without installing the air cleaner (ACL). The rotating compressor in the Turbo can cause serious personal injury. Foreign objects entering the intake ducts can also cause mechanical damage.


⚠ Engine with air pre-heating (starter element): Never use start spray or similar agents to start the engine. The starter element could ignite the spray and cause an explosion in the intake pipe. Danger of personal injury.


⚠ Avoid opening the filler cap for engine coolant system (freshwater cooled engines) when the engine is still hot. Steam or hot coolant can spray out as system pressure will be lost. If opening the filler cap or drain cock/venting cock, or removing a plug or engine coolant line from a hot engine, open the filler cap slowly and release coolant system pressure gradually. Steam or hot coolant can spray out.


⚠ Stop the engine and close the sea cock before carrying out operations on the engine cooling system.


⚠ Only start the engine in a well-ventilated area. If operating the engine in an enclosed space, ensure that exhaust gases and crankcase ventilation emissions are ventilated out of the working area.


 Anti-corrosion agents are hazardous to health. Read the instructions on the product packaging!


 Anti-freeze agents are hazardous to health. Read the instructions on the product packaging!


 Certain engine conservation oils are inflammable. Some of them are also dangerous if inhaled. Ensure that ventilation in the work place is good. Use a protective mask when spraying.


 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, otherwise oil could be ejected.


 Never allow an open flame or electric sparks near the battery or batteries. Never smoke in proximity to the batteries. The batteries give off hydrogen gas during charging which when mixed with air can form an explosive gas—oxyhydrogen. This gas is easily ignited and highly volatile. Incorrect connection of the battery can cause a spark which would be sufficient to cause an explosion with resulting damage. Do not disturb battery connections when starting the engine (spark risk) and do not lean over batteries. Refer to instructions in the Instruction Book.

 Always ensure that the positive and negative battery leads are correctly installed on the corresponding terminal posts. Incorrect installation can result in serious damage to electrical equipment. Refer to wiring diagrams.

 Always use protective goggles when charging and handling batteries. Battery electrolyte contains sulfuric acid which is highly corrosive. If battery electrolyte comes into contact with unprotected skin wash off immediately using plenty of water and soap. If battery acid comes in contact with the eyes, immediately flush with copious amounts of water and obtain medical assistance.

 Turn off the engine and turn off power at main switch(es) before carrying out work on the electrical system.


 Clutch adjustments, where a clutch is fitted, must be carried out with the engine turned off.

 Use the lifting eyes mounted on the engine/reverse gear when lifting the drive unit. 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).


To ensure safe handling and to avoid damaging engine components on top of the engine, use a lifting beam to raise the engine. All chains and cables should run parallel to each other and as perpendicular as possible in relation to the top of the engine.


If extra equipment is installed on the engine altering its center of gravity, a special lifting device is required to achieve the correct balance for safe handling.


Never carry out work on an engine suspended on a hoist.


 Components in the electrical system, ignition system (gasoline engines) and fuel system on Volvo Penta products are designed and constructed to minimize the risk of fire and explosion.

Using non-original Volvo Penta parts that do not meet the above standards can result in fire or explosion on board. Damage caused by using non-original Volvo Penta replacement parts will not be covered under any warranty provided by AB Volvo Penta.

 Fuel filter replacement should be carried out on a cold engine to avoid the risk of fire caused by fuel spilling onto the exhaust manifold. Always cover the generator if it is located under the fuel filter. The generator can be damaged by spilled fuel.

 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 use fuels recommended by Volvo Penta. Refer to the Instruction manual. The use of lower quality fuels can damage the engine. Poor quality diesel fuel can cause control rods to seize and the engine to overrev with the resulting risk of damage to the engine and personal injury. Poor fuel quality can also lead to higher maintenance costs.

 Observe the following rules when cleaning with high-pressure water jets. Never direct the water jet at seals, rubber hoses or electrical components. Never use a high pressure jet when washing the engine.

General information

Welcome aboard

Thank you for choosing a Volvo Penta marine engine. Volvo Penta have been building marine engines since 1907. Quality, operating reliability and innovation have made Volvo Penta a world leader in the marine engine industry.

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.

We would like to wish you many pleasant voyages.

AB VOLVO PENTA

Technical Information

Your new boat

Every new boat has its own special characteristics. Even experienced boat owners are advised to note carefully how the boat behaves at different speeds, weather conditions and loads. If your boat and engine combination permit high-speed use, we strongly recommend that a safety breaker is fitted, regardless of the type of boat. If your boat is not fitted with a safety breaker contact your Volvo Penta dealer who can assist you in selecting one.


Running-in

A new marine engine needs to be run in for its first 20 operating hours. Run the engine at varying engine speeds but at a maximum of 3/4 throttle for the first two hours. In the next 8 hours of operation use the same operating method as earlier but with a maximum of 2 minutes at wide open throttle (WOT) included. During the last 10 hours the periods of running at WOT can be increased to 5–10 minutes at a time. Reduce throttle to idle engine speed between WOT running so that engine temperature drops. Never run an engine at a constant engine speed for long periods during the running-in period. The engine can be expected to use more engine oil during the running-in period than would otherwise be normal. Check the oil level regularly and more frequently during the running-in period. The First Service inspection should be carried out after 20 hours of operation.

Fuel and lubricants

Only use lubricants and fuels recommended under “**Technical Data**”. Use of other grades can cause malfunctions and reduced service life.

Spare parts

 **WARNING!** Components in the electrical system and in the fuel system on Volvo Penta products are designed and manufactured to minimize risks of fire and explosion. Using non-original Volvo Penta parts which do not meet the above standards, can result in fire or explosion on board.

Any type of damage which results from the use of non-original Volvo Penta replacement parts for the product will not be covered under any warranty provided by AB Volvo Penta.

Safety

Everyone wants to have a problem-free and pleasant time when they take their boat out. To help you do this we have provided a pre-journey check-list below, of course extra items can be added to this list if you want. Important areas are the engine and its equipment and the general maintenance of the boat.

Planning your trip

- Get out up-to-date charts for the planned route
- Calculate distance and fuel consumption
- Note places where you can refuel on your planned course
- Tell friends or relatives about your route

Safety equipment

- Rescue and emergency items such as life vests and signal rockets. Does everyone know where they are?
- Replacement parts on board. On board kit with impeller
- Proper tools
- Fire extinguisher (checked and charged)

Joint responsibility

Volvo Penta continually commits a considerable part of its development resources towards minimizing the environmental impact of its products. Examples of areas where we are always looking for improvements are exhaust emissions, noise levels and fuel consumption.

Regardless of whether your Volvo Penta engine is installed in a boat used for pleasure or commercial operation, incorrect operation or improper maintenance of the engine will result in disturbance or damage to the environment.

In this instruction book there are a number of service procedures, which, if not followed will lead to an increase in the engine's impact on the environment and running costs and a reduction in service life. Always observe recommended service intervals and make a habit of checking that the engine is operating normally every time you use it. One example is an excessively smoky exhaust. Contact an authorized Volvo Penta workshop if you cannot correct the fault yourself.

Bear in mind that most chemicals used on boats are harmful to the environment if used incorrectly. Volvo Penta recommends the use of bio-degradable degreasing agents for all cleaning. Always dispose of engine and transmission oil waste, old paint, degreasing agents and cleaning residue etc. at proper disposal areas so that they do not harm the environment..

Adapt speed and distance during your boat trips so that swell and noise generated by the boat do not disturb or harm wildlife, moored boats, landing stages etc. Wherever you land or cruise, please show consideration and always leave the areas you visit as you would like to find them yourself.

Warranty

A Service and Warranty book with conditions for Volvo Penta's International Limited Warranty is supplied with every engine. Contact your nearest Volvo Penta dealer or importer for your copy if you have not received one.

Some markets can have other warranty conditions depending on national legislation and regulations, information about these conditions can be obtained from Volvo Penta importers and dealers in those markets. Contact your local Volvo Penta representative for a copy.

Warranty Registration Card

The Warranty Registration Form (North American market) or Warranty Card (other markets) should always be filled out and sent in by the dealer. Make sure that this has been done, since refusal of warranty can occur if no proof of the delivery date can be provided.

Maintenance and care

– Delivery undertaking Pre-Delivery Commissioning (PDC), for marine engines: "PDC" enables us to ensure that Volvo Penta products operate correctly after installation in a boat, and further that the end-user gets acquainted with the product, its functions and care (refer to checklist in the Warranty and Service book). Delivery undertaking "PDC" is carried out at the time of the delivery of the boat to the end-user. The cost of this work is covered by the Volvo Penta company's International Limited Warranty.

– First Service inspection, for marine engines: A First Service inspection must be carried out after 20–50 running hours or within 180 days of delivery, or at the end of the first season, whichever comes first. Labor and material costs in connection with the First Service Inspection are not covered by the Volvo Penta International Limited Guarantee (for checklist see your Warranty and Service book).

Regular maintenance should be carried out after the First Service Inspection in accordance with the maintenance scheme in this book. Any work carried out in addition to maintenance services should be documented (refer to the Warranty and Service book)

It is an absolute condition for the Volvo Penta International Limited Warranty to apply that the Pre-Delivery Commissioning and First Service Inspection have been carried out by an authorized Volvo Penta service dealer.

Volvo Penta Service

Volvo Penta has a comprehensive dealer network that offers both service and spare parts for Volvo Penta engines. These dealers have been carefully selected and trained to provide professional assistance for service and repairs. They also have the special tools and testing equipment required for maintaining a high standard of service. Volvo Penta dealers and vendors must maintain a stock of original spare parts and accessories to cover most requirements of Volvo Penta owners. When ordering a service or spare parts always quote the engine and drive/reverse gear complete type designation and serial number. You will find this information on the engine product plate and on a decal on the valve cover.

Important information for engines certificated for Lake Constance and Switzerland.

National and regional legislation is not identical in all the markets where Volvo Penta sells its products. Occasionally legislation requires that we build special engine variants, or that an engine must be approved in advance, that is, certificated by the local authorities.

As the owner or operator of a certificated Volvo Penta engine it is important that you are aware of the following:

- The Service Intervals and maintenance operations recommended by Volvo Penta must be observed.
- Only Volvo Penta Original Spare parts intended for the certificated engine may be used.
- Service work on the ignition system, timing and fuel injection system (gasoline) or injection pump and injectors (diesel) must always be carried out by an authorized Volvo Penta workshop.
- The engine may not be altered or modified in any way, with the exception of accessories and service kits developed by Volvo Penta for that engine.
- No modifications to the exhaust pipes and air supply ducts for the engine room (ventilation ducts) may be undertaken as this may effect exhaust emissions.
- No seals on the engine may be broken except by authorized persons.



Identification numbers

Other equipment

High speed running – important

Your boat is equipped with a Volvo Penta V8 engine, developed for performance without compromising safety and reliability. The engine's power and the ratio of the drive/reverse gear have been designed to give optimum acceleration and top speed. **Take advantage of the performance of the boat using good judgement and good seamanship!**

High speed running requires an experienced driver who has learnt how to handle high performance boats. Get to know how your boat handles at different speeds and in different conditions before taking passengers.

High speed running also requires special attention to the course of the boat and its surroundings!

Always maintain a good margin for the unexpected! Pay attention to what others are doing! Remember that other boat drivers may not realize how fast you are travelling. This is particularly true when you approach a boat from astern or ahead.

A boat going at 60 knots travels 30 meters (33 yds) in a second. The faster you travel the faster the unexpected can happen! **High speed running requires plenty of open water and a safe distance between you and possible danger.** Always reckon on 3–4 second reaction time.

Always tell your passengers about the boat's handling characteristics and the maneuvers you are about to undertake. Never give the wheel to an inexperienced driver. Ensure that all passengers are sitting down in the boat. This is particularly important when driving a large cabin cruiser on which you can normally move about while the boat is underway. Reduce speed if someone needs to move somewhere else in the boat.


Always use the safety breaker! A safety breaker will stop the engine(s) immediately if the driver is thrown from the control position. Even if the danger of falling overboard is negligible, there is a higher risk of falling and knocking oneself senseless, in a high sea for example.

Remember that **even with the engine(s) stopped, a planing high performance boat will travel up to 100 meters (109 yds) before falling below planing speed and coming to rest.**

Safety equipment

Outfit your boat with all the safety equipment you think necessary and that required by law and regulations. The following should also be observed on a high performance boat:

- Life jackets for everybody on board.

 **WARNING!** Life jackets should be approved for use at speeds up to the top speed of the boat. A "normal" life jacket could be ripped off or cause personal injury if you fall overboard at high speed.

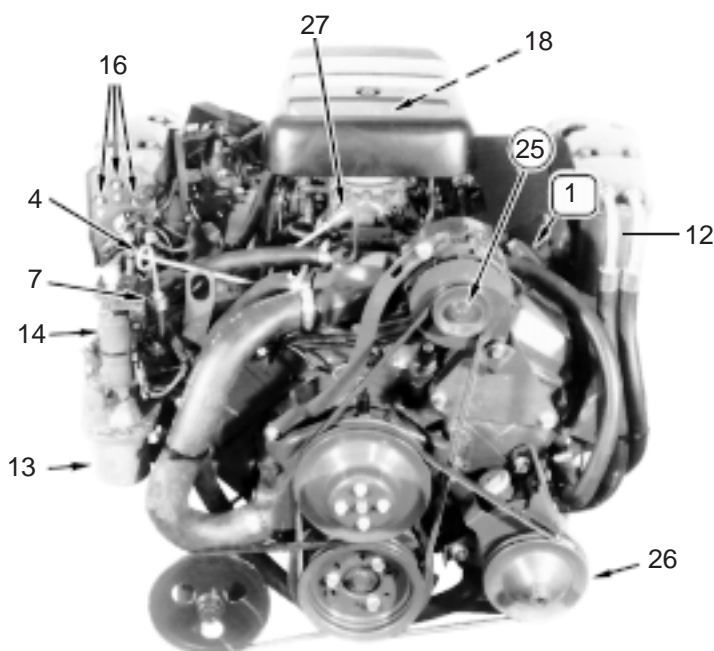
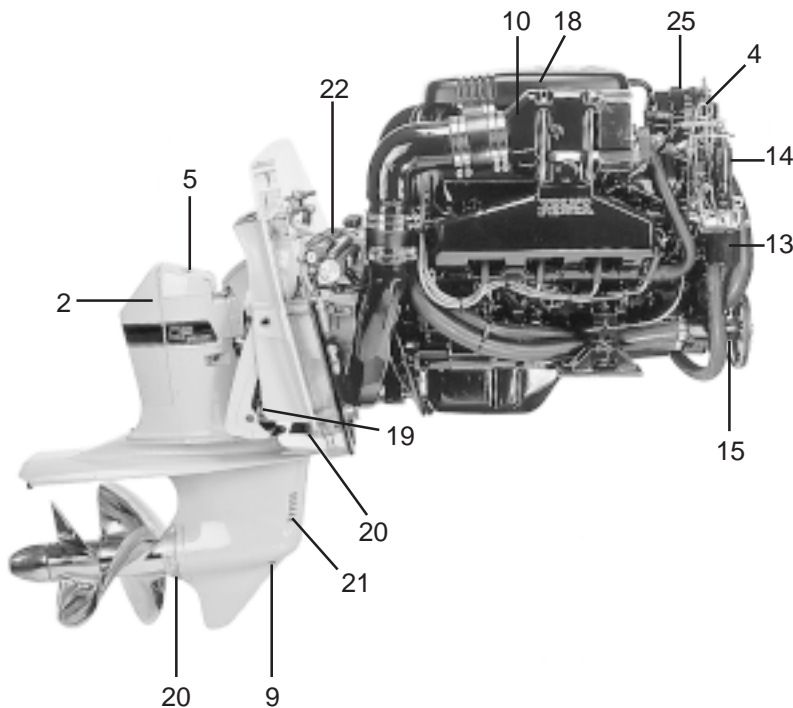
- A helmet should be worn under advanced driving at high speed. Use a helmet approved for boating use.
- A wet suit should also be worn under advanced driving in cold water.
- Eye protection. If the boat is not equipped with a provisional windshield, the driver and navigator should wear approved, shatterproof safety glasses.

Introduction

All engines, the 7.4GL, 7.4Gi, 7.4GSi, 8.2GL and the 8.2GSi are gasoline V8s with high quality cast iron engine blocks and cylinder heads. Engines have overhead valves and hydraulic valve lifters which eliminate the need to adjust them. The 7.4GL and 8.2GL have a four port carburetor and the 7.4Gi, 7.4GSi and 8.2GSi have electronic fuel injection.

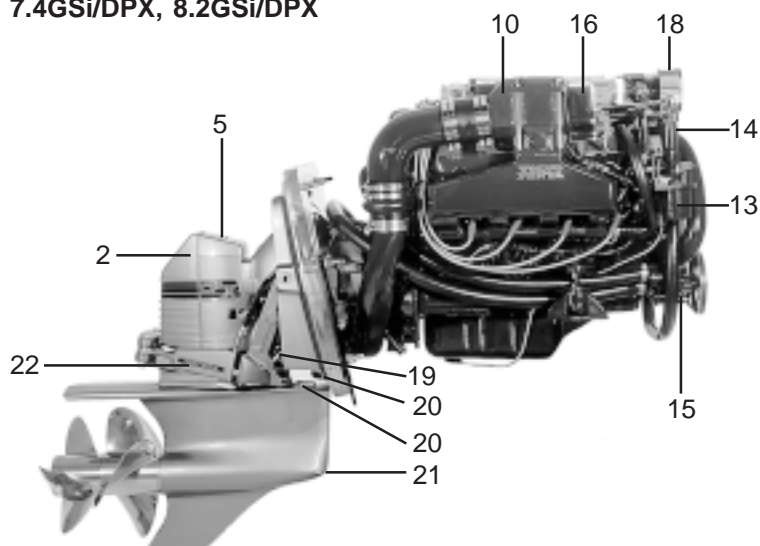
The 7.4GL and 7.4Gi have DP drives or HS1 reverse gears, the 7.4GSi and 8.2GSi have a DPX drive. The 8.2GL has a DP drive or HS1 reverse gear. The photos below do not show all engine/transmission combinations. **If your engine type does not have the transmission shown, refer to another engine with the relevant transmission for an introduction to the transmission.*

7.4GL/DP, 8.2GL/DPX*

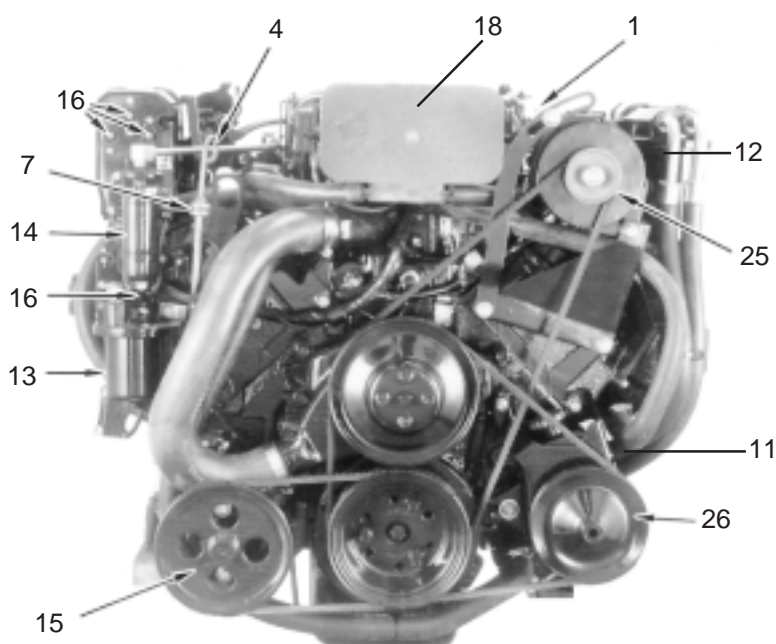
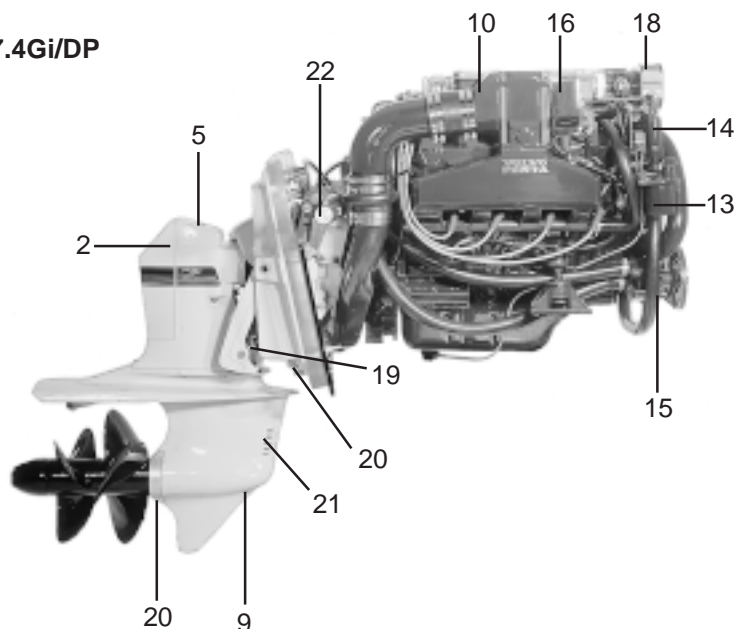


- 1 Topping up engine oil, engine
- 2 Topping up oil, drive
- 3 Topping up oil, reverse gear
- 4 Oil dipstick, engine
- 5 Oil dipstick, drive
- 6 Oil dipstick, reverse gear
- 7 Oil pump connector, engine
- 8 Oil pump connector, reverse gear
- 9 Draining oil, drive
- 10 Water-cooled exhaust elbow
- 11 Oil cooler, engine
- 12 Oil filter, engine
- 13 Fuel filter
- 14 Fuel pump
- 15 Seawater pump
- 16 Automatic fuses
- 17 Oil cooler, power steering
- 18 Flame trap
- 19 Trim cylinder
- 20 Rust protection
- 21 Coolant water intake
- 22 Control cylinder
- 23 Oil cooler, reverse gear
- 24 Lubrication oil filter, reverse gear
- 25 Generator
- 26 Power steering pump
- 27 Carburetor

7.4GSi/DPX, 8.2GSi/DPX

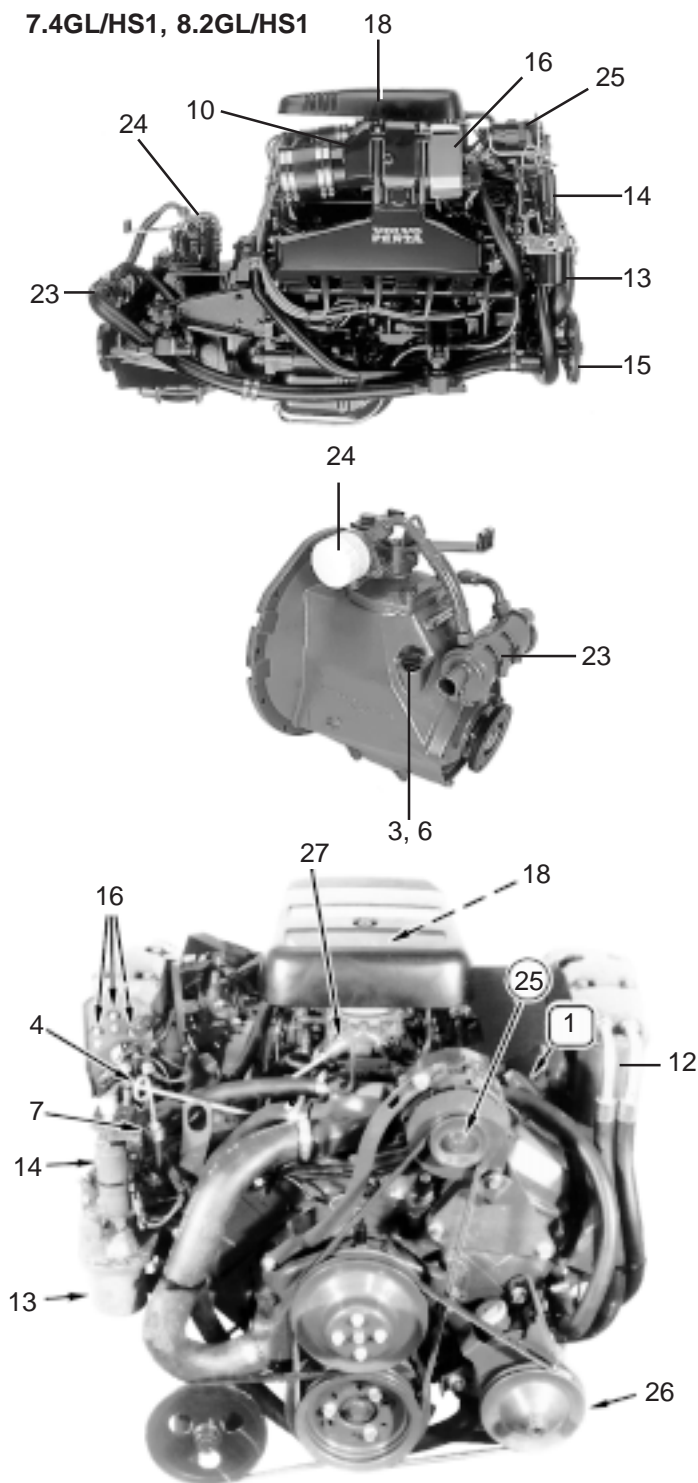


7.4Gi/DP



- 1 Topping up engine oil, engine
- 2 Topping up oil, drive
- 3 Topping up oil, reverse gear
- 4 Oil dipstick, engine
- 5 Oil dipstick, drive
- 6 Oil dipstick, reverse gear
- 7 Oil pump connector, engine
- 8 Oil pump connector, reverse gear
- 9 Draining oil, drive
- 10 Water-cooled exhaust elbow
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- 21 Coolant water intake
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- 23 Oil cooler, reverse gear
- 24 Lubrication oil filter, reverse gear
- 25 Generator
- 26 Power steering pump
- 27 Carburetor

7.4GL/HS1, 8.2GL/HS1



- 1 Topping up engine oil, engine
- 2 Topping up oil, drive
- 3 Topping up oil, reverse gear
- 4 Oil dipstick, engine
- 5 Oil dipstick, drive
- 6 Oil dipstick, reverse gear
- 7 Oil pump connector, engine
- 8 Oil pump connector, reverse gear
- 9 Draining oil, drive
- 10 Water-cooled exhaust elbow
- 11 Oil cooler, engine
- 12 Oil filter, engine
- 13 Fuel filter
- 14 Fuel pump
- 15 Seawater pump
- 16 Automatic fuses
- 17 Oil cooler, power steering
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- 23 Oil cooler, reverse gear
- 24 Lubrication oil filter, reverse gear
- 25 Generator
- 26 Power steering pump
- 27 Carburetor

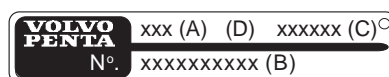
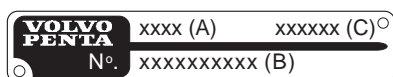
Type plates

Engine

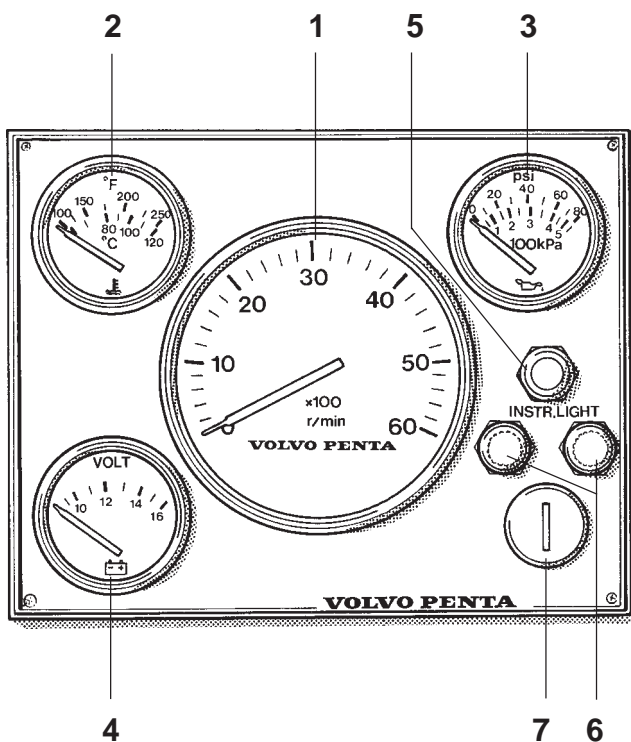


- A Product designation
- B Serial number
- C Product number
- D Gear ratios
- E Certification number

S-Drive/Reverse gear



The instrument panel for Volvo Penta gasoline engines is equipped with a tachometer, temperature gauge, oil pressure gauge, voltmeter, 2 fuses, instrument lighting switch and an ignition switch. Instruments, fuses and ignition switch can also be installed separately without an instrument panel. The boat builder's instrumentation can also be supplemented with extra Volvo Penta instruments, such as: synchronization tachometers, fuel gauge, fresh water gauge, clock, speed log or rudder indicator.



1. Tachometer

Shows the rpm of the engine. Multiply this value by 100 for revolutions per minute. Integral "Hours run" meter (only on separately installed instrument). Displays the engine's operating time in hours and tenths of an hour.

Engine speed range: See chapter "Operation".

2. Temperature gauge

Indicates the engine coolant temperature. Normal operating temperature is approx. 70–90°C.

3. Oil pressure gauge

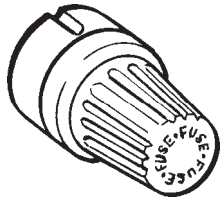
Indicates the oil pressure in the engine. Normal operating oil pressure is approx. 300 kPa (43.5 psi). At engine idle this is normally lower.

4. Voltmeter

Indicates the charge current from the generator which should normally be approx. 14 V. With the engine stopped the current indicated is that in the starter battery circuit, normally 12 V.

5. Instrument lighting

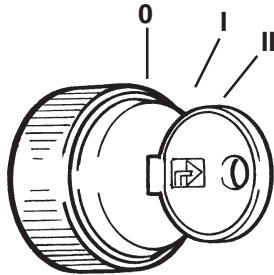
Switch for instrument lighting.



6. Fuses, 8 A

Fuses for the starter function and system voltage. To change fuses: Press the button and turn anti-clockwise.

⚠ IMPORTANT! Always carry extra fuses on board.



7. Ignition switch

The ignition switch has three positions (these positions are not marked):

0 = The key can be inserted and taken out.

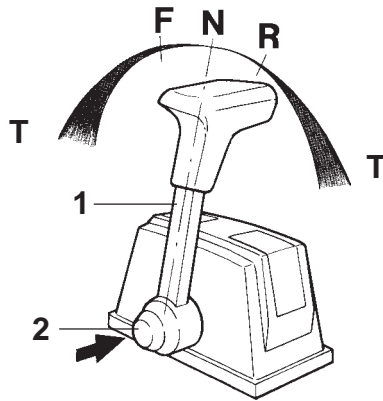
I = Operating and running position. System voltage connected

II = Starter position (spring-loaded). The starter motor is engaged.

⚠ IMPORTANT! Read the starting instructions in the chapter **“Starting the engine”**.

The ignition keys are marked with a key code used when ordering extra keys. Make a note of this key code so that keys can be ordered if the old keys get lost. Keep the code in a safe place where unauthorized persons do not have access to it.

The shift function and engine speed control are combined in one lever. The shift function can be simply disengaged so that only engine speed is affected. The control is available for top or side mounting. The control lever has an adjustable friction brake. A neutral position switch is available as an accessory, this will only permit the engine to be started with the drive/reverse gear disengaged.



Maneuvering

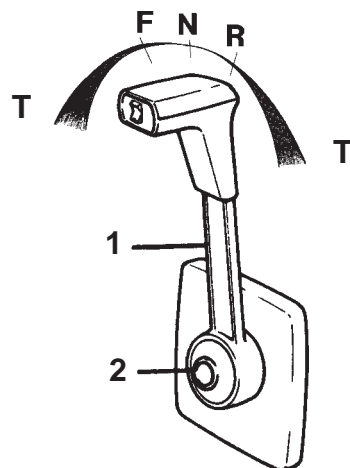
Shifting and engine speed are controlled with the same lever (1).

N = Neutral position. Drive/reverse gear disengaged

F = Drive/reverse gear engaged for forward movement (ahead).

R = Drive/reverse gear engaged for backward movement (astern).

T = Engine speed control.

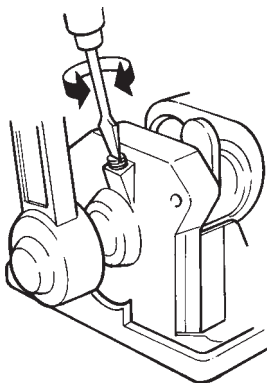


Disengaging the shift function

Move lever (1) to the neutral position (**N**). Press in button (2), move the lever slightly forward and release button. The shift function is now disengaged and the lever affects only engine speed.

When the lever is moved back to the neutral position it will automatically re-engage.

⚠ IMPORTANT! Take care not to engage the drive/reverse gear by mistake.



Adjusting the friction brake

The friction brake only affects the engine speed control movements. Adjust with the lever in the **half-open throttle/reverse position**.

- Remove the cover over the control. NOTE! For side-mounted controls the lever must first be removed.

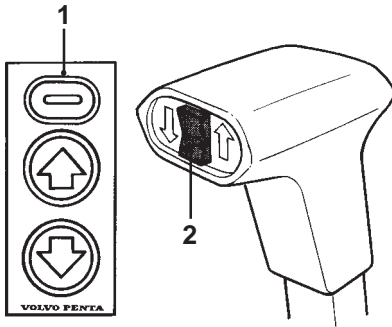
- Adjust the friction brake by turning the screw at the arrow (see figure).

Turn clockwise (+) for more friction and counterclockwise (–) for less friction.

- Reinstall the cover and lever.

Power Trim

The DP and DPX drives have a hydraulic trim system (Power Trim) which makes it possible to adjust the boat's trim for maximum comfort and fuel economy in different operating conditions. For further information see the chapter "**Operation**".



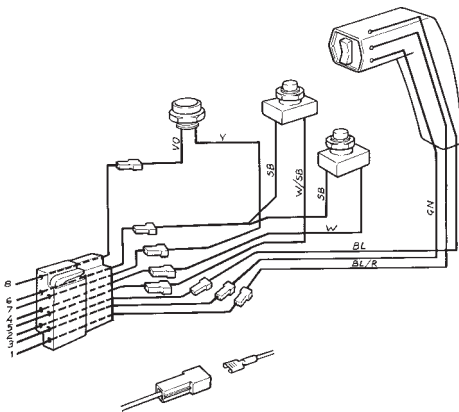
Trim control

Trimming and raising the drive can be done either using the separate control panel (1) or using the control button (2) in the control lever (accessory). The trim position of the drive is shown on the separate trim instrument (DP) or on the trim indicator (DPX).

Maneuvering

The maneuvering panel (1) has three buttons. The center button raises the bows of the boat. The lower button lowers the bows of the boat. The upper button bypasses the Beach range catch on the DP drive. This button has no function on the DPX drive. See also chapter "**Operation**".

Using the button (2) in the control lever it is possible to raise the bow of the boat by pressing the upper half of the button, and to lower it by pressing the lower half of the button. To trim within the BEACH range press a separate switch on the instrument panel (to bypass the catch) at the same time.

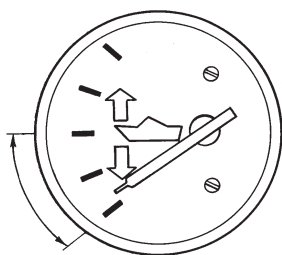


BEACH lock function

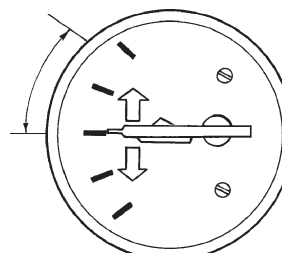
Boats with separate BEACH catch bypass switches can be equipped with a lock function.

Trim to and within the BEACH range as follows:

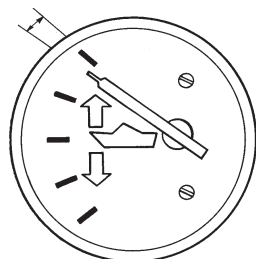
Press the button to bypass the BEACH catch. The signal lamp lights to confirm that the lock function is engaged. The drive can now be trimmed with one hand within the BEACH range. The lock function remains engaged as within the BEACH range. When the drive is lowered into the TRIM range the BEACH catch engages again and the signal lamp lights.



1. Trim range



2. Beach range



3. Lift range

Trim controls

The DP drive Power Trim has two different types of instrument – digital or analogue. The DPX drive has a mechanically controlled trim indicator.

Analogue trim instrument (DP)

The trim instrument indicates the current trim position. It has a scale with five segments and three main ranges:

1. Trim range

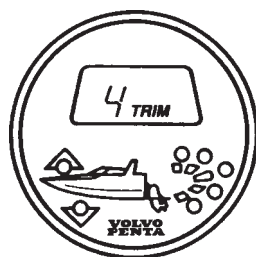
The trim range is used to achieve maximum comfort under normal operation from start to maximum speed.

2. Beach range

The beach range is used for operation **at reduced speed** in shallow water where water depth is uncertain. This range is also used when launching and taking the boat out of the water onto a trailer ramp.

3. Lift range

The lift range is used for lifting the drive to its maximum angle, **however this cannot be used during operation**. This range is used for transporting the boat and to minimize fouling of the drive. The Power Trim has an automatic stop which cuts off the current when the stop position is reached. The stop is automatically reset when trimming down.



Digital trim instrument (DP)

Displays a figure within the range. This figure is the angle of the drive to perpendicular (stationary boat). The instrument is a built in control program which starts each time the instrumentation is switched on with the ignition key. When this control program is run, all LCD segments light and A- BEACH is displayed. The instrument then returns to displaying the current drive angle.

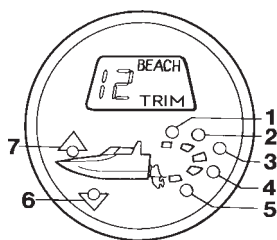
TRIM = Drive position at all speeds. Max trim up to 5.

BEACH = Used for operation at in shallow water where water depth is uncertain. Speed should always be low. 6 – 40.

Lift = Flashing red warning lamp. Drive up completely. See LEDs position 1.

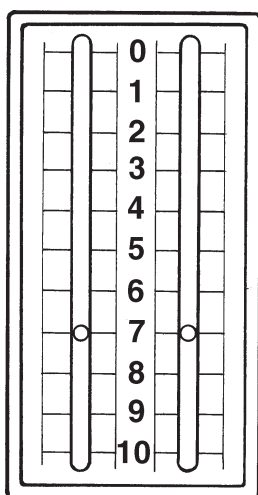


IMPORTANT! The engine must not be run with the drive in this position.



LEDs

- 1 Flashes red within the lift range above 40. Otherwise out.
- 2 Constant red light: 6 – 40. Otherwise out.
- 3 Constant green light: 2 – 5. Otherwise out.
- 4 Constant green light in the range 0 – 2. Otherwise out.
- 5 Constant green light in trimmed range up to 0. Otherwise out.
- 6 Constant yellow light in maximum trimmed position up to 0. Flashes when the drive moves and the bow is lowered. Otherwise out.
- 7 Constant yellow light. 2 to 5. Flashes when the drive moves and the bow is raised.



Trim indicator DPX

The mechanically controlled trim indicator displays the position of the drive within the trim range as figure from 0 to 7. When first testing the boat check where the most comfortable ride is obtained and use that value as a basis.

When the drive is within beach range 7 – 10, speed should be below planing speed. At full lift the engine should be stopped.

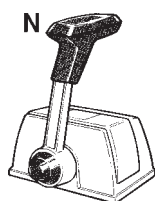
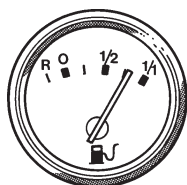
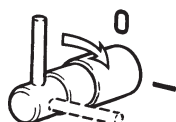
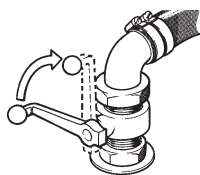
The trim indicator only indicates a position within the trim range and the start of the beach range. In twin installations drives may be trimmed individually within the trim range. Pay attention to the trim indicators.

⚠ IMPORTANT! When lifting drives **within the beach range both drives must be lifted at the same time** – in parallel, so as not to place an undue strain on the parallel strut between the drives.

When lifting both drives in parallel they must first be trimmed to their forward stop positions. Start the lift from this position.

When lowering twin drives it is important that both be lowered in parallel to avoid snapping the parallel strut.

Starting the engine



Preparations

- Open the fuel cock (and the sea cock for the cooling water intake on reverse gear engines).
- Check that there are no fuel, engine coolant or oil leaks.
- Check the engine oil level. See section on **Maintenance**.
- Switch on the main switches.

⚠ IMPORTANT! Never break the circuit with the main switches while the engine is running. The generator and engine electronics (injection engines) may be damaged.

- Insert the key in the ignition switch. Turn the key on step to the right (operating position); this switches on the engine system voltage and instrumentation.
- Start the engine compartment fan if one is fitted and let it run for at least four minutes.
- Check that there is sufficient fuel.
- Lower the drive if it was raised. Check there are no obstacles in the water near the propellers.

⚠ IMPORTANT! DPX twin installation: Lower both drives at the same time.

Starting

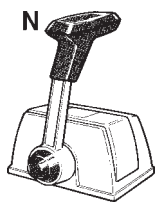
1. Move the control lever to the neutral/idle position.
2. Turn the ignition key one more step to the right (starter position) to start the engine. Release the key as soon as the engine has started. Turn the starter motor for a maximum of 10 seconds, if the engine does not start release the key and try again after a few seconds.

⚠ IMPORTANT! Never turn the key to the starter position with the engine running!

3. Immediately after the engine has started check that the **oil pressure** and **battery charge** instruments are reading normal.

Your boat may be equipped with a low oil pressure (and high engine coolant temperature) acoustic alarm and warning lamp. This alarm may sound while the engine is started until oil pressure has built up. **Never rev a cold engine!**

4. If the engine is cold: idle it, while casting off for example.



5. Shift to forward or reverse and start off.

⚠ WARNING! Your engine(s) produce considerable power even when idling. Depending on the type of boat the engine(s) can power it at 5 – 8 knots at idling speed. You may need to adjust your speed by shifting to neutral or reverse (or ahead) more frequently than you are used to in harbor, in shallow water or when approaching moorings. If you do not adjust your speed with the shift control you may exceed the speed limit in harbor and narrow channels. We recommend lowering engine speed to idle and raising the drive(s) into the Beach range if at all unsure about water depth.

⚠ IMPORTANT! DPX twin installation: Raise (and lower) both drives at the same time.

Volvo Penta Xact™ power steering system, DPX

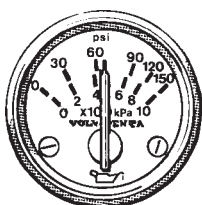
The DPX drive has the Volvo Penta Xact™ power steering system. This is fully hydraulic and servo-assisted. The control cylinders are externally mounted and act on the drive directly without the need for linkages and control arms. This gives precise and direct steering with 2.7 turns of the wheel between full lock in either direction. As a safety measure both engines in a twin installation are equipped with power steering pumps (two engines have pumps on a triple installation). Running on only one engine in a twin or triple installation makes the steering heavier than with all engines running. This is particularly noticeable when idling.

NOTE! When the steering wheel is turned to full lock there is a noise from the power steering system. This sound is perfectly normal and stops when the steering wheel is released. Forcing the power steering system to work at full lock for any length of time may damage the oil. Note that full lock is not increased by holding the steering wheel against its stop.

All shifting between forward/reverse must be done at engine idle speed. Shifting at higher speeds may damage the drive/reverse gear and will also be uncomfortable for those on board. If the boat has two or three engines, it is important that they are all running during maneuvers astern (rearward movement), otherwise water might get into the exhaust of the engine which is not running when the backwash catches up with the boat. Water getting into the engine can cause serious damage.

■ Checking instruments

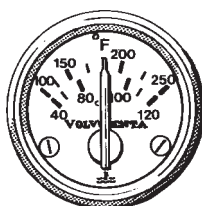
Check instruments regularly. Stop the engine if there is an abnormal reading or if an alarm (accessory) sounds. The following normal readings apply:



Oil pressure

Normal operating oil pressure is approx. 150 – 500 kPa (21–71 psi). At engine idle this is normally lower. Your boat may be equipped with a low oil pressure acoustic alarm and warning lamp (accessory).

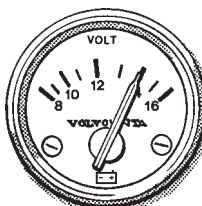
⚠ IMPORTANT! If oil pressure is too low: Stop the engine immediately and investigate.



Engine coolant temperature

The temperature gauge should read between 75 – 90°C (166 – 194°F) normally. Your boat may be equipped with an engine coolant temperature acoustic alarm and warning lamp (accessory).

⚠ IMPORTANT! If engine coolant temperature is too high: Idle the engine, shift to reverse and then to forward. Idle the engine for 2 – 3 minutes and shut off the engine if the temperature does not sink. Investigate and correct the malfunction.

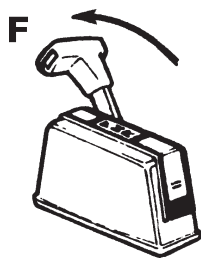


Charge

The operating charge is approx. 14 V. When the engine is stopped battery voltage is approx. 12 V.

■ Engine protection 7.4Gi, 7.4GSi, 8.2GSi

If oil pressure is too low or engine coolant temperature too high, the engine control module (ECM) engages a “protection program”. When this program engages the acoustic alarm (accessory) is triggered and engine speed is limited to 2,500 rpm or lower. If the throttle is still set at position above 2,500 rpm the engine will run unevenly. Check oil pressure and coolant water temperature gauges to establish the reason that the engine protection has engaged. Then check the oil level/coolant water intake. The reason for the low oil pressure/overheating must be remedied before the engine can operate normally. If the coolant water temperature is too high, the engine must cool down completely before running normally again. See also chapter **Other Product Information**.

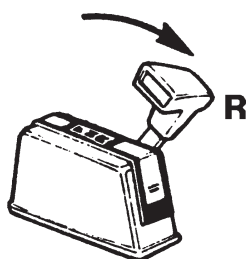


■ Cruising speed

Operating the engine at wide open throttle (WOT) should be avoided since it is both uneconomical and uncomfortable. Volvo Penta recommends a cruising speed in the range 300 – 500 rpm lower than maximum rpm at WOT. Depending on hull type, choice of propeller, load and conditions etc. the maximum engine speed at top speed can vary, but it should be within the WOT range.

Wide Open Throttle (WOT) range:

7.4GL	4200–4600 rpm	7.4GSi	4800–5200 rpm
7.4Gi	4200–4600 rpm	8.2GL	4400–4800 rpm
8.2GSi	max. 5000 rpm		



■ Maneuvering astern (reverse)

Maneuvering astern should be carried out with the drive in the “Trim” or “Beach” position. Always let engine speed drop to idling speed before shifting to reverse. Be careful not to go aground or hit anything when maneuvering astern. The hydraulic system can only free the drive when travelling forward, there is no protection in case of a collision when maneuvering astern.

⚠ WARNING! Never shift to reverse when the boat is planing. There is a danger that water will get into the engine causing serious damage.

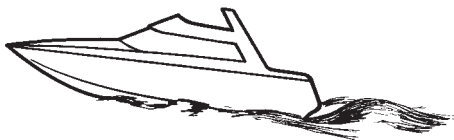
■ Power Trim

The DP and DPX drives have a hydraulic trim system (Power Trim) which makes it possible to adjust the boat’s trim for maximum comfort and fuel economy in different operating conditions.

Every boat has its own unique characteristics that are also affected by external factors. When you have got to know your boat thoroughly you can experiment with the best trim angles for different speed, load and sea conditions. It can generally be said that when the boat feels well-balanced, easy to steer and pleasant to operate, then that is the optimal trim angle for the boat. **NOTE!** For information about the Power Trim controls and instruments. See chapter **Power Trim**.

With the drive in the “Trim range”:

⚠ WARNING! The drive should not be trimmed violently when running at high speed. If the bow is lowered at high speed the boat’s ability to hold a course may become unstable. To a great extent this is dependant on the shape of the hull and will vary from boat to boat. However, even if safety is not compromised the result may be an unpleasant experience for driver and passengers, who may lose confidence in the boat’s handling.



When starting

Trim the drive. The bow will be pressed down and the boat accelerates faster. This gives improved running and steering characteristics at speeds below the planing threshold.



At planing speed

Trim the drive out to the running position which feels comfortable and the boat feels stable and smooth.

For maximum fuel economy

Run boat at a constant throttle opening. Trim the drive out/in a little. The boat is most easily propelled and speed will increase in the position that gives the highest engine speed. The throttle opening can then be slightly reduced to retain the original speed.



In choppy seas or running against a heavy sea

Trim drive so the bows drop. This will provide more comfortable running.

⚠ WARNING! High speed running in a heavy sea is dangerous. High speed running in a heavy sea requires the driver's maximum attention and a boat of the right size and design for this type of running.

Side winds

If the boat has a dual installation the drives can be trimmed at different trim angles. This compensates for side winds or uneven transverse load distribution (athwartships), which makes the boat list during running.

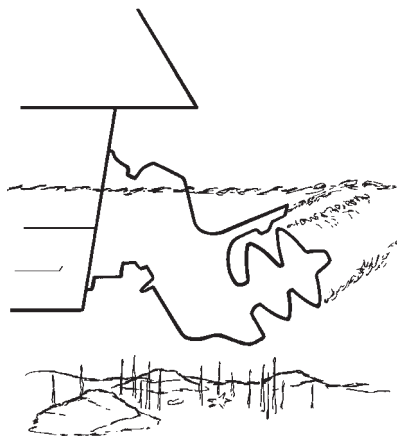
With the drive in the "Beach range":

Running in shallow water

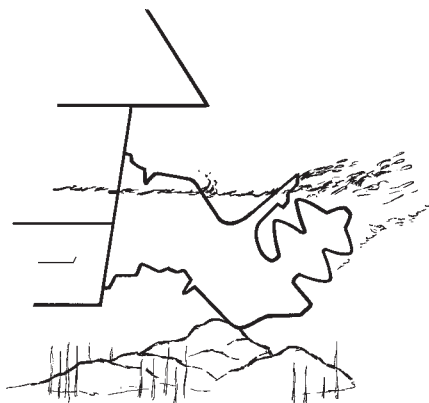
If you do not know how much water is under the keel, slow down and trim the drive to the "Beach range".

⚠ IMPORTANT! Maneuvering characteristics change with the drive in the "Beach range": Always lower your speed before trimming the drive in the "Beach range". Max. permitted engine speed (rpm) when running in the "Beach range" is 1000 rpm.

⚠ IMPORTANT! DPX: There is no automatic stop between the "Beach" and "Lift" ranges. Check the trim indicator carefully to see if the "Lift" range has been reached. The engine must not be run with the drive in the "Lift" range.



Running aground:



Kick-up function

The DP/DPX drive has a built-in Kick-up function which releases the drive if it grounds or strikes an obstruction in the water. If the function has been tripped and the drive released it must be trimmed back to the original position using the control buttons.

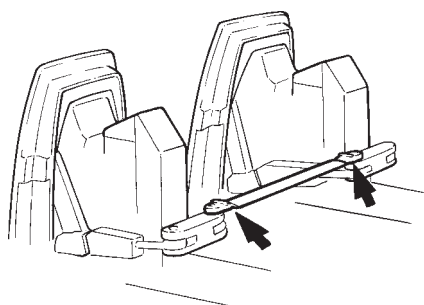
⚠ IMPORTANT! The Kick-up function only protects the drive when running ahead (forwards). There is no protection for the drive while running astern (backward).

After running aground check for damage to the drive or propeller and for vibrations from the drive. If this is the case then the boat (if possible) should be run to harbor at reduced speed and taken out of the water.

Check the oil level in the drive. If it is colored gray then water has entered the drive. If this is the case or if other damage has occurred to the drive it must be inspected at an authorized Volvo Penta workshop.

If a propeller has been damaged it must be replaced. Launch the boat and test drive. If there are still vibrations it must be inspected by an authorized Volvo Penta workshop.

⚠ IMPORTANT! To prevent galvanic corrosion any damage to the paintwork on the drive and propeller must be repaired before launching the boat: See chapter on ***Laying up/Launching***.



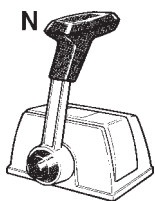
DPX twin and triple installations:

⚠ WARNING! If the parallel strut shows signs of damage, run at reduced speed to harbor. The parallel strut is a vital safety component, damage may affect 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 dealer for assistance.

With the drive in the “Lift range”:

⚠ IMPORTANT! The engine must never be run in the “Lift” range.

See also chapter: **Stopping the engine**, “Transporting on a trailer”.

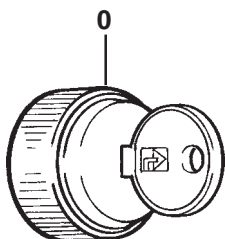


Before stopping the engine

To counteract boiling and heat stress the engine should be run for a few minutes at idle (in neutral) before turning it off. This is especially important if the engine has been operated at high engine speeds (rpm).

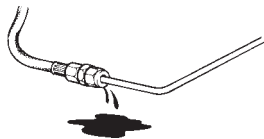
Boats with drives: The drive must be trimmed in to its maximum to protect the trim cylinders untreated surfaces from fouling.

⚠ IMPORTANT! Do not trim the drive if it might hit the bottom, at low water for example. Trim it to its maximum raised position instead.



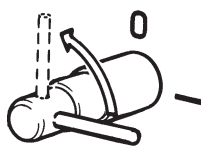
Stopping

Turn the key to stop position. The key can then be taken out.

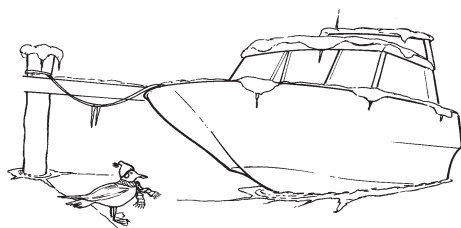


Safety measures

- Inspect the engine and engine compartment for any leaks.
- Close the fuel cock and sea cock (reverse gear) for the cooling water intake.
- ⚠ **IMPORTANT!** Do not forget to open the cocks before the engine is started again.
- Switch off the main switches if the boat is not to be used for some time.



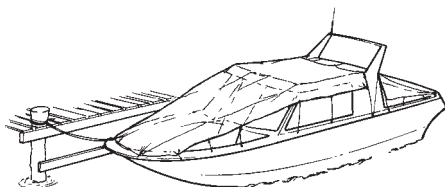
⚠ **IMPORTANT!** Never break the circuit with the main switches while the engine is running. The generator and engine electronics (injection engines) may be damaged.



Cold weather precautions

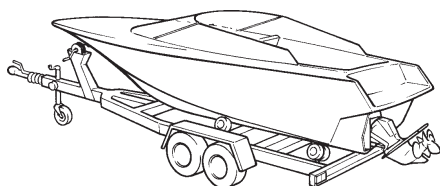
To prevent freezing damage the seawater system must be drained and the freshwater system (accessory) coolant must have sufficient anti-freeze protection. See chapter **Maintenance** "Cooling systems".

⚠ **IMPORTANT!** A poorly charged battery may burst as a result of freezing.



■ Laying up

If the boat is not going to be used for some time but be left in the water, the engine must be run hot at least once every 14 days. This prevents the corrosion in the engine. If the boat is not going to be used for longer than two months then inhibiting procedures must be applied: See chapter: ***Laying up and inhibiting.***

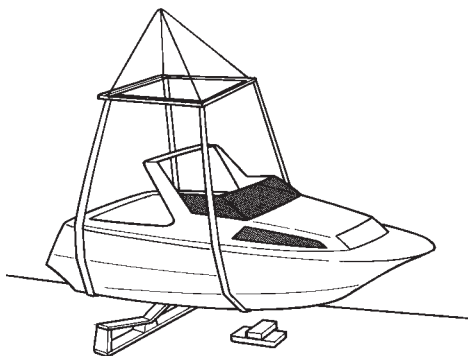


■ Transporting on a trailer

Trim out to the "Lift" range (maximum lift point) before pulling the boat onto the trailer. An automatic stop will cut off the current to the hydraulic pump when the drive has reached its max. lift point. The stop is automatically reset when trimming down. **NOTE!** Check local legislation for transporting boats on trailers, there are differences between different countries' trailer laws.

⚠ IMPORTANT! The engine must not be run with the drive in the "Lift" range. Before transporting the boat by trailer always secure the drive in the lift position with a Trailer Kit (accessory) or similar, so that it cannot drop down.

Boats with reverse gear: Drain water out the exhaust pipes to prevent water entering the engine when transporting the boat by trailer.



■ Laying up on land

Where boats are kept laid up on land when not in use, for example, trailer boats, 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.

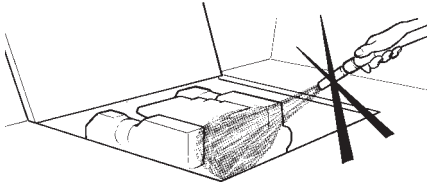
NOTE! Do not use a wire brush or other steel tools when cleaning, as these may damage the galvanic protection.

Other product information

Injection system 7.4Gi, 7.4GSi, 8.2 GSi

The injection system has no service points. Any service apart from routine maintenance should be carried out by an authorized Volvo Penta workshop which will have the necessary test equipment and trained service personnel.

⚠ IMPORTANT! Never disconnect connectors from sensors or the engine control module (ECM). Parts of the electronic system work at voltages as low as 4 – 5 V. Electronics can be damaged by static discharges of as little as 100 V. In comparison it takes a discharge of 4,000 V for it to be felt on the skin.

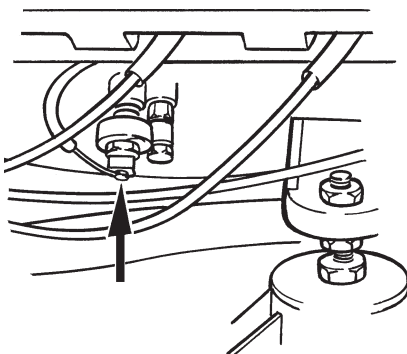


Check system cabling for damage and dirt annually. Clean with a rag with a mild cleaning agent. **Never spray with water or degreasing agent.** Connectors are protected against moisture and filled with a special grease to prevent corrosion. Connectors and the rest of the system should be inspected every other year by an authorized Volvo Penta workshop.

Engine control module (ECM)

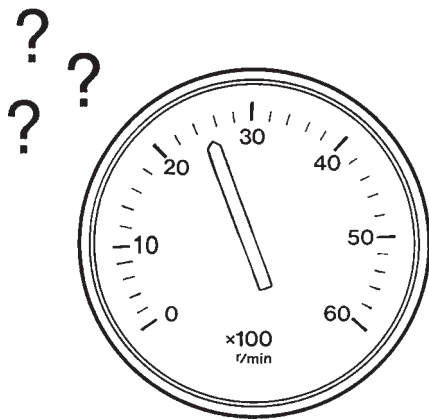
The injection system engine control module (ECM) optimizes the running of the engine in all conditions. The engine control module (ECM) obtains information from sensors and uses it to calculate fuel supply and ignition timing.

One of these sensors is the Manifold Absolute Pressure Sensor (MAP) which detects the pressure in the intake manifold. The MAP sensor allows the control module to correct for changes in air pressure. **No adjustments need be made** to the engine when running on high altitude lakes.



The knock sensor (KS) detects abnormal engine vibrations (engine knock) and sends signals to the control module which adjusts the ignition timing.

⚠ IMPORTANT! It is extremely important that original Volvo Penta knock sensors (KS) be used. The knock sensor (KS) is unique to this marine engine. Never replace with an automobile knock sensor (KS) or other sensor. This may result in serious damage to the engine. If the knock sensor (KS) has been removed it must be reinstalled correctly. Ensure that the tread is clean and tighten sensor to 15 – 22 Nm (11 – 16 ft. lbs.) The wrong tightening torque may result in faulty signals from the knock sensor (KS). Please contact your nearest authorized Volvo Penta workshop for assistance.



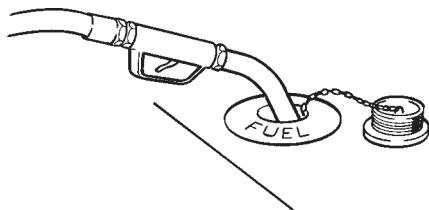
Engine protection

If oil pressure is too low and engine coolant temperature too high, the engine control module (ECM) engages a “protection program”. When this program engages, engine speed is limited to 2,500 rpm or lower. The protection program is also engaged if the control module receives abnormal signals from other sensors, and in the case of a fault in the control module itself. If the cause of the fault was not oil pressure too low or coolant water temperature too high (see also: **Operation**), contact your nearest Volvo Penta workshop for an inspection of the injection system.

The engine control electronics are protected against false signals and interference. However, always observe the following: Never mount a transmitter antenna and cabling close to the control module, as strong electromagnetic fields may interfere with the electronics. The engine should never be used as a ground terminal for any equipment.

Starting a flooded engine

If the engine has flooded it can be cleared by opening the throttle to 75% of WOT. The control module will turn off fuel injection for as long as the throttle is at 75% and the engine speed (starter speed) is below 400 rpm. If the throttle is opened or closed from 75%, the control module will return to normal operation.



Fuel

Use gasoline with an octane number of at least 93 (RON). The 7.4Gi, 7.4GSi and 8.2GSi fuel injected engines can be run on gasoline down to 90 octane (RON) if 93 octane fuel is not available. Some power will be lost when running on lower octane fuel. The engine is designed for unleaded gasoline and for environmental reasons should always be run on this type of fuel. Leaded fuel can be used if unleaded gasoline is not available. **NOTE!** In certain areas, Lake Constance for example, the use of leaded fuel is not permitted.

Never use lead additives as these may leave deposits on injectors and carburetor jets.

Alcohol in the gasoline (especially methanol), causes rubber and plastic components to age more quickly. This can result in fuel leakage.

Fuels containing methanol should therefore not be used to avoid damage to fuel system components. **This type of damage is not covered by the factory warranty.**

The ethanol content of fuels used must not exceed 10% and the gasoline **must** maintain the correct octane number.

When running the engine on fuels containing alcohol, a leaner fuel air mixture is required. This may cause idling problems, starting difficulties and vapor locks.

Gasoline mixed with alcohol as opposed to pure gasoline binds water. This can result in the increased corrosion of metal components in the fuel system. Check often and regularly.

For safety reasons all rubber or plastic components in the fuel system should be checked often and regularly. This includes components such as fuel lines, seals and fuel tanks. Always replace components you suspect are aged or damaged.

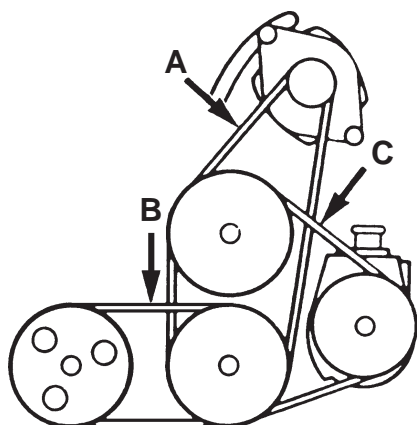
Maintenance and care

Volvo Penta engines and transmissions are designed for maximum service life and reliability. They are built to survive in a tough marine environment, but also to cause as little environmental impact as possible. In order for your engine and transmission to operate reliably, **regular maintenance** is necessary. This chapter describes the engine/transmission and how to carry out the most essential maintenance operations. The following chapter has a maintenance schedule which shows when maintenance operations must be carried out.

NOTE! Always use Volvo Penta Original Spare Parts, otherwise you run the risk of losing the original quality of the product, quite literally bit by bit.

⚠ WARNING! To prevent personal injury the engine must be turned off before starting maintenance work.

Engine

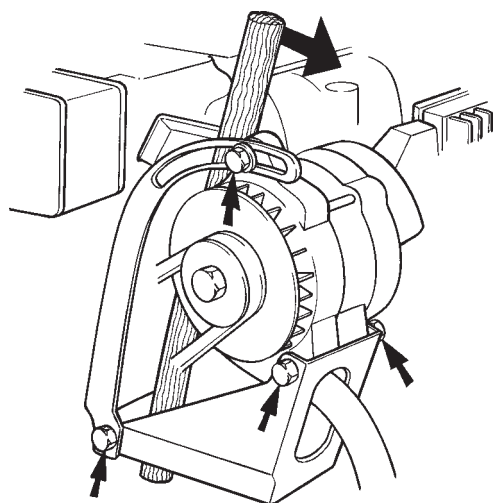


Drive belts. General

Check the tension and condition of the belts regularly. A belt that is too tight can damage the bearings and a belt that is too loose can result in slippage and poor charging, coolant water flow and power steering. Inspect and adjust after running the engine so that the belts are warm. Replace belts if they seem worn or are cracked.

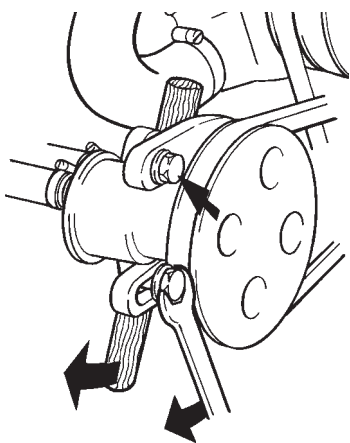
⚠ WARNING! Ensure that the ignition is off and the ignition key out before inspecting and tightening belts.

The correct belt tension has been achieved when the belt can be pressed down 6 – 13 mm (0.4 – 0.5 in) with normal thumb pressure at points **A**, **B** and **C**.



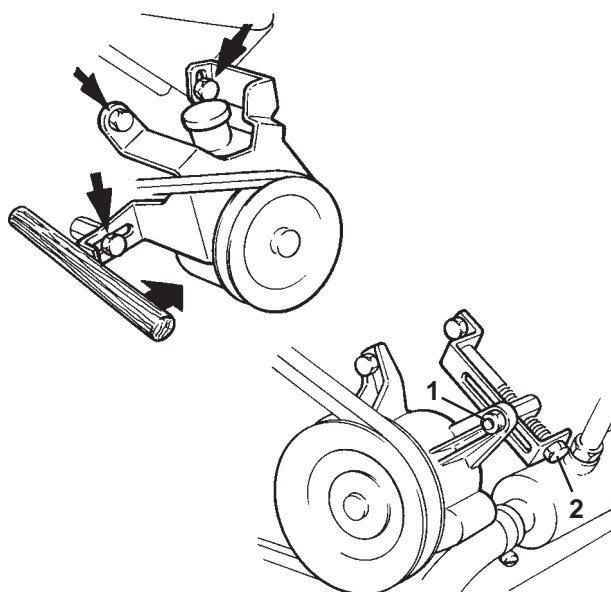
Drive belt. Generator

Check generator belt at **A**, in between circulation pump and generator pulleys. Undo the generator mounting screws. To increase belt tension prize out generator and tighten mounting screws without releasing the generator. Use a suitable wooden handle or similar to prize out the generator. Check belt tension again.



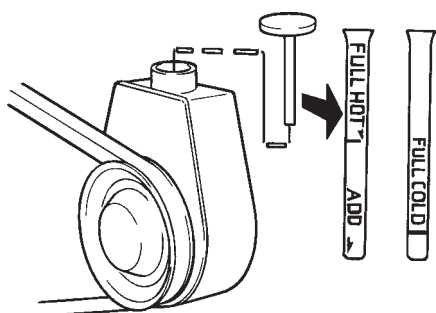
Drive belt. Seawater pump

Check seawater pump belt at **B**, in between crankshaft and seawater pump pulleys. Undo mounting screws between seawater pump and bracket. Prize out seawater pump to increase belt tension, tighten screws without releasing seawater pump. Use a suitable wooden handle or similar to prize out the seawater pump. Check belt tension again.



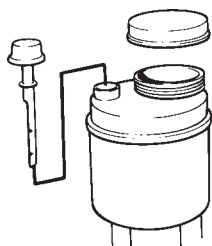
Drive belt. Power steering

Check power steering pump belt at **C**, in between circulation pump and power steering pump pulleys. Undo power steering pump mounting screws. On the 7.4GL, 7.4Gi prize out power steering pump to increase belt tension, tighten screws without releasing power steering pump. Use a suitable wooden handle or similar to prize out the pump. On the 7.4GSi, 8.2GL, 8.2GSi undo lock nut (1) and tension belt with tensioning screw (2). Tighten screw (1). Check belt tension again.



7.4 Gi/DP Power steering pump. Oil level

Check with the engine stopped. Turn the filler cap counterclockwise and remove. Check the oil level is between the MAX and MIN markings on the dipstick. Top up if necessary using ATF oil.



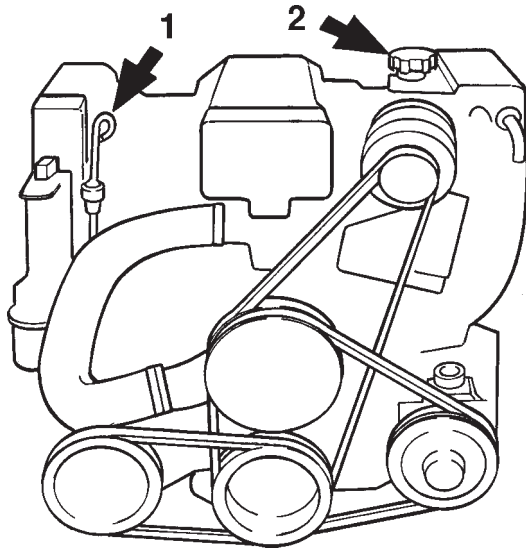
7.4 GSi/DPX, 8.2GL/DPX, 8.2GSi/DPX Power steering pump. Oil level

Check with the engine(s) idling. Remove the oil filler cap. The cap has a dipstick. The level should be between Max and Min on the dipstick. The level is higher when the engine(s) is/are not running, the level on the dipstick can therefore be misleading. Wipe the dipstick and screw on the cap so that the correct level is obtained with the engines running. Top up if necessary using ATF oil. See also page 46.

Lubrication System

The engine has a pressurized lubrication system. The oil pump sucks oil from the oil pan and then pumps it to the moving parts in the engine. The oil is cooled in the oil cooler and cleaned in the oil filter. Always use Volvo Penta original oil filters, they have an integral relief valve that allows the oil to by-pass the filter even if the filter is completely clogged.

⚠ IMPORTANT! With a new or reconditioned engine, the oil and oil filters must be changed after 20 hours of operation. After that they should be changed every 100 operating hours or at least once a year. Use only oils of the recommended grade: See the chapter **“Technical Data”**.



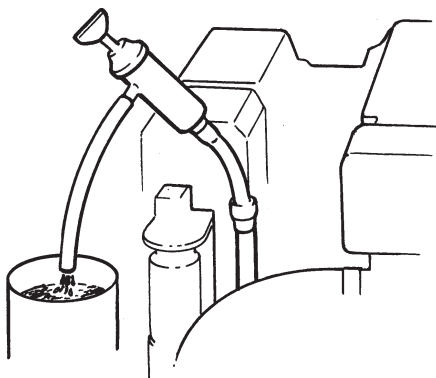
Oil level. Checking and topping up

Every day before starting check that the level is between the Max and Min markings on the dipstick (1) and that the level is sufficient for the planned journey.

Top up if necessary through the oil filler (2). See chapter **Technical Data** for the grade of oil.

High performance engines usually have a higher oil consumption than lower powered engines. Apart from lubrication, the most important function of the oil is to cool and remove heat from the internal components of the engine. High performance engines produce much more heat at full load than lower powered engines. So it is important that the correct oil level is always maintained. **Check oil level daily.**

⚠ IMPORTANT! Fill to the Max mark and no higher. The level must not drop below the Min mark.



Oil and oil filters. Replacement

The oil should be changed when the engine is hot. Stop the engine. Suck out oil through the oil scavenging/bilge pipe.

⚠ WARNING! Hot oil can cause burns.

Unscrew the old filter. **NOTE!** Avoid oil spillage. Check the mating surface of the engine is clean. Moisten the filter rubber gasket with a little oil. Screw on the new filter by hand until it is in contact with the mating surface. And then a further half turn but **no more!**

Top up oil to correct level. Start the engine and let it idle. Stop the engine. Check that there are no leaks round the oil filter and the oil level, top up if necessary.

NOTE! Collect up the old oil and filter for deposit at a proper disposal site.

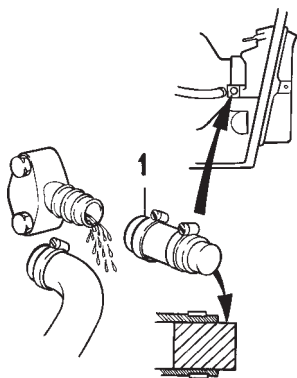
Cooling system

The cooling system is a seawater system, a freshwater system is available as an accessory for certain types of engine. The engine seawater pump sucks in water through the reverse gear (reverse gear oil cooler) and engine oil cooler. The thermostat regulates the flow of seawater to the engine cooling ducts, the circulation of water in the engine is controlled by a circulation pump. Freshwater cooled engines have a heat exchanger, the engine block cooling ducts are cooled by freshwater and the flow of freshwater to the heat exchanger, which is cooled by seawater, is regulated by the thermostat. The seawater is passed through the exhaust elbow pipe where it is mixed with the exhaust gases.

⚠ WARNING! If there is a risk of frost the cooling system must be drained. If the boat is left in the water, the seawater intake to the engine must be turned off with a seawater cock (non-standard equipment) or other method before draining the engine. If the water is not drained properly the boat may fill with water and sink. To prevent water remaining in the drive water ducts from freezing, the drive must be completely trimmed down in the water. Pump out the boat and ensure that there are no leaks before you leave the boat.

⚠ IMPORTANT! When laying up the boat for the winter it is important that the cooling system be flushed with freshwater so that deposits do not dry and to prevent the build-up of salt crystals.

NOTE! When pumping out the boat: check that bilge water does not contain oil or other chemicals that could damage the environment.



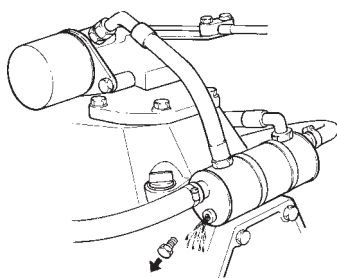
Cooling system. Draining

The cooling system should be drained in the following order:

1. Drive

Remove the seawater hose from the shield and close the hose connector with a plug (1)*, is held in place with a hose clamp. Water will flow in immediately the seawater hose is removed. Have tools, plug and hose clamp ready.

**Make this plug from a piece of 30 mm diameter hose (approx. 100 mm long). Plug one end of the hose with a piece of dowel or similar and hold the dowel in place with a hose clamp.*

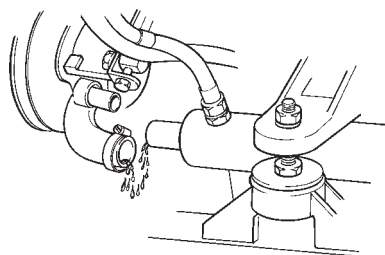


2. Reverse gear

Close the sea cock and remove the port side drain plug.

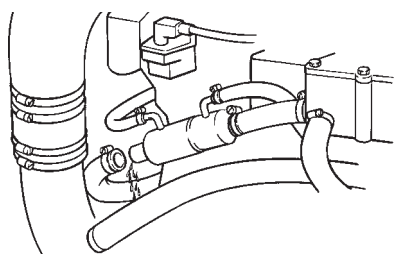
3. Oil cooler (engine)

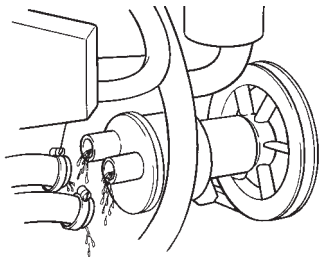
Remove any coolant water hose from the radiator, remove the radiator mountings and tip the open connection so that all the water can run out.



4. Oil cooler (power steering)

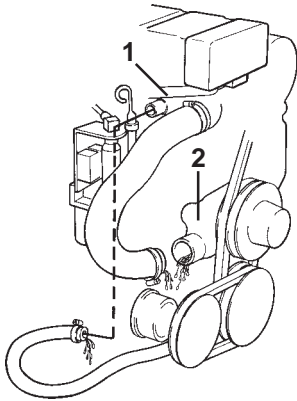
Remove the lower coolant water hose to drain it.





5. Seawater pump

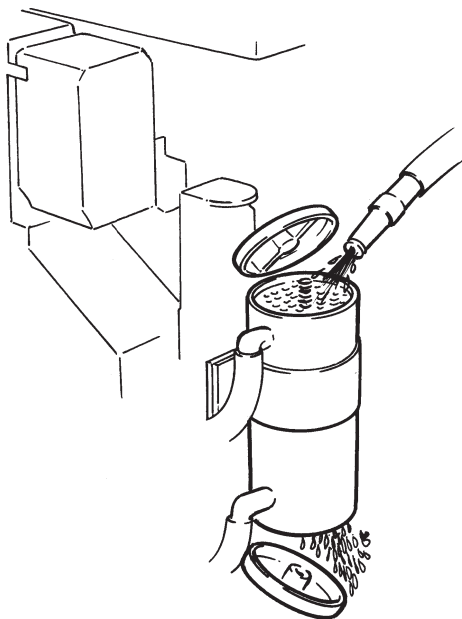
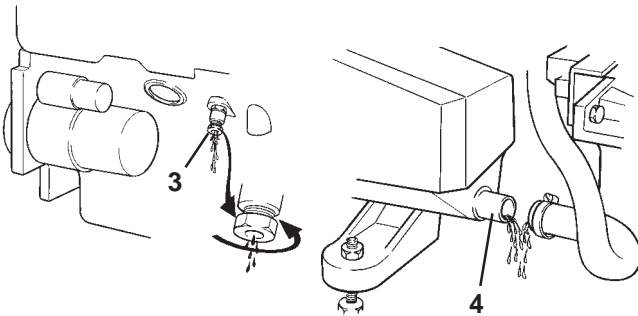
Undo the hose clamps, disconnect hoses from the water pump and let the water run out. Turn the engine with the starter motor for a second (the engine must not start!) so that the water remaining in the seawater pump comes out.



6. Engine block (seawater cooled)

Remove the longer of the coolant water hoses from the thermostat housing (1). Bend down the hose and let it drain completely. Remove the larger hose at the circulation pump (2). Remove port and starboard plugs (3) on the engine block and remove coolant water hoses from the exhaust pipes (4). Ensure that all water has run out of the engine block, exhaust pipes, oil cooler and hoses. Reinstall all hoses (apart from the one on the shield) and drain plugs.

⚠ IMPORTANT! Tighten all hose clamps and plugs. Do not forget to reconnect the seawater hose to the shield before the engine is started again.



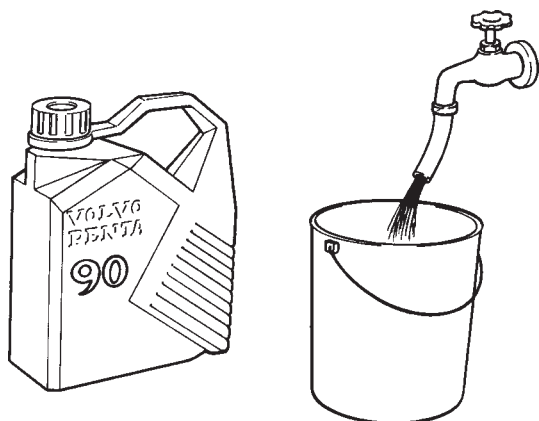
7. Engine (freshwater cooled)

Check the freshwater system antifreeze if uncertain about its strength. If antifreeze protection is not strong enough the freshwater system must be completely drained and refilled. (See page 35)

⚠ WARNING! The coolant system of a hot engine is under pressure. Open the filler cap with care. Steam or hot coolant may spray out. Turn the pressure cap to the first stop and let any pressure escape from the system before removing the cap.

Draining the cooling system seawater component: Drain in accordance with points 1 – 5. Remove coolant water hoses from the exhaust pipes. Remove heat exchanger end plates and flush heat exchanger. Reinstall all hoses (apart from the shield hose on the DP, DPX), heat exchanger end plates and reverse gear oil cooler drain plug.

⚠ IMPORTANT! Re-tighten all hose clamps, plugs and heat exchanger end plates. Do not forget to reconnect the seawater hose to the shield (DP, DPX) before the engine is started again.



Cooling system. Inhibiting

When laying up the boat for the winter it is important that the cooling system be flushed with freshwater so that deposits do not dry and to prevent the build-up of salt crystals. Seawater in the system causes corrosion when air is introduced and can cause the build-up of salt crystals that could block the system. Flush clean freshwater cooled (seawater component) and seawater cooled engines. This work should be carried out with the boat out of the water.

Flush the cooling system by removing the intake seawater suction hose (connected to the drive and the sea cock on reverse gear engines). Remove hose at engine and reverse gear oil cooler. Connect another hose of a suitable length and put its other end into a bucket of freshwater. Keep the container filled. Remove the thermostat from seawater cooled engines, reinstall thermostat housing.

Start the engine and let it idle for a few minutes. Stop the engine. Remove the heat exchanger end plates on freshwater cooled engines and flush the heat exchanger. Reinstall the end plates.

⚠ IMPORTANT! The pump must never run dry.

NOTE! Ensure that nobody is splashed with water spraying out of the exhaust outlet.

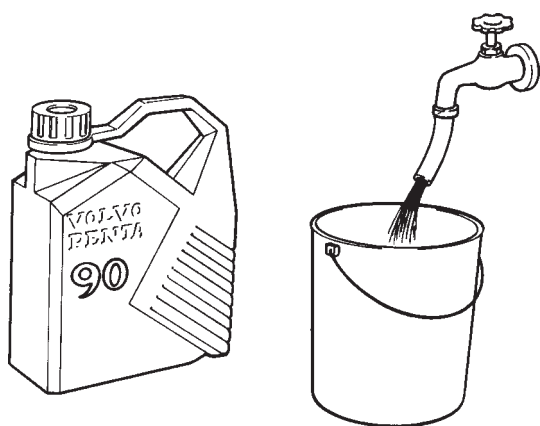
To avoid corrosion in the coolant water ducts these should be filled with either a 50/50 mixture of freshwater and glycol, or emulsifying oil. Fill a bucket with either the 50/50 mixture or the oil. If possible fix up an overflow return to the bucket (or another bucket). Start the engine and let it idle. Stop the engine if the bucket starts to empty and needs filling

⚠ IMPORTANT! The pump must never run dry.

Start over. When the engine has been running for a few minutes the entire cooling system will have been flushed and filled with the mixture. A 50/50 mixture of glycol and water will not need to be drained. If emulsifying oil is used, it must be drained if the temperature is likely to drop below freezing while the boat is laid up.

⚠ IMPORTANT! Emulsifying oil provides no antifreeze protection and must be drained if freezing temperatures are likely.

To drain see **Cooling System. Draining**



Freshwater systems. General

To avoid corrosion damage the freshwater engine coolant system must always be filled with a mixture of freshwater and additives.

NOTE! Never use only freshwater. To avoid corrosion damage in freshwater systems replace engine coolant as the anti-corrosion additives are depleted.

For coolant change intervals, see Changing Coolant. To avoid reduced cooling performance caused by scaling in the coolant system it should be flushed when it has been drained.

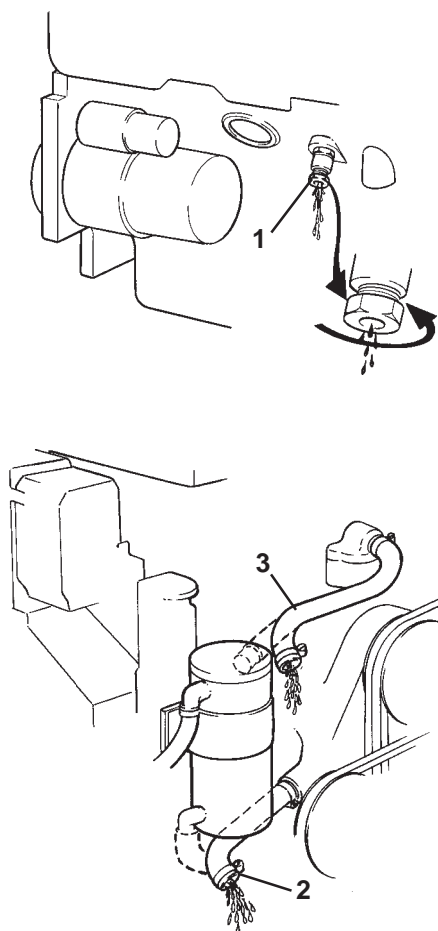
When there is a risk for freezing the engine coolant system must be filled with a mixture of 50% Volvo Penta antifreeze and 50% clean water. This mixture will protect against freezing to a temperature of approx. -40°C (-40°F) and should be used all year round.

NOTE! There should be at least 40% antifreeze in the system for complete protection against corrosion. The volume of the freshwater system is about 20 liters (5.3 US gallons).

Freshwater systems. Replacing the coolant

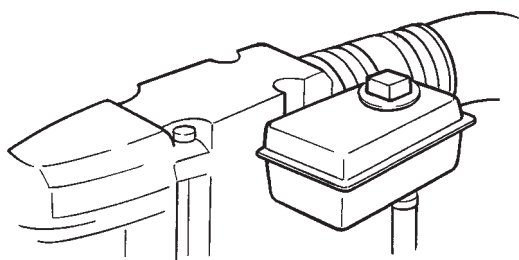
The additives that protect from corrosion become less effective over a period of time and the coolant must be changed. If the freshwater system is filled with anti-freeze mixture it must be changed every other year. If the system is filled with anti-corrosion agent mixture it must be changed every year.

To avoid reduced cooling performance caused by scaling in the coolant system it should be flushed when it has been drained.



Freshwater systems. Draining

Remove expansion tank filler cap. Remove port and starboard engine block plugs (1). Check that the water is running out, unblock plug holes with wire if necessary. Remove hose (2) at heat exchanger. Bend hose down to drain off remaining water from circulation pump. Remove thermostat housing hose (3) and drain off any remaining water. Reinstall all plugs and hoses before filling with new coolant. Re-tighten all hose clamps and plugs.



Freshwater systems. Topping up

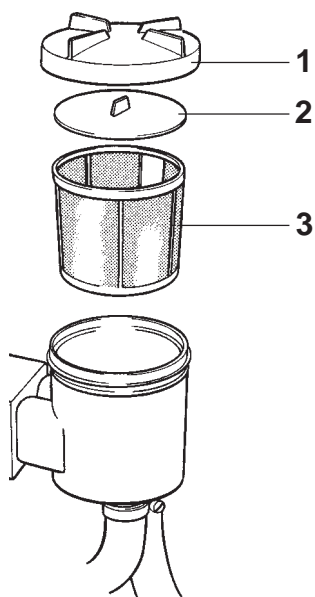
Turn the pressure cap to the first stop and let any pressure escape from the system before removing the cap. Fill coolant to a level between the **Max** and **Min** markings. Reinstall the cap.

NOTE! The coolant level must **not** be below the **Min** mark in the expansion tank. exchanger.

⚠ WARNING! Open the filler cap with care. Steam or hot coolant may spray out.

A completely empty cooling system should be filled slowly so that trapped air can get out. Fill with coolant to correct level. Start engine and let it idle until it reaches normal operating temperature. Stop engine and let it cool down. Check coolant level and top up if necessary to correct level.

⚠ IMPORTANT! The engine should never be run if there is no water supply to the sea water pump.



Seawater filter. Cleaning

The seawater filter is an accessory for reverse gear engines. Screw off cover (1) and remove seal plate (2). Lift out and clean the insert (3).

NOTE! If the boat is used in water that contains a lot of contaminants or seaweed, the filter must be checked more frequently than indicated in the maintenance schedule. Otherwise there is a risk the filter will clog and the engine will overheat.

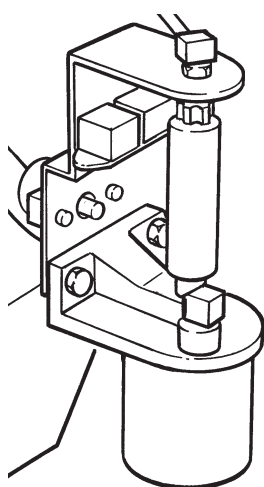
⚠ WARNING! Stop the engine before removing the cover on the seawater filter.

Fuel system

An electrical feed pump sucks fuel from the fuel tank through the fuel filter to the fuel injection system or to the carburetor. The fuel pump and fuel injection system are fused, see **Electrical System**.

⚠ IMPORTANT! All work on the engine fuel injection system (7.4Gi, 7.4GSi, 8.2GSi) must be carried out at an authorized workshop.

⚠ WARNING! Be extremely careful when replacing fuel filters or other service work on the fuel system. Gasoline is highly inflammable and can be extremely explosive in certain circumstances. Before starting work: switch off the ignition and allow the engine to cool completely. There must be no smoking, naked flames or sparks in the immediate vicinity. Place a rag under fuel connectors and filters when removing. Remove the rag and any fuel spillage immediately and dispose of it in a safe place. When work has finished: check carefully that there are no leaks. Check both before and after starting the engine. Run the engine compartment fan for at least 4 minutes before starting the engine.



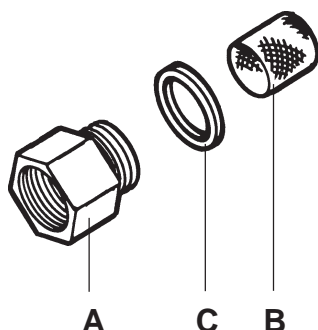
Fuel filter

The fuel filter is located upstream of the fuel pump. Unscrew the fuel filter counterclockwise. Avoid fuel spillage.

⚠ WARNING! The old filter contains inflammable fuel. Dispose of the filter safely.

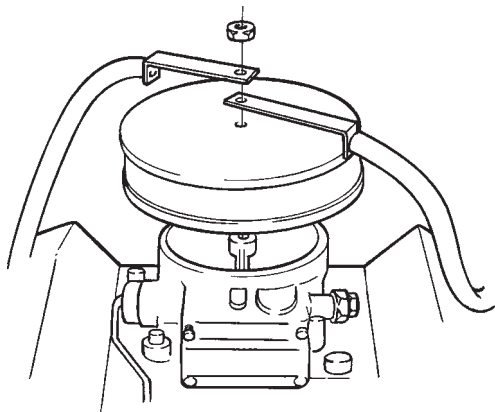
Check that the mating surface on the engine is absolutely clean. Lightly lubricate the rubber seal on the filter, screw the new filter into place by hand until the seal is in contact with the engine. Then tighten the filter a further 1/2 turn.

NOTE! Fuel injection models 7.4Gi, 7.4GSi, 8.2GSi have a fuel filter with a 5-10 micron filter action. Always use an original Volvo Penta filter to ensure that the correct filter is used.



Carburetor filter

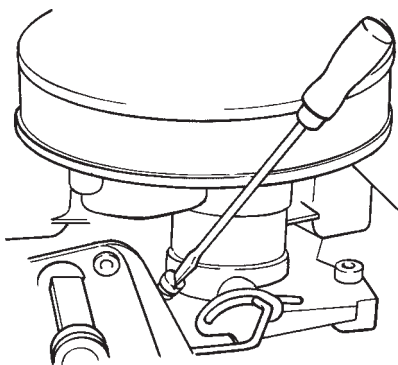
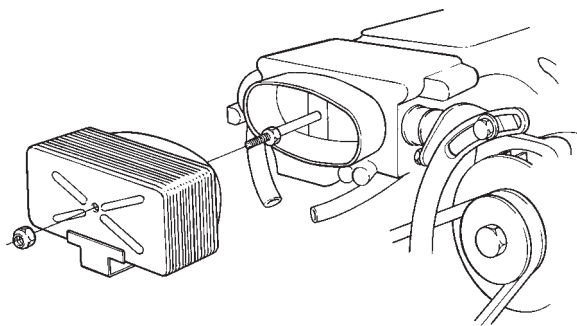
Models 7.4GL and 8.2GL have a fuel filter located at the connection between the fuel line and the carburetor. Check the filter at least once per season or as necessary. Check: Remove fuel line and remove nipple **A** in the filter housing (avoid fuel spillage!) Filter **B** can now be removed for inspection. Note spring inside filter (8.2GL). Wash filter in kerosene or similar. Reinstall in reverse order. Check seal **C** between nipple and filter housing and replace it if necessary. Start the engine and check that no connections are leaking.



Flame trap

The flame trap should be cleaned annually. Remove flame trap and clean in kerosene or other solvent. Blow through with compressed air and check for damage. Reinstall flame trap, check that flame trap is securely mounted.

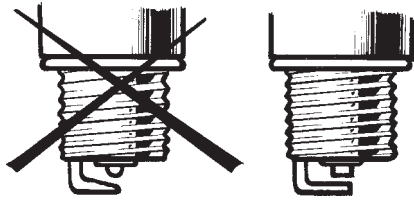
⚠ WARNING! To avoid the danger of an explosion or fire in the engine compartment, the engine must always have an undamaged flame trap securely installed.



Carburetor adjustment (7.4GL, 8.2GL)

Changes in fuel, temperature or altitude (high level lakes) may make it necessary to adjust the carburetor idling setting (see figure) and the fuel mixture. Before making adjustments, ignition timing (including spark plug gap) and the state of the flame trap must be checked.

NOTE! The engine should be hot when idling speed and fuel mixture are adjusted. An authorized Volvo Penta Service workshop should set the fuel mixture. A workshop tachometer should be used when setting idling speed.



Spark plugs

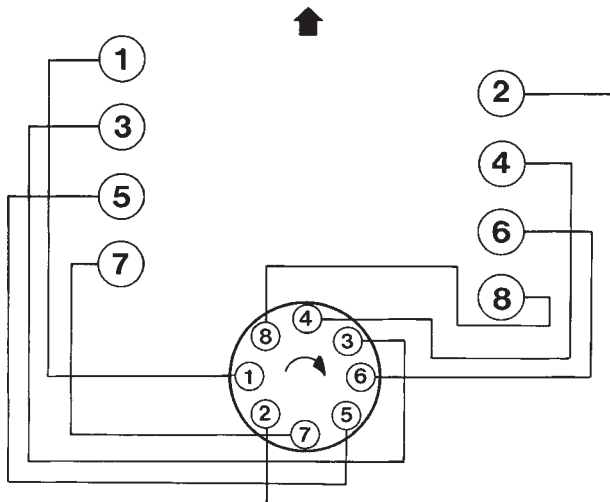
Always clean the area around the spark plugs before removing them. Remove spark plug and clean. Check the electrode gap with a feeler gauge, adjust the gap if necessary. Replace the spark plug if the edges of the electrodes are rounded or if the ceramic spark plug body is damaged. See chapter: **Technical Data** for spark plug type and electrode gap.

⚠ WARNING! The wrong type of spark plug can cause operating problems and engine damage. Do not run the engine if the ceramic spark plug body is damaged. Damaged spark plugs can cause sparks and ignite fuel vapor in the engine compartment.

Ignition cables and distributor cap

Clean ignition cables and distributor cap. Check that the cables are in good condition and that the distributor cap is not cracked. Replace if damaged. Other distributor components are maintenance free.

⚠ WARNING! To minimize the risk of fire and explosion Volvo Penta ignition components meet national and marine safety standards. The use of components that do not meet safety standards (automobile components for example) can cause a fire or explosion on board.

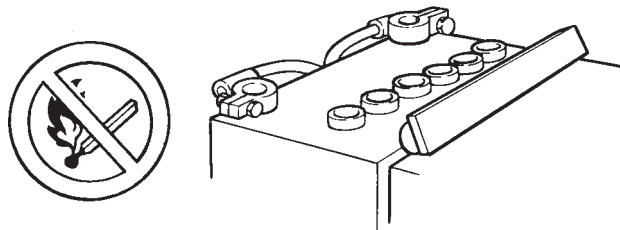


If ignition cables are removed, ensure that they are reinstalled in the correct order. The arrow points to the front of the engine. Firing order 1-8-4-3-6-5-7-2

Electrical system

The electrical system has a voltage of 12 V. The generator has a charging regulator to make it more effective. The engine also has semi-automatic and normal fuses which cut off the current if there is an overload. There are also fuses for the trim pump and the Power Trim controls.

⚠ WARNING! Danger of explosion! Never allow an open flame or sparks near the battery area. Always use eye protection when working with the batteries. The battery electrolyte contains extremely corrosive sulfuric acid. If electrolyte comes into contact with the skin: Wash it off with soap and plenty of water. If battery acid comes in contact with the eyes, immediately flush with copious amounts of water. Contact a doctor immediately.



Electrolytic corrosion

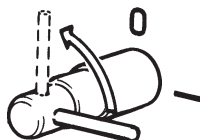
To protect the drive and propeller against galvanic corrosion your boat and its propulsion unit have galvanic corrosion protection. Leakage current from the electrical system will prevent this protection system from working and result in major damage. Leakage current from the electrical system can be caused by faulty equipment or incorrect installation of electrical equipment.

⚠ IMPORTANT! Electrolytic corrosion as a consequence of leakage currents may cause serious damage to your boat's equipment within a short time. Work on the boat's low voltage circuit should only be carried out by qualified/experienced personnel. Installation or work on the shore power equipment must only be carried out by electricians authorized to work with high-voltage installations.

The following should always be observed: Route and clamp electric cables so that they will not be exposed to damp or bilge water in the keelson. The main engine switch must be connected to the positive (+) terminal on the battery, and cuts off all power consuming equipment as soon as the engine is stopped. If an extra battery has been installed then

there must be separate switches for extra equipment. There should also be a main switch between the auxiliary battery positive terminal and the electrical equipment fuse strip. The main switch for the auxiliary battery must cut off all power consuming equipment connected to that battery and be turned off when power is no longer needed. The engine or drive must not be electrically connected to other equipment such as the trim plane, bathing steps etc. The engine and transmission must not be used as ground points for radio or navigation installations or other electrical equipment with separate ground cables. **All separate ground cables must have a common ground point, separated from the engine and transmission.** If shore power is connected a protective ground should not be connected to the engine or to any other ground terminal on the boat. Transformers connected to shore power must be installed so that the protective ground on the input side (120/220 V) and the negative connection on the output side (12 V) are not connected.

⚠ IMPORTANT! Turn the engine off and switch off power at the main switches before carrying out work on the electrical system.



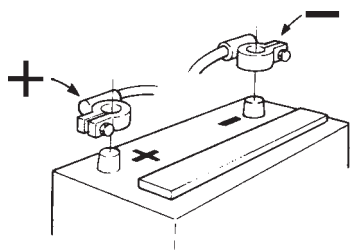
Main ON/OFF power switch

The main switch must never be turned off before the engine has stopped. If the circuit between the generator and the battery is cut off when the engine is running the generator can be seriously damaged. Engine electronics (fuel injection engines) may also be damaged.

For the same reason charging circuits must never be switched over while the engine is running. To simultaneously charge two independent battery circuits, fit a Volvo Penta charge distributor (accessory) to the regular generator.

Generator

Check belt tension regularly, replace belt if they appear worn. See under heading "Engine".



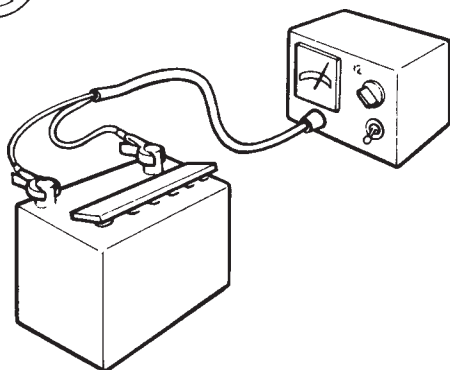
Batteries

Never mix up the battery positive and negative terminals, this can cause serious damage to electrical equipment.

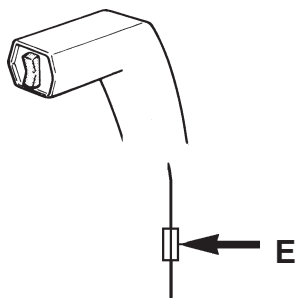
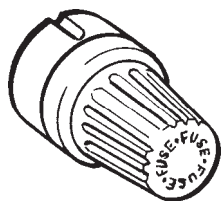
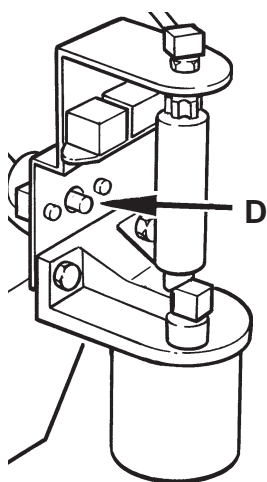
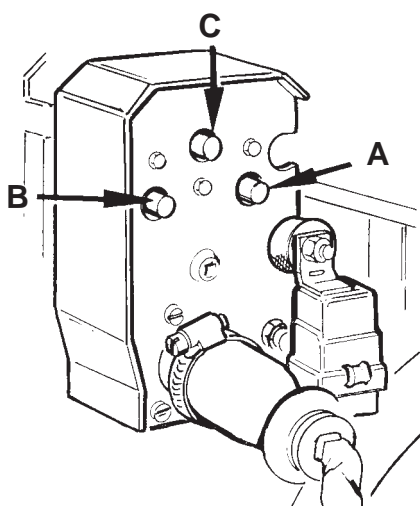
Charging

Avoid boost charging the batteries. If boost charging is necessary then both battery leads must be removed from the battery. Never use a boost charger unit to jump start an engine.

When charging, unscrew filler plugs but leave them in their holes. Ventilation should be good, particularly if the batteries are being charged in an enclosed area. Always switch off the charging circuit **before** removing the battery charger connectors.



⚠ WARNING! Danger of explosion! Never allow an open flame or sparks near the battery area.



Fuses in the electrical system

If the engine cannot be started or if all instruments read zero, an engine fuse can have blown. Depending on its model the engine has one or more automatic fuses that cut off the electrical system if it overloads. The fuse has a reset button. Always investigate the cause of an overload before resetting the fuse.

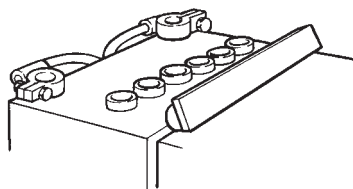
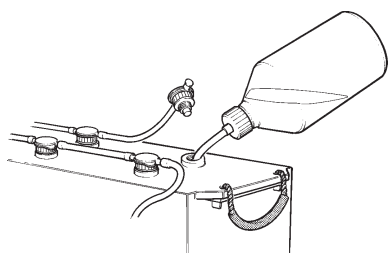
NOTE! Extra equipment requires its own fused circuits. Power should be taken from the battery (or from a contact unit intended for this purpose). Boats with Volvo Penta instrumentation also have two power take off terminals for accessories under the instrument panel. One fused for up to 5 A and one not fused for up to 20 A.

The Power Trim electrical circuit is protected by a 50 A automatic fuse (A). Automatic fuse (B) is 60 A (50 A in the 8.2GL) and protects the main engine cabling. Automatic fuse (C) in the 7.4Gi, 7.4 GSi and 8.2GSi, is 12.5 A and protects the engine control module (ECM). Automatic fuse (D) is 20 A and protects the fuel pump. The fuses are located to starboard of the engine.

The engine also has two 8 A fuses in the instrument panel that protect the starter and system power. See: chapter **Instrumentation**.

The control lever and integrated Power Trim button has a 5 A fuse (E) in its cabling.

IMPORTANT! Always carry extra fuses on board.



Battery. Battery electrolyte levels

The electrolyte should be 5 – 10 mm (0.2 – 0.4 in) over the plates in the battery. Top up if necessary using **distilled water**. Charge the battery after topping up for at least 30 minutes by running the engine at fast idle. NOTE! Certain maintenance-free batteries have special instructions which must be followed.

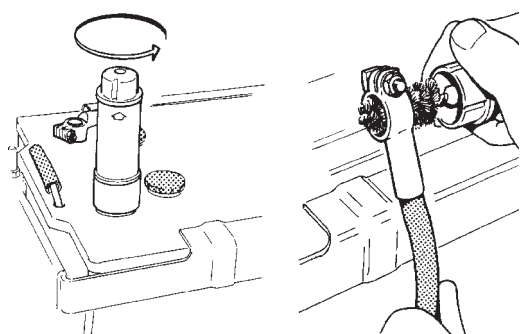
⚠ WARNING! Danger of explosion! No naked flames or sparks. Battery electrolyte is highly corrosive. If it gets in the eyes, flush with water. Contact a doctor immediately.

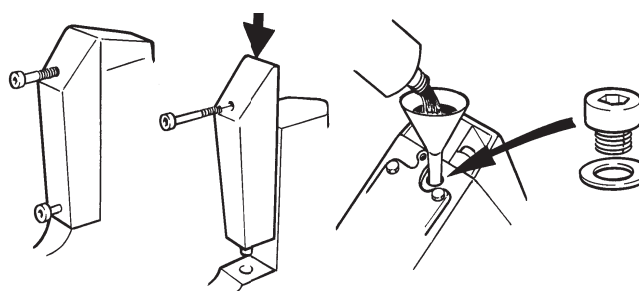
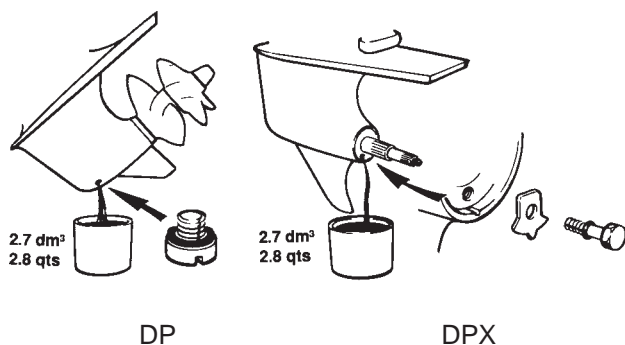
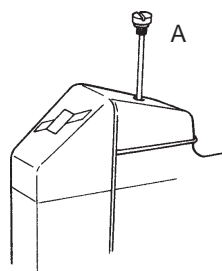
Battery and electrical connections

The service life of your batteries depends largely on how they are maintained. Keep batteries dry and clean. Oxidation or dirt on the battery and battery terminals can cause short-circuits, voltage drop and discharge especially in damp weather.

Clean the battery terminals and leads to remove oxidation using a steel brush. Tighten the cable terminals well and spray the battery terminals and connections with anti-corrosive agent or coat them with Vaseline. Also check that all other electrical connections are dry and free of oxidation and that there are no loose connections. If necessary, spray these connections with a water-repellent spray (Volvo Penta Universal oil).

⚠ IMPORTANT! Never mix up battery positive and negative terminals.





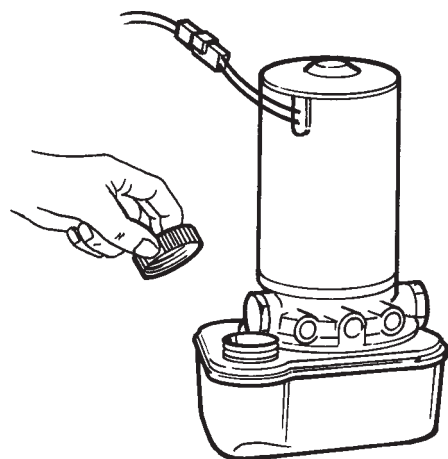
Changing oil in drives

Remove the oil dipstick (A). Trim the DP drive up as far as possible, trim the DPX drive in (forward) as far as possible. Remove the plug on the gear housing and let the oil run out. If oil is discolored, contact an authorized Volvo Penta workshop. Reinstall plug and o-ring. Always replace a damaged o-ring. Remember the environment, dispose of the oil at a proper disposal site.

Remove cover and remove oil filler plug and o-ring. Fill with oil. See "Technical Data" for grades and quantity. Let down the drive.

After a while check the oil level with the dipstick. The dipstick should **not** be screwed down when checking the level. If the level is too high oil must be drained off. If the level is too low top up with oil through the dipstick hole.

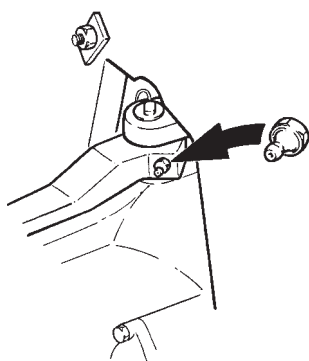
Check the tightening of the dipstick and bottom plug. Reinstall the cover.



Power Trim pump, oil level

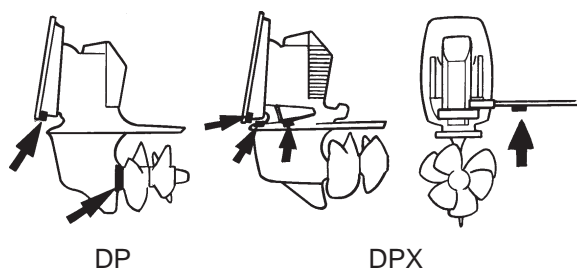
Trim the drive in as far as possible. Check the oil level is between the MAX and MIN markings on the oil container. Top up if necessary using ATF oil. Cleanliness is extremely important, no dirt must get into the drive when topping up with oil.

If the system has been drained, fill with new oil and trim the drive in and out 6 – 10 times to vent the system. Check the oil level and top up if necessary.



Steering bearing lubrication (DP)

Lubricate steering bearing with a grease gun. Use water resistant grease. Press in grease until it is forced out of the bearing.



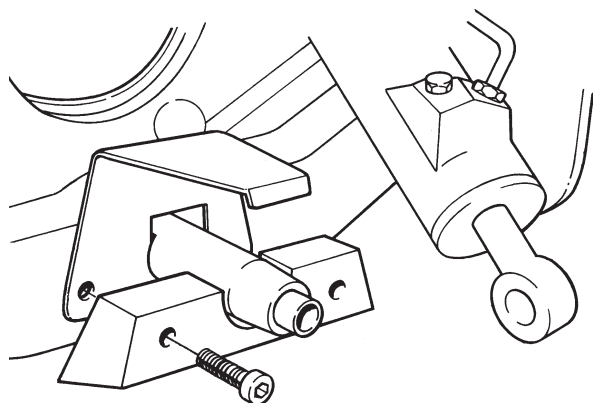
Checking corrosion protection

Sacrificial anodes should be replaced when they are half corroded. The oxidation layer on the corrosion protection should be rubbed down with emery cloth before launching the boat. Never use a wire brush or other steel tool.

The **DP drive** has a zinc ring* mounted on the gear housing in front of the propellers. To replace the zinc ring: Remove the propellers, undo the zinc ring screws and remove the ring. Scrape the mating surface on the gear housing clean to provide good contact with the new ring. Install the ring. There is a zinc anode** on the lower edge of the support shield. Undo the two screws holding the anode. Remove the anode and the support plate under the anode. Clean the mating surface and install the new zinc anode. Do not forget to reinstall the support plate.

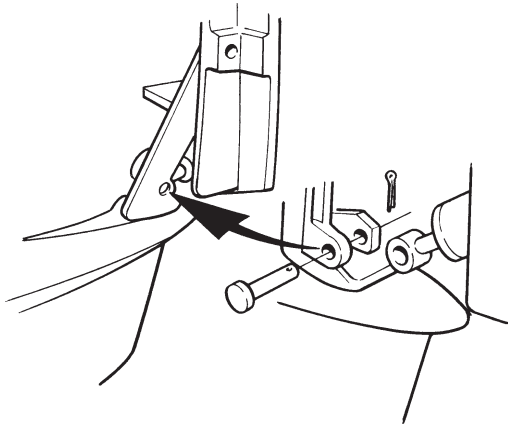
**Replace with a magnesium ring (VP P/N 876138-9) if the boat is being used mainly in freshwater.*

*** DP drives with stainless propellers (accessory) should have two zinc anodes on the shield (mounted with two screws VP P/N 963701-8 and two spacers 854486-8).*



The **DPX drive** has zinc anodes mounted at the front edge of the top of the cavitation plate, on the steering cylinder housing and the rear edge of the gear housing. Twin and triple installations also have zinc anodes on the parallel strut. All anodes are screw mounted. Note that there is a ground cable mounted on one of the screws. Undo the screws holding the anode. Clean the mating surface and install the new zinc anode. There is a zinc anode on the lower edge of the support shield. Undo the two screws holding the anode. Inside the anode is a plate holding the trim sensor in place. Clean the mating surface. Check carefully that the plate locks the trim sensor in place before the zinc anode is installed and screws are tightened.

For detailed information about corrosion, see page 39.

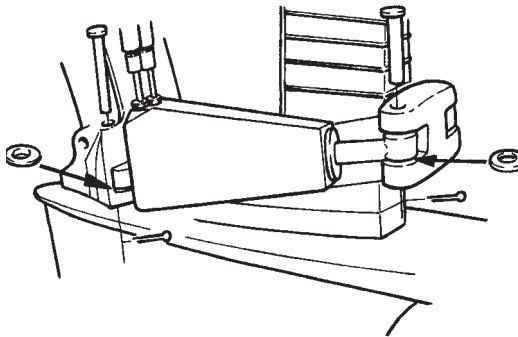


Bellows. Replacement

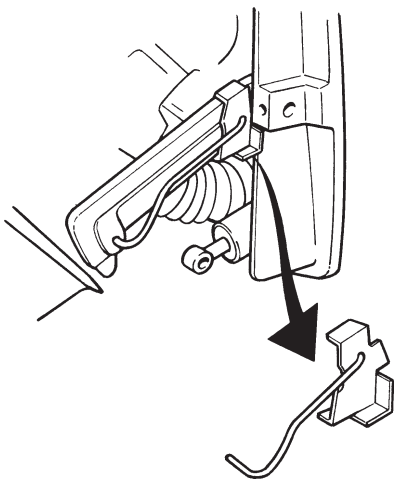
Check the condition on the universal joint and the exhaust bellows every year. If there are cracks or other defects they must be replaced. Otherwise replace every other year. The drive may need to be removed from the support fork to replace the bellows. Removal of the drive requires special knowledge and tools. If in doubt contact your Volvo Penta workshop for assistance.

⚠ WARNING! Never work on the drive bellows or hydraulic system without locking the drive in its raised position so that it cannot fall down. A falling drive can cause serious personal injury.

Tool 885143-8, when properly installed, prevents the drive falling. Install the tool as follows: Trim the drive down to 0. Remove cotter pins and knock out trim cylinder bolts.

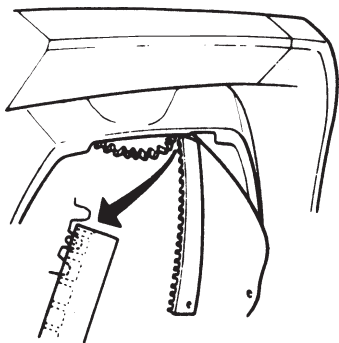


DPX: Also remove steering cylinders by removing pins. Tie up the steering cylinder so that they do not hang in the way.

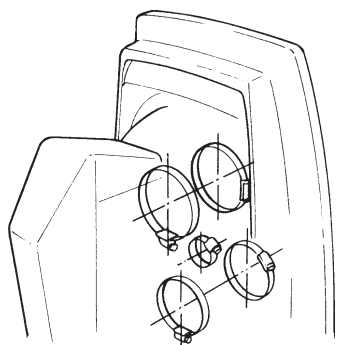


The drive can now be lifted by hand to its raised position. Hold the drive steady in this position and install the tool on the starboard side as illustrated. Carefully check the bellows for damage. The exhaust bellows can be replaced without removing the drive.

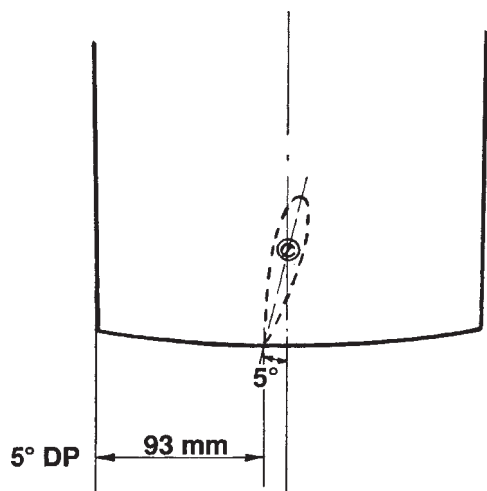
⚠ WARNING! Do not overload the tool by standing on the raised drive.



DP: If the drive has been removed the steering rack and drive controlling the trim sensor may have come out of position. Turn the cog until the notched tooth is visible. Install the steering rack so that the first cog position meshes with the marked tooth.

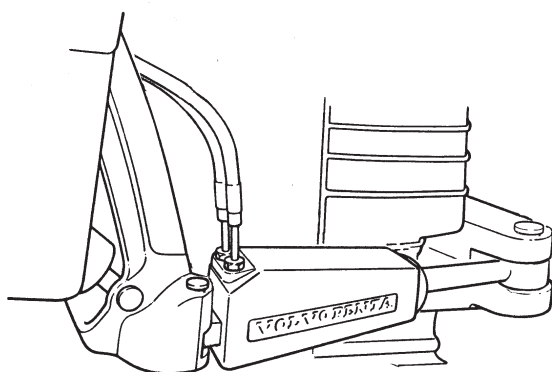


DP, DPX: Hose clamp screws should be located as illustrated when tightened.



Adjusting the trim fin, DP

There are two versions of the DP drive. One has a trim fin which is set at the factory. This setting applies to all installations, even twin drives. If the trim fin needs to be reset, undo it from the underside of the cavitation plate. Turn the fin in accordance with the measurements in the figure and tighten it.



DPX, Xact™ Steering system

To ensure safe and reliable steering follow these instructions: Check steering system oil level every two weeks to detect changes. The oil level should not normally change, oil consumption is negligible over a year. If the oil level drops there is probably a leak. This leak must immediately be localized and remedied. Please contact your nearest authorized Volvo Penta workshop for repairs. The steering system is filled with

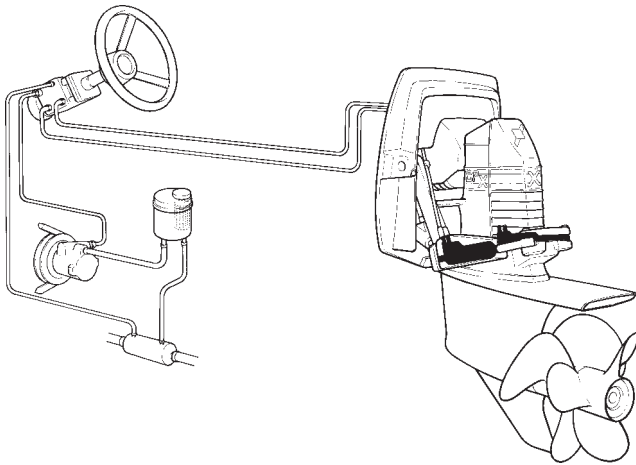
ATF oil, the oil should not have to be changed. As long as the oil is red and contains no visible contaminants you do not need to change the oil. If the color of the oil changes to black or contains visible contaminants you must change the oil. The oil should also be changed if the steering system has been opened for servicing.

⚠ WARNING! Always use the recommended grade of an ATF oil from a recognized manufacturer. Never fill the steering system with an unknown grade of oil. **The wrong type of oil can negatively affect steering, and at worst steering can be lost altogether.** The wrong oil can also damage steering system components.

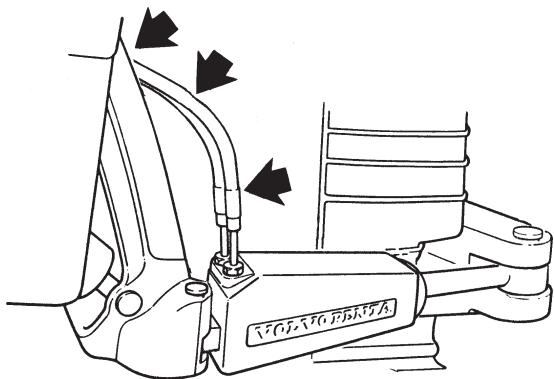
Venting

If the steering system hydraulic circuit has been removed or dismantled, the system must be vented. Venting is easier if you have an assistant.

⚠ WARNING! Be extremely careful that hands, clothes, hair, necklaces and tools do not come into contact with engine drive belts or pulleys.



Fill the system. Start the engine(s). The steering system engine circuit is automatically vented when the engine has been running for 2–3 minutes. Other parts of the system are vented as follows: Turn the wheel 2–3 times port and starboard to full lock. Check the oil level as the wheel is being turned and top up as necessary. The oil level can drop rapidly when the wheel is turned. Be ready to top up the oil immediately so that no air is sucked into the system. Check the oil level one last time with the dipstick and top up as necessary. Check that there are no leaks before running, particularly if the system has been dismantled. Also check that all connections have been tightened properly.



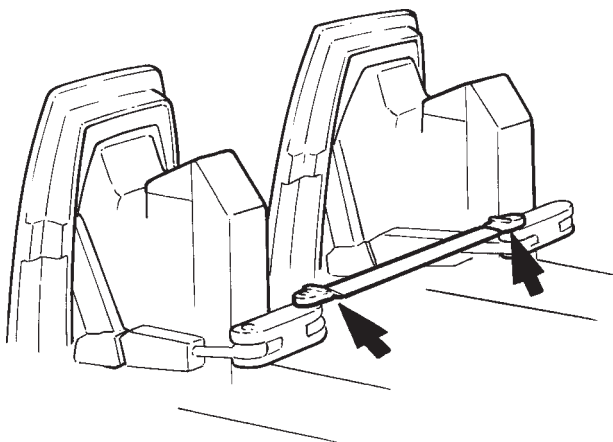
Checking hydraulic hoses

Carefully check the steering system's hydraulic hoses for wear and cracks. Check external hoses especially carefully, as these have been exposed to water fatigue. Hoses must be replaced if at all damaged.



WARNING! A leaking hydraulic hose can negatively affect steering, and at worst steering can be lost altogether. Cleanliness is extremely important, no dirt must get into the hydraulic system. Before removing, clean and note carefully how hoses are routed and connected.

Faulty routing or dirt in the hydraulic system can negatively affect steering, and at worst steering can be lost altogether. Please contact your nearest authorized Volvo Penta workshop for assistance.



Checking parallel strut

The parallel strut (twin and triple installation) is a vital safety component. Inspect it carefully if the drive kick-up function has been triggered by the boat going aground or hitting an object in the water. Check parallel strut ball joints and for cracks or other damage annually.

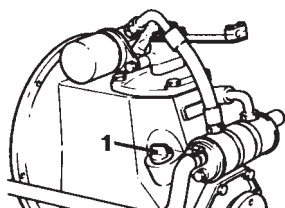


WARNING! If the parallel strut shows signs of damage, run at reduced speed to harbor. The parallel strut is a vital safety component, damage may affect steering characteristics. In the worst case steering could be lost altogether. Never align or weld a damaged parallel strut. Please contact your nearest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

Reverse gear HS1

The HS1 reverse gear is hydraulic, which means that gear shifting is hydraulic. The reverse gear hydraulic system is controlled by wire from the control lever. The reverse gear lubrication system has an oil filter and oil cooler.

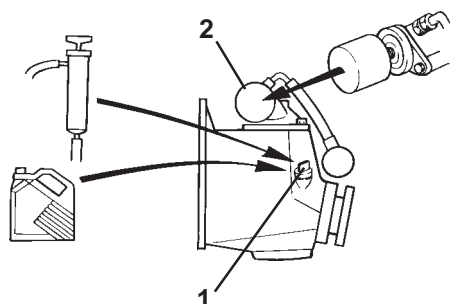
⚠ IMPORTANT! Volvo Penta recommends the installation of a seawater filter to guarantee the proper coolant water flow to the engine and reverse gear. Contaminants in the seawater will otherwise foul the reverse gear radiator and other cooling system components. Regular inspection and cleaning of the filter is necessary to guarantee full coolant water flow.



Reverse gear oil level

Level should be within the area marked on the dipstick. Do **not** screw down the dipstick when checking level. Top up if necessary through the oil filler (1). Use only oils of the recommended grade: See the chapter **Technical Data**.

⚠ IMPORTANT! Do not fill the oil above the MAX level.

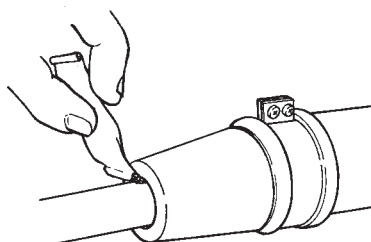
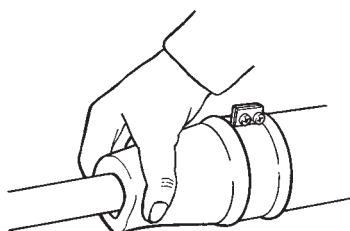


Reverse gear. Oil change

Oil is sucked up using an oil bilge pump through the hole for the dipstick (1). Replace oil filter (2).

NOTE! The old filter contains oil. Dispose of the filter properly, think of the environment.

Top up oil to correct level. Start engine and run at 1,500 rpm for a few minutes so the reverse gear oil cooler is filled with oil. Stop engine and check oil level. Top up if required. Use only oils of the recommended grade: See the chapter **Technical Data**.



Propeller shaft seal. Reverse gear

If the boat has a Volvo Penta shaft the shaft seal must be vented and lubricated directly after launching.

Vent the bushing by pressing it together while pressing down on the shaft until water appears. Then press in approx. 1 cm³ (0.06 in³) **water repellent** grease in the seal.

⚠ IMPORTANT! The seal must be replaced every 500 running hours or every 5th year.

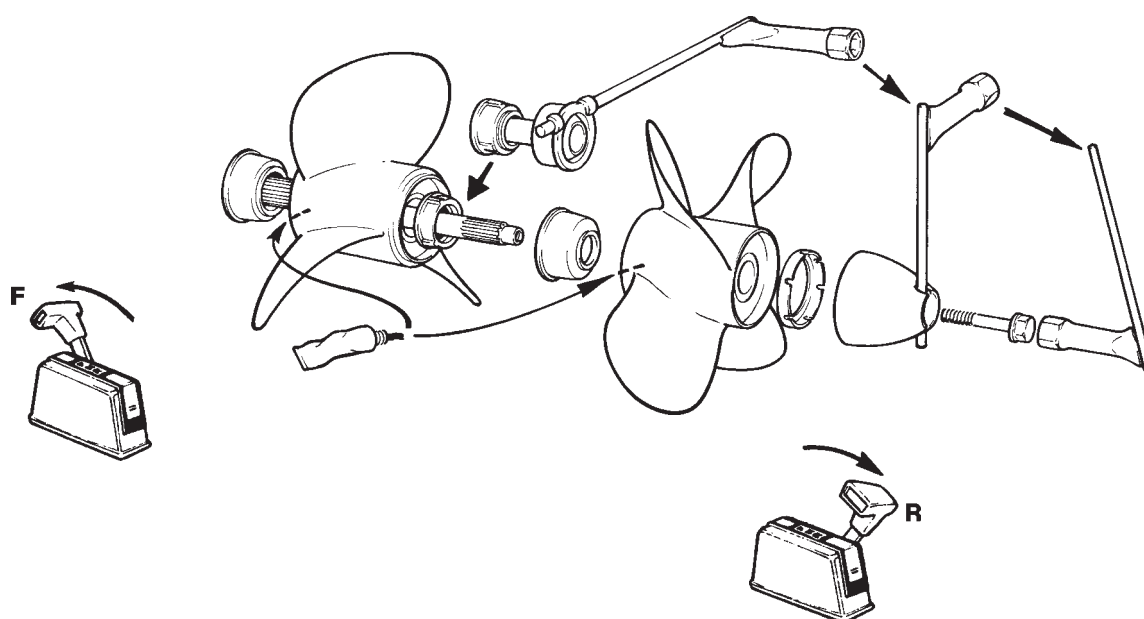
Propellers

For best performance and fuel economy the engine speed should be within the wide open throttle (WOT) range: See chapter **Operation**. If the engine speed at WOT falls outside the WOT range then the propeller should be changed.

⚠ IMPORTANT! Damaged propellers should be replaced immediately. Running with a damaged propeller should be undertaken with extreme care and only at reduced engine speeds.

Propeller installation

DP:



⚠ WARNING! Remove ignition key from ignition switch before installing propellers. Handle repelling rings (fishing line knives) carefully, their edges are sharp and can cause injury.

Control lever in “Ahead” position.

Use the tool supplied when removing and installing propellers.

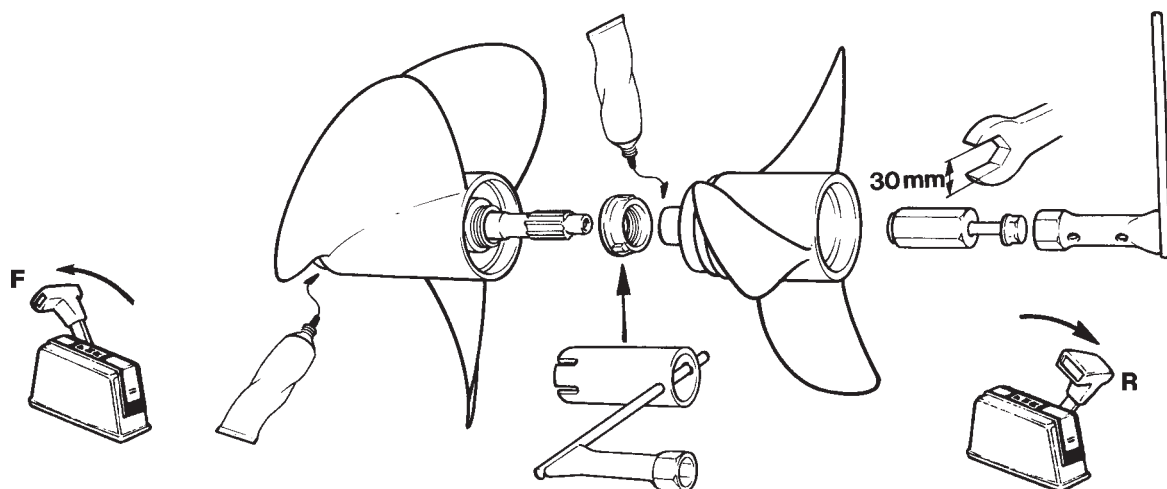
Lubricate both propeller hubs. Use Volvo Penta grease 828250-1. Press in repeller rings and the front propeller. Screw on nut and tighten with tool. Tightening torque 50–75 Nm (37–55 ft.lb.).

Control lever in “Astern” position.

Install rear propeller repeller ring. Push on the rear propeller and the plastic washer and spacer ring if it was previously installed.

Screw on the propeller nut cone and tighten hard. Install the center screw and washer and tighten hard.

Propeller installation DPX:



⚠ WARNING! Remove ignition key from ignition switch before installing propellers.

Control lever in "Ahead" position.

Use the tool supplied when removing and installing propellers.

Lubricate both propeller hubs. Use Volvo Penta grease 828250-1.

Push the front propeller onto the shaft. Screw on large locknut and tighten with tool. Tightening torque 50–70 Nm (37–55 ft.lb.).


Control lever in "Astern" position.

Push rear propeller onto the shaft and tighten with nut. Use a 30 mm socket and tighten to 25–35 Nm (19–26 ft. lbs.).

Screw in the lock screw and tighten to 70–80 Nm (55–59 ft.lbs.).

Maintenance schedule

Regular maintenance is necessary if the engine and transmission are to operate without problems. It is important this is done properly and that nothing is forgotten. Below is a maintenance schedule that covers the recommended maintenance operations. Read the chapter on **Maintenance** carefully before starting work. It contains instructions on how to carry out operations in the schedule. If there is any item you are not sure of, please contact your Volvo Penta dealer for more information.

 **IMPORTANT!** These service operations ☐ must be carried out by an authorized Volvo Penta Service workshop.

Daily before starting first time:

- Engine. Check oil level
- Engine. Check coolant (freshwater cooled engines)
- Check fuel level

Checks every two weeks:

- Seawater filter. Clean (freshwater cooled engines)
- Drive belts. Check belt tension
- Servo pump. Check oil level
- Trim pump. Check oil level
- Reverse gear. Check oil level
- DP, DPX Drives. Check corrosion protection

Checks every 50 hours

- Steering shaft bearing. Lubricate
- Battery. Check electrolyte level

Every 100 operating hours or at least once a year:

- Engine oil and oil filter. Change

Every 200 operating hours or at least once a year:

- DP, DPX Drives. Oil change
- Fuel filter. Change
- Carburetor filter (7.4GL, 8.2GL). Check
- Flame trap. Clean
- Spark plugs. Replace
- Seawater pump. Check
- Universal joint and exhaust elbow bellows. Check
- Drive belts. Check
- Reverse gear. Change oil and oil filter
- Anti-fouling paint. Check
- Controls. Check, adjust
- Hydraulic hoses (DPX). Check
- Parallel strut (DPX). Check

Every other year:

- Engine coolant. Change (freshwater cooled engines)
- Seawater pump. Replace impeller
- ☐ DP, DPX drives. Replace universal joint and exhaust bellows

Every 500 operating hours or at least every fifth year:

- ☐ Reverse gear. Replace propeller shaft seal

Laying up/Launching

Before taking the boat out of the water for winter/out-of-season storage have an authorized Volvo Penta workshop inspect the engine and other equipment. Have any necessary repairs or service work carried out so that your boat is in top condition for the new season.

Inhibiting


Inhibition should be carried out to ensure that the engine and transmission are not damaged while out of commission during the winter/off-season. It is important this is done properly and than nothing is forgotten. We have therefore provided a checklist covering the most important operations. Before carrying out inhibition read the chapter on **Maintenance** carefully. This contains instructions on how to carry out the operations in the checklist. If there is any item you are not sure of, please contact your Volvo Penta dealer for more information.

The following are best carried out with the boat in the water:

- Replace the fuel filter. Replace fuel pre-filter if installed.
- Change engine oil and oil filters.

The following should be carried out with the boat out of the water:


- Any fouling on the hull and drive is easiest removed directly after taking up the boat and before it has dried.

 **IMPORTANT!** Be careful when cleaning with a high pressure water spray. Never direct the jet at seals, rubber bellows and hoses (for example the propeller shaft seal, exhaust or drive joint bellows and the trim cylinder seals).

Engine

- Freshwater cooled engines: If the freshwater system is filled with an antifreeze mixture: Check that antifreeze protection is sufficient. Top up if required. Drain and refill with new antifreeze at least every other year.

If the freshwater system is only filled with an anti-corrosion mixture then it should be drained and refilled once every season.

 **IMPORTANT!** An anti-corrosion mixture in the engine coolant system provides no protection against freezing. If there is a risk of freezing temperatures the system should be drained and refilled when launched.


- Clean and inhibit the seawater system. Ensure that the cooling system is fully drained if not inhibited with a glycol mixture.
- Drain any water and contaminants from the fuel tank. Fill the tank completely with fuel to avoid condensation.
- Remove batteries from the boat. **NOTE!** A poorly charged battery may easily burst as a result of freezing. Keep batteries cool and dry. Trickle charge every other month.
- Clean the outside of the engine. Do not use a high pressure spray to clean the engine. Touch up any damaged areas of paintwork with Volvo Penta original paint.
- Spray electrical system components with moisture repellent spray.
- Check all control cables and treat with rust inhibitor.

Transmission

- Change oil in the drive/reverse gear.
- Replace reverse gear oil filter.
- Repair any damaged areas of paintwork with Volvo Penta original paint. **NOTE!** Read the special instructions on painting the drive under the heading: "Painting the drive and underwater hull".
- Remove propeller(s) for winter storage. Grease the propeller shaft using water repellent grease.
- DP, DPX Drives. Check the universal joint and exhaust bellows. Replace every other year.
- DP drive. Lubricate steering shaft bearing.
- DPX drive. Check the steering system's hydraulic hoses for wear and cracks.

■ Bringing out of storage


- Check oil level in the engine and drive/reverse gear. Top up if required. If there is inhibiting oil in the system drain and fill with new oil, change oil filter. For correct oil grade: See the chapter ***Technical Data***.
- Check drive belt condition. Check belt tension and adjust if necessary.
- Close/tighten drain cocks/plugs.
- Check condition of rubber hoses and tighten hose clamps.
- Freshwater cooled engines: Check engine coolant level and antifreeze protection. Top up if required.
- Connect up the charged batteries.
- Paint drive and hull: See following section.
- Immediately before launching the drive's sacrificial anodes must be cleaned off with emery paper. If there is less than 50% of an anode left it must be replaced.

 **IMPORTANT!** Do not use steel brushes or any steel tools for cleaning the anodes. This can result in reduced galvanic protection.

- Install propellers.
- Launch the boat. Check there is no fuel, water or exhaust leakage. Check that all control functions are operating normally.
- Vent the rubber propeller shaft seal after launching (reverse gear).

■ Painting the drive and underwater hull

Before treating the drive with anti-fouling agent any damaged paintwork must be repaired. Sand down metal surfaces lightly using a 120 grade paper and a finer grade for painted surfaces. Wash off using thinners or similar. Any pores in the surface should be filled and sanded down. Paint using Volvo Penta original primer and topcoat. Let the paint dry. Then apply at least two coats of Volvo Penta anti-fouling **primer**. Let them dry. A further two coats of Volvo Penta anti-fouling should then be applied.

 **IMPORTANT!** The sacrificial anodes on the drive must not be painted or treated with teflon. Ensure that the contact between the sacrificial anodes and the drive is good.

Use of anti-fouling agents is not permitted in all countries. Please make sure that it is permitted where your boat is to be used. If anti-fouling agents are not permitted we recommend that the drive be treated with pure teflon* on the original paintwork without sanding down first.

*Teflon® is the registered trademark of the Du Pont Corp.

Paint the underwater hull with a suitable paint or pure Teflon agent. 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 some cases these agents are completely forbidden for use on leisure craft used in freshwater. If the boat is easy to take up on land then we recommend teflon treatment combined with mechanical cleaning several times during the season. For larger craft this is not practicable. If the boat is in an area where the water quickly produces fouling then anti-fouling paints must probably be used. If this is the case use a copper-based paint containing copper cyanate and **not copper oxide**. Tin-based agents (TBT) must not be used. **Check the legislation that applies where the boat is to be used.** Do not paint closer than 10 mm (0.4 in) to the shield/drive. Wait for the paint to dry before launching the boat.

Troubleshooting

The fault tracing schedule below contains the most common causes of faults. In general you can repair most of the following faults yourself by using this instruction book. Engine variants have different equipment so that contained under **Probable cause** of fault and **Corrective action** need not necessarily apply to your engine. If in doubt contact your nearest Volvo Penta workshop.

Symptom	Probable cause	Corrective action
Engine does not start	Fuel cock closed, fuel tank empty, water or contaminants in fuel. Main switch off, battery flat, fuse blown. Battery leads loose or corroded. Safety breaker out.	Open fuel cock, fill up with fuel, drain and clean tank, replace fuel filter. Switch on main switches charge battery, check fuses. Clean and tighten battery leads. Reset safety breaker.
Engine runs unevenly	Water or contaminants in fuel. Fuel filter fouled. Fault in ignition system.	Check drain, clean fuel injection system. Replace filter. Clean carburetor filter. Wipe ignition cables. Contact Volvo Penta Service.
Vibrations	Damaged propeller, something has fouled propeller. Propeller shaft damaged after running aground, hitting an object.	Check propellers. Remove whatever has fouled the propeller. Check for other damage – oil leaks, cracks etc. Run slowly to harbour, contact Volvo Penta Service.
Engine cannot attain correct engine speed at wide open throttle (WOT)	Boat abnormally loaded, not properly trimmed. Fouling on underwater hull. Damaged propeller. Partly fouled fuel filter. Incorrect ignition timing. Engine protection has been triggered (engine speed max. 2,500 rpm 7.4Gi, 7.4GSi, 8.2 GSi).	Check load. Check trim. Check and clean. Check, replace if damaged. Replace fuel filter (fuel filter carburetor filter). Contact Volvo Penta Service. Follow instruction book, contact Volvo Penta Service if the fault persists.
Engine overheats	Fouled coolant water intake, oil cooler, damaged coolant water pump. Incorrect ignition timing.	Check that cooling system is free of contaminants and that the coolant water pump is in good condition. Contact Volvo Penta Service.
Engine stops	Fuel tank empty, fuel cock closed. Automatic fuel pump fuse has blown, other fuse blown. Incorrect ignition timing	Check fuel supply. Follow instruction book instructions regarding fuses. Contact Volvo Penta Service if the fault persists. Contact

Technical Data

Engine

Engine designation	7.4GL	7.4Gi	7.4GSi 8.2GSi	8.2GL
No. of cylinders	8	8	8	8
Cylinder diameter	107.95 mm	107.95 mm	107.95 mm 113,49 mm	113.49 mm
Cylinder stroke	4.25 in 101.60 mm	4.25 in 101.60 mm	4.25 in 101.60 mm	4.47 in 101.60 mm
Displacement	4.0 in 7.4 liter	4.0 in 7.4 liter	4.0 in 7.4 liter	4.0 in 8.2 liter
1.95 US gal	1.95 US gal	1.95 US gal	2.16 US gal 8,2 liter (8.2GSi) 2.16 US gal	
Max. bhp: See sales literature				
Idling speed	750	600	600	750
WOT range when operating (rpm)	4200-4600	4200-4600	4800-5200	4400-4800
Compression ratio	8.4:1	8.4:1	8.4:1 8,8:1 (8.2GSi)	8.8:1
Rotation (from the front)	Clockwise	Clockwise	Clockwise	Clockwise
Weight (engine without oil or water)	98 kg 216 lbs	116 kg 256 lbs	129 kg 285 lbs	179 kg 395 lbs

Fuel system

Carburetor, type	4-port	—	—	4-port
Fuel injection, type	—	Multi-port	Multi-port	—

Lubrication System

Oil capacity (including oil filter)	5.7 liter 1.5 US gal	5.7 liter 1.5 US gal	8.55 liter 2.25 US gal	5.7 liter 1.5 US gal
Volume between Max and Min on the dipstick	1.0 liter 1.06 US quarts	1.0 liter 1.06 US quarts	1.0 liter 1.06 US quarts	1.0 liter 1.06 US quarts
Oil grade in accordance with the API system	Service SG	Service SG	Service SG	Service SG
Viscosity at -5° to +50°C*	SAE 20W/50** (SAE 15W/50)	SAE 20W/50** (SAE 15W/50)	SAE 20W/50** (SAE 15W/50)	SAE 20W/50** (SAE 15W/50)

* Temperature based on constant ambient temperature

** Single grade oil can also be used, at temperatures above 0°C SAE 30 should be used.

Cooling system

Thermostat: No.	1	1	1	1
Thermostat: opens at	60°C (140°F)	60°C (140°F)	60°C (140°F)	58°C (138°F)
fully open at	66°C (150°F)	66°C (150°F)	66°C (150°F)	68°C (152°F)
Freshwater system** volume approx.	20 liter 5.3 US gal	20 liter 5.3 US gal	20 liter 5.3 US gal	20 liter 5.3 US gal

* Applies to freshwater cooled version

** Freshwater system is available as an option on reverse gear models and an accessory on other models.

Electrical systems

System voltage	12 V	12 V	12 V	12 V
Battery capacity (starter battery)	70 Ah	70 Ah	70 Ah	70 Ah
Generator for alternating current:				
Voltage/max. current	14V/51A	14V/60A	14V/65A	14V/51A
Power approx.	714 W	910 W	910 W	714 W
Starter motor, power approx.	1.0 kW	1.0 kW	1.0 kW	1.0 kW

	7.4GL	7.4Gi	7.4GSi 8.2GSi	8.2GL
Ignition system				
Spark plugs, Volvo Penta P/N	876047-2	876047-2	876047-2	876047-2
Spark plug gap, mm	0.9 (0.035 in)	1.1 (0.043 in)	1.1 (0.043 in)	0.9 (0.035 in)
Tightening torques, spark plugs	30 Nm 22 ft. lbs	30 Nm 22 ft. lbs	30 Nm 22 ft. lbs	30 Nm 22 ft. lbs

■ Fuel specification

Octane no. (RON)	93	93*	93*	93
Unleaded/leaded gasoline	Unleaded**	Unleaded**	Unleaded**	Unleaded**

* If 93 octane (RON) is not available, gasoline down to 90 octane (RON) can be used.

** Leaded gasoline can be used if unleaded is unavailable.

■ Outboard drive

Designation	DP
Oil grade/viscosity	VP 1141572-6 (API GL5 SAE75/90) Synthetic.
Oil capacity, liter	2.7 (2.85 US quarts)
Volume between Max and Min, liter	0.15 (0.16 US quarts)
Gear ratio	1.68:1 or 1.78:1
Power Trim hydraulic system	
Oil grade	ATF (Dexron II)
Oil capacity, liter	1.0 (1.06 US quarts)
Power Steering	
Oil grade	ATF (Dexron II)

■ Outboard drive

Designation	DPX:
Oil grade/viscosity	VP 1141572-6 (API GL5 SAE75/90) Synthetic.
Oil capacity, liter	2.0 (2.1 US quarts)
Volume between Max and Min, liter	0.15 (0.16 US quarts)
Gear ratio	1.59:1, 1.68:1 or 1.78:1
Power Trim hydraulic system	
Oil grade	ATF (Dexron II)
Oil capacity, liter	1.0 (1.06 US quarts)
Xact™ Power steering	
Oil grade	ATF (Dexron II)
Oil capacity, liter	2.0* (2.1 US quarts)

* Capacity depends on type of boat. Always check the oil level with the dipstick with the engine running.

■ Reverse gear

Type designation	HS1
Ratio	1.96:1 or 2.63:1
Oil capacity, approx.	3.3 liter (3.5 US quarts)
Oil grade in accordance with API system	Service SG
Viscosity	SAE 20W/50 (15W/50)

