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ENGINES

Solé Diesel

MINI - 11
MINI - 17
MINI - 26

Instruction Manual and Parts Lits

INTRODUCTION

Whe thank you having selected our MINI-11 MINI-17 MINI-26 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, fuel injection pump).
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 decribed and illustrated here, SOLE, S. A., reserves all rights to make modifications in parts, details and acessories as may be required for any technical or commercial reasons.

TABLE OF CONTENTS

1 - PRECAUTIONARY MEASURES WHEN USING THE ENGINE

- Always use SOLE DIESEL and keep an eye on oil pressure when the engine is functioning.
- Use clean fuel, free of dirt and impurities.
- Do not let air or water enter the fuel circuit.
- If the starter engine pinion does not couple with the crown wheel when you start the engine, turn the key again the engine has come to a complete rest.
- Pay attention to the colour of exhaust gases.
- Clean and change the oil and fuel filters regularly.
- Follow the instructions given when doing an oil-change.
- Check that water coolant is circulating properly through the engine.

SAFETY PRECAUTIONS
¡ BEWARE DANGER !

- Fuel is inflammable. DO NOT SMOKE while refuelling or when in the engine-room. There should be NO BARE FLAME ABOARD while refuelling.
- Exhaust gases are toxic. Ensure exhaust fitting is properly installed.
- Keep the engine-room well ventilated.
- Stop the engine when refuelling with diesel.
- Abide by the manufacturer's battery instructions. The acid in the battery is caustic and toxic. Battery gases can ignite. Keep well away from sparks and bare flame.
- When dismantling or assembling, never stand under the engine while it is suspend in the hoist. Ensure the hoist is in good working order.
- Keep a properly functioning fire extinguisher at hand.
- Do not use starter spray. Danger of explosion.
- Important warning for sailboats: If you are attempting to use the engine to leave the shore in heavy seas and the boat is leaning, the engine should not be at a lean of over 30 degrees for more than a few seconds. Otherwise the engine may fail and the craft will run aground.

¡ ACCIDENT PREVENTION !

- Do not touch moving parts while the engine is on.
- Never remove the refrigerator cap while the engine is hot. It could cause severe burns.
- To avoid burns, do not touch the engine unless wearing suitable gloves.
- Keep the area around the engine free of grease and oil to avoid accidents caused by slipping.
- Switch the engine off when doing maintenance jobs.
- Wear protective goggles when doing air-compression jobs.
- Do not keep engine fluids, such as coolants, etc., containers that could be confused with drinks.
- Avoid contact with fuel and lubricants. Use protective gloves. Used oil has been shown to cause skin-cancers in laboratory animal testing.
- When checking fuel-injection nozzles never place your hand under the fuel-jet.
- Keep loose clothing and long hair away from moving engine parts.
- The engine should only be handled by one person at a time.
- Ensure tools are in good working order. Worn tools can slip and cause accidents.

¡ ENGINE AND CRAFT PRECAUTIONS !

- Do not overexert the engine. Abide by instructions for proper use.
- In the event of malfunctioning: ascertain the cause as soon as possible, otherwise you run the risk of causing further engine damage.
- Do not undertake engine repairs or maintenance unless you are experienced in doing so.
- Do not replace parts with any other than original spares.
- If you have to undertake emergency repairs at sea, take all proper safety precautions.
- Maximum lean for the engine-mounting is 20 degrees.
- The engine shloud not be running at a lean of over 30 degrees for more than a few seconds.
- Do not use salt-water or corrosive fluid as a coolant.
- The cooling system should always be topped up. If there is not enough coolant, the engine may overheat.
- Always shut off the sea-water inlet tap before undertaking work on sea-water cooling systems. Failure to do so has been khown to sink the craft.
- If the craft is to be out of use for some time, shut off the sea-water inlet tap. Crafts have sunk due to faulty cooling pipes.
- When carrying out welding work, abide by the "Instructions for welding work" supplied. Battery clips should be removed while undertaking welding work on the boat.
- When working on the electrical system, remove the ground clip from the battery.
- Reconnect as the last step of the operation to avoid short-circuiting.
- Never turn the starter key while the engine is still running, as this will damage the regulator.
- Ensure the gear lever is in neutral before starting the engine.
- Do not set the contact key to the "start" position while the engine is running, as this will damage the starter pinion.
- When connecting battery leads do not mix up the battery poles.
- Never change gear while the engine is running at over 750 rpm.
- Never run the engine while dry, i.e, without coolant or lubricant.
- Only use recognised fuel suppliers. Impurities in the fuel can cause serious damage.
- Ensure the control lights are working properly.
- Never shut off the engine suddenly when hot. Leave ticking over on idle for five minutes to avoid subsequent boiling over.
- The sea-water pump should never be allowed to run while dry, otherwise you may damage the rotor wheel. Always open the sea-water inlet tap before starting the engine.
- After starting, check to see that water-coolant is coming out of the exhaust pipe. If not, shut off the engine immediately and find out why.
- Never put cold coolant into a hot engine, as this may rupture the engine block.
- When topping up with engine oil never overstep the maximum mark on the oil-gauge as this could damage the engine.
- Do not leave the engine running on idle for more than 10 minutes, as this may carbonize the cylinder and piston.

- Never change gear/rpm suddenly from forward to reverse gears.
- Remember that with the shaft engaged, it will only go into gear if the lever has meshed properly. It must be moved gently into forward or reverse, otherwise you may damage the gears.

¡ ENVIRONMENTAL PRECAUTIONS !

- Warning: Dispose of used oil at authorised sites. Used oil must not be allowed to seep into the soil or drainage systems otherwise there is a danger of poisoning drinking water.
- Used filters as well as anti-corrosive and anti-freeze substances are toxic waste and should be disposed of at authorised sites. Cylinder head gaskets contain asbestos and are also toxic waste materials.
- Abide by local waste disposal standars for treating used coolant.
- When refuelling never tip fuel into the water. Keep oil-absorbing substances at hand all times. Wipe up splashes immediately afterwards with an absorbent cloth. Keep the cloth in a safe place. Oil-stained clothing should be changed immediately.
- Do not leave the engine on idle for longer than necessary, as it is harmful to the environment.
- If you have to scrap your engine, remove all oil before taking it to the scrapyard. Inform staff at the scrapyard that the head gasket is toxic waste.

SAFETY AT SEA

Before setting off, go through the following check-list:

- Is there enough fuel in the petrol tank?
- Is the petrol tank cap screwed back on tightly?
- Is there enough oil and coolant in the engine?
- Are the batteries charged?
- Check for leaking fuel. If you see any, find the leak and repair it.
- Is the sea-water inlet tap open?

Is there enough life-saving equipment aboard for each of the passengers? Check the following:

- Have all passengers been instructed on the use of life-saving equipment?
- Are there suitable extinguishers aboard in good working order?
- Ensure that all passengers know what to do in a fire emergency and where the extinguishers are located.
- Explain to passengers all that is necessary to ensure their safety. When mishaps occur there is never time to explain safety measures.
- Do you have enough navigation maps aboard?
- Have you listened to the weather report?

2 - SPECIFICATIONS

		MINI-11	MINI-17	MINI-26
Tipe		Diesel, vertical, 4-stroke, water cooled		
Cylinder number		Two in line		There in line
Cylinder diameter		65 mm. (2,56")	76 mm. (2,99")	
Stroke		70 mm. (2,76")		
Total cylinder capacity		464 cc.	635 cc.	952 cc.
Compression ratio		23 : 1		
Power / rpm DIN 6270/A		9,25 HP (6,9 KW) / 3.600	13,5 HP (10.1 KW) / 3.600	21 HP (15,46 KW) / 3.600
Power / rpm DIN 6270/B		11 HP (8,2 KW) / 3.600	16 HP (11,8 KW) / 3.600	25 HP (18,4 KW) / 3.600
Idling minimum rpm		750-800		
Gear box		RONIM V type mechanical Red. 2,25:1 - 3,05:1		
Ignition sequence		1 - 2		1 - 3 - 2
No-load weight with gear box		98 kgs.		112 kgs.
Maximum assembly angle		20° continuous 25° intermittent		
Oil capacity	Engine	2,4 lit		3,6 lit
	Gear box	0,5 lit		
Oil type		See pag. 57		
Cooling		Tap water with thermostatic control and heat exchanger. Cooled exhaust manifold		
Cooling water capacity		3 lit		4 lit
Injection pump		BOSCH NC type		
Injector		Governor type		
Injector pressure		140		
Governor		Centrifuge counterweight type		
Electrical system		See diagrams págs. 39, 40 and 41		
Starting engine		12 V - 1,2 KW		
Alternator		12 V - 40 A		
		Cladded type incandescent spark pigs		
		60 A general fuse		
Baterry capacity		12 V - 4 Ah or more		12 V - 60 Ah or more
Dimensions	Length:	634 mm.		723 mm.
	Width:	480 mm.		480 mm.
	Height:	503 mm.		503 mm.

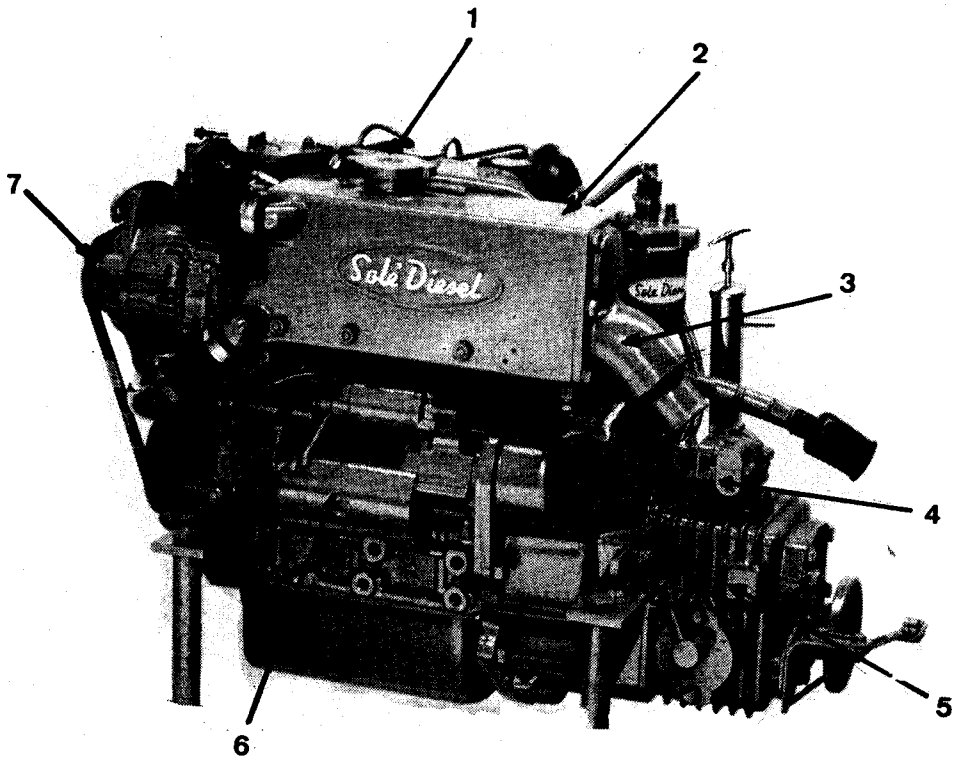


Figure 1

1 Tap water filling plug
2 Exhaust manifold water cooler
3 Wet exhaust elbow
4 Feeding pump
5 Gear box
6 Starting engine
7 Alternator

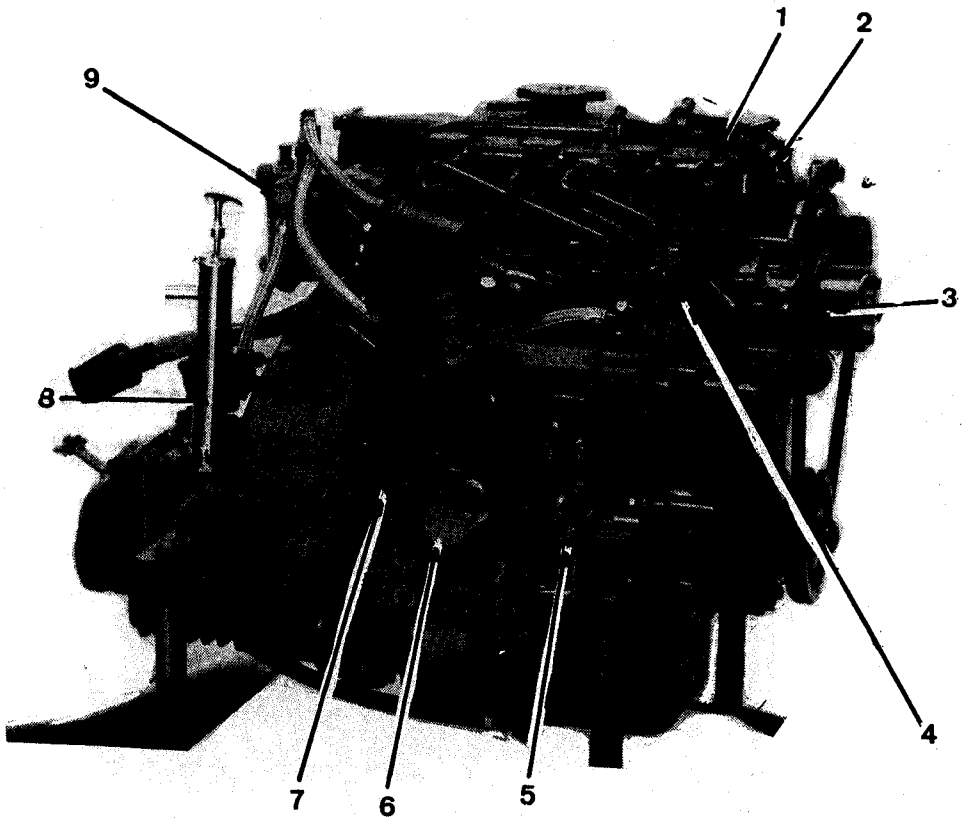


Figure 2

1 Oil filling plug
2 Thermostat
3 Tap water pump
4 Injecting pump
5 Seawater pump
6 Oil filter
7 Air filter
8 Oil extraction pump
9 Gas-oil filter

3 - USE

3.1 - BEFORE COMMISSIONING

Your new engine requiros 50 operating hours for the running-in of all its movable elements and the performance of a high yield. Carefully perform this running-in, bearing in mind the following points:

PRECAUTION

- Daily checking performances must be made without failure.
- Engine is to be operated at idle speed and heated up minimum 5 minutes after its starting.
- Avoid a speeded-up acceleration.
- Carefully comply with the inspection and maintenance instructions shown in this manual.

3.2 - PRE- ARRANGEMENTS BEFORE COMMISSIONING

1) Engine and inverter oil filling.

Figure 3

Fill engine with oil as shown in page 57 up to the upper limit of the rod mark (Fig. 3). Through the filling plug (Fig. 4).

Fill inverter up to the level shown in the rod, through the rod hole (Figure 5). Use the same oil type as in the engine.

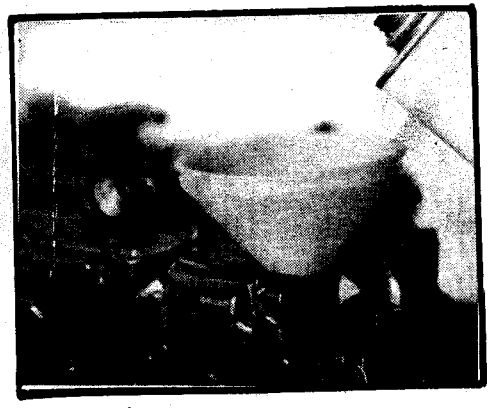


Figure 4

2) Fuel tank filling

Fill fuel tank with clean and filtered gas-oil. Check tank is fully cleaned without iron or polyester particles.

Open the fuel delivery cock.

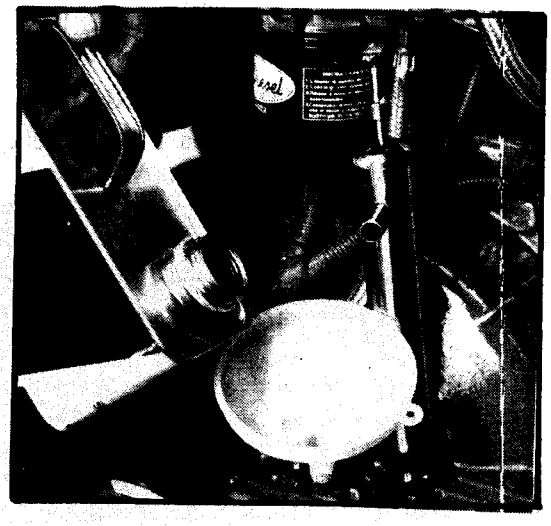


Figure 5

3) Water circuit filling

Fill circuit with clean water by previously pouring a 1 % homologated anticorrosive product (10 cm^3/l.) up to the filling hole. Antifreeze should be added in winter (Fig. 6).

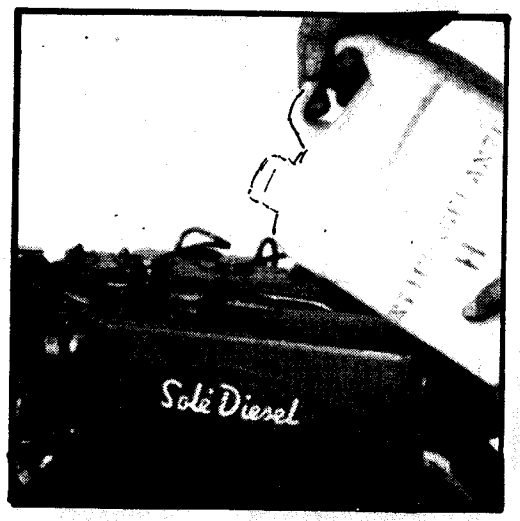


Figure 6

4) Open seawater entry cock

5) Fuel circuit dranaige

Firts drain the fuel filter and then the injecting pump (For more details, refer to "Fuel circuit drainage", chapter 4.2).

6) Connection of the battery disconnector

Connect the battery connector.

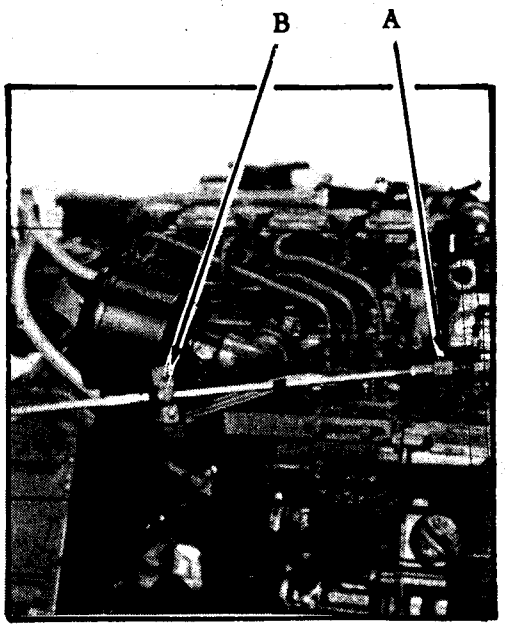


Figure 7

7) Remote control connection

a) Engine

Connect control cable to the ball-joint fitted to the lever (A) and position the cable with the clamp (B). Adjust in a way that gas is not delivered until the inverter gear is engaged (Fig. 7).

b) Gear box

Connect control cable to the lever by means of the ball-joint provided for this purpose and position cable with the clamp.

When fitted, adjust control in a way that it has the same forward running that rearward and gas is not delivered until the gear is perfectly engaged (Fig. 8).

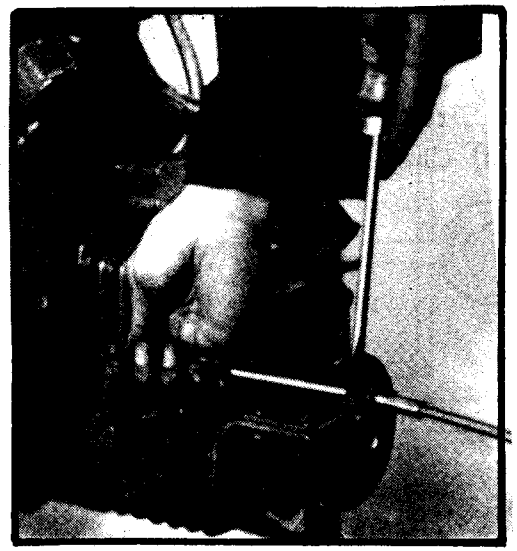


Figure 8

Figure 9

To check fitting is correct, proceed as follows:

Place the gear box lever and remote control lever in the position of forward running.

Tune-up is made with the holes of the gear box lever and slides of positioning support to cable (Figure 9).

8) Other checkings.

a) Carefully check the engine positioning points.
b) Check all screws are correctly tightened.
c) Check all water, oil and gas-oil pipe nipples, verifying if all them are well connected and correctly tightened.
d) Check exhaust and transmission systems.

3.3 - COMMISSIONING

1) Place control lever at the neutral point.
2) Rotate the starting key (D) to position "ON". Check oil pressure (H), battery charge (F) lamps are lighted and the alarm (B) is heard (Fig. 10).
3) Pre-heating of incandescent spark plugs.

   Rotate starting key to position ⩙ (pre-heating), until the indicator lamp od the heating spark plugs is lighted (E) (Figure 10).

   Thesuitable pre-heating time is 20 seconds approx. In the practice, the optimum pre-heating time varies as a function of the ambient temperature, follow then the table given bellow: (Pag. 18).

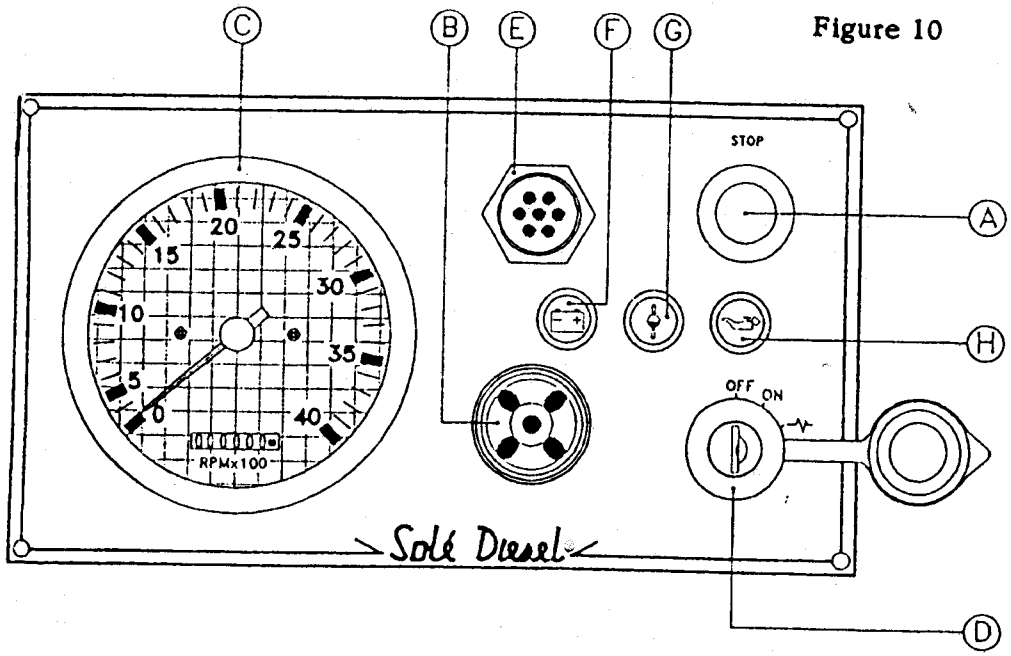


Figure 10

Ambient Temperature	Pre-heating time
Higher than + 5° C	Approx. 10 seconds
From + 5° C to -5° C	Approx. 20 seconds
Less than -5° C	Approx. 30 seconds
Continuous use limitation	1 minute

However, pre-heating must not take longer than 2 minutes, so that spark plug lifte is not shortened.

If the spark plug indicator is not red heated, refer to a SOLE service for a checking.

4) Starting

Place the remote control lever to neutral point and deliver gas up to the half position, rotate the starting key to the "START" position until the engine starts running. If the engine does not start running, even with the starting key in the "START" position for 10 seconds, draw your hand out from the key for 30 seconds and then try again to start the engine, if necessary heating again the spark plugs. Never allow the starting engine to operate more then 30 seconds.

When the engine is already running, rotate the key to position "ON" and leave it in this position during the running.

After the starting operation, check oil pressure and battery charge lamps are switched off.

5) Heating

Heat the engine for approx. 5 minutes, allowing it to run with no-load at half feed.

CAUTION

The engine during the running must not undergo a starting key rotation at the "START" position since if done the starting motor will be damaged.

If engine is heated, the pre-heating operations should not be done. In this case, directly rotate the starting. Key to the "START" position until the engine is running.

When already running, return the key to the "ON" position.

3.4 - STARTING PRECAUTIONS AND OPERATING PRECAUTIONS

1) Usual starting

a) Check gear box and engine oil level and add oil if required.
b) Fill gas-oil to the tank.
c) Check cooling water level and add water if required.
d) Start the engine according to the instructions in the previous pages.

2) Starting in cold weather

When the atmospheric temperature is under zero, the three circumstances set out bellow are happening. In these cases, the engine should be started as shown.

a) The lubricating oil turned viscous.
   - Pour hot water into the cooler.
   - Check oil used is the recommended one. Check also oil has not ben apolled.

b) Voltage running by the battery terminals is reduced.
   - Protect battery against cold, covering it with a suitable material.
   - Check battery is fully charged.

c) The injection air temperature is low and engine is not easily started.
   - Allow incandescent spark plugs to heat as required.

3) Precautions during the running

- Check cooling water is flowing.
- Check water or oil leakages are not caused.
- Check oil pressure lamp is switched off.
- Check exhaust smoke is as follows:
  - while the engine is cold: white smoke.
  - when engine is being heated: almost no smoke.
  - when engine is somehow overcharged: some black smoke.

CAUTION

All gears shall always be engaged with engine at idle speed.

WARNING

So as to avoid a quick spoiling of the engine, the system overload should be prevented. This overload migth be caused by an unsuitable propeller, by an incorrect installation (restricted exhaust pipe, incorrect aligning of the main components) etc. It is essential then to check at full power (at full running) the engine rpm which must be lower than 3600 rpm.

3.5 - STOPPAGE

1) The engine revolutions shall gradually be reduced until idle speed is reached and place clutch at neutral point.
2) Press "STOP" stopping pushbutton (A) Fig. 10 until, the engine is fully stopped.
3) With engine stopped rotate starting key to the "OFF" position.

   Battery will be discharged if left at the "ON" position.

   To avoid it to happen, draw the key out after the engine is stopped.

   If engine is not to run for a longer period, it is advisable to shut fuel and water cocks and also to disconnect the battery.

CAUTION

The stoppage does not operate if the key is not connected to "ON" position. Never stop engine immediately after running at full power or when the cooling water temperature is high.

Allow the engine to rotate a minimum number of revolutions fort a short period.

4 - MAINTENANCE

4.1 - LUBRICATING SYSTEM

1) Oil with the correct viscosity

Oil with the suitable viscosity to the ambient temperature should be used according to the table of page 57 (Service data). A multigrade oil is recommended for all seasons.

2) Oil pressure

An oil pressure suitable or not during engine operation is shown by the oil pressure alarm lamp and also by the alarm horn.

- During current operation:

  Oil pressure is usual if the lamp is switched off.

- At the starting time:

  Lamp shall be lighted and horn sounding.

Lamp is lighted during the usual operation in case the oil pressure lowers under 0.2-0.4 kg/cm^2 and in such a case refer to SOLE technical assistance service.

3) Oil change

a) Engine

Engine oil should be changed after the first 50 operating hours and afterwards every 100 hours.

Oil shall be changed with a hot engine so as to be sure the oil is fully drained. This operation is performed with extraction pump placed at the inverter side of air filter (Fig. 11).

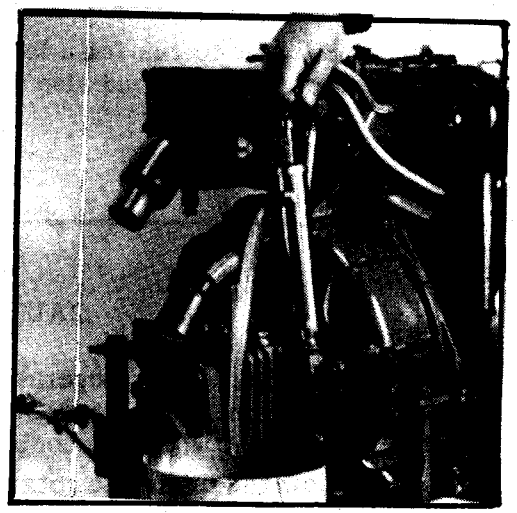


Figure 11

When drained, fill with fresh oil, with the quantity shown (2.4 l. MINI-11, MINI-17 and 3.6 l. MINI-26) through the plug located at the rocking cap no. 1 of figure 2.

The engine should then bo operated at the idle speed for some minutes until the control lamp of the dashboard is switched off.

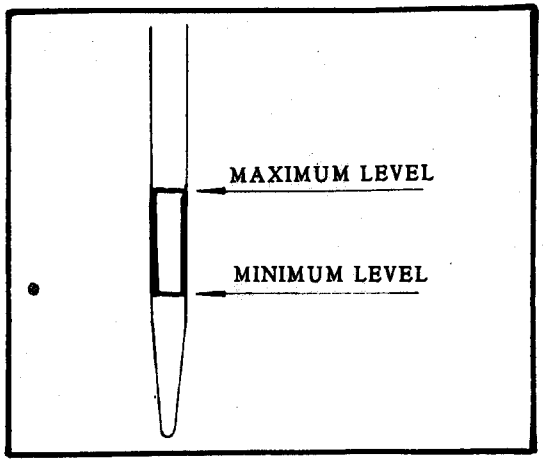


Figure 12

When this operation is performed, avoid engine is started by pressing the stop pushbutton.

Stop the engine. Check filter and engine sealing. Then check oil level, removing the rod, cleaning it with a rag and placing it again by tightening. Then remove the rod again to check oil level and if then the upper mark is not reached, carefully add more oil up to the upper mark of the rod (Fig. 12).

NOTE:

Be careful that any rod marks refer to the engine at a horizontal position.

Therefore, check the engine inclination when the level is verified.

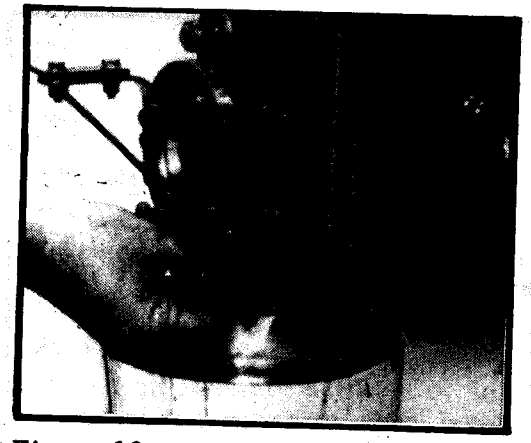


Figure 13

b) Gear box

The gear box is self-lubricated with independence from the engine.

To perform an oil change, drain the used oil by removing the plug located at the lower rear side (Fig. 13).

When drained, tighten the plug and fill with fresh oil through the hole of the level rod (Fig. 5).

Change oil the firts 50 hours and afterwards every 100 hours.

4) Oil filter

The oil filter is located under the air filter no. 6 of figure 2.

Change the oil filter after the firts 50 operating hours and afterwards every 100 hours.

The oil filter being a cartridge type of easy handling shall not be cleaned.

To remove the filter, use a tool ref. H-131.24.051 and a wrench of 26 mm (Fig.14) only for spare ones.

USE IT ONLY FOR REMOVAL

When fitting a fresh oil filter, smear a small quantity of oil into the annular seal and firmly tighten it with the hand.

When this operation is finished, start the engine and check oil is not leaking.

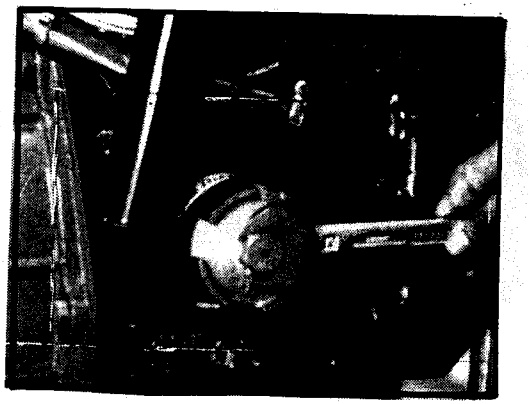


Figure 14

4.2 - COMBUSTION SYSTEM

1) Gas oil

Always use filtered and cleaned gas-oil. Never use kerosene nor heavy oils.

Fuel filling must be made with anticipation. In clod weather, much water steam is caused when there is too much air within the fuel tank. Therefore the tank must be kept full as much as possible.

When filling the tank see that impurities and water are avoided by always using clean plastic containers and have the fuel filtered.

Additionally be careful the tank has not any water nor dust.

Check all tank filling plugs located at the boat deck are sealed.

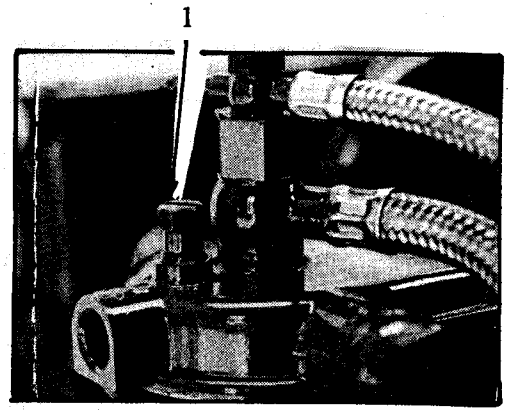


Figure 15

2) Fuel system drainage

When performing the firts engine running and if the engine has been operated with an empty tank, air might be caused in the combustion system and this air shall be drained.

Proceed as follows:

a) Loosen the screw (1) located at the filter-holder cap and when bubbles are not delivered, said screw shall be tightened (Fig. 15).

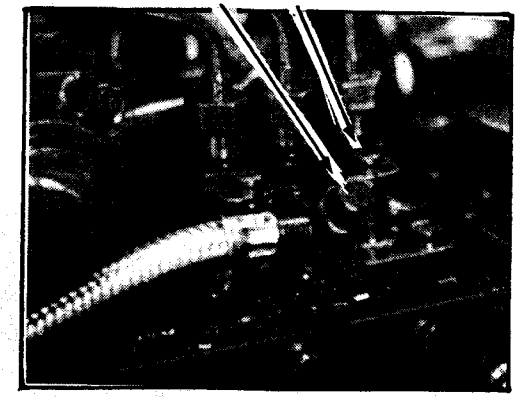


Figure 16

b) Then, air is drained by loosening the venting screw of the injection pump and screws (3) these ones only for MINI-26 of Figure 16.

> NOTE:
>
> Do not loosen any screw without having not tightened the previous one.

c) Check fuel cock located at the tank delivery is open.

d) Then allow the engine is running for a few seconds with the starting motor, by placing the lever to the "fully open" position, so that air is delivered from the pistons, fuel injection pipes and injectors.

> CAUTION
>
> Be careful not to allow the starting motor to run for more than 30 seconds continuously at a time.

This operation can also be performed by driving the pump feeding lever located at the gear box upper side (Figure 17) until air is delivered.

Figure 17

The engine can be started by following the operations of the previous page shown. In the case that the engine is not easily started, the injection nuts at the side of the injectors shall be loosened, the fuel lever placed at "fully open" position, the starting motor be driven or the feeding pump lever be driven and then firmly tighten the nuts.

3) Change of the fuel filter

The fuel filter is cladded and cannot be cleaned, it must be replaced every 400 hours and at least once a year.

To perform the filter change:

a) Shut off the cock located at the tank delivery.

b) Unscrew the filter from the cap using a chain wrench.

c) Screw the fresh filter to the cap with the hand.

d) Perform the operations of the item 2). fuel system drainage of pag. 25.

If a fuel decanting filter is fitted in addition to the engine's, proceed to drain the filter every 100 hours and replace the filtering cartridge every 200 hours.

4) Control of the fuel filter

The fuel filter change has to be performed in accordance with the maintenance schedule. In case of an early dusting of the filtering cartridge which is limiting the gas-oil passage and causing an engine lower power, the cartridge should be changed.

5) Fuel injection pump

The fuel injection pump is one of the most relevant components of a Diesel engine and therefore its handling requires the best

care. In addition, the injection pump has carefully been adjusted at factory and should never be adjusted carelesly. Said adjustment, whenever is required, shall be made by a SOLE licensed service shop, since a precision pump monitor and skill knowledge are required.

The requirements for the handling of a fuel injection pump are the following:

- Always use fuel which is without impurities.
- Fuel filter shall be changed at the scheduled time.

6) Injectors

Injectors shall be detached after a prolonged winter or when failure symptoms are perceived.

> CAUTION
>
> Injector change and its tare must be performed by SOLE DIESEL or a licensed shop.

7) Idle speed adjustment

The screw nut placed in front of the gas lever shall be loosened and tighten or loosen the nut, if the idle speed revolutions are wanted to be increased or decreased (Fig. 18). The nut should then be tightened.

This operation of correctly adjusting the idle speed must be performed when the engine has reached the operating usual temperature.

The idle speed rate is from 750 to 800 rpm.

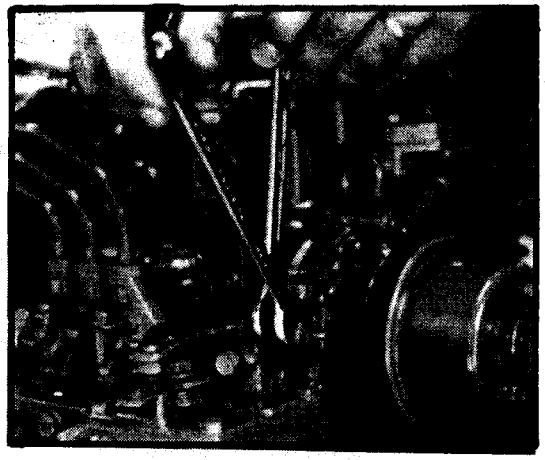


Figure 18

> CAUTION
>
> Never touch the lower screw which is sealed.

4.3 - COOLING SYSTEM

The engine is cooled with tap water which in turn will be cooled with seawater.

1) Tap water circuit

As cooling water use clean water with minimum impurities such as tap water (Never use rain water). Dusty or hard water use is causing engine fouling with subsequent cooling rate reduction.

Before water is poured into the cooling circuit, add to it 1 % (10 cm^3/l) of a homologated anticorrosive product to avoid oxidation and corrosion of the cooling system and cooling reduction due to corrosion.

If the danger of low temperatures is envisaged, i.e. temperatures under 0°C, an antifreeze product should be added to the cooling water. Otherwise expansion of frozen water can cause cracks and damages in the block and cooling body.

The antifreezing rate depends on the expected temperatures.

The antifreezing agent manufacturer, in the package labels is giving the instructions to be followed at each case.

However, in the following box, suitable rates are set out in accordance with temperatures:

Antifreezing stength, %	13	23	30	35	45	50	60
Freezing °C temperature (°F)	-5 (23)	-10 (14)	-15 (5)	-20 (-4)	-30 (-22)	-40 (-40)	-50 (-58)

Recommended antifreeze solution can be used during a six month current operation without draining. When the six montss are elapsed, antifreeze shall be drained, made a good cleaning and again prepare an antifreeze solution (never fill up any shortage).

Before antifreeze is again poured check cooling circuit is cleaned.

NOTE

It is advisable the antifreezing agent strength is selected based on a temperature which is approx. 5° C under the actual atmospheric temperature.

Cooling circuit capacity:
3 litres: MINI-11 and MINI-17 - 4 litres: MINI-26

a) Tap water pump

The tap water pump is located at the engine center forward side, alternator side (no. 3- Fig. 2) and is driven by the same trapezial belt (V-belt) than the alternator. If said belt is thinly tensioned, the engine can then reheated.

Therefore, the belt tension shall regularly be checked and adjusted if required (Fig 19).

b) Thermostat

The thermostat is a key component of the engine life, therefore, it is not advisable nor convenient to remove it, since in hot weather it does not absolutely affect the water passage to the interchanger or heat exchanger, on the contrary if it goes to another weather with very low temperatures, the time to take the service temperature is delayed so early wear can be caused.

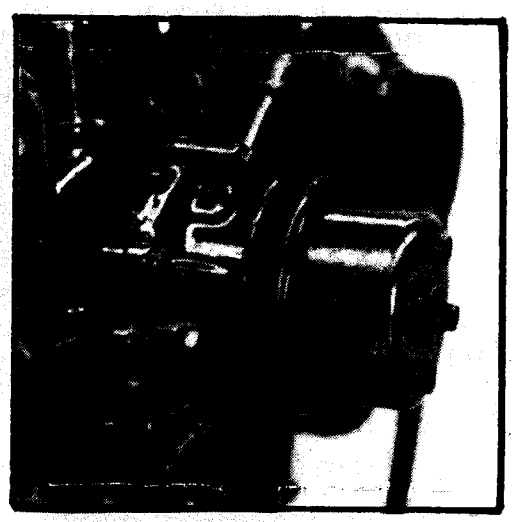


Figure 19

A cooling water temperature with engine load can come from a defective thermostat. In this case, its monitoring is required and the thermostat replaced if advisable.

Before such a checking is made, be sure the V-belt tension is the correct one.

The thermostat is located at the cylinder head lateral side, alternator side (no. 2- Figure 2). The thermostat is 71º C.

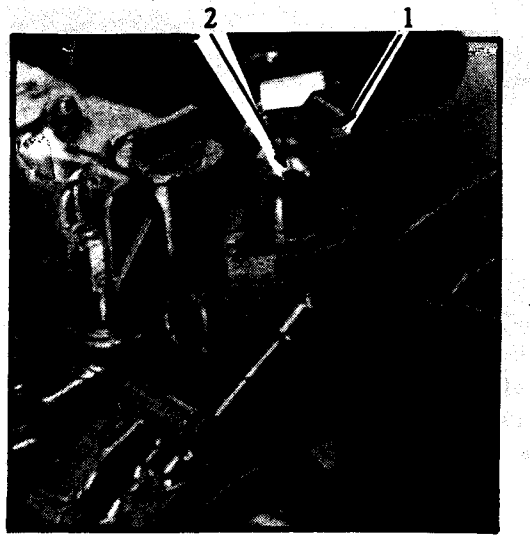


Figure 20

To check, proceed as follows:

DISASSEMBLY

1) Stop the engine and wait until it is cooled.
2) Drain cooling circuit water.
3) Loose a clamp, disconnect the bushing coming from the heat exchanger.
4) Disassemble the two positioning screws (1) in the upper body base and remove the upper body (2) of Fig. 20.

5) Draw the thermostat out from its housing and check its condition and if dusty, go to clean it.

ASSEMBLY

6) Place the thermostat component at its housing.
7) If the seal is damaged on disassembly, replace the seal and fit the upper cap with the two positioning screws (1) of Figure 20.
8) Connect the exchanger bushing and tighten the clamp.
9) Refill with water the heat exchanger.
10) Start the engine and check its sealing.

c) Heater.

It can be supplied on request.

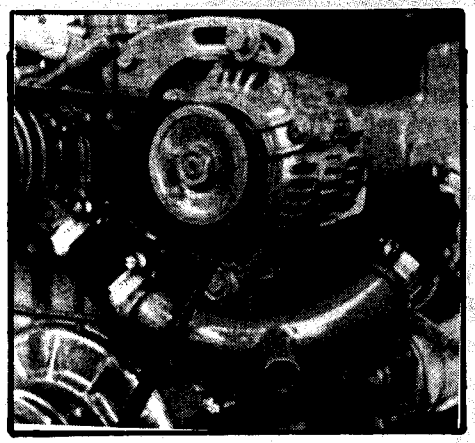


Figure 21

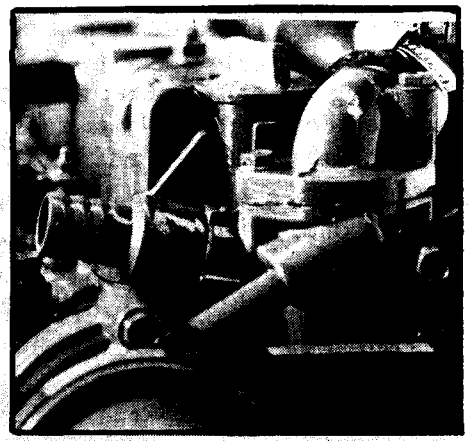


Figure 22

2) Seawater circuit

a) Water pump.

The seawater flowing pump is located at the engine front side (no. 5 of Fig. 2). The driving impeller is neoprene and cannot rotated without load. In case it is operating without water it can also be broken. It is significant then, to have always a spare impeller.

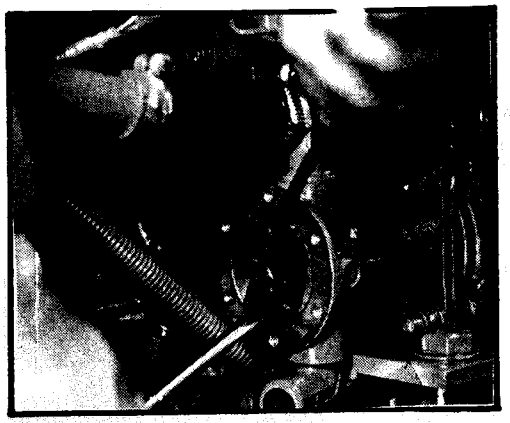


Figure 23

To make its replacement, shut off water access cock, remove the oil filter, oil rod, remove the pump cover and with two screwdrivers lever up by removing the shaft impeller. Clean the housing and replace a fresh one. Fit the cover by placing a fresh seal (Fig. 23) place the level rod and oil filter. Open the bottom cock.

CAUTION

If the impeller is broken, when its replacement is made, be sure the water pipes are drawn out of the rubber residues which could have been torn.

b) Water filter

It is essential to fit between the engine and the bottom cock a filter to avoid that any impurities existing in the sea water might clog the cooling conduits.

Filter shall be cleaned every 100 hours by loosening the wing nut and removing the filtering component. Clean the filter and fit it again taking care the cover is well seated on the O-ring (Fig. 24).

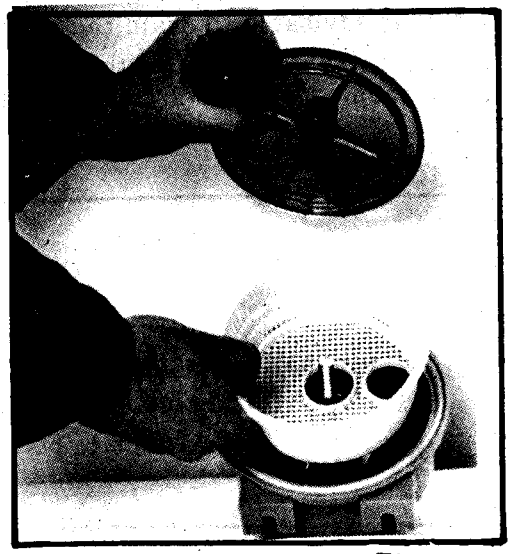


Figure 24

Then the engine is started to check if water is leaking from the cover.

3) Drainages

The engine is provided with two drain cocks, for the fresh water, one in the exchanger (Fig. 25) and one at the cylinder block (Fig. 26).

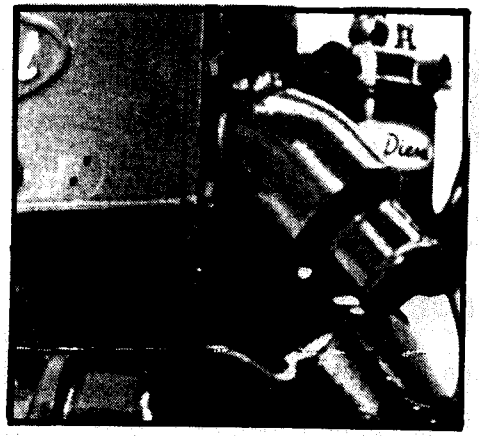


Figure 25

Figure 26

When in cold climates, if the engine is not to be used for a long period, it is advisable to drain the water circuit.

To do this, shut off the bottom cock and drain off all the circuit water by opening the two drain cocks fitted (Figs. 25 and 26).

CAUTION

Water shall be drained with the engine stopped and wait until the water is cold. When draining hot water, be careful not to be scalded.

4.4 - ELECTRICAL SYSTEM

The engine has a 12V system and its electrical circuit is as shown in the following diagrams (Fig. 28 and 29).

When fitting electrical components, connect them correctly, referring to the diagram and concurrently checking any damaged cable coating and if earthing is correct.

CAUTION

Before any handling of the electrical system is performed, firstly disconnect the battery negative cable.

1) Incandescent spark plugs

In the detection of a defective incandescent spark plug (s) yake a length of electrical wire making up a bridge between the starting motor positive terminal and the contact (screwed rod) or the incandescent spark plug upper side. If sparks are jumped our incandescent spark plug is in a good condition and if otherwise it should be replaced.

2) Alternator

The alternator is a 12V, 40A and carries a built-in electrical governor. A delivery is also provided for the counter-revolutions intake.

Regularly check the electrical connections, its relevant positioning and the good terminal contact.

a) Alternator belt tension

Check V-belt tension and if required adjust it.

An excessive tension may cause a quick wear of the belt and alternator bearings. Otherwise, if the belt is excessively loose or has oil, an insufficient load due to the belt skidding can be caused.

Never adjust the belt tension with engine running.

A suitable belt tension is provided when the belt is curved from 9 to 11 mm when depressed with the fore of the thumb finger (some 10 kgs) at the center point of the higher distance between the two pulleys.

To tension the alternator belt the two alternator positioning screws, one located at the alternator lower side (1) and the other at the upper side (2) i.e the tensioner, shall be loosened, the belt shall be tensioned levering up with the alternator until the suitable tension is achieved (Fig. 27).

Then tighten again the two alternator prior positioning screws.

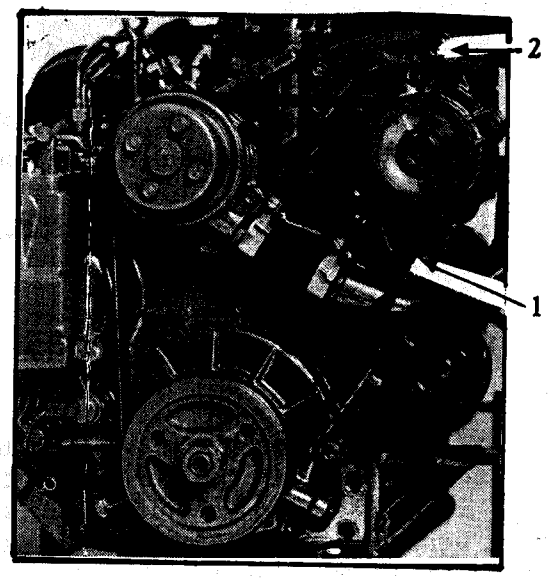


Figure 27

b) Change of belt.

Loosen the two screws (1) and (2) of Fig. 27.

Fully detension old belt so that ist removal can be made easier.

When belt is unfitted, check the condition of the pulley recesses, they shall be dry and clean. Its cleanliness is performed with soap water (never use petrol, gas-oil or similar products).

Fit the belt taking care the belt insertion is made with the hand but without damaging it and if required pace it with a tool at least without any cutting edges since otherwise the belt could be damaged and its life shortened.

The belt shall be tensioned such as is previously explained.

CAUTION

During the engine performance, the alternator shall be continuously connected to the battery. If that condition is not complied with, the voltage governor diodes would immediately be destroyed. Before proceeding to the battery charge with an outside charger, both terminals (positive and negative) shall be disconnected.

3) Battery

Batteries require a very careful handling and frequent checkings.

Proceed as shown below:

a) Always keep batteries dry and cleaned.

b) Regularly check terminal cleaniness. If dust is settled, terminals should be loosened, cleaned and smeared with a neutral grease layer.

c) Do not allow the batteries go into contact with oil or fuel.

d) Metal objects must not be placed over the battery (keys, etc.) (To avoid short-circuits).

e) Batteries or containers containing acids should carefully be handled so as to avoid the acid contact with the skin or clothes. The acid can cause burns and injuries to people and destroy the clothes.

f) Monthly check the acid level and supplement it with distilled water if required. Level should not exceed the battery inside mark.

g) Never use open flames to light battery components: there is explosion danger.

h) In winter, batteries should be detached and placed following the manufacturer's instructions.

4) Fuse

The electrical system carries as protection a 60A fuse placed at the side of the starting motor in the cable going from the latter to the switchboard (see diagram page 39).

In case the switchboard does not received power supply check if the switchboard is or not fused and replace.

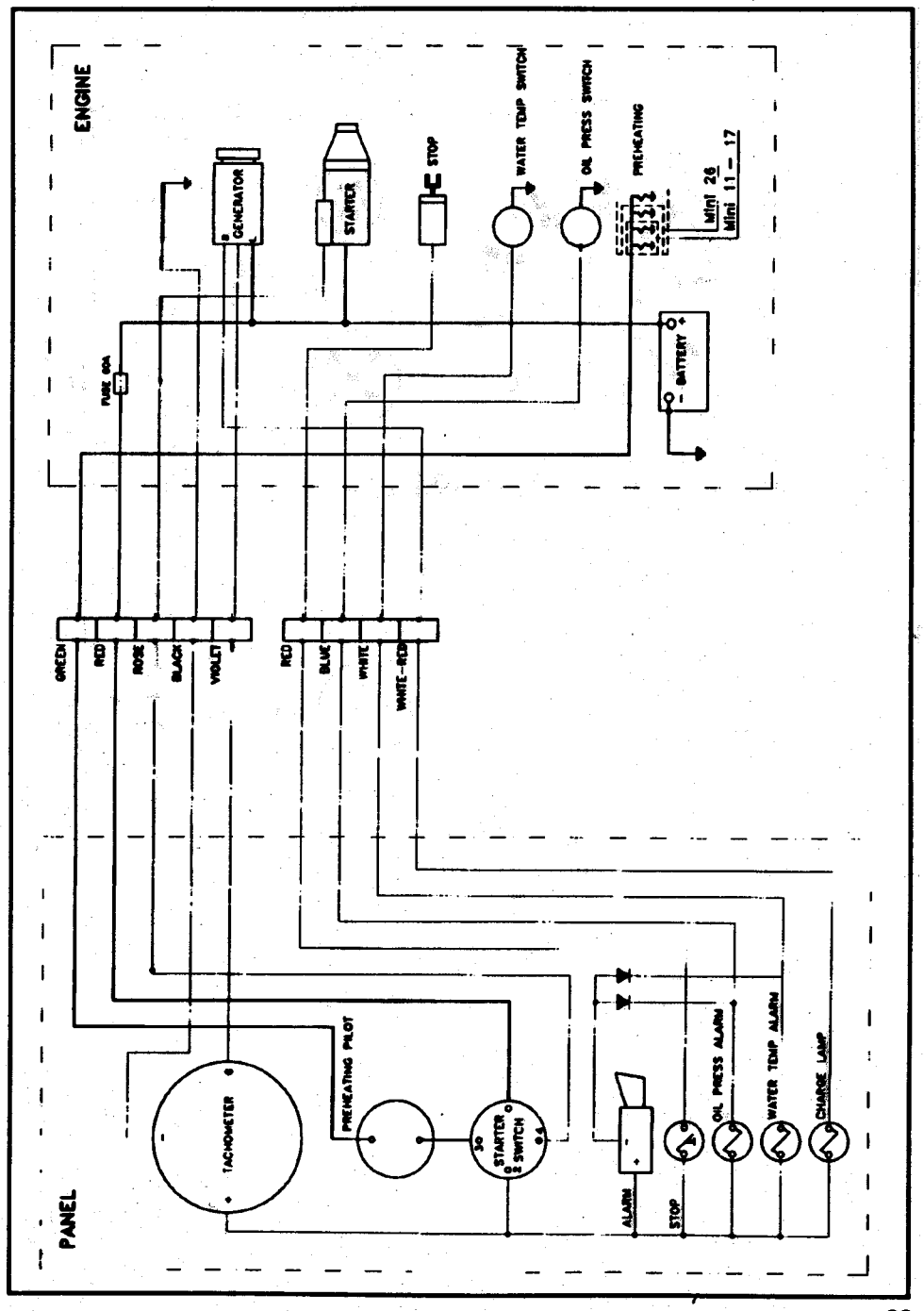
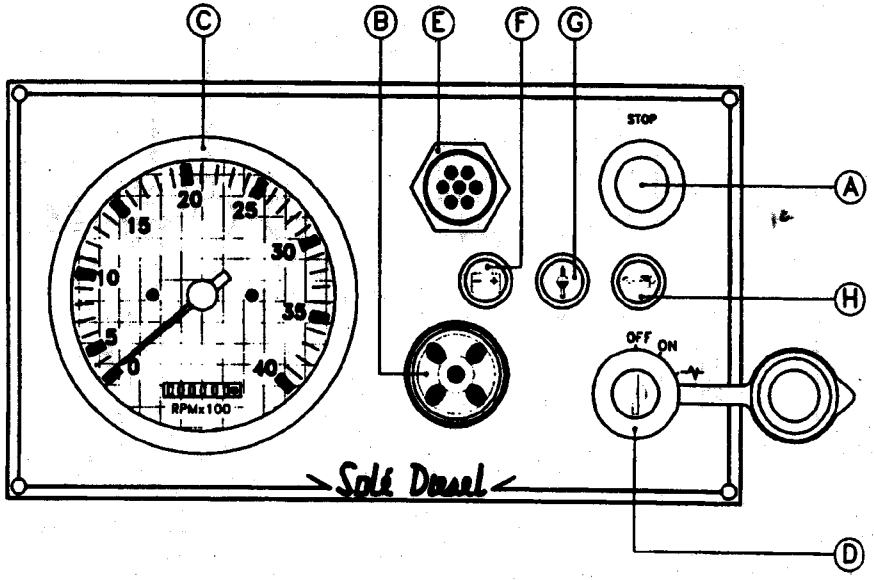
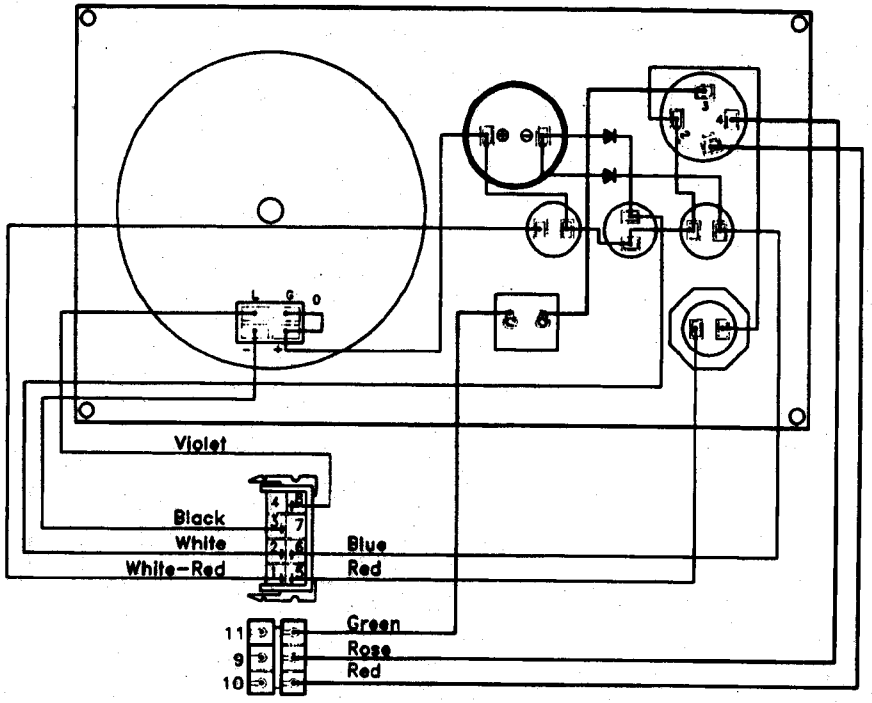


Figure 28





POINT	DESCRIPTION
A	SWITCH, STOP
B	ALARM
C	TACHOMETER
D	KEY
E	PREHEATING PILOT
F	SWITCH, STOP
G	WATER TEMP LAMP
H	OIL PRESS LAMP

N°	FUNTION	COLOR
1	BATTERY CHARGE LAMP	WHITE-RED
2	WATER TEMP LAMP	WHITE
3	NEGATIVO	BLACK
5	STOP	RED
6	OIL PRESS LAMP	BLUE
8	TACHOMETER	VIOLET
9	STARTER	ROSE
10	CURREN TAP	RED
11	PREHEATING GLOW PLUGS	GREEN

4.5 - INTAKE SYSTEM

The engine is provided with an injection air filter with a filtering component (no. 7- Fig. 2).

Change the air filter component every 400 hours.

To perform such a change, loose the filter center wing nut, remove the cap and the filtering component, and replace it with a fresh one. (Fig. 30).

The component should NOT be cleaned, it must be replaced.

Figure 30

4.6 - GEAR BOX

The mechanically driven RONIM gear box is made with high mechanical and seawater resistance aluminium alloy.

a) Operation

With engine at idle speed, smoothly push forwardly the inverter lever (forward gear) and rearwardly (rear gear) according to the sense wanted.

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

	Inspection concept \ Intervals	Daily	First 50 Hours	Every 100 Hours	Every 200 Hours	Every 400 Hours	Every 800 Hours	For longer time
Engine body	Screw tightening, fixing		○	○		○		
	Valve play		○			○		
	Engine idle speed		○	○				
	Exhaust gases, noise and vibrations	○						
Lubricating system	Engine oil	○	●	●				
	Gear box oil	○	●	●				
	Oil filter		●	●				
Combustion system	Fuel	○						△
	Fuel tank							□
	Fuel filter (engine)					●		
	Water filter (if any)		○	△	●			
	Injector				○			
	Fuel filter (decanter)			△	●			
	Air filter					●		
Cooling system	Cooling water	○					●	
	Water filter	○		□				
	Bottom cock	○						
	Water pump impeller					○		
Electrical system	Every instrument	○						
	Incandescent spark plug					○		
	Alternator and starting motor						○	
	Alternator belt and tension	○	○				●	
	Battery water level				○			

5 - REGULAR INSPECTIONS

5.1 - DAILY CHECKING BEFORE USE OF THE ENGINE

1) Check oil level in the engine and gear box. Filling. Filling is not required if level is near to the rod upper line.
2) Check fuel level and open fuel delivery cock.
3) Open the water acces cock.
4) Check indicators.
   After commissioning check oil pressure, water temperature and battery charge. The three lamps must be switched off and the horn must not be sounded.
5) Check cooling water is flowing and if some failure is detected in the exhaust gases, noise and vibrations.
6) Check cooling water level.
7) Check alternator belt integrity and tension.

5.2 - MAINTENANCE AFTER THE FIRST 50 OPERATING HOURS

1) Change gear box and engine oil. Proceed as shown in the page 22 (4-1 Lubricating system -3).
2) Change oil filter. Proceed as shown in the page 24 (4.1 Lubricating system -4).
3) Adjust valve play.

Figure 31

Perform this operation when the engine is cold in the following way:

a) Whit the rocking cover removed, loosen the rocking nut and while the adjustment screw is rotated, adjust the valve play with a gauge (Fig. 31).

b) With the cylinder no. 1 piston (forward) at the neutral point and in the upper side of the compression stroke, the injection and exhaust valves of the cylinder no. 1 shall be adjusted.

   Proceed similarly as with the other cylinders.

c) The position of the cylinder no. 1 upper neutral point can be confirmed with the aligning signs of the distribution or timing cover and the crankshaft pulley.

d) After the adjustment, the rocking nut should be well tightened while the adjusting screw is locked so that it does not rotate.

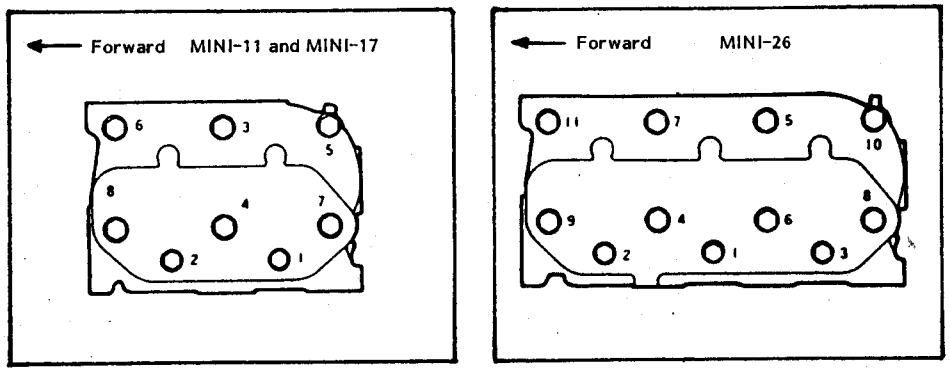


Figure 32

NOTE:

The adjustment of the valve play must be made after the cylinder head screws are again tightened (tightening sequence as per Fig. 32).

Valve play (injection-exhaust 0.25 mm (0.0099").

Cylinder head screws tightening torsion/torque:

Screws M.8 : 2.0 - 3.0 Kgm.
Screws M.10 : 7.5 - 8.5 Kgm.
Rocking screw M.8 : 1.5 - 2.2 Kgm.

4) Control and eventual adjustment of the alternator belt. Proceed as show int the page 35 (4.4 Electrical system - 2a).

5) Overhaul of the propeller shaft and positioning screw tightening torque.

6) Adjustment of the engine idle speed. Proceed as shown in the page 28 (4.2 Combustions system - 7).

5.3 - MAINTENANCE EVERY 100 OPERATING HOURS

1) Gear box and engine oil change. See page 22 (4.1 - Lubricating system) -3).

2) Oil filter change. See page 24 (4.1 - Lubricating system - 4).

3) Fuel filter change. See page 27 (4.2 Combustion system - 3).

4) Fuel decanting filter drainege.
Loosen the wing nut located at the lower side of the glass vessel and let go all the acrued water. Shut again off the wing nut and check it does not drip.

5) Water filter cleaning. See page 33 (4.3 Cooling system - 2b).

6) Engine idle speed adjustment. See page 28 (4.2 Combustion system - 7).

7) Again tighten the positioning screws and nuts of the injection and exhaust manifold, alternator, engine positioning and propeller shaft.

5.4 - MAINTENANCE EVERY 200 OPERATING HOURS

1) Decanting filter component change.

Replace the filter component, placing also fresh seals.
Check there is not any gas-oil leakage.

2) Injector checking.
Set up the injector pressure to 140 $^{+10}_{-0}$ kg/cm^2 and remove all the undesirable injection conditions incluging "post-dripping" (This operation shall be made by a SOLE service).

3) Check battery water level.
Check this level, and DISTILLED WATER should be added if required.

5.5 - MAINTENANCE EVERY 400 OPERATING HOURS

1) Check the tightening torque of the engine positioning, propeller shaft screw and gas-oil piping nipples.

2) Valve play shall be adjusted. See page 44.

3) Check incandescent spark plugs.
Check incandescent spark plugs in case they migth fused or if there is two connections.

4) Change air filter component. See page 42. (4.5 Intake system).

5) Fuel filter change. See page 27 (4.2 Combustion system - 3).

6) Check condition of seawater pump impeller and its eventual replacement. See page 32 (4.3 Cooling system - 2a).

5.6 - MAINTENANCE EVERY 800 OPERATING HOURS

1) Change cooling circuit water.

Drain off any water by opening the drain cocks of the fresh water circuit (Fig. 25 and Fig. 26) Page 34.

When the water is already drained, shut off the cock and fill with fresh and clean water up to the hole of the tank plug (Fig. 6) Page 14.

2) Check alternator and starting engine.

Check brush wear and switch surface roughness. Replace if the service limitation has ben reached.

Check tension and voltage with a circuit engine.

3) Check the starting engine pinion and the flywheel toothed crown.

With a file rectify the belleved area which could have been damaged and replace pinion ot toothed crown if fully damaged.

4) Replace the alternator belt. See page 36 (4.4 Electrical system - 2b).

5.7 - INSTRUCTIONS FOR WINTER LAY-UP

When the engine is not to be used for a long period of time, certain operations must be carried out yo keep it in perfect operating condition. Follow these lay-up instructions carefully.

1 - Carefully clean the external surface of the engine with diesel oil or alcohol.

2 - Drain the fluid from the cooling system. If the engine is conected to a boiler, also drain the boiler system.

3 - Fill the cooling system with clean water to which a rust inhibitor additive has been added in a proportion of 1 %. If very low temperatures are expected, also add antifreeze to the water. 4 ½ LTR GEMENGT MET ANTI-FREEZE.

4 - With the engine at operating temperature, drain the oil from the crankcase. Then refill with rust inhibitor oil. The oil level rod should indicate the maximum level.

5 - In the case of low-capacity tanks, drain completely and clean; refill with a mixture of diesel oil and rust inhibitor oil. For diesel oil in large-capacity tanks, it is enough to add 10 % rust inhibitor oil.

6 - Bleed the fuel supply system.

7 - Run the engine at half speed until service temperature is reached (thast is, when the thermostat opens). Then stop the engine.

8 - Remove the cylinder head cover and spray the rocker arms with a protective mixture composed of diesel oil and 10 % rust inhibitor oil. Then put the valve cover on again.

9 - Spray rust inhibitor oil on the intake system.

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

11 - Remove the battery and store it away, following the manufacturer's instructions.

5.8 - INSTRUCTIONS FOR STARTING UP THE ENGINE AFTER WINTER LAY-UP

When starting up the engine again after winter lay-up, certain operations must be performed in addition to those described in the instructions in Section 3 (Use).

Follow these steps:

1 - Fill the fuel tank with clean diesel oil.
Carry out the process for checking the fuel filter. If the filter is clogged, replace the filter cartridge.

2 - Drain the rust inhibitor oil contained in the crankcase and refill according to the instructions on page 22 (4.1 Lubrication system - 3).

3 - Inspect the internal water system anf fill according to instructions.

4 - Reconnect the battery and apply a layer of neutral vaseline to the battery terminals.

5 - Remove the nozzle supports and clean them. If possible, verify the setting of the nozzles at a workshop. Turn the engine without nozzles, using the starting motor, to eliminate the rust inhibitor oil used in the winter. Then install the clean nozzles.

6 - Carry out the operations described on page 25 (Bleeding the fuel system - 2) and connect the cooling and exhaust systems.

CAUTION: During this process, remember to remove the plugs installed in the engine for winter lay-up.

7 - Verify whether there are any leaks in the fuel and water systems.

8 - Start up the engine and try it out at different speeds, making sure that the water flows correctly. Check again to see if the connectors leak.

NOTE:

The diesel oil - rust inhibitor oil mixture placed in the tank for winter lay-up can be used to operate the engine.

6 - TROUBLE SHOOTING

It is essential that all faults or defects be detected and corrected as soon as possible. Carry out all inspections and follow the instructions given below. If a fault calls for operations that go beyond your capabilities, have it repaired at an authorized Solé Diesel service.

1 - Engine does not start

a) Engine does not turn

- Instrument panel lights off in "ON" position.	
Battery defective or discharged	Replace or charge battery an check tightness of terminals
Start switch defective	Change or repair switch
Cables rusty or loose	Correct connections and contacts
Fuse burned out	Replace
Instrument panel ligts on in "ON" position (they always go off in "Start" position).	
Engine seized	Repair. (Call Solé Diesel Service).
Starting motor faulty	Inspect and repair

b) Engine turns very slowly

Battery partly discharged	Charge battery
Engine oil of unsuitable viscosity (especially at very low temperatures)	See the oil specified in the service chart. Change for correct oil.

c) Engine turns but does not start

Fuel tank empty or almost empty	Verify and fill. Bleed the Circuit (See page 25)
Fuel outlet cock closed	Open
Fuel filter clogged	Inspect filter and replace cartridge (page 27)
Air in fuels lines or in injection pump	Check for fuel leaks in lines and connectors. Tighten the clamp on the lines. Bleed the fuel circuit (See page 25)
Incorrect setting of injection pump	Inspect and correct. (Call an authorized Solé Diesel service)
Insufficient preheating of glow plugs	Preheat sufficiently
Preheating glow plugs burned out	Inspect and replace with new glow plugs
Incorrect adjustment of valve play	Inspect and adjust. (Call an authorized Solé Diesel service)
Timing out of adjustment	Correct it. (Call an authorized Solé Diesel service)

2. Engine stops when running

Fuel tank empty	Fill and bleed fuel circuit (see page 25)
Fuel filter clogged	Inspect filter and replace cartridge (see page 27)
Air in fuel lines or in injections pump	Check for fuel leaks in the lines and connectors. Tighten the clamps of the lines. Bleed the fuel circuit (see page 25)

3. Engine lacks power or misfires

Fuel filter clogged	Inspect filter and replace cartridge (see page 27)
Air in fuel lines or in injection pump	Check for fuel leaks in the lines and connectors. Tighten the clamps of the lines. Bleed the fuel circuit (see page 25)
Insufficient air for combustion	Inspect air filter and clean it. Increase air intake to engine compartment.
Valves out of adjustment	Check play and adjust. (Call an authorized Solé Diesel service)
Water in fuel circuit	Replace filter cartridge and drain water from tank, filling with clean diesel oil

4. Engine does not reach rated rpm at full power

Engine overloaded	Check that propeller is not overdimensioned. Change propeller
Exhaust backfires	Check for obstructions in the exhaust system
Vent hole of fuel tank clogged	Inspect the vent tube of the tank. Remove the obstruction.
Insufficient air for combustion	Inspect air filter and clean it. Increase the air intake to the engine compartment

5. Engine discharges a large quantity of blue smoke

Oil level too high	Verify oil level and drain excess

Excessive valve play	Inspect play and adjust. (Call an authorized Solé Diesel service)
Insufficient compression	Check compressions. Loss of compression may be caused by a broken or worn ring or by excessive play of valve guides.

6. Engine discharges black smoke

Engine overloaded	Check that propeller is not overdimensioned. Change propeller.
Nozzle do not spray correctly (dirty or incorretly set)	Have the nozzles inspected at an authorized Solé Diesel service. Set them at the specified pressure.
Injection pump out of adjustment (Excessive flow)	Have the injection pump inspected at an authorized Solé Diesel or Condiesel (CAV) service.
Fuel filter clogged	Inspect filter and replace cartridge (see page 27)

7. Engine heats up

Shortage of water in fresh water circuit	Check level and top off, if necessary
Fresh water pump does not operate correctly	Verify condition and tension of belt. Tighten it or replace it (see page 36) Inspect the condition of the water pump. Repair it or replace it.
Bottom cock to water filter clogged	Inspect and clean (see page 33)

Cooling system clogged	Verify that the oil and water cooling lines are clean. Clean them.
Thermostat faulty	Verify thermostat operation. If necessari, replace it.
Insufficient air flow in engine compartment	Increase air intake to engine compartment
Thermocontact or temperature transmitter faulty	Inspect and replace, if necessary
Salt water pump faulty	Inspect operation and check impeller condition. Replace, if broken (See page 32)
Engine oil level too high	Verify oil level and drain excess

8. Low oil pressure

Engine oil level too low	Verify level and fill to top mark on rod
Oil viscosity too low	Check oil viscosity and replace with oil of correct viscosity
Oil leak through connections, lines or discharge valve	Check for losses and correct
Oil pressure contact defective	Inspect and replace

9. Battery charge defective

Alternator belt tension incorrect or belt broken	Inspect and tighten or replace (see page 36)

Alternator regulator faulty	Have it inspected at an authorized Solé Diesel or Bosch service
Battery defective	Change

10. Gear do not mesh correctly

Remote shitft out of adjustment	Adjust
Reversing gear control out of adjustment	Adjust
Clutch cone worn	Change

7 - SERVICE DATA

7.1 - SERVICE SPECIFICATIONS

a) Valve play — 0.25 mm (0.0099") cold engine both in the injection as exhaust valves)

b) Compression pressure: — 28 Kg/cm^2 or more than 280 rpm

c) Injection time (Before PMS in the compression stroke) — Lower than 2800 rpm - 17°; 2800 rpm or more - 19°

d) Injector pressure — $140\ ^{+10}_{-0}$

7.2 - OIL

Use a Diesel engine oil of known brand. API's service classification will be as follows:

Heavy-duty service . . . . . Class CD
(or continuous rate higher than 3000 rpm)

OIL VISCOSITY

Select oil viscosity most suitable for the atmospheric temperatures on which the engine should be operated. It is recommended to use SAE 10W-30 oil in all the seasons due to the minimum change in its viscosity with the temperature changes.

Atmospheric Temperature	Viscosity
Higher than 20° C	SAE 30 or SAE 10W-30
From 5º C to 20° C	SAE 20 or SAE 10W-30
Lower than 5° C	SAE 10W-30

8 - TIGHTENING TORQUE

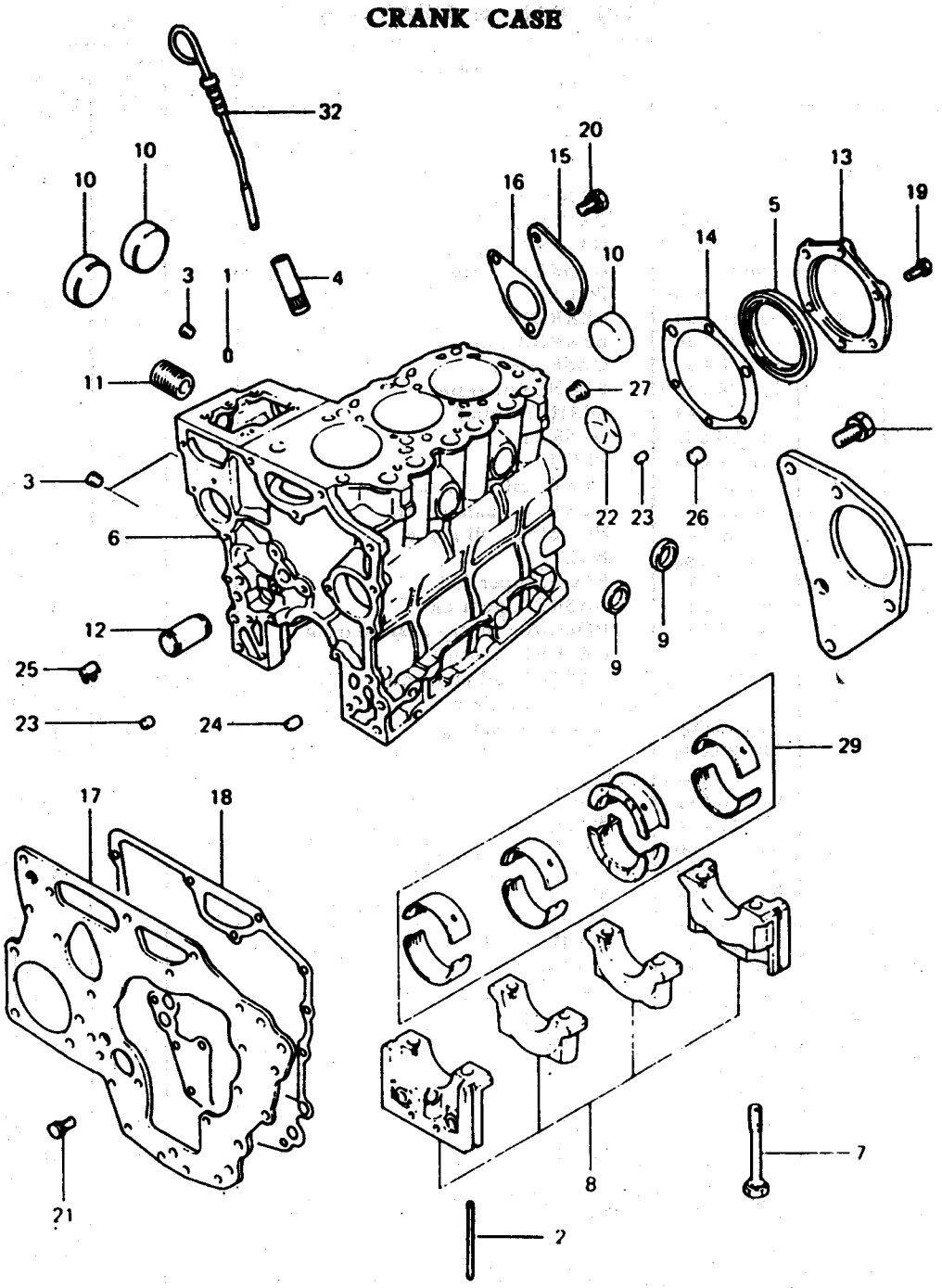
	Thread	Kg.m	(ft-lb)
Cylinder head sub-bolts	M. 8	2,0 - 3,0	(14,6 - 21,9)
Cylinder head main bolts	M. 10	7,5 - 8,5	(54,8 - 62,1)
Rocker stay bolts	M. 8	1,5 - 2,2	(10,9 - 16,1)
Crankshaft pulley nut	M. 16	10 - 12	(73 - 87,6)
Main bearing cap bolts	M. 10	5 - 5,5	(36,5 - 40,2)
Connecting rod cap nuts	M. 8	3,2 - 3,5	(23,4 - 25,6)
Flywheel bolts	M. 10	8,5 - 9,5	(62,1 - 69,4)
Oil pan drain plug	M. 18	5 - 6	(36,5 - 43,8)
Oil filter		1,1 - 1,3	(8 - 9,5)
Delivery valve holder	M. 16	3,5 - 3,9	(25,6 - 28,5)
Nozzle holder body retaining nuts	M. 16	3,5 - 4,0	(25,6 - 29,2)
Nozzle holder mounting	M. 20	5 - 6	(36,5 - 43,8)
Glow plugs	M. 10	1,5 - 2,0	(10,9 - 14,6)
Starter terminal B fitting nut		1,0 - 1,2	(7,3 - 8,8)
Reversing gear lay- shaft setscrew		12	(87,6)
Water cooler element locknut		2	(14,6)
Reversing gear body setscrew		4	(29,2)
General tightening torque of screws and nuts:	M. 6	0,8	(5,9)
	M. 8	1,7	(12,4)
	M. 10	3,5	(25,6)
	M. 12	6,4	(46,7)
	M. 14	9,5	(69,4)

PARTS LIST

CRANK CASE

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	131.20.036	PIN, dowel	2	2	2
2	138.20.002	SEAL, side	4	4	4
3	131.20.012	PLUG, taper 1/16	3	3	3
4	132.20.007	GUIDE, oil level gange	1	1	1
5	138.20.008	OIL SEAL	1	1	1
6-10	130.20.001	BLOCK SUB ASSY, cylinder	1	-	-
6-10	138.20.001	BLOCK SUB ASSY, cylinder	-	1	-
6-10	139.20.001	BLOCK SUB ASSY, cylinder	-	-	1
7	138.20.009	BOLT, bearing cap	6	6	8
8	138.20.010	CAP ASSY, bearing	1	1	-
8	139.20.010	CAP ASSY, bearing	-	-	1
9	132.20.012	CAP, sealing	1	1	2
10	135.20.013	PLUG, expansion	2	2	3
11	131.24.047	SHAFT, oil filter	1	1	1
12	138.20.014	SHAFT, idler	1	1	1
13	138.20.015	CASE, oil seal	1	1	1
14	138.20.016	GASKET, oil seal	1	1	1
15	138.20.011	COVER	1	1	1
16	138.20.012	GASKET	1	1	1
17	138.20.017	PLATE, front	1	1	1
18	138.20.018	GASKET, front plate	1	1	1
19	521.02.157	BOLT	6	6	6
20	521.02.256	BOLT	2	2	2
21	521.02.156	BOLT	7	7	7
22	138.20.013	PLUG, expansion	1	1	1
23	137.20.009	BUSHING, knock	2	2	2
24	138.20.021	BUSHING, knock	1	1	1
25	132.20.021	BUSHING, knock	2	2	2
26	135.20.010	BUSHING, knock	3	3	3
27	138.20.023	PLUG, taper 1/4	1	1	1
29	138.20.003	BEARING SET, crankshaft STD	1	1	-
29	139.20.003	BEARING SET, crankshaft STD	-	-	1
29	138.20.004	BEARING SET, crankshaft US 0,25	1	1	-
29	139.20.004	BEARING SET, crankshaft US 0,25	-	-	1
29	138.20.005	BEARING SET, crankshaft US 0,50	1	1	-
29	139.20.005	BEARING SET, crankshaft US 0,50	-	-	1
30	138.20.024	BRACKET, starter	1	1	1
31	522.02.308	BOLT	3	3	3
32	138.20.029	GAUGE, oil level	1	1	1

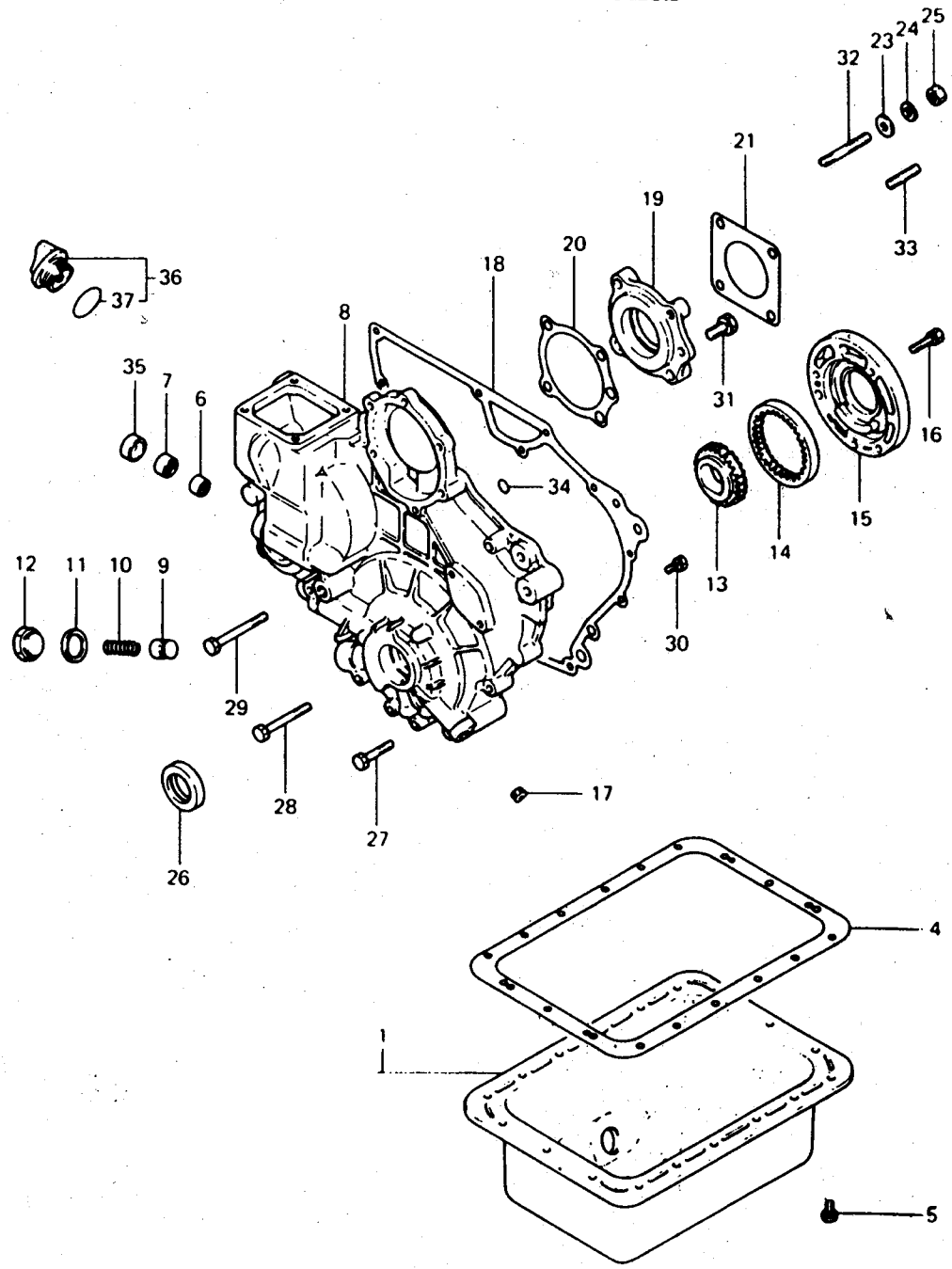
CRANK CASE



OIL PAN & GEAR CASE

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	138.20.030	PAN ASSY, oil	1	1	-
1	139.20.030	PAN ASSY, oil	-	-	1
4	138.20.033	GASKET, oil pan	1	1	-
4	139.20.033	GASKET, oil pan	-	-	1
5	131.23.005	BOLT	14	14	18
6	138.20.034	BEARING, needle	1	1	1
7	138.20.036	BEARING, needle	1	1	1
8	138.20.035	CASE, gear	1	1	1
9	132.24.043	PLUNGER, relief	1	1	1
10	138.24.044	SPRING, relief	1	1	1
11	131.20.032	GASKET	1	1	1
12	132.24.045	PLUG	1	1	1
13	138.20.050	GEAR, oil pump inner	1	1	1
14	138.20.051	GEAR, oil pump onter	1	1	1
15	138.20.052	HOUSING, oil pump	1	1	1
16	521.01.159	BOLT	3	3	3
17	138.20.041	PLUG, taper 1/8	2	2	2
18	138.20.040	GASKET, gear case	1	1	1
19	138.20.037	HOUSING, pump gear bearing	1	1	1
20	138.20.038	GASKET, housing	1	1	1
21	131.20.047	GASKET, oil pump cover	1	1	1
23	510.30.008	WASHER, plain	4	4	4
24	530.33.008	WASHER, spring	4	4	4
25	521.20.008	NUT	4	4	4
26	138.20.039	OIL SEAL	1	1	1
27	138.20.042	BOLT	3	3	3
28	137.20.038	BOLT	4	4	4
29	521.01.166	BOLT	1	1	1
30	521.02.156	BOLT	4	4	4
31	521.02.258	BOLT	1	1	1
32	132.20.042	STUD	3	3	3
33	132.20.043	STUD	1	1	1
34	138.20.044	O-RING	2	2	2
35	138.20.045	CAP, sealing	1	1	1
36 y 37	135.21.003	CAP ASSY, oil filler	1	1	1
37	137.21.007	O-RING	1	1	1

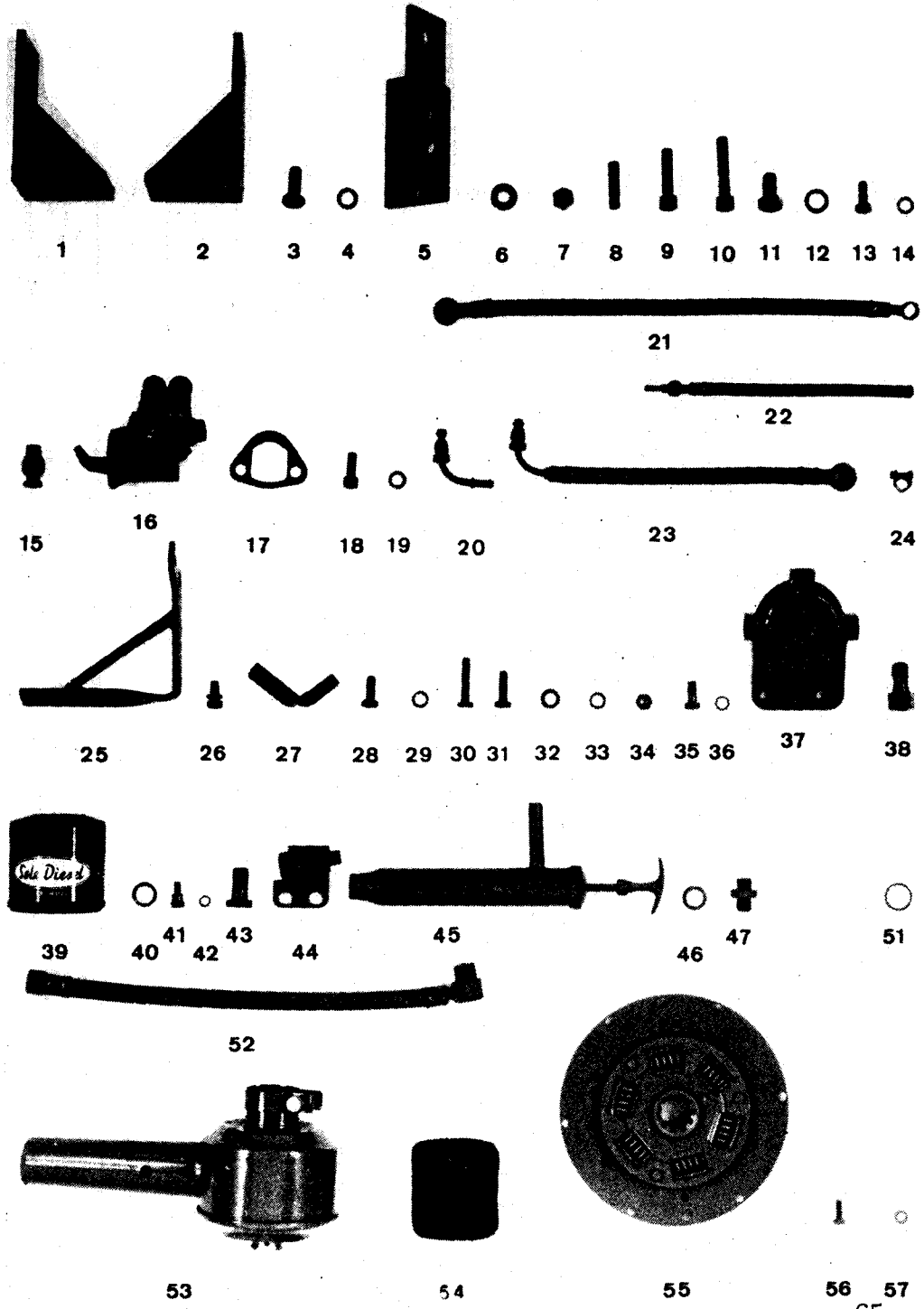
OIL PAN & GEAR CASE



BLOCK INLET

Item	Part nº	DECRIPTION	QUANTITY		
			M-11	M-17	M-26
1	138.10.001	LEFT, front bracket	1	1	1
2	138.10.002	RIGHT, front bracket	1	1	1
3	522.02.308	BOLT DIN 933 M10-1,25x25 8.8	4	4	4
4	530.33.010	WASHER GROWER DIN 127 Ø 10	4	4	4
5	138.10.010	REAR, bracket	2	2	2
6	131.10.017	WASHER PLAIN	6	6	6
7	511.23.010	NUT DIN 985 M10 5.6	6	6	6
8	131.10.011	STUD	2	2	2
9	521.03.311	BOLT DIN 912 M10x40 8.8	2	2	2
10	521.03.313	BOLT DIN 912 M10x50 8.8	2	2	2
11	522.02.357	BOLT DIN 933 M12-1,25x20 8.8	5	5	6
11	522.02.363	BOLT DIN 933 M12-1,25x50 8.8	1	1	-
12	530.38.012	WASHER DIN 6798-A Ø 12	5	5	6
13	521.02.257	BOLT DIN 933 M8x20 8.8	4	4	4
14	530.33.008	WASHER GROWER DIN 127 Ø 8	4	4	4
15	131.11.039	DRAIN COCIC BLOCK	1	1	1
16	131.14.001	PUMP FUEL SUPPLY	1	1	1
17	131.14.002	GASKET	1	1	1
18	521.03.257	BOLT DIN 912 M8x20 8.8	2	2	2
19	530.38.008	WASHER DIN 6798-A Ø 8	2	2	2
20	131.14.003	PIPE INLET	1	1	1
21	138.14.017	PIPE, filter to inj. pump	1	1	-
21	139.14.017	PIPE, filter to inj. pump	-	-	1
22	138.14.020	PIPE, fuel return	1	1	1
23	134.14.016	PIPE, pump to filter	1	1	1
24	510.80.095	CLAMP 9,5	1	1	1
25	138.14.001	BRACKET, fuel filter	1	1	-
25	139.14.001	BRACKET, fuel filter	-	-	1
26	131.20.034	BOLT WITH WASKER	2	2	2
27	138.14.002	SUPPORT, bracket	1	1	-
27	139.14.002	SUPPORT, bracket	-	-	1
-	138.14.003	SPACER	1	1	-
28	521.02.257	BOLT DIN 933 M8xx20 8.8	1	1	1
29	530.33.008	WASHER GROWER DIN 127 Ø 8	-	-	1
30	521.02.259	BOLT DIN 933 M8x30 8.8	-	-	1
31	521.02.258	BOLT DIN 933 M8x25 8.8	3	3	1
32	510.30.008	WASHER DIN 125 Ø 8	2	2	2
33	530.33.088	WASHER GROWER DIN 127 Ø 8	2	2	2
34	521.20.008	NUT DIN 934 M8 8.8	2	2	2
35	131.14.007	SCREW SHORT CONNECTOR	1	1	1
36	570.00.357	WASHER 8,2-12-1,5	2	2	2

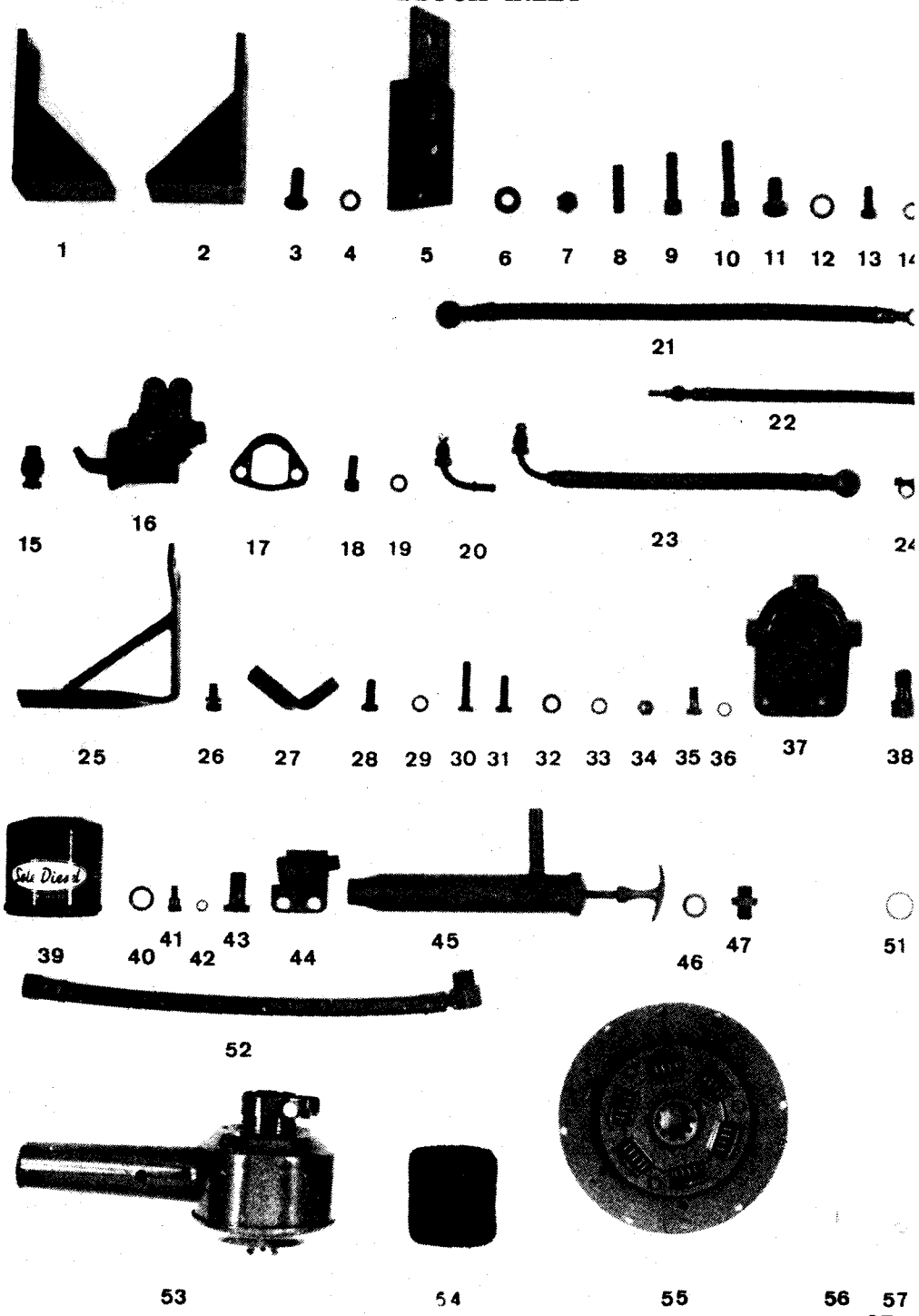
BLOCK INLET



BLOCK INLET

Item	Part n°	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
37	131.14.020	COVER, filter	1	1	1
38	131.14.021	COUPLING, cover filter	1	1	1
39	131.14.022	FILTER, element	1	1	1
40	570.00.369	WASHER 14,2-20-1,5	4	4	4
41	131.14.023	SCREW, air breather	1	1	1
42	570.00.353	WASHER 6,2-11-1,5	1	1	1
43	128.14.051	SCREW, eye	1	1	1
44	135.14.002	BRACKET, oil extraction pump	1	1	1
45	147.14.001	PUMP, oil suction	1	1	1
46	560.00.067	WASHER, 13-20-1,5	2	2	2
47	132.14.024	NIPPLE, oil pump bracket	1	1	1
51	560.00.077	WASHER 18-23-1,5	2	2	2
52	138.14.021	EXTRACTION, hose	1	1	1
53	138.10.012	CLEANER ASSY, air	1	1	1
54	121.11.031	ELEMENT, air filter	1	1	1
55	138.10.040	COUPLING, damper	1	1	1
56	521.02.156	BOLT DIN 933 M6x15 8.8	6	6	6
57	530.33.006	WASHER GROWER DIN 127 Ø 6	6	6	6

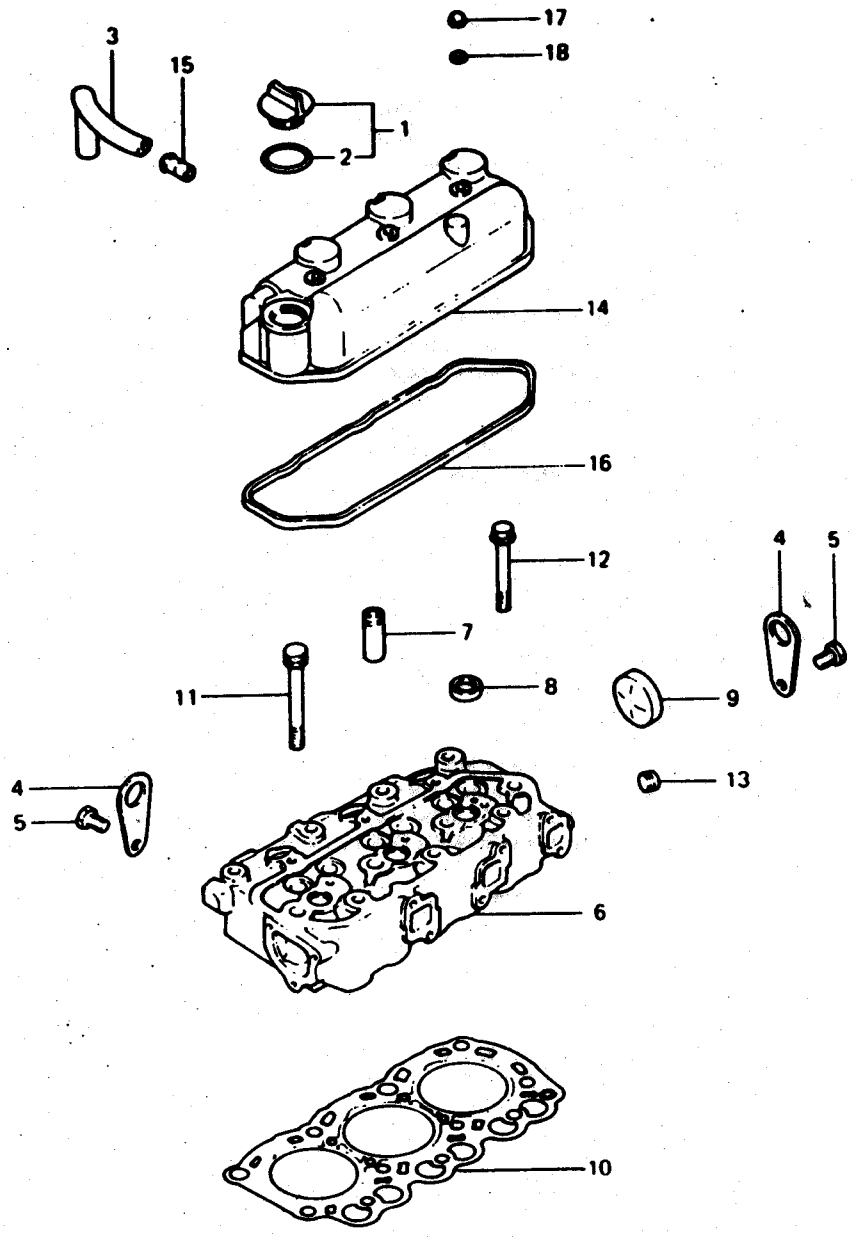
BLOCK INLET



CYLINDER HEAD

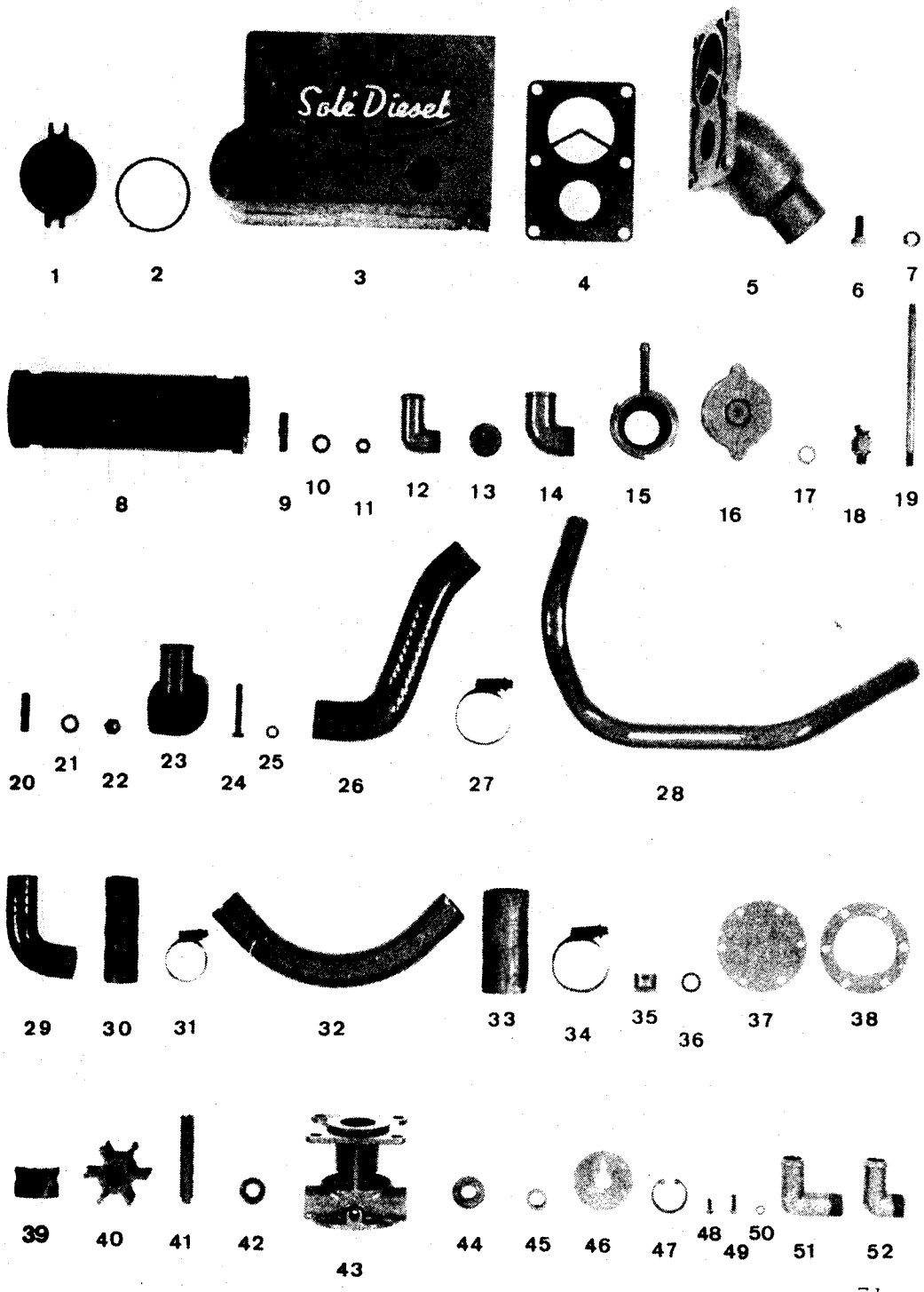
Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1 - 2	135.21.003	CAP ASSY, oil filler	1	1	1
2	137.21.007	O-RING	1	1	1
3	138.21.006	HOSE, breather	1	1	1
4	138.21.011	HANGER, engine	2	2	2
5	521.02.256	BOLT	2	2	2
6-9	130.21.001	HEAD ASSY, cylinder	1	-	-
6-9	138.21.001	HEAD ASSY, cylinder	-	1	-
6-9	139.21.001	HEAD ASSY, cylinder	-	-	1
7	137.21.002	GUIDE, valve	4	4	6
8	138.21.012	CAP, sealing	2	2	3
9	135.20.013	PLUG, espension	1	1	1
10	130.21.004	GASKET, cylinder head	1	-	-
10	138.21.004	GASKET, cylinder head	-	1	-
10	139.21.004	GASKET, cylinder head	-	-	1
11	138.21.005	BOLT, cylinder head	6	6	8
12	138.21.013	BOLT, flange	2	2	3
13	138.20.041	PLG, taper 1/8	1	1	1
14-15	138.21.009	COVER ASSY, rocker	1	1	-
14	139.21.009	COVER ASSY, rocker	-	-	1
15	132.21.017	PIPE	1	1	1
16	138.21.010	GASKET, rocker cover	1	1	-
16	139.21.010	GASKET, rocker cover	-	-	1
17	138.21.018	NUT, cap	2	2	3
18	510.30.006	WASHER, plain	2	2	3

CYLINDER HEAD



COOLING SYSTEM

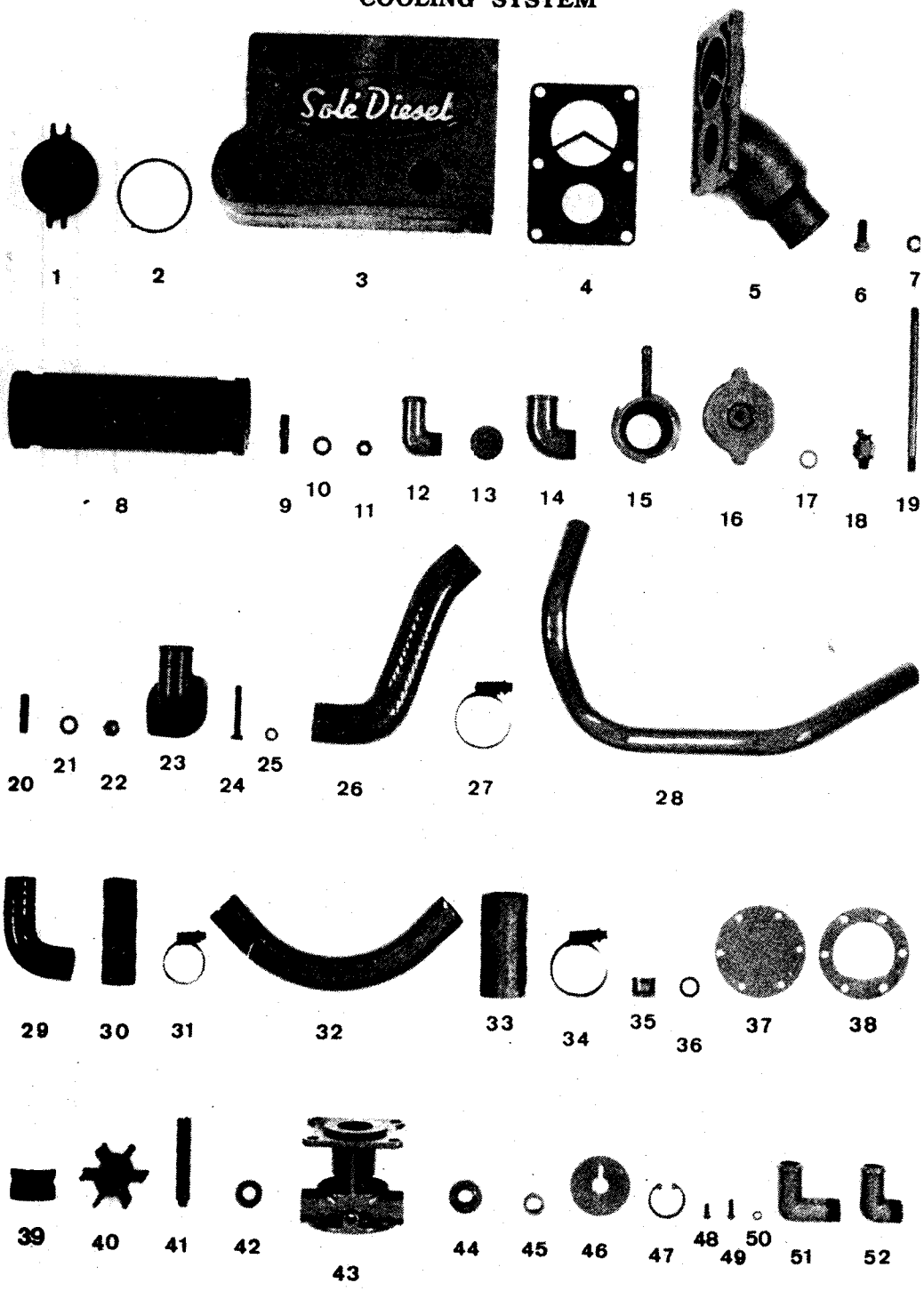
Item	Part n°	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1 - 18	138.11.000	COOLER, complete water	1	1	-
1 - 18	139.11.000	COOLER, complete water	-	-	1
1	138.11.002	COVER, water cooler	1	1	1
2	138.11.007	O-RING	2	2	2
3	138.11.001	BODY, water cooler	1	1	-
3	139.11.001	BODY, water cooler	-	-	1
4	138.13.016	GASKET	1	1	1
5	138.13.015B	ELBOW, wet exhaust	1	1	1
6	521.02.257	BOLT DIN 933 M8x20 8.8	6	6	6
7	530.33.008	WASHER GROWER DIN 127 Ø 8	6	6	6
8	138.11.004	ELEMENT, water cooler	1	1	-
8	139.11.004	ELEMENT, water cooler	-	-	1
9	133.11.006	STUD, cover	2	2	2
10	510.30.008	WASHER DIN 125 Ø 8	2	2	2
11	541.20.008	NUT DIN 934 M8	2	2	2
12	132.11.027	WATER INLET BEND	1	1	1
13	121.13.092	PLUG	1	1	1
14	138.11.011	HOSE 3/4	2	2	2
15	151.11.002	CAP MOUNTH	1	1	1
16	147.11.003	CAP	1	1	1
17	560.00.061	WASHER 10-16-1,5	1	1	1
18	131.11.038	DRAIN COCIC WATER COOLER	1	1	1
19	138.11.015	MANIFOLD, mounting stud	2	2	3
20	147.11.008	STUD, cover	2	2	3
21	510.30.008	WASHER DIN 125 Ø 8	4	4	6
22	541.20.008	NUT DIN 934 M8	4	4	6
23	138.11.020	FITTING, water ontlet	1	1	1
24	521.02.161	BOLT DIN 933 M6x40 8.8	1	1	1
25	530.33.006	WASHER GROWER DIN 127 Ø 6	2	2	2
26	138.11.012	PIPE	1	1	1
27	540.82.025	CLAMP 25-40	2	2	2
28	138.11.013	PIPE	1	1	-
28	139.11.013	PIPE	-	-	1
29	138.11.016	ELBOW	1	1	1
30	132.11.033	RUBBER SLEEVE 20-28-80 (1)	1	1	-
30	138.11.016	ELBOW (2)	1	1	-
30	139.11.033	ELBOW 20-28-100	-	-	1
31	540.81.020	CLAMP 20-32	4	4	4



COOLING SYSTEM

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
32	138.11.014	ELBOW	1	1	1
33	138.11.017	ELBOW 28-38-80	2	2	2
34	540.82.025	CLAMP 25-40	4	4	4
35	138.11.026	COUPLING, water pump	1	1	1
36 - 50	332.11.000	PUMP WATER, assy (1)	1	1	1
	334.11.000	PUMP WATER, assy (2)	1	1	1
36	252.10.010	O-RING (1)	1	1	1
	333.11.013	O-RING (2)	1	1	1
37	312.11.002	COVER PUMP	1	1	1
38	312.11.003	GASKET COVER	1	1	1
39	312.11.005	CAM	1	1	1
40	312.11.008	IMPELLER ASSY	1	1	1
41	312.11.010	SHAFT PUMP (1)	1	1	1
	334.11.010	SHAFT PUMP (2)	1	1	1
42	321.11.020	SEAL SHAFT (1)	2	2	2
	334.11.020	SEAL (2)	1	1	1
-	334.11.019	SEAL (2)	1	1	1
43	332.11.001	BODY WATER PUMP (1)	1	1	1
	334.11.001	BODY WATER PUMP (2)	1	1	1
44	121.10.030	BEARING (1)	2	2	2
	334.11.014	BEARING (2)	2	2	2
45	332.11.015	BUSHING SPACER (1)	1	1	1
	334.11.015	BUSHING SPACER (2)	1	1	1
46	332.11.026	DISK (1)	1	1	1
	334.11.026	DISK (2)	1	1	1
47	530.41.028	CIRCLIP DIN 472 I-28 (1)	1	1	1
	530.41.032	CIRCLIP DIN 472 I-32 (2)	1	1	1
48	553.07.104	BOLT DIN 86 3/16Wx10 (Down to Sep. 89)	6	6	6
	551.02.104	BOLT DIN 933 M5x10 (1)	6	6	6
	541.02.104	BOLT DIN 933 M5x10 (2)	6	6	6
49	553.07.105	BOLT DIN 86 3/16x13	1	1	1
50	570.00.301	WASHER 5-7,5-1	1	1	1
51	132.11.035	ELBOW (1 M-11 and M-17)	1	1	1
51	132.11.031	ELBOW (2)	1	1	-
52	132.11.027	ELBOW	1	1	1

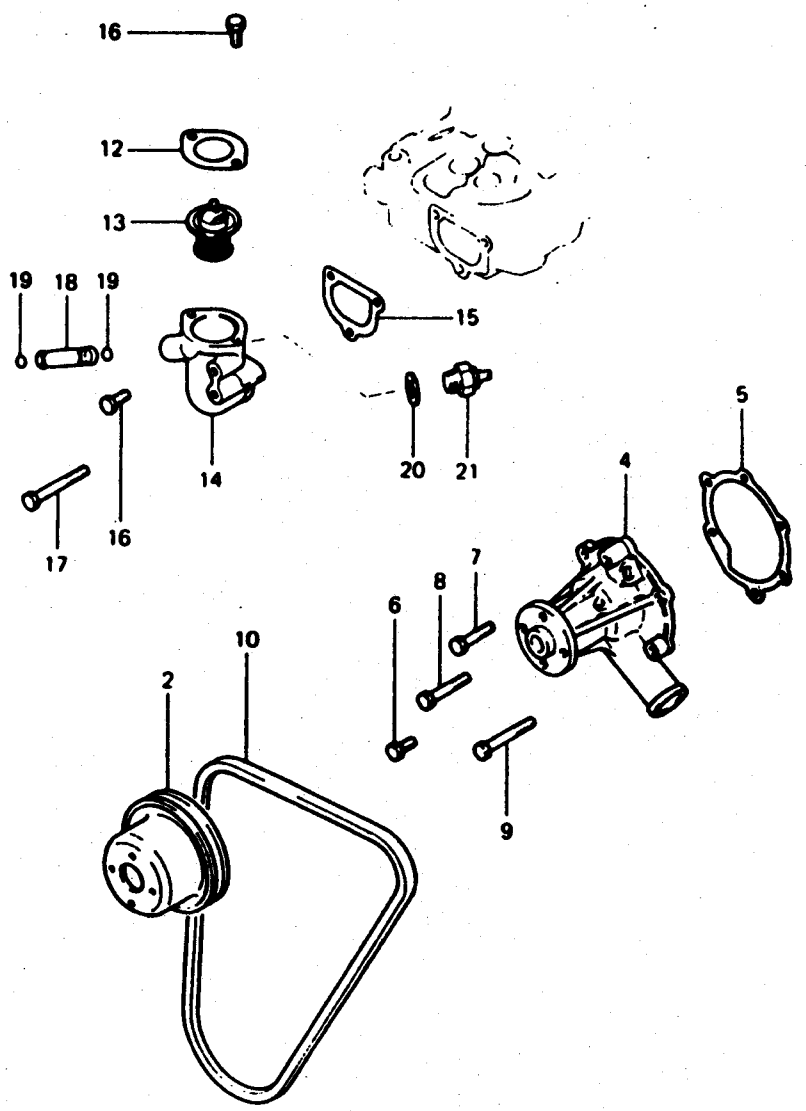
(1) Down to eng. MINI-11 nº 3.649
Down to eng. MINI-17 nº 10.612
Down to eng. MINI-26 nº 37.477
(2) Up to eng. MINI-11 nº 3.650
Up to eng. MINI-17 nº 10.613
Up to eng. MINI-26 nº 37.478



COOLING PARTS

Item	Part no	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
2	132.21.021	PULLEY, water pump	1	1	-
2	139.21.021	PULLEY, water pump	-	-	1
3	131.23.005	BOLT	4	4	4
4	138.21.020	PUMP ASSY, water	1	1	1
5	138.21.022	GASKET, water pump	1	1	1
6	521.02.157	BOLT	2	2	2
7	138.20.042	BOLT	1	1	1
8	138.21.023	BOLT	1	1	1
9	137.20.038	BOLT	2	2	2
10	138.21.028	V-BELT	1	1	1
12	138.21.031	GASKET, water outlet fitting	1	1	1
13	138.21.027	THERMOSTAT 71º	1	1	1
14	138.21.037	FITTING, thermostat	1	1	1
15	138.21.033	GASKET, thermostat fitting	1	1	1
16	521.02.157	BOLT	3	3	3
17	521.01.165	BOLT	1	1	1
18	138.21.026	PIPE, bypass	1	1	1
19	138.21.038	O-RING	2	2	2
20	138.21.039	GASKET	1	1	1
21	609.00.070	SWITCH ASSY, thermo	1	1	1

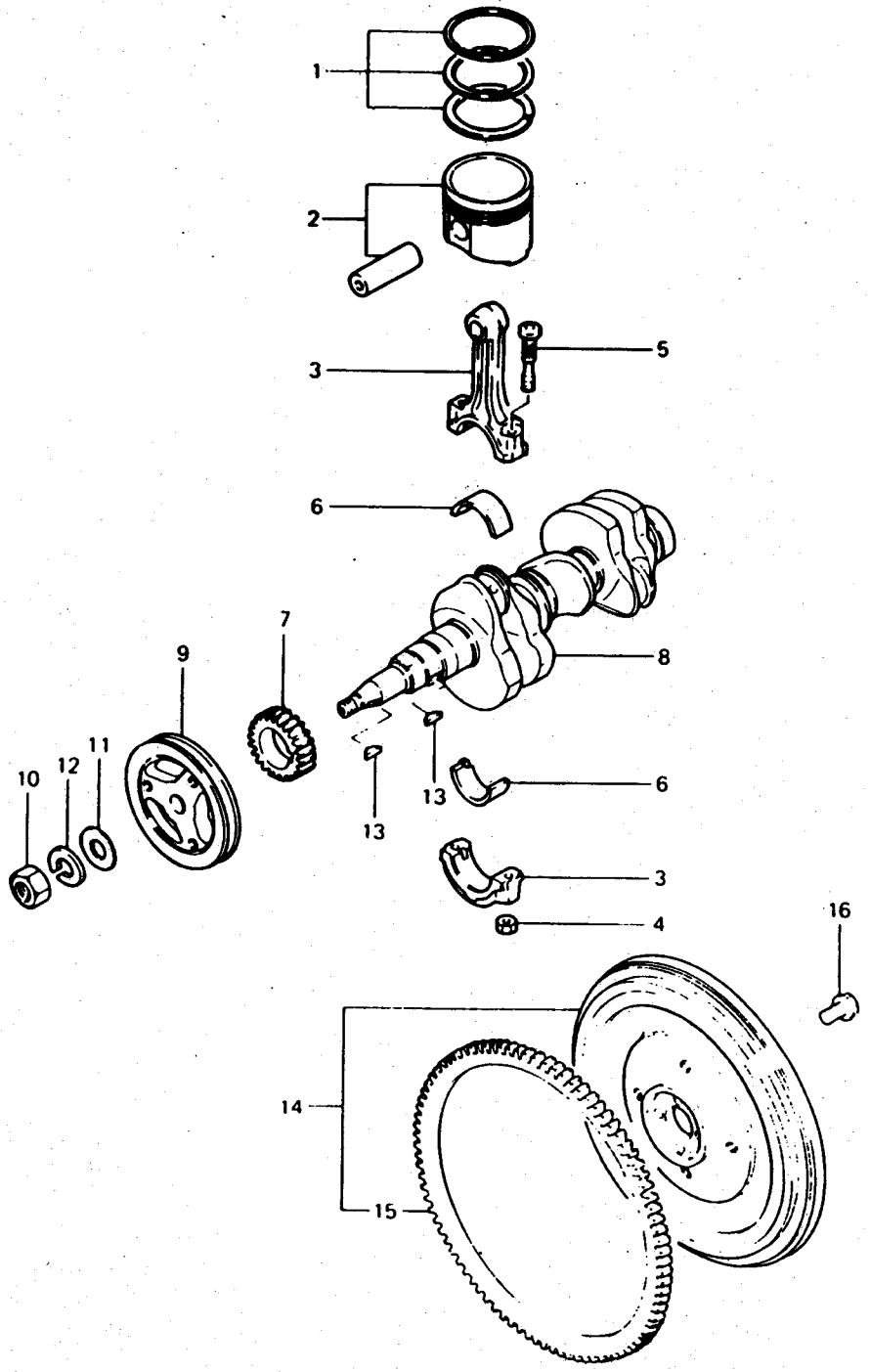
COOLING PARTS



MAIN MOVING PARTS

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	130.22.006	RING SET, piston STD	2	–	–
1	138.22.006	RING SET, piston STD	–	2	3
1	130.22.007	RING SET, piston 0,25 OS	2	–	–
1	138.22.007	RING SET, piston 0,25 OS	–	2	3
1	130.22.008	RING SET, piston 0,50 OS	2	–	–
1	138.22.008	RING SET, piston 0,50 OS	–	2	3
2	130.22.001	PISTON & PIN SET STD	2	–	–
2	138.22.001	PISTON & PIN SET STD	–	2	3
2	130.22.002	PISTON & PIN SET 0,25 OS	2	–	–
2	138.22.002	PISTON & PIN SET 0,25 OS	–	2	3
2	130.22.003	PISTON & PIN SET 0,50 OS	2	–	–
2	138.22.003	PISTON & PIN SET 0,50 OS	–	2	3
3-5	130.22.012	ROD ASSY, connecting	2	–	–
3-5	138.22.012	ROD ASSY, connecting	–	2	3
4	132.22.011	NUT, con rod	4	4	6
5	138.22.013	BOLT, con rod	4	4	6
6	138.22.014	BEARING SET, con rod STD	2	2	3
6	138.22.015	BEARING SET, con rod 0,25 OS	2	2	3
6	138.22.016	BEARING SET, con rod 0,50 OS	2	2	3
7	138.22.021	GEAR, crankshaft	1	1	1
8	138.22.018	CRANKSHAFT	1	1	–
8	139.22.018	CRANKSHAFT (Down to engine nº 31.853)	–	–	1
8	139.22.019	CRANKSHAFT (Up to engine nº 31.854)	–	–	1
9	138.22.024	PULLEY, crankshaft	1	1	–
9	139.22.024	PULLEY, crankshaft	–	–	1
10	138.22.026	NUT, jam	1	1	1
11	510.30.016	WASHER, plain	1	1	1
12	530.33.016	WASHER, spring	1	1	1
13	131.22.036	KEY, woodruff	2	2	2
14-15	138.22.027	FLYWHEEL ASSY	1	1	1
15	137.22.029	GEAR, ring	1	1	1
16	138.22.031	BOLT, flywheel	4	4	4

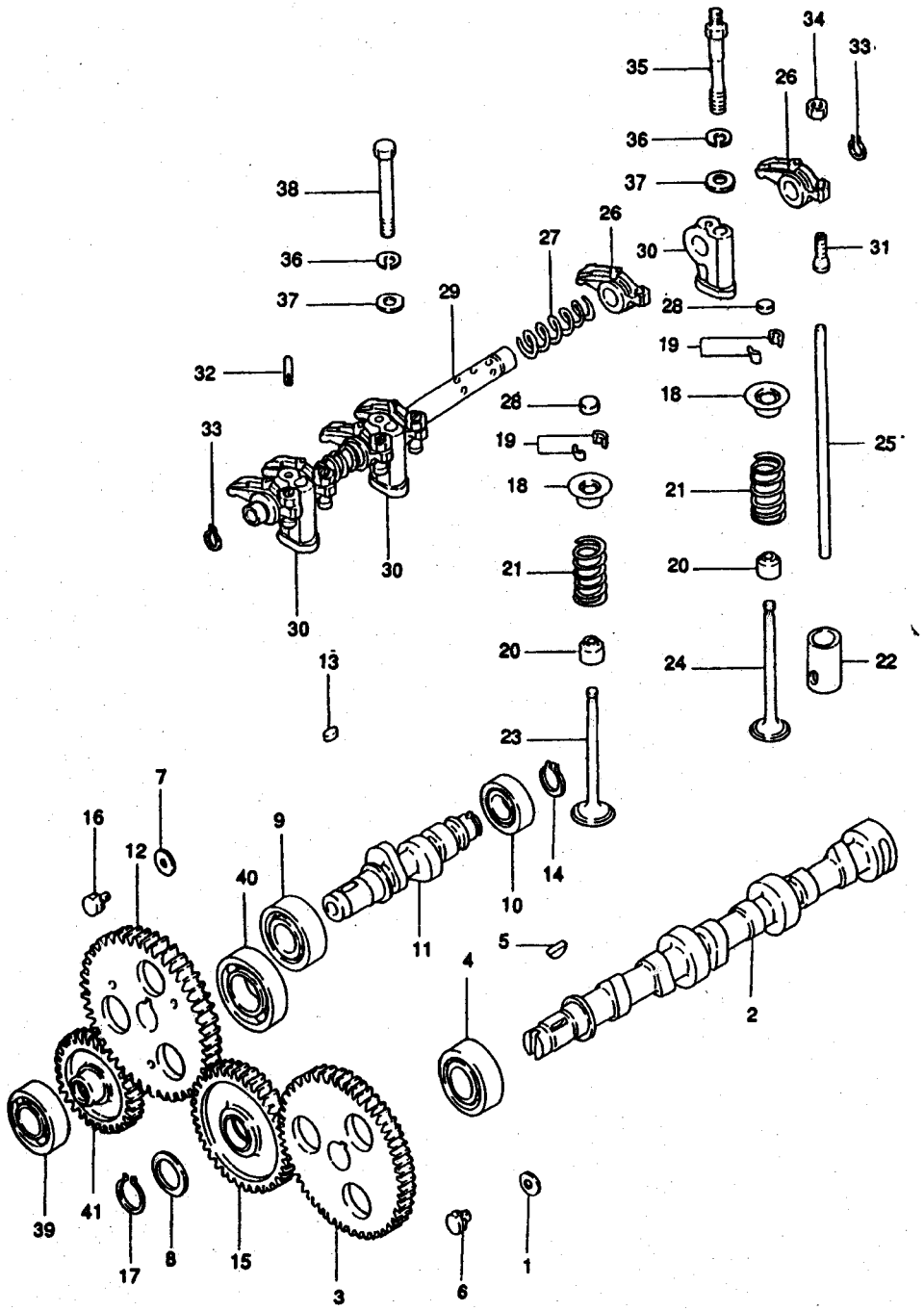
MAIN MOVING PARTS



TIMING PARTS

Item	Part n°	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	138.22.033	WASHER, camshaft stopper	1	1	1
2	138.22.035	CAMSHAFT	1	1	-
2	139.22.035	CAMSHAFT	-	-	1
3	138.22.037	GEAR, camshaft	1	1	1
4	138.22.067	BEARING, ball	1	1	1
5	131.22.036	KEY, woodruff	1	1	1
6	131.23.005	BOLT	1	1	1
7	138.22.033	WASHER, camshaft stopper	1	1	1
8	138.22.034	PLATE, distance	1	1	1
9	138.22.067	BEARING, ball	1	1	1
10	138.22.068	BEARING, ball	1	1	1
11	138.22.040	SHAFT, fuel injection pump cam	1	1	-
11	139.22.040	SHAFT, fuel injection pump cam	-	-	1
12	138.22.043	GEAR, fuel injection pump cam	1	1	1
13	132.22.060	KEY, sunk	1	1	1
14	530.40.016	SNAR RING	1	1	1
15	138.22.038	GEAR ASSY, idler	1	1	1
16	131.23.005	BOLT	1	1	1
17	530.40.020	SNAP RING	1	1	1
18	138.22.058	RETAINER, valve spring	4	4	6
19	132.22.059	LOCK, valve spring retainer	8	8	12
20	132.22.054	SEAL, valve stem	4	4	6
21	138.22.057	SPRING, valve	4	4	6
22	138.22.061	TAPPET	4	4	6
23	138.22.055	VALVE, intake	2	2	3
24	138.22.056	VALVE, exhaust	2	2	3
25	138.22.041	ROD, push	4	4	6
26	138.22.042	ARM, rocker	4	4	6
27	137.22.047	SPRING, rocker shaft	1	1	2
28	138.22.069	CAP, valve stem	4	4	6
29	138.22.046	SHAFT ASSY, rocker	1	1	-
29	139.22.046	SHAFT ASSY, rocker	-	-	1
30	137.22.048	STAY, rocker	2	2	3
31	138.22.044	SCREW, adjusting	4	4	6
32	138.22.070	PIN, grooved	1	1	1
33	530.40.012	SNAP RING	2	2	2
34	521.20.006	NUT, jam	4	4	6
35	138.22.053	BOLT, rocker stay	2	2	2
35	139.22.053	BOLT	-	-	1
36	530.33.008	WASHER, spring	2	2	3
37	510.30.008	WASHER, plain	2	2	3
38	521.01.265	BOLT	-	-	1
39	138.22.067	BEARING	1	1	1
40	138.22.066	BEARING	1	1	1
41	138.22.065	GEAR PRESSURE, oil pump	1	1	1

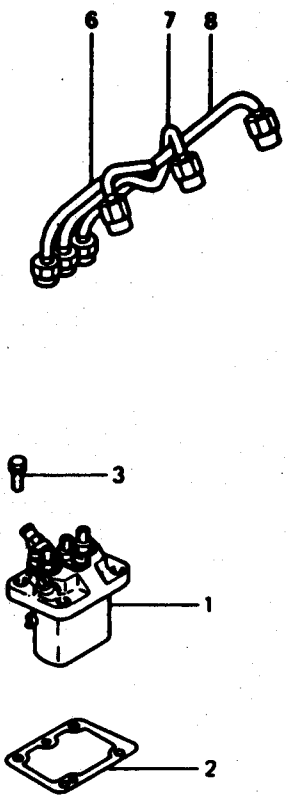
TIMING PARTS

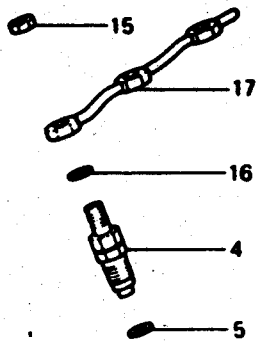


FUEL SUPPLY PARTS

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	130.25.001	PUMP ASSY, fuel injection	1	-	-
1	138.25.001	PUMP ASSY, fuel injection	-	1	-
1	139.25.001	PUMP ASSY. fuel injection	-	-	1
2	138.24.003	SHIM, adjusting 0,2 mm.	C	C	-
2	139.24.003	SHIM, adjusting 0,2 mm.	-	-	C
2	138.24.004	SHIM, adjusting 0,3 mm.	C	C	-
2	139.24.004	SHIM, adjusting 0,3 mm.	-	-	C
2	138.24.005	SHIM, adjusting 0,5 mm.	C	C	-
2	139.24.005	SHIM, adjusting 0,5 mm.	-	-	C
2	138.24.006	SHIM, adjusting 0,4 mm.	C	C	-
2	139.24.006	SHIM, adjusting 0,4 mm.	-	-	C
2	138.24.007	SHIM, adjusting 0,6 mm.	C	C	-
2	139.24.007	SHIM, adjusting 0,6 mm.	-	-	C
2	138.24.008	SHIM, adjusting 0,7 mm.	C	C	-
2	139.24.008	SHIM, adjusting 0,7 mm.	-	-	C
2	138.24.009	SHIM, adjusting 0,8 mm.	C	C	-
2	139.24.009	SHIM, adjusting 0,8 mm.	-	-	C
2	138.24.010	SHIM, adjusting 0,9 mm.	C	C	-
2	139.24.010	SHIM, adjusting 0,9 mm.	-	-	C
2	138.24.011	SHIM, adjusting 1,0 mm.	C	C	-
2	139.24.011	SHIM, adjusting 1,0 mm.	-	-	C
3	521.02.158	BOLT	4	4	4
4	138.26.001	NOZZLE & HOLDER ASSY	2	2	3
5	138.24.013	GASKET, nozzle holder	2	2	3
6	138.24.015	PIPE ASSY, fuel injection nº 1	1	1	1
7	138.24.016	PIPE ASSY, fuel injection nº 2	1	1	1
8	139.24.019	PIPE ASSY, fuel injection nº 3	-	-	1
15	138.24.024	NUT	2	2	3
16	138.24.025	GASKET, fuel return pipe	2	2	3
17	138.24.026	PIPE, fuel return	1	1	-
17	139.24.026	PIPE, fuel return	-	-	1

FUEL SUPPLY PARTS

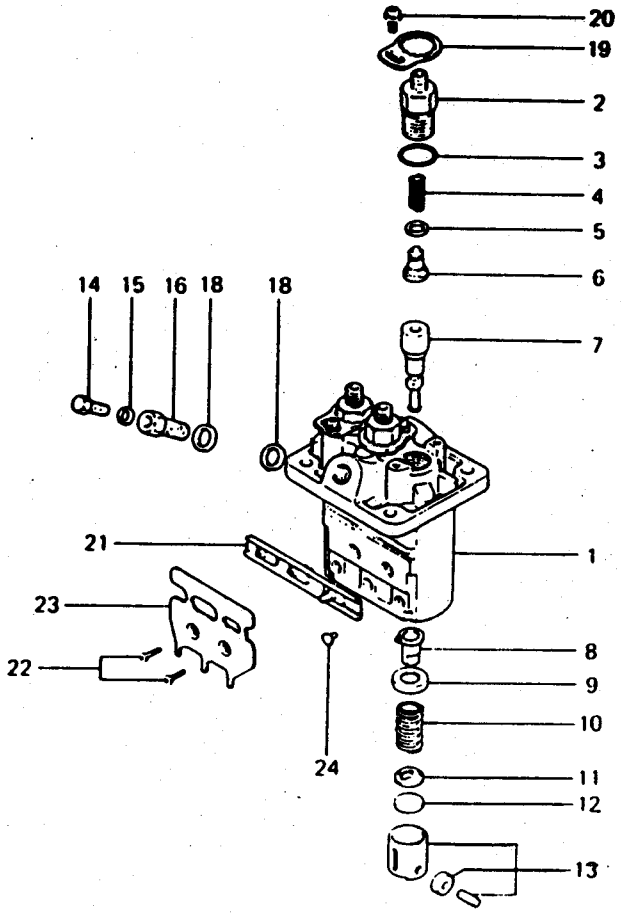




FUEL INJECTOR PUMP

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1-24	130.25.001	PUMP ASSY, fuel injection	1	-	-
1-24	138.25.001	PUMP ASSY, fuel injection	-	1	-
1-24	139.25.001	PUMP ASSY, fuel injection	-	-	1
1	138.25.005	HOUSING SUB ASSY, pump	1	1	-
1	139.25.005	HOUSING SUB ASSY, pump	-	-	1
2	138.25.004	HOLDER, delivery valve	2	2	3
3	138.25.033	O-RING	2	2	3
4	138.25.002	SPRING, delivery valve	2	2	3
5	131.25.007	GASKET, delivery valve	2	2	3
6	138.25.008	VALVE SUB ASSY	2	2	3
7	130.25.009	ELEMENT SUB ASSY	2	-	-
7	138.25.009	ELEMENT SUB ASSY	-	2	3
8	138.25.010	SLEEVE SUB ASSY	2	2	3
9	138.25.011	SEAT, spring upper	2	2	3
10	138.25.012	SPRING, pump plunger	2	2	3
11	138.25.013	SEAT, spring lower	2	2	3
12	138.25.014	PLATE, tapper shim 1,85 mm.	C	C	C
12	138.25.015	PLATE, tapper shim 1,90 mm.	C	C	C
12	138.25.016	PLATE, tapper shim 1,95 mm.	C	C	C
12	138.25.017	PLATE, tapper shim 2,00 mm.	C	C	C
12	138.25.018	PLATE, tapper shim 2,05 mm.	C	C	C
12	138.25.019	PLATE, tapper shim 2,10 mm.	C	C	C
12	138.25.020	PLATE, tapper shim 2,15 mm.	C	C	C
12	138.25.052	PLATE, tapper shim 2,20 mm.	C	C	C
12	138.25.053	PLATE, tapper shim 2,25 mm.	C	C	C
12	138.25.054	PLATE, tapper shim 2,30 mm.	C	C	C
12	138.25.055	PLATE, tapper shim 2,35 mm.	C	C	C
12	138.25.056	PLATE, tapper shim 2,40 mm.	C	C	C
12	138.25.057	PLATE, tapper shim 2,45 mm.	C	C	C
12	138.25.058	PLATE, tapper shim 2,50 mm.	C	C	C
13	138.25.021	TAPPET ASSY	2	2	3
14	138.25.026	SCREW, air bleeder	1	1	1
15	138.25.025	WASHER, drain screw	1	1	1
16	138.14.008	SCREW, follow	1	1	1
18	138.25.061	WASHER, drain union	2	2	2
19	138.25.030	PLATE SET, lock	2	2	3
20	138.25.028	SCREW, with washer	2	2	3
21	138.25.006	RACK ASSY, control	1	1	-
21	139.25.006	RACK ASSY, control	-	-	1
22	138.25.062	SCREW, countersunk	2	2	2
23	138.25.063	BRACKET, stop wire	1	1	-
23	139.25.063	BRACKET, stop wire	-	-	1
24	138.25.022	PIN, tappet guide	2	2	3

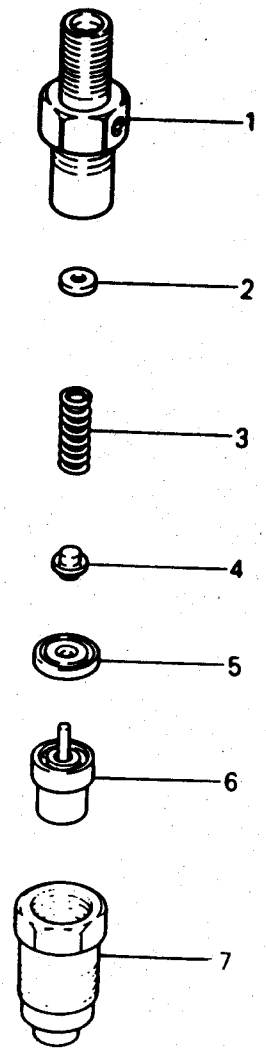
FUEL INJECTION PUMP



NOZZLE & NOZZLE HOLDER

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1-7	138.26.001	NOZZLE & HOLDER ASSY	2	2	3
1	138.26.002	BODY SUB ASSY	2	2	3
2	138.26.010	WASHER 1,25 mm.	C	C	C
2	138.26.011	WASHER 1,30 mm.	C	C	C
2	138.26.012	WASHER 1,35 mm.	C	C	C
2	138.26.013	WASHER 1,40 mm.	C	C	C
2	138.26.014	WASHER 1,45 mm.	C	C	C
2	138.26.015	WASHER 1,50 mm.	C	C	C
2	138.26.016	WASHER 1,55 mm.	C	C	C
2	138.26.017	WASHER 1,60 mm.	C	C	C
2	138.26.019	WASHER 1,65 mm.	C	C	C
2	138.26.020	WASHER 1,70 mm.	C	C	C
3	138.26.004	SPRING, pressure	2	2	3
4	138.26.003	PIN, pressure	2	2	3
5	138.26.007	PIECE, distance	2	2	3
6	138.26.018	NOZZLE ASSY	2	2	3
7	138.26.006	NUT, retaining	2	2	3

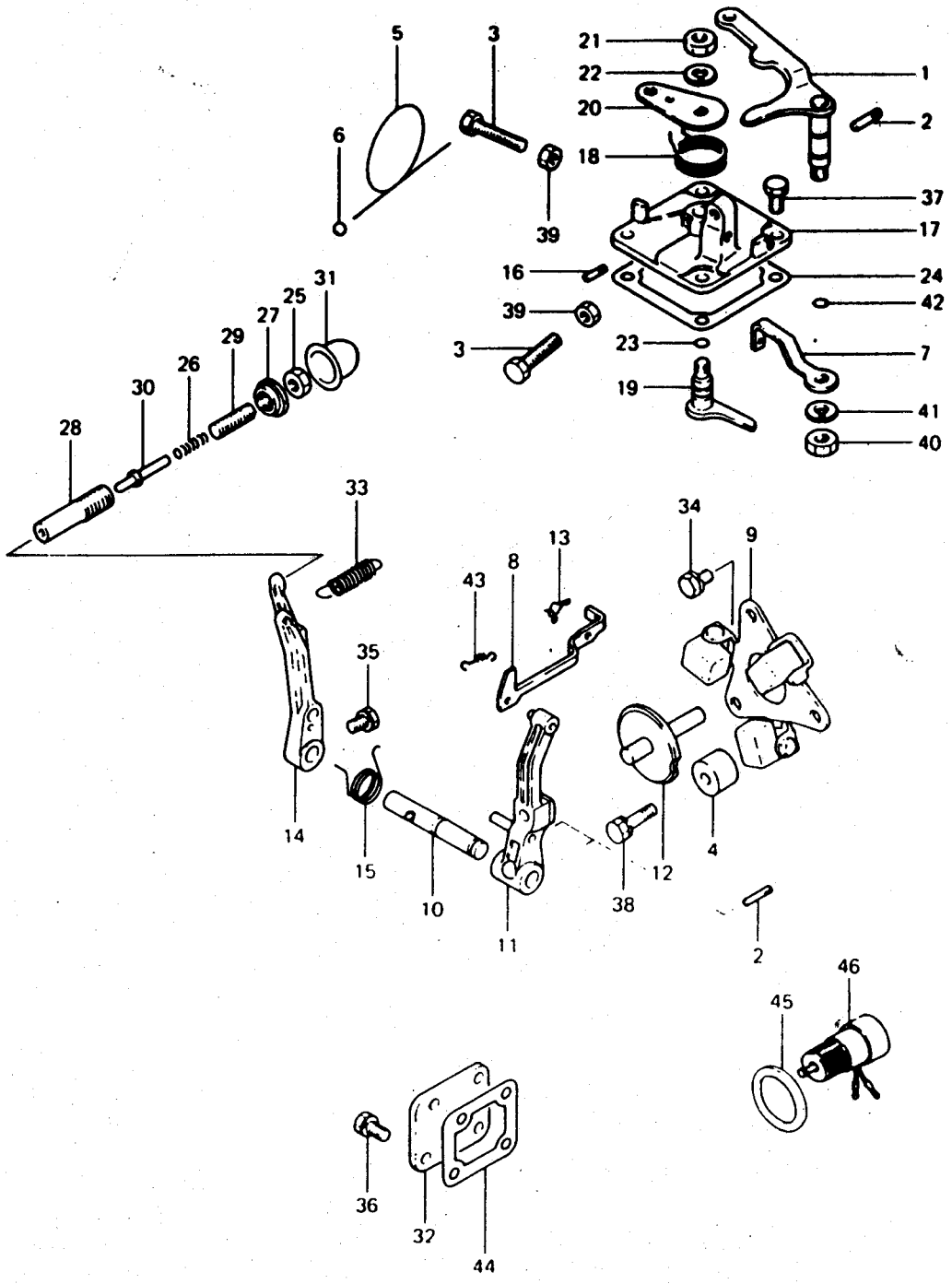
NOZZLE & NOZZLE HOLDER



GOVERNOR PARTS

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	138.23.008	LEVER ASSY, speed control	1	1	1
2	138.23.009	PIN, grooved	2	2	2
3	131.23.017	BOLT	2	2	2
4	137.23.005	STOPPER	1	1	1
5	131.23.020	WIRE	1	1	1
6	131.23.019	METAL, sealing	1	1	1
7	138.23.027	LEVER, governor spring	1	1	1
8	138.23.005	ROD, tie	1	1	1
9	138.23.001	WEIGHT ASSY, governor	1	1	1
10	138.23.006	SHAFT, governor	1	1	1
11	138.23.003	LEVER, governor	1	1	1
12	138.23.002	SHAFT ASSY, sliding	1	1	1
13	138.23.028	CLIP, tie rod	1	1	1
14	138.23.007	LEVER, tension	1	1	1
15	138.23.036	SPRING, start	1	1	1
16-23	138.23.019	COVER ASSY, governor	1	1	1
16	138.23.031	PIN, grooved	1	1	1
17	138.23.032	COVER, governor	1	1	1
18	138.23.030	SPRING, return	1	1	1
19	138.23.026	LEVER ASSY, stop	1	1	1
20	138.23.029	LEVER, stop	1	1	1
21	521.20.008	NUT, jam	1	1	1
22	530.33.008	WASHER, spring	1	1	1
23	131.23.021	O-RING	1	1	1
24	138.23.033	GASKET, governor cover	1	1	1
25-30	138.23.035	SPRING SET, torque	1	1	1
25	137.22.045	NUT	1	1	1
26	138.23.037	SPRING, torque	1	1	1
27	138.23.038	NUT	1	1	1
28	138.23.039	CASE, torque spring	1	1	1
29	138.23.040	SCREW, adjusting	1	1	1
30	138.23.041	STOPPER, torque spring	1	1	1
31	138.23.042	CAP, torque set sealing	1	1	1
32	138.23.043	COVER, tie rod	1	1	1
33	138.23.015	SPRING, governor	2	2	2
34	132.23.016	BOLT	1	1	1
35	131.23.005	BOLT	4	4	4
36	521.02.156	BOLT	4	4	4
37	134.23.024	BOLT	1	1	1
38	137.23.008	BOLT	2	2	2
39	521.20.006	NUT	1	1	1
40	521.20.008	NUT, jam	1	1	1
41	530.33.008	WASHER, spring	1	1	1
42	131.23.021	O-RING	1	1	1
43	138.23.044	SPRING, tie rod	1	1	1
44	138.23.014	GASKET, tie rod cover	1	1	1
45	134.25.028	GASKET	1	1	1
46	138.24.020	SOLENOID	1	1	1

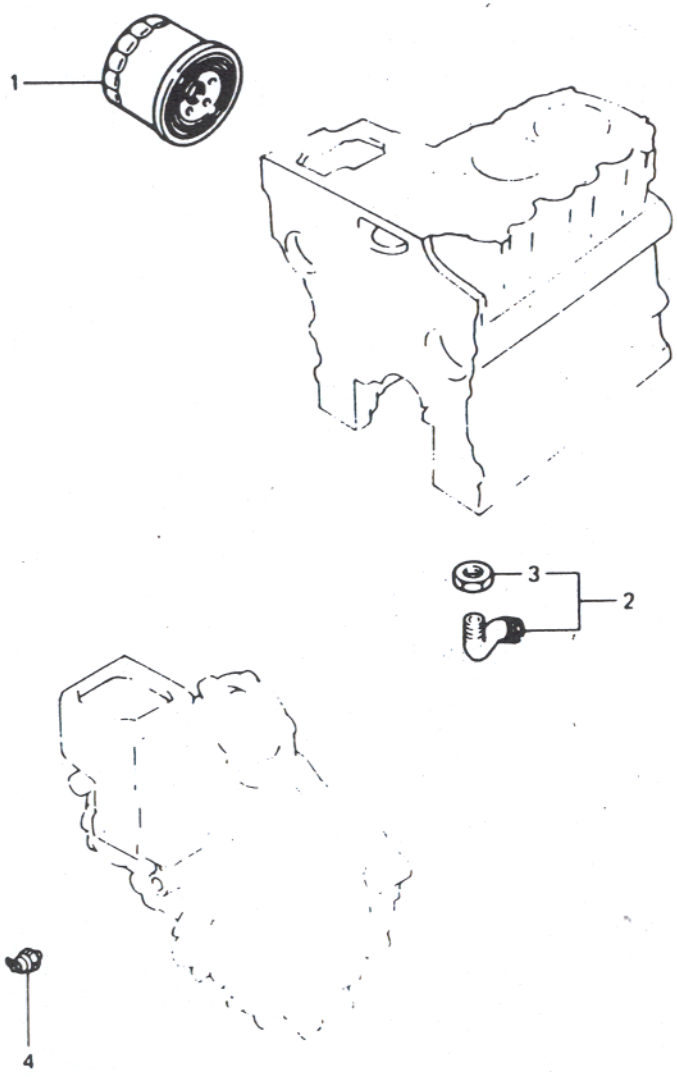
GOVERNOR PARTS



LUBRICATING PARTS

Item.	Part nº	DESIGNATION	QUANTITY		
			M-11	M-17	M-26
1	131.24.051	FILTER ASSY, oil Ø 80	1	1	1
2 - 3	138.24.052	SCREEN ASSY, oil	1	1	1
3	512.21.014	NUT, jam	1	1	1
4	609.00.076	SWITCH ASSY, oil pressure	1	1	1

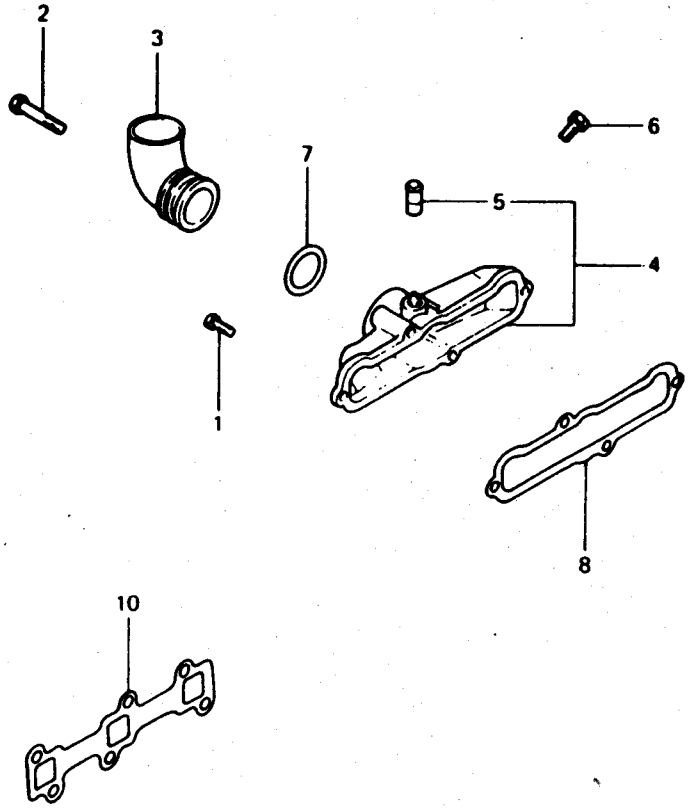
LUBRICATING PARTS



INTAKE PARTS

Item	Part n°	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	521.02.157	BOLT	1	1	2
2	138.21.023	BOLT	2	2	2
3	138.21.029	PIPE, intake	1	1	1
4-5	138.21.030	COVER SUB ASSY, intake	1	1	-
4-5	139.21.030	COVER SUB ASSY, intake	-	-	1
5	132.21.017	PIPE	1	1	1
6	132.23-.016	BOLT	1	1	1
7	138.21.042	O-RING	1	1	1
8	138.21.032	GASKET, intake manifold	1	1	-
8	139.21.032	GASKET, intake manifold	-	-	1
10	138.21.035	GASKET, exhaust manifold	1	1	-
10	139.21.035	GASKET, exhaust manifold	-	-	1

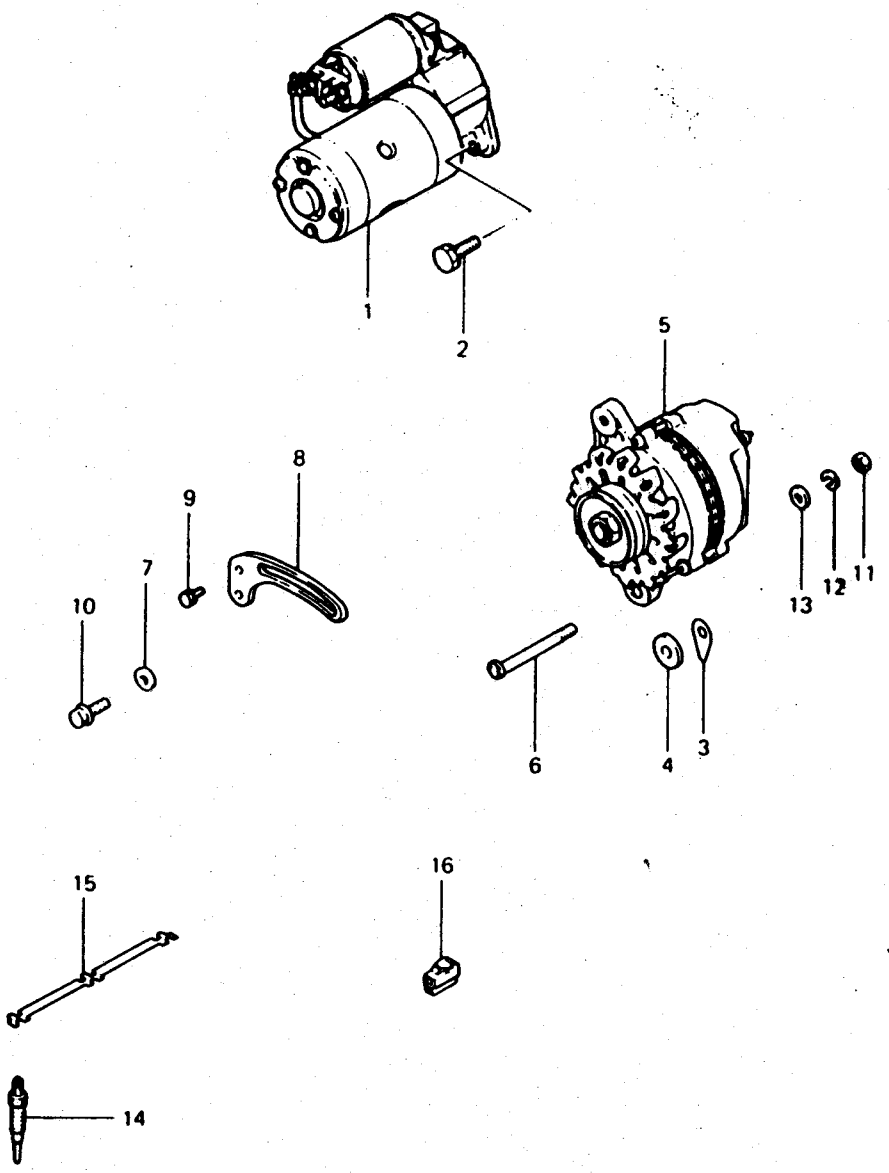
INTAKE PARTS



ELECTRICAL EQUIPMENT

Item	Part n°	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1	138.27.001	STARTER ASSY	1	1	1
2	521.02.258	BOLT	2	2	2
3	131.27.005	SHIM	S	S	S
4	138.27.006	SPACER	1	1	1
5	138.27.010	ALTERNATOR ASSY	1	1	1
6	137.27.008	BOLT	1	1	1
7	510.31.008	WASHER, plain	1	1	1
8	138.27.007	BRACE, generator	1	1	1
9	521.02.156	BOLT	1	1	1
10	138.27.012	BOLT	1	1	1
11	521.20.008	NUT	1	1	1
12	530.33.008	WASHER, spring	1	1	1
13	510.30.008	WASHER, plain	1	1	1
14	138.27.017	PLUG, glow	2	2	3
15	138.27.018	PLATE, glow plug	1	1	-
15	139.27.018	PLATE, glow plug	-	-	1
16	135.27.018	CONNECTOR	1	1	1

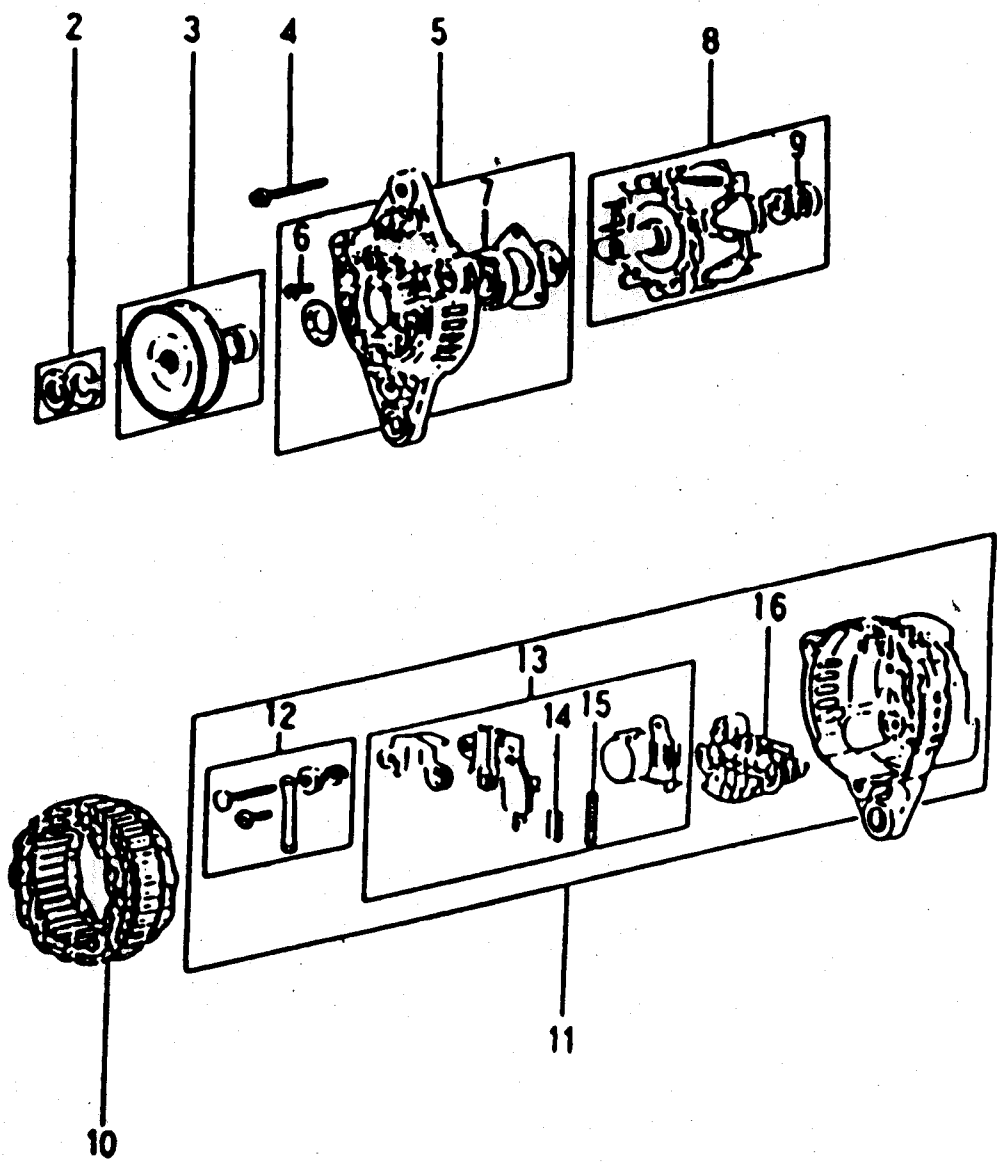
ELECTRICAL EQUIPMENT



ALTERNATOR

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
2-16	138.27.010	ALTERNATOR ASSY	1	1	1
2	132.27.051	NUT SET	1	1	1
3	138.27.052	PULLEY ASSY	1	1	1
4	138.27.053	BOLT SET	1	1	1
5	138.27.054	BRACKET ASSY, front	1	1	1
6	138.27.055	SCREW SET	1	1	1
7	132.27.056	BEARING, front	1	1	1
8	138.27.057	ROTOR ASSY	1	1	1
9	138.27.058	BEARING, rear	1	1	1
10	138.27.059	STATOR ASSY	1	1	1
11	138.27.060	BRACKET ASSY, rear	1	1	1
12	138.27.061	TERMINAL SET	1	1	1
13	138.27.016	REGULATOR ASSY	1	1	1
14	138.27.065	BRUSH	2	2	2
15	132.27.066	SPRING, brush	2	2	2
16	138.27.067	RECTIFIER ASSY	1	1	1

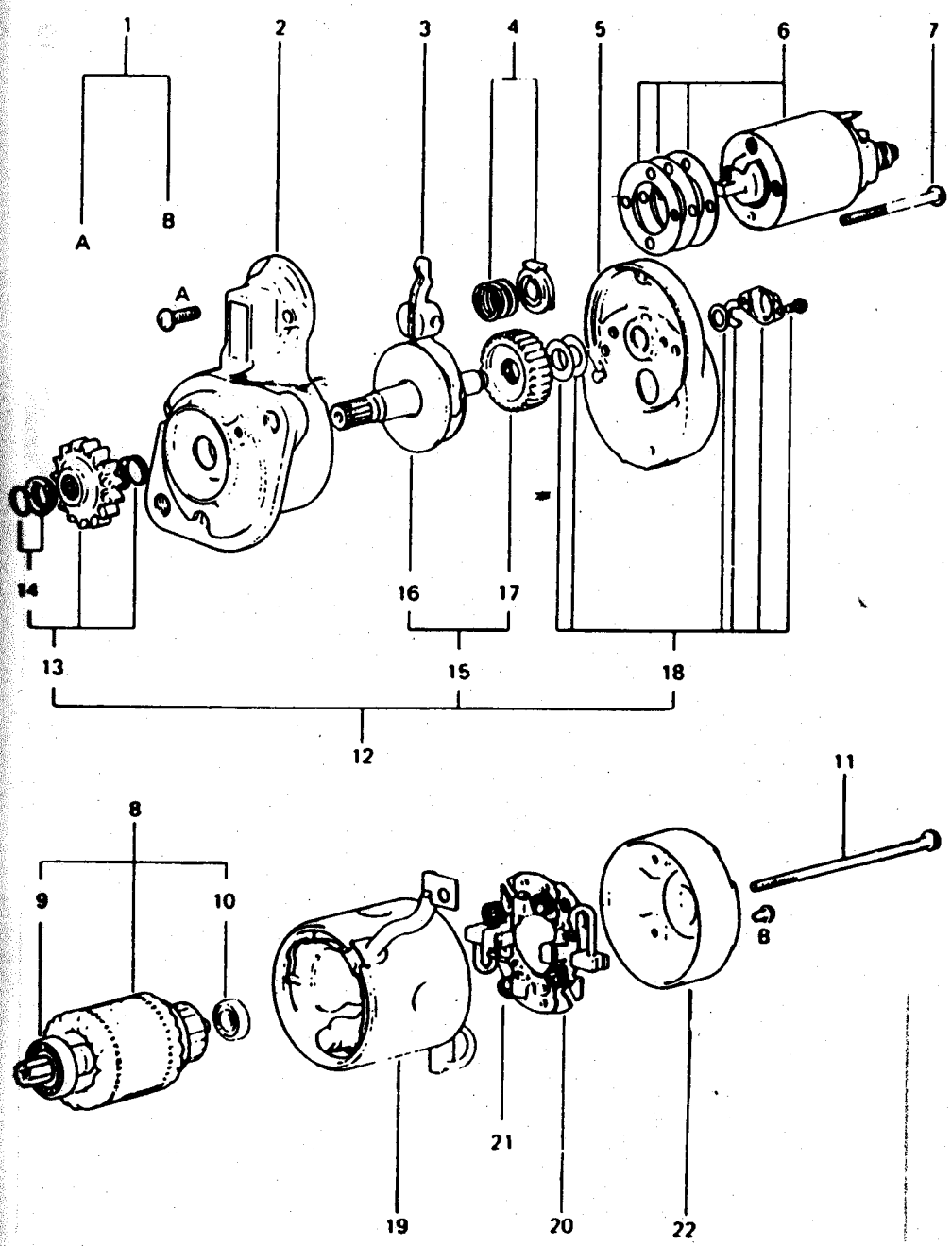
ALTERNATOR



STARTER

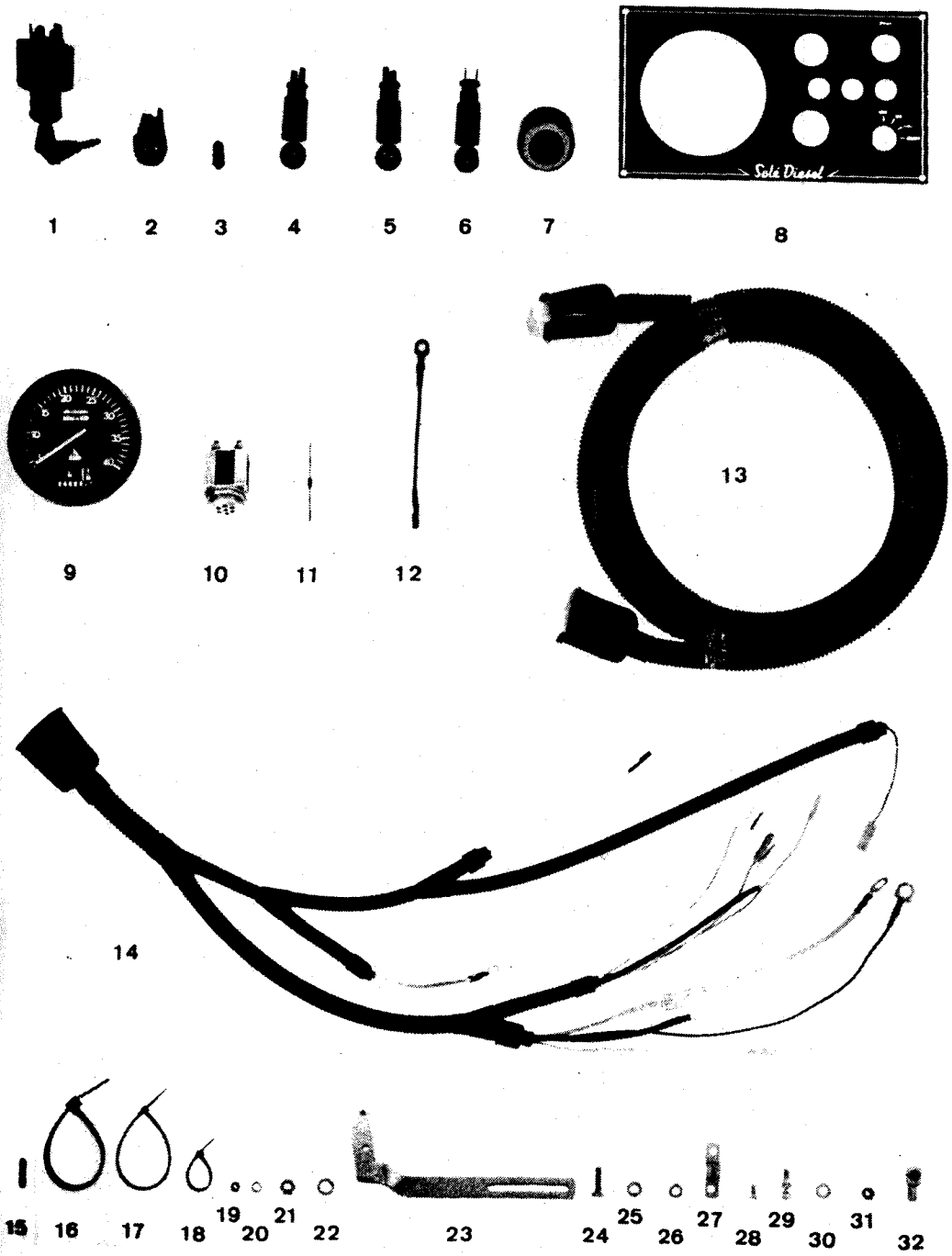
Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1-22	138.27.001	STARTER ASSY	1	1	1
1	132.27.101	SCREW SET	1	1	1
2	138.27.102	BRACKET ASSY, front	1	1	1
3	132.27.103	LEVER ASSY	1	1	1
4	131.27.103	SPRING SET	1	1	1
5	138.27.105	BRACKET ASSY, center	1	1	1
6	131.27.104	SWITCH ASSY	1	1	1
7	132.27.107	BOLT SET	1	1	1
8	138.27.108	ARMATURE SET	1	1	1
9	132.27.109	BEARING, front	1	1	1
10	132.27.110	BEARING, rear	1	1	1
11	138.27.111	BOLT, through	2	2	2
12	132.27.112	SHAFT ASSY, clutch set	1	1	1
13	132.27.113	PINION SET	1	1	1
14	132.27.114	STOPPER SET	1	1	1
15	132.27.115	GEAR SET	1	1	1
16	132.27.116	SHAFT ASSY	1	1	1
17	132.27.117	GEAR	1	1	1
18	132.27.118	COVER SET	1	1	1
19	138.27.119	YOKE ASSY	1	1	1
20	132.27.120	HOLDER ASSY, brush	4	4	4
21	131.27.118	SPRING, brush	1	1	1
22	132.27.122	BRACKET ASSY, rear			

STARTER



ELECTRICAL EQUIPMENT AND REMOTE CONTROL

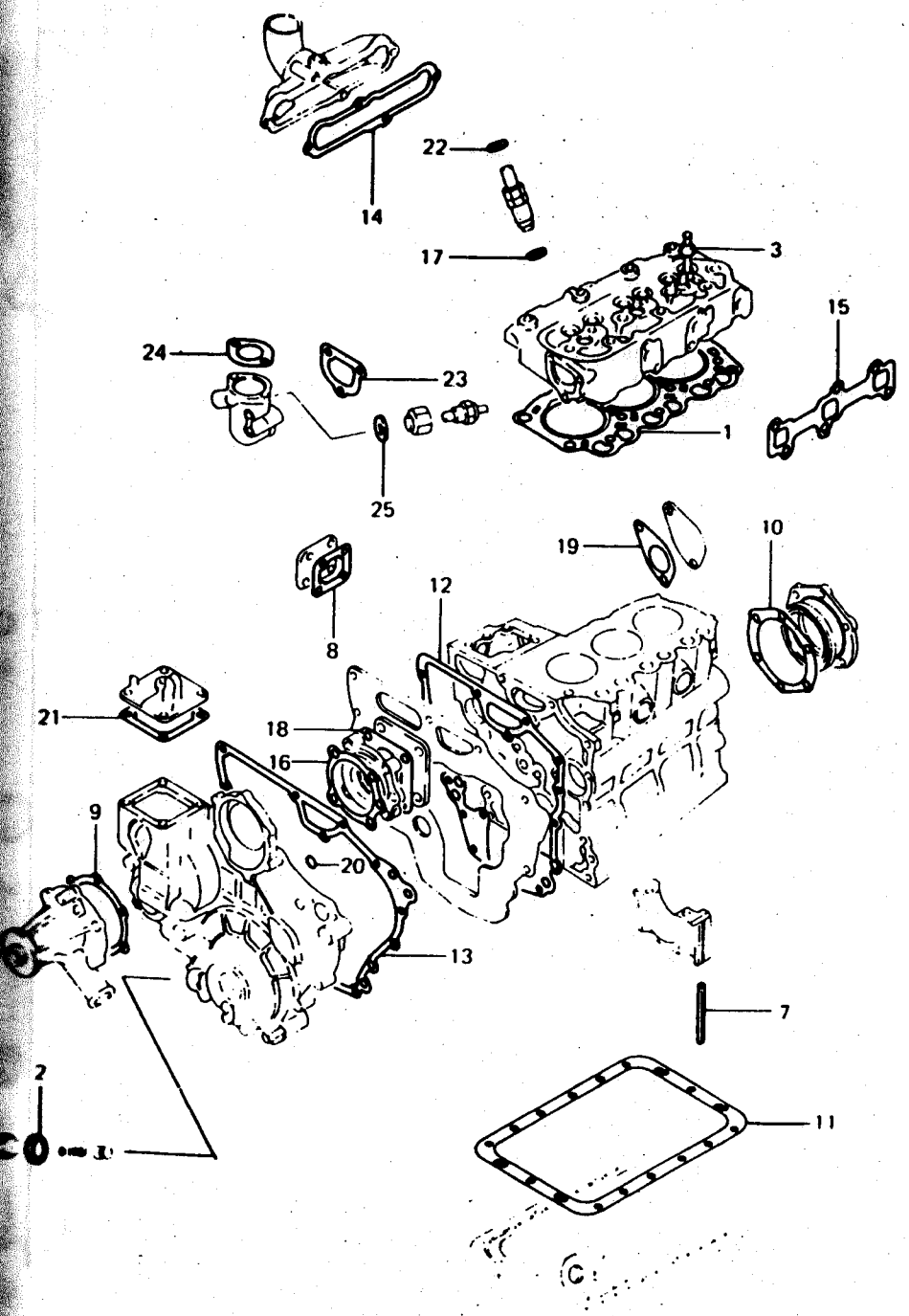
Item.	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1 - 11	609.38.000	ELECTRICAL PANEL	1	1	-
1 - 11	609.39.000	ELECTRICAL PANEL	-	-	1
1	609.00.031	KEY-LOCKING SWITCH	1	1	1
-	609.00.035	COVER, key	1	1	1
2	609.00.040	SWITCH, stop	1	1	1
3	609.00.045	BULB, 12V.	3	3	3
4	609.00.050	LAMP, oil press	1	1	1
5	609.00.051	LAMP, charge	1	1	1
6	609.00.052	LAMP, water temp.	1	1	1
7	609.00.060	ALARM, switch	1	1	1
8	609.31.001	PANEL	1	1	1
9	609.38.710	TACHOMETER	1	1	1
10	609.37.095	LAMP, glow	1	1	-
10	609.39.095	LAMP, glow	-	-	1
11	609.00.110	DIODE 3A	2	2	2
12	609.34.040	WIRINE	1	1	1
13	609.31.210	VIRINES 3 m.	1	1	1
14	609.38.200	WIRE, electrical	1	1	1
15	609.34.117	FUSE 60A	1	1	1
16	580.88.271	CLAMP UNFEX 2271	2	2	2
17	580.88.225	CLAMP UNFEX 2225	1	1	1
18	580.88.221	CLAMP UNFEX 2221	1	1	1
19	521.20.005	NUT DIN 934 M5 8.8	1	1	1
20	530.33.005	WASHER GROWER DIN 127 Ø 5	1	1	1
21	521.20.008	NUT DIN 934 M8 8.8	1	1	1
22	530.33.008	WASHER GROWER DIN 127 Ø 8	1	1	1
23	138.19.004	BRACKET, engine control	1	1	1
24	521.02.157	BOLT DIN 933 M6x20 8.8	2	2	2
25	510.30.006	WASHER DIN 125 Ø 6	2	2	2
26	530.33.006	WASHER GROWER DIN 127 Ø 6	2	2	2
27	147.19.013	CLAMP, cable	1	1	1
28	553.07.104	BOLT DIN 86 3/16Wx10	2	2	2
29	144.19.023	BALL JOINT	1	1	1
30	510.30.006	WASHER DIN 125 Ø 6	1	1	1
31	521.20.006	NUT DIN 934 M6 8.8	1	1	1
32	151.19.015	CABLE HOLDER BALL AND. SOC. J	1	1	1



GASKET KIT

Item	Part nº	DESCRIPTION	QUANTITY		
			M-11	M-17	M-26
1-25	130.20.101	GASKET KIT	1	-	-
1-25	138.20.101	GASKET KIT	-	1	-
1-25	139.20.101	GASKET KIT	-	-	1
1	130.21.004	GASKET, cylinder head	1	-	-
1	138.21.004	GASKED, cylinder head	-	1	-
1	139.21.004	GASKET, cylinder head	-	-	1
2	131.20.032	GASKET	1	1	1
3	132.22.054	SEAL, valve stem	4	4	6
7	138.20.002	SEAL, side	4	4	4
8	138.23.014	GASKET, tie rod cover	1	1	1
9	138.21.022	GASKET, water pump	1	1	1
10	138.20.016	GASKET, oil seal	1	1	1
11	138.20.033	GASKET, oil pan	1	1	-
11	139.20.033	GASKET, oil pan	-	-	1
12	138.20.018	GASKET, front plate	1	1	1
13	138.20.040	GASKET, gear case	1	1	1
14	138.21.032	GASKET, intake manifold	1	1	-
14	139.21.032	GASKET, intake manifold	-	-	1
15	138.21.035	GASKET, exhaust manifold	1	1	-
15	139.21.035	GASKET, exhaust manifold	-	-	1
16	138.20.038	GASKET, housing	1	1	1
17	138.24.013	GASKET, nozzle holder	2	2	3
18	131.20.047	GASKET, oil pump cover	1	1	1
19	138.20.012	GASKET	1	1	1
20	138.20.044	O-RING	2	2	2
21	138.23.033	GASKET, governor cover	1	1	1
22	138.24.025	GASKET, fuel return pipe	2	2	3
23	138.21.033	GASKET, thermostat fitting	1	1	1
24	138.21.031	GASKET, water outlet fitting	1	1	1
25	138.21.039	GASKET	1	1	1

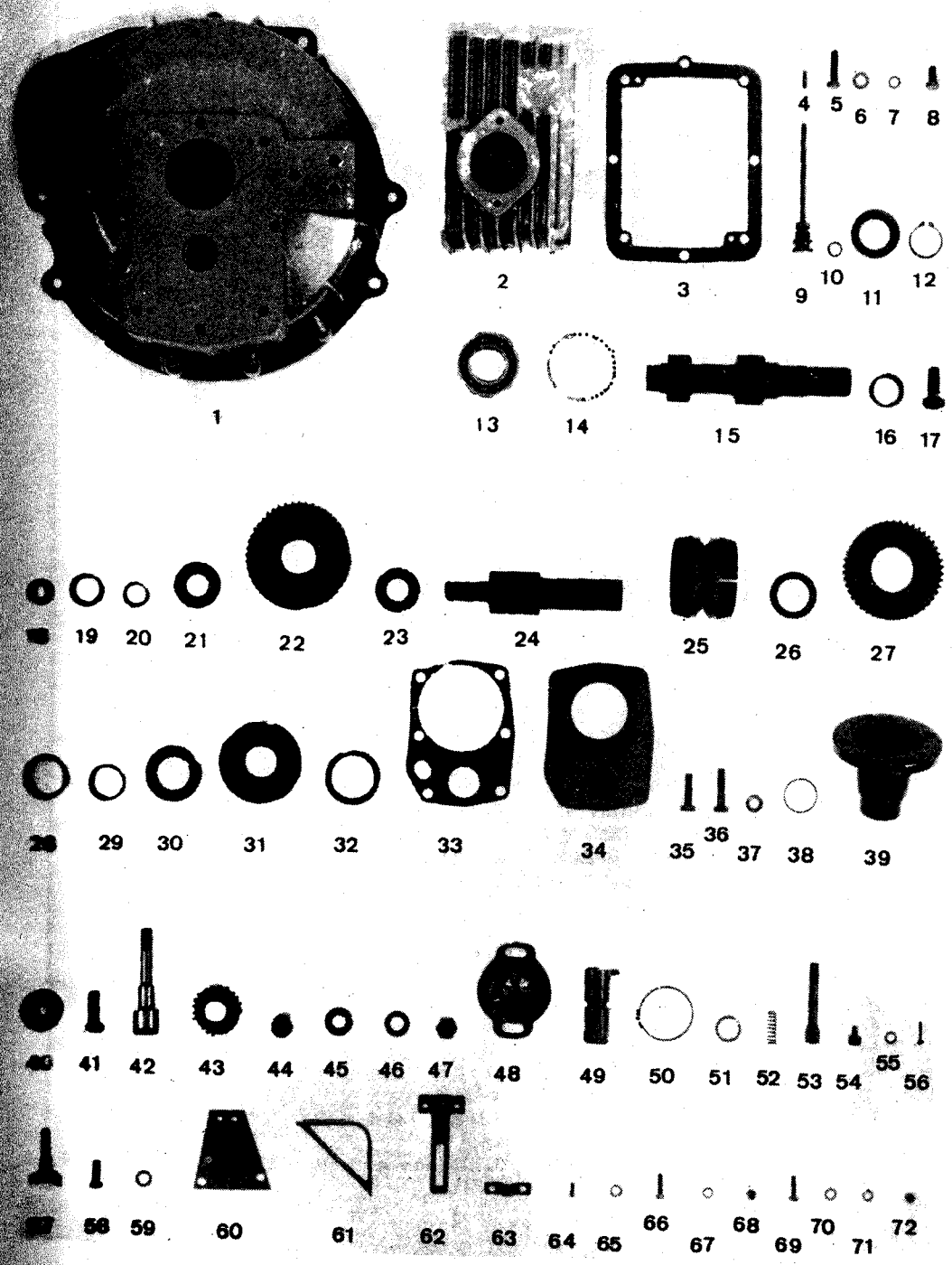
GASKET KIT



GEAR BOX

Item	Part nº	DESCRIPTION	QUANTITY	
			2,28:1	3,05:1
1 al 72	225.13.000	GEAR BOX ASSY RONIM-V Red. 2,28:1	1	-
1 al 72	225.15.000	GEAR BOX ASSY RONIM-V Red. 3,05:1	-	1
1	225.10.001	MOUSING, front	1	1
2	225.13.002	MOUSING, rear red. 2,28:1	1	-
2	225.15.002	MOUSING, rear red. 3,05:1	-	1
3	225.10.003	GASKET	1	1
4	222.10.007	PIN	2	2
5	521.02.259	BOLT DIN 933 M8x30 8.8	8	8
6	510.30.008	WASHER DIN 125 Ø8	8	8
7	570.00.357	WASHER 8,2-12-1,5	1	1
8	521.02.256	BOLT DIN 933 M8x15 8.8	1	1
9	223.10.008	PLUG, oil level	1	1
10	252.10.010	O-RING	1	1
11	222.10.103	SEAL, oil	1	1
12	530.40.030	CIRCLIP DIN 471 E-30	1	1
13	251.10.104	BEARING, ball	1	1
14	530.41.062	CIRCLIP DIN 472 I-62	1	1
15	225.13.101	SHAFT, input red. 2,28:1	1	-
15	225.15.101	SHAFT, input red. 3,05:1	-	1
16	222.10.106	BEARING, needle	1	1
17	252.10.222	BOLT, blockage	1	1
18	222.10.219	WASHER	1	1
19	222.10.204	BEARING, needle	2	2
20	222.10.205	RING	2	2
21	225.10.228	SPACER	1	1
22	225.13.203	GEAR, front red. 2,28:1	1	-
22	225.15.203	GEAR, front red. 3.05:1	-	1
23	225.10.216	SPACER, gear	1	1
24	225.10.201	SHAFT, output	1	1
25	225.10.202	CONE, clutch	1	1
26	225.10.217	SPACER, gear	1	1
27	225.13.210	GEAR, rear, red. 2,28:1	1	-
27	225.15.210	GEAR, rear, red. 3,05:1	-	1
28	225.10.204	BEARING, needle	1	1
29	225.10.205	RING, bearing	1	1
30	225.10.218	SPACER, bearing	1	1
31	224.15.224	BEARING, ball	1	1
32	252.10.214	SEAL, oil	1	1
33	225.10.209	GASKET, rear	1	1

GEAR BOX



GEAR BOX

Item.	Part n°	DESCRIPTION	QUANTITY	
			2,28:1	3,05:1
34	225.13.208	COVER, rear red. 2,28:1	1	-
34	225.15.208	COVER, rear red. 3,05:1	-	1
35	521.02.259	BOLT DIN 933 M8x30 8.8	4	4
36	521.01.260	BOLT DIN 931 M8x35 8.8	2	2
37	510.30.008	WASHER DIN 125 Ø 8	6	6
38	252.10.231	O-RING	1	1
39	225.10.225	FLANGE, output	1	1
40	252.10.219	WASHER, blockage	1	1
41	531.02.359	BOLT DIN 933 M12x30 12,9	1	1
42	225.10.301	SHAFT, intermediate	1	1
43	225.10.302	GEAR, intermediate	1	1
44	225.10.306	BEARING, needle	1	1
45	225.10.305	WASHER, friction	1	1
46	510.30.012	WASHER DIN 125 Ø 12	1	1
47	511.23.012	NUT DIN 985 M12 5.6	1	1
48-56	225.10.400	CONTROL ASSY	1	-
48-56	225.15.400	CONTROL ASSY	-	1
48	223.10.401	BODY, control	1	-
48	223.15.401	BODY, control	-	1
49	223.10.402	EXCETRICA, control	1	1
50	223.10.417	O-RING	1	1
51	252.10.408	O-RING	1	1
52	252.10.411	SPRING	1	1
53	252.10.424	LEVER, control	1	1
54	147.19.115	COUPLING, cable	1	1
55	510.30.006	WASHER DIN 125 Ø 6	1	1
56	540.51.155	PIN DIN 94 2x16 inox.	1	1
57	225.10.423	ARM, control	1	1
58	521.02.257	BOLT DIN 933 M8x20 8.8	2	2
59	510.30.008	WASHER DIN 125 Ø 8	2	2
60	225.10.915	BRACKET MORSE REVERSE GEAR	1	1
61-68	121.19.000	ASSY BRACKET, morse control	1	1
61	121.19.020	BRACKET, gear box control	1	1
62	121.19.021	SUPORT CLAMP	1	1
63	147.19.013	CLAMP, cable	1	1
64	553.07.104	BOLT DIN 86 3/16Wx10	2	2
65	510.30.006	WAHER DIN 125 Ø 6	2	2
66	521.02.157	BOLT DIN 933 M6x20 8.8	2	2
67	530.33.006	WASHER GROWER DIN 127 Ø 6	2	2
68	521.20.006	NUT DIN 934 M6 8.8	2	2
69	521.02.157	BOLT DIN 933 M6x20 8.8	2	2
70	510.30.006	WASHER DIN 125 Ø 6	4	4
71	530.33.006	WASHER GROWER DIN 127 Ø 6	2	2
72	521.20.006	NUT DIN 934 M6 8.8	2	2
-	225.13.501	GASKET AND SEAL KIT (Item n°s 3-10-11 32-33-38-50-51)	1	1

GEAR BOX