Operating and maintenance instructions

Engines

MINI 1
MINI 2
MINI 3

SOLÉ, S.A.

FOREWORD

It is important to remember that like any other machine, an engine requires care and attention in order to keep it in perfect running condition.

Before starting the engine, be sure to read carefully the operating and maintenance instructions contained in this manual, and follow them closely.

It should be borne in mind that careless or inadequate servicing can cause faulty running of the engine and impairment of the terms of guarantee.

NOTE

For correct and immediate supply of spare parts, it is of the utmost importance to include the following information in orders:

a) Model of engine (indicated on the specification plate).

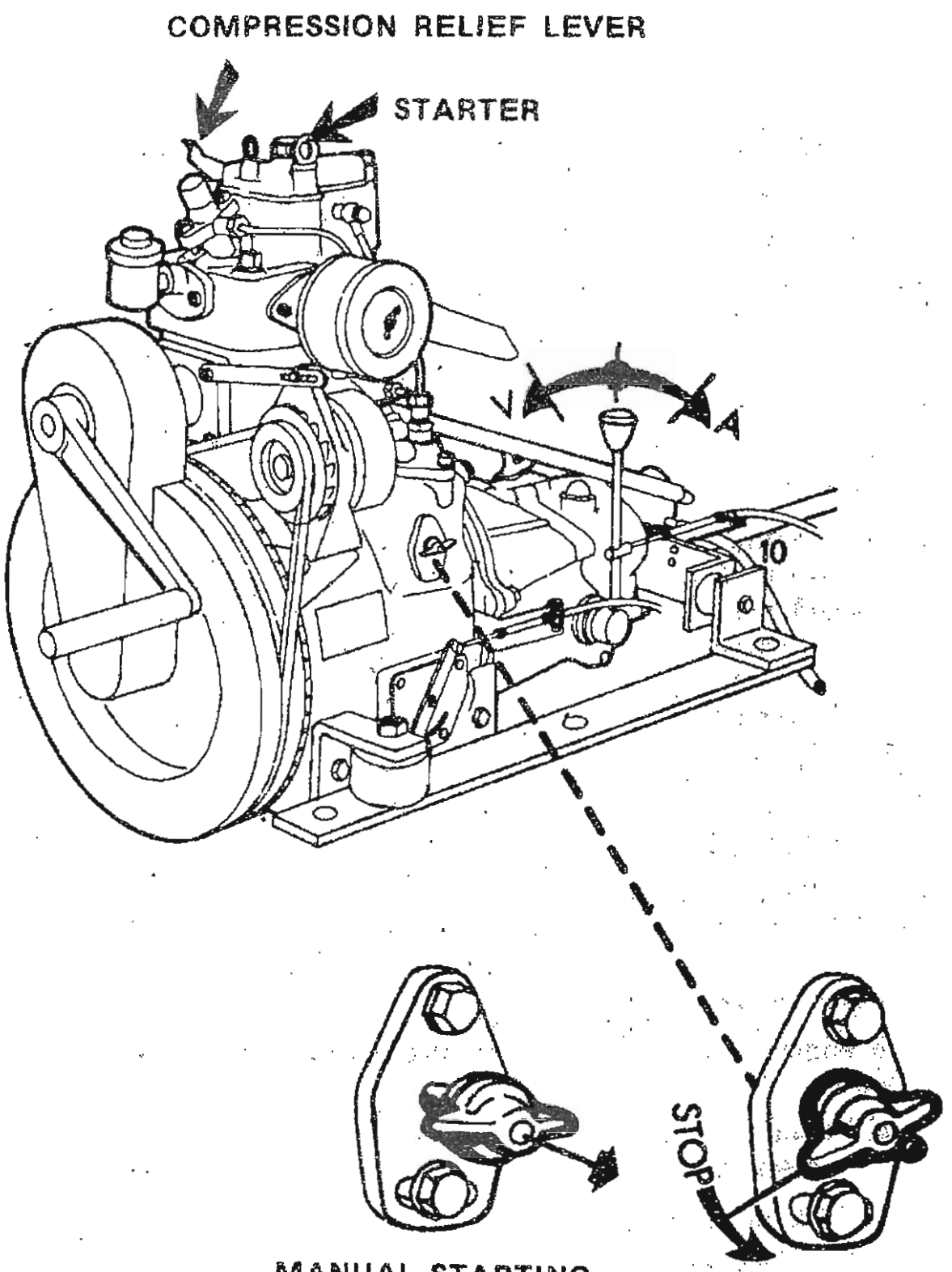
b) Engine number (engraved on the plate or bedplate).

c) Reference number and nomenclature of required part.

Crankshaft revolutions in relation to starting shaft

Crankshaft	Shaft	Crankshaft	Shaft	Crankshaft	Shaft	Crankshaft	Shaft	Crankshaft	Shaft
650	276	1.100	468	1.550	659	2.000	851	2.450	1.042
675	287	1.125	478	1.575	670	2.025	861	2.475	1.053
700	297	1.150	489	1.600	680	2.050	872	2.500	1.063
725	308	1.175	500	1.625	691	2.075	883	2.525	1.073
750	319	1.200	510	1.650	702	2.100	893	2.550	1.084
775	329	1.225	521	1.675	712	2.125	904	2.575	1.094
800	340	1.250	531	1.700	723	2.150	914	2.600	1.105
825	351	1.275	542	1.725	734	2.175	925	2.625	1.116
850	361	1.300	553	1.750	744	2.200	936	2.650	1.126
875	372	1.325	563	1.775	755	2.225	948	2.675	1.137
900	383	1.350	574	1.800	765	2.250	958	2.700	1.148
925	393	1.375	585	1.825	776	2.275	968	2.725	1.158
950	404	1.400	595	1.850	787	2.300	978	2.750	1.169
975	414	1.425	606	1.875	797	2.325	989	2.775	1.179
1.000	425	1.450	617	1.900	808	2.350	1.000	2.800	1.190
1.025	436	1.475	627	1.925	819	2.375	1.010	2.825	1.201
1.050	446	1.500	638	1.950	829	2.400	1.021	2.850	1.211
1.075	457	1.525	649	1.975	840	2.425	1.031	2.875	1.222
								2.900	1.232

NOTE. — The descriptions and illustrations contained in this instruction manual are not binding. In consequence, and subject to the principal characteristics of the engine herein described and illustrated remaining unchanged, SOLE, S. A. reserve all rights to modify assemblies, details or fittings as they may deem advisable for any reason of technical or commercial nature.



MANUAL STARTING

OPERATION

BEFORE STARTING

Check oil levels in the engine and reverse gearbox. The level should be between the two marks on the dipstick.

Make sure that the water inlet and fuel valves are open.

STARTING

A) Manual starting

Place the gear lever in neutral and open the fuel control halfway. Pull the wing handle (Fig. 1) outward to provide additional fuel.

Raise the compression relief lever (Fig. 1) and fit the starting handle into its socket. Swing the handle rapidly to the right. When a sufficient speed has been reached, release the compression relief lever and continue swinging until the engine starts.

B) Electric starting

Place the gear lever in neutral and open the fuel control halfway. Turn the switch key to the left and hold it in that position until the engine is fully started.

After starting, it is advisable to leave the engine running at half speed for 2 or 3 minutes to allow the alternator to recharge the battery.

C) Starting in very cold climates

If the engine does not start with the above methods, proceed as follows:

a) Remove the rubber plug marked «Starter», located on the rocker cover (Fig. 1).

b) Fill the primer pot with oil.

c) Refit the plug tightly.

d) Proceed as before.

ENGINE RUNNING

Make sure that the coolant water is circulating.

Important note

> Always engage gears with the engine idling

STOPPING

Set the engine at idling speed and the gear lever in neutral.

Turn the «Stop» wing handle (Fig. 1) to the left until the engine stops running.

If using a remote stop cable, pull the cable until the engine stops running.

Important note

> Never use the compression relief lever to stop the engine

If the engine will not be used for a long period of time, it is advisable to shut off water and fuel valves.

RUNNING IN

To allow gradual adjustment of all the moving parts of a new engine, a running-in period is necessary in addition to the usual works running-in. This is done by running the engine at 70% of **normal power for the first 50 hours.**

MAINTENANCE

CHECKING OIL LEVELS

Engine

Check the engine oil level every day before starting. The dipstick is on the starboard side below the starting motor (Fig. 2). The oil level should be between the two marks on the dipstick.

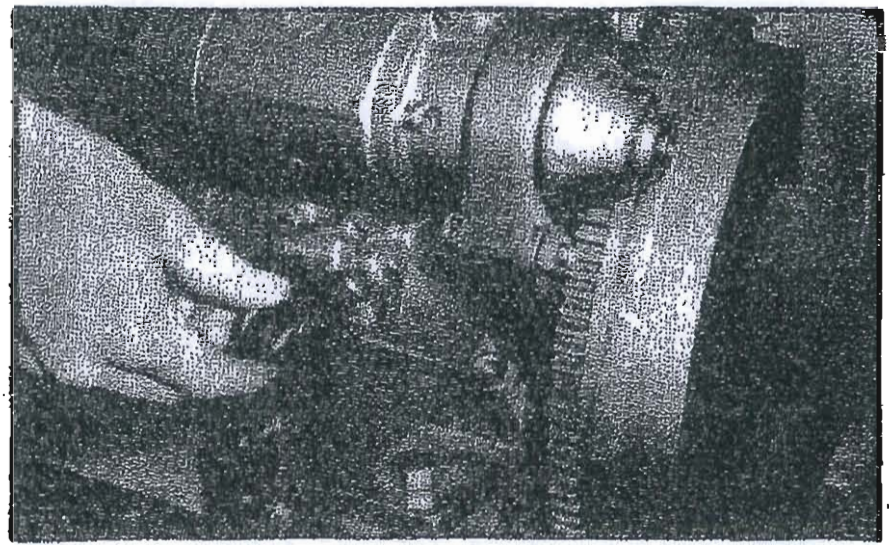


Fig. 2

If there is insufficient oil, add oil through the cap on the rocker cover (Fig. 5).

Reverse gearbox

The reverse gearbox has its own lubrication system. This must be checked every day by means of the dipstick on the top of the gearbox (Fig. 3).

If the level is low, add oil through the dipstick aperture.

Use the same oil as for the engine.

Fig. 3

OIL CHANGES

Engine

Change the oil after the **first 20 hours**, and **every 100 hours** thereafter.

Before changing run the engine to heat up the oil.

Drain the oil, either with the extractor pump through the dispstick aperture (Fig. 4) or by unscrewing the plug on the bottom of the oil sump.

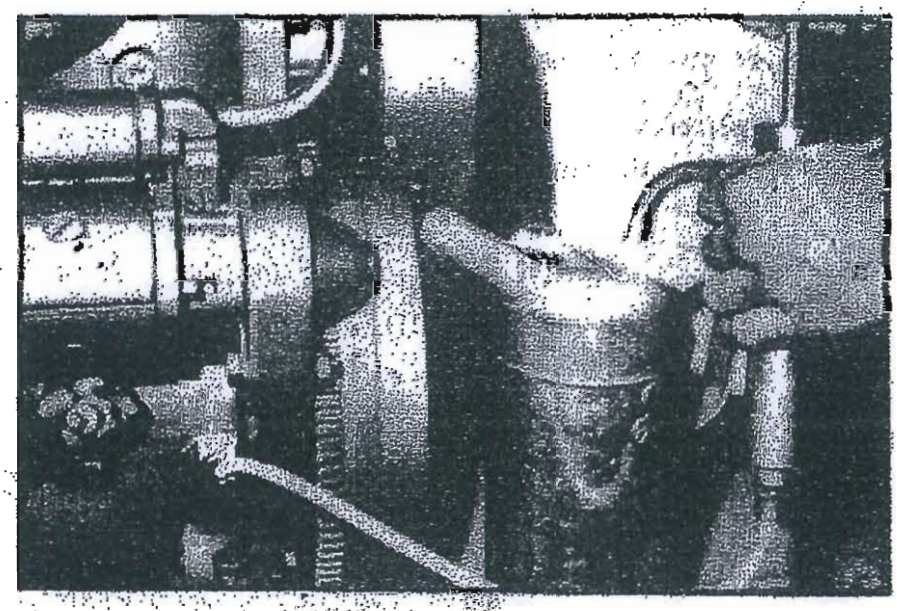


Fig. 4

Refill with oil through the capped opening in the rocker cover (Fig. 5), leaving the dipstick aperture open to allow air to escape.

Fill to the upper mark on the dipstick.

USE SAE-30 SERIES 3 OIL ONLY

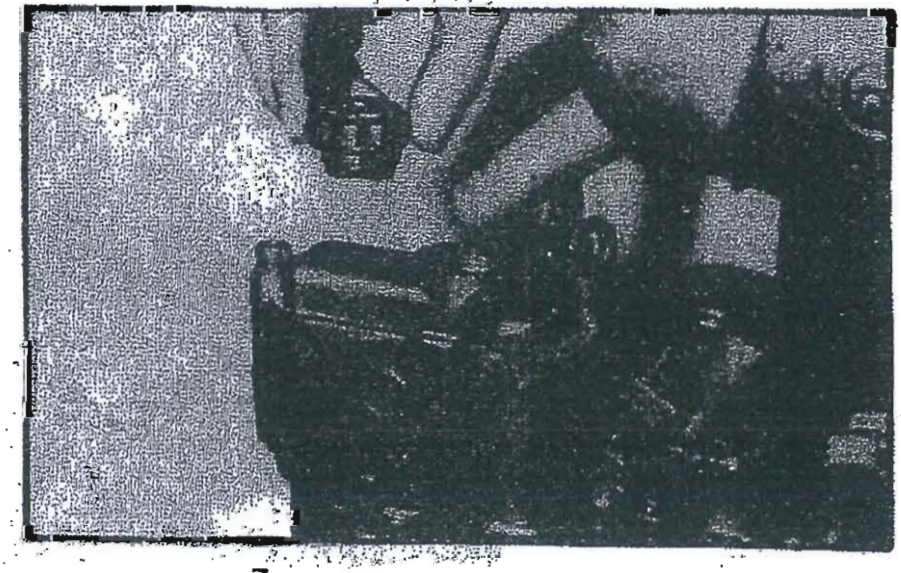


Fig. 5

Reverse gearbox

Drain the oil, either with the extractor pump through the dipstick aperture (Fig. 3) or by unscrewing the plug on the bottom of the reverse gearbox.

Refill with oil through the dipstick aperture to the upper mark on the dipstick.

Use the same grade of oil as for the engine.

CHANGING AIR FILTER

Unscrew the nut at the centre, take off the cover, remove the filter element and fit a new one. Replace the cover and screw it tight (Fig. 6).

Paper elements CAN NOT be cleaned

Fig. 6

CHANGING OIL FILTER

Take off the entire air filter assembly and unscrew the nut on the top of the fuel filter. Remove the filter element and the rubber rings (top and bottom). Fit new ones. Refit both filters (Fig. 7).

Air-bleed fuel system (see page 10).

Fig. 7

TIGHTENING ALTERNATOR BELT

Loosen the alternator positioning bolt and tighten the belt by pushing the alternator outwards.

Tighten the belt until 1 cm of play remains. Retighten the bolt (Fig. 8).

Fig. 8

ADJUSTING ROCKER CLEARANCES

The engine must be cold whenever this is done.

Take off the rocker cover. Turn the flywheel to the right until the valve closes. Turn a further 90° to the right. Adjust by loosening or tightening the rocker adjustment screw (Fig. 9). Follow the same procedure for the other valve. Refit the rocker cover.

CLEARANCE WITH ENGINE COLD: INLET AND EXHAUST 0.20 mm

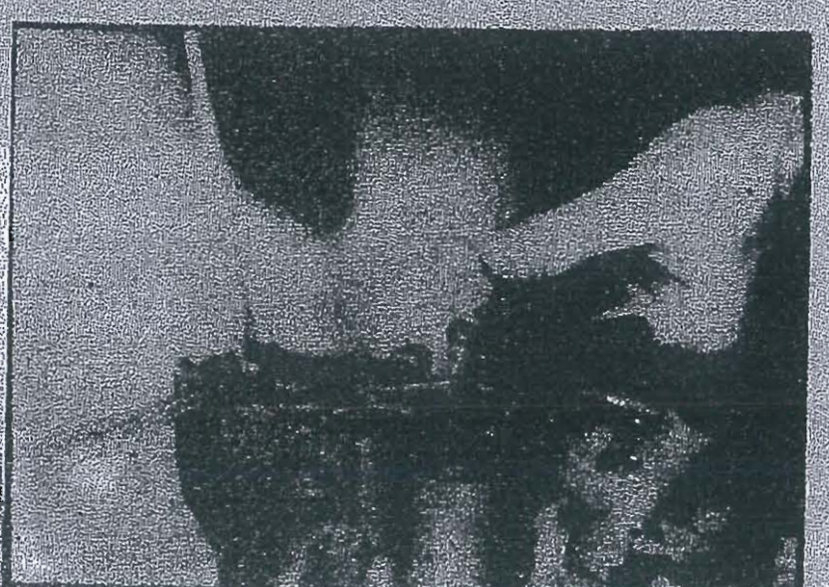


Fig. 9

BATTERY

Check the level of acid in the cells. The level must be not less than 5 mm above the tops of the plates. Add distilled water if it is low.

The terminals must be kept free of acid at all times.

BLEEDING AIR FROM FUEL SYSTEM

A) Engines without fuel pump

Open the fuel tank valve. Loosen the screw on the top of the injection pump 2 turns. Turn the engine over until fuel free of air bubbles emerges (Fig. 10). Retighten the screw.

Loosen the injector pipe nut and turn the engine over until fuel emerges. Retighten the nut.

B) Engines with fuel pump

Prime the fuel pump, then proceed as indicated in the preceding paragraph.

Fig. 10

ADJUSTING IDLING SPEED

Loosen the lock-nut of the screw on the lower part of the fuel control box (Fig. 11) and tighten or loosen the screw, depending on whether the idling speed is to be increased or reduced.

Retighten the lock-nut.

Important note:

Never touch the sealed upper screw on the box

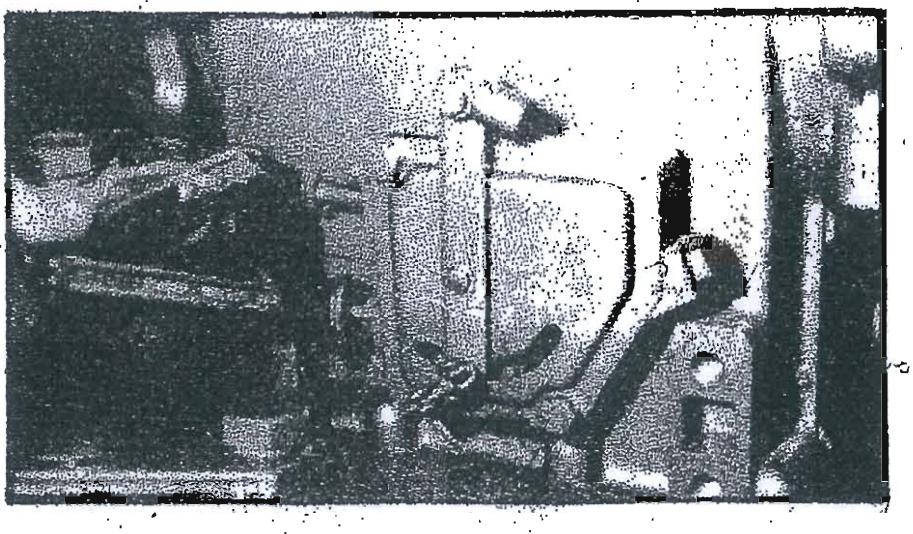


Fig. 11

WATER PUMP

The engine cooling system pump is located on the rear portion of the reverse gearbox. The impeller is made of Neoprene and cannot run dry. If allowed to run without water it may break. It is important for this reason always to carry a spare impeller.

To change the impeller, close the water valve and take off the pump cover. Using two screwdrivers as levers, pull the impeller off its shaft. Clean the mounting area and fit a new one. Replace the cover, at the same time fitting a new gasket (Fig. 12). Open the water valve.

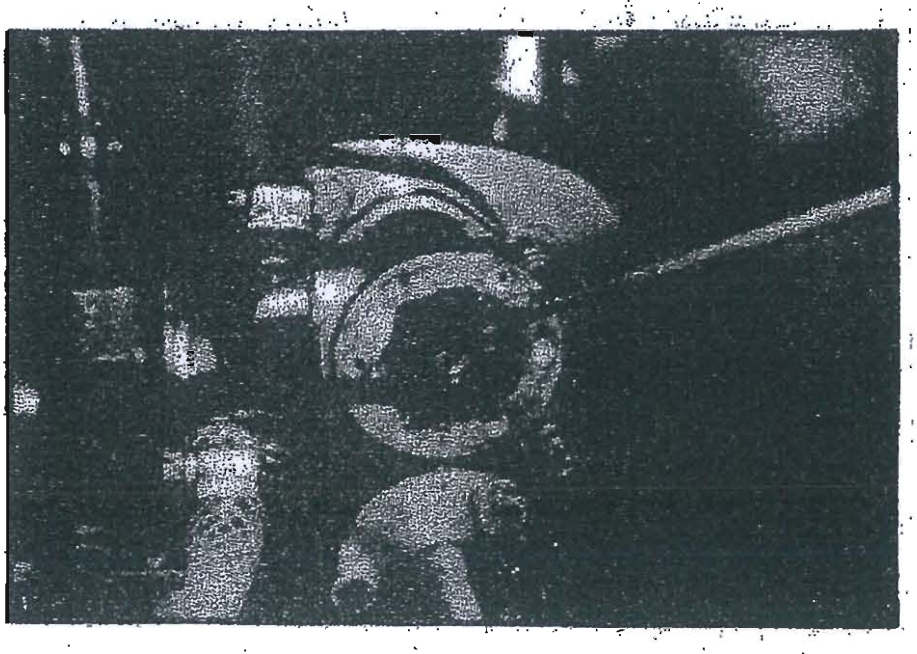


Fig. 12

ADJUSTING REVERSE GEARBOX

Loosen the lever fastening screws and move the lever laterally right or left until the throw is the same for both ahead and astern. Retighten the screws (Fig. 13).

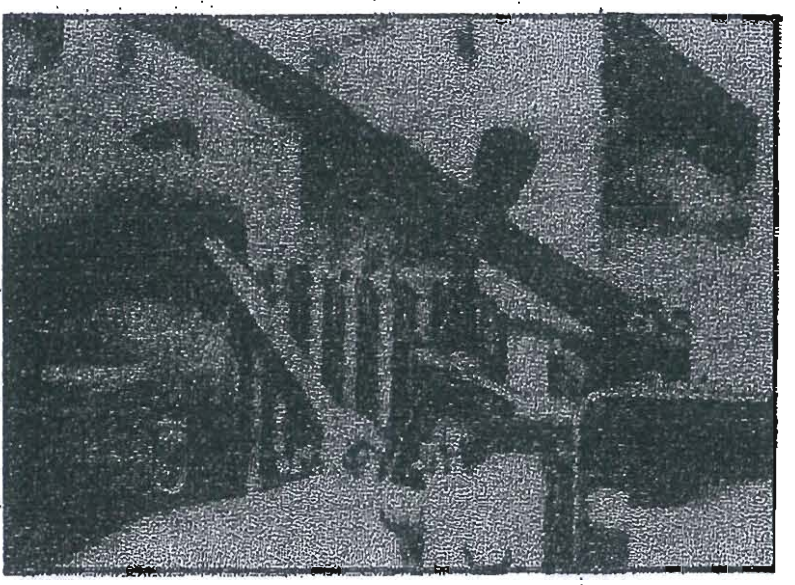
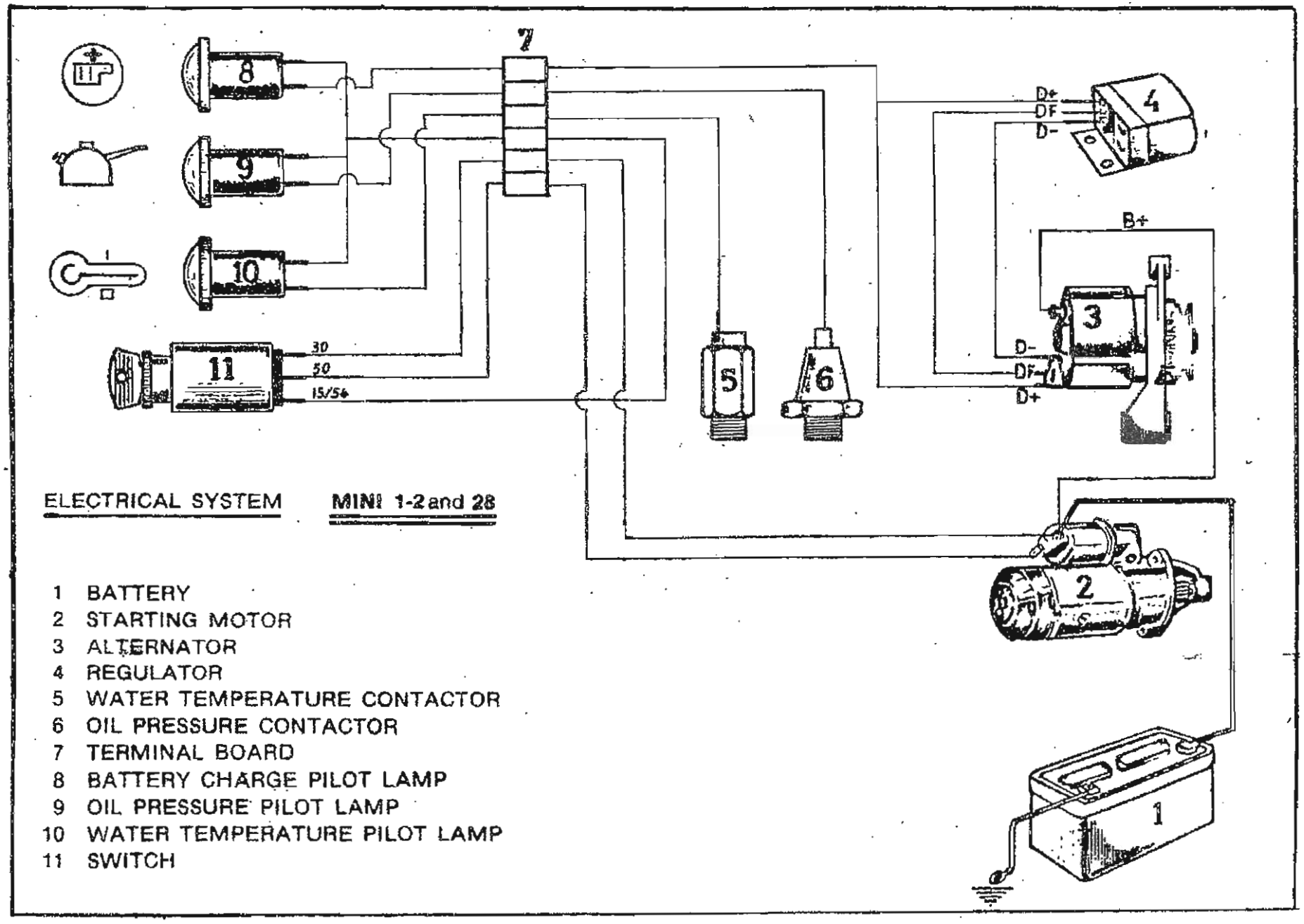


Fig. 13

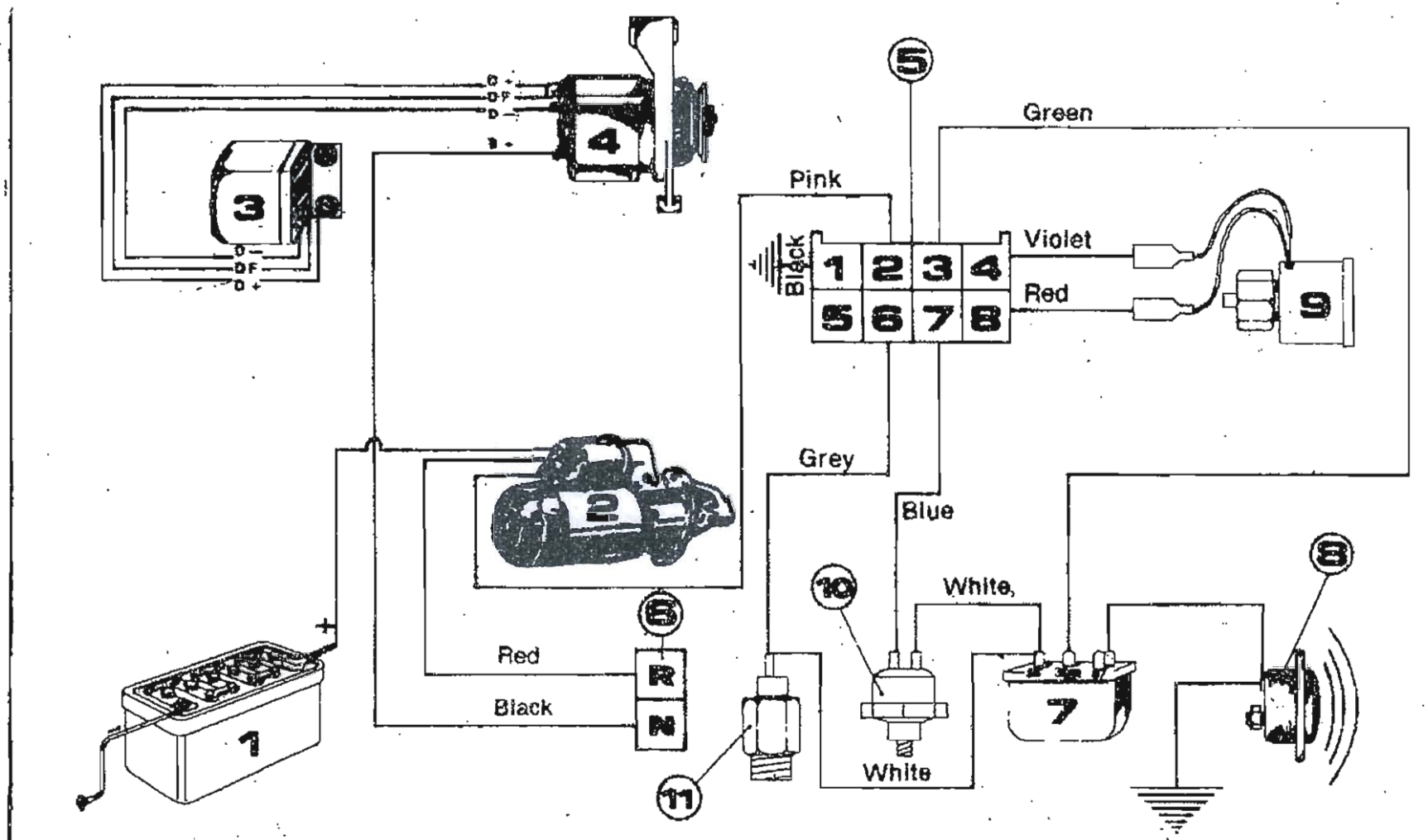
MAINTENANCE SCHEDULE

JOB	WORK ON	HOURS			
		8	50	100	300
CLEAN	Injector				X
INSPECT	Water pump impelier				X
	Engine	X			
	Oil level				
	Reverse gearbox	X			
	Battery water level				X
	Rocker clearance		X		
	Tighten alternator belt			X	
CHANGE	Engine			X	
	Oil				
	Reverse gearbox			X	
	Air filter				X
	Fuel filter			X	
	Oil filter				X



ELECTRICAL SYSTEM **MINI 1-2 and 28**

1 BATTERY
2 STARTING MOTOR
3 ALTERNATOR
4 REGULATOR
5 WATER TEMPERATURE CONTACTOR
6 OIL PRESSURE CONTACTOR
7 TERMINAL BOARD
8 BATTERY CHARGE PILOT LAMP
9 OIL PRESSURE PILOT LAMP
10 WATER TEMPERATURE PILOT LAMP
11 SWITCH



ELECTRICAL SYSTEM, MINI-1 -2 and 28 ENGINES, WITH INSTRUMENT PANEL

1. Battery
2. Starting motor
3. Regulator
4. Alternator
5. Panel terminal boards
6
7. Relay
8. Alarm siren
9. Tachometer
10. Oil pressure
11. Temperature contactor

TECHNICAL SPECIFICATIONS

	MINI 1	MINI 2	MINI 3
No. of cylinders	1	1	1
Cylinder bore in mm	80	85	85
Stroke in mm	80	80	90
Cubic capacity in cc	402	454	510
Stroke capacity in cc			
DIN power			
RPM 6270 Hp (kW)	6	9	12
Weight in kg with manual starting	2200	2600	2800
Weight in kg with electrical starting	83	83	83
Gear ratio	96	96	96
Maximum installation angle	2:1	2:1	2:1
Lubrication	20°	20°	20°

Gear pump forced

Oil capacities:

Engine	± 2 litres
Reverse gearbox	± 0.4 litres

Oil grade:

Engine and reverse gearbox **SAE 30 Series 3**

Cooling

Direct by sea water
Thermostat at 60°C

Injection system

Injection pump	Condiesel		
Injector	4 diameter 0.25 holes		
Injection pressure	180 kg/Cm²		200 kg/cm²
Injection point before TDC	24.5°	20.5°	24.25°
	25°	21°	24.5°

Electrical system (see diagram on page 13)

Starting motor	BOSCH 12 V
Alternator	BOSCH 12 V 28 A 400 W

Nut torques

Catalogue reference		Nomenclature	Tightening torque in mkg
Table	Part		
1	8019	Bell housing nut	7
2	8116	Cylinder head nut	4,8
2	128116	Cylinder head nut	4,8
3	8253	Flywheel nut	17
6	8510	Feed coupling	5
7	8607	Injector cap	7

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