

### III.1. ENGINE DISASSEMBLY

Prior to dismantling the engine clean off engine exterior thoroughly. Dismantling will be greatly facilitated by location with good lighting and freedom of movement, away from dirt and metal chips. The work to be carried out is described and illustrated step by step in the following. Please do take the trouble to read the description of the work involved prior to starting so that the scope will be appreciated right from the start.

## 1. Drain lubrication oil

Place suitable container under the drain hole. Remove oval flange of oil drain, remove oilfilter. Wait until oil has fully drained, if necessary, tip over engine. (Figures 1 and 1a)

## 2. Air cleaner

Remove the two aircleaner selflocking nuts. Pull off the air cleaner and discard gasket.

## 3. Muffler

Unscrew the two M8 hex nuts of the muffler and the M6 hex nut of the muffler screen. Pull off the screen, muffler and discard gasket. (Figure 2)

## 4. Fuel tank

Place clamp, close to the injector pump on the fuel supply line coming from the tank. Next, remove the banjo bolts and their copper washers from the fuel injector and the fuel injection pump. Close ports of injector and pump again with banjo bolts to prevent dirt from entering. Next, remove the locknut holding the fuel supply line clamp. Finally, loosen the fuel tank straps and slide them off the ends of the tank. The fuel tank and the line may now be removed. (Figure 3)



## 5. Fuel tank support brackets

Pull off the fuel tank support brackets as well as the intake and the exhaust manifold gaskets.

(Figure 4)

## 6. Air deflectors

Remove the two screws and lockwashers holding the air deflector shields on top of the crankcase.

(Figure 5)

## 7. Valve cover

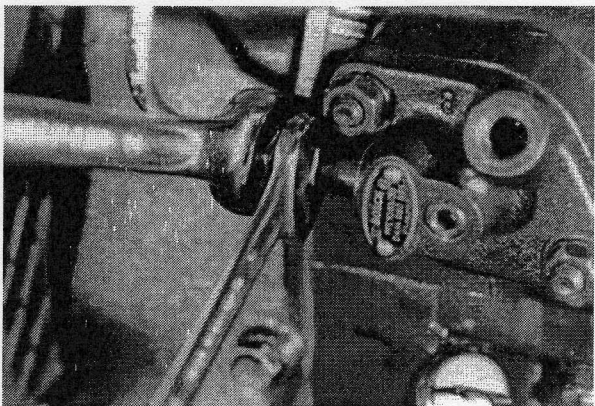
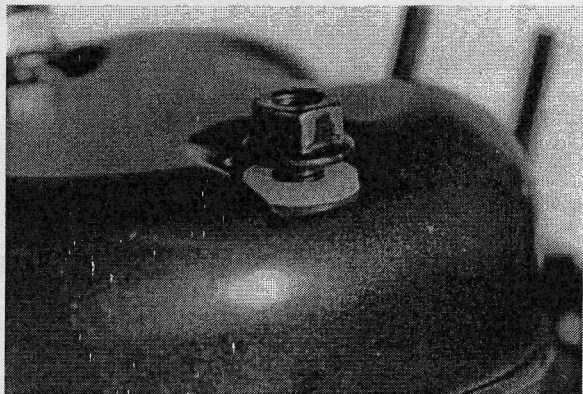
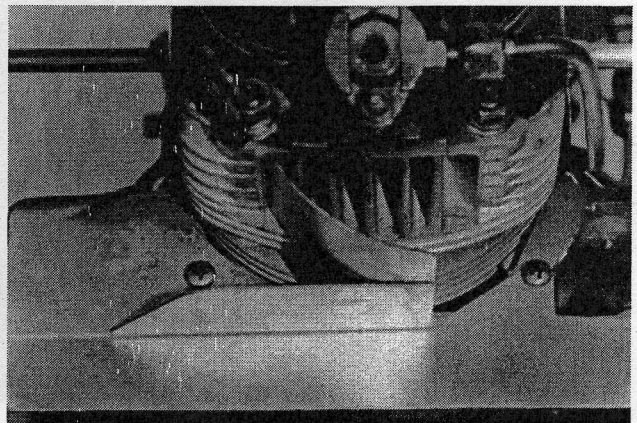
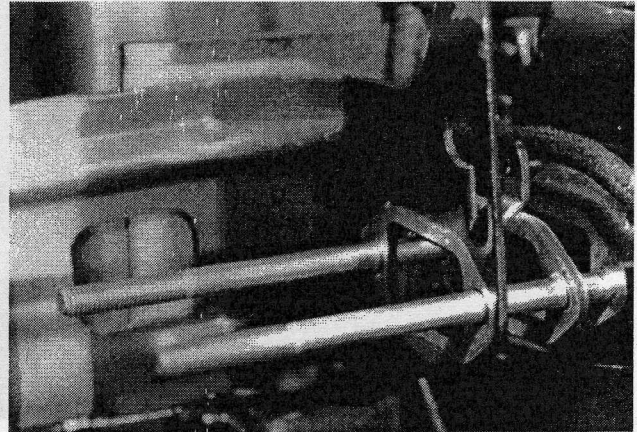
Remove the valve cover and the gasket by removing the two nuts and plastic washers on top of the valve cover. If necessary, tap lightly on the side of the valve cover with a soft faced hammer to loosen it.

(Figure 6)

## 8. High pressure fuel line

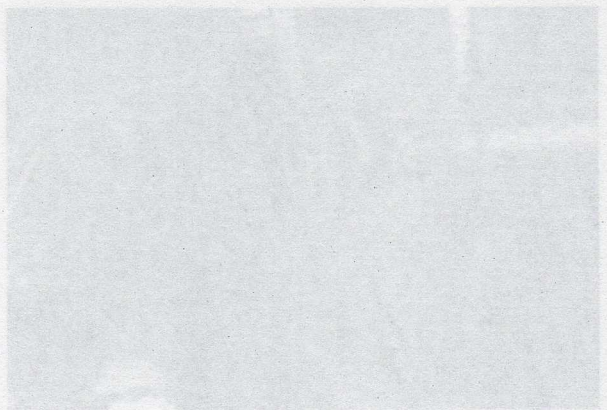
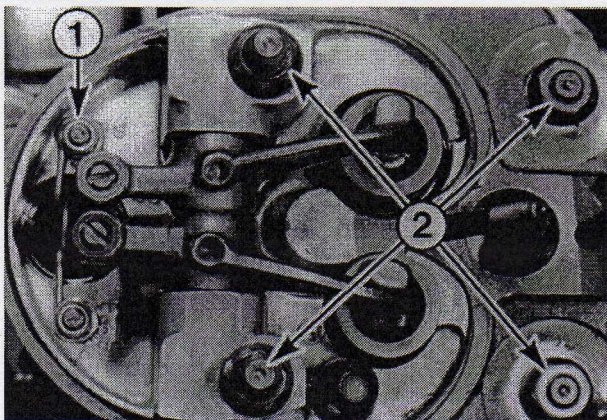
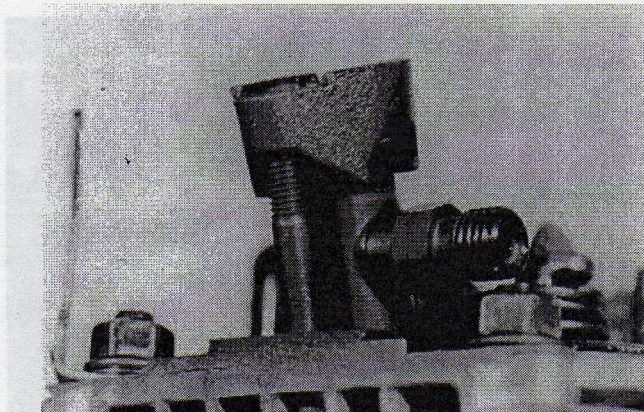
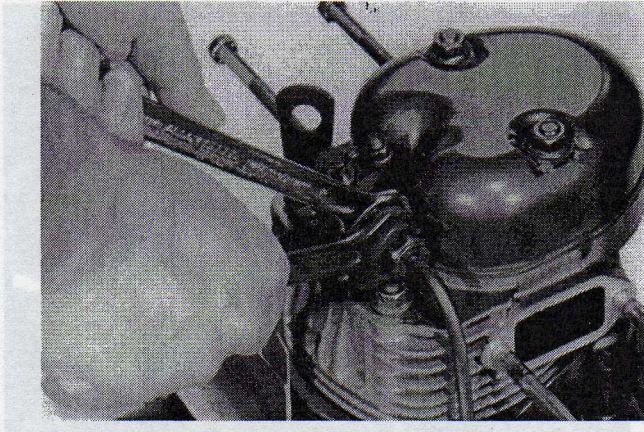
Loosen the high pressure fuel line by holding a 14 mm wrench on the delivery valve holder while unscrewing the fuel line fitting with a 17 mm wrench.

(Figure 7)

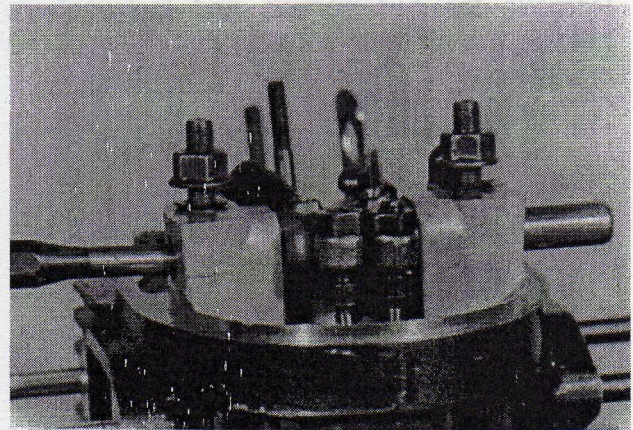




### III. ENGINE REPAIR



5. Fuel tank support brackets  
Pull off the fuel tank support  
brackets as well as the intake and the  
exhaust manifold gaskets.  
(Figure 4)



Loosen the high pressure line at the injector  
in the same way.  
(Figure 8)

#### 9. Fuel injector

Remove the two hex nuts and their  
lockwashers from the injector clamp, and pull  
out the injector. If the injector sticks in the  
hand, use a soft faced hammer and tap  
slightly on the injector. Do not use too much  
force, as this may damage the injector.

**Attention:** Under the injector a special  
packing washer is located which must  
also be removed.



## **II. TECHNICAL DATA**

### **10. Cylinder head**

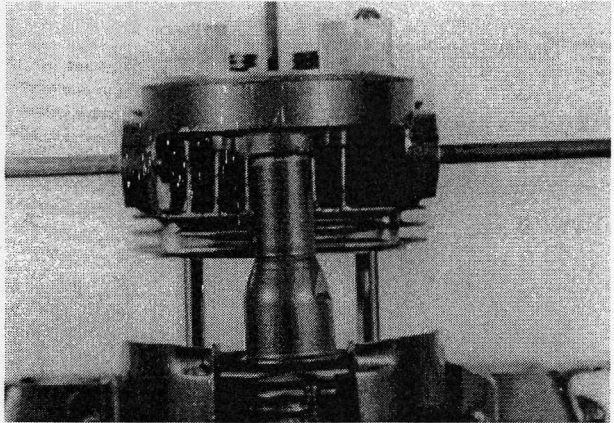
Remove the two locknuts and washers (1) holding the protection tube retaining spring. Next loosen the four cylinder head nuts (2). (Figure 10)

Drive out the rocker arm bolt with a drift pin and a hammer. Remove the rocker arms and push rods. (Figure 11)

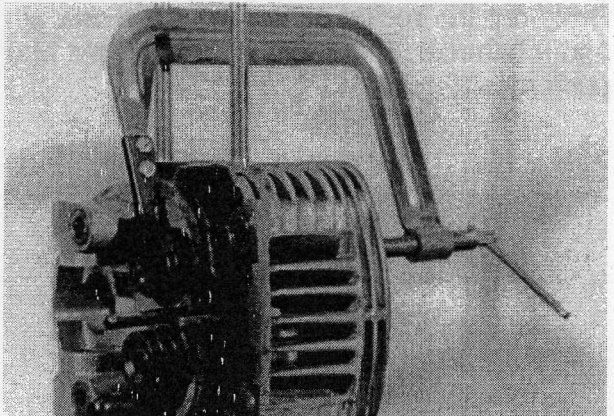


### III. ENGINE REPAIR

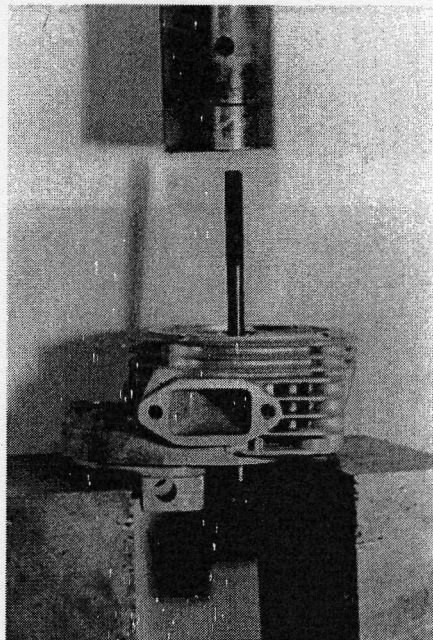
Remove the cylinder head nuts and the cylinder head.  
(Figure 12)



For dismantling valves use special tool.  
Watch out for the two thin steel washers  
under the inlet valve spring.  
(Figure 13)

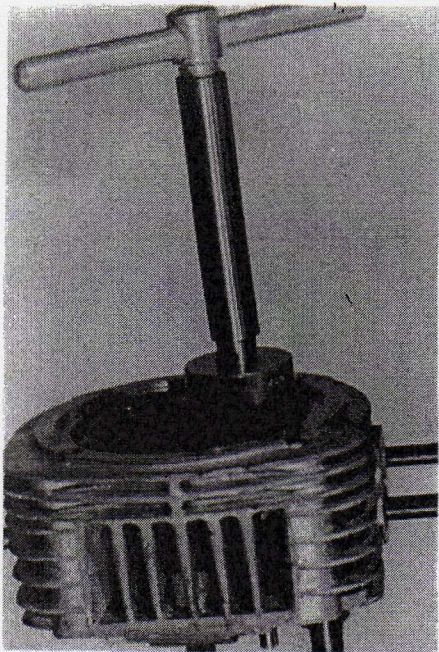


If the valve guides need replacement (for  
wear and tear measurements refer to section  
III.2.), use driver to press old guides out.  
(Figure 14)

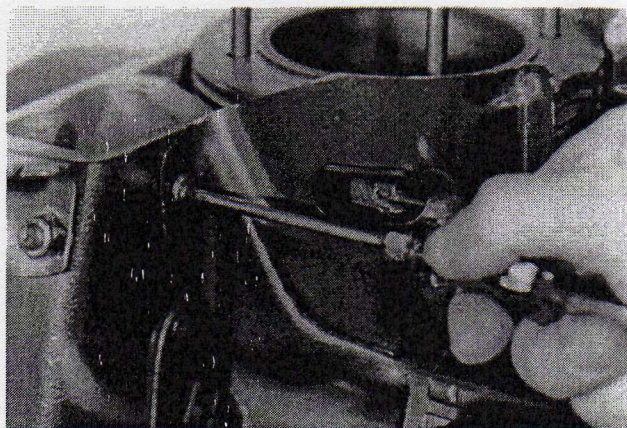




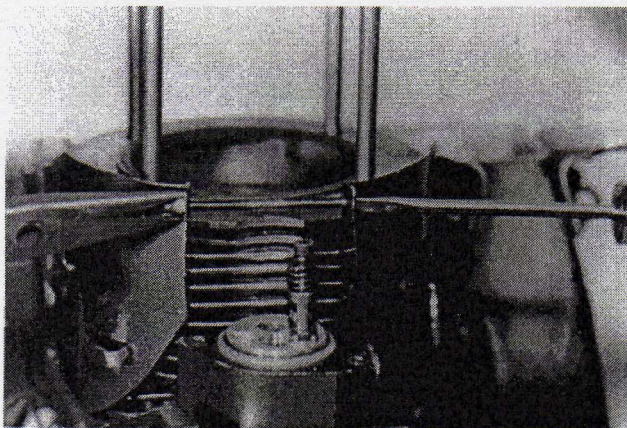
## II. TECHNICAL DATA



Should the valve seat be damaged to the point that grinding of valves is not sufficient, the seat can be resurfaced with tool (for wear and tear limits and detailed instructions for use of tool refer to section III.2. resp. III.7.) (Figure 16)



Remove the valve cover and use a needle nose pliers or a seven mm wrench. (Figure 16)



Next, unscrew the two head screws and remove the shields from the crankcase. (Figure 17)



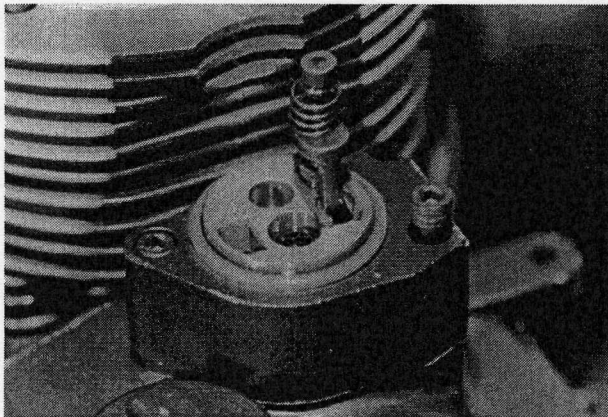
Should the valve seat be damaged to the point that grinding of valves is not sufficient, the seat can be resurfaced with tool (for wear and tear limits and detailed instructions for use of tool refer to section III.2. resp. III.7.)  
(Figure 15)

#### 11. Cylinder shields

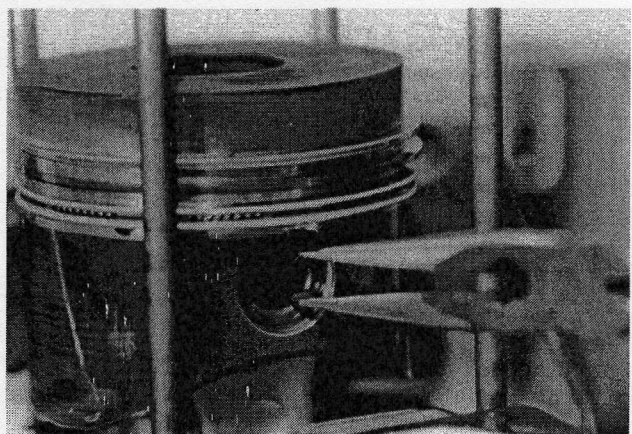
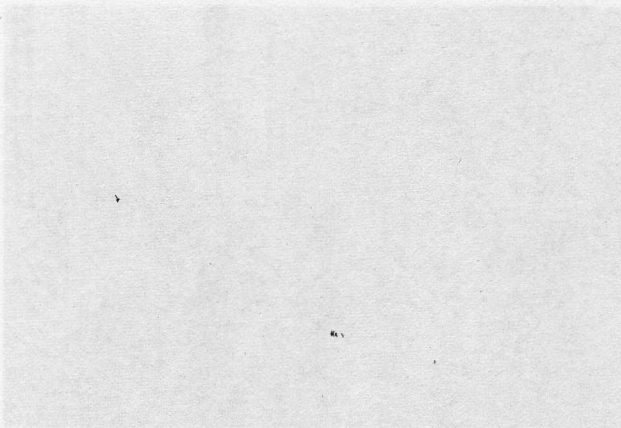
Remove the bolt holding the two cylinder air deflector shields together using a screwdriver and needle nose pliers or a seven mm wrench.  
(Figure 16)

Next, unscrew the two head screws and remove the shields from the crankcase.  
(Figure 17)

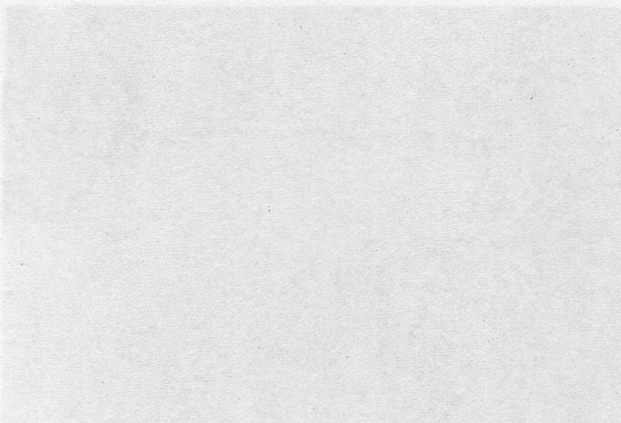
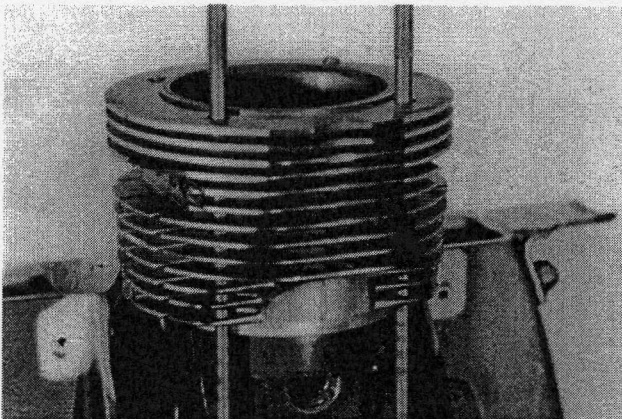
## II. TECHNICAL DATA



Compression release  
After removing the screws, pull the  
compression release out of the gearcase.  
(Figure 18)



so far that piston pin bore is free and  
continue with step 14.  
(Figure 19)



14. Piston  
Slowly rotate the flywheel until the piston  
reaches the top of its stroke. With a needle  
nose pliers, remove the piston pin retainer  
from groove in piston at the gear train side of  
the engine.  
(Figure 20)



#### Compression release

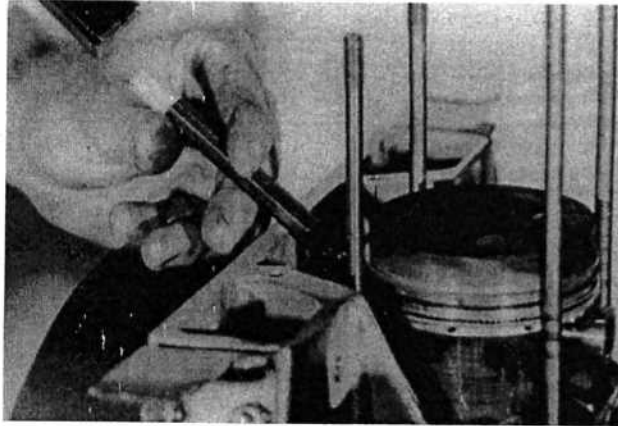
After removing its screws, pull the compression release out of the gearcase.  
(Figure 18)

#### 13. Cylinder

Rotate the flywheel until the piston reaches the bottom of its stroke. Carefully slide the cylinder up off the studs.

**Attention:** If the repair does not require the renewal of piston and liner, leave the liner on the piston. Pull up the liner only so far that piston pin bore is free and continue with step 14.

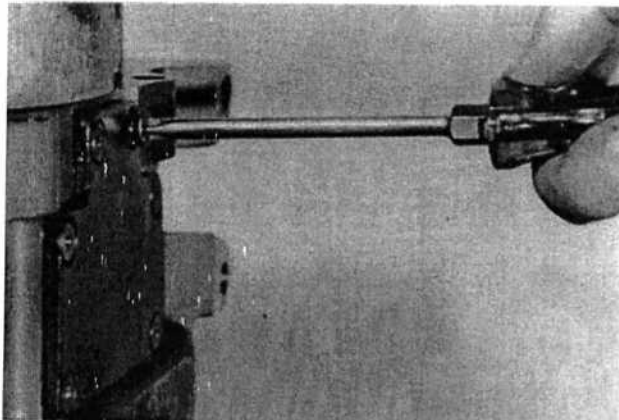
(Figure 19)



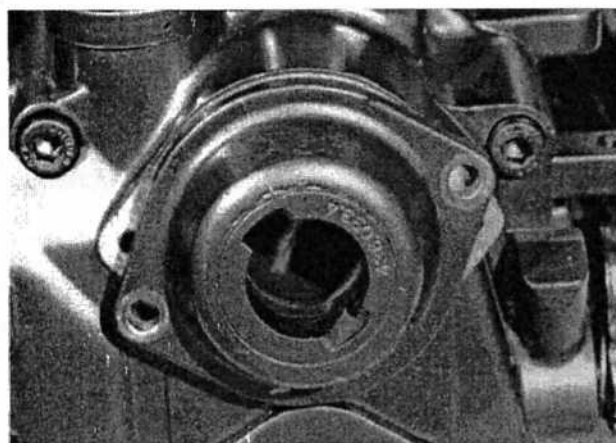
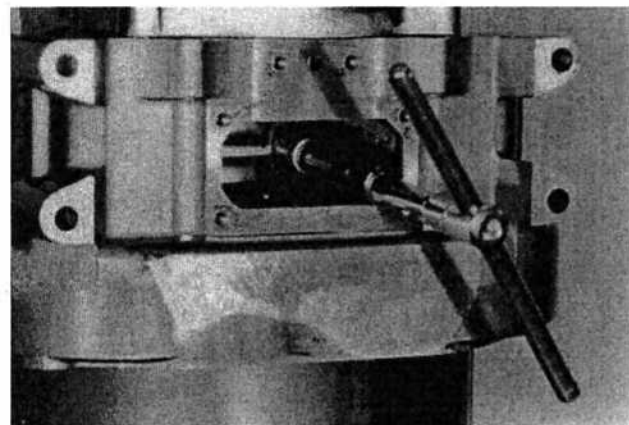
#### 14. Piston

Slowly rotate the flywheel until the piston reaches the top of its stroke. With a needle nose pliers, remove the piston pin retainer from groove in piston at the gear train side of the engine.

(Figure 20)



## II. TECHNICAL DATA



With a drift pin gently hammer piston pin out of the piston from flywheel side.

**Attention:** If piston pin sticks in piston, remove piston complete with connecting rod (step 15 and hammer out piston pin after the assembly has been removed from engine.

(Figure 25)

### 15. Connecting rod

Turn the flywheel until piston reaches the bottom of his stroke (BCD).

Lay engine on to its flywheel side. Remove the crankcase inspection cover by unscrewing the six head screws. If these screws are very tight, tapping on them with a hammer and drift pin or flat-faced punch may help loosen them.

(Figure 22)

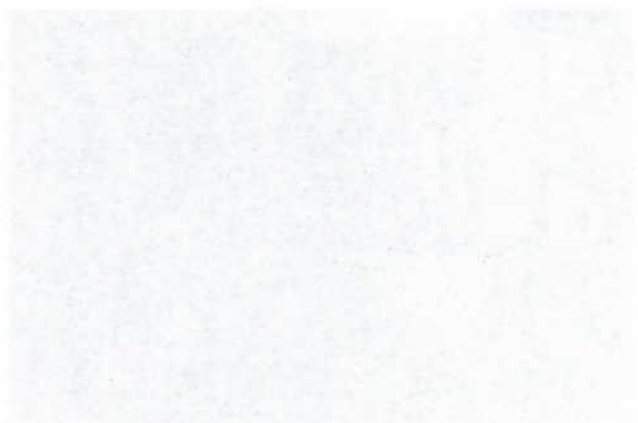
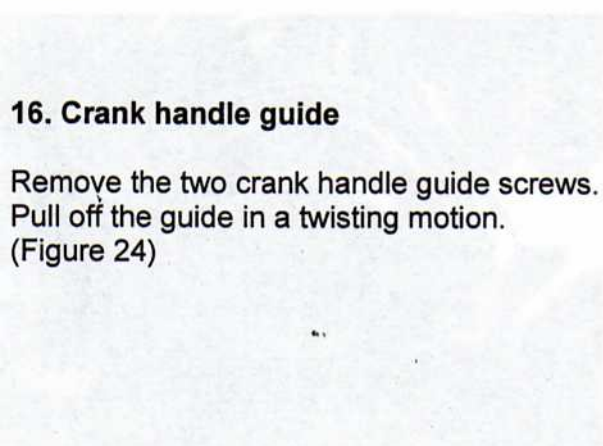


When re-using the conrod bearings again, mark the bearing shell halves and the corresponding parts of the conrod. This ensures that the bearing runs in the same position again after the reinstallation.

Using a 13 mm socket, remove the two conrod hex nuts. Pull out the conrod cap downwards and the conrod upwards.  
(Figure 24)

#### 16. Crank handle guide

Remove the two crank handle guide screws.  
Pull off the guide in a twisting motion.  
(Figure 24)



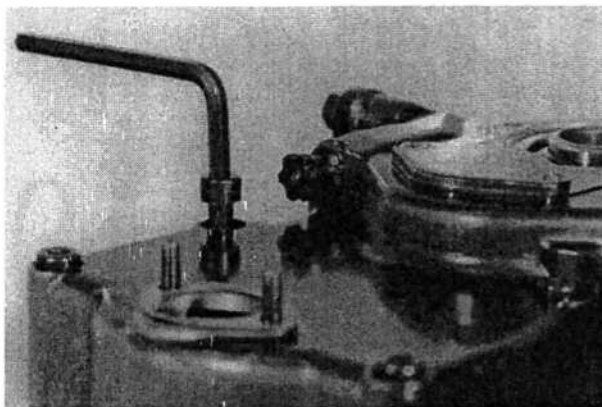


## II. TECHNICAL DATA

### 17. Gear cover

Remove the six allen screws and pull off the gear cover. If necessary, tap at the gear cover with a soft faced hammer to loosen it. If, when removing, the cover should catch on the governor beneath, turning the flywheel slightly will free it.

(Figure 25)

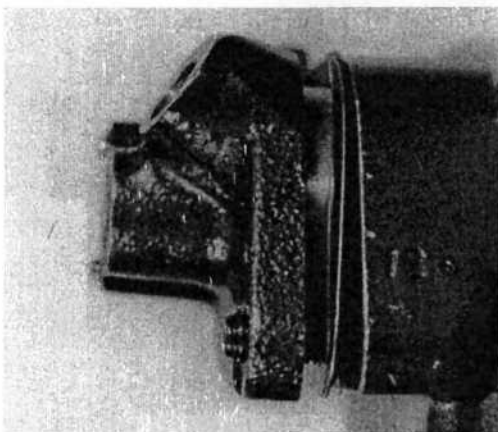


Do not dismantle the gear cover any further, if there is no need for (to check wear and tear limits of crankshaft, speed regulation shaft and camfollower refer to section III.2.). In case the need for dismantling arises, proceed as follows:

#### 17.1. Injection pump

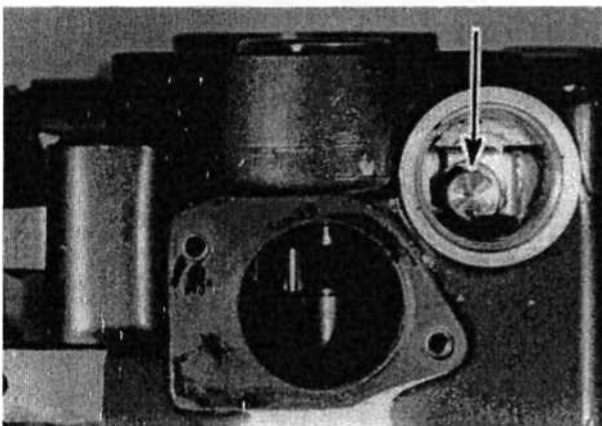
Remove the two injection pump hex nuts. Pull the injection pump from the gear cover. Leaving the injection pump gasket and shims on the gear cover, reinstall the hex nut and lockwashers on their studs.

(Figure 26)



To remove the injection pump camfollower, unscrew fixing screw (arrow) through oil filling bore.

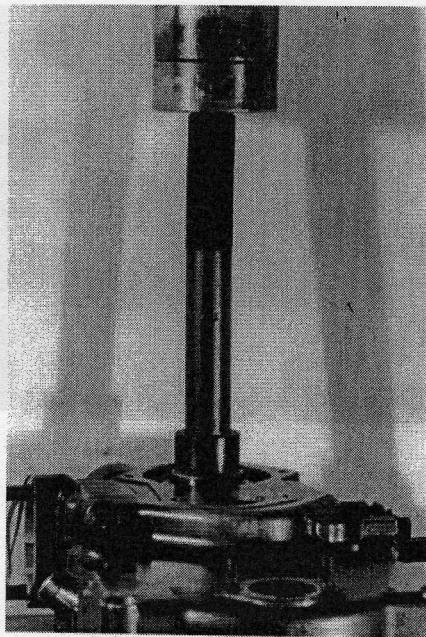
(Figure 27)



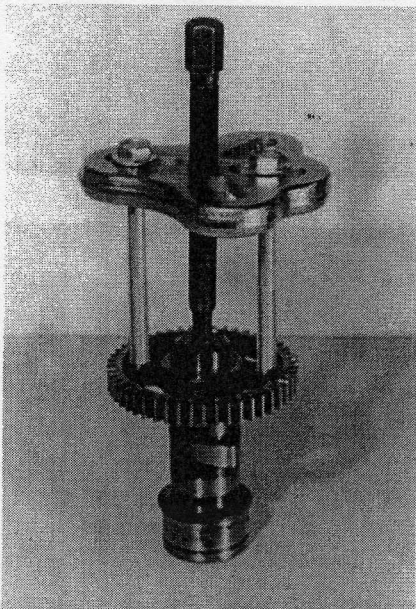
### III. ENGINE REPAIR

#### 17.2. Camshaft

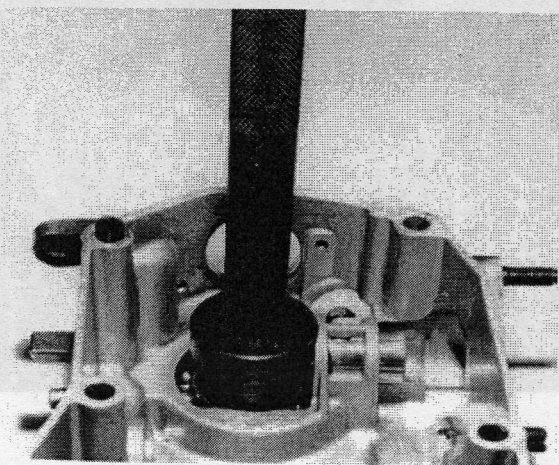
Remove the snap ring holding the camshaft in the gear cover. Press out the camshaft using the driver.  
(Figure 28)



To pull off the camshaft gear wheel, use puller or press out the camshaft.  
(Figure 29)



After the camshaft is removed, the roller bearing can be pressed out from the inside of the cover using driver.  
(Figure 30)

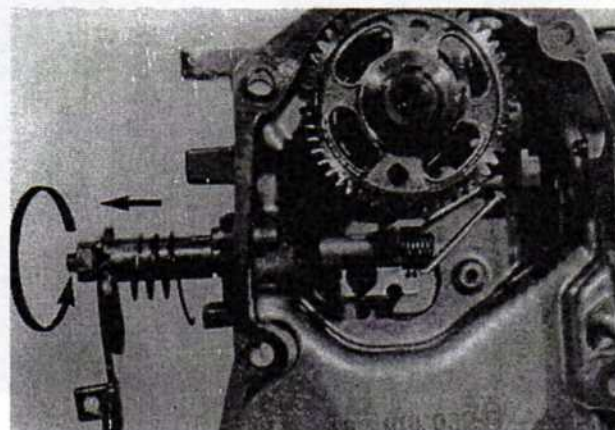




## II. TECHNICAL DATA

### 17.3. Speed regulation assembly

Lay the gear cover down on the work bench. Remove the retaining ring from the regulation shaft with a pliers. Pull the shaft outwards till the ratchet plate is free from the pin. Unhook the outer torsion spring from the boss (use a pliers and watch out for your fingers). Hold the inner control lever and twist the acceleration lever down below the normally - stop position till the inner torsion spring is without tension (approx. horizontal position of the acceleration lever) and then pull eccentric shaft out of control lever and bearing bush. (Figure 31)



### 18. Governor

Install holding device remove governor pin from governor. Spread flyweights with a breakerbar and use hexagon socket to unscrew governor.

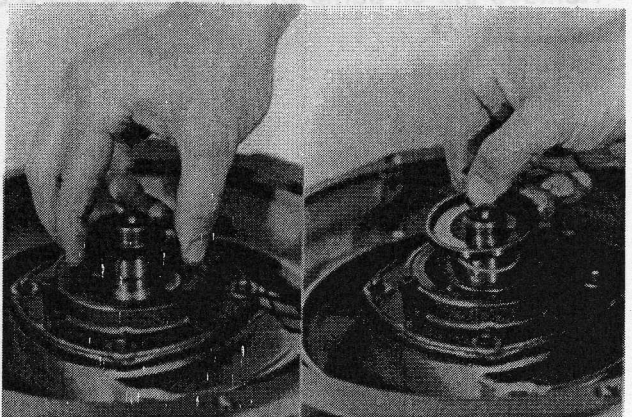
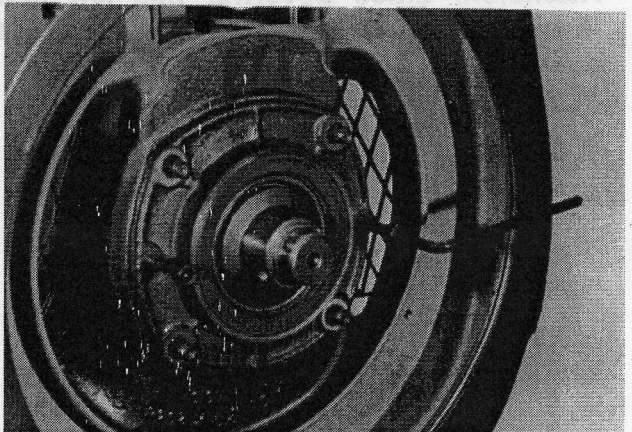
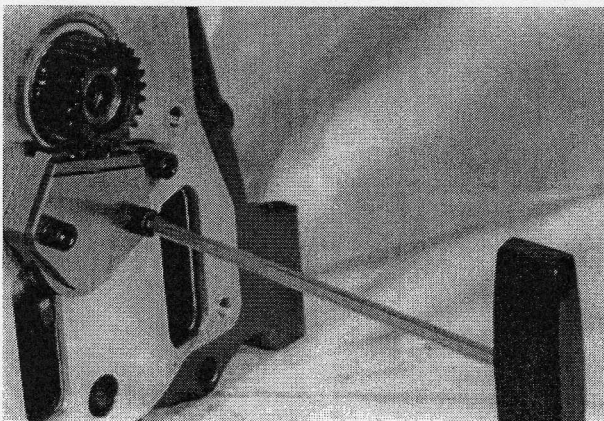
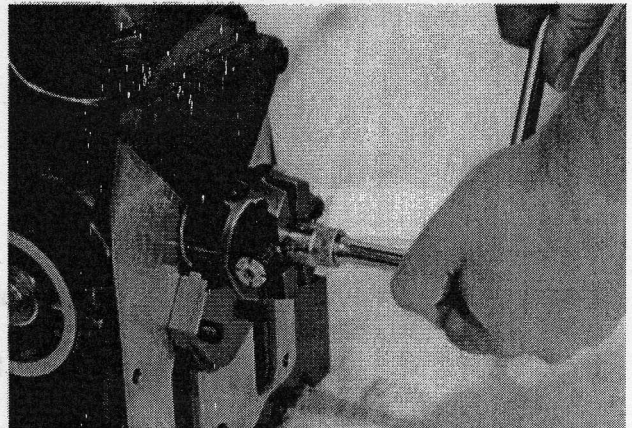
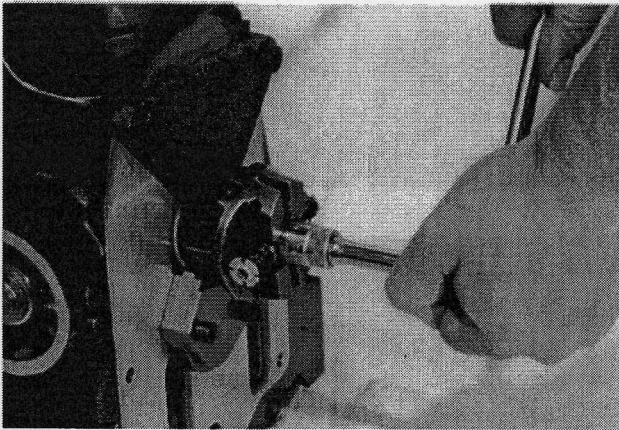
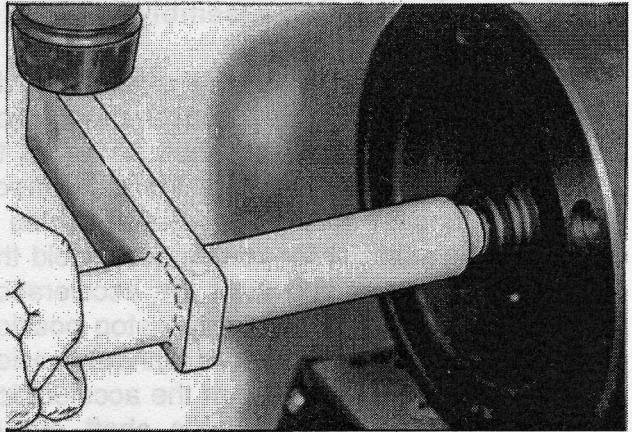
**Attention:** Since governor has left hand thread, unscrew governor in a clockwise direction.

(Figure 32)

### 19. Oil pump

Remove the oil pump by unscrewing the 3 oil pump screws. (Figures 33)

### III. ENGINE REPAIR





## II. TECHNICAL DATA

### 20. Flywheel

Using socket on stricker and a hammer, loosen the flywheel nut by two turns.

**Attention:** If the flywheel has to be removed from an engine without dismantling the governor/regulation linkage, it is necessary to place the acceleration lever at full load position. Otherwise damage may occur to the regulation linkage.

(Figure 35)

Leave the flywheel nut on the shaft. Install the flywheel puller and turn the screws until the flywheel breaks loose from the crankshaft taper. Remove the flywheel nut and flywheel.

(Figure 35)

### 21. Main bearing cover

Remove the four main bearing cover nuts and washers. Next install two screws M6x30 (if not available use allen screws M6x30 from oilpump) into the threaded holes and screw them in until the cover breaks loose.

(Figure 36)

Remove the key, belleville washers, angle ring, o-ring and thrust washer.

(Figure

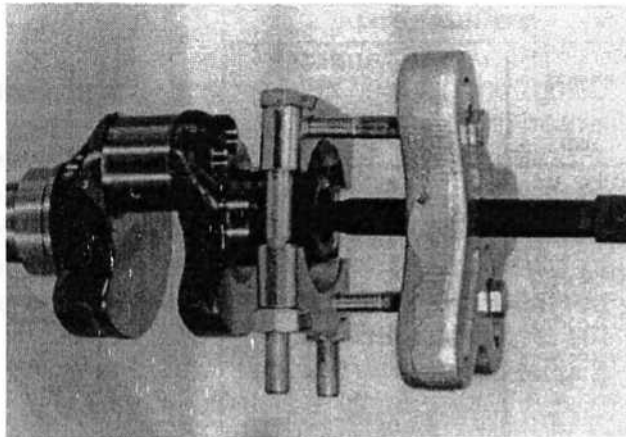
37)

## 22. Crankshaft

Remove the crankshaft from the crankcase, being careful not to drag the crankshaft gear on the main bearing bushing.

To pull off the crankshaft gear wheel, use puller.

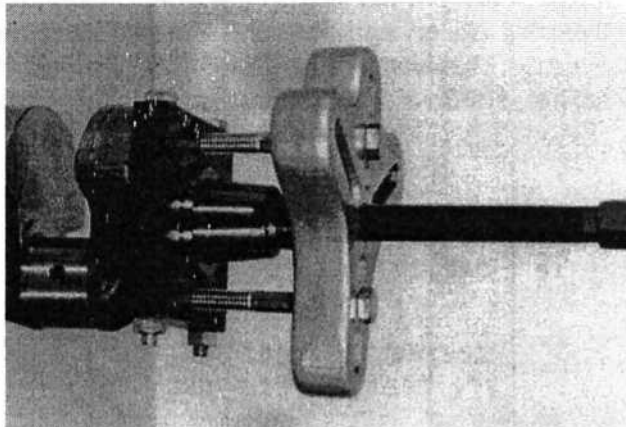
(Figure 38)



### 22.1.

In case the roller bearing needs replacement, replace also the inner race, which is shrunk fit on to the crankshaft. Use race puller, pull off the inner race.

(Figure 39)



The engine is now completely stripped down. Clean all parts in diesel fuel or another cleaning solution.

When the parts are dry, check for damage and / or wear and tear. In case of doubt, change the part.