YAMAHA

DS7 (1972) RD250 (1973) R5C (1972) RD350 (1973)

SVM-360-0800-20

FOREWORD

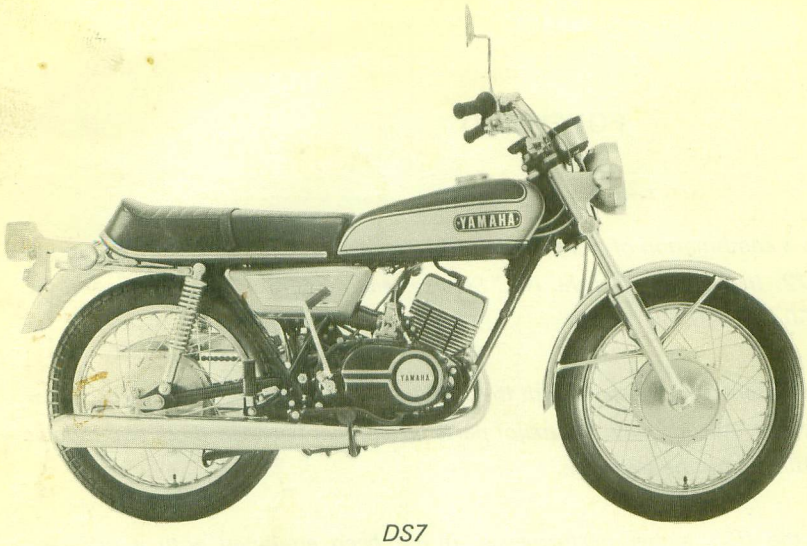
This Service Manual is a combination of the DS7 and R5C Service Manuals originally printed in Japan, September 1972. In essence, it is the R5C Service Manual with appropriate additions for models DS7, RD250, and RD350.

All of these models are essentially the same with the R5's having an increase in bore to account for the larger displacement. Accordingly, the major parts differences between these two models is within those parts affected by the overbore.

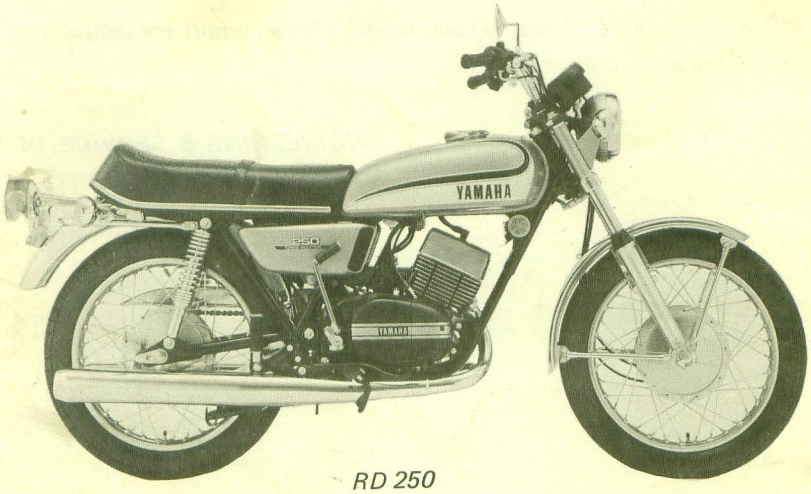
Additionally, due to the R5's higher performance, it has been equipped with a different primary ratio and larger rear tire. Additional information can be found in the specifications section.

Should any questions arise concerning any model, please consult the appropriate model Parts List and/or Service or Parts News Bulletins.

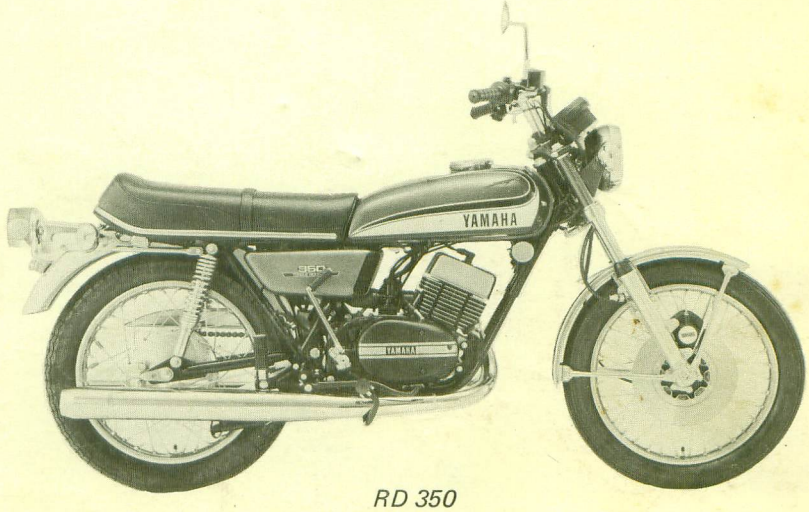
ENGINEERING & SERVICE DEPARTMENT
YAMAHA MOTOR CO., LTD.



DS7



RD 250



RD 350

CONTENTS

CHAPTER 1. YAMAHA AUTOLUBE
(Separate Automatic Lubrication System)

1–1 What is Yamaha Autolube?

YAMAHA Autolube is an automatic lubricating device for 2-stroke engines. Developed by the YAMAHA Technical Institute, it meters oil to the engine with respect to engine speed and throttle opening by means of a precision pump. As a result, the YAMAHA engine does not require pre-mixed gas and oil like other 2-stroke engines. Controlled lubrication is automatically applied to the working parts of the engine. This makes YAMAHA Autolube the best lubricating system ever devised for 2-stroke engines. The oil pump is driven by the engine through a reduction gear system and is also connected to the throttle.

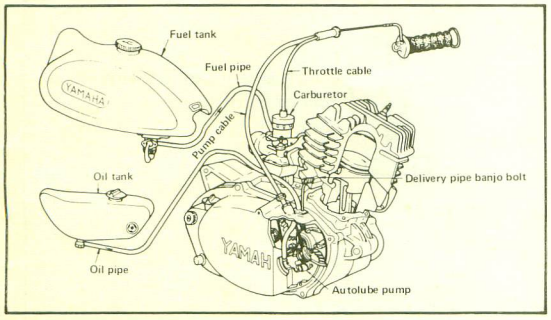


Fig. 1-1-1

1–2 Features of Yamaha Autolube

The YAMAHA Autolube:

1. Eliminates the bother of pre-mixing gas and oil.
2. Maintains optimum lubrication according to both engine speed and throttle opening.
3. Reduces spark plug fouling by injecting just enough oil for proper lubrication.
4. Cuts oil consumption to 1/3 that of conventional 2-stroke engines.
5. Reduces exhaust smoke. .
6. Lets you use the engine compression as a ,brake; the oil injection/continues according to engine RPM, even though the throttle may be closed.
7. Improves performance; no excess oil to interfere with complete combusion of the gas-air mixture.
8. Prolongs engine life; each injection is clean, undiluted oil.

1–3 Handling of the Oil Pump

The oil pump is a precision-machined assembly. Make no attempt to disassemble it. When you remove the oil pump from the engine, protect it from dust, dirt, etc., and after reinstalling it, bleed and adjust the pump correctly. Proper handling will keep the pump free from trouble.

1. Checking Minimum Pump Stroke

   a. Checking
   1) Fully close the accelerator grip.
   2) Turn the oil pump starter plate in the direction of the arrow marked on the plate. Keep the gap as wide as possible by observing it with the eye. Then measure the gap between the adjustment pulley and the adjustment plate.

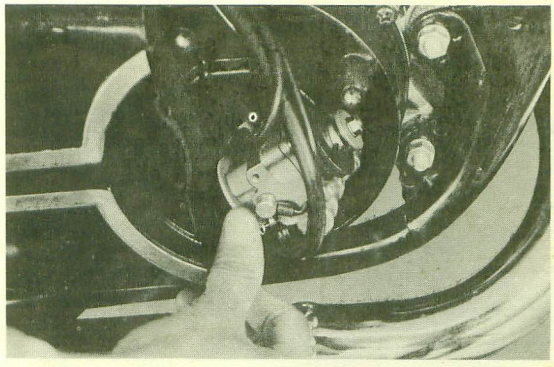


Fig. 1-3-1

   3) Use thickness gauges to check the gap width. The correct minimum pump stroke tolerance is 0.20 ~ 0.25 mm. (0.008 ~ 0.010")

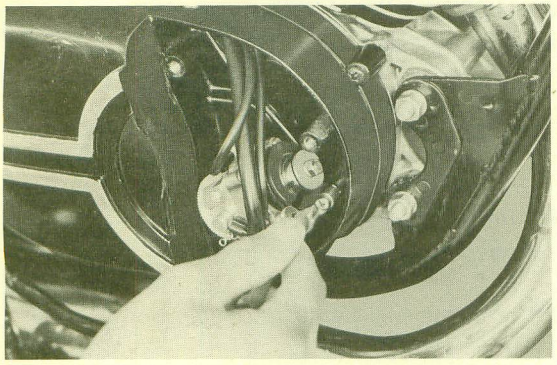


Fig. 1-3-2

b. Adjustment

1) Remove the adjustment plate lock nut and adjustment plate.

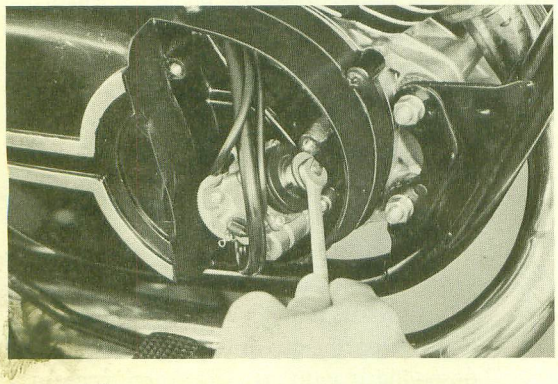


Fig. 1-3-3

2) Add or remove a 0.1 mm adjustment shim (where the adjustment plate was.) to increase or decrease the minimum pump stroke.

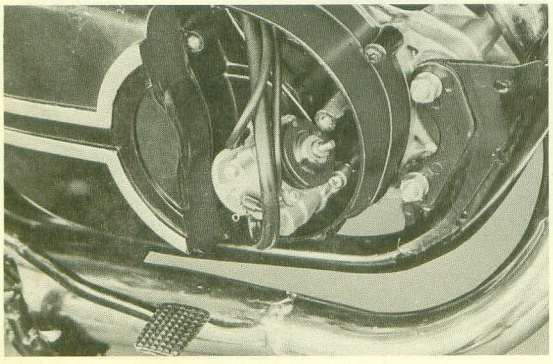


Fig. 1-3-4

3) Reinstall the adjustment plate and lock nut, and measure the minimum stroke for the correct tolerance.

2. Pump and Carburetor Setting

Follow the preceding steps to check the minimum stroke, and adjust it if incorrect. Then adjust the pump and carburetors.

a. Checking

1) Adjust both carburetors so the slides raise and lower simultaneously and the cables have correct slack right at the carburetors. (See carburetor section for details.)
2) Adjust the throttle cable at the throttle grip so it has proper slack (see Fig. 1-3-6)
3) Set the idle mixture screws to 1-3/4 turns out from a lightly seated position.
4) Start the machine, let it warm up, and synchronize the idle speeds so the machine idels at 1,300-1,500 rpm.

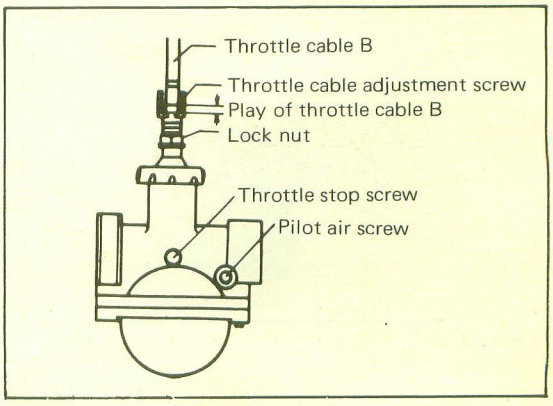


Fig. 1-3-5

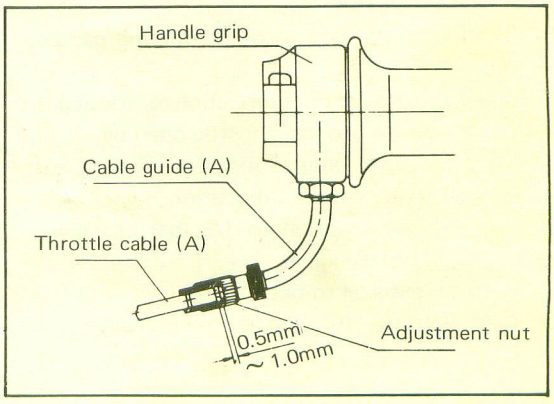


Fig. 1-3-6

5) Close the throttle grip completely, then twist it open until all cable slack is removed, but stop before the slides start to lift.
6) Adjust the pump cable so the raised mark on the pump pulley lines up with the guide pin (adjustor located at bottom end of cable, screwed into top of right case).

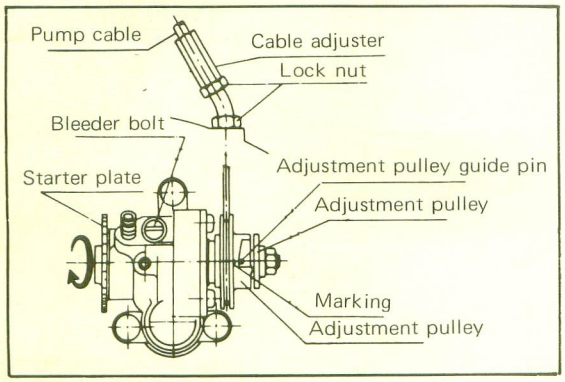


Fig. 1-3-7

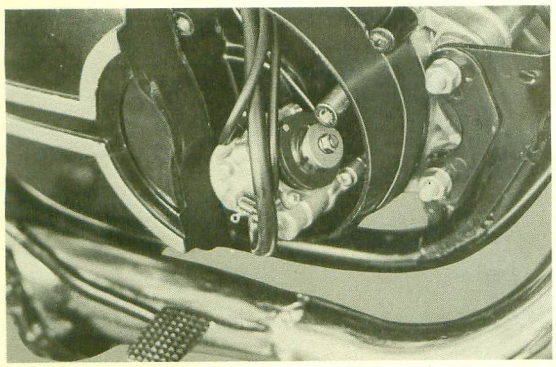


Fig. 1-3-8

3. Bleeding
When the pump has been removed or the Autolube oil has run out, air will enter the pump. The air will cause an irregular flow of oil after the pump is mounted again or the oil tank is refilled.
In order to prevent an irregular flow of oil, bleed the pump in the following manner.

1) Removed the bleeder bolt.

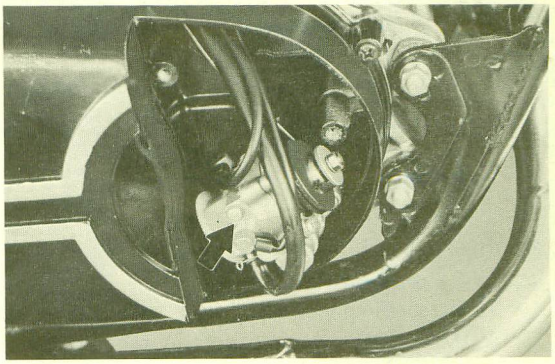


Fig. 1-3-9

2) Next, rotate the starter plate in the direction of the arrow marked on the plate.
Continue turning the plate until no air remains, and tighten the bleeder bolt. To facilitate this bleeding, fully open the accelerator grip. As the plunger stroke becomes greater, the air can be quickly bled.

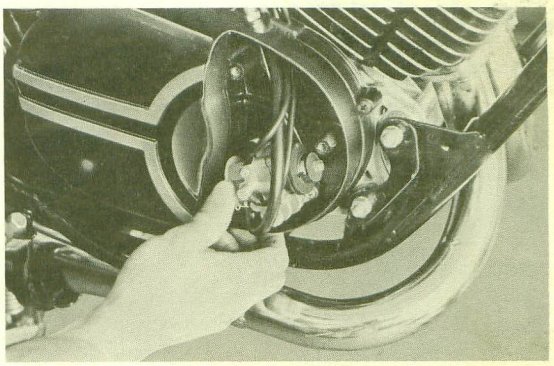


Fig. 1-3-10

3) Prior to installation of the cover, check the pump guide pin. It should not strike the raised boss at either end of the cable pulley (at idle or full throttle). Additionally, check to see that the cover does not pinch any delivery lines when tightened down.

4. Recommended Oil

It is recommended that your first choice be YAMALUBE, which can be purchased from any Authorized Yamaha dealer. If for any reason you use another type of oil, choose from the following list, which is in descending order of preference.

1) Any major brand of two-stroke oil labeled as "BIA certified for service TC-W."
2) Another brand 30 wt. two-stroke oil designed for air cooled engines.
3) A 30 wt. two-stroke oil designed for water cooled engines.
4) A 30 wt. SAE "MS" name-brand, detergent type automotive oil.

NOTE:

The Autolube system, due to its superior metering capabilities, will help any automotive type oil (such as L4 above) do a good lubricating job. However, we recommend two-stroke oil due to the extra, added protection it offers; particularly YAMALUBE.

5. Temperature

Oil delivery to the Autolube pump is via gravity feed. YAMALUBE remains non-viscous to well below the freezing point. In the event temperatures drop to, and stay at, levels well below freezing, use the following formula:

Below 15°F use MS SAE 10W-30
Below -10°F use MS SAE 5W-20

CHAPTER 2. CYLINDER PORTING

2–1 Description of 5-Port Cylinder

The Schnuerle loop scavenging system is the most commonly used induction system for two-stroke engines. In the Schnuerle loop system, transfer ports on the right and left sides of the cylinder are employed to transfer 2 streams of fresh fuel in the loop design that had proved to be the most effective induction system until the innovation of Yamaha's 5-port cylinder. This conventional Schnuerle loop system had a design limit in tha the transfer ports could not be made large enough to completely clear the combustion chamber of exhaust gases because of the position of the intake and exhaust ports. This would result in a portion of exhaust gas remaining in the central area of the combustion chamber that would contaminate the fresh fuel charge.

The rotary valve induction system incorporates the use of a 3rd transfer port at the back of the cylinder that directs a fresh fuel charge to the dead area containing the remaining exhaust gases. But to incorporate the rotary valve system sometimes creates physical limitations of excessive engine width and unattractive appearance restricting such an engine design.

Yamaha's Research and Engineering Departments, therefore, designed and perfected the 5-port cylinder induction system that is used on the R5. This new 5-port system, with the incorporation of two additional specially designed transfer ports, completely removes all the exhaust gases previously left in the dead area of the cylinder.

Engine performance is greatly increased with the use of this 5-port system. You, as the owner and rider of the $5, will benefit from the 5-port system by having increased engine reliability, increased engine performance, and a reduction in gas and oil consumption.

2–2 Construction and Features

(Refer to Figs. 2-2-1, 2 and 3))

The 5-port sylinder induction system is similar to the Schnuerle loop scavenging system in that the two main streams (a) of fresh fuel meet at the cylinder wall opposite the exhaust ports, and deflect upward. Then, the streams again deflect downward, forcing out the burnt gases through the exhaust ports.

Additionally, in the 5-port cylinder induction system, two ausiliary transfer passages are so arranged that these two ports run from the bottom of the cylinder up to the same height as the main transfer ports. Therefore, when the piston comes down to bottom dead center, these two transfer passages are opened and fuel is pushed up from the crankcase to the cylinder through the two holes in the cylinder.

In the conventional Schnuerle system of porting, the burnt gases (b) cannot be completely cleared out of the cylinder, remaining in the center of the combustion chamber as shown in Fig. 2-2-1.

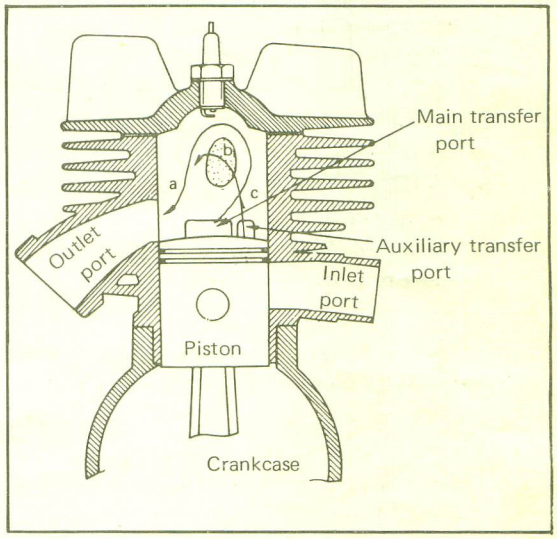


Fig. 2-2-1

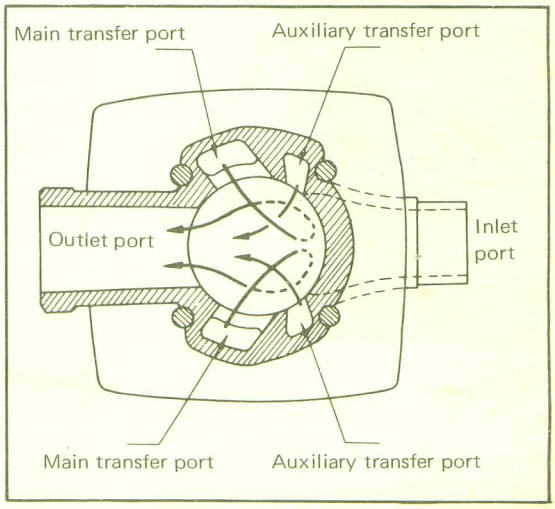


Fig. 2-2-2

However, the design of the 5-port cylinder induction system has successfully eliminated such a disadvantage; the additional ports are designed to direct their fresh charge (c) at the area containing the remaining burnt gases, completely forcing the exhaust gases out of the cylinder.

Another advantage of the 5-port induction system is that the piston is cooled by the fresh fuel passing over it. This greatly increases the engine power in combination with the new design of 5-port system.

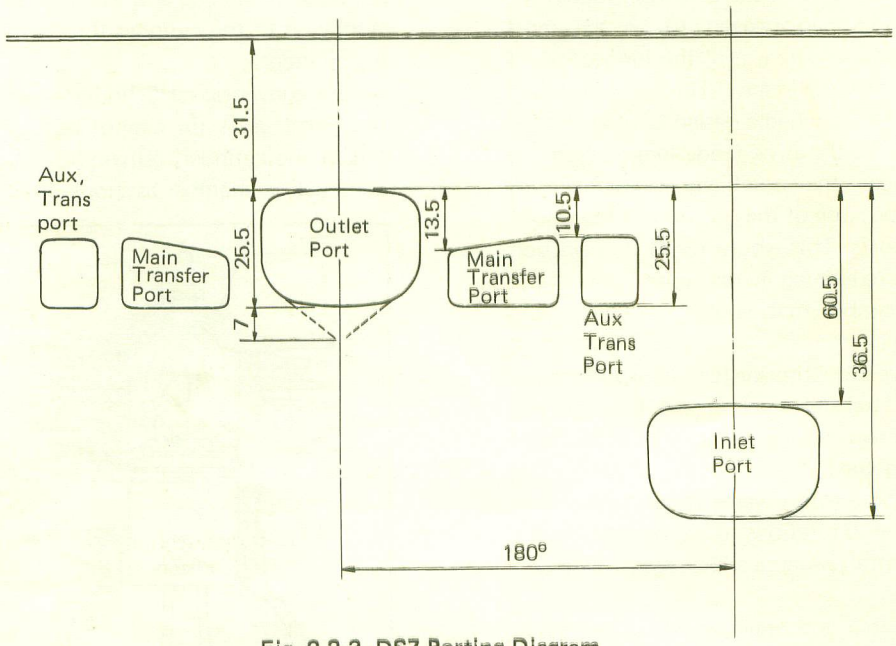


Fig. 2-2-3 DS7 Porting Diagram

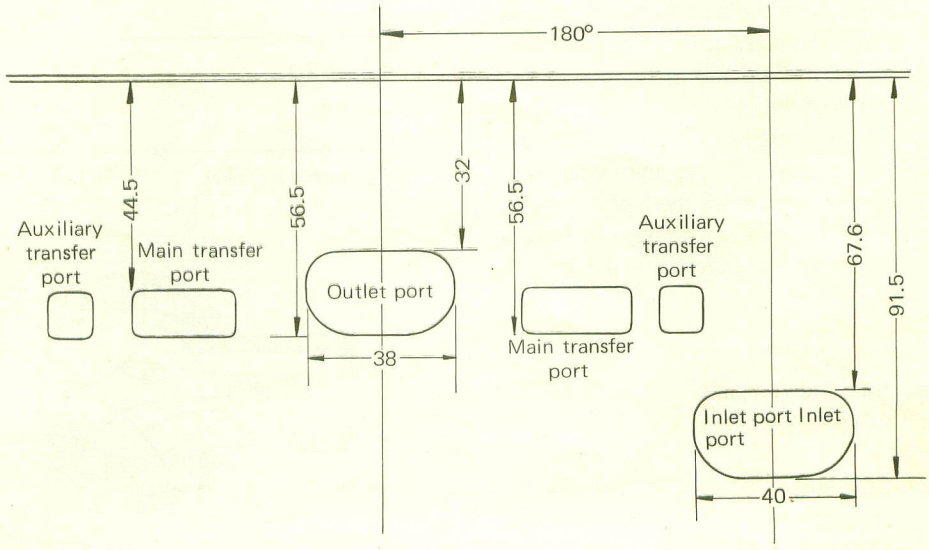


Fig. 2-2-4 R5C Porting Diagram

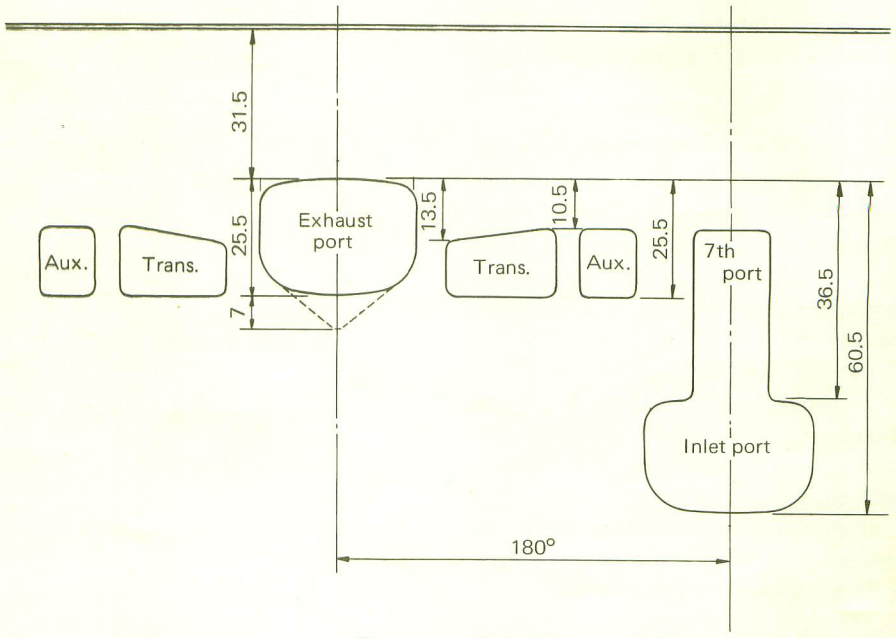


Fig. 2-2-5 RD250 Porting Diagram

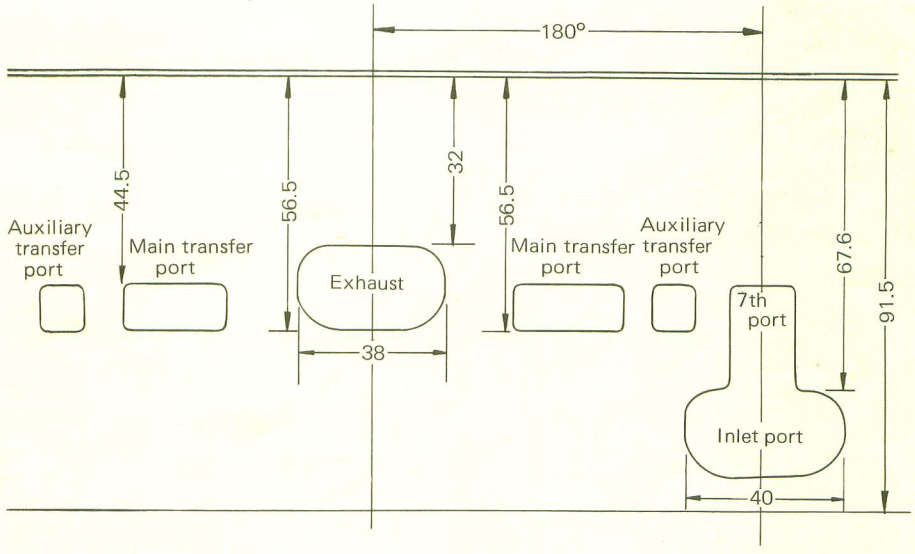


Fig. 2-2-6 RD350 Porting Diagram

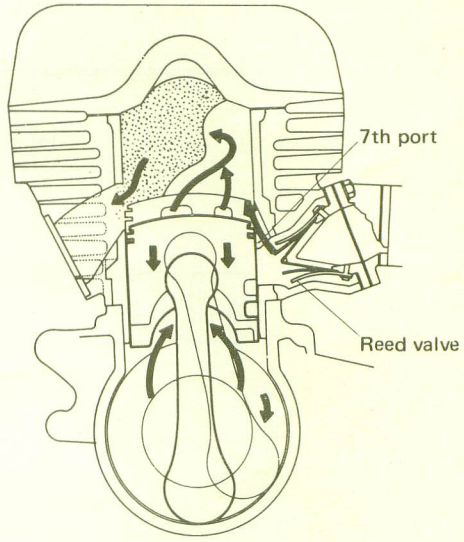
2–3 The Torque Induction System (7-port cylinder reed valve system)

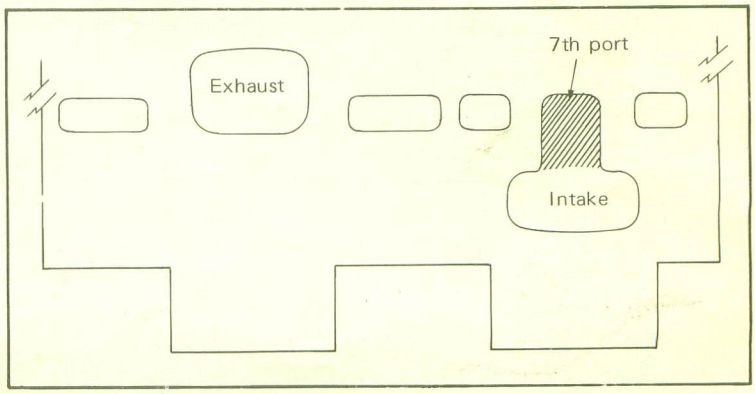
Over six years ago, the engineers at the Yamaha Research Institute took on a problem that has long plagued many riders: how to get more effective horsepower. Riders who buy motorcycles on the basis of advertised high RPM horsepower often find that overall performance is poor. Under heavy loads, many bikes stutter and stall ... spark plugs foul. The bikes may have high peak horsepower running flat-out, but they lack effective performance overall.

After a thorough study of this problem, Yamaha engineers confronted a fundamental fact: if you want better overall performance, you need a better breathing engine. By "better breathing" we mean the ability of the engine to get the fuel/air mixture it needs when it needs it. Engineers call an engine's breathing process "induction."

Yamaha's answer for "better breathing" is Torque Induction(R). Torque Induction is a unique method for supplying the fuel/air mixture to the engine, based on engine demand rather than an arbitrary mechanical induction system such as the piston skirt or a crankshaft-mounted rotary valve. With Torque Induction, Yamaha added a unique new 7th port that gives you bike more muscle at the top end. The 7th port improves performance by (1) allowing more fuel/air mixture to be "rammed" into the combustion chamber and (2) by simultaneously improving the "scavenging," or removal, of exhaust gases. The blast of cool fuel/air mixture directly from the carb into the combustion chamber helps cool the engine, and greatly extends piston life.

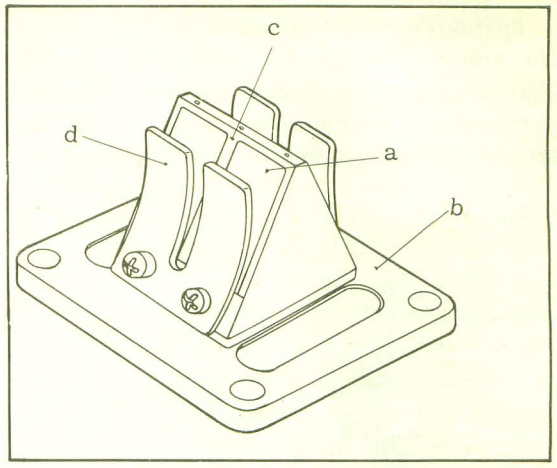
With Torque Induction, your Yamaha runs cooler and breathes better over its entire RPM range, for roaring response in the dirt and greater peak power on the street.





2–4 The Yamaha Reed Valve

Yamaha has designed a unique stainless steel reed valve located between the carburetor and cylinder. The valve works independently on a demand basis. There's no mechanical device, such as a rotary valve or piston skirt to govern its opening and closing.



1. Construction of the Reed Valve

   a. Valve
   The valve is made of special flexible stainless and designed to open and close the inlet port.

   b. Case
   The case is made of a die-cast aluminum alloy.

   c. Gasket
   Made of heat- and oil-resisting rubber, the gasket is "welded" to the case by heat.

   d. Valve Stopper
   The valve stopper is made of highly-durable cold-rolled stainless steel plate, and controls the movement of the valve.

2. Handling of the Reed Valve

As explained earlier, the reed valve is operated by changes in the crankcase pressure and by the inertia effect of the fuel-air mixture stream. It is a high-precision work, and therefore, it must be handled with special care.

a. Storage
The reed valve must be stored in a clean and dry place and must not be exposed to the sun. Particularly, it must be kept free from salt. Avoid allowing your hand to touch the valve.

b. Inspection

1) Valve
Check the valve for cracks and breakage.

2) Valve Stopper
The valve stopper limits the movement of the reed valve.

3) Set-screw
The valve and valve stopper should be fastened with the set-screw. Tightening torque should be correct; otherwise, the valve and valve stopper will be deformed.
Correct tightening torque: 8.0 kg-cm

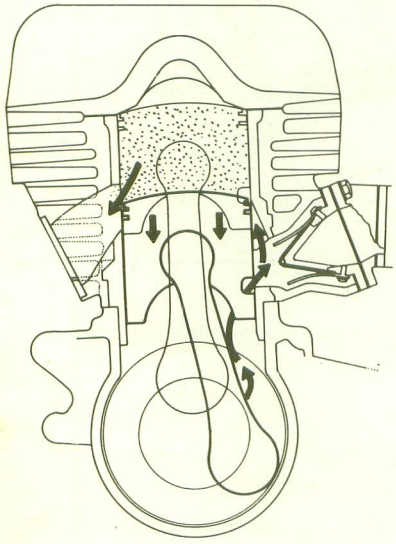
4) Gasket
The gasket is "welded" to the case by heat. It should be checked for separation from the case. If the gasket becomes loose, it may fail to achieve a good seal with the valve.

c. Valve Service
The reed valve can not be perfect, if any of its componets—valve, valve stopper, gasket case and set-screw is faulty. If so, it is advisable to replace the whole assembly, instead of replacing a faulty part.

2–5 Operation of the Torque Induction System

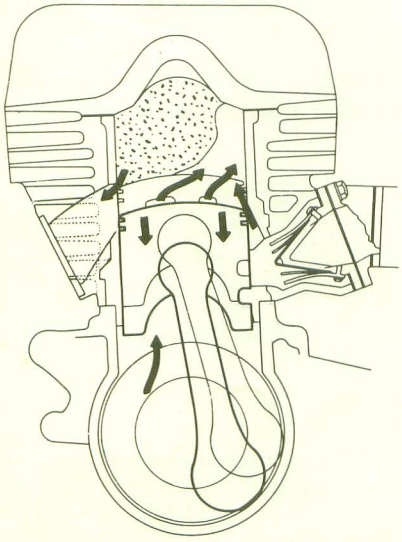
I. Ignition Power and Exhaust

The piston approaches top dead center, and the spark plug fires. Combustion pressure forces the piston down. As the piston crown passes the exhaust port, exhaust gases begin to flow out.



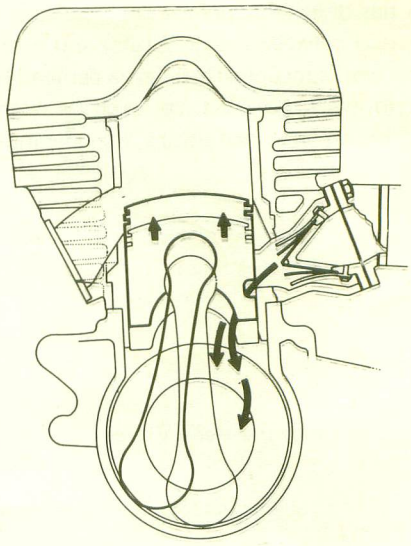
II. Transfer

As the piston continues down, it passes the transfer ports, opening them. They allow the compressed fuel/air mixture in the crankcase to flow into the combustion chamber. All the remaining exhaust gases within the chamber are pushed out by this transfer action.



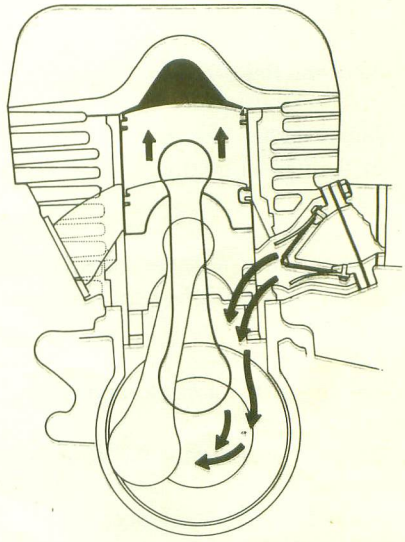
III.

When the piston starts up, it creates a vacuum within the crankcase. Atmospheric pressure forces the Torque Induction valve open, and a fresh fuel/air charge is rammed into the crankcase.



IV. Compression

The piston starts up, closing all ports. As it moves up, it compresses the fuel/air charge for ignition. At the same time, the upqard movement of the piston creates a suction effect or "demand" in the crankcase.



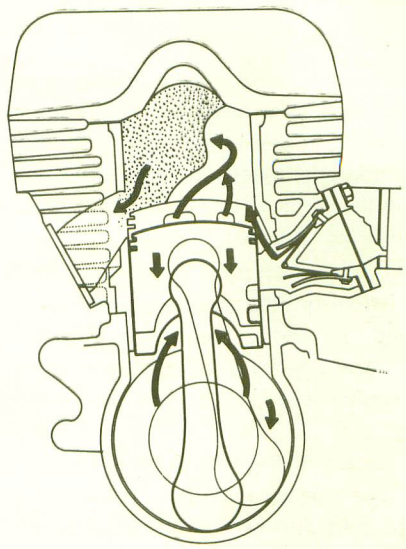
V. Induction

The "demand" created by the piston traveling upward causes atmospheric pressure to "ram" air into the crankcase. The steel reed valve opens to allow the fuel/air mixture in. This is the real secret behind Torque Induction. There is no mechanically-governed device to arbitrarily open the crankcase—sometimes at the wrong time. The fuel/air mixture from the carb comes in only when it is wanted.

VI. Scavenging by the 7th Port

On the 5-port cylinder, the auxiliary transfer ports are positioned on the same level as the main transfer ports. As the piston lowers to the position as illustrated, the fuel-air mixture in the cylinder is compressed and is going to stream into the cylinder through the main and auxiliary transfer ports. On the 7-port cylinder, too, the compressed mixture is about to stream into the cylinder through the inlet port of the piston.

As the piston moves down further, the main, auxiliary and 7th ports are cleared and the fuel-air mixture enters the cylinder in streams. In this case, the inertia effect of the streams causes the reed valve to open, and the fuel-air mixture passing through the reed valve flows directly into the cylinder through the 7th port (the mixture does not enter the crankcase), thereby forcing the burned gases out of the cylinder. This is the scavenging action of the 7th port.



CHAPTER 3. ENGINE

The 250, 350 series engine are equipped with Yamaha's specially designed aluminum cylinder with a cast iron sleeve. This special cylinder gives greatly improved heat radiation efficiency. Combined with the 5-port system, the engine assures extra high performance.

The 5-speed transmission is designed for smooth gear shifting—on the streets or highways, or on hilly land. To prevent the shifter from by-passing the next gear when a quick or hard shift is made, a safety device is provided, thus assuring accurate shifting.

The crankcase is designed to permit easier accessibility for service work. Without using special tools, it can be split into two sections, upper and lower. The engine shoudl be disassembled and reassembled in an orderly sequence to make the work easier and more efficient. The procedures outlined here are "examples".

- Caution on engine disassembling.

1) Before dismounting the engine, throughly clean the cylinder head, cylinder and crankcase to remove dirt and dust.
   Exercise care not to allow dust to enter the engine while disassembling it.
2) Always use clean tools in the correct manner. Take care not to damage the parts.
3) Put all disassembled parts in parts trays, in groups, so that no parts will be misplaced.

3–1 Removing the Engine

1. Warm up the engine for one minute or so, and then drain the oil from the transmission.
   - Warming up the engine will quicken draining the oil
   - The amount of oil is 1,500 c.c. (1.6 qts.). Motor oil SAE 10W/30 should be used.
2. Remove the exhaust pipe.

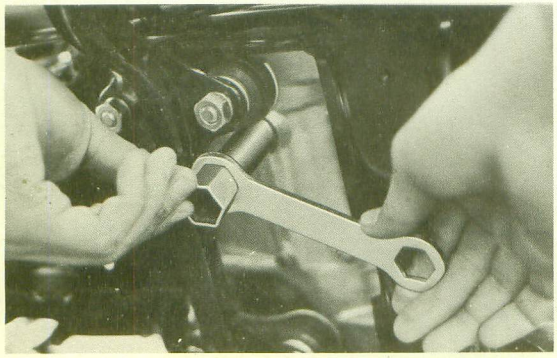


Fig. 3-1-1

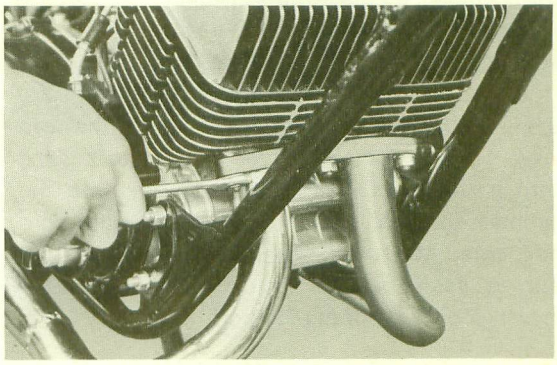


Fig. 3-1-2

3. Remove the gear change pedal.

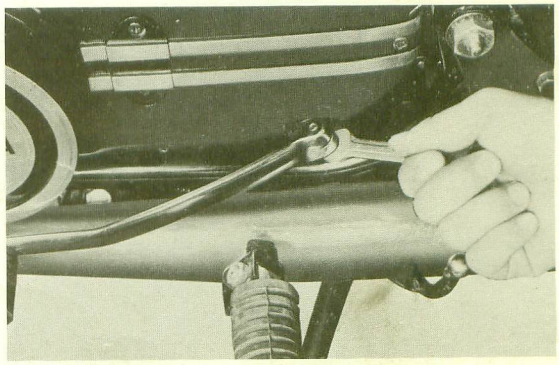


Fig. 3-1-3

4. Remove the dynamo cover.

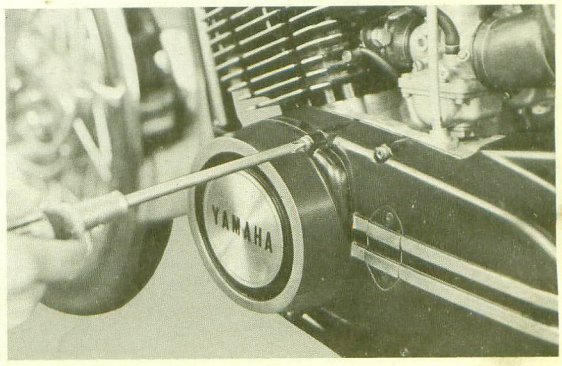


Fig. 3-1-4

5. Disconnect the clutch cable.

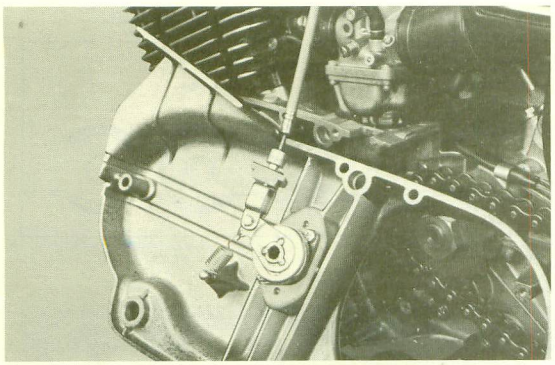


Fig. 3-1-5

6. Remove the dynamo wiring and the neutral switch wire.

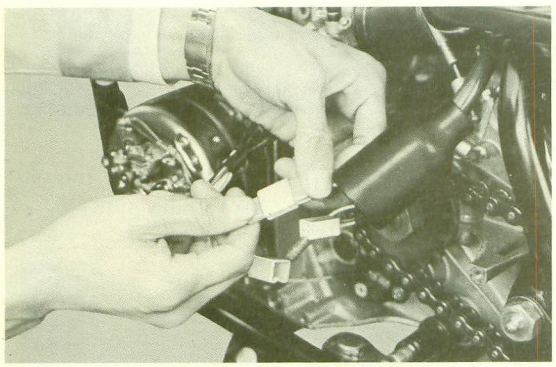


Fig. 3-1-6

7. Remove the yoke mounting bolts, and then the yoke assembly.

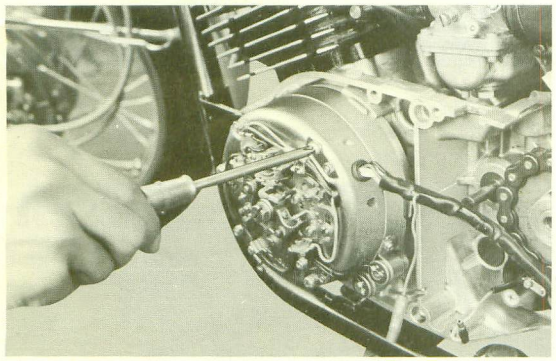


Fig. 3-1-7

8. Remove the armature bolt, governor and cam.

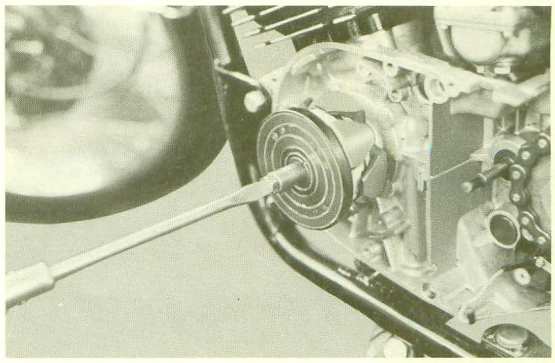


Fig. 3-1-8

9. Remove the armature with the armature puller bolt or shock puller.

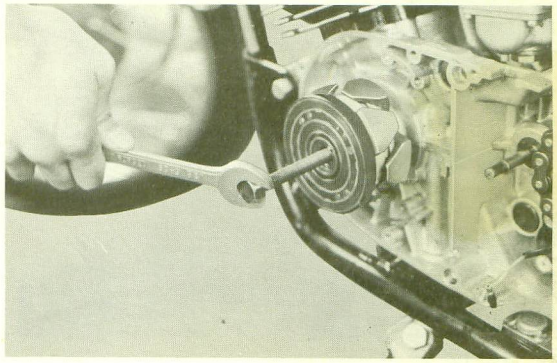


Fig. 3-1-9

10. Remove the woodruff key with a slot head screwdriver.

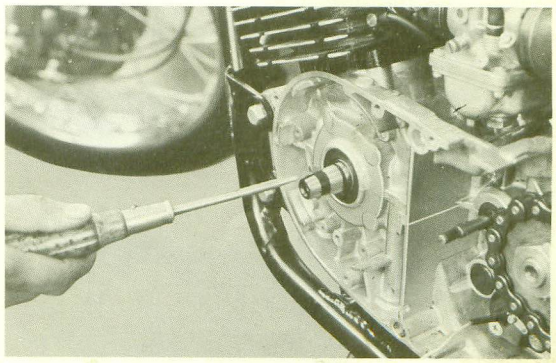


Fig. 3-1-10

11. Disassembly

a) Removing Chain

Fit the special tool with an adapter for removing the chain. Then place the chain joint on the special tool and put apart the chain by screwing in the pulling bolt.

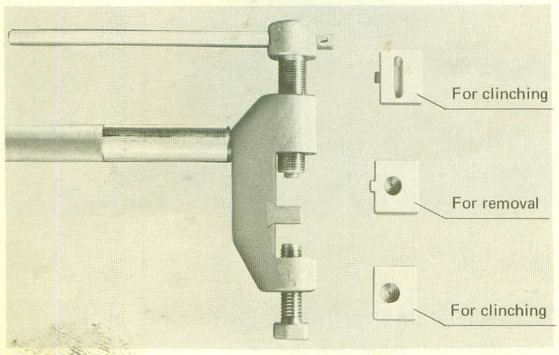


Fig. 3-1-11

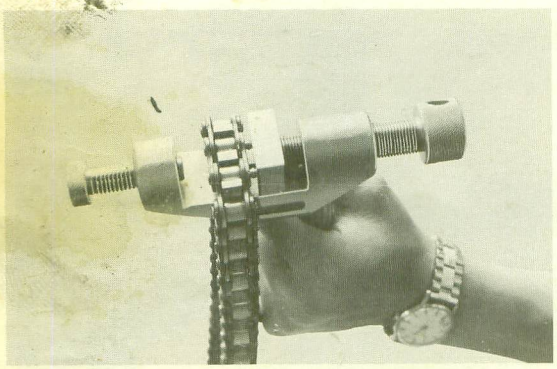


Fig. 3-1-12

b) Installing Chain

Joint the chain ends on the rear wheel sprocket using a joint. Place the chain joint on the sprocket where it is easier to use the special tool. Use the special tool with a chain installing adapter to caulk the joint plate by screwing in the pulling bolt.

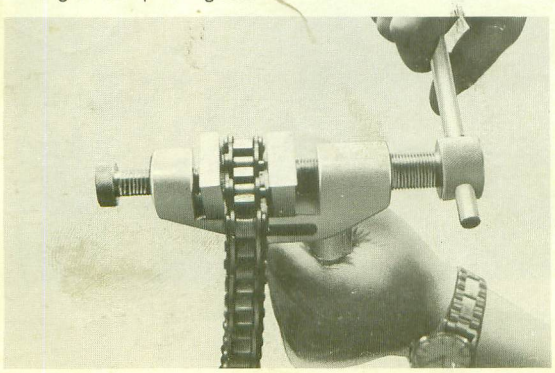


Fig. 3-1-13

c) Whenever installing the chain, always install the master link retaining clip so that the rounded closed end faces the direction of travel.

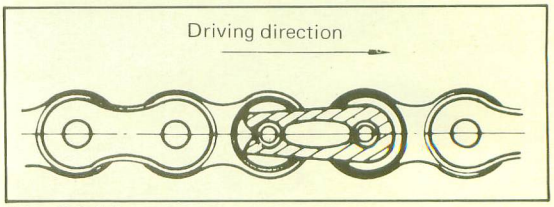


Fig. 3-1-14

12. Remove the oil pump cover.

Fig. 3-1-15

13. Remove the oil line at the bottom of the oil tank. Place a short, plugged length of live over the fitting.

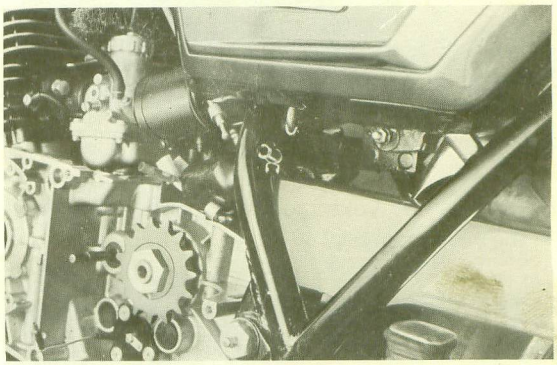


Fig. 3-1-16

14. Detach Autolube were frew pump and them remove the pump cable.

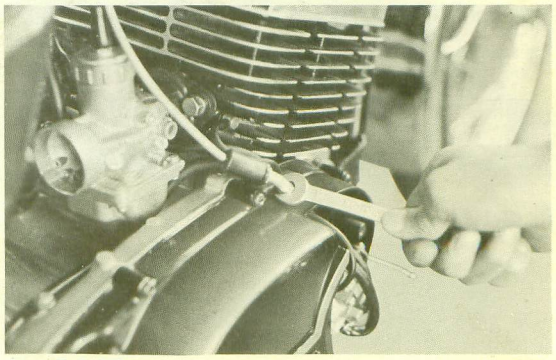


Fig. 3-1-17

15. Loosen the air cleaner clamp screw, and then remove the air cleaner rubbers.

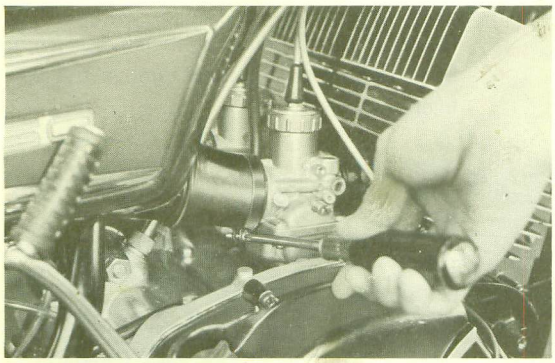


Fig. 3-1-18

16. Disconnect the cable from the tachometer drive.

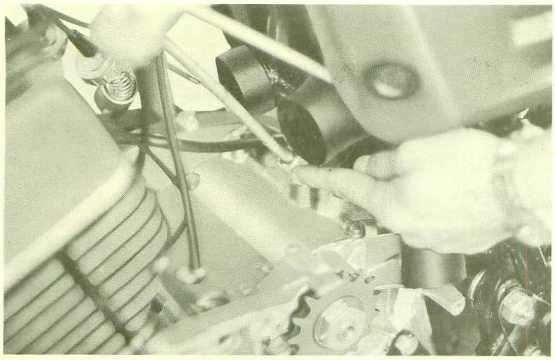


Fig. 3-1-19

17. Turn the fuel cock to "CLOSE", and disconnect the fuel line (both right and left) from the carburetors.
18. Remove the throttle valves from the carburetors.

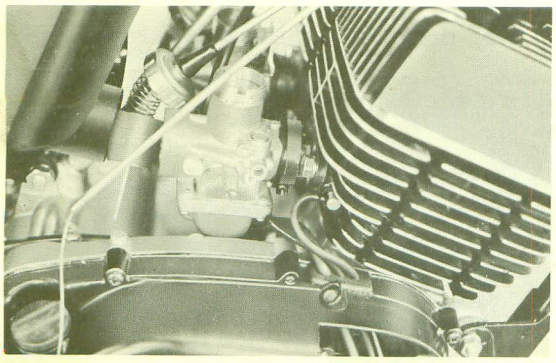


Fig. 3-1-20

19. Loosen the carburetor clamp screws, and then remove the caburetors. Take care during removal not to damage the fuel crossover tube.

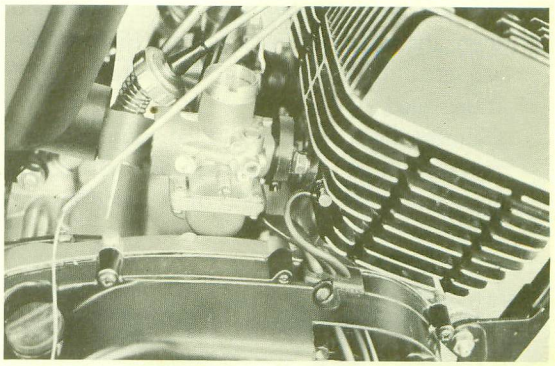


Fig. 3-1-21

20. Remove the four engine mounting bolts and upper right rear mounting plate.
    Engine mounting bolts should be tightened to 180 in./ibs. (2 kg-m) for 8ϕ mm, and 300 in/lbs. (3.5 kg-m) for 10ϕ mim.

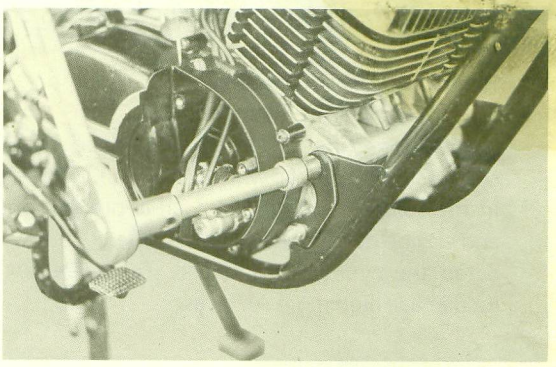


Fig. 3-1-22

21. Dismount the engine from the frame.

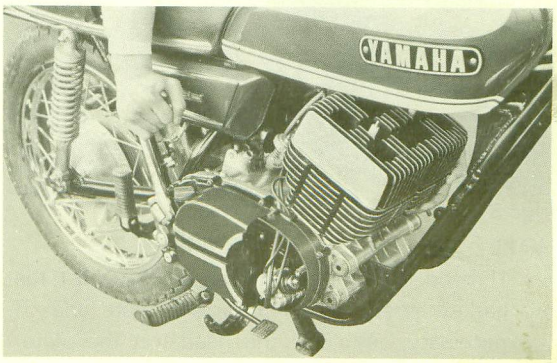


Fig. 3-1-23

3–2 Cylinder Head

1. Removal and Reinstallation

Remove the four nuts from the top of the cylinder head, remove the cylinder head and then the cylinder head gasket. Reverse the sequence for reinstallation. Replace the gasket if damaged.
Cylinder head nuts should be loosened and tightened in a "cross" pattern and in progressive stages final torque of 180 in/lbs (2 kg-m).

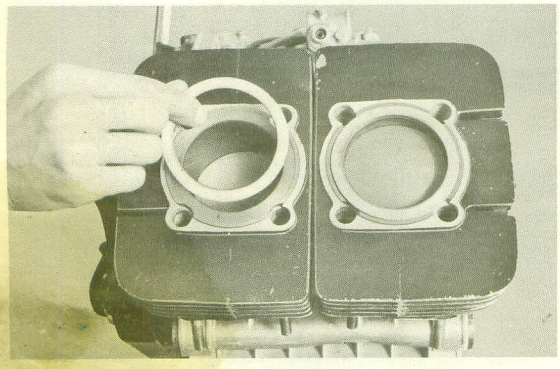


Fig. 3-2-1

2. Removing Carbon Deposits

Carbon deposits inside the cylinder head combustion chamber will result in an increase in the compression ratio, as well as preignition and engine overheating.
Scrap the cylinder head clean. Take care not be damage aluminum surfaces.

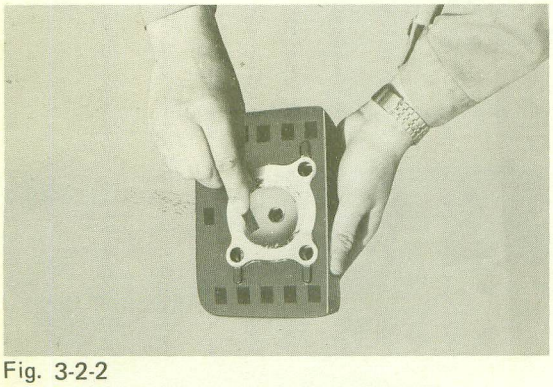


Fig. 3-2-2

NOTE

If head shows signs of gas leakage past the gasket, check it on a surface plate and, if necessary, resurface the head (on the plate) using #400 sandpaper. Waipage should not exceed 0.0005"

3–3 Cylinder

1. Removing the Cylinder

1) Remove the oil delivery pipe clamps from both cylinders and then remove the delivery pipes.

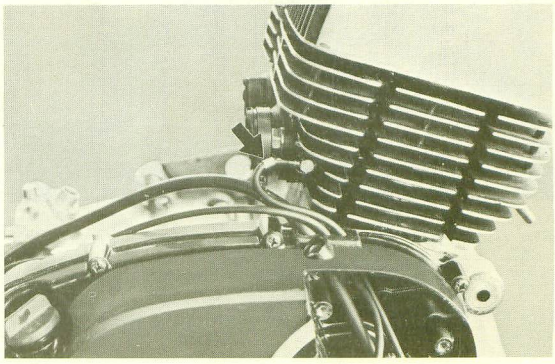


Fig. 3-3-1

2) Remove the cylinders by striking them gently with a soft-faced hammer.

NOTE

Stuff rogs be beneath the pistons to keep porticles out of crankcase.

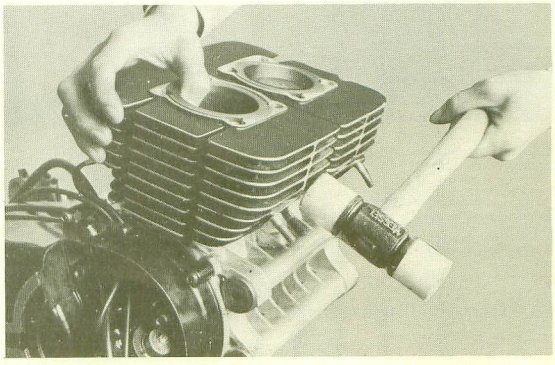


Fig. 3-3-2

3) Replace the cylinder base gaskets.

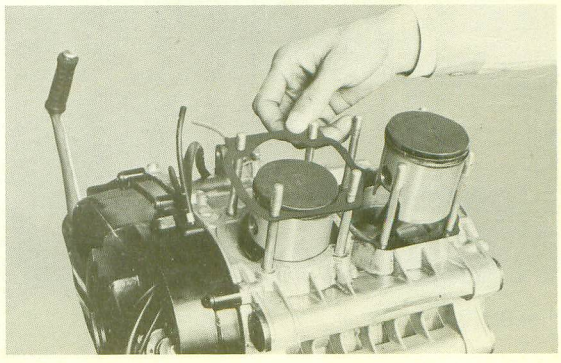


Fig. 3-3-3

2. Checking the Cylinder for Wear

1) In two-stroke engines, the maximum wear usually occurs in the upper area of the cyliner wall due to the side thrust of the piston, with less wear in the adjacent areas of transfer and exhaust ports. Measure each cylinder's bore diameter at four different depths (a, b, c, d) with a micrometer or a cylinder gauge placed in the direction of A and B. See Fig. 3-3-5 if the difference between the maximum and minimum diameters measured exceeds 0.05 mm (0.0019 in.), rebore and hone the cylinder. Warpage, however, can be extreme at high heat areas such as the exhaust port. Therefore, care must be taken during measuring.

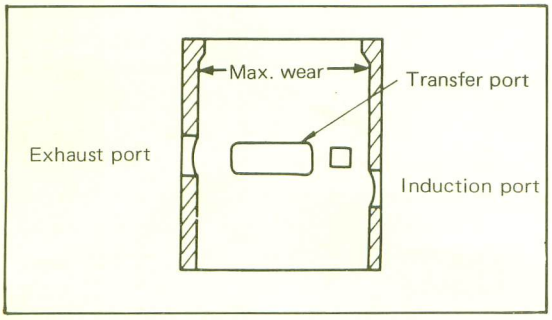


Fig. 3-3-4

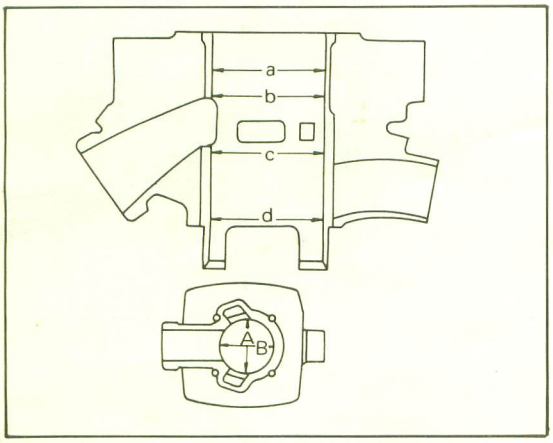


Fig. 3-3-5

2) The minimum allowable clearance between the piston and the cylinder is 0.040 ~ 0.045 mm. (0.0016 ~ 0.0018 in.)

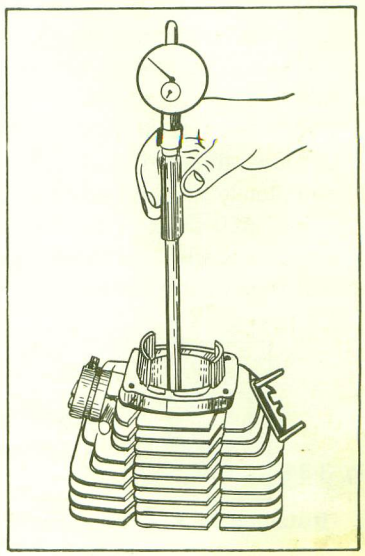


Fig. 3-3-6

3) To make sure that the cylinder boring has been correctly done, measurements should be made as illustrated in Fig. 3-3-5.

4) Cylinder Reconditioning

a. Pistons are available in 0.25 mm and 0.50 mm oversizes.
b. Cylinders should be rebored and honed to the diameter of the oversize piston, plus the standard clearance.
c. The error between the maximum and minimum diameters after honing should be no more than 0.01 mm.
d. The ports should be carefully rechamfered afterwards to prevent the rings from catching on sharp corners.

3. Carbon Removal

Carbon tends to accumulate at the transfer and exhaust ports of the cylinder, thereby imparing both scavenging and exhausting efficiency. Be sure to remove carbon accumulations whenever necessary.
Avoid the use of files for carbon removal, because the carbon build-up can not be completely removed as shown by the arrow of A, or undesirable cuts may result in these ports. It is advisable to use a carbon scraper B and remove the carbon from every corner of the port.

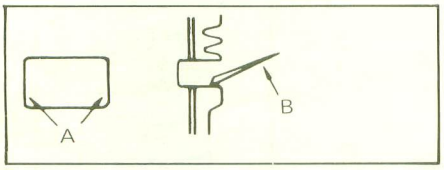


Fig. 3-3-8

4. Installing the Cylinder

Put your fingers at each end of the piston ring, and align both ends of the ring with the knock pin in each ring groove. Then insert the piston into the cylinder. Take care not to damage the piston rings with the cylinder.
Make sure a new cylinder base gasket has been installed. (See also Fig. 3-5-2)

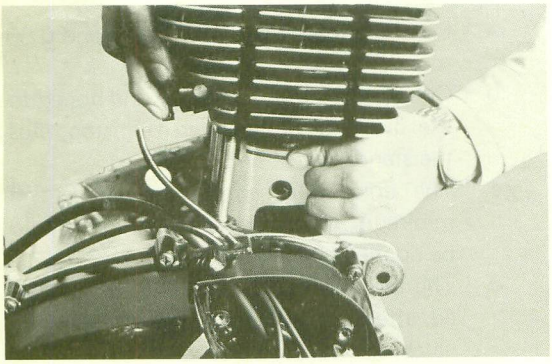


Fig. 3-3-9

3–4 Piston Pin

1. Pulling out the Piston Pin

Remove the clips at both ends of the piston pin with a needle nose pliers, and press out the piston pin with a finger or a slot head screwdriver.

NOTE

Before removing the piston pin clips, cover the crankcase with a clean rang. so you will nto accidentally drop the clips into the crankcase. Do not drive the pin out with a hammer. Use a "pressure" type pin press. After the pin has been removed, ream the pin boss out and refit the pin. (See Fig. 3-4-1)

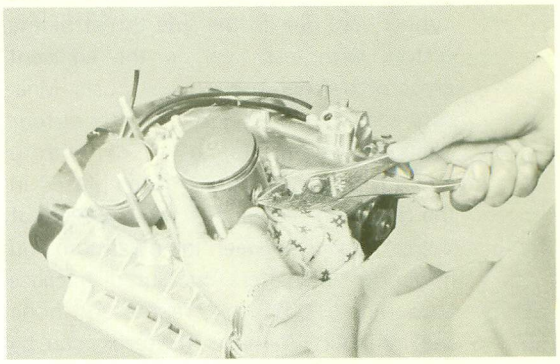


Fig. 3-4-1

2. Piston-to-Piston Pin Fit

The piston pin (with a light film of oil) should fit snugly in its bore so that it drags a little as you turn it. If the pin is loose, replace the pin and/or the piston. If the pin has step-wear in its center, replace the needle bearing as well as the pin. Check the small end of the connecting rod for wear by inserting the piston pin and bearing in the rod. There should be absolutely no up-and-down free play. (See Fig. 3-4-3)

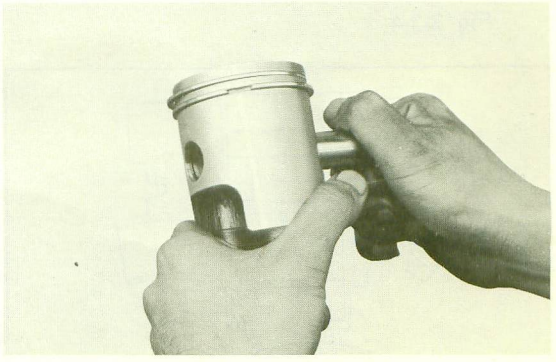


Fig. 3-4-2

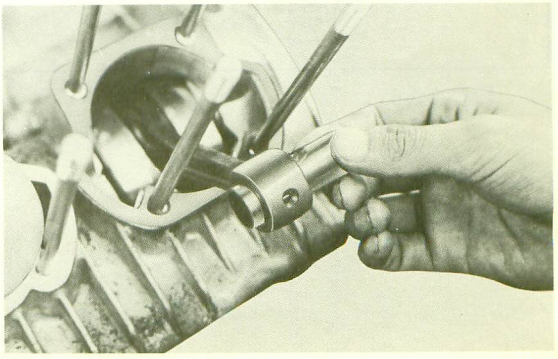


Fig. 3-4-3

3–5 Piston Ring

1. Removing the Piston Ring

Put your thumbs at each end of the piston ring and pull the piston ring ends apart. Remove the ring by moving the ring off the piston at the other side of the ring ends.

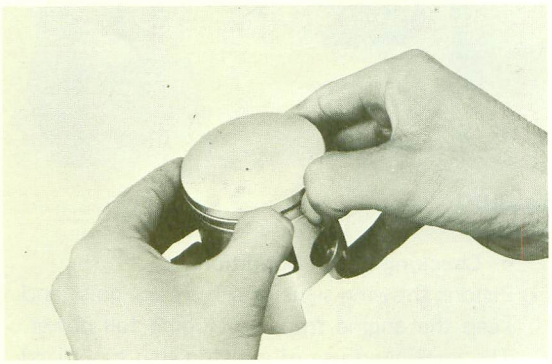


Fig. 3-5-1

2. Piston Ring Installation

It is important to align the piston end gap with the locating pin that is in the ring groove. Be sure that the marking on the piston rign faces upward.

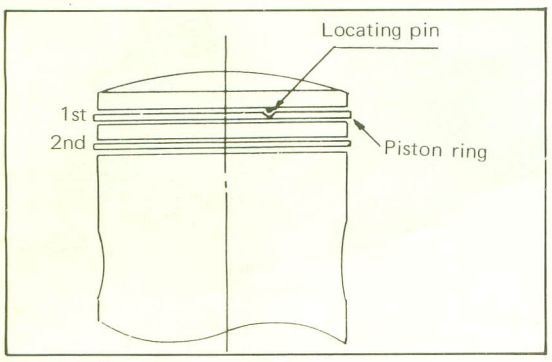


Fig. 3-5-2

3. Checking the Piston Ring

1) Piston Ring Wear
Improper contact between the piston rings and the cylinder may result in combustion pressure leakage, or scores, or spotty wear on the cylinder wall. Therefore, whether the "contact" between the piston rings and the cylinder looks proper or not they should be checked before the piston is installed.

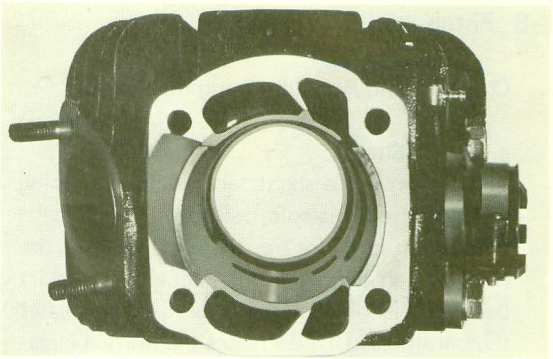


Fig. 3-5-3

Fig. 3-5-3 shows an example for checking the contact: Correctly fit the ring in the cylinder, and then check whether or not any gap is seen between the ring and the cylinder wall by using a sheet of white paper as a reflector. If no gap is found, a good sealing between them is maintained.

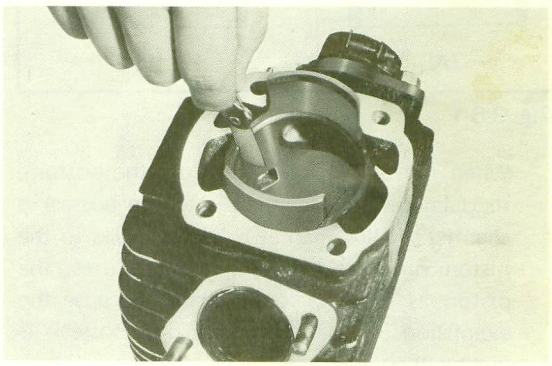


Fig. 3-5-4

2) Measuring the piston ring for wear
Put the piston ring into the cylinder so that the ring is parallel with the bottom edge of the cylinder. Then measure the gap between both ends of the ring with a feeler gauge.

3) Removing carbon deposits
Carbon on the piston rings and in the ring grooves will make the rings stick to the piston, thus impairing cylinder performance, Remove the piston ring, and clean the rings and the piston ring grooves.

End Gaps:

DS7/RD250	0.15 ~ 0.35 mm
R5C	0.30 ~ 0.50 mm
RD350	0.20 ~ 0.40 mm

3–6 Piston

1. Checking and Reconditioning the Piston

a. Piston Shapes

The piston has a slight taper below the ring section when it is cold, as shown in Fig. 3-6-1 (A). When it warms up, the expansion of the ring section is greater than that of the skirt because the ring section is exposed to higher temperatures. This decreases the normal clearance between the piston and cylinder wall, as shown in Fig. 3-6-1 (B).

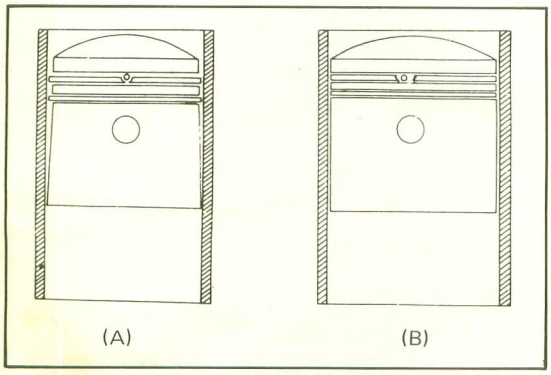


Fig. 3-6-1

When the piston is viewed from the bottom, its diameter at A (at the piston pin bosses) is slightly smaller than at B (right angles to the piston pin). At operating temperatures, the piston as sumes a round shape, because the exapnsion at A (thypiston pin bosses) is greater than at B.

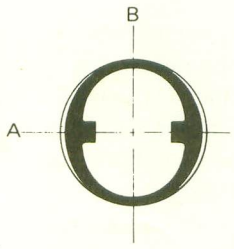


Fig. 3-6-2

b. Piston Clearance Measurement

Piston clearance is the difference between the minimum cylinder bore and the maximum piston diameter. Proper clearance is between 0.040 ~ 0.045 mm (0.0016 ~ 0.0018 in.), as described in the "Cylinder" section.

To determine macimum piston diameter, measure the piston with a micrometer at right angles to the pinhole 10 mm from its bottom edge, as shown in Fig. 3-6-3.

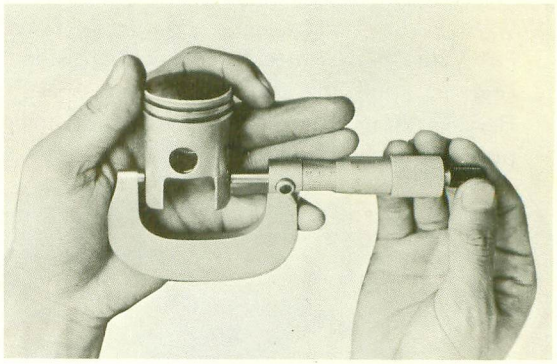


Fig. 3-6-3

c. Checking Piston Condition

Pistons showing signs of seizure are noisy and keep the engine from developing full power. The continued use of a piston that has seized will damage the cylinder wall.

A seized piston can be reused only if the seizure marks can be completely removed when lightly sanded with #400 sandpaper. Replace those seized pistons that connot be corrected in this manner.

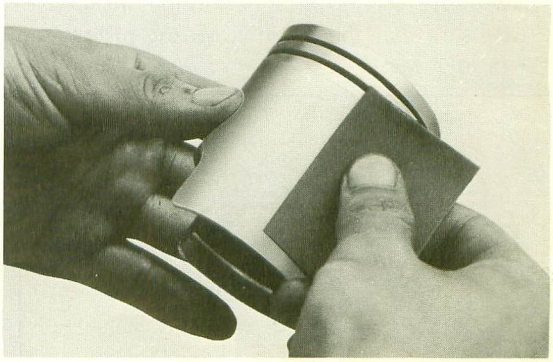


Fig. 3-6-4

d. Removing Carbon Deposits

Use a scraper or reshaped broken hack saw blade to scrap off the accumulated carbon on the piston head.

Fig. 3-6-5 shows one type of scraper shape. Do not use sharp objects to clean carbon. Sharp objects can gouge the a aluminum leaving sharp edges which may cause pre-ignition during operation. After cleaning, use #240 or #360 grit (wet) sandpaper to remove lacquer deposits from the piston crown. Use #400 grit (wet) sandpaper to remove lacquer deposits from the ring groove area.

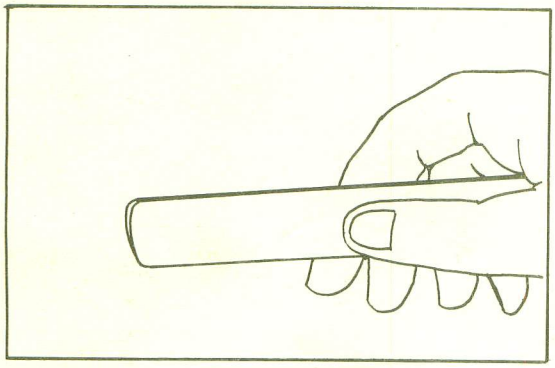


Fig. 3-6-5

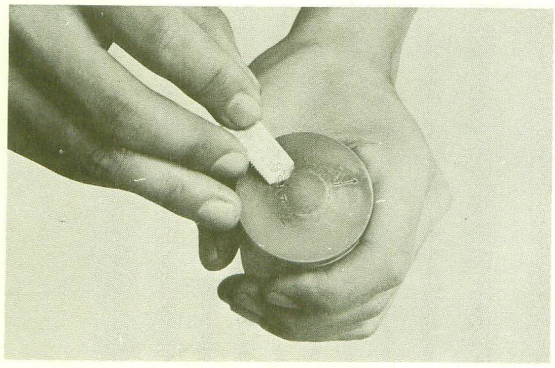


Fig. 3-6-6

Remove the carbon from the piston ring grooves; otherwise, the ring will stick to the piston. Use a broken ring.

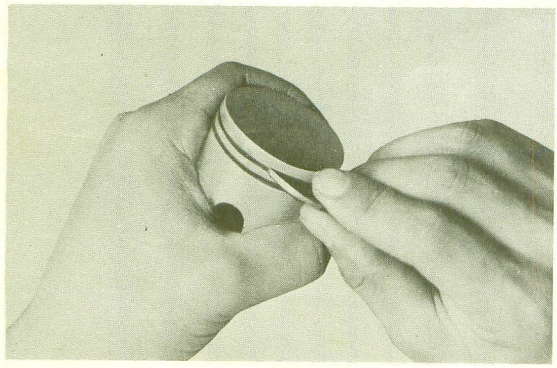


Fig. 3-6-7

2. Piston Installation

Install the piston so that the arrow marked on the piston head is in the direction towards the exhaust port.

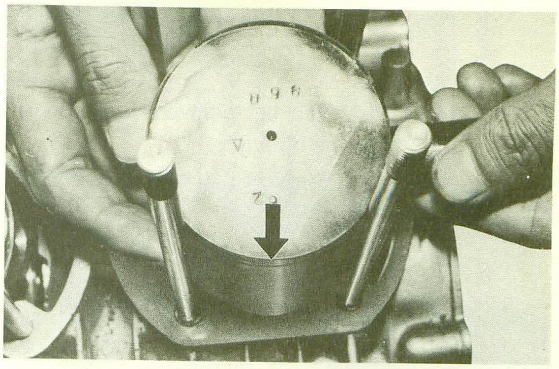


Fig. 3-6-8

3–7 Crankcase Cover (R)

1. Removal

1) Remove the kick crank mounting bolt and the kick crank.

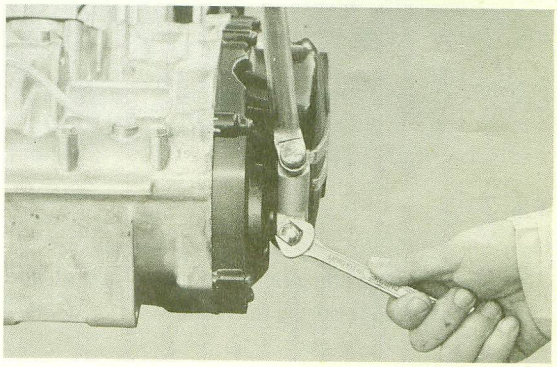


Fig. 3-7-1

2) Remove the Phillips-head screws holding the crankcase cover, and then remove the case cover.
(The cover can be removed without dismounting the oil pump.)

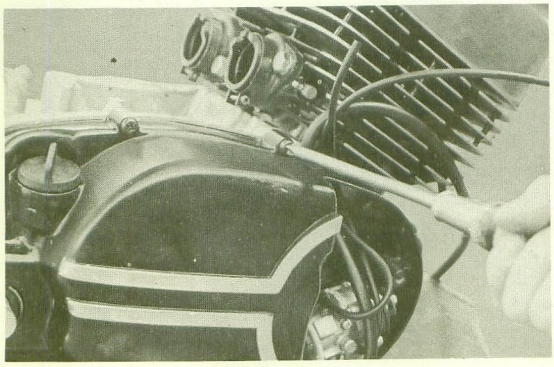


Fig. 3-7-2

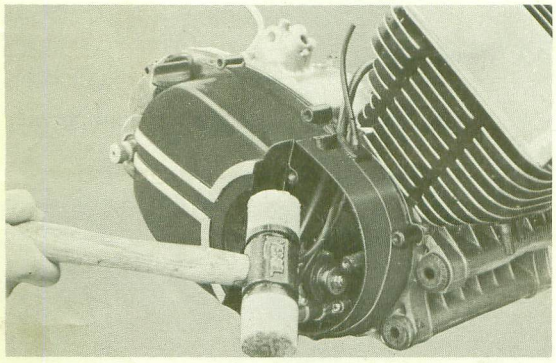


Fig. 3-7-3

3) Remove the crankcase cover gasket and replace it during reassembly.

2. Installation

Spread YAMAHA Bond No. 5 over the mating surface of the crankcase (R) and place the crankcase cover (R) on the crankcase (R) with a gasket between.
Be sure to apply YAMAHA Bond No. 5 to the mating surface; otherwise, the crankcase may leak.

NOTE

When installing the crankcase cover, make sure that the oil pump drive gear correctly meashes with the primary driven gear.

3–8 Clutch

The purpose of the clutch is to permit the rider to couple or uncouple the engine and transmission. The R5C clutch is a wet multi-disc type, consisting of six molded cork friction plates and seven clutch plates mounted on the main shaft of the transmission.

The clutch housing is mounted on the primary driven gear, which in turn is meshed with the primary drive gear mounted on the crankshaft. The primary drive gear has 23 teeth, and the primary driven gear 66 teeth. (Primary reduction ratio ... 66/23 = 2.869 (R5C))
DS7: 68/21 = 3.238
RD250: 68/21 = 3.238
RD350: 66/23 = 2.870

Sectional View of the Clutch Assembly

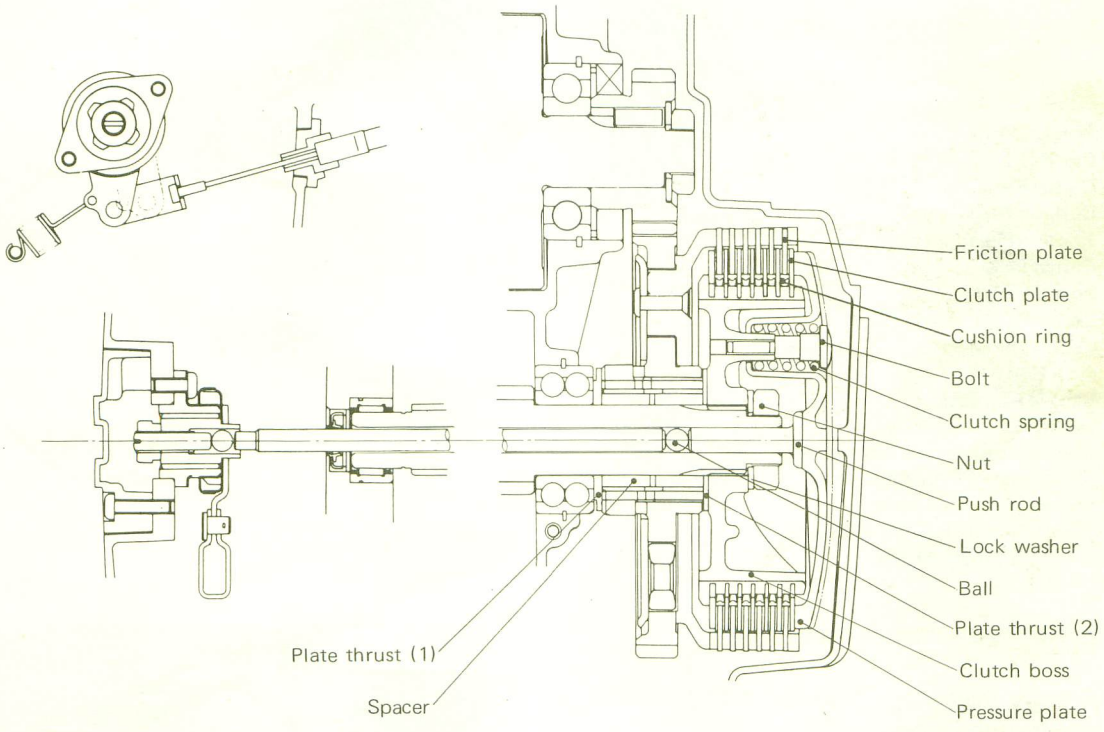
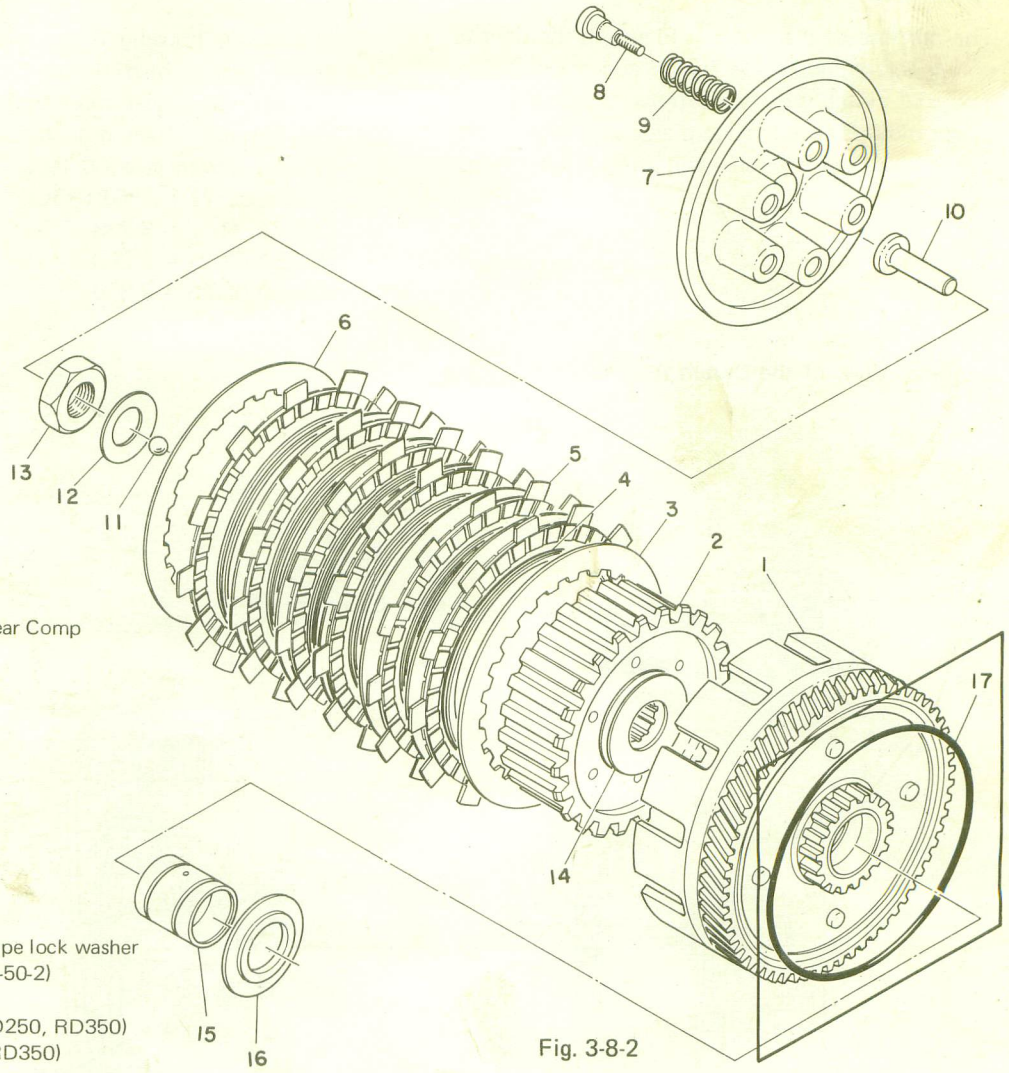


Fig. 3-8-1

Disassembled View of the Clutch Assembly



1. Primary Driven Gear Comp
2. Clutch Boss
3. Clutch Plate
4. Cushion Ring
5. Friction Plate
6. Clutch Plate
7. Pressure Plate
8. Spring Screw
9. Clutch Spring
10. Push Rod
11. Ball (5/16 inches)
12. Lock Nut
13. Beveled Spring–type lock washer
14. Thrust Plate 2 (25-50-2)
15. Spacer
16. Thrust Plate 1 (RD250, RD350)
17. O-Ring (RD250, RD350)

Fig. 3-8-2

1. Removing the Pressure Plate

Remove the six clutch spring holding screws, and then the pressure plate and push rod.

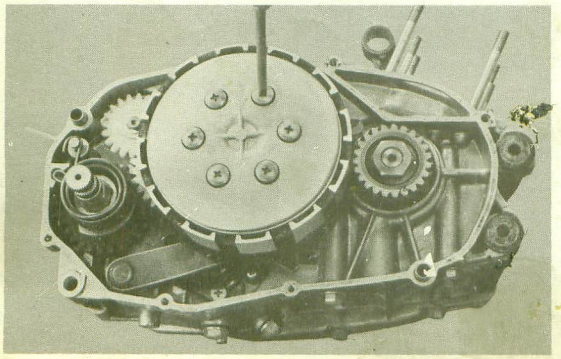


Fig. 3-8-3

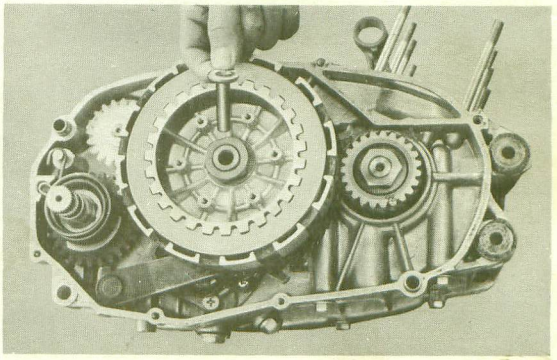


Fig. 3-8-4

2. Removing the Clutch Boss

Install the 350 YR1 clutch holding tool on the clutch boss, loosen the lock nut, and then remove the clutch boss.

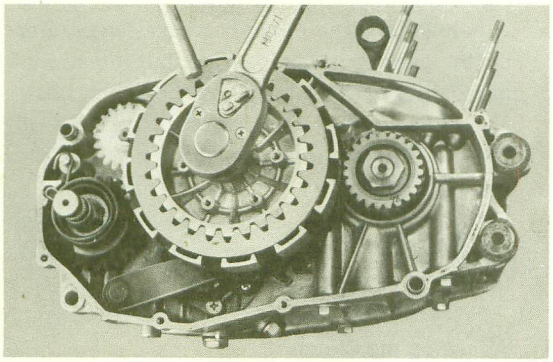


Fig. 3-8-5

3. Checking the Clutch Spring

If the spring is 1 mm or more shorter than the standard free length, replace it.

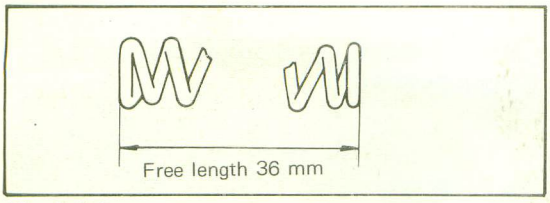


Fig. 3-8-6

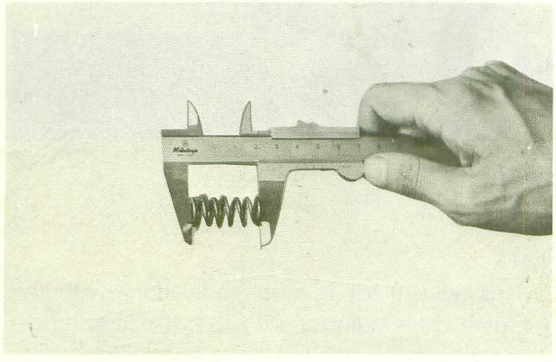


Fig. 3-8-7

4. Checking the Friction Plate

The friction plate is subject to wear. Replace it if it wears 0.3 mm or more or shows uneven contact.

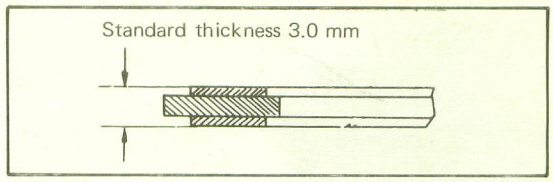


Fig. 3-8-8

Checking the clutch plates

The steel clutch plates should show no heat discoloration (bluing) and when checked on a surface plate they should show no more than .005" warpage and/or concavity/convexity.

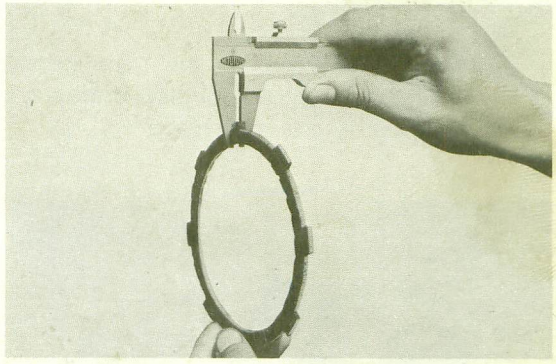


Fig. 3-8-9

5. Checking the Primary Driven Gear Ass'y

The rubber friction ring is placed between the periphery of the primary driven gear and the clutch housing in order to reduce gear noise at low engine speeds.

1) Check for scratches on the slotted surfaces of the boss.
2) Check the tooth surfaces of the primary drive and driven gears for scratches resulting from foreign matter jammed between them.

6. Checking the Spacer

1) Check the inner and outer surfaces of the spacer for scratches.
   Scratches on the spacer will impair clutch action. Smooth away any scatches with fine grain sandpaper or an oil stone. If the scratches cannot be removed, replace the spacer.
2) Insert the spacer into the primary driven gear boss and check for clearance. If the clearance is excessive, noise may result. Replace the spacer and/or primary driven gear.

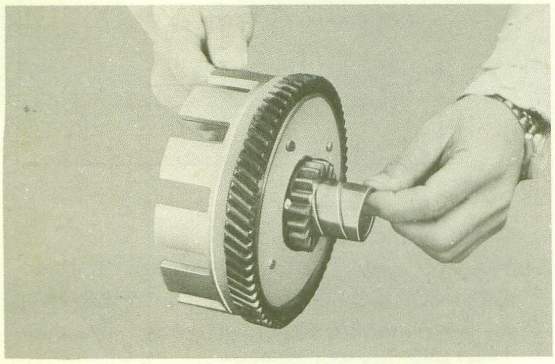


Fig. 3-8-10

3) Mount the spacer on the transmission main axle, and check for play. If the play is excessive, replace the spacer.

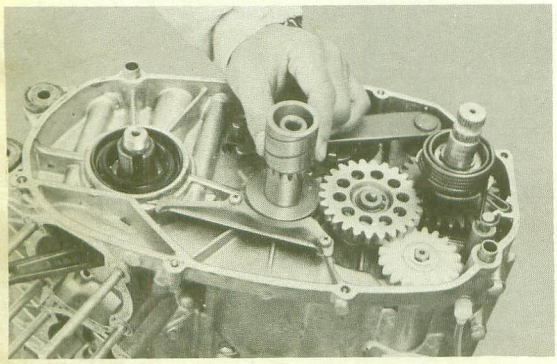


Fig. 3-8-11

7. Installing the Cushion Ring

The cushion rings are placed between the clutch plate and the friction plates to achieve better clutch action.
Check whether the cushion rings are in place and not twisted.

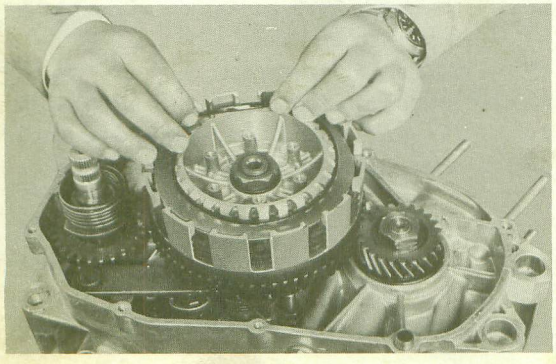


Fig. 3-8-12

8. Note for Reassembling the Clutch

On both ends of the primary gear spacer are thrust washers. If thses washers are incorrectly installed, or omitted, the clutch boss will rub against the primary driven gear, impairing clutch action. The thrust bearing assembly fits on the primary retaining collar but it may slip out of place when installing the clutch boss. Therefore, apply grease to both surfaces of the bearing to make it stick to the gear retaining collar.
Before fitting the clutch boss, install the clutch plates, friction plates, etc., and then install the clutch boss.

9. Adjusting the Clutch

1) Adjusting the Push Screw
Remove the clutch adjust cover, and loosen the push screw lock nut. To set the push screw, tighten it until lightly seated and then back off a 1/4 turn. In stall the lock nut and tighten it.

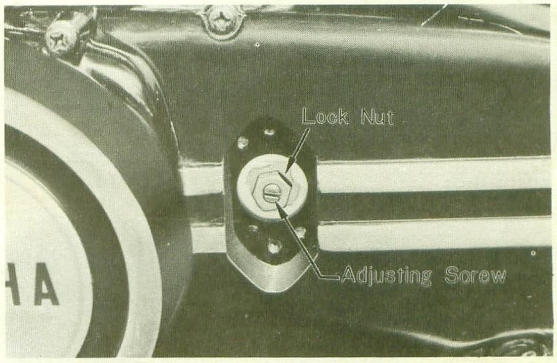


Fig. 3-8-13

NOTE
This adjustment is most easily done with the clutch cable adjustor (Fig. 3-8-15) screwed all the way in.

2) Clutch Cable Tension Adjustment
The clutch cable should be adjusted after a long period of use. Adjust the cable so that the handle lever has a play of 0.080 ~ 0.120 in (2 ~ 3 mm) at the point. Any excessive cable play may result in poor clutch action. Or, if the cable is too tight, clutch slippage may result.

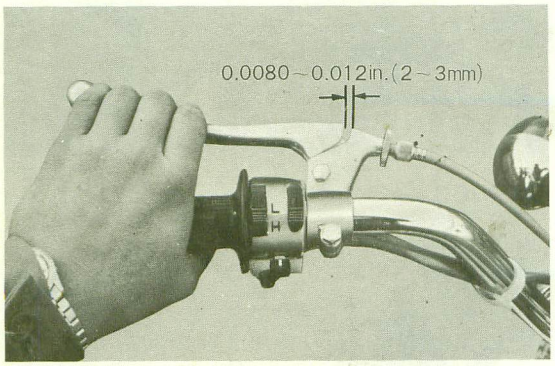


Fig. 3-8-14

3) Adjustment Sequence of the Clutch Cable
a. Loosen the lock nut.
b. To increase the play of the lever, turn the adjusting screw in; to reduce the play, back the adjusting screw out.
c. After adjustment, fully tighten the lock nut.

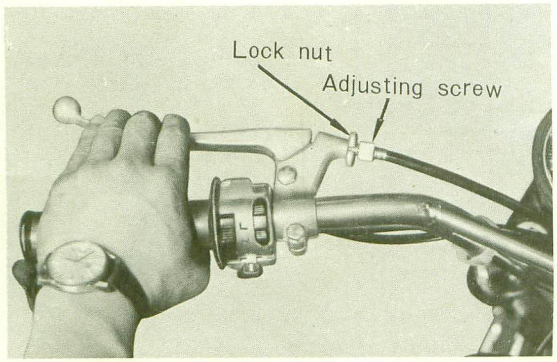


Fig. 3-8-15

3–9 Primary Drive Gear

When loosening the primary drive gear lock nut, a rag should be placed between the primary driven and drive gears so that these gears will nto rotate. Fold rog carefully so it will not be drawn between the gears.

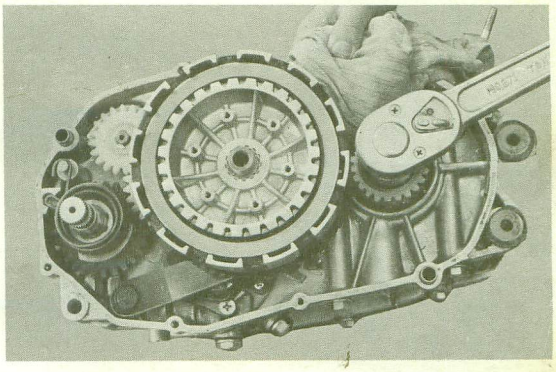


Fig. 3-9-1

Loosen and remove lock nut.

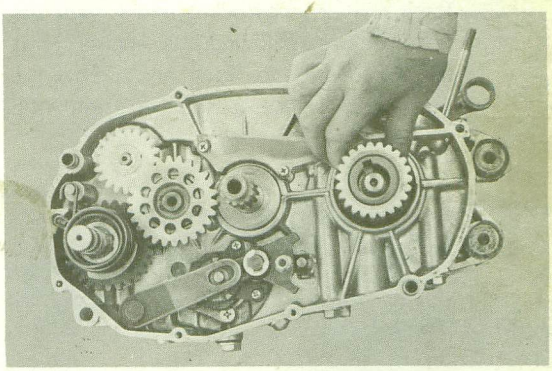


Fig. 3-9-2

Remove the drive gear and key.

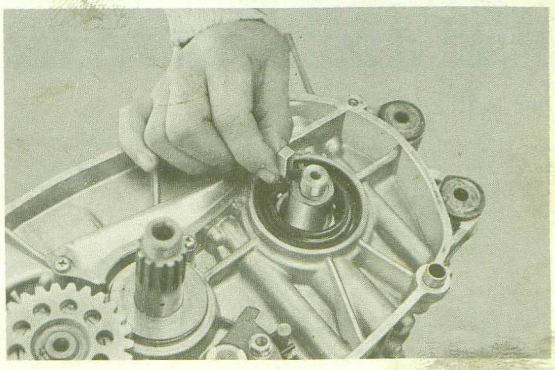


Fig. 3-9-3

3–10 Drive Sprocket

1. Removal

1) Straighten the lock washer tab with a chisel.

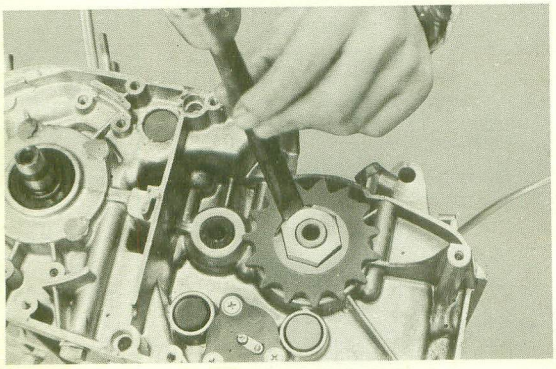


Fig. 3-10-1

2) Lock the drive sprocket and loosen the nut. (Before removing the engine, shift the transmission to "low" and remove the sprocket, or use a tool to hold the sprocket.)

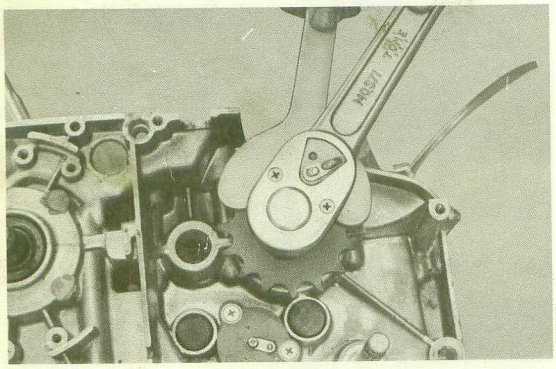


Fig. 3-10-2

3) Remove both sprocket and spacer.

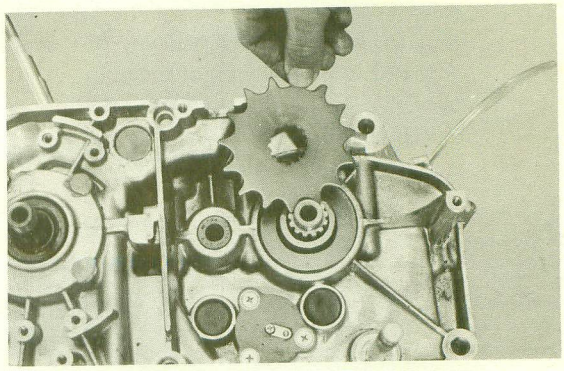


Fig. 3-10-3

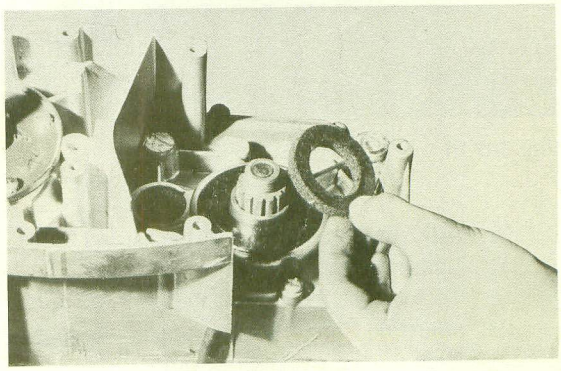


Fig. 3-10-4

2. Checking the Drive Sprocket

A worn drive sprocket may result in abnormal noise and shorten the life of the chain.
Check the sprocket teeth for wear and deformation.
Checking the Chain and Drive Sprocket for Meshing:
Drive sprocket wear can be checked by inspecting the teeth only, but it can more easily be checked by observing the meshing of the sprocket with the chain.
Whether the drive sprocket is worn or not can be determined by using a new drive dhain. If there is excessive play between the sprocket and the new chain, replace the sprocket.

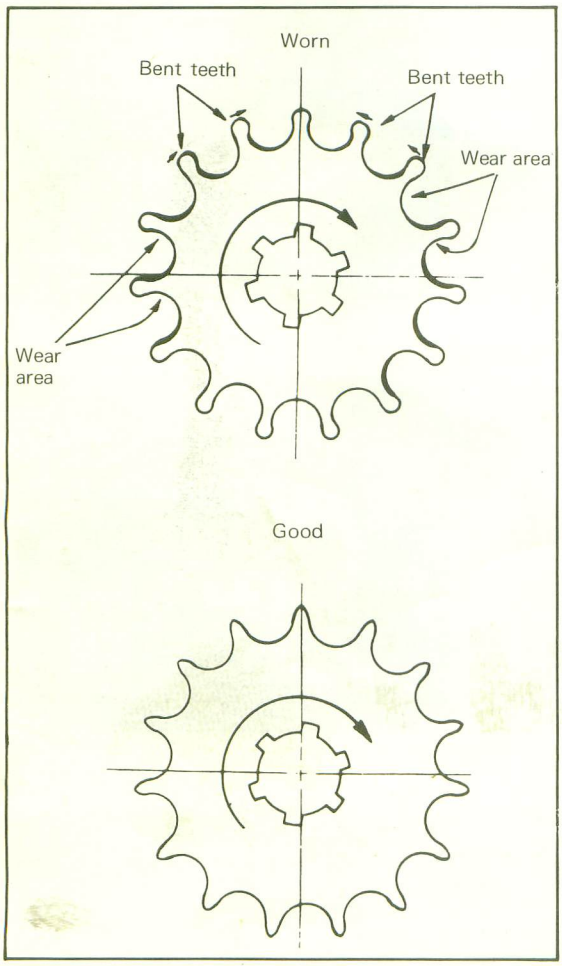


Fig. 3-10-5

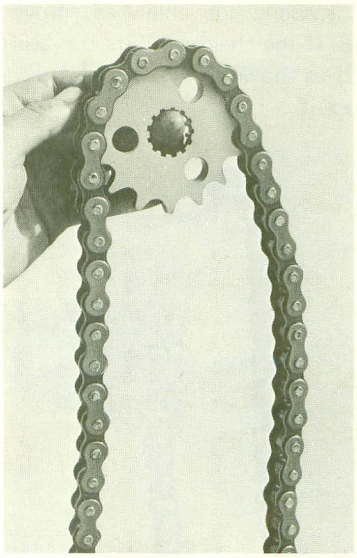


Fig. 3-10-6

Clean the chain with solvent before checking it. Then hold the chain in your fingers, as shown in Fig. 3-10-7, and check whether the chain bends without curling.

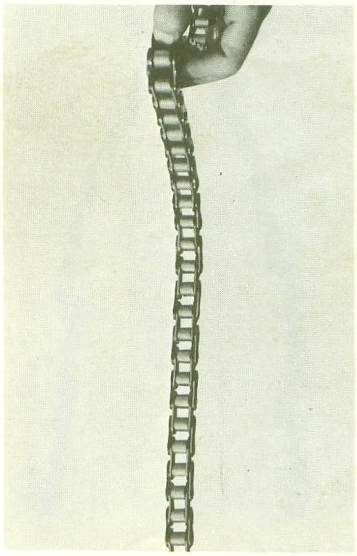


Fig. 3-10-7

Next, suspend the chain as shown in Fig. 3-10-8. If the chain exhibits curvatures, (A, B and C) as shown in Fig. 3-10-9, it is defective. Replace it.

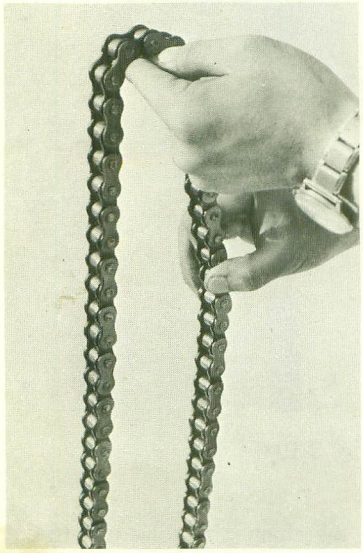


Fig. 3-10-8

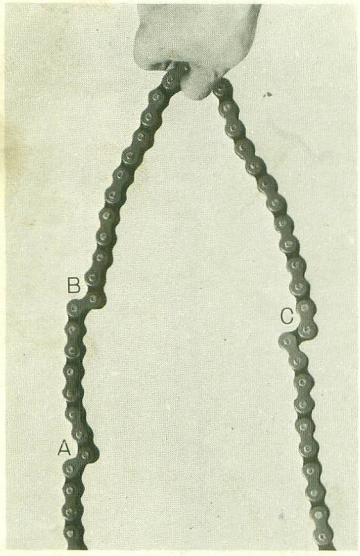


Fig. 3-10-9

Curvatures may often result from lack of lubrication, dirt attached, or rust. In this case, reclean the chain and repeatedly bend it back and forth in detergent oil, then again check it for defects.

Another good test for wear is to mesh the chain with a new sprocket and check for excessive slack. The chain is bad if you can pull it away from the curvature of the sprocket a distance of more than 1/2 link.

3–11 Splitting the Crankcase

The 250, 350 series employ a type of crankcase which is designed to split into upper and lower halves horizontally.

Splitting the crankcase does not require special tools, and can be performed with ease.

1. Preparations Necessary to Split the Crankcase

   a. Removing the Kick Idle Gear

   Remove the clip, and then the kick idle gear.

NOTE

The shims (Fig. 3-11-3).

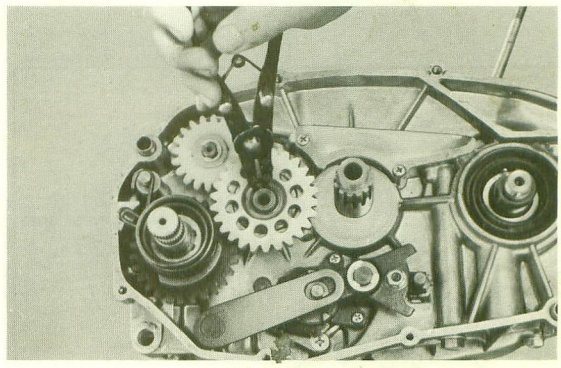


Fig. 3-11-1

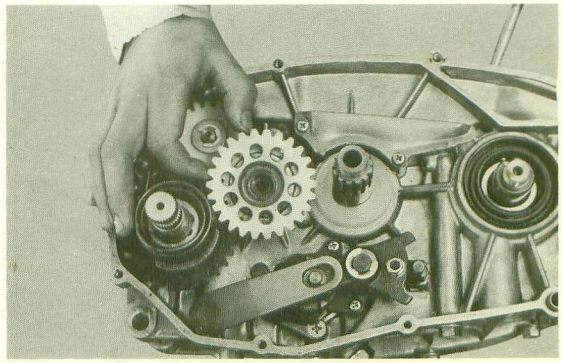


Fig. 3-11-2

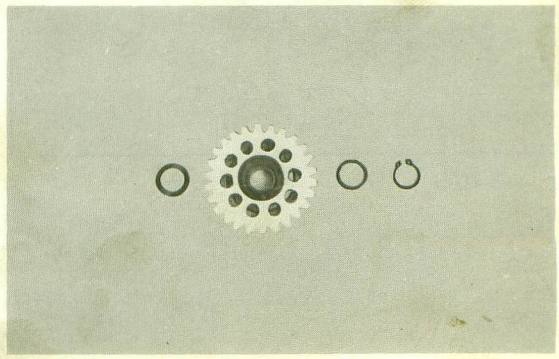


Fig. 3-11-3

b. Removing the Kick Starter Assembly
Remove the kick spring, and then the kick starter assembly. Note the shims.

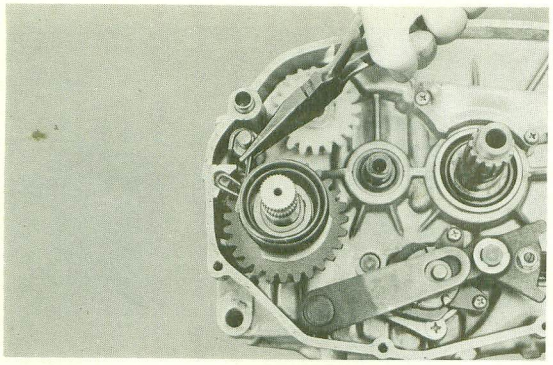


Fig. 3-11-4

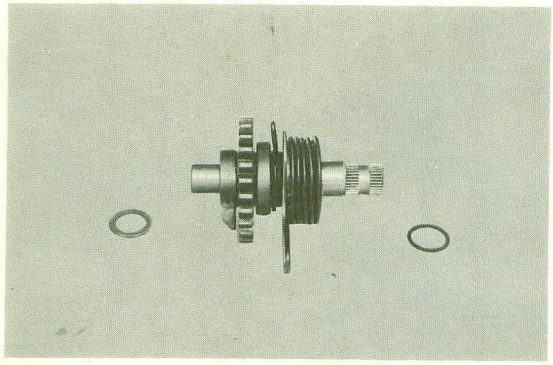


Fig. 3-11-5

c. Removing Gear Change Shaft Parts

1) Remove the change shaft sealing boot.

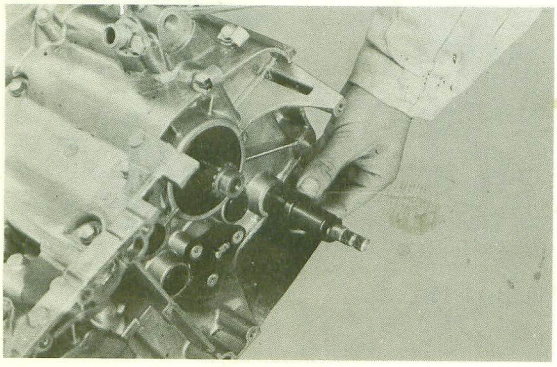


Fig. 3-11-6

2) Remove the change shaft circlip and the shim.

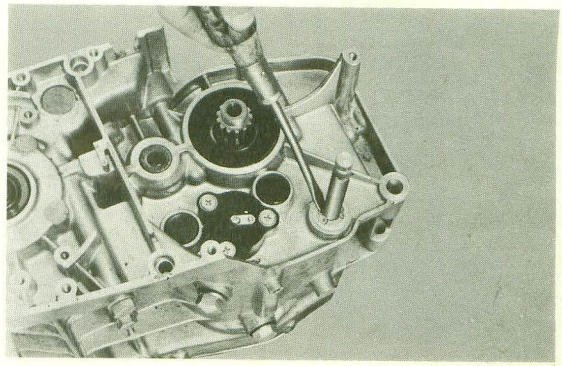


Fig. 3-11-7

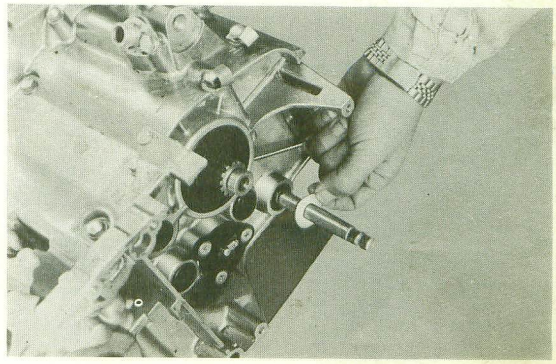


Fig. 3-11-8

3) Pull out the change shaft assembly from the primary side.

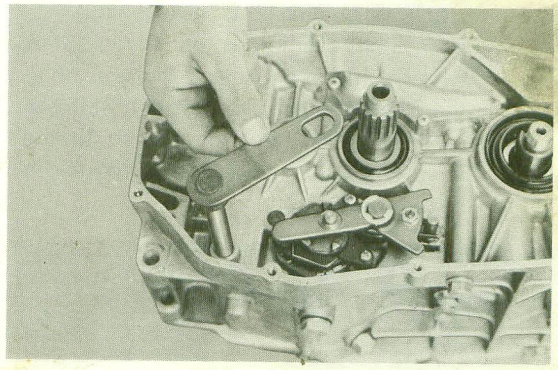


Fig. 3-11-9

4) Remove the circlip, and then the change lever assembly.

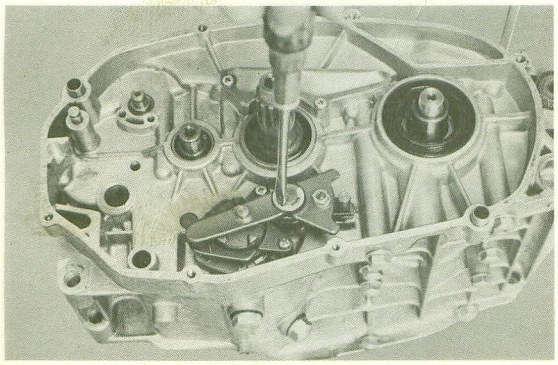


Fig. 3-11-10

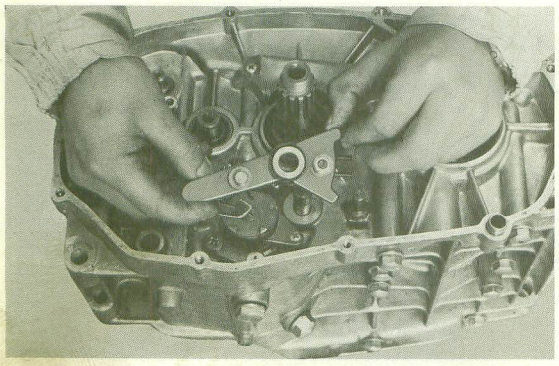


Fig. 3-11-11

d. Splitting the Crankcase

1) Invert the crankcase, and remove the crankcase holding bolts (hexagonal).
Each bolt position is numbered. Start with the highest number for disassembly; the lowest number for assembly. Loosen each bolt 1/4 turn and proved to the next. Repeat sequence until all bolts can be removed with fingers.

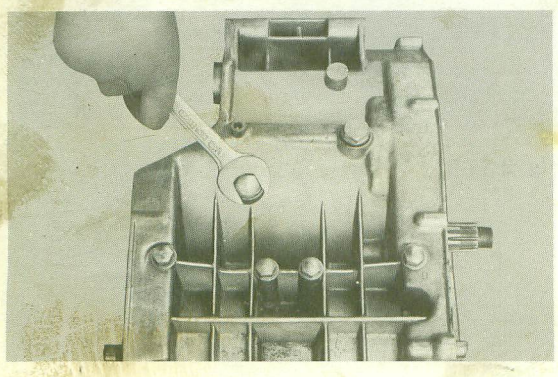


Fig. 3-11-12

2) Split the crankcase by lightly striking the front part of the upper crankcase and the rear, part of the lower crankcase.

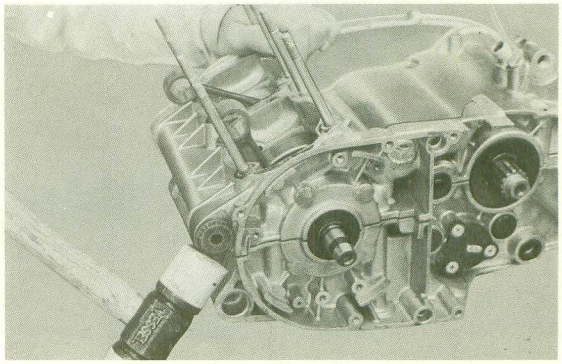


Fig. 3-11-13

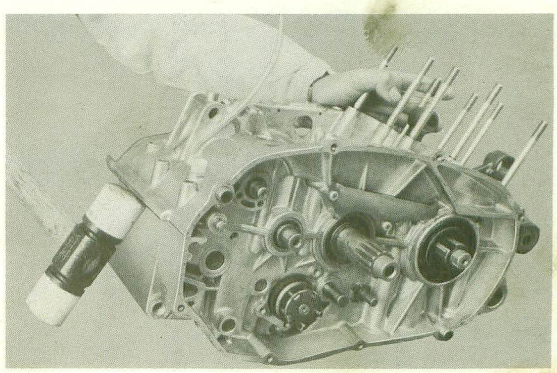


Fig. 3-11-14

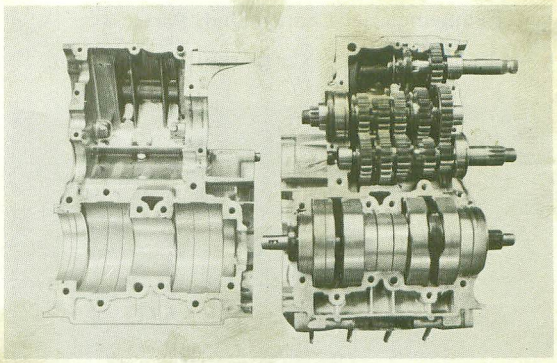


Fig. 3-11-15

e. Reassembling the Crankcase

Apply YAMAHA Bond No. 4 to the freshly cleaned mating surfaces of the crankcase, and assemble the upper and lower halves of the crankcase. Install the hexagonal bolts and then tighten them with a torque wrench in the order of the numbers marked on the lower half.

The amount of torque is:

1 kg-m for 6 mm bolts (90 in/lbs)

2 kg-m for 8 mm bolts (180 in/lbs)

NOTE

When using a socket wrench, T-type or L-type wrench, exercise care not to apply an excessive amount of torque. (The use of such a wrench tends to deform the crankcase.) Tighten bolts in assending numerical order in three stages until final torque valve is reached.

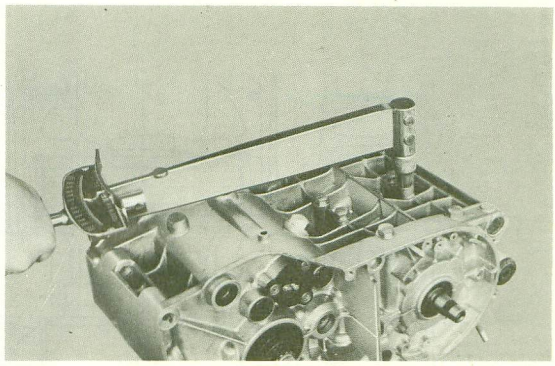


Fig. 3-11-16

3–12 Crankshaft

The crankshaft is one of the most precision components within the engine and is subjected to the greatest stresses. Therefore, it must be thoroughly checked for wear or damage.

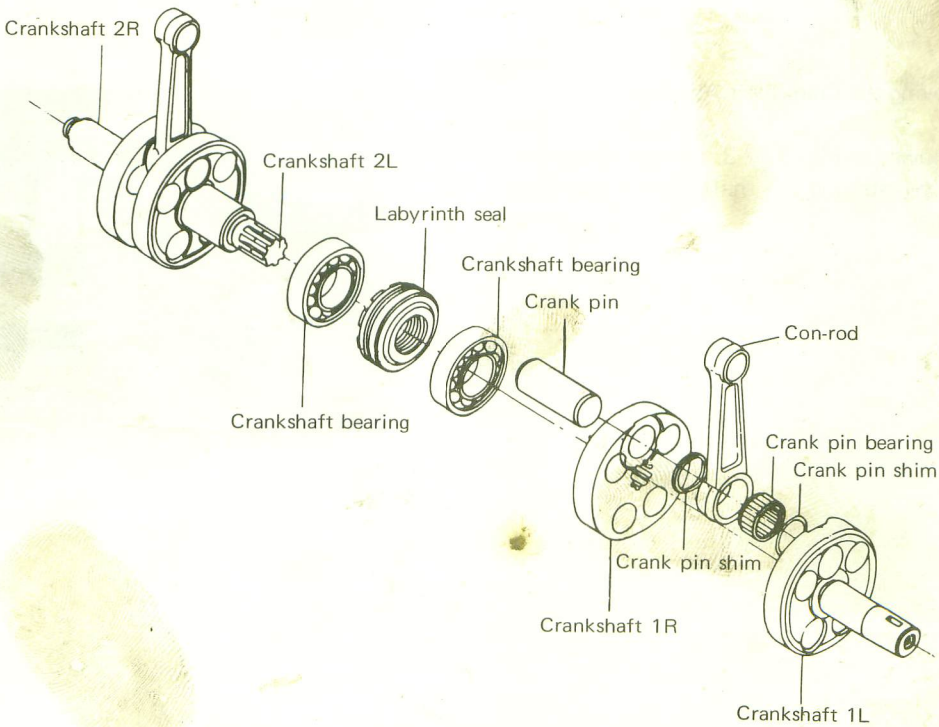


Fig. 3-12-1 Crankshaft Assembly Components

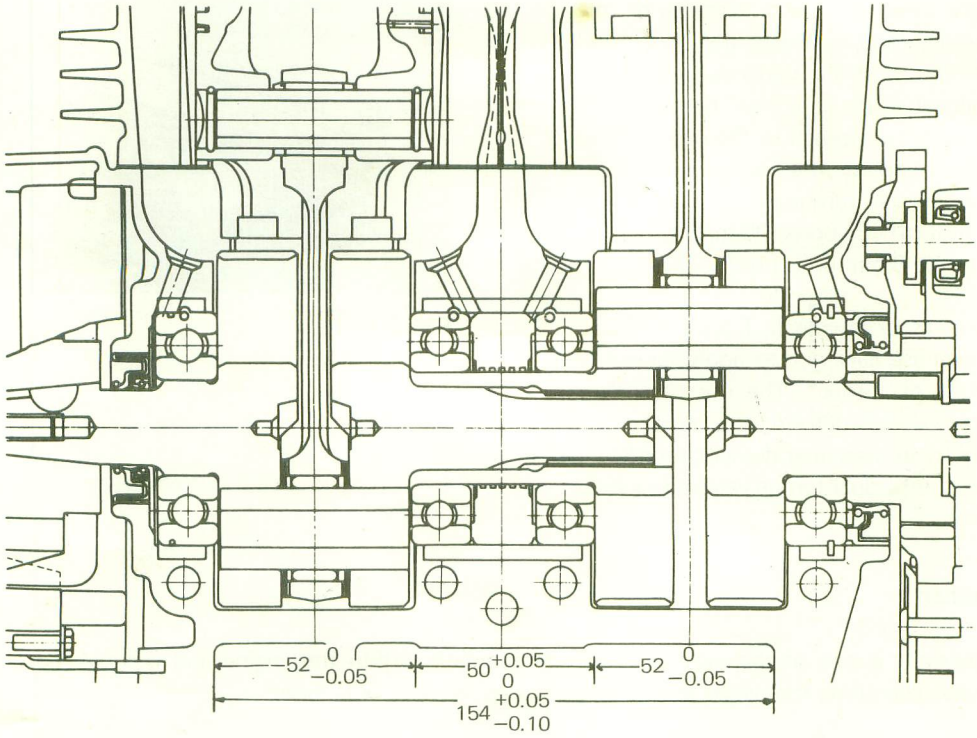


Fig. 3-12-2 Crankshaft Assembly Dimensions

1. Removing the Crankshaft Assembly

As shown in Fig. 3-12-3, remove the crankshaft by striking the shaft with a soft-faced hammer.

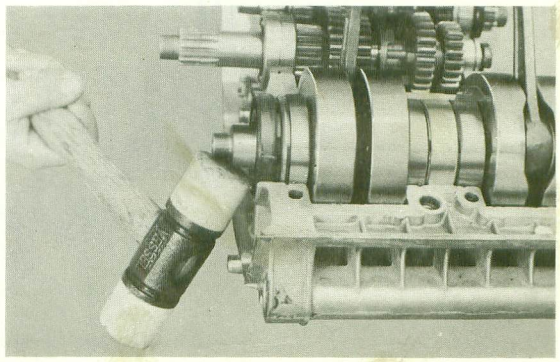


Fig. 3-12-3

2. Checking and Adjustment

1) Checking the Crankshaft Assembly

Check connecting rod axial play at the small end (to determine the amount of wear in the large end, crank pin, and large end bearing). (Fig. 3-12-4)	Small end play should not be more than 2 mm.	If small end play exceeds 2 mm, disassemble the crankshaft, check the connecting rod, crank pin, and bearing for wear and other defects. Replace worn parts so that small end play is within 0.8 ~ 1.0 mm after reassembling.
Check the connecting rod for large end side play. (Fig. 3-12-5)	Shift the connecting rod to one side, and measure the clearance between the edge of large end and the crankweb, with a feeler gauge. Side play should be within 0.1 ~ 0.3 mm.	If side play exceeds 0.3 mm, diassemble the crankshaft assembly, and replace any worn parts.
Accuracy of the crankshaft assembly: Check the crankshaft for runout at the three points as shown in Fig. 3-12-6.	Dial indicator reading at each point should be 0.02 mm or less.	If excessive runout exists, align the crank flywheel, with a brass hammer and wedge. (Strike the flywheel lightly with the hammer.)

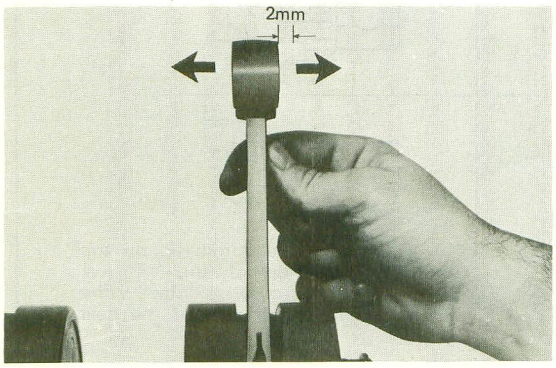


Fig. 3-12-4

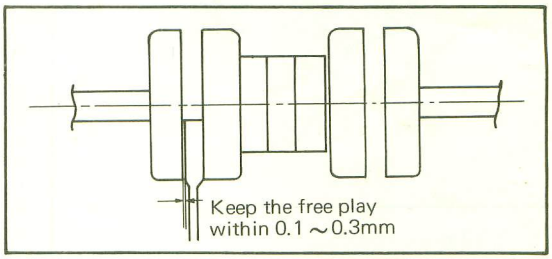


Fig. 3-12-5

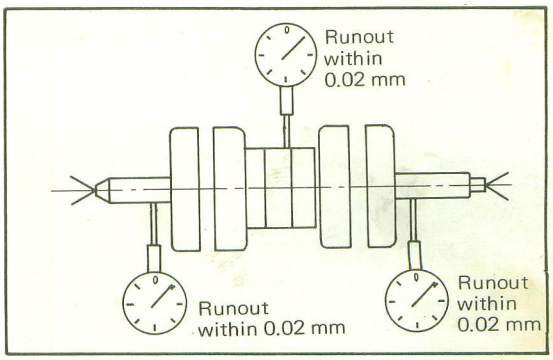


Fig. 3-12-6

3. Note for Crankshaft Assembly Installation

1) Knock pin When installing the crankshaft, align the bearing knock pin with the pin slot in the crankcase lower half.
Position the knock pin hole in the as indicated below, when installing the crank bearing.

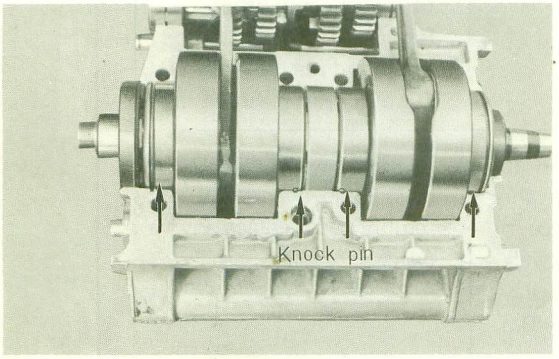


Fig. 3-12-7

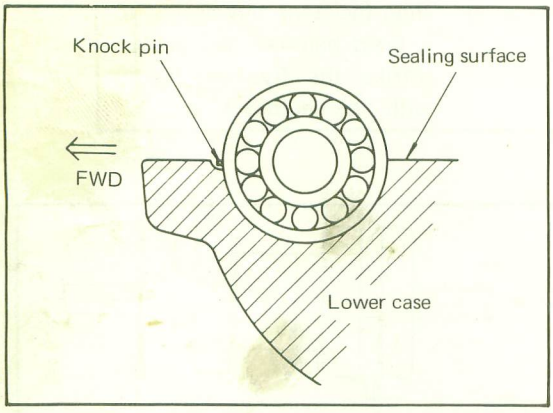


Fig. 3-12-8

2) Circlip
Install the circlip half on the bearing (on the clutch side), Fig. 3-12-9 shows the position of the circlip installation.

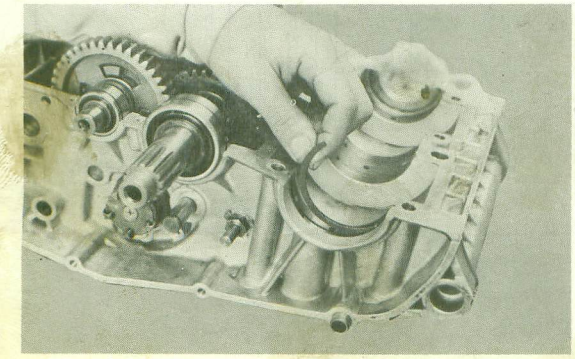


Fig. 3-12-9

3) Crankshaft Oil (R) and (L) (Teflon lip)
The crankshaft oil seal lip is made of Teflon, which is superior in heat and wear resisting properties to the conventional rubber lip.

a. Oil seal (L) ... on the dynamo side
Install the oil seal in the crankcase boss so that the seal will be even with the boss end surface. (In this case, the oil seal will not touch the bearing.)

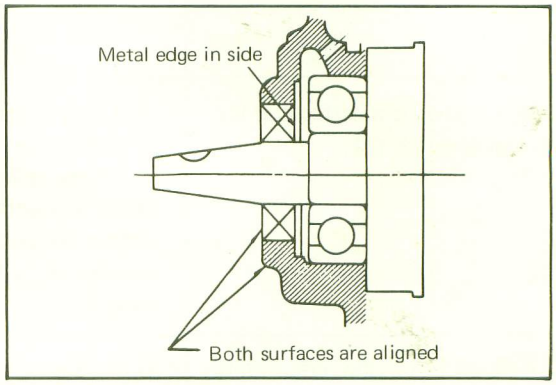


Fig. 3-12-10

b. Oil seal (R) ... clutch side:

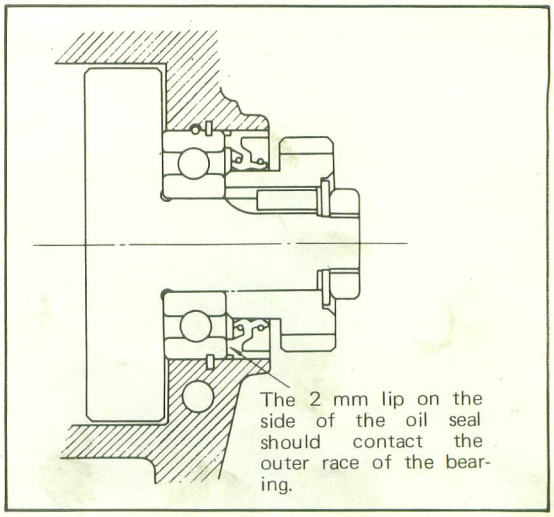


Fig. 3-12-11

3–13 Transmission

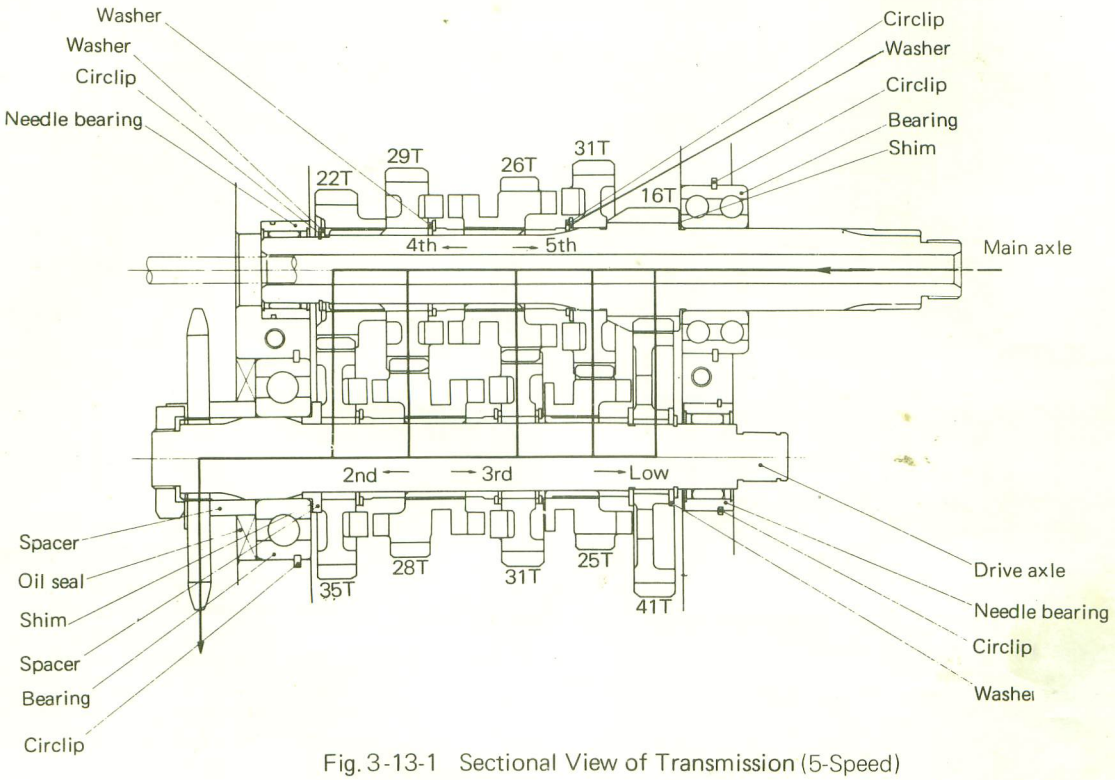
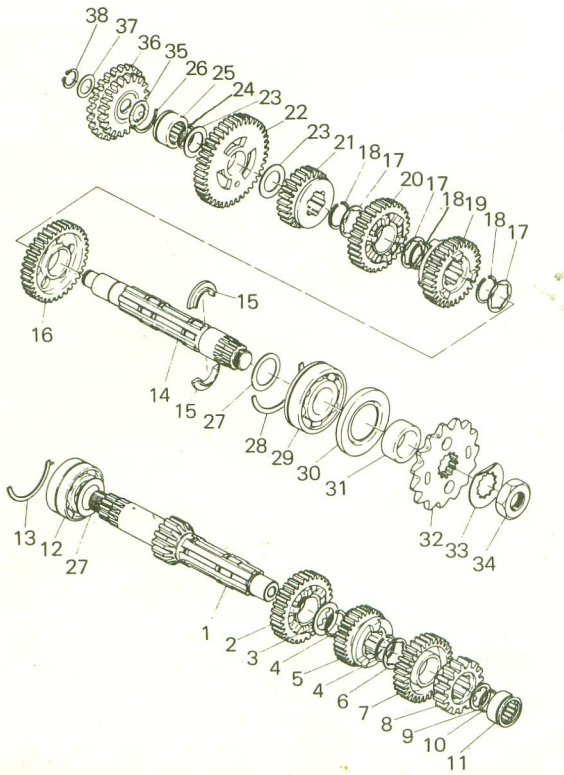
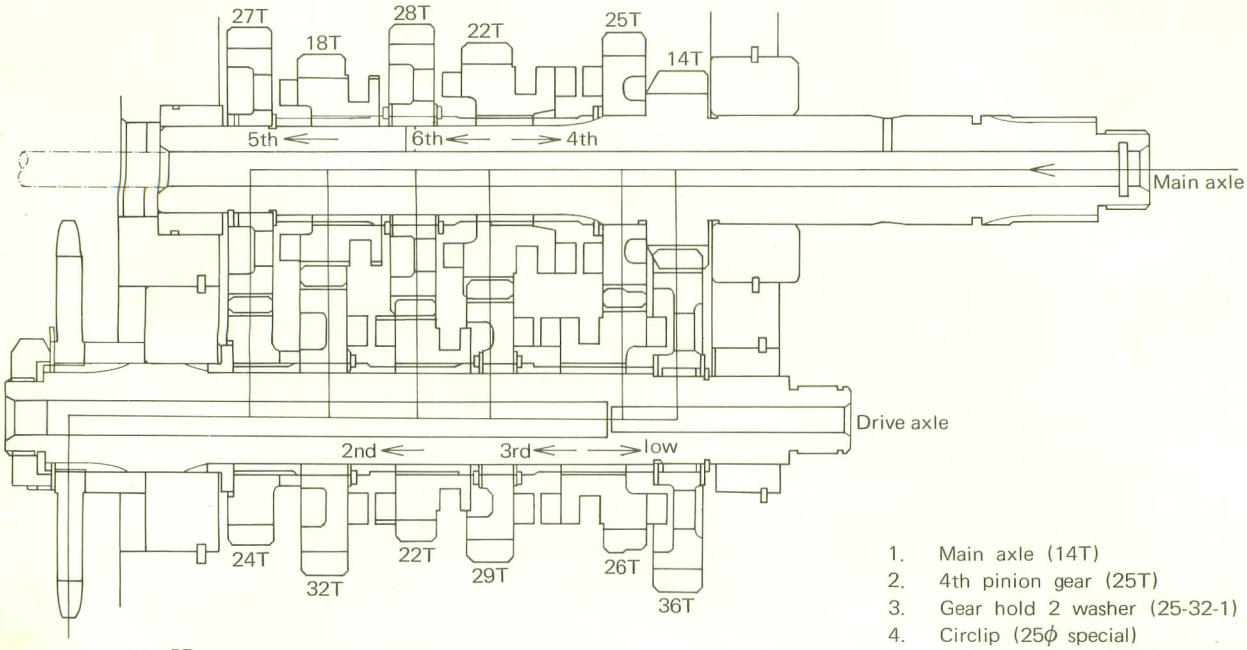


Fig. 3-13-1 Sectional View of Transmission (5-Speed)



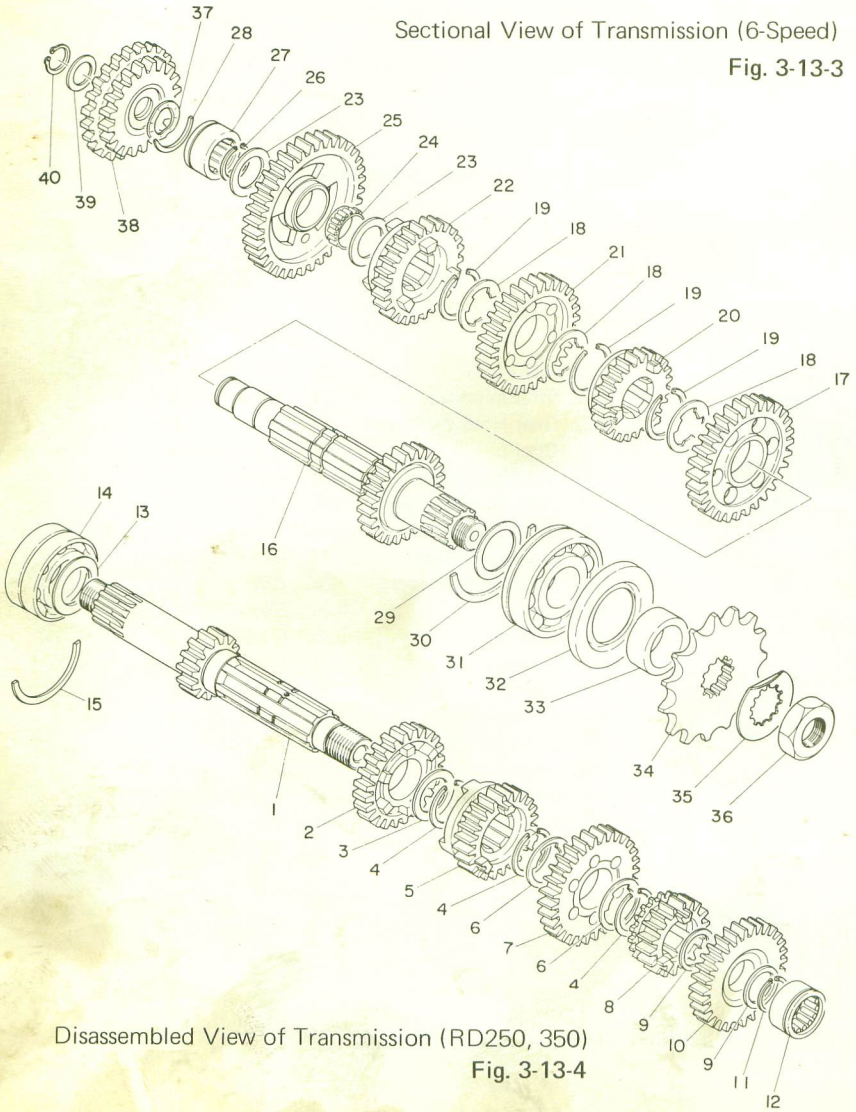
1. Main Axle
2. 5th Pinion Gear
3. Gear Hold 2 Washer
4. Circlip
5. 3rd Pinion Gear
6. Gear Hold Washer
7. 4th Pinion Gear
8. 2nd Pinion Gear
9. Gear Hold Washer
10. Circlip
11. Bearing
12. Bearing
13. Circlip
14. Drive Axle
15. Drive Axle Spacer
16. 2nd Wheel Gear
17. Gear Hold Washer
18. Circlip
19. 4th Wheel Gear
20. 5th Pinion Gear
21. 5th Wheel Gear
22. 1st Wheel Gear
23. Gear Hold Washer
24. Circlip
25. Bearing
26. Circlip
27. Drive Axle Shim
28. Circlip
29. Bearing
30. Oil Seal
31. Distance Collar
32. Drive Sprocket
33. Lock Washer
34. Lock Nut
35. Wave Washer
36. Idle Gear Ass'y
37. Main Axle Shim
38. Circlip

Fig. 3-13-2 Disassembled View of Transmission (DS7, R5C)



Sectional View of Transmission (6-Speed)

Fig. 3-13-3



Disassembled View of Transmission (RD250, 350)

Fig. 3-13-4

1. Main axle (14T)
2. 4th pinion gear (25T)
3. Gear hold 2 washer (25-32-1)
4. Circlip (25ϕ special)
5. 3rd pinion gear (22T)
6. Gear hold 1 washer
7. 6th pinion gear (28T)
8. 2nd pinion gear (18T)
9. Gear hold washer (22-15-1)
10. 5th pinion gear (27T)
11. Circlip (S-20)
12. Bearing (20-30-15)
13. Drive axle shim (25-34-0.3)
    Drive axle shim (25-34-0.5)
14. Bearing (25-52-20.6)
15. Circlip
16. Drive axle comp. (24T)
17. 2nd wheel gear (32T)
18. Gear hold 1 washer
19. Circlip (25ϕ special)
20. 6th wheel gear (22T)
21. 3rd wheel gear (29T)
22. 4th wheel gear (26T)
23. Gear hold washer (202-30-1.0)
24. Bearing (20-24-10)
25. 1st wheel gear (36T)
26. Circlip (S-20)
27. Bearing (20-33-15)
28. Circlip
29. Drive axle shim (25-34-0.5)
30. Circlip
31. Bearing (6305N special)
32. Oil seal (SD-35-62-6)
33. Distance collar (25-35-17.5)
34. Sprocket (14T)
    Sprocket (15T)
    Sprocket (16T)
35. Lock washer
36. Lock nut
37. Wave washer
38. Idler gear ass'y (22T & 27T)
39. Main axle shim (15.2-20-1)
40. Circlip (S-15)

Figs. 3-13-1 and 2 show the layout and details of the transmission assembly. The primary and the secondary reduction ratios are 66/23 (2.869) and 40/15 (2.666), respectively. Accordingly, both transmission gear ratios and overall reduction ratios for each gear position are as follows:

– R5C –	Primary Reduction Ratio - 66/23 = 2.869	
	Secondary Reduction Ratio - 40/15 = 2.666	
	Transmission gear reduction	Total reduction ratio
Low	41/16 = 2.562	19.596
2nd	35/22 = 1.590	12.162
3rd	31/26 = 1.192	9.118
4th	28/29 = 0.965	7.381
Top	25/31 = 0.806	6.165

1. Removing the Transmission

1) Remove the transmission by tapping it with a soft-faced hammer or the hands.

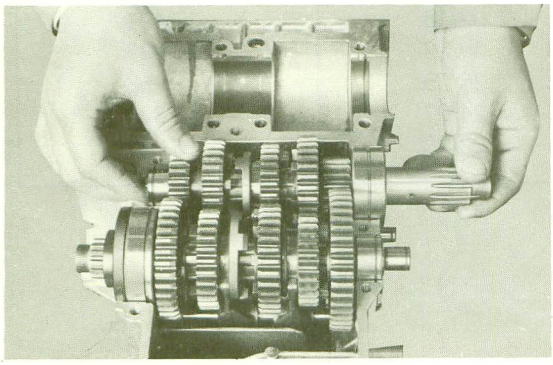


Fig. 3-13-5

– DS7 – Pri. 68/21 = 3.238 Sec. 40/15 = 2.666		
TRANS.		TOTAL RED. RATIO
1st	41/16	22.115
2nd	35/22	13.725
3rd	31/26	10.289
4th	28/29	8.330
5th	25/31	6.957

2. Note for Transmission Installation

1) Circlip
Install the circlip half on the drive axle and main axle, Fig. 3-13-4 and 5 shows the position of the circlip installation.

2) To facilitate crankcase installation, install the oil seal on the axle beforehand.
Exercise care not to damage the oil seal lip by forcing the transmission into the case.

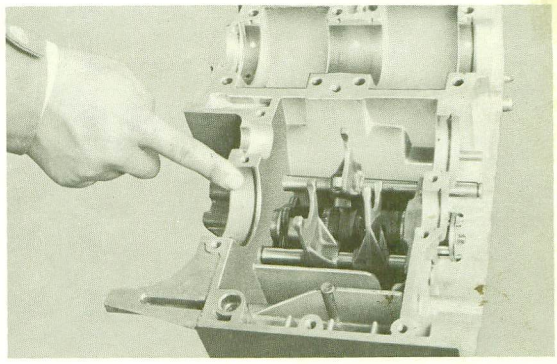
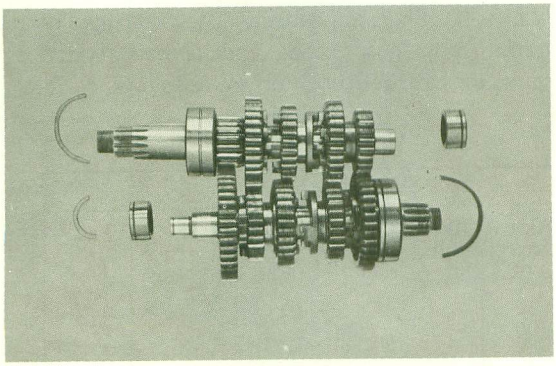
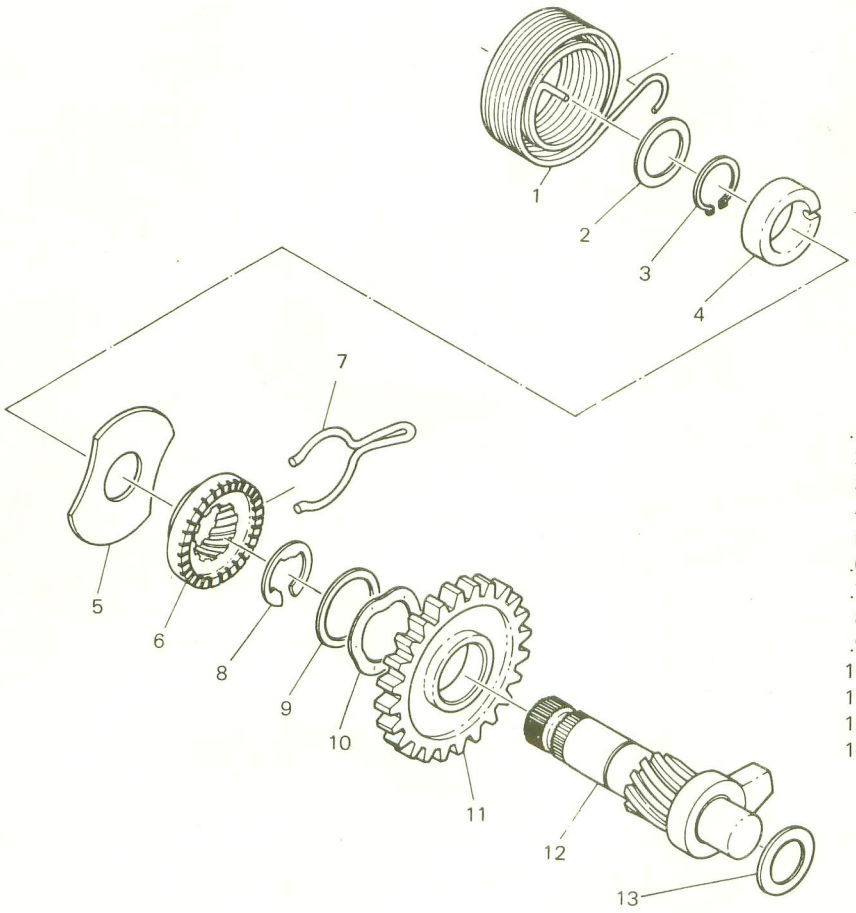


Fig. 3-13-6



– RD 250 – Pri. 68/21 = 3.238 Sec. 40/15 = 2.666			– RD 350 – Pri. 66/23 = 2.870 Sec. 40/15 = 2.668		
TRANS.		TOTAL RED. RATIO	TRANS.		TOTAL RED. RATIO
1st	36/14	22.204	1st	36/14	19.677
2nd	32/18	15.351	2nd	32/18	17.491
3rd	29/22	11.382	3rd	29/22	10.087
4th	26/25	8.980	4th	26/25	7.958
5th	24/27	7.675	5th	24/27	6.802
6th	22/28	6.785	6th	22/28	6.012

3–14 Kick Starter



1. Kick Spring
2. Gear Hold Washer (20-25-1)
3. Circlip
4. Spacer
5. Spring Cover
6. Ratchet Wheel
7. Clip
8. Circlip
9. Gear Hold Washer (25-32-1)
10. Wave Washer
11. Kick Gear
12. Kick Axle Ass'y
13. Washer (17.2-28-1)

Fig. 3-14-1 Disassembled View of Kick Starter

1. Note for Installing thy Kick Starter

   Position of the ratchet wheel clip.

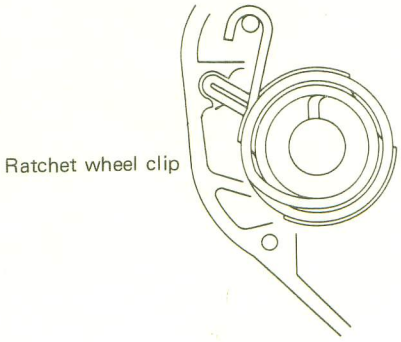
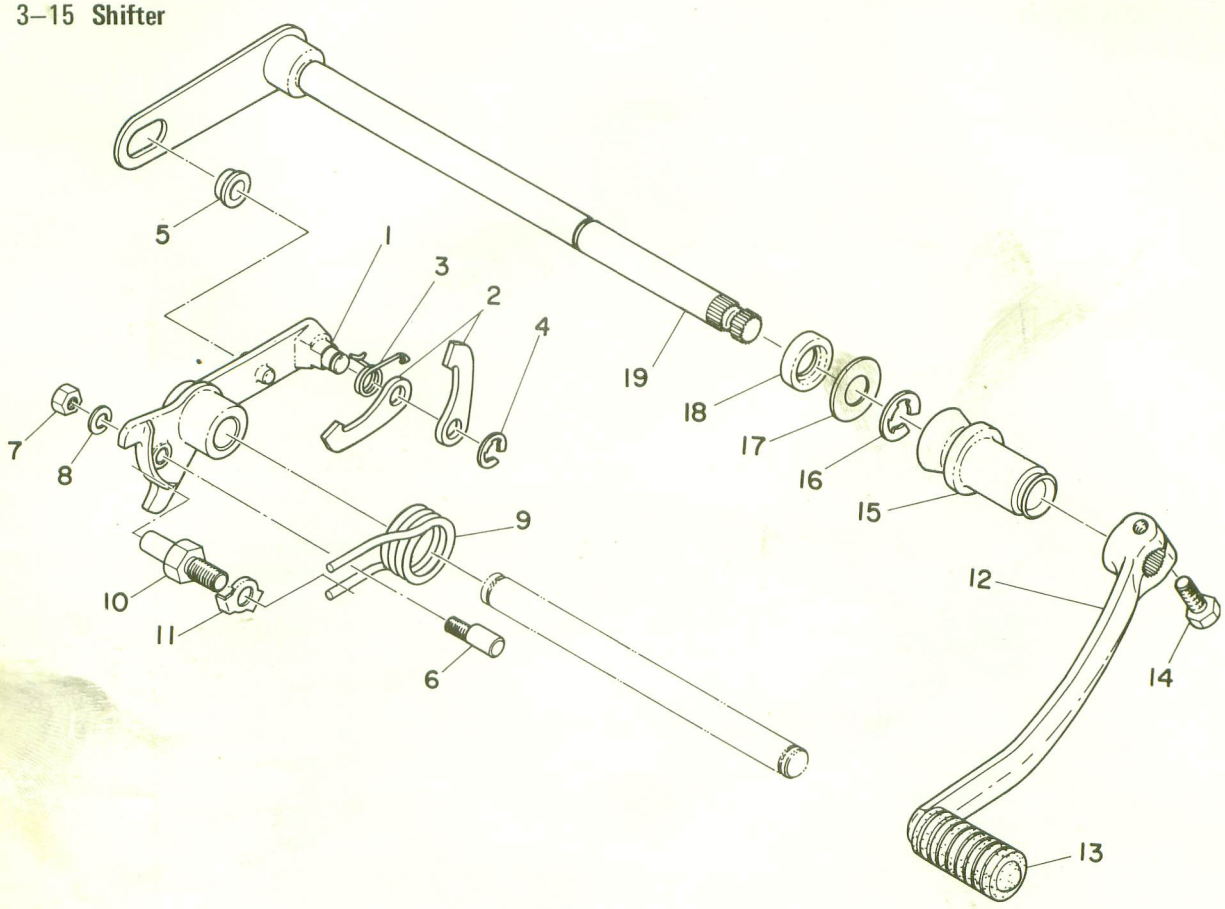


Fig. 3-14-2

3–15 Shifter



1. Bracket
2. Change 3 lever
3. Spring
4. Circlip (E-7)
5. Change lever roller
6. Adjusting screw
7. Nut
8. Spring washer
9. Shaft return spring
10. Screw stopper
11. Lock washer
12. Change pedal
13. Change pedal cover
14. Bolt
15. Sealing boot
16. Circlip (E-10)
17. Change axle washer (12.1-26-1.6)
18. Oil seal (S-12-22-5)
19. Change shaft ass'y

Fig. 3-15-1 Shifter A

1. Removing the Shifter

1) Remove the phillips-head screws holding the change lever guide, and then the change lever guide.

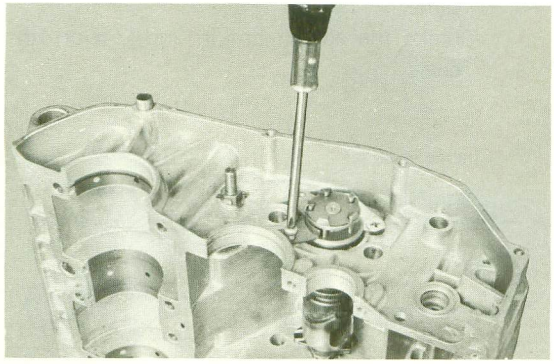


Fig. 3-15-2

2) Remove the screws, and then the stopper plate.

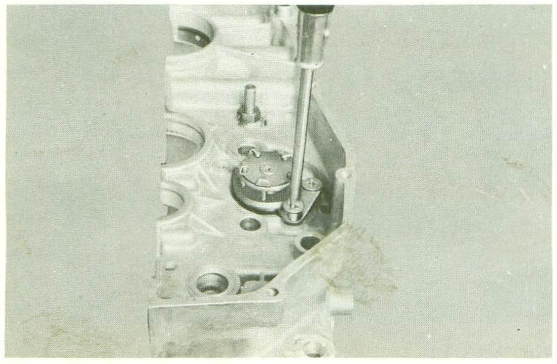


Fig. 3-15-3

3) Pull out the guide bars, and then remove the shift fork.

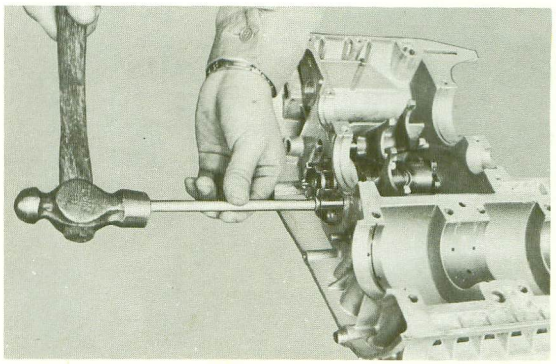


Fig. 3-15-4

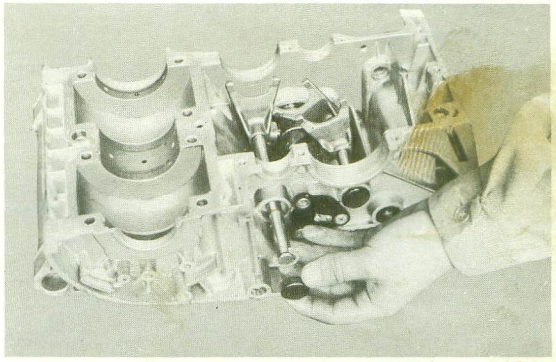


Fig. 3-15-5

4) Remove the change can stopper.

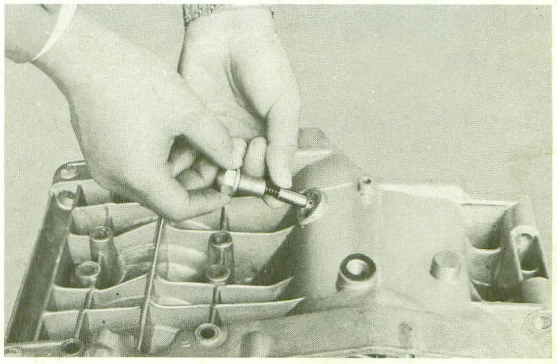


Fig. 3-15-6

5) Remove the stopper plate L circlip, and then the shift cam.

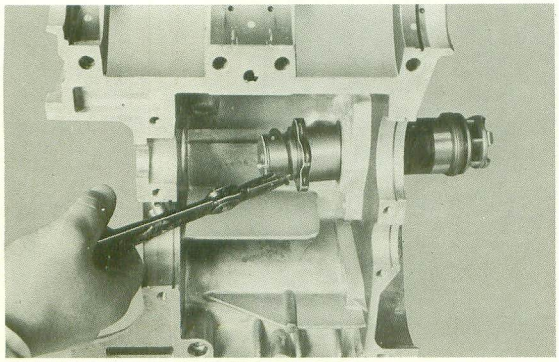


Fig. 3-15-7

2. Note on Assembling the Shifter

To assemble the shifter, reverse the sequence of the disassembling as specified above.

1) Position of the stopper plate L.

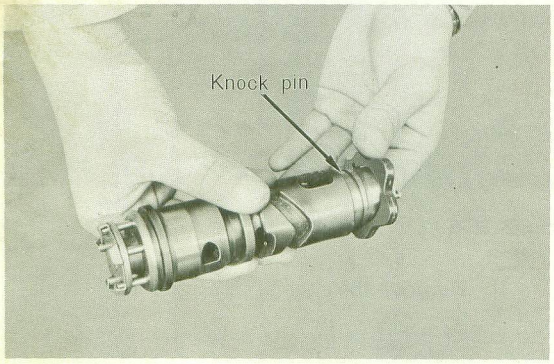


Fig. 3-15-8

2) Position of the stopper plate L circlip.

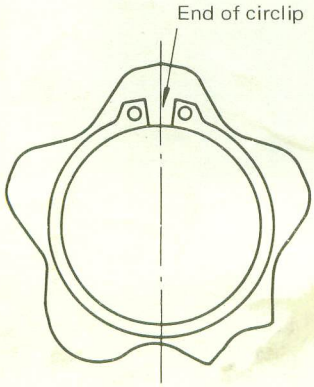


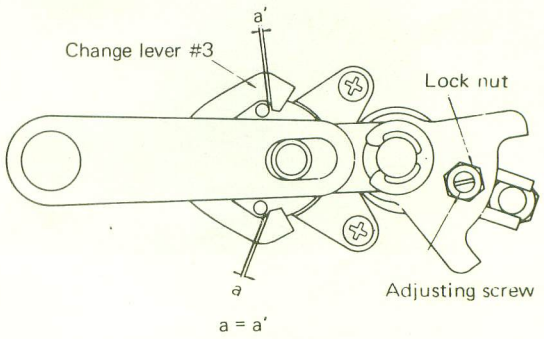
Fig. 3-15-9

3) How to set change lever (#3) and shift cam.

Set the change lever (#3) and shift cam pin as shown in Fig. 3-15-9.

Note that width a and a' must be the same.

Make the adjustment in 2nd, 3rd or 4th gear.



a = a'

Fig. 3-15-10

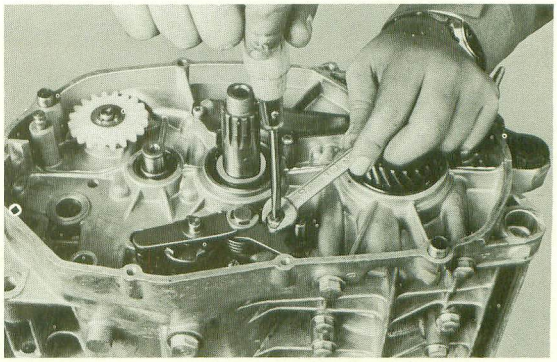


Fig. 3-15-11

Shifter

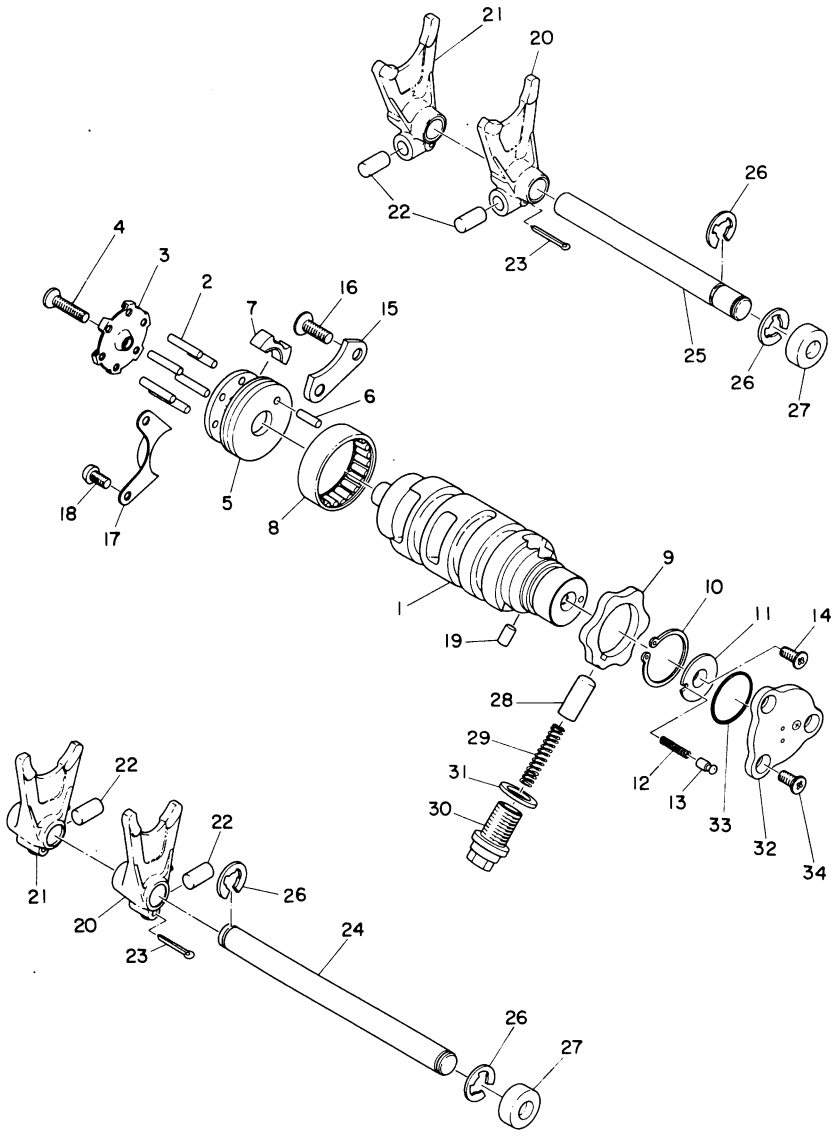
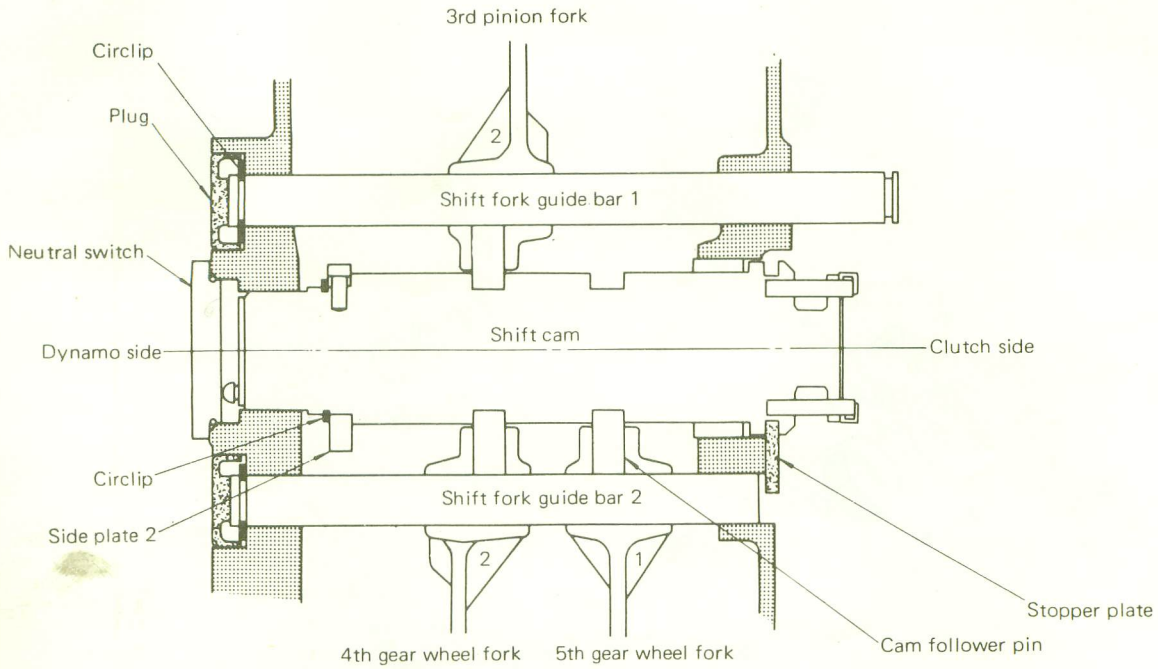


Fig. 3-15-12 Shifter B

1. Shift cam
2. Dowel pin (4-21.8)
3. Side 1 plate
4. Flat head screw
5. Segment
6. Dowel pin
7. Pawl plate
8. Bearing (36-46-12)
9. Stopper plate
10. Circlip (S-30)
11. Side 2 plate
12. Spring
13. Neutral point
14. Flathead screw
15. Stopper 2 plate
16. Flathead screw
17. Change lever guide
18. Panhead screw
19. Dowel pin (4-8)
20. Shift 1 fork
21. Shift 2 fork
22. Cam follower pin
23. Cotter pin
24. Shift fork guide 1 bar
25. Shift fork guide 2 bar
26. Circlip (E-10)
27. Blind plug
28. Cam stopper
29. Cam stopper spring
30. Spring screw
31. Drain plug gasket (14-21-1.5)
32. Neutral switch ass'y
33. O-ring (2.4-29.4)
34. Flathead screw

4) Position of the shift fork.



5-Speed

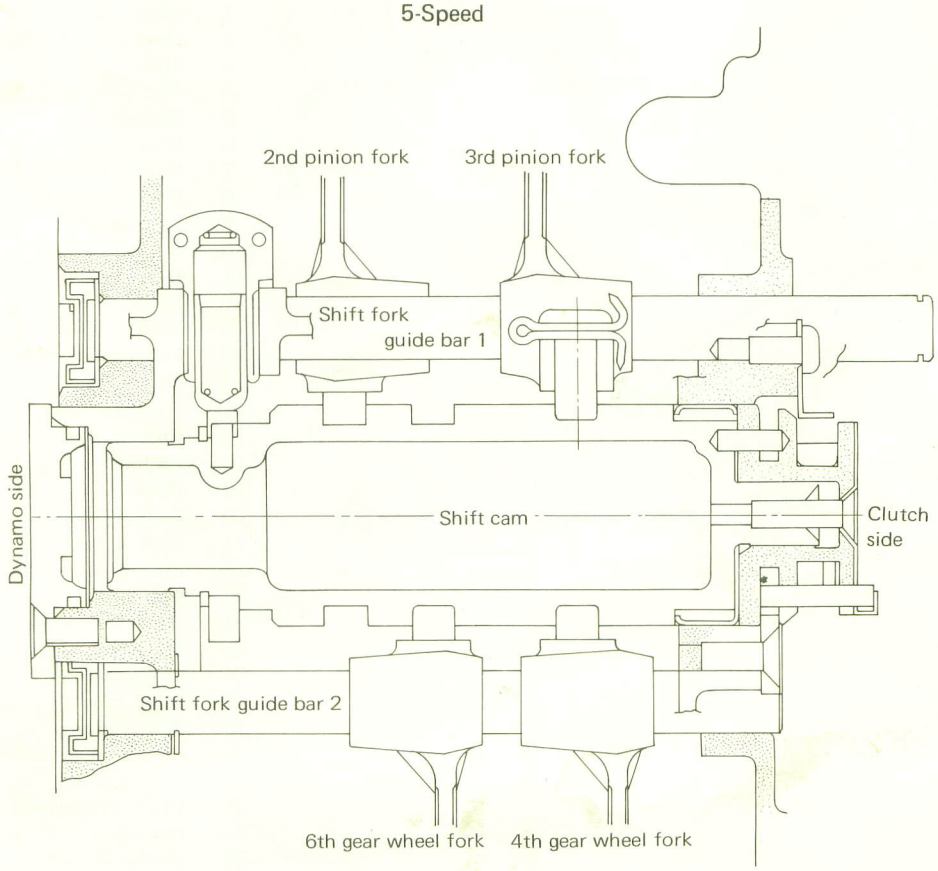


Fig. 3-15 -13

6-Speed

3. Removing the Neutral Switch

1) Remove the screws holding the neutral switch, and then the neutral switch.

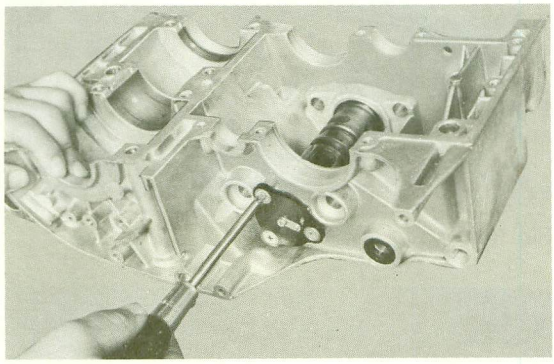


Fig. 3-15-14

2) Remove the screw holding the side plate (2), and then the side plate (2), neutral point and spring.

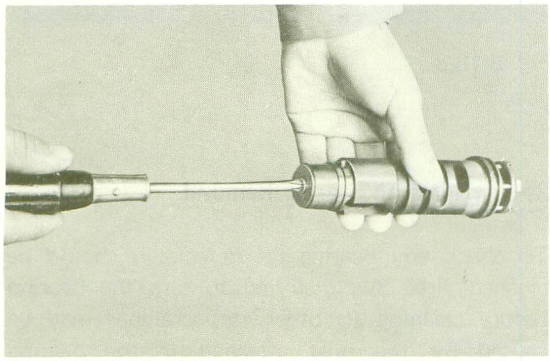


Fig. 3-15-15

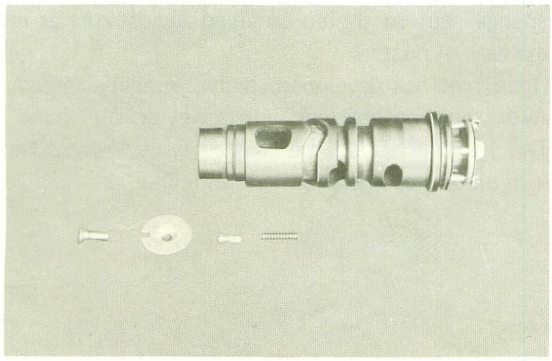


Fig. 3-15-16

3–16 Tachometer Gear

Removing the Tachometer Gear

1) Remove the bolt, and then driven gear.

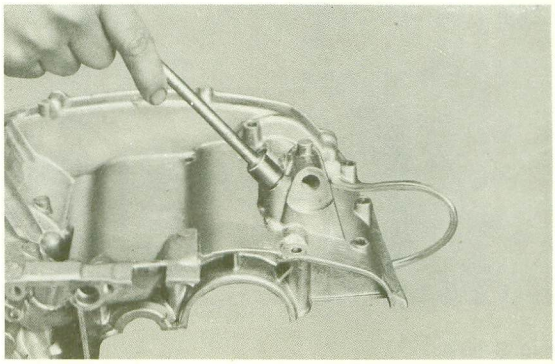


Fig. 3-16-1

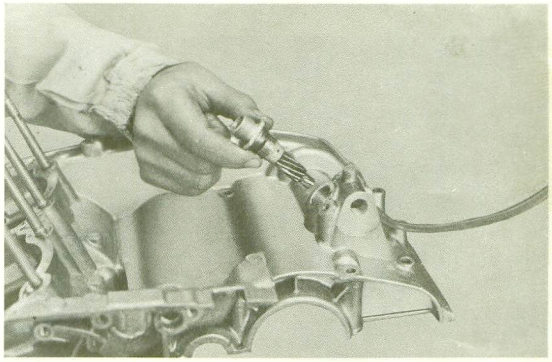


Fig. 3-16-2

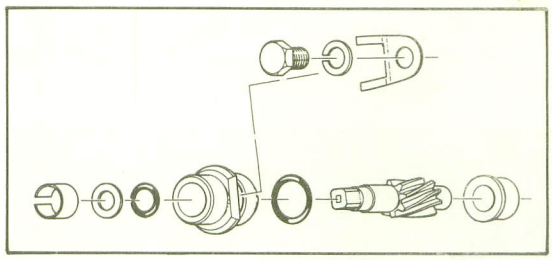


Fig. 3-16-3

2) Remove the circlip, and then the primary gear.

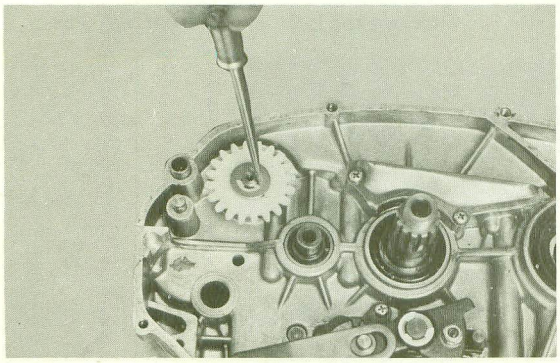


Fig. 3-16-4

3) Remove the screws holding the stopper, and then the stopper.

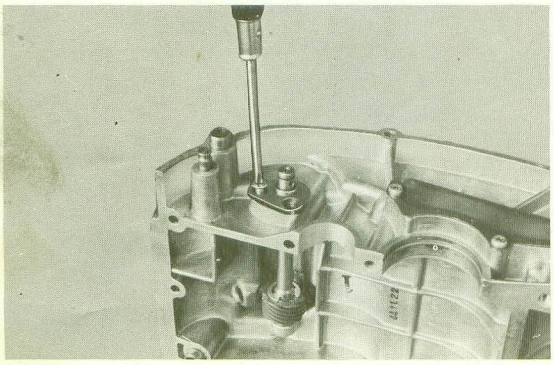


Fig. 3-16-5

4) Remove the drive gear circlips, and then drive gear.

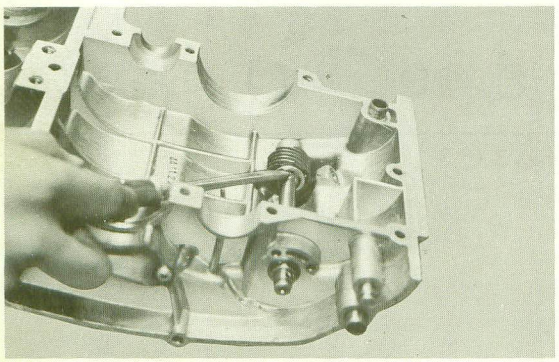


Fig. 3-16-6

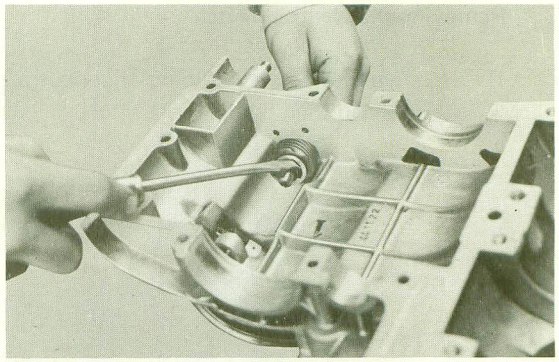


Fig. 3-16-7

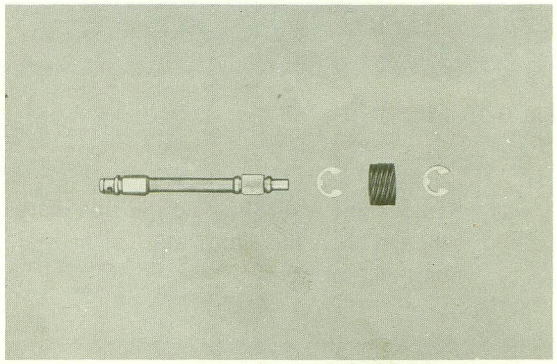


Fig. 3-16-8

3–17 Notes on Bearing Removal

To check any bearing for defects, it should be cleaned first. Avoid trying to turn the bearing before cleaning it; otherwise, scratches may be caused by the dust attached to the bearing surfaces. Even a new bearing, which is just unpacked, should be carefuly treated, because the grease may contain dust.

Special caution should be taken against rust as in the case of dust.

Once rust has developed, it may quickly spread. Avoid holding bearings with a wet or salty hand. The bearings shoudl be cleaned with solvent. Be sure oil or grease them after cleaning.

3–18 Carburetor

The YAMAHA R5C, RD250 and RD350 employ two ANAL type VM28SC carburetors in order to meet the requirements of better acceleration and high speed operation. **(DS7 = VM 26 SC)**

1. Checking the Carburetor

1) Float Valve
Check the float valve seat. If the seat is worn or scratched, replace the valve. If the float valve spring weakens, fuel may overflow, flooding the float chamber when the machine is running at certain speeds or certain conditions. Depress the float valve spring with your finger, and make sure that it properly returns to the original position after releasing.

2) Overflowing
If fuel overflows, check the carburetor in the manner as specified in 1) above, If nothing is found to be wrong, the overflowing is considered to be caused by dust or dirt located between the float valve and the valve seat. Clean out the dust or dirt. Drain the fuel, rinse out the fuel tank with clean gasoline, and clean all other parts of the fuel system including the float valve and the valve seat, with compressed air.

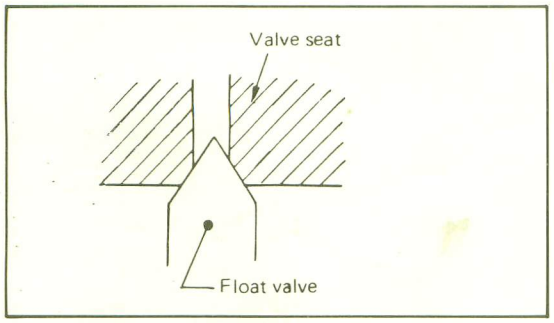


Fig. 3-18-1

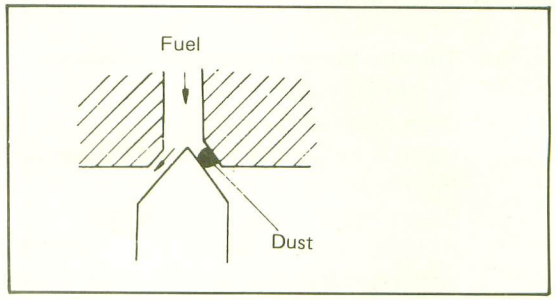


Fig. 3-18-2

3) Cleaning the Carburetor
Disassemble the carburetor, and wash all its parts in a suitable solvent or carburetor cleaner.

NOTE
Always remove Starter Jet plunger—some solvents will dowage neoprene seat.

Blow all air and fuel passages in the carburetor with compressed air.
All jets and other delicate parts should be cleaned by blowing compressed air through them. When using wires or other hard pointed cleaning tools, take care not to damage or scratch the precision-machined surfaces.

NOTE
Always remove float bowl before blowing compressed air through carburetor passages.

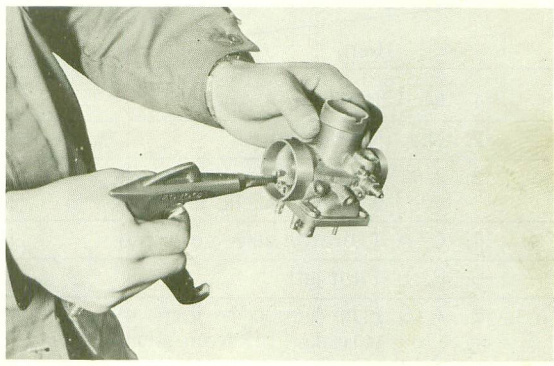


Fig. 3-18-3

2. Carburetor Setting

a. Throttle Synchronization & Adjustments

1) Synchronize both throttle cables so the slides raise simultaneously.
Remove the air intake hoses and open the throttle to full position.
Reach into the carburetor venturis to feel if both slides begin to drop into the venturis at the same time, as the throttle grip is slowly rotated closed.

2) Each slide can be raised or lowered by turning the adjustor cable on top of each carburetor. At idle, each cable should have approximately 1mm slack at the adjustors.

3) Adjust the throttle cable end at the throttle grip to have 0.5-1.0mm slack. The adjustment nut is located at the cable end near the grip.

4) Turn each idle mixture screw in until lightly seated, then back it out 1-3/4 turns. This is a factory setting and requires no further adjustment (Fig. 3-18-5).

5) Start the machine and let it warm up. Synchronize the idle speed so that both cylinders pull evenly at 1,300-1,500 rpm. The idle speed ajustor is screwed into the side of the carburetor. Screwing it in increases idle speed, screwing it out decreases idle speed (Fig. 3-18-4).

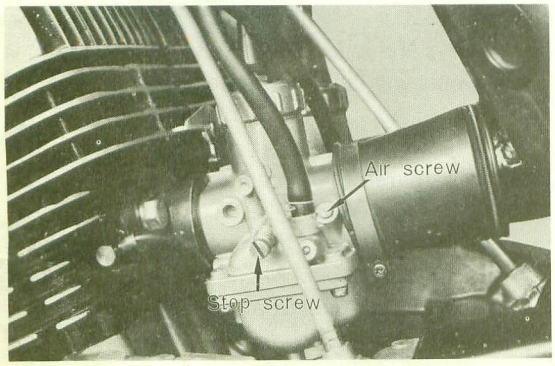


Fig. 3-18-4

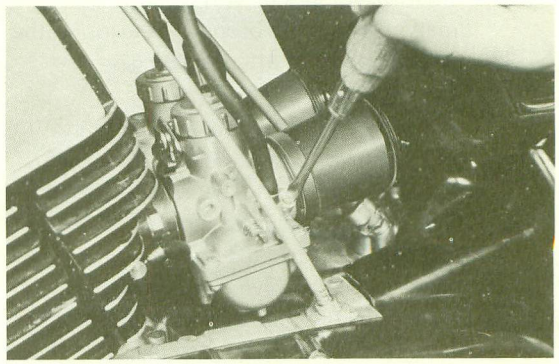


Fig. 3-18-5

b. Carburetor Settings

Item \ Model	DS7	R5C	RD 250	RD 350
1. M. J. (Main jet)	#100	#120	#120	#130
2. N.J. (Needle jet)	0–0	0–0	0–8	0–8
3. J. N. (Jet needle setting the step where J. N. clip isfiftted)	5DP7–4	5DP7–4	5J6–3	5J6–3
4. C. A. (Throttle valve cutaway)	2.0	2.0	1.5	1.5
5. P. J. (Pilot jet)	#30	#30	#30	#25
6. A. S. (The number of turns the A.S. is backed off from alighly seated position)	1.0	1¼	1½	1¼
7. G. S. (Starter jet)	#100	#100	#100	#100
8. V. S. (Valve seat)	2.0	2.0	2.5	2.5

3–19 Air Cleaner

1. Removal

Open the seat and remove the rubber band holding the air cleaner case cap.
Raise the cleaner element and remove it.

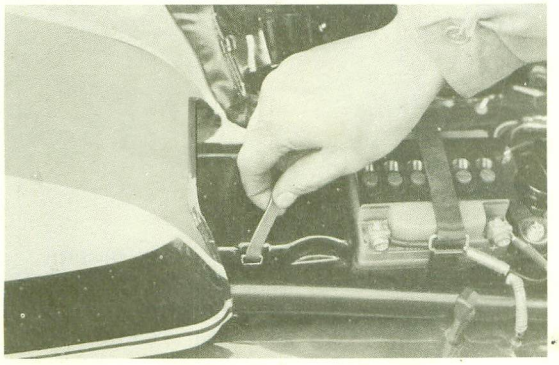


Fig. 3-19-1

2. Cleaning

The air cleaner should be cleaned by blowing with compressed air, and/or by lightly tapping the filtering paper so that the dust may be removed.
As the element is made of paper, it should be kept away from water and oil. If possible, the element should be replaced every 3,000 miles (5,000 km).

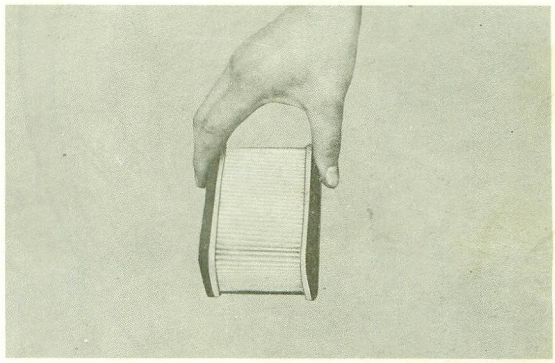


Fig. 3-19-2

CHAPTER 4. CHASSIS (DS7, R5C, RD250)

4–1 Front Wheel

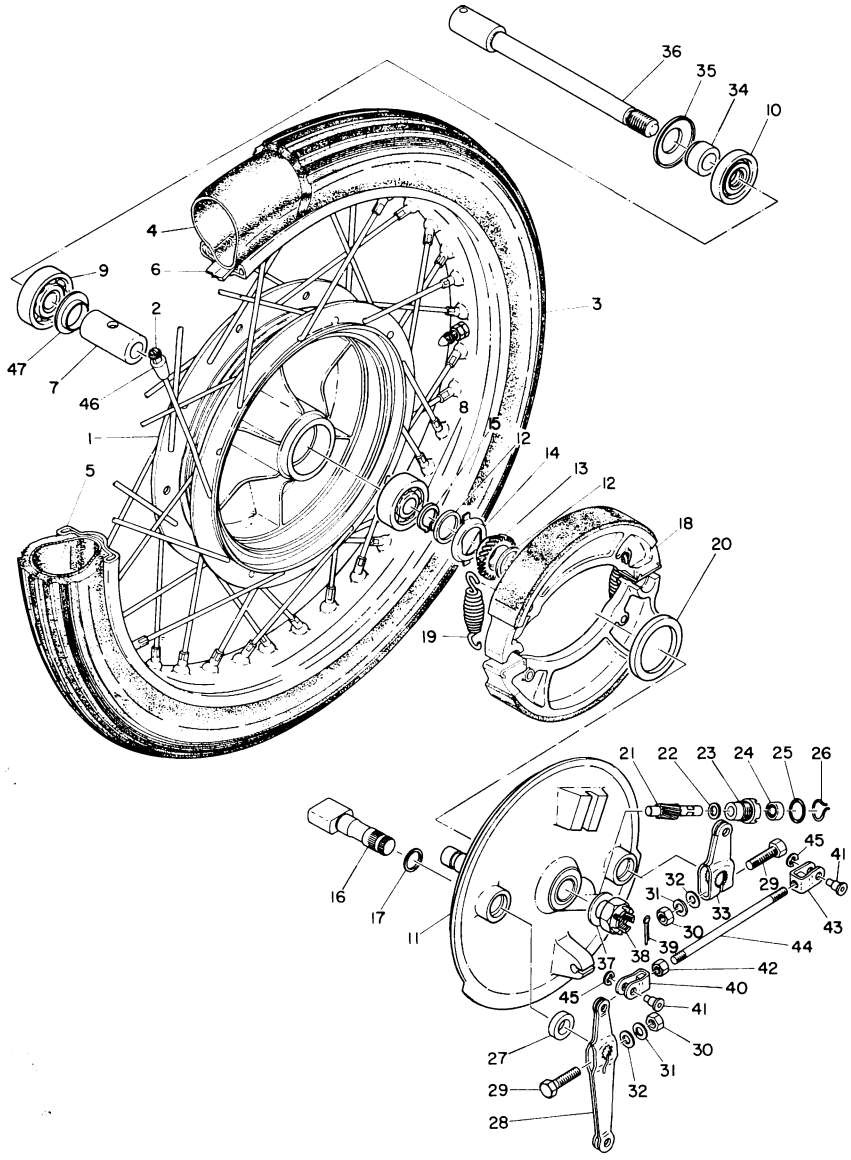


Fig. 4-1-1

1. Front hub
2. Sproke set
3. Front tire (3.00-18-4PR)
4. Tube (3.00-18)
5. Rim (1.60A-18)
6. Rim band (3.00-18)
7. Bearing spacer
8. Bearing (6302)
9. Bearing (6302Z)
10. Oil seal (SD-22-42-7)
11. Brake shoe plate
12. Thrust 2 washer (22.5-29-1)
13. Drive gear (27T)
14. Meter clutch
15. Circlip (S-22)
16. Camshaft
17. Camshaft shim (14.2-24-0.5)
18. Brake shoe comp.
19. Return spring
20. Oil seal (SDD-53-65-7)
21. Meter gear
22. Thrust 1 washer (7-12-0.8)
23. Bushing
24. Oil seal (SD-7-14-4)
25. O-ring (2.4-13.8)
26. Stop ring
27. Camshaft seal
28. Camshaft 1 lever
29. Bolt
30. Nut
31. Spring washer
32. Plain washer
33. Camshaft 2 lever
34. Wheel shaft collar
35. Hub dust cover
36. Wheel shaft
37. Plain washer
38. Nut
39. Cotter pin
40. Rod 1 end
41. Rod end pin
42. Nut
43. Rod 2 end
44. Connecting rod
45. Circlip (E-4)
46. Wheel balancer
47. Spacer flange

4–1 Front Wheel (DS7, R5C, RD250)

The front tire is 3,000-18-4 PR in size. The brake is a two-leading shoe type, sized at 7.10 x 1.18 inches (180 x 30 mm), and is water and dust proof.

1. Removal

1) Disconnect the brake cable at the handle lever.

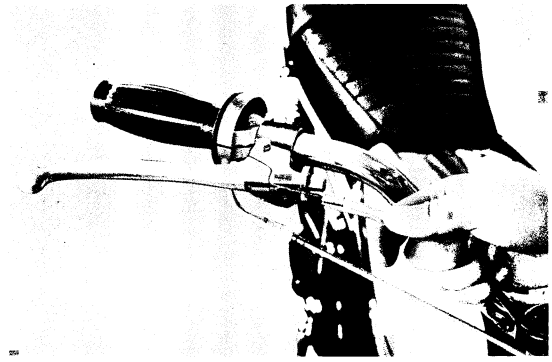


Fig. 4-1-2

2) Disconnect the brake cable and speedometer cable from the front shoe plate.

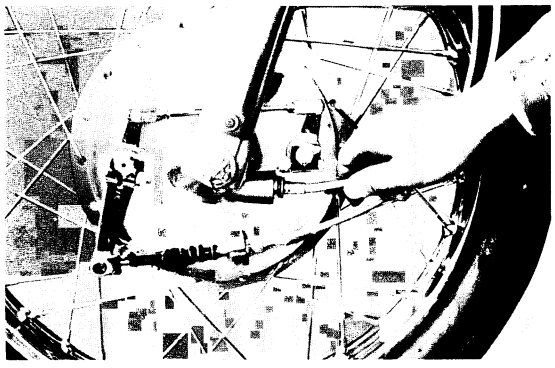


Fig. 4-1-3

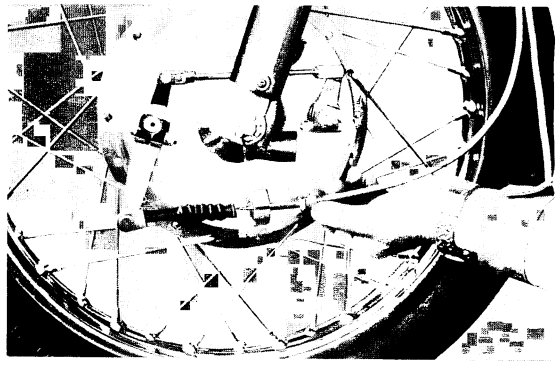


Fig. 4-1-4

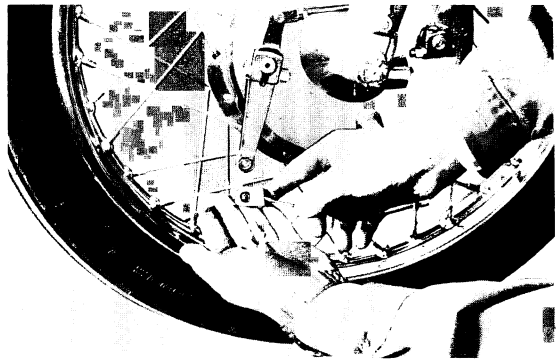


Fig. 4-1-5

3) Remove the cotter pin, and then the front wheel shaft nut.

NOTE

Replace the cotter pin if damaged or worn.

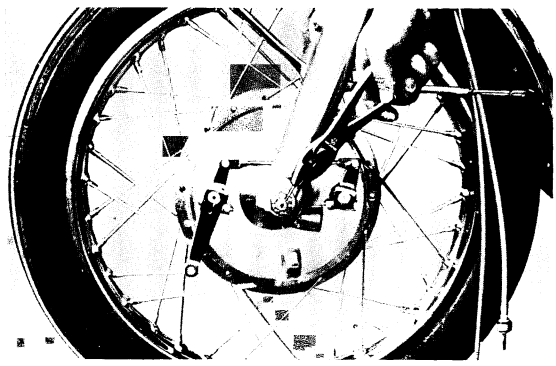


Fig. 4-1-6

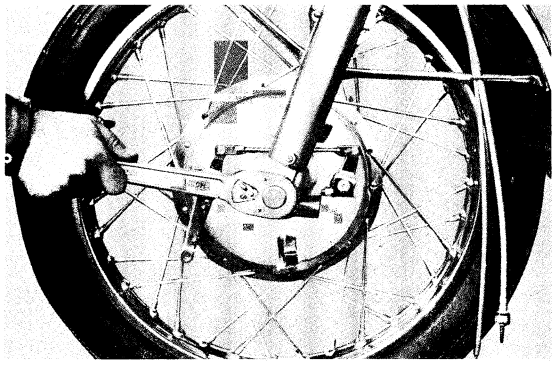


Fig. 4-1-7

4) Loosen the front wheel shaft lock nuts.

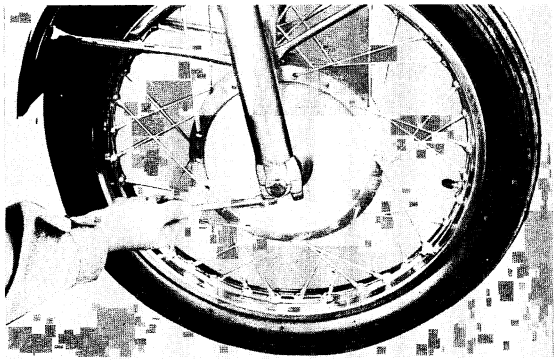


Fig. 4-1-8

5) Pull out the front wheel shaft.

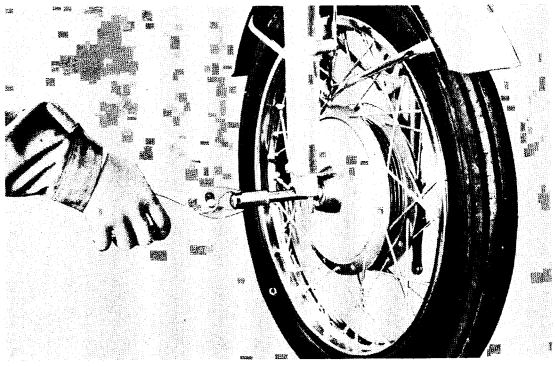


Fig. 4-1-9

6) Raise the front of the chassis, and remove the front wheel assembly.

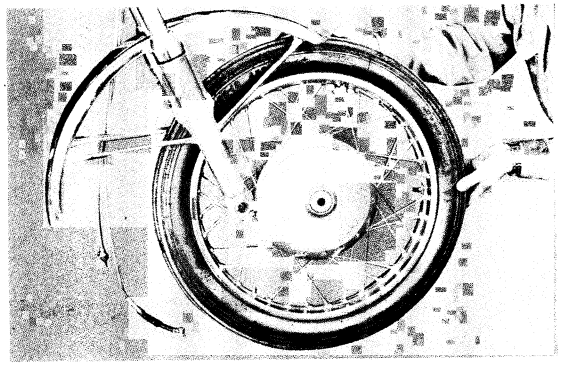


Fig. 4-1-10

2. Checking and Adjustment

1) Checking the Runout of the Rim: Anchor the front wheel as shown in Fig. 5-1-10, and measure the runout of the rim with a dial guage.
Runout limits: 0.07 in. (2 mm)
Excessive runout of the rim may cause stering difficulties while riding the machine, which may lead to an accident. Excessive runout may result from a deformed rim or loose spoke nipple.

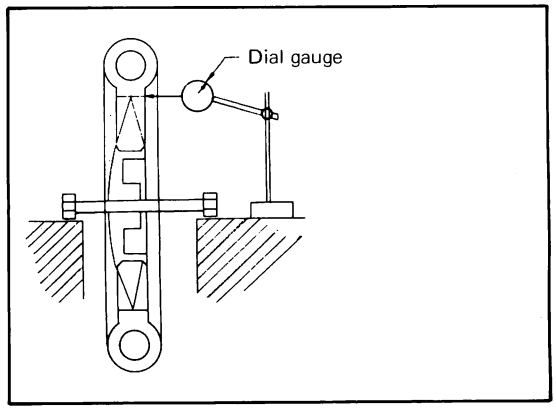


Fig. 4-1-11

2) Spokes

a. Replacing Spokes:
Any bent or faulty spoke should be quickly replaced because it will adversely affect other neighboring spokes, imposing extra loads on them.
The bent end of the spoke is inserted into the hub, the threaded end is locked to the nipple. (See Fig. 4-1-11) To remove the spoke, completely unscrew the nipple and remove the bent end from the hub.

Fig. 4-1-12

b. Adjusting the Spoke Tension
Any loosened spoke or uneven spoke tension may cause the rim to warp. This may also adversely affect the spoke itself. Spokes tend to become loose after many miles. This is particularly true with a new machine. Therefore, the spokes should be retightened periodically.
Retightening should be performed by given each nipple one turn, beginning with one side of the hub and then the other side.

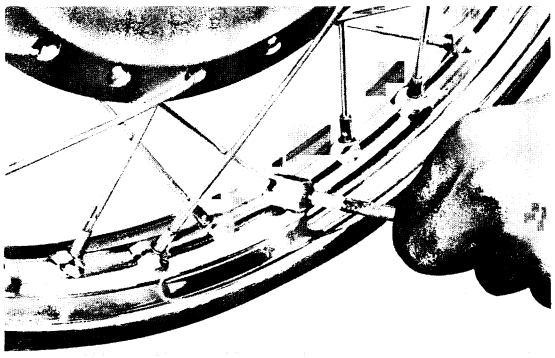


Fig. 4-1-13

3) Brake Shoe Set the brake shoe, and measure the outer diameter of the shoe, with slide calipers as shown in Fig. 4-1-13
If the shoe is less than 175 mm (6.9 in.), replace it.

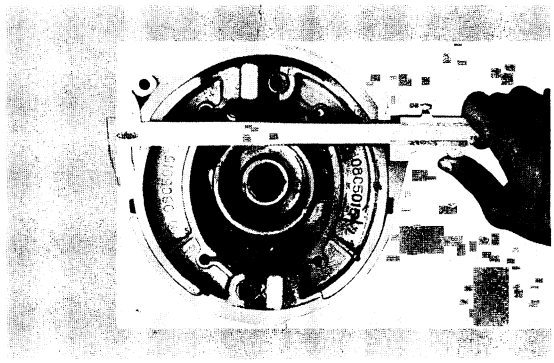


Fig. 4-1-14

4) Brake Drum
Oil or scratches on the inner surface of the brake drum will impair braking performance or result in abnormal noises. Remove oil by wiping with a rag soaked in lacquer thinner or solvent. Remove scratches by lightly and evenly rubbing with emery cloth.

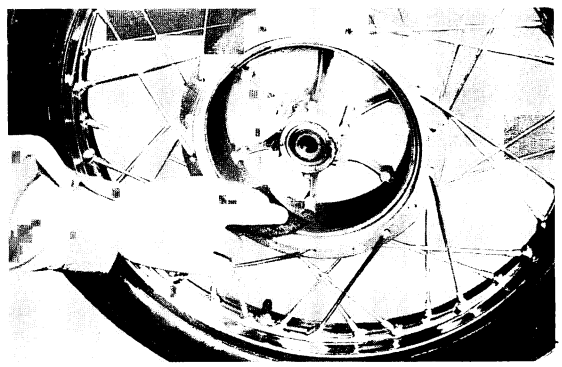


Fig. 4-1-15

5) Repairing the Brake Shoe
If the brake shoe has scratches or uneven contact with the brake drum, smooth out the surface with sandpaper or hand file.

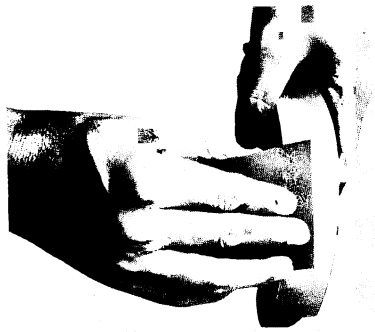
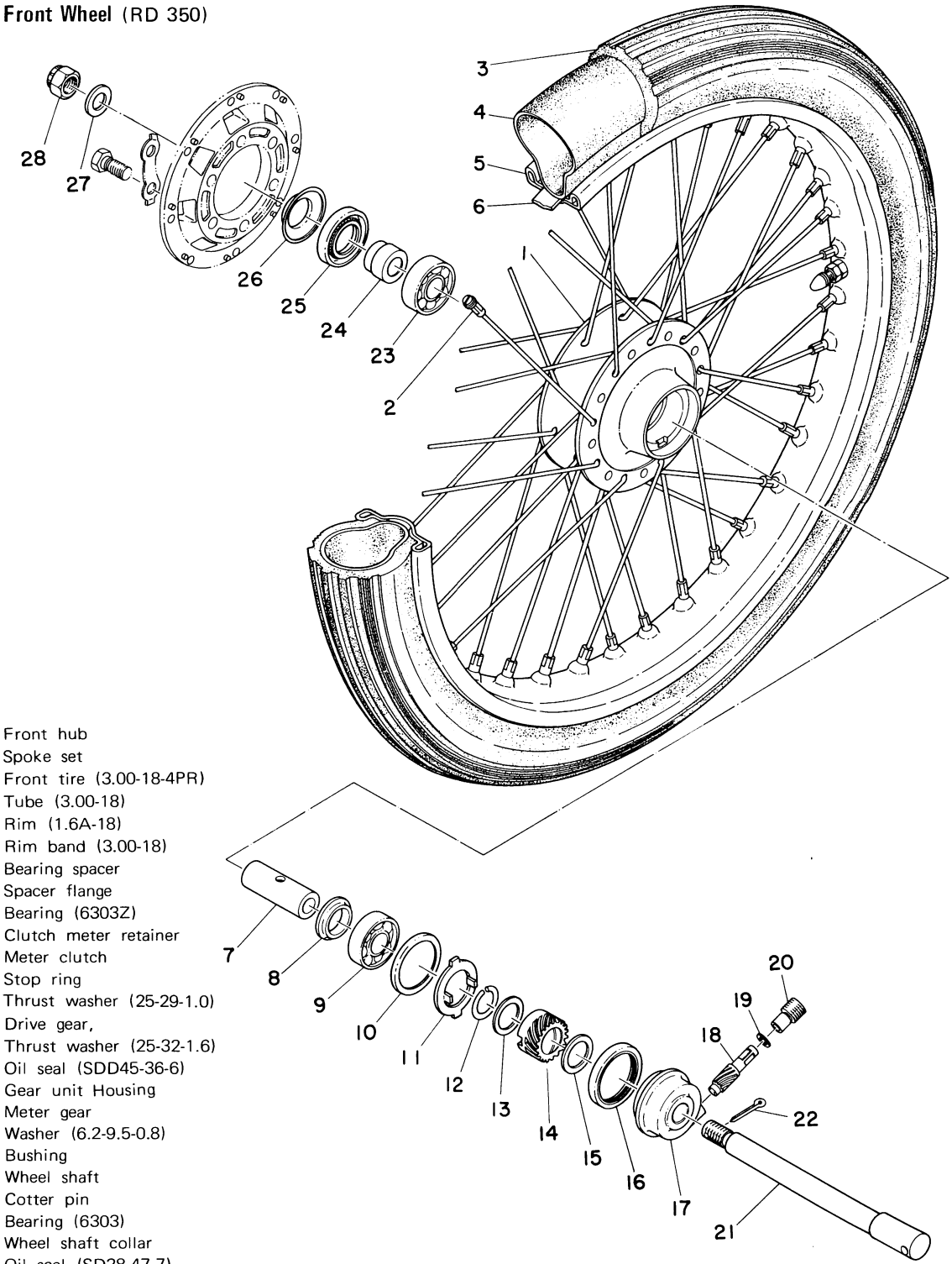


Fig. 4-1-16

4–2 **Front Wheel** (RD 350)



1. Front hub
2. Spoke set
3. Front tire (3.00-18-4PR)
4. Tube (3.00-18)
5. Rim (1.6A-18)
6. Rim band (3.00-18)
7. Bearing spacer
8. Spacer flange
9. Bearing (6303Z)
10. Clutch meter retainer
11. Meter clutch
12. Stop ring
13. Thrust washer (25-29-1.0)
14. Drive gear,
15. Thrust washer (25-32-1.6)
16. Oil seal (SDD45-36-6)
17. Gear unit Housing
18. Meter gear
19. Washer (6.2-9.5-0.8)
20. Bushing
21. Wheel shaft
22. Cotter pin
23. Bearing (6303)
24. Wheel shaft collar
25. Oil seal (SD28-47-7)
26. Hub dust cover
27. Plain washer
28. Shaft nut

Fig. 4-2-1

The front tire is 3.00–18–4 PR in size. The brake is a fixed-caliper type disc brake.

1. Removal

1) Disconnect the speedometer cable.

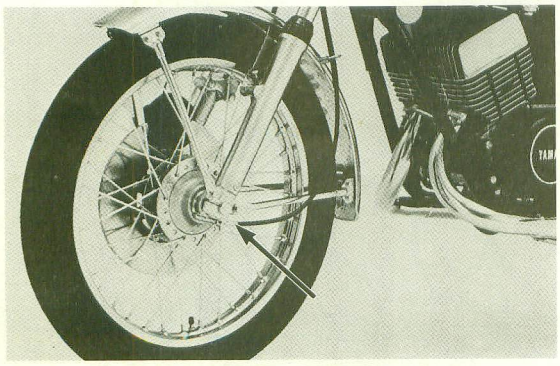


Fig. 4-2-2

2) Remove the cotter pin, and then the front wheel shaft nut.

NOTE

Replace the cotter pin if damaged or worn.

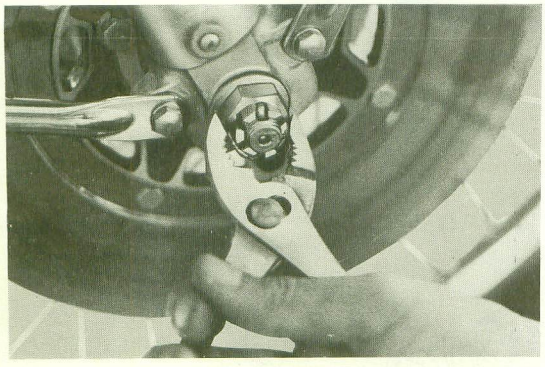
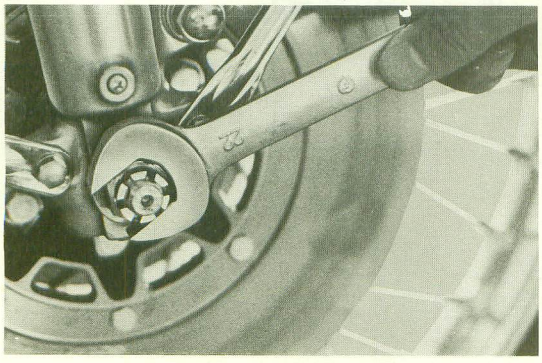


Fig. 4-2-3



3) Loosen the front wheel shaft lock nuts.

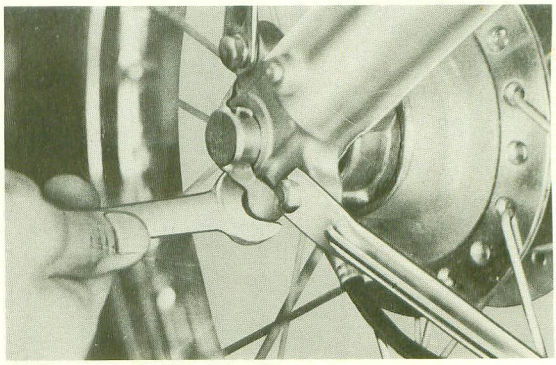


Fig. 4-2-4

4) Pull out the front wheel shaft.

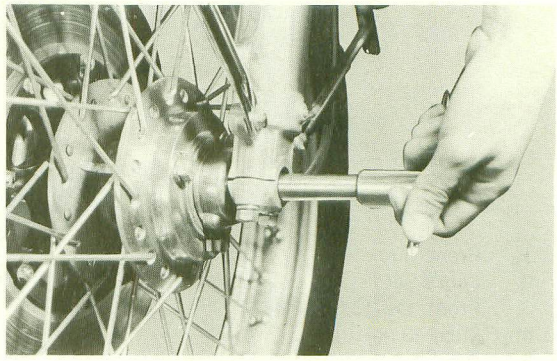


Fig. 4-2-5

5) Raise the front of the chassis, and remove the front wheel assembly.

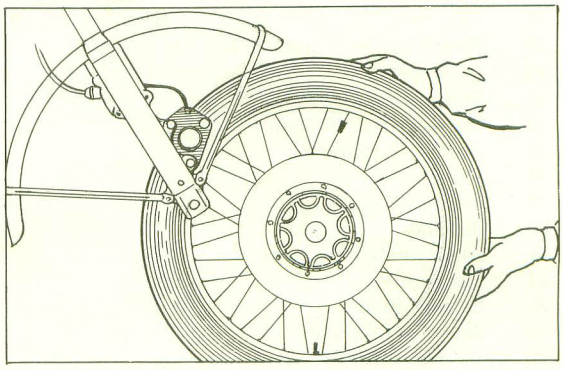


Fig. 4-2-6

4–3 DISC BRAKE

I. Construction

Construction

A fixed-caliper type disc brake, in which the two flat shoes grip the rotating disc, is in use. The right part of the handlebar has a brake lever and a master cylinder. The calipers are installed on the front fork, while the brake disc is mounted on the front hub. The master cylinder is connected to the calipers by a brake hose and pipe.

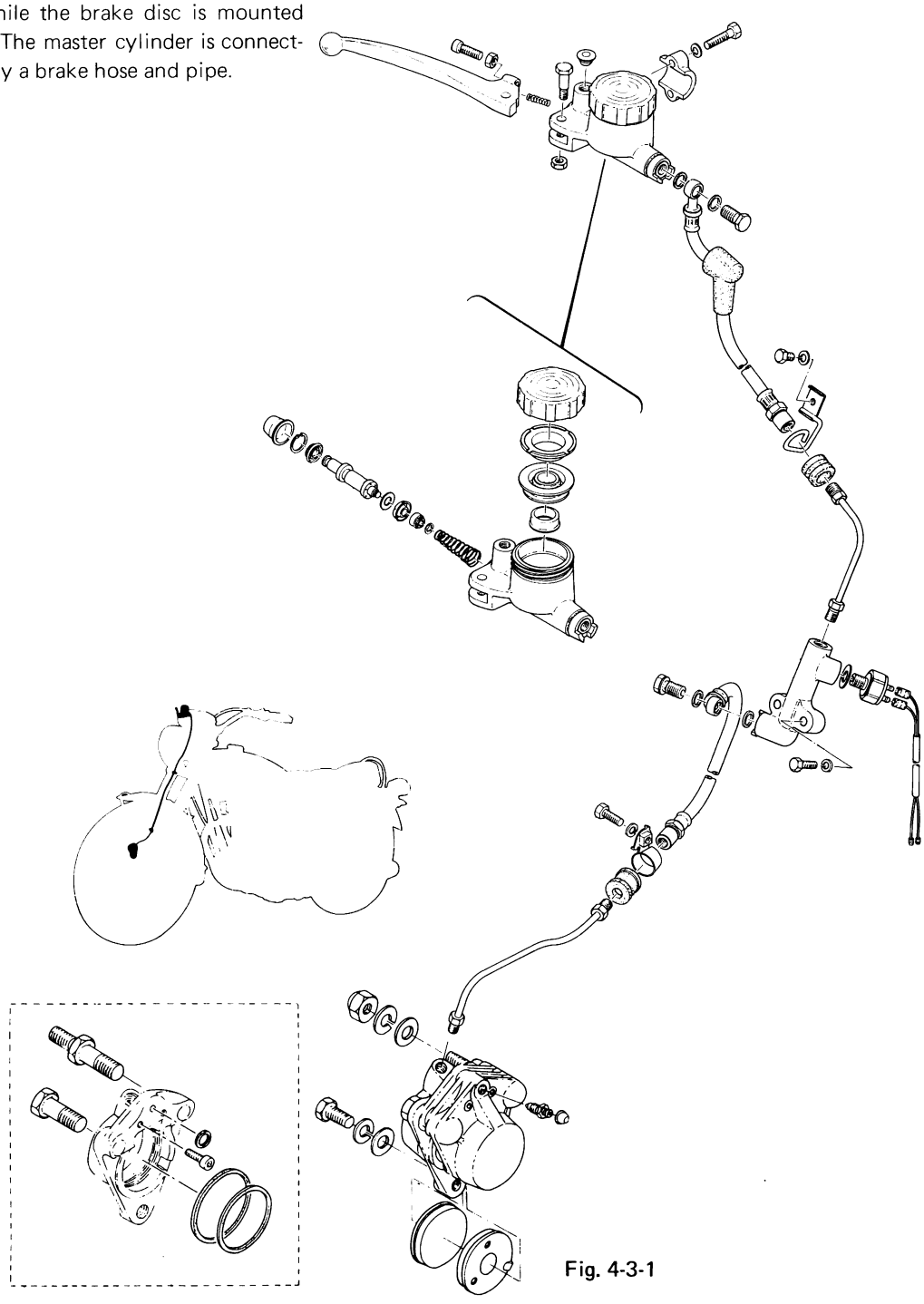


Fig. 4-3-1

Operation

When the front brake lever is squeezed, it forces the master cylinder piston to move. As the piston cup moves past the compensating port, it traps the brake fluid in the cylinder. Pressure rises rapidly, and the fluid is forced through the brake hose to the caliper cylinders. The brake fluid forced into the caliper cylinders pushes against the pistons in the cylinders, and the pads (or "pucks") located on each side of the disc are forced against the disc. The friction between the pads and revolving disc then provides the braking action. As the brake lever is released, both brake lever and pistons are forced back to their respective original positions by the force of return springs.

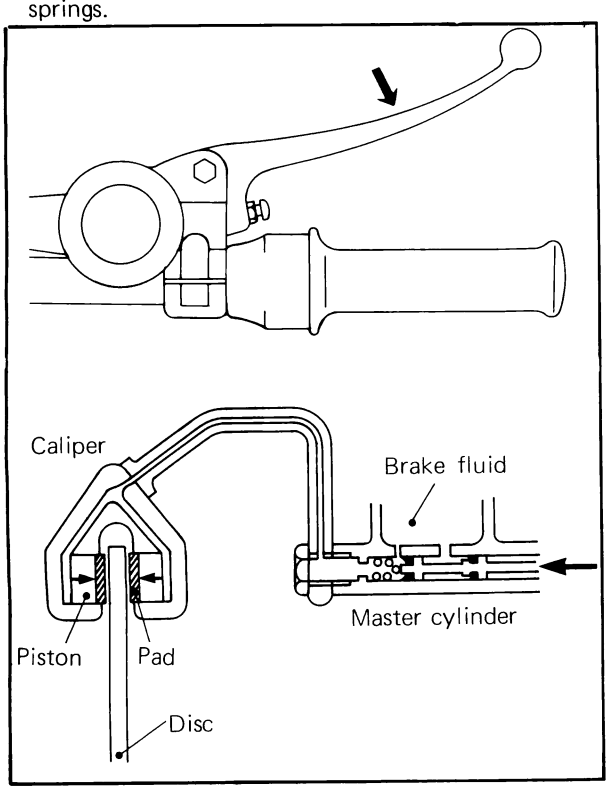


Fig. 4-3-2

Brake Lever

When the brake lever is squeezed, it produces a push, at the master cylinder piston about four times greater than the force applied to the brake lever.

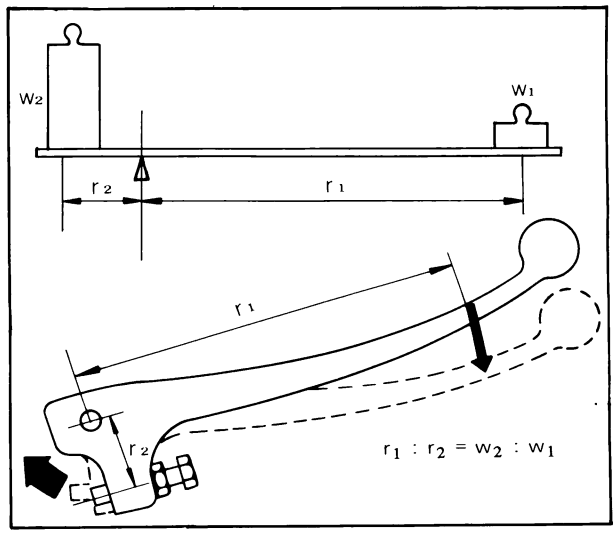


Fig. 4-3-3

Master Cylinder

The master cylinder piston is linked to the brake lever. When the brake lever is squeezed, the piston forces the brake fluid through the hose and pipe to the calipers.

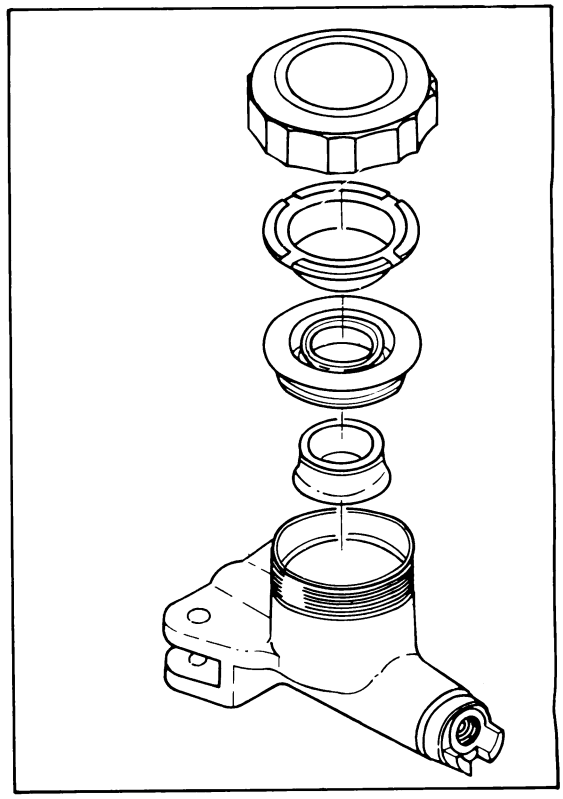


Fig. 4-3-4

Reservoir Tank

As wear on the brake pads increases, the amount of brake fluid must be increased to maintain proper hydraulic pressure. The reservoir tank supplies this brake fluid. (tank capacity is approximately 30cc). To prevent air from entering the brake line when the brake fluid level lowers, especially on a rough road or in an inclined position, a compensating diaphragm is provided for the reservoir tank.

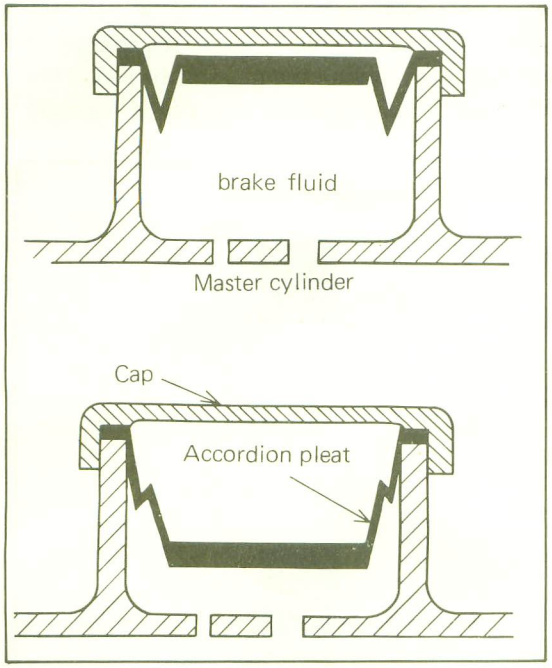
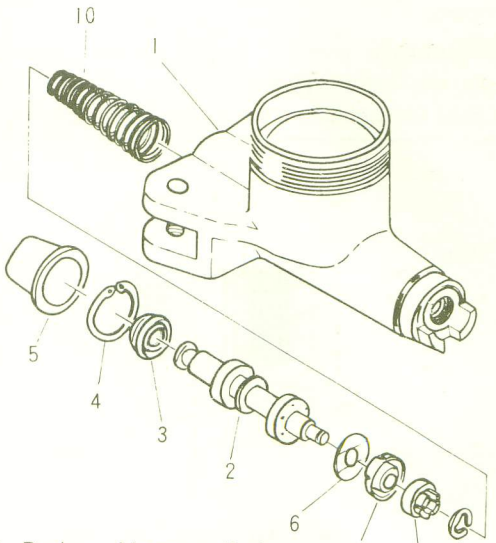


Fig. 4-3-5

Piston

The master cylinder piston has two cups; one maintains good sealing between the cup and the cylinder wall of the master cylinder, and the other prevents the brake fluid from leaking out from the cylinder to the brake lever side. The return spring forces the brake lever to its home position, when the lever is released.



1. Body Master cylinder
2. Piston
3. Cup
4. Circlip
5. Dust boot
6. Spacer
7. Cup
8. Retainer
9. Clip
10. Spring

Fig. 4-3-6

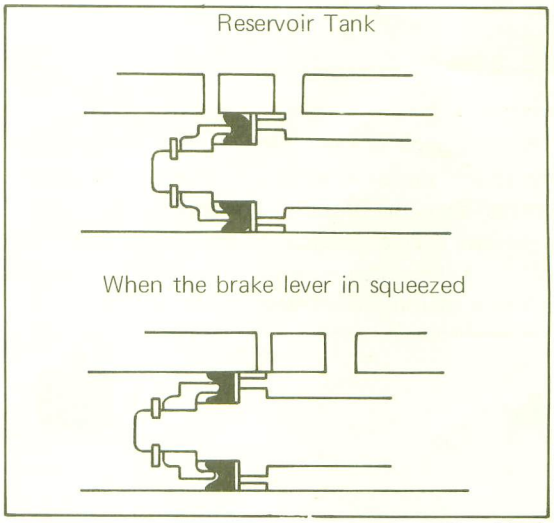


Fig. 4-3-7

Brake hose and pipe

The brake hose and pipe carry hydraulic pressure to the calipers.

The brake hose is flexible and capable of withstanding a hydraulic pressure of 350 kg/cm in conferming to SAEJ—1401.

The brake pipe is made of doubled steel tubing. For better corrosion resistance it is palted with zinc.

Calipers

The hydraulic pressure carried to the calipers forces the caliper pistons out by which action the pads are pushed out to grip the revolving disc.

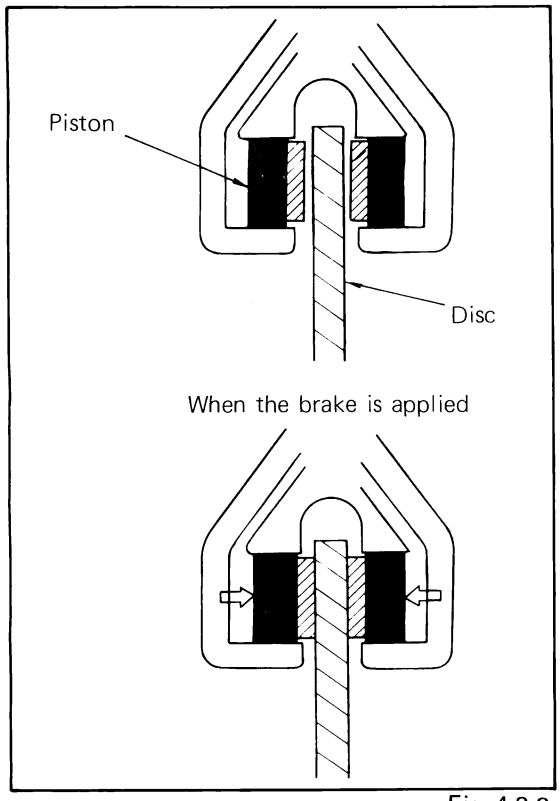


Fig. 4-3-8

Piston

The caliper pistons are forced against the pads by hydraulic pressure which is about nine times greater than the pressure produced in the master cylinder. This is because the caliper cylinder piston surface area in much large than the master cylinder piston surface area.

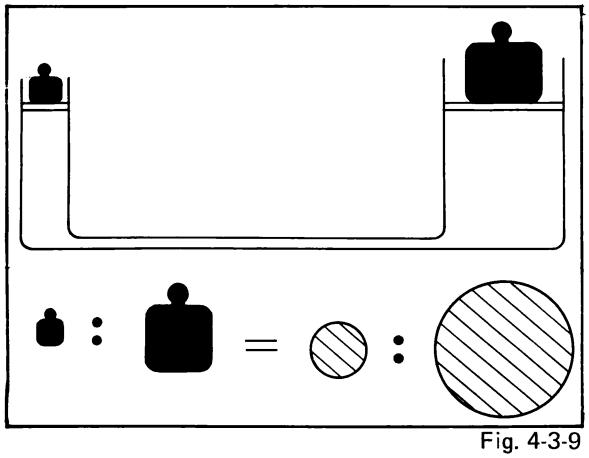


Fig. 4-3-9

The pressure load ratis is proportional to the area ratis.

Seals

Each caliper cylinder has a piston seal (to mainatin good sealing between the piston and the caliper cylinder wall) and a dust seal (to prevent dirt and water from entering the cylinder).

The piston seal is designed to move the piston back to its home position by making use of its tortional moment after the brake lever is released. The tortional moment is produced by the frictional force and elasticity of the piston seal. The piston seal also serves as an automatic adjuster of the clearance between the disc and the pad. (The clearance between the disc and pad is normally 0.1 to 0.3 mm.)

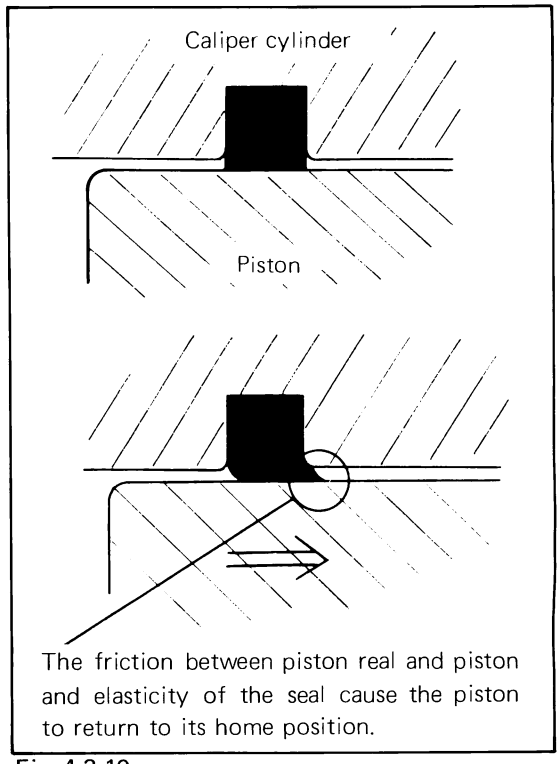


Fig. 4-3-10

Pads
The pads are forced against the revolving disc by the caliper cylinder pistons to grip the disc. They are composed of resin mold asbest.

Bleed Screw
Air in the hydraulic line impairs hydraulic action. To expel air out of the caliper cylinder, a bleed screw is provided on the caliper ass'y.

Disc
The stainless steel disc the held to the front wheel hub, and it is gripped by the pads located on each side of the disc.

Brake Fluid
The brake fluid is compressed in the master cylinder, and the hydraulic pressure thus produced is carried to the caliper cylinder pistons. In this sense, the brake fluid plays a very important role. The brake fluid must meet the following requirements:

1. Proper viscosity and liquiodity can be maintained at working temperatures.
2. Good stability is maintained. (That is, the fluid will not separate, change in viscosity, and/or precipitate.)
3. Boiling point is high. (No vapor lock will result.)
4. It will not deteriorate rubber.
5. Water resisting property is excellent.

Note that the disc brake fluid must be of genuine quality. because the fluid temperature tends to rise as compared with the drum brake.
Suggested brake fluid specifications:SAE J1703B.

2. Disassembly
The tire and bearings can be disassembled without removing the brake disc. Do not attempt to remove the brake disc unnecessarily.
Tools and Parts required for Dissembly:

General service tools
Hexagon wrench, 5mm
Grip pliers
Air compressor
Rags
Torque wrench

Caliper

Removing the Caliper

1. Remove the brake pipe from the caliper ass'y.
   Put the removed brake pipe is a clean vinyl bag so that it can be kept free from dust and dirt.

NOTE
It is advisable to keep the brake lever squeezed, because this brake lever position prevents the fluid from leaking out of the reservoir. Place a heavy rubber band around the lever and handlebar grip.

Fig. 4-3-11

Fig. 4-3-13

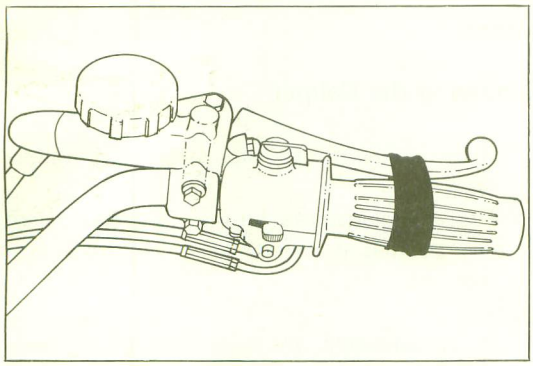


Fig. 4-3-13

2. Remove the caliper mounting bolts and nuts.
3. Rotate the caliper ass'y upward, and remove it.

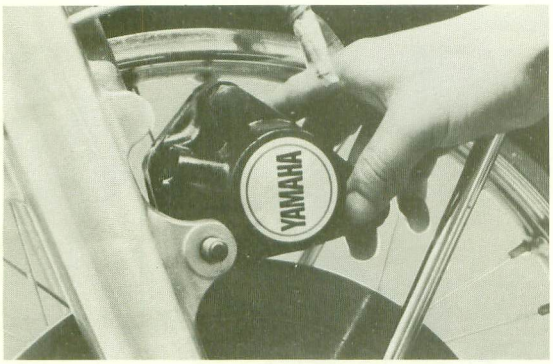


Fig. 4-3-14

Removing the Pads

4. Remove the pads from their seats.

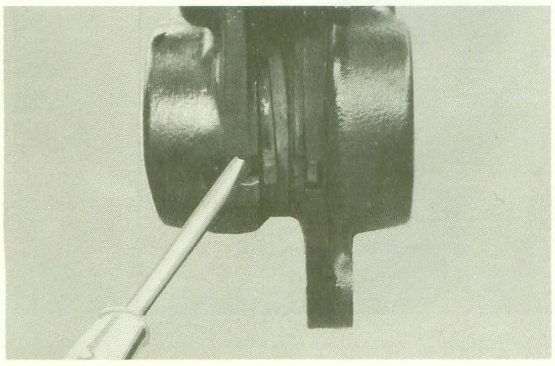


Fig. 4-3-15

Removing the caliper Pistons and Seals:

5. Remove the two bridge bolts and two hexagon bolts.
6. Remove the caliper seal.

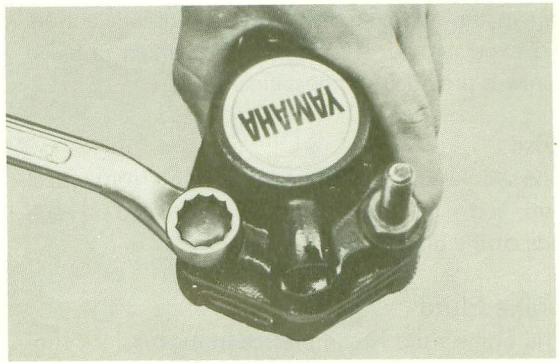


Fig. 4-3-16

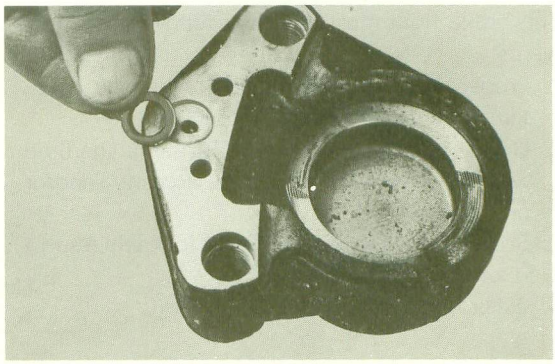


Fig. 4-3-17

7. Force the piston from the caliper cylinder by feeding compressed air into the cylinder through the fluid inlet. Never attempt to push the pistons, with a screw driver.

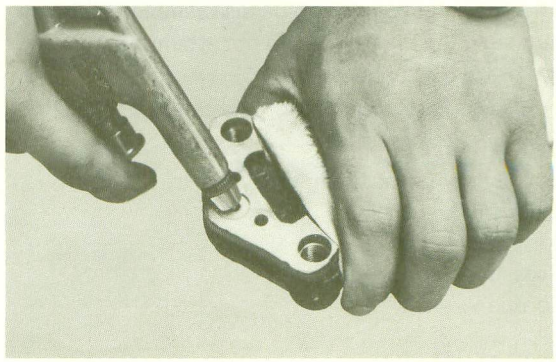


Fig. 4-3-18

8. Remove the piston seal and dust seal from the caliper body.
   The foregoing applies to both pistons.

NOTE

The removed parts should be kept free from gasoline, kerosene, engine oil, etc. If any oil attaches to a seal, it will swell up or deteriorate.

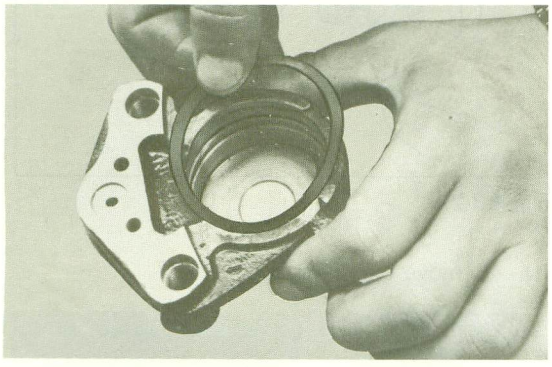


Fig. 4-3-19

Master Cylinder

1. Remove the stop switch and brake lever. (Take care not to misplace the brake lever return spring.)

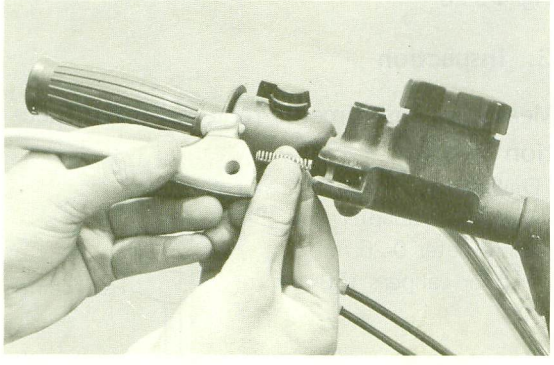


Fig. 4-3-20

2. Remove the brake hose.

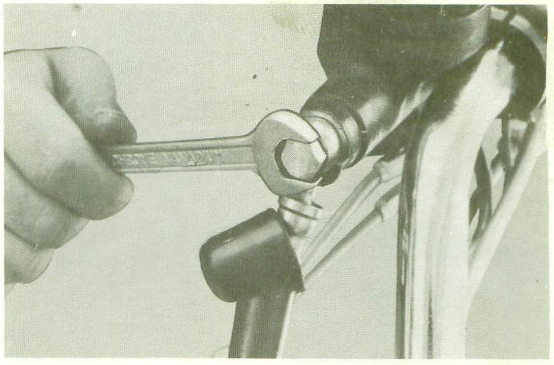


Fig. 4-3-21

3. Remove the two master cylinder mounting bolts, and remove the master cylinder from the handlebar.
4. Remove the reservoir tank cap, and remove the disphragm.
5. Drain the brake fluid from the reservoir tank.

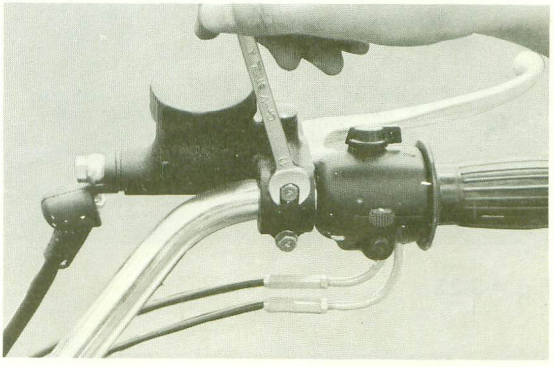


Fig. 4-3-22

6. Remove the master cylinder boot.

Fig. 4-3-23

7. Remove the snap ring with clip pliers.

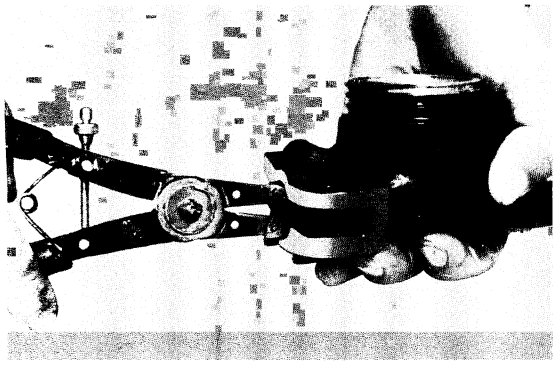


Fig. 4-3-24

8. Remove the piston. (Note that a spirng remains in the master cylinder.)9.

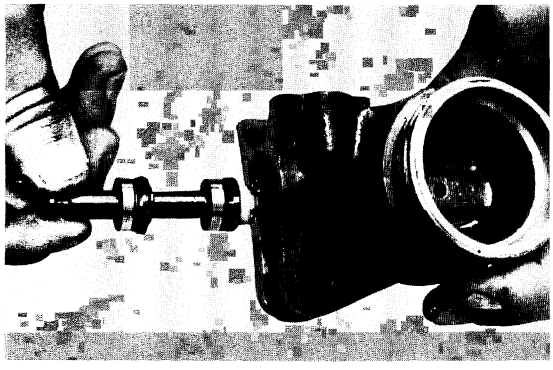


Fig. 4-3-25

Fig. 4-3-26

9. Remove the E clip, and remove the cylinder cup retainer.

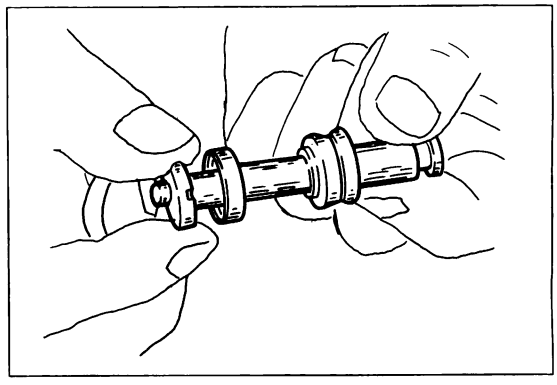


Fig. 4-3-27

10. Remove the cliner cup.

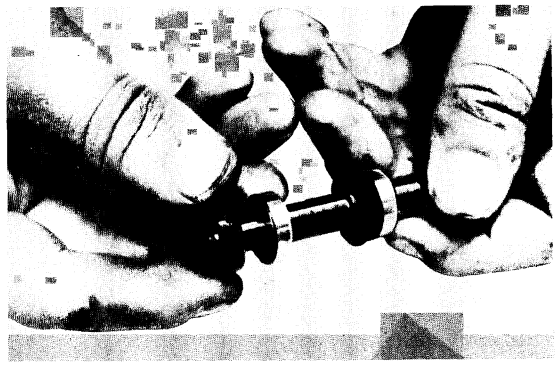


Fig. 4-3-28

3. Inspection

Measuring Instruments required for Inspection

Dial gauge
Dial gauge adapter
Micrometer 0-25 mm
Vernier calipers 150 mm

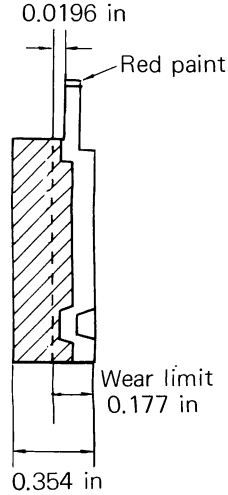


Fig. 4-3-29

Pistons

Pistons
If any piston is found scratched or worn, replace it.

Pads
If any pad is found excessively worn, replace it.
Min allow pad thickness: 0.5 mm

Piston Seal and Dust Seal
If any seal is found damaged, replace it.
It is advisable to replace the seals every two years of use, whether they appear damaged or not.

Bridge Bolt
Replace the bridge bolts each time they are removed for disassembly, whether damaged or not.

Master Cylinder

Master Cylinder Body
1) If the amster cylinder has any streak or grooved wear on its wall, replace it.
2) If the outlet end has any scratch or dent, replace it.
3) Check the compensating port for clogging.
4) Check for any foreign matter inside the cylinder and the reservoir tank.

Piston
1) If the piston has any streak or grooved wear, replace it.
2) If the piston has any rust, replace it.

Cylinder Cups
1) If any cylinder cup has a streak or grooved wear on its contacting surface, replace it.
2) If any cylinder cup is found to be swollen, replace it together with the other seal and rubber parts.
   Thoroughly wash all areas which are exposed to brake fluid in free it, new, brake fluid.
3) Whether it shows wear or not, replace the cylinder cup every two years of use.

Reservoir Diaphragm and Master Cylinder Boot.
1) Check the flange and accordion pleats for damage, cracks and aging.
2) Check for swelling. (If swollen, take the same steps as in the case of the cylinder cup.)
3) Replace both every two years to use, whether they are in good condition or net.

Conical Spring
1) Check the spring for breakage and wear.

Brake Hose and Brake Pipe
1) Check them for leakage and damage.
2) Replace the brake hose every four years of use, whether it appears to be in good condition or not.

Disc
1) Check the disc ass'y for run-out.
   If the disc shows a deflection of 0.15 mm or more, check the disk itself and the bearings.

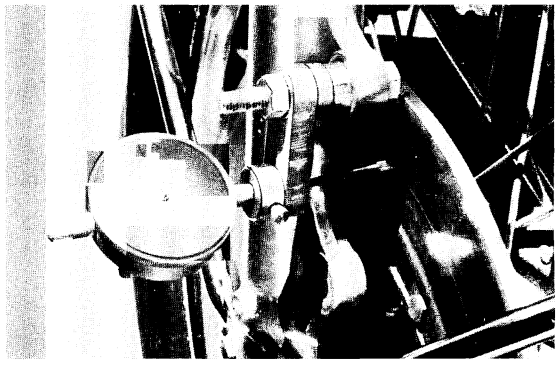


Fig. 4-3-30

2) If the disc has excessive wear or damage, replace it. Min allow disc thickness: 6.5mm

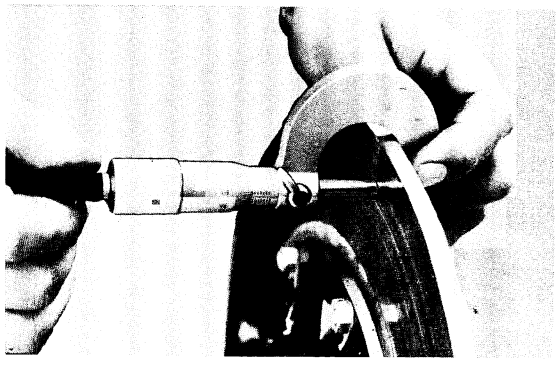


Fig. 4-3-31

4. Assembly and Adjustment

Cleaning

All the removed part should be washed in the following manner before they are installed.

1) A new brake fluid should be used as a cleaning detergent.
   (The use of any mineral oil should avoided, because it causes rubber parts to swell. The same can be said of alcohol. Any rubber dipped in alcohol will swell.)
2) If an oil of any other kind (such as mineral oil) is mixed in the system by mistake, the piston cups and seals should be replaced with new ones. All other parts should be washed with fresh, clean, new brake fluid. In addition, the lines, ports, passages, etc., should be thoroughly flushed with clean, new brake fluid.

Calipers

Piston Installation

1) Install the piston seal and dust seal in their seats in the caliper cylinder.
2) Coat the caliper cylinder walls and piston with new brake fluid.
3) Insert the piston into the caliper cylinder with your hand.
   In inserting the piston, special care should be taken so that the piston goes into the cylinder smoothly.

Fig. 4-3-32

Assembling the outer and inner calipers

4) Install the caliper seal in their seat.
5) Put together the outer and inner calipers.
   (Make sure that no dust or dirt is attached to the mating surfaces.)
6) The two bridge bolts must be replaced with new ones. Tighten the two hexagon bolts. (The bridge bolts should be tightened later.)
   Tightening torgue: 60 ~ 100 kg-cm

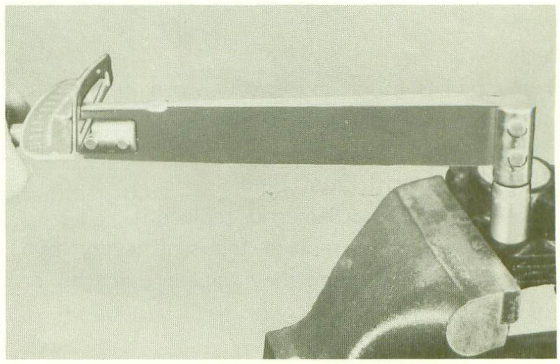


Fig. 4-3-33

7) They are very important parts viewed from operational safety, and therefore, the removed bridge bolts should always be replaced. Be sure they are tightened with corrent torque.
   Tightening torgue: 750 ~ 950 kg-cm

Pad Installation

8) Install the pads in their seats.
9) When replacing the pads alone, it is necessary to push back the piston to that new pads can easily be installed. (When the piston is pushed back, and the compensating port is open, the brake fluid level in the reservoir tank will rise steeply. Loosen the bleed screw in necessary, and bleed off the excess brake fluid.

Installing the Calipers

10) To install the calipers on the front fork, reverse the procedures for removal.
    Tightening torque: 400 ~ 500 kg-cm)
11) Install the brake pipe.
    Tightening torque: 130 ~ 180 kg-cm

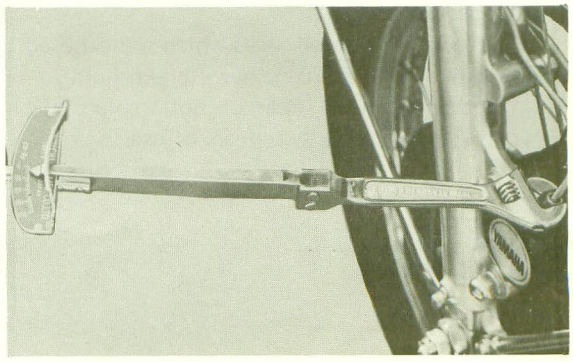


Fig. 4-3-34

Master Cylinder

Installing the Cylinder Cup

1) Dip the cup in a new brake fluid, and install it. Take care not to scratch the cup and the piston. (Use the jigs.)

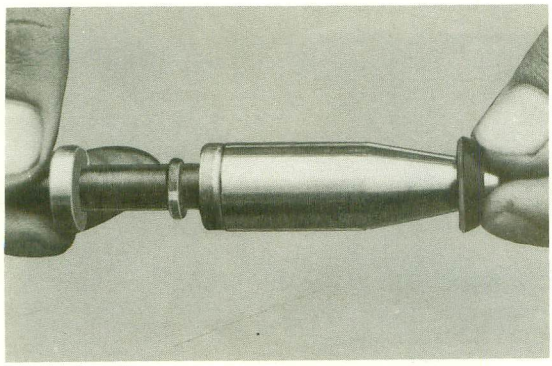


Fig. 4-3-35

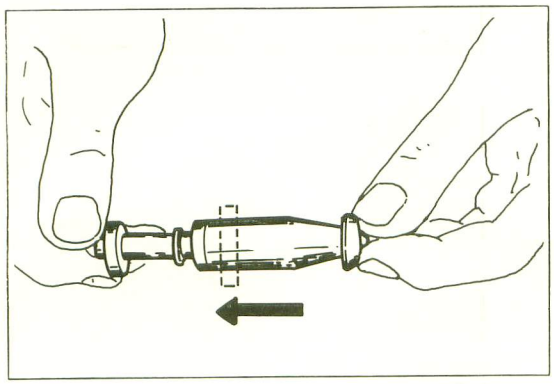


Fig. 4-3-36

2) Install the spacer. Be sure that the spacer is positional correctly.

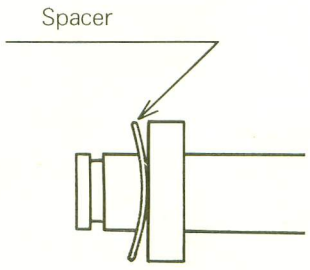


Fig. 4-3-37

3) Install the cup, retainer and E clip.

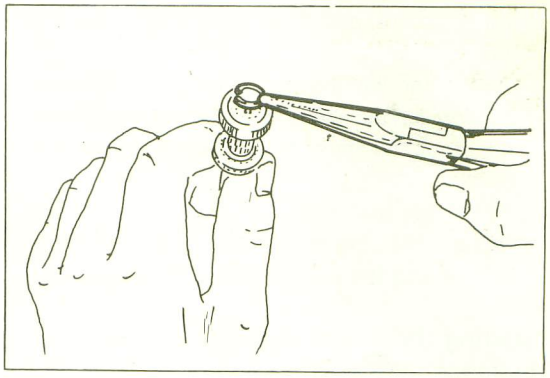


Fig. 4-3-38

4) Insert the spring into the master cylinder body.

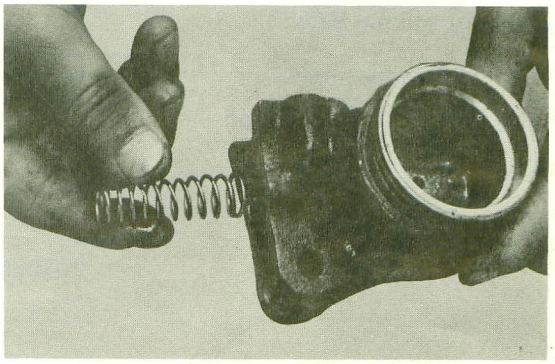


Fig. 4-3-39

Installing the Piston

5) Check the piston surfaces and cup surfaces for scratches, and then, insert the piston into the cylinder.
   Avoid forcing the piston into the cylinder; otherwise, the cylinder wall will be scratched, thus allowing the brake fluid to leak past.
6) Install the snap ring.
7) Install the boot in the master cylinder groove and the piston groove, respectively.

Installing the master cylinder on the handlebar

8) Install the master cylinder on the handlebar.
9) Adjust the clearance between the piston and the push rod.

NOTE

Fully tighten the adjusting screw lock nut so that it will not become loose.

10) Fasten the brake hose to the master cylinder with the union bolt.

NOTE

If the gasket is fourd scratched, it should be replaced.

11) Feed approximately 30cc brake fluid into the reservoir tank prior to bleeding.

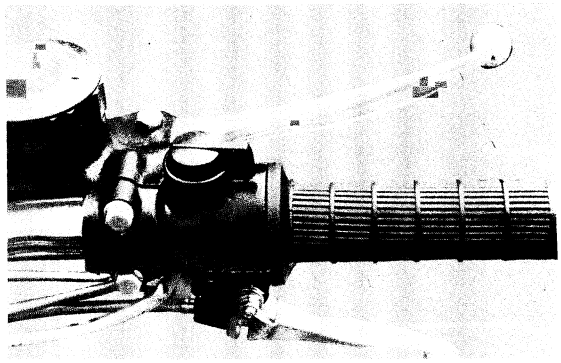


Fig. 4-3-40

Brake Hose and Brake Pipe

The brake hose and brake pipe fitting should be fastened with the following torque.

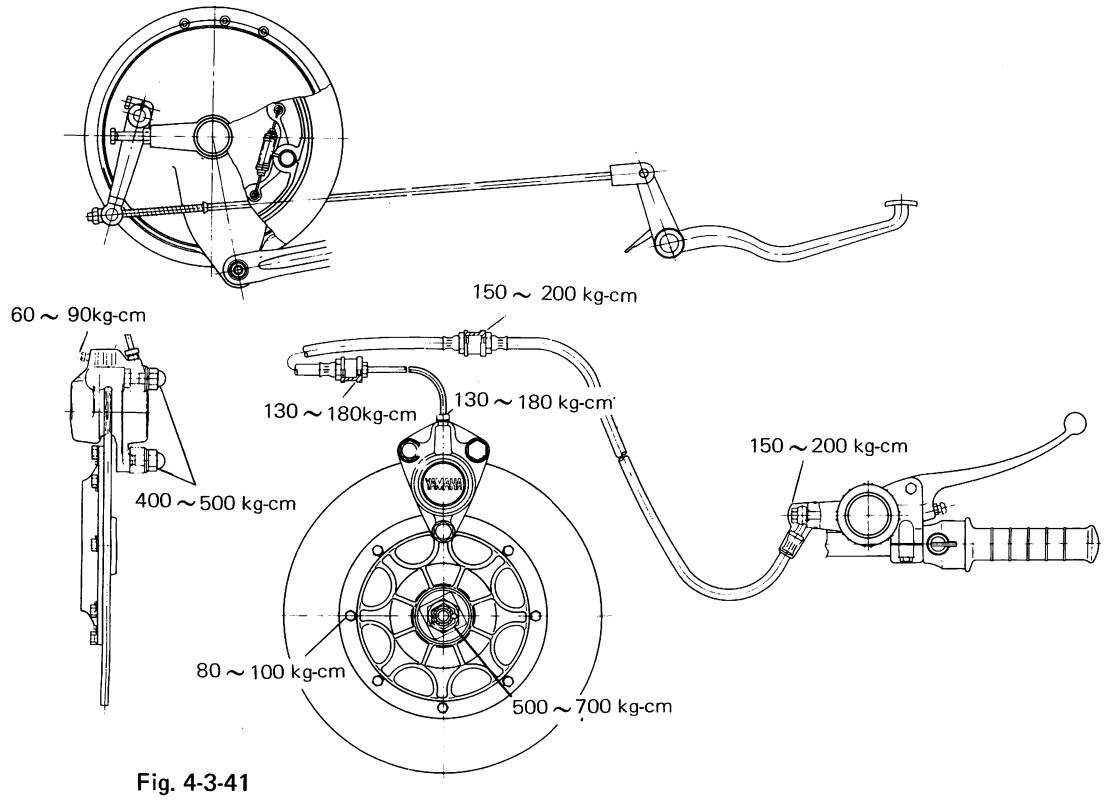


Fig. 4-3-41

Disc

1) The disc mounting bolts should be tightened gradually and in pattern with correct torque. The lock tabs should be properly positioned and bent tightly over the bolt heads.
   Tightening torque: 80 ~ 100kg-cm
2) The deflection of the disc ass'y should be within the specified value. (0.15 mm)
3) The disc trailing torque should be within the specified amount after it is assembled.
   Torque: 2 ~ 4 kg when assembled as shown in the figure on the right.
   If the value exceeds this limit, check the disc run out.

* On the disc brake, a slight drag can be neglected, A slight drag will not result in serious trouble, and will not develop into a worse condition.

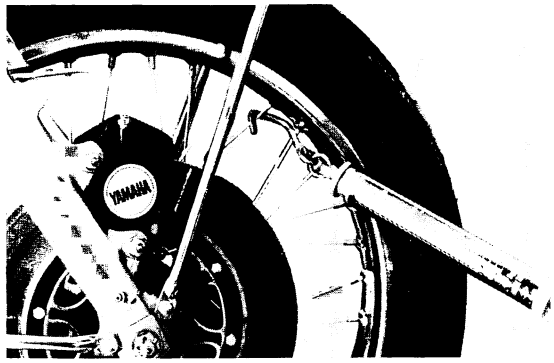


Fig. 4-3-42

Air Bleeding

When any parts relating to the brake fluid are reinstalled, be sure that each metal fastner is fully tightened and then bleed the air.

Tools and Parts

Wrench
Torque wrench
Vinly tube Inside dia 4 mm
Brake fluid (SAE grade #J1703B)
Brake fluid receiving vessel
Rags

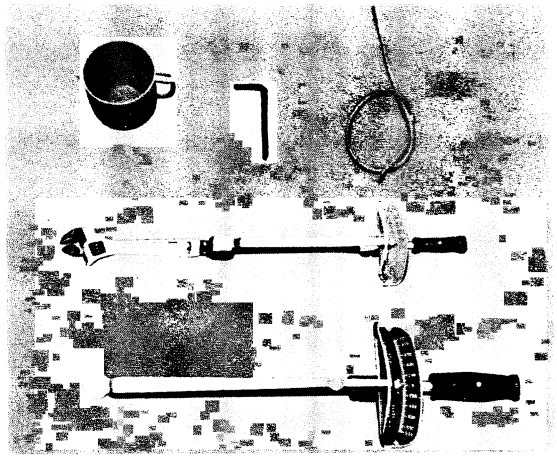


Fig. 4-3-43

1) Fell with brake fluid so that the reservoir level reaches the specified line.
2) Install the diaphragm to prevent the brake fluid from escaping.

Fig. 4-3-44

3) Connect the vinyl tube to the caliper bleed screw tightely so that no brake fluid will leak out.

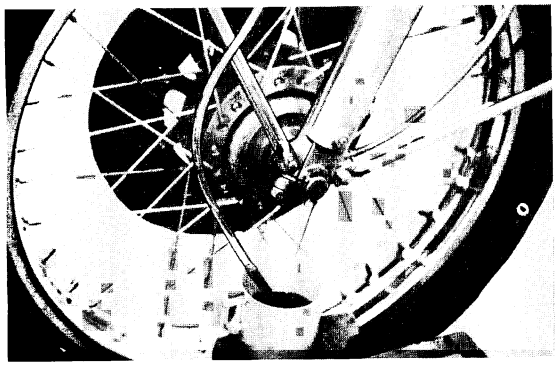


Fig. 4-3-45

4) Place the brake fluid receiving vessel at the end of the vinyl tube.

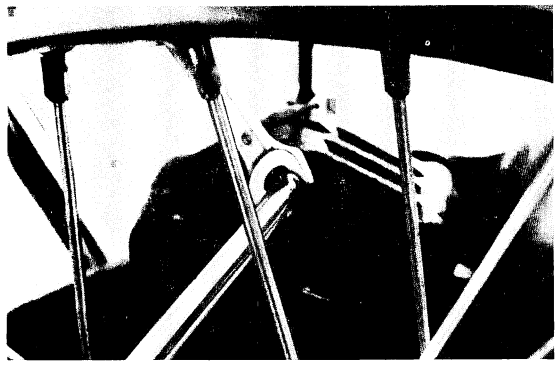


Fig. 4-3-46

5) Apply the brake lever slowly a few times. With the brake lever squeezed, loosen the bleed screw.
6) As fluid and air escape, the lever will close. Tighten the bleed screw before the lever bottoms on the handle bar grip.

NOTE
When bleeding the air, do not operate the brake lever quickly. Otherwise, the air will turn into fine bubbles, thereby making the air bleeding difficult.

7) Repeat the procedures in 5) - 6) above until air bubbles will completely disappear in the vinyl bute.

NOTE
Bleed screw tightening torque: 60 ~ 90 kg-cm
60 ~ 90 kg-cm

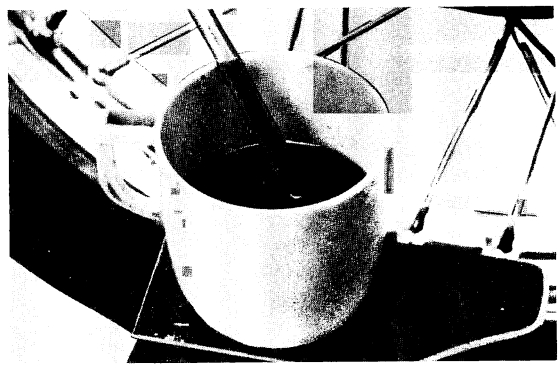


Fig. 4-3-47

8) Refill with brake fluid so that the level will again reach the specified line.

4–4 Rear Wheel

1. Removal

1) Remove the rear brake and anchor bar from the rear brake plate.

NOTE

Replace the cotter pin it damaged or worn.

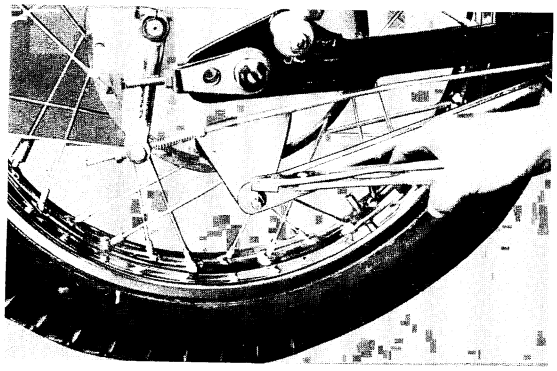


Fig. 4-4-1

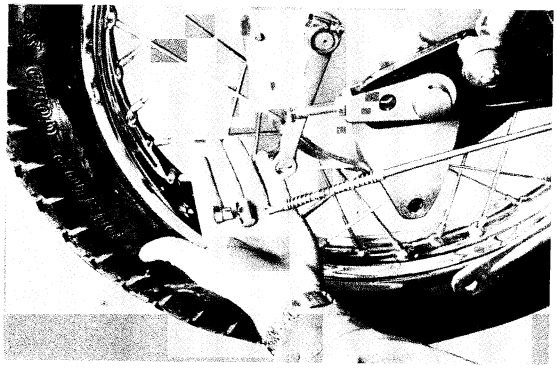


Fig. 4-4-2

2) Loosen the chain tension adjustment nuts and bolts on both right and lift sides.

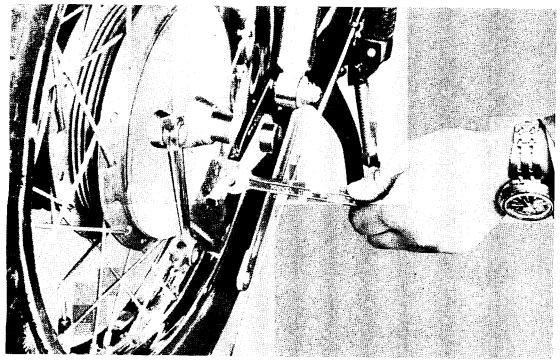


Fig. 4-4-3

3) Remove the cotter pin, and then remove the rear wheel shaft nut.

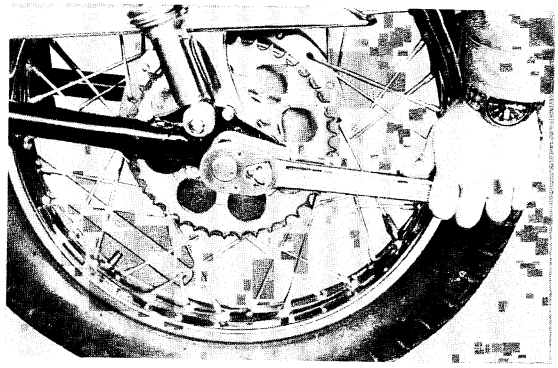


Fig. 4-4-4

4) Pull out the rear wheel shaft by striking it with a soft-faced hammer.

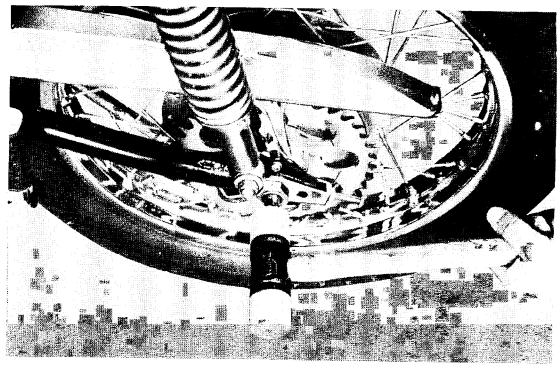


Fig. 4-4-5

5) Remove the right-hand chain puller and istance collar.

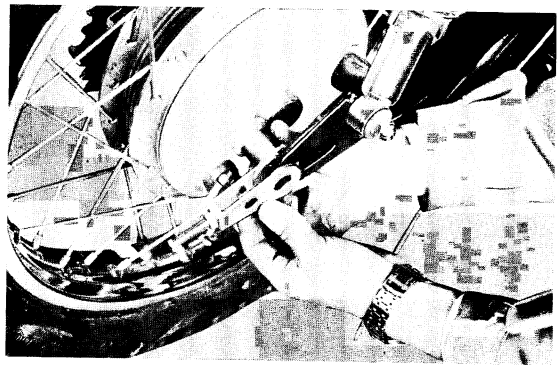


Fig. 4-4-6

6) Remove the rear brake plate.

Fig. 4-4-7

7) Remove the rear wheel assembly.
8) Replacing the Cluth Hub Bearing
a. First remove the sprocket shaft by pushing it out toward the other side.
b. Remove the sprocket shaft collar. (It can easily be pulled out with your hand.)
c. Remove the oil seal. Exercise care not to damage the oil seal.
d. Remove the circlip.
e. Use the bearing fitting tool to push out the clutch hub bearing toward the sprocket side.
f. To install the clutch hub bearing, reverse the above sequence. Before installation, grease the bearing and oil seal.

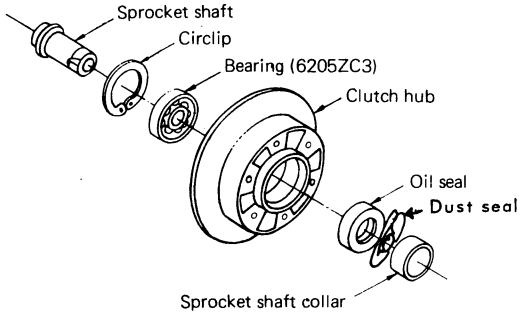


Fig. 4-4-8

9) Replacing the Wheel Bearing
a. First, clean the outside of the wheel hub.
b. Insert the bent end of the special tool (as shown in Fig. 5-1-19) into the hole in the center of the bearing spacer, and drive the spacer out of the hub by tapping the other end of the special tool with a hammer. (Both bearing spacer and spacer flange can easily be removed.)
c. Push out the bearing on the other side.
d. To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation and use the bearing fitting tool (furnished by Yamaha).

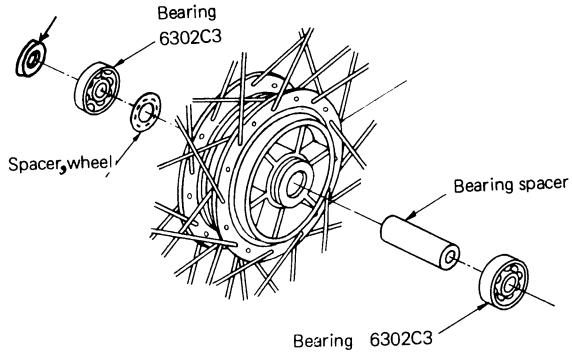
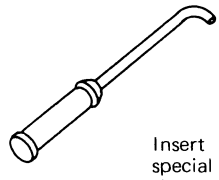


Fig. 4-4-9



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

Fig. 4-4-10

10) Replace a bent or damaged wheel axle.
11) Check the lips of all seals for damage or warpage. Replace as necessary.

2. Checking and Adjustment

1) Runout of the Wheel Rim
Measure the runout of the wheel rim in the same manner as in the case of the front wheel.
Runout limits ..... 2 mm or less (0.07 in. or less)
2) Brake Shoe
Follow the same procedure as in the case of the front wheel.
Minimum diameter ..... 175 mm (6.9 in.)
3) Brake Drum
Check and recondition the brake drum in the same manner as in the case of the front wheel.
4) Repairing the Brake Shoe
Repair the brake shoe in the same manner as in the case of the front wheel.
5) Checking the balance of the wheel
Check the balance of the wheel assembly by rotating the wheel on a taking stand place balance weights oposite the heavy side.

4–5 Replacing Tires

1. Removal

1) Remove the valve cap and lock nut from the tire valve, and deflate the tire.
2) Remove the tire from the wheel rim by the use of two tire levers. (Exercise care to avoid damaging the inner tube with the levers.)

2. Installation

1) Insert the tube between the tire and the wheel rim and inflate the tube to remove creases. Be sure that the valve stem is directly toward the wheel shaft. At this time the tire is still halfway off the rim
2) Force the tire completely back on the wheel rim by the use of tire levers. For this operation, it is advisable that the bead on the other side of the tire be pushed in toward the rim flange.
3) To avoid pinching the tube between the tire and the rim, tape the tire with a hammer as the tire is partially inflated.
4) Tighten the tire valve lock nut, and inflate the tire to the recommended pressure, then install the valve cap.

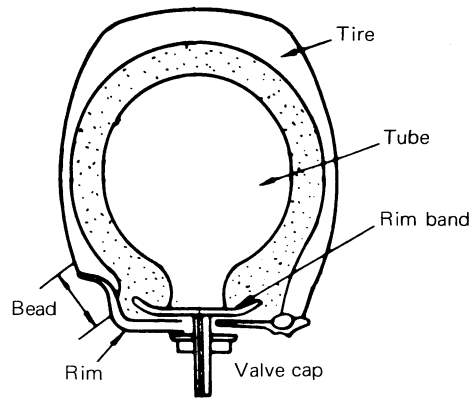


Fig. 4-5-1

4–6 Rear Sprocket Wheel

1. Removal

1) Disconnect the chain joint and remove the chain.

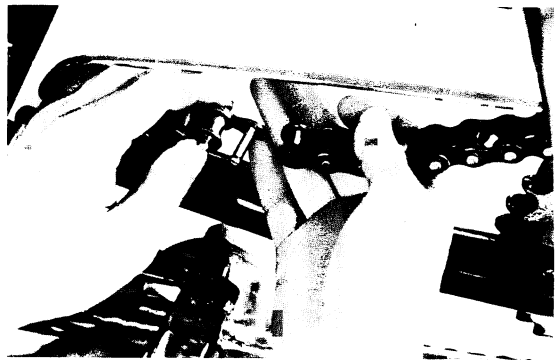


Fig. 4-6-1

NOTE
See page 13 for chain installation.

2) Remove the sprocket shaft nut, and then the sprocket.

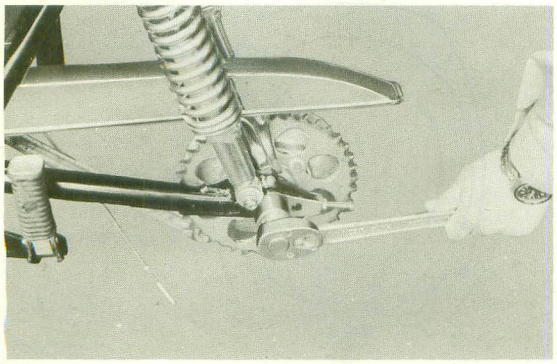


Fig. 4-6-2

2. Checking and Adjustment

The rear sprocket wheel is installed on the clutch hub. To replace the sprocket, take the following steps.

1) Removing the sprocket.

a. Flatten the lock washer.

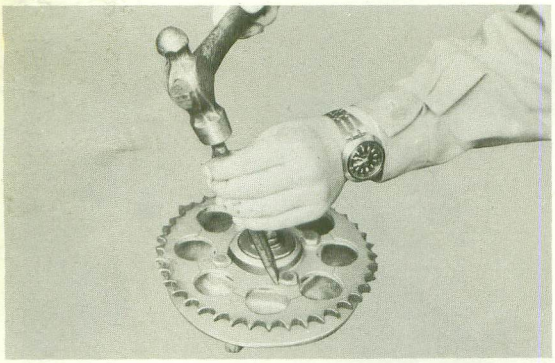


Fig. 4-6-3

b. Remove the sprocket mounting bolt.

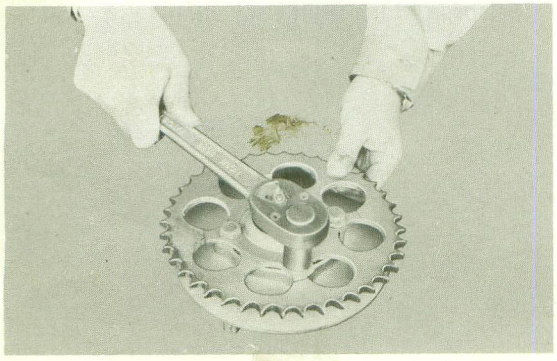


Fig. 4-6-4

2) Checking

Check the lock washers and hexagonal bolts for brakage and damage. If the sprocket wheel lock washer is damaged or not bent to lock the hexagon bolt, the bolt may come loose while travelling, and cause an accident. Therefore, the bolt should be fully tightened and secured by the lock washer.

The sprocket wheel should be checked for wear in the same manner as in the case of the drive sprocket.

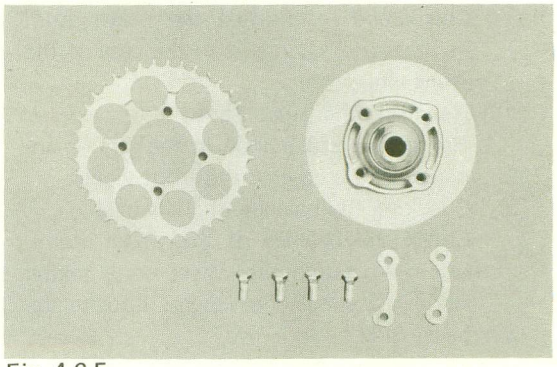


Fig. 4-6-5

4–7 Tire Inflation

The YAMAHA's develops a maximum speed in excess of 100 mph (161 kph). If the tires are faulty or inflation pressures incorrect, it may result in a serious accident. Carefully inflate for the conditions described below and instruct the owner likewise.

1) General driving (up to but not averaging 80 mph (130 kph).
   Front 22psi (1.6kg/cm^2)
   Rear 28psi (2.0kg/cm^2)
2) High speed driving (speeds consistently around 90 mph (145 kph).
   Front 28psi (2.0kg/cm^2)
   Rear 33psi (2.4kg/cm^2)
3) Continuous high speed driving (speeds consistently around 100 mph (160 km/h).
   Replace the tires with racing types.
4) Riding double
   Depending upon the driver's and passenger's combined weights, tire pressures will be +10% of #1 (above) up to #2 (above). Rear shock position will have to be determined by rider preference.
   Continous high speed driving (#3 above) should not be attempted with a passenger as it is unsafe.

4–8 Front Fork

Check the front fork for bends and oil leakages and repair it in the following manner.

1. Removal

1) Remove the fron fender.

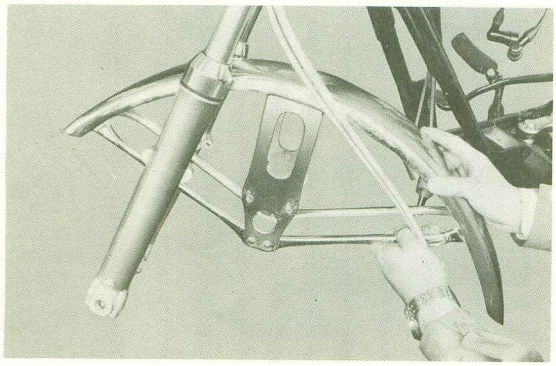


Fig. 4-8-1

2) Loosen the steering handle crown mounting bolts, and pull the handle downward.

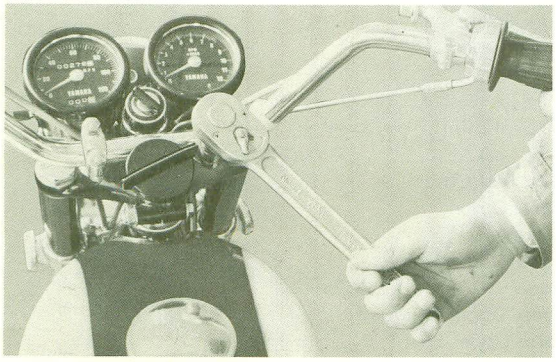


Fig. 4-82

3) Remove the inner tube cap bolt.

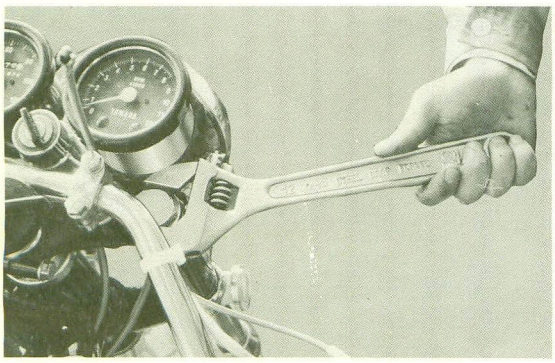


Fig. 4-8-3

4) Loosen the underbracket bolts.

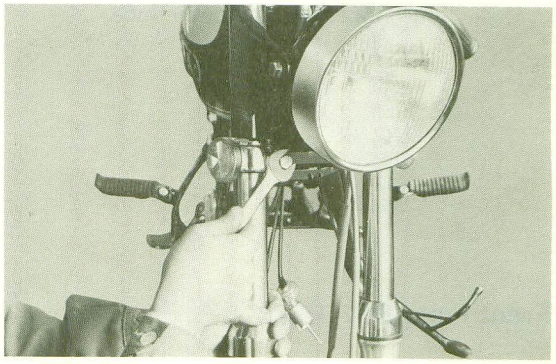


Fig. 4-8-4

5) Pull out the inner tube.

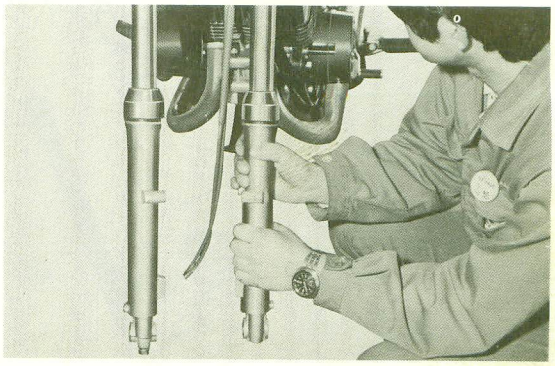


Fig. 4-8-5

2. Disassembling the Inner and Outer Tubes

1) Remove the fork spring.
2) Drain the oil from the fork and discard the oil.

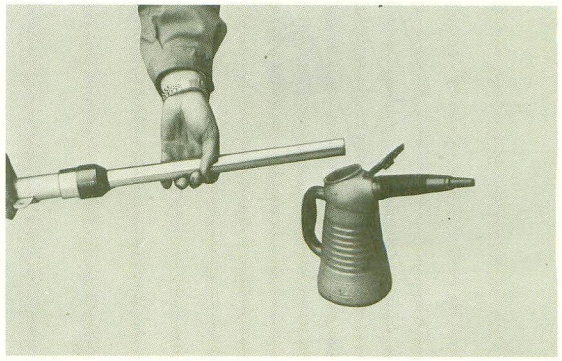


Fig. 4-8-6

3) Remove the Allen screw with a hexagonal wrench key, and then withdraw the inner tube from the outer tube.

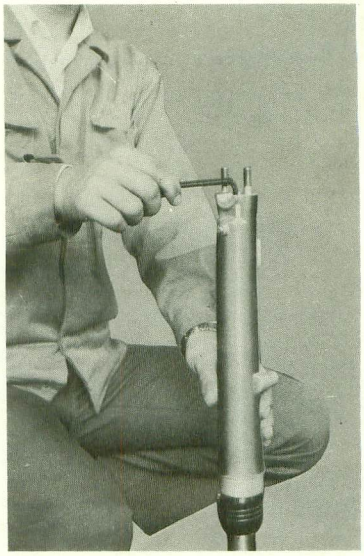
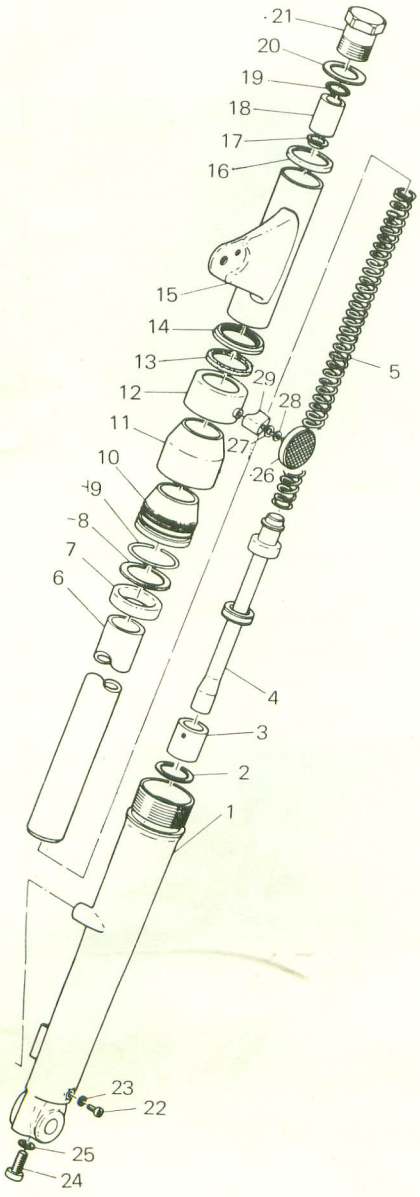


Fig. 4-8-7

Front Fork (DS7, R5C)



1. Outer Tube
2. Circlip
3. Front Fork Piston
4. Cylinder Comp
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. Cover Under Guide
15. Upper Cover
16. Cover Upper Guide
17. Sprin Upper Seat
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

Fig. 4-8-8

Front Fork (RD350)

1. Front fork ass'y
1. Outer left tube
2. Outer right tube
3. Oil seal
4. Washer
5. Snap ring
6. Circlip (P-28)
7. Front fork piston
8. Cylinder comp.
9. Inner tube
10. Fork spring
11. Dust seal
12. Outer cover
13. Packing
14. Cover under guide
15. Cover upper guide
16. Spring upper seat
17. Spacer
18. Packing
19. Cap bolt
20. Underbracket comp.
21. Underbracket bolt
22. Spring washer
23. Axle holder
24. Nut
25. Spring washer
26. Bolt
27. Packing
28. Drain plug
29. Drain plug gasket
30. Upper left cover
31. Upper right cover

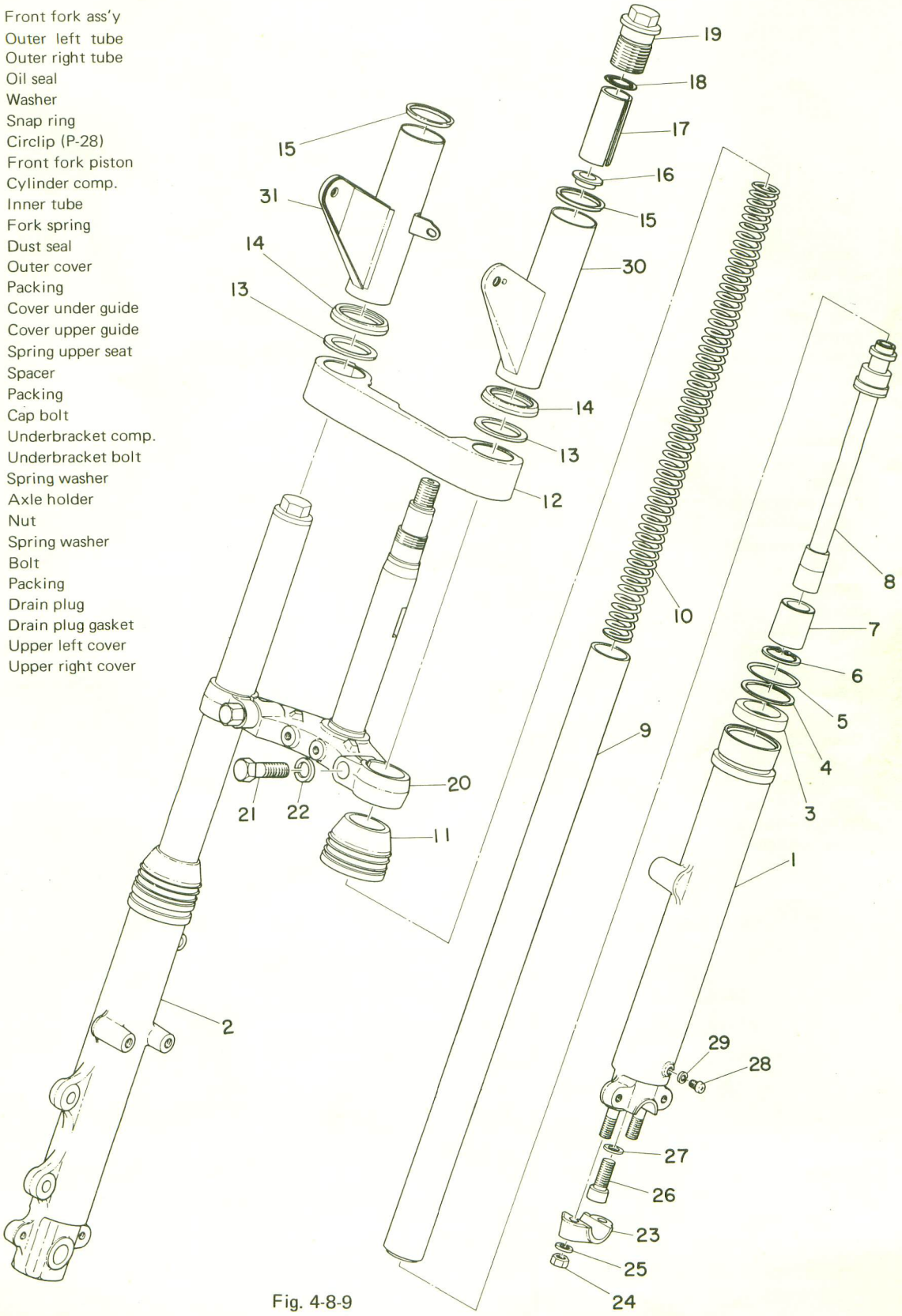


Fig. 4-8-9

Front Fork (RD250)

1. Outer left tube
2. Outer right tube
3. Oil seal
4. Washer
5. Snap ring
6. Circlip (R-28)
7. Front fork piston
8. Cylinder comp.
9. Inner tube
10. Fork spring
11. Dust seal
12. Outer cover
13. Packing
14. Cover under guide
15. Cover upper guide
16. Spring upper seat
17. Spacer
18. Packing
19. Cap bolt
20. Underbracket comp.
21. Underbracket bolt
22. Spring washer
23. Bolt
24. Packing
25. Drain plug
26. Drain plug gasket
27. Axle holder
28. Nut
29. Spring washer
30. Upper left cover

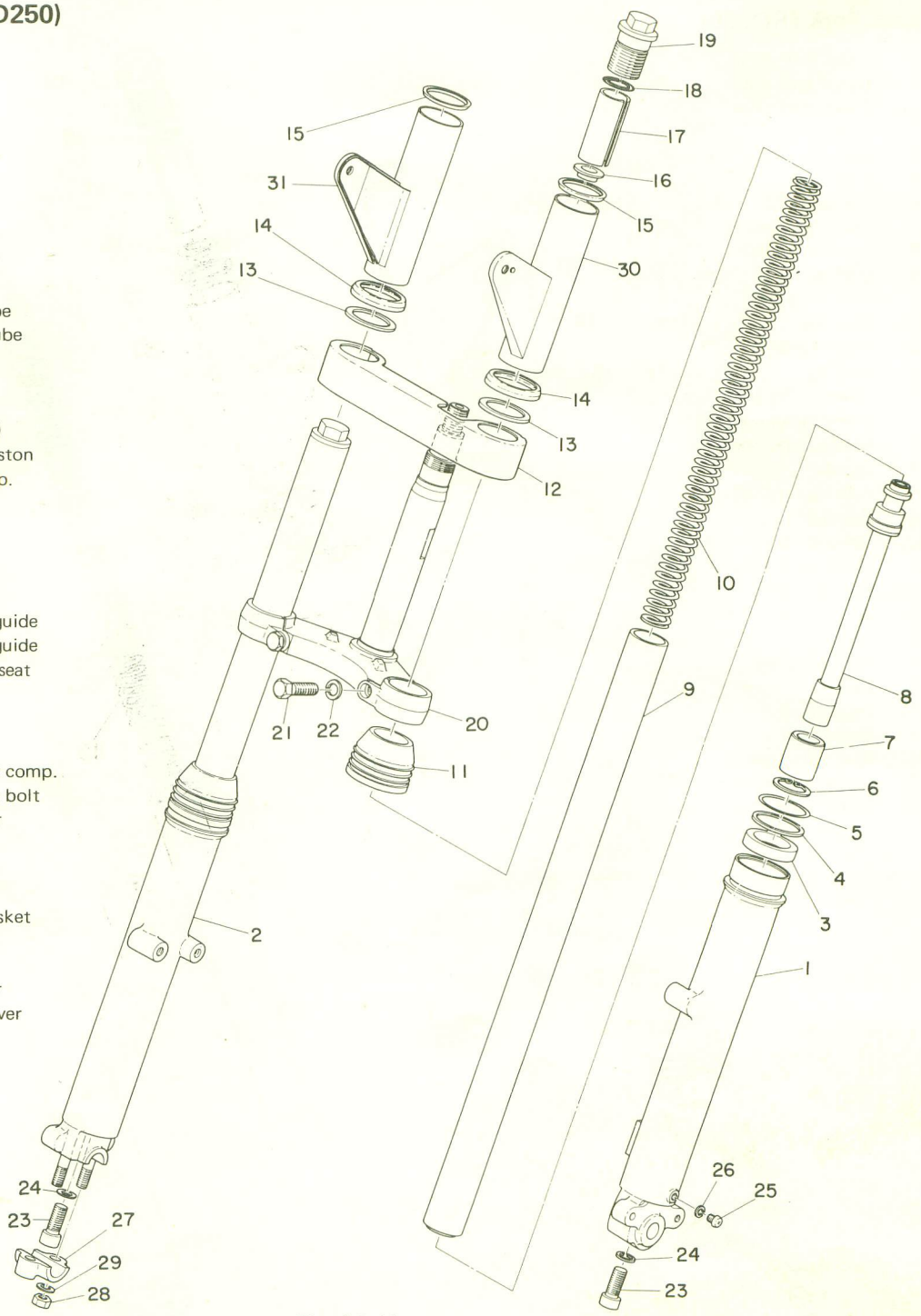


Fig. 4-8-10

3. Checking

1) Inner Tube
Check the inner tube for bends or scratches. If the bend is slight, it can be corrected with a press. It is recommendable, however, to replace the tube whenever possible.

2) Oil Seal
When disassembling the front fork, replace the oil seal in the outer tube.

4. Assembling

1) For reassembling the front fork, reverse the order of disassembling. Make sure the inner tube slides in and out smoothly.

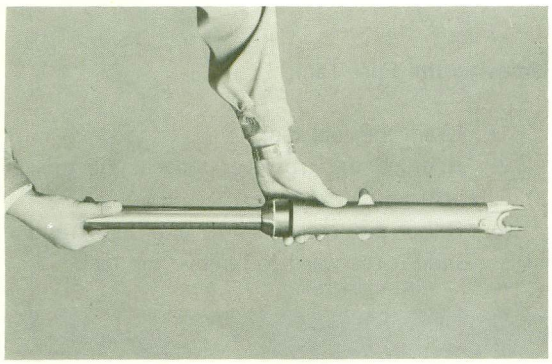


Fig. 4-8-11

5. Installation

1) Pull the front fork in to the uppermost position with the front fork holding tool (identical with that for the 650 XS1, and tighten the underbolt on the underbracket.

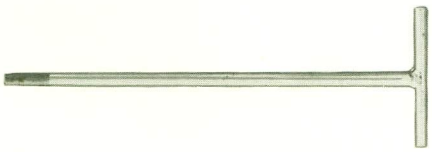


Fig. 4-8-12

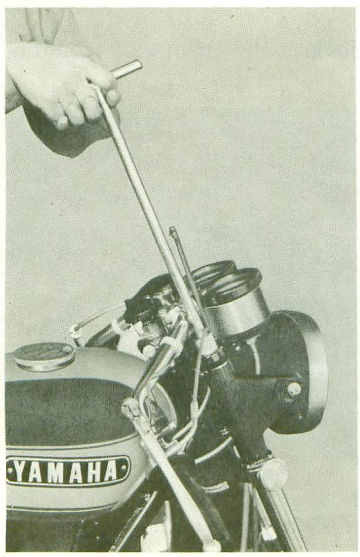


Fig. 4-8-13

2) Fill the front fork with oil through the end of the inner tube.
Oil amount – 145 c.c. (4.9 f.o.z.) for each side.
Type of Oil – Motor oil SAE 10W/30

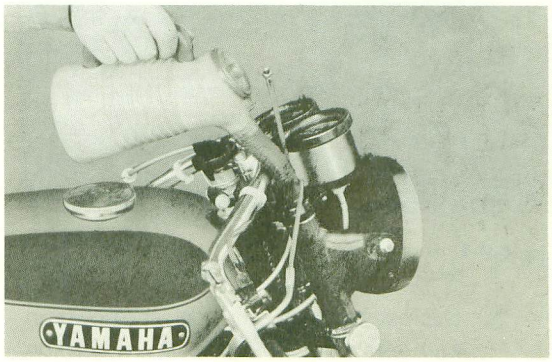


Fig. 4-8-14

3) Install the cap bolt.
4) Tighten the underbracket pinch bolt.

4–9 Rear Cushion

The 250, 350 series rear cushion are adjustable in 3 stages to allow for road and running conditions or the rider's choice.
It is not possible to disassemble the rear cushion, so this chapter only discusses oil leakages.

1. Checking

Sometimes oil seepage appears on the bottom of the cover, but in most cases this is considered to be a mere seepage of the grease applied to the spring inside. Therefore, such grease seepage can be ignored because it is not rear cushion oil leakages.
To diagnose oil leakage, take the following steps.

1) Remove the rear cushion.

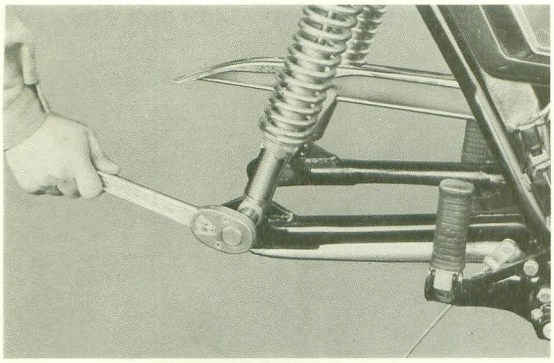


Fig. 4-9-1

2) Depress the rear cushion as shown in Fig. 4-9-2, and release it. If the cushion quickly returns halfway and then slowly returns to the fully extended position, the rear cushion is in good condition.
But if the cushion quickly returns to the fully extended position, check the cushion for very noticeable oil leakages, and replace the whole assembly if the oil leaks.

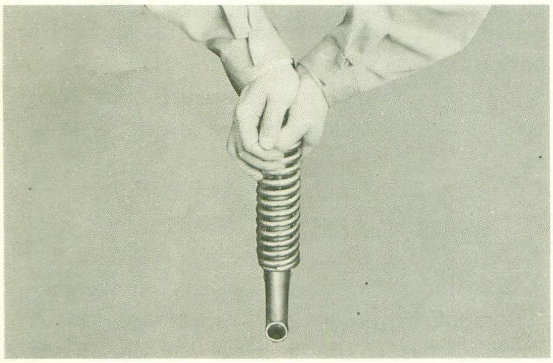


Fig. 4-9-2

4–10 Fuel Tank

The tank capacity is 3.2 gal. (12 liters). In addition, a rubber cushion is placed between the frame and the tank in order to absorb road shocks to the tank.

Removing the Fuel Tank

1) Drain the fuel tank.
2) Remove the crossover tube at the tank bottom.
3) Raise the rear part of the tank, and slide it rearward to remove the tank.

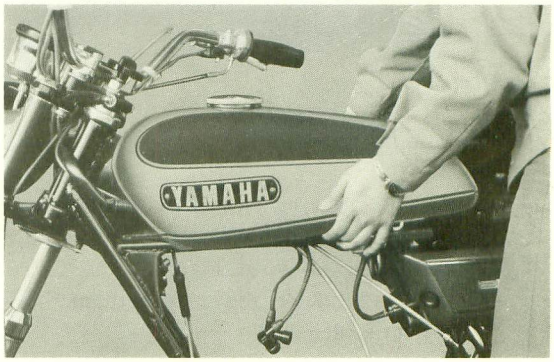


Fig. 4-10-1

4–11 Rear Arm

1. Removal

1) Remove the chain case mounting bolts.

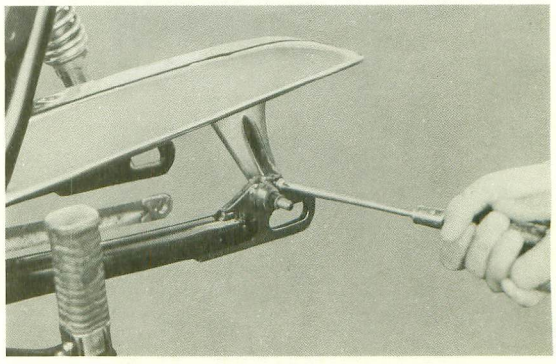


Fig. 4-11-1

2) Remove the rear arm shaft nut, pull out the shaft, and remove the rear arm.

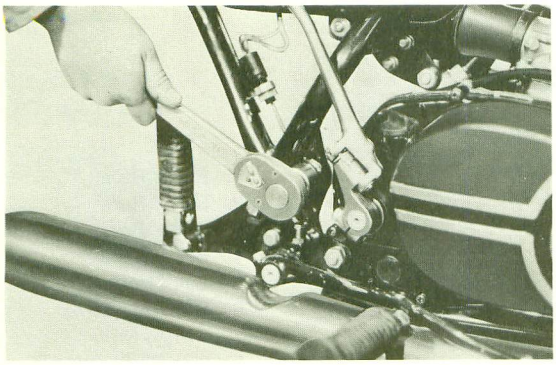


Fig. 4-11-2

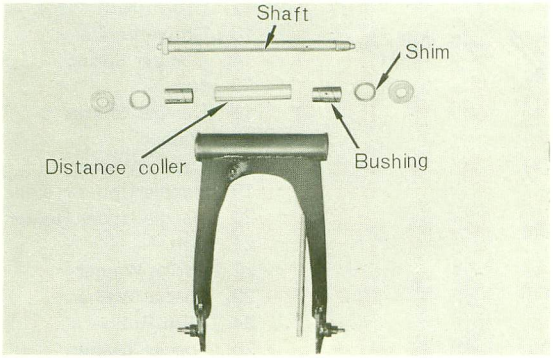


Fig. 4-11-3

2. Checking

1) Check the play of the rear arm by shaking it as shown in Fig. 4-11-4, with the rear arm installed.
If the play is excessive, replace the rear arm bushing or the rear arm shaft, whichever shows wear.

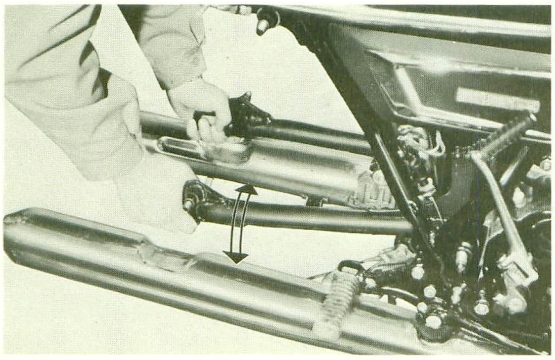


Fig. 4-11-4

2) Insert the bushing as indicated in Fig. 4-11-4, and check it for play. If the play is excessive, replace the bushing.

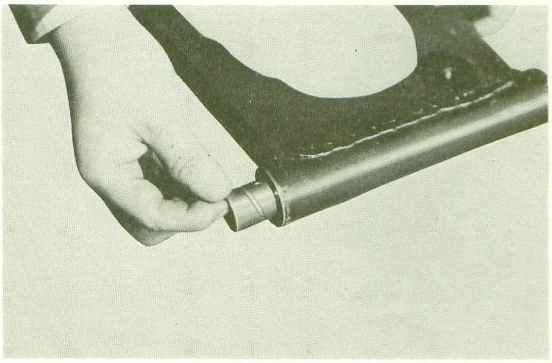


Fig. 4-11-5

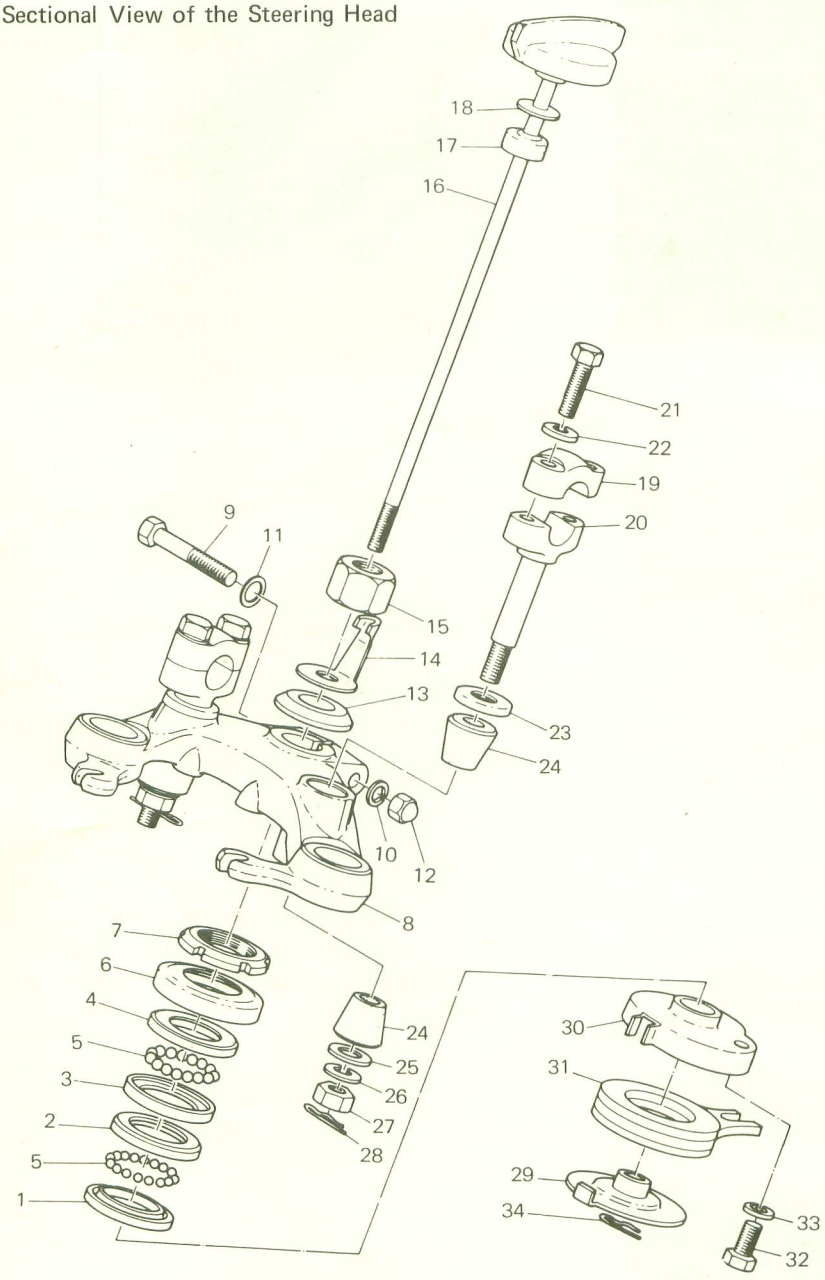
3) Grease the rear arm shaft from time to time.

3. Replacing Rear Swing Arm Bushings

On motorcycles being habitually used for on-the-street riding, rear swing arm bushings should be replaced every 10,000 km (6,000 miles).
The same may not apply to those used for racing or rough riding. Replacement should be made according to machine condition such as excessive play of the rear swing arm, or hard steering (wander, shimmy or rear wheel hop), or upon request of the customer.

4–12 Steering Head

1. Sectional View of the Steering Head



1. Ball 1 Race
2. Ball 2 Race
3. Ball 1 Race
4. Ball 2 Race
5. Ball (1/4 inch x 19)
6. Ball Race Cover
7. Fitting Nut
8. Hanelle Croun
9. Bolt
10. Spring Washer
11. Pedal Link Washer
12. Crown Nut
13. Crown Washer
14. Damper Spring
15. Nut
16. Damper Shaft
17. Washer
18. Special Washer
19. Handle Upper Holder
20. Handle Under Holder
21. Bolt
22. Spring Washer
23. Special Washer
24. Bush Rubber
25. Special Washer
26. Spring Washer
27. Nut
28. Tension Bar Clip
29. Damper Plate (1)
30. Damper Plate (2)
31. Damper Plate
32. Bolt
33. Spring Washer
34. Clip

Fig. 4-12-1 Disassembled View of Steering Head (DS7, R5C)

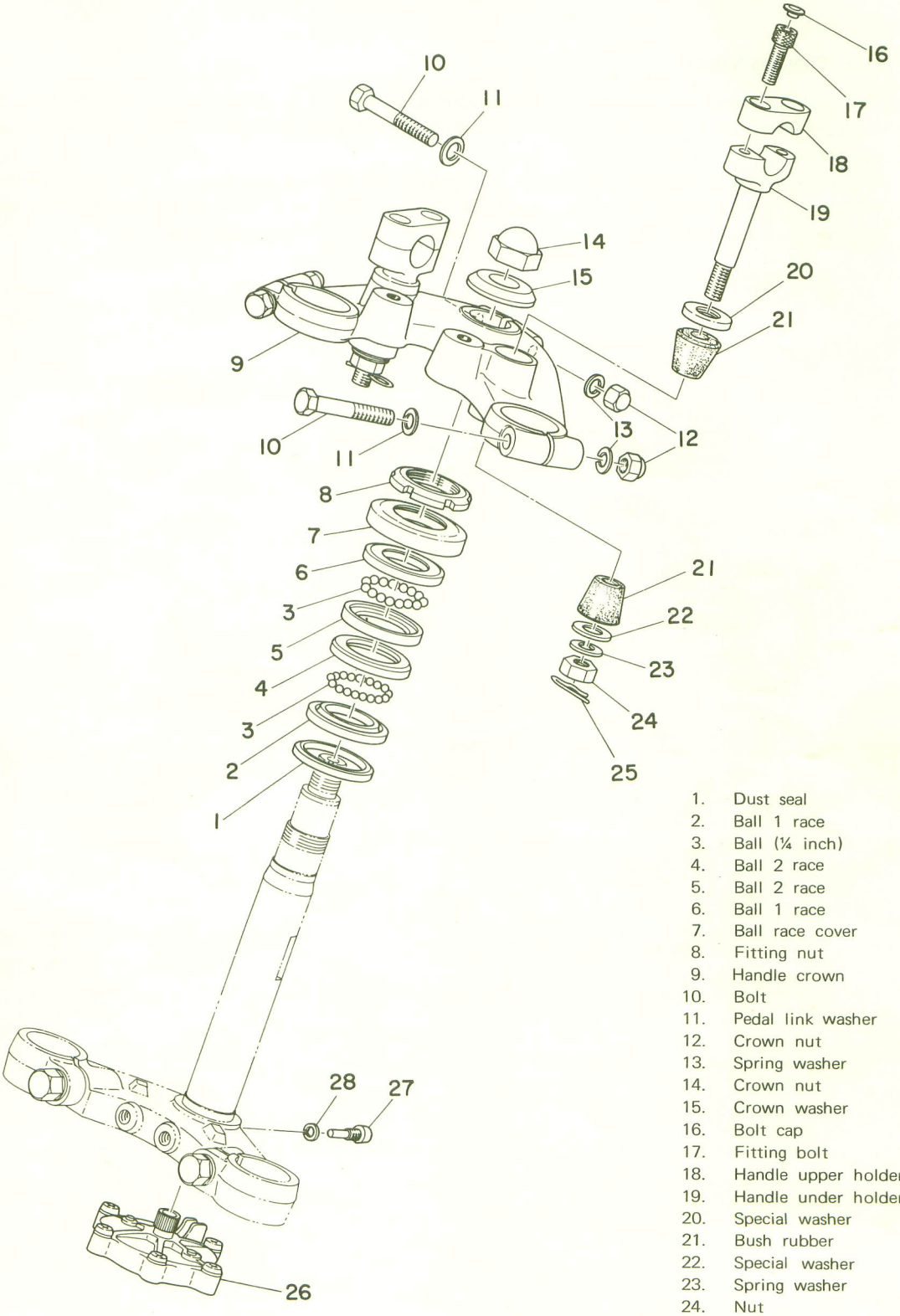


Fig. 4-12-2 Disassembled View of Steering Head (RD250, RD350)

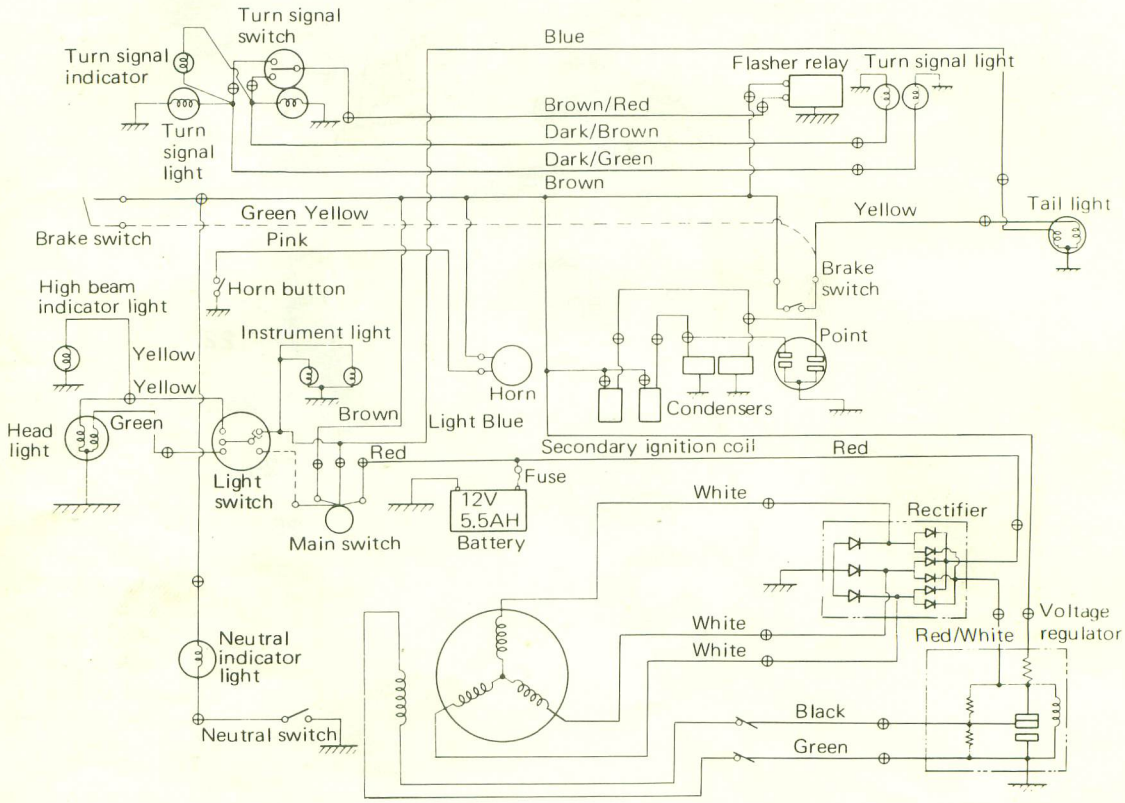
1. Dust seal
2. Ball 1 race
3. Ball (¼ inch)
4. Ball 2 race
5. Ball 2 race
6. Ball 1 race
7. Ball race cover
8. Fitting nut
9. Handle crown
10. Bolt
11. Pedal link washer
12. Crown nut
13. Spring washer
14. Crown nut
15. Crown washer
16. Bolt cap
17. Fitting bolt
18. Handle upper holder
19. Handle under holder
20. Special washer
21. Bush rubber
22. Special washer
23. Spring washer
24. Nut
25. Tension bar clip
26. Oil damper ass'y
27. Bolt
28. Spring washer

CHAPTER 5. ELECTRICAL

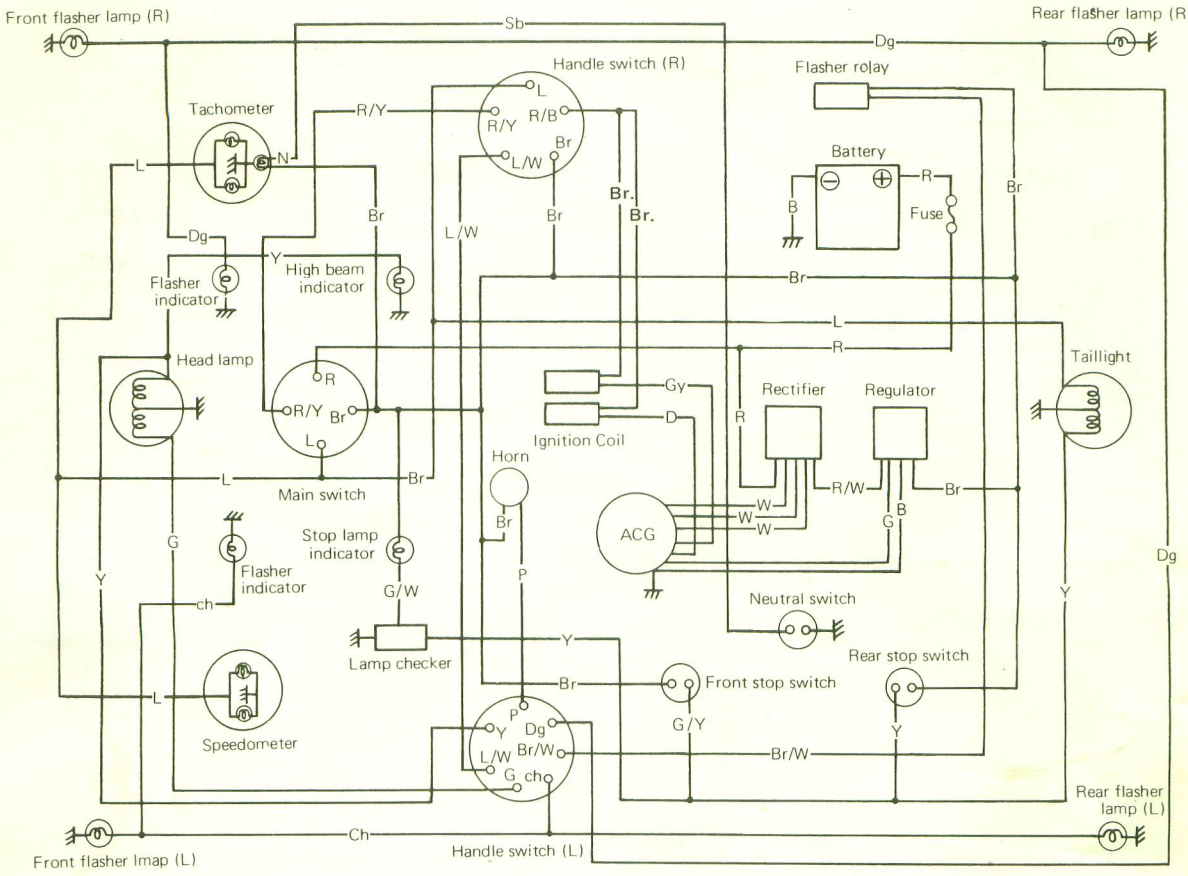
5–1 Charging System

The 250, 350 series electrical system use an alternator to generate voltage which is then rectified to direct currect. These direct currect voltage are controlled by a voltage regulator which is set to maintain a 12-15V DC constant.

When the engine is stopped, DC current to energize the lighting and ignition circuits is supplied by the BATTERY circuit. When the engine is running, excess voltage is shunted to the battery, if necessary, for recharging. If unneeded, the voltage regulator will decrease alternator amperage output.



DS7, R5C



RD250 , RD350

Fig. 5-1-1

2. Checking

1) Ball Races and Steel Balls

Check the ball races and steel balls for wear.

Check them very carefully if the machine has been in long use. If any are found to be worn or cracked, replace all of them because the others may be defective also. Replace any ball race having scratches or streaks resulting from wear. Lubricate ball races every 4,000 miles.

This circuit consists of the battery (to first provide voltage to the rotor field windings), regulator, ACG (alternating current generator), rectifier, and main switch.

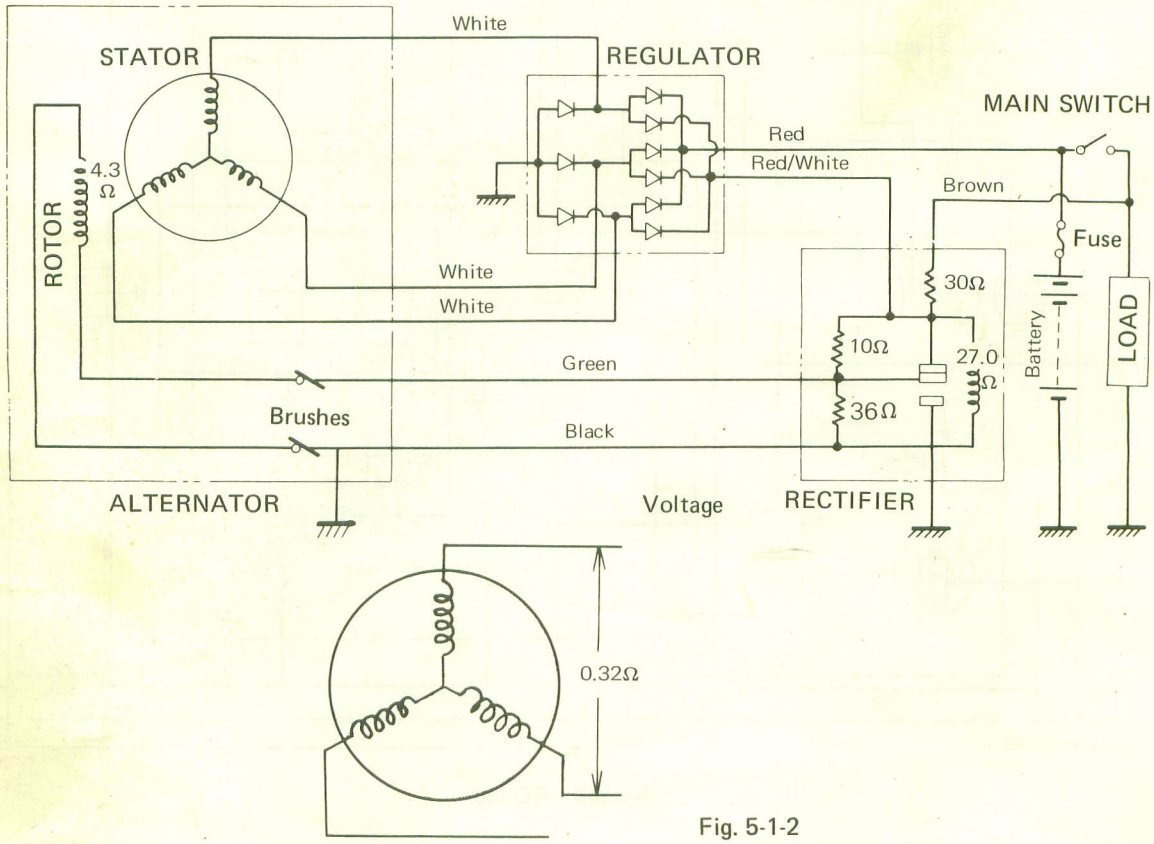
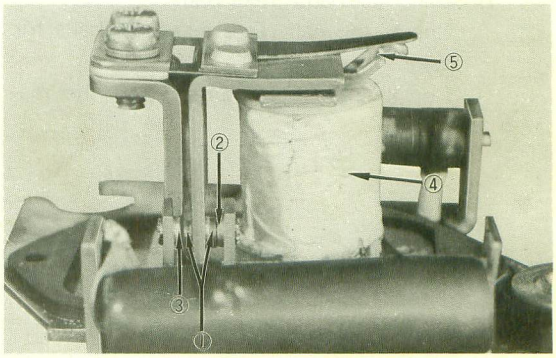


Fig. 5-1-2

1. Regulator

1) The regulator's function is to pass a controlled amount of voltage to the rotor windings which create a magnetic field that produces charging voltage in the stator.
2) The regulator operates as a magnetic switch. As charging voltage rises, part of this voltage is routed through an electromagnet in the regulator. Rising voltage creates greater regulator magnetism, which in turn pulls the central contact point through different positions. Different resistors are switched into the circuit as this central contact point moves. These resistors cut down the amount of voltage passing to the rotor windings, which reduces the charging voltage output.



1. Central point arm
2. Right point (low rpm position)
3. Left point (high rpm position)
4. Electromagnet
5. Adjusting arm

Fig. 5-1-3

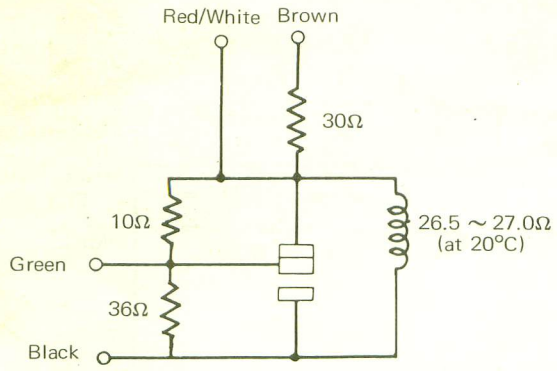


Fig. 5-1-4

3) Charging voltage output can be controlled at the regulator. Inside the housing is an arm that pushes against a flat spring steel plate. This is the adjusting arm. When adjusting arm is raised, output voltage will rise, and when arm is lowered, voltage will drop.

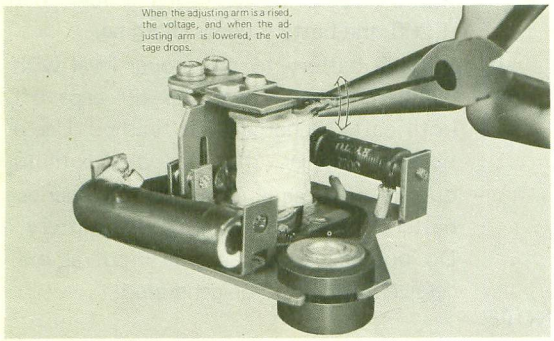


Fig. 5-1-5

4) Start the engine. Disconnect the rectifier red wire at the snap connector and hook up a voltmeter from the rectifier wire to ground. Accelerate the engine to 2,000 rpm. The voltmeter should read 14.5-15.5 volts DC. If it varies from this amount bend the adjusting arm up to raise the charging voltage or down to reduce output.

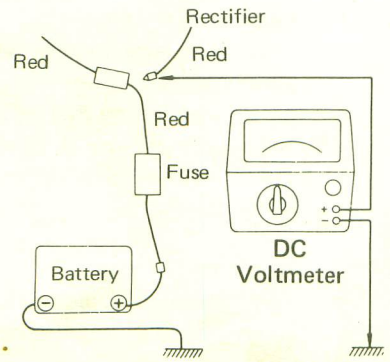


Fig. 5-1-6

2. Rectifier

This unit is a full wave rectifier which changes alternating current generated by the alternator to DC current by passing this AC current through nine silicon diodes. The diodes permit only one-way electrical flow. The DC current is sent to the battery, main switch and regulator.

3. Rotor (Alternating Current Generator)

The rotor of the ACG (Alternating Current Generator-alternator) is the source for the magnetic field which induces current flow in the stator windings. Current for the rotor windings comes from the voltage regulator and is supplied either by the battery (when the machine is not running) or by the stator windings themselves.

NOTE

In order to make the explanation easier remember that current flows as a result of voltage (electromative force). Current flows from Negative to Positive. Voltage does not "flow" but is instantly present when a circuit is closed. However, we shall discuss the operation of this ciruit in terms of voltage "flow". As soon as voltage is present in a circuit, and there is a complete path for current to flow, it will. The amount of current flow is dependent upon the amount of voltage present to act upon the electrons and the amount of resistance present to oppose electron flow.

1) When the ignition switch is turned on, voltage flows from the battery, through the closed contacts in the voltage regulator, bypassing the dropping resistors in the voltage regulator.
2) From the voltage regulator, voltage passes through the positive brush, to the single rotor winding. If the winding is intact, and the negative brush has good electrical contact, current will begin to flow through the rotor winding.
3) When this current flows, it creates a magnetic field around the wire it flows in. Wind this wire into a tightly concentrated coil and the magnetism will become quite intense. The rotor has now become an electromagnet.
4) The rotor is attached directly to the

crankshaft. When the crankshaft revolves, the magnetic field surrounding the rotor windings (due to current flow through the windings) rotates also. The brushes and slip ring on the rotor are necessary in order to maintain electrical contact and current flow during this rotation.

4. Stator (Alternating Current Generator)

The stator consists of three windings of wire surrounding the rotor assembly. It is within the stator windings that current is generated for recharging the battery and running the various electrical circuits on the machine.

1) When the magnetic field surrounding the rotor winding begins to spin, its lines of magnetic flux (force) intersect the windings within the stator. As this takes place, current is generated within the stator windings.
2) This current flow is in the form of alternating current. It is transmissted on the three (white) stator winding wires to the rectifier where it is changed to direct current by the diodes of the rectifier.
3) The stator assembly also holds the brushes for the rotor circuit.

5. Battery

1) Servicing a new battery

a. Check the housing for cracks or other damage. Fill the battery with electrolyte and let set for a few hours. This allows the acid to soak into the plates. With the caps off, hook up a trickle charger to the battery and charge it at 1 amp/hour rate or less. Check the specific gravity. A fully charged battery should have a rating of 1.260~1.280. If the electrolyte has dropped below minimum level after charging, add distilled water.

2) Battery maintenance

a. Periodic inspection can determine the condition of the battery housing and the condition of the internal parts. Check for cracks or holds in the housing. Check for broken plates, sulfation, low fluid level, or corroded terminals.

b. The battery housing is marked with a minimum and maximum fluid level. If any cell fluid level drops below the minimum level, fill with distilled water to correct height. Check once a month or more often in hot weather. Do not use tap water.

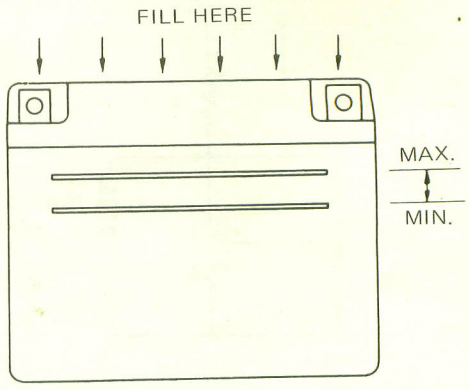


Fig. 5-1-7

3) Charging

a. Remove the battery and check the specific gravity of the battery fluid. A fully charged battery reads between 1.260~1.280. If the rating is less than 1.260, the battery needs charging.

b. Fill the battery to the proper level with distilled water. Leave the fill caps off until battery charging has finished. Use a battery charger that has a maximum output of 1 amp. The 250, 350 series battery yse a 5.5 amp/hours battery. Do not exceed a one amp input as excessive heat would be generated.

NOTE

Battery fluid level sometimes drops during charging. Refill it necessary, using distilled water.

4) Troubleshooting

a. Excessive fluid evaporation from cells: Normal battery operation requires fluid to be added to the cells approximately once a month. If distilled water must be added every week or two, the battery is possibly being overcharged. Check voltage input from the alternator.

b. Low fluid level in one cell: If one cell continuously loses more fluid than others, check for a shorted cell. A shorted cell creates abnormal fluid evaporation. Check with a hydrometer for excessive difference in specific gravities between the cells.

c. Won't hold a charge:
First check the alternator output to eliminate the possibility of a low charging rate. Next, check for loose terminal con-

nections (creating high resistance), or a build-up of material in the bottom of the housing that could short the plates. Nothing can be done about loose terminals themselves except to replace the battery. Sediment at the bottom of the housing can sometimes be removed by flushing the battery out several times with distilled water if the cell is discharged, electrolyte if fully charged. Dry the battery off, and recharge for a few hours. If enough loose sediment is flushed out, the battery could hold a charge. If the battery still cannot hold a full charge, replace it.

d. Sulfation: Sulfation, in the form of a white, scaly material, gradually forms on the plates and at the bottom of the housing. It is created over a period of time as the sulfuric acid combines with the lead plates to produce lead sulfate (white particles of sulfation). It is a product of age and use. The battery usually needs to be replaced when sulfation reaches the point of shorting out the plates.

e. Make sure that the wires are hocked to the proper battery terminals. The red wire must be hooked to the "positive" terminal, the black lead must be hooked to the "negative" terminal. If the wires are reversed, the battery will quickly lose its charge. Very likely the battery will be destroyed if the reversed hook-up is left connected for any length of time.

5) Storage

a. Whether it is a new battery or one that has been in service, preparation for storage of either one is almost idential. When new, the battery is dry-charged (no electrolyte). Keep it away from moisture and heat. A stored dry-charged battery can last several months without losing a great deal if its charge.

b. A used battery should be filled to the maximum level with distilled water, given a complete charged and stored in a cool area (coldness slows the process of battery discharge). It should be given a booster charge every two months. When preparing to place a stored battery back into service, check for sufficient electrolyte and fully charge the battery.

6. Troubleshooting

Troubleshooting the electrical system of the R5 is relatively simple if a few basic facts are kept in mind.

First; the entire electrical system is composed of the following assemblies.

1) Rotor
2) Stator
3) Rectifier
4) Voltage regulator
5) Turn signal relay
6) Ignition points/condensors
7) Ignition coils
8) Spark plugs
9) Min switch
10) Battery/fuse
11) Accessory switch
12) Light bulbs
13) Wiring loom
14) Horn

In the majority of instances where a failure occurs the assembly is replaced. This includes lights, switches, coils, plugs, relays, points, condenser and, in most cases, horn.

Second; in the assemblies, remember that they are made out of wire and only two things can go wrong with a piece of wire.

a. It can brak in two, stopping current flow. (Lose continuity)

b. Its insulation can be lost, causing it to short circuit with ground or another wire. This can be a direct short with zero ohms between, or "insulation leakage" with as much as two million ohms between.

Our troubleshooting list defines the steps taken to search for these two possibilities.

NOTE

All these tests can be completed with the parts still attached to the machine. There should be no necessity to remove anything except inspection covers or miscellaneous items to get to the part.

1) Charging voltage output

a-1 Start the engine.

a-2 Disconnect the rectifier red wire. Hook up a voltmeter from the rectifier wire to ground.

a-3 Accelerate the engine to approximately 2,000 rpm and check the generated voltage. It must read between 14.0~15.0 volts DC.

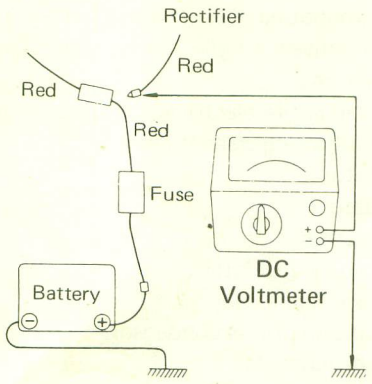


Fig. 5-1-8

a-4 If voltage output is off, (and not correctable by regulator adjustment), then each part of the charging circuit must be checked to locate the defective part.
Perform these checks in the sequence listed below.

Caution

Before each resistance test, be sure that the ohmmeter dial has been set at the correct position and adjusted to zero.

2) Broken wires

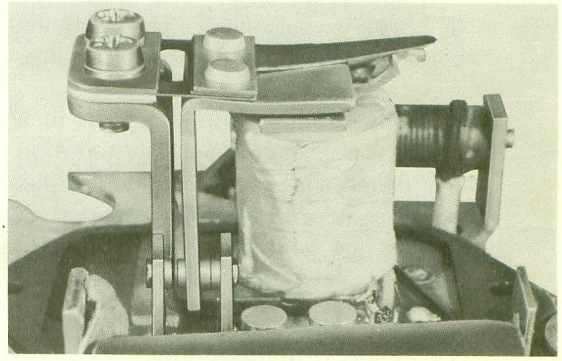
a. Check for obviously broken wires or separated connectors (especially multiple connectors). Pay particular attention to any parts that are subject to wear or might by subjected to vibration.

3) Regulator

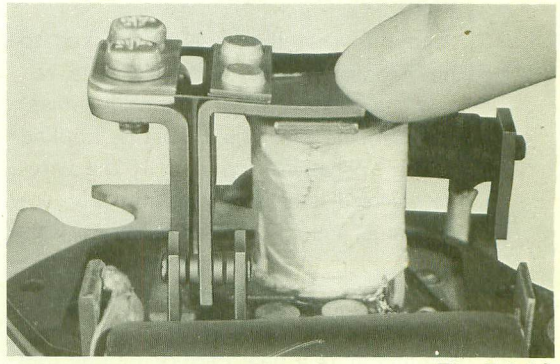
a. A defective regulator can cause abnormally low or high voltage output. Remove the regulator cover and examine all internal parts for signs of failure. All point surfaces should be reasonably clean. If they are very pitted, or if the central contact point has fused to a stationary point, then this is the troublespot. Clean the points if possible. If this does not help, replace the regulator.
Also, if any wire is broken, and cannot be soldered back in place, replace the regulator.

b. If visual inspection does not locate any troublesport then check for proper resistance through all regulator circuits. This is done by separating the regulator multiple connector and measuring resistance through the green, black, red/white, and brown wires at the connector.

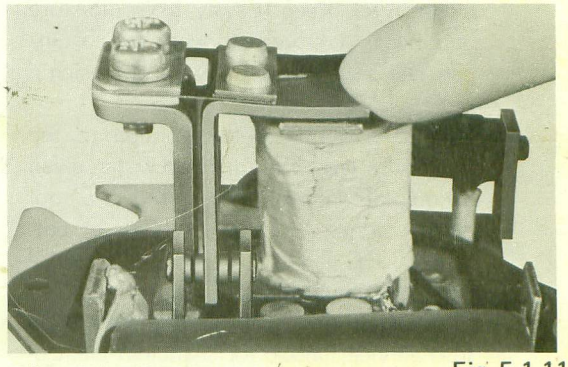
c. The following regulator resistance tests will refer to "1st position, 2nd position, and 3rd position". These refer to the center regulator point and its position between both outer points. 1st position is for voltage control at low engine rpm. 2nd point position is for voltage control at mid-rpm range. 3rd point position is for high rpm voltage control. This center point will be moved by hand to the proper position during testing procedures.



#1 Point Position Fig. 5-1-9
center point against right-hand point.



#2 Point Position Fig. 5-1-10
center point in the middle, not touch either stationary point.



#3 Point Position Fig. 5-1-11
center point against left-hand point.

d. Each of the following resistance test will give proper meter hook ups, position the regulator points should be in, and resistance specifications.

NOTE

All specifications have maximum and minimum tolerances of 2.5 ohms, except "zero" specifications, which must be less than 1 ohm maximum to be considered good.

e. For resistance test #1, hook the ohmmeter (0 x 1 ohms scale) to the black wire and the regulator base. This hook up must read zero ohms resistance. One or more ohms indicates a frayed or broken black wire.

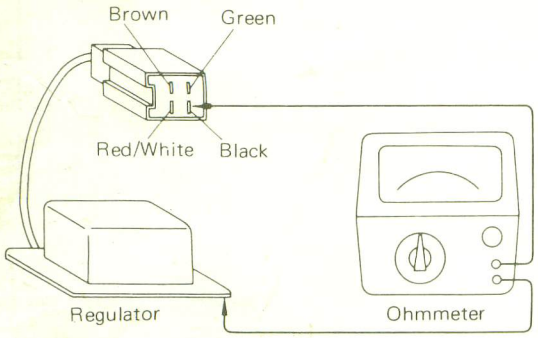


Fig. 5-1-12

f. For resistance test #2, remove the regulator cover and hook the two ohmmeter probes to the red/white wire and green wire.

#1 Point Position: 0 ohms
#2 Point Position: 9 ohms
#3 Point Position: 9 ohms

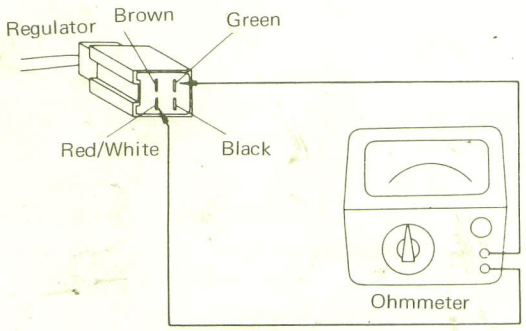


Fig. 5-1-13

g. For resistance test #3, hook the two ohmmeter probes to the red/white wire and black wire.

#1 Point Position: 27 ohms
#2 Point Position: 32 ohms
#3 Point Position: 9 ohms

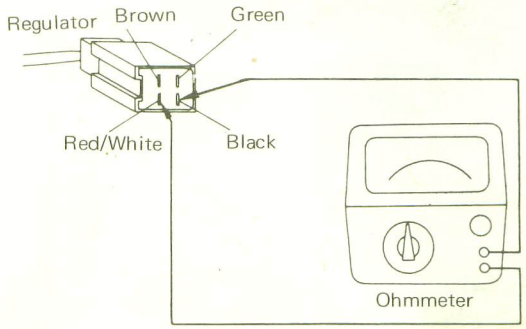


Fig. 5-1-14

h. For resistance test #4, hook the two ohmmeter probes to the brown wire and green wire.

#1 Point Position: 29 ohms
#2 Point Position: 37 ohms
#3 Point Position 37 ohms

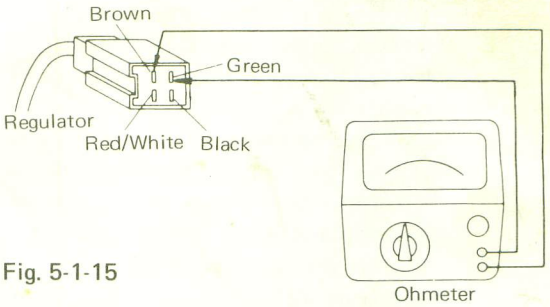


Fig. 5-1-15

i. For resistance test #5, hook the two ohmmeter probes to the brown wire and black wire.

#1 Point Position: 57 ohms
#2 Point Position: 62 ohms
#3 Point Position: 38 ohms

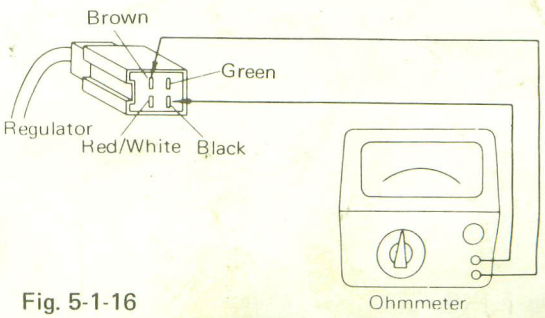


Fig. 5-1-16

j. For resistance test #6, hook the two ohmmeter probes to the green wire and black wire.

#1	Point Position:	27 ohms
#2	Point Position:	28 ohms
#3	Point Position:	0 ohms

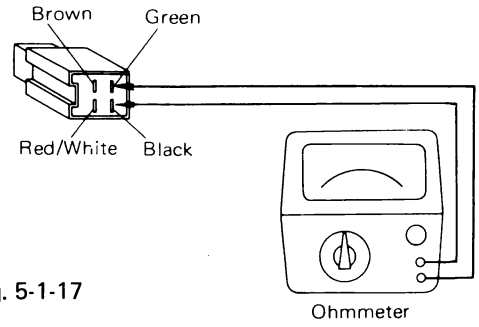


Fig. 5-1-17

k. A correctly operating regulator will give the resistance values as listed in each test. If, the measured values differ, and the variation cannot be blamed on a broken or disconnected wire (that can be re-soldered), or burnt points that can be cleaned, replace the regulator unit. If a complete regulator resistance test shows all circuits to have correct resistance, the regulator is probably not the cause of improper voltage output. The next charging circuit component must be checked.

4) Rectifier

a. Check the rectifier for proper one-way electrical flow through the diodes. Trace the rectifier wiring back to its multiple connector and disconnect it. Inside the connector are five metal prongs.

b. The prongs are connected to three white wires (that hook up to the alernator wires), one black wire (to ground), one red wire (to battery and main switch) and one red/white wire (to regulator). Perform the following tests, using an ohmmeter (0~100Ω scale) to check the condition of the rectifier.

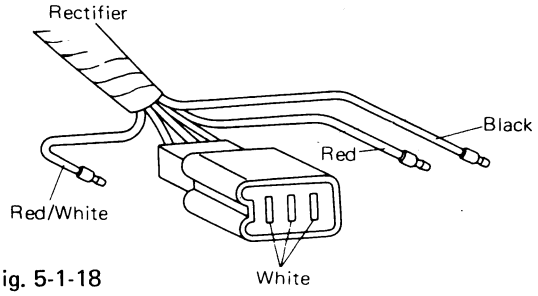


Fig. 5-1-18

c. Visually check all rectifier wires for breaks.

d. Clamp the black probe to the black wire and touch the othe;positive test lead to each white wire in the connector. Next, reverse the position of the meter probes and again touch each of the white wires. For these diodes to be good the meter must show a small resistance (7-9Ω) reading one way and almost infinite resistance with the probes reversed.

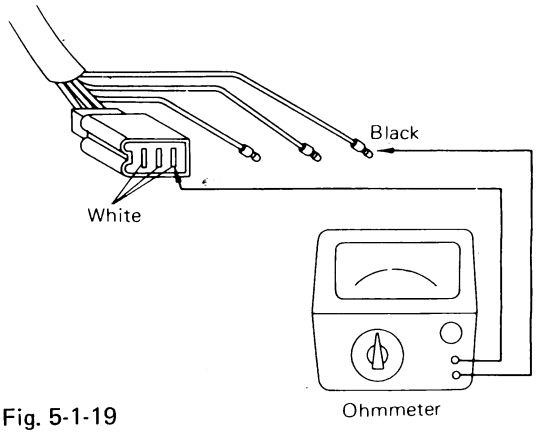


Fig. 5-1-19

e. Attach one mater probe to the red wire and again touch each white lead with the othe;probe. Reverse the probes and again touch each white lead. The resistance readings must be identical to those in d.

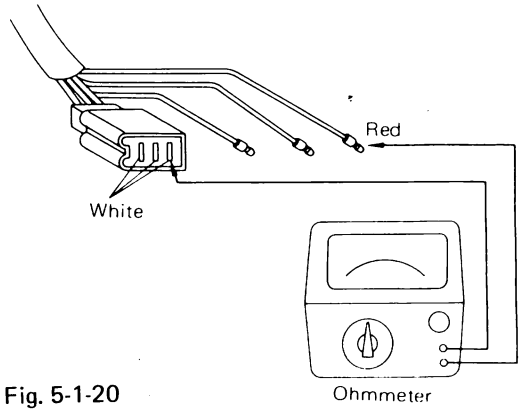


Fig. 5-1-20

f. Attach one meter probe to the white/red wire and again touch each white lead with the othe;probe. Reverse the probes and again touch each white lead. The resistance readings must be indentical to those in e.

g. All rectifier wires directly attached to the diodes are fully insulated. If any are broken, replace the unit.

h. If resistance results of steps d, e and f show that current can flow both ways, or neither way, then one or more diodes have been damaged. Replace the unit.

5) Stator Windings

a. Trace the ACG wiring up to the multiple connector. Disconnect the connector and perform the following test to the three white wire ends at the multiple connector.

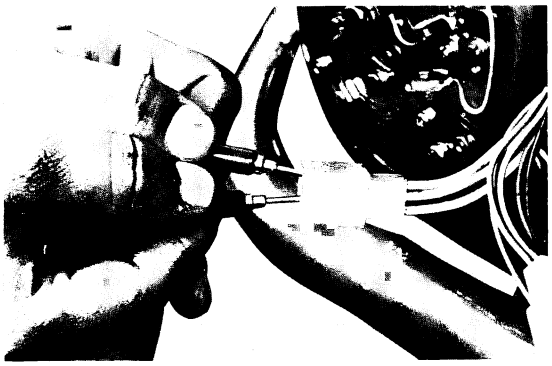


Fig. 5-1-21

b. All three white wires are interconnected in the stator windings. Use an ohmmeter to check resistance between any two white wires (three possible combinations). Each of the three measurements should shown 0.3~0.35Ω resistance.

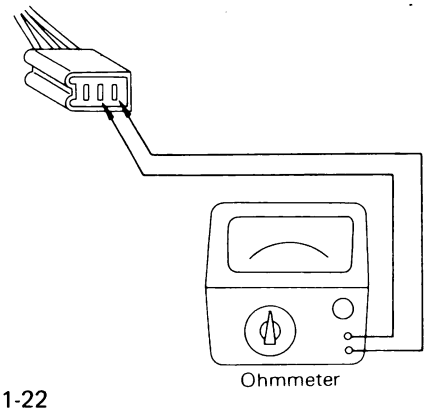


Fig. 5-1-22

c. Set the ohmmeter scale to read at least in kilo-ohms. Clamp the ohmmeter probe to the stator housing and touch each white wire with the other probe. There should be infinite resistance.

d. If resistance values in steps b & c vary from those specified, then the stator windings are broken, shorted together, or shorted to the housing. Replace the entire unit.

6) Carbon Brushes

a. If the carbon brushes do not function correctly, electricity cannot pass to the rotor field windings. This reduces alternator output.

b. Visually inspect the carbon brush holder and brushes for obvious brakage or wear. Standard brush length is 11.0 mm (0.433"), wear limit is 6.0 mm (0.236"). Also check for carbon dust on the brush that could cut down maximum possible output.

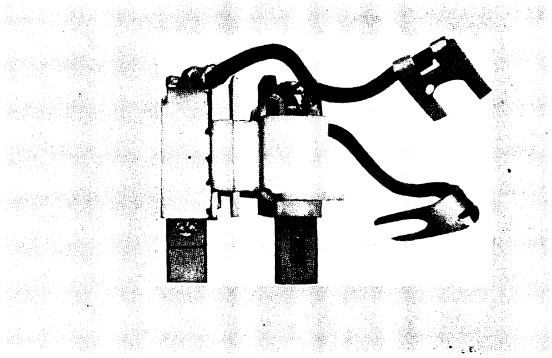


Fig. 5-1-23

c. If high resistance exists in either the green or black brush wire, it is frayed or broken. Repair or replace the entire wire (check wire to brush solder joint).

7) Rotor Windings

a. The field windings are one continuous coil of wire, each end attached to an insulated slip ring.

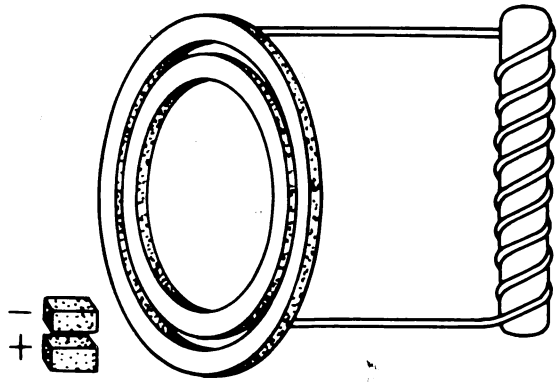


Fig. 5-1-24

b. Use an ohmmer (Ω x 1) to check resistance from one slip ring to another. Resistance must measure 4~4.5Ω. If more or less rotor will not work properly.

NOTE

Both slip rings must be clean or an inaccurate reading will result

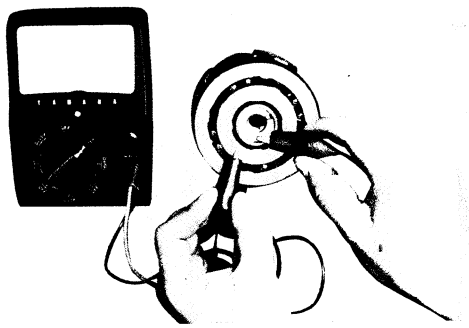


Fig. 5-1-25

c. Use an ohmmeter set to register at least kilo-ohms resistance. Measure insulation between each slip ring and the rotor core. This must show infinite resistance (more than 20 million ohms).

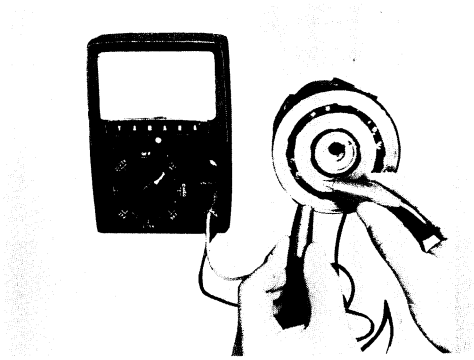
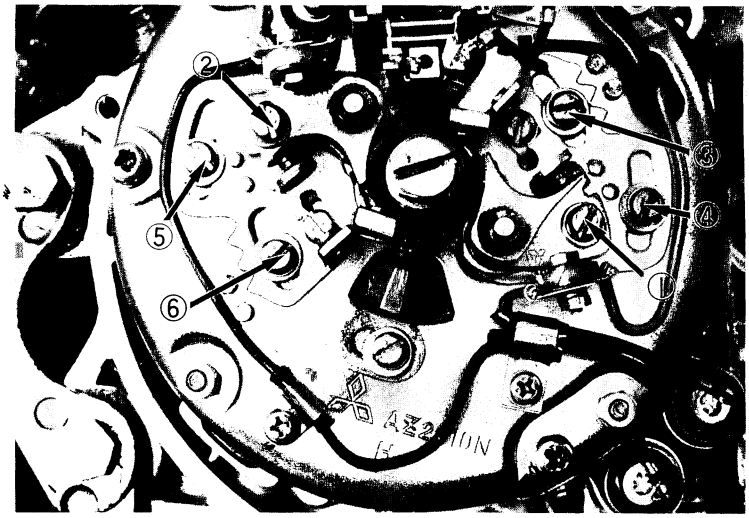


Fig. 5-1-26

d. If resistance measurements differ greatly from those specified, the winding is either broken, shorted to itself, or shorted to the core. Replace it.

5–2 Ignition System

1. Ignition Braker Points



1. R. H. point gap lock screw
2. L. H. point gap lock screw
3. R. H. ignition timing lock screw
4. R. H. ignition timing lock screw
5. L. H. ignition timing lock screw
6. L. H. ignition timing lock screw

Fig. 5-2-1

This unit is equipped with two independent sets of ignition points; one for each cylinder. Th points act as circuit breakers for the ignition system. A point cam spins counter-clockwise in the center of the ignition unit. A lobe on the cam controls the opening and closing of the points.

When the points are cosed, current flows to the secondary coil (which begins to build a magnetic field). At a precisely calculated point of crankshaft rotation, the cam forces the points apart, which stops current flow to the primary winding in the ignition coil. High voltage is then generated in the coil's secondary winding and causes a spark to jump the plug electrodes.

1) Wear

a. The points gradually become burnt and pitted. This is noraml wear. However, metal from one point might transfer to the other. If this metal build-up cannot be cleaned off with a point file, the points should be replaced.

b. Oil may gradually seep past the seal and coat the points or wiring. This will burn onto the points creating an insulating film. It must be cleaned off with ignition cleaning solvent.

c. The fiber cam follower mounted on the pivoting point arm rubs against the cam. Eventually this block wears down which results in a reduction of the point gap and retarded timing of that cylinder. The remedy is to regap the points and check the timing (timing should be checked anytime the points are re-gapped).

d. If a point return spring becomes weak of broken, the pivoting point will bounce. Timing will become erratic and ignition firing will be uneven. Measure spring tension by attaching a scale (measured in grams) to the pivoting point. It should take 700~800g to cause the points to separate. (Use a point checker to measure the separation electrically.)

2) Repair

a. Point gap on each set of points must be set at 0.3~0.4 mm (0.012"~0.016"). Constant electrical arcs across the points causes some metal to burn away, changing point gap. Clean and regap the points every 2,000 miles. Check timing after re-gapping.

b. To clean the points, run a point file between the points until the grey deposits and pits have been removed. Spray the points with ignition point cleaner or lacquer thinner, then snap the points shut on a white business card (or paper of hard texture) and repeatedly pull the card through until no more carbon or metal particles come off on the card. See Fig. 5-2-2.

Fig. 5-2-2

c. To gap the points, first rotate the engine until the ignition cam opens the points to their widest position. Slip a 0.4 mm feeler gauge into the gap. It must be a tight slip fit. If an adjustment is necessary, loosen the point lock screw (1 or 2) as shown in the Fig. 5-2-3, insert a screwdriver into the adjustment slots (3 or 4), and open or close the points until the feeler gauge indicates the correct gap. Retighten the lock screw and recheck the gap.

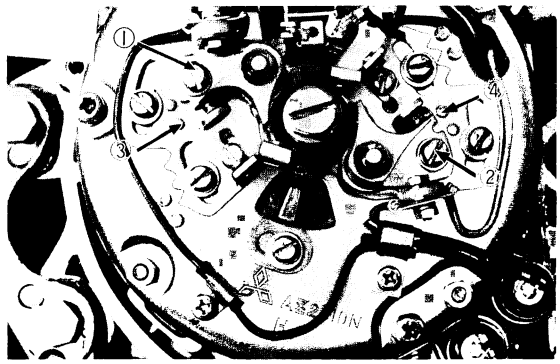


Fig. 5-2-3

d. Next, rotate the crankshaft until the second set of points opens to its widest point. Then perform the same steps as described in teh previous paragraph.

NOTE

Add a few drops of light-weight oil onto the felt rubbing pad after each point adjustment to lubricate the point cam surface. Do not over oil.

2. Condenser

The condenser serve as a storage device to decrease arcing across the ignition points. Should one fail there will be either not spark or severe point pittidue to arcing. In the event of severe arcing there is also the possibility that the strength of the ignition spark may be decreased.

1) Insulation Tests

Hook an ohmmeter to the condenser. Black (Neg) lead to the condenser case. Red (Pos) lead to the wire running from the center of the condenser. There will be a momenatry flow of current and then the condenser should show at least 4-5 million ohms resistance between the positive terminal and ground. (See Fig. 5-2-4)

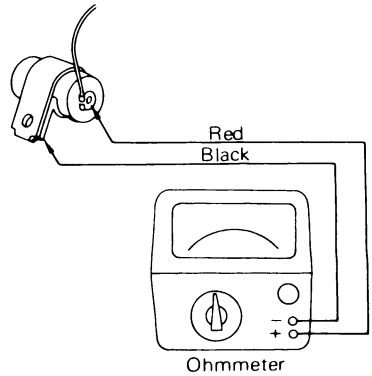


Fig. 5-2-4

2) Capacity Tests
Hook an electrotester to the condenser. Balck (Neg) lead to the condesner case, Red (Pos) lead to the wire running from the center of the condenser.
The capacity should not be more than 0.22 μF ±10%, (Before testing the condenser, adjust the capacity of the electrotester).

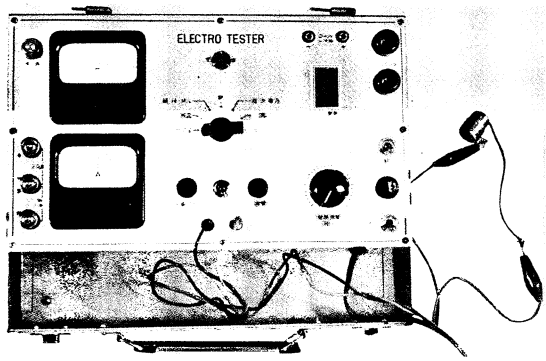


Fig. 5-2-5

3. Ignition Coil

1) Location
The ignition coils are mounted to a bracket directly in back of the steering head. They can not be removed until the gas tank is removed.
2) The ignition coils can be checked on the machine. It is not necessary to removed either the coil or the gas tank unless the coil is defective and needs replacing.
3) Static Test:
Follow the diagram at the right to check the coil. Leave the ignition key off and block the points open with a piece of paper. The coil should show at least 8 mm spark gap.
(Instructions for setting up the Electrotester can be found on the Electrotester cover.)

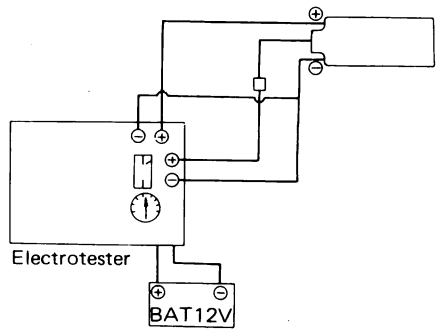


Fig. 5-2-6

4) Dynamic Test
Follow Fig. 5-2-7 for setting up. Close the point gap on the Electrotester to zero. Turn the ignition on and start the machine. Rev the machine to 2~3,000 rpm (or the rpm you wish to test at) and begin opening the tester's point gap. When the engine begins to misfire, close the point gap until it runs smooth again. Point gap should be at least 7 mm.

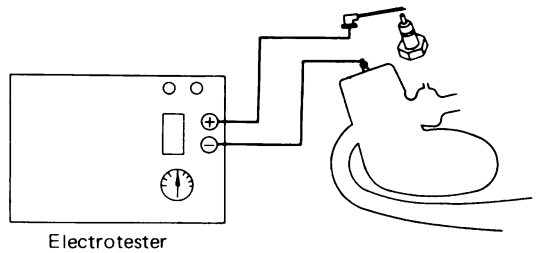


Fig. 5-2-7

4. Spark Plug

1) Standard spark plug is an NGK B-8HS which is a 12.7 mm, 1/2" reach, fairly cold plug.
2) Under normal conditions the spark plug should show no deposits on the porcelain insulator around the positive electrode. The porcelain should be a light to medium tan color. After 2,000~4,000 miles fuel deposits will begin to build up heavily on the plug. As this is the time for a major tune-up, the plug would be replaced.

3) If one or both plugs is wet, black, and/or heavily sooted, this is an indication that temperatures within the combustion chamber are too low. Check with the rider as to his habits. The plug is designed to give best performance during moderate to medium speed cruising.
4) If one or both plugs are white, blistered, and/or the electrode has melted away, this is an indication of excessive combustion chamber temperature.
5) Under normal circumstances it is best to tune carburetion to achieve a correct spark plug reading. However, if the situation is only slightly awry , then one step hotter (B-7HS) or colder (B-9HS) spark plug can be installed. If the machine is being driven under extremely adverse conditions it may be necessary to change carburetion, timing, and one or more heat ranges in the plug.
6) Servicing
Clean the electrodes of carbon and adjust the electrode gap to 0.6~0.7 mm (0.024''~0.028''). Be sure to use the specified plug, B-8HS, when replacing it.

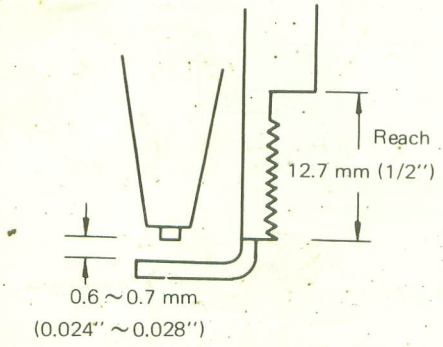


Fig. 5-2-8.

5. Adjusting Ignition Timing

Adjust ignition timing on both cylinders.
Adjustment with a dial gauge. Tools and instruments for adjustment are as follows:
Dial gauge (accuracy 1/100 mm)
Dial gauge adapter
Conductivity test lamp or YAMAHA
Point Checker
Point wrench
Slot-head screwdriver, 12 mm wrench.

1) Install a dial gauge adapter in the plug hole on the cylinder head, and then install the dial gauge. Set the indicator at zero when the piston is at top dead center. Rotate the crankshaft against the normal direction of rotation to 2.0 mm BTDC.

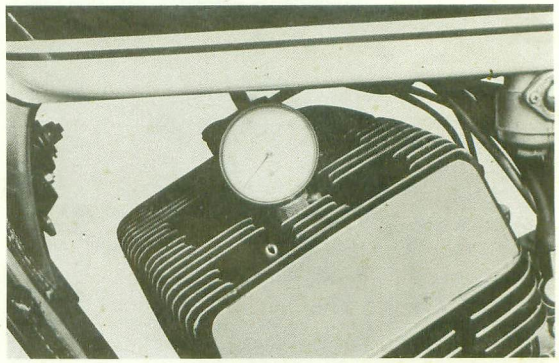


Fig. 5-2-9

2) Set the point gap at 0.3~0.4 mm (0.012''~0.016'') by moving the braker plate.
When adjusting ignition timing for the right-hand cylinder, adjust the points of the I_1 (L.H.) terminal (grey), while for the left-hand cylinder, adjust the points of the I_2 (R.H.) terminal (orange).

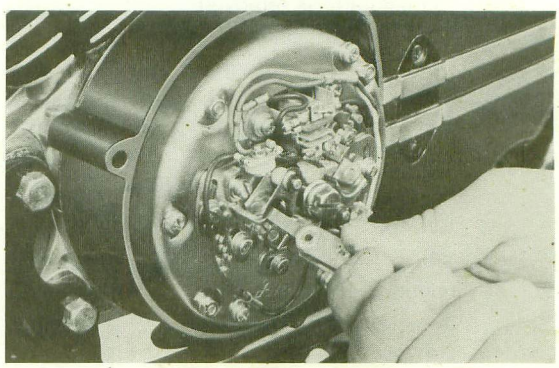


Fig. 5-2-10

3) Connect the positive lead of the point checker to the insulated point terminal. Ground the negative lead of the point checker to the engine or chassis.

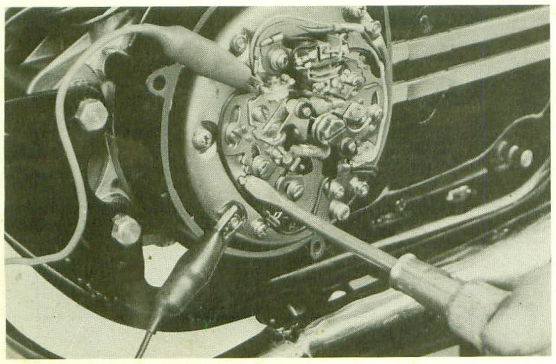


Fig. 5-2-11

4) Loosen the breaker plate setting screw, and move the plate to the right or left with a slot-head screwdriver until the point checker indicated the points opening at exactly 2.0 mm B.T.D.C. (Do not fully loosen the screw, because the breaker plate tends to move when the screw is retightened). Turning the breaker palte in the normal rotating direction will retard the ignition timing, while turning it in the reverse direction will advance the ignition timing.

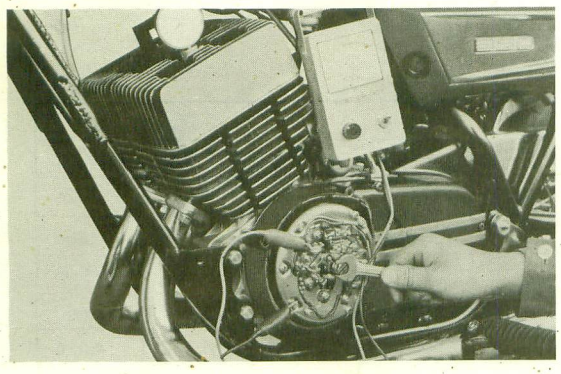


Fig. 6-2-12

5) Finally, tighten all screws, rotate the crankshaft against the normal, running direction until the dial gauge indicates 2.5 mm BTDC. Then slowly turn the crankshaft in the normal running direction. The point checker should just swing into the green at 2.0 mm BTDC, indicating the points are opening causing ignition.

6) For best performance each cylinder's specifications should be nearly identical. Point gap (L & R) should be identical and timing should be within 0.05 mm - 0.10 mm.
For Example:

	GAP	TIMING
L. Cyl.	.013	2.02mm BTDC
R. Cyl.	.013	2.06mm BTDC

Timing on any one cylinder besides being in balance, must be ±0.1 mm of 2.0 mm BTDC.

APPENDIX A

CONVERSION TABLES

Milimeters to Inches

	0	.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0		.0039	.0079	.0118	.0157	.0197	.0236	.0276	.0315	.0354
1	.0394	.0433	.0472	.0512	.0551	.0591	.0630	.0669	.0709	.0748
2	.0787	.0827	.0666	.0906	.0945	.0984	.1024	.1063	.1102	.1142
3	.1181	.1200	.1260	.1299	.1339	.1378	.1417	.1457	.1496	.1535
4	.1575	.1614	.1654	.1693	.1732	.1772	.1811	.1850	.1890	.1929
5	.1969	.2000	.2047	.2087	.2126	.2165	.2205	.2244	.2283	.2323
6	.2362	.2402	.2441	.2480	.2520	.2559	.2598	.2638	.2677	.2717
7	.2756	.2795	.2835	.2874	.2913	.2953	.2992	.3031	.3071	.3110
8	.3150	.3189	.3228	.3268	.3307	.3346	.3386	.3425	.3465	.3504
9	.3543	.3583	.3622	.3661	.3701	.3470	.3780	.3819	.3858	.3898
10	.3937	.3976	.4016	.4055	.4094	.4134	.4173	.4213	.4252	.4291

.01mm = .0004" .03mm = 0012" .05mm = .0020" .07mm = .0028" .09mm = .0035"
.02mm = .0008" .04mm = .0016" .06mm = .0024" .06mm = .0031" .10mm = .0039"

Inches to Milimeters

	0	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.254	.508	.762	1.016	1.270	1.524	1.778	2.032	2.286
.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
.8	20.320	20.574	20.828	21.062	21.336	21.590	21.844	22.098	22.352	22.606
.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146
1.0	25.400	25.654	25.908	26.162	26.416	26.670	26.924	27.178	27.432	27.686

.001" = .0254mm .003" = .0762mm .005" = .1270mm .007" = .1778mm .009" = .2286mm
.002" = .0508mm .004" = .1016mm .006" = .1524mm .008" = .2032mm .010" = .254mm

CONVERSION TABLES

LENGTHS

Multiply	By	To Obtain	Multiply	By	To Obtain
Millimeters (mm)	0.03937	Inches	Kilometers (km)	.6214	Miles
Inches (in)	25.4	Millimeters	Miles (mi)	1.609	Kilometers
Centimeters (cm)	.3937	Inches	Meters (m)	3.281	Feet
Inches (in)	2.54	Centimeters	Feet (ft)	.3048	Meters

WEIGHTS

Kilograms (kg)	2.205	Pounds	Grams (g)	.03527	Ounces
Pounds (lb)	4536	Kilograms	Ounces (oz)	28.25	Grams

VOLUMES

Cubic centimeters (cc)	.06102	Cubic inches	Imperial gallons	277.274	cu.in.
Cubic inches (cu.in.)	16.387	cc.	Liters (ℓ)	1.057	Quarts
Liters (ℓ)	.264	Gallons	Quarts (qt)	.946	Liters
Gallons (gal)	3.785	Liters	Cubic centimeters (cc)	.0339	Fluid ounces
U.S. gallons	1.2	Imperial gals.	Fluid ounces (fl. oz)	29.57	cc.
Imperial gallons	4.537	Liters			

OTHERS

Metric horsepower (ps)	1.014	bhp	Foot-pounds (ft.lbs)	.1383	kg-m
Brake horsepower (bph)	.9859	ps.	Kilometers per liter (km/ℓ)	.2.352	mpg
Kilogram-meter (kg-m)	7.234	Foot-pounds	Miles per gallon (mpg)	.4252	km/ℓ
Kilograms/sq.cm (kg/cm^2)	14.22	Pounds/sq.in. (lbs/in^2 or psi)			
Centigrade (C°)	(C° x 9/5) + 32	Fahrenheit (F°)			

TORQUE SPECIFICATIONS

Stud size	kg-m	In-lbs*
6mm	1.0	90
7	1.5	135
8	2.0	180
10	3.2–4.0	300–350
12	4.0–4.6	350–400
14	4.6–5.2	400–450
17	5.87–7.0	500–600

* Ft-lbs = in-lbs divided by 12

APPENDIX B

IBM PARTS ORDER SYSTEM

In order to help our dealers to understand how our IBM system works, we are providing these hints.

1. Basic composition: 000-00000-00-00 (for standard parts)
2. Basic composition: 00000-00000-00 (for interchangeable parts)

1. STANDARD PART: These 12 digits are divided in three (3) sections: a-b-c-d.

A. These first three digits represent the original model in which this part was used.

164	-00000-00-00)	Identifies the YL2/YL2C model (100cc.)
165	-00000-00-00)	
166	-00000-00-00)	
167	-00000-00-00)	
168	-00000-00-00)	Identifies the YR1 model (350cc.)
169	-00000-00-00)	Identifies the YDS5E model (250cc.)
170	-00000-00-00)	
171	-00000-00-00)	Identifies the YM2C model (350cc.)
172	-00000-00-00)	
173	-00000-00-00)	Identifies the YCS1E model (180cc.)
174	-00000-00-00)	
177	-00000-00-00)	Identifies the TD1C model (250cc. Road Racer)

You will also find that some of these "three-digit" numbers will interchange with, or are used for other models. In addition to the various "three digits" that we mentioned above and which are assigned originally for those models, we also have quite a few "three digit" models that are not sold in the U.S.A.

B. The next FIVE DIGITS represent the Section and Actual Part No.
The FIRST DIGIT of this "five digit section" represent the section of the m/c to which the part belongs, i.e.:

000-	1	0000-	00-00	(1) represents the ENGINE section
000-	2	0000-	00-00	(2) represents the FRAME section
000-	8	0000-	00-00	(3) represents the ELECTRIC or wiring section

The SECOND & THIRD digits represent the location of the part within the section.
(Engine-Frame-Electric)
EXAMPLES: (ENGINE SECTION)

000-1	13	11-00-00	Cylinder	(13) Identifies the Crankcase area.
000-1	16	01-00-00	Ring set Std.	(16) Identifies the Piston area.
000-1	74	01-00-00	Main Axle Ass'y	(74) Identifies the Transmission area.
000-1	41	01-00-00	Carburetor Ass'y (L)	(41) Identifies the Carburetor area.

EXAMPLES: (FRAME SECTION)

000-2	22	10-00-00	Rear Cushion	(22) Identifies the Rear Fender area.
000-2	31	36-00-00	Outer tube R	(31) Identifies the Front Fork area.
000-2	41	71-00-00	Knee grip L	(41) Identifies the Tank/Seat area.
000-2	53	86-00-00	Collar, sprocket shaft	(53) Identifies the Rear Wheel area.

EXAMPLES: (ELECTRIC/WIRING SECTION)

Any part number that you find within this "five digit" section which starts with the number 8 is a component of the ELECTRIC/WIRING section, i.e.:

000-	8	1910-20-00	Regulator
000-	8	2510-10-00	Main switch assembly
000-	8	2590-10-00	Wire harness assembly
000-	8	2116-00-00	Lead wire (–)
000-	8	2540-00-00	Neutral switch assembly

The FOURTH and FIFTH digits ARE the ACTUAL PART NUMBER.

000-141	01	-00-00	Carburetor (L)	(01) Identifies the Carburetor (L)
000-141	02	-00-00	Carburetor (R)	(02) Identifies the Carburetor (R)
000-113	11	-01-00	Cylinder (L)	(11) Identifies the Cylinder (L)
000-113	21	-01-00	Cylinder (R)	(21) Identifies the Cylinder (R)
000-241	71	-00-00	Knee grip (L)	(71) Identifies the Knee Grip (L)
000-241	72	-00-00	Knee grip (R)	(72) Identifies the Kee Grip (R)

C. The NINTH and TENTH digits in the "12 Digit" series, advises you of any changes, corrections or modifications to the original part.

EXAMPLES: (YCS1)

174-18511-	00	-00	FORK, shift (1)—This gear was modified for better performance and therefore the number was changed to read:
174-18511-	01	-00	If we get a further modification of this part, and we hope not, the number will then read:
174-18511-	02	or 03 -00	

D. The last two digits (11th & 12th) in the "12 Digit" series will indicate a color code number whenever a part is a painted item. If no color code is required, these last two digits will be 00 to complete the twelve digit requirement.

The IBM COLOR CHART consists of the following numbers:

000-00000-00-	22	Candy Red	000-00000-00-	24	Light Vermilion (Red)
000-00000-00-	25	Yamaha Yellow	000-00000-00-	33	Deep Black
000-00000-00-	34	Super Black	000-00000-00-	35	Silver
000-00000-00-	44	Candy Blue (new)	000-00000-00-	81	Primer

PLEASE do not fail to include this color number when ordering painted parts.

2. INTERCHANGEABLE PARTS:
These "12 digits" are divided into 2 section of "5 digits" each.
These series ALWAYS start with the number "9" followed by Nos. 1, 2, 3 or 4, plus 8 more numbers.

91000-00000-00 number is used for Bolts, Cotter-Pins, etc.
92000-00000-00 number is used for Screws, Nuts, etc.
93000-0000-00 number is used for Oil-Seals, O-Rings, Bearings, etc.
94000-00000-00 number is used for Tires, Rims, Spark Plugs, etc.

A. BOLT, PIN AND SCREW

(9 0 0 0 0 - 0 0 0 0 0 - 0 0)

Length (*l*)
Diameter (d)
Kind
Surface treatment
Material

Kind	Parts	Shape	Kind	Parts	Shape
11	Bolt		21	Screw, oval head	
12	Bolt		22	Screw, flat head	
13	Bolt		23	Screw, cylinder head	
14	Pin, cotter		24	Screw, crown head	
15	Pin, clevis		25	Screw, pan head	
16	Pin, spring		26	Screw, oval head	
28	Pin, dowel		27	Screw, flat head	

B. NUT AND WASHERS

(9 0 0 0 0 - 0 0 0 0 0 - 0 0)

N/A
Kind
Classification
Normal diameter (d)
Surface treatment
Material and heat reatment

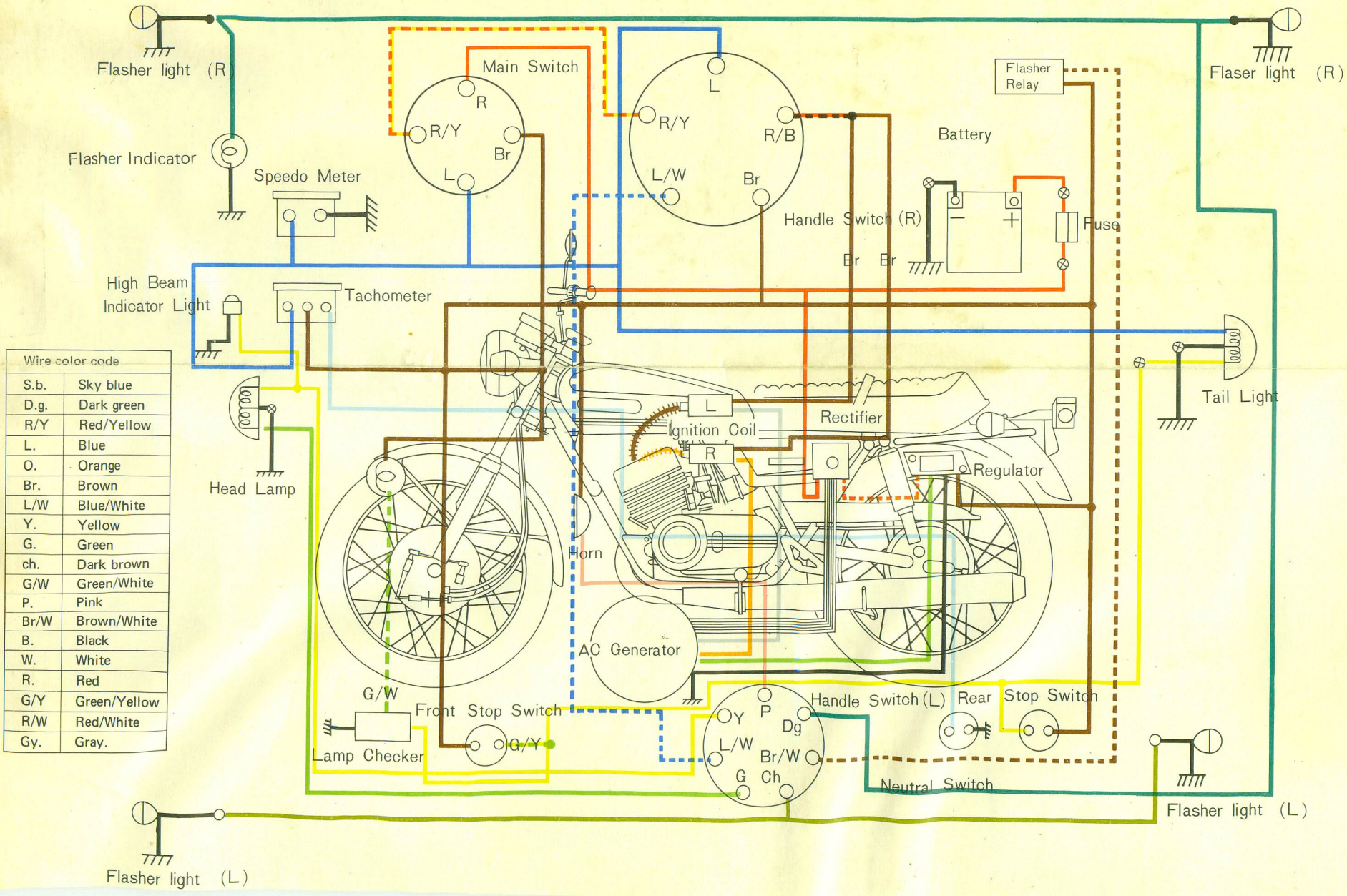
Kind	Class	Parts	Shape	Kind	Class	Parts	Shape
28	1	Nut		29	1	Washer, spring	
28	2	Nut		29	2	Washer, plain	
28	3	Nut		29	3	Washer, tooth	
28	5	Nut, slotted		29	4	Washer, tooth	
28	7	Nut, crown					

C. OTHERS

(9 0 0 0 0 - 0 0 0 0 0 - 0 0)

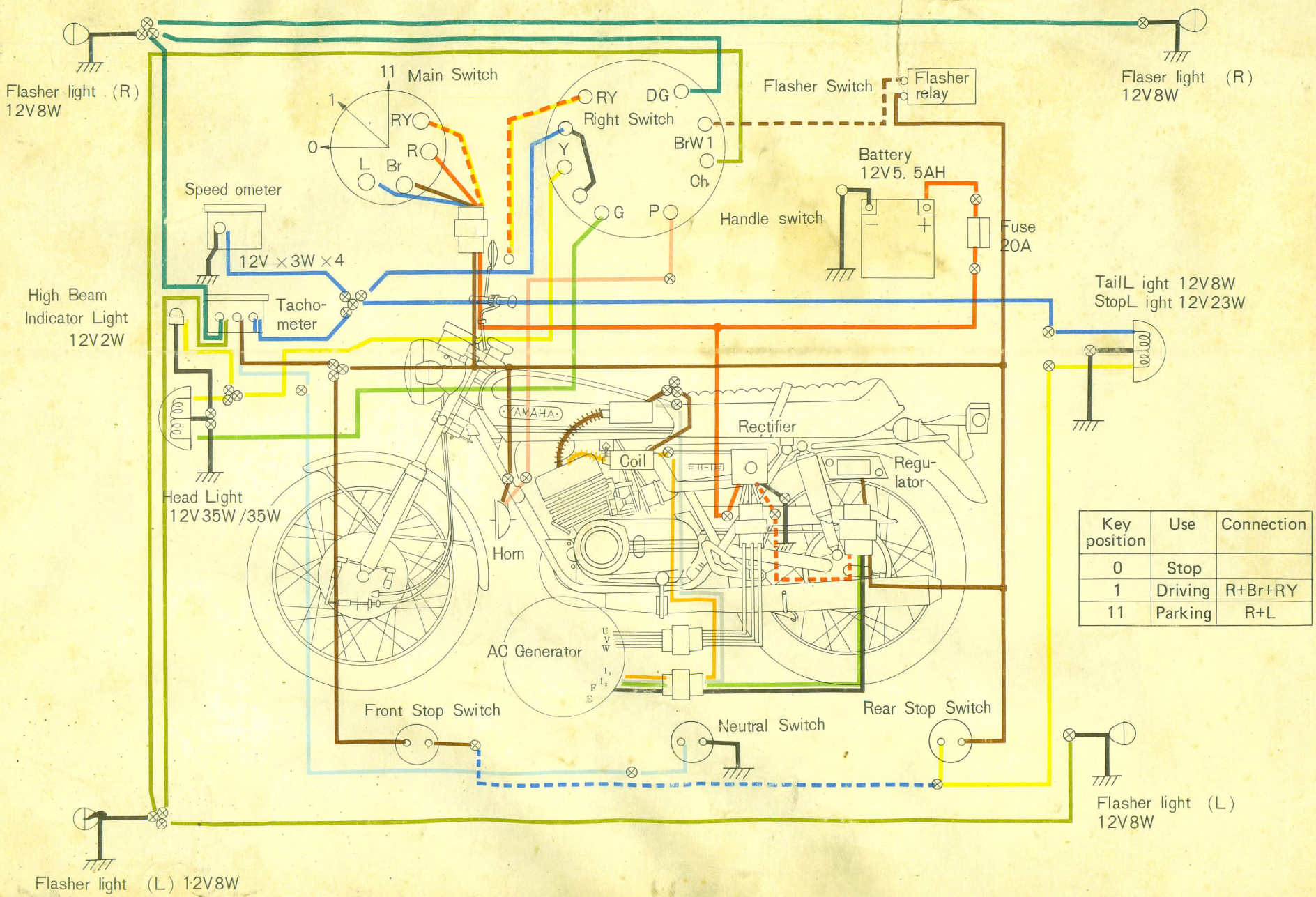
Oil seal	93100-00000-00	Tire	94100-00000-00
"O" ring	93200-00000-00	Tube	94200-00000-00
Bearing	93300-00000-00	Band, rim	94300-00000-00
Circlip	93400-00000-00	Rim	94400-00000-00
Ball	93500-00000-00	Chain	94500-00000-00
Pin, dowel B	93600-00000-00	Joint, chain	94600-00000-00
Grease nipple	93700-00000-00	Spark Plug	94700-00000-00

RD 250 350 Circuit Diagram



Wire color code	
S.b.	Sky blue
D.g.	Dark green
R/Y	Red/Yellow
L.	Blue
O.	Orange
Br.	Brown
L/W	Blue/White
Y.	Yellow
G.	Green
ch.	Dark brown
G/W	Green/White
P.	Pink
Br/W	Brown/White
B.	Black
W.	White
R.	Red
G/Y	Green/Yellow
R/W	Red/White
Gy.	Gray.

R5C DS7 Circuit Diagram



Key position	Use	Connection
0	Stop	
1	Driving	R+Br+RY
11	Parking	R+L