

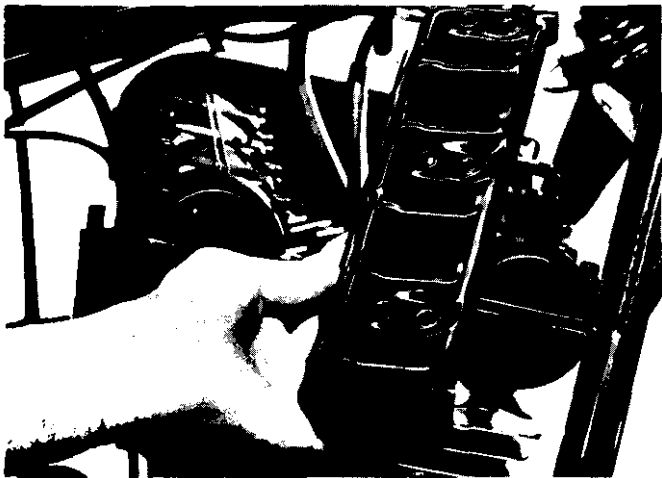
ENGINE OVERHAUL

3-1 ENGINE REMOVAL

NOTE: It is not necessary to remove the engine to remove the cylinder head, cylinder, or pistons.

A. Preparation For Removal

1. All dirt, mud, dust and foreign material should be thoroughly removed from the exterior of the engine before removal and disassembly. This will help prevent any harmful foreign material from entering the engine.
2. Before engine removal and disassembly, be sure that you have the proper tools and cleaning equipment so that you can perform a clean and efficient job.
3. During disassembly of the engine, clean and place all parts in trays in order of disassembly. This will speed assembly time and help insure correct reinstallation of all engine parts.
4. Place machine on center stand. Start engine and allow it to warm up. Stop engine and drain engine/transmission oil.
5. Remove oil filter element to drain oil filter.
6. If middle gear case is to be removed, drain middle gear oil.
7. Remove air scoop from cylinder head cover.

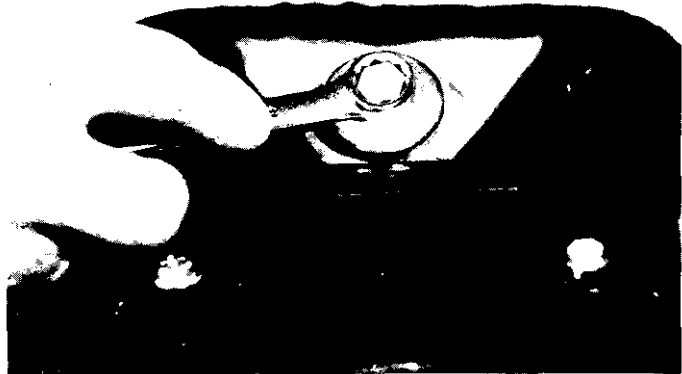


B. Fuel Tank Removal

1. Turn fuel petcocks to "on" (there is no "off" position—fuel will not flow from a petcock on

the "on" position unless the engine is operating). Disconnect fuel pipes and vacuum pipes from petcock.

2. Lift seat and remove fuel tank holding bolt. Remove fuel tank.



C. Muffler, Footrest, Brake Pedal

Remove rear brake pedal and passenger right footrest.

2. Remove exhaust pipe holding screws from cylinder head.



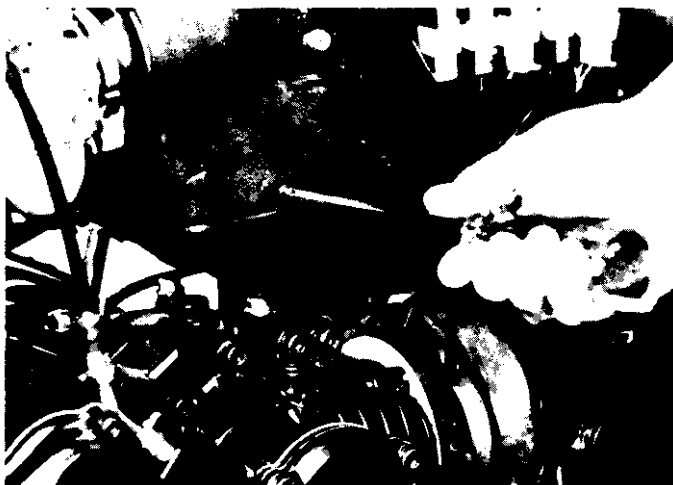
3. Remove exhaust pipes and muffler as an assembly.

D. Side Cover, Air Cleaner Case

1. Remove left and right side covers.



2. Remove screws holding intake silencers (left and right). Remove intake silencers.



3. Loosen clamps holding carburetors to air cleaner case and intake manifolds. Loosen breather hose clamp at air cleaner case junction.



4. Remove bolts holding air cleaner case to frame. Note ground wire connection on left frame bracket.



5. Pull air cleaner case to the rear. Remove clutch cable from holder attached to the left carburetor. Lift carburetors back and to the left. Remove throttle cable from carburetors.



6. Remove air cleaner case,

E. Wiring and Cables

1. Pull back rubber cover on clutch adjuster at engine. Disconnect clutch cable.



2. Remove spark plug wires and tachometer cable.

3. Remove two (2) screws holding starter motor cover. Remove starter motor cover. Disconnect electric starter cable.



4. Disconnect ground wire from top of engine case.

5. Disconnect wiring harness couplers on left side of machine. Remove ignition wiring (orange, yellow, grey, blue wires), generator wiring (white wires), and field wiring (green, black wires). Position wires so that they can be safely removed.



F. Drive Shaft Joint

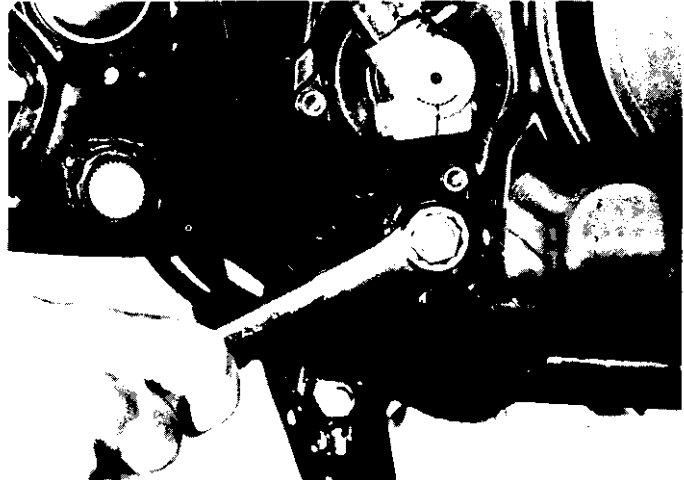
1. Pull rubber boot from drive shaft coupling to expose four (4) bolts.



2. Remove four (4) bolts on drive shaft coupling.

G. Removal

1. Remove three (3) engine mounting bolts from frame. Remove footrests with the two (2) rear engine mounting bolts.



2. Slide engine forward. Remove engine to the right. Position a box or other support to the right of the machine for assistance when removing the engine.

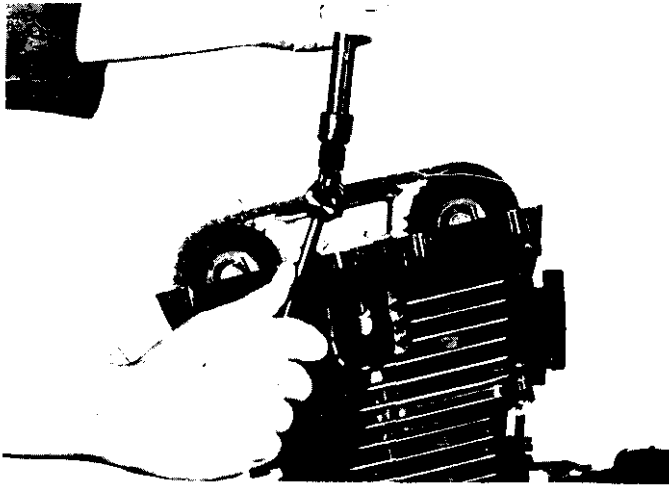
3-2 ENGINE DISASSEMBLY

A. Cylinder Head and Cylinder Removal

NOTE: Cylinder head and cylinder can be removed without removing engine.

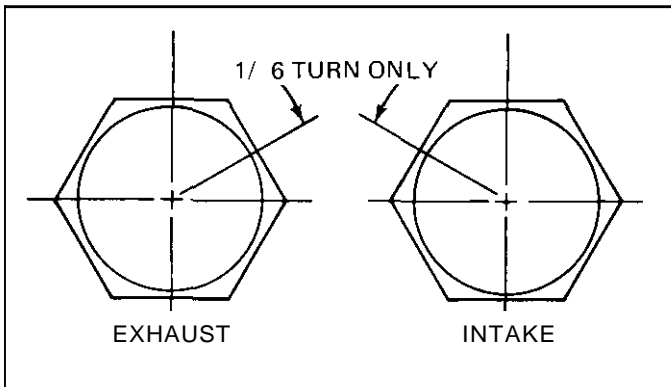
1. Remove cylinder head cover.

2. Remove points cover. Rotate the crankshaft to T.D.C. of the compression stroke on the NO. 1 (L.H.) cylinder. Tie each end of the cam chain to prevent it from falling into the crankcases when it is separated. Push out the master link pins with the cam chain cutter.



CAUTION: Whenever the cam chain is separated, valve and cylinder head damage can occur **by** random turning of the cam shafts.

3. Rotate intake cam 1/6 turn counterclockwise (from L.H. end) and rotate exhaust cam 1/6 turn clockwise (from L.H. end). See illustration.



4. Remove cam chain guide stopper.



5. Remove the cam caps

CAUTION: To avoid damage to the camshaft caps, observe the following:

- a. Position cams as described in step 3.
- b. The camshaft caps are numbered left to right 1, 2, 3, 4 and 'E' or 'I' for intake or exhaust. Damage will result if the caps are incorrectly removed or installed.
- c. Remove camshaft caps from right to left (4, 3, 2, 1). Notice that the arrows on the caps all point to the LEFT.
- d. Remove cams.

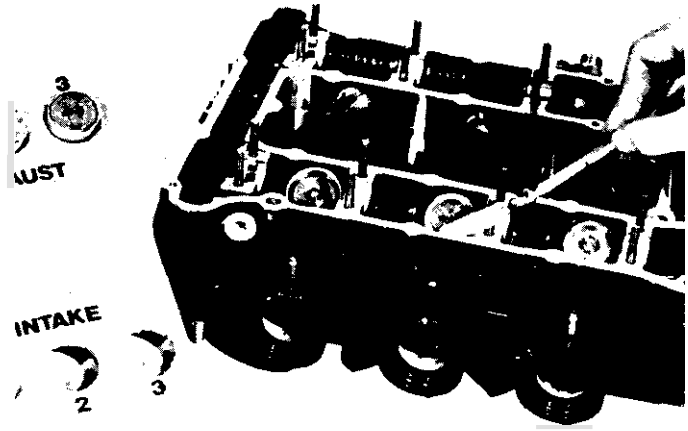
6. Remove two (2) cam chain tensioner securing bolts and remove tensioner assembly.



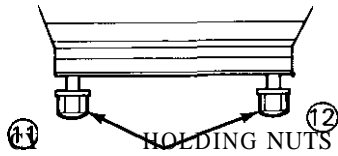
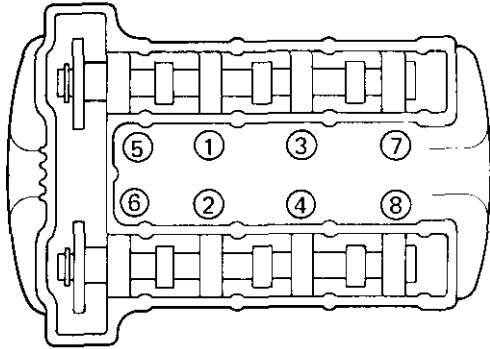
7. Remove cylinder head oil pipe union bolts and remove oil pipe. Note placement of copper gaskets.



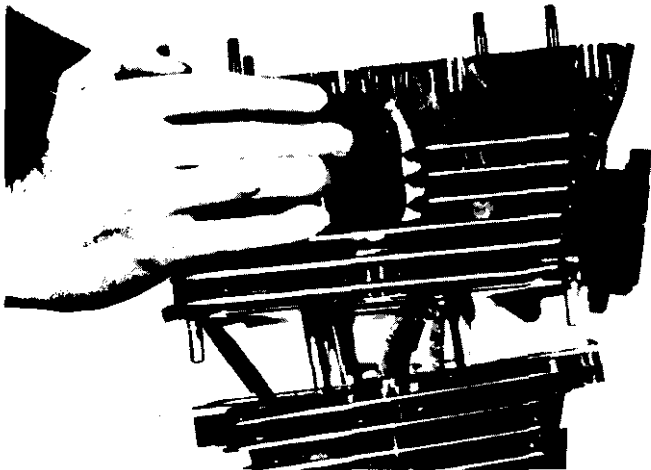
8. Remove spark plugs.
9. Remove cylinder head holding nuts and bolts as follows:
 - a. Loosen each nut and bolt ½ turn, observing the torque sequence.
 - b. Remove the cylinder head holding nuts first.
 - c. Note location of larger washers on two (2) center exhaust studs.



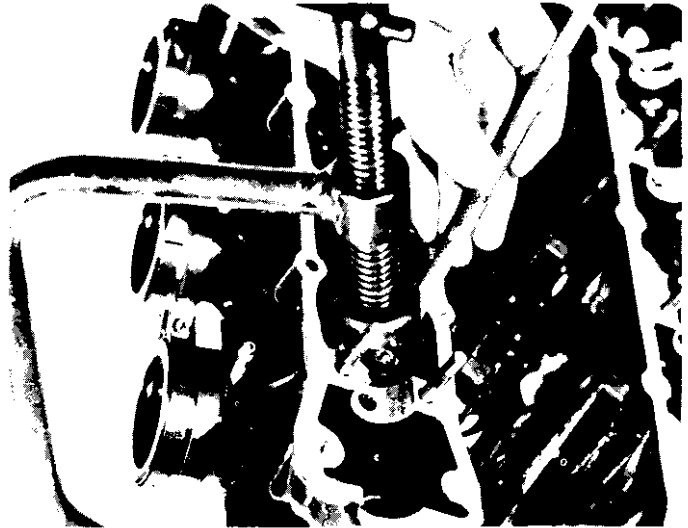
CAUTION: Lifters must always be installed in their original locations.



10. Remove cylinder head. Remove cylinder. It may be necessary to tap each lightly with a soft hammer.



2. Install the valve spring compressor (special tool). Remove the valve keepers by using a magnet. Remove the retainer and valve springs.



NOTE: The valve springs are progressively wound. The more tightly wound end is placed down against the cylinder head.

3. Remove valves.

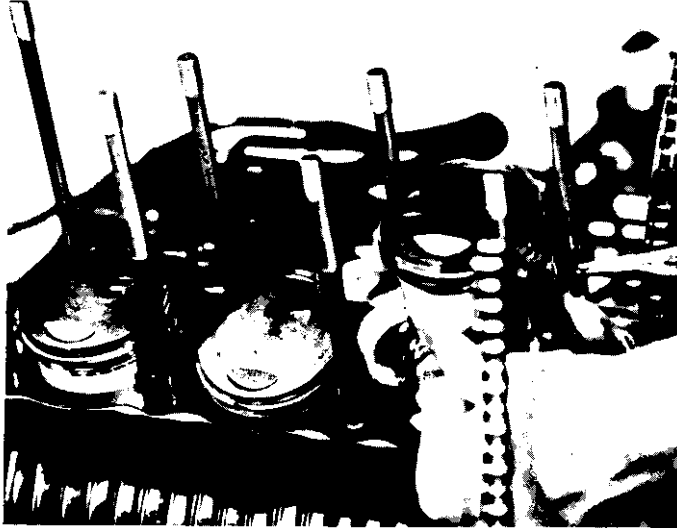
NOTE: Deburr any deformed valve stem end. Use an oil stone to smooth the stem end. This will help prevent damage to the valve guide during valve removal.

B. Cylinder Head Disassembly

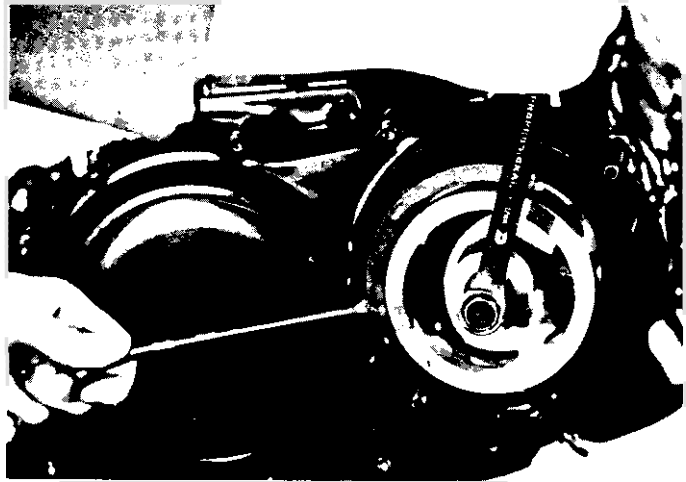
1. Remove valve lifters and pads. Place each lifter in a box that identifies the location of each lifter.

C. Piston Removal

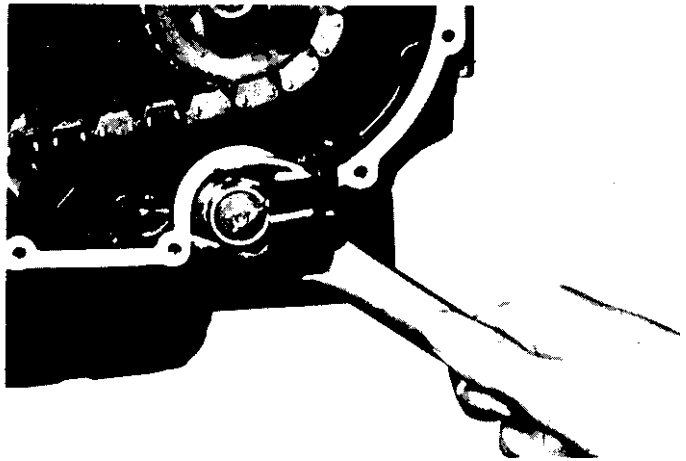
1. Mark each piston to aid in reassembly.
2. Place a clean towel or rag into the crankcase to keep circlips and material from falling into the engine.
3. Remove piston pin clips, piston pins, and pistons.



4. Remove the bolt, plate washer and lock washer from the rotor. Use the rotor holding tool and bolt (special tools) to remove rotor.

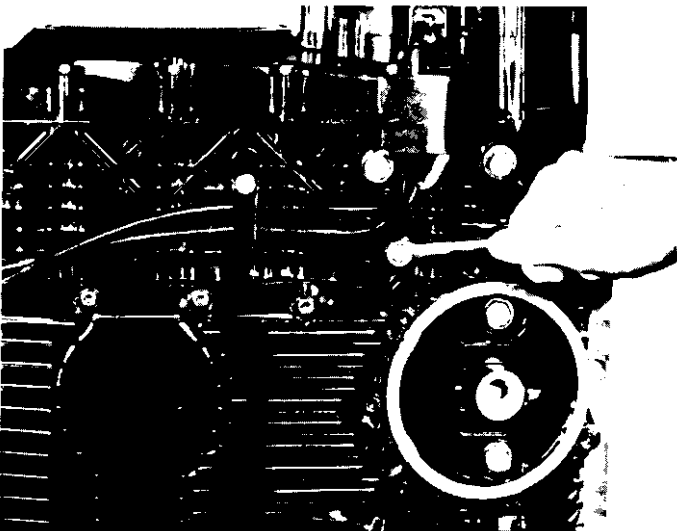


5. Remove the crankcase cover bolts and remove the cover.
6. Remove oil pressure warning switch.



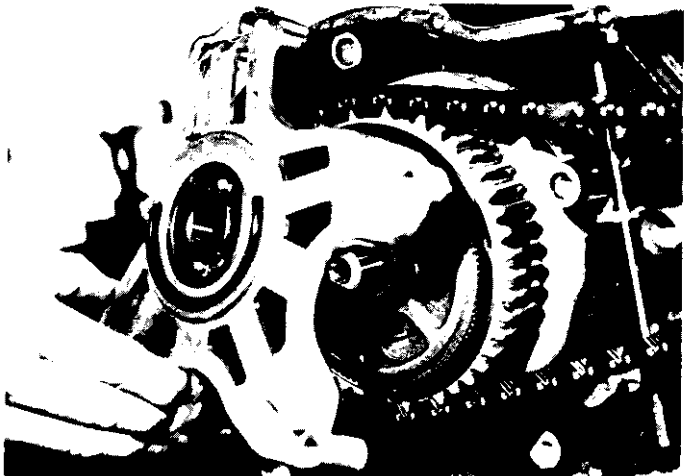
D. Generator

1. Remove generator wiring harness from mounting clips. Remove oil pressure warning switch wire.



E. Bearing Housing

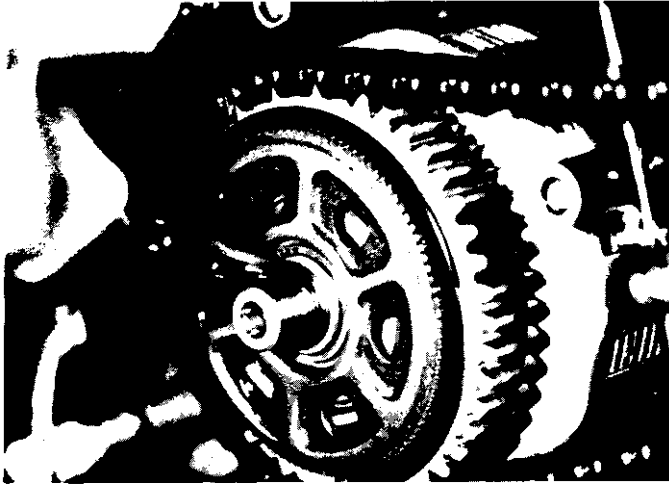
Remove four (4) bearing housing securing bolts and remove bearing housing.



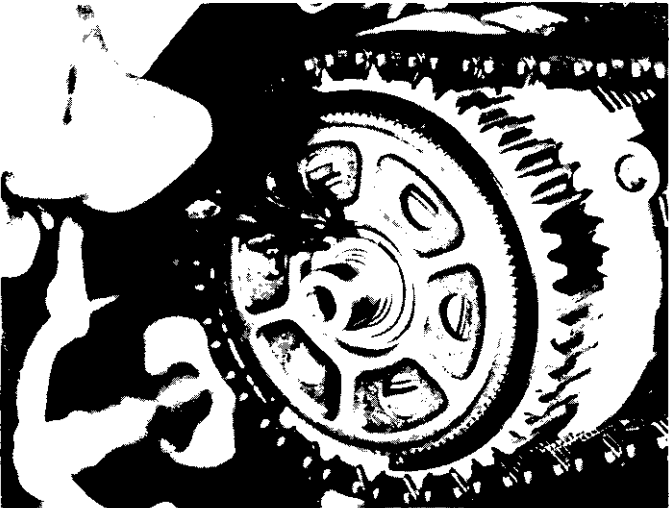
2. Remove kick crank
3. Remove generator cover.

F. Clutch and Primary Driven Gear

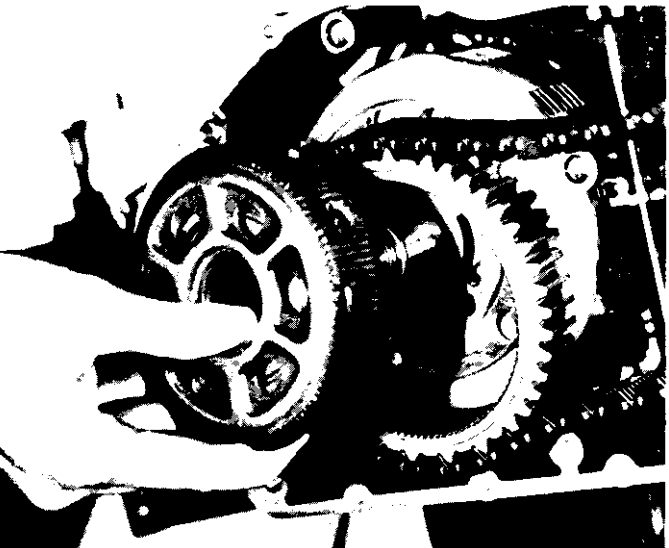
1. Remove small circlip and washer from R.H. end of transmission.



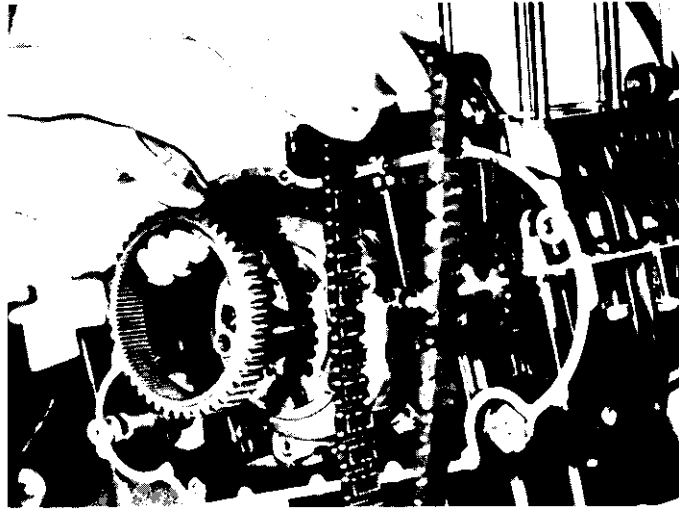
2. Remove larger circlip.



3. Remove clutch damper.

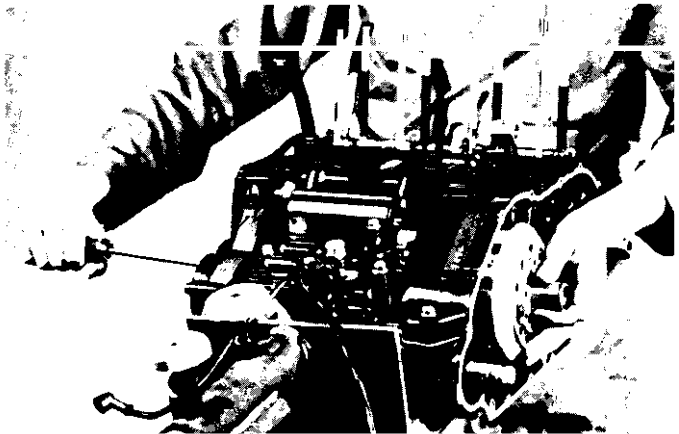


4. Remove primary driven gear and chain.

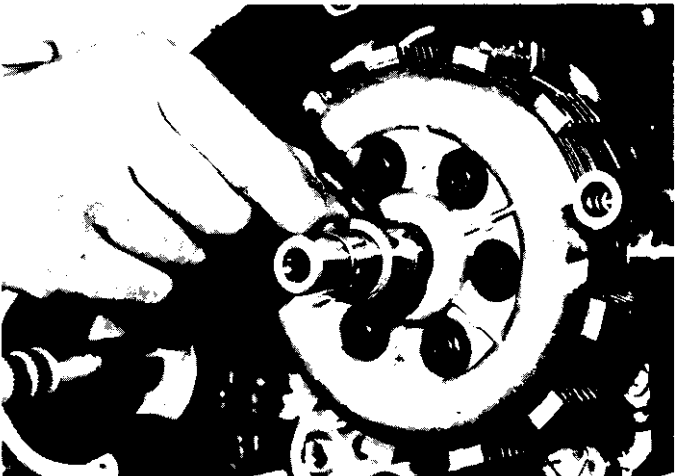


5. Remove clutch housing.

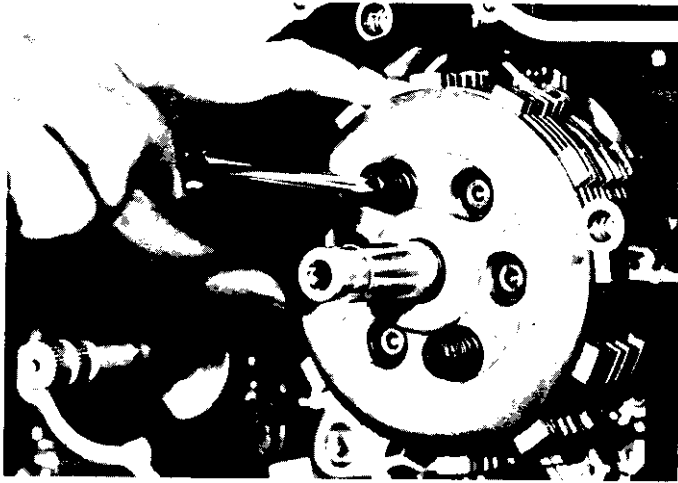
NOTE: If the clutch plates are stuck to the housing, thread in the clutch adjuster screw on the left side of the engine. This will push off the housing.



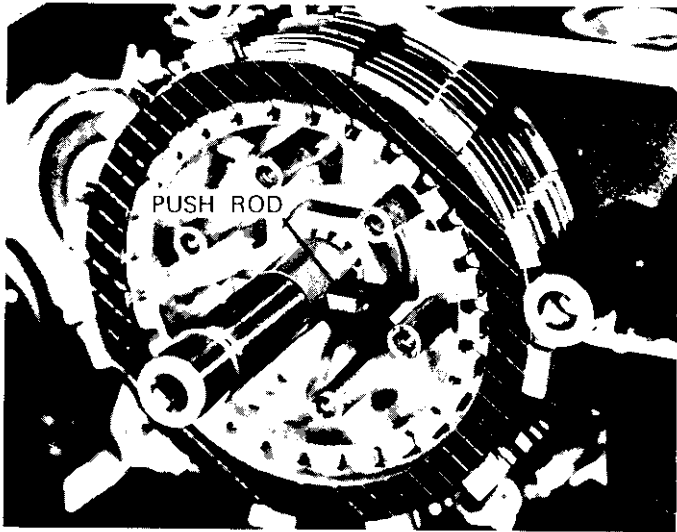
6. Remove washer and circlip in front of pressure plate.



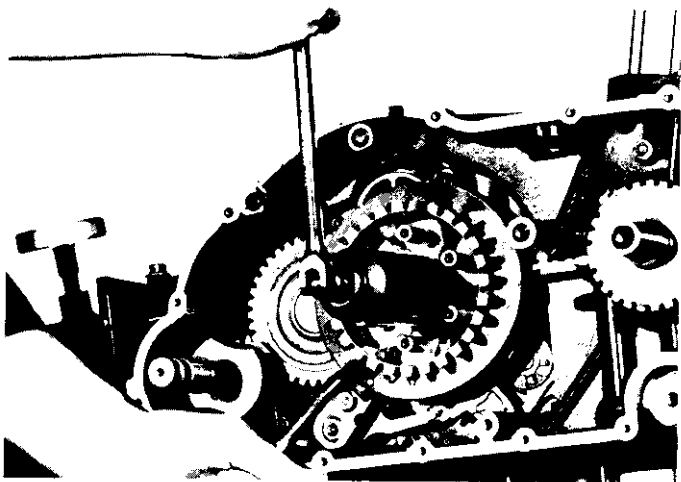
7. Remove pressure plate screws and clutch springs. Remove pressure plate.



8. Remove clutch plates, clutch push rod and ball bearing.

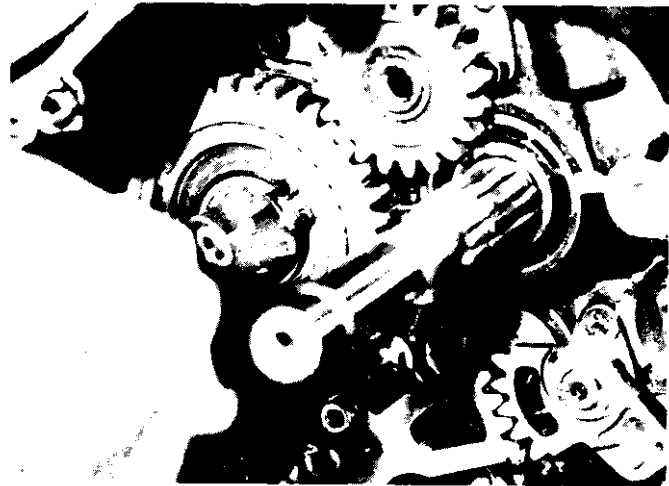


9. Use clutch holding tool (special tool) to hold clutch boss. Use deep 32mm socket to remove clutch boss nut. Remove nut, spring washer, clutch boss, plate washer, and spacer.

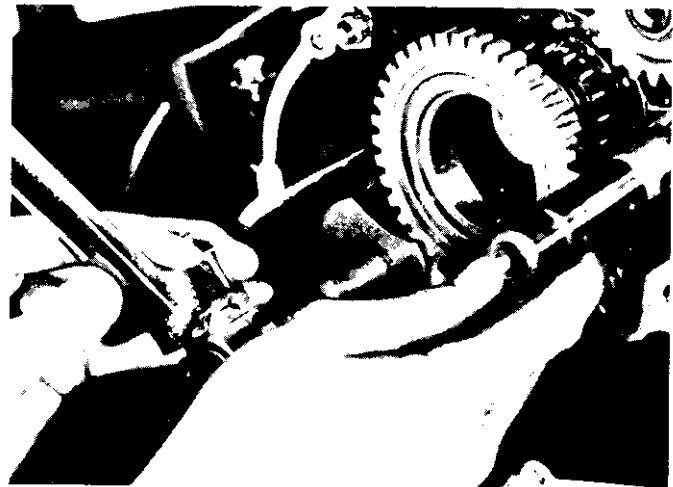


G. Kick Gear Removal

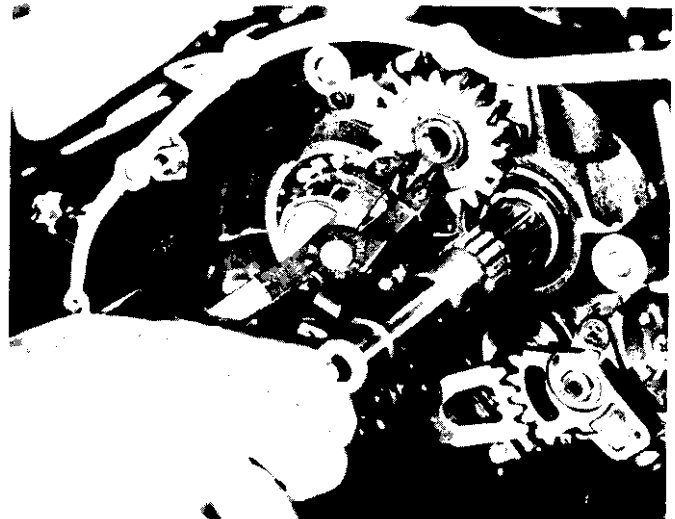
1. Remove circlip holding the kick idlegear.



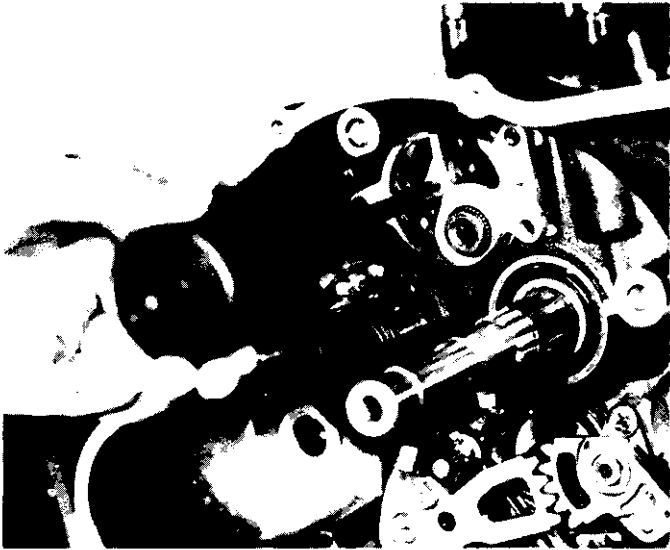
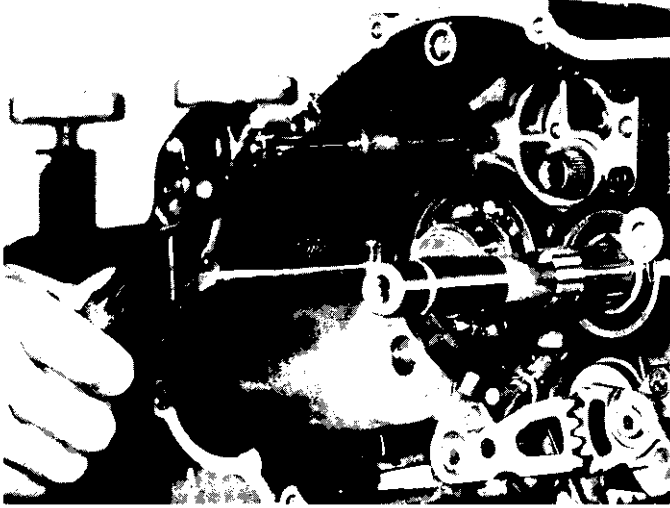
2. Install the kick crank on the kick shaft. Pull the kick starter assembly and the kick idlegear out together. Remove bearing and washer.



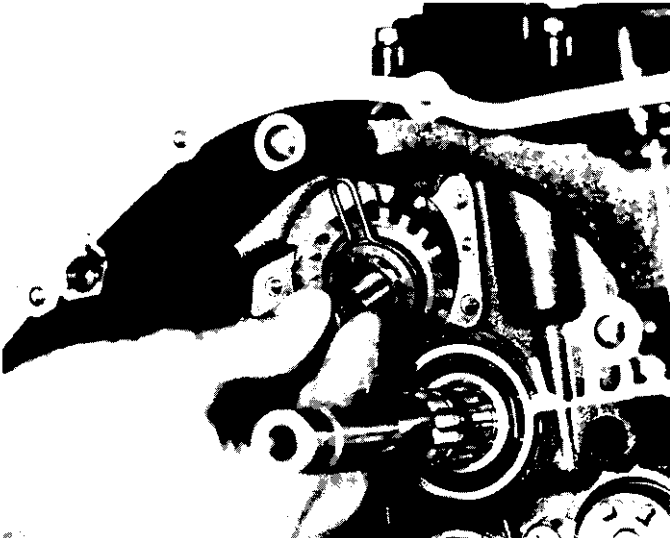
3. Remove the circlip holding kick gear 4. Remove the washer and gear.



4. Remove kick gear holder bolts. Use a slide hammer to remove the holder.



5. Remove the kick shaft assembly.

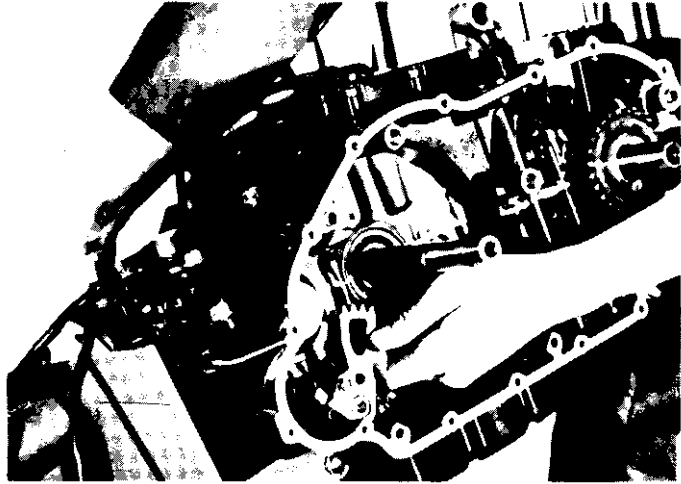


H. Shift Lever, Shift Shaft Removal

1. Remove clip holding shift lever two (2). Remove the lever.

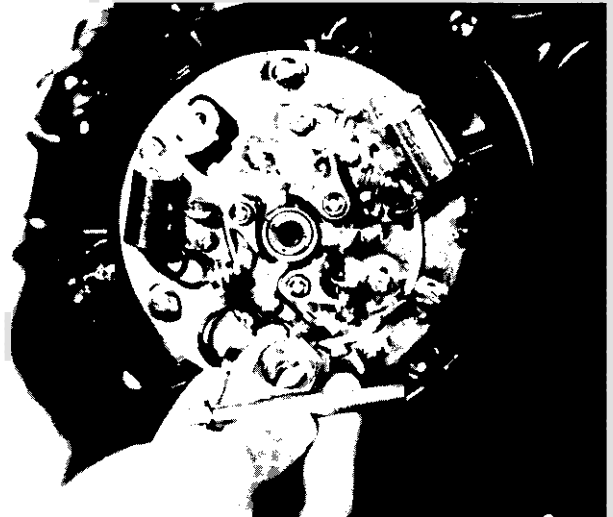


2. Remove clip holding shift shaft lever. Remove shift shaft.

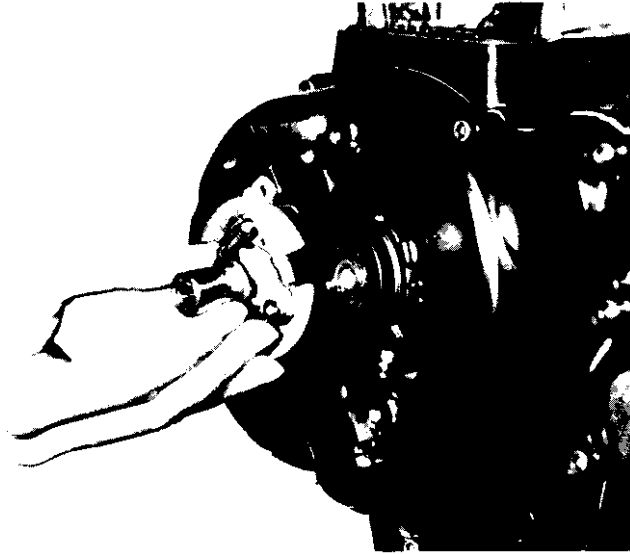
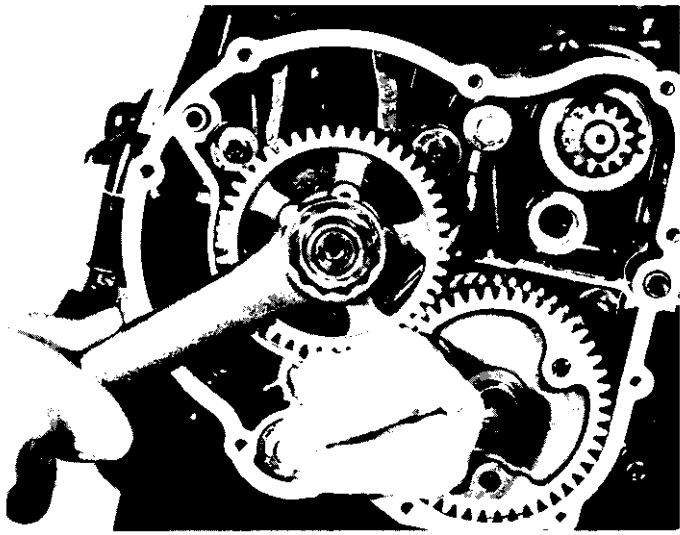


I. Governor Assembly Removal

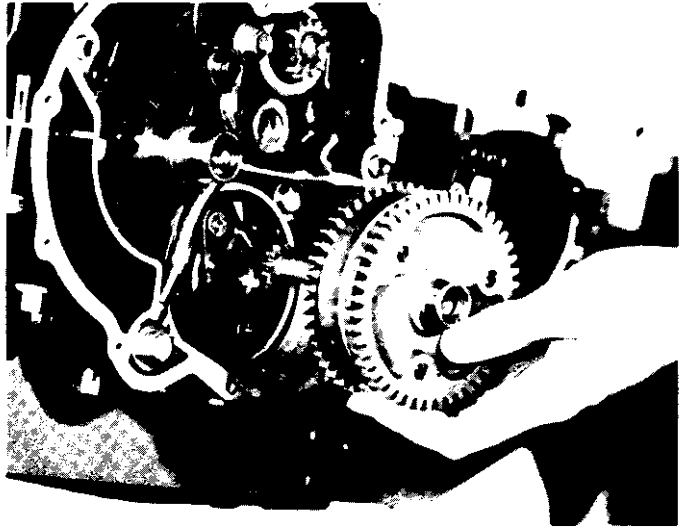
1. Remove bolt holding crankshaft turning nut from L.H. end of crankshaft.



2. Remove neutral light wire. Remove breaker assembly wiring harness from clamps on crankcase. Remove three (3) breaker plate holding screws and remove breaker assembly.
3. Remove governor assembly.



4. Remove starter clutch assembly



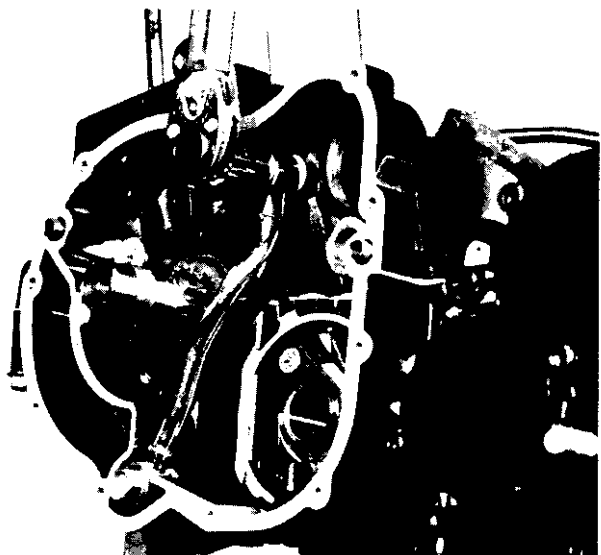
J. Electric Starter Removal

Remove L.H. crankcase cover.

2. Remove idler gear 1 and shaft.

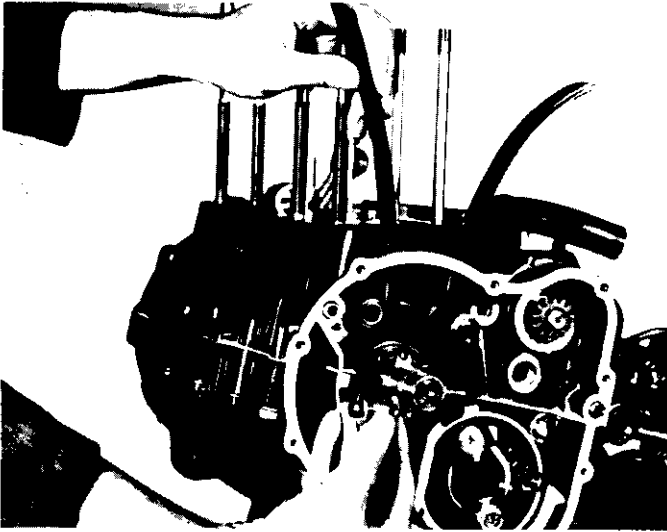


5. Remove oil delivery pipe,

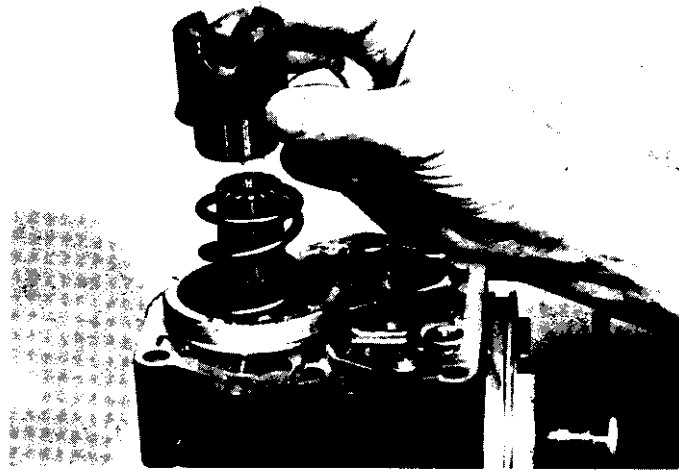
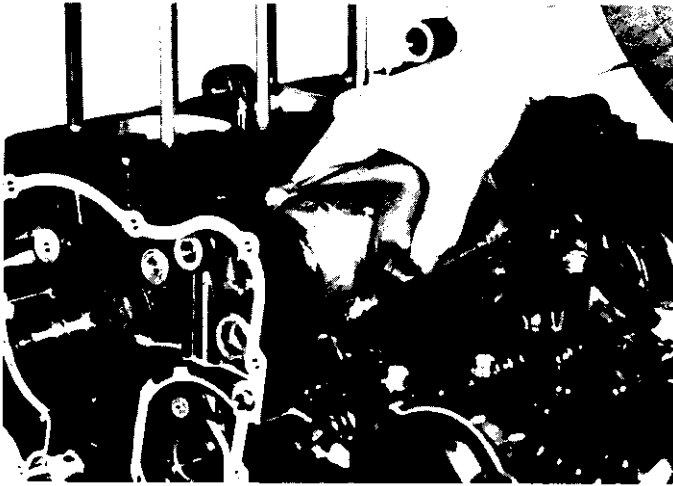


3. Place a folded rag between the kick idler gear two (2) and pump drive gear as shown. Remove pump drive gear nut and gear. Remove cam chain.

6. Remove cam chain dampers.



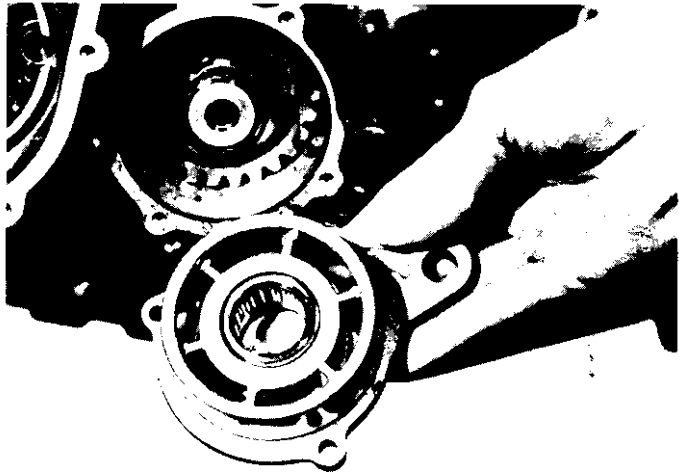
7. Remove two (2) starter motor securing bolts. Remove starter motor.



Middle Gear Case Disassembly is covered in the Shaft Drive, Section page 102.

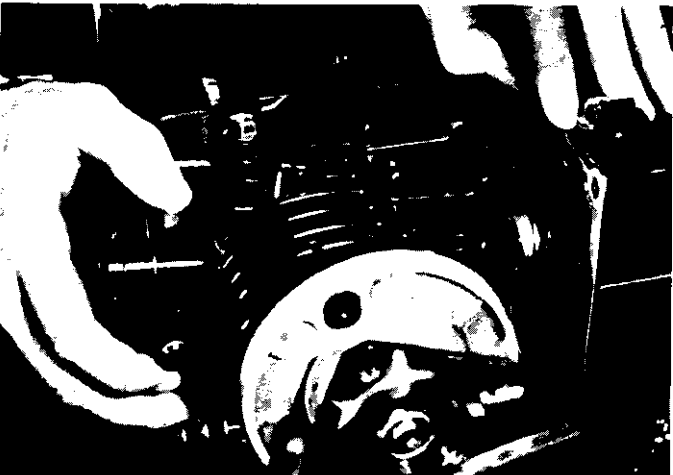
L. Transmission Bearing Housing Removal

Remove the transmission bearing housing bolts. Remove housing.



K. Middle Gear Removal

Remove seven (7) middle gear case securing bolts. Remove the middle gear case, drive cam and spring.



M. Breather Removal

Remove six (6) breather securing bolts. Remove breather.

