

## ENGINE

Removing the engine from the frame:

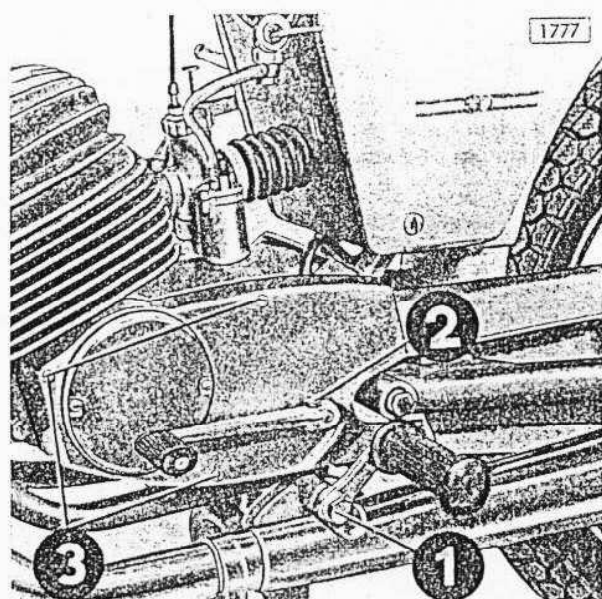


Fig. 1: Engine l. h. s. view

1. Undo both nuts from the exhaust pipe at the cylinder then remove both fixing screws of the exhaust (fig. 2/1) and the screw of the support (fig. 2/2), thereafter remove the complete exhaust unit.
2. Undo foot rest fixing bolts l. h. s. (fig. 1/1) and r. h. s. and turn foot rests downwards i.e. they need not be removed completely. Disconnect foot brake linkage at the rear brake lever (fig. 2/3).

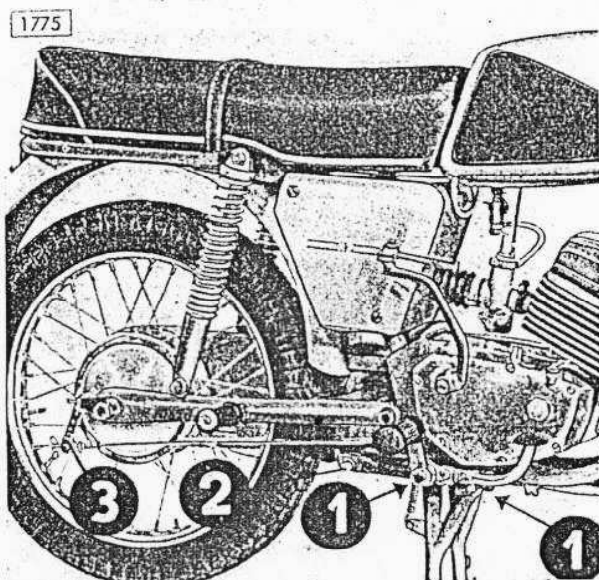


Fig. 2: Engine r. h. s. view

3. Undo gear shift lever-fixing bolt (fig. 1/2) and cover fixing screws (3 screws, fig. 1/3), and remove both the gear shift lever and cover.

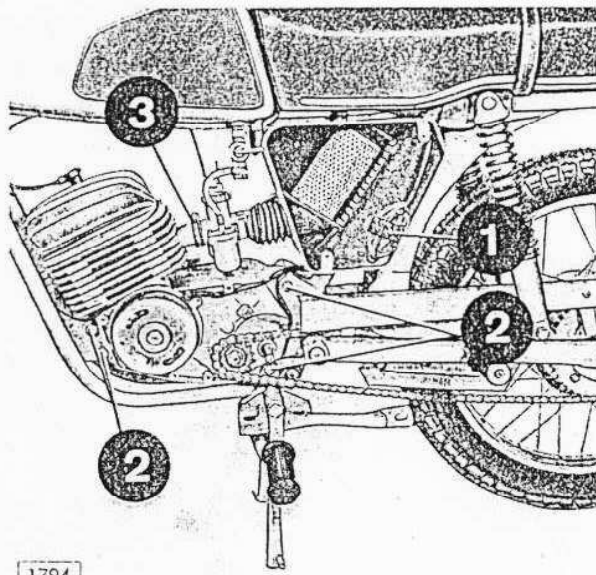


Fig. 3: Engine mounting bolts

4. Open chain master link and remove chain from the gearbox sprocket, disconnect leads of the generator at the connecting terminal (fig. 3/1) in the compartment and take off cable plug from the spark plug.
5. Loosen clutch control cable at the handlebar first then unhook it at the engine.
6. Unscrew the nuts of the four engine mounting bolts and remove the bolts (fig. 3/2).
7. Unscrew the carburetor clamping screw (fig. 3/3), pull the carburetor from the intake pipe and let it hang on the throttle cable. Now remove the engine, in r. h. s. direction, from the frame.
8. Drain off the gearbox oil.

Dismantling the engine:

We recommend fixing the engine to a home-made engine repair stand resp. use special tool part no. 905.1.31.101.2.

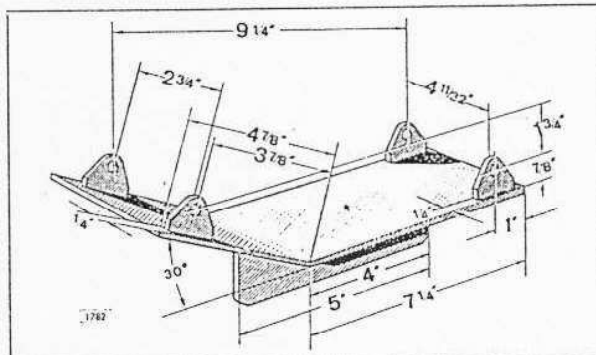
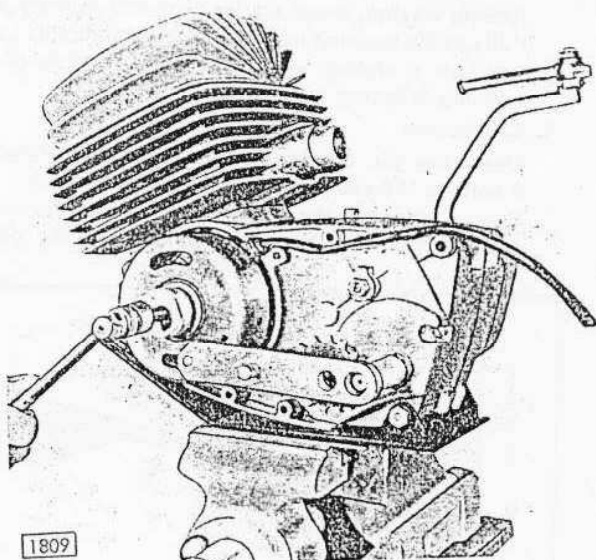


Fig. 4: Sketch of an engine repair stand

## 1. Flywheel magneto:

Unscrew the fixing nut, while locking the flywheel using special tool part no. 905.6.36.103.2  
Now pull the flywheel off by means of the extractor.



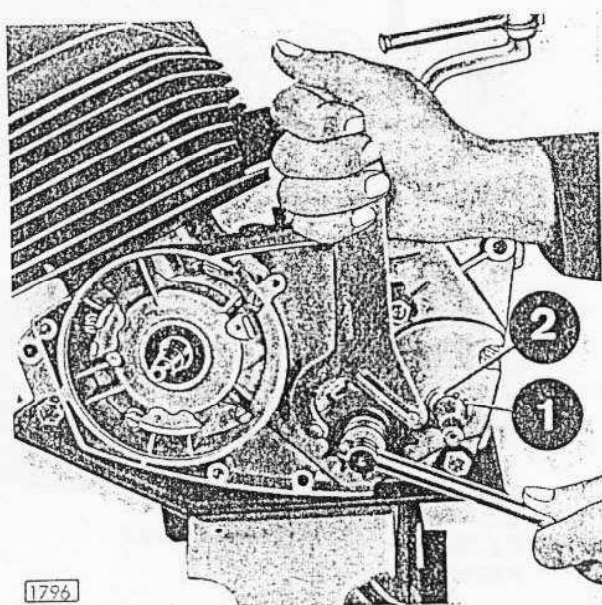
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Fig. 5: Removing the flywheel magneto

Undo the three mounting bolts of the magneto base plate and remove it.  
Fix the key to the journal with adhesive tape so as not to lose it.

## 2. Gearbox sprocket:

While the gearbox sprocket is kept in place by means of the special tool part no. 905.0.36.101.2 unscrew the fixing nut. Remove the lock washer, gearbox sprocket and thrust washer.



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Fig. 6: Removing gearbox sprocket

## 3. Circlip on gearshifting shaft:

Take off circlip (fig. 6/1), detach covering disc (fig. 6/2) with rubber seal from the gearshifting shaft.

## 4. Cylinder and piston:

Unscrew spark plug. Loosen cylinder head nuts and remove cylinder head (no gasket is used between head and cylinder). Loosen cylinder flange nuts by means of the special spanner part no. 905.1.35.101.1 and take off cylinder.

(Attention: Hold con rod and piston firm to prevent the piston becoming damaged.)

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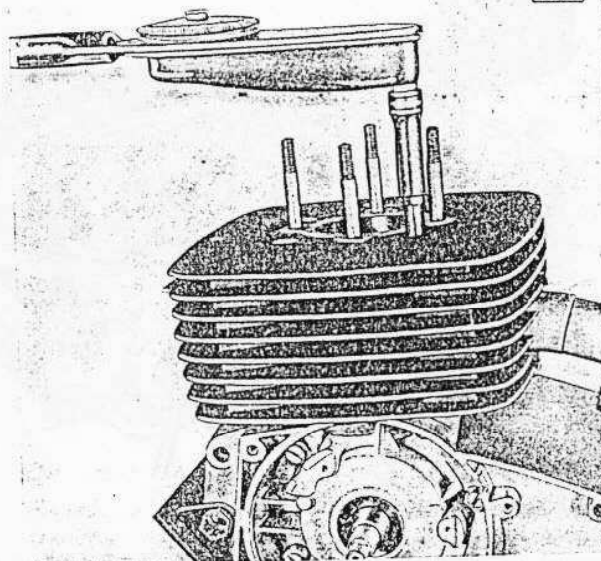


Fig. 7: Removing the cylinder

Remove both wrist pin circlips and press wrist pin out. Take off piston and mind that the two thrust washers (fig. 8/4) one on the left and one on the right of the wrist pin needle bearing do not get lost. Note: The design with wider needle bearing need no thrust washers. The piston ring gap i.e. the open side of the piston ring points in driving direction.

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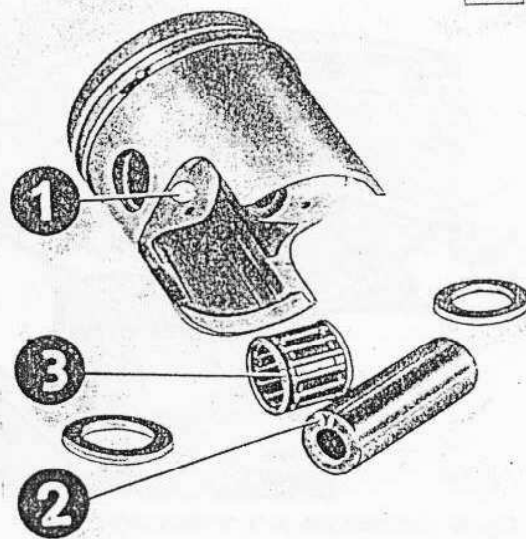


Fig. 8: Wrist pin bearing.

The detached piston should be put into the cylinder again from the bottom in order to prevent the piston from being damaged.

#### 5. Crankcase cover with starter mechanism:

Remove the kickstarter crank. Unscrew centering screw of the declutching unit, loosen screws of crankcase cover and take off cover together with starter shaft and starter mechanism (fig. 9/1). Remove gasket.

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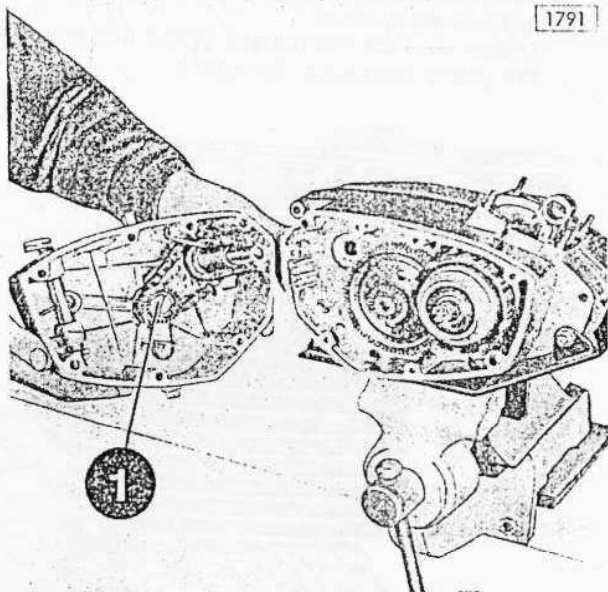
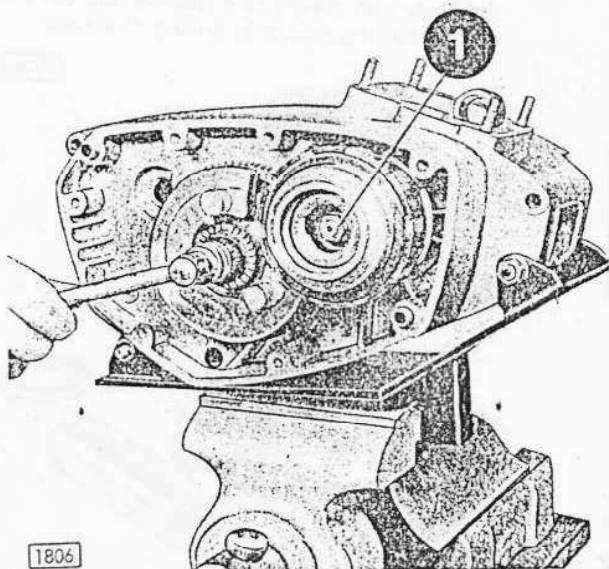


Fig. 9: Removing crankcase cover

#### 6. Clutch and primary drive:

Remove the circlip from the clutch set bolt and take set bolt out. If the replacement of the clutch spring should not prove to be necessary the circlip can be reassembled. This way the clutch spring with spring cup and spring cage remain in pre-tensioned condition and when reassembling it is easier to tighten



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Fig. 10: Undoing the nuts of the primary drive

the fixing nut. Put the locking device (spec. tool part no 905.6.36.102.1) onto the primary gear and undo the nut of the primary gear and clutch (fig. 10/1). Remove clutch spring with spring cage and spring cup. Take out clutch discs. There are 5 identical steel discs and 4 identical discs with lining. The fifth disc with lining is without dog and is installed next to the crank web. Pull off clutch hub and clutch housing. Remove bushing from crankshaft journal. Remove locking washer, small starter gear and primary gear. Pull out the bushing from the countershaft, this bushing has a sliding seat. The grooved side of the bushing is facing the gearbox.

#### 7. Crankcase:

Undo the six crankcase bolts (the dimension of 5 bolts is M 6 x 50 mm and one is M 6 x 85 mm). Before stripping the engine down put it on to the repair stand with the magneto side facing downwards.

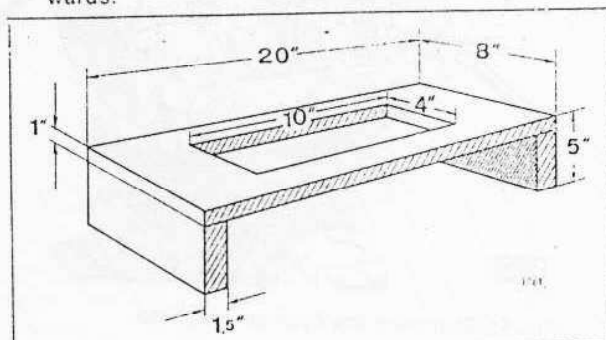


Fig. 11: Sketch of the repair stand

Thereafter remove the crankcase-half of the primary drive side together with the crankshaft. Only when this crankcase-half is removed do the gearbox with the countershaft, the main shaft, the ratchet wheel and both selector forks as well as the gearshifting mechanism remain in their functional position without getting confused.

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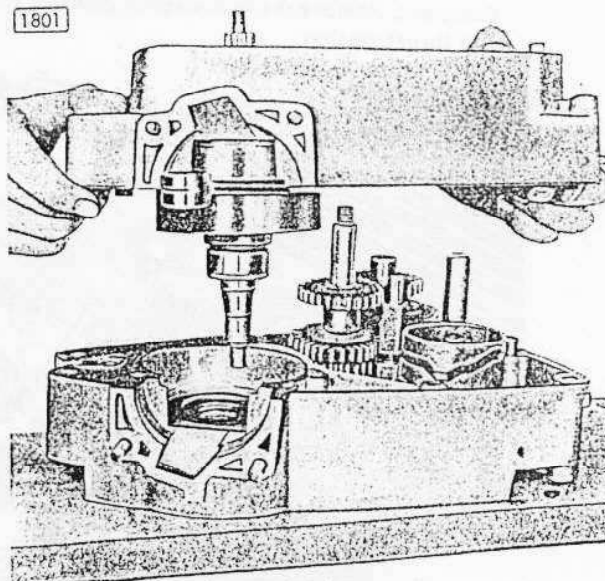


Fig. 12: Removing the crankcase-half  
Remove the gasket



## 8. Stripping the gearbox:

Before stripping the gearbox engage the 4<sup>th</sup> speed; take the countershaft, with the four speed gears pressed on it out of the crankcase; pull out bolt of selector forks.

Remove selector fork for 3<sup>rd</sup> and 4<sup>th</sup> gear and 1<sup>st</sup> and 2<sup>nd</sup> gear.

Pull gearshifting main shaft with all speed gears out of the crankcase.

Pay attention to the grooved thrust washer 28x21, 5x3,00 mm.

This washer is available in various thicknesses that is: 3 mm, 3,25 mm, 3,5 mm, 3,75 mm and 4,00 mm. With the help of these various washers the axial play of the mainshaft is adjusted. The grooved side of the washer is facing the rollers of the bearing. Take the rollers (16) out from the outer bearing ring. Only now remove the hex nut for the axle of ratchet wheel outside of the crankcase and pull out the ratchet wheel. This procedure causes the catch and catch spring to drop out. Remove gearshifting shaft with complete gearshifting mechanism as well as the thrust washer at the bore for axle of ratchet wheel in the crankcase.

Now press out the crankshaft from the crankcase-half r.h.s.

In order to avoid any damage to the thread of crankshaft journal fix nut again (fig. 13/1).

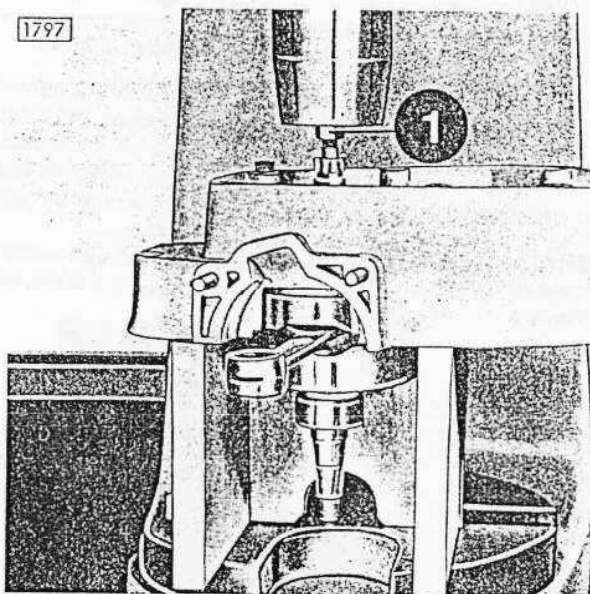


Fig. 13: Pressing out the crankshaft

## Description of the main shaft:

The 1<sup>st</sup> and 4<sup>th</sup> speed gear is put on to the main shaft just loose. The 2<sup>nd</sup> and 3<sup>rd</sup> speed gear are kept axial between two outer circlips. The gear change wheels of the 1<sup>st</sup> and 2<sup>nd</sup> gear as well as those of the 3<sup>rd</sup> and 4<sup>th</sup> gear are identical.

## Description of the countershaft:

The countershaft and two speed gears are made out of one piece, the other two speed gears are pressed onto the shaft. The shaft can not be stripped.

## 9. Stripping and checking gear shifting mechanism (if necessary).

Clamp the selector assembly with its selector shaft in a vice between aluminium jaws. Remove selector spring, take off the small circlips, the selector finger with lifting plate and spring for lifting plate and quadrant sector. Take off the outer circlip from the gearshifting shaft, pull off the base plate.

Check disassembled parts for wear:

Check selector finger for wear at the dented hole. Edges of the engaging pawl should not be chipped or excessively worn. Replace lifting plate if necessary. When exchanging it take care that it is fairly movable in the selector finger resp. on the quadrant sector. Click lifting spring only when assembling it into the centering bore of the selector finger.

In the quadrant sector, which is welded to the gearshifting shaft, there is a spring pin. Check this pin for tight seat. If necessary press in a new spring pin. The movable quadrant sector and the welded quadrant sector must be assembled correctly as follows. The central tooth of the movable quadrant sector must face in the direction of the gearshifting shaft. In this position the movable quadrant sector must be aligned with the quadrant sector welded to the gearshifting shaft.

## 10. Starter mechanism.

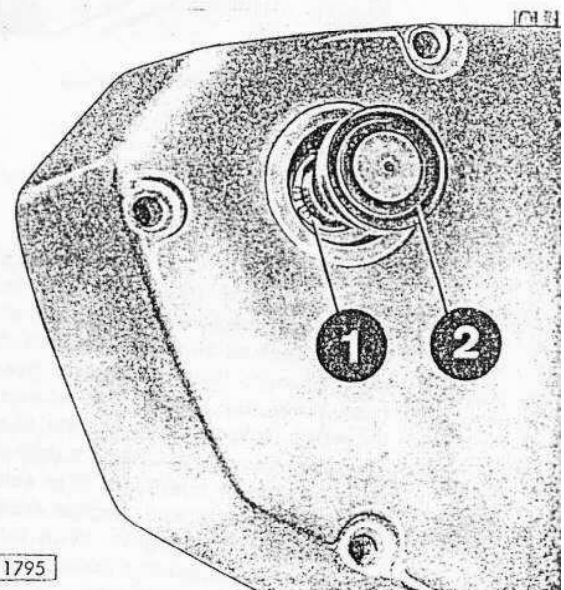


Fig. 14: Starter shaft

Undo the mounting bolt and take off starter driver with brake spring and the small sprocket. The starter shaft, is kept in the crankcase cover by a circlip.

This circlip (fig. 14/1) is covered by the oil seal 17/28/ (fig. 14/2) of the starter shaft.

Therefore first dismantle the oil seal from the shaft with a screwdriver and then dismantle the circlip. After that the kickstarter shaft with sprocket welded to it, the kickstarter stop and the starter chain can be pulled out from the crankcase cover.

The starter chain is endless and has no chain master link.

Replacement of the starter spring (if necessary): Clamp the crankcase cover with the starter shaft in a vice between aluminum jaws. Remove the pin by means of a drift punch and take off the starter spring. When reassembling the starter spring have it pre-tensioned by appr. half a turn (Turn spring to the right.)

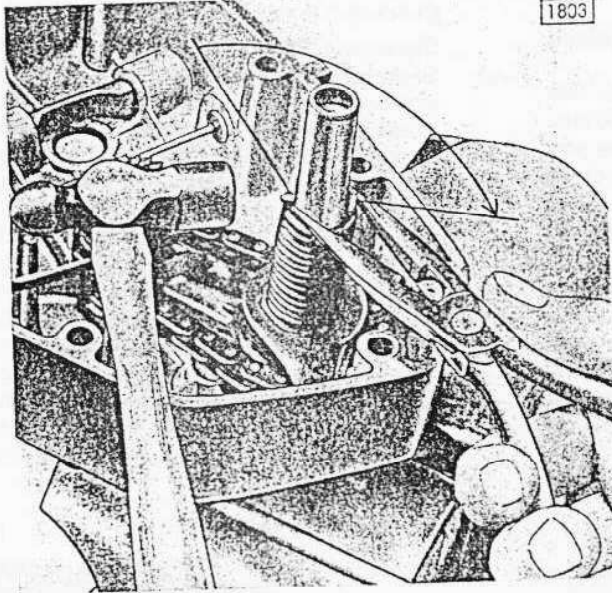


Fig. 15: Mounting the starter spring

### Assembling the Engine

#### 1. Attention:

All engine parts have to be cleaned with petroleum or cleaning petrol (gasoline) and dried by compressed air. Before reassembling, oil movable parts. Have a visual check of all parts. Replace damaged or worn out bearings, thrust washers, gear wheels etc. In case there are some gear wheels of the gearbox defective replace the complete change-speed gear. Do not use new gear wheels together with ones which were already in operation. It is self-evident that new gaskets, oil seals and circlips must be used when reassembling the engine. With this engine it is not necessary to adjust the (axial) crankshaft clearance. The crankshaft is kept in place in the r.h.s. crankcase-half and is immovable fixed with the pressed in ball bearing with circlip, the thrust washer, bearing bushing, clutch hub and the spring cup. Excessive play can only be the result of worn out bearings or loose bearing seat.

The lubrication of both main bearings (one roller bearing and one ball bearing) of this engine is achieved via the gearbox. The correct gearbox oil level and proper oil quality and oil change specification guarantee the lubrication of main bearings. Reassembling is performed in reversed order of disassembling observing the following paragraphs:

#### 1. Crankshaft bearings:

##### a) Crankcase:

The crankshaft roller bearing (outer bearing race with rollers) in the l.h.s. crankcase-half can be pressed out jointly by means of the special tool part no. 250.7011.2.

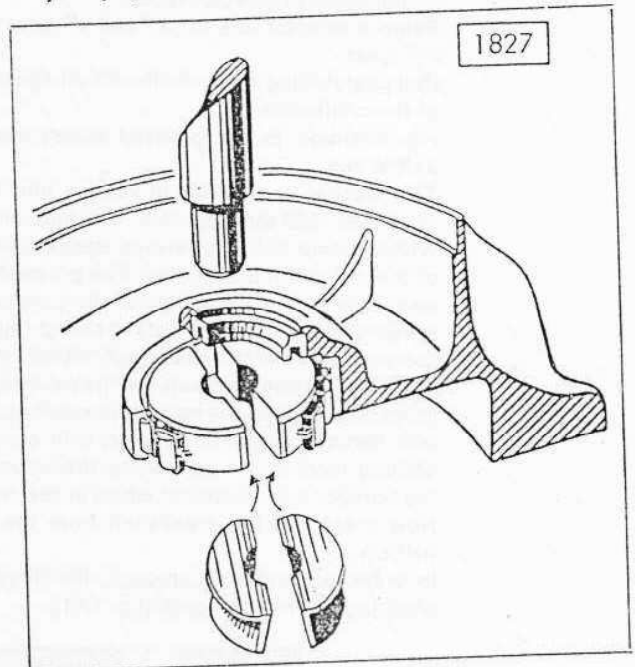


Fig. 16: Pressing out the roller bearing

Before pressing in the bearing again the crankcase should be heated up to appr. 80° C resp. 170–180 F. The roller bearing in the l.h.s. crankcase-half and the ball bearing in the r.h.s. crankcase-half is pressed up to its stop into the crankcase by using the special tool part no. 905.1.33.102.0

The ball bearing is secured with a circlip. The inscription on the bearing faces the crank web.

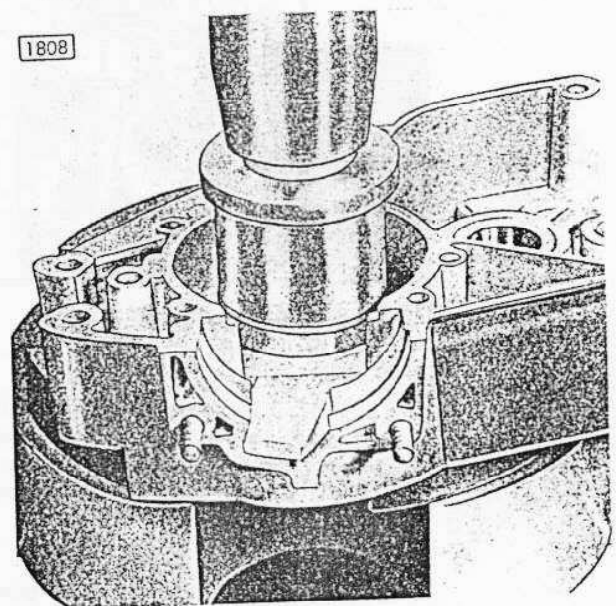


Fig. 17: Pressing in the bearing.

**Important:**

After having been pressed in both large oil seals on the crankshaft must be on a level with the inner face of the crankcase. The lips of both large oil seals point to the bearings. There must be a gap of appr. 2 mm (.079 in.) between the roller bearing and oil seal in the left crankcase half. For this reason do not fail to use the special tool part number 905.1.33.102.0, provided for pressing in the oil seals.

The small oil seal is pressed in from the generator side. The lip points to the crank web.

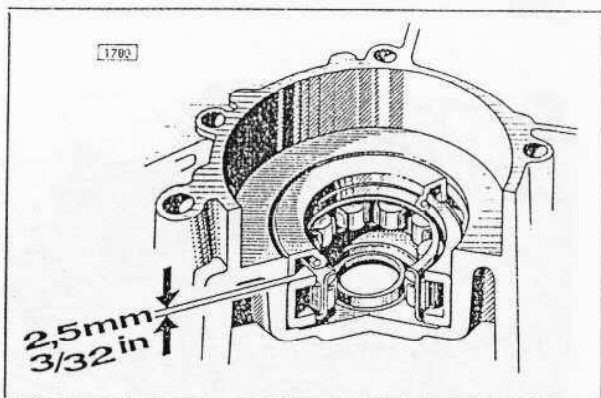


Fig. 18: Gap between bearing and oil seal

**b) Crankshaft:**

The ring for the oil seal and the inner ring of the roller bearing are pressed on to the l.h.s. crankshaft journal. Only the ring for the oil seal is pressed on the r.h.s. crankshaft journal.

For extracting these rings use the extractor part no. 905.1.34.101.0

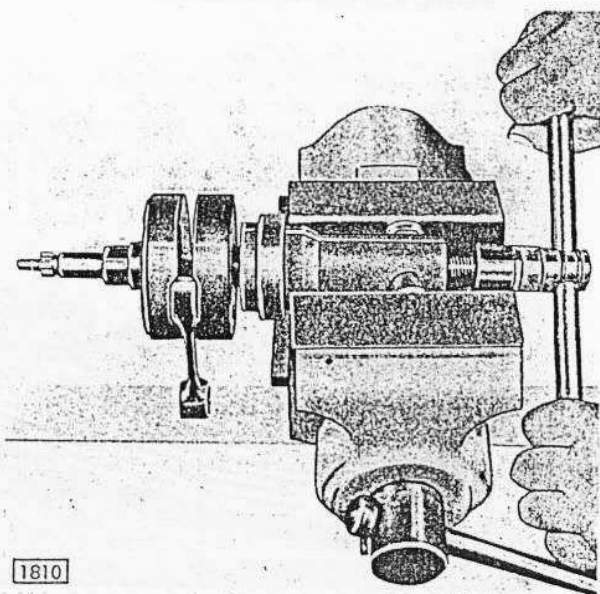


Fig. 19: Extracting the rings from the crankshaft

When pressing both rings for the oil seals on to the crankshaft journals observe that the right-angled shoulder of the rings points to the crank web. The inscription of the inner ring of the roller bearing must point to the crank web.

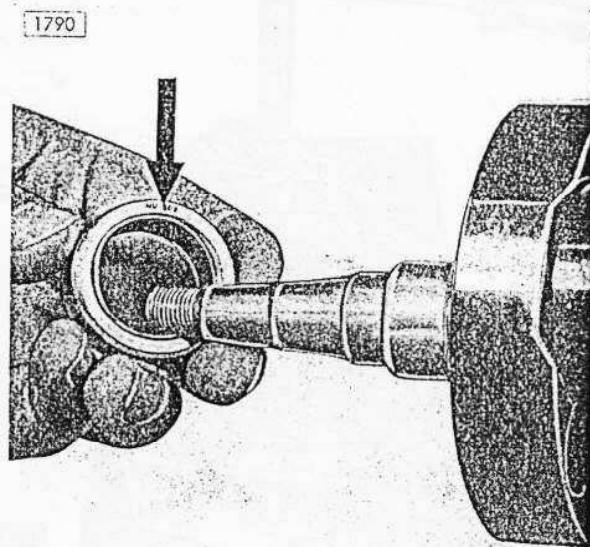


Fig. 20: Crankshaft with ring and inner ring of roller bearing

For pressing on the rings use the mounting sleeve part no. 905.1.33.102.0 and put the special tool part no. 905.1.33.103.2 between the crank webs in order to support them.

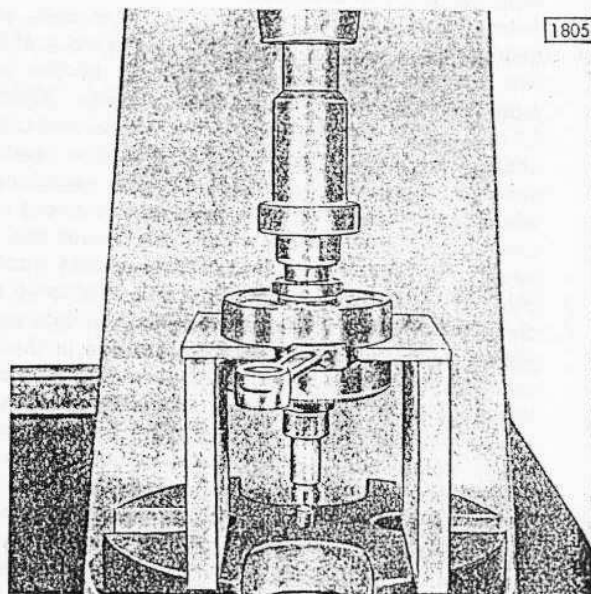


Fig. 21: Pressing on the bearing ring

**2. Gearbox:**

If it is necessary to replace both ball bearings in the r.h.s. crankcase-half press them out or in by means of a suitable stamp (better use special tool part no. 905.1.33.102.0).



To replace the ball bearing in the l.h.s. crankcase-half use special tool no. 905.0.14.002.0 and 905.0.14.006.0

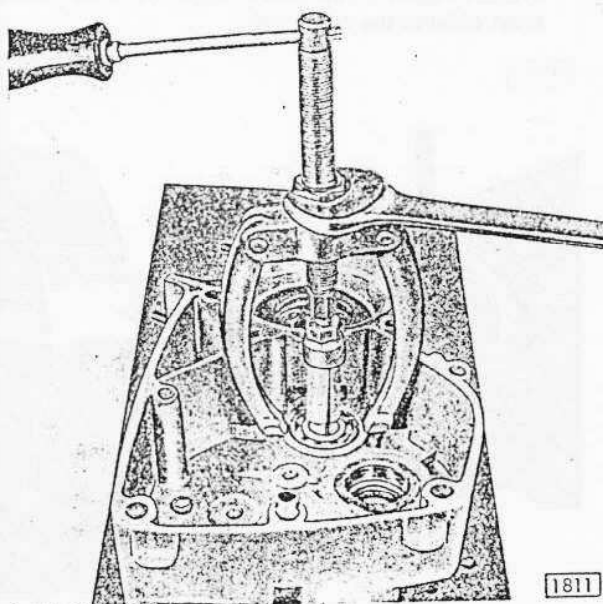


Fig. 22: Extracting the bearing from crankcase

#### Assembling, gauging and distancing the mainshaft.

When mounting the mainshaft proceed as follows: First install the circlip on the shorter part of the shaft then put on the 3<sup>rd</sup> speed gear and 2<sup>nd</sup> speed gear from gearbox sprocket side.

After that install the other circlip. Now slide one gearchange wheel onto the shaft on the r.h.s. of the two mounted gears and on the l.h.s. of the two mounted gears. Slip the thrust washer 27/16,8/1,5 and the 4<sup>th</sup> speed gear over the shorter end of the shaft. Then install the 3<sup>rd</sup> circlip, from the gearbox sprocket side onto the mainshaft. The gearchange wheel for 1<sup>st</sup> and 2<sup>nd</sup> gear is held by this circlip and cannot be pulled off any more. Now mount the 1<sup>st</sup> speed gear and mount the grooved thrust washer 28/21,5/3, described under paragraph "Stripping the Gearbox" facing the bearing rollers. Now this completely premounted mainshaft is installed in the left crankcase-half. Put the other crankcase half on tentatively without gasket and screw both crankcase-halves together with a few bolts. If the mainshaft now has no noticeable clearance and can still be turned, a play of 0.0084"—0.016" is obtained by installing the crankcase gasket. If the mainshaft clearance is more than 0.008"—0.016" install a spacer of the next thicker dimension, if no clearance is obtained with a gasket install the next thinner one.

Stick to the clearance of 0.008"—0.016" precisely. Take the right crankcase-half off again.

#### Gauging and distancing the countershaft:

The countershaft need not be adjusted as it is immovably fixed and screwed together, with the bearing, the spacer of the primary gear and the thrust washer, in the right crankcase-half.

#### Gearbox assembly:

Put the left crankcase half onto the mounting board with its clutch side facing downwards.

- Install the 16 rollers by sticking them in place with bearing grease.
- Put the thrust washer 21/8/1,5 (fig. 23/1) for the gearshifting assy. into the crankcase over the bore for axle of ratchet wheel and fix it with grease.
- Mount the gearshifting shaft (fig. 23/2) complete with the gearshifting unit (fig. 23/3).

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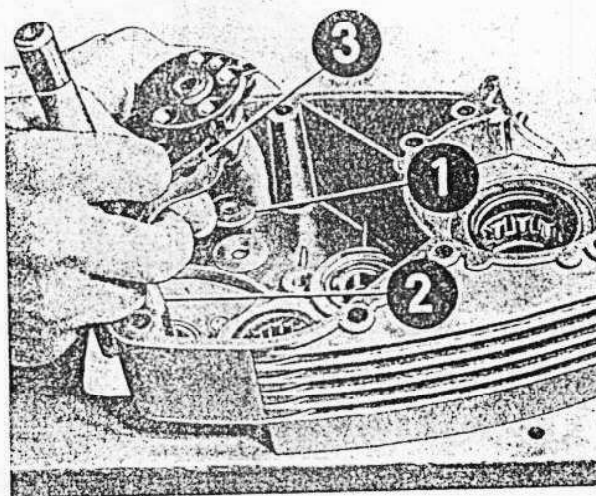


Fig. 23: Installing the gearshifting unit

- Install ratchet wheel (fig. 24/1) with catch spring and catch — grease the latter somewhat — and insert the axle for ratchet wheel through the gearshifting unit into the crankcase.

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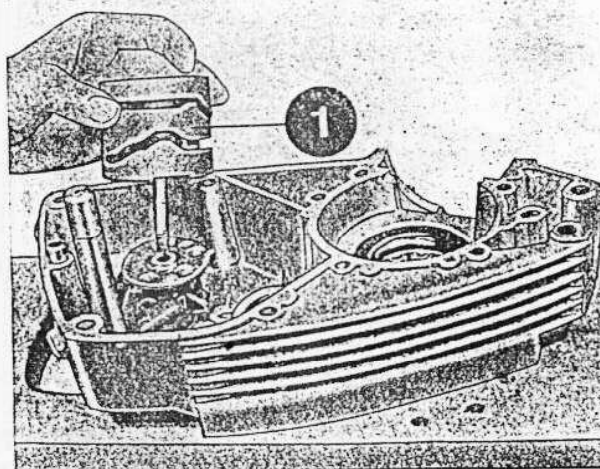


Fig. 24: Installing the ratchet wheel

Screw on the locking plate and hex nut for ratchet wheel axle and tighten.

- e) Put the previously distanced mainshaft (fig. 25/1) through the roller bearing.
- f) Put ratchet wheel in 4<sup>th</sup> gear position.
- g) Engage the selector forks for 1<sup>st</sup> and 2<sup>nd</sup> (fig. 25/2) as well as 3<sup>rd</sup> and 4<sup>th</sup> gear (fig. 25/3).

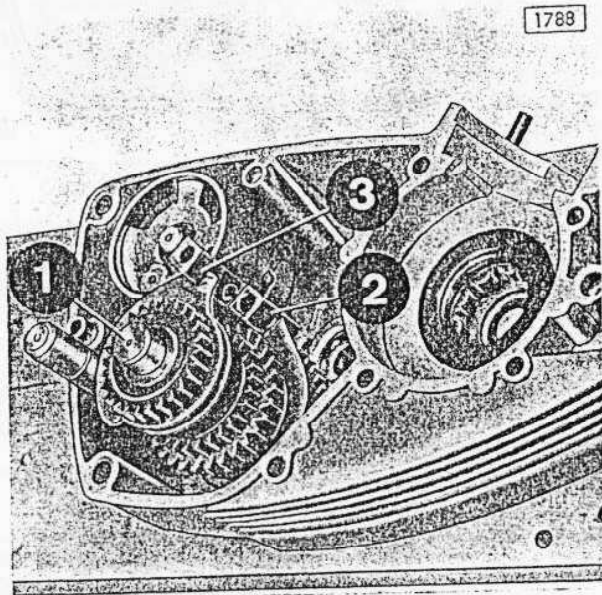


Fig. 25: Engaging the selector forks

- h) Put in the axle for selector forks.
- i) Install the countershaft with its speed gears pre-mounted on it. If the ratchet wheel has not been put into the 4<sup>th</sup> gear position, the gearchange

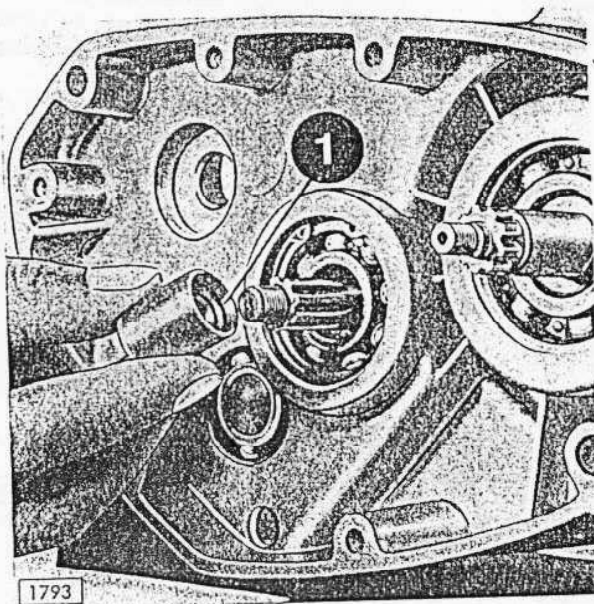


Fig. 26: Bushing for countershaft

wheel for 3<sup>rd</sup> and 4<sup>th</sup> gear and the selector fork for 1<sup>st</sup> and 2<sup>nd</sup> gear will not allow the assembly of the countershaft.

- j) Soak the new gasket somewhat with grease on one side and put it on to the crankcase.
- k) Press the crankshaft into the right crankcase-half into which the oil seal and ball bearing have already been pressed before.

Put both crankcase-halves together then turn the complete crankcase over and put the bolts for crankcase assembly into their holes and tighten. For this place engine on repair stand.

Mount the rubber seal, the covering disc and the circlip on to the gearshifting shaft.

Install the bushing for the countershaft with its grooved side (fig. 26/1) to the gearbox.

Do not fail to have the gearshifting mechanism tested with the engine assembled to this state. When doing so rotate the countershaft by hand so as to make gearshifting easier. Provided the function of the gearbox is satisfactory lock the nut for ratchet wheel axle by bending up the tab washer.

### 3. Clutch and primary drive:

Mount primary gear, small starter gear and tab washer to the countershaft and screw on the fixing nut. Put thrust washer 37x16,5x5,5 mm with its grooved side facing the bearing to the countershaft journal and then place the spacer with its grooved side facing outward. Oil the spacer and install clutch housing as well as clutch hub.

Start assembling the clutch discs in following sequence: First the disc without dog, then a steel disc then a disc with lining and so on. Mount spring cap with clutch spring, spring cup and tab washer and tighten with nut. For pressing the clutch spring together use special tool part no. 905.6.31.105.0.

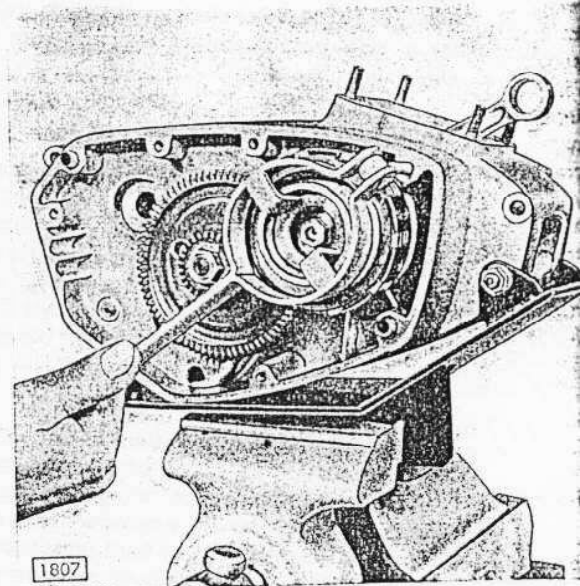


Fig. 27: Special tool for clutch spring



Clamp engine to the repair stand. Now put in locking device (special tool part no 905.6.36.102.1) and tighten nut to the countershaft resp. the clutch and lock. Mount clutch set bolt and circlip. Grease the new crankcase cover-gasket, put it onto the crankcase and assemble the premounted crankcase cover complete with the starter mechanism and tighten with the mounting bolts.

Before screwing in the centering screw of the set bolt make sure that the cut out on the declutching shaft points in driving direction. Screw in centering screw. Fasten declutching shaft to the support for the clutch cable by means of a piece of wire until clutch control cable is finally installed. Then mount the kickstarter crank and kick it down to make sure that the starter shaft moves back to its initial position as a result of the pre-tensioned starter spring.

#### Hint:

The caulking lip of the oil seal for starter shaft in crankcase cover must point outwards.

#### Clutch set bolt:

When installing a new set bolt observe that there is a clearance of 0,2 mm between the ball nut at the set bolt and the cut out of the declutching shaft. This results in a play of appr. 3–5 mm at the declutching lever of the crankcase cover. This play is absolutely necessary as the clutch release bearing must not run under stress.

#### 4. Assembling cylinder and piston:

Put the new cylinder flange gasket in its place and reassemble cylinder, piston, wrist pin, needle bearing and thrust washers in reversed order of stripping. Fix both thrust washers l.h.s. and r.h.s. to the needle bearing inside the piston and stick them there with some grease. Use special tool part no. 905.1.34.102.1 Because of the close clearances which are necessary for a high output engine the following directions should be observed:

##### a) Sorting of cylinders and pistons:

In order to keep the necessary clearance, cylinders and pistons are sorted and marked with the letters "A" to "E" that is cylinder "A" is matched with piston "A" and so on. As spare parts only piston A, C and E are supplied. Piston "A" is used for cylinders A and B, piston C for cyls C and D and piston E for cyl E. Piston rings of the pistons "A" to "E" have the same diameter. The piston ring gap clearance is .008 to .012 in.

On principle cylinders, pistons or piston rings must not be replaced as single parts. Replace piston or piston rings on a new or rather new engine only if absolutely necessary. If the cylinder needs decarbonizing use a suitable piece of hard plastic only so as to prevent the bridge at the exhaust port from getting bent resp. prevent the chromium in the cylinder bore from being damaged.

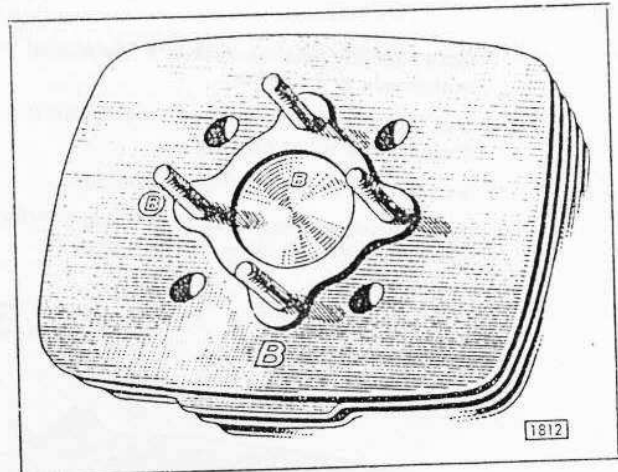


Fig. 28: Marking of cylinder and piston

##### b) Sorting of wrist pin bore and wrist pin:

In order to adhere to the required tolerance, wrist pin bore and wrist pin are sorted together. The wrist pin bore is marked inside the piston by a spot of blue or yellow paint. Corresponding to the sorting arrangement 1 to 3, the wrist pin is marked with 1–3 lines on its front. When mounting proceed as specified in paragraph d) and fig. 30.

##### c) Assortment of wrist pin, connecting rod small end and wrist pin needle bearing:

As with the cylinder, piston and wrist pin, the wrist pin, wrist pin needle bearing and connecting rod are sorted to each other and marked by figures or color, that is:

Wrist pin: With 1 to 3 lines on the front. (1 line the largest; 3 lines the smallest).

Needle bearing: Marked with color (red, blue, white) on its cage (red the largest; white the smallest).

Note: For repair a yellow bearing (larger than the red one) is supplied (see page 6–12).

Connecting rod: Marked with numbers 1–5 on the small end (no 5 largest bore; no 1 smallest bore). Assembling is performed as per sorting table.

Piston wrist pin bore		Wrist pin					Wrist pin needle bearing				
YELLOW	1			III	II	I					
	2		III	II	I						
	3	III	II	I							
BLUE	1										
	2										
	3										
		1	2	3	4	5	Connecting rod bore				
		III	II	I							
		II	I								
		I									

III White  
II Blue  
I Red

Fig. 29: Sorting table

## d) Sorting table:

Independent of the sorting of pistons and cylinders, the wrist pin bore in the piston with wrist pin, wrist pin with needle bearing and needle bearing with connecting rod have to go in pairs.

The pairs are sorted according to the following table:

Piston wrist pin bore		Wrist pin		Wrist pin needle bearing					Connecting rod bore				
YELLOW	1	2	3	III	II	I	III	II	I	III	II	I	III
BLUE	1	2	3	III	II	I	III	II	I	III	II	I	III

III White  
II Blue  
I Red

1833

Fig. 30: Application of table

## Example.

The connecting rod no. 4 goes together with needle bearing marked with red colour (in vertical position on chart), the wrist pin marked with 2 stripes on its front and the piston marked with blue or yellow color (horizontal position on chart). See also fig. 8.

## Note:

- As spare part the crankshaft with connecting rod no. 3. is supplied only. That means, before buying a new crankshaft you will have to check on the chart if it is not necessary to buy also a new needle bearing that matches with the piston.
- If your engine is equipped with a con rod no. 5 and you get as spare a piston with blue marking you will need a yellow needle bearing (not shown in chart). This needle bearing could also be used with a con rod no. 4 and wrist pin no. 3 and blue piston.
- If your engine is equipped with a con rod no. 1 and you get as spare a piston with yellow marking use a white needle bearing as before.

If the color spots or identifications are not visible or illegible use those parts with which the smallest mounting clearance is obtained.

After having assembled the cylinder mount the cylinder head without gasket. When tightening the cylinder head nuts adhere to the specified torque.

## 5. Gearbox sprocket:

Mounting the gearbox sprocket:

Fit toothed intermediate disc, gearbox sprocket, tab washer and screw on nut and lock with washer. While doing so the sprocket is held in special tool no. 905.0.36.101.2.

## 6. Flywheel magneto and fan:

Put woodruff key for the guide of flywheel to crankshaft journal. Then mount magneto base plate. The plate is fixed with fillister head screws, washers, toothed lock washers. There are 3 longitudinal slots in the base plate for mounting the screws. Turn magneto base plate so that the screws are situated in the centre of the slots. On ignition timing it is further possible to obtain more or less advanced ignition by turning the base plate.

## Mounting the flywheel:

Before mounting the flywheel it is absolutely necessary to degrease the seat on the crankshaft and in the flywheel by means of an effective agent (i. e. carbon tetrachloride, trichlorethylen etc.).

Even small traces of grease reduce the torque up to 30% which possibly could cause the flywheel to vibrate loose. If there are any metal chips on the magneto poles remove them carefully in order to avoid ignition trouble.

The flywheel must be tightened by means of a torque wrench to the specified torque of 26 – 29 ft lb (3,4 mkg).

## Ignition timing:

See under electrical equipment.

## 7. Assembling the engine in the frame:

The engine is assembled in the frame in reverse order of disassembling. Fill 600 cc oil into the gearbox. When installing the clutch control cable observe that it has some play at the clutch control lever. If installed without play this results in a damaged bolt or clutch discs.

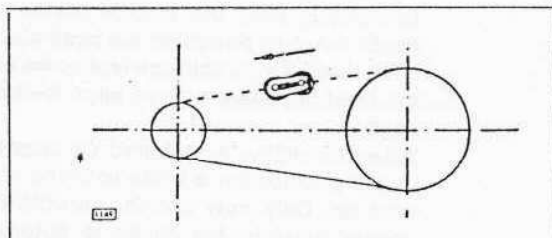


Fig. 31: Mounting the chain

When mounting the chain be sure that the master link is properly installed.

## Carburetor.

### Operation:

The carburetor supplies the engine with a well prepared and properly apportioned fuel-air mixture. The preparation of this mixture is achieved by a specially tuned system of jets.

We distinguish, in general between an idling jet system and a main jet system. In low speed range the mixture is supplied to the engine through the idling jet system. This system consists of the idling jet for the fuel supply, of the idling air hole in the carburetor housing, of the idling air jet and the air control screw. The mixture for idling gets richer on throttling the air intake by means of the air control screw and leaner by opening it.

The main jet system starts working when the engine revolutions are increased. It consists of main jet, firmly installed diffuser and needle jet. The exchangeable main jet is placed in the jet carrier and is screwed in laterally — the spot on the carburetor housing is marked with "H" ("H" means Hauptdüse = main jet) — if the carburetor has oblique placed jets. As soon as the main jet system starts acting, fuel flows through the main jet to the needle jet. The outlet bore of the needle jet is situated in the mixing chamber where the pre-diffusion of the fuel and the air is effected. The air is transported to the needle jet via pre-diffusion bore. Fuel-air bubbles are formed and mixed up with the primary air flow induced into the combustion space of the engine.

The cross section of the needle jet is throttled by a conical needle which is fixed in the throttle piston. If, by operating the throttle piston this needle is led deeper into the needle jet, the open cross section between the needle jet bore and needle gets smaller, in reversed case larger. On the needle itself there are several notches or bores so that an adjustment of the needle in relation to the throttle piston can be actuated. If by changing the needle position the needle is adjusted deeper into the needle jet the engine is supplied with a leaner fuel-air mixture. Is the needle in the throttle piston clamped higher, the open cross section of the needle jet gets larger, resulting in a richer fuel-air mixture. The jet needle influences the fuel consumption only with regard to the throttle positions whereas the fuel consumption on full throttle is influenced by the main jet.

This carburetor is also equipped with a choke for starting the engine from cold.

To start from cold proceed as follows:

Completely shut the throttle piston and push the choke down by operating the push pin; when starting open throttle only until you feel some resistance, now the throttle piston is open appr. 2–3 mm. Crank the engine.

After the engine has started up stick to this throttle piston position for a while until the engine has warmed up. Only now can the throttle piston be fully opened whereby the choke is automatically pulled up by the throttle piston and engages in its final position.

The tickler on the float cap can also be used as starting aid but only in cold season, and with cold en-

gine. This means that the tickler is operated until fuel flows out through the ventilation bore of the float cap.

### Regulation:

The carburetor design and jet sizes are determined by the engine producer and the manufacturer of the carburetor mutually. The adjustment thus obtained an optimum value and it is therefore not advisable to alter the specified adjustment.

### Idling:

Idling is to be adjusted only when the machine is warm. Shut the throttle piston by means of the adjusting screw only until the engine reaches the idling run required. Now the idling air screw is tentatively screwed in and screwed out. With the obtained throttle piston (position of throttle stop screw) the correct position of the idling screw is the position which results in the optimum r.p.m.

If after this tentative adjustment of the idling air screw, the idling r.p.m. increases, first adjust to the required r.p.m. with the throttle stop screw and then again adjust the idling air screw to the proper position.

### Hints:

Turning the air adjusting screw clockwise results in a richer mixture while counterclockwise turning results in the mixture becoming leaner. The adjustment of the air adjusting screw must then not be altered any more since this would also effect the lower and medium r.p.m. range and possibly increase fuel consumption. The engine must pick up speed evenly when the throttle piston is opened slowly.

When opening the throttle the engine must not cough nor must the revolutions drop in any position of the throttle piston. If the engine sputters the mixture is too lean. Repeated back blowing or back-firing in the carburetor and hard starting of the engine indicate that the mixture is too lean.

### Range of operation:

In order to determine the appropriate main jet for a carburetor it is necessary to establish the top speed of a vehicle on a straight road either from the speedometer reading or by means of a stop watch. Generally the correct main jet is the one which results in the highest speed being reached on a level road. If however on long rides with full throttle a pinkish noise is audible due to overheating install a main jet one size larger.

In the middle range fine adjustments should be carried out by means of the jet needle. By adjusting the jet needle higher the mixture becomes richer, by setting it lower it becomes leaner.

Note that the position of the jet needle only effects the richness of the mixture in the lower and middle speed ranges and not on full throttle. With a properly adjusted carburetor the insulator of the spark plug has a brown color. Sooted or wet spark plugs indicate that the mixture is too rich, white spark plugs indicate that the mixture is too lean. Therefore always observe that the carburetor is correctly adjusted as only then economical functioning is guaranteed.



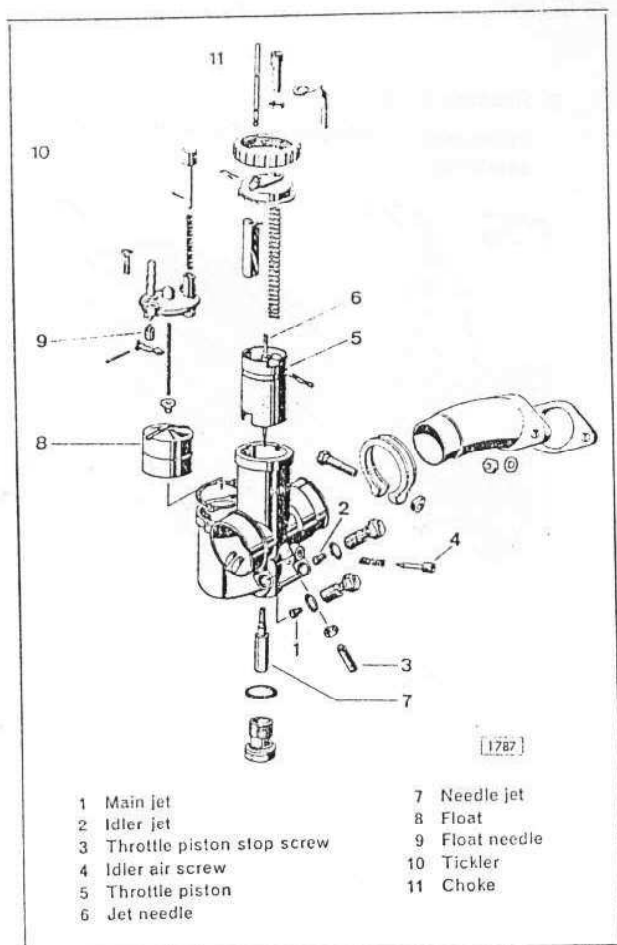


Fig. 32: Carburetor, exploded view

**Maintenance of the carburetor:**

Have the carburetor washed and cleaned with gasoline from time to time. On this occasion check if all parts are in perfect condition. Worn out float needle jet and throttle piston (noise, no idling) have to be replaced by new ones as they influence the performance and consumption of the machine.

When riding on dusty roads or cross country operation (see paragraph 3) the air filter element, placed in the filter housing, should be cleaned more often and replaced more often. It is particularly detrimental to the operation of the machine to remove the air filter as the carburetor adjustment would become incorrect and the running-life of cylinder and piston decreased considerably.