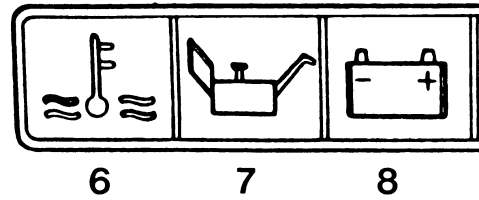
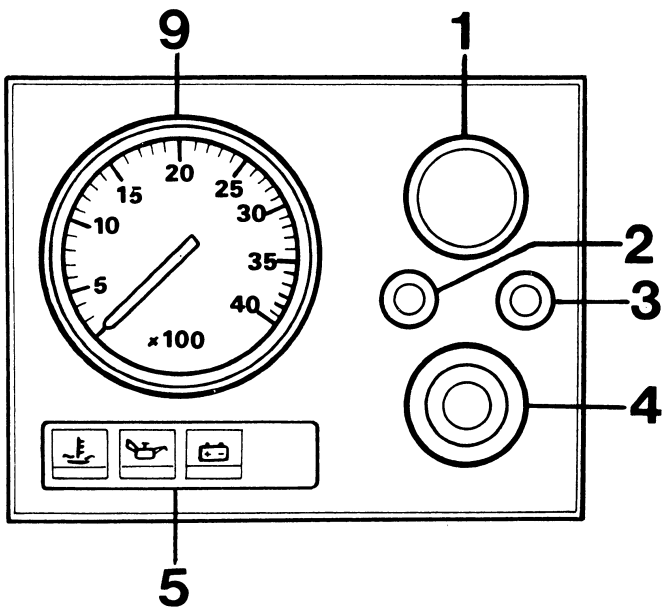


OPERATOR'S MANUAL

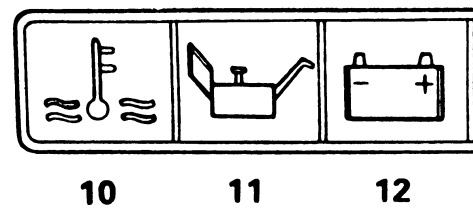
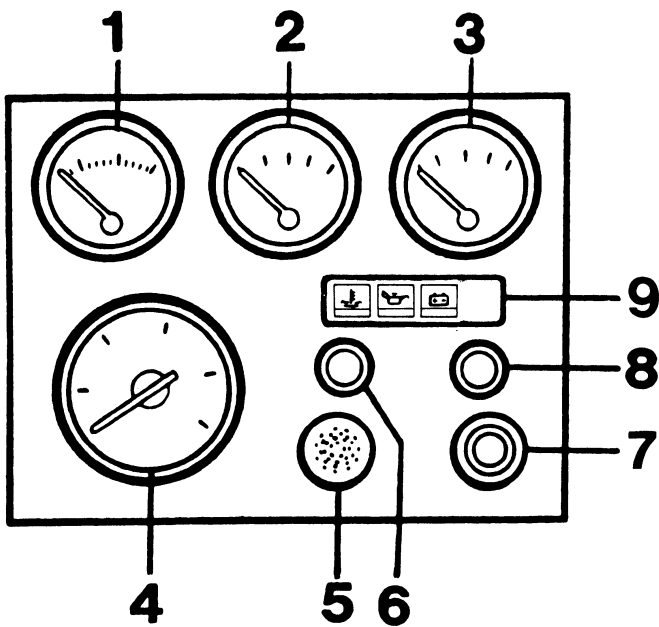
2001, 2002, 2003, 2003T

**VOLVO
PENTA**

Alternative A



Alternative B



Instrument panel, alternative A

1. Alarm "Low oil pressure" or "Cooling water temperature"
2. Alarm check
3. Switch for instrument panel
4. Start button
5. Alarm panel
6. Warning lamp, high cooling water temperature
7. Warning lamp, low oil pressure
8. Warning lamp, no charging
9. Revolution counter

Instrument panel, alternative B

1. Temperature gauge for cooling water (fresh water)
Normal cooling water temperature 75–90°C (167–194°F)
2. Oil pressure gauge
3. Voltmeter
4. Rev counter with operating hour meter
5. Alarm, "Low oil pressure", "Temperature too high"
6. Alarm check
7. Ignition switch
8. Switch for instrument lighting
9. Alarm panel
10. Warning lamp, high temperature
11. Warning lamp, low oil pressure
12. Warning lamp, no charging

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Important Information

The figures in front of the text refer to pictures at the bottom of the page.

IMPORTANT INFORMATION

Stop the engine before opening the hatch to the engine compartment. An engine which is in operation has rotating and moving parts which are dangerous to touch.

Bear in mind the risk of a fire. All engine fuel is inflammable.

The cooling system is filled with liquid and it should be drained when there is risk of frost. Note that in certain cases a suction action may occur when the sea-water system is being drained. Close all drainage points when the boat is not under constant supervision. Incorrectly performed drainage can cause the boat to become filled with water and sink.

INTRODUCTION

This instruction book provides helpful information for running and maintaining your Volvo Penta products.

The content apply to particular engines specifications. Each engine is supplied from Volvo Penta in accordance with the published specifications. Examine your engine and other components to be able to find them in this book. Read this book carefully before operating the engine. Do not wait until a problem occurs.

WARRANTY

A service and warranty book which states the Volvo Penta International Limited Warranty (all markets except USA) should have been provided by the selling dealer. If you have not received this publication contact the nearest Volvo Penta Dealer Importer for a copy.

Some markets provide special or limited warranties as a supplement or replacement for the Volvo Penta International limited warranty. Contact the local Volvo Penta Importer to obtain copies of such special warranties if applicable.

For products operating in the USA special limited warranties and warranty documents apply.

WARRANTY REGISTRATION CARD — WARRANTY CARD

The Warranty Registration Card (US market) Warranty Card (other markets) should be filled in and sent in by the dealer. Warranty service can be refused if no proof or delivery date can be provided.

VOLVO PENTA SERVICE

Volvo Penta has built up an extensive dealer network to support you with service and parts. These dealers have the necessary training, special tools, test equipment and stocks of parts to provide quality service. When requesting service or parts always quote the complete product model and serial number taken from the product serial number plate.

AB Volvo Penta Technical information

INFORMATION NOTICE: All information, illustration and specifications contained in this manual are based on the latest production information available at the time of publication. Volvo Penta reserves the right, without prior notice, to revise prices, materials, standard equipment, specifications, models and to discontinue models. Not all models, standard equipment and accessories are available in all countries. Volvo and Volvo Penta are registered trade marks of AB Volvo.

SAFETY NOTICE

The following warning notes will alert you to possible bodily injury dangers and to important information on safe operation of equipment. Observe them carefully. "Warning" notes alone do not eliminate the dangers that they signal. Personal close attention to detail plus common sense operation of equipment are major accident prevention measures.



WARNING: You are warned that personal injuries, damage to property or malfunction of the engine can result from your not following these instructions.

GENERAL INFORMATION

Important information concerning the function to your engine:

FUEL

Use diesel fuel oil of quality "Autodiesel" (No 2 Diesel). Lower fuel quality can cause interruptions in operation.

LUBRICATING OIL

Use only oil with quality CD (DS) according to the API system. Volvo Penta oil for diesel engines meets these requirements.

RUNNING IN

A new marine motor requires careful running-in during the first 20 working hours. Run the motor as for normal operations but do not load the motor fully during this period. Unnecessary idling with an unloaded motor should always be avoided. A greater consumption of lubricating oil during the running-in period is usual. Check the oil level more often during the running-in period.

FULL THROTTLE OPERATING RANGE

When fitting a propeller to a specific boat-engine combination it is sometimes hard to select the proper sized propeller for varying load and weather conditions. Therefore Volvo Penta offers a wide range of propeller sizes and types. In some boats there are advantages to selecting a propeller that limits engine rpm including lower fuel consumption, lower noise, lower vibration and better propeller efficiency.

Full throttle operating range 2800–3200 rpm.

Recommended engine revolutions when charging the battery: 1300–1500 rpm

SAFETY EQUIPMENT

Regardless of whether the boat is being used for long cruises or short day trips, it should be equipped with safety equipment as suggested below. This list can, of course, be supplemented according to personal option. Safety equipments should be inspected at regular intervals.

LIFE-JACKETS for all on board, approved type.

FIRE EXTINGUISHER, at least one easily accessible, approved type.

DISTRESS ROCKETS and matches. Packed watertight.

FIRST AID BOX

TOOLS suitable for the equipment on board.

ON BOARD KIT containing, e.g. an impeller, spare engine parts, etc. (See your dealer for recommended on board kit for your engine).

ANCHOR with line.

RADAR REFLECTOR

RADIO for listening to, e.g. weather reports.

COMPASS which has been corrected for deviation.

BOAT HOOK and **PADDLE**.

MOORING ROPES, BUMPERS.

FOG-HORN and **WHISTLE**.

SEA ANCHOR

FLASHLIGHT

EXTRA PROPELLER AND MOUNTING TOOLS.

NOTICE: Most countries have specific equipment and safety requirements that must be complied with to operate boat safely and legally.

PREPARATIONS BEFORE STARTING

Before starting engine make sure that:

There is no **FUEL LEAKAGE**

There is no **WATER LEAKAGE**

There is no **OIL LEAKAGE**

There is no **SMELL OF LP-GAS** in the deep cavities of the boat or elsewhere.

The **OIL LEVELS** are correct

COOLING WATER LEVEL in the expansion tank for the fresh water system is correct. The proper **NAUTICAL CHARTS** are on board for the planned voyage.

There is enough **FUEL** on board for the planned voyage.

Make sure when filling your fuel tank that there is no open flame on board. Ventilate the boat and run the engine room fan (if fitted) for 4 minutes before starting the engine. Do not overfill fuel tank.

If some people are on board for the first time, tell them how to manoeuvre the boat and where to find life-jackets and fire-extinguishers. Also tell them everything else you think necessary from the point of view of safety. Should something unexpected happen during the voyage, very often it is too late to tell those on board how the safety equipment works.

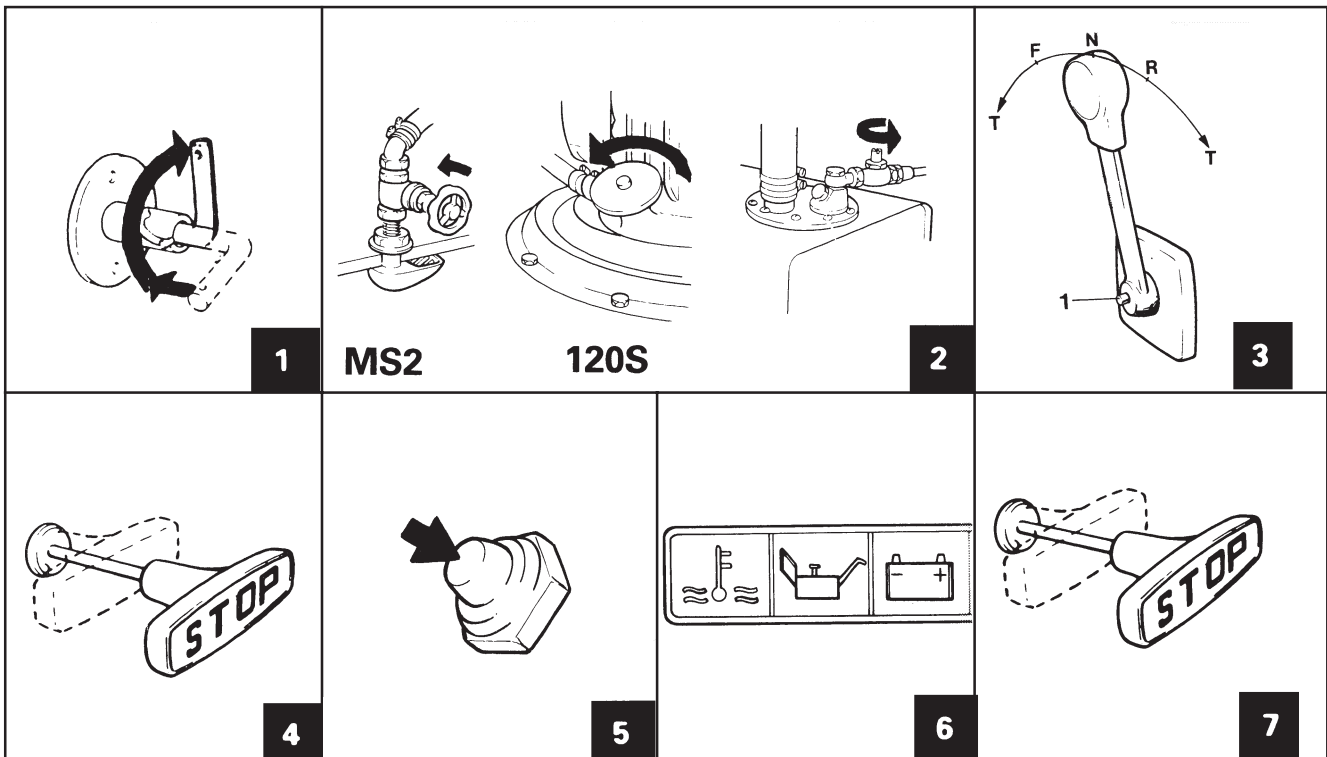
STARTING THE MOTOR

- 1** Switch on the main switch. Start the engine room fan (if fitted) and allow it to run for several minutes before starting the engine.
- 2** Check that the fuel and bottom cocks are in the open position. Pump out any water in the boat with the bilge pump.
- 3** Release the throttle control from the gear shift control as follows: Press the release button (1) in when the lever is in the neutral position, and then move the lever slightly forwards. Release the button. The control lever will now operate the engine speed only.
- 4** Cold Start: Release the throttle control and put it in max. position. Pull out the stop cable, and then push it in again

INSTRUMENT PANEL TYPE A:

(Standard)

- 5** Press in button for instrument panel power supply "3". (Warning lamps for temp., oil and battery light.) Now press start button and hold until motor starts.
- 6** Check immediately after start that the warning lights for temp., oil and battery are not lit. If both lamps for temp. and battery are lit at the same time this implies that the generator is not charging.
- 7** Stop the engine if the alarm sounds and the lamps light up, by pulling the stop cable completely out.



INSTRUMENT PANEL TYPE B: (De Luxe)

8 Turn the starter key to position 1. The lamps for engine temperature oil pressure and charging light up.

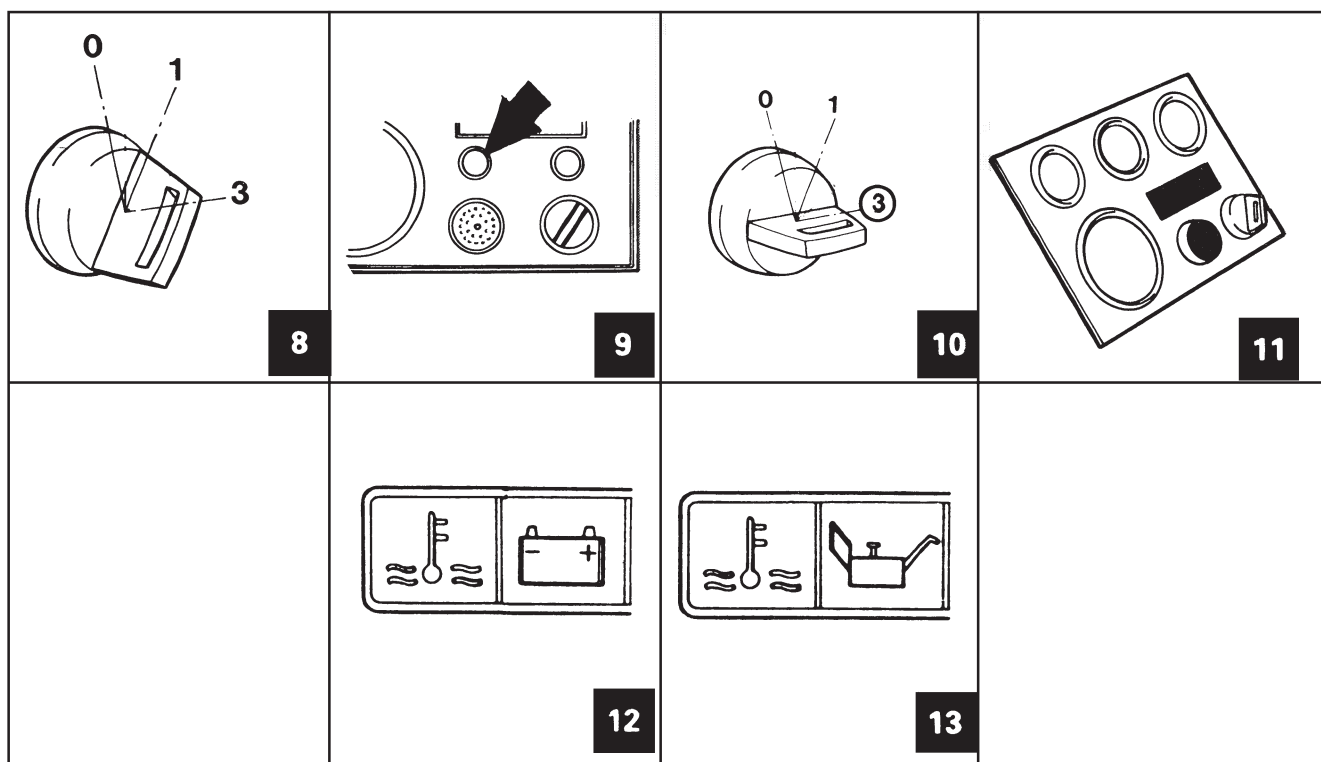
9 Press the alarm button to make sure that the alarm is working.

10 Turn the starter key to position 3. Release the key when the engine has started. When the engine is running the key should be in position 1. Before restarting the engine, return the key to position 0.

11 Immediately after starting the engine, check that the oil pressure gauge and the voltmeter show normal readings and that the alarm is not sounding. If the readings are abnormal and the alarm is sounding, stop the engine immediately and investigate the cause.

12 If the engine temperature and battery charging lamp lights up, but the alarm does not sound, there is a charging fault.

13 If the engine temperature or oil pressure lamps light up and the alarm sounds, either the engine temperature is too high or the oil pressure is too low, and you should stop the engine and investigate the cause.




RUNNING INSTRUCTIONS

14

The single control lever combines the throttle and gear shift functions.

F = Forward
R = Reverse
N = Neutral
T = Throttle

 **WARNING!** Never change travel direction before the engine has returned to idling speed.

15

For best results, do not run the engine at maximum revolutions for long periods.

16

Stop the engine at once if the alarm sounds and the signal lamps light up.

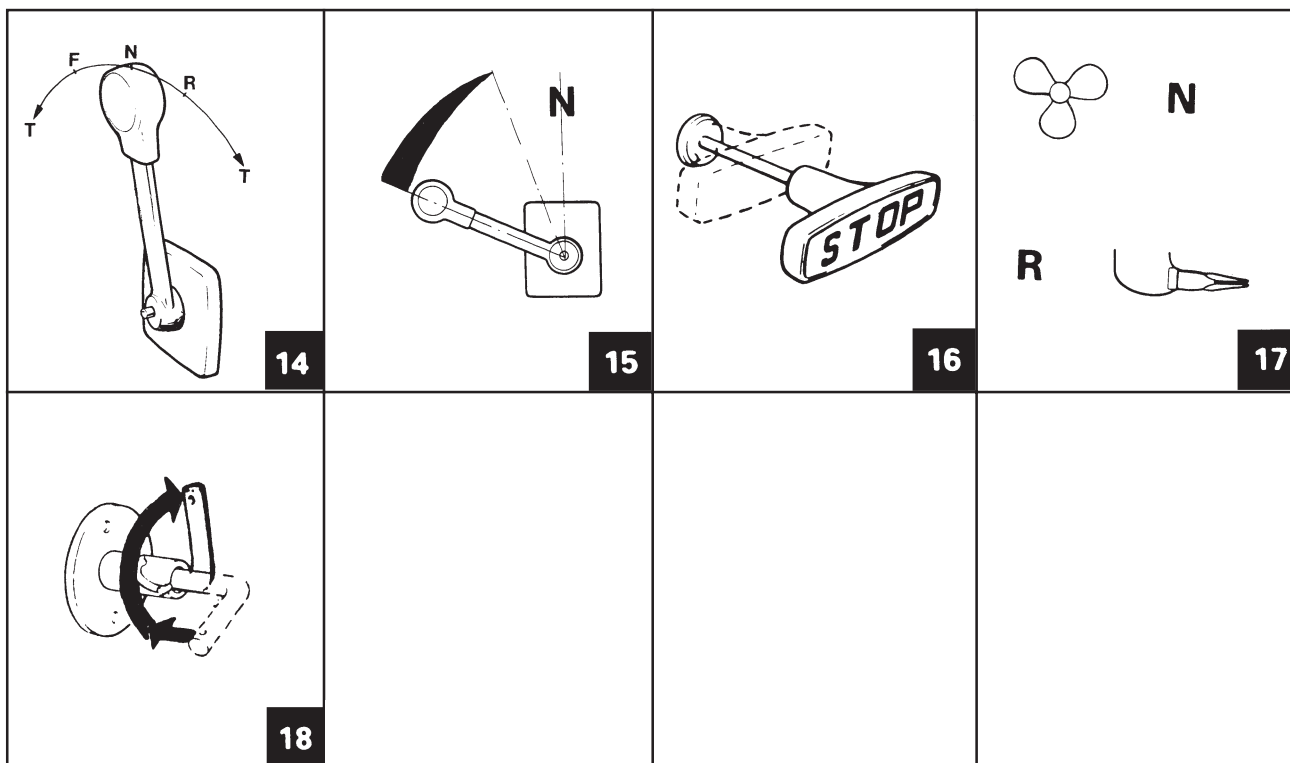
17

When under sail, the control lever should be in the neutral position if the propeller is a fixed propeller. If the propeller is a folding propeller, the control lever should be in the reverse position. Start the engine and run it for five minutes every ten hours when on long-distance cruises.

18

Note: Do not switch off the main switch before the engine has stopped.

TURBO CAUTION: Do not race the engine immediately after starting. Cold oil flows less rapidly and will **not** reach all necessary parts immediately.



SHUTDOWN PROCEDURE

19

Before shutting down the engine, it should be allowed to idle for a few minutes, with the control lever in the neutral position.

20

Stop the motor by pulling out the stop control when the motor is idling.

Instrument panel alternative A

Disconnect instrument panel power supply.



Warning!

Never leave the instrument panel "Alternative A" with the power switched on when the engine is not running. Always switch off the power with the switch in the instrument panel to prevent undesired starting when pressing the start button.

Instrument panel alternative B

Turn key switch to 0 position.

21

Switch off the main switch. **IMPORTANT!** The main switch must never be switched off until the engine has stopped. Close the fuel and cooling water cocks during long intervals between use. Before leaving the boat, check that no leakages have occurred.

FROST RISK

22

If the engine is fitted with a fresh water cooling system, it should be filled with a 50–50 mixture of anti-freeze and water, or alternatively drained off.

Use the antifrost liquid type 90.

DRAINING OFF, FRESH WATER SYSTEMS

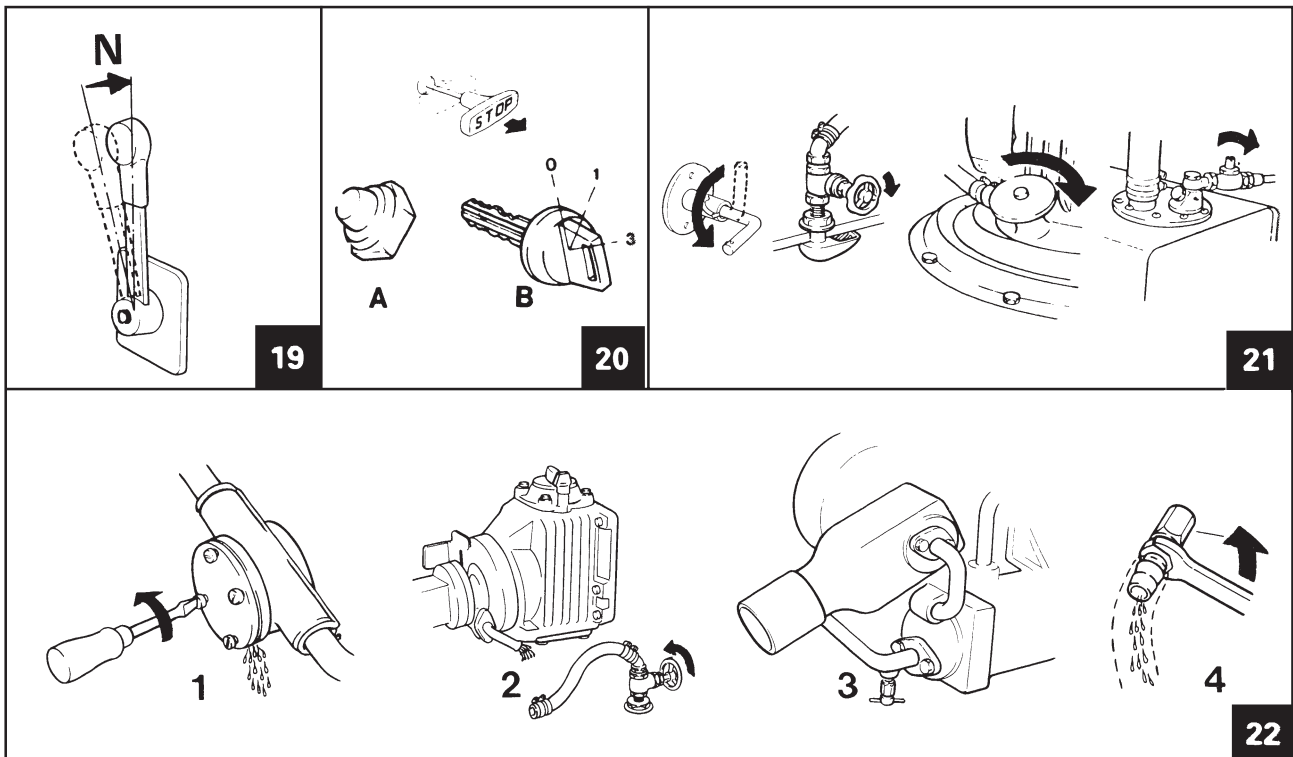
To drain off the fresh water cooling system, open the cock on the side of the engine block (4).

DRAINING OFF, SEA WATER SYSTEMS

Unfasten the cover on the sea water pump (1). Unfasten the hose on the reverse gear (2). Open the cock on the cooling water pipe (3). (For engines with no cock on the pipe, remove the pipe itself.) Close the cocks and refasten the cover on the sea water pump before leaving the boat.

DRAINING OFF, SEA WATER COOLED ENGINES

Unfasten the cover on the sea water pump (1). Unfasten the hose on the reverse gear (2). Open the cock on the side of the engine block (4). Close the cocks and fasten the cover on the sea water pump before leaving the boat.



CHECK BEFORE STARTING

CHECK OIL LEVEL.

- 23** Check the oil level every day before starting the engine, to make sure that it is within the dipstick markings for maximum and minimum levels, and that you have enough oil for the journey you are planning.

Fill up with oil when necessary. See "Technical Data" for type of oil to be used.

CHECK WATER COOLING LEVEL (FRESH WATER SYSTEMS)

- 24** Check every day before starting the engine that the water level in the expansion tank is within the markings for maximum and minimum levels. When necessary, fill up with fresh water or corrosion inhibitive anti-freeze mixture. When there is a danger of frost it is important to ensure that the fresh water system is filled with anti-freeze. Alternatively, the system can be drained. For draining the sea water system see under "Shut-down Procedure".

2003T

If the cooling system has been drained, or when starting a new engine, the turbocharger must be vented. Start the engine, loosen the screw, and run the engine until air bubbles cease to appear. Then tighten the screw up again. (Later models are fitted with a tap.)

FOURTEEN DAY CHECK

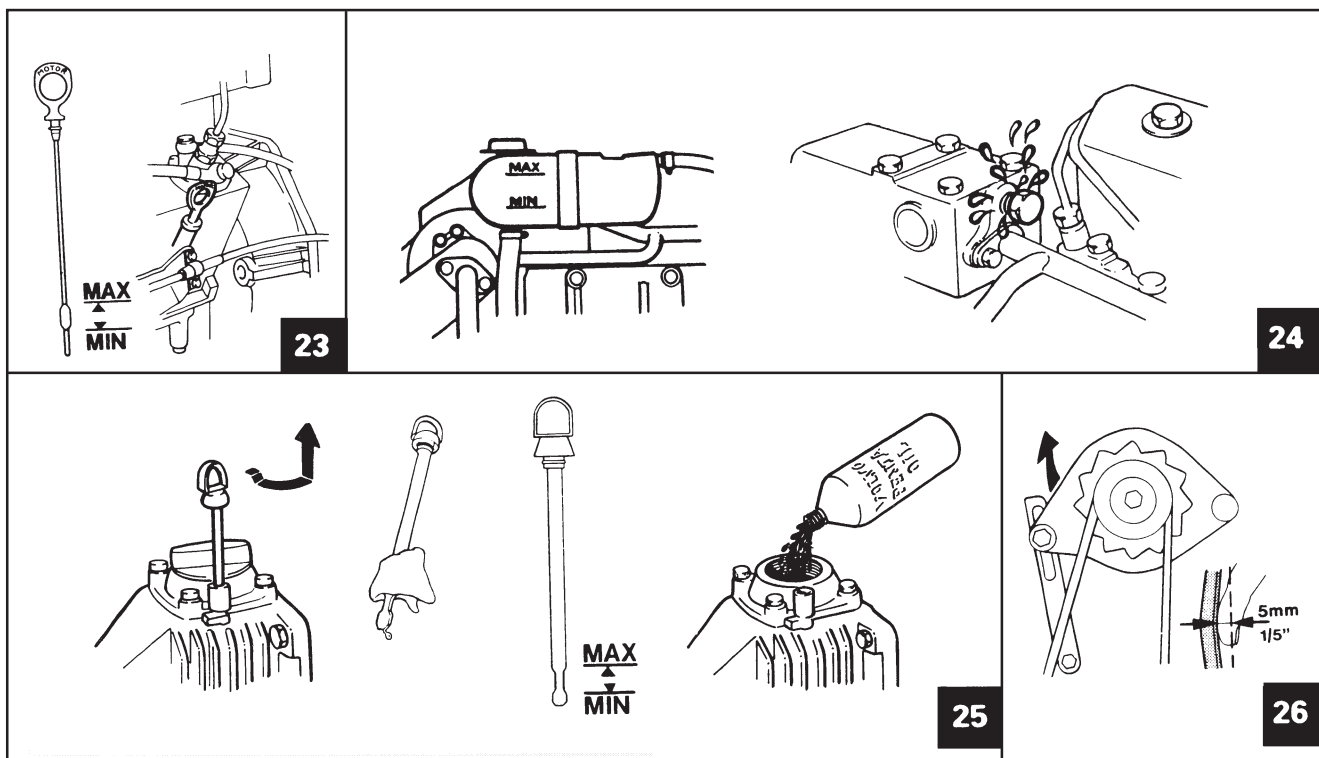
CHECK OIL LEVEL IN REVERSE GEAR OR DRIVE.

- 25** Check that the oil level is within the dipstick markings for maximum and minimum levels. Fill up with oil when necessary, but do not exceed the maximum level. See "Technical Data" for type of oil to be used.

CHECK BELT TENSION

- 26** The V-belt must be correctly tensioned in order to obtain full alternator output. When it is properly tensioned, it should be possible to push the belt down about 5 mm (1/5") midway between the pulleys with your thumb.

To tension the belt, first loosen the mounting nuts for the alternator. Worn or cracked belts should be replaced.



CHECK ELECTROLYTE LEVEL IN BATTERY

27

The electrolyte level in the battery should be 5-10 mm (1/5–7/16") above the cell plates. Fill up with distilled water when necessary.



WARNING! Exercise great care when filling as the gas formed in the battery is explosive and the acid is caustic.

100 HOURS (OR SEASONAL) ENGINE SERVICE

CHANGE ENGINE OIL.

28

Run the engine until it is warm. Pump up the oil through the hole for the dipstick, and then refill with oil to the correct level. See "Technical Data" for type of oil to be used.

Note: The oil filter should be changed at the same time as every second change of engine oil.

CHANGE OIL FILTER

29

The oil filter should be changed after the first 20 hours of running, and thereafter at every second change of engine oil.

Screw off the filter and throw it away.

Coat the rubber seal of the new filter with oil. Check the contact surface on the engine, and then screw the filter on by hand until it is just touching the contact surface. **Tighten the filter another half turn. Do not tighten it any further.**

Note: Use only genuine Volvo Penta oil filters.

Start the engine, let it idle and check that the oil pressure lamp goes out. Check the oil level, and that there are no leakages around the filter.

CLEAN INTAKE SILENCER

30

The intake silencer should be cleaned each season. Loosen the intake silencer, wash in diesel oil and rinse thoroughly. Re-fit the intake silencer. On 2003T the intake silencer should be replaced once every two years.

CHANGE OIL IN DRIVE

The oil in the drive should be changed after every 400 hours or at least once a season.

31

Remove the dipstick. Remove the plug under the propeller gear housing and allow the oil to run out. Then reinsert the plug and fill up with oil. Make sure that the oil level is between the maximum and minimum levels indicated on the dipstick. Note: Do not exceed the maximum level. See "Technical Data" for type and volume of oil to be used.

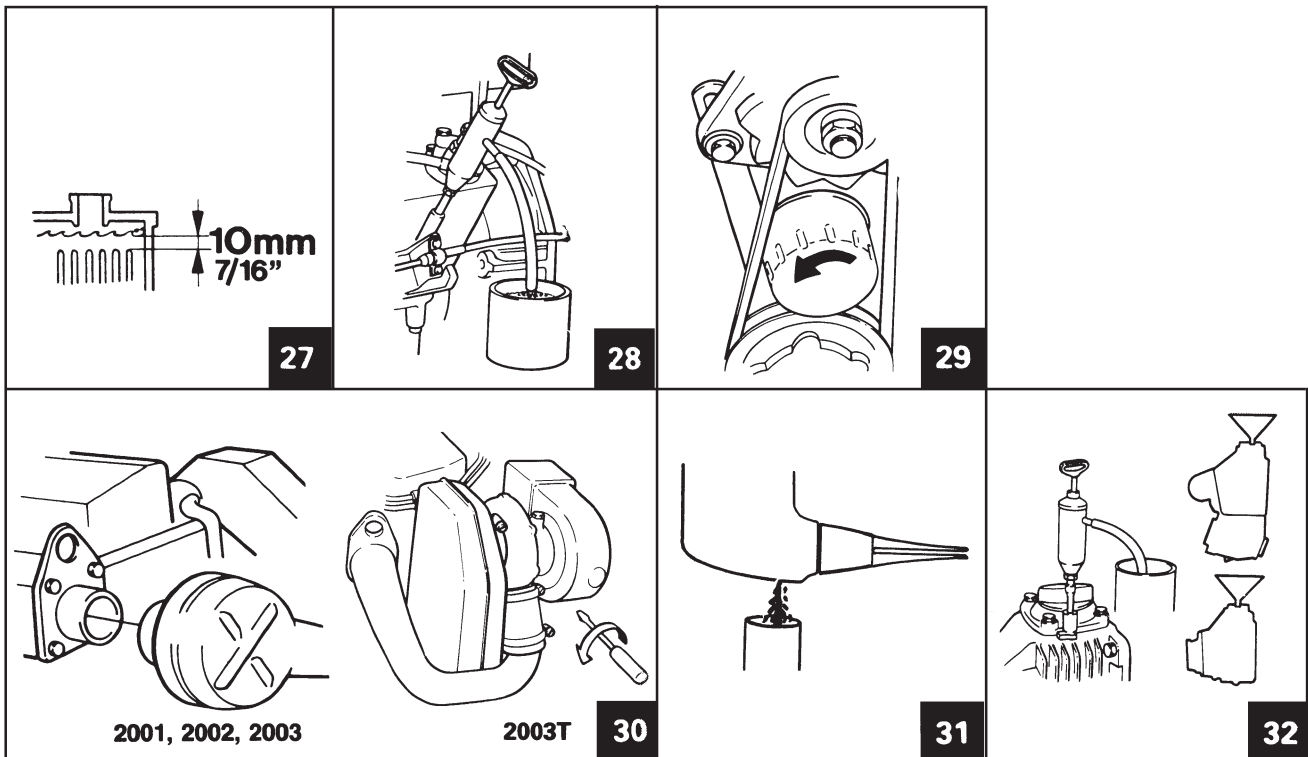
CHANGE OIL IN REVERSE GEAR, MS2 AND MS2V.

The oil in the reverse gear should be changed after every 400 hours or at least once a season.

32


The reverse gear can be drained by removing the plugs underneath it, or by pumping the oil up through the hole for the dipstick using an oil pump. Then fill up with oil. Make sure that the oil level is between the maximum and minimum levels indicated on the dipstick.

Note: Do not exceed the maximum level. See "Technical Data" for type and volume of oil to be used.



CHECK/CHANGE THE IMPELLER

- 33** The impeller may become damaged, for example through lack of water in the pump due to blocked intake. Close the **bottom-cock**. Then remove the pump cover and inspect the impeller. If it has been damaged it should be replaced. Remove the impeller with a pair of adjustable pliers, and fit a new one. Then refit the pump cover with a new seal. Open the bottom-cock again.

 **WARNING!** Watch out for waterleakage.

CHECK VALVE CLEARANCE

- 34** Checking and adjusting the valve clearance should only be carried out by an authorized Volvo Penta dealer. See "Valves" under "Technical Data".


35 CHECK STARTER AND ALTERNATOR

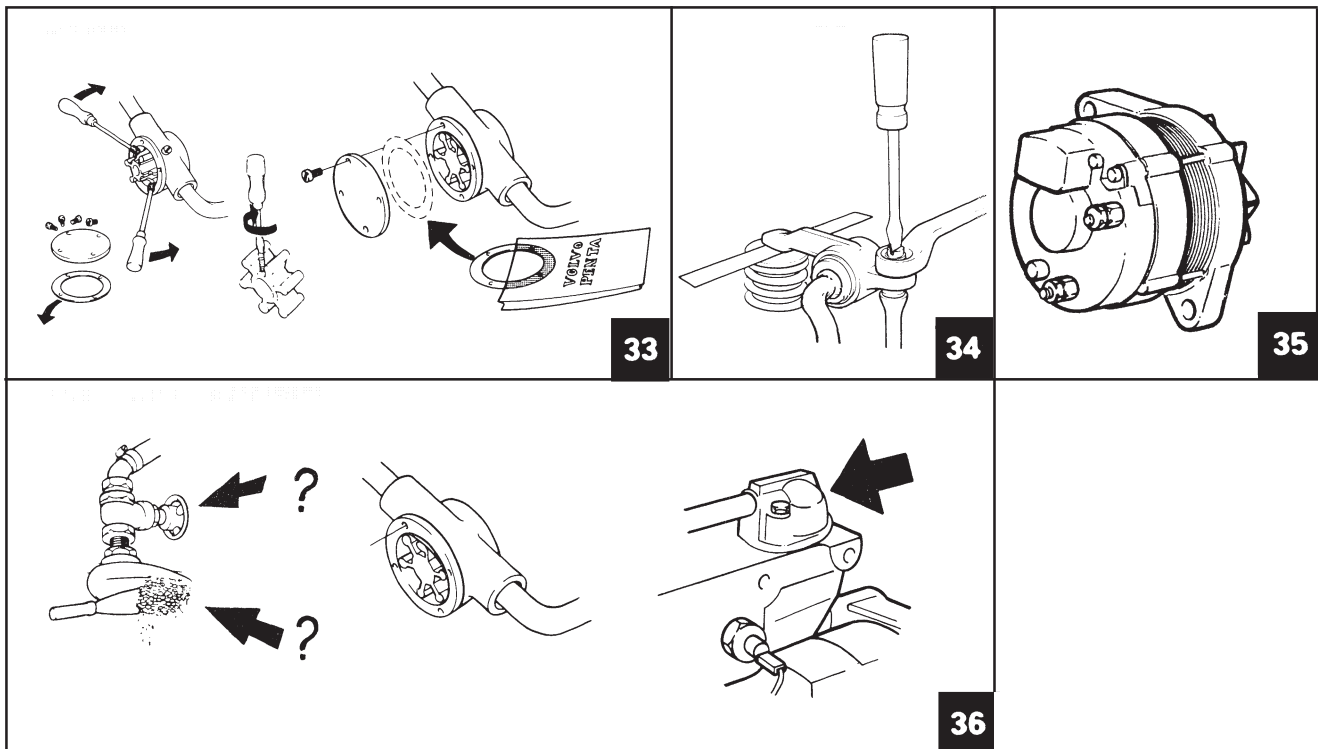
Maintenance work on the starter and alternator should only be carried out by an authorized Volvo Penta dealer. Inspection and checking should be carried out at the same time as general inspection of the engine.

CHECK COOLING SYSTEM

- 36** If the cooling system is functioning normally, the "TEMP" lamp will not be lit up. If the temperature is too high and the lamp lights up, the cause may be one of the following:

Blocked water intake
Defective impeller in sea water pump
Defective thermostat or temperature gauge

 **WARNING!** Watch out for waterleakage whenever you are working on the cooling system.



VACUUM VALVE

37 To make sure that the vacuum valve functions properly it should be dismantled at least once every season.

Remove the whole of the valve from its mounting on the bulkhead. Unfasten the cover on the valve and membrane, and clean off any deposit. Damaged membranes should be replaced.

REASSEMBLE THE VALVE IN THE UPRIGHT POSITION.

Put the membrane in the cover, making sure that it is in the correct position, and is not squeezed by the seal. Insert the seal and screw the cover back into position.

Note: Torque factor should be 2 Nm (0.2 kpm–1.47 ft.lbs). If the cover is too tight the valve will not function properly.

CHANGING THE FUSES

38 The fusebox included in the electrical system is mounted on top of the electrical unit. The fuse will disconnect the electricity supply if it is overloaded. You can reconnect the circuit by wiring up to the next terminal.

LAYING UP AND LAUNCHING

INHIBITING

While the boat is in the water but not in use, the engine should be run warm at least once every 14 days. If the boat is not to be used for over a month at a time, long-term inhibiting should be carried out.

LONG-TERM INHIBITING

You should have the engine and its accessories checked by an authorized Volvo Penta dealer before carrying out long-term inhibiting, and see that any necessary repairs are carried out at this point.

Inhibiting Schedule (with boat in water).

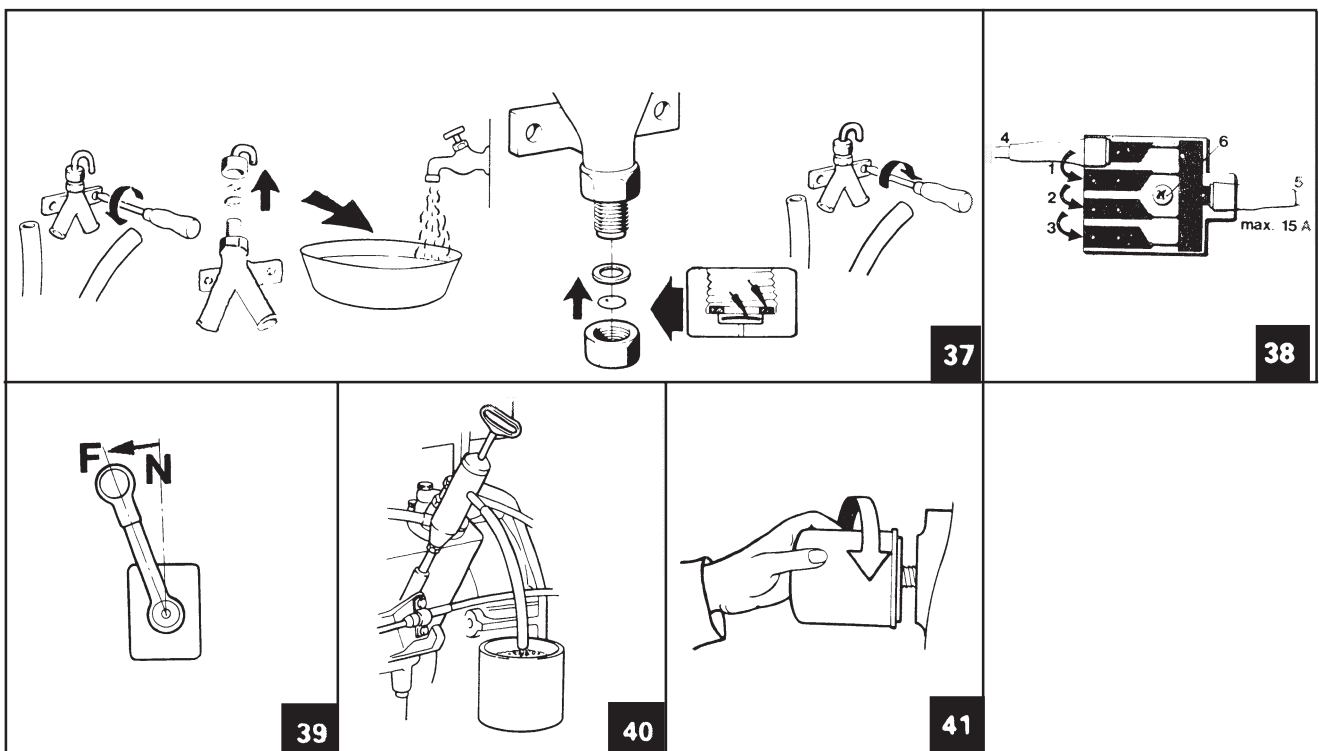
39 Allow the engine to idle at high revolutions for a few minutes. Then stop it.

40 Pump all oil out of the engine and reverse gear using the oil pump.

41 Change the oil filter. If the engine is fitted with an S drive this should be drained when the boat is laid up. Fill the engine and reverse gear to the correct level with Volvo Penta oil, which also protects against corrosion.

The engine is then ready to run on this oil next season.

When inhibiting for longer periods than normal laying-up for the winter, special preservative oil should be used, and the oil filter should not be changed until the boat is launched again.



- 42** Change the fuel filter.

VENTING THE FUEL SYSTEM

- 43** Loosen the venting screw on the fuel filter about four turns. Watch out for fuel splashing.

- 44** Pump up the fuel using the hand primer until the fuel is flowing out free of air bubbles. Tighten the venting screw again.

The fuel injection pump is vented automatically when the engine is started.

Inhibiting Schedule (with boat on land).

FRESH WATER COOLED ENGINE

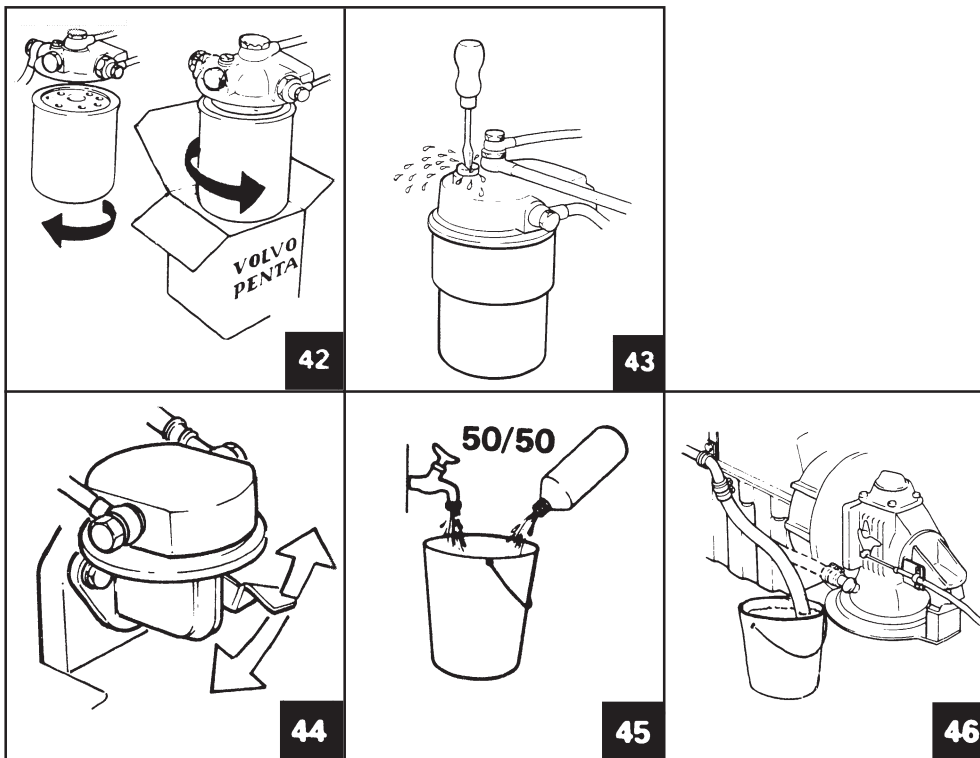
- 45** If the fresh water system has already been filled with ethylene glycol or similar corrosion inhibitive fluid, check the anti-freeze. If the system has been filled with fresh water only it should be drained and then filled with a 50/50 mixture of water and ethylene glycol.

FRESH WATER COOLED ENGINE

Sea water system

- 46** Prepare a 50/50 mixture of fresh water and anti-freeze glycol or similar corrosion inhibitive fluid, and insert the hose in it. Arrange for the collection of the fluid when it has run through the engine before you start. Then start the engine and let it idle until all the mixture has been used up.

Note: The pump must not be allowed to run dry.



SEA WATER COOLED ENGINE

47 Drain off the cooling water. Remove the cover of the thermostat housing and take out the thermostat. Then put the thermostat cover and seal back in position.

48 Prepare a 50/50 mixture of fresh water and ethylene glycol or similar corrosion inhibitive fluid. Disconnect the hose on the low side of the sea water pump (for engines with S drive) and connect up a piece of hose long enough to drain your bucket or other receptacle containing the rust-proofing mixture. For reverse gear engines the hose should be connected up to the low side of the engine.

Start the engine and let it idle until all the mixture has been used up. Then turn it off at once, as the pump must not be allowed to run dry.

You do not need to drain the mixture off.

49 Put the thermostat back in position, using a new seal, and reconnect the suction hose to the pump or reverse gear engine. Clean the vacuum valve.

50 Remove the impeller. If it is in good condition, rinse it in fresh water and then store it in a sealed plastic bag while the boat is laid up. Worn or damaged impellers should be replaced.

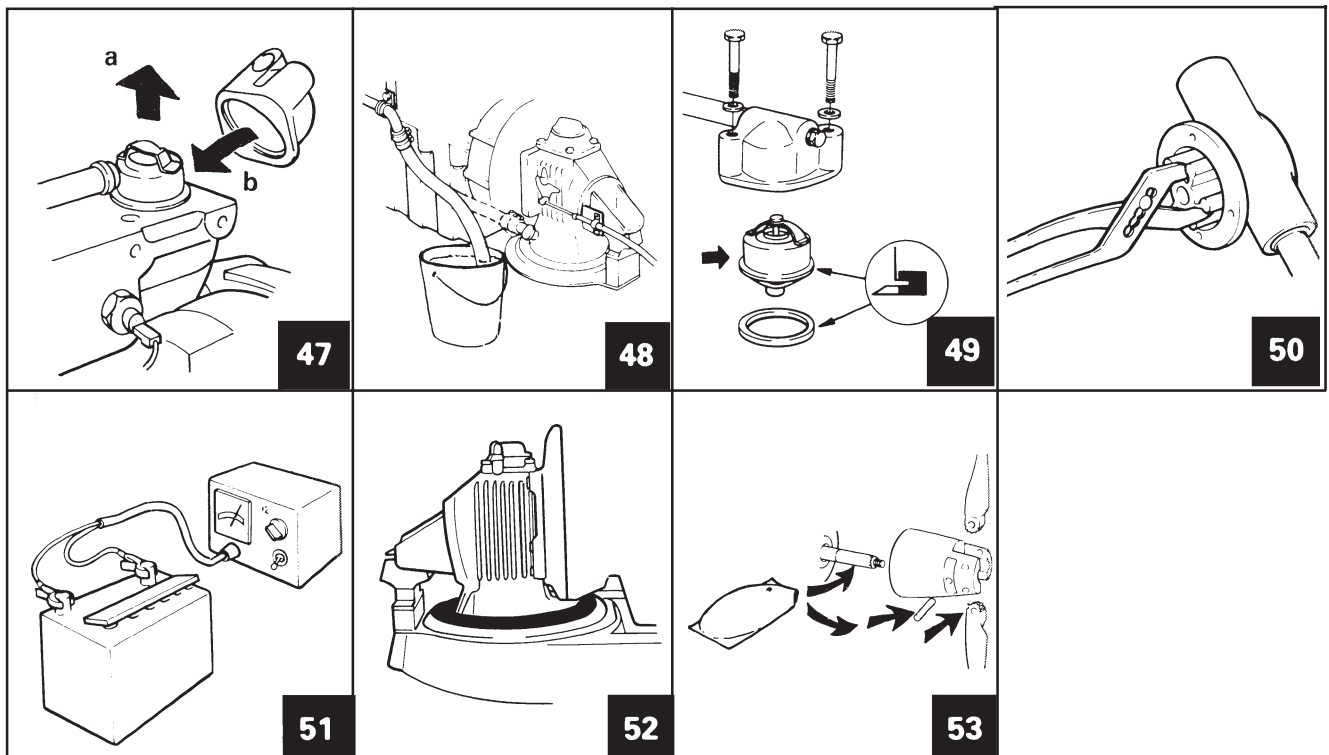
51 Check the state of the battery. Charge it and leave it in the boat. Batteries which are allowed to remain less than fully charged may suffer frost damage.

Spray all electrical connections with corrosion inhibitive oil. Clean off the engine and make good any damage to paintwork.

52 In boats fitted with S drive, the rubber seal between the drive and the bedding should be checked carefully. The seal should be changed every seven years. This should be done by an authorized Volvo Penta dealer.

53 If the boat has a folding propeller, it should be dismantled and taken indoors while the boat is laid up.

Unfasten the locking screws for the propeller blade suspension pins, knock out the pins and remove the blades. Unfasten the propeller shaft nuts and pull off the hub. The shaft should be greased (use type 828250 grease as recommended) after cleaning.



LAUNCHING

54

Check the zinc ring on the S drive and the zinc anodes on the folding propeller (if fitted) and the engine, and replace them if necessary.

Where the engine is fitted with S drive it is most important that the anti-fouling paint you use should not contain copper, as this can cause extensive corrosion of the drive. Zinc rings and zinc anodes should **not** be painted.

55

Check that the battery is fully charged.

56

If the engine was filled with Volvo Penta engine oil when the boat was laid up, the oil system will be ready for use. But if you used preservative oil during laying-up, this should be drained off and the system topped up with Volvo Penta engine oil.

Check the oil level in the engine and reverse gear or S drive before launching the boat. Check that all the hose clamps are tight, inspect the hoses and open the bottom cock or the cock on the S drive.

57

Put the impeller back in position in the water pump, and use a new seal when fastening the cover.

58

Check and if necessary change the engines corrosion protection.

LAUNCH THE BOAT

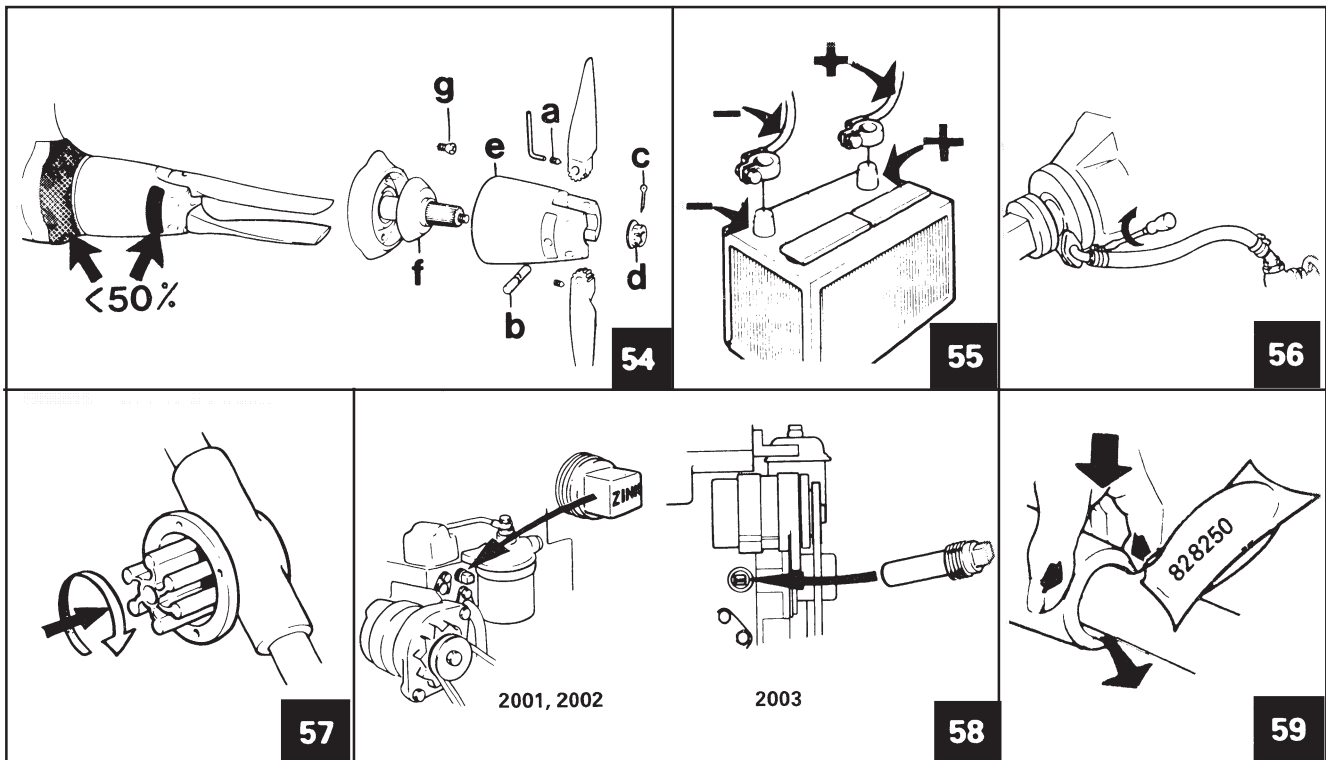
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1. If the propeller shaft is fitted with a rubber stuffing box, press in grease before launching.
2. The stuffing box should be vented after launching.



WARNING!

The rubber stuffing box must be replaced after 500 hours or 5 years.



TRACING FAULTS

Engine does not start

If the starter motor does not turn over, check whether the battery is flat. Use a hydrometer to measure the specific gravity of the electrolyte. Check that the cables for the battery and the starter motor are properly connected. If the battery is sufficiently charged and you can hear a clicking noise from the starter solenoid when the starter key is turned, the starter motor itself maybe defective. If you cannot hear this clicking noise then there maybe a defect in the solenoid, the key switch or the wiring for them.

Engine does not start, or stalls

If the starter motor does turn over, but the engine either will not start, or keeps stalling, check that you have fuel in the fuel tank and that the fuel cock is open. If the engine is fitted with an extra fuel filter, there should be fuel visible in the glass or metal optic.

Check that fuel is reaching the injectors by unscrewing the pressure pipe on the injector, and then turn the engine over using the starter motor. If no fuel appears it may mean that the filter is blocked, the fuel pump is defective, or that there is air in the system. Change all the filters and vent the system. If no fuel appears after this, either the feed pump or the injector pump maybe defective.

If fuel does come out of the pressure pipe when you carry out this test, it may mean that one of the injectors is defective. Change the injectors and try to start the engine again. If the engine still will not start the fault is probably in the injection pump. You should take it to an authorized Volvo Penta dealer. Check the position of the stop cable.

Uneven Running or Excessive Vibration

Most interferences in engine running are caused by defects in the fuel supply system, which in turn are often the result of water, air or impurities getting into the fuel. You should therefore change all the filters and vent the system, and perhaps change the injectors. Check that all fuel pipes are properly connected.

Rather more infrequently, it may be that the trouble is caused by loss of compression in one or more of the cylinders. Have your nearest Volvo Penta service dealer carry out a compression check.

Engine overheates

If the engine is overheating, check to see if:

1. The thermostat is faulty.
2. The impeller is defective.
3. The cooling water intake or jackets are blocked. (If yes, dismantle and clean them.)

Engine does not attain full Revolutions

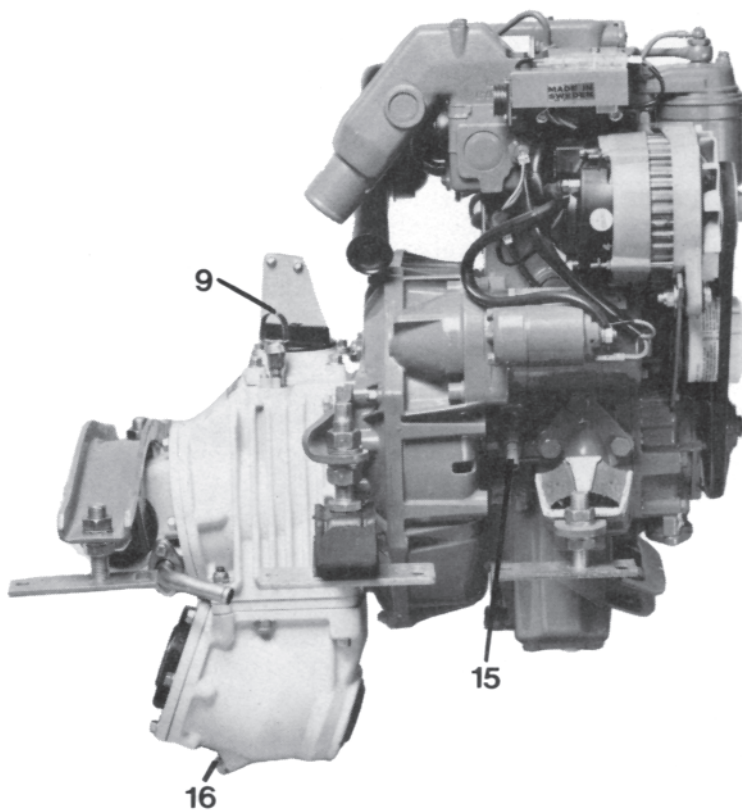
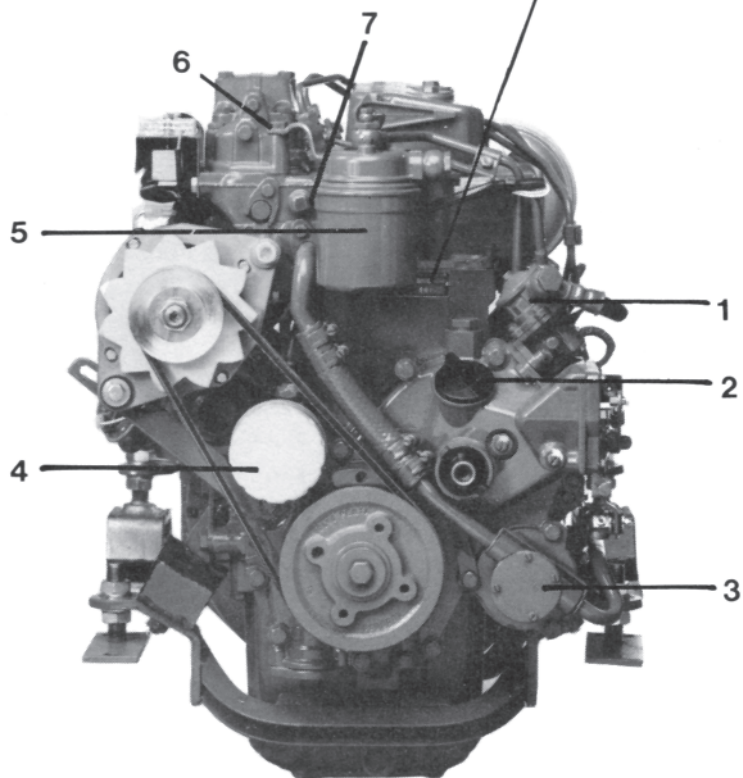
If the engine starts properly and runs smoothly, but does not reach the same revolutions as previously, this does not necessarily indicate a defect in the engine, but may mean that there is fouling on the bottom of the boat, or that it is overloaded. It is also possible that the propeller may be defective. If all these causes can be eliminated, there may have been a loss of compression in one or more of the cylinders. Have your nearest Volvo Penta dealer carry out a compression test.

Aligning Engine and Reverse Gear

Once a season or after launching, the alignment of the engine with the propeller shaft should be checked and if necessary adjusted. To do this:

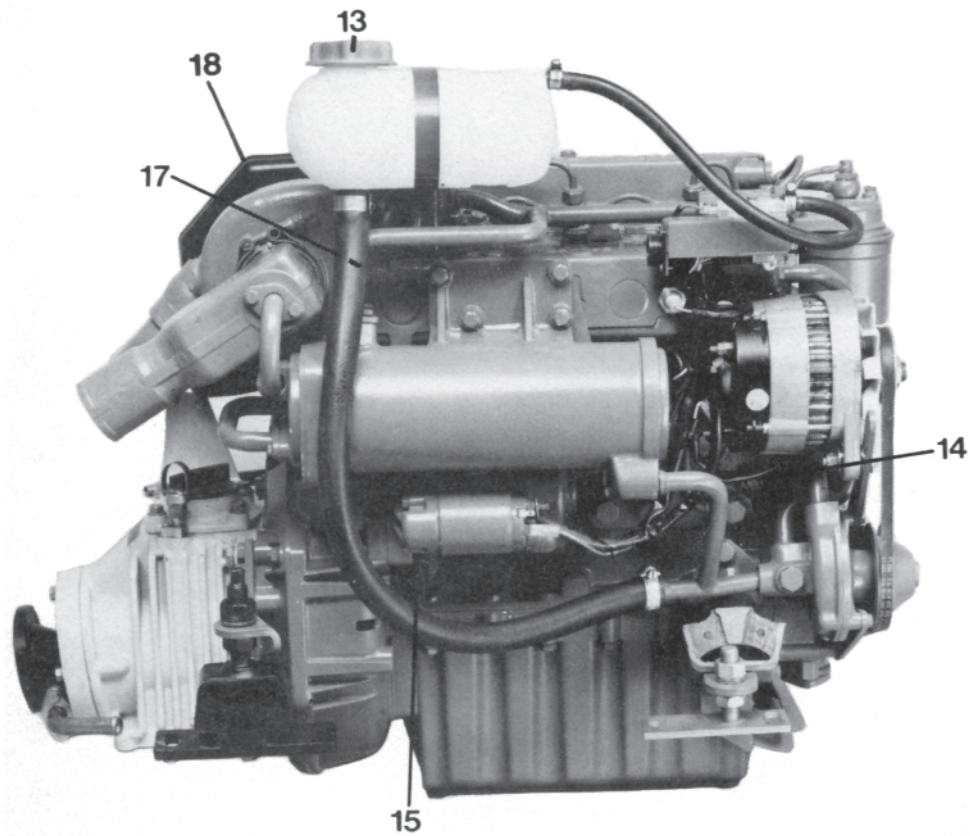
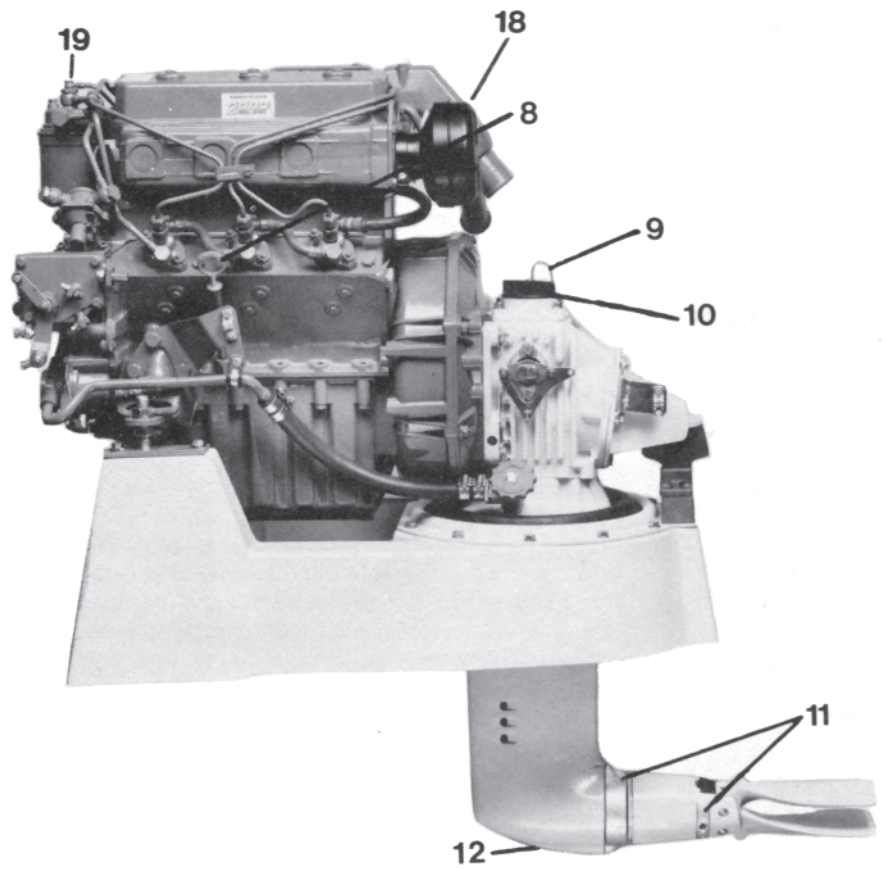
Unfasten the screw union for the propeller shaft flange. Using a 0.10 mm thickness gauge, check that there is not enough room to insert it between the reverse gear and propeller shaft flanges at any point when the propeller shaft flange is pushed forwards. Turn the shaft through 90°, 180° and 270° when carrying out this test. If the gap is more than 0.10 mm (0.004") the alignment should be adjusted. If a non-adjustable rubber suspension is fitted, the thickness of the padding should be adjusted.

Engine identification



Engine component guide

1. Fuel strainer
2. Oil filling, engine
3. Sea-water pump (draining, sea-water)
4. Oil filter
5. Fuel filter
6. Thermostat
7. Zinc anode (2001, 2002)
8. Oil dipstick
9. Oil dipstick, drive/reverse gear
10. Oil filling, drive/reverse gear
11. Zinc anodes, drive
12. Oil drainage, drive
13. Fresh water filler
14. Zinc anode (2003)
15. Drain plug
16. Oil drainage, V-drive
17. Venting, turbo
18. Intake air silencer
19. Fuel system venting



TECHNICAL DATA

ENGINE DESCRIPTION	2001	2002	2003	2003T
Number of cylinders	1	2	3	3
Output, see sales literature				
Max. operating speed rpm		3200		
Bore, mm (inch)		79 (3.110")		
Stroke, mm (inch)		87 (3.425")		
Displacement, dm ³ (in ³)	0.43 (26.2)	0.85 (51.8)	1.28 (78.1)	1.28 (78.1)
Idling speed rpm		850		
Max. angle of incline when under way		10°		
Max. angle of lateral incline under way		30°		
Engine weight incl. reverse gear				
(MS2) kg (lbs)	112 (246)	139 (305)	159 (349)	176 (387)
(V-drive) kg (lbs)	118 (259)	145 (319)	165 (363)	182 (400)
Engine weight incl. S drive kg (lbs)	126 (277)	153 (336)	173 (380)	—
Fuel		Autodiesel (No 2 Diesel)		

VALVES

Valve clearance, inlet mm, warm engine	0.30 (0.012")
Valve clearance, outlet mm, warm engine	0.30 (0.012")
Decompressed depression, mm	0.50 (0.020")

LUBRICATING SYSTEM

Oil capacity, incl. filter lit (US qts)	1.4 (1.5)	2.75 (2.9)	4.1 (4.3)	4.3 (4.5)
Oil quality		CD		
Viscosity		SAE 15/W40		
Ratio, MS2, MS2V		2,4:1 alt. 3,0:1		
Oil capacity MS2 lit (US qts)		0,8 (0.85)		
Oil capacity MS2V lit (US qts)		1,8 (1.9)		
Oil quality (as for engine)				
Viscosity (as for engine)				
Ratio 120S		2,20:1		
Oil capacity 120 S lit (US qts)		2,8 (2.85)		
Oil quality (as for engine)				
Viscosity (as for engine)				
Thermostat begins opening				
sea water cooled engine °C (°F)	60 (140)	60 (140)	60 (140)	—
fresh water cooled engine °C (°F)	—	74 (165)	74 (165)	74 (165)
Thermostat, fully open				
Sea water cooled engine °C (°F)	75 (167)	75 (167)	75 (167)	—
Fresh water cooled engine °C (°F)	—	87 (188)	87 (188)	87 (188)
Fresh water cooling system, lit. (US qts)	—	4 (4.2)	5.5 (5.8)	7 (7.4)

ELECTRICAL SYSTEM

Battery voltage		12		
Starter motor battery, max Ah		70		
Starter motor output, kW	0.8	1,4	1,4	1,4
Alternator output, A (W)		50 (14x50)		
Specific gravity of electrolyte				
Recharge at g/cm ³		1230		
Fully charged, g/cm ³		1,275–1,285		

TORQUE FACTORS

Nuts for injectors, Nm (kpm) (ft.lbs)		20 (2.0) (15)		
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When installing accessories or extra equipment on engines equipped with sailboat drives and instrument panel as in alternative A (twin pole electrical system) the earthing must always be done at the generator's B-contact or at the battery's minus pole.

Wiring diagram, alternative A

(Standard)

INSTRUMENTPANEL

1. Printed circuit card
2. Rev counter (accessory)
3. Start button
4. Switch for instrument panel
5. Alarm test button
6. Alarm

Max output from the panel = 5 A

Cable colour

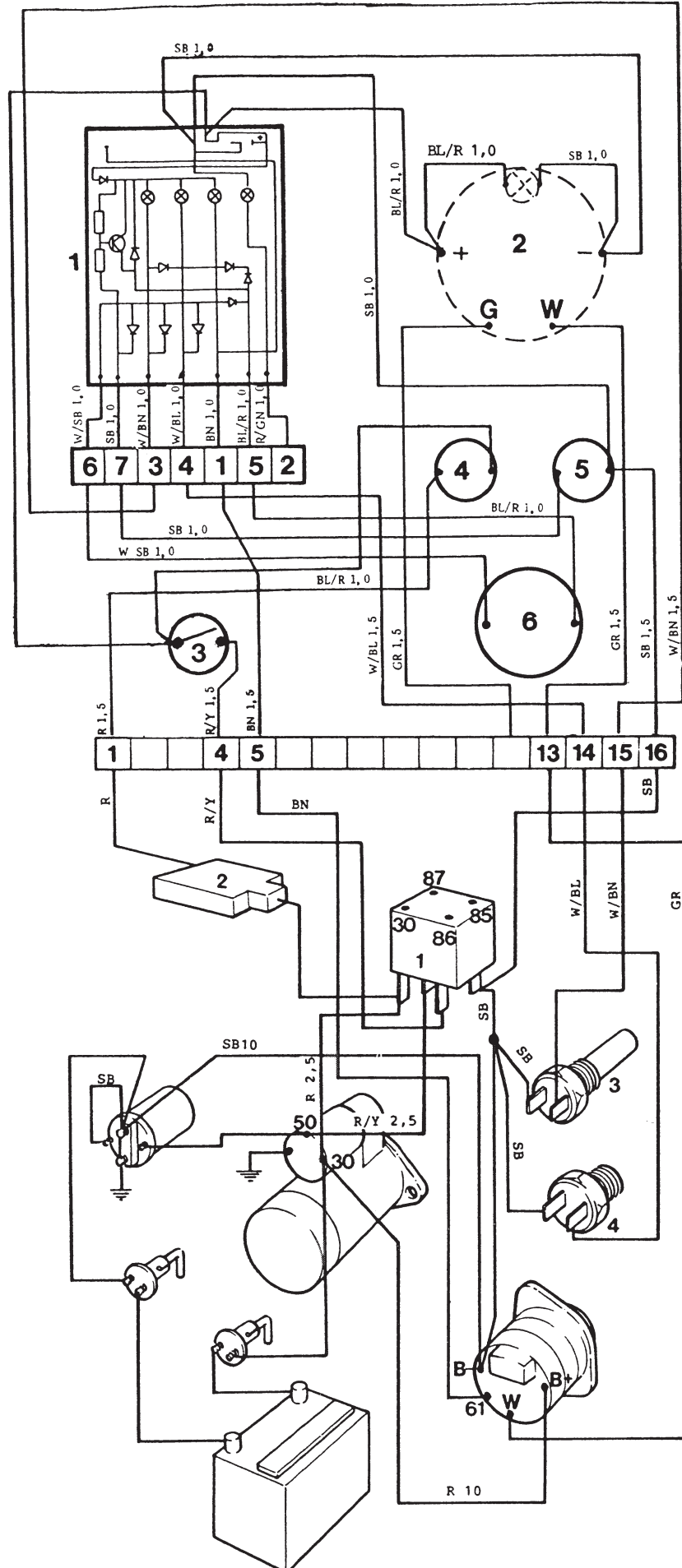
- R = Red
- PU = Purple
- BN = Brown
- OR = Orange
- GR = Grey
- SB = Black
- W = White
- Y = Yellow
- GN = Green
- BL = Blue

ENGINE

1. Relay
2. Fuse
3. Temp. alarm sender
4. Oil pressure alarm sender

Wire areas in mm²

Wire area	
mm ²	AWG
1,0	16
1,5	14
2,5	12
10	6



Wiring diagram, alternative B (De Luxe)

INSTRUMENT PANEL

1. Voltmeter
2. Oil pressure gauge
3. Coolant temperature gauge
4. Printed circuit card
5. Alarm test
6. Switch for instrument lighting
7. Rev. counter
8. Key switch
9. Alarm

Max output from the panel: 5 A

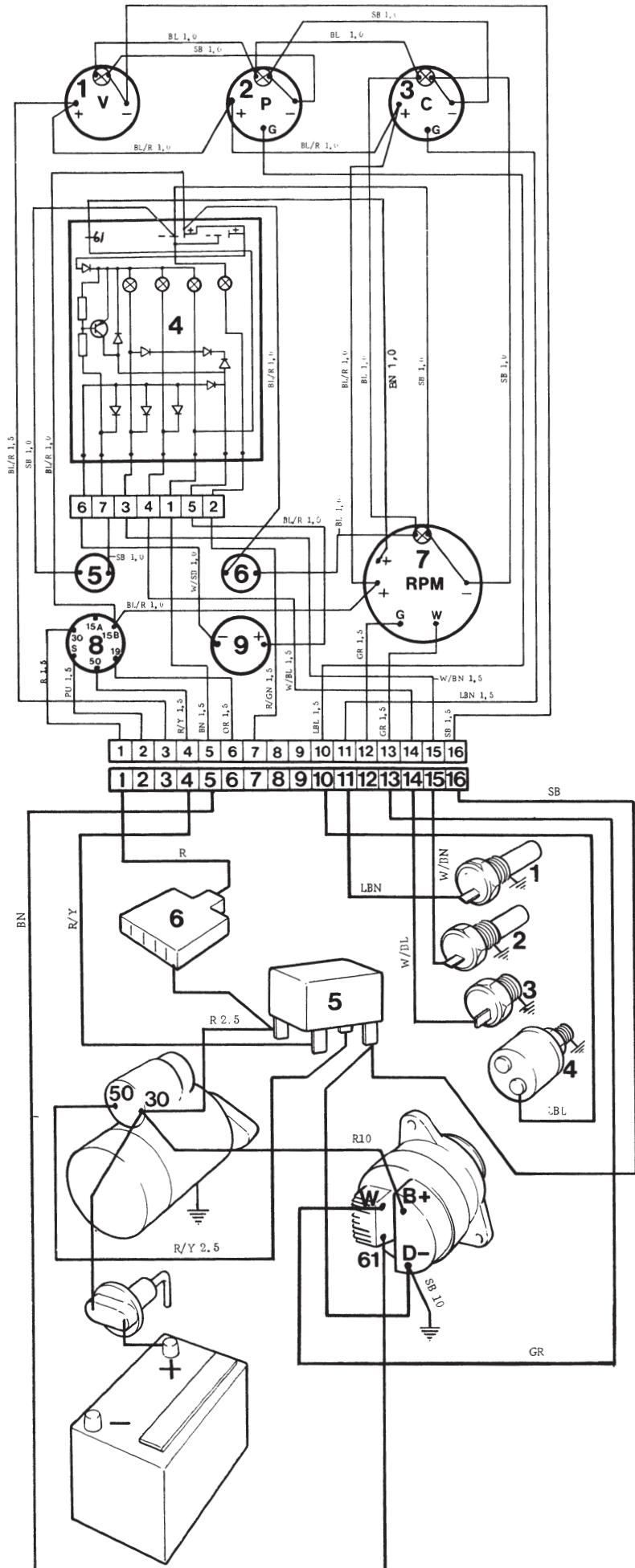
Cable colour

- GR = Grey
- SB = Black
- BN = Brown
- LBN = Light brown
- R = Red
- P = Purple
- GN = Green
- Y = Yellow
- W = White
- BL = Blue
- LBL = Light blue

ENGINE

1. Coolant temperature sender
2. Oil pressure alarm sender
3. Coolant temperature alarm sender
4. Oil pressure sender
5. Relay
6. Fuse

Wire areas in mm²



VOLVO PENTA

AB Volvo Penta

SE-405 08 Göteborg, Sweden

www.volvopenta.com