



INSTRUCTION MANUAL

MINI-32

INTRODUCTION

We thank you for having selected our MINI -32 Diesel engine for your use.

BEFORE SETTING THE ENGINE RUNNING, it is important to read the operation and maintenance instructions contained in this booklet closely to follow them strictly.

If you have any doubt or query on your engine or in case of breakdown, please contact the nearest dealer where you will receive due attention.

ATTENTION

So that spare parts deliveries may be exact and immediate, it is extremely important to give the details listed below in your order:

- a) Type of engine (given on the nameplate).
- b) Engine number (given on the top of the block, alternator side).
- c) Number and description of the required part.

OBSERVATIONS: The descriptions and illustrations given in this instruction booklet are not binding. Therefore, whilst maintaining the main features of the engine described and illustrated here, **SOLE, S. A.** reserves all rights to make modifications in parts, details and accessories as may be required for any technical or commercial reasons.

CONTENTS

1	-	Precautions when using the engine.	5
2	-	Specifications.	6
3	-	Use.	7
		3.1 - Before starting up.	7
		3.2 - Preparations for starting up.	7
		3.3 - Starting up.	9
		3.4 - With engine running.	11
		3.5 - Stoppage.	12
4	-	Maintenance.	
		4.1 - Lubrication system.	13
		4.2 - Fuel system.	16
		4.3 - Inlet system.	20
		4.4 - Cooling system.	23
		4.5 - Electrical system.	24
5	-	Periodical inspections.	
		5.1 - Daily check prior to using the engine.	29
		5.2 - Maintenance after the first 50 hours.	29
		5.3 - Maintenance after every 100 hours running.	31
		5.4 - Maintenance after every 200 hours running.	31
		5.5 - Maintenance after every 400 hours running.	32
		5.6 - Maintenance after every 800 hours running.	32
6	-	Troubleshooting.	34
7	-	Service details.	37
8	-	Spare parts description list.	38

1 - PRECAUTION WHEN USING THE ENGINE

- * Always use an appropriate oil and check the oil pressure while the engine is running.
- * Use clean fuel, free from impurities and water.
- * Prevent water and air from entering into the fuel circuit.
- * If the starter motor pinion does not mesh with the crown gear on starting up, turn the key again after the motor has stopped running.
- * Pay attention to the colour of the exhaust gases.
- * Clean or periodically change the fuel and oil filters;
- * Change the oil as specified.
- * Check that the cooling water circulates correctly through the engine.

Safety precautions

- * Do not touch any moving parts of the engine while this is running.
- * Do not touch hot parts, such as the exhaust pipe, and keep any in flammable materials away from them.
- * Inspect and adjust engine parts only when stopped.
- * Check engine oil cooling and fuel levels and refill only when the engine stopped.
- * Use always tools of an appropriate size and work with care when effecting any service operation.

2 - SPECIFICATIONS

Type:	Diesel, upright, 4-stroke, water cooled
Number of cylinders:	Four
Cylinder bore:	70 mm (2.76")
Piston stroke:	78 mm (3.07")
Total cubic capacity:	1200 cm ³ (73.22 in ³)
Compression ratio:	20:1
Power per DIN 6270 - B:	28 HP (20.6 KW)
Maximum rpm:	3000
Reversing/reduction gear:	Mechanical, type RONIM-IV. Gear ratio 1.91:1
Dry weight with reversing gear:	177 Kg. (390 lb)
Maximum installation angle:	17° constant
Lubrication:	Forced, by rotary pump
Oil capacity:	Engine 4.5 litres Reversing gear 0.4 litre
Type of oil:	HD 20° or higher SAE-30 5° to 20°C SAE-20 5° or lower SAE-10
Cooling:	Fresh water with heat exchange
Cooling water capacity:	5.25 litres
Injection system:	BOSCH M Centrifugal governor
Electrical system:	Nozzle pressure 120 ⁺¹⁰ ₀ See diagrams on pages: Starting motor, 12 V 1.6 KW Alternator, 12 V 35 A Glow plug, sheated type 30 A fuse

3 . USE

3.1 . BEFORE STARTING UP

Your new engine requires a 50 HOUR running-in period for setting all moving parts and obtaining a high performance.

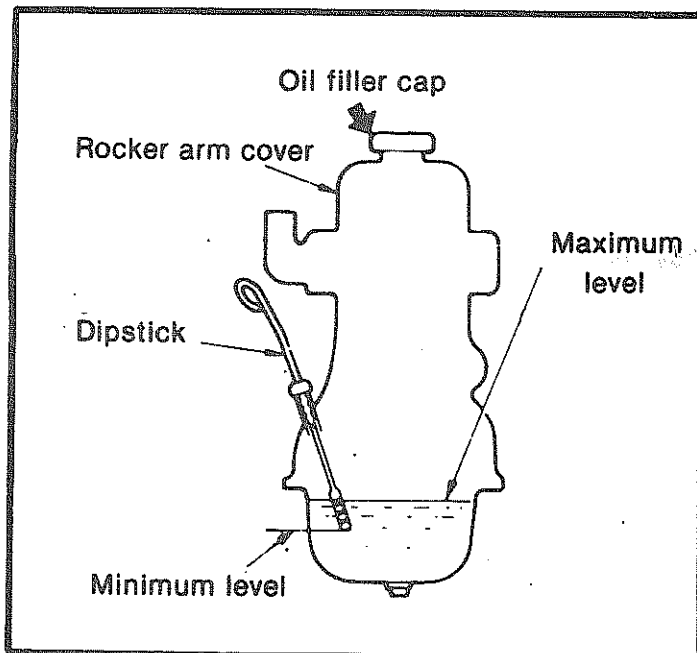
Carry out this running-in carefully, bearing in mind the following points:

WARNING

- * Run the motor at slow-running speed and warm up for at least 5 minutes.
- * Avoid hasty acceleration.

3.2 . PREPARATIONS BEFORE STARTING

1) Filling engine and reversing gear with oil



Fill the engine with the appropriate oil up to the upper mark on the dipstick (Fig. 1). Fill the reversing gear through its filler opening up to the level on the dipstick (Fig. 2). Use the same type of oil as in the engine.

Fig. 1

2) Filling tank with fuel

Fill the fuel tank with clean, filtered diesel oil. Make sure that the tank is completely clean, with no particles of iron or polyester. Open the fuel outlet cock.

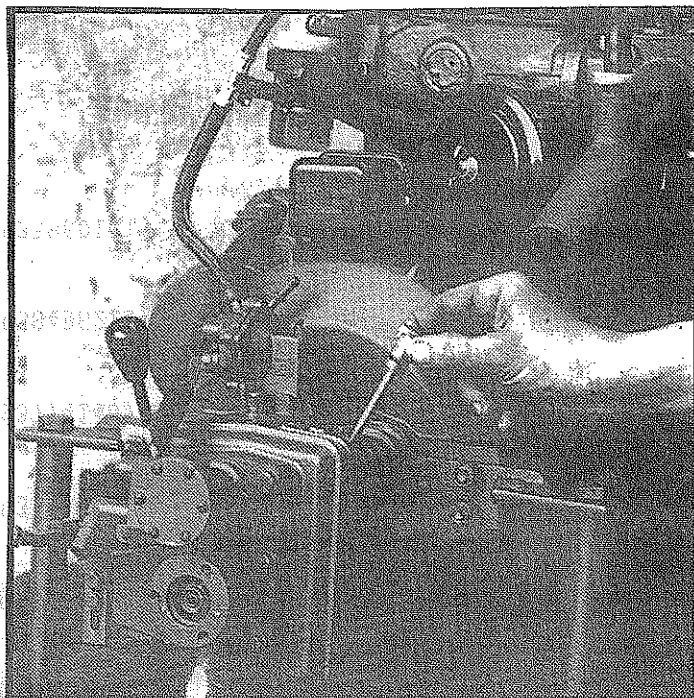


Fig. 2

3) Filling water system

Fill the system with clean water up to the filler opening. In winter, add antifreeze (Fig. 3)

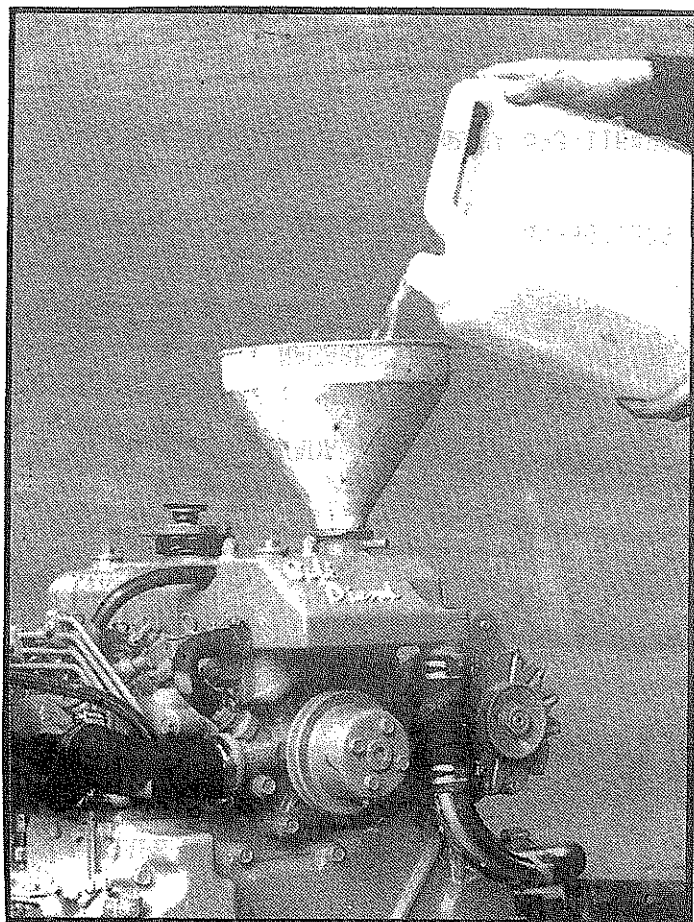


Fig. 3

4) Open salt water inlet cock

5) Bleeding fuel system

Bleed the fuel filter first and the fuel pump afterward. (For further details, refer to "Bleeding fuel system" in Chapter 4.2)

6) Closing battery disconnecter

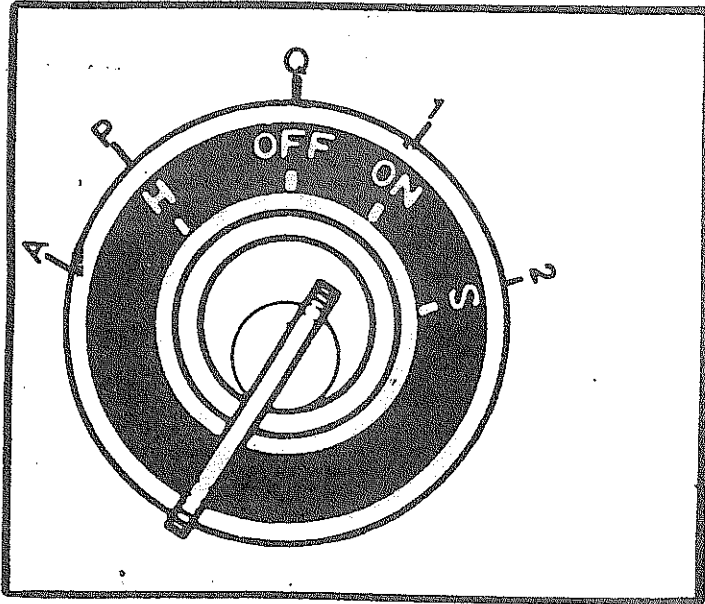
Close the battery disconnecter.

3.3 - STARTING UP

1) Reverse gear neutral position

Set the clutch to neutral and open the throttle half way.

2) Setting of ignition key in position "1"



Set the ignition key in position "1" and check that the pilot lights are illuminated and the alarm sounds (Fig. 4).

Fig. 4

3) Pre-heating of glow plugs

Turn the ignition key to position "P" (warming-up) until the glow plug indicator becomes sufficiently red hot.

The normal warm-up time is 20 seconds. In cold weather, follow, the table as below:

Temperature	Warm-up time
+ 5° or above	Approx. 20 seconds
+ 5°C to -5°C	Approx. 30 seconds
- 5°C or below	Approx. 60 seconds

Notwithstanding, the warm-up period should not last more than 2 minutes to avoid shortening the plug life.

If the plug indicator does not become red hot, it should be checked by a SOLE Service Centre.

4) Starting up

Turn the ignition key to position "A" and hold it there until the engine fires. If the engine does not fire, although the key is held in position "A" for 10 seconds, release the key for 30 seconds and thereafter try to start the engine up again, after allowing for a sufficient warm-up of the plug. The starter motor must never be operated for more than 30 seconds at a time.

Once the engine has fired, turn the key to position "1" and leave it there while running.

After starting, check that the oil pressure and battery charge pilot lights are extinguished.

5) Warm-up

Warm up the engine for about 5 minutes, allowing it to run light at half throttle.

IMPORTANT:

While the engine is running, do not turn the key to position "2", since in this case the starter motor would be damaged.

If the engine is warm, the warm-up operations are not required in this case, turn the key to position "2" and hold it there until the engine fires. Once the engine has fired, return the key to position "1".

3.4 . PRECAUTIONS WHEN STARTING AND DURING RUNNING

1 . Normal starting

- a) Check the oil level in the engine and reversing gear, and top up if necessary
- b) Put diesel oil in the tank.
- c) Check the cooling water level and top if necessary;
- d) Start the engine as explained on the preceding pages.

2 . Starting in below-freezing weather

When the atmospheric temperature drops below the freezing point, the three things listed below happen. In such circumstances, the engine must be started as indicated.

- a) The lubricating oil becomes viscous.
Pour hot water into the radiator.
Make sure that the oil being used is suitable. Also check that it has not deteriorated.
- b) The voltage delivered at the battery terminals drops.
Protect the battery against the cold by covering it with some suitable material.
Make sure that the battery is fully charged.
- c) The temperature of the inlet air is low and the engine is hard to start.
Let the glow plug get hot enough.

3 . Precautions during running

- * Check that the cooling water is circulating.
- * Check that there are no water or oil leaks.
- * Check that the oil pressure light is out.
- * Check the exhaust smoke for the following appearances:

- While the engine is cold: White smoke
- As the engine warms up: Almost smokeless
- When the engine is overloaded: A slight amount of black smoke

IMPORTANT:

Always change gear with the engine at slow running speed.

3.5. - STOPPAGE

- 1) Set the engine to slow running and the clutch to neutral.
- 2) Push the Stop button until the engine has completely stopped.
- 3) With the engine stopped, set the ignition key to position "0". The battery will be discharged if the key is left in position "1".

To prevent this, remove the key after stopping the engine.

If the engine is not going to be used for a long period of time, it is advisable to close the water and fuel valves and to disconnect the battery.

IMPORTANT:

The Stop button does not operate if the key is not in position "1".

4.4. - MAINTAINANCE

4.1 - LUBRICATION SYSTEM

1 - Correct viscosity of oil

Use an oil having a viscosity appropriate to the local ambient temperature. The use of an all-season SAE-10W-30 multigrade oil is recommended since this affords a minimum viscosity variation at different temperatures (see Specifications Section)

2 - Oil pressure

To help you monitor the oil pressure while the engine is running there is an oil pressure warning light and an alarm horn.

— During normal running:

The oil pressure is normal if the light is extinguished.

— When starting:

The light should be illuminated and the horn sounding.

Fig. 5

The light will become illuminated during normal running if the oil pressure drops below 0.2-0.4 kg/cm and in such case you should consult your nearest SOLE Service Centre.

NOTE:

If the oil pressure drops or the cooling water excessively overheats, the alarm



3 - Oil changes

a) Engine

Change the engine oil after the first 50 hours of operation, and every 100 hours thereafter.

The old oil is taken out by the extractor pump after connecting it to the engine (Fig. 6).

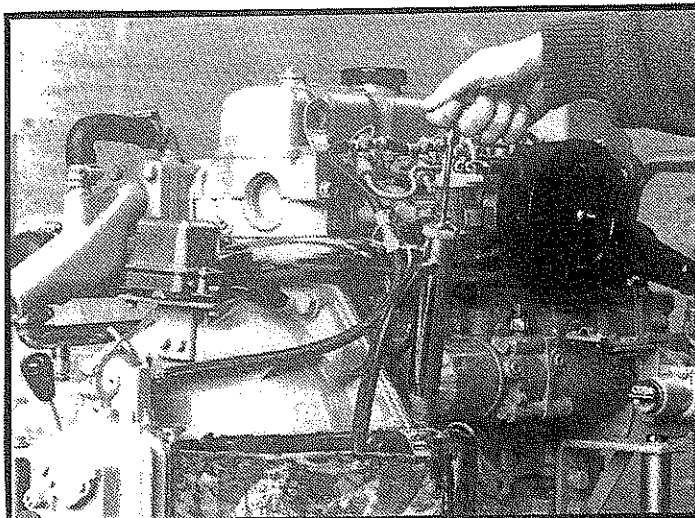


Fig. 6

After the old oil has been removed, pour in new oil through the filler opening in the rocker arm cover (Fig. 7). Next idle the engine for several minutes.



Fig. 7

Then stop it and check the oil level by taking out the dipstick, cleaning it with a rag, putting it back and pressing it home. Now take it out again to check the level.

NOTE:

Remember that the markings on the dipstick refer to the engine in the level position. If the engine is tilted, allowance must be made for this when checking the level.

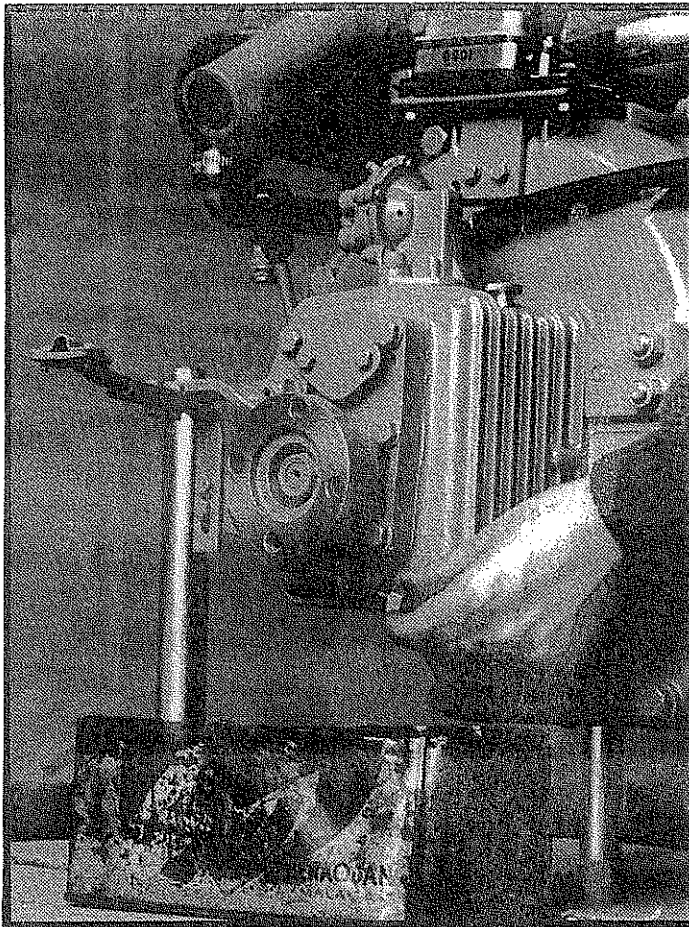


Fig. 8

b) Reversing gear

The reversing gear is lubricated separately from the engine.

To change the oil, take out the plug located in the bottom of the reversing gear case at the back.

After draining, replace and tighten the plug and fill with new oil through the dipstick opening (Fig. 8).

Change the oil after the first 50 hours and every 100 hours thereafter.

4 - Oil filter change

Change the oil filter after the first 50 hours running and thereafter at intervals of 100 hours.

The oil filter is an easy-to-handle cartridge not requiring internal cleaning.

On fitting the new oil filter, rub a little engine oil on the seal and screw up hand-tight.

After replacing the filter, set the engine running and check for leaks (Fig. 9).

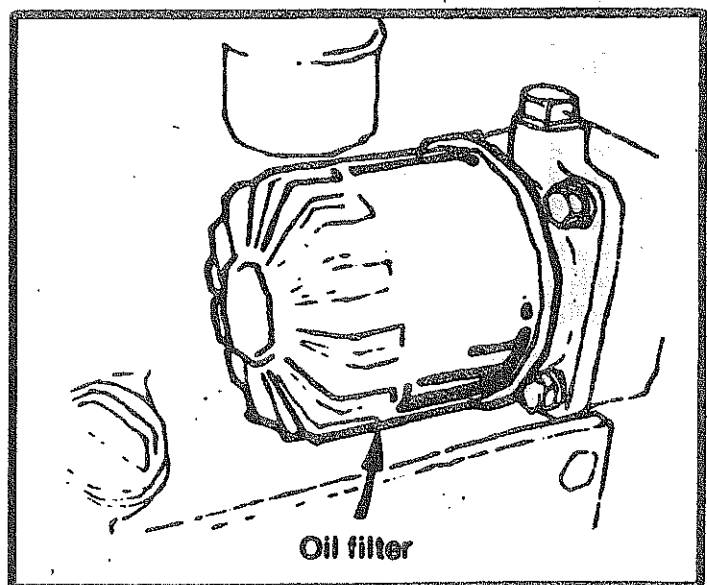


Fig. 9

4.2 . FUEL SYSTEM

1 . Gasoil

Always use clean, filtered gasoil. Never use kerosene or heavy oils. Fill with fuel beforehand. In cold weather, a lot of water vapour is produced when there is a lot of air in the fuel tank. Therefore the tank should be kept as full as possible.

When filling the tank, try to avoid impurities and water, always using clean plastic containers and filter the fuel whenever possible. Also make sure that the tank is free from water and dirt.

2 . Fuel system purge

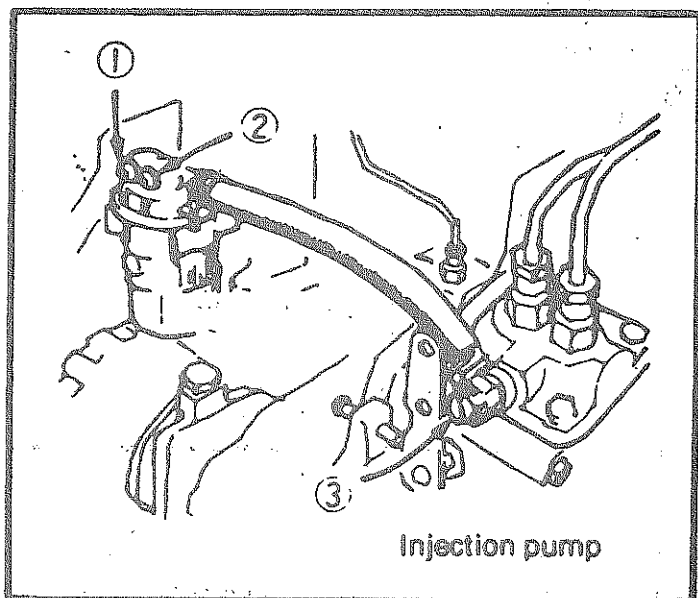


Fig. 10

The presence of air in the fuel system will prevent the engine from starting up. Therefore it is absolutely necessary to inspect and pay due attention to the fuel system to check for air leaks.

To purge the air from the fuel system, first loosen the fuel filter ventilation screw (1) and re-tighten the screw after bubbling ceases. Thereafter purge the air by loosening the fuel filter and injection pump ventilation screws (2) and (3), in this order, and then re-tighten the screws (Fig. 10).

Thereafter turn the engine over for a few seconds with the starter motor, with the lever in the "fully open" position so that the air may be removed from the piston, the fuel injection tubes and the nozzles.

This operation may also be effected by operating the supply pump lever located at the of the reverse gear (Fig: 11) until the air is purged.

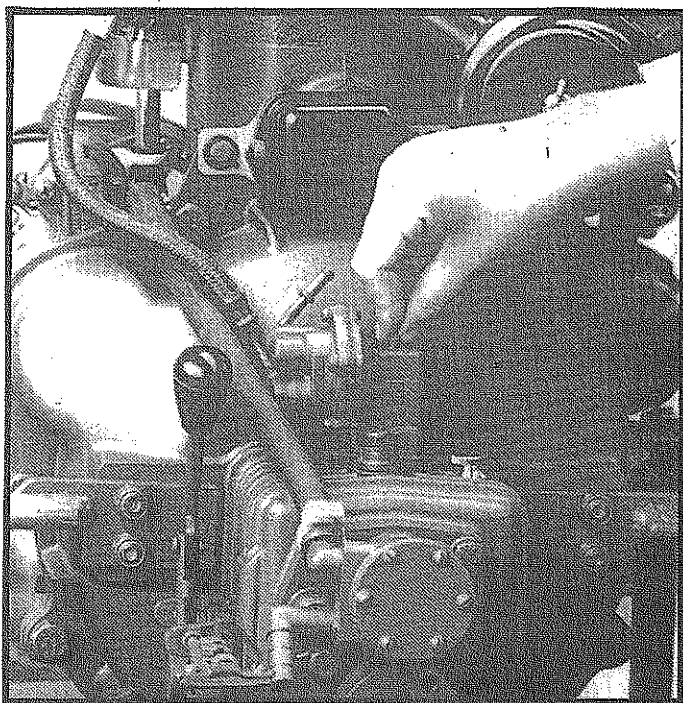


Fig. 11

The engine may be started up by following the above listed sequence of operations. If the engine does not start up easily, remove the injection screws from the nozzle side, setting the fuel lever in the "fully open" position, operate the starter motor or the fuel pump lever and then firmly tighten up the nuts.

3 - Cleaning and replacement of fuel filter

The fuel filter is of the easy-to-handle cartridge type. The accumulation of dirt and water in the filter causes operating difficulties. Remove the engine filter every 100 running hours, clean the outside and remove the two ventilation screws. Purge any water that has collected inside and thereafter rinse the filter in clean gasoil (Fig. 12).

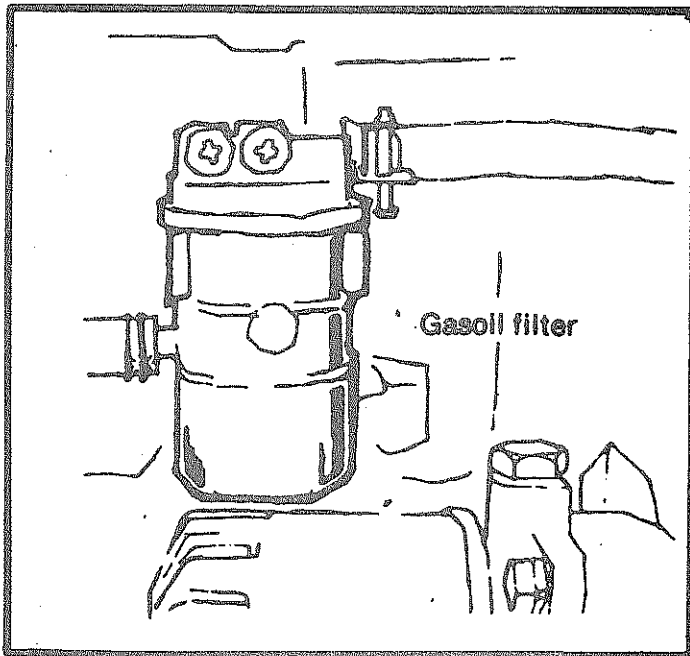


Fig. 12

The filter should be replaced after every 200 hours running. If a fuel decanter filter is fitted apart from the engine, drain it every 100 hours and replace the cartridge every 200 hours.

4 - Fuel injection pump

The fuel injection pump is one of the most important parts of a Diesel engine and, therefore, great care is required when handling it. Moreover, the injection pump has been very carefully adjusted at the works and should never be handled carelessly. When any adjustment is required, it should be effected by an authorized SOLE Service Centre, since a precision pump tester and specialized knowledge are needed.

The requirements for handling fuel injection pumps are as follows:

- Always use fuels free from impurities.
- Clean and replace the fuel filters periodically.

5 - Setting of slow running speed

Slacken off the locknut of the screw in front of the gas lever and tighten up or slacken off the nut according to whether it is wanted to increase or reduce the slow running speed (Fig. 13) Then re-tighten the locknut.

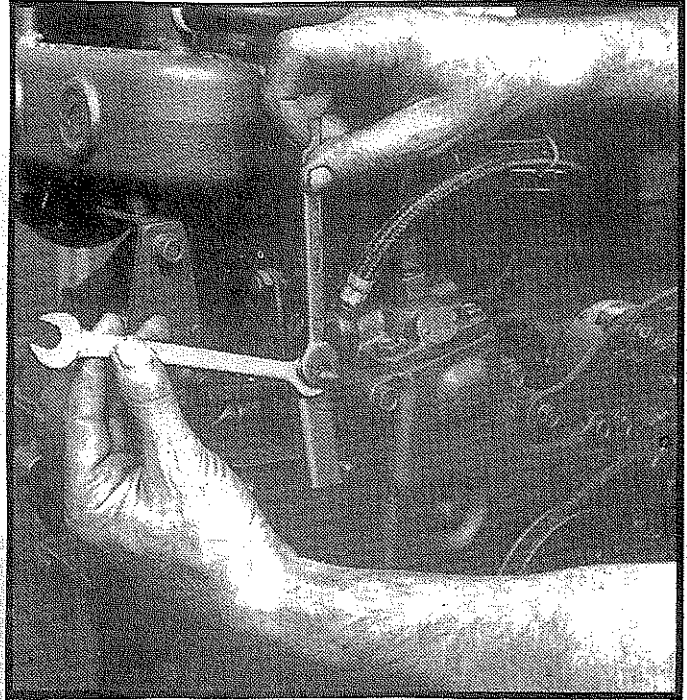


Fig. 13

IMPORTANT:

Never touch the sealed screw located behind the gas lever.

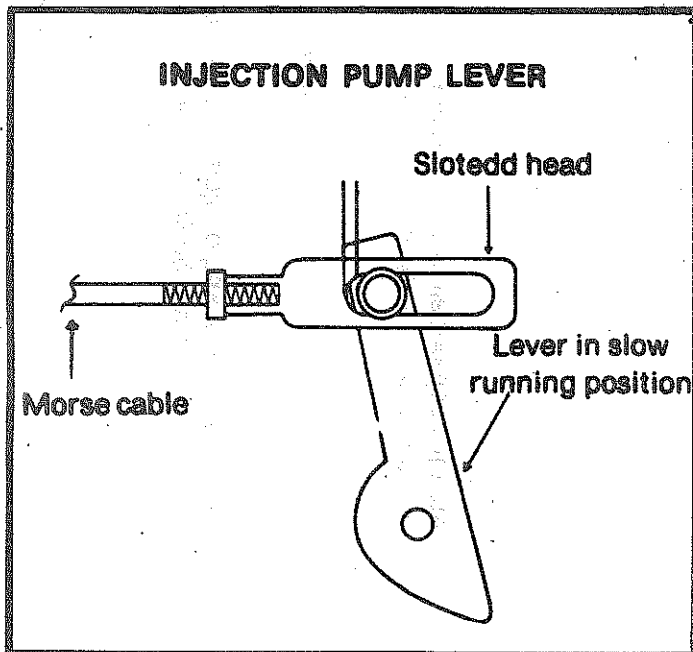


Fig. 14

6 - Fitting of remote control to engine

The engine fuel system comprises a single lever for accelerating and stopping the engine. Therefore, the gas lever slotted head has to be fitted as shown in Fig. 14.

4.3 - COOLING SYSTEM

The engine is cooled by fresh water, contaminated as little as possible, such as tap water or rainwater. Using hard or dirty water will cause formation of scale inside the system, which will considerably reduce the cooling effect.

If low temperatures, i.e. below 0°C, are a hazard, antifreeze must be added to the cooling water.

The proportion of antifreeze depends on the anticipated temperatures. The antifreeze makers give guidance for this on the package labels of their products. In any case, the following table shows the proportions appropriate for the expected temperatures.

Concentration of antifreeze (%)	13	23	30	35	45	50	60
Temperature in °C	-5	-10	-15	-20	-30	-40	-50
in °F	(23)	(14)	(5)	(-4)	(-22)	(-40)	(-58)

Be sure to clean the cooling system before adding antifreeze.

NOTE

It is advisable to choose an antifreeze concentration corresponding to a temperature about 5°C lower than the actual atmospheric temperature.

Cooling system capacity: 5.25 litres

2 - Salt water system

a) Water pump

The water pump is located on the right hand side of the engine at the front, underneath the alternator. The rotor is made of neoprene and must not be allowed to run dry. If it without water it can break. It is therefore important always to carry a spare.

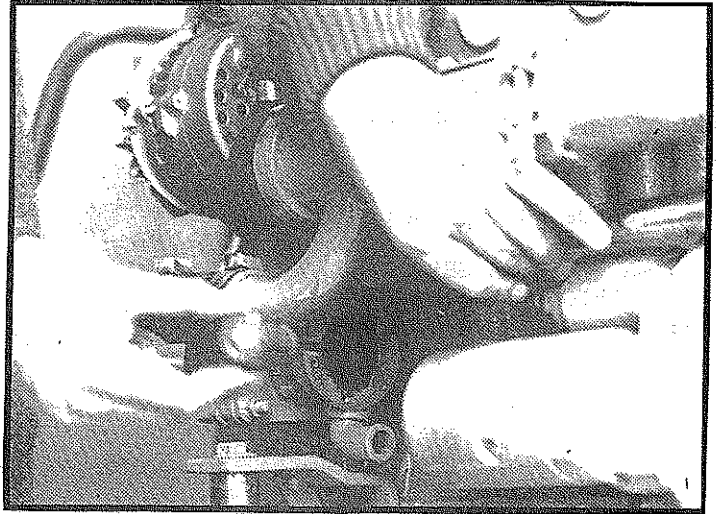
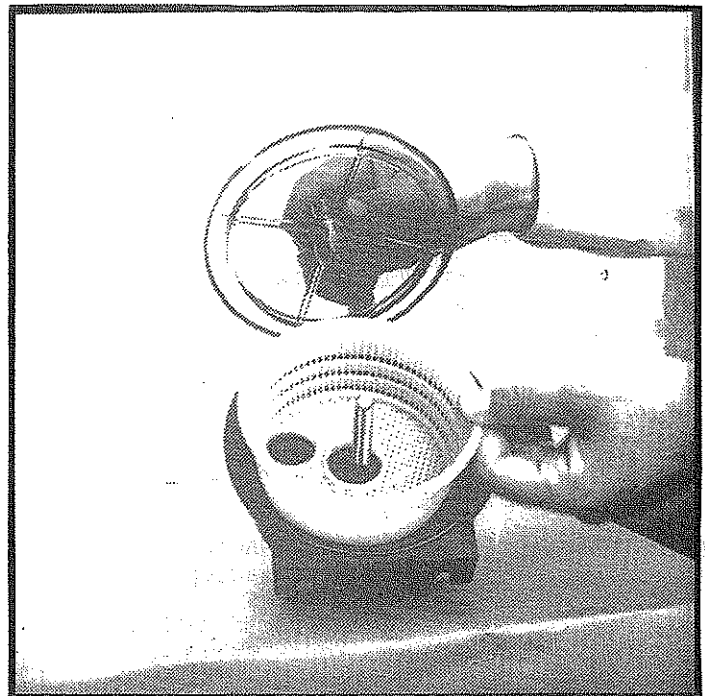


Fig. 15

To replace the rotor, turn off the water inlet cock, take off the pump cover and remove the rotor from its shaft, using two screwdrivers for leverage. Clean the seat and fit a new rotor. Replace the cover with a new gasket (Fig. 15).

Open the bottom cock.

Fig. 16



It is important to install a filter between the engine and the bottom cock to prevent the impurities contained in the sea water from obstructing the cooling pipes and seizing the thermostat.

Clean the filter every 50 hours by slackening off the wing nut and removing the filter element. Clean out

and replace, making sure that the cover is properly seated on the O-ring. (Fig. 16).

Then set the engine running to check for water leaks from the cover.

3 - Drainage

The engine has three drain cocks, two for salt water and one for fresh water (Figs. 17 and 18).

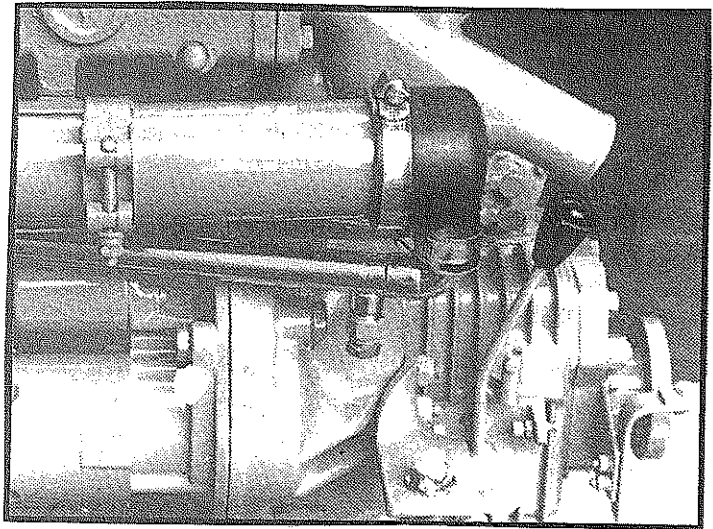


Fig. 17

In cold weather, it is advisable to drain the salt water system if the engine is not going to be used for a long time.

To do this, close the bottom cock and drain all the water from the system by opening its cocks (Fig. 17)

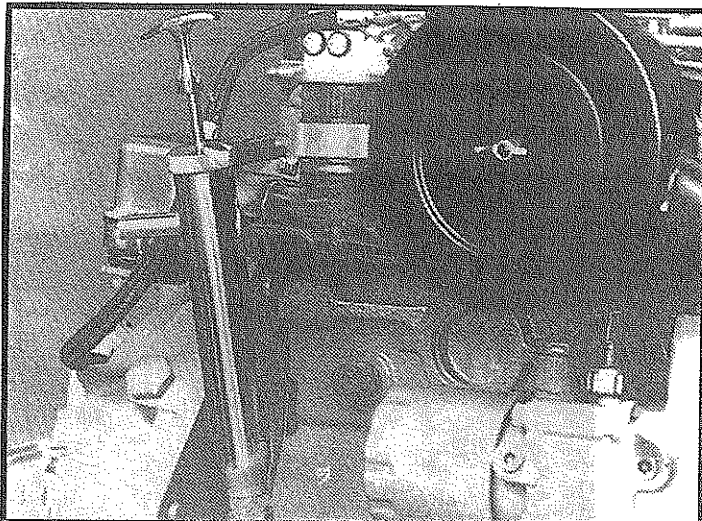


Fig. 18

ELECTRICAL SYSTEM

1 - The engine is equipped with a 12 V system and the electrical circuit is shown in the following diagrams (Fig. 21 and 21 bis).

To install electrical equipment, connect it correctly, following the diagram and, at the same time, check for any damaged cable sheathing and whether the earth connection is correct.

2 - Alternator belt tension

The alternator belt is properly tensioned if it moves from 10 to 12 mm when pressed with your finger.

Too much tension may cause rapid wearing of the and the alternator bearings.

On the other hand, if it is too slack or is oily, there may be an insufficient charge due to slipping of the belt.

Never try to adjust the belt tension with engine running.

To tension the alternator belt, loosen the two alternator holding bolts, one located underneath and the other on the tension device, tension up the belt by levering with the alternator until the appropriate tension is obtained. Then retighten the two bolts. (Fig. 19).

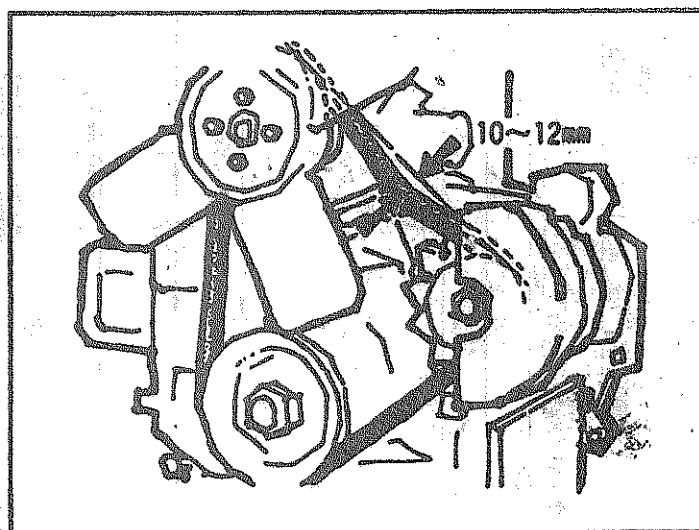


Fig. 19

3 - Fuse

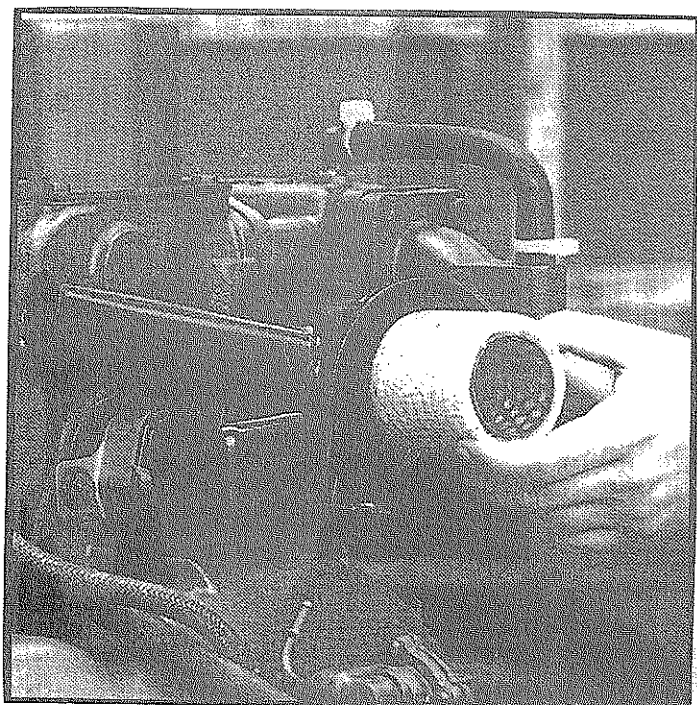
The electrical system is protected by a 30 A fuse, fitted alongside the starter motor on the lead running from the latter to the control panel (see diagram on page 25).

If no power reached the panel, make sure that the fuse is not burnt out. If it is, install a new one.

4.3 - INLET SYSTEM

1 - Replacement of inlet air filter element

Change the air filter element every 400 hours.



To replace the filter, slacken off the filter centre nut, remove the cover and pull out the filter element insert a new element (Fig. 20). The element **MAY NOT** be cleaned.

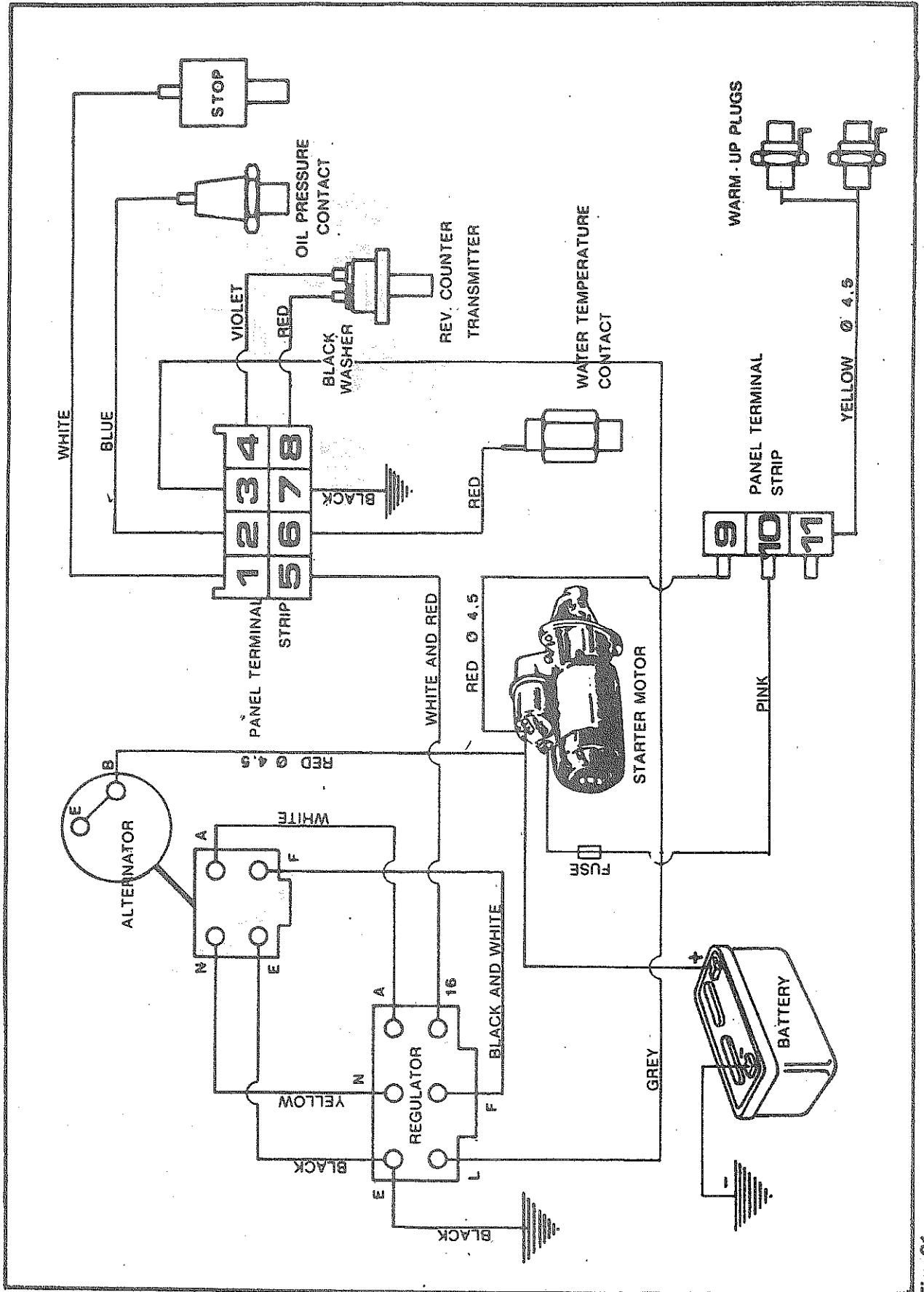
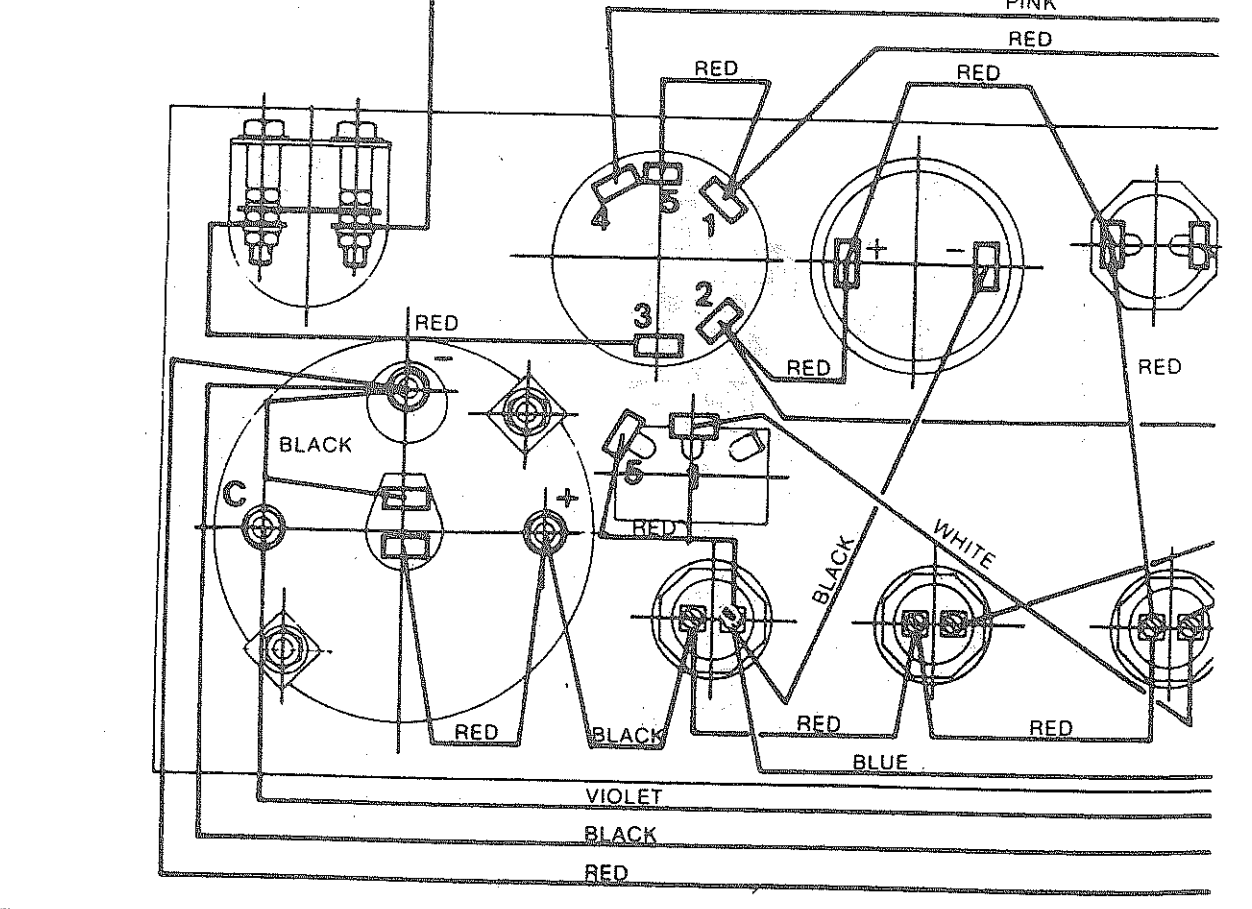
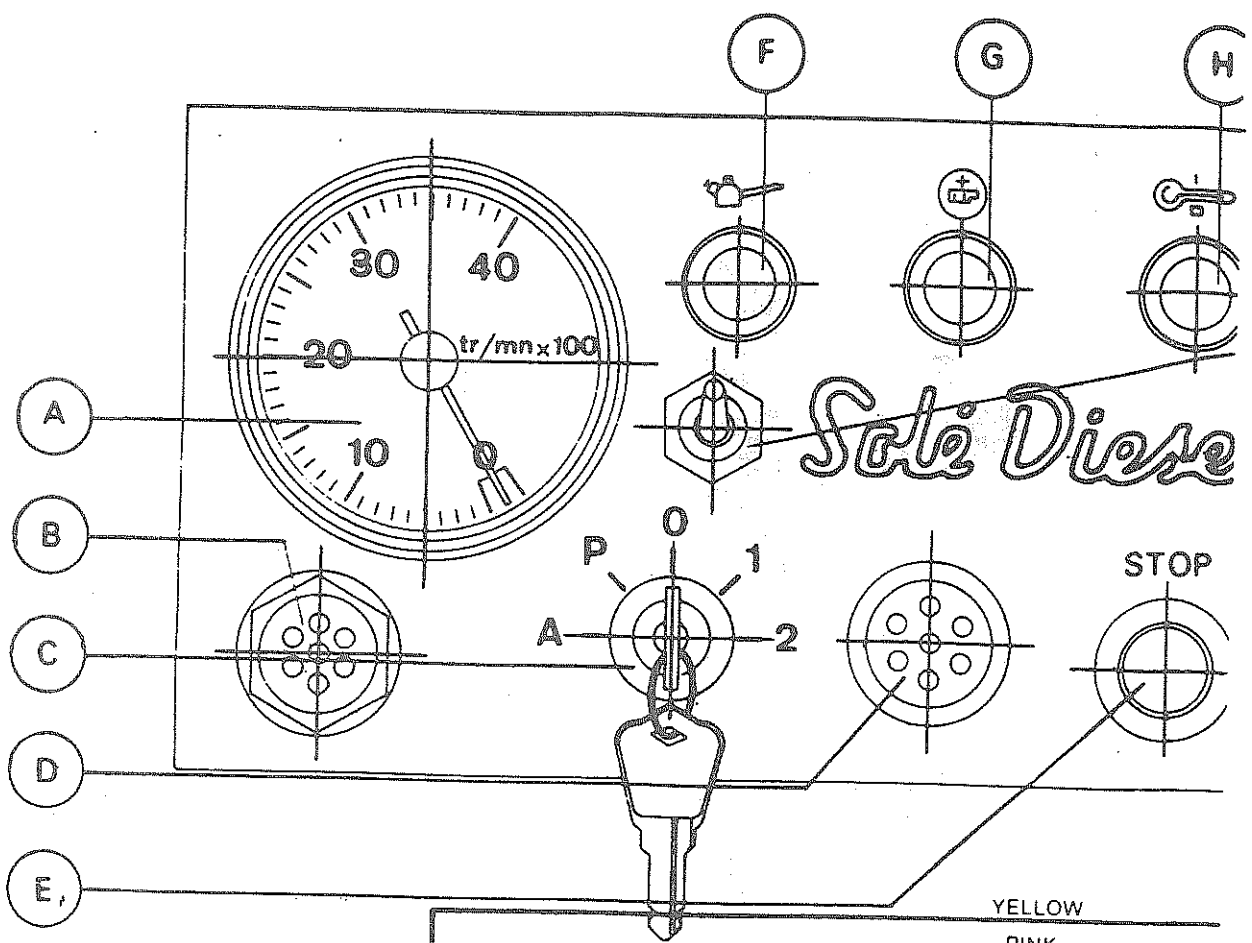
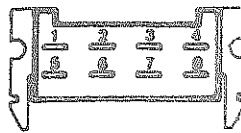


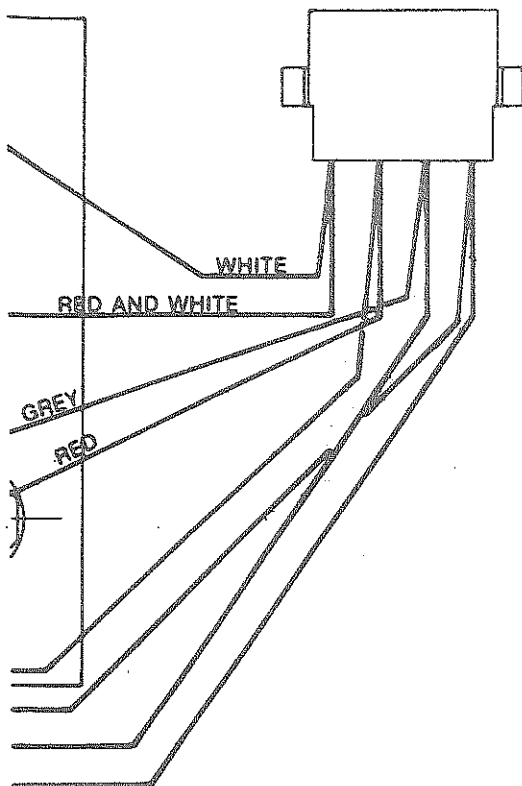
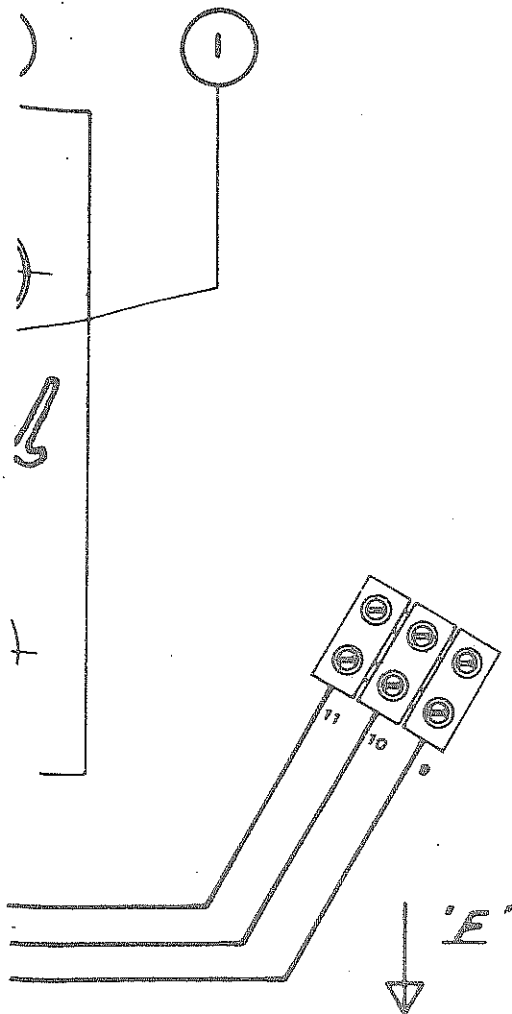
FIG. 21





View through **F**

No.	CABLE FUNCTION	COLOUR
1	Engine stop	White
2	Oil pressure	Blue
3	Battery charge (regulator L)	Grey
4	Rev. counter	Violet
5	Contact output (regulator 1G)	Red and white
6	Water temperature	Red
7	Earth	Black
8	Rev. counter (black washer)	Red
9	Current tap	Red
10	Starter	Pink
11	Warm - up plugs	Yellow



I	Switch
H	Water temperature pilot light
G	Battery charge pilot light
F	Oil pilot light
E	Stop switch
D	Alarm horn
C	Ignition lock
B	Warm - up pilot
A	Rev. counter
MARK	DESCRIPTION

○ Inspection, adjustment of filling □ Cleaning ● Change △ Drain

Item to inspect	Intervals							Long term
	Daily	First 50 hours	Every 100 hours	Every 200 hours	Every 400 hours	Every 800 hours		
Engine body Tighten setscrews Valve clearance Engine slow running speed Engine compression ratio		○ ○ ○ ○	○ ○ ○ ○	○ ○		○ ○	○	
Lubrication system Engine oil Reverse gear oil Oil filter	○ ○	● ● ●	● ●					
Fuel system Fuel Fuel tank Fuel filter Counter filter (if any) Nozzle Injection pump	○		○ △	● ● ○			○	△ □
Air filter					●			
Cooling system Cooling water Water filter Bottom cock Water pump impeller	○ ○	□ □	○ □			○		
Electrical system Each instrument Glow plug Starter motor, alternator and regulator Alternator belt tension Battery water level	○	○ ○		○ ○	○ ○	○ ○	○	

5 - PERIODICAL INSPECTIONS

5.1 - DAILY CHECKS BEFORE USING THE ENGINE

- 1 - Check engine and reverse gear oil level. Top up. No topping up required if oil level is close to upper level on dipstick.
- 2 - Check fuel level and open tank outlet valve.
- 3 - Open water inlet valve.
- 4 - Check pilot lights.

After starting, check oil pressure, water temperature and battery charge. The three pilot lamps should be extinguished and the horn should not sound.

- 5 - Check that the cooling water is flowing and for any irregularities in the exhaust gases, noise and vibrations.
- 6 - Check cooling water level

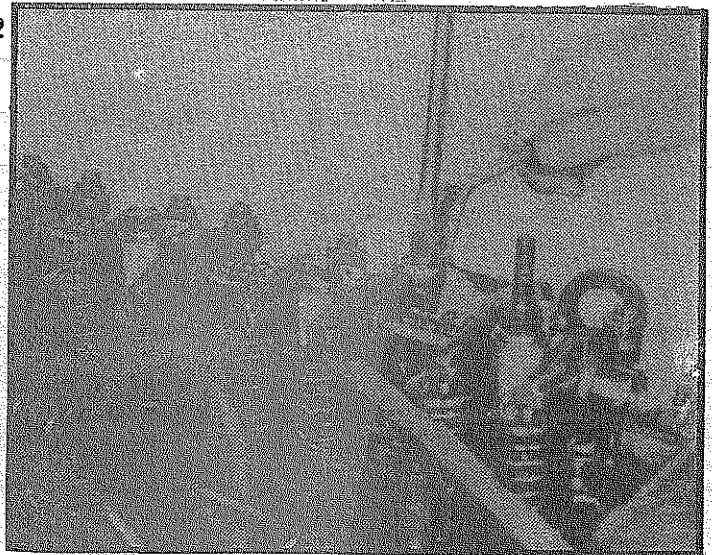
5.2 - MAINTAINANCE AFTER FIRST 50 HOURS RUNNING

- 1 - Change engine and reverse gear oil. Proceed as indicated on pages 13 and 14.
- 2 - Change oil filter. Change as specified on page 14.

3 - Setting valve clearance. Carry out this operation when the engine is cold, as follows:

- a) Remove the rocker arm cover, slacken off the rocker arm nut and while the adjusting screw is being turned, check the valve clearance with a gauge (Fig. 22)

Fig. 22



b) With the piston of no. 1 (forward) cylinder at top dead centre of the compression stroke, adjust the clearance of the inlet and exhaust valves of this cylinder.

Proceed in the same way with the other cylinders.

c) The top dead centre position of no. 1 cylinder can be checked by means of the alignment markings on the valve cover and the crankshaft pulley (Fig. 23).

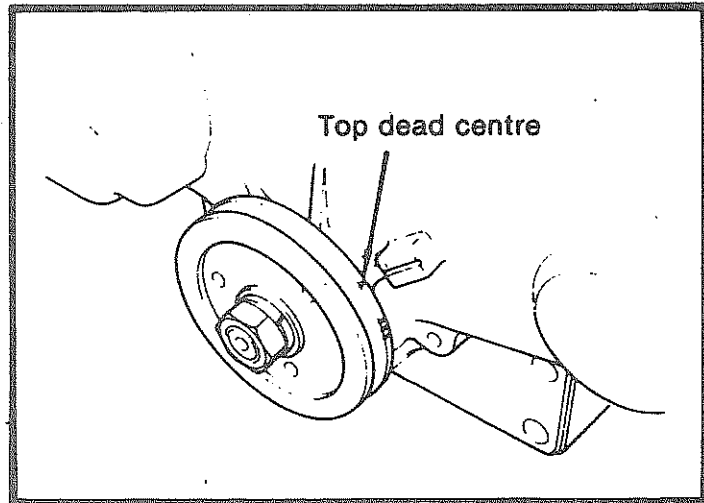


Fig. 23

d) After adjusting, tighten the rocker arm nut while holding the adjusting screw in place so that it does not turn.

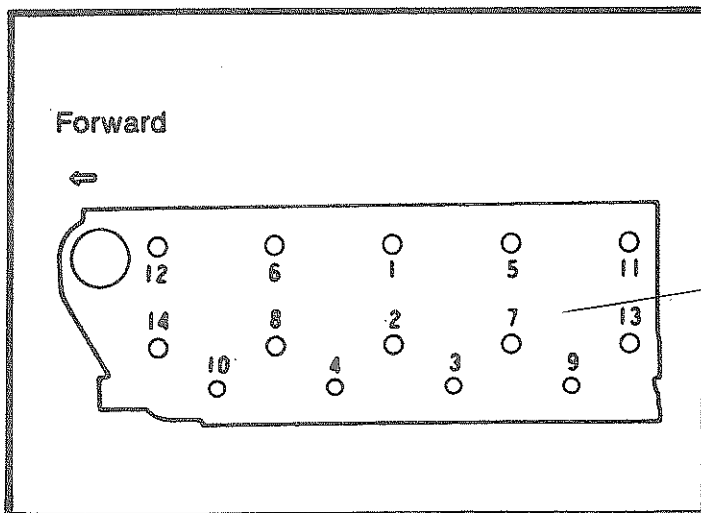


Fig. 24

NOTE:

Valve clearances must be adjusted after the cylinder head screws have been tightened (Fig. 24 shows the order of tightening).

Valve clearance (inlet and exhaust): 0.25 mm (0:0099")

Torque on cylinder head studs:

M 10 screws: 7-8 Kg m

M 12 screws: 11-12 Kg m

4 - Adjustment of alternator belt. Proceed as explained on page 23.

5 - Re-tightening nuts and bolts.

Check the tightness of the engine and propeller shaft mounting bolts.

6 - Adjust engine slow running speed.

Check the engine slow running speed and adjust as indicated on page 17.

5.3 - MAINTAINANCE AFTER EVERY 100 HOURS RUNNING

1 - Change engine oil (see page 13).

2 - Change oil filter (see page 14).

3 - Clean fuel filter (see page 16).

4 - Drain fuel decanter filter.

Slacken off the wing nut located at the bottom of the glass bowl and allow all the accumulated water to run out. Re-tighten the wing nut and check for dripping.

5 - Clean water filter (see page 20).

6 - Adjust engine slow running speed (see page 18).

5.4 - MAINTAINANCE AFTER EVERY 200 HOURS RUNNING

1 - Change fuel filter. Proceed as indicated on page 16.

2 - Change decanter filter element.

Replace filter element together with gaskets.

Check that there is no fuel leak.

3 - Adjust alternator belt. (See page 21).

4 - Nozzle check.

Set the nozzle pressure to 120_{-0}^{+10} Kg/cm² and remove any undesirable injec-

tion conditions, including "after-dripping" (This operation should be effected by an Official SOLE Service Centre.

5 - Check battery water level.

Check this level, topping up with DISTILLED WATER, whenever required.

5.5. - 400-HOUR MAINTENANCE

1 - Tighten the engine mount and propeller shaft screws.

2 - Adjust the valve clearances (see page 30)

3 - Check glow plugs.

Make sure the glow plugs are not burnt out.

4 - Install a new air filter element. Proceed as explained on page 24.

5.6 - 800-HOUR MAINTENANCE

1 - Check the compression pressure. To do so, take out the glow plugs (or the nozzles) and measure with a compression gauge.

Adjust as necessary if the pressure differential between cylinders exceeds 2.5 Kg/cm², or if the pressure in any cylinder is less than 26 Kg/cm² (take measurements at 280 rpm).

2 - Adjust the fuel injection.

Have this operation made by a SOLE official service.

3 - Check the alternator and governor.

Adjust the voltage and current, using a circuit tester.

4 - Check the starter motor pinion and the flywheel ring gear. Using a file, true any damage to the chamfered area; replace the part if it is completely worn out.

5 - Check the water pump rotar.
Make sure that no blades of the rotar are broken. If any is, proceed as explained on page 21.

6 - Change the cooling system water.
Drain by opening the fresh water system drain cock (Fig. 18). After all the water has drained out, close the cock and refill with fresh, clean water up to the filler cap opening (Fig. 3).

6 - TROUBLESHOOTING

It is essential to detect and repair any breakdown or fault as soon as possible. Check and act in accordance with the instructions given below. If any repair requires a technical capacity beyond your reach, have it done by a SOLE, S. A. Authorized Service Centre.

1. Engine does not start

Starter switch faulty.	Check connections and contacts.
Low starter motor torque.	The battery is exhausted, the starter motor is faulty or the wiring is dirty or has a loose connection.
Inappropriate engine oil viscosity.	Check viscosity and change oil as required.
Moving parts seized.	Correct
Still air inside. No fuel in tank. Fuel filter clogged.	Thoroughly purge. Fill up. Clean or replace.

2. Engine stops while running

Fuel tank empty.	Fill up.
Fuel filter clogged.	Clean or replace.
Air in fuel system.	Retighten fuel pipe connections.

3. Poor engine performance

Fuel filter clogged.	Clean or replace.
Air in fuel system.	Retighten fuel pipe connections.

4. Inadequate oil pressure

Insufficient amount of oil.	Top up.
Oil leaks from connections.	Repair.
Oil pressure switch faulty.	Replace.

5. Engine overheats

Insufficient cooling water.	Check water pump impeller and replace. Check bottom cock.
Dirty water filter.	Clean.
Cooling circuit clogged.	Clean.
Faulty thermocontact.	Replace.

6. Battery charges poorly

Incorrect belt tension.	Adjust.
Wiring faults.	Repair.
Incorrect ammeter. (if fitted)	Replace.
Faulty battery.	Replace.
Faulty regulator.	Repair or replace.

7. Gears do not engage smoothly

Remote control poorly adjusted.	Adjust.
Reverse gear control maladjusted.	Adjust.
Clutch cone worn.	Replace.

7. RUNNING DATA

7.1 - RUNNING STANDARDS

- * Valve clearances: 0.25 mm (0.0099"), engine cold (both inlet and exhaust)
- * Compression pressure: 32 Kg/cm (454.4 psi) (280 rpm)
- * Oil capacity: Engine: 4.5 litres
Reversing gear: 0.4 litres
- * Injection order: 1-3-4-2
- * Injection timing: 23° before top dead centre
- * Nozzle pressure: 120^{+10}_0 Kg/cm ($1.706^{+0.143}_0$ psi)

7.2 - TIGHTENING TORQUES

		kg-m	ft-lb
* Cylinder head screw	M.10	7-8	50.6-57.8
	M.12	11-12	79.5-86.7
* Crankshaft pulley nut		20-25	144.6-180.7
* Connecting rod cap nut		3.2-3.5	23.1-25.3
* Crankshaft bearing screw		5-5.5	36.1-39.8
* Flywheel screw		11.5-12.5	83.2-90.4
* Oil filter		1.1-1.3	8.0-9.4
* Exhaust valve seat		4.0-5.0	28.9-36.2
* Nozzle sleeve fastening screw		1.5-2.0	10.8-14.5
* Nozzle sleeve and retaining nut		6.0-8.0	43.3-57.9
* Glow plug		1.5-2.0	10.8-14.5
* Reversing gear driving flange nut			
* Reversing gear driven flange nut			
* Standard torque for following screws			
	M.6	0.7	(5.1)
	M.8	1.7	(12.3)
	M.10	3.5	(25.3)
	M.12	6.4	(46.3)
	M.14	9.5	(68.7)



SOLÉ, S.A.

Crta. Martorell a Gelida, Km.2
Apartado Correos 15
C.P.: 08760 Martorell (Barcelona)

Tel.: +34 93 775 14 00
Fax: +34 93 775 30 13
Tel. Recambios: +34 93 775 44 05
Fax Recambios: +34 93 776 53 79

E-mail: sole@solediesel.com
Web: www.solediesel.com