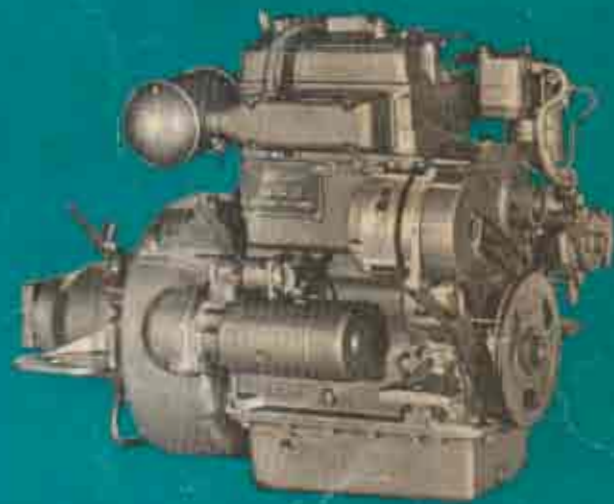


# Instruction book



# ALBIN AD-21

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Instruction book  
**ALBIN AD-21**

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**ALBIN MOTOR AB**  
KRISTINEHAMN • TEL. 0550/150 00

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The specifications and design information given in this book are not binding. We reserve the right to carry out modifications without previous notice.

## Introduction

The ALBIN AD-21 is a modern, short-stroke, easy-to-install and compact marine diesel with comprehensive standard equipment. Direct injection ensures excellent cold starting and low fuel consumption. The ALBIN AD-21 has a new, compact, spring-loaded reverse gear and single control lever operation. This means that with only one lever, which can be placed near to the driver, both the engine speed and reverse gear can be operated — a simpler way to manoeuvre the boat would be hard to find. These are some of the facts which make boating enthusiasts choose the ALBIN AD-21.

The engine is a 2-cylinder, 4-stroke diesel with overhead valves and direct injection. The fully balanced crankshaft, carried in three main bearings, together with the short-stroke design, ensure smooth and vibration-free running. The fuel injection pump is provided with a feed pump, which can also be operated by hand. The specially designed inlet channels together with the multi-hole injectors provide outstandingly good fuel economy.

The ALBIN AD-21 has a 12-volt electric system with 1.3 h.p. starter motor and a 490-watt alternator. In addition to providing a higher max. output, the alternator also generates current even when the engine is idling.

The starting handle is located at a convenient height. Easy manual starting is ensured thanks to the decompression device and high inertia flywheel.

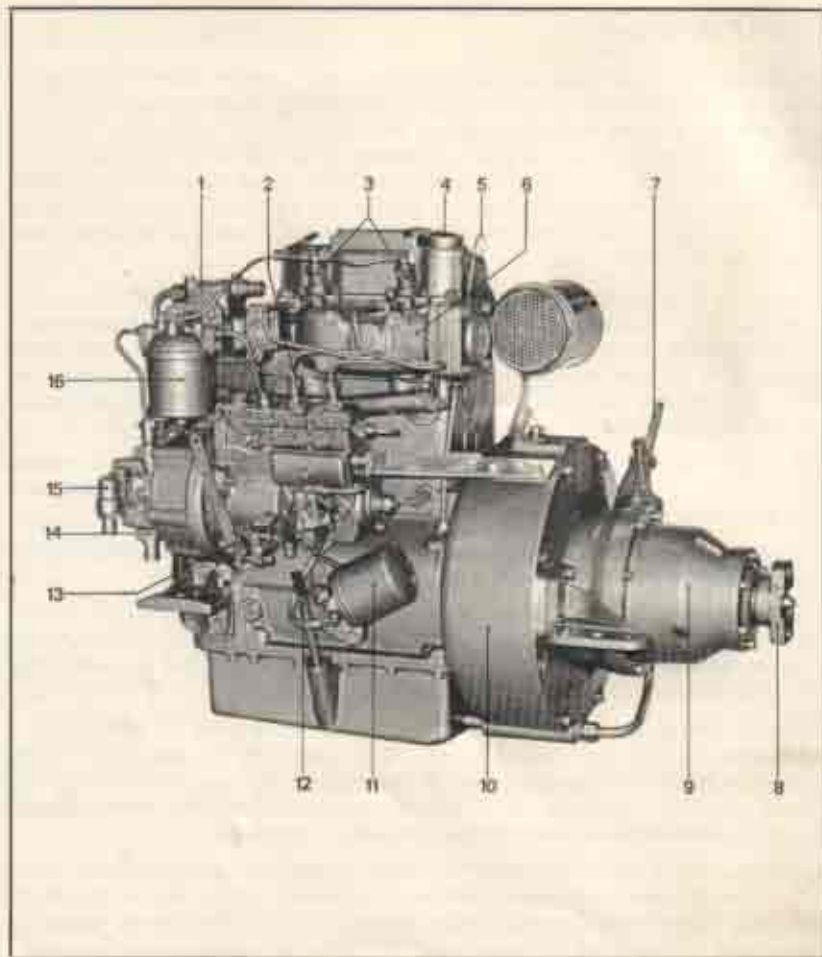
The engine, reverse gear, reduction gear (alternative equipment) and fuel injection pump are pressure-lubricated from a common lubrication system. All these components have the same oil supply, so that only one oil dipstick is required for checking oil level.

Normally, the engine is sea-water cooled. The requisite parts for conversion to fresh-water cooling are stocked by ALBIN MOTOR AB. The sea-water cooling pump and automatic bilge pump are of the constriction type and are fitted with rubber impellers, which are highly resistant to impurities in the water. Correct operating temperature is maintained by the built-in thermostat.

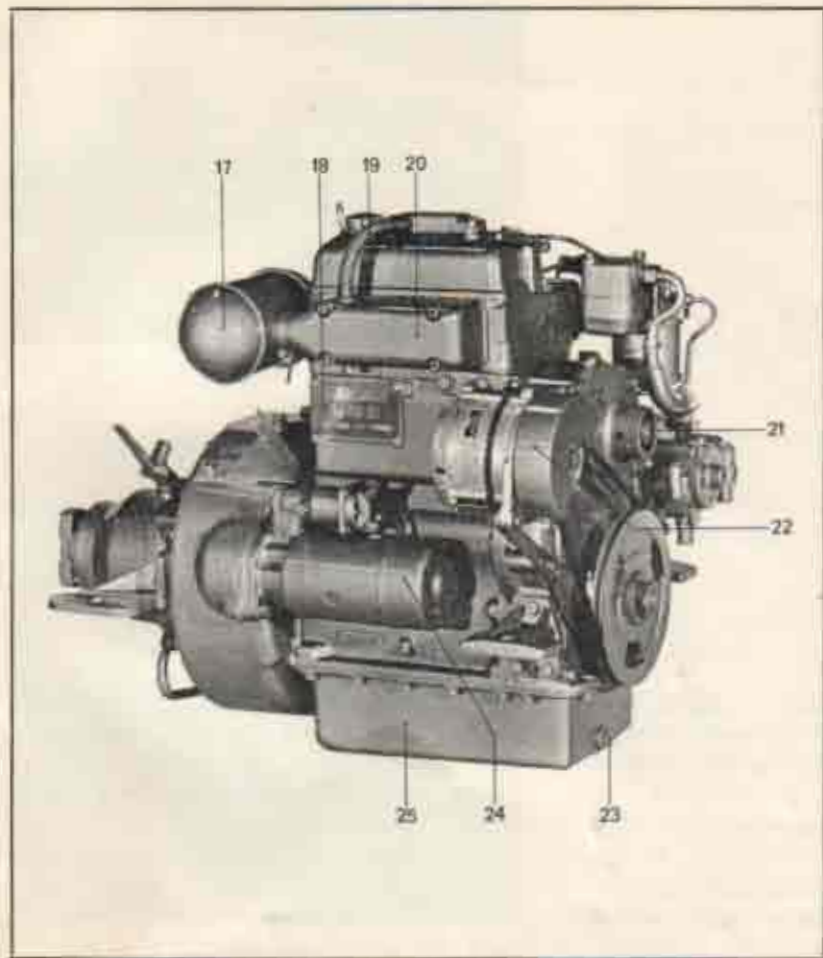
The engine has a closed crankcase ventilation system, replaceable bearing shells, etc. It has everything you would wish in a top modern engine. The ALBIN AD-21 has behind it many years of outstanding experience and skill in the marine engine field.

Fig. 1

- 1 Thermostat housing
- 2 Fuel injection pump
- 3 Injector
- 4 Oil filler point
- 5 Oil dipstick
- 6 Water-cooled exhaust manifold
- 7 Control lever
- 8 Propeller shaft coupling
- 9 Reverse gear
- 10 Flywheel casing
- 11 Lubricating oil filter
- 12 Pipe for oil bilge pump
- 13 Feed pump
- 14 Cooling water pump
- 15 Bilge pump
- 16 Fuel filter







**Fig. 2**

- 17 Intake damper with air cleaner
- 18 Data plate with series and engine number
- 19 Crankcase ventilation
- 20 Intake manifold
- 21 Manual start device
- 22 Alternator
- 23 Drain plug for lubricating oil
- 24 Starter motor
- 25 Oil sump

# Running

## Running-in

When an engine is new or reconditioned, it should be run with a certain amount of care during the first period.

When an engine leaves the factory, it is partly run-in and has been carefully checked and bench-tested up to the specified output. It is recommended, therefore, that the engine be run for about 25 hours at 85% of the full load and speed, in order to complete the running-in process.

Afterwards, the lubricating oil should be changed. The oil change should be carried out when the engine is warm. The oil used during the running-in should be removed from the engine oil sump. This can be done with the oil bilge pump supplied with the tool kit. Connect the pump to the dipstick hole. See Fig. 4.

After the first 25 hours of operation, all accessible bolts and nuts should be final-tightened, when the engine is warm.

During the running-in period, make a habit of keeping a watchful eye on the temperature gauge (the temperature should be within the green field) and the warning lamps for the oil pressure (yellow) and battery charging (red).

## Procedure before the first start

1. Fill the engine with oil.

N.B. The engine, fuel injection pump, reverse gear and reduction gear are pressure-lubricated through one lubricating system, and for this reason all these components have a common oil compartment and the same oil dipstick for checking the oil level.

Concerning oil capacity, oil quality and viscosity, see under the chapter, Technical Data, Lubricating System.

The lubricating oil is filled through the filler hole in the valve cover. See Fig. 3. Oil is filled to the upper mark on the dipstick, and must never be allowed to go below the lower mark on the dipstick. See Fig. 5.



Fig. 3 Filling with lubricant

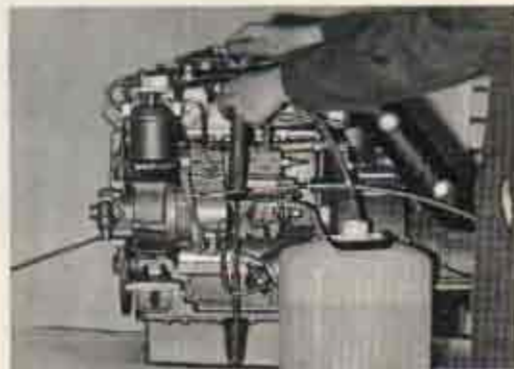


Fig. 4 Oil bilge pump in use



Fig. 5 Oil dipstick

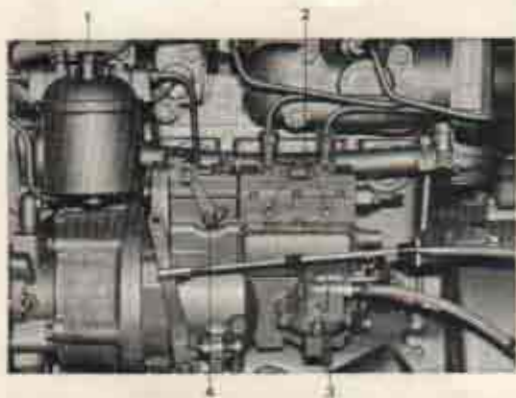


Fig. 6 Fuel injection pump and fuel filter

- 1 Bleed screw for fuel filter
- 2 Bleed screws
- 3 Manual pump
- 4 Cold start button

- 2 Check the fuel level in the tank. (See under Technical Data, Fuel System.)

Bleed the fuel system as follows:

- a) With the feed pump manual pumping lever (Fig. 6, pos. 3), pump up the fuel.
- b) Then slacken the nipple bolt for the return oil line to the fuel tank. This is fitted on the fuel filter. See Fig. 6, pos. 1. Pump again with the manual pumping lever until fuel free from air bubbles flows out.
- c) Open the front bleed screw on the fuel injection pump. See Fig. 6, pos. 2. Pump further with the manual pumping lever until fuel free from air bubbles flows out. Close the bleed screw.

Air in the fuel system is the chief reason why a diesel engine does not start or runs unevenly. For this reason, make sure that the fuel system connections and lines are properly tightened and do not leak.

- 3 If a propeller equipment of the ALBIN-type is used, check to make sure that the lubricator in the shaft seal is filled. See Fig. 21, pos. 3. A suitable lubricant is a semi-liquid grease with film-reinforcing additive, so-called "outboard grease".

### Starting

A so-called combined speed-gear control lever is fitted for operating the reverse gear and engine speed.

- 1 Check that the bottom cock for the cooling water intake is open.
- 2 Place the control lever in neutral. Disengage the control lever with the disengaging latch so that only the engine speed is operated. Set the control lever to  $\frac{1}{4}$  max. throttle. See Fig. 8.
- 3 If the engine is used during cold weather, place the control lever in position for  $\frac{1}{4}$  max. engine speed and at the same time push in the cold start button on the fuel injection pump to get extra starting fuel. See Fig. 6, pos. 4.
- 3 Check to make sure that the stop lever on the fuel injection pump is in the steering position (stop control on control panel pressed in).



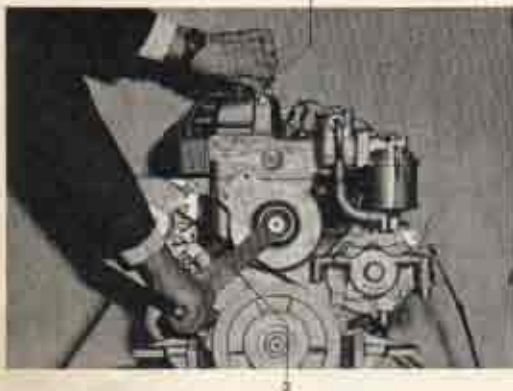


Fig. 7 Components for manual starting

- 1 Decompression lever
- 2 Crank

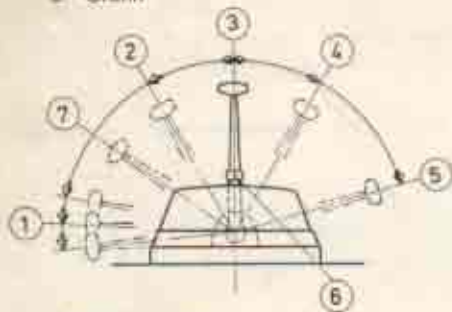


Fig. 8 Teleflex controls

- |                        |                         |
|------------------------|-------------------------|
| 1 "Ahead" — max. speed | 5 "Astern" — max. speed |
| 2 "Ahead" — idle       |                         |
| 3 Neutral              | 6 Disengaging pawl      |
| 4 "Astern" — idle      | 7 Starting position     |

- 4 Turn the starter switch key (see Fig. 10) clockwise to the first position and check that the warning lamps for battery charging (red) and oil pressure (yellow) light up.
- 5 Press in the starter switch key (see Fig. 10) and turn it clockwise until the starter motor engages. Hold the key in this position until the engine starts. Then release the key, which will return to neutral position.
- 6 Move back the control lever to idling position.

If, for some reason or other, the electrical system is not functioning, the engine can be started manually as follows:

- 1 Follow the instructions given in points 1 and 2 above.
- 2 Set the decompression lever — see Fig. 7 — in vertical position.
- 3 Insert the starting crank, see Fig. 7.
- 4 Crank the engine as quickly as possible with the starting crank and move the decompression lever rapidly down to the horizontal position while cranking.
- 5 As soon as the engine has started, set the control lever to idling.

Check to make sure that the warning lamps for battery charging and oil pressure go out when the engine has started. Some minutes after starting, the needle of the temperature gauge should be within the green field.

### Manoeuvring

The ALBIN AD-21 is fitted with a spring-loaded type reverse gear which requires little operating effort so that it is possible to install a so-called combined speed-gear control lever. With this type of control, both the reverse gear and engine speed are operated by means of a single control lever (see Fig. 8).

N.B. The reverse gear is of such a design that it will not slip when properly engaged for "Ahead" or "Astern". When engaging the control lever for either of these two operations, use firm, positive movements. Any other engaged position can thus damage the reverse gear.

The battery can be re-charged during short periods (½ hour) with the engine idling and the reverse gear in neutral. Any re-charging for a longer period should be done with the propeller engaged for running "Ahead".

### Running

At regular intervals when running, check to make sure that the cooling water temperature gauge needle is within the green field (see Fig. 9), and that the warning lamps for battery charging (red) and oil pressure (yellow) are not lighted.

The ALBIN AD-21 is a modern, fast, marine diesel engine, designed to meet today's high demands on performance and serviceability. The engine is constructed to allow continuous running at maximum rev. speed, but, as the fuel-consumption diagram shows, fuel consumption increases considerably when the engine is run at maximum revolutions. This not only applies to the AD-21, but to all marine engines and is related to the increase in resistance of the water at higher speeds.

### Stopping

- 1 Move the control lever to idling position.
- 2 Pull out the stop control (the stop arm on the fuel injection is moved in the aft direction) so that the engine stops. The engine must not be stopped by using the decompression device.
- 3 Switch off the current when the engine has stopped by turning the key to the 0-position; see Fig. 10.

N.B. Under no conditions whatsoever may the current circuit be broken when the engine is running. This would damage the rectifier diodes of the alternator.

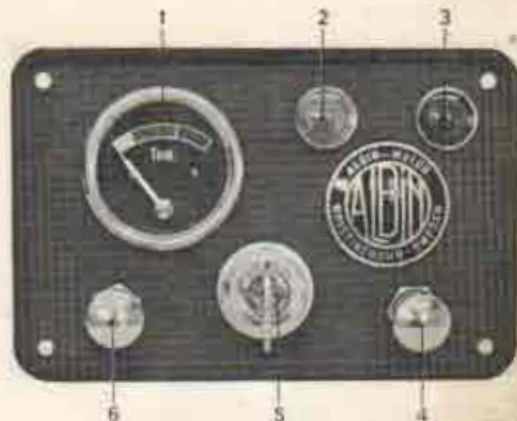


Fig. 9 Instrument panel

- 1 Temperature gauge for cooling water
- 2 Warning lamp for low oil pressure
- 3 Warning lamp for battery charging
- 4 Pull switch for extra lighting
- 5 Starter switch key
- 6 Pull switch for instrument lighting



Fig. 10 Starter switch key

- 0 Neutral position
- 1 Switched-on position
- 2 Starting position (starter motor switched on)
- 3 "Radio" position

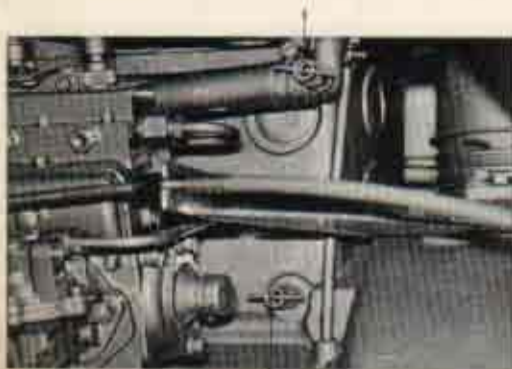


Fig. 11 Drain cocks for cooling water

- 1 Cock for exhaust manifold
- 2 Cock for engine block

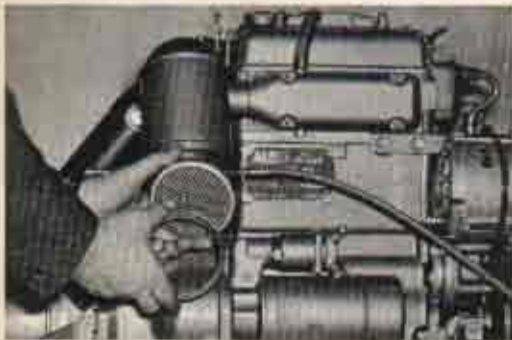


Fig. 12 Air cleaner removed for cleaning (in, e.g., white spirit)

## Precautions against frost

### Direct cooling

- 1 After the engine has stopped, close the bottom cock for the cooling water intake.
- 2 Open the drain cock on the cylinder block and exhaust pipe, see Fig. 11.
- 3 When all the water has been drained, start the engine and run it for max. one minute. The engine speed should be raced up in spurts to 1500 r.p.m. in order to "blow" water from the exhaust system.

### Fresh-water cooling

If the ALBIN AD-21 is fitted with a fresh-water cooling system and is used when there is risk of frost, anti-frost should be added to the fresh-water system. The anti-frost recommended is ethylene glycol.

It can be mentioned as a guide that, for a freezing point of  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), the coolant must consist of at least 35 per cent by volume of ethylene glycol.

The total capacity of the fresh-water system is 3.7 litres (6.5 Imp. pints = 7.8 US pints)

If anti-frost is not added, the cooling water must be drained according to points 1—3 above.

N.B. There is also a drain cock on the expansion tank.

## Description and Maintenance

### Fuel system

The fuel system consists of a feed pump, fuel filter, fuel injection pump with governor, injectors and pipes as well as fuel tank.

The fuel is drawn up by the feed pump from the fuel tank and is conveyed under pressure through the fuel filter to the fuel injection pump.



The fuel injection pump is integrally built with the speed governor and is pressure-lubricated from the engine. The governor is of the all speed centrifugal type, that is, it covers the entire speed range, and prevents the engine from racing in the event of the engine being suddenly off-loaded.

The fuel injection pump supplies fuel to the injectors at high pressure. The function of the injectors is to atomize the fuel at high pressure into the engine combustion chambers.

### Fuel filter

The fuel filter insert is not to be cleaned, the only servicing being replacement. This is done by releasing the centre screw 1 (Fig. 13), removing the cover base (2) and replacing the insert (3). The nipple bolt (5) connects the return fuel line to the tank and it also functions as a bleed screw. The leak-off oil line from the injectors is fixed to the filter by means of the nipple bolt (4). Normally, the filter insert should be replaced after every 300 hours of operation.

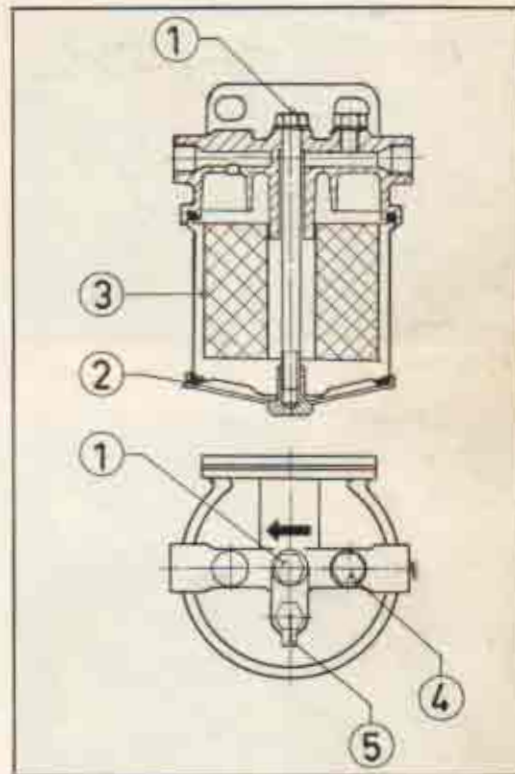
### Fuel

The AD-21 is a high-speed diesel. Therefore, it requires a fuel with cetane rating 45 intended for high-speed diesel engines. In other words, the same type of fuel as used for diesel-driven trucks and buses. If unsuitable fuel is used, there is great risk of the injectors carbonizing with weak combustion as a result.

### Lubricating system

The engine, reverse gear, reduction gear and fuel injection pump are lubricated under pressure from a common lubricating system. The ALBIN AD-21 has thus only one lubricating point for all these components and only one oil dipstick for checking oil level (Fig. 5).

The lubricating oil pump, which is gear-driven from the engine timing gears, draws oil through a strainer in the oil sump. The oil passes through the pump where the pressure is "built up" (1—3 kp/cm<sup>2</sup> = 14—43 p.s.i.). The oil pump forces the oil



**Fig. 13** Fuel filter  
1 Centre screw  
2 Cover  
3 Filter insert  
4 Nipple bolt  
5 Nipple bolt — bleed screw





Fig. 14. Replacing lubricating oil filter

through the oil filter which is of the full-flow type, that is, all oil passes through the filter and drilled oil channels before reaching the various lubricating points. If the filter becomes clogged (for example, from neglecting to change the filter at the prescribed interval — see Maintenance Schedule, a relief valve opens and the engine is lubricated directly from the oil pump.

Concerning the lubricating oil quality and viscosity recommended; See Technical Data. For lubricating oil change intervals — see Maintenance Schedule on page 18.

**NEVER FILL WITH OIL USED FOR FLUSHING!**

#### Replacing the lubricating oil filter

The lubricating oil filter cannot be cleaned but must be replaced (Fig. 14). Replacement should be carried out every 300 hours of operation or once per season.

Replacement is as follows:

1. Screw off the old filter.
2. Check to make sure that the sealing surfaces of the new oil filter gasket are clean and not damaged. Smear oil on the gasket.
3. Tighten the filter securely by hand.
4. Run the engine and check for any leakage.

Check the engine oil level after replacing the oil filter.

#### Cooling system

##### Direct cooling

Cooling water circulation is carried out by the cooling water pump, see Fig. 18. Water is 'sucked' from the boat cooling water intake, through the cooling water pump to the cooling jackets of the exhaust manifold and engine. The cooling water flow through the cooling jackets is controlled by means of a thermostat. When the engine is cold, the thermostat is closed. The water supplied by the cooling pump passes for the most part through the upper part of the thermostat housing and

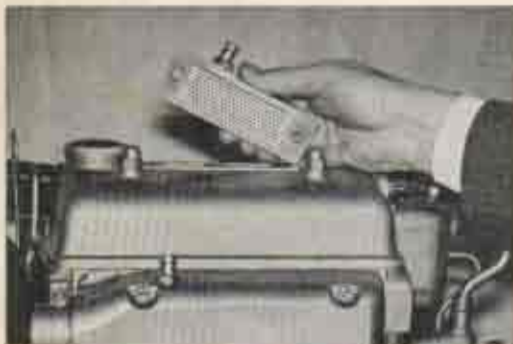


Fig. 15. Filter for crankcase ventilation (cleaned in, e.g. white spirit)

straight out to the exhaust pipe. When the engine cooling water temperature approaches the normal operating temperature, the thermostat gradually opens. This causes most of the water from the cooling water pump to be diverted to the cooling jackets of the exhaust manifold and engine from where it passes via a thermostat and the upper part of the thermostat housing out into the exhaust system. The capacity of the cooling system is 2.7 litres (4.8 Imp. pints=5.7 US pints).

The cooling water pump is integrally built with the automatic bilge pump, which always keeps the boat free from bilge water. At max. engine speed, the capacity is approx. 15 litres (26 Imp. pints=31.5 US pints) per minute and approx. 4 litres (7.0 Imp. pints=8.5 US pints) per minute at idling. The pumps are of the impeller type. When there is no bilge water in the keelson, the bilge pump is lubricated by water from the cooling water pump.

#### Fresh-water cooling

The ALBIN AD-21 can also be supplied with a fresh-water cooling system, that is, indirect cooling with a heat exchanger as extra equipment. The engine then has two separate cooling systems.

##### 1 The fresh-water system

The cooling water pump circulates the water in the cooling jackets of the engine and exhaust manifold, also through the heat exchanger.

The capacity of the fresh-water system is 3.7 litres (6.5 Imp. pints=7.8 US pints).

##### 2 The sea-water system

The previously mentioned automatic bilge pump is modified and used in this system as a sea-water pump. This pump draws the water from the cooling water intake and pumps it to the heat exchanger which is built into the expansion tank. The fresh water is cooled by the sea water in the heat exchanger. When the sea water leaves the heat exchanger, it flows out to the engine exhaust system where it functions as a cooling and damping medium.

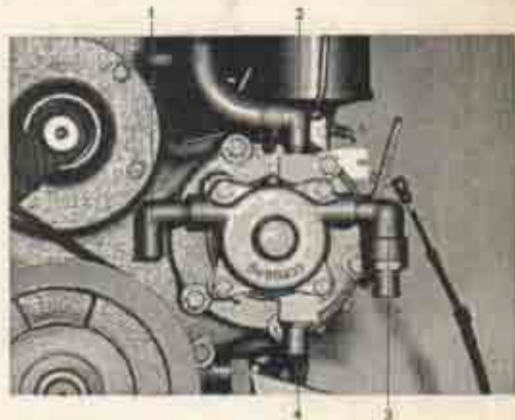


Fig. 16 Cooling water pump and bilge pump

- 1 Outlet — bilge pump
- 2 Outlet — cooling water pump
- 3 Inlet — bilge pump
- 4 Inlet — cooling water pump

## Electrical system

The ALBIN AD-21 has a 12-volt electrical system with a 1.3 h.p. starter motor and a 490-watt alternator, which gives a charging current of 18 amps already at idling speed.

Standard equipment also includes an instrument panel (see Fig. 9), starter switch, warning lamps for charging and oil pressure, cooling water thermometer, switches for instrument lighting and navigation lights.

**N.B. Always connect up the battery with the correct polarity.**

Connecting up the battery wrongly will ruin the alternator rectifiers. (The battery negative pole is to be earthed to the frame. See Fig. 17.)

**The charging current must not be broken when the engine is running.**

If the charging current system is broken at any point when the alternator is charging, this will damage the rectifier diodes of the alternator.

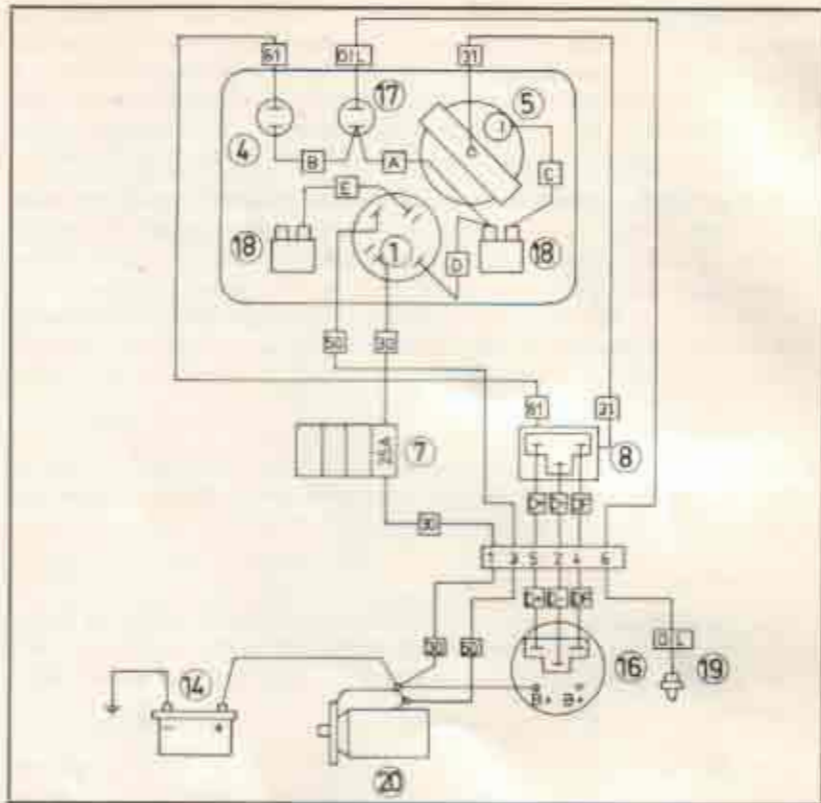


Fig. 17 Wiring diagram

- |                                 |                          |  |
|---------------------------------|--------------------------|--|
| 4 Battery charging control lamp | 8 Charging relay         | 18 Pull switch for instrument and extra lighting |
| 5 Instrument lighting           | 14 Battery               | 19 Oil pressure sensor                           |
| 7 Fusebox                       | 16 Alternator            | 20 Starter motor                                 |
|                                 | 17 Oil press. cont. lamp |  |

## Rustproofing

### Engine

If the engine is run only during the summer, it should be inhibited for the rest of the year.

ALBIN MOTOR AB stocks inhibiting oil with part number **76552**. Diesel oil is mixed with 5% of this inhibiting oil. If, for example, 10 litres (17.6 Imp. pints=21.1 US pints) diesel oil is to be used, then  $\frac{1}{2}$  litre (1 pint) inhibiting oil should be added. Make sure that the inhibitor and fuel are well mixed. Then run the engine on this mixture for  $\frac{1}{2}$ —1 hour.

Procedure before starting for first time next season.

- 1 Change the fuel filter (see Chaps. "Description" and "Servicing", fuel filter).
- 2 Fill the tank with fuel.
- 3 Bleed the fuel system (see Chap. "Procedure before first start", point 2).
- 4 Change the lubricating oil.

Otherwise see "Maintenance Schedule".

### Cooling system

If the engine has been installed in a boat which is stationed in coastal waters with high salt content, we recommend that the cooling system is flushed with fresh water. This is done by running the engine for about 10 minutes with fresh water. The cooling system should then be drained (see Chap. "Precautions against frost") and the engine is run for  $\frac{1}{2}$  minute so that any water remaining is "blown" out.

Remove the battery. Make sure that it is fully charged and store it where it will be protected against frost.



### Reverse gear

The ALBIN AD-21 is fitted with a so-called "spring-loaded" type reverse gear. The reverse gear is very compact and combines the rugged construction of a mechanical unit with the small demands made on operational stresses by a hydraulic reverse gear component. This has made it possible to install a single control lever and considerably simplify boat manoeuvring.

The spring-loaded type reverse gear has been given its name by the fact that spring elements are used to transfer the engine torque to the reverse gear — and also to make the various manoeuvring functions possible. This reverse gear requires a minimum of supervision because it is self-adjusting and pressure-lubricated from the engine lubricating system.

### Manoeuvring

#### 1 Neutral (see Fig. 18).

Move the control lever (9) to position 10. This pushes the plunger (12) down to its bottom position where it takes up the spring band (14), which releases from the inner engaging ring (13) and this disengages the reverse gear.

#### 2 Operation "Ahead" (see Fig. 18).

For operation "Ahead" move the control lever (9) to position 11. Both plungers (7 and 12) are in their upper position and do not

influence the spring bands. Engine torque is transmitted through the inner engaging ring (13) via the spring band (14) to the engaging ring (15). This engaging ring is firmly fixed to the outer engaging ring (5) and is thus able to transmit the torque to the spring band (6), which transfers the torque to the gear housing (17) and the gears (19 and 3) on the reverse gear shaft. From the reverse gear shaft, the torque is conveyed further through the reduction gear (2) to the output shaft (1).

#### 3 Operation "Astern" (see Fig. 18).

Move the control lever (9) to position 8. This pushes the plunger (7) down to its bottom position where it takes up the spring band (6).

The spring band releases the outer engaging ring (5) at the same time as the gear housing (17) is held due to the spring band (6) locking against the control section (16). Engine torque is transmitted to the inner engaging ring (13), across the spring band (14) to the engaging ring (15). The gear wheel (18) on this latter engaging ring rotates. This rotation is transmitted to the planetary assembly gears (4 and 19), which are in mesh. Gear wheel (19) then engages with the reverse gear shaft gear wheel (3) which, via the reduction gear (2), transfers the torque to the output shaft (1). By the fact that the gear housing (17) is held by the spring band (6) during this operation, the rotational direction of the planetary gear is changed — for operation "Astern".

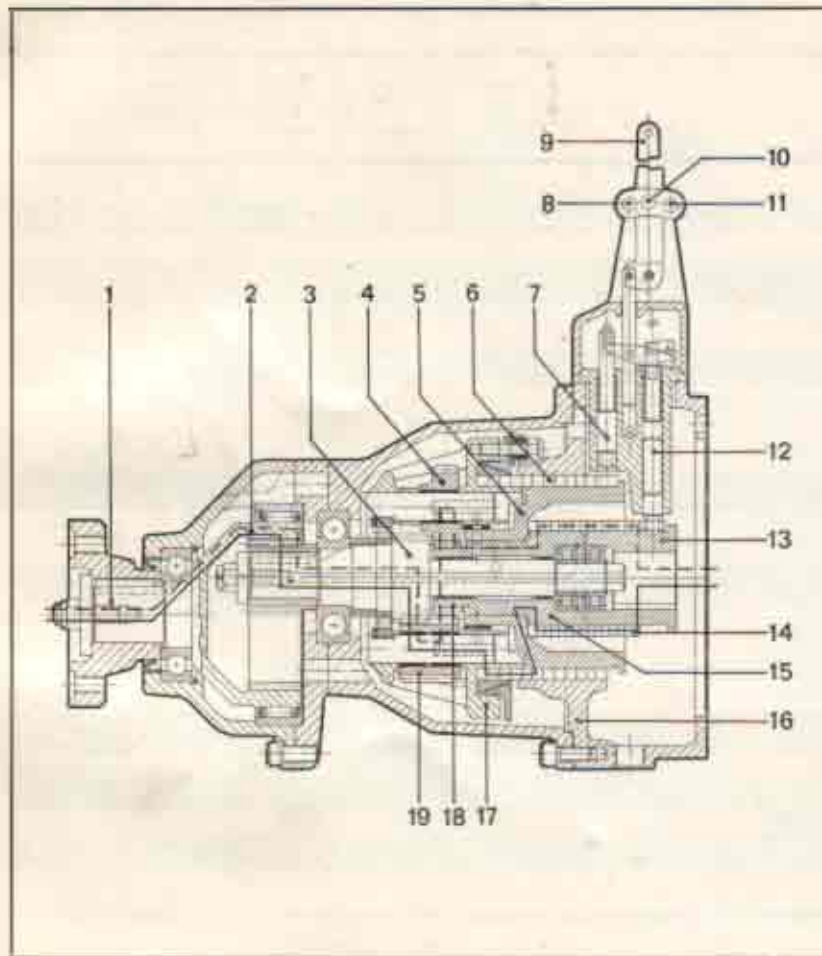


Fig. 18 Reverse gear

Operation "Ahead" \_\_\_\_\_

Operation "Astern" - - - - -

- 1 Output shaft
- 2 Reduction gear
- 3 Reverse gear shaft gear wheel
- 4 Gear wheel in planetary gear assembly
- 5 Outer engaging ring
- 6 Spring band
- 7 Plunger, operation "Astern"
- 8 "Astern" operating position with ball stop
- 9 Control lever
- 10 Neutral position with ball stop
- 11 "Ahead" operating position with ball stop
- 12 Plunger, neutral position
- 13 Inner engaging ring
- 14 Spring band
- 15 Engaging ring
- 16 Control section
- 17 Gear housing
- 18 Gear
- 19 Gear wheel in planetary gear assembly

## Maintenance schedule

Operation	Daily	Every 100 hours <sup>1)</sup>	Every 200 hours <sup>1)</sup>	Every 300 hours	Every 400 hours	Every 1000 hours
<b>Lubrication</b>	Check the oil level	X				
	Change the oil		X			
	Change the lubricating oil filter cartridge			X		
<b>Fuel system</b>	Change the fuel filter			X		
	Check the injectors				X	
<b>Cooling system</b>	Check the cooling system				X	
<b>Electrical system</b>	Check the acid level in the battery	X				
	Check the generator and starter					X
<b>Reverse gear</b>	Check the reverse gear			X		
<b>General inspection and overhaul</b>						
	Check the valve clearance			X		
	Clean the inlet silencer			X		
	Clean the oil strainer					X
	Clean the crankcase ventilation system			X		
	Decarbonise and grind the valves					X

<sup>1)</sup> or at least once every season.

## Fault tracing schedule

Engine does not start		Engine starts but stops	Engine does not go up to full speed or misfires	Abnormally high cooling water temperature	Possible reason for faults	
Starter motor does not crank engine	Starter motor cranks engine					
X					Flat battery. Oxidized battery cable terminals. Faulty ignition switch. Defective starter motor.	Elec. comp.
	X X  X X	X	X X X X	X	Incorrect setting on injection pump Poor compression Faulty valve clearance Wrong propeller Air cleaner clogged Cold start device not functioning Faulty idle setting	Mech. comp.
	X X X X X X	X X X X	X X X		Defective fuel line Defective feed pump Clogged fuel filter Air in fuel system No fuel in tank Defective injector	Fuel system
				X	Insufficient lubricant	Lubr. system
				X X X X X	Cooling water intake blocked Defective sea-water pump Defective thermostat Air leakage in cooling water pump suction line Excessive counterpressure on outlet side due to, e.g., constriction in output cooling water hose	Cooling system



# Installation

## General

If your engine is to give you full satisfaction during many long "boat years", it is not just sufficient that it leaves the factory in good trim. The installation of the engine in the boat is of the greatest importance. Operational troubles can generally be traced to incorrect installation. Let a boatyard with skilled installers install the engine for you.

## Engine bed

The engine bed should be solid and robust, and should be spread out as far as possible along the length of the boat.

For wooden boats, the bed should be of oak and should be fixed to the hull by through-bolts.

Generally a boat with a plastic hull has the engine bed already arranged during the building of the boat. In certain cases, it may be necessary to fit a number of reinforcements.

When the boat is running, the angle between the propeller shaft and the water line should be as little as possible in order to obtain good operating efficiency for the propeller.

## Mounting

The engine is delivered as standard with fixed mountings, which can be changed for rubber mountings without having to alter the engine bed. However, the attaching bolts must be moved if such a change is to be made.

For a flexibly mounted engine, flexible connections are required for the fuel and cooling water lines.

## Engine case

Extensive tests have been carried out to produce an effective sound insulating engine case. The recommended design shown in Fig. 20 has given good results.

To obtain optimal insulation, a bulkhead should be placed on each side of the engine. These bulkheads should cover the entire space from the floor down to the planking and should be lined with the same sound insulating material as the engine case. With this insulating arrangement, a 2" internal diameter rubber hose must be taken through the bulkhead aft in order to provide the engine with sufficient air.

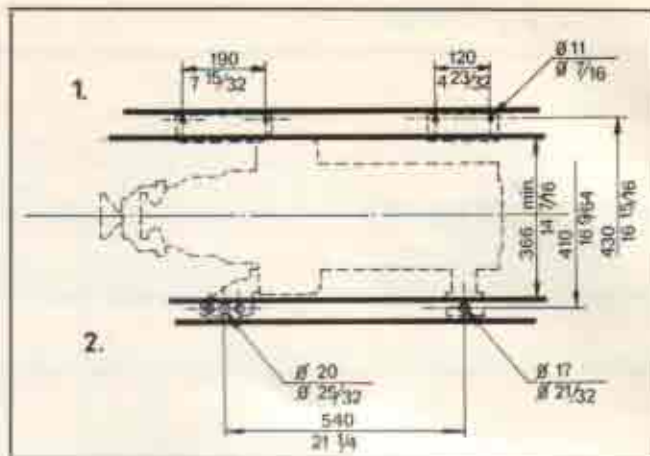


Fig. 19 Engine bed: 1 Rubber mounting 2 Fixed mounting

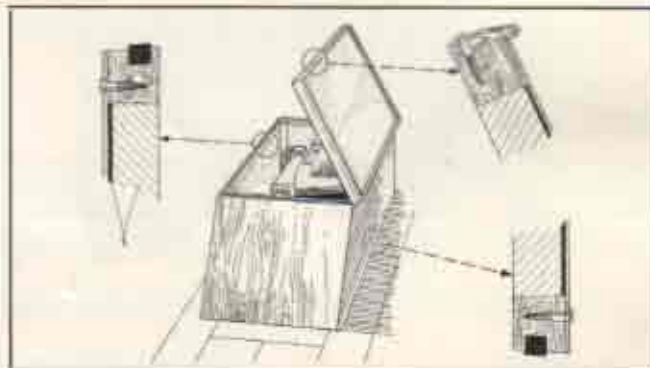


Fig. 20 Engine case with sound insulation

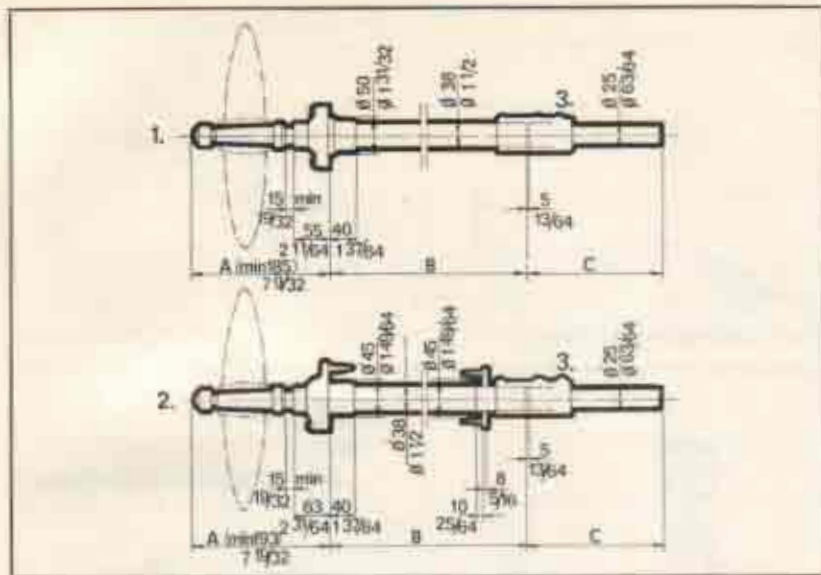
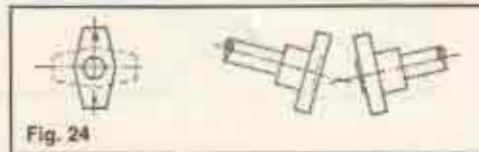
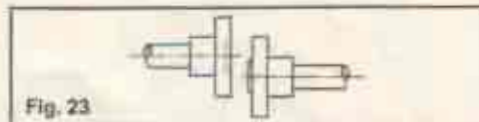
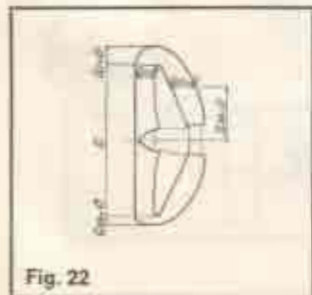


Fig. 21 Propeller device  
 1 Type intended for plastic boat  
 2 Type intended for wooden boat  
 3 Lubricator in shaft seal



## Propeller equipment

ALBIN MOTOR AB stocks a new type of propeller equipment which requires lubricating (use semi-fluid grease, so-called "outboard grease") only once each season. Fig. 21 shows the type used for a plastic boat (1) and for a wooden boat (2). The effective bearing is lubricated from a lubricator which contains enough lubricant for operating a whole season. The aft bearing is water-lubricated and has a self-adjusting rubber sleeve which eliminates pressure on the edge of the bearing.

## Propeller

The propeller aperture must be large enough to suit the propeller intended for the boat. Vibrations can be caused by too small a propeller aperture. The measurements indicated in Fig. 22 should not be reduced. On request, ALBIN MOTOR AB will make a propeller calculation without charge for a special installation.

## Alignment

About a couple of days after launching the boat, check the alignment of the engine and propeller shaft. This is particularly important for engines with fixed propeller shaft couplings. Slacken the coupling bolts and separate the coupling halves slightly.

- 1 Check for misalignment between the centralines by drawing the halves apart so that the guide boss and recess are free. The guide boss should fit in the recess when the halves are pressed together again. See Fig. 23.
- 2 Check the angle and centralines by inserting a feeler gauge, 0.05 mm (0.002") between the halves. Press the halves together so that the feeler gauge jams in between. This measurement check is to be made in the horizontal and vertical plane. See Fig. 24.

## Fuel system installation

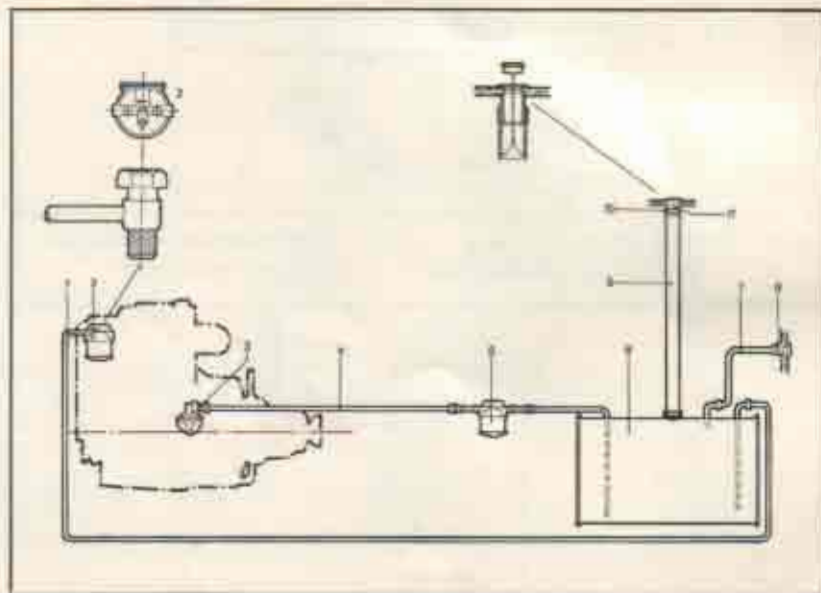


Fig. 25 Fuel system installation

- 1 Return fuel line
- 2 Fuel filter
- 3 Feed pump
- 4 Fuel line
- 5 Pre-filter with water separator
- 6 Fuel tank
- 7 Evacuation pipe
- 8 Bulkhead bolting for evacuation pipe, fitted with filter
- 9 Filler connection
- 10 Hose clamps
- 11 Filler fittings

## Exhaust system installation

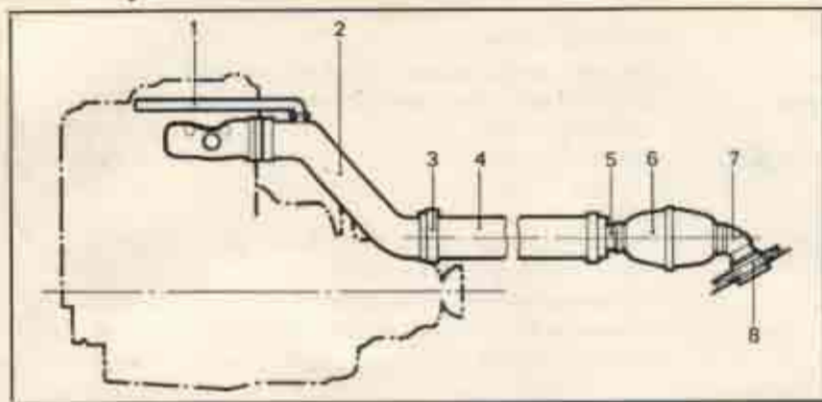


Fig. 26 Exhaust system installation

- 1 Rubber hose from thermostat housing
- 2 Exhaust elbow
- 3 Hose clamp
- 4 Exhaust hose of heat-resistant rubber
- 5 Connection to silencer
- 6 Silencer of neoprene rubber
- 7 Connection to bulkhead bolting
- 8 Bulkhead bolting for exhaust line

## Cooling system installation

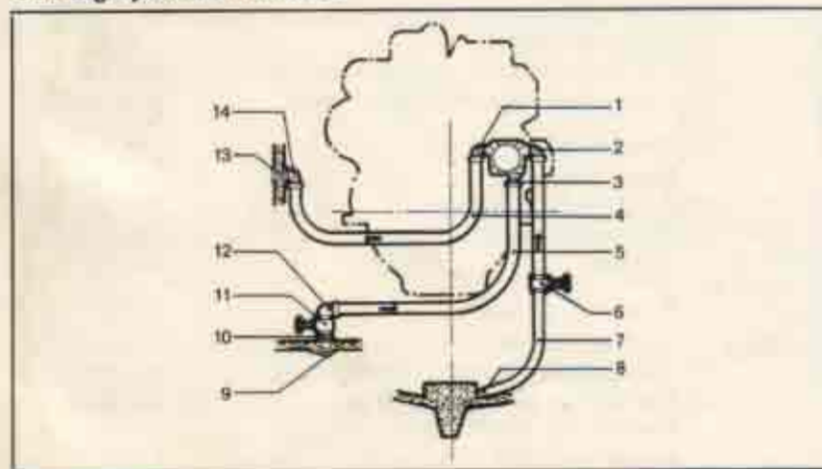


Fig. 27 Cooling system installation

- 1 Angle nipple
- 2 Angle nipple and non-return valve
- 3 Inlet nipple for cooling water
- 4 Rubber hose
- 5 Rubber hose
- 6 Shut-off cock
- 7 Rubber hose
- 8 Strainer for bilge pump
- 9 Strainer
- 10 Bulkhead bolting — inlet
- 11 Shut-off cock
- 12 Angle nipple
- 13 Bulkhead bolting — outlet
- 14 Angle nipple



# Technical data

## General

Number of cylinders	2
Type of engine	Four-stroke
Output SAE hp/rpm	22/2400
Torque kpm/rpm (ft.lb.)	6.5/2400 (47/2400)
Bore mm (in)	90 (3.54)
Stroke mm (in)	82 (3.23)
Cylinder capacity, litres (cu.in)	1.044 (63.7)
Compression ratio	17.5:1
Compression pressure at 320 rpm kp/cm <sup>2</sup> (psi)	21 (300)
Revolutions idling, rpm	600
Direction of rotation (viewed from astern)	
without reduction gear	Counter-clockwise
with reduction gear 2.04:1	Counter-clockwise
Maximum inclination	13°
Valve clearance, cold engine	
Intake mm (in)	0.3 (0.012)
Exhaust mm (in)	0.3 (0.012)
Weight approx. kg (lb)	235 (516)

## Fuel system

Combustion system	Direct injection
Max. fuel capacity at 1200 injection pump rpm	7.7—7.9 cm <sup>3</sup> /200 pump strokes (0.470—0.482 cu. in)
Injection pressure kp/cm <sup>2</sup> (psi)	165 (2350)
Injection timing (marked on the flywheel)	23° before TDC
Feed pump, suction lift m (ft.)	1.5 (5)
Fuel diesel oil with cetane rating	45

## Lubricating system

Oil quantity, engine, injection pump, reverse- and reduction gear, litres (Imp/US pints)	
excluding oil filter	5.2 (9.15/11.0)
including oil filter	5.5 (9.68/11.6)
Oil quality	Service DM
Viscosity	
Temp. —10°C up to +10°C (14°F—50°F)	SAE 20
Temp. +10°C and above (50°F)	SAE 30
Oil pressure by warm engine kp/cm <sup>2</sup> (psi)	2—3 (29—43)
Oil pressure minimum kp/cm <sup>2</sup> (psi)	0.5 (7)
Lubricating oil filter	Fram PH 2834

## Cooling water system

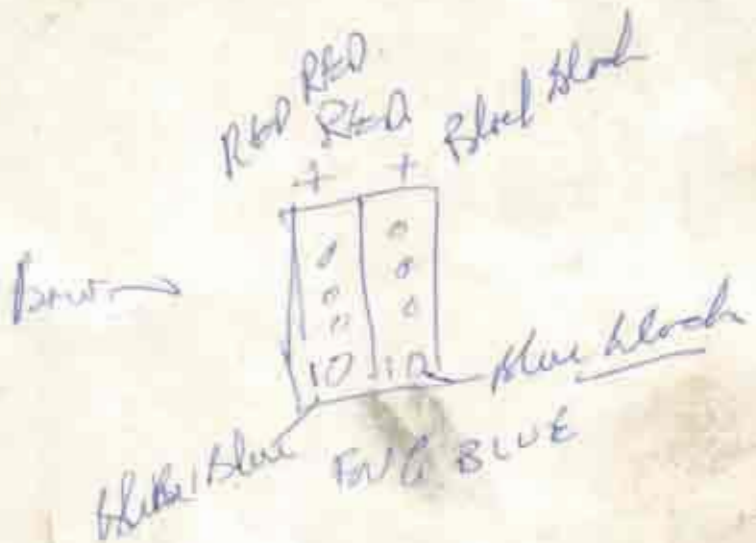
Thermostat begins to open (normal type)	77°C (170°F)
Thermostat begins to open (tropical type)	65°C (149°F)
Bilge pump capacity	
at idling litres/min. (Imp/US pints)	4 (7/8.5)
at full load litres/min. (Imp/US pints)	15 (26/31.5)

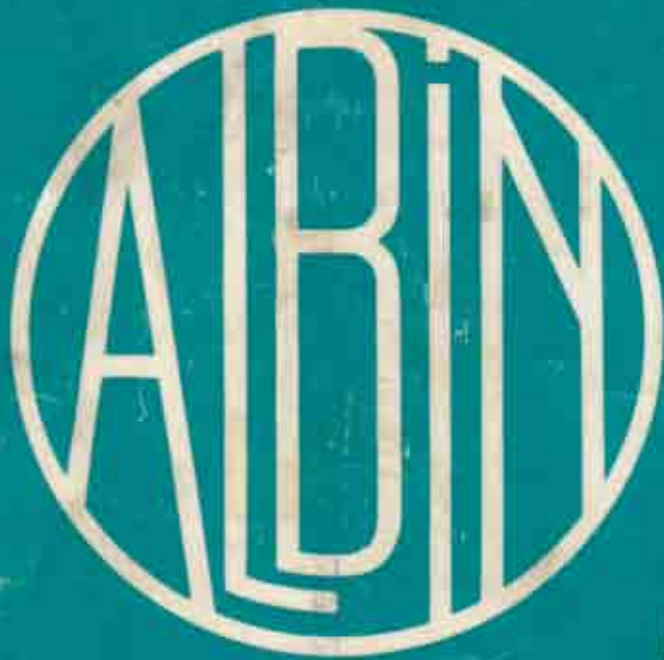
## Electrical system

Battery voltage, volt	12
Battery capacity amps/hr	57
Starter output, hp	1.3
Alternator output, watt (amps)	490 (38)

## Recommended torque

Cylinder head nuts kpm (ft.lb)	12 (86)
Connecting rod bearing bolts kpm (ft.lb)	5.2 (37)
Main bearing bolts kpm (ft.lb)	10 (72)
Flywheel bolts kpm (ft.lb)	3.5 (26)
Injector kpm (ft.lb)	2.5 (18)





## ALBIN MOTOR AB

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