



# Sprite - Barracuda SHOP MANUAL

125cc - 200cc - 250cc

FOUR AND FIVE SPEED

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PRICE \$3.00

**COSMOPOLITAN MOTORS, INCORPORATED**  
**JACKSONVILLE & MEADOWBROOK ROADS, HATBORO, PA. 19040**

(215) OS 2-9100

**ENGINE** - Single cylinder 4 stroke - Over head valves - bore 54 mm. - stroke 54 mm. - Cylinder displacement 123,7cc. - Compression ratio 9,5 to 1 - CV. 16 at 8.800 R.P.M. - Distribution with standard cam - Intake open 30° BTDC - Intake close 75° ABCD - Exhaust open 75° BBDC - Exhaust close 30° ATDC - Valve clearance with hot motor 0.006" - Forced lubrication by gear pump 60 L/H Oil capacity 2 qts - Gravity fuel supply 98 to 100 octane - Carburetor UB 22 BS - Ignition by alternator flywheel magneto with external H.T. coil - Ignition advance 19° - Plus automatic advance of 25° - Point gap 0.016" - Marelli Plug CW 260 L - Champion plug N. 3 - With multiplate clutch - Costant mesh gear box - Foot shift pedal - Primary transmission by helicoidal gears - Secondary transmission by chain 1/2" x 5/16".

**FRAME** - Combination of pressed steel and tubular - Double action hydraulic front fork - Rear swing arm with adjustable hydraulic shock absorbers.

**TIRES** - Pirelli 2.75 x 18" (rib.) front wheel - 3.00 x 18" (univ.) rear wheel - Expanding type brakes.

**LIGHTING EQUIPMENT** - Alternating current 6V 7 amp equipped with battery to ensure steady supply of current to lights and horn - Large 130 mm. headlight - Headlight: 6V 25/25 S. B.

**OVERALL DIMENSIONS** - Length 76.44" - Width 27" - Height 36.64" Weight 229 lbs. (DRY) - Fuel tank capacity 3,5 gallons - Reserve .05 gallons - Maximum speed 78 MPH - Fuel consumption 90 MPG.

**MOTORCYCLE 200cc. (Technical data different from 125cc.)**

**ENGINE** - Bore 66,5 mm. - Stroke 57 mm. - Cylinder displacement 197,9cc. - Compression ratio 8,8 to 1 - CV. 19,5 at 8.600 R.P.M. - Carburetor UB 22 BS - Ignition advance 9° 30' - Plus automatic advance of 29° with flywheel magneto ADP 79/AN.

(Note: with flywheel magneto ADP 54/2ANB ignition advance 17° - plus automatic advance of 25°).

**TIRES** - Pirelli 3.00 x 18" rib. front wheel - 3.00 x 18" univ. rear wheel.

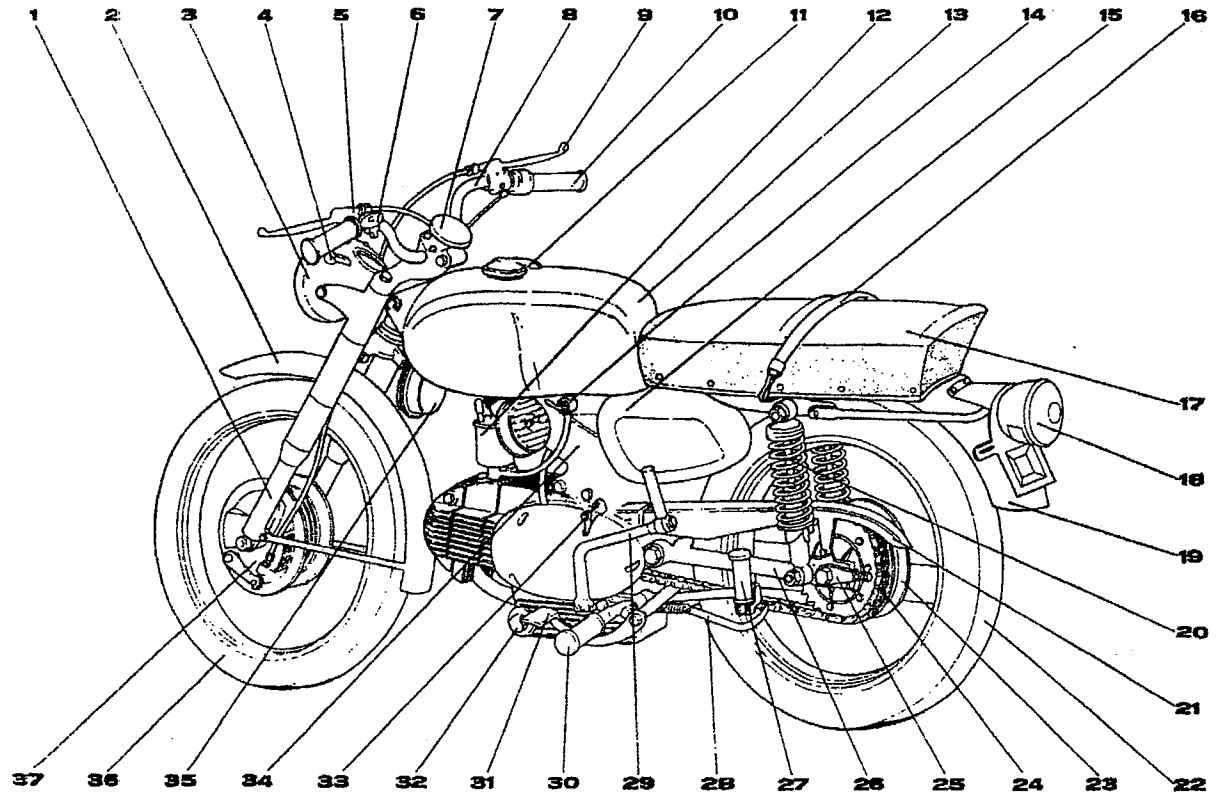
**OVERALL DIMENSIONS** - Weight 231 lbs. (DRY) - Maximum speed 90 MPH - Fuel consumption 85 MPG.

**MOTORCYCLE 250cc. (Technical data different from 125cc.)**

**ENGINE** - Bore 74 mm - Stroke 57 mm - Cylinder displacement 245.1cc. - Compression ratio 8,5 to 1 - CV. 24 at 8.500 R.P.M. - Carburetor UB 24 BS 2 - Ignition advance 9° 30' - Plus automatic advance of 29° with flywheel magneto ADP 79/AN and ADP 78/2ANB.

**TIRES** - Pirelli 3.00 x 18" univ. front wheel - 3.25 x 18" univ. rear wheel.

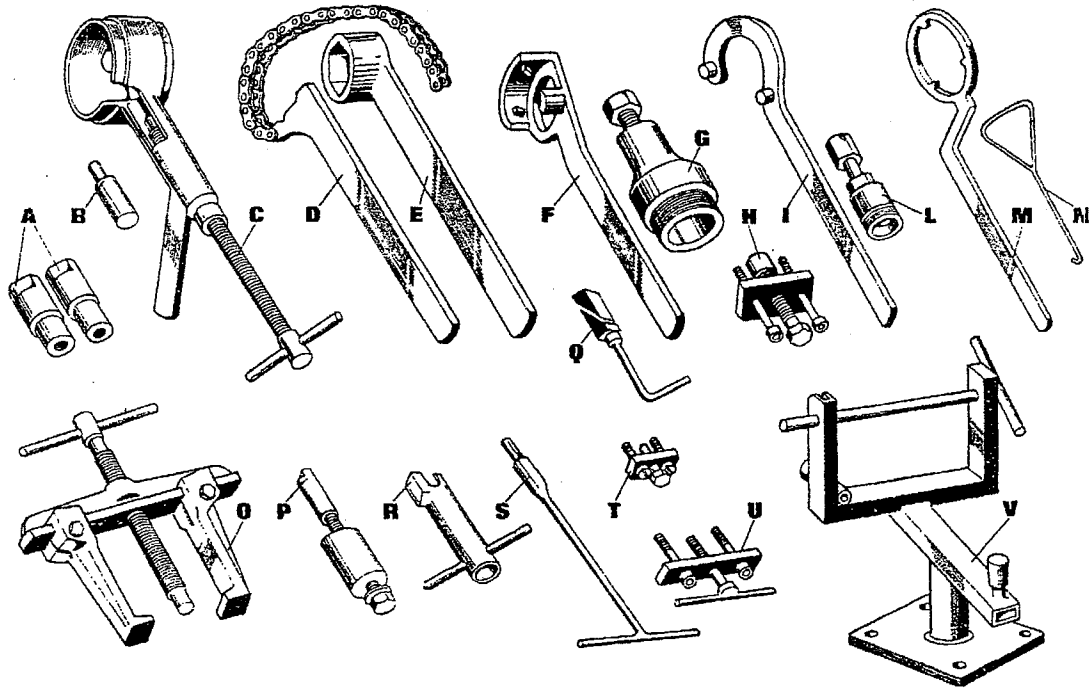
**OVERALL DIMENSIONS** - Weight 232 lbs. (DRY) - Maximum speed 95 MPH - Fuel consumption 80 MPG.



- |                     |                   |                    |
|---------------------|-------------------|--------------------|
| 1 Front fork        | 14 Petcock        | 27 Rear foot rest  |
| 2 Front fender      | 15 Tool box       | 28 Stand           |
| 3 Headlamp          | 16 Strap          | 29 Kickstart       |
| 4 Switch key        | 17 Seat           | 30 Foot rest       |
| 5 Clutch lever      | 18 Rear light     | 31 Brake pedal     |
| 6 Dimmer switch     | 19 Rear fender    | 32 Oil drain plug  |
| 7 Damper            | 20 Shock absorber | 33 Clutch adjuster |
| 8 Handlebar         | 21 Chain guard    | 34 Frame           |
| 9 Front brake lever | 22 Rear wheel     | 35 Horn            |
| 10 Throttle control | 23 Rear hub       | 36 Front wheel     |
| 11 Gas cap          | 24 Chain          | 37 Front hub       |
| 12 Carburetor       | 25 Chain adjuster |                    |
| 13 Gastank          | 26 Rear fork      |                    |

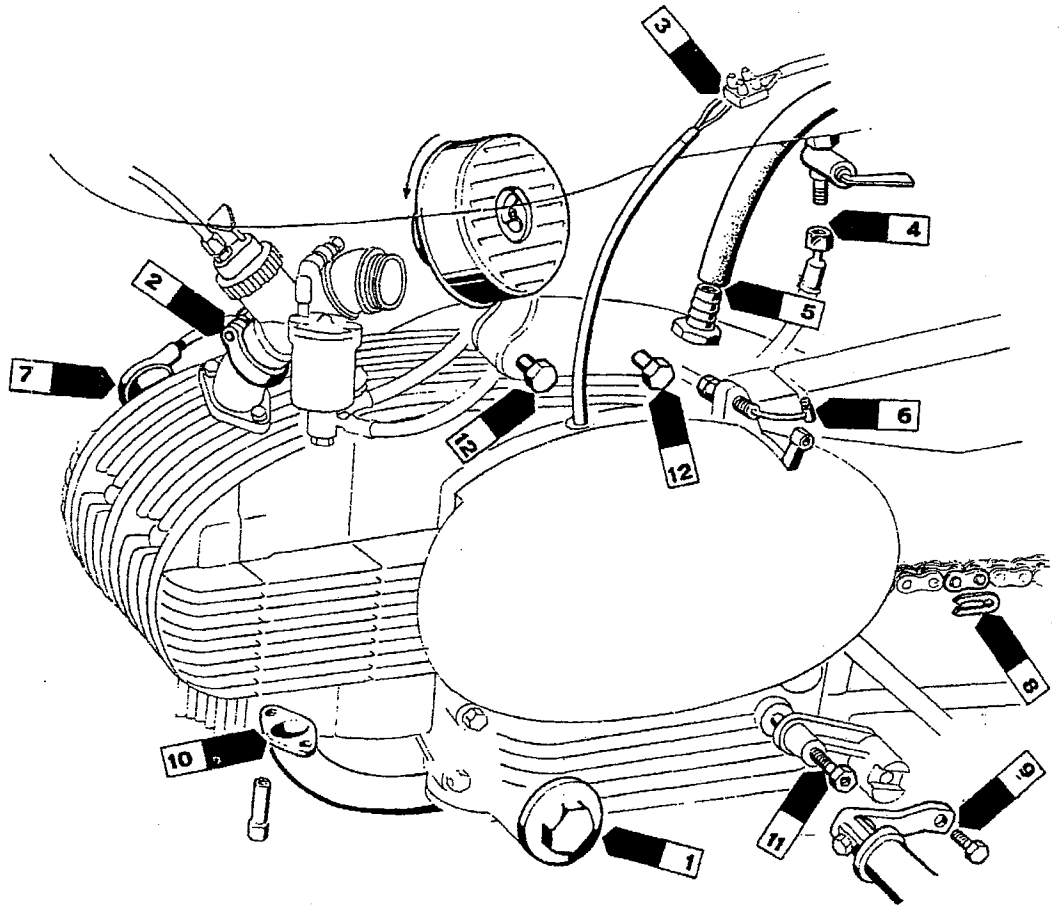
**SPECIAL TOOLS**

Special tools are made in order to facilitate disassembly and reassembly operations, and used with metric wrenches, will enable you to perform all necessary operations.



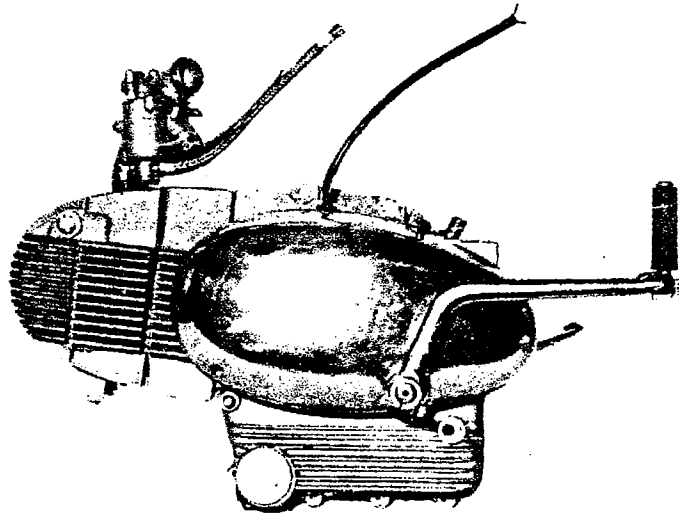
A	Thread protecting bushings	138&139/MB	N	Clutch spring tool	135/MB			
B	Piston pin shaft extractor	} 144/MB	O	Universal puller	133/MB			
C	Piston extractor		D	Countershaft sprocket holder	141/MB	P	Cam follower bushing extractor	134/MB
D	Countershaft sprocket holder	141/MB	E	Countershaft sprocket wrench	140/MB	Q	Crankshaft spacer	G 276
E	Countershaft sprocket wrench	140/MB	F	Engine pinion holder	131/MB	R	Kich starter spring holder	142/MB
F	Engine pinion holder	131/MB	G	Engine pinion puller	143/MB	S	5mm Allen wrench	G 262
G	Engine pinion puller	143/MB	H	Engine pinion puller	146/MB	T	Shifting drum puller	136/MB
H	Engine pinion puller	146/MB	I	Flywheel magneto holder	132/MB	U	Cam gear extractor	147/MB
I	Flywheel magneto holder	132/MB	L	Flywheel magneto extractor	137/MB	V	Engine support	145/MB
L	Flywheel magneto extractor	137/MB	M	Clutch hub holder	130/MB			

Before performing any operation, it is advisable to thoroughly clean the machine, in order to prevent any dust particles from accumulating on engine components.

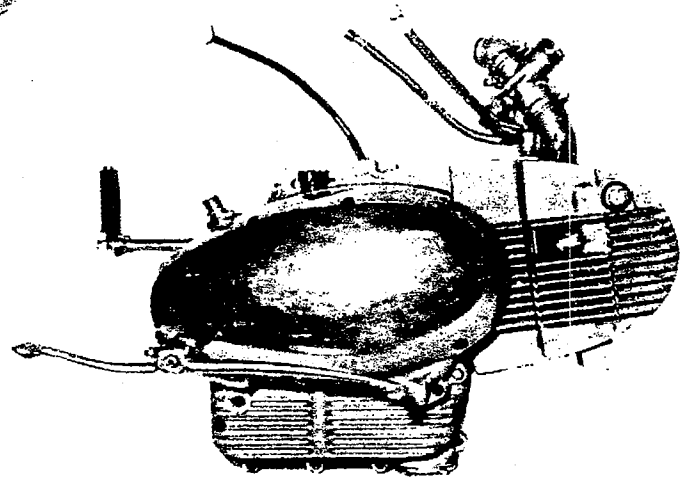


- 1) Remove engine oil, using 27mm wrench to unscrew oil plug. Then remove oil filter assembly.
- 2) Loosen carburetor clamp with 8mm wrench and pull out carburetor after air filter has been removed.
- 3) Remove electric wires from junction box.
- 4) Unscrew fuel lines with 12mm wrench.
- 5) Pull out engine breather tube.
- 6) Loosen clutch cable clamp and pull out cable.
- 7) Pull out the spark plug cap.
- 8) Remove with pliers, master link clip, master link and chain.
- 9) Unscrew foot peg bolts with 17mm wrench. Remove knurled nut of brake rod.
- 10) Remove exhaust pipe and muffler.
- 11) Unscrew lower engine stud nut using 17mm wrench - press out stud.
- 12) Remove upper engine studs nuts with 14mm wrench, also studs and engine from frame.

**To reassemble, reverse above instructions.**



Engine view flywheel magneto side



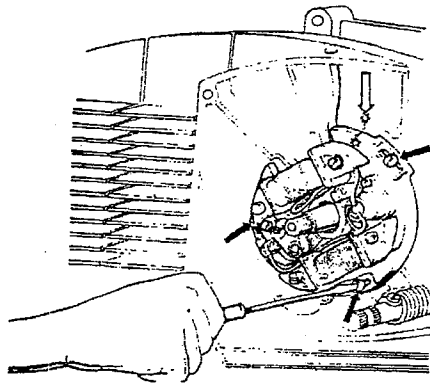
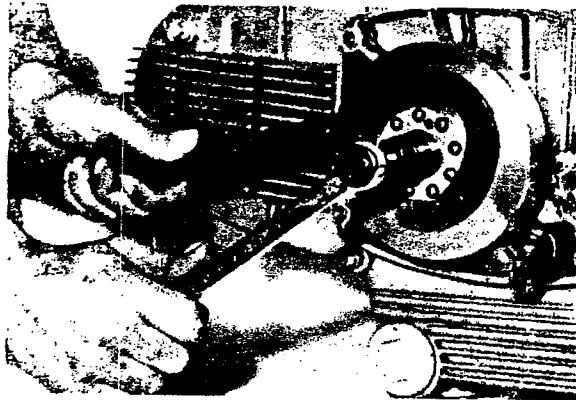
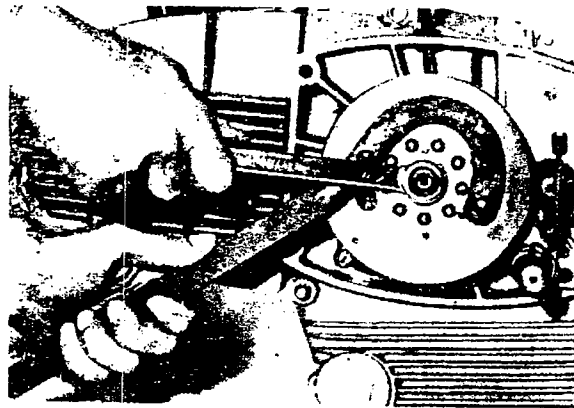
Engine view clutch side

**NOTE:**

Due to the unique characteristics of the engine, most of the operations shown in this book can be made with the engine on the frame. Only if the crankcase must be split, will engine have to be removed.

By removing the left hand cover, the flywheel magneto, clutch adjuster and countershaft sprocket are accessible.

By removing the right hand cover, the clutch, preselector components and cam distribution gears are visible. These are operated in oil bath, therefore, this cover must be perfectly sealed. The cylinder head, rocker arm and cylinder are removable from the front side.



hand cover (flywheel magneto side) with tool S, removing the three fastening screws.

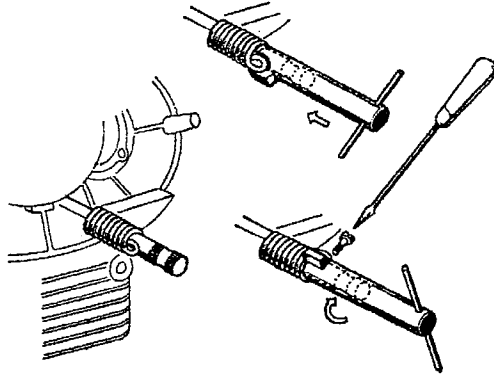
Remove the flywheel magneto nut, using 19mm wrench, holding at the same time, the flywheel with tool I.

Lock the flywheel puller L in position and with 22mm wrench, loosen the flywheel from crankshaft. Tap on the puller bolt slightly with a hammer if the flywheel is hard to remove.

Before removing the backing plate, it is advisable to make a reference mark on the crankcase in order to facilitate the reassembly operation.



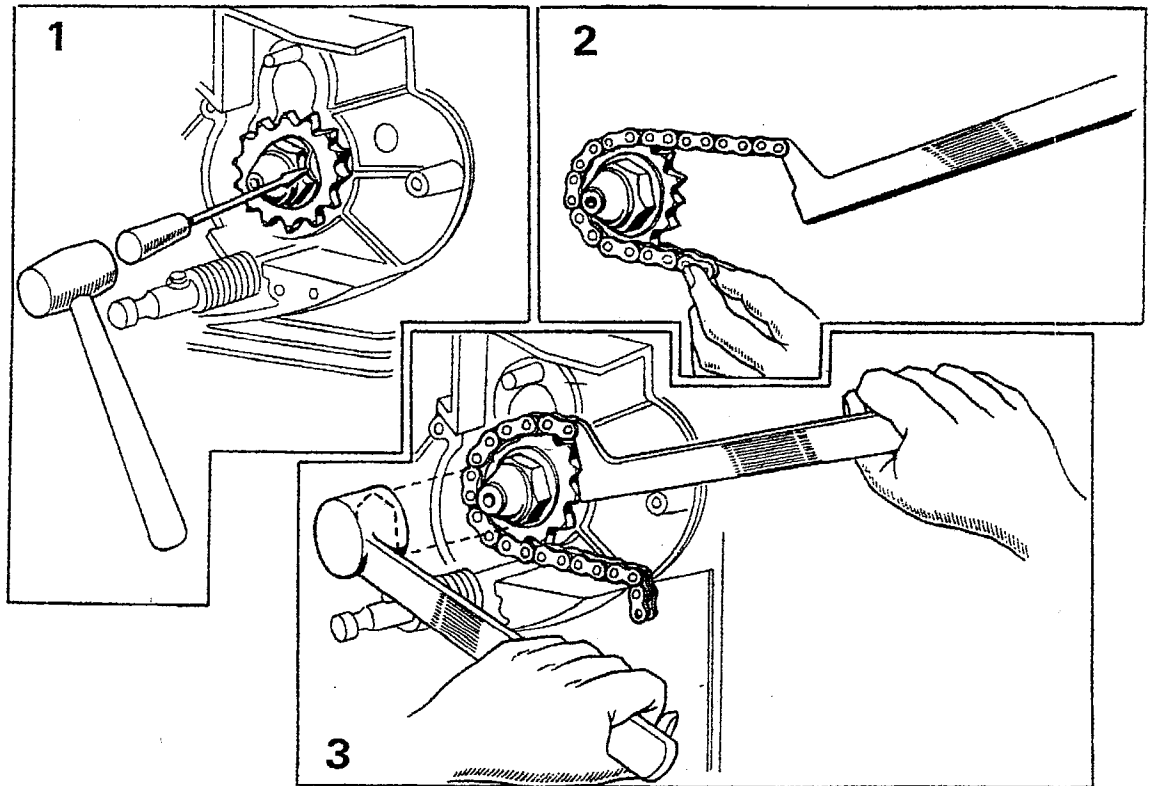
Remove clutch lever support screws using tool S. With screw driver, unscrew flywheel protection cover fastening screws.

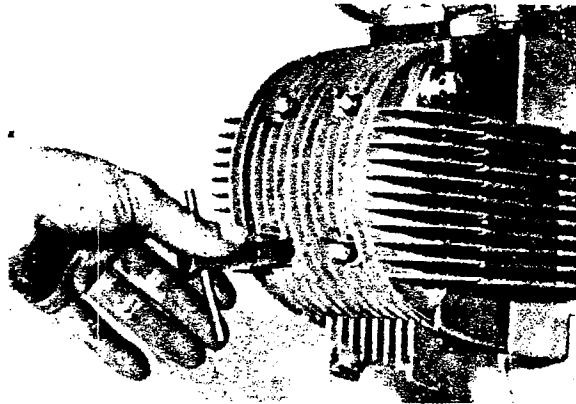


Holding kick starter spring with tool R, remove with screw driver the spring fastening screw.

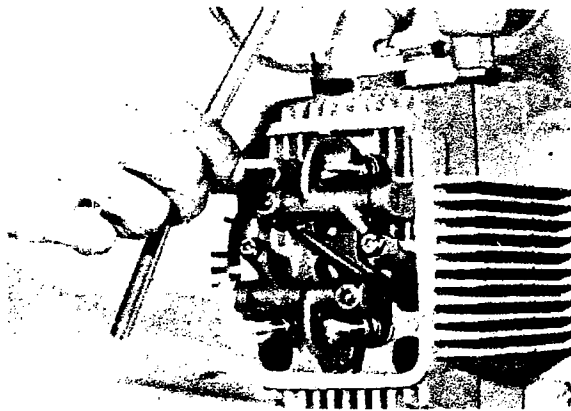
To remove countershaft sprocket it is necessary to:

- 1) Lift up the safety washer loop.
- 2) Install the special tool D.
- 3) Remove the nut with special wrench E, holding at the same time the countershaft sprocket with tool D.





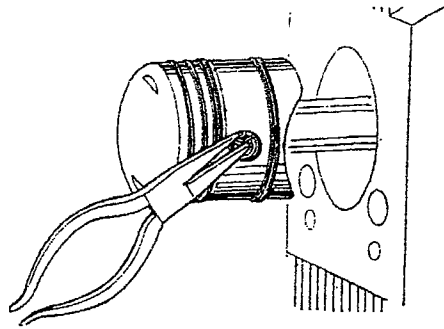
With 10mm socket wrench, remove the 4 rocker cover fastening screws. Pull out cover and aluminum gasket.



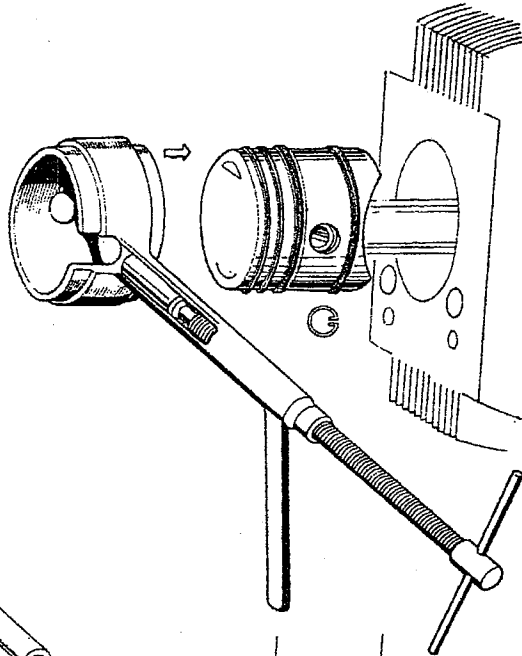
Before removing with 12mm socket wrench, the four cylinder head nuts, be certain that the piston is in compression stroke position. Pull out the rocker arm support carefully in order not to damage the threads of the cylinder studs.



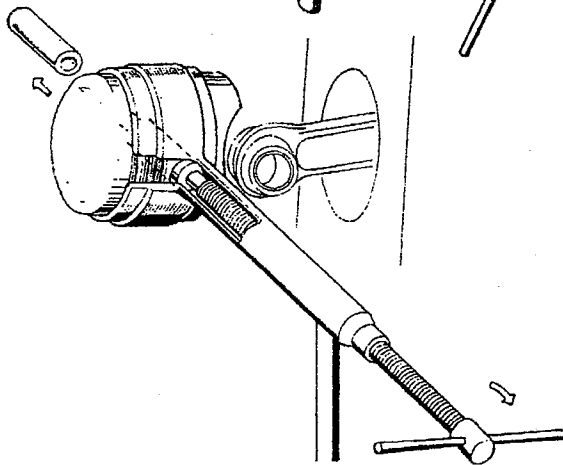
Pull out the cylinder head, gasket, cylinder and base gaskets.



Remove with pliers the two piston pin circlips.

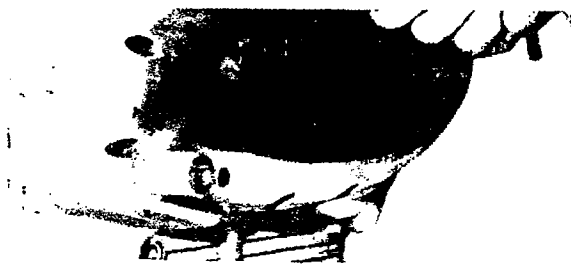


Insert the pin B in the tool C. Install the tool C on the piston. (It is advisable to slightly heat the piston before removing the pin).

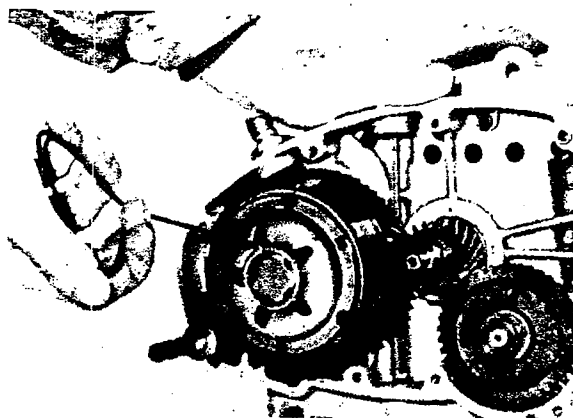


Turn the spindle until the piston pin is removed from the connecting rod.

NOTE: It is not necessary to remove the piston rings, to remove the piston.

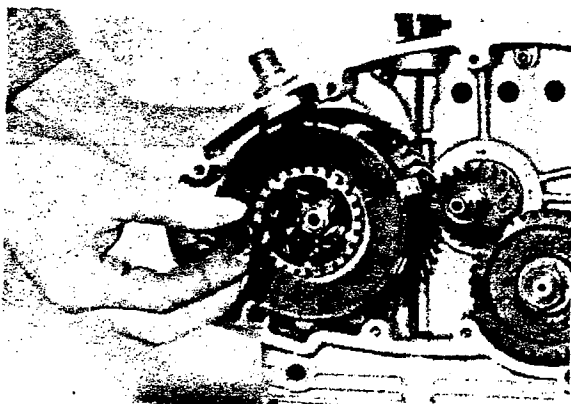


After the shifting lever has been removed, unscrew the 10 Allen screws with the tool S. Tapping slightly with plastic hammer, pull out cover.

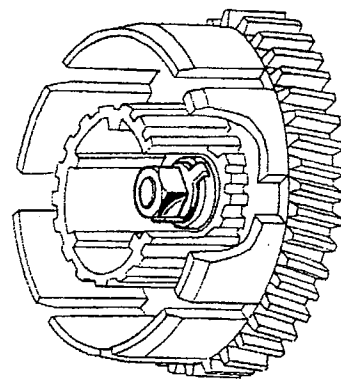
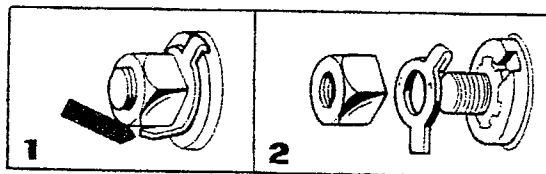


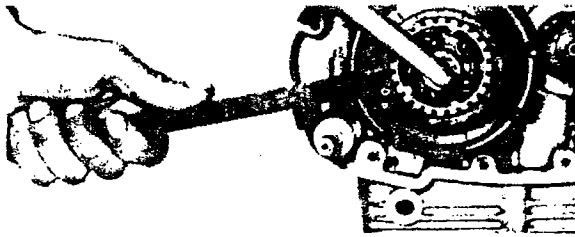
#### Dismantling of the clutch

With the special curved tool N, disconnect the five clutch springs.

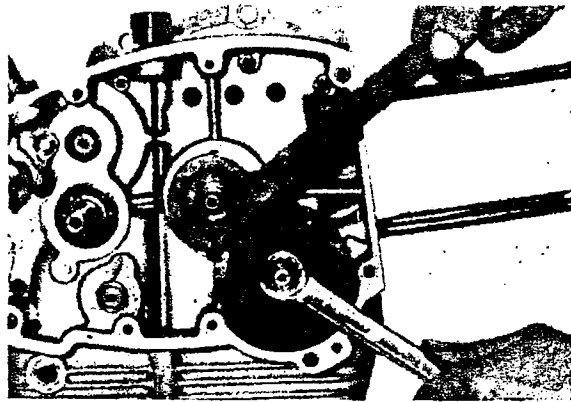


Remove the clutch plates and the short clutch rod. Lift up the loop of the safety washer (bent over the nut).

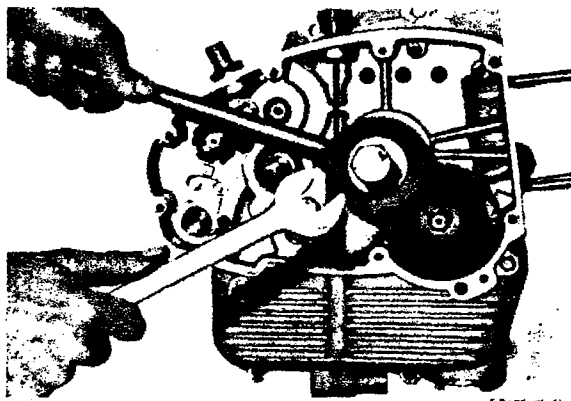




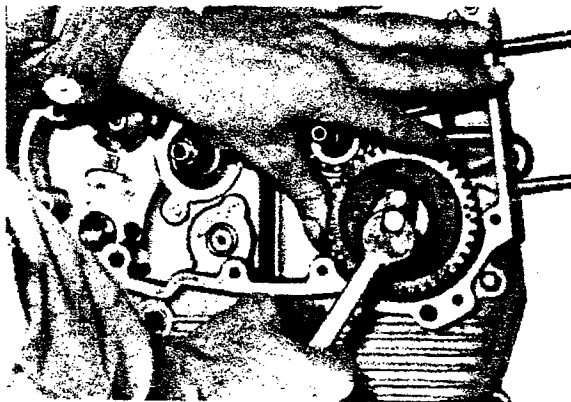
Holding the clutch drum with special tool M, unscrew the locking nut using 17mm wrench. Then pull out the clutch drum, thrust washer, clutch crown and second thrust washer. Pull out the preselector shaft.



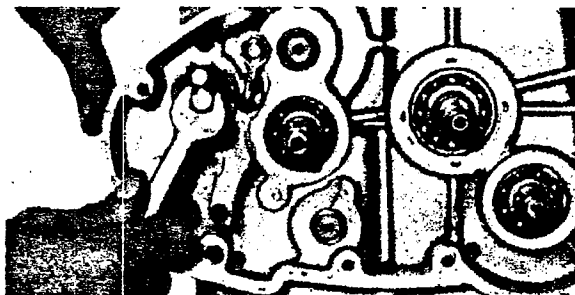
Holding with special tool F, the engine pinion gear, remove the cam gear and engine pinion gear locking nuts.



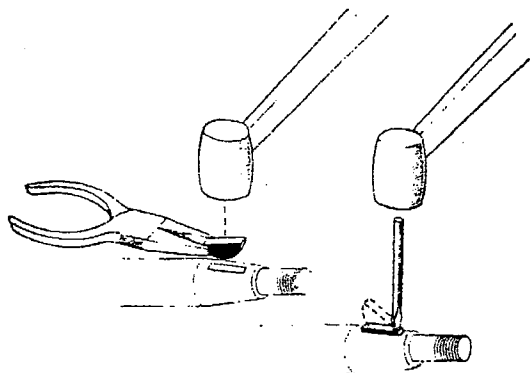
With special puller G, remove the engine pinion gear.  
NOTE: If the special puller G can not be use, use puller H.



Using extractor O, pull out the cam gear.  
NOTE: Use special puller U with gear having two threaded holes.



After the nut of the selector drum has been removed, using 11mm socket wrench, pull out drum with special tool T.



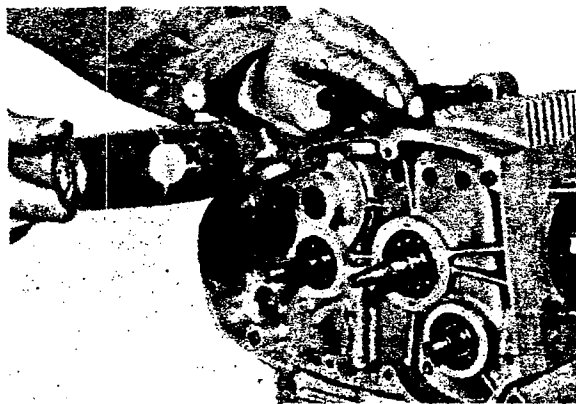
Extract the Woodruff keys of the engine pinion gear, cam shaft and desmodromic shaft.

To remove the Woodruff key, it is advisable to use a small pin in order to rotate it. To install Woodruff key, hold with pliers and tap slightly.

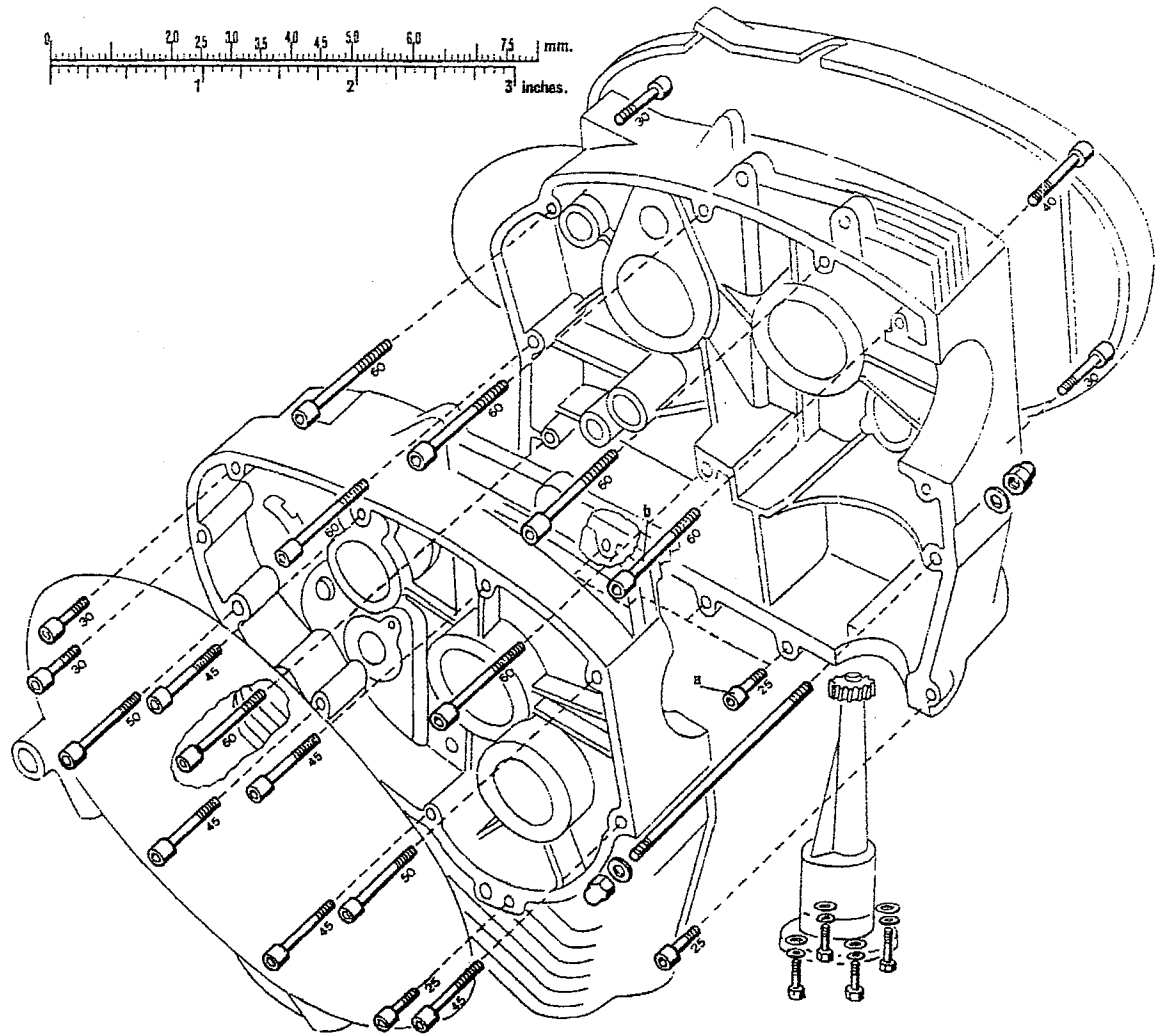
#### How to split the crankcase:

Remove the four oil pump bolts with 10mm wrench.

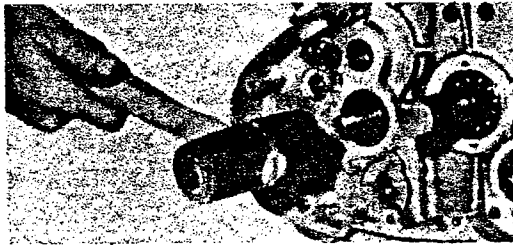
Use 11mm wrench to unscrew crankcase stud nut from one side, then pull out the stud. Unscrew and remove the Allen bolts, using tool S. The screws are indicated on sketch on page 14-15



With a pin, press out the crankcase centering bushing.





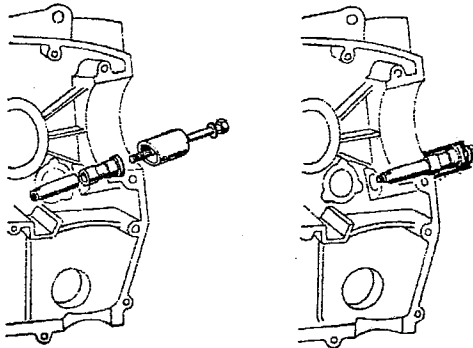


Install the protecting bushing A **tightly** on the crankshaft.

It is **advisable** to slightly heat the crankcase before proceeding to split it. (140° F. H.) Tap slightly with plastic hammer on primary shaft and crankshaft until the right hand crankcase is separated from the other half.

Remove all the components and clean thoroughly.

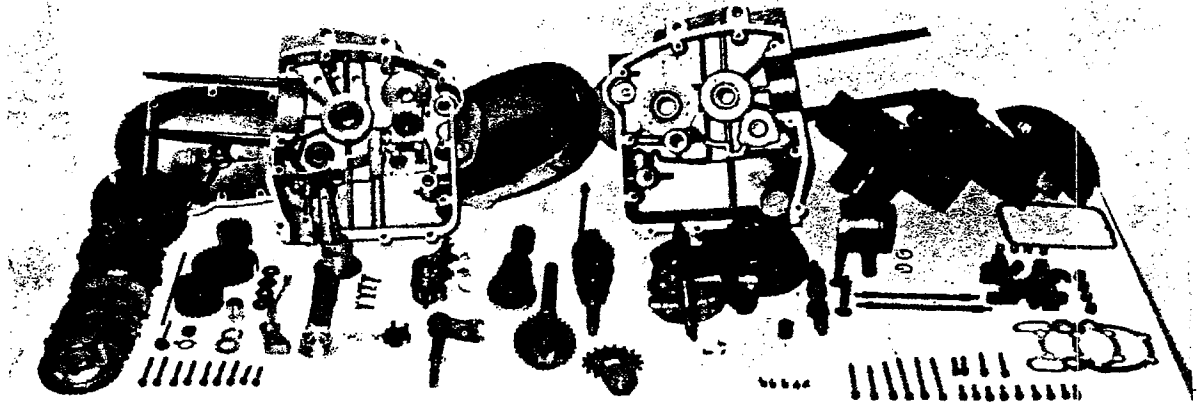
To disassemble the crankshaft from the left hand side crankcase, **install tightly** the coarse threads protecting bushing and proceed as per above instructions.



Heat the crankcase at approximately 140° to 180° Fahrenheit before removing bearing from it.

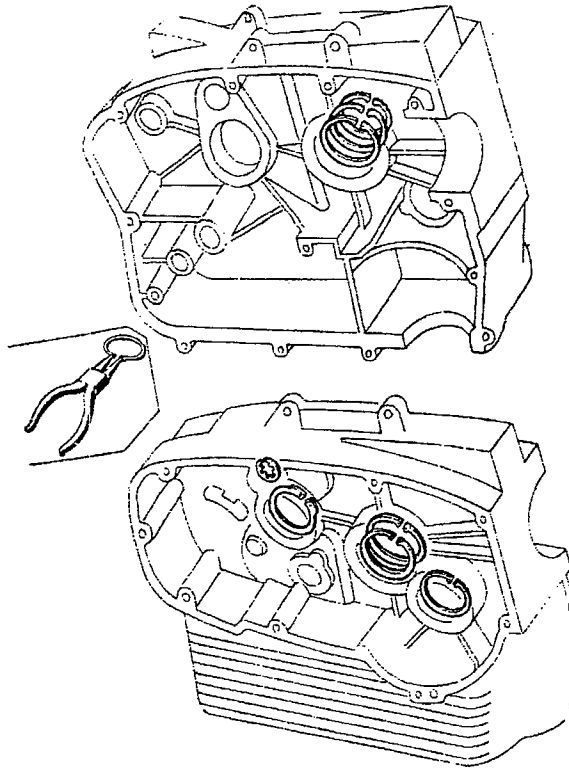
To remove the camshaft and final gear drive bearings from left hand crankcase (flywheel magneto side), dismantle the two bearing covers and press out.

To replace the cam follower bushings, use special extractor P as indicated on the figure alongside.



the seeger rings and other components.

NOTE: The two half crankcase are joined without gaskets, therefore, any imperfections of the contact faces must be corrected.



**List of seeger assembled on 5 speed engine crankcases**

**Left hand half crankcase**, (Flywheel magneto side).

No. 2 seeger rings type 47J assembled into the main bearing seat.

No. 1 seeger ring type 47J must be installed after the large bearing is assembled.

**Right hand crankcase** (clutch side).

No. 2 seeger rings type 47J assembled into the main bearing seat.

No. 1 seeger ring type 40J assembled into the camshaft bearing seat.

No. 1 seeger ring type 40JV assembled into the primary shaft bearing seat.

No. 1 seeger ring type K assembled into the secondary shaft bearing seat.

NOTE: This seeger must be installed (after the crankcase are joined).

**List of seeger rings assembled on 4 speed engine crankcases**

**Left hand half crankcase** (Flywheel magneto side)

No. 1 seeger type 47J assembled on the main bearing seat.

**Right hand half crankcase** (clutch side) FOR 200cc and 250 cc.

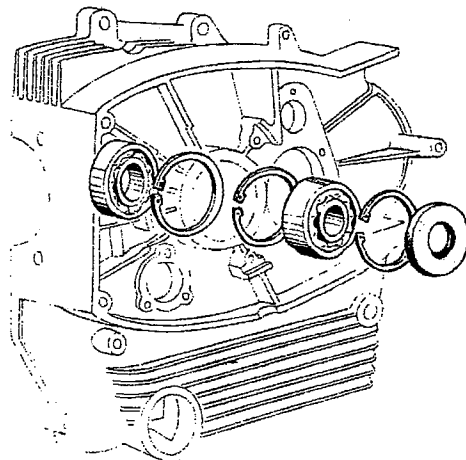
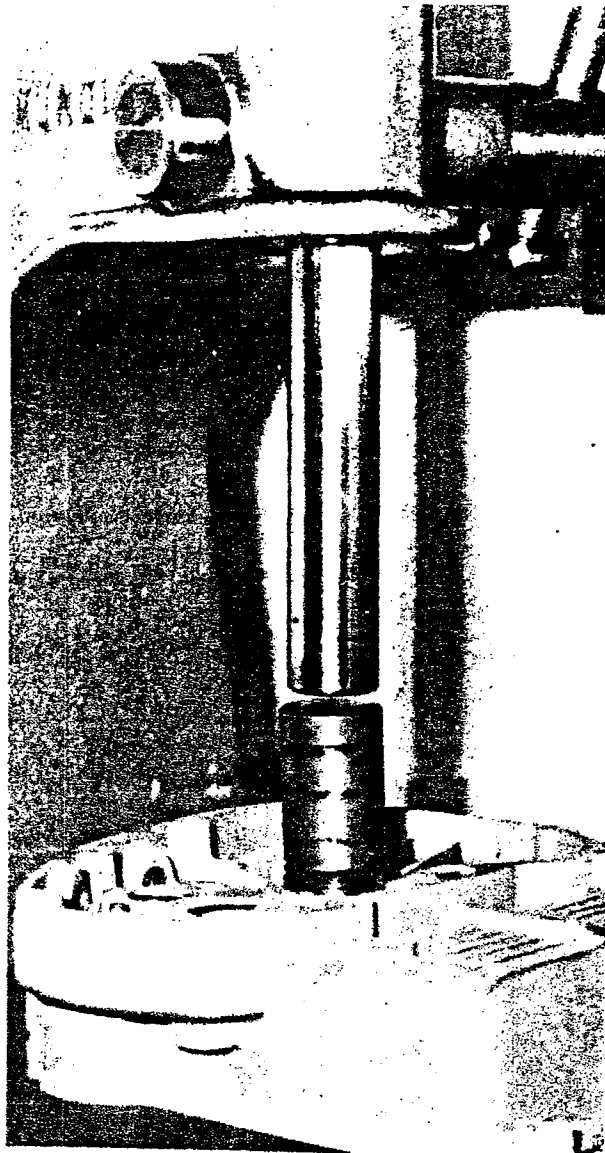
No. 1 seeger ring type 47J assembled into the main bearing seat.

**Right hand half crankcase** (clutch side) FOR 125cc.

No. 2 seeger ring type 47J assembled into the main bearing seat.

NOTE: All the other seeger rings are interchangeable.

After all the seeger rings are installed into the half crankcases and before the installation of all the bearings, it is necessary to heat the crankcase at approximately 140° to 180° Fahrenheit.



**List of bearings installed into left hand crankcase (5 speed engine).**

1 Bearing 25-47-14 for crankshaft (inner side).

1 Bearing 20x47x20,6 (double race) for crankshaft (external side).

1 Bearing 25x52x12 for primary shaft installation from the external side of crankcase.

The bearing must be even with crankcase face externally.

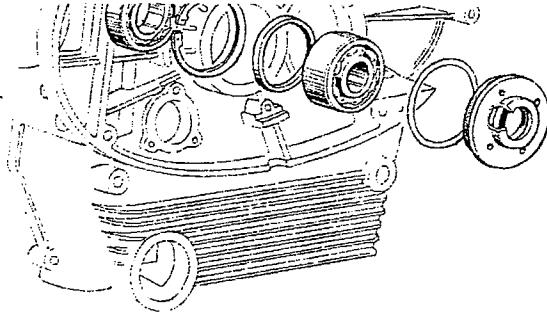
1 Bearing 12x32x10 for camshaft.

1 Steel bushing for secondary shaft needle cage installed internally.

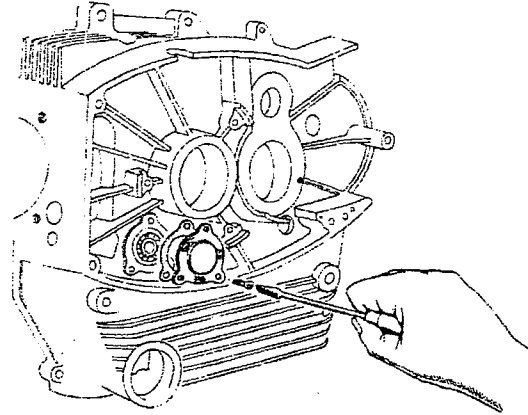
1 Cam follower bushing.

Install the seeger rings J 47 from the external side. Then install the oil seal 20x47x8.

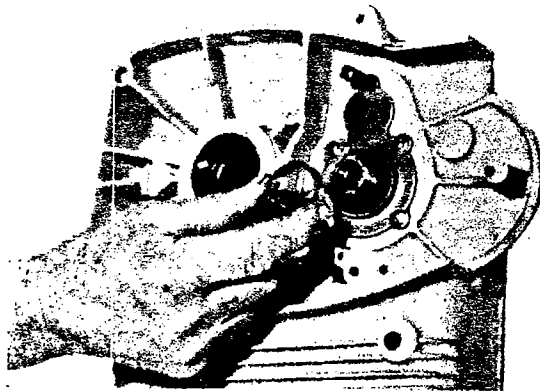
Install oil ring into the kick starter shaft hole.



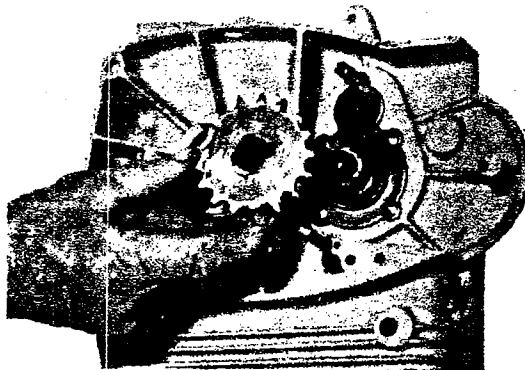
1 Bearing for crankshaft installed externally (20x47x20,6 with double races).  
 1 Oil seal 20x30x7.  
 Install the crankshaft oil seal into the threaded ring (20x30x7).  
 Assemble gasket and ring on the external side of crankcase.  
 The oil seal and plate of the final gear drive are assembled on the external side of crankcase.



The special supporting screw of the dust protecting plate must be installed on the upper side of the engine (see picture alongside).  
 Install the cam shaft bearing cover with the respective gasket and lock the three screws tightly.



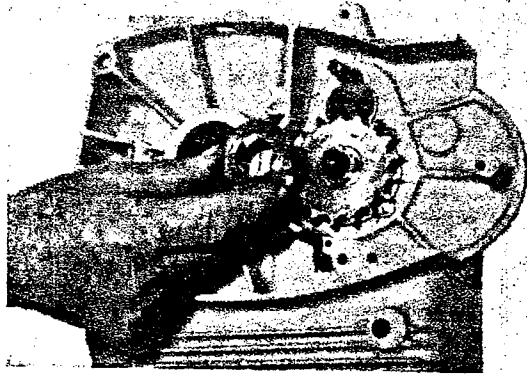
Install the final drive gear (internally) and from the external side, press in the countershaft sprocket spacer.



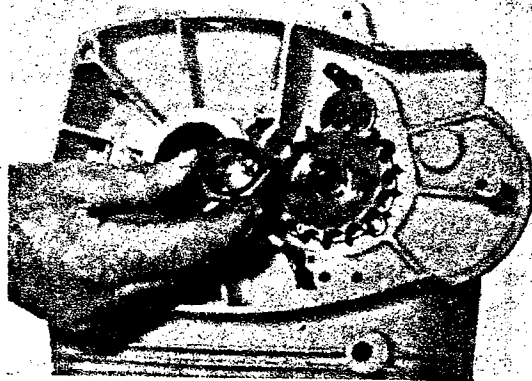
Assemble the countershaft sprocket.



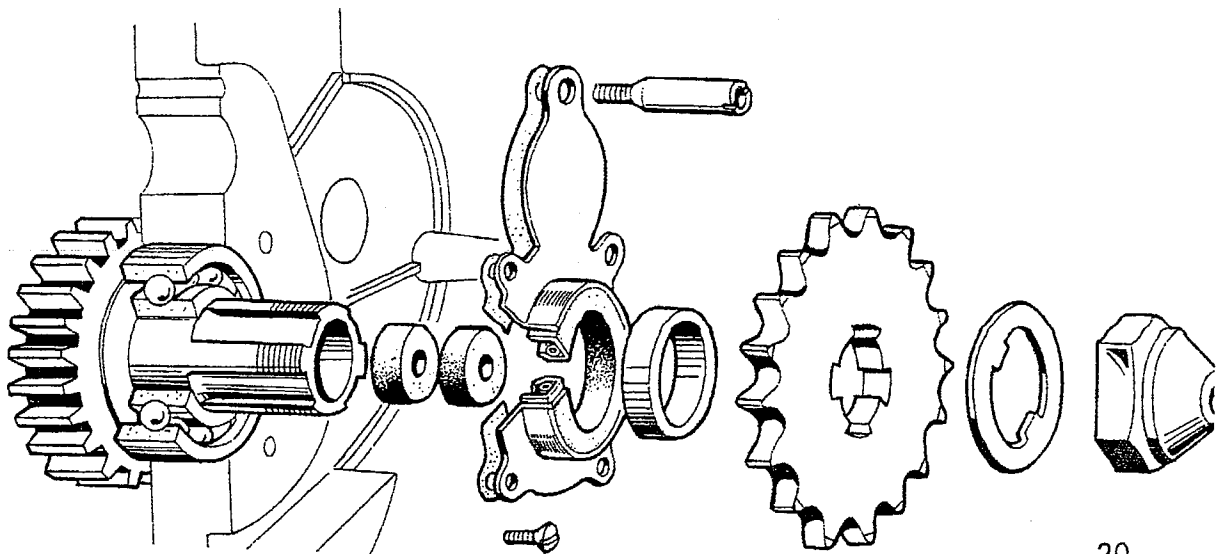
Install the two clutch rod oil seals into the final drive gear.

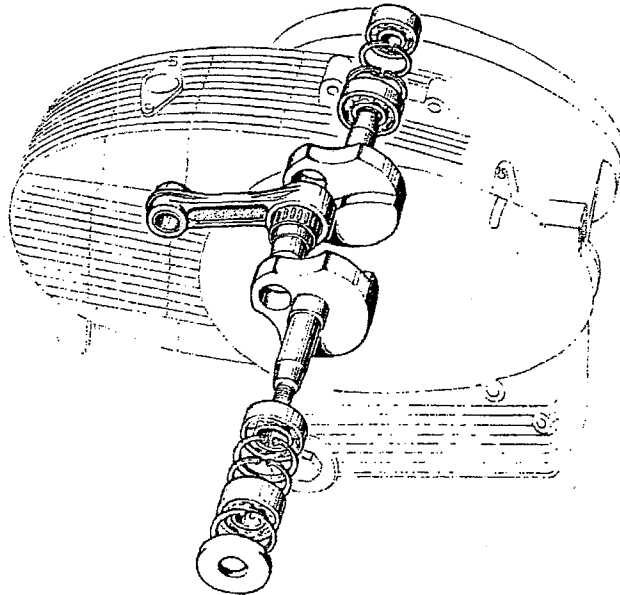
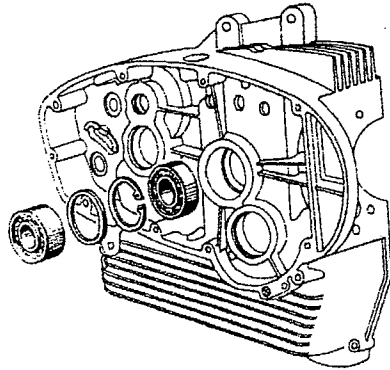
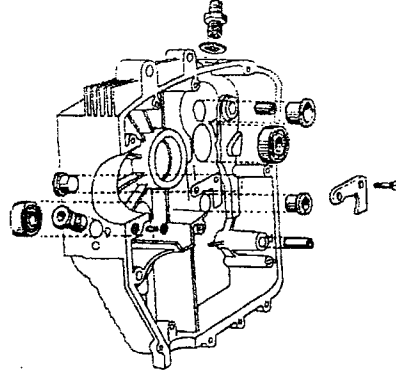
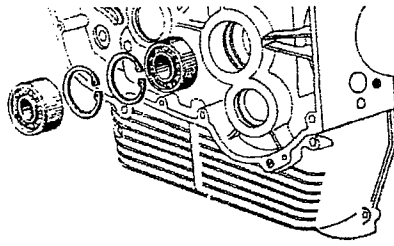


Assemble special safety washer.



Use special tools D and E to lock the countershaft sprocket nut. (FT-LB 65). Bend safety washer over nut face.





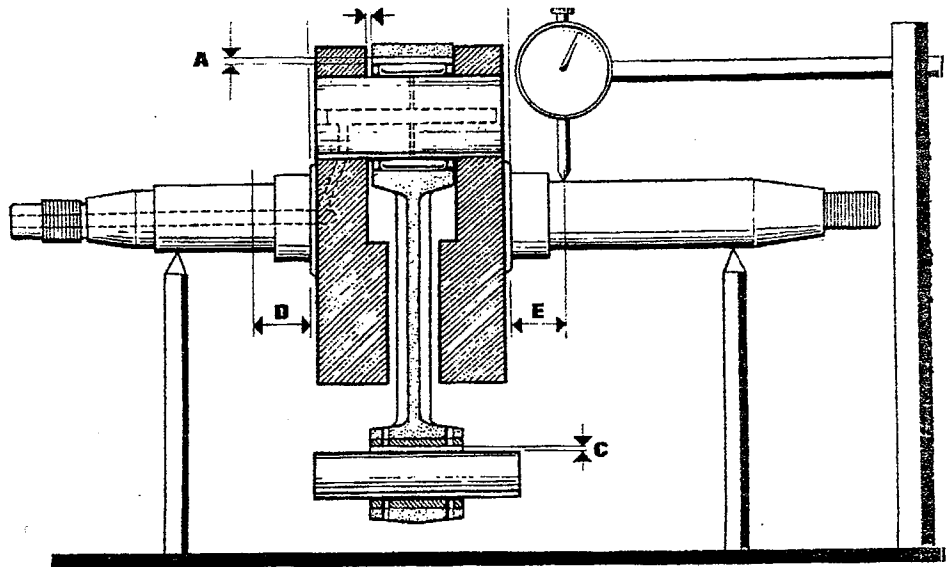
nally (20x47x20,6 double race).  
 NOTE: For 125cc.  
 (1 Bearing 20x47x14 single race).  
 1 Bearing for crankshaft - assemble internally 25x47x14.

- 1 Bearing for cam shaft 17x40x14.
- 1 Bearing for primary shaft 17x40x14.
- 1 Steel bushing for needle cage of secondary shaft-assemble internally.
- 1 Brass bushing for kick starter shaft-assemble internally.
- 1 Brass bushing for desmodromic shaft-assemble internally.
- 1 Cam follower bushing.
- 1 Brass bushing for preselector shaft assemble externally.
- 1 Kick starter lever stop plate.
- 1 Oil tube and seal rubber ring.
- 1 Lower crankcase centering bushing.
- 1 Breather tube.

**List of bearings installed on right hand half crankcase. (4 speed engine).**

For 125cc - 1 Bearing for crankshaft-assemble externally 20x47x14.  
 1 Bearing for crankshaft-assemble internally 25x47x14.  
 For 200-250cc - 1 Bearing for crankshaft-assemble internally 25x47x14.  
 1 Spacer externally.  
 1 Bearing for crankshaft assemble externally 20x47x20,6 double race.  
 All the other parts bearing and bushing remain unchanged as per 5 speed.

**Main bearing assembly 5 speed engine.**



## 11 CRANKSHAFT ASSEMBLY TECHNICAL DATA AND CONTROLLING ECCENTRICITY

**A radial play connecting rod**

STD.	0,010 ÷ 0,020 .000393" ÷ .000787"
Max allow. Limit	0,050 .001968"

**B connecting rod side play**

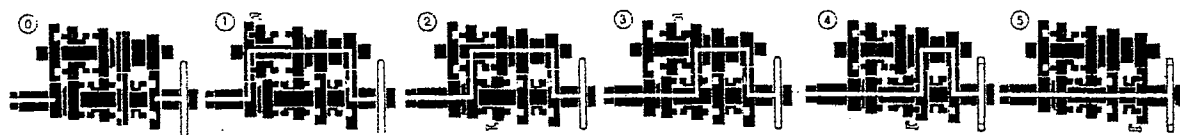
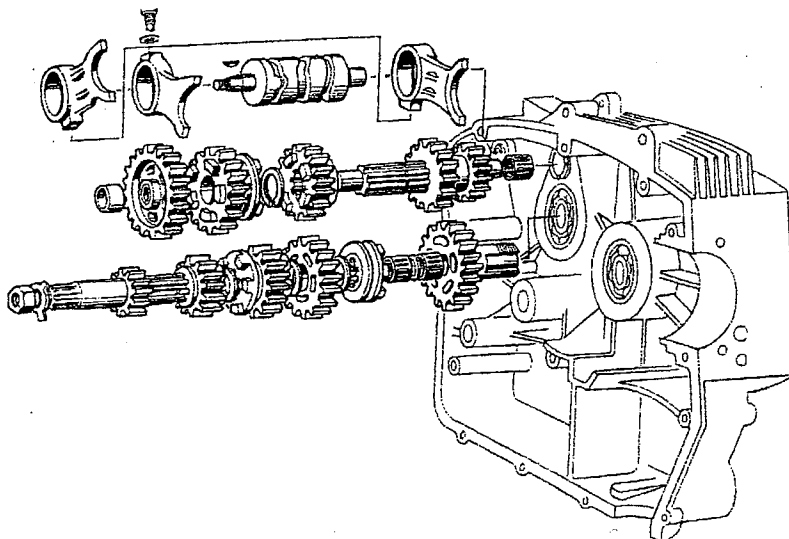
STD.	0,100 ÷ 0,150 .003937" ÷ .005905"
Max allow. Limit	0,400 .01574"

**C piston pin play**

STD.	0,015 ÷ 0,020 .000590" ÷ .000787"
Max allow. Limit	0,050 .001968"

**D-E 20 mm. = (0.787")**

<p>Maximum excentricity admissible, measured at the point D-E indicated in the figure 0.020 (.000787")</p>
--



**Gear box ratio**

**For 125-200-250cc.**

Engine gear box ratio = 3 to 1  
 Internal gear box ratio

- 1st 3.166
- 2nd 2.010
- 3rd 1.529
- 4th 1.162
- 5th 1.000

**For 125cc.**

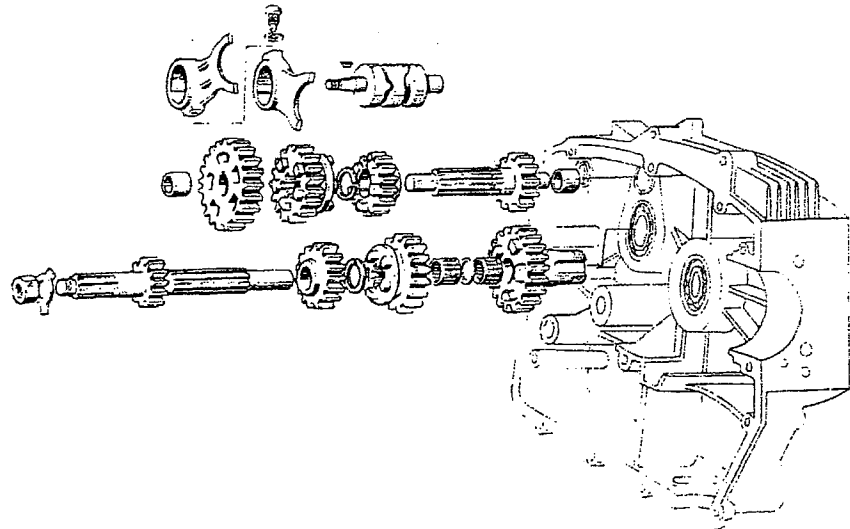
Countershaft sprocket = 15 T  
 Rear wheel sprocket = 44 T  
 Final ratio

- 1st 27.857
- 2nd 17.685
- 3rd 13.453
- 4th 10.224
- 5th 8.799

**For 200-250cc.**

Countershaft sprocket = 17 T  
 Rear wheel sprocket = 41 T  
 Final ratio

- 1st 22.899
- 2nd 14.538
- 3rd 11.059
- 4th 8.404
- 5th 7.233



**Gear box ratio**

**For 125-200-250cc. Engine gear box ratio = 3 to 1**

**For 125cc.**

Internal gear box ratio

- 1st 2.683
- 2nd 1.665
- 3rd 1.267
- 4th 1.000

Countershaft sprocket = 15 T  
Rear wheel sprocket = 44 T

Final ratio

- 1st 23.607
- 2nd 14.650
- 3rd 11.148
- 4th 8.799

**For 200-250cc.**

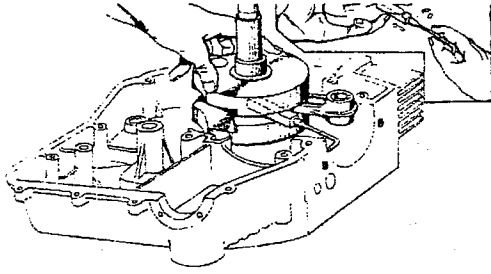
Internal gear box ratio

- 1st 2.615
- 2nd 1.515
- 3rd 1.153
- 4th 1.000

Countershaft sprocket = 17 T  
Rear wheel sprocket = 41 T

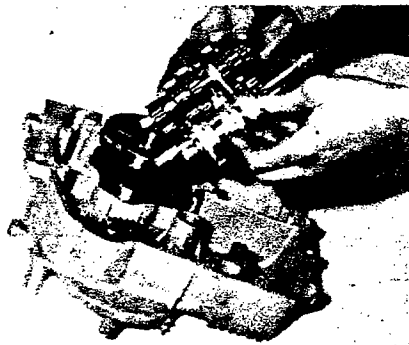
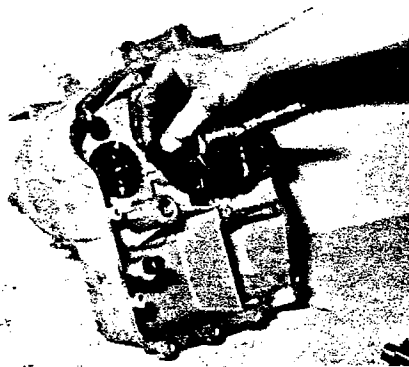
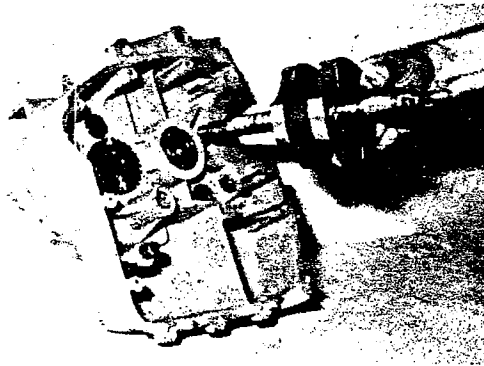
Final ratio

- 1st 18.914
- 2nd 10.957
- 3rd 8.339
- 4th 7.233



Heat the crankcase at approximately 140° to 180° Fahrenheit before proceeding with the installation of the various groups.

Insert the adjustable special spacer Q in between the two half crankshafts before assembling this group.



Insert in the final gear drive the following:

First needle cage

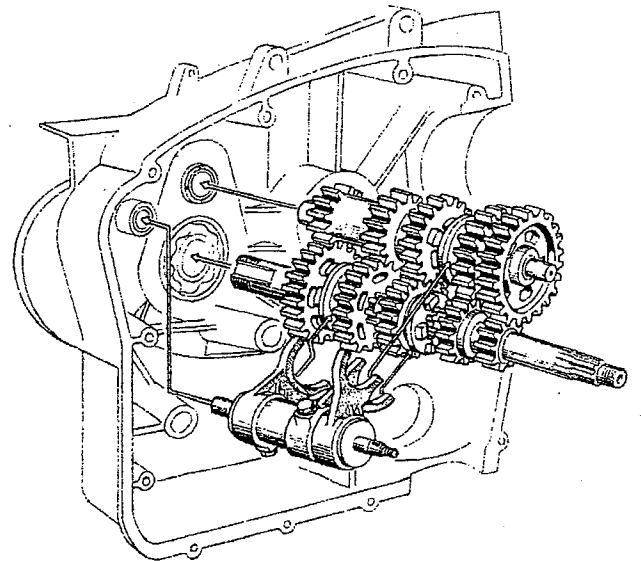
Spacer

Second needle cage

Insert the needle cage into the steel bushing of the secondary shaft.

Insert the gear box assembly into the proper seats.

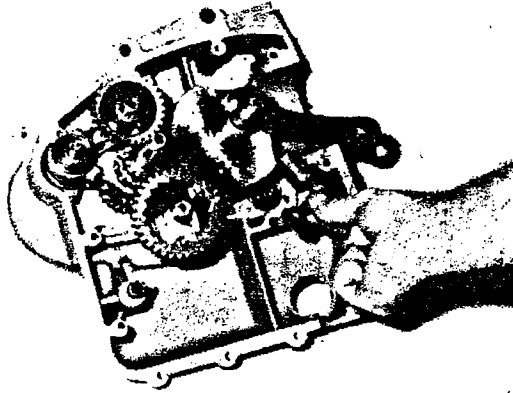
NOTE: For the 4 speed gear box - proceed as per above instructions.



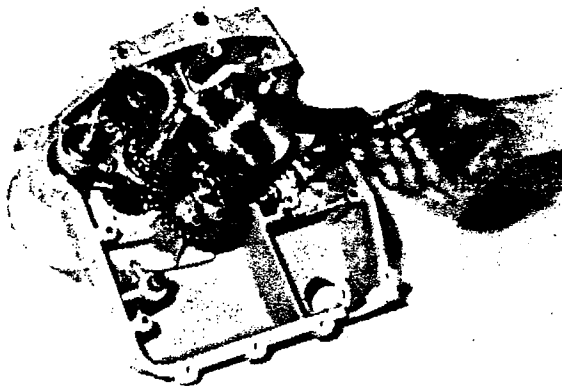


into respective seat of the crankcase. Protect the end of the shaft with a layer of scotch tape.

NOTE: Before proceeding to join the right hand crankcase, be sure that the ratchet is facing towards the lower part of crankcase as shown in the picture.



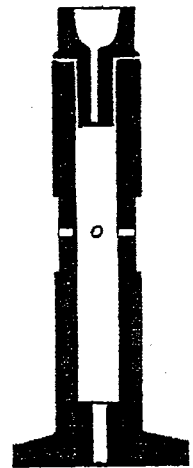
Clean thoroughly the oil passages of the cam follower and insert into the bushing

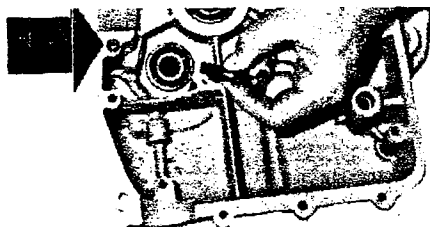


Insert cam.

#### IMPORTANT NOTE

On all engines for Sprites and Barracudas, the cam followers together with the oil passage tubes, play an important part for the lubrication of the valves and rocker arms (see next page) the oil is forced through the cam followers and push rod. This prevents noise and wear to the parts subject to constant pounding force.

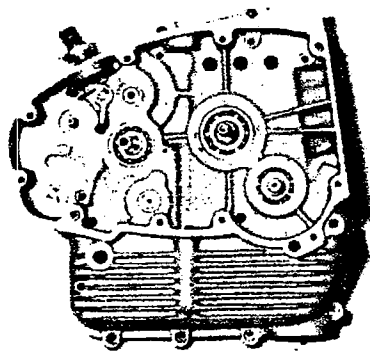
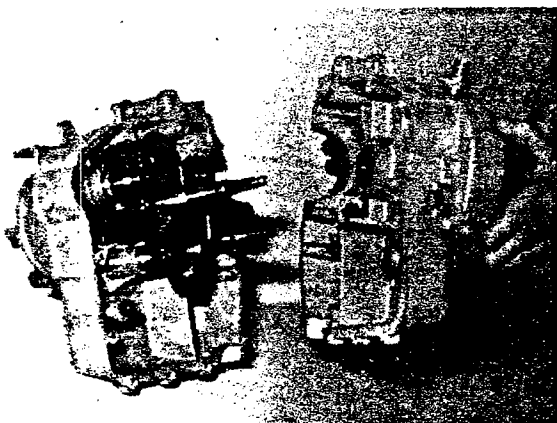




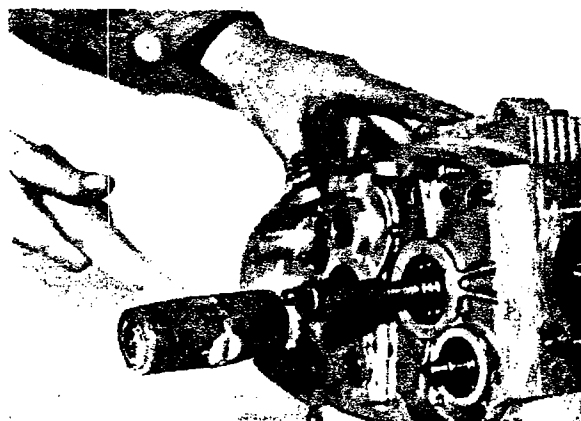
... get the contact on the half crankcases contact faces, and assemble the half case, being careful that all the shafts are aligned with the respective seats and all the components are in the proper place.

**NOTE**

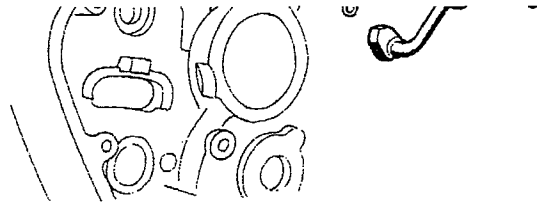
The cam follower shoulder must be against the bushing and the cam ramps must face toward the back of the engine.



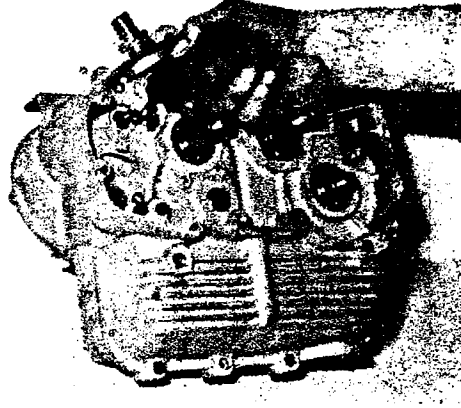
When all the shafts are partially inserted into the seats, tap slightly and evenly the half crankcase and completely close. Insert and tighten evenly (crosswise) all the screws as shown in Fig. on page 14-15. Assemble the needle cage into the steel bushing of the secondary shaft and install the seeger ring.



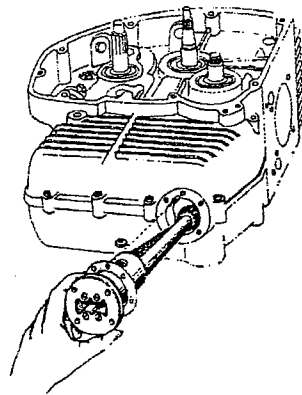
Remove the adjustable spacer Q from the crankshaft. Free all the shafts tapping slightly on the ends with a plastic hammer.



On the right hand cover install the gear stop lever spring, lever and seeger.



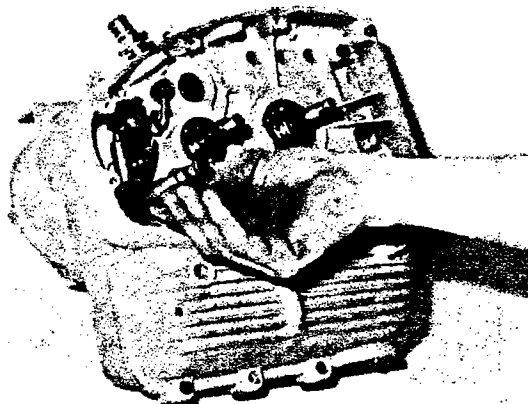
Assemble Woodruff key and shifting drum nut and tighten firmly with 11mm socket wrench.



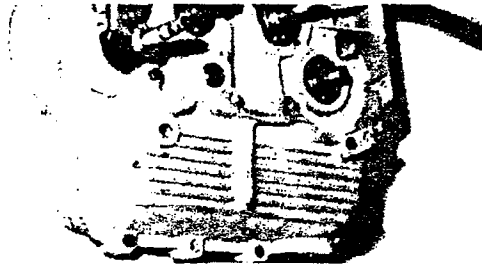
Insert the oil pump rubber ring into the oil pump seat and slide it into the crank case from the bottom.

NOTE: Align the reference hole with the pin of the crankcase.

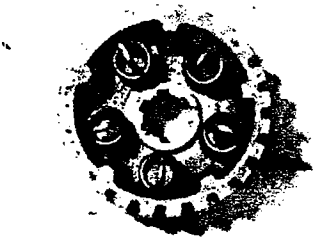
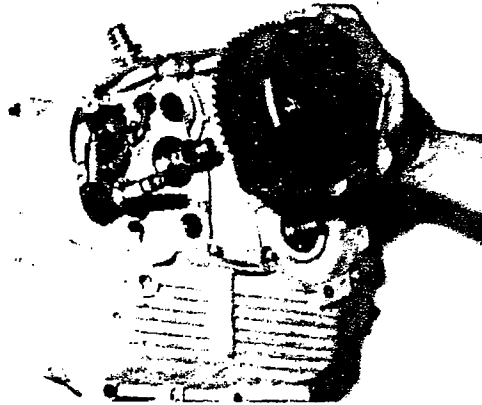
Use gasket cement on the oil pump gasket and the four screws.



Assemble the preselector shaft and thrust washer.

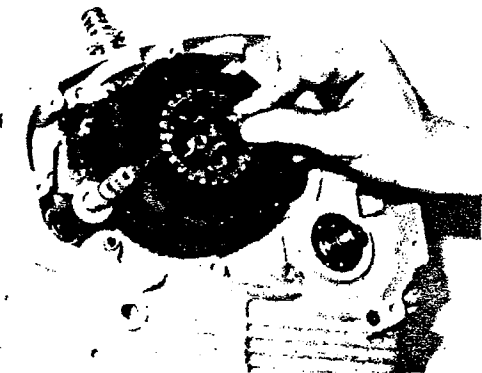


second Trust washer.

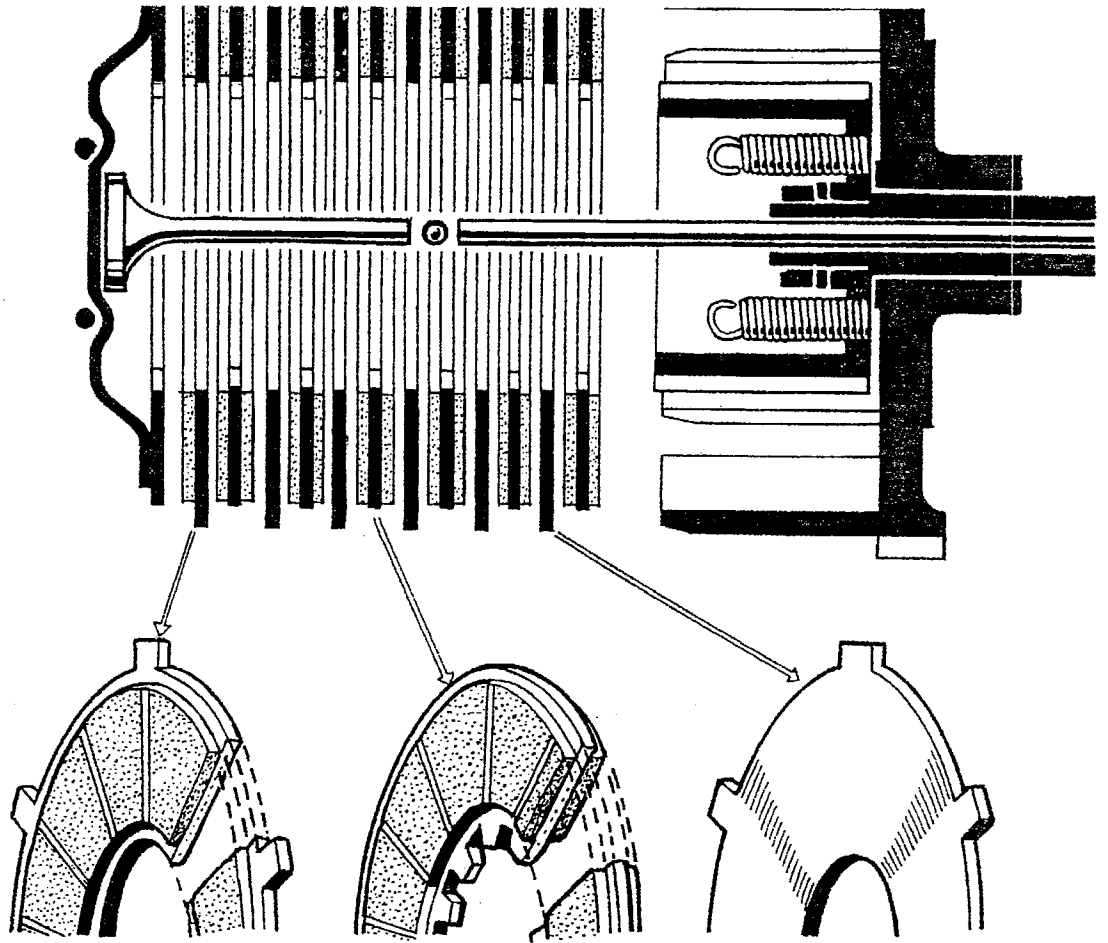


Before assembling the clutch hub, be certain that all the clutch spring hooks are all facing the center and at the same height.

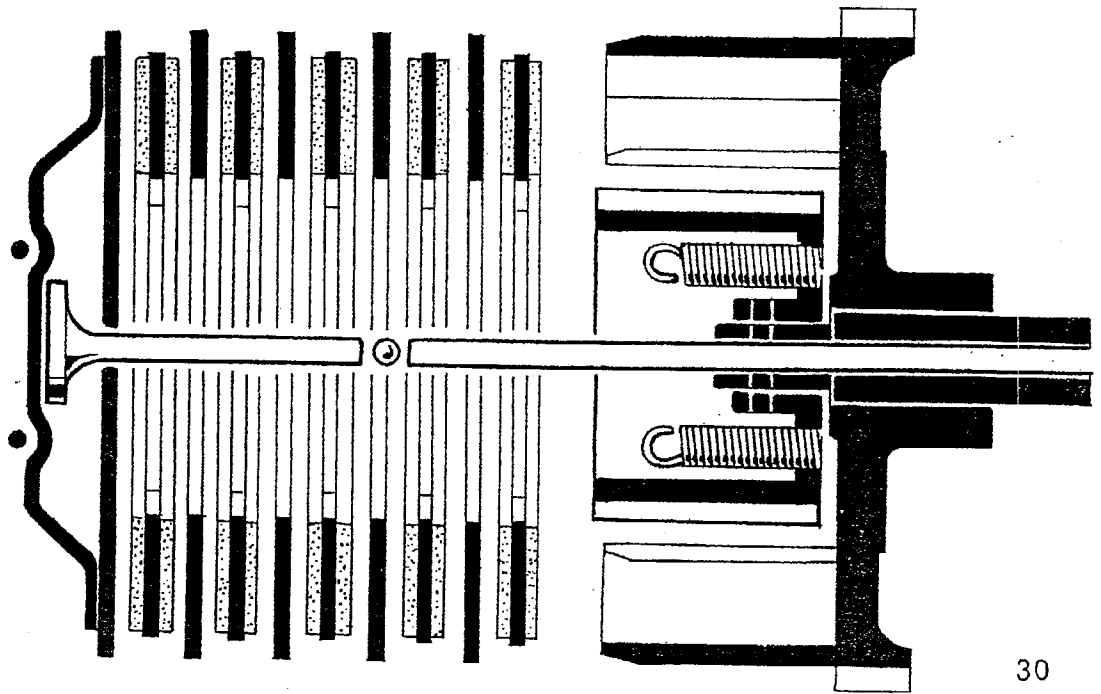
NOTE: It is important that the clutch springs are even with the clutch hub face.

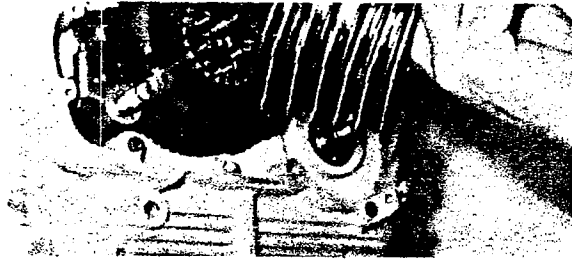


Slide on the primary shaft the clutch hub. Install the safety washer and lock the nut at 45-50 ft. lb. Bend the loop of the safety washer over the locking nut.

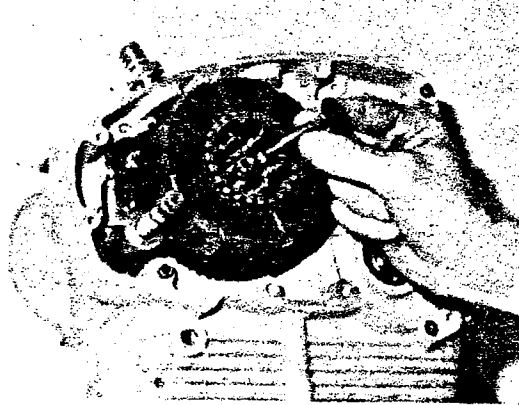


Exploded view of the clutch assembly for 125cc (4) four and (5) five speed engines.

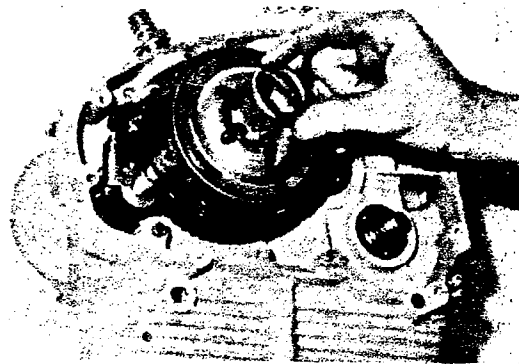




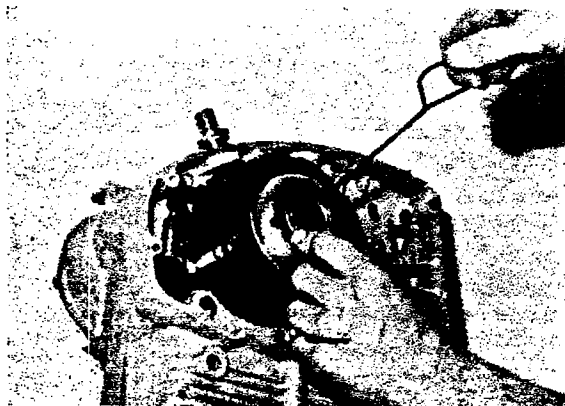
Insert the clutch discs in the proper sequence as shown on page 30



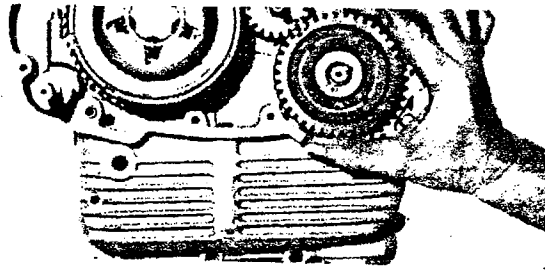
Install the 3/16" ball and the short clutch rod.



Assemble the pressure clutch disc with the slots corresponding to the hooks of the clutch spring. Set the clutch spring retainer ring on the clutch pressure disc and attach the spring using special tool N.



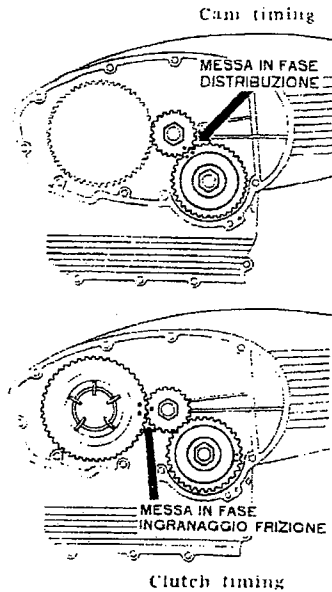
**NOTE:**  
The slot of the clutch spring retainer ring must be placed in the center of two slots of the clutch pressure disc.



Install the Woodruff keys and assemble the two gears, matching the timing marks.

The primary transmission is composed of three helicoidal gears of high precision which are accurately matched by the manufacturer.

The timing of the engine pinion gear with the cam gear determines the distribution of the strokes, while the reference mark of the clutch crown is to set the gear in the same position, to avoid any gear noise.



Procedure of distribution timing.

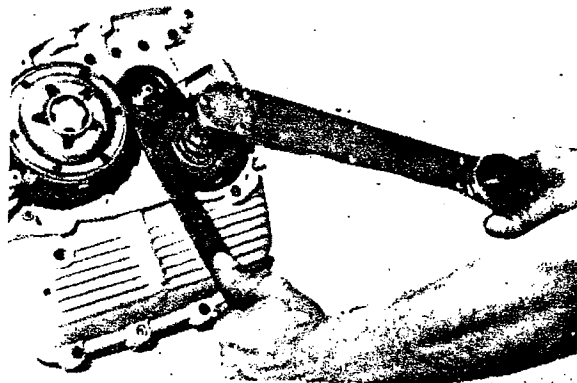
Install engine pinion gear.

Match mark (dot) of engine pinion gear with the dots of clutch crown.

Rotate crankshaft clockwise until the Woodruff key slot reaches 4 o'clock position.

Turn cam shaft until the key reaches about 3 o'clock position.

Match the dot of engine pinion gear with two dots of cam gear.

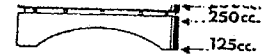
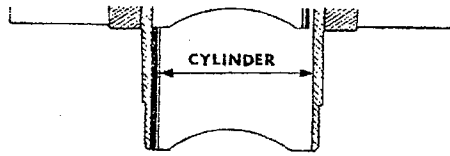


NOTE: When installing the cam gear, be certain that Woodruff key matches the key slot of the gear.

Install the gears nuts and tighten at 45-50 ft. lb. using the special tool F. To hold pinion gear.

Assemble the locking nut and tighten at 40-45 ft. lb.

Install the 4 cylinder head studs using a nut and lock nut.



Piston with indicative measurement for each model.

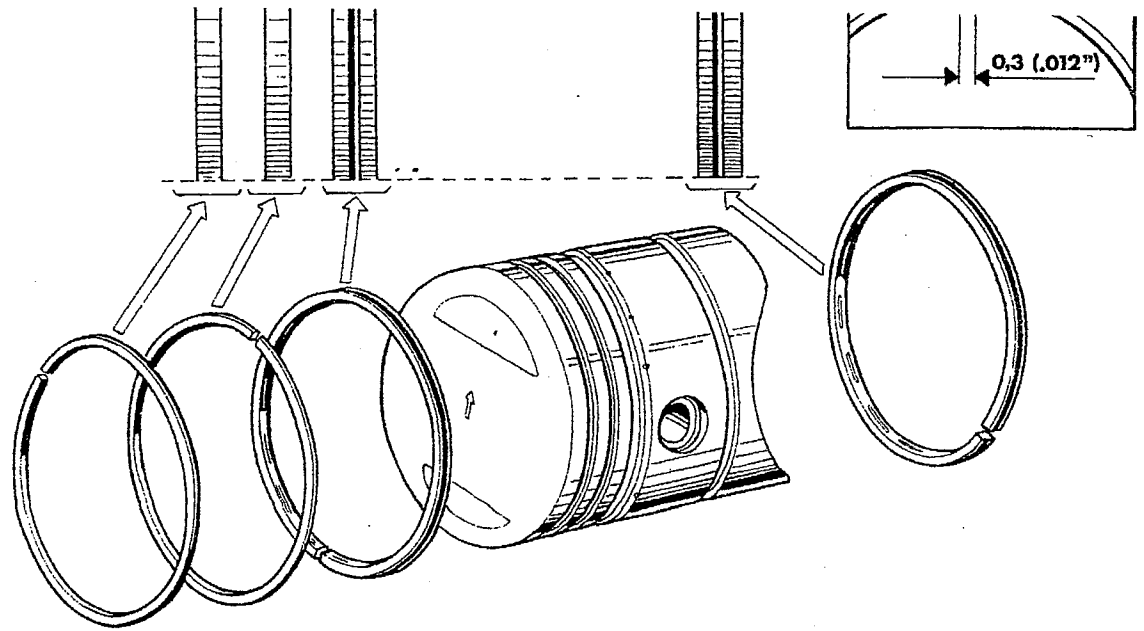
### 15 CYLINDER-PISTON TECHNICAL DATA

125 cc. Grading	Cylinder	Piston	Play on assembly (*)		Play at limit of wear
			Min.	Max.	
New	54 (2.1259") Selection: A } <sup>0</sup> +0,010 (.000393")	54 (2.1259") Selection: A } -0,030 (.001181") -0,040 (.001574")	0,030 (.001181")	0,050 (.001968")	0,120 (.004724")
	B } +0,010 (.000393") +0,020 (.000787")	B } -0,020 (.000787") -0,030 (.001181")			
	C } +0,020 (.000787") +0,030 (.001181")	C } -0,010 (.000393") -0,020 (.000787")			
	1st oversize	54,2 (2.1338")			
2nd oversize	54,4 (2.1417")	54,4 (2.1417")	As per STD	As per STD	As per STD
3rd oversize	54,6 (2.1496")	54,6 (2.1496")			

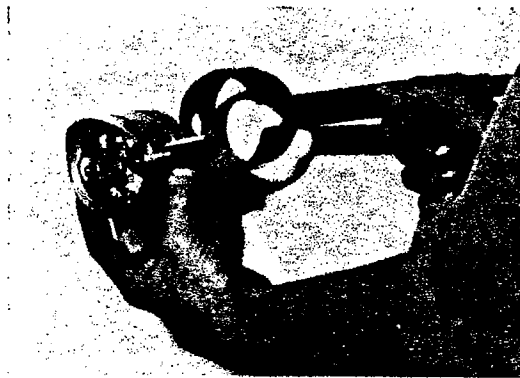
200 cc. Grading	Cylinder	Piston	Play on assembly (*)		Play at limit of wear
			Min.	Max.	
New	66,5 (2.6181") Selection: A } <sup>0</sup> +0,010 (.000393")	66,5 (2.6181") Selection: A } -0,035 (.001378") -0,045 (.001772")	0,035 (.001378")	0,055 (.002165")	0,150 (.005905")
	B } +0,010 (.000393") +0,020 (.000787")	B } -0,025 (.000984") -0,035 (.001378")			
	C } +0,020 (.000787") +0,030 (.001181")	C } -0,015 (.000590") -0,025 (.000984")			
	1st oversize	66,7 (2.6259")			
2nd oversize	66,9 (2.6338")	66,9 (2.6338")	As per STD	As per STD	As per STD
3rd oversize	67,1 (2.6417")	67,1 (2.6417")			

250 cc. Grading	Cylinder	Piston	Play on assembly (*)		Play at limit of wear	
			Min.	Max.		
New	74 (2.9133") Selection: A } <sup>0</sup> +0,010 (.000393")	74 (2.9133") Selection: A } -0,045 (.001772") -0,055 (.002165")	0,045 (.001772")	0,065 (.002559")	0,150 (.005905")	
	B } +0,010 (.000393") +0,020 (.000787")	B } -0,035 (.001378") -0,045 (.001772")				
	1st oversize	74,2 (2.9212")				74,2 (2.9212")
	2nd oversize	74,4 (2.9291")				74,4 (2.9291")
3rd oversize	74,6 (2.9370")	74,6 (2.9370")	As per STD	As per STD	As per STD	

NOTE: On the cylinder the selection letters A-B-C are stamped on the Upper Face. The selection letters A-B-C of the piston are stamped on the piston top.

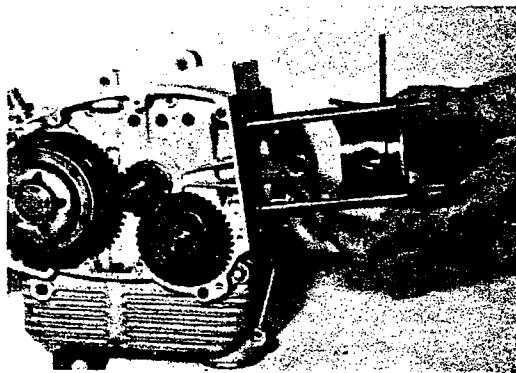


Assemble the oil ring and piston ring in the sequence as shown in Fig.



**Assembly of the piston**

Before assembly, check for wear (see technical date).  
 Install the piston rings on piston.  
 Install the piston pin into the piston hub and slide it into the special tool C.

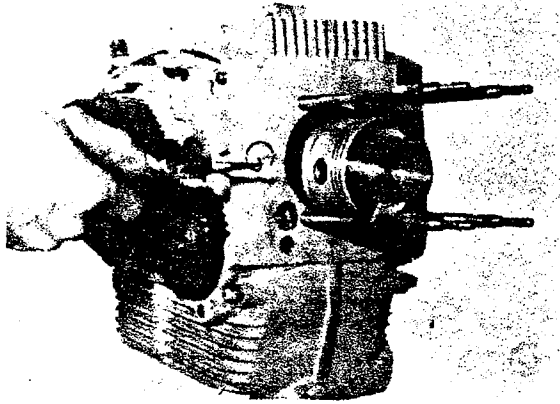


Lift the connecting rod and at the same time, slide the special tool through the cylinder studs until the piston pin is in alignment with the connecting rod bushing. Insert the guiding pin B at the opposite end of the piston pin.

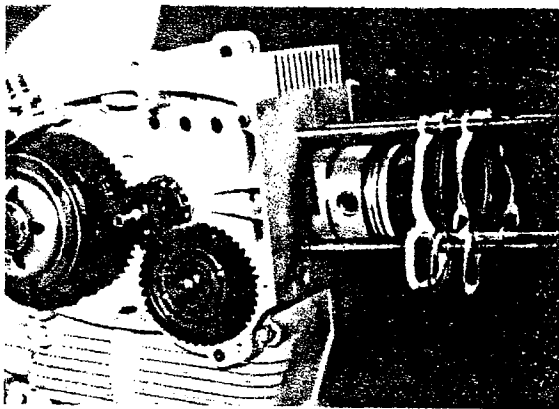


Turning the spindle of the tool, drive in the piston pin until it is level with the circlip groove.

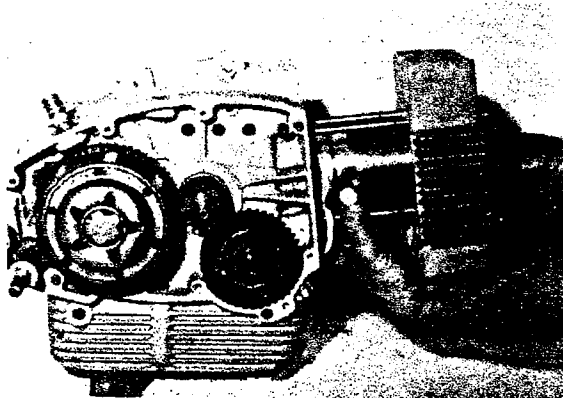
It is advisable to heat the piston at 100°-120° Fahrenheit before the installation of the piston pin.



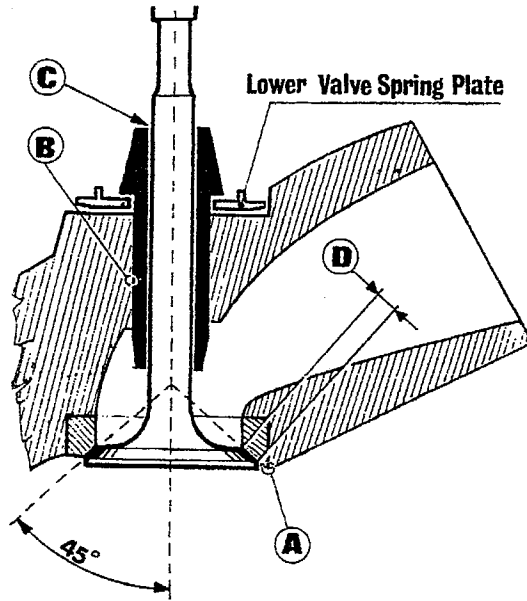
Use needle nose pliers to install circlips.



Install one thin paper gasket, special alloy gasket and a second thin paper gasket before assembling the cylinder.



Lubricate the piston and cylinder wall. Assemble cylinder while pressing the rings with fingers in order to facilitate the installation.



**A Valve seat press. interference for exhaust-intake**

125 cc. Intake	Min. 0,35 (.013779")
	Max. 0,40 (.015748")
200-250 cc. Intake	Min. 0,30 (.011811")
	Max. 0,35 (.013779")

**B Valve guide press. interference for exhaust-intake**

125-200-250 cc. Intake	Min. 0,03 (.001181")
	Max. 0,05 (.001968")

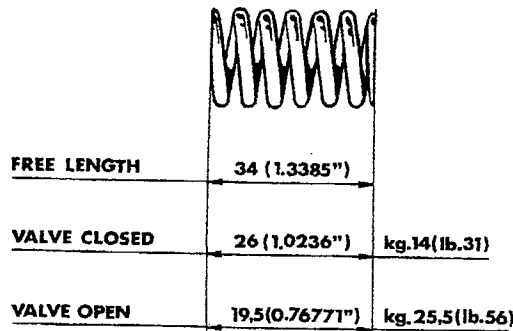
**C Play between valve and valve guide**

Intake	Min. 0,01 (.000393")	
	Max. 0,035 (.001377")	
STD. 125 cc.		Max. allow limits
Exhaust	Min. 0,02 (.000787")	0,1 (.003937")
	Max. 0,045 (.001771")	
STD. 200-250 cc.	Min. 0,02 (.000787")	Max. allow limits
Intake-Exhaust	Max. 0,045 (.001771")	0,1 (.003937")

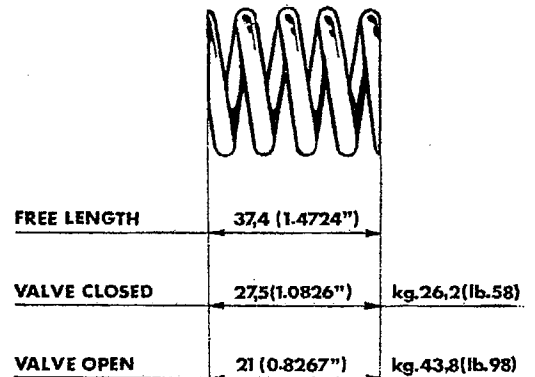
**D Valve seat width**

STD 125-200-250 cc. Intake-Exhaust	2,1 (.082677")
	Max allowable limit 3,2 (.125984")

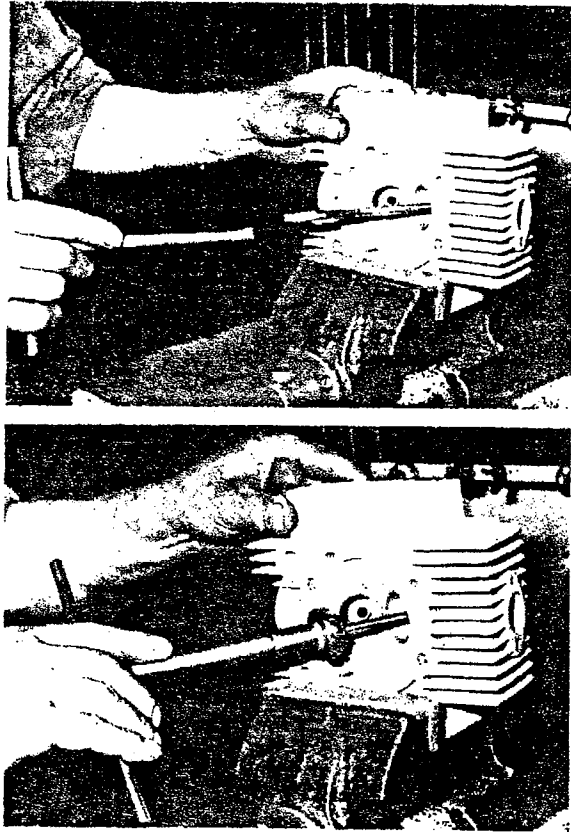
**Outer valve spring STD.**



**Inner valve spring STD.**



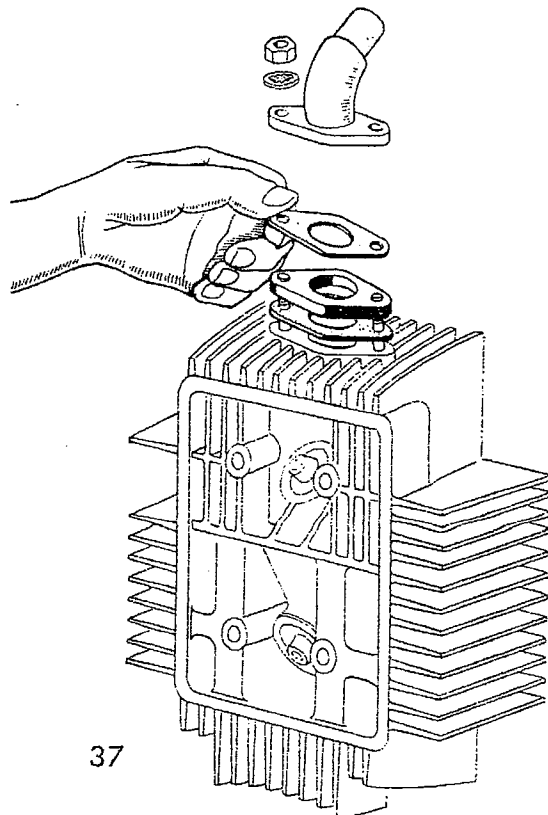
Max. allowable limit (pressure loss.) 25% ~ of the standard pressure.



To install the valve seat, it is necessary to pre-heat the cylinder head at 380° - 420° Fahrenheit and press in the valve seat using special tool.

To remove and install the valve guide, pre-heat the cylinder head at 220° - 260° Fahrenheit.

Hold the cylinder head in the vise and using the special 45° valve seat cutter, make a 0.60" wide ring, for the perfect coupling with the valve.



Proceed to lap the valve seat with valve, using fine grinding compound.

Wash thoroughly the cylinder head, and with the special tool, or with nut and counter lock nut, install the intake manifold and exhaust pipe studs.

Install the intake manifold gaskets in sequence as shown in the picture alongside. Assemble the manifold (facing the back of the engine) and with 10mm wrench, lock the two nuts.

