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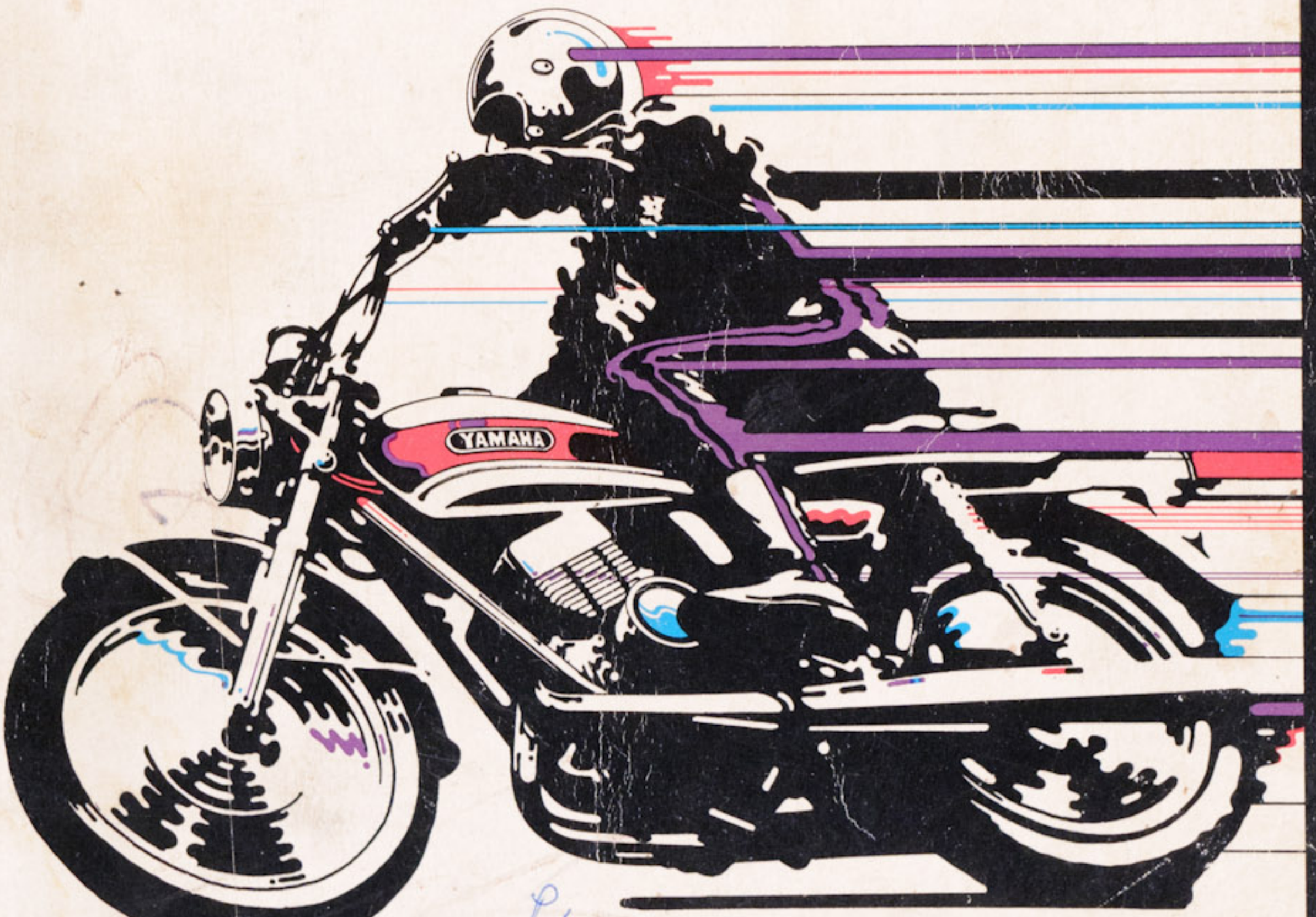
YAMAHA

SERVICE • REPAIR HANDBOOK

90-350cc Twins • 1965-1974



PLATE

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CLYMER PUBLICATIONS

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YAMAHA SERVICE • REPAIR HANDBOOK

90-350cc TWINS • 1965-1974

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CS3-C	200cc	1970	YM2	305cc	1967			

Year shown indicates the first year a model was produced

CHAPTER ONE

GENERAL INFORMATION

This book was written to help owners service and repair Yamaha twin cylinder motorcycles. The following machines are covered:

HS1	CS5	YM2-C
HS1-B	YDS3	YR1
YL1	YDS3-C	YR2
YL1-E	YDS5	YR2-C
LS-2	DS6	R3
YAS1	DS6-C	R3-C
YAS1-C	DS6-B	R5
AS2C	DS7	R5-B
YCS-1	RD250	R5-C
YCS1-C	RD250A	RD350
CS3-C	YM1	RD350A
CS3-B	YM2	

MODEL DESCRIPTION

The models covered are briefly described in this section. For detailed information, refer to Chapter Seven.

Models HS1, HS1-B

This motorcycle is powered by a 90cc engine which develops 4.9 horsepower at 8,000 rpm.

Model LS-2

This is a new 100cc, 10.5 horsepower twin introduced with the 1972 model.

Models YL1 and YL1-E

These machines are powered by 100cc engines developing 9.5 horsepower. The YL1-E is equipped with an electric starter.

Models YAS1, YAS1-C, and AS2C

The engines in these machines displace 125cc. Power output is 15 horsepower at 8,500 rpm in the YAS1, and 15.2 horsepower in the YAS1-C and AS2-C. The AS2-C is equipped with an alternator in place of the DC generator on the YAS1 and YAS1-C.

Models YCS-1 and YCS1-C

These models are powered by 3-port, 180cc engines which develop 21 horsepower at 8,000 rpm. The YCS1-C can be identified by the higher location of the exhaust pipes.

Models CS3-B, CS3-C, and CS5

These models feature electric starters and 5-port, 200cc engines which produce 22 horse-

power at 7,500 rpm. The exhaust pipes on the CS3-B are mounted lower than on the CS3-C. The CS5 is an improved version of the CS3 models and has a 22 horsepower engine, introduced with the 1972 model year.

Models DS6, DS6-B, DS6-C, and DS7

These machines are powered by 5-port, 250cc engines rated at 30 horsepower. The models may be distinguished by the location of the exhaust pipes. Model DS6-B pipes are mounted low; DS6-C pipes are mounted high. The DS7 is a refined version of the DS6's and has a 30 horsepower engine, introduced in 1972.

Models YDS3, YDS3-C, and YM1

The same basic 3-port, 250cc engine powers these machines. Model YM1 develops more power as a result of engine modifications which include increased bore, different cylinder head, and larger carburetors.

Models YDS5, YM2, and YM2-C

These models are similar, except for engine size. The YDS5 model has a 250cc, 3-port engine; the YM2 and YM2-C models have 305cc, 3-port engines.

Models YR1, YR2, and YR2-C

Models YR2 and YR2-C have 5-port, 350cc engines. The engine in the YR1 is of 3-port design. Model YR2-C can be distinguished by its high exhaust pipes.

Models R3 and R3-C

Both machines use 350cc, 5-port, 36 hp engines. The R3-C is a scrambler type version with higher exhaust pipes, an engine protection plate, and slightly different front fork tubes.

Models R5, R5-B, and R5-C

Models R5 and R5-B are equipped with 5-port, 360cc engines which develop 36 horsepower. Differences are mainly in styling. The R5-C introduced in 1972 is similar to the R5 and R5-B, with minor changes.

Models RD250, RD250A, RD350, and RD350A

Basically, all four models are similar, except that the RD350 series piston/cylinder bores are 10mm larger than the RD250 series. All four models have reed valve induction and 7-port cylinders. Both the RD250's produce 30 hp, while both RD350's produce 39 hp. All four models have a six-speed transmission. Both RD350's have hydraulically operated front disc brakes.

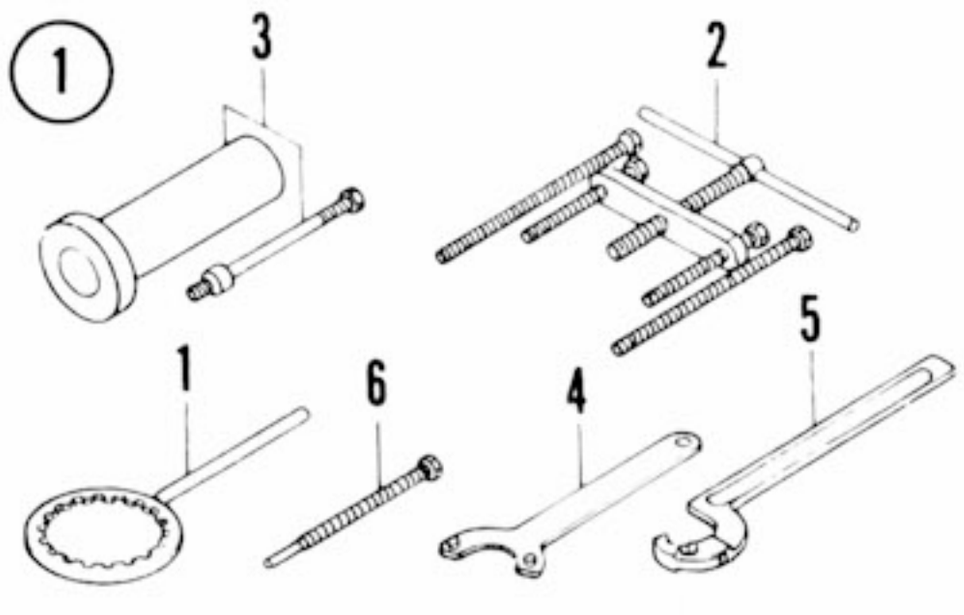
SERVICE HINTS

Most of the service procedures described are straightforward, and can be performed by anyone reasonably handy with tools. It is suggested however, that you consider your own capabilities carefully before attempting major work on precision parts. Crankshaft disassembly, for example, requires the use of a press. It would be wiser to have such an operation performed by a fully equipped shop rather than to try it with makeshift equipment. Some procedures require precision measurements, and unless you have the skills and equipment to make them, give the assignment to a professional.

Repairs will be faster and easier if your machine is clean. There are special cleaners for washing the engine and related parts. Brush or spray on the cleaning solution, let it stand, then rinse away with a garden hose. Clean all oily or greasy parts with cleaning solvent as you remove them. *Never use gasoline as a cleaning agent.* Gasoline presents an extreme fire hazard. Be sure to work in a well ventilated area when using *any* cleaning solvent. Keep a fire extinguisher handy, just in case.

Special tools are required for some service procedures. These tools may be purchased at Yamaha dealers. If you are on good terms with the dealer's service department, you may be able to use his. Representative samples of special tools are shown in **Figure 1**.

Much of the labor charge for repairs made by dealers is for removal and disassembly of other components to reach the defective part. It is frequently possible for you to do all of this yourself, then take the affected subassembly into the dealer for repair.



1. Clutch holding tool
2. Crankcase separating tool
3. Crankshaft installing tool
4. Flywheel magneto holding tool
5. New type exhaust ring nut wrench
6. Slide hammer

TOOLS

To properly service your motorcycle, you will need an assortment of ordinary hand tools. As a minimum, required hand tools include:

1. Combination wrenches
2. Socket wrenches
3. Plastic mallet
4. Small hammer
5. Snap ring pliers
6. Phillips screwdrivers
7. Pliers
8. Slot screwdrivers
9. Feeler gauges
10. Spark plug gauge
11. Spark plug wrench
12. Dial indicator

Electrical system servicing requires a voltmeter, ammeter, ohmmeter or other device for determining continuity, and a hydrometer for checking battery condition.

SAFETY HINTS

Professional motorcycle mechanics can work for years and never sustain a serious injury. If you observe the following rules of common sense and safety, you can also enjoy many safe hours servicing your bike. You can also hurt yourself or damage the machine if you ignore these rules.

1. Never use gasoline as a cleaning solvent.
2. Never smoke or use a torch in the area of flammable liquids, such as cleaning solvent in open containers.
3. Never smoke or use a torch in an area where batteries are charging. Highly explosive hydrogen gas is formed during the charging process.
4. If welding or brazing is required, remove the fuel tank to a safe distance, at least 50 feet away.
5. Be sure to use properly sized wrenches for nut turning.
6. If a nut is tight, think for a moment what would happen to your hand should the wrench slip. Be guided accordingly.
7. Keep your work area clean and uncluttered.
8. Wear safety goggles in all operations involving drilling, grinding, or use of a chisel.
9. Do not use worn tools.
10. Keep a fire extinguisher handy. Be sure that it is rated for gasoline and electrical fires.

CHAPTER TWO

THEORY, TROUBLESHOOTING, AND TUNING

This chapter discusses theory and troubleshooting of two-stroke engines, and the carburetors, electrical systems, and ignition systems used with them.

TWO-STROKE ENGINE PRINCIPLES

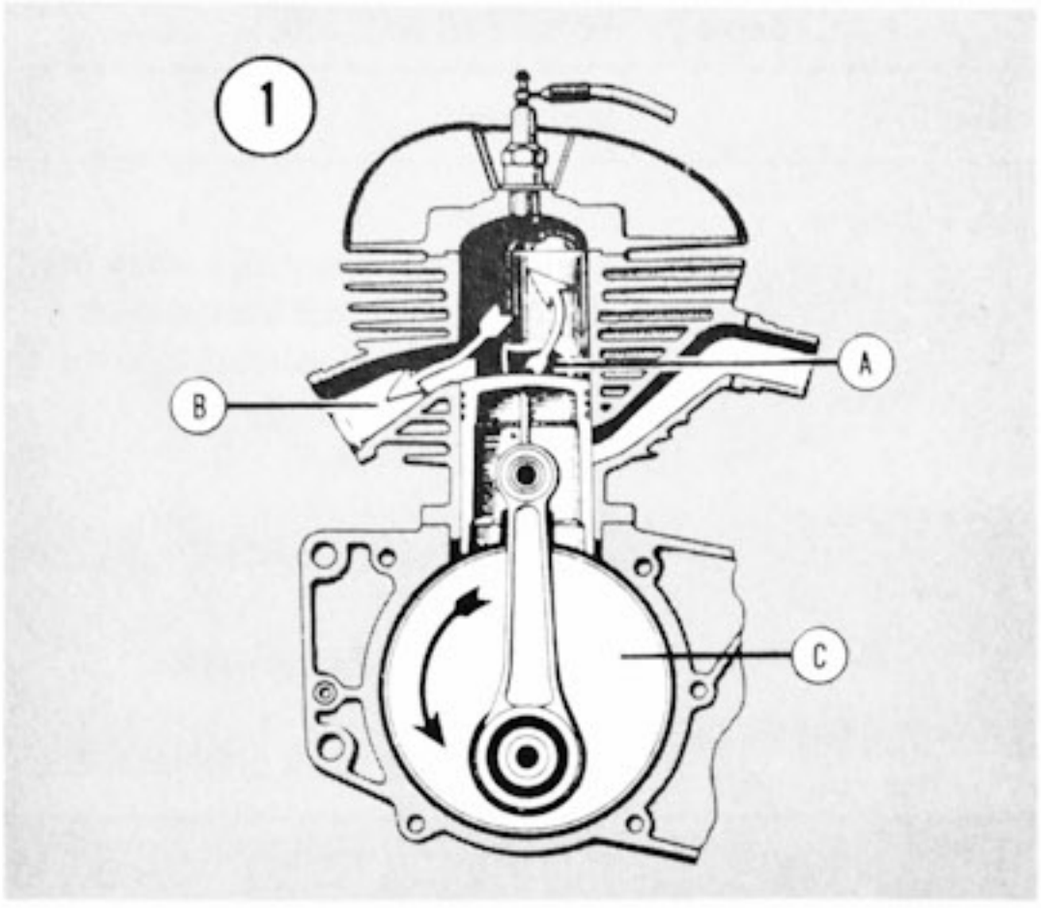
Figures 1 through 4 illustrate the four phases of the operating cycle of a two-stroke engine. Notice that unlike conventional four-stroke engines found in automobiles, the two-stroke engine has no camshaft, timing gears, or valve mechanism. All valving action is accomplished by the piston as it moves up and down, thereby opening and closing ports in the cylinder and crankcase. Another major difference between the two- and four-stroke engine is that the crankcase in the two-stroke engine must be sealed, since it doubles as a passageway through which fuel mixture reaches the combustion chamber.

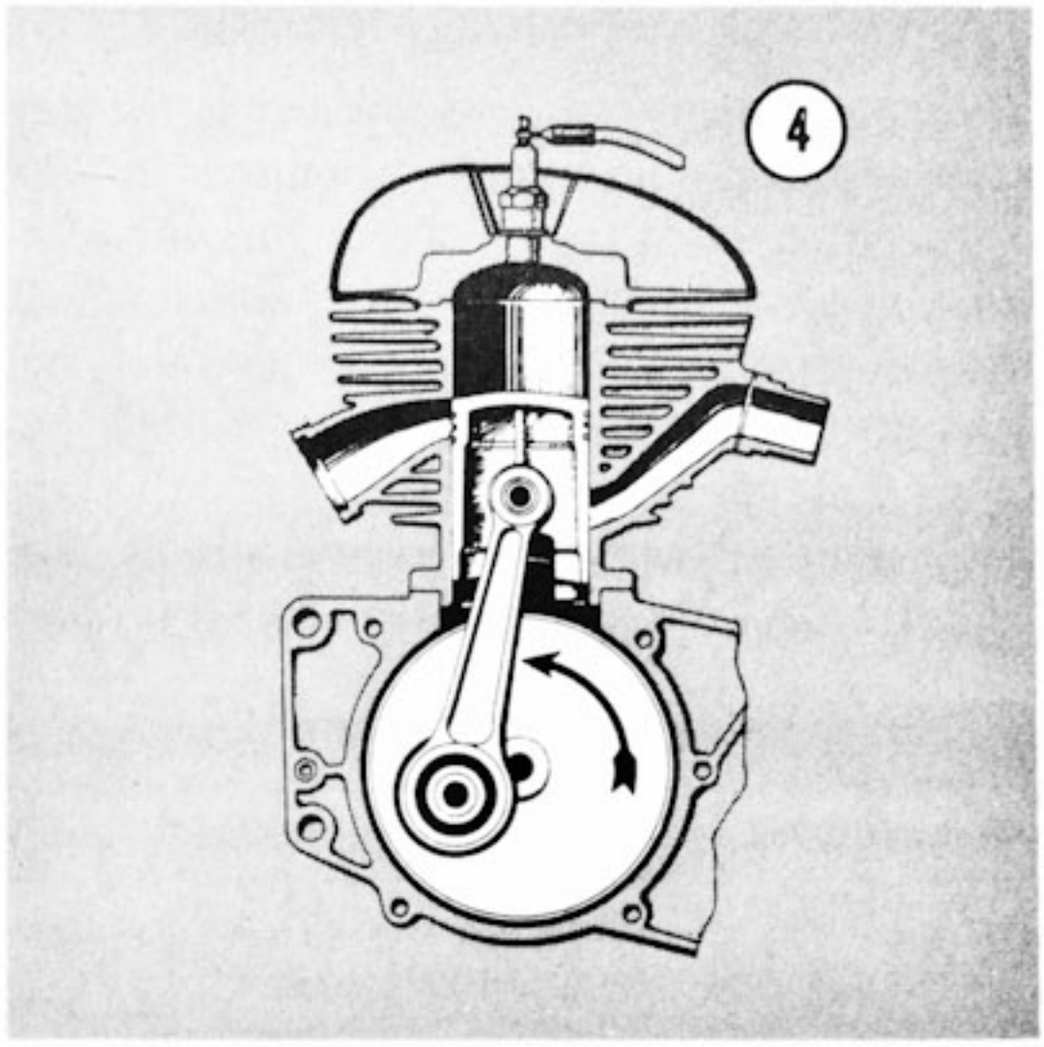
During this discussion, assume that the crankshaft is rotating counterclockwise. In Figure 1, as the piston travels downward, a transfer port (A) between the crankcase and the cylinder is uncovered. The exhaust gases leave the cylinder through the exhaust port (B), which is also opened by the downward movement of the piston. A fresh fuel/air charge, which has previously been compressed slightly, travels from the crankcase (C) to the cylinder through the transfer port (A) as the port opens. Since the incoming charge is under pressure, it rushes into the cylinder quickly and helps to expel the exhaust gases from the previous cycle.

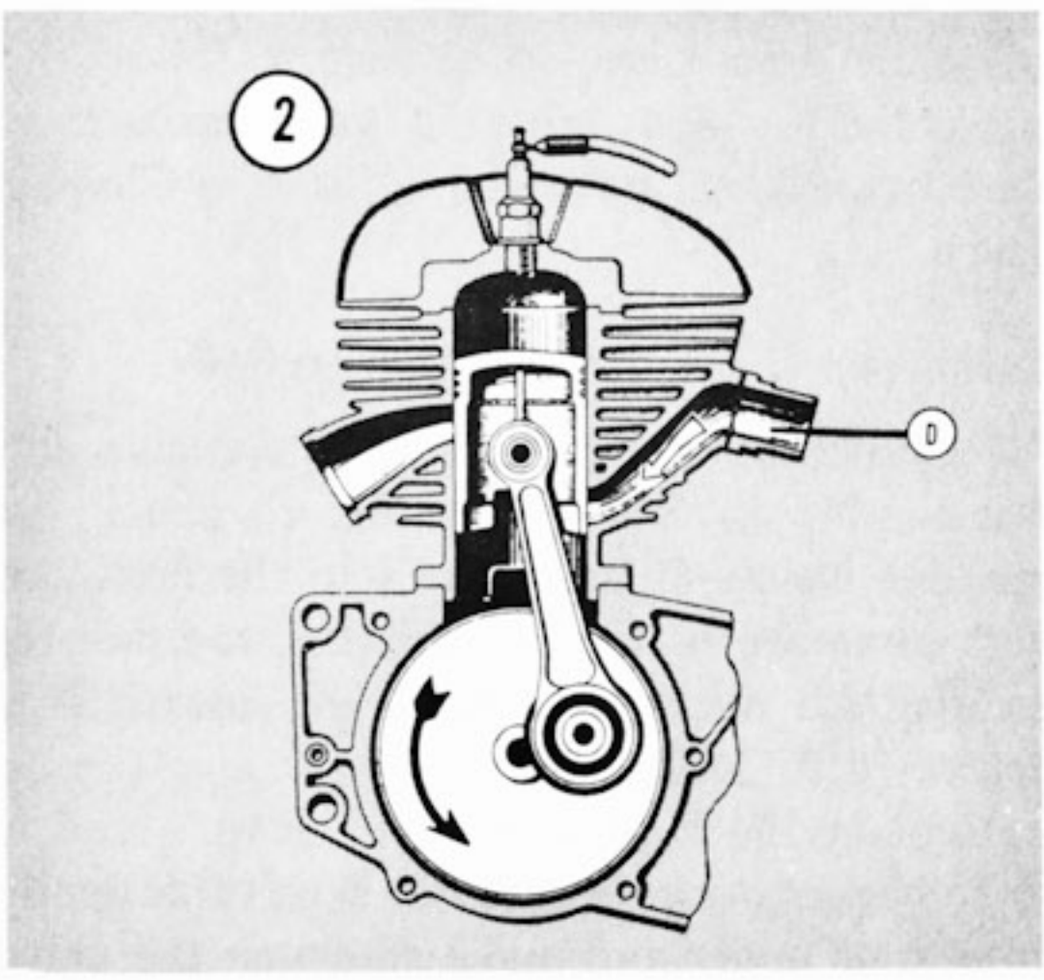
Figure 2 illustrates the next phase of the cycle. As the crankshaft continues to rotate, the piston moves upward, closing the exhaust and transfer ports. As the piston continues upward, the fuel/air mixture in the cylinder is compressed. Notice also that a low pressure area is created in the crankcase at the same time. Further upward movement of the piston uncovers the intake port (D). A fresh fuel/air charge is then drawn into the crankcase through the intake port because of the low pressure created by the upward piston movement.

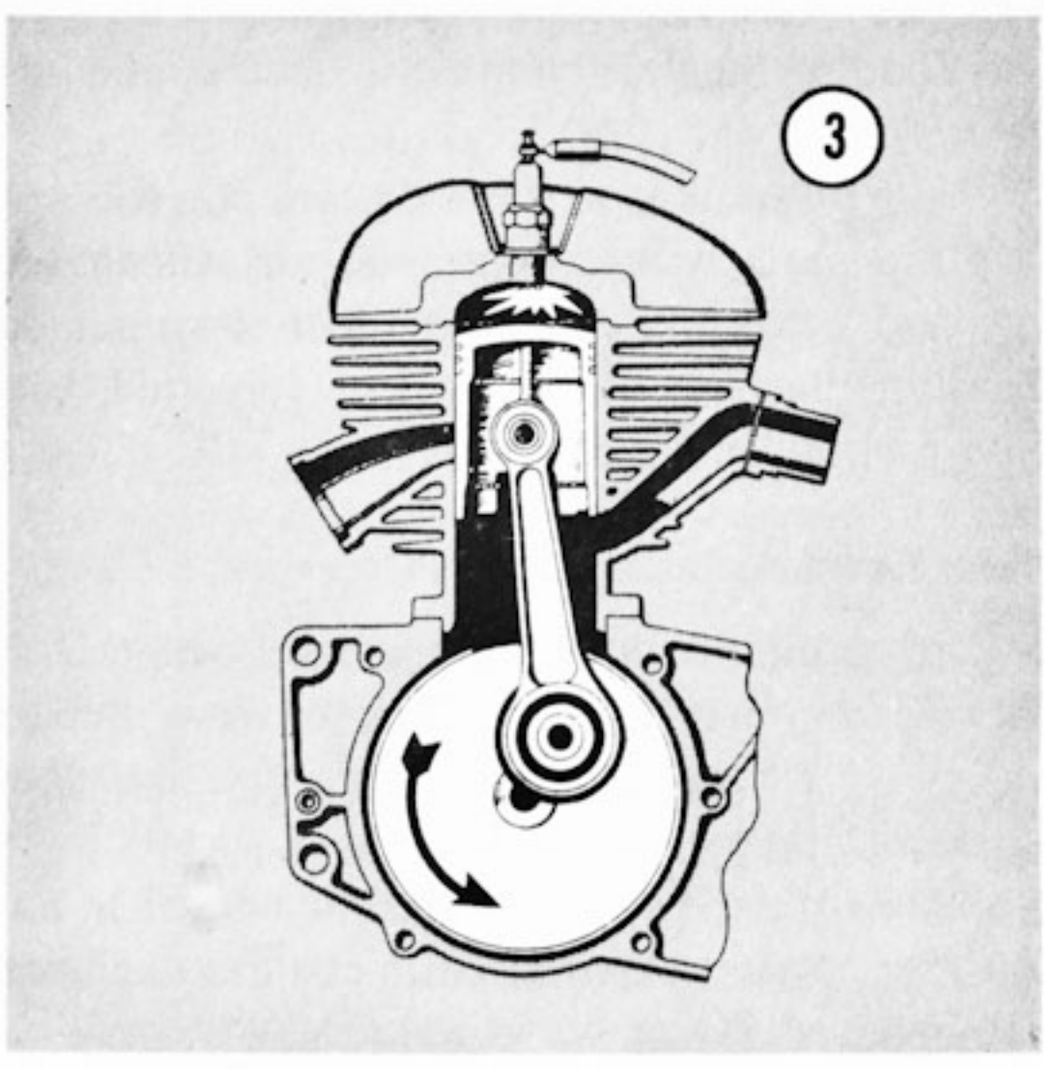
The third phase is shown in Figure 3. As the piston approaches top dead center, the spark plug fires, igniting the compressed mixture. The piston is then driven downward by the expanding gases.

When the top of the piston uncovers the exhaust port, the fourth phase begins, as shown in Figure 4. The exhaust gases leave the cylin-









der through the exhaust port. As the piston continues downward, the intake port is closed and the mixture in the crankcase is compressed in preparation for the next cycle.

It can be seen from the foregoing discussion that every downward stroke of the piston is a power stroke. Twin cylinder engines are so arranged that the cylinders fire alternately, to produce two power strokes for each revolution of the crankshaft.

ENGINE LUBRICATION

The two-stroke engine cannot receive its lubrication from an oil supply in the crankcase. Oil splash in the crankcase obviously would be carried with the fuel/air charge into the cylinder.

One common method for lubricating two-stroke engines is to mix lubricating oil with the gasoline. As the fuel mixture enters the crankcase, the oil is carried with it to the moving parts. This method results in high consumption of oil, and also causes oil starvation during periods when the engine runs with the throttle closed, as when descending a long hill.

Yamaha's Autolube system uses an engine-driven oil pump to supply oil from a separate tank to the engine. The output from the pump is controlled both by engine speed and throttle position, and thus supplies the proper amount of oil to the engine under all operating conditions.

ENGINE TROUBLESHOOTING

Proper diagnosis of malfunctions is the key to repair. Three things are required for the engine to function—the correct fuel/air mixture, compression, and a properly timed spark. If these three are present, the engine will run properly. Troubleshooting, then, merely becomes a matter of determining to what degree one or more of these three essentials is lacking. **Table 1** will help you isolate a no-start condition.

Table 1 NO-START CONDITION

Probable Cause	How to Check
No fuel	Fill fuel tank or clean fuel line. Is fuel petcock open?
Too much fuel	Check for fuel-wetted spark plug. Try tapping the associated carburetor to dislodge dirt from float needle. Crank engine with throttle full open. Is the air cleaner dirty?
No spark	Remove each spark plug and check for fouling. Hold each spark lead ¼ inch from cylinder head. Crank engine with ignition on. A fat blue-white spark should jump the gap.
No compression	Hold your finger over each spark plug hole and crank engine. Is your finger blown away?

These simple checks should narrow the problem down into one of the three main areas. After you have isolated the problem, read the applicable troubleshooting section.

FUEL SYSTEM TROUBLESHOOTING

For an engine to run properly, it must be supplied with fuel and air in the proper proportions. A mixture in which there is an excess of fuel is said to be rich. A lean mixture is one which contains insufficient fuel. It is the carburetor's function to supply the proper mixture to the engine. Symptoms resulting from improper mixtures are listed in **Table 2**. If these conditions exist, carburetor overhaul may be indicated.

Table 2 IMPROPER MIXTURE

Condition	Symptom
Rich Mixture	Rough idle Hard starting, especially when hot "Blubbering" under acceleration Black deposits in exhaust pipe Gas-fouled spark plug Poor gas mileage
Lean Mixture	Backfiring Rough idle Overheating Hesitation upon acceleration Loss of power White color on spark plug insulator

CARBURETOR

Figures 5 and 6 are exploded views of a typical carburetor on these machines. Service procedures for the carburetors are similar, but there are some differences, so be sure to follow the instructions which apply to your carburetor. Carburetor usage by model is listed in Chapter Seven.

Carburetor Disassembly and Inspection

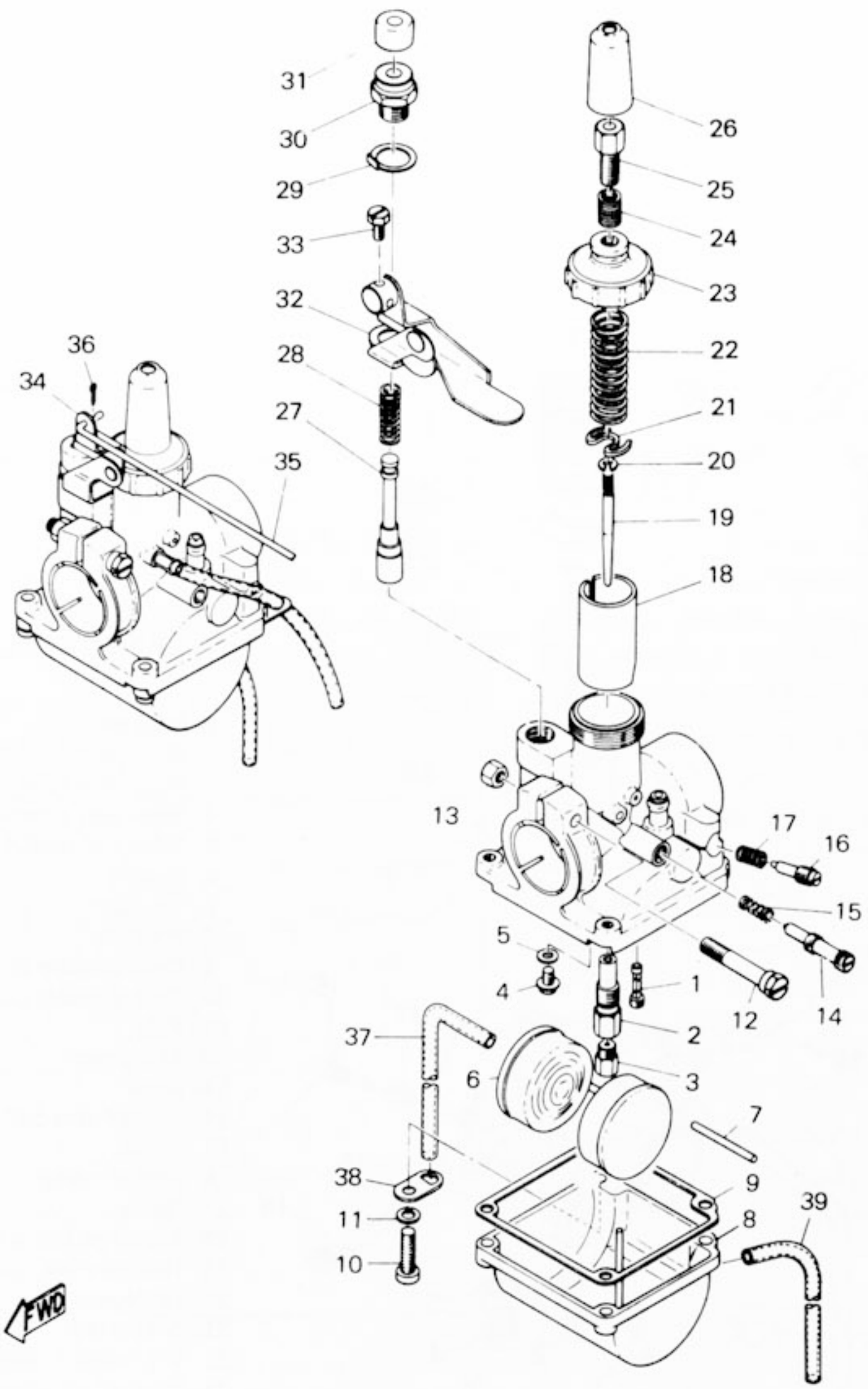
Remove the carburetor from the engine and disassemble it. Shake the float to check for gasoline inside. If fuel leaks into the float, the float chamber fuel level will rise, resulting in an overrich mixture. Replace the float if it is deformed or leaking.

Replace the float valve if its seating end is scratched or worn. Depress the float valve gently with your finger and make sure that the valve seats properly. If the float valve spring is weak, fuel will overflow, causing an overrich mixture and flooding the float chamber whenever the fuel petcock is open.

Clean all parts in carburetor cleaning solvent. Dry the parts with compressed air. Clean the jets and other delicate parts with compressed air after the float bowl has been removed. Use new gaskets upon reassembly.

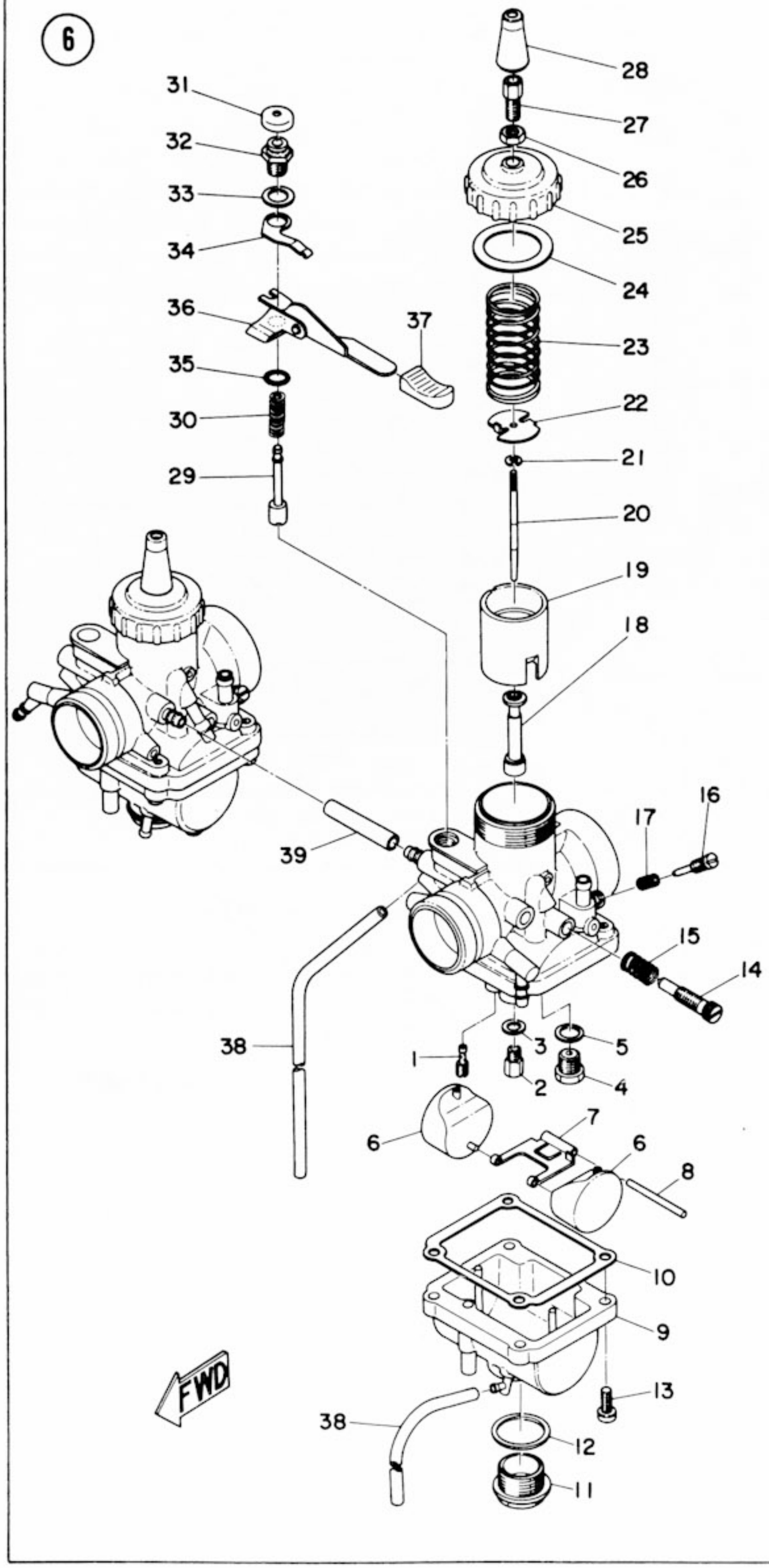
Float Level Adjustment

The carburetor float level was set properly at the factory, but rough riding, a worn needle valve, or a bent float arm can cause the float level to change. If the float level is too high, a rich mixture results. If the float level is too low, the resulting lean mixture can cause engine damage.



TYPICAL CARBURETOR

1. Pilot jet
2. Main nozzle
3. Main jet
4. Valve seat assembly
5. Valve seat washer
6. Float
7. Float pivot shaft
8. Float chamber body
9. Float chamber gasket
10. Pan head screw
11. Spring washer
12. Body fitting screw
13. Nut
14. Throttle stop screw
15. Throttle stop screw spring
16. Pilot air screw
17. Pilot air screw spring
18. Throttle valve
19. Jet needle
20. Jet needle clip
21. Clip retainer
22. Throttle valve spring
23. Mixing chamber top
24. Cable adjusting spring
25. Cable adjusting screw
26. Cap
27. Starter plunger
28. Plunger spring
29. Starter lever plate
30. Plunger cap
31. Plunger cap cover
32. Starter lever, left
33. Rod screw
34. Starter lever, right
35. Starter lever rod
36. Cotter pin
37. Air vent pipe
38. Plate
39. Overflow pipe



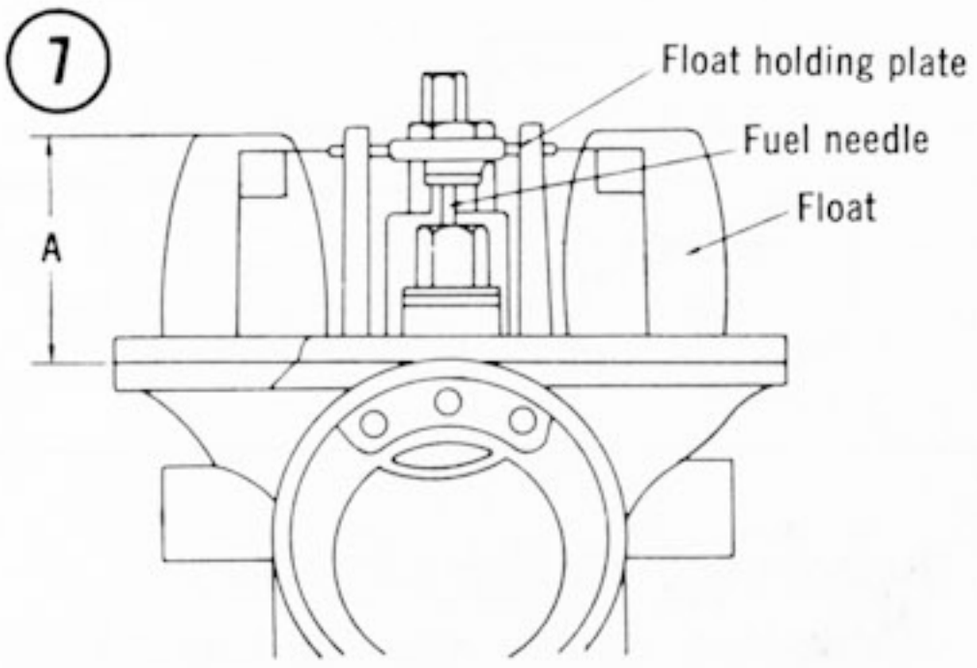
TYPICAL CARBURETOR

1. Pilot jet
2. Main jet
3. Main jet washer
4. Valve seat assembly
5. Valve seat gasket
6. Float
7. Float arm
8. Float pin
9. Float chamber body (float bowl)
10. Float chamber gasket
11. Plug
12. Plug gasket
13. Screw
14. Throttle stop screw
15. Spring
16. Pilot air screw
17. Spring
18. Needle jet/main nozzle
19. Throttle valve (slide)
20. Jet needle
21. Needle clip
22. Clip retainer/spring seat
23. Slide return spring
24. Gasket
25. Mixing chamber top
26. Lock nut
27. Cable adjuster
28. Cap
29. Starter plunger
30. Plunger spring
31. Cover
32. Plunger cap
33. Gasket
34. Starter lever plate
35. O-ring
36. Starter lever
37. Cap
38. Air vent tube
39. Starter system connecting tube

There are two types of float assemblies used on the twin cylinder models. First is the inter-connected floats design, with a bar connecting both floats into one unit. Figure 5 has already identified this style. Figure 6 has identified the independent floats design. These slide on pins attached to the float chamber body, and remain separate from the carburetor mixing chamber.

To set float level on the inter-connected floats system, refer to **Figures 7 and 8**. Remove the float chamber body, then invert the mixing chamber. Do not press down on the floats as this would compress a special spring in the base of the fuel needle (Figure 7). Measure distance (A) from the float to the gasket surface. Compare this distance to specifications listed in **Table 3**. Readjust the float level if more than .02 inch (.5mm) different than specifications listed. Bend the float arm tang shown in Figures 6 and 7 to raise or lower the float unit.

7



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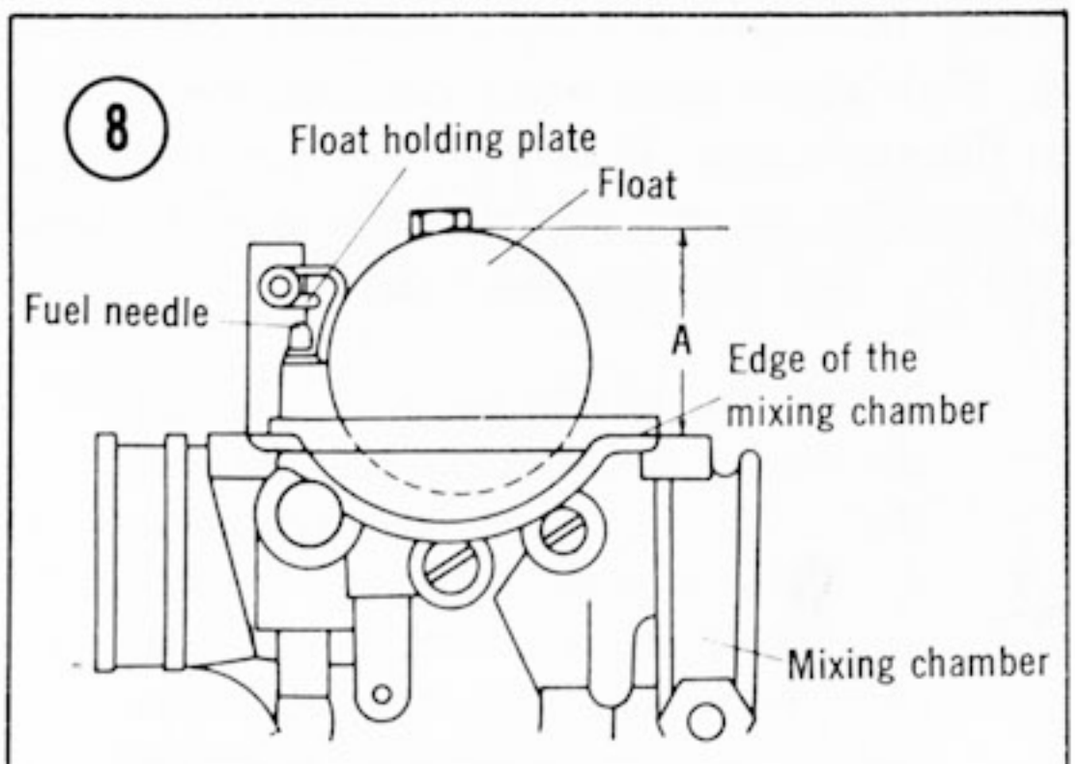


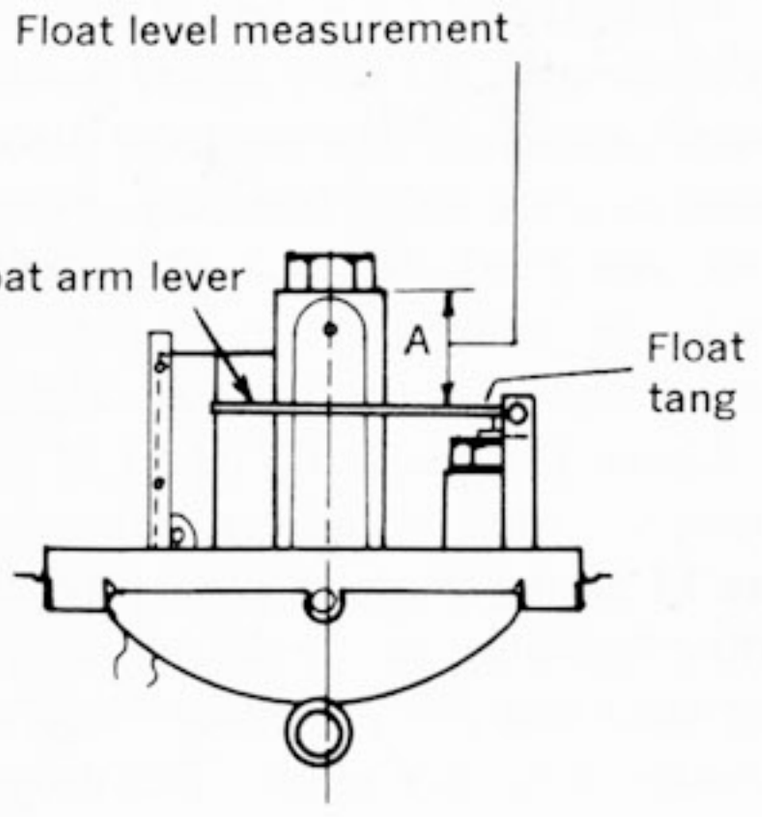
Table 3 FLOAT LEVEL ADJUSTMENT

Carburetor	Distance A	
VM16SC	0.95 inch	(24mm)
VM17SC	0.89 inch	(22.5mm)
VM18SC	0.91 inch	(23mm)
VM20SC	0.86 inch	(21.7mm)
VM24SC	1.00 inch	(25.4mm)
VM26SC	1.01 inch	(25.7mm)
VM26SC*	.59 inch	(15mm)
VM28SC	1.00 inch	(25.4mm)
VM28SC*	.59 inch	(15mm)

*Independent floats have different measurements

To set float level on the independent floats system, refer to **Figure 9**. In this adjustment, you do not touch the floats. Remove the float mixture chamber and invert the remaining carburetor assembly. Measure distance (A). Be sure not to compress the spring in the back of the needle. Readjust the float level if (A) is more than .02 inch (5mm) different than specifications listed in Table 3. Bend the float arm tang shown in Figure 9.

9



Idle Mixture/Idle Speed Adjustment

To adjust the idle mixture and idle speed on the various models, refer to **Table 4**. First set the idle mixture screw by turning it in until it seats lightly, then back it out the number of turns specified. Finally, adjust the idle speed as indicated. At higher altitudes, approximately 3,000 feet (1,000 meters), it may be advisable to back out the mixture screw an additional ¼ turn.

Table 4 IDLE SPEED/MIXTURE ADJUSTMENT

Carburetor Model	Idle Mixture	Idle Speed
VM16SC	1½	1,100-1,200 rpm
VM17SC	1¾	1,100-1,200 rpm
VM18SC	2	1,100-1,200 rpm
VM20SC	2	1,050-1,200 rpm
VM24SC	1½	1,050-1,150 rpm
VM26SC	1½	1,150-1,250 rpm
VM28SC	1¾	1,300-1,400 rpm

A suggested method for adjusting the idle speed is to warm up the engine, then stop it and disconnect either spark plug lead. Restart the engine and very slowly reduce the idling speed until the engine just dies. Then repeat this procedure for the opposite cylinder. Finally adjust both idle speed screws equally to achieve the specified rpm.

Throttle Cable Free-play

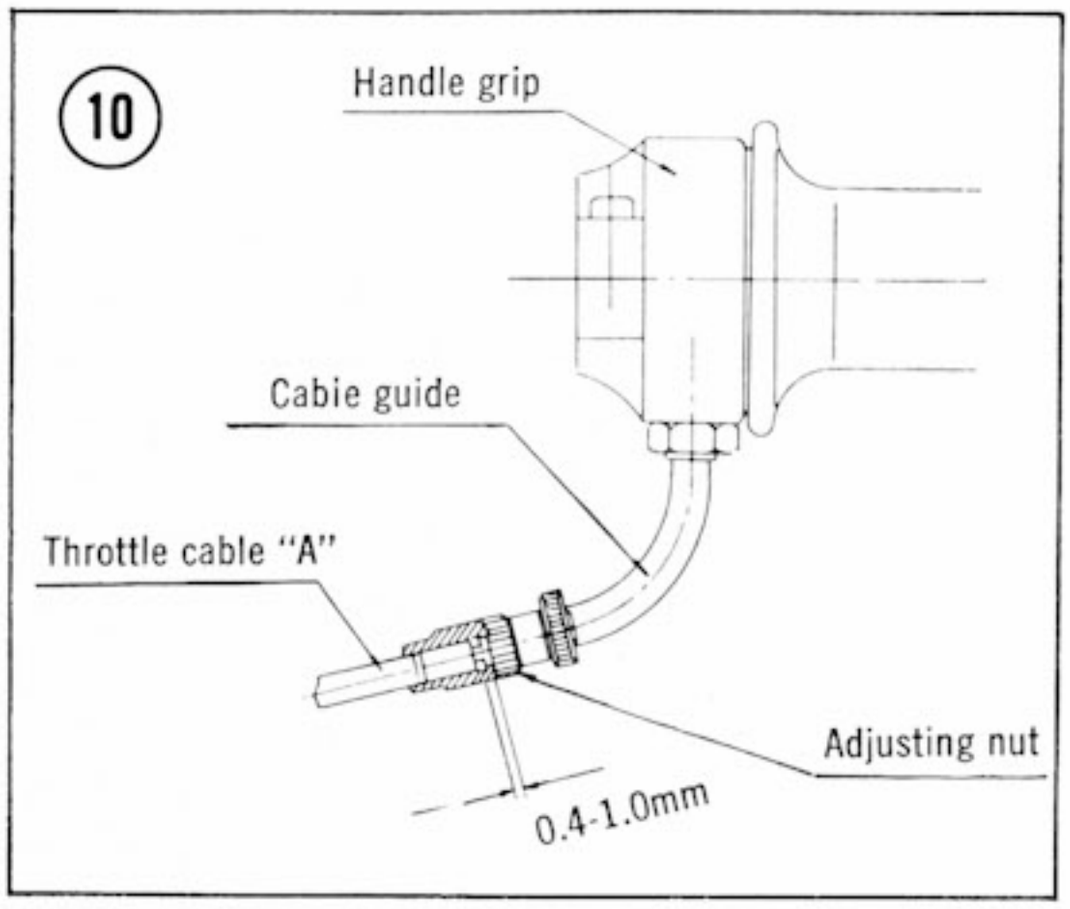
Prior to synchronizing the carburetors, check for adequate throttle cable free-play at the throttle grip and on the top of each carburetor.

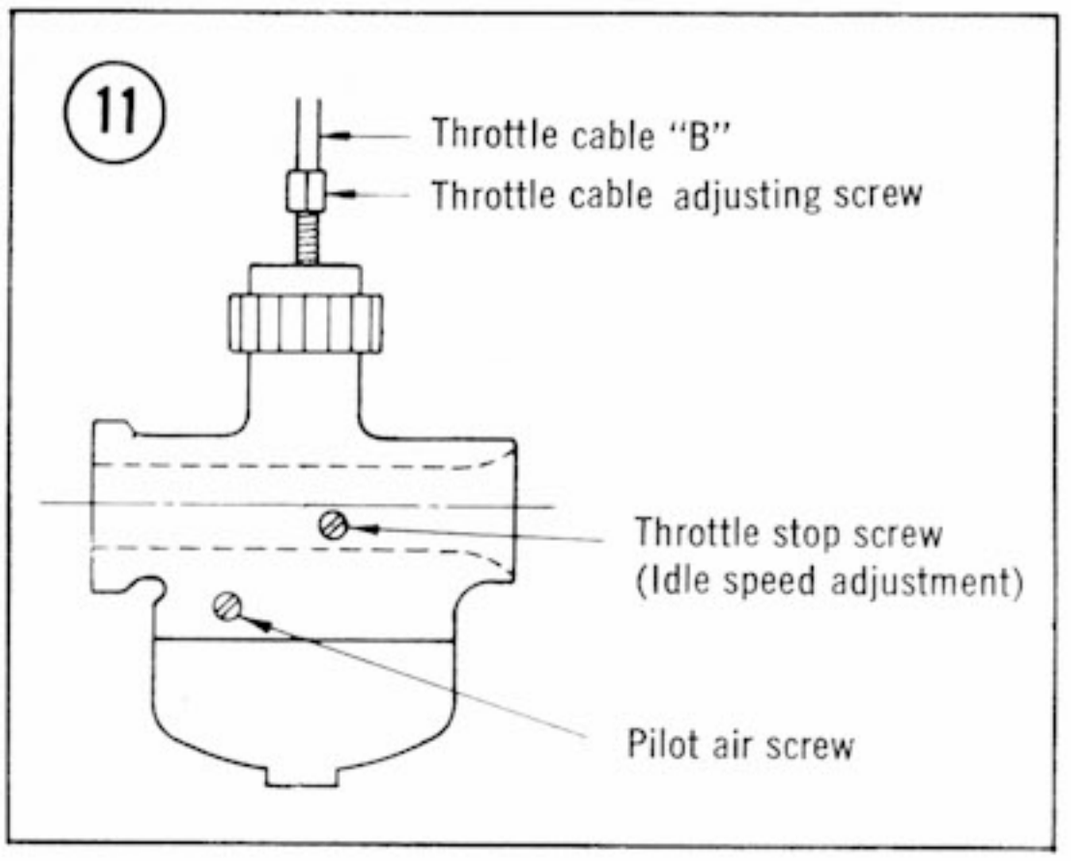
First, check free-play at the throttle grip. With the grip at a fully closed position, slide the outer cable housing away from the grip to determine existing cable free-play. **Figure 10** shows that you need .04 inch (1mm) free-play. To make an adjustment, loosen the lock nut as shown and twist the adjuster. Tighten lock nut.

Check for .04 inch (1mm) of throttle cable free-play where it enters carburetor cap. **Figure 11** shows where to check. To determine existing free-play, gently lift the outer cable housing until you feel resistance. Now let the cable housing drop until seated. This dropped distance is the free-play. To make a change, loosen the lock nut and screw the adjuster in or out to obtain correct free-play. Perform this adjustment to both carburetors.

Carburetor Synchronization

Power output from the cylinders will be unbalanced unless both carburetors are synchronized. If one cylinder receives more fuel/air mixture from its associated carburetor than does the other cylinder, overall poor performance will result.





1. Remove both air filter connections.
2. Rotate the throttle grip to the full open position.
3. Look into the carburetor bores as you slowly rotate the throttle grip to the closed position. It may be helpful to use a small mirror to do so.
4. Both slides must enter the carburetor bore at the same time. If they do not, use the cable adjuster at the top of the carburetor to raise or lower one slide to match the other.

NOTE: *On the HS1 and HS1-B models the slides will not lift entirely up out of the carburetor bores. This is due to special factory slide design. To check synchronization, reach into both carburetor bores and feel that both slides start to drop simultaneously when the throttle is twisted from full open toward idle position.*

Both carburetors must be straight up and down. If tipped, this will alter the float level, causing improper fuel supply. Slide up the rubber caps on top of each carburetor (if installed), then lay a straightedge across the tops of both carburetors. The straightedge must touch completely across both tops. If not, loosen the carburetor cinch bolts and twist the carburetors until you achieve complete contact. Retighten the cinch bolts, then double-check the setting.

Throttle Cable Replacement

Figure 12 shows the entire cable assembly. To replace any cable requires disconnecting the entire assembly at points (1), (2), (3), (4), and (5), as described in the following steps.

At the carburetors:

1. Unscrew the tops off both carburetors and lift out the slides.
2. Unhook each throttle cable from each slide. You must lift the spring out of the slide, then remove the butterfly-shaped needle retaining plate. Finally, grip the wire, push down to unseat its end, slide the wire over to the larger hole in the slide and lift out.

CAUTION

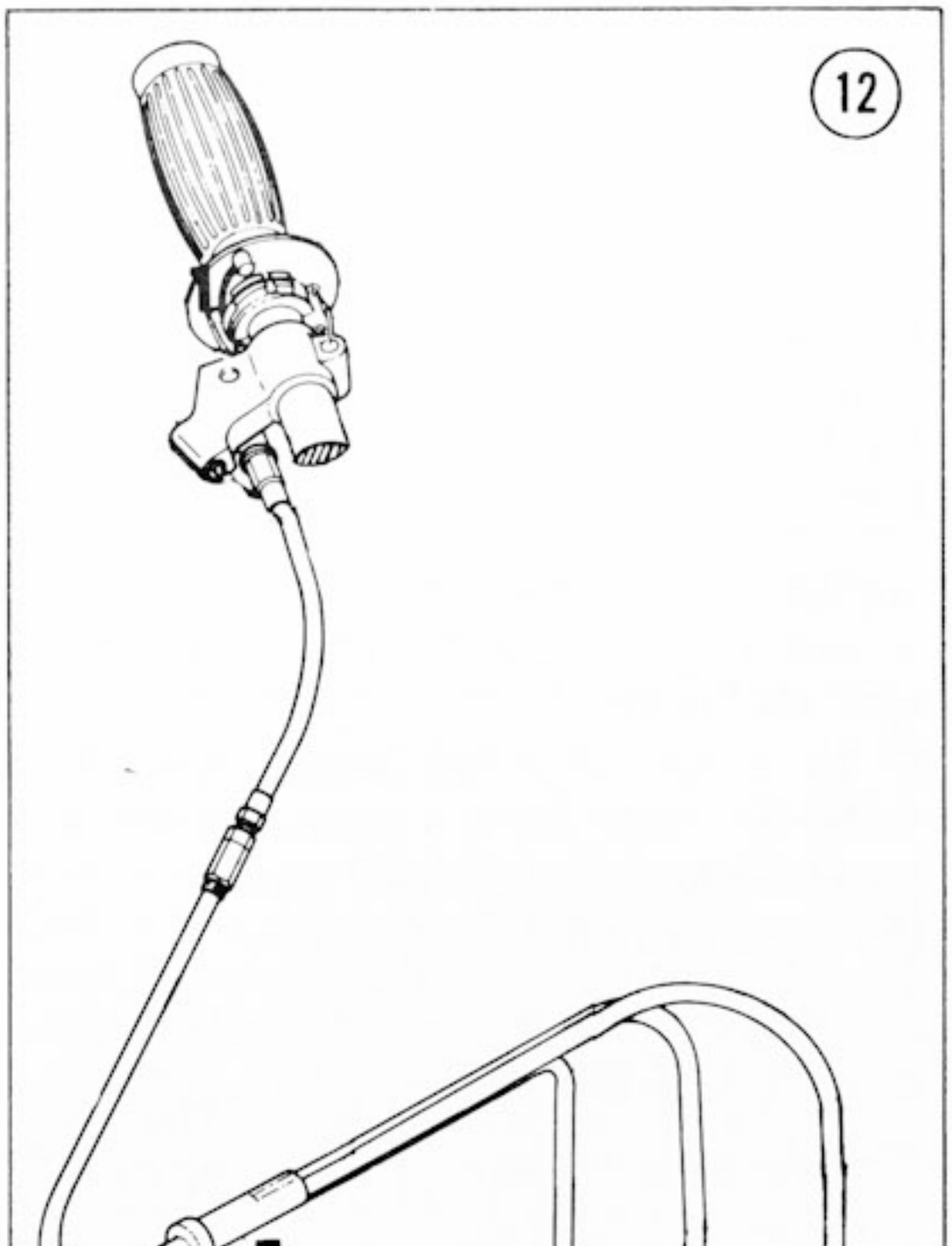
When inserting the slide back into its carburetor, the 'cutaway' section shown in **Figure 13** *must face back towards the air cleaner. If installed improperly, the slide can hang up in the full open throttle position. Make sure the slide drops down fully into the carburetor.*

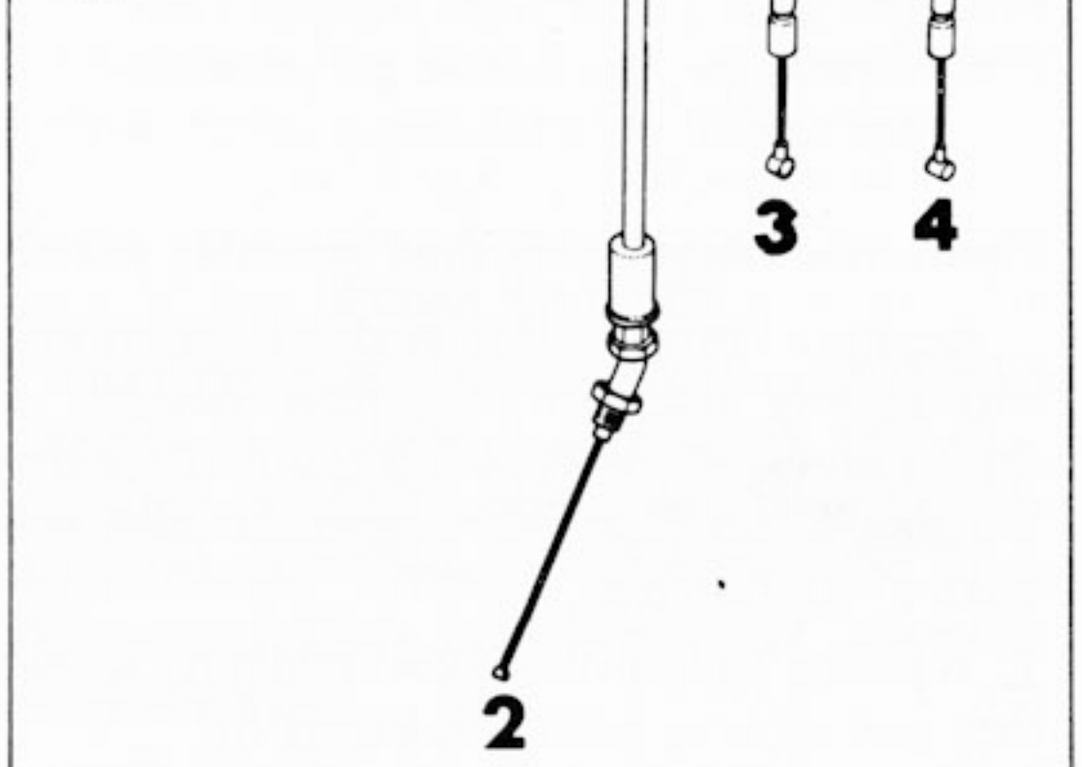
At the throttle grip:

1. Remove both screws that hold the throttle grip retaining caps together, then pull the caps apart for access to the cable end.
2. Slide the end of the wire from its anchor hole in the actuator. For proper installation, notice which direction it is wound around the actuator channel.

At the Autolube pump:

1. Remove the Autolube pump cover. On the YDS3 series, YDS5, DS6, YM1, and YM2-C,





this cover is located on the engine's left side. On all other models this cover is mounted on the right side.

2. Unhook the Autolube wire. You must twist the pulley to provide slack in the wire, then slip the end out of its anchor hole in the pulley. Notice the direction this wire is wound around the pulley to ensure proper installation at a later time.

At the cable junction:

1. Grasp both ends of this junction and pull it apart (5, Figure 12).

2. To replace any cable, unhook its end from the white plastic junction piece, pull the cable out of the junction box, slide the new cable in, and hook it onto the white piece.

NOTE: *1. On some models the cables from the junction box to each carburetor are not equal in length. When buying a replacement cable, specify left or right cable.*
2. After any cable has been replaced, you must adjust cable free-play, carburetor synchronization, and Autolube cable.

Carburetor Disassembly (and assembly notes)

Among all twin cylinder models there are only two slightly different carburetor designs, as shown previously in Figures 5 and 6. Since they are almost identical, only one disassembly procedure will be given.

1. Remove all four float bowl retaining screws, then pull off float bowl (10, Figure 5).

If your model has independent floats, these will be located on pins inside the float bowl. Slide these floats off the pins. When reinstalling the floats, be sure the pin on the side of the float faces in and down (6, Figure 6).

If your carburetor has inter-connected floats, just remove the float bowl.

2. Turn the carburetor upside down, then pull out the float pin. This will free the float arm (or float assembly) which can be set aside.

3. Loosen and remove the fuel valve (also called float valve or needle valve). See (4), Figure 6. Take care to immediately remove the fuel needle that fits loosely in the fuel valve.

4. To remove the pilot jet (1, Figure 5), requires a narrow flat-bladed screwdriver.

5. Unscrew the main jet (3, Figure 5), from the base of the needle jet.

NOTE: *A brass washer fits over the main jet threads, but might remain inside the carburetor during jet removal. This spacer must be in place when the main jet is installed.*

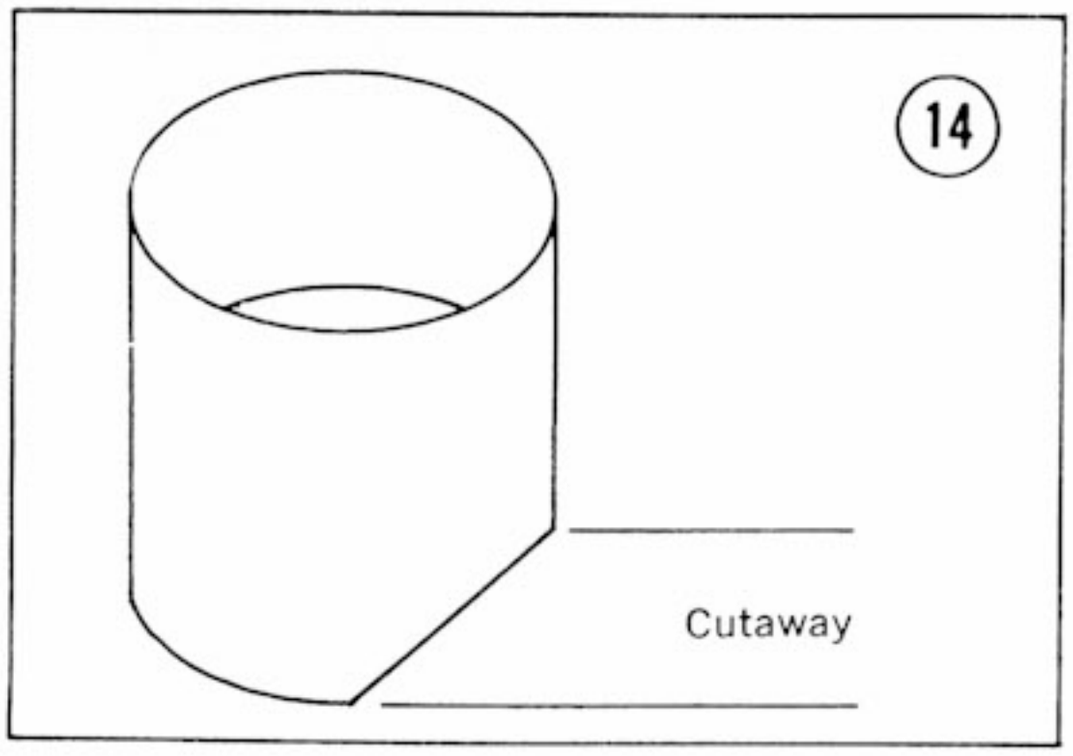
6. Remove the throttle stop screw and idle mixture screw (also called a pilot air screw). The larger screw is the throttle stop screw.

If the carburetor is to be placed in cleaning solvent, remove the starter jet system. Solvent will ruin the rubber-tipped plunger and internal O-ring. The starter cap (30, Figure 5) must be unscrewed before pulling the starter plunger out.

Mixture Control Components

Throttle Opening, 0-⅛: The pilot jet controls fuel supply. The pilot air screw controls air supply. Normally there is no reason to differ from factory recommended settings.

Throttle Opening, ⅛-¼: The throttle slide cutaway controls fuel/air mixture (**Figure 14**). The higher this cutaway section is, the leaner the mixture is. This rarely needs changing on standard machines.



Throttle Opening, ¼-¾: Fuel supply is mainly controlled by needle jet and jet needle position. A needle clip fits into one of five grooves in the top of the needle. Where this clip is placed determines jet needle position. The top groove is called the #1 clip position. To make mid-

range fuel mixture richer, place the clip in a lower groove. This raises the needle and allows more fuel to pass. To get a leaner mixture, raise the clip. Clip positions are listed in Chapter Seven under *Carburetor*. If the jet needle number is, for example, 5I4-3, the last number indicates clip position. Put the clip in the #3 groove, counting from the top.

Sometimes a clip position change is necessary. However, if you must change clip location more than one groove away from the recommended setting to get proper engine performance, check for a mechanical malfunction.

Throttle Opening, ¾-full: The main jet controls fuel supply. Main jet size number is stamped on the side or end of the jet. Larger numbers provide a richer mixture. A change in one main jet size to obtain a more correct spark plug color is OK. If a main jet two or more sizes larger or smaller is needed to get proper performance, consider troubleshooting. Always change main jets one size at a time.

Main jet size numbers differ between jets above and below size #100. See **Table 6** for details.

Table 6 MAIN JET SIZES

#100 and below		#100 and above
#90	2 steps leaner	
#95	1 step leaner	
#100	Factory standard	#100
	1 step richer	#110
	2 steps richer	#120

Access to the main jet differs between the two types of carburetors. On the R5 series, R250 series, DS7, and RD350 series, a removable screw cap in the bottom of the float bowl permits main jet removal without removing any other parts. On all other twin models you must remove the float bowl to get to the main jet. This usually requires carburetor removal.

Starter Jet System

To provide a rich starting mixture, each carburetor is equipped with a special starter jet circuit. A plunger is raised when the starter jet lever is pushed down. This opens a separate carburetor fuel and air system that enriches the total carburetor mixture. There are two different actuating systems, with different adjustments and design notes.

The DS7, RD250 series, R5 series, and RD350 series utilize only one starter jet plunger, located in the left carburetor. However, a rubber hose transfers starting fuel from the left carburetor to the right carburetor. If this hose becomes cracked, or is bent due to carburetors not parallel, a potentially damaging air leak can develop.

All other twin carburetor models have linkage between two starter jet plungers that must be adjusted. This rod, anchored to the left carburetor, is held to the right carburetor by a set screw on the carburetor linkage. Loosen this set screw, then push the starter jet plunger in each carburetor down until completely seated. Retighten the set screw. You should be able to push the starter lever a small distance without either plunger starting to lift. Failure to adjust this linkage could result in one plunger not seating completely. One carburetor would run rich, and the spark plug would be covered with black sooty deposits, especially after idling.

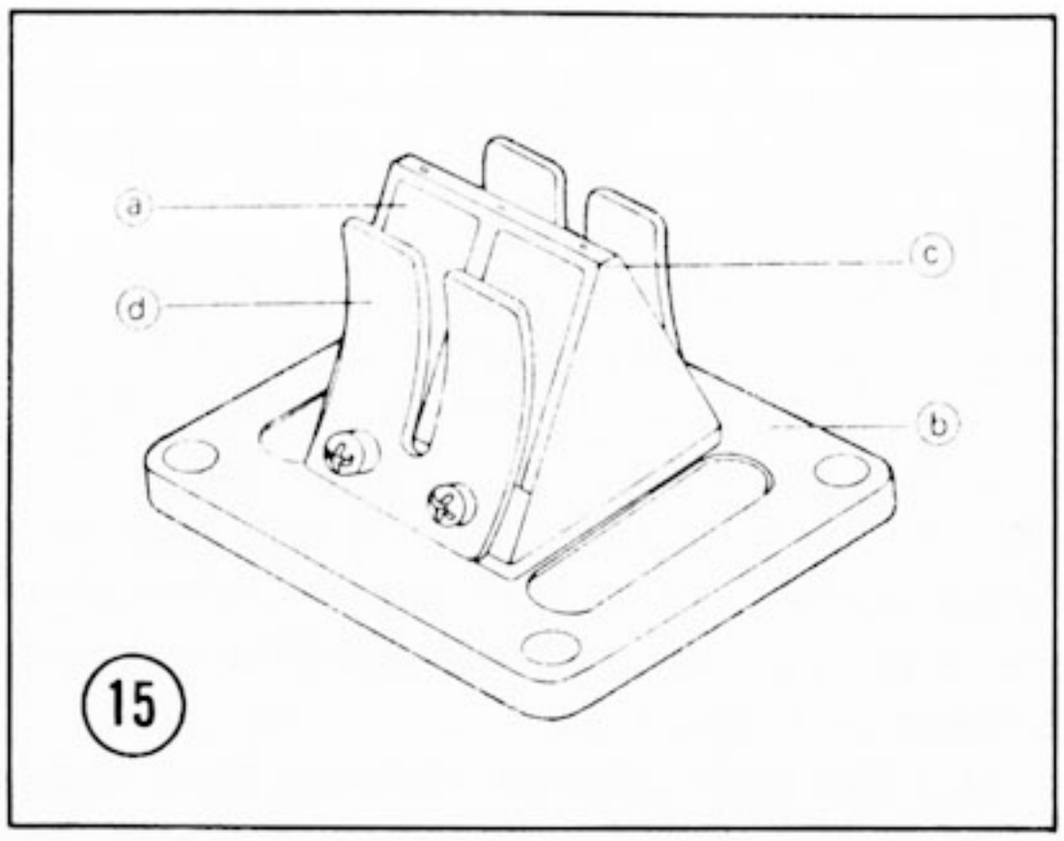
REED VALVES

The RD250, RD250A, RD350 and RD350A cylinders have identical reed valves. These are located in the intake tract, between carburetor and crankcase. **Figure 15** identifies reed valve components. Each valve consists of four main components:

a. The stainless steel reeds, which open and close the inlet port in response to crankcase pressure changes.
b. The aluminum alloy valve case.
c. The valve seat, which is made of heat and oil resistant rubber, and is bonded to the valve case.
d. The valve stopper, made from cold rolled stainless steel. This stopper limits reed valve movement.

Removing The Reed Valve

1. Remove the carburetor, if still attached.
2. Unscrew the four reed valve retaining bolts



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that screw into the cylinder, then slip out the carburetor mounting flange and reed unit.

Reed Valve Maintenance

This precision component must be handled with care. Store in a clean dry place. Avoid touching the reeds with your fingers.

Maintenance is limited to inspection and checking screw tightness. Check the reeds for cracks or chipped edges. A reed showing signs of failure must be replaced to prevent possible engine damage. Also check to be sure the rubber seat remains securely bonded to the valve case. Make sure the reed stopper securing screws are completely tight.

Whenever the reed valve unit is removed, check the gasket that fits between the reed case and cylinder. If torn or scarred, replace it to prevent possible air leakage.

PETCOCK FILTER

The fuel petcock screwed into the gas tank contains a contamination trapping filter that requires periodic cleaning. Access to the filter is identical on all models; screw off the bottom chamber of the petcock. **Figure 16** identifies the filter screen and retaining screw that must be removed. When installing the bottom chamber, do not overtighten.

AIR FILTER

All models covered in this manual have paper filament filters. To clean this type filter, carefully tap it against a hard surface to dislodge

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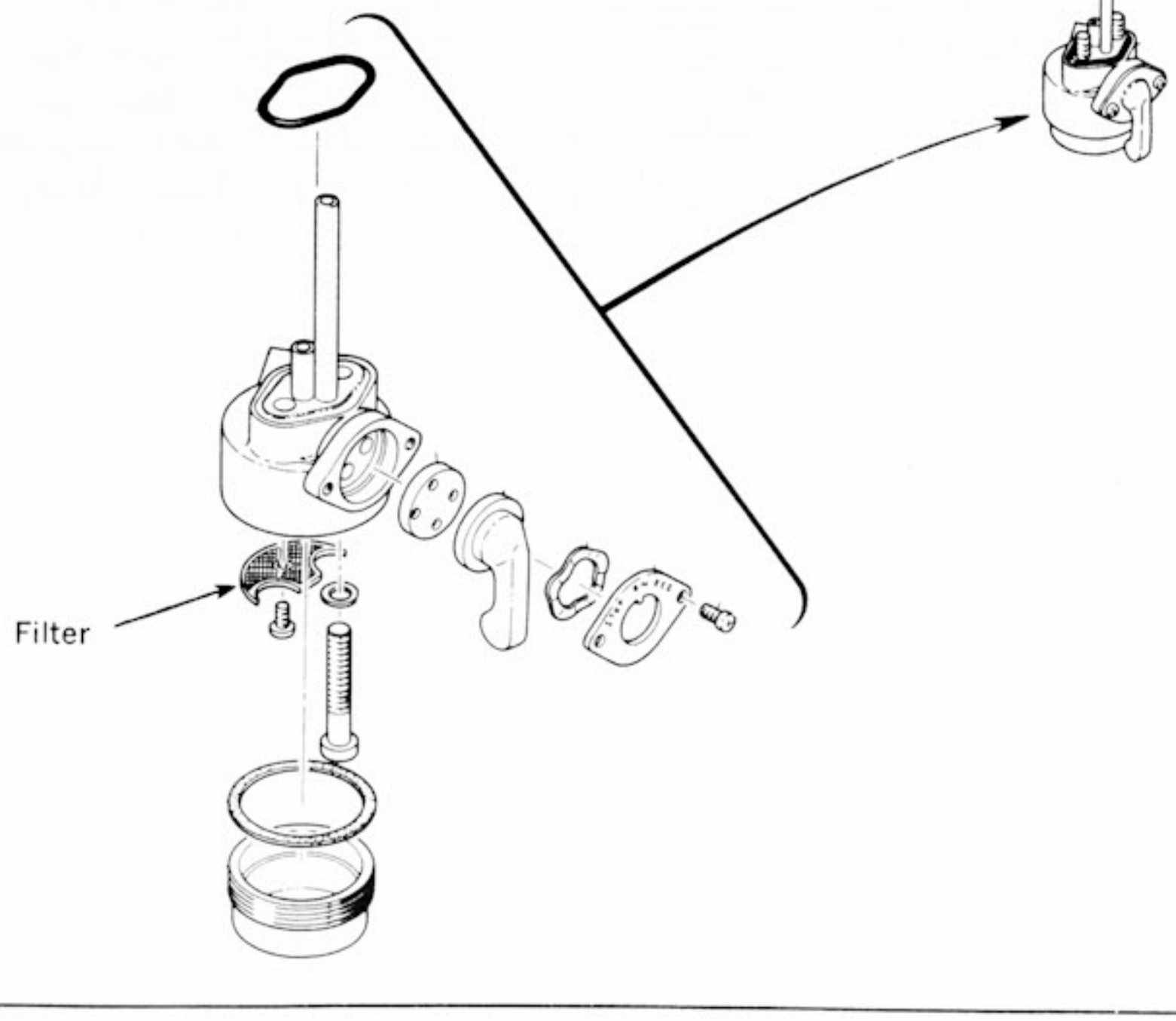


the dirt. If possible, blow it off with air. The filter should never be exposed to water or solvents. Water swells the fibers and restricts air flow. Take special care when washing the machine.

CARBURETOR MOUNTING FLANGES

The DS7, RD250 series, R5 series, and RD350 series use rubber carburetor mounting flanges (joints). This reduces engine vibration to the carburetor. Periodically check the rubber flange for cracks. If a deep crack is found, replace the flange immediately to prevent possible air leakage.

Miscellaneous Carburetor Problems

Water in the carburetor float bowl and sticking carburetor slides can result from careless washing of the machine. Soapy residue will compound the situation. To remedy, remove and clean the carburetor bowl, main jet, and any other affected parts.

Be sure that the ring nut on top of each carburetor is neither too tight nor too loose. If the carburetor mounting cinch bolt is loose, the carburetor can pivot, resulting in an improper mixture because the float level is changed.

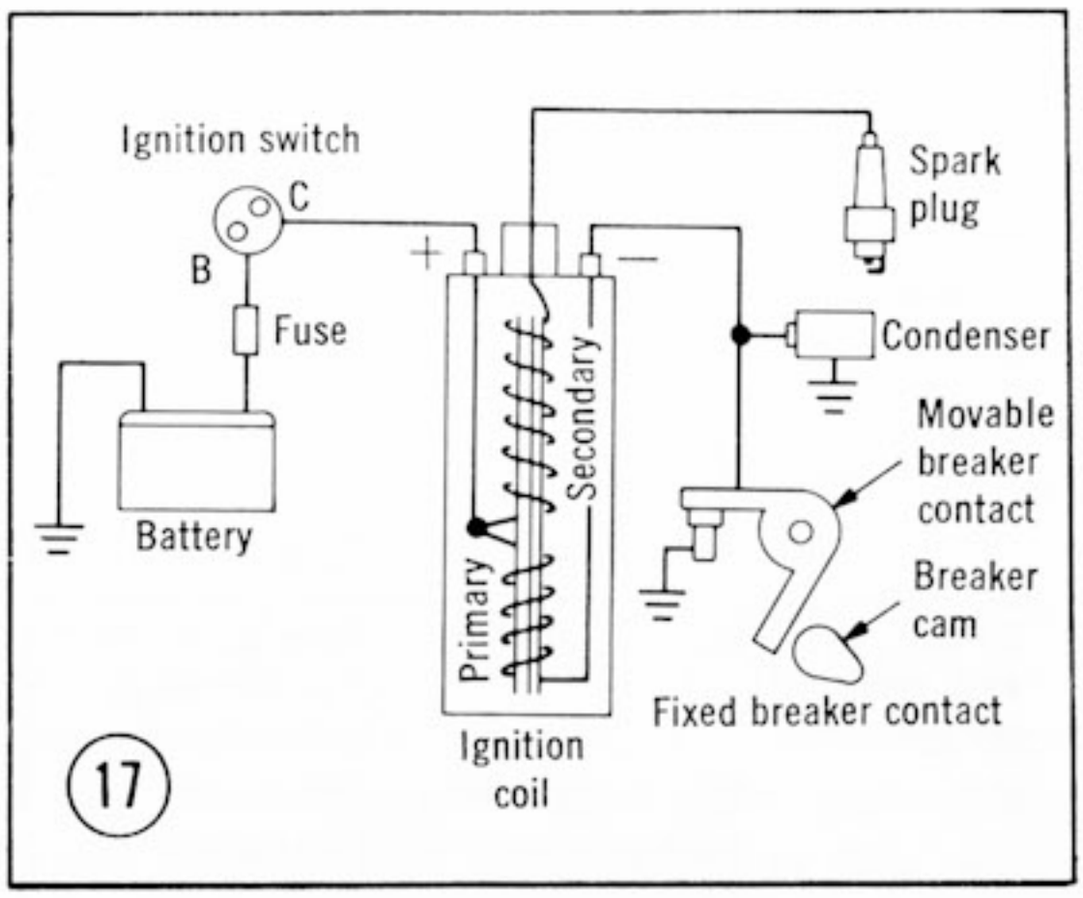
If gasoline leaks past the float bowl gasket, high rpm fuel starvation may occur. Varnish deposits on the outside of the float bowl are evidence of this condition.

IGNITION SYSTEM

Functional Operation

Figure 17 illustrates the ignition system used on these machines. Note that while the system is shown for a single cylinder only, all components except the battery, fuse, and ignition switch are duplicated for the other cylinder.

When the breaker points are closed, current flows from the battery through the primary winding of the ignition coil, thereby building a magnetic field around the coil. The breaker cam rotates with the crankshaft and is so adjusted that the breaker points open as the piston reaches the firing position.



As the points open, the magnetic field collapses. As the field collapses, a very high voltage (approximately 15,000 volts) is induced in the secondary winding of the ignition coil. This high voltage is sufficient to jump the gap at the spark plug.

The condenser serves primarily to protect the points. Inductance of the ignition coil primary tends to keep a surge of current flowing through the circuit even after the points have started to open. The condenser stores this surge and thus prevents arcing at the points.

Ignition Troubleshooting

Ignition system problems can be classified as no spark, weak spark, or improperly timed spark. These conditions can affect either or both cylinders of a twin cylinder engine. **Table 5** lists common causes and remedies for ignition system malfunctions.

If the problem is no spark at either cylinder, it is almost certainly because current is not reaching either coil. Since the only current path is through the battery connections and the main switch, the defect should be easy to locate.

Ignition failures confined to one cylinder are also easy to isolate.

1. Rotate the engine until the points associated with the affected cylinder are closed. The points for the right cylinder have a grey wire. An orange wire is connected to the points for the left cylinder.
2. Disconnect the high voltage lead from the spark plug and hold it ¼ inch away from the

Table 5 IGNITION SYSTEM MALFUNCTIONS

Symptom	Probable Cause	Remedy
No spark or weak spark, both cylinders.	Discharged battery	Charge battery
	Defective fuse	Replace
	Defective main switch	Replace
	Loose or corroded connections	Clean & tighten
	Broken wire	Repair
No spark or weak spark, one cylinder only	Incorrect point gap	Reset points. Be sure to readjust ignition timing
	Dirty or oily points	Clean points
	Spark plug lead damaged	Replace wire
	Broken primary wire	Repair wire
	Open winding in coil	Replace coil
	Shorted winding in coil	Replace coil
	Defective condenser	Replace condenser
Misfires	Dirty spark plug	Clean or replace plug
	Spark plug is too hot	Replace with colder plug
	Spark plug is too cold	Replace with hotter plug
	Spring on ignition points is weak	Replace points and reset timing
	Incorrect timing	Adjust timing

cylinder head. Turn on the ignition. With an insulated tool, such as a piece of wood, open the points. A fat, blue-white spark should jump from the spark plug lead to the cylinder head. If the spark is good, clean or replace the spark plug. If there is no spark, or it is thin, yellowish, or weak, continue with Step 3.

3. Connect the leads of a test lamp or voltmeter to the wire on the points and to a good ground. Turn on the ignition switch. If the lamp lights, even dimly, or if the meter indicates any voltage, the problem is defective points. Replace them.

4. Open the points with an insulated tool, such as a piece of wood. The test lamp should light, or the voltmeter should indicate battery voltage. If not, there are three possibilities:

a. shorted points
b. shorted condenser
c. open coil primary circuit

5. Disconnect the condenser and the wire from the points. Connect the ungrounded test lamp or voltmeter lead to the wire which was connected to the points. If the test lamp does not light, or the voltmeter does not indicate battery voltage, the problem is an open coil primary circuit. Replace the suspected coil with the known good one from the other cylinder. If that coil doesn't work, the problem is in the primary wiring.

6. If the test lamp lights when it is connected to the wire and ground, the coil primary circuit is OK. Connect one test lamp lead to the wire. Block the points open with a calling card and connect the other test lamp or voltmeter lead to the movable contact. If the lamp now lights, or the voltmeter indicates, the points are shorted. Replace them.

7. If the foregoing checks are satisfactory, the problem is in the coil or condenser. Separately substitute each of these with the known good one from the other cylinder to determine which is defective.

Spark Plugs

The spark plugs recommended by the factory are usually the most suitable for your machine. If riding conditions are mild, it may be advisable to go to a plug one step hotter than normal. Unusually severe riding conditions may require a slightly colder plug.

The proper heat range for the spark plug is determined by this requirement. The plug must operate hot enough to burn off unwanted deposits, but not so hot that it burns itself or causes preignition. A spark plug of the correct heat range will show a light tan color on the portion of the insulator within the cylinder.

If the insulator appears to be burned or white, the plug is too hot. Possibly the insulator and center electrode will even show evidence of melting. Such a plug should be replaced with a colder one.

Unburned residue such as fluffy black carbon deposits or grimy oil deposits indicate too cold a spark plug. The insulator color may range from dark brown to black. Try using hotter plugs if these conditions are found.

Remove and inspect the spark plugs at least once every 1,000 miles (about 1,600 kilometers). After cleaning, inspect them for worn or eroded electrodes. Replace them if there is any doubt about their condition. If the plugs are found to be serviceable, file the center electrode square, then adjust the gap by bending the outer electrode only. Measure the gap with a round wire spark plug gauge only, a flat gauge will yield an incorrect reading. Standard spark plugs and proper gaps are listed in **Table 6**.

Table 6 SPARK PLUGS AND GAPS

Model	Standard Spark Plug	Plug Gap Inch	Plug Gap Millimeter
HS1, HS1-B, LS-2	B-9HC	0.020-0.023	0.5-0.6
YL1, YL1-E	B-7HZ	0.020-0.023	0.5-0.6
YAS1	B-8HC	0.020-0.023	0.5-0.6
YAS1-C, AS2C	B-9HC	0.020-0.023	0.5-0.6
YCS-1, YCS1-C	B-8HC	0.020-0.023	0.5-0.6
CS3-B, CS3-C, CS5	B-9HC	0.020-0.023	0.5-0.6
YDS3, YDS3-C, YDS5	B-8HC	0.024-0.028	0.6-0.7
DS6, DS6-B, DS6-C, DS7	B-9HC	0.020-0.023	0.5-0.6
RD250, RD250A	B-8HS	0.020-0.023	0.5-0.6
YM1	B-8HC	0.024-0.028	0.6-0.7
YM2, YM2-C	B-8HC	0.024-0.028	0.6-0.7
YR1, YR2, YR2-C	B-8HC	0.020-0.023	0.5-0.6
R3, R3-C	B-9HC	0.020-0.023	0.5-0.6
R5, R5-B	B-9HC	0.020-0.023	0.5-0.6
R5-C	B-8HS	0.020-0.023	0.5-0.6
RD350, RD350A	B-8HS	0.020-0.023	0.5-0.6

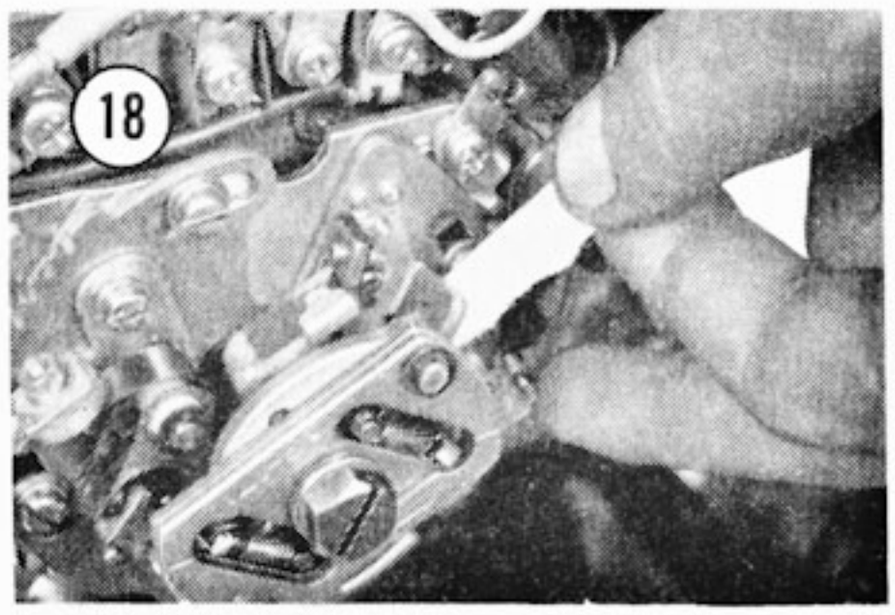
Ignition Point Maintenance

There are two sets of points, one set for each cylinder. Normal use of the motorcycle causes the points to burn and pit gradually. If the points are not too pitted, they can be dressed with a few strokes of a clean point file. Do not use emery cloth or sandpaper, as particles can remain on the points and cause arcing and burning. If a few strokes of the file don't smooth the points completely, replace them.

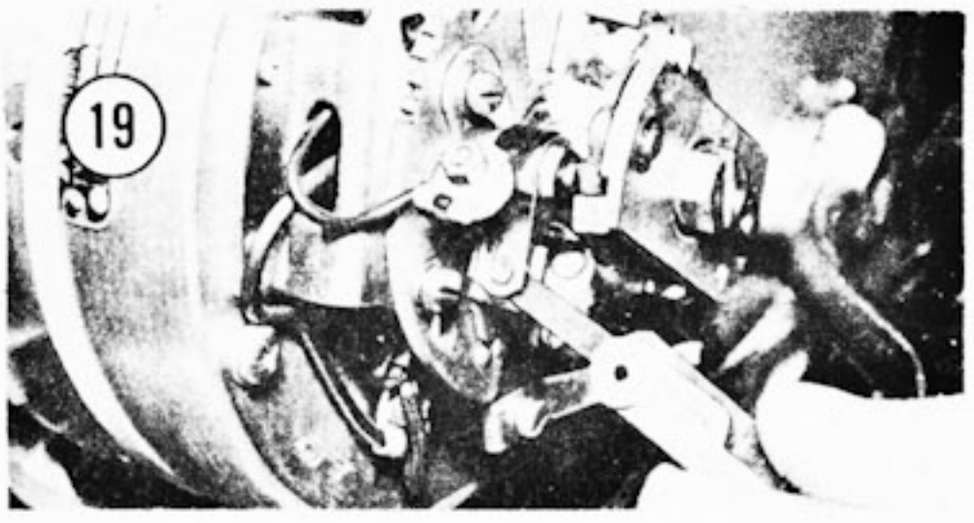
Oil or dirt may get on the points, resulting in premature failure. Common causes for this condition are defective crankshaft seals, improper lubrication of the rubbing block, or lack of care when the crankcase cover is removed and replaced.

If the point spring is weak or broken, the points will bounce, causing misfiring at high speeds. Measure the spring tension with a point tension gauge. Spring tension as the points open should be 25 to 28 ounces (700-800 grams).

Clean and regap the points every 2,000 miles (about 3,000 kilometers). To clean the points, dress them lightly with a point file, then remove all residue with lacquer thinner. Close the points on a piece of clean white paper (**Figure 18**) such as a business card. Continue to pull the card through the closed points until no particles are visible on the card. Finally, rotate the engine as you observe each set of points as they open and close. If they do not meet squarely, replace them.



To gap the points, again rotate the engine until one set of points is open to the widest gap. Measure this gap with a feeler gauge, as shown in **Figure 19**. If the gap is not as specified in **Table 7**, adjust the movable point. **Figure 20** illustrates a typical adjustment method.



Point Gap Adjustment

1. Loosen the lock screw (1) or (2).
2. Insert a screwdriver into the adjustment slot (3) or (4), then adjust the movable point until the feeler gauge indicates the correct gap.

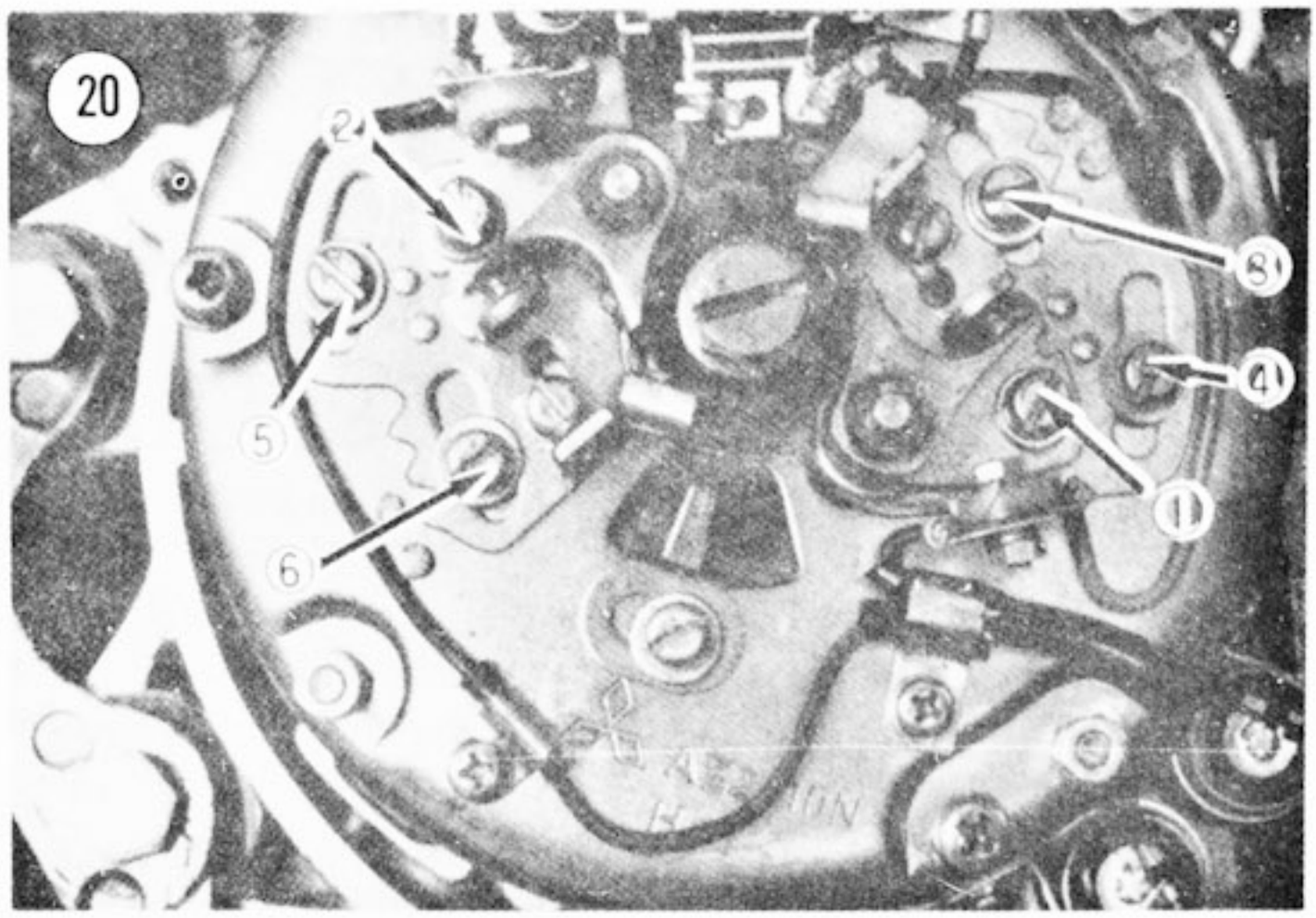


Table 7 IGNITION STANDARDS

Model	Point Gap Inch	(Millimeter)	Ignition Timing Inch	(mm)
HS1, HS1-B	0.012-0.014	(0.30-0.35)	0.071	(1.8)
YL1, YL1-E	0.012-0.014	(0.30-0.35)	0.071	(1.8)
LS-2	0.012-0.016	(0.30-0.40)	0.071	(1.8)
YAS1, YAS1-C, AS2C	0.012-0.014	(0.30-0.35)	0.071	(1.8)
YCS-1, YCS1-C	0.012-0.014	(0.30-0.35)	0.071	(1.8)
CS3-B, CS3-C, CS5	0.012-0.014	(0.30-0.35)	0.071	(1.8)
YDS3, YDS3-C	0.012-0.016	(0.30-0.40)	0.071	(1.8)
YDS5	0.012-0.016	(0.30-0.40)	0.071	(1.8)
DS6, DS6-B, DS6-C	0.012-0.016	(0.30-0.40)	0.071	(1.8)
DS7	0.012-0.016	(0.30-0.40)	0.071	(1.8)
DR250, RD250A	0.012-0.016	(0.30-0.40)	0.079	(2.0)
YM1	0.012-0.016	(0.30-0.40)	0.075	(1.9)
YM2, YM2-C	0.012-0.014	(0.30-0.35)	0.083	(2.1)
YR1, YR2, YR2-C	0.012-0.014	(0.30-0.35)	0.083	(2.1)
R3, R3-C	0.012-0.014	(0.30-0.35)	0.083	(2.1)
R5, R5-B, R5-C	0.012-0.014	(0.30-0.35)	0.083	(2.1)
RD350, RD350A	0.012-0.014	(0.30-0.40)	0.079	(2.0)

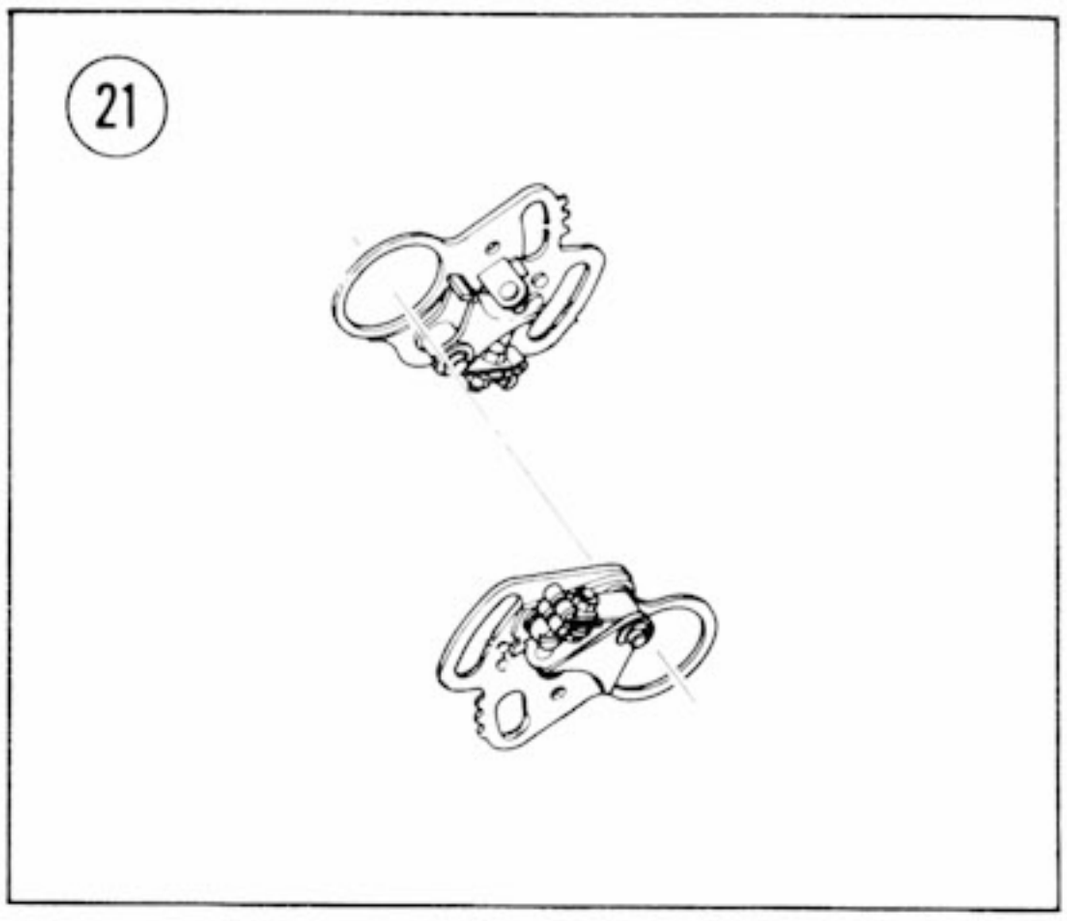
3. Tighten the lock screw and recheck the gap.
4. Rotate the crankshaft until the other set of points is fully open and repeat Steps 1 through 3.
5. Apply a few drops of light oil to the felt cam lubricator. Do not apply too much oil.

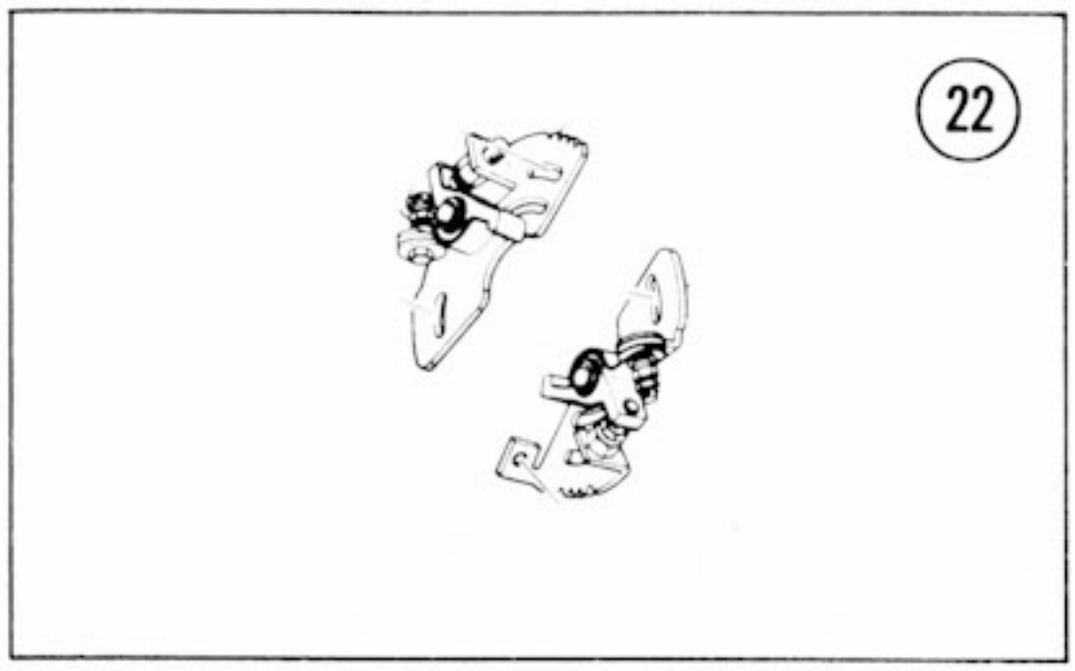
The stationary point on some models is adjusted by loosening a lock nut, then turning the contact with a small screwdriver, and finally retightening the lock nut. It is very important to check that the points meet squarely after the adjustment is made. Since the stationary contact rotates as it is adjusted, any pitting on either contact will make accurate measurement impossible and prevent proper closure of the contact points.

Ignition timing is affected by any change in point gap. Always adjust the timing after you service the points.

Ignition Points Replacement

A complete set of ignition points is mounted to a point plate. There are two ignition point sets and two point plates per machine. Each point plate assembly is replaced as a unit. **Figures 21 and 22** identify two slightly different point plate designs used from model to model.





Although point plate shape differs slightly from one model to another, the replacement procedure is the same.

1. To begin replacement, remove both wires that are bolted to the movable ignition point (one wire comes from the condenser, the other from a power source).

2. Each plate is held to the yoke by two screws (they fit through slots in the point plate). Remove these screws and lift off the point plate.

3. When installing the point plates shown in Figure 21, mount the right-hand point plate first, then the left plate. The unusual shape of the metal rings of the plate requires this procedure.

Some models using the style of point plate shown in Figure 22 have a different left and right plate design. When purchasing these points, request the salesman to identify each box of points with a pen. Either side may be installed first.

4. To install either style of point plate, place the plate into approximate position, then install and tighten both mounting screws.

5. Reattach the condenser and power source wires to the movable point. Be sure to mount the wires to the outside of the bolt. The movable point is insulated, and these wire ends must be kept insulated also.

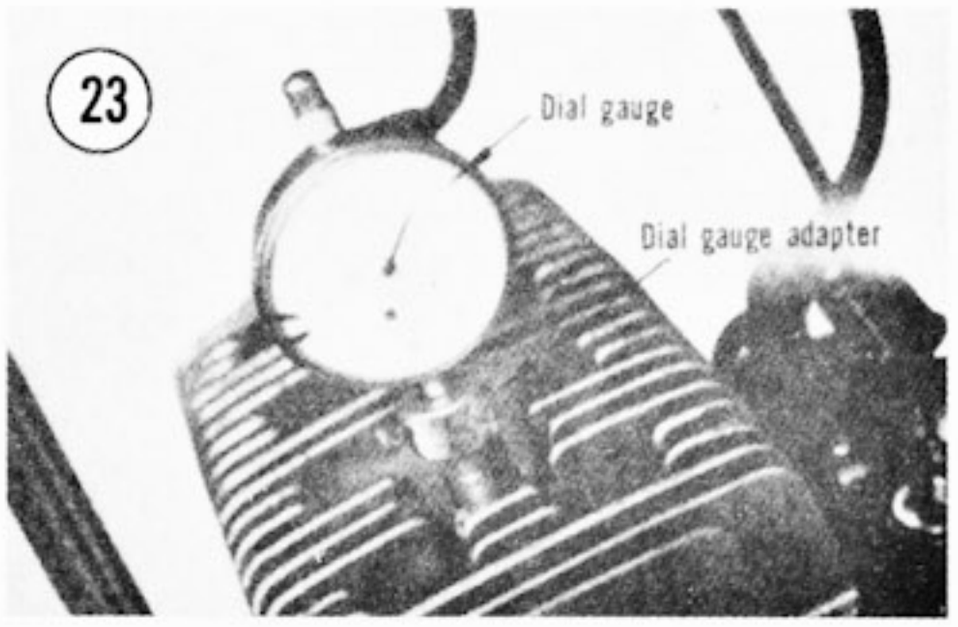
After replacing ignition points, it is essential to check point gap and ignition timing.

Ignition Timing

Any change in the point gap, including that from normal point wear, point maintenance, or point replacement, affects ignition timing. It is essential, therefore, to adjust ignition timing each time the points are serviced. In fact, do not start to set ignition timing until you have cleaned and gapped the points.

Adjust the timing of each cylinder separately. Either side may be done first. The following procedure is applicable to any twin cylinder model.

1. Remove a spark plug. Screw in the dial gauge adaptor (Yamaha part #908-90010-39-00). Screw the long gauge needle into the dial gauge (Yamaha part #908-90030-03-00), loosen the adaptor set screw, then insert the dial gauge down through the adaptor and tighten the set screw (**Figure 23**). This locks the dial gauge in place.



2. Use the dial gauge to find piston top dead center (TDC). Starting with the piston low in the cylinder, rotate the crankshaft until the piston pushes on the dial gauge and the dial needle rotates.

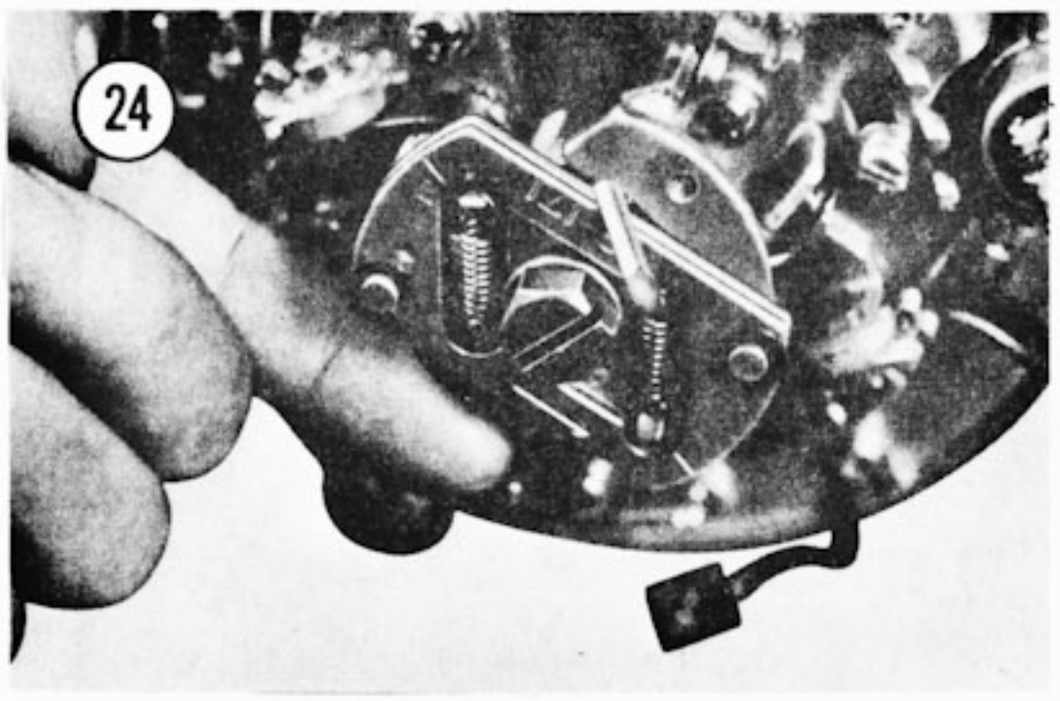
The needle will continue sweeping in a counterclockwise direction as long as the piston travels upward. When the needle stops, then reverses its direction of sweep, that stopping point is piston TDC. Find TDC, then rotate the dial gauge face until the "0" lines up with the needle.

3. Turn the crankshaft backwards in a clockwise direction until the needle has made three complete sweeps of the dial face. This puts the piston at 3.0mm before TDC (each sweep of the face equals 1.00mm).

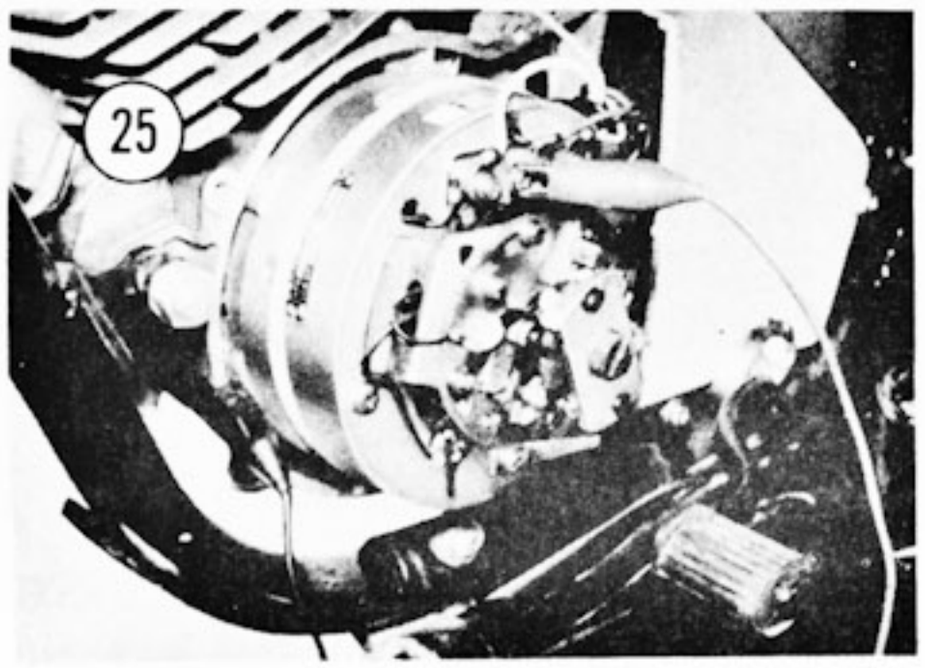
4. Now, depending on recommended timing specifications, rotate the crankshaft forward (counterclockwise) until you have moved from 3.00mm BTDC to the BTDC listed in specifications. If timing must be set at 1.8mm BTDC, you must rotate the crankshaft counterclockwise from the original 3.0mm position until you are

only 1.8mm BTDC. From 3.0 to 1.8 equals 1 complete sweep of the dial, plus twenty of the smallest marks on the face.

5. Machines with electric starters have an automatic ignition advance. Wedge the advance unit in the full advance position, as shown in **Figure 24**.



6. Hook an ohmmeter or continuity tester across the points. **Figure 25** shows how to hook up a Yamaha Point Checker (Yamaha part #908-90030-31-00). Connect one meter lead to the terminal leading to the movable point, then connect the other lead to a good ground (cylinder fin, engine case).



If the dial gauge is on the left cylinder, attach the meter to the points with the orange lead wire. The right set of points have a grey wire.

CAUTION

Be sure the ignition switch is off. If the meter is connected with the switch on, you will burn out the test meter.

7. See Figure 20 and loosen both point plate securing screws (1) and (2) or (3) and (4) just enough to permit plate movement. Place a screwdriver in the indicated slot on the outer plate edge, then rotate the plate until the meter shows the points just opening. On the Yamaha meter, the points are closed when the needle is completely to the left side of the scale. The points are open when the needle just completes its swing to the right side of the meter. Now tighten the point plate securing screws.

NOTE: *The point plate tends to move as the setting screws are tightened. It may be necessary to repeat the adjustment and tightening sequence several times.*

8. When the adjustment is within tolerances, repeat Steps 1 through 7 for the other cylinder.

Timing tolerance for each cylinder is plus or minus .1mm BTDC. If you are setting timing to occur at 1.8mm BTDC, the points must just open between 1.7mm and 1.9mm.

Timing between both cylinders has a tolerance of .05mm. If one cylinder is set at 1.8mm BTDC, the other points should open between 1.75mm BTDC and 1.85mm BTDC.

Ignition Coil

The ignition coil is a form of transformer which develops the high voltage required to jump the spark plug gap. The only maintenance required is that of keeping the electrical connections clean and tight, and making sure that the coil is mounted securely.

If coil condition is doubtful, several checks should be made:

1. Measure resistance with an ohmmeter between the positive and negative primary terminals. Resistance should indicate approximately five ohms for most coils on these machines. Some coils, however, have a primary resistance less than one ohm. Compare the measurement with that of the known good coil on the other cylinder.
2. Measure resistance between either primary terminal and the secondary high voltage terminal. Resistance should be in the range of 5,000 to 11,000 ohms.
3. Scrape the paint from the coil housing down to bare metal. Measure the resistance between

this bare spot and the high voltage terminal. Insulation resistance must be at least 3 megohms (3 million ohms).

4. If these checks don't reveal any defects, but the coil condition is still doubtful, replace the coil with the known good one from the other cylinder.

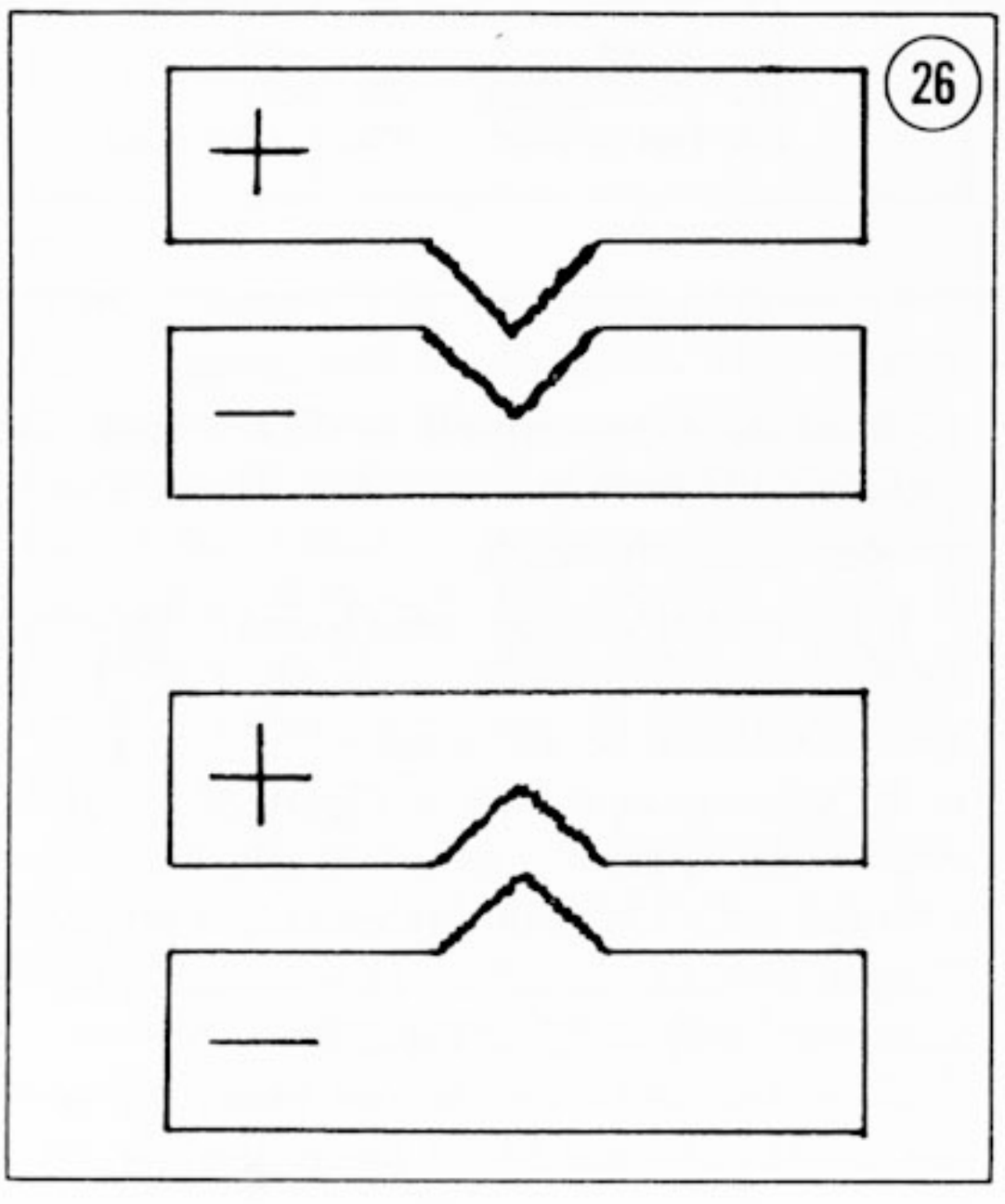
Be sure that you connect the primary wires correctly. The brown wire goes to the positive terminal. The orange or grey wire goes to the negative terminal.

Condenser

The condenser is a sealed unit that requires no maintenance. Be sure both connections are clean and tight.

Two tests can be made on the condenser. Measure condenser capacity with a condenser tester. Capacity should be 0.22 microfarad, plus or minus ten percent. The other test is insulation resistance, which should not be less than 4 megohms, measured between the condenser pigtail and case.

The ignition point surfaces will help determine if the condenser needs replacement. **Figure 26** illustrates excessive metal transfer from one point to another, and means the condenser is not performing properly. Replace it.



CHARGING SYSTEMS

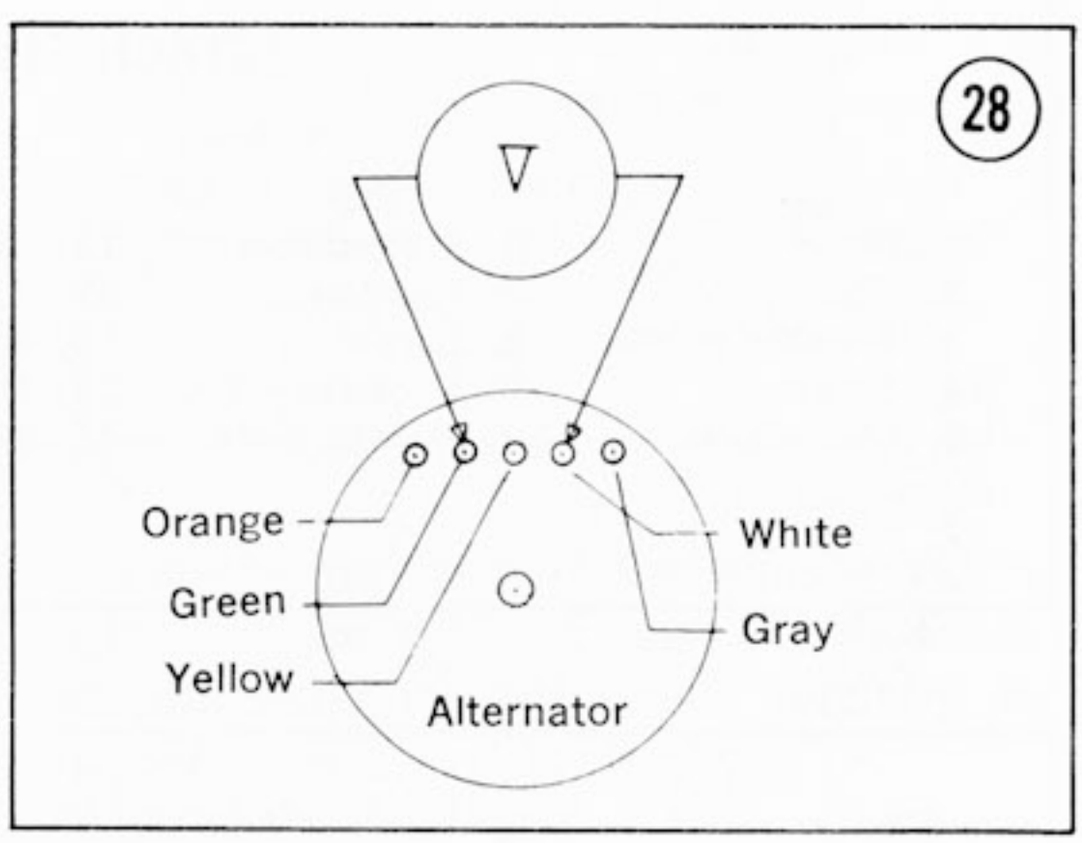
The charging system consists of an electrical generator, voltage regulator, battery, and connecting wiring. The generators on these machines are either alternators, direct-current generators, or combination starter/generators.

Hitachi 108-08 Alternator

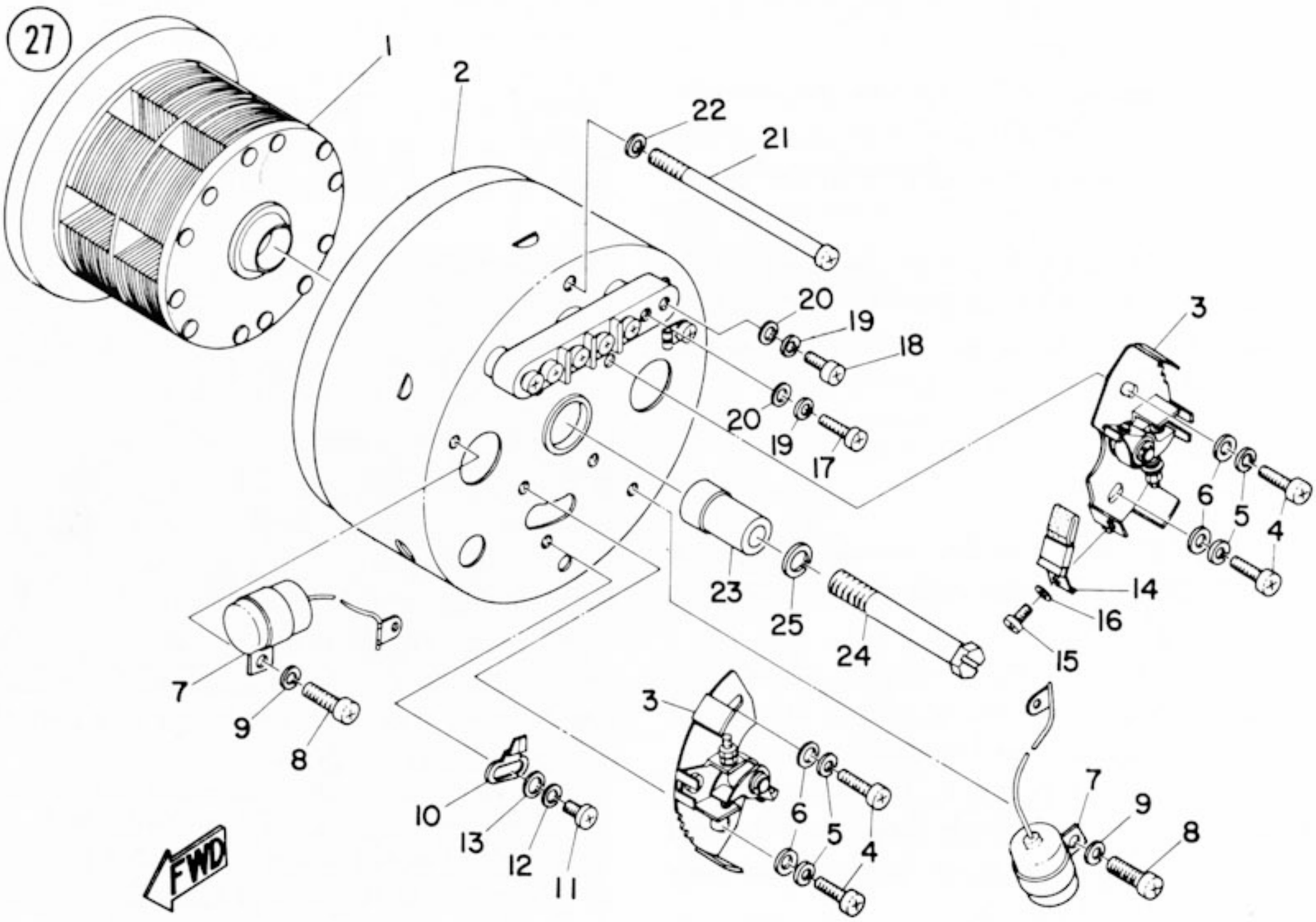
This alternator, the simplest, consists of a 6-pole permanently magnetized rotor that revolves within a stator. Rotation of the rotor induces alternating current in the stator, which is then rectified and used to charge the battery and operate the electrical accessories. This alternator does not use a regulator. **Figure 27** (next page) is an exploded view of the alternator.

When alternator problems are suspected, as in the case of dim headlights or a chronically low battery, check the alternator day and night output voltages.

1. Disconnect the yellow, green, and white wires from the alternator. Connect a 0-100 volt AC voltmeter as shown in **Figure 28** to measure daytime charging voltage.

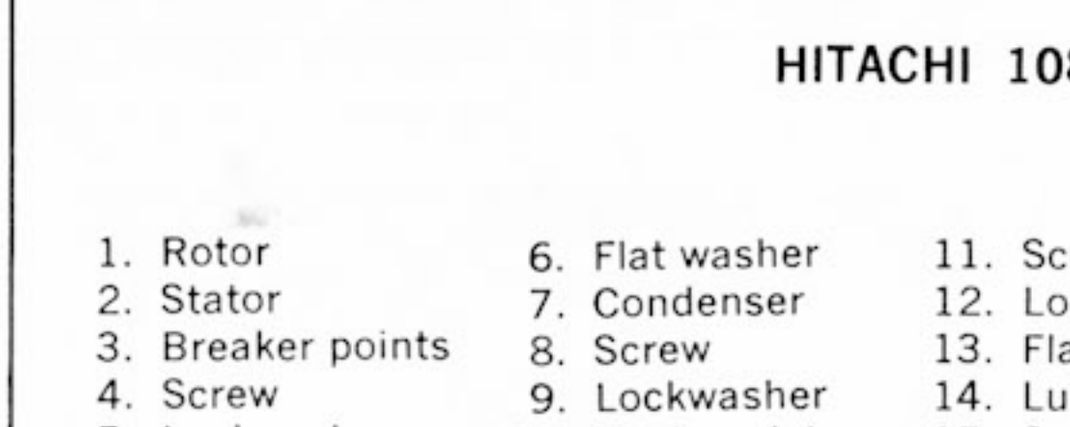


2. Start the engine and run it at 3,000 rpm. Set the main switch to the day riding position. The voltmeter should indicate 48 to 58 volts.
3. Increase the engine speed to 5,000 rpm. The meter should now indicate 83 to 97 volts.
4. Stop the engine. Reconnect the voltmeter as shown in **Figure 29** and set the main switch to the night riding position.
5. Start the engine and run it at 3,000 rpm. The meter should indicate 48 to 58 volts.



HITACHI 108-08 ALTERNATOR

1. Rotor
2. Stator
3. Breaker points
4. Screw
5. Lockwasher
6. Flat washer
7. Condenser
8. Screw
9. Lockwasher
10. Timing plate
11. Screw
12. Lockwasher
13. Flat washer
14. Lubricator
15. Screw
16. Lockwasher
17. Screw
18. Screw
19. Lockwasher
20. Flat washer
21. Screw
22. Lockwasher
23. Cam
24. Bolt
25. Lockwasher



6. Increase engine speed to 5,000 rpm. The meter should now indicate 83 to 97 volts.
7. Reconnect the leads.

If the output voltages were found to be within limits, the alternator is probably OK. To be sure, connect a DC ammeter with a range of 0 to 10 amperes as shown in **Figure 30**. Start the engine and operate it at 3,000 and 5,000 rpm with the switch in both day and night positions. Output current should be as specified, plus or minus 0.5 ampere. See **Table 8**.

If the output current is low, check the rectifier. Refer to **Figure 31** for this procedure.

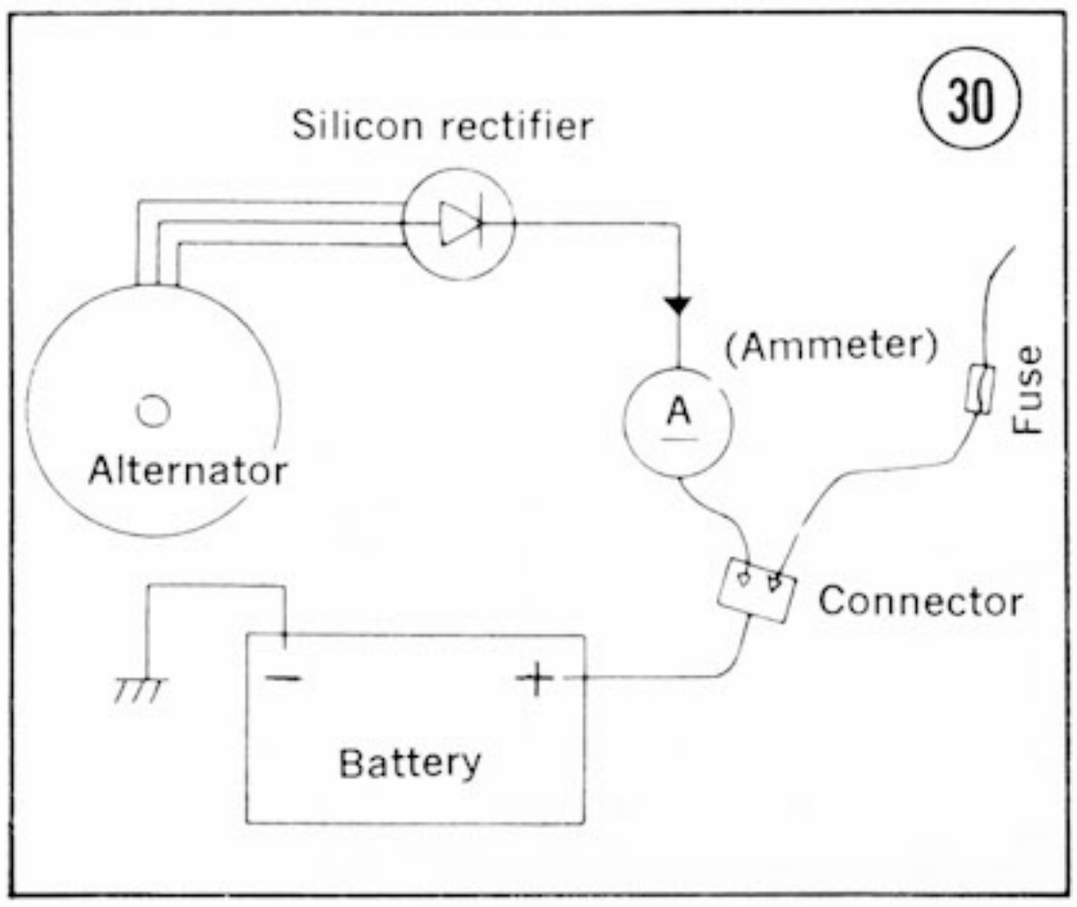
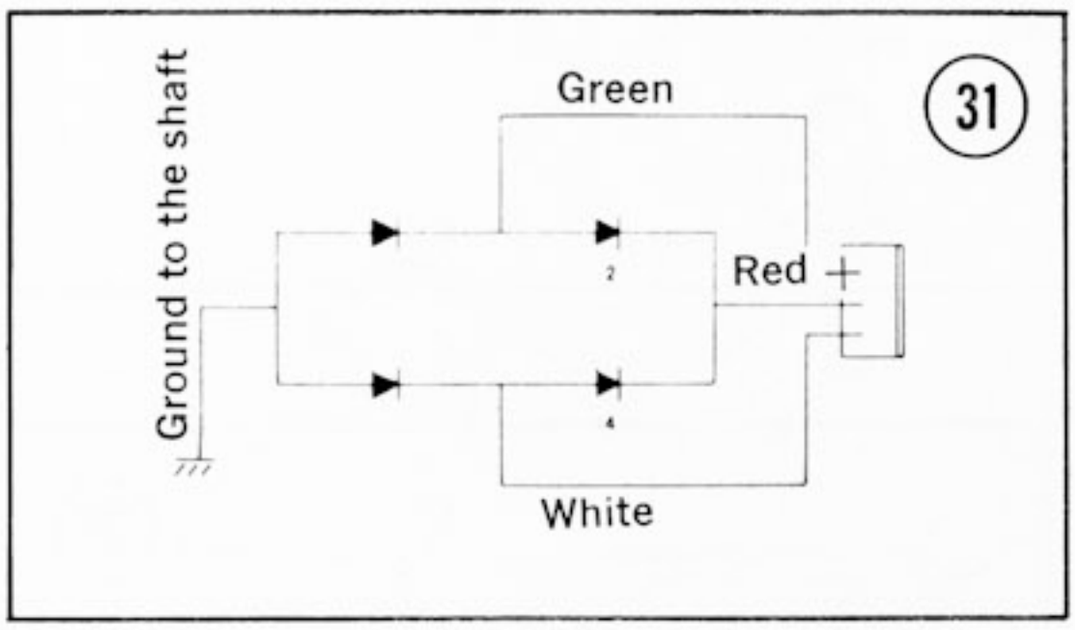


Table 8 OUTPUT CURRENT

rpm	Amperes Day	Night
3,000	2.8	6.7
5,000	3.2	7.1



1. Check diode (1) by measuring resistance between the green lead and the shaft. Then reverse the ohmmeter leads and again measure the resistance. If the resistance is approximately 10 ohms in one direction, and essentially infinite in the other direction, the diode is good. If resistance is low in both directions, the diode is shorted. If resistance is high in both directions, the diode is open.

2. Check diode (2) by measuring the resistance between the red and green leads, in both directions.

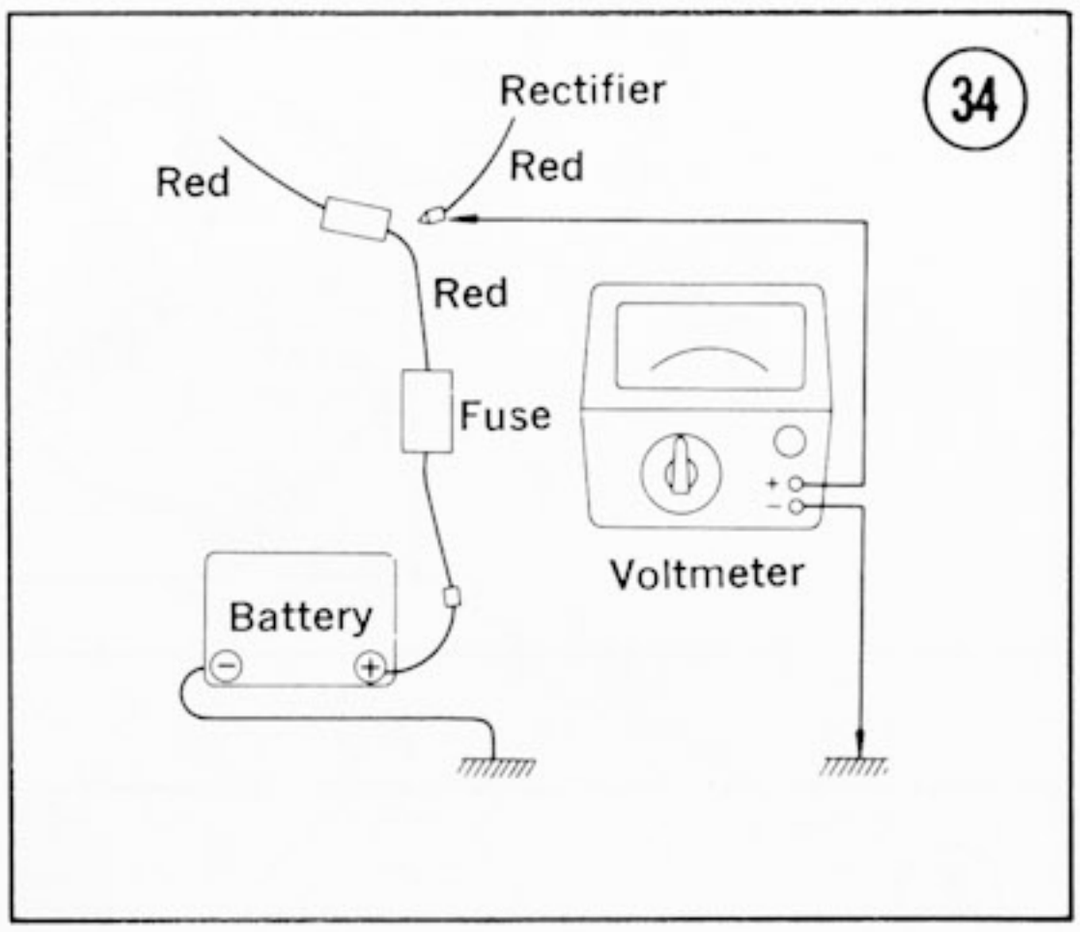
3. Measure resistance between the whita lead and the shaft, in both directions, to check diode (3).

4. Check diode (4) by repeating the measurements beaween the white and red leads. Replace the diode assembly if any diode is open or shorted.

Mitsubishi AZ2010N Alternator

This alternator is excited by a separate field winding (**Figure 32,** next page). The voltage regulator controls the alternator output by varying the field current. **Figure 33** (page 25) is an exploded view of this alternator.

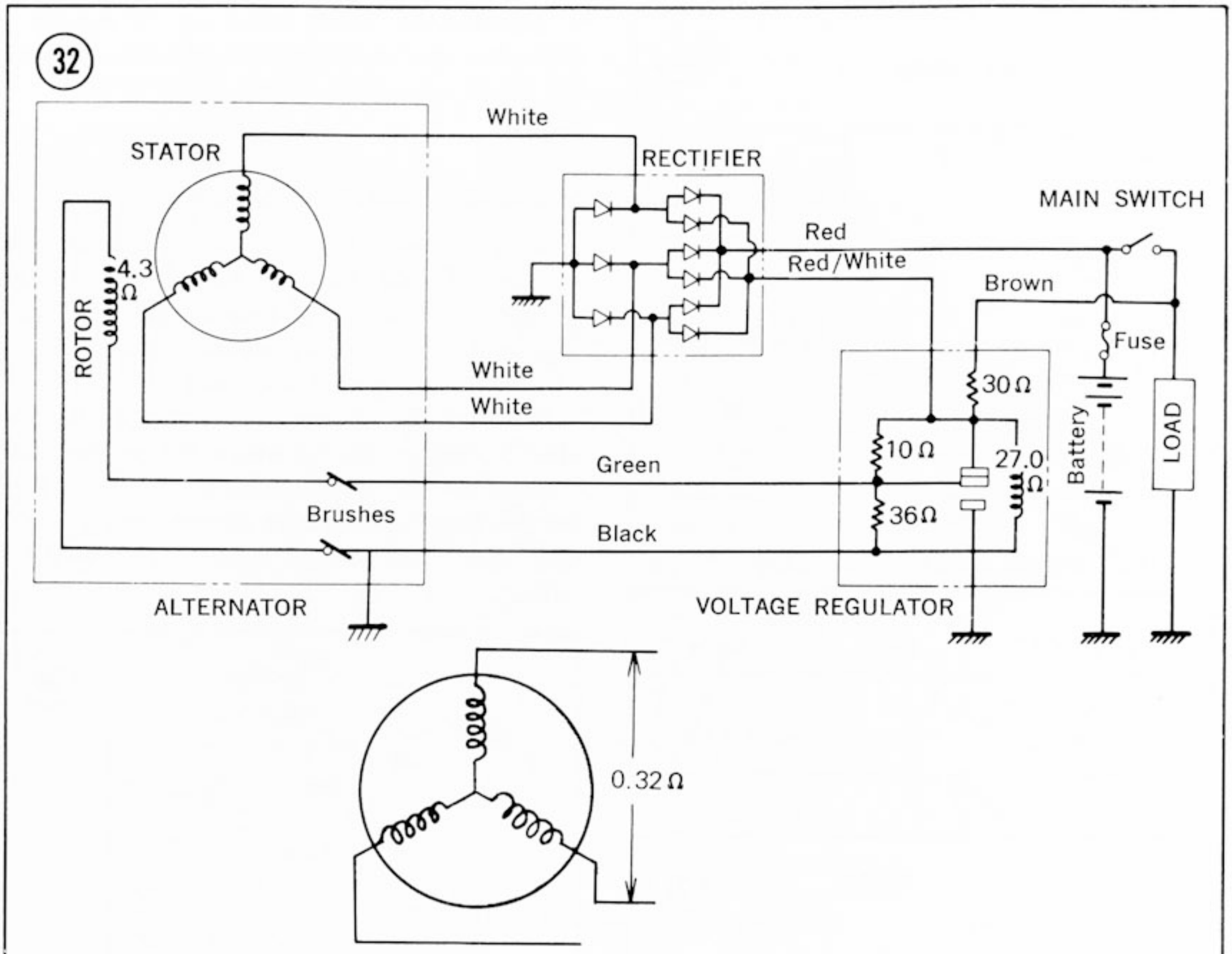
To check the alternator output, start the engine. Disconnect the red wire at the rectifier, and connect a 0-20 DC voltmeter as shown in **Figure 34**. Run the engine at approximately 2,500 rpm. The meter should indicate 15.5 to 16.5 volts.

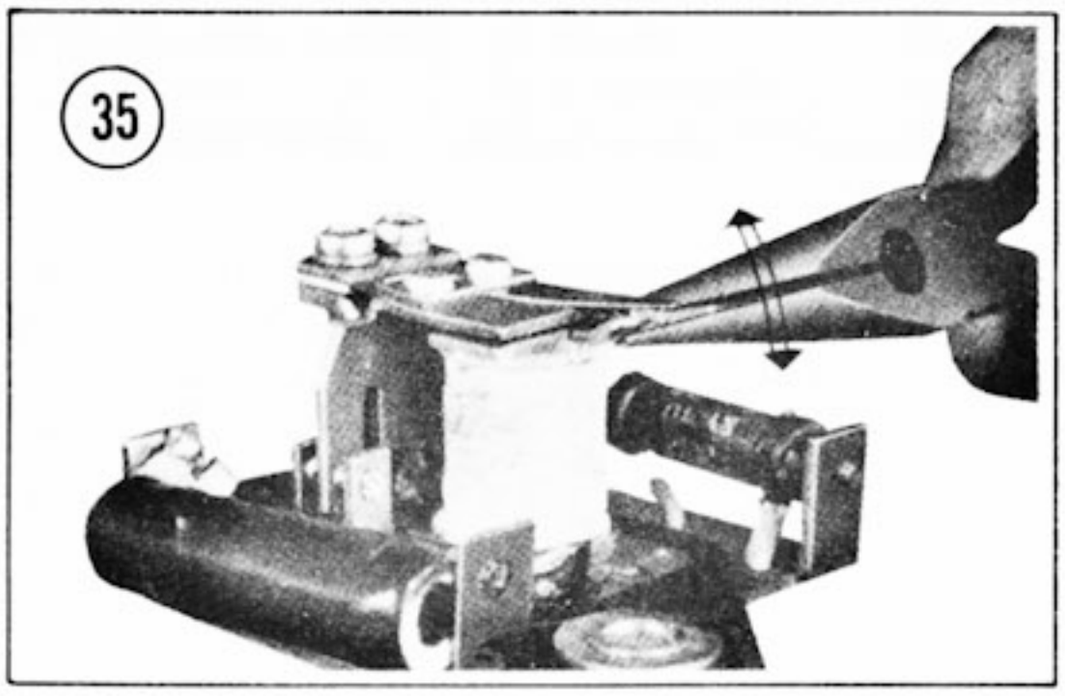


Adjust the regulator if the voltage differs slightly from the specified value, as shown in **Figure 35**. Make the adjustment carefully, in small steps.

To get to the regulator you must remove the battery. The regulator will then be visible through a large hole in the base of the battery box. Do not attempt regulator adjustment with the regulator still attached to the battery box. It is too easy to "ground" the regulator. Instead, unscrew the single securing bolt, which is visible through the battery box base, then slide the regulator off its retaining shelf. Remove the cover, start the engine, then make your adjustment.

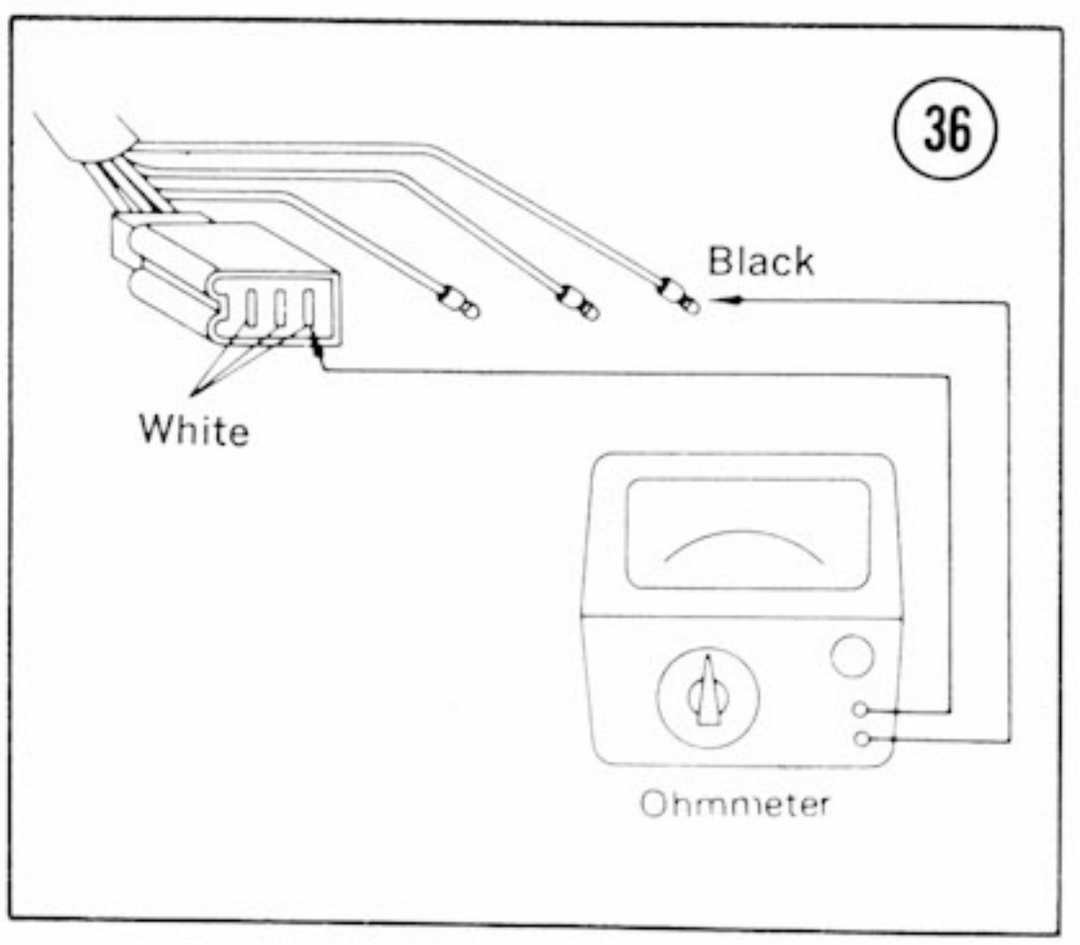
If the adjustment of the regulator does not remedy the problem, or if the voltage differs



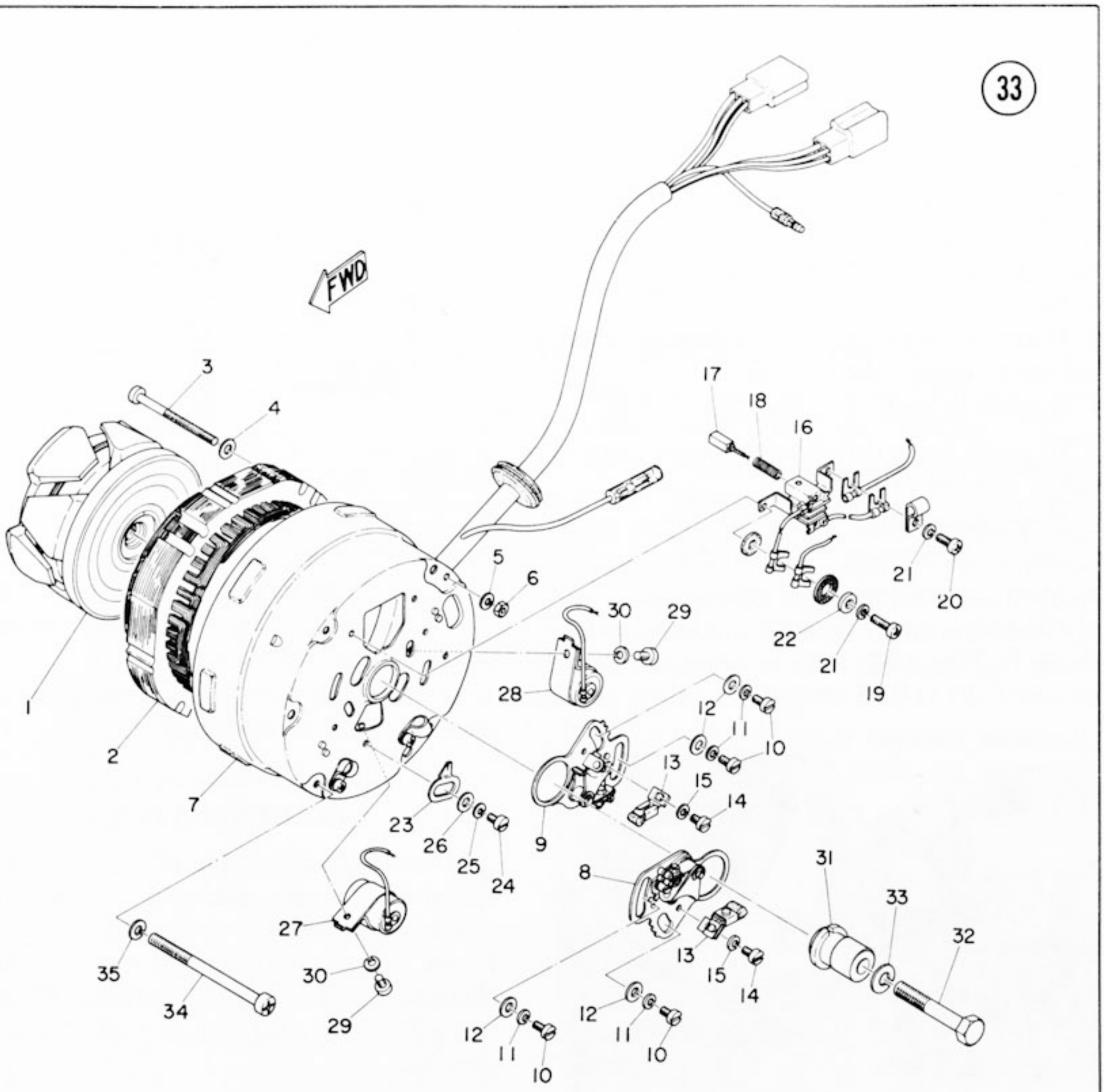


greatly, look for obvious broken, corroded, or loose wires or terminals.

Next, check the rectifier, located behind the right-hand chassis cover, near the battery box. Trace the rectifier wiring back towards the alternator and disconnect the rectifier-to-alternator wiring connector (under the air filter) as shown in **Figure 36**. To check the rectifier:



1. Connect one ohmmeter lead to the black wire, and the other lead to each of the three white wires. Then repeat the measurements with the ohmmeter leads reversed. All measurements



MITSUBISHI AZ2010N ALTERNATOR

1. Rotor
2. Armature
3. Screw
4. Flat washer
5. Lockwasher
6. Nut
7. Stator
8. Left breaker assembly
9. Right breaker assembly
10. Screw
11. Lockwasher
12. Flat washer
13. Lubricator
14. Screw
15. Flat washer
16. Brush holder
17. Brush
18. Brush spring
19. Screw
20. Screw
21. Lockwasher
22. Flat washer
23. Timing plate
24. Screw
25. Lockwasher
26. Flat washer
27. Left condenser
28. Right condenser
29. Screw
30. Lockwasher
31. Cam
32. Bolt
33. Lockwasher
34. Screw
35. Lockwasher

should be 20 to 30 ohms in one direction, and essentially infinite in the other direction.

2. Repeat Step 1, except make measurements between the red wire and each white wire. Meter indications should be as in Step 1.

3. Repeat Step 1, except make measurements between the red/white wire and the three white wires. Resistance readings should be the same as before.

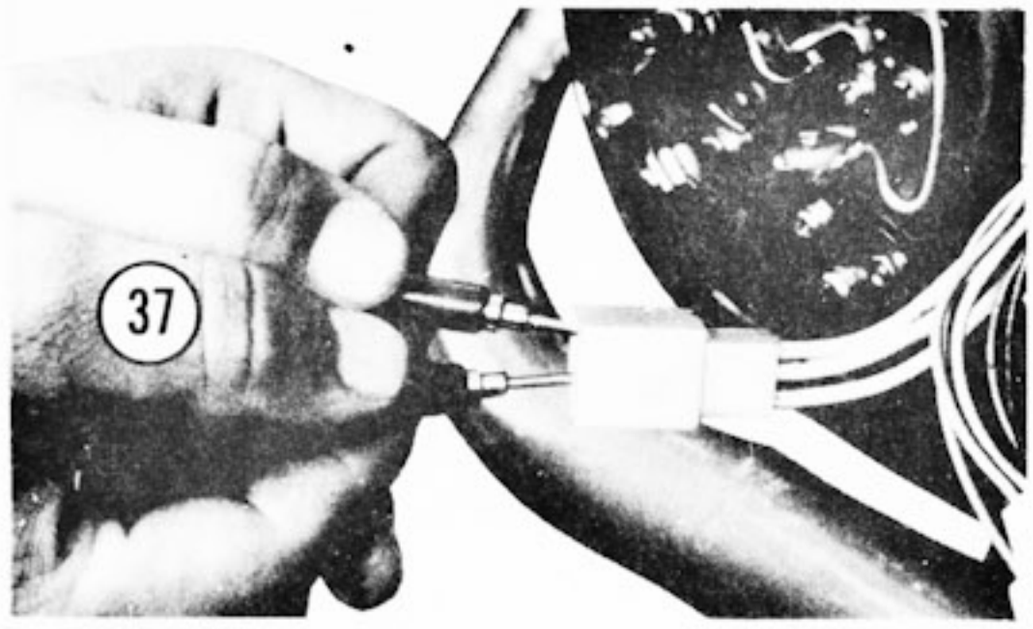
4. If any reading differs greatly from the specified value, replace the rectifier unit.

5. Reconnect leads if rectifier checks OK.

To check for a defective alternator rotor or stator, proceed as follows:

1. Trace the wiring from the alternator to the connector. Disconnect the connector.

2. Measure the resistance between each pair of white wires (three possible combinations), as shown in **Figure 37**. Each combination should indicate 0.30 to 0.35 ohm.



3. Ground one ohmmeter lead to the stator housing. Set the ohmmeter to its highest resistance range.

4. Measure insulation resistance between each white lead and the stator housing. Resistance should be essentially infinite.

5. If the readings are not as specified in Steps 2 through 4, the windings are open, shorted, or shorted to the housing. Replace the entire stator unit.

Also check the rotor and the brushes as follows:

1. Inspect the brushes for obvious damage or wear. Standard brush length is 0.43 inch (11 mm). The wear limit is 0.23 inch (6mm).

2. Measure the resistance between each of the rotor slip rings as shown in **Figure 38**. Resistance must be 4.0 to 4.5 ohms. If less than 3.5 ohms or more than 5.0 ohms, replace the rotor.

3. Measure insulation resistance between each slip ring and the rotor core, with the ohmmeter on the highest range. Insulation resistance should be essentially infinite.

4. Replace the rotor if measurements differ greatly from those specified.

DC GENERATORS

Several different models of generators are installed on Yamaha machines, but they are all similar in construction and service procedures. **Figure 39** is a wiring diagram for a typical machine equipped with a DC generator. **Figure 40** (page 28) is an exploded view of a typical DC generator.

Troubleshooting

If all the wiring and connectors are in good condition, trouble in the system must be either the generator or the regulator. To determine which, first check the generator.

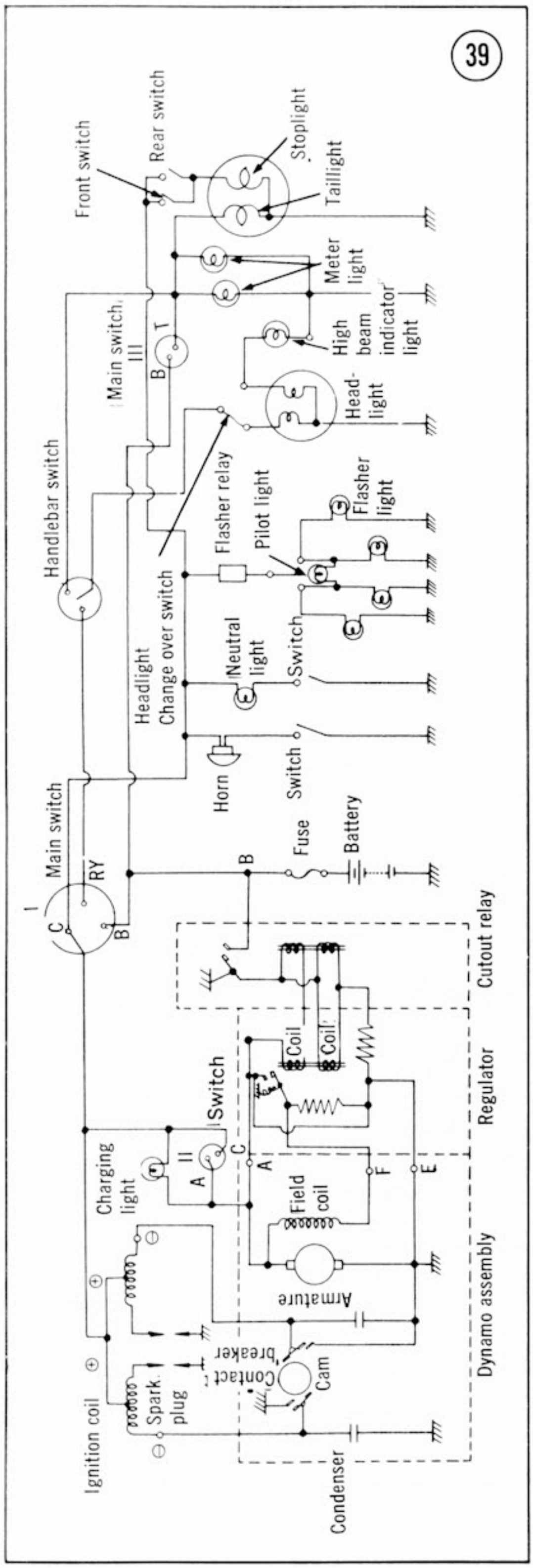
1. Disconnect the wire (usually green) from terminal "F" on the generator.

2. Connect a jumper from terminal "F" to a good ground.

3. Disconnect the wire (usuaully white) from terminal "A" on the generator.

4. Connect the positive lead of a 0-20 DC voltmeter to terminal "A". Connect the negative voltmeter lead to a good ground.

5. Start the engine and run it no higher than 2,000 rpm. The meter should indicate more



than 14 volts for machines with 12-volt electrical systems. If the machine has a 6-volt system, the meter should indicate at least 7 volts. Do not operate the engine longer than is necessary to make the measurement.

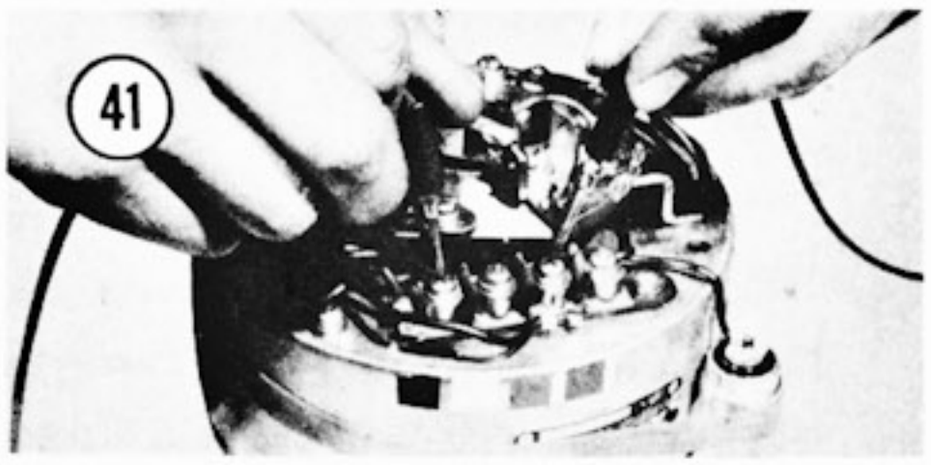
If the meter indication was as specified, the generator is good, and any trouble will be found in the regulator or wiring. If the meter indicated less than specified, the generator is at fault.

Yoke Inspection and Testing

Clean the yoke assembly of all foreign material and remove it from the machine.

1. Use an ohmmeter to measure the insulation resistance between the positive brush and ground. If the meter indicates continuity, check for a short circuit at the brush holder or terminal "A". Note that the negative brush holder is not insulated. The positive brush holder has a piece of plastic located between the holder and the brush assembly.

2. Measure the resistance between terminals "F" and "A" (**Figure 41**). Field coil resistance should be 5 to 8 ohms.

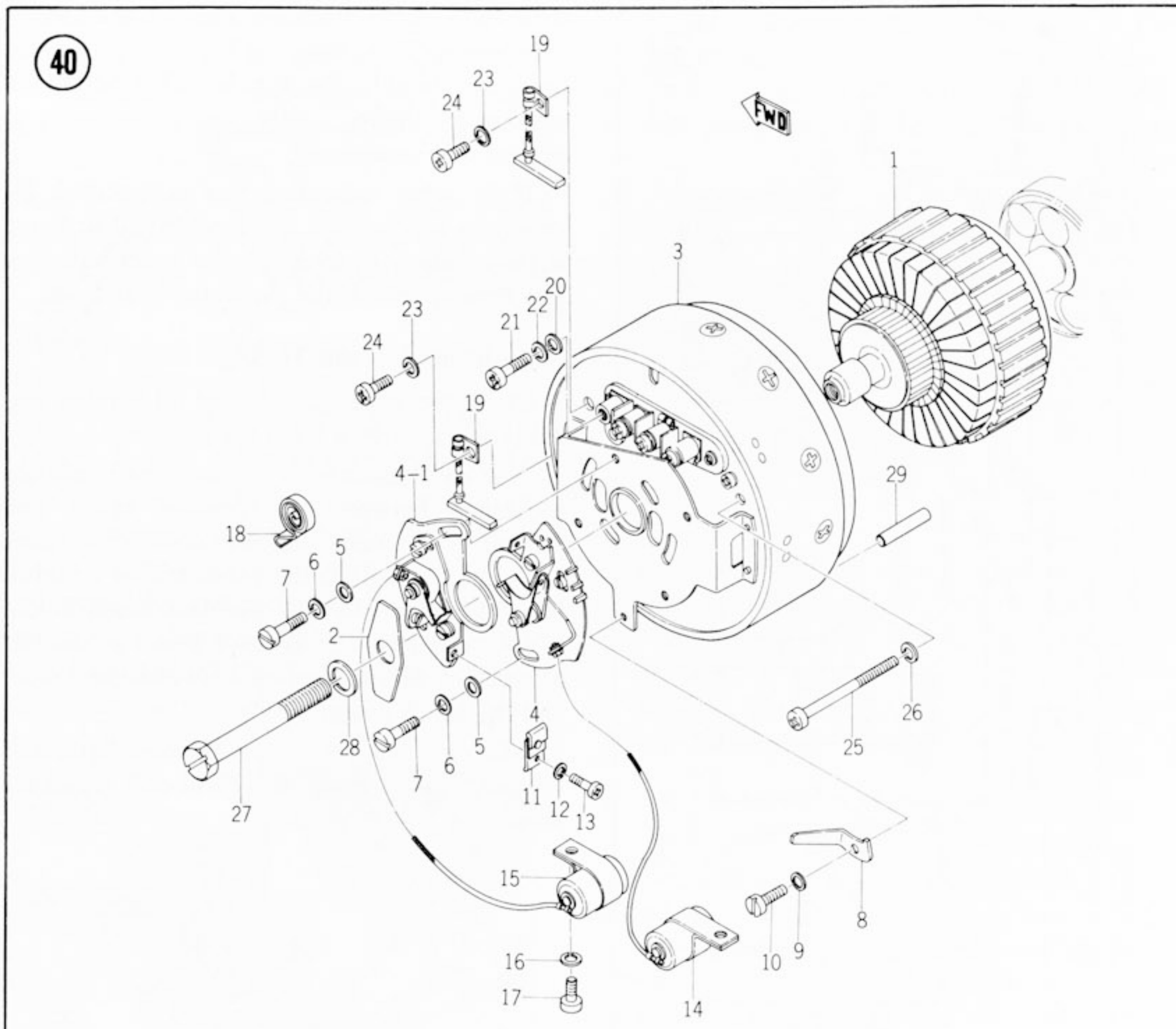


3. Set the ohmmeter to its highest range. Measure the insulation resistance between terminal "F" and a good ground. Insulation resistance should be essentially infinite.

If the readings obtained in Steps 2 or 3 are not as specified, replace the yoke. If the yoke assembly is good, check the brushes and armature.

Brush Inspection

Poor brush condition is one of the most frequent causes of low generator output. Remove the brushes and examine them carefully. Each brush must contact the commutator with at least



TYPICAL GENERATOR

1. Armature
2. Cam plate
3. Stator
4. Breaker points
5. Flat washer
6. Lockwasher
7. Screw
8. Timing plate
9. Lockwasher
10. Screw
11. Lubricator
12. Lockwasher
13. Screw
14. Right condenser
15. Left condenser
16. Lockwasher
17. Screw
18. Brush spring
19. Brush
20. Flat washer
21. Screw
22. Lockwasher
23. Lockwasher
24. Screw
25. Screw
26. Lockwasher
27. Bolt
28. Lockwasher
29. Dowel pin

three quarters of its contact surface. If either brush is worn past the limit line, replace both brushes.

If the brushes and the commutator are rough, misalignment of the armature and crankshaft may be the cause. Check the tapered bore of the armature and smooth it if there are any burrs.

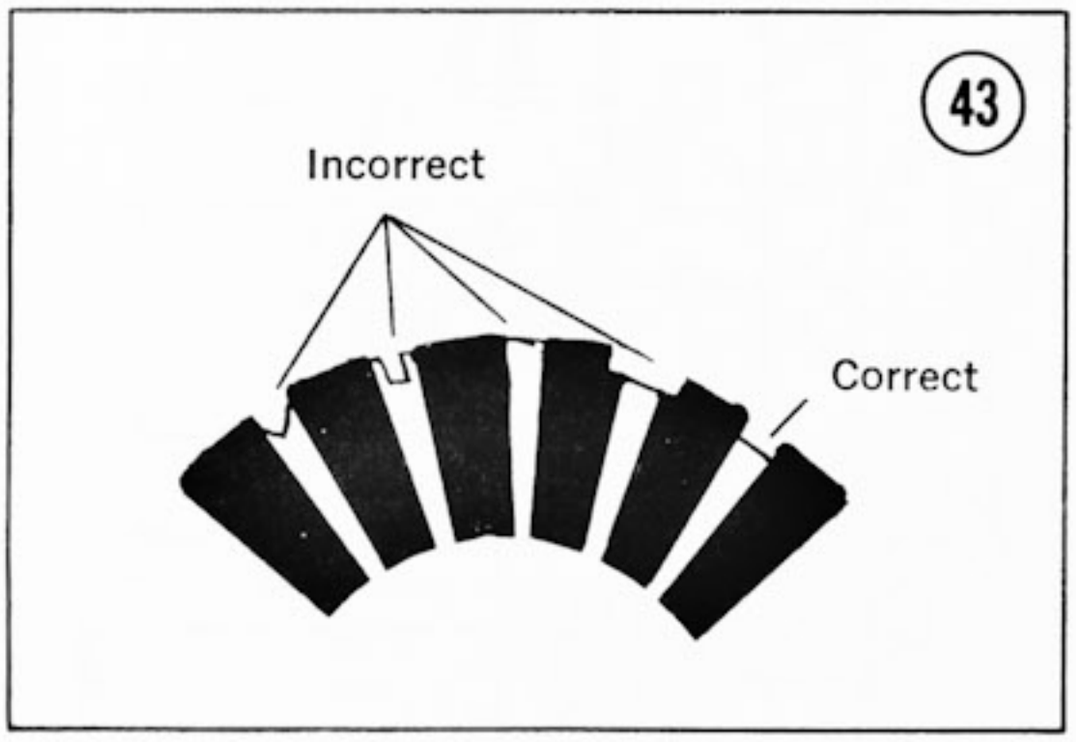
When you replace the brushes, be sure that the positive brush lead doesn't touch the brush holder or the edge of the breaker plate. Also be sure that the negative brush lead doesn't touch the positive brush spring.

Armature Inspection and Testing

1. Clean the commutator of oil, dust, and foreign material.
2. If the commutator is rough or covered with carbon dust, polish it as shown in **Figure 42**

using fine emery paper. If a light polishing does not clean up the surface, remove the armature and turn the commutator in a lathe. Do not reduce the commutator diameter by more than 0.08 inch (2mm).

3. **Figure 43** shows how to undercut the mica segments between the commutator segments, using a hacksaw blade, to a depth of 0.02 to 0.04 inch (0.5 to 1.0mm). Remove the dust from between the segments.



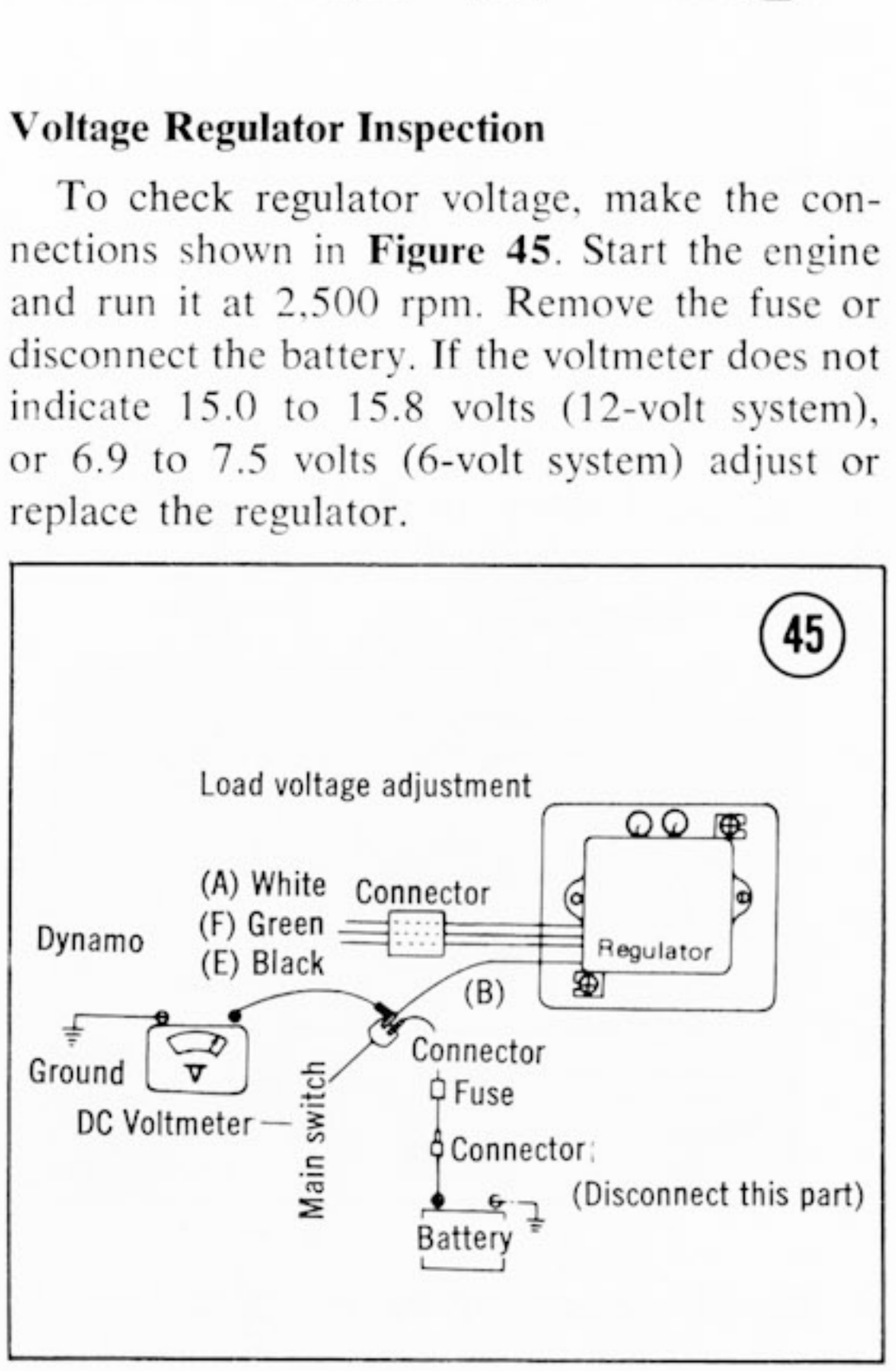
4. Use an ohmmeter (**Figure 44**) or armature growler to determine that no commutator segment is shorted to the shaft. If any short exists, replace the armature.

VOLTAGE REGULATOR

Varying engine speeds and electrical loads affect the output of the generator. The regulator controls the generator output, and also disconnects the battery from the generator whenever the generator output voltage is less than that of the battery, thereby preventing battery discharge through the generator.

Voltage Regulator Inspection

To check regulator voltage, make the connections shown in **Figure 45**. Start the engine and run it at 2,500 rpm. Remove the fuse or disconnect the battery. If the voltmeter does not indicate 15.0 to 15.8 volts (12-volt system), or 6.9 to 7.5 volts (6-volt system) adjust or replace the regulator.



Observe the contacts on the cutout relay as you slowly increase the engine speed. The contacts should close when the voltmeter indicates 12.5 to 13.5 volts (12-volt system) or 6.5 to 7.0 volts (6-volt system).

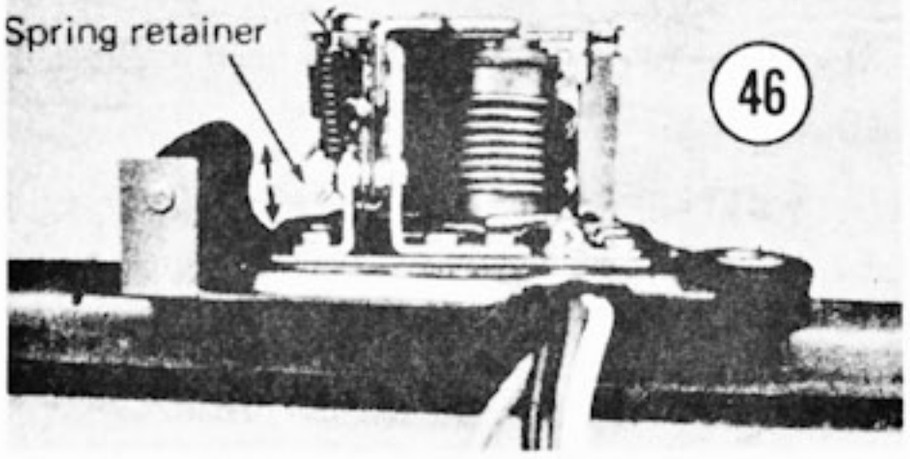
Voltage Regulator Adjustment

CAUTION

Disconnect the battery before you remove the regulator cover. Do not make any adjustments with the battery wiring in place.

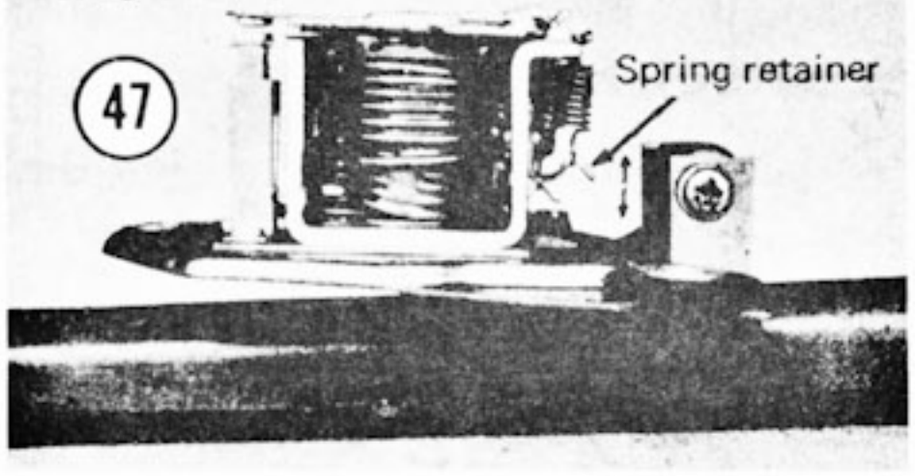
Remove the regulator cover and adjust the regulator by bending the adjustment spring (**Figure 46**). Bending the spring downward raises the voltage setting. The voltage regulator can be identified by its two contact points.

When the spring retainer is lowered, the voltage rises, and when the spring retainer is raised, the voltage drops.



The cutout relay (**Figure 47**) can be identified by a single set of contacts which are normally open. The relay rarely, if ever, needs adjustment. Usually all that is required is to dress the contacts lightly to remove any corrosion or light pitting.

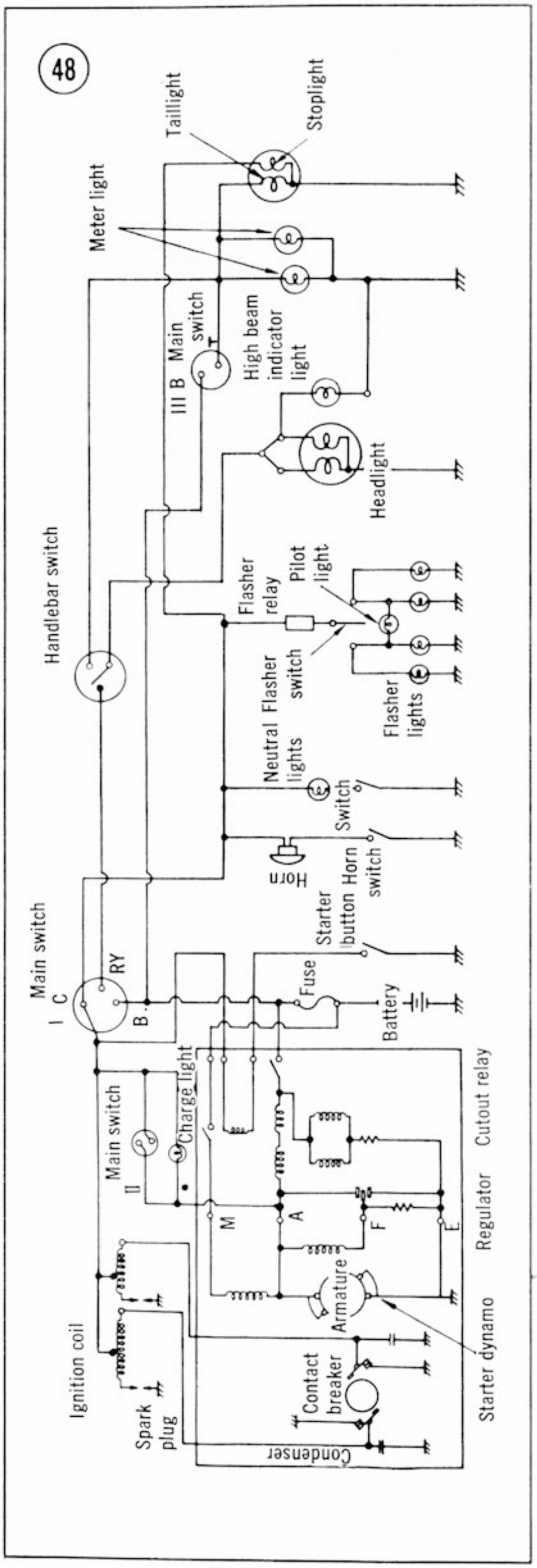
When the spring retainer is lowered, the voltage rises, and when the spring retainer is raised, the voltage drops.



Should adjustment be required, bend the spring retainer up or down as required. Lowering the spring retainer raises the voltage setting.

STARTER/GENERATOR

The starter/generator and its associated voltage regulator function similarly to the shuunt-wound DC generator and voltage regulator which were discussed in the foregoing paragraphs. When the engine is stopped, however, the starter/generator may be operated as a series-wound motor to start the engine. **Figure 48** is a schematic diagram of a typical machine equip-



ped with a starter/generator. **Figure 49** is an exploded view of a typical starter/generator.

In general, service procedures for these units are the same as for the corresponding units of the DC generator system. These procedures which are different are described in the following paragraphs.

Generator Testing

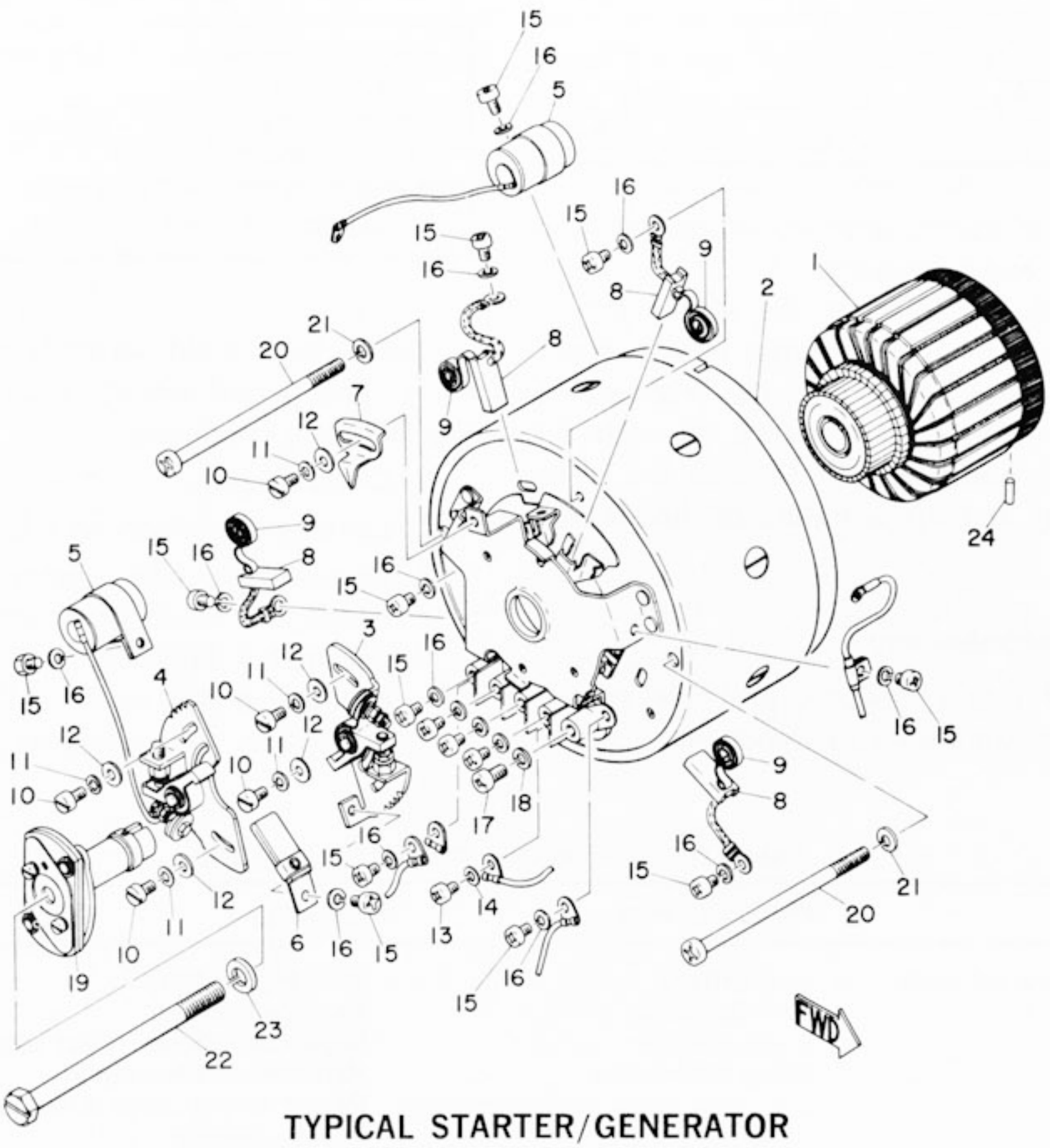
The test connections are the same. Do not run the engine at over 1,700 rpm for 12-volt systems, or 1,400 rpm for 6-volt systems. At these speeds, the voltmeter should indicate at least 10 volts for a 12-volt system, or 5 volts for a 6-volt system.

There are three field terminals to check on the starter/generator yoke instead of the two on the DC generator. Determine that there is continuity between terminals "A" and "F", "A" and "M", and "F" and "M". Resistance should be as given in **Table 9**.

Starter Relay

There is an additional relay in the voltage regulator (**Figure 50**). This relay connects the

49



TYPICAL STARTER/GENERATOR

1. Armature
2. Stator
3. Left breaker assembly
4. Right breaker assembly
5. Condenser
6. Lubricator
7. Timing plate
8. Brush
9. Spring
10. Screw
11. Lockwasher
12. Flat washer
13. Screw
14. Lockwasher
15. Screw
16. Lockwasher
17. Screw
18. Lockwasher
19. Advance mechanism
20. Screw
21. Lockwasher
22. Bolt
23. Lockwasher
24. Dowel pin

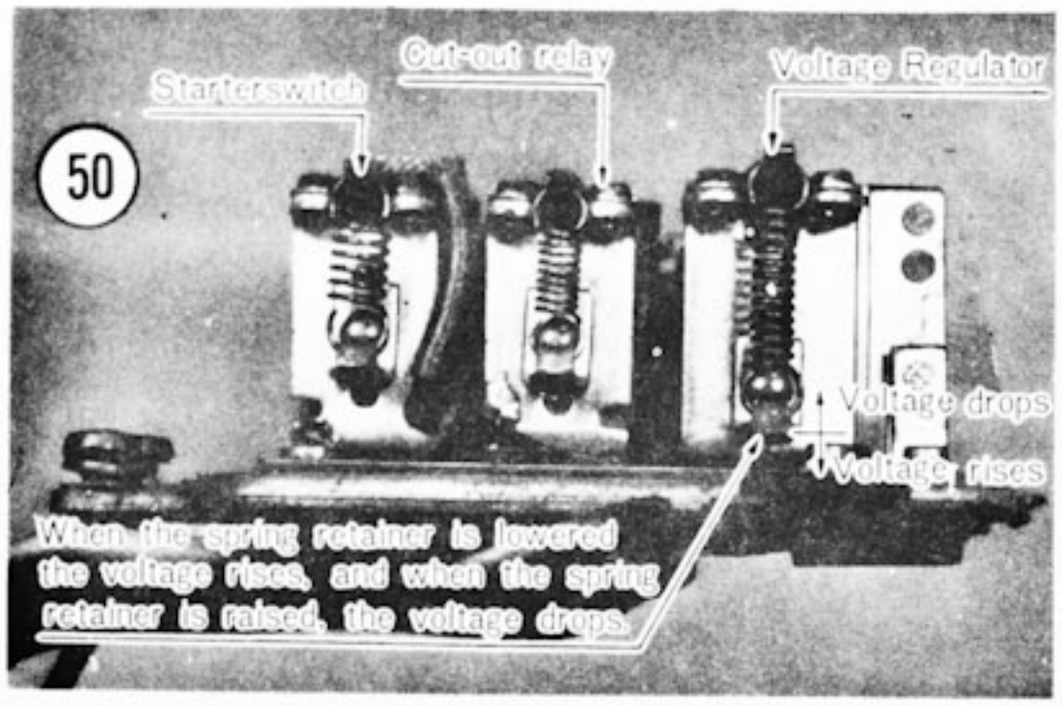


Table 9 RESISTANCE

Terminals	Ohms
"A" to "F"	4.9
"A" to "M"	0
"F" to "M"	4.9

battery to the starter/generator to operate it as a motor for engine starting.

When the rider presses the starter switch, current flows through the starter relay coil and closes the starter relay contacts (Figure 48). Current flows from the battery, through the starter relay contacts, then through the series field winding and the armature of the starter/generator.

Starter Troubleshooting

Table 10 lists symptoms, probable causes, and remedies for starter malfunctions.

BATTERY

Check the battery occasionally for sulfation or deposits in the bottoms of the cells. Replace the battery if such conditions exist, or if the battery will not accept or hold a charge.

Maintain the battery electrolyte level between the minimum and maximum level marks on the battery case. Use only distilled water to fill the cells. If the battery requires water more frequently than once a month, check the charging system. It is possible that the battery is being overcharged. See **Table 11**.

Table 11 BATTERY SERVICE STANDARDS

Initial charging current (new battery)	0.2 ampere for 25 hours
Recharging current (used battery)	0.2 ampere for 13 hours
Specific gravity at full charge	1.260 to 1.280

Battery life should normally be two to three years. This period will be shortened by any of the following conditions:

1. Overcharging.
2. Leaving the battery in a discharged state.
3. Freezing. A fully charged battery will freeze at a much lower temperature than one that is discharged. If the machine is exposed to cold weather, be sure to keep the battery fully charged.

Table 10 STARTER TROUBLESHOOTING

Symptom	Probable Cause	Remedy
Starter does not work	Low battery	Recharge battery
	Worn brushes	Replace brushes
	Internal short	Repair or replace defective component
	Relay inoperative	Replace voltage regulator
	Defective wiring or connections	Repair wire or clean & tighten connections
	Defective switch	Replace switch
Starter action is weak	Low battery	Recharge battery
	Pitted relay contacts	Clean contacts or replace voltage regulator
	Brushes worn	Replace brushes
	Defective wiring or connections	Repair wire or clean & tighten connections
	Short in commutator	Replace commutator
Starter runs continuously	Stuck relay	Dress contacts or replace voltage regulator

4. Allowing the electrolyte level to drop below the tops of the plates.
5. Adding anything to the electrolyte except distilled water.

If the motorcycle is not to be used for an extended period, charge the battery fully, remove it from the machine, and store it in a cool, dry place. Recharge the battery every two months while it is in storage, and again before it is put back into service.

Be very careful to connect the battery properly. Machines equipped with alternators will suffer instantaneous damage to the rectifier diodes, and possible burn-out of the alternator stator, if the battery is installed with reversed connections. If the battery is installed backward in a DC generator or starter/generator-equipped machine, no damage will occur until the engine is started. After starting, the generator and regulator may be severely damaged. Although the battery circuit is fused, damage may still occur, as fuses have been known to fail.

FUSE

The clear plastic fuse box is hooked in line with the battery's red wire. It is located under the seat, usually on the left side and behind the battery. Most often you may find it inside a small black rubber wiring cover.

A burnt fuse results in no spark to the ignition when trying to start the engine. Also, none of the electrical accessories will work with the engine stopped.

If several fuses burn out within a short time, do not put in a stronger fuse, or try to bypass the fuse box. Instead look for a wire either in the ignition circuit or accessory circuit (horn, lights, turn signals, electric starter, etc.) that has to be touching bare metal at some point, creating a ground.

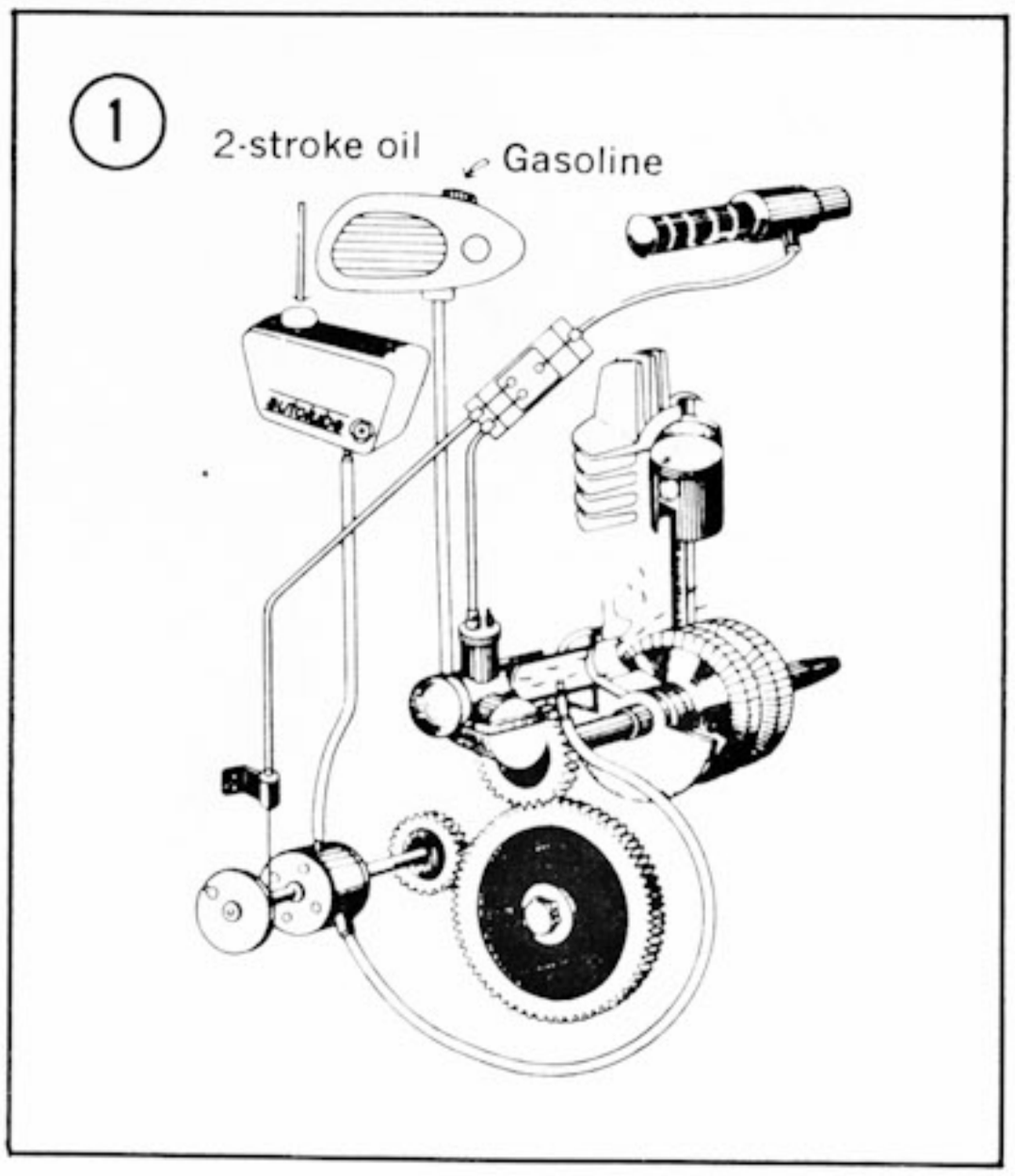
CHAPTER THREE

AUTOLUBE SYSTEM

Conventional two-stroke engines require that lubricating oil be mixed with the fuel. The Autolube system, however, provides a separate means for supplying lubricating oil to the engine.

Figure 1 illustrates the Autolube system. The pump is driven by the engine through reduction gears, so that pump output is therefore varied by engine speed. Lubrication requirements, however, depend not only on engine speed, but also on engine load. Since engine load and throttle position are closely related, it is possible to use throttle position in addition to engine speed to regulate the pump output. This is done in the Autolube system by a control cable from the throttle grip to the pump.

Output from the oil pump is delivered to the induction tract and thence to the engine moving parts.



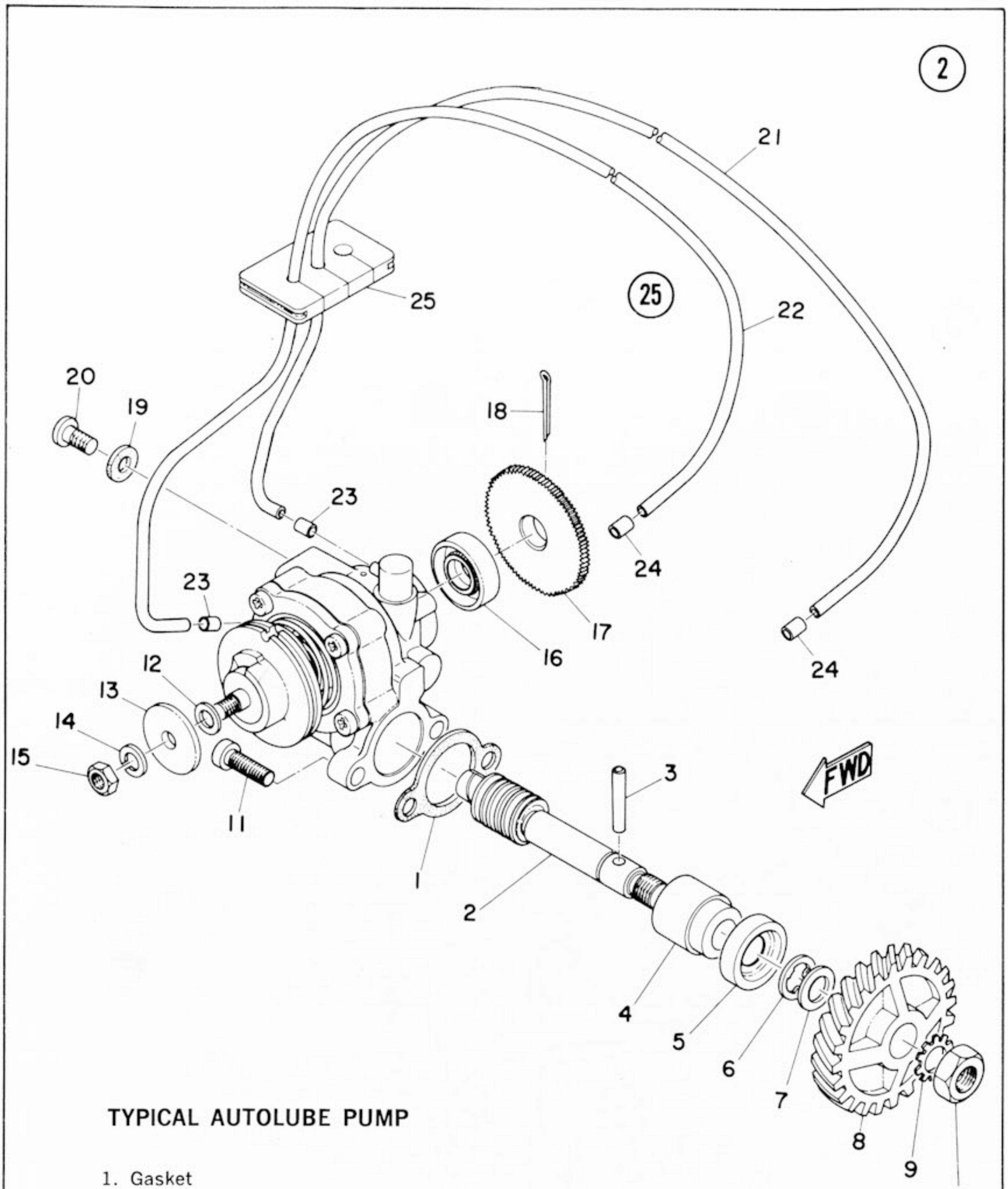
SERVICE PROCEDURES

Figure 2 is an exploded view of a typical Autolube pump. The puump is a precision assembly; do not attempt to disassemble it. Whenever the pump is removed, protect it at all times from dust, dirt, and foreign material. After you reinstall the pump, be sure to follow the instructions for adjustment and bleeding.

Pump location varies on different models. On YDS3, YDS5, DS6 series, YM1, and YM2 models, it is located behind a plate on the engine's left side. On all other models the pump is located behind a small cover on the front section of the engine's right case cover.

Minimum Pump Stroke Adjustment

1. Fully close the throttle grip (engine idle position).



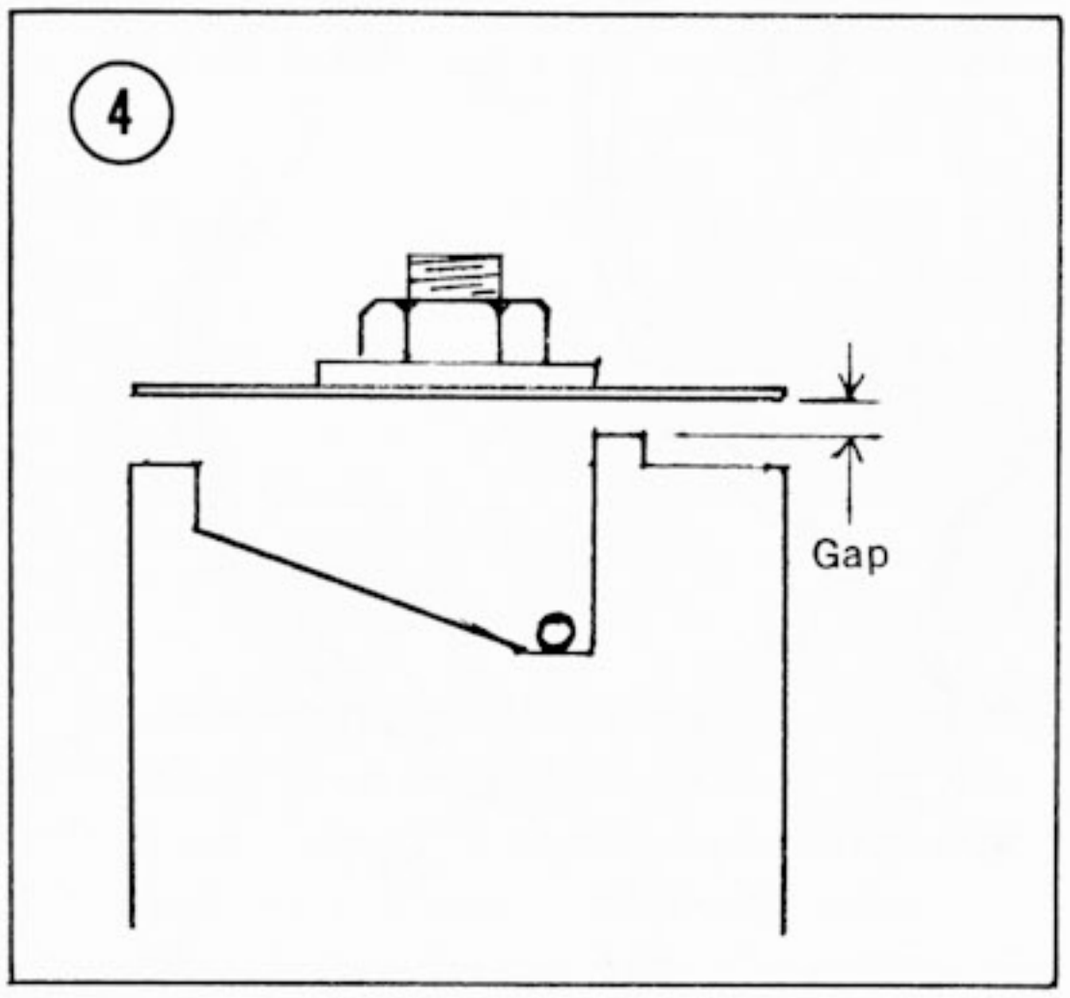
TYPICAL AUTOLUBE PUMP

1. Gasket
2. Shaft
3. Dowel pin
4. Collar
5. Oil seal
6. Snap ring
7. Washer
8. Gear
9. Lockwasher
10. Nut
11. Screw
12. Shim
13. Adjusting plate
14. Lockwasher
15. Nut
16. Oil seal
17. Starter plate
18. Cotter pin
19. Gasket
20. Screw
21. Delivery tube
22. Delivery tube
23. Clip
24. Clip
25. Tube holder

2. Rotate the white plastic starter plate (**Figure 3**) in the direction of the arrow marked on the plate until the plunger (opposite end) moves out to the end of its stroke.

3. Measure the gap shown in **Figure 4** with a feeler gauge, between the adjustment plate and raised nub on the pump pulley. The gap should be between 0.008-0.010 inch (0.20-0.25mm). Minimum allowable gap is 0.006 inch (0.15mm).

4. If adjustment is required, remove the adjustment plate lock nut already identified in Figure 3, and then the adjustment plate. Install or remove thin shims under the adjustment plate as required. Adding a shim increases gap width. If shims are needed, it is easiest to buy shim stock and trim to fit.

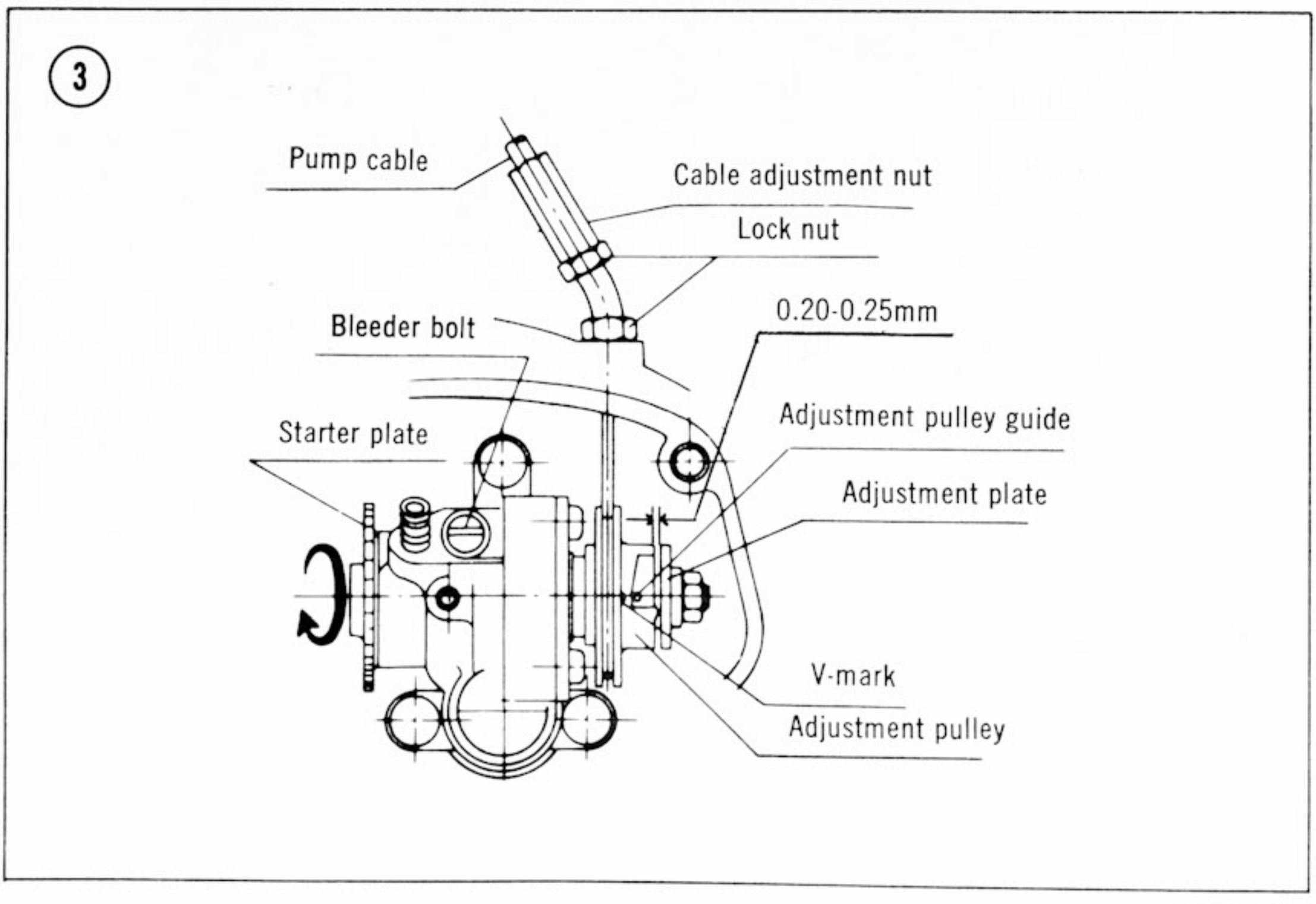


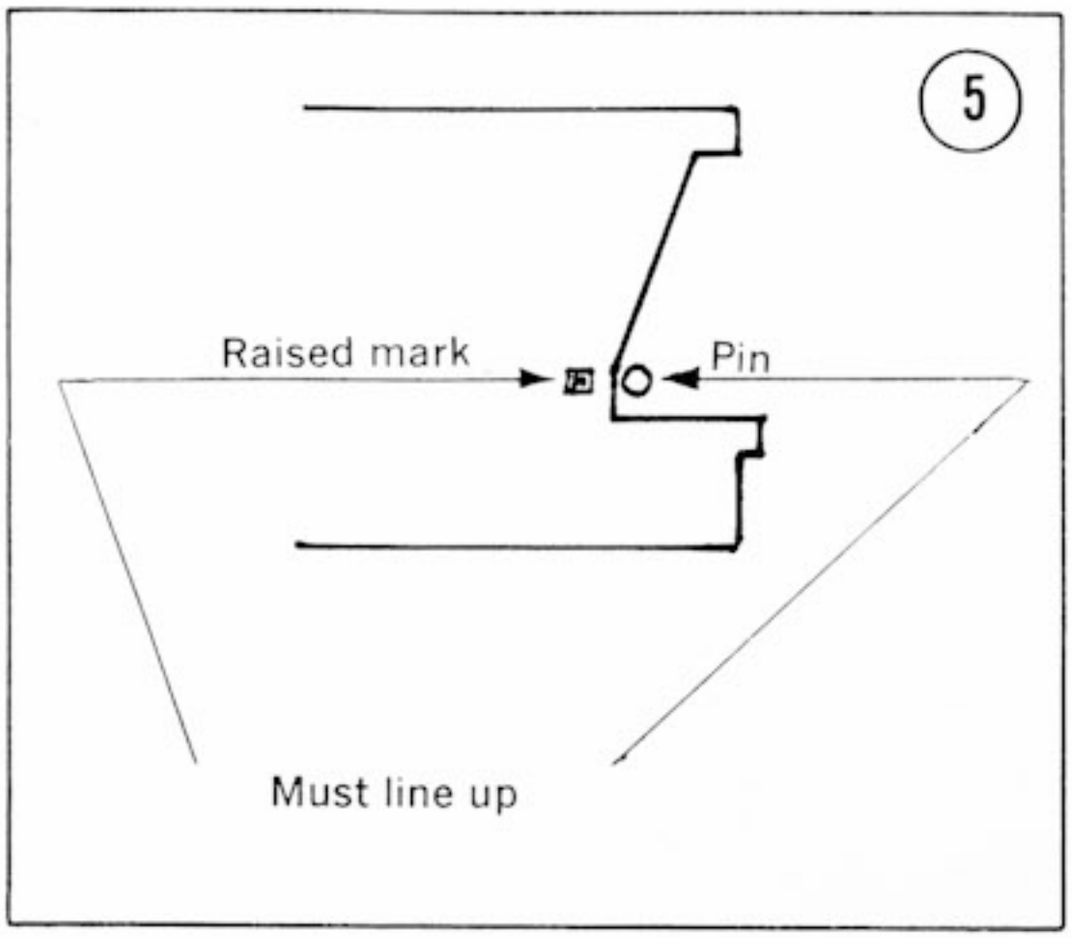
Pump Cable Adjustment

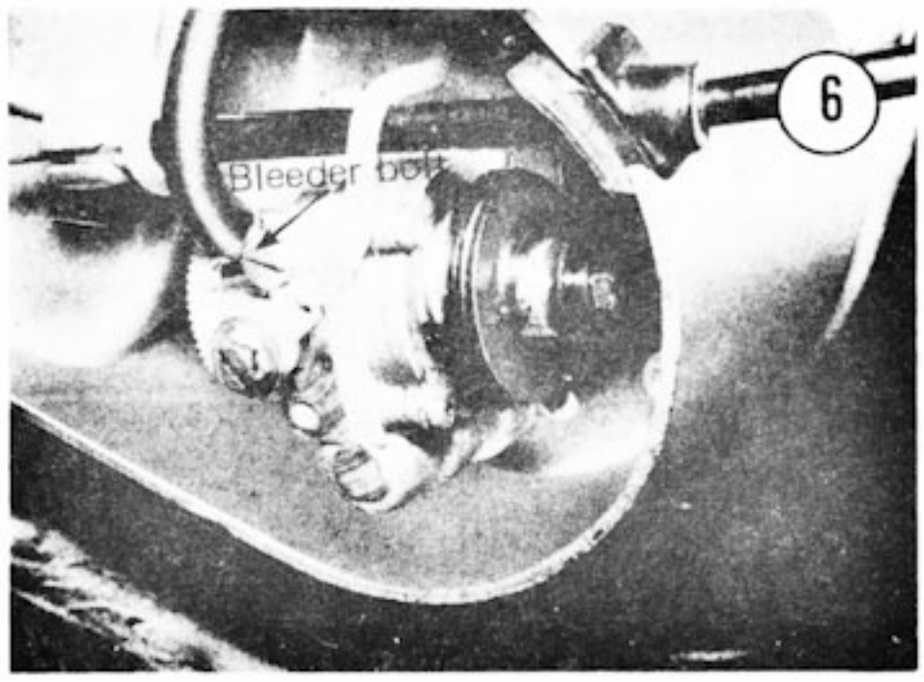
1. First, adjust carburetor cable free-play, carburetor synchronization, and idle speed, as instructed in the *Carburetor* section in Chapter Two. Only after these adjustments have been checked can you accurately adjust the Autolube pump.

2. Slowly rotate the throttle grip just until all throttle cable free-play has been taken up. The grip will become harder to turn after all free-play is eliminated. Hold the throttle grip in this position.

3. See if the pulley guide pin lines up with the raised alignment mark on the pulley, as illustrated in **Figure 5**. If adjustment is needed, loosen the adjuster lock nut and rotate the cable adjuster until the pin and mark line up.







Bleeding the Autolube Pump

If air enters the pump, it can possibly cause blockage of oil flow. The pump is equipped with a bleeder screw to bleed off air bubbles. The pump must be bled whenever it has been removed, the Autolube oil tank has run out of oil, or there are air bubbles in the tank-to-pump delivery line.

1. Remove the bleed screw. Its location is pinpointed in **Figure 6**.
2. With the engine shut off, fully open the throttle grip and rotate the white plastic starter plate in the direction of the arrow on the plate. Continue priming the pump until air bubbles cease to come out of the bleed hole with the oil, then install the bleed screw.

CHAPTER FOUR

ENGINE, TRANSMISSION, AND CLUTCH

This chapter describes the removal, disassembly, servicing, and reassembly of the engine, transmission, and clutch. It is suggested that the engine be serviced without removing it from the chassis except for overhaul of the crankshaft assembly, transmission, gearshift mechanism, or bearings.

PREPARATION FOR ENGINE DISASSEMBLY

1. Thoroughly clean the engine exterior of dirt, oil, and foreign material, using one of the cleaners formulated for the purpose.

2. Be certain that you have the proper tools for the job. See general information in Chapter One.

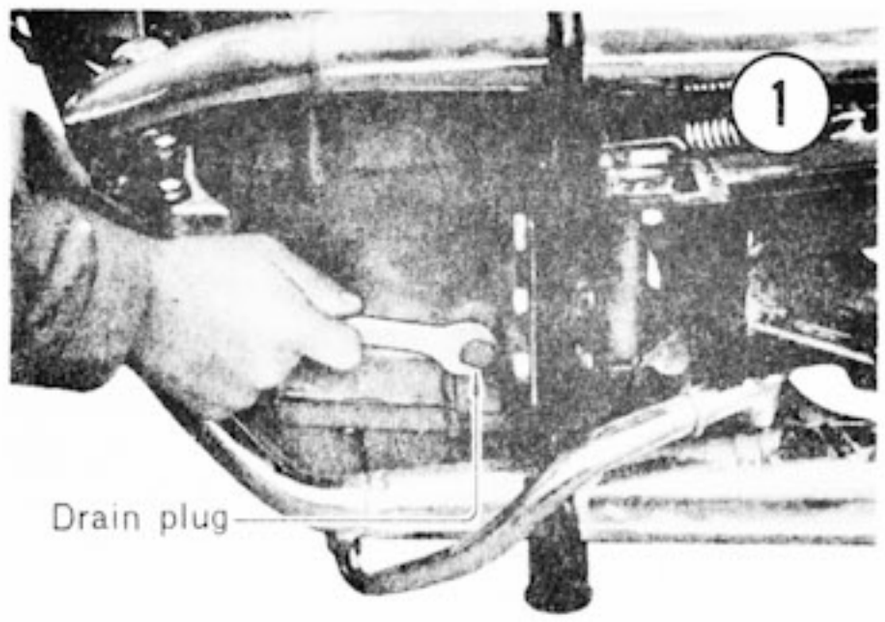
3. As you remove parts from the engine, clean them and place them in trays in the order of their disassembly. Doing this will make reassembly faster and easier, and will ensure correct installation of all engine parts.

4. Note that there are different disassembly procedures for the various engines covered by this manual. Be sure to follow the procedure which applies to your engine.

ENGINE REMOVAL

The procedure for removing the engine is generally similar for all models. The following steps are set forth as a guide.

1. If possible, start the engine and warm it up for a few minutes, then drain the transmission oil. The drain bolt is located on the underside of the engine, as identified in **Figure 1**.



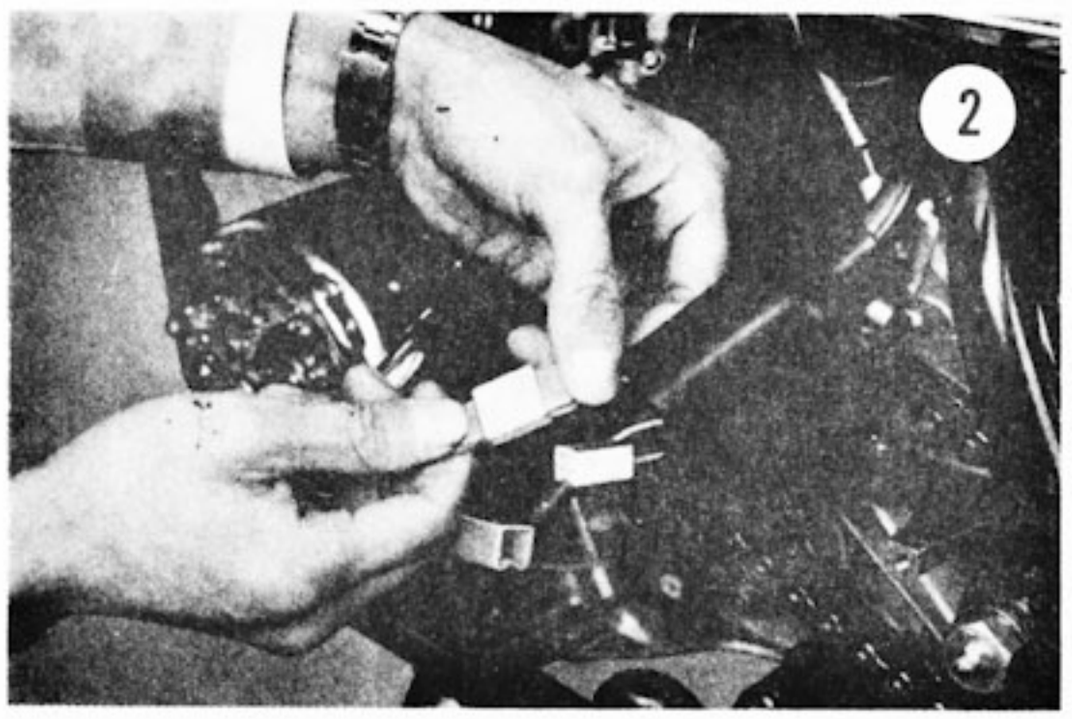
2. Remove both exhaust pipes and mufflers. On models that secure the pipe to the cylinder with a ring nut, use a spanner wrench (Yamaha part #908-90010-40-00). Sometimes penetrating oil helps as rust build-up makes nut removal difficult. When threading these nuts back on, oil them, then take care to prevent cross-threading; these are fine threads and they can easily be stripped.

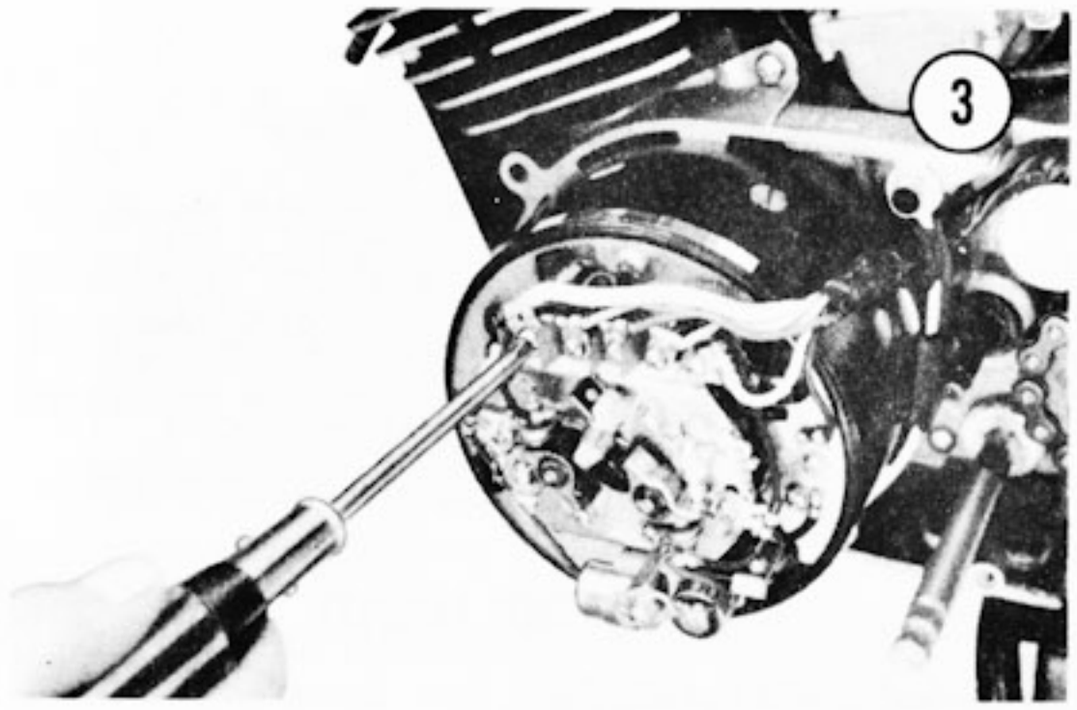
3. Remove the gearshift lever on the left side, and remove the footrest assembly if needed.

4. Rmove the case cover protecting the electrical dynamo. On YDS3 and YM1 models this

would be the right case; all other models require left case cover removal.

5. Disconnect all wiring that is connected to the dynamo. On the R5 series, RD250 series, and RD350 series, pull apart the connectors as shown in **Figure 2**. On all other models, first loosen the screw-type terminals on the yoke, then lift the wires free. **Figure 3** shows their location. Also remove the black ground wire anchored to one side.

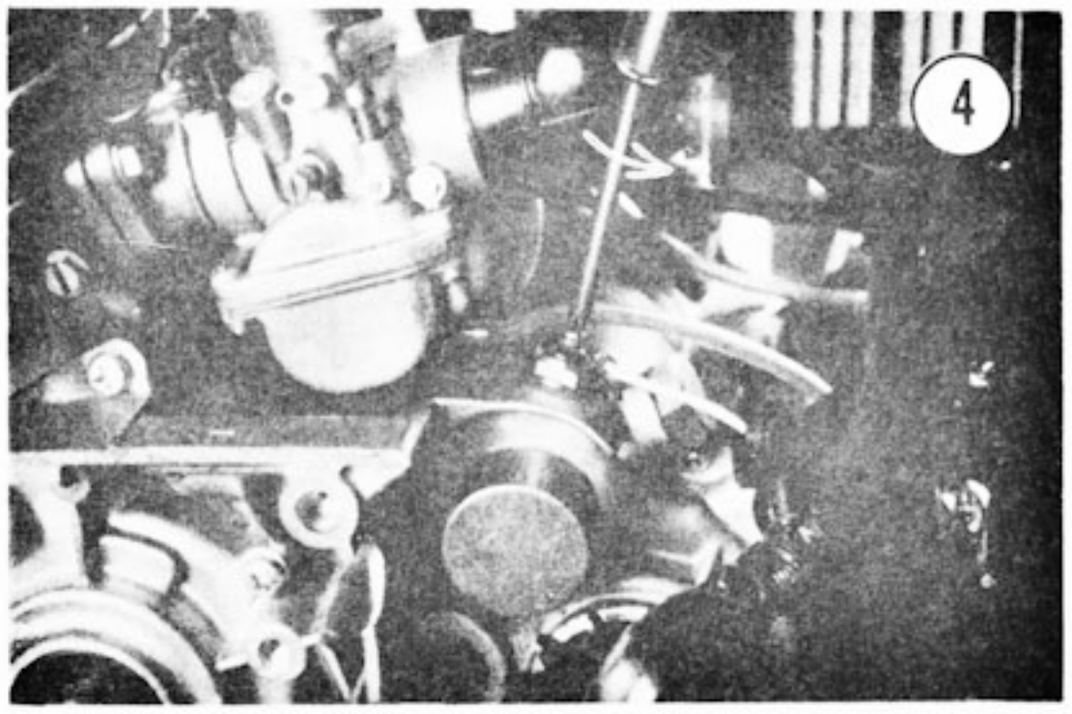


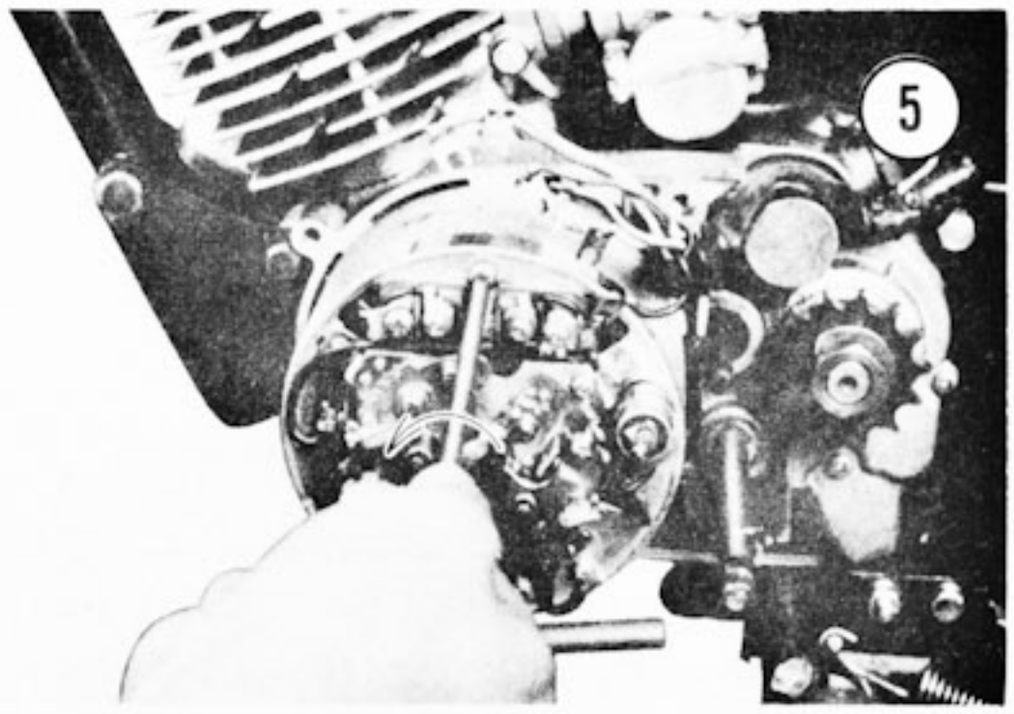


During wire attachment later, match the wire color with the color identification band pasted right above the terminals. This prevents improper hookup.

6. Disconnect the neutral light wire (light blue color) at the point shown in **Figure 4**.

7. Remove the dynamo yoke assembly. On all models you can slide the yoke off once the two long retaining screws have been removed (see **Figure 5**). It is advisable to pull the carbon brushes back on generator-equipped models. This prevents brush damage during yoke removal or installation. The spring that pushes the brush against the commutator can be held to one side until the brush is pulled partially out. Release the spring to wedge it against the brush, holding it in place.





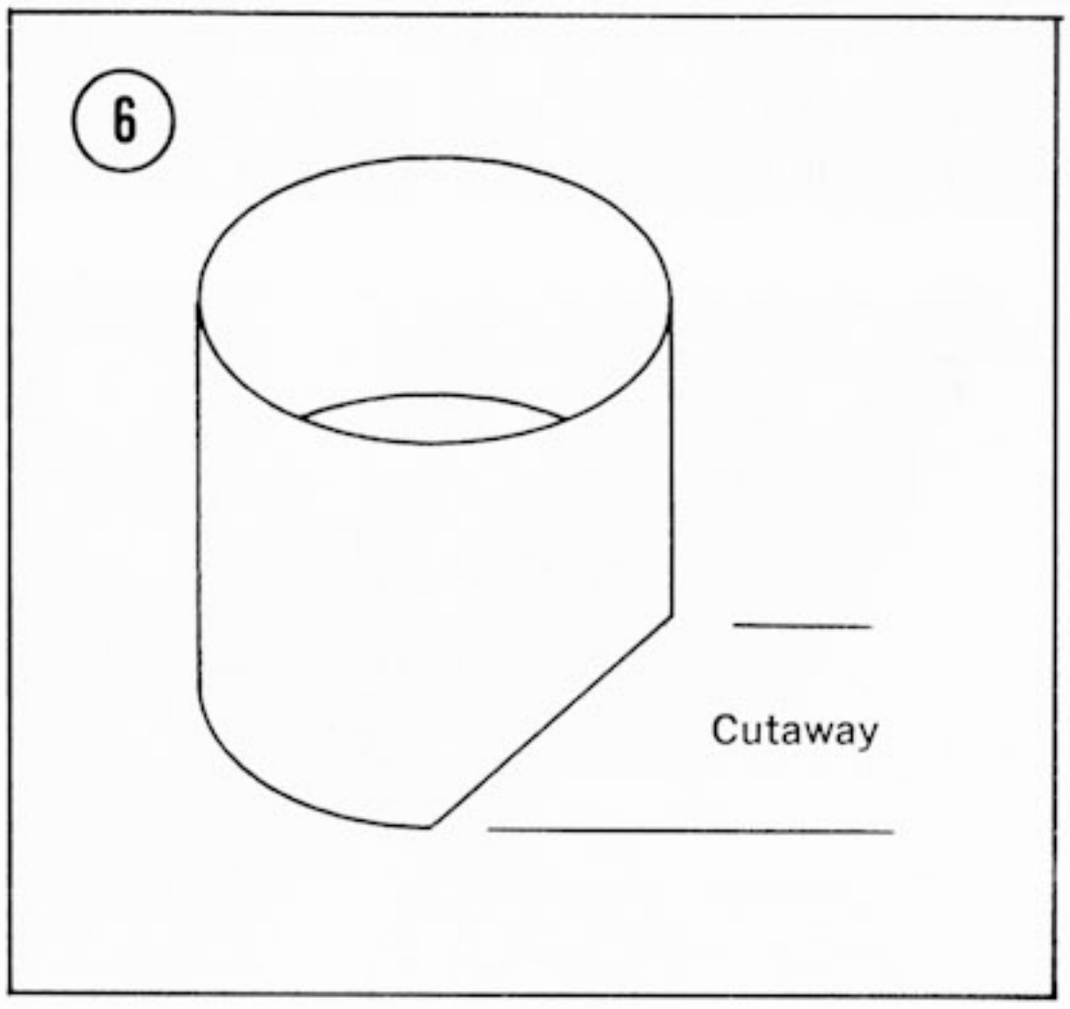
8. Remove the armature (also called a rotor). First, remove the center bolt, then pull out the point cam (and combined advance unit, if it has a starter/generator). Using a slide hammer (Yamaha part #908-90900-10-00), run the proper fitting bolt through the slide weight, then screw the bolt into the threaded armature center until it seats. Slide the weight back quickly, striking the bolt end, until the armature pops loose. Do not stand directly in line with the sliding weight; if the armature comes loose suddenly, it may come off with considerable force. After armature removal, immediately pull off the Woodruff key from its slot in the crankshaft.

9. Remove the carburetor-to-air cleaner rubber connectors. If you have the HS1 or HS1-B, you will have to remove the entire air cleaner assembly.

10. Unscrew the ring nuts at the top of each carburetor and remove both throttle valves.

CAUTION

When installing the slides, you must have the bottom notched part (cutaway) facing out towards the air filter. See **Figure 6**. *If installed backwards, the slides will not drop to idle position. This could cause sudden acceleration when the engine is started.*



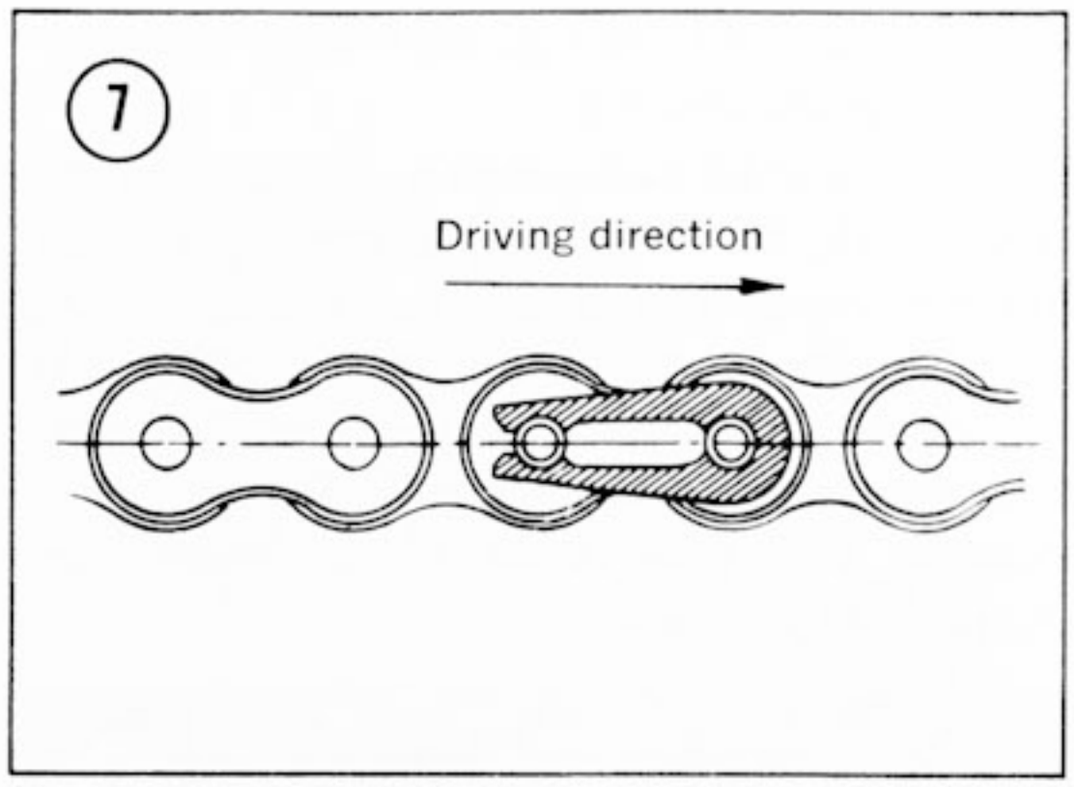
11. Disconnect the fuel lines and remove the carburetors. Be sure the fuel petcock is closed.

12. Disconnect the master link and remove the chain. It may be necessary to rotate the rear wheel to position the master link for convenient removal. When you replace the chain, be sure to position the master link as shown in **Figure 7**. Adjust the chain tension so that there is approximately 0.8 inch (20mm) up-and-down movement of the chain, measured on the lower chain run, with the rider in position.

NOTE: *If you plan to remove the drive sprocket later, loosen it now with the chain attached. With the rear brake applied, the chain will lock the drive sprocket in place, making it easy to loosen the nut.*

13. Disconnect the oil line at the oil tank. Be sure to plug hole to prevent oil from flowing out.

14. Remove the Autolube pump cover, then disconnect the Autolube cable. Wind the wire off the pulley, then slide the end free from the pulley. Completely unscrew the Autolube cable adjuster from the engine case.



NOTE: *After reattaching the cable and laying it in the pulley channel, operate the throttle grip to make sure you have wound the wire around the pulley in the proper direction.*

15. Remove the tachometer cable. Disconnect the clutch cable.

16. Disconnect the engine mounting bolts. Then straddle the machine, grasp the engine by the cylinder and starter pedal, and remove the engine.

ENGINE INSTALLATION

To install the engine after service or overhaul, reverse the removal procedure. Be sure to refill the transmission with 10W-30 motor oil and bleed the Autolube pump before you start the engine.

CYLINDER HEAD

Removal and Installation

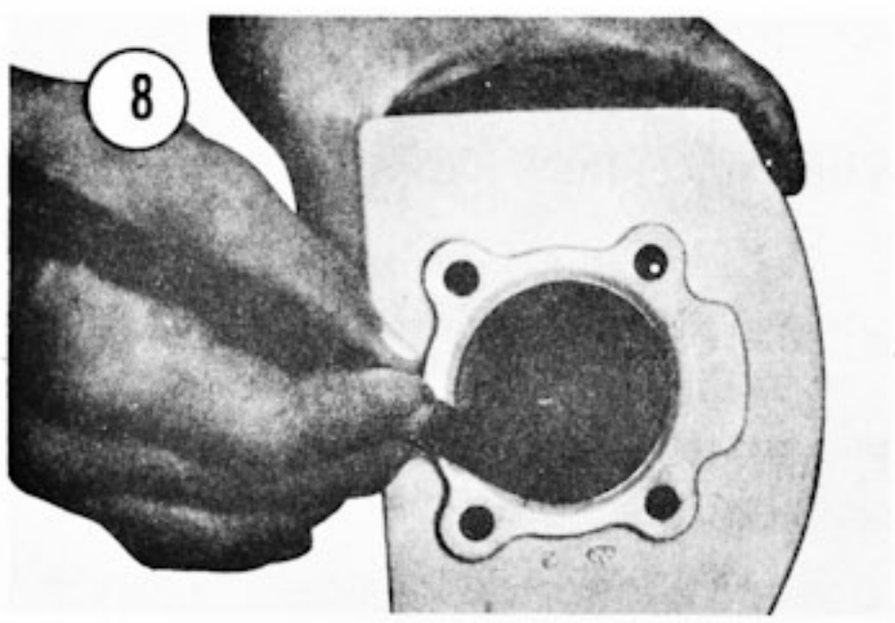
Let the engine cool first, then loosen the special head retaining nuts a quarter-turn at a time in a criss-cross pattern. Lift off the heads and head gaskets. Install new gaskets upon reassembly if there is any doubt about their condition. Tighten the cylinder head nuts in a criss-cross pattern, in two torquing steps, to the final load specified in **Table 1**.

Table 1 CYLINDER HEAD TORQUES

Bolt Size	Torque
8mm	15 to 18 ft.-lbs. (2.0 kg-m)
10mm	25 to 30 ft.-lbs. (3.5 to 4.0 kg-m)

Carbon Removal

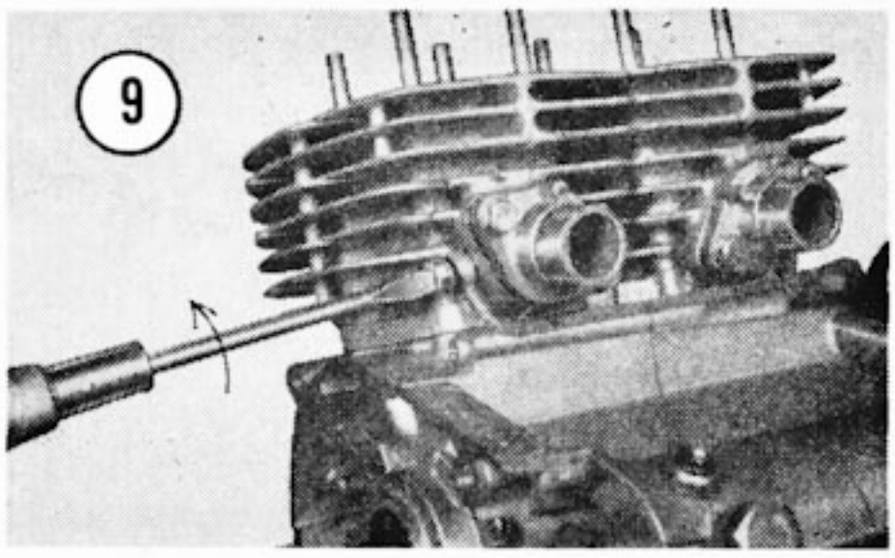
Carbon deposits inside the dome of the cylinder head increase the compression ratio and may cause preignition and overheating. To remove these deposits, scrape them off with the rounded end of a hacksaw blade as shown in **Figure 8**.



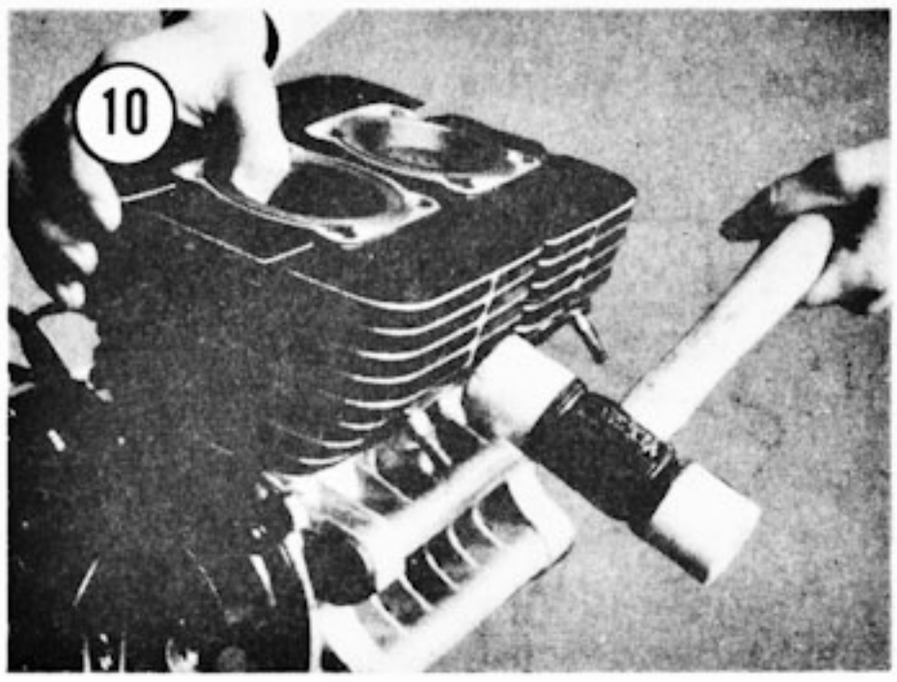
CYLINDER

Cylinder Removal

1. Disconnect the oil delivery tube at each cylinder (**Figure 9**).



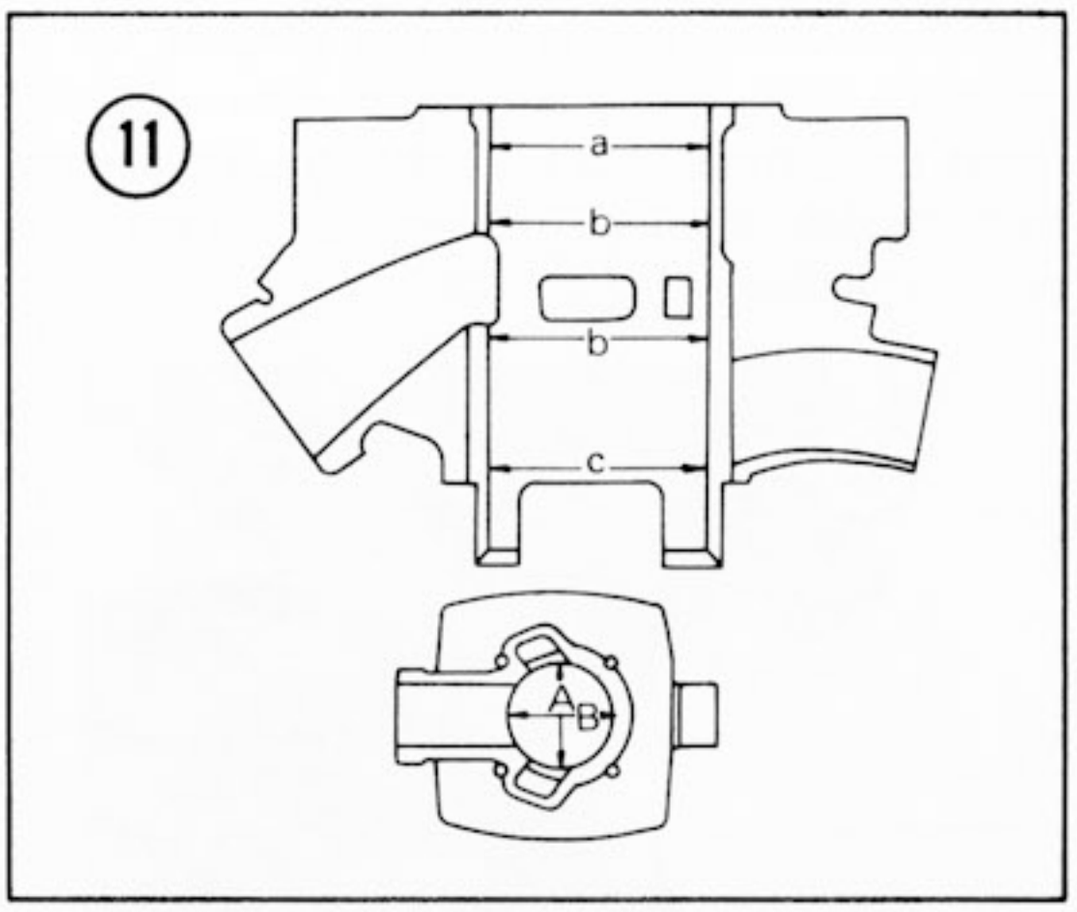
2. Strike the cylinder lightly with a soft mallet to loosen it from the crankcase, then pull upward to remove, as shown in **Figure 10**. Stuff a rag in the crankcase openings to prevent any dirt or foreign material from entering.



3. Replace the cylinder base gaskets upon reassembly, using new ones if necessary.

Cylinder Inspection

Measure the diameter of each cylinder at four depths, as shown in **Figure 11**. These measurements should be made at right angles and parallel to the crankshaft. For all models, if the difference between the maximuum and minimum diameters exceeds 0.0019 inch (0.05mm), rebore and hone the cylinder to the next oversize.



Cylinder Reconditioning

1. Pistons are available in oversizes of 0.25mm and 0.50mm for smaller sizes, and to 0.75mm and 1.00mm in some of the larger sizes.

2. The cylinder should be bored and honed to the diameter of the oversize piston, plus the minimum allowable clearance, as specified in **Table 2**.

Table 2 CYLINDER OVERSIZES

Engine Size	Clearance
90cc	0.0012-0.0016 in. (0.030-0.040mm)
100cc	0.0014-0.0016 in. (0.035-0.040mm)
125cc	0.0020-0.0022 in. (0.050-0.055mm)
180cc	0.0012-0.0014 in. (0.030-0.035mm)
200cc	0.0012-0.0014 in. (0.030-0.035mm)
250cc*	0.0014-0.0016 in. (0.035-0.040mm)
305cc*	0.0014-0.0016 in. (0.035-0.040mm)
YR2, YR2-C, R3, R3-C	0.0012-0.0014 in. (0.030-0.035mm)
YR1	0.0014-0.0016 in. (0.035-0.040mm)
R5, R5-B, R5-C	0.0016-0.0018 in. (0.040-0.045mm)
RD350, RD350A	0.0016-0.0018 in. (0.040-0.045mm)

*Except YM1 and YDS3, 0.0020-0.0022 inch (0.050-0.055mm)

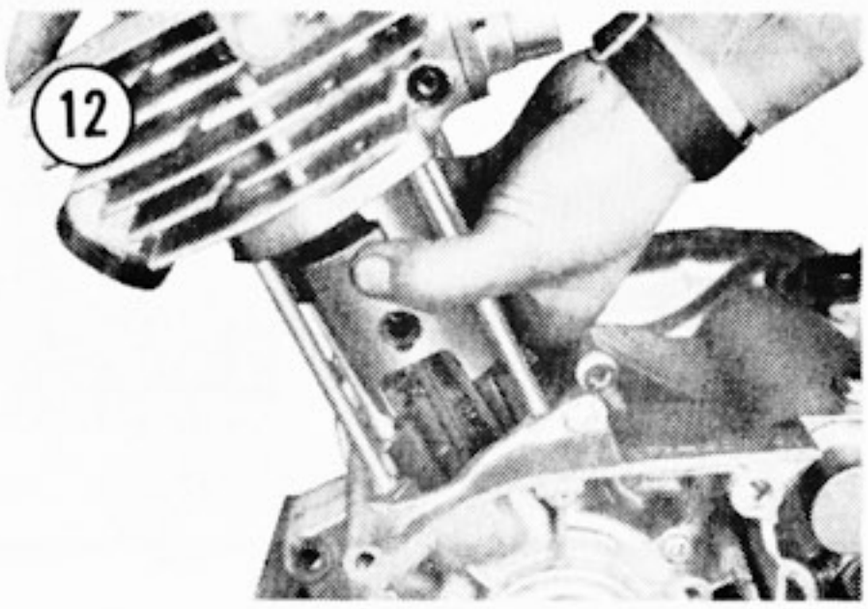
3. Maximum difference between minimum and maximum diameter of the cylinder should be 0.0004 inch (0.01mm).

Carbon Removal

Use a carbon scraper to remove all carbon deposits from the exhaust and transfer ports.

Cylinder Installation

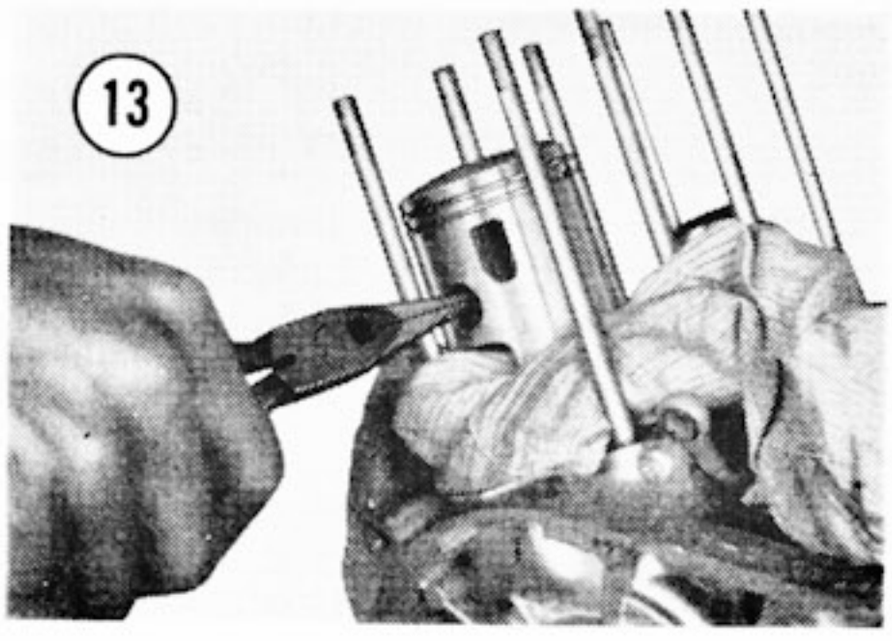
Figure 12 illustrates cylinder installation procedure. Lubricate the pistons and cylinders. Be sure that the ends of the piston rings are aligned with the locating pins in the ring grooves. Compress the rings with your fingers, then carefully insert the pistons into the cylinders. Be careful that you don't damage the rings against the base of the cylinder.



PISTON PINS

Piston Pin Removal

Use needle nose pliers to remove the clips from each end of the piston pins, as shown in **Figure 13**. Then press out the piston pins with a finger or suitable tool.



Throw away the old circlips and use new ones during the reassembly sequence.

After some usage, a ridge builds up around the circlip groove. This makes the pin hole smaller, preventing the pin from sliding out. *Do not* hammer the pin out. This might bend the rod. Carefully chamfer the outer circlip groove edge with a knife to remove this ridge and make pin removal easier.

Always mark the pistons with a felt pen to identify it as left or right-hand piston. Pistons must always be kept matched with their proper cylinder, since they have been fitted to each other (clearances).

Piston Pin Fit

The piston pin should fit snugly in its bore in the piston so that it drags slightly as you turn it. Replace the piston pin and/or the piston if the piston pin is loose. If the piston pin shows step wear in the center, replace the needle bearing in the upper end of the connecting rod also. Check the small end of the connecting rod for wear by inserting the piston pin into the bearing. **Figures 14 and 15** illustrate the procedure for checking the piston pin.

PISTON RINGS

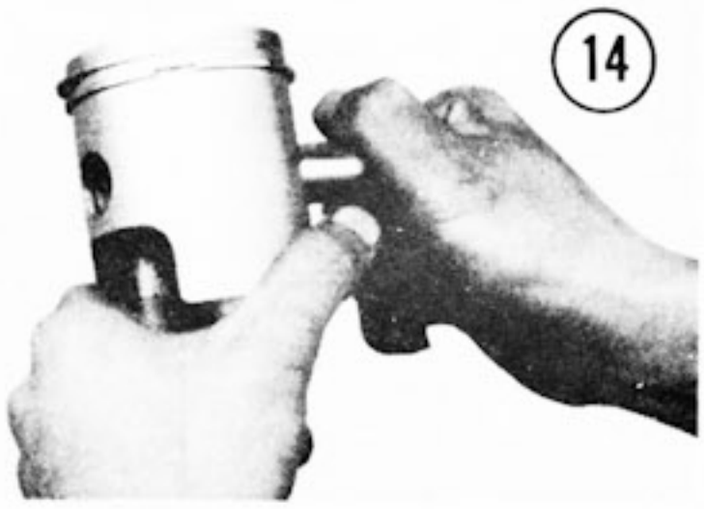
Keystone Pistons and Rings

Some Yamaha machines are equipped with Keystone pistons and rings. Keystone and conventional rings are compared in **Figures 16 and 17**. The design of the Keystone ring uses combustion gas pressure to force the ring outward against the cylinder wall (**Figure 18**).

An important advantage of the Keystone ring is illustrated in **Figure 19**. As the piston moves up and down, the piston ring tends to move inward and outward, thus varying the ring land clearance. This varying clearance tends to prevent the ring from sticking in its groove.

The outer surface of the Keystone ring is Teflon-coated. This Teflon coating aids ring seating. Also, the coating tends to follow microscopic irregularities in the cylinder, thereby reducing blowby.

Keystone rings can be identified by their shape; the top and bottom edges are not parallel. Keystone rings are not interchangeable with the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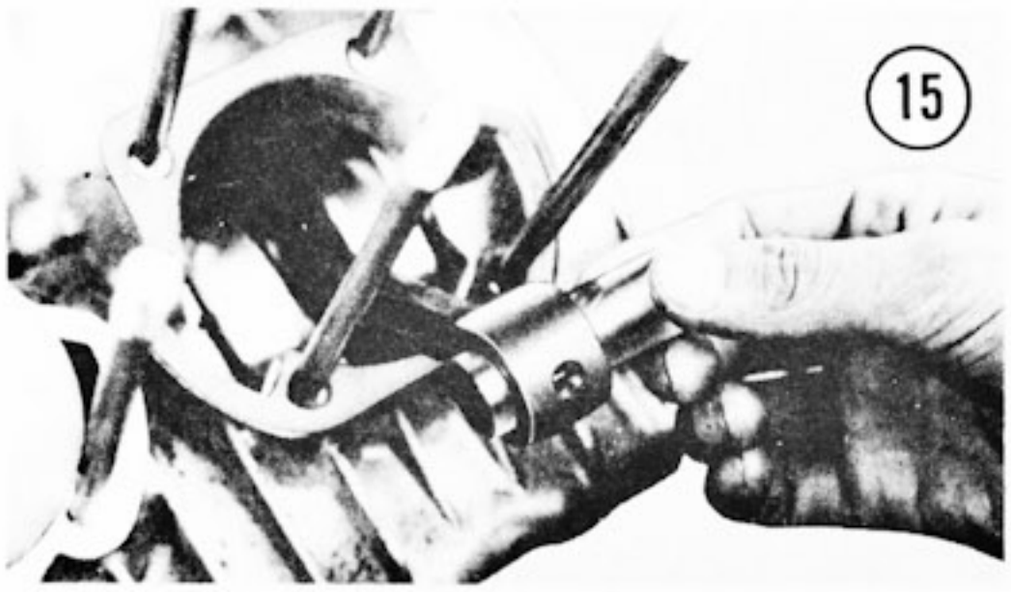
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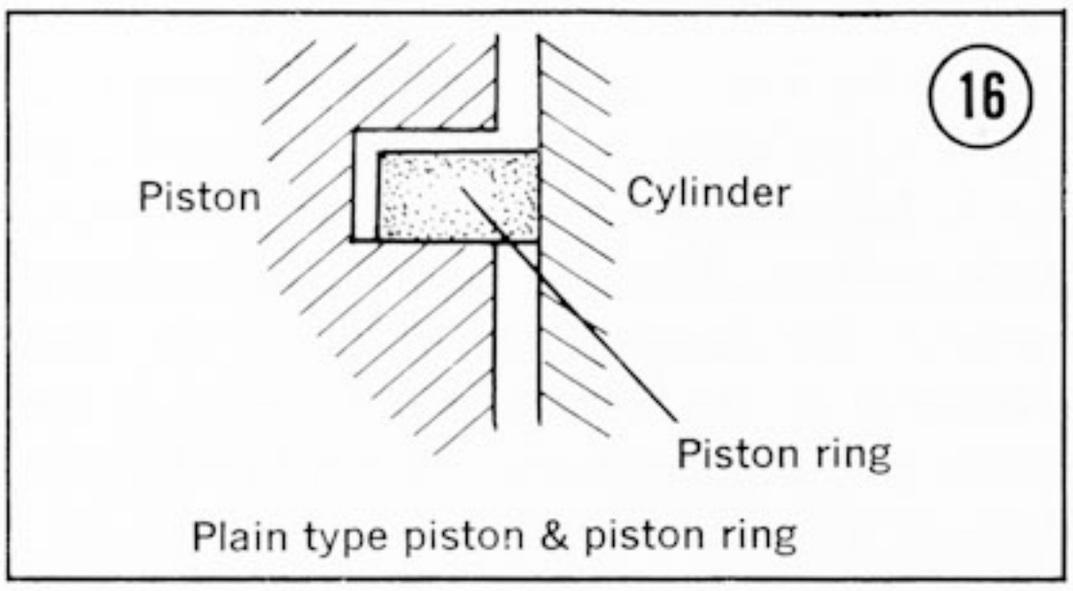
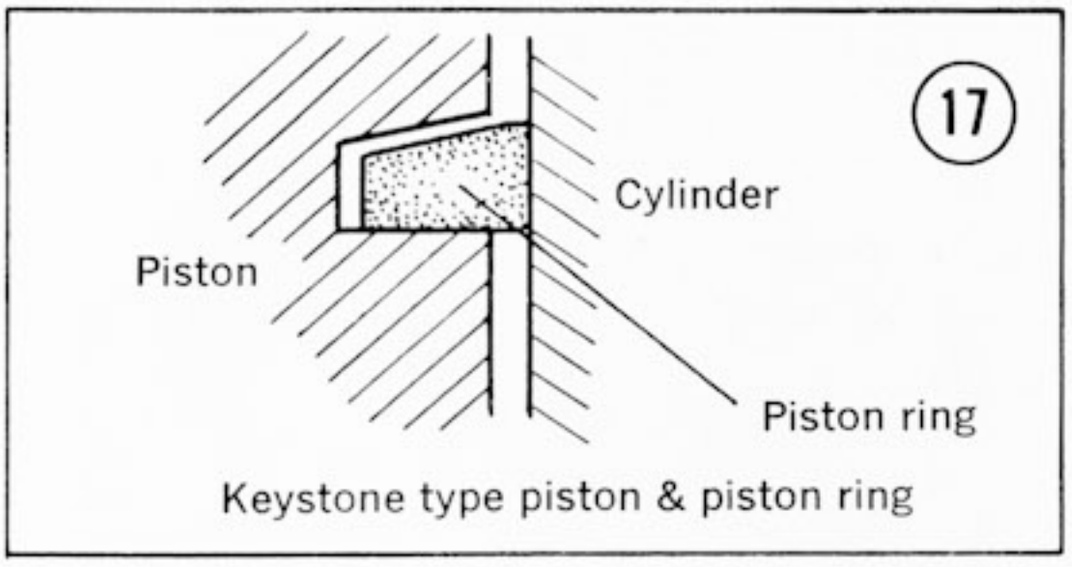
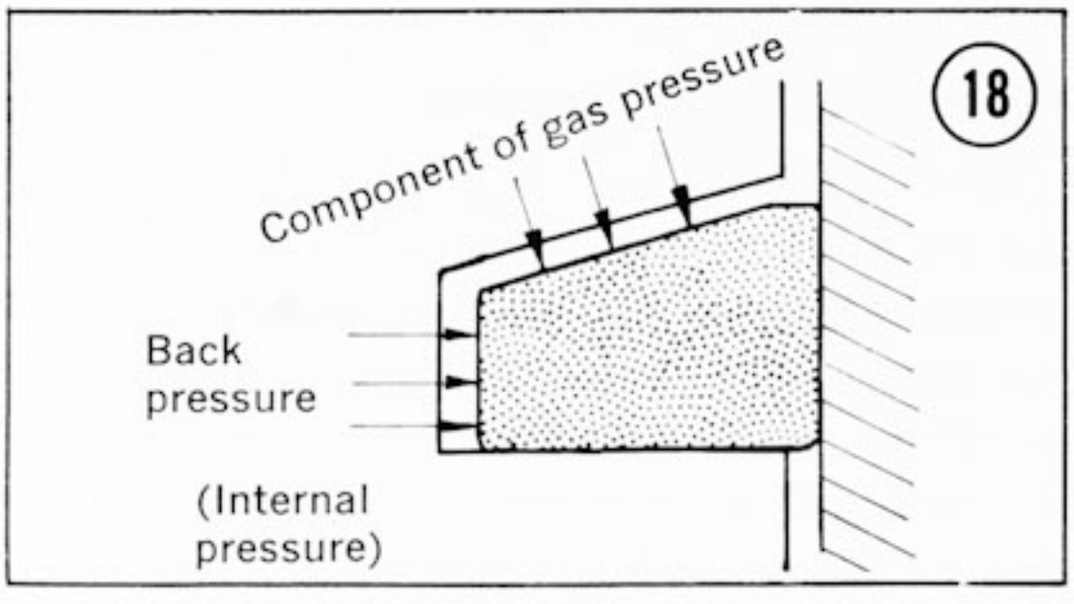
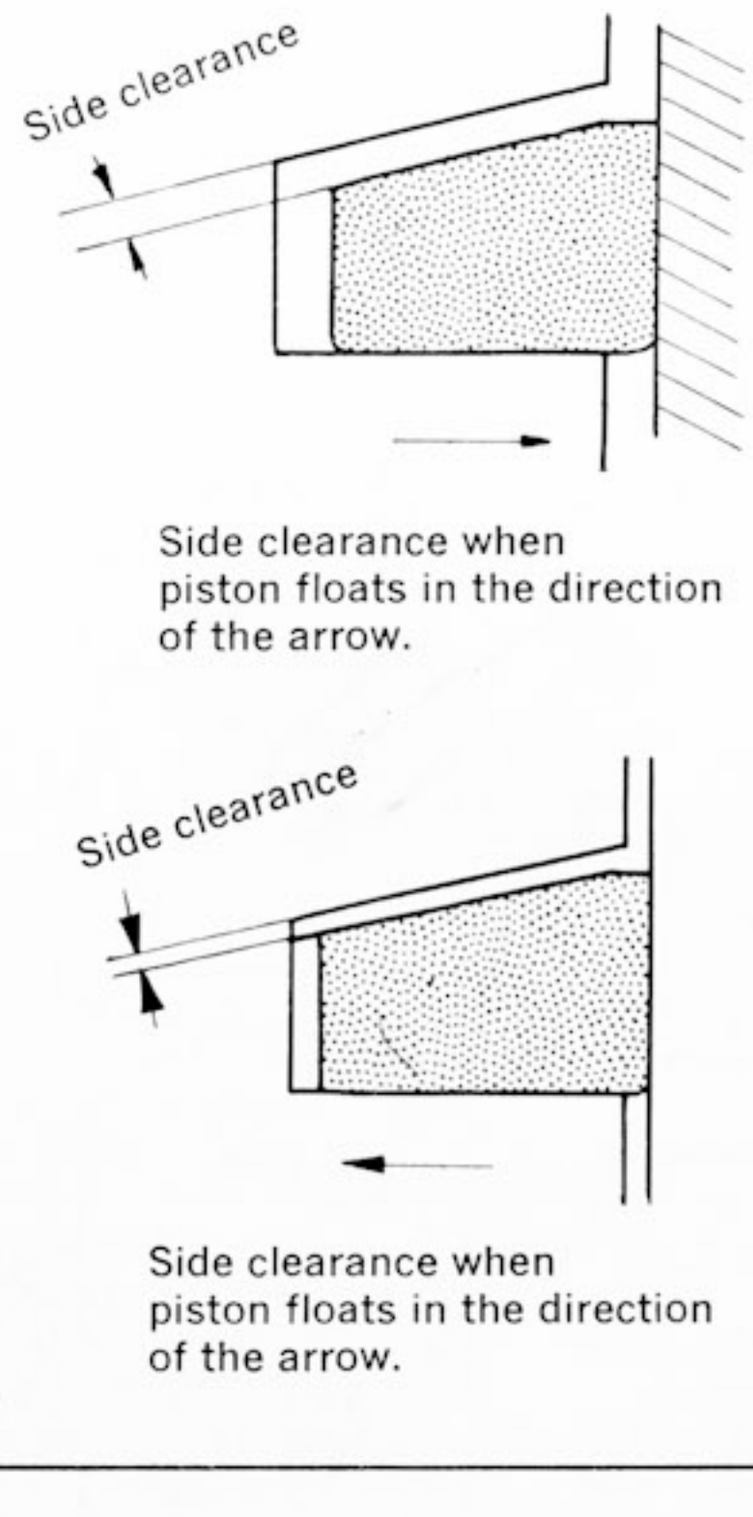


Plain type piston & piston ring



Keystone type piston & piston ring





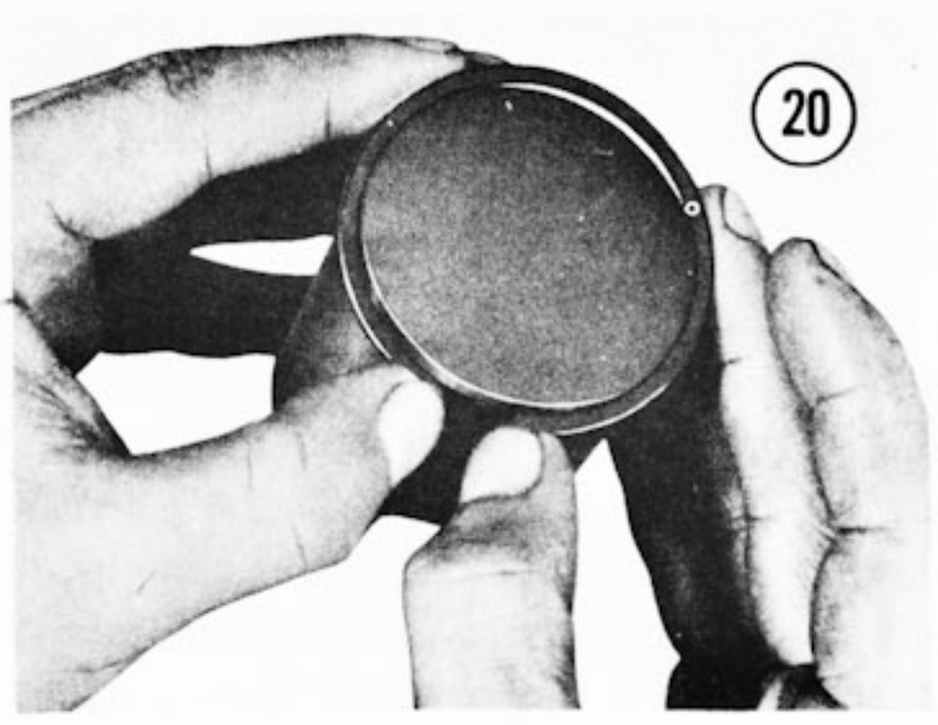
Side clearance when piston floats in the direction of the arrow.

Side clearance when piston floats in the direction of the arrow.

conventional type, and must be used with Keystone pistons. Keystone pistons may be identified by the "K" stamped on the head after the piston size. Keystone rings are handled in the same manner as conventional rings.

Piston Ring Replacement

Remove the piston rings by spreading the top ring with a thumb on each end, as shown in **Figure 20**, then remove the ring from the top. Repeat this procedure for the remaining ring.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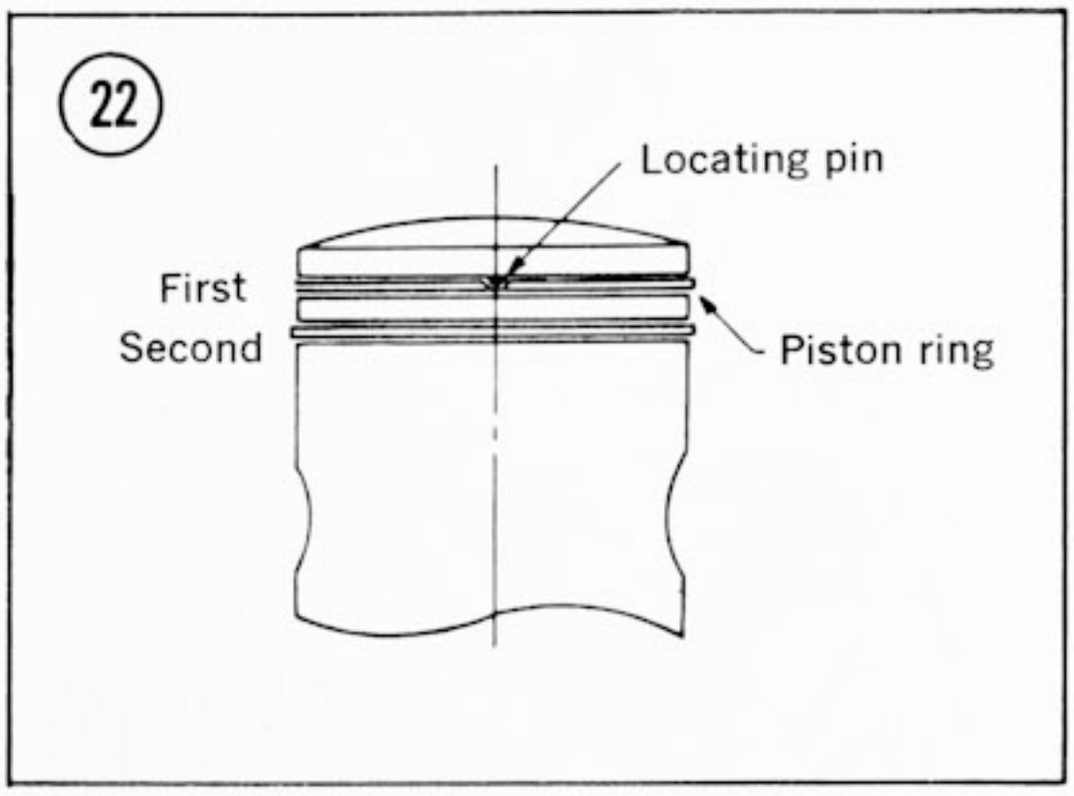
Measure each ring for wear by inserting the ring into the cylinder, parallel to the bottom edge. Then measure the gap with a feeler gauge (**Figure 21**). If the end gap is not as specified in **Table 3** replace the ring.

Table 3 PISTON RING GAP

Model	Gap Inch	Millimeter
HS1, HS1-B, YL1, YL1-E	0.006-0.014	(0.15-0.35)
LS-2	0.004-0.012	(0.10-0.30)
YAS1, YAS1-C, AS2C	0.006-0.018	(0.15-0.45)
YCS-1, YCS1-C	0.006-0.014	(0.15-0.35)
CS3-B, CS3-C, CS5	0.006-0.014	(0.15-0.35)
YDS5 (Upper ring)	0.006-0.012	(0.15-0.30)
(Lower ring)	0.004-0.008	(0.10-0.20)
DS6, DS6-B, DS6-C	0.006-0.014	(0.15-0.35)
DS7	0.006-0.014	(0.15-0.35)
RD250, RD250A	0.008-0.016	(0.20-0.40)
YDS3, YDS3-C, YM1		
(Upper ring)	0.006-0.012	(0.15-0.30)
(Lower ring)	0.004-0.008	(0.10-0.20)
YM2, YM2-C (Upper ring)	0.006-0.012	(0.15-0.30)
(Lower ring)	0.004-0.008	(0.10-0.20)
YR1, YR2, YR2-C	0.006-0.014	(0.15-0.35)
R5, R5-B, R5-C	0.018-0.025	(0.45-0.65)
R3, R3-C	0.006-0.014	(0.15-0.35)
RD350, RD350A	0.006-0.014	(0.15-0.35)

Clean all carbon and gum from the piston ring grooves. Any deposits left in the grooves will cause the rings to stick, thereby allowing gas blowby and loss of power. To clean the groove, carefully scrape with an old ring that has been broken.

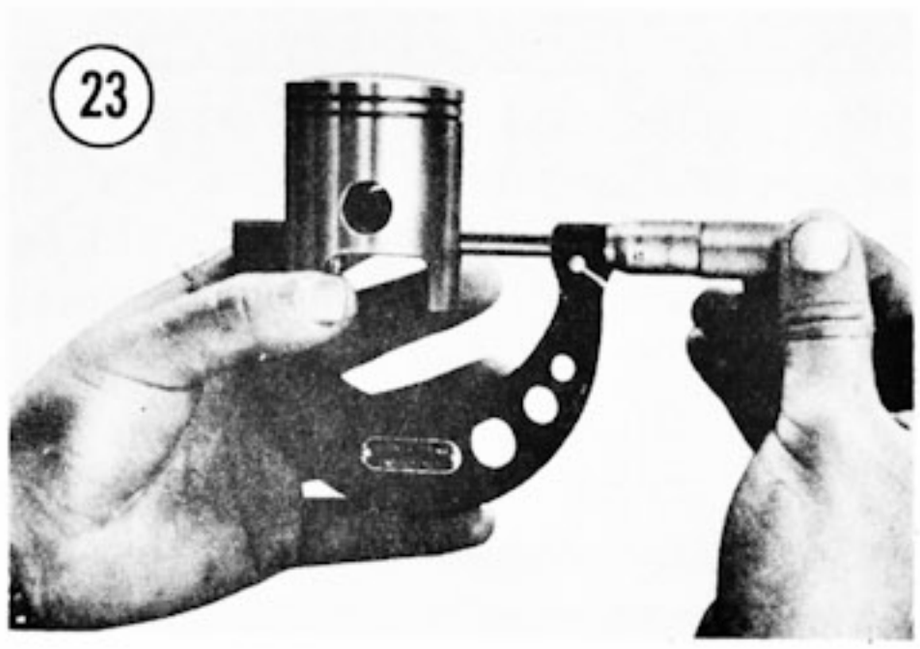
When you replace the rings, first install the lower ring, then the upper one. Use a pair of piston ring pliers, if available. If not, spread the rings carefully with your thumbs, just enough to slip them over the piston. Align the end gaps with the locating pin in each ring groove, as shown in **Figure 22**. Conventional rings are installed with the printing upward. On Keystone rings, the beveled edge of the ring in installed upward.



PISTON

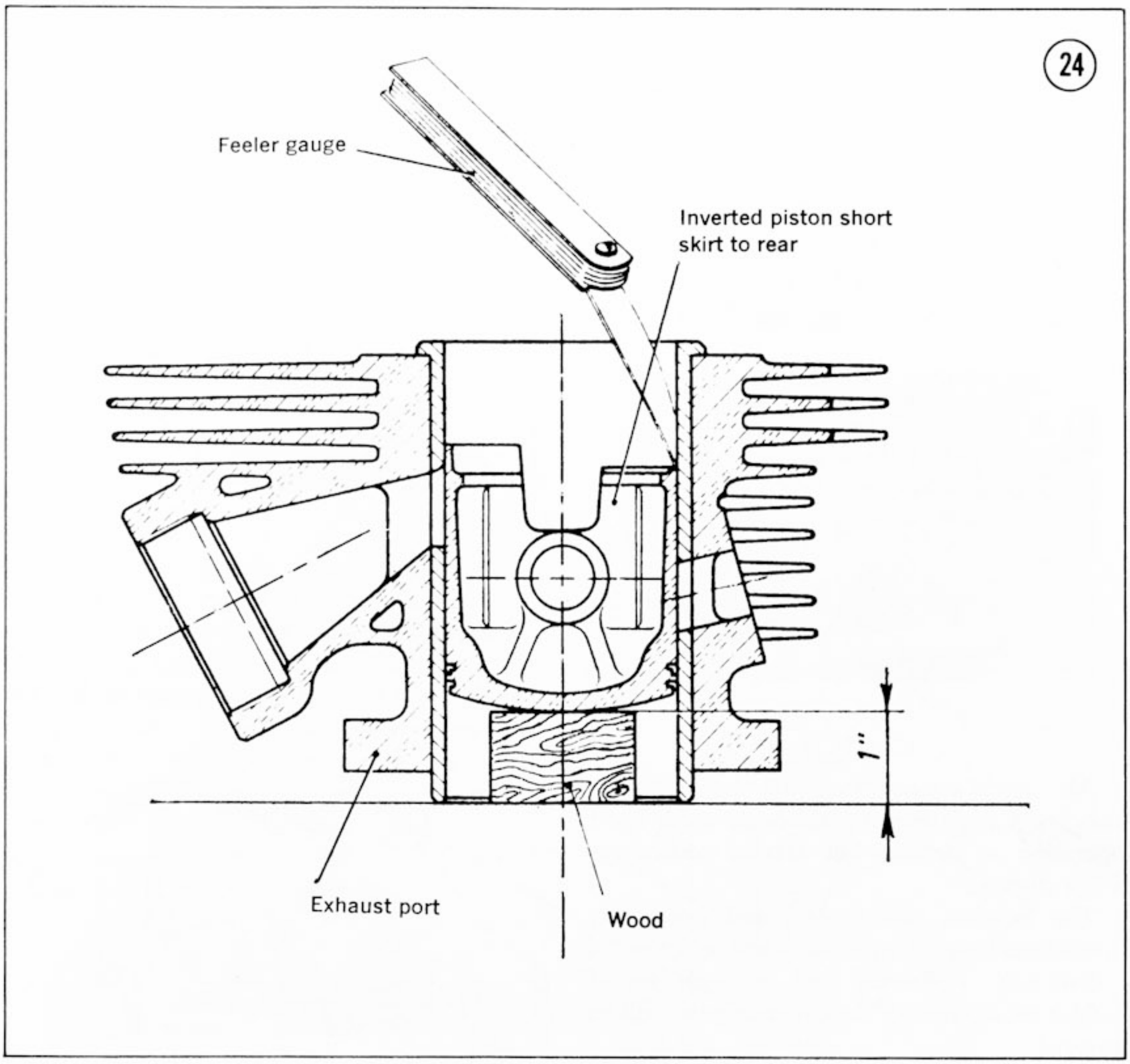
Piston Clearance

Piston clearance is the difference between the minimum cylinder diameter and the maximum piston diameter. **Figure 23** illustrates the piston measurement. With an outside micrometer, measure the diameter of the piston 3/8 inch (10mm) from the bottom, at right angles to the piston pin. Proper clearances are listed under *Cylinder Reconditioning*.



Piston-to-Cylinder Clearance

If a cylinder gauge and outside micrometer are not available to determine piston clearance, try the following procedure to establish an approximate value. **Figure 24** shows that if you insert the piston into the cylinder, then slide the largest possible feeler gauge that will fit alongside the piston, the feeler gauge size will be close



to existing piston-to-cylinder clearance. Compare with the figures given in Table 2. If clearance is 0.004 inch (.1mm) or larger, piston noise will occur. Either reboring or installation of a new piston or cylinder will be required.

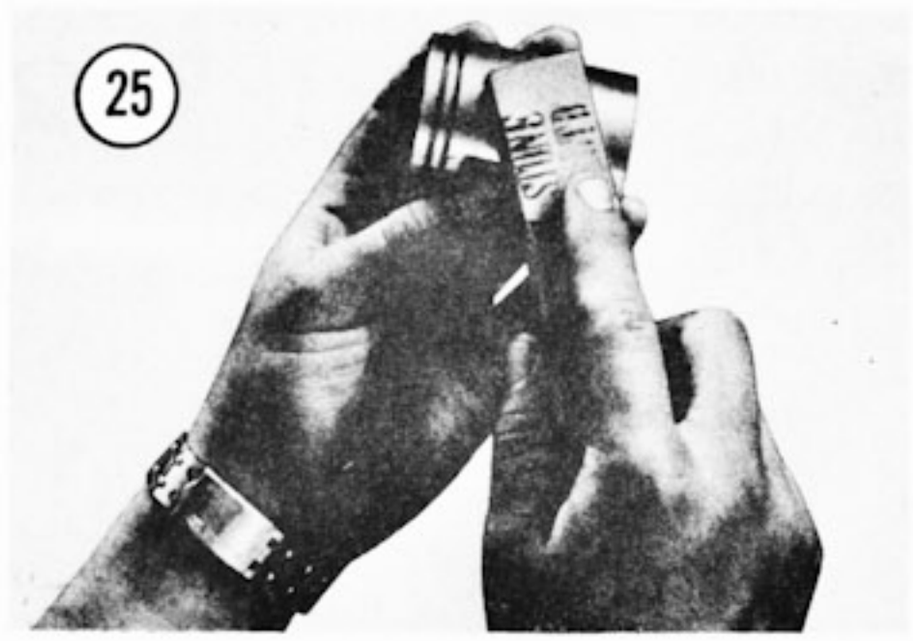
NOTE: *If the above wear conditions exist, and you have no measuring micrometer, have a shop measure both cylinder and piston to decide which needs replacement or reconditioning.*

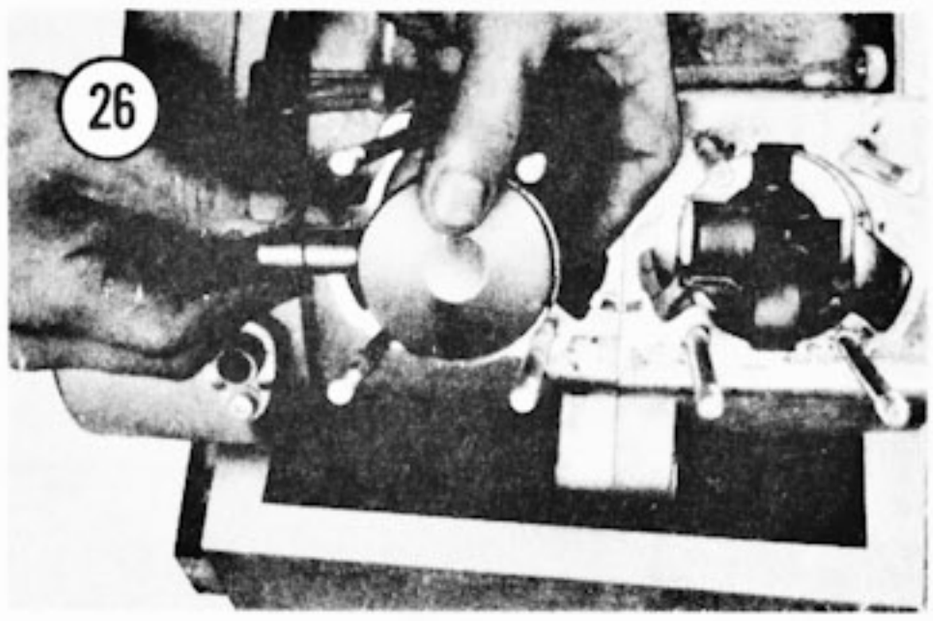
A piston showing signs of seizure will cause noise, loss of power, and damage to the cylinder wall. If such a piston is reused without correction, another seizure will develop. To correct this condition, lightly smooth the affected area with No. 400 emery paper or a fine oilstone (**Figure 25**). Replace the piston if the seizure marks cannot be removed with very minimal sanding. If in any doubt, replace the piston. Remove carbon accumulation from the top of the piston with a scraper or hacksaw blade.

Piston Installation

Install each piston so that the arrow on the piston head points forward, toward the cylinder exhaust port, as shown in **Figure 26**.

During this procedure, always have clean rags stuffed into the crankcase openings below the pistons.





CLUTCH

All models are equipped with wet multiplate clutches. Three types of clutches are used. Their operation is similar, but service procedures differ slightly.

The location, disassembly, and reassembly procedures for each type clutch will be discussed individually. Following that, a single set of service procedures for the common parts will be covered.

To get to the clutch, you will remove either the left or right case cover. During reassembly, make sure all gasket surfaces are clean, use a new gasket, and coat both sides of the gasket with gasket paste (Yamabond #5).

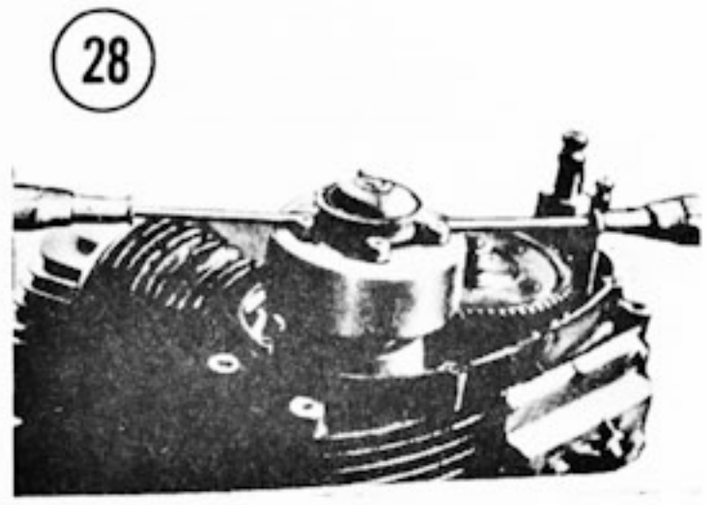
CLUTCH REMOVAL/INSTALLATION

DS3 Series, Model YM1

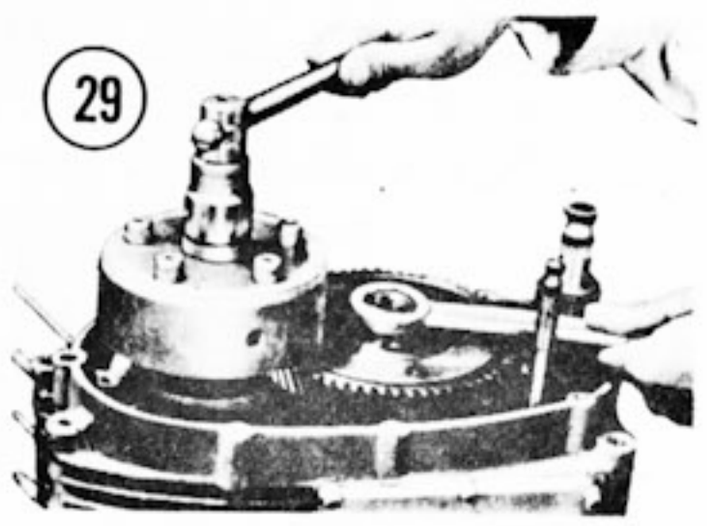
The clutch is located on the engine's left side, attached to the crankshaft.

Removal

1. **Figure 27** identifies the parts involved. Remove the shift lever and kick lever, then disconnect the Autolube delivery lines at the cylinders. Remove all case cover securing screws, then pull off the cover. If needed, tap the cover lightly with a rubber hammer to free it.
2. As shown in **Figure 28**, wedge off the clutch push crown. Beneath it is a retaining nut. A bend-up type lockwasher under this nut must be flattened first.



3. Loosen the clutch retaining nut with a 26mm socket, as illustrated in **Figure 29**. At this time you can also loosen the 29mm primary driven gear nut (right side of this figure). It may help to stuff a rag into the meshing gear teeth if the nuts are on tightly.



4. As pictured in **Figure 30**, lift the clutch assembly off the crankcase end. Remaining on the shaft will be a needle bearing, a spacer inside the bearing, a thrust washer, and a thrust plate against the transmission bearing in the case. Remove all of these, noting the order of the thrust washer and thrust plate. Identify their order of installation with tags if need be.

Disassembly

1. If you plan to take the clutch completely apart, pull the primary drive gear assembly out of the clutch unit. See **Figure 31** for identification. The inner thrust plate and thrust washer just lay inside the drive gear assembly, on top of the spacer.

DS3 AND YM1 CLUTCH

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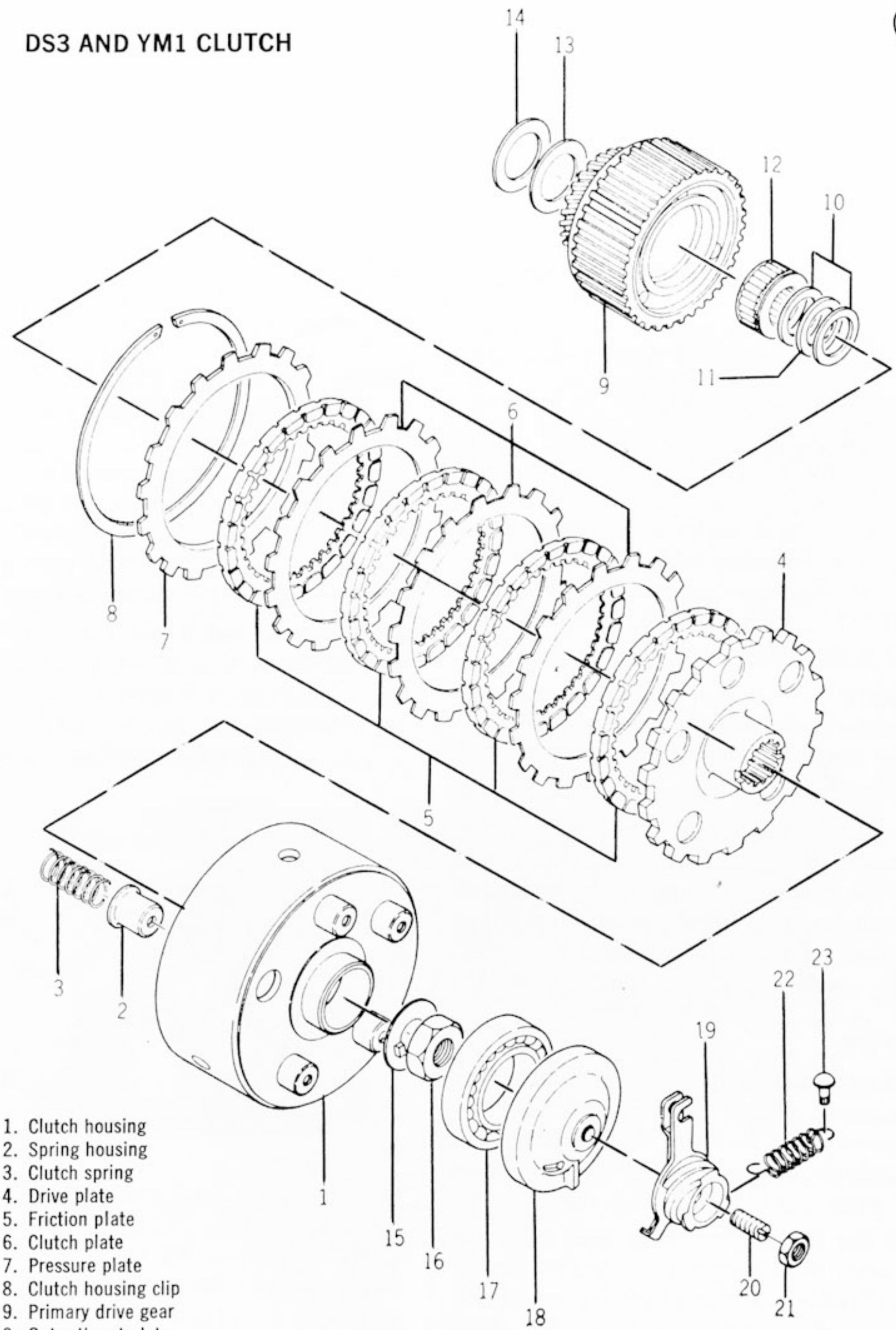
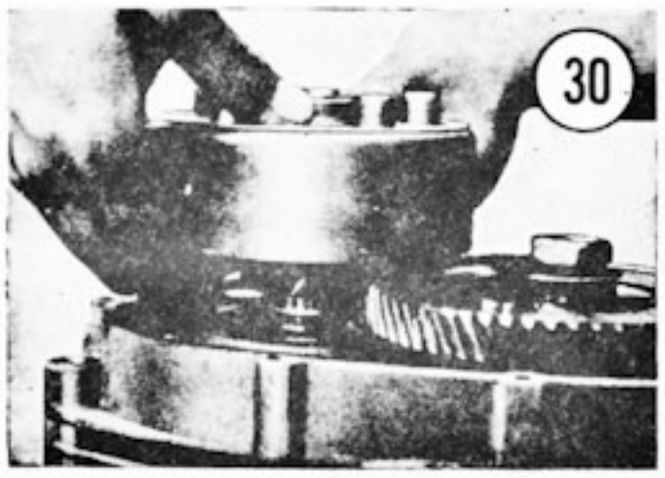
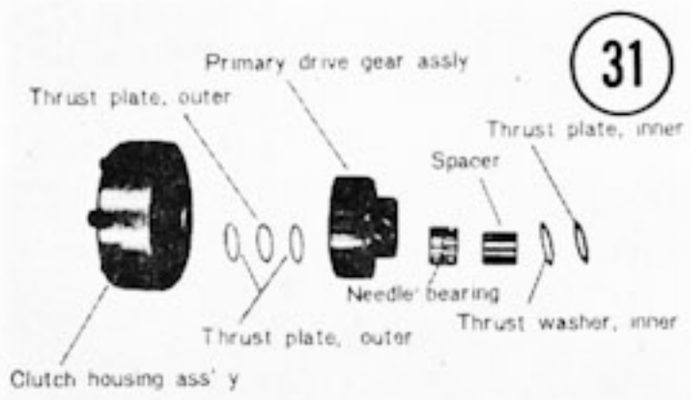


1. Clutch housing
2. Spring housing
3. Clutch spring
4. Drive plate
5. Friction plate
6. Clutch plate
7. Pressure plate
8. Clutch housing clip
9. Primary drive gear
10. Outer thrust plate
11. Outer thrust washer
12. Bearing
13. Inner thrust washer
14. Inner thrust plate
15. Lockwasher
16. Lock nut
17. Bearing
18. Push crown
19. Clutch push lever assembly
20. Adjusting screw
21. Adjusting nut
22. Return spring
23. Spring hook





2. Figure 27 shows an exploded view of the clutch and its components. Using this as a guide, continue the disassembly. From the open end of the clutch housing remove the retaining snap ring (8) at the edge.

NOTE: *Be careful; internal spring pressure will cause the plates to push out and spill parts when the circlip is released.*

3. Remove the heavy outer steel clutch plate, then remove the spaced fiber and steel clutch plates. The clutch springs lay in the bottom of the clutch housing; lift them out. Inside are three thrust plates (10) and (11). Note their order for proper installation later.

Installation

1. When reinstalling the clutch unit, install the drive plate (4, Figure 27), and springs. Place the primary drive gear inside the clutch housing, then install the fiber and steel plates. Push down on the plates and install the snap ring.

2. Pull out the primary drive gear. Slide the thrust plate and thrust washer over the crankshaft end. Slide the spacer over the crankshaft. Put the needle bearing into the primary drive gear, then put this unit over the spacer (onto the crankshaft). Slip the remaining three thrust plates on top of the primary drive gear. Place the clutch housing against the primary drive gear, line up the plates, then slide the housing on. Add the lockwasher, then tighten the nut and bend up the lockwasher. Finish by tapping the clutch push crown into place. Keep the push crown lever stopper turned upward.

3. When installing the case cover, make sure the Autolube pump drive gear engages properly.

YDS5, YM2, DS6 series, R1, R2, and R3

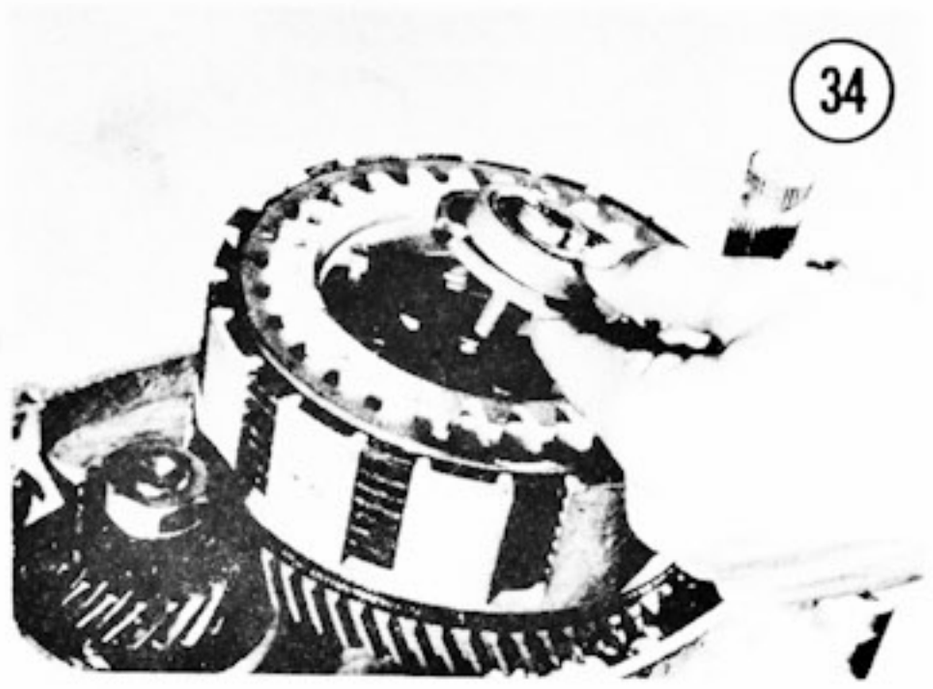
On the R1, R2, and R3, the clutch is located behind the right engine case cover. On the other models, the clutch is located on the engine's left side, attached to the main transmission axle.

Removal and Disassembly

1. Remove the shift lever (if needed), kick lever and its seal, then disconnect the Autolube delivery lines at each cylinder. Remove all case cover securing screws, then pull off the cover. If needed, tap the cover lightly with a rubber hammer to free it. The cover can be removed without removing the Autolube pump.

2. **Figures 32 and 33** show an exploded view and assembled view of this clutch. Refer to it for added guidance if needed during the following procedures.

3. Lift out push crown assembly (**Figure 34**).



4. Remove the thick pressure plate. This requires unscrewing six clutch holding screws identified in **Figure 35**, then lifting off the pressure plate. Now lift out the clutch springs.

5. Install the clutch holding tool shown in **Figure 36** (Yamaha part #908-90010-24-00), then loosen and remove clutch boss retaining nut.

6. To complete disassembly, slide off all clutch plates, the clutch boss, and the single thrust washer beneath the clutch boss. Then slide off

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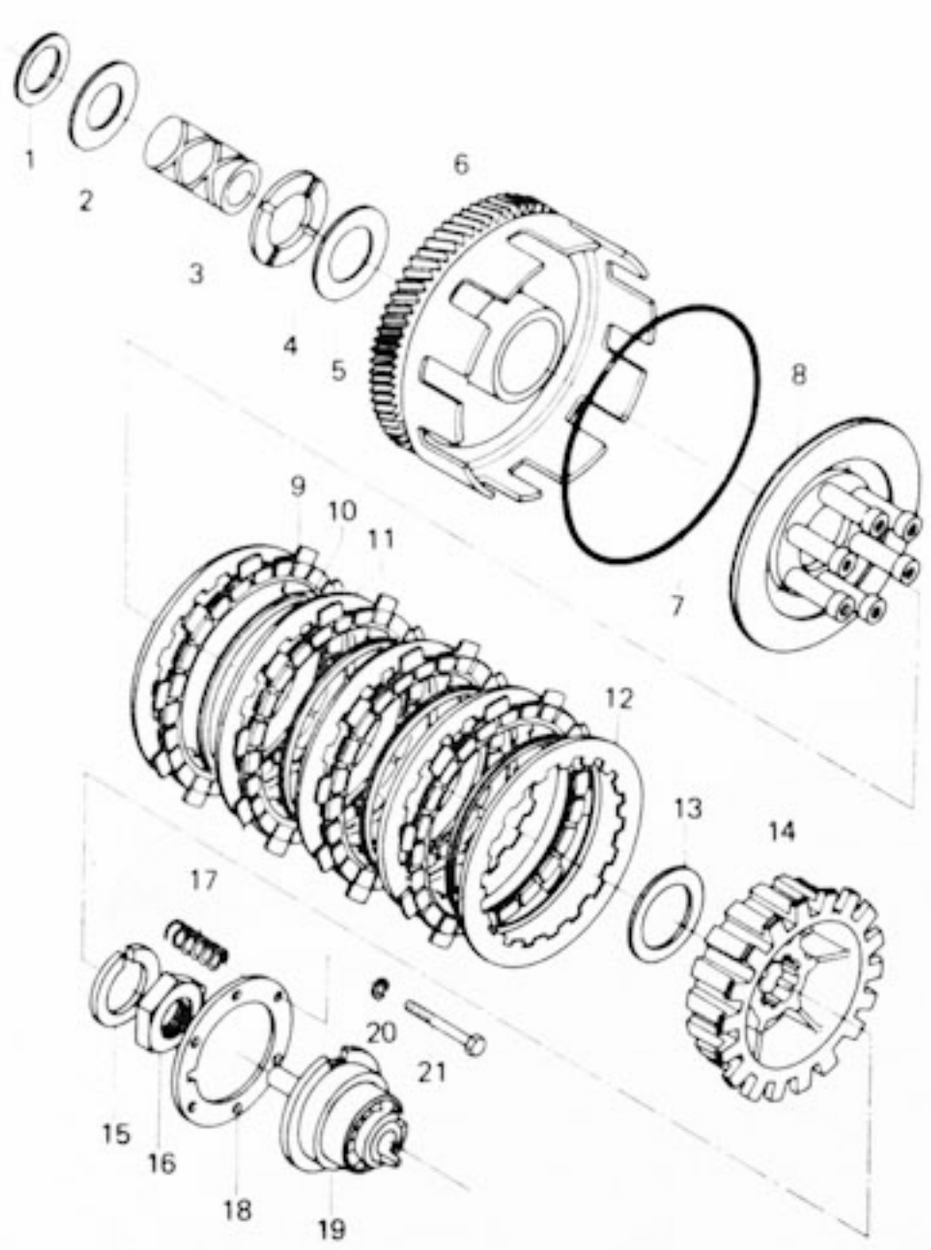
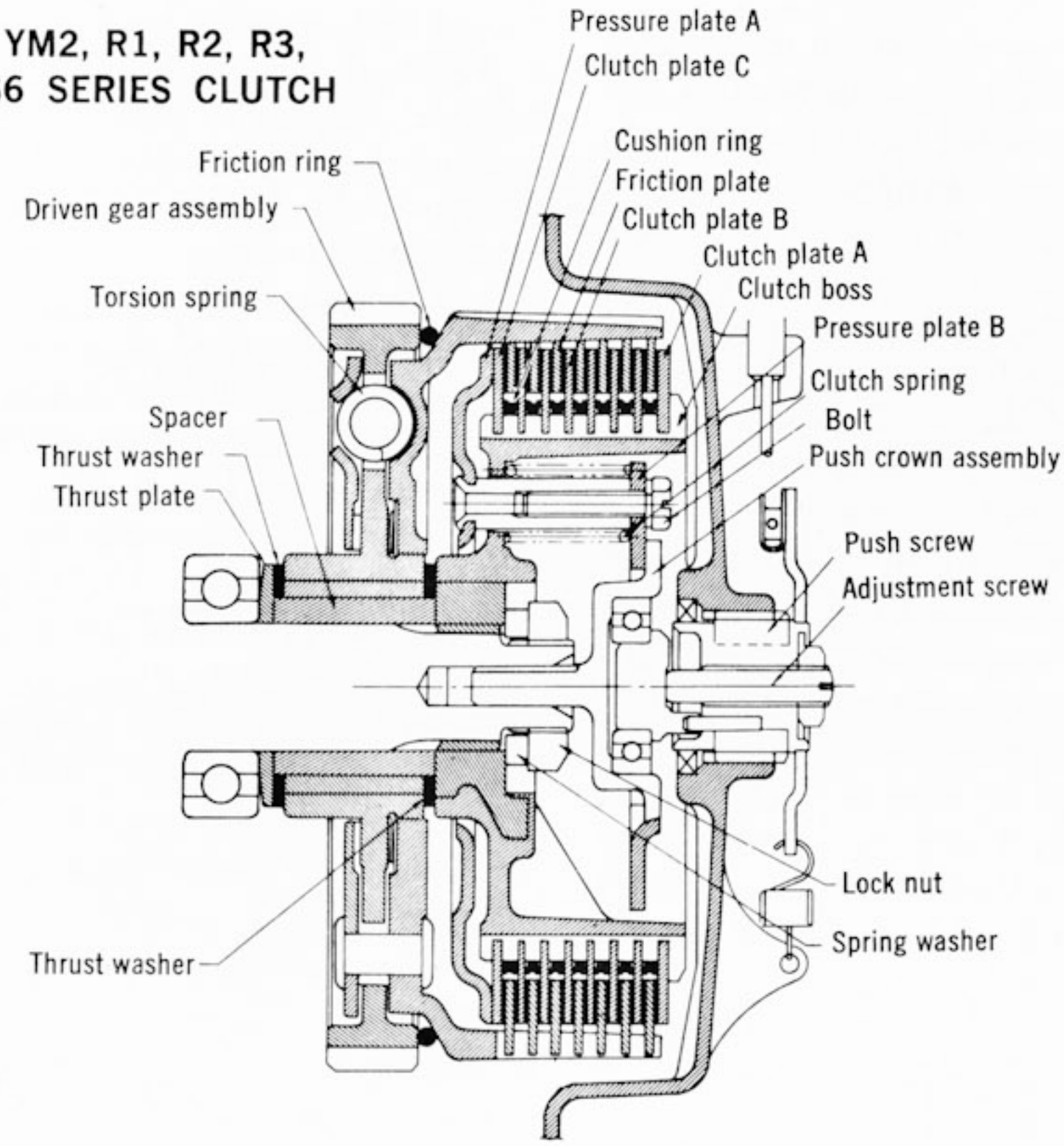
YDS5, YM2, R1, R2, R3, AND DS6 SERIES CLUTCH

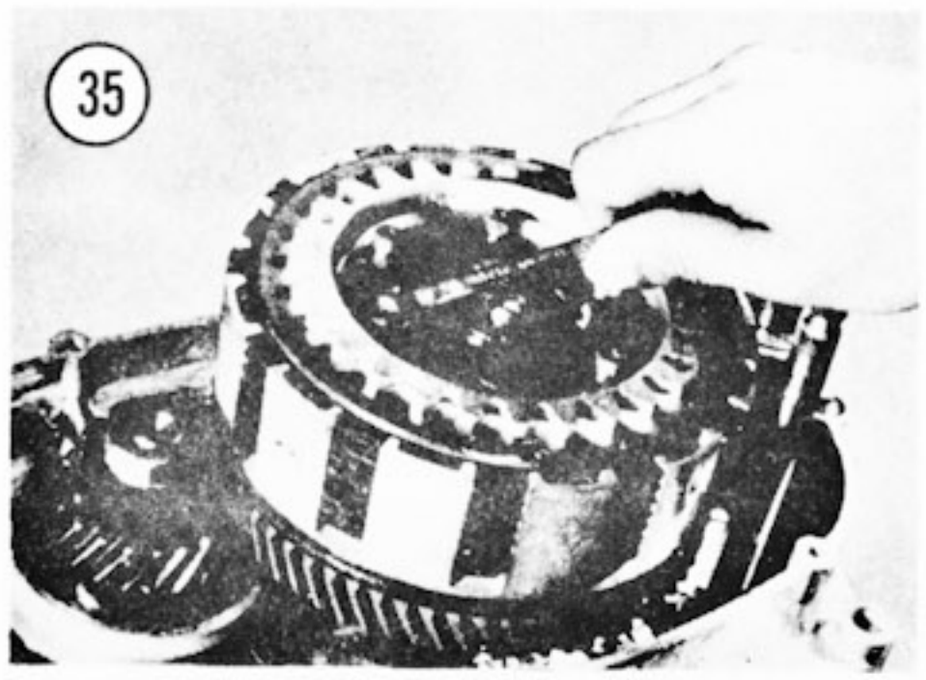


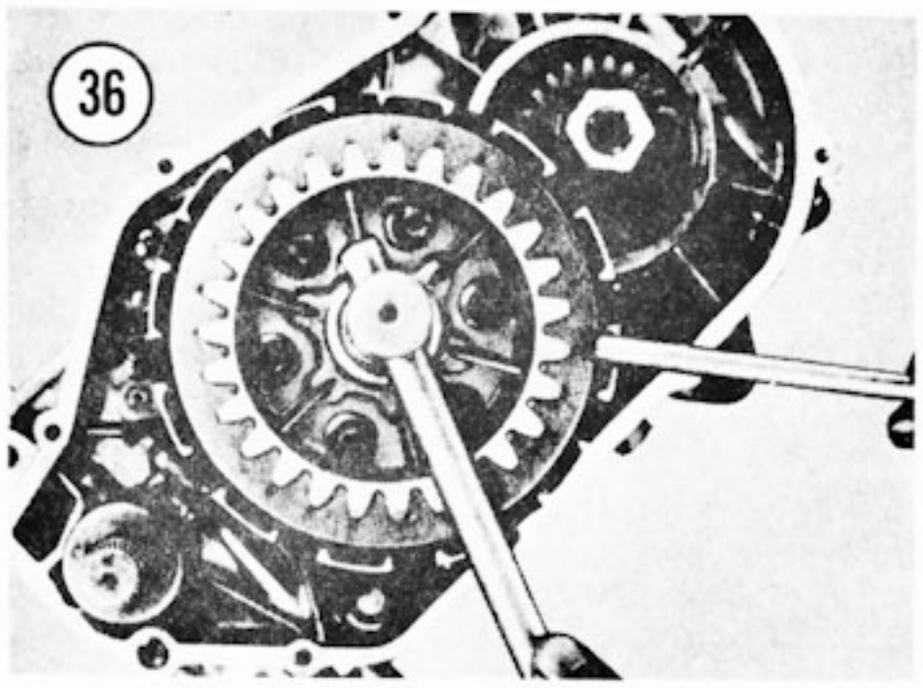
1. Thrust plate 1
2. Thrust plate 2
3. Spacer
4. Thrust bearing
5. Thrust bearing
6. Primary driven gear assembly
7. Friction ring
8. Pressure plate A
9. Friction plate
10. Cushion ring
11. Clutch plate B
12. Clutch plate A
13. Thrust plate 2
14. Clutch boss
15. Spring washer
16. Nut
17. Clutch spring
18. Pressure plate B
19. Push crown assembly
20. Spring washer
21. Bolt

33

YDS5, YM2, R1, R2, R3, AND DS6 SERIES CLUTCH







the primary gear assembly, the flat thrust bearing, the thrust bearing with needle bearings, the spacer, and two remaining thrust plates that fit against the transmission bearing.

Reassembly

1. When reassembling the parts, be very careful to have the thrust plates and bearings in proper order. Four go behind the primary driven gear assembly and one goes between the clutch boss and primary driven gear assembly.
2. Alternately install all fiber and steel clutch plates on the clutch boss. Be sure the single thrust bearing has been installed, then slide the clutch boss on as you line up the fiber plate "ears" into the outer housing slots. Immediately add and tighten the retaining nut, then make sure the clutch unit spins freely. If it is tight, disassemble and check thrust bearing locations.
3. When tightening the spring retaining screws, tighten them until they are just snug. Do not overtighten.
4. When installing the case cover, make sure the Autolube pump drive gear engages properly with its mating gear on the crankshaft.

All Other Models

The clutch is located on the engine's right side, attached to the main transmission axle.

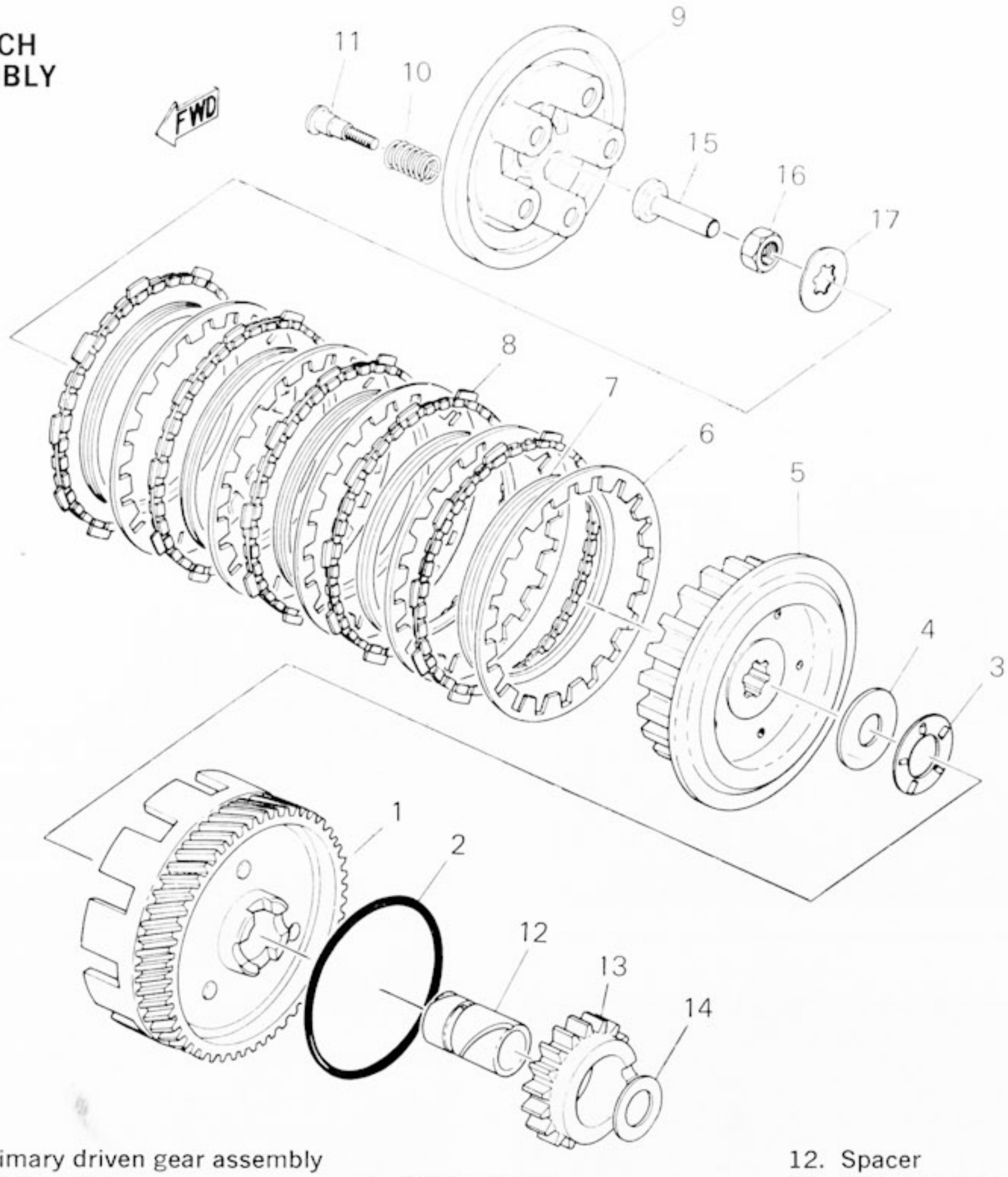
Removal and Disassembly

1. To gain access, remove the kick lever, then disconnect the Autolube delivery lines at each cylinder. Remove all case cover screws, then pull off the cover. If needed, tap the cover lightly with a rubber mallet to free it. The cover can be removed without removing the Autolube pump.
2. **Figures 37** (next page) **and 38** (page 52) show exploded and assembled views of this clutch. Refer to them for added guidance if needed during the following procedures.
3. Remove all six clutch spring holding screws (**Figure 39**), then lift off the pressure plate. Now slide out the valve shaped pushrod located in the end of the transmission (**Figure 40**). In the same transmission hole, behind the pushrod, is a ball bearing. Tip the engine or use a magnet to remove it and prevent its loss. A long rod-shaped pushrod will side out after the ball.
4. **Figure 41** shows how to loosen and remove the clutch lock nut by anchoring the clutch with a clutch holding tool (Yamaha part #908-900100-34-00). Be sure to first bend down the bend-type lockwasher.
5. Slide off the clutch boss. Directly behind the clutch boss will be a thrust washer, or two identical thrust washers with a flat thrust bearing (3, Figure 37) sandwiched between them. It depends on the clutch type used with your engine. Note their position for future installation.
6. Slide off the primary driven gear assembly (outer housing). Behind the outer housing will be a kick gear (13, Figure 37). On some models it is an integral part of the driven gear assembly; on other models it is a separate gear. Slide it off if separate. Now slide off the spacer and thrust plate next to the transmission bearing.

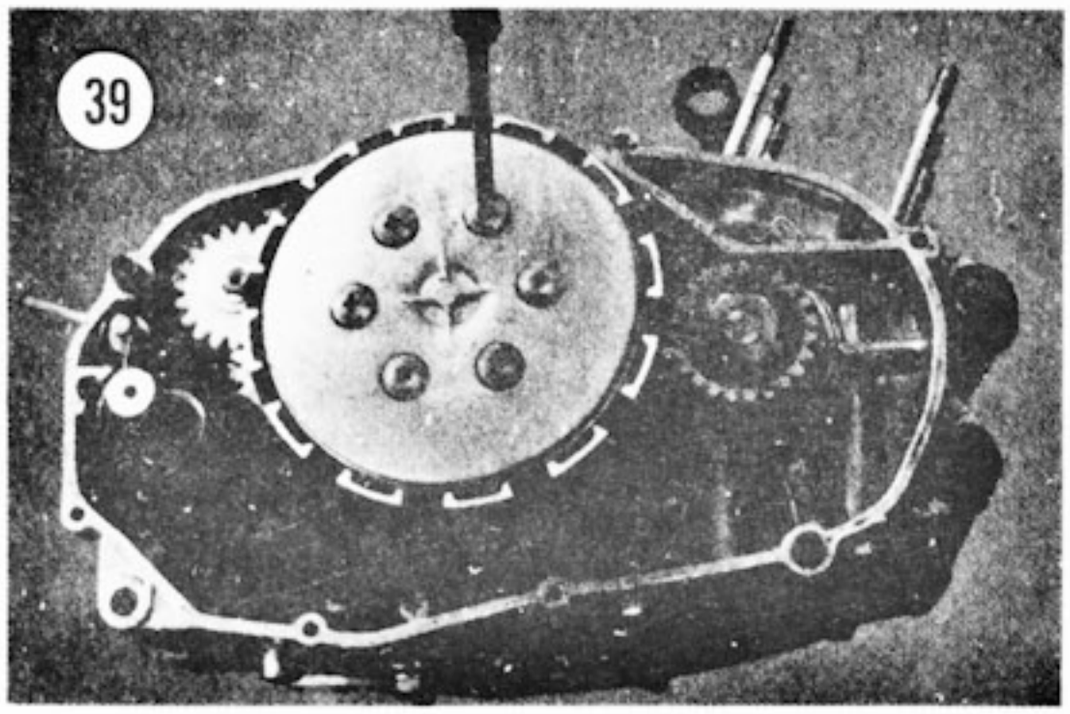
Installation

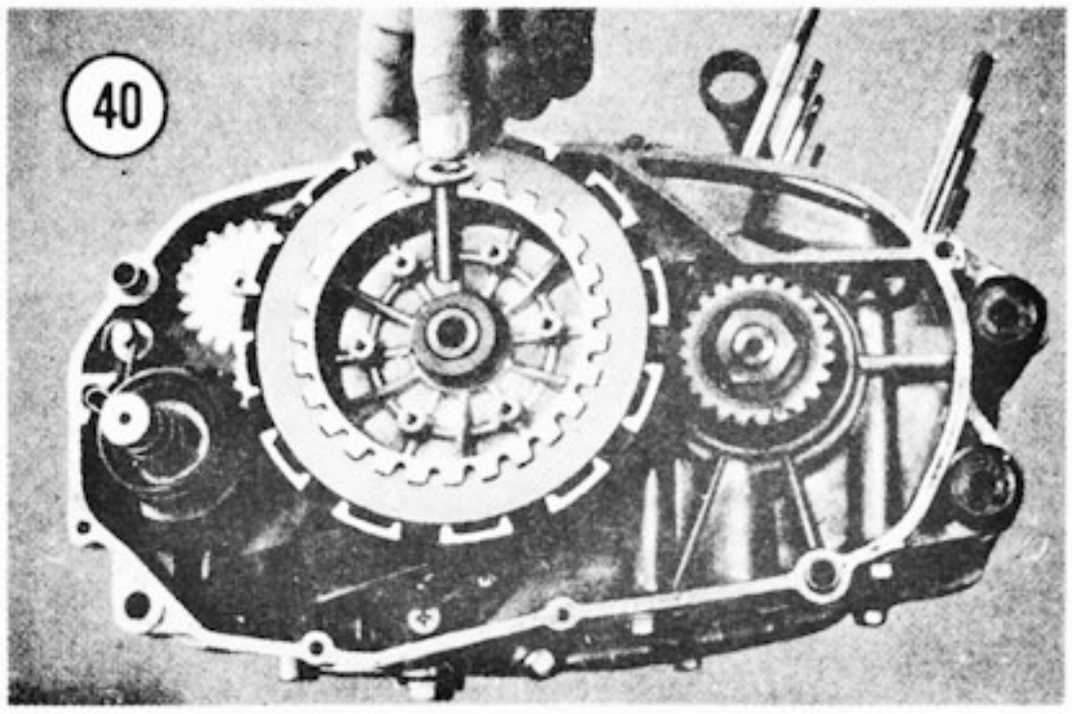
1. During installation of these parts, be sure that all thrust washers, plates, and bearings are

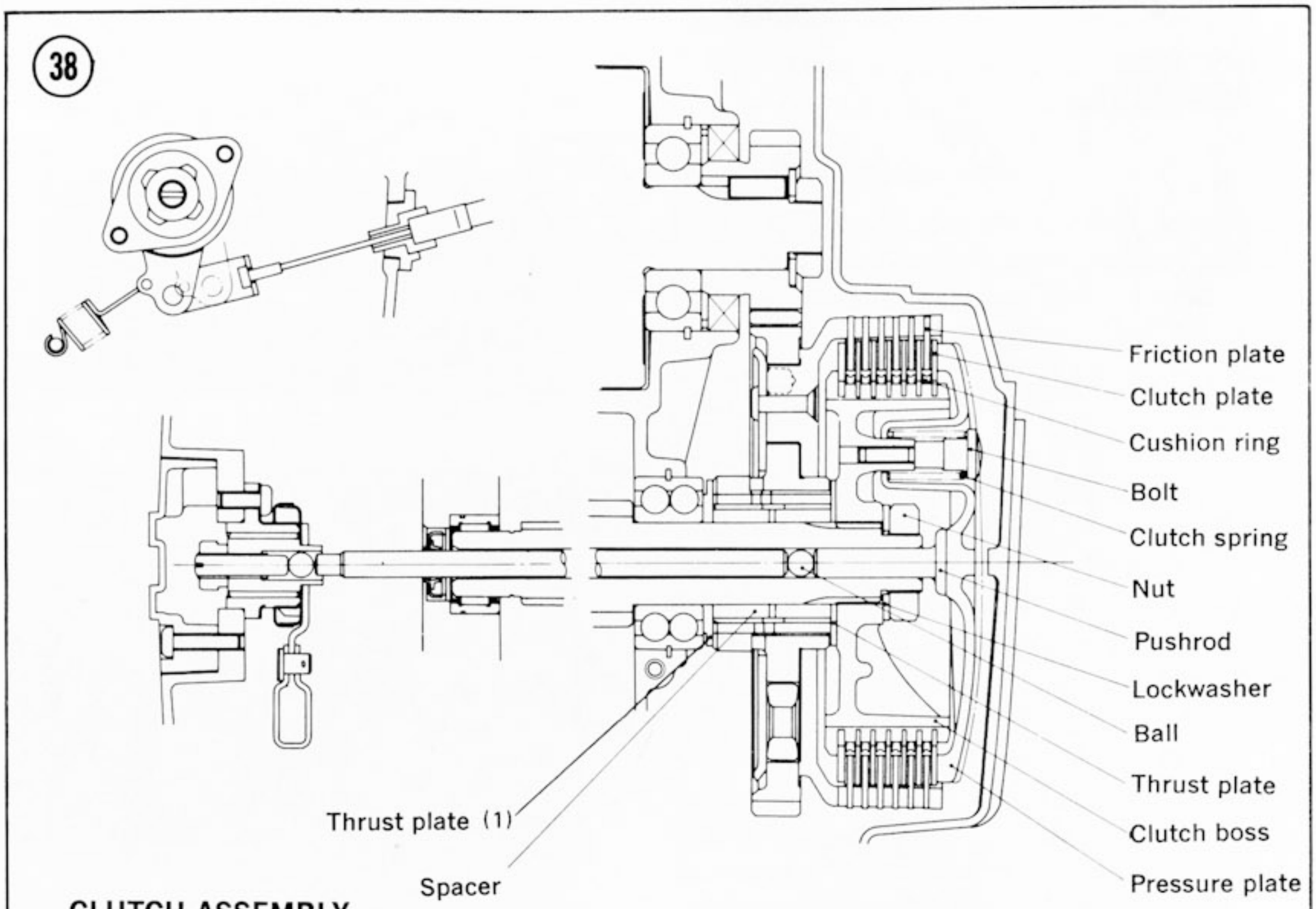
CLUTCH ASSEMBLY



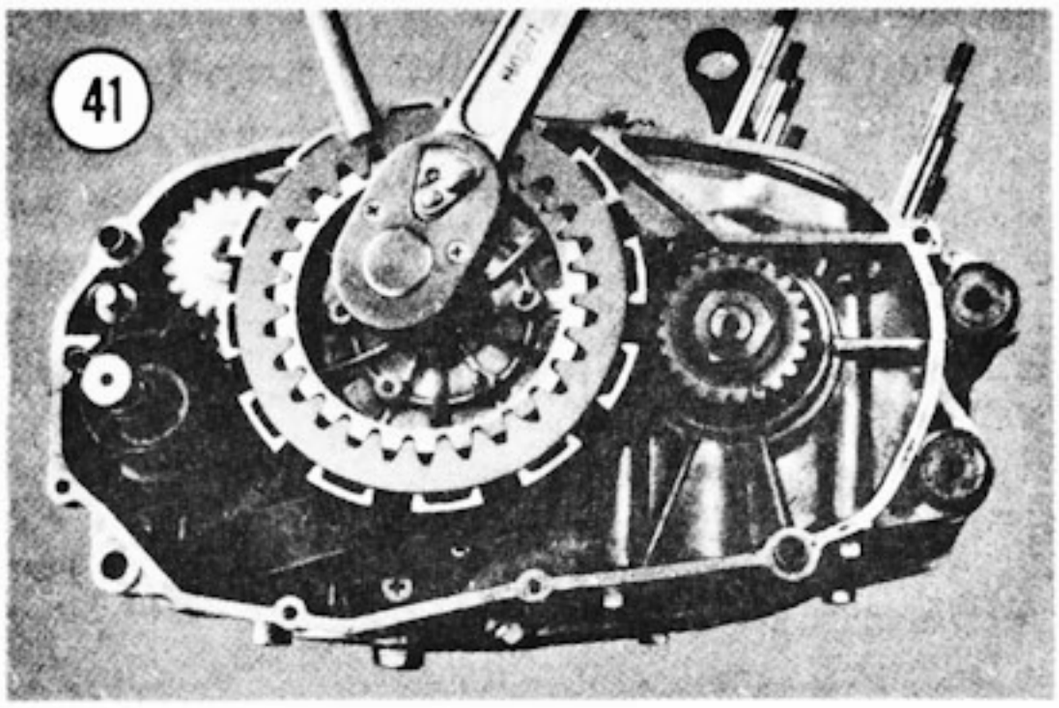
1. Primary driven gear assembly
2. Friction ring
3. Thrust bearing
4. Thrust plate
5. Clutch boss
6. Clutch plate
7. Cushion ring
8. Friction plate
9. Pressure plate
10. Clutch spring
11. Clutch spring holding screw
12. Spacer
13. Kick pinion gear
14. Thrust plate
15. Pushrod
16. Lock nut
17. Lockwasher







CLUTCH ASSEMBLY



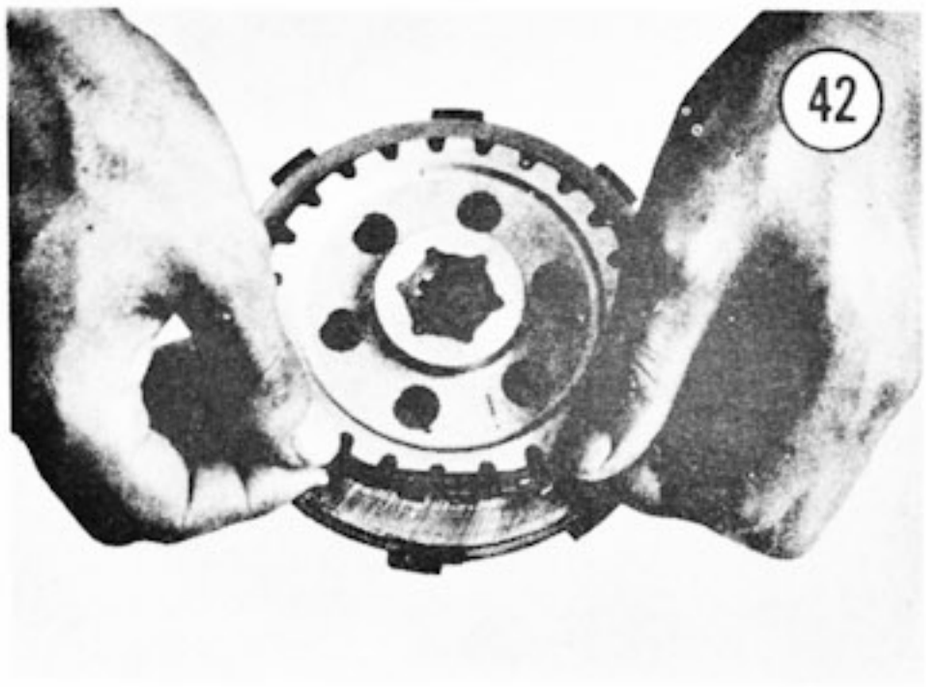
in proper position. If your model has a separate kick gear, make sure its two protruding dogs engage the two squared off slots in the back of the primary driven gear. Take care; there are also two rounded slots that the dogs could accidentally engage.

2. After installing the primary driven gear assembly, slide on the thrust washers, then carefully slide on the clutch boss. Be careful; pulling the clutch boss out after its installation could dislodge the thrust washers and prevent the boss from sliding completely in.

3. After clutch boss installation, slide in alternate metal and fiber plates. If your machine has rubber cushions, these are installed over the clutch boss after each metal plate, as shown in **Figure 42**. The open end faces out. Make sure they are not twisted. These cushions help separate the plates during disengagement. They are helpful, but not required for clutch operation.

NOTE: *At this time be sure to install the long pushrod, ball bearings, and short pushrod into the transmission shaft hole. If any are left out, there will be no tension at the clutch lever after assembly.*

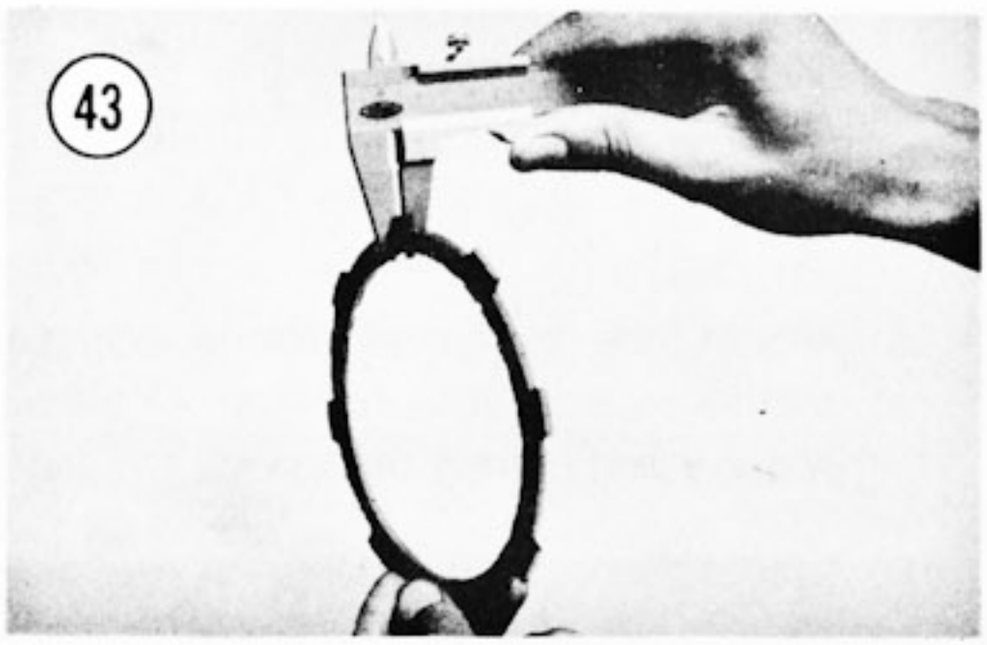
4. Add the pressure plate, springs, and spring retaining screws. Tighten the spring retaining screws just slightly until snug. Excessive torque can snap the screw, which will require you to replace the primary drive gear assembly.



CLUTCH INSPECTION AND ADJUSTMENT

Friction Plates

Friction plates wear with use. Measure the thickness of each plate at several places, as shown in **Figure 43**. Replace any plate that is worn unevenly, or more than 0.012 inch (0.3mm) below standard thickness as listed in **Table 4**.



Metal Plates

These plates will not be subject to wear, but heat can distort them. They must be flat. Lay each one on a flat surface. A piece of glass would be ideal. If they appear to be cupped, and the clutch does not want to disengage totally, replace the defective plates. If heat has turned the plate blue, or if the surface is scored, consider replacing it.

Clutch Springs

Weak clutch springs result in slipping or uneven clutch action. Measure the length of each spring, as shown in **Figure 44**. Standard free lengths and dimensional tolerances are listed in **Table 5**. Replace any spring which is shorter than the standard length by the specified amount.

Table 4 FRICTION PLATE THICKNESS

Model	Standard Thickness Inch	(Millimeters)
HS1-B	0.157	(4.0)
YL1, YL1-E, LS-2	0.157	(4.0)
YAS1, YAS1-C, AS2-C	0.157	(4.0)
YCS-1, YCS1-C	0.157	(4.0)
CS3-B, CS3-C, CS5	0.157	(4.0)
YDS5	0.118	(3.0)
DS6, DS6-B, DS6-C, DS7	0.118	(3.0)
YDS3, YDS3-C, YM1	0.169	(4.3)
YM2, YM2-C	0.118	(3.0)
YR1, YR2, YR2-C	0.118	(3.0)
R3, R3-C	0.118	(3.0)
R5, R5-B, R5-C	0.118	(3.0)
RD250, RD250A	0.118	(3.0)
RD350, RD350A	0.118	(3.0)

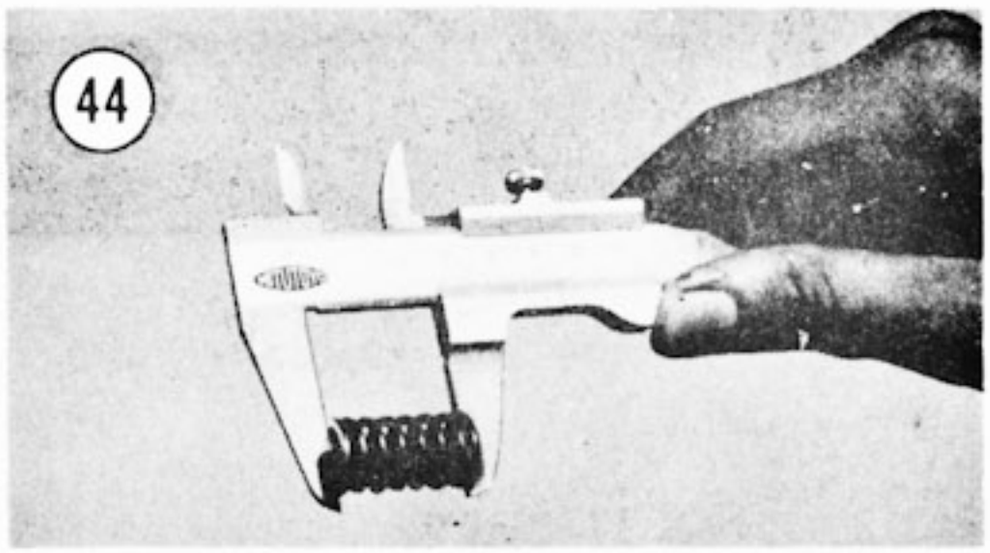


Table 5 CLUTCH SPRING LENGTH

Model	Standard Length In.	(mm)	Tolerance In.	(mm)
HS1, HS1-B	1.24	(31.5)	0.04	(1.01)
YL1, YL1-E	1.00	(25.5)	0.08	(2.0)
LS-2	1.34	(34.0)	0.04	(1.0)
YAS1, YAS1-C, AS2C	1.34	(34.0)	0.04	(1.0)
YCS-1, YCS1-C	1.34	(34.0)	0.04	(1.0)
CS3-B, CS3-C, CS5	1.34	(34.0)	0.04	(1.0)
YDS5	1.00	(25.5)	0.08	(2.0)
DS6, DS6-B, DS6-C	1.73	(44.0)	0.04	(1.0)
DS7	1.42	(36.0)	0.03	(0.8)
YDS3, YDS3-C, YM1	1.00	(25.5)	0.08	(2.0)
YM2, YM2-C	1.00	(25.5)	0.08	(2.0)
YR1, YR2, YR2-C	1.43	(36.4)	0.04	(1.0)
R3, R3-C	1.43	(36.4)	0.04	(1.0)
R5, R5-B	1.43	(36.4)	0.04	(1.0)
R5-C	1.42	(36.0)	0.04	(1.0)
RD250, RD250A	1.42	(36.0)	0.04	(1.0)
RD350, RD350A	1.42	(36.0)	0.04	(1.0)

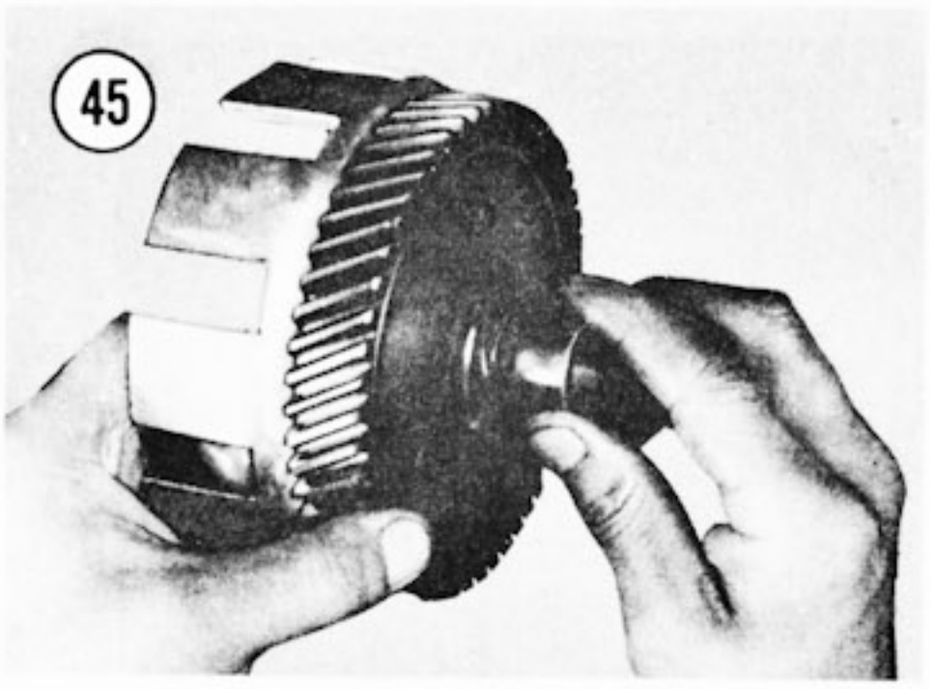
Primary Driven Gear

Check the teeth on the primary driven gear for scratches or other damage. Also check for any scratches on the slotted surfaces of the clutch boss. Some models are equipped with a rubber friction ring between the primary driven gear and the clutch housing. This ring reduces gear noise at low engine speeds.

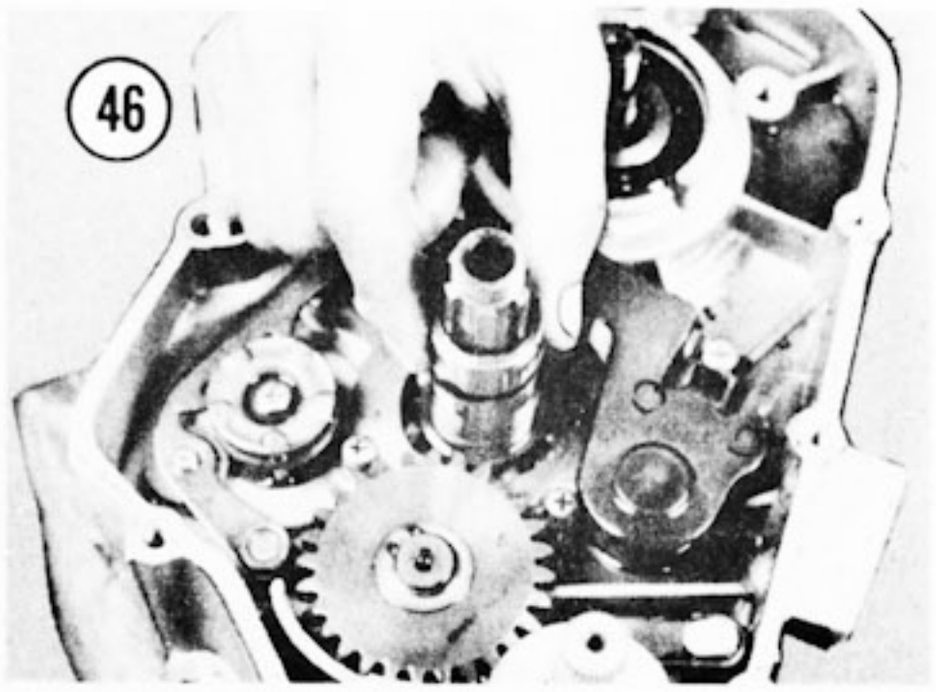
Spacer

Check for scratches on the inner and outer surfaces of the spacer. Lightly smooth any scratches with a fine oilstone or fine grain emery paper. Replace the spacer if any scratches cannot be removed.

Lightly oil the spacer and insert it into the driven gear boss as shown in **Figure 45**. There should be no excess clearance. Replace the spacer and/or the primary driven gear if play is excessive.

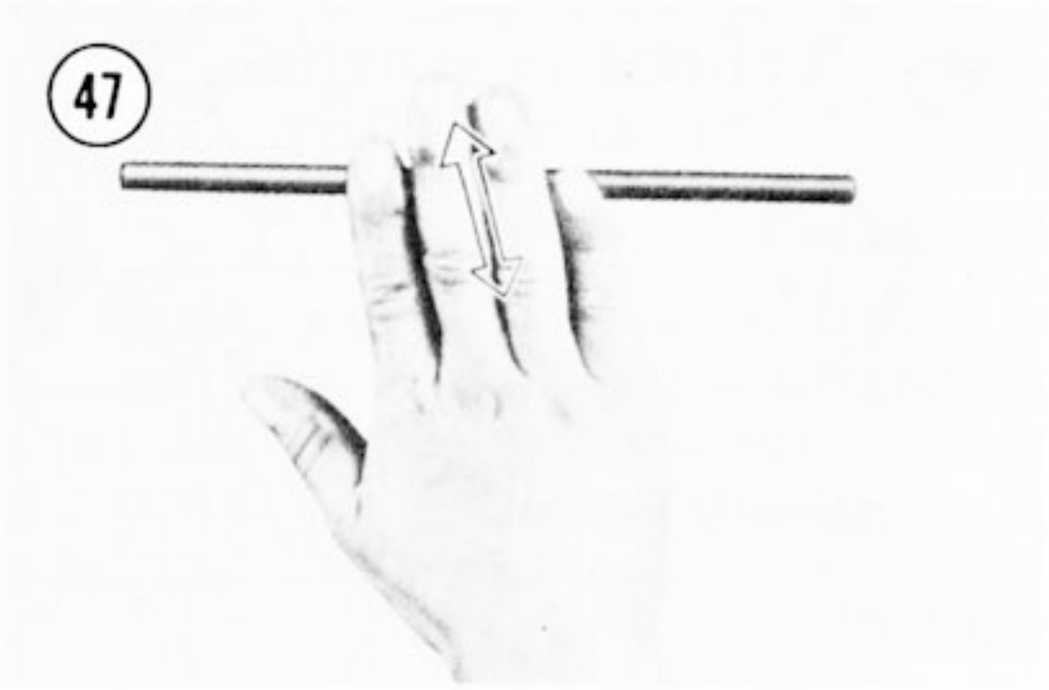


Lightly lubricate the spacer and slide it onto the transmission mainshaft (**Figure 46**). Replace the spacer if there is any noticeable play.



Pushrod

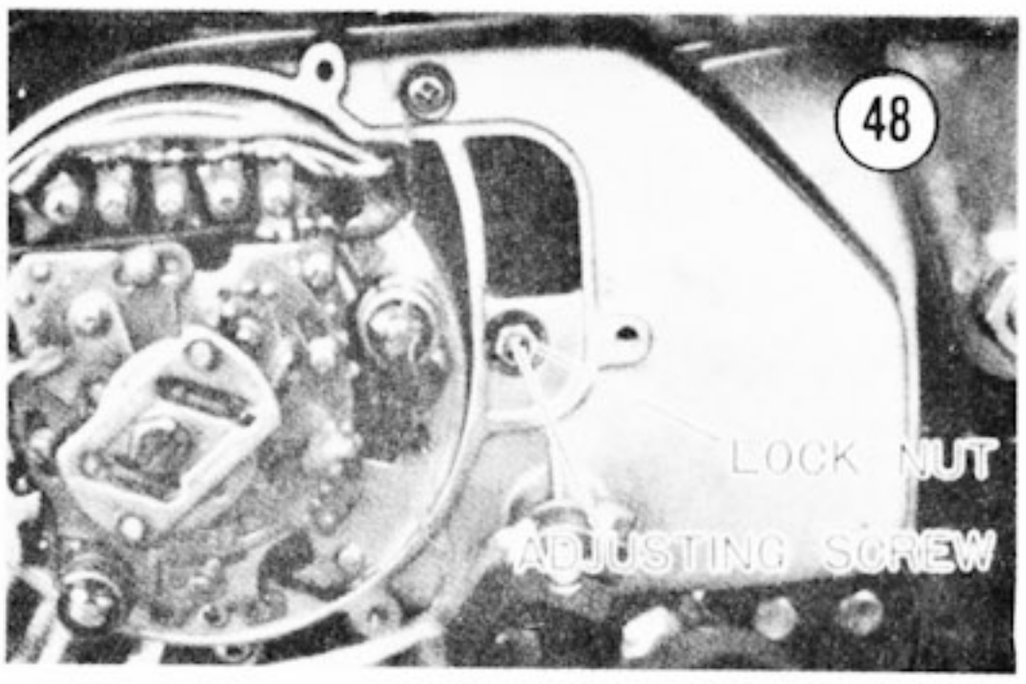
Clutches located on the right side of the machine are operated by a pushrod. Check this rod for straightness by rolling it over a flat surface, as shown in **Figure 47**. If the pushrod is bent, straighten or replace it.



Clutch Adjustment

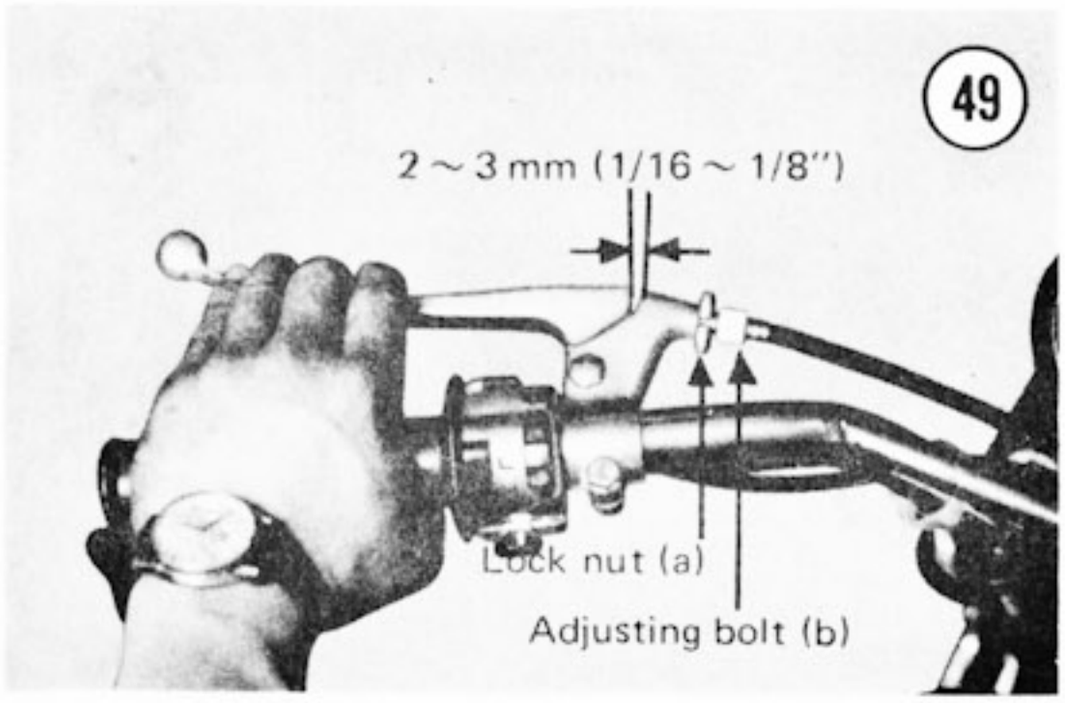
Locate the clutch adjustment screw on the left side. On some models, it is under the left crankcase cover or under an access door on the lower left side of the engine. On other models, it is under the Autolube pump cover.

Loosen the lock nut, as shown in **Figure 48**. Slowly tighten the adjusting screw until it bottoms, then back the adjusting screw out a quarter turn. Tighten the lock nut.



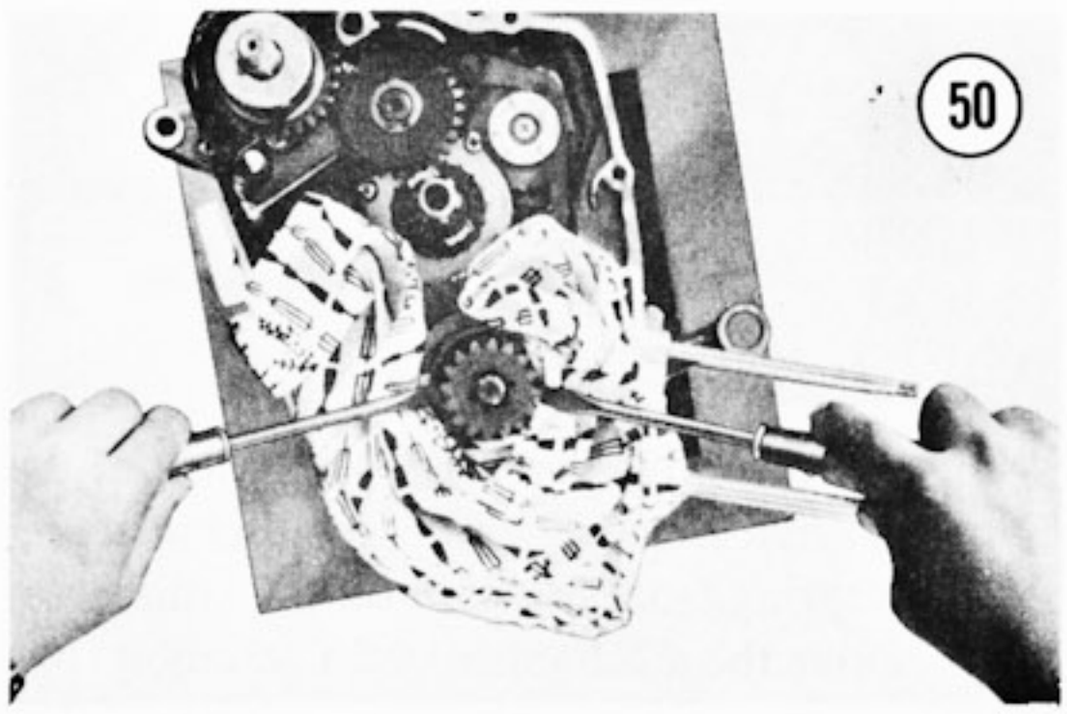
Clutch Cable Adjustment

Adjust the clutch cable at the clutch hand lever to provide approximately 1/16 to 1/8 inch (2-3mm) free-play at the lever. To make the adjustment, loosen the lock nut, then turn the adjusting screw as required. This adjustment is shown in **Figure 49**.



PRIMARY DRIVE GEAR

To remove the primary drive gear, feed a rolled-up rag between the primary drive and primary driven gears. Consider the direction the gears tend to turn as you loosen the lock nut. You may then pry the drive gear from the shaft (**Figure 50**) with two screwdrivers.

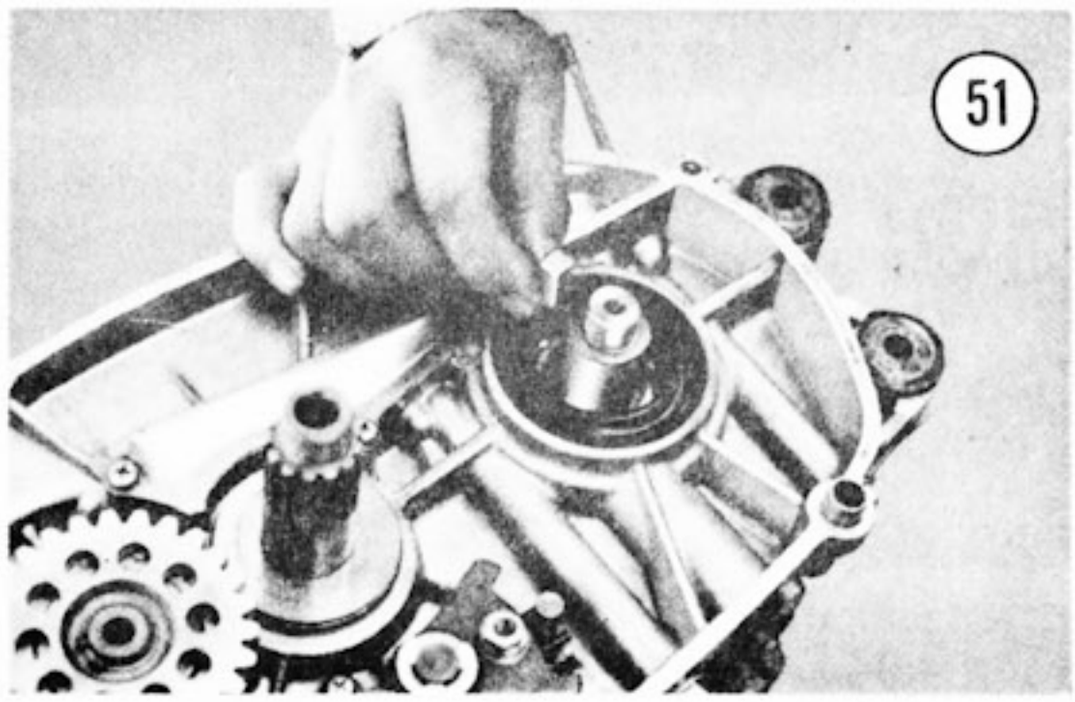


On some models there is a smaller gear mounted on top of the primary drive gear. This drives the Autolube pump. It should slip off easily.

Some primary drive gears are held by splines on the shaft. Others, as shown in **Figure 51**, use a Woodruff key. To avoid losing the key, set it aside at once.

Check the gear for scratches, wear, fit on the shaft, and backlash. Excessive backlash results in a clashing noise; insufficient backlash results in a whine. Gears are available in oversizes and undersizes so that the correct backlash may be obtained.

Primary drive gears on some models have a chamfered end. This end must slide in first, against the crankshaft bearing.



DRIVE SPROCKET AND CHAIN

Straighten the lockwasher with a blunted metal punch. Use the flywheel magneto holding tool, if available, to prevent the drive sprocket from turning, and loosen the sprocket nut. If the holding tool is not available, shift the transmission into low gear and use a striking wrench or impact wrench to loosen the sprocket nut.

Behind the sprocket on each model is a metal spacer (collar). Grip it with a needlenose pliers; it will slide out easily. When installing it, either end can go in first. Put oil on the seal lips to prevent this spacer from damaging the seal.

Check the sprocket teeth for wear. **Figure 52** compares worn and serviceable sprockets. Mesh the sprocket with a new chain. Replace the sprocket if there is excessive play. Clean the chain before you check it. After cleaning it, check to be sure that the chain bends without any kinks. Mesh the chain with a new sprocket. If you can pull the chain away from the sprocket a distance of half a link, the chain should be replaced.

KICKSTARTER

Five types of kickstarter mechanisms are used on these machines. The type of starter used with each model is listed in **Table 6**.

Type 1 Kickstarter

Figure 53 (page 57) shows the Type 1 kickstarter. To disassemble the unit, remove the kick spring with a pair of needle nose pliers, then remove the kickstarter assembly as a unit (**Figure 54**). The kick idler gear (**Figure 55**) may be removed after the snap ring is removed. Reverse the procedure to reassemble the starter.

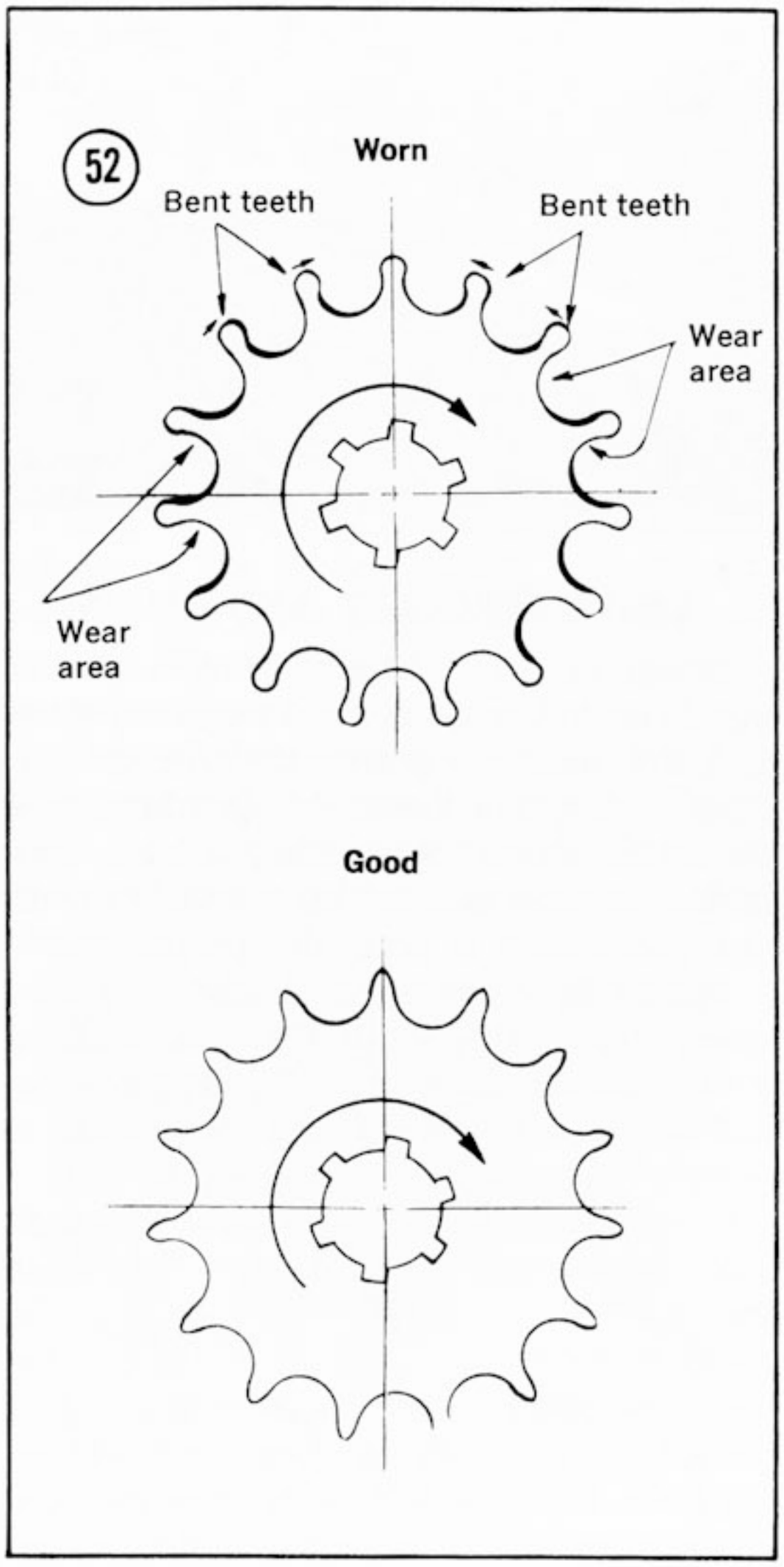
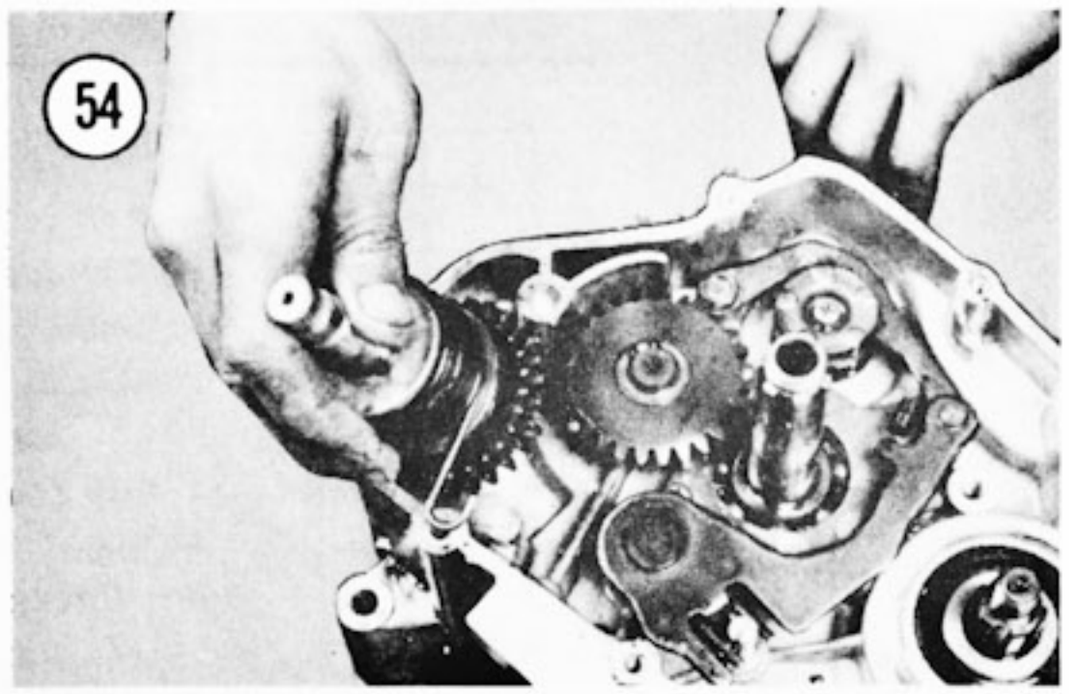
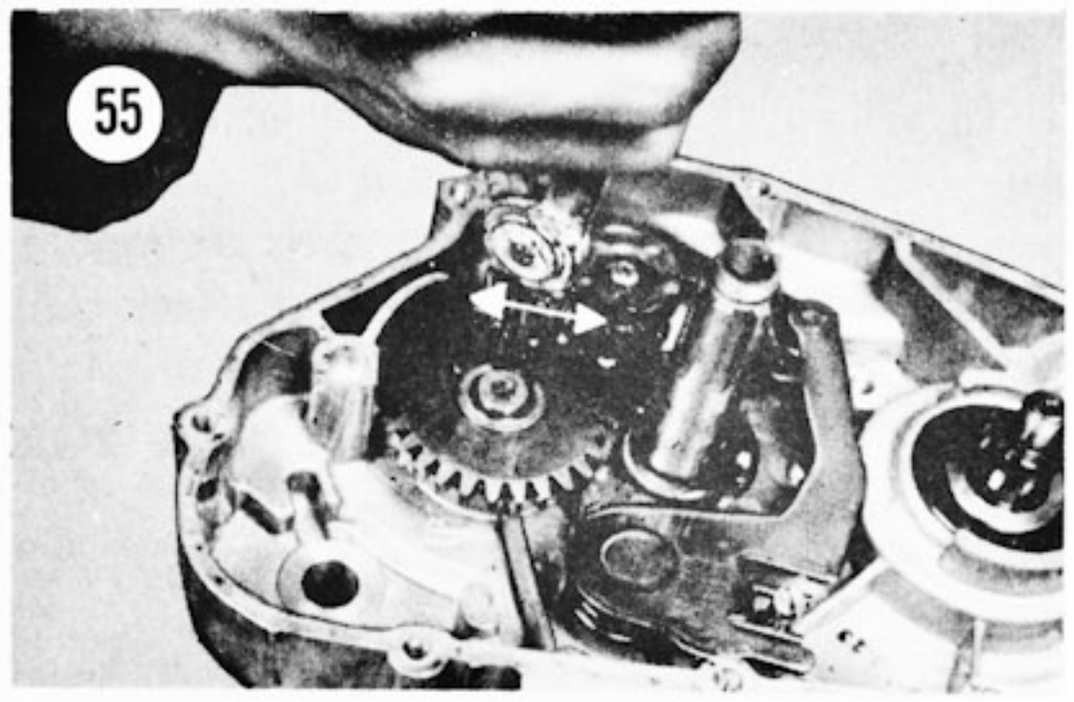


Table 6 KICKSTARTER TYPES

Model	Type
HS1, HS1-B, LS-2	1
YL1, YL1-E	2
YAS1, YAS1-C, AS2C	1
CS3-B, CS3-C, CS5	1
YCS-1, YCS1-C	2
YDS5	3
DS6, DS6-B, DS6-C	3
DS7	4
YDS3, YDS3-C, YM1	3
YM2, YM2-C	3
YR1, YR2, YR2-C	4
R5, R5-B, R5-C	4
R3, R3-C	5
RD250, RD250A	4
RD350, RD350A	4





Type 2 Kickstarter

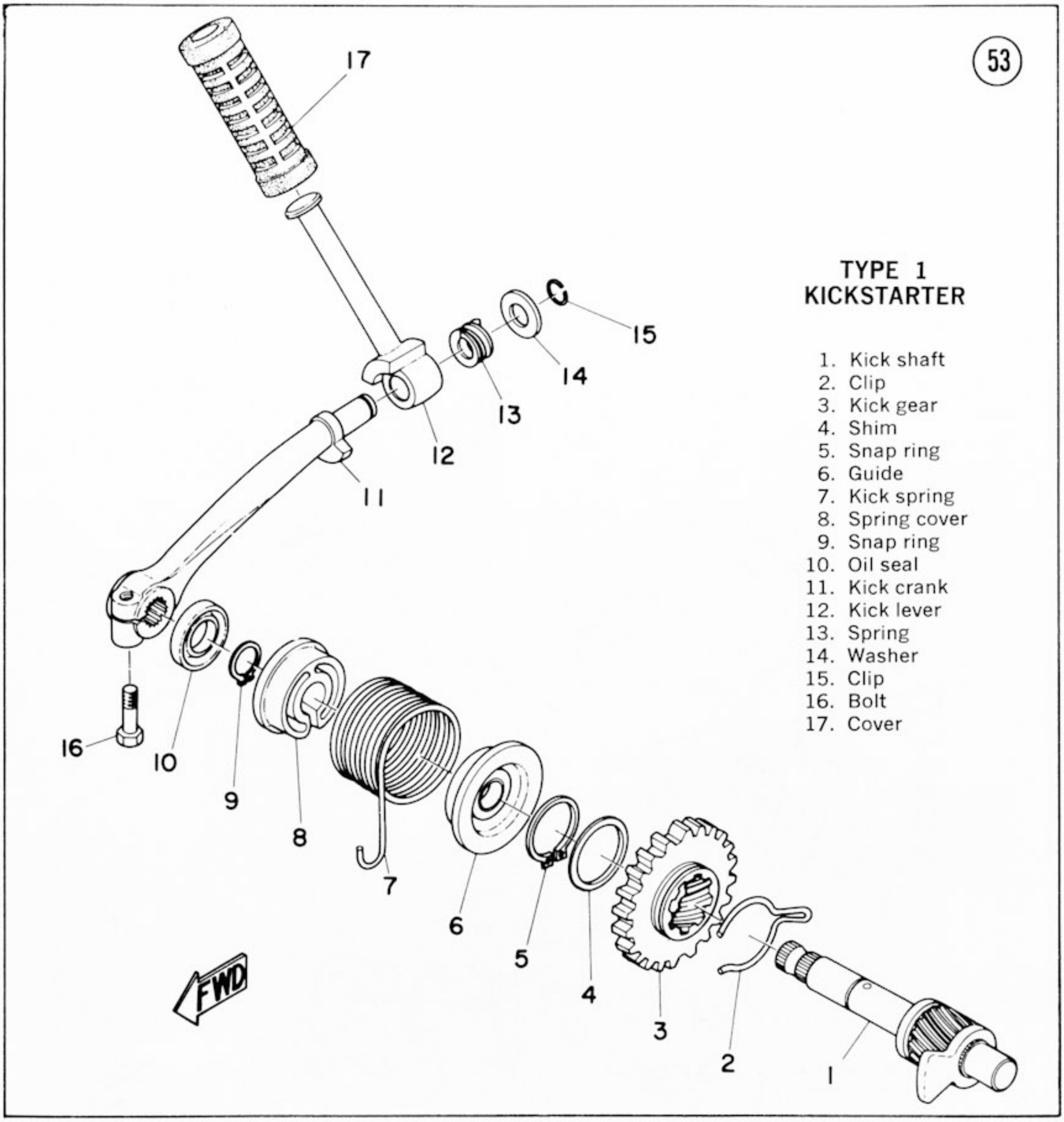
Figure 56 (p. 58) is an exploded view of the Type 2 starter. Begin assembly by disconnecting the kick spring from the base on the crankcase, then remove the mechanism as an assembly.

Check the inner teeth of the kick gear. If these teeth are worn or chipped, the kick pawl may slip. Replace the kick pawl if the tip is worn. Be sure that there is no foreign matter in the pawl pin hole, and that the pawl pin operates freely.

To replace the mechanism, install the assembly on its shaft. Depress the pawl and rotate the shaft until the pawl seats against the stop. Finally, wind the spring clockwise and hook the end on the boss in the crankcase.

Type 3 Kickstarter

Figure 57 (page 59) is an exploded view of the Type 3 kickstarter. The crankcase must be split and the transmission removed before the kickstarter can be disassembled. Refer to crankcase disassembly later in this chapter.

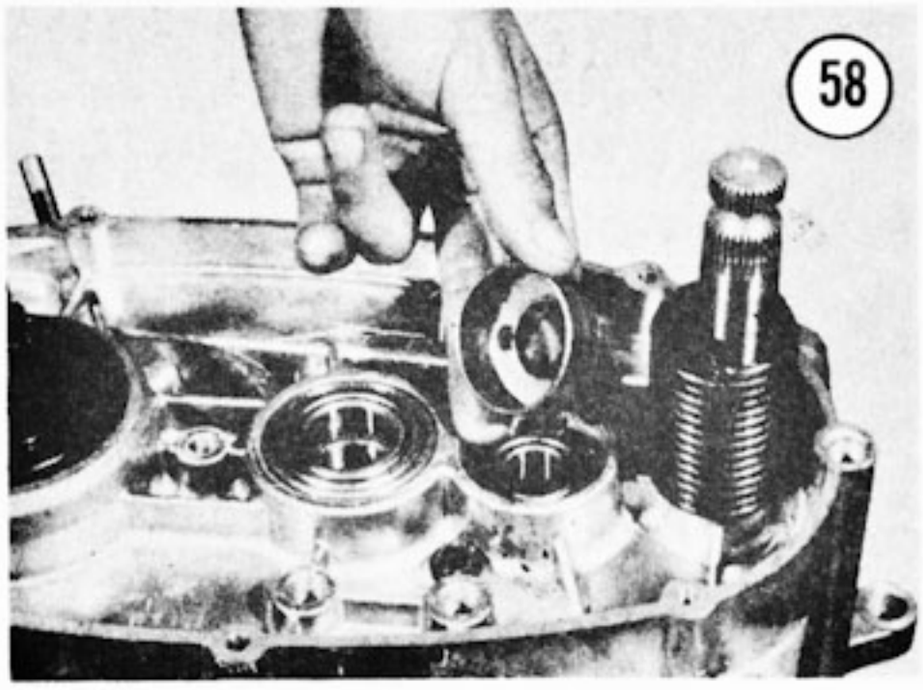


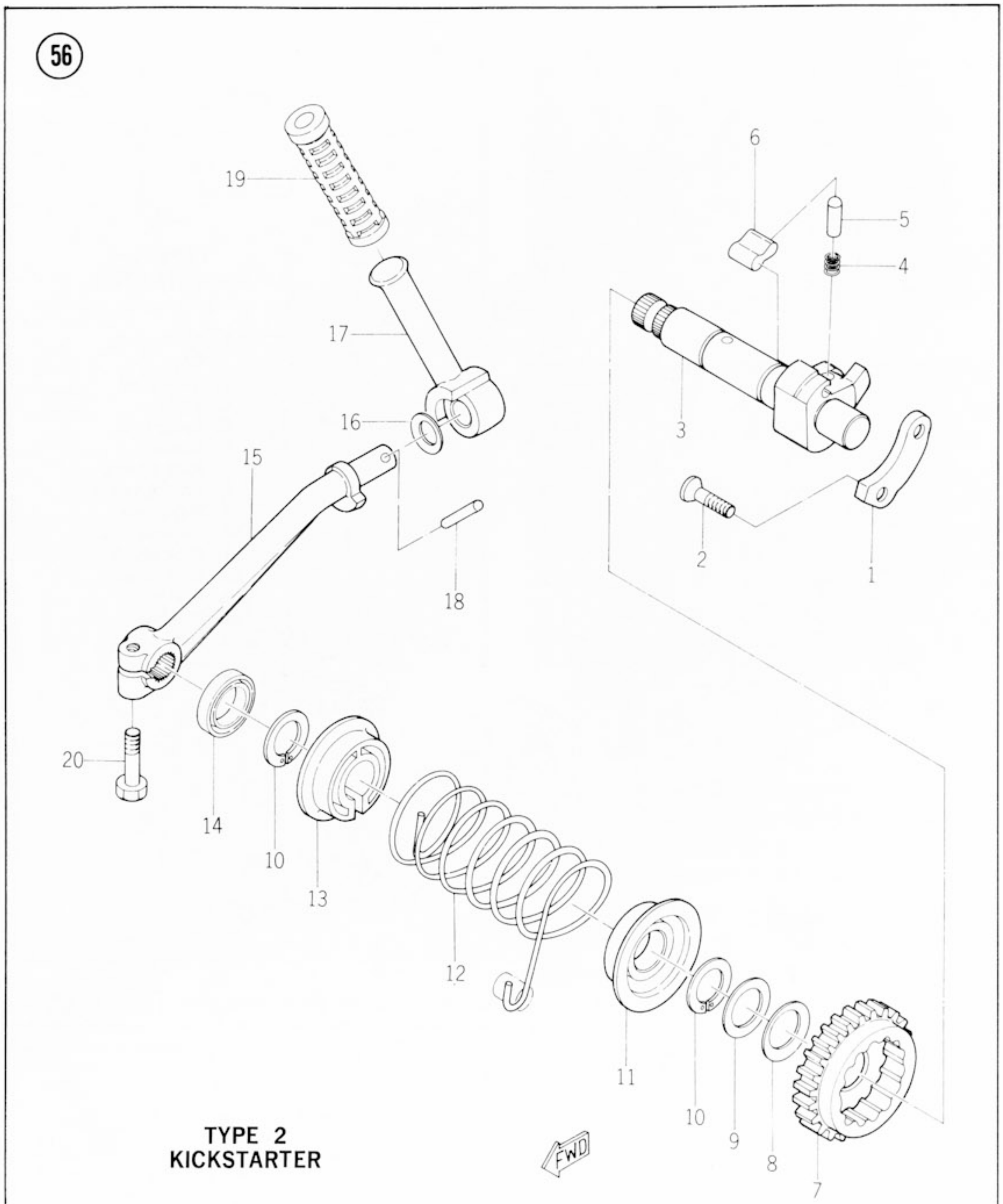
TYPE 1 KICKSTARTER

1. Kick shaft
2. Clip
3. Kick gear
4. Shim
5. Snap ring
6. Guide
7. Kick spring
8. Spring cover
9. Snap ring
10. Oil seal
11. Kick crank
12. Kick lever
13. Spring
14. Washer
15. Clip
16. Bolt
17. Cover

To begin disassembly, remove the kick spring cover (**Figure 58**) and the kick spring (**Figure 59**). Use a pair of snap ring pliers to remove the snap ring from the shaft, then slide the shaft assembly toward the inside of the crankcase (**Figure 60**).

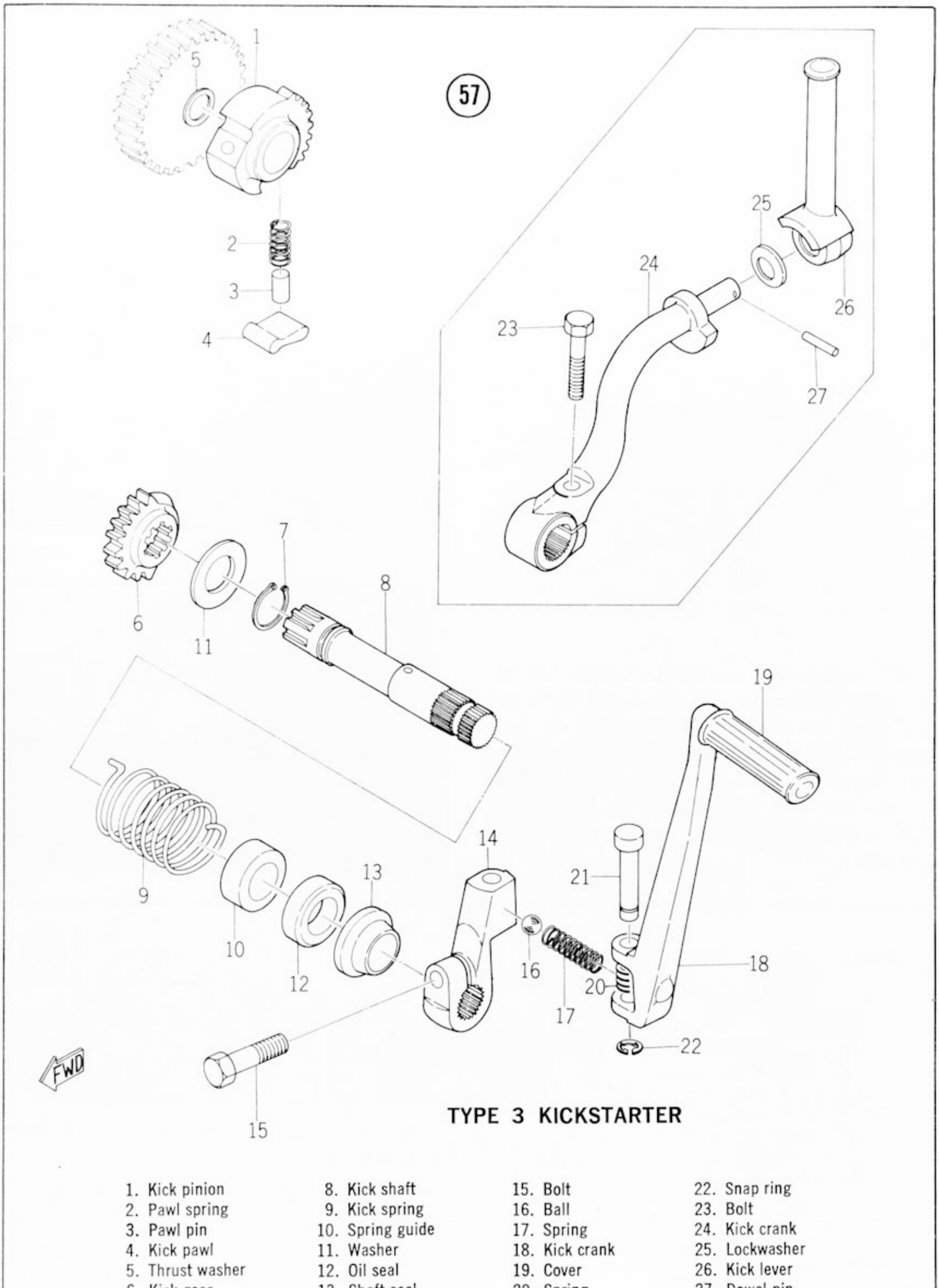
Examine the parts for damage or wear. Pay particular attention to the tip of the kick pawl and the inner teeth of the first gear. Be sure that there is no foreign material in the pawl pin hole (**Figure 61**).





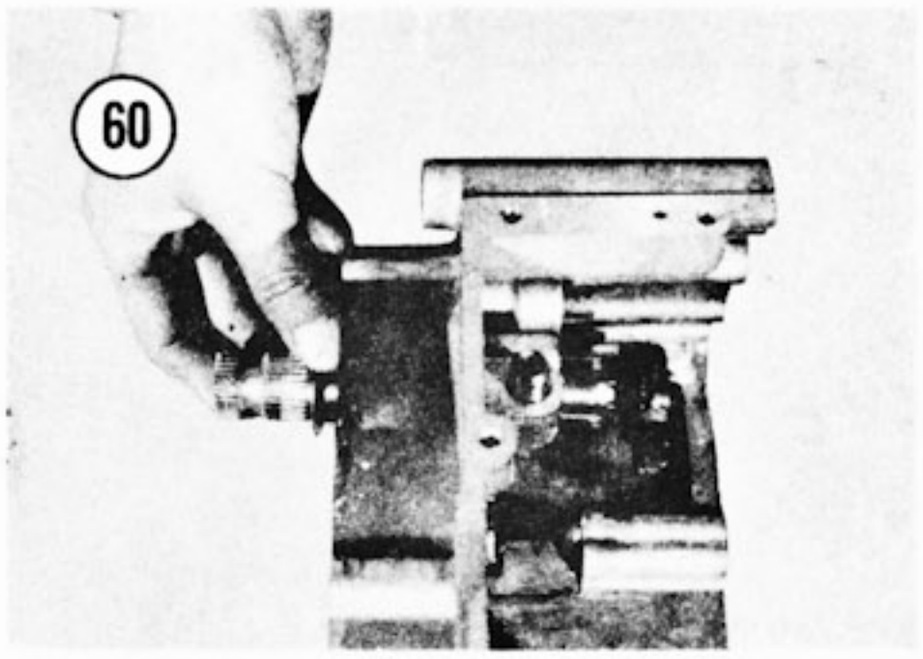
TYPE 2
KICKSTARTER

1. Pawl stopper
2. Screw
3. Kick shaft
4. Pawl spring
5. Pawl pin
6. Kick pawl
7. Kick gear
8. Waved washer
9. Shim
10. Snap ring
11. Guide
12. Kick spring
13. Kick spring cover
14. Oil seal
15. Kick crank
16. Lockwasher
17. Kick lever
18. Dowel pin
19. Cover
20. Bolt



TYPE 3 KICKSTARTER

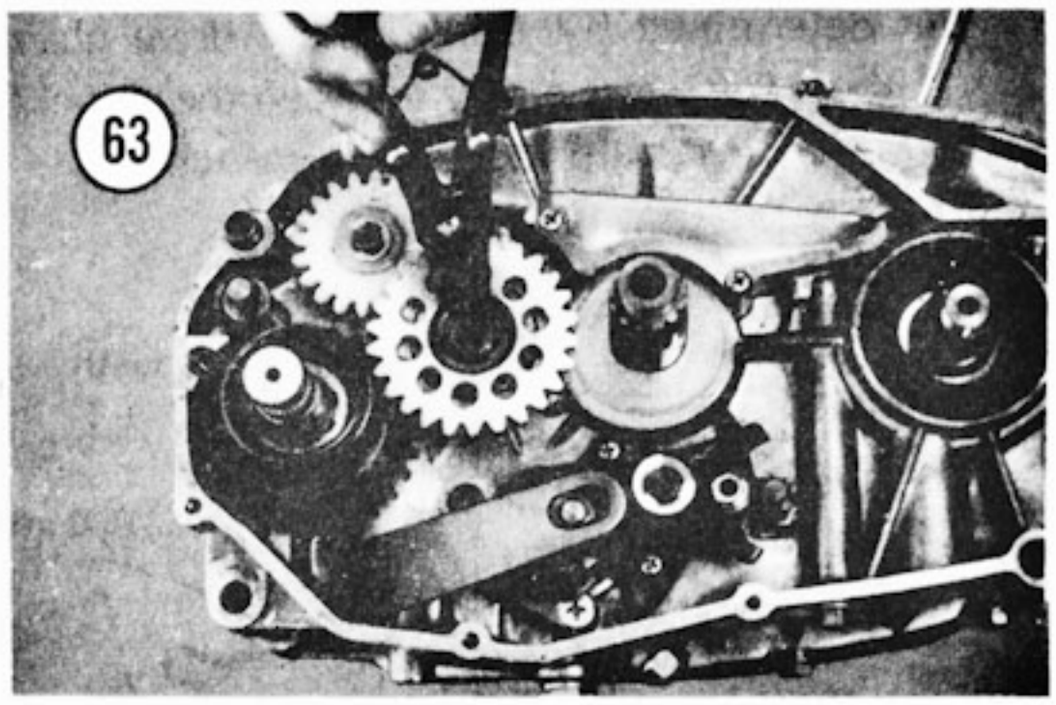
1. Kick pinion
2. Pawl spring
3. Pawl pin
4. Kick pawl
5. Thrust washer
6. Kick gear
7. Snap ring
8. Kick shaft
9. Kick spring
10. Spring guide
11. Washer
12. Oil seal
13. Shaft seal
14. Crank boss
15. Bolt
16. Ball
17. Spring
18. Kick crank
19. Cover
20. Spring
21. Pin
22. Snap ring
23. Bolt
24. Kick crank
25. Lockwasher
26. Kick lever
27. Dowel pin

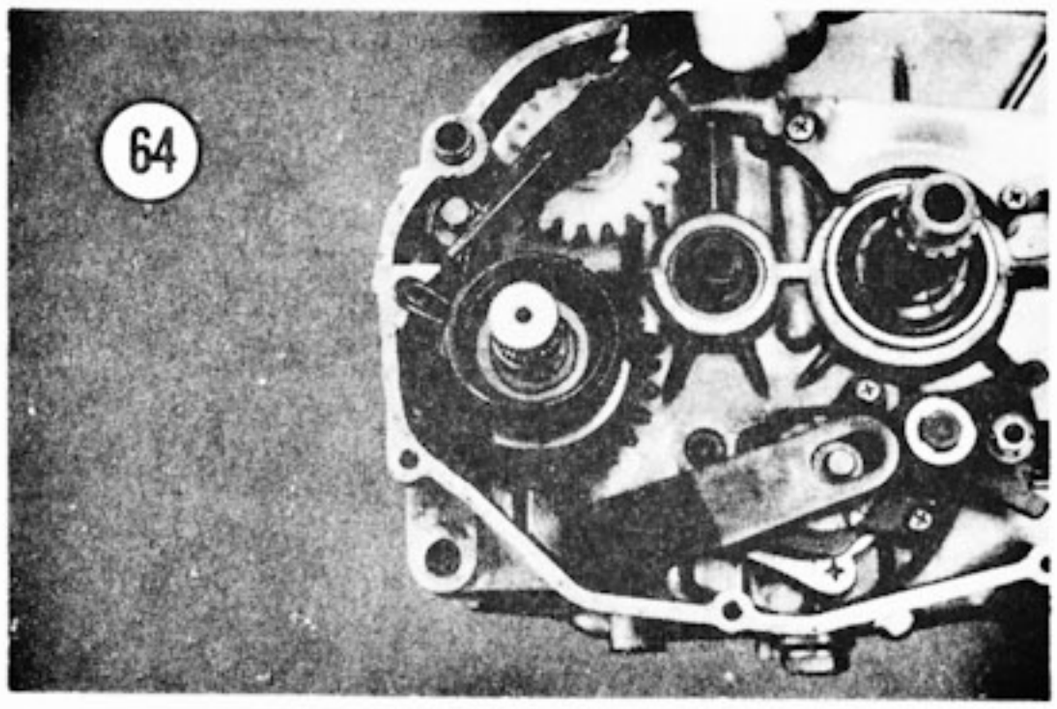


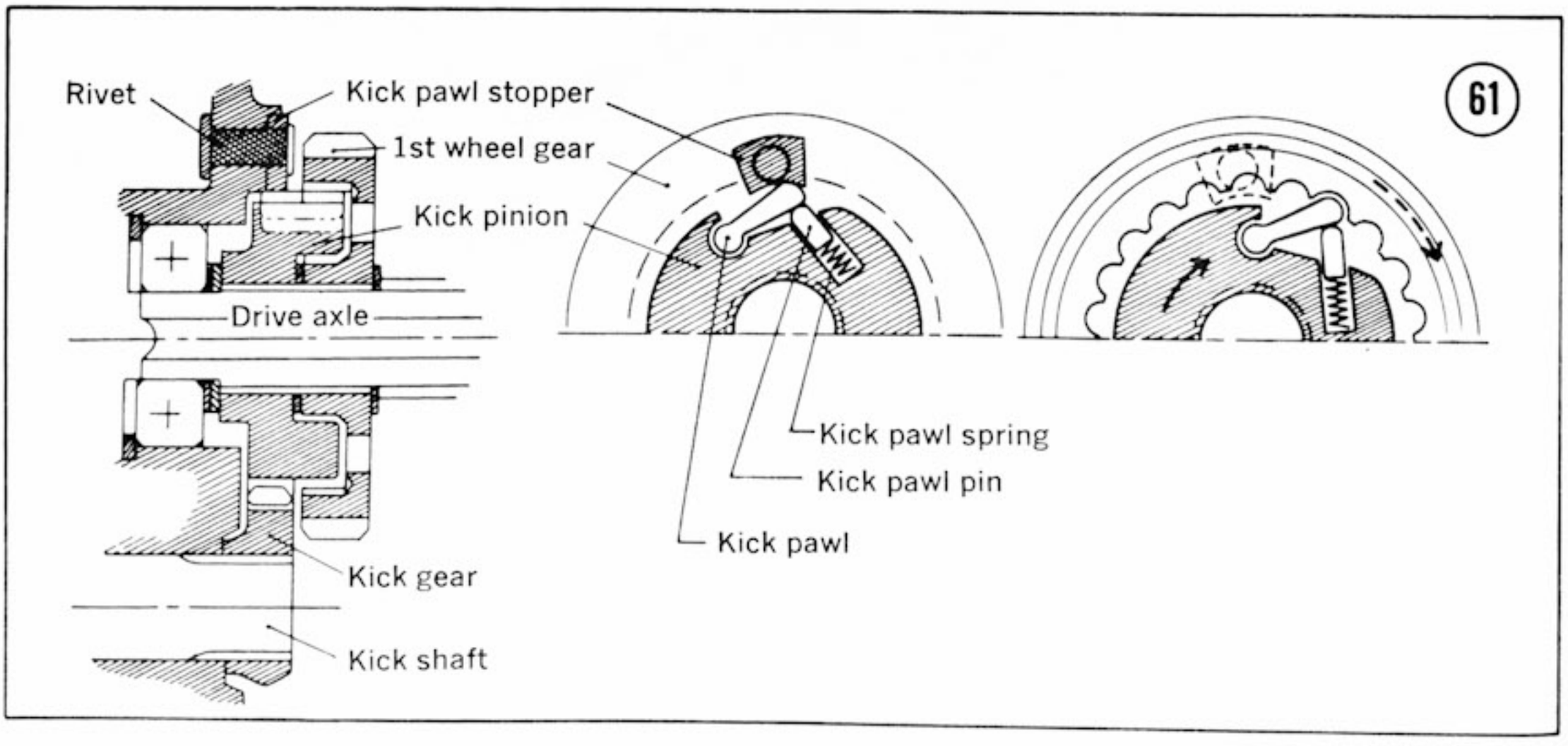
To assemble the kickstarter, reverse the disassembly procedure. The kickstarter shaft and kick gear are pressed together after the kick gear is heated to 265 to 300 degrees F. (130 to 150 degrees C.). Insert the spring into the hole in the case, then hook it into the hole in the shaft. Install the spring cover with a soft mallet and pliers.

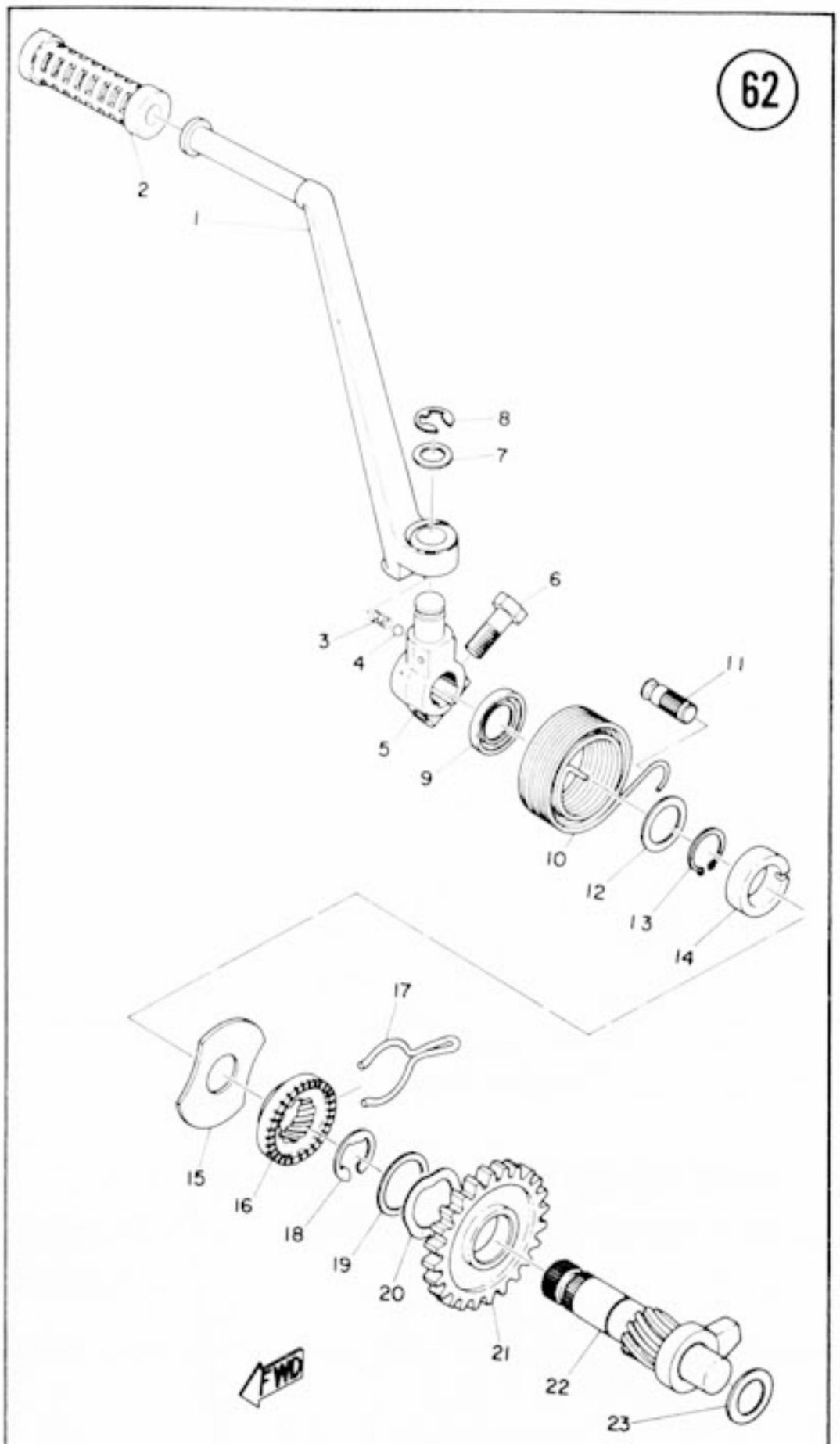
Type 4 Kickstarter

Figure 62 is an exploded view of the Type 4 kickstarter. To disassemble the mechanism, remove the snap ring, then pull the kick idler gear (**Figure 63**) from its shaft. Note the position of the shims. Then remove the spring with a pair of pliers, and pull out the kickstarter assembly (**Figure 64**).







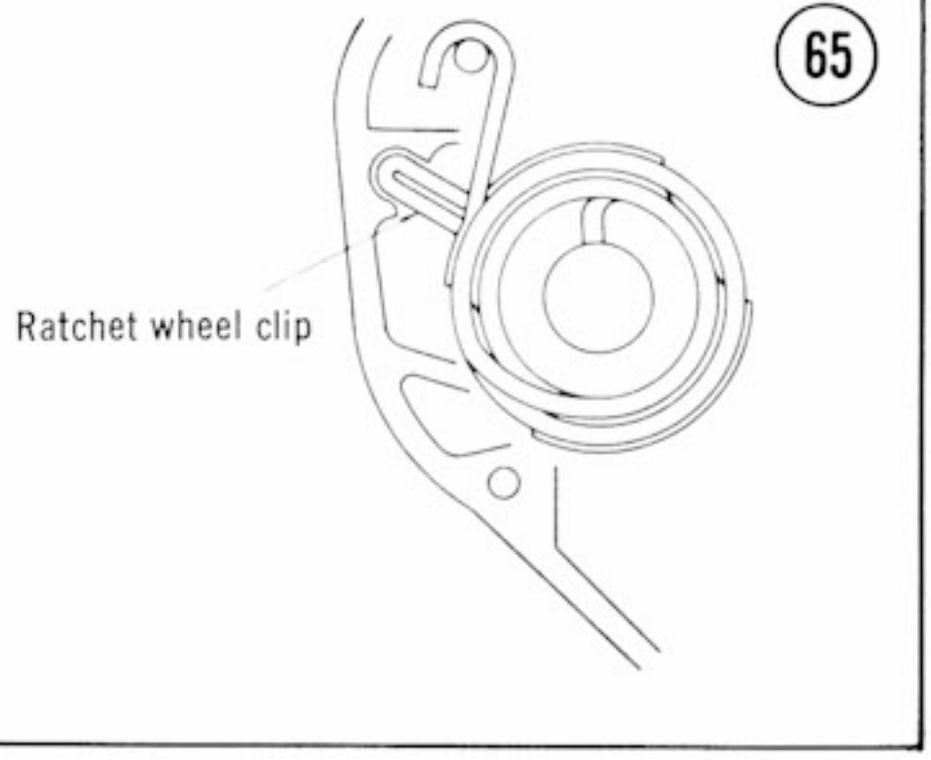


TYPE 4 KICKSTARTER

1. Kick crank
2. Cover
3. Spring
4. Ball
5. Crank boss
6. Bolt
7. Washer
8. Snap ring
9. Oil seal
10. Kick spring
11. Stopper
12. Washer
13. Snap ring
14. Spacer
15. Spring cover
16. Ratchet wheel
17. Clip
18. Snap ring
19. Washer
20. Waved washer
21. Kick gear
22. Kick shaft
23. Washer

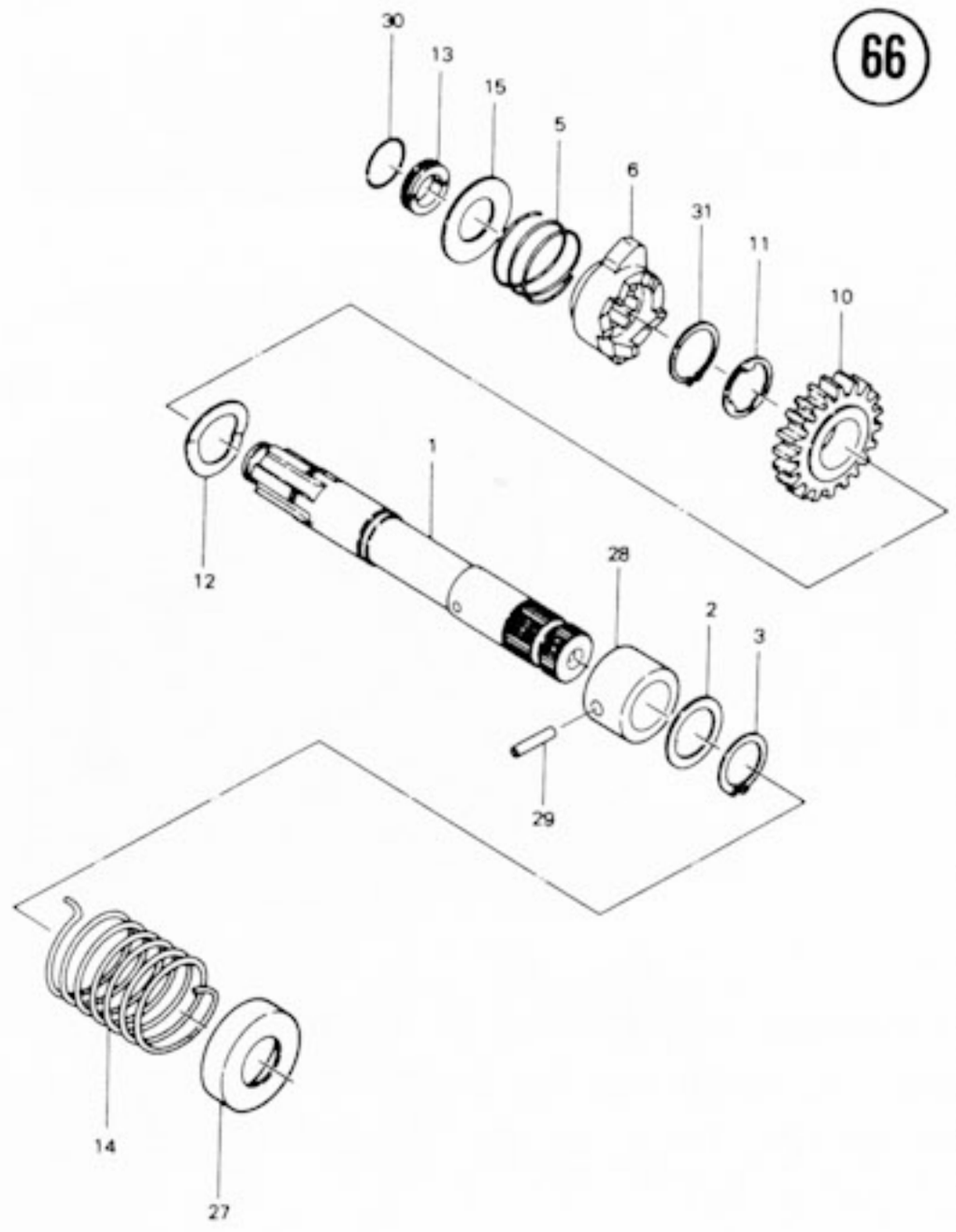
Examine the parts carefully for wear or damage. Replace any parts which are in doubtful condition.

Reverse the disassembly procedure to install the kickstarter. Pay particular attention to the position of the ratchet wheel clip (**Figure 65**).



Type 5 Kickstarter

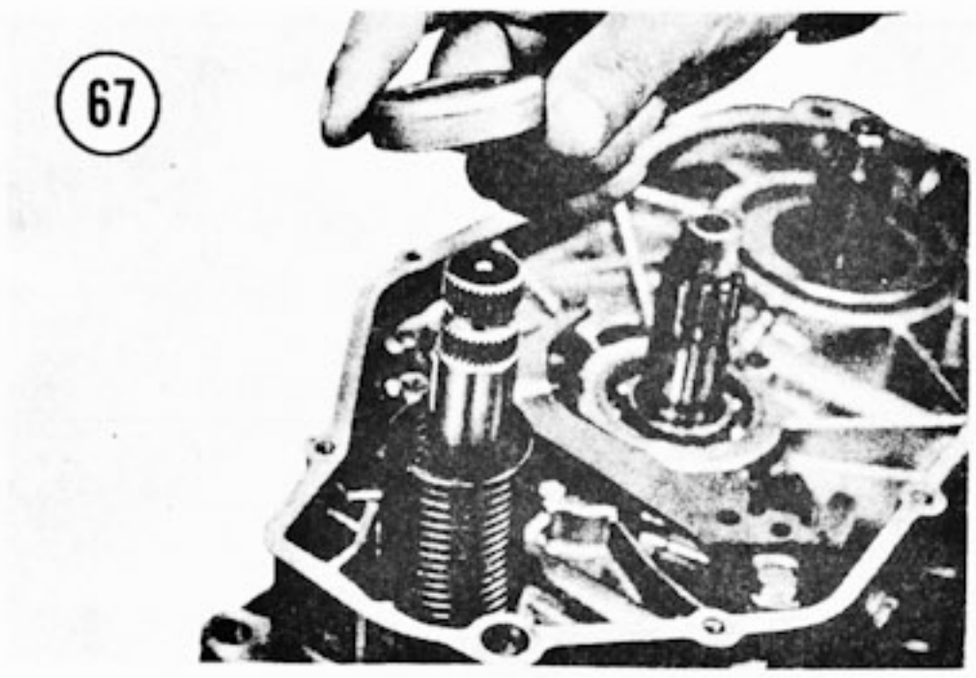
Figure 66 is an exploded view of the Type 5 kickstarter. The crankcase must be split to gain access.

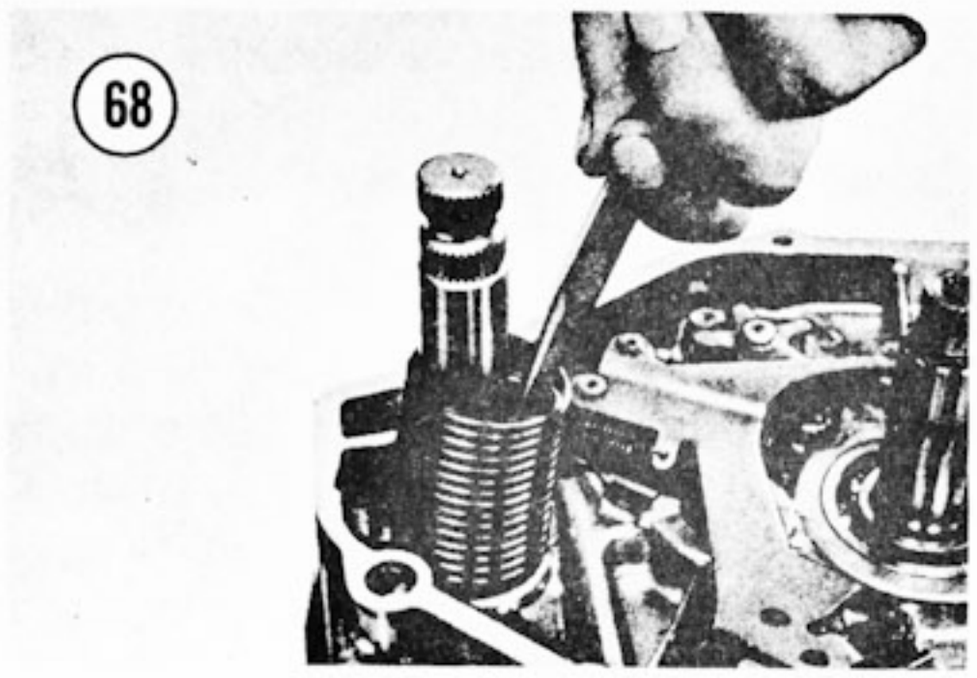


TYPE 5 KICKSTARTER

1. Kick axle
2. Shim
3. Clip
5. Ratchet wheel spring
6. Kick ratchet wheel
10. Kick gear
11. Washer
12. Waved washer
13. Kick ratchet wheel holder
14. Kick spring
15. Spring cover
27. Spring guide
28. Spacer
29. Dowel pin
30. Clip
31. Circlip

To begin disassembly, first remove the kick spring cover (**Figure 67**) and the kick spring (**Figure 68**). The transmission must be removed before further disassembly is possible. Refer to the section on transmission removal. After the transmission is removed, complete the disassembly by removing the clip from the inner end of the shaft, then remove the ratchet wheel retainers, the spring cover, the spring, and the ratchet wheel. The kick gear may be pulled from the shaft after the snap ring and washer are removed.



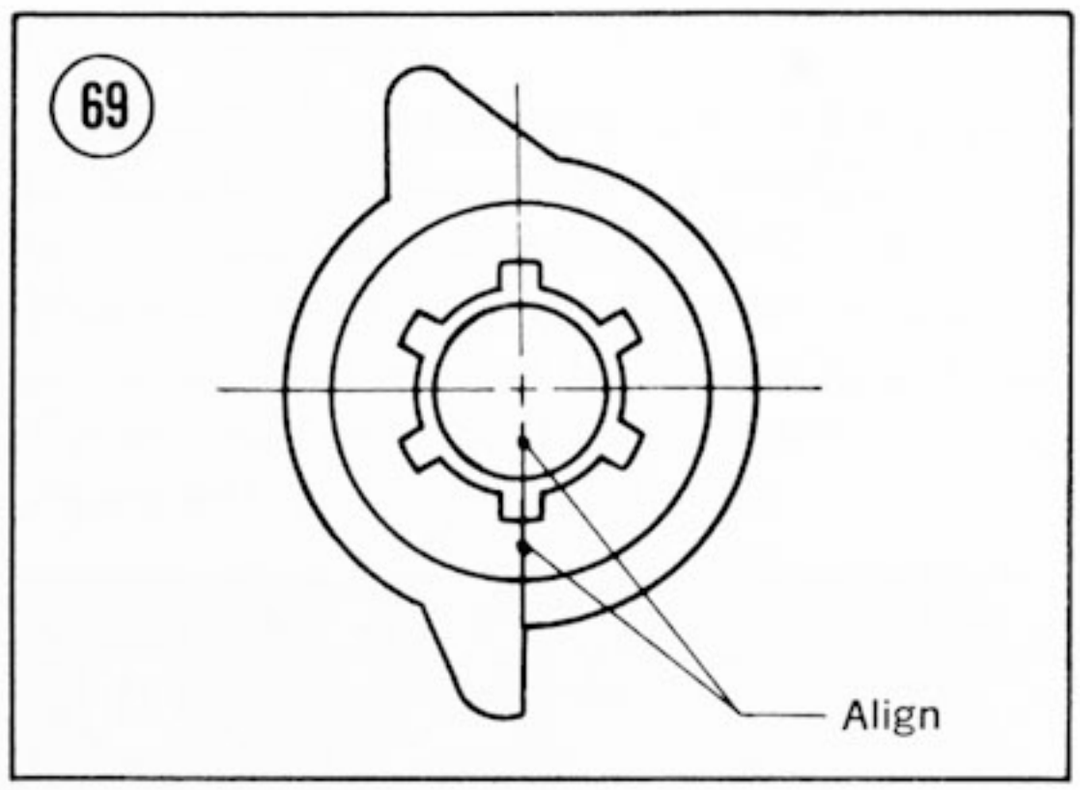


Replace any broken or worn parts. Be sure that the teeth on the kick ratchet wheel and the mating teeth on the side of the kick gear are not worn.

To install the kickstarter, reverse the disassembly procedure. Be sure to align the markings on the kick shaft (**Figure 69**) and the kick ratchet wheel. Be sure that the ratchet wheel is installed correctly (**Figure 70**).

GEARSHIFT MECHANISM

There are five types of gearshift mechanisms used on these motorcycles, identified as Types 1, 2, 3, 4, and 5. **Table 7** lists the types used with each model.



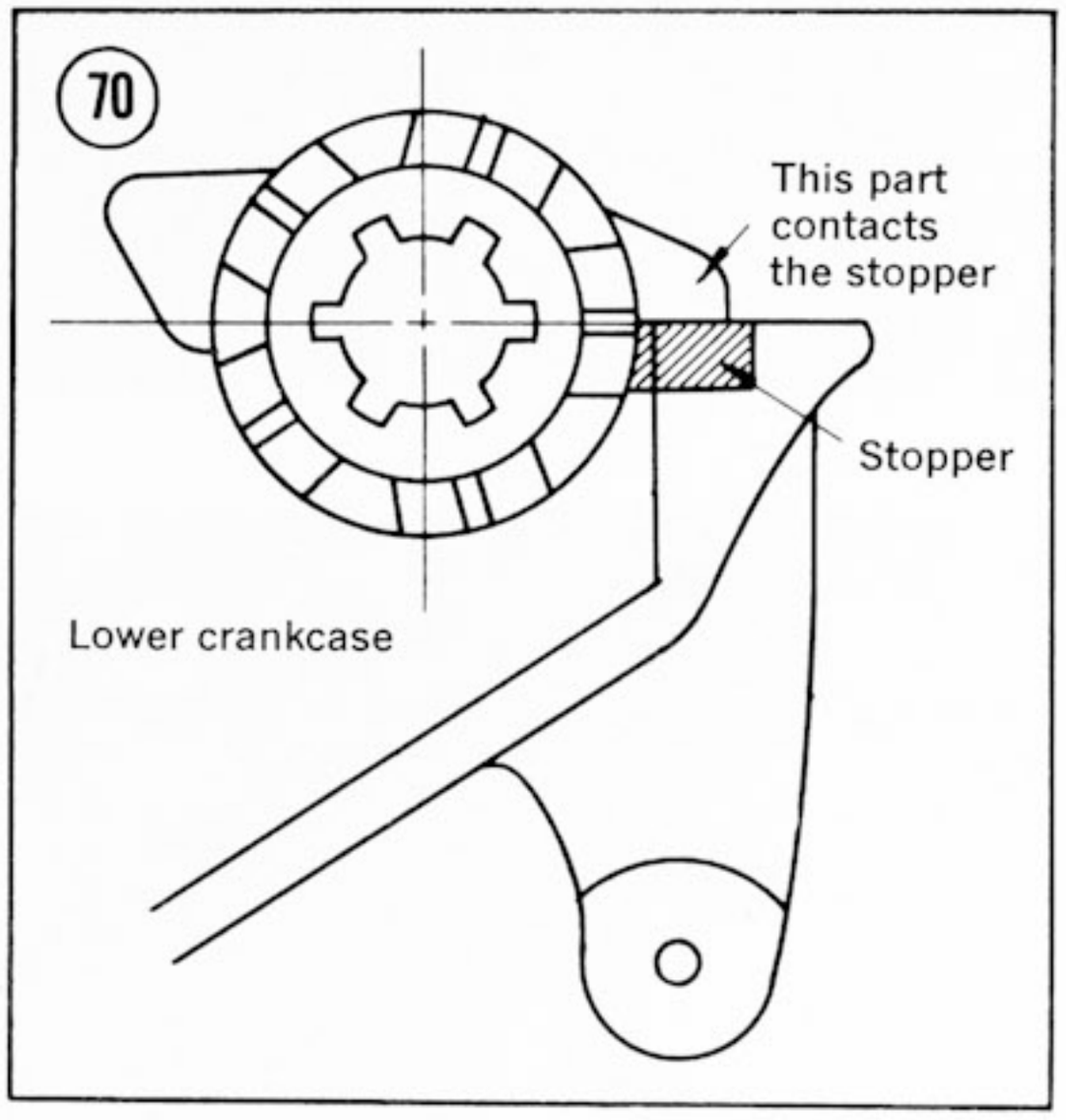


Table 7 GEARSHIFT TYPES

Model	Type
HS1, HS1-B	1
YL1, YL1-E, LS-2	1
YAS1, YAS1-C, AS2C	1
CS3-B, CS3-C, CS5	1
YCS-1, YCS1-C	1
YDS5	2
DS6, DS6-B, DS6-C, DS7	2
YDS3, YDS3-C, YM1	2
YM2, YM2-C	2
R3, R3-C	3
YR1, YR2, YR2-C	3
R5, R5-B, R5-C	4
RD250, RD250A	5
RD350, RD350A	5

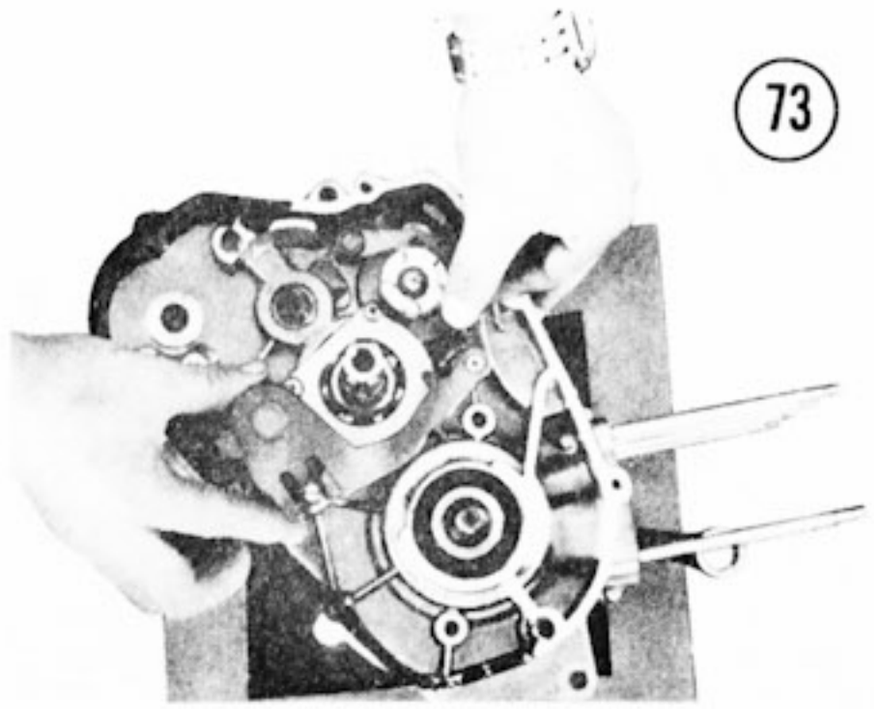
Type 1 Shifter

Figure 71 (next page) illustrates the Type 1 shifter. **Figure 72** illustrates the operation of the shift mechanism. As the shift pedal moves, arm "B" moves arm "A" back and forth. Arm "A" presses one of five shift drum pins. Thus, as the pedal is pressed, the drum makes one fifth of a revolution. The shift drum stopper lever presses against the drum pins to hold the drum at each shift position. Shift forks move laterally in grooves on the outer surface of the drum. The movement of these forks changes the gear positions in the transmission. Neutral is between first and second gear drum pins.

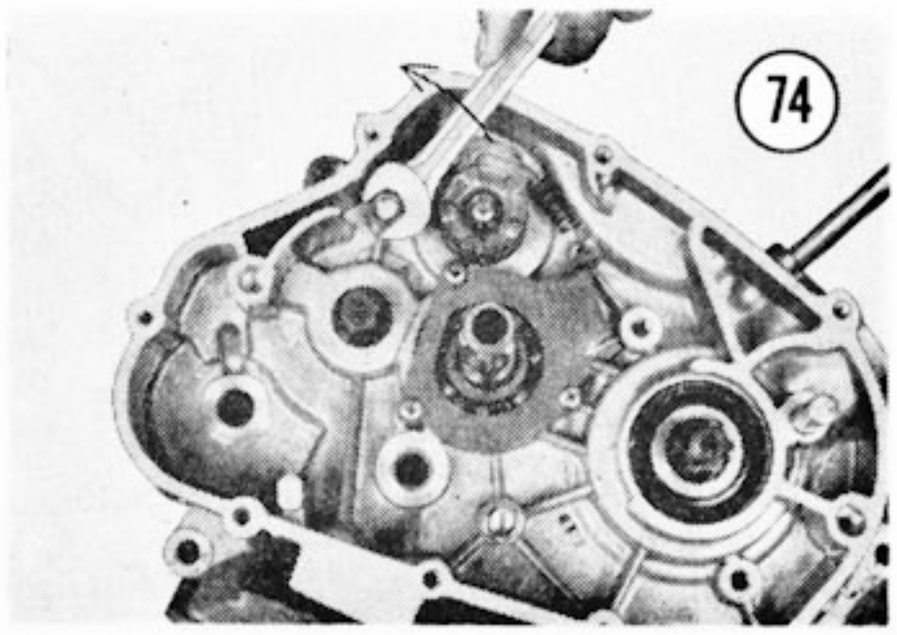
To remove shift arms "A" and "B", remove the snap ring (**Figure 73**) and washer from the left side of the engine, then pull the shaft out from the right side. Then remove the mounting bolt (**Figure 74**) and the springs to remove the shift drum stop lever.

The remainder of the shifter is removed with the transmission. Refer to the applicable section later in this chapter.

Check for worn or broken parts. Broken, fatigued, or weakened springs will cause shifting difficulties.

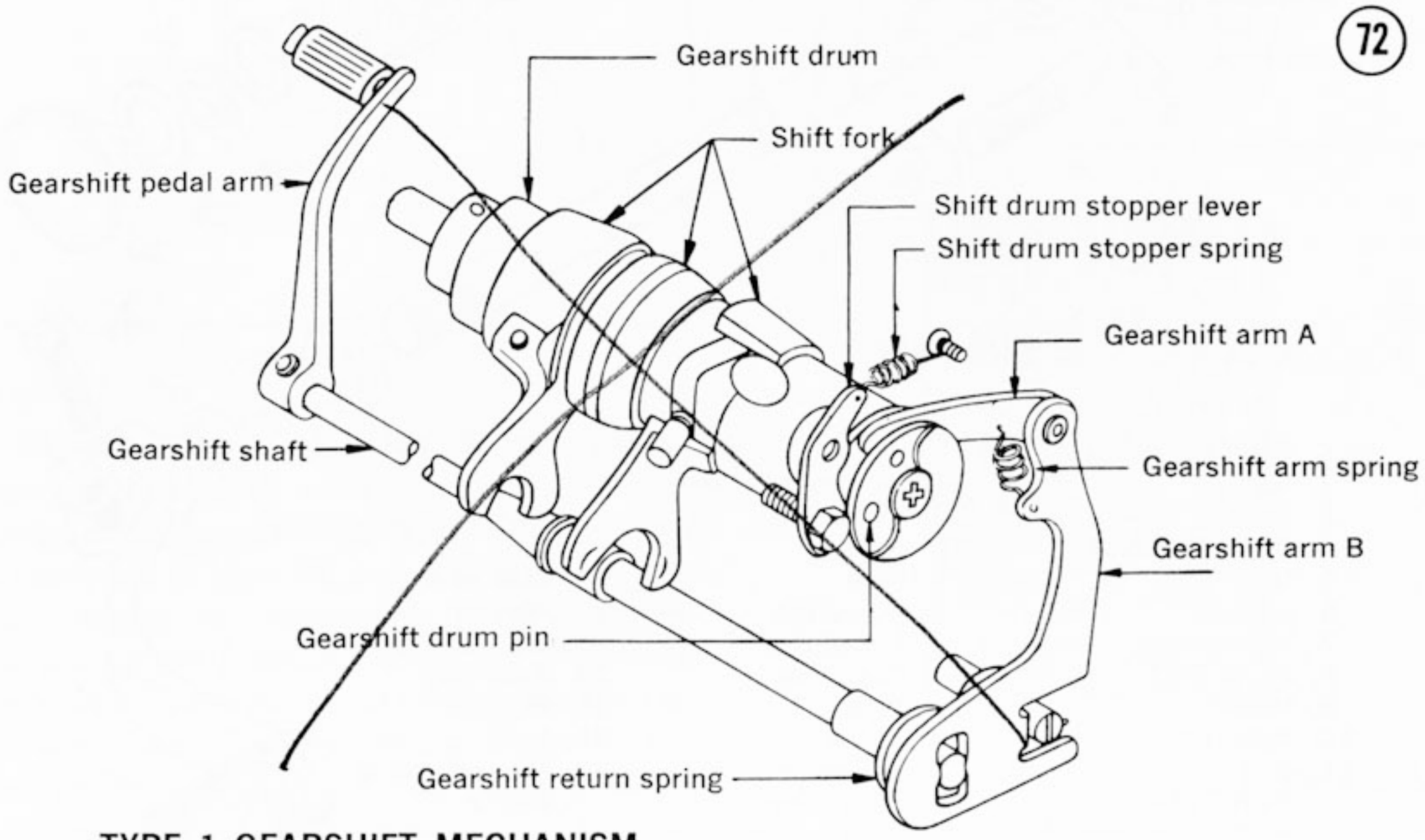


73



74

The shifting mechanism requires adjustment after installation, or if the gears have been overshifting or undershifting. **Figure 75** identifies the



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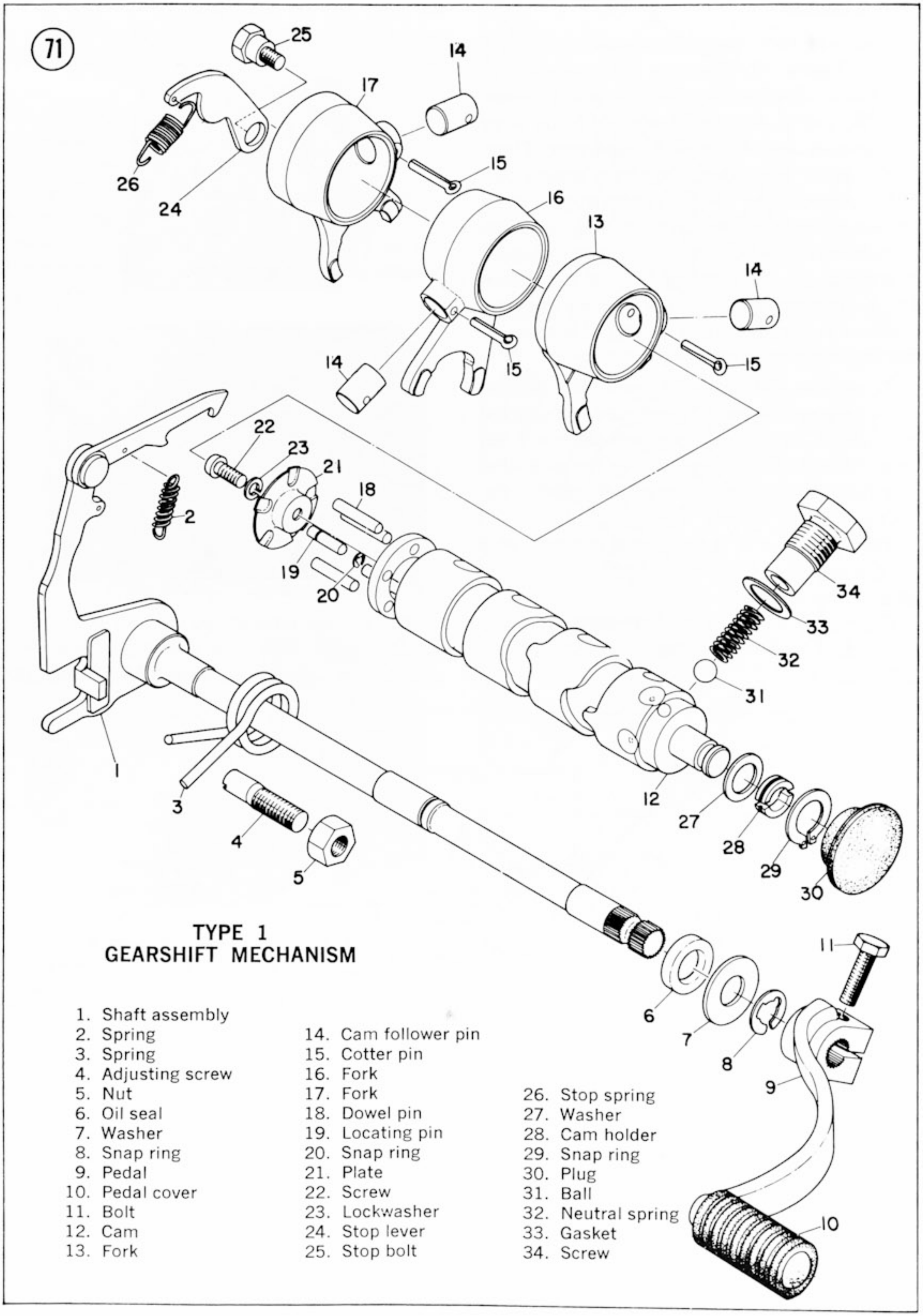
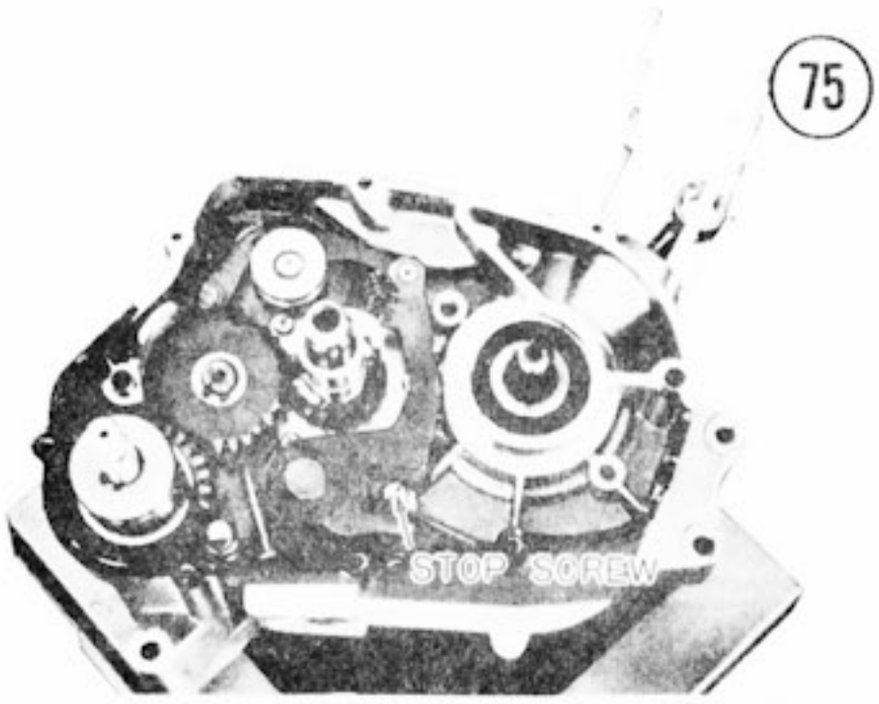
TYPE 1 GEARSHIFT MECHANISM

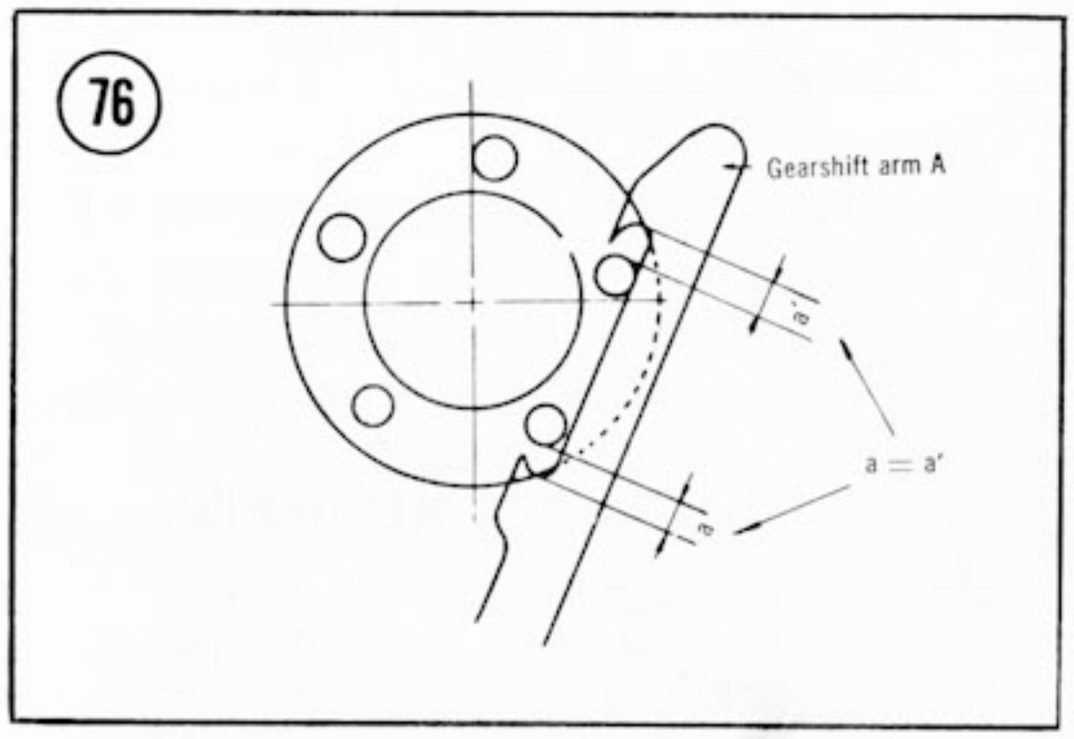


TYPE 1
GEARSHIFT MECHANISM

1. Shaft assembly
2. Spring
3. Spring
4. Adjusting screw
5. Nut
6. Oil seal
7. Washer
8. Snap ring
9. Pedal
10. Pedal cover
11. Bolt
12. Cam
13. Fork
14. Cam follower pin
15. Cotter pin
16. Fork
17. Fork
18. Dowel pin
19. Locating pin
20. Snap ring
21. Plate
22. Screw
23. Lockwasher
24. Stop lever
25. Stop bolt
26. Stop spring
27. Washer
28. Cam holder
29. Snap ring
30. Plug
31. Ball
32. Neutral spring
33. Gasket
34. Screw

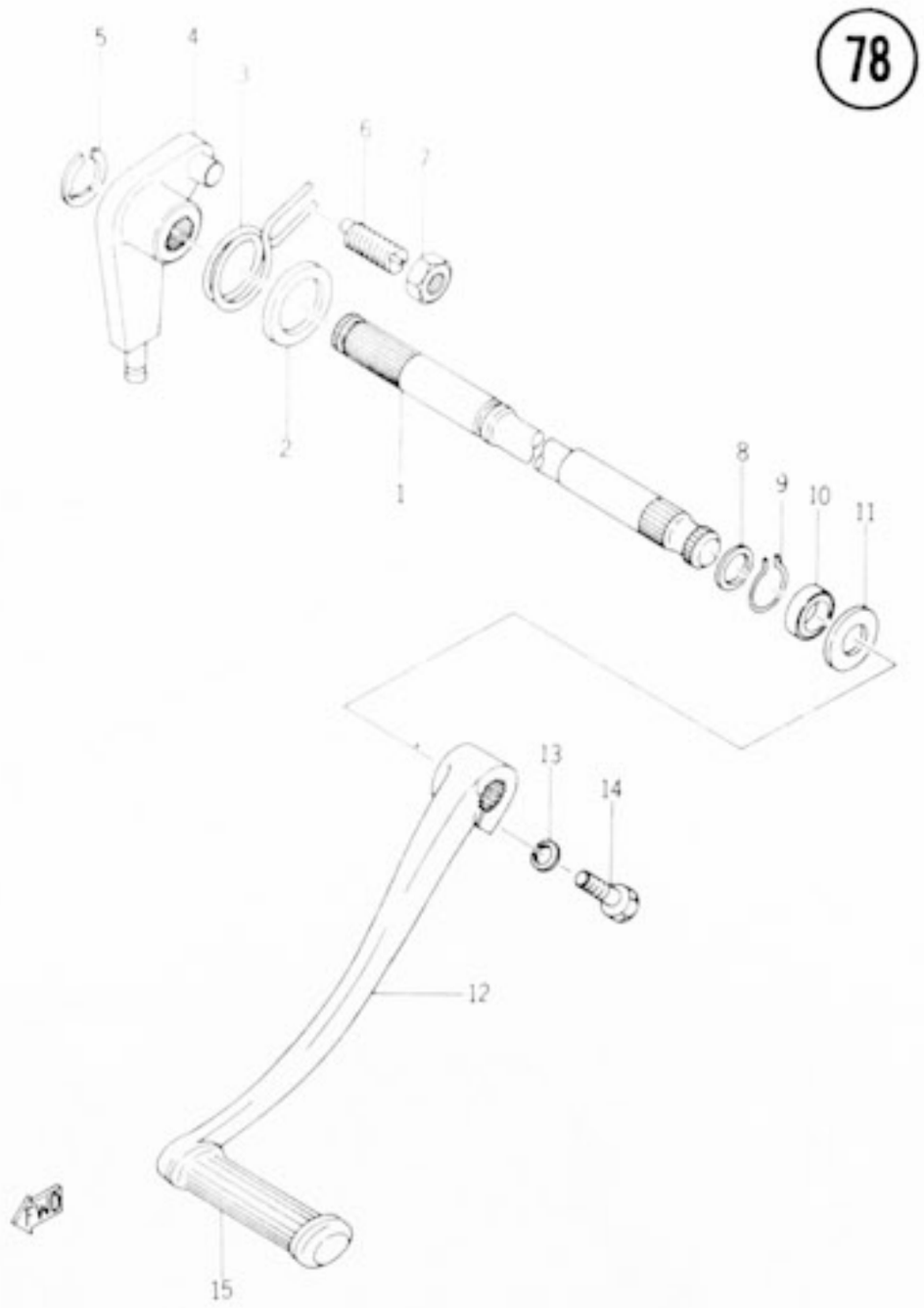


point of adjustment (the gearshift return spring stop screw). Loosen the lock nut, then look at the hooks on the end of gearshift arm "A" and their distance to the pins (**Figure 76**). This screw is eccentrically shaped. Turning this screw will move the shift linkage. Adjust the screw until the distance from each hook to pin is equal (Figure 76). This procedure must be done in either second, third, or fourth gear. Release all pressure on the shift lever before checking for equal gaps.



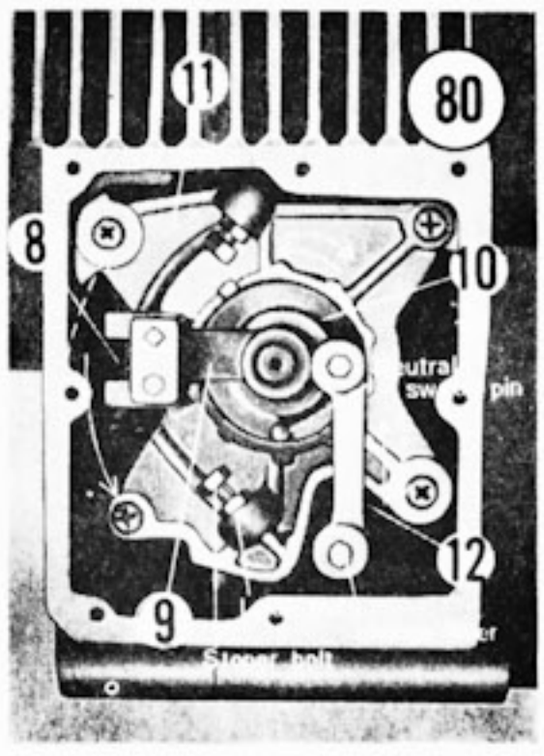
Type 2 Shifter

Figures 77 (next page) **and 78** are exploded views of the internal and external parts, respectively, of the Type 2 shifter. This shifter employs a cam plate (**Figure 79**, page 67) to select gear ratios within the transmission. Refer to **Figure 80** during the following discussion. Gearshift pedal motion is transmitted through the shaft to the change lever, and then to the change link (9) and the pawl holder (12). The shifter pawl (8) rotates the shifter working plate (10). The shifter working plate is splined to the gearshift cam, which rotates with the shifter working plate.



TYPE 2
GEARSHIFT MECHANISM

1. Shaft
2. Washer
3. Spring
4. Change lever
5. Snap ring
6. Adjusting screw
7. Nut
8. Washer
9. Clip
10. Oil seal
11. Shaft seal
12. Pedal
13. Lockwasher
14. Bolt
15. Pedal cover



The shifter forks move in slots in the gearshift cam. The shifter forks, in turn, position the gears in the transmission. There are five gear positions and one neutral position.

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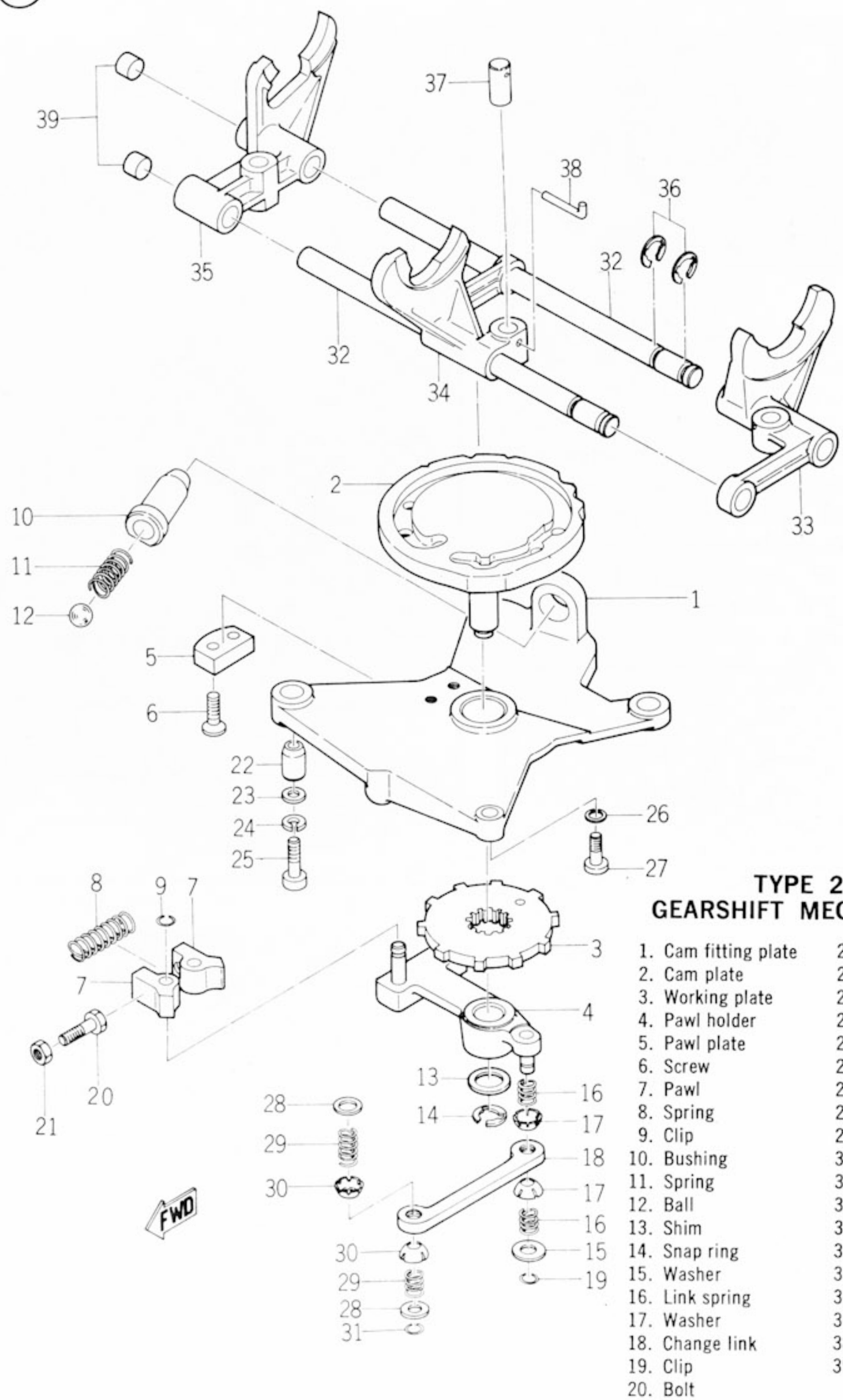
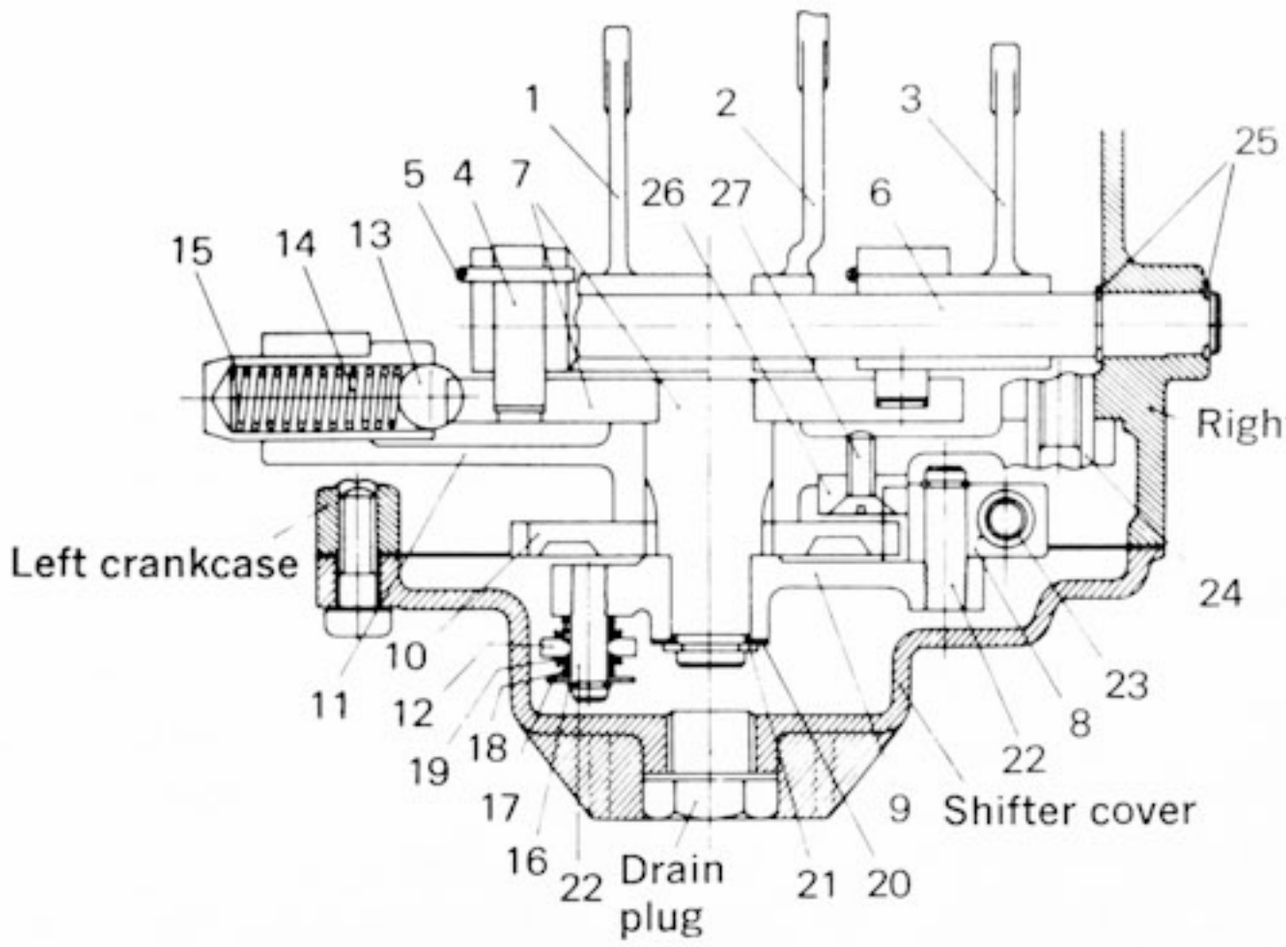


TYPE 2 GEARSHIFT MECHANISM

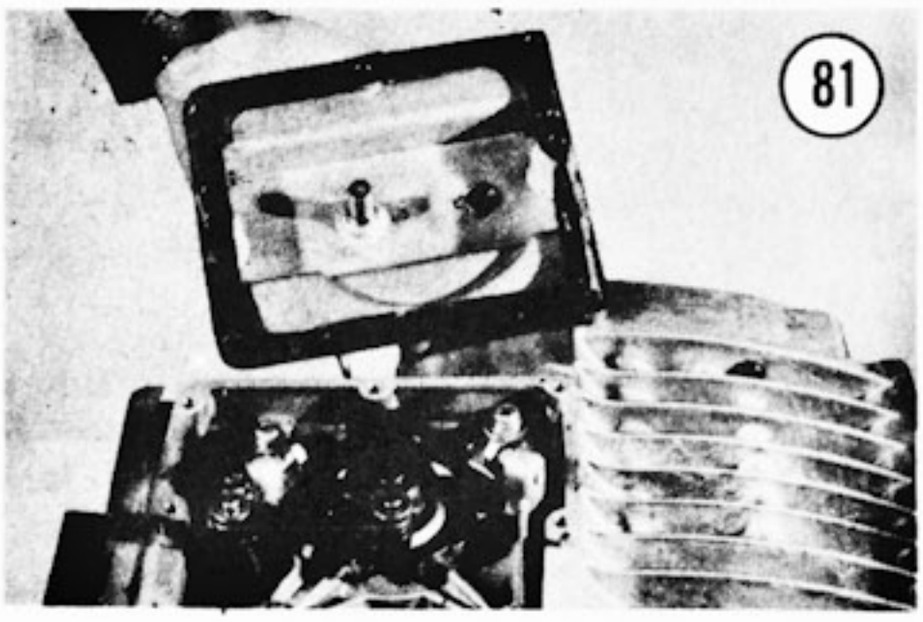
1. Cam fitting plate
2. Cam plate
3. Working plate
4. Pawl holder
5. Pawl plate
6. Screw
7. Pawl
8. Spring
9. Clip
10. Bushing
11. Spring
12. Ball
13. Shim
14. Snap ring
15. Washer
16. Link spring
17. Washer
18. Change link
19. Clip
20. Bolt
21. Nut
22. Dowel pin
23. Flat washer
24. Lockwasher
25. Screw
26. Lockwasher
27. Screw
28. Flat washer
29. Link spring
30. Link washer
31. Clip
32. Shaft
33. Fork
34. Fork
35. Fork
36. Snap ring
37. Rotor
38. Pin
39. Plug

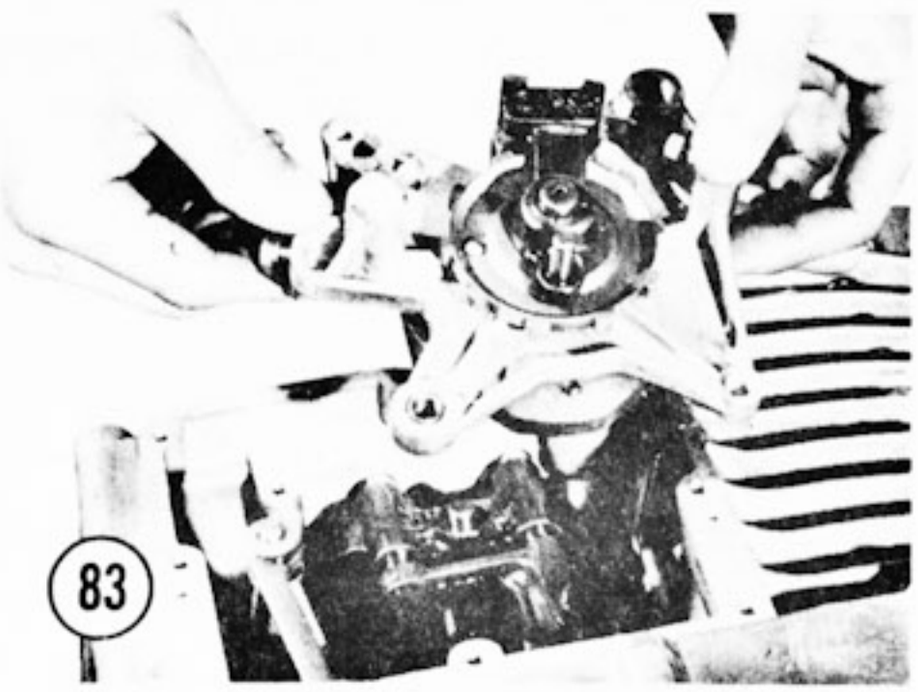


TYPE 2 GEARSHIFT MECHANISM

1. Second gear wheel shift fork
2. Third and fifth pinion shift fork
3. Fourth gear wheel shift fork
4. Shifter rotor
5. Rotor stopper pin
6. Shifter shaft
7. Gearshift cam
8. Shifter pole
9. Shifter pole holder
10. Shifter working plate
11. Shift cam setting plate
12. Change link
13. Cam stopper ball
14. Cam stopper spring
15. Cam stopper bushing
16. Shifter pole shaft clip
17. Change link plane washer
18. Change link spring
19. Change link ball washer
20. Shift cam shim
21. Shift cam clip
22. Shifter pole shaft
23. Shifter pole spring
24. Shift cam setting plate pipe knock
25. Shifter shaft clip
26. Shifter pole free plate
27. Free plate set screw

To remove the shifter, first remove the shifter cover (**Figure 81**), then disconnect the lever and change link (**Figure 82**). Cover the crankcase with a clean rag to prevent any foreign material from dropping into the crankcase. Then pull out the shifter cam (**Figure 83**).

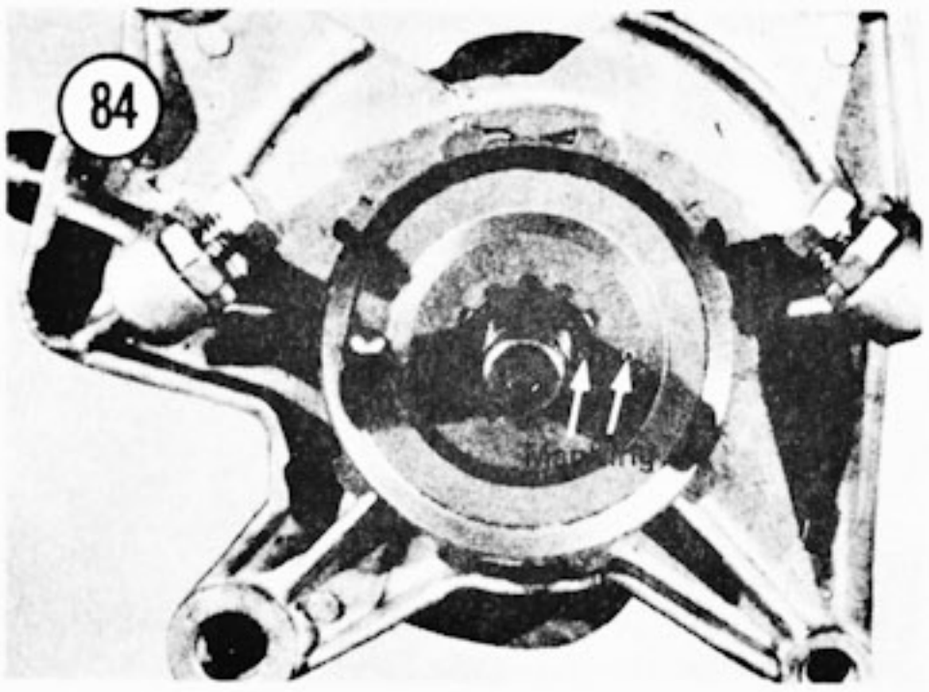




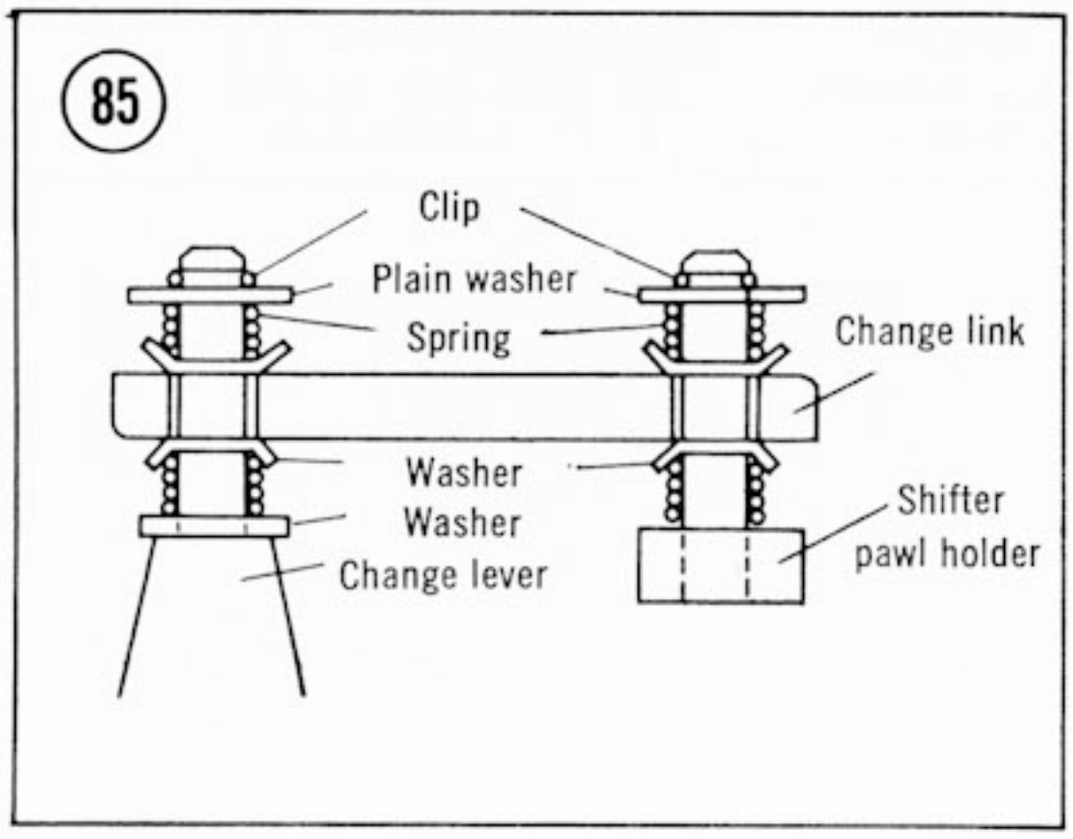
Remove the shifter shafts and forks by removing the shifter shaft snap rings on the outside of the transmission case. Then pass the shafts inward and remove the inner snap rings.

Check all parts for wear or damage. The shift forks are susceptible to wear, so check them very carefully. Replace any worn or damaged parts.

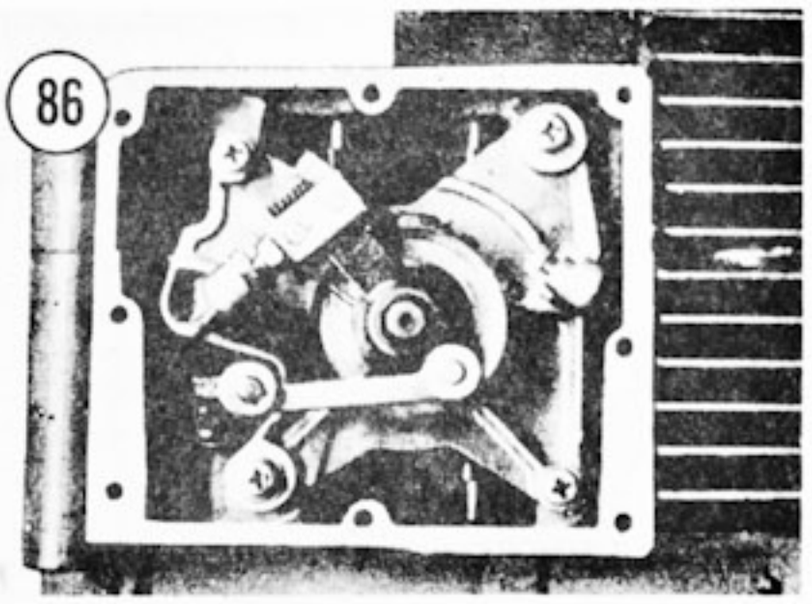
To install the shifter, reverse the disassembly procedure. Be sure that the transmission is in neutral. Align the markings (**Figure 84**) on the shift cam and shifter working plate.



To ensure proper assembly of the change linkage and related parts, review **Figure 85**.



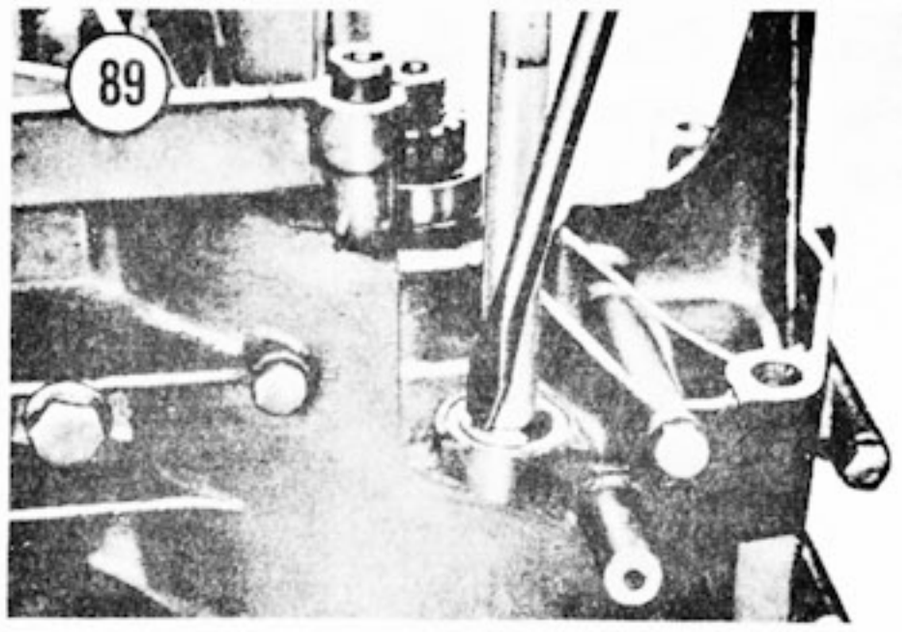
Shift the transmission through all gears in both directions and observe the stroke of the shifter pawl arm. With the stopper ball engaged in the detent, adjust the shifter so that the gap between the working plate pawl and the shifter stop is approximately 0.04 inch (1mm) as shown in **Figure 86**.

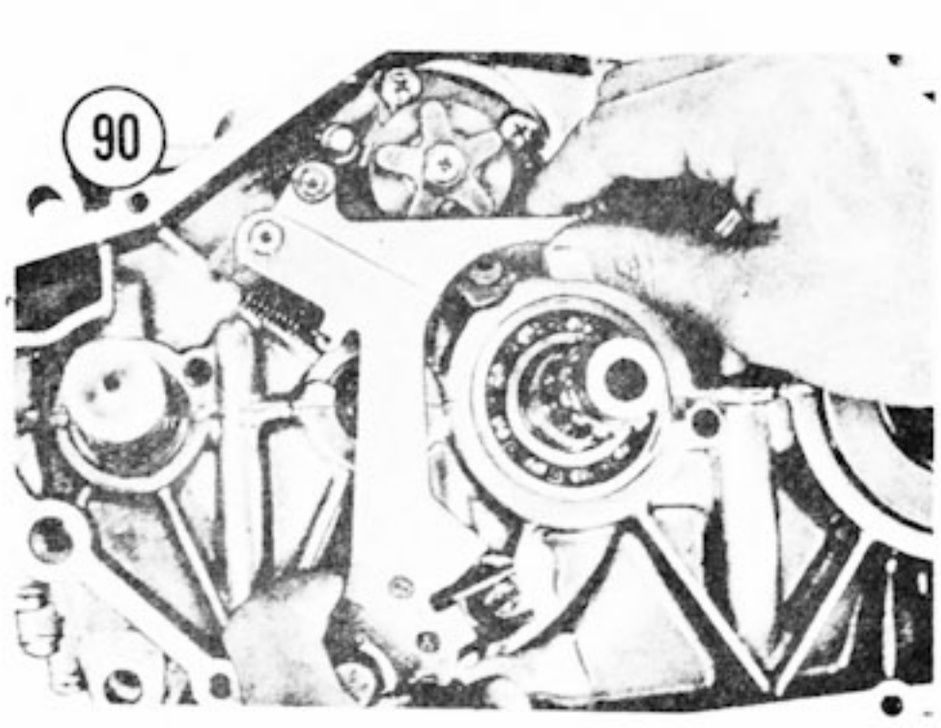


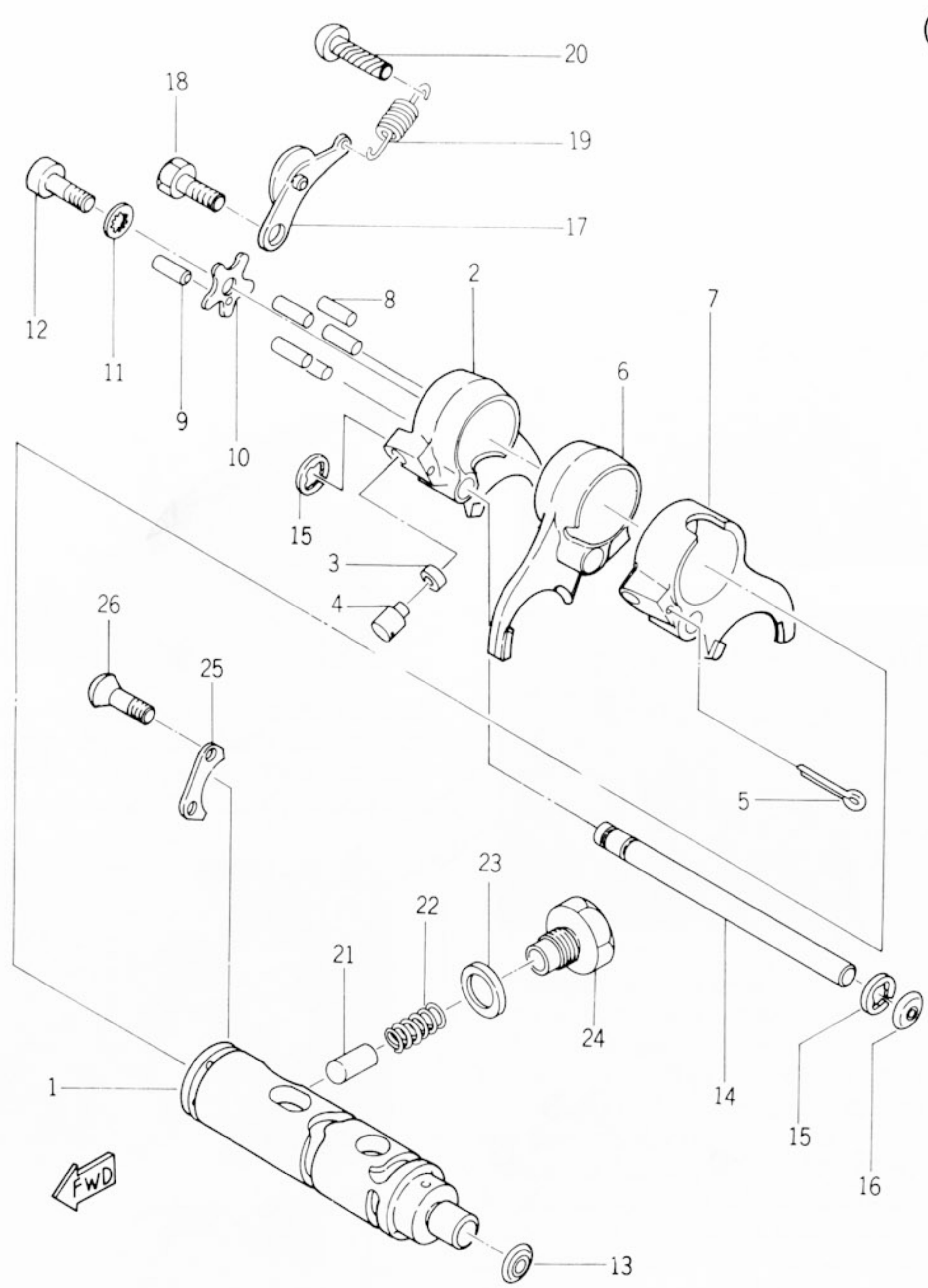
Type 3 Shifter

Figures 87 (next page) **and 88** (page 70) are exploded views of the internal and external parts, respectively, of the Type 3 shifter. This shifter employs a drum cam to move the shifter forks. The shifter cannot be completely disassembled until after the crankcase is split and the transmission removed. Refer to the applicable instructions later in this chapter for splitting the crankcase and removing the transmission.

Begin disassembly by removing the sealing boot from the gearshift shaft, then the snap ring and the adjustment shims (**Figure 89**). Hold the gearshift arm down, remove the arm from the pin on the shift drum (**Figure 90**), and pull the shaft out from the left side of the crankcase. Remove the gearshift drum stop lever (**Figure 91**) and the shift drum setting plate (**Figure 92**). Further disassembly of the shifter requires transmission removal.

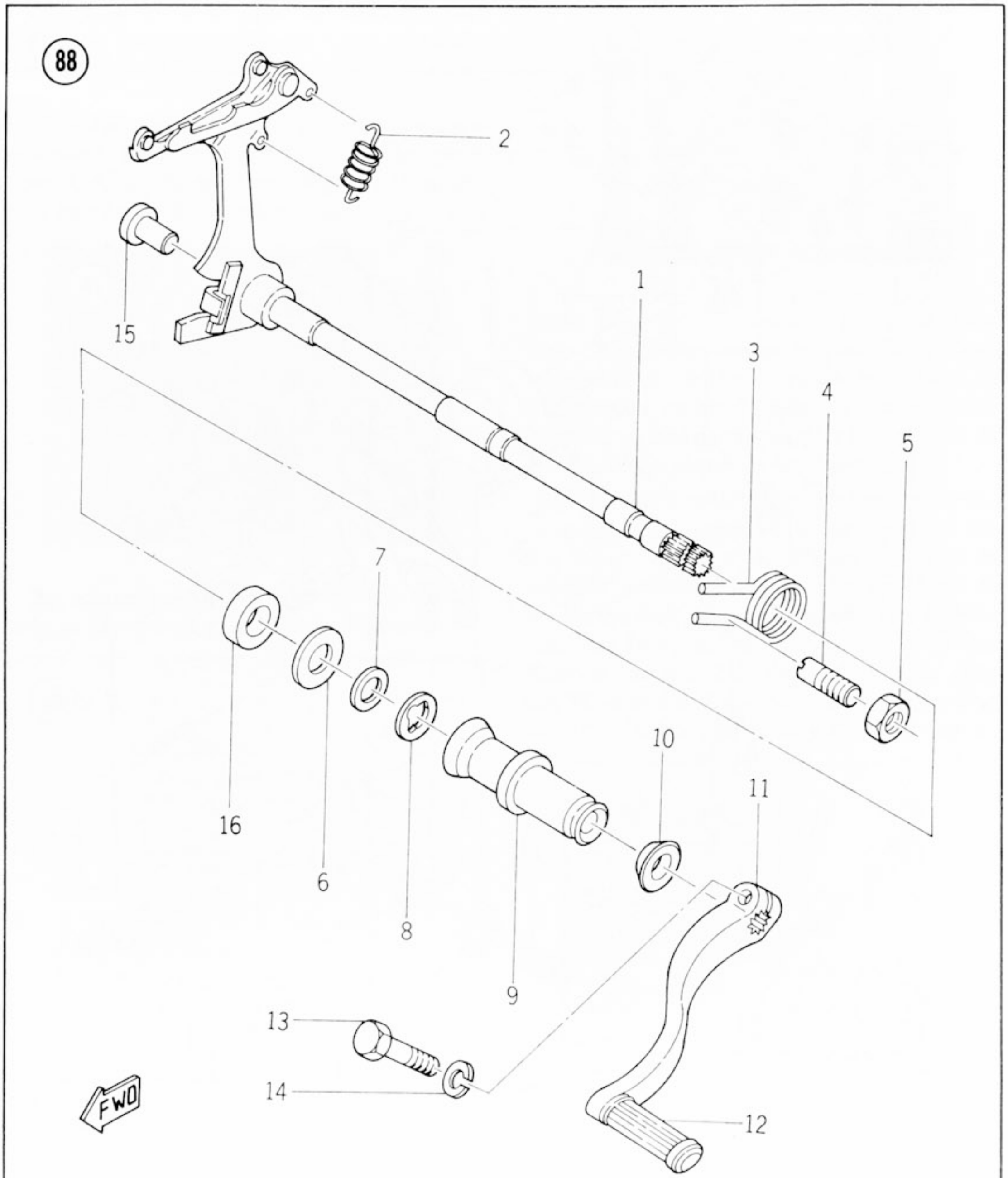






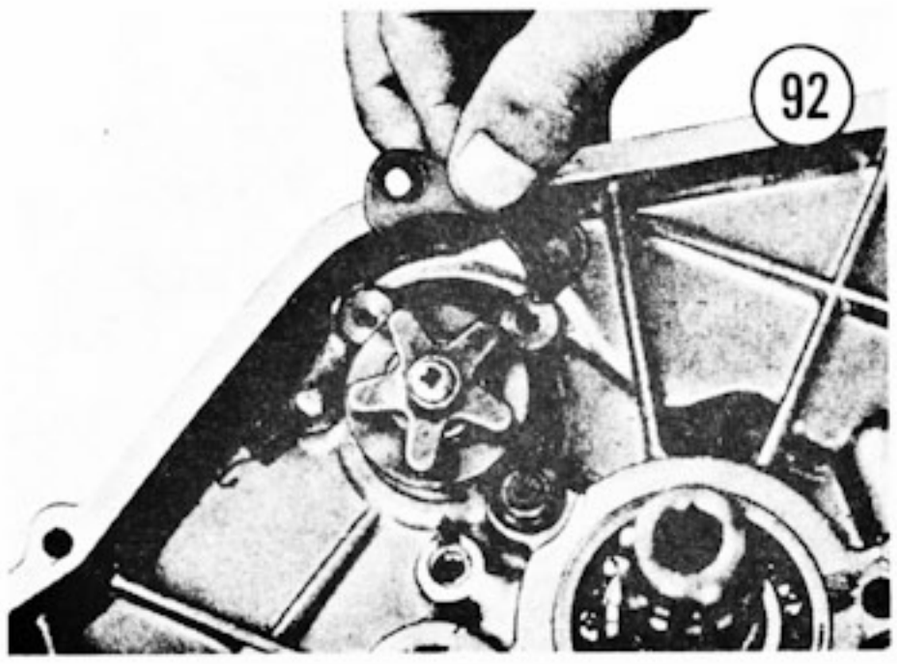
TYPE 3 GEARSHIFT MECHANISM

1. Cam
2. Fork
3. Roller
4. Pin
5. Cotter pin
6. Fork
7. Fork
8. Dowel pin
9. Dowel pin
10. Plate
11. Lockwasher
12. Screw
13. Plug
14. Guide bar
15. Snap ring
16. Plug
17. Stop lever
18. Bolt
19. Spring
20. Spring hanger
21. Cam stopper
22. Neutral spring
23. Gasket
24. Bolt
25. Plate
26. Screw

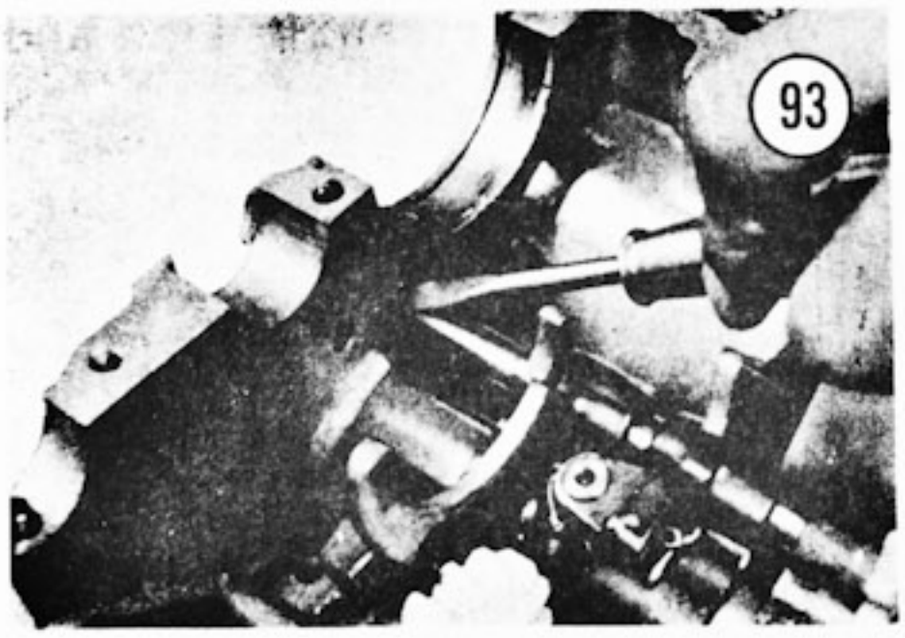


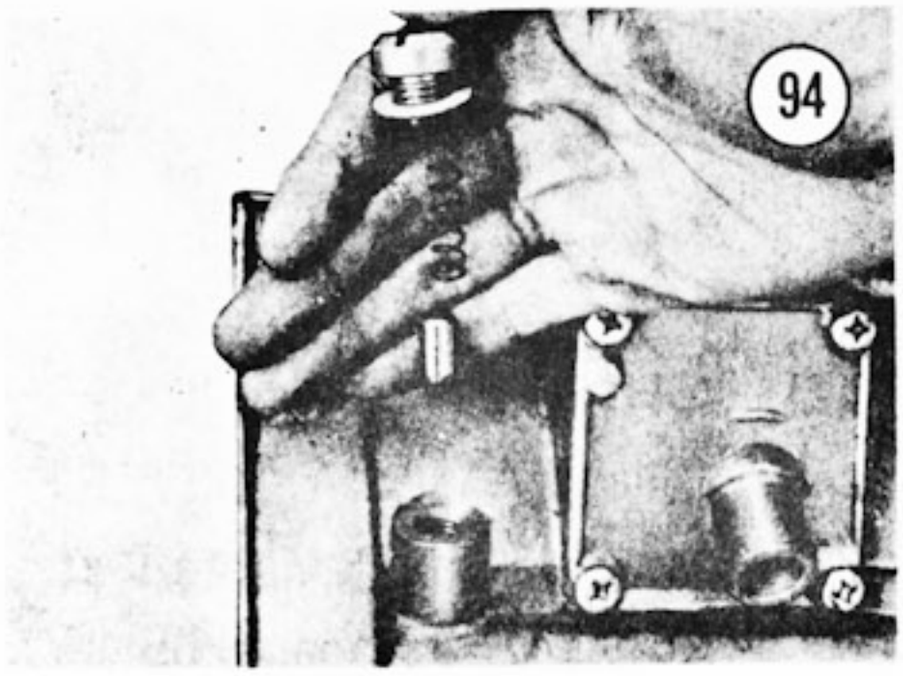
TYPE 3 GEARSHIFT MECHANISM

1. Shaft
2. Spring
3. Return spring
4. Adjusting screw
5. Nut
6. Washer
7. Washer
8. Snap ring
9. Boot
10. Seal
11. Pedal
12. Cover
13. Bolt
14. Lockwasher
15. Plug
16. Oil seal

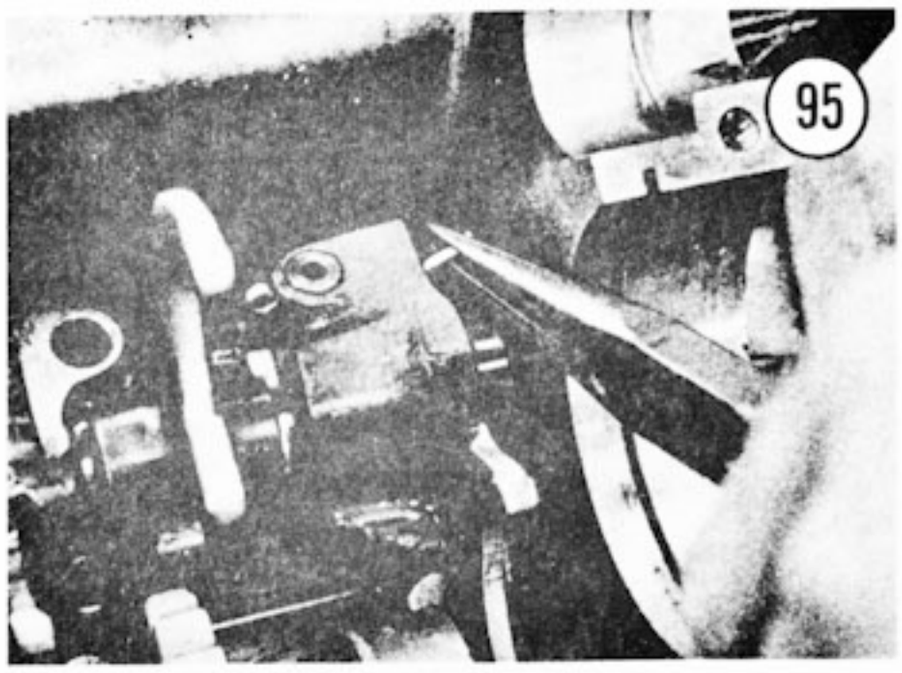


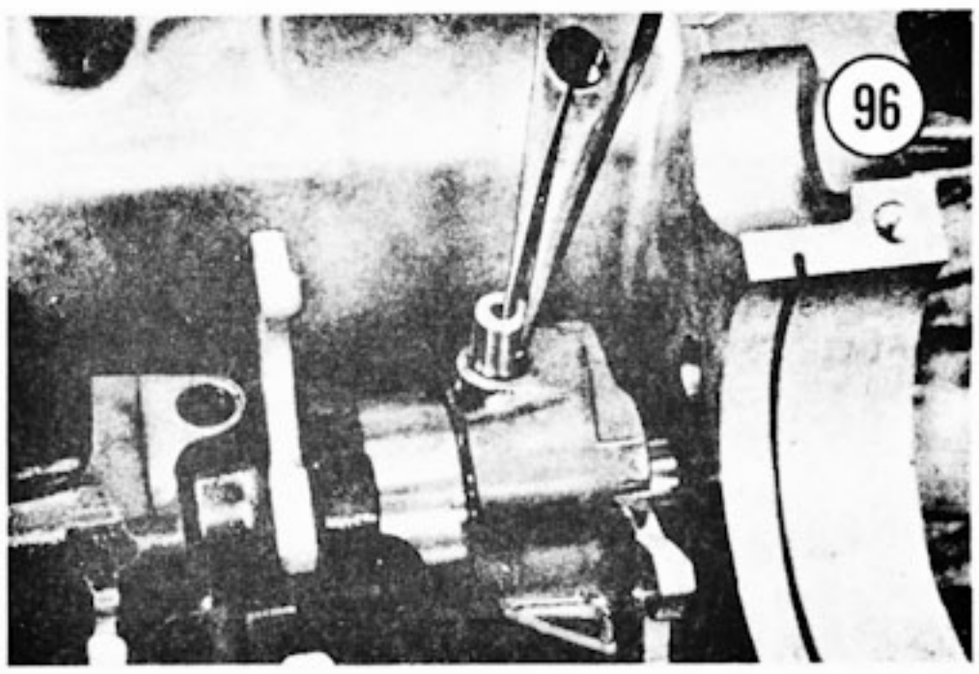
Remove the two snap rings from the shift fork guide bar (**Figure 93**). One is located inside the case; the other is outside. Then withdraw the shift fork guide bar. Remove the neutral stop (**Figure 94**).





Pull the shift drum out slightly. Remove the cotter pin from the fourth gear shift fork cam follower (**Figure 95**). This cotter pin is the one located closest to the generator. Then remove the cam follower roller (**Figure 96**). Remove the center cotter pin and roller, then the cotter pin and roller from the end toward the clutch. Finally, lift out the shift drum.





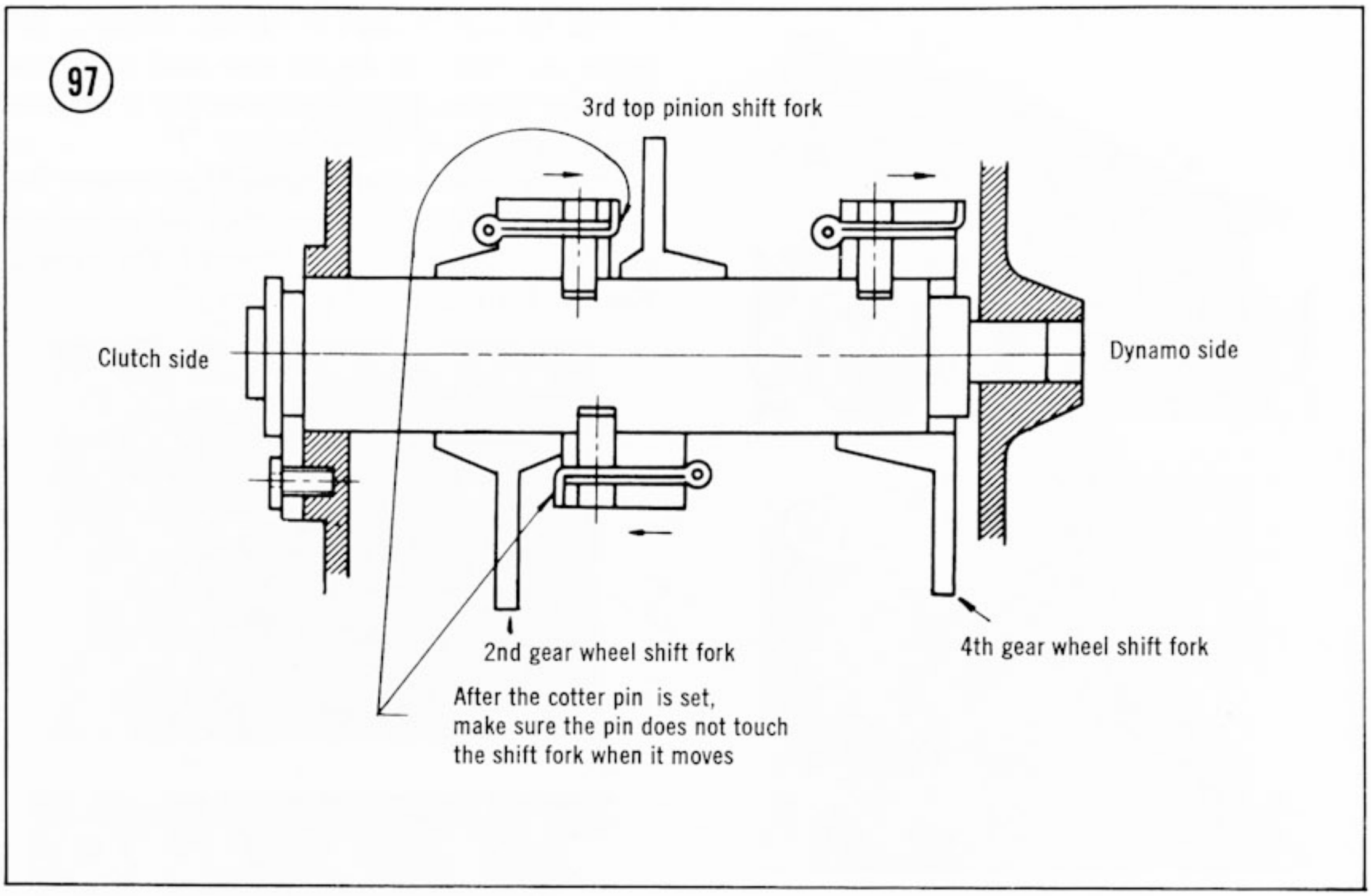
Examine the parts carefully. Any part which shows wear or damage should be replaced.

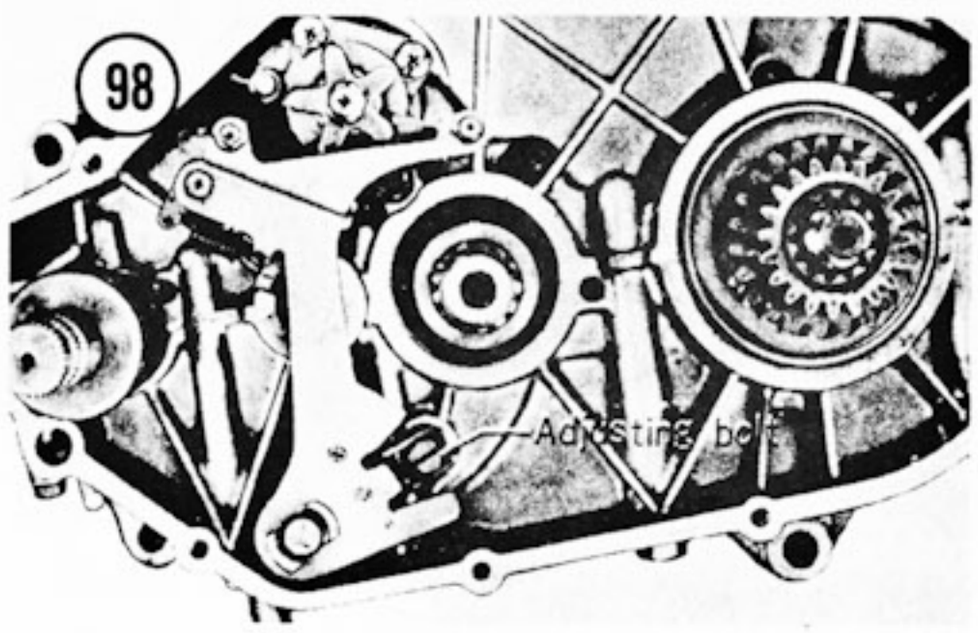
Reverse the disassembly procedure to assemble the shifter. Refer to **Figure 97** as you assemble the unit. Be very careful that the cotter pins do not touch the shift forks.

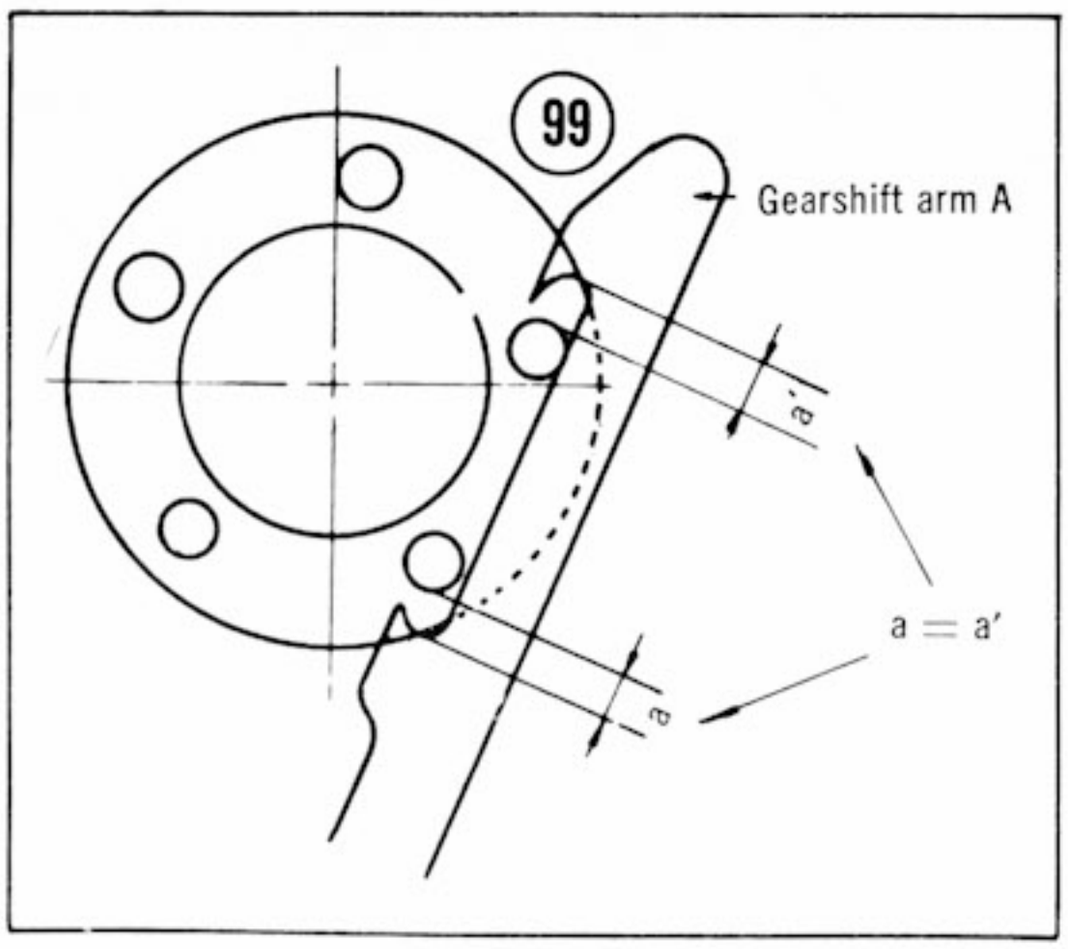
Refer to **Figures 98 and 99** as you adjust the shifter. Turn the adjustment bolt so that the clearance between the shift drum pins and the gearshift arm is equal at both places. Do this while in third gear, with no pressure on the shifter.

Type 4 Shifter

Figures 100 (p. 73) **and 101** (p. 74) are exploded views of the internal and external parts, respectively, of the Type 4 shifter. In this shifter,

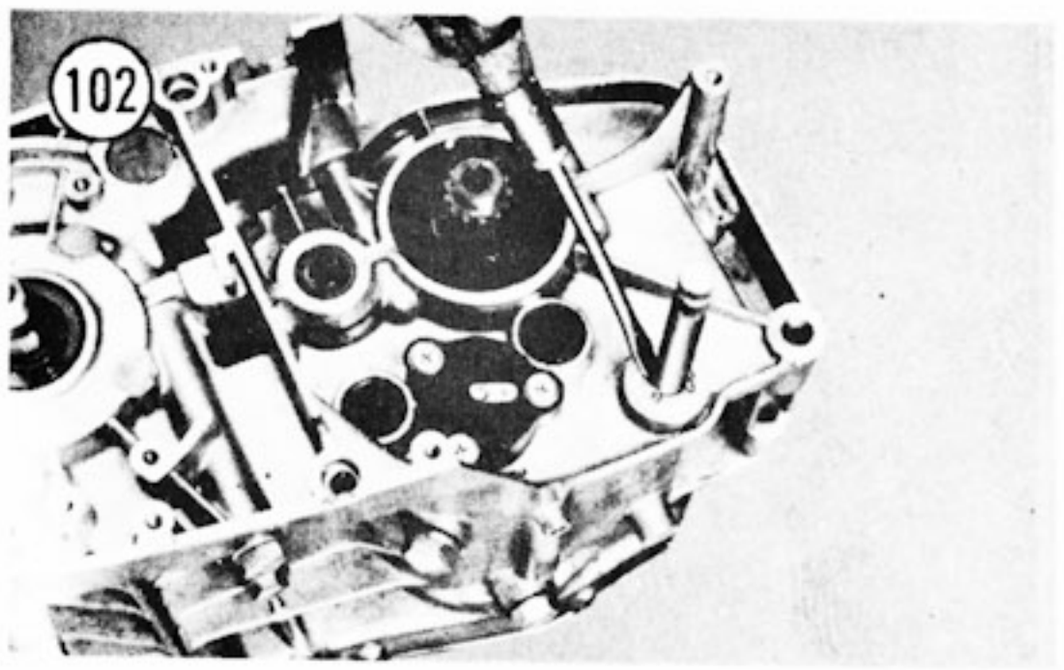




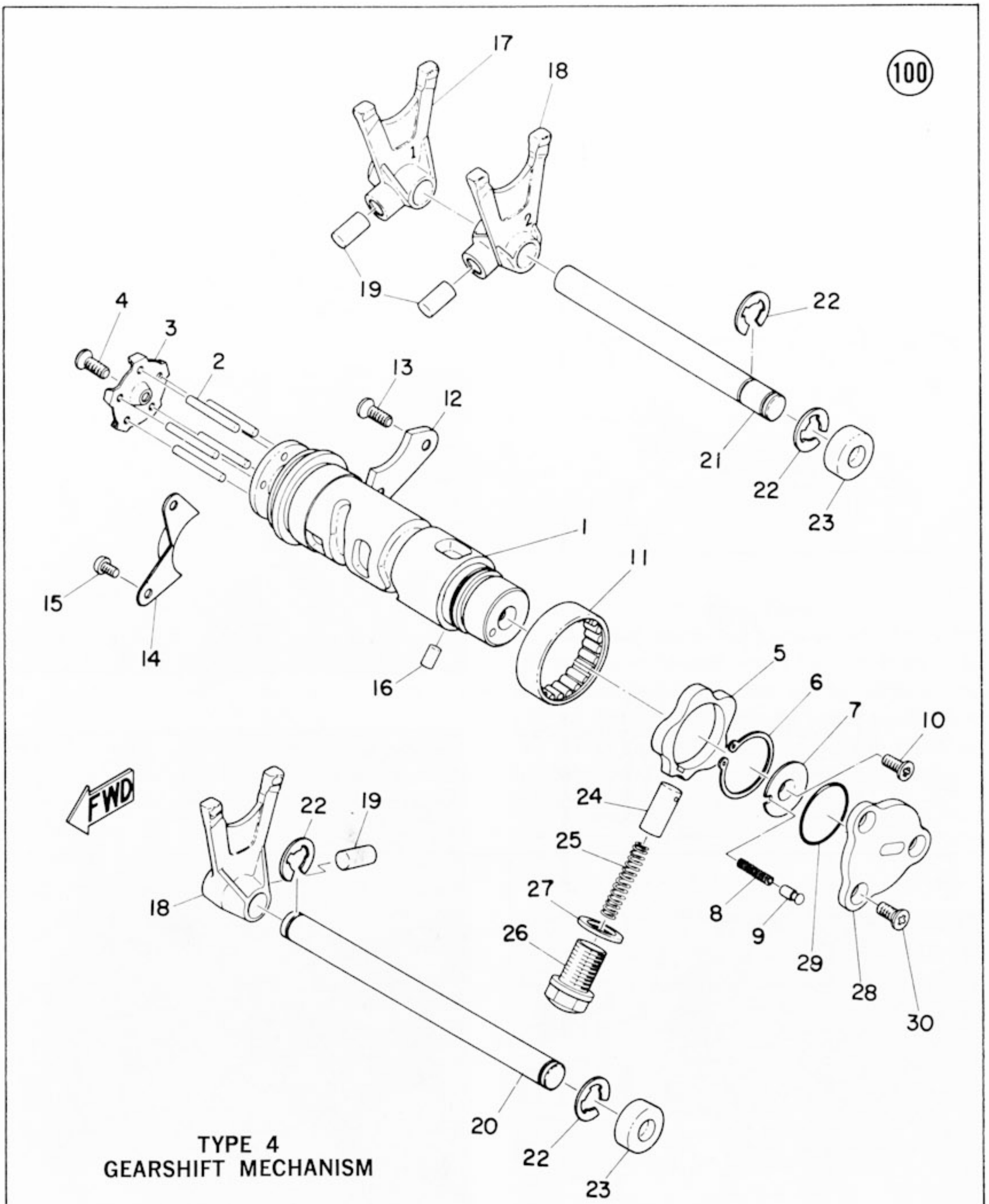


a drum cam is rotated by the action of the gearshift pedal. The shift forks, which position the transmission gears, are moved by grooves on the drum. Complete removal of this shifter requires disassembly of the crankcase and transmission.

Begin disassembly by removing the gearshift shaft snap ring and shim (**Figure 102**). Then pull out the shaft from the opposite side (**Figure 103**). Finally, remove the change lever snap ring (**Figure 104**) and the change lever.

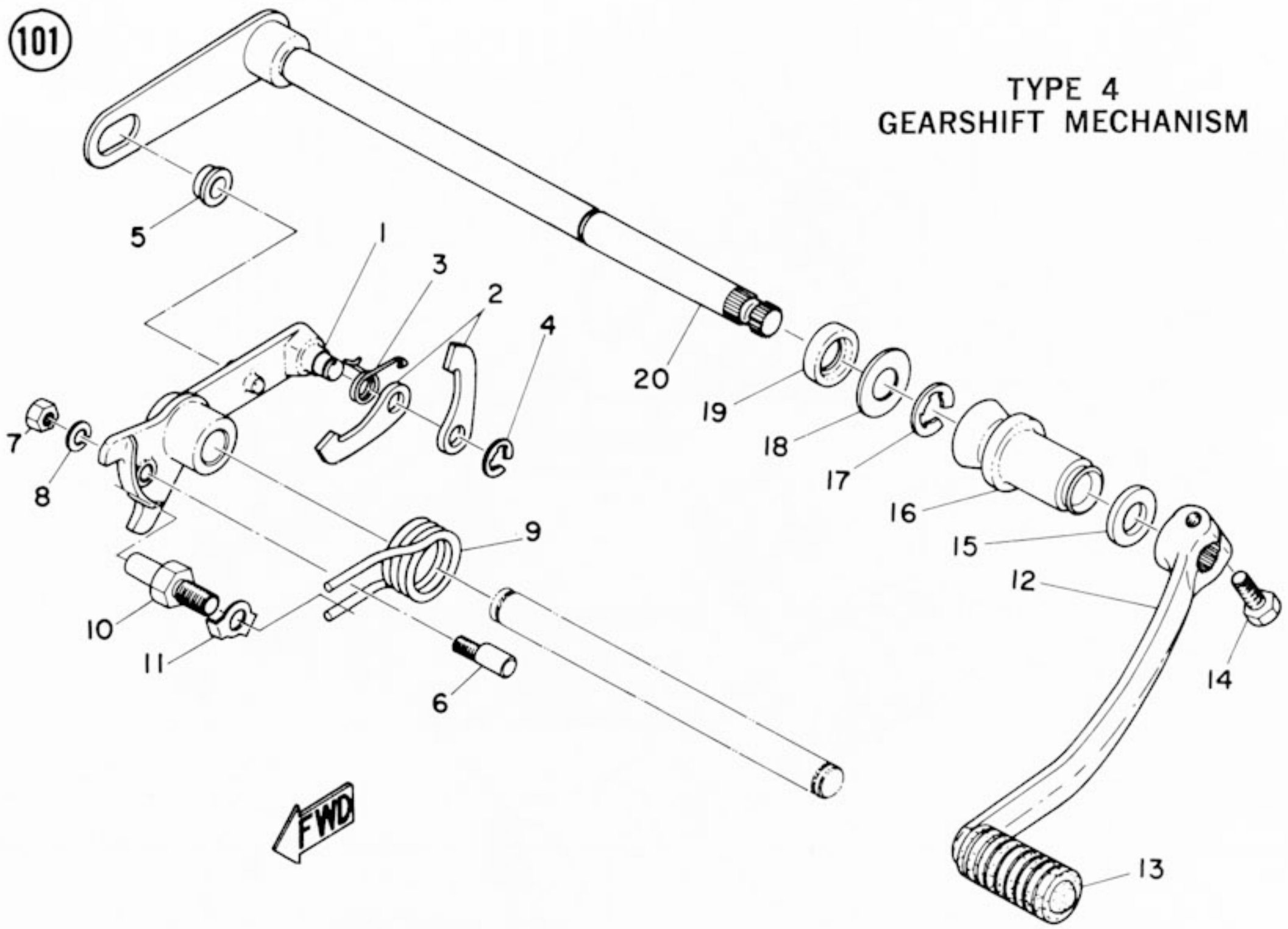


A roller fits on the change lever and slips into the only slot in the shift shaft plate. See (5), Figure 101. Remove this roller immediately to prevent its loss.

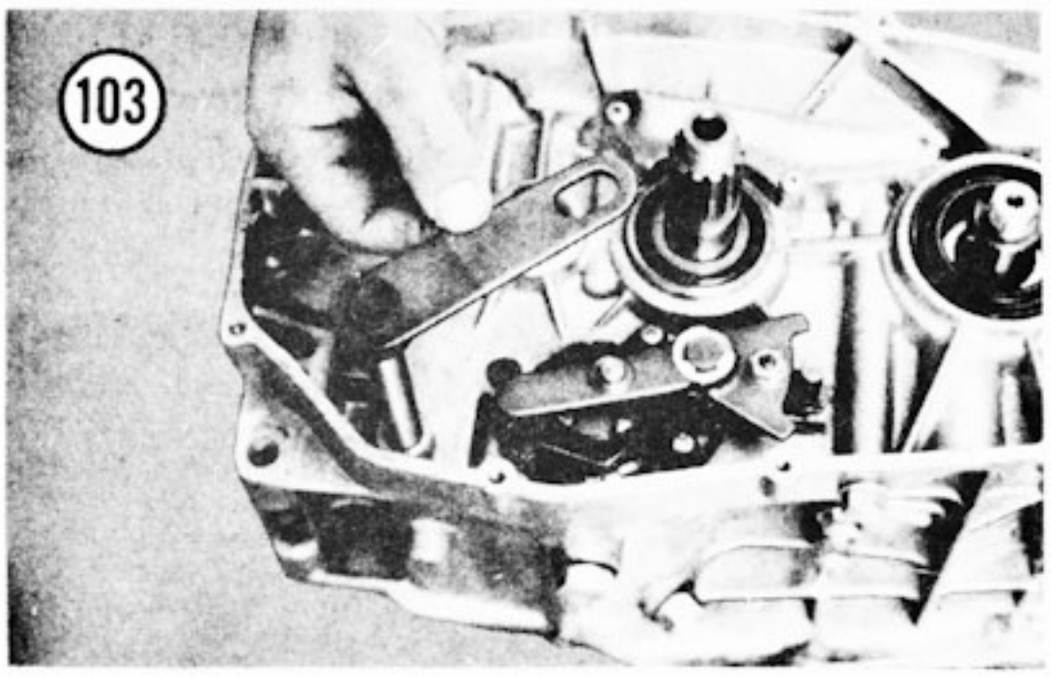


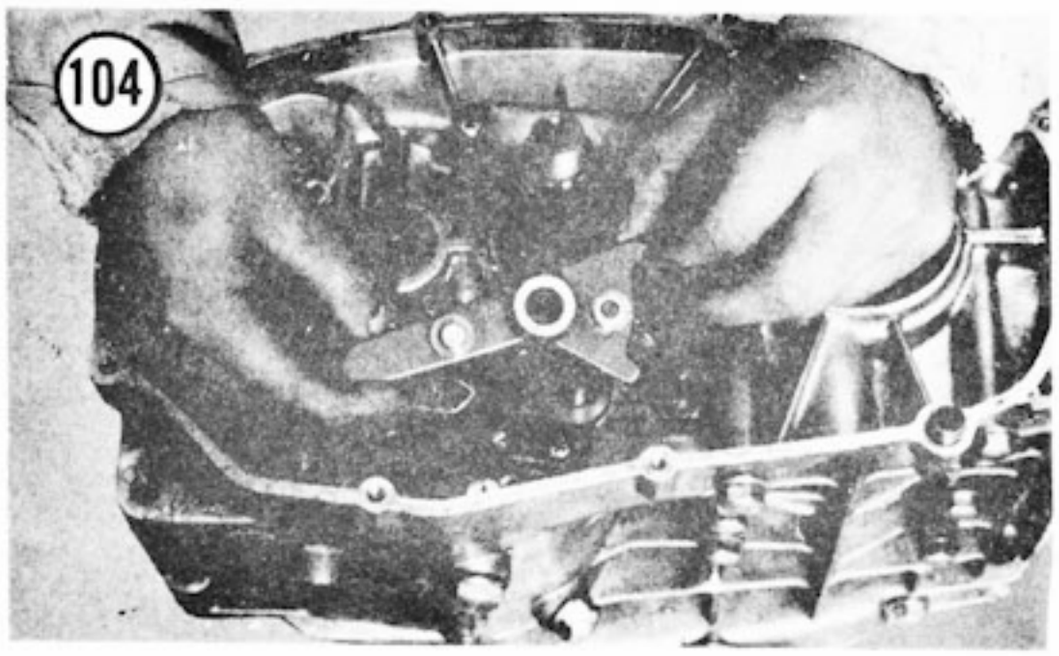
TYPE 4
GEARSHIFT MECHANISM

1. Cam
2. Dowel pin
3. Plate
4. Screw
5. Plate
6. Snap ring
7. Plate
8. Spring
9. Neutral pin
10. Screw
11. Bearing
12. Plate
13. Screw
14. Guide
15. Screw
16. Dowel pin
17. Fork
18. Fork
19. Follower pin
20. Guide bar
21. Guide bar
22. Snap ring
23. Plug
24. Stopper
25. Spring
26. Screw
27. Gasket
28. Switch
29. O-ring
30. Screw



1. Bracket
2. Lever
3. Spring
4. Snap ring
5. Roller
6. Adjusting screw
7. Nut
8. Lockwasher
9. Return spring
10. Stopper
11. Lockwasher
12. Pedal
13. Pedal cover
14. Bolt
15. Shaft seal
16. Boot
17. Snap ring
18. Washer
19. Oil seal
20. Shaft

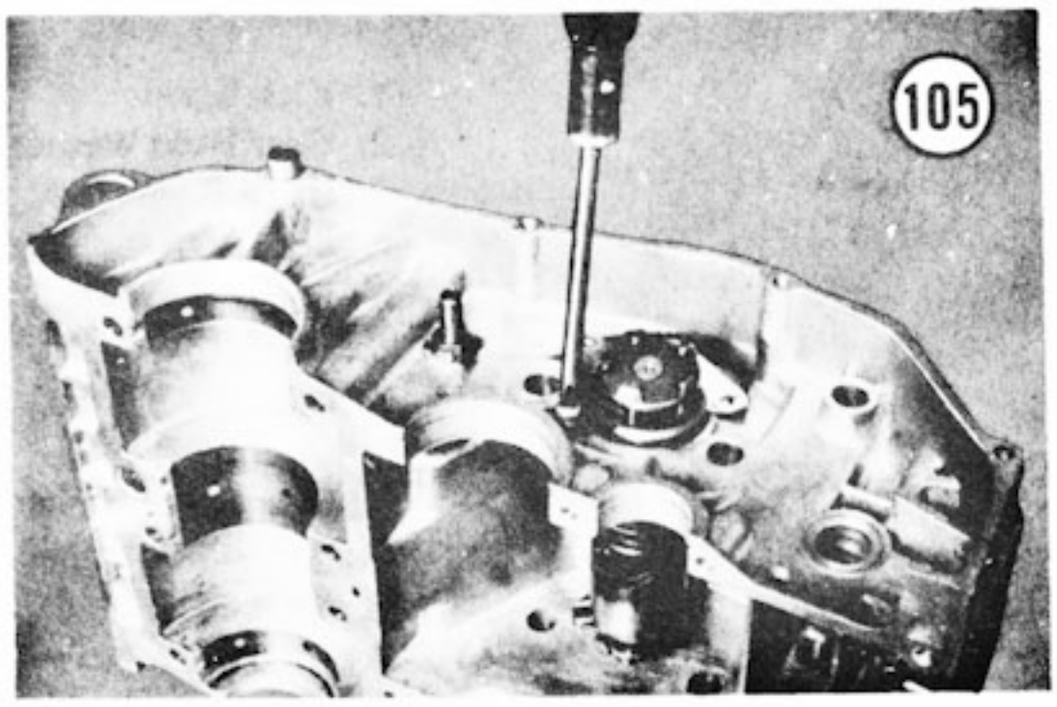


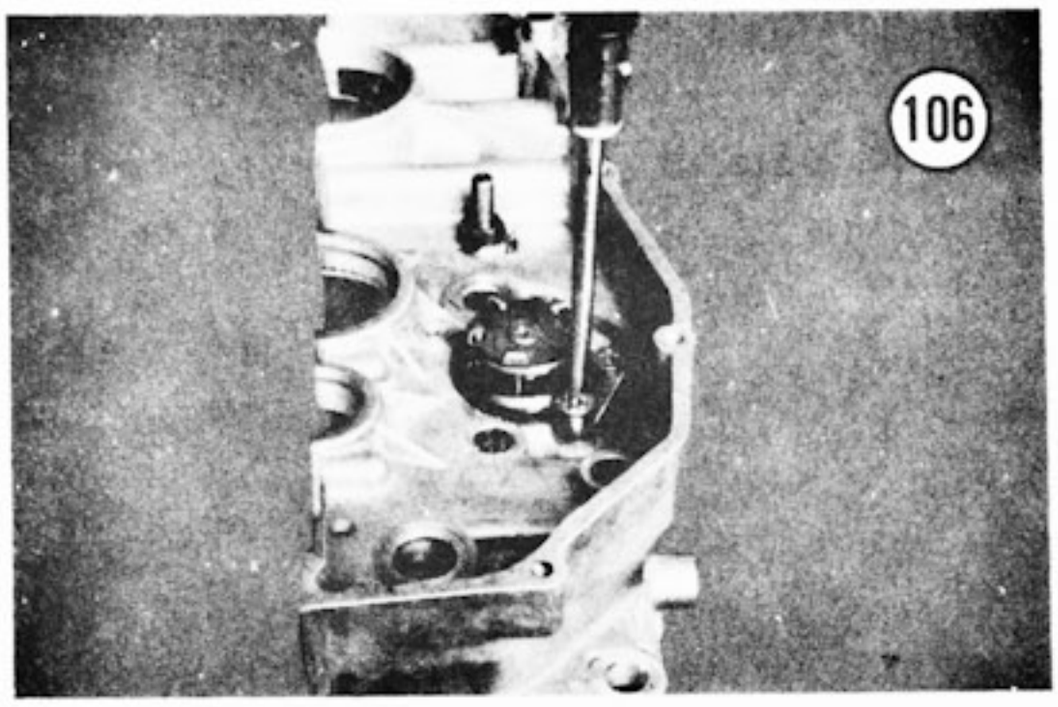


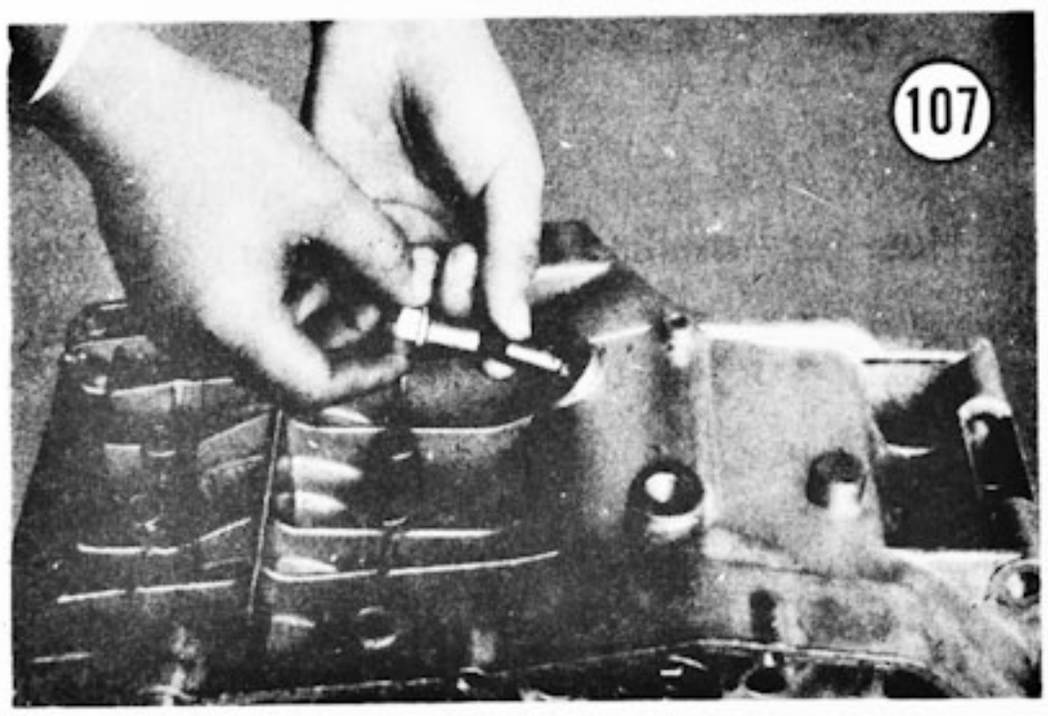
Further disassembly requires removal of the transmission. Refer to the applicable section later in this chapter.

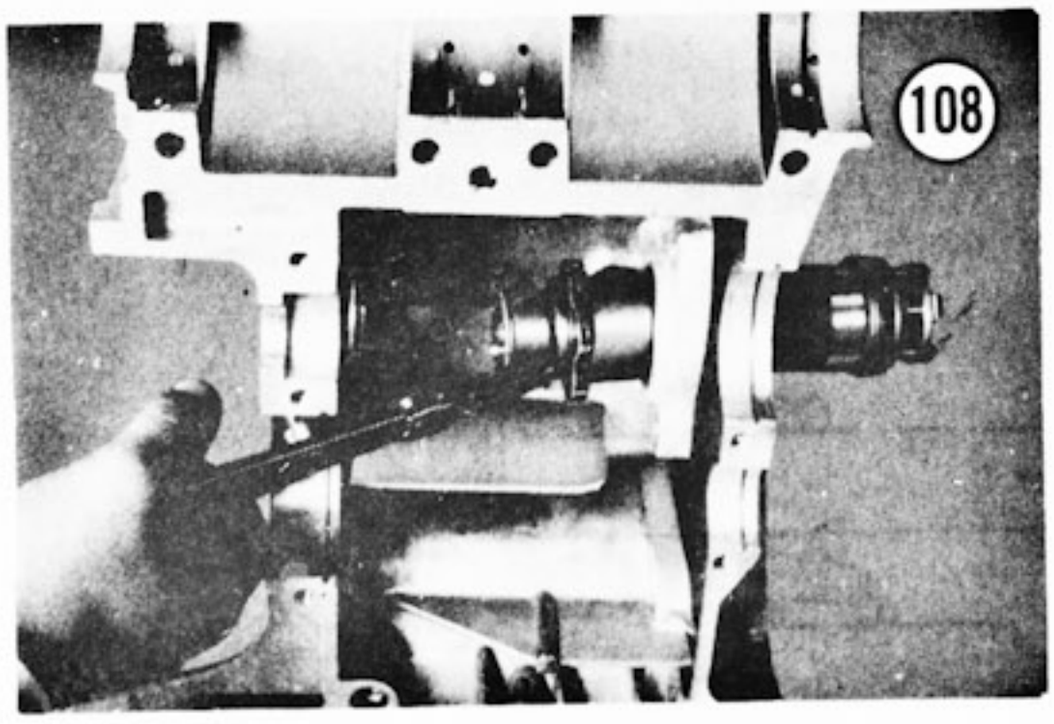
After the transmission is removed, remove the change lever guide (**Figure 105**). Then remove the stop plate (**Figure 106**). Pull out the guide bars and shift forks. Remove the cam stop (**Figure 107**). The shift cam can then be pulled out after the snap ring (**Figure 108**) is removed.

Examine all parts carefully. Worn or damaged parts can result in shifting difficulties, and

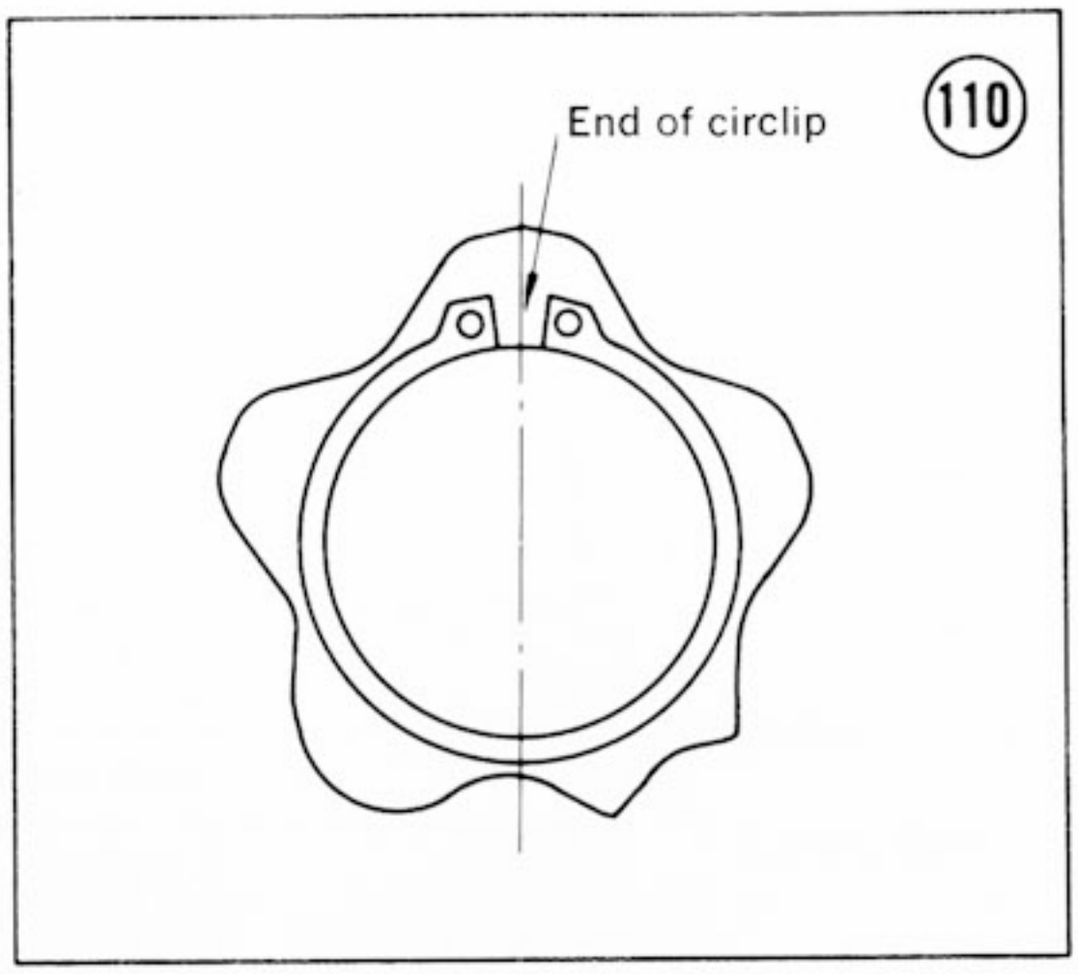




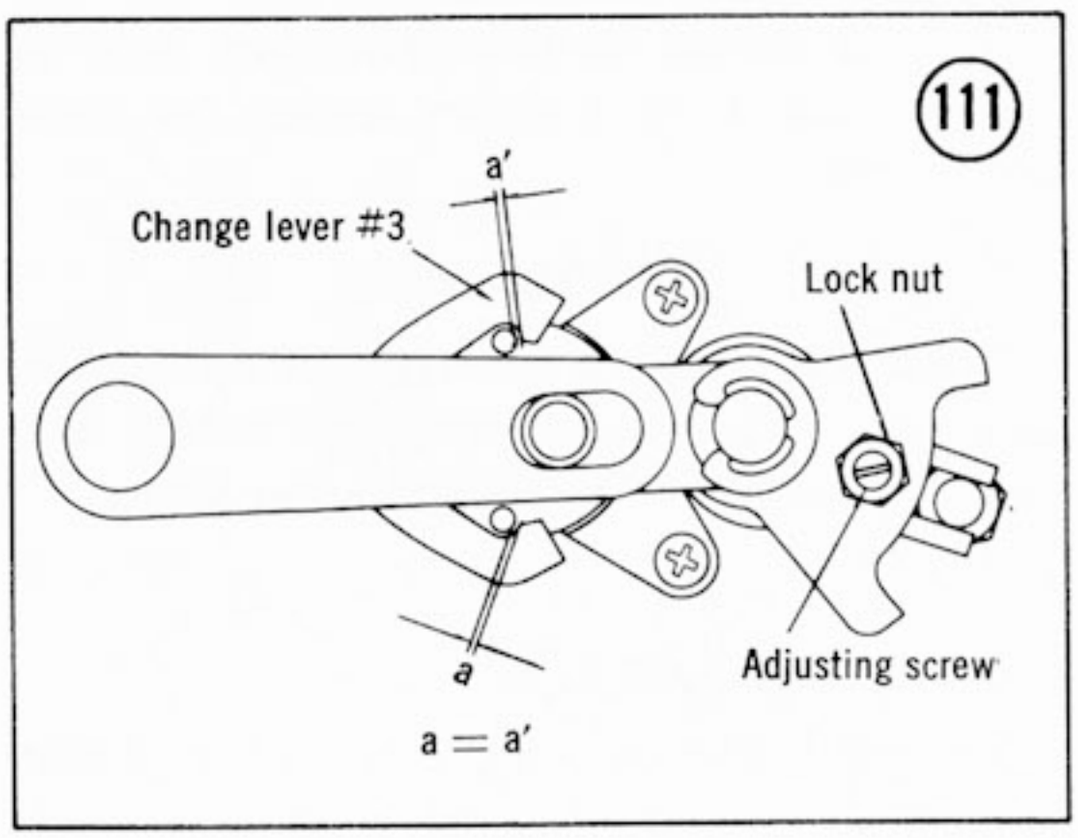




should be replaced. Reverse the disassembly procedure to assemble the shifter (**Figure 109**, next page). Note the position of the stop plate snap ring (**Figure 110**).

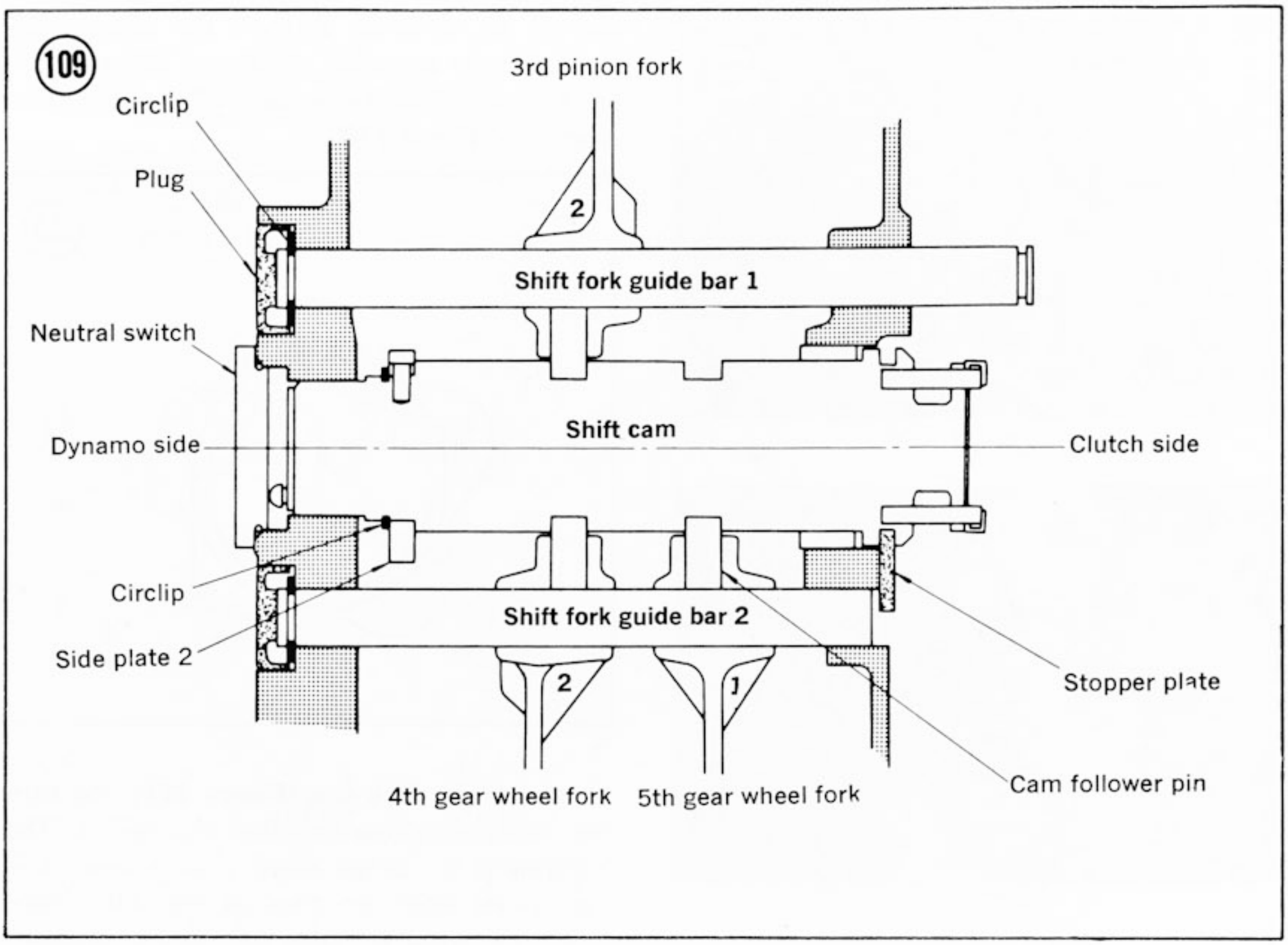


Loosen the lock nut (**Figure 111**) and turn the adjusting screw to adjust the shifter. The adjustment is correct when change lever 3 is equidistant from two pins on the shift drum; that is, distance (a) must be equal to distance (a′). Make this adjustment in second, third, or fourth gear. Tighten the lock nut and recheck the adjustment.



Type 5 Shifter

Figures 112 (page 77) **and 113** (page 78) show an exploded view and an assembled view of this system. It operates the six-speed transmission. Basic removal and installation pro-



cedures, plus shift linkage adjustment, are identical to the Type 4 shifter. The grooves cut into the shift cam are different, and there are four shift forks instead of three. Therefore, refer to the previous Type 4 shifter section for those procedures.

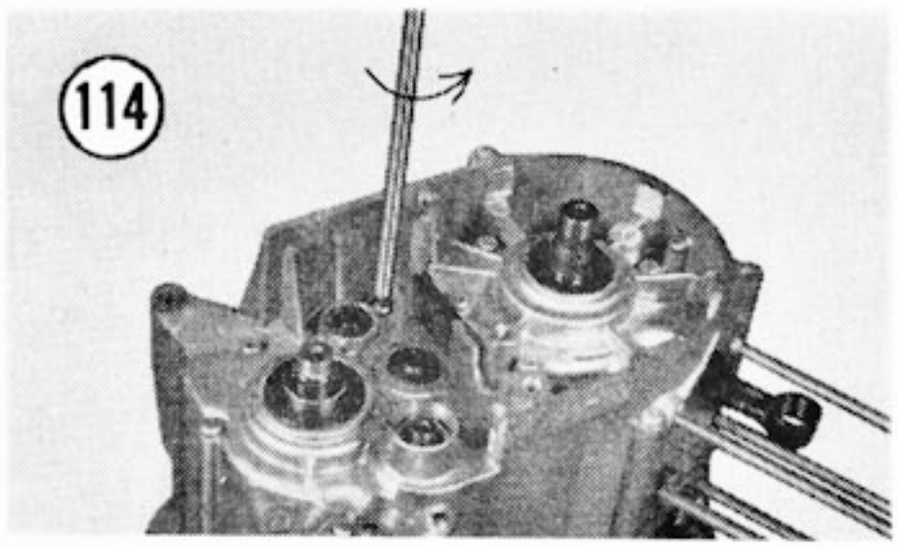
CRANKCASE

These machines use two types of crankcases. One type splits into left and right halves. The other type splits into upper and lower halves.

Left and Right Split Type

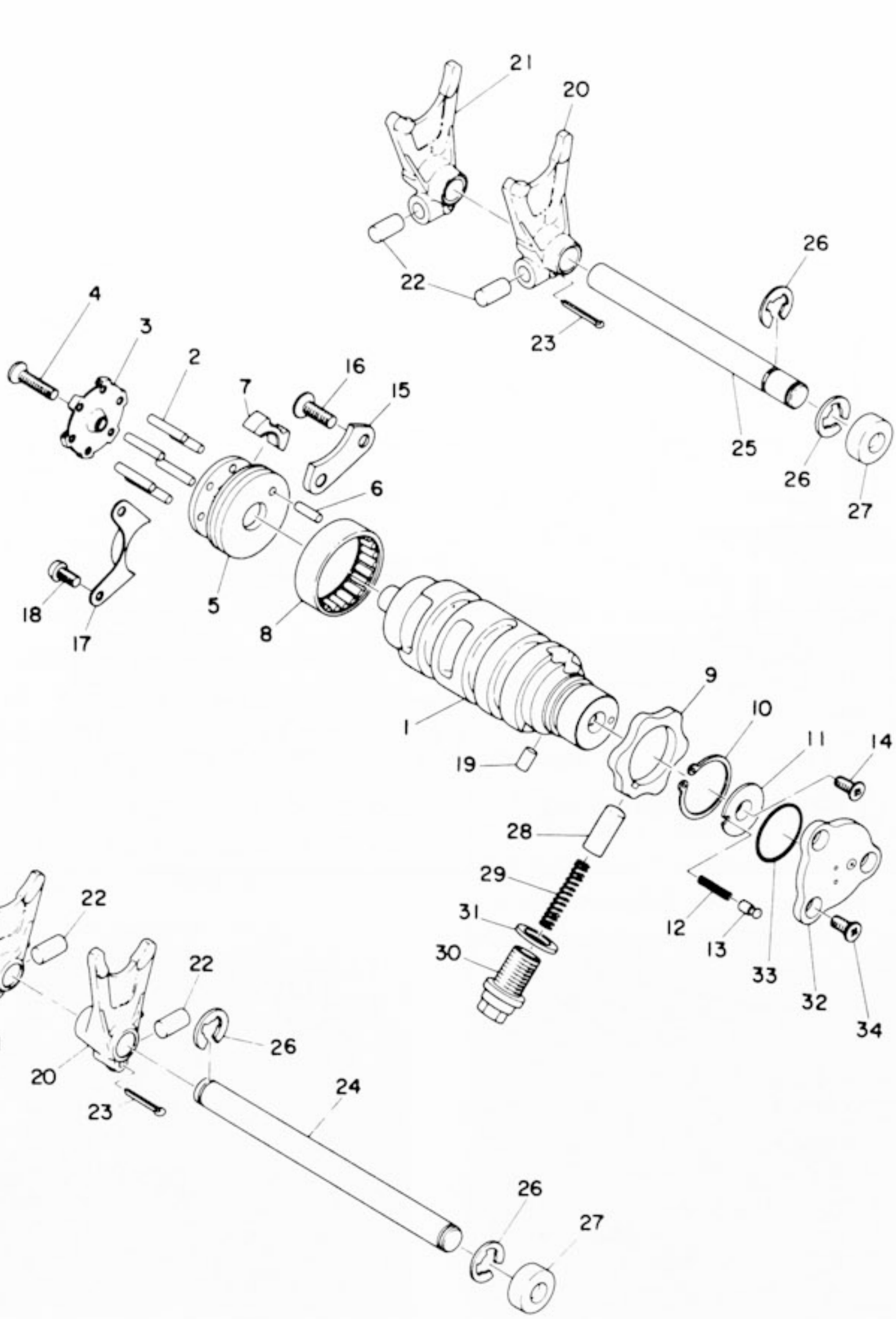
To split this type, first remove the clutch, primary drive gear, external kickstarter parts, generator, drive sprocket, and external parts of the shift mechanism. Refer to the applicable procedures.

Remove the screws (**Figure 114**) which hold the crankcase halves together. They are all located on one side, but may be on the left or right side depending on the model.



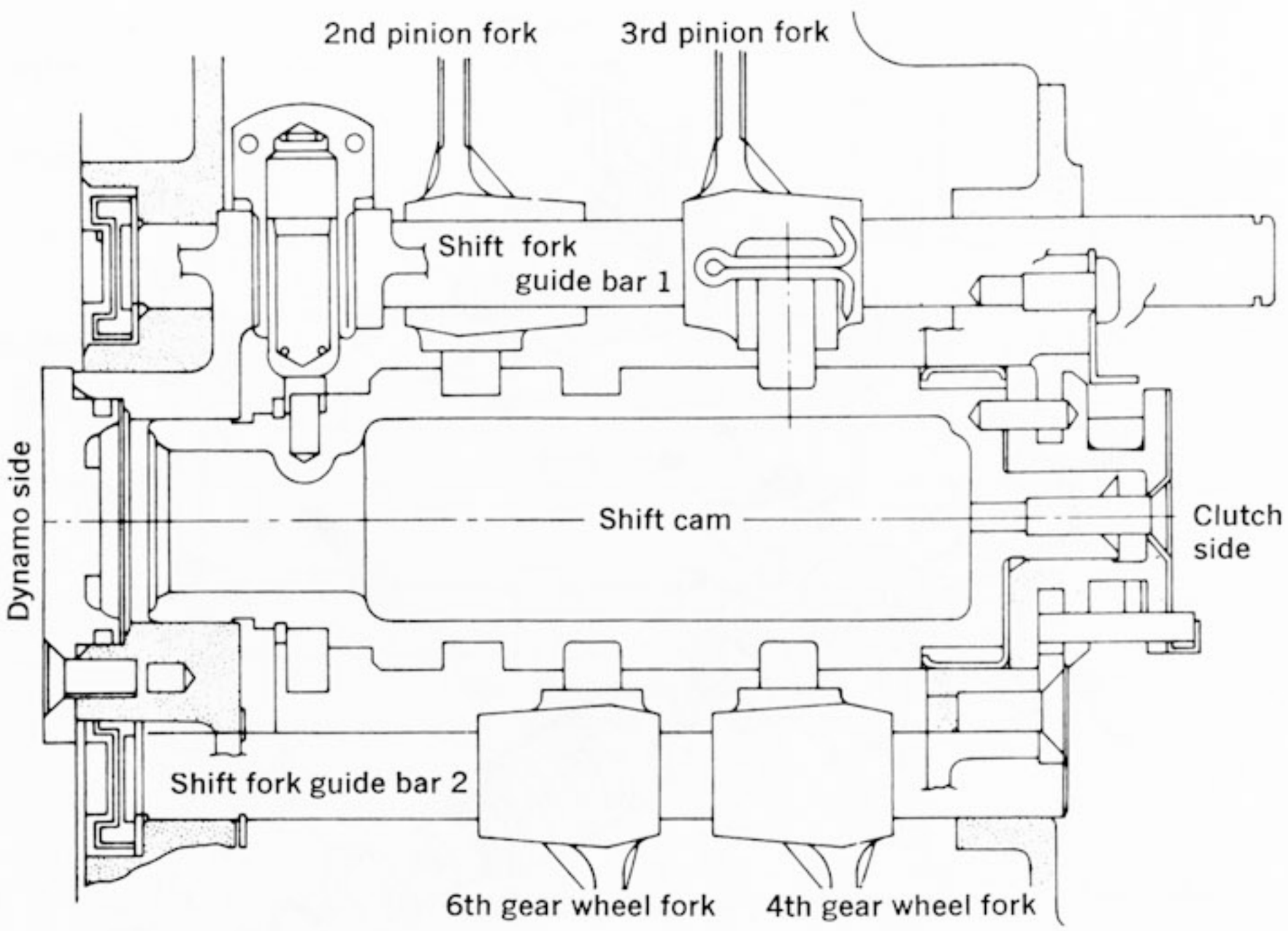
On the YDS3 series, YM1, YM2 series, and DS6 series, two case securing screws are protected (and hidden) by black rubber plugs. These screws are located up front in the finned crankcase area and must not be overlooked.

Next install the crankcase dividing tool (Yamaha part #908-90010-11-00) on the right crankcase half, as shown in **Figure 115**. Alternately tap the transmission mainshaft and crankcase as you turn the handle on the tool. Be sure that the mounting bolts on the tool are fully tightened and that the tool remains parallel to the side of the crankcase (**Figure 116**).

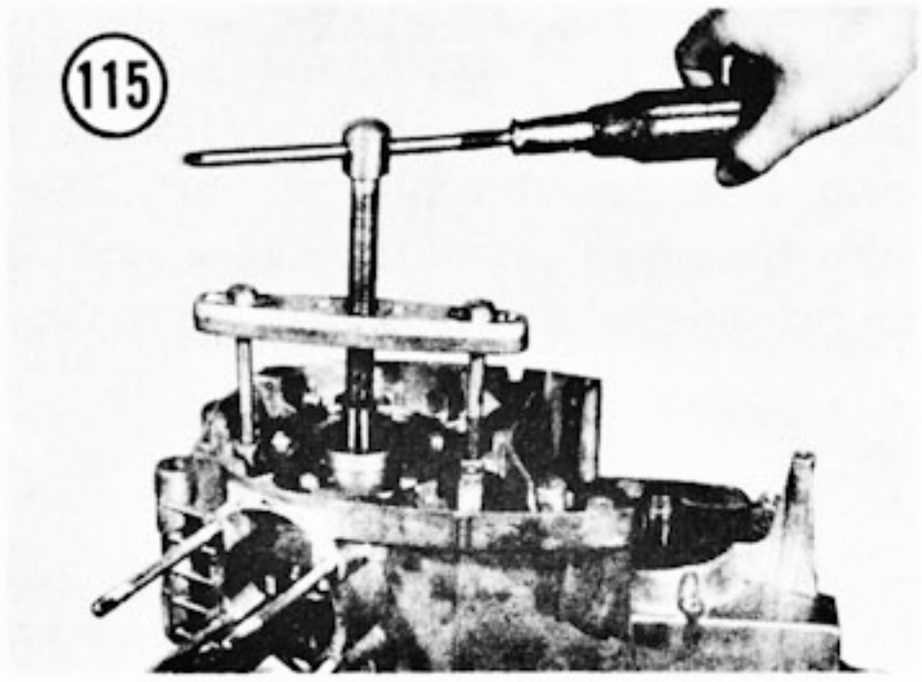


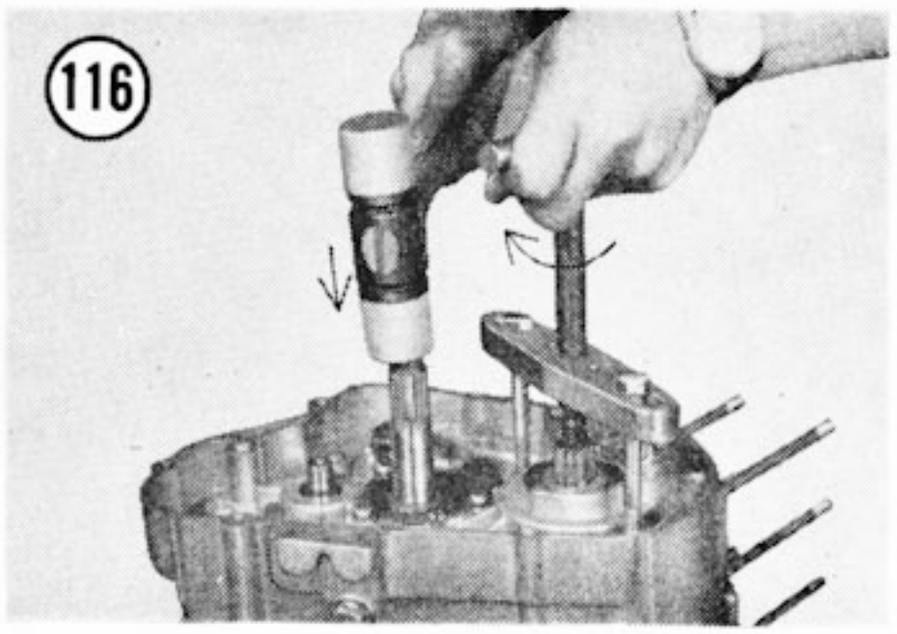
TYPE 5 GEARSHIFT MECHANISM

1. Shift cam
2. Dowel pin
3. Side plate
4. Flat head screw
5. Segment
6. Dowel pin
7. Pawl plate
8. Bearing
9. Stopper plate
10. Circlip
11. Side plate
12. Spring
13. Neutral point
14. Flat head screw
15. Stopper plate
16. Flat head screw
17. Change lever guide
18. Pan head screw
19. Dowel pin
20. Shift fork
21. Shift fork
22. Cam follower pin
23. Cotter pin
24. Shift fork guide bar
25. Shift fork guide bar
26. Circlip
27. Blind plug
28. Cam stopper
29. Cam stopper spring
30. Spring screw
31. Drain plug gasket
32. Neutral switch assembly
33. O-ring
34. Flat head screw



TYPE 5 GEARSHIFT MECHANISM





When reassembling the cases, be sure the mating surfaces are perfectly clean. Always apply gasket paste (Yamabond #5) to both surfaces just before assembly. Do not let it dry.

Assemble the crankshaft, transmission, and shift cam in the left case. Lower the right case over the crankshaft end and transmission shaft sticking up. Tap the case with a soft-headed hammer, alternating from one end of the case and back to the other. Drive the case down evenly over the shafts until the mating surfaces meet. Install the securing screws and tighten in pattern. There are numbers stamped next to each screw to signify the tightening order. Hand-tighten until secure, but do not overtighten as the case threads are aluminum and may be stripped.

NOTE: *Be sure the connecting rods are at top and bottom dead center (one position each) during case assembly. On 250cc models especially, the case could catch the rod and bend it. This damage would require costly rod replacement.*

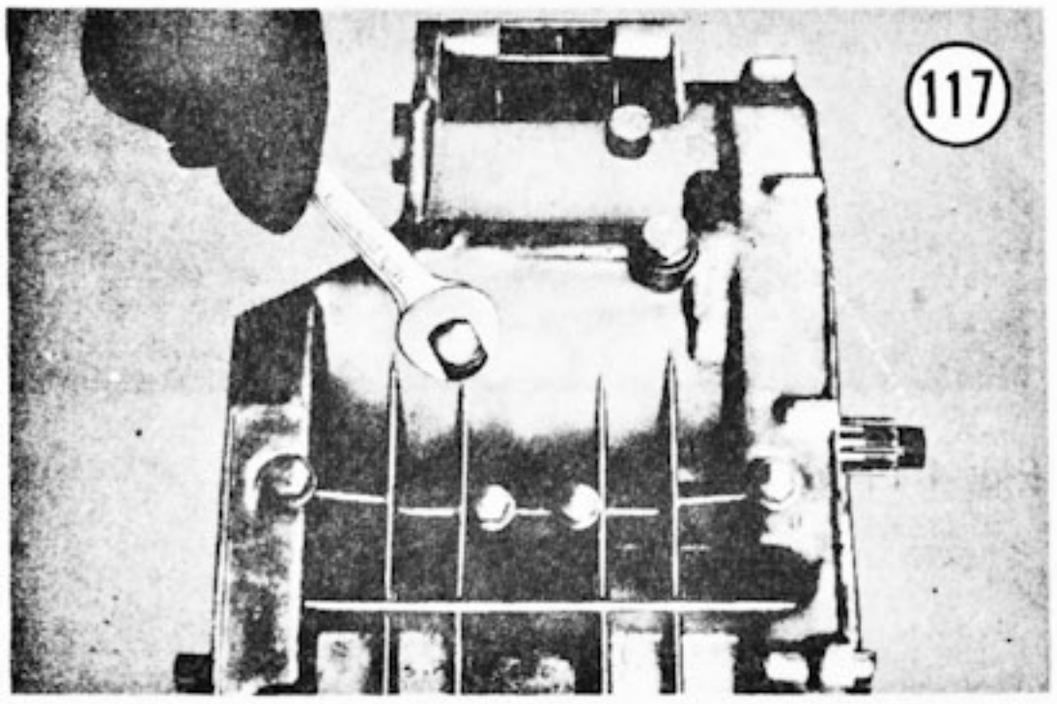
Do not start to assemble the case until the gear box has been shifted into neutral. In this position, either transmission shaft should spin freely without turning the other.

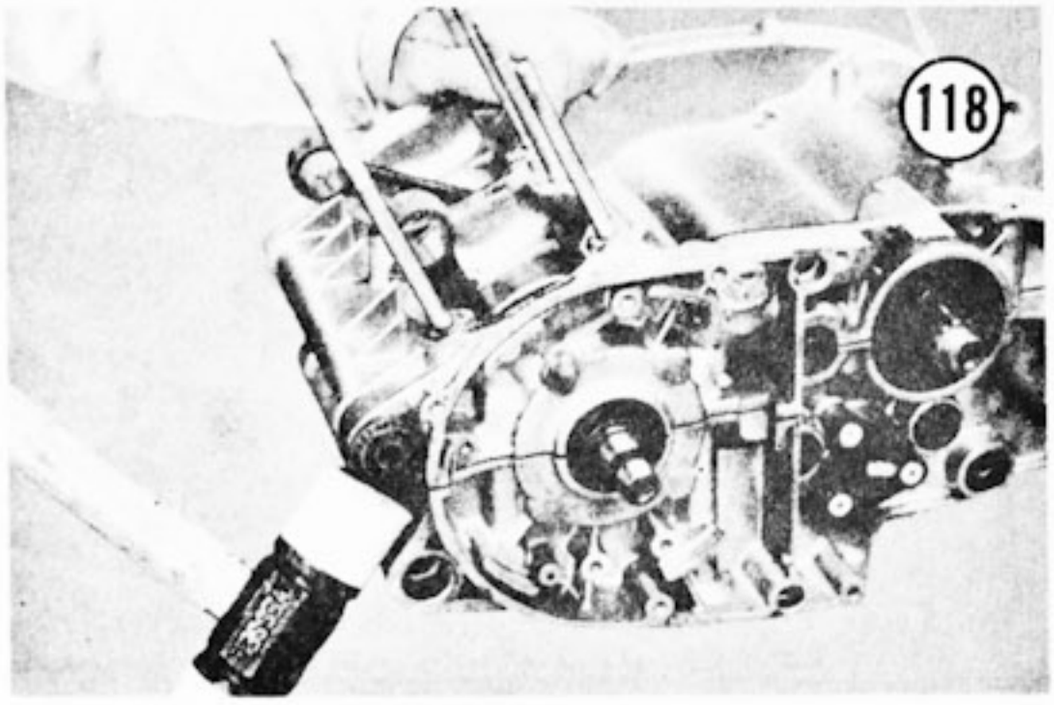
The case being installed should easily slide down over the shafts and butt against the other case. If the cases get close, but do not want to come together, *stop*, pull the case back off, and examine for a transmission shaft out of place, improper shim location on either end of the shafts, or transmission in gear.

Upper and Lower Split Type

Refer to the applicable procedures to remove the clutch, primary drive gear, alternator or generator, drive sprocket, kickstarter mechanism, and external gearshift parts.

Invert the crankcase and remove the hex bolts (**Figure 117**) which hold the sections together. Each bolt is numbered. Start with the highest number as you disassemble the unit. Lightly strike the front portion of the upper section (**Figure 118**) and rear portion of the lower section to split the crankcase.





To reassemble the crankcase, reverse the disassembly procedure. Clean the mating surfaces carefully, then apply gasket cement. Tighten the bolts in ascending order. Use a torque wrench to tighten the bolts. See **Table 8**.

Table 8 BOLT TORQUES

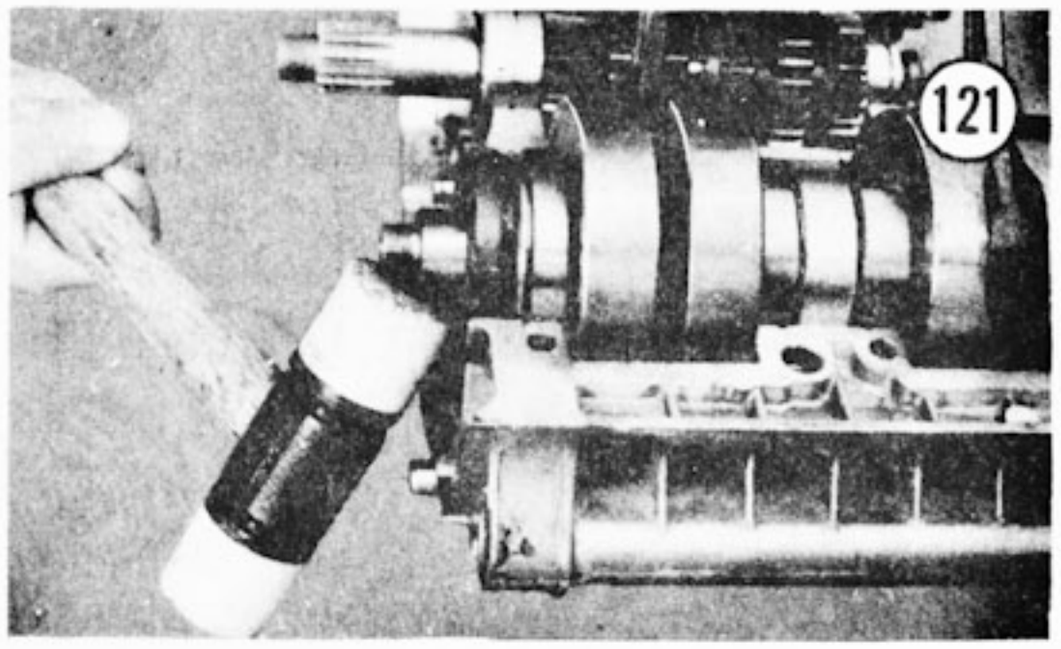
Bolt Size	Torque
6mm	90 in.-lb. (1 kg-m)
8mm	180 in.-lb. (2 kg-m)

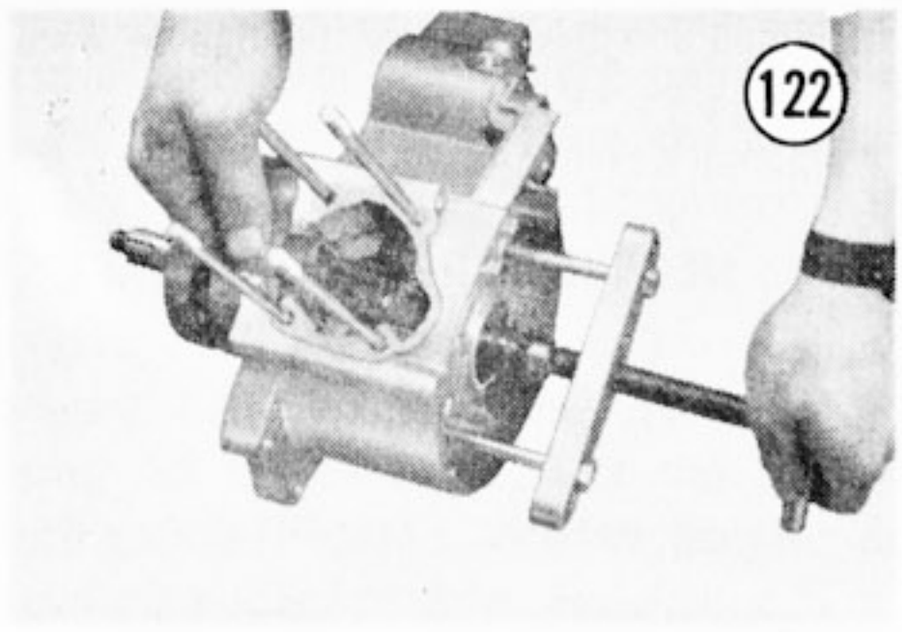
CRANKSHAFT

Figures 119 and 120 are exploded views of typical old and new crankshaft assemblies.

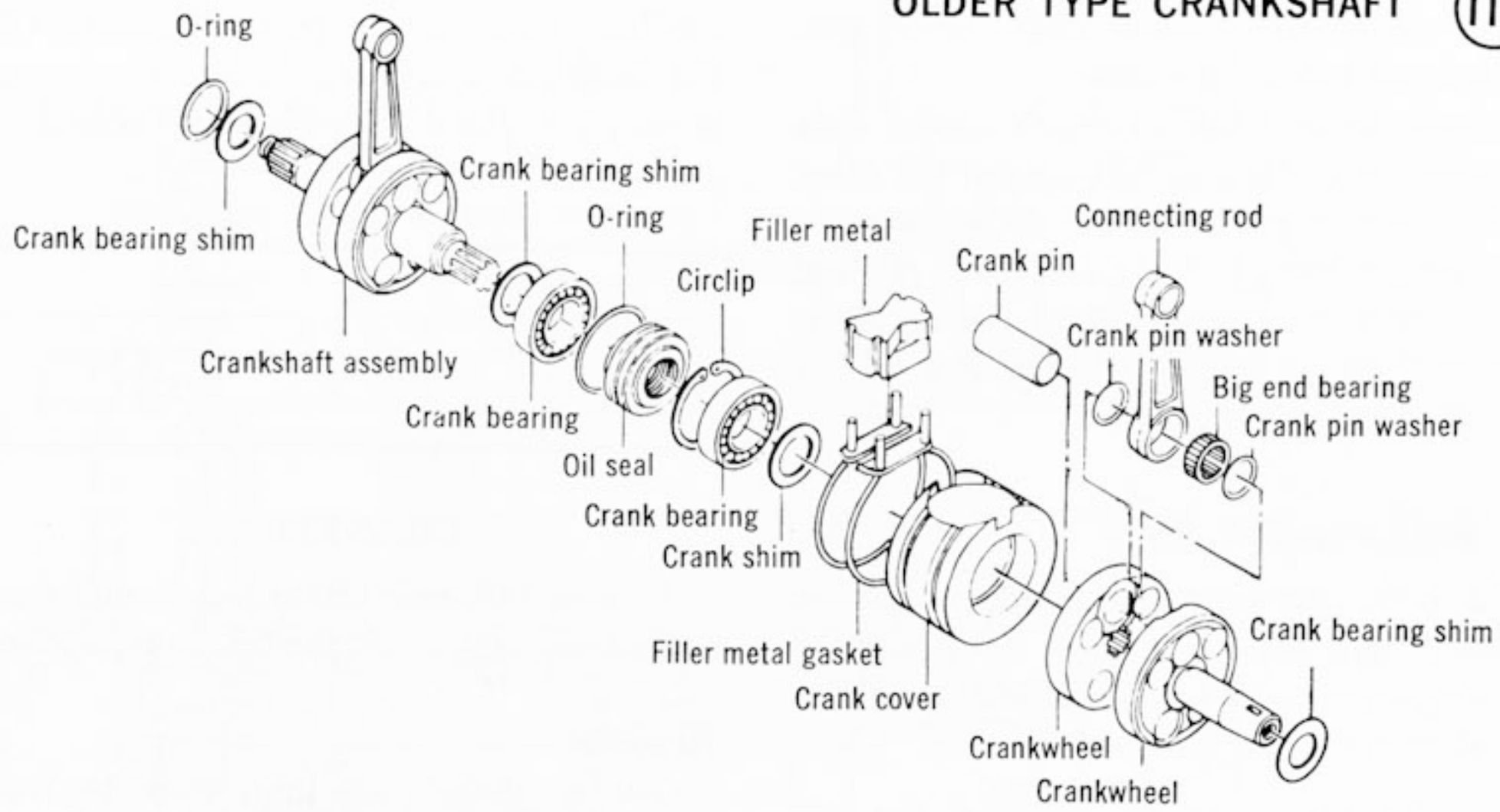
Removal

The crankshaft assembly may be removed from the vertically split crankcase by striking the shaft (**Figure 121**) with a soft mallet. Use the crankcase dividing tool (**Figure 122**) to press the crankshaft from the horizontally split crankcase. Be sure that the bolts on the tool are tightened into the crankcase, and that the tool remains parallel to the side of the crankcase. Pull the connecting rod which is nearer to the tool up to top dead center to avoid interference.

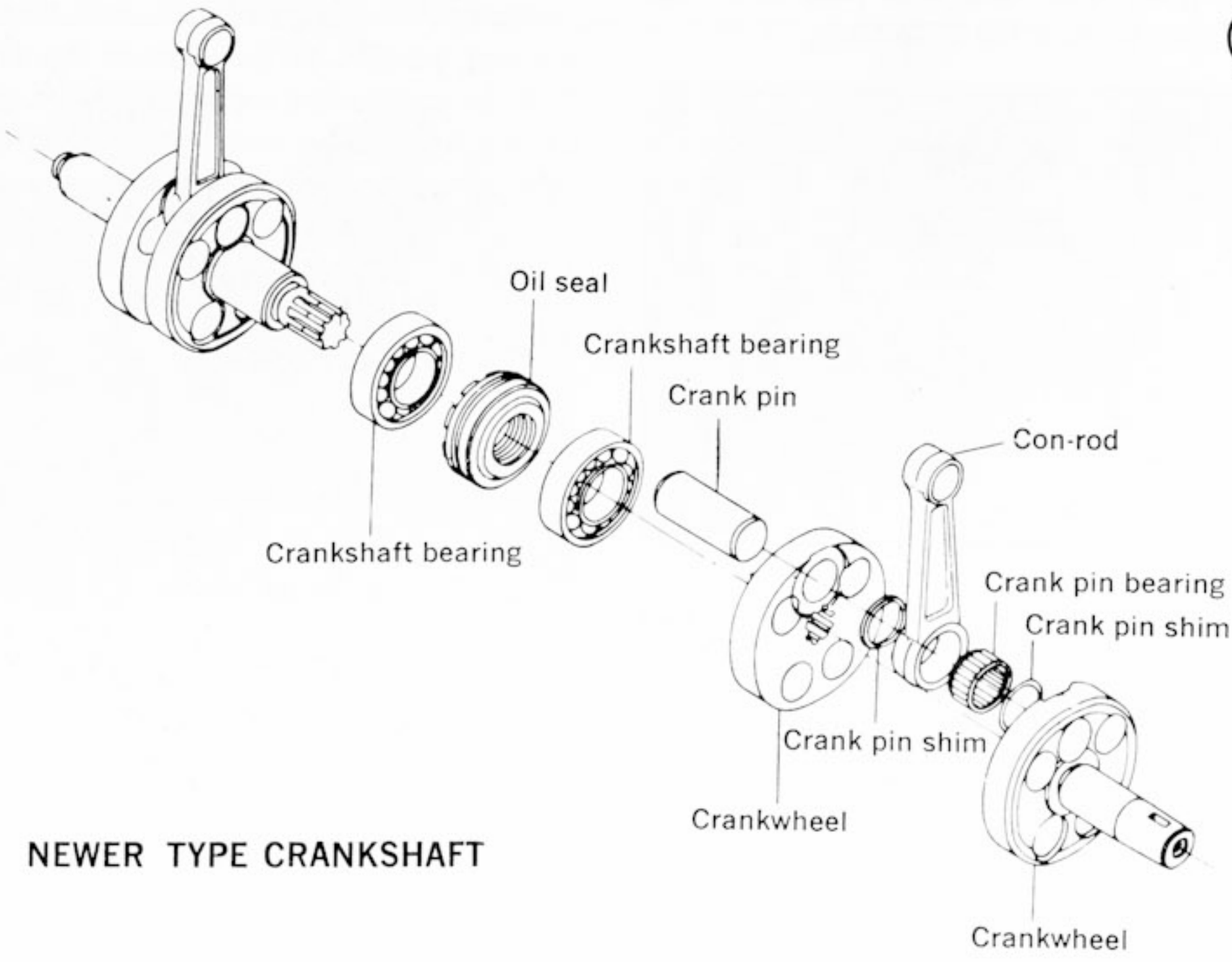




OLDER TYPE CRANKSHAFT (119)

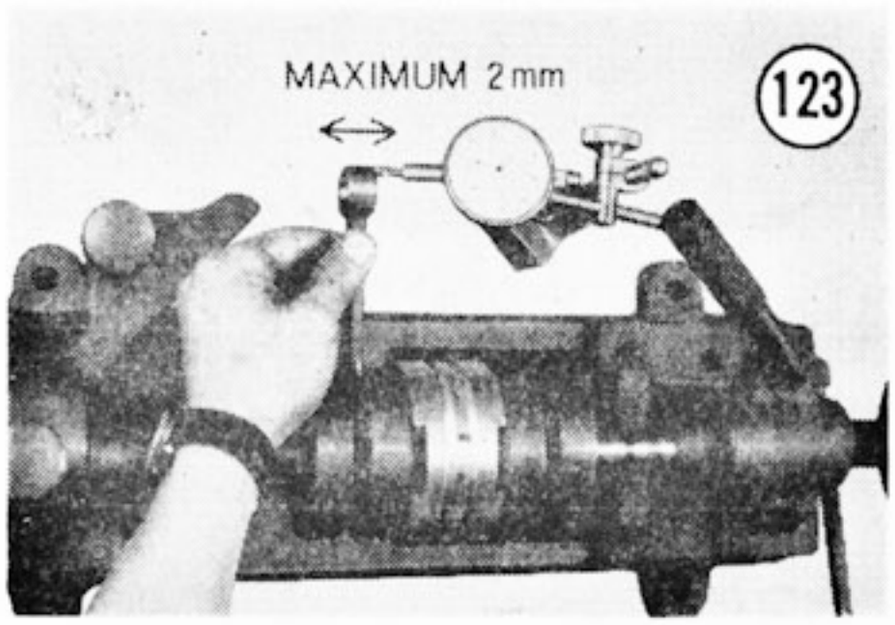


NEWER TYPE CRANKSHAFT (120)

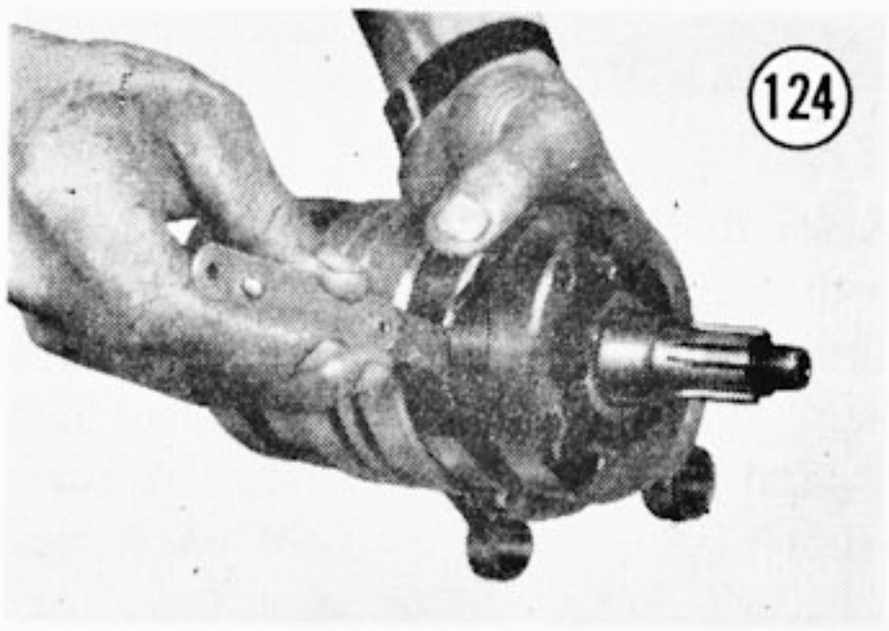


Crankshaft Inspection

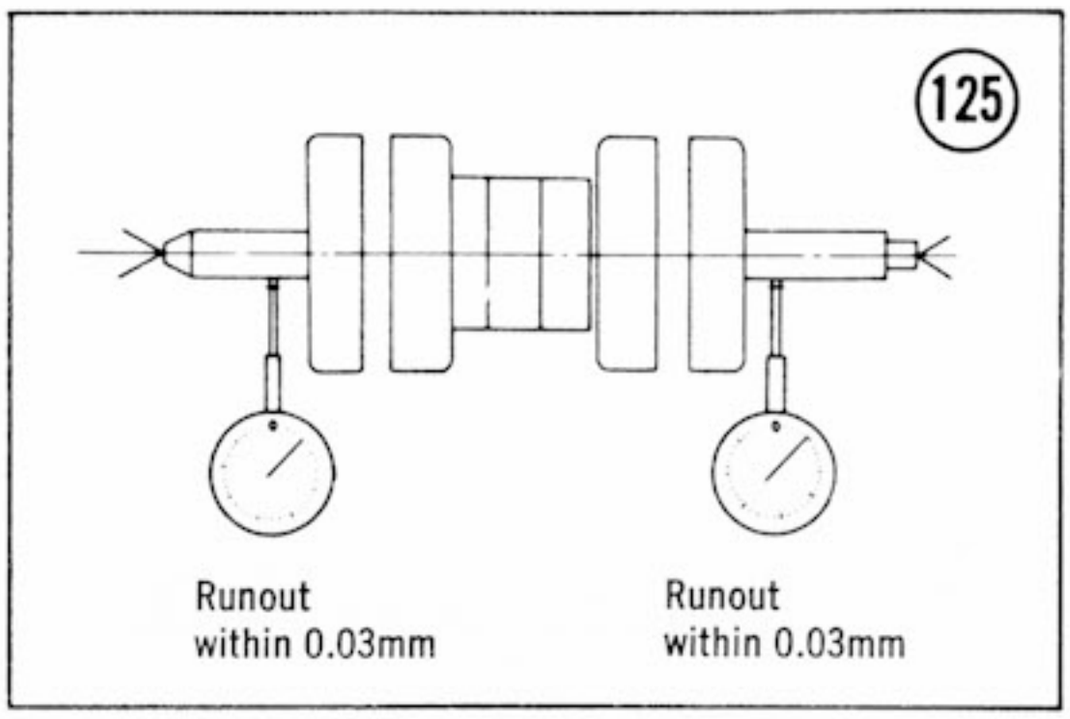
Determine crankpin and big end bearing wear by moving the small end of each rod back and forth (**Figure 123**). Axial play should be 0.08 inch (2mm) or less. If the play exceeds that amount, replace worn parts. Axial play should be 0.03 to 0.04 inch (0.8 to 1.0mm) after reconditioning.



Check for side play at the big end of the connecting rod by inserting a feeler gauge between the big end and the crank wheel (**Figure 124**). Side play limits are 0.004 to 0.012 inch (0.1 to 0.3mm).



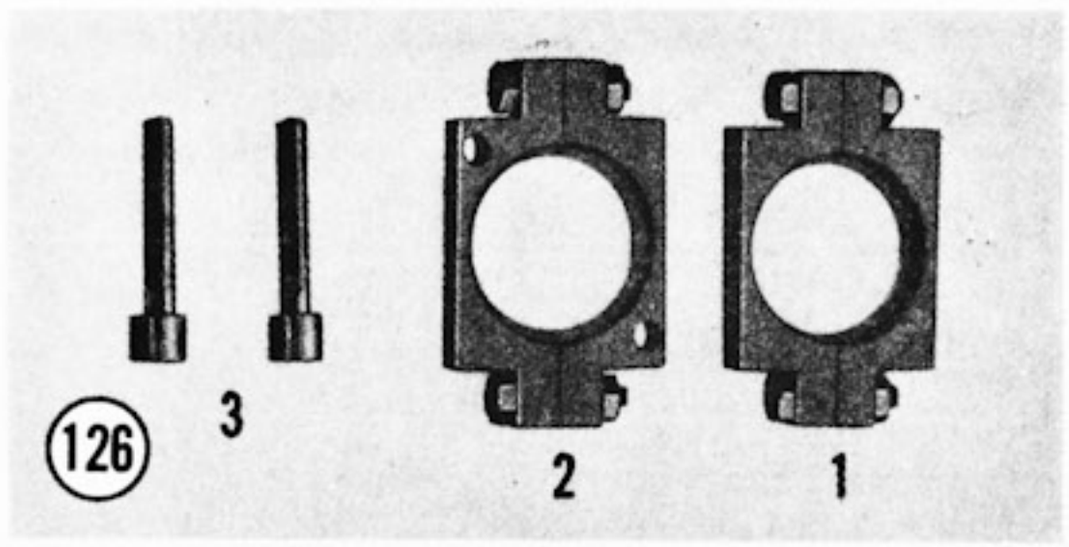
Measure runout as shown in **Figure 125**. As the crankshaft is rotated through a complete revolution, runout should not exceed 0.0012 inch (0.03mm).

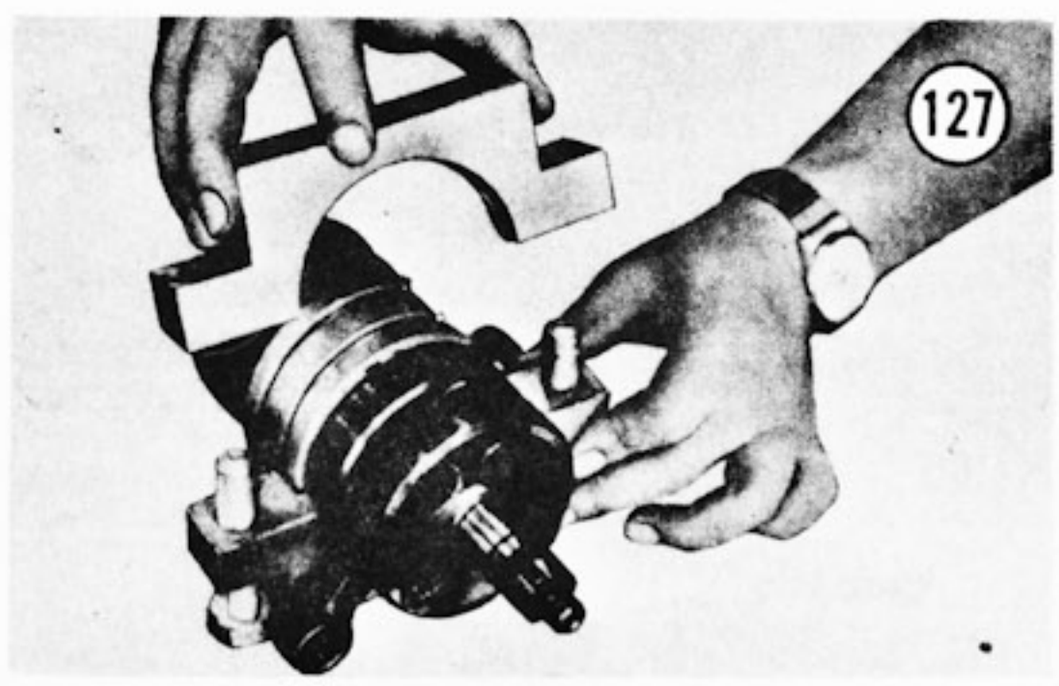


Crankshaft Disassembly

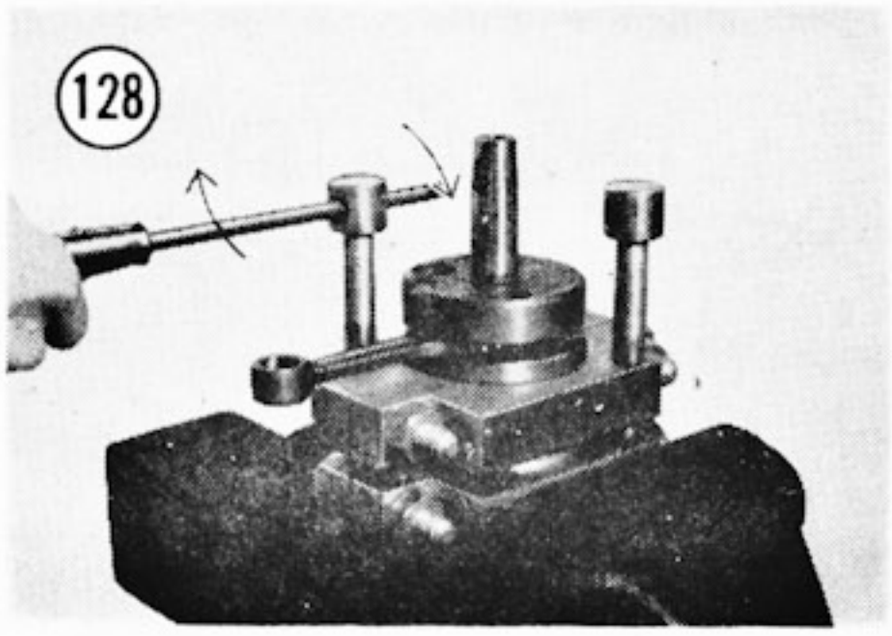
The crankshaft disassembly tools shown in **Figure 126** are required for this procedure. Follow Steps 1 through 8 to disassemble the crankshaft.

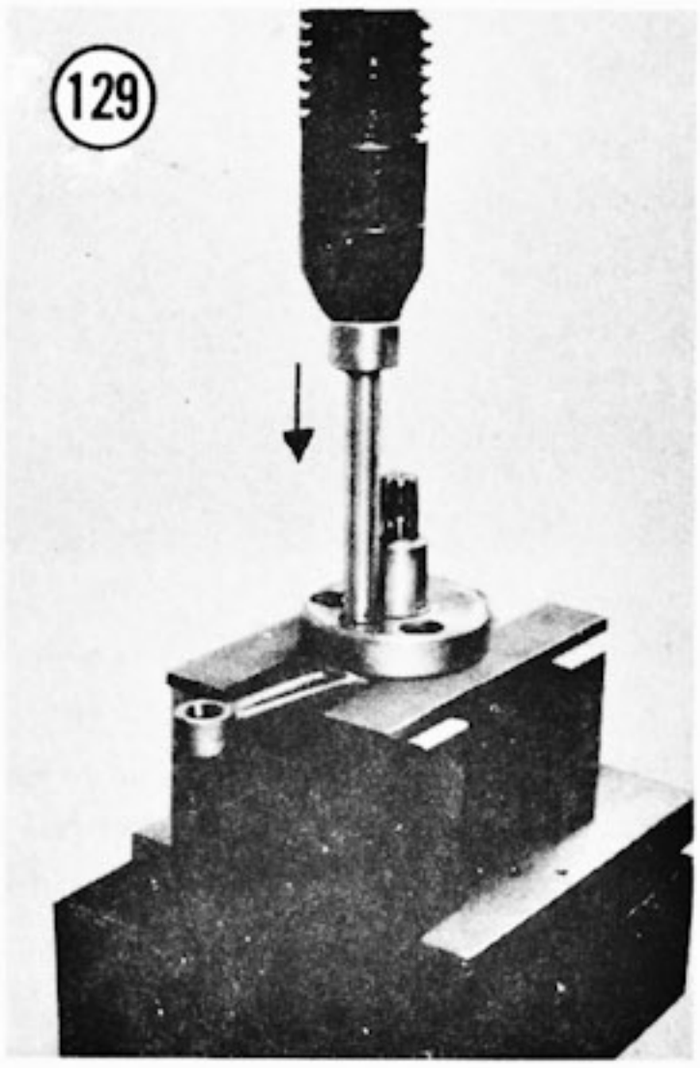
1. Install Tool 1 into the gap between the crank wheel and crank cover (**Figure 127**).

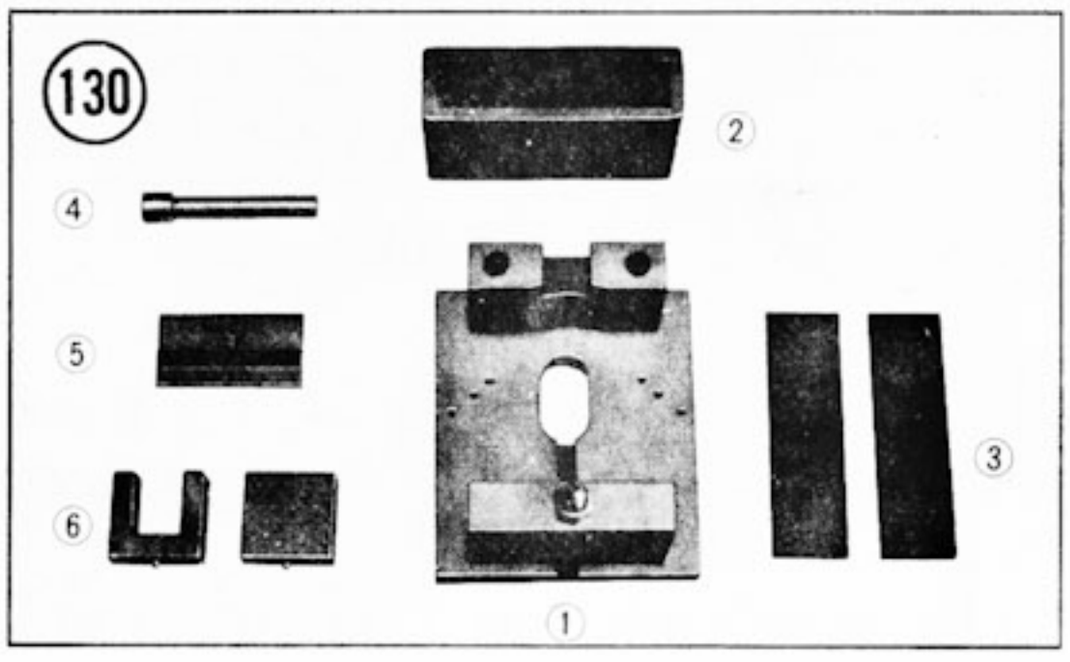




2. Install Tool 2 on the other crankshaft half in the same manner. Be sure that the bolts on the tools are tightened fully.
3. Thread each bolt, Tool 3, into Tool 2 until they seat against Tool 1. Clamp Tool 1 in a vise.
4. Turn each bolt alternately one turn at a time (**Figure 128**) to separate the crankshaft assembly into two parts.
5. Use a press to remove the crank cover and bearing.
6. **Figure 129** illustrates the proceduure for pressing out the crankpin. Use the crankshaft assembly tools (**Figure 130**) to support the crank wheel during this operation.







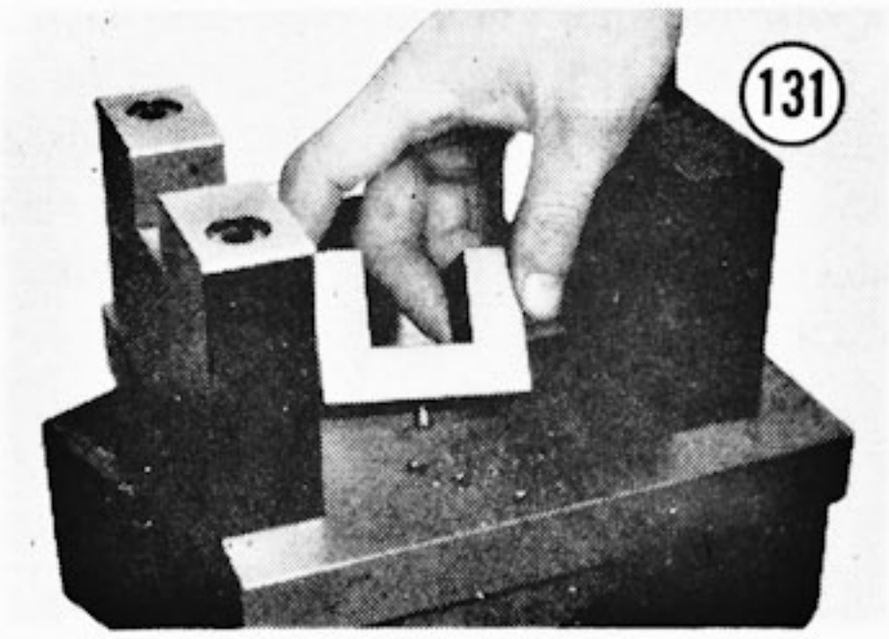
7. Turn the other crank wheel over and place it on the support plates, then press out the crankpin.

8. Repeat Steps 6 and 7 to disassemble the other crankshaft half.

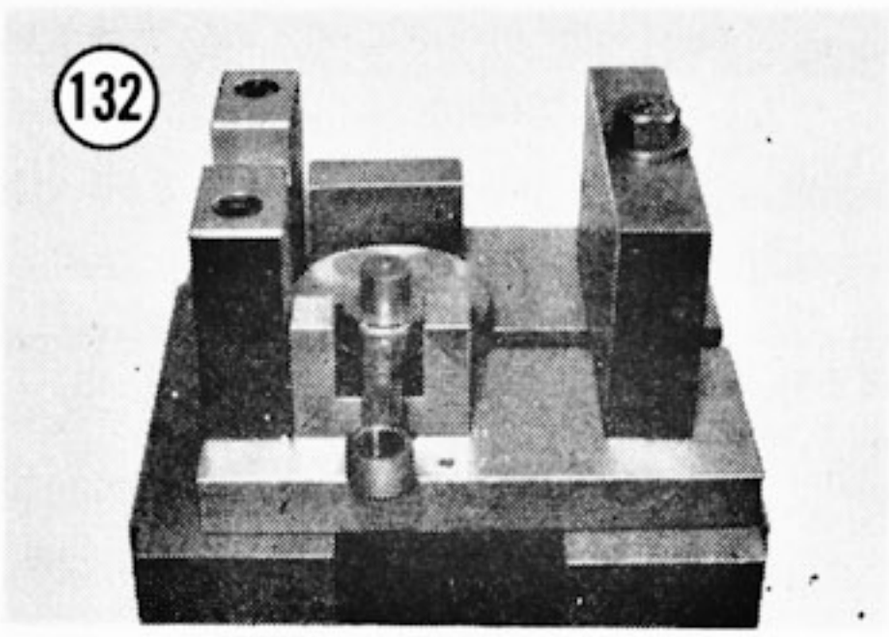
Crankshaft Reassembly

Crankshaft assembly tools (Figure 130) are required for this procedure. Proceed as follows:

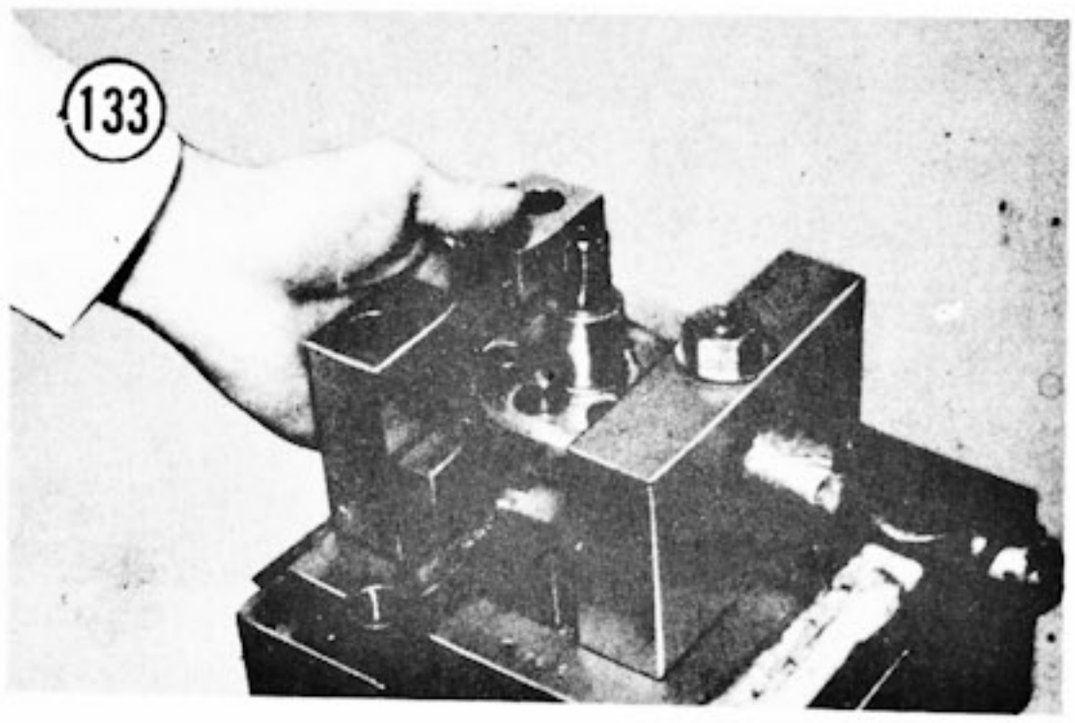
1. Install Tool 6 on Tool 1, as shown in **Figure 131**.



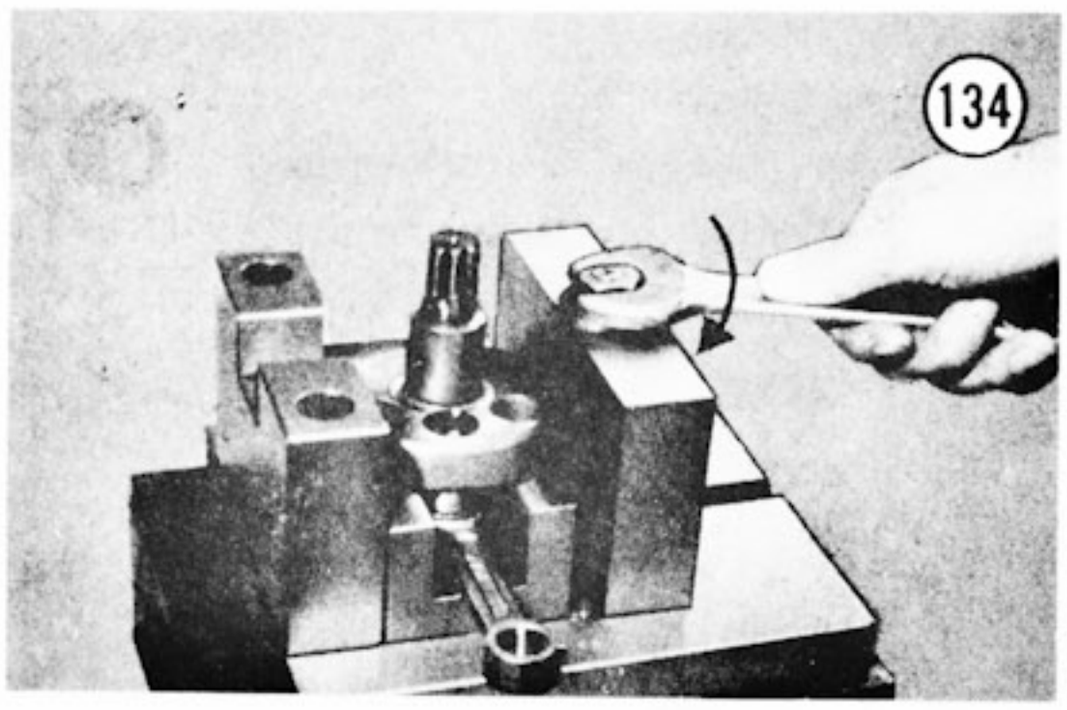
2. Press the crankpin into the crank wheel (**Figure 132**), then install the connecting rod on the crankpin.



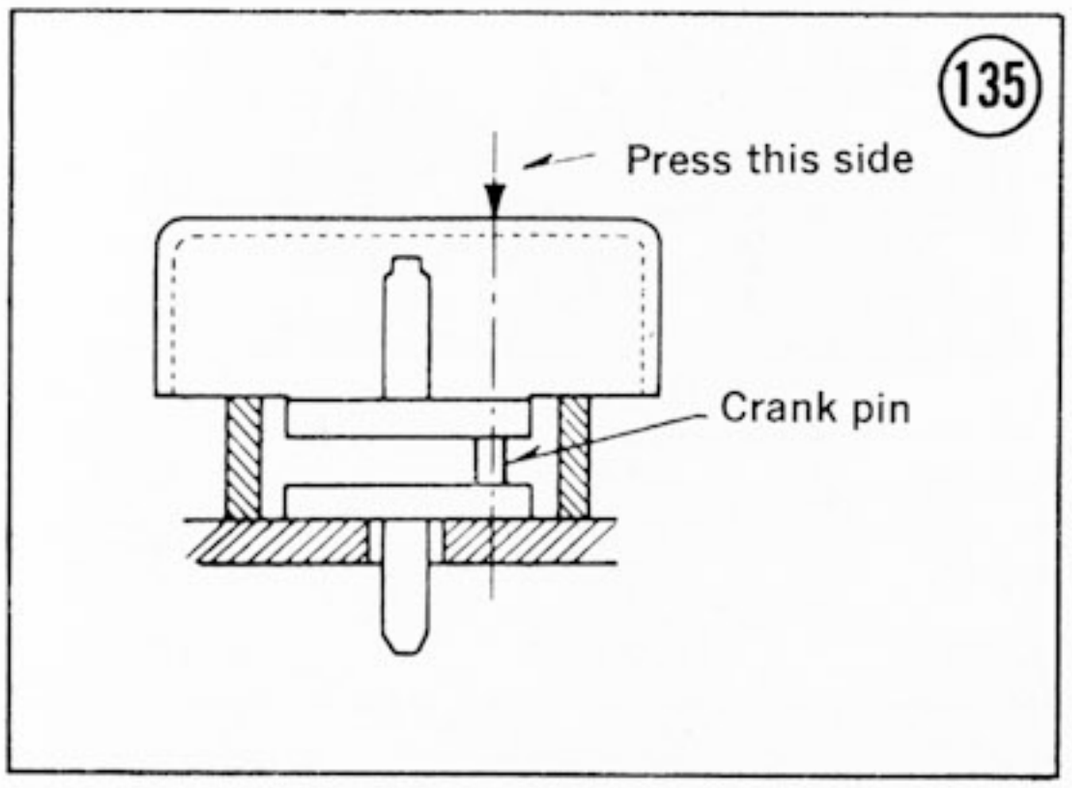
3. Refer to **Figure 133** for this step. Position the other crank wheel and lightly tap it onto the crankpin, using a brass or lead hammer. Be sure that the upper crank wheel remains horizontal during this step. Also be sure that the slide plate lock nut on Tool 1 is loose.

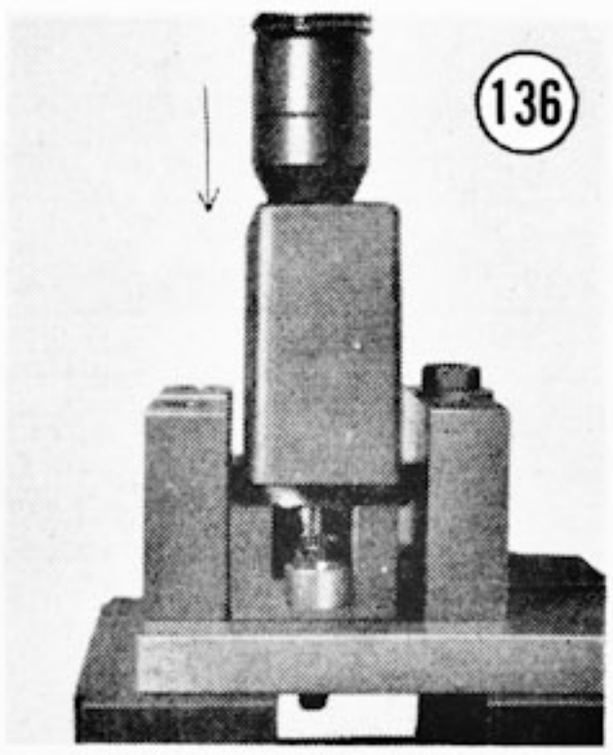


4. Fully tighten the slide plate lock nut (**Figure 134**).

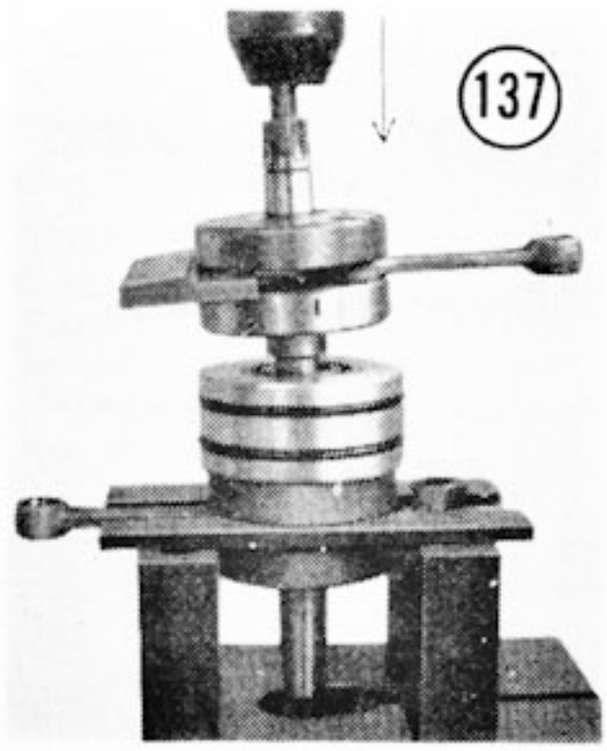


5. Place Tool 2 on the crank wheel, then press downward until Tool 2 contacts Tool 6. Continue pressing until the force reaches 5 tons (4,500 kilograms). Apply the force along the center line of the crank pin as shown in **Figures 135 and 136**.

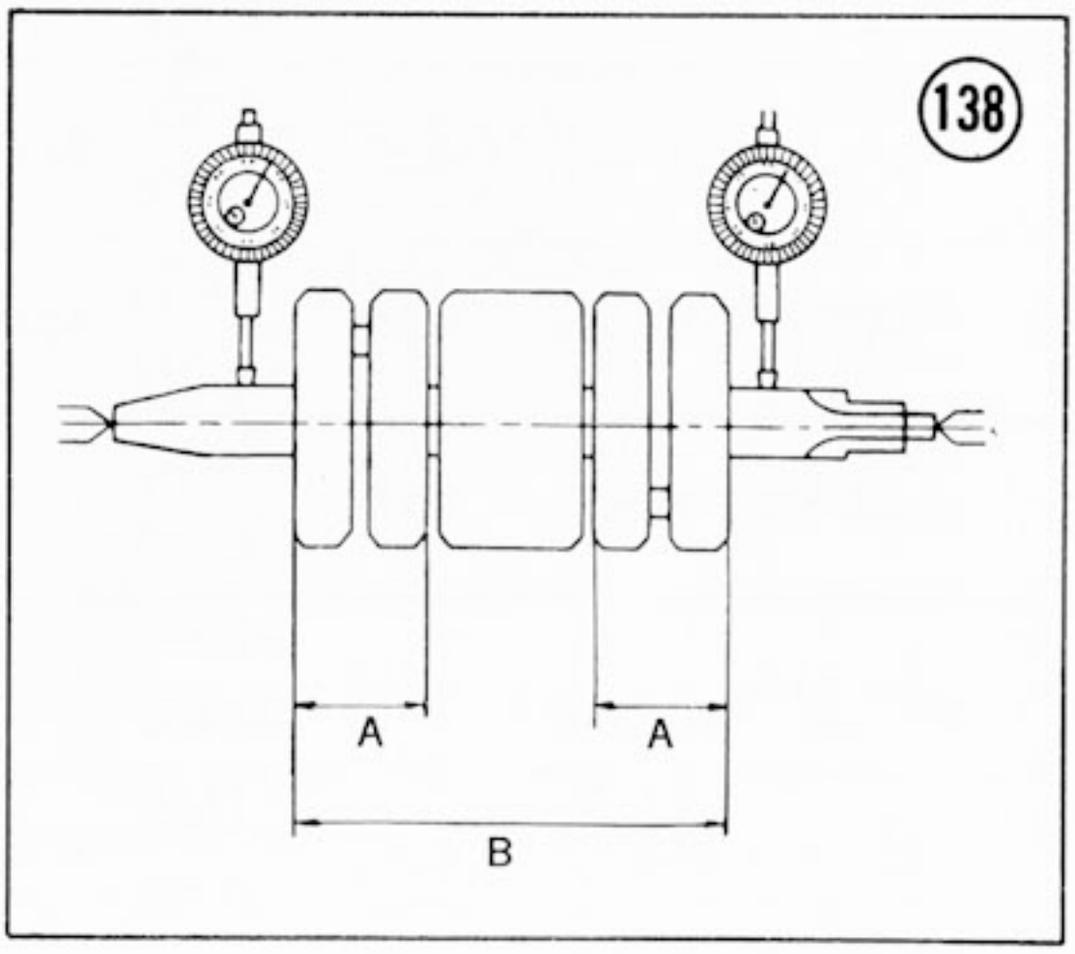




6. Press the crank cover and bearing over the splined center shaft. Make sure that the two crankpins are 180 degrees apart, then press the two crankshaft halves together, as shown in **Figure 137**. Note that the crankshaft wedge, Tool 5, is placed between the upper crank wheels to prevent collapse. Make sure that the center splines are correctly mated, then press the halves together with a force of approximately 10 tons (9,100 kilograms).



7. Remove the crankshaft assembly from the press and check distances (A) and (B) as shown in **Figure 138**. The splines are shouldered to prevent the halves from being pressed too close together, but it is possible for a tight spline fit to prevent the crankshaft halves from sliding together completely. Distances (A) and (B) should be as specified in **Table 9**. After the dimensions are correct, align the crankshaft.



Crankshaft Alignment

Mount the assembled crankshaft in a lathe, V-blocks, or other suitable centering device. Measure the runout as shown in Figure 125. If

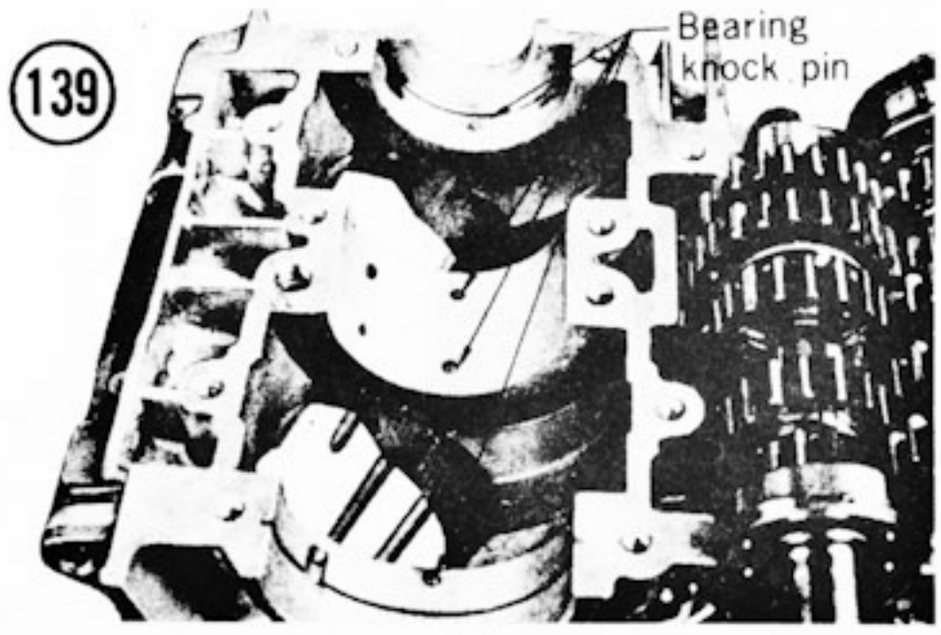
Table 9 CRANKSHAFT STANDARDS

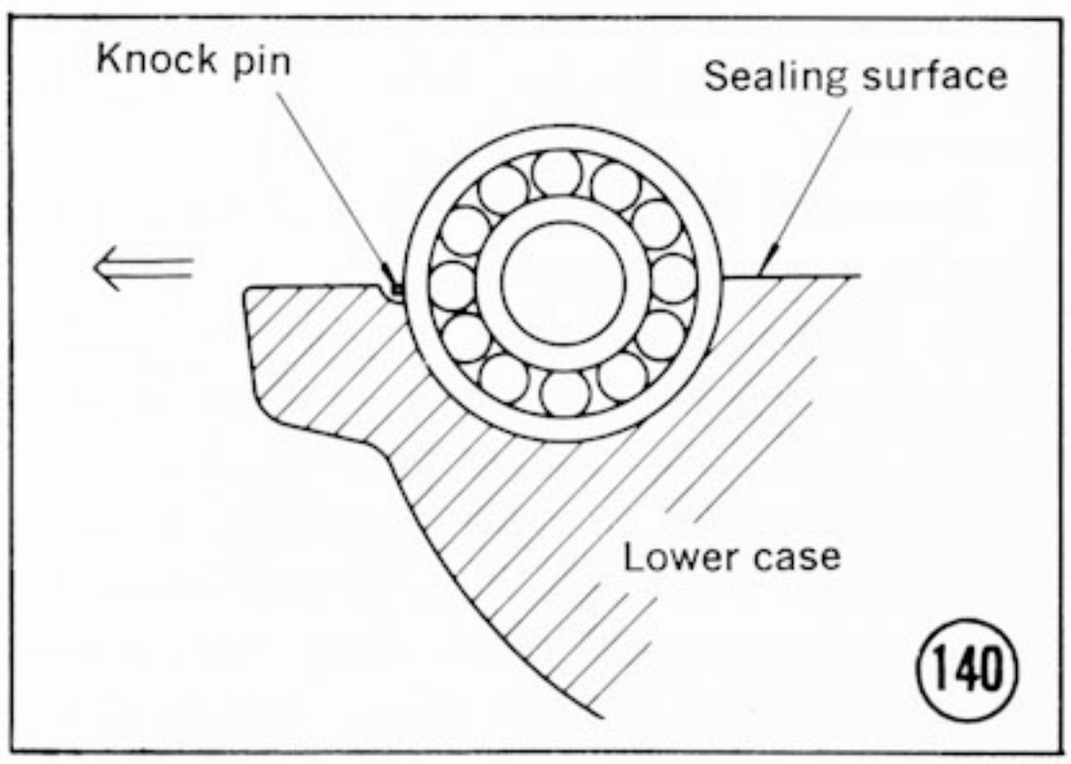
Model	Distance "A" Inches		Distance "A" Millimeters		Distance "B" Inches		Distance "B" Millimeters	
HS1, HS1-B	1.693	+0.002 —0.004	43.00	+0.05 —0.10	4.962	+0 —0.008	126.00	+0 —0.20
YL1, YL1-E, LS-2	1.693	+0.002 —0.004	43.00	+0.05 —0.10	4.962	+0 —0.008	126.00	+0 —0.20
YAS1, YAS1-C	1.693	+0.002 —0.004	43.00	+0.05 —0.10	4.962	+0 —0.008	126.00	+0 —0.20
AS2C	1.693	+0.002 —0.004	43.00	+0.05 —0.10	4.962	+0 —0.008	126.00	+0 —0.20
YCS-1, YCS1-C	1.850	+0.002 —0.004	47.00	+0.05 —0.10	5.118	+0 —0.008	130.00	+0 —0.20
CS3-B, CS3-C, CS5	1.850	+0.002 —0.004	47.00	+0.05 —0.10	5.512	+0 —0.008	140.00	+0 —0.20
DS6, DS6-B, DS6-C	2.047	+0.002 —0.002	52.00	+0.05 —0.05	5.945	+0.004 —0.004	151.00	+0.10 —0.10
DS7	2.047	+0 —0.002	52.00	+0 —0.05	6.063	+0.002 —0.004	159.00	+0.05 —0.10
YDS3, YDS3-C	2.047	+0.002 —0.002	52.00	+0.05 —0.05	5.945	+0.004 —0.004	151.00	+0.10 —0.10
YM1	2.047	+0.002 —0.002	52.00	+0.05 —0.05	5.945	+0.004 —0.004	151.00	+0.10 —0.10
YM2, YM2-C, YDS5	2.047	+0.002 —0.002	52.00	+0.05 —0.05	5.945	+0.004 —0.004	151.00	+0.10 —0.10
YR1, YR2, YR2-C	2.195	+0.002 —0.002	55.75	+0.05 —0.05	6.437	+0.002 —0.002	163.50	+0.05 —0.05
R3, R3-C	2.195	+0.002 —0.002	55.75	+0.05 —0.05	6.437	+0.002 —0.002	163.50	+0.05 —0.05
R5, R5-B, R5-C	2.047	+0.002 —0.002	52.00	+0.05 —0.05	6.063	+0.002 —0.004	154.00	+0.05 —0.10
RD250, RD250A	2.047	+0.002 —0.002	52.00	+0.05 —0.05	6.063	+0.002 —0.004	154.00	+0.05 —0.10
RD350, RD350A	2.047	+0.002 —0.002	52.00	+0.05 —0.05	6.063	+0.002 —0.004	154.00	+0.05 —0.10

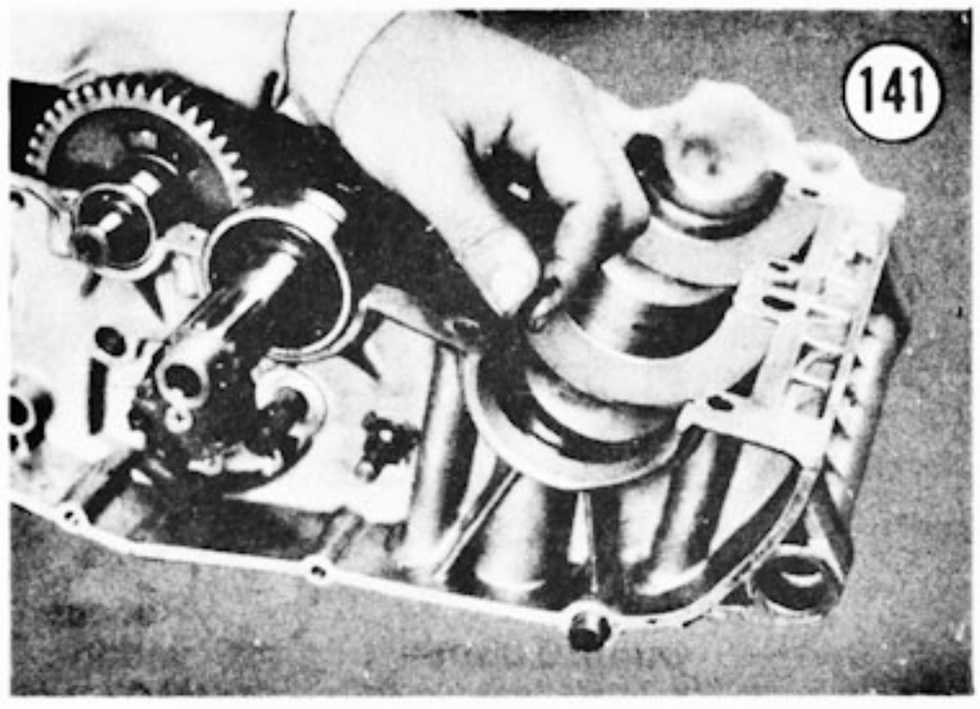
runout exceeds 0.0012 inch (0.03mm), have a qualified repair shop align the crankshaft. Unless you are fully experienced at alignments, the crankshaft could easily be damaged.

Crankshaft Installation, Horizontally Split Crankcase

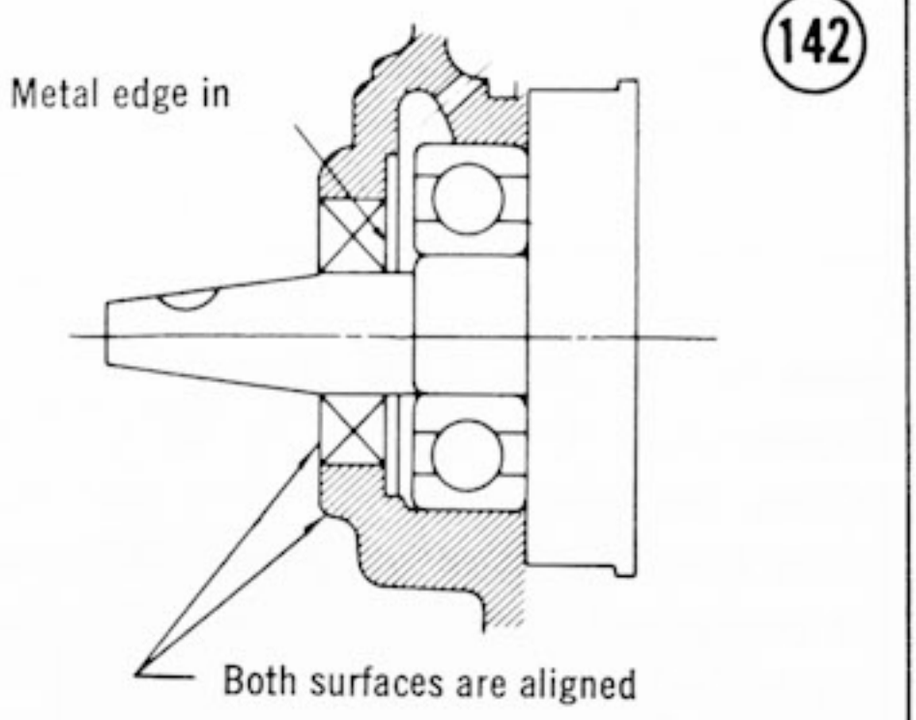
Align the bearing locating pins with the pin holes. Pin holes are in the upper crankcase half (**Figure 139**) on the YR1, YR2, YR3, R3, and R3-C models. On the R5, R250, and R350 series, the pin holes are in the lower crankcase half (**Figure 140**). Install the snap ring halves on the clutch side bearing (**Figure 141**).

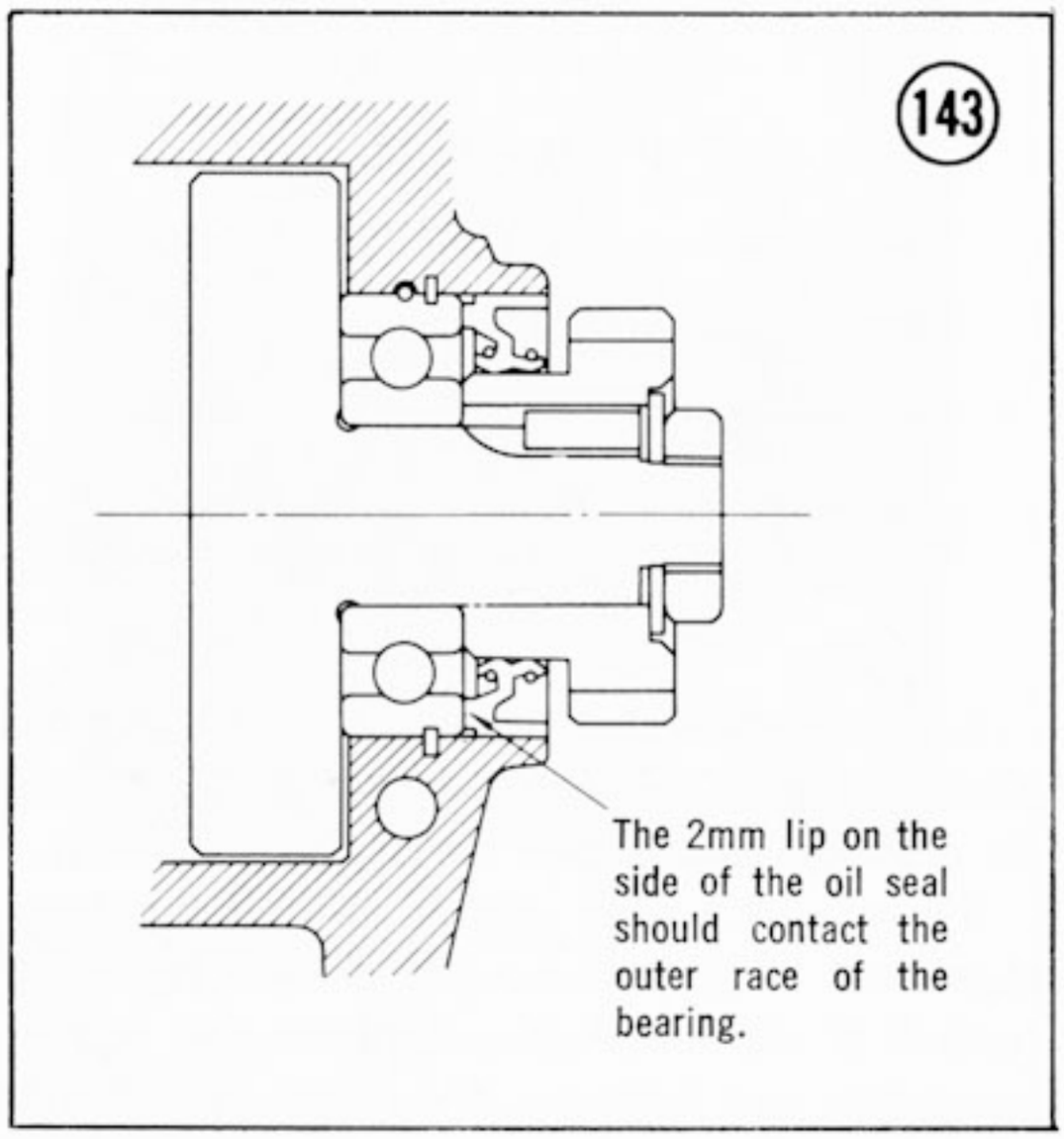






Install the oil seal on the generator side so that the outer surface of the seal is even with the edge of the crankcase boss, as shown in **Figure 142**. The oil seal on the clutch side is to be installed so that the seal lip contacts the outer race of the bearing (**Figure 143**).

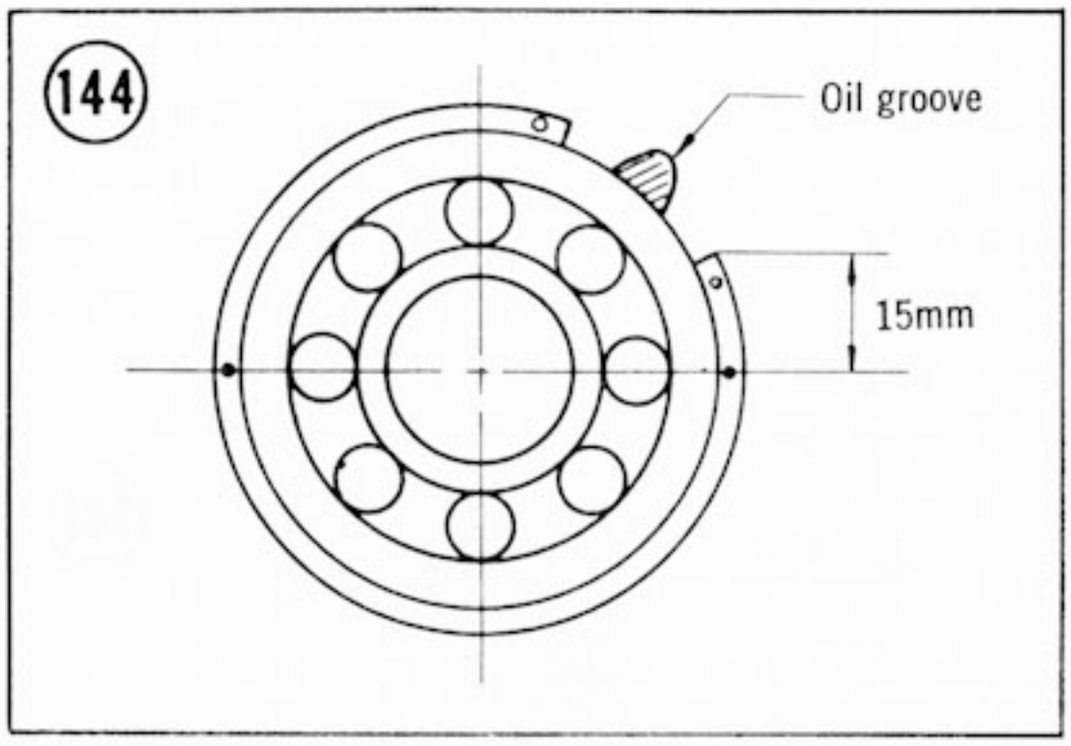




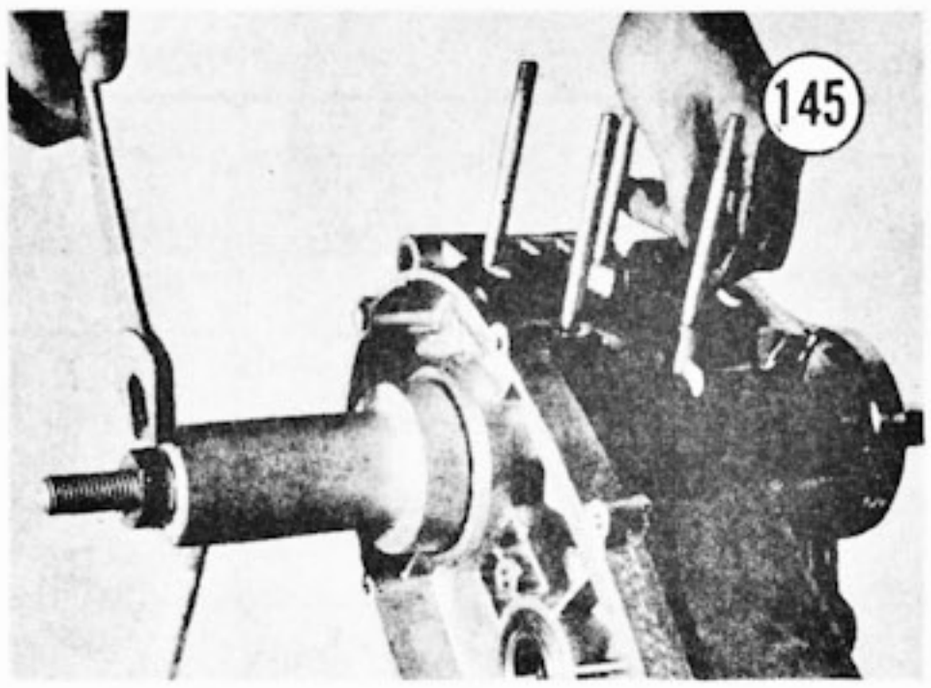
On the R3, R3-C, YR1, YR2, and YR2-C models, position the snap ring on the right crankshaft bearing so that the oil groove on the upper half of the crankcase is between the ends of the snap ring (**Figure 144**).

Crankshaft Installation, Vertically Split Crankcase

Apply gasket cement to the crank cover seal. Then insert the crankshaft assembly into the



crankcase and attach the crankshaft setting tool (**Figure 145**). Turn the nut on the tool, thereby pulling the crankshaft into position. Hold the center filler block facing upward. Be careful that the crankshaft does not scrape the crankcase as it is pulled into position.



It is important that you watch connecting rod position during this entire procedure to prevent the rod from catching on the case and bending.

There is a rubber gasket around the large aluminum block in the center of the crankshaft (called a crank cover). Replace the rubber piece if at all flattened. Coat this gasket with Yamabond #5 just before installing crankshaft.

Be sure you have the dynamo end of the crankshaft aimed in the proper direction to prevent the left end being where the right end should be.

The metal filler block that rests on top of the crank cover can fit only one way. Be sure it matches up with the case mating surface. Also, keep tapping this metal filler block down when installing the crankshaft *and* when assembling the case halves.

TRANSMISSION

There are six transmission types in these machines, identified as Types 1, 2, 3, 4, 5, and 6. Individual gear ratios vary in a given type, but service procedures are similar. **Table 10** lists transmission types by models.

Table 10 TRANSMISSION TYPES

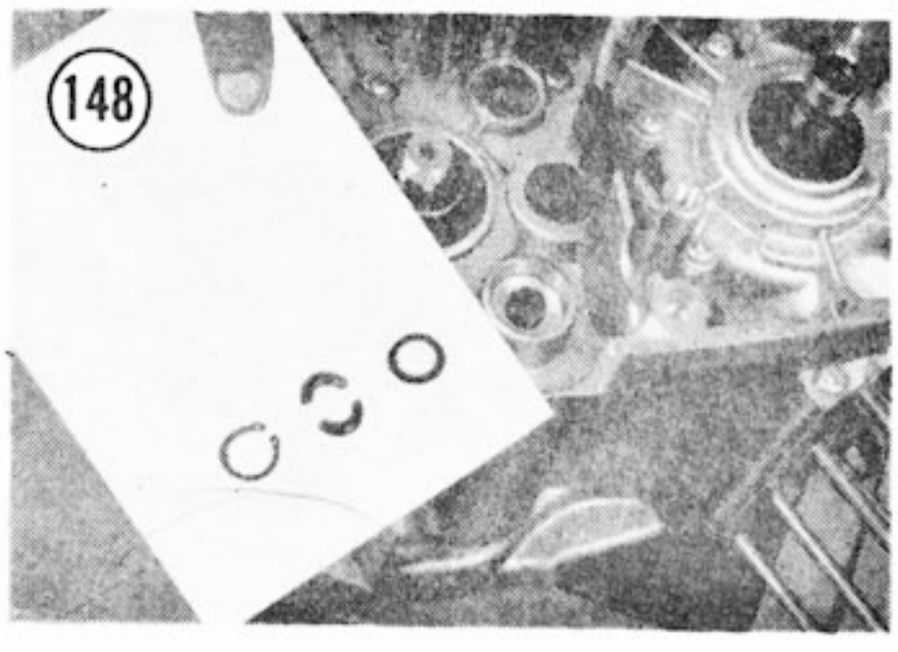
Model	Type
HS1, HS1-B, LS-2	1
YL1, YL1-E	2
YAS1, YAS1-C, AS2C	1
YCS-1, YCS1-C	1
CS3-B, CS3-C, CS5	1
DS6, DS6-B, DS6-C, DS7	3
YDS3, YDS3-C, YM1	3
YDS5	3
YM2, YM2-C	3
YR1, YR2, YR2-C	4
R3, R3-C	4
R5, R5-B, R5-C	5
RD250, RD250A	6
RD350, RD350A	6

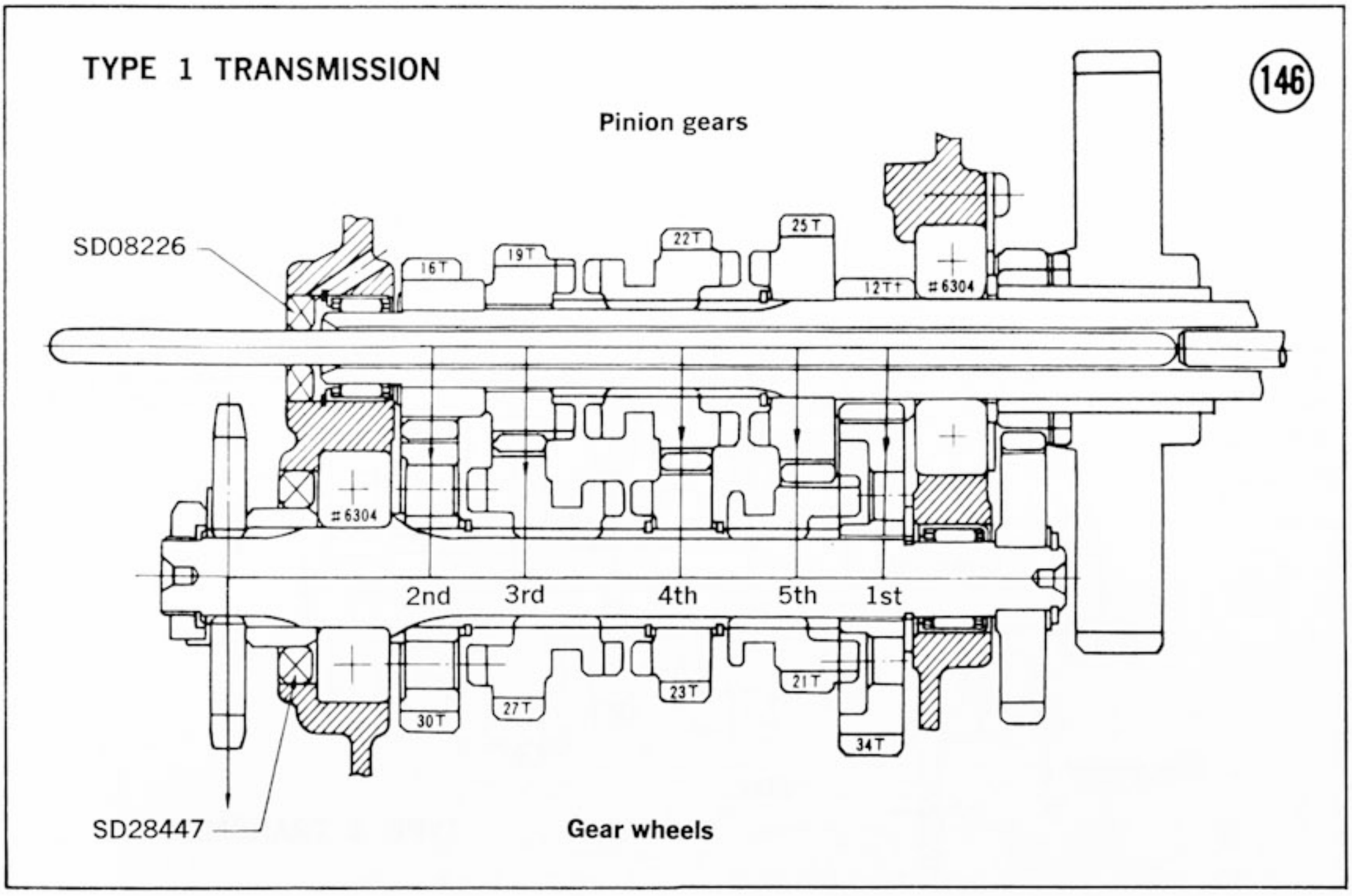
Type 1 Transmission

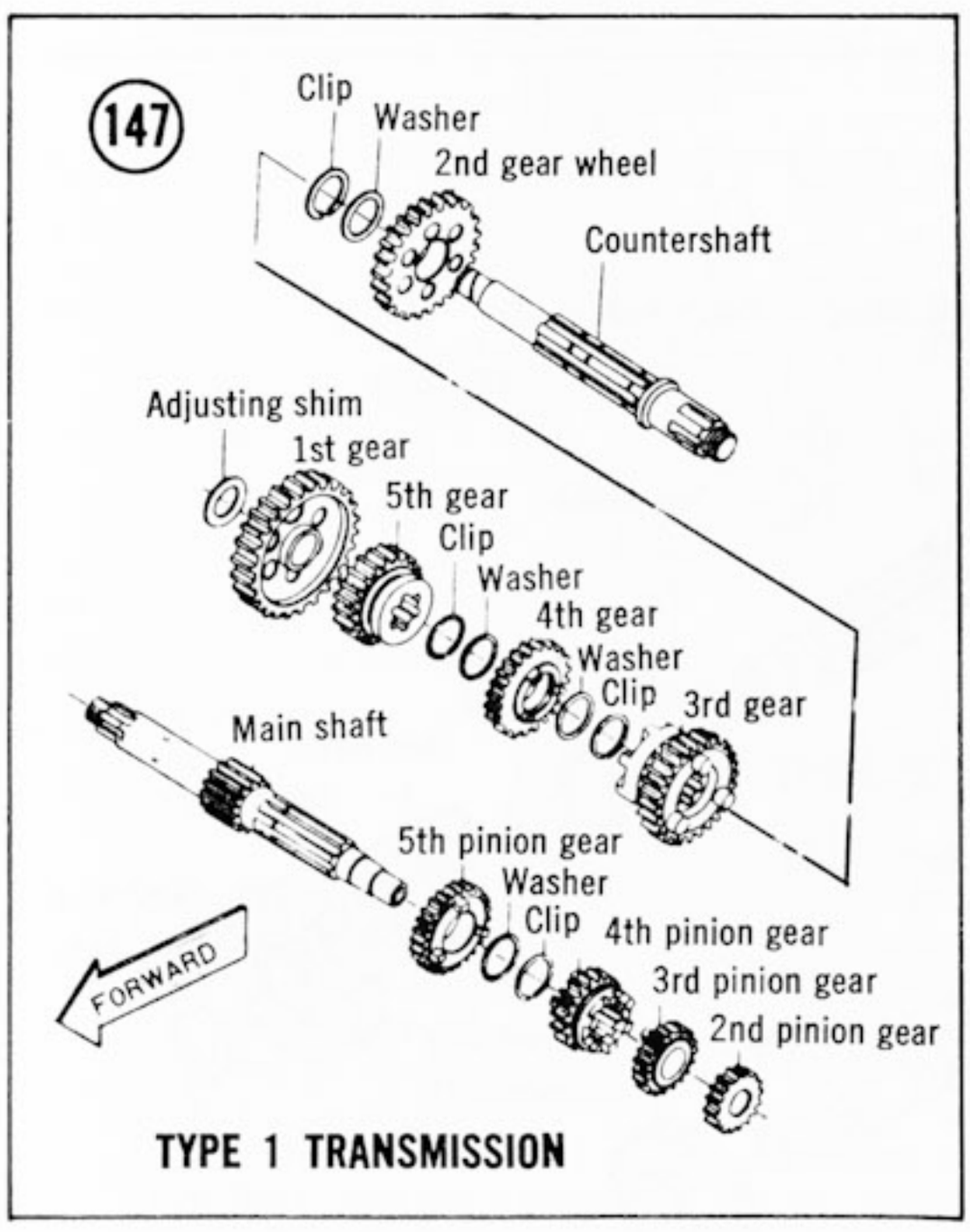
Figures 146 and 147 are sectional and exploded views of this transmission. Refer to the specifications for the individual gear ratios for your model.

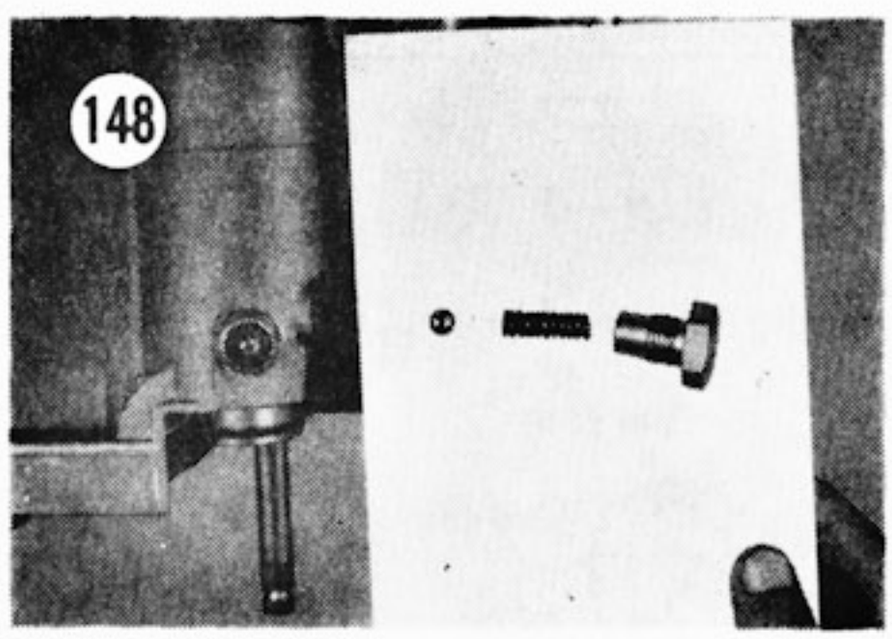
To remove the transmission, first remove the snap ring, retainers, and washer from the shift drum (**Figure 148**), then remove the neutral stop (**Figure 149**). Use a soft mallet to drive out the transmission and shifter as a unit.

Be very careful to check for shims on either end of both shafts. Once the transmission has been removed, check inside each case, against the transmission shaft bearings, to see if any shims are stuck to the bearings.









Upon reinstallation, install the transmission and shifter as a unit. Be careful not to assemble the crankcase with the transmission in first gear.

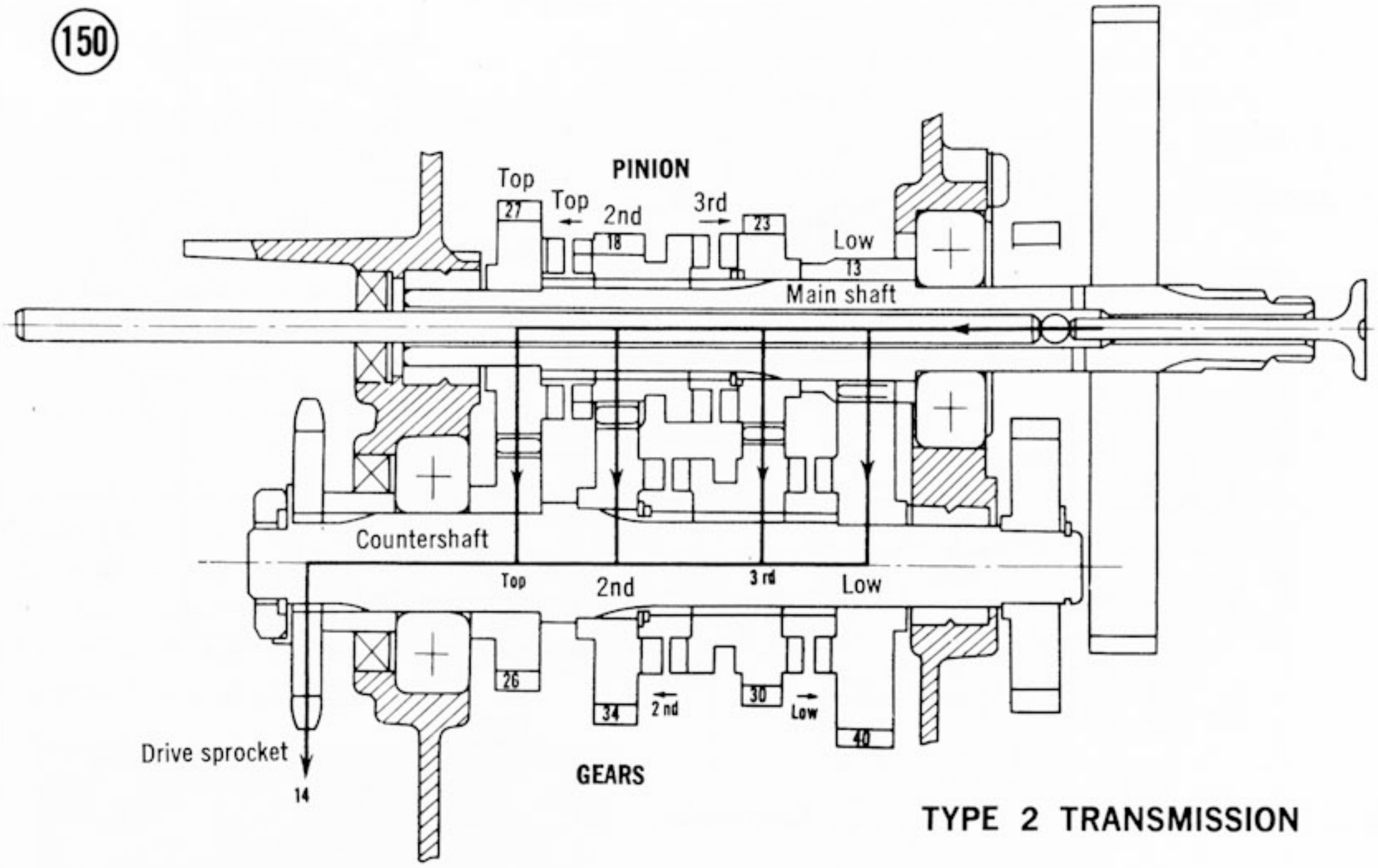
Type 2 Transmission

Type 2 transmissions are used on YL1 and YL1-E models. This is a four-speed transmission; all others have five speeds. **Figures 150 and 151** are sectional and exploded views of this transmission.

Remove the shift drum mounting bolt. This bolt is on the left side of the crankcase. Use a soft mallet to drive the transmission and shifter assembly from the crankcase. The shifter and transmission are replaced as a unit. Be sure that you install all washers properly.

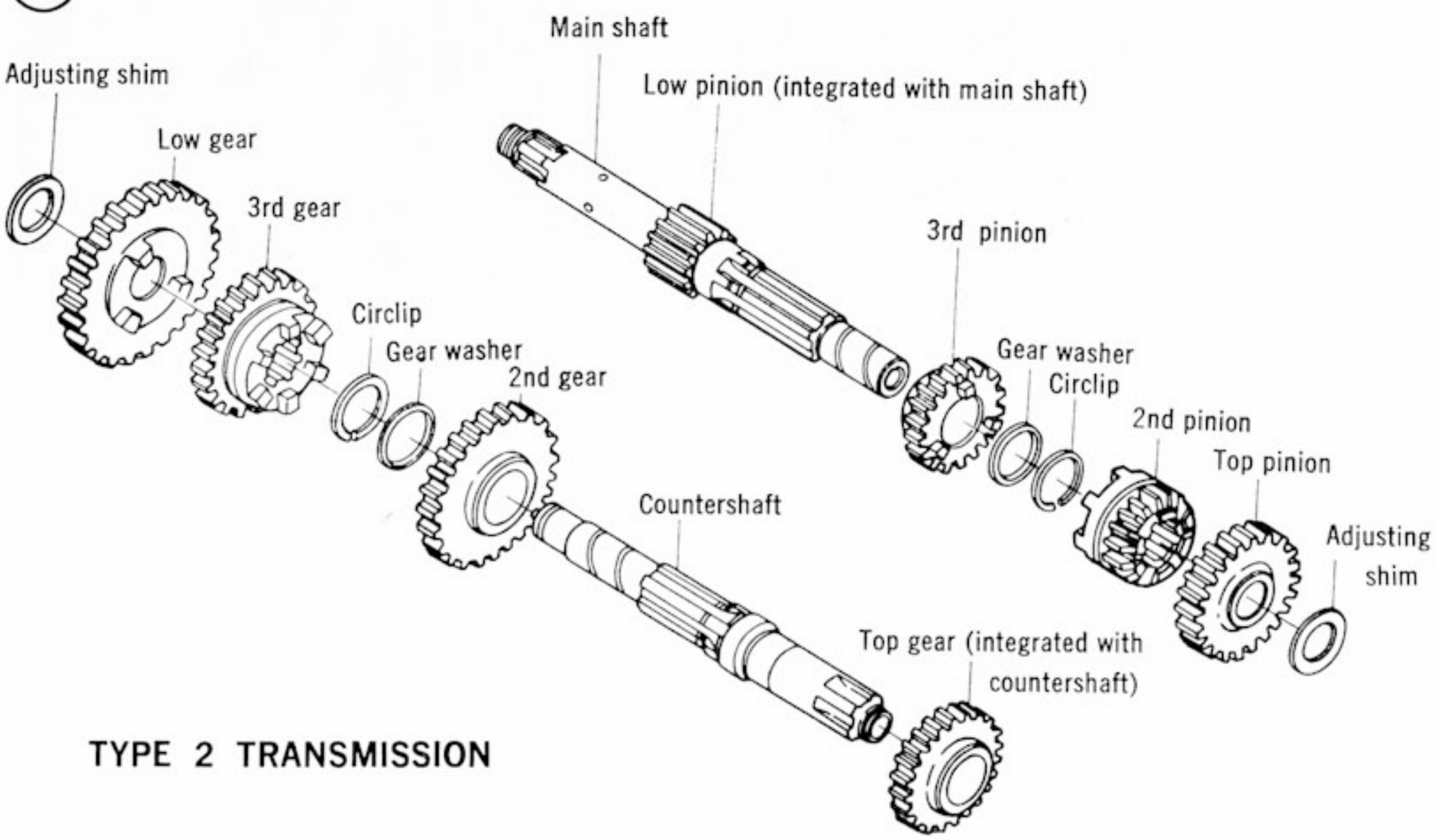
Be very careful to check for shims on either end of both shafts. Once the transmission has

150



TYPE 2 TRANSMISSION

151



TYPE 2 TRANSMISSION

been removed, check inside each case, against the transmission shaft bearings, to see if any shims are stuck to the bearings.

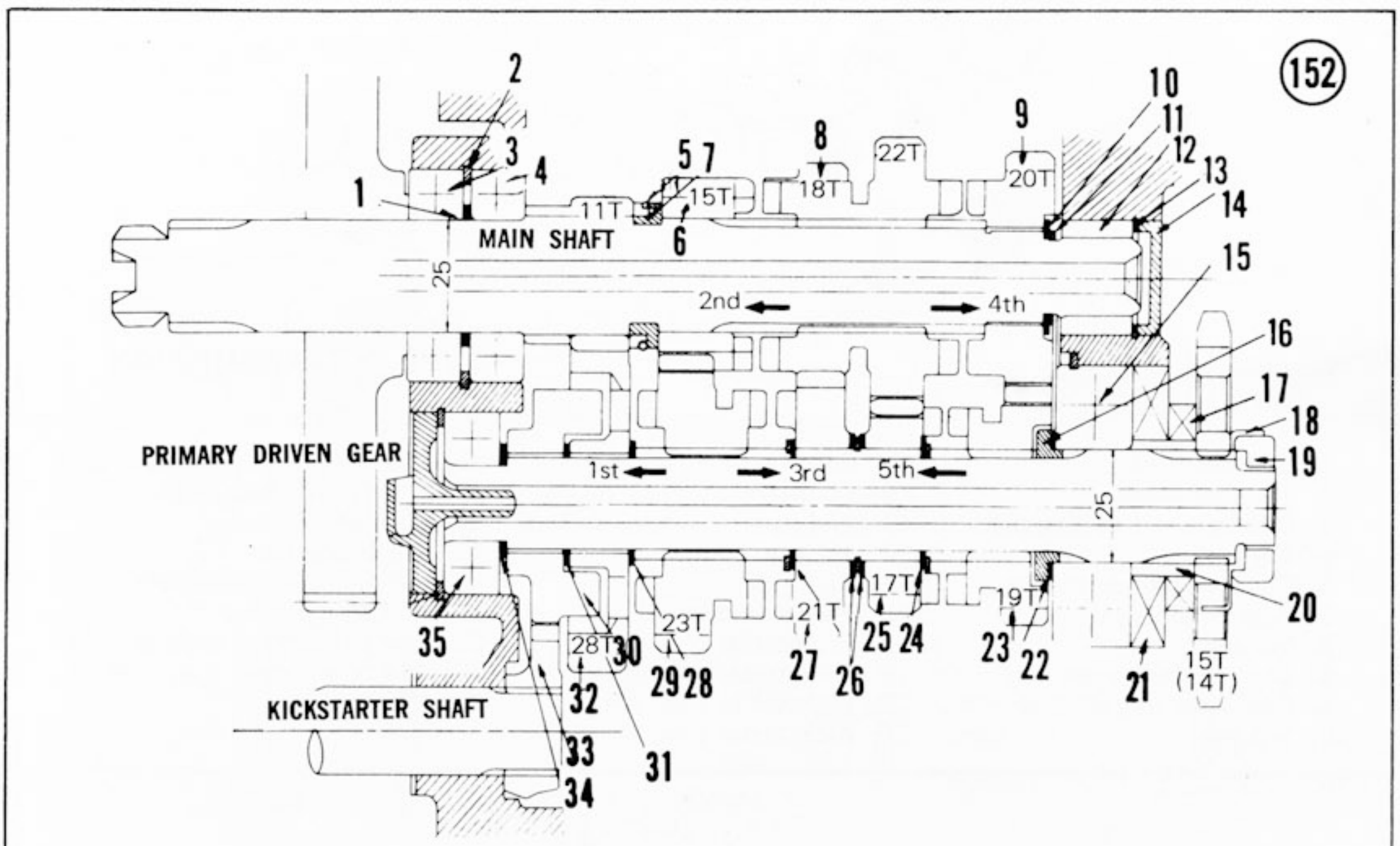
Type 3 Transmission

Figures 152 and 153 are sectional and exploded views of the Type 3 transmission. Notice that a portion of the kickstarter mechanism is incorporated into the transmission.

Remove the transmission by alternately tapping the ends of both transmission shafts to drive them from the left crankcase half. When you replace the transmission, be sure that all washers are installed properly.

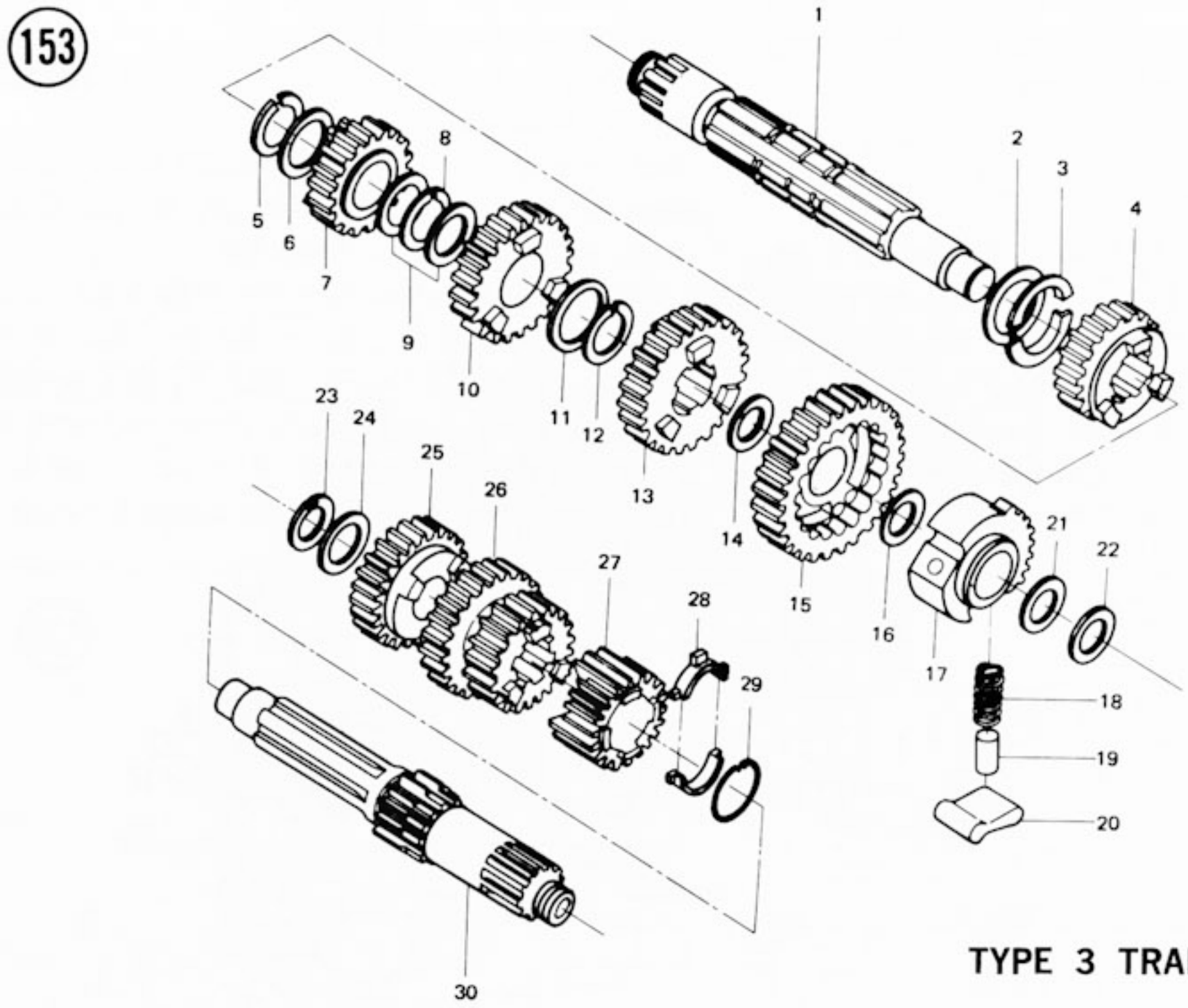
Be very careful to check for shims on either end of both shafts. Once the transmission has been removed, check inside each case, against the transmission shaft bearings, to see if any shims are stuck to the bearings.

Figure 154 shows how to mesh the kick pinion with the kick gear; notice the position of the teeth in relation to each other. In this position the kick lever can be fully depressed and the teeth will remain engaged. Also note that both kick pawls that spring out to cause kickstarter



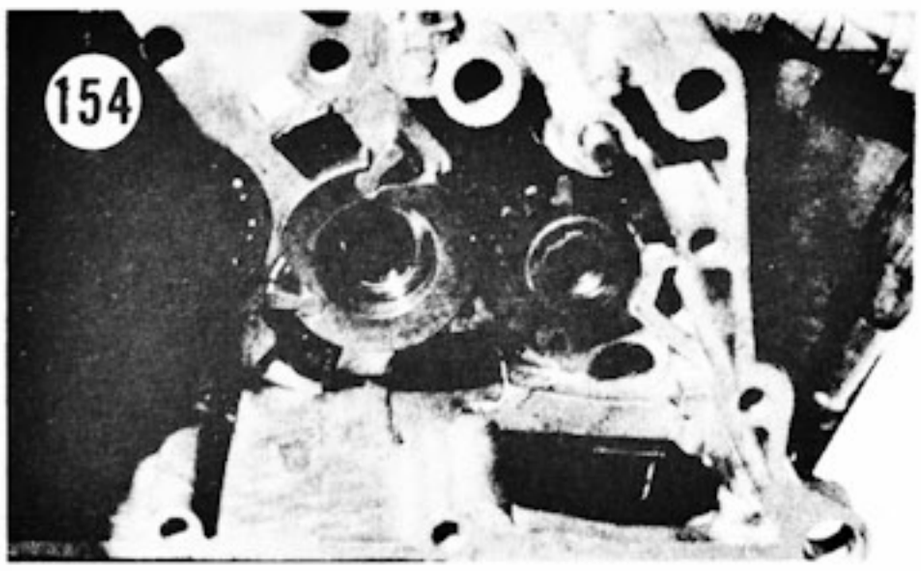
TYPE 3 TRANSMISSION

1. Spacer
2. Main shaft bearing clip
3. Main shaft bearing
4. Main shaft bearing
5. 2nd pinion retaining clip
6. 2nd pinion gear
7. 2nd pinion setting plate
8. 3rd and 5th pinion gears
9. 4th pinion gear
10. Main shaft washer
11. Main shaft snap ring
12. Main shaft needle bearing
13. Needle bearing snap ring
14. Needle bearing plug
15. Countershaft bearing
16. Countershaft setting plate
17. Fuel ring
18. Sprocket lockwasher
19. Sprocket lock nut
20. Distance collar
21. Countershaft bearing
22. 4th gear shim
23. 4th gear
24. Gear retaining washer
25. 5th gear
26. Gear retaining washers
27. 3rd gear
28. 1st gear spacer
29. 2nd gear
30. Kick pinion
31. Thrust washer
32. 1st gear
33. Kick gear
34. Countershaft adjusting shim
35. Countershaft bearing



TYPE 3 TRANSMISSION

1. Countershaft
2. 4th gear shim
3. Countershaft setting plate
4. 4th gear
5. Countershaft snap ring
6. Gear retaining washer
7. 5th gear
8. Countershaft snap ring
9. Gear retaining washer
10. 3rd gear
11. Gear retaining washer
12. Countershaft snap ring
13. 2nd gear
14. 1st gear spacer
15. Kick gear
16. Thrust washer
17. Kickstarter pinion gear
18. Kickstarter pawl spring
19. Kickstarter pawl pin
20. Kickstarter pawl
21. Countershaft adjustment shim
23. Main shaft snap ring
24. Main shaft washer
25. 4th pinion gear
26. 3rd and 5th pinion gear
27. 2nd pinion gear
28. 2nd pinion gear setting plate
29. 2nd pinion gear snap ring
30. Main shaft



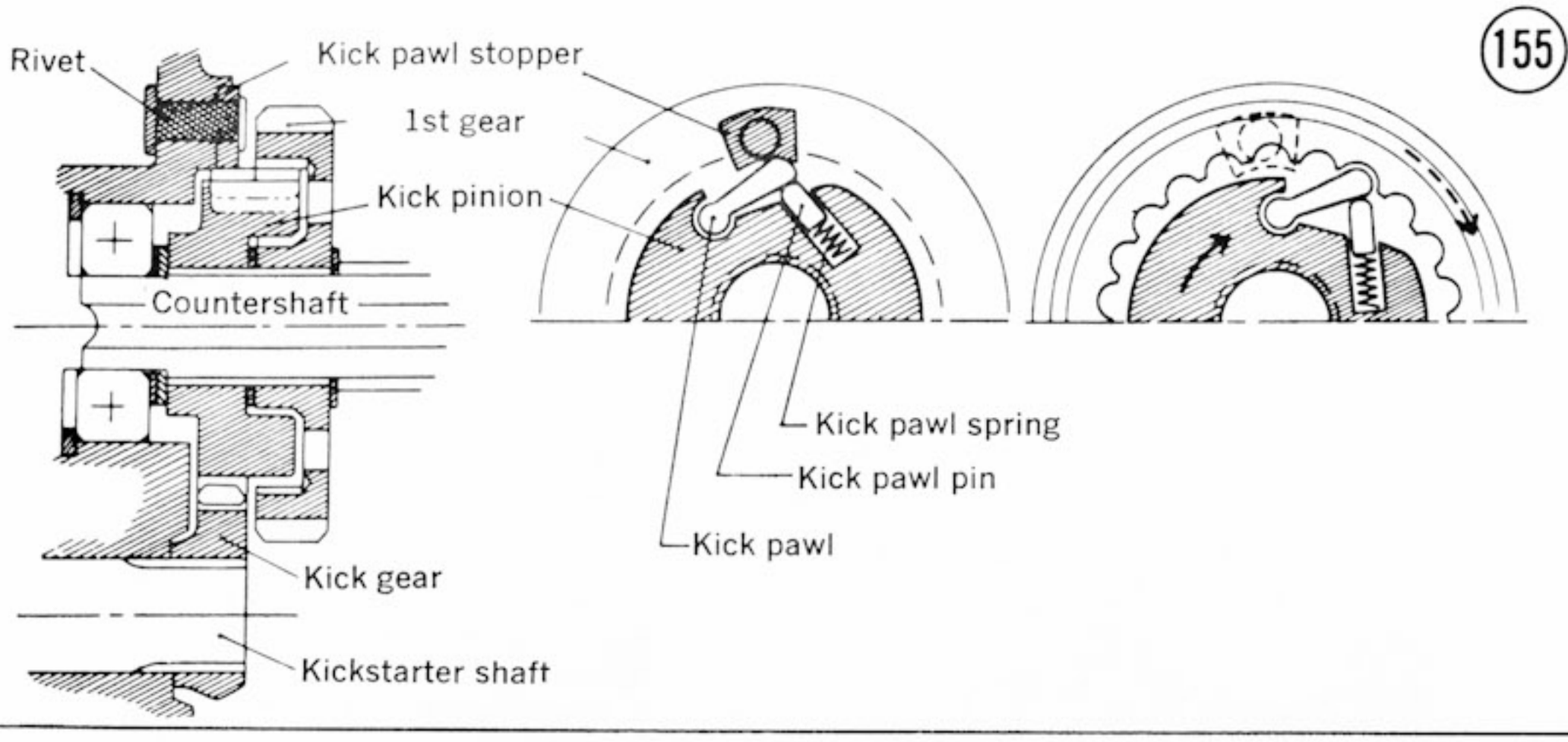
engagement are held inward by the kick pawl stoppers. **Figure 155** gives precise positioning detail. If either kick pawl stopper is loose, support the stopper and press or hammer the rivet end tight against the case.

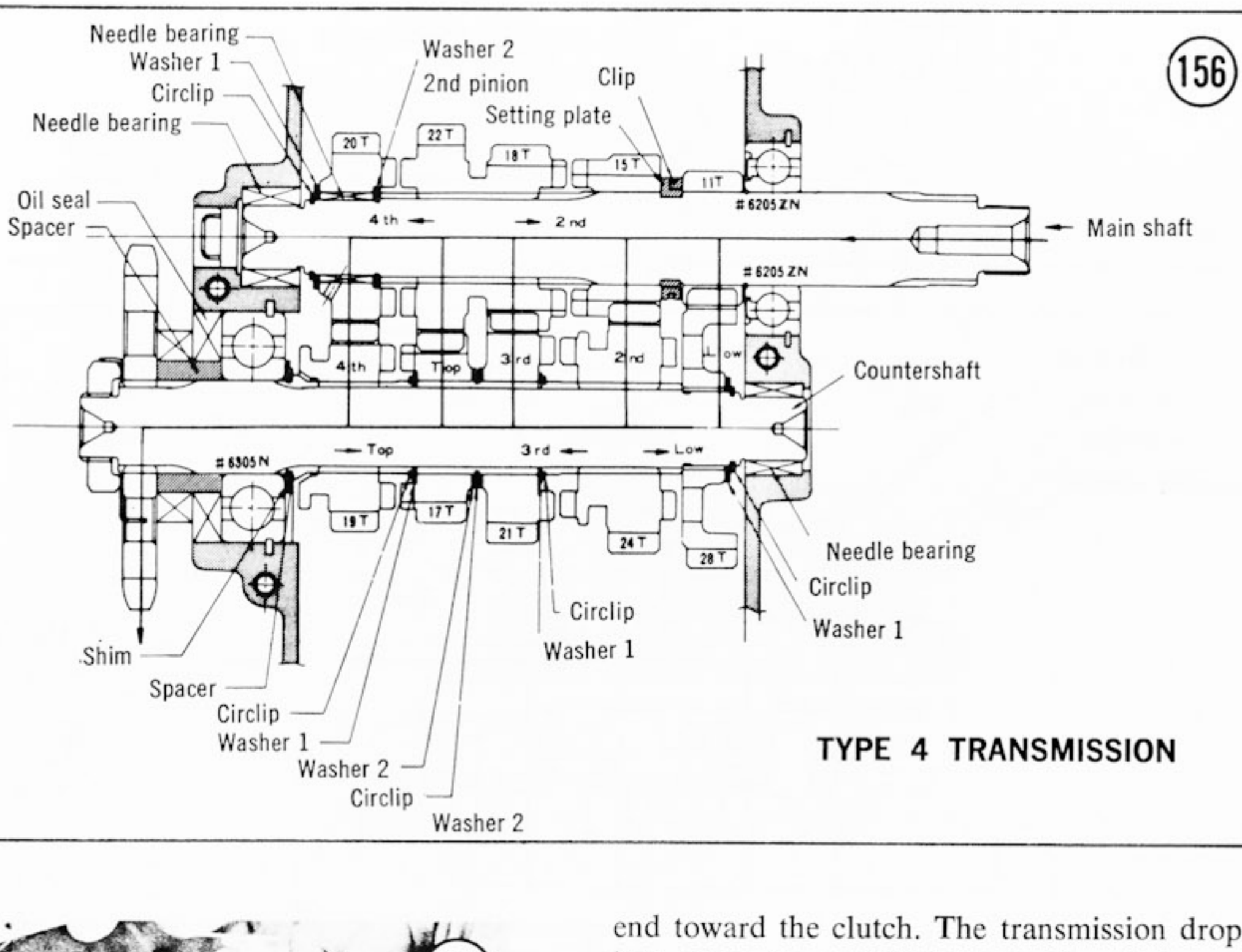
Install the drive shaft assembly, meshing it with each gear on the mainshaft. Alternately tap the end of each shaft with a plastic mallet to drive them in place. Be sure the gears are correctly meshed as you do so.

Type 4 Transmission

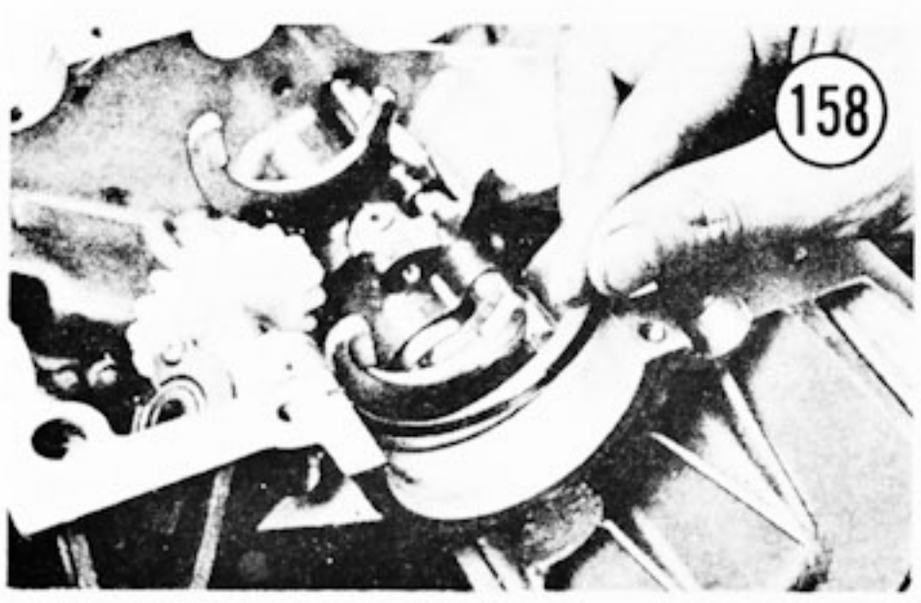
Figures 156 (next page) **and 157** (page 92) show views of the Type 4 transmission.

To remove this transmission, lift it from the crankcase. It may be necessary to tap the shafts lightly with a soft mallet. Install the oil seal on the transmission shaft before you replace the transmission. Install the snap ring half (**Figure 158**) on the transmission drive shaft on the





TYPE 4 TRANSMISSION

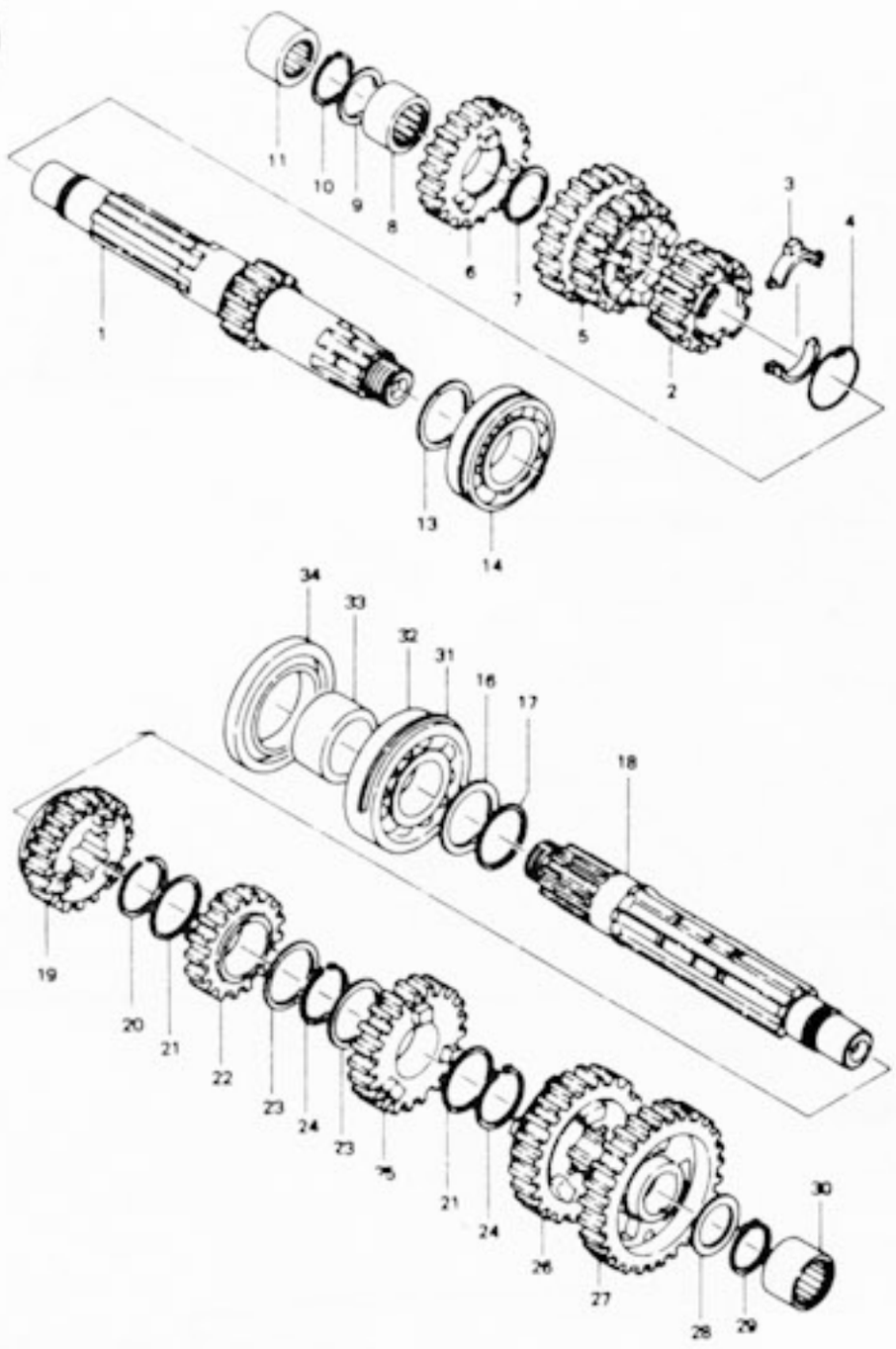


end toward the clutch. The transmission drops into place. Be careful that you do not damage the oil seal.

Type 5 Transmission

Figures 159 and 160 are exploded and sectional views of this transmission. Removal and replacement procedures are identical to those for the Type 4 transmission.

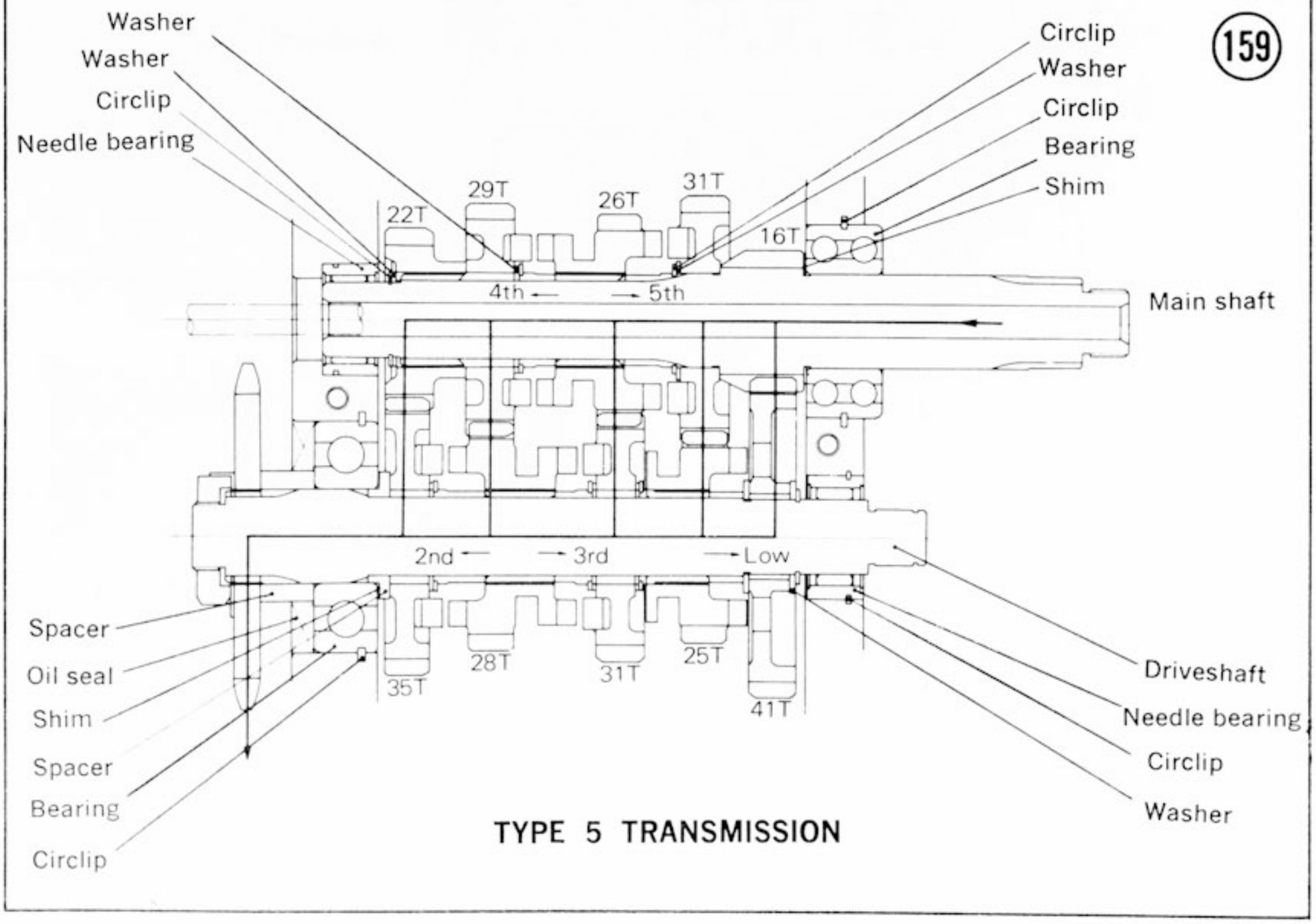
157



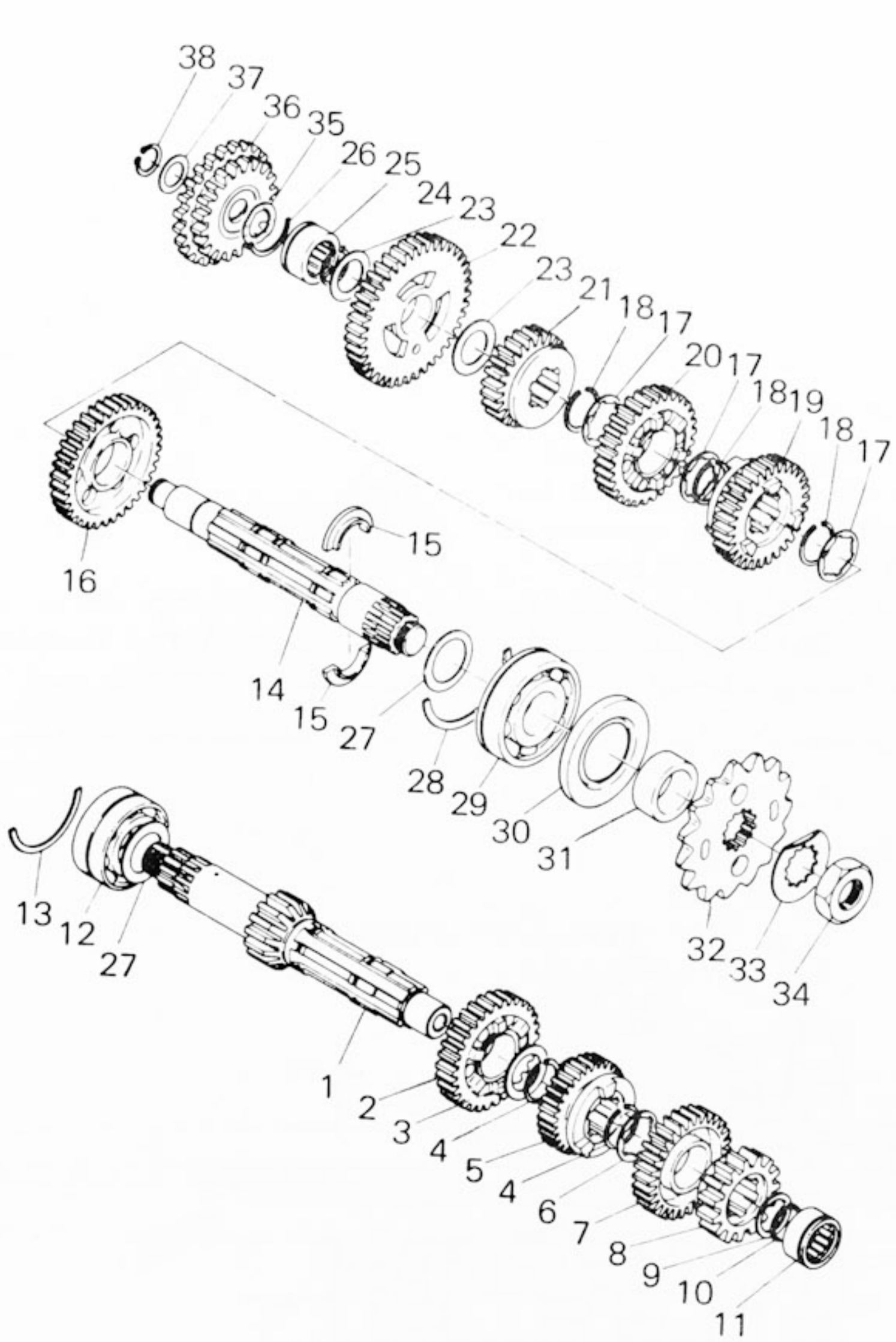
TYPE 4 TRANSMISSION

1. Main shaft
2. 2nd pinion gear
3. 2nd pinion setting plate
4. Clip
5. 3rd and 5th pinion gear
6. 4th pinion gear
7. Washer 2
8. Needle bearing
9. Washer 1
10. Circlip
11. Needle bearing
13. Shim
14. Bearing
16. Shim
17. Spacer
18. Countershaft
19. 4th gear
20. Circlip
21. Washer 1
22. 5th gear
23. Washer 2
24. Circlip
25. 3rd gear
26. 2nd gear
27. 1st gear
28. Washer
29. Circlip
30. Bearing
31. Circlip
32. Bearing
33. Spacer
34. Oil seal

159



TYPE 5 TRANSMISSION



TYPE 5 TRANSMISSION

1. Main shaft
2. 5th pinion gear
3. Gear retaining washer
4. Snap ring
5. 3rd pinion gear
6. Gear retaining washer
7. 4th pinion gear
8. 2nd pinion gear
9. Gear retaining washer
10. Snap ring
11. Bearing
12. Bearing
13. Snap ring
14. Countershaft
15. Countershaft spacer
16. 2nd gear
17. Gear retaining washer
18. Snap ring
19. 4th gear
20. 5th pinion gear
21. 5th gear
22. 1st gear
23. Gear retaining washer
24. Snap ring
25. Bearing
26. Snap ring
27. Countershaft shim
28. Snap ring
29. Bearing
30. Oil seal
31. Distance collar
32. Drive sprocket
33. Lockwasher
34. Lock nut
35. Waved washer
36. Idler gear assembly
37. Main shaft shim
38. Snap ring

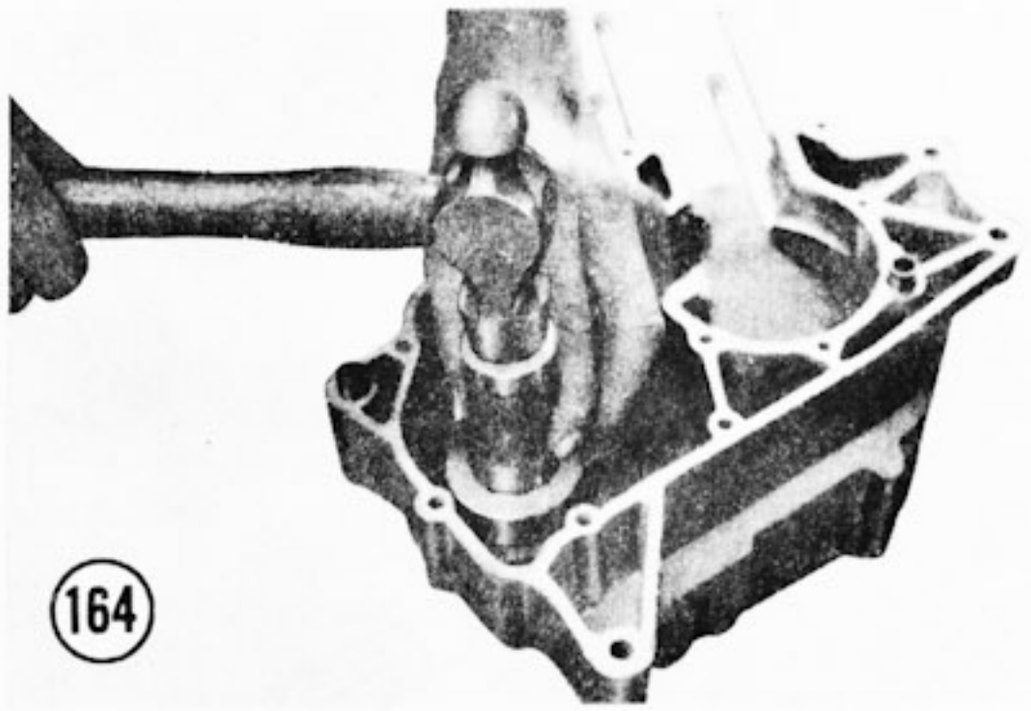
Inspect all parts closely. Replace any part which shows chips, cracks, or wear.

Type 6 Transmission

Figures 161 and 162 show a cross-sectional view and exploded view of the six-speed transmission. Removal from the case, and installation, are identical to the Type 4 transmission. Refer to that section for details.

BEARINGS AND OIL SEALS

Figure 163 (p. 96) shows bearings and oil seals in a typical engine with a vertically split crankcase. If possible, heat the crankcase to approximately 250 degrees F. (120 degrees C.) in an oven before removing or installing the bearings and oil seals. Do not use a torch, as this will cause uneven heating, warping, and metal fatigue. Pry out the old seals with a screwdriver. Always use new oil seals when you overhaul the engine. Remove the bearings with the bearing removal tool (**Figure 164**).

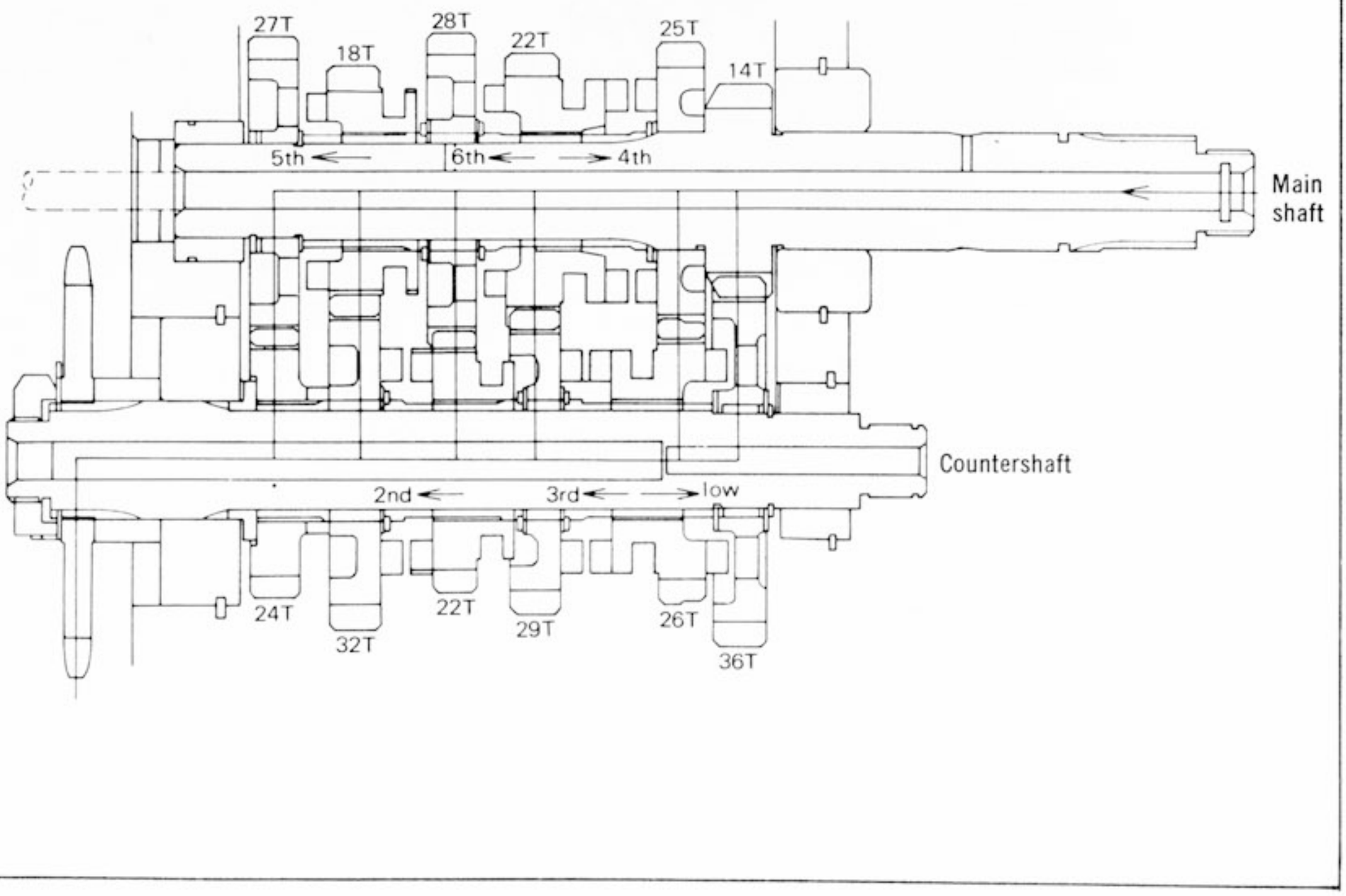


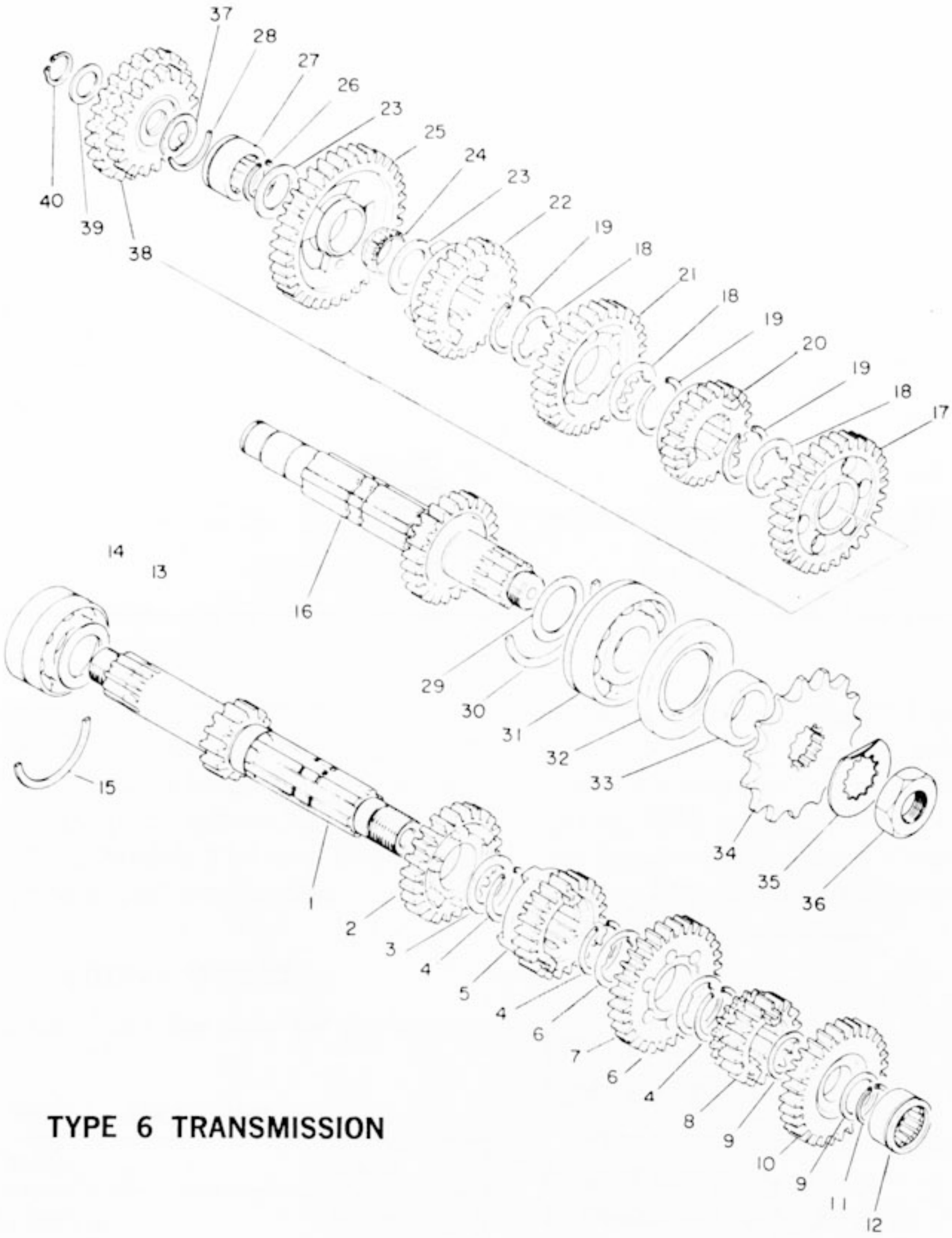
164

Install all bearings and oil seals with the markings outward. Pack the bearings with light grease before installation.

161

TYPE 6 TRANSMISSION



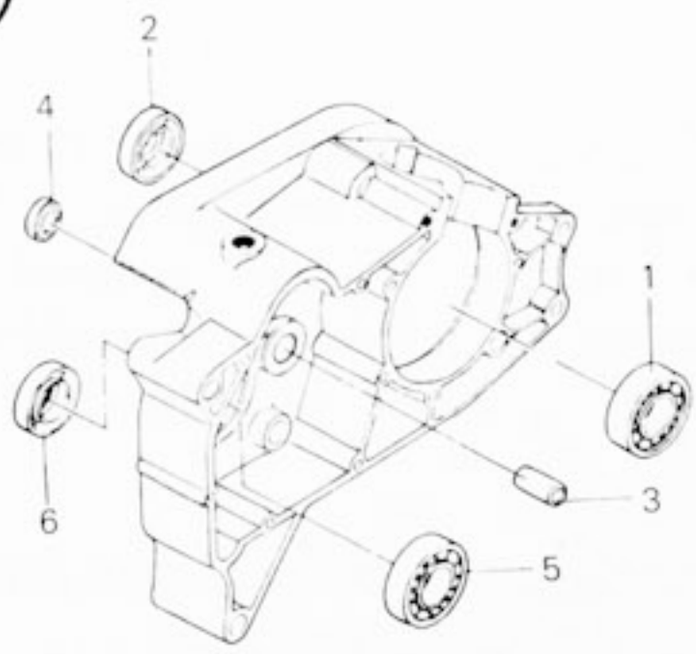


TYPE 6 TRANSMISSION

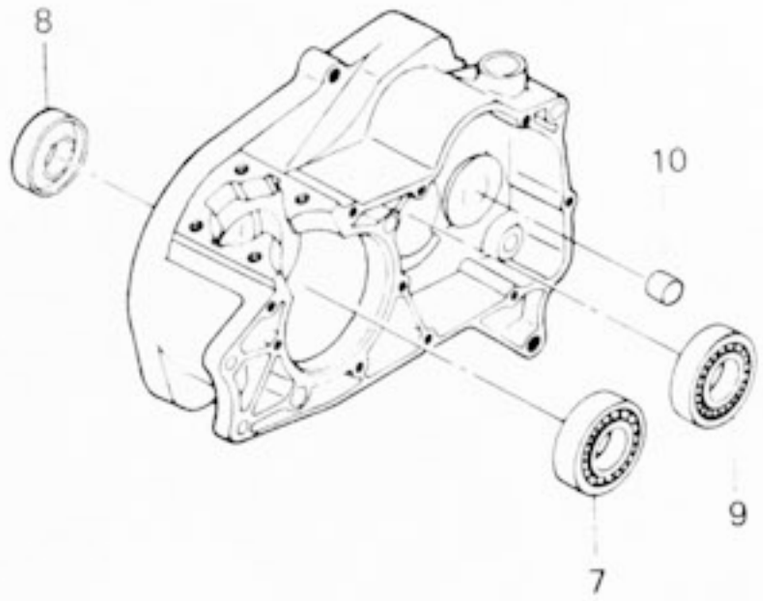
1. Main shaft
2. 4th pinion gear
3. Gear retaining washer
4. Snap ring
5. 3rd pinion gear
6. Gear retaining washer
7. 6th pinion gear
8. 2nd pinion gear
9. Gear retaining washer
10. 5th pinion gear
11. Snap ring
12. Bearing
13. Countershaft shim
14. Bearing
15. Snap ring
16. Countershaft
17. 2nd gear
18. Gear retaining washer
19. Snap ring
20. 6th gear
21. 3rd gear
22. 4th gear
23. Gear retaining washer
24. Bearing
25. 1st gear
26. Snap ring
27. Bearing
28. Snap ring
29. Countershaft shim
30. Snap ring
31. Bearing
32. Oil seal
33. Distance collar
34. Sprocket
35. Lockwasher
36. Lock nut
37. Waved washer
38. Idler gear assembly
39. Main shaft shim
40. Snap ring

163

LEFT HALF



RIGHT HALF



1. Bearing
2. Oil seal
3. Needle bearing
4. Oil seal
5. Bearing
6. Oil seal
7. Bearing
8. Oil seal
9. Bearing
10. Needle bearing

CHAPTER FIVE

CHASSIS, SUSPENSION, AND STEERING

The frames on most machines are of welded steel tubing. Oil-damped front forks are used on all models. The rear suspension system consists of a swinging arm, adjustable springs, and shock absorbers. Models YL1 and YL1-E have frames of pressed steel construction.

FRONT WHEEL

Table 1 lists front tire sizes for the various models.

Table 1 FRONT TIRE SIZES

Model	Tire Size
HS1, HS1-B	2.50-18
YL1, YL1-E	2.50-17
YAS1, YAS1-C, LS-2	2.50-18
AS2C	2.75-18
CS3-B, CS3-C, CS5	2.75-18
YCS-1, YCS1-C	2.50-18
YDS5	3.00-18
DS6, DS6-B, DS6-C, DS7	3.00-18
YDS3, YDS3-C, YM1	3.00-18
YM2, YM2-C	3.00-18
YR1, YR2, YR2-C	3.00-18
R3, R3-C	3.00-18
R5, R5-B, R5-C	3.00-18
RD250, RD250A	3.00-18
RD350, RD350A	3.00-18

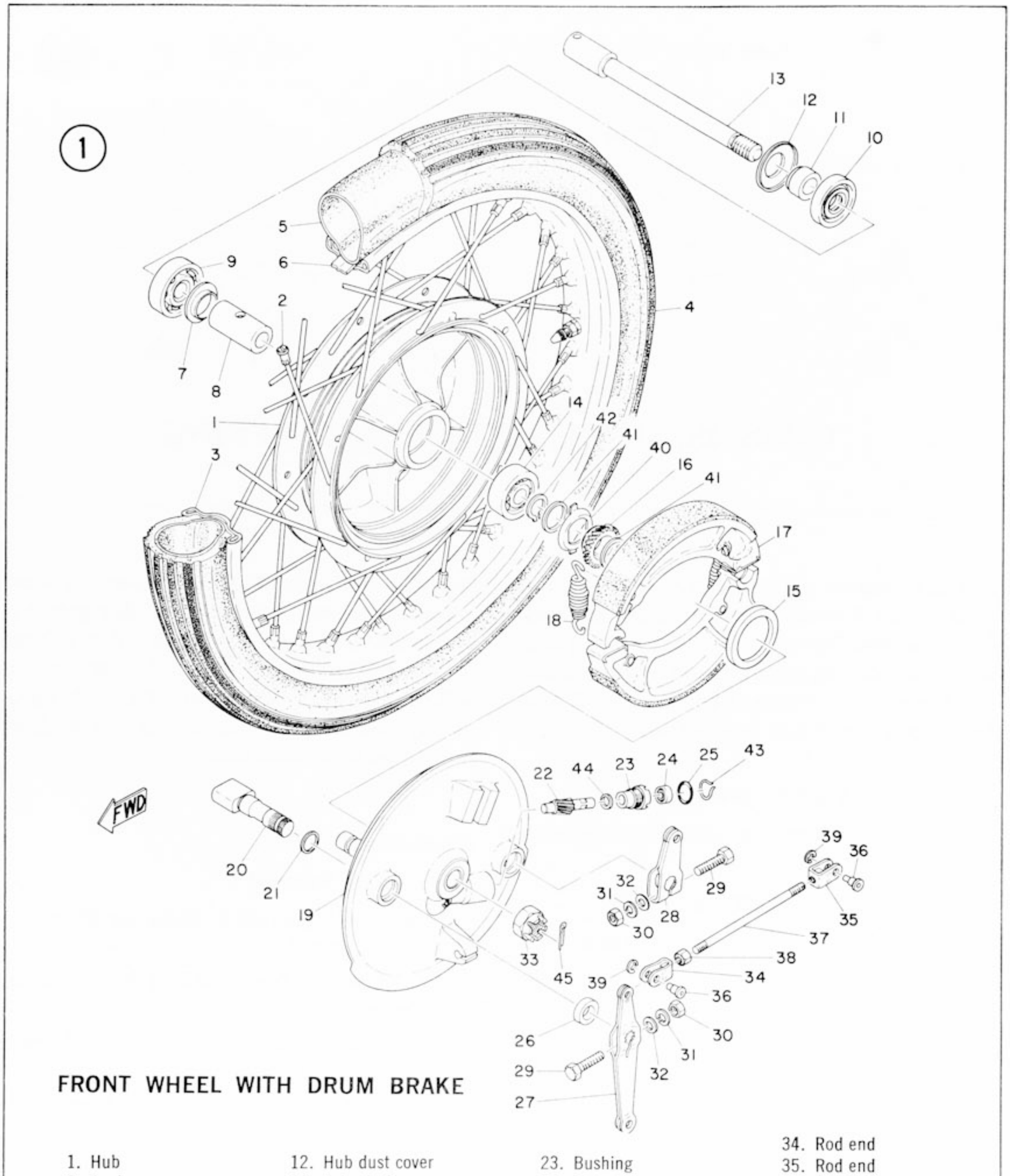
All models except the RD350 and RD350A are equipped with similar front wheel assemblies that include drum-type front brakes. **Figure 1** identifies this style. **Figure 2** shows the front wheel assembly, including the disc-type hydraulically operated front brake, that is used on the RD350 series. The following sections will describe each type of wheel assembly separately, including all maintenance. The drum brake type is covered first.

Drum Brake Models

Front Wheel Removal

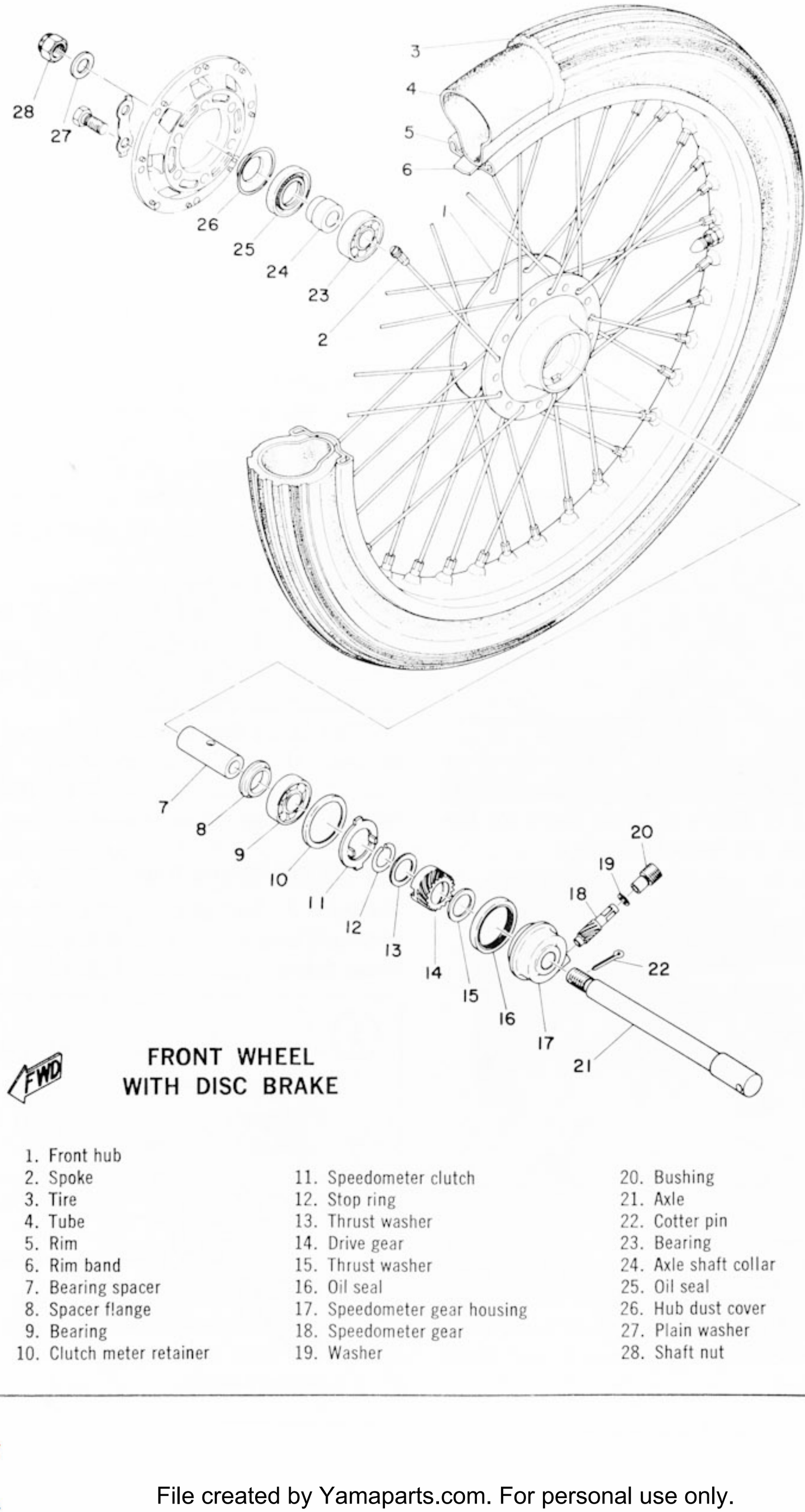
Front wheel removal is similar for all models. Proceed as follows.

1. Disconnect the brake cable at the front brake hand lever.
2. Disconnect the brake cable and speedometer cable at the front wheel hub.
3. Remove the front axle shaft nut. Remove the cotter pin on models so equipped.
4. Loosen the axle pinch bolts.
5. Raise the front of the motorcycle and support it on a box.
6. Insert the shank of a Phillips screwdriver through the hole in the end of the axle shaft, then simultaneously twist and pull the axle shaft to remove it.
7. Reverse the foregoing procedure to replace the wheel.



FRONT WHEEL WITH DRUM BRAKE

1. Hub
2. Spoke
3. Rim
4. Front tire
5. Tube
6. Rim band
7. Spacer flange
8. Bearing spacer
9. Bearing
10. Oil seal
11. Axle shaft collar
12. Hub dust cover
13. Axle shaft
14. Bearing
15. Oil seal
16. Drive gear
17. Brake shoe
18. Return spring
19. Brake shoe plate
20. Camshaft
21. Camshaft shim
22. Meter gear
23. Bushing
24. Oil seal
25. O-ring
26. Camshaft seal
27. Camshaft lever
28. Camshaft lever
29. Bolt
30. Nut
31. Spring washer
32. Plain washer
33. Axle shaft nut
34. Rod end
35. Rod end
36. Rod end pin
37. Connecting rod
38. Nut
39. Circlip
40. Meter clutch
41. Thrust washer
42. Circlip
43. Stop ring
44. Thrust washer
45. Cotter pin



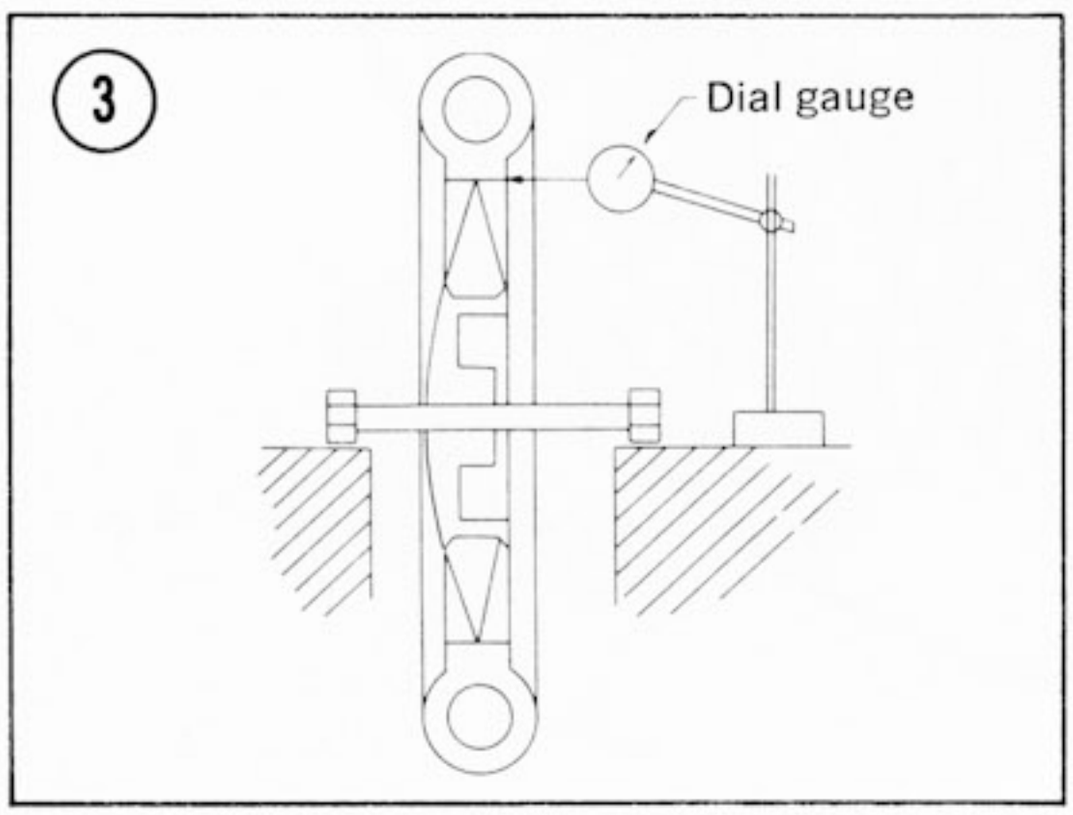
FRONT WHEEL
WITH DISC BRAKE

1. Front hub
2. Spoke
3. Tire
4. Tube
5. Rim
6. Rim band
7. Bearing spacer
8. Spacer flange
9. Bearing
10. Clutch meter retainer
11. Speedometer clutch
12. Stop ring
13. Thrust washer
14. Drive gear
15. Thrust washer
16. Oil seal
17. Speedometer gear housing
18. Speedometer gear
19. Washer
20. Bushing
21. Axle
22. Cotter pin
23. Bearing
24. Axle shaft collar
25. Oil seal
26. Hub dust cover
27. Plain washer
28. Shaft nut

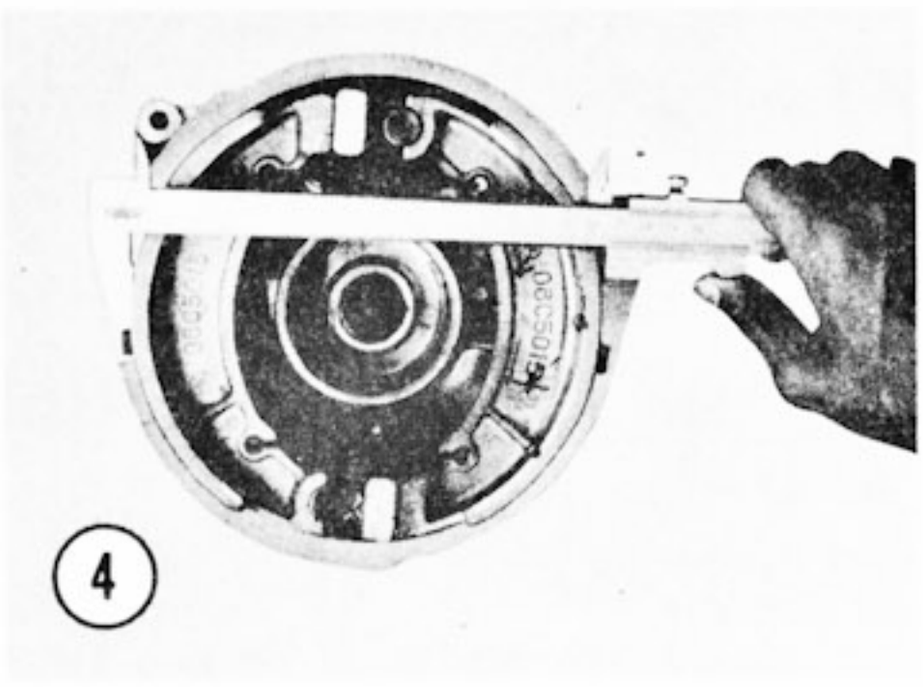
When inserting the axle, be sure the hub dust cover and wheel shaft (axle) collar (11 and 12, Figure 1) have been installed.

Front Wheel Inspection

To measure runout of the wheel rim, assemble the wheel and axle as shown in **Figure 3**. Observe the dial indicator as you rotate the wheel through a complete revolution. The runout limit for all models is 0.07 inch (2 millimeters). Excessive runout may be caused by a bent wheel rim or loose spokes. Repair or replace as required.



To check the front brake for wear, measure the outside diameter of the brake shoe assembly as shown in **Figure 4**. Wear limits for the various models are listed in **Table 2**.



If the contact surface of the brake shoe is glazed, scratched, scarred, or shows high spots (localized shiny spots), smooth the surface with a dry type sandpaper or a hand file. Do not allow moisture, especially oil, to touch the brake contact surface.

Table 2 BRAKE SHOE DIAMETER

Model	Minimum Diameter
HS1, HS1-B, LS-2	4.14 inches (105mm)
YL1, YL1-E	4.14 inches (105mm)
YAS1, YAS1-C, AS2C	4.92 inches (125mm)
CS3-B, CS3-C, CS5	6.9 inches (175mm)
YCS-1, YCS1-C	6.9 inches (175mm)
YDS5	6.9 inches (175mm)
DS6, DS6-B, DS6-C, DS7	6.9 inches (175mm)
YDS3, YDS3-C, YM1	6.9 inches (175mm)
YM2, YM2-C	6.9 inches (175mm)
YR1, YR2, YR2-C	6.9 inches (175mm)
R3, R3-C	6.9 inches (175mm)
R5, R5-B, R5-C	6.9 inches (175mm)
RD250, RD250A	6.9 inches (175mm)

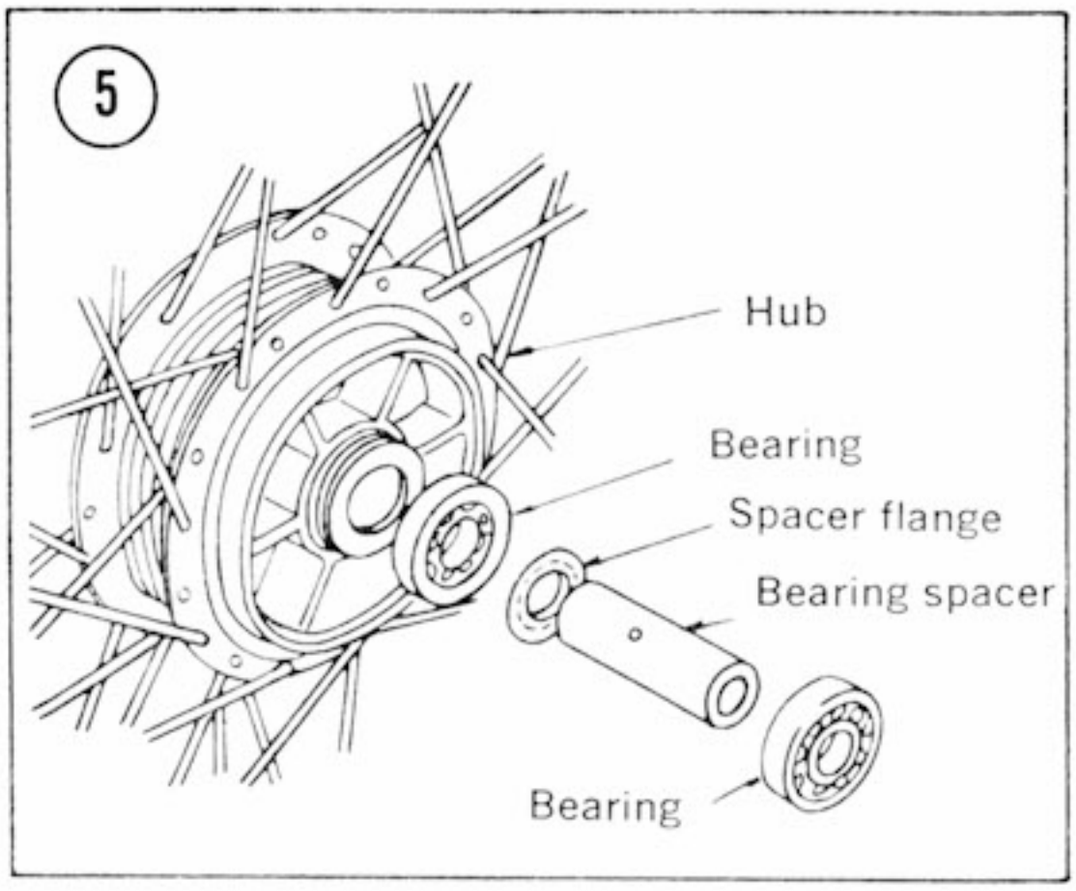
Examine the inner surface of the brake drum. Oil, grease, grooves, or scratches will result in noise or impaired braking performance, and should be considered dangerous. Smooth the inner surface of the drum with sandpaper and then clean it with a rag soaked in lacquer thinner.

Check spokes for looseness and bending. Loose spokes should be tightened and bent spokes should be replaced. If the machine is subjected to severe service, the spokes should be checked at regular intervals.

Other items that should be checked include the tire, axle shaft, speedometer drive gear, and front wheel grease seal. Check the front wheel bearing for roughness or excessive play.

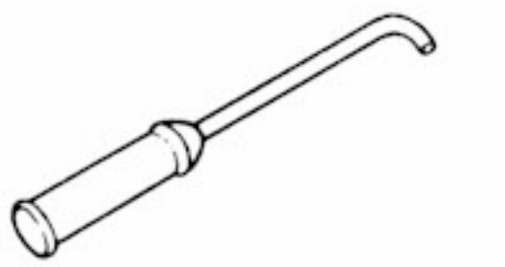
Front Wheel Bearing Replacement

Figure 5 illustrates a typical front hub assembly. To disassemble the hub and replace the wheel bearings, proceed as follows.



1. Clean the dirt from the outside of the front wheel hub.

2. If possible, make a tool like that shown in **Figure 6**; otherwise use a long thin punch. Place the end of the tool into the hole in the center of the bearing spacer. Tap the tool with a hammer to drive the bearing out.



6

Insert the bent end of the tool into the hole in the center of the bearing spacer.

3. Remove the other bearing in a similar manner.

4. To install the wheel bearings, reverse the foregoing procedure. Be sure to grease the wheel bearings before you install them. Use the bearing fitting tool for installation.

Disc Brake Models

Front Wheel Removal

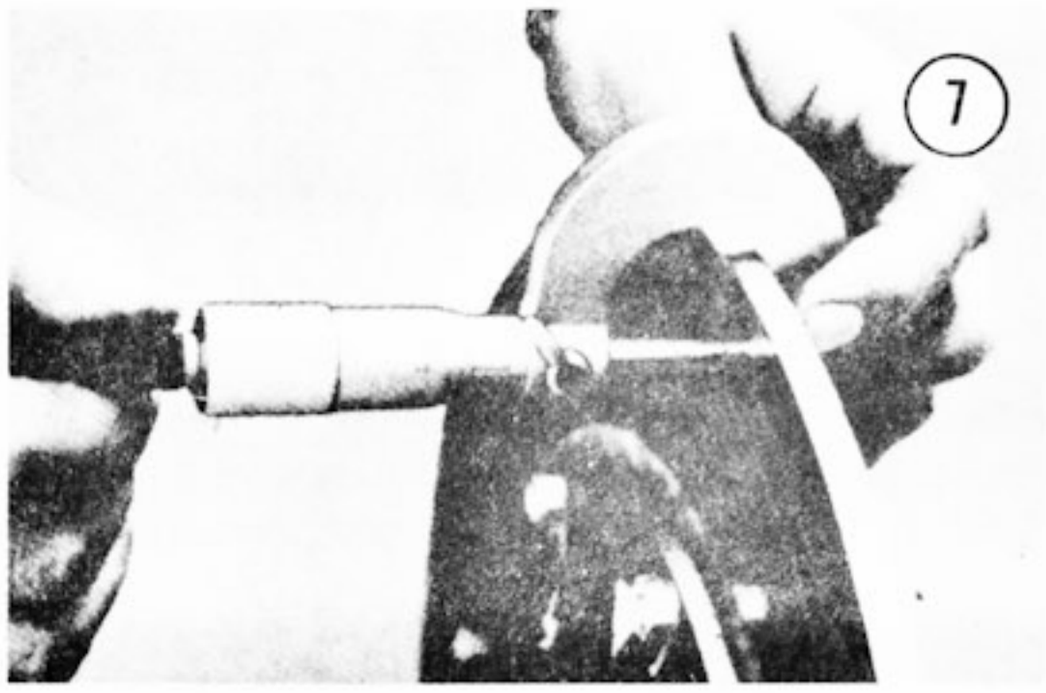
To remove the front wheel, prop the machine on a box so that the front wheel is in the air. Disconnect the speedometer cable, remove the axle cotter pin, unscrew the axle bolt, loosen the front axle pinch bolts (bottom of the fork leg), and pull out the axle from the left side. The wheel will now fall free.

Front Wheel Inspection

For service and replacement information on bearings, rim runout, and spokes, refer to the previous section describing the drum brake type front wheel unit. The information is valid for both types.

Brake Disc Inspection

The disc contact surface will become scarred and develop blue discoloration from normal use. If the disc is worn to less than .250 inch (6.5mm), as measured in **Figure 7**, replace it. If



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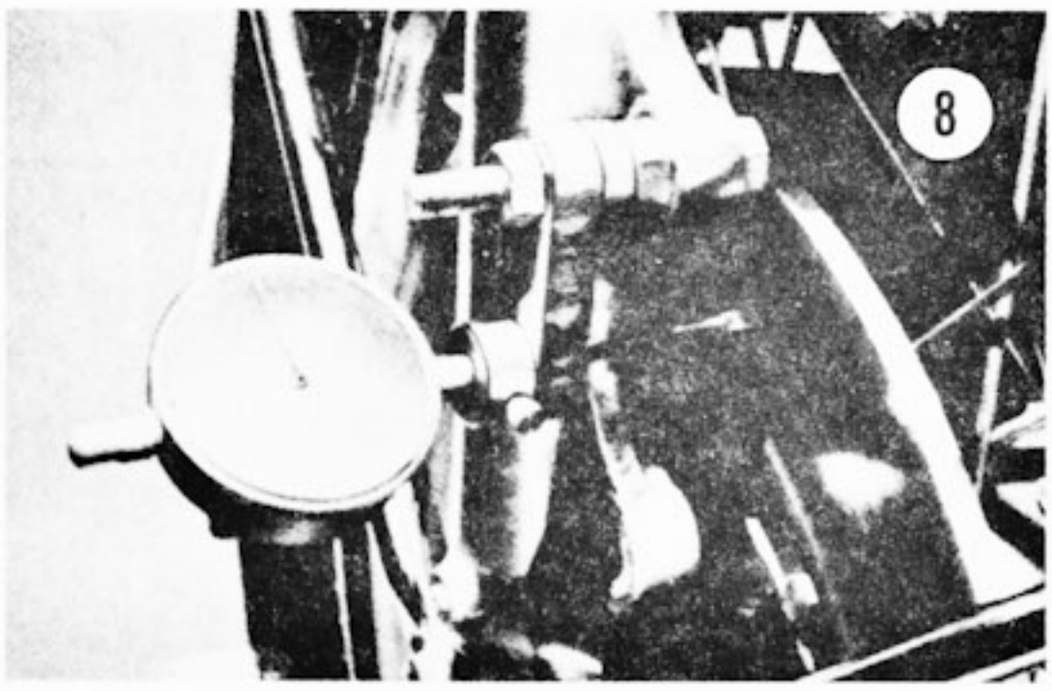
it has more than .006 inch (.15mm) runout as measured in **Figure 8**, check the bearings for wear or the disc for warpage. Replace parts as needed to reduce runout to an acceptable amount.



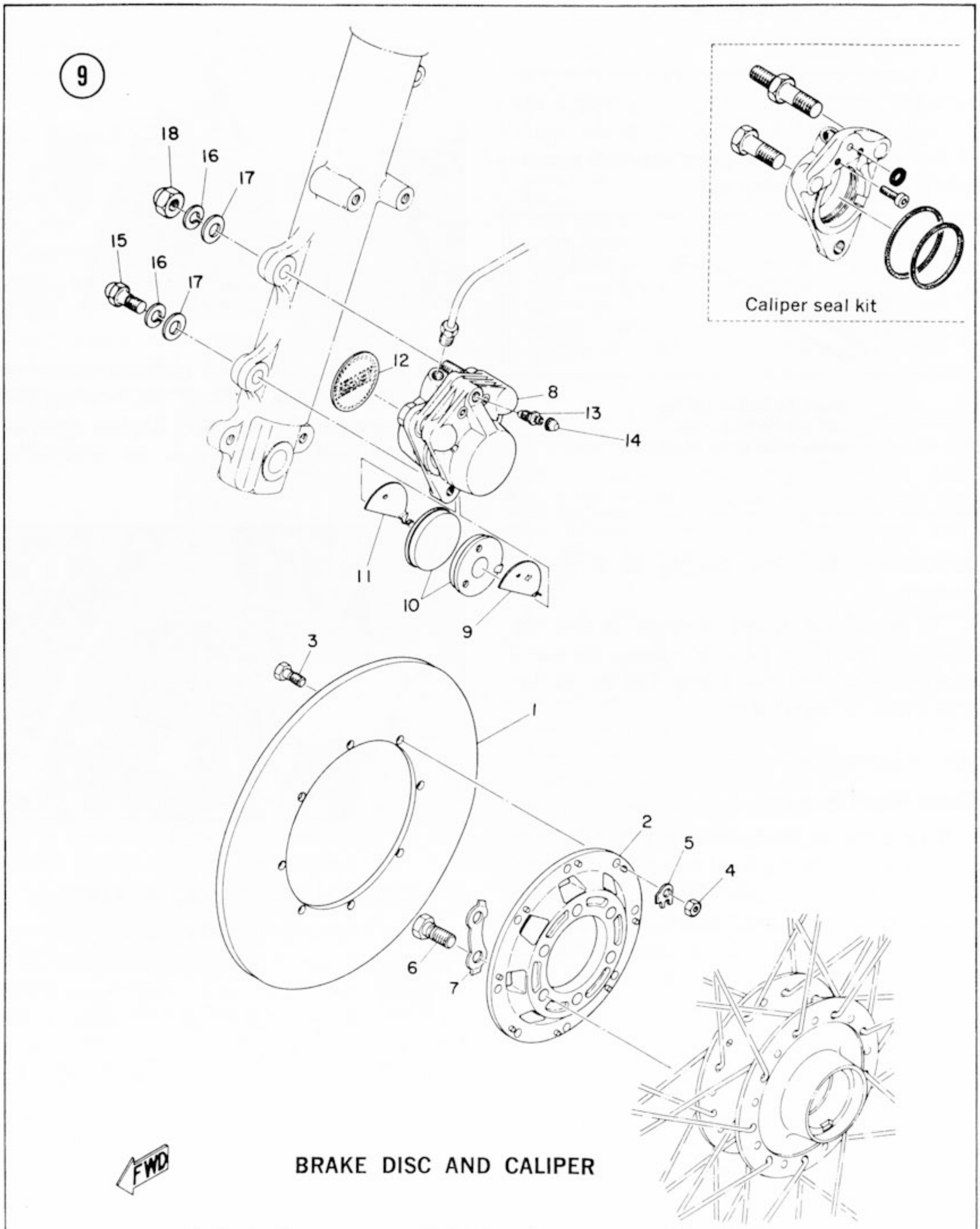
8

HYDRAULIC BRAKE SYSTEM

The RD350 and RD350A are equipped with hydraulically operated front disc brakes. This system includes a hydraulic pumping chamber on the handlebar, a flexible brake hose to the front wheel, and a caliper and caliper housing to grip the disc fastened to the front hub. The following information describes disassembly and assembly procedures, plus maintenance steps and wear tolerances. All steps listed are keyed to **Figures 9 and 10**; refer to these illustrations for visual details.

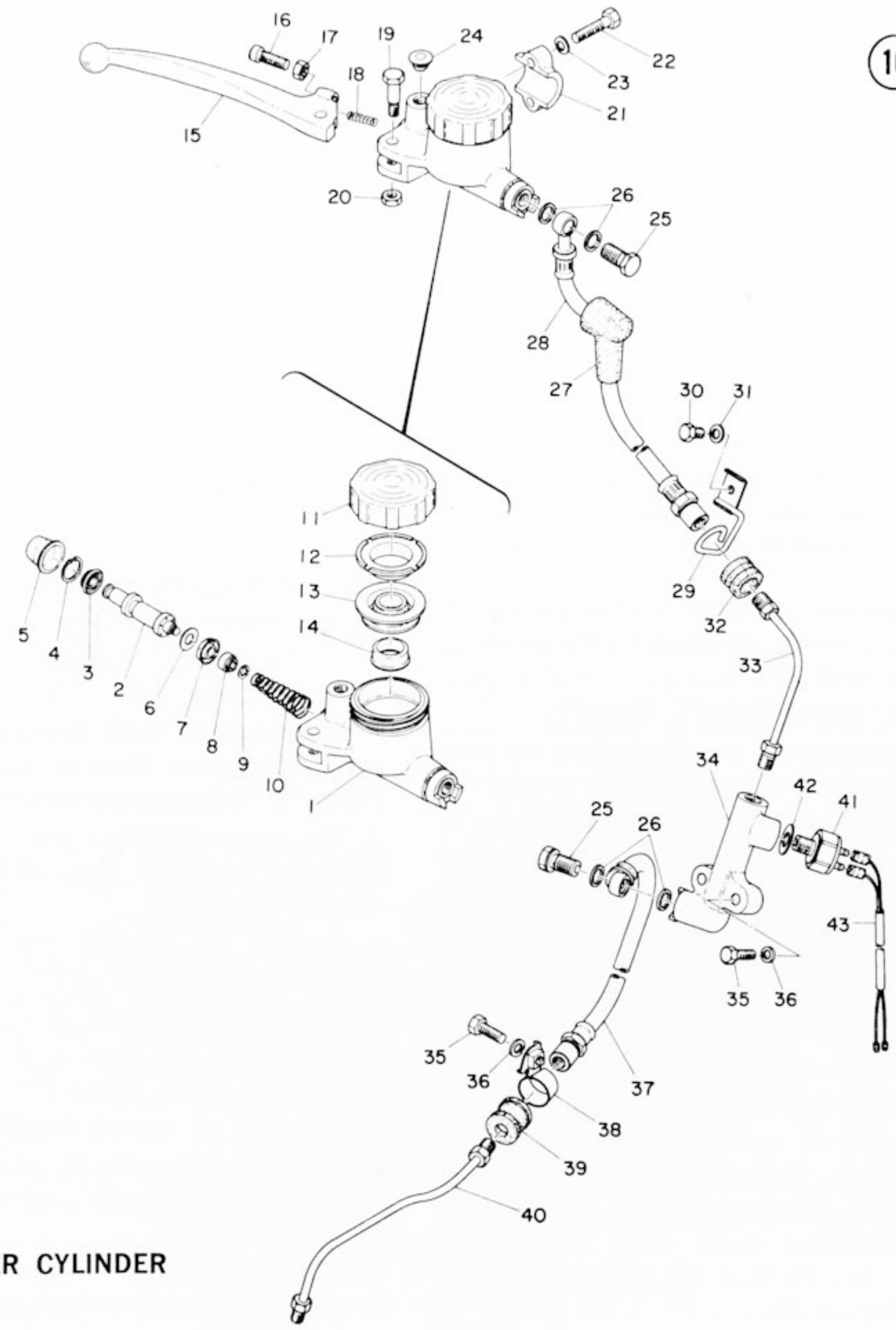
Caliper Disassembly and Reassembly

1. Trace the brake line from the master cylinder down to its connection point on the caliper unit, then disconnect it.



BRAKE DISC AND CALIPER

1. Brake disc
2. Disc bracket
3. Fitting bolt
4. Nut
5. Lockwasher
6. Fitting bolt
7. Lockwasher
8. Caliper
9. Shim
10. Caliper pad
11. Shim
12. Caliper emblem
13. Bleed screw
14. Cap
15. Fitting bolt
16. Spring washer
17. Plain washer
18. Cap nut



MASTER CYLINDER

1. Master cylinder
2. Piston
3. Cup
4. Snap ring
5. Cover
6. Piston cup spacer
7. Cup
8. Spring retainer
9. Snap ring
10. Spring
11. Reservoir cap
12. Diaphragm bushing
13. Reservoir diaphragm
14. Reservoir float
15. Brake lever
16. Adjusting screw
17. Adjusting nut
18. Lever return spring
19. Lever attaching screw
20. Nut
21. Bracket
22. Bolt
23. Lockwasher
24. Blind plug
25. Oil plug
26. Oil plug washer
27. Master cylinder connection
28. Brake hose
29. Brake hose clip
30. Bolt
31. Lockwasher
32. Brake hose connector
33. Brake line
34. Fitting
35. Bolt
36. Lockwasher
37. Brake hose
38. Brake hose clip
39. Brake hose connection
40. Brake line
41. Front stop switch
42. Washer
43. Front stop switch wires

2. Pull the handlebar-mounted brake lever until it touches the grip, then cinch the lever in position to prevent master cylinder fluid loss.

3. Tie rags and plastic around the disconnected brake line to keep out dirt and to protect the end from damage.

4. Remove the bottom caliper securing bolt, unscrew the top securing nut, and pivot the housing upward to clear the disc. Remove the housing from the front fork.

5. Remove both pads (10, Figure 9). They are just held in their cavities by a sliding fit. Carefully slide a thin tool into the notch in the side of the housing and wedge out each pad.

NOTE: *Measure each pad for wear. If worn to within .02 inch (.5mm) thickness, replace it.*

6. Separate the caliper housing into halves. Remove both remaining bridge bolts. Remove both small hex head bolts that are located on each side of the bleed screw (13, Figure 9).

7. Remove the small seal that lays on the inner housing surface in a small cavity around the fluid delivery hole (see caliper seal kit, Figure 9).

8. Behind each pad is a piston that the fluid pushes against, which in turn pushes the pad into contact with the brake disc. Blow air into the fluid delivery hole to force out this piston. Do not try to pry it out as this could easily damage the housing or piston.

9. Lift out the flat dust seal located just inside the pad/piston cavity.

10. Remove the piston seal (see caliper seal kit, Figure 9). This rubber seal, which has a square cross-sectional shape, fits into a groove in the pad/piston cavity. When in operation, this seal prevents fluid from leaking past the piston. Replace this seal if it is cut, gouged, or damaged in any way.

11. To reassemble this unit, first wash off all parts and parts cavities with brake fluid. Do not use a different grade of brake fluid and do not use solvent or gasoline. These liquids will not mix with the brake fluid in the system.

12. Reverse the order of disassembly to assemble all parts. During this procedure, be sure to perform the following special steps.

a. Wet the piston seal with brake fluid so the piston will slide past without catching.

b. Reexamine each part for wear before installing it.

c. Two small hex head bolts help hold the caliper housing halves together. Tighten these to 4-6 ft.-lb. (60-100 kg-cm).

d. Replace all three bridge bolts that help hold the caliper halves together and mount the unit to the front fork. Tighten the bridge bolts to 55-70 ft.-lb. (750-950 kg-cm).

e. Mount the caliper housing to the front fork and tighten both bolts to 29-36 ft.-lb. (400-500 kg-cm).

Master Cylinder Disassembly and Assembly

1. Remove the lever pivot bolt, then set the lever to one side. Take care not to lose the lever spring (18, Figure 10).

2. Disconnect the brake line at its master cylinder junction point. Remove bolt (25) shown in Figure 10. This permits line removal.

3. The master cylinder is anchored to the handlebar by two bolts. Unscrew these bolts and remove the cylinder.

4. Remove the reservoir cap, reservoir diaphragm, and empty out all brake fluid.

5. Remove the dust boot (5, Figure 10).

6. Use a snap ring pliers to remove the piston retaining circlip (4, Figure 10).

7. Examine the master clinder bore (cavity) that the piston slips into. If it is rusted or scored to the extent that it would gouge the cup, replace the master cylinder.

8. Check for swollen or cracked rubber cups (on piston) or reservoir diaphragm.

NOTE: *Replace all rubber parts every two years, even if not apparently damaged.*

9. Examine the piston for signs of rust or scoring which would prevent the cups from sealing. Replace the piston if this wear is found.

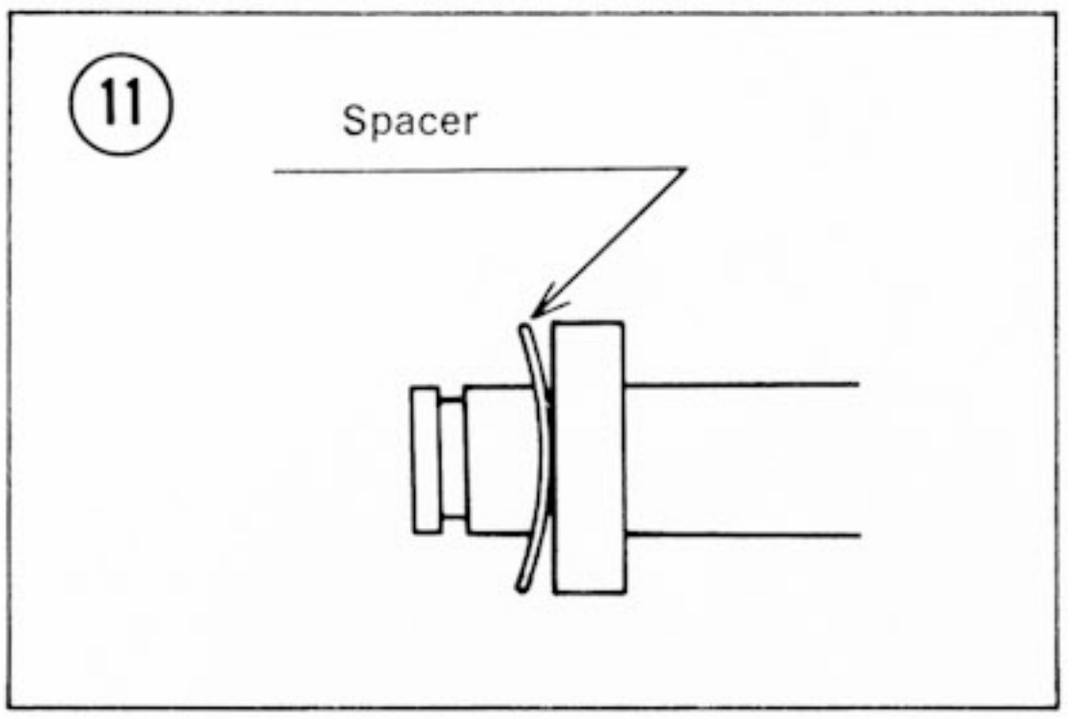
10. Examine the brake hose for leaks or cracks.

NOTE: *The brake hose should be replaced every four years, even if not apparently damaged.*

11. To assemble this unit, reverse the disassembly procedure, taking note of the following special instructions.

a. When installing new cups onto the piston, wet both parts with brake fluid to avoid scratching the cup.

b. The spacer which is installed behind the cup must be installed as shown in **Figure 11**.



c. When installing the piston assembly, wet the cups and master cylinder bore to prevent damage to cup sealing edges.

d. After completing the assembly procedure, add approximately 30cc of grade DOT 3 or 4 brake fluid to the master cylinder reservoir. Now bleed the brake system.

Brake System Bleeding

The brake system will require bleeding if the system has been disassembled or if air is trapped inside the hydraulic fluid. Air will displace an area normally occupied with brake fluid. When the lever is actuated, it will feel spongy until all this trapped air is compressed.

1. Fill the master cylinder reservoir fully to the "fill line" with grade DOT 3 or 4 brake fluid. Do not mix brands or use cheap grades.
2. Install the reservoir diaphragm, but not necessarily the cap.
3. Attach a clear flexible tube (4mm inside diameter) to the bleed screw (13, Figure 9), and place the remaining tube end into a container.
4. Slowly squeeze the brake lever until pressure is felt. Continue pushing on the lever and open the bleed screw until fluid and air start to drain down the clear tubing. Tighten the bleed screw before the lever touches the grip. Release the brake lever, then again squeeze the lever until pressure is felt, and open the bleed screw. Repeat this procedure until air bubbles no longer appear in the brake fluid. Fully tighten the bleed screw when finished.
5. Check and refill the master cylinder reservoir.

REAR WHEEL

Figure 12 is an exploded view of a typical rear wheel. The link design of the brake tension bar minimizes brake cam lever position shift as the rear swinging arm moves up and down. The clutch hub (damper) minimizes shock through the entire drive train. **Table 3** lists rear tire sizes on the various models.

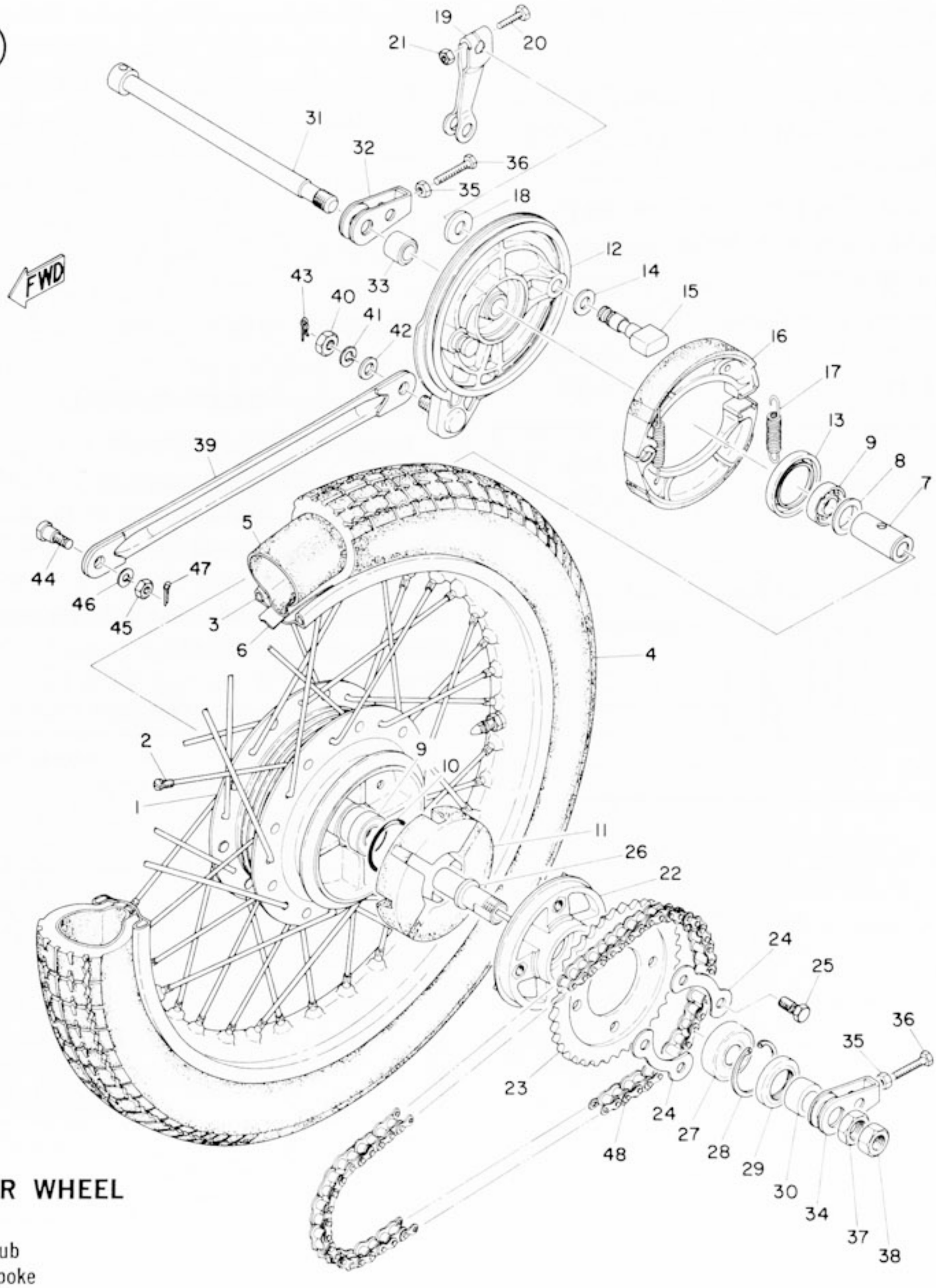
Table 3 REAR TIRE SIZES

Model	Rear Tire Size
HS1, HS1-B, LS-2	2.50-18
YL1, YL1-E	2.50-17
YAS1, YAS1-C	2.75-18
AS2C	3.00-18
CS3-B, CS3-C, CS5	3.00-18
YCS-1, YCS1-C	2.75-18
YDS5	3.25-18
DS6, DS6-B, DS7	3.25-18
DS6-C	3.50-18
YDS3, YDS3-C, YM1	3.25-18
YM2, YM2-C	3.25-18
YR1, YR2, YR2-C	3.50-18
R3, R3-C	3.50-18
R5, R5-B, R5-C	3.50-18
RD250, RD250A	3.25-18
RD350, RD350A	3.50-18

Rear Wheel Removal

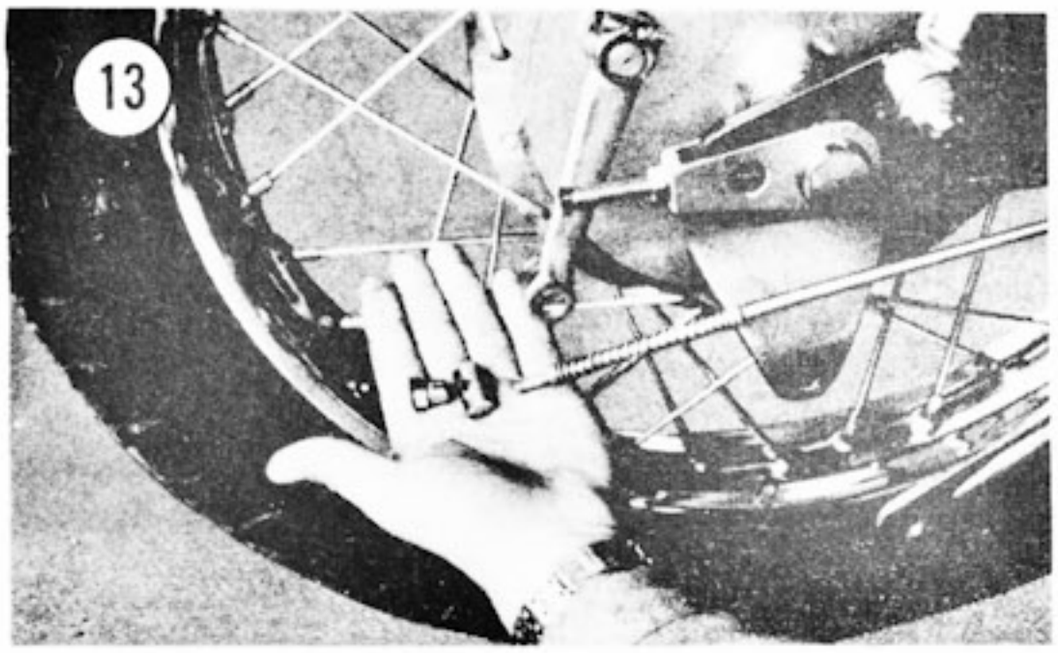
The procedure for removing the rear wheel is similar for all models.

1. Remove the brake rod and brake tension bar from the rear brake plate, as shown in **Figure 13**.
2. Loosen the chain tension adjustment nuts and bolts on both sides.
3. Remove the rear wheel shaft nut.
4. Drive out the rear wheel shaft with a plastic-tipped mallet.

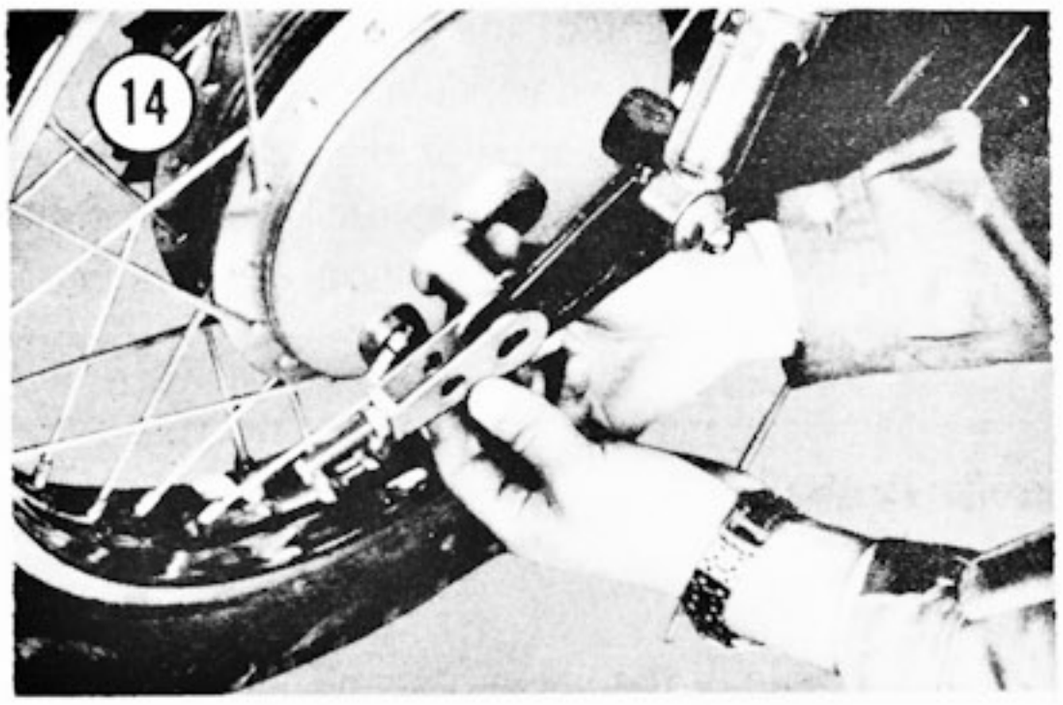


REAR WHEEL

1. Hub
2. Spoke
3. Rim
4. Tire
5. Tube
6. Rim band
7. Bearing spacer
8. Spacer flange
9. Bearing
10. O-ring
11. Damper
12. Brake shoe plate
13. Oil seal
14. Camshaft shim
15. Shaft cam
16. Brake shoe
17. Return spring
18. Camshaft seal
19. Camshaft lever
20. Bolt
21. Nut
22. Hub clutch
23. Sprocket wheel gear
24. Lockwasher
25. Fitting bolt
26. Sprocket wheel shaft
27. Bearing
28. Circlip
29. Oil seal
30. Sprocket shaft collar
31. Axle shaft
32. Chain tensioner
33. Axle shaft collar
34. Chain tensioner
35. Nut
36. Chain tensioner bolt
37. Sprocket shaft nut
38. Nut
39. Tension bar
40. Nut
41. Spring washer
42. Plain washer
43. Tension bar clip
44. Tension bar bolt
45. Nut
46. Spring washer
47. Cotter pin
48. Chain



5. Remove the right-hand chain adjuster and spacer (**Figure 14**).



6. Remove the rear brake assembly.
7. Tilt the machine to the left, then remove the rear wheel assembly.

Rear Wheel Inspection

To check the rear wheel, follow the procedure described for checking the front wheel. Brake shoe wear limits are listed in **Table 4**.

Table 4 BRAKE SHOE WEAR LIMITS

Model	Minimum Diameter
HS1, HS1-B, LS-2	4.14 inches (105mm)
YL1, YL1-E	4.14 inches (105mm)
YAS1, YAS1-C, AS2C	4.92 inches (125mm)
CS3-B, CS3-C, CS5	6.9 inches (175mm)
YCS-1, YCS1-C	5.3 inches (145mm)
YDS5	6.9 inches (175mm)
DS6, DS6-B, DS6-C, DS7	6.9 inches (175mm)
YDS3, YDS3-C, YM1	6.9 inches (175mm)
YM2, YM2-C	6.9 inches (175mm)
YR1, YR2, YR2-C	6.9 inches (175mm)
R3, R3-C	6.9 inches (175mm)
R5, R5-B, R5-C	6.9 inches (175mm)
RD250, RD250A	6.9 inches (175mm)
RD350, RD350A	6.9 inches (175mm)

SPOKES

A bent or otherwise faulty spoke will adversely affect neighboring spokes, and should therefore be replaced immediately. To remove the spoke, completely unscrew the threaded portion, then remove the bent end from the hub.

Spokes tend to loosen as the machine is used. Retighten each spoke one turn, beginning with those on one side of the hub, then those on the other side.

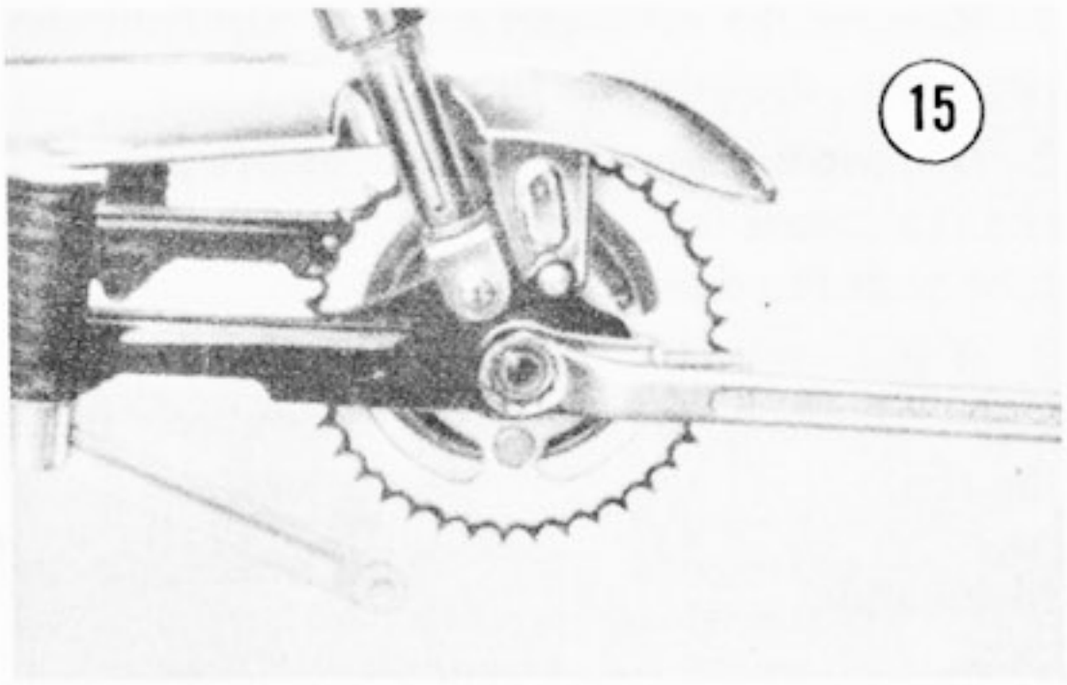
If all spokes are tightened an equal amount, they should all produce the same tone when tapped with the metal end of a screwdriver. If one spoke sounds "dull" or "dead" compared to all others, it is probably loose and should be tightened. If it produces a higher pitched sound than the others, it should be loosened until the sound produced equals all the rest.

REAR SPROCKET

Removal

The rear sprocket assembly is similar for all models. To remove this unit, proceed as follows.

1. Disconnect the master link, then remove the chain.
2. Remove the sprocket shaft nut (**Figure 15**), then the sprocket.

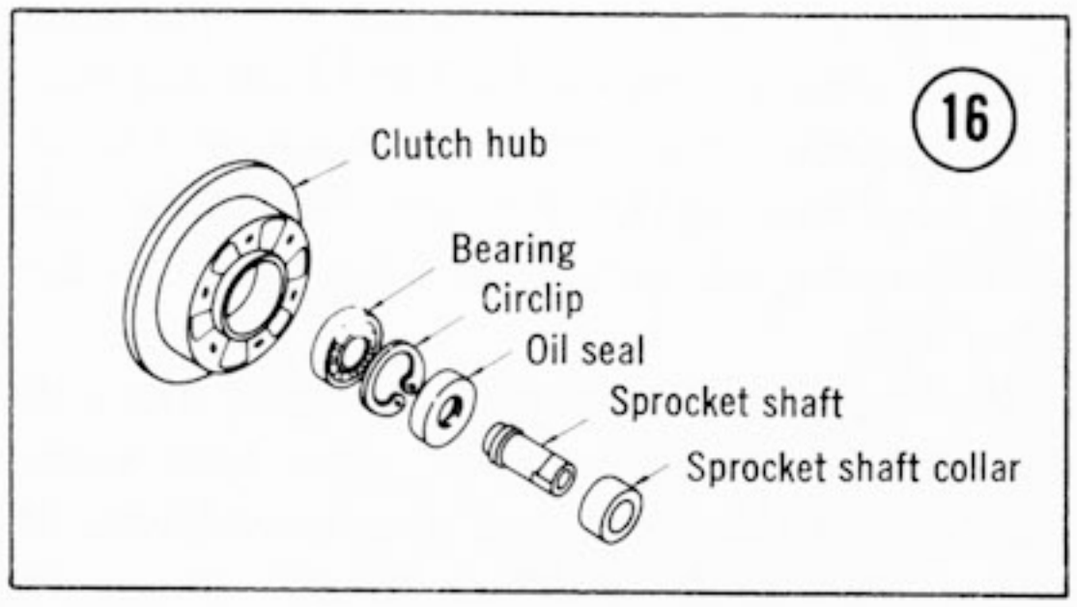


3. Flatten the tabs on the lock plates, then remove the bolts which attach the sprocket to the clutch hub.

Check the rear sprocket carefully. If the teeth are worn or bent, replace the sprocket. When you replace the sprocket, be sure that the bolts which attach the clutch hub are tight, and that the tabs on the lock plates are bent around the bolt heads.

Clutch Hub

Figure 16 is an exploded view of a typical clutch hub. To replace the bearings, proceed as follows.



1. Push out the sprocket shaft.
2. Pull out the sprocket shaft collar.
3. Remove the oil seal. Be careful not to damage it.
4. Remove the snap ring.
5. Press out the bearing.
6. Reverse the procedure to replace the bearing. Be sure to grease the bearing and the oil seal before installation.

TIRES AND TUBES

Removal

1. Remove the valve cap and lock nut from the tire valve, then deflate the tire.
2. Use two tire irons to remove the tire from the rim. Take care that you do not damage the inner tube with the tire irons.
3. If only the inner tube is to be replaced, it is not necessary to remove the tire entirely from the rim.

Installation

1. On wheels equipped with a bead spacer, pull the spacer toward the wheel rim flange.
2. Using two tire irons, work one tire bead onto the rim.
3. Insert the inner tube valve stem through the hole in the rim. Then insert the inner tube between the tire and wheel rim.
4. Partially inflate the inner tube.
5. Using two tire irons, work the tire onto the wheel rim. This operation will be easier if the bead on the other side of the tire is pushed in toward the rim flange.
6. While the tire is still partially inflated, tap the tire with a hammer to avoid pinching the tube between the tire and rim.
7. Install the tire valve lock nut. Then inflate the tire to the recommended pressure and install the valve cap.

Tire Pressure

Table 5 lists recommended inflation pressures for the various sizes of tires. These pressures apply only when the tires are cold. As the machine is run, the tires will become warm and the pressure will rise. This rise is normal. Do not bleed air out from a hot tire.

Table 5 TIRE PRESSURES

Tire Size	Normal Pressure
2.50-17	17 psi
2.50-18	17 psi
2.75-18	17 psi
3.00-18	22 psi
3.50-18	28 psi

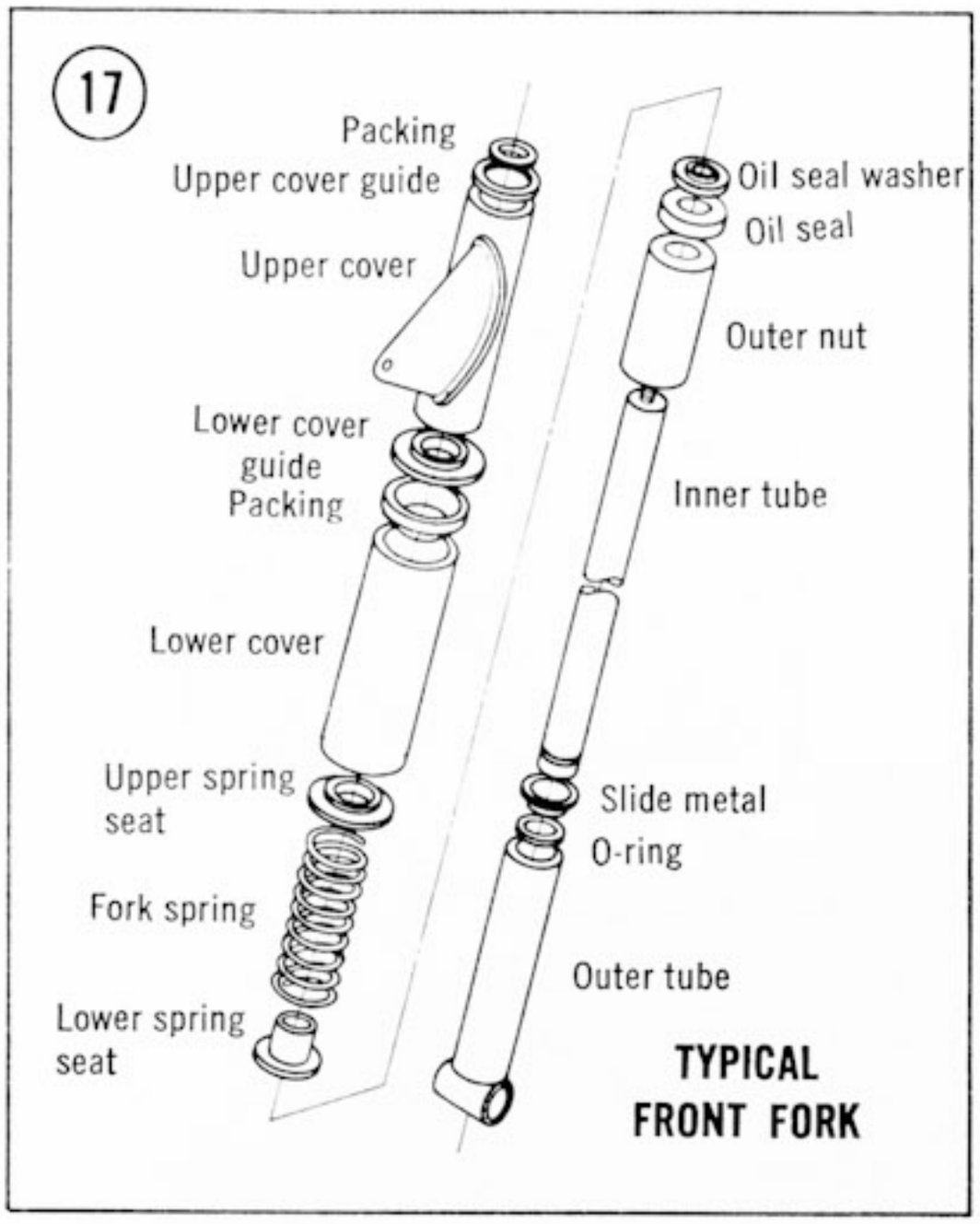
FRONT FORK

All models are equipped with oil-damped telescopic front forks. **Figure 17** is an exploded view of a typical front fork tube used on the smaller models. An exploded view of the fork tube assembly on the R5, RD250, and RD350 series is shown in **Figure 18**.

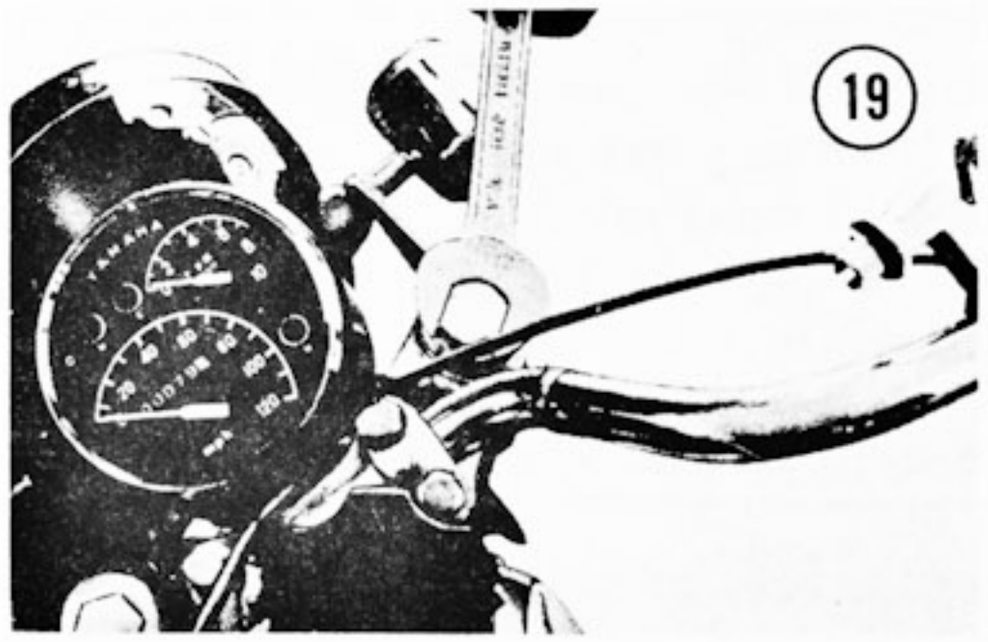
Removal

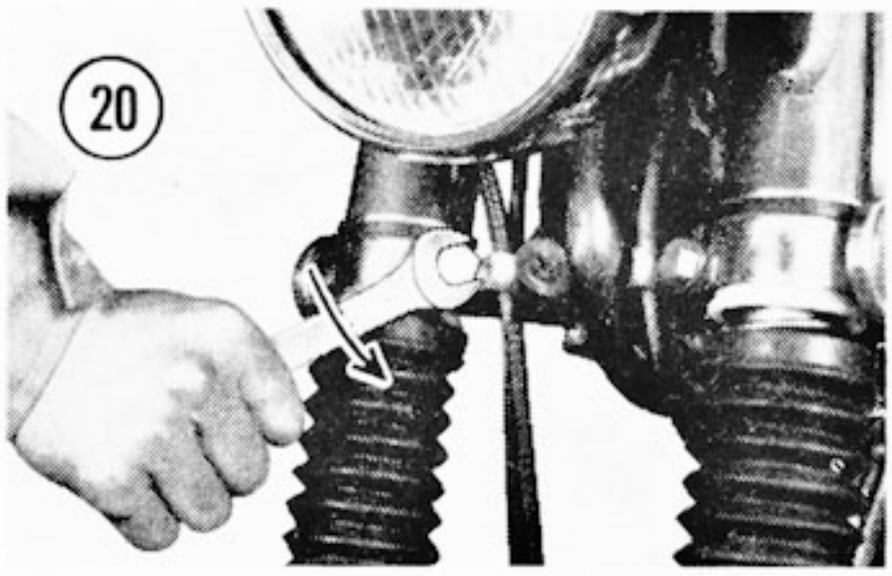
Front fork removal procedure is similar for all models. Proceed as follows.

1. Remove the front wheel and front fender.
2. Remove the inner tube cap bolts (**Figure 19**). On some models it may be necessary to loosen the handlebar pinch bolts and move the handlebar assembly to gain access to the cap bolts.
3. Loosen the underbracket bolts (**Figure 20**).
4. Pull the fork tube assembly downward to remove it from the steering head (**Figure 21**).



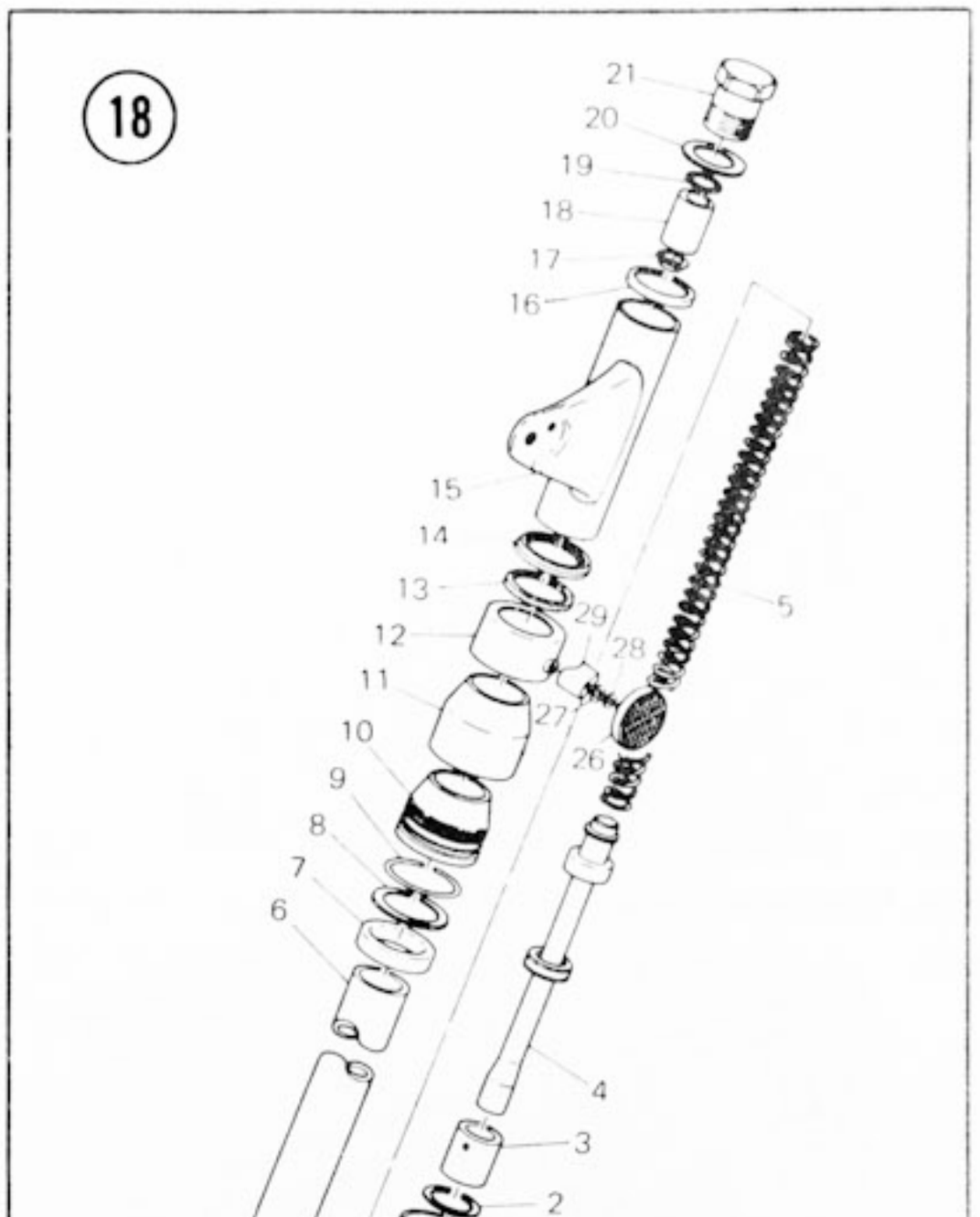
TYPICAL FRONT FORK





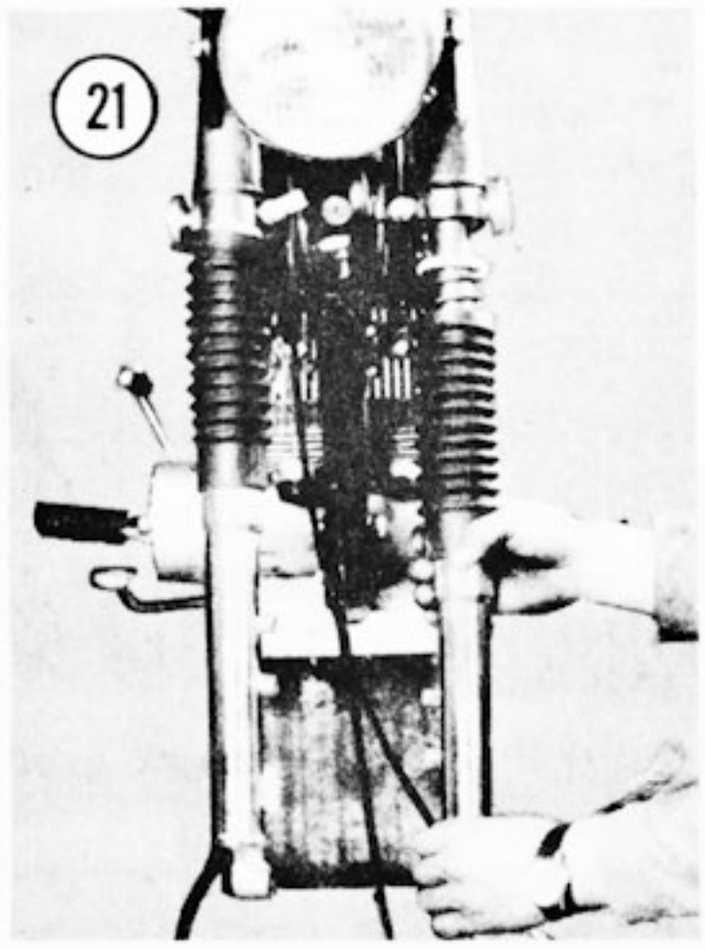
Disassembly, except R5 Series

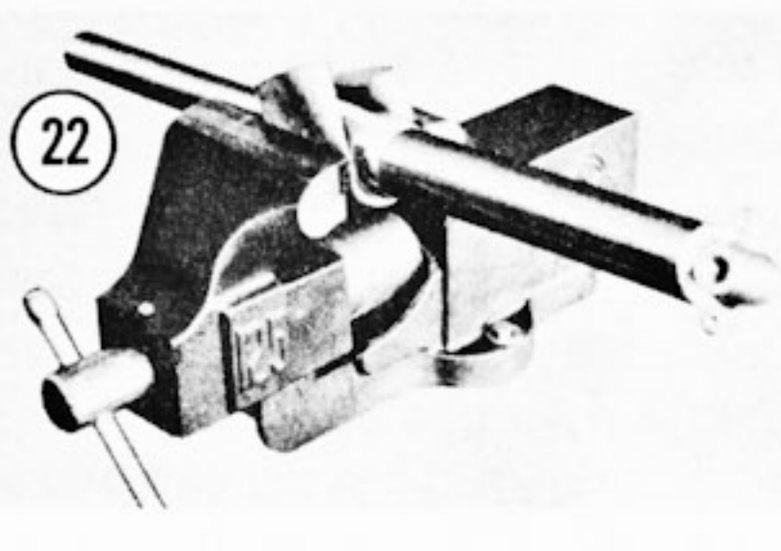
1. Drain the oil from the fork. Discard the used oil.
2. Wrap an inner tube from a tire or a piece of rubber sheeting around the outer tube nut and clamp the nut in a vise (**Figure 22**). Be



R5, RD250 SERIES, AND RD350 SERIES FRONT FORK

1. Outer tube
2. Circlip
3. Front fork piston
4. Cylinder
5. Fork spring
6. Inner tube
7. Oil seal
8. Oil seal washer
9. Oil seal clip
10. Dust seal
11. Dust seal cover
12. Outer cover
13. Packing
14. Lower guide cover
15. Upper cover
16. Upper cover guide
17. Upper seat spring
18. Spacer
19. Packing
20. Cap washer
21. Cap bolt
22. Drain plug
23. Drain plug gasket
24. Bolt
25. Packing
26. Reflector
27. Plain washer
28. Spring washer
29. Damper





careful that you do not deform the outer tube by clamping the vise too tightly.

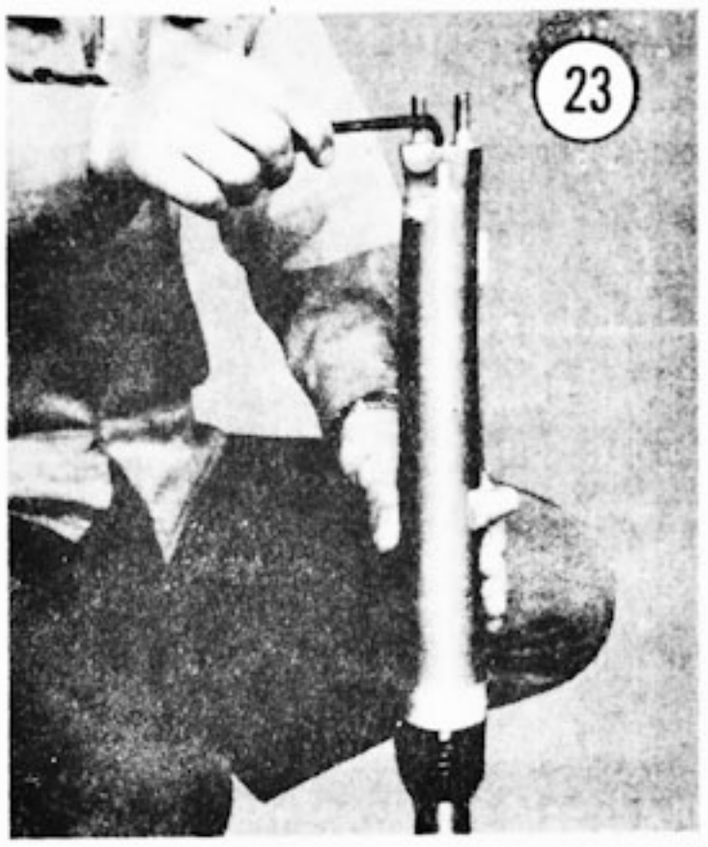
3. Turn the outer shaft counterclockwise to loosen the nut. The outer shaft may be turned easily by using the front axle shaft as a lever. The inner and outer tubes may be separated after the nut is loosened.

Fork Inspection

Check the inner tubes for bends and scratches. A slightly bent inner tube may be straightened in a press, but it is better to replace the tube if possible.

Disassembly, R5, RD250, and RD350 Series

Fork disassembly on these models is similar to that described above with one exception. It is first necessary to remove the bolt from the lower end of the fork tube (24, Figure 18) before the tubes can be separated. **Figure 23** illustrates this step. Perform this step before separating the inner and outer fork tubes.



Fork Tube Reassembly

1. Reverse the disassembly procedure to assemble the fork tube. Be sure that the inner tube slides in and out smoothly. Always replace the oil seal upon reassembly.

2. To install the fork tube on the steering head, place the assembly in the correct position, then tighten the underbracket pinch bolts.

3. Refill each fork with the correct quantity of 10W-30 motor oil. After refilling each leg, install the cap bolts. Fork leg oil quantity is listed in **Table 6**.

Table 6 FORK OIL CAPACITY

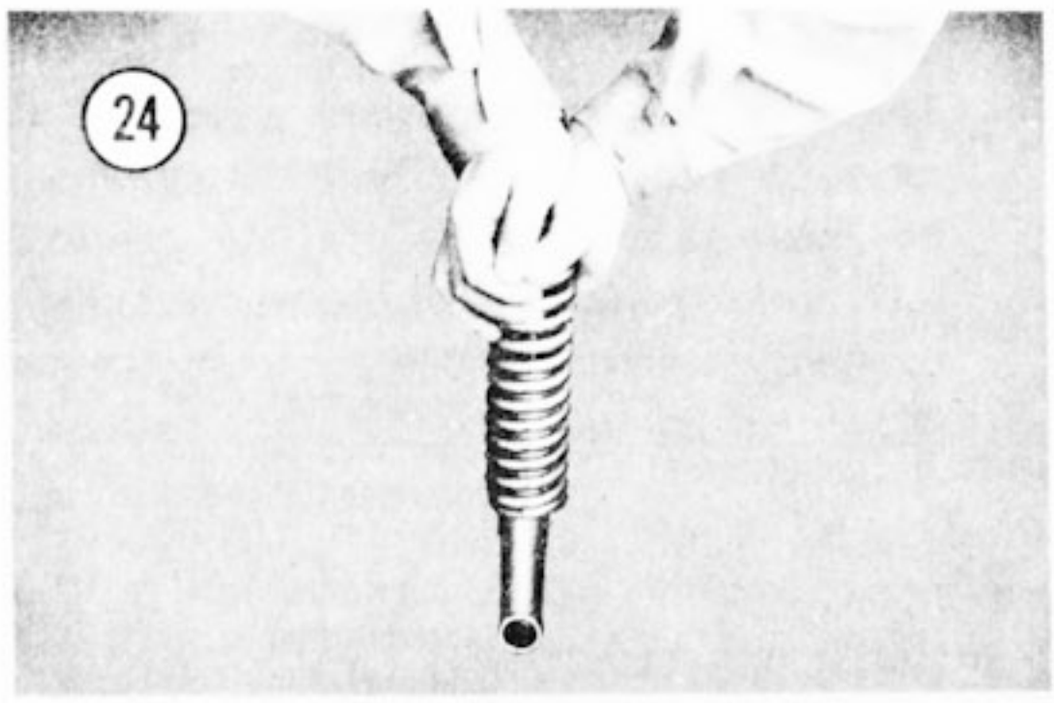
Model	Ounces	(cc)
HS1, HS1-B, LS-2	5.0	(147)
YL1, YL1-E	4.4	(130)
YAS1, AS2C, CS5, CS3-C	5.4	(160)
YAS1-C, YCS-1, YCS1-C	5.7	(170)
CS3-B	5.6	(165)
YDS-5, DS6, DS6-B, DS6-C	6.8	(200)
DS7	4.9	(145)
YDS3, YDS3-C, YM1, YM2, YM2-C	6.8	(200)
YR1, YR2, YR2-C, R3, R3-C	8.1	(240)
R5, R5-B, R5-C	4.9	(145)
RD250, RD250A	4.7	(140)
RD350, RD350A	4.7	(140)

REAR SUSPENSION

The rear suspension consists of parallel trailing arms, adjustable springs, and shock absorbers. The trailing arms pivot on replaceable bushings. The adjustable springs permit the rider to adjust the rear suspension to suit varying riding conditions.

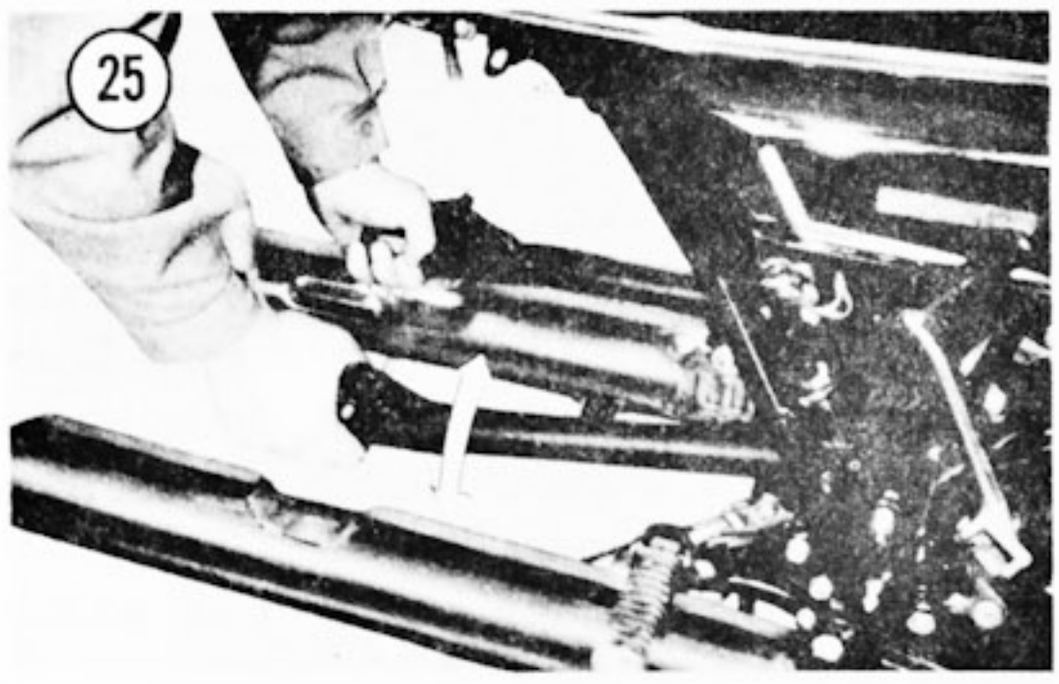
Shock Absorber Inspection

First remove the upper and lower bolts to remove the shock absorber from the motorcycle. Fully compress the shock absorber as shown in **Figure 24**. Quickly release the pressure while you maintain the shock absorber in a vertical position. If the unit is good it will quickly return halfway and then slowly return to the original extended position. Check the shock absorber for oil leakage. If it returns quickly to the original position, examine it for leaks. If any leaks are visible, replace the unit.

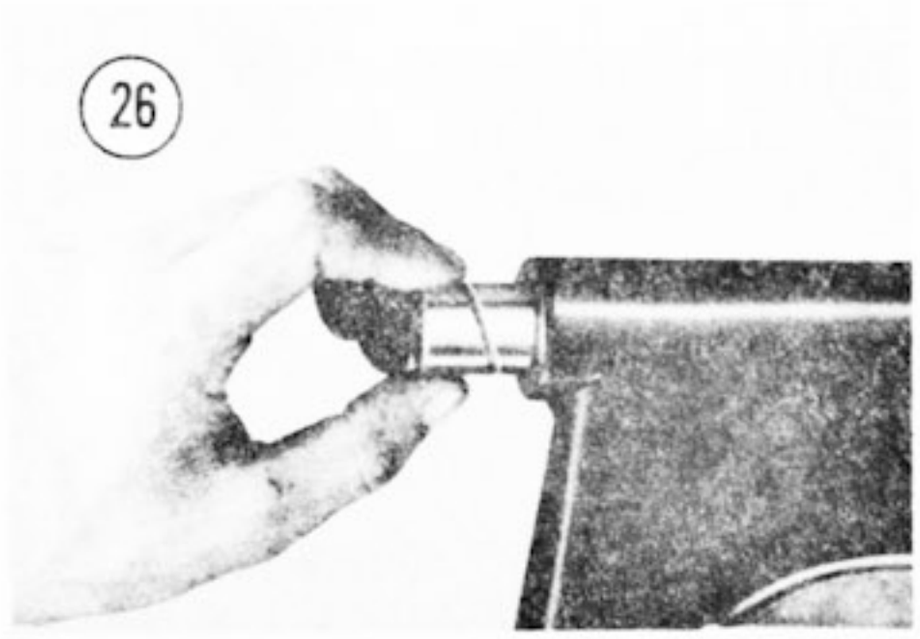


Trailing Arms

Check trailing arm play by shaking from side to side, as shown in **Figure 25**. If play is excessive, replace the trailing arm bushings and/or shaft. To replace the shaft and bushings, proceed as follows.



1. Remove the chain cover mounting bolts.
2. Remove the trailing arm shaft nut, then withdraw the shaft to remove the arms.
3. Insert new bushings as shown in **Figure 26**.



On machines used primarily for street riding, the bushings should normally be replaced every 6,000 miles (10,000 kilometers). Machines subjected to severe service will require more frequent replacement. Need for replacement may be indicated by wander, shimmy, or rear wheel hop.

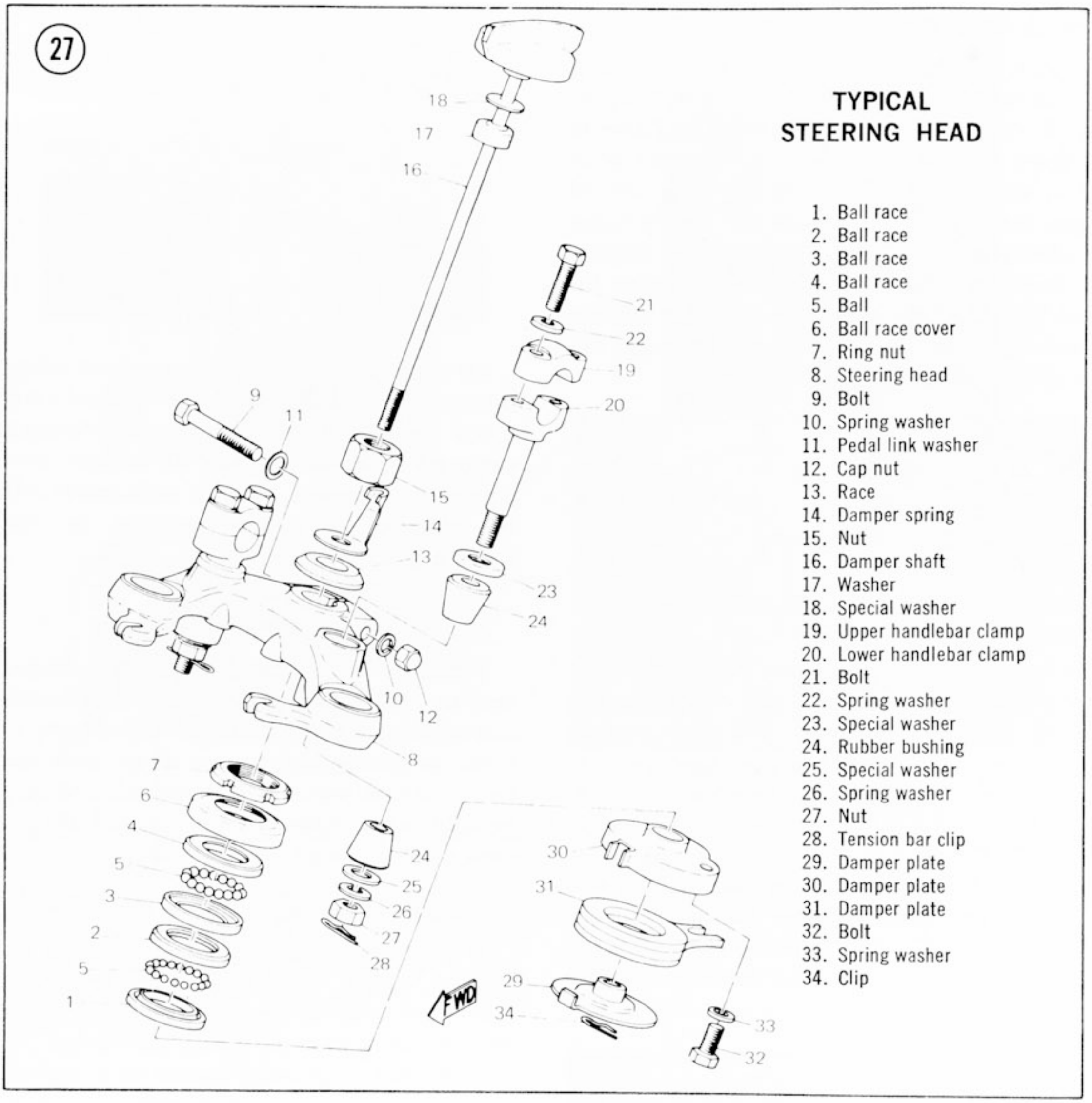
STEERING HEAD

Figure 27 is an exploded view of a typical steering head. Occasionally check the ball races and balls for pitting, cracks, or wear. If any of these conditions exist, replace all the balls and races. Always replace the whole ball and race assembly when replacement is required. Do not use a combination of new and used parts.

Steering Head Bearing and Race Replacement

In preparation, remove the front wheel assembly. Next, it would be advisable to remove both front forks as described in the previous section. Do not disassemble; just loosen all underbracket pinch bolts, remove each cap bolt (on top), then pull the fork legs out.

1. Remove steering head damper if equipped.
2. In the center of the top bracket is a nut that must be loosened and removed. The top bracket can now be lifted off.
3. Loosen the ring nut (7, Figure 27) by tapping with a hammer and punch in a counterclockwise direction. As this ring is loosened, the bottom bracket (underbracket) will start to drop down. Hold this bracket up to prevent the upper and lower steering head bearings (5, Figure 27) from falling out.
4. Remove the ring nut, then lift off the top race and carefully remove all balls. A magnet



is helpful. Next lower the underbracket until you can remove the bottom balls. Keep a rag or container under the bracket to catch any balls that fall.

5. To remove the ball races inside the steering head (2 and 3, Figure 27), tap each one out from the opposite end with a hammer and punch. To remove the bottommost race, carefully wedge it up and off the underbracket stem.

NOTE: *When installing new inner races, carefully tap them down until fully seated.*

To begin reassembly, grease the bottom bearing race (1, Figure 27) and push all the balls firmly into the grease so they will not fall. Slide the bottom bracket (underbracket) up and hold in place while you grease the top bearing race and place all top bearings into place, then install and tighten the ring nut just until all underbracket free-play is removed.

Install the top bracket and nut, then install both fork leg units. For a final adjustment, use a hammer and punch to tighten the ring nut until the underbracket is not loose, but the forks can still swing from lock to lock without binding.

CHAPTER SIX

PERIODIC SERVICE AND MAINTENANCE

To gain the utmost in safety, performance, and useful life from your machine, it is necessary to make periodic inspections and adjustments. It frequently happens that minor problems are found during such inspections. They are simple and inexpensive to correct at the time, but could lead to major problems later.

The following table is a suggested maintenance schedule. Procedures for performing these services are described in the applicable chapters.

MAINTENANCE INTERVALS

Maintenance Item	Miles (Kilometers)			
	200 (300)	1,000 (1,500)	2,000 (3,000)	4,000 (6,000)
Adjust brakes	X			
Adjust clutch	X			
Change oil	X			
Check battery	X			
Check Autolube pump	X			
Clean spark plug		X		
Grease chassis		X		
Check points and timing			X	
Adjust carburetor			X	
Service air cleaner			X	
Remove carbon from engine			X	
Clean exhaust system			X	
Service drive chain			X	
Tighten all fastenings			X	
Overhaul carburetor				X
Grease wheel bearings				X
Replace fork oil				X
Inspect generator brushes				X

CHAPTER SEVEN

SPECIFICATIONS

This chapter contains specifications and performance figures for the various Yamaha models covered by this book. The tables are arranged alphabetically in order of increasing engine size. Since there are differences between various models of the same engine size, be sure to consult the correct table for the motorcycle in question.

SPECIFICATIONS — MODELS HS1 AND HS1-B

DIMENSIONS	
Overall length	70.9 in. (1,800mm)
Overall width	30.3 in. (770mm)
Overall height	39.6 in. (1,005mm)
Wheelbase	47.0 in. (1,195mm)
Road clearance	6.1 in. (155mm)
WEIGHT	221 lbs. (100 kg)
PERFORMANCE	
Maximum output	4.9 hp @ 8,000 rpm
Maximum torque	3.1 ft.-lb. @ 5,500 rpm (0.43 kg-m @ 5,500 rpm)
Maximum speed	53 mph (85 kmph)
Climbing ability	20°
Braking distance	21.3 ft. @ 22 mph (6.4m @ 35 kmph)
Fuel consumption	153 mpg @ 25 mph (65 kmpl @ 40 kmph)
ENGINE	
Type	2-stroke, air cooled, 5-port
Displacement	5.43 cu. in. (89cc)
Bore x stroke	1.437 x 1.693 in. (36.5 x 43.0mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM16SC
Main jet	70
Needle jet	E-O
Jet needle/clip position	3G9/4
Cutaway	1.5
Pilot jet	20
Starter jet	30
Air screw (no. of turns out)	1½
Float level	22.5mm
Fuel tank capacity	2.0 gal. (7.5 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.71 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — MODELS HS1 AND HS1-B (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi K108-09
Battery	12V 5.5 ah
Headlight	12V 25/25W
Tail/brake lamp	12V 7/23W
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.894 (74/19)
Final reduction ratio	3.077 (40/13)
Transmission gear ratios	
1st gear	3.182 (35/11)
2nd gear	1.813 (29/16)
3rd gear	1.300 (26/20)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
Overall reduction ratios	
1st gear	38.126
2nd gear	21.723
3rd gear	15.576
4th gear	12.521
5th gear	10.064
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Caster	63.0°
Trail	3.4 in. (86.5mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.50 - 18, 4PR
Rear	2.50 - 18, 4PR

SPECIFICATIONS — MODEL LS-2

DIMENSIONS	
Overall length	73.2 in. (1,860mm)
Overall width	29.5 in. (750mm)
Overall height	39.4 in. (1,000mm)
Wheelbase	47.2 in. (1,200mm)
Road clearance	6.3 in. (160mm)
WEIGHT	209 lbs. (95 kg)
PERFORMANCE	
Maximum output	10.5 hp @ 8,000 rpm
Maximum torque	6.95 ft.-lb. @ 7,500 rpm (0.96 kg-m @ 7,500 rpm)
Maximum speed	69 mph (110 kmph)
Climbing ability	22.5°
Braking distance	24.6 ft. @ 22 mph (7.5m @ 35kmph)
Fuel consumption	153 mpg @ 25 mph (65 kmpl @ 40 kmph)
ENGINE	
Type	2-stroke, air cooled, 5-port
Displacement	5.919 cu. in. (97cc)
Bore x stroke	1.496 x 1.693 in. (38 x 43mm)
Number of cylinders	2
Compression ratio	7.0:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM17SC
Main jet	70
Needle jet	0-0
Jet needle/clip position	3D12/3
Cutaway	2.0
Pilot jet	15
Starter jet	40
Air screw (no. of turns out)	1¾
Float level	22.5mm
Fuel tank capacity	2.0 gal. (7.5 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.5 qts. (1.4 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — MODEL LS-2 (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi K10812
Battery	12V 5.5 ah
Headlight	12V 25/25W
Tail/brake lamp	12V 8/2W
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 2W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.894 (74/19)
Final reduction ratio	3.000 (42/14)
Transmission gear ratios	
1st gear	3.181 (35/11)
2nd gear	1.812 (29/16)
3rd gear	1.300 (26/20)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
FRAME	
Type	Diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Caster	62° 30′
Trail	3.5 in. (90mm)
Minimum turning radius	78.7 in. (2,000mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.50 - 18, 4PR
Rear	2.50 - 18, 4PR

SPECIFICATIONS — MODELS YL1 AND YL1-E

DIMENSIONS	
Overall length	71.6 in. (1,820mm)
Overall width	24.8 in. (630mm)
Overall height	37.3 in. (947mm)
Wheelbase	45.1 in. (1,145mm)
Road clearance	5.1 in. (130mm)
WEIGHT	180 lbs. (81.65 kg)
PERFORMANCE	
Maximum output	9.5 hp @ 8,500 rpm
Maximum torque	6.0 ft.-lb. @ 8,000 rpm (0.83 kg-m @ 8,000 rpm)
Maximum speed	65-70 mph (100-110 kmph)
Climbing ability	20°
Braking distance	23 ft. @ 22 mph (7.0104m @ at 35.4 kmph)
Fuel consumption	153 mpg @ 19 mph (65.05 kmpl @ 30 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	5.92 cu. in. (97cc)
Bore x stroke	1.493 x 1.690 in. (38 x 43mm)
Number of cylinders	2
Compression ratio	7.1:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM15SC
Main jet	60
Needle jet	E-O
Jet needle/clip position	3D3/3
Cutaway	1.5
Pilot jet	17.5
Starter jet	15
Air screw (no. of turns out)	2½
Float level	23mm
Fuel tank capacity	1.93 gal. (7.3 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.16 qts. (1.1 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-7HZ

(continued)

SPECIFICATIONS — MODELS YL1 AND YL1-E (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi, GI 206
Battery	12V 5.5 ah
Headlight	12V 25WD
Tail/brake lamp	12V 8/20W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 5W
High beam indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	4-speed, constant mesh
Primary reduction ratio	3.89:1 (74/19)
Final reduction ratio	2.33:1 (35/15)
Transmission gear ratios	
1st gear	3.08:1
2nd gear	1.89:1
3rd gear	1.30:1
4th gear	0.96:1
FRAME	
Type	Pressed steel
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	45° left and right
Caster	63°
Trail	3.5 (90mm)
BRAKES	
Front, type	Drum, internal expanding
Rear, type	Drum, internal expanding
TIRES	
Front	2.50 - 17, 4PR
Rear	2.50 - 17, 4PR

SPECIFICATIONS — MODEL AS2C

DIMENSIONS	
Overall length	77.8 in. (1,875mm)
Overall width	31.5 in. (800mm)
Overall height	42.2 in. (1,020mm)
Wheelbase	47.2 in. (1,200mm)
Road clearance	6.3 in. (160mm)
WEIGHT	220 lbs. (100 kg)
PERFORMANCE	
Maximum output	15.2 bhp @ 8,500 rpm
Maximum torque	9.4 ft.-lb. @ 7,500 rpm (1.30 kgm @ 7,500 rpm)
Maximum speed	(70-75 mph) 112-120 kmph
Climbing ability	23.5°
Braking distance	37.7 ft. @ 31 mph (11.5m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	7.56 cu. in. (124cc)
Bore x stroke	1.693 x 1.693 in. (43 x 43mm)
Number of cylinders	2
Compression ratio	7.0:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM17SC
Main jet	95
Needle jet	0-0
Jet needle/clip position	4D9/4
Cutaway	2.0
Pilot jet	17.5
Starter jet	30
Air screw (no. of turns out)	1¾
Float level	22.0mm
Fuel tank capacity	2.0 gal. (7.5 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — MODEL AS2C (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi, K108-01
Battery	12V 5.5 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 7/23W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.894 (74/19)
Final reduction ratio	2.600 (39/15)
Transmission gear ratios	
1st gear	3.182 (35/11)
2nd gear	1.813 (29/16)
3rd gear	1.300 (26/20)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	47° left and right
Caster	63°
Trail	3.6 in. (92mm)
Minimum turning radius	70.9 in. (1,800mm)
BRAKES	
Front, type	Drum, internal expanding
Rear, type	Drum, internal expanding
TIRES	
Front	2.75 - 18, 4PR
Rear	3.00 - 18, 4PR

SPECIFICATIONS — MODEL YAS1

DIMENSIONS	
Overall length	73.0 in. (1,850mm)
Overall width	29.2 in. (740mm)
Overall height	42.2 in. (1,070mm)
Wheelbase	47.2 in. (1,200mm)
Road clearance	6.3 in. (160mm)
WEIGHT	220 lbs. (100 kg)
PERFORMANCE	
Maximum output	15.2 bhp @ 8,500 rpm
Maximum torque	9.4 ft.-lb. @ 7,500 rpm (1.30 kgm @ 7,500 rpm)
Maximum speed	70-75 mph (112-120 kmph)
Climbing ability	23.5°
Braking distance	37.7 ft. @ 31 mph (11.5m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	7.56 cu. in. (124cc)
Bore x stroke	1.693 x 1.693 in. (43 x 43mm)
Number of cylinders	2
Compression ratio	7.0:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM17SC
Main jet	95
Needle jet	0-0
Jet needle/clip position	4D9/4
Cutaway	2.0
Pilot jet	17.5
Starter jet	30
Air screw (no. of turns out)	1¾
Float level	22.0
Fuel tank capacity	2.5 gal. (9.5 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-8HC

(continued)

SPECIFICATIONS — MODEL YAS1 (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi K108-01
Battery	12V 5.5 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 7/23W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.894 (74/19)
Final reduction ratio	2.600 (39/15)
Transmission gear ratios	
1st gear	3.182 (35/11)
2nd gear	1.875 (30/16)
3rd gear	1.300 (26/20)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	47° left and right
Caster	63°
Trail	3.4 in. (86.5mm)
Minimum turning radius	69.0 in. (1,750mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.50 - 18, 4PR
Rear	2.75 - 18, 4PR

SPECIFICATIONS — MODEL YAS1-C

DIMENSIONS	
Overall length	73.0 in. (1,855mm)
Overall width	31.9 in. (810mm)
Overall height	39.6 in. (1,005mm)
Wheelbase	47.2 in. (1,200mm)
Road clearance	5.9 in. (150mm)
WEIGHT	220 lbs. (100 kg)
PERFORMANCE	
Maximum output	15.2 bhp @ 8,500 rpm
Maximum torque	9.4 ft.-lb. @ 7,500 rpm (1.30 kgm @ 7,500 rpm)
Maximum speed	72-75 mph (115-120 kmph)
Climbing ability	23.5°
Braking distance	37.7 ft. @ 31 mph (11.5m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	7.56 cu. in. (124cc)
Bore x stroke	1.693 x 1.693 in. (43 x 43mm)
Number of cylinders	2
Compression ratio	7.0:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM17SC
Main jet	95
Needle jet	0-0
Jet needle/clip position	4D9/4
Cutaway	2.0
Pilot jet	17.5
Starter jet	30
Air screw (no. of turns out)	1¾
Float level	22.0mm
Fuel tank capacity	2.5 gal. (9.5 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — MODEL YAS1-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Hitachi K108-01
Battery	12V 5.5 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 7/23W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.894 (74/19)
Final reduction ratio	2.600 (39/15)
Transmission gear ratios	
1st gear	3.182 (35/11)
2nd gear	1.875 (30/16)
3rd gear	1.300 (26/20)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	47° left and right
Caster	63°
Trail	3.4 in. (86.5mm)
Minimum turning radius	69.0 in. (1,750mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.50 - 18, 4PR
Rear	2.75 - 18, 4PR

SPECIFICATIONS — YCS-1 AND YCS1-C

DIMENSIONS		
Overall length	75.7 in. (1,920mm)	
Overall width	30.1 in. (765mm)	
Overall height	42.2 in. (1,070mm)	
Wheelbase	49.1 in. (1,245mm)	
Road clearance	6.1 in. (155mm)	
PERFORMANCE		
Maximum output	21 PS @ 8,000 rpm	
Maximum torque	14.5 ft.-lb. @ 7,000 rpm (2.0 kg-m @ 7,000 rpm)	
Maximum speed	87 mph (140 kmph)	
Climbing ability	23°	
Fuel consumption	130 mpg @ 25 mph (55 kmpl @ 40 kmph)	
ENGINE		
Type	2-stroke, air cooled	
Displacement	10.98 cu. in. (180cc)	
Bore x stroke	1.965 x 1.8078 in. (50 x 46mm)	
Number of cylinders	2	
Compression ratio	7.4:1	
Starter type	Electric starter	
FUEL SYSTEM		
	YCS-1	**YCS1-C**
Carburetor		
Manufacturer, model	Mikuni, VM18SC	Mikuni, VM18SC
Main jet	65	65
Needle jet	0-0	N-6
Jet needle/clip position	4D2/3	4D10/3
Cutaway	3.0	2.5
Pilot jet	20	30
Starter jet	40	40
Air screw (no. of turns out)	2	2¼
Float level	21.0	21.0
Fuel tank capacity	3 gal. (11.36 liters)	3 gal. (11.36 liters)
LUBRICATION		
Engine	Yamaha Autolube	
Oil tank capacity	2.0 qt. (1.9 liters)	
IGNITION SYSTEM		
Ignition type	Battery ignition	
Ignition timing	0.071 in. (1.8mm)	
Spark plug type	B-8HC	

(continued)

SPECIFICATIONS — YCS-1 AND YCS1-C (continued)

ELECTRICAL EQUIPMENT	
Battery	12V 9 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 7/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 2W
Speedometer lamp	12V 3W
Turn signal indicator lamp	12V 2W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.313 (53/16)
Final reduction ratio	2.466 (37/15)
Transmission gear ratios	
1st gear	2.833 (12/34)
2nd gear	1.875 (16/30)
3rd gear	1.421 (19/27)
4th gear	1.045 (22/23)
5th gear	0.840 (25/21)
Overall reduction ratios	
1st gear	23.151
2nd gear	15.320
3rd gear	11.611
4th gear	8.542
5th gear	6.864
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	42° left and right
Caster	63°
Trail	3.35 in. (85mm)
Minimum turning radius	80.8 in. (2,050mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.50-18, 4PR
Rear	2.57-18, 4PR

SPECIFICATIONS — MODEL CS3-B AND CS3-C

DIMENSIONS	
Overall length	76.0 in. (1,930mm)
Overall width	32.1 in. (815mm)
Overall height	40.2 in. (1,020mm)
Wheelbase	49.0 in. (1,245mm)
Road clearance	6.9 in. (175mm)
WEIGHT	287 lbs. (130 kg)
PERFORMANCE	
Maximum output	22 hp @ 7,500 rpm
Maximum torque	15.7 ft.-lb. @ 7,000 rpm (2.17 kg-m @ 7,000 rpm)
Maximum speed	85 mph plus (135 kmph plus)
Acceleration (SS ¼ mile)	16.0 seconds
Climbing ability	25°
Braking distance	36.0 ft. @ 31 mph (11m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	11.89 cu. in. (195cc)
Number of cylinders	2
Compression ratio	6.2:1
Starter type	Electric starter and kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM20SC
Main jet	65
Needle jet	N-6
Jet needle/clip position	4D10/3
Cutaway	2.5
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	2
Float level	0.85 in. (21.7mm)
Fuel tank capacity	2.4 gal. (9.0 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.0 qts. (1.9 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — MODEL CS3-B AND CS3-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, Hitachi CD-HR,GS214
Battery	12V 9 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 7/23W
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.313 (53/16)
Final reduction ratio	2.860 (40/14)
Transmission gear ratios	
1st gear	2.833 (34/12)
2nd gear	1.875 (30/16)
3rd gear	1.421 (27/19)
4th gear	1.045 (23/22)
5th gear	0.840 (21/25)
Overall reduction ratios	
1st gear	26.843
2nd gear	17.766
3rd gear	13.464
4th gear	9.902
5th gear	7.959
FRAME	
Type	Steel, diamond frame
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	45° left and right
Caster	64°
Trail	3.5 in. (90mm)
Minimum turning radius	80.7 in. (2,050mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.75 - 18, 4PR
Rear	3.00 - 18, 4PR

SPECIFICATIONS — CS5

DIMENSIONS	
Overall length	76.2 in. (1,935mm)
Overall width	31.9 in. (835mm)
Overall height	40.7 in. (1,035mm)
Wheelbase	49.0 in. (1,245mm)
Road clearance	6.9 in. (175mm)
WEIGHT	287 lbs. (130 kg)
PERFORMANCE	
Maximum output	22 hp @ 7,500 rpm
Maximum torque	15.7 ft.-lb. @ 7,000 rpm (2.17 kg-m @ 7,000 rpm)
Maximum speed	85 mph plus (135 kmph plus)
Climbing ability	25°
Braking distance	36 ft. @ 31 mph (11m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	11.89 cu. in. (195cc)
Number of cylinders	2
Compression ratio	6.2:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni VM20SC
Main jet	65
Needle jet	N-6
Jet needle/clip position	4D10/3
Cutaway	2.5
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	2
Float level	0.85 in. (21.7mm)
Fuel tank capacity	2.4 gal. (9.0 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.0 qts. (1.9 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — CS5 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi, Hitachi CD-HR, GS214
Battery	12V 9 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 8/23W
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 2W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.313 (53/16)
Final reduction ratio	2.860
Transmission gear ratios	
1st gear	2.833
2nd gear	1.875
3rd gear	1.421
4th gear	1.045
5th gear	0.840
FRAME	
Type	Steel
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	42° left and right
Caster	64°
Trail	3.5 in. (90mm)
Minimum turning radius	82.7 in. (2,100mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	2.75 - 18, 4PR
Rear	3.00 - 18, 4PR

SPECIFICATIONS — DS6 AND DS6-B

DIMENSIONS	
Overall length	78.3 in. (1,990mm)
Overall width	32.9 in. (835mm)
Overall height	41.9 in. (1,065mm)
Wheelbase	50.8 in. (1,290mm)
Road clearance	6.3 in. (160mm)
WEIGHT	320 lbs.(145 kg)
PERFORMANCE	
Maximum output	30 bhp @7,500 rpm
Maximum torque	21.1 ft.-lb. @7,000 rpm (2.92 kg-m @ 7,000 rpm)
Maximum speed	90-100 mph (145-160 kmph)
Acceleration (SS ¼ mile)	15.0 seconds
Climbing ability	24°
Braking distance	38 ft. @ 31 mph (11.7m @ 50 kmph)
Fuel consumption	94.1 mpg @ 25 mph (40.5 kmpl @ 40.23 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	15.01 cu. in. (246cc)
Bore x stroke	2.205 x 1.969 in. (56 x 50mm)
Number of cylinders	2
Compression ratio	7.3:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni VM26C
Main jet	110
Needle jet	N-8
Jet needle/clip position	4D3/3
Cutaway	2.0
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	2¼
Float level	1.00 in. (25.5mm)
Fuel tank capacity	2.9 gal. (11 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — DS6 AND DS6-B (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, DU100-12
Battery	12V 5 ah
Headlight	12V 35/25W
Tail /brake lamp	12V 7/23W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.250 (65/20)
Final reduction ratio	2.733 (41/15)
Transmission gear ratios	
1st gear	2.545 (28/11)
2nd gear	1.533 (23/15)
3rd gear	1.167 (21/18)
4th gear	0.950 (19/20)
5th gear	0.773 (17/22)
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	38° left and right
Caster	63°
Trail	3.5 in. (88.5mm)
Minimum turning radius	86.6 in. (2,200mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — DS6-C

DIMENSIONS	
Overall length	78.3 in. (1,990mm)
Overall width	32.9 in. (835mm)
Overall height	41.9 in. (1,065mm)
Wheelbase	50.8 in. (1,290mm)
Road clearance	5.9 in. (150mm)
WEIGHT	331 lbs. (150 kg)
PERFORMANCE	
Maximum output	30 bhp @ 7,500 rpm
Maximum torque	21.1 ft.-lb. @ 7,000 rpm (2.92 kg-m @ 7,000 rpm)
Maximum speed	90-93 mph (145-150 kmph)
Acceleration (SS ¼ mile)	15.2 seconds
Climbing ability	25°
Braking distance	38 ft. @31 mph (11.7m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	15.01 cu. in. (246 cc)
Bore x stroke	2.205 x 1.969 in. (56 x 50mm)
Number of cylinders	2
Compression ratio	7.3:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM26HC
Main jet	110
Needle jet	N-8
Jet needle/clip position	4D3/3
Cutaway	2.0
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	2¼
Float level	1 in. (25.5mm)
Fuel tank capacity	2.9 gal. (11 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	1.6 qts. (1.5 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — DS6-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, DU100-12
Battery	12V 5 ah
Headlight	12V 35/25W
Tail /brake lamp	12V 7/23W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidsc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.250 (65/20)
Final reduction ratio	2.733 (41/15)
Transmission gear ratios	
1st gear	2.545 (28/11)
2nd gear	1.533 (23/15)
3rd gear	1.167 (21/18)
4th gear	0.950 (19/20)
5th gear	0.773 (17/22)
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	38° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	86.6 in. (2,200mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — DS7

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	32.9 in. (335mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	5.9 in. (150mm)
WEIGHT	304 lbs. (138 kg)
PERFORMANCE	
Maximum output	30 bhp @ 7,500 rpm
Maximum torque	21.1 ft.-lb. @ 7,000 rpm (2.92 kg-m @ 7,000 rpm)
Maximum speed	93-100 mph (150-160 kmph)
Acceleration (SS ¼ mile)	14.8 seconds
Climbing ability	24°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	94.1 mpg @ 31 mph (40 kmpl @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	15.07 cu. in. (247cc)
Bore x stroke	2.126 x 2.126 in. (54 x 54mm)
Number of cylinders	2
Compression ration	7.1:1
Starter type	Primary kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM26SC
Main jet	100
Needle jet	0-0
Jet needle/clip position	5DP7/4
Cutaway	2.0
Pilot jet	40
Starter jet	100
Air screw (no. of turns out)	1½
Float level	15.1mm
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.1 qts. (2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — DS7 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, AZ2010N
Battery	12V 5.5 ah
Headilght	12V 35/35W
Tail /brake lamp	12V 8/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 2W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.238 (68/21)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.562 (41/16)
2nd gear	1.590 (35/22)
3rd gear	1.192 (31/26)
4th gear	0.965 (28/29)
5th gear	0.806 (25/31)
Overall reduction ratios	
1st gear	22.126
2nd gear	13.737
3rd gear	10.295
4th gear	8.337
5th gear	6.963
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	39°, 30' left and right
Caster	62°, 30'
Trail	4.17 in. (106mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — MODELS RD250 AND RD250A

DIMENSIONS	
Overall length	80.3 in. (2.040mm)
Overall width	32.9 in. (835mm)
Overall height	43.7 in. (1,110mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	5.9 in. (150mm)
WEIGHT	309 lbs. (140 kg)
PERFORMANCE	
Maximum output	30 bhp @ 7,500 rpm
Maximum torque	21.1 ft.-lb. @ 7,000 rpm (2.92 kg-m @ 7,000 rpm)
Maximum speed	93 mph (150 kmph)
Acceleration (SS ¼ mile)	14.7 seconds
Climbing ability	24°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	94.1 mpg @ 31 mph (40 kmpl @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	15.07 cu. in. (247 cc)
Bore x stroke	2.126 x 2.126 in. (54 x 54mm)
Number of cylinders	2
Compression ratio	6.7:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	140
Needle jet	0-8
Jet needle/clip position	5I4/3
Cutaway	2.5
Pilot jet	25
Starter jet	100 (RD250A-70)
Air screw (no. of turns out)	1¾
Float level	0.59 in. (15mm)
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.1 qts. (2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.079 in. (2.0mm)
Spark plug type	B-8HS

(continued)

SPECIFICATIONS — MODELS RD250 AND RD250A (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi, AZ2010NI
Battery	12V 5.5 ah
Headlight	12V 8/27W
Tail/brake lamp	12V 27W
Turn signal lamp	12V 3W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	6-speed, constant mesh
Primary reduction ratio	3.238 (68/21)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.571 (36/14)
2nd gear	1.777 (32/18)
3rd gear	1.318 (29/22)
4th gear	1.040 (26/25)
5th gear	0.888 (24/27)
6th gear	0.785 (22/28)
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Caster	62° 30′
Trail	4.17 in. (106mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — YDS3, YDS3-C, AND YM1

DIMENSIONS	
Overall length	79.0 in. (2,005mm)
Overall width	31.2 in. (780mm)
Overall height	42.0 in. (1,050mm)
Wheelbase	51.9 in. (1,287mm)
Road clearance	5.8 in. (150mm)
WEIGHT	350 lbs. (158 kg)
PERFORMANCE	
Maximum output	28 hp @ 8,000rpm
Maximum speed	95-100 mph (150 kmph)
Climbing ability	23°
ENGINE	
Type	2-stroke, air cooled
Displacement	15 cu. in. (246cc)
Bore x stroke	2.205 x 1.969 in. (56 x50mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM24SC
Main jet	130
Needle jet	0-0
Jet needle/clip position	4D4/2
Cutaway	2.0
Pilot jet	20
Starter jet	40
Air screw (no. of turns out)	1½
Float level	25mm
Fuel tank capacity	3.6 gal. (14 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.0 qts. (1.9 liters)
IGNITION SYSTEM	
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-8HC
ELECTRICAL EQUIPMENT	
Generator	Mitsubishi DV65/6DIL
Battery	6V 7 ah

(continued)

SPECIFICATIONS — YDS3, YDS3-C, AND YM1 (continued)

TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Transmission gear ratios	
1st gear	2.545
2nd gear	1.533
3rd gear	1.166
4th gear	0.950
5th gear	0.773
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Minimum turning radius	86.5 in. (2,200mm)

SPECIFICATIONS — YDS5

DIMENSIONS	
Overall length	78.4 in (1,990mm)
Overall width	30.3 in. (770mm)
Overall height	41.4 in. (1,050mm)
Wheelbase	50.8 in. (1,290mm)
Road clearance	6.1 in. (155mm)
WEIGHT	325 lbs. (147 kg)
PERFORMANCE	
Maximum output	29.5 hp @ 8,000 rpm
Maximum torque	19.68 ft.-lb. @ 7,500 rpm (2.72 kg-m @ 7,500 rpm)
Maximum speed	100 mph (160 kmph)
Climbing ability	23.5°
Braking distance	42.5 ft. @ 31 mph (13m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	15 cu. in. (246cc)
Bore x stroke	2.205 x 1.969 in. (56 x 50mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Electric starter and kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM26SC
Main jet	120
Needle jet	0-5
Jet needle/clip position	4D3/2
Cutaway	2.5
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	1½
Float level	1.0 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.5 qts. (2.4 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.071 in. (1.8mm)
Spark plug type	B-8HC

(continued)

SPECIFICATIONS — YDS5 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric CE-GL
Battery	12V 11 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 8/25W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.250
Final reduction ratio	2.733 (41/15)
Transmission gear ratios	
1st gear	2.545
2nd gear	1.533
3rd gear	1.167
4th gear	0.950
5th gear	0.773
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	38° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.7 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — YM2

DIMENSIONS	
Overall length	78.4 in. (1,990mm)
Overall width	28.9 in. (735mm)
Overall height	39.4 in. (1,000mm)
Wheelbase	50.8 in. (1,290mm)
Road clearance	6.1 in. (155mm)
WEIGHT	320 lbs. (145 kg)
PERFORMANCE	
Maximum output	31 hp @ 7,000 rpm
Maximum torque	23.15 ft.-lb. @ 6,500 rpm (3.20 kg-m @ 6,500 rpm)
Maximum speed	103 mph (165 kmph)
Climbing ability	23.5°
Braking distance	42.5 ft. @ 31 mph (13m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	18.6 cu. in. (305cc)
Bore x stroke	2.36 x 2.12 in. (60 x 54mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM26SC
Main jet	110
Needle jet	0-5
Jet needle/clip position	4D3/2
Cutaway	2.5
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	1½
Float level	1 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.5 qts. (2.37 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-8HC

(continued)

SPECIFICATIONS — YM2 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, DU100/12GL
Battery	12V 5.5 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 8/25W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.250
Final reduction ratio	2.500 (40/16)
Transmission gear ratios	
1st gear	2.545
2nd gear	1.533
3rd gear	1.167
4th gear	0.950
5th gear	0.773
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	38° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.7 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — YM2-C

DIMENSIONS	
Overall length	78.4 in. (1,990mm)
Overall width	30.7 in. (780mm)
Overall height	38 in. (965mm)
Wheelbase	50.8 in. (1,290mm)
Road clearance	6.1 in. (155mm)
WEIGHT	325 lbs. (147 kg)
PERFORMANCE	
Maximum output	30.5 hp @ 7,000 rpm
Maximum torque	23.15 ft.-lb. @ 6,500 rpm (3.20 kg-m @ 6,500 rpm)
Maximum speed	94 mph (150 kmph)
Climbing ability	28°
Braking distance	42.5 ft. @ 31 mph (13m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	18.6 cu. in. (305cc)
Bore x stroke	2.36 x 2.12 in. (60 x 54mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM26SC
Main jet	110
Needle jet	0-5
Jet needle/clip position	4D3/2
Cutaway	2.5
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	1½
Float level	1 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.5 qts.
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-8HC

(continued)

SPECIFICATIONS — YM2-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, DU100/12BL
Battery	12V 5.5 ah
Headlight	12V 35/25W
Tail /brake lamp	12V 8/25W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	3.250
Final reduction ratio	2.500 (40/16)
Transmission gear ratios	
1st gear	2.545
2nd gear	1.533
3rd gear	1.167
4th gear	0.950
5th gear	0.773
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	38° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.7 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.25 - 18, 4PR

SPECIFICATIONS — R3

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	35.2 in. (895mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.7 in. (1,340mm)
Road clearance	5.9 in. (150mm)
WEIGHT	340 lbs. (150 kg)
PERFORMANCE	
Maximum output	36 hp @ 7,000 rpm
Maximum torque	28.0 ft.-lb. @ 6,000 rpm (3.87 kg-m @ 6,000 rpm)
Maximum speed	99-107 mph (160-173 kmph)
Acceleration (SS ¼ mile)	13.8 seconds
Climbing ability	26°
Braking distance	37 ft. @ 30 mph (11m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	21.2 cu. in. (348cc)
Bore x stroke	2.40 x 2.34 in. (61 x 59.6mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	170
Needle jet	0-2
Jet needle/clip position	5D1/3
Cutaway	2.0
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	1½
Float level	1.0 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	3.38 qts. (3.2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — R3 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, DU100-12
Battery	12V 5 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 7/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.870 (66/23)
Final reduction ratio	2.730 (41/15)
Transmission gear ratios	
1st gear	2.545 (28/11)
2nd gear	1.600 (24/15)
3rd gear	1.167 (21/18)
4th gear	0.950 (19/20)
5th gear	0.773 (17/32)
Overall reduction ratios	
1st gear	19.94
2nd gear	12.54
3rd gear	9.15
4th gear	7.44
5th gear	6.06
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	40° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — R3-C

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	35.2 in. (895mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.7 in. (1,340mm)
Road clearance	5.90 in. (150mm)
WEIGHT	342 lbs. (151 kg)
PERFORMANCE	
Maximum output	36 hp @ 7,000 rpm
Maximum torque	28.0 ft.-lb. @ 6,000 rpm (3.87 kg-m @ 6,000 rpm)
Maximum speed	98-105 mph (157-168 kmph)
Acceleration (SS ¼ mile)	13.8 seconds
Climbing ability	26°
Braking distance	37 ft. @ 30 mph (11m @ 50 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	21.2 cu. in. (348 cc)
Bore x stroke	2.40 x 2.34 in. (61 x 59.6mm)
Number of cylinders	2
Compression ratio	7.5:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	170
Needle jet	0-2
Jet needle/clip position	5D1/3
Cutaway	2.0
Pilot jet	30
Starter jet	40
Air screw (no. of turns out)	1½
Float level	1 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	3.38 qts. (3.2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — R3-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi Electric, DU100-12
Battery	12V 5 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 7/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.870 (66/23)
Final reduction ratio	2.730 (41/15)
Transmission gear ratios	
1st gear	2.545 (28/11)
2nd gear	1.60 (24/15)
3rd gear	1.167 (21/18)
4th gear	0.950 (19/20)
5th gear	0.773 (17/32)
Overall reduction ratios	
1st gear	19.94
2nd gear	12.54
3rd gear	9.15
4th gear	7.44
5th gear	6.06
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	40° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — R5

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	32.9 in. (835mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	6.1 in. (155mm)
WEIGHT	308 lbs. (140 kg)
PERFORMANCE	
Maximum output	36 bhp @ 7,000 rpm
Maximum torque	20.0 ft.-lb. @ 6,500 rpm (3.87 kg-m @ 6,500 rpm)
Maximum speed	100 mph plus (160 kmph plus)
Acceleration (SS ¼ mile)	13.8 seconds
Climbing ability	28°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	82.5 mpg @ 37 mph (35 kmpl @ 60 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	21.18 cu. in. (347 cc)
Bore x stroke	2.520 x 2.126 in. (64 x 54mm)
Number of cylinders	2
Compression ratio	6.9:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	110
Needle jet	0-0
Jet needle/clip position	5DP7/4
Cutaway	2.0
Pilot jet	40
Starter jet	100 (left carburetor only)
Air screw (no. of turns out)	1¾
Float level	0.59 in. (15mm)
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.1 qts. (2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — R5 (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, AZ2010N
Battery	12V 55 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 8/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.869 (66/23)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.562 (41/16)
2nd gear	1.590 (35/22)
3rd gear	1.192 (31/26)
4th gear	0.965 (28/29)
5th gear	0.806 (25/31)
Overall reduction ratios	
1st gear	19.608
2nd gear	12.173
3rd gear	9.123
4th gear	7.388
5th gear	6.171
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	39° 30′ left and right
Caster	62° 30′
Trail	4.17 in. (106mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — R5-B

DIMENSIONS	
Overall length	80.3 in. (2.040mm)
Overall width	32.9 in. (835mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	6.1 in. (155mm)
WEIGHT	308 lbs. (140 kg)
PERFORMANCE	
Maximum output	36 bhp @ 7,000 rpm
Maximum torque	28.0-ft.-lb. @ 6,500 rpm (3.87 kg-m @ 6,500 rpm)
Maximum speed	100 mph plus (160 kmph plus)
Acceleration (SS ¼ mile)	13.8 seconds
Climbing ability	28°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	82.5 mpg @ 37 mph (35 kmpl @ 60 kmph)
ENGINE	
Type	2-stroke,air cooled
Displacement	21.18 cu. in. (347 cc)
Bore x stroke	2.520 x 2.126 in. (64 x 54mm)
Number of cylinders	2
Compression ratio	6.9:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	110
Needle jet	0-0
Jet needle/clip position	5DP7/4
Cutaway	2.0
Pilot jet	40
Starter jet	100 (left carburetor only)
Air screw (no. of turns out)	1¾
Float level	0.59 in. (15mm)
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.1 qts. (2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-9HC

(continued)

SPECIFICATIONS — R5-B (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, AZ2010N
Battery	12V 5.5 ah
Headlight	12V 35/35W
Tail/brake lamp	12V 8/23W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 1.5W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.869 (66/23)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.562 (41/16)
2nd gear	1.590 (35/22)
3rd gear	1.192 (31/26)
4th gear	0.965 (28/29)
5th gear	0.806 (25/31)
Overall reduction ratios	
1st gear	19.608
2nd gear	12.173
3rd gear	9.123
4th gear	7.388
5th gear	6.171
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	39° 30′ left and right
Caster	62° 30′
Trail	4.17 in. (106mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — R5-C

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	32.9 in. (835mm)
Overall height	42.7 in. (1,085mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	6.1 in. (155mm)
WEIGHT	311 lbs. (141 kg)
PERFORMANCE	
Maximum output	36 bhp @ 7,000 rpm
Maximum torque	28.0 ft.-lb. @ 6,500 rpm (3.87 kg-m @ 6,500 rpm)
Maximum speed	100 mph plus (160 kmph plus)
Acceleration (SS ¼ mile)	13.8 seconds
Climbing ability	28°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	82.5 mpg @ 37 mph (35 kmpl @ 60 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	21.18 cu. in. (347 cc)
Bore x stroke	2.520 x 2.126 in. (64 x 54mm)
Number of cylinders	2
Compression ratio	6.9:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	120
Needle jet	0-4
Jet needle/clip position	5DP7/4
Cutaway	2.0
Pilot jet	30
Starter jet	100 (left carburetor only)
Air screw (no. of turns out)	1¼
Float level	0.59 in. (15mm)
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
Oil tank capacity	2.1 qts. (2 liters)
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.083 in. (2.1mm)
Spark plug type	B-8HS

(continued)

SPECIFICATIONS — R5-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi electric, AZ2010N
Battery	12V 5.5 ah
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 2W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.869 (66/23)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.562 (41/16)
2nd gear	1.590 (35/22)
3rd gear	1.192 (31/26)
4th gear	0.965 (28/29)
5th gear	0.806 (25/31)
Overall reduction ratios	
1st gear	19.608
2nd gear	12.173
3rd gear	9.123
4th gear	7.388
5th gear	6.171
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	39° 30′ left and right
Caster	62° 30′
Trail	4.17 in. (106mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — MODELS RD350 AND RD350A

DIMENSIONS	
Overall length	80.3 in. (2,040mm)
Overall width	32.9 in. (835mm)
Overall height	43.7 in. (1,110mm)
Wheelbase	52.0 in. (1,320mm)
Road clearance	6.1 in. (155mm)
WEIGHT	315 lbs. (143 kg)
PERFORMANCE	
Maximum output	39 hp @ 7,500 rpm
Maximum torque	28.0 ft.-lb. @ 7,000 rpm (3.87 kg-m @ 7,000 rpm)
Maximum speed	100 mph (160 kmph)
Acceleration (SS ¼ mile)	13.7 seconds
Climbing ability	28°
Braking distance	46 ft. @ 31 mph (14m @ 50 kmph)
Fuel consumption	82.5 mpg @ 37 mph (35 kmpl @ 60 kmph)
ENGINE	
Type	2-stroke, air cooled
Displacement	21.18 cu. in. (347 cc)
Bore x stroke	2.520 x 2.126 in. (64 x 54mm)
Number of cylinders	2
Compression ratio	6.6:1
Starter type	Kickstarter
FUEL SYSTEM	
Carburetor	
Manufacturer, model	Mikuni, VM28SC
Main jet	140
Needle jet	0-8
Jet needle/clip position	5I4/3
Cutaway	2.5
Pilot jet	25
Starter jet	100 (RD350A-70)
Air screw (no. of turns out)	1¾
Float level	0.59 in. (15mm)
Fuel tank capacity	3.2 gal. (12 liters)
LUBRICATION	
Engine	Yamaha Autolube
IGNITION SYSTEM	
Ignition type	Battery ignition
Ignition timing	0.79 in. (2.0mm)
Spark plug type	B-8HS

(continued)

SPECIFICATIONS — MODELS RD350 AND RD350A (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi, AZ2010NI
Battery	12V 5.5 ah
Headlight	12V 35/25W
Tail/brake lamp	12V 8/27W
Turn signal lamp	12V 27W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
Turn signal indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	6-speed, constant mesh
Primary reduction ratio	2.869 (66/23)
Final reduction ratio	2.666 (40/15)
Transmission gear ratios	
1st gear	2.571 (36/14)
2nd gear	1.777 (32/18)
3rd gear	1.318 (29/22)
4th gear	1.040 (26/25)
5th gear	0.888 (24/27)
6th gear	0.785 (22/28)
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Caster	62° 30′
Trail	4.17 in. (106mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

SPECIFICATIONS — YR1, YR2, AND YR2-C

DIMENSIONS		
Overall length	81.2 in. (2,060mm)	
Overall width	28.9 in. (735mm)	
Overall height	39.4 in. (1,000mm)	
Wheelbase	52.6 in. (1,335mm)	
Road clearance	5.7 in. (145mm)	
WEIGHT	348 lbs. (158 kg)	
PERFORMANCE		
Maximum output	36 hp @ 7,000 rpm	
Maximum speed	100-110 mph (173 kmph)	
Climbing ability	26°	
Braking distance	43 ft. @ 31 mph (13m @ 50 kmph)	
Fuel consumption	95 mpg @ 25 mph (40 kmpl @ 40 kmph)	
ENGINE		
Type	2-stroke, air cooled	
Displacement	21.23 cu. in. (348cc)	
Bore x stroke	2.40 x 2.34 in. (61 x 59.6mm)	
Number of cylinders	2	
Starter type	Kickstarter	
FUEL SYSTEM	**YR1**	**YR2, YR2-C**
Carburetor		
Manufacturer, model	Mikuni, VM28SC	Mikuni, VM28SC
Main jet	190	170
Needle jet	0-2	0-2
Jet needle/clip position	5D1/2	5D1/3
Cutaway	1.5	2.0
Pilot jet	30	30
Starter jet	40	40
Air screw (no. of turns out)	2¼	1¼
Float level	1 in. (25.5mm)	1 in. (25.5mm)
Fuel tank capacity	4 gal. (15 liters)	4 gal. (15 liters)
LUBRICATION		
Engine	Yamaha Autolube	
Oil tank capacity	3.3 qts. (3.2 liters)	
IGNITION SYSTEM		
Ignition type	Battery Ignition	
Ignition timing	0.083 in. (2.1mm)	
Spark plug type	B-8HC	

(continued)

SPECIFICATIONS — YR1, YR2, AND YR2-C (continued)

ELECTRICAL EQUIPMENT	
Generator	Mitsubishi, DU100/12AR
Battery	12V 5.5 ah
Headlight	12V 35/25W
Tail /brake lamp	12V 8/25W
Turn signal lamp	12V 8W
Neutral indicator lamp	12V 3W
Speedometer lamp	12V 3W
High beam indicator lamp	12V 3W
TRANSMISSION SYSTEM	
Clutch type	Wet, multidisc
Number of speeds, type	5-speed, constant mesh
Primary reduction ratio	2.870
Final reduction ratio	2.560 (41/16)
Transmission gear ratios	
1st gear	2.545
2nd gear	1.600
3rd gear	1.600
4th gear	1.168
5th gear	0.770
Overall reduction ratios	
1st gear	18.75
2nd gear	11.80
3rd gear	8.60
4th gear	7.00
5th gear	5.69
FRAME	
Type	Double cradle
Suspension, front	Telescopic fork
Suspension, rear	Swing arm
STEERING	
Steering angle	40° left and right
Caster	63°
Trail	3.48 in. (88.5mm)
Minimum turning radius	90.6 in. (2,300mm)
BRAKES	
Front, type	Drum, internal expansion
Rear, type	Drum, internal expansion
TIRES	
Front	3.00 - 18, 4PR
Rear	3.50 - 18, 4PR

CHAPTER EIGHT

USEFUL FORMULAS AND TABLES

This chapter contains formulas for converting metric to American dimensions and vice versa, with typical examples worked out. Also in this chapter are other useful tables and formulas.

CONVERSIONS

Multiply	by	To obtain
Volume		
Cubic centimeters	0.061	Cubic inches
Cubic inches	16.387	Cubic centimeters
Liters	0.264	Gallons
Gallons	3.785	Liters
Liters	1.057	Quarts
Quarts	0.946	Liters
Cubic centimeters	0.0339	Fluid ounces
Fluid ounces	29.57	Cubic centimeters
Length		
Millimeters	0.03937	Inches
Inches	25.4	Millimeters
Centimeters	0.3937	Inches
Inches	2.54	Centimeters
Kilometers	0.6214	Miles
Miles	1.609	Kilometers
Meters	3.281	Feet
Feet	0.3048	Meters
Millimeters	0.10	Centimeters
Centimeters	10.0	Millimeters
Weight		
Kilograms	2.205	Pounds
Pounds	0.4536	Kilograms
Grams	0.03527	Ounces
Ounces	28.35	Grams
Other		
Metric horsepower	1.014	Brake horsepower
Brake horsepower	0.9859	Metric horsepower
Kilogram-meters	7.235	Foot-pounds
Foot-pounds	0.1383	Kilogram-meters
Kilometers per liter	2.352	Miles per gallon
Miles per gallon	0.4252	Kilometers per liter
Square millimeters	0.00155	Square inches
Square inches	645.2	Square millimeters
Kilometers per hour	0.6214	Miles per hour
Miles per hour	1.609	Kilometers per hour

Examples of Conversions

1. To convert 250 cubic centimeters to cubic inches, multiply 250 cubic centimeters by 0.061:

$$250 \times 0.061 = 15.25 \text{ cubic inches}$$

2. To convert 0.65 inch to millimeters, multiply 0.65 inch by 25.4:

$$0.65 \times 25.4 = 16.51 \text{ millimeters}$$

3. To convert 76 kilograms to pounds, multiply 76 kilograms by 2.205:

$$76 \times 2.205 = 167.58 \text{ pounds}$$

4. To convert 41 miles per gallon to kilometers per liter, multiply 41 miles per gallon by 0.4252:

$$41 \times 0.4252 = 17.43 \text{ kilometers per liter.}$$

PISTON DISPLACEMENT

The formula for finding piston displacement can be expressed as:

$$D = \pi \times R^2 \times S \times N$$

D = Piston displacement

π = 3.1416 (a constant)

R = Radius of one cylinder (one-half of bore)

S = Piston stroke

N = Number of cylinders

Example 1

A single cylinder engine has a bore of 70 millimeters, stroke of 62 millimeters. What is its displacement?

First convert 70 millimeters (bore) and 62 millimeters (stroke) to centimeters by dividing each by 10, which is equivalent to multiplying each by 0.10. This step is necessary so that our answer will come out in cubic centimeters. Then using bore and stroke figures expressed in *centimeters* in the formula:

R = one-half of bore = 3.5

S = 6.2

N = 1

$$\begin{aligned} D &= \pi \times R^2 \times S \times N \\ &= 3.1416 \times (3.5)^2 \times 6.2 \times 1 \\ &= 3.1416 \times 12.25 \times 6.2 \\ &= 238.6 \text{ cubic centimeters} \end{aligned}$$

Example 2

A 3-cylinder engine has a bore of 60 millimeters and a stroke of 58.8 millimeters. What is its piston displacement?

First convert both bore and stroke into centimeters by multiplying by 0.10:

R = one-half of bore = 3 centimeters

S = 5.88 centimeters

N = 3

$$\begin{aligned} D &= \pi \times R^2 \times S \times N \\ &= 3.1416 \times (3.0)^2 \times 5.88 \times 3 \\ &= 3.1416 \times 9 \times 5.88 \times 3 \\ &= 498.75 \text{ cubic centimeters} \end{aligned}$$

Note that the formula will work equally well if bore and stroke are expressed in inches or millimeters. If they are expressed in inches, the answer will come out in cubic inches. The answer will come out in cubic millimeters if millimeters are used in the formula.

BOLT TORQUE

The table on the following page lists nominal tightening torques for various metric thread sizes:

BOLT TIGHTENING TORQUES

Diameter (Millimeters)	Pitch (Millimeters)	Torque	
		Foot-pounds	(Meter-kilograms)
Coarse thread			
5	0.90	2.53-3.47	(0.35-0.48)
6	1.00	4.56-6.37	(0.63-0.88)
8	1.25	11.6-15.9	(1.6-2.2)
10	1.50	22.4-30.4	(3.1-4.2)
12	1.75	39.1-54.2	(5.4-7.5)
14	2.00	60.0-83.2	(8.3-11.5)
16	2.00	94.0-130	(13-18)
18	2.50	130-181	(18-25)
20	2.50	188-253	(26-35)
Fine thread			
5	0.50	2.53-3.47	(0.35-0.48)
6	0.75	3.98-5.57	(0.55-0.77)
8	1.00	9.76-13.4	(1.35-1.85)
10	1.25	18.4-25.3	(2.55-3.5)
12	1.50	32.5-44.8	(4.5-6.2)
14	1.50	53.5-73.8	(7.4-10.2)
16	1.50	83.2-116	(11.5-16)
18	1.50	123-166	(17-23)
20	1.50	166-239	(23-33)

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THE NEW LOOK

IN TRAFFIC SIGNS AND MARKINGS...

(U.S. Department of Transportation — 1972)

WIDESPREAD CHANGES in highway and street traffic signs and pavement markings during the next few years will affect every American motorist and pedestrian.

The United States is moving toward an international-type system of traffic control devices, which emphasizes pictures and symbolic signs rather than written messages.

Symbolic signs are not entirely new. The familiar curve and crossroad symbols have been used for many years. Symbols have several advantages over word messages. They provide almost instant communication with the driver, since they can be understood at a glance without having to be read. Also, they overcome language barriers. This is important in view of the growth of international travel. Familiarity with the symbolic signs will help Americans traveling abroad, as well as foreign visitors to the United States.

Some of the present word signs will remain in use. These are signs which have proven effective in the past and which contain easily understood messages, such as the "Stop" sign and speed limit signs.

Change Will Be Gradual

States and local communities have a target date of 1973 to implement pavement marking requirements; 1975 for signs, and 1977 for signals. As the new signs are introduced, companion word messages also will be used until the public becomes accustomed to the new system.

Color Is Significant

Red indicates stop or a prohibition; green shows movement permitted or gives directional guidance; blue is for signs leading to motorist services; yellow indicates a general

Some familiar signs will remain.

Shaded Area = Red

warning; black on white indicates regulatory signs such as those for speed limits; orange conveys construction and maintenance warnings; and brown is for public recreation and scenic guidance.

Shapes Have Meaning

Diamond shaped signs signify a warning; rectangular signs with the longer dimension vertical provide a traffic regulation; and rectangular signs with the longer dimension horizontal contain guidance information. An octagon means stop; an inverted triangle means yield; a pennant means no passing; a pentagon shows the presence of a school; and a circle warns of a railroad crossing.

New Pavement Markings

In pavement markings, yellow will be used much more than in the past. Yellow lines will delineate the separation of traffic flow in opposing directions. The center line on two-way roadways will be dashed yellow to differentiate from the dashed white lines used on multi-lane one-way roadways. This will warn drivers who leave one-way roadways that traffic will be opposing them to the left of the yellow line. Other uses of yellow will include occasional left edgelines on divided roadways where traffic cannot pull entirely off the roadway, and for the marking of obstructions and islands which must be passed on the right.

Regulatory Signs

While European nations are adopting the U.S. "Stop" sign, the U.S. is turning to more international standards with the red and white "Yield" and "Do Not Enter" signs, and the use of the red circle with a diagonal slash to indicate prohibited movement.

NEW	OLD
	
	
	
	
	
	

Dark Shaded Areas = Red
Light Shaded Areas = Yellow

The new pennant-shaped warning sign supplements rather than replaces the rectangular, regulatory, "Do Not Pass" sign. The pennant is located on the left side of the road, and points to the beginning of the no-passing barrier line.

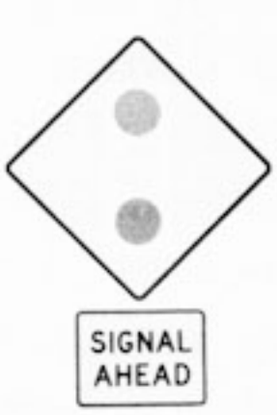
NEW	OLD
	
	

Bicycles are used by many persons on portions of heavily traveled roadways. This mixing of bicycles and motor vehicles is extremely dangerous and wherever possible, separate facilities are being provided for the bicycles.

The two signs shown here will appear where bicycles are restricted from roadways and where separate paths for bicycles are provided. A guide sign, with the bicycle symbol, is also being used to direct bicyclists to permissible routes.

Warning Signs

NEW	OLD	NEW	OLD
			
			
			
			
			
			
			

Pedestrians, including school age children, often must cross roadways where heavy vehicle traffic constitutes a hazard. These signs are to inform motorists of frequent crossings by pedestrians and to alert them to the possibility that young children may dart out on the roadway.

Light Shaded Areas = Yellow

Warning Signs

Where sudden changes in the number of highway lanes occur, motorists need to be alerted in advance so that the proper maneuvers can be completed. The three signs above appear in a series to serve as a repeating reminder to merge into the adjacent lane.

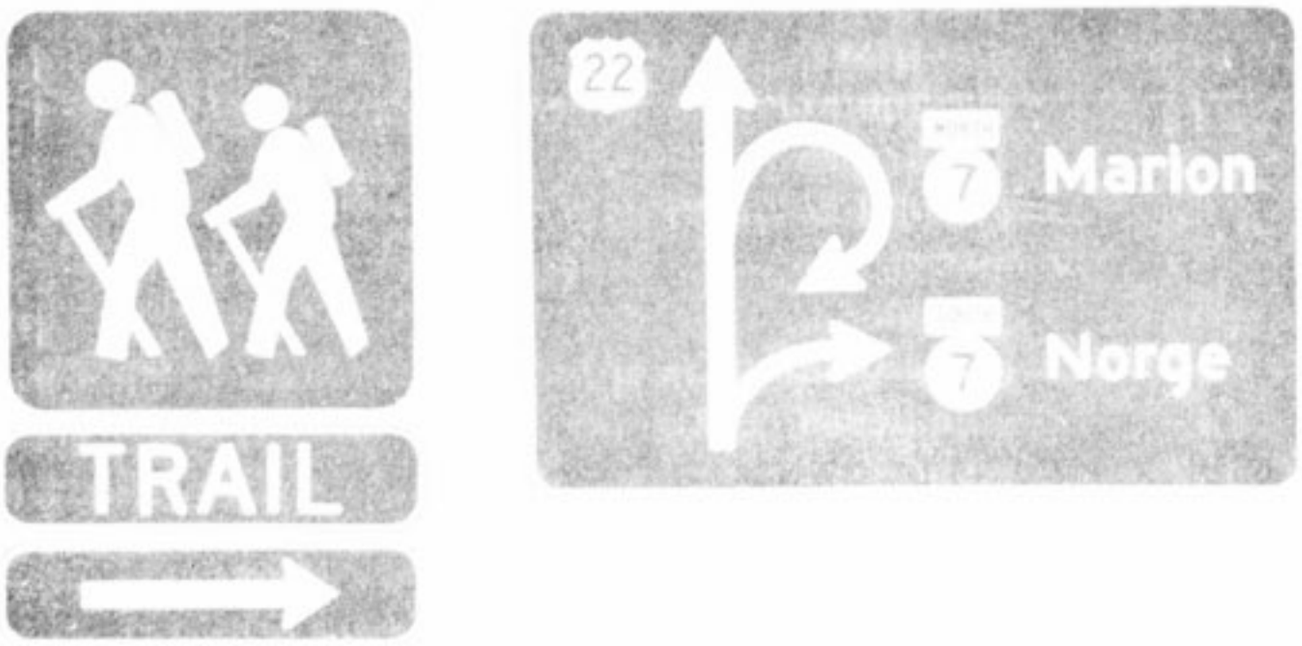
Animals crossing the roadway, as well as slow moving agricultural equipment, are hazards to high speed vehicles. These are the symbols that will be used to warn motorists.

Services Signs

The blue color of these signs indicates that they provide direction to motorist service facilities. Word message signs also will be used to direct motorists to areas where service stations, restaurants, and motels are available.

Guide Signs

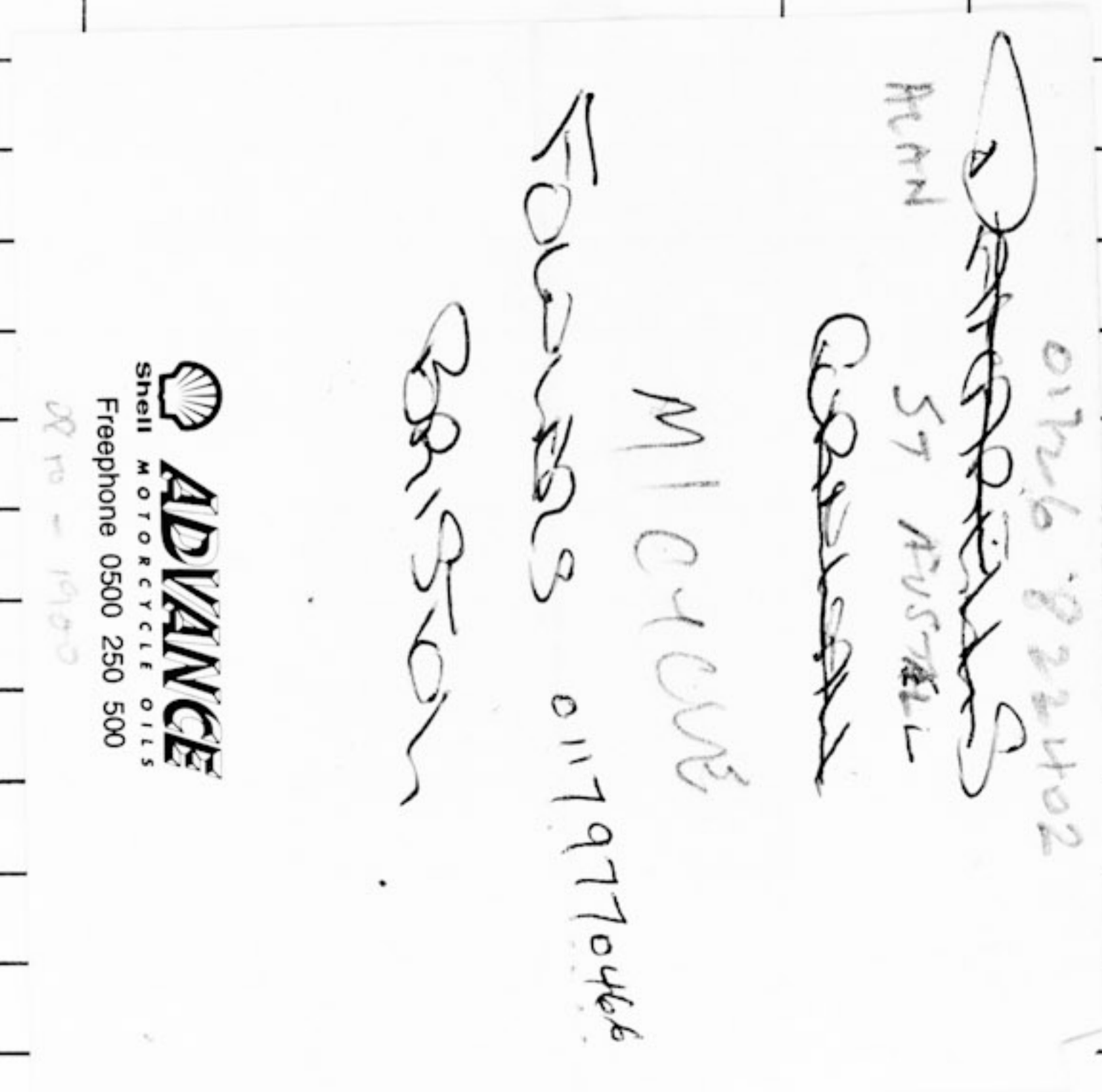
The green background signs indicate that the message is providing directional information. Diagrams on some signs are being introduced to help motorists find the correct path through complicated interchange ramp networks. Roadside mileage markers will assist in trip planning and provide locational information. New directional signs will point to bike and hiking trails.



Light Shaded Areas = Yellow
Medium Shaded Areas = Blue
Dark Shaded Areas = Green

MAINTENANCE LOG

DATE	TYPE OF SERVICE	COST	REMARKS
31-12-76	SEARINGS 23 NORTH ST BISHOPS STORTFORD		~~0279 51897~~ 01279 651897
17/2/99	FOWLERS BRISTOL		01179 770466
	2-12 BATH ROAD BS4 3DR		STORES NIGEL ADAMS.
	ALAN DAMARELLS STANSTED		01726 822402
	YAMAHA (UK) 50 NORTH DRIVE BROOKLANDS WEYBRIDGE		01932 358000
	SPARES MNGR MR HEALEY (JANE) WX M'CARE / ARGOS)		



MAINTENANCE LOG

DATE	TYPE OF SERVICE	COST	REMARKS

the right book for your bike

Clymer's completely new, professionally-written motorcycle service manuals are a must for all bike owners! Expert text and hundreds of photos give model-by-model service, repair, and troubleshooting information. Jobs for the amateur are fully detailed. When to call in a "pro" is also made clear.

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*Summer, 1974 Publication
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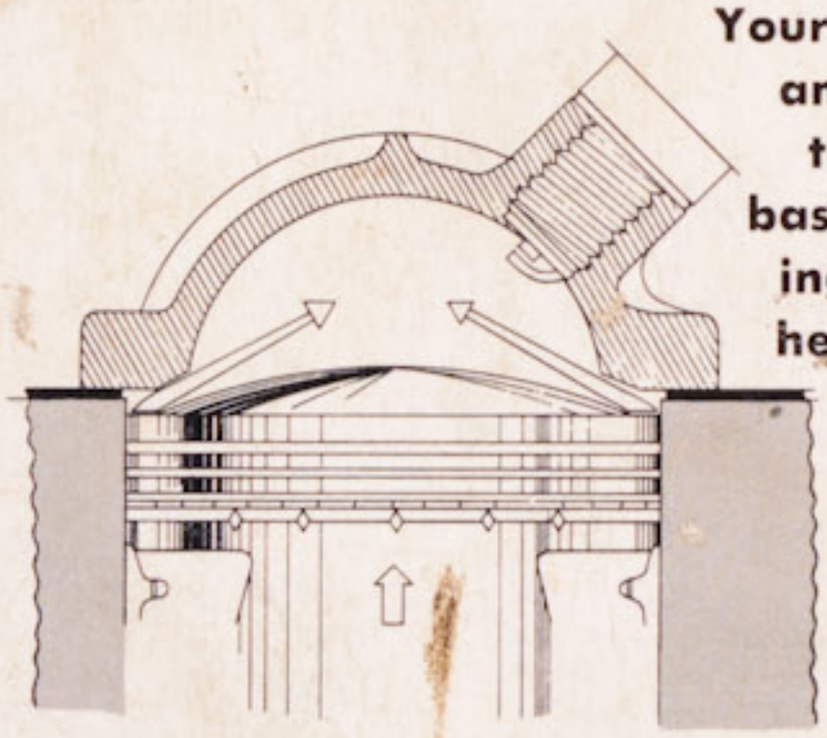
YAMAHA SERVICE • REPAIR HANDBOOK

90-350cc TWINS • 1965-1974

HS1	90cc	1970	CS5	200cc	1972	YM2-C	305cc	1967
HS1-B	90cc	1971	DS6	250cc	1968	R3	350cc	1969
LS-2	100cc	1972	DS6-B	250cc	1970	R3-C	350cc	1969
YL1	100cc	1966	DS6-C	250cc	1969	R5	350cc	1970
YL1-E	100cc	1967	DS7	250cc	1972	R5-B	350cc	1971
AS2C	125cc	1969	RD250	250cc	1973	R5-C	350cc	1972
YAS1	125cc	1967	RD250A	250cc	1974	RD350	350cc	1973
YAS1-C	125cc	1968	YDS3	250cc	1965	RD350A	350cc	1974
YCS-1	200cc	1967	YDS3-C	250cc	1965	YR1	350cc	1967
YCS1-C	200cc	1968	YDS5	250cc	1967	YR2	350cc	1968
CS3-B	200cc	1971	YM1	250cc	1966	YR2-C	350cc	1968
CS3-C	200cc	1970	YM2	305cc	1967			

Year shown indicates the first year a model was produced



Your motorcycle was designed to free you from crowds and congestion. Let it—but make sure you'll be able to get back when you want to. This book, plus a few basic tools, can spell the difference between completing a trip and breaking down miles from the nearest help.

This is a book for active bike enthusiasts. Glance through it. Carry it along as standard equipment. It's a good feeling to understand what's happening below you—and an even better one to realize you can get inside if necessary and make repairs.

More than 70% of bike problems stem from poor tuning, misadjustment or loosening caused by vibration. Most of these troubles can be cleared up quickly with simple tools—if you know what to do.

Clymer motorcycle books offer detailed step-by-step procedures for servicing, troubleshooting, repair and major overhaul. Material has been painstakingly gathered and edited by top technical writers who are also bike enthusiasts. Text is illustrated by the best available photos and drawings, all keyed to the appropriate paragraphs.

Clymer is the world's largest publisher of books devoted exclusively to motorcycles and automobiles. Our 200 other titles deal with repair, performance tuning and racing. Ask for them.

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