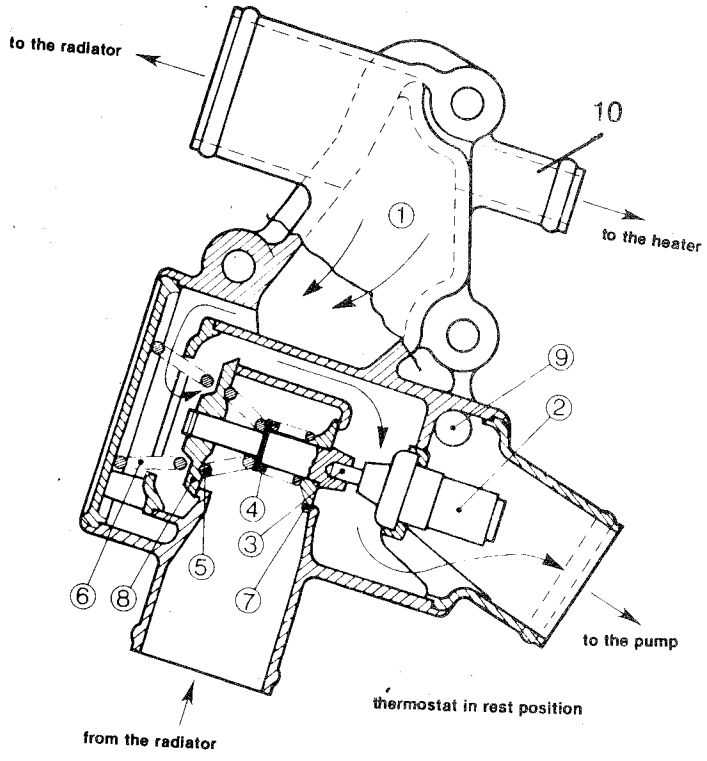


Fig. 22

Control of thermostat operation

If any faults are found in the cooling system of the engine, check the correct opening of the thermostat valve as follow:

Submerge the thermostat in a container filled with water and heat the water, controlling its temperature with a thermometer.
When a temperature of 80 + 2°C is reached, the thermostat valve should begin to open.
Continue heating the water and check the stroke of the thermostat valve to see that it remains completely open at a temperature of 90°C.
If the values found are other than specified, replace the thermostat.

c) Heater

By request, the engine can be supplied for use with a hot water thermos or heater.
For such use, connect tube 10 (fig. 22) of the thermostat to the heater and set up return through tube 2 (fig. 23). (Tube 3 must be ordered by special request).

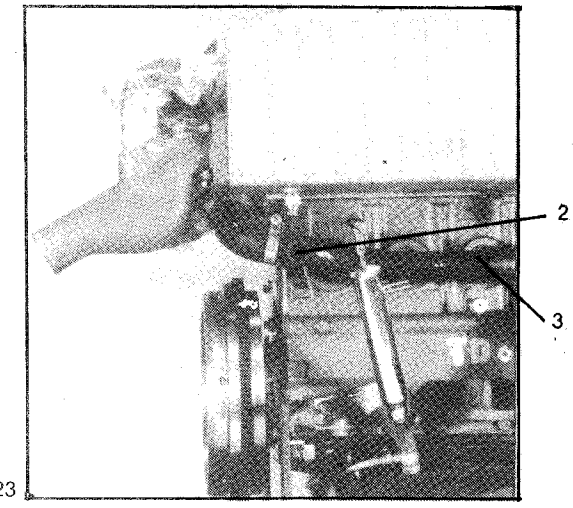
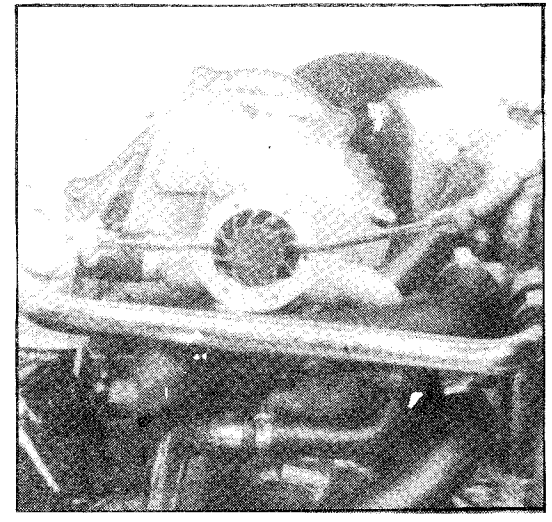


Fig. 23

2 - Salt water circuit

a) Water pump

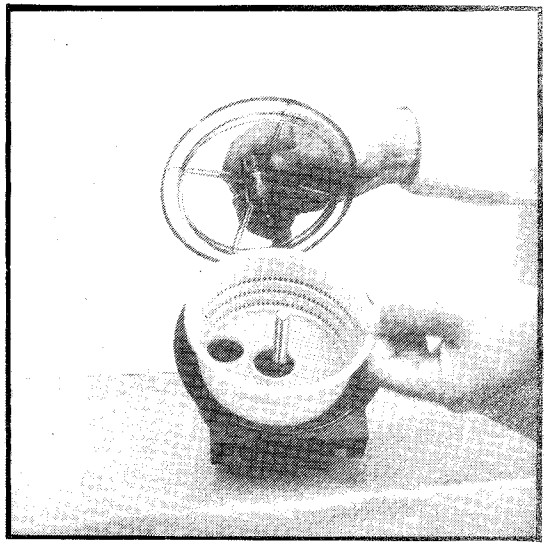
The salt water flow pump is located on the upper rear part of the engine (no. 6 of fig. 2). The impeller is of neoprene and cannot turn dry. If it is run without water, it may break, so it is important to always have a spare impeller on hand.



Tho change the impeller, close the water intake cock, remove the cover from the pump, and use two screwdrivers to pry the impeller off the shaft. Clean the housing and set on a new impeller. Replace the cover, installing a new gasket (fig. 24).
Open the bottom cock.

Fig. 24

Fig. 25



b) Water filter

It is important to install a filter between the engine and the bottom cock to prevent impurities in the sea water from clogging the cooling lines.
Clean the filter every 50 hous, loosening the wing-nut and removing the filter element. Clean it and put it back in place, checking that the cover seats correctly on the O-ring (fig. 25).

Then start the engine to check for water leaks through the cover.

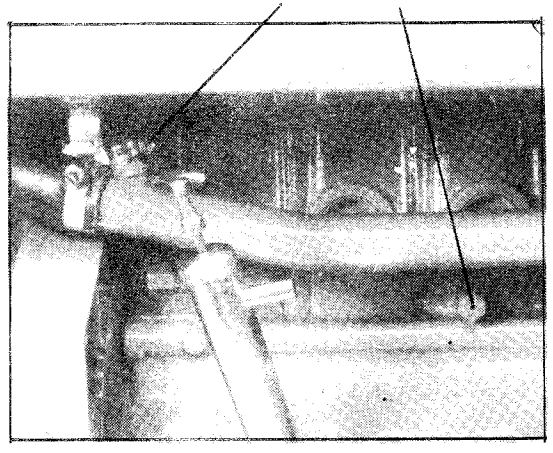
IMPORTANT

If the impeller nust be changed due to breakage, make sure that any broken bits of rubber are removed from the water lines.

3 - Drains

The engine is equipped with 2 fresh water drain cocks on the engine block beneath the heat exchanger (fig. 26).

Fig. 26



Always clean the cooling circuit before adding antifreeze.

NOTE

An antifreeze concentration for a temperature about 5°C lower than the real atmospheric temperature should ben chosen.

Cooling circuit capacity: 10.5 litres.

6 - Fresh water pump

The fresh water pump is located on the left front part of the engine (starboard) over the alternator (no. 4, fig. 1). It is driven by the same V-belt as the alternator. If the belt is too loose, the engine may heat up, so its tightness should be periodically checked, adjusting it if necessary (see Electrical System, page 30).

b) Thermostat

The thermostat of by-pass type, is installed on a support on the cylinder head. The cooling liquid delivered by the pump reaches the cylinder head through chamber **1** of the thermostat support.
At temperatures under 80° + 2°C, the cooling liquid flows through the thermostat without passing through the radiator, entering the water pump and from there to the block and the cylinder head. As the temperature nears the thermostat setting, bulb **2**, which contains expansible material, acts on piston **3** which, overcoming the resistance of springs **4, 5 and 6,** opens valves **7 and 8.** When these valves open, a certain amount of cooling liquid reaches the radiator and mixes with the liquid coming from the cylinder head. As the temperature nears 90°C, the two valves open completely and valve **8,** which rests completely on the bottom of its housing, prevents the liquid coming fros chamber **1** from passing, only allowing the full circulation of the cooling liquid coming from the cooling radiator.
Hole **9** of the support body allows free circulation of the cooling liquid coming directly from the prechamber and nozzle areas.

6 · Idle ajustment

For correct ajustment of idle, the engine should have first reached its normal operating temperature.
To adjust the idling speed, turn screw «A» on the injector pump. The idling speed is 770 - 800 R.P.M. (fig. 21).

Fig. 21

4.3 · COOLING SYSTEM

The engine is cooled by fresh water, which is in turn cooled by sea water.

1 · Fresh water circuit

Use clean water with a minimum of impurities for the cooling circuit, such tap as water or rain water. Hard or dirty water will lead to the formation of deposits in the engine, with the resulting decrease in cooling power.

If there is any risk of low temperatures, that is, under O°C, antifreeze must be added to the cooling water.

The proportion of antifreeze to be added will depend on the expected temperatures.

The precise instructions for use of antifreeze are given by the manufacturer on each container. The following table, however, gives suitable proportions of antifreeze according to expected temperature.

Antifreeze concentration %	13	23	30	35	45	50	60
Freezing temperature °C (°F)	—5 (23)	—10 (14)	—15 (5)	—20 (—4)	—30 (—22)	—40 (—40)	—50 (—58)

4.4 · ELECTRICAL SYSTEM

The engine has a 12 V system and its electrical circuit is shown in the diagrams (figs. 28 and 29).
When installing electrical components, connect correctly by consulting the diagrams and check that there are no defects in the wire sheathing and that the grounding is correct.

IMPORTANT

Before handling the electrical system in any way, disconnect the negative lead of the battery.

2 · Glow plugs

To determine whether a glow plug is defective, take a piece of electrical wiring and make a bridge between the positive terminal of the starting motor and the contact (threaded rod) on top of the glow plug. If sparks jump, the glow plug is in good condition.

2 · Alternator

The alternator is of 12 V 55 A and has built-in electric regulator. It also has an outlet for thermometer connection (tap W).
Periodically check the electrical connections, their respective attachments and the good contact of terminals.
Also check the tightness of the V-belt and adjust it as required. Excessive tightness may cause rapid wear of the belt itself and of the alternator bearings.
To the contrary, if the belt is too loose or oily, it may slip and lead to undercharging of the battery.
Never try to adjust balt tightness with the engine running.
The tightness of the belt is correct if it gives 5-6 mm when pressed with normal force beneath your finger.
To tighten the alternator belt, loosen nuts A and B (fig. 27) and use a lever to press down on the alternator to tighten it. When the tension of the belt is appropriate, retighten nuts A and B.

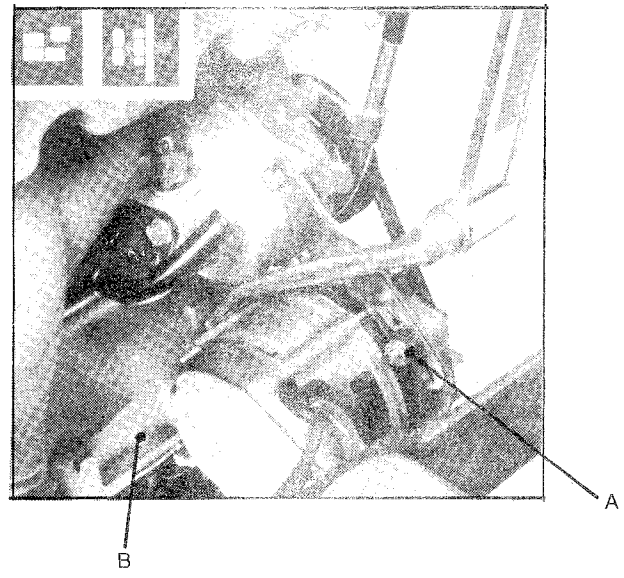


fig. 27

IMPORTANT

When the engine is running, the alternator should be continuously connected to the battery. Otherwise, the diodes of the voltage regulator will be immediately destroyed.
Before charging the battery with an external charger, both the positive and negative terminals must be disconnected.

3 · Batteries

The batteries require very careful maintenance and frequent checks.
Care for them in the following way:

c) Remove the gasket and the nozzle, then clean as follows:

- Take hold of the needle by its cylindrical shank, being careful not to touch ist polished surfaces with your fingers to prevent corrosion.
- Clean the inside of the nozzle body with and appropriately shaped wooden stick and gasoline or Diesel oil.
- Clean the pressure chamber of the nozzle body with a ring-grooved scraper.
- Using extreme care, clean the seat of the needle in the nozzle body with an appropriate needle. When turning the cleaning needle, do not exert excessive pressure.
- The injection hole should be cleaned with an appropriate needle from inside to outside.
- The nozzle needle should be cleaned with a hard wooden stick with cutting edge, previously moistened in Diesel oil.
- Any possible deposits should be removed with a suitable wire brush.

Replace the nozzle as follows:

a) Turn the crankshaft to expel any foreing bodies from the combustion chamber.
b) Install new washers in the combustion antechamber.
c) Place the nozzle in its housing and refit the yoke, tightening the screw to a torque of 4 kg m (39 Nm).
d) Replace the injection tubes and the overflow tube.
e) Whit the engine running, check the fuel lines and main connectors for possible leaks.

IMPORTANT

Do not touch any other screw on the injection pump.

4 · Changing fuel filter

The fuel filter should be replaced every 300 hours.
To change it, loosen screw «A» (located in the top of the filter) and replace the filter alement, likewise changing the rubber gaskets (fig. 19).

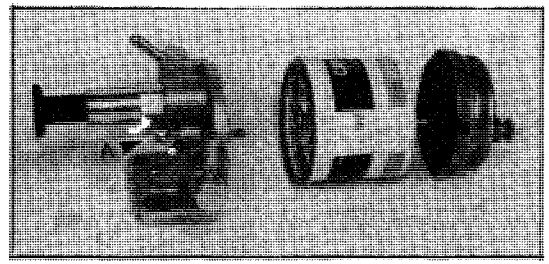


Fig. 19

5 · Nozzles

The nozzles should be removed after a long winter lay-up or whenever they show sings of damage. The nozzles should be removed as follows:

a) Disconnect injection tubes «A» with a 17 mm wrench, and the overflow tube «B» with a 10 mm wrench.
b) Loosen screw «C» (17 mm wrench) and remove the fork which supports each nozzle (fig. 20).

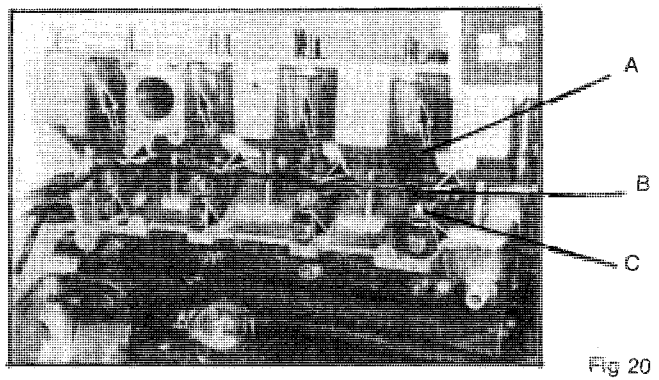


Fig 20

a) Always keep the batteries dry and clean.
b) Periodically check the good cleanliness of terminals. If any dirt deposits have formed, loosen the terminals, clean them and apply a coating of natural grease.
c) Do not allow the batteries to come into contact with oil or fuel.
d) Do not place metal objects on the battery (keys, etc.), to prevent short circuits.
e) Carefully handle the batteries and acid containers to prevent contact of acid with skin or clothing. Acid may cause burns and wounds to persons and destroy clothing.
f) Each month check the acid level and fill it up, if necessary, with distilled water. The acid level should not exceed 15 mm above the upper edge of the plates.
g) Do not use bare flames to light up the battery components to avoid the risk of explosion.
h) During winter lay-up, remove the batteries and store them according to the manufacturer's instructions.

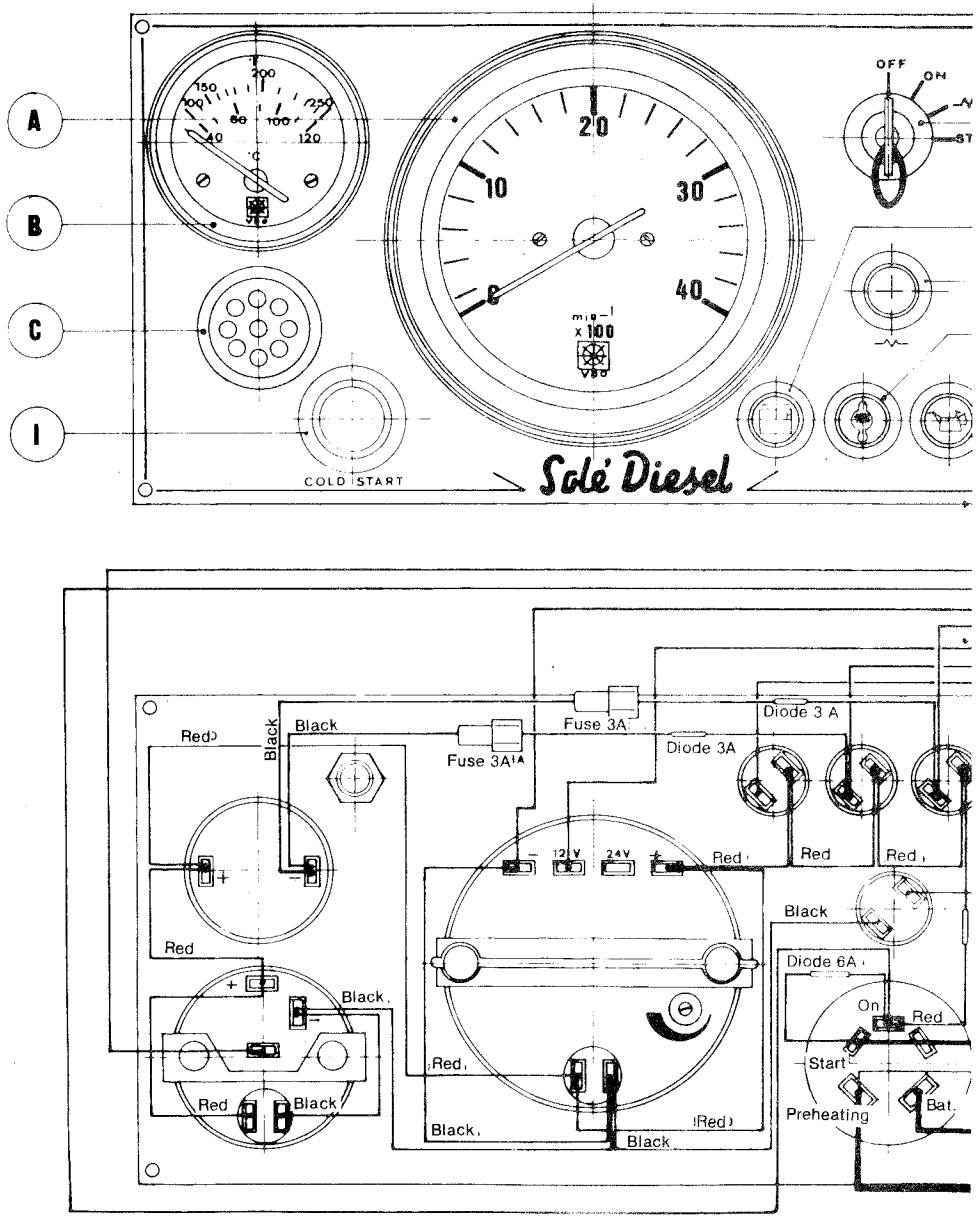
4 · Fuse

For protection, the electrical system is equipped with a 50 A fuse next to the starting motor on the cable leading from the starting motor to the control panel. (See the diagram on page 32).
If current does not reach the control panel, check to see if the fuse has burnt out and, if so, replace it.

4.5 · REVERSING GEAR

The S.M.P. reversing gear, with mechanical drive, is made of aluminium alloy featuring very high mechanical strength and resistance to sea water.

fig. 29



Then tighten screw «A».

f) Loosen all four injection tubes «B» and turn the starting key to «START» position. Run the engine until fuel without air bubbles comes out of all four injection tubes, then tighten the tubes again (fig. 18).

When these operations have been completed, start the engine according to the instructions in section 3.3 (Starting) (page 13).

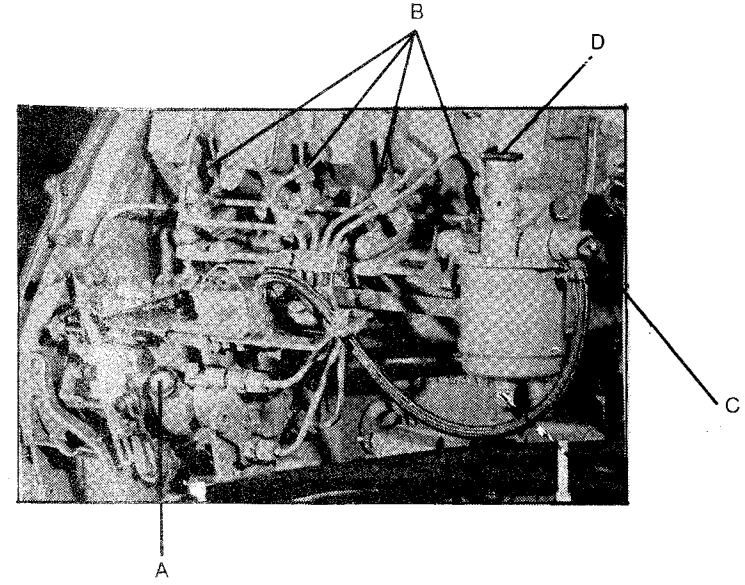


Fig. 18

3 · Draining sediment cup

The Diesel oil which is normally used contains water as a condensation product. This water may very seriously damage the injection pump and nozzles.

To prevent this, the fuel filter is equipped with a sediment cup which catches the water. Every 100 hours, empty the sediment cup as follows:

— Loosen screw «D» (located inside the filter) a few turns, and place a small container beneath it to prevent water from falling on the starting motor. When fuel without water comes out, retighten the screw.

VERY IMPORTANT

If, for any reason, the oil lines between the cooler and the engine must be removed, remember to replace them in the same intake and outlet positions, since the engine will otherwise be left without oil pressure.

4.2 - FUEL SYSTEM

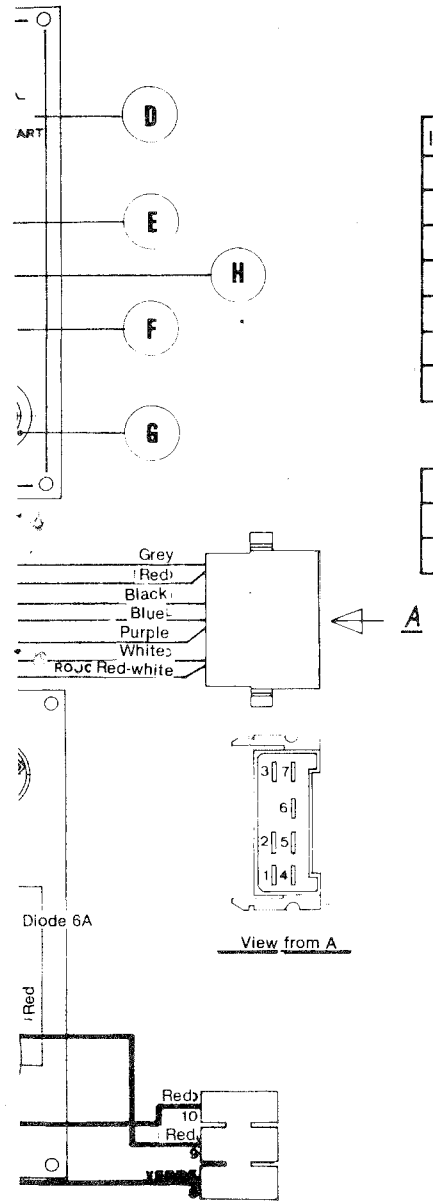
1 - Diesel oil

Always use clean filtered Diesel oil. Never use kerosene or heavy oils.
Always refill fuel in good time. In cold weather, a large amount of water vapour is produced when there is a large amount of water vapour is produced when there is a large quantity of air inside the fuel tank, so the tank should always be kept as full as possible.
Vhen filling the tank, try to prevent impurities and water from entering by always using clean plastic fuel containers and filtering the fuel when possible.
Also try to keep tho tank free of water and dirtiness.

2 - Bleeding fuel system

Air gests into the fuel system qwhn the engine is started up for the first time or when it is run on a nearly empty fuel tank, and this air must be blec.
To do so, follow these instructions:

a) Loosen screws «C» of the filter and «A» of the injection pump.
b) Loosen the priming pump «D» completely and turn the contact key to «ON» position (contact).
d) Press and release pump «D» repeatedly until fuel without air bubbles comes out of screw «C» of the filter.
Then tighten screw «C».
e) Continue to press and release pump «D» until fuel without air bubbles comes out of screw «A» of the pump.



Item	CABLE FUNCTION	COLOUR
1	Water alarm	White
2	Oil alarm	Blue
3	Water temperature clock	Grey
4	Charge control	Red-white
5	R.P.M. counter	Purple
6	Negative	Black
7	Engine stop	Red
8	Preheating	Green
9	Starting	Pink
10	+ Current intake	Red

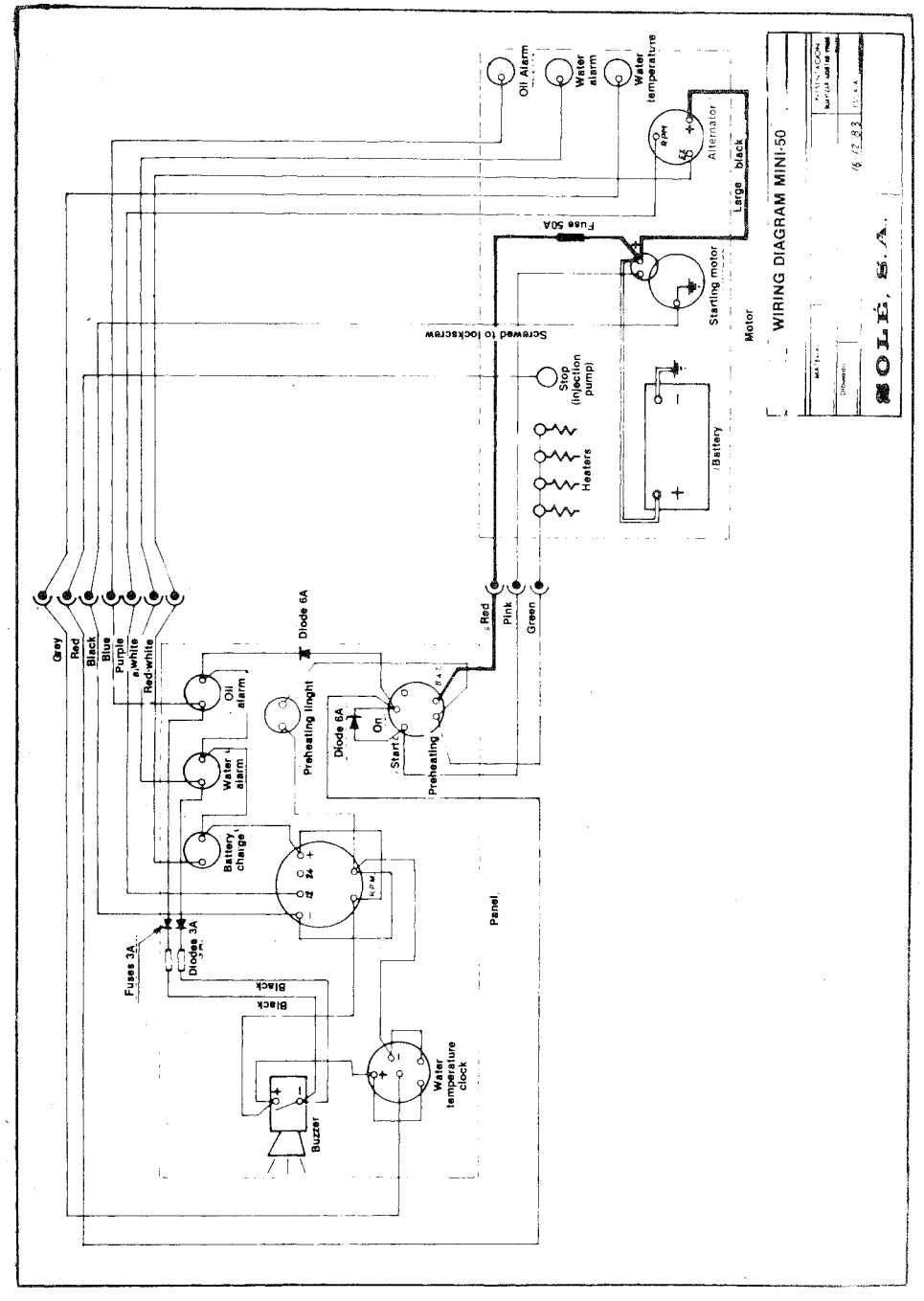
Item	DESCRIPTION
I	Cold start
H	Preheating light
G	Oil light
F	Water temperature light
E	Battery charge ligt
D	Contact key
C	Buzzer
B	Water temperature
A	R.P.M. counter

ELECTRIC PANEL MINI-50

MATERIAL	TRATAMIENTO	ACABADO	
Dibujado	Verificado	Tol general ±	FECHA 16/12/83 ESCALA

SOLÉ, S.A. 000.61.000

fig. 28



NOTE

Change the engine and reversing gear oil at least once a year, even if the operating time of the unit is less than specified for such changes.

4 · Oil filter

The oil filter is located in the rear part of the engine over the oil cooler. It is of the cartridge type and cannot be cleaned.

Replace the oil filter after the first 20 hours of operation and every 200 hours from then on.

When installing a new oil filter, spread a little motor oil on the rubber gasket, then tighten the filter on firmly with a suitable wrench.

Once the filter has been installed, start up the engine.

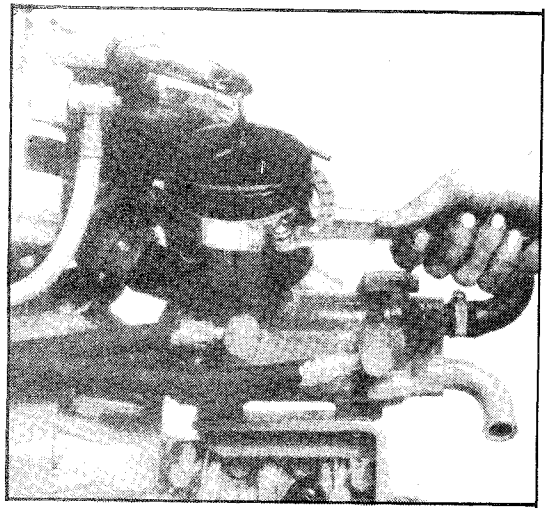


Fig. 16

5 · Oil cooler

At least once a year, remove the tube bundle from the oil cooler and check for corrosion or dirtiness. If necessary, clean with 10% solution of sodium bicarbonate in water.

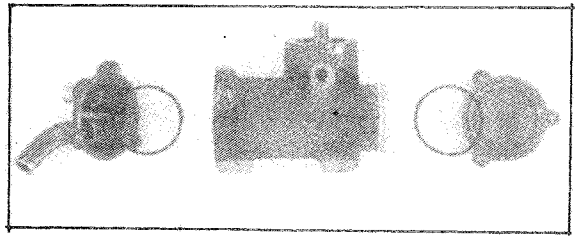


Fig 17

To remove the tube bundle, loosen the three screws in the covers, remove the covers and take out the bundle.

The hermetic seal between the covers and the body is provided by O-rings. Check their condictions, and replace if necessary (fig. 17).

IMPORTANT

Never preheat for more than 45 minutes.

4) Starting

Set the remote control lever in neutral and pull the «COLD START» cable to provide supplementary fuel supply. Hold the cable in this position and turn the starting key to «START» position until the engine starts up. If the engine does not start, even with the key in «START» position for 15 seconds, release the key for 30 seconds, then try to start up the engine again, preheating the glow plugs again if necessary. The starting motor should not operate continuously for more than 30 seconds.

When the engine has started, turn the starting key to «ON» position, set the «COLD START» cable back into its normal position and give a little more gas by means of the remote control lever.

When the engine starts, check that the oil pressure and battery charge lamps go off.

5) Warm-up

Warm up the engine for about 5 minutes, letting it operate without load at half gas.

IMPORTANT

Do not turn the key to «START» position while the engine is in operation since this could harm the starting motor.

6 - Bleed the fuel system.

7 - Run the engine at medium speed, until service temperature is reached. (Opening of thermostat, then stop engine).

8 - Remove cylinder head cover and spray protective mixture of Diesel oil with 10% anticorrosion oil on the rocker arms. Then replace valve cover.

9 - Spray anticorrosion oil on fuel intake system.

10 - Turn engine with starting motor for a few seconds without starting it up. In this way, the exhaust gases are discharged completely and the cylinder liners are protected by a coating of oil.

11 - Remove and story battery, following the manufacturer's instructions.

5.9 INSTRUCTIONS FOR STARTING UP THE ENGINE AFTER LAY-UP

To adjust the engine for correct operating condition after winter lay-up, a few specific operations must be performed in addition to those given in section 3 (Operation):

1 - Fill the fuel tank with clean Diesel oil. Check the fuel filter according to instructions. If the filter is clogged, change filter cartridge.

2 - Drain the anticorrosion oil from the crakcase and refill according to the instructions on page 17 (4.1 Lubrication system -3).

3 - Check the internal water system and fill it as specified.

4 - Reconnect the battery and apply a coating of neutral vaseline on the battery terminals.

5 - Remove the nozzle supports and clean them. If possible, check the nozzle settingg at a service station. Turn the engine without nozzles by means of the starting motor to eliminate the anticorrosion oil used for winter lay-up. Reassemble the clean nozzles.

6 - Perform the operation described on page 20 (Bleeding fuel system -2) and make the necessary connections of the cooling and exhaust systems.

WARNING - When performing this operation, remember to remove the plugs installed for winter lay-up of the engine.

7 - Check for leaks in the fuel and water systems.

8 - Start the engine and test it at different speeds, checking that the water circulates correctly. Check again to see if there are any leaks in the connectors.

NOTE:

The Diesel oil and oil mixture in the tank for winter lay-up may be used to run the engine.

8) Other checks

a) Carefully check the engine mounting points.
b) Check for correct tightness of all screws and bolts.
c) Check fo correct connection and tightness of the connectors of water, oil and Diesel oil lines.
d) Check the exhaust and transmission systems.

3.3 - STARTING

1) Set the gearshift lever in neutral
2) Turn the starting key (E) to the «ON» position. Check that the oil pressure (H) and battery charge (F) lamps go on and taht alarm (C) sounds (fig. 10).

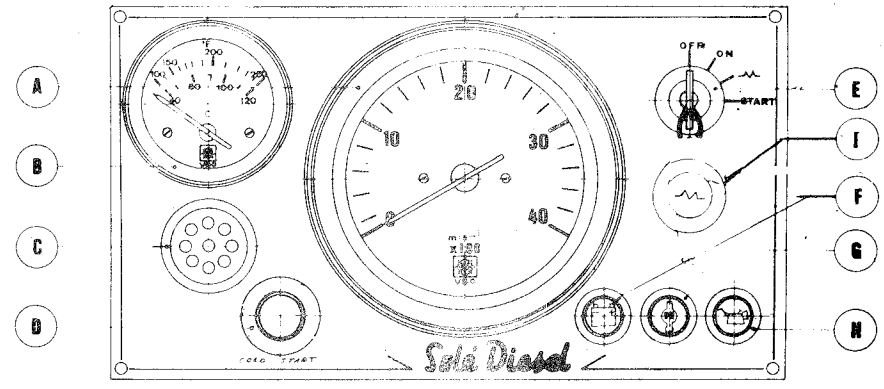
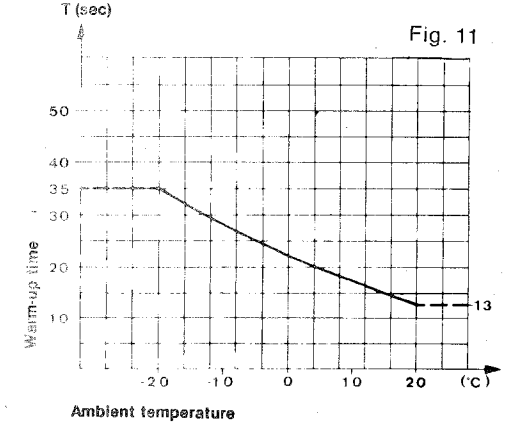


Fig. 10

3) Preheating

Turn the starting key to position (preheating). The preheating pilot lamp (1) should go on (fig. 10). Keep the key this position as long as specified in the following table (fig. 11).

Fig. 11



b) Reversing gear

Connect the remote control cable to the ball joint of the lever and secure it with the clamp.
Once installed, adjust the remote control so that it will have the same travel in front and behind. Do not

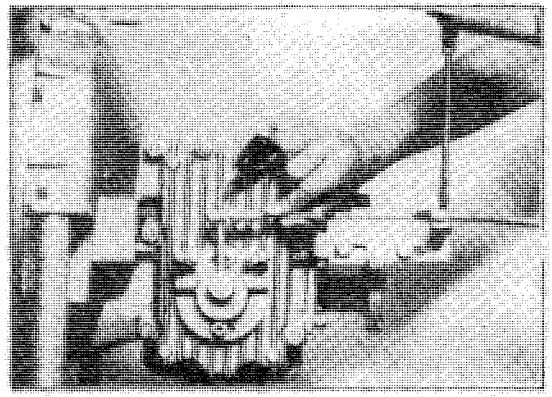


fig. 8

accelerate until it has begun to operate correctly (fig. 8).
To check for correct assembly, do as follows: Set the reversing gear lever and the remote control lever in forward drive position.
Next, match up the holes in the ball joint (A) and the lever (B) (fig. 9).
Fine adjustment is made with the holes of the reversing gear lever and the links of the cable attachment support.

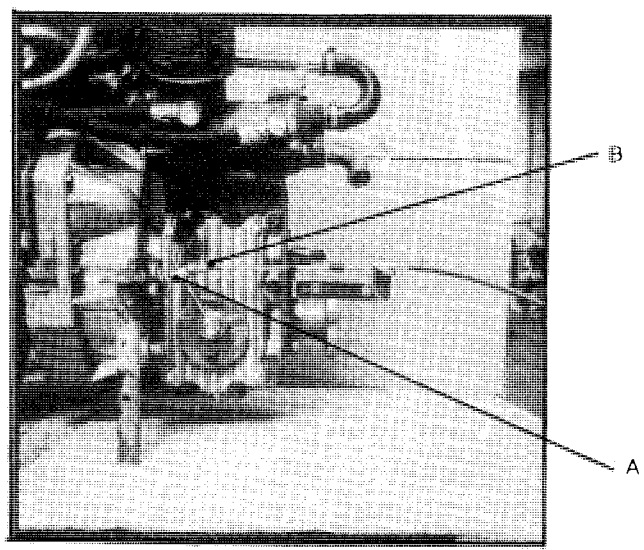


fig. 9

○ Inspection, adjustment □ Cleaning ● Change △ Draining or filling

	Inspection item \ Intervals	Daily	After first 20 hours	Every 100 hours	Every 300 hours	Every 600 hours	Every 900 hours	Every 1800 hours
Engine body	Tightness of setscrews		○			○		
	Clearance of tappets		○			○		
	Engine idle		○		○			
	Triming belt							●
Lubrication system	Engine oil	○	●	●				
	Reversing gear oil	○	●	●				
	Oil filter		●	●				
Fuel system	Fuel	○						△
	Fuel tank							□
	Fuel filter (sediment cup)			△	●			
	Water filter (if any)			□				
	Nozzle						□	
Cooling system	Cooling water	○						
	Water filter	○		□				
	Bottom cock	○						
	Water pump impeller					○		
Electrical system	Each instrument	○						
	Glow plug							○
	Starting motor, alternator and regulator						○	
	Alternator belt		○	○				●
	Battery water level				○			

6 · TROUBLE SHOOTING

Any fault or defect must be detected and corrected as early as possible. Inspect and take correct action according to the instructions given below. Faults which require servicing beyond the user's capabilities should be repaired at a service station authorized by SOLE, S. A.

1 · Engine does not start

a) Does not turn

—Lights on instrument panel off in «ON» position.	
Battery defective or run down	Replace or charge and check tightness of terminals
Starting switch defective	Change or repair
Cables rusty or loose	Correct connections and los contacts
Fuse burnt out	Replace
Lights on instrument panel on in «ON» position (they always go off in «START» position).	
Engine seized	Repair (see your Solé Diesel Service)
Starting motor defective	Inspect and repair
b) Turns very slowly	
Battery partly run down	Charge
Improper viscosity of engine oil (particularly at very low temperatures).	Check that oil meets rating given in specification table. Replace with correct oil

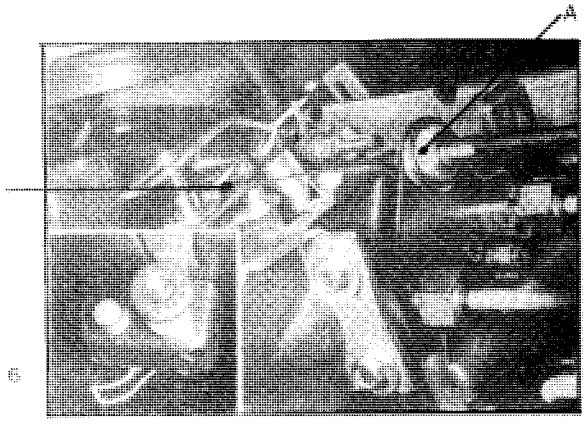


fIG. 6

6) Connecting cold start cable

The i injection pump has a lever for supplementary fuel supply and advance of injection to enhance starting in cold weather. The lever is actuated by the cable marked «COLD START», installed in the instrument panel.

Install the cable by fitting it in the sheath on support «A» and in lever «B» of the injection pump. Tighten appropriately.

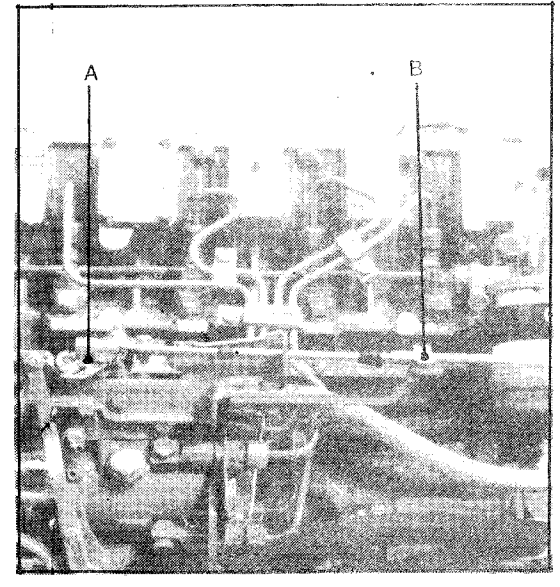


Fig. 7

7) Remote control connection

a) Engine

Connect the remote control cable to the ball joint of lever (A) and secure the cable with clamp (B). Adjust it so that no gas is supplied until the reversing gear has started.

2) Filling fuel tank

Fill the fuel tank with clean filtered Diesel oil. Check that the tank is completely clean, with no particles of iron or polyester. Open the fuel outler cock.

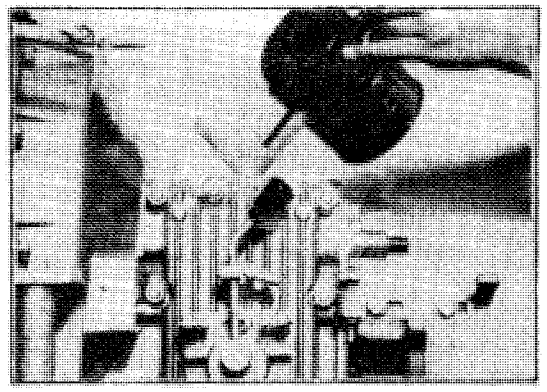


Fig. 4

3) Filling water circuit

Fill the circuit with clean water up to the fill hole. Add antifreeze in winter (fig. 3).

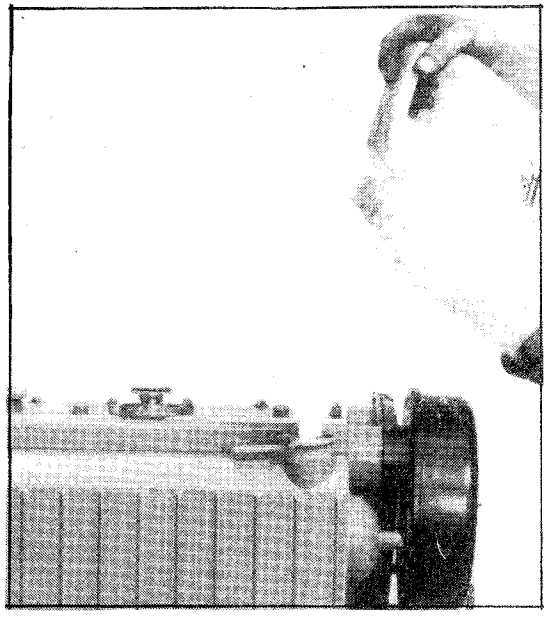


Fig. 5

4) Open the salt water intake cock

5) Bleeding fuel circuit

Firts bleed the fuel filter and then the injection pump. (For more details, see «Bleeding fuel circuit» in section 4.2).

5) Connecting battery switch

Connect the battery switch.

c) Engine turns but does not start

Fuel tank empty or almost empty	Check and fill. Bleed circuit (see page 20)
Fuel outlet cock closed	Open
Fuel filter clogged	Inspect filter and replace cartridge (page 22)
Air in fuel lines or in injection pump	Check for possible in lines and connectors. Tighten line clamps. Bleed fuel circuit (see page 20)
Incorrect setting of injection pump	Inspect and correct (see your Solé Diesel Service)
Insufficient preheating of glow plugs	Heat sufficiently
Preheating glow plugs burnt out	Inspect and replace
Incorrect adjustment of valve clearance	Inspect and adjust (see your Solé Diesel Service)
Timing out of adjustment	Correct (see your Solé Diesel Service)

2. Engine stops when running

Fuel tank empty	Fill and bleed fuel circuit (see page 20)
Fuel filter clogged	Inspect filter and replace cartridge (see page 22)
Air in fuel lines or in injection pump	Check for fuel leacks in lines and connectors. Tighten line clamps. Bleed fuel circuit (see page 20)

3. Engine weak or misfires

Fuel filter clogged	Inspect filter and replace cartridge (see page 20)
Air in fuel lines or in injection pump	Check for fuel leaks in lines and connectors. Tighten line clamps. Bleed fuel circuit (see page 22)
Insufficient air for combustion	Inspect air filter and clean. Increase air intake into engine compartment.
Valve setting out of adjustment	Inspect clearance and adjust (see your Solé Diesel Service)
Water in fuel system	Replace filter cartridge and drain water from tank, then refill with clean Diesel oil

4. Engine at full power does not reach correct R.P.M.

Engine overloaded	Check that screw is not overdimensioned. Change screw
Backpressure in exhaust	Check for obstructions in exhaust system
Vent hole of fuel tank obstructed	Check vent tube of tank. Remove obstruction
Insufficient air for combustion	Check air filter and clean. Increase air intake into engine compartment

5. Engine expels large amounts of blue smoke

Oil level too high	Check oil level and empty surplus

3.1 · BEFORE STARTING

You new SOLE engine requires 20 HOURS operation to run in all its moving parts achieve high performance.

This running-in process should be carried out carefully, as follows:

PRECAUTIONS

* Let the engine warm up while idling for at least 5 minutes.
* Avoid brusque accelerations.

3.2 · PRE-STANTING PREPARATIONS

1) Filling engine and reversing gear with oil.

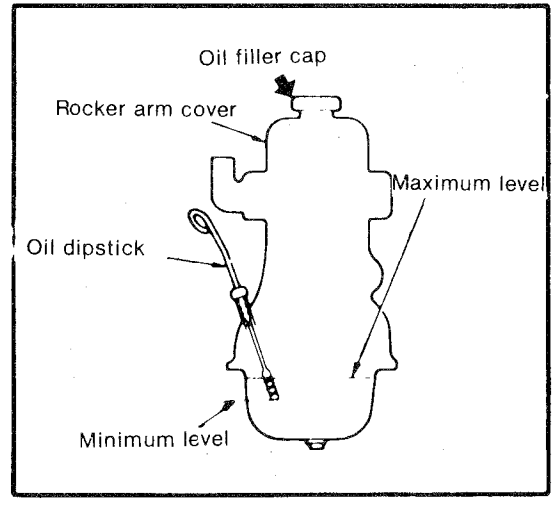


Fig. 3

Fill the engine with oil as specified on page 6, to the upper mark on the dipstick (fig. 3). Fill the reversing gear to the level marked on the dipstick, through the dipstick hole (fig. 4). Use the same type of oil for in the engine.

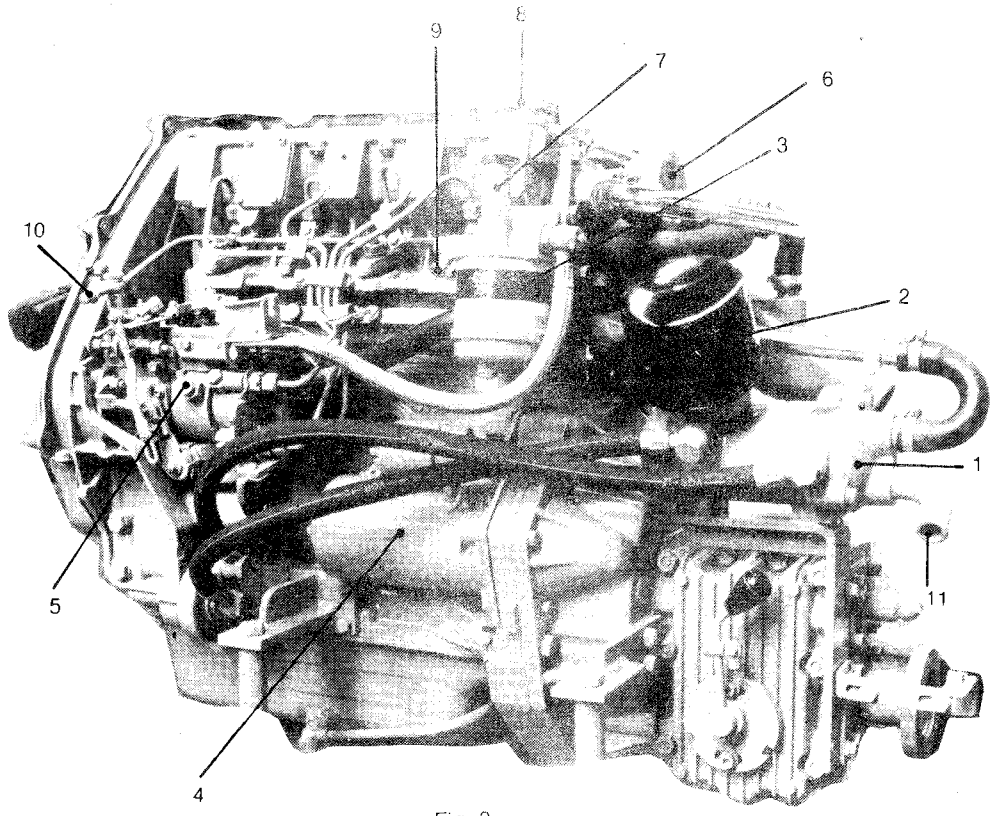


Fig. 2

1 Oil cooler
2 Oil filter
3 Diesel oil filter
4 Starting motor
5 Injection pump
6 Salt water pump
7 Manual priming pump
8 Oil filler cap
9 Fuel intake
10 Fuel return
11 Salt water intake

Valve clearance excessive	Inspect clearance and adjust (see your Solé Disel Service)
Insufficient compression	Check compression. Compression loss mey be caused by a broken or worn out piston ring or by excessive clearance of valve guides

6. Engine expels black smoke

Engine overloaded	Check that screw is not overdimensioned. Change screw
Nozzles do not spray correctly (dirty or incorrectly set)	Heve nozzle cheaked at authorized service. Set for specified pressure
Injection pump incorrectly adjusted (excessive flow)	Have pump checked at authorized Solé Diesel or Condiesel (CAV) workshop
Fuel filter clogged	Inspect filter and re place cartridge (see page 22)

7. Engine heats up

Shortage of water in fresh water circuit	Check level and fill up if necessary
Fresh water pump does not operate correctly	Inspect condition and tightnees of belt. Tighten or replace (see page 30). Check condition of water pump. Repair or replace
Bottom cock to water filter clogged	Inspect and clean (see page 28)

Cooling system clogged	Check that cooler and water lines are clean. Clean
Thermostat faulty	Check thermostat operation. If necessary, replace
Insufficient air circulation in engine compartment	Increase air intake into engine compartment
Thermocontact or temperature sender faulty	Inspect and replace, if necessary
Salt water pump faulty	Inspect operation and check condition of impeller. Change if broken (see page 27)
Engine oil level too high	Check oil level and drain surplus

8. Low oil pressure

Engine oil level too low	Check level and fill to upper mark on dipstick
Oil viscosity too low	Check viscosity and replace with oil of correct viscosity
Oil leak through connections or lines	Check for leaks and correct
Oil monocontact faulty	Check and replace

9. Faulty battery charge

Incorrect alternator belt tighness or broken belt	Check and tigthen or replace (see page 30)

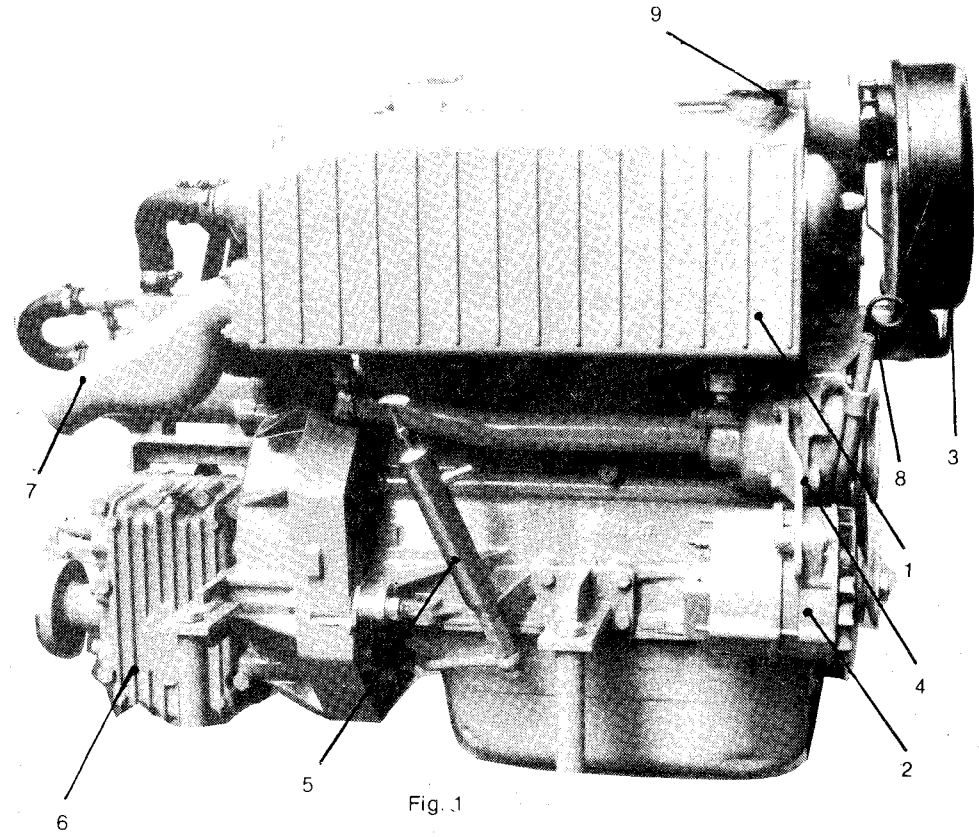


Fig. 1

1 Heat exchanger
2 Alternator
3 Air filter
4 Fresh water pump
5 Oil drain pump
6 Reducing-reversing gear
7 Wet exhaust elbow
8 Oil dipstick
9 Fresh water filler cap

2 · SPECIFICATIONS

Type:	Diesel, 4-stroke, water-cooled
No. of cylinders:	Four
Cylinder bore:	83 mm
Stroke:	79.2 mm
Total displacement:	1714 cc.
Compression ratio:	20:1
Power DIN 6270-B	50 HP. (36.8 kw)
Maximum R.P.M.:	3800
Minimum R.P.M. at idle:	(without load)
Reducing-reversing gear:	Mechanical, type SMP-H, Red: 2:1, 2.5: 1 or 3:1
Dry weight with reversing gear:	215 Kg
Maximum installation angle (continuous):	17°
Oil capacity:	Engine: 5.5 l (including cooler) Reversing gear: 0.8 l
Oyl type:	Multigrade, series 3, 15 W 40 · 20 W 50
Cooling:	closed circuit with heat exchanger
Cooling circuit capacity:	10.5 l
Injection pump:	C.A.V. type DPS C 8550 A 000A, rotatory Injector pressure: 130 + 0 bar
Electrical equipment:	See diagram on page 32
Starting motor:	Bosch 12 V
Alternator:	Bosch 12 V 55 A
	Glow plug
	Main fuse 50 A
Battery capacity:	90-95 (minimum)
Dimensions:	Length: 895 mm Width: 575 mm Height: 673 mm

Alternator regulator faulty	Have it checked at Solé Diesel or Bosch official Service
Battery defective	Change

10. Gears do not mesh correctly

Remote control incorrectly adjusted	Adjust
Reversing gear control incorrectly adjusted	Adjust
Clutch cone worn	Change

7 · SERVICING DATA

7.1 · Service standards

Valve clearance (cold):	Intake 0,35 mm Exhaust 0,40 mm
Compression pressure:	22/25 kg./cm$_2$
Oil pressure (accelerated to operating temperature 100°):	3, 42 - 4,9 bav
Firing sequence:	1-3-4-2
Nozzle pressure:	$130\ ^{-3}_{+0}$ bar

Thread Torque

		Torques	Par apriete	
			Nm	Kgm
Lockscrew, reversing gear output shaft			120	12
Lockscrew, water cooler element			20	2
Nut, reversing gear outlet flange			170	17
Lockscrews, reversing gear casing			40	4
General torque of screws	M. 6		7,8	0,8
	M. 8		27	2,7
	M. 10		35	3,5
	M. 12		64	6,4
	M. 14		95	9,5

1 · PRECAUTIONS FOR ENGINE OPERATION

* Always use appropriate oil and check oil pressure during operation.
* Use clean fuel, free of impurities and water.
* Prevent water and air from entering fuel circuit.
* If the starting motor pinion does not mesh with the crown when starting, let the motor stop completely, then turn the key again.
* Always check the colour of the exhaust smoke.
* Periodically clean or change the fuel and oil filters.
* Change oil according to instructions.
* Check the correct circulation of cooling water through the engine.

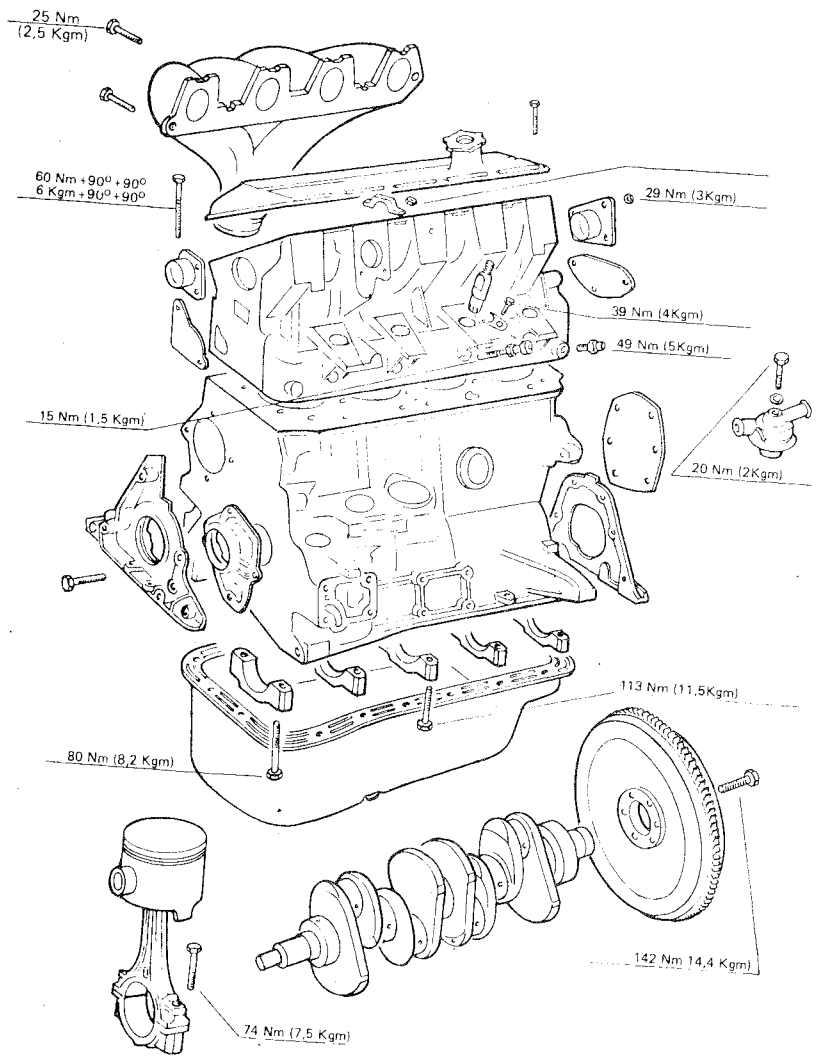
Safety precautions

* Do not touch the moving parts of the engine while it is running.
* Do not touch weak points when hot, such as exhaust pipe, and do not place combustible materials near such parts.
* The various parts of the engine should only be inspected and adjusted when the engine is not runnig.
* Check the level, and refill in necessary, of engine oil, cooling water and fuel after turning off the engine.
* Always use tools of suitable dimensions and take all precautions when servicing the engine.

CONTENTS

1 -	Precautions for engine operation	5
2 -	Specifications	6
3 -	Operation	9
	3.1 - Before starting	9
	3.2 - Pre-starting preparations	9
	3.3 - Starting	13
	3.4 - Precautions when starting and during operation	15
	3.5 - Stopping	16
4 -	Maintenance	17
	4.1 - Lubrication system	17
	4.2 - Fuel system	20
	4.3 - Cooling system	24
	4.4 - Electrical system	29
	4.5 - Reversing gear	31
5 -	Periodic inspections	36
	5.1 - Daily check before starting engine	36
	5.2 - Maintenance after the firts 20 hours of operation	36
	5.3 - Maintenance after every 100 h. of operation	37
	4.4 - Maintenance after every 300 h. of operation	37
	5.5 - Maintenance after every 600 h. of operation	37
	5.6 - Maintenance after every 900 h. of operation	38
	5.7 - Maintenance after every 1800 h. of operation	38
	5.8 - Instructions for winter lay-up	38
	5.9 - Instructions for starting engine after lay-up	39
6 -	Trouble-shooting	42
7 -	Servicing specifications	48

DESCRIPTION THREAD	Torque	Par de apriete	
		Nm	Kgm
Lockscrew, front capscrew to block	M 10 × 1,25	80	8,2
Self-blocking locknut, intermediate and central capscrews to block	M 12 × 1,25	113	11,5
Lockscrew, intermediate and central capscrews to block	M 12 × 1,25	113	11,5
Lockscrew, vent body to block	M 8 × 1	20	2
Lockscrew, cylinder head to block*	M 14 × 1,25 M 12 × 1,25	60 Nm + 90° + 90°	6 Kgm + 90° + 90°
Locknut, cylinder head to block*	M 14 × 1,25 M 12 × 1,25	60 Nm + 90° + 90°	6 Kgm + 90° + 90°
Lockscrew, intake manifold	M 8 × 1,25	25	2,5
Lockscrew, exhaust manifold	M 8 × 1,25	25	2,5
Nut for connecting conrod capscrew	M 10 × 1	74	7,5
Self-blockimg lockscrew, flywheel	M 12 × 1,25	142	14,4
Lockscrew, driven gear, timing shaft control	M 12 × 1,25	118	12
Lockscrew, fixed tightener bearing	M 10 × 1,25	44	4,5
Locknut, tightener support	M 10 × 1,25	44	4,5
Locknut, timing shaft cover	M 10 × 1,25	39	4
Locknut, timing shaft end supports	M 8 × 1,25	29	3
Lockscrew, injection pump bracket	M 6 × 1	7,8	0,8



FOREWORD

Thank you for having chosen the SOLE MINI-50 DISESEL engine.

BEFORE STARTING YOUR ENGINE, read these operating and maintenance instructions carefully and follow them closely.

If you have any questions about your engine or any problems with it, please contact your nearest SOLE Dealer, who will de delighted to attend to you.

IMPORTANT

To ensure correct and speedy spare parts supply, it is very important to state the following information on all orders:

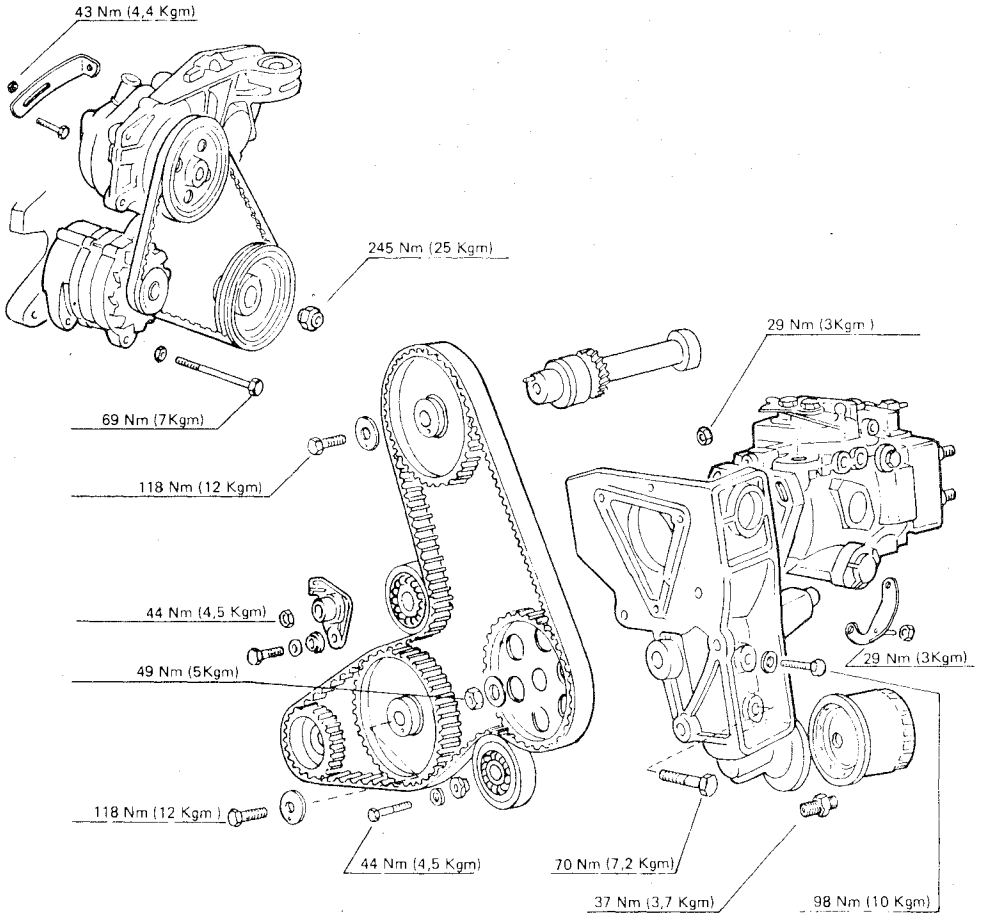
a) Engine type (given on the name-plate).

b) Engine number (given on the top of the block on the alternator side).

c) Number and description of part required.

NOTE: The descriptions and illustrations in this Operating and Maintenance Manual are not binding. Therefore, although the main specifications of the engine described and illustrated here will remain as given, SOLE, S. A. reserves the right to make any appropriate changes in the parts, details or accessories of the engine, at its discretion, to meet technical or commercial requirements.

DESCRIPTION THREAD	Torque	Par de apriete	
		Nm	Kgm
Locknut, injection pump	M 8 x 1,25	29	3
Locknut, injection pump control gear	M 12 x 1,75	49	5
Lockscrew, bracket to oil filter support and to injection pump	M 8 x 1,25	29	3
Upper lockscrew, oil filter and injection pump	M 12 x 1,25	98	10
Lower lockscrew, oil filter and injection pump	M 10 x 1,25	71	7,1
Locknut, driving pulley to crankshaft	M 20 x 1,5	245	25
Lockscrew, cover and bracket to water pump body	M 8 x 1	23	2,3
Locknut, alternator to lower support	M 12 x 1,25	69	7
Self-blocking locknut with nylon, alternator to upper bracket	M 10 x 1,25	43	4,4
Locknut for studbolt, air depressor	M 6 x 1	7,8	0,8
Lockscrew, air depressor	M 6 x 1	7,8	0,8
Lockscrew, nozzle supports	M 10 x 1,25	39	4
Preheating glow plugs	M 12 x 1,25	15	1,5
Oil pressure switch	M 14 x 1,5	32	3,2
Electric thermometer sender (cooling liquid temperature)	M 16 x 1,5 conical	49	5
Oil pressure sender	M 14 x 1,5	37	3,7
Lockscrew for cylinder head plate and engine hoisting anchorage (timing side)	M 8 x 1,25	34	3,4


43 Nm (4,4 Kgm)
245 Nm (25 Kgm)
69 Nm (7Kgm)
118 Nm (12 Kgm)
29 Nm (3Kgm)
44 Nm (4,5 Kgm)
49 Nm (5Kgm)
29 Nm (3Kgm)
118 Nm (12 Kgm)
44 Nm (4,5 Kgm)
70 Nm (7,2 Kgm)
37 Nm (3,7 Kgm)
98 Nm (10 Kgm)