

gruppo industriale

agrali-GARELLI

s.p.a. monticello brianza (Como)

TEL. 039 / 931733-4-5-6

DISMANTLING AND REASSEMBLY INSTRUCTIONS VERTICAL CYLINDER ENGINES

1979 ISSUE



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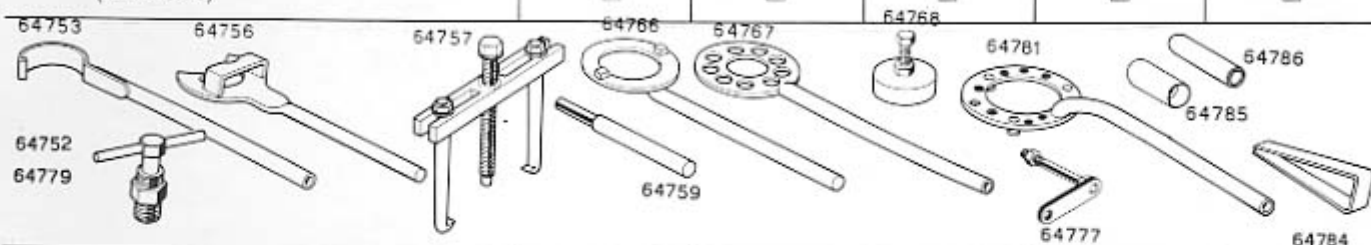
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TECHNICAL SPECIFICATIONS

| GARELLI ENGINE | | SINGLE SPEED | AUTOMATIC 2 SPEED | 3 SPEED | 4 SPEED | 5 SPEED |
|--|----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| — Single cylinder, 2 stroke | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| — Displacement | cc. cu.in. | 49 2,989 | 49 2,989 | 49 2,989 | 49 2,989 | 49,6 3,026 |
| — Bore | mm. in. | 40 1,574 | 40 1,574 | 40 1,574 | 40 1,574 | 40 1,574 |
| — Stroke | mm. in. | 39 1,535 | 39 1,535 | 39 1,535 | 39 1,535 | 39,5 1,555 |
| — Points gap | mm. in. | 0,35÷0,45 .014÷.018 | 0,35÷0,45 .014÷.018 | 0,35÷0,45 .014÷.018 | 0,35÷0,45 .014÷.018 | 0,35÷0,45 .014÷.018 |
| — Ignition timing | | 23° | 23° | 23° | 23° | 26° |
| — corresponding to | mm. in. | 1,80 .070 | 1,80 .070 | 1,80 .070 | 1,80 .070 | 2,30 .090 |
| — Starting: pedals kickstarter | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| — Clutch: centrifugal automatic in oil bath lined multidisc in oil bath | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| — Gearbox: single speed 2 speed automatic 3 speed handshift 4 speed footshift 5 speed footshift | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| — Primary reduction | | 18/67 | 18/67 25/58 | 18/67 | 18/67 | 18/67 |
| — Secondary reduction, 1st speed | | 14/39 | 14/39 | 14/39 | 14/39 | 14/39 |
| — Secondary reduction, 2nd speed | | | | 20/33 | 20/33 | 18/35 |
| — Secondary reduction, 3rd speed | | | | 24/29 | 24/29 | 22/31 |
| — Secondary reduction, 4th speed | | | | | 27/26 | 24/29 |
| — Secondary reduction, 5th speed | | | | | | 26/27 |
| — Carburettor, Dell'Orto type | | SHA 14/12 | SHA 14/12 | SHA 14/12 | SHB 18/12 SHB 19/19B | SHB 18/12 SHB 19/19B |
| — Gearbox oil capacity, type FIAT VS+30 (SAE 30) | c.c. cu.in. | 350 21,35 | 350 21,35 | 450 27,46 | 450 27,46 | 450 27,46 |

SPECIAL TOOLS - TORQUE SPECIFICATIONS FOR SCREWS & NUTS

| TOOLS | SINGLE SPEED | 2 SPEED AUTOMATIC | 3 SPEED | 4 SPEED | 5 SPEED |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 64.752 Extractor tool for CEV and DUCATI flywheels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.753 Holding tool for primary driving sprocket | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.756 Holding tool for crankshaft driving sprocket | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.757 Adjustable extractor tool | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.759 Drift for gudgeon pin | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.766 Tool for hub body | | <input type="checkbox"/> | | | |
| 64.767 Holding tool for clutch hub | <input type="checkbox"/> | | | | |
| 64.768 Clutch extractor | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.777 Checking tool for gears location | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.779 Extractor tool for Bosch flywheels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.781 Holding tool for flywheel and driven gears | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.784 Holding tool for freewheel catches | | <input type="checkbox"/> | | | |
| 64.785 Oilseal protection tool (secondary shaft) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64.786 Oilseal protection tool (drive side) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



| TORQUE SPECIFICATIONS | | SINGLE SPEED | 2 SPEED AUTOMATIC | 3 SPEED | 4 SPEED | 5 SPEED |
|-----------------------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CYLINDER HEAD NUT | Kgm in.lb. | 1,5÷1,8 0,084÷0,10 | 1,5÷1,8 0,084÷0,10 | 1,5÷1,8 0,084÷0,10 | 1,5÷1,8 0,084÷0,10 | 1,5÷1,8 0,084÷0,10 |
| FLYWHEEL MAGNETO NUT | Kgm in.lb. | 3÷3,5 0,168÷0,196 | 3÷3,5 0,168÷0,196 | 3÷3,5 0,168÷0,196 | 3÷3,5 0,168÷0,196 | 3÷3,5 0,168÷0,196 |
| CLUTCH NUT | Kgm in.lb. | 3÷3,5 0,168÷0,196 | 3,5÷4 0,196÷0,224 | 4,5÷5 0,252÷0,280 | 4,5÷5 0,252÷0,280 | 4,5÷5 0,252÷0,280 |
| DRIVEN GEAR NUT | Kgm in.lb. | 4÷4,5 0,224÷0,252 | 8÷8,5 0,448÷0,476 | | | |
| CHAIN SPROCKET NUT | Kgm in.lb. | 6÷6,5 0,336÷0,364 | 6÷6,5 0,336÷0,364 | 6÷6,5 0,336÷0,364 | 6÷6,5 0,336÷0,364 | 6÷6,5 0,336÷0,364 |
| CRANKCASE SCREW | Kgm in.lb. | 0,8 0,044 | 0,8 0,044 | 0,8 0,044 | 0,8 0,044 | 0,8 0,044 |

ENGINE REMOVAL

After removing engine covers, if any, the chain cover, the starting and gearchange pedals, for which no special tools or procedures are required, proceed as follows:

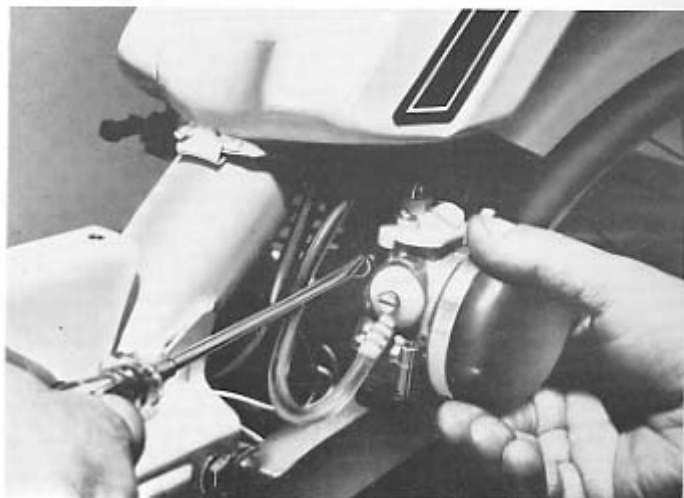
- Remove the silencer using special tool 64753 (for single speed, 2 speed automatic, 3 speed models). For the other models simply loosen the two nuts with an 11 mm (.433") open end wrench.



- Disconnect the starting cable using a 17 mm (.669") open end wrench as illustrated.

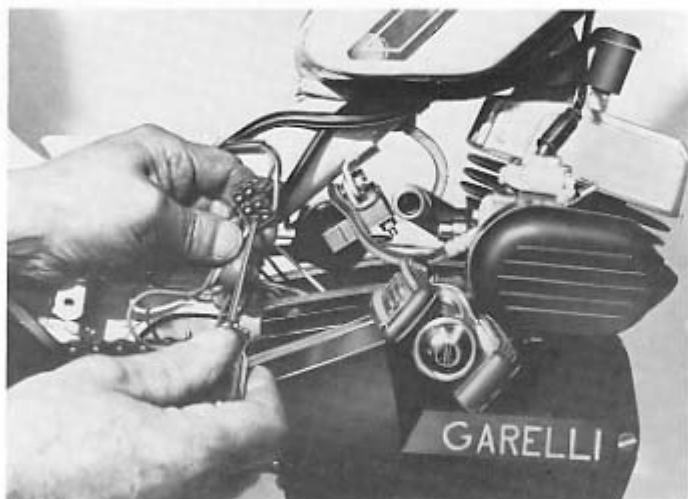


- With a screwdriver remove carburettor from the engine but leave it connected to the frame.



ENGINE REMOVAL

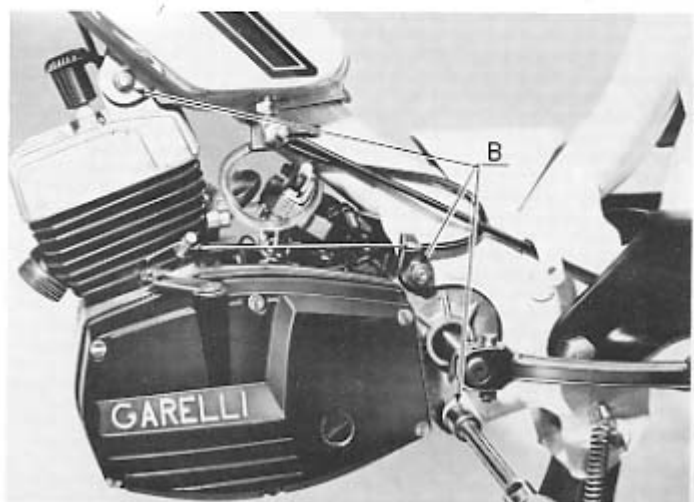
- Disconnect the wires from the terminal block, as well as the spark plug and the engine cut-off wires.



- Break the chain by removing master link



- Remove the engine by loosening the 3 «B» mounting bolts, using a 13 mm (.511") socket.

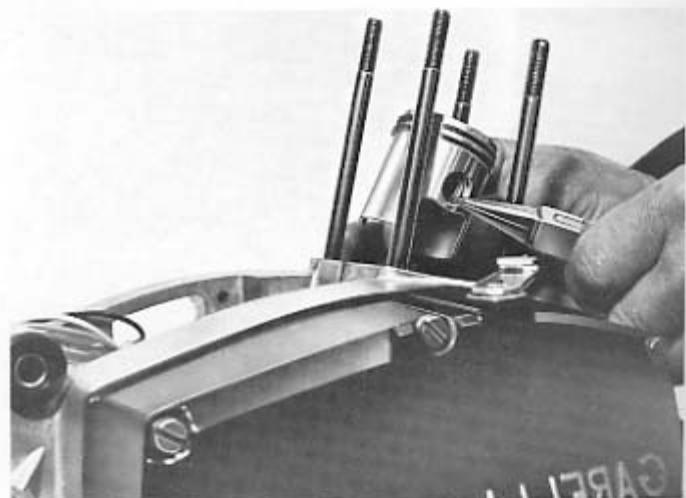


ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

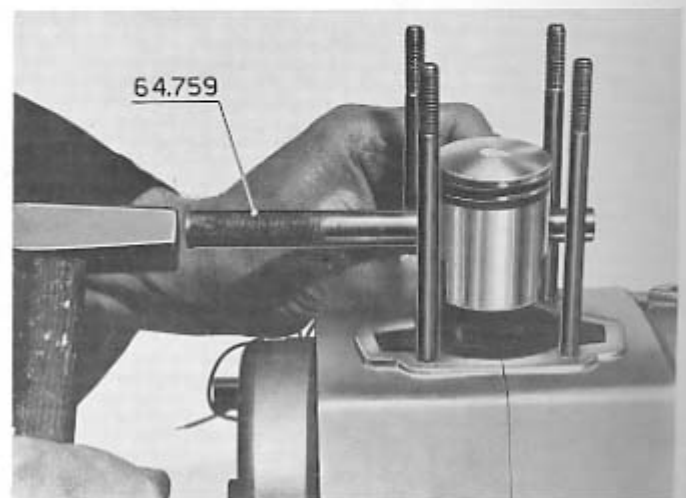
- Remove the 4 nuts holding the cylinder head using one 11 mm (.433") box spanner. Lift the head and the barrel over the 4 studs and remove the cylinder base gasket.



- Remove the two gudgeon pin retaining circlips with the pliers.

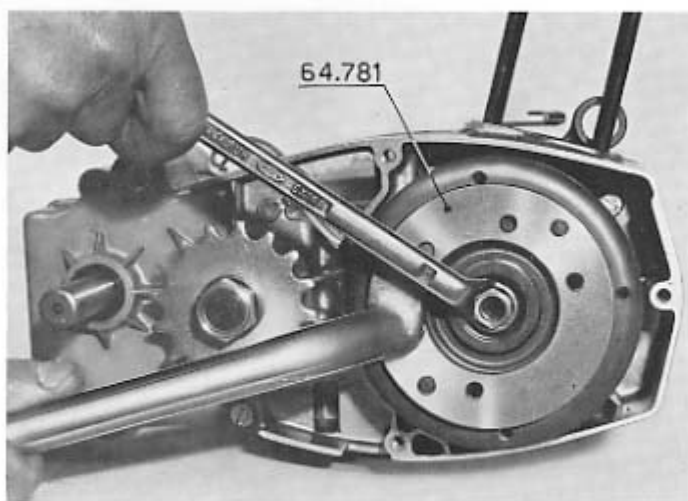


- Remove the piston gudgeon pin using the extractor 64759 and a mallet, being careful to support the piston on the opposite side.

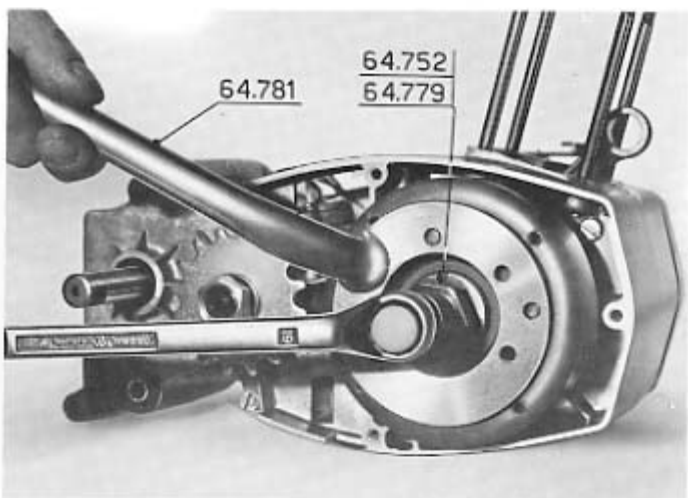


ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

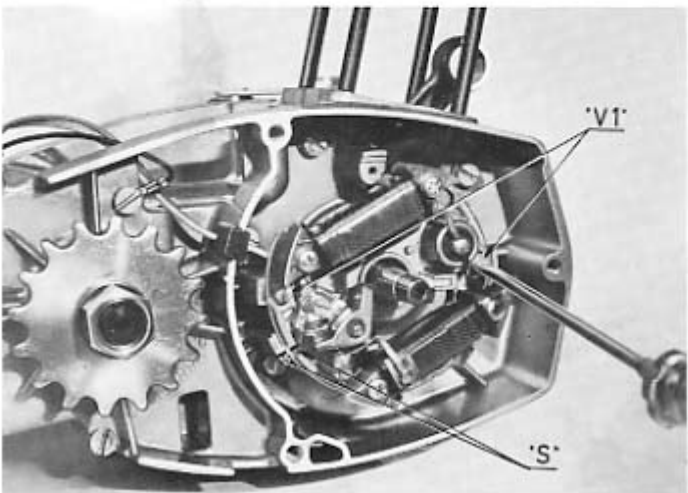
- Using the tool 64781 to hold the flywheel, unscrew the flywheel retaining nut with a 14 mm (.551") socket. Remove the spring washer.



- CAUTION
Before using the extractor, the external threads and those of the center bolt should be lightly greased. Screw the extractor 64779 (for Bosch flywheels) or 64752 (for the others) into the threads of the flywheel, then turn the extractor center bolt in a clockwise direction to pull the flywheel off the taper; keep holding the rotor with the tool 64781

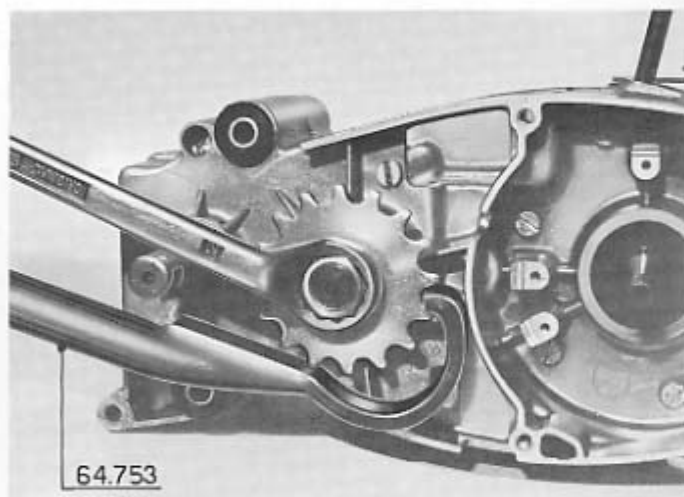


- Make a scribe mark «S» across the bottom of the stator plate and the crankcase in order to facilitate re-timing on assembly. Remove the screws «V1» holding the stator plate to the crankcase. Remove the Woodruff key from the crankshaft.



ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

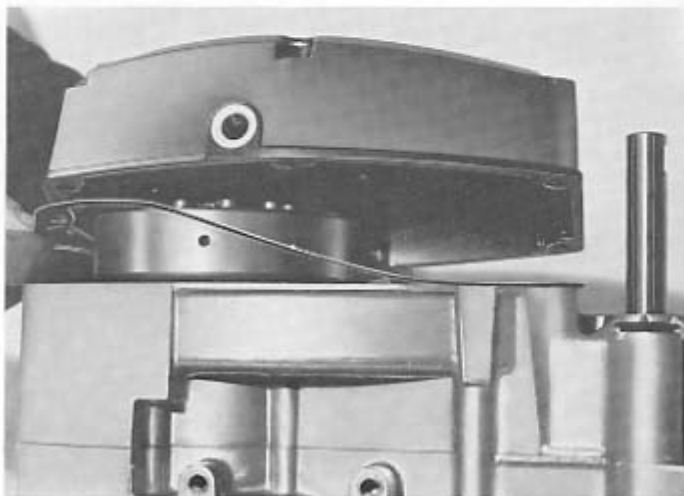
- Using the tool 64753 and 22 mm (.866") wrench remove the nut and the lock washer, then pull the sprocket from the shaft.



- Drain oil from the gearbox and clutch by removing the drain plug on the bottom of the engine.



- Remove the left sidecover and its gasket by taking out the six screws that hold it to the crankcase.

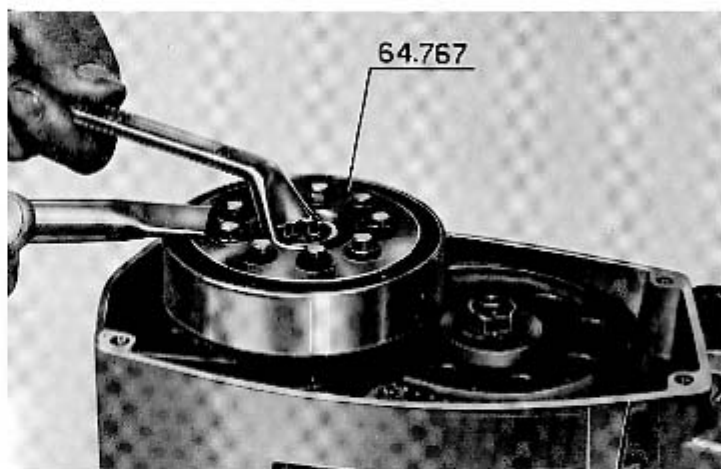


CLUTCH DISMANTLING - SINGLE SPEED

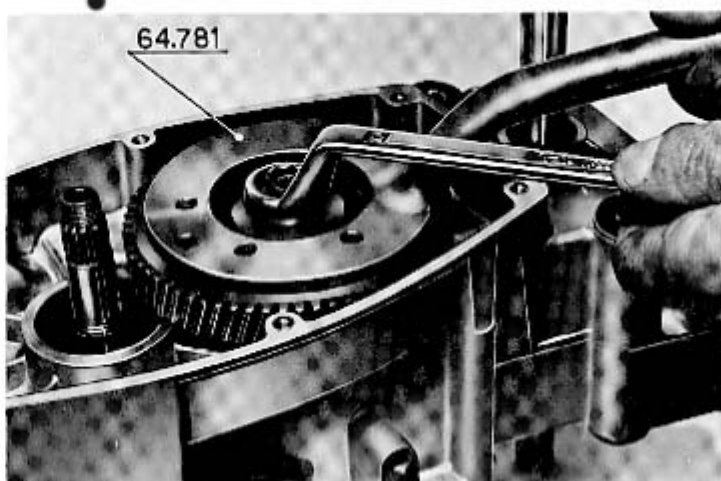
- Using the needlenose pliers remove the circlip and the spring from the clutch assembly.



- Using the tool 64767 and a 17 mm (.669") socket remove the nut locking the clutch hub. Then slide the clutch hub and housing from the crankshaft.



- Holding the gear with the tool 64781, unscrew the nut with a 17 mm (.669") socket.

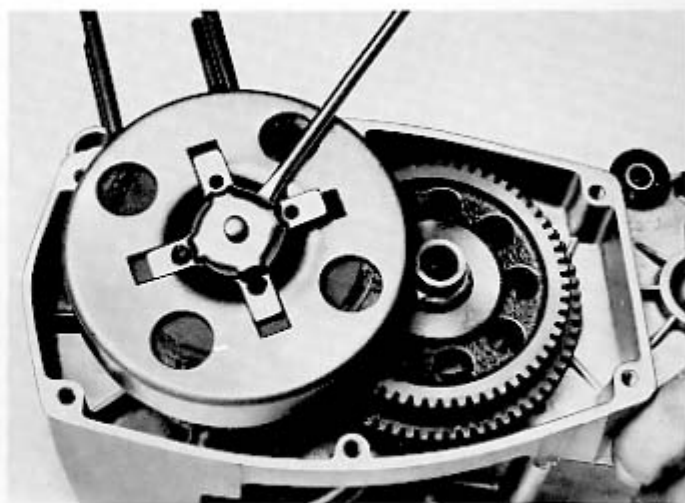


- Use extractor tool 64757 and a 19 mm (.748") wrench to remove the gear.

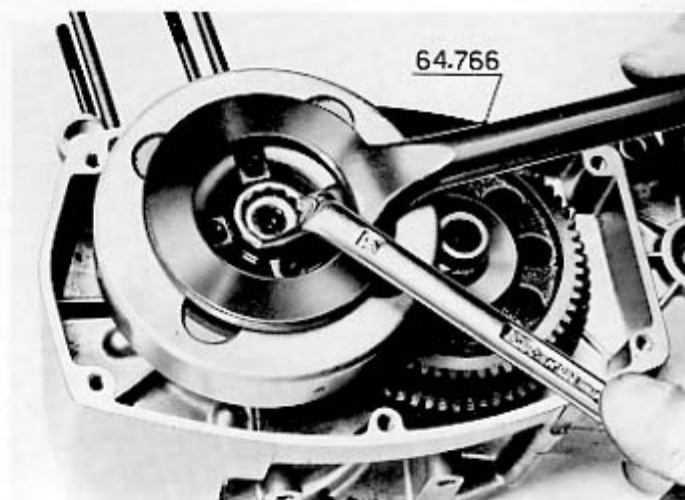


CLUTCH DISMANTLING - 2 SPEED AUTOMATIC

- Remove with the screwdriver the pressure plate from the 4 rubbers.



- Holding the clutch body with the tool 64766, use a 17 mm (.669") socket to unscrew the nut, then remove the washer.

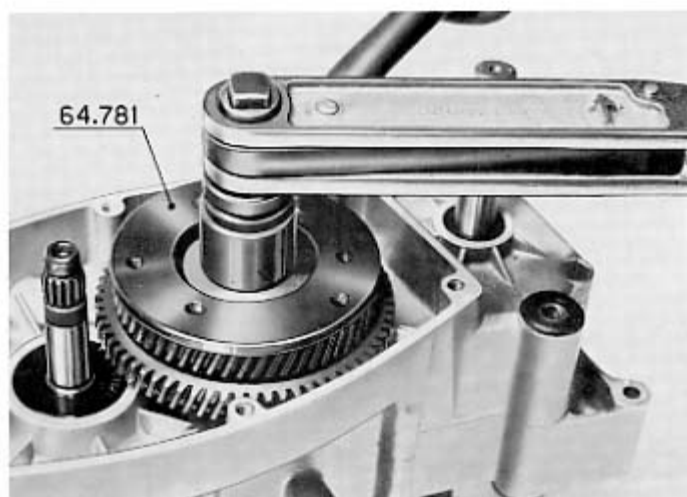


- Take the assembly of two clutches complete with gears and slide it from the crankshaft.



CLUTCH DISMANTLING - 2 SPEED AUTOMATIC

- Hold the gear with the tool 64781 while unscrewing the nut with a torque wrench.



- Remove the 2nd speed gear and then the 1st', while holding the catches with the tool 64784. Then slide the clutch hub and washers.

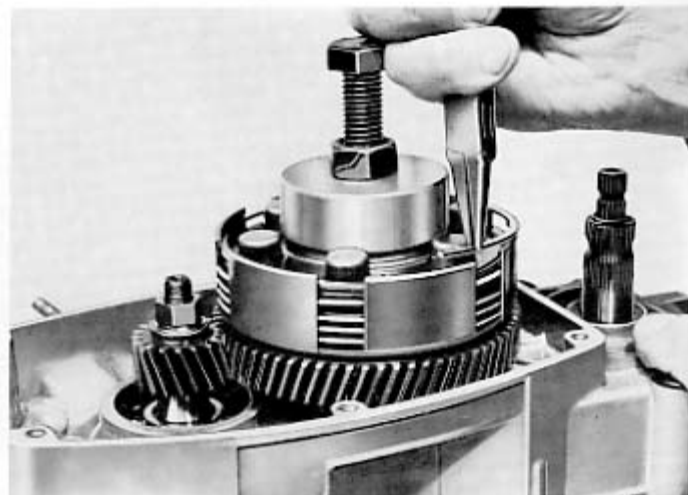


CLUTCH AND PRIMARY DRIVE DISMANTLING 3-4-5 SPEED

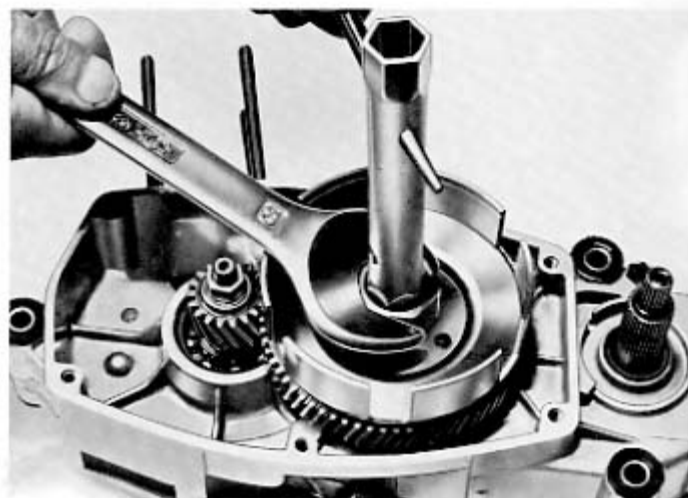
- Take off the lock nut and unscrew the clutch rod. Take the extractor 64768, act on its screw first, then tighten the nut «D» with a 22 mm (.866") socket to make the spring group pack together.



- With the pliers remove the circlip, the spring plate and the clutch discs.



- Hold the clutch hub with a 30 mm (1.181") wrench, unscrew the lock nut with a 17 mm (.669") socket, slide the washers, the nut and the hexagonal body.



CLUTCH AND PRIMARY DRIVE DISMANTLING 3-4-5 SPEED

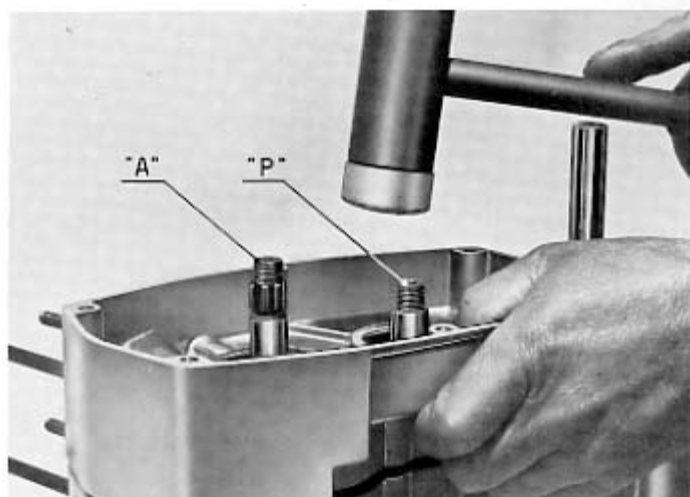
- Hold the gear with the tool 64756, remove the nut with a 14 mm (.551") polygonal wrench, remove the spring washer.



- Hold the gear with the tool 64.757 operate its centre screw and slide the gear from the crankshaft with a 19 mm (.748") wrench.



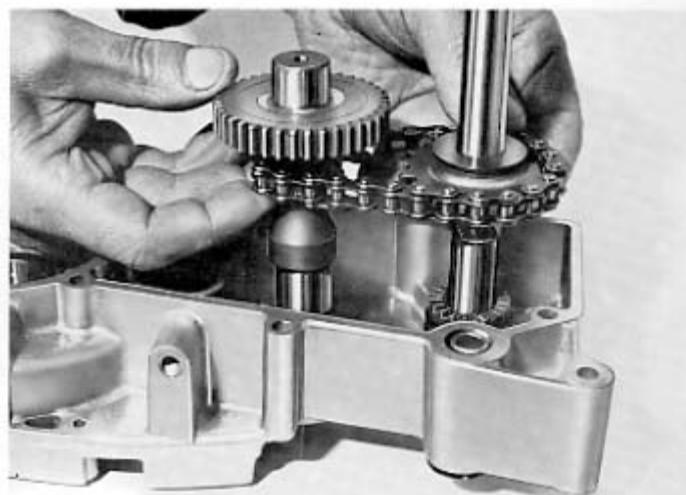
- **COMMON OPERATION TO ALL MODELS**
Remove the 10 crankcase screws from the right hand crankcase. Strike the ends of the crankshaft «A» and of the primary shaft «P» alternately with a mallet until the two halves of the crankcase separate.



GEARBOX AND SECONDARY DRIVE DISMANTLING

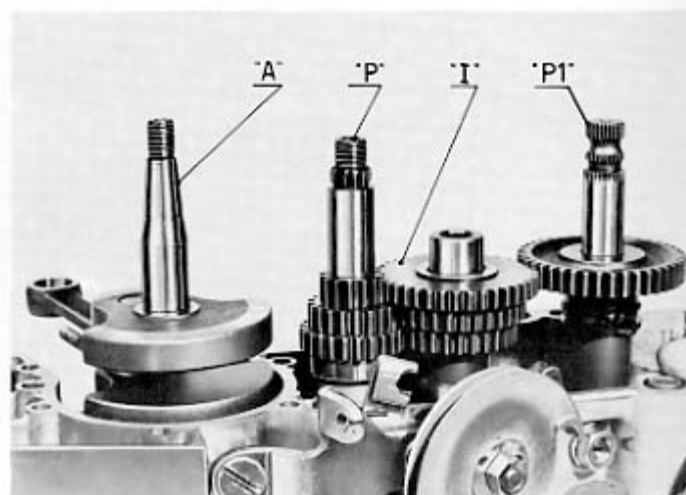
SINGLE SPEED - 2 SPEED AUTOMATIC

- Remove the crankshaft, the primary shaft, and the secondary shaft and the pedal shaft together.

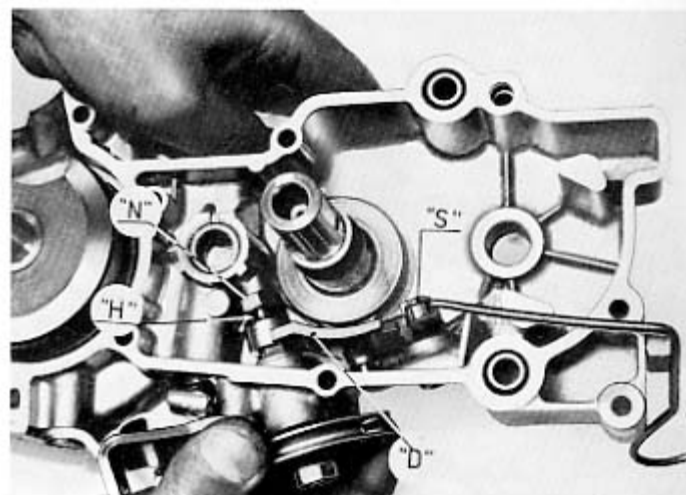


3 SPEED

- Slide the starting assembly «P1», the gears «I» from the secondary shaft, the primary shaft «P» and the crankshaft «A» from the crankcase, using a mallet if necessary. Making use of a magnet, remove the 7 pins from their housings in the secondary shaft.



- Unscrew the nut «N» that secures the selector «D» to the shaft «H», slide out the shaft complete and the secondary shaft. To make this operation easier, secure in the open position the catch «S».

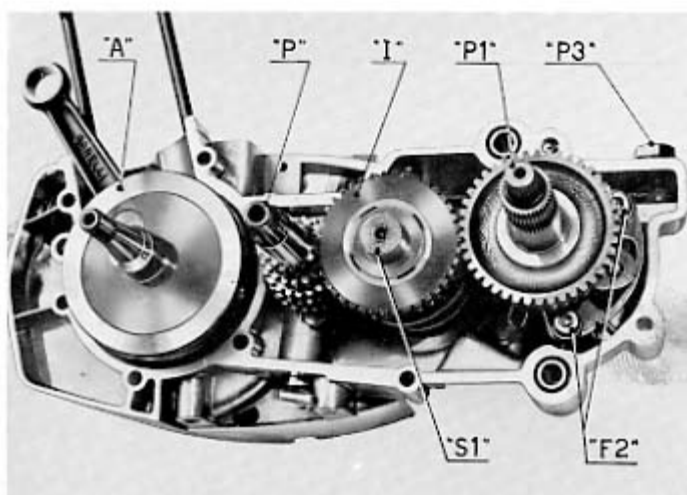


GEARBOX AND SECONDARY DRIVE DISMANTLING 4-5 SPEED

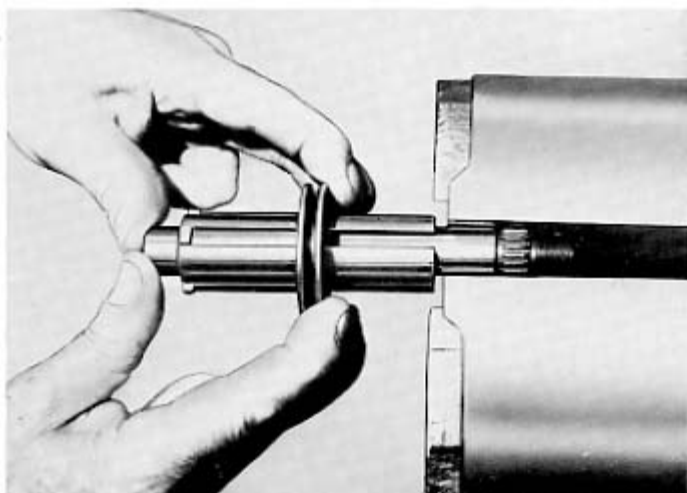
- Slide the starting assembly «P1», the gears «I» from the secondary shaft, the primary shaft «P» and the crankshaft «A» from the crankcase, using a mallet if necessary.

For the 4 speed engines only: making use of a magnet remove the 9 pins from their housings in the secondary shaft.

Remove the secondary shaft «S1» together with the selector assembly, taking care to remove first the 2 hexagonal screws «F2» and the top spindle «P3».



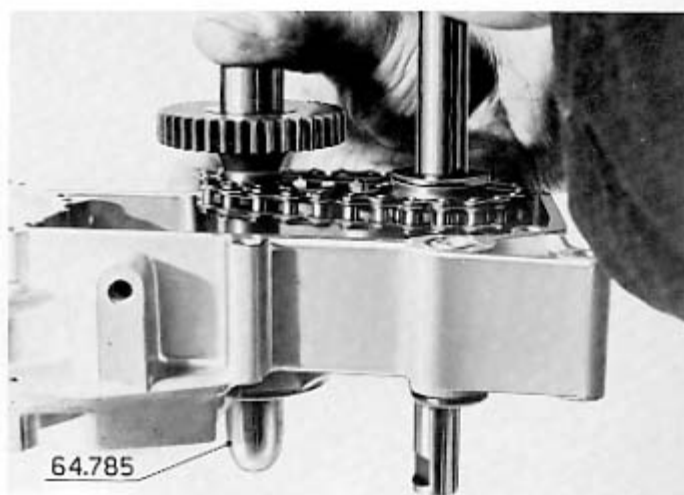
- Secure in a vice the secondary shaft of the 5 speed engine, draw back and slide off the slider taking care not to lose the springs and locating balls.



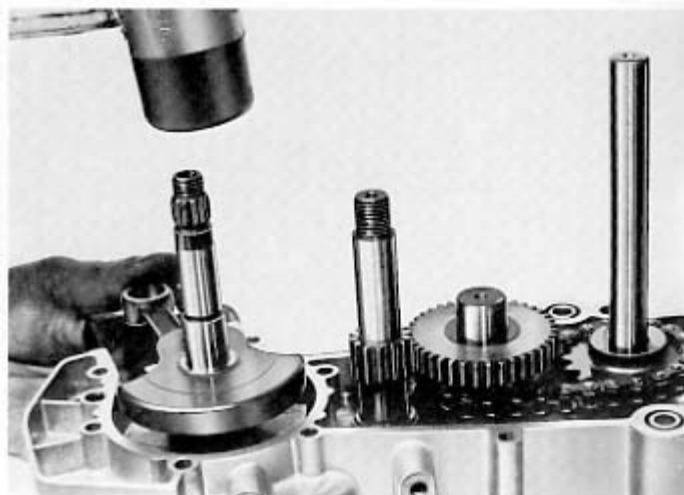
ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

Before starting to assemble the unit, carefully clean and slightly oil all the parts.

- Using the tool 64785 insert in the right hand crankcase the secondary shaft along with the pedals shaft with the chain, the starting spring and the starting assembly. Then fit the primary shaft and shim washer.



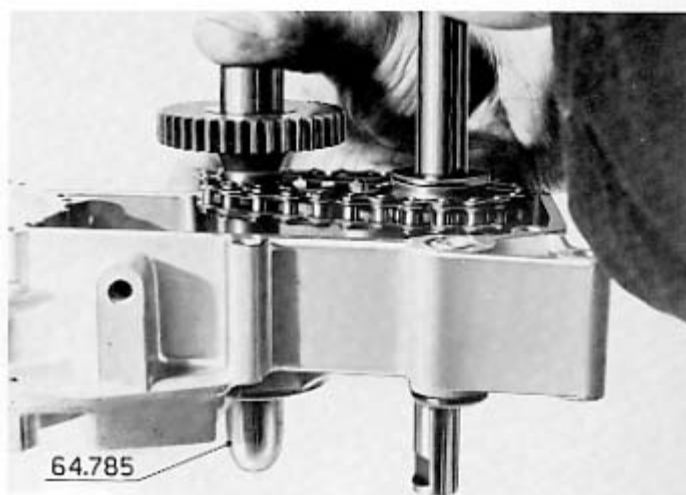
- Insert the crankshaft into the crankcase, lightly tapping it with a mallet.



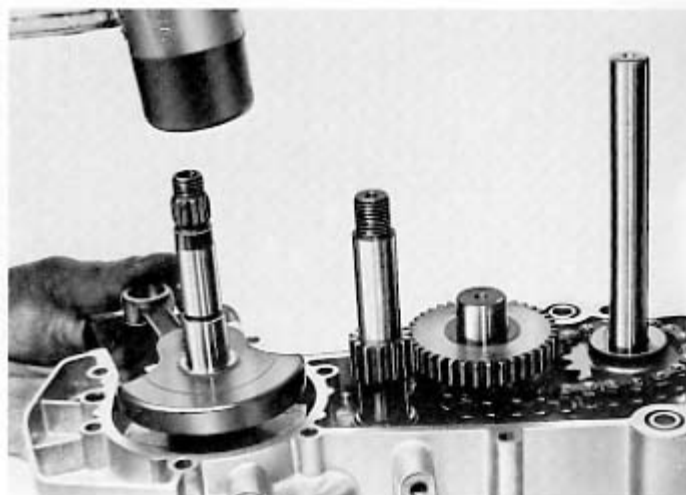
ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

Before starting to assemble the unit, carefully clean and slightly oil all the parts.

- Using the tool 64785 insert in the right hand crankcase the secondary shaft along with the pedals shaft with the chain, the starting spring and the starting assembly. Then fit the primary shaft and shim washer.



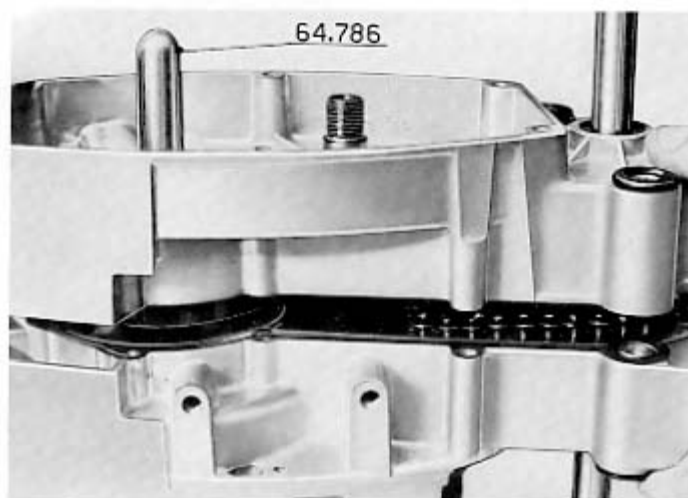
- Insert the crankshaft into the crankcase, lightly tapping it with a mallet.



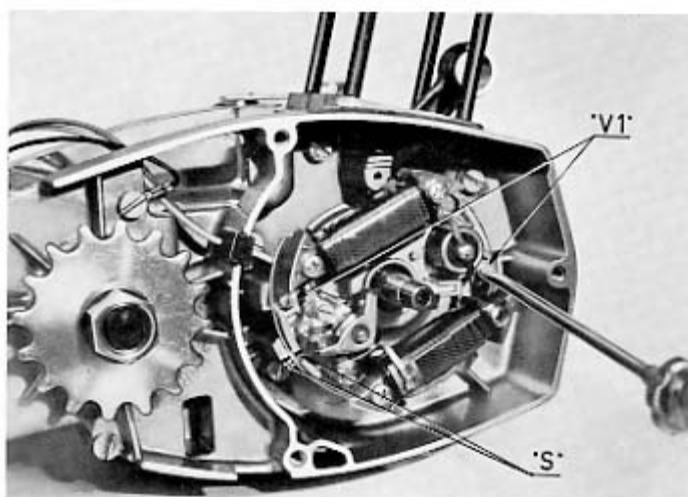
ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

— Join the left crankcase with the right one acting as follows:

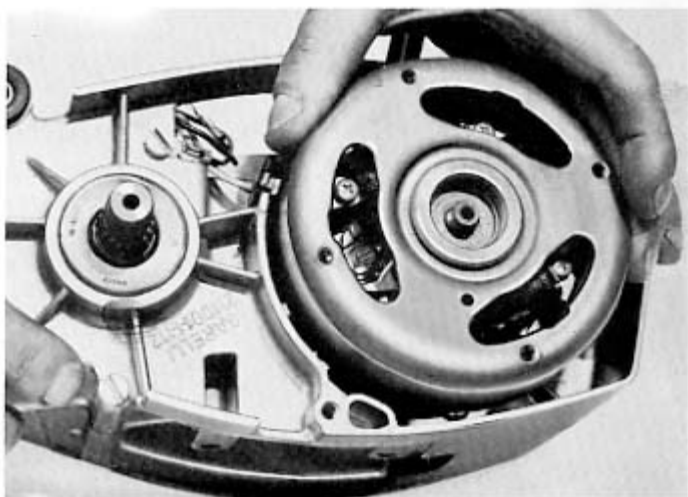
- a) Make sure that the faces of the cases are clean and free from burrs and that the dowels are in position.
- b) Slightly grease a new gasket on both sides, which is to be inserted between the two crankcase halves.
- c) Using the tool 64786, press the two crankcases by hand and then tap them together with a mallet.
- d) Fit and tighten the 10 screws joining the cases.
- e) Check that the crankshaft, the primary shaft, the secondary shaft and the pedal shaft turn freely.



— With the exception of the Bosch flywheel, insert the distance piece under the stator plate, fit the plate so that the scriber mark «S» previously made is in line, tighten the mounting screws «V1».

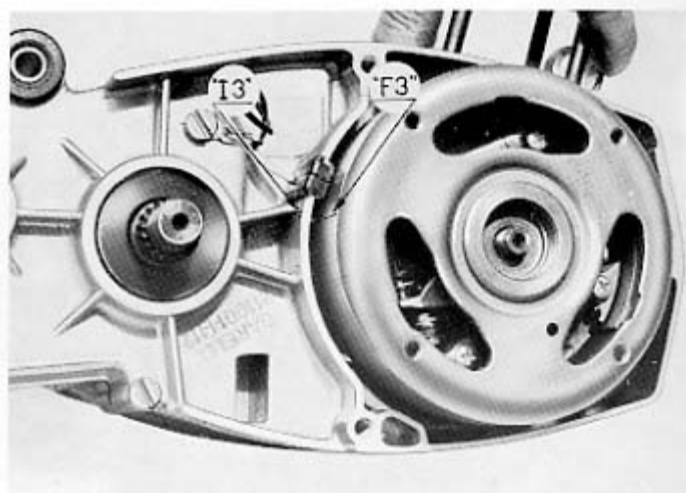


— Fit the woodruff key in position on the crankshaft, slip the flywheel and rotate it until it is felt that the key is correctly seated.

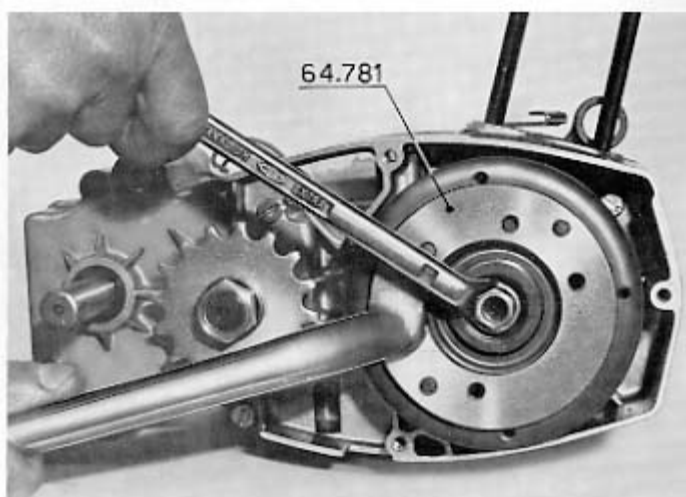


ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

- Rotate the flywheel by hand in the clockwise direction until the points gap is in the widest position. At this instant check the gap with a feeler gauge, resetting if necessary to $0,35 \div 0,45$ mm ($.014'' \div .018''$). Check the timing, which is correctly set when the points begin to open at 23° B.T.D.C. (for 5 speed only: 26° B.T.D.C.) (see owner's manual). To check the timing rotate the flywheel in the clockwise direction so as to line up the arrow «F3» on the flywheel and the mark «I3» on the crankcase; in this position the points should just begin to open. If they do not, slip off the flywheel, loosen the stator plate fastening screws, rotate the plate in the appropriate direction, lightly refit the screws, refit the flywheel, check the gap.



- When satisfied that the gap is set correctly, fit the washer and tighten the fastening nut, using the tool 64781 and the 14 mm ($.551''$) socket previously used when dismantling.



- Fit the chain gear and the two shim washers on the secondary shaft, using the tool 64753 and a torque wrench tighten the nut to $6 \div 6,5$ kpm. (in. lb. $0,336 \div 0,364$).

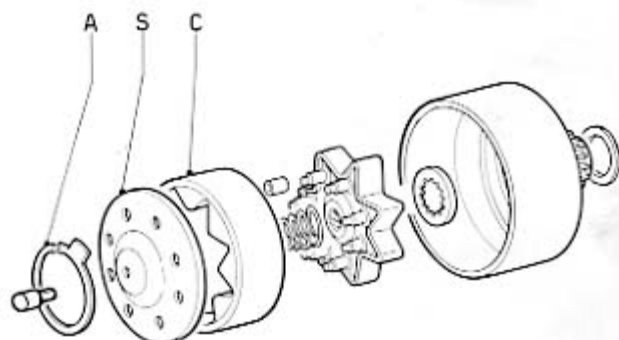


REASSEMBLY OF DRIVEN GEAR AND CLUTCH SINGLE SPEED

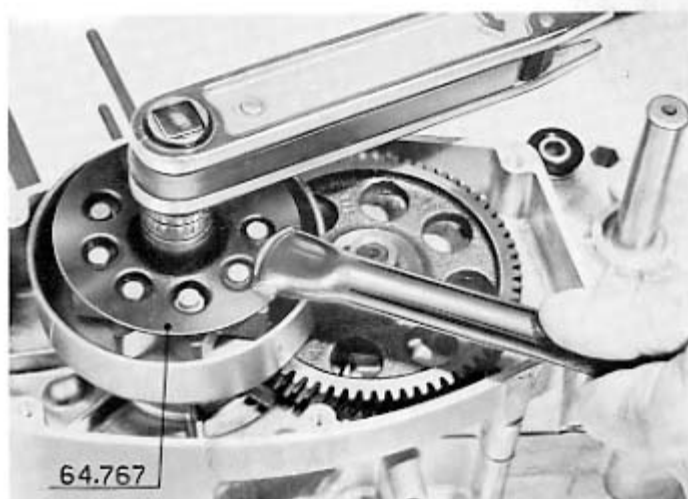
- Turn the engine the opposite side, place on the primary shaft the gear, the washer and the nut and, using the tool 64781, tighten it to $4 \div 4,5$ kpm (in. lb. $0,224 \div 0,252$) with the torque wrench.



- Fit the clutch assembly and hub following the illustration.

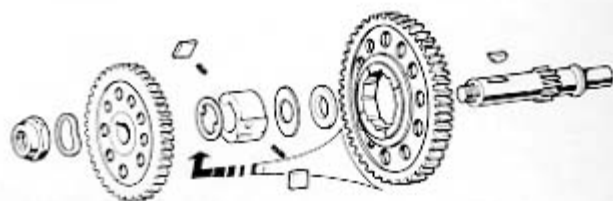


- Before mounting the plate «S», the elastic body «C» and the circlip «A», with the tool 64767 and torque wrench tighten to $3 \div 3,5$ kpm (in. lb. $0,168 \div 0,196$) the nut fixing the clutch hub to the crankshaft.



REASSEMBLY OF DRIVEN GEARS FREEWHEEL AND CLUTCH

2 SPEED AUTOMATIC



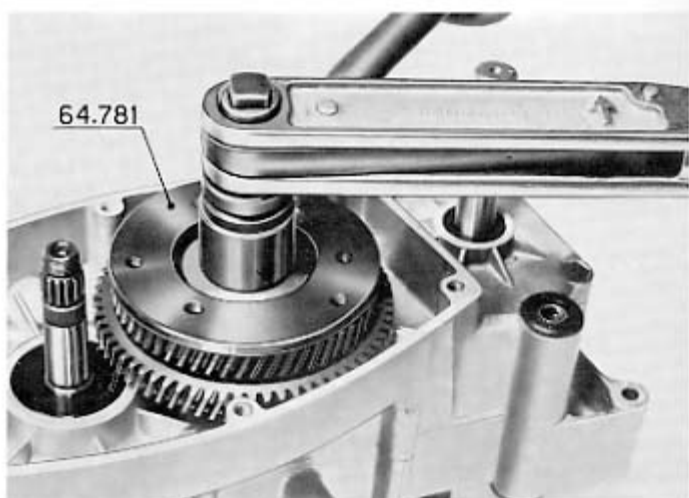
- Place gears and freewheel on the primary shaft as per illustration. Use the tool 64784 to hold in place springs and catches when sliding the 1st speed gear.



- CAUTION: the freewheel hub shall be fitted so as to allow the 1st speed gear to turn free when rotated in the counter-clockwise direction.



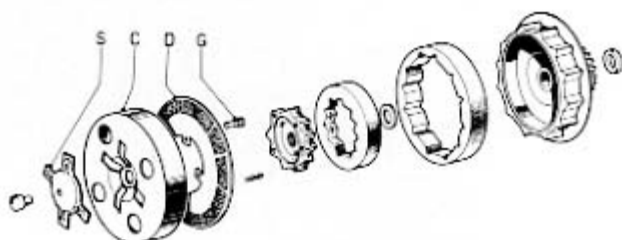
- With the tool 64781 and torque wrench tighten to $8 \div 8,5$ kpm (in.lb. $0,448 \div 0,476$) the nut fixing the gears on the primary shaft.



REASSEMBLY OF DRIVEN GEARS FREEWHEEL AND CLUTCH

2 SPEED AUTOMATIC

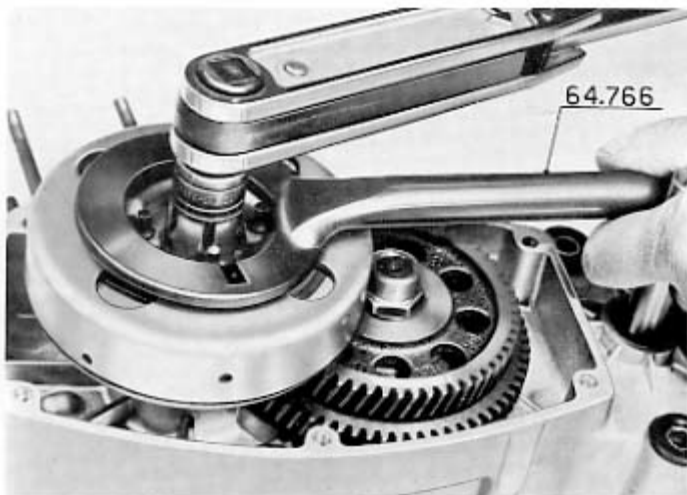
- Reassemble the clutch assembly as illustrated.



- When at the disc «D», place the 4 rubbers «G» in the corresponding holes. The rubbers ends should face towards the outer side of the engine and the thicker lined face of the disc towards the inner side.



- Hold the 2nd speed housing «C» with the tool 64766 and tighten the nut to 3÷4 kpm (in.lb. 0,168÷0,224) with the torque wrench.



- Slide the cross shaped plate «S» with the pliers on the 4 rubbers «G» as illustrated, then cut the 4 rubbers ends.



ENGINE REASSEMBLY - PISTON, CYLINDER, CYLINDER HEAD

SINGLE SPEED, 2 SPEED AUTOMATIC, 3 SPEED

Once the mentioned operations are accomplished, before fitting the cover make sure the two rubber bodies turn free on the hubs.

Make sure that the faces of the left hand crankcase and of the cover are clean and free from burrs, slightly grease a new gasket and place it on the crankcase face. Make certain that the cover fits the oil plug and washer. Place the cover on the crankcase and tighten the 6 joining screws.

- Refit piston with needlebearing, gudgeon pin and circlips as illustrated and make certain that the circlips are properly inserted in their grooves. Make sure that «S» on the piston is towards the exhaust port.



- Check that the crankcase upper face and the cylinder base are clean and free from burrs. Lightly grease a new gasket on both sides and lay it on the crankcase face. Oil the cylinder bore and the piston skirt. Lower the cylinder onto the piston with fingers compressing the rings into the bore. Make sure that the ends of the piston rings are properly fitted in position against the pegs of the ring grooves. Slide the cylinder along the 4 studs and fit it in place.

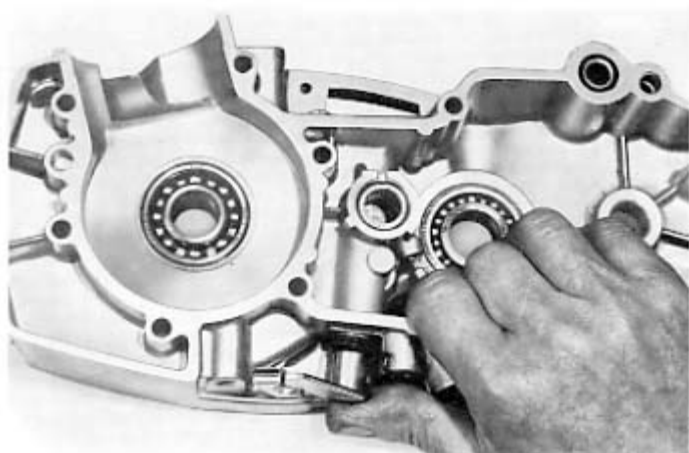


- Check that the top of the cylinder and the face of the head are clean and undamaged. Fit the head over the studs and place the 4 washers and nuts on the studs. Tighten the nuts gradually in a cross pattern. The final torque should be $1,5 \div 1,8$ kpm (in.lb. $0,084 \div 0,10$). Refit the spark plug. Through the hole on the left hand cover fill the crankcase with abt. 350 cc. (cu.in. 21,35) of FIAT VS+30 (SAE 30) oil.

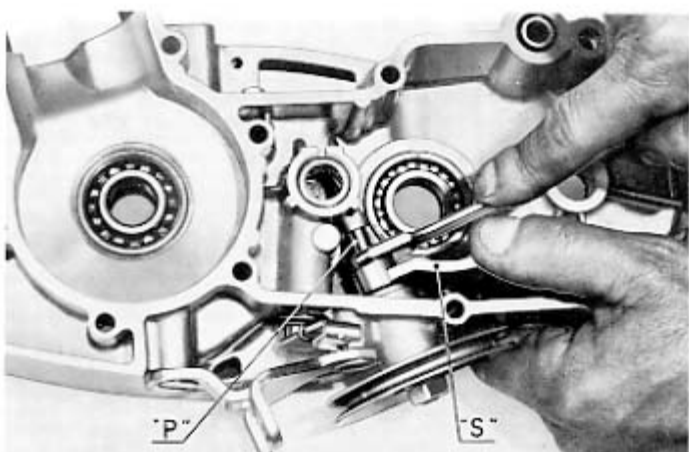


ENGINE REASSEMBLY 3 SPEED

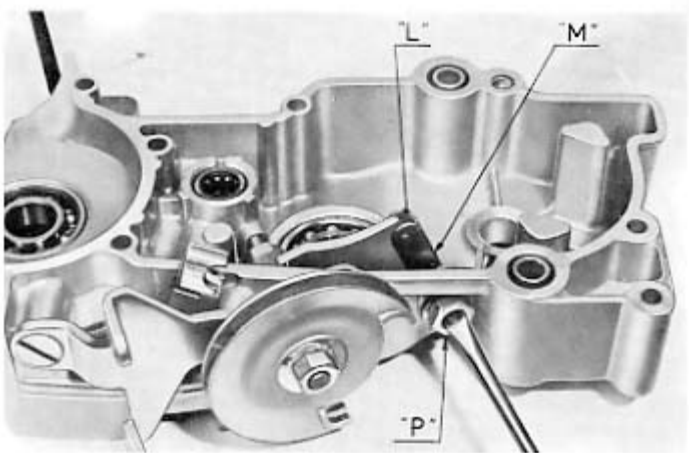
- Fit as illustrated the clutch lever with return spring and tighten the screw on the opposite side of the crankcase. (This operation also applies to the 4 speed and 5 speed engines).



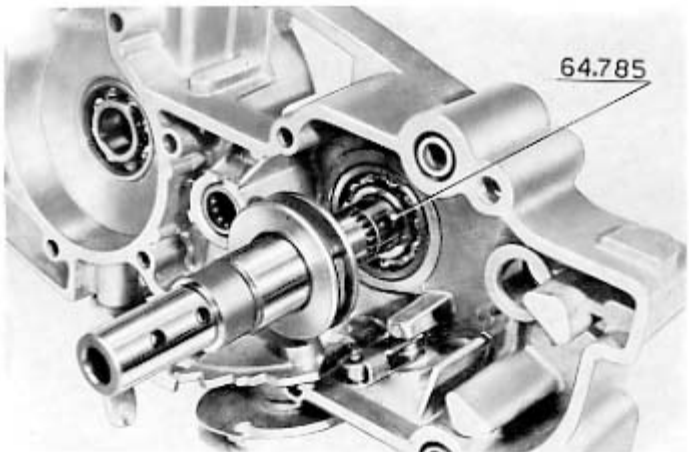
- Fit the selector «S», the pin «P» and tighten the nut inside the crankcase.



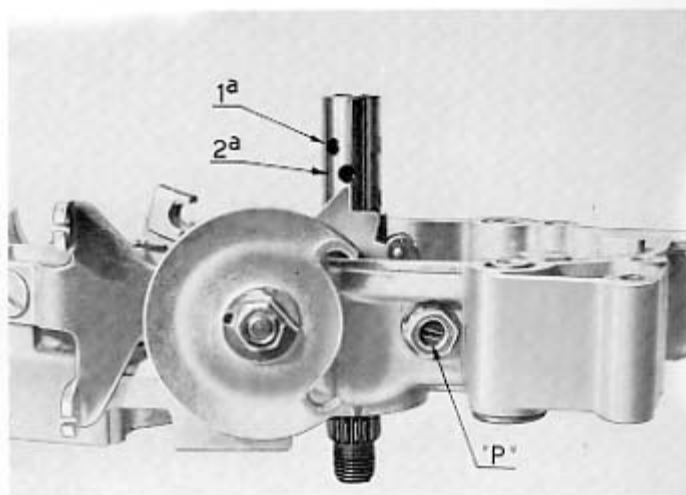
- Mount the pin «P», the spring «M» and the gears locating lever, screw but do not tighten the locknut.



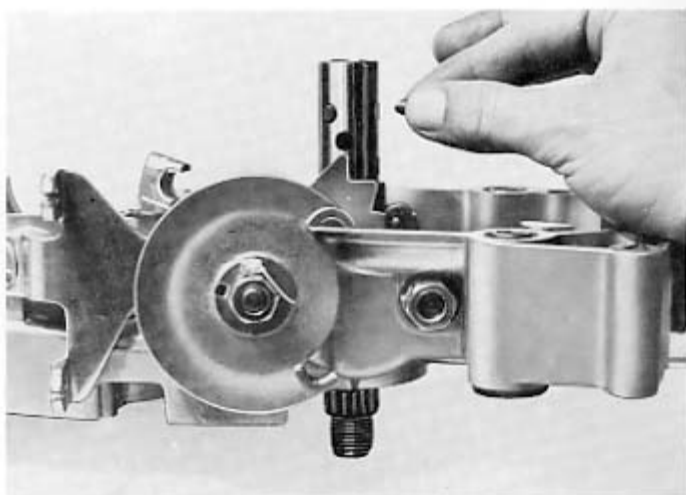
- Slide the secondary shaft in the support and then in the bearing, using the tool 64785.



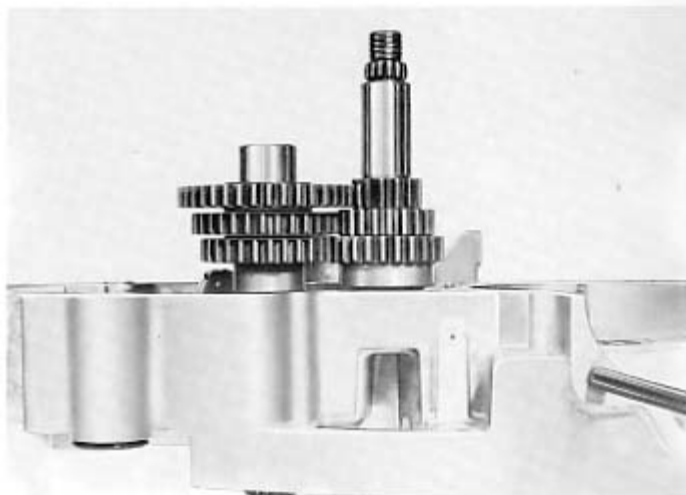
- Put the gearchange in the «neutral» position and adjust it acting with a screwdriver on the pin «P» until when the protrusion on the sliding axle is in the centre between the hole of the 1st speed and that of the 2nd speed.



- Place the balls in the respective holes on the secondary shaft and hold them in place with some grease.

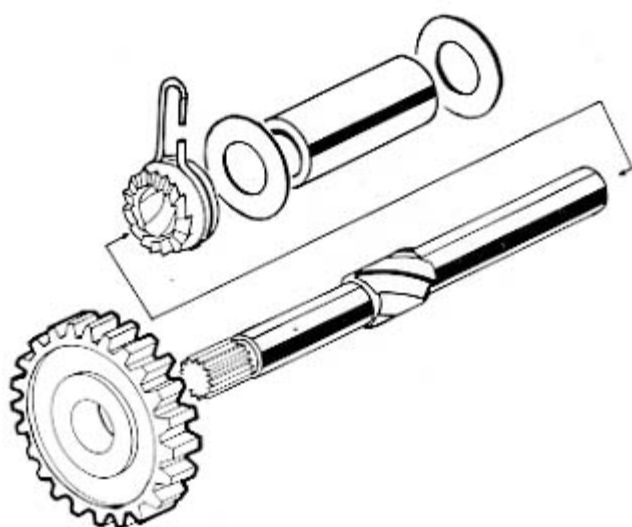


- Mount the primary shaft and then the gears on the secondary shaft. Make sure that the toothings are in line.

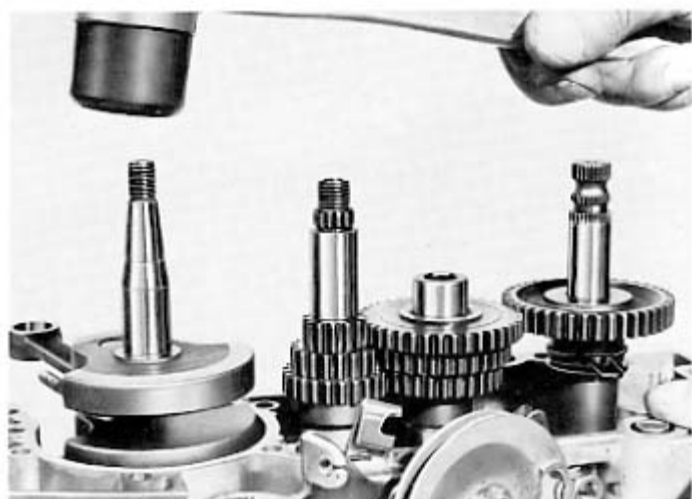


ENGINE REASSEMBLY 3 SPEED

- Mount the distance piece, the shaft, the engagement for starting with gear as shown in the illustration.

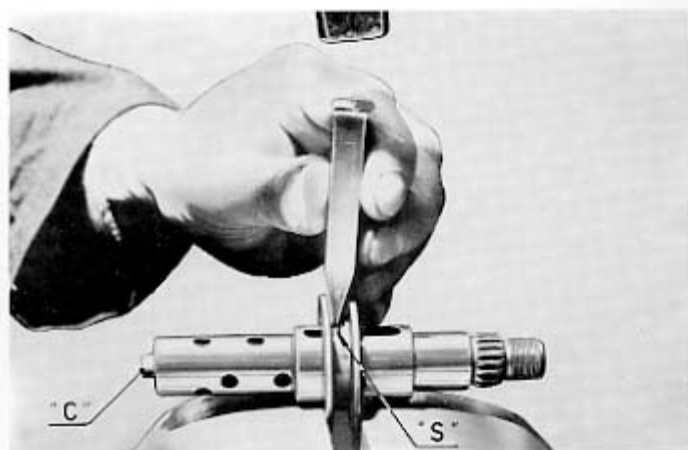


- Slide the crankshaft, lightly tapping it with a mallet.

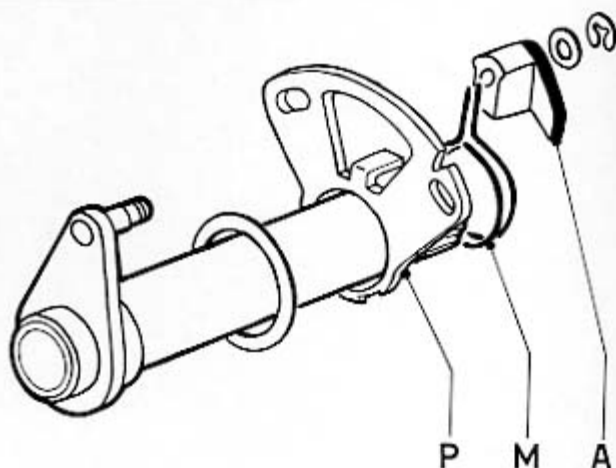


- Join the left crankcase with the right one acting as follows:
 - a) Make sure that the faces of the cases are clean and free from burrs and that the dowels are in place.
 - b) Slightly grease a new gasket on both sides, which is to be inserted between the two crankcase halves.
 - c) Press the two crankcases, by hand then tap them together with a mallet.
 - d) Fit and tighten the 10 screws joining the cases.
 - e) Check that the crankshaft, the primary shaft, the secondary shaft turn freely.

- To mount the sleeve and slider on the secondary shaft, hold the assembly in a vice as illustrated. The sleeve side having the hole of 4 mm \varnothing should be up.
Slide the dowel «S» fully in with a 3 mm \varnothing center punch, which should engage also into the transverse hole of the slider «C».
With a calking tool make a cross mark on the hole to avoid that the dowel may get out.
Note: Check that the mark is such as to hold the dowel in place.



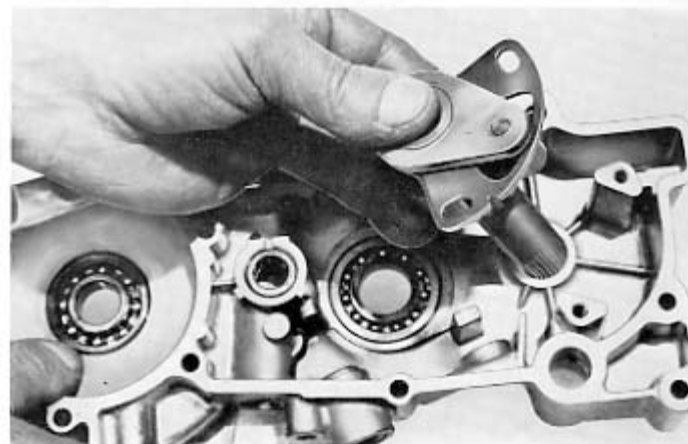
- Assemble the selector group as illustrated.



- Once the group is assembled, the spring «M» should be engaged with the plate «P» and anchor «A» as illustrated.

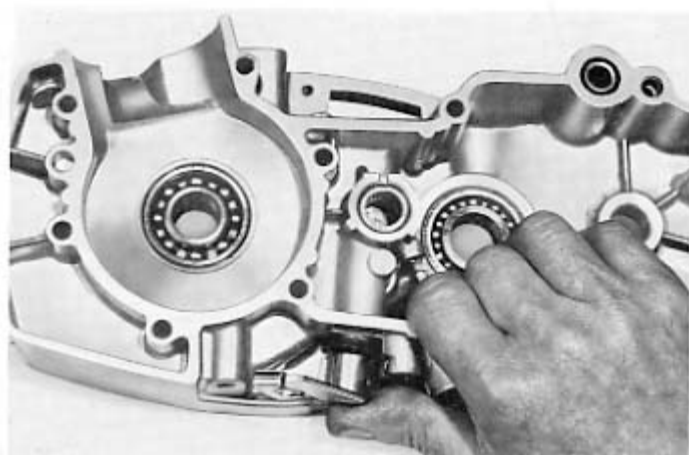


- Slide the selector group into the right hand crankcase, lightly tighten the 2 hexagonal screws.

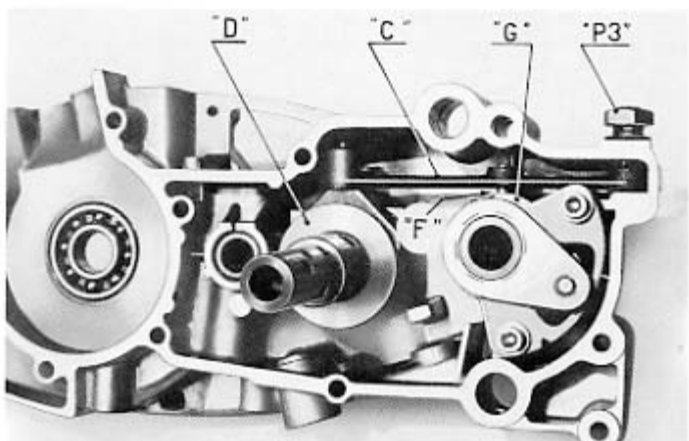


ENGINE REASSEMBLY 4 SPEED

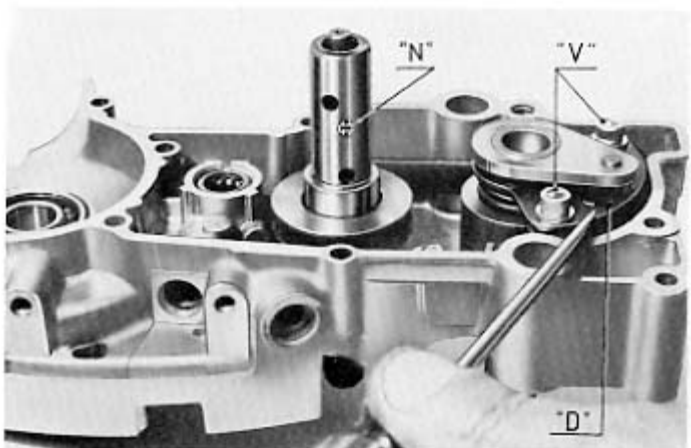
- Fit the clutch lever and spring and tighten the screw on the opposite side of the crankcase.



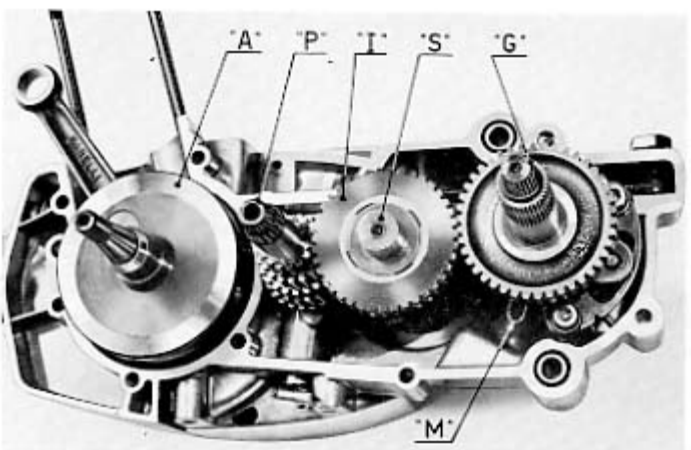
- Fit the gearchange lever «C» slipping the gears operating slider into the sleeve «D» placed on the secondary shaft. Insert the secondary shaft in place making sure that the grub screw «F» on the lever «C» is properly seated in the slide of the selector drum «G». Then tighten the screw «P3».



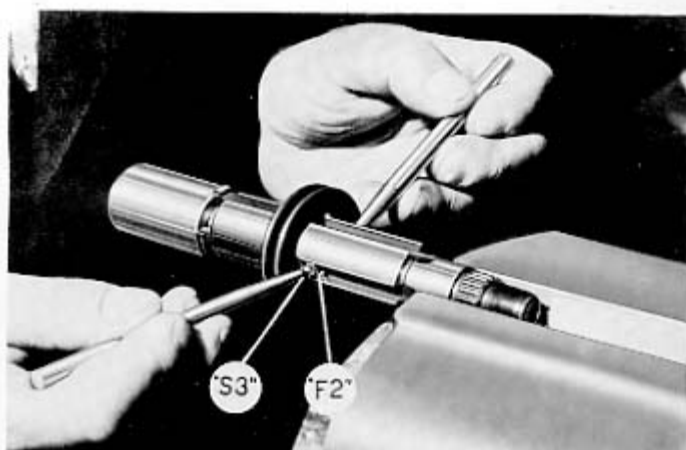
- To check and adjust if necessary the gears position, act as follows:
 - a) Operate the gearchange lever to drive the sliding axle protrusion in the 2nd or 3rd speed position and make sure that the slider sideways swivel (both up and down) is steady and not excessive or defective.
 - b) To regulate this, rotate the gear selector quadrant «D» in the appropriate direction until adjustment is got, then tighten the 2 screws «V».



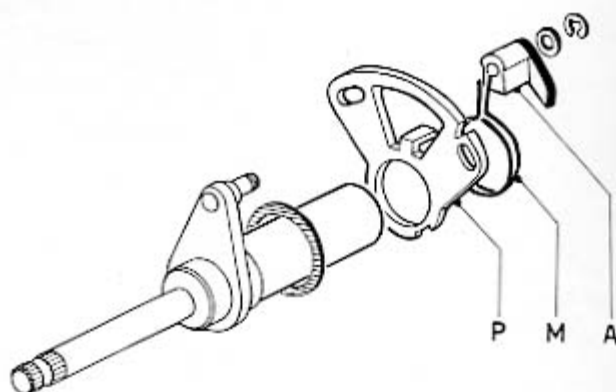
- Slide the crankshaft «A» in the right hand crankcase and the primary shaft «P» in place. Slide the gears group «I» on the secondary shaft «S» taking care that the balls previously fitted do not get out from the shaft. Fit the starting assembly «G» in the selector group. Make sure that the spring «M» is correctly seated.



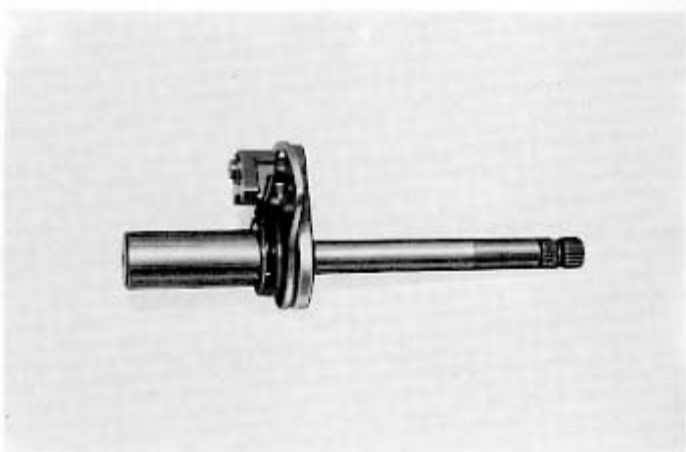
- Hold the secondary shaft in a vice. Slide the sleeve far enough to leave the hole «F2» exposed. Place in the hole the springs and the 3/16" balls «S3» (one each side). Using two punches press the balls inward towards one another and at the same time push the sleeve over them.



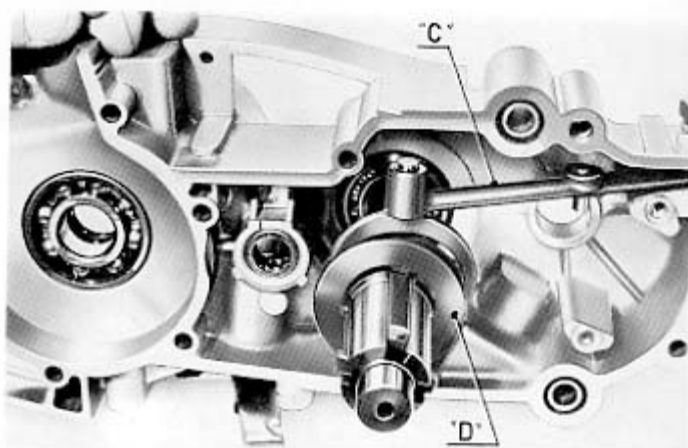
- Assemble the selector group as illustrated



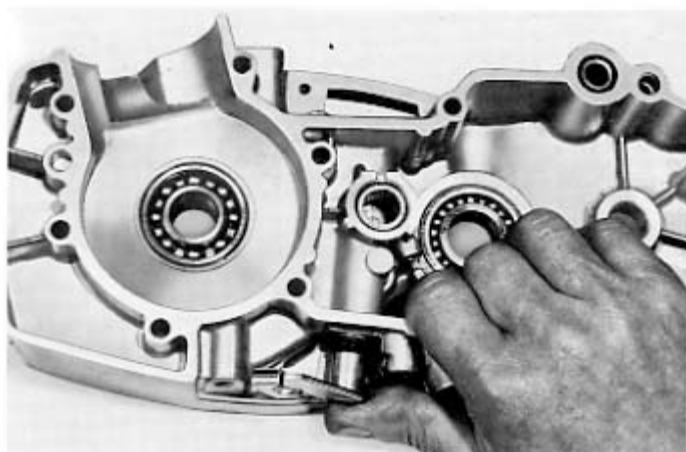
- To have the group assembled correctly, the spring «M» should be engaged with the plate «P» and the anchor «A» as per illustration.



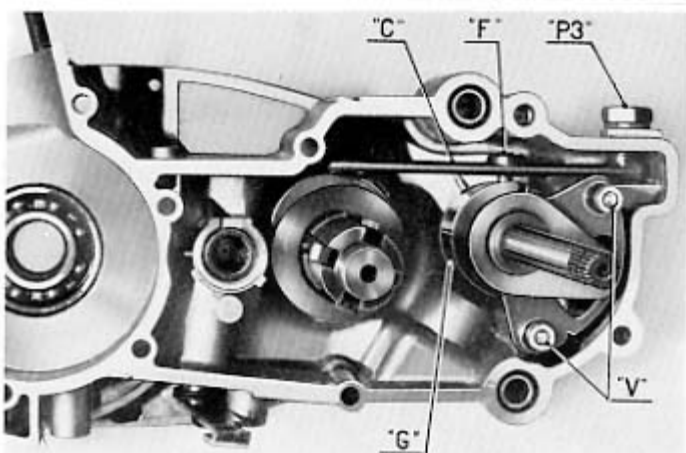
- Fit the gearchange lever «C» sliding the control fork into the sleeve «D», then place the sleeve in place using the tool 64785.



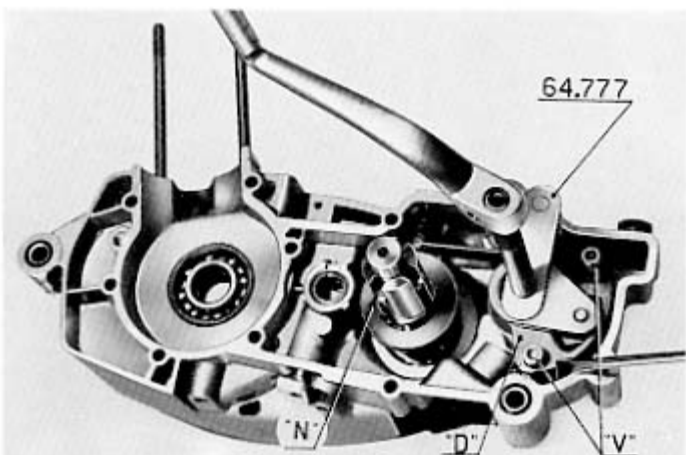
- Fit the clutch lever and spring and tighten the screw on the opposite side of the crankcase.



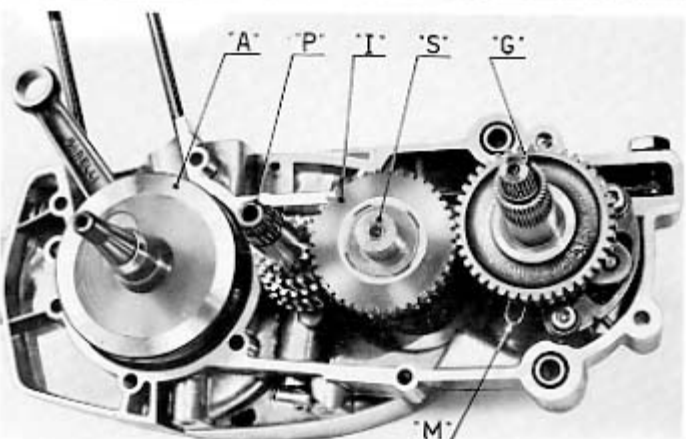
- Insert the selector group in the right hand crankcase, making sure that the grub screw «F» on the lever «C» is properly seated in the slide of the selector drum «G». Tighten the 2 hexagonal screws «V». Then tighten the screw «P3» and nut. The more the screw is tight, the more accurate is the speed passage.



- Using the tool 64777, operate the gearchange lever to drive the sleeve nibs «N» in the 2nd and then in the 3rd speed position, and make sure that the slider sideways swivel (both up and down) is steady. To regulate this, rotate the gear selector quadrant «D» in the appropriate direction until adjustment is got, then tighten the 2 screws «V».

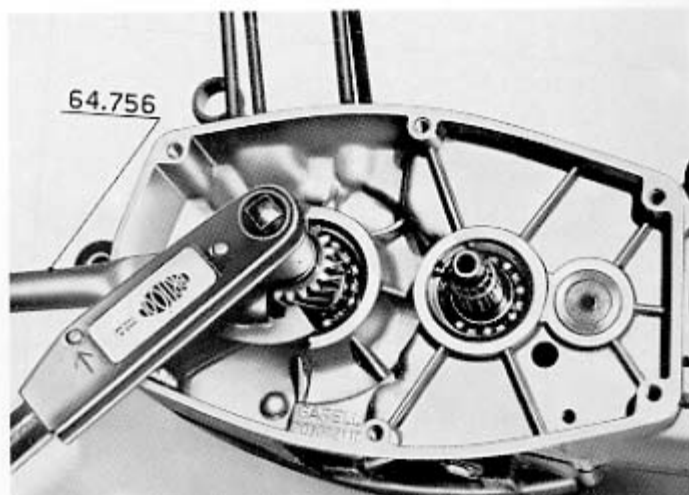


- Slide the crankshaft «A» in the right hand crankcase and the primary shaft «P» in place. Slide the gears group «I» on the secondary shaft «S», as well as the shim washer and the starting group «G». Check that at each pull the sleeve nib is in the centre of the gears marks. Make sure that the spring «M» is correctly seated.

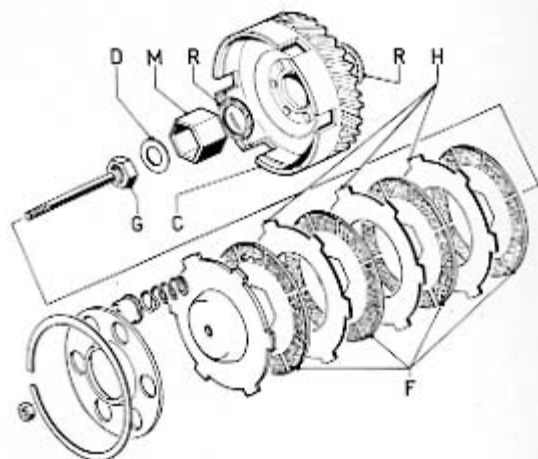


REASSEMBLY OF CLUTCH - 3-4-5 SPEED

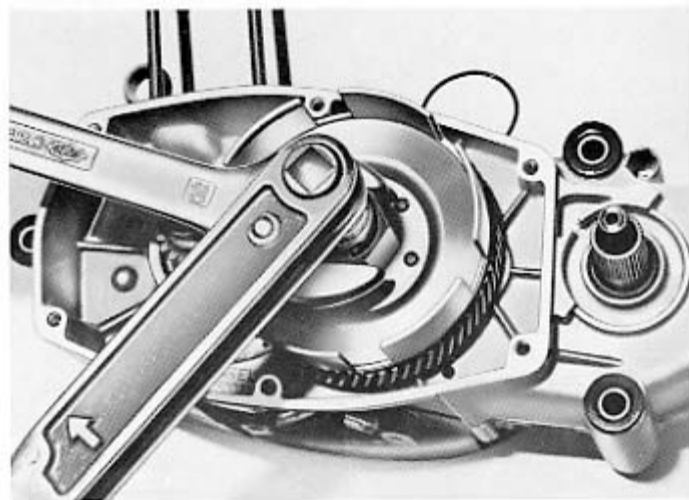
- Place the gear and the elastic washer on the end of the crankshaft. With the tool 64756 and torque wrench tighten to $3,5 \div 4$ kpm. (in.lb. $0,196 \div 0,224$).



- Assemble the clutch as illustrated

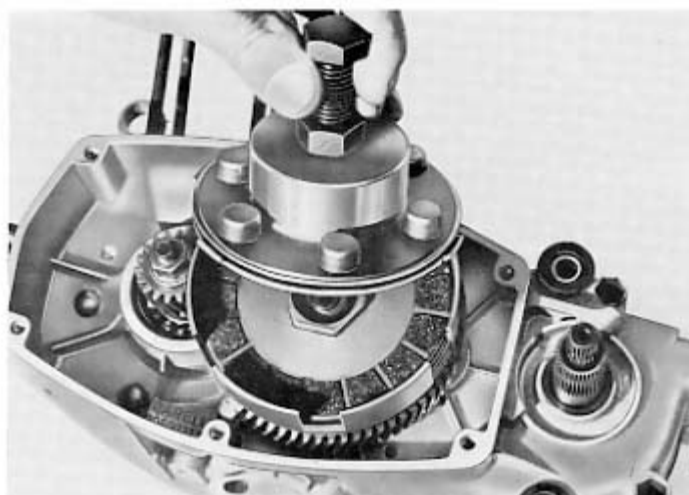


- Place on the primary shaft the shim washer «R», the clutch housing «C», the other shim washer «R», fit the clutch hub «M», the washer «D» and the nut «G». Hold the clutch hub with a 30 mm socket and tighten the nut «G» to $4,5 \div 5$ kpm (in.lb. $0,252 \div 0,280$) with the torque wrench.

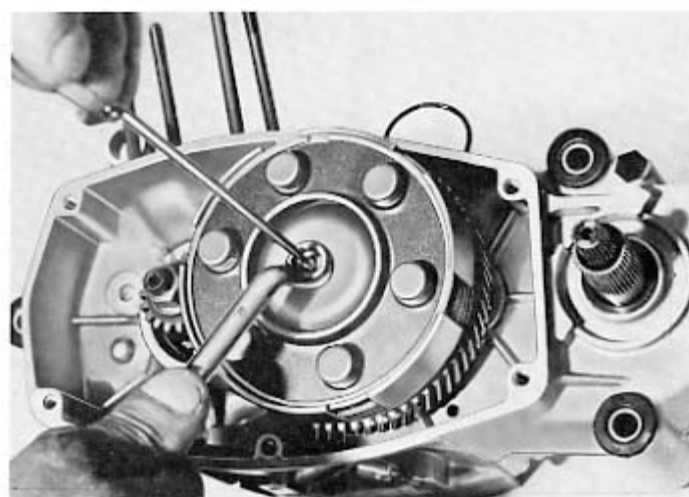


REASSEMBLY OF CLUTCH - 3-4-5 SPEED

- Place the clutch discs «F-H» taking care that the «H» discs nibs face outwards.
Mount the springs holder plate, following the inverse procedure as when dismantling.



- With a 10 mm (.393") socket and screwdriver adjust the play (6÷8 mm) (.236"÷.314") of the clutch discs control rod.

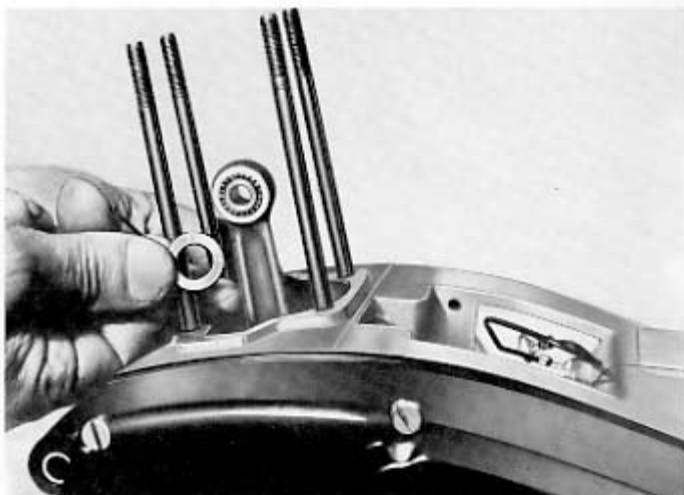


ENGINE REASSEMBLY - PISTON, CYLINDER, CYLINDER HEAD 4-5 SPEED

- Grease the bore of the small end and the 21 needles $2 \times 11,8$, insert them in the small end eye holding them in place with the drift pin bush 64759.

Slide the piston over the connecting rod making sure that the «S» on the piston is towards the exhaust port.

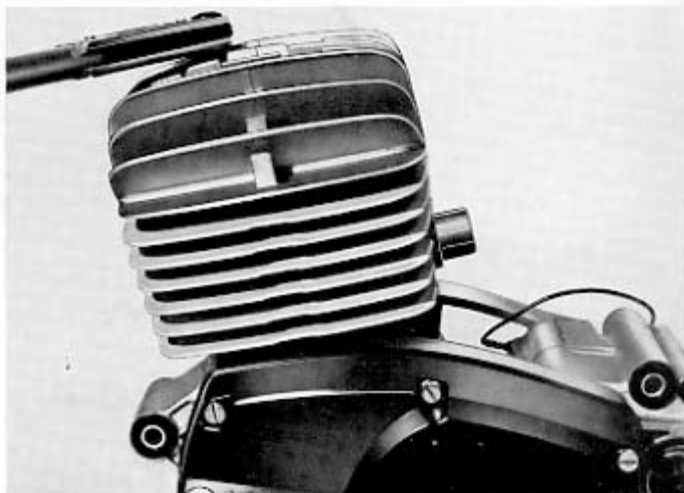
Place the gudgeon pin on the drift pin 64759, insert it through the piston and the small end bore forcing out the bush, then slide it out. Fit in place the two gudgeon pin rings and the piston rings into their grooves.



- Check that the crankcase upper face and the cylinder base are clean and free from burrs. Lightly grease a new gasket on both sides and lay it on the crankcase face. Oil the cylinder bore and the piston skirt. Lower the cylinder onto the piston with fingers compressing the rings into the bore. Make sure that the ends of the piston rings are properly fitted in position against the pegs of the rings grooves. Slide the cylinder along the 4 studs and fit it in place.



- Check that the top of the cylinder and the face of the head are clean and undamaged. Fit the gasket and the studs and place the 4 washers and nuts on the studs. Tighten the nuts gradually in a cross pattern. The final torque should be $1,5 \div 1,8$ kpm. (in.lb. $0,084 \div 0,10$). Then refit the gearchange and starting pedals, the carburettor and the spark plug. Through the hole on the left hand cover fill the crankcase with abt. 450 cc. (cu.in 27,46) of FIAT VS + 30 (SAE 30) oil.



For reassembly of flywheel magneto and chain gear follow the same procedure as illustrated at pages 17 - 18. No special instructions are needed to mount the complete engines on the frames, but follow the inverse procedure as shown at pages 4-5.