Instruction book

ALBIN AD-2

List of Contents

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-2 is a compact, short-stroke, modern and easy-to-install marine diesel with comprehensive standard equipment. Direct injection ensures excellent cold starting and low fuel consumption. These are some of the facts which make boating enthusiasts choose the ALBIN AD-2.

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

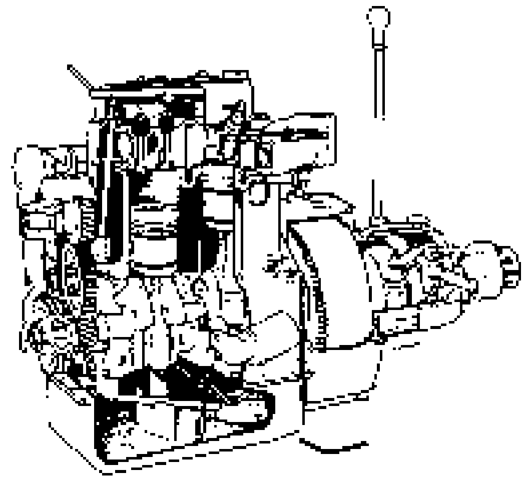
The standard 12-volt electric equipment consists of a 1.3 h.p. starter and a 90 watt (11 amps) generator. Alternatively, a 460-watt (38 amps) alternator which charges at idling speed can be fitted in lieu of the standard generator.

The convenient position of the starting handle, coupled with the decompression device and high inertia flywheel, ensures easy hand starting.

The engine and reverse gear are pressure-lubricated from a common lubrication system. The oil is supplied through drilled channels to the various lubrication points, eliminating the need for vulnerable external oil pipes.

Both the engine and the exhaust pipe are raw sea water cooled. The sea water cooling pump and automatic bilge pump are of the construction type and are fitted with rubber impellers which are capable of handling solids. The bilge pump can also be used for cleaning the cockpit etc. The built-in thermostat maintains the correct working temperature.

The engine has a closed crankcase ventilation system, replaceable bearing shells etc. giving the unit all the characteristics of the "engine of today". Behind the AD-2 construction lies more than 60 years' experience in the marine engine field.



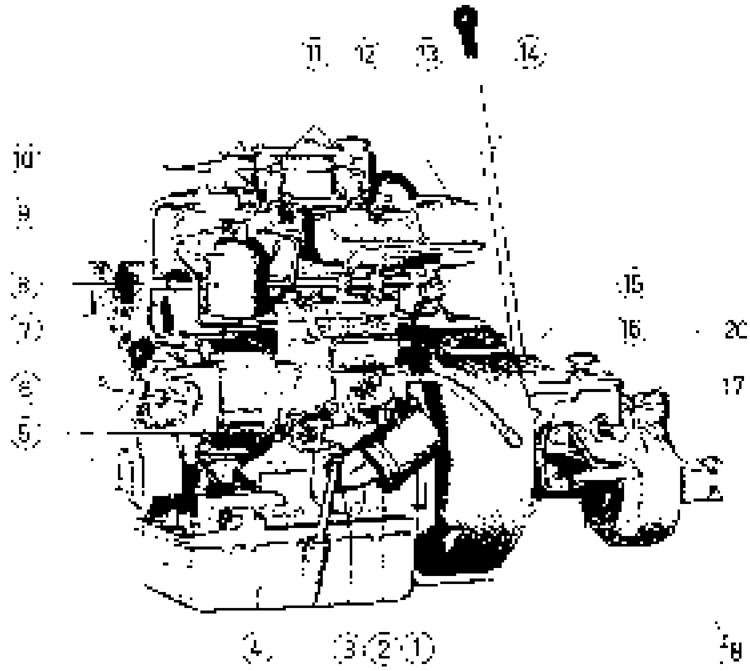


Fig. 1

1 [illegible]
2 [illegible]
3 [illegible]
4 [illegible]
5 [illegible]
6 [illegible]
7 [illegible]
8 [illegible]
9 [illegible]
10 [illegible]
11 [illegible]
12 [illegible]
13 [illegible]
14 [illegible]
15 [illegible]
16 [illegible]
17 Propeller shaft coupling
18 Reduction gear (the engine can be supplied with or without reduction gear)
20 Oil filler cap and venting for reduction gear

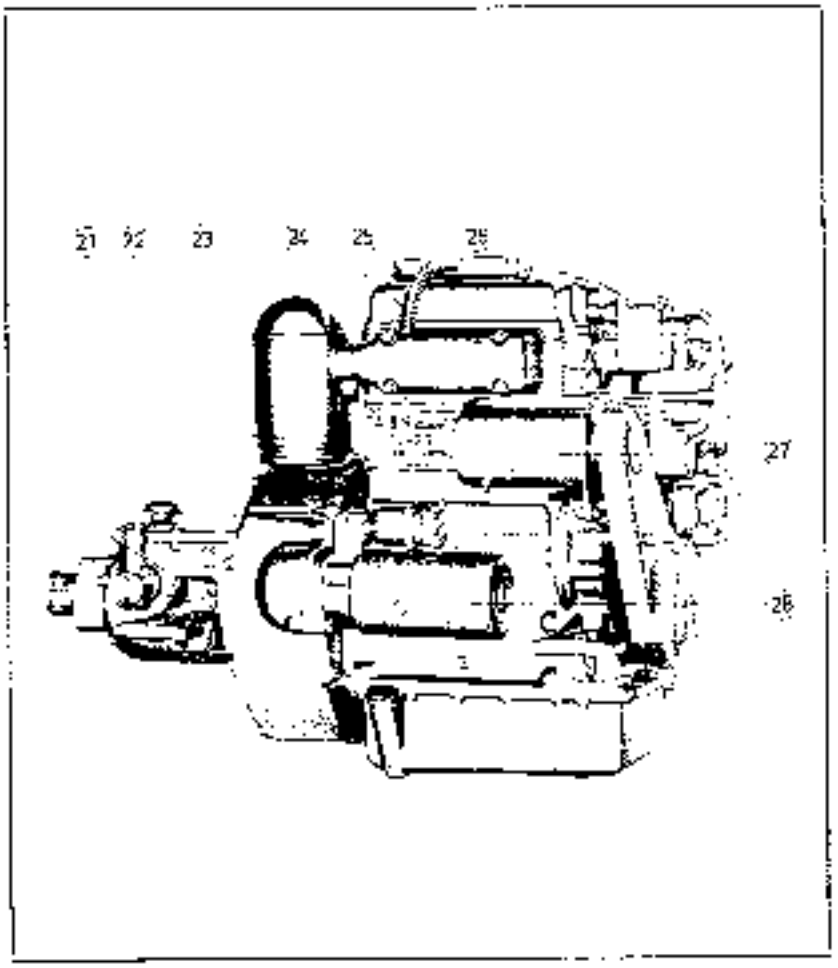


Fig. 2
21 Reverse gear
22 Gearbox operating lever
23 Mounting valve for reverse gear
24 Inlet silencer with oil filter
25 Cylinder head with inlet
26 Inlet manifold
27 Generator
28 Starter

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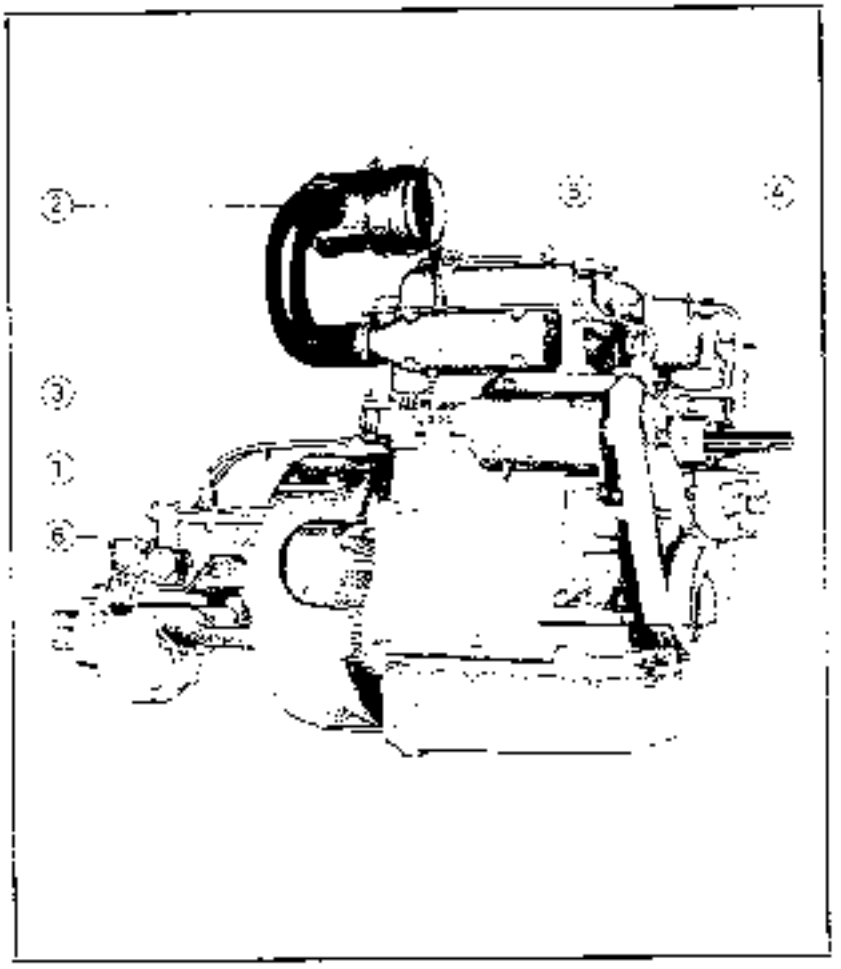


AD-2 Lifeboat version

The ALBIN Model AD-2 is approved as a lifeboat engine. Its design varies to meet the regulations of different countries.

Fig. 3

This engine has

1 Vertical pipe nipples with high-placed pipe connection
2 Inlet manifold intake placed above the engine
3 Start slot
4 Lengthened handstart shaft
5 Generator (can be supplied as optional extra)
6 Screws and plug pricks with special seals

Running

Running-in

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, however, that the engine be run for about 24 hours at about 3/4 of the full load and speed in order to complete the running-in process. Afterwards the oil in the engine and reduction gear must be changed when the engine is warm. Full engine speed should not be used. (see "Maintenance Schedule" Page 27.

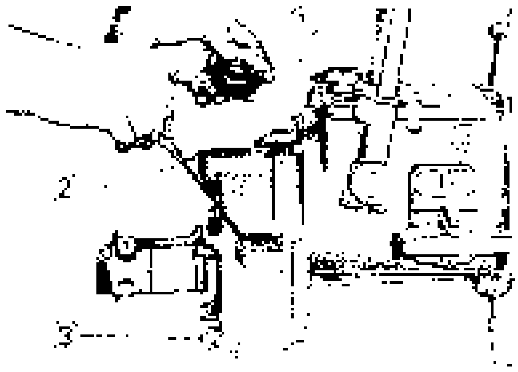


Fig. 4
1 Oil ...
2 Oil ...
3 Oil ...

Preparation

1 Fill the engine with oil through the oil funnel and in the rocker arm box, fig. 1, No. 12. Check the oil level with the dipstick on the port side of the engine, fig. 1, No. 2. (The reverse gear is pressure lubricated from the engine.)

2 Fill the reduction gear with oil through the filler cap, fig. 4, No. 1. Check the level with the dipstick, fig. 4, No. 2.

3 The governor and the injection pump should be lubricated with the same oil as for the engine and reduction gear. The oil is filled through the oil filler cap No. 1 until oil flows from the oil level plug No. 2, fig. 5.

4 Bleed the fuel system. This should be done even if the engine has not been used for a long time or if the fuel tank has been emptied during running. Slacken the banjo bolt, fig. 5, No. 3, on the fuel filter and pump fuel with the hand pump, fig. 5, No. 4, until a stream of fuel free from air bubbles flows from the bolt. Then tighten the bolt. Slacken the bleed screws No. 5 on the injection pump and repeat the procedure, tightening the bleed screws when fuel flows free from air bubbles. Air in the fuel system is the main cause of starting troubles and irregular running. If the fuel system needs frequent bleeding, check fuel pipes, pipe fittings and tank in order to find any air leaks.

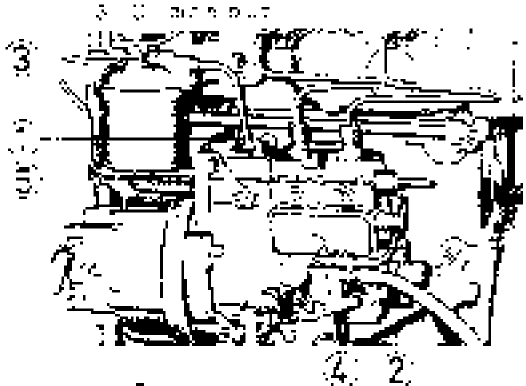


Fig. 5
1 Oil filler cap
2 Oil level plug
3 Banjo bolt
4 Hand pump
5 Bleed screws

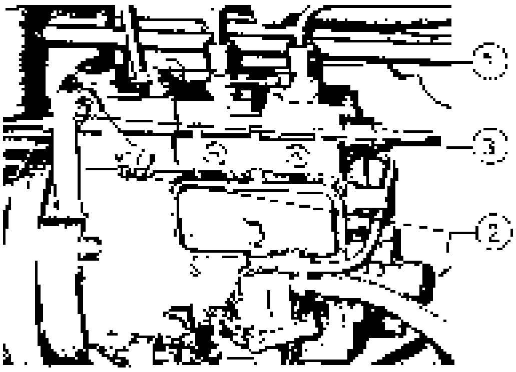


Fig. 6
1 Governor lever (mounted between the injection pump and the engine block)
2 Button for extra starting fuel
3 Stop lever

Before Starting

1 Check the oil level in the engine and reduction gear.
2 Check the fuel level in the tank and open the fuel cock.
3 Open the sea cock and adjust the three way cock on the exhaust pipe for direct discharge overboard.
4 Grease the propeller shaft bearings.

Electrical Starting

1 Put the reverse gear lever in neutral.
2 Insert the ignition key on the instrument panel.
3 Set the governor lever in the centre position, fig. 6, No. 1.
4 Press the button on the pump for extra starting fuel, fig. 6, No. 2.
5 Press the starter button on the instrument panel.

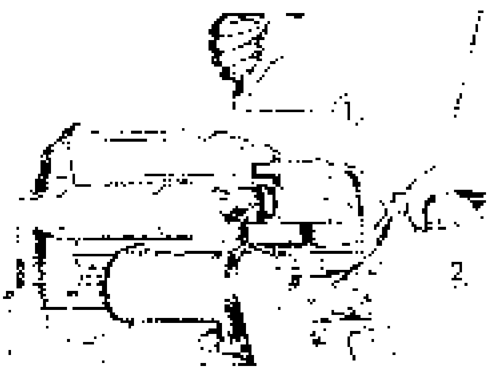


Fig. 7
1 Decompression lever
2 Starting crank

Hand Starting

1 See Nos. 1–3 and 4 above under the heading "Electrical Starting".
2 Set the decompression lever, fig. 7, No. 1, in vertical position.
3 Insert the starting crank, fig. 7, No. 2.
4 Crank the engine as quickly as possible with the starting crank and return the decompression lever to the horizontal position while cranking.

Start Pilot

If the engine has to be started in very cold weather it may be fitted with a "Start pilot" (see fig. 3). Remove the plug on the lower side of the intake pipe and fit the connection pipe for the start pilot. Start the engine at the same time as starting fuel is injected.

After Starting

1. When the engine has started, set the governor to fast idling speed, about 700 r.p.m.
2. Check the oil pressure. The needle of the gauge should register in the green sector.
3. If the engine is electrically equipped, check that the charging control light goes out when the engine revolutions are increased.
4. Set the three-way cock on the exhaust pipe in the middle position and check the cooling water circulation by seeing that the water is discharged overboard.

Manoeuvring

Move the operating lever forward for running ahead and aft for running astern. When manoeuvring, keep the engine speed at about 800 r.p.m. Avoid short movements of the lever as this will cause unnecessary strain on the engine and reverse gear. Also, excessively slow movement of the lever will cause the clutch to slip. There is no risk of the engine racing when manoeuvring from ahead or astern to neutral as the engine is equipped with a centrifugal governor.

Running

At regular intervals when running check the oil pressure, the cooling water temperature and whether the dynamo is charging. The needles of the oil pressure gauge and cooling water thermometer should register in the green sections at all times. The charging control light should glow dimly when the engine is running at low revolutions, but should extinguish when the revolutions are increased. This indicates that the dynamo is charging. The engine is constructed to allow continuous running at maximum revolutions speed of 3,200 r.p.m. But, as shown on the chart, Fig. 9, the fuel consumption is increased considerably when the engine is run at maximum revolutions. This not only applies to the AD-2 but to all engines and is dependent on the increased resistance of the water at higher speeds.

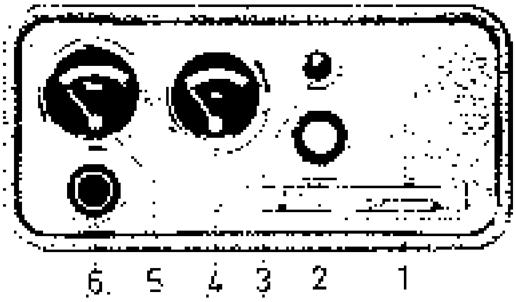


Fig. 8 Instrument Panel
1 Switch box
2 Starter button
3 Charging control light
4 Oil pressure gauge
5 Cooling water thermometer
6 Stop control button

Key positions in switch box

Position	Key inserted	Key pulled out
1	Start current switched on	All current switched off
0 4 2	Start current and instrument panel lighting switched on	Instrument panel lighting switched on
0 2	Start current, instrument panel lighting and other lighting switched on	Instrument panel lighting and other lighting switched on

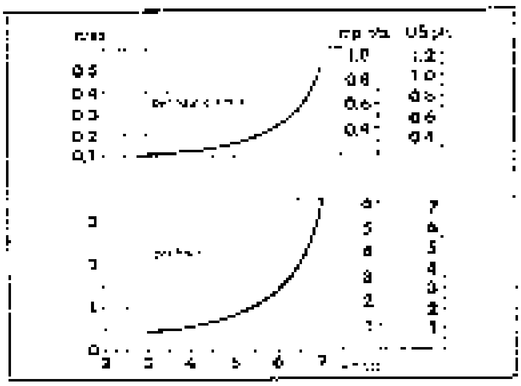


Fig. 9 Fuel consumption for AD-2 with 2:1 reduction gear and 3-blade propeller 17 1/2 x 14" installed in a sailing motor-boat approximately 28' x 8'.

Fig. 10 1 Decompression lever
2 Adjusting screws

Stopping

1. IMPORTANT! Before stopping the engine, move the three-way cock on the exhaust pipe to discharge all the cooling water overboard. This should be done about 1/2 minute before stopping the engine and allows the exhaust pipe to be blown free from water and eliminates the risk of water entering the cylinders.
2. Stop the engine by moving the stop lever, Fig. 8 No. 6, outwards.
3. Switch off the electrical circuit by pulling out the key on the instrument panel. The engine must not be stopped by using the decompressor device otherwise damage will result.

Frost Precautions

1. After the engine has stopped, open the drain cocks on the cylinder block and exhaust pipe. Shut the bottom cock of the three-way cock if there is a cock fitted to the bilge pump inlet. This should also be shut alternatively if the pipe is above the water line.
2. When all the water has drained, start the engine and run it for 1–2 minutes. Tests show that moisture in the pump is turned into ice crystals and this has no detrimental effect while restarting during severe frost. Running with closed cocks on the intake side does not cause damage to the water pump impellers if the above stated time is not exceeded.

Description and Maintenance

General

The **cylinder block** is cast in one piece with centrifugal-cast bores which considerably lengthens the life of the engine.

The cylinder head is also cast in one piece and has replaceable exhaust valve seats.

The decompression device is built into the valve cover. By moving the lever, fig. 10, No. 1, to the vertical position, two adjusting screws, No. 2, are pressed against the exhaust valve rocker arms, the exhaust valves open and the engine is decompressed. See "Hand Starting", Page 8. To adjust the decompression device, both the exhaust valves should be closed. Tighten the adjusting screws against the rocker arms and then screw them down ½ to ¾ turn. Locking the screws with the lock nuts.

The **crankcase ventilation** is closed to prevent the escape of unpleasant fumes. The fumes are sucked back into the engine from the valve cover to the manifold inlet pipe through the reinforced plastic hose. A filter is fitted on the upper side of the valve cover.

The filter, fig. 11, No. 1 should be cleaned after about 300 hours.

The **valves** should be adjusted when the engine is cold. The valve clearance should be 0.3 mm/0.012" for both the inlet and exhaust valves.

The **exhaust valves** have stellite faces. Stellite is a very hard metal between 380 and 420 HV which has excellent resistance to corrosion at high temperatures. The valve spindles are hard chromium plated.

The **inlet valves** are fitted with rubber sleeves to stop lubricating oil from leaking down the valve spindles into the cylinders.

The **pistons** are of light alloy and are fitted with three compression rings and two oil scraper rings. The top compression ring is hard chromium plated.

The **crankshaft** is manufactured from nodular iron, a material which is excellent for crankshafts as nodular iron combines the strength of steel with the fine bearing qualities of the gray cast iron.

The **main bearings** consist of bearing shells of trimetal [illegible].

The **connecting rods** are drop-forged and supplied with lead bronze bushings and bearing shells of trimetal [illegible].

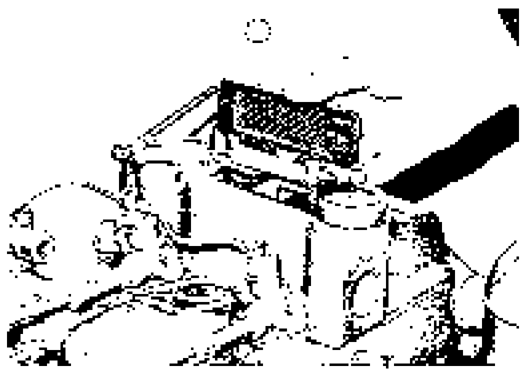


Fig. 11 1. Filter for crankcase ventilation

Fig. 12 Valve Adjustment

Fig. 13 Removal of [illegible] for [illegible] the crankshaft

The **camshaft** is [illegible] with hardened cams.

The engine is fitted with a large **inlet silencer** (fig. 7) with filter which should be cleaned after about 300 hours running.

Fuel system

The injection pump is mounted on the port side of the engine and is driven by the crankshaft gear wheels.

The governor which is combined with the injection pump is of the all-speed centrifugal type and prevents the engine from racing in the event of the load being suddenly removed.

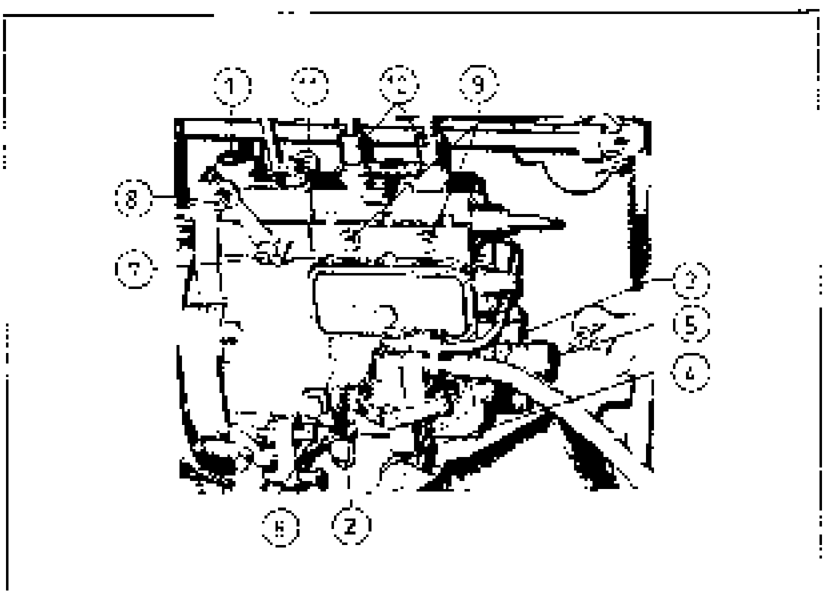


Fig. 14 Injection pump

1. Oil filler plug
2. Oil drain plug
3. Oil level plug
4. Fuel regulating hand lever
5. Connection for tachometer
6. Adjusting screws for idling and max. speed
7. Press button for extra starting fuel
8. Shut-off device
9. Bleed screws
10. [illegible]
11. [illegible]

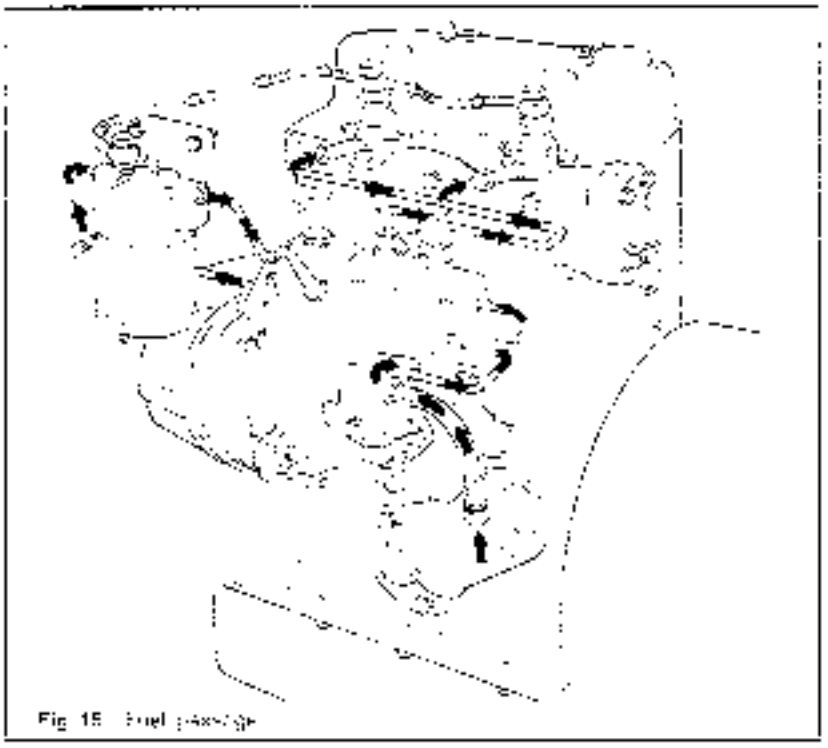


Fig. 15 Fuel passage

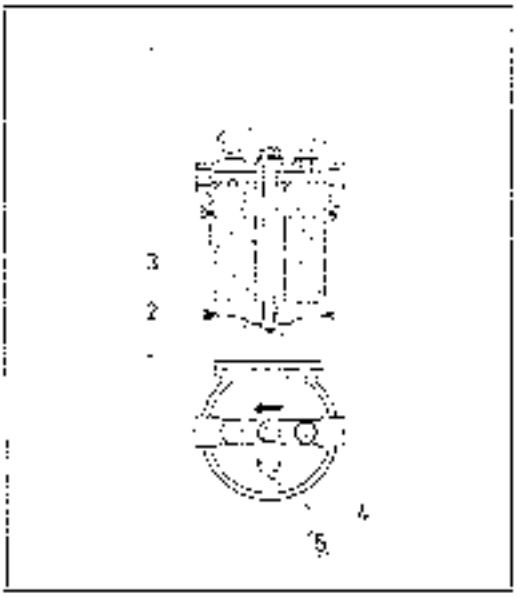


Fig. 16 Fuel filter

1 Filter retaining bolt
2 Cover base
3 Filter cartridge
4 Bleed screw
5 Groove for return flow

Fuel filter

The dual element cartridge cannot be cleaned but not to be replaced. By undoing the retaining bolt (Fig. 16 No. 1) cover (2) can be removed and the filter cartridge (3) replaced by unscrewing the bleeding for fuel system, use screw (4). This must be bled each time the filter cartridge is changed to extract air from the system. Nipple (5) is for the return excess fuel from the injectors. Normally the filter should be replaced after about 500 hours running. If dirty fuel is used then the filter cartridge will require changing more frequently.

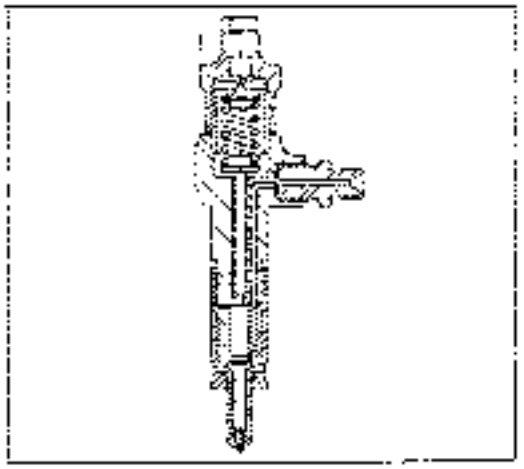


Fig. 17 Injector in section

Fig. 18 Injection timing and T.D.C. are marked on the flywheel. By removing the cover to which the inner eye bolt is fitted on top of the flywheel bell housing these marks are easily visible.

Injector

The injector is responsible for injecting fuel at exactly the right moment in spite of the high pressure in the cylinder. The fuel flow which is assisted by the fuel pump is borne through a hole in the nozzle holder cover to the nozzle. When the correct pressure is reached the needle rises and allows the fuel to pass through four very fine holes. These carefully created nozzle holes, together with the well designed combustion chamber, ensure perfect atomisation of the fuel and consequently a very clean exhaust.

NOTE: NO SERVICING OR ADJUSTMENT TO THE INJECTION EQUIPMENT MUST BE CARRIED OUT BY ANYONE OTHER THAN A DIESEL SPECIALIST.

The fuel filter cartridge can be replaced by the user but for other adjustments we recommend that a diesel workshop be contacted.

Fuel

The Model AD-2 is a fast running diesel and requires a fuel with cetane index 45 which is suitable for fast running engines. It may be some fuels used in trucks, buses and other high speed automotive diesel engines. There is a great risk of the injectors carbonising resulting in imperfect combustion if unsuitable fuel is used.

Lubricating system

The engine and reverse gear are lubricated by means of a common lubricating system. It is sufficient to check the oil level in the engine, thus ensuring the reverse gear is also lubricated. In the oil sump there is a strainer through which the oil passes before it is sucked up into the lubricating oil pump. This is a gear pump with relief valve. The oil is then forced through an oil filter of the full flow type. Consequently all lubricating oil passes through the filter and oil delivery channels before it reaches the different parts to be lubricated. If the filter is clogged, thus the cartridge requires replacing, but a relief valve will open and the engine will be lubricated direct from the oil pump. Should the oil pressure fall, it could mean that the lubricating oil filter is clogged.

Checking of oil level

Before starting, check the oil level every day with the dipstick at the port side of the engine (fig. 1, No. 3). If the oil level does not reach the lower mark on the dipstick, oil must be poured into the oil filler plug on the valve cover of the engine (fig. 1, No. 12).

The oil consumption will be exceptionally high if the oil level is above the top mark on the dipstick.

The oil capacity of the engine/reverse gear including that of the lubricating oil filter is 3.3 litres (5.8 Imp. pints, 7.0 US pints).

Engine and reverse gear oil change

The oil should be changed every 100 hours or once per season if shorter. However during the running-in period, the oil should be changed every 25 hours and it should always be done while the engine is hot. During the running-in period (about 100 hours) the lubricating oil consumption is higher than normal and therefore has to be checked more often. The oil is removed by being sucked out through the oil dipstick hole by means of the oil bilge pump supplied in the tool kit with the engine.

NEVER USE FLUSHING OIL

Suitable oils

Quality	Service DM
Viscosity at temperatures between —10° C and +10° C (14° F and 50° F)	SAE 20
at temperatures above +10° C (50° F)	SAE 30

BP	Energol Diesel SI
Caltex	RPM Delo Super Special
Castrol	Deusol CR 30
Esso	Essolube HDX
Gulf	Gulflube Motor Oil HD
Mobil Oil	Mobil DTE Marine Oil No. 8/30
Shell	Rotella T 30
Valvoline	Super HPO

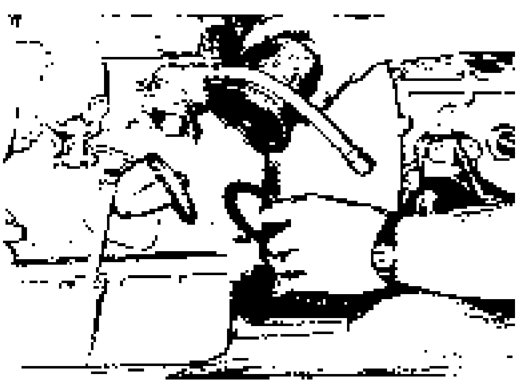


Fig 18 Replacing of the filter

Replacing of the filter cartridge

The lubricating oil filter cartridge cannot be cleaned and must be replaced (fig. 18) every 300 hours or once every season.

1. Remove the old filter cartridge.
2. Oil the gasket of the new filter cartridge and check that the facing surfaces are clean and undamaged.
3. Tighten the filter cartridge carefully by hand and wipe off any oil around the filter.
4. Run the engine and check that there are no oil leaks.

Reduction gear oil change

The reduction gear, if fitted, is lubricated separately. Oil should be filled up to the dipstick mark. Check the oil level each time the oil level in the engine is checked. Change the oil every 300 hours, but during the running-in period, it should be changed after the first 25 hours. Change the oil while the engine is warm. Drain the oil through the plug at the lower part of the gearbox (fig. 4, No. 2). Use the same oil as for the engine. The reduction gear contains 0.25 litres of oil (0.44 Imp. pints, 0.53 US pints).

Injection pump and governor oil change

The governor and injection pump have the same oil supply. Change the oil while the engine is warm every 100 hours or once every season, by draining it through the plug (fig. 14, No. 2) fitted under the pump. Fill up through the oil filler plug on the top of the pump (fig. 14, No. 1), until oil flows from the oil level plug (fig. 14, No. 3) using the same oil as for the engine.

Cooling system

The engine is fitted with a water cooled [illegible] cooling water pump is mounted on the forward end of the engine and is coupled to the auxiliary drive shaft. They are [illegible] pumps with rubber impellers which are capable of handling [illegible].

The [illegible] bilge pump is capable of delivering, [illegible] 15 litres (30 [illegible] pints, 18 US pints) per minute at full speed and approximately 4 litres (7 [illegible] pints, 8.6 US pints) per minute at [illegible]. If there is no water in the sump the pump will be lubricated by water entering through a hole in the wall between the cooling water pump and the bilge pump.

The pumps are fitted with Teflon impregnated nylon bearings which are [illegible] affected by wear.

A damaged impeller will probably cause the cooling water supply to stop. This can happen if the engine is run too long without a water supply (e.g. impeller has broken. See "Fault Finding" page 10). If damaged, the impeller must be replaced and this can be accomplished by removing the pump cover, the bilge pump and the wear [illegible] between the pumps (see Fig. 21).

The thermostat is enclosed in the thermostat housing. By removing the hose cover the thermostat is accessible for replacement (Fig. 22). Cooling water is distributed by the distributor so that the engine block and cylinder head reach the proper working temperature.

From the connection No. 9 Fig. 20 a pipe must be taken to a three-way cock which should be fitted to the exhaust pipe (see Installation Drawing on Page 20). The cooling system has to be checked about every 400 hours or once every season. The checking should include a test thermostat, pipes and temperature gauge.

Fig. 20
1 Inlet with non return valve — bilge pump
2 Outlet — bilge pump
3 Inlet — cooling water pump
4 Outlet — cooling water pump
5 Distributor cooling water pipe — engine thermostat
6 Cooling water pipe to engine exhaust manifold
7 Cooling pipe to the heater
8 Thermostat housing
9 Connection for cooling water pipe to three-way cock on exhaust pipe

17

Fig. 21 Water pump impeller replacement
1 Impeller

Electrical system

The engine is fitted with a 12-volt electrical system.

It is supplied with a starter of 1.3 h.p. 60 watt (5 amp) generator, voltage cut-out and regulator and instrument panel as standard.

If extra output is required, a 480 watt (40 amp) alternator can be fitted in place of the standard 60 watt (5 amp) generator. This has the advantage of charging even when the engine is idling.

Fig. 22 Thermostat replacement

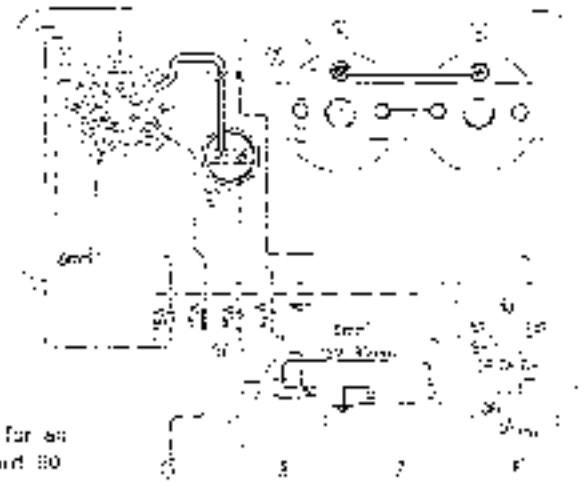


Fig. 23

Wiring diagram 2K-250 for an engine with the standard 80 watt (11 amp) generator.

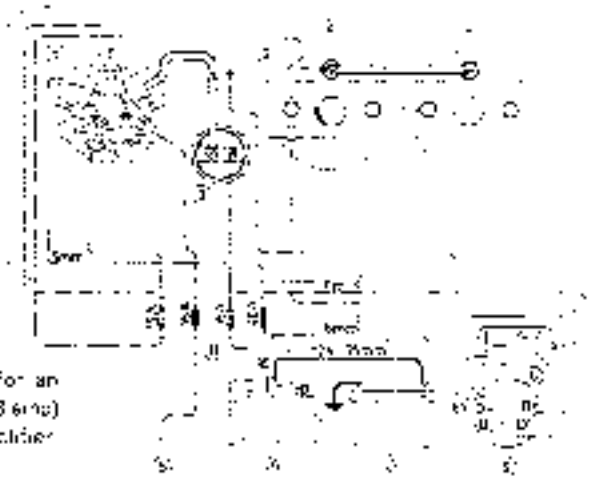


Fig. 24

Wiring diagram 2K-251 for an engine with a 490-watt (38 amp) alternator and built-in rectifier

1 Switch box
2 Charging control light
3 Starter button
4 Instrument lights
5 Lighting
6 Starter
7 Battery
8 90-watt (11 amp) generator
9 490-watt (38 amp) alternator. NOTE. The alternator must not be run unless it is connected to the ship's electrical system and battery
10 Voltage control cut out regulator
11 Fuse box
Engine block

The cable cross section area should be 2.5 mm² (0.004 sq. in.) if not otherwise stated. If cable length exceeds 5 meters (16') a larger cable area should be used

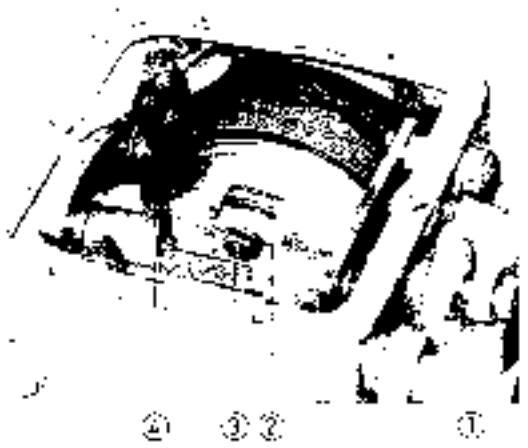


Fig. 25 Adjusting screw and locknut for neutral position
2 Adjusting ring for gear clutch
3 Locking set-bolt for adjusting ring
4 Adjusting screw and locknut for astern band

Reverse Gear

The reverse gear is of the planetary type with a built-in neutral position. It is lubricated with oil from the engine.

Adjustment for running ahead

Adjustment of the gear clutch for running ahead is carried out by turning the adjusting ring (fig. 25, No. 2) clockwise after slackening the locking set-bolt No. 3. Usually it is sufficient to turn the ring so that the locking set-bolt fits into the first or second notch after the previous one used. Then tighten the locking set-bolt.

NOTE. Check the adjustment after the first 50 hours running.

Adjustment for running astern

Slacken the locking nut on the adjusting screw No. 4. Turn the screw ½ to ¾ turn clockwise which is a normal adjustment. Tighten the locking nut.

Adjustment of neutral position

Slacken the locking nut on screw No. 1. Have the engine running with the operating lever in the neutral position. Turn the screw clockwise or anticlockwise until the propeller shaft stops rotating and tighten the locking nut. NOTE. This adjustment must be carried out when the engine has reached its normal working temperature.

If the engine is installed in a sailing vessel, mark clearly the position of the propeller blades on the propeller shaft coupling. When sailing, turn the propeller shaft so that the propeller blades are vertical and hidden behind the stern post, then lock the propeller shaft in this position by moving the operating lever in the position for running ahead. The propeller then gives minimum drag in the water. If the propeller shaft rotates when sailing, it causes damage. The reverse gear is pressure lubricated from the engine and if the engine is not running, the reverse gear is not lubricated.

Reduction gear

The engine can be supplied with three different ratios:
Direct drive 1:1 ratio
Reduction gear 2.1 ratio
Reduction gear 2.71 ratio

By selecting the correct ratio, an engine can be supplied with the correct number of propeller revolutions suitable for your boat. A small light boat can be fitted with direct drive, but a heavier boat should have reduction gear in order to obtain good propeller efficiency.

The reduction gear is not lubricated by the engine lubricating system (see "Lubricating system", Page 16).

Anti-corrosive treatment

When an engine is not run for a long period, e.g. during the winter, corrosion damage can occur in both the combustion and cooling systems. Engine life can be considerably extended by thorough anti-corrosive treatment.

Internal components

Run the engine until it has reached normal working temperature. Drain the oil from the engine, oil filter, governor/injection pump and reduction gear. Pour in anti-corrosive oil. Empty the fuel tank and pour in a small quantity of anti-corrosive fuel. Start the engine and run it for about 10 minutes. Stop the engine and drain the anti-corrosive oil from the engine, governor, injection pump, oil filter and reduction gear. Empty the fuel tank and fuel filter. Cover intake and exhaust pipe openings.

Anti-corrosive oil

Shell	Ensis Oil 30
Esso	Rust Ban 625
Gulf	Gulf NO-Rust Engine Oil No. 1
Caltex	Preservative Oil 30
BP	Energol Protective Oil 30
Castrol	Castrol Storage Oil
Mobil Oil	Mobil Kote 503
Valvoline	Tectyl 876

Anti-corrosive fuel

Shell	50 % Ensis Oil 10 W. 50 % white spirit
Esso	½ Rust Ban 623, ½ Autodiesel
Gulf	Gulf Calibrating Oil 45A
Caltex	Rustproof Oil
BP	Energol LM or Energol LM-C
Castrol	Castrol Calibration Oil 6327
Mobil Oil	Mobil Kote 205
Valvoline	½ Tectyl 875, ½ Autodiesel

Anti-corrosive oil — Cooling jackets

Shell	Donax C
Esso	Rust Ban 392 (not emulsifying)
Gulf	Gulf Cut 51 A
Caltex	Rarusolex
BP	Soluble Oil SH Energol SB 4
Castrol	Dilkool 5 (5 %)
Mobil Oil	Solvac 2 (emulsifying) Mobil Kote 200 (not emulsifying, water supersed ng)
Valvoline	Tectyl 91 D Base

Cooling jackets

Unscrew the connection between the cooling water pipe and thermostat cover and remove the cover, thermostat and cooling water pipe. Plug the openings in the pump and outlet pipe (see Page 17). Open all drain cocks and let out the water. Close the cocks and pour anti-corrosive oil into the thermostat housing until the whole system is filled. Replace the thermostat cover.

NOTE: The cooling water pump and bilge pump must not come into contact with the anti-corrosive oil. They are made wholly of stainless material and the rubber impellers could be damaged by the anti-corrosive oil.

Electrical units

The electrical units, such as the starter and generator, are preserved by lacquers so that they can be stored in damp and cold air. It is not necessary, therefore, to remove these units from the engine to be stored in a heated room. Every second year the electrical units should be overhauled by a specialised workshop.

When preparing the engine for use again

Draw off the anti-corrosive oil from the cooling jackets and refit the thermostat and all pipes. Fill up with lubricating oil to the required amount and ensure that there is fuel in the tank, and the engine is ready to be operated.

MAINTENANCE SCHEDULE

		Daily	Every 100 hours [1]	Every 200 hours [1]	Every 300 hours	Every 400 hours	Every 1000 hours
Lubrication	Check the oil level in engine	×					
	Check the oil level in reduction gear	×					
	Change the oil in engine		×				
	Change the oil in reduction gear				×		
	Change the oil in governor and injection pump		×				
	Change the lubricating oil filter cartridge				×		
Fuel system	Change the fuel filter				×		
	Check the injectors					×	
Cooling system	Check the cooling system					×	
Electrical system	Check the acid level in the battery	×					
	Check the generator and starter						×
Reverse gear	Check the reverse gear		×				
General inspection and overhaul							
	Check the valve clearance			×			
	Clean the inlet silencer			×			
	Clean the oil strainer						×
	Clean the crankcase ventilation system				×		
	Decarbonise and grind the valves						×

[1]) or at least once every season

Installation

1 Operating lever. Operating power on lever tip: Ahead 8 kg. (17.5 lb), astern 7 kg. (15.5 lb). Torque max. 4.4 kgm (32 ft. lb.)

2 Connection for start pilot

3 Governor lever. Length 143 mm (5 ⅝"). Angular movement 30°. Torque 0.5 kgm (3.5 ft. lb.)

4 Injection pump stop lever. Length 45 mm (1 ¾"). Angular movement 87°. Torque 0.04 kgm (0.3 ft. lb.)

5 Connection for cooling water thermometer, ½" BSP

6 Connection for exhaust pipe 1½" BSP

7 Three-way cock for cooling water outlet. Connection for rubber hose with ¾" internal diameter

8 Connection for oil pressure gauge, ⅛" BSP

9 Connection for fuel feed pipe, diameter 7.5 mm (¼")

10 Connection for tachometer SAE regular drive

11 Bilge pump inlet. Connection for rubber hose with ½" internal diameter

12 Cooling water inlet. Connection for rubber hose with ¾" internal diameter

13 Bilge pump outlet. Connection for rubber hose with ½" internal diameter

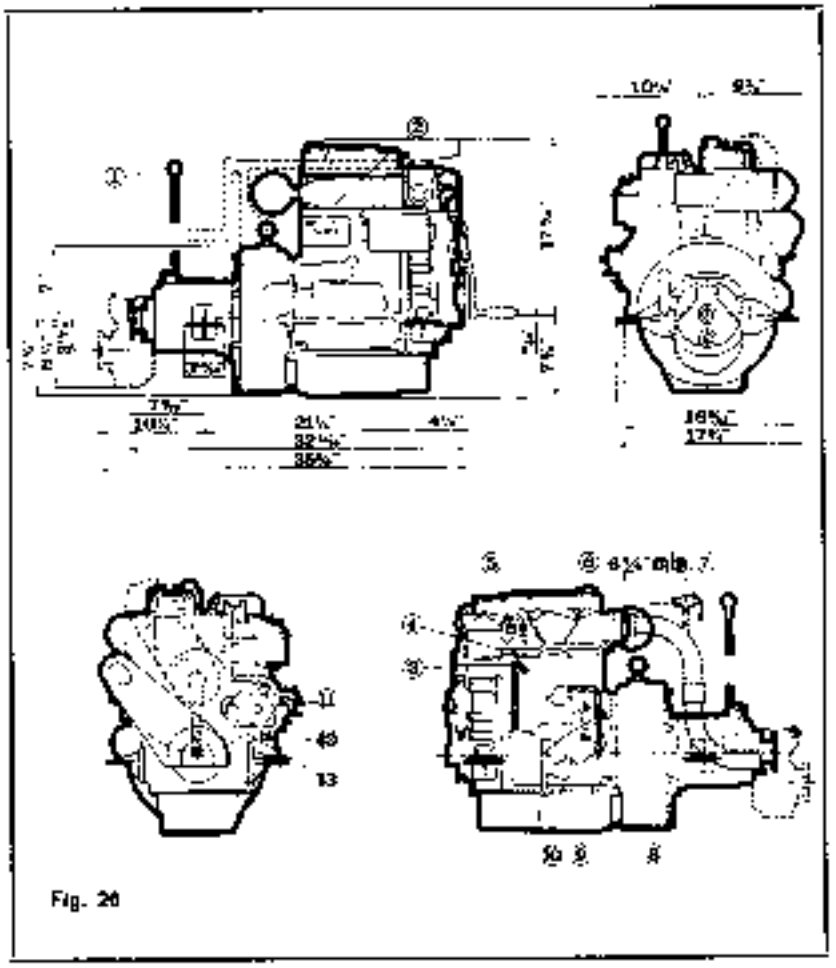


Fig. 20

General

To get the best out of your engine, correct installation is essential. The engine is carefully tested before leaving the factory and many faults arise due to bad installation. You are advised therefore, to contact a boatyard to check the installation by skilled marine engineers.

Engine bed

The engine bed should be robust and, if possible, of oak, the weight being spread over as many timbers as possible.

The bed should be fixed to the hull by through-bolts.

Mounting

As standard, the engine is delivered with fixed mountings, but it can also be delivered with rubber mountings.

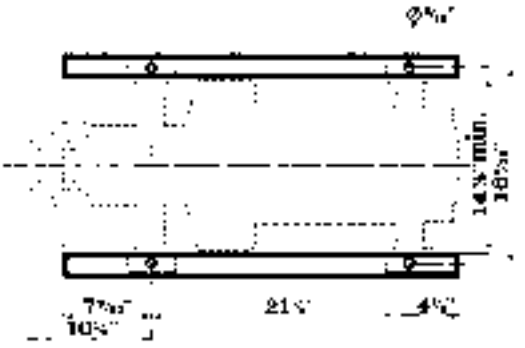


Fig. 27 Engine bed
The same engine bed can be used for fixed mounting and rubber mounting due to easily exchangeable mounting brackets.

Engine compartment

A series of tests has been carried out and, as a result, an effective sound insulating engine case has been designed. Fig. 28 shows the recommended design which has given good test results.

To obtain optimal insulation, it is advisable to place a bulkhead on each side of the engine. These bulkheads should cover the whole space from the cabin floor down to the planking and, of course, they have to be lined with the same sound insulating material as the engine case. In order to provide the engine with sufficient air, it is necessary to fit a 2" internal diameter rubber hose through the bulkhead aft.

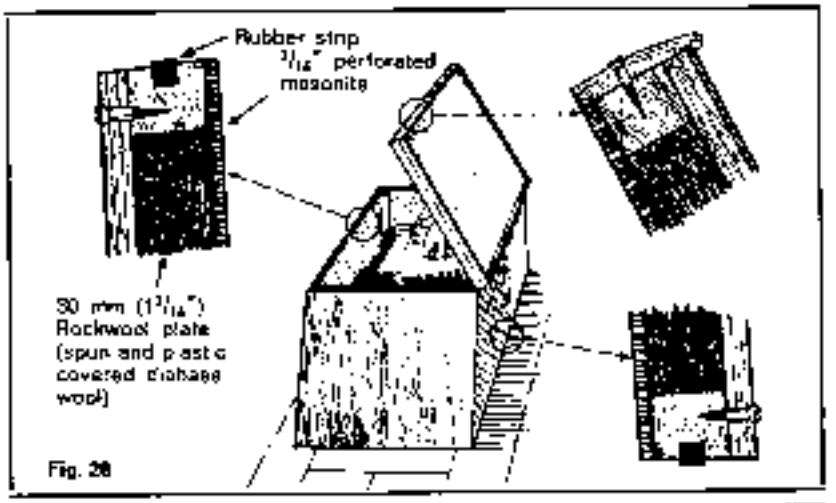


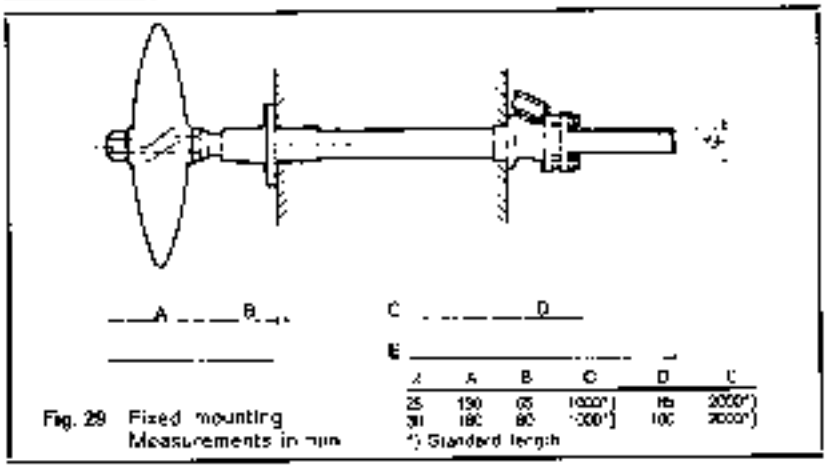
Fig. 28

Propeller Equipment

A flexible propeller shaft coupling must be used for a rubber mounted engine which has fixed stern bearings. If the propeller shaft between the inner stern bearing and the coupling is shorter than 0.3 m (12") it is also necessary to use flexible mounted bearings.

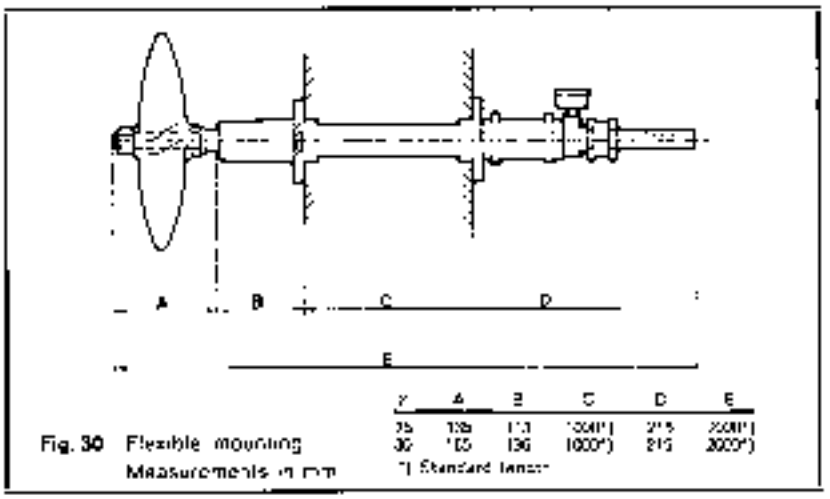
Propeller

Vibrations can be caused by too small a propeller aperture. The measurements given in fig. 31 should not be reduced. ALBIN MOTOR will make a propeller calculation for a special installation without charge on request.



	A	B	C	D	E
25	150	65	1600*)	150	2000*)
30	180	80	2000*)	100	2000*)

Fig. 29 Fixed mounting
Measurements in mm
*) Standard length



Y	A	B	C	D	E
25	105	113	1000*)	215	2000*)
30	105	130	1000*)	215	2000*)

*) Standard lenght

Fig. 30 Flexible mounting
Measurements in mm

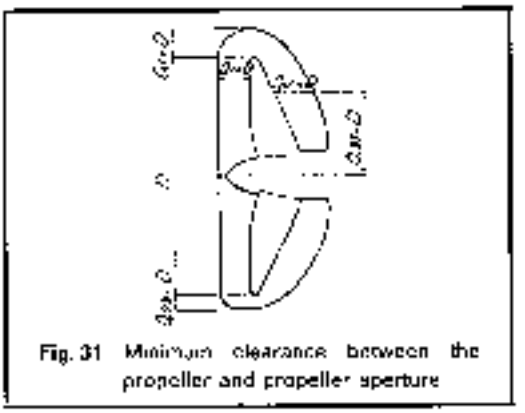


Fig. 31 Minimum clearance between the propeller and propeller aperture

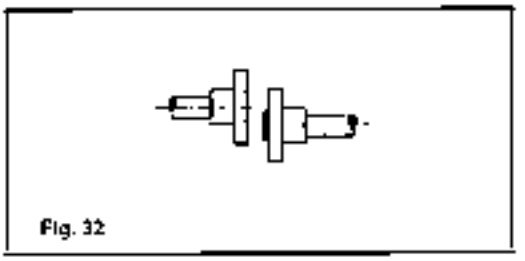


Fig. 32

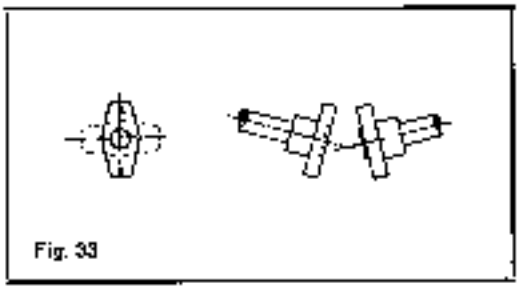


Fig. 33

Alignment

Check the alignment of the engine and propeller shaft two/three days after launching. This is particularly important for engines with fixed propeller shaft couplings. Loosen the coupling bolts and separate the coupling halves slightly.

1 Check for misalignment between the centre lines by drawing the halves apart so that the guide boss and recess are free. When pressed together, the guide boss and recess should fit. See fig. 32.

2 Check the angle and centre lines by inserting a feeler gauge, 0.05 mm (0.002") between the halves. Press them together so that the feeler gauge touches. This measurement check must be made both in the horizontal and vertical plane. The couplings should then be rotated and checked at 90° intervals.

Fuel system installation

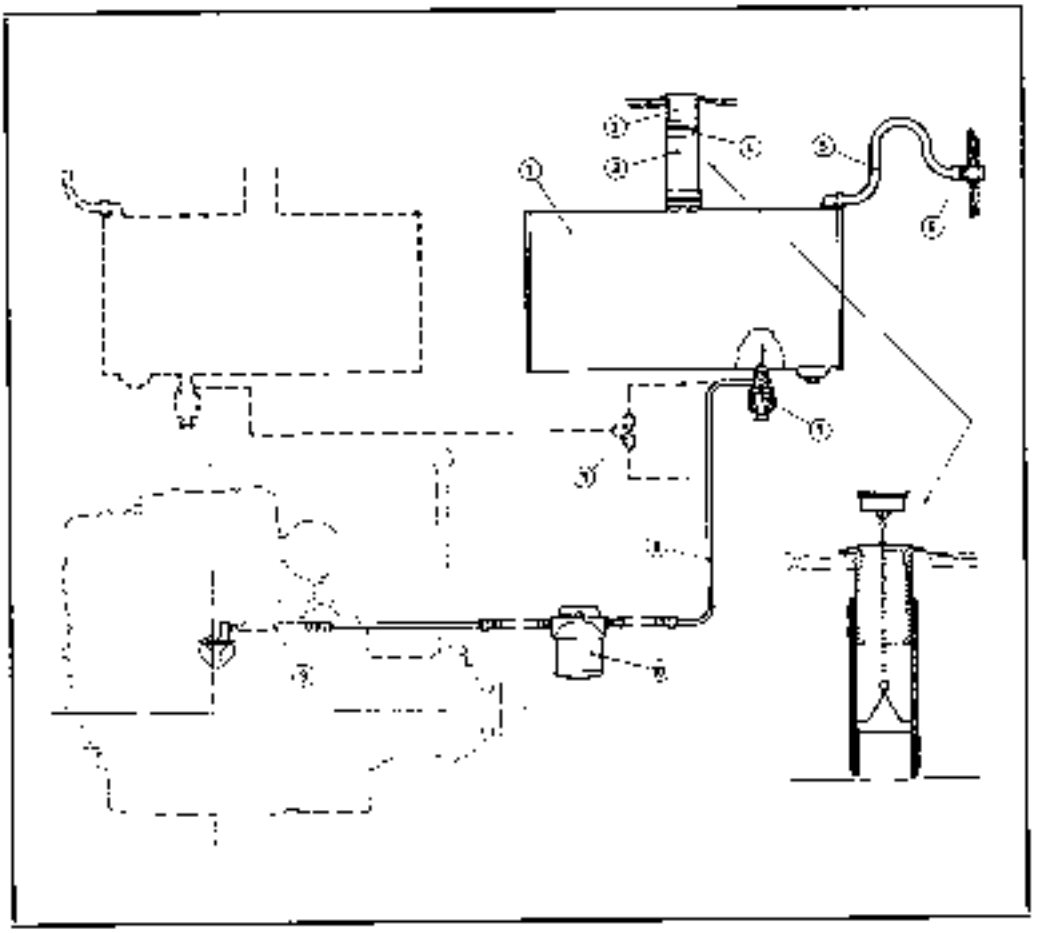


Fig. 34
1 Fuel tank
2 Tank filler cap
3 Tank filler neck
4 Hose clamps
5 Vent pipe
6 Skin fitting for vent pipe with filter
7 Fuel cock
8 Fuel pipe
9 Flexible hose between engine and fuel pipe
10 Coarse filter
11 T-pipe

Cooling water installation

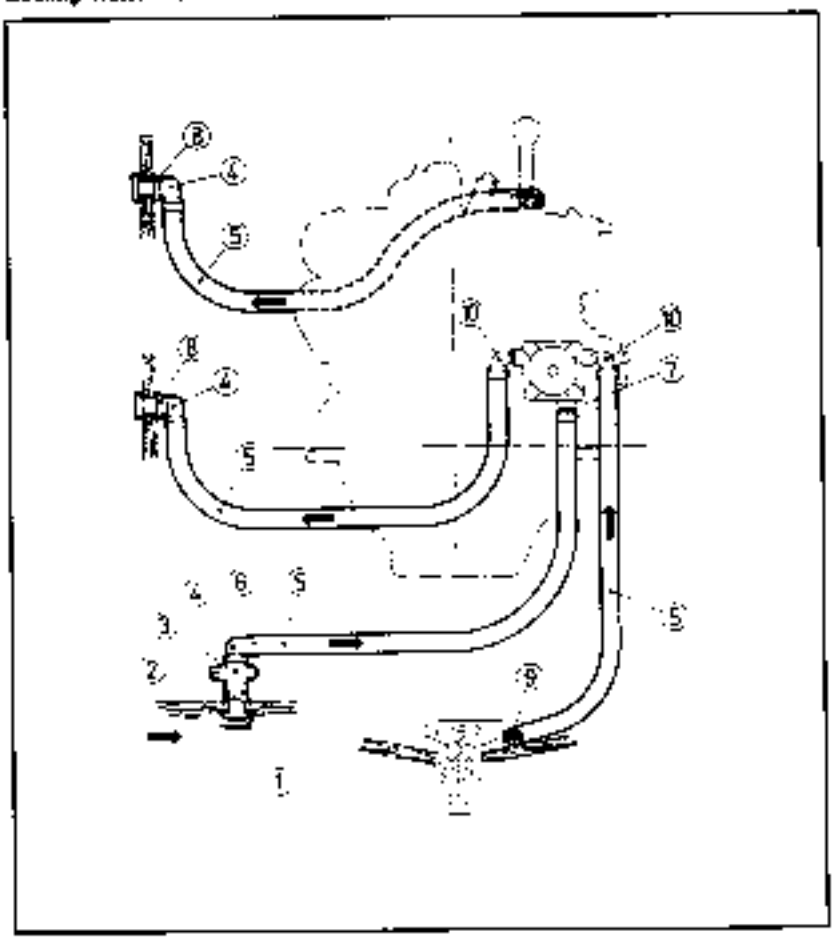


Fig. 35

1 Strainer
2 Inlet skin fitting
3 Sea cock
4 Union
5 Rubber hose
6 Hose clamp
7 Inlet union for cooling water pump
8 Outlet skin fitting
9 Strainer for bilge pump
10 Union

Exhaust system installation

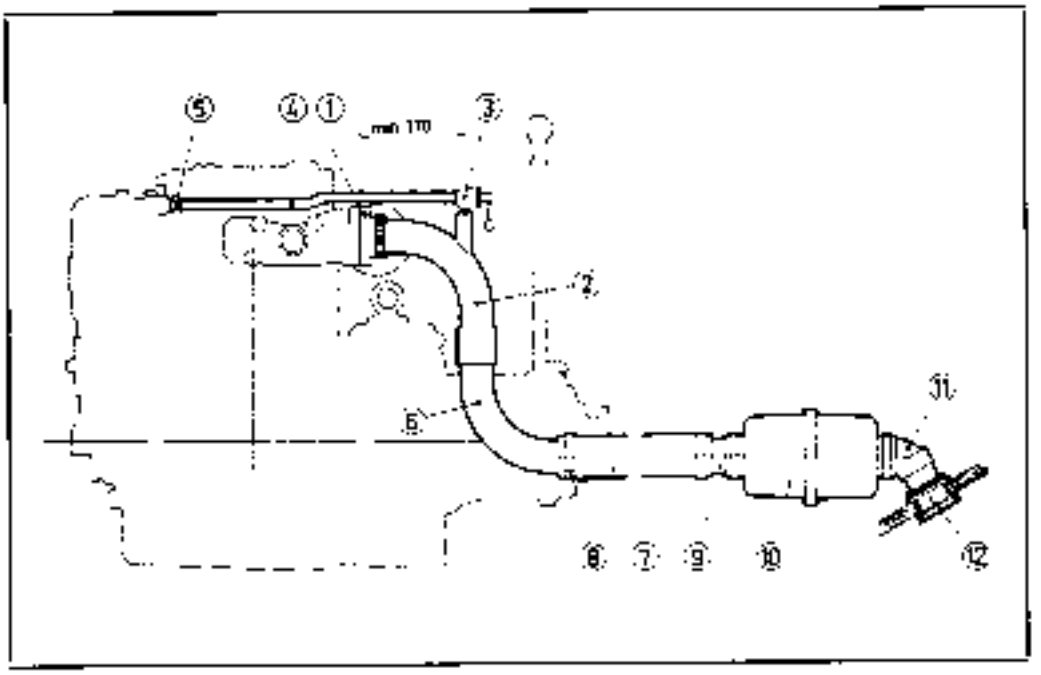


Fig. 36

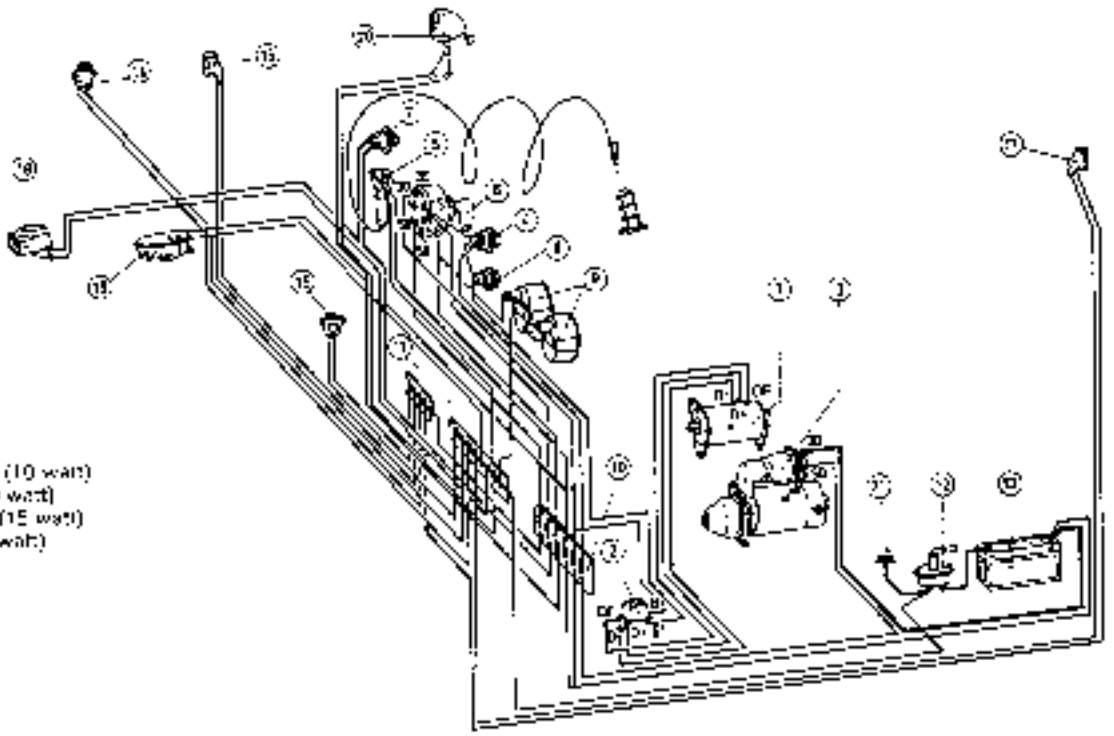
1 Exhaust pipe flange
2 Bend
3 Three-way cock for cooling water outlet
4 Pipe from thermostat to three-way cock
5 Connection at thermostat
6 Bend
7 Heat resistant rubber exhaust hose
8 Hose clamp
9 Silencer connection
10 Silencer of neoprene rubber
11 Connection to skin fitting
12 Exhaust pipe skin fitting

When a special heat resistant rubber exhaust hose is used, cooling water must be passed out through the exhaust system at the time. If a neoprene rubber silencer is used, it must be mounted at least 90 cm (36") from the flange of the exhaust manifold and the space between the cooling water inlet and the silencer must be at least 60 cm (24"). The silencer must not be installed close to the hull, rudder, etc. but must be freely suspended.

Electrical system

Fig. 37

1 Generator
2 Voltage cut-out regulator
3 Starter motor with solenoid
4 Starter button
5 Connection for inspection lamp
6 Switch box and key
7 Horn button
8 Charging control light
9 Instruments with lights
10 Fuse box
11 Distribution terminals
12 Main switch
13 Battery
14 Starboard light — green (10 watt)
15 Port side light — red (10 watt)
16 Mast head light — white (15 watt)
17 Stern light — white (15 watt)
18 Fog horn
19 Interior lighting
20 Search light
21 Fog horn relay



Battery

Standard capacity 12-volt 42 amp/hr

Electrical wires

Ensure that the wires are of the correct thickness. For all lighting a two-wire with an area of 2.5 mm² (0.004 sq.in.) should be used. Should the length of wire exceed 5 m (16'), a thicker wire must be used. The feeder cable from the battery is a single wire 6 mm² (0.01 sq.in.) and the wire between the battery and starter and between the engine body and battery is a single wire 35 mm² (0.055 sq.in.).

Technical data

Output SAE hp/rpm	22/2200
Output DIN-hp/rpm	16/2200
Torque max. kgm/rpm (ft lb/rpm)	5.3/2000 (37.6/2000)
Bore, mm (ins.)	90 (3.54)
Stroke, mm (ins.)	82 (3.23)
Swept volume, litres (cu in.)	1.044 (63.7)
Compression ratio	17.5:1
Compression pressure kg/cm² (psi) at 320 rpm	21 (300)
Revolutions, idling, rpm	550
Engine rotation (seen from the stern)	
without reduction gear	Anti-clockwise
with reduction gear 2.1 and 2.7:1 respectively	Clockwise
Maximum inclination	13°
Valve clearance, cold engine	
Intake, mm (ins.)	0.3 (0.012)
Exhaust, mm (ins.)	0.3 (0.012)
Decompression device, pressing down of valves (number of turns of the adjusting screws)	½—¾
Weight kg (lb)	235 (520)

Fuel system

Combustion system	Direct injection
Injection pressure kg/cm² (psi)	185 (2950)
Injection timing (marked on the flywheel)	23° before TDC
Feed pump, suction lift m (ft)	1.5 (5)
Fuel: diesel oil with cetane index	45

Lubricating system

Oil quantity, engine — reverse gear, litres (imp./US pints)	
excluding oil filter	3 (5.3/6.35)
including oil filter	3.3 (5.85/7.0)
Oil quantity, reduction gear, litres (imp./US pints)	0.25 (0.44/0.53)
Oil quality	Service DM
Viscosity	
Temperature —10°C up to —10°C (14°F —50°F)	SAE 20
Temperature —10°C and above (50°F)	SAE 30
Oil pressure by warm engine kg/cm² (psi)	2—3 (28—43)
Oil pressure, minimum, kg/cm² (psi)	0.5 (7)
Lubricating oil filter	Fram PH-966

Cooling water system

Thermostat begins to open	77°C (170°F)
Bilge pump	
capacity at idling, litres/min (imp./US pints)	4 (7/8.5)
capacity at full load, litres/min (imp./US pints)	15 (26/31.5)

Electrical system

Battery voltage, volt	12
Battery capacity amp/hr	43
Starter output, hp	1.3
Generator output, watt (amp)	90 (11)
Alternator output, watt (amp)	490 (38)

Recommended torque

Cylinder head nuts, kgm (ft. lb)	10 (72)
Connecting rod bearing bolts, kgm (ft. lb)	5.2 (37)
Main bearing bolts, kgm (ft. lb)	10 (72)
Flywheel bolts, kgm (ft. lb)	2.6 (19)
Injector, kgm (ft. lb)	2.5 (18)

Effekt, SAE-hk/r/m	20/2200
Effekt, DIN-hk/r/m	16/2200
Vridmoment, kpm vid 2000 r/m	[illegible]
Arbetssätt	fyrtakt
Varvtal	
Max, r/m	2200
Tomgång, r/m	500
Största lutning, °	15
Rotationsriktning (sett akterifrån)	
Utan reduktionsväxel	Moturs
Med reduktionsväxel	Medurs

Vikt	
Motor med backslag, kg	225
Motor med backslag och reduktionsväxel	240
Reduktionsväxel, utväxlingsförhållande	2,04:1 el. 2,7:1
Bränsleförbrukning	
Full last, liter	3,3
Marschfart, liter	ca 1,5
Kompressionsförhållande	17,5 : 1
Kompressionstryck, kp/cm² vid 320 r/m	33
Cylindervolym, liter	1,044

CYLINDRAR OCH KOLVAR

Antal cylindrar	2
Cylinderdiameter, mm	90
Slaglängd, mm	82
Kolvmaterial	Lättmetall
Kolvspel, max, mm	0,12

Kolvringsgap	
Kompressionsring nr 1, mm	0,356/0,483
Kompressionsring nr 2 och 3, mm	0,229/0,406
Oljeskrapring nr 1 och 2, mm	0,279/0,406
Kolvringsspel – bredd	
Kompressionsring nr 1, mm	0,114/0,063
Kompressionsring nr 2 och 3, mm	0,089/0,038
Oljeskrapring nr 1 och 2, mm	0,089/0,038

VENTILER

Ventildiameter	
Inloppsventil, mm	36
Avgasventil, mm	32
Ventilspel, kall motor	
Inloppsventil, mm	0,3
Avgasventil, mm	0,3
Ventilspindelspel	
Inloppsventil, mm	0,05
Avgasventil, mm	0,05

Ventilsätets och ventilens vinkel	
Inloppsventil, °	30
Avgasventil, °	30
Inloppsventilen	
öppnar, ° före ö.d.	16
stänger, ° efter n.d.	52
Avgasventilen	
öppnar, ° före n.d.	54
stänger, ° efter ö.d.	16

LAGERSPEL

Vevlagerspel, mm	0,03 – 0,09
Ramlagerspel, mm	0,05 – 0,09

FÖRBRÄNNINGSSYSTEM

Förbränningssystem	Direktinsprutning
Insprutningspump, Simms	[illegible]
Insprutare, Simms	N 1172 A
Spridarhållare, Simms	[illegible]
Spridare, Simms	NL 123 (4 hål)
Öppningstryck, insprutare, kp/cm²	165
Förinsprutningsvinkel (märkt på svänghjulet) ° före ö.d.	25
Insprutningsmängd, fullgas (200 insprutningar vid 600 r/m), cm³	6,3 – 6,4
Bränslefilter, Simms	FH 20
Filterinsats, Simms	A 18065
Matarpump, AC	Membranpump
Matarpump, max sughöjd, m	1,5
Regulator	Allvarvsregulator av centrifugaltyp

Bränsle

Specifik vikt vid 15° C	0,8 – 0,9
Viskositet vid + 20° C, cSt	3,5
Flampunkt, °C	40
Lägsta flyttemperatur A.S.T.M.	
vinter, °C	30
sommar, °C	– 20
Vattenhalt	Ingen
Askhalt, max, %	0,001
Svavelhalt, max, %	0,5
Kokstal enligt Conradson, max	0,03
Effektivt värmevärde, kcal/kg	10200
Cetantal, min	52

Fortsättning

SMÖRJSYSTEM

Oljepump, typ	Kugghjuls-pump	Oljetryck Varm motor, kp/cm²	2 – 3
		Minimum, kp/cm²	0,3
Oljefilter, Fram	PH-60	Oljekvalitet	Service DM
Smörjsystem Motor	Tryckcirkulation	Viskositet + 20° C och över	SAE 30
Backslag	Tryckcirkulation	– 10° C till + 20° C	SAE 20
Oljemängd Motor och backslag, liter	3		
Reduktionsväxel, liter	0,3		

KYLSYSTEM

Kylvattenpump	Pump med gummihjul	Länspump	Pump med gummihjul
Termostat Öppningstemperatur, °C	77	Kapacitet Vid fullvarv, liter/minut	15
Helt öppen, °C	86,5	Vid tomgång, liter/minut	4

ELSYSTEM

Batterikapacitet, Ah (med likströmsgenerator)	42	Alternativ utrustning Växelströmsgenerator, Bosch	LC 038/12 3 14K 1 R 14 V 35 A 20
Startmotor, Bosch (effekt 1,3 kW)	GE(D) 12 V 1,3 PS		
Generator, Bosch (effekt 90 W)	EH(R) 14 V 11 A 19	Relä, Bosch	RS/ADN 1/14/2
		Batterikapacitet, Ah	100
Relä, Bosch	JA 14 V 11 A	Generatoreffekt, W	490
Spänning, V	12		

ERFORDERLIGT ÅTDRAGNINGSMOMENT

Cylinderlocksmuttrar, kpm (ftlb)	10 (72)	Svanghjulsbultar, kpm (ftlb)	8,0 (58)
Vevstaksmuttrar, kpm (ftlb)	6,3 (37)	Insprutare, kpm (ftlb)	2,5 (18)
Ramlagerbultar, kpm (ftlb)	10 (72)		

Motornummer	Ungefärligt tillverkningsår
1100	1925
1200	1926
1400	1927
1600	1928
1900	1929
2200	1930
2600	1931
2800	1932
3000	1933
3500	1934
3700	1935
4100	1936
4700	1937
5100	1938
5600	1939
6400	1940
6900	1941
7400	1942
7700	1943
8200	1944
8500	1945
8900	1946
9200	1947
14.000	1947-1948
15.000	1948
16.000	finns inga kort på dessa nummer
17.000	" " " " " "
18.000	1948
19.000	1949
20.000	1949-1950
21.000	1950-1951
22.000	1951
23.000	1951-1952
24.000	1952-1953
25.000	1953
26.000	1954
27.000	1954-1955
28.000	1955-1956
29.000	1956-1957
30.000	1957
31.000	1958
32.000	1959
33.000	1959-1960
34.000	1960
35.000	1961-1962
36.000	1962-1963
39.000	1964
41.000	1965
44.000	1966
47.000	1967
49.000	1968
52.000	1969
54.600	1970
57.500	1971
59.000	1972
59.500-	1973-1976

Efter 1973 går det ej att göra någon uppdelning.