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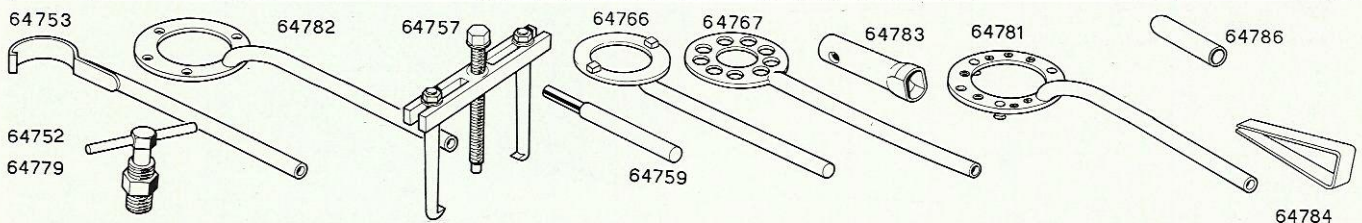
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# TECHNICAL SPECIFICATIONS

GARELLI ENGINE		SINGLE SPEED PEDALS	SINGLE SPEED KIKSTARTER	AUTOMATIC PEDALS	AUTOMATIC KICK
— Single cylinder, 2 stroke		<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
— Bore	mm. in.	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
— 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
— Ignition timing correspondig to	mm. in.	18° 1,2 .047	18° 1,2 .047	18° 1,2 .047	18° 1,2 .047
— Starting: pedals kickstarter		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
— Clutch: centrifugal automatic in oil bath		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
— Gearbox: single speed 2 speed automatic		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
— Primary reduction		16/71	16/71	16/71 23/64	16/71 23/64
— Carburettor, Dell'Orto type		SHA 14/12	SHA 14/12	SHA 14/12	SHA 14/12
— Gearbox oil capacity, type FIAT VS+30 (SAE 30)	cc. cu.in.	350 21,35	350 21,35	350 21,35	350 21,35

# SPECIAL TOOLS - TORQUE SPECIFICATIONS FOR SCREWS & NUTS

TOOLS	SINGLE SPEED PEDALS	SINGLE SPEED KICKSTARTER	AUTOMATIC PEDALS	AUTOMATIC KICK
64752 Extractor tool for CEV an DUCATI flywheels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64753 Holding tool for primary driving sprocket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64782 Tool for clutch hub		<input type="checkbox"/>		
64.757 Adjustable extractor tool	<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"/>
64.766 Tool for hub body			<input type="checkbox"/>	<input type="checkbox"/>
64.767 Holding tool for clutch hub	<input type="checkbox"/>			
64.783 Tool for starting assy. nut		<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"/>
64.781 Holding tool for flywheel and driven gears	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64.784 Holding tool for freewheel catches			<input type="checkbox"/>	<input type="checkbox"/>
64.786 Oilseal protection tool (drive side, crankshaft, primary shaft)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

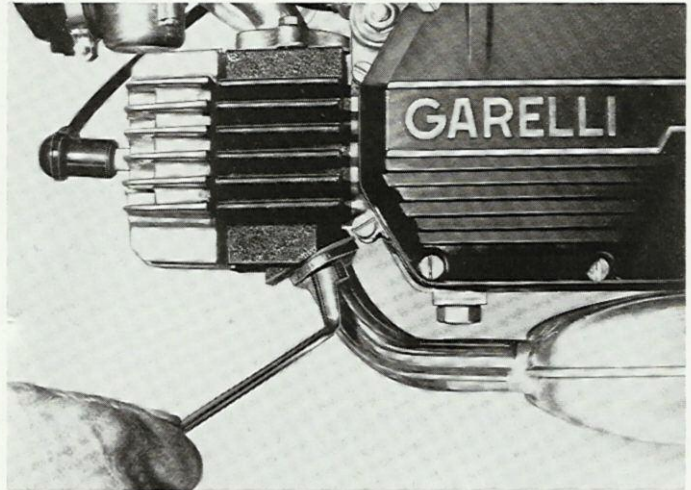


TORQUE SPECIFICATIONS		SINGLE SPEED PEDALS	SINGLE SPEED KICKSTARTER	AUTOMATIC PEDALS	AUTOMATIC KICK
CYLINDER HEAD NUT	Kgm in.lb.	1,5÷1,8 0,084÷0,10	1,5÷1,8 0,084÷0,10	1,5÷1,8 0,084÷0,10	1,5÷1,8 0,084÷0,10
FLYWHEEL MAGNETO NUT	Kgm in.lb.	3÷3,5 0,168÷0,196	3÷3,5 0,168÷0,196	3÷3,5 0,168÷0,196	3÷3,5 0,168÷0,196
CLUTCH NUT	Kgm in.lb.	3÷3,5 0,168÷0,196	3÷3,5 0,168÷0,196	3,5÷4 0,196÷0,224	3,5÷4 0,196÷0,224
DRIVEN GEAR NUT	Kgm in.lb.	4÷4,5 0,224÷0,252	4÷4,5 0,224÷0,252	8÷8,5 0,448÷0,476	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
CRANKCASE SCREW	Kgm in.lb.	0,8 0,044	0,8 0,044	0,8 0,044	0,8 0,044
SIDE COVERS SCREW	Kgm in.lb.	0,8 0,044	0,8 0,044	0,8 0,044	0,8 0,044

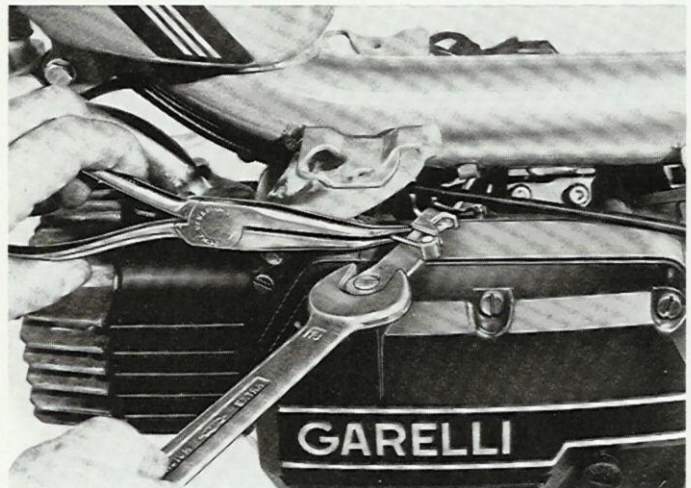
# ENGINE REMOVAL

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

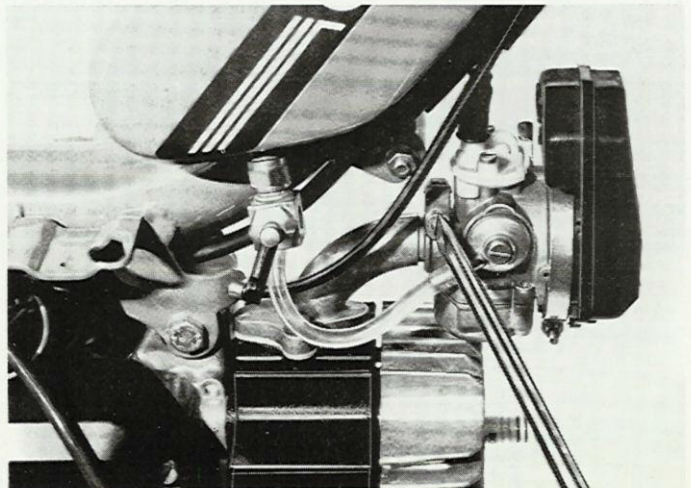
- Remove the silencer loosening the three nuts and screws with an 11 mm (.433") open end wrench. Take off the gasket.



- On the pedals model only, disconnect the starting cable using a 17 mm (.669") open end wrench as illustrated.

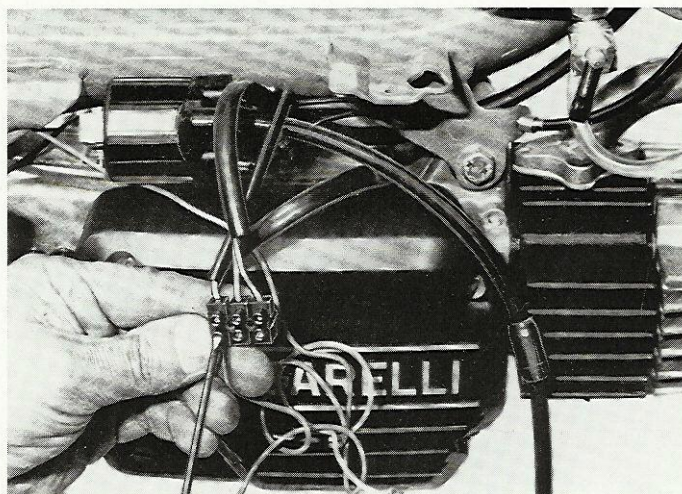


- With a screwdriver remove carburettor from the engine but leave it connected to the frame.

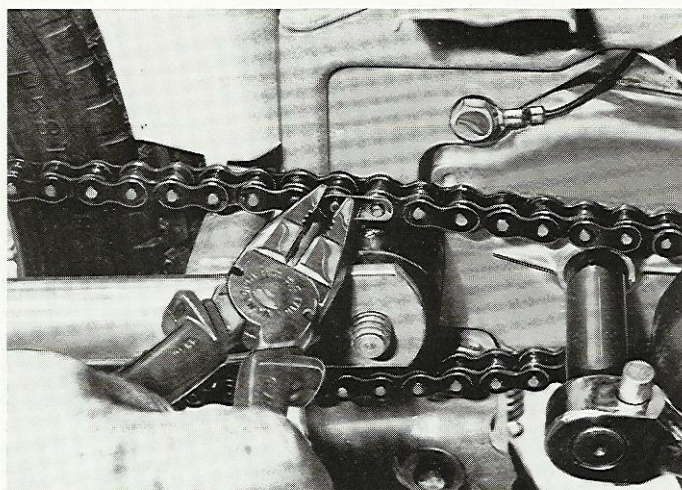


# ENGINE REMOVAL

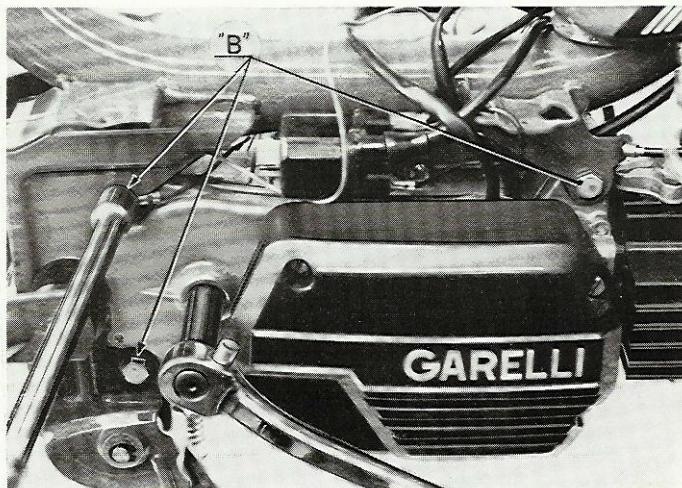
- Disconnect the wires from the terminal block, as well as the spark plug and the engine cut-off wires.



- Break the chain by removing master link

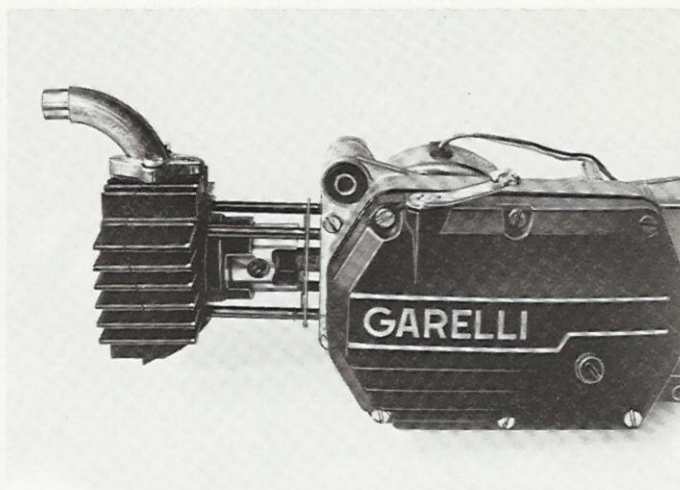


- Remove the engine by loosening the 3 «B» mounting bolts, using a 13 mm (.551") socket.



# 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.

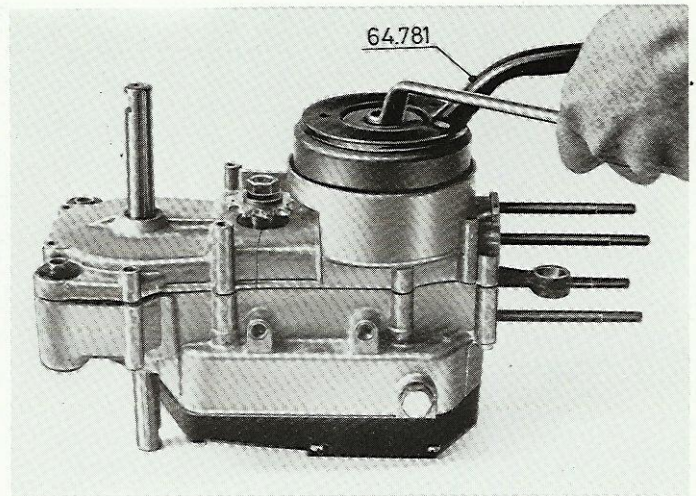


- Remove the piston gudgeon pin using the extractor 64759 and a mallet, being careful to support the piston on the opposite side.

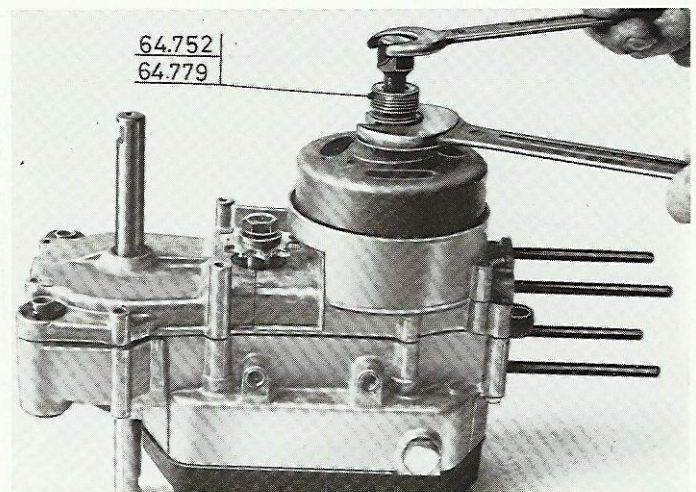


# ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

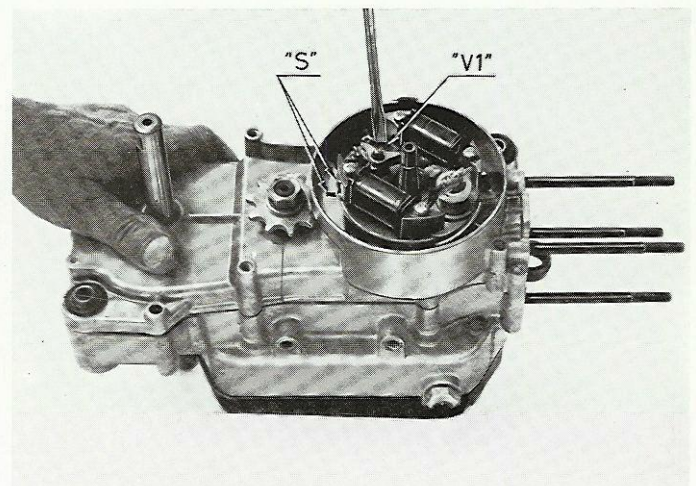
- Using the tool 64781 to hold the flywheel, unscrew the flywheel retaining nut with a 12 mm (.472") socket. Remove the spring washer.



- 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.

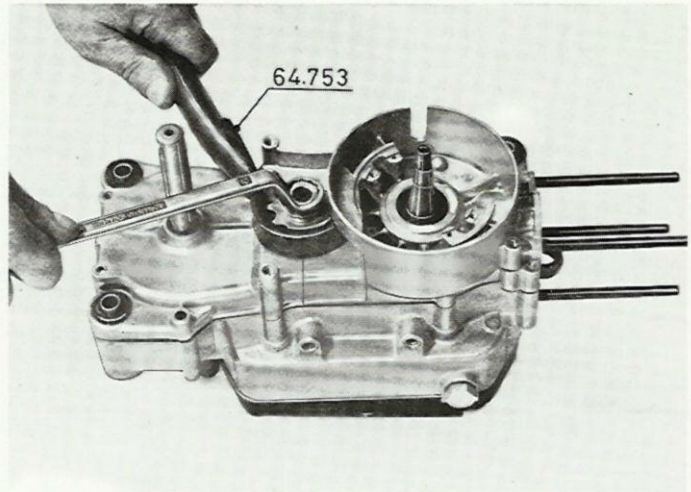


- **CAUTION**  
Make a scribe mark «S» across the bottom of the stator plate and the crankcase in order to facilitate re-timing on assembly. Remove the screws «V1» holding the stator plate to the crankcase. Remove the Woodruff key from the crankshaft.

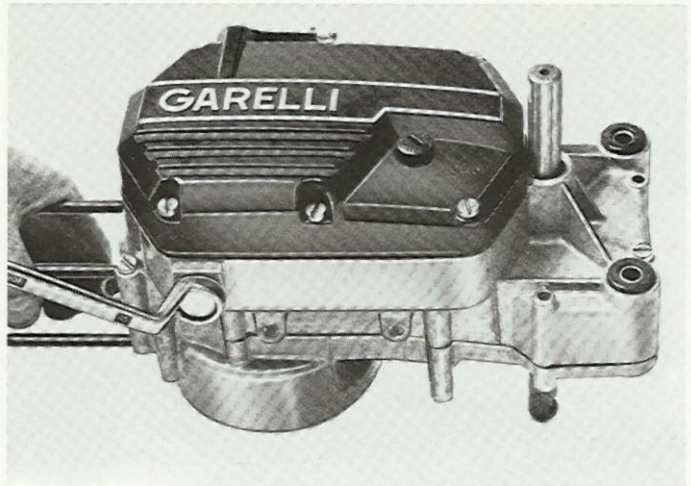


# ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

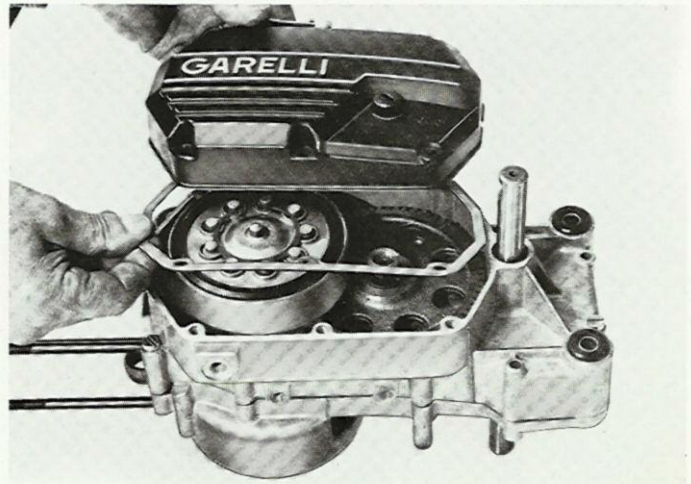
- Using the tool 64753 and a 17 mm (.669") wrench remove the nut and the lock washer, then pull the sprocket from the shaft.



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



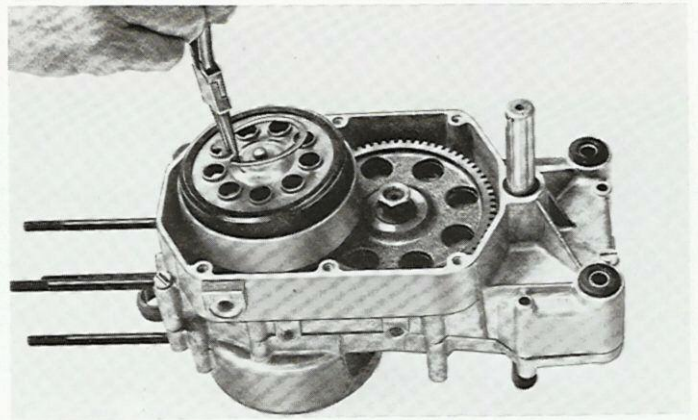
- Remove the left sidecover and its gasket by taking out the six screws that hold it to the crankcase. On the kickstarter models only: remove the starting assy. from the left hand cover taking off the 3 screws fixing the plate, then remove the various parts.



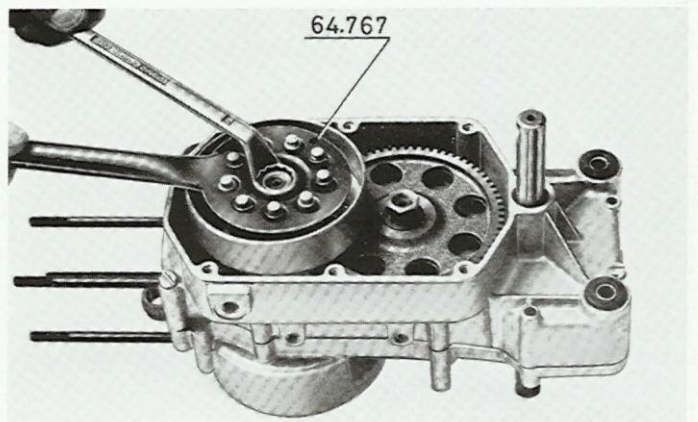


# CLUTCH DISMANTLING - SINGLE SPEED

- On the pedals models only:  
Using the needlenose pliers remove the circlip and the spring from the clutch assembly.

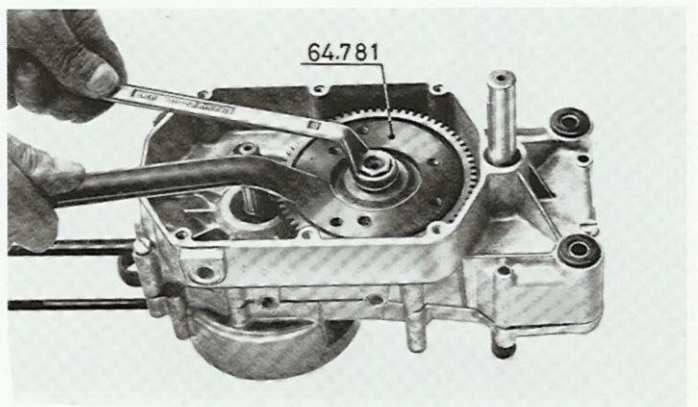


- On the pedals models: Using the tool 64767 and 17 mm (.669") socket remove the nut locking the clutch hub. Then slide the clutch hub and housing from the crankshaft.

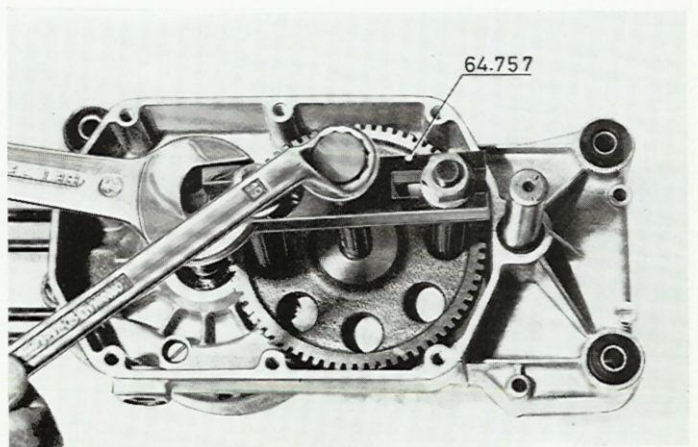


- On the kickstarter models: follow the same procedure using the tools 64782 and 64783.

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

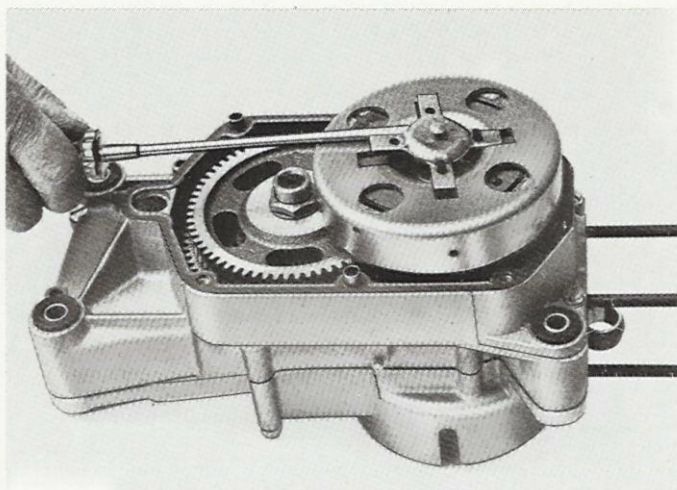


- Use extractor tool 64757 and a 19 mm (.748") wrench to remove the gear.

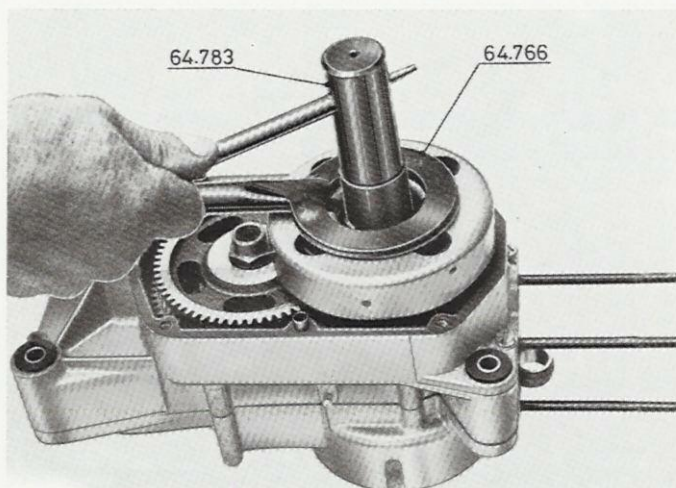


# CLUTCH DISMANTLING - 2 SPEED AUTOMATIC

- On the pedals models only: remove with a screwdriver the pressure plate from the 4 rubbers.

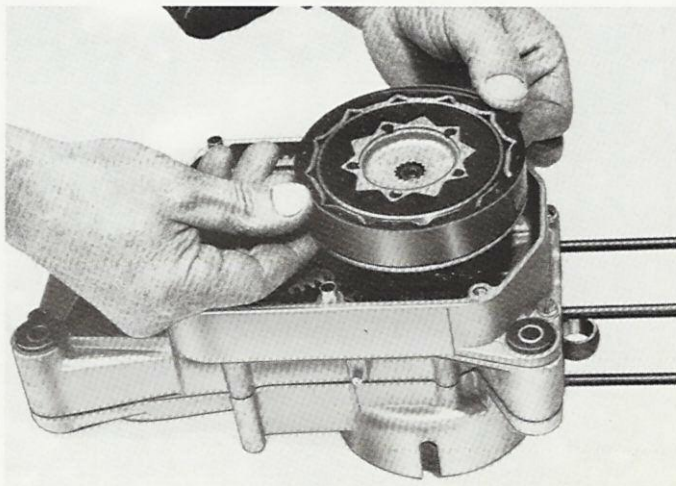


- On the kickstarter models: holding the clutch body with tool 64766, use the tool 64783 to unscrew the nut, then remove the washer.



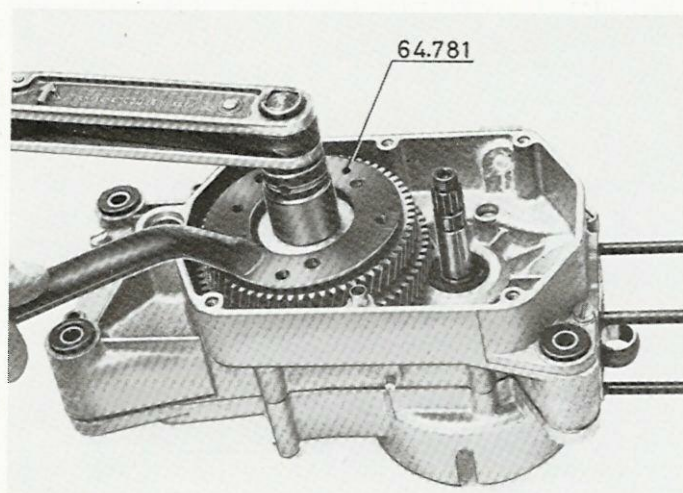
- On the pedals models: follow the same procedure using a 17 mm (.669") socket.

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

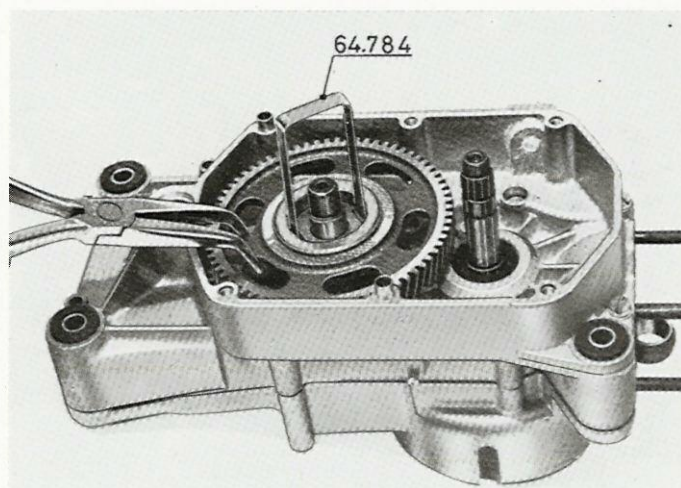


# CLUTCH DISMANTLING - 2 SPEED AUTOMATIC

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

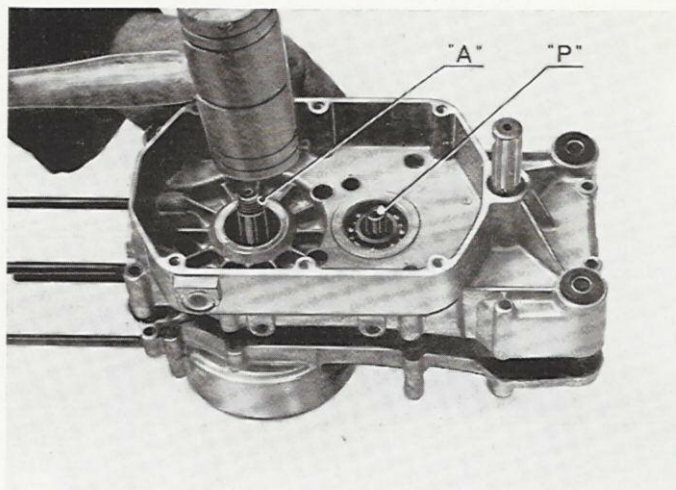


- Remove the 2nd speed gear and then the 1st', while holding the catches with the tool 64784. Then slide the clutch hub and washers.

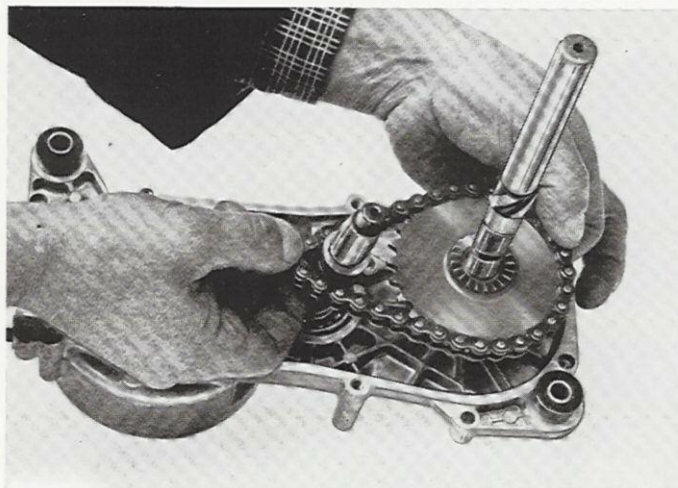


# ENGINE DISASSEMBLY - COMMON OPERATIONS TO ALL MODELS

- Remove the 10 crankcase screws from the right hand crankcase. Strike the ends of the crankshaft «A» and of the primary shaft «P» alternatively with a mallet until the two halves of the crankcase separate.



- On the pedals models: remove the crankshaft, the primary shaft and the pedals shaft together.
- On the kickstarter models: remove the crankshaft and then simply take off the primary shaft.

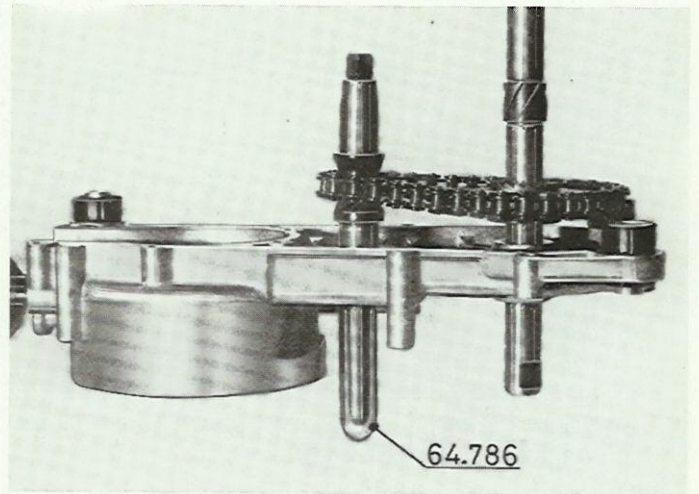


# ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

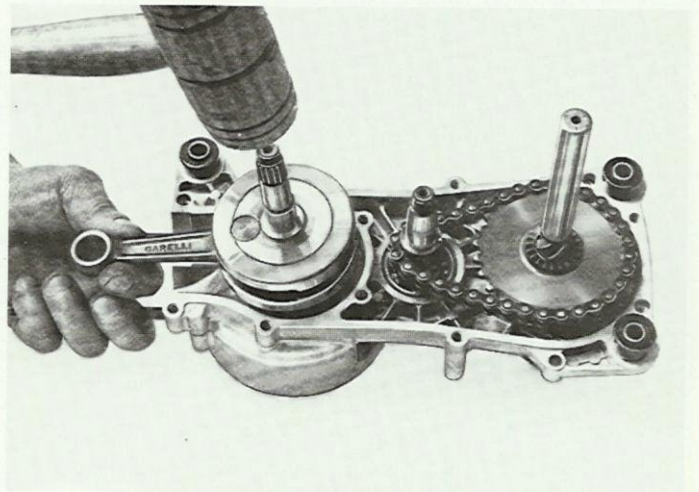
Before starting to assemble the unit, carefully clean and slightly oil all the parts.

— On the pedals models: Using the tool 64785 insert in the right hand crankcase the primary shaft along with the pedals shaft with the chain, the starting spring and the starting assembly.

— On the kickstarter models: simply slide the primary shaft in place.



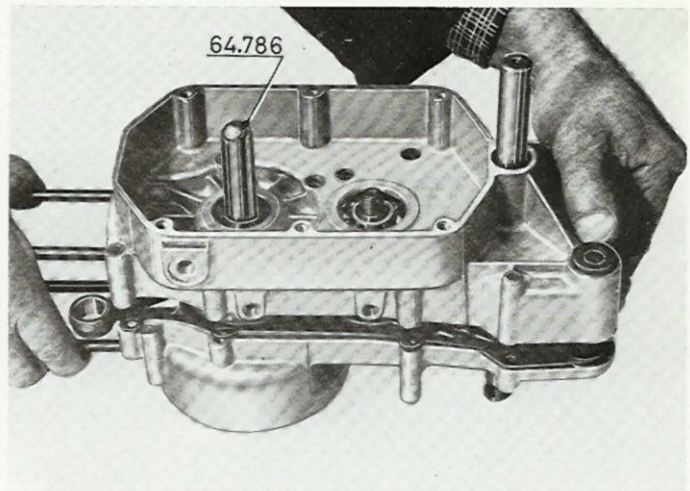
— Insert the crankshaft into the crankcase, lightly tapping it with a mallet.



# ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

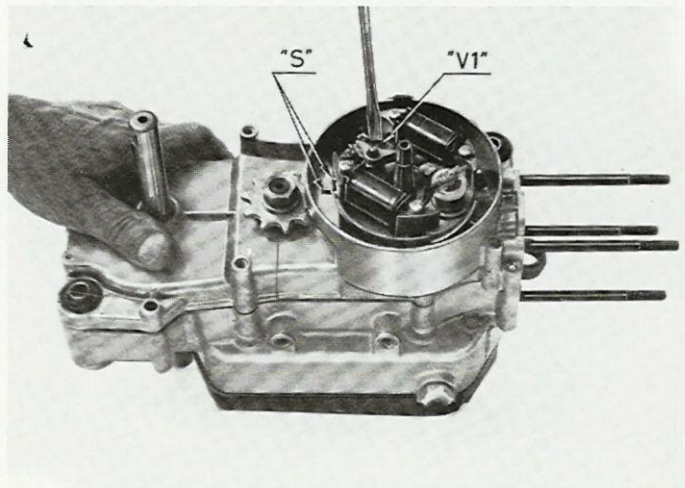
— Join the left crankcase with the right one acting as follows:

- 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, and the pedal shaft turn freely.

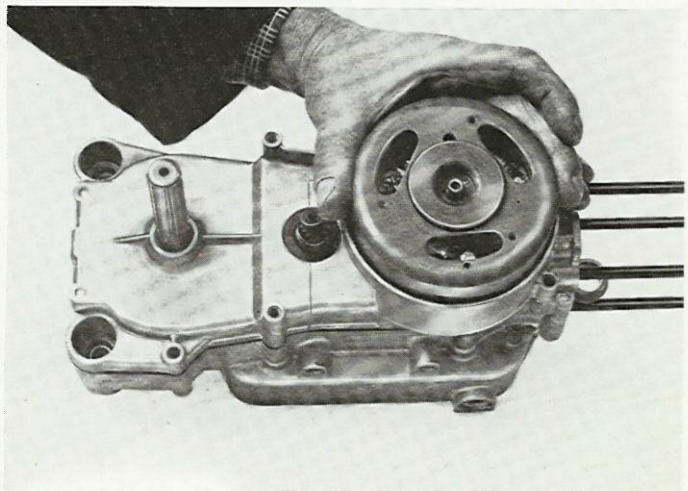


— Caution

Fit the plate so that the scriber mark «S» previously made is in line, tighten the mouting screws «V1».

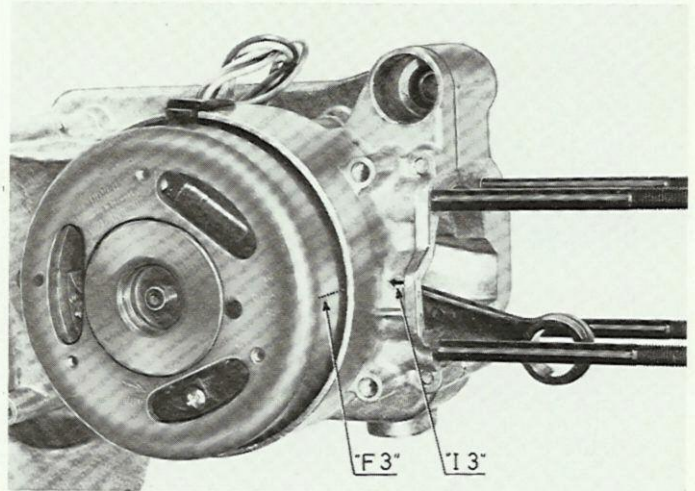


— Fit the woodruff key in position on the crankshaft, slip the flywheel and rotate it until it is felt that the key is correctly seated.

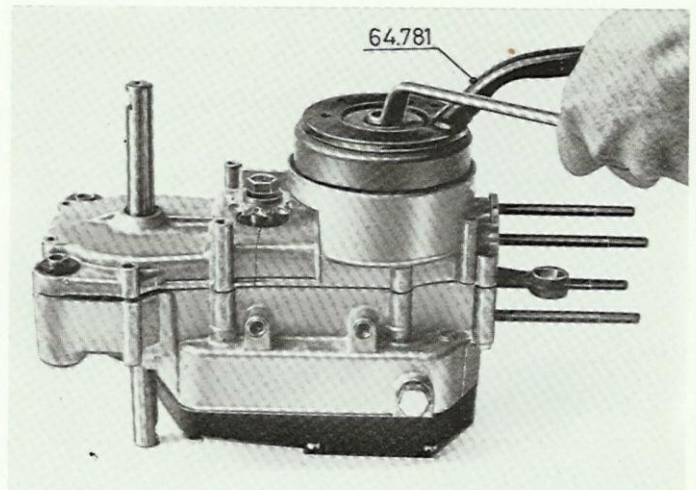


# ENGINE REASSEMBLY - SINGLE SPEED, 2 SPEED AUTOMATIC

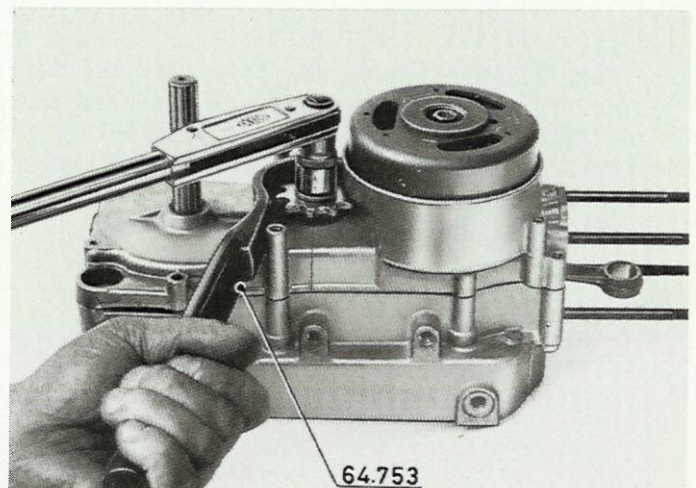
- Rotate the flywheel by hand in the counter clockwise direction until the points gap is in the widest position. At this instant check the gap with a feeler gauge, resetting if necessary to  $0,35 \div 0,45$  mm. ( $.014'' \div .018''$ ). Check the timing, which is correctly set when the points begin to open at  $18^\circ$  B.T.D.C. To check the timing rotate the flywheel in the counter-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 12 mm (.472'') socket previously used when dismantling.



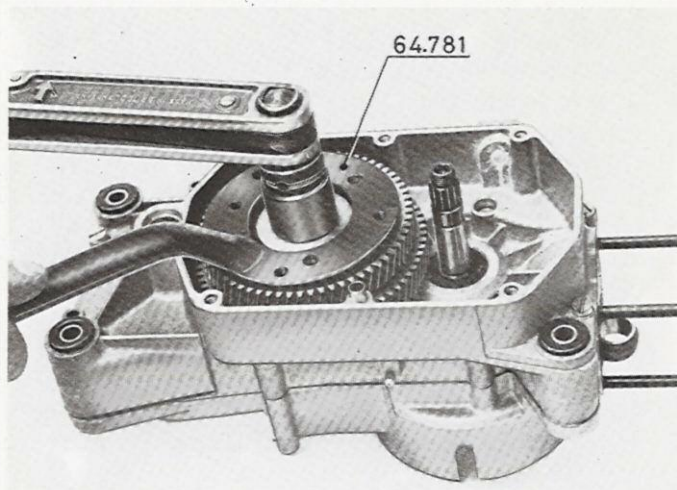
- Fit the chain gear and the two shim washers on the primary shaft, using the tool 64753 and a torque wrench tighten the nut to  $6 \div 6,5$  Kpm. (in.lb.  $0,336 \div 0,364$ ).



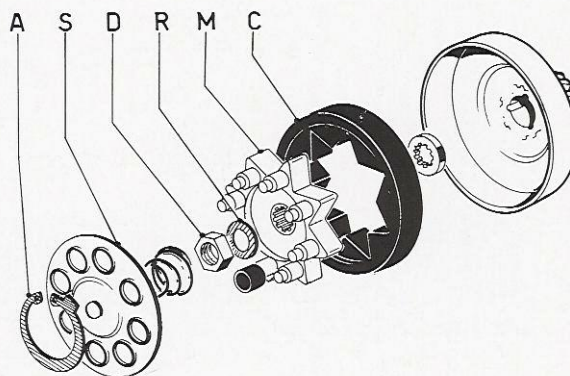
# REASSEMBLY OF DRIVEN GEAR AND CLUTCH

## SINGLE SPEED, PEDALS

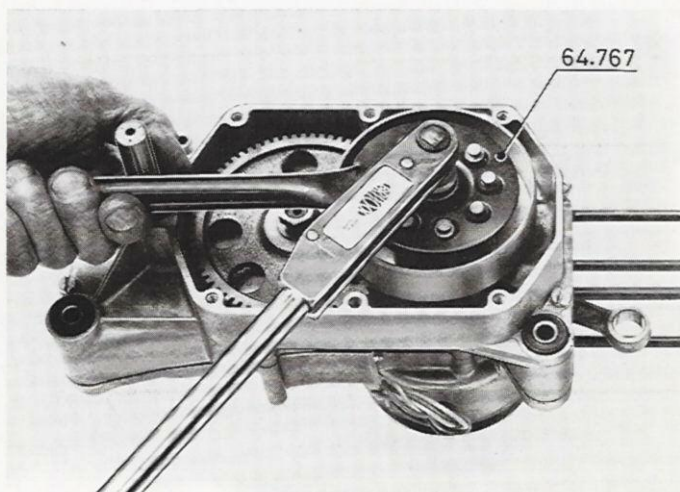
- Turn the engine the opposite side, place on the primary shaft the gear, the washer and the nut and, using the tool 64781, tighten it to  $4 \div 4,5$  kpm (in.lb.  $0,224 \div 0,252$ ) with the torque wrench.



- 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 «D» and the washer «R» fixing the clutch hub «M» to the crankshaft.

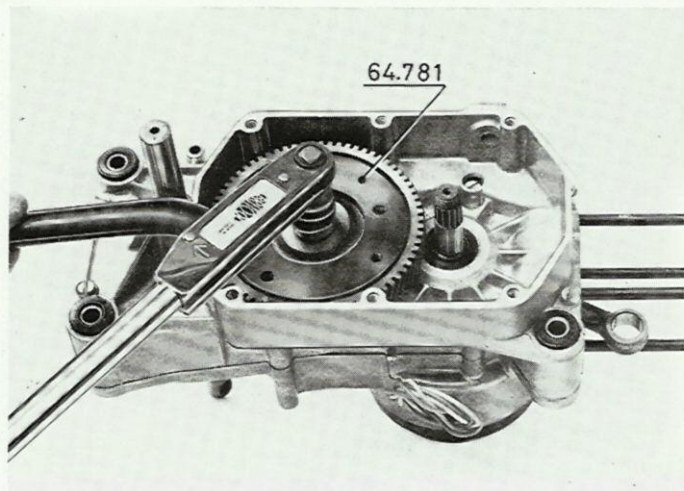




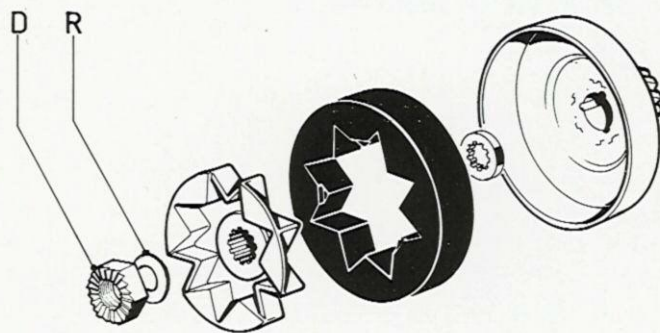
# REASSEMBLY OF DRIVEN GEAR AND CLUTCH

## SINGLE SPEED, KICKSTARTER

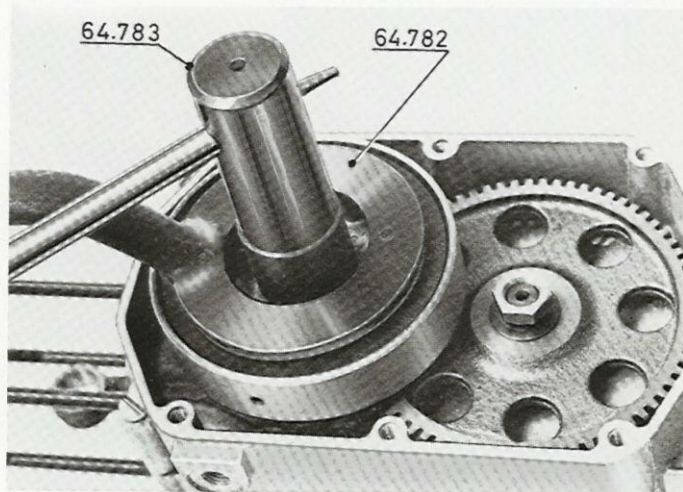
- Turn the engine the opposite side, place on the primary shaft the gear, the washer and the nut and, using the tool 64781, tighten it to  $4 \div 4,5$  Kpm (in. lb.  $0,224 \div 0,252$ ) with the torque wrench.



- Fit the clutch assembly and hub following the illustration.

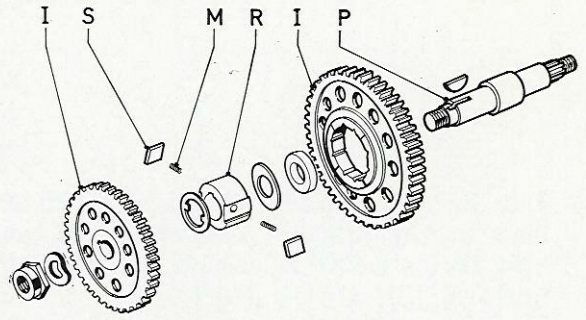


- With the tool 64782 hold the clutch hub and tighten with the tool 64783 the nut «D» and washer «R» fixing it to the crankshaft.

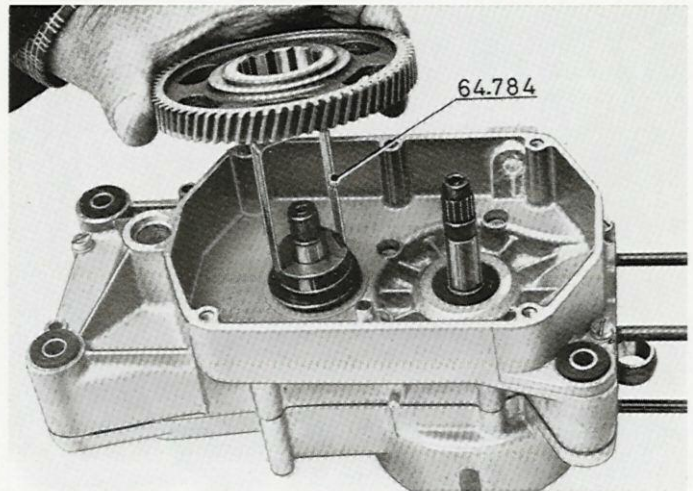


# REASSEMBLY OF DRIVEN GEARS FREEWHEEL AND CLUTCH

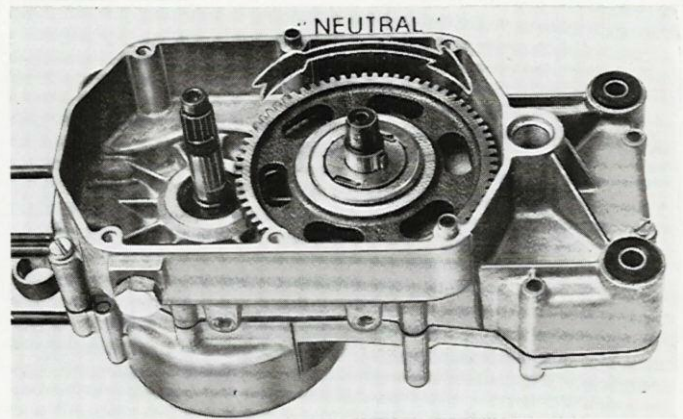
## 2 SPEED AUTOMATIC



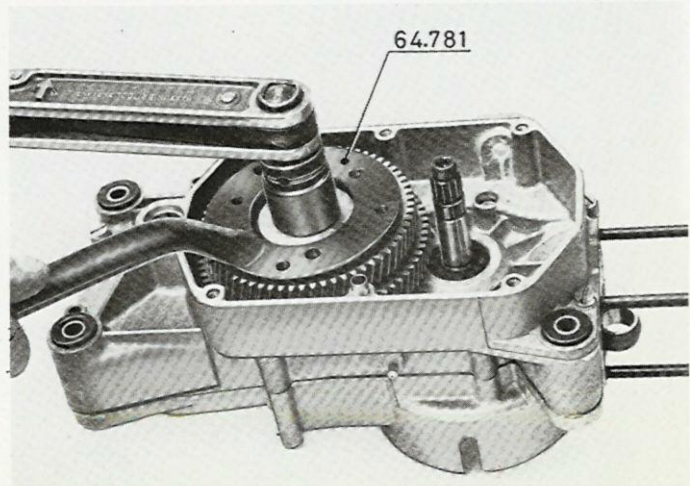
- Place gears «I» and freewheel «R» on the primary shaft «P» as per illustration. Use the tool 64784 to hold in place the springs «M» and catches «S» when sliding the 1st speed gear on.



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



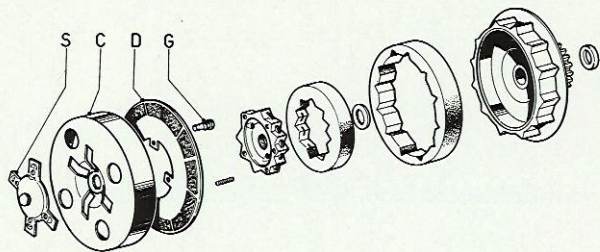
- With the tool 64781 and torque wrench tighten to  $8 \div 8,5$  kpm (in.lb.  $0,448 \div 0,476$ ) the nut fixing the gears on the primary shaft.



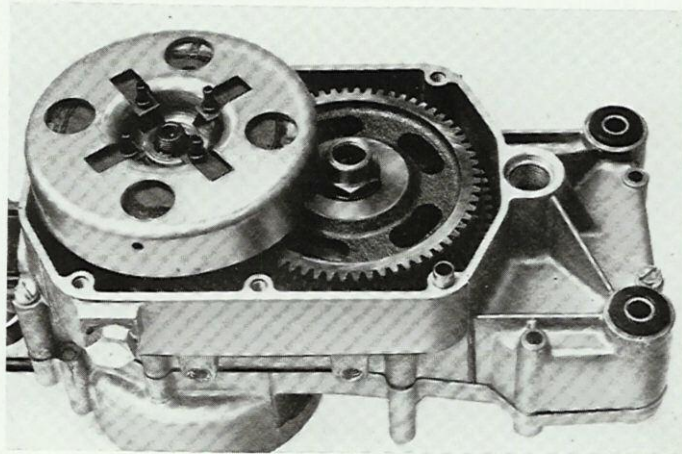
# REASSEMBLY OF DRIVEN GEARS FREEWHEEL AND CLUTCH

2 SPEED AUTOMATIC, PEDALS

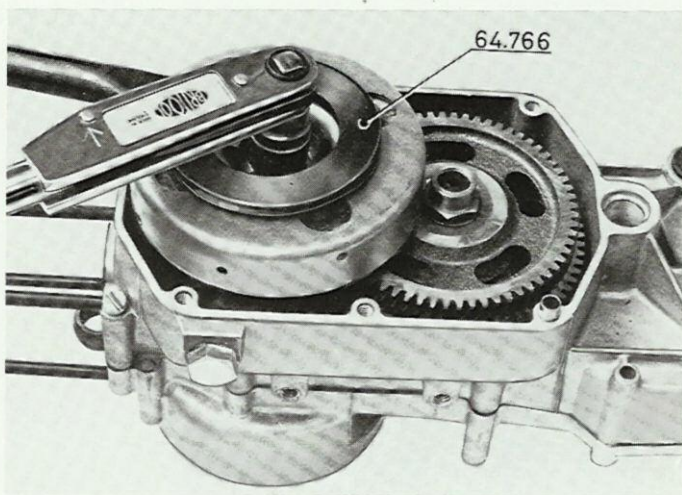
- Reassemble the clutch assembly as illustrated.



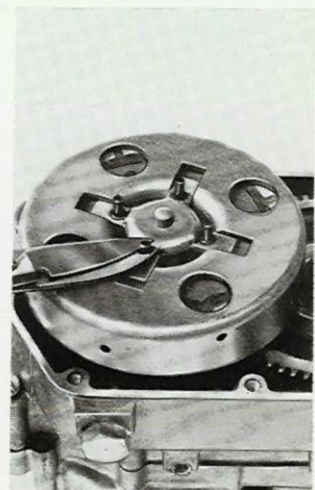
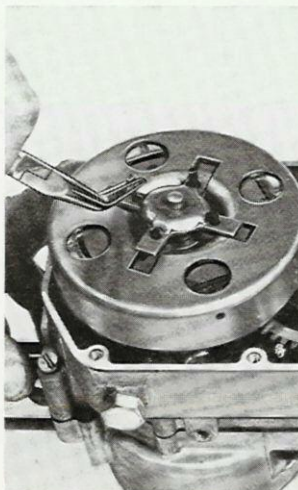
- When at the disc «D», place the 4 rubbers «G» in the corresponding holes. The rubbers ends should face towards the outer side of the engine and the thicker lined face of the disc towards the inner side of engine.



- 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 torque wrench.



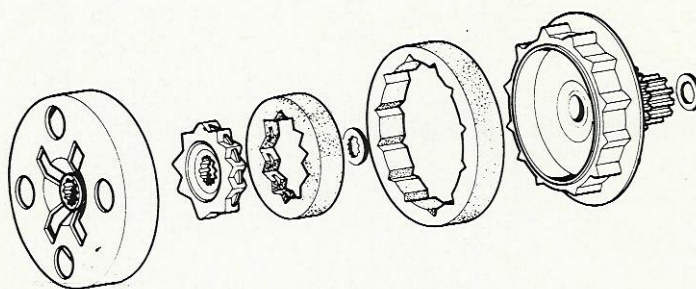
- Slide the cross shaped plate «S» with the pliers on the 4 rubbers «G» as illustrated, then cut the 4 rubbers ends.



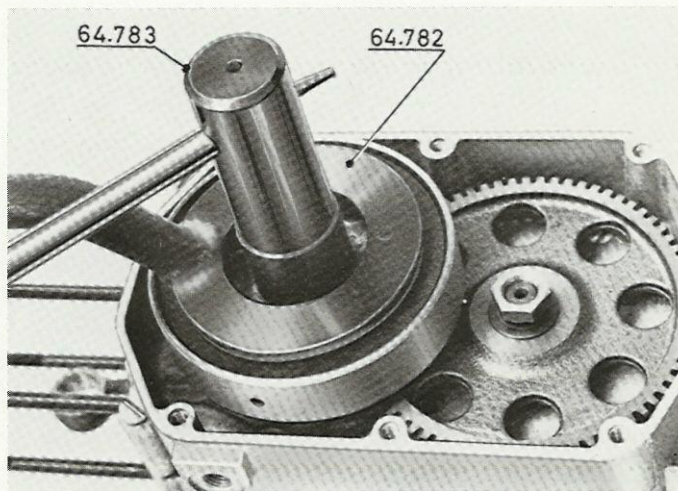
# REASSEMBLY OF DRIVEN GEARS FREEWHEEL AND CLUTCH

## 2 SPEED AUTOMATIC, KICKSTARTER

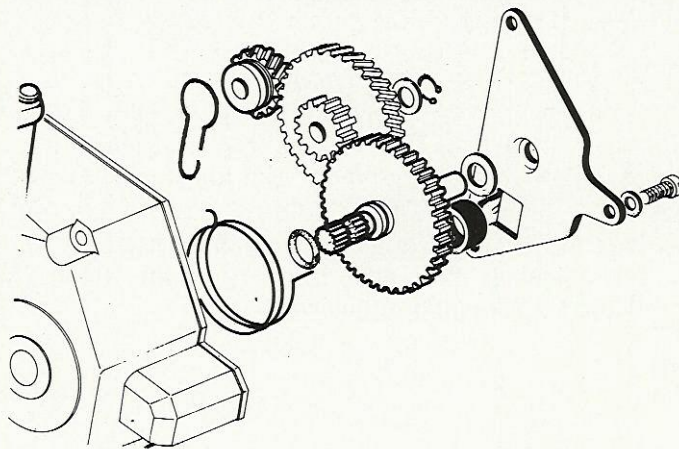
- Reassemble the clutch assy. as illustrated.



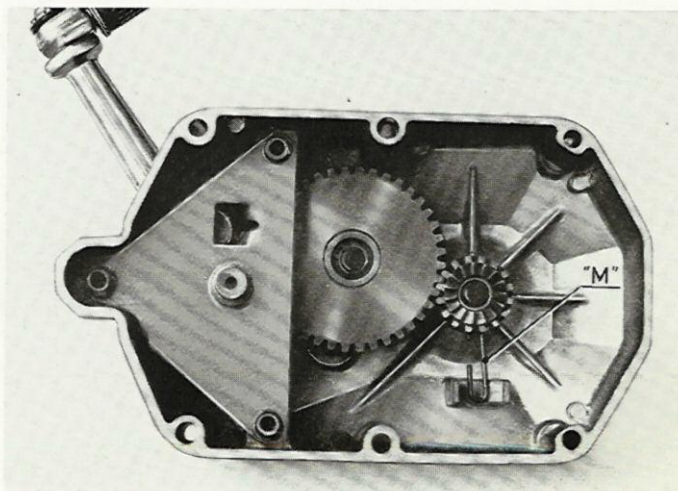
- Hold the 2nd speed housing with the tool 64766 and tighten the nut with the tool 64783.



- Assemble the starting assy. as illustrated. (This operation also applies to the single speed kickstarter models).



- When refitting the starting assy., make sure that the return spring «M» is correctly in place as illustrated. (this operation also applies to the single speed kickstarter models).



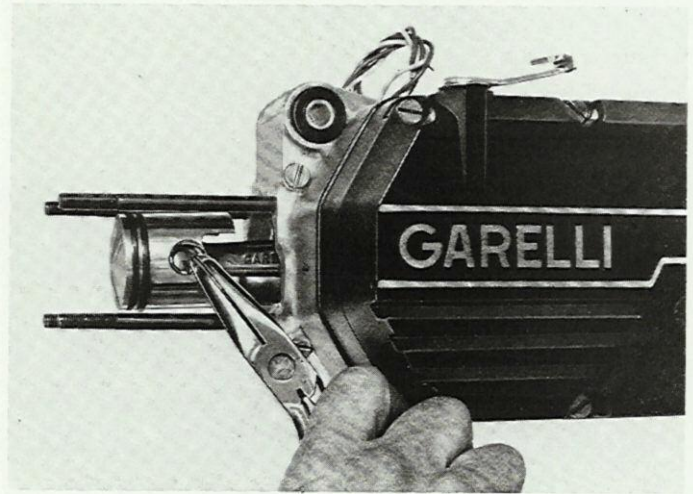
# REASSEMBLY OF PISTON, CYLINDER AND CYLINDER HEAD

## SINGLE SPEED, 2 SPEED AUTOMATIC

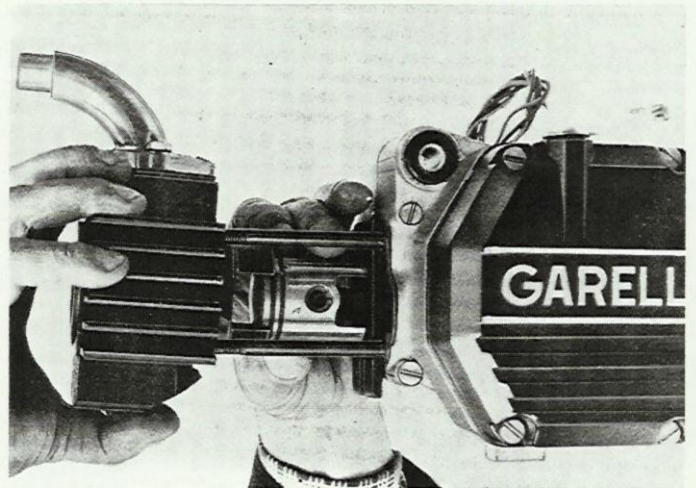
Once the mentioned operations are accomplished, before fitting the cover make sure the two rubber bodies turn free on the hubs.

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 left hand crankcase fits the oil plug and washer. Place the cover on the crankcase and tighten the 6 joining screws.

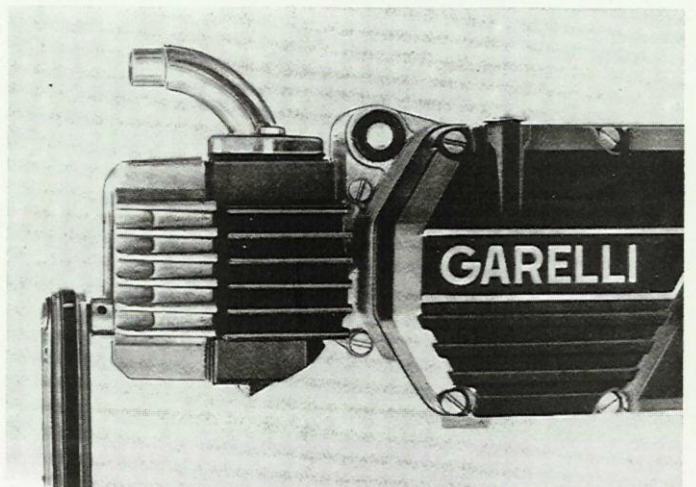
- Refit piston with needlebearing, gudgeon pin and circlips as illustrated and make certain that the circlips are properly inserted in their grooves. Make sure that the «S» on the piston is towards the exhaust port.



- 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 gasket and 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.



No special instructions are needed to mount the complete engines on the frames, but follow the inverse procedure as shown at pages 4-5.

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# DISMANTLING AND REASSEMBLY INSTRUCTIONS HORIZONTAL CYLINDER ENGINES

1979 ISSUE

