

MR HOURICAN

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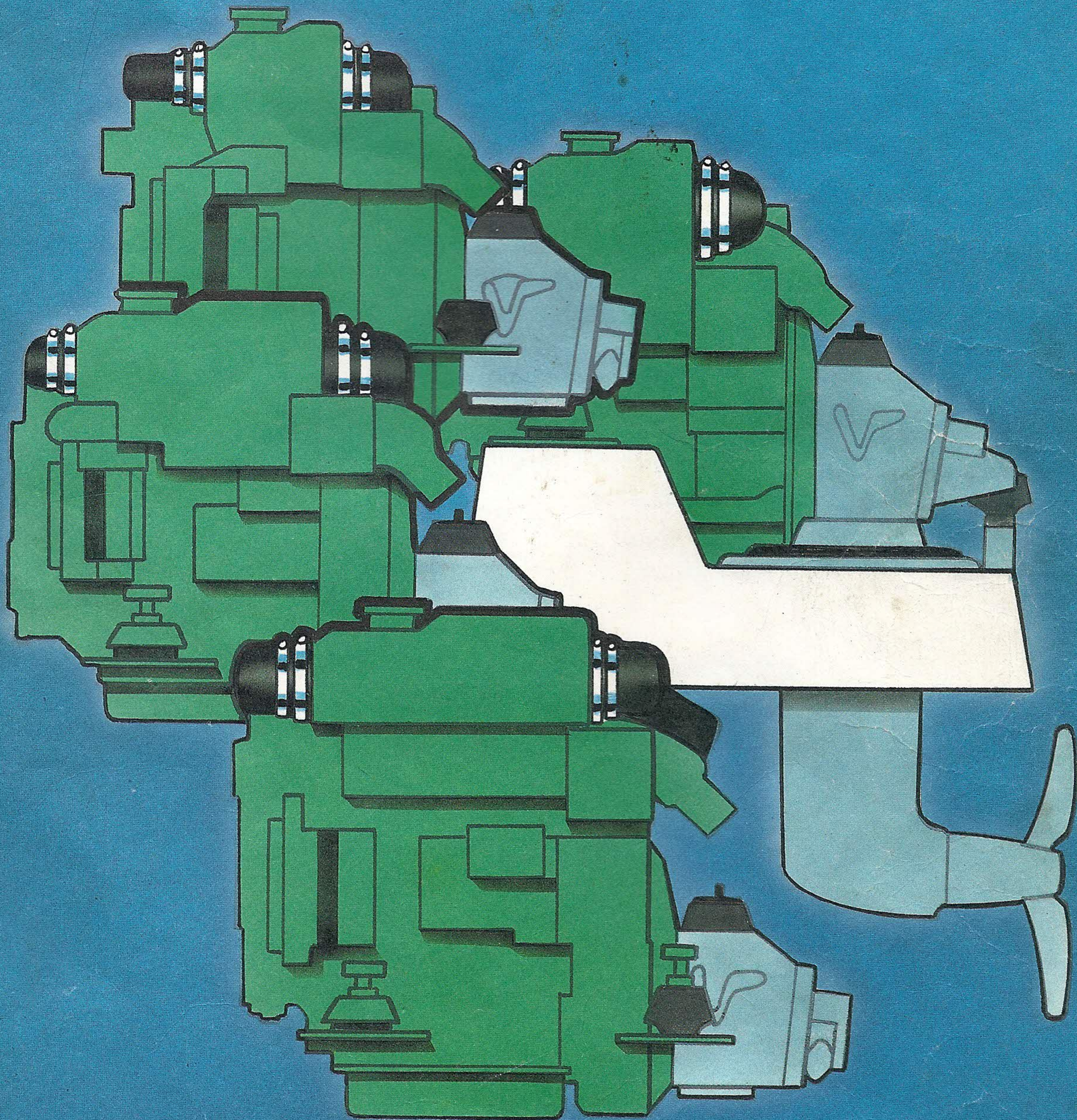
MR REED

Owner's Manual

Marine Diesel Engines

MD2010 • MD2020 • MD2030 • MD2040

MD2020B



**VOLVO
PENTA**

Owner's Manual

Marine Diesel Engines

MD2010B • MD2020B • MD2030B • MD2040B

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Safety precautions

Introduction

This Owner's Manual contains the information you will need to operate the engine correctly. Check that you have the correct Owner's Manual for your engine.

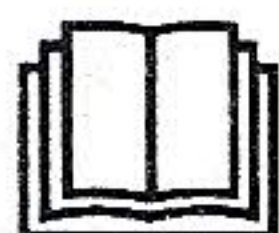
Read the book carefully before operating or servicing the engine. Incorrect operation or servicing of the engine could result in personal injury or material damage as well as damaging the engine itself. **If you do not understand or are uncertain on any operation in this book, contact your dealer who can explain or demonstrate the procedure for you.**

Important

In this manual and on the engine you will find the following special warning symbols.



WARNING! Possible danger of personal injury, damage to property or mechanical malfunction if the instructions are not followed.



Read the Owner's Manual.

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 labels on the engine are always clearly visible. Replace labels which have been damaged or painted over.



Always turn the engine off before starting service procedures. Avoid burns. Take precautions to avoid hot surfaces and liquids in supply lines and hoses when the engine has been turned off immediately prior to starting work on it and it is still hot.

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

Approaching an engine which is operating is a safety risk. 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 an engine which is operating, 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 (breakers) so it is impossible to start, and lock the switch (breakers) in the OFF position before starting work. Set up a warning notice at the engine control point or helm.



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



Engines with intake air pre-heating: Never use starting spray in the air intake. Use of such products could result in an explosion in the air intake pipe due to the hot-spot pre-heater. Danger of personal injury.



Do not open the filler cap for the engine coolant (freshwater cooled engines) when the engine is hot. Steam or hot engine coolant can be ejected and any pressure in the system will be lost. Open the filler cap slowly and release coolant system pressure (freshwater cooled engines), if the filler cap or drain cock must be opened, or if a plug or engine coolant line must be removed on a hot engine. Steam or hot coolant can be ejected.



Stop the engine and close the bottom valve before carrying out operations on the cooling system.



Only start the engine in a well-ventilated area. If operating the engine in a closed area ensure that there is exhaust ventilation leading out of the work area to remove exhaust gases and crankcase ventilation emissions.



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 breathed in. Ensure good ventilation in the work place. Use a protective mask when spraying.



Hot oil can cause burns. Avoid getting hot oil on the skin. Ensure that the lubrication system is not under pressure before carrying out any work. 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 area. 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. This gas is easily ignited and highly volatile. Incorrect connection of the battery can cause sparks sufficient to cause an explosion with resulting damage. Do not shift the connections when attempting to start the engine (spark risk) and do not lean over any of the batteries. Refer to instructions in the Owner's Manual.



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



Always use protective goggles when charging and handling the batteries. The battery electrolyte contains extremely corrosive sulfuric acid. If this should come in contact with the skin, immediately wash with soap and plenty of water. If battery acid comes in contact with the eyes, immediately flush with water and obtain medical assistance.



Turn the engine off and turn off the power at the main switches (breakers) 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 fitted on the engine/reverse gear when lifting the drive unit. Always check that the lifting equipment used is in good condition and has the load capacity to lift the engine (engine weight including reverse gear and any extra equipment installed).

To ensure safe lifting and avoid damage to components installed on the top of the engine use an adjustable lifting beam. All chains and cables must run parallel to each other and as perpendicular as possible to the upper side of the engine.

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

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



The components in the electrical system, the ignition system (gasoline/petrol engines) and in the fuel system on Volvo Penta products are designed and manufactured to minimize risks of fire and explosion.

Using parts that are not Original Volvo Penta parts which do not correspond to the demands above, can result in fire or explosion on board. Any type of damage which is the result of using replacement parts that are not original Volvo Penta replacement parts for the product in question will not be covered under any warranty or guarantee provided by AB Volvo Penta.



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



Always use protective gloves when detecting leaks. Liquids ejected under pressure can penetrate the body tissues and cause serious injury. Danger of blood poisoning.



Always use fuels recommended by Volvo Penta. Refer to the Owner's Manual. Use of fuels that are of a lower quality can damage the engine. On a diesel engine poor quality fuel can cause the actuating rod to hang and the engine to overrev with resulting risk of damage to the engine and personal injury. Poor fuel quality can also lead to higher maintenance costs.



Observe the following when cleaning with high-pressure water jets. Never point the water jet at seals, rubber hoses or electrical components. Never use high pressure jets 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 advice, service requirements and spare 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 requires a running-in period of 20 operating hours. Run the engine at varying engine speeds, but not over a maximum of 3/4 throttle opening for the first two hours. For the next 8 hours run the engine in the same way, but with max. 2 minute periods at wide open throttle (WOT). During the final 10 hours increase wide open throttle periods to 5–10 minutes at a time. Reduce the throttle opening to idle periodically to allow the engine temperature to drop. During the running-in period never run the engine for long periods at a constant engine speed. It is normal for the engine to use more engine oil during the running-in period. Make a point of checking the engine oil level more frequently during the running-in period than during normal operation. Carry out the First Service Inspection after the initial 20-hour running-in period.

Fuel and lubricants

Only use lubricants and fuels recommended under "Technical Data". Use of other classifications can cause malfunctions and reduced service life.

Spare parts



WARNING! The components in the electrical system and in the fuel system on Volvo Penta products are designed and manufactured to minimize the risk of fire and explosion.

Using parts that are not Original Volvo Penta parts and which do not correspond to the demands above, can result in fire or explosion on board. Any type of damage which is the result of using replacement parts that are not original Volvo Penta replacement parts for the product in question will not be covered under any warranty or guarantee provided by AB Volvo Penta.

Maintenance Manual

This Owner's Manual contains a short maintenance guide/instructions in the form of a maintenance plan with text and illustrations.

If you prefer to carry out some maintenance and service yourself there is the more comprehensive "Do-it-yourself" manual available. The book describes the engine systems, for example the coolant system and shows how to carry out work that does not demand special knowledge. References to tools, lubricants and other service products which may be required have been included.

"Do-it-yourself" is available from your VOLVO PENTA dealer. The publication reference numbers are in the engine manual bag.

Safety

Everyone wants and expects to have a problem-free and pleasant time when they take their boat out. To help you do this we have provided a check-list below which can of course be added to according to personal experience. A major area is naturally the engine, its equipment and that the boat in general is properly maintained.

Planning your trip

- Get out up-to-date charts for the route planned
- Calculate distance and fuel consumption
- Note down if there are fuel points on your planned course
- Tell friends or relatives about your trip plans

Boat equipment

- Rescue and emergency items such as life-vests and signal rockets. Does everyone know where they are?
- Spare parts on board, for example: Kit with water pump impeller etc.
- Proper tools for the equipment
- Fire extinguisher (checked and charged)

Our 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, sound levels and fuel consumption.

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

In this Owner's Manual there are a number of service procedures, which, if not followed will lead to a deterioration of engine characteristics with regard to how it effects the environment, its service life and cost of operation. Always follow the recommended service intervals and make a habit of checking that the engine is operating normally every time you use it. One example is excessively smoky exhaust. Contact an authorized Volvo Penta workshop if you cannot correct the fault yourself.

Bear in mind that most of the chemicals used around 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 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 and guarantee

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. These conditions are provided by the Volvo Penta importer or distributor for the market in question. If you wish to have a copy of the conditions please contact your local Volvo Penta representative.

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 vendor. 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

– PDC (Pre Delivery Commissioning) delivery undertaking, 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 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 International Limited Warranty.

– First Service inspection, for marine engines: A first Service Inspection must be carried out after operating the engine for 20–50 hours or within 180 days from the delivery date, or the end of the first season, whichever occurs 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 PDC Delivery undertaking 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. Volvo Penta dealers are carefully selected and then trained in order to provide customers with professional assistance on engine service and repairs. These dealers have the special tools required to carry out the work and the test equipment that ensures a high service standard. They are required to keep a stock of Volvo Penta Original Spare Parts and accessories that cover most requirements. When ordering service or spare parts always quote the complete engine and/or drive/reverse gear model designation and serial number. These are stated on the engine product plate and on a label on the engine valve cover.

Certificated engines

Important information for engines certificated for Lake Constance and Switzerland

All Volvo Penta engines and products are developed to minimize environmental impact.

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.

An engine with certification means that we, as the manufacturer, guarantee that all engines manufactured are of the same type as the certificated and approved example. Certification is not only a requirement covering engines from the factory, but also that engines in use must meet the environmental demands set for that engine. In order for Volvo Penta as the manufacturer to take responsibility for engines in use, certain requirements pertaining to service and spare parts must be met. We do not wish to discourage owners from carrying out service work themselves, rather the opposite since an owner can quickly notice if an engine is not operating normally. However, a number of service operations demand access to special expertise, workshop manuals, special tools and other equipment designed for the engines. These service operations may only be carried out by an authorized Volvo Penta Service workshop. Always contact your Volvo Penta dealer if you are not sure about anything concerning your engine's function or maintenance.

As an 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 followed.
- Only Volvo Penta Original Spare parts intended for the certificated engine may be used.
- Service work on the ignition system, ignition settings and fuel injection system (gasoline/petrol) or injection pumps, pump settings 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.
- Any seals on the engine may not be broken other than by authorized persons.



IMPORTANT! Use only VOLVO PENTA original spare parts. The use of spare parts other than VOLVO PENTA original spare parts will invalidate

AB VOLVO PENTA's responsibility for the engine specification being in accordance with the certificated variant. VOLVO PENTA accepts no responsibility or liability for any damage or costs arising through the use of replacement parts other than original VOLVO PENTA replacement parts for the product in question.

Identifying Numbers

Immediately after you have taken delivery of your boat, make a note of the serial number and model designation of the engine and drive as well as the shield or reverse gear. Include the serial number and model designation of the boat and any extra equipment. This information is necessary when you contact your Volvo Penta or boat sales representative for service and spare parts. Take a copy of the information and keep it in a safe place so it is available should the boat be stolen.

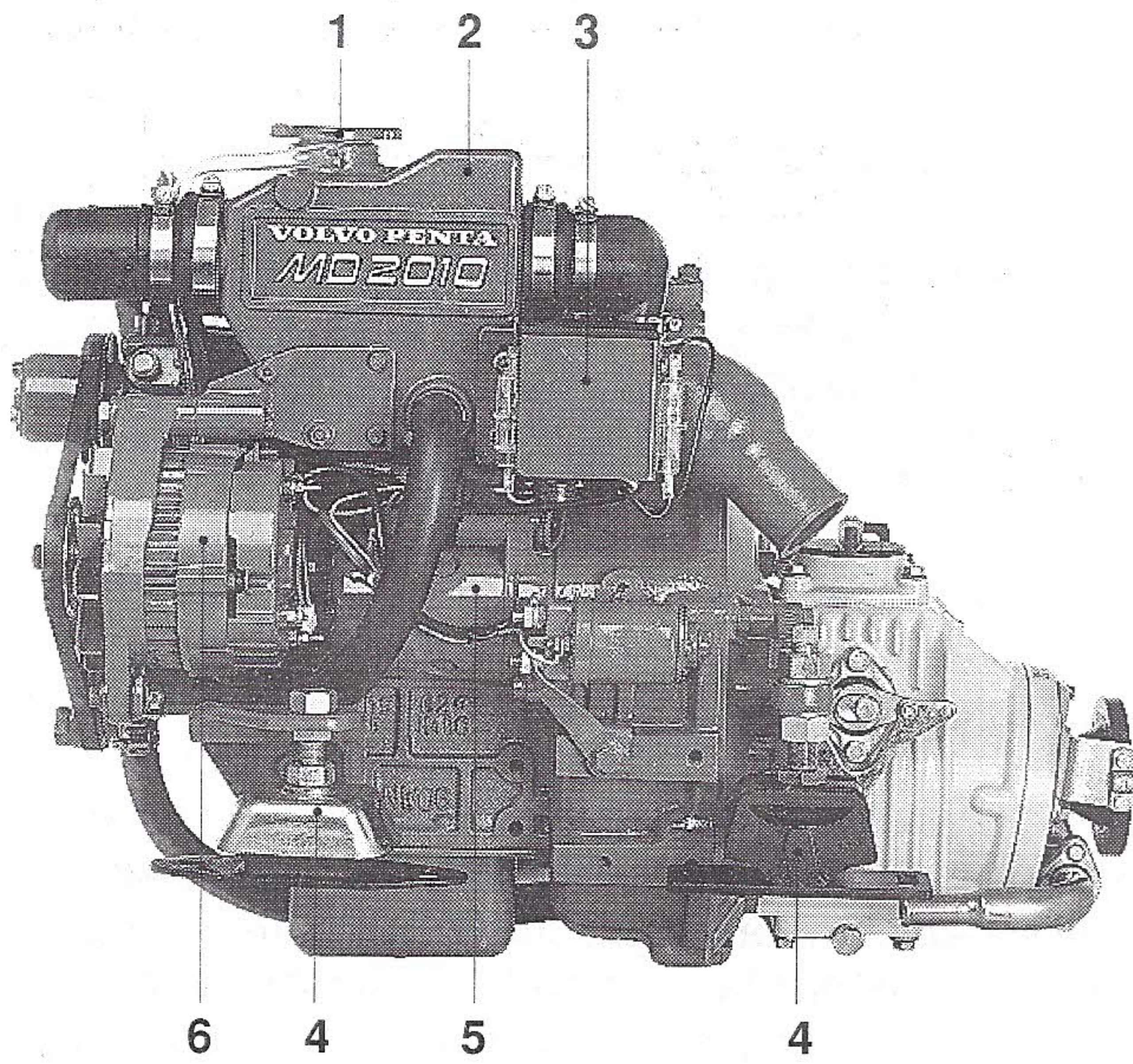
Engine type no. MD 2020B 5101311336
Drive type no. 120S 3101076769
Serial no. drive

Reverse gear type
Serial no.

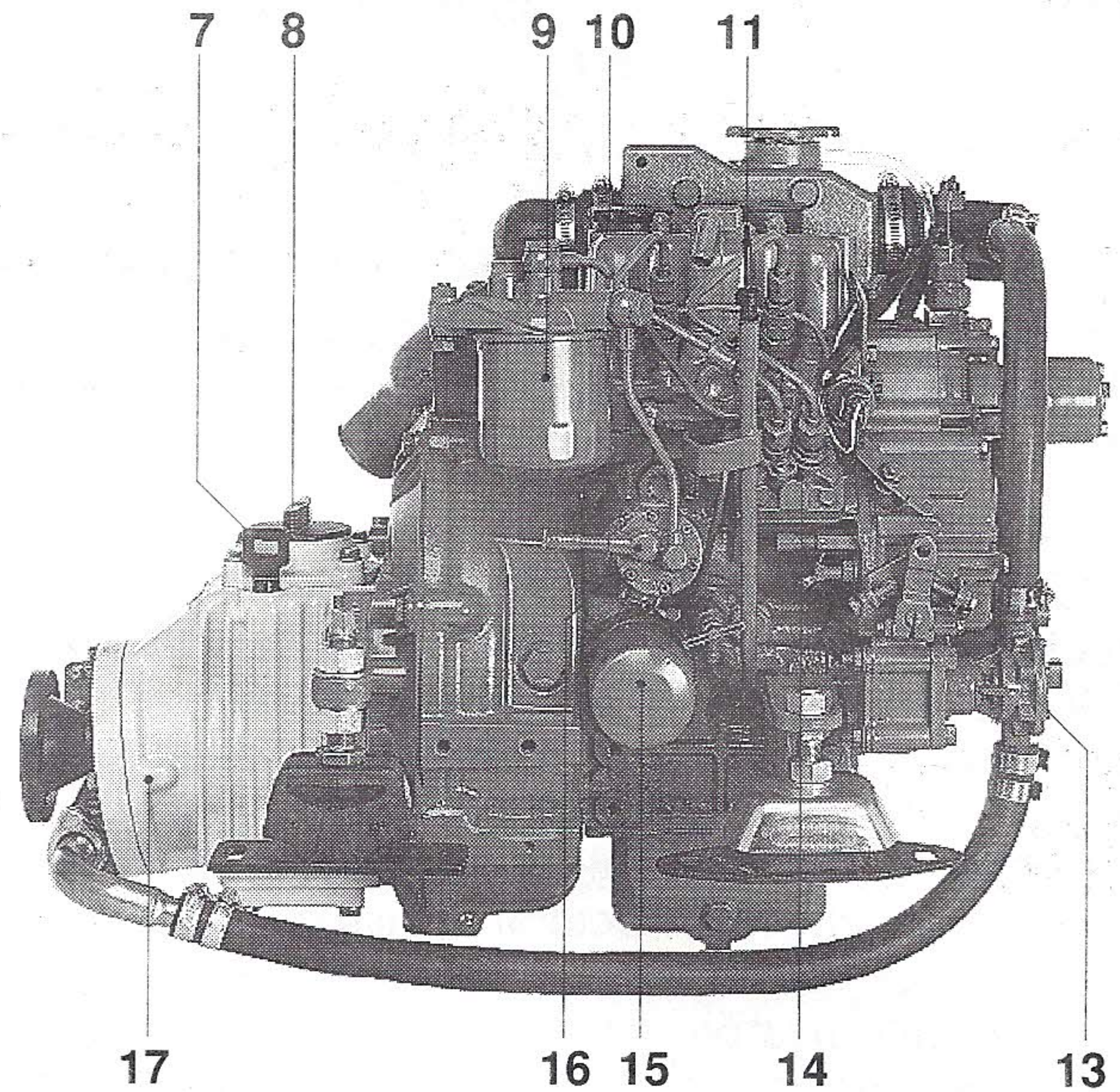
Propeller designation 15x9 872600 284125
16x11 28CH FOURDING

Boat type
Serial no.
Ignition switch no.
Other equipment
.....
.....
.....

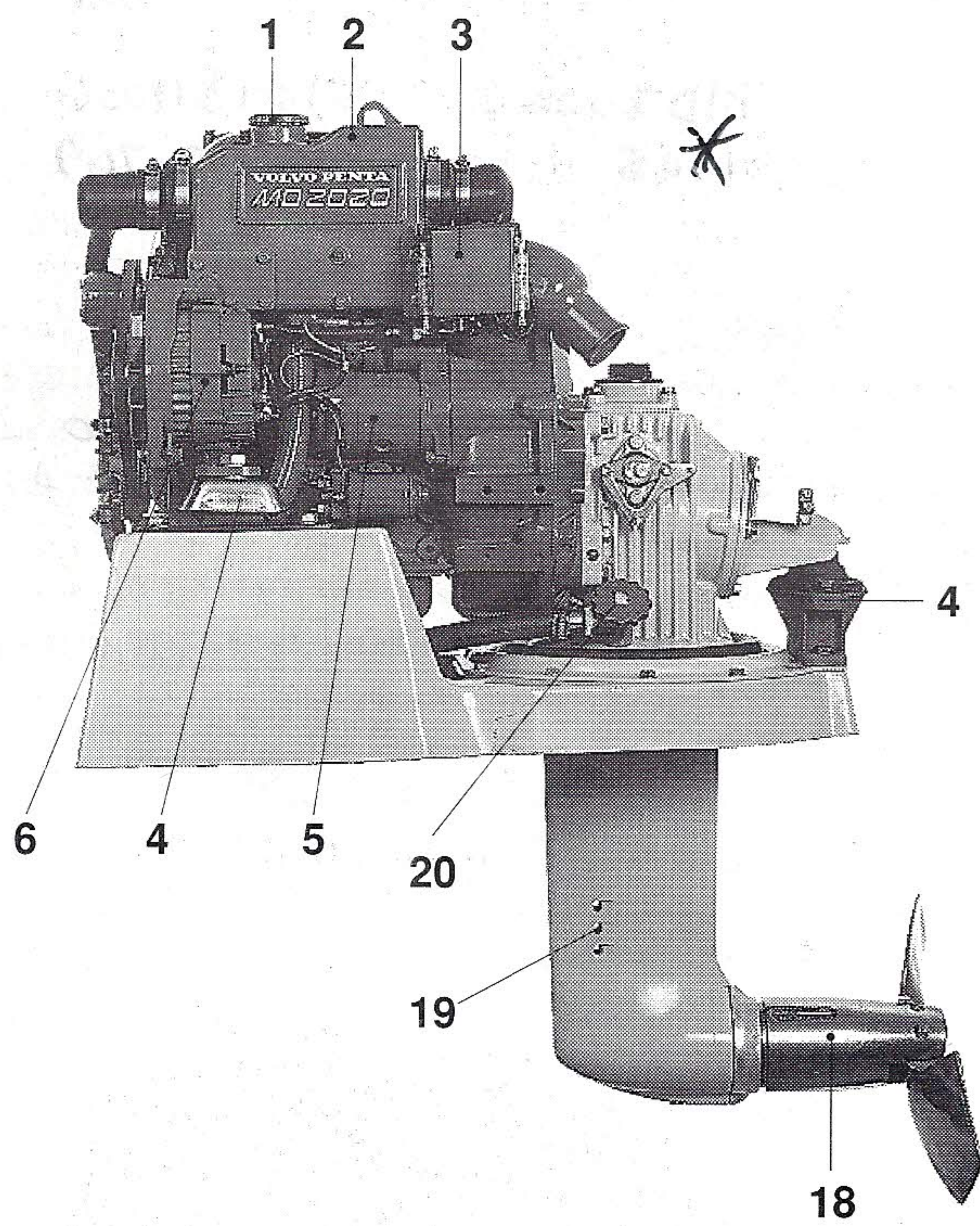
Introduction



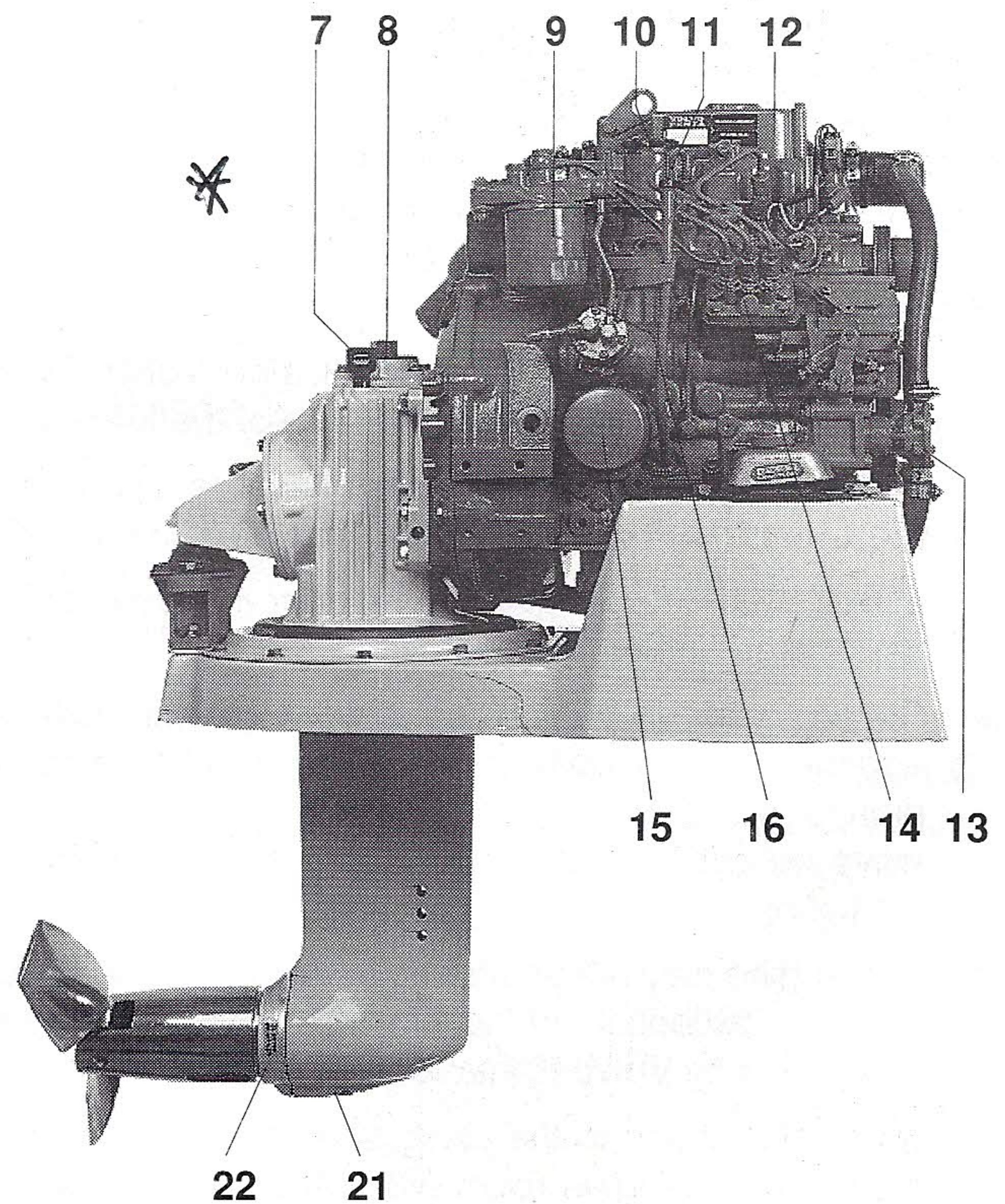
MD2010 with reverse gear MS2L-D



MD2010 with reverse gear MS2L-D



MD2020 with 120S-drive



MD2020 with 120S-drive

Illustrations for guidance (pages 8 and 9)

1. Coolant filler cap
2. Expansion tank
3. Relay box with fuses
4. Rubber mount
5. Starter motor
6. Alternator
7. Oil dipstick, reverse gear/S-drive
8. Oil filler cap, reverse gear/S-drive
9. Fuel fine filter
10. Oil filler cap, engine
11. Oil dipstick, engine
12. MD2040: Air filter. Other engines: Air intake

13. Seawater pump
14. Injection pump
15. Lubricating oil filter
16. Feed pump
17. Oil cooler, reverse gear
18. Folding propeller
19. Cooling water intake, S-drive
20. Bottom cock (seawater), S-drive
21. Oil drainage, S-drive
22. Zinc ring*

*NB. A magnesium ring should be used when running in freshwater.

Type designations (example)

Engine:

Engine designat.

Serial number

Product No.



Reverse gear designat. (or drive designation)

Serial number

Product number

Approval No. (Certifying)



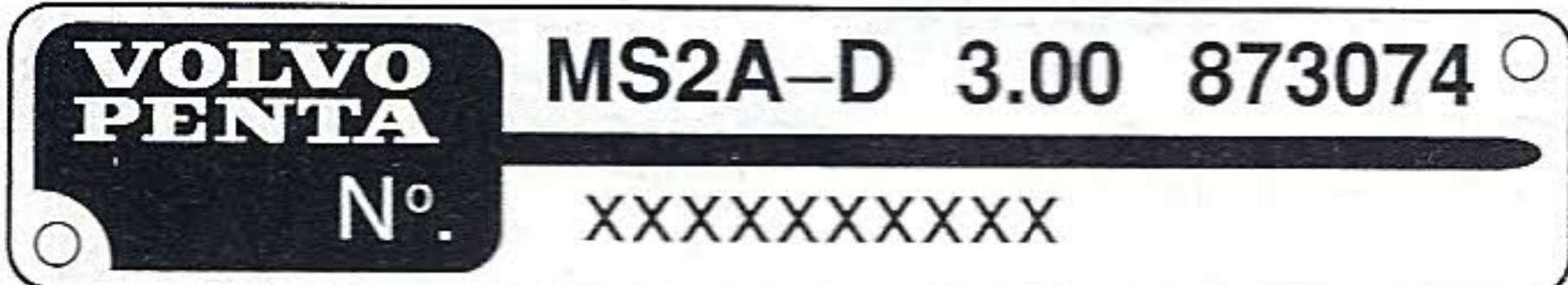
Engine designation

Serial number

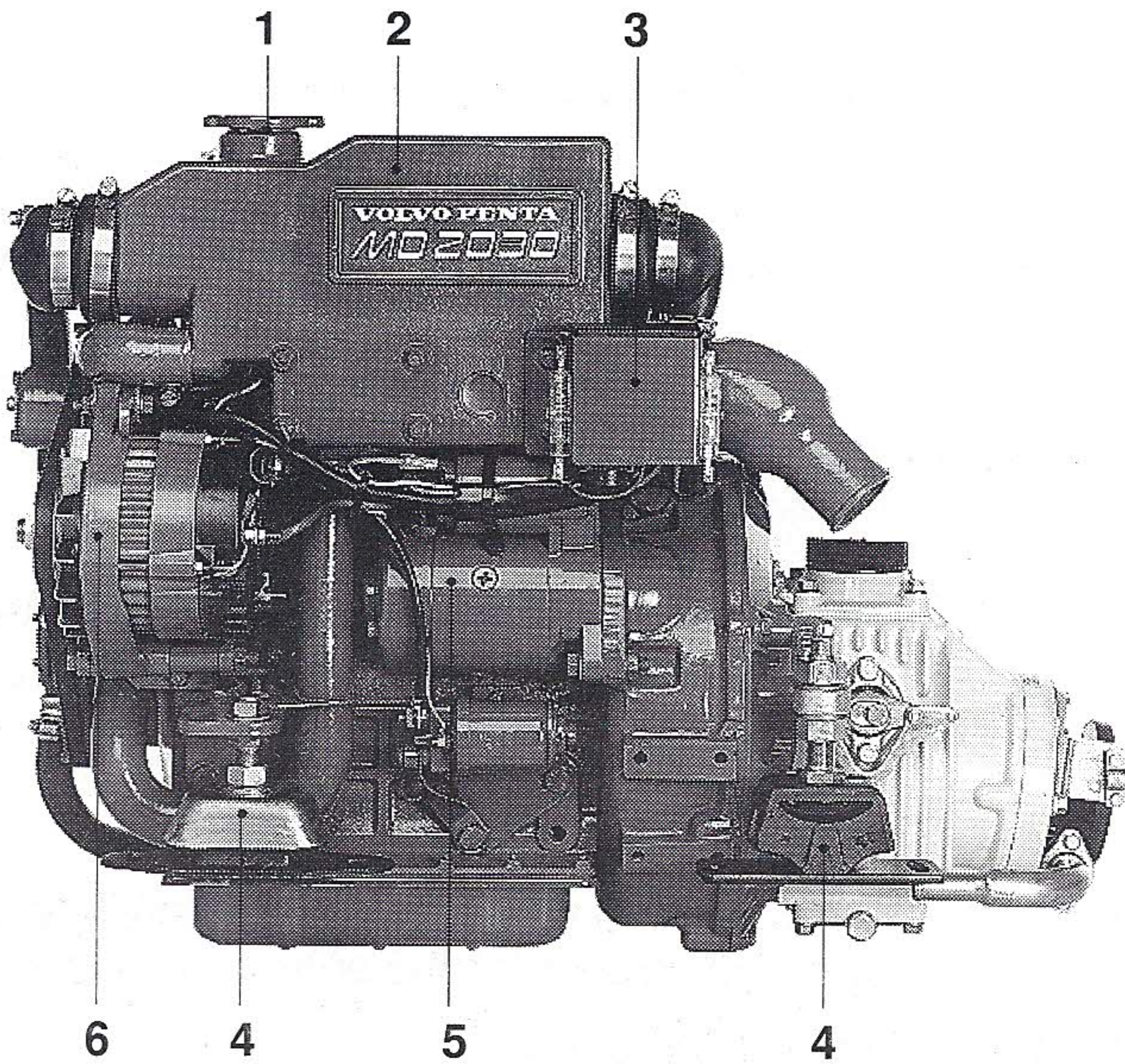
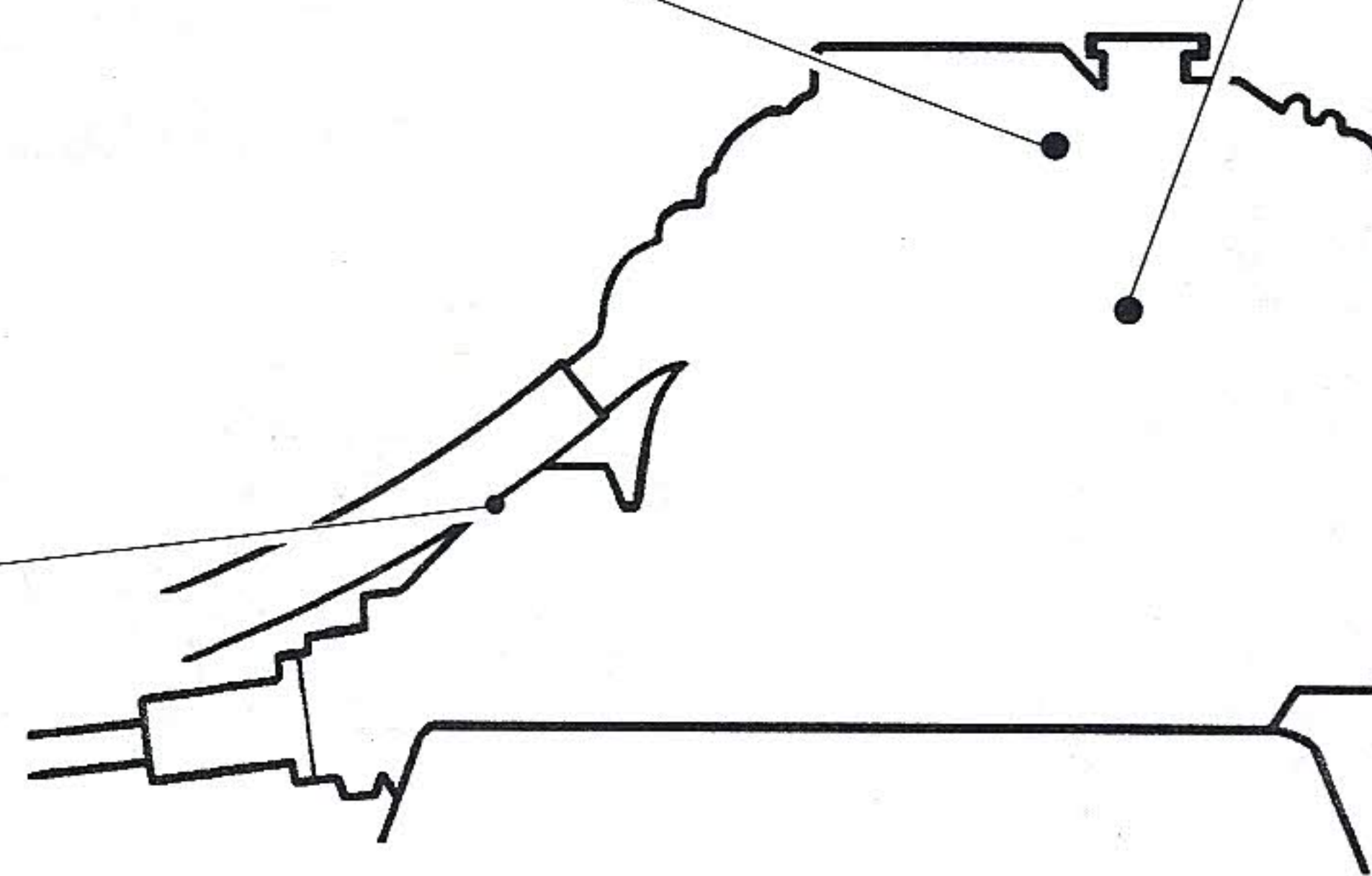
Product No.

Reverse gear/S-drive:

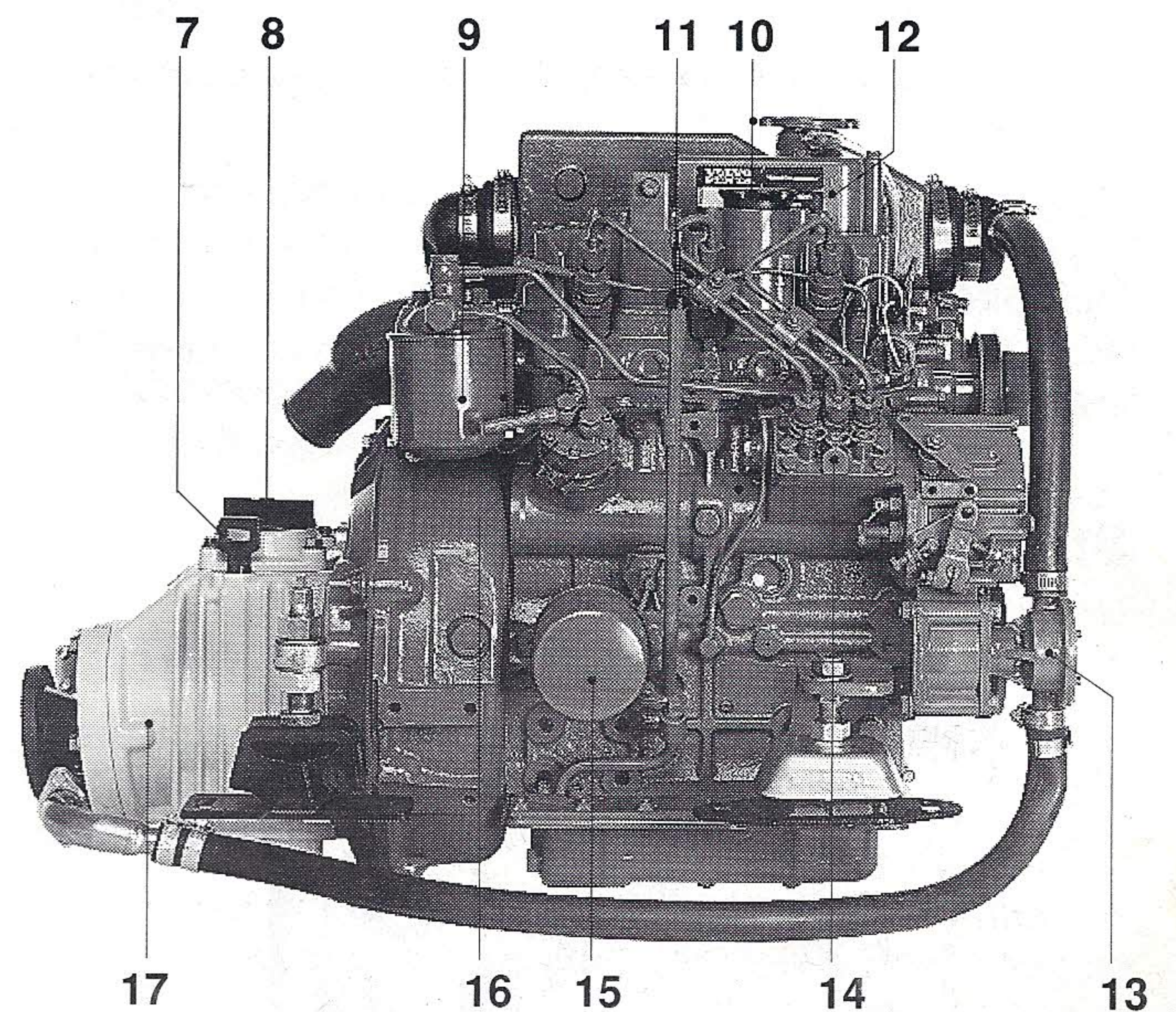
Designation Ratio Product No.



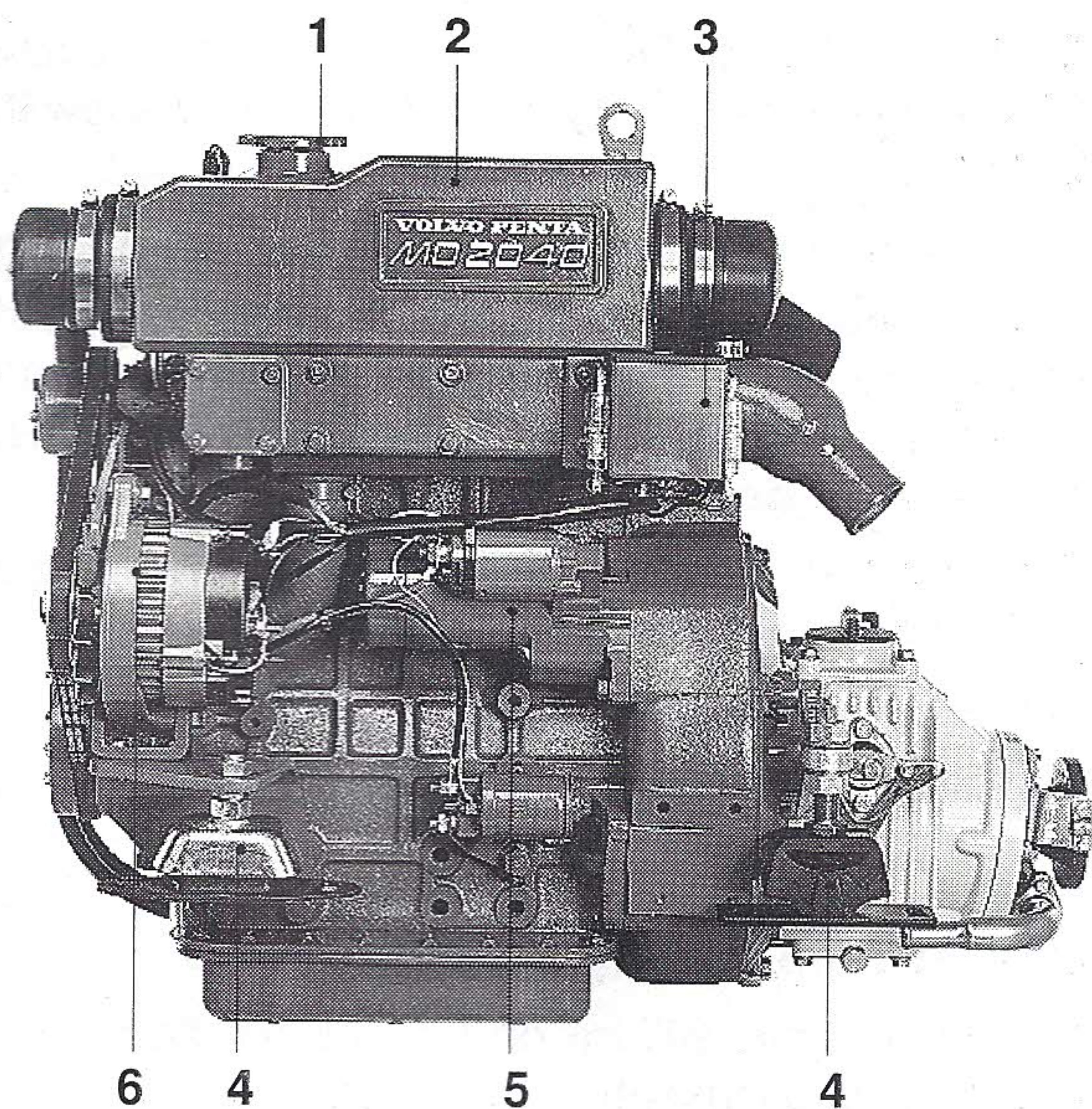
Serial number



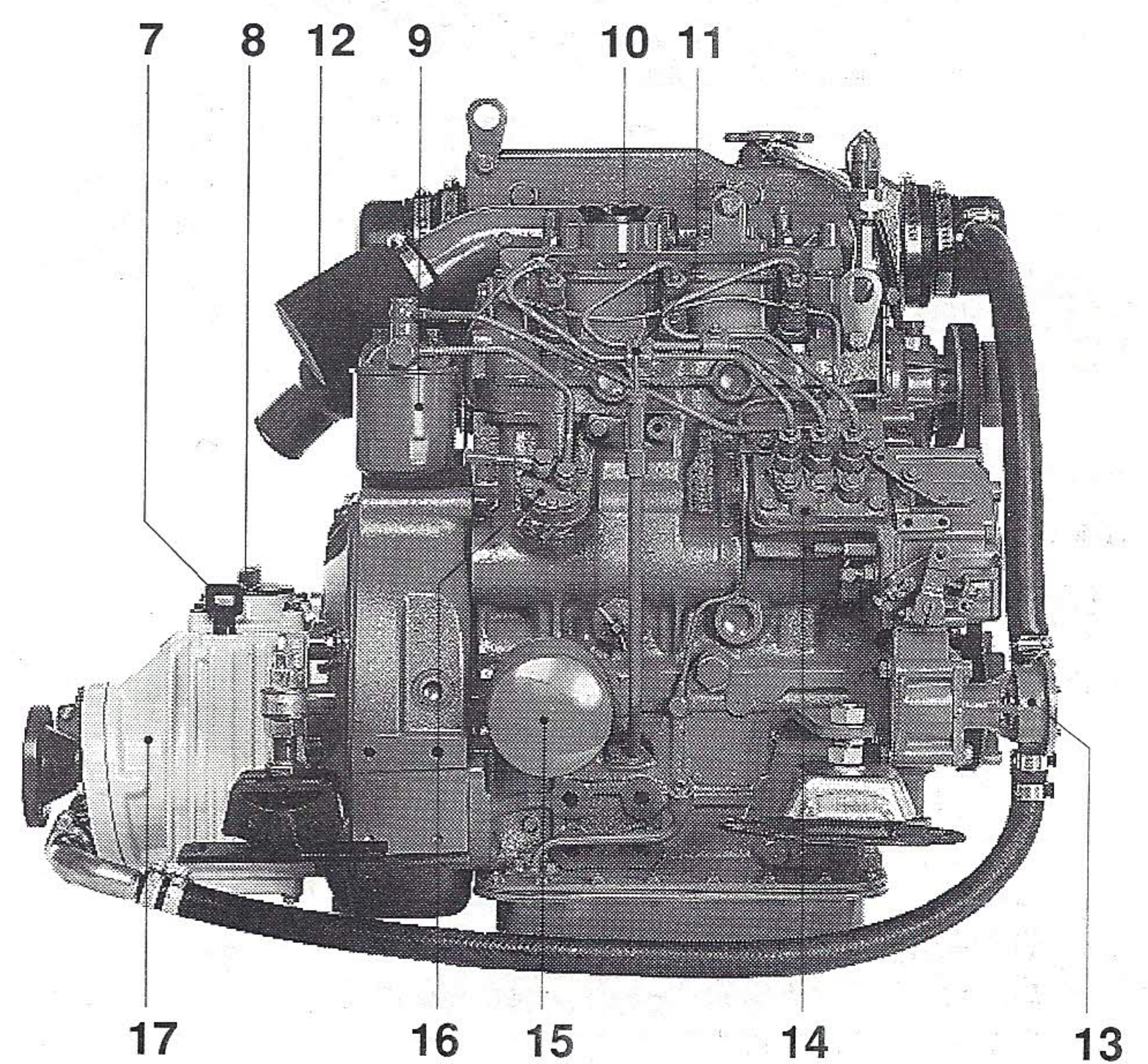
MD2030 with reverse gear MS2A-D



MD2030 with reverse gear MS2A-D



MD2040 with reverse gear MS2L-D

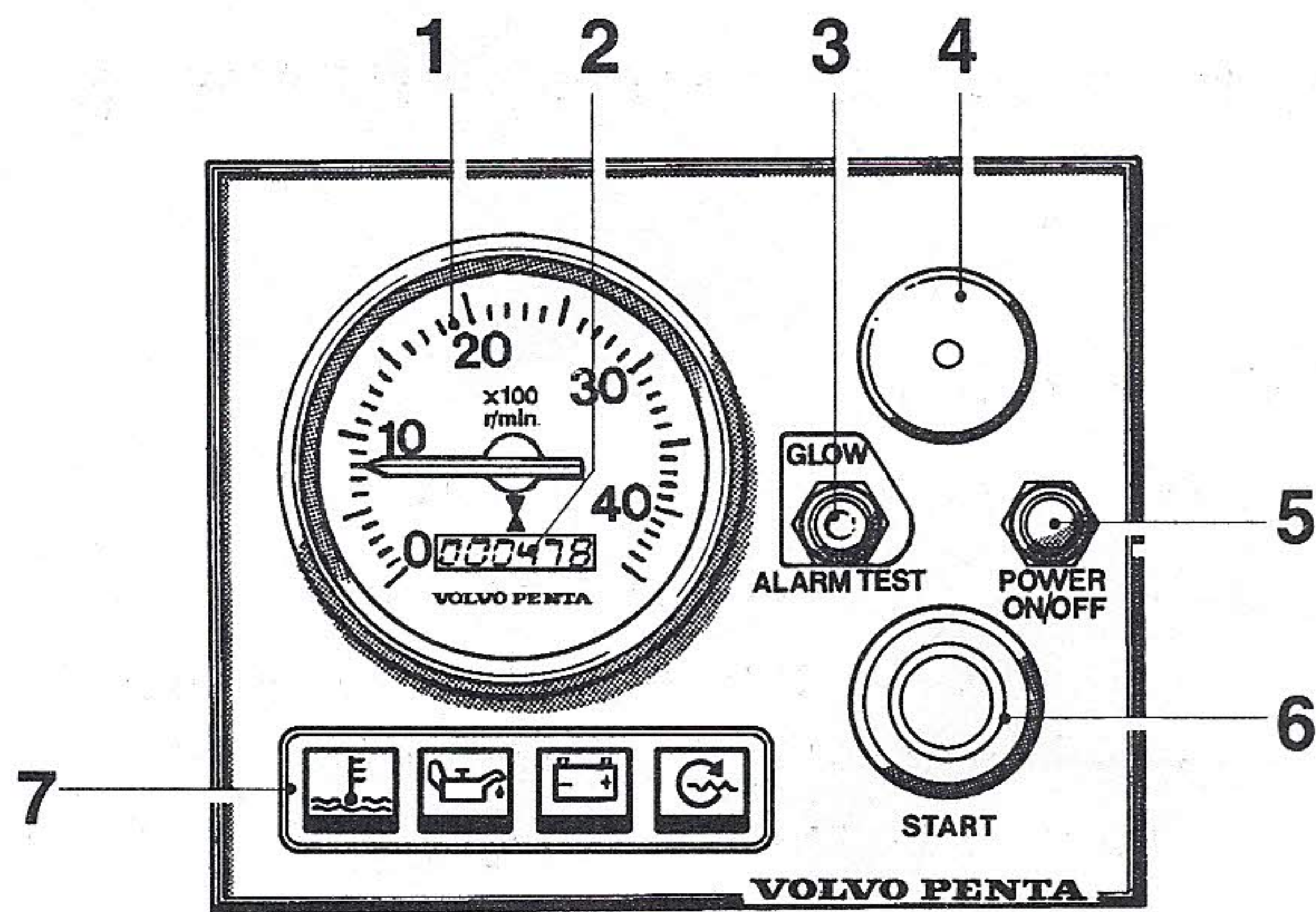


MD2040 with reverse gear MS2L-D

Instruments

There are three types of main panel (A, B and C).

Standard (alternative "A")

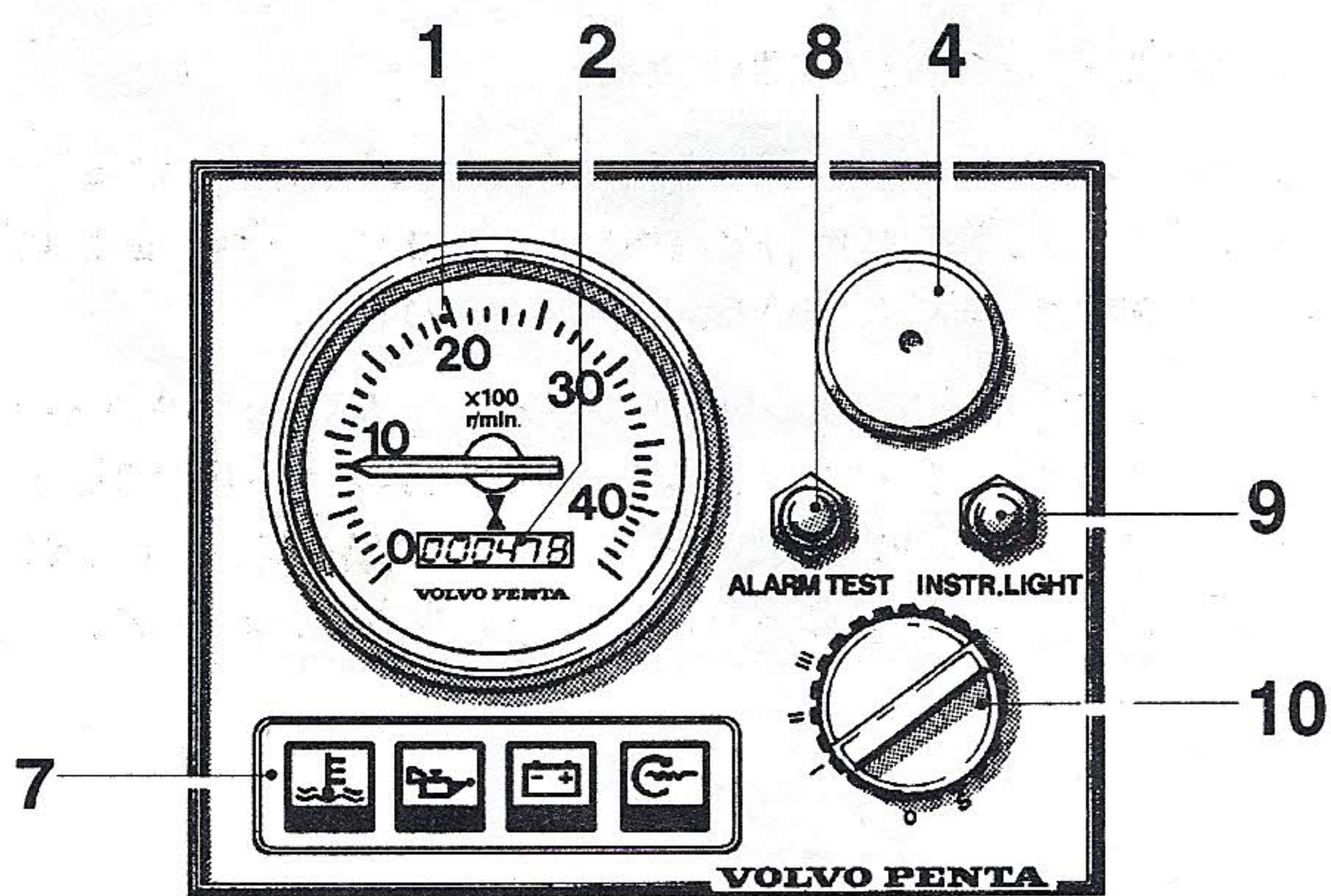


Instrument panel (standard)* without key switch

*Note. Rev. counter with built-in hour counter is optional.

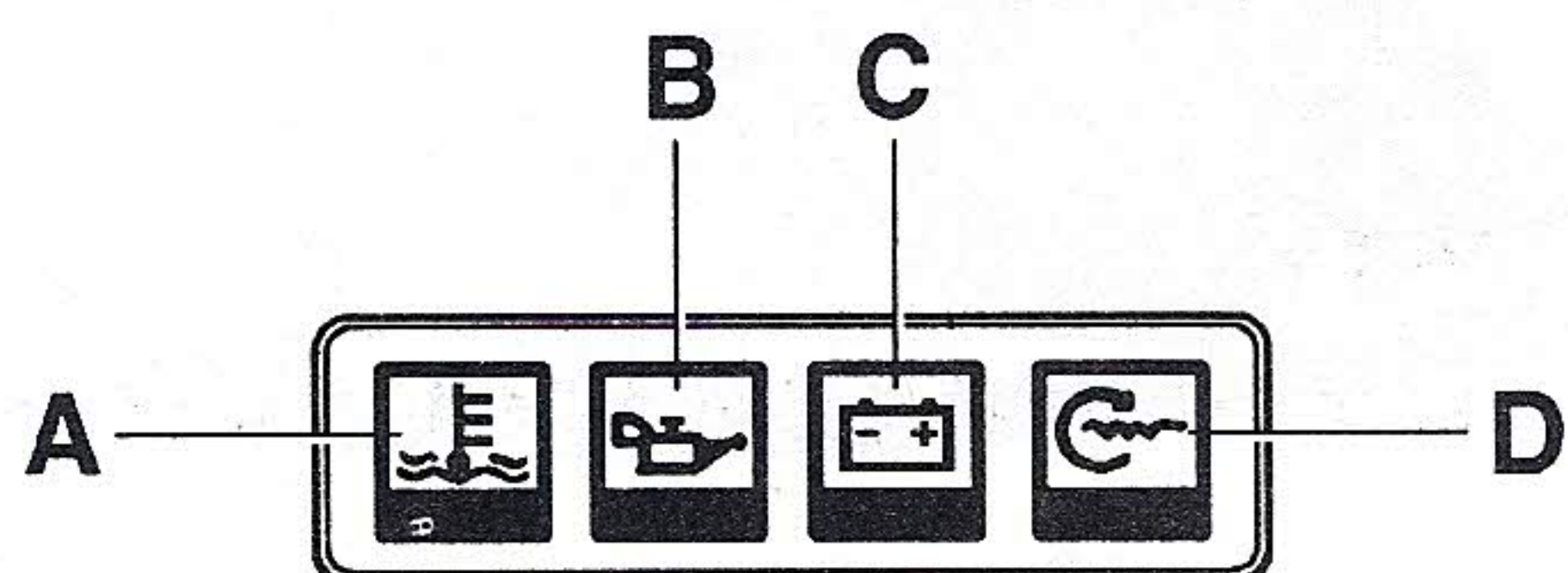
Note. Standard instrument panels (alternative "A") do not have a key switch. The operator's cabin should therefore be lockable and/or a lockable main switch should be used in order to prevent unauthorised persons from starting the engine.

Standard (alternative "B")



Instrument panel (standard)* with key switch

*Note. Rev. counter with built-in hour counter is optional.



Warning display

1. Blind plug/Rev. counter (optional)

The rev. counter shows the engine speed. Multiply the value by 100 to calculate revolutions per minute.

Full throttle: operating range: 3200–3600 r/min.

IDLING = 850 ± 25

2. Hour counter

Shows the engine operating time in hours and tenth of an hour.

3. Toggle switch: Heating – Alarm test/ Acknowledge

Pos.: ↑ (up) = "Glow" position (glow plugs switched on).

↓ (down) = **No alarm:** Alarm test (all warning lights on – not flashing – and the siren sounding).

Alarm: Acknowledgement of alarm.*

*The siren stops sounding, but the warning light continues to flash until the fault has been rectified. If a new alarm condition arises, the siren will sound again and the next warning light will also start to flash, and so on.

4. Alarm (siren)

5. Pressure switch for switching instrument panel On/Off (In/Out)

6. Start button

The starter motor comes on as soon as this button is pressed. Let the button go as soon as the engine has started.

See also the starting instructions on page 13.

7. Warning display

The display has four "windows". If the acoustic alarm comes on, one of windows "A–C" starts to blink (red) to show the cause of the alarm.

A. Coolant too hot.* **Reduce the speed to idling (in neutral) until the temperature decreases. Investigate the cause of the alarm (e.g. restricted water supply to the engine). Stop the engine if the temperature does not decrease.**

B. Lubricating oil pressure too low. **Stop the engine immediately and locate the cause of the alarm.**

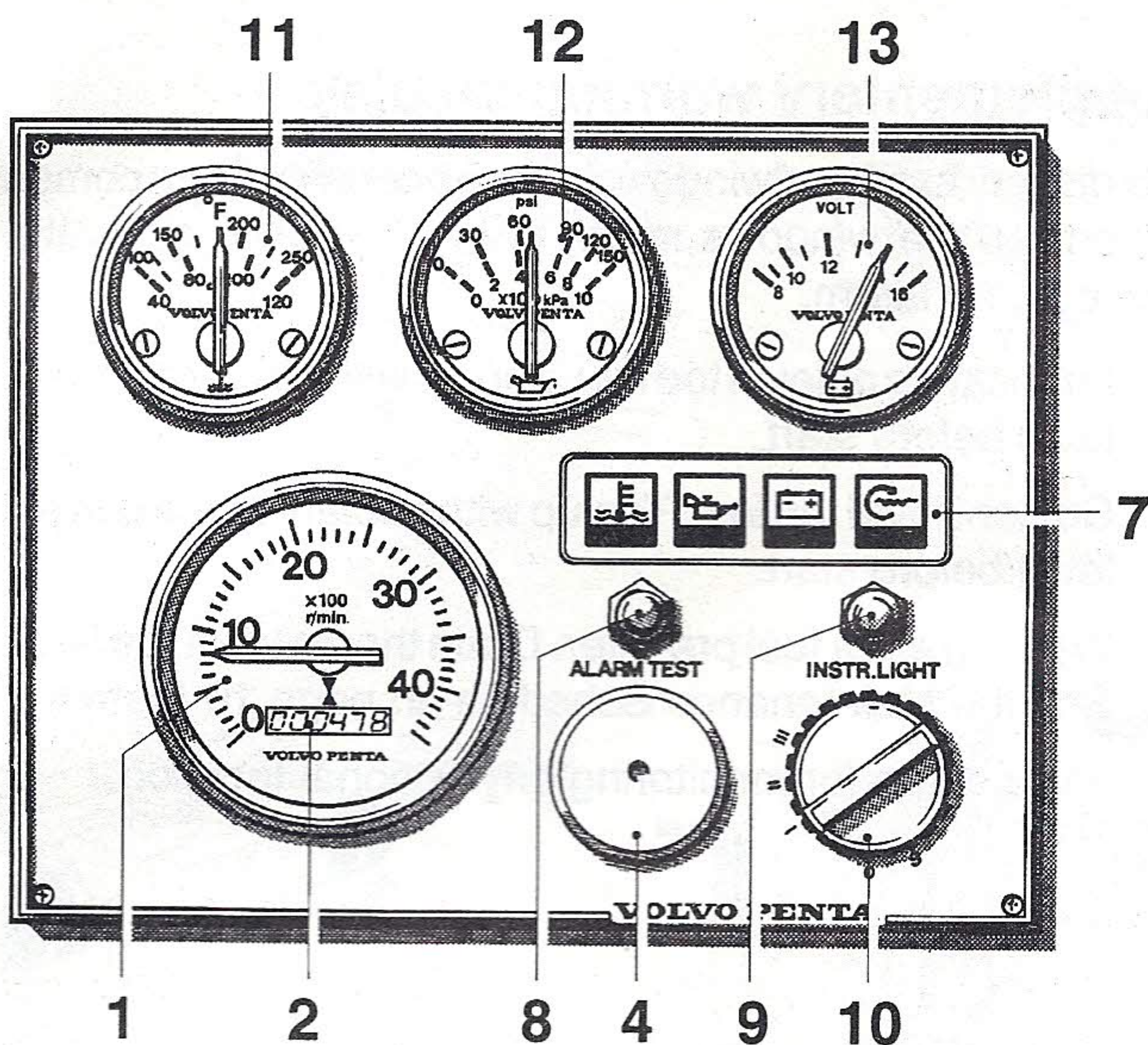
C. Alternator not charging.

D. Heating (indicator lamp comes on when glow plugs are on).

Lamp Test (before starting):

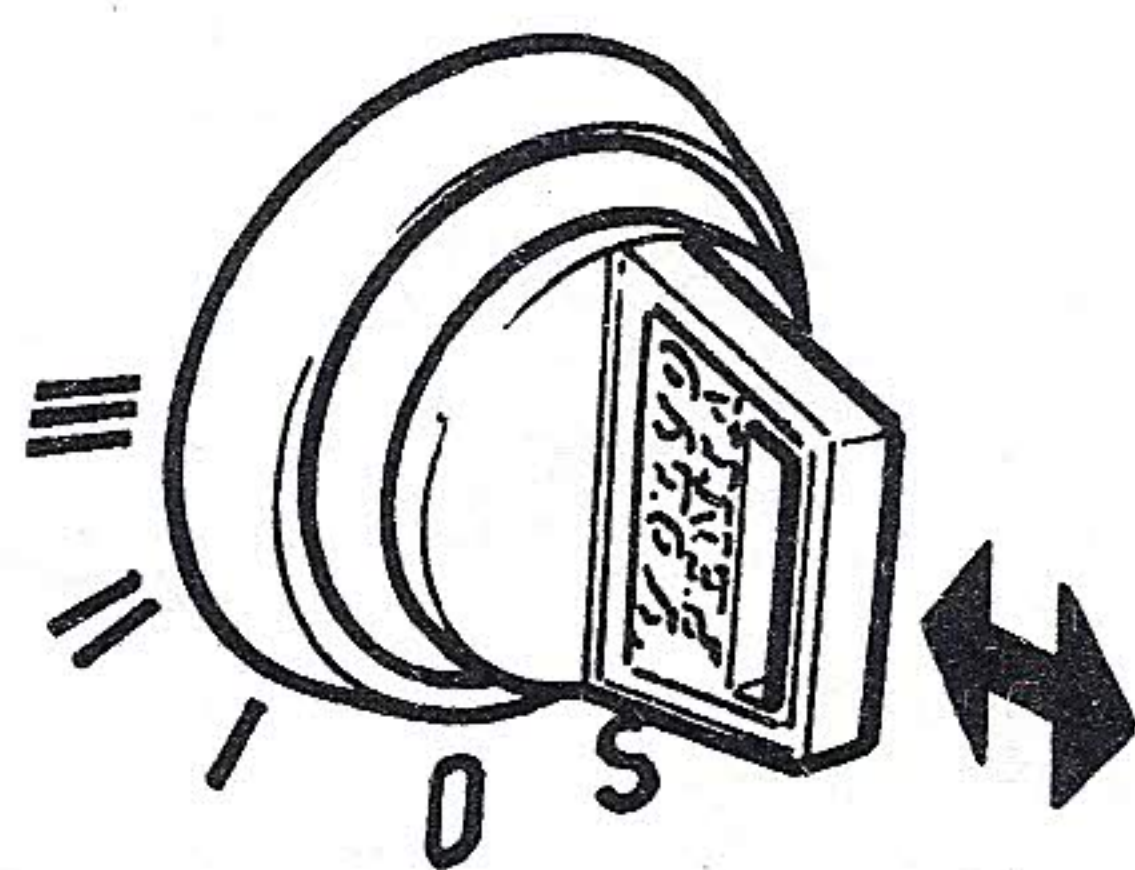
All the warning lights will be on but will not flash (for a maximum of 20 seconds) after the key switch has been put in the "Running" position (I). The warning light for high coolant temperature (A) will then go off.

De luxe (alternative "C")

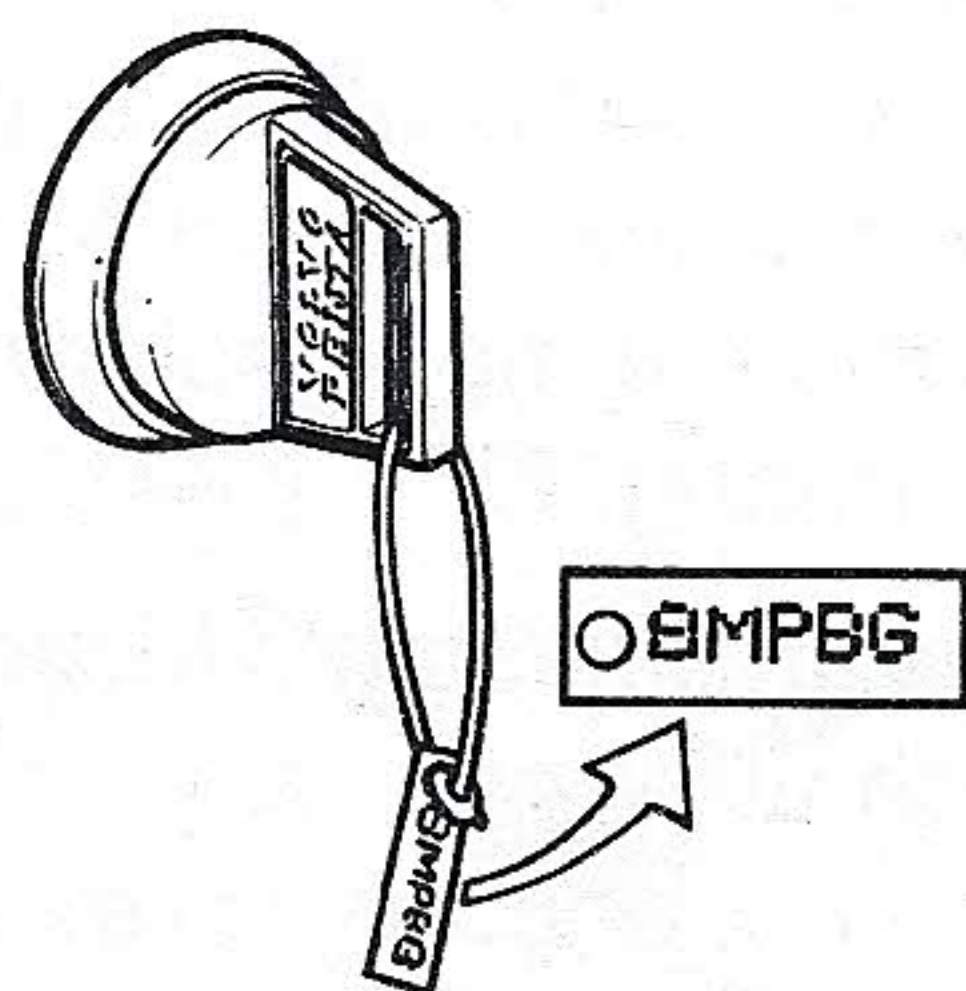


Instrument panel (De luxe)*

*Note. Rev. counter with built-in hour counter is optional.



Key switch



Disc with key code

8. Pressure switch – Alarm test/Acknowledge

The same functions as specified for the toggle switch in pos. 3 (down).

9. Pressure switch–instrument lighting

10. Key switch

The key switch has five positions, including 0:

Pos. 0 = Key can be inserted and removed.

S = The mechanical restart block disengages. The key springs back automatically to 0.

I = Running position. Key springs automatically back to running position after starting.

II = "Glow" position.

III = Start position (starter motor comes on). Let the key go as soon as the engine has started.

See also the starting instructions on page 13.

A disc is provided with the **keys** which gives the key code. This code must be stated when ordering new keys. Do not keep the number disc on the boat. Do not allow unauthorised persons access to the code.

11. Temperature gauge

The temperature gauge should normally show approx. 75–95°C (167–203°F) during normal operation. The acoustic alarm comes on when the coolant is too hot.

If an alarm is emitted, reduce the speed to idling (in neutral) until the temperature decreases. Investigate the cause (e.g. restricted water supply to the engine). Stop the engine if the temperature does not decrease.

12. Oil pressure gauge

The oil pressure gauge should normally show approx. 150–500 kPa (1.5–5 kp/cm² = 21–71 lbf/in²) during operation. It is normal for the gauge to show a lower value when the engine is idling.

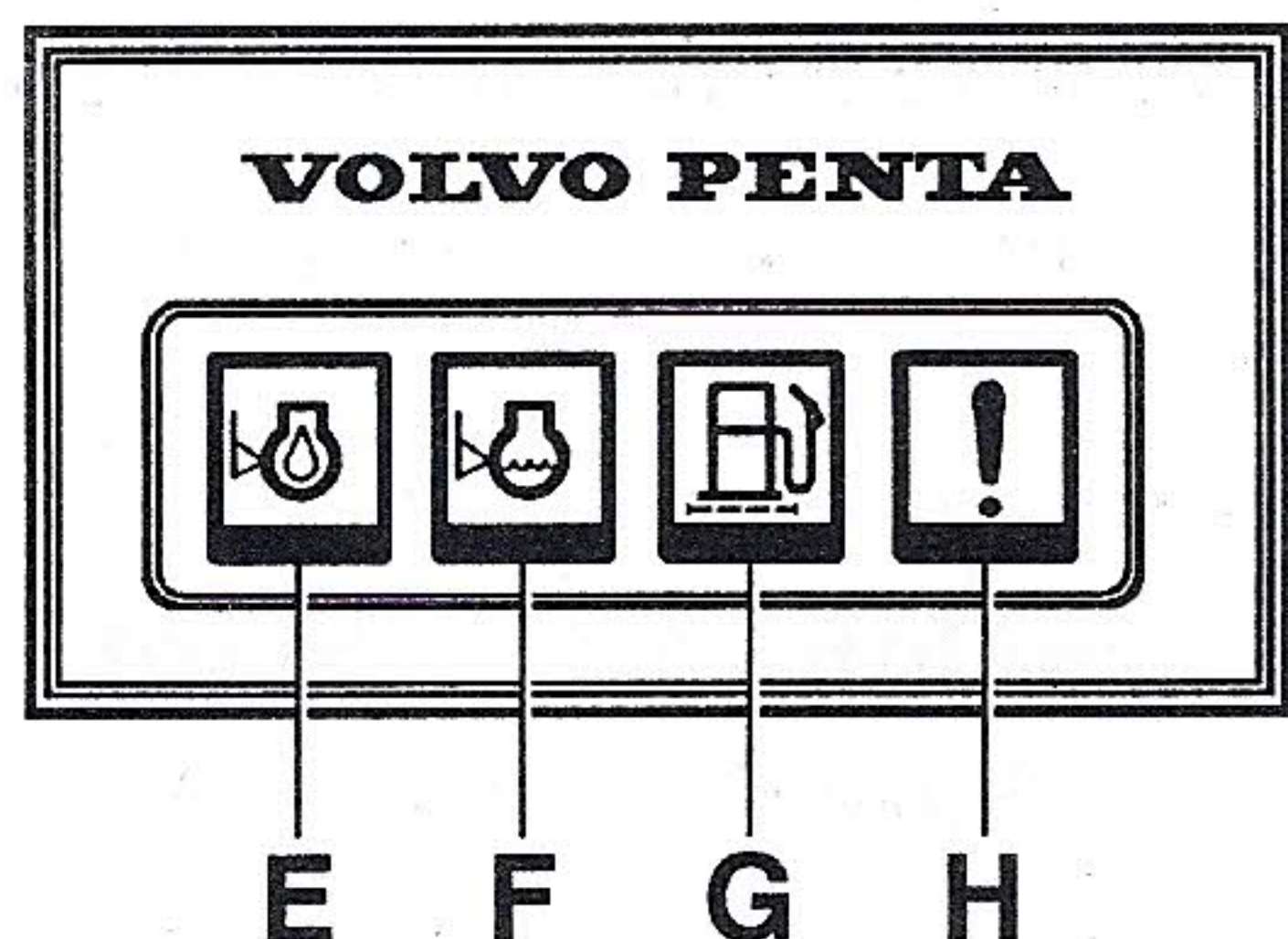
The acoustic alarm comes on when the oil pressure is too low.

When the alarm sounds, stop the engine immediately and locate the cause.

13. Voltmeter

The voltmeter shows the voltage in the starter battery circuit.

The voltage should be about 14V during operation. The voltage is about 12V when the engine is off.



Supplementary warning display

Supplementary warning display

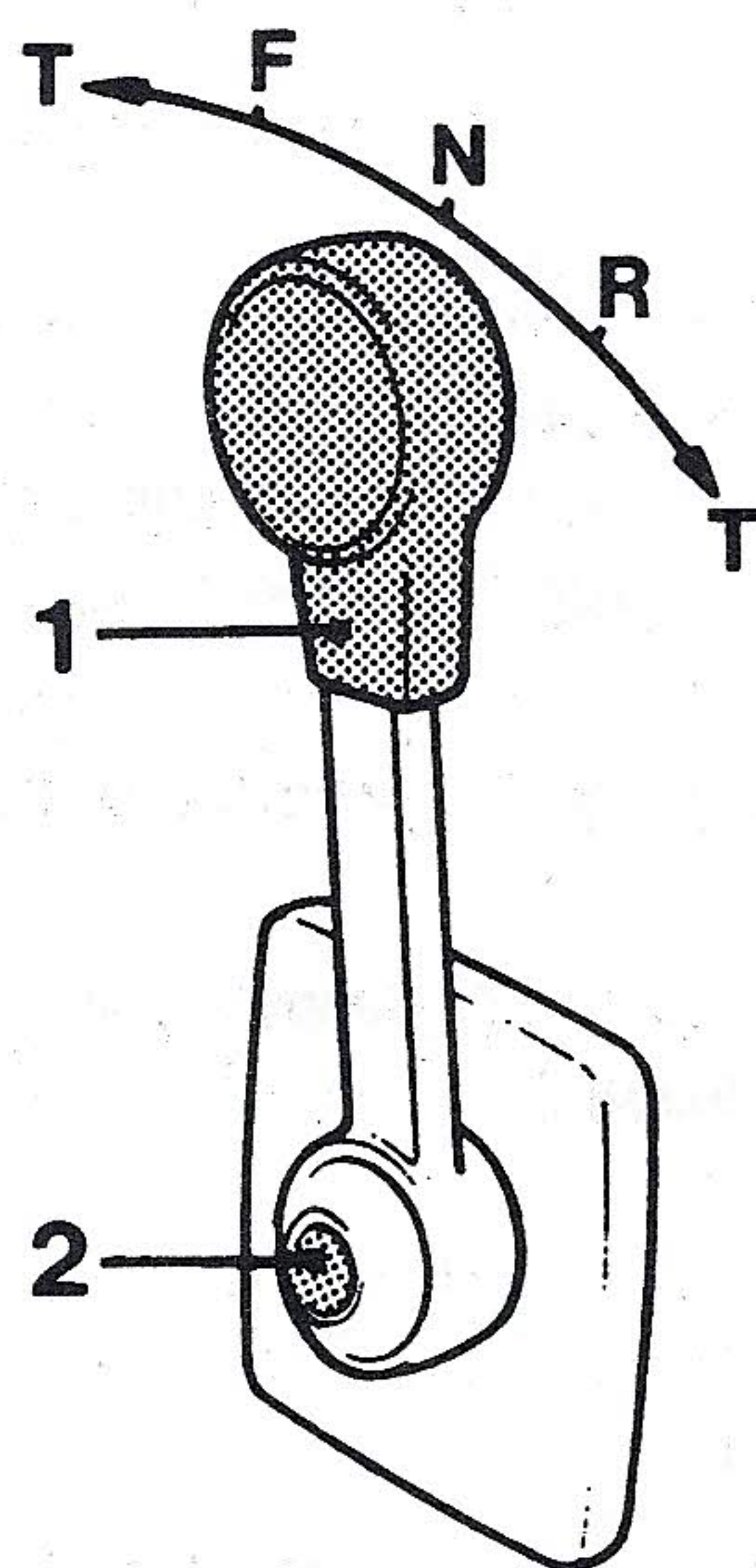
The display has four "windows". If the acoustic alarm comes on, one of the windows starts to blink (red) to show the cause of the alarm.

- E. Lubricating oil level too low. Top up with oil to the correct level before start.
- F. Coolant level too low. Top up with coolant to the correct level before start.
- G. Water in extra fuel pre-filter. Drain the water in the filter. See the Maintenance Schedule on page 16 (Item 4).
- H. Extra alarm for monitoring any optional function.

Controls

The Volvo Penta single-lever control combines the throttle and gear shift functions in one lever. When starting, for example, the gear change function can easily be switched off so only the engine speed is affected by the lever. When manoeuvring the boat backwards or forwards, the control mechanism makes the engine speed drop to idling speed when the gears are changed.

The control lever has an adjustable friction brake. A neutral position switch which allows the engine to be started only when reverse gear is not engaged is available as an extra.



VP single control

Manoeuvring takes place as follows:

Lever (1) for reverse gear/S-drive manoeuvres and engine speed control.

Position N = neutral position.

From N to F – reverse gear engaged for forward running.

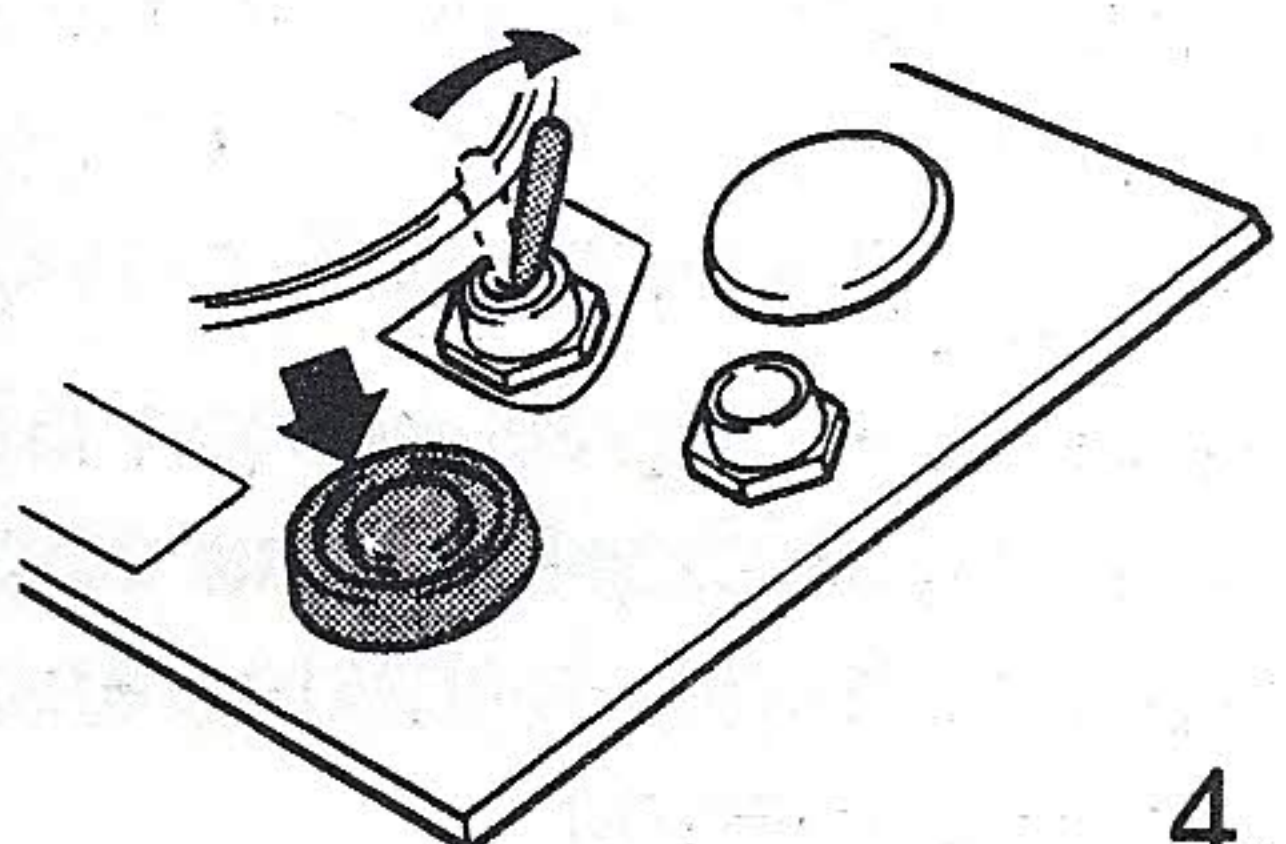
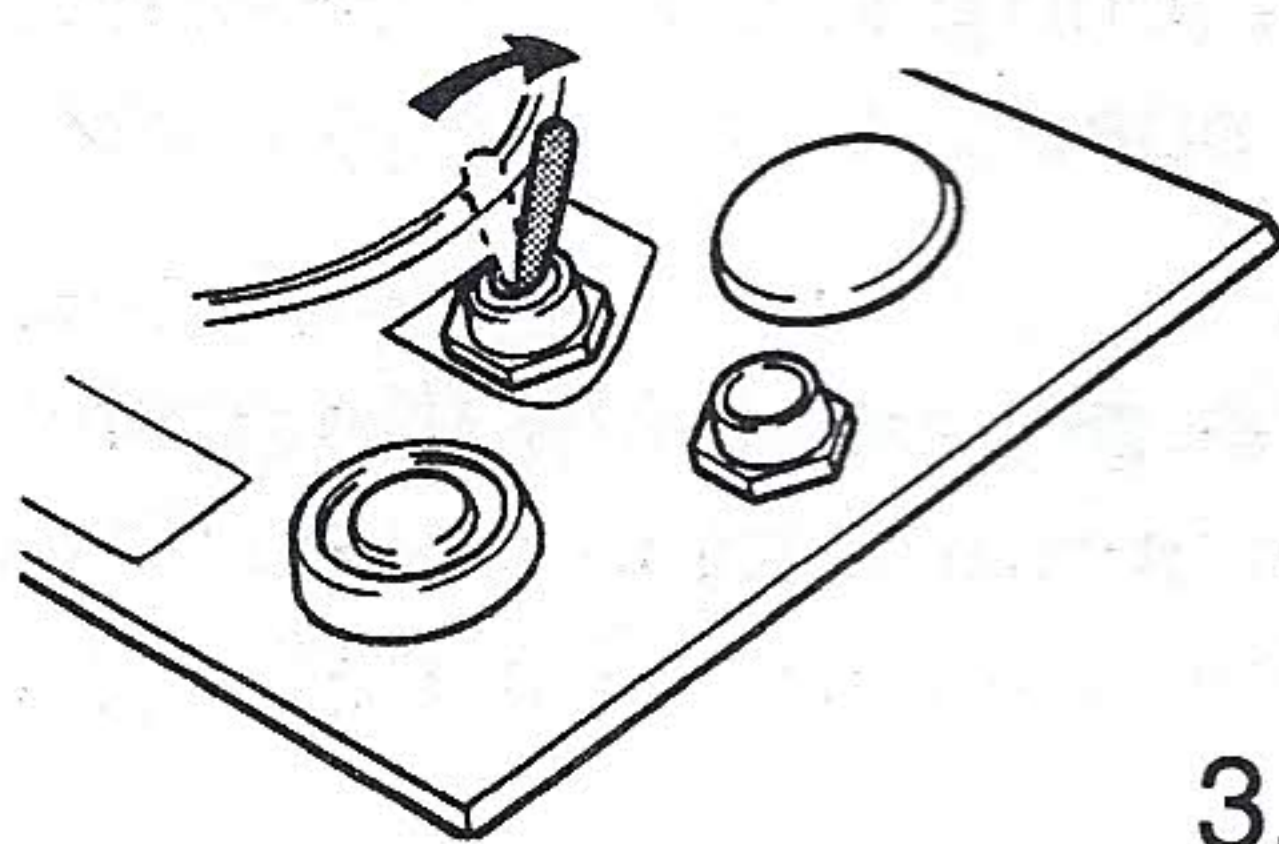
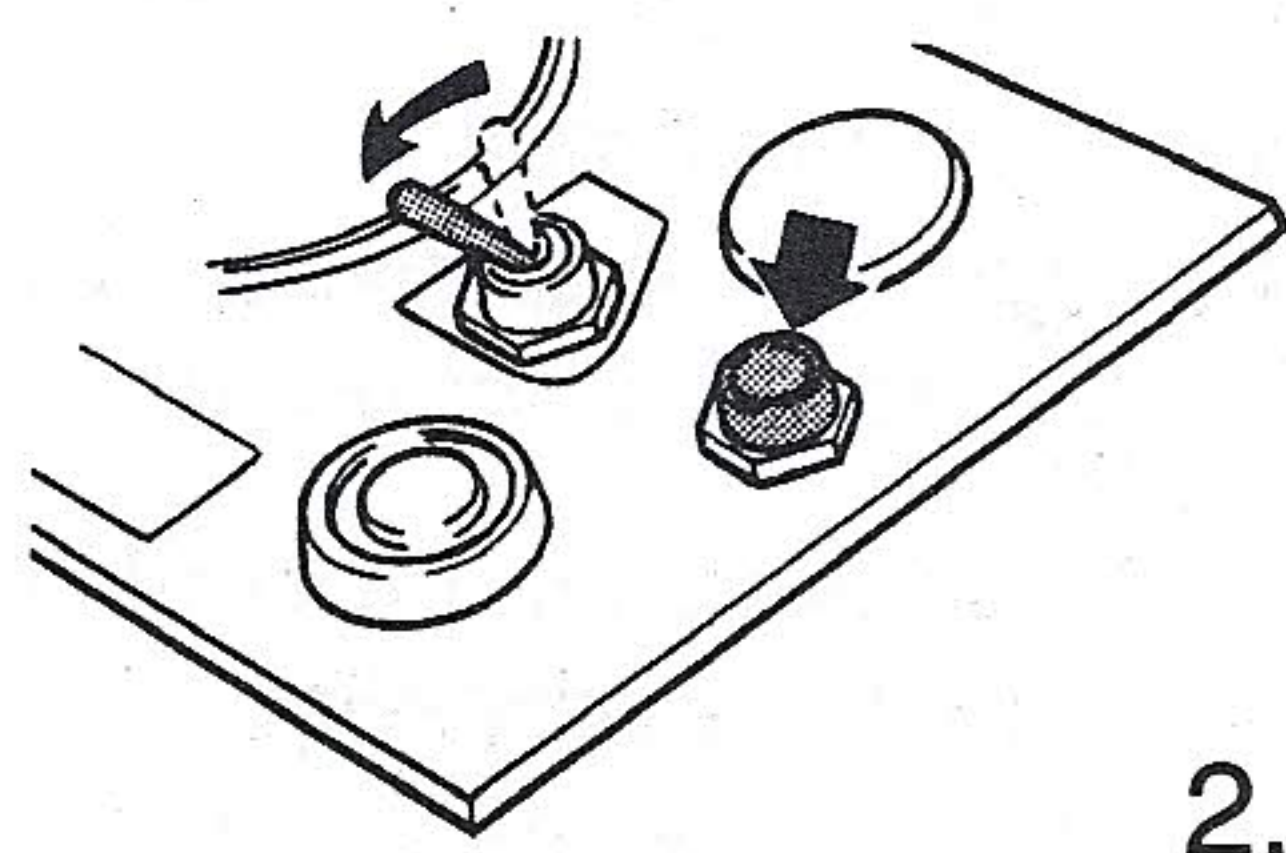
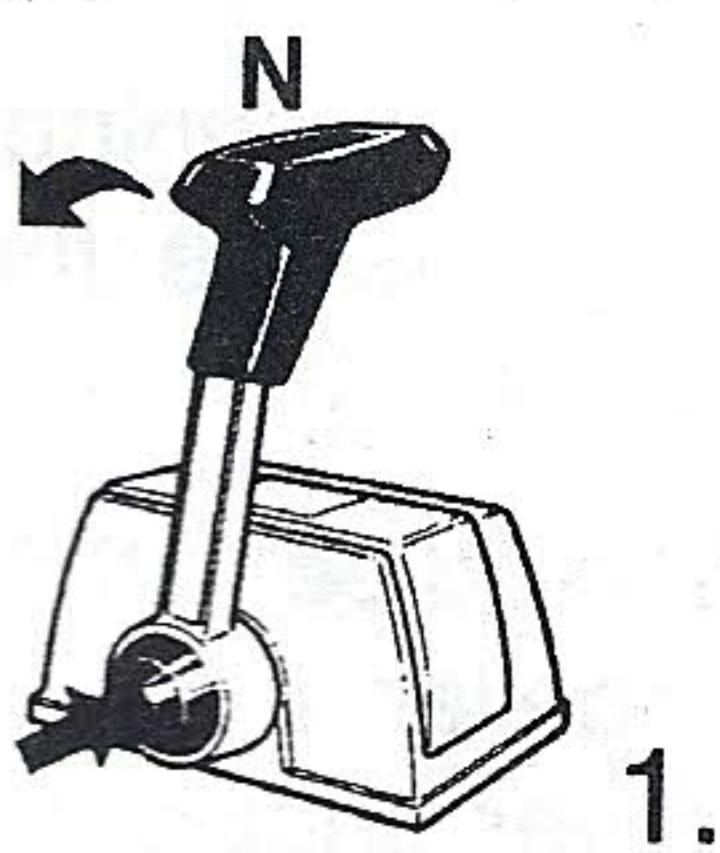
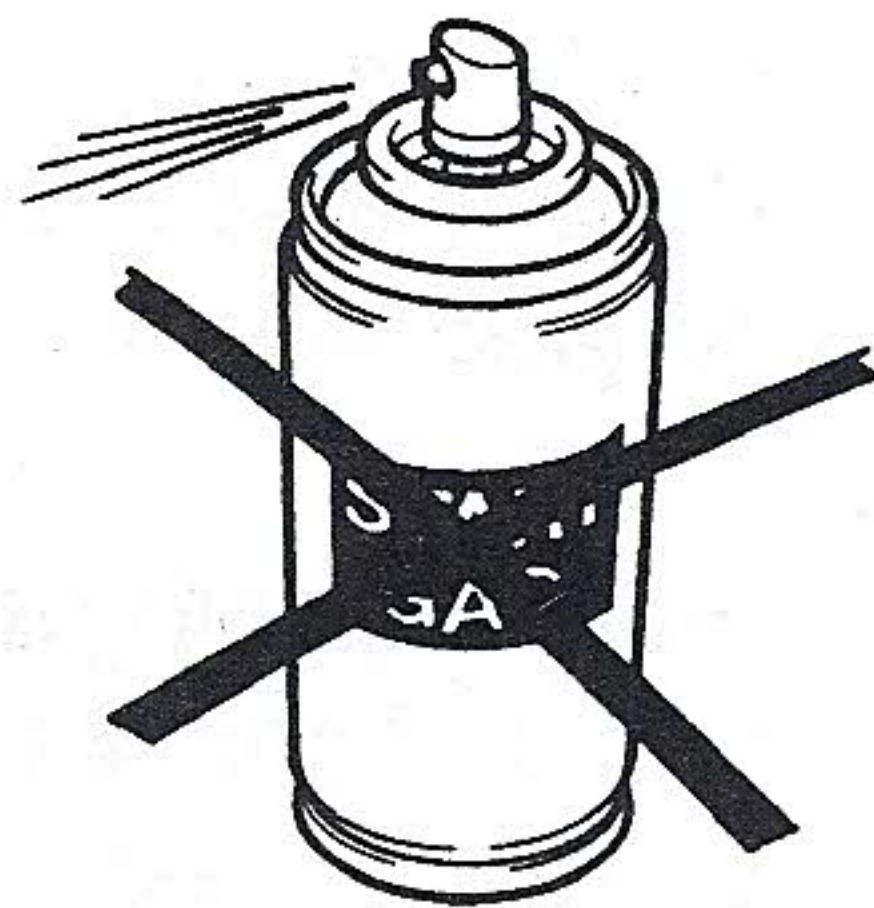
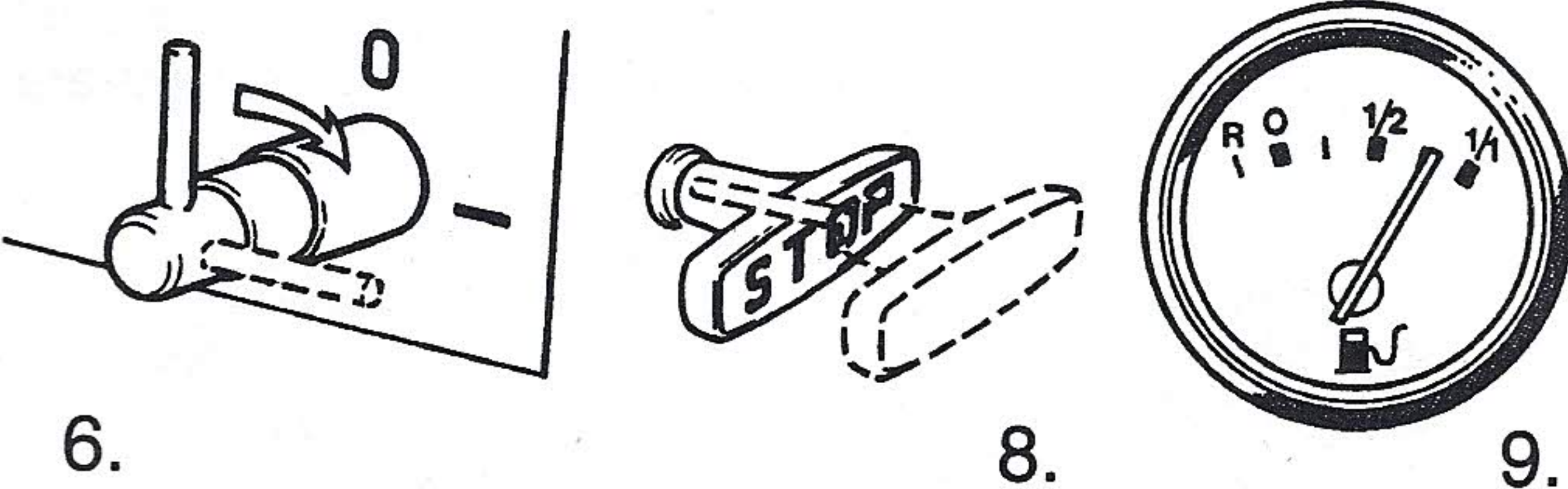
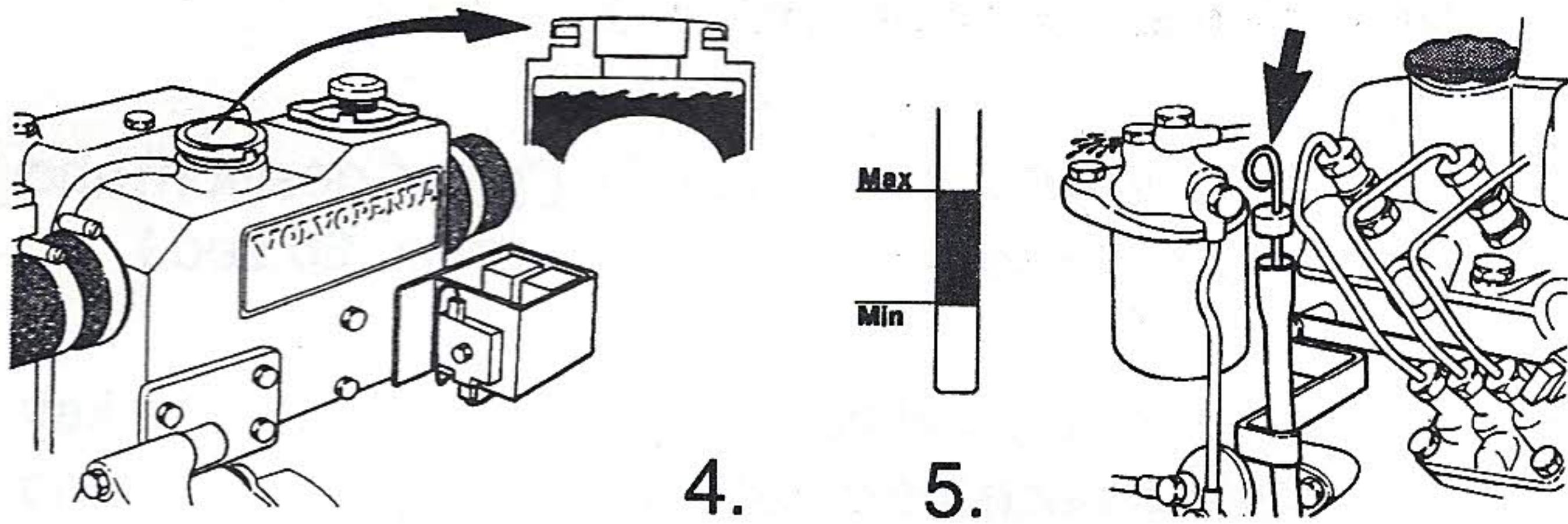
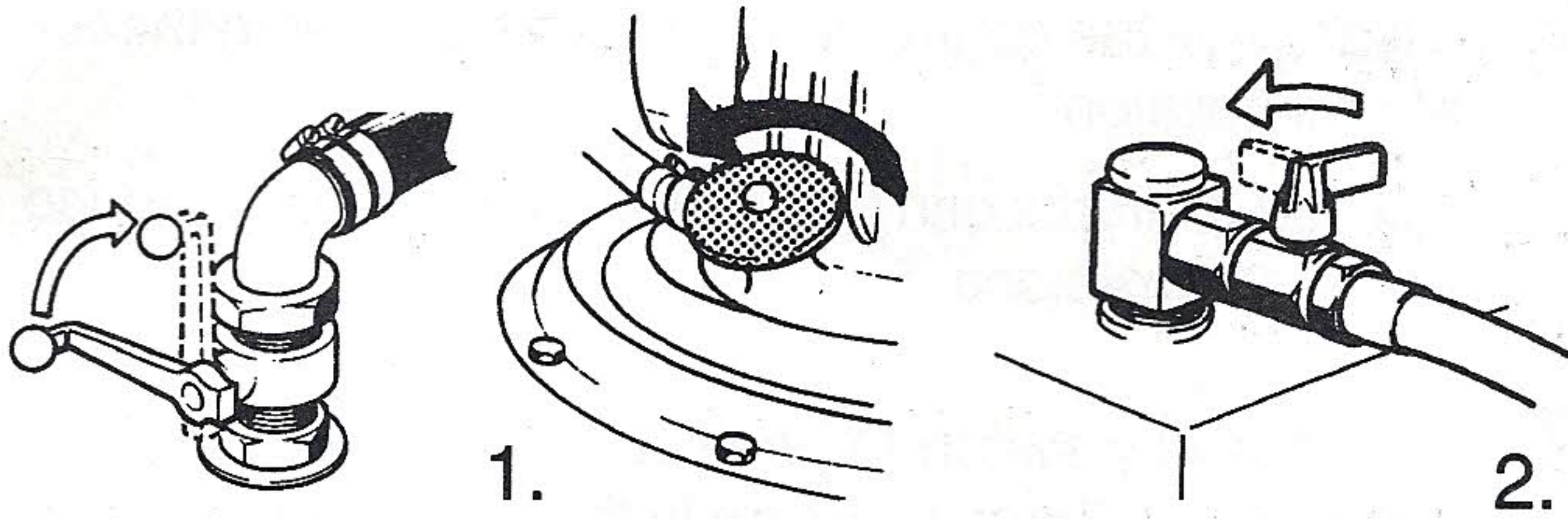
From N to R – reverse gear engaged for reversing.

T = affects engine speed.


Disengaging the reverse gear from the control:

Place the lever (1) in the neutral position "N". Press the button (2), push the lever forwards slightly and release the button. The lever will now only affect the speed.


The lever automatically reconnects the reversing function when it is moved back to the neutral position. The speed can then be adjusted and forward/reverse manoeuvres executed. **Ensure that the reverse gear/S-drive is not engaged unintentionally.**



Measures to be taken before starting

1. Open the bottom cock for the cooling water intake.
2. Open the fuel cocks.
3. Check that no leakage of water, fuel or oil occurs.
4. Check the level of coolant. The level should be just below the filler neck, or between the MIN and MAX marks on the separate expansion tank (extra).
 **Open the cap carefully if the engine is hot.**
5. Check the engine oil level. This should be within the area marked on the dipstick.
The oil level must never drop below the lower mark.
6. Engage the main switch.
7. Start the engine room blower (if fitted). Let it run for at least four minutes before starting the engine.
8. Push in the stop control.
9. Check the amount of fuel.

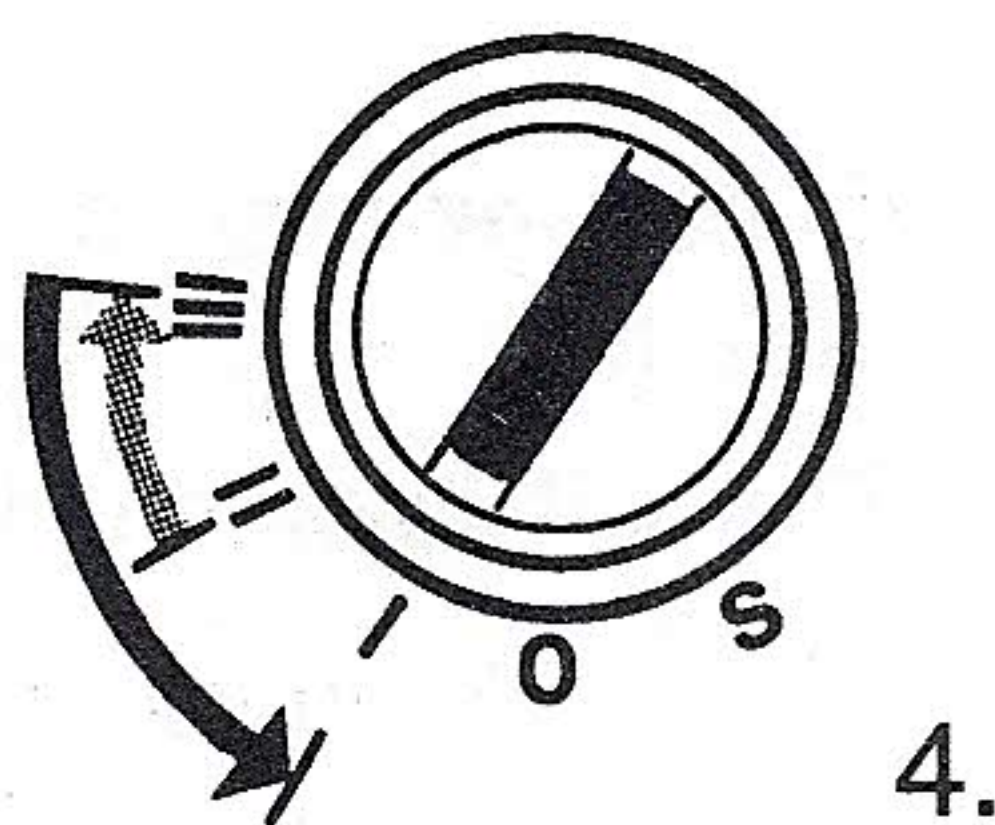
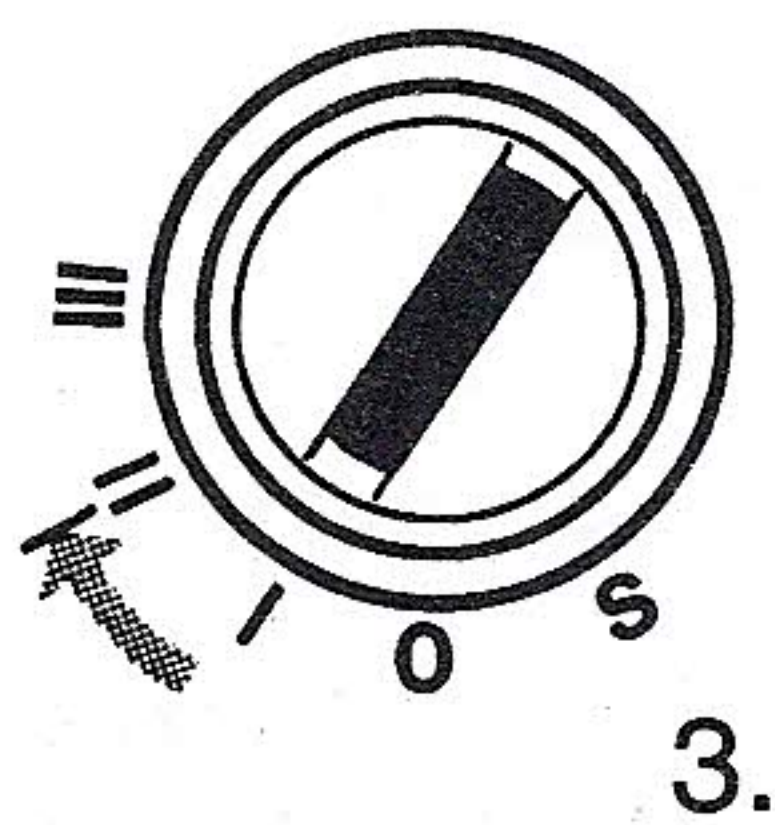
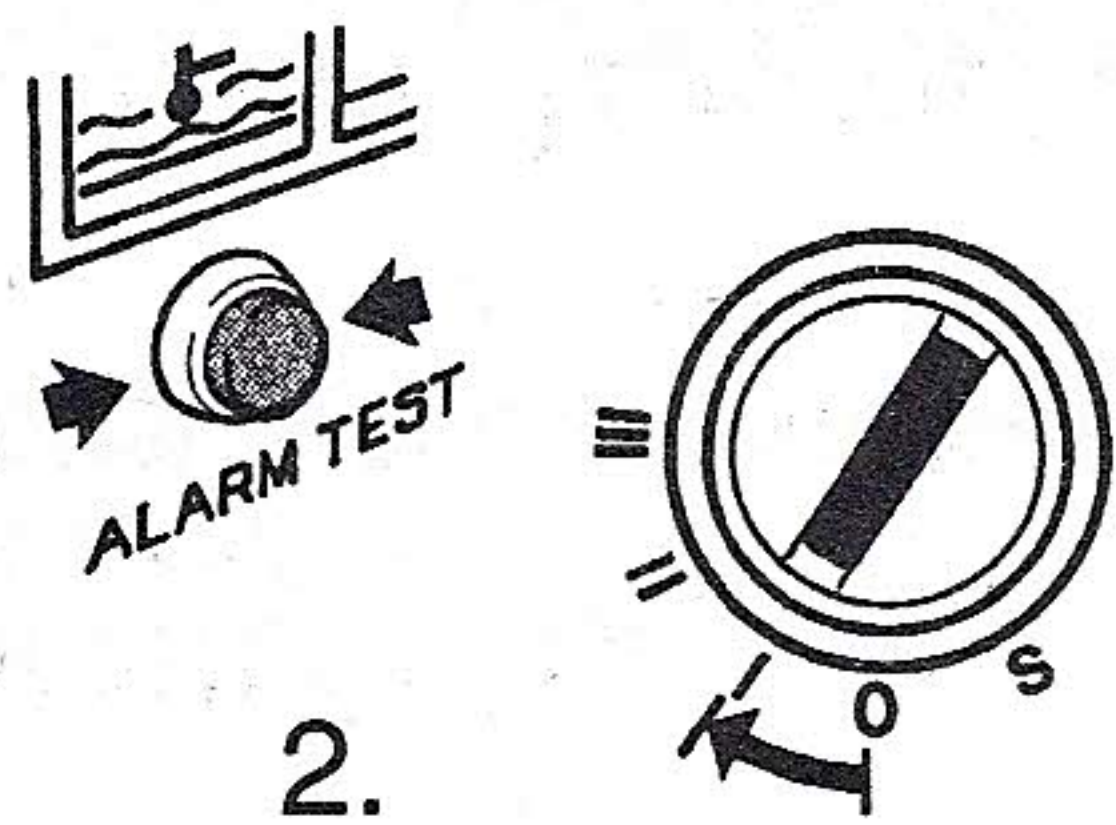
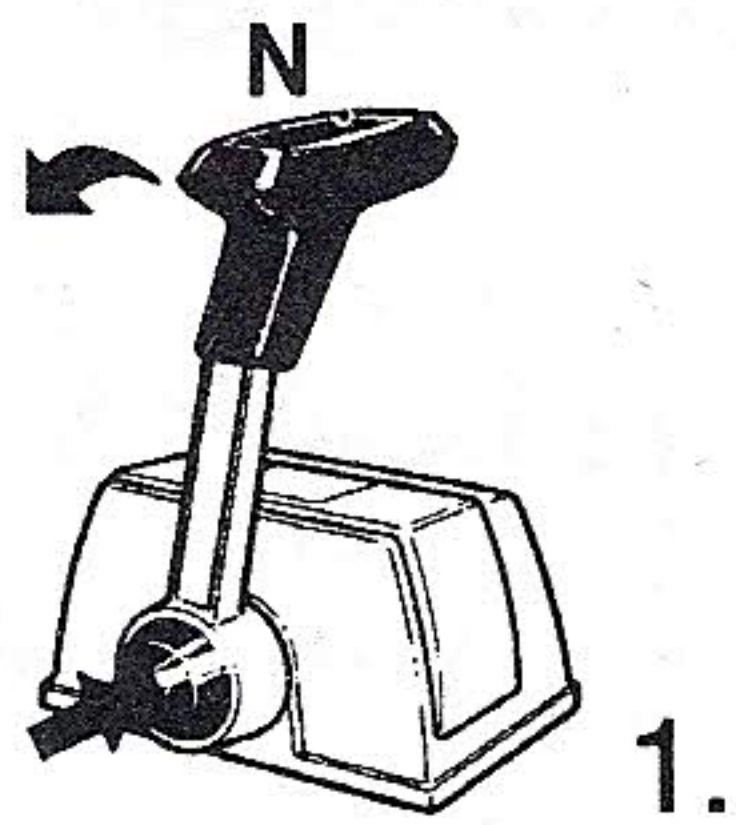
Starting

-  **Warning!** Never use starting spray or similar products to help you start the engine. The glow plugs may cause an explosion in the inlet manifold. Risk of personal injury.

Standard instrument panel ("A")

1. Disengage the control lever. Place the lever in the full speed position.
NB. Less throttle can be used when starting to reduce exhaust emissions.
2. Press the "Power ON/OFF" switch (instrument panel comes on). All warning lights on (not flashing – max. 20 sec.). After that the warning light for high coolant temperature goes out.
 Push the toggle switch down ("Alarm test") and check that the alarm sounds (warning lights on).
3. Push the toggle switch up to the "Glow" position and hold it there for about 20–30 sec. (max. 60 sec.).
4. Press the start button at the same time. Let the button and the toggle switch go when the engine starts.* Reduce the engine speed to idle.

*NB. Do not run the starter motor for more than 20 sec.



Standard instrument panel ("B"), or De luxe instrument panel ("C")

1. Disengage the control lever. Place the lever in the full speed position.

NB. Less throttle can be used when starting to reduce exhaust emissions.

2. Turn the key switch to position "I" (running position). The warning lights come on in this position (not flashing – max. 20 sec.). After that the warning light for high coolant temperature goes out.


Press the "Alarm Test" button and check that the alarm sounds (warning lights on).

3. Turn the key switch to position "II" ("glow" position) and hold it there for about 20–30 sec. (max. 60 sec.).

4. Turn the key to position "III" to start. Release the key immediately once the engine has started* (it will spring back automatically to the running position). Reduce the engine speed to idle.

***NB.** Do not run the starter motor for more than 20 sec. The key switch has a restart lock. Therefore, the starting procedure must always begin from the "S" position when repeated attempts are made to start the engine.

The following applies to all engines regardless of the type of instrument panel:

 **NB:** The starter motor must **never** be switched on when the engine is running. The starter motor and the flywheel ring gear may be seriously damaged.


5. Warm up the engine at low speed and under low load. **Do not race the engine when it is cold.**

6. Monitor the instruments/warning display during operation. Stop the engine and check the cause of any abnormal readings or if a warning light comes on.

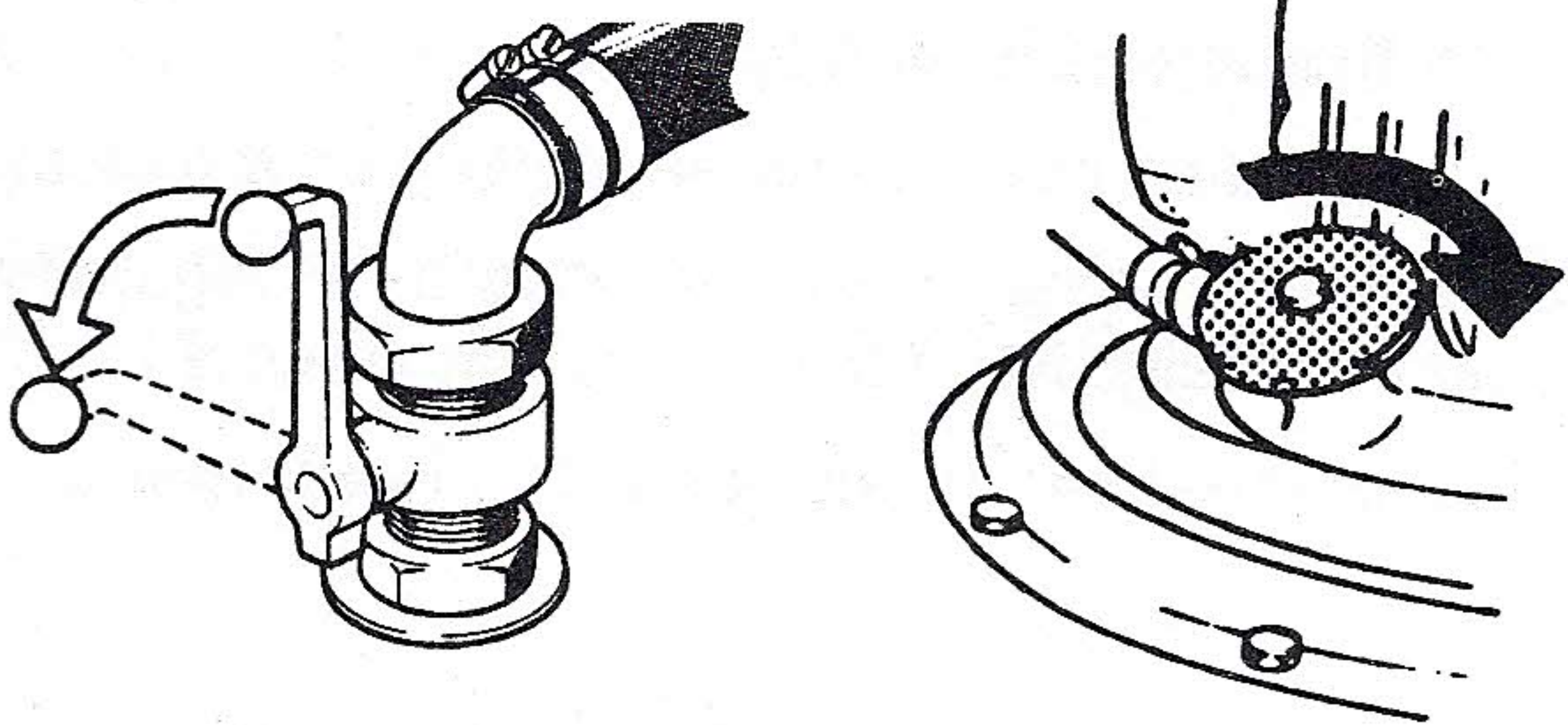
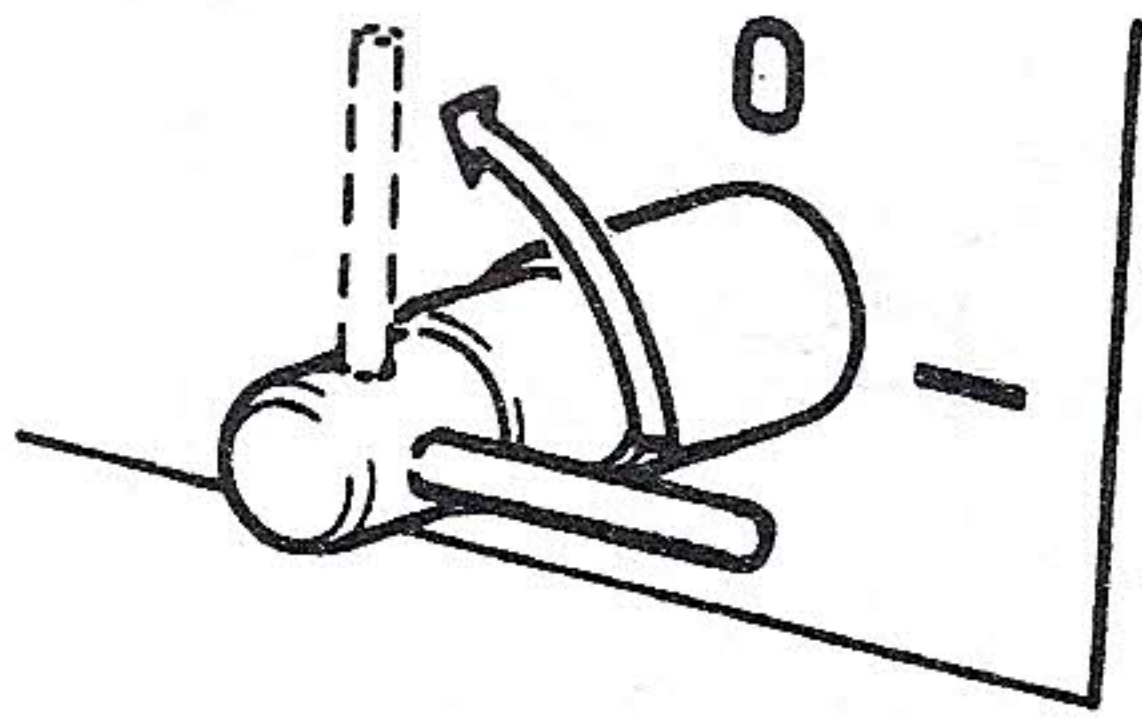
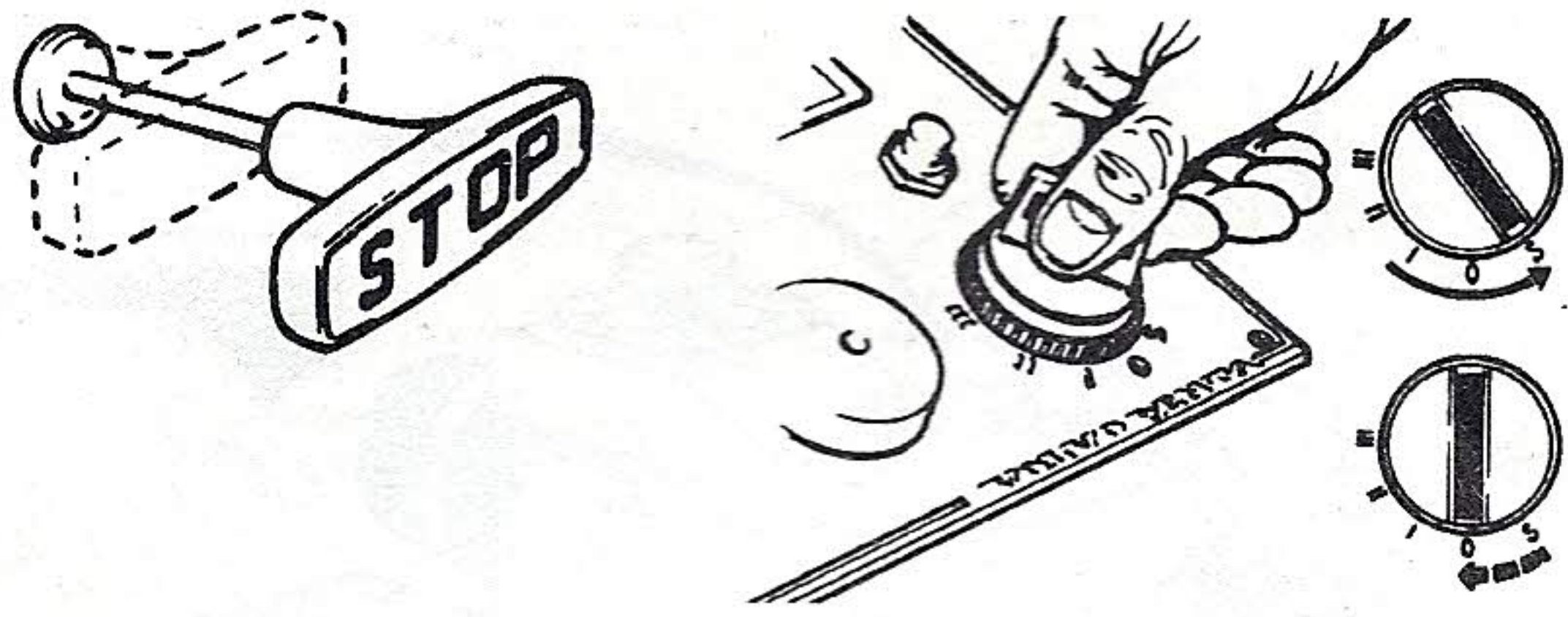
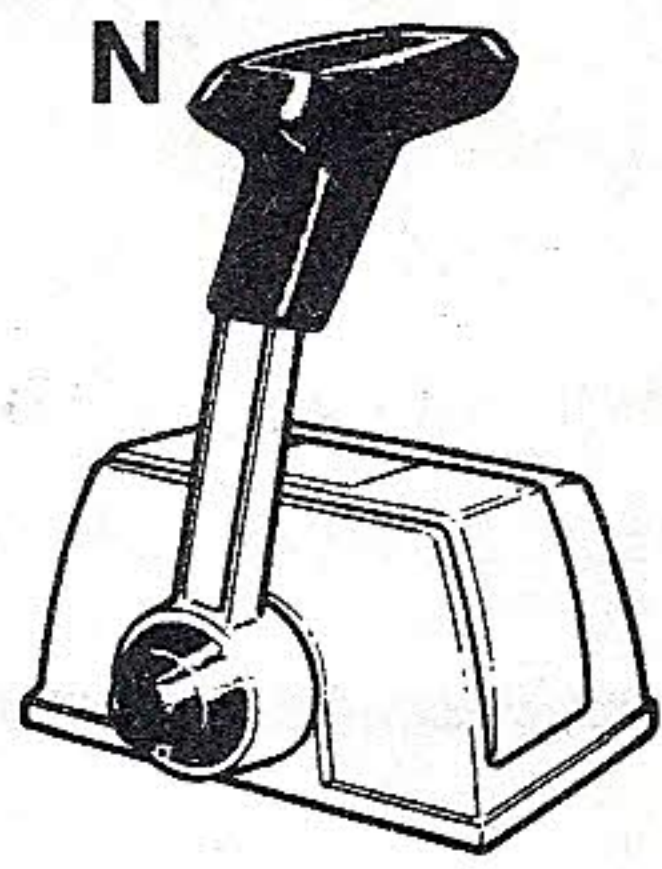
The engine must not be run if the oil pressure is too low or the coolant temperature too high.

NB. For maximum fuel economy, avoid running on full throttle. The maximum cruising speed is the maximum speed reached minus approx. 300 r/min.

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 for five minutes every ten hours when on long-distance cruises.

 **Warning!** Manoeuvring of the reverse gear/S-drive should be done at idling speed. Manoeuvring at higher engine speed can damage the reverse gear/S-drive.

NB: Never switch off the power using the main switch when the engine is running. If you do, the voltage regulator and alternator may be seriously damaged.



Shutdown procedure

1. Let the engine run at idling speed for about 1 min after operation (with reverse gear/S-drive in the neutral position). This will ensure an equalisation of temperature in the engine and prevent "afterboiling".
2. Pull out the stop control. Turn the key switch to the "S" position and release it (the key will automatically spring back into the "0" position). You may then remove the key.

Safety measures:

3. Disconnect the main switch if the boat is not to be used for some time.

⚠ NB: Never disconnect the main switch when the engine is running. If you do, the voltage regulator and alternator may be seriously damaged.

4. Check there are no leaks around the engine and that everything in the engine room looks normal.
5. Close the sea cock (cooling water intake) and the fuel cocks.

In cold weather, where there is a risk of freezing, it is important that the coolant in the freshwater system has sufficient antifreeze.

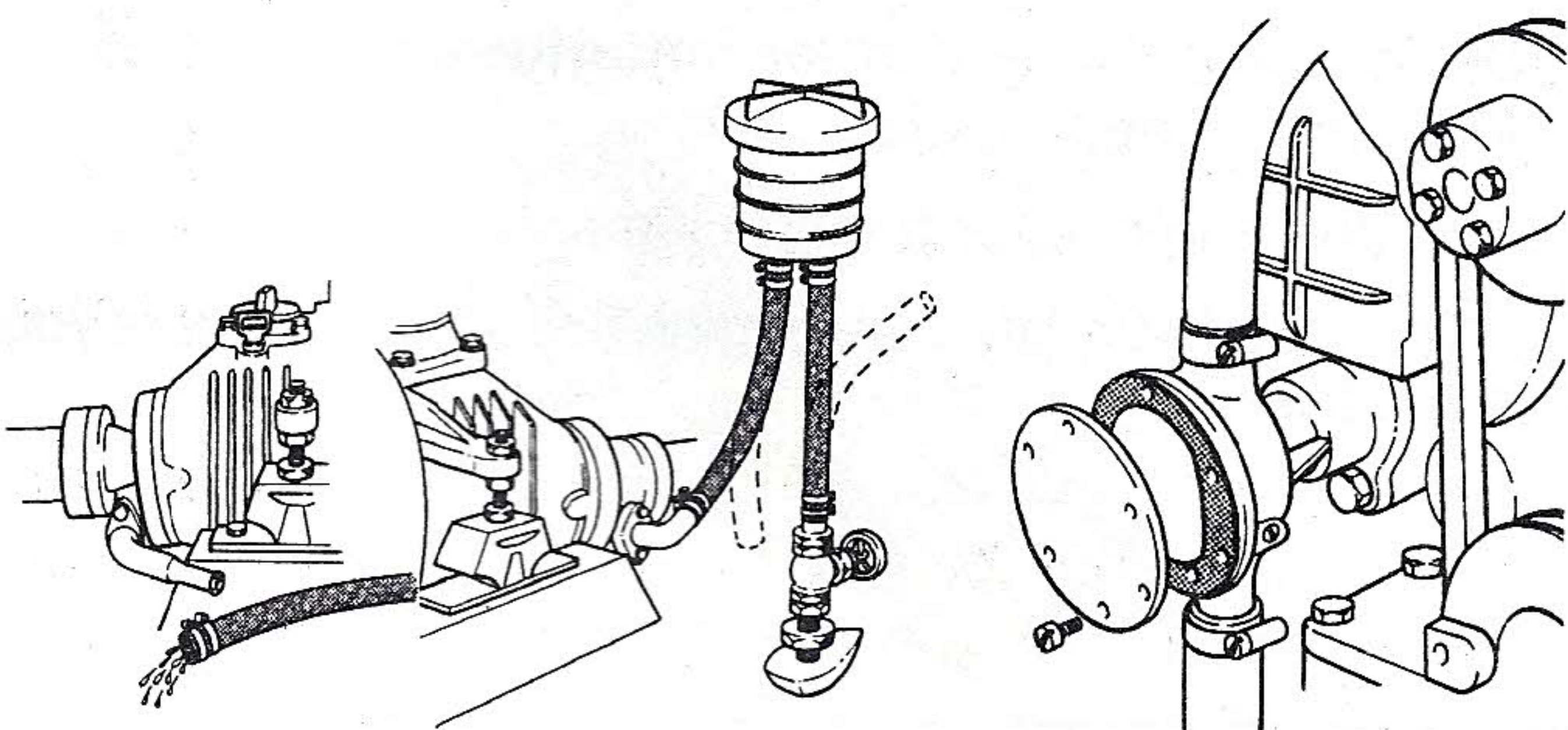
Drain the water in the seawater system (see next section).

Check the battery's charge. A battery with low charge can easily burst when frozen.

Draining the seawater system:


⚠ Do not allow the ingress of water into the boat.

1. **Close the bottom cock (sea cock).** Release the cap on the seawater pump and let the water run out.
2. Release the hoses from the seawater pump and seawater filter at the reverse gear/S-drive and point them downwards so that the water runs out.
3. Tighten the hoses and the cap on the seawater pump.




Maintenance

General description for MD2010, MD2020, MD2030 and MD2040.

 **NB: Stop the engine and cut the power using the main switch before service work is begun!**

Check daily before starting

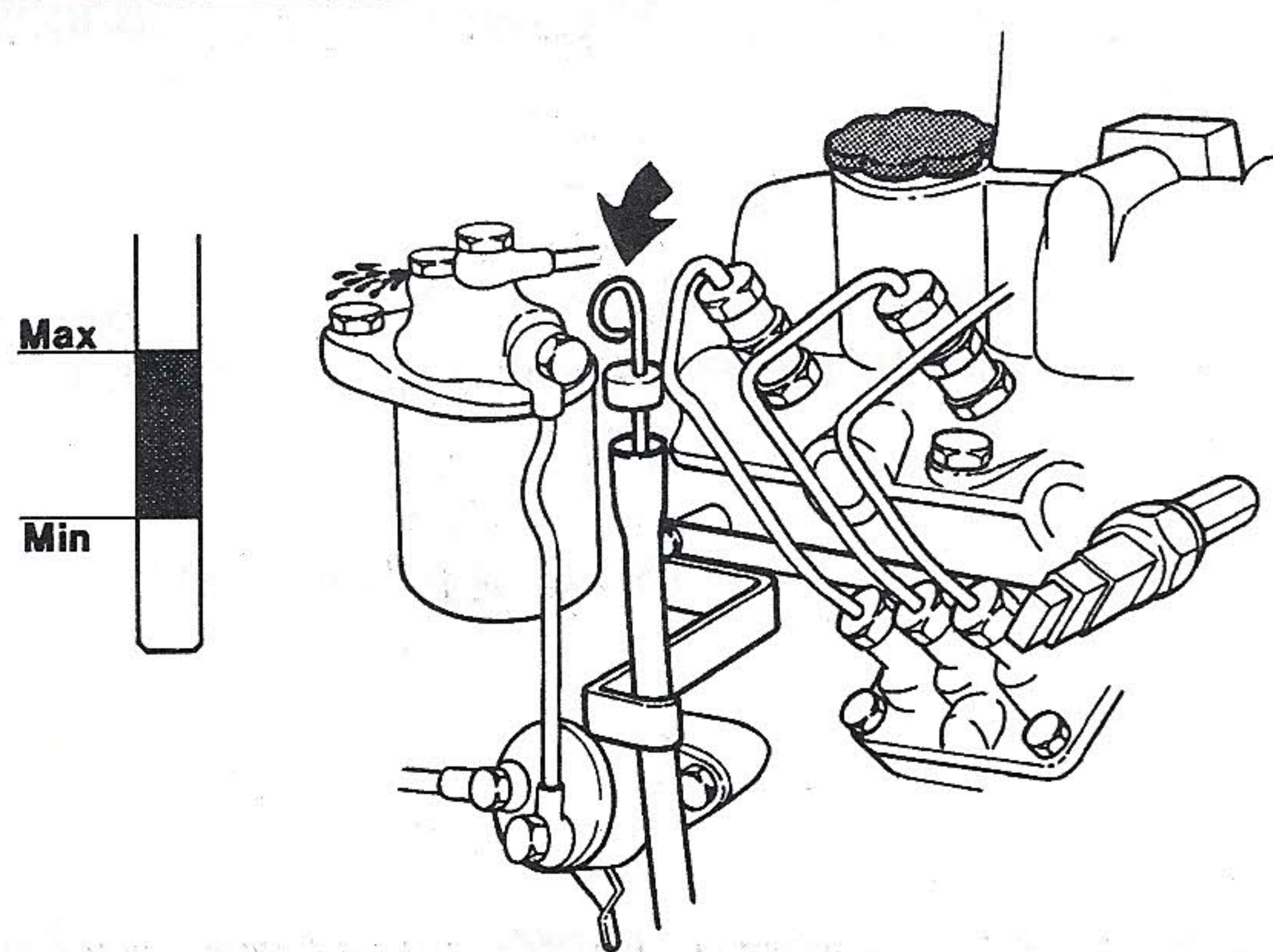
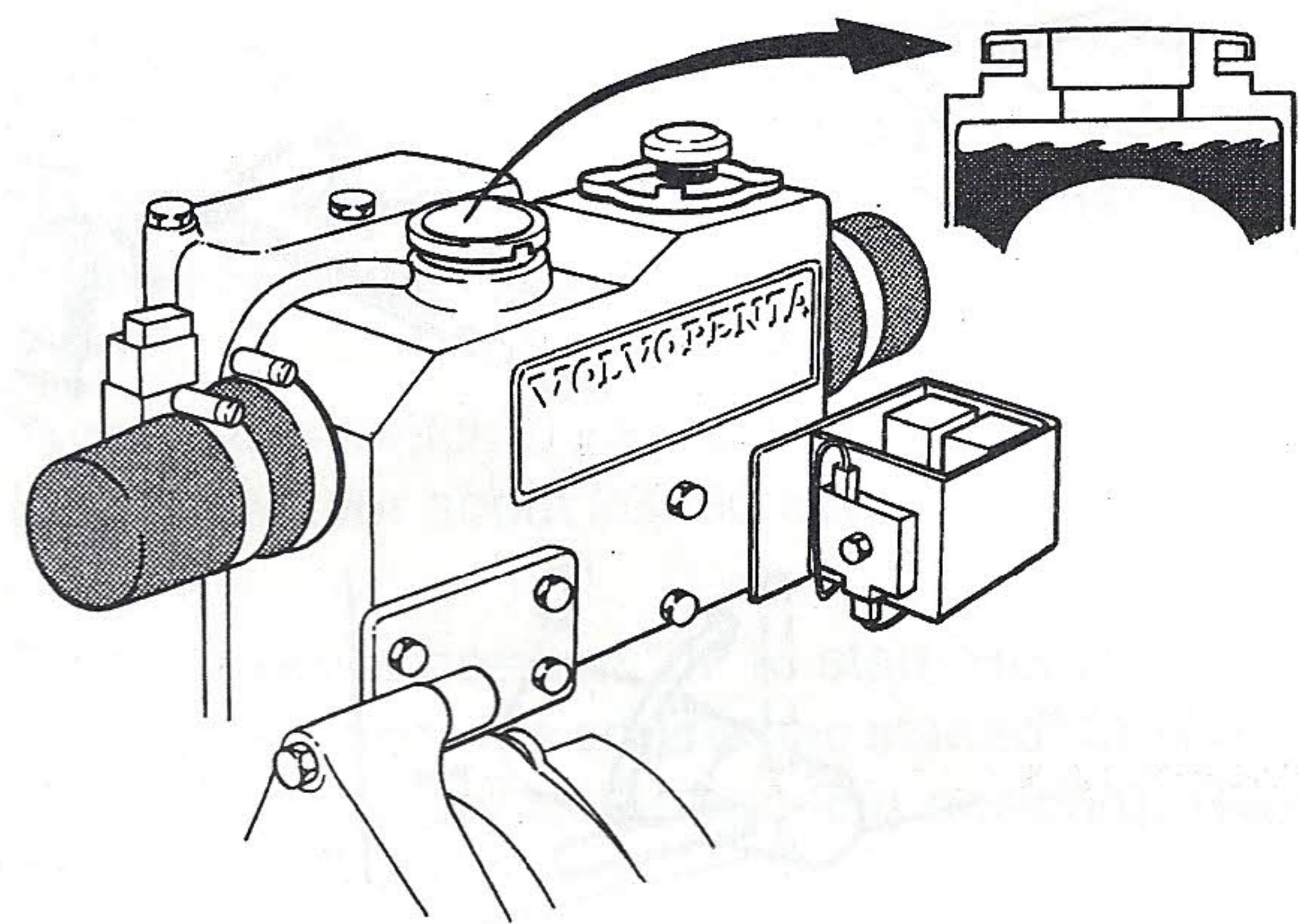
1. Check the coolant level.

 **Warning! Open the filler cap very carefully if the engine is hot. Steam or hot liquid may spray out.**

Turn the cap to the first stop and wait a moment before removing the cap.

The level should be just below the filler neck, or between the MIN and MAX marks on the separate expansion tank (extra). See the section entitled "Coolant" on page 19 for information on coolants.

A solution which is the same as that already in the cooling system should be used to replenish the system. **NB. Fill the cooling system slowly!**



2. Check the engine's lubricating oil level.

The level should be within the area marked on the dipstick. Add more oil if necessary. See "Technical data" regarding oil quality and viscosity. **NB. Fill the system slowly!**

The oil level must never fall below the lower mark.

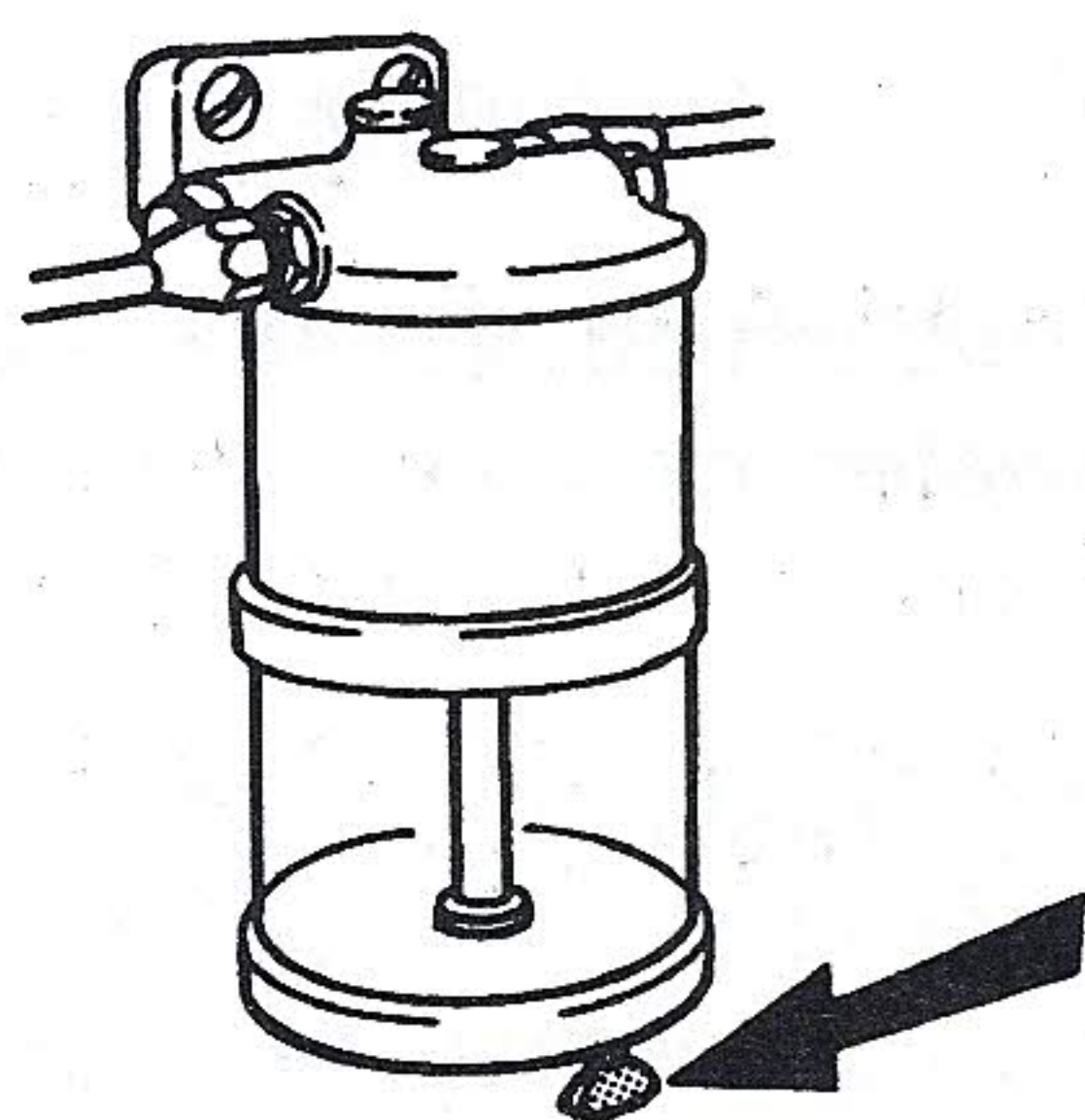
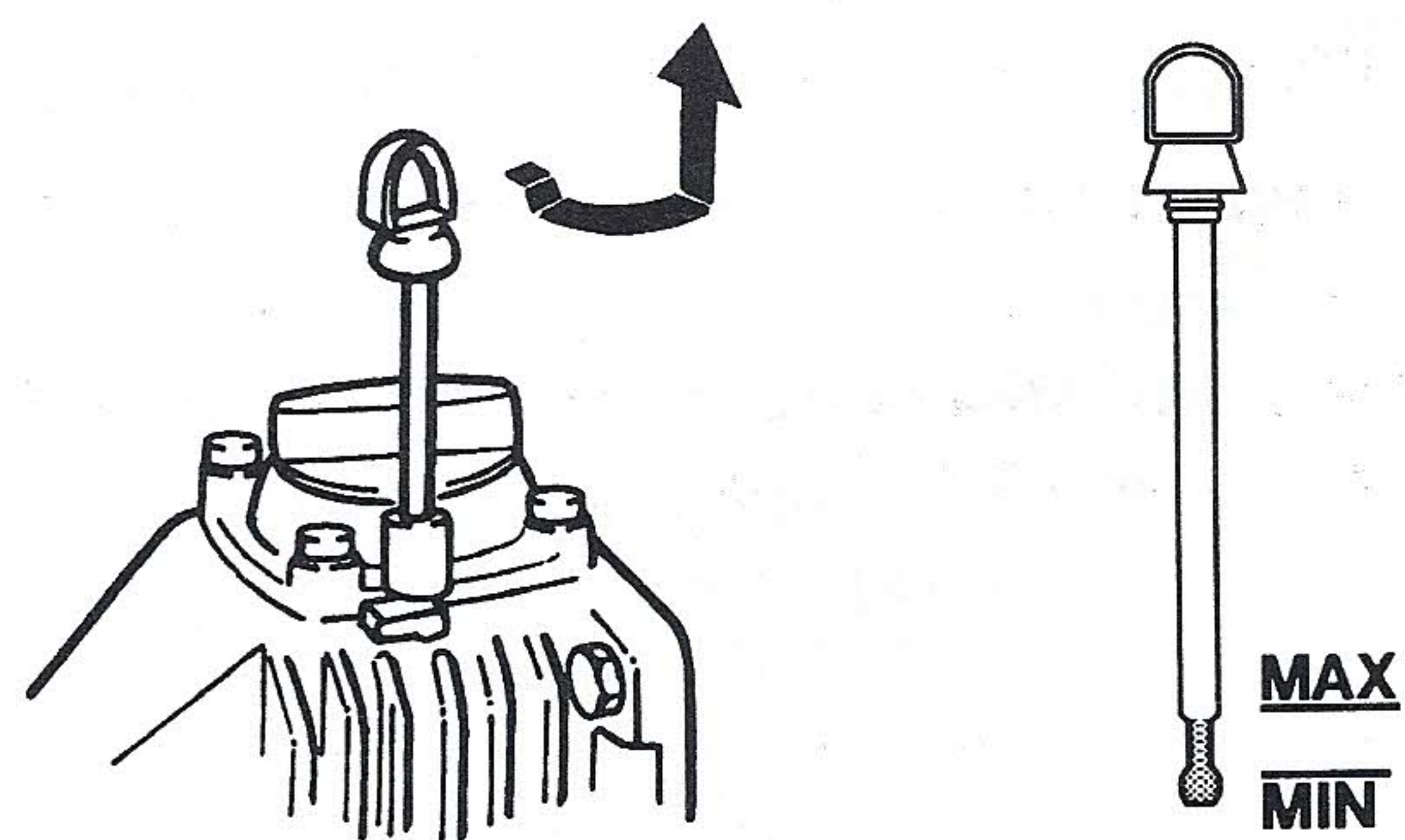
Check every 14 days

3. Check the oil level in the reverse gear or S-drive.

The level should be within the area marked on the dipstick. **NB. The dipstick should not be screwed in** when you check the oil level.

Add more oil if necessary. See "Technical data" regarding oil quality and viscosity.

The oil level must never fall below the lower mark.



4. Drain water and any other impurities from the extra fuel filter (if applicable).

Drain water or impurities through the cock/plug (1).

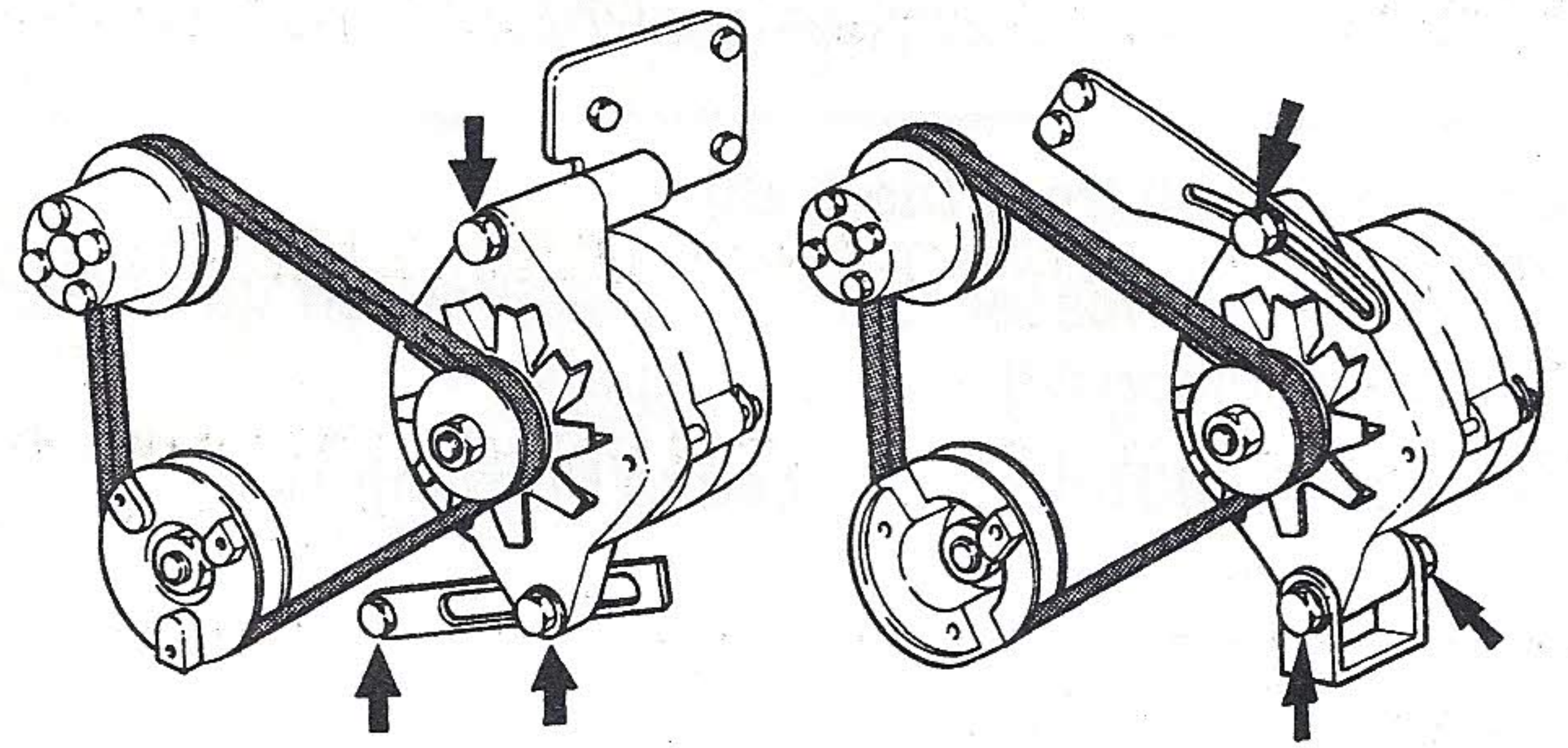
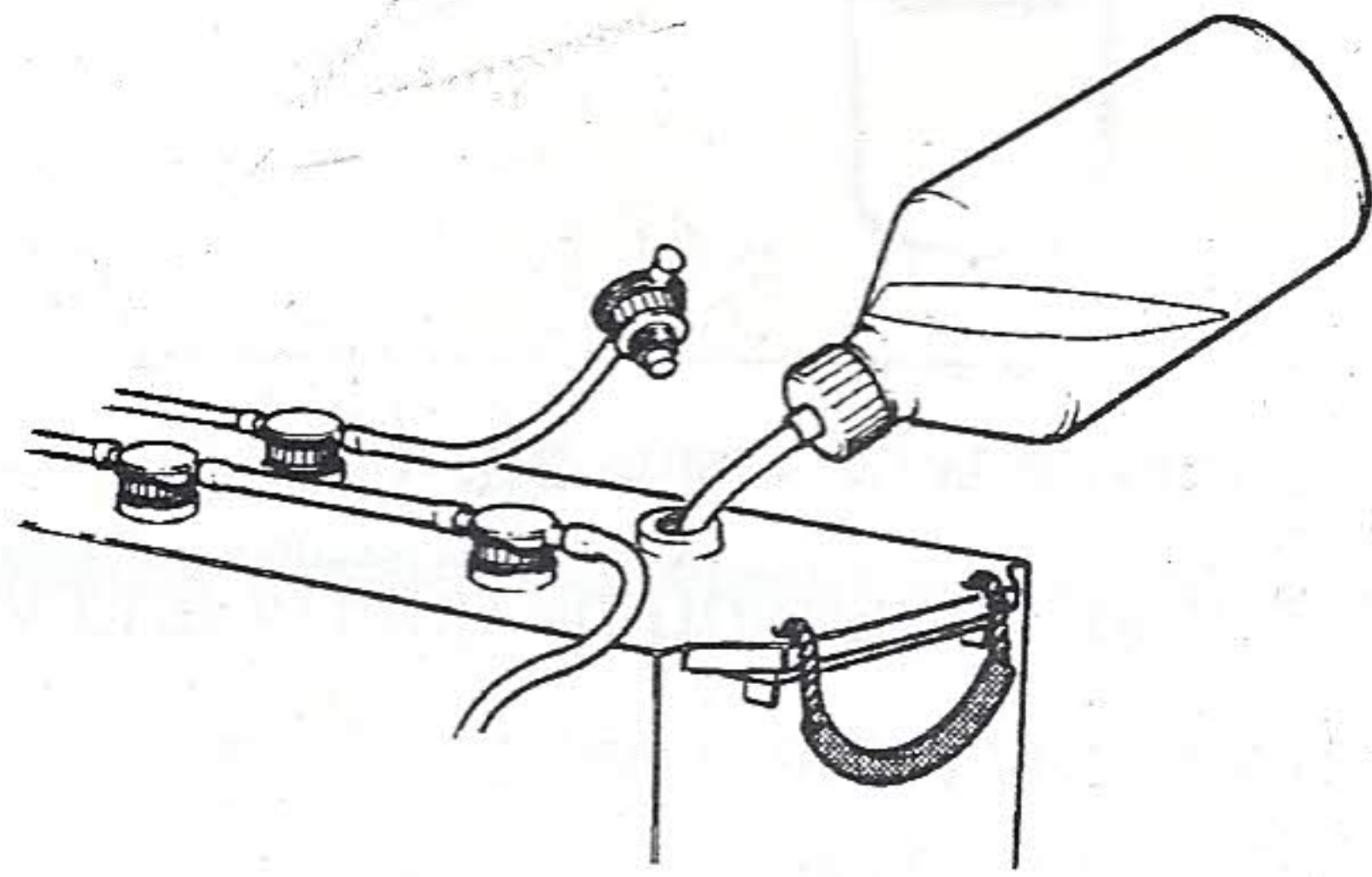
NB. Wait a few hours after the engine has stopped before you drain the filter.

5. Check/tension the drive belt.

If the belt is too tight, it may damage the bearings. If the belt is too loose, it may make the belt pulley slip.

Change the belt if it looks worn or is cracked.

After changing the belt: Re-check the tension of the belt after about one hour's running.



MD2010, MD2020

MD2030, MD2040

6. Check the level of electrolyte in the battery.



Warning! Use protective goggles. The batteries contain oxyhydrogen gas and extremely corrosive sulphuric acid. A spark or naked flame in the vicinity of the battery can cause an explosion.

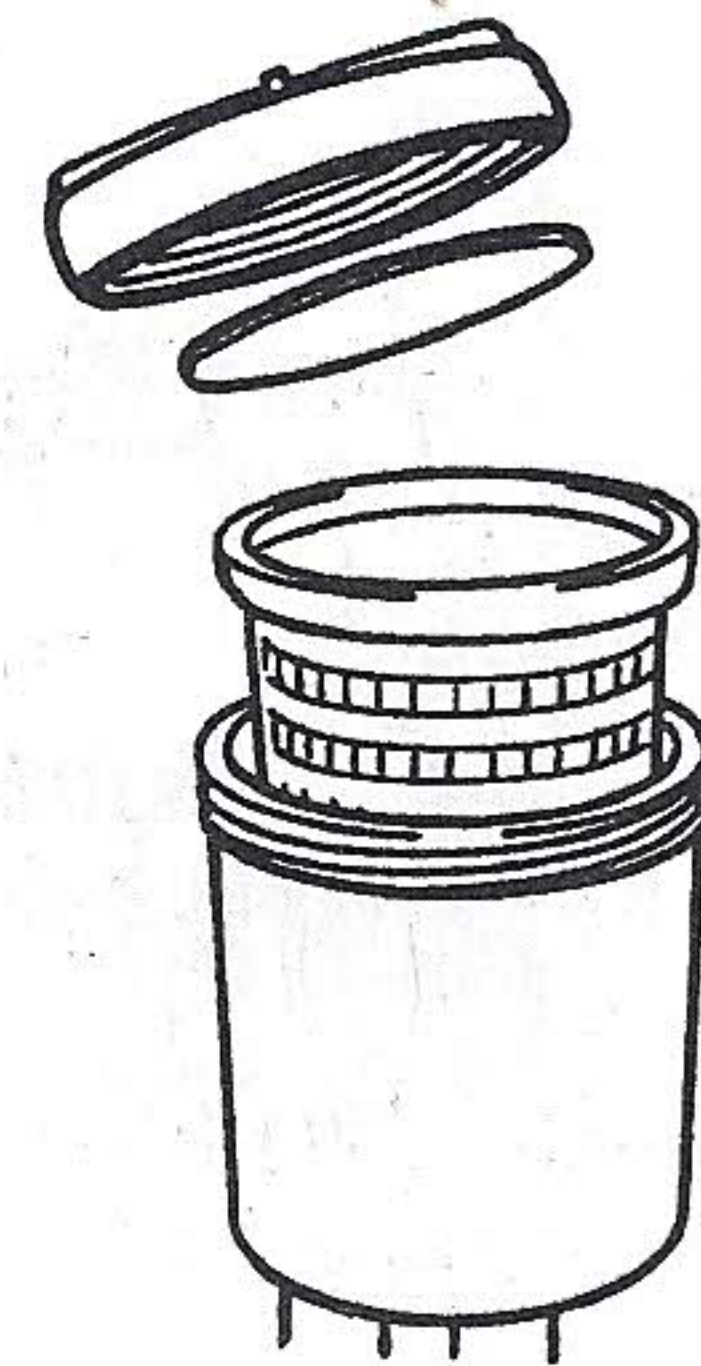
Service every 50 hours of operation

7. Check the seawater filter.*

Close the sea valve. Open the filter, clean it if necessary.

Warning! Take care not to let in water.

*NB. When to check the seawater filter should be determined from experience after running the boat for a time. Check the filter more often should there be a danger that it will get blocked.



Service every 100 hours of operation, or at least once every 6 months

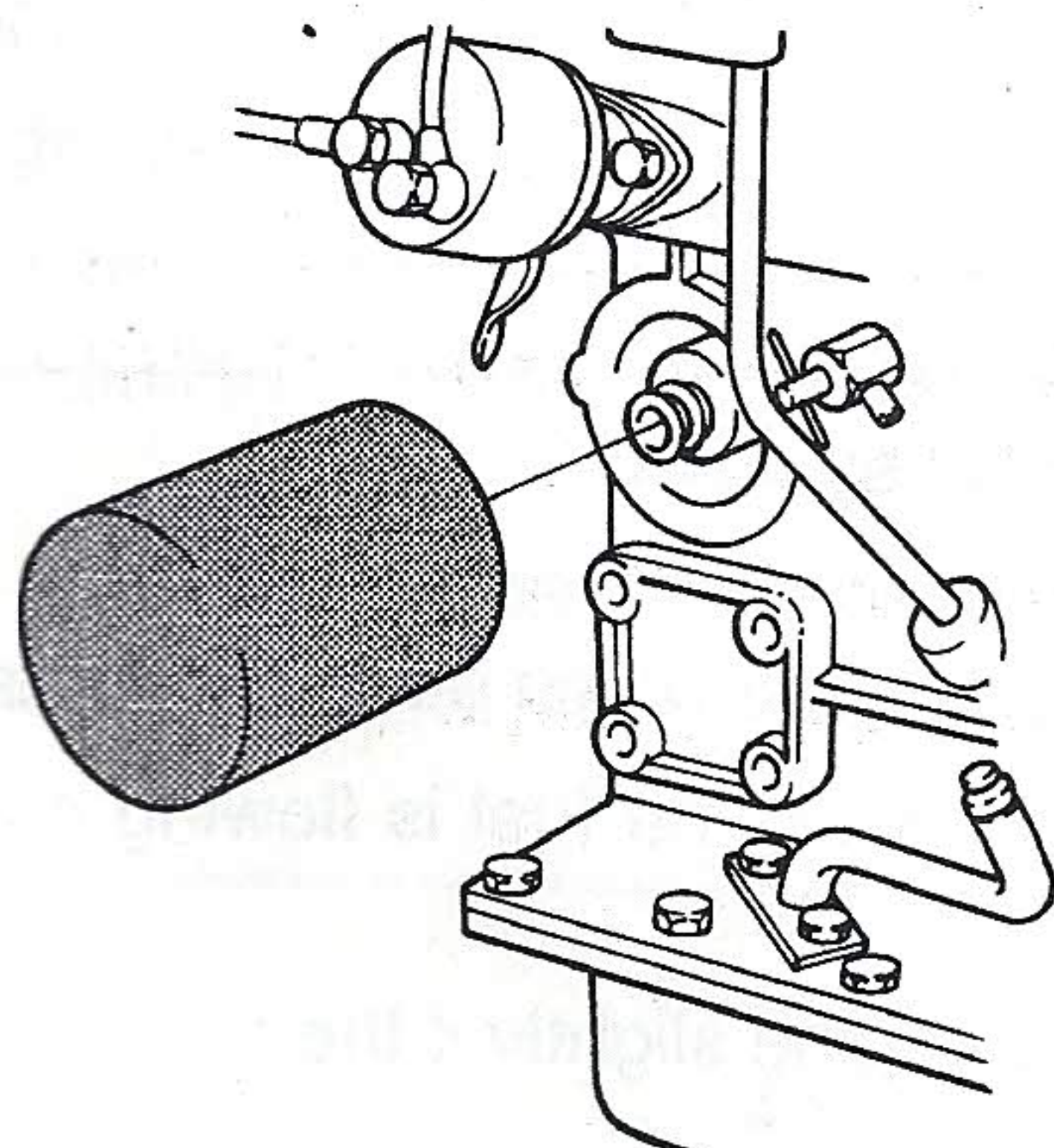
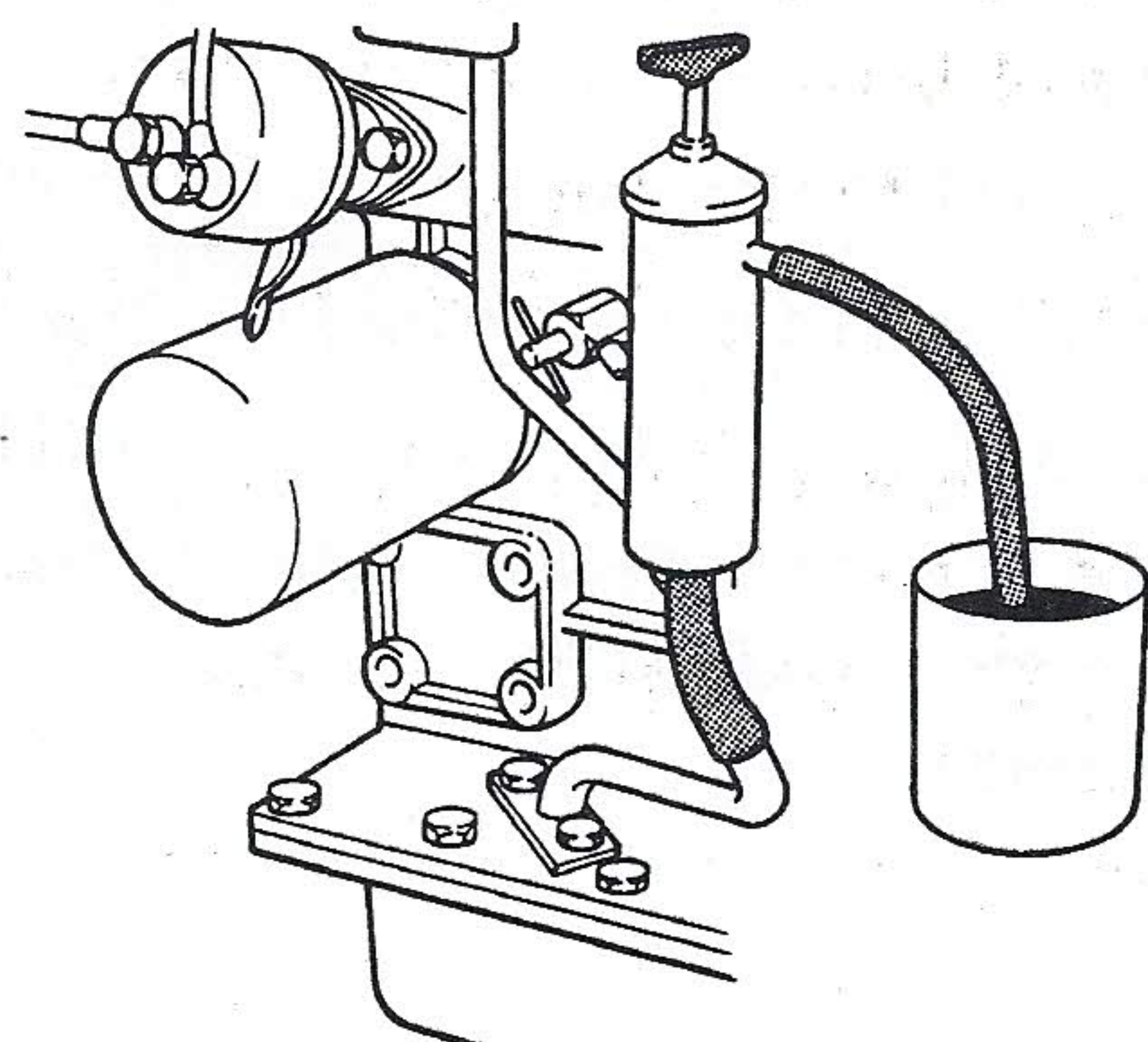
8. Change the engine oil.*

See "Technical data" regarding oil quality and viscosity.

Warning! Hot oil can cause burn injuries.

NB. Fill up slowly! Check that you are using the correct amount.

*NB: The oil should be changed after the first 20-40 operating hours in a new or reconditioned engine.



9. Change the lubricating oil filter.*

Screw on the new filter by hand until the gasket is in close contact. Then tighten it by another 1/2 turn. Check for leaks.

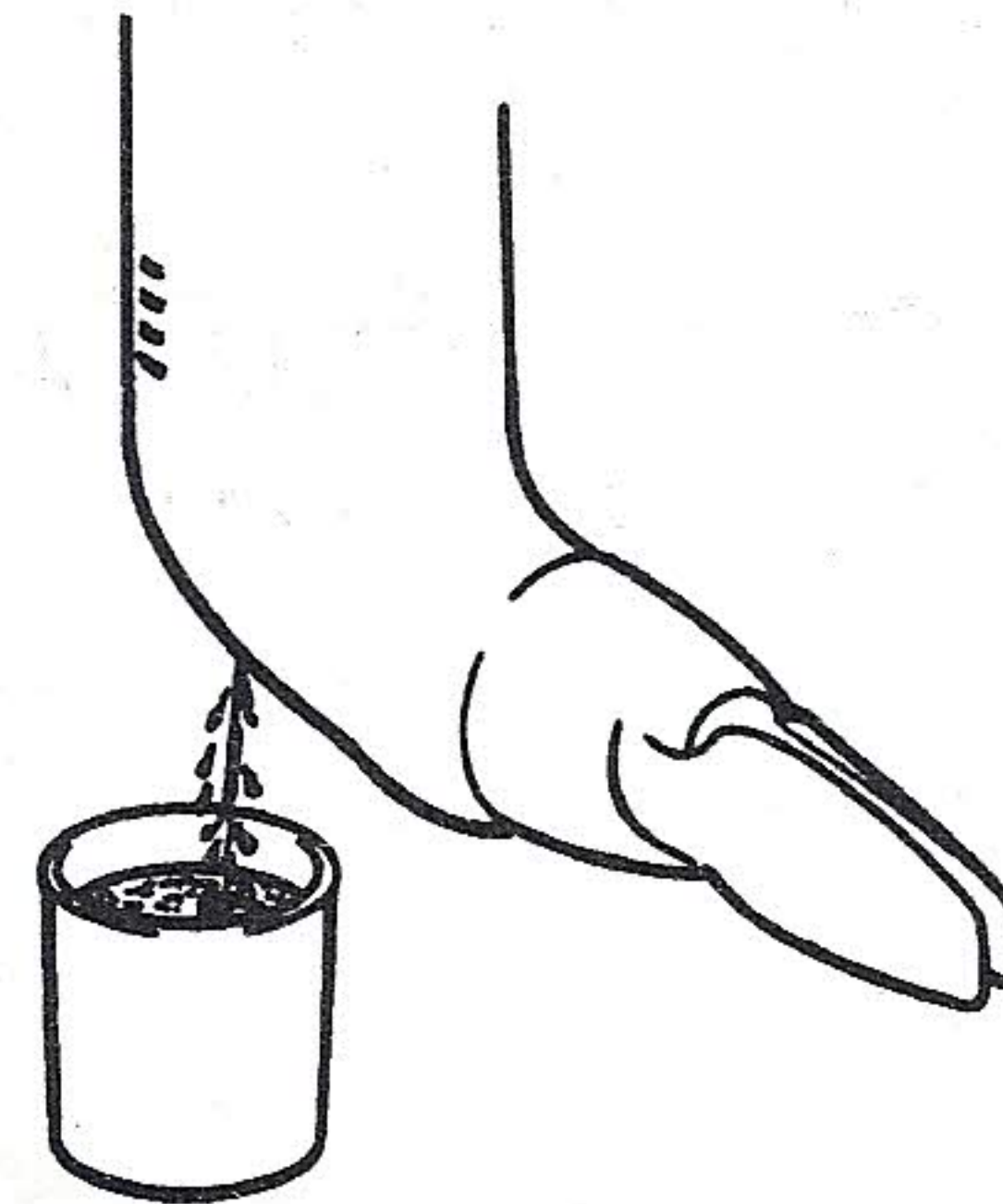
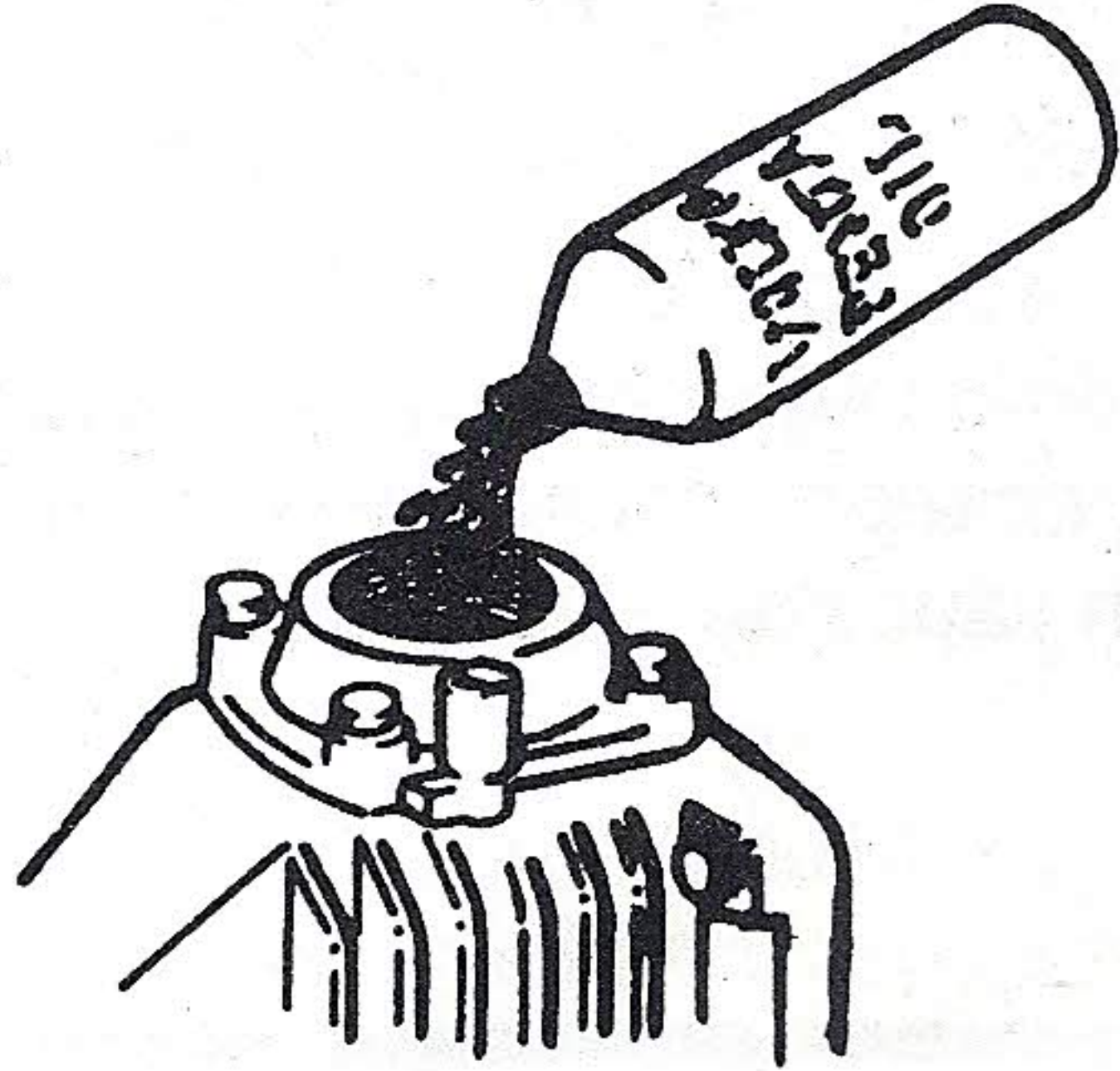
*NB: The oil filter should be changed after the first 20-40 operating hours for a new or reconditioned engine.

Service every 200 hours of operation, or at least once a year

10. Drain the oil from the S-drive.

Use a collecting vessel. Contact an authorised Volvo Penta Service Workshop if the oil looks grey.

⚠ Warning! Hot oil can cause burn injuries.

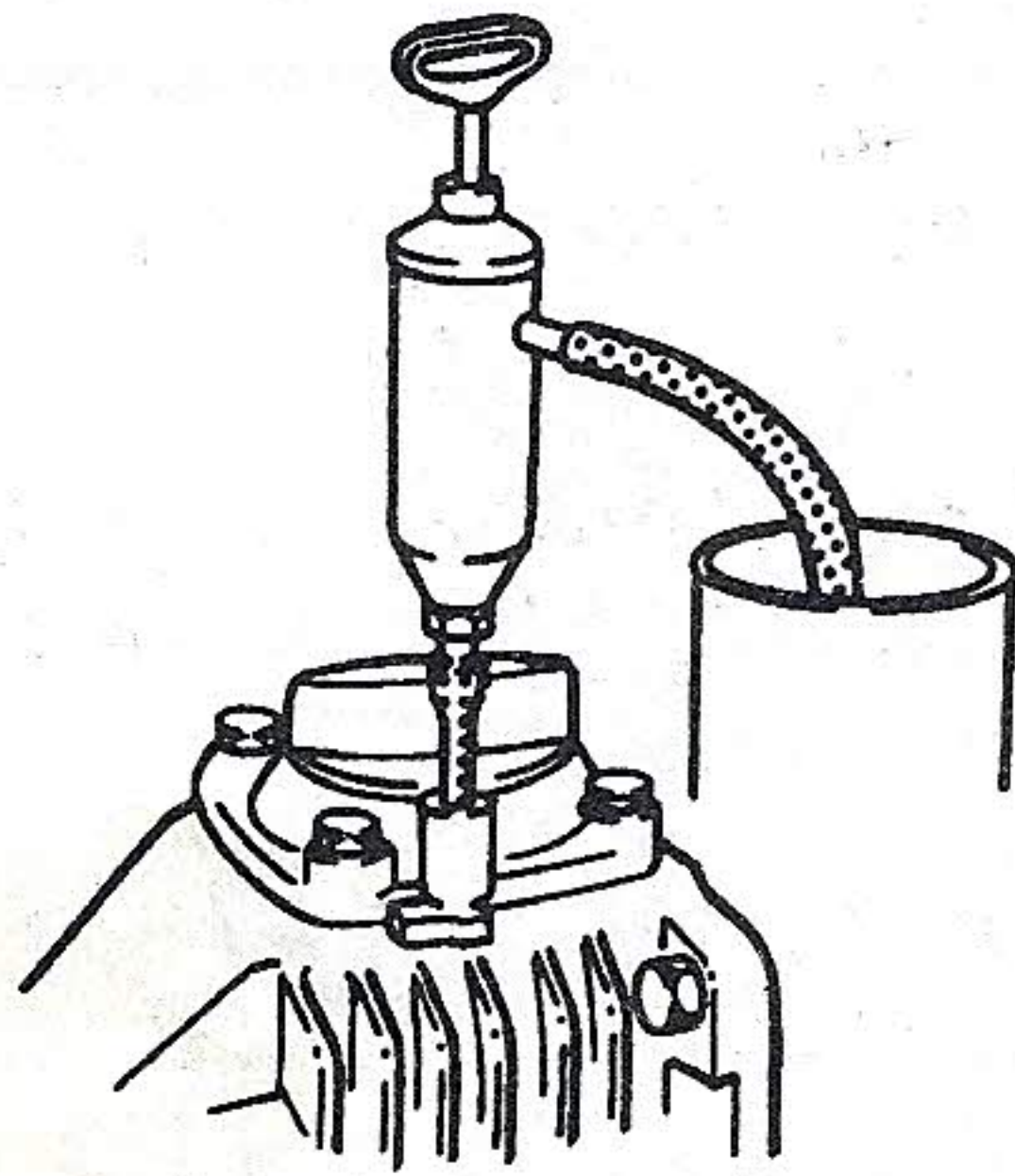


11. Refill the S-drive with new oil.

See "Technical data" regarding oil quality and viscosity.

NB. Do not screw down the dipstick when measuring the oil level. If there is too much oil, the excess must be drained off.

Check the tightening of the dipstick and the plug.



12. Change the oil in the reverse gear.

⚠ Warning! Hot oil can cause burn injuries.

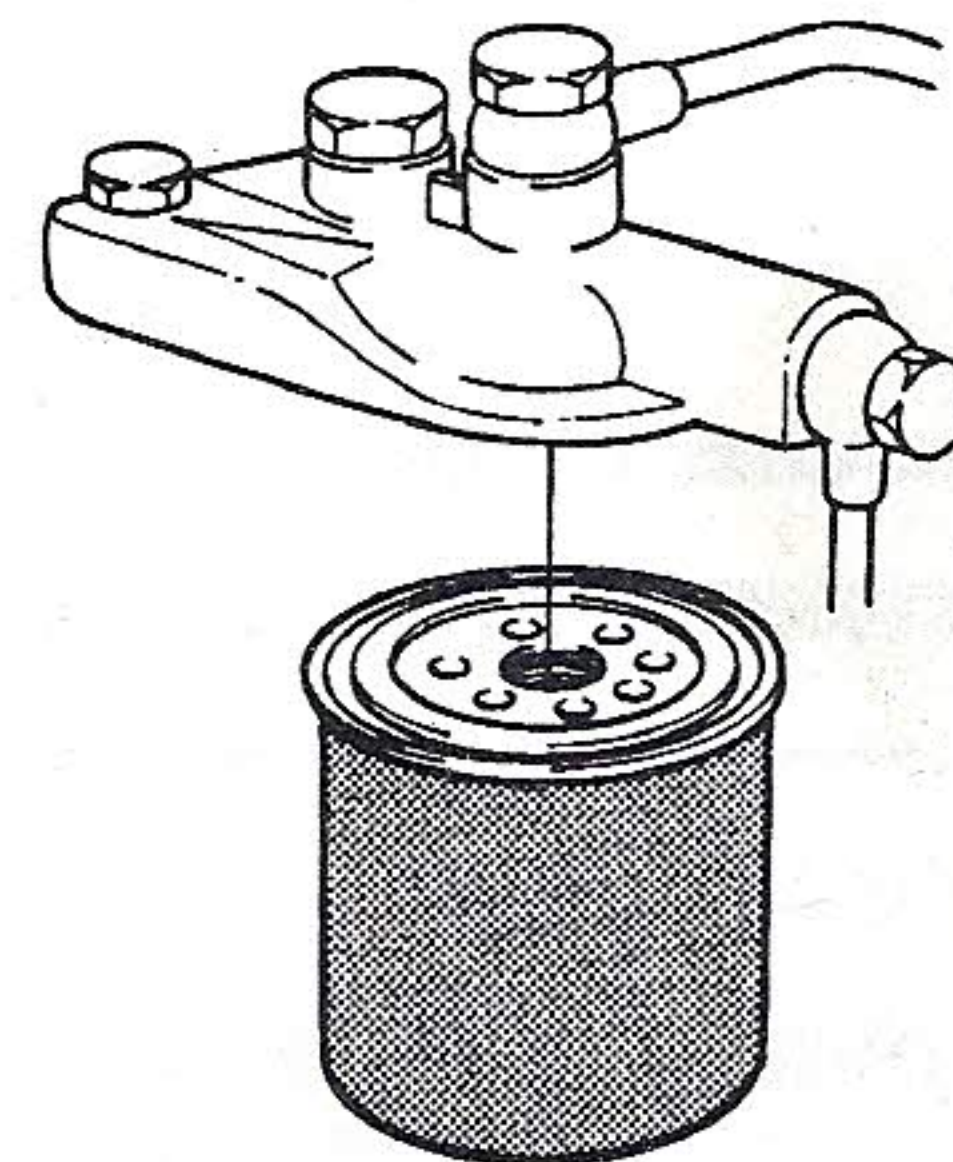
See "Technical data" regarding oil quality and viscosity.

Check the level. Top up with oil if necessary.

13. Change the fuel fine filter.

Be careful not to spill fuel! Screw on the new filter by hand until the gasket is in close contact. Then tighten it by another 1/2 turn.

Vent the system. See Item 15. Check the tightness.

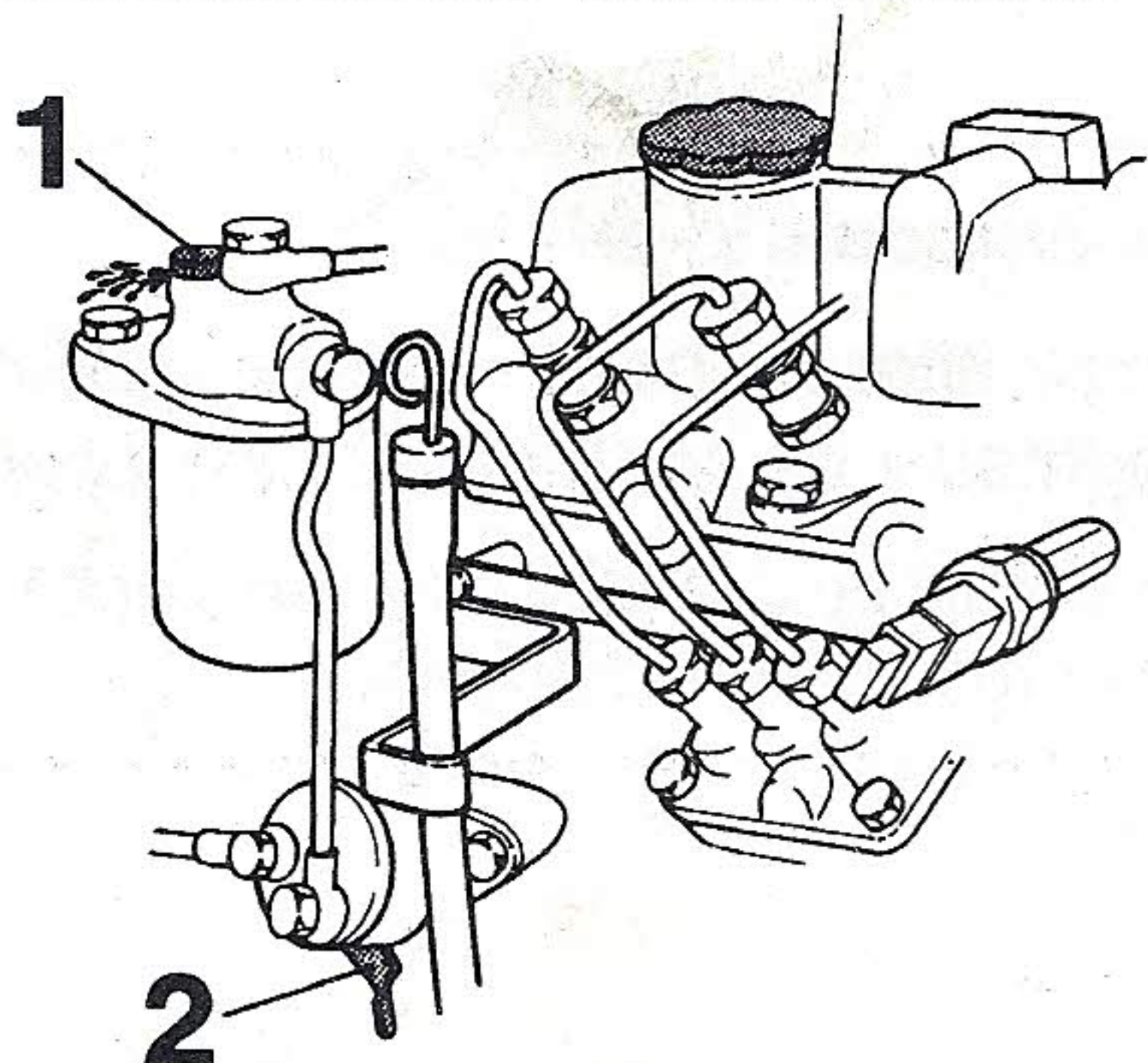
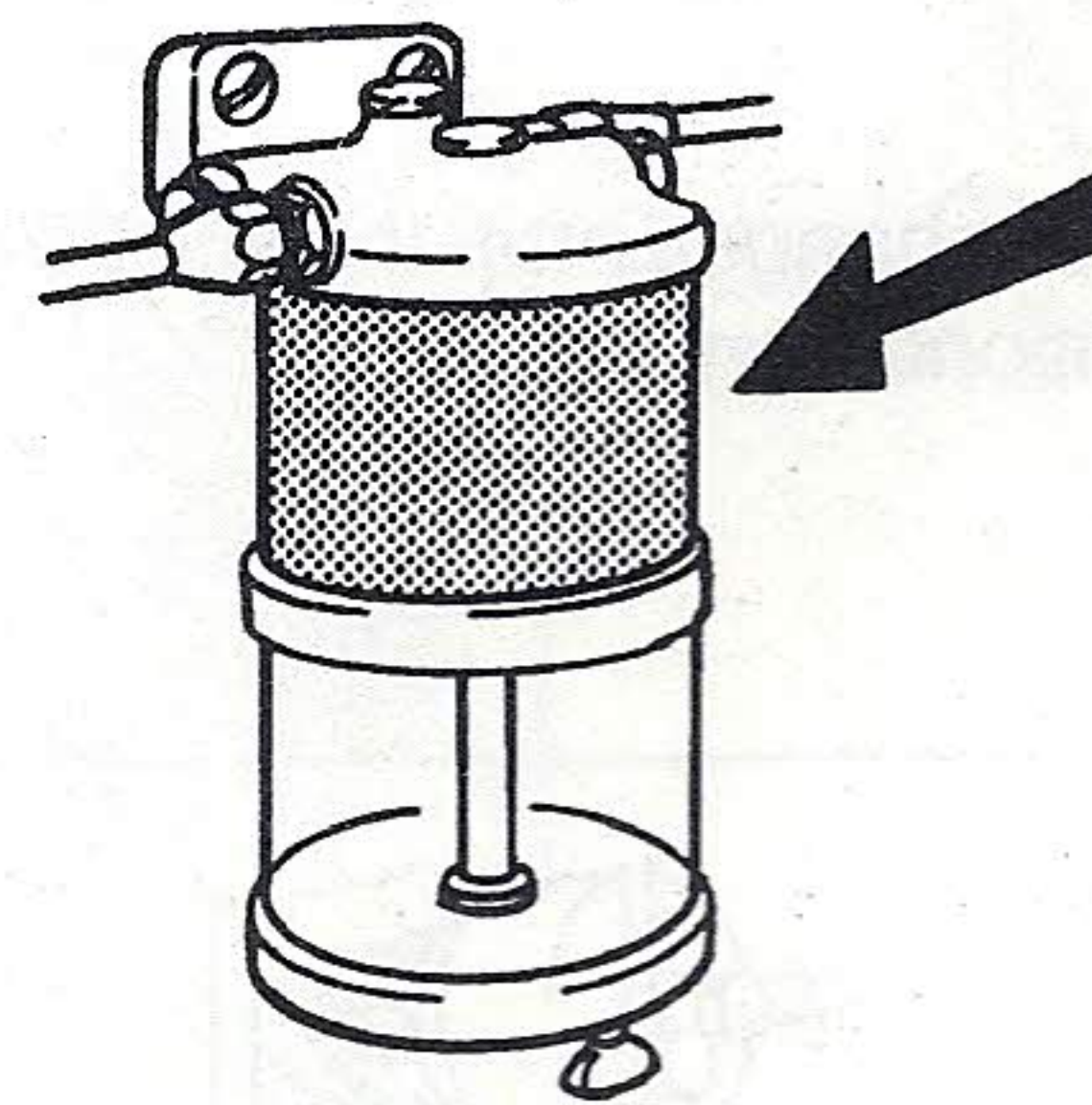


14. Change the insert in any extra fuel filter fitted.

Close the fuel cocks at the tank. Be careful not to spill fuel!

Clean the filter bowl. Fit a new filter insert and tighten it. Open the fuel cocks and vent the filter.

Check for leakage.



15. Vent the fuel system.

Open the venting screw (1) and pump using the hand pump (2) until fuel comes out which does not contain air bubbles.

Close the screw while the fuel is flowing out. Avoid spilling fuel.

NB. Rotate the engine slightly if the pump output is poor.

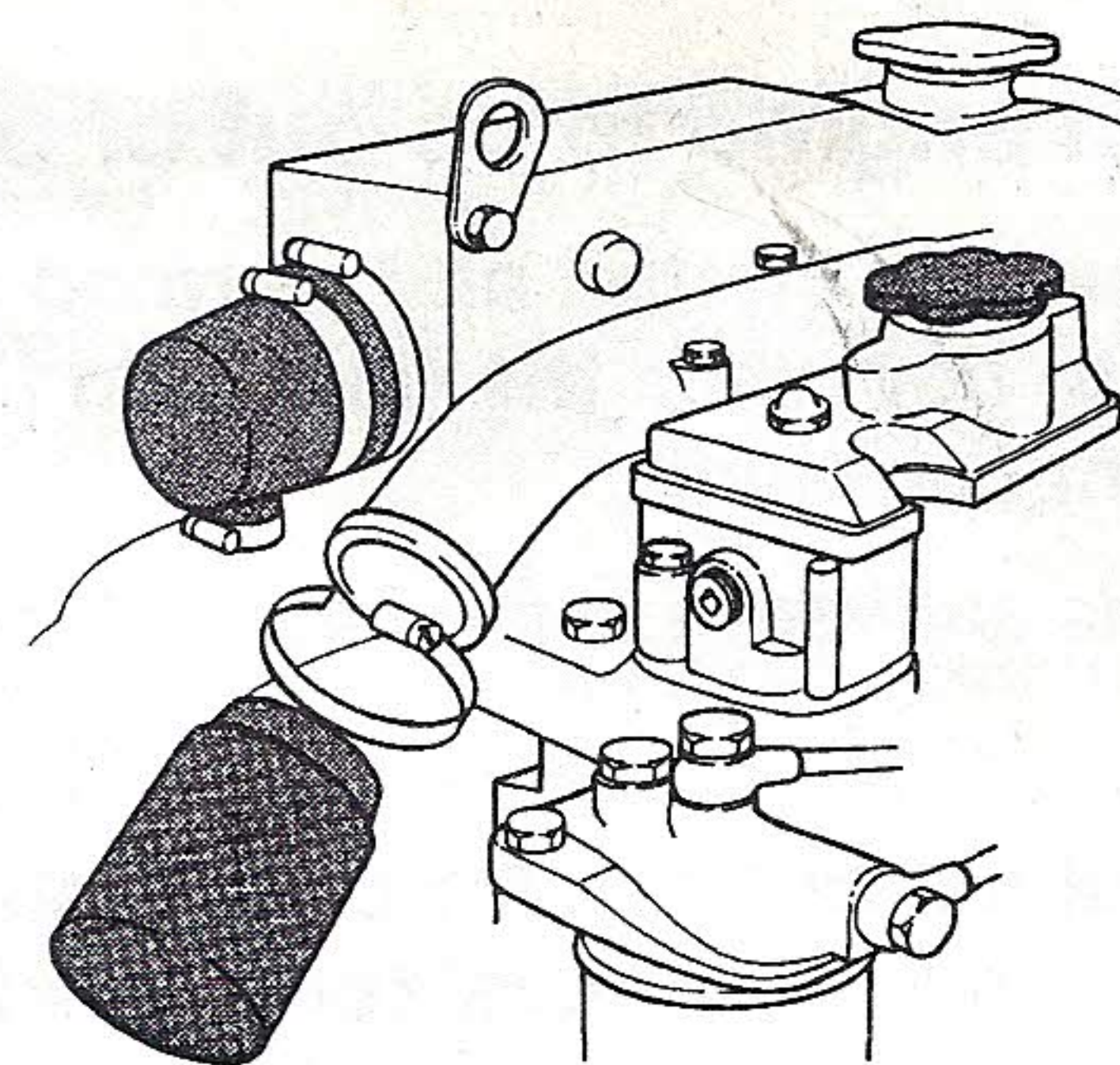
Service every 400 hours of operation, or at least once every other year

16. Clean the air filter (MD2040).

Remove the filter.

Carefully blow the filter clean using compressed air.

NB. Impurities must not be allowed to enter the engine.



MD2040

Other maintenance

Some checks are best carried out in connection with inhibiting/recommissioning. These maintenance actions are marked “-”.

Some checks and maintenance actions require specialist knowledge, which is why we recommend that you consult an authorised service workshop. The following are of this type (marked “•”):

every 200 hours, or at least once a year:

- Check/adjust idling speed.
- General check of the engine and its equipment.
 - Check the impeller in the seawater pump.*
 - Check the S-drive's zinc anode (zink ring).*
- Take apart and clean the vacuum valve, if fitted.*
 - Lubricate the rubber propeller shaft seal (inboard engine).*

every 400 hours, or at least once every other year:

- Re-tighten the cylinder head bolts.
- Check the valve clearance.
- Check the injectors.
 - Clean the cooling system and change the coolant.*
 - Check that the heat exchanger is not blocked. If necessary, flush and clean it using suitable brushes.*

* **NB.** See the instructions under “Inhibiting” on the next page.

Fuel system

Venting the fuel system

The fuel system must be vented in the following cases in order for the engine to start:

- After the fuel filter has been changed.
- After filling the tank with fuel if it has been run completely dry.
- After the fuel lines have been undone.
- After the boat has not been used for a long time.

NB. Refer to Item 15 in the maintenance schedule for venting.

Cooling system

Coolant

Use a mixture of 50% Volvo Penta antifreeze (glycol) and 50% clean water (as neutral as possible) for the engine's internal cooling system (freshwater system).

This mixture protects against freezing down to a temperature of approx. -40°C (-40°F) and should be used all year round.

NB. At least 40% antifreeze should be used in the system in order to attain satisfactory anti-corrosion protection.

⚠ NB: Glycol is harmful to health (dangerous to consume).

Topping up shall use the same mixture as is already in the system. Topping up using only water will adversely affect the coolant's properties as regards anti-corrosion protection, antifreeze and boiling point.

NB. Fill slowly! Check that the correct amount is being used.

The cooling system normally operates at a temperature of 75-95°C (167-203°F).

Too high coolant temperature (warning light comes on) may be caused by:

- A blocked seawater intake or seawater filter (optional).
- A defective seawater pump impeller.
- Low coolant level, air in the freshwater system.
- Slipping or broken circulation pump drive belt.
- Faulty thermostat, temperature sender or instrumentation.

Be careful not to allow the ingress of water when working with the cooling system.

⚠ Ensure that water is not able to leak in and sink the boat if it has to be left with the cooling system dismantled.

Maintain quality and safety.

Always use original VOLVO PENTA parts.

Inhibiting

Inhibiting an engine to be out of operation

The engine must be started and warmed up at least once every 14th day while the boat is in the water in order to prevent corrosion.

Check/top up the antifreeze in the freshwater system.

Should the boat not be used for more than 90 days, it should be put into long-term inhibiting as follows:

NB. Let an authorised service workshop test the engine and equipment before the boat is taken out of the water. Repairs can then be carried out while the boat is not being used.

Do the following while the boat is in the water:

1. Warm up the engine. Then stop it and drain or pump off the lubricating oil from the engine and reverse gear, if any.
2. Change the lubricating oil filter.
3. Fill Volvo Penta lubricating oil* to the right level in the engine.
4. Fill lubricating oil* to the right level in the reverse gear.

*NB. See "Technical data" regarding oil quality and viscosity.

Do the following while the boat is on land:

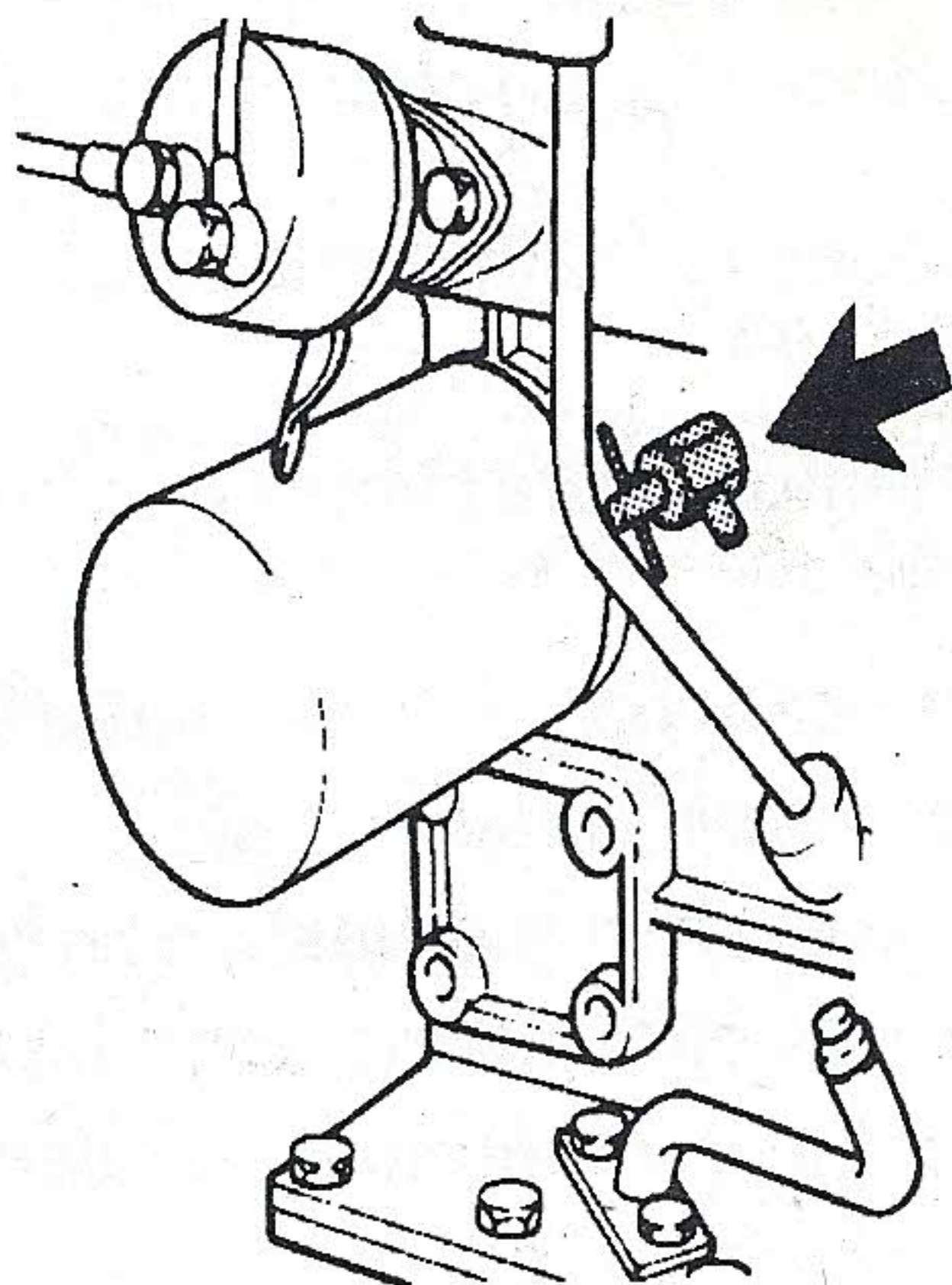
Freshwater system

Check/top up the antifreeze in the freshwater system.

NB. The coolant should be changed at least once every two years.

Unscrew the filler cap and open the drain cock. Flush through the drainage opening until clean water comes out.

See under "Coolant" on page 19 regarding coolant.



Location of drain cock (freshwater system)

Seawater system

Release the hose at the seawater pump intake. Connect a hose to the pump and place the free end into a container of freshwater. Check that nothing is in danger of being splashed behind the exhaust discharge. Fill up the reservoir and start the engine. Let it run at a fast idle speed for a few minutes in neutral.

⚠ NB! The seawater pump should not be run dry (the impeller will be damaged).

Fill the reservoir with a mixture of 50% Volvo Penta glycol and 50% freshwater, then repeat the same procedure.

Alternatively, a mixture of freshwater and emulsifying oil can be used. However, this mixture has no anti-freezing properties and must therefore be drained immediately after stopping.

Hand the mixture in at a recycling plant. Never pollute the water. Or drain the mixture and keep it to use again the next year.

Remove the alternator/circulation pump drive belt.

Remove the seawater pump impeller. Rinse the impeller in freshwater and keep it in a sealed plastic bag during laying-up if it is in good condition. (Otherwise fit a new impeller when launching the boat.)

Clean the outside of the engine and reverse gear/S-drive. Where necessary, touch up with original paint to avoid corrosion.

⚠ Warning! Never direct the water at the propeller shaft seal when cleaning the S-drive with high-pressure jets.

Remove the propeller for winter storage and lubricate the propeller shaft with anti-corrosion oil.

Protect control parts, cables and electrical system components against corrosion using moisture-repellant spray.

Remove the batteries from the boat. Clean them and store them in a cool, dry place. Check that the batteries are well charged. Trickle charge them according to the manufacturer's instructions (a flat battery can easily be damaged as a result of freezing).

Drain any water or impurities in the fuel tank.

Fill the tank to prevent the formation of condensation.

Boat with S-drive:

Change the oil in the drive. See Items 10 and 11 in the maintenance schedule.

Carefully check the rubber seal between the S-drive and the bed plate.

⚠ NB. The seal should be changed every 7 years. This should be done by an authorised service workshop.

S-drive with folding propeller: Remove the folding propeller for winter storage.

Remove the blades' mounting pin locking screws. Knock out the pins and remove the blades. Remove the propeller shaft nut and pull off the propeller hub. Clean and lubricate the propeller shaft with anti-corrosion oil.

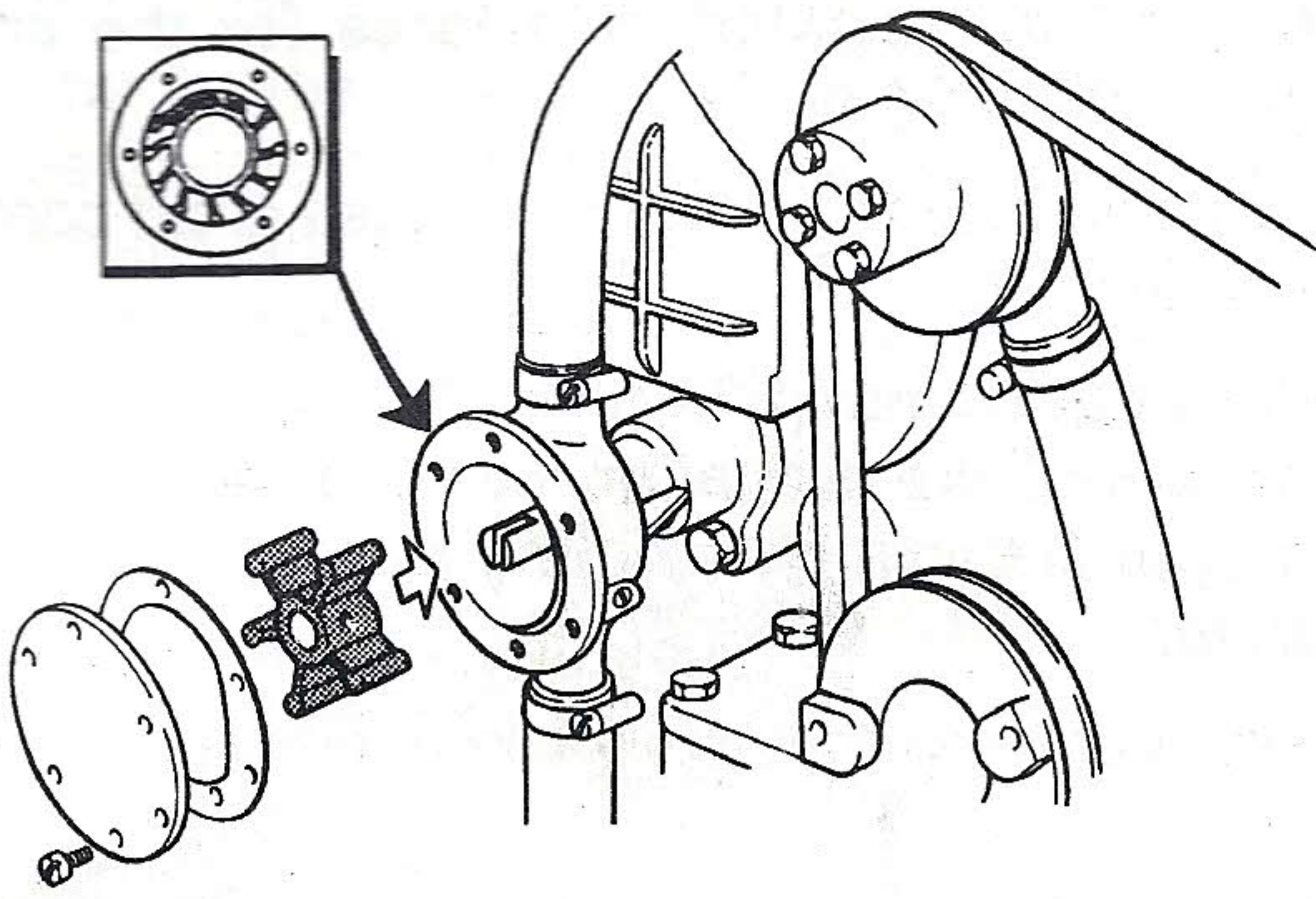
Recommissioning, Launching

Recommissioning – Launching

Check the oil level in the engine and reverse gear or S-drive.

Change the engine fuel filter and any extra fuel pre-filter. Vent the fuel system. See Items 13–15 in the maintenance schedule.

Fit the impeller to the seawater pump. Check that the impeller is in good condition. Change it if necessary.



Fitting the impeller in the seawater pump

Lubricate the pump housing and the inside of the cover with a little lubricating grease. Press in the wheel while turning it (clockwise). Fit the grommet in the outer edge of the centre of the impeller. Fit the cover using a new gasket.

Fit the alternator/circulation pump drive belt. Change the belt if it is worn. See Item 5 in the maintenance schedule.

Check the condition of the rubber hoses and the tightening of all hose clamps.

Take apart the vacuum valve (where appropriate) for cleaning.

Fit the propeller. See the next section regarding fitting the propeller to the S-drive.

Check the batteries' charge. Connect the batteries.

Boat with inboard engine fitted with a propeller shaft seal of rubber:

Vent the tubular sleeve and seal after launching by pressing them together and pressing the seal down against the shaft until water emerges. Then press approx. 1 cm³ of water-proof grease into the seal.

Warning! The propeller shaft seal must be changed after 5 years or a maximum of 500 operating hours.

Fitting a propeller to the S-drive

Warning! Remove the key from the instrument panel or cut the power using the main switch before starting work on the propeller.

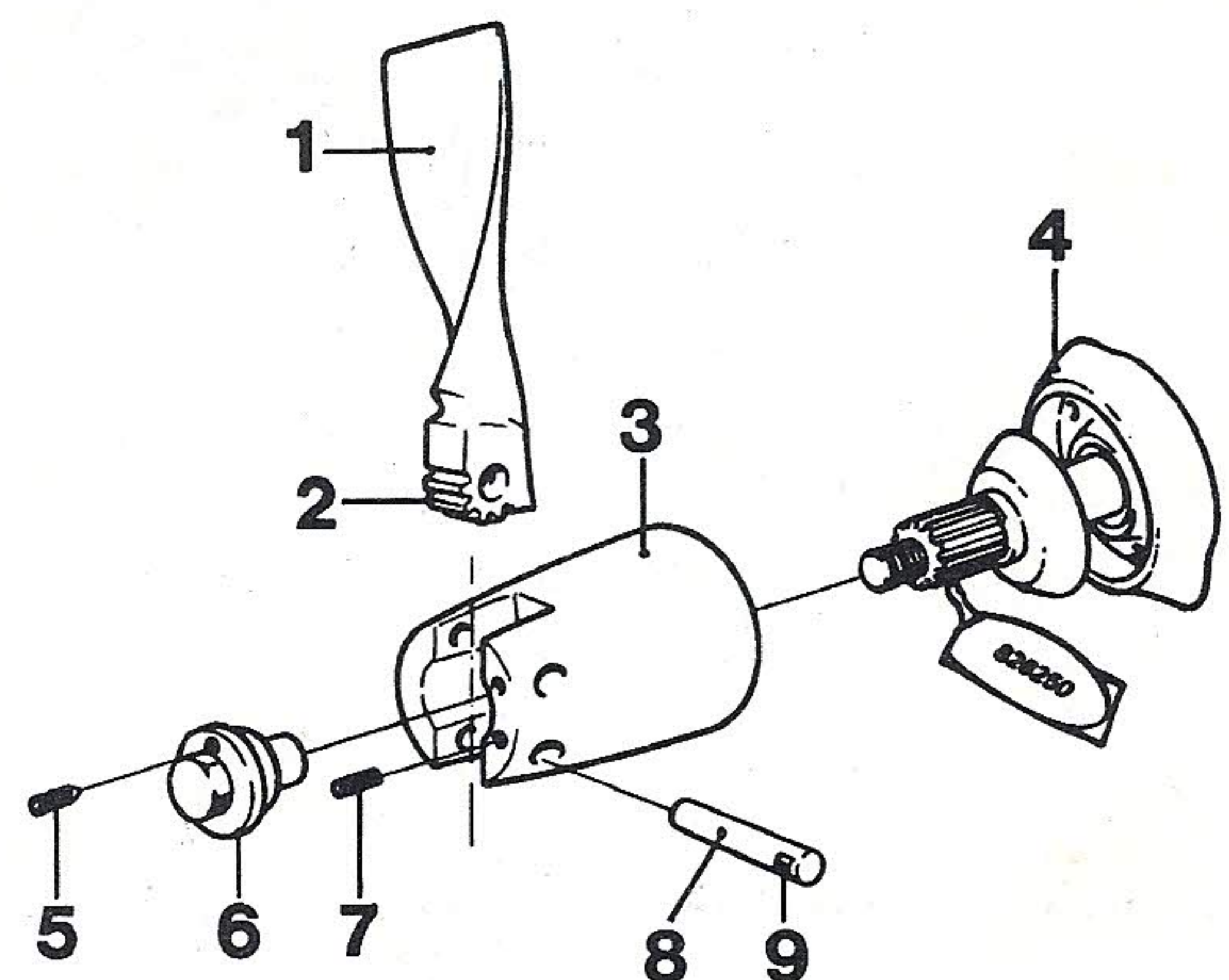
Check the zinc anode* (zinc ring "4"). Change the anode if it is consumed more than 50%.

Otherwise clean the anode with an emery cloth to remove the oxide layer. **NB.** This should be done shortly before launching.

NOTE! Steel brushes or other steel tools must not be used for cleaning, as these may reduce the galvanic protection. Ensure that there is good galvanic contact between the anodes and the drive.

***NB:** A magnesium anode should be used when running in freshwater.

1. Put the control in the "Forward" position.
2. Carefully clean the propeller shaft and propeller hub (3).
3. Lubricate the shaft pivot and hub (grease pad 828250-1).
4. Fit the propeller hub to the shaft. Tighten the locking nut (6) by 65–75 Nm (6.5–7.5 kpm = 47–54 lbf. ft). Socket spanner 24 mm.
5. Fit the locking screw (5) and tighten it using a hexagonal key (4 mm).
6. Grease the pins (8) and the teeth (2) of the propeller blades.
7. Fit a propeller blade in the propeller hub and push the pin into a position such that the groove (9) in the pin end up right in the centre of the locking screw hole (7). Tighten the locking screw using a hexagonal key (4 mm).
8. Fit the other blade in the same way. Check that the blades form the same angle to the propeller shaft and that they move freely.



Fitting folding propeller to S-drive

- | | |
|--------------------|------------------|
| 1. Propeller blade | 6. Locking nut |
| 2. Teeth | 7. Locking screw |
| 3. Propeller hub | 8. Pin |
| 4. Zinc anode* | 9. Groove |
| 5. Locking screw | |

***NB:** A magnesium anode should be used when running in freshwater.

Launching

Painting

Check the painting of the S-drive. Touch up damaged areas using Genuine Volvo Penta drive Paint. Then coat the drive with a Teflon[®]* agent for aluminium drives. We recommend the Volvo Penta Anti-fouling Agents (part No. 1141593-2 or 1141594-0). These products are specially designed for the S-drive and are at the same time as kind to the environment as possible.

Paint the bottom of the boat and the propeller using a suitable anti-fouling paint or with a pure Teflon agent.

All anti-fouling paints are poisonous and by definition more or less harmful to our marine environment. Avoid such products. Most countries have a legislation which controls the usage of anti-fouling boat bottom paints. **Always make sure you follow these regulations!** In some countries it is forbidden to use anti-fouling paints on leisure crafts, e.g. in freshwater.

*NB. Teflon is a registered trademark of Du Pont.

We recommend simple Teflon treatment in combination with mechanical cleaning a few times during the season, especially in the case of smaller boats which are easy to lift.

This may be impractical for larger boats. Also, if the boat is in water which promotes fouling, an anti-fouling paint may need to be used after all. In this case, use a pure copper-based anti-fouling paint which contains copper thiocyanate (**not copper oxide**).

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

Bear in mind the legislation in force for the area in which the boat is used.

NB. Unsuitable bottom paints may cause great corrosion damage to the S-drive.




Warning! Do not paint the zinc anode (zinc ring) in front of the propeller. Leave a 10 mm (0.4 in) margin without anti-fouling paint around the S-drive.

Launch the boat when the paint has dried.


Electrical system


Important

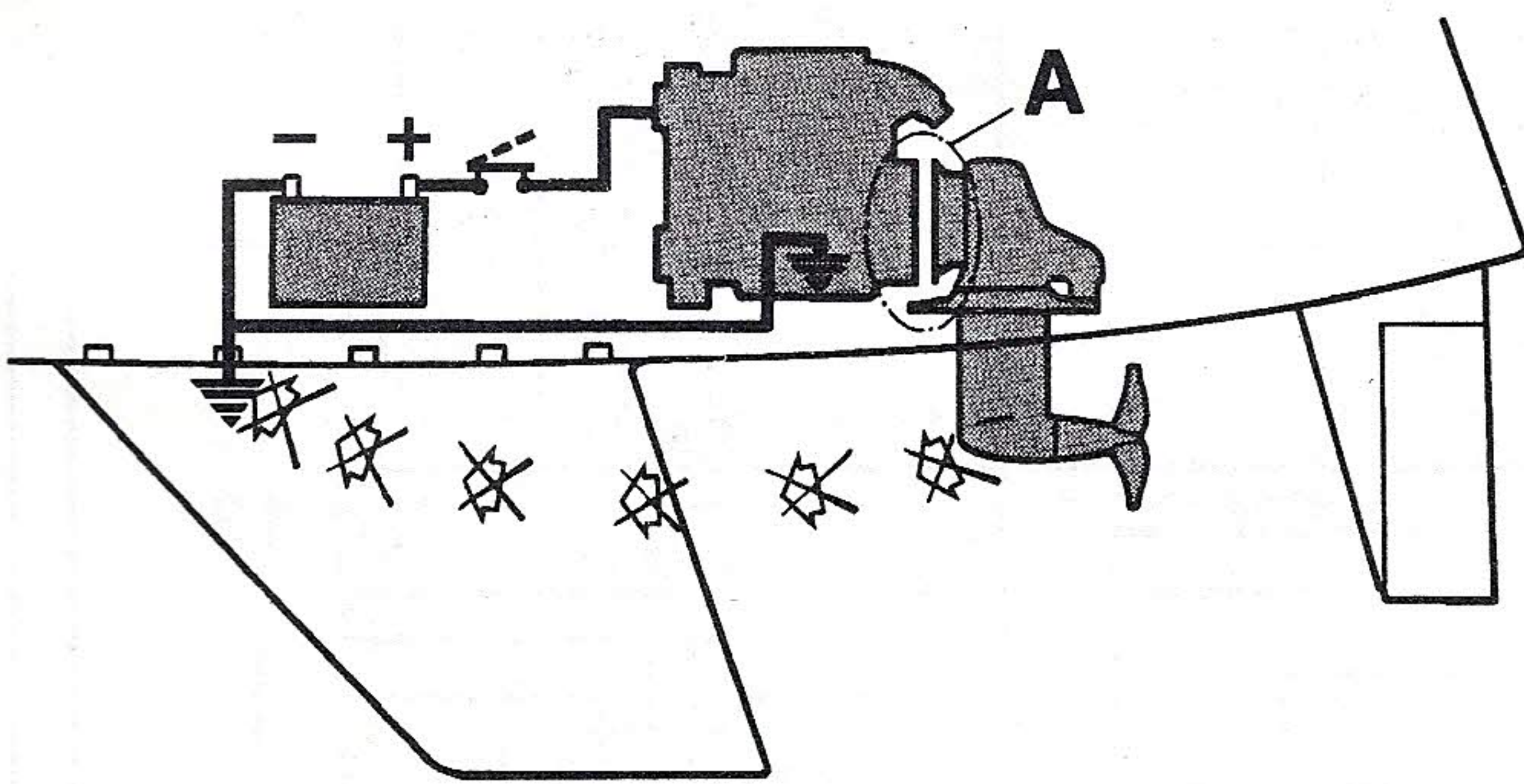
 Stop the engine and cut the power using the main switch before working on the electrical system.

Galvanic corrosion

The engine's flywheel casing and power transmission (reverse gear/S-drive) have been electrically insulated from the rest of the engine.

 **Warning!**


 The flywheel casing or power transmission (reverse gear/S-drive) must on no account be grounded. Grounding these components may cause serious damage due to galvanic corrosion.



Electrical insulation (A) between engine and flywheel casing/
power transmission

Batteries

NB: Follow the stipulated safety regulations when charging batteries. Always break the charging current **before** the charging clamps are removed.

 **Warning!** When charging, the batteries give off hydrogen gas which forms oxyhydrogen gas with air. This gas is inflammable and extremely explosive.

Always use protective goggles and gloves when handling batteries.

The battery electrolyte contains strongly corrosive acid. Should this acid come into contact with the skin, wash with soap and plenty of water. Should the battery acid come into contact with the eyes, immediately rinse with copious amounts of water and contact your doctor immediately.

Fuses

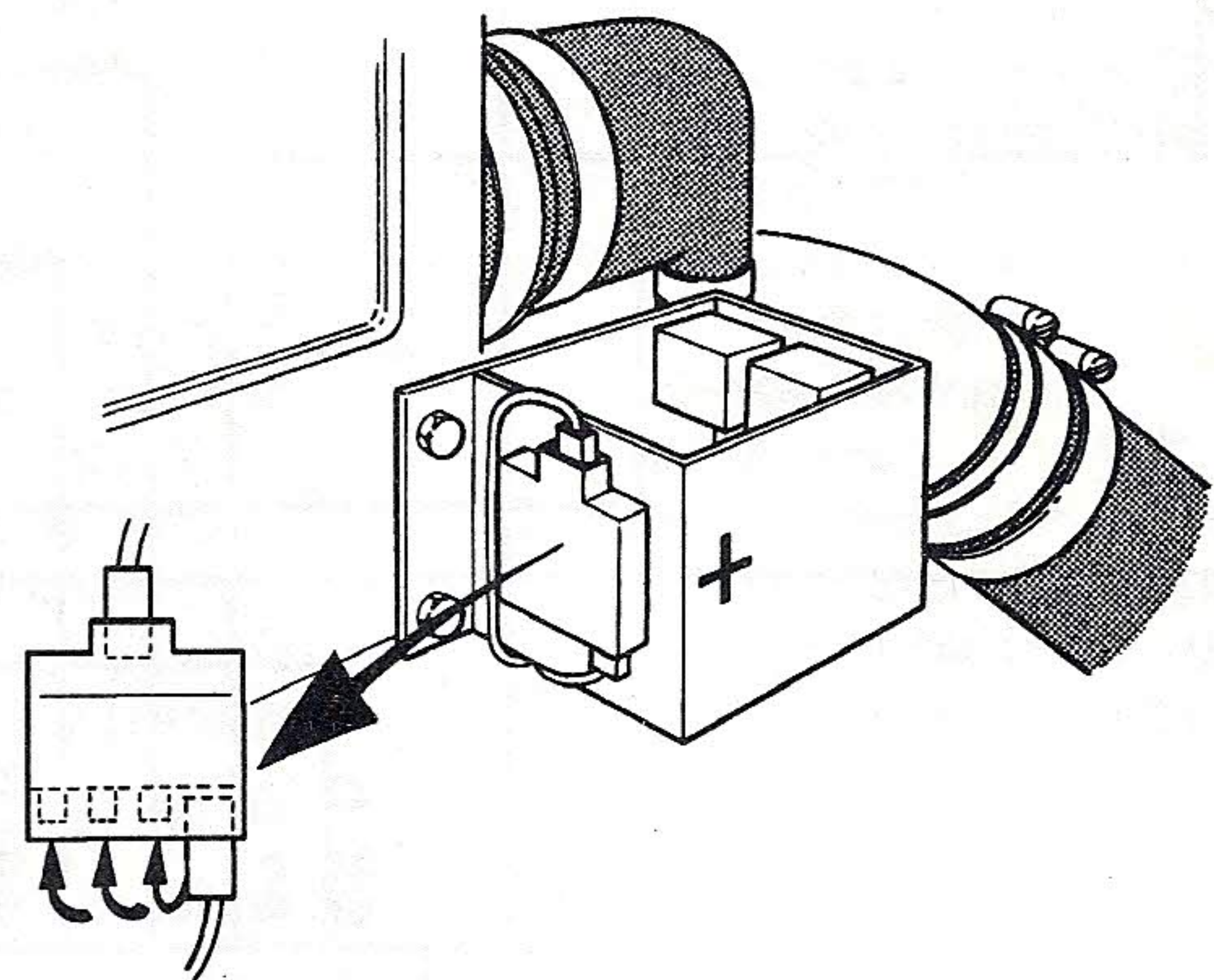
One block of fuses containing four fuses (15A) is located on the relay box at the rear of the left-hand side of the engine.

One fuse protects the electrical system (+), while the rest are spares. The fuse breaks the circuit in the event of an overload.

Re-couple the electrical system if the fuse has burnt out by moving the cable connection to the next contact.

Always investigate the cause of the overload.

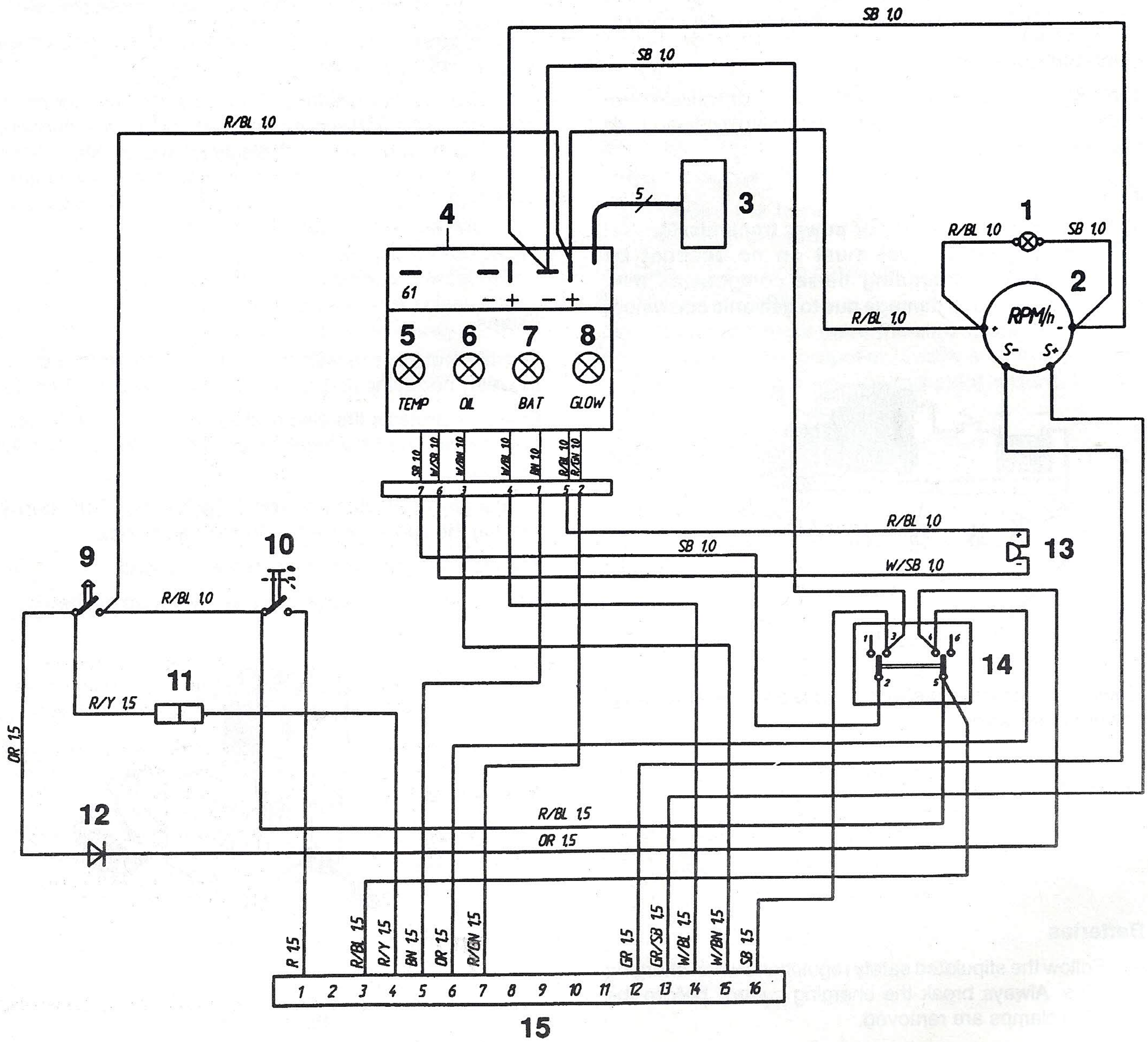
Ensure that you always have spare fuses available.



Fuses (15A)

Wiring diagrams

Standard instrument panel ("A") without key switch



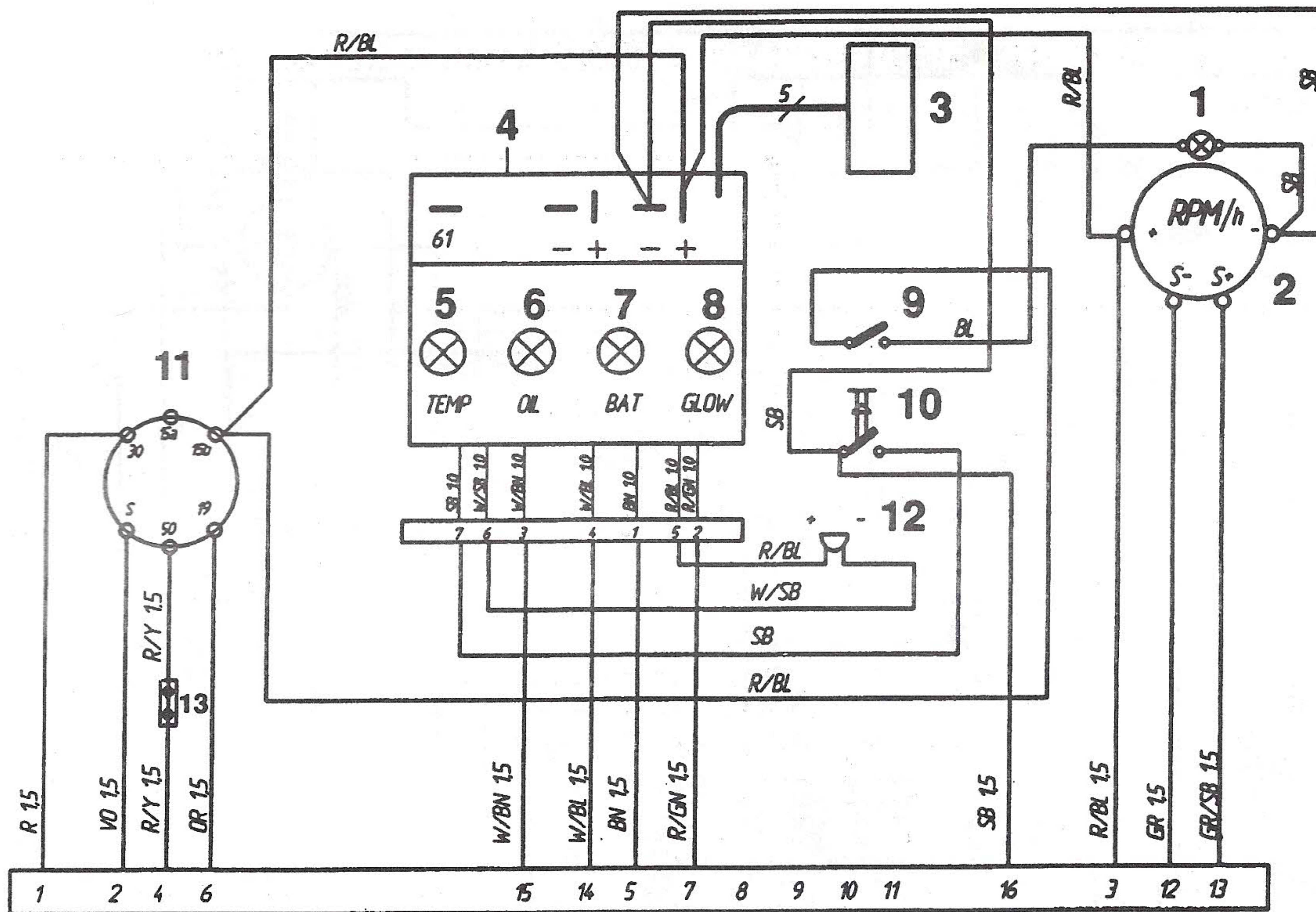
- | | |
|---|--|
| 1. Instrument lighting | 8. Control light, heating |
| 2. Rev. counter with built-in hour counter (extra equip.). Blind plug as an alternative | 9. Starter button |
| 3. Connector for connecting supplementary warning display (extra equip.) | 10. Pressure switch. Instrument panel In/Out |
| 4. Electronic unit (alarm) | 11. Connector for connecting neutral position switch, if applicable (extra equip.) |
| 5. Warning light, coolant temperature | 12. Semiconductor diode |
| 6. Warning light, oil pressure | 13. Alarm |
| 7. Warning light, charging | 14. Toggle switch. Heating - Alarm test/Acknowledge |
| | 15. 16-pole connection |

Wire colours

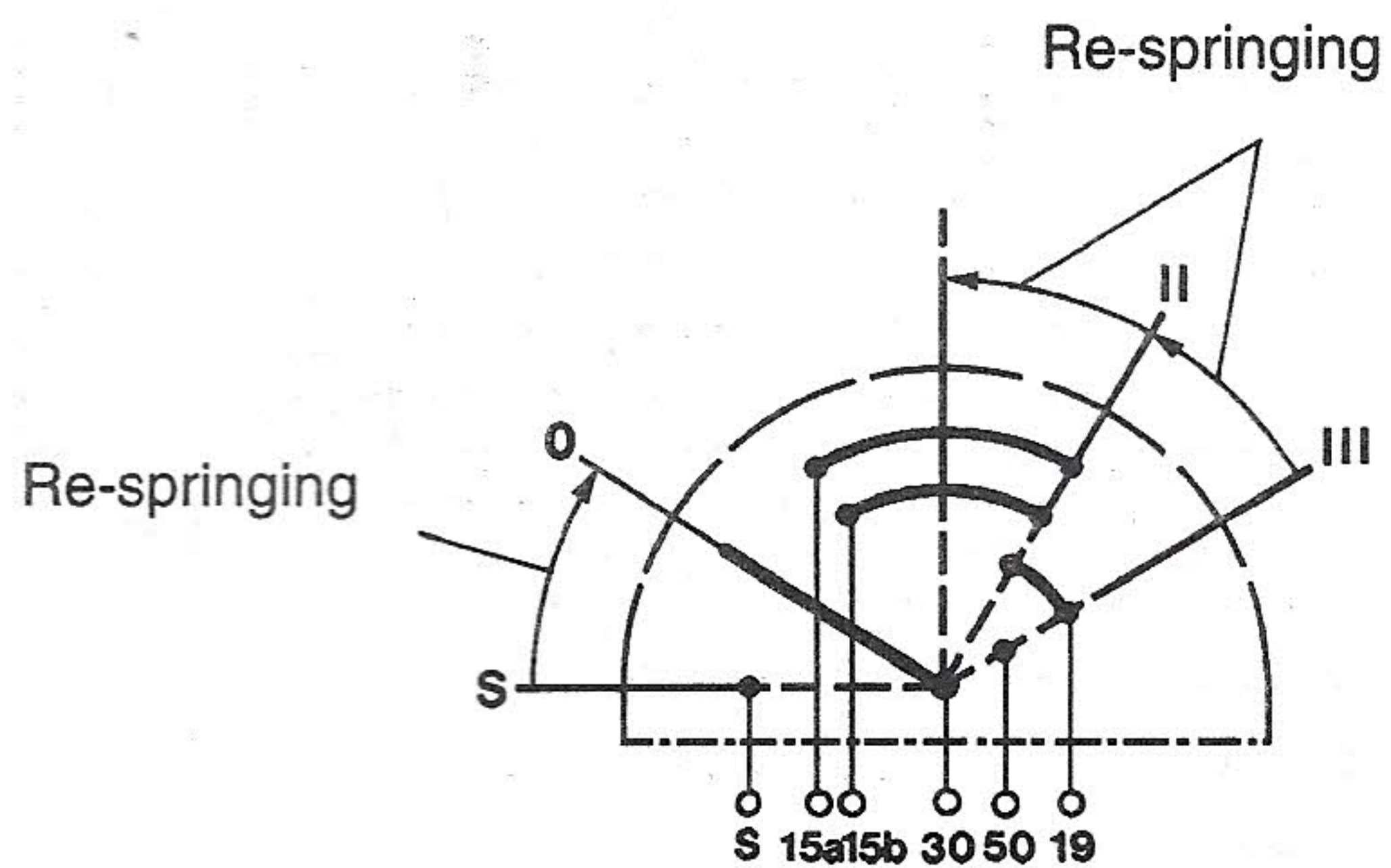
- | | | |
|----|---|--------|
| BL | = | Blue |
| BN | = | Brown |
| GN | = | Green |
| GR | = | Grey |
| OR | = | Orange |
| PU | = | Purple |
| R | = | Red |
| SB | = | Black |
| W | = | White |
| Y | = | Yellow |

Cable areas in mm² are stated after the colour code in the wiring diagram.

Standard instrument panel ("B") with key switch



14



1. Instrument lighting
2. Rev. counter with built-in hour counter (extra equip.).
Blind plug as an alternative
3. Connector for connecting supplementary warning display (extra equip.)
4. Electronic unit (alarm)
5. Warning light, coolant temperature
6. Warning light, oil pressure
7. Warning light, charging
8. Control light, heating
9. Switch, instrument lighting
10. Switch - Alarm test/Acknowledge
11. Key switch
12. Alarm
13. Connector for connecting neutral position switch, if applicable (extra equip.)
14. 16-pole connection

Wire colours

BL = Blue
 BN = Brown
 GN = Green
 GR = Grey
 OR = Orange
 R = Red
 SB = Black
 VO = Lilac
 W = White
 Y = Yellow

Cable areas in mm² are stated after the colour code in the wiring diagram.

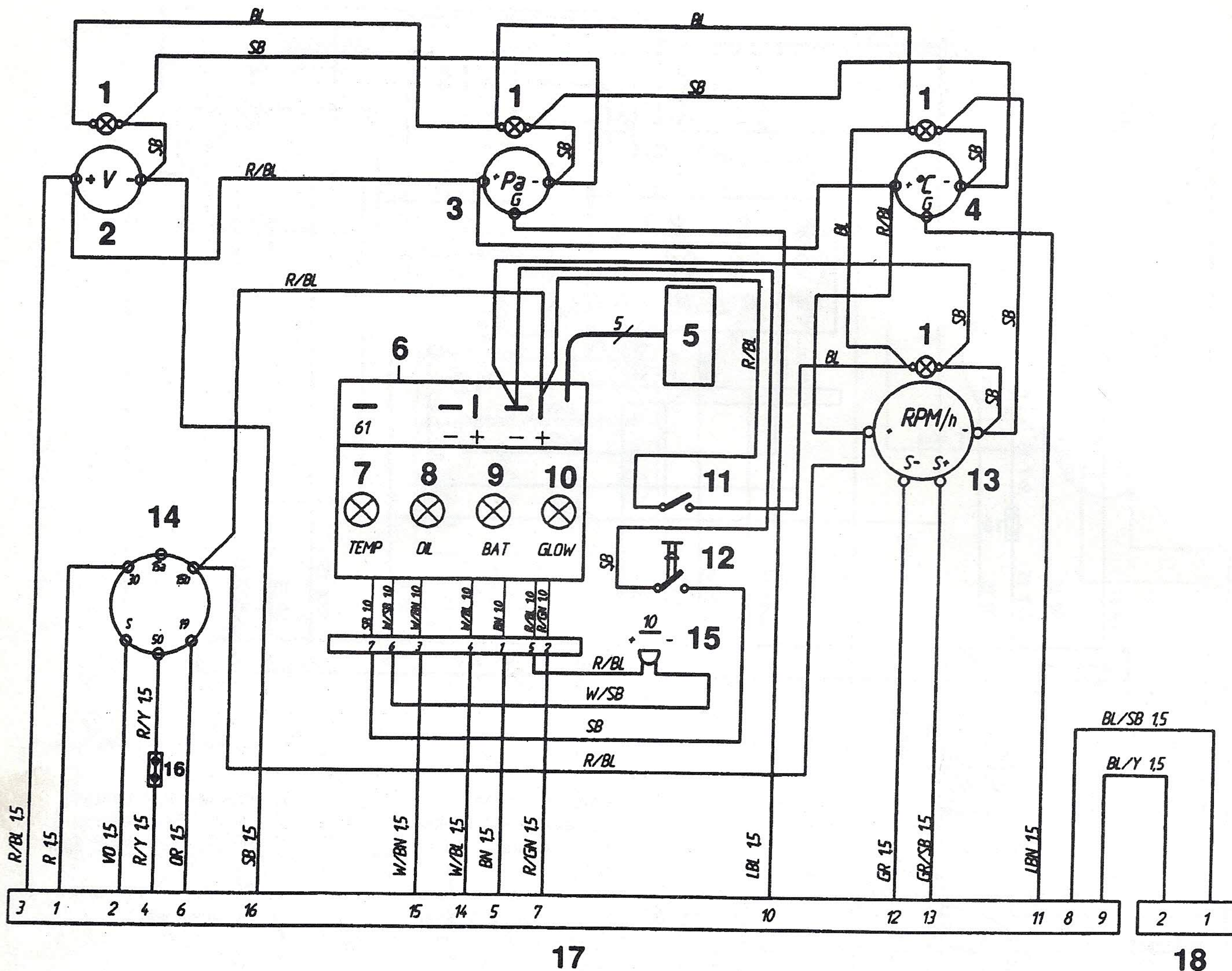
Where no area is stated 1.0 mm² applies

Relation mm²/AWG*

* American Wiring Gauge

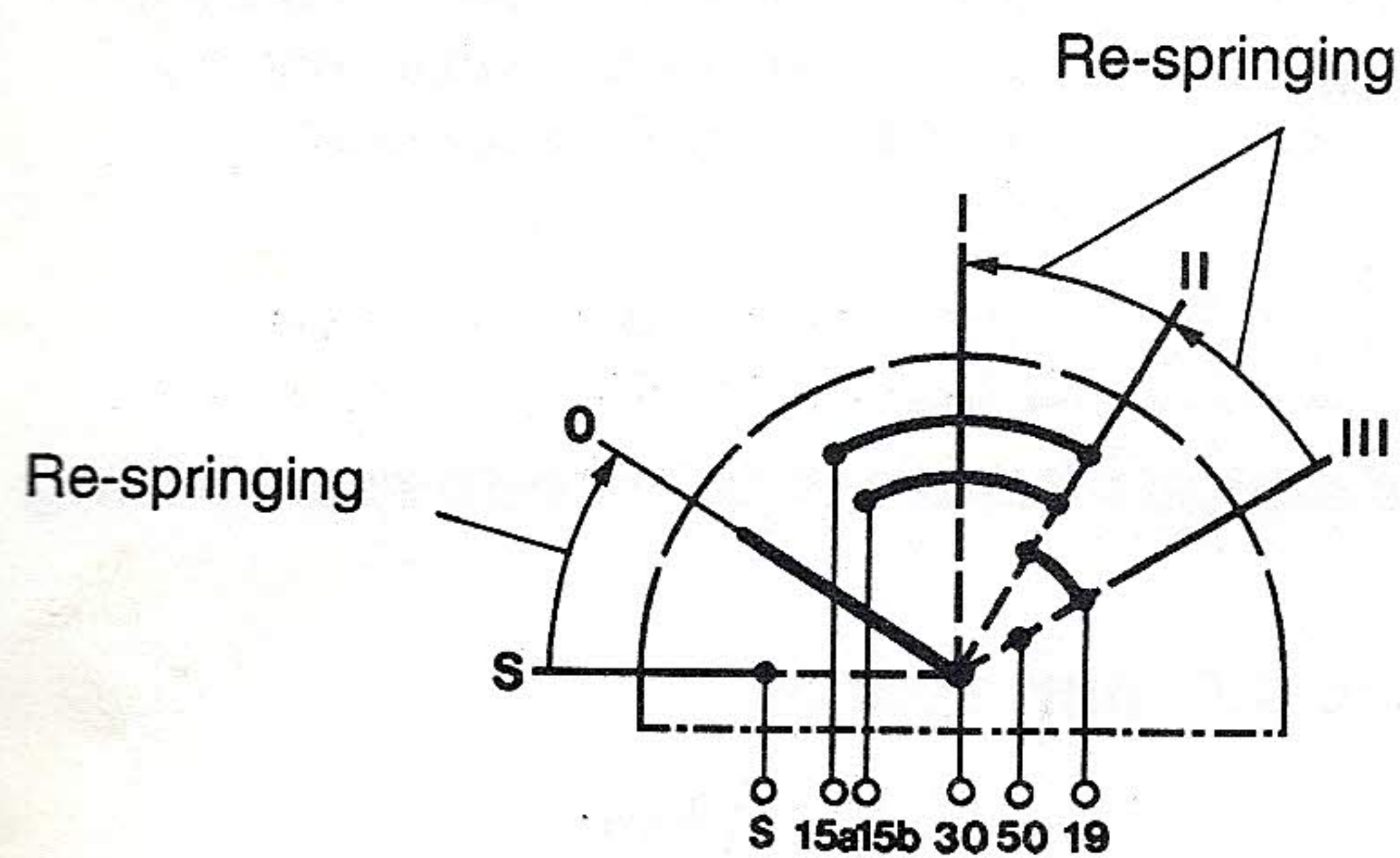
mm ²	1.0	1.5	2.5	10	16
AWG	16 (17)	15 (16)	13	7	5

De luxe instrument panel ("C")



17

18



Wire colours

BL	=	Blue
LBL	=	Light blue
BN	=	Brown
LBN	=	Light brown
GN	=	Green
GR	=	Grey
OR	=	Orange
R	=	Red
SB	=	Black
VO	=	Lilac
W	=	White
Y	=	Yellow

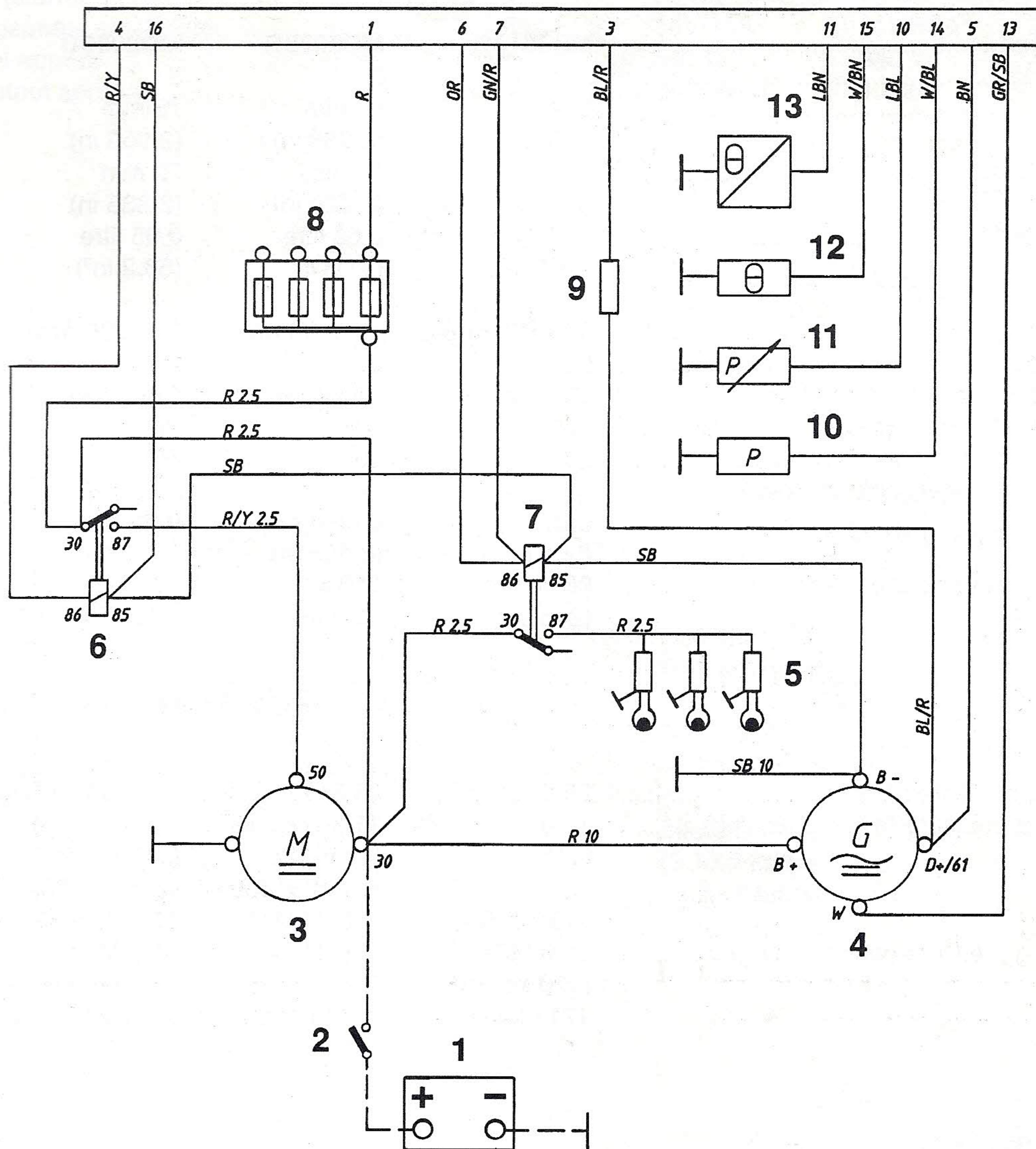
1. Instrument lighting
2. Voltmeter
3. Oil pressure gauge
4. Coolant temperature gauge
5. Connector for connecting supplementary warning display (extra equip.)
6. Electronic unit (alarm)
7. Warning light, coolant temperature
8. Warning light, oil pressure
9. Warning light, charging
10. Control light, heating
11. Switch, instrument lighting
12. Switch - Alarm test/Acknowledge
13. Rev. counter with built-in hour counter (extra equip.).
Blind plug as an alternative
14. Key switch
15. Alarm
16. Connection for connecting neutral position switch, if applicable (extra equip.)
17. 16-pole connection
18. 2-pole connection (for additional panel, if applicable)

Cable areas in mm² are stated after the colour code in the wiring diagram.

Where no area is stated 1.0 mm² applies

Engines MD2010 B, MD2020 B, MD2030 B, MD2040 B

14



- 1. Battery
- 2. Main switch
- 3. Starter motor
- 4. Generator
- 5. Glow plugs*
- 6. Start relay

- 7. Glow relay
- 8. Fuses (x 4), max. 15A (+)
- 9. Excitation resistance (33Ω/9W)
- 10. Oil pressure switch, engine (normally open, closes at 0.3 ±0.1 bar)
- 11. Oil pressure sender

- 12. Coolant temperature switch (normally open, closes at 100° ±2°C = 212° ±4°F)
- 13. Coolant temperature sender
- 14. Connector, 16-pole

* MD2010: x 2. Other engines: x 3.

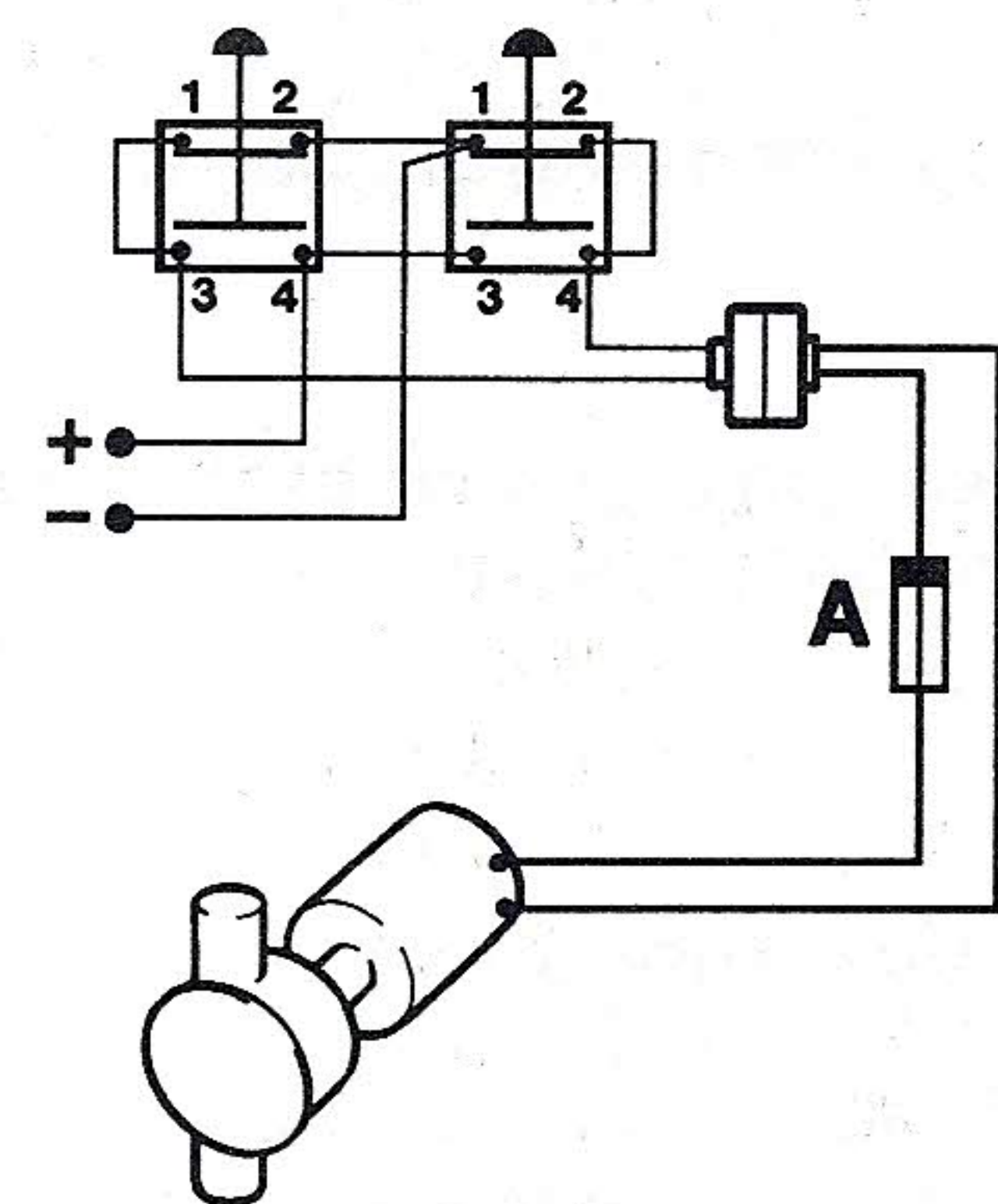
Wire colours

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

Cable areas in mm² are stated after the colour code in the wiring diagram.

Where no area is stated 1.0 mm² applies

Volvo Penta does not supply the dashed wires.



Proposal for connection of oil bilge pump (draining and filling)

Wire area 1.5 mm².

A. Fuse (15A).

Technical data

General

	MD2010B	MD2020B	MD2030B	MD2040B
Engine designation	MD2010B	MD2020B	MD2030B	MD2040B
No. of cylinders	2	3	3	3
Bore	67 mm (2.638 in)	67 mm (2.638 in)	75 mm (2.953 in)	84 mm (3.307 in)
Stroke	64 mm (2.520 in)	64 mm (2.520 in)	72 mm (2.835 in)	90 mm (3.543 in)
Swept volume, total	0.45 litre (27.5 in ³)	0.68 litre (41.3 in ³)	0.95 litre (58.2 in ³)	1.50 litres (91.3 in ³)
Output, see sales literature				
Idling speed	850 ±25 r/min.	850 ±25 r/min.	850 ±25 r/min.	850 ±25 r/min.
Compression ratio	23.5:1	23.5:1	23:1	22:1
Direction of rotation, seen from the front	Clockwise	Clockwise	Clockwise	Clockwise
Max. permissible tilt backwards during operation	20°	20°	20°	20°
Max. side tilt during operation	30°	30°	30°	30°
Valve clearance, stationary cold engine:				
inlet and outlet	0.20 mm (0.008 in)	0.20 mm (0.008 in)	0.20 mm (0.008 in)	0.20 mm (0.008 in)
Weight, engine without oil and water	98 kg (216 lbs)	116 kg (256 lbs)	129 kg (285 lbs)	179 kg (395 lbs)

Fuel system

Start of injection, crankshaft position	25.5° ±1° BTDC	25.5° ±1° BTDC	22.5° ±1° BTDC	21° ±1° BTDC
Injectors, opening pressure (when checking)	11.3–12.3 MPa (115–125 kp/cm ² =1639– 1784 lbf/in ²)	11.3–12.3 MPa (115–125 kp/cm ² =1639– 1784 lbf/in ²)	11.3–12.3 MPa (115–125 kp/cm ² =1639– 1784 lbf/in ²)	15.2–16.2 MPa (155–165 kp/cm ² =2205– 2347 lbf/in ²)
opening pressure (when setting)	11.8 MPa (120 kp/cm ² = 1711 lbf/in ²)	11.8 MPa (120 kp/cm ² = 1711 lbf/in ²)	11.8 MPa (120 kp/cm ² = 1711 lbf/in ²)	15.7 MPa (160 kp/cm ² = 2276 lbf/in ²)

Lubricating system

Oil capacity, inc. oil filter, approx.:				
no engine tilt	1.8 litres (3.2 Imp. pints/ 1.9 US quarts)	3.4 litres (6.0 Imp. pints/ 3.6 US quarts)	4.3 litres (7.6 Imp. pints/ 4.5 US quarts)	7.3 litres (12.8 Imp. pints/ 7.7 US quarts)
Oil quality according to the API-system	CD	CD	CD	CD
Viscosity at -5° - +50°C*	SAE 15W/40 SAE 20W/50	SAE 15W/40 SAE 20W/50	SAE 15W/40 SAE 20W/50	SAE 15W/40 SAE 20W/50
Oil drain plug, tightening torque	30–40 Nm (3.0–4.0 kpm= 21.7–28.9 lbf.ft)	30–40 Nm (3.0–4.0 kpm= 21.7–28.9 lbf.ft)	30–40 Nm (3.0–4.0 kpm= 21.7–28.9 lbf.ft)	30–40 Nm (3.0–4.0 kpm= 21.7–28.9 lbf.ft)

*Note! The temperature values bear reference to a constant ambient temperature.

Cooling system

Thermostat, No.	1	1	1	1
The thermostat begins to open at	75° ±2°C (167° ±4°F)	75° ±2°C (167° ±4°F)	82° ±2°C (179° ±4°F)	82° ±2°C (179° ±4°F)
completely open at	87°C (189°F)	87°C (189°F)	95°C (203°F)	95°C (203°F)
Freshwater system capacity, approx.	2.1 litres (3.7 Imp. pints/ 2.2 US quarts)	3.0 litres (5.3 Imp. pints/ 3.2 US quarts)	4.0 litres (7.0 Imp. pints/ 4.2 US quarts)	6.9 litres (12.1 Imp. pints/ 7.3 US quarts)

Electrical system

	MD2010B	MD2020B	MD2030B	MD2040B
System voltage	12 V	12 V	12 V	12 V
Fuses	15A	15A	15A	15A
Battery capacity (starter battery)	70 Ah	70 Ah	70 Ah	70 Ah
Alternator, voltage/max. amperage	14V/60A	14V/60A	14V/60A	14V/60A
output approx.	840 W	840 W	840 W	840 W
Starter motor, output approx.	0.7 kW	0.7 kW	1.2 kW	2.0 kW

Reverse gear

	MS2L-D	MS2A-D
Type designations	MS2L-D	MS2A-D
Gear ratios	2.3:1	2.37:1; 3.0:1
Angle (output shaft)	0°	7°
Oil capacity, approx.		0.8 litre (1.4 Imp. pints/ 0.85 US quarts)
Oil quality in accordance with the API system		CD
Viscosity		SAE 15W/40
Weight		17 kg (37.5 lbs)
Tightening torque:		
oil drain plug		20 ±5 Nm (2 ±0.5 kpm = 14.5 ±4 lbf. ft)

S-drive

Type designation	120S-D
Gear ratio	2.48:1
Oil capacity, approx.	2.8 litres (4.9 Imp pints/3.0 US quarts)
volume difference min.-max.	0.07 litre (0.12 Imp pints/0.07 US quarts)
Oil quality in accordance with the API system	CD
Viscosity	SAE 15W/40
Weight	28 kg (61.7 lbs)
Tightening torque:	
oil drain plug	10 ±5 Nm (1 ±0.5 kpm = 7.2 ±4 lbf. ft)

Troubleshooting

Troubleshooting schedule – engine

Engine does not start	Engine stops	Does not reach full speed	Runs unevenly, vibrates	Gets abnormally hot	Cause of fault
•					Check the batteries, electric wires, main switch.
•	•	•	•		Check amount of fuel, fuel cocks, fuel filter and fuel (for any impurities, water, air).
		•	•		Faulty injectors.
		•			Boat abnormally loaded, fouling on the bottom of the boat.
		•			Blocked air filter.
			•		Damage to propeller.
				•	Blocked cooling water intake, blocked seawater filter, coolant level too low, air in the freshwater system, defective impeller or thermostat.

VOLSPEC 01621 869756

Morris' XHD - FE 10W/40 SEMI-SYNTHETIC DIESEL OIL (6 ltrs 3.4 litres)

OIL FILTER VOLVO 3581621

FUEL FILTER VOLVO 861477-8

ZINC RING 1205-DRIVE

VOLVO PENTA

AB Volvo Penta
Technical Information

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