

## INTRODUCTION

We thank you having selected our MINI 23 - MINI 34 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 described and illustrated here, **SOLE, S. A.** reserves all rights to make modifications in parts, details and accessories as may be required for any technical or commercial reasons.

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## 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 suspended 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., in 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 should 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 known 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 standards 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 scrapyards. Inform staff at the scrapyards 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

	<u>MINI-23</u>	<u>MINI-34</u>
Type:	Diesel, upright, 4 stroke, water cooled	
Number of cylinders:	3	4
Bore:	73 mm. (2,87 in.)	
Stroke:	78 mm. (3,07 in.)	
Total displacement:	979 cc. (59,74 cu. in.)	1305 cc. (79,63 cu. in.)
Compression ratio:	20:1	20:1
Output DIN 6270 B:	20 Hp. (14,92 KW)	31 Hp. (22,81 KW)
Maximum r.p.m.:	3.000	3.000
Gear box:	Mechanical. RONIM V type. Ratio 2,25:1	
Maximum installation angle (continuous):	20°	20°
Oil Capacity:		
Engine:	3,5 l.	4,5 l.
Gear box:	0,4 l.	0,4 l.
Type of oil:	HD	
	20° or higher	SAE-30
	5° to 20° C.	SAE-20      SAE 10W-30 HD
	5° C or lower	SAE-10
Cooling system:	Fres water, whit heat exchanger.	
Cooling water capacity:	4,5 l.	5,25 l.
Injection system:	BOSCH M	
	Centrifugal governor	
	Nozzle pressure 120 $\pm$ 10	
	0	
Electrical system:	See diagrams on pages 25 and 26	
Starter:	12 V. 1,6 KW	12 V. 2 KW
Alternator:	12 V. 35 A.	12 V. 50 A.
	Glow plug, sheated type	
	60 A. fuse	

## 3 - USE

### 3.1 - BEFORE STARTING UP

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

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

#### WARNING

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

### 3.2 - PREPARATIONS BEFORE STARTING

#### 1) Filling engine and reversing gear with oil

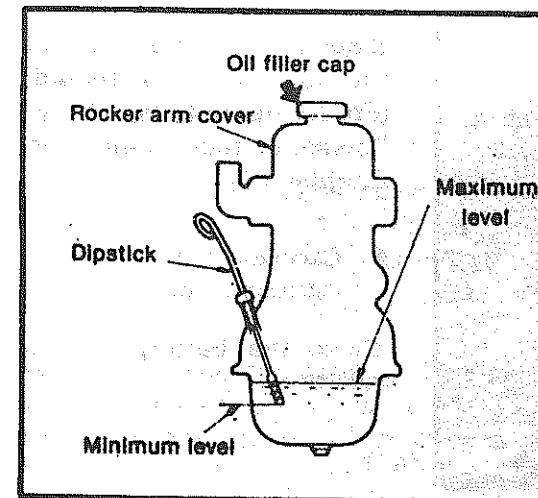


Fig. 1

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

## 2) Filling tank with fuel

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

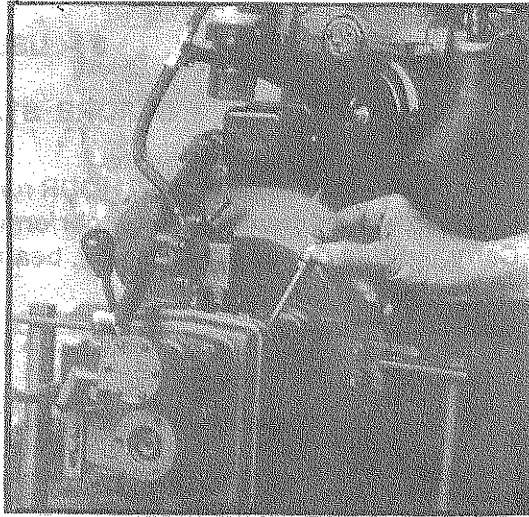


Fig. 2

## 3) Filling water system

Fill the circuit with clean water up to the filler hole after adding an approved antirust product in a proportion of 1 % (10 cm.<sup>3</sup>/ltr) In the winter, add antifreeze (Fig. 3).

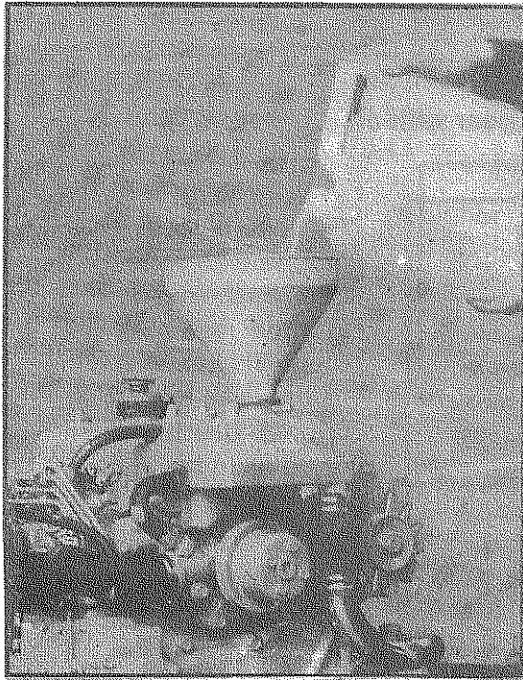


Fig. 3

## 4) Open salt water inlet cock

## 5) Bleeding fuel system

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

## 6 Closing battery disconnecter

Close the battery disconnecter.

## 3.3 . STARTING UP

### 1) Reverse gear neutral position

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

### 2) Setting of ignition key in position ON

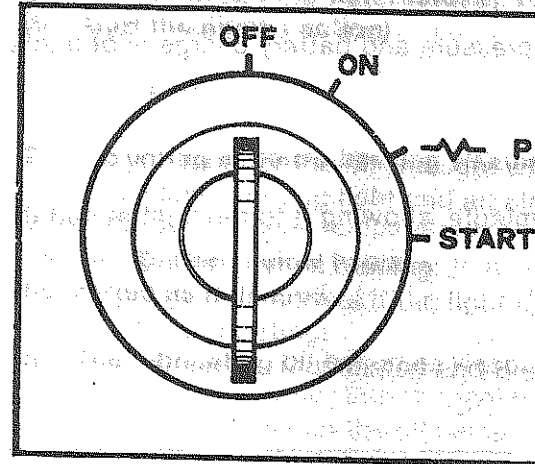


Fig. 4

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

### 3) Pre-heating of glow plugs

Turn the ignition key to position "P" (warming-up) until the glow plug indicator becomes sufficiently red hot. The normal warm-up time is 20 seconds. In cold weather, follow the table as below:

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

Notwithstanding, the warm-up period should not last more than 2 minutes to avoid shortening the plug life. If the plug indicator does not become red hot, it should be checked by a SOLE Service Centre.

#### 4) Starting up

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

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

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

#### 5) Warm-up

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

#### IMPORTANT:

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

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

### 3.4 - PRECAUTIONS WHEN STARTING AND DURING RUNNING

#### 1 - Normal starting

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

#### 2 - Starting in below-freezing weather

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

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

#### 3 - Precautions during running

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

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

**IMPORTANT:**

Always change gear with the engine at slow running speed.

**3.5. STOPPAGE**

- 1) Set the engine to slow running and the clutch to neutral.
  - 2) Push the Stop button until the engine has completely stopped.
  - 3) With the engine stopped, set the ignition key to position OFF. The battery will be discharged if the key is left in position ON.
- To prevent this, remove the key after stopping the engine.  
If the engine is not going to be used for a long period of time, it is advisable to close the water and fuel valves and to disconnect the battery.

**IMPORTANT:**

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

**4.4. MAINTAINANCE**

**4.1. LUBRICATION SYSTEM**

**1. Correct viscosity of oil**

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

**2. Oil pressure**

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

- During normal running:

The oil pressure is normal if the light is extinguished.

- When starting:

The light should be illuminated and the horn sounding.

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



### 3 - Oil changes

#### a) Engine

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

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

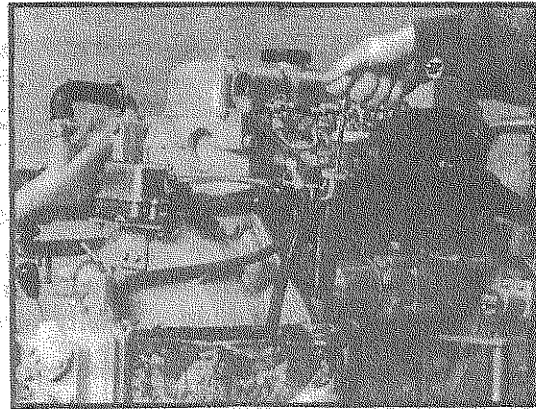


Fig. 6

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

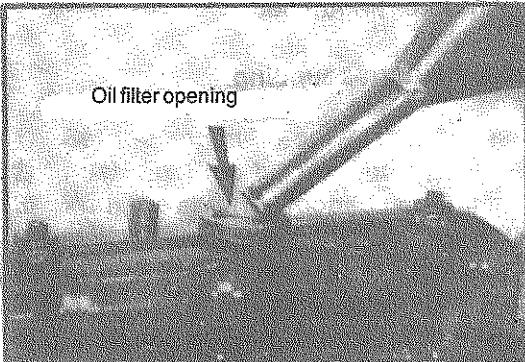


Fig. 7

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

#### NOTE:

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

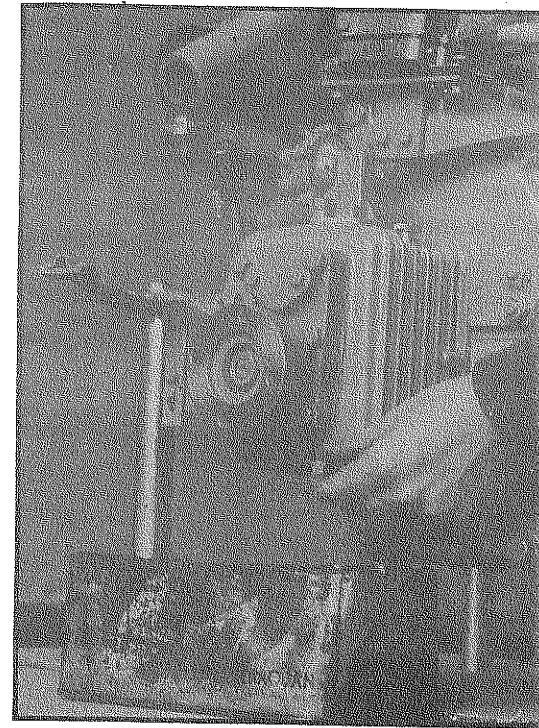


Fig. 8

#### b) Reversing gear

The reversing gear is lubricated separately from the engine.

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

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

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

### 4 - Oil filter change

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

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

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

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

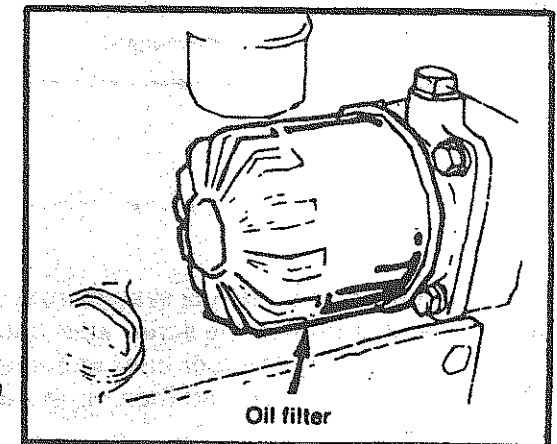


Fig. 9

## 4.2 · FUEL SYSTEM

### 1 · Gasoil

Always use clean, filtered gasoil. Never use kerosene or heavy oils.

Fill with fuel beforehand. In cold weather, a lot of water vapour is produced when there is a lot of air in the fuel tank. Therefore the tank should be kept as full as possible.

When filling the tank, try to avoid impurities and water, always using clean plastic containers and filter the fuel whenever possible.

Also make sure that the tank is free from water and dirt.

### 2 · Fuel system purge

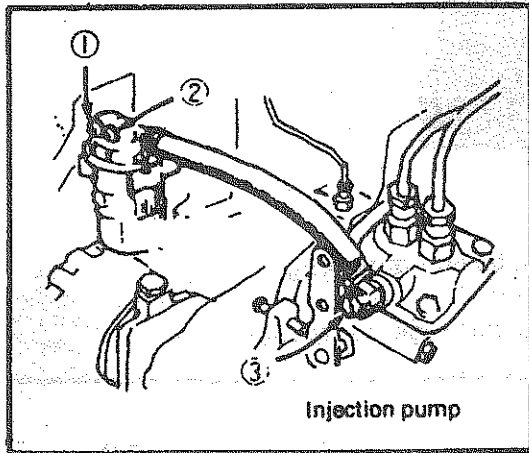


Fig. 10

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

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

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

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

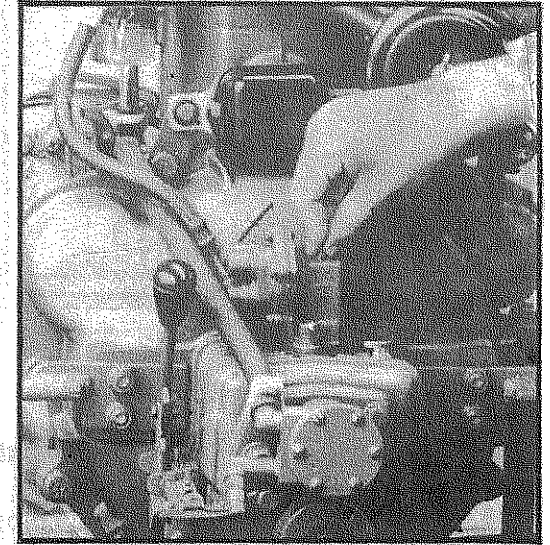


Fig. 11

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

### 3 · Cleaning and replacement of fuel filter

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

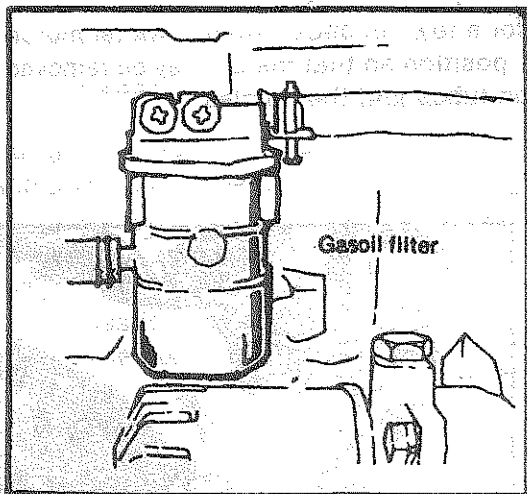


Fig. 12

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

#### 4 - Fuel injection pump

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

The requirements for handling fuel injection pumps are as follows:

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

#### 5 - Setting of slow running speed

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

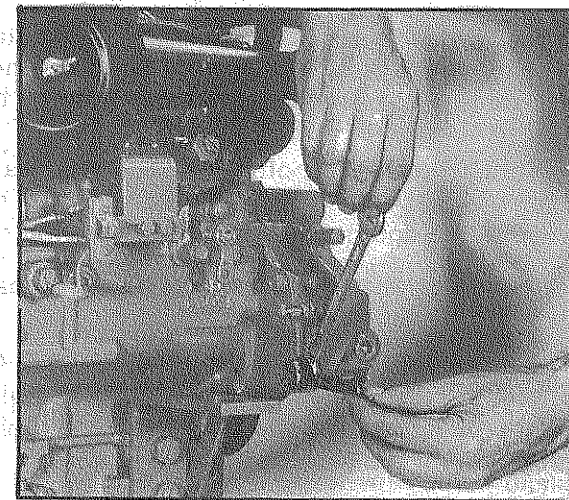


Fig. 13

#### IMPORTANT:

Never touch the sealed screw located OVER the gas lever.

### 4.3 - COOLING SYSTEM

As a coolant, use clean water with a minimum of impurities, such as tap water (NEVER use rain water). The use of hard or dirty water causes the formation of deposits in the engine with the resulting reduction of cooling power.

Before filling the cooling circuit with water, add an approved anti-rust product in a proportion of 1 % (10 cm.<sup>3</sup>/lt) to prevent corrosion of the cooling system and reduction of cooling power.

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

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

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

Be sure to clean the cooling system before adding antifreeze.

#### NOTE

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

Cooling system capacity: 5'25 litres

### 2 - Salt water system

#### a) Water pump

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

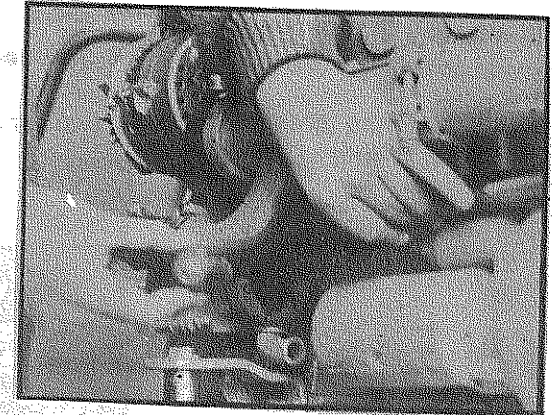
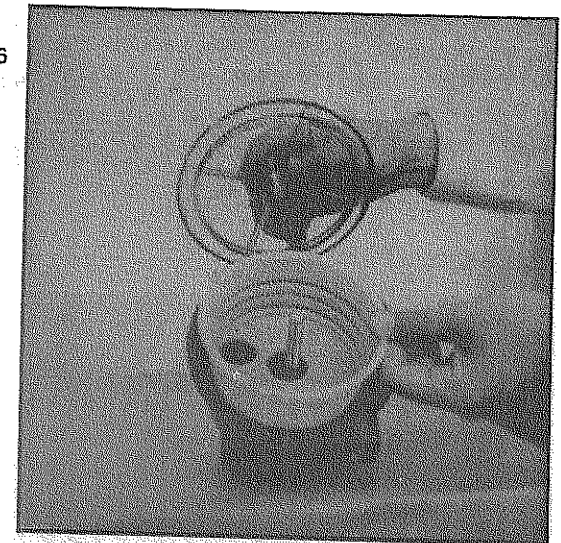


Fig. 15

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

Open the bottom cock.

Fig. 16



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

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

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

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

### 3 - Drainage

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

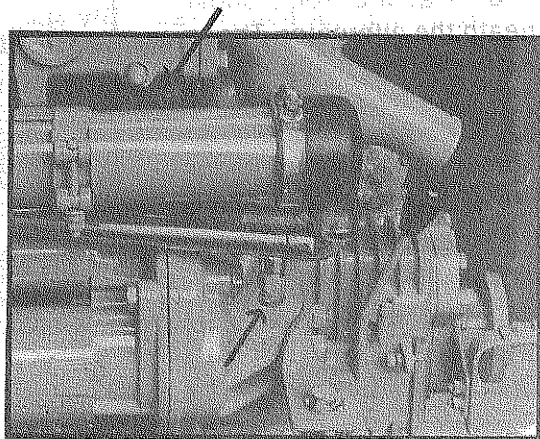


Fig. 17

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

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

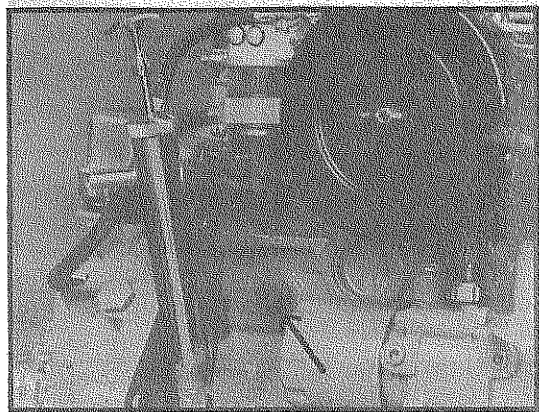


Fig. 18

### 4.4 ELECTRICAL SYSTEM

1 - The engine is equipped with a 12 V system and the electrical circuit is shown in the following diagrams (Figs. 24 - 24 (bis) ).

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

#### 2 - Alternator belt tension

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

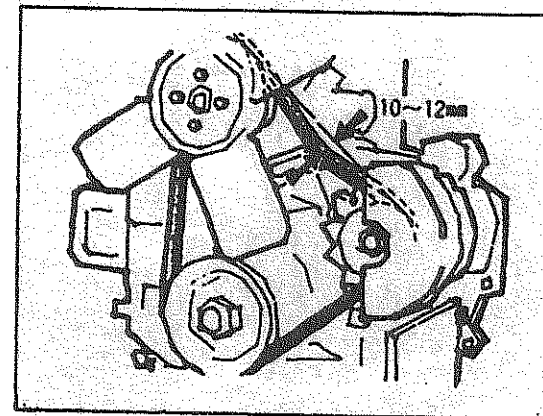
Too much tension may cause rapid wearing of the and the alternator bearings.

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

Never try to adjust the belt tension with engine running.

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

Fig. 19



### 3 - Fuse

The electrical system is protected by a 60 A fuse, fitted alongside the starter motor on the lead running from the latter to the control panel (see diagram on page 31).

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

### 4.5 - INLET SYSTEM

#### 1 - Replacement of inlet air filter element

Change the air filter element every 400 hours.



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

Fig. 20

### 4.6 - REVERSING REDUCTION GEAR

The ronim mechanically operated reversing gear is made from aluminium alloy having high mechanical strength and resistance to sea water.

#### 1) Operation

With the engine running at tick-over speed, gently push the reverse gear lever forwards (ahead) or backwards (astern) as desired.

#### 2) Remote control connection

Connect the control cable to the lever with the ball joint provided and attach the cable with the clamp. Once the control is mounted, adjust it so that it moves the same distance forwards as backwards and do not open the accelerator until the gear has properly entered. (Fig. 21) To check that the assembly is correct, proceed as follows:

Push the reverse gear lever and the remote control lever to 'ahead'.

At this stage, line up the bores of the ball joint (A) and lever (B) (Fig. 22).

Any adjustment is made with the reverse gear lever bores and with the elongate holes of the cable attachment support.

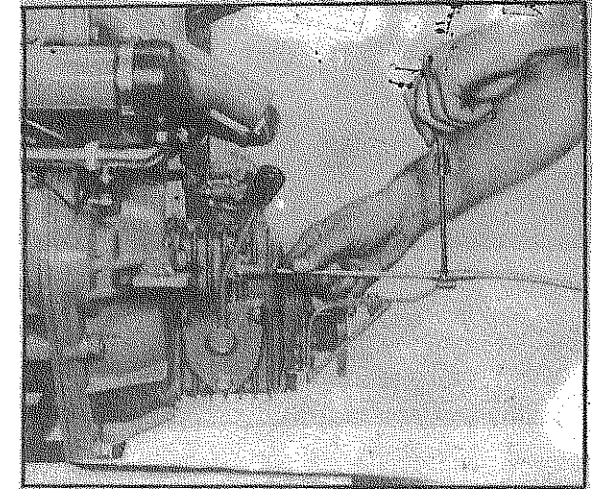
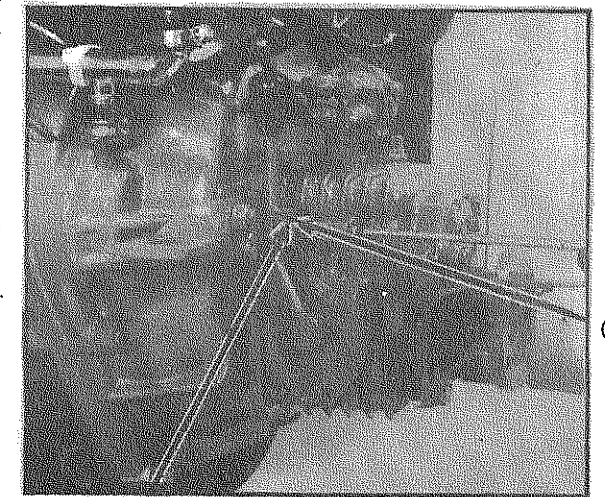


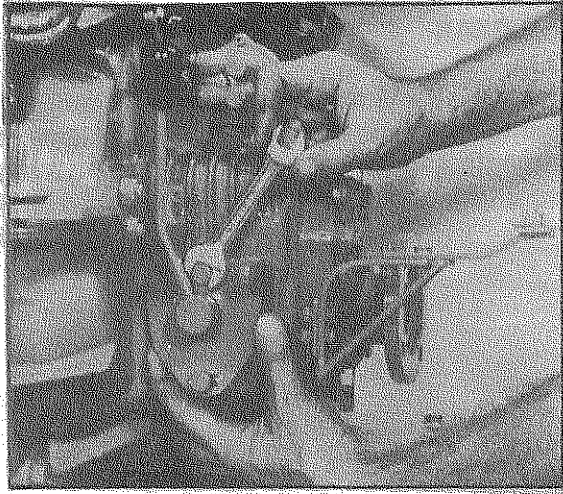
Fig. 21



(A)

(B)

Fig. 22



### 3) Adjustment of control

Slacken off the control attachment screws and move it sideways to the right or the left until the same stroke is obtained both 'ahead' and 'astern'. Then retighten the screws (Fig. 23).

Fig. 23

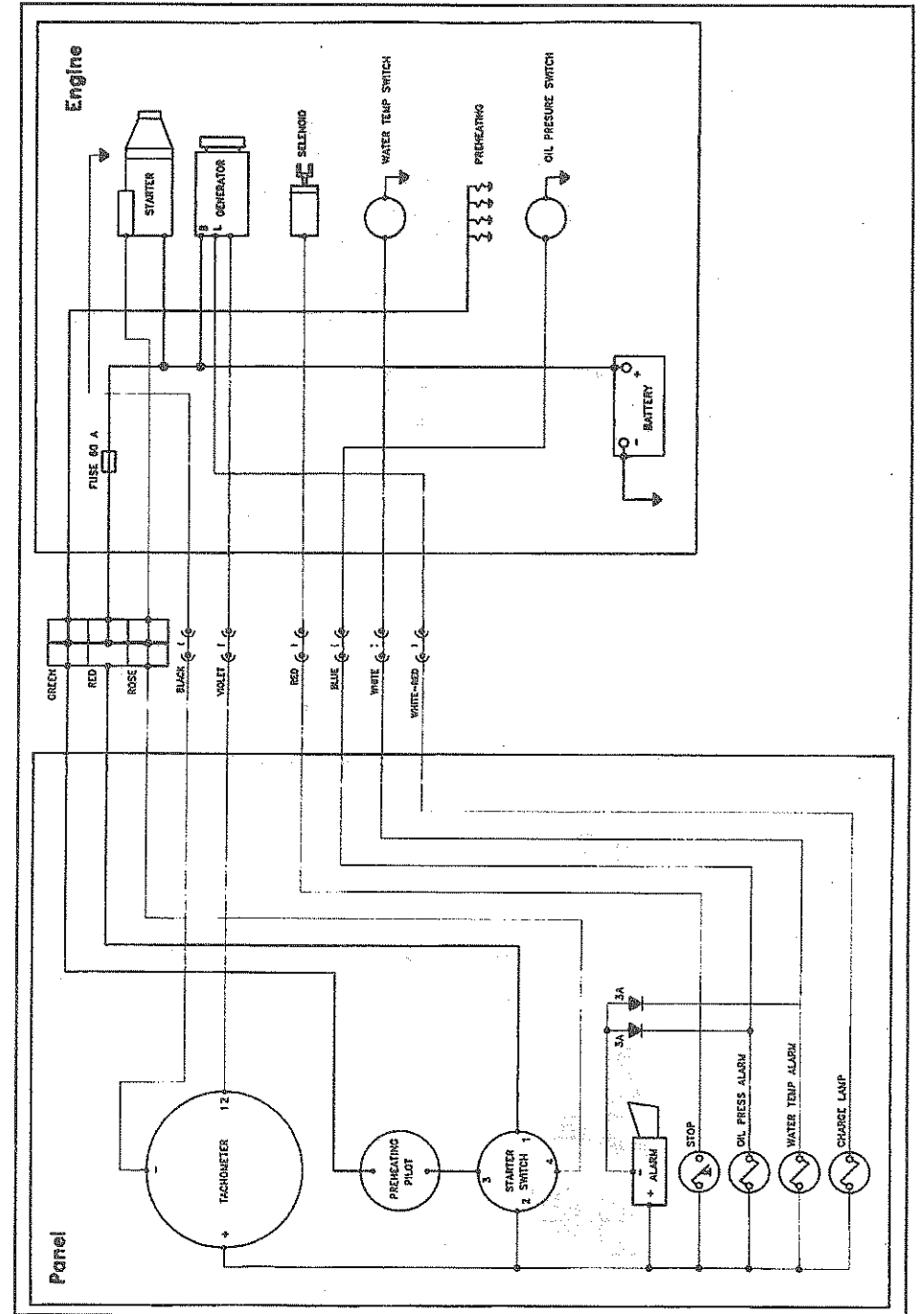
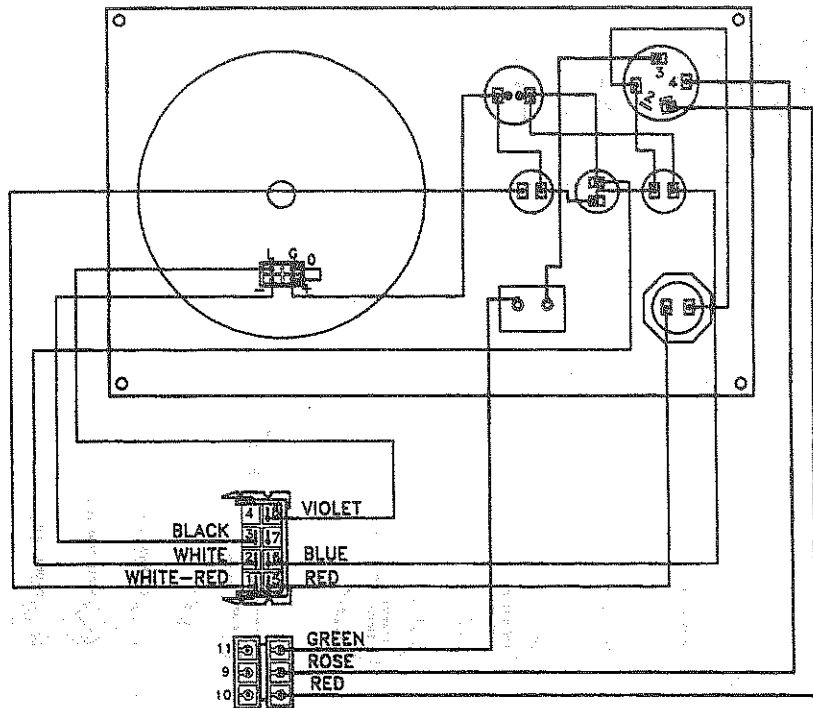
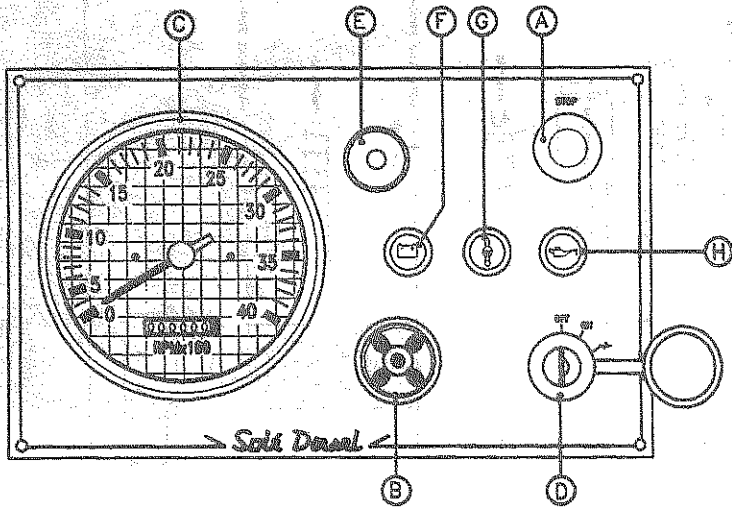


Fig. 24



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

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

Fig. 24 bis



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

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

## 5 - PERIODICAL INSPECTIONS

### 5.1 - DAILY CHECKS BEFORE USING THE ENGINE

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

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

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

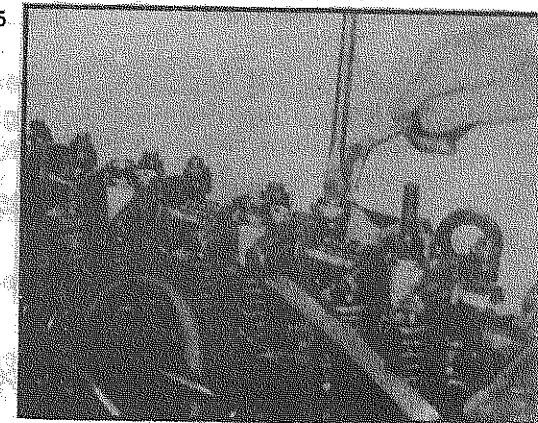
### 5.2 - MAINTAINANCE AFTER FIRST 50 HOURS RUNNING

- 1 - Change engine and reverse gear oil. Proceed as indicated on pages 18 and 19.
- 2 - Change oil filter. Change as specified on page 19.

Fig. 25

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

a) Remove the rocker arm cover, slacken off the rocker arm nut and while the adjusting screw is being turned, check the valve clearance with a gauge (Fig. 25).



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

Proceed in the same way with the other cylinders.

c) The top dead centre position of no. 1 cylinder can be checked by means of the alignment markings on the valve cover and the crankshaft pulley (Fig.26).

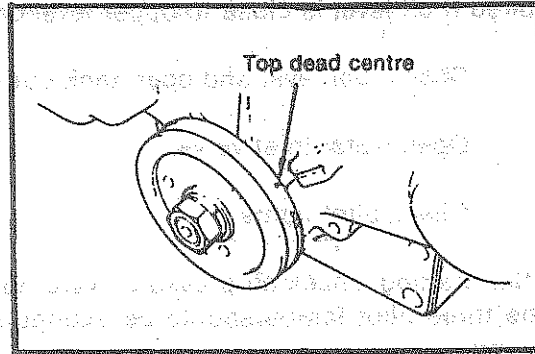


Fig. 26

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

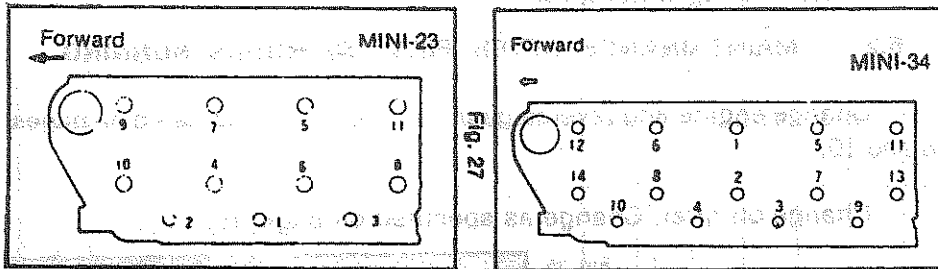


Fig. 27

**NOTE:**

Valve clearances must be adjusted after the cylinder

head screws have been tightened (Fig. 27 shows the order of tightening).

Valve clearance (inlet and exhaust): 0.25 mm (0.0099")

Torque on cylinder head studs:

M 10 screws: 7-8 Kg m

M 12 screws: 11-12 Kg m

4 - Adjustment of alternator belt. Proceed as explained on page 27.

5 - Re-tightening nuts and bolts. Check the tightness of the engine and propeller shaft mounting bolts.

6 - Adjust engine slow running speed. Check the engine slow running speed and adjust as indicated on page 22.

**5.3 - MAINTAINANCE AFTER EVERY 100 HOURS RUNNING**

1 - Change engine oil (see page 18).

2 - Change oil filter (see page 19).

3 - Clean fuel filter (see page 21).

4 - Drain fuel decanter filter.

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

5 - Clean water filter (see page 25).

6 - Adjust engine slow running speed (see page 22).

**5.4 - MAINTAINANCE AFTER EVERY 200 HOURS RUNNING**

1 - Change fuel filter. Proceed as indicated on page 21.

2 - Change decanter filter element. Replace filter element together with gaskets. Check that there is no fuel leak.

3 - Adjust alternator belt. (See page 27)

4 - Nozzle check. Set the nozzle pressure to  $120 \pm 10$  Kg/cm and remove any undesirable injection.

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

5 - Check battery water level. Check this level, topping up with DISTILLED WATER, whenever required.

### 5.5 - MAINTENANCE AFTER EVERY 400 HOURS RUNNING

- 1 - Tighten the engine mount and propeller shaft screws.
- 2 - Adjust the valve clearances (see page 35).
- 3 - Check glow plugs. Make sure the glow plugs are not burnt out.
- 4 - Install a new air filter element. Proceed as explained on page 28.

### 5.6 - MAINTENANCE AFTER EVERY 800 HOURS RUNNING

- 1 - Check the compression pressure. To do so, take out the glow plugs (or the nozzles) and measure with a compression gauge. Adjust as necessary if the pressure differential between cylinders exceeds  $2.5 \text{ Kg/cm}^2$ , or if the pressure in any cylinder is less than  $26 \text{ Kg/cm}^2$  (take measurements at 280 rpm).
- 2 - Adjust the fuel injection. Have this operation made by a SOLE official service.
- 3 - Check the alternator and governor. Adjust the voltage and current, using a circuit tester.

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

5 - Check water pump rotar. Make sure that no blades of the rotar are broken. If any is, proceed as explained on page 25.

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

## 6 - TROUBLESHOOTING

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

### 1. Engine does not start

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

### 2. Engine stops while running

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

### 3. Poor engine performance

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

### 4. Inadequate oil pressure

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

### 5. Engine overheats

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

## 6. Battery charges poorly

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

## 7. Gears do not engage smoothly

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

## 7. RUNNING DATA

### 7.1 - RUNNING STANDARDS

- \* Valve clearances: 0.25 mm (0.0099"), engine cold  
(both inlet and exhaust)
- \* Compression pressure: 32 Kg/cm (454.4 psi) (280 rpm)
- \* Oil capacity: Engine: MINI 23 4 litres MINI 34 4'5 litres  
Reversing gear: 0.4 litres
- \* Injection order: MINI 34 1-3-4-2 MINI 23 1-2-3
- \* Injection timing: 23° before top dead centre
- \* Nozzle pressure: 120<sup>+10</sup><sub>0</sub> Kg/cm (1.706<sup>+0.143</sup><sub>0</sub> psi)

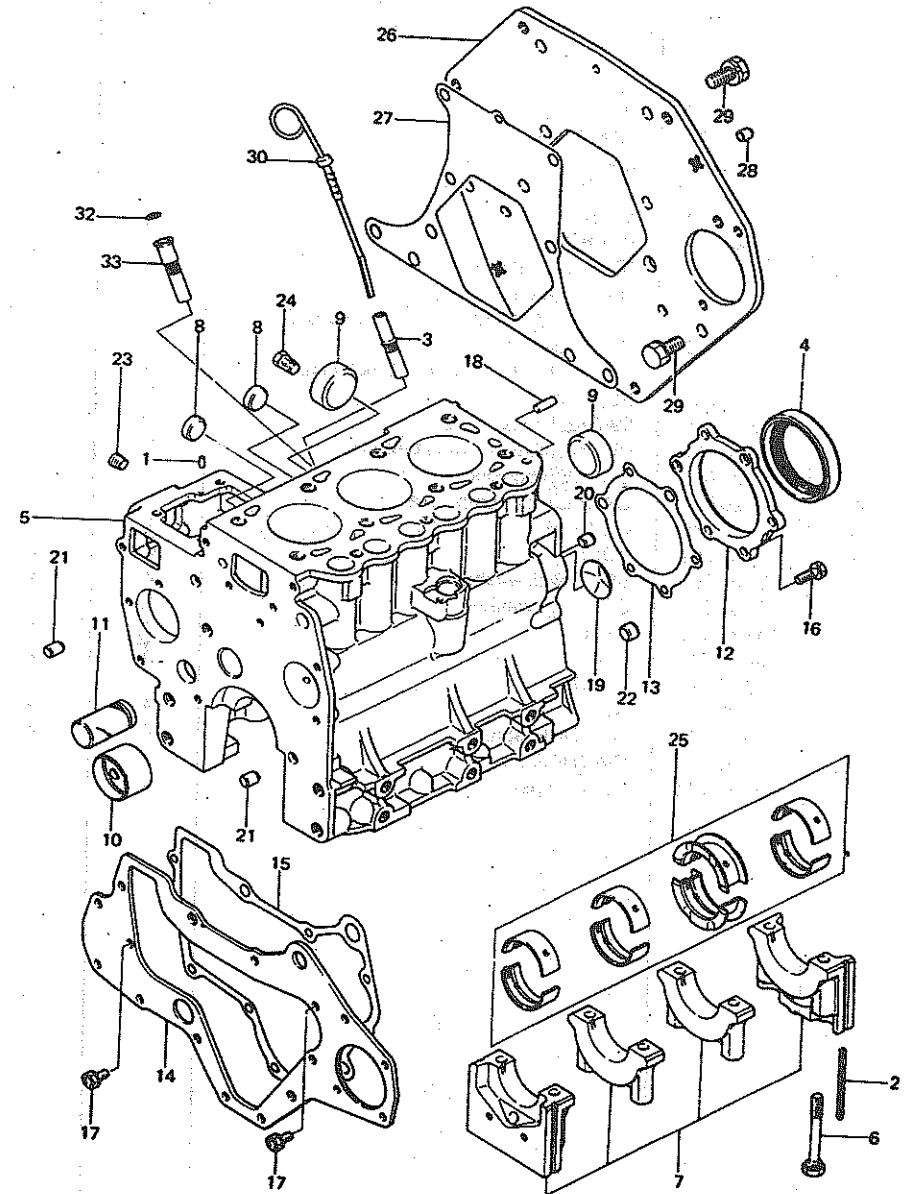
### 7.2 - TIGHTENING TORQUES

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

### CRANK CASE

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	131 20 036	PIN, dowel	2	2
2	132 20 002	SEAL, side	4	4
3	132 20 007	GUIDE, oil level gauge	1	1
4	132 20 008	OIL SEAL	1	1
5-10	134 20 001	BLOCK SUB ASSY, cylinder	-	1
	136 20 001	BLOCK SUB ASSY, cylinder	1	-
6	132 20 009	BOLT, bearing cap	8	10
7	136 20 010	CAP ASSY, bearing	1	-
	132 20 010	CAP ASSY, bearing	-	1
8	132 20 012	CAP, sealing	2	2
9	132 20 013	CAP, sealing	2	3
10	132 20 011	BUSH, camshaft	1	1
11	132 20 014	SAHFT, idler	1	1
12	132 20 015	CAE, oil seal	1	1
13	132 20 016	GASKET, oil seal	1	1
14	132 20 017	PLATE, front	1	1
15	132 20 018	GASKET, fron plate	1	1
16	521 022 57	BOLT, whit washer	6	6
17	131 22 050	BOLT, whit washer	3	3
18	132 20 020	PIN, dowel	1	1
19	131 20 007	PLUG, expansion	1	1
20	131 20 009	BUSHING, knock	2	2
21	132 20 021	BUSHING, knock	2	2
22	132 20 022	BUSHING, knock	2	2
23	132 20 023	PLUG, tape	3	3
25	136 20 003	BEARING SET, crankshaft Std.	1	-
	132 20 003	BEARING SET, crankshaft Std.	-	1
	136 20 004	BEARING SET, crankshaft 0,25	1	-
	132 20 004	BEARING SET, crankshaft 0,25	-	1
	136 20 005	BEARING SET, crankshaft 0,50	1	-
	132 20 005	BEARING SET, crankshaft 0,50	-	1
	136 20 006	BEARING SET, crankshaft 0,75	1	-
	132 20 006	BEARING SET, crankshaft 0,75	-	1
26	132 20 024	PLATE, rear	1	1
27	132 20 025	GASKET, rear plate	1	1
28	132 20 026	PIN, knock	2	2
29	132 20 027	BOLT, with washer	8	13
30	132 20 029	GAUGE, oil level	1	1

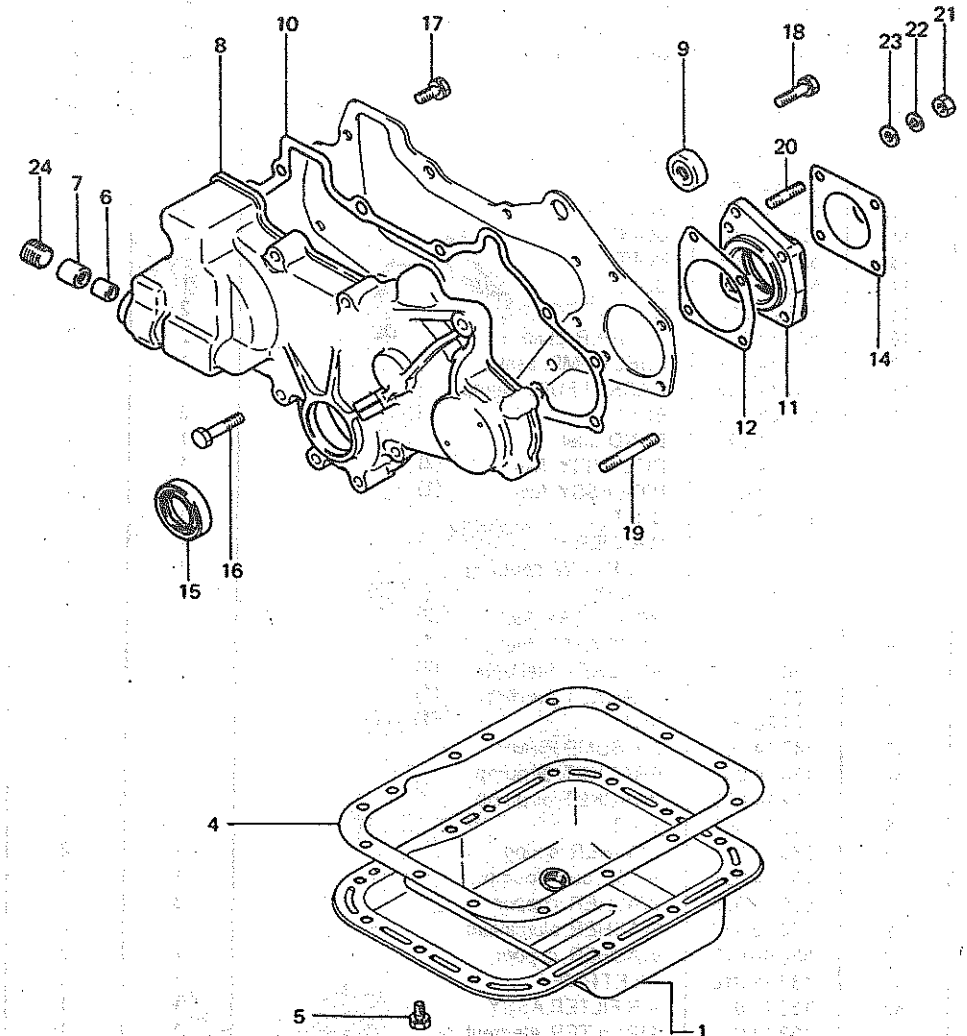
### CRANK CASE



### OIL PAN & GEAR CASE

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	136 20 030	PANASSY, oil	1	-
	132 20 030	PANASSY, oil	-	1
4	136 20 033	GASKET, oil pan	1	-
	132 20 033	GASKET, oil pan	-	1
5	521 02 256	BOLT, whit washer	15	17
6	132 20 034	BEARING, needle	1	1
7	132 20 036	BEARING, needle	1	1
8	132 20 035	GASE, gear (since 13.103 Mini 34 - 17.999 Mini 23)	1	1
	134 20 035	GASE, gear (from 13.104 Mini 34 - 18.500 Mini 23)	1	1
9	134 20 051	PLUG, thrust	1	1
10	132 20 040	GASKET, gear case	1	1
11	132 20 037	HOUSING, pump gear bearing	1	1
12	132 20 038	GASKET, bousing	1	1
14	131 20 047	GASKET, oil pump cover	1	1
15	132 20 039	OIL SEAL	1	1
16	521 01 262	BOLT	8	8
17	521 02 256	BOLT, with washer	2	2
18	521 01 259	BOT, with washer	1	1
19	134 20 042	STUD	3	3
	132 20 042	STUD	3	3
20	132 20 043	STUD	1	1
21	521 20 008	NUT	4	4
22	530 33 008	WASHER, spring	4	4
23	510 30 008	WASHER, plain	4	4
24	131 20 037	PLUG, taper	1	1

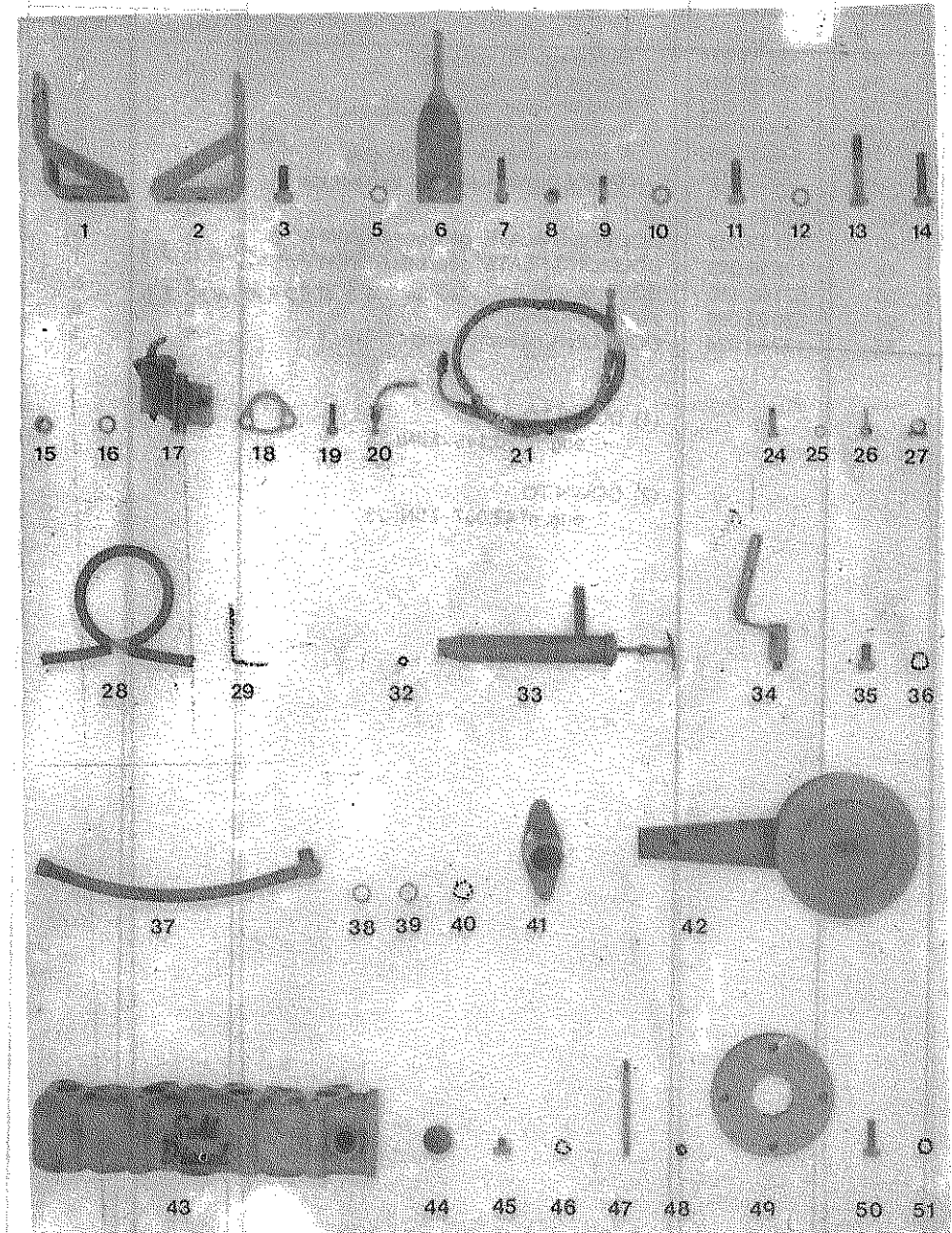
### OIL PAN & GEAR CASE



### BLOCK INLET EXHAUST

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	132 10 001	BRACKET FRONT, right	1	1
2	132 10 002	BRACKET FRONT, left	1	1
3	522 02 359	BOLT, bracket	4	4
5	530 33 012	WASHER, spring	4	4
6	132 10 010	BRACKET, rear	2	2
7	521 03 311	BOLT	4	4
8	511 23 010	NUT, self-locking	6	6
9	131 10 011	STUD	2	2
10	131 10 017	WASHER, plain	6	6
11	522 02 361	BOLT	5	5
12	530 38 012	WASHER	6	6
13	521 01 363	BOLT	2	-
13	521 01 368	BOLT	-	2
14	522 02 363	BOLT	1	1
15	521 20 012	NUT	2	2
16	530 33 012	WASHER, plain	2	2
17	131 14 001	FUEL PUMP, assy	1	1
18	131 14 002	GASKET FUEL, pump	2	2
19	521 03 258	BOLT	2	2
20	131 14 003	BEND, inlet	1	1
21	136 14 005	PIPE ASSY, fuel (2)	1	-
21	132 14 005	PIPE ASSY, fuel (1)	-	1
24	131 14 008	BOLT	1	1
25	560 00 006	WASHER	7	9
26	131 14 011	OVERLOW, coupling	1	1
27	510 80 012	CLAMP (1) (2)	3	4
28	136 14 007	HOSE ASSY, fuel (2)	1	-
28	132 14 007	HOSE ASSY, fuel (1)	-	1
29	136 14 012	BRACKET, fuel filter (2)	1	-
29	132 14 012	BRACKET, fuel filter (1)	-	1
32	521 20 006	NUT (1) (2)	1	1
33	147 14 001	OIL SUMP PUMP	1	1
34	136 14 002	BRACKET, oil pump	1	-
34	132 14 020	BRACKET, oil pump	-	1
35	522 02 357	BOLT	-	2
36	530 33 012	WASHER, spring	-	2
37	132 14 021	HOSE, sump pump	1	1
38	560 00 068	WASHER, copper	3	2
39	570 00 367	WASHER, aluminium	-	2
40	560 00 077	WASHER, copper	2	2
41	132 11 010	INLET PIPE	1	1
42	132 11 012	AIR FILTER ASSY	1	1
	132 11 013	AIR FILTER, element	1	1
43	136 13 002	EXHAUST MANIFOLD ASSY	1	-
43	132 11 021	EXHAUST MANIFOLD ASSY	-	1
44	121 11 004	CAP	4	6
45	131 11 038	PLUG, drain	1	1
46	560 00 061	WASHER, copper	1	1

### BLOCK INLET EXHAUST

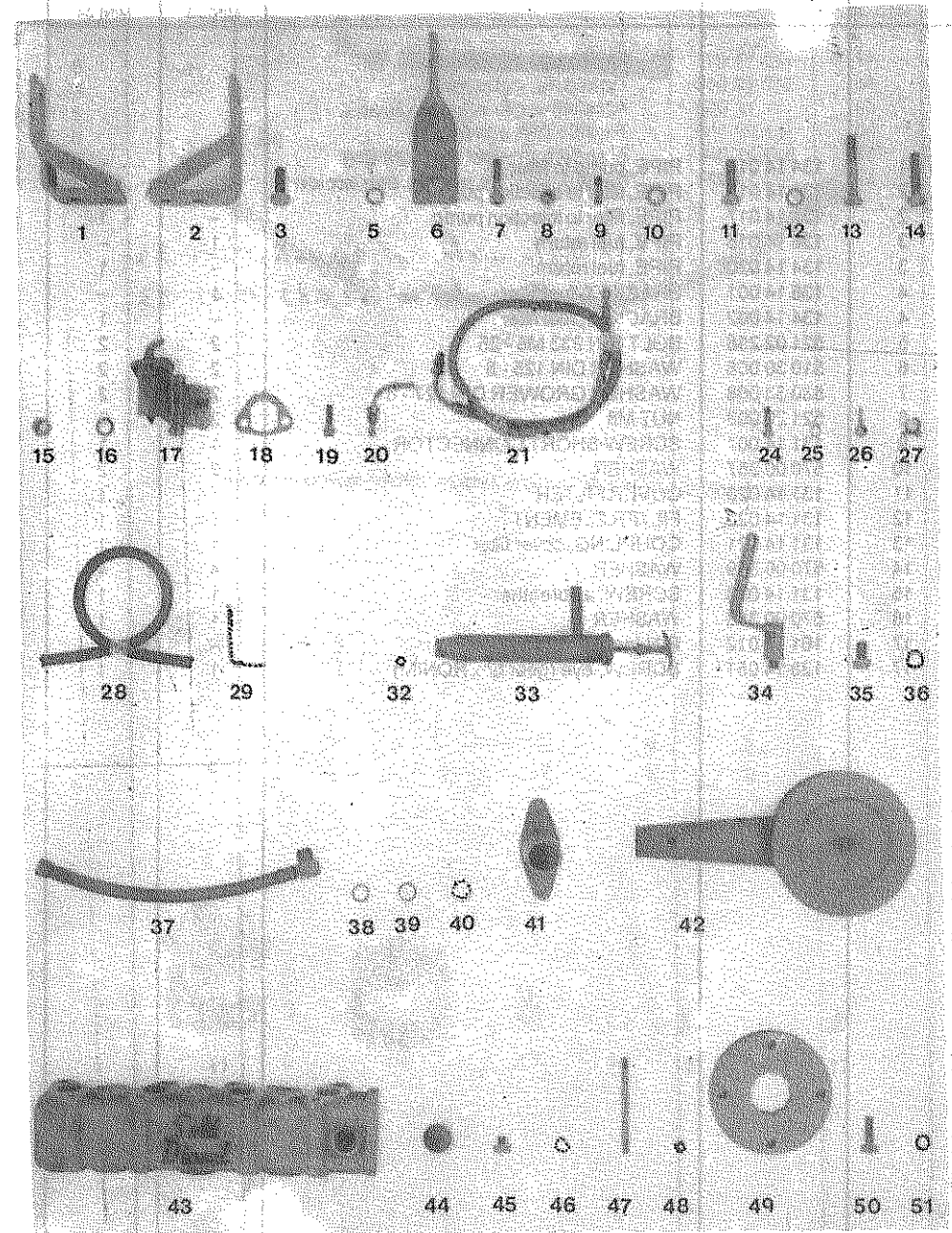




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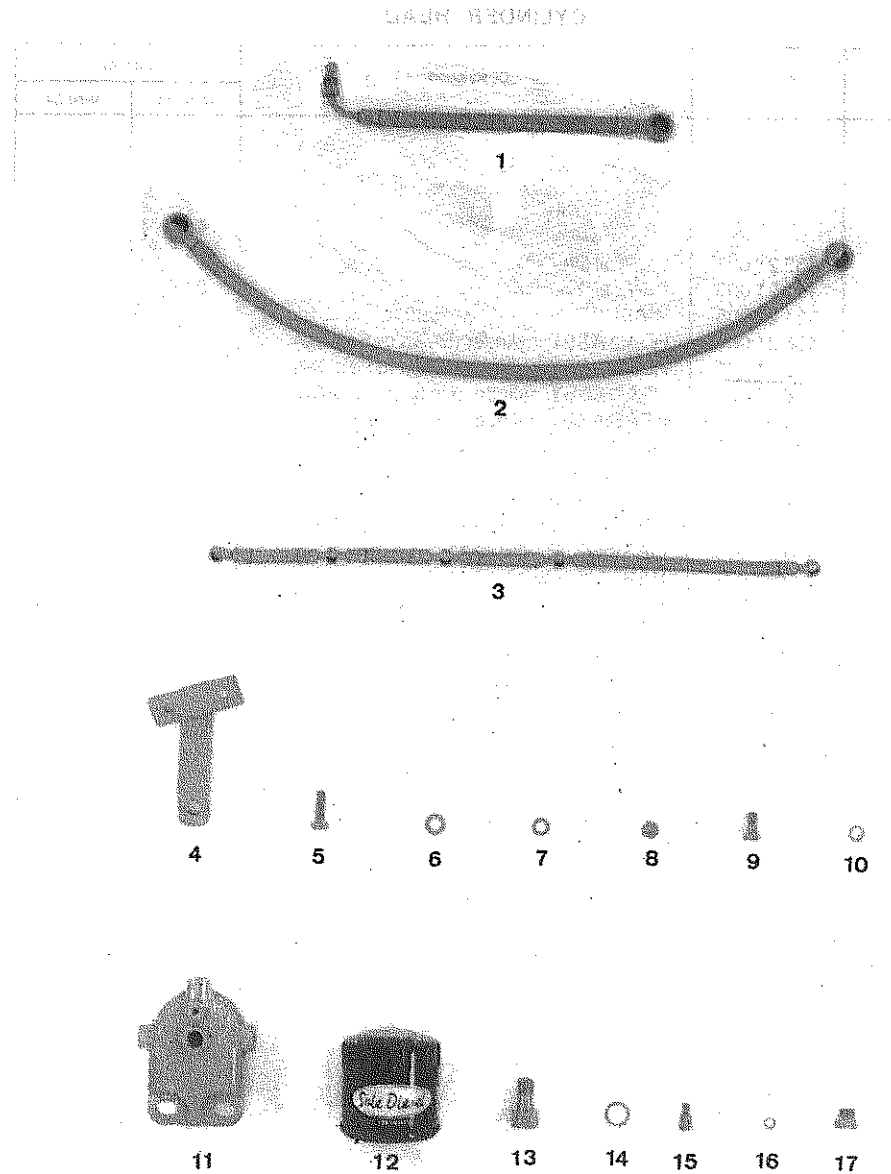
Item	Part no	Description	Quantity	
			MINI-23	MINI-34
47	132 11 015	STUD, exhaust manifold	6	8
48	132 11 016	NUT	6	8
49	131 12 003	COUPLING PLATE, gear box RONIM IV	1	1
49	138 10 040	COUPLING PLATE, gear box RONIM V	-	1
50	521 02 156	BOLT	8	8
51	530 33 006	WASHER, spring	8	8
52	132 14 024	COUPLING, oil sump pump	1	1
		(1) DOWN TO eng. n° 20.145 - MINI-34		
		(2) DOWN TO eng. n° 42.087 - MINI-23		

# BLOCK INLET EXHAUST



UP TO eng. MINI-23 n° 44.681  
 UP TO eng. MINI-34 n° 20.978

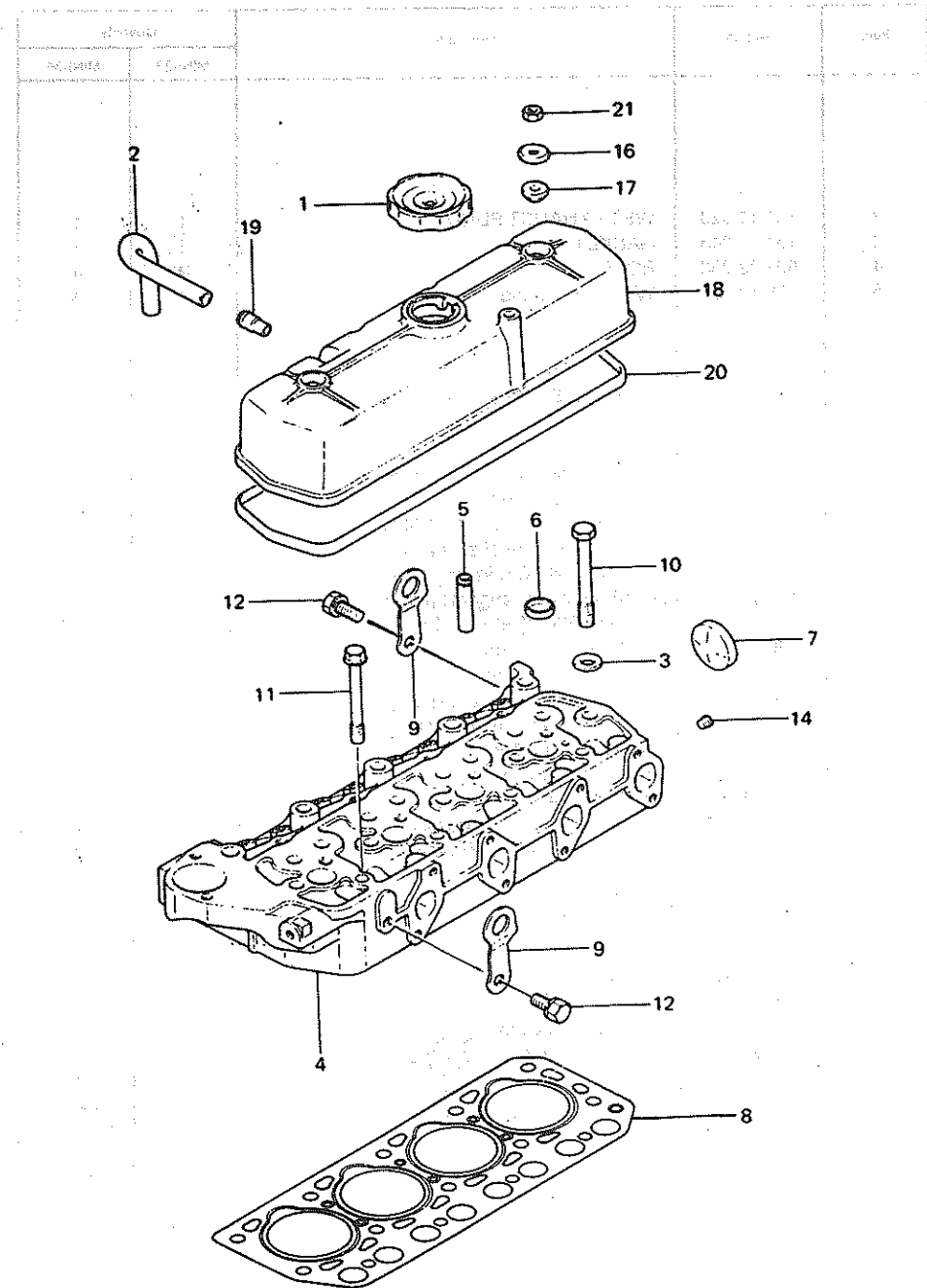
Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	134 14 016	PIPE, pump to filter	1	1
2	136 14 017	PIPE, filter to injection pump	1	-
2	134 14 017	PIPE, filter to injection pump	-	1
3	136 14 018	PIPE, fuel return	1	-
3	134 14 020	PIPE, fuel return	-	1
4	136 14 001	BRACKET, fuel filter	1	-
4	134 14 002	BRACKET, fuel filter	-	1
5	521 02 258	BOLT DIN 933 M8 - 25	2	2
6	510 30 008	WASHER DIN 125 - 8	2	2
7	530 33 008	WASHER GROWER DIN 127 - 8	2	2
8	521 20 008	NUT M8	2	2
9	131 14 007	SCREW SHORT CONNECTOR	1	1
10	570 00 357	WASHER	2	2
11	131 14 020	COVER FILTER	1	1
12	131 14 022	FILTER ELEMENT	1	1
13	131 14 021	COUPLING, cover filter	1	1
14	570 00 369	WASHER	4	4
15	131 14 023	SCREW, air breather	1	1
16	570 00 353	WASHER	1	1
17	161 12 012	PIN (gear box SMP)	-	1
17	128 14 051	SCREW, eye (gear box RONIM)	1	1



### CYLINDER HEAD

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	132 21 003	CAP, oil filter	1	1
2	132 21 006	PIPE, air breather	1	1
3	131 21 005	WASHER, cylinder head bolt	8	10
4-7	136 21 001	HEAD ASSY, cylinder (Down to Sep. 90)	1	-
	132 21 001	HEAD ASSY, cylinder (Down to Sep. 90)	-	1
4-7	136 21 101	HEAD ASSY, cylinder (Up to eng. n° 86.135)	1	-
4-7	134 21 001	HEAD ASSY, cylinder (Up to eng. n° 28.795)	-	1
5	132 21 002	GUIDE, valve	6	8
6	132 20 012	CAP, sealing	3	4
7	132 20 013	CAP, sealing	1	1
8	136 21 004	GASKET, cylinder head	1	-
	134 21 004	GASKET, cylinder head	-	1
9	132 21 011	HANGER, engine	2	2
10	132 21 005	BOLT, cylinder head	8	10
11	132 21 012	BOLT	3	4
12	522 02 307	BOLT, with washer	2	2
14	131 20 011	PLUG, taper	1	1
16	132 21 015	PLUG., taper	2	2
17	132 21 016	WASHER	2	2
18	136 21 009	COVER ASSY, rocker	1	-
	132 21 009	COVER ASSY, rocker	-	1
19	132 21 017	PIPE	1	1
20	136 21 010	GASKET, cover racker	1	-
	132 21 010	GASKET, cover racker	-	1
21	521 20 008	NUT	2	2

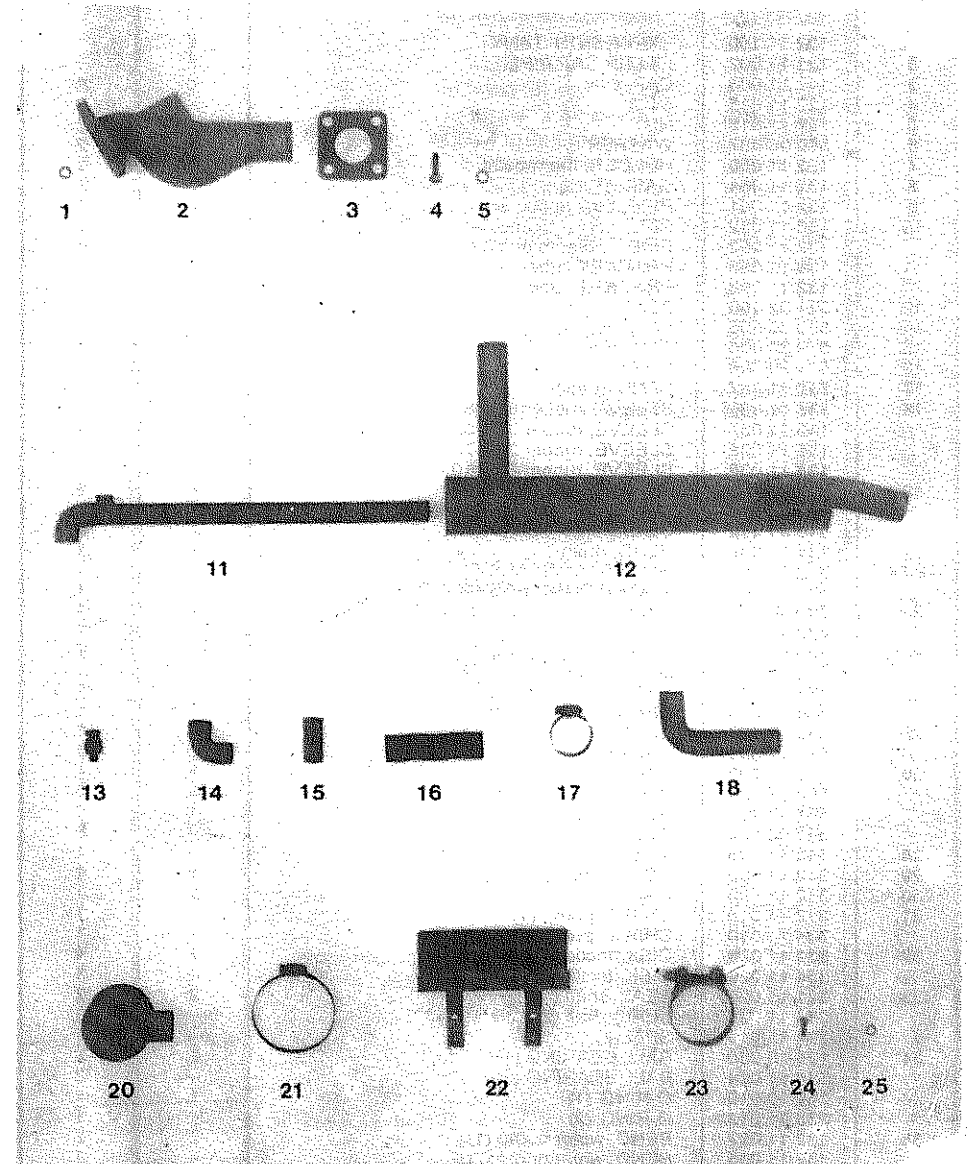
### CYLINDER HEAD



**COOLING SYSTEM**

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
2	131 11 023	WET EXHAUST BEND	1	1
3	151 13 043	GASKET	1	1
4	521 02 258	BOLT	4	4
5	530 33 008	WASHER, spring	4	4
<b>SEA WATER SYSTEM</b>				
9	132 11 026	COUPLING, water pump (17.999 Mini 23 - 13.103 Mini 34)	1	-
9	134 11 026	COUPLING, water pump (18.500 Mini 23 - 13.104 Mini 34)	-	1
11	136 11 028	PIPE, pump to heat exchanger (DOWN TO eng. n° 17.999)	1	-
11	134 11 028	PIPE, heat exchanger to pump (DOWN TO eng. n° 13.103)	-	1
11	136 11 030	PIPE, pump to heat exchanger (UP TO eng. n° 18.500)	1	-
11	134 11 030	PIPE, heat exchanger to pump (UP TO eng. n° 13.104)	-	1
12	136 11 029	WATER COOLER	1	-
13	132 11 029	WATER COOLER	-	1
14	131 11 038	PLUG, drain	1	1
15	132 11 035	BEND, exhaust manifold	2	2
15	132 11 031	COUPLING, exhaust manifold	1	1
16	132 11 033	SLEEVE, rubber	1	1
17	540 81 020	CLAMP	4	6
18	132 11 034	BEND, rubber	1	1
20	132 11 040	CAP, cooler	2	2
21	540 82 050	CLAMP	2	2
22	136 11 041	BRACKET, cooler	1	-
22	132 11 041	BRACKET, cooler	-	1
23	510 83 060	CLAMP, cooler	2	2
24	521 02 156	BOLT	4	4
25	530 33 006	WASHER, spring	4	4

**COOLING SYSTEM**

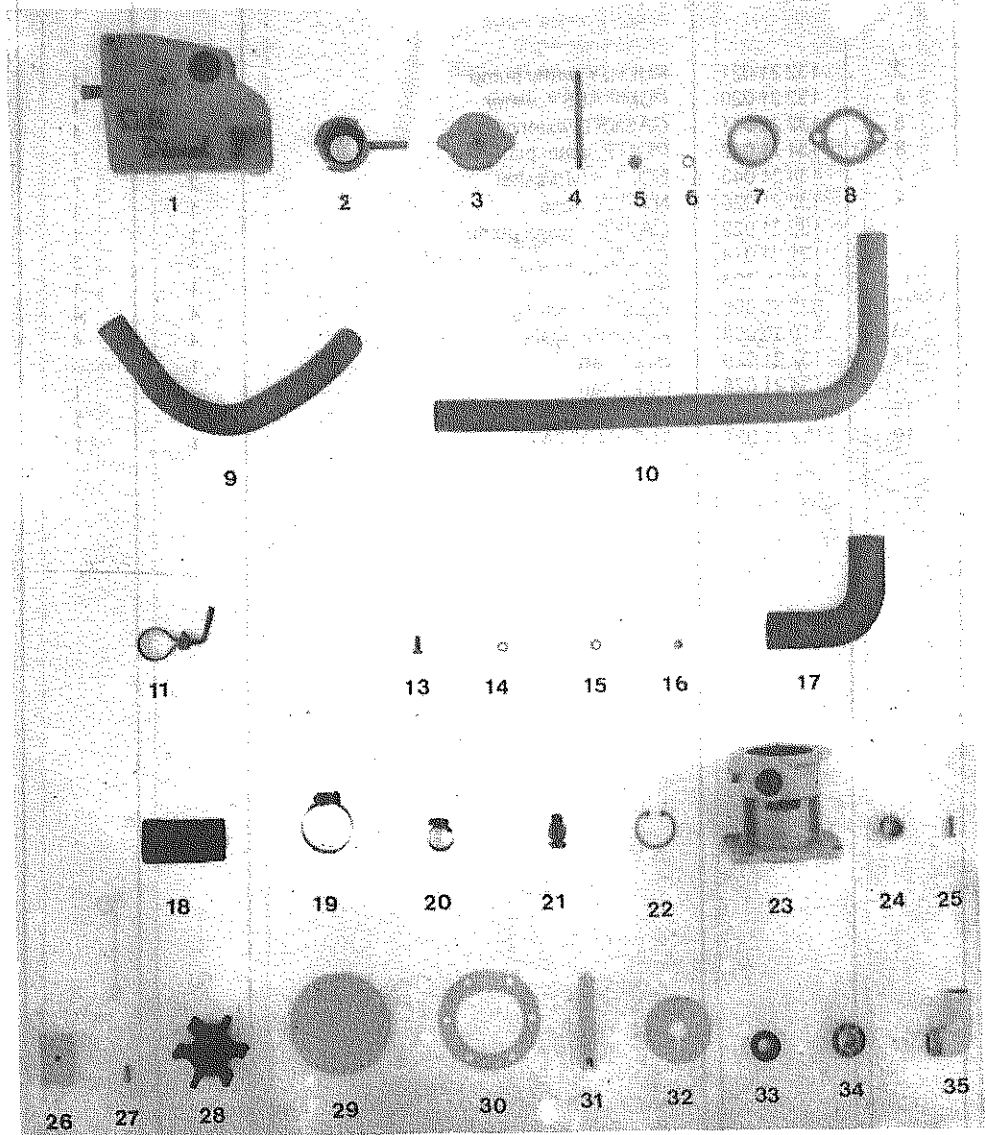


COOLING SYSTEM

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-2	132 11 150	EXPANSION TANK	1	1
2	151 11 002	FILLER CAP PIPE	1	1
3	147 11 003	CAP, filler	1	1
4	132 11 015	STUD	2	2
5	132 11 016	NUT	2	2
6	560 00 007	WASHER	2	2
7	132 11 056	HOLDER, thermostat	1	1
8	132 11 054	GASKET	1	1
9	132 11 051	PIPE, tank to cooler	1	1
10	136 11 052	PIPE, cooler to engine	1	1
	132 11 052	PIPE, cooler to engine	-	-
11	136 11 053	BRACKET, tube	1	-
11	132 11 053	BRACKET, tube	-	1
13	521 02 156	BOLT	1	1
14	530 33 006	WASHER, spring	1	1
15	510 30 006	WASHER, plain	1	1
16	521 20 006	NUT	1	1
17	132 11 057	BEND, rubber	1	1
18	136 11 036	SLEEVE, rubber 30 x 85	1	-
	136 11 037	SLEEVE, rubber 30 x 80	1	1
	136 11 038	SLEEVE, rubber 30 x 75	1	-
	134 11 036	SLEEVE, rubber 30 x 100	-	2
19	540 82 025	CLAMP	7	8
	540 82 032	CLAMP	1	-
20	540 81 012	CLAMP	2	2
21	131 11 039	PLUG, drain	1	1
22-34	332 11 000	WATER PUMP ASSY (1)	1	1
	334 11 000	WATER PUMP ASSY (2)	-	1
22	530 41 028	PIN (1)	1	1
	530 41 032	PIN (2)	-	1
23	332 11 001	BLOCK, water pump (1)	1	1
	334 11 001	BLOCK, water pump (2)	-	1
24	332 11 015	SPACING BOSH (1)	1	1
	334 11 015	SPACING BOSH (2)	-	1
25	553 07 105	BOLT	1	1
-	570 00 301	WASHER	1	1
26	312 11 005	CAM	1	1
27	553 07 104	BOLT (Down to Sep. 89)	6	6
	551 02 104	BOLT (Up to Oct. 89) (1)	6	6
	541 02 104	BOLT (2)	-	6
28	312 11 008	IMPELLER ASSY	1	1
29	312 11 002	COVER, pump	1	1
30	312 11 003	GASKET, cover	1	1
31	312 11 010	SHAFT, pump (1)	1	1
	334 11 010	SHAFT, pump (2)	-	1
32	332 11 026	DISK, friction (1)	1	1
	334 11 026	DISK, friction (2)	-	1
33	321 11 020	SEAL, shaft (1)	2	2
	334 11 020	SEAL, shaft (2)	-	1
	334 11 019	SEAL(2)	-	1
34	121 10 030	BALL BEARING (1)	2	2
	334 11 014	BALL BEARING (2)	-	2
-	252 10 010	O-RING (1)	1	1
-	333 11 013	O-RING (2)	-	1
35	132 11 027	BEND, water pump (1)	2	2
	132 11 035	BEND, water pump (2)	-	1
		BEND, water pump (2)	-	1

(1) Down to eng. Mini-34 n° 30.350  
 (2) Up to eng. Mini-34 n° 30.355

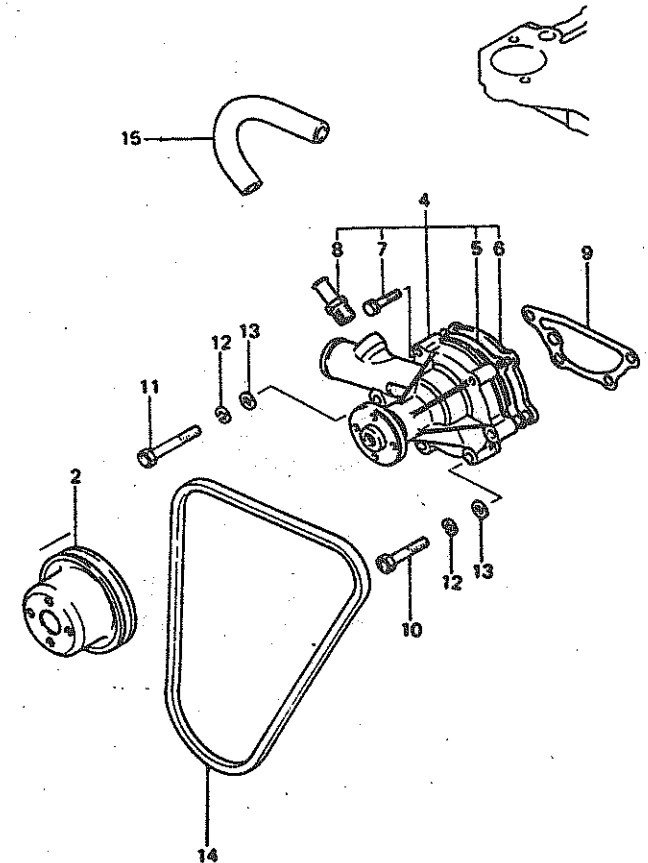
COOLING SYSTEM



COOLING PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
2	132 21 021	PULLEY, water pump	1	1
4	132 21 020	PUMP ASSY, water	1	1
5	132 21 041	GASKET, water pump	1	1
6	134 21 042	PLATE, water pump	1	1
7	134 21 043	BOLT, whit washer	1	1
8	132 21 026	NIPPLE, hose	2	2
9	132 21 022	GASKET, water pump	1	1
10	131 24 014	BOLT	1	1
11	131 21 023	BOLT	3	3
12	530 33 008	WASHER, spring	1	1
13	510 30 008	WASHER, plain	4	4
14	132 21 028	BELT, fan	4	4
	134 21 028	BELT, fan	1	-
15	132 21 025	HOSSE ASSY, water	1	1
19	132 21 027	THERMOSTAT	1	1

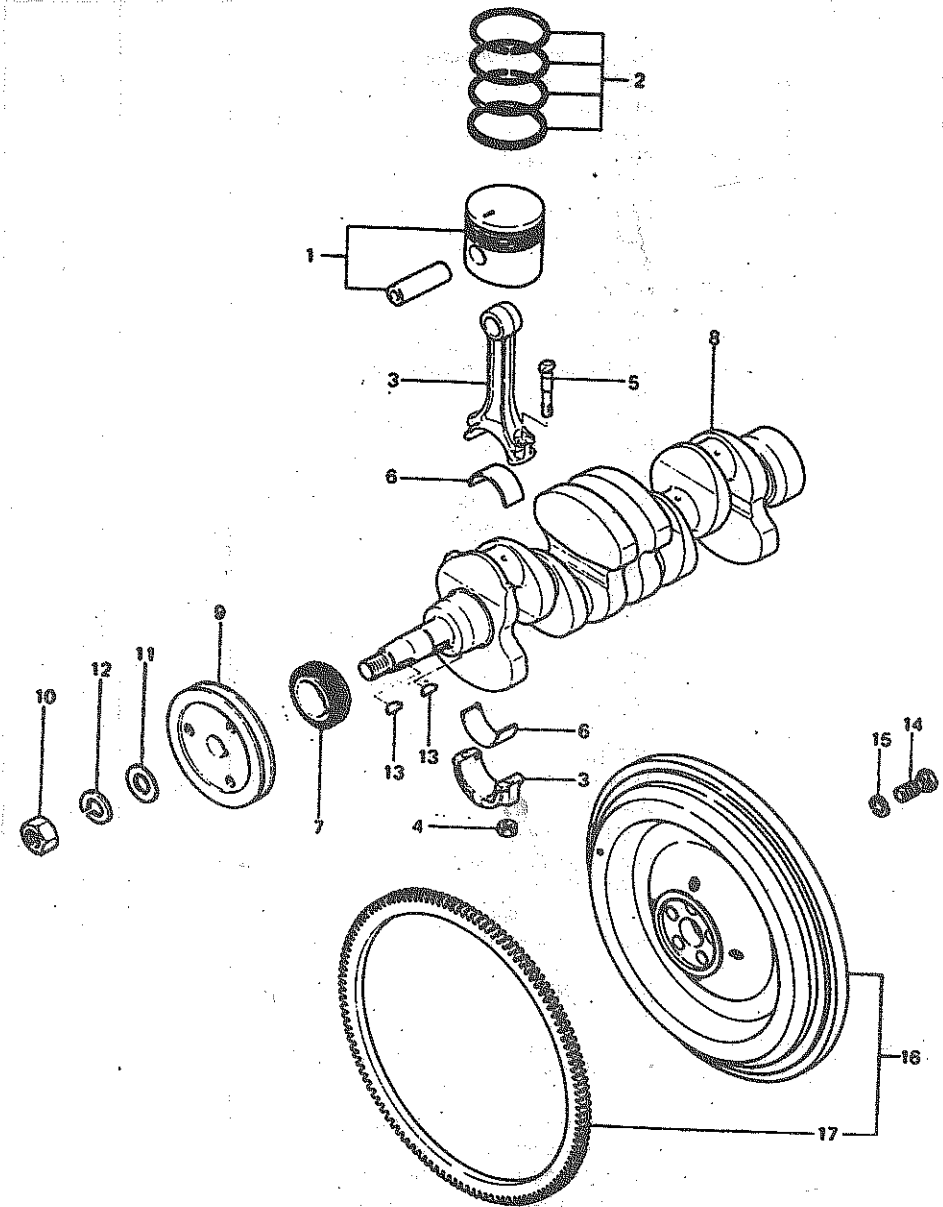
COOLING PARTS



MAIN MOVING PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	134 22 001	PISTON & PIN STD.	3	4
	134 22 002	PISTON & PIN SET + 0,25	3	4
	134 22 003	PISTON & PIN SET + 0,50	3	4
	134 22 004	PISTON & PIN SET + 0,75	3	4
2	134 22 006	RING SET, piston std.	3	4
	134 22 007	RING SET, piston + 0,25	3	4
	134 22 008	RING SET, piston + 0,50	3	4
	134 22 009	RING SET, piston + 0,75	3	4
3-5	132 22 012	ROD ASSY, connecting	3	4
4	132 22 011	NUT, con. rod	6	8
5	132 22 013	BOLT, con rod	6	8
6	132 22 014	BEARING SET, con rod std.	3	4
	132 22 015	BEARING SET, con rod + 0,25	3	4
	132 22 016	BEARING SET, con rod + 0,50	3	4
	132 22 017	BEARING SET, con rod + 0,75	3	4
7	132 22 021	GEAR, crankshaft	1	1
8	136 22 018	CRANKSHAFT	1	-
	132 22 018	CRANKSHAFT	-	1
9	136 22 024	PULLEY, crankshaft	1	-
	132 22 024	PULLEY, crankshaft	-	1
10	132 22 026	NUT	1	1
11	510 30 018	WASHER, plain	1	1
12	530 33 018	WASHER, spring	1	1
13	132 22 020	KEY, woodruff	2	2
14	131 22 031	BOLT, flywheel	5	5
15	131 22 030	WASHER, special spring	5	5
16	132 22 027	FLYWHEEL, sub assy	1	1
17	132 22 029	GEAR, ring	1	1

MAIN MOVING PARTS

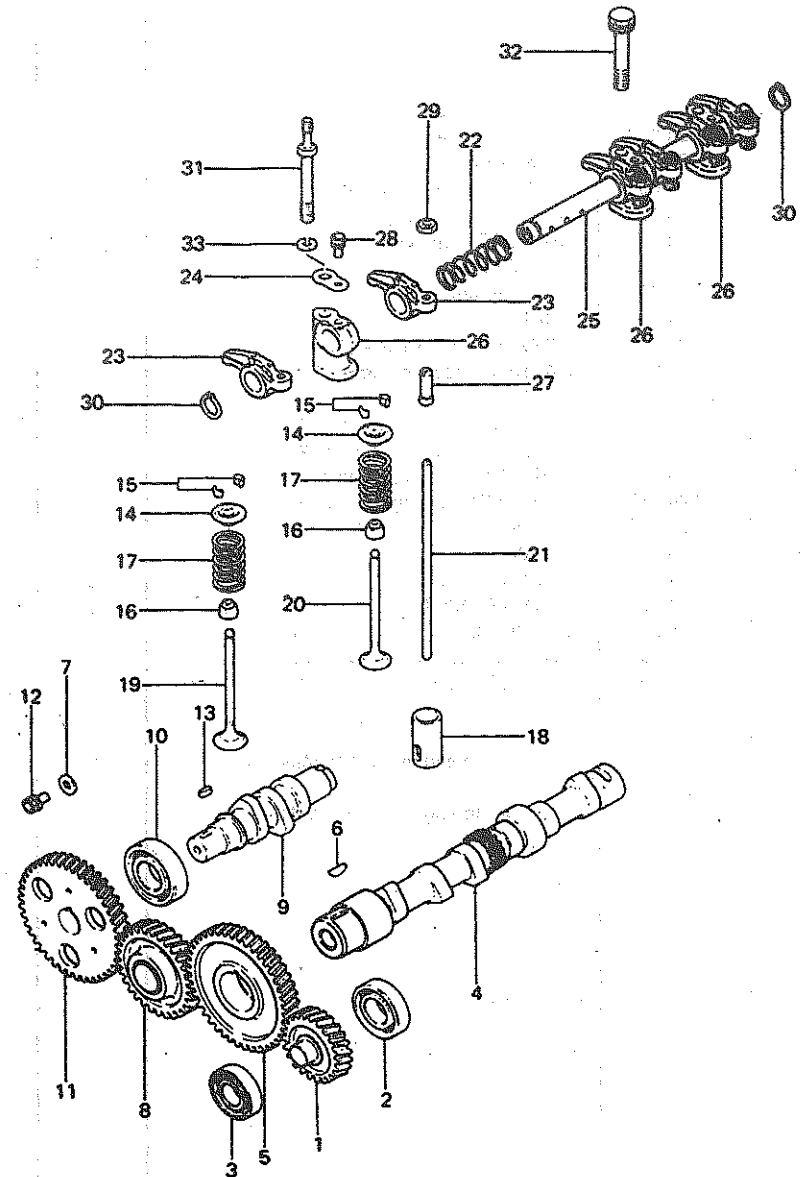


TIMING PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	132 22 066	GEAR, pressure oil pump (up) (1)	1	1
	134 22 066	GEAR, pressure oil pump (from) (2)	1	1
2	132 22 067	BEARING, ball	1	1
3	132 22 068	BEARING, ball (up) (1)	1	1
	132 22 067	BEARING, ball (from) (2)	1	1
4	136 22 035	CAMSHAFT	1	—
	132 21 035	CAMSHAFT	—	1
5	132 22 037	GEAR, camshaft	1	1
6	132 22 020	KEY, woodruff	1	1
7	510 30 008	WASHER	1	1
8	132 22 038	GEAR ASSY, idler	1	1
9	136 22 040	SHAFT, fuel injection pump cam.	1	—
	132 22 040	SHAFT, fuel injection pump cam.	—	1
10	132 22 062	BEARING, ball	1	1
11	132 22 043	GEAR, fuel injection pump cam	1	1
12	131 22 050	BOLT, whit washer	1	1
13	132 22 060	KEY, sunk	1	1
14	132 22 058	RETAINER, valver spring	6	8
15	132 22 059	LOCK, valve spring retainer	12	16
16	132 22 054	SEAL, valve stem	6	8
17	132 22 057	SPRING, valve	6	8
18	132 22 061	TAPPET	6	8
19	132 22 055	VALVE, intake Ø 27,2 (Down to Sep. 90)	3	4
19	132 22 155	VALVE, intake Ø 32,2 (3)	3	4
20	132 22 056	VALVE, exhaust Ø 25,2 (Down to Sep. 90)	3	4
20	132 22 156	VALVE, intake Ø 27,2 (3)	3	4
21	132 22 041	ROD, push	6	8
22	131 22 047	SPRING, rocker shaft LH	2	3
23	132 22 042	ARM, rocker	6	8
24	132 22 063	WASHER, seat	2	2
25	136 22 046	SHAFT ASSY, rocker	1	—
	132 22 046	SHAFT ASSY, rocker	—	1
26	132 22 049	STAY, rocker	3	4
27	131 22 044	SCREW, adjusting	6	8
28	521 02 156	BOLT, whit washer	2	2
29	131 22 045	NUT, jam	6	8
30	530 40 019	SNAR RING	2	2
31	132 22 053	BOLT	2	2
32	132 22 065	BOLT, with washer	1	2
33	530 33 010	WASHER, spring	2	2

- (1) Down to eng. n° 17.999 MINI-23  
Down to eng. n° 13.103 MINI-34  
(2) Up to eng. n° 18.500 MINI-23  
Up to eng. n° 13.104 MINI-34  
(3) Up to eng. n° 86.135 MINI-23  
Up to eng. n° 28.795 MINI-34

TIMING PARTS





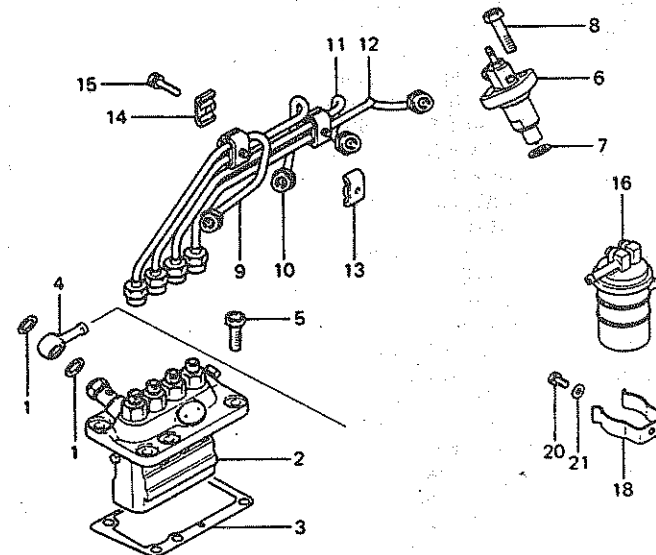
## FUEL SUPPLY PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	131 24 001	WASHER, seal	2	-
	132 24 001	WASHER, seal	-	2
2	136 25 001	PUMP ASSY, fuel injection	1	-
	134 25 001	PUMP ASSY, fuel injection	-	1
3	136 24 103	SHIMSET, adjusting	1	-
	132 24 103	SHIMSET, adjusting	-	1
4	136 24 002	COLLAR, union	1	-
	132 24 002	COLLAR, unión	-	1
5	131 24 012	BOLT	4	6
6	131 26 001	NOZZLE & HOLDER ASSY	3	4
7	131 24 013	GASKET, nozzle holder	3	4
8	521 01 259	BOLT	6	8
9	132 24 015	PIPE ASSY, fuel injection n° 1	1	1
10	132 24 016	PIPE ASSY, fuel injection n° 2	1	1
11	132 24 019	PIPE ASSY, fuel injection n° 3	1	1
12	132 24 022	PIPE ASSY, fuel injection n° 4	-	1
13	131 24 017	CLAMP	2	3
14	131 24 018	CLAMP	2	3
15	131 24 019	BOLT, with washer	2	3
16	131 24 020	FILTER ASSY, fuel (1) (2)	1	1
18	131 24 021	CLAMP, filter (1) (2)	1	1
20	131 23 005	BOLT, with washer (1) (2)	1	1
21	510 30 006	WASHER, plain (1) (2)	1	1

(1) Down to eng. n° 20.145 MINI-34

(2) Down to eng. n° 42.087 MINI-23

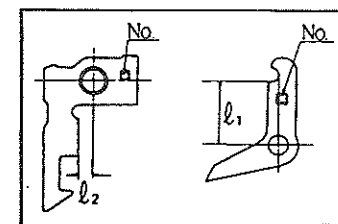
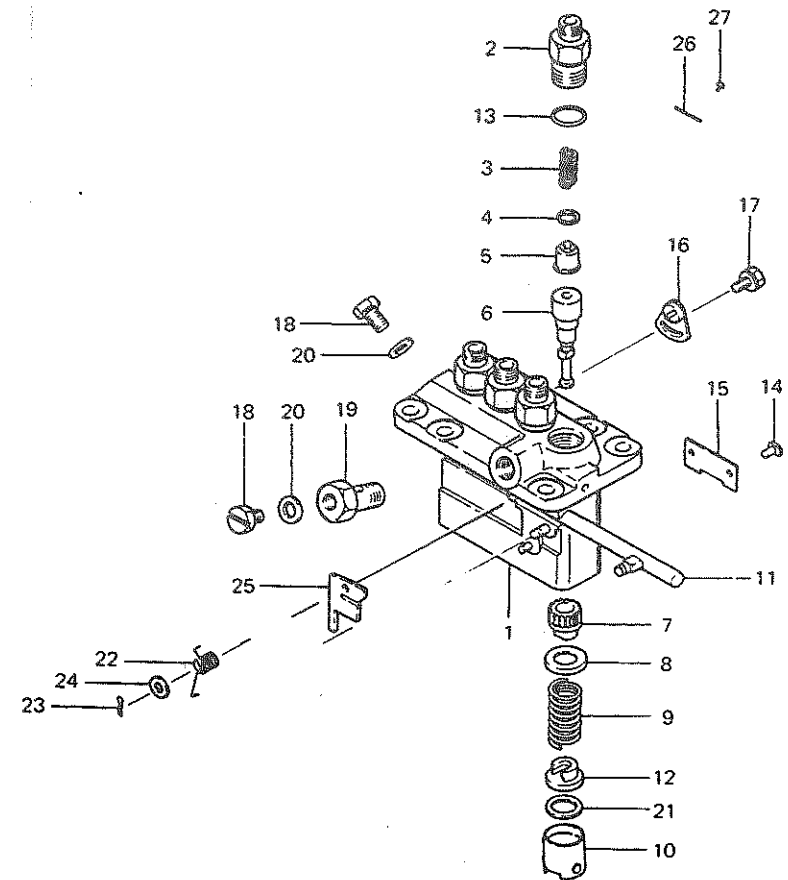
## FUEL SUPPLY PARTS



### FUEL INJECTION PUMP

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-27	136 25 001	PUMP ASSY, fuel injection	1	-
	134 25 001	PUMP ASSY, fuel injection	-	1
1	136 25 005	HOUSING SUB ASSY, pump	1	-
	132 25 005	HOUSING SUB ASSY, pump	-	1
2	131 25 004	HOLDER, delivery valve	3	4
3	132 25 002	SPRING, delivery valve	3	-
	131 25 006	SPRING, delivery valve	-	4
4	131 25 007	GASKET, delivery valve	3	4
5	131 25 008	VALVE SUB ASSY, delivery	3	4
6	136 25 009	ELEMENT SUB ASSY, pump	3	-
	134 25 009	ELEMENT SUB ASSY, pump	-	4
7	131 25 010	SLEEVE, plunger control	3	4
8	131 25 011	SEAT, spring upper	3	4
9	131 25 012	SPRING, pump plunger	3	4
10	131 25 021	TAPPET SUB ASSY	3	4
11	136 25 006	RACK ASSY, control	1	-
	132 25 006	RACK ASSY, control	-	1
12	131 25 013	SEAT, spring lower	3	4
13	131 25 033	O-RING	3	4
14	131 25 022	PIN, tappet guide	3	4
15	136 25 023	PLATE	1	-
	131 25 023	PLATE	-	2
16	131 25 030	PLATE ASSY, adjusting	2	3
17	131 25 028	BOLT, with washer	2	2
18	131 25 026	SCREW, air breather	1	2
19	131 25 027	SCREW, follow	1	-
	132 25 057	SCREW, follow	-	1
20	131 25 025	WASHER	1	2
21	131 25 014	SHIM, plate	C	C
	131 25 015	SHIM, plate	C	C
	131 25 016	SHIM, plate	C	C
	131 25 017	SHIM, plate	C	C
	131 25 018	SHIM, plate	C	C
	131 25 019	SHIM, plate	C	C
	131 25 020	SHIM, plate	C	C
22	132 25 031	SPRING, return	1	-
	134 25 031	SPRING, return	-	1
23	131 25 032	PIN, split	1	1
24	510 30 005	WASHER, plate	1	1
25	136 25 042	STOPPER	C	-
	136 25 043	STOPPER	C	-
	136 25 044	STOPPER	C	-
	136 25 045	STOPPER	C	-
	136 25 046	STOPPER	C	-
	136 25 047	STOPPER	C	-
	136 25 048	STOPPER	C	-
	136 25 049	STOPPER	C	-
	136 25 050	STOPPER	C	-

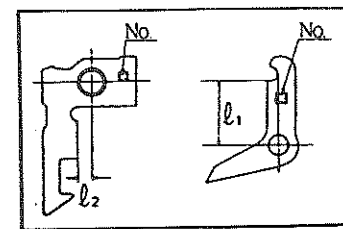
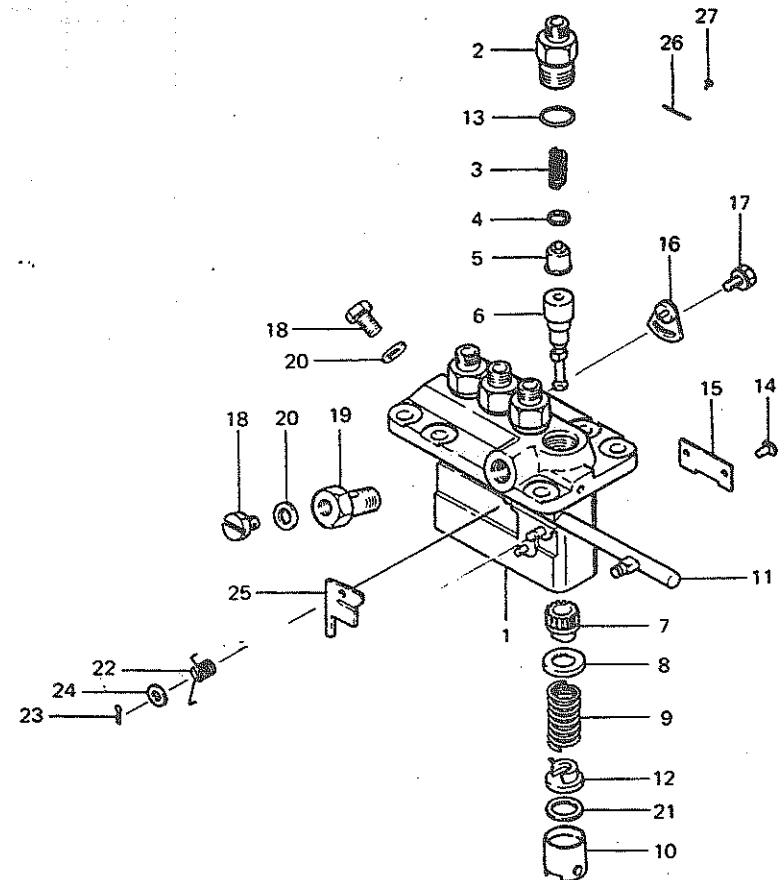
### FUEL INJECTION PUMP



### FUEL INJECTION PUMP

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
	136 25 052	STOPPER	C	-
	136 25 053	STOPPER	C	-
	132 25 046	STOPPER	-	C
	132 25 047	STOPPER	-	C
	132 25 048	STOPPER	-	C
	132 25 049	STOPPER	-	C
	132 25 050	STOPPER	-	C
	132 25 052	STOPPER	-	C
	132 25 042	STOPPER	-	C
	132 25 043	STOPPER	-	C
	132 25 044	STOPPER	-	C
	134 25 053	STOPPER	-	C
26	136 25 058	PLATE, mame	1	-
	134 25 058	PLATE, mame	-	1
27	131 25 003	RIVET	2	2

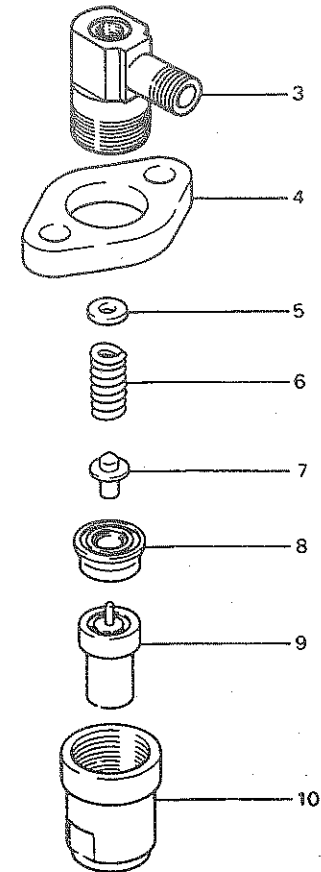
### FUEL INJECTION PUMP



NOZZLE & NOZZLE HOLDER

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-10	131 26 001	NOZZLE & HOLDER ASSY	3	4
3	131 26 002	BODY	3	4
4	131 26 008	FLANGE	1	1
5	131 26 017	WASHER, 1,3	C	C
	131 26 010	WASHER, 1,35	C	C
	131 26 011	WASHER, 1,4	C	C
	131 26 012	WASHER, 0,9	C	C
	131 26 013	WASHER, 1,0	C	C
	131 26 014	WASHER, 1,1	C	C
	131 26 015	WASHER, 1,2	C	C
	131 26 016	WASHER, 0,1	C	C
6	131 26 004	SPRING, pressure	3	4
7	131 26 003	PIN, pressure	3	4
8	131 26 007	PIECE, distance	3	4
9	131 26 018	NOZZLE, assy	3	4
10	131 26 006	NUNT, retaining	3	4

NOZZLE & NOZZLE HOLDER

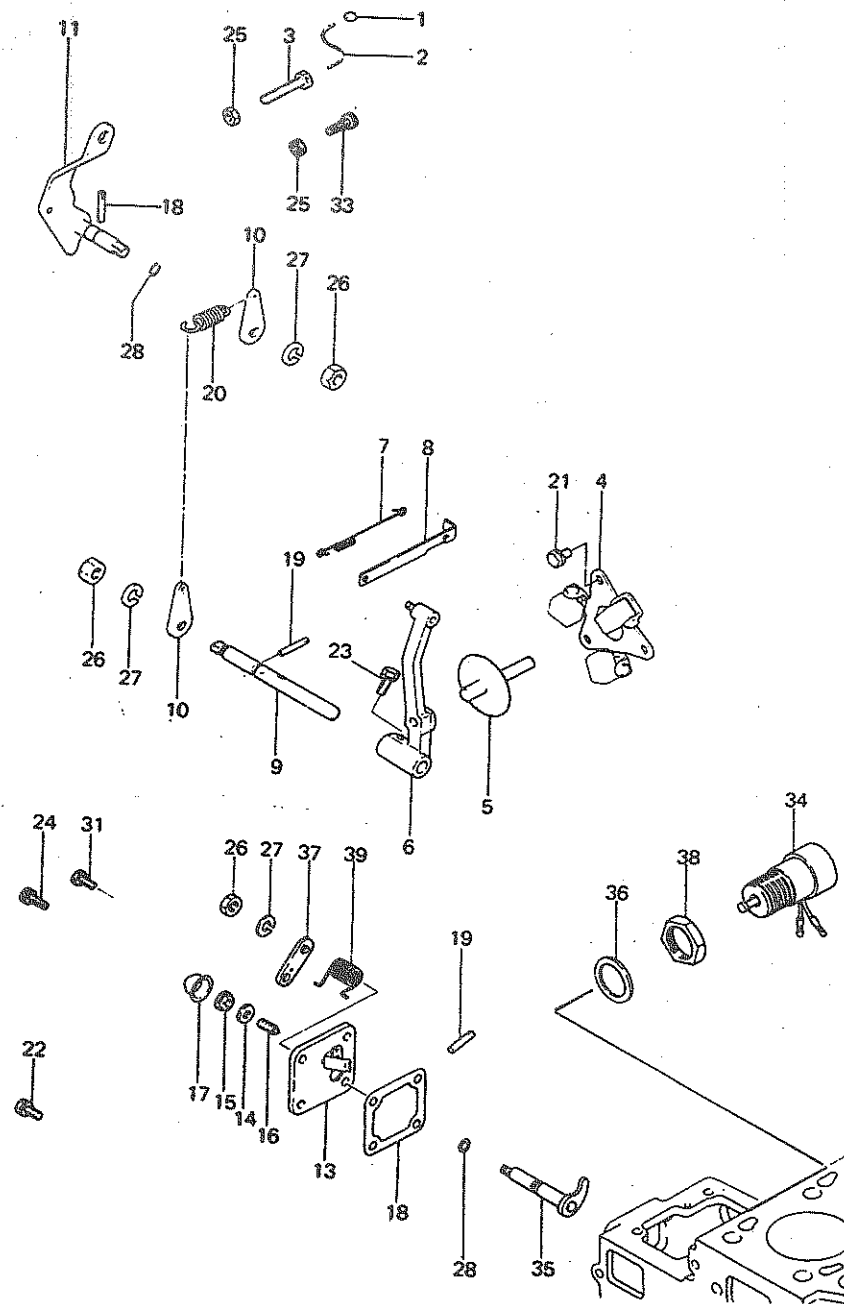


## GOVERNOR PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	131 23 019	METAL, sealing	1	1
2	131 23 020	WIRE	1	1
3	131 23 017	BOLT, high speed set	1	1
4	132 23 001	WHEIGHTASSY, governor	1	1
5	132 23 002	SHAFT ASSY, sliding	1	1
6	132 23 003	LEVER ASSY, governor	1	1
7	132 23 004	SPRING, tie rod	1	-
7	134 23 004	SPRING, tie rod	-	1
8	134 23 005	ROD, tie	1	1
9	132 23 006	SHAFT, governor	1	1
10	132 23 007	LEVER, governorspring	2	2
11	134 23 008	LEVER ASSY, speed control (2)	1	-
11	132 23 008	LEVER ASSY, speed control (1)	-	1
13-16	134 23 019	COVER ASSY, tie rod	-	-
14	134 23 020	WASHER	1	1
15	134 23 021	NUT	1	1
16	134 23 022	BOLT ADJUSTING	1	1
17	134 23 023	CAP SEALING	1	1
18	132 23 014	GASKET, cover	1	1
19	131 23 009	PIN, grooved	2	2
20	134 23 015	SPRING, governor (A)	1	1
20	170 23 015	SPRING, governor (B)	1	1
21	132 23 016	BOLT	3	3
22	521 02 156	BOLT	1	1
23	521 02 156	BOLT	1	1
24	131 24 019	BOLT	3	3
25	521 20 006	NUT	2	2
26	521 20 008	NUT, jam	3	3
28	131 23 021	O'RING	2	1
31	134 23 024	BOLT, cable clamp	2	2
33	134 23 025	BOLT, low idle set	1	1
34	134 24 025	SELENOID	1	1
35	134 25 026	LEVERASSY, stop	1	1
37	134 25 027	LEVER, stop	1	1
36	134 25 028	GASKET	1	1
38	134 25 029	NUT	1	1
39	134 25 030	SPRING, return	1	1

(1) Down to eng. n° 17.999 MINI-23  
Down to eng. n° 13.103 MINI-34  
(2) Up to eng. n° 18.500 MINI-23  
Up to eng. n° 13.104 MINI-34

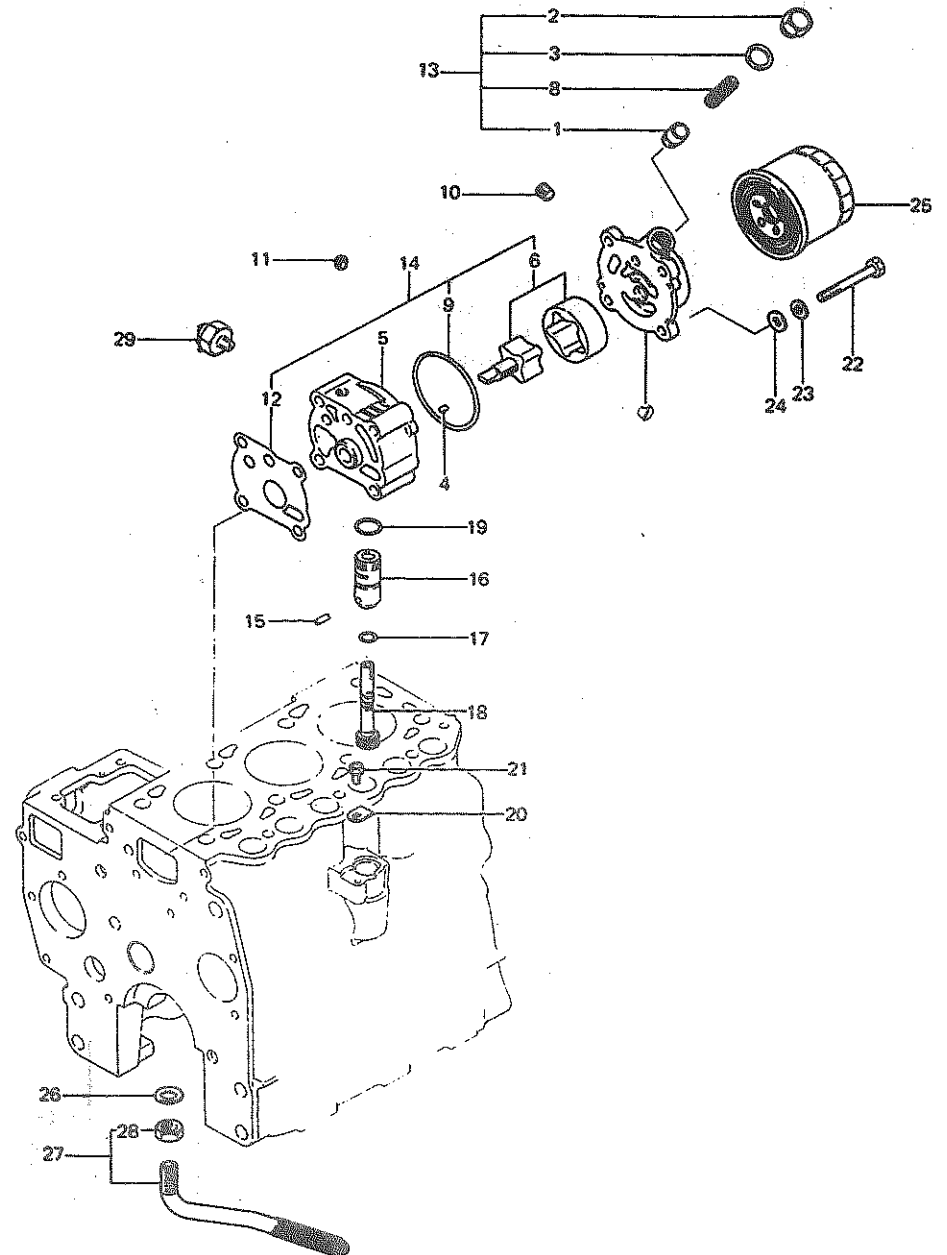
## GOVERNOR PARTS



## LUBRICATING PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-11	132 24 040	OIL PUMP ASSY	1	1
1	132 24 043	PLUMGER, relief	1	1
2	132 24 045	PLUG	1	1
3	131 20 032	GASKET	1	1
4	134 20 036	PIN, dowel	2	2
5	132 24 046	BODY, oil pump	1	1
6	132 24 042	ROTOR ASSY, oil pump	1	1
7	132 24 061	COVER, oil pump	1	1
8	132 24 044	SPRING, relief	1	1
9	132 24 049	O-RING	1	1
10	132 20 023	PLUG, toper	1	1
11	131 20 011	PLUG, toper	1	1
12	132 24 041	GASKET, oil pump body	1	1
13	132 24 070	SERVICE, kit relief valve	1	1
14	132 24 075	SERVICE, kit rotor	1	1
15-19	132 24 054	DRIVEN UNIT, speed meter	1	1
16	132 24 056	SLEEVE SPEEDOMETER GEAR	1	1
17	132 24 057	O-RING	1	1
18	132 24 058	GEAR, speedometer driven	1	1
19	132 24 059	O-RING	1	1
20	132 24 063	PLATE, looking	1	1
21	521 02 156	BOLT, whit washer	1	1
22	132 24 062	BOLT	4	4
23	530 33 008	WASHER, spring	4	4
24	510 30 008	WASHER, plain	4	4
25	131 24 051	FILTER ASSY, oil	1	1
26	132 24 001	WASHER, seal	1	1
27-28	136 24 052	SCREEM ASSY, oil	1	-
	132 24 052	SCREEM, assy oil	-	1
28	132 24 053	NUT, jam	1	1
29	131 24 060	SWITCH ASSY, oil pressure	1	1

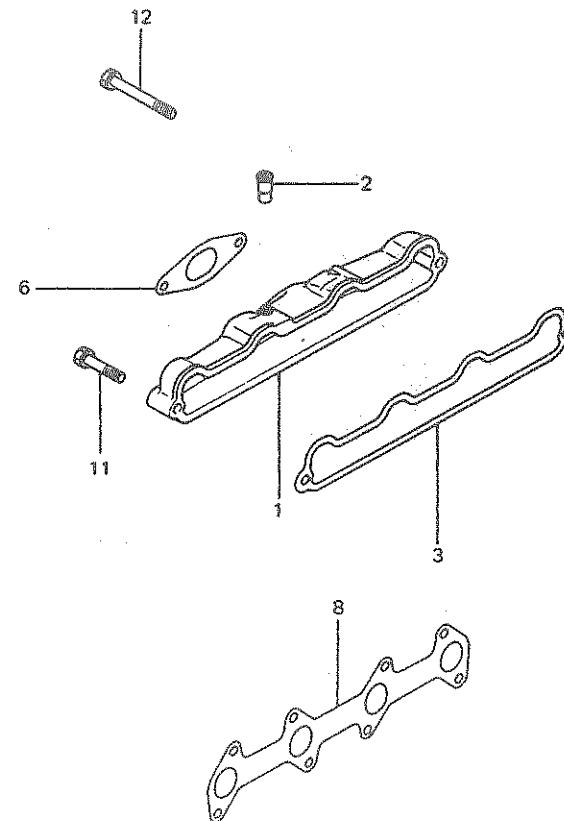
## LUBRICATING PARTS



### INTAKE PARTS

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-2	136 21 030	MANIFOLD ASSY, intake	1	-
	132 21 030	MANIFOLD ASSY, intake	-	1
2	132 21 017	PIPE	1	1
3	136 21 032	GASKET, intake manifold	1	-
	132 21 032	GASKET, intake manifold	-	1
6	132 21 034	GASKET, inlet pipe	1	1
8	136 21 035	GASKET, exhaust manifold	1	-
	132 21 035	GASKET, exhaust manifold	-	1
11	132 21 036	BOLT, whit washer	1	2
12	521 01 265	BOLKT, with washer	2	2

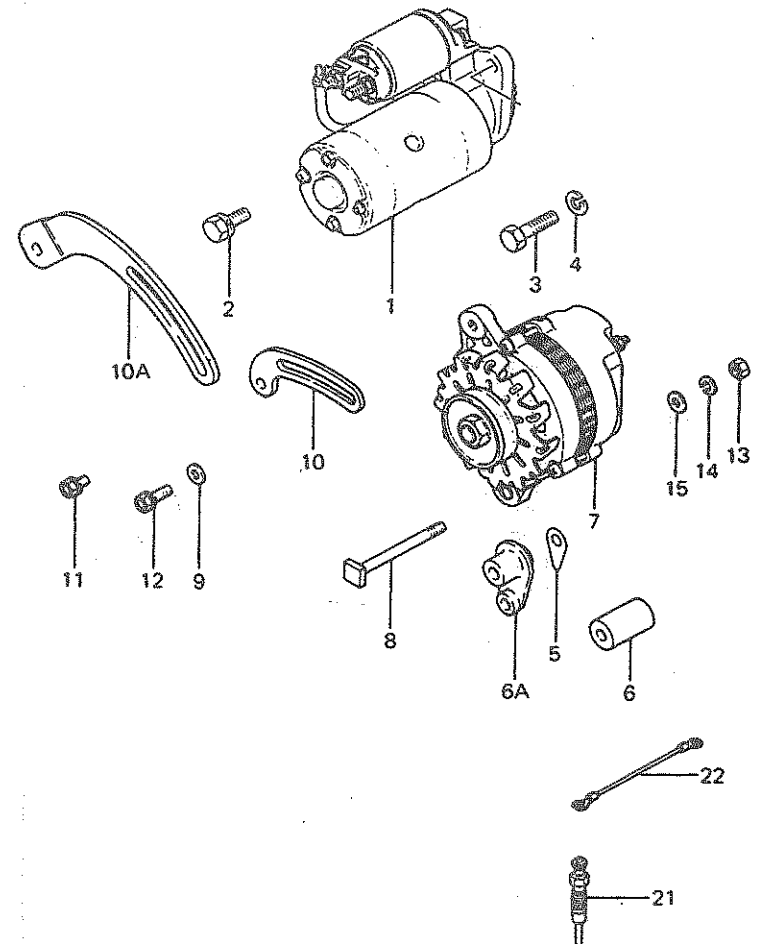
### INTAKE PARTS



ELECTRICAL EQUIPMENT

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	132 27 001	STARTERASSY	1	-
	134 27 001	STARTERASSY	-	1
2	522 02 308	BOLT	2	1
3	522 02 311	BOLT, starter	-	1
4	530 33 010	WASHER, spring	-	1
5	131 27 005	SHIM	S	S
6	132 27 006	SPACER	1	-
6-A	134 27 006	SPACER	-	1
7	136 27 010	ALTERNATORASSY (12V-35A)	1	-
	134 27 010	ALTERNATORASSY (12V-50A)	-	1
8	132 27 008	BOLT	1	-
	134 27 008	BOLT	-	1
9	132 22 039	WASHER	1	1
10	132 27 007	BRACE, generator	1	-
10-A	134 27 007	BRACE, generator	-	1
11	131 22 050	BOLT	1	1
12	131 27 012	BOLT	1	1
13	521 20 008	NUT	1	1
14	530 33 008	WASHER, spring	1	1
15	510 30 008	WASHER, plain	1	1
21	131 27 017	PLUG, glow	3	4
22	131 27 018	WIRE, glow plug read	2	3

ELECTRICAL EQUIPMENT

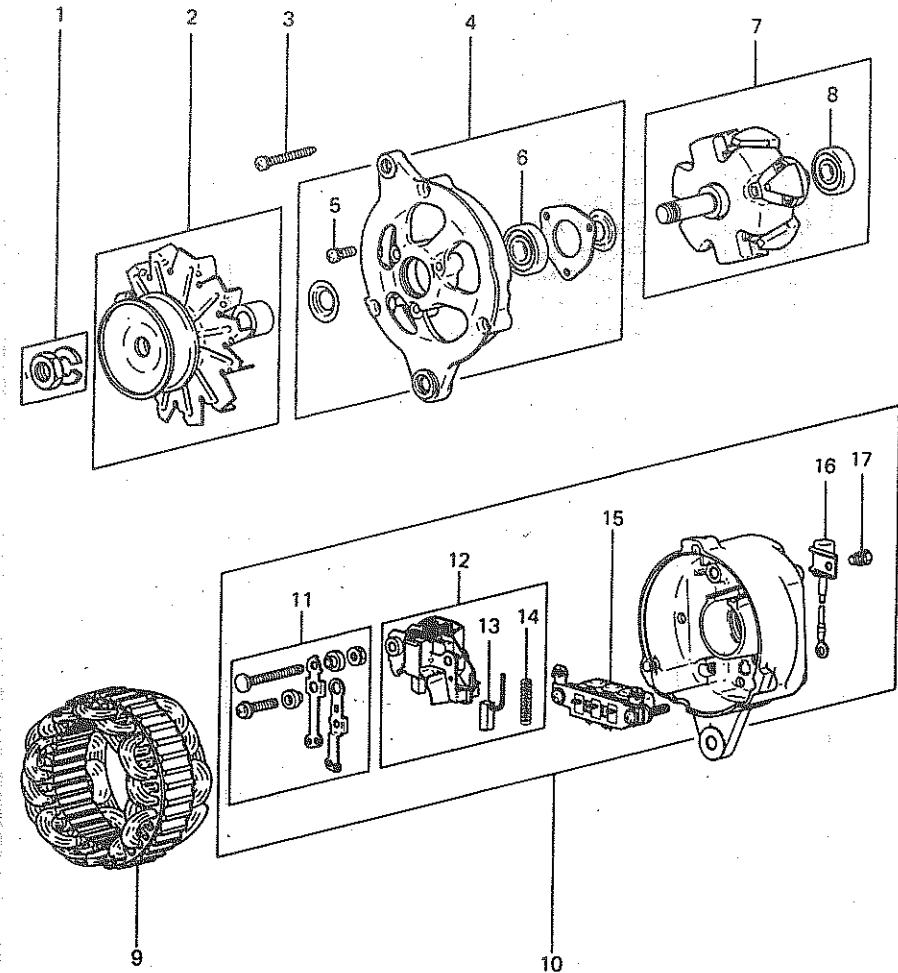




## ALTERNATOR

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1-17	136 27 010	ALTERNATOR ASSY (12V-35A)	1	-
1-16	134 27 010	ALTERNATOR ASSY (12V-50A)	-	1
1	132 27 051	NUT SET	1	1
2	136 27 052	PULLEY ASSY	1	-
	134 27 052	PULLEY ASSY	-	1
3	136 27 053	BOLT SET, through	1	-
	132 27 053	BOLT SET, through	-	1
4	136 27 054	BRACKET ASSY, front	1	-
	134 27 054	BRACKET ASSY, front	-	1
5	132 27 055	SCREW SET	1	1
6	136 27 056	BEARING, front	1	-
	132 27 056	BEARING, front	-	1
7	132 27 057	ROTOR ASSY	1	-
	134 27 057	ROTOR ASSY	-	1
8	132 27 058	BEARING, rear	1	1
9	136 27 059	STATOR ASSY	1	-
	134 27 059	STATOR ASSY	-	1
10	136 27 060	BRACKET ASSY, rear	1	-
	134 27 060	BRACKET ASSY, rear	-	1
11	136 27 061	TERMINAL SET	1	-
	134 27 061	TERMINAL SET	-	1
12	136 27 016	REGULATOR ASSY	1	-
	134 27 016	REGULATOR ASSY	-	1
13	134 27 065	BRUSH	2	2
14	132 27 066	SPRING BRUSH	2	2
15	136 27 067	RECTIFIER ASSY	1	-
	134 27 067	RECTIFIER ASSY	-	1
16	136 27 068	CONDENSER ASSY	1	-
	134 27 068	CONDENSER ASSY	-	1
17	136 27 069	BOLT, with washer	1	-

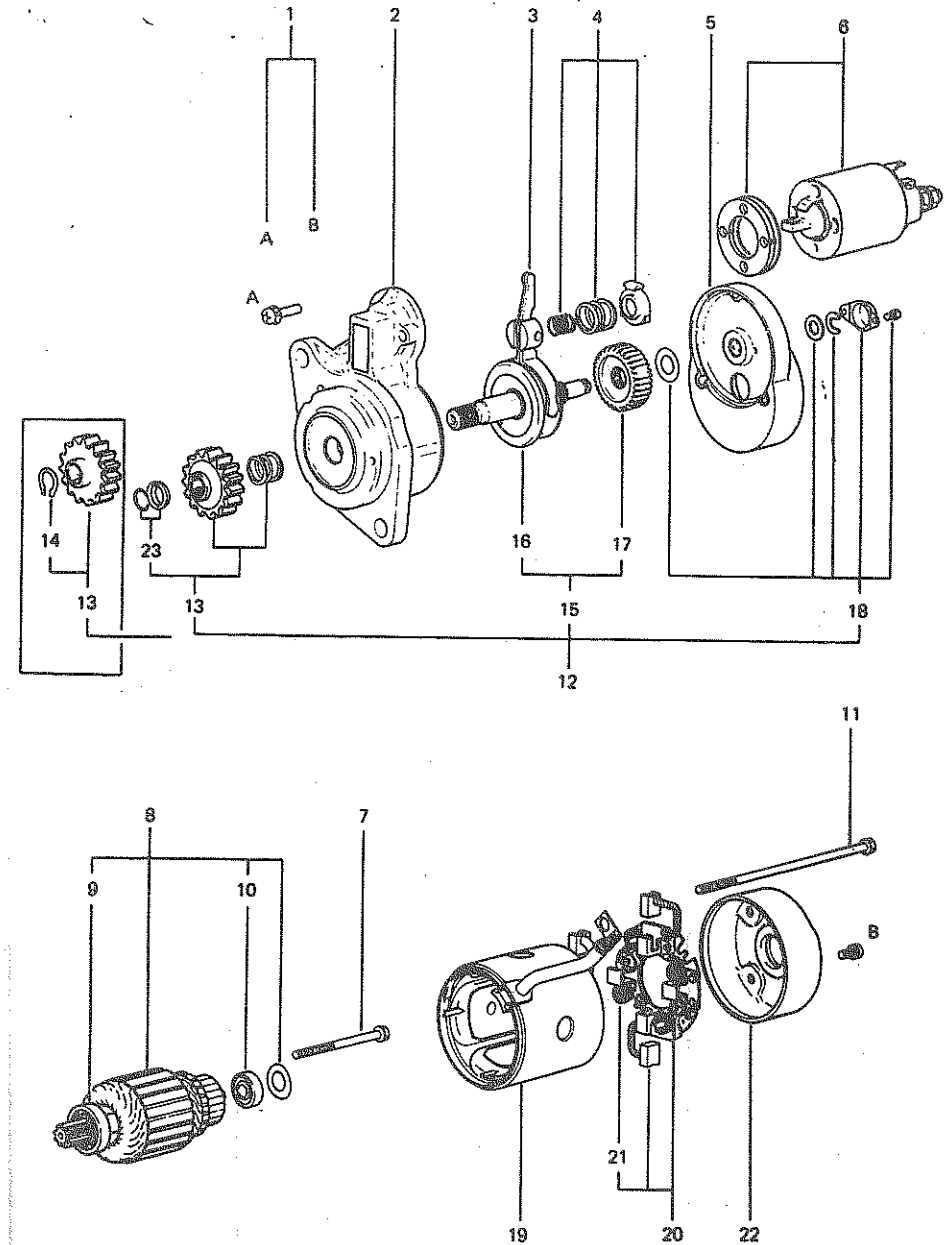
## ALTERNATOR



### STARTER MINI-23

Item	Part no.	Description	Quantity
1-22	132 27 001	STARTER ASSY (Model M002T50371)	1
1	132 27 101	SCREW SET	1
2	132 27 102	BRACKET ASSY, front	1
3	132 27 103	LEVER ASSY	1
4	131 27 103	SPRING SET	1
5	132 27 105	BRACKET ASSY, center	1
6	131 27 104	SWITCH ASSY	1
7	132 27 107	BOLT	1
8	132 27 108	ARMATURE SET	1
9	132 27 109	BEARING	1
10	132 27 110	BEARING	1
11	132 27 111	BOLT	1
12	132 27 112	SHAFT ASSY, clutch set	1
13	132 27 113	PINION SET	1
14	132 27 114	SNAP RING	1
15	132 27 115	GEAR SET	1
16	132 27 116	SHAFT ASSY, pinion	1
17	132 27 117	GEAR	1
18	132 27 118	COVER SET	1
19	132 27 119	YOKE ASSY	1
20	132 27 120	BRUSH HOLDER ASSY	1
21	131 27 118	SPRING, brush	4
22	132 27 122	BRACKET, rear	1
23	132 27 125	SERVICE KIT STARTER BEARING	S

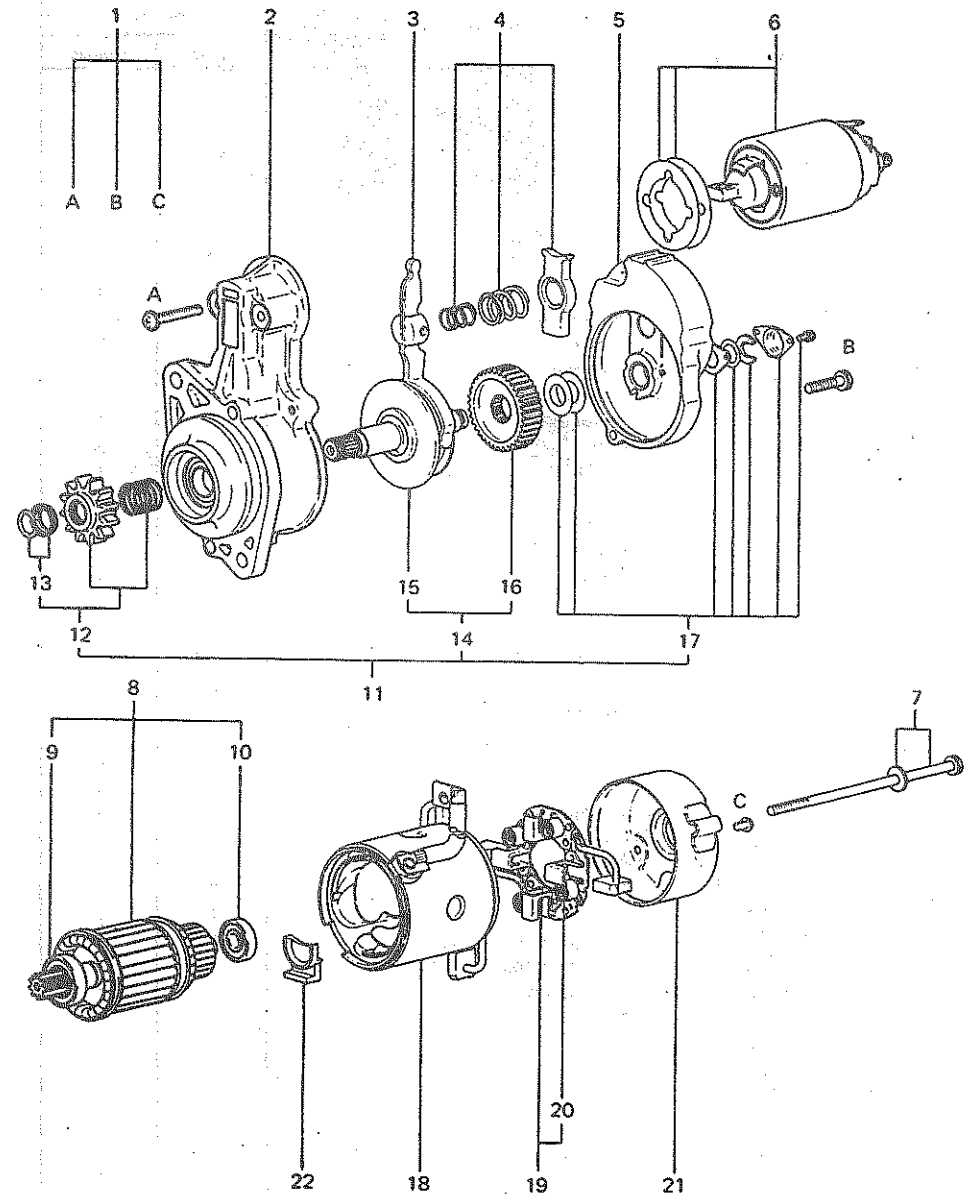
### STARTER MINI-23



### STARTER MINI-34

Item	Part no.	Description	Quantity
1-22	134 27 001	STARTER ASSY	1
1	134 27 101	SCREW SET	1
2	134 27 102	BRACKET ASSY, front	1
3	134 27 103	LEVER ASSY	1
4	134 27 104	SPRING SET	1
5	134 27 105	BRACKET ASSY, center	1
6	134 27 106	SWITCH ASSY	1
7	134 27 107	BOLT SET	1
8	134 27 108	ARMATURE SET	1
9	134 27 109	BEARING, front	1
10	134 27 110	BEARING, rear	1
11	134 27 112	SHAFT ASSY, clutch set	1
12	134 27 113	PINION SET	1
13	134 27 114	STOPPER SET	1
14	134 27 115	GEAR SET	1
15	134 27 116	PINION SHAFT ASSY	1
16	134 27 117	GEAR	1
17	134 27 118	COVER SET	1
18	134 27 119	YOKE ASSY	1
19	134 27 120	HOLDER ASSY, brush	1
20	134 27 121	SPRING, brush	4
21	134 27 122	BRACKET ASSY, rear	1
22	134 27 123	PACKING	1

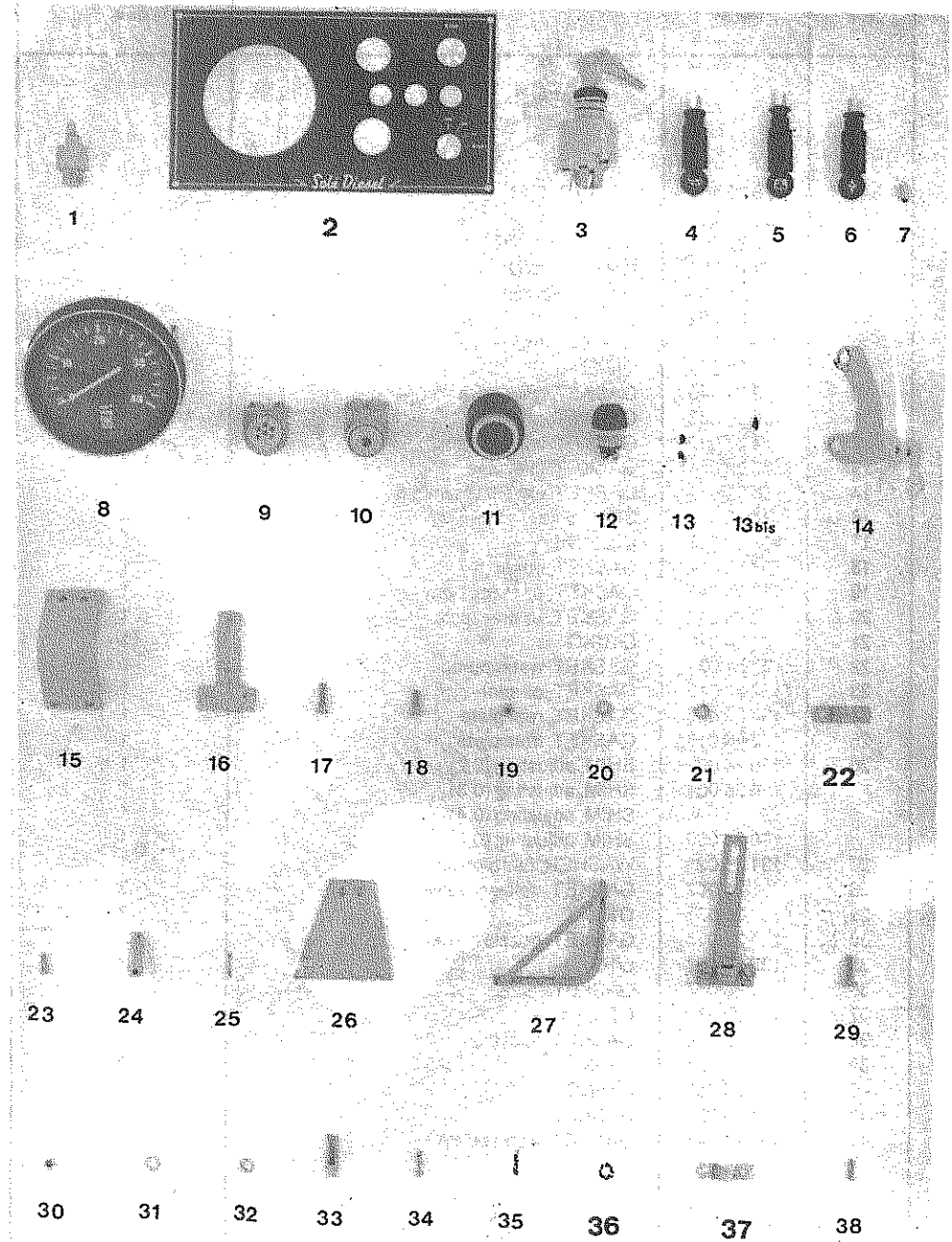
### STARTER MINI-34



# ELECTRICAL EQUIPMENT AND REMOTE CONTROL

Item	Part no.	Description	Quantity	
			MINI-23	MINI-34
1	609 00 070	SWITCH, thermo	1	1
2-13	609 36 000	ELECTRICAL PANEL	1	-
2-13	609 34 000	ELECTRICAL PANEL	-	1
2	609 31 001	PANEL	1	1
3	609 00 031	SWITCH, starting	1	1
-	609 00 035	COVER, key	1	1
4	609 00 050	LAMP, oil press	1	1
5	609 00 051	LAMP, charge	1	1
6	609 00 052	LAMP, water temp.	1	1
7	609 00 045	BULB 12 V.	3	3
8	609 34 710	TACHOMETER	1	1
9	609 36 095	LAMP, glow	1	-
10	609 32 095	LAMP, glow	-	1
11	609 00 060	ALARM, switch	1	1
12	609 00 040	STOP SWITCH	1	1
13	609 00 115	FUSE 3A.	2	2
13 bis	609 00 110	DIODE	2	2
14	136 19 001	BRACKET, eng. control	1	-
15	134 19 002	BRACKET, eng. control	-	1
16	121 19 021	BRACKET, eng. control	1	1
17	521 02 157	SCREW	2	2
18	521 02 156	NUT	2	2
19	521 20 006	WASHER	4	4
20	510 30 006	WASHER, spring	4	4
21	530 33 006	CLAMP, cable	4	4
22	147 19 013	SCREW, clamp	1	1
23	553 07 105	GAS control yoke	2	2
24	134 19 003	PIN	1	1
25	510 51 107	BRACKET, gear box control	1	1
26	131 19 015	BRACKET, gear box control	1	1
27	121 19 020	BRACKET, clamp	1	1
28	121 19 021	SCREW	1	1
29	521 02 157	SCREW	4	4
30	521 20 006	NUT	4	4
31	510 30 006	WASHER	4	4
32	530 33 006	WASHER, spring	4	4
33	131 19 128	YOKE	1	1
34	147 19 027	PIN	1	1
35	510 51 107	PIN	1	1
36	510 30 005	WASHER	2	2
37	147 19 013	CLAMP, cable	1	1
38	563 07 104	SCREW, clamp	2	2
	609 34 117	FUSE 60 A	1	1

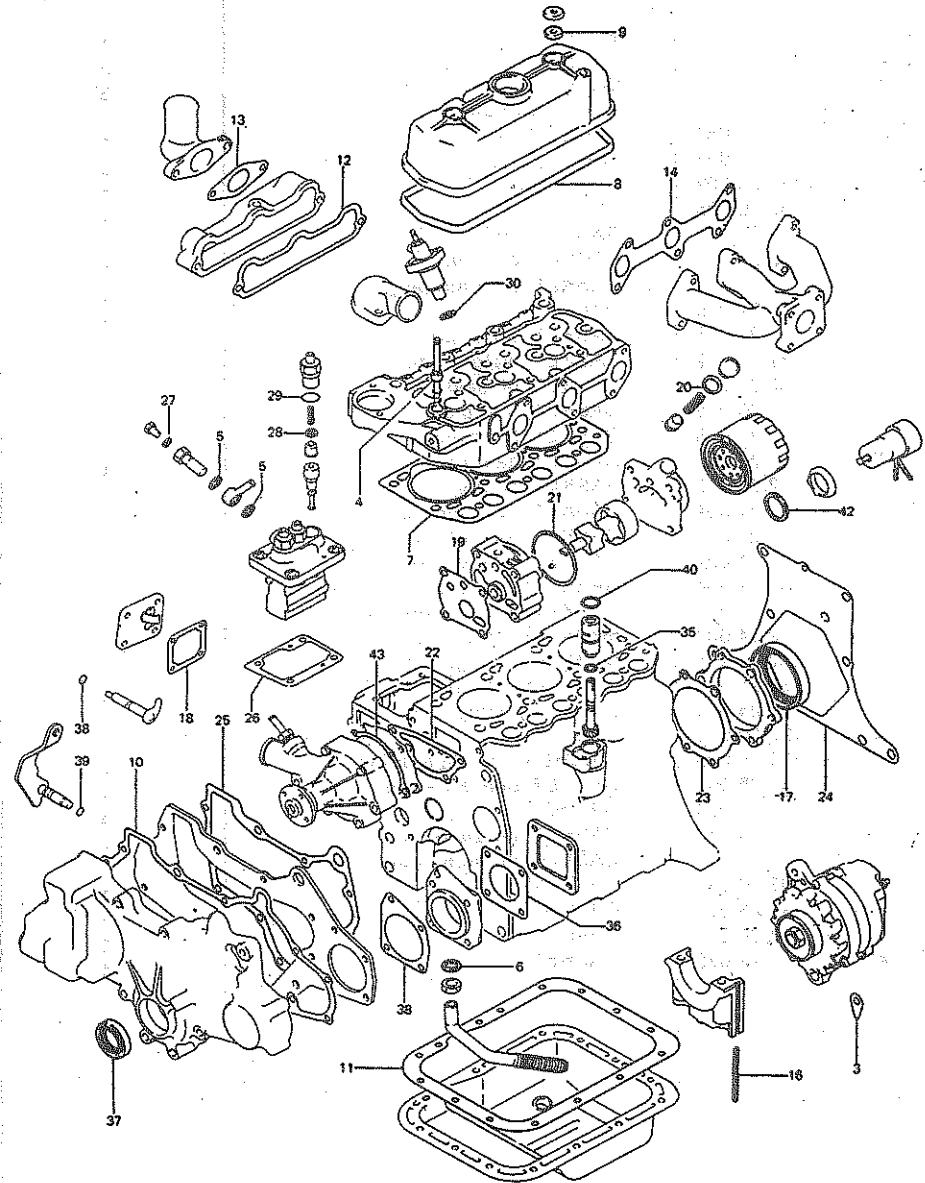
# ELECTRICAL EQUIPMENT AND REMOTE CONTROL



### GASKET KIT MINI-23

Item	Part no.	Description	Quantity
3-43	136 20 101	GASKET KIT	1
3	131 27 005	SHIM	S
4	132 22 054	SEAL, valve stem	6
5	131 24 001	WASHER, seal	2
6	132 24 001	WASHER, seal	1
7	136 21 004	GASKET, cylinder head	1
8	136 21 010	GASKET, rocker cover	1
9	132 21 016	OIL SEAL	2
10	132 20 040	GASKET, gear case	1
11	136 20 033	GASKET, oil pan	1
12	136 21 032	GASKET, inlet manifold	-
13	132 21 034	GASKET, inlet pipe	1
14	136 21 035	GASKET, exhaust manifold	1
16	132 20 002	SEAL, side	4
17	132 20 008	OIL SEAL	1
18	132 23 014	GASKET, cover	1
19	132 24 041	GASKET, oil pump body	1
20	132 24 047	GASKET, oil drain plug	1
21	132 24 049	O-RING	1
22	132 21 022	GASKET, water pump	1
23	132 20 016	GASKET, oil seal	1
24	134 20 025	GASKET, rear plate	1
25	132 20 018	GASKET, front plate	1
26	136 24 003	SHIM, adjusting (0,2)	1
	136 24 004	SHIM, adjusting (0,3)	1
	136 24 005	SHIM, adjusting (0,4)	1
	136 24 009	SHIM, adjusting (0,8)	1
27	131 25 025	WASHER, fuel pipe union	1
28	131 25 007	GASKET, delivery valve	3
29	131 25 033	O-RING	3
30	131 24 013	GASKET, nozzle holder	3
35	132 24 057	O-RING	1
36	131 20 047	GASKET	1
37	132 20 039	OIL SEAL	1
38	132 20 038	GASKET, housing	1
39	131 23 021	O-RING	2
40	132 24 059	O-RING	1
42	134 25 028	GASKET	1
43	132 21 041	GASKET, water pump	1

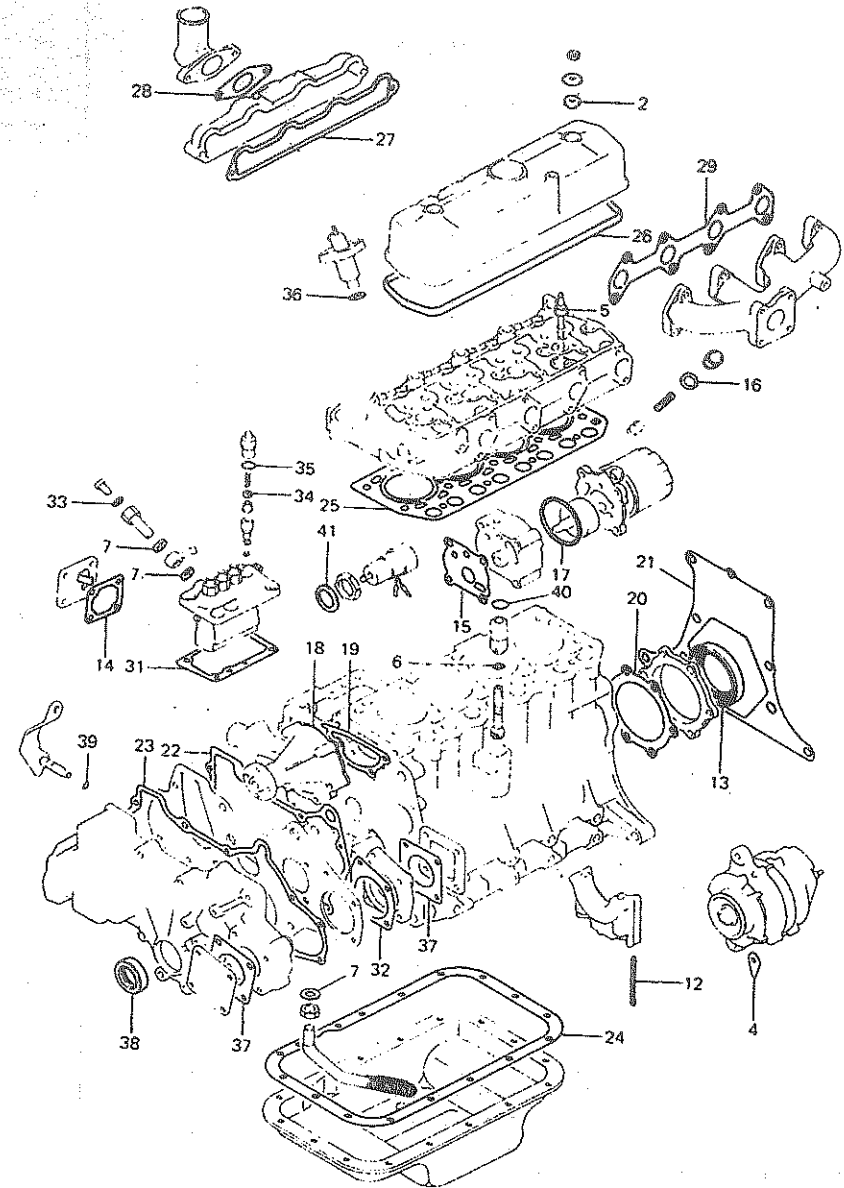
### GASKET KIT MINI-23



GASKET KIT MINI-34

Item	Part no.	Description	Quantity
2-41	134 20 101	GASKET KIT	1
2	132 21 016	OIL SEAL	2
4	131 27 005	SHIM	S
5	132 22 054	SEAL, valve stem	8
6	132 24 057	O-RING B	1
7	132 24 001	WASHER, seal	3
12	132 20 002	SEAL, side	4
13	132 20 008	OIL SEAL	1
14	132 23 014	GASKET, cover	1
15	132 24 041	GASKET, oil pump body	1
16	132 24 047	GASKET, oil drain plug	1
17	132 24 049	O-RING	1
18	132 21 041	GASKET, water pump	1
19	132 21 022	GASKET, water pump	2
20	132 20 016	GASKET, oil seal	1
21	134 20 025	GASKET, rear plate	1
22	132 20 018	GASKET, front plate	1
23	132 20 040	GASKET, gear case	1
24	132 20 033	GASKET, oil pan	1
25	134 21 004	GASKET, cylinder head	1
26	132 21 010	GASKET, rocker cover	1
27	132 21 032	GASKET, intake manifold	1
28	132 21 034	GASKET, inlet pipe	1
29	132 21 035	GASKET, exhaust manifold	1
31	132 24 003	SHIM, adjusting (0,2t)	1
	132 24 004	SHIM, adjusting (0,3t)	1
	132 24 005	SHIM, adjusting (0,4t)	1
	132 24 009	SHIM, adjusting (0,8t)	1
32	132 20 038	GASKET, housing	1
33	131 25 025	WASHER, fuel pipe union	2
34	131 25 007	GASKET, delively valve	4
35	131 25 033	O-RING	4
36	131 24 013	GASKET, nozzle holdin	4
37	131 20 047	GASKET, oil pump cover	1
38	132 20 039	OIL SEAL	1
39	131 23 021	O-RING	1
40	132 24 059	O-RING	1
41	134 25 028	GASKET	1

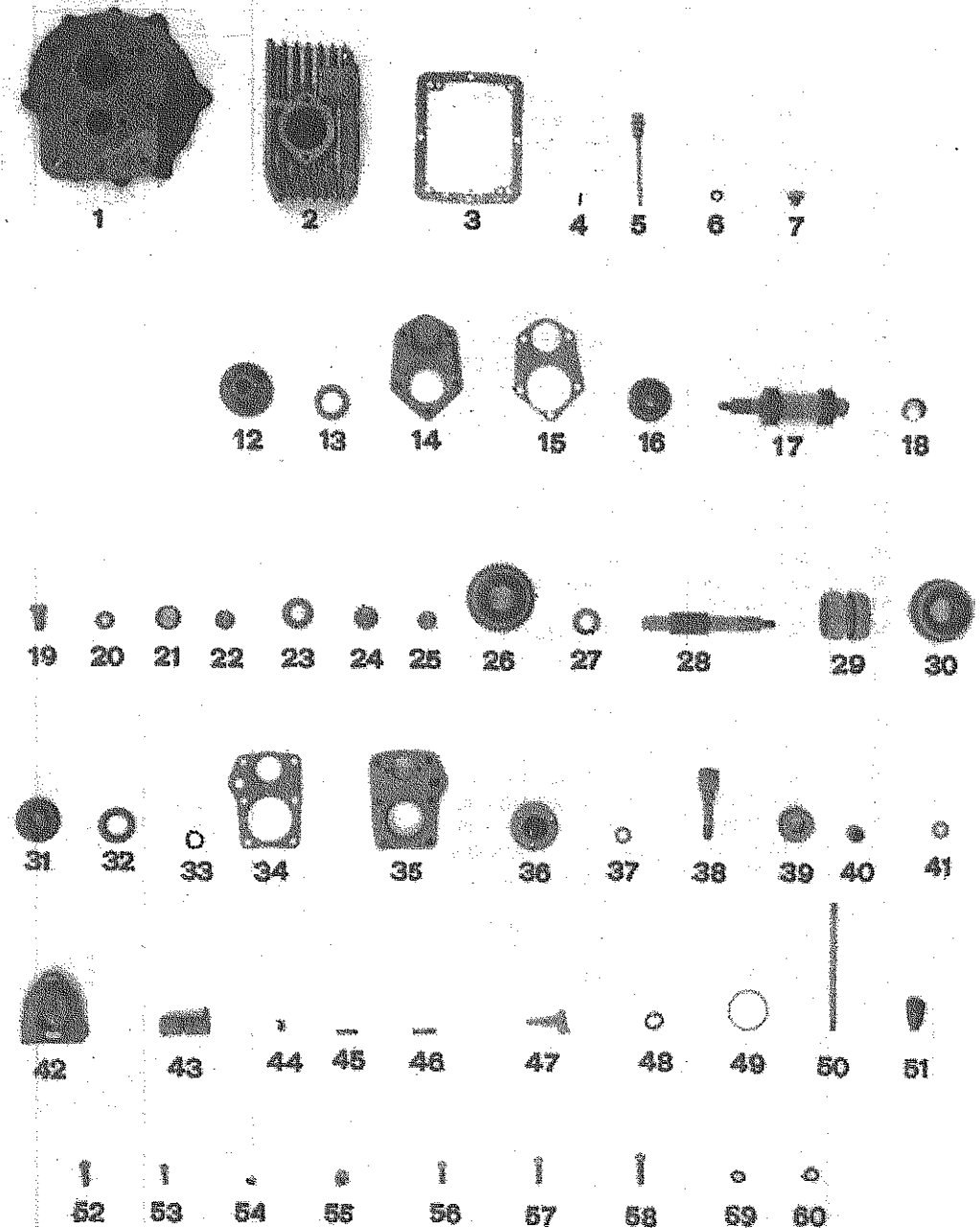
GASKET KIT MINI-34



### GEAR BOX

Item	Part no.	Description	Quantity	
			2:1	3:1
1-64	224 13 000	RONIM IV GEAR BOX 2:1 RED	1	-
1-64	224 15 000	RONIM IV GEAR BOX 3:1 RED	-	1
1	224 10 001	HOUSING, front	1	-
1	224 15 001	HOUSING, front	-	1
2	224 10 002	HOUSING, rear	1	-
2	223 15 102	HOUSING, rear	-	1
3	223 10 003	GASKET, housing	1	1
4	222 10 007	PIN	2	2
5	223 10 008	PLUG, oil level	1	1
6	252 10 010	O-RING, plug	1	1
7	511 022 54	PLUG, drain	1	1
12	224 10 005	FLANGE, input	1	-
12	224 15 005	FLANGE, input	-	1
13	222 10 103	OIL SEAL	1	-
13	224 10 223	OIL SEAL	-	1
14	223 10 102	COVER, front	1	-
14	224 15 102	COVER, front	-	1
15	223 10 105	GASKET, front cover	1	-
15	224 15 105	GASKET, front cover	-	1
16	222 10 104	BALL BEARING, front	1	-
16	224 10 224	BALL BEARING, front	-	1
17	224 13 101	SHAFT, input	1	-
17	224 15 101	SHAFT, input	-	1
18	222 10 106	NEEDLE BEARING, rear	1	1
19	252 10 222	SCREW	1	1
20	222 10 219	WASHER	2	1
21	222 10 204	NEEDLE BEARING, front gear	2	2
22	222 10 205	RING, bearing	2	2
23	223 10 218	SPACER, bearing front	1	-
23	224 10 218	SPACER, bearing rear	1	1
23	224 15 218	SPACER, bearing	-	1
24	224 10 204	NEEDLE BEARING, rear gear	1	1
25	224 10 205	RING, bearing	1	1
25bis	224 15 205	RING	-	1
26	224 13 203	GEAR, front	1	-
26	224 15 203	GEAR, front	-	1
27	223 10 217	SPACER, gear front	1	1
27	224 10 217	SPACER, gear rear	1	1
28	224 10 201	SHAFT, output	1	1
29	223 10 232	CLUTCH CONE	1	1
30	224 10 210	GEAR, rear	1	-
30	224 15 210	GEAR, rear	-	1
31	224 10 224	BALL BEARING, rear	1	-
31	224 15 224	BALL BEARING, rear	-	1
32	224 10 223	OIL SEAL	1	-
32	224 15 223	OIL SEAL	-	1
33	222 10 225	O-RING	1	1
34	224 10 209	GASKET, cover rear	1	-

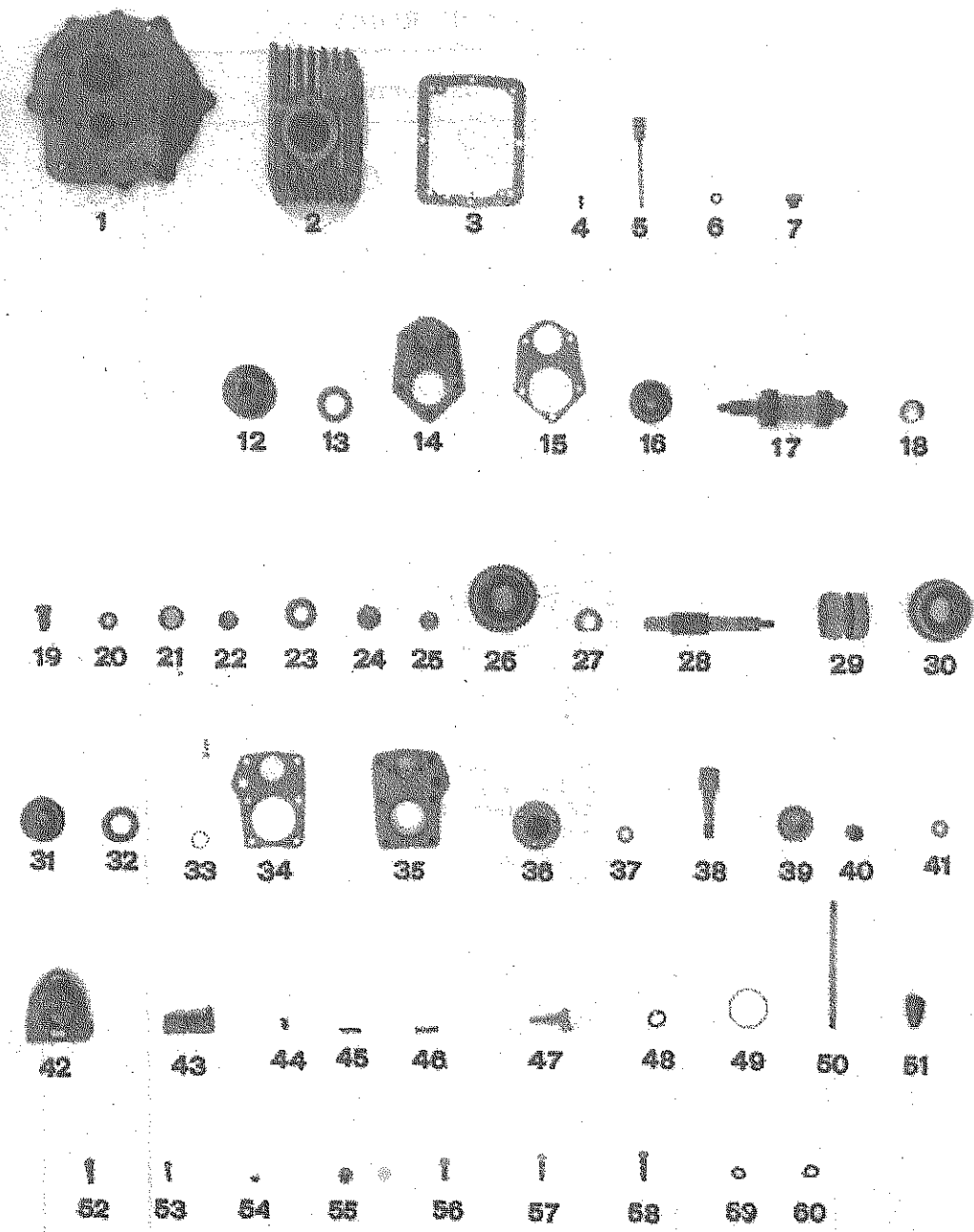
### GEAR BOX



GEAR BOX

Item	Part no.	Description	Quantity	
			21	31
34	224 15 209	GASKET, cover rear	-	1
35	224 10 208	COVER, rear	1	-
35	224 15 208	COVER, rear	-	1
36	224 10 225	FLANGE, output	1	-
36	224 15 225	FLANGE, output	-	1
37	510 30 012	WASHER	2	2
37	510 30 016	WASHER	1	2
38	223 10 301	SHAFT, intermediate	1	1
39	223 10 302	GEAR, intermediate	1	-
39	224 15 302	GEAR, intermediate	-	1
40	222 10 306	NEEDLE BEARING, intermediate	1	1
41	223 10 304	FRICTION WASHER	1	1
42	223 10 401	CONTROL, housing	1	1
43	223 10 402	CONTROL, excentric	1	1
44	252 10 418	PIN, excentric	1	1
45	530 52 310	PIN	1	1
46	252 10 411	SPRING, control	1	1
47	225 10 423	ARM, control	1	1
48	252 10 408	O-RING, excentric	1	1
49	223 10 417	O-RING, housing	1	1
50	252 10 424	CONTROL, level	1	1
51	221 10 416	BALL	1	1
52	521 02 258	SCREW, 933 M8 x 25	2	2
53	521 03 157	SCREW, 912 M6 x 20	2	2
54	521 20 006	NUT, 934 M6	2	2
55	511 23 016	NUT, 985 M16	1	-
55	512 23 016	NUT, 985 M16 x 1,50	-	1
55	511 23 012	NUT, 985 M12	1	1
56	521 01 258	SCREW, 931 M8 x 25	11	11
57	521 01 259	SCREW, 931 M8 x 30	2	2
58	521 01 260	SCREW, 931 M8 x 35	5	5
59	510 30 008	WASHER, PLAIN Ø8	20	20
60	560 00 116	WASHER, copper	1	1
61	224 10 226	COVER	1	1
62	321 11 023	GASKET, cover	1	1
63	521 02 156	SCREW, 933 M6 x 15	2	2
64	570 00 353	WASHER	2	2

GEAR BOX

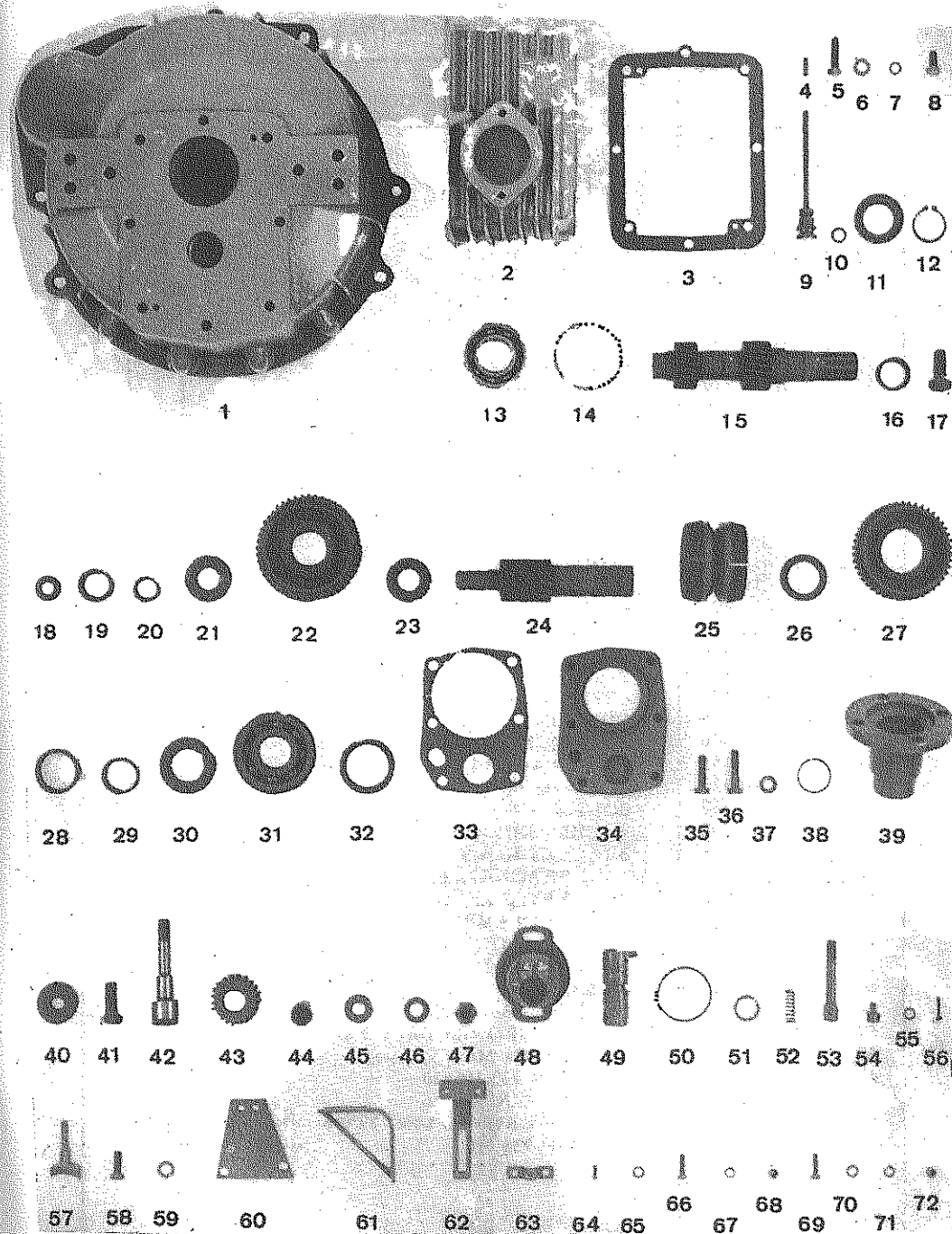




UP TO eng. MINI-34 n<sup>o</sup> 24.153  
GEAR BOX RONIM-V

Item	Part n <sup>o</sup>	DESCRIPTION	Quantity 2,28:1
1-72	225.13.100	GEAR BOX ASSY RONIM-V Red. 2,28:1	1
1	225.10.020	MOUSING, front	1
2	225.13.002	MOUSING, rear red. 2,28:1	1
3	225.10.003	GASKET	1
4	222.10.007	PIN	2
5	521.02.259	BOLT DIN 933 M8x30 8.8	8
6	510.30.008	WASHER DIN 125 Ø8	8
7	570.00.357	WASHER 8,2-12-1,5	1
8	521.02.256	BOLT DIN 933 M8x15	1
9	223.10.008	PLUG, oil level	1
10	252.10.010	O-RING	1
11	222.10.103	SEAL, oil	1
12	530.40.030	CIRCLIP DIN 471 E-30	1
13	251.10.104	BEARING, ball	1
14	530.41.062	CIRCLIP DIN 472 1-62	1
15	225.13.101	SHAFT, input red. 2,28:1	1
16	222.10.106	BEARING, needle	1
17	252.10.222	BOLT, blockage	1
18	222.10.219	WASHER	1
19	222.10.204	BEARING, needle	2
20	222.10.205	RING	2
21	225.10.228	SPACER	1
22	225.13.203	GEAR, front red. 2,28:1	1
23	225.10.216	SPACER, gear	1
24	225.10.201	SHAFT, output	1
25	225.10.202	CONE, clutch	1
26	225.10.217	SPACER, gear	1
27	225.13.210	GEAR, rear, red. 2,28:1	1
28	225.10.204	BEARING, needle	1
29	225.10.205	RING, bearing	1
30	225.10.218	SPACER, bearing	1
31	224.15.224	BEARING, ball	1
32	252.10.214	SEAL, oil	1
33	225.10.209	GASKET, rear	1

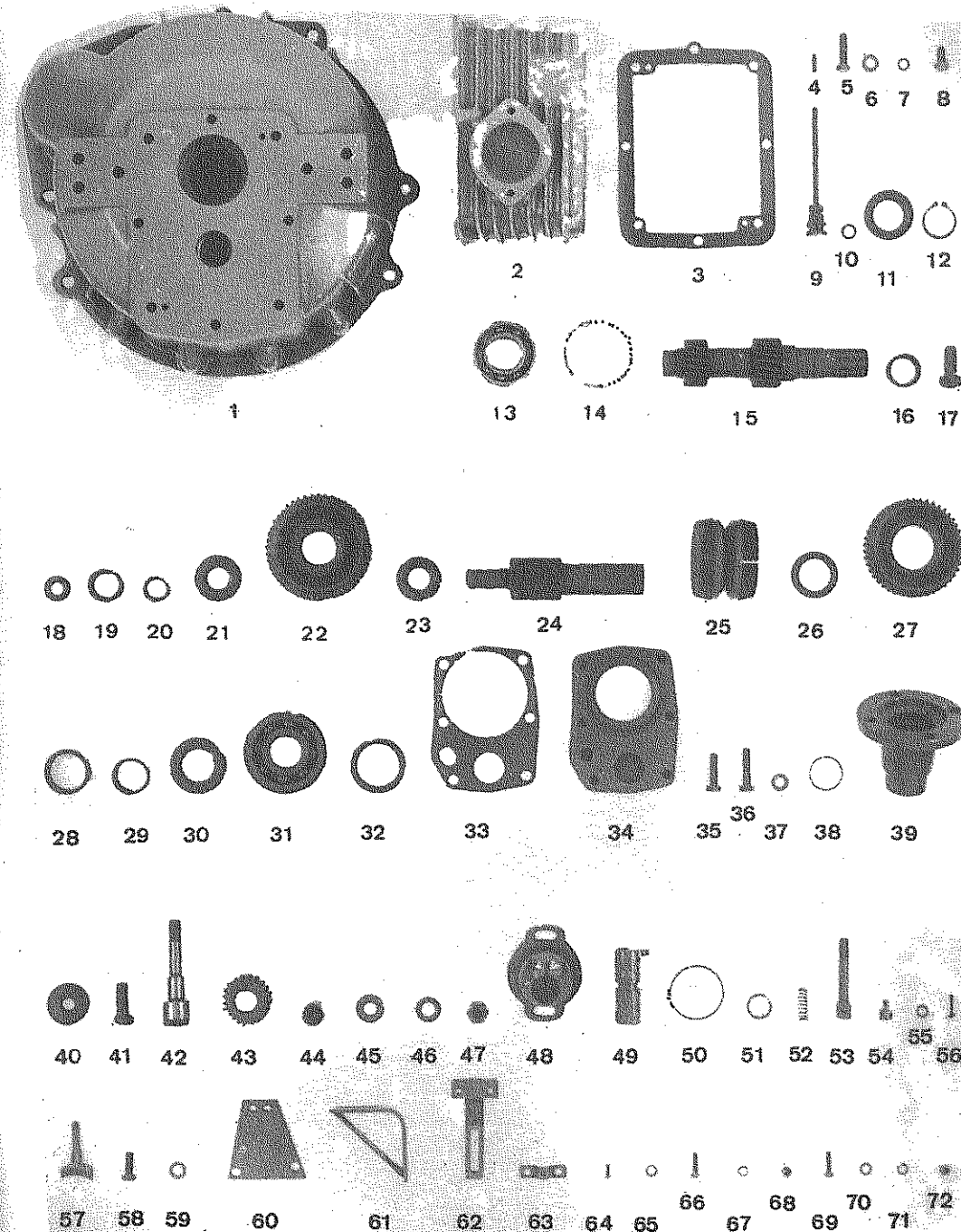
GEAR BOX RONIM-V



### GEAR BOX RONIM-V

Item	Part nº	DESCRIPTION	Quantity 2,28:1
34	225.13.208	COVER, rear red. 2,28:1	1
35	521.02.259	BOLT DIN 933 M8x30 8.8	4
36	521.01.260	BOLT DIN 931 M8x35 8.8	2
37	510.30.008	WASHER DIN 125 Ø8	6
38	252.10.231	O-RING	1
39	225.10.225	FLANGE, output	1
40	252.10.219	WASHER, blockage	1
41	531.02.359	BOLT DIN 933 M12x30 12,9	1
42	225.10.301	SHAFT, intermediate	1
43	225.10.302	GEAR, intermediate	1
44	225.10.306	BEARING, needle	1
45	225.10.305	WASHER, friction	1
46	510.30.012	WASHER DIN 125 Ø12	1
47	511.23.012	NUT DIN 985 M12 5.6	1
48-56	225.10.400	CONTROL ASSY	1
48	223.10.401	BODY, control	1
49	223.10.402	EXCENTRICA, control	1
50	223.10.417	O-RING	1
51	252.10.408	O-RING	1
52	252.10.411	SPRING	1
53	252.10.424	LEVER, control	1
54	147.19.115	COUPLING, cable	1
55	510.30.006	WASHER DIN 125 Ø6	1
56	540.51.155	PIN DIN 94 2x16 inox.	1
57	225.10.423	ARM, control	1
58	521.02.257	BOLT DIN 933 M8x20 8.8	2
59	510.30.008	WASHER DIN 125 Ø8	2
60	225.10.915	BRACKET MORSE REVERSE GEAR	1
61-68	121.19.000	ASSY BRACKET, morse control	1
61	121.19.020	BRACKET, gear box control	1
62	121.19.021	SUPPORT CLAMP	1
63	147.19.013	CLAMP, cable	1
64	553.07.104	BOLT DIN 86 3/16 Wx10	2
65	510.30.006	WASHER DIN 125 Ø6	2
66	521.02.157	BOLT DIN 933 M6x20	2
67	530.33.006	WASHER GROWER DIN 127 Ø6	2
68	521.20.006	NUT DIN 934 M6	2
69	521.02.157	BOLT DIN 933 M6x20	2
70	510.30.006	WASHER DIN 125 Ø6	4
71	530.33.006	WASHER GROWER DIN 127 Ø6	2
72	521.20.006	NUT DIN 934 M6	2

### GEAR BOX RONIM-V



## **SOLE, S.A.**

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