

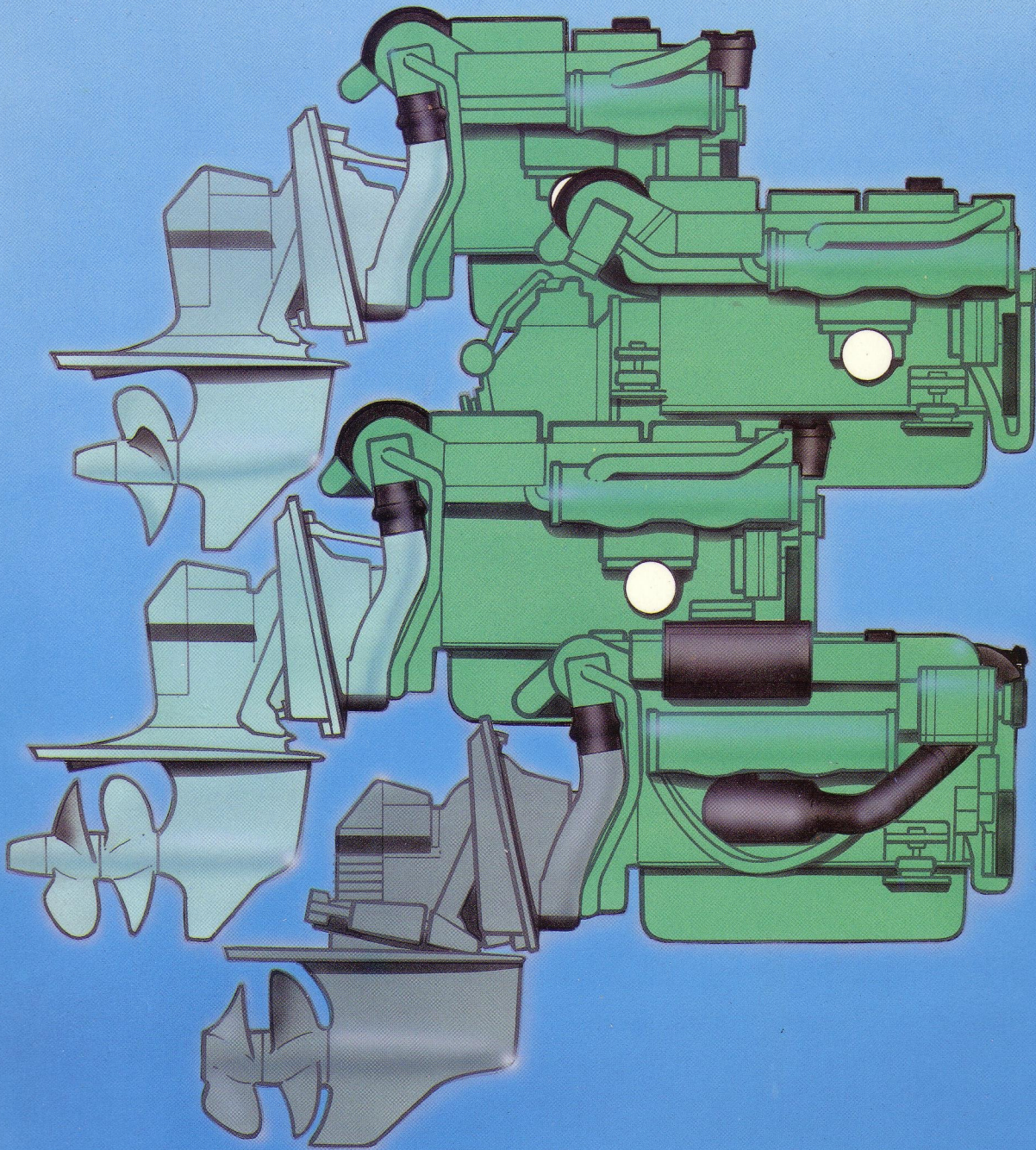
Owner's Manual

AD31 TMD31 TAM31

AD41 TMD41 TAM41

KAD42 KAMD42

SP DP DPX MS4B HS1A



**VOLVO
PENTA**

Welcome on board!

You have chosen a boat with all the comfort you could ever wish for, and an engine with maximum safety which will be extremely economical to run. We welcome you to our worldwide service network.

Read this before you cast off from shore

We advise you to read through this Operator's Manual even if you are used to the sea and have previously piloted various types of boat. Some things may be different to what you are used to.

Warranties and Service

Provided with each engine is a description of the warranty we issue for our product. The warranty card you receive should be filled in and returned to VOLVO PENTA by your sales representative; this is important both for us and for you. Make sure this is done, because we may refuse to undertake repairs on the warranty because the date of delivery cannot be verified.

Some markets have other warranty conditions which replace or supplement the VOLVO PENTA international warranty.

Fuel

Use "Autodiesel" diesel oil. An inferior fuel may cause breakdowns.

Lubricating oils

Use only lubricating oils of the quality recommended in "Technical Data".

Maintenance

There are a number of maintenance instructions listed in this Operator's Manual. If these are not carried out in good time, your engine may become less reliable and less economical to run as a result. Contact an authorised VOLVO PENTA workshop if you are unable to carry out the prescribed maintenance yourself.

It is important that you always use original parts in order to maintain VOLVO PENTA quality. It will be worth it in the long run. VOLVO PENTA has developed an extensive network of retailers in order to be able to provide services and parts.

Always state the complete type designation and serial number when ordering parts.

Safety instructions



When you see this symbol before an item of text, it means that there is a danger of injury or damage unless the instructions are followed.

Maintenance Manual

This Owner's Manual contains brief maintenance instructions in the form of an operating schedule containing text and illustrations.

For the "Do-It-Yourself" we have put together a more comprehensive **Maintenance Manual** which also describes the various systems, e.g. the cooling etc. in more detail. The Maintenance Manual also provides hints on the tools you will need.

The Maintenance Manual can be obtained from your VOLVO PENTA retailer.

Safety

Preparations

We have put together the checklist below (to which you can, of course, add your own notes) so that you may enjoy trouble-free sailing.

It is, of course, important that the engine, its equipment and the boat in general are maintained according to the instructions given.

Travel plans

- Do you have a current nautical chart for the planned voyage?
- Have you calculated the distance and the amount of fuel you will require?
- Where can you buy fuel on your journey?
- Do your relatives know of your travel plans?

The boat's equipment

- Rescue equipment such as life jackets and distress rockets - does everyone on board know where they are?
- Spare parts on board, e.g. water pump wheel (impeller) for the seawater pump.
- Tools which suit the equipment
- Full fire extinguishers.

The environment

The marine environment is in many ways through natural deterioration and emissions caused by/from human inventions. Our product development gives priority to measures that will make your engine as environmentally-friendly as possible. The injection equipment is therefore set and sealed at the factory to have as little effect on the environment as possible.

As a boat owner, you can help the environment by using the recommended fuel as instructed in the manual. It is important that annual servicing be carried out.

Parts need to be replaced in many of the operations described. Discarded oil and fuel filters always contain a small amount of oil or fuel and must be deposited in special containers. Used and discarded batteries should be deposited at special collection points.

AB VOLVO PENTA
Technical information

Owner's Manual

TAMD31D

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Vigtig Information

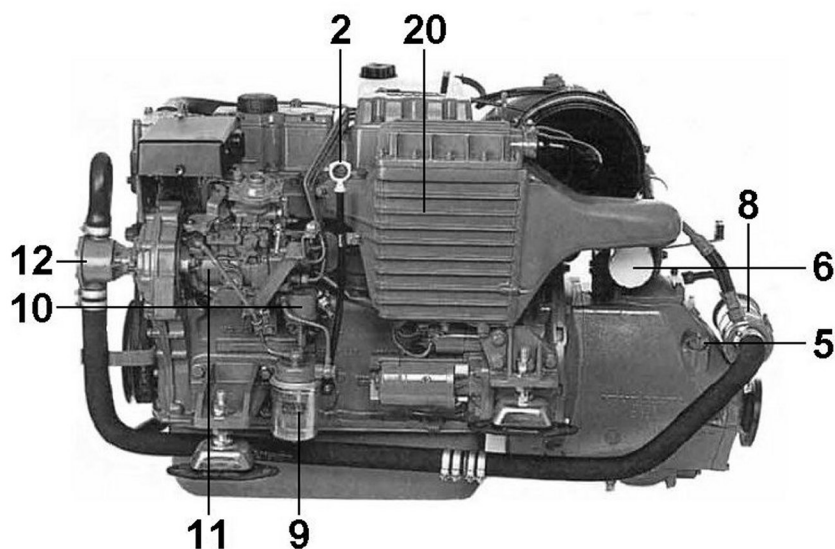
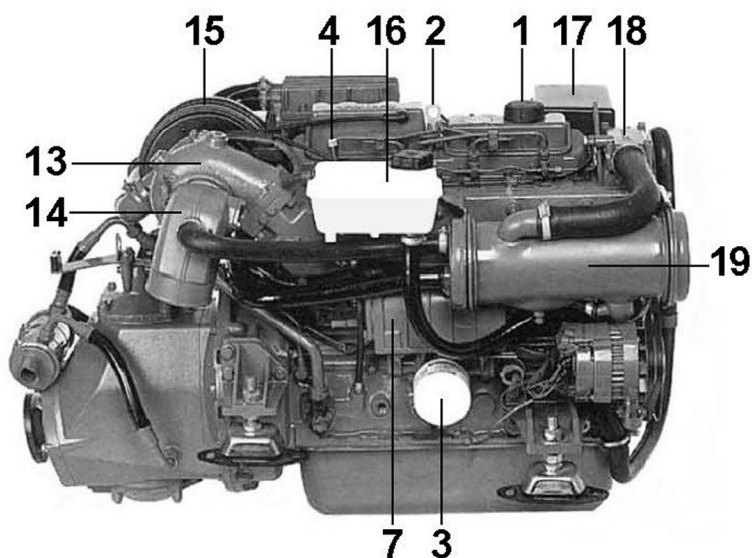


Starte-spray må ikke anvendes, hvis motoren er udstyret med forvarmer

Stop motoren før du åbner lemmen til motorrummet. Der er roterende dele som er farlige ved berøring, når maskinen kører. Vær opmærksom på brandfare. Al fuel er brandfarlig.

Motoren afkøles med væske. Tøm søvandsystemet, når motoren stoppes, hvis der er fare for frostvejr. Ferskvandssystemet skal være tilsat frostvæske, der virker korrosionsbeskyttende. Vær opmærksom på, at galvanisk tæring kan opstå mellem visse materialer og søvandssystemet. Luk alle haner og bloker alle slanger, hvis båden ikke er tjekket regulært. Defekte afløb kan foresage, at båden fyldes med vand og synker.

TAMD31D med HS1 reverse gear



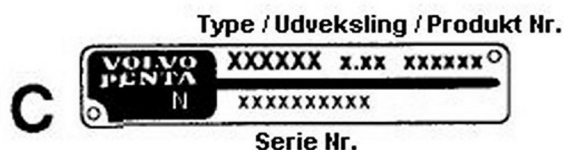
- 1 Oliepåfyldning motor
- 2 Oliepind, olieaftapning motor
- 3 Oliefilter motor
- 4 Olieedræn motor
- 5 Oliepåfyldning, oliepind reverse gear
- 6 Oliefilter reverse gear
- 7 Oliekøler motor
- 8 Oliekøler reverse gear
- 9 Fuel filter
- 10 Fuel pumpe
- 11 Injektion pumpe
- 12 Søvandspumpe
- 13 Turbo
- 14 Vandkøling af udstødning
- 15 Luffilter
- 16 Ferskvandskøling påfyldning
- 17 Elektrisk terminalboks
- 18 Termostathus
- 19 Varmeveksler
- 20 Aftercooler

Typeskilt

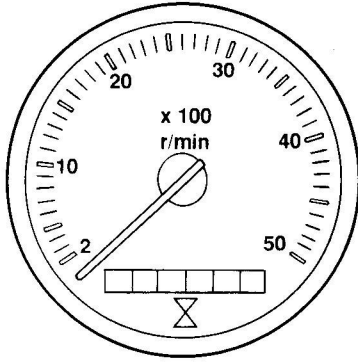
Motor:



Reverse Gear



Instruments, Main panel



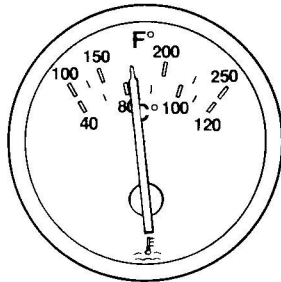
Rev counter

This shows the engine speed in revs per minute x 100.

Speed

It is important that the engine reaches a maximum speed of 3900, or as near this speed as possible, with a normal load. A recommended maximum cruising speed is around 200 r/min below the maximum speed achieved.

NB! Growth on the hull reduces the speed.

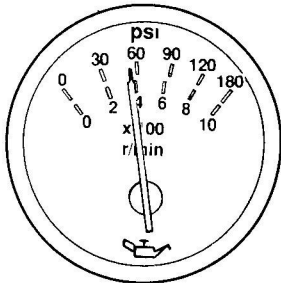


Temperature gauge

During normal use, the temperature gauge should display 75–90°C (165–195°F). The alarm will sound if the cooling water temperature is too high.



If the alarm comes on, reduce the speed to idling in neutral. Find out what is blocking the water supply to the engine if the temperature does not drop. Stop the engine if necessary and rectify the fault.

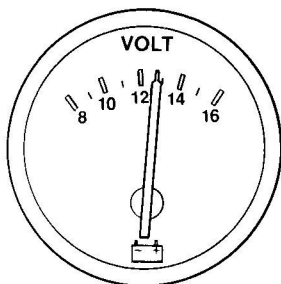


Oil pressure gauge

The oil pressure gauge should normally show 300–500 kPa (45–75 psi) when the engine is running. It is normal for the gauge to show a lower reading at lower speeds. An acoustic alarm will sound if the oil pressure is too low.

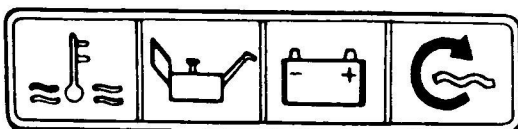


If the alarm comes on, stop the engine immediately and determine the cause.



Voltmeter

The voltmeter shows the system voltage. When the engine is running, this is ca 14 V in a 12 V system and ca 28 V in a 24 V system. The voltages are 12 and 24 V respectively when the engine is switched off.



1

2

3

4

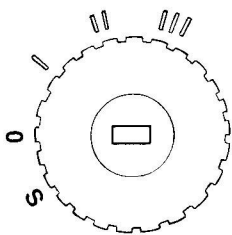
Warning display

The display has three warning windows which, in combination with the acoustic alarm, display red to indicate why the alarm is being sounded:

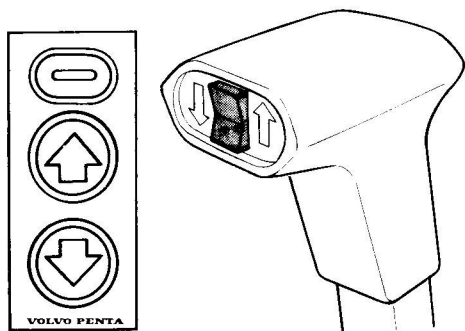
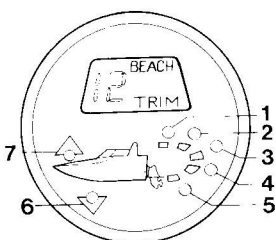
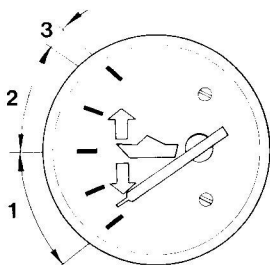
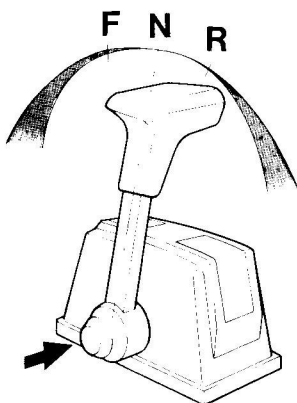
1. High cooling water temperature
2. Low oil pressure
3. No charge
4. Pre-heating (extra equipment)

Control units, in combination with SP and DP drives

Ignition switch



Single lever control



S = Stop position for stopping the engine.

0 = Everything connected across the key is switched off. The key can be withdrawn from the lock.

1 = Drive position. The warning display is lit up during the start procedure and the alarm can be tested using "alarm test".

2 = Used only on engines equipped with pre-heating.

3 = Start position. Release the key as soon as the engine starts.

Release. Lever in neutral **N**. Press the button in the centre of the lever hub. Push the lever forward slightly. Release the button. Only the speed will be affected now. When the lever is returned to the neutral position, it comes out of neutral automatically and the speed, forward and reverse can be regulated.

F = FORWARD. Simultaneous control of speed and movement.

R = REVERSE. Simultaneous control of speed and movement.

Trimming and tilting the drive is done either from the separate control panel or using trim buttons on the control, if the control is suitably equipped.

The drive's trim position is shown on the separate instrument which is available in two configurations - digital and analog.

1 = TRIM. Max trim: DP = through 5, SP = through 12. Drive position at all speeds.

2 = BEACH. Used when tying up in shallow water or where there is doubt about the depth. The speed must always be slow.
DP = 6 through 40, SP = 13 through 40.

3 = LIFT. Flashing red warning light (digital instruments). Drive fully tilted. The engine must not be run in this position.

LEDs (digital trim instruments)

1 Flashes red in tilt range above 40. Otherwise off.

2 Continuous red light: DP = 6 through 40, SP = 13 through 40. Otherwise switched off.

3 Continuous green light: DP = 2 through 5, SP = 2 through 12. Otherwise switched off.

4 Continuous green light in the range 0 through 2. Otherwise switched off.

5 Continuous green light in trimmed position through 0. Otherwise switched off.

6 Continuous yellow light in max. trimmed position through 0. Flashes when drive moves and the bow is lowered. Otherwise switched off.

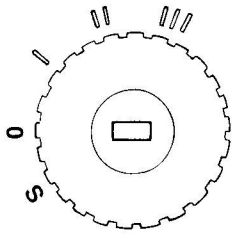
7 Continuous yellow light: DP = 2 through 5, SP = 2 through 12. Flashes when the drive moves and the bow is raised.

The control panel has three buttons. The bottom one lowers the bow, the middle one raises the bow and the other, red, button in combination with the middle button trims the drive in the Beach range.

The control button on the control lever raises and lowers the bow by pressing its upper or lower segment. The separate switch on the instrument panel must be pressed to put the drive into Beach range.

Control units, in combination with DPX drive

Ignition switch



S = Stop position for stopping the engine.

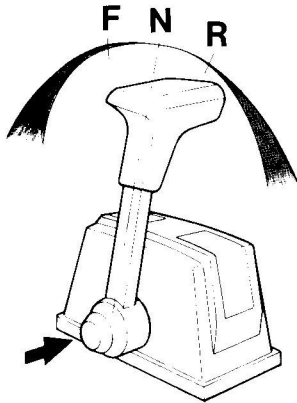
0 = Everything connected across the key is switched off. The key can be withdrawn from the lock.

1 = Drive position. The warning display is lit up during the start procedure and the alarm can be tested using "alarm test".

2 = Used only on engines equipped with pre-heating.

3 = Start position. Release the key as soon as the engine starts.

Control



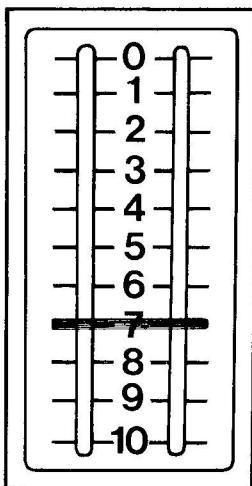
Volvo Penta's single lever control has a linked speed and control function and is used as follows:

Release. Lever in neutral **N**. Press the button in the centre of the lever hub. Push the lever forward slightly. Release the button. Only the speed will be affected now. When the lever is returned to the neutral position, it comes out of neutral automatically and the speed, forward and reverse can be regulated.

F = FORWARD. Simultaneous control of speed and movement.

R = REVERSE. Simultaneous control of speed and movement.

Trim operations



The trim indicator, which is mechanically controlled, displays the drive position in the trim range as a digit from 0 to 7. Check during the first test run which trim position provides the best comfort and then use this number as a reference in the future.

When the drive is in the Beach range, 7-10, the speed of the boat must be lower than planing speed. The engine must be stopped when the drive is fully tilted.

The trim indicator displays the position in the Trim range and the beginning of the Beach range only. In the case of a twin installation, individual trimming of the drives is permitted in the trim range. Take note of the trim indicators.



Warning! If one drive in a twin installation needs to be tilted in the Beach range, both drives must be tilted at the same time (i.e. parallel) to prevent unnecessary stress on the tie rod between the drives.

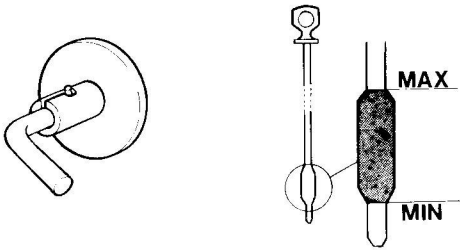
When tilting in parallel, both drives must be trimmed to their forward positions (0) first. Start lifting from this position.

When lowering the drives, it is important for both to be lowered in parallel to avoid stressing the tie rod.

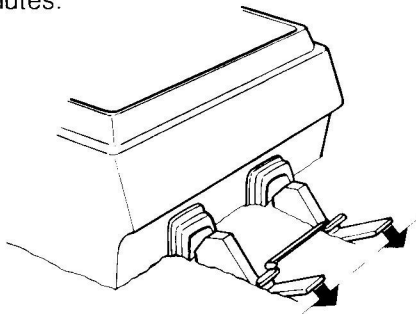
Driving

Starting

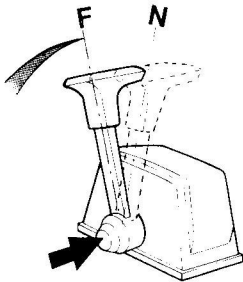
- 1 Check the oil level in the engine.



- 2 Switch on the main switch.
- 3 Start the engine room fan. Let it run for a few minutes.



- 4 Lower the drive if it is tilted.
DPX Double installation: Lower both drives at the same time.



- 5 Release the control lever. Idling position.
- 6 Start the engine. (See "Ignition switch".) Adjust the speed to idling.

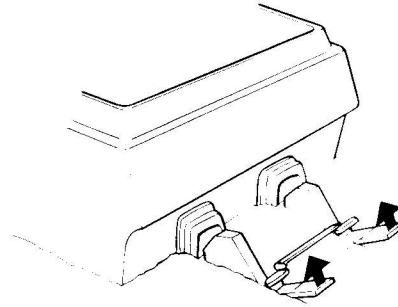
If the engine is equipped with pre-heating, this must be engaged about 30 s before starting.

⚠ Turbo warning! Do not race the engine immediately after starting. This could damage the turbo compressor.

- 7 Read the instruments. If the readings are abnormal, stop the engine and determine the cause.
- 8 Check for obstructions in front of and behind the boat before selecting "Forward" or "Reverse".

The maximum cruising speed is maximum speed less ca 200 r/min. Good operating economy is achieved if full throttle is avoided.

We recommend that you decrease speed and raise the drive(s) to Beach range when operating in shallow water.



DPX twin installation: The drives must be tilted simultaneously to avoid stress on the tie rod.

Check the instruments regularly while driving. Stop the engine to determine the cause if any reading is abnormal.

KAD42, KAMD42

The engine is equipped with a mechanical compressor which provides powerful acceleration up to the planing position. The compressor is engaged and disengaged electronically depending on the speed. Engagement is at ca 1700 r/min depending on the setting and disengagement takes place at ca 3100 r/min.

The compressor also has a "kickdown" function which engages the compressor at speeds from idling to 3100 r/min.

When operating in the vicinity of the compressor's engagement/disengagement speeds, the compressor can be engaged/disengaged for brief periods. If this is done, adapt the speed so that the compressor is either constantly engaged or disengaged. The engine sound changes when the compressor is engaged. This is quite normal.


Power Trim

- 9 The built-in trim function can be used to achieve planing and a more comfortable ride much more quickly. The drive should be in the trim range during normal planing.

Raise or lower the bow using the buttons on the panel or the buttons on the control lever. The instrument indicates the drive's position.

Refer also to "Control units".

- 10 Reversing can be done with the drive in "Trim" or "Beach". Always allow the speed to decrease to idling before selecting "Reverse".

 **WARNING:** Never select reverse when the boat is planing.

After use

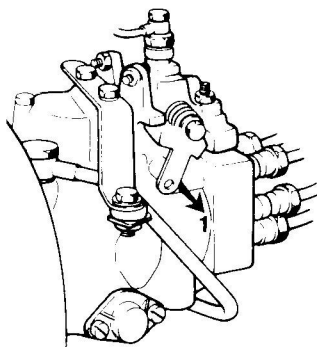
- 11 After use and when the boat is tied up, it is important for the engine to run at idling for at least 1 minute to avoid subsequent boiling of the coolant.

- 12 Trim the drive to the maximum trimmed position to protect the trim cylinders' untreated surfaces from fouling. The exception to this is when there is a risk that the drive could run aground. The drive then must be raised instead to the maximum position. Do not forget to lower the drive before starting.

DPX double installation: Both drives must be tilted at the same time and lowered at the same time before starting.

Stop the engine using the ignition switch.

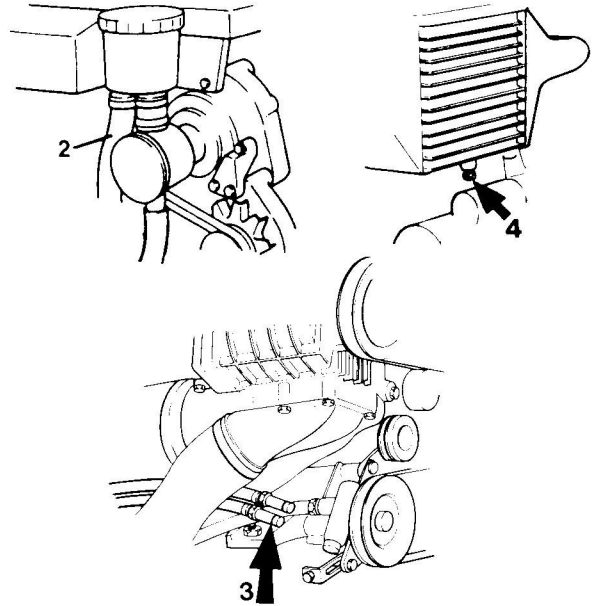
CAUTION. Never switch off at the main switch before stopping the engine. This could damage the alternator.



- 13 The engine can be stopped in an emergency by pulling the injection pump lever backwards.

- 14 Switch off the main switch.

- 15 Check for leaks around the engine and that everything else in the engine compartment appears normal.




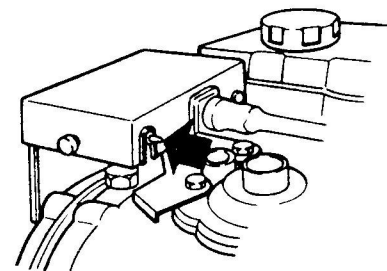
- 16 In cold weather when there is a risk of freezing, it is important that the freshwater system's coolant has sufficient frost protection. The seawater system must be drained.

Watch out for leakage into the boat. Drain as follows:

Undo the hose (2) from the seawater filter and bend it down so that the water runs out. Reconnect the hose. Drain the oil cooler and the after-cooler (4), and undo the cover on the seawater pump and allow the water to drain out. Drain the oilcooler on the KAD42 via the hose (3) marked blue.

Reverse gear HS1A and MS4: Close the bottom cock and undo the hose on the oil cooler port side.


 Do not forget to close the cocks. Never leave the boat with open cocks or hoses that are not connected. There is a risk that the boat could sink.

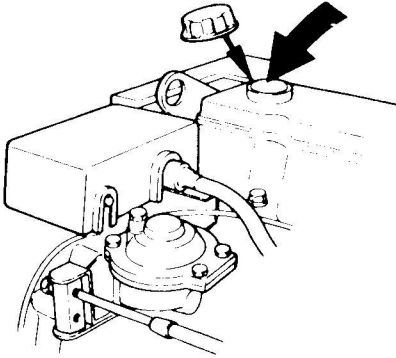


- 17 An automatic fuse may have tripped if the engine cannot be started or if the instruments display 0 readings. If this is the case, reset the fuse using the button. Always investigate the cause of overloading.

Regular maintenance

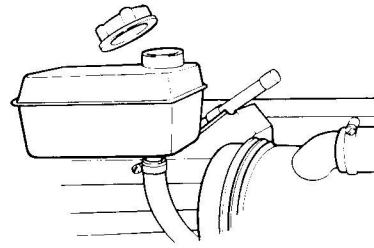
Daily inspection before starting

 To avoid injury, always make sure that the engine is switched off before starting work on it. There are many moving parts - pulleys, drive belts etc.




Check the oil level in the engine. When checking the level refer to "Technical data" for the correct type of oil.


CAUTION Fill to no higher than the "Max" mark. Never allow the level to go below the "Min" mark.



Checking the coolant level

 **Warning!** Observe extreme caution when checking the coolant level if the engine is hot or running - the system is pressurized.

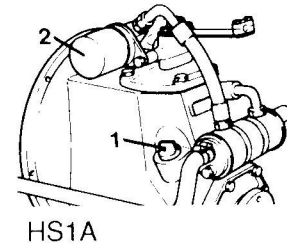
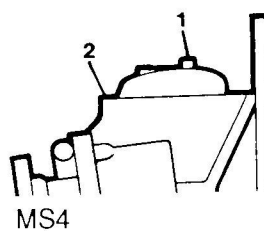
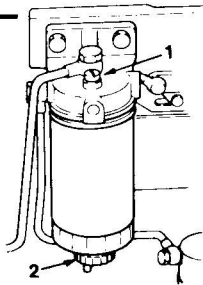
Turn the cap on the expansion tank to the first stop to relieve the pressure. The level should be between the maximum and minimum marks when the engine is hot. It is normal for the level to be lower when the engine is cold. Fill as required when the engine is running.

 **CAUTION!** Beware of moving pulleys and drive belts.

Use Volvo Penta type 90 coolant or a 50/50 mixture of antifreeze and water.

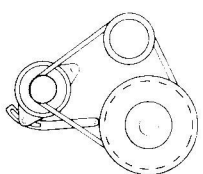
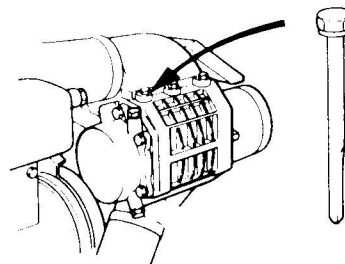
Check every 14 days

Check the oil in the reverse gear with the engine stopped. Do not screw in the dipstick. Replenish as required according to "Technical data".

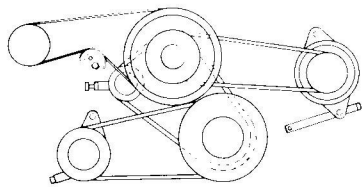


Drain the water from the fuel filter. Open the vent screw (1) 3 turns, then the drain screw (2) and let any water run out. Vent the fuel system.

Check the oil level in the compressor (KAD42) with the engine stopped. Screw in the dipstick. Change the oil every 200 hours.



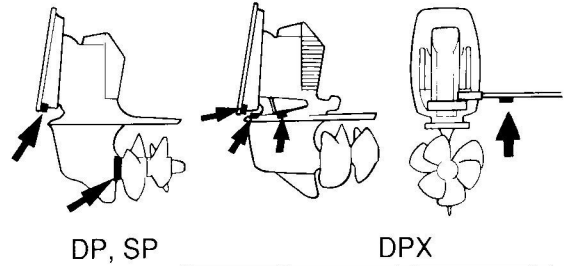
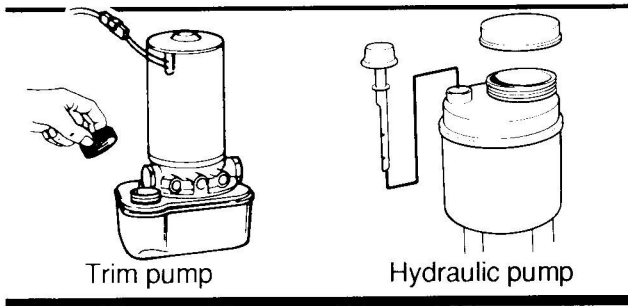
31, 41



42

Check the belt tension. Excessive tension will damage the bearings in the water pump and alternator. Insufficient tension will cause slipping. Replace worn belts.

Check the corrosion protection for pitting.
When replacing – scrape the mating surface clean.

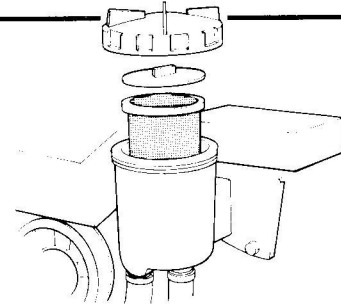
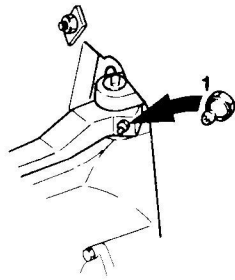


Check the oil level in the trim pump and the hydraulic pump with the drive trimmed. Refer to "Technical data" for the type of oil. Never mix engine oil and ATF oil.

Check every 50 hours

Check the seawater filter more regularly if there is a risk of blockages.

Warning! Beware of water penetration.

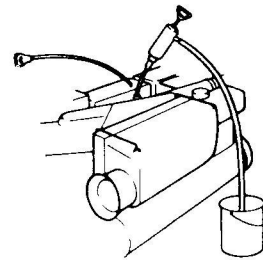
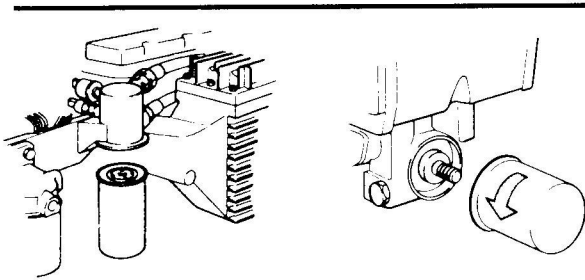


Lubricate the steering shaft bearing with water-resistant grease.

Check every 100 hours or at least once every season

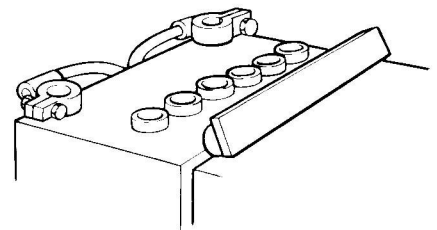
Change the engine oil. To be done after 20 hours on new or reconditioned engines. See "Technical data" for the type of oil.

Warning! Hot oil can cause burns.



Change the oil filter after the first 20 hours and then every 100 hours. Screw on the filter until it stops and then a further ½ turn, no more. Check for leaks.

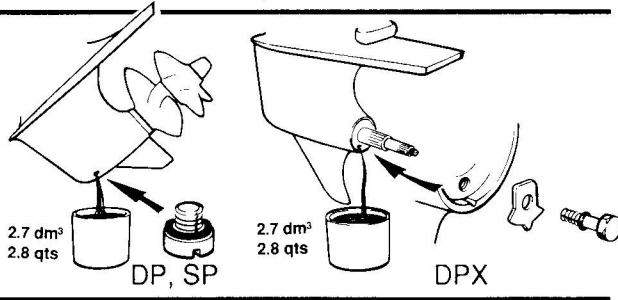
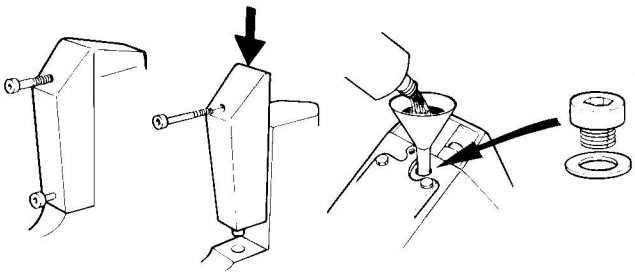
Warning! Check the electrolyte level in the battery. **WARNING!** Risk of explosions. No naked flames. Electrolyte is corrosive. Rinse with water if it gets in the eyes. Call a doctor immediately!



Maintain quality and safety.
Always use VOLVO PENTA original parts - it pays in the long run.

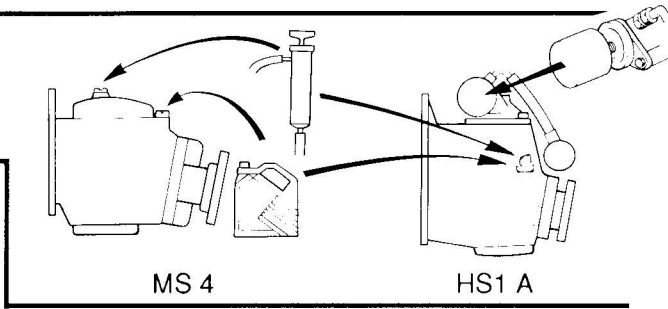
Check every 200 hours or at least once a year

Drain the oil from the drive. Contact your VP Service workshop if the oil is discolored (gray). Remember the environment and drain the oil into a suitable container.



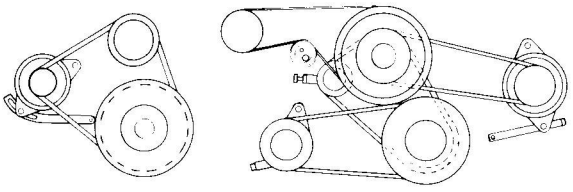
Fill with new oil. Refer to "Technical data" for the type of oil. Do not screw in the dipstick when checking. Drain or add oil for the correct level. Check the tightness of the dipstick and plug.

Change oil in reverse gear. Refer to "Technical data". Change oil filter. Check level. Run engine at idling for a few minutes. Add oil as required.



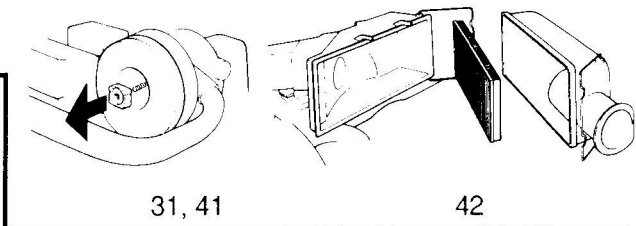
MS 4 HS1 A

Change drive belts if worn or split. Check tension after a few hours of use.



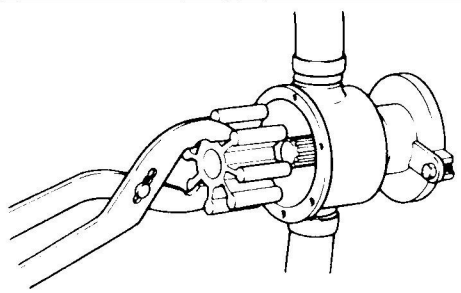
31, 41 42

Replace the air filter. The engine must **not** be running - risk of injury! Prevent ingress of dirt.

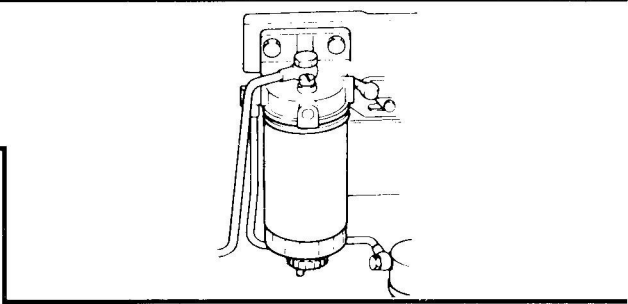


31, 41 42

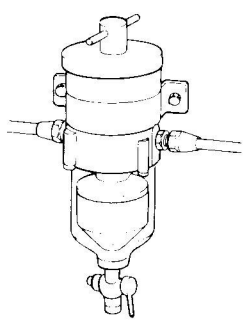
Check the pump impeller. Ensure there is no water penetration! Replace pump impeller if defective. If the shaft can be rotated, replace the carrier.



Replace fuel filter. Avoid spilling fuel. Consider the environment when discarding the old filter. Tighten the new filter until it stops then turn further ½ turn. Bleed system and check for leaks.



If an extra fuel filter is fitted, change the filter cartridge and drain the water. Water can damage the injection pump and injectors.

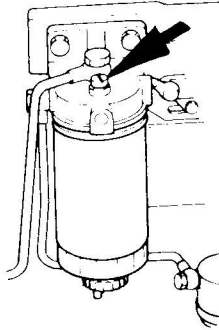


Venting the fuel system

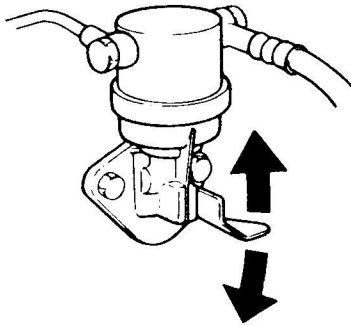
Venting must be carried out in the following cases before the engine can be started:

- When a filter is replaced
- When the engine runs out of fuel
- When the injection pump has been removed
- When the fuel system is repaired
- Leakages or if the fuel lines are opened
- If the engine has not been run for a long time

Venting is done as follows:

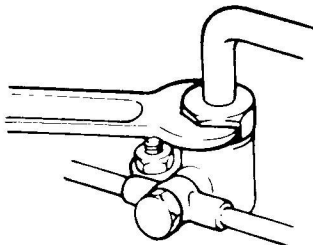


Open 4 turns. Avoid spilling fuel. Pump manually.



Close when air-free fuel appears. If the pump effect is poor rotate the engine a little.

If the engine does not start, continue bleeding. Pump manually for ca ½ minute for automatic bleeding of the injection pump.



Undo all pressure pipe nuts. Set the speed control to full speed. Run using the starter motor until fuel appears. Avoid spillage. Tighten the nuts.

Other check


Some checks and tasks require special knowledge and we therefore recommend that you use an authorised workshop. The following checks fall into this category:

- Checking the turbo compressor (200 hours)
- Adjusting the valves (200 hours)
- Checking the starter motor and alternator (200 hours)
- Checking the injectors (600 hours)
- Checking the electrical system (200 hours)
- DPX:** Checking the hydraulic hoses and connections, inside and outside the transom shield
- DPX:** Checking the tie rod plastic bushings for excessive wear.

The cooling system operates normally when the gauge shows 75–90°C (165-195°F). Overheating can be caused by the following:

- Blocked seawater inlet, seawater filter or oil cooler.
- Defective pump impeller and/or carrier in seawater pump.
- Air in freshwater system.
- Coolant level low.
- Slipping or broken drive belt for circulation pump.
- Faulty thermostat, temperature gauge or instruments.

Avoid water penetration when working on the cooling system.

 **If the boat must be left with parts of the cooling system removed, make sure that water cannot leak into the boat in an uncontrolled manner causing it to sink.**

Never top up the cooling system with water alone since the coolant properties with respect to boiling point, corrosion protection and frost protection may be reduced.

Drain and flush the cooling systems once a year.

If the boat is used in water with a high salt content or in abnormally contaminated water, it is important for the seawater system to be flushed more often with freshwater. This avoids the accumulation of deposits and salt crystals.

Laying-up

If the boat is unlikely to be used for more than 90 days, or if there is a risk of frost, it must be put into storage.

Long-term laying-up during the winter.

Let an authorized workshop test the engine and equipment before the boat is taken out of the water.

Do the following while the boat is in the water:

- Drain the engine oil once the engine is hot.
- Change the oil filter.
- Fill with engine oil to the correct level. See Technical Data.

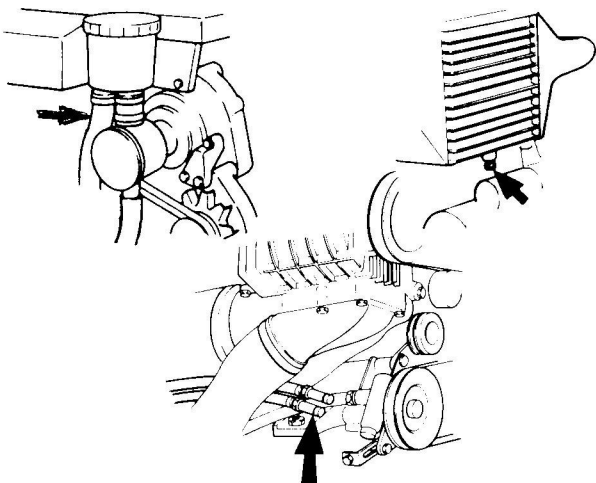
Do the following with the boat laid up:

- Change the fuel filter.
- Bleed the fuel system.
- Change the air filter.

Seawater system

Flush the seawater system by placing one end of a suction hose from the pump into a bucket of fresh water. Arrange so that it can be refilled, then start the engine and let it idle for a while. It is very important to flush out any deposits and to avoid any salt crystals being formed. **CAUTION! Do not allow the pump to run dry.**

To avoid corrosion damage in the cooling water channels, these must be filled with a mixture of 50/50 fresh water and anti-corrosion glycol, or a mixture of fresh water and emulsifying oil. The latter mixture **does not provide any frost protection** and must therefore be drained directly.



The procedure is as follows for both mixtures:

Place the end of the suction hose in a bucket containing the mixture. Provide a collection vessel to return mixture to the bucket. Make sure nothing is splashed. Run the engine for a few minutes. **CAUTION! Do not let the pump run dry.**

The antifreeze mixture need not be drained until shortly before setting the boat back in the water.

CAUTION! Do not throw the mixture into the water.

Remove the pump impeller when laying-up for the winter and store it in a cool place.

Freshwater system

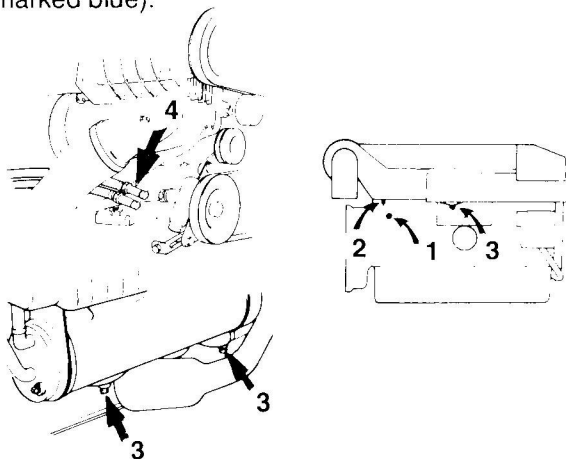
Inhibiting can be done in two ways:

Option 1. Check the freezing point if the system is filled with an antifreeze mixture.

Option 2. If the system is filled with a corrosion-protection mixture, it must be replaced once every season.

CAUTION! The latter mixture (option 2) does not provide frost protection.

Drain points: exhaust manifold, heat exchanger and engine block (KAD42: through the hose not marked blue).



The system can be left empty during the winter but do not forget to refill it before putting the boat back into the water.

Other tasks

Change the oil in the drive or the reverse gear.

Remove the propellers for winter storage and lubricate the propeller shafts with rust protection oil.

Provide corrosion protection for control components and cables and the components of the electrical system.

The finish on the engine and drive must be checked. Touch up the paint where necessary to prevent corrosion damage.

The battery can be kept on board only if it is fully charged.

Fill the fuel tanks to avoid condensation. Check that you are allowed to store the boat with its tanks full.

The vacuum valve, if fitted, shall be dismantled for cleaning.

Bringing out of storage and launching

Check the oil levels in the engine and drive. If special inhibiting oil is used, replace with oil according to the Technical Data. **Check the coolant level** and the frost protection. Use Volvo Penta coolant type 90.

Check the tightness of the hose clamps at the same time as the condition of the bellows is checked.



WARNING: Never work on the drive hose clamps, bellows or hydraulics without securing the drive so that it cannot fall down. Special tool (885143-8) is used to lock the drive in the tilted position. A falling drive can cause severe injury.

The joint bellows and hose clamps should be replaced every other year.

Check the tightness of the steering helmet screws (SP, DP) which link the steering helmet to the drive. See Technical Data.

Painting the drive and the bottom of the hull

Check the paint on the outboard drive. Touch up damaged areas using Volvo Penta original paint. Then paint the drive with a teflon-based agent for aluminum drives. We recommend Volvo Penta anti-fouling agent. These teflon-based agents are specially designed for the drive and are as kind as possible to the environment. **CAUTION! Never paint the drive's zinc anodes or treat them with teflon.**

Paint the hull of the boat with a suitable bottom paint or a pure teflon agent. All anti-fouling paints are toxic and are more or less harmful to the environment. Avoid using such agents. Most countries have legislation which regulates the use of anti-fouling bottom paint. Always comply with such legislation. If it is necessary to use anti-fouling paint, use a pure copper-based paint which contains copper thiocyanate. The paint must not contain copper oxide.

Tin-based paints (TBT) must not be used.

Find out about the legislation which applies for the area where the boat is going to be used. Do not paint closer than 10 mm (.4") to the shield/drive.

Check that the batteries are fully charged.

Bleed the fuel system.

A propeller shaft seal (inboard) made of rubber shall be vented after launching by pressing together the opening and pushing it down until water appears. Force about 1 cm³ of water-resistant grease into the seal.

Replace the propeller shaft seal every 5 years.

Fit the propellers. See page 18 for an illustrated description.

Launch the boat. Check the functions and for leaks.

Troubleshooting schedule - engine

Does not start	Stops	Does not reach full speed	Runs unevenly, vibrates	Abnormally hot	Cause
<input type="checkbox"/>					Check the battery, electric cables, main switch, automatic fuse
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			Check the amount of fuel, fuel cock, fuel filter
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Water, air, contamination in fuel/filter
		<input type="checkbox"/>	<input type="checkbox"/>		Defective injectors
		<input type="checkbox"/>			Boat abnormally loaded, fouling on the hull of the boat.
		<input type="checkbox"/>	<input type="checkbox"/>		Blocked air filter, faulty turbo compressor, damage to propeller.
				<input type="checkbox"/>	Blocked coolant intake, blocked water filter, incorrect freshwater level, defective pump impeller or thermostat, air in cooling system.

Technical Data

Engine designation	AD31D TMD31D TAMD31D	AD41D TMD41D TAMD41D	KAD42B KAMD42B
Idling speed, r/min	650-750	600-700	600-700
Swept volume, dm ³	2.39	3.59	3.59
Injection sequence	1-3-4-2	1-5-3-6-2-4	1-5-3-6-2-4
Direction of rotation, seen from front	Clockwise	Clockwise	Clockwise
Max. forward tilt	4°	4	4°
Max. backward tilt during operation	15°	15°	15°
Max. side tilt during operation	20°	20°	20°
Valve clearance, inlet/outlet, cold, mm(in) ...	0.40 (0.016)	0.40 (0.016)	0.40 (0.016)
Engine, oil capacity, dm ³ , excl. oil filter	8.5 (9qts)	10.5 (11qts)	10.5 (11qts)
Engine, oil capacity, dm ³ , incl. oil filter	9.0 (9.5qts)	11.0 (11.5qts)	11.0 (11.5qts)
At 15° backward tilt, excl. oil filter	9.0 (9.5qts)	11.0 (11.5qts)	11.0 (11.5qts)
At 15° backward tilt, incl. oil filter	9.5 (10qts)	11.5 (12qts)	11.5 (12qts)
Oil quality	VDS or CD	VDS or CD	VDS or CD
Viscosity	SAE 15W/40	SAE 15W/40	SAE 15W/40
Oil pressure, hot engine			
Idling, kg/cm ² (lbs/in ²)	1.5 (21)	1.5 (21)	1.5 (21)
Full speed, kg/cm ² (lbs/in ²)	4.2-5.0 (59-71)	4.2-5.0 (59-71)	4.2-5.0 (59-71)
Drive, SP			
Oil capacity, dm ³	2.6 (2.7qts)	2.6 (2.7qts)	
Oil quality, viscosity	See engine	See engine	
Oil capacity between max and min, dm ³	0.15 (0.2qts)	0.15 (0.2qts)	
Drive, DP			
Oil capacity, dm ³	2.7 (2.8qts)	2.7 (2.8qts)	2.7 (2.8qts)
Oil quality, viscosity	Volvo Penta, part no. 1141572-6 (APIGL5SAE75W/90 Synthetic)		
Oil capacity between max and min, dm ³	0.15 (0.2qts)	0.15 (0.20qts)	0.15(0.20qts)
Drive, DPX			
Oil capacity, dm ³			2.0 (2.06qts)
Oil quality, viscosity	Volvo Penta, part no. 1141572-6 (APIGL5SAE75W/90 Synthetic)		
Oil capacity between max and min, dm ³			0.15 (0.20qts)
Reverse gear, MS4			
Oil capacity, dm ³	1.7 (1.8qts)	1.7 (1.8qts)	1.78 (1.8qts)
Oil quality, viscosity,	Volvo Penta, part no. 1141572-6 (APIGL5SAE75W/90 Synthetic)		
Reverse gear, HS1A			
Oil capacity, dm ³		3,3 (3.5qts)	3,3 (3.5qts)
Oil quality, viscosity,		See engine	See engine
Compressor			
Oil capacity, dm ³			0,1 (0.1qts)
Oil quality			Volvo Penta, Part No,1141592-4

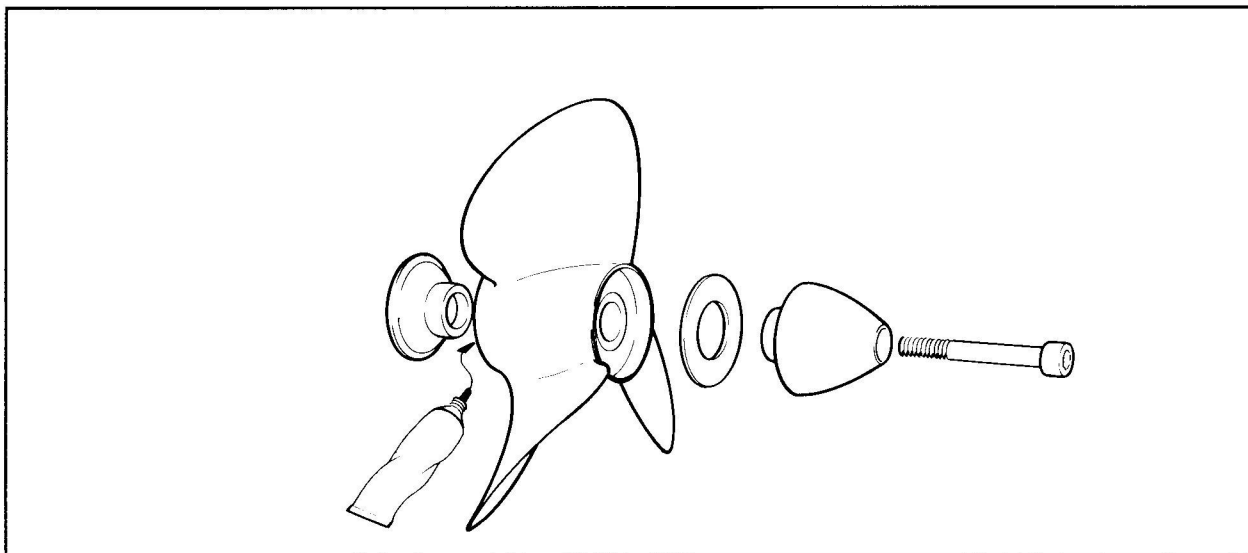
Technical Data

Engine designation	AD31D TMD31D TAMD31D	AD41D TMD41D TAMD41D	KAD42B KAMD42B
Power Trim			
Oil capacity, dm ³	1.0 (1.1qts)	1.0 (1.1qts)	1.0 (1.1qts)
Oil quality, viscosity	See engine	See engine	See engine
Oil quality, DPX			ATF, Type G
Power Steering			
Oil quality, viscosity	See engine	See engine	See engine
Hydraulic steering, Volvo Penta			
Oil quality	Volvo Penta part no.1140595-8 , Shell Aero 4, Texaco HO15 Esso Univis N15, Chevron Aviation Fluid A, Mobil Aero HFA		
Hydraulic steering, DPX			
Oil quality			ATF, type G
Cooling system			
Thermostats open/fully open	81°C/94°C 178°F/201°F	81°C/94°C 178°F/201°F	81°C/94°C 178°F/201°F
Freshwater system capacity, dm ³	13 (13.5qts)	19 (20qts)	20 (21qts)
Electrical system			
System voltage	12	12	12
Starter motor battery, capacity, Ah	140	140	140
Battery electrolyte spec. gravity:			
Charge at g/cm ³	1.230	1.230	1.230
Fully charged at g/cm ³	1.275–1.285	1.275–1.285	1.275–1.285
Alternator max output	14V 60A	14V 60A	14V 60A
Starter motor, output hp (kW)	3.4 (2.3)	3.4 (2.3)	3.4 (2.3)
Tightening torque			
Steering cover screws SP, DP, kpm (Nm) ...	3.5 (35)	3.5 (35)	3.5 (35)

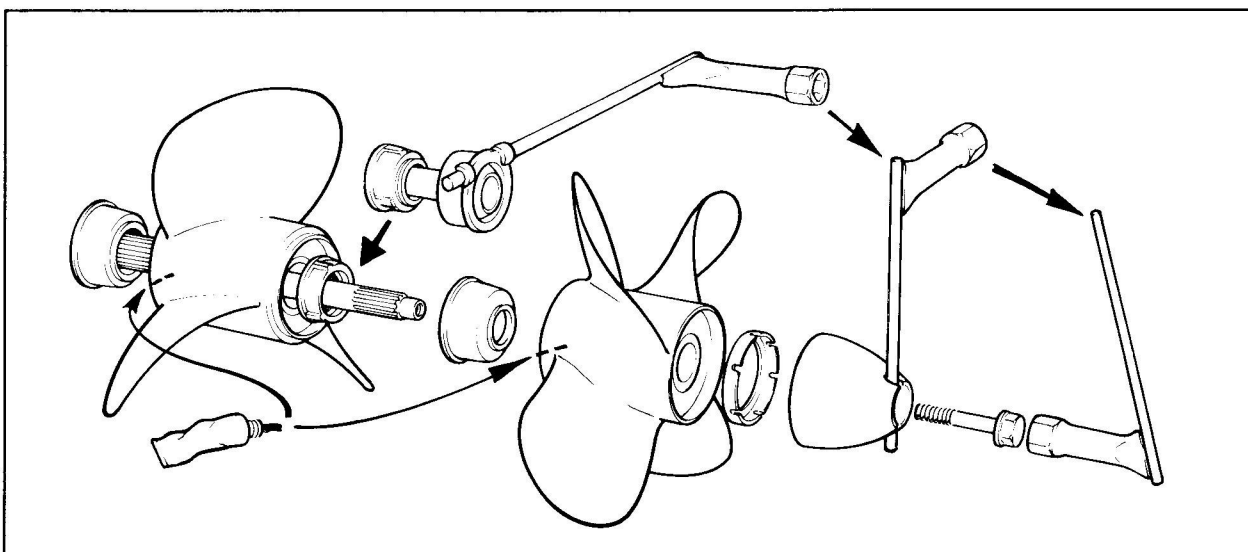
Technical data

Engine	TAMD31D
Production period	1993-1994
Operation	4-stroke
Cylinder configuration	4
Bore (mm)	92
Stroke (mm)	90
Compression ratio	16:1
Displacement (litres)	2.39
Power (hp)	130
Max engine speed (rpm)	3250

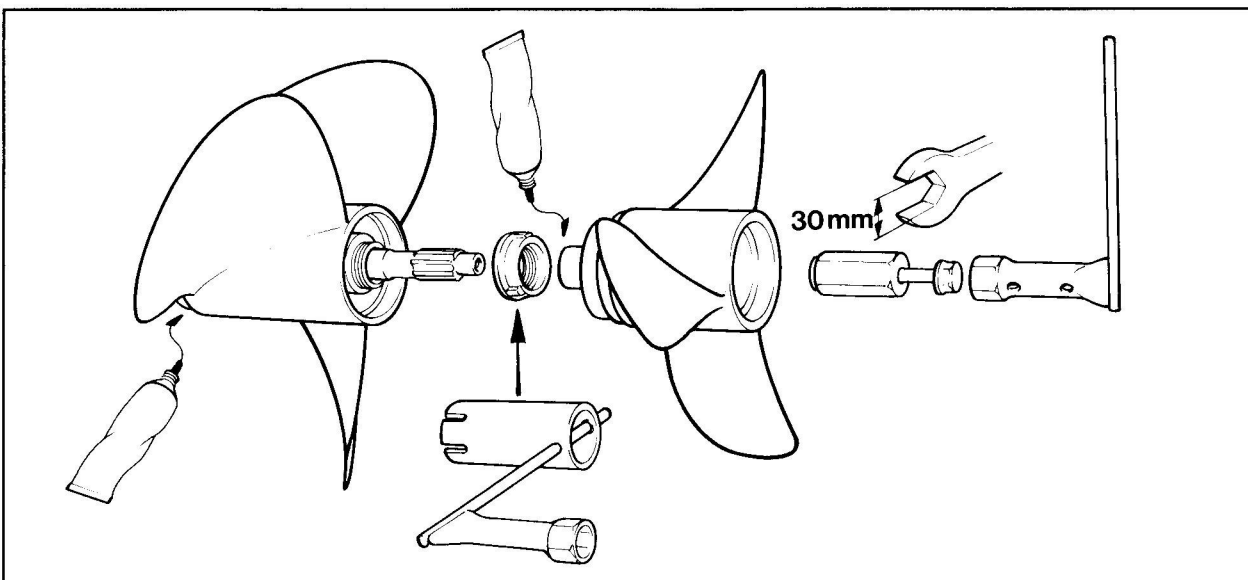
Fitting propeller, SP



Fitting propellers, DP



Fitting propellers, DPX



Maintenance instructions, installations in commercial use, with SP and DP drives

The more detailed instructions given in the instruction book must be followed in addition to these brief instructions. This applies to items of equipment as well as when running-in the engine.

Note that the service intervals for installations in commercial operation differ from the intervals given in the instruction book.

The checks which should be carried out by technicians at an authorized workshop are written *in italics*.

Daily

Visual inspection of the drive and propellers. Damaged propellers must be replaced.

Monthly

Check the corrosion protection on the drive and shield. Replace when half the anode has been corroded. Check the universal joint and exhaust bellows.

Replace as required.

Check painted surfaces for corrosion damage and/or places where mechanical action has removed the paint. If necessary touch up the paint.

Annually

Clean and touch up paint.

Replace the universal joint and exhaust bellows.

Replace the exhaust bellows between the engine's exhaust bend and the shield's exhaust pipe.

After the first 2-5 hours

Run in the engine with a light load. The oil in the engine and drive must be changed at the end of the running-in period. Make sure that the drive is properly drained.

Every 125 hours

Change the lubricating oil. See the recommendations in Technical Data.

Lubricate the guide bushings in the shield.

Check the oil level in the servopump (on the engine).

Check the oil level in the trim pump.

Check the tightening torque at the following points:

- 1 The joint between the lower gear housing and the intermediate housing.*
- 2 The joint between the upper gear housing and the intermediate housing.*
- 3 The screw for the steering arm and the steering spindle.*

Tighten the hose clamps.

Check the universal joint bellows for any water leakage and wear.

Every 500 hours

Check the bushings in the suspension fork.

Check the steering guide bushings and seal in the shield.

Check for play in the holes for the drive mounting journals in the drive.

Lubricate the steering guide bearing in the suspension fork.

Check the control cable, cable cub and controls.

Check the grounding of the trim cylinders and shield.

Check the servo cylinder and hoses for any oil leakage.

Check the propeller shaft for straightness.

Check the gear mechanism for wear and function.

Check the "non-return valve" in the exhaust.

Check that there is no abnormal play in the steering.

Every 1000 hours

Change the drive for a replacement drive or recondition drive.

Replace control cables and cable cub.

Check the exhaust pipe for corrosion damage.

Check the bellows between the exhaust pipe on the engine and the exhaust pipe on the shield.

Check the cooling water hoses and connection on the inside of the shield.

Check the hydraulic hoses for leakage and wear on the outside of the shield.

Additional action may be necessary if the type of operation differs significantly from Volvo Penta's application classes or if gear-changing is more frequent (more than 20 changes per hour on average).

Restrictions

This maintenance instruction applies to:

Engine AD41 "Medium Duty" (165 hp / 3800 r/min).

Engine AD41 "Light Duty" (200 hp / 3800 r/min).

Maximum drive extension for commercial operation= 1".

If the water is severely polluted, particular attention must be given to corrosion damage.

Long period of operation in neutral position should be avoided. The gear for forward propulsion must be engaged for a continuous period of at least 5 minutes for every hour of use.

VOLVO PENTA

AB Volvo Penta
Technical Information
S-405 08 Göteborg, Sweden

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