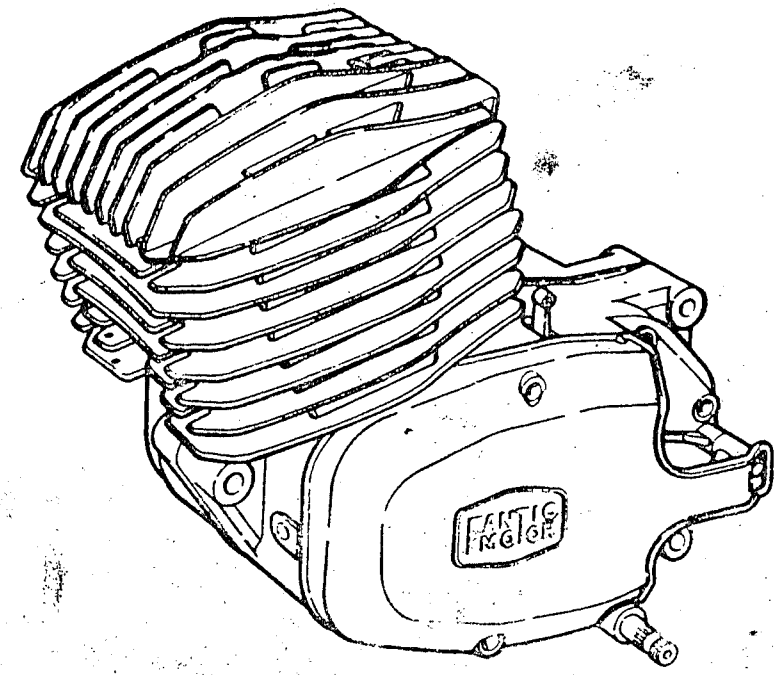
FANTIC MOTOR

200

REPAIR MANUAL ENGINE



OPERATING INSTRUCTIONS

Initial Starting

Check oil level by removing screw 1 on right side of engine (see fig. 1 below). Replace oil filler plug used for shipping.

Best engine performance is obtained by an oil mix ratio of 5% (20 : 1) per gallon CASTROL SUPER T.T.

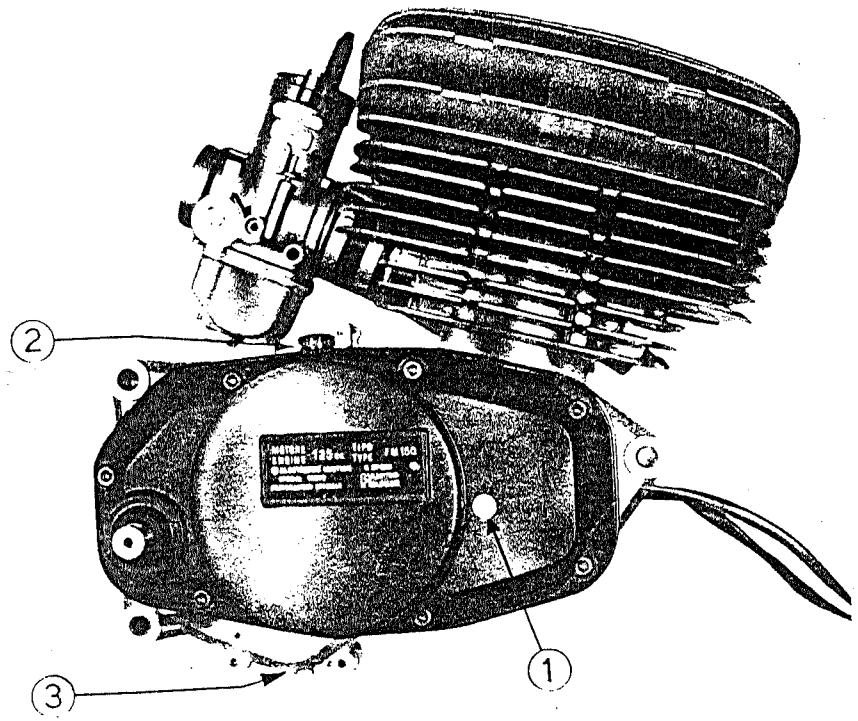


Fig. 1 Oil level - 2 Oil filler - 3 Oil drain

Gearbox and clutch are running in an oil capacity of 3 pints (Kg. 1,5) of MOTOR OIL SAE 30.
Gearbox is filled through plug 2 fig. 1. Draining plug 3 is located bottom right side of engine case. Gearbox oil should be changed at first 310 miles (500 km.) and at every 2650 miles (4000 km.) thereafter.
Check oil level at 600 miles (1000 Km.) by removing oil level plug 1. If necessary, add oil until oil runs out of hole. Then replace filler level screw 1. Oil changes should be done with warm engine.

Starting Procedure

Open fuel cock at bottom right side of gasoline tank. if engine is cold use manual choke by operating lever on right side of handlebars. After starting, adjust choke level until engine runs smoothly. Do not use choke on warm engine, as this reduces performance.

Difficult Starting

If engine fails to start after several attempts, check the following points:

1. Fuel supply and is fuel flowing to carburettor?
   a) Empty tank
   b) Gas taps closed
   c) Gas tap filters clogged
   d) Fuel line air bound (remove fuel line from carburettor, turn on fuelcock, replace fuel line when air is gone)
   e) Cap vent is clogged (if engine runs properly when tank cap is removed, and fails when cap is in place)
   f) Carburettor is clogged with dirt. Check fuel filter in carburettor and filter at fuel inlet.
2. Spark fails
   a) Check spark plug for fouling and proper gap .040" (0,6 ÷ 0,7 mm.)
   b) Is spark plug sparking? Remove spark plug. Plug spark plug into cap. Hold bottom side of plug against cylinder. Crank engine by hand with kickstart lever.
   c) Check three ignition vites at red transformer units for tightness and proper connection.

RUNNING IN

If you wish to have a good preforming motorcycle with long life, observe the following points during the first 310 miles (500 Kms).

1) Do not over rev engine in any gear. Cange down at proper speed.
2) Avoid long, steep hills and do not hesitate changing down when engine pulls hard on hills. When going downhill do not keep throttle closed. Remember, engine is lubricated as the gasoline burns in the engine. Occasionally open and close throttle when going down long hills. Engine does get lubicated when throttle is closed.
3) Use gasoline mixture 20 : 1 (5%). (Refer to lubrication section).
4) Change gear box oil as recommended. (MOTOR OIL SAE 30).

HOW TO STOP ENGINE

Select neutral gear when coasting to a stop. Close throttle, press engine cut out button, shut off fuel.

GENERAL MAINTENANCE

MOTOR

When engine tends to decrease in power, generally the reason is burned carbon crust deposits in cylinder exhaust port and in exhaust system, or possibly on cylinder surface. Engine and exhaust system should be decarbonated at 5.000 mile intervals. This entails removing complete exhaust system baffle from exhaust, cylinder head and cylinder. Carefully scrape carbon deposits from piston crown, exhaust port, and exhaust system. When reassembling, install new gaskets. Cylinder head nuts should be tightened with a torque wrench.

CLUTCH ADJUSTMENT

Clutch needs proper play to ensure non-slipping and to ensure that proper disengagement is obtained. Check that hand clutch lever has approximately 10 ÷ 20 mm. free play. If free play cannot be obtained at hand lever, remove outer cover on left side of engine. Now see Fig. 2. Hold slotted screw with screw driver. Loosen lock nut.
Adjust screw to get proper play in cable. Hold screw, lock nut, replace cover.

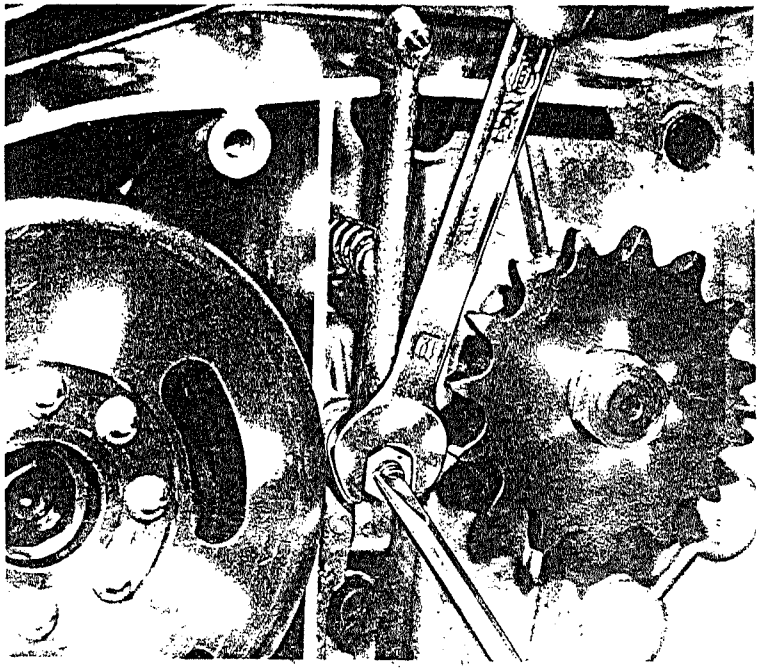
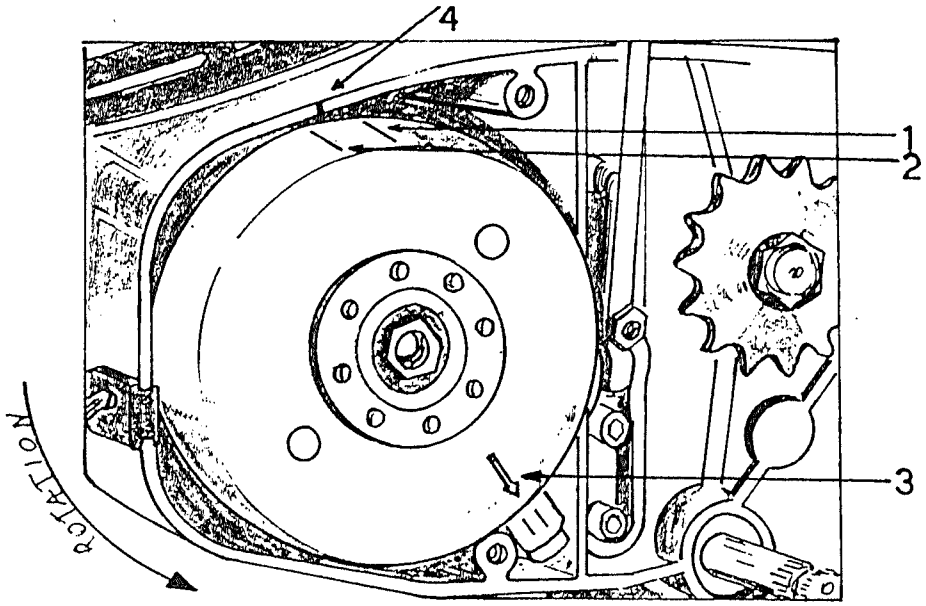


Fig. 2 - Clutch adjustment

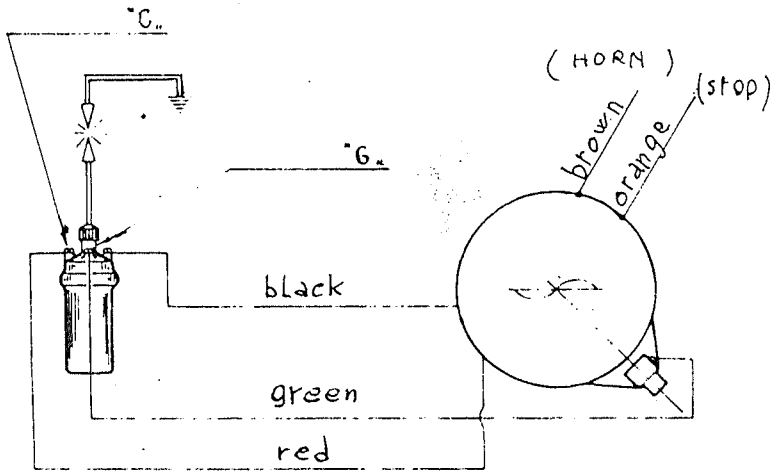
IGNITION TIMING CHECK

Leave the flywheel magneto fixed part so that, when the index 2 on the flywheel is aligned with the index 4 on the crankcase, also the arrow 3 on the flywheel should be between the pick up lines.



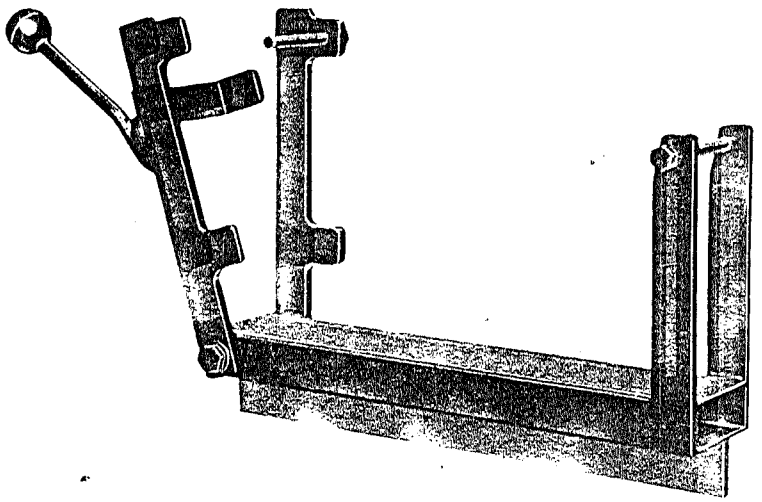
LIGHTING INSTALLATION

Check that the electric cables from the flywheel magneto, are correctly connected. See fig. 2.



Note:

Fig. 5 engine stand used when work on engine must be done with engine removed from frame. Stand can be made or purchased: part N° 0005.176.00. Engine stand can be bolted to table or held in vice.



ENGINE DISMANTLING

Note: All special tools on Fig. 47 page 44 may be ordered by number and description.

After removing engine from frame and placing in engine stand, remove left side cover.

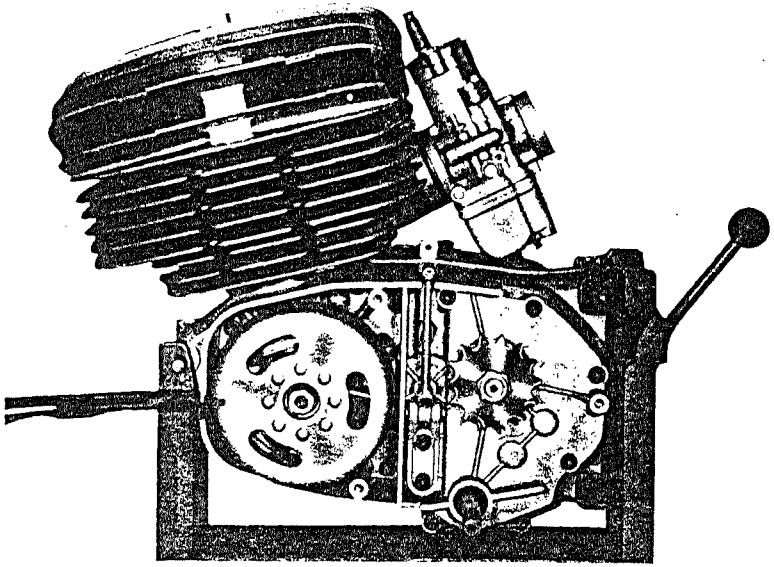


Fig. 6 - First step of disassembly

FLYWHEEL DISASSEMBLY

Using flywheel holder 0005.331.00 remove lock nut with 15 mm. socket.

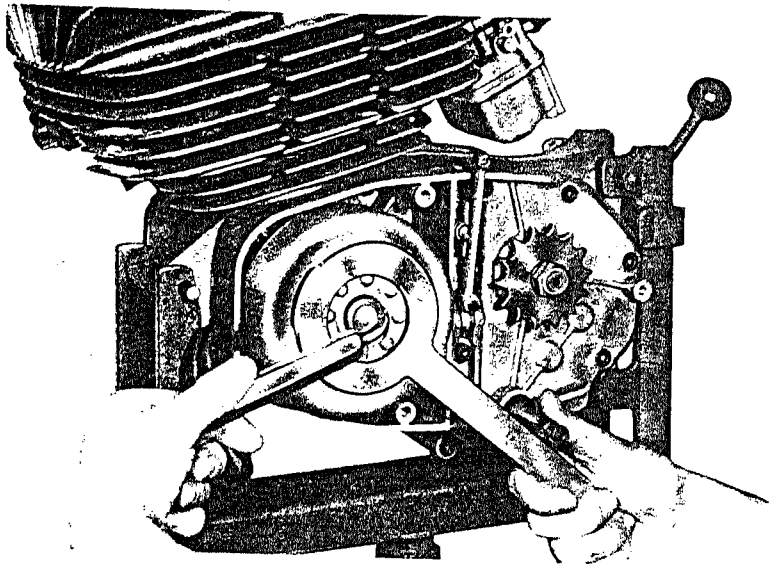


Fig. 7 - Removal of Flywheel lock nut

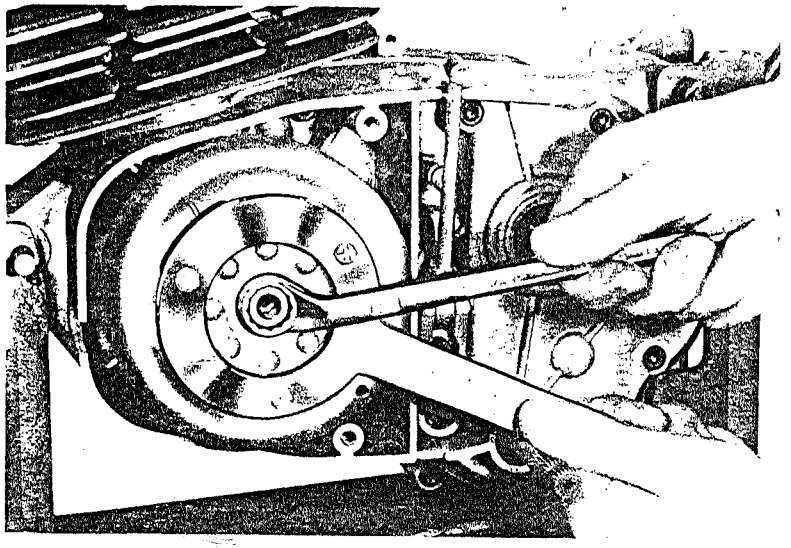


Fig. 8 - Pulling of Flywheel

Using flywheel puller 0005.080.10, screw into center of flywheel while holding flywheel with 0005.331.00. Tighten 17 mm. bolt on puller.
Sometimes a light tap from hammer on end of puller is needed
Remove stator plate that is held to engine case with three screws.

Mark position of stator so position can be found when reassembled

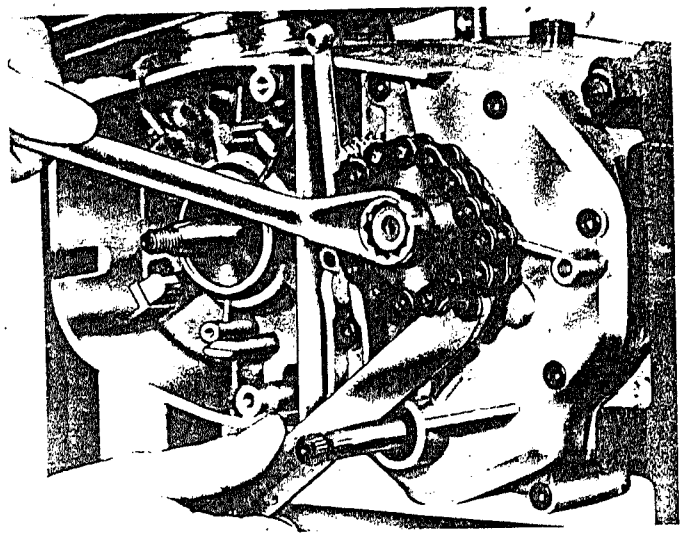


Fig. 10 Removal of drive sprocket

SPROCKET REMOVAL

Hold sprocket with tool 0005.318.00, remove nut with 17 mm. socket. Remove nut and washer. See Fig. 10. Removal of sprocket with special tool 0005.051.00, and 17 mm. socket.

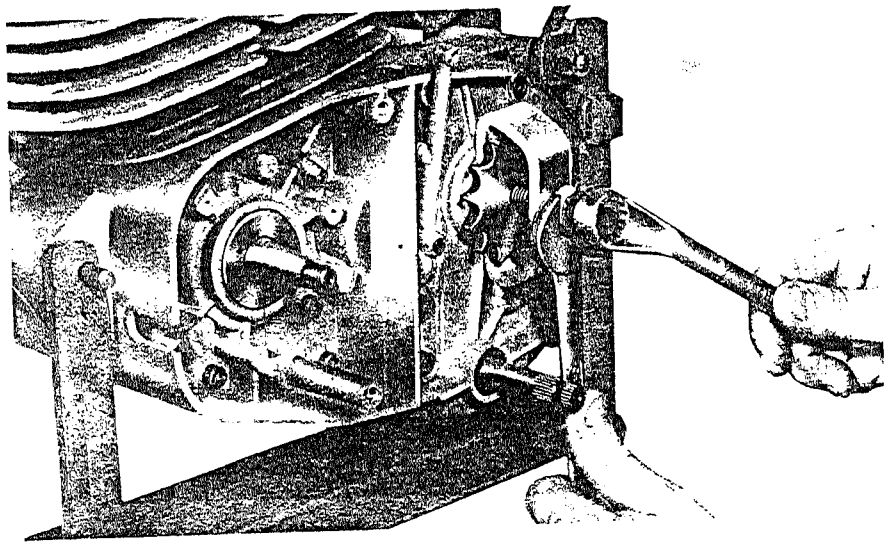


Fig. 11 Sprocket removal

CYLINDER HEAD CYLINDER AND PISTON REMOVAL

Remove four 13 mm. nuts and washers. Lift off cylinder head and gasket. Lift off cylinder. Remove rings from piston and remove pistor pin clips with needle nose pliers. Use tool 0005.075.00 to push out piston pin.

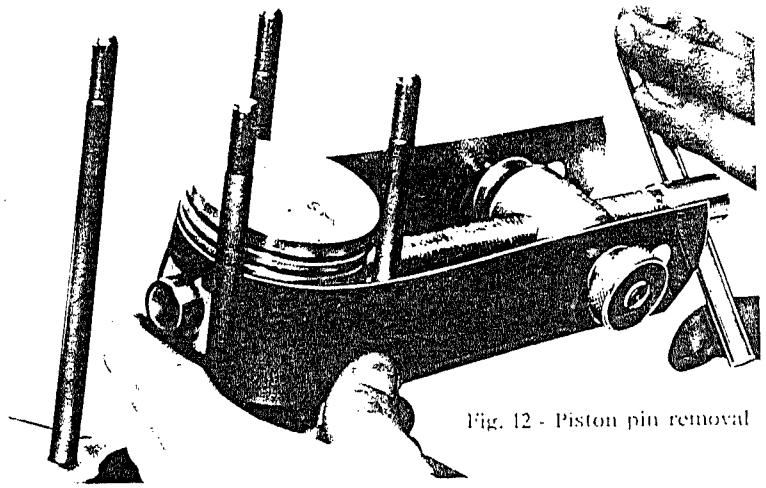
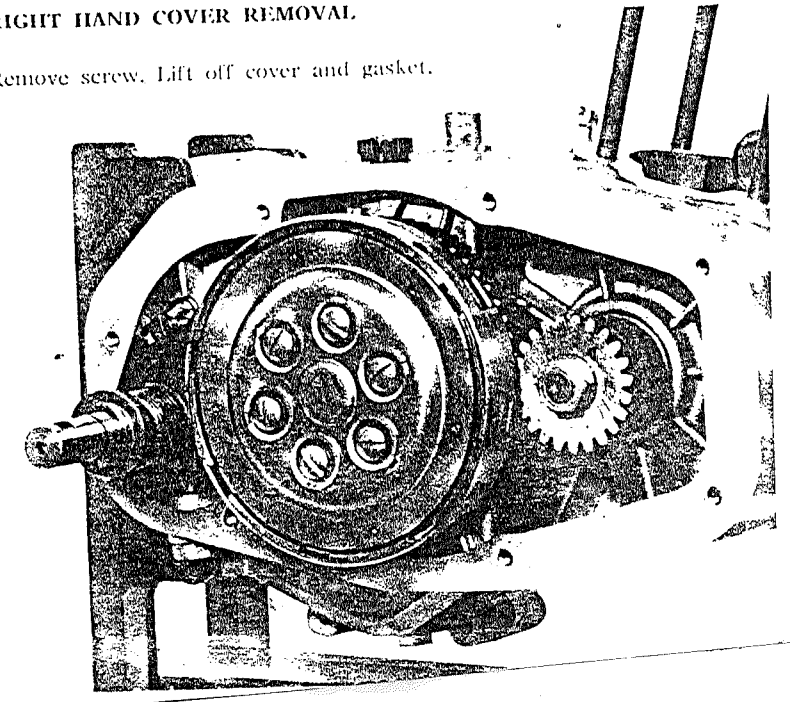


Fig. 12 - Piston pin removal

RIGHT HAND COVER REMOVAL

Remove screw. Lift off cover and gasket.



KICKSTART DISMANTLING

Replace kickstart lever, hold down lever slightly, remove 16 mm. stop bolt from bottom of case.

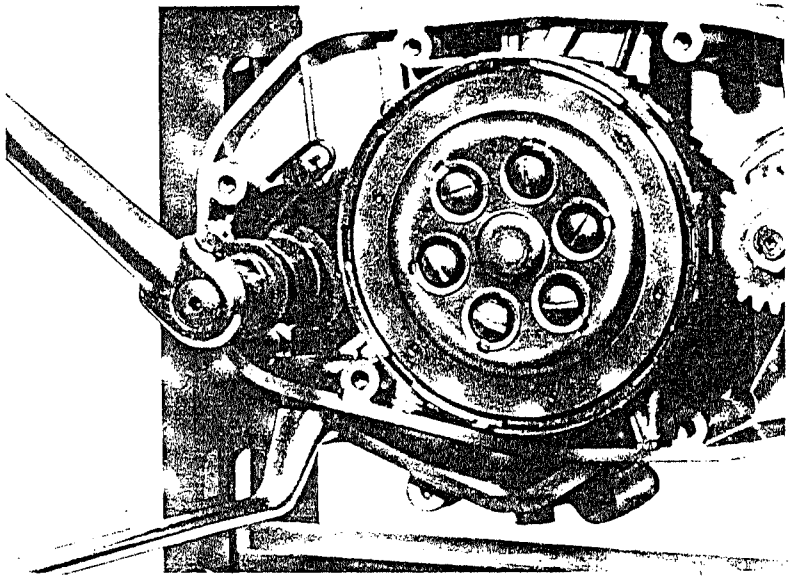


Fig. 14 - Dismantling of kickstarter and stop

Let kick lever return slowly till stopped. Take away kick lever. Remove spring stop screw. Kickstart shaft may now be removed.

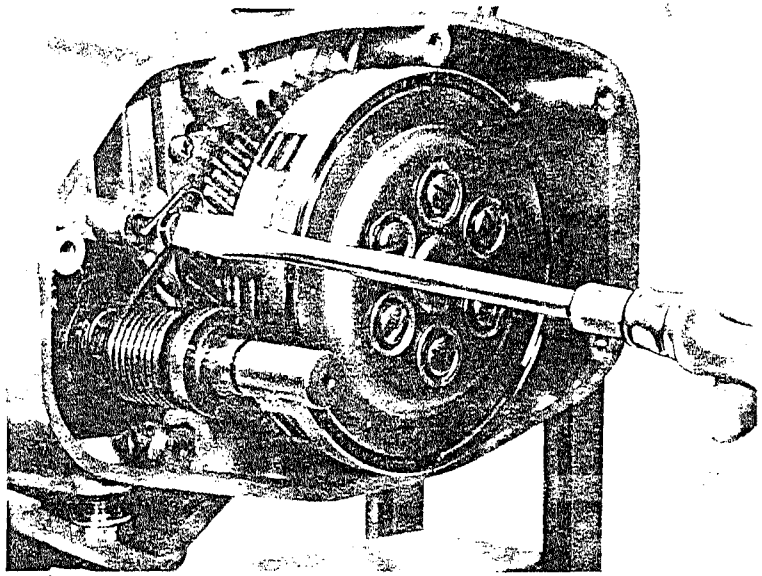


Fig. 15 - [illegible]

CLUTCH DISMANTLING

Remove five screws carefully and springs. Remove complete set of clutch discs. Now use tool 0005.325.00 to hold clutch housing.
Remove lock from front primary sprocket nut with 17 mm. [illegible]

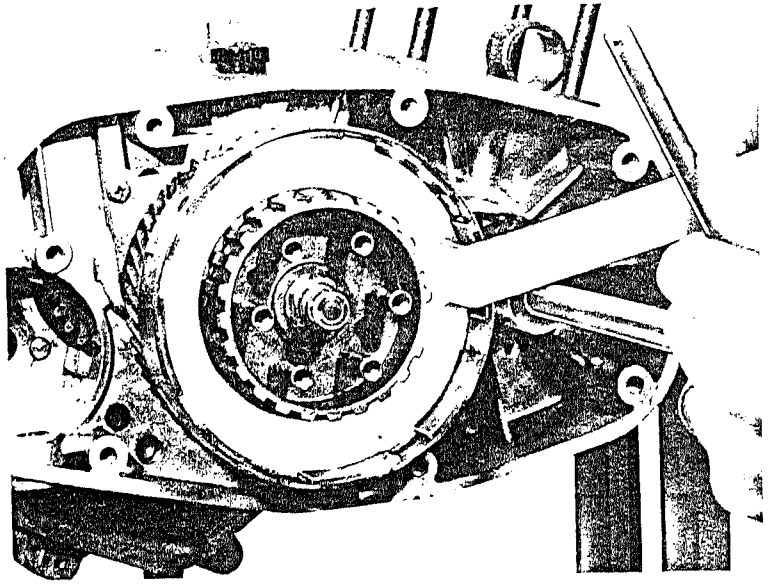


Fig. 16 - Removal of primary sprocket

Removal of clutch housing. While holding housing with 0005.325.00 remove 17 mm. nut.

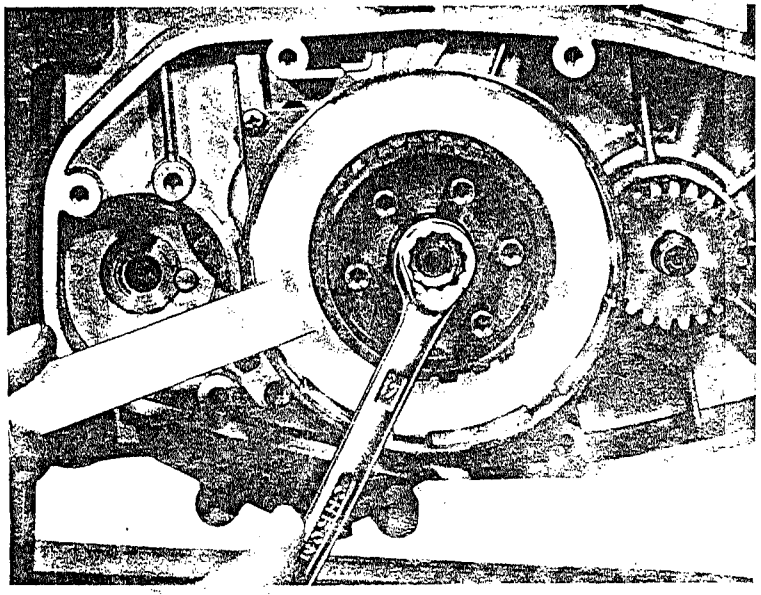


Fig. 17 - [illegible]

Remove clutch hub by holding housing with 0005.325.00. Install 0005.007.00 with two screws. Tighten 17 mm. bolt Fig. 18.
Remove clutch gear from shaft. One shim washer is fitted behind clutch housing.

In pratically all engines you will find shim washer behind front primary sprocket. Washers may have .08, .016, .024, .032, mm. thickness. Be careful to check sizes at each point when removing.

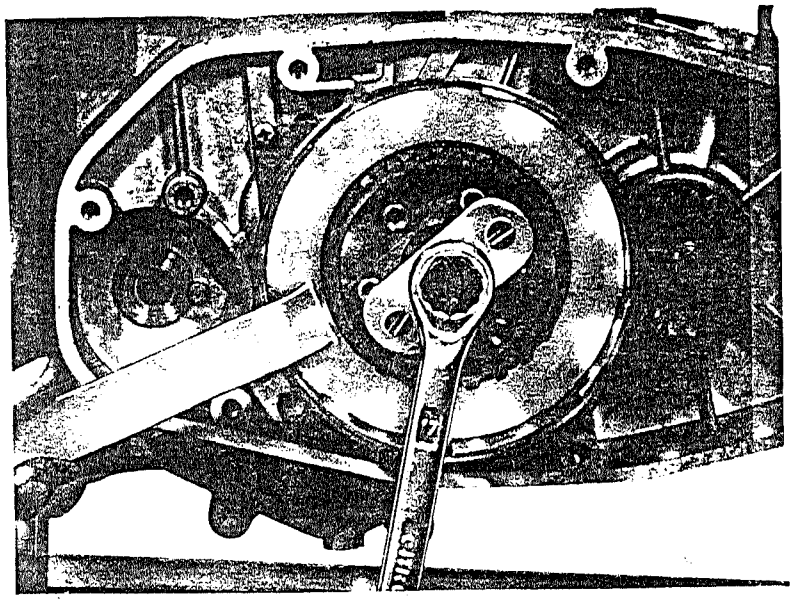


Fig. 18 - Withdrawing of clutch hub

Remove front drive sprocket by using tool 0005.042.00, depending on sprocket size. Tighten 17 mm. bolt while holding tool with 17 mm. wrench as shown.

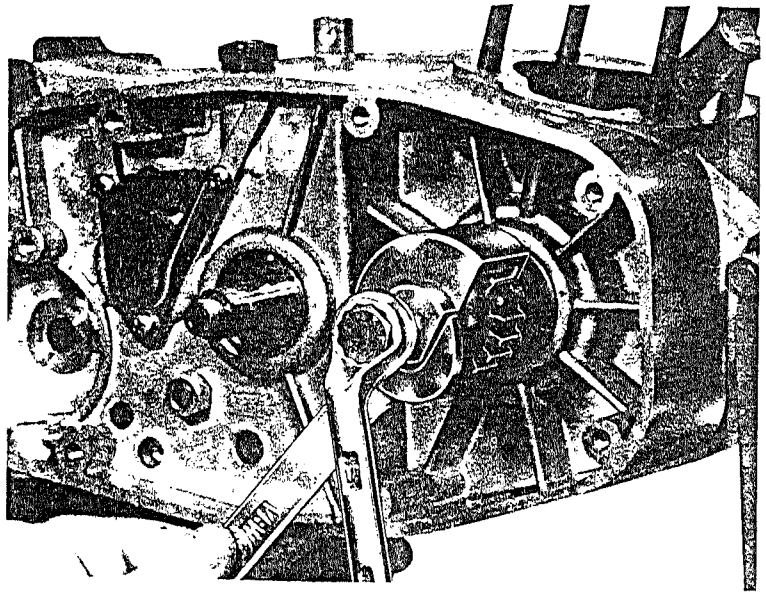


Fig. 19 - Sprocket Removal

SPLITTING CRANKCASES

Loosen screws on left side with hammer driver or alan key as shown is Fig. 20.

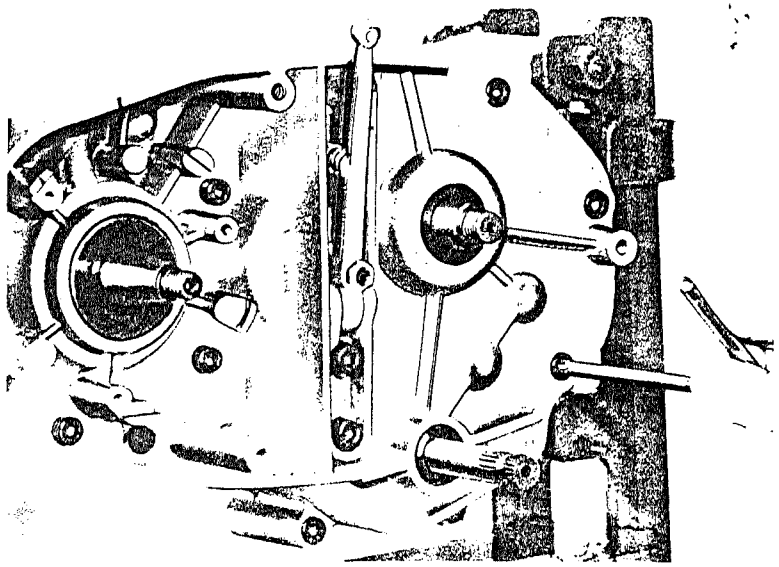


Fig. 20 - Removing crankcase screws

Note: With this operation completed, engine must now be removed from 0005.176.00 stand. Remaining disassembly is done with engine on rectangular stand of 2 x 4 wood frame so that shafts may be removed as in Fig. 21.

Remove three locating dowel pins (Fig. 21) with 12 mm. rod.

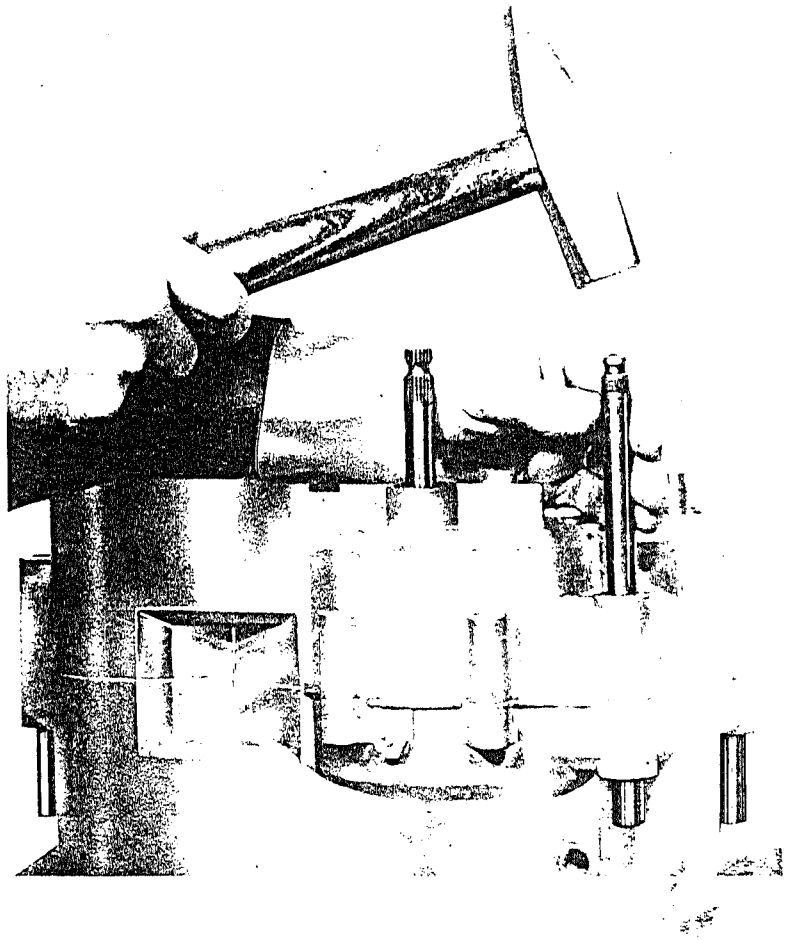


Fig. 21 - Dowel pin removal

Separate case with help of tool 0005.065.00, fixed to left side as shown Fig. 22. Carefully tighten two 19 mm. bolts evenly so that case lifts evenly at both ends, 1/4 turn each bolt until free.
At the same time tap with mallet on gear selector shaft to completely separate case.

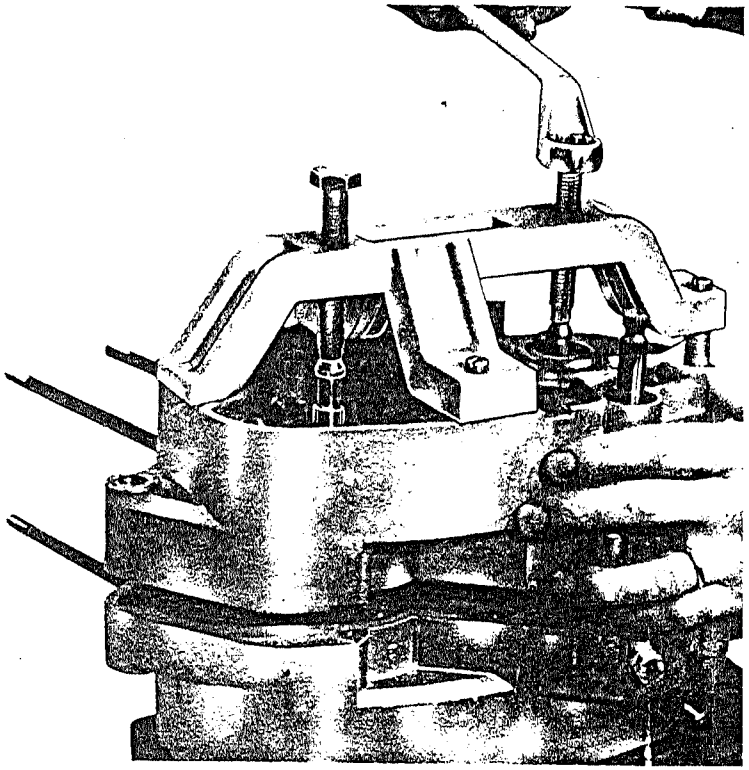


Fig. 22 - Crankcase left hand removal

DISASSEMBLY OF GEAR BOX AND GEAR SELECTOR

Remove primary shaft by lightly tapping with mallet. At same time remove secondary shaft, the selector cam and relating sliding forks. Note location of any and all spacers or shim washers, leaving on proper shafts if possible. Otherwise note size and location.

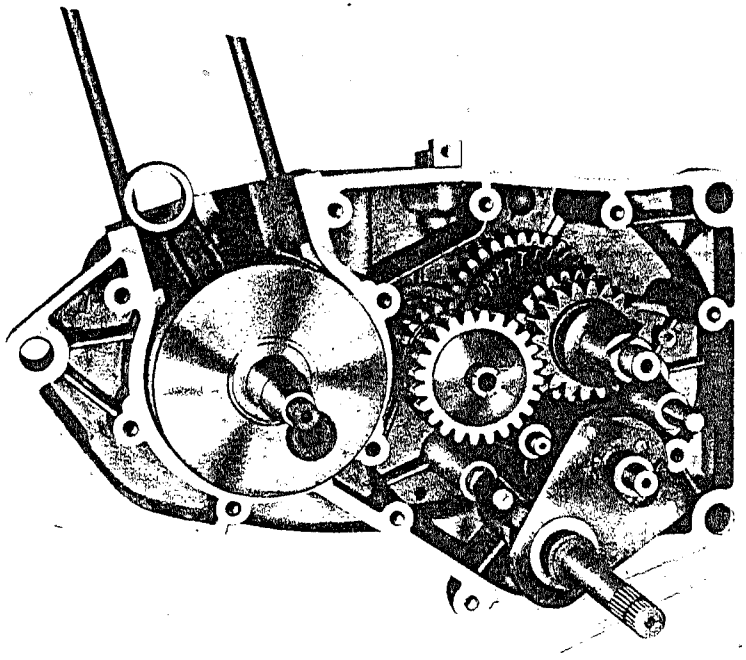


Fig. 23 - View of open engine

When it is necessary to change one of more gears, on secondary shaft it is always necessary to change circlip ring.
When secondary shaft is changed, there must be a shim washer on each end of shaft. There must also be 0.1 - 0.2 mm. axle movement at shaft assembly when located in crankcase. Different thickness shim washers are available. Overall lenght of gear shaft should measure 106.25 mm 106.35 mm. as shown in Fig. 27. To maintain proper axle movement change shim washers to get proper clearance.

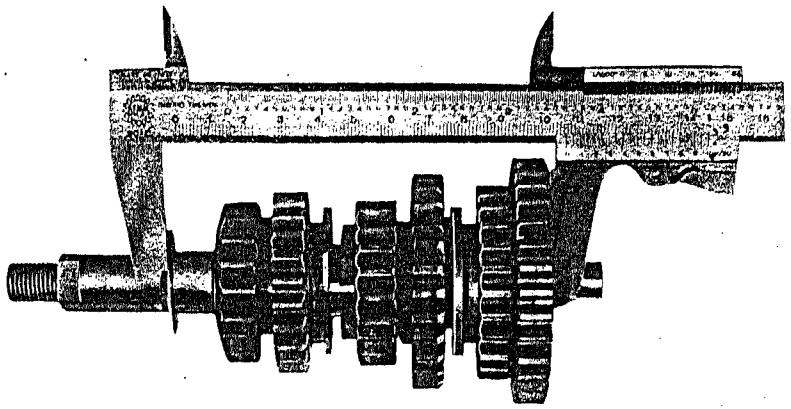


Fig. 27 - Secondary shaft and gear assembly

SHIFTER DRUM ASSEMBLY

It is always necessary to have a shim washer of 0.6 mm. on both ends of cam assembly Fig. 28.

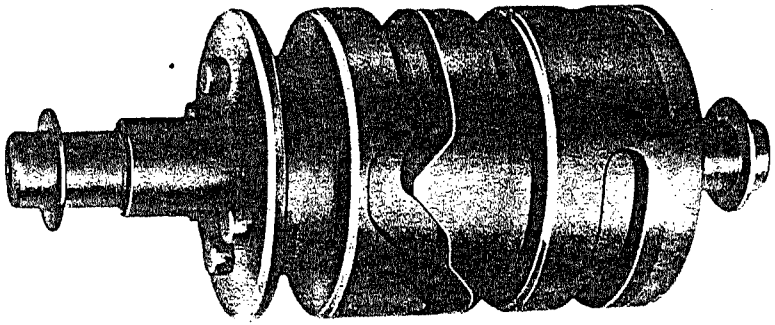


Fig 28 - Gear assembly

PREPARATION OF GEAR SELECTOR SHAFT

It is always necessary to locate a shim washer on both ends of shaft. Thickness of shim washer 0.4, 0.6, 0.8 mm. When necessary to change for shifter fork assembly, be sure fork is properly installed as shown in Fig. 29.

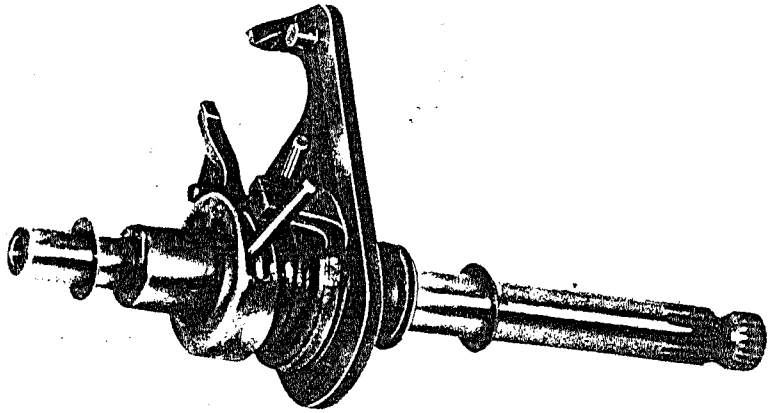


Fig. 29 - Gear selector assembly

CRANKSHAFT DISASSEMBLY

Withdraw crankshaft from right side case by tapping on right side of crankshaft of tool 0005.017.00 with rubber or plastic mallet
Proceed with caution so as not to damage crankshaft or bearing.
A shim washer could be found between crankshaft and right bearing.

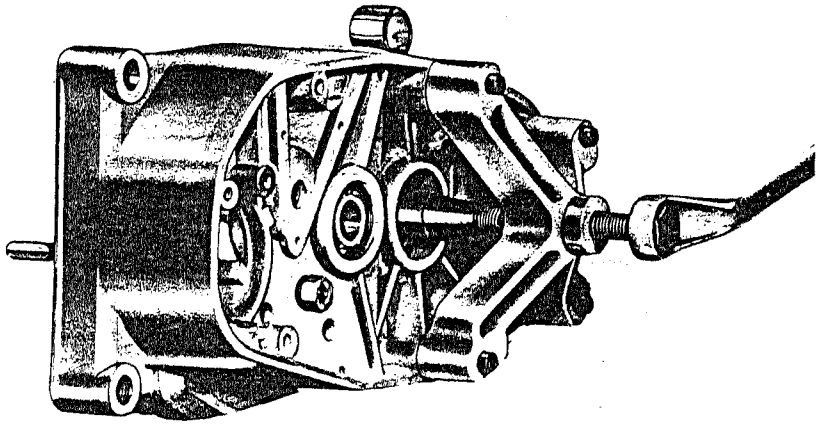


Fig. 24 - Crankshaft removal

BALL BEARING DISASSEMBLY

This operation is needed only when bearing is found defective.
Use standard bearing removal tool. Always replace seals when reassembling even when bearings have not been changed. This ensures proper sealing of shafts.

ENGINE ASSEMBLY

Before assembly of engine parts, carefully inspect all parts and clean.

PREPARATION OF CRANKCASE

Prepare crankcase by cleaning all areas of crankcase with a cleaning solvent. When completed, parts should look new. If bearings have not been removed, carefully clean and blow clean with air.

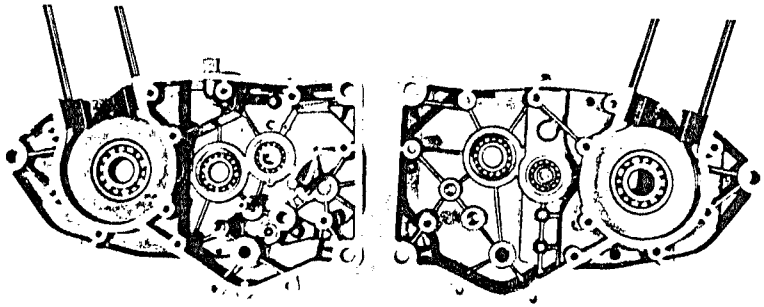


Fig. 25 - Crankcase half

PREPARATION OF GEAR ASSEMBLY

Prepare complete gear assembly, making sure all washers are in proper location. There will be no problem if the location of washers is noted before disassembling.

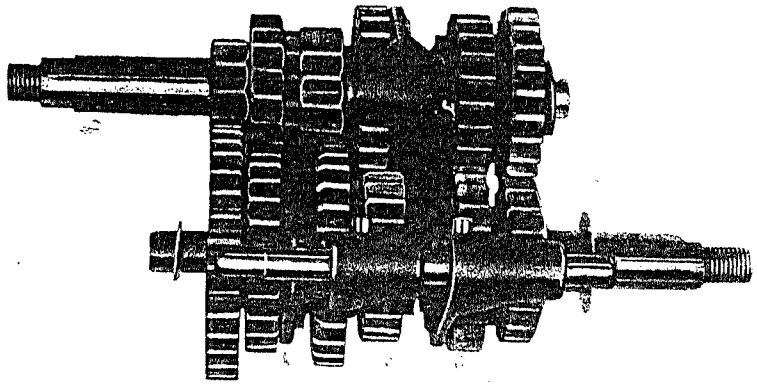


Fig. 26 - Gear assembly

GEARBOX ASSEMBLY

Note: The gearbox is 6 speed. Gears are of constant engagement. To change gears from on to another, a sliding engagement of gears is effected with selector forks. The shifting movement is obtained by the movement of the shifter drum assembly shown on page 27, Fig. 26.
The foot operated shift lever operates the selector shaft shown on page 28. The selector shaft assembly controls the drum assembly, page 28. The selecteur shaft assembly controls the drum assembly, pages 27 and 28. The drum assembly in turn controls the movement of the shifter forks which change the actual gears which are shown on Figs. 26 and 32. Neutral engagement is located between 1st and 2nd gear.
When placing secondary shaft into crankcase, do so carefully to insure that no damage is done to the oil seal.

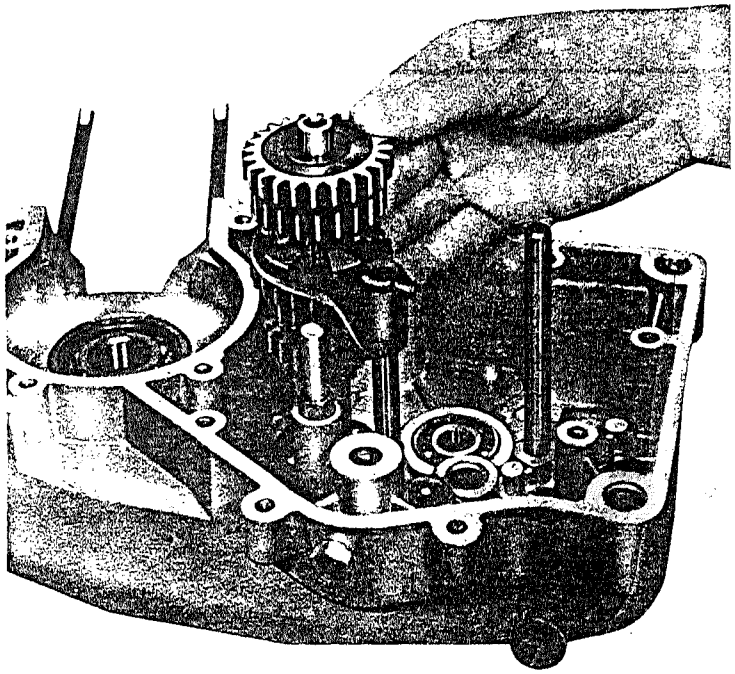


Fig. 31 - Primary shaft installation

ASSEMBLY OF SECONDARY SHAFT AND GEAR ASSEMBLY

With right hand crankcase half laying, place secondary shaft in crankcase as shown. Before installing drum assembly, be sure spring and ball bearing are located in recessed hole beside camshaft hole. Use small amount of grease to keepball in place.
Carefully introduce the secondary shaft into the ball bearing together with three shifter forks, in place. Shifter forks must also be located on guide pins.

SHIFTER DRUM INSTALLATION

In installing shifter drum, pay attention to ball bearing so that it is located in a hole in the drum assembly. Be sure shift forks pin locate in slotted hole in drum assembly. Fig. 32. Slide secondary shaft completely into crankcase. This is done by holding secondary shaft and selector drum in place, as shown in Fig. 31, and sliding all shafts into respective locations in one process.

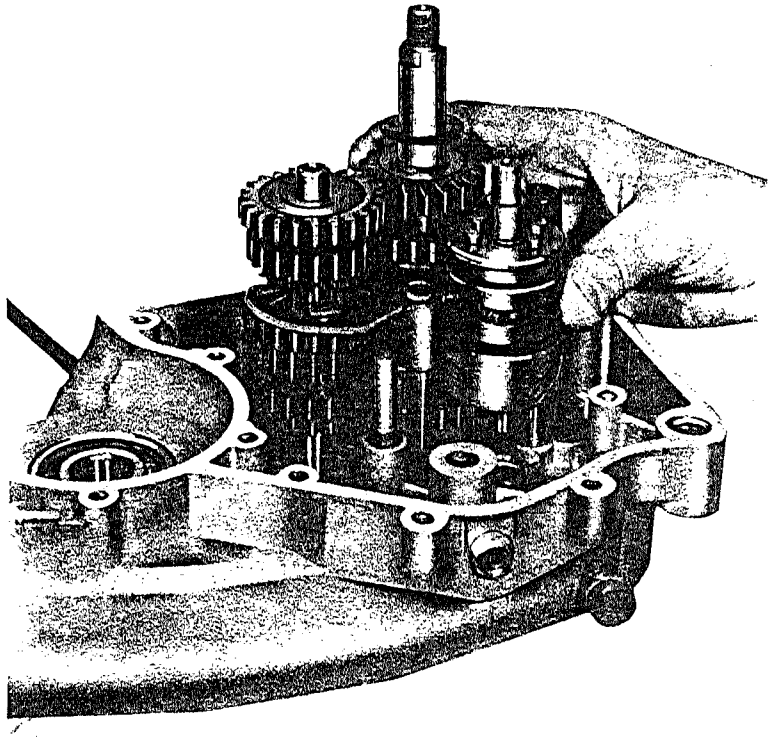


Fig. 32 - Installation of gear cam shaft

After installation of secondary shaft and cam assembly, a check should now be made to see that all six gears can be achieved by turning drum assembly in both directions. This is more easily done by using a special tools 0005.340.00 as shown in Fig. 33.

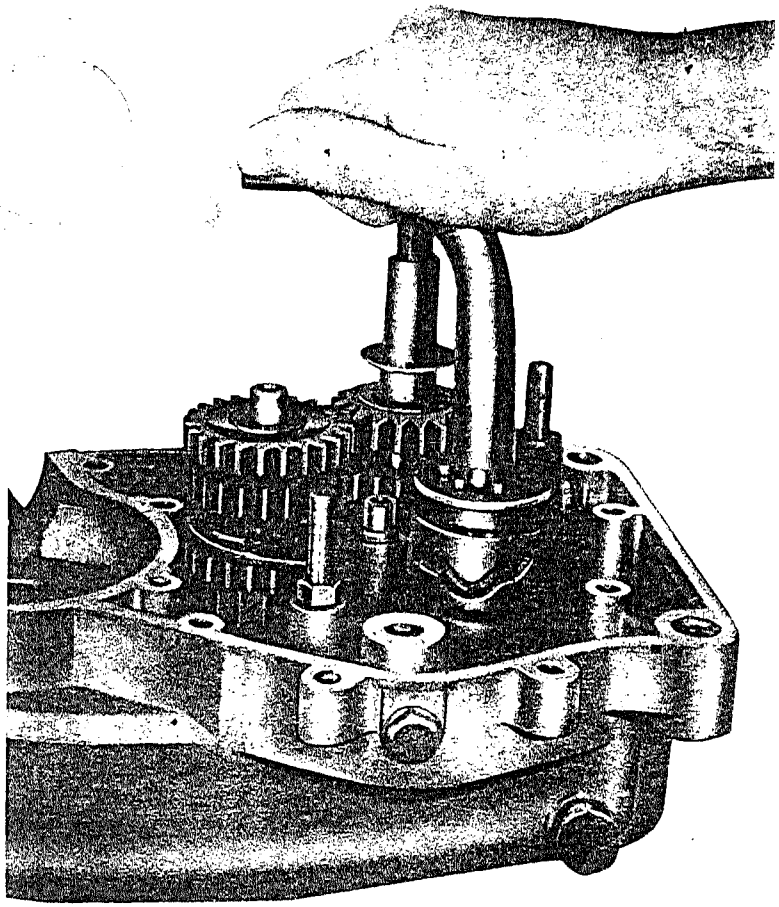


Fig. 33 - Gear alignment check

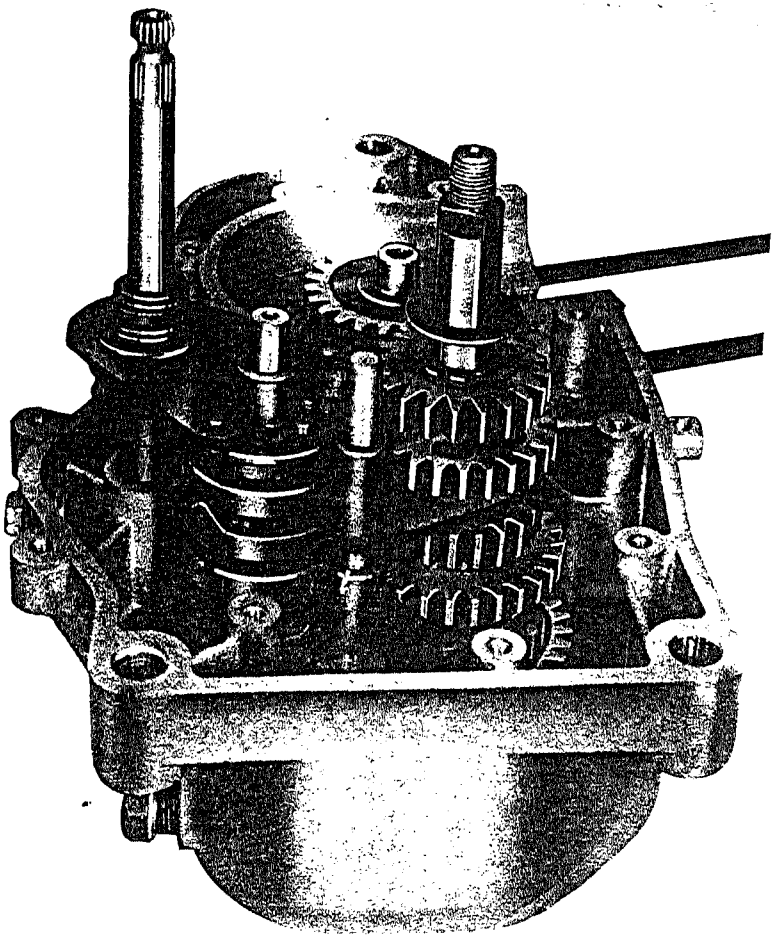


Fig. 34 - Selector shaft installation

CRANKSHAFT INSTALLATION

Before installation, first check connecting rod play on big end bearing for excessive play. It is always advisable to change complete crankshaft when connecting rod free play is excessive. Side play of connecting rod should not measure more than 0.9 at 1 mm. Connecting rod - Crankshaft 0.035 at 0.039 mm.

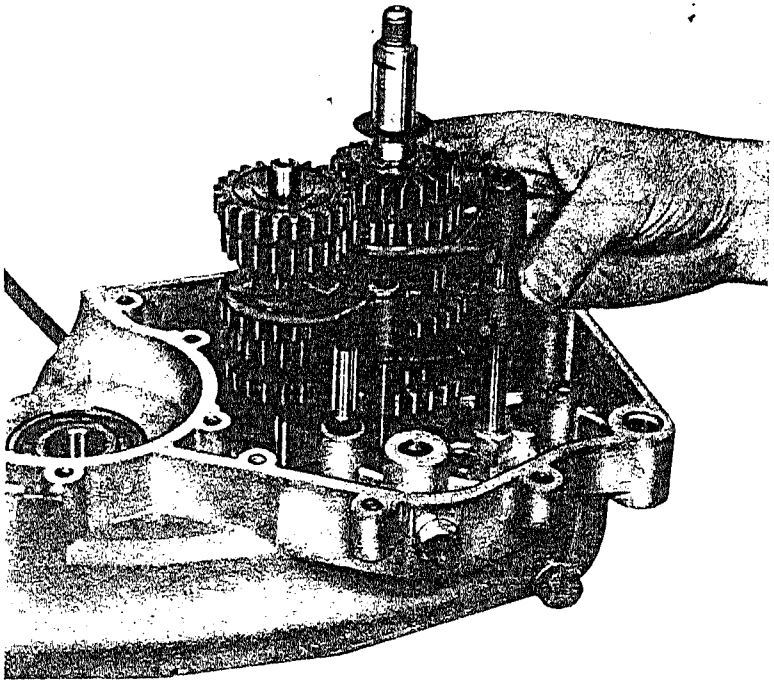


Fig. 35 - Crankshaft installation

CRANKCASE HALF ASSEMBLING

Before joining crankcases check that all sealing surfaces are free of dirt and scratches.
Check that all shafts in gear box have shim washers in place.
Check that all shafts are properly installed.
Install gasket on bottom case. Grease bottom case slightly to hold gasket in place. Always use a new gasket to assure a good seal between cases.
Oil all shafts slightly to give easy passage through bearings.

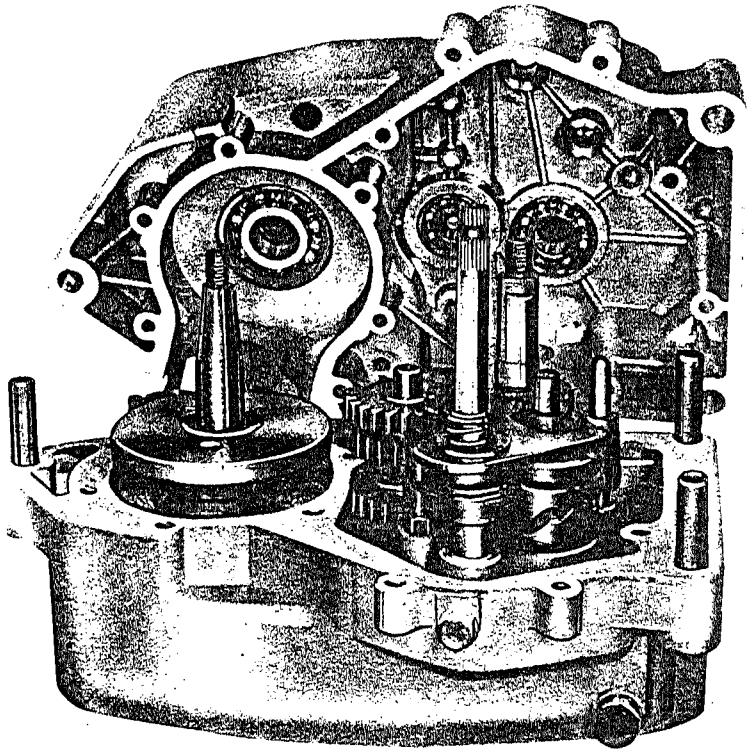


Fig. 36 - Crankcase pre-assembly

Close crankcase evenly. Make sure gasket is in place and that all shafts turn free. Fig. 37.
Insert three dowel pins in respective holes and insert screws.
Make sure that each screw stands approximately 3/4" above case before threading.
Arrange all screws so they have even height before threading, as there are different length screws.
Tighten completely all screws evenly and again check that all shafts are free. If a shaft is tight it is possible that the shim washer used is too thick, or that a ball bearing is not completely seated. Check all shafts for proper free movement. Crankshaft movement is .05 mm. Free play is reduced with proper shim washer .01 mm.

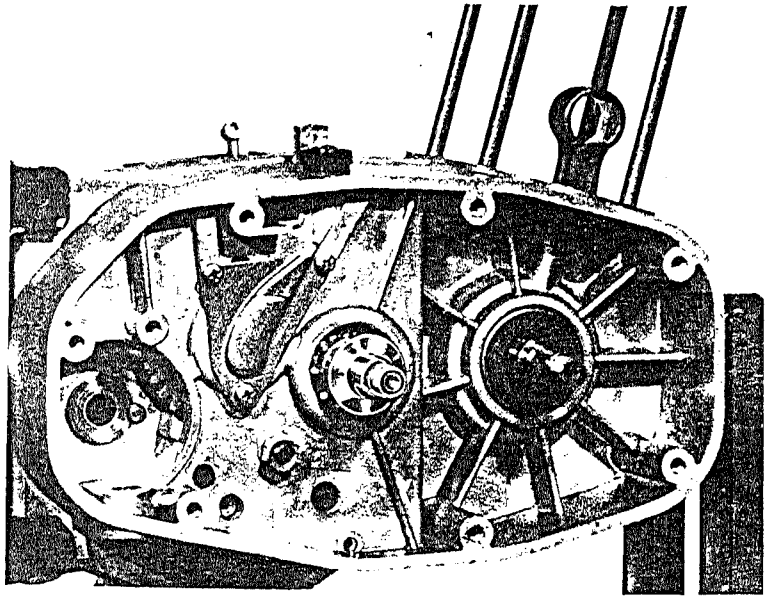


Fig. 37 - Assembled crankcase

CLUTCH ASSEMBLING

PRIMARY DRIVE ASSEMBLING

First install .6 mm. spacer washer on primary drive shaft for proper alignment with primary gear.
If it is necessary to change one drive gear, the other should also be changed. Check for a minimum amount of free play existing between gear teeth. Fig. 38.

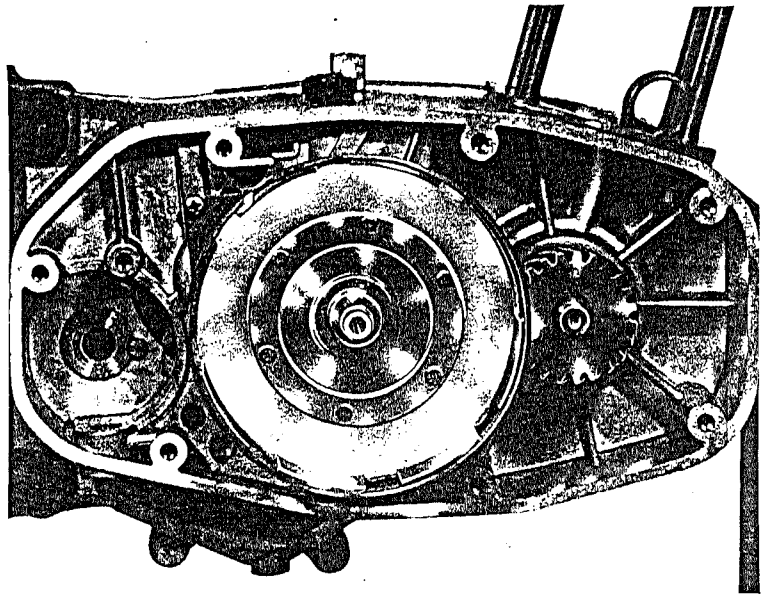


Fig. 38 - Assembling of primary drive

CLUTCH HUB INSTALLATION

First install spacer washer when installing clutch hub. Be sure that clutch hub is aligned on square shaft. Tighten lock nut using special tool 0005.325.00 and 17 mm. socket.
After tightening, check for movement of clutch hub. Maximum movement is .1 mm. Install clutch rod into center of primary shaft with rounde end going in first. Now install 3/16" ball bearing, followed by the clutch push rod.

CLUTCH PLATE INSTALLATION

Install clutch plates in proper order as shown in Fig. 38.
Install six springs and tighten six screws as in Fig. 40.

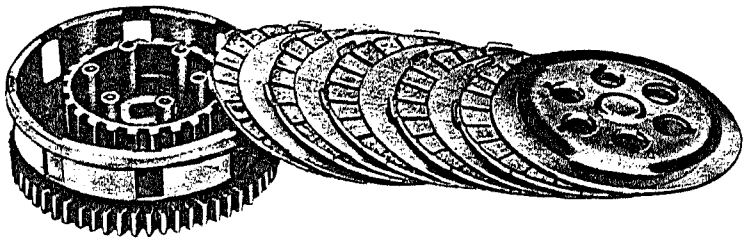


Fig. 39 - Clutch disc sequence

Check clutch operating lever for free play of 1/10". Proper adjustment can be obtained by referring to page 5, Fig. 2.

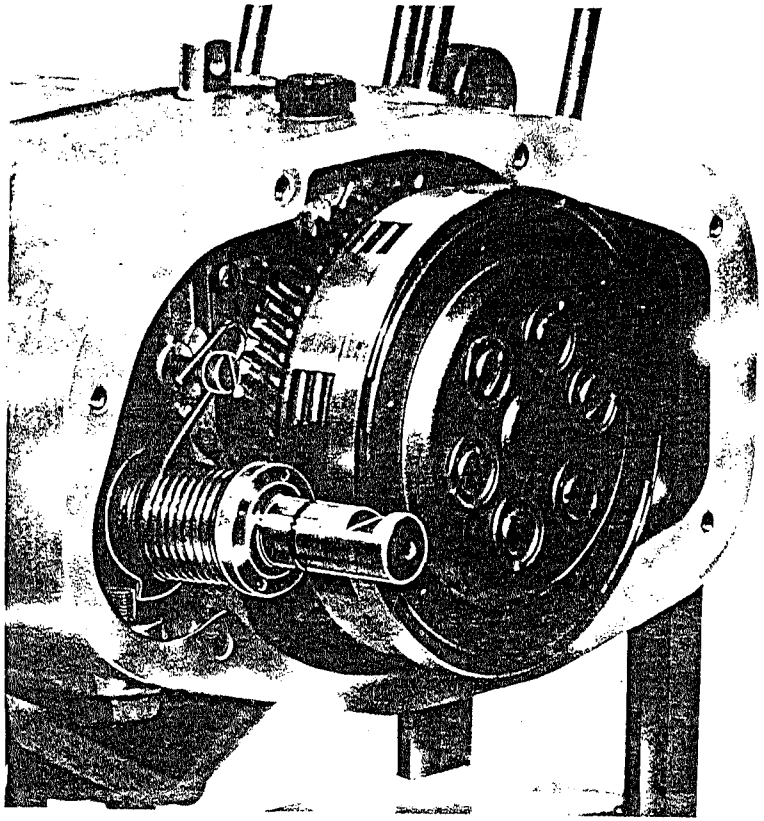


Fig. 40 - Clutch and kickstart shaft assembly

KICKSTART ASSEMBLY INSTALLATION

Assemble parts on kickstart shaft as shown in Fig. 41. Stop shoulder should be pointed in opposite position as slot in shaft. See arrows in Fig. 41

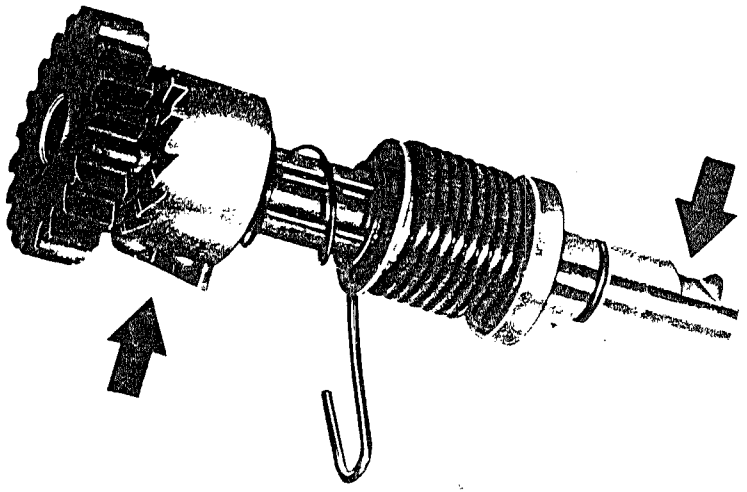


Fig. 41 - Kick shaft assembly

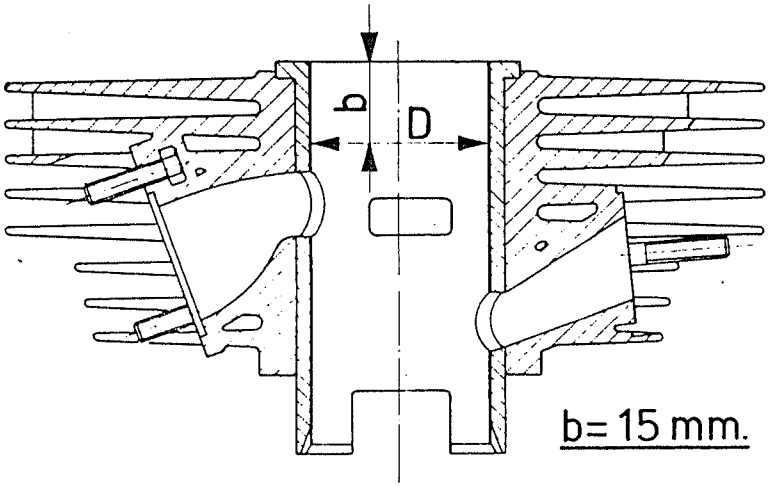
Place 6 x 30 spring holding screw in case, Fig. 40. When installing kickstart shaft, place spring end over screw and tighten screw. Temporarily install kickstart lever, wind shaft counter-clockwise and insert kickstart stop bolt into bottom of case, Fig. 40.

INSTALLATION OF RIGHT COVER

When installing right cover, use new gasket and be sure kickstart sealing ring is in proper location. After checking for dirt and scratches on sealing surfaces, install screw arrangement with a 1/2" height evenly on all screws. Make final check that gasket is in proper location.

PISTON, CYLINDER AND CYLINDER HEAD ASSEMBLY

Note: Before assembling, decarbonize parts and clean properly.
When installing new piston, check for proper clearance (see page 40) and the diameter of cylinder.
Cylinder is measured at point « D » Fig. 42.
Piston is measured at point « d » Fig. 43.
Pistons are marked on dome for size. Size stated is size over standard over 55 mm. Size stated is to closest 1/50 mm., so it is advisable to measure piston for actual size.
The necessary tolerance of piston to cylinder is .060 - .070 mm.
Measured « D » of cylinder minus small « d » of piston must stay between the above stated limits.
Clearance may be changed by honing or boring out.



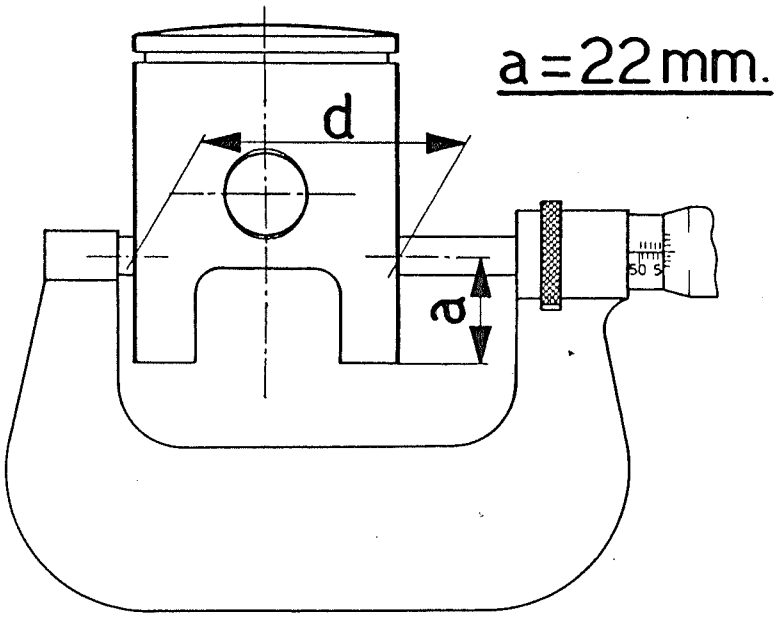


Fig. 43 - Piston measurement

For matching of sizes over standard, maintain same piston-cylinder tolerance.
Pistons are available in three categories: 55.2, 55.4, and 55.6.
Pistons and cylinders with « D » and « d » can only be matched with group.

PISTON - INSTALLATION

After the correct clearance is obtained, carefully instal needle bearing in the connecting rod.
Check the piston pin for correct clearance in piston.
After installing piston on connecting rod, check clearance of piston pin to piston pin bearing (it is always advisable to replace both parts together).
Before installing the piston, check Figure 44. It is very important that the arrow on the piston head is pointing towards the exhaust port.

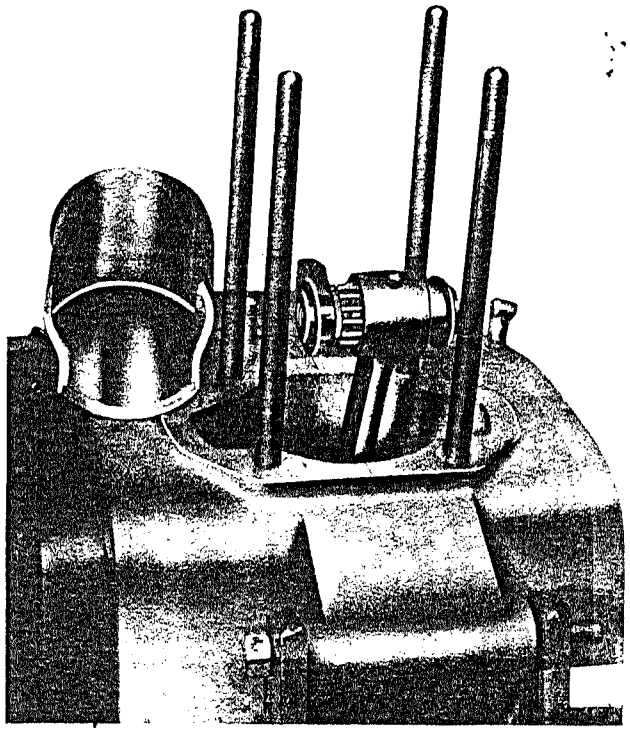


Fig. 44 - Piston installation

When installing piston pin completely, use tool 005.07.00. This will ensure that no damage is done to the piston or connecting rod. Before fitting piston ring, piston ring should be placed in cylinder at Point « D » of Figure 42. It is important that a piston ring gap of between .1 and .2 mm is available. When fitting piston ring to piston, ensure that the piston ring is free to turn in the piston ring groove, and after fitting barrel, check that there is no tightnes-

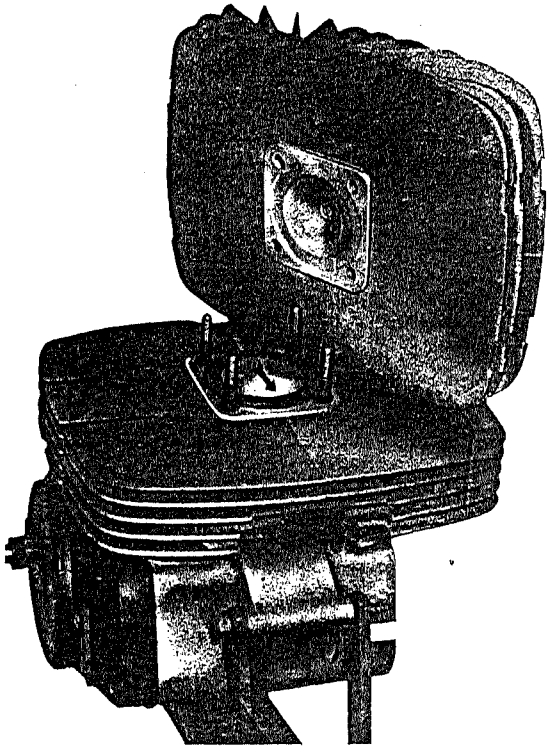


Fig. 45 - For correct piston location, check for letter « S » with arrow facing exhaust port

CYLINDER INSTALLATION

Before installing cylinder permanently, make following check. Place cylinder and turn piston up and down. Check that piston is free. If the piston is only rubbing on one side remove piston and place rod in connecting rod and carefully bend connecting rod to put piston in exact center.
Reinstall parts and check again. Properly clean all surfaces and install new gaskets. Slightly oil cylinder and piston rings by squeezing rings to piston. Slide cylinder over piston.

REPLACEMENT OF CYLINDER HEAD

First replace head gasket. Check for proper thickness.
Use small amount of grease to keep gasket in place.
Replace cylinder head and tighten with cross pattern.
Using torque wrench.

FLYWHEEL MAGNETO ASSEMBLY

Replace woodruff key (new) using small amount of grease.
Locate stator assembly and place wire through rubber grommet.
Locate matching mark on stator plate and engine case.
Install three screws. Add small amount of grease to felt pad.
Fit flywheel on shaft and make sure that woodruff key is in place.
Slightly tighten locking nut. Check ignition timing and contact point setting, all on page 7.
Tighten lock nut completely using special tool 0005.330.00.
Replace drive sprocket using lock nut to completely seat sprocket, using 0005.318.00 and 17 mm. socket.
Replace left hand cover, spark plug, and carburettor. After replacing engine in frame, add gearbox oil with 3 pints (Kg. 1,5) MOTOR OIL SAE oil and check for proper level.

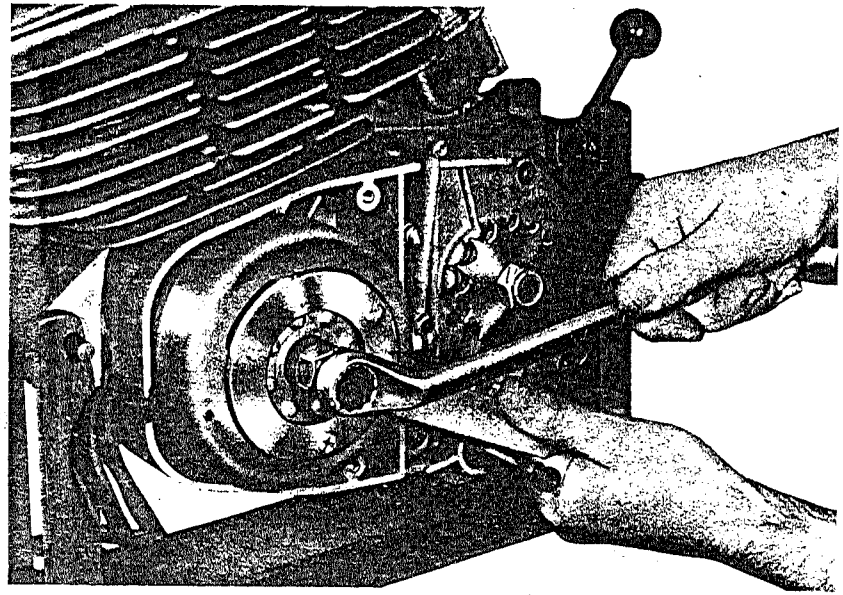


Fig. 46 - Tightening magneto lock nut

To successfully repair engines, we recommend that the following special tools be used:

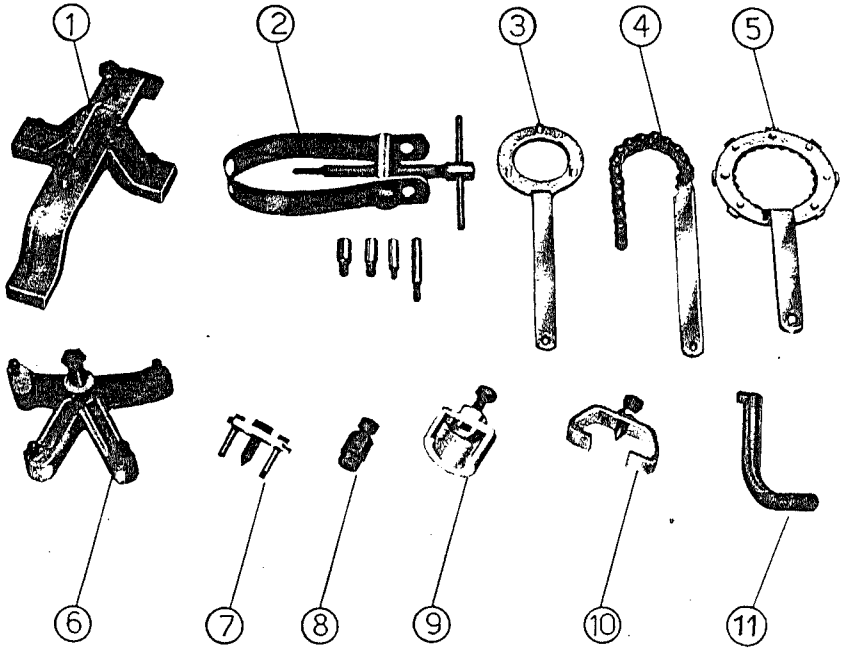


Fig. 47 - Special Tools

		DESCRIPTION
—	0005.176.00	Engine stand
1	0005.065.00	Case splitting tool
2	0005.075.00	Wrist pin pusher
3	0005.331.00	Flywheel holder
4	0005.318.00	Primary sprocket puller
5	0005.325.00	Clutch Body Holder
6	0005.017.00	Crankshaft puller
7	0005.007.00	Clutch hub remover tool
8	0005.080.00	Flywheel puller
9	0005.042.00	Primary sprocket puller 18 T.
10	0005.051.00	Chain sprocket puller
11	0005.340.00	Secondary shaft tool