YAMAHA

SERVICE MANUAL
R5

YAMAHA MOTOR CO., LTD.

FOREWORD

The new Yamaha R5 is an improved version of the R5 – a 350 c.c. sportster highly acclaimed for superior engine performance and outstanding maneuverability. The special cast iron sleeved 5–Port cylinders, combined with Yamaha Autolube, assures stable engine performance throughout the whole range of operation.

The crankcase is designed to be split into the upper and lower halves. This provides easier access for service work, requiring no special crankcase dividing tools.

Besides having all of these features, the R5 incorporates many attractive innovations – separate, easy to read, large speedometer and tachometer, polished cylinders, cylinder heads and crankcase as well as chrome-plated front and rear fenders.

This service manual is prepared to furnish all Yamaha deaders and service men with the technical information and repair instructions required to keep the Yamaha R5 in top condition. We hope that you will find this manual most helpful and valvable in carrying out your jobs.

YAMAHA MOTOR CO., LTD.
SERVICE DIVISION

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CHAPTER 1. GENERAL

1–1 Features and External View

1. 5-Port Cylinder Engine
Like the R5 sportster, the Yamaha R5 has special, cast iron sleeved aluminum cylinders employing the 5-port cylinder induction system which is the first of its kind ever produced for motorcycles. Its improved scavenging efficiency assures extra power and steady performance particularly in the low-to-medium speed range.

2. Reliable Yamaha Autolube
Like every other Yamaha model, the Yamaha R5 also employs the world-renowned Autolube. It automatically meters oil to the engine on demand, depending on speed and load. Thus, lubrication is extremely thorough and economical.

3. 5-Speed Close Ratio Transmission
The Yamaha R5 assures steady engine performance from low speed off-the-road riding to high speed road work with the close ratio 5-speed transmission.

4. Easy-to-start, Starter-built-in Carburetors
Equipped with individual built-in starter jets, the carburetors ensure easy starting even in the coldest weather. You can start the engine quickly by simply pushing the starter lever down and then operating the kickstarter.

5. Horizontally-Split Crankcase
The aluminum die cast crankcase is designed to be split into upper and lower halves, thus permitting easier access for service. No special tools are required.

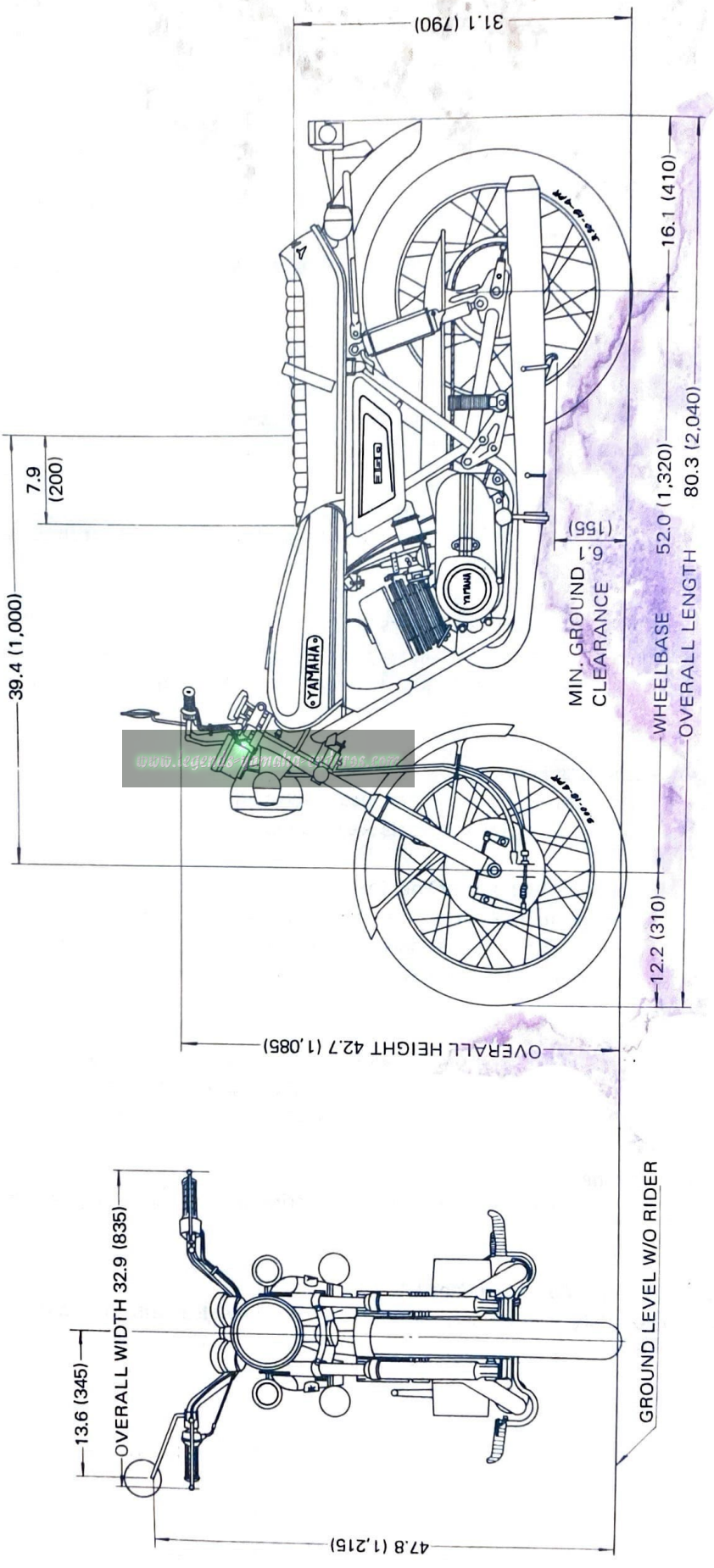
6. Easy-to-read, Separate Tachometer and Speedometer
To enable the rider to make best use of the engine power, the Yamaha R5 is provided with a large-sized, easy-to-read tachometer and separate speedometer. Both these meters are rubber-mounted on the handle crown to reduce road shocks to a minimum.

7. Powerful Braking
The front brake is of the twin-leading shoe design which is ideal for high speed road work. Both front and rear wheels employ Yamaha's proven brake drums with greatly improved waterproof and dustproof qualities. Stable braking efficiency is assured even under the worst road conditions.

8. Three-way Adjustable Rear Suspension
Depending on road conditions and speeds, the spring tension can be adjusted to ensure tireless riding comfort.

9. Additional Safety (U.S.A. and Canada)
For the extra safety of the rider, the Yamaha R5 is provided with the front brake stop light and side reflex reflectors.

R5 External View



1–2 Specifications and Performance

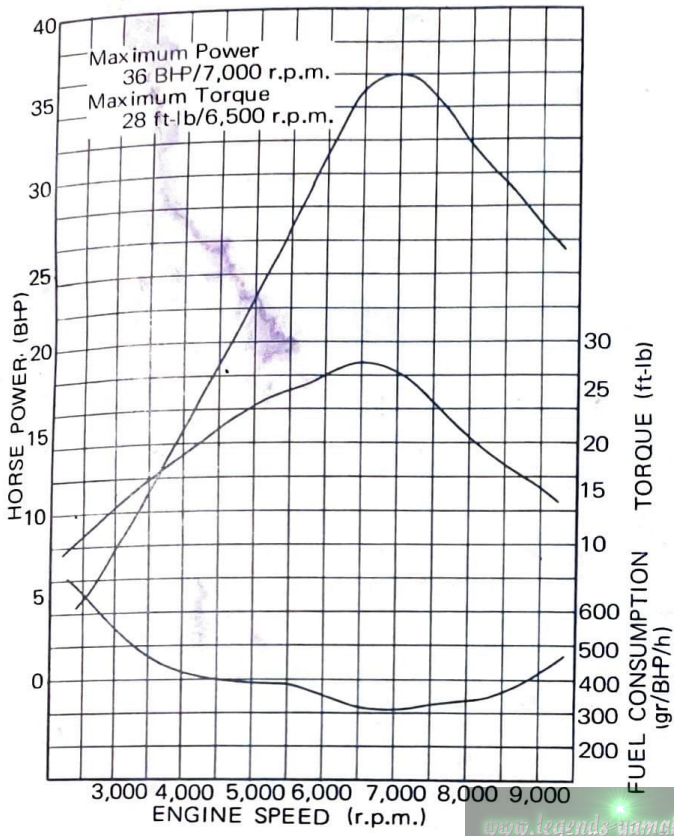
Model	R5
Dimensions: Overall length Overall width Overall height Wheelbase Min. ground clearance	80.3 in. (2,040 mm) 32.9 in. (835 mm) 42.7 in. (1,085 mm) 52.0 in. (1,320 mm) 6.1 in. (155 mm)
Weight: Net Gross	308 lbs. (140 kg) 340 lbs. (154 kg)
Performance: Max. speed Fuel consumption (on paved level road) Climbing capacity Min. turning radius Braking distance Acceleration performance (SS 1/4 mile)	100 mph plus (160 km/h plus) 82.5 mpg at 37 mph (35 km/lit. at 60 km/h) 28 degrees 90.6 in. (2,300 mm) 46 ft. at 31 mph (14 m at 50 km/h) 13.8 seconds
Engine: Type Cylinder Lubrication system Displacement Bore & Stroke Compression ratio Max. output Max. torque Starting system Ignition system	R5, 2 stroke, air cooled. Two in parallel, forward inclined, 5-port. Separate lubrication (Yamaha Autolube) 21.18 cu.in. (347 c.c.) 2.520 x 2.126 in. (64 x 54 mm) 6.9 : 1 36 BHP/7,000 rpm 28.0 ft.lbs./6,500 rpm (3.87 kg-m/6,500 rpm) Kick starter Battery ignition
Carburetor:	VM28SC x 2
Air cleaner:	Dry, paper filter type.
Power transmission: Clutch Primary reduction system Primary reduction ratio	Wet, multi-disc type. Helical gear 2.869 (66/23)
Gear Box: Type Reduction ratio 1st Reduction ratio 2nd Reduction ratio 3rd Reduction ratio 4th Reduction ratio 5th Secondary reduction ratio Secondary reduction system	Constant mesh, 5-speed forward 2.562 (41/16), Total reduction ratio 19.608 1.590 (35/22), Total reduction ratio 12.173 1.192 (31/26), Total reduction ratio 9.123 0.965 (28/29), Total reduction ratio 7.388 0.806 (25/31), Total reduction ratio 6.171 2.666 (40/15) Chain

Model	R5
Chassis:	
Type of frame	Double cradle type
Suspension system, front	Telescopic fork
Suspension system, rear	Swing arm
Cushion system, front	Coil spring, oil damper
Cushion system, rear	Coil spring, oil damper
Steering system:	
Steering angle	39°30' both right and left
Caster	62°30'
Trail	106 mm (4.17 in.)
Braking system:	
Type	Internal expansion
Operation method, front	Right hand operation
Operation method, rear	Right foot operation
Tire, front	3.00-18-4PR
Tire, rear	3.50-18-4PR
Fuel tank capacity	3.2 gals. (12 liters)
Oil tank capacity	2.1 qts. (2 liters)
Generator:	
Model	AZ2010N
Manufacturer	Mitsubishi Elec.
Spark plug:	B-9HC
Battery:	
Model	12N5.5-3B
Capacity	12V 5.5 AH
Lights:	
Headlight	12V 35/35W
Taillight	12V 8W
Stoplight	12V 23W
Flasher lights	12V 8W x 4
Neutral light	12V 3W
Meter lights	12V 3W x 2
High beam indicator light	12V 1.5W

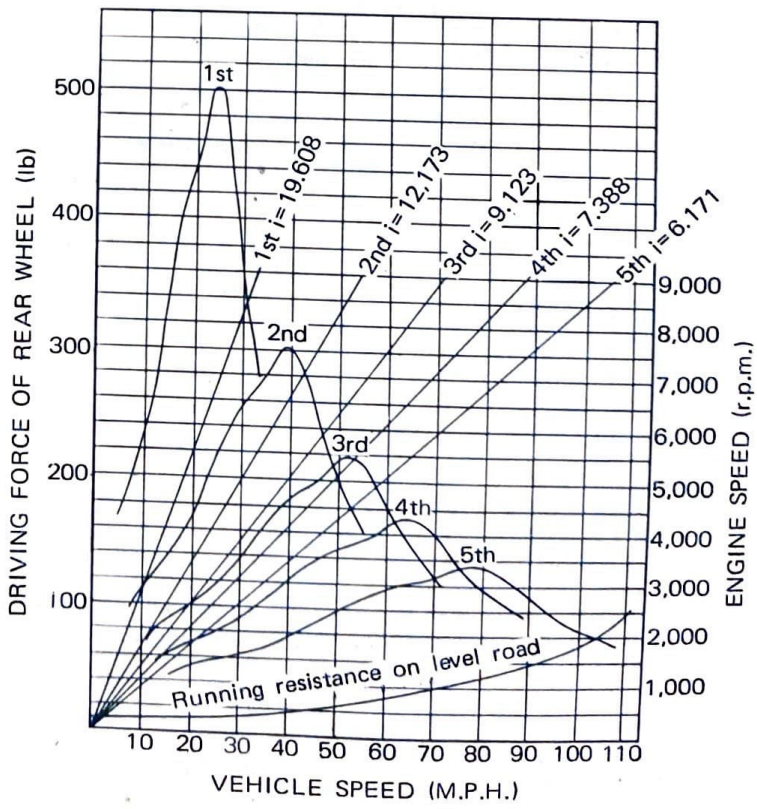
The following data subjects to change without notice.

1–3 Performance Curves

R5 ENGINE PERFORMANCE CURVES



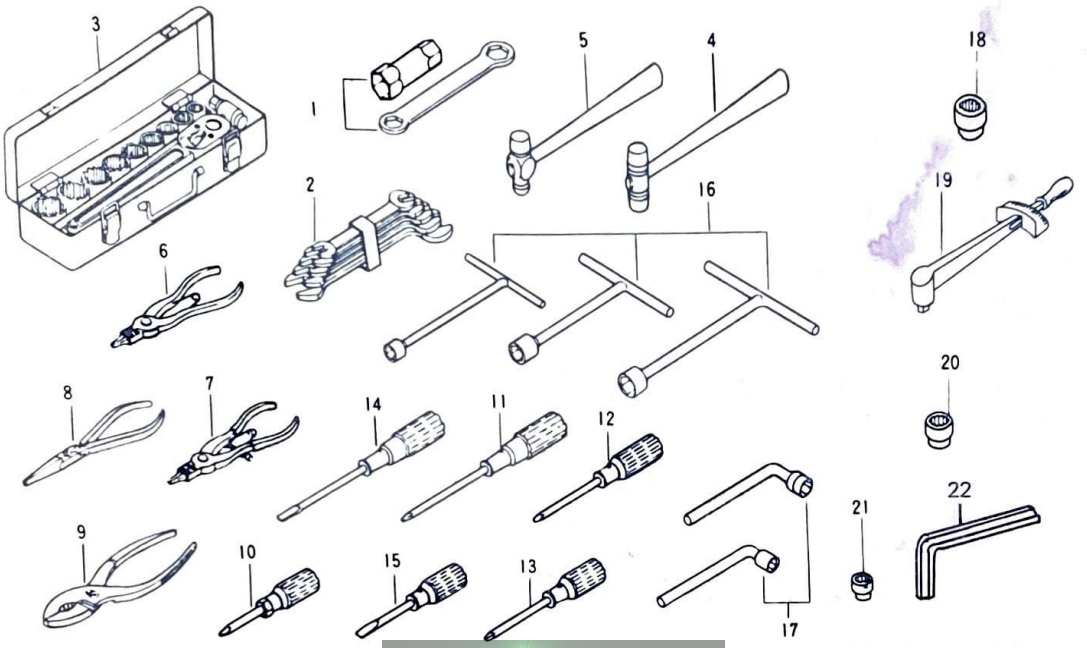
350 R5 DRIVING PERFORMANCE CURVES



1–4 Service Tools

The following service tools are required to service the YAMAHA 350 R5.

1. Standard Tools



1. Plug wrench
2. A set of open-end wrenches
3. A set of socket wrenches
4. Soft-faced-hammer
5. Steel hammer
6. Circlip pliers (ST type)
7. Circlip pliers (RT type)
8. Needle nose pliers
9. Pliers
10. Phillips-head screwdriver
11. Phillips-head screwdriver (Large)
12. Phillips-head screwdriver (Medium)
13. Phillips-head screwdriver (Small)
14. Slot-head screwdriver (Medium)
15. Slot-head screwdriver (Small)
16. T-type socket wrench
17. L-type socket wrench
18. Socket wrench (29 mm)
19. Torque wrench
20. 13 mm Socket (for Torque wrench)
21. 10 mm Socket (for Torque wrench)
22. Hexagonal wrench key

Fig. 1-4-1

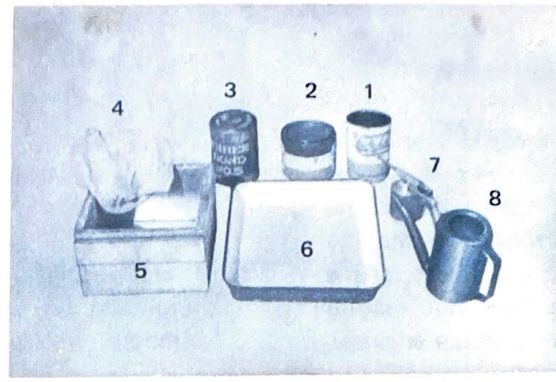
2. Special Tools

1. 350 YR1 clutch holding tool (similar type to that for YDS5)
2. Armature puller bolt (Mitsubishi-made)

Fig. 1-4-2

In addition to the above special tools, the YAMAHA electrotester, tachometer (engine speedometer), gravimeter, etc. are required.

3. Other Miscellaneous Tools



1. YAMAHA Autolube oil
2. Grease
3. YAMAHA Bond (No. 5)
4. Wiping materials
5. Overhauling stand
6. Parts tray
7. Oiler
8. Oil cup

Fig. 1-4-3

Using a wooden box ((5) as shown in the above photo) will facilitate engine service. Expendable parts (such as gaskets) and replacement parts must also be on hand.

CHAPTER 2. YAMAHA AUTOLUBE
(Separate Automatic Lubrication System)

2–1 What is Yamaha Autolube?

YAMAHA Autolube is an automatic lubricating device for 2-storke 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.

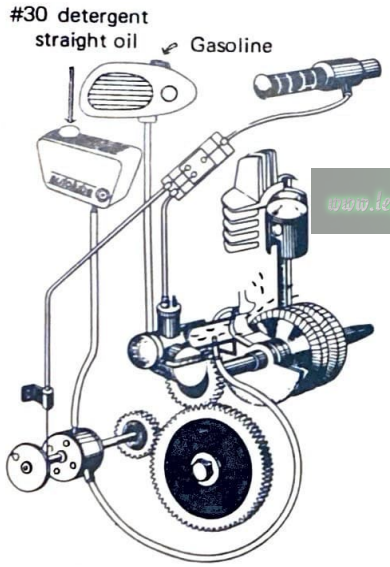


Fig. 2-1-1

2–2 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 combustion of the gas-air mixture.
8. Prolongs engine life; each injection is clean undiluted #30 wt. detergent oil with high film strength, qualities often lacking in 2-stroke oils.

2–3 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.

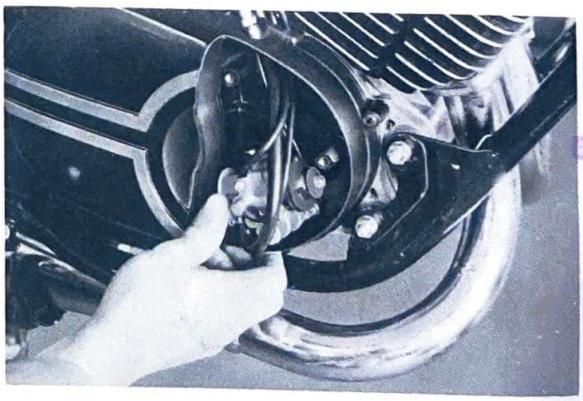


Fig. 2-3-1

3) Use thickness gauges to check the gap width. The correct minimum pump stroke tolerance is 0.20 ~ 0.25 mm. (0.008 ~ 0.012")

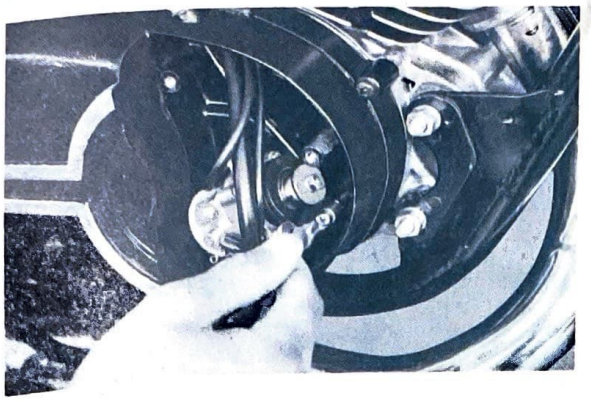


Fig. 2-3-2

b. Adjustment

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

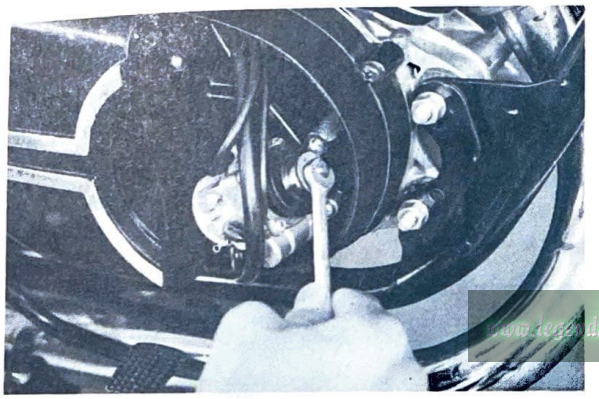


Fig. 2-3-3

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

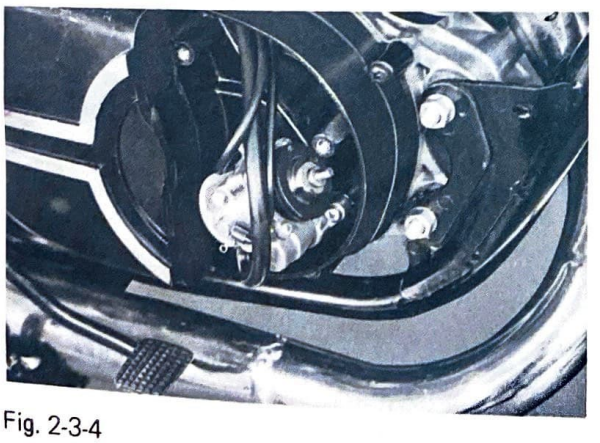


Fig. 2-3-4

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 the carburetor with the engine at idle, and remove all slack from the two throttle cables (B). (Idling RPM is between 1,300 and 1,400 rpm.)

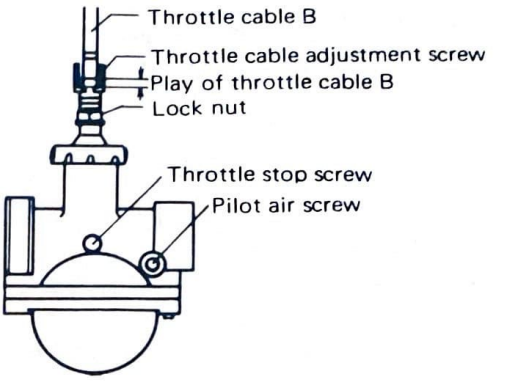


Fig. 2-3-5

- To bring the play of the throttle cable to zero, loosen or tighten the throttle cable adjustment screw.
- After this adjustment, pull both throttle cable (B) alternately, and engine speed will slightly increase from idling RPM.

2) Next, adjust the throttle cable (A) so that the gap as shown in Fig. 2-3-6 will be between 0.5 and 1.0 mm.

- While pulling the outer part of the throttle cable (A), turn the accelerator grip and check the play. If the play is excessive or insufficient, adjust the play with the adjustment screw.

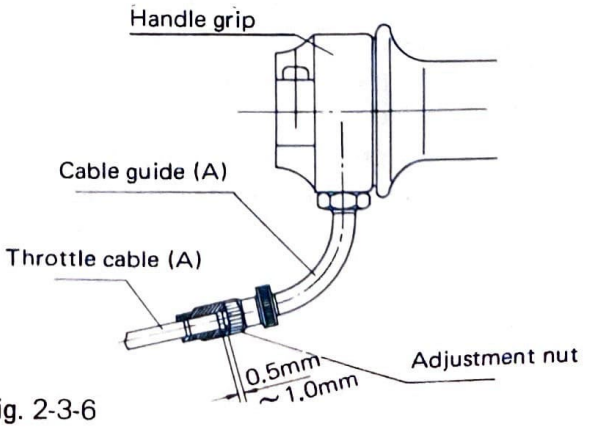


Fig. 2-3-6

3) Adjust the pump cable so that the marking (arrow) on the adjustment pulley is aligned with the guide pin.

O Fully close the accelator grip, and slowly turn it so that the play of the throttle cable (A) will be brought down to zero.

Next, adjust the pump cable so that the marking on the adjustment pulley will be aligned with the guide pin.

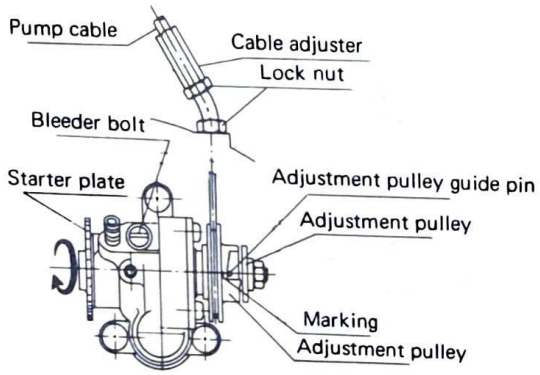


Fig. 2-3-7

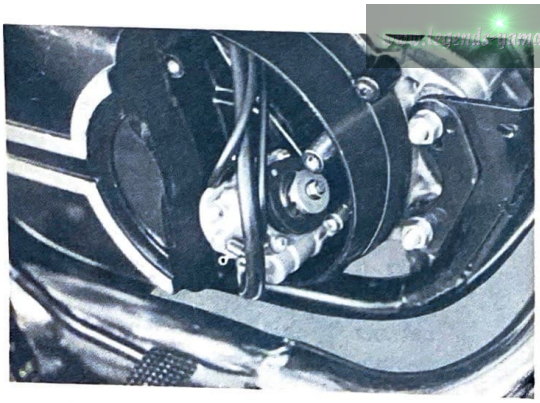


Fig. 2-3-8

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) Remove the bleeder bolt.

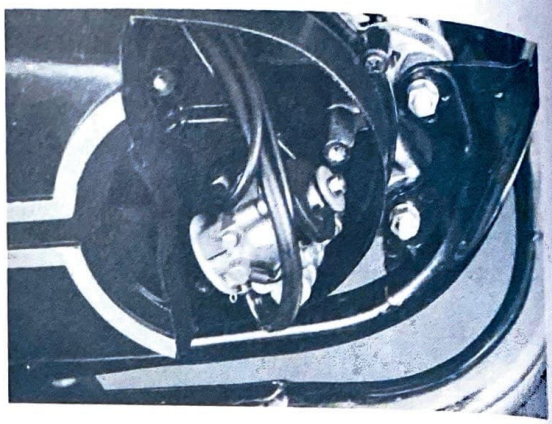


Fig. 2-3-9

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.

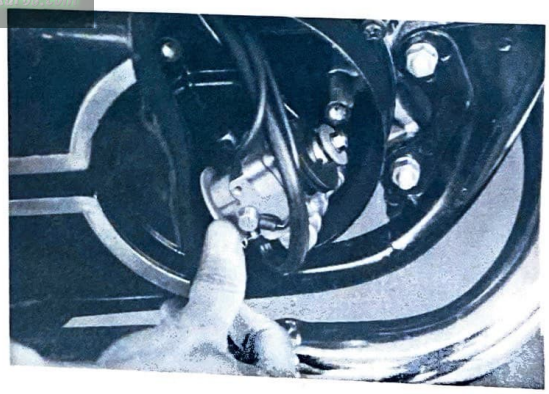


Fig. 2-3-10

CHAPTER 3. 5-PORT CYLINDER

3–1 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 that 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.

The engine performance is greatly increase with the use of this 5-port system. You, as the owner and rider of the R5, will benefit from the 5-port system by having increased engine reliability, increased engine performance, and a reduction in gas and oil consumption.

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

The 5-port cylinder 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 auxiliary 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. 3-2-1.

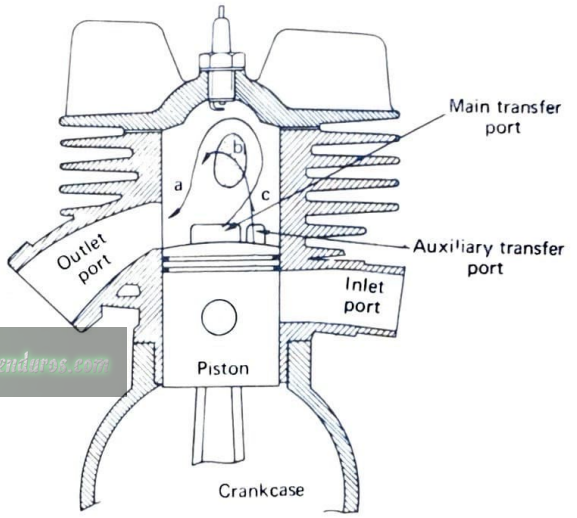


Fig. 3-2-1

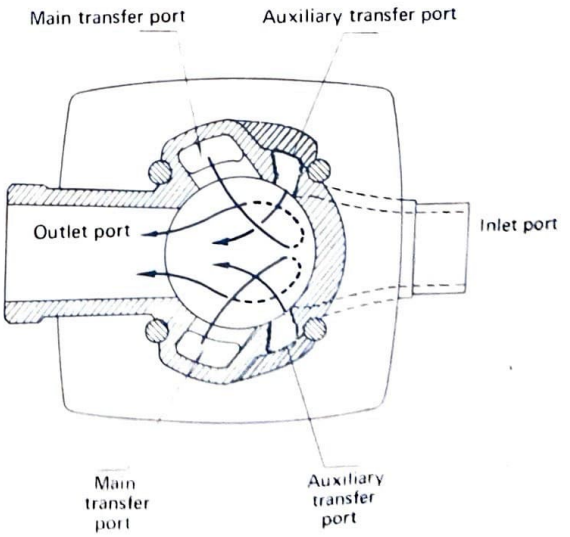


Fig. 3-2-2

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-porting system.

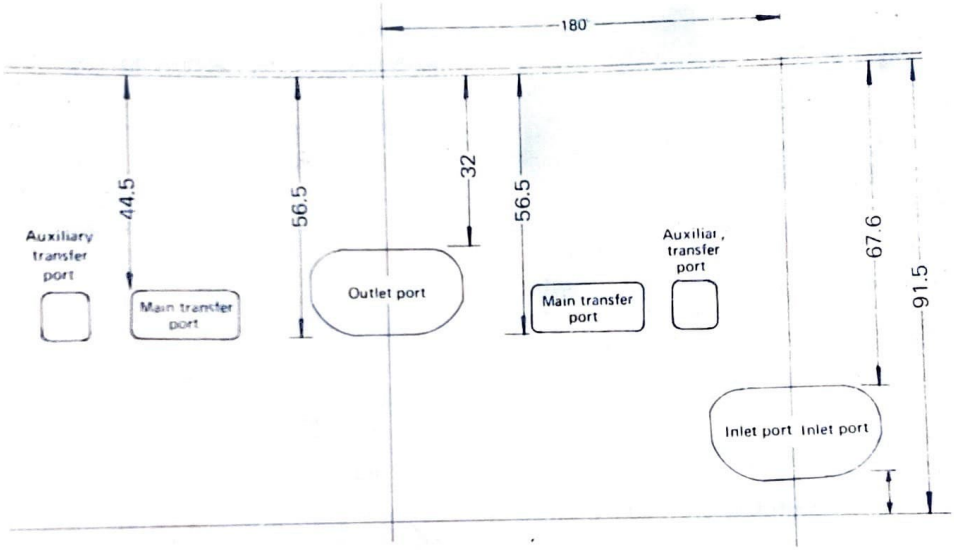


Fig. 3-2-3

CHAPTER 4. ENGINE

The R5 engine is 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 should 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, thoroughly 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.

4–1 Removing the Engine

1. Warm up the engine for one minute or so, and then drain the oil from the transmission.

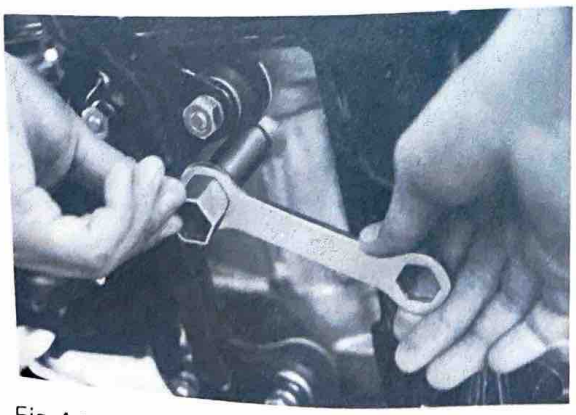


Fig. 4-1-1

○ 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.

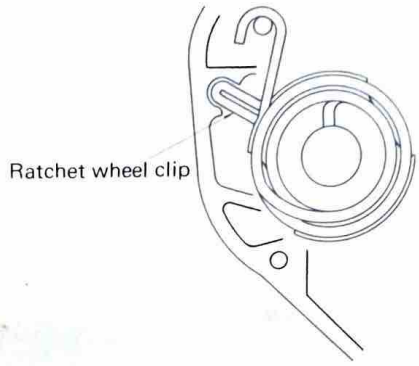


Fig. 4-1-2

3. Remove the gear change pedal.

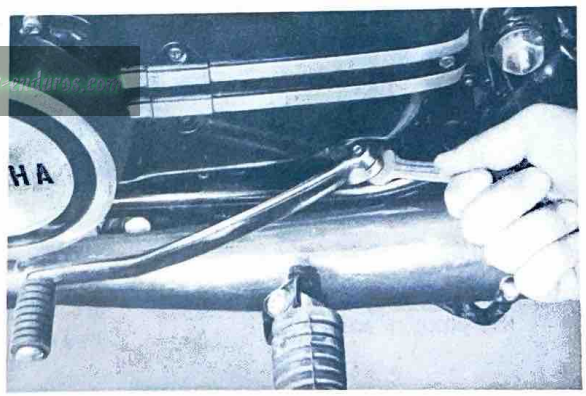


Fig. 4-1-3

4. Remove the dynamo cover.

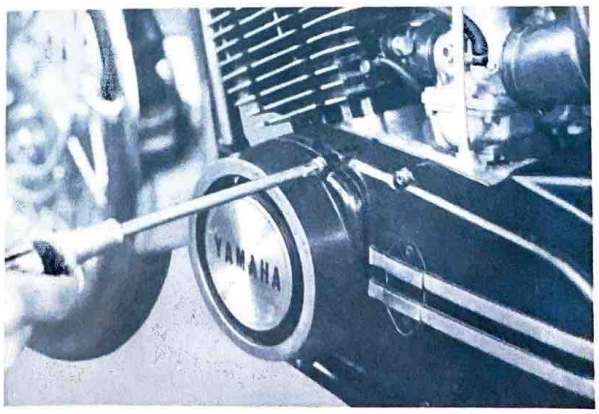


Fig. 4-1-4

5. Disconnect the clutch cable.

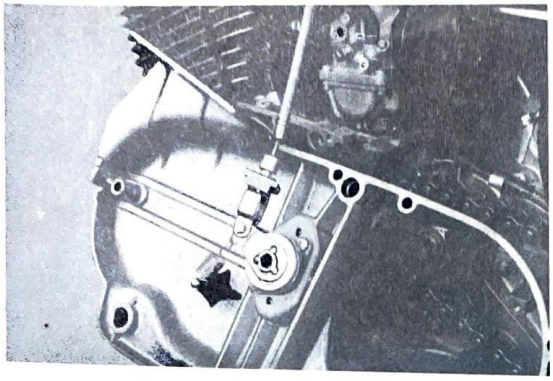


Fig. 4-1-5

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

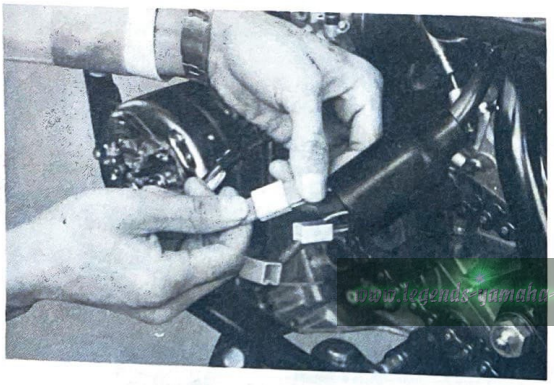


Fig. 4-1-6

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

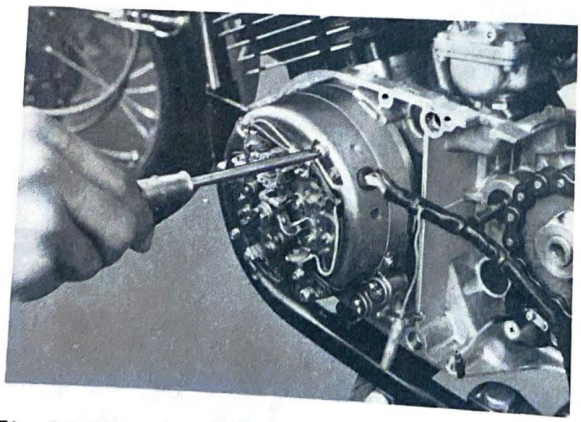


Fig. 4-1-7

8. Remove the armature bolt, governor and cam.

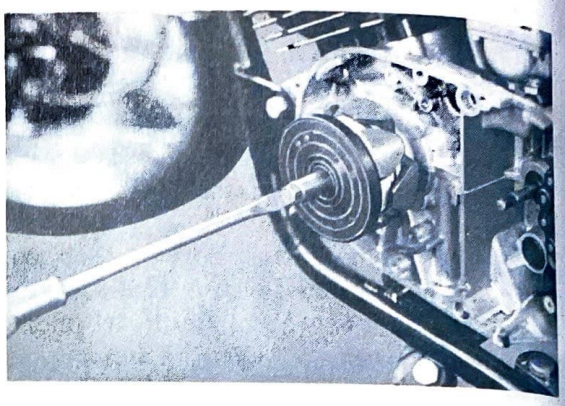


Fig. 4-1-8

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

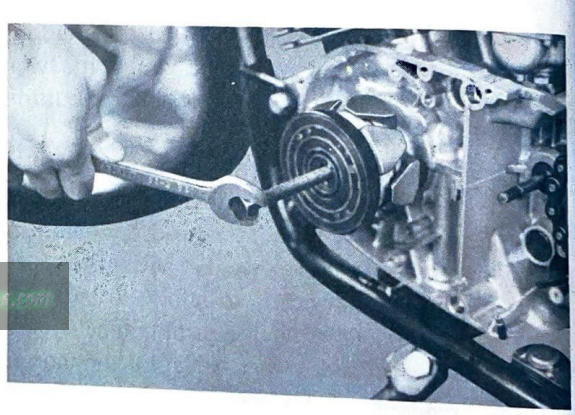


Fig. 4-1-9

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

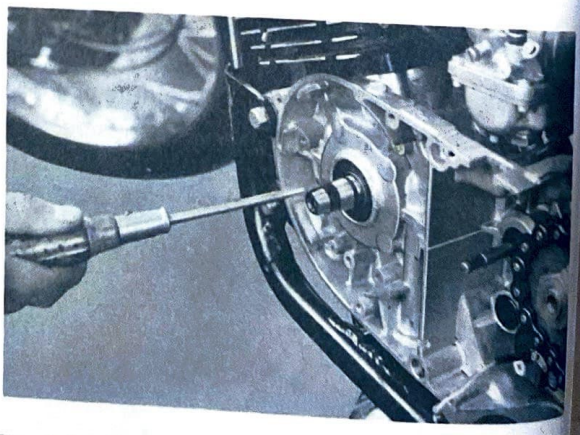


Fig. 4-1-10

11. Disconnect the chain at the master link.

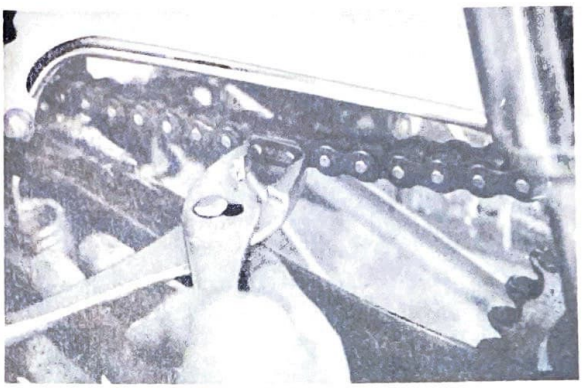


Fig. 4-1-11

The drive chain should be connected as shown below.
After connecting the chain, take the motorcycle off the so ground that the rear wheel fully rests on the ground. Measure the up-and-down movement of the chain at the center of the lower chain run, and adjust it so that the total up-and-down movement of the chain is about 0.8 in. (20 mm).

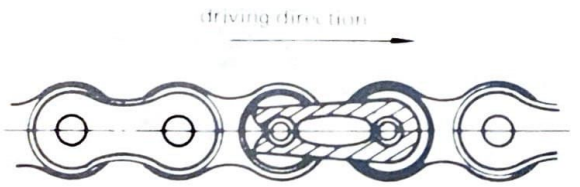


Fig. 4-1-12

12. Remove the oil pump cover.

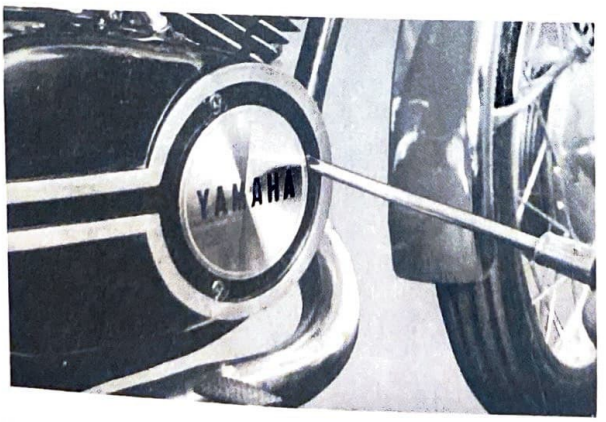


Fig. 4-1-13

13. Remove the oil line at the bottom of the oil tank.

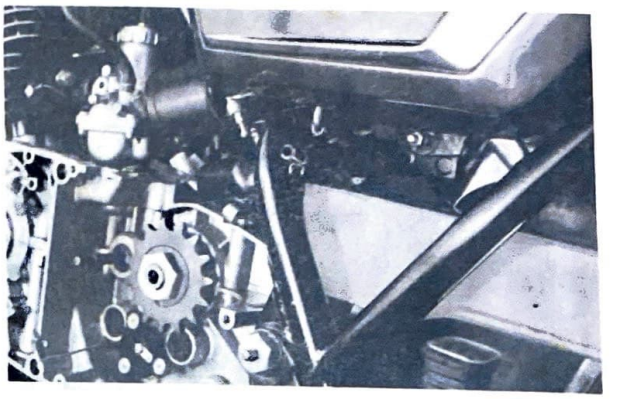


Fig. 4-1-14

14. Remove the pump cable.

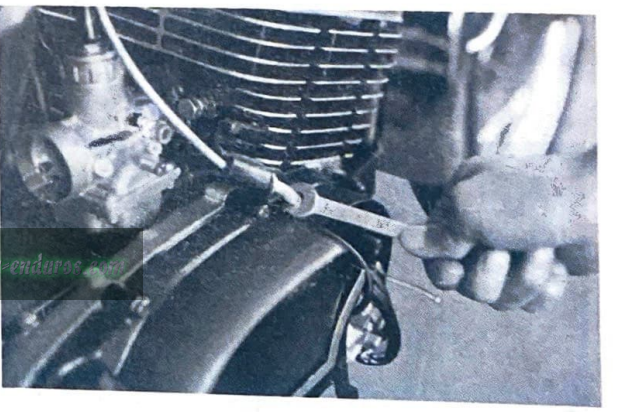


Fig. 4-1-15

15. Loosen the air cleaner clamp screws, and then remove air cleaner rubber.

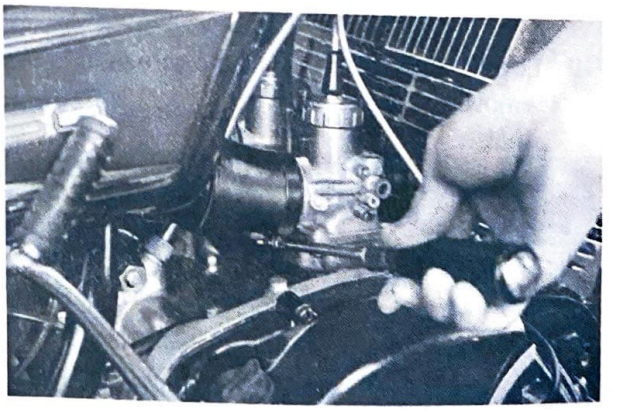


Fig. 4-1-16

16. Disconnect the cable from the tachometer drive.

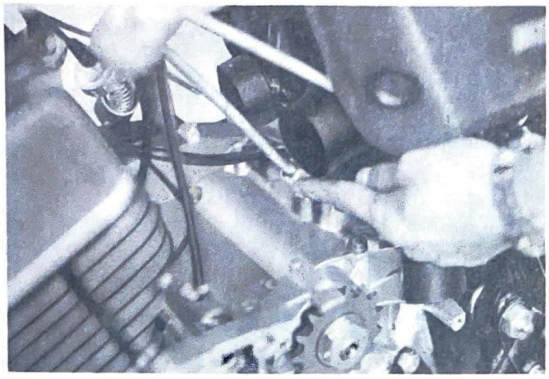


Fig. 4-1-17

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

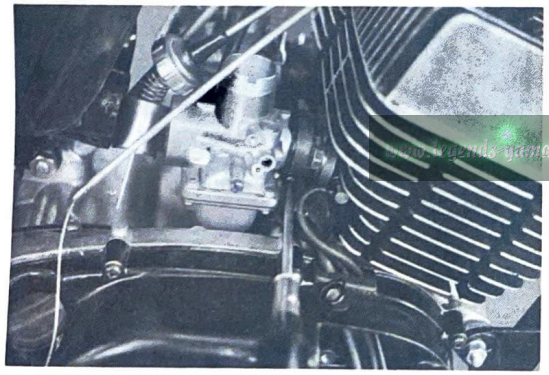


Fig. 4-1-18

19. Loosen the carburetor clamp screws, and then remove the carburetors.

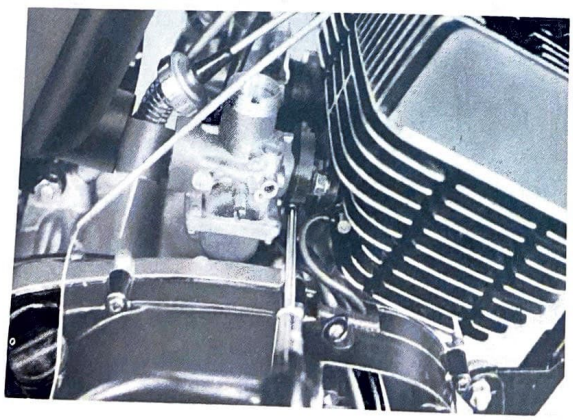


Fig. 4-1-19

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

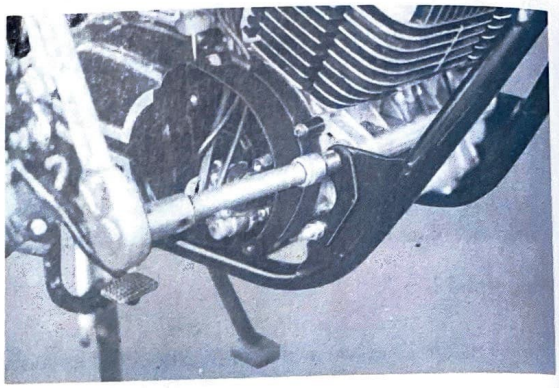


Fig. 4-1-20

21. Dismount the engine from the frame.

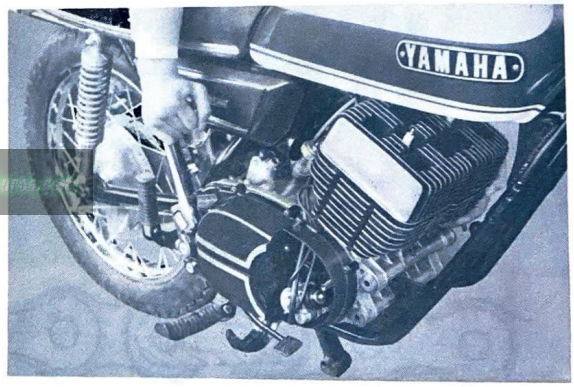


Fig. 4-1-21

4–2 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 tightened with a torque of 180 in/lbs (2 kg-m).

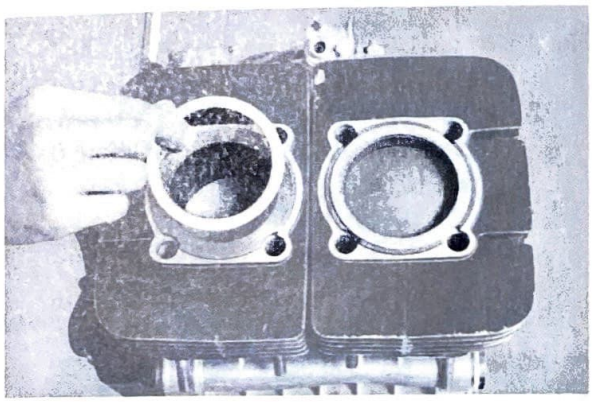


Fig. 4-2-1

2. Removing Carbon Deposits

Carbon deposits inside the cylinder head combustion chamber will result in an increase in the compression ratio, as well as pre-ignition and engine overheating.
Scrape the cylinder head clean.

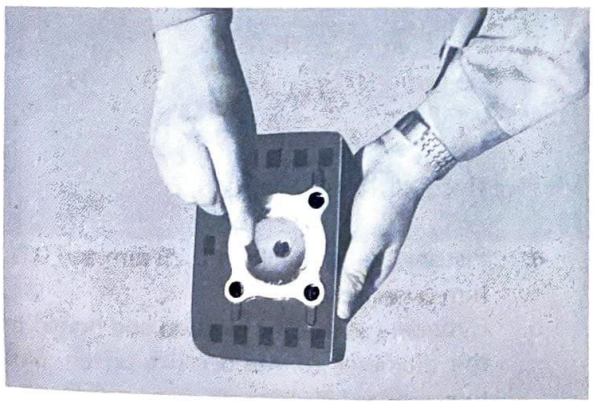


Fig. 4-2-2

4–3 Cylinder

1. Removing the Cylinder

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

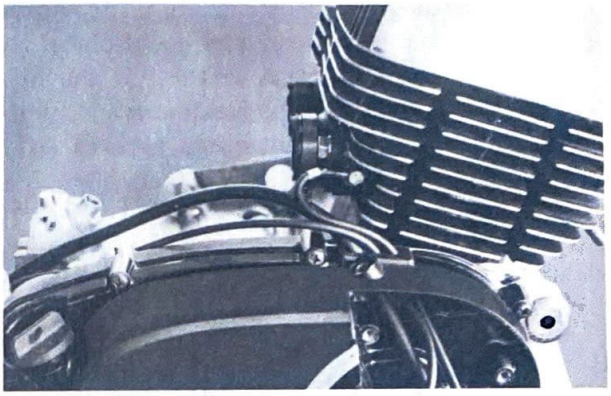


Fig. 4-3-1

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

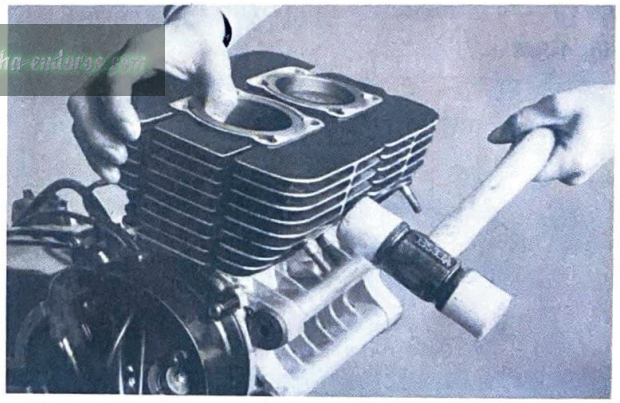


Fig. 4-3-2

3) Replace the cylinder base gaskets.

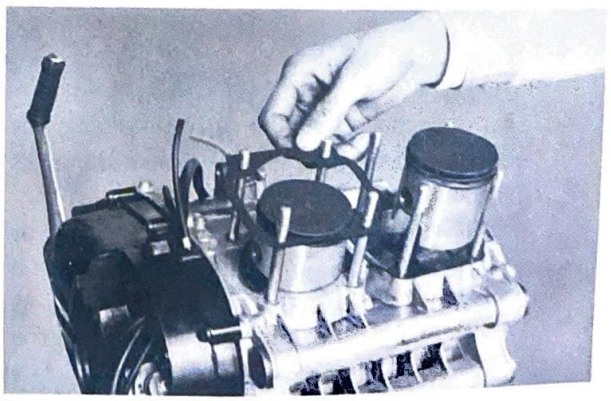


Fig. 4-3-3

2. Checking the Cylinder for Wear

1) In two-stroke engines, the maximum wear usually results in the upper area of the cylinder 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. If the difference between the maximum and minimum diameters measured exceeds 0.05 mm (0.0019 in.), rebore and hone the cylinder.

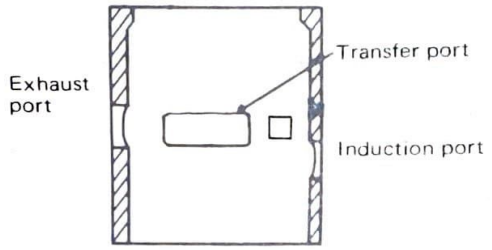


Fig. 4-3-4

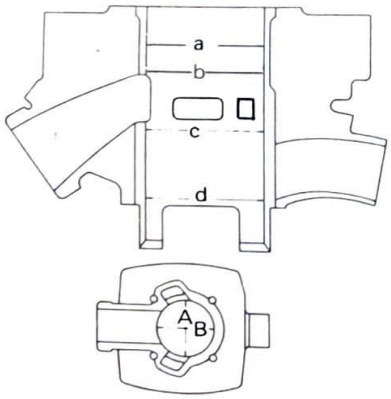


Fig. 4-3-5

2) To make sure that the cylinder boring has been correctly done, measurements should be made as illustrated below.
Measure each cylinder's bore diameter at three different depths (a, b and c) with a micrometer or a cylinder gauge placed at right angles and then in parallel to the crankshaft (A and B).

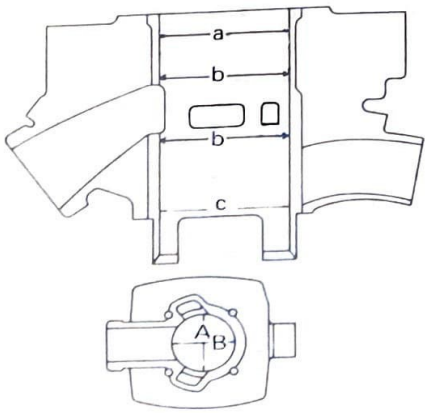


Fig. 4-3-6

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

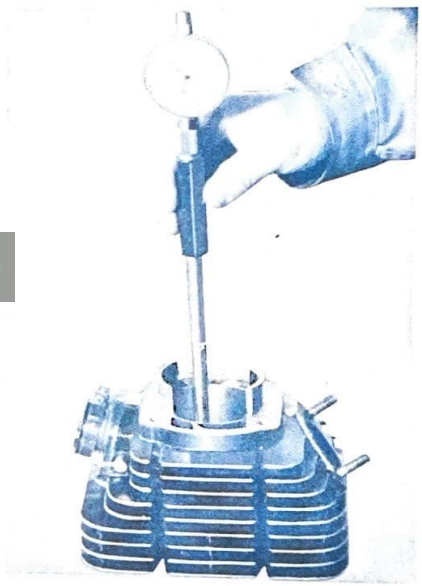


Fig. 4-3-7

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.

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.

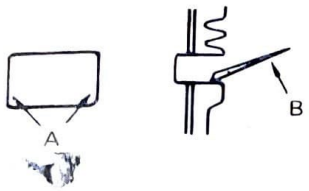


Fig. 4-3-8

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.

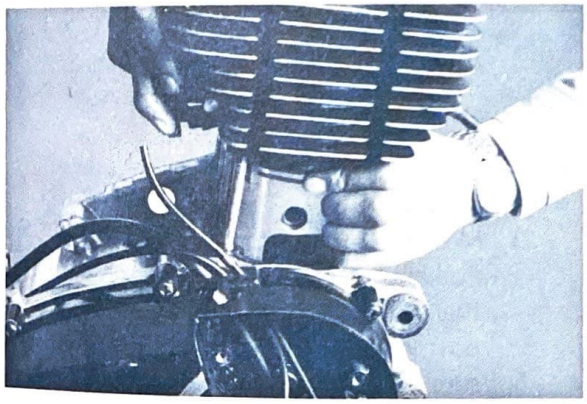


Fig. 4-3-9

4–4 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 rag, so you will not accidentally drop the clips into the crankcase.

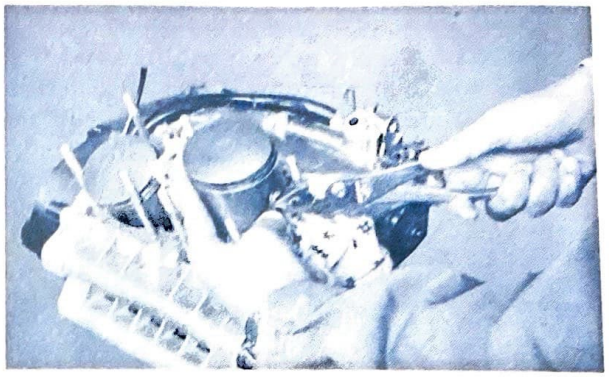


Fig. 4-4-1

2. Piston-to-Piston Pin Fit

The piston pin should fit snugly in its bore so that it drags a little as you turn it. It 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.

Fig. 4-4-2

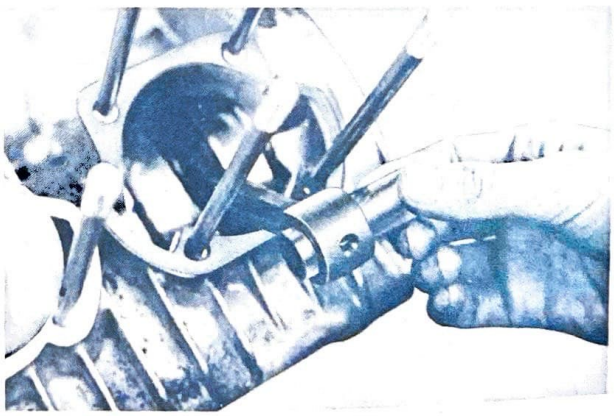


Fig. 4-4-3

4–5 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.

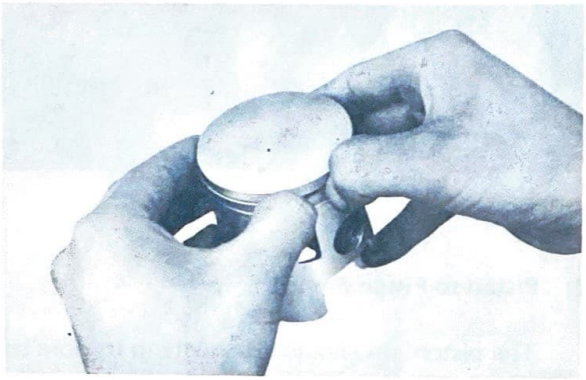


Fig. 4-5-1

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 ring faces upward.

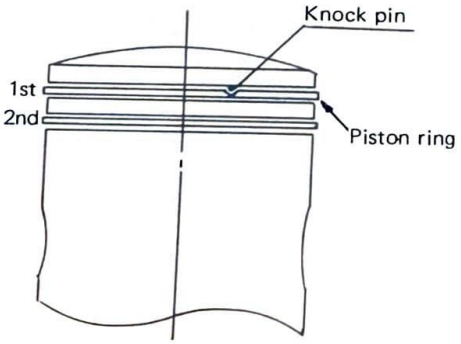


Fig. 4-5-2

3. Checking the Piston Ring

1) Piston Ring Wear
Improper contact between the piston 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.

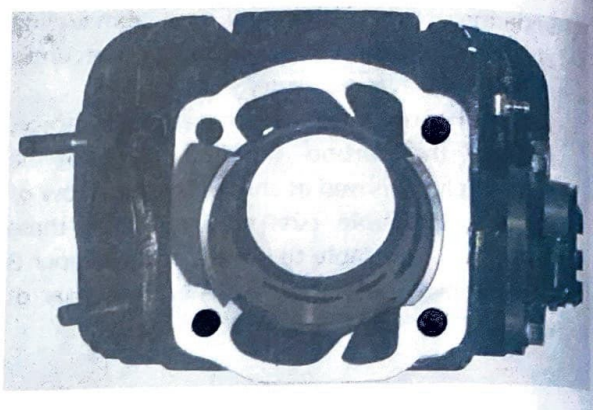


Fig. 4-5-3

Fig. 4-5-4 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.

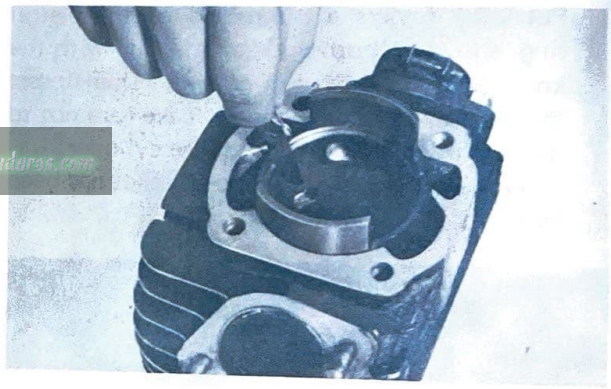


Fig. 4-5-4

2) Measuring the piston ring for wear
Put the piston ring into the cylinder so that the ring is in parallel with the bottom edge of the cylinder. Then measure the gap between both ends of the ring with a feeler gauge.
End gap should be between 0.45 mm and 0.65 mm for both No. 1 and No. 2 rings.

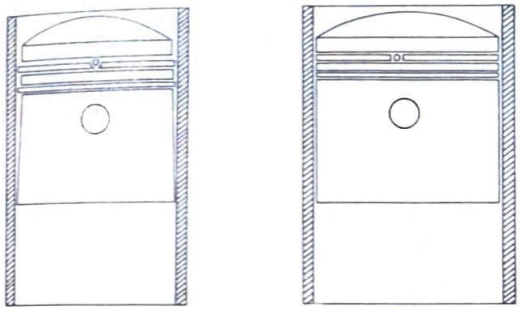
3) Removing carbon deposits
Carbon on the piston rings and in the ring grooves will make the rings stick to the piston, thus impairing cylinder performance, Remove the piston ring, and clean the rings and the piston ring grooves.

4–6 Piston

1. Checking and Reconditioning the Piston

a. Piston Shapes

The piston has a slightly tapered ring section when it is cold, as shown in Fig. 4-6-1 (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. 4-6-1 (B).



(A) (B)

Fig. 4-6-1

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 assumes a round shape, because the expansion at A (the piston pin bosses) is greater than at B.

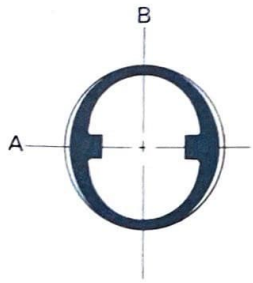


Fig. 4-6-2

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 maximum piston diameter, measure the piston with a micrometer at right angles to the pinhole 10 mm from its bottom edge, as shown in Fig. 4-6-3.

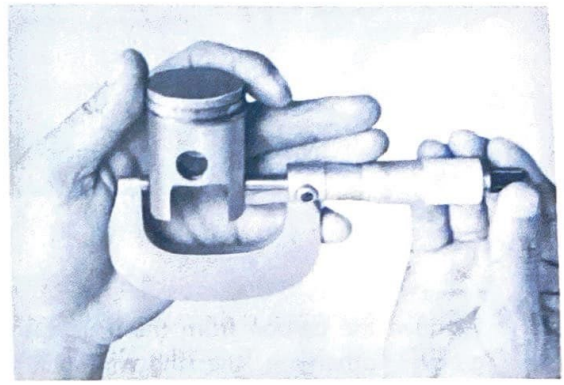


Fig. 4-6-3

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 cannot be corrected in this manner.

Fig. 4-6-4

d. Removing Carbon Deposits

Use a screw driver or broken hack saw blade to scrape off the accumulated carbon on the piston head.

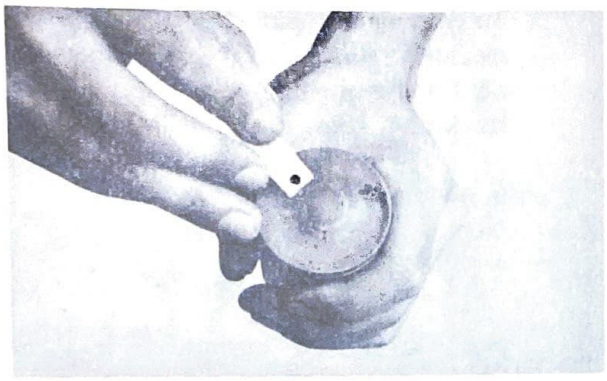


Fig. 4-6-5

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

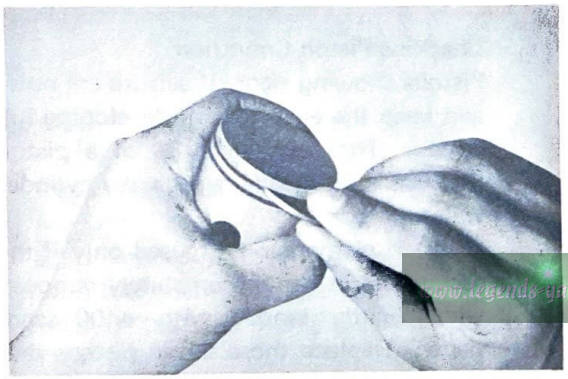


Fig. 4-6-6

2. **Piston Installation**

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

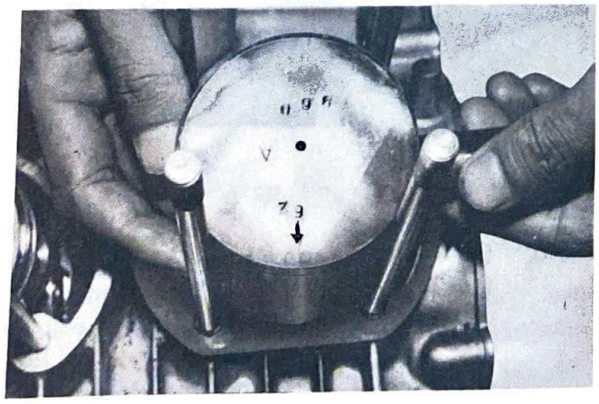


Fig. 4-6-7

4–7 Crankcase Cover (R)

1. Removal

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

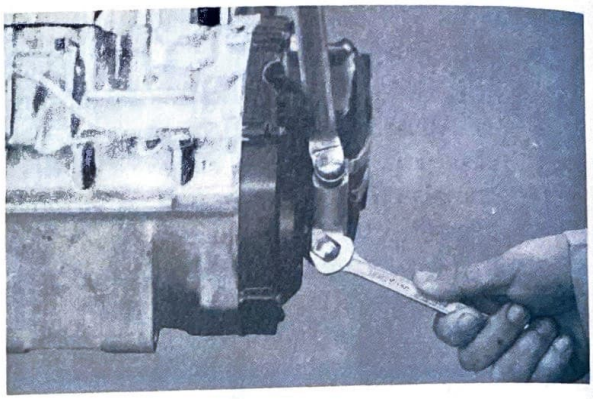


Fig. 4-7-1

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.)

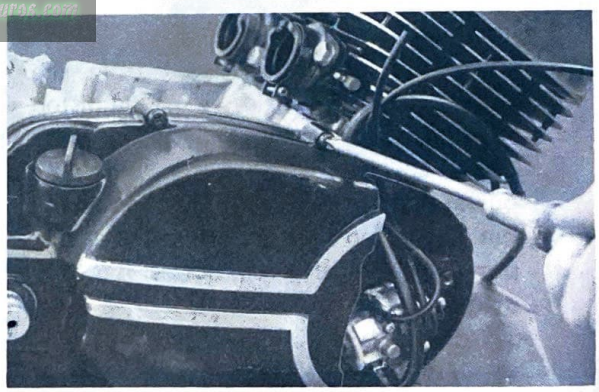


Fig. 4-7-2

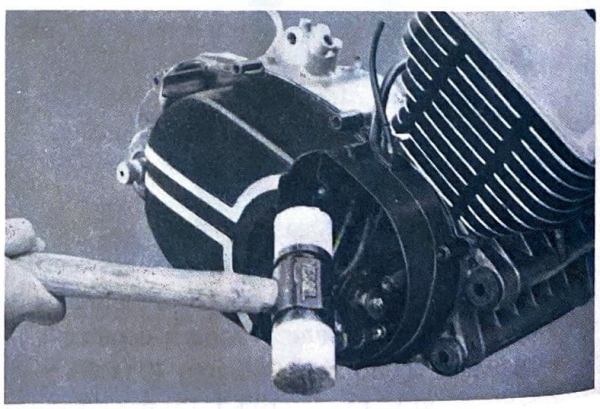


Fig. 4-7-3

3) Remove the crankcase cover gasket and replace it if damaged.

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 meshes with the primary driven gear.

4–8 Clutch

The purpose of the clutch is to permit the rider to couple or uncouple the engine and transmission. The R5 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)

Sectional View of the Clutch Assembly

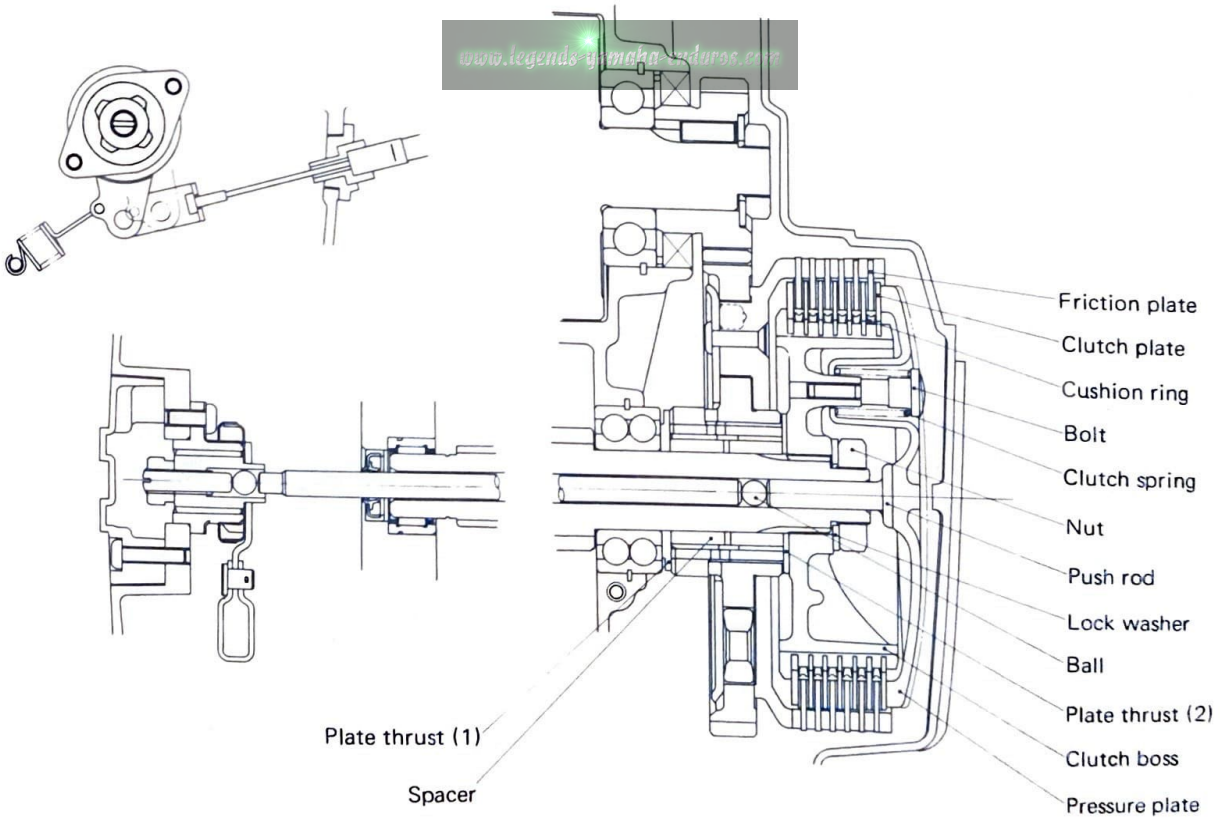
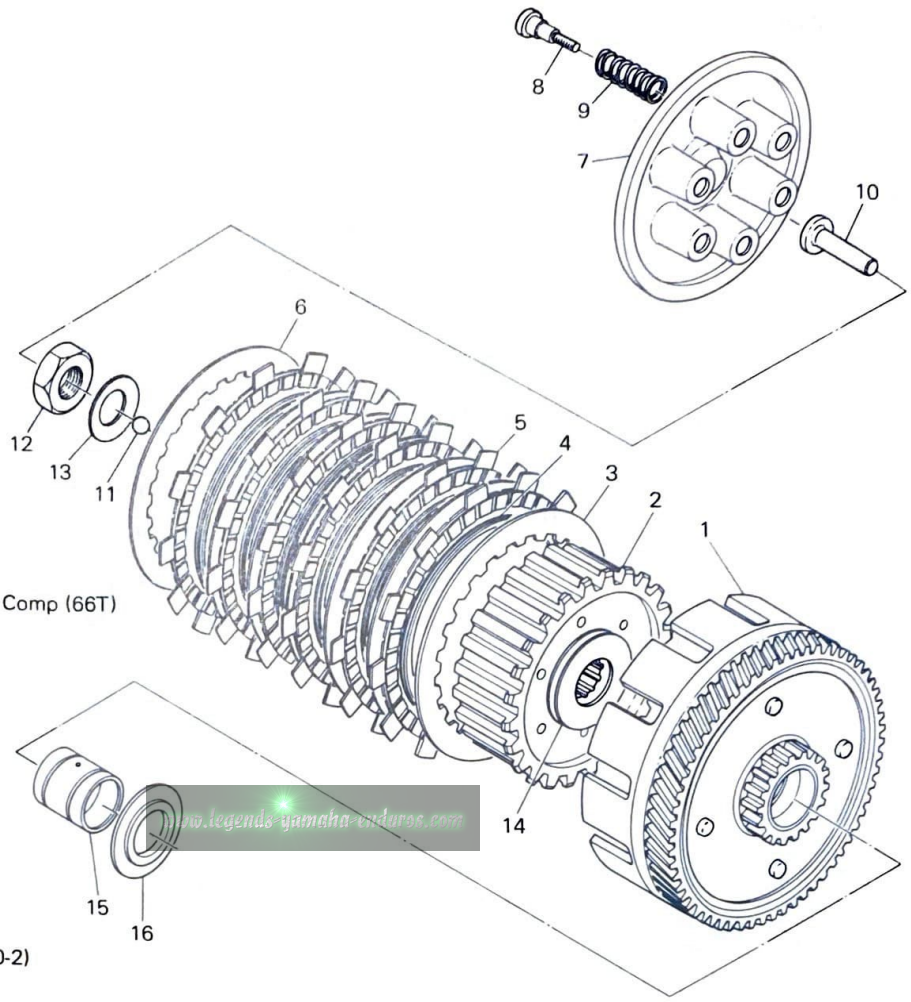


Fig. 4-8-1

Disassembled View of the Clutch Assembly



1. Primary Driven Gear Comp (66T)
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. Bellevile Spring
14. Thrust 2 Plate (25-50-2)
15. Spacer
16. Thrust 1 Plate (25-50-2)

1. Removing the Pressure Plate

Remove the six clutch spring holding screws, and take out both pressure plate and the push rod.

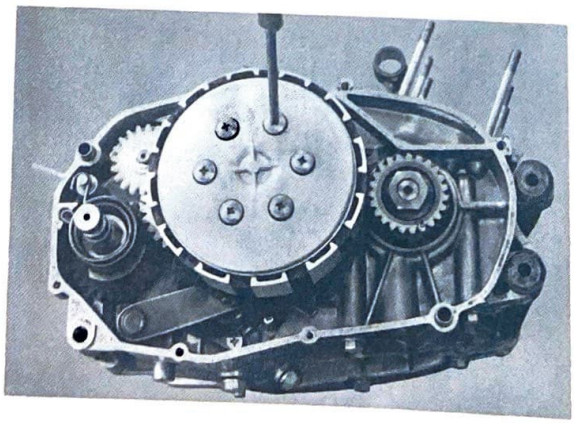


Fig. 4-8-2

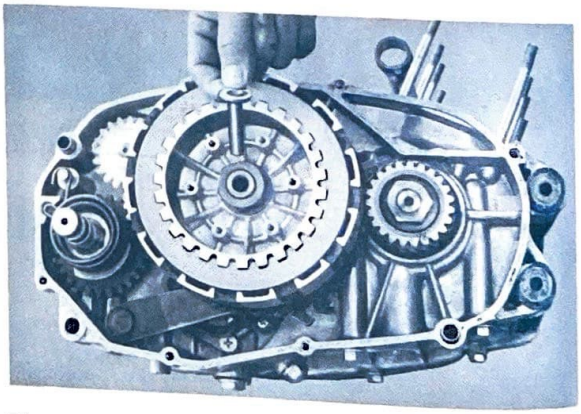


Fig. 4-8-3

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.

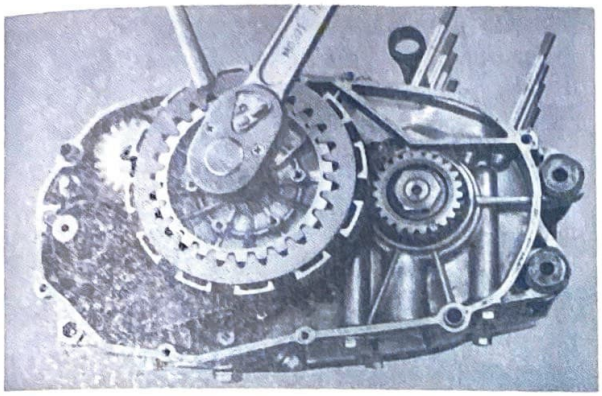


Fig. 4-8-4

3. Checking the Clutch Spring

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

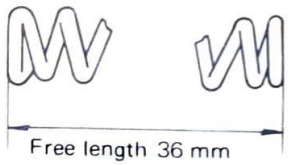


Fig. 4-8-5

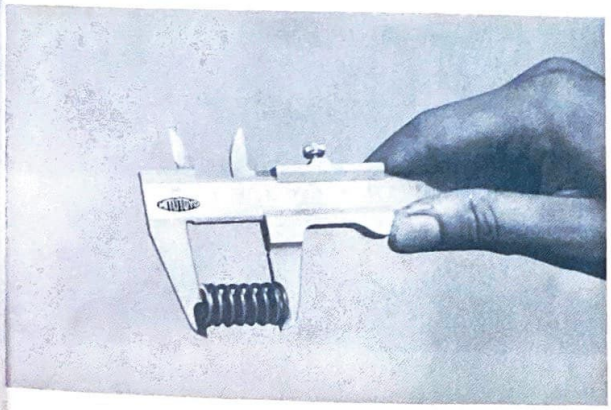


Fig. 4-8-6

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.

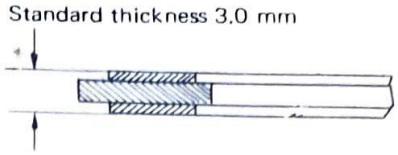


Fig. 4-8-7

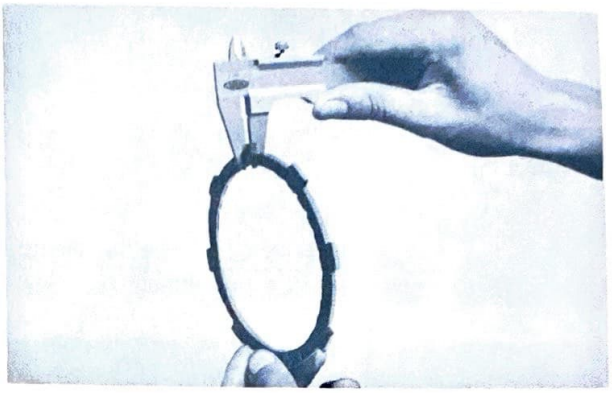


Fig. 4-8-8

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 scratches with fine grain sandpaper or with 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.

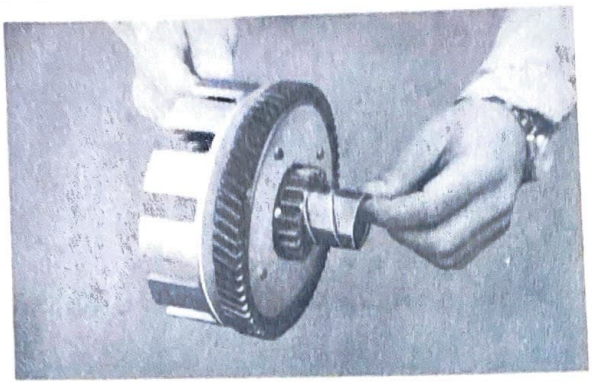


Fig. 4-8-9

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

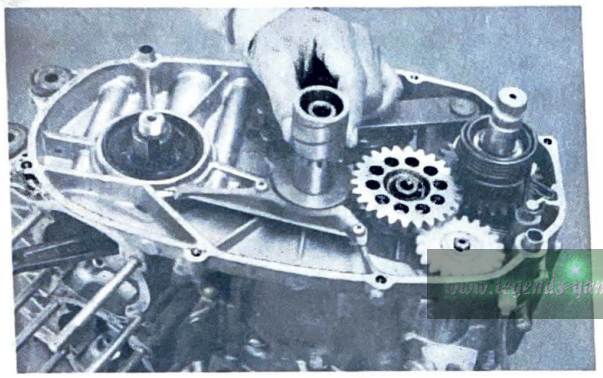


Fig. 4-8-10

7. Installing the Cushion Ring

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

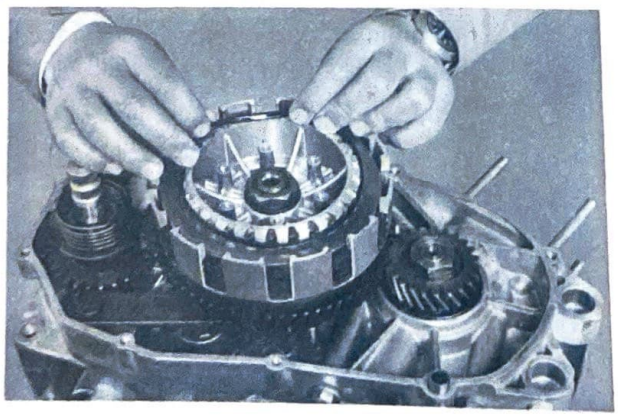


Fig. 4-8-11

8. Note for Reassembling the Clutch

On both ends of the primary gear spacer are thrust washers and thrust bearings. If these washers and bearings are incorrectly installed, or omitted, the clutch boss will rub against with 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 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, fully tighten it and then back off a 1/4 turn. Install the lock nut and tighten it.

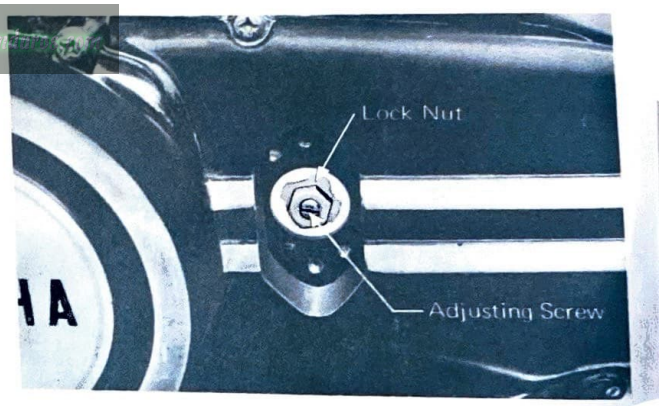


Fig. 4-8-12

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 ~ 0.012 in. (2 ~ 3 mm).
Any excessive cable play may result in poor clutch action. Or, if the cable is too tight, clutch slippage may result.

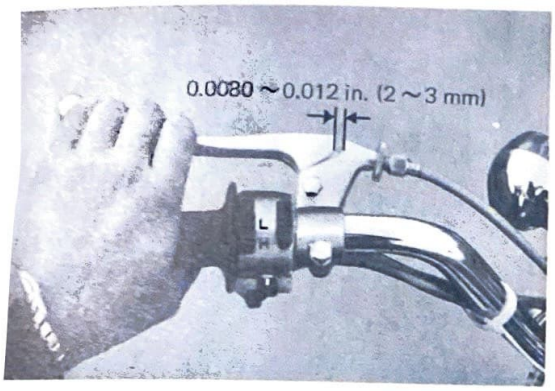


Fig. 4-8-13

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

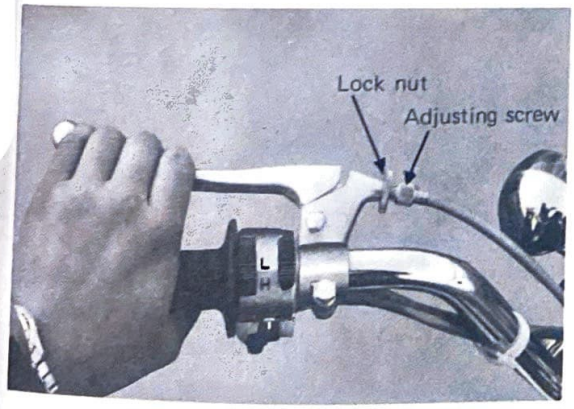


Fig. 4-8-14

4-9 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 not rotate.

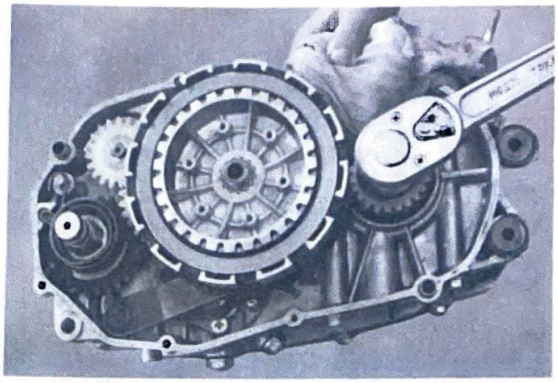


Fig. 4-9-1

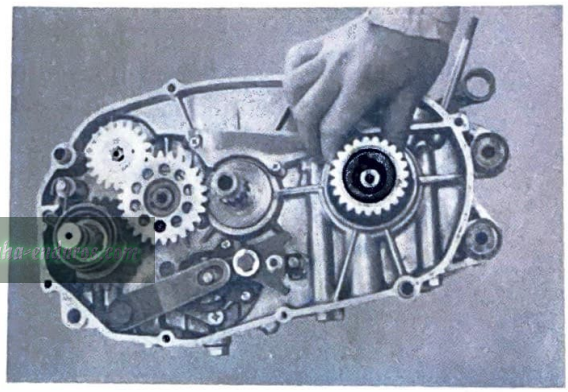


Fig. 4-9-2

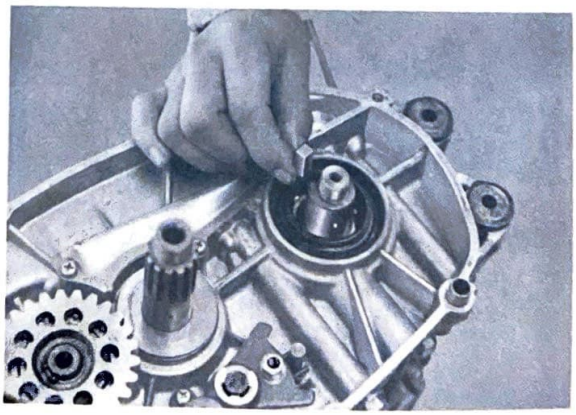


Fig. 4-9-3

4–10 Drive Sprocket

1. Removal

   1) Straighten the lock washer tab with a chisel.

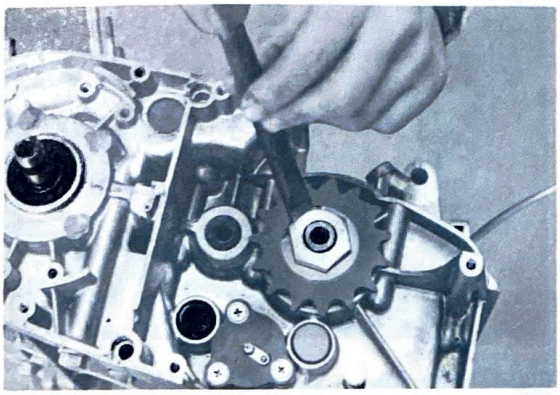


Fig. 4-10-1

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

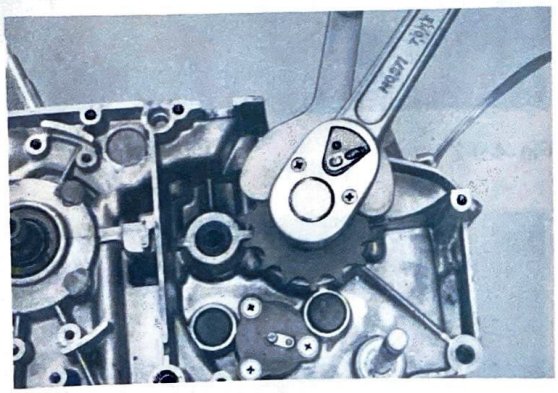


Fig. 4-10-2

   3) Remove both sprocket and spacer.

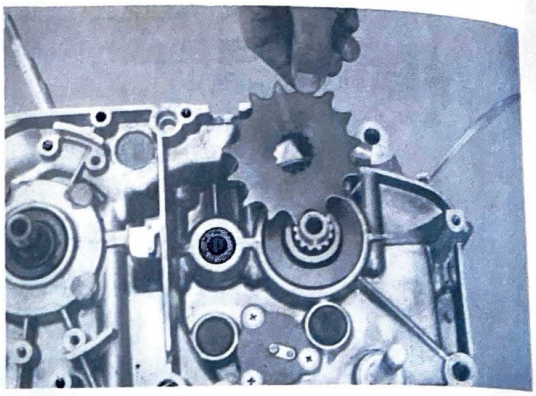


Fig. 4-10-3

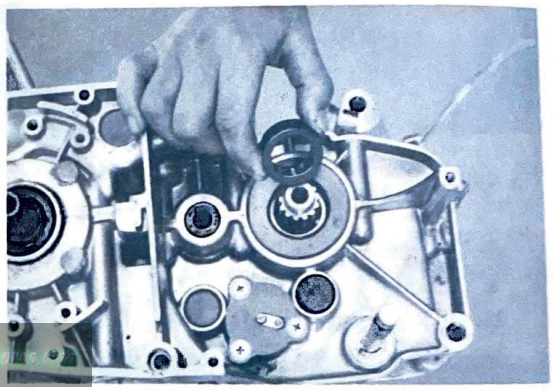


Fig. 4-10-4

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 chain. If there is excessive play between the sprocket and the new chain, replace the sprocket.

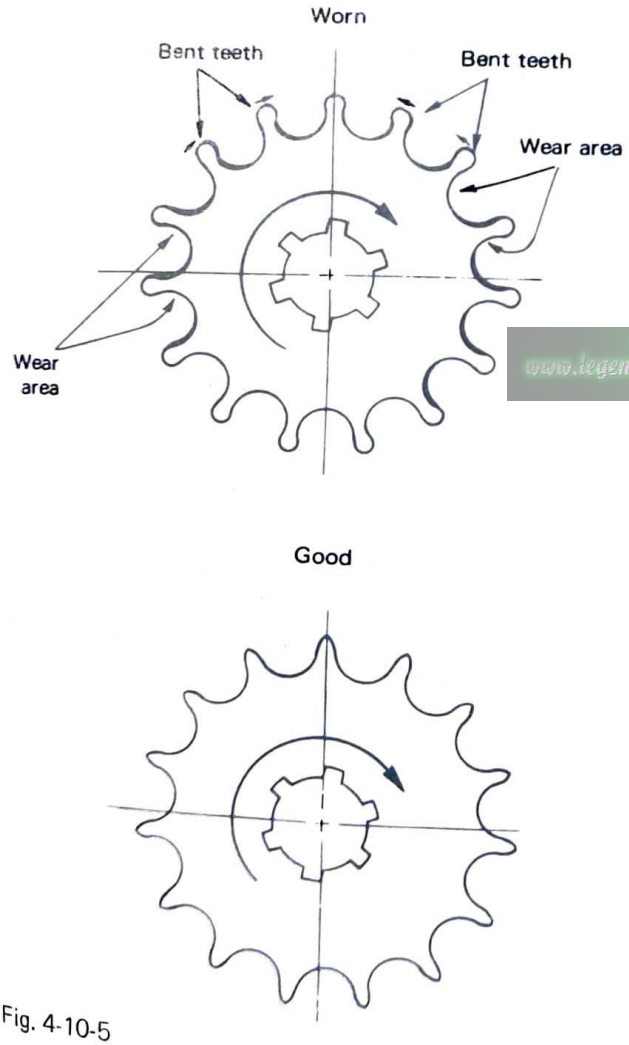


Fig. 4-10-5

Fig. 4-10-6

Clean the chain with solvent before checking it. Then hold the chain in your fingers, as shown in Fig. 4-10-7, and check whether the chain bends without curling.

Fig. 4-10-7

Next, suspend the chain as shown in Fig. 4-10-8. If the chain exhibits curvatures, (A, B and C) as shown in Fig. 4-10-9, it is defective. Replace it.

Fig. 4-10-8

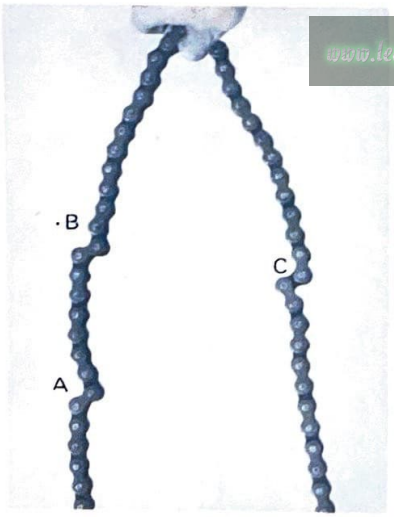


Fig. 4-10-9

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.

4–11 Splitting the Crankcase

The 350 R5 employs 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. a. Removing the Kick Idle Gear
Remove the clip, and then the kick idle gear.

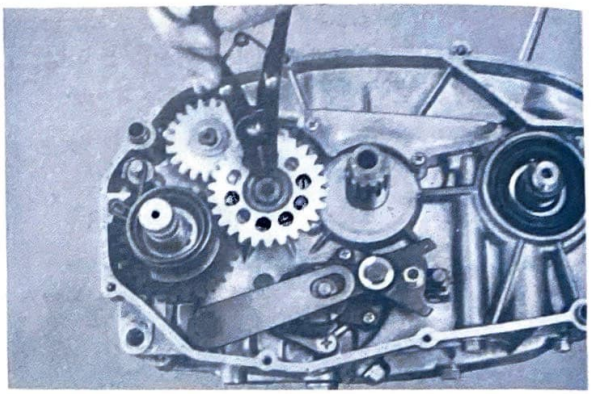
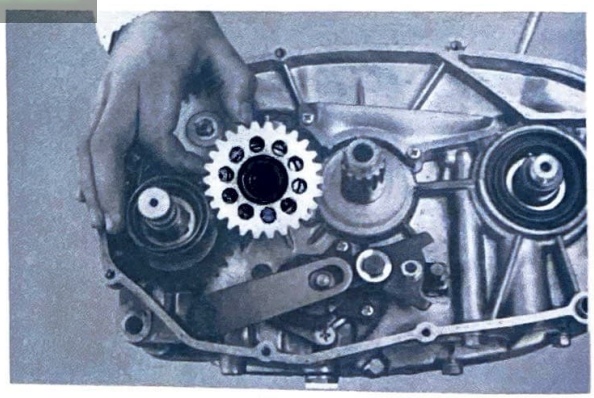


Fig. 4-11-1



Fi g. 4-11-2

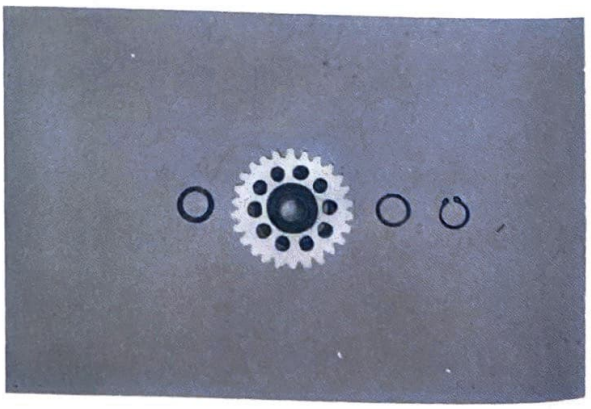


Fig. 4-11-3

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

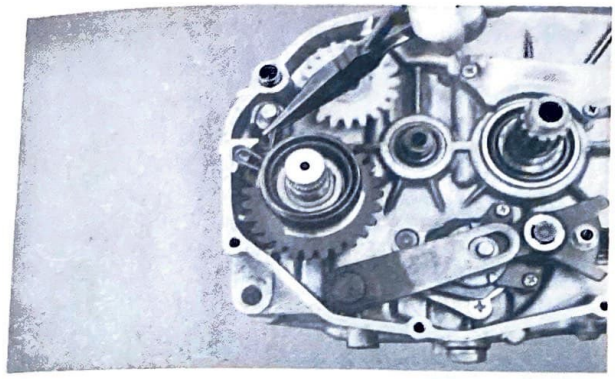


Fig. 4-11-4

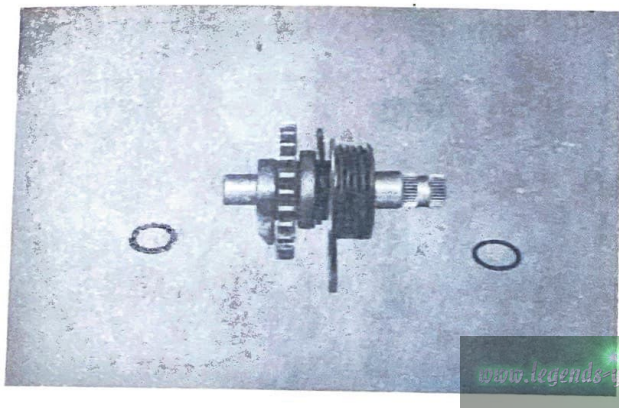


Fig. 4-11-5

c. Removing Gear Change Shaft Parts
1) Remove the change shaft sealing boot.

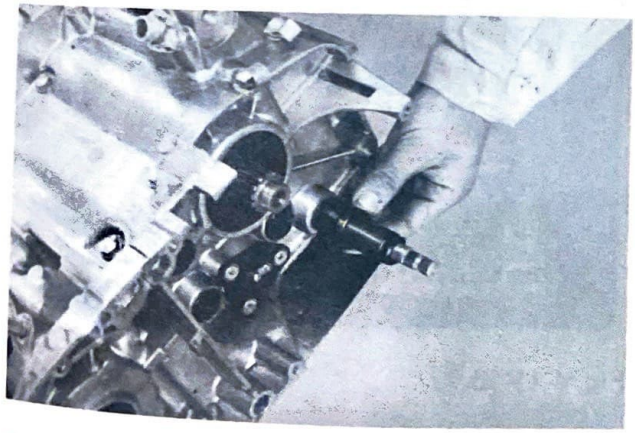


Fig. 4-11-6

2) Remove the change shaft circlip and the shim.

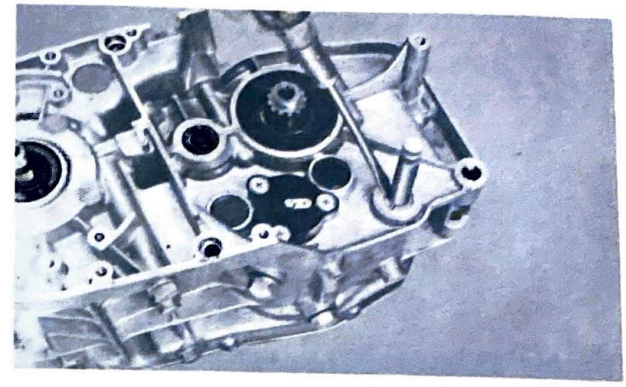


Fig. 4-11-7

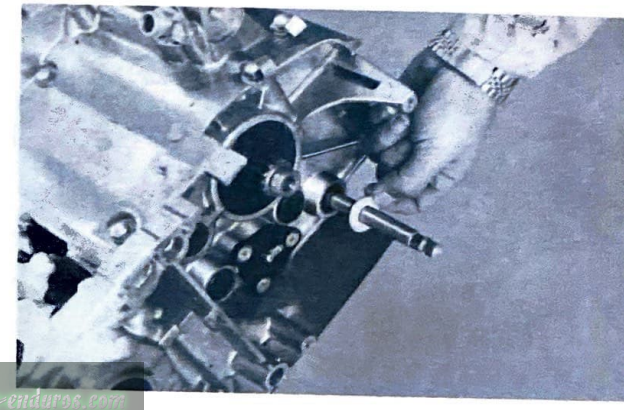


Fig. 4-11-8

3) Pull out the change shaft assembly.

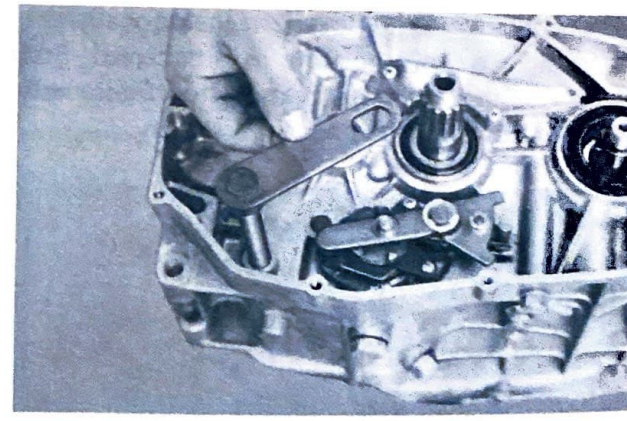


Fig. 4-11-9

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

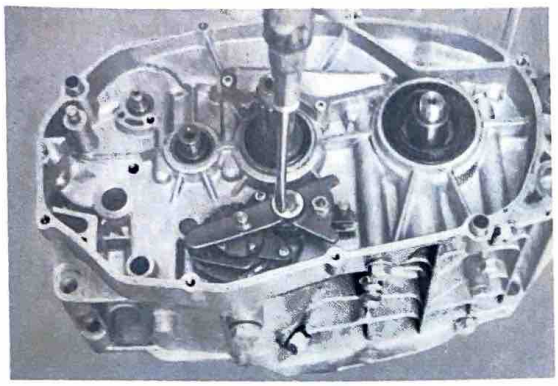


Fig. 4-11-10

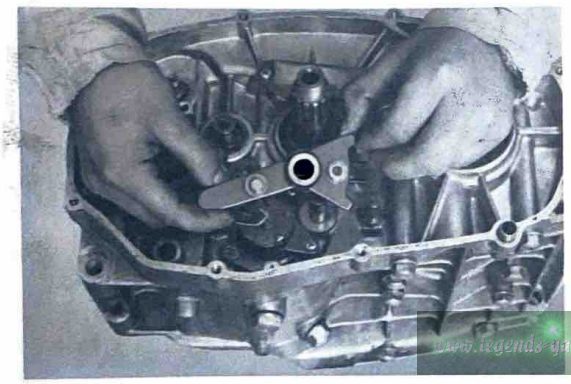


Fig. 4-11-11

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.

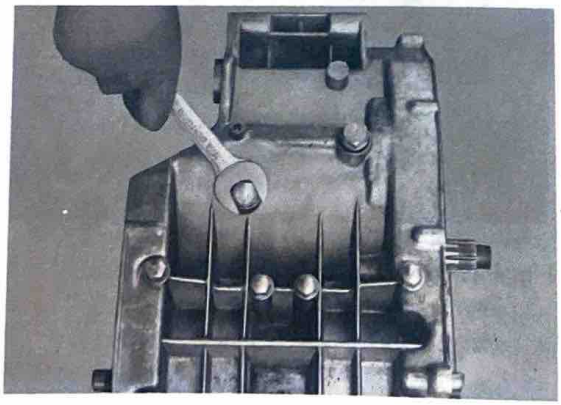


Fig. 4-11-12

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

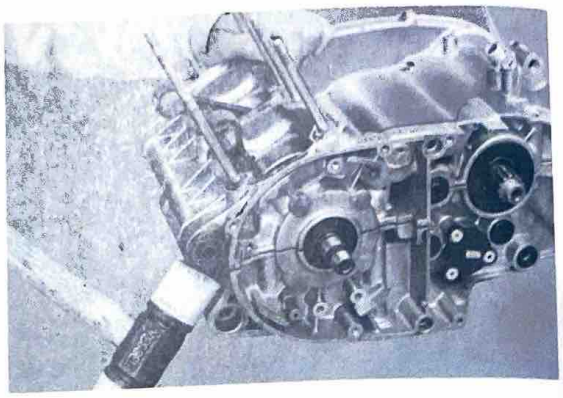


Fig. 4-11-13

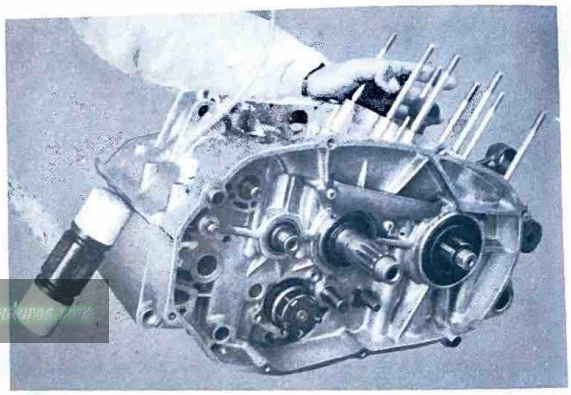


Fig. 4-11-14

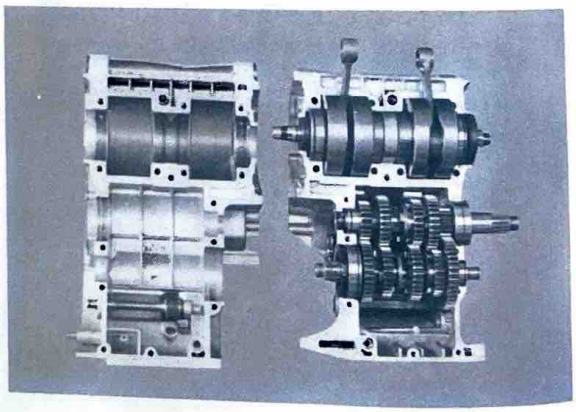


Fig. 4-11-15

e. Reassembling the Crankcase

Apply YAMAHA Bond No. 5 to the freshly cleaned mating surfaces of the crankcase, and assembly 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.)

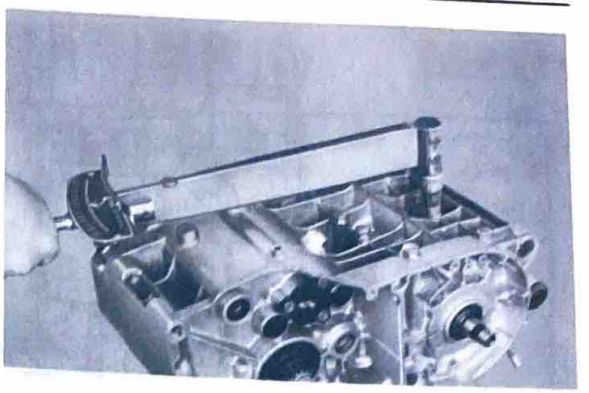


Fig. 4-11-16

4–12 Crankshaft

The crankshaft is one of the most precision components and liable to wear.

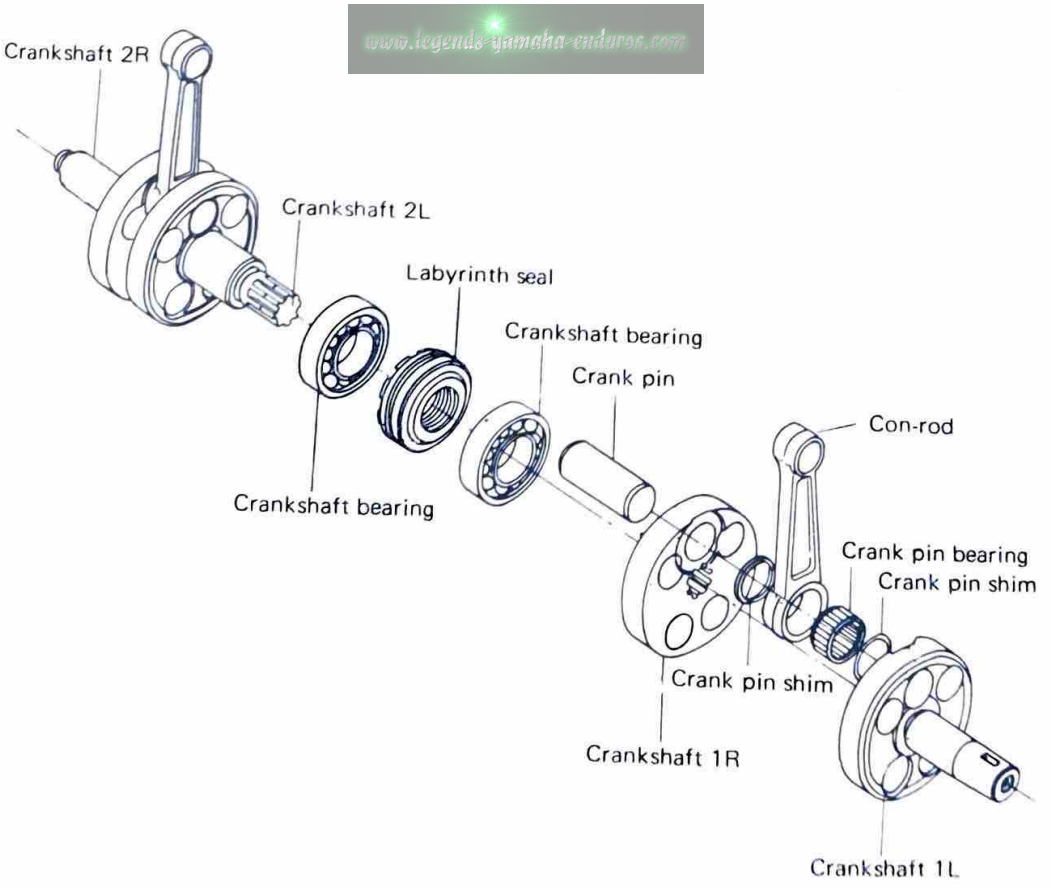


Fig. 4-12-1 Crankshaft Assembly Components

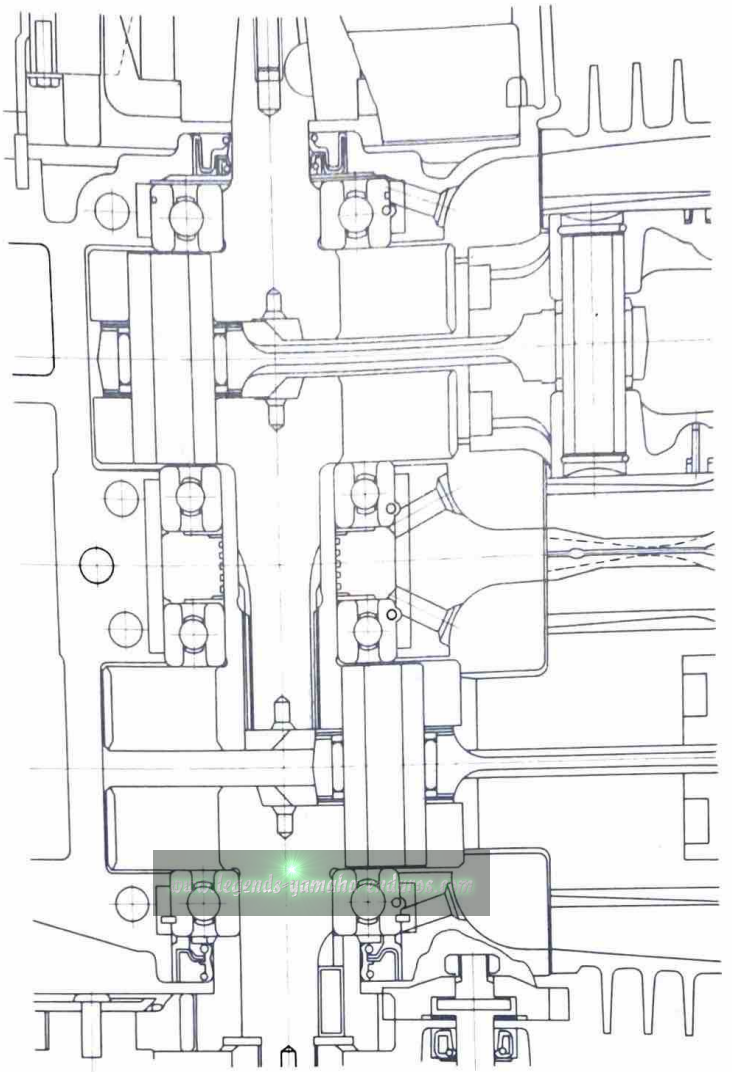


Fig. 4-12-2 Crankshaft Assembly Dimensions

1. Removing the Crankshaft Assembly

As shown in Fig. 4-12-3, remove the crankshaft by striking the shaft with a soft-faced hammer.

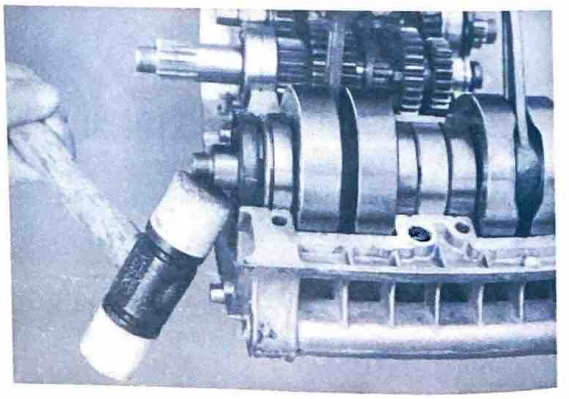


Fig. 4-12-3

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. 4-12-4)	Small end play should be not 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. 4-12-5)	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, disassemble the crankshaft assembly, and replace worn parts.
Accuracy of the crankshaft assembly: Check the crankshaft for runout at the two points as shown in Fig. 4-12-6.	Dial indicator reading at each point should be 0.03 mm or less.	If excessive runout exists, align the crank flywheel, with a brass hammer and wedge. (Strike the flywheel lightly with the hammer.)

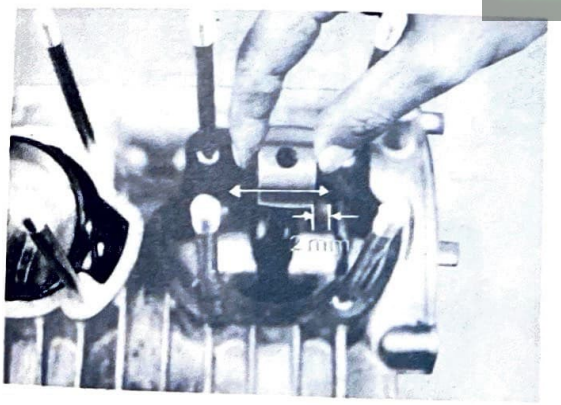


Fig. 4-12-4

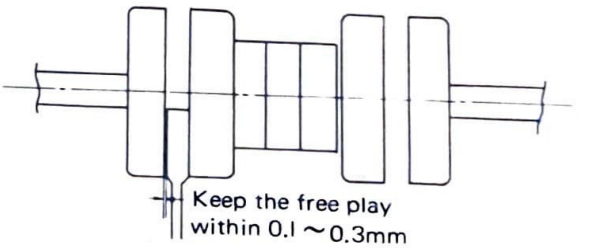


Fig. 4-12-5

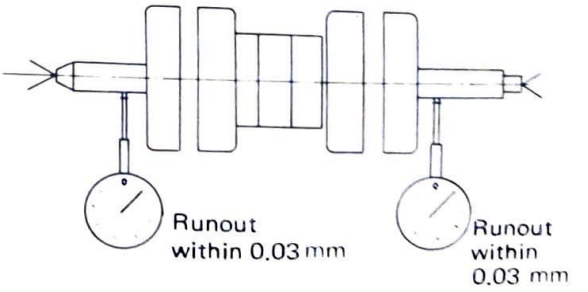


Fig. 4-12-6

3. Note for Crankshaft Assembly Installation

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

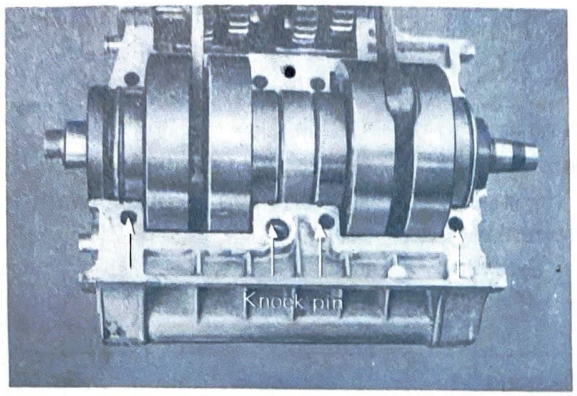


Fig. 4-12-7

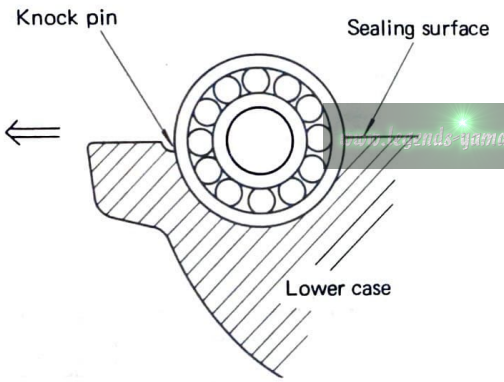


Fig. 4-12-8

2) Circlip
Install the circlip half on the bearing (on the clutch side), Fig. 4-12-9 shows the position of the circlip installation.

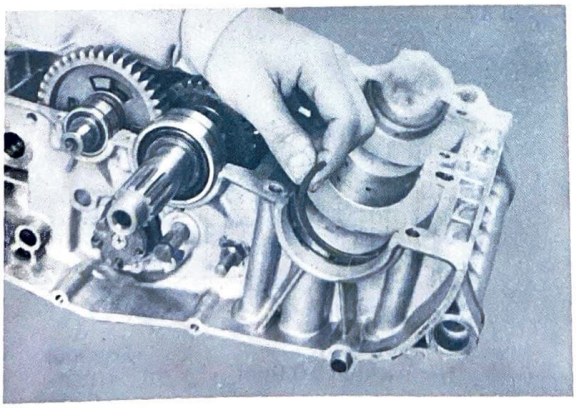


Fig. 4-12-9

3) Crankshaft Oil Seals (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.)

b. Oil seal (R) . . . on the clutch side

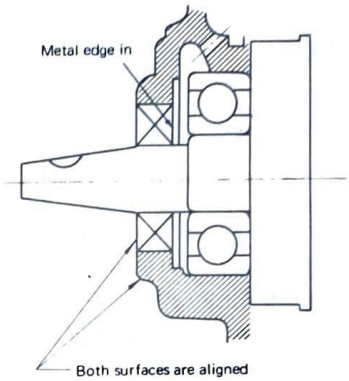


Fig. 4-12-10

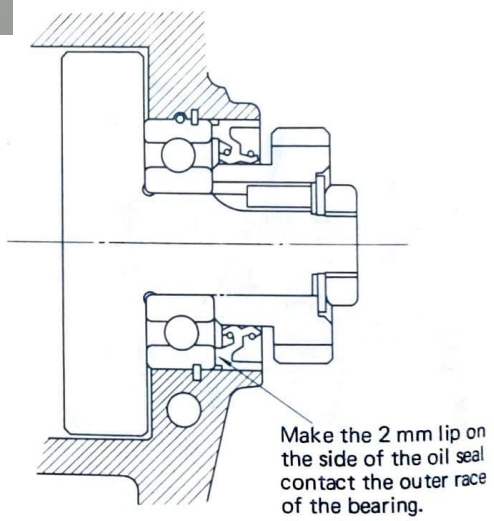


Fig. 4-12-11

4–13 Transmission

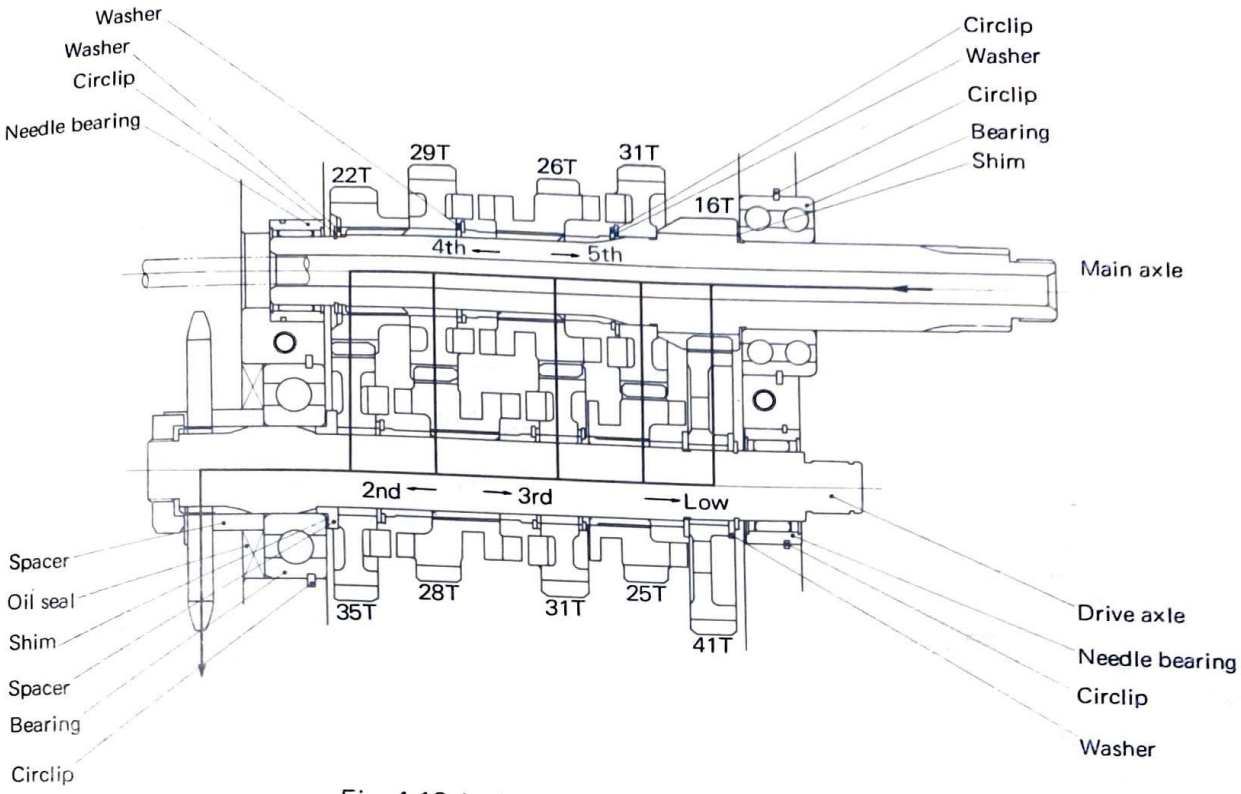


Fig. 4-13-1 Sectional View of Transmission

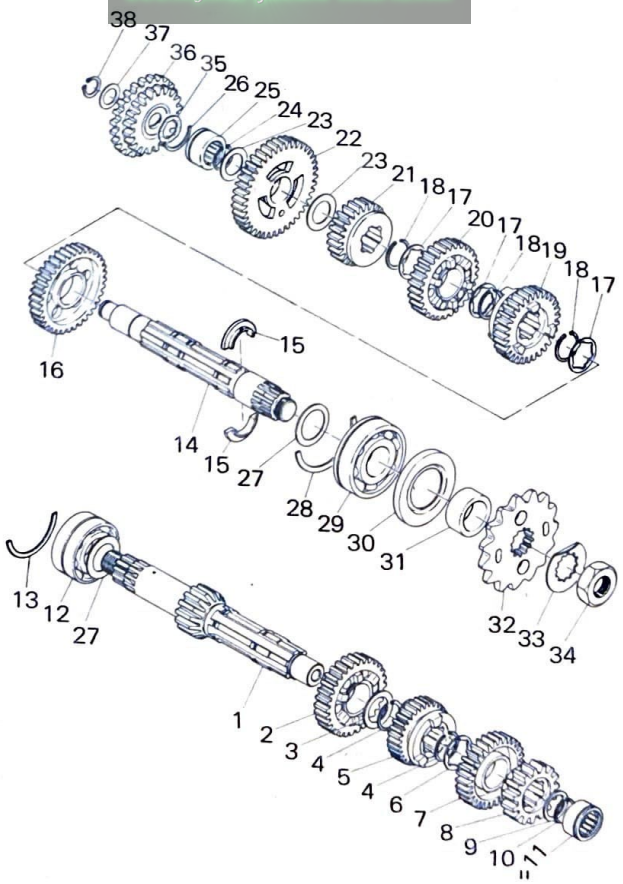


Fig. 4-13-2 Disassembled View of Transmission

Figs. 4-13-1 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 reduction ratios for each gear position are as follows:

	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	19.608
2nd	35/22 = 1.590	12.173
3rd	31/26 = 1.192	9.123
4th	28/29 = 0.965	7.388
Top	25/31 = 0.806	6.171

1. Removing the Transmission

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

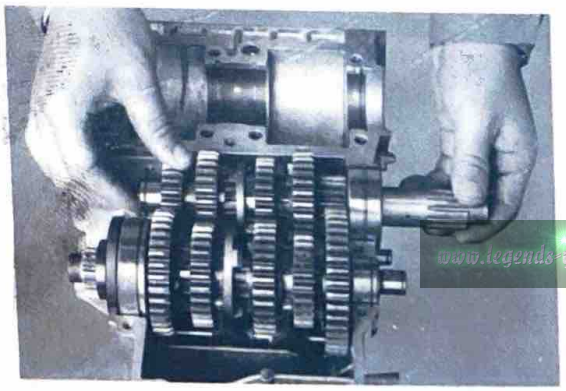


Fig. 4-13-3

2. Note for Transmission Installation

1) Circlip
Install the circlip half on the drive axle and main axle, Fig. 4-13-4 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.

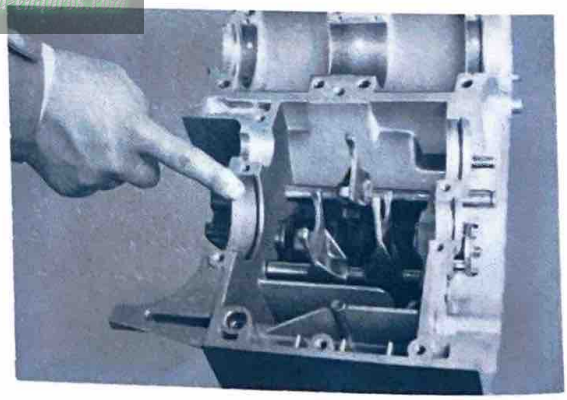


Fig. 4-13-4

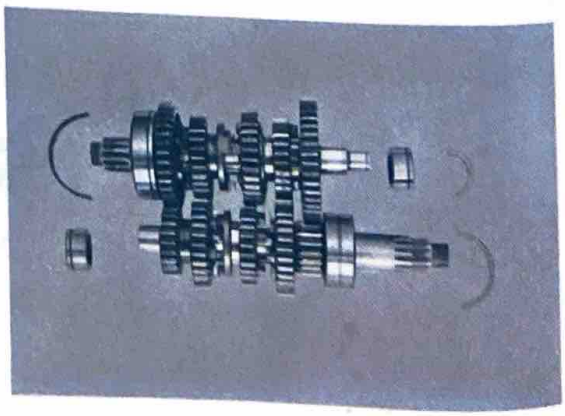


Fig. 4-13-5

4–14 Kick Starter

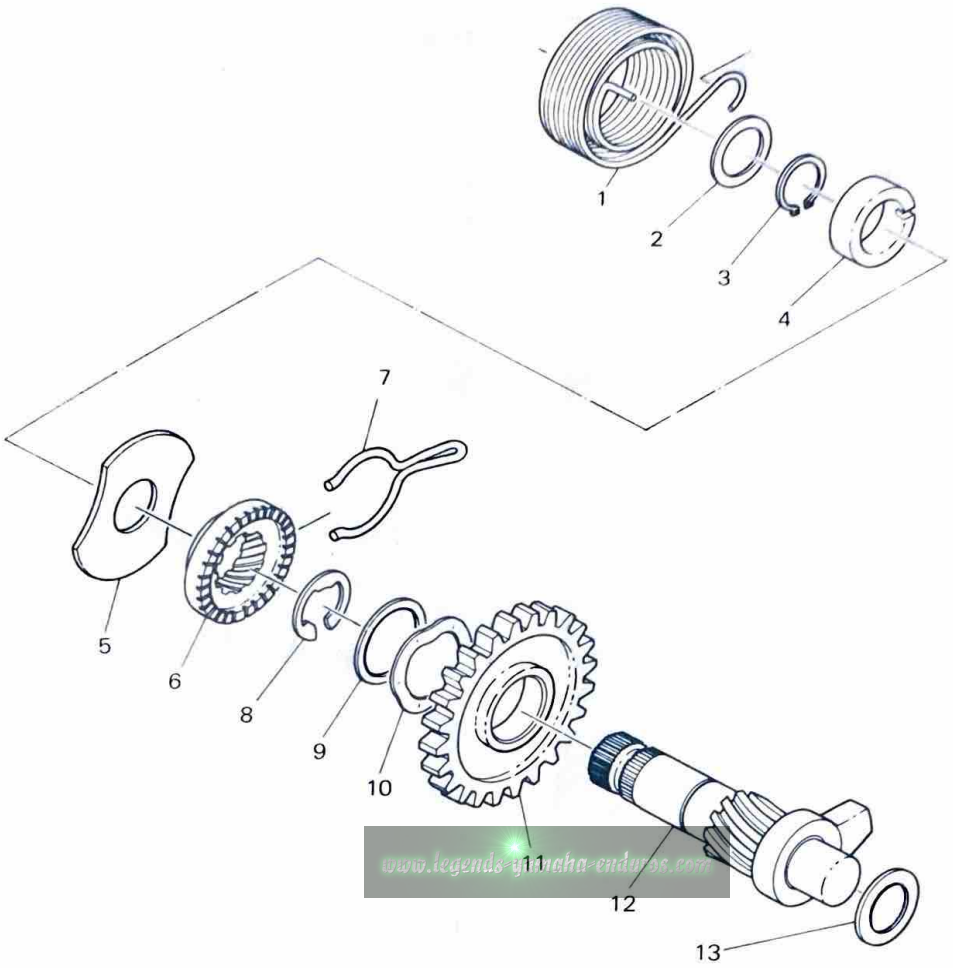


Fig. 4-14-1 Disassembled View of Kick Starter

1. Note for Installing the Kick Starter

   Position of the ratchet wheel clip.

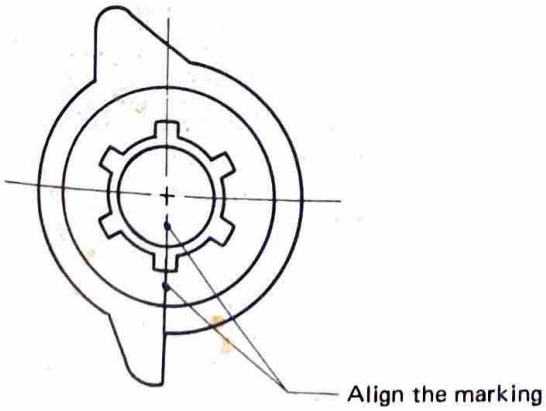


Fig. 4-14-2

4–15 Shifter

The YAMAHA 350 R5 employs the shifter drum type, instead of the cam plate type which is used in 250 DS6, this provides a smoother shifting action.

1. Removing the Shifter

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

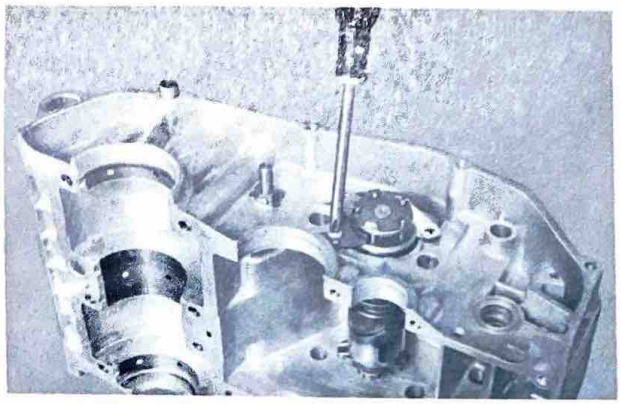


Fig. 4-15-1

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

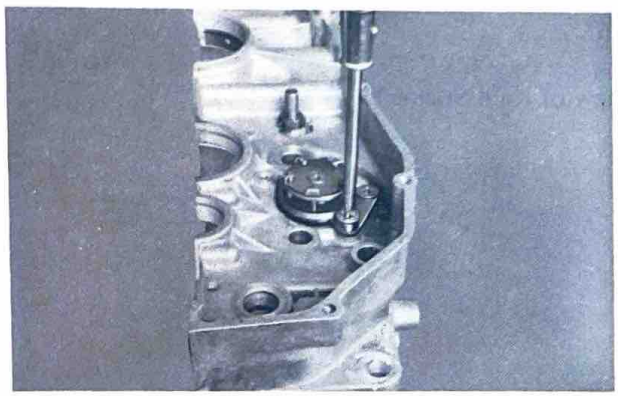


Fig. 4-15-2

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

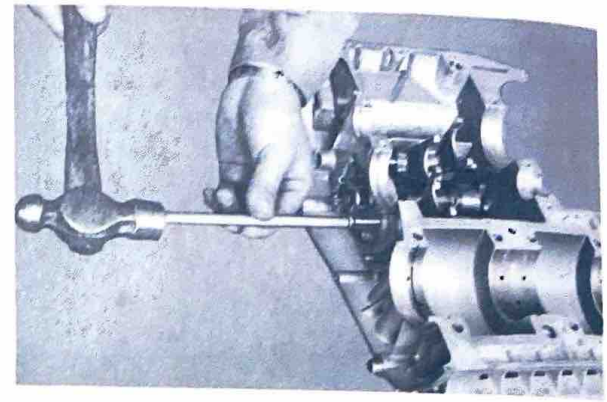


Fig. 4-15-3

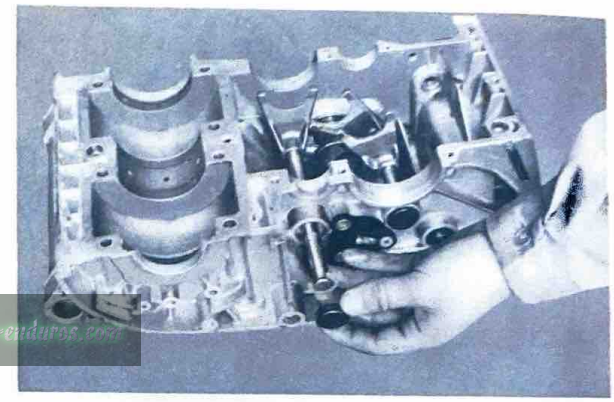


Fig. 4-15-4

4) Remove the change cam stopper.

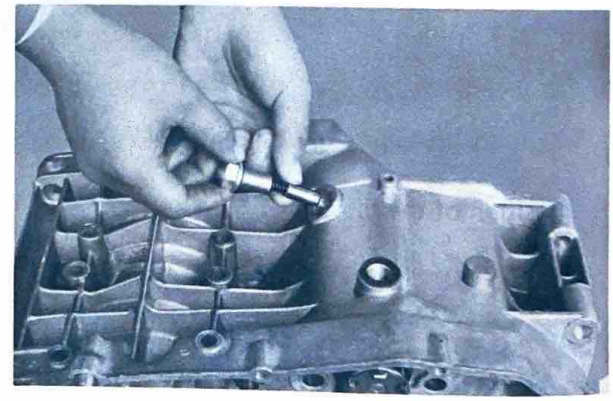


Fig. 4-15-5

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

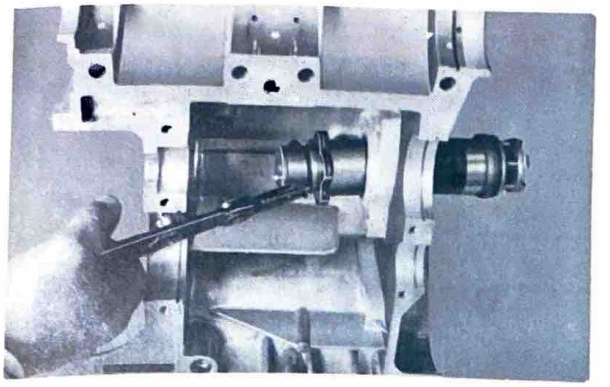


Fig. 4-15-6

2. Note on **Disassembling the Shifter.**

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

1) Position of the stopper plate L.

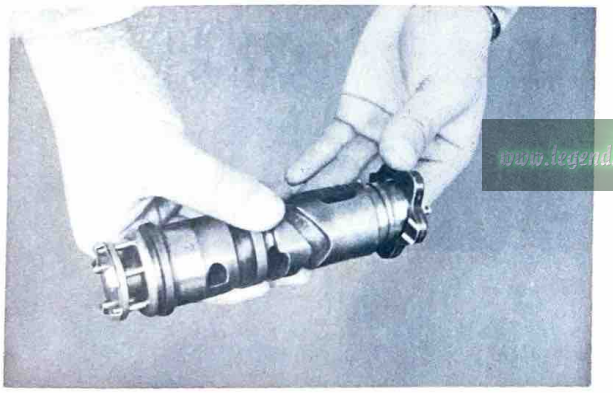


Fig. 4-15-7

2) Position of the stopper plate L circlip.

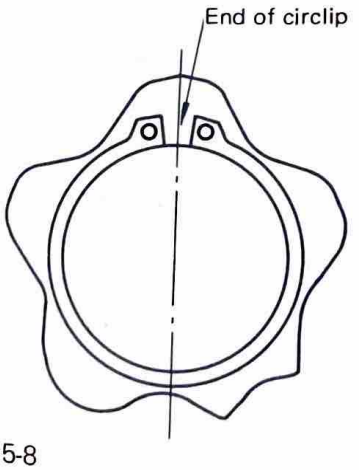


Fig. 4-15-8

3) How to set change lever (#3) and shift cam.
Set the change lever (#3) and shift cam pin as shown in Fig. 4-15-9. Note that width a and a' must be the same.

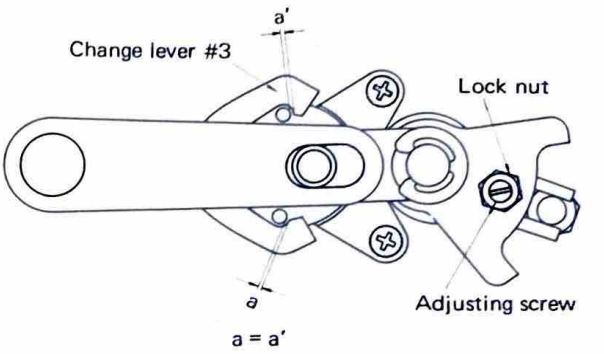


Fig. 4-15-9

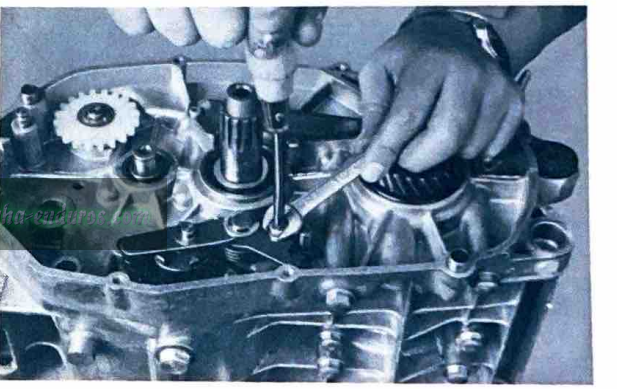


Fig. 4-15-10

4) Position of the shift fork.

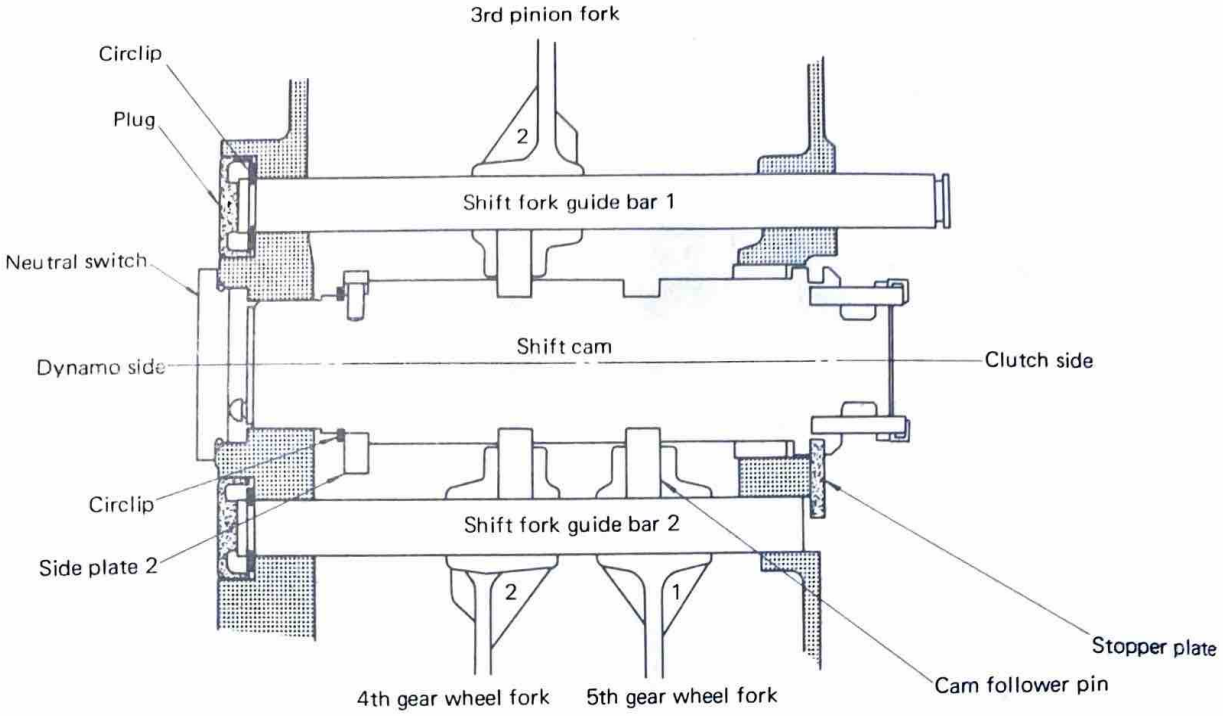


Fig. 4-15-11

3. Removeing the Neutral Switch

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

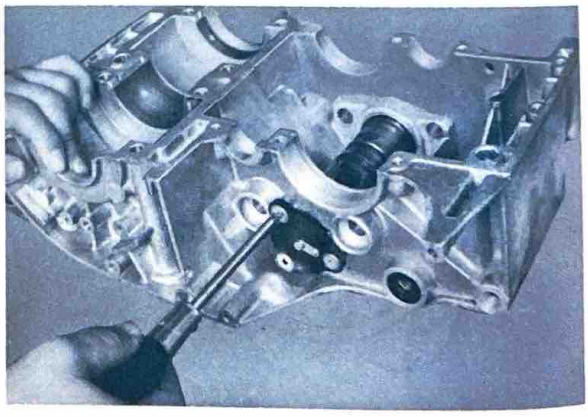


Fig. 4-15-12

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

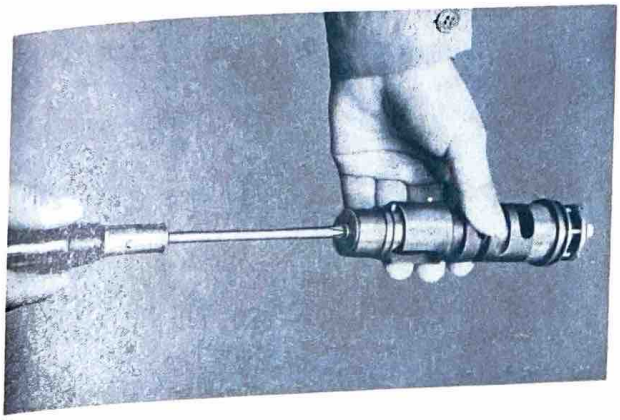


Fig. 4-15-13

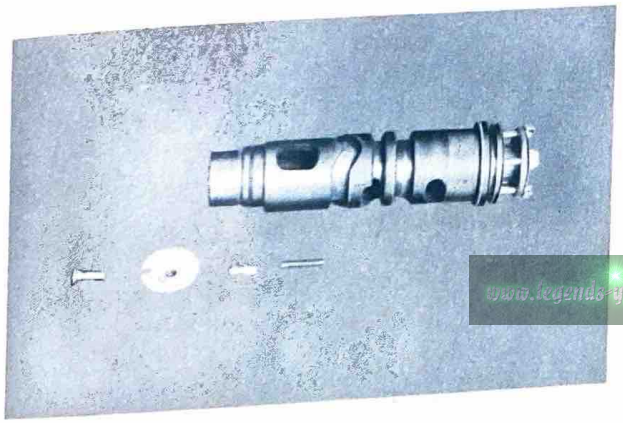


Fig. 4-15-14

4–16 Tachometer Gear

Removing the Tachometer Gear

1) Remove the bolt, and then driven gear.

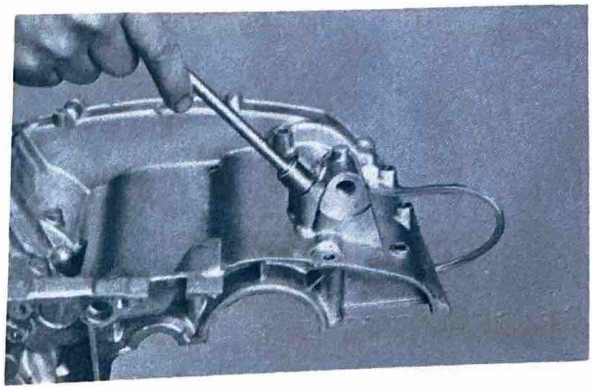


Fig. 4-16-1

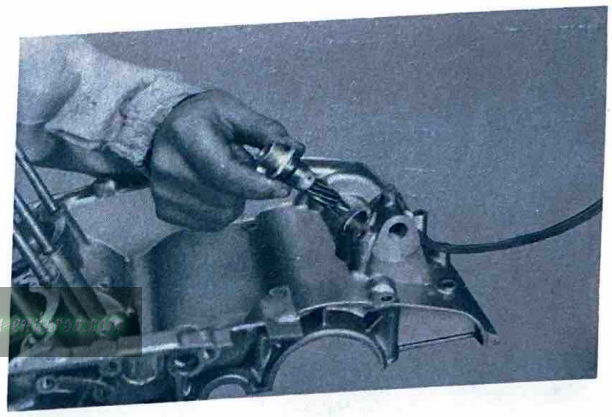


Fig. 4-16-2

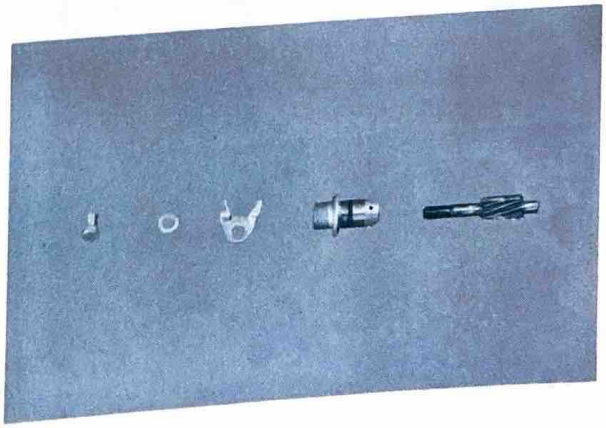


Fig. 4-16-3

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

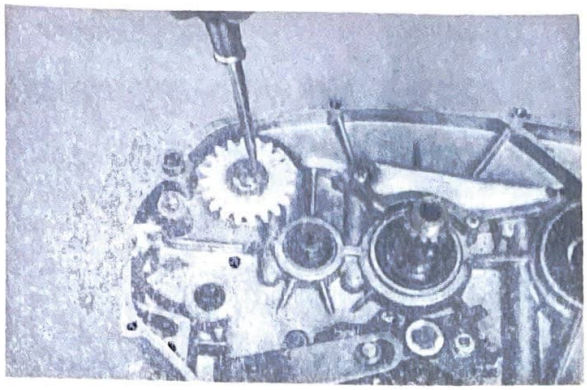


Fig. 4-16-4

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

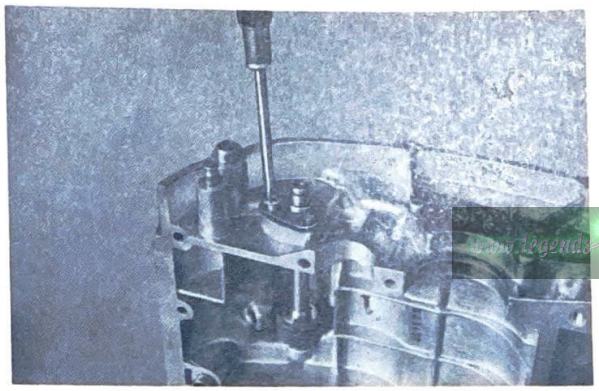


Fig. 4-16-5

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

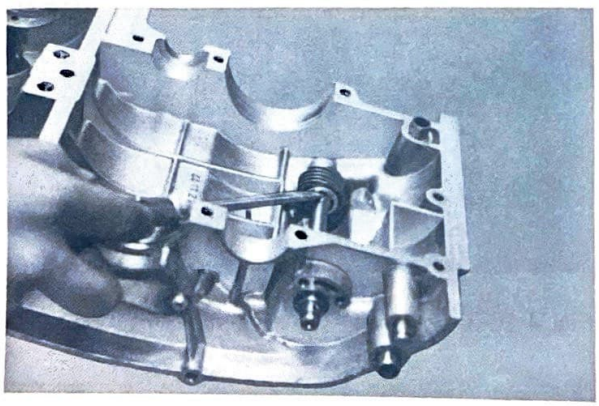


Fig. 4-16-6

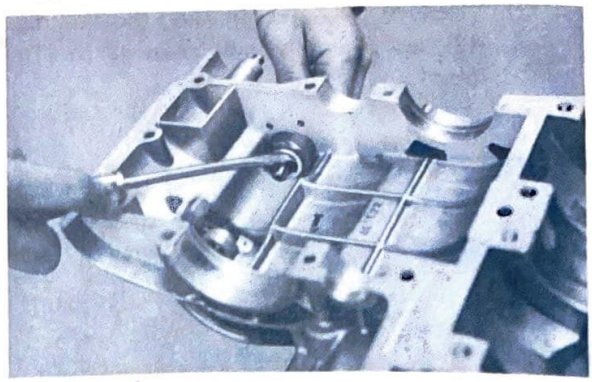


Fig. 4-16-7

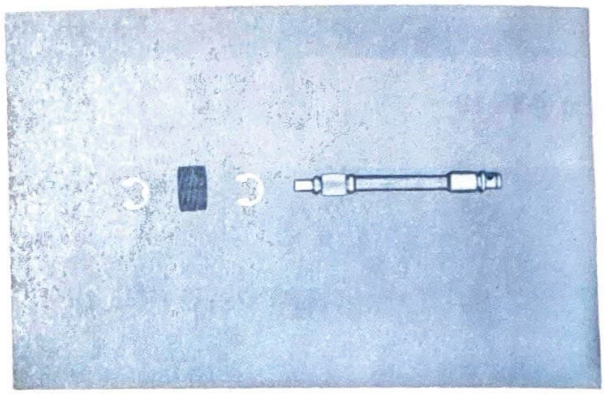


Fig. 4-16-8

4–17 Notes on Bearing Removal

To check the 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 amy quickly spread. Avoid holding bearings with a wet or salty hand. The bearings should be cleaned with solvent. Be sure to grease them after cleaning.

4–18 Carburetor

The YAMAHA 350 R5 employs two AMAL type VM28SC carburetors in order to meet the requirements of better acceleration and higher speed operation.

1. Checking the Carburetor

1) Float Valve
Check the float valve for seating. 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 with your finger, and make sure that it properly returns to the original position after released.

2) Overflowing
If fuel overflows, check the carburetor in the manner as specified in 1) and 2) 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.

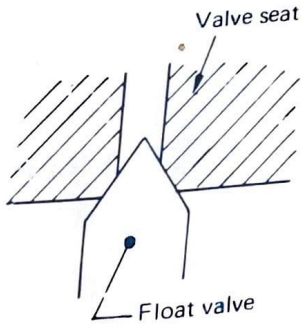


Fig. 4-18-1

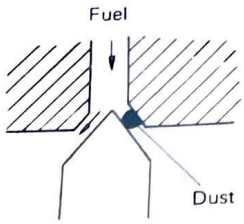


Fig. 4-18-2

3) Cleaning the Carburetor
Disassemble the carburetor, and wash all its parts in a suitable solvent or carburetor cleaner.
Blow all air and fuel passages in the carburetor with compressed air.
All jets and other delicated 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.

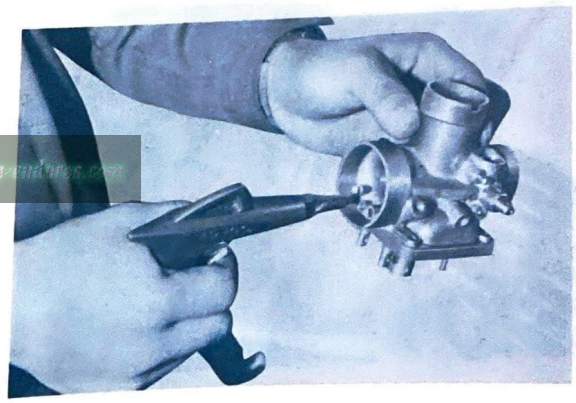


Fig. 4-18-3

2. Carburetor Setting

a. Idling Adjustment

1) Set the idle air screw to the factory recommended setting.
There should be no reason to experiment for a better setting.
The idle air setting is 1-3/4 turns out from a lightly seated position.

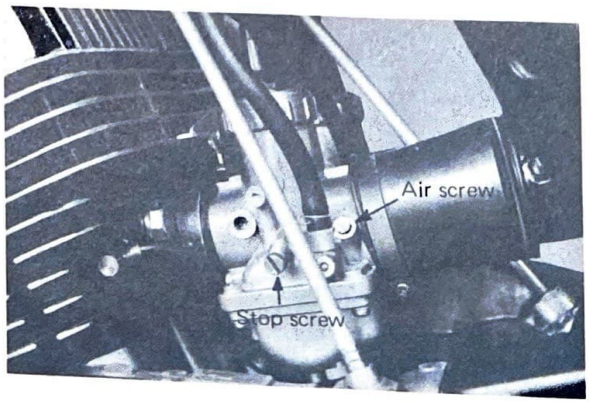


Fig. 4-18-4

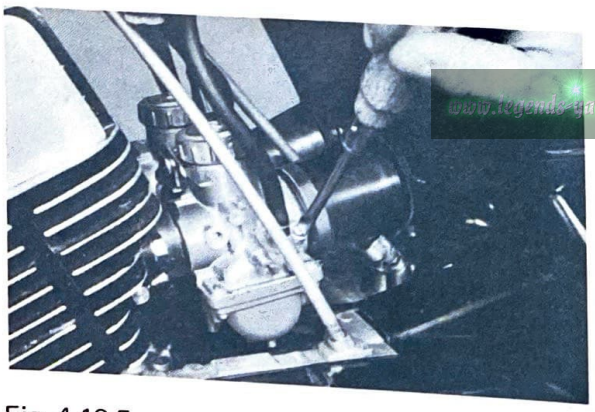


Fig. 4-18-5

2) Turn the stop screw until the engine reaches its 1,300 ~ 1,400 r.p.m.

b. **Carburetor Settings.**

1	M. J. (Main jet)	#110
2	N. J. (Needle jet)	0 - 0
3	J. N. (Jet needle setting the step where J. N. clip is fitted)	5DP7-4 stages
4	C. A. (Throttle valve cutaway)	2.0
5	P. J. (Pilot jet)	#40
6	A. S. (The number of turns the A.S. is backed off from a lightly seated position)	
7	G. S. (Starter jet)	#100 (left)
8	V. S. (Valve seat)	2.0

4–19 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.

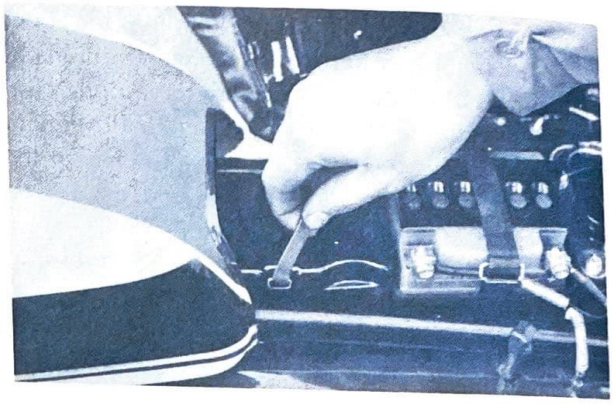


Fig. 4-19-1

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).

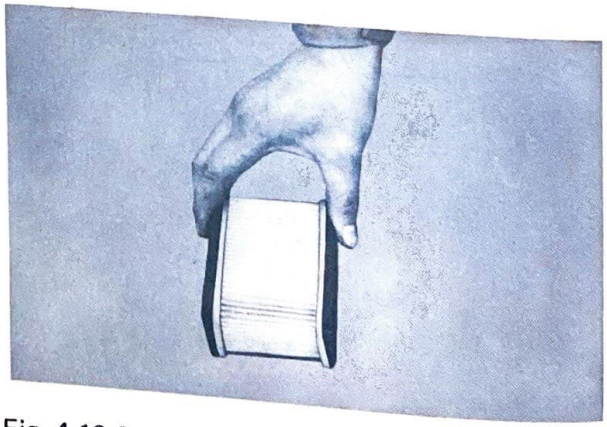


Fig. 4-19-2

CHAPTER 5. CHASSIS

5–1 Front Wheel

The front tire is 3.00–18–4 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.

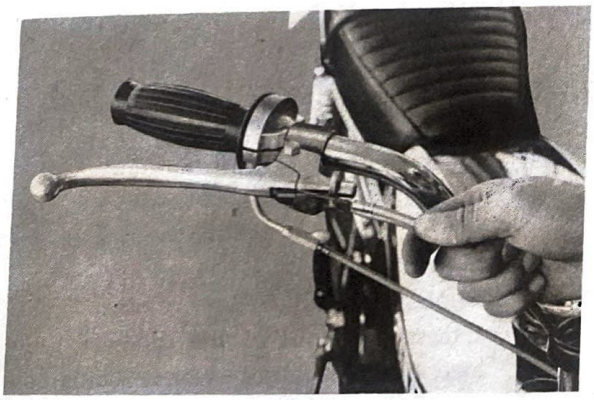


Fig. 5-1-1

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

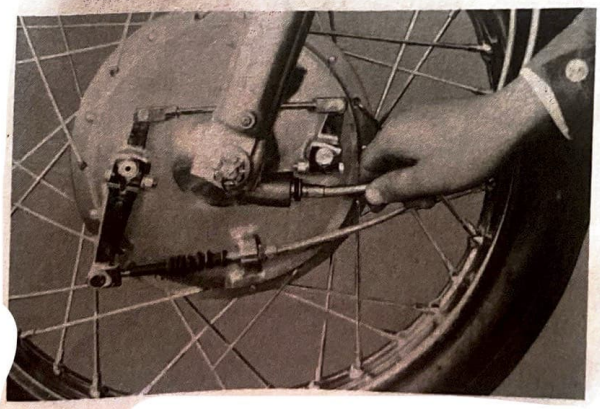


Fig. 5-1-2

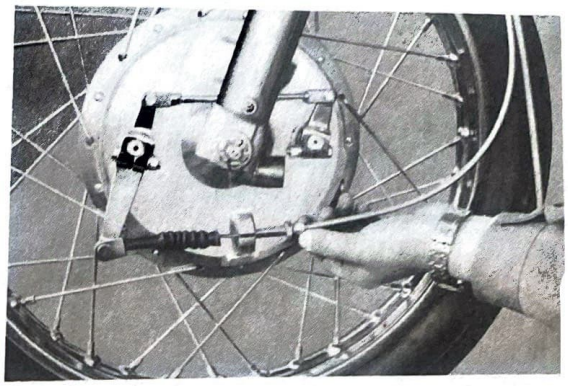


Fig. 5-1-3

Fig. 5-1-4

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

Note:

Replace the cotter pin if damaged or worn.

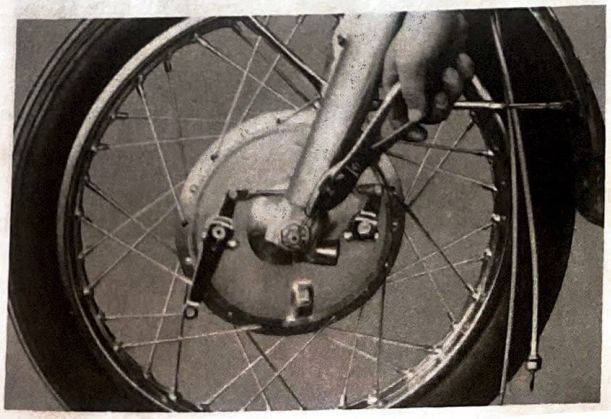


Fig. 5-1-5

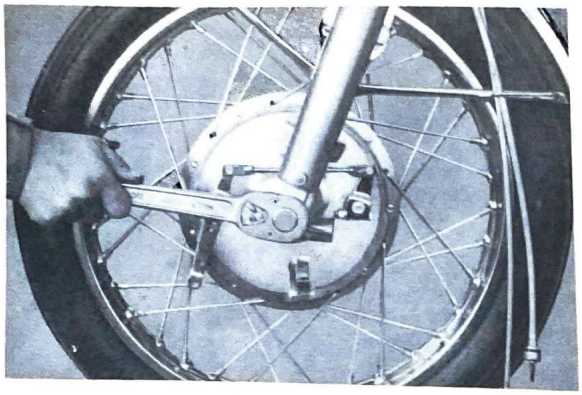


Fig. 5-1-6

4) Loosen the front wheel shaft lock nuts.

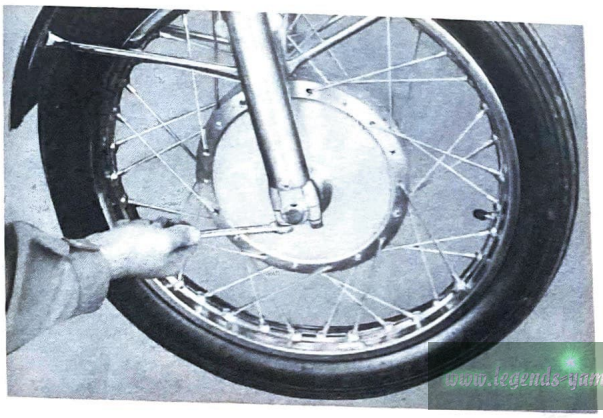
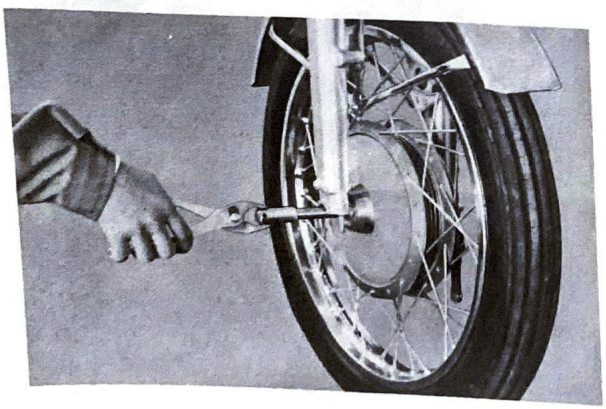


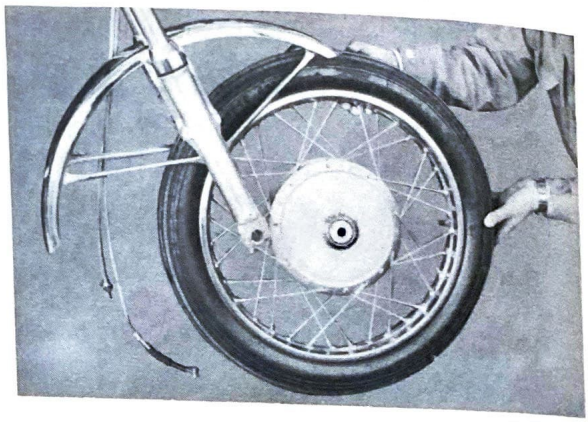
Fig. 5-1-7

5) Pull out the front wheel shaft.



Fi g. 5-1-8

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



Fi g. 5-1-9

2. Checking and Adjustment

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

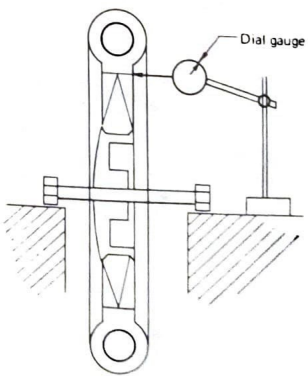


Fig. 5-1-10

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. 5-1-11) To remove the spoke, completely unscrew the nipple and remove the bent end from the hub.

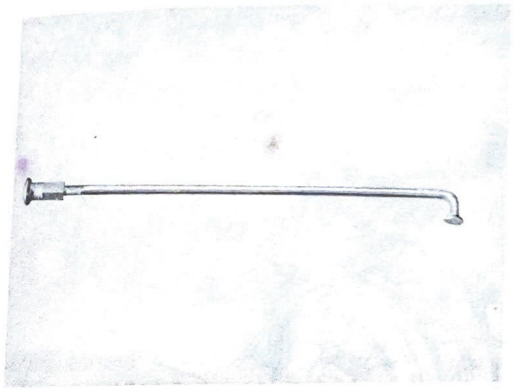


Fig. 5-1-11

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 giving each nipple one turn, beginning with one side of the hub and then the other side.

Spoke nipple tightening torque: 15 kg-cm

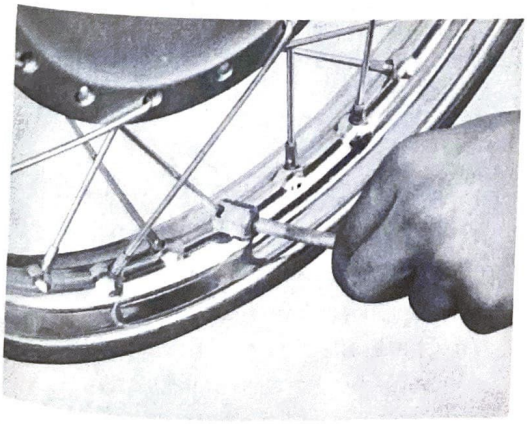


Fig. 5-1-12

3) Brake Shoe

Set the brake shoe, and measure the outer diameter of the shoe, with a slide calipers, as shown in Fig. 5-1-13.

If the shoe is less than 175 mm (6.9 in.), replace it.

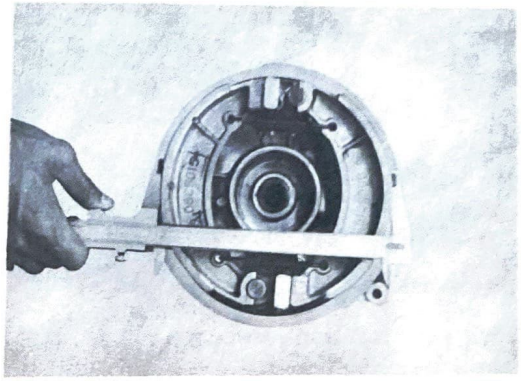


Fig. 5-1-13

4) Brake Drum

Oil, dust or scratches on the inner surface of the brake drum will result in abnormal noise or a malfunction of the brake. Clean or smooth out the surface with a rag or sandpaper.

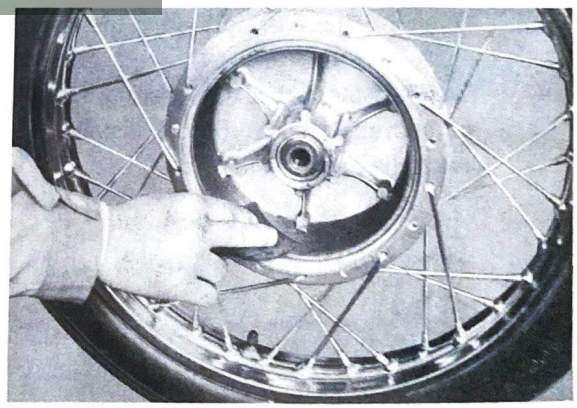


Fig. 5-1-14

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.

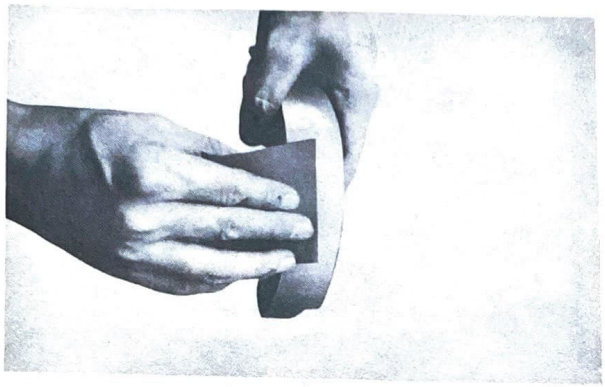


Fig. 5-1-15

6) Replacing the Clutch 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. Exerise 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.

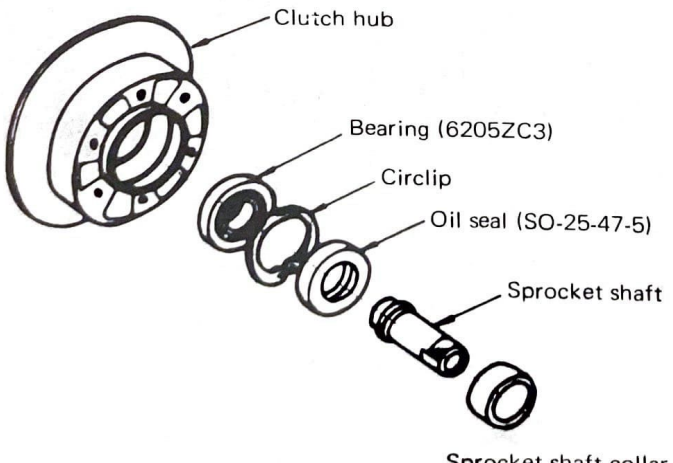


Fig. 5-1-17

7) 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).

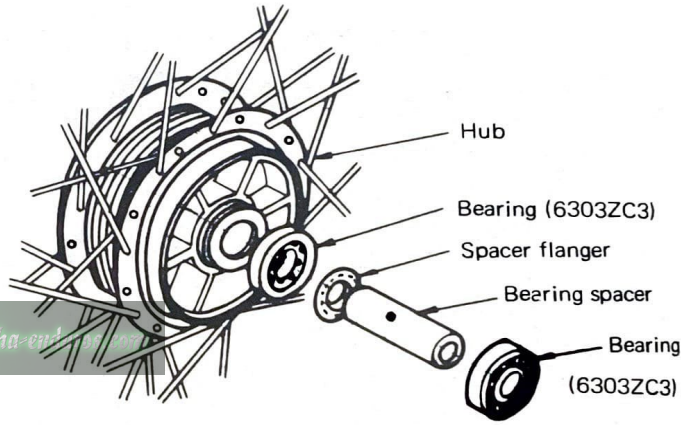
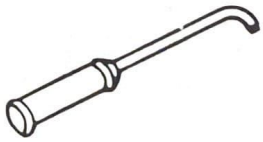


Fig. 5-1-18



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

Fig. 5-1-19

8) Replace a bent or damaged wheel axle.
9) If the tooth surface of the helical speedometer drive gear on the front hub is excessively worn, replace it.
10) Check the lips of all seals for damage or warpage. Replace as necessary.

5-2 Rear Wheel

1. Removal

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

Note:
Replace the cotter pin if damaged or worn.

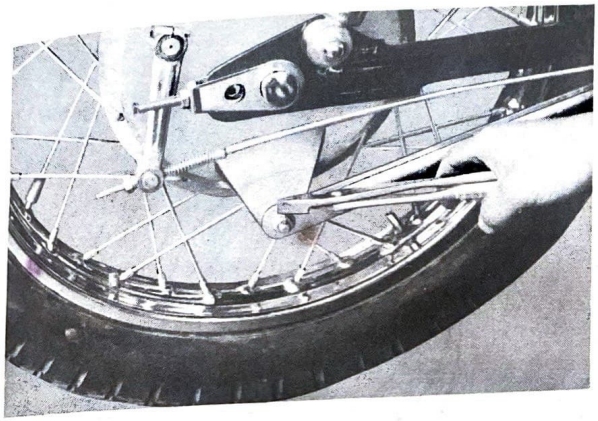


Fig. 5-2-1

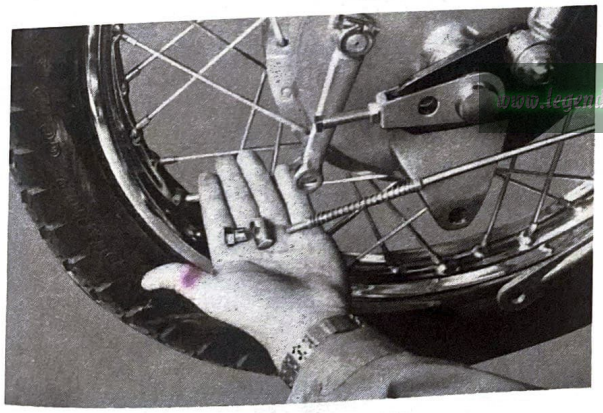


Fig. 5-2-2

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

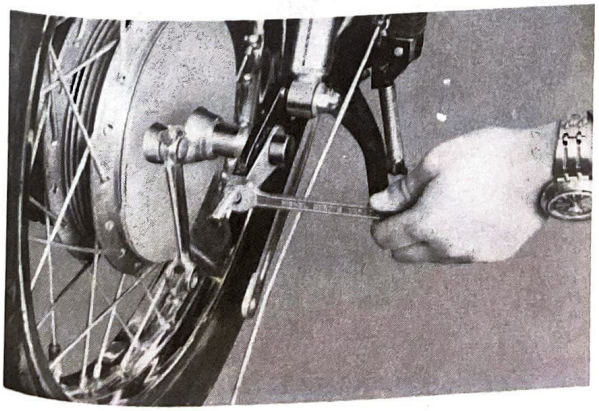


Fig. 5-2-3

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

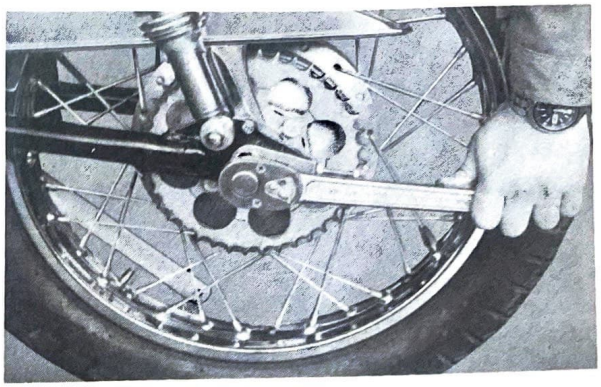


Fig. 5-2-4

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

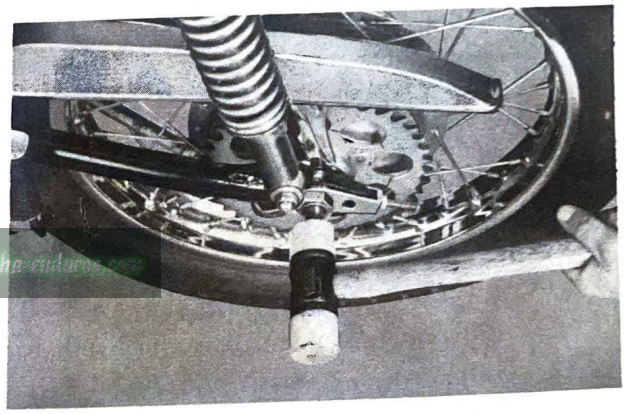


Fig. 5-2-5

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

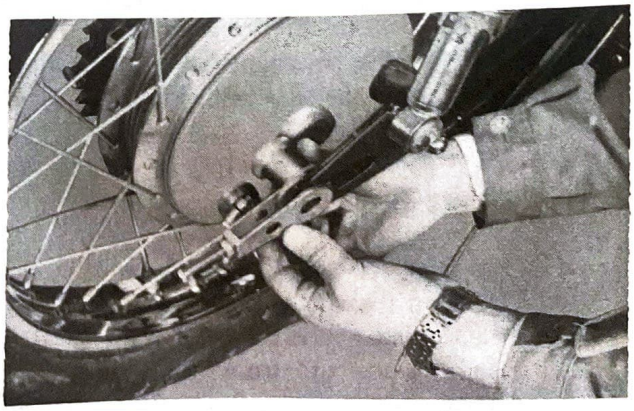


Fig. 5-2-6

6) Remove the rear brake plate.

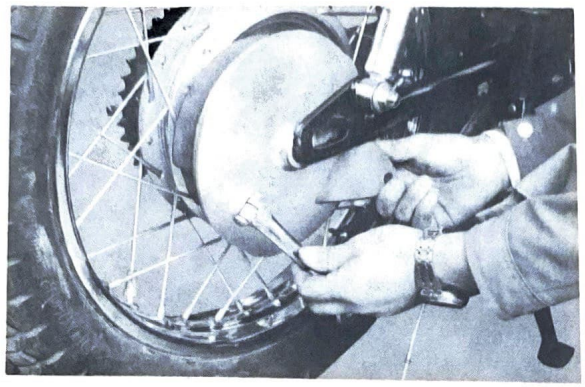


Fig. 5-2-7

7) Remove the rear wheel assembly.

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.

5–3 Replacing Tires

1) Removal
a. Remove the valve cap and lock nut from the tire valve, and deflate the tire.
b. 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
a. Replace the tube between the tire and the wheel rim, and inflate the tube halfway Be sure that the valve stem is directed toward the wheel shaft.
b. Mount the tire on the wheel rim by the use of tire levers. For this operation, it is advisable that the bead on one side of the tire be pushed in toward the rim flange.
c. To avoid pinching the tube between the tire and the rim, tap the tire with a hammer.
d. Tighten the tire valve lock nut, and inflate the tire to the recommended pressure, then install the valve cap.

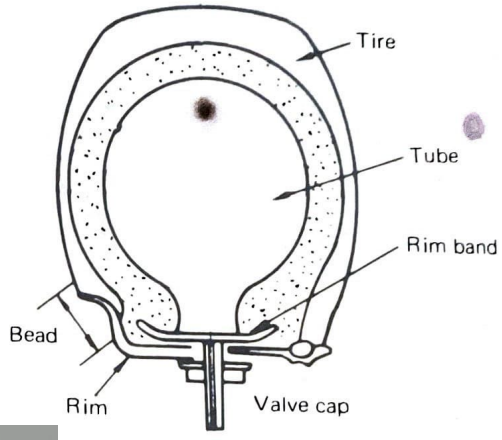


Fig. 5-3-1

5–4 Rear Sprocket Wheel

1. Removal

1) Disconnect the chain joint and remove the chain.

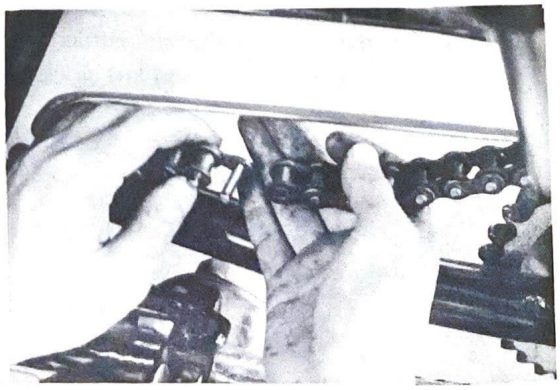


Fig. 5-4-1

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

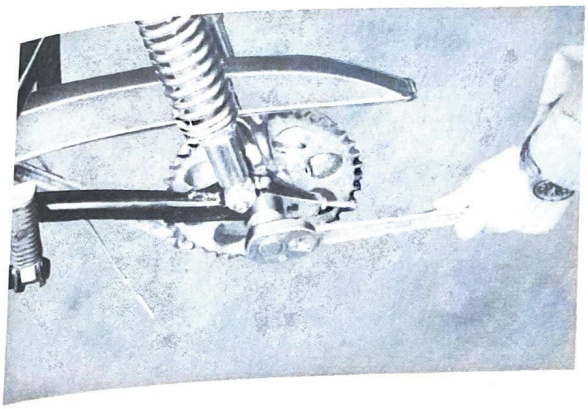


Fig. 5-4-2

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.

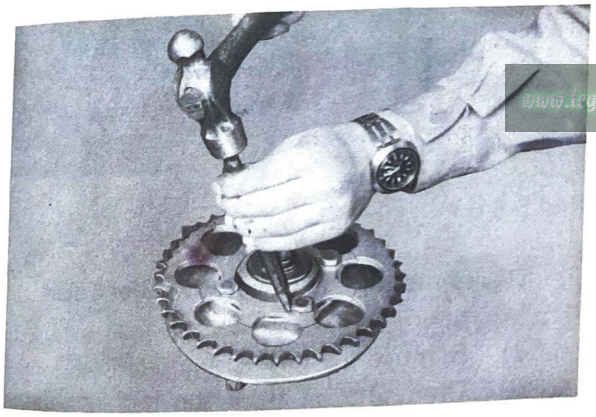


Fig. 5-4-3

b. Remove the sprocket mounting bolt.

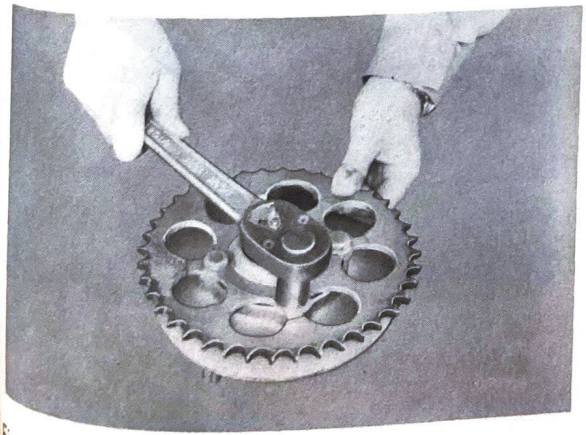


Fig. 5-4-4

2) Checking

Check the lock washers and hexagonal bolts for breakage 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. (See page 27.)

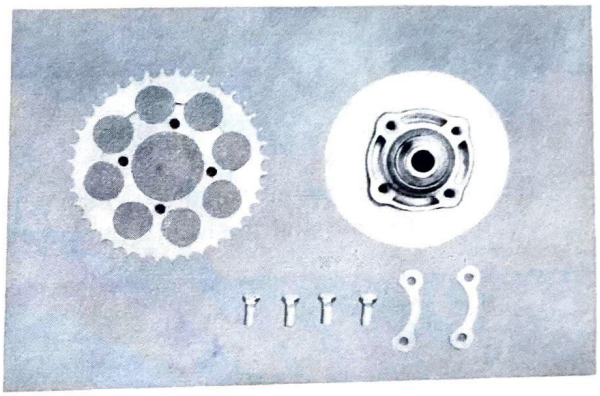


Fig. 5-4-5

5–5 Tire Inflation

The YAMAHA 350 R5 develops a maximum speed of 100 mph plus. If the tire is faulty or tire inflation is incorrect, it may result in a serious accident. Checking tire inflation should be performed carefully.

1) General driving
   Front wheel 1.6 kg/cm² (22 lbs/in²)
   Rear wheel 2.0 kg/cm² (28 lbs/in²)
2) High speed driving (continuous running at more than 94 mph or 150 km/h)
   Front wheel 2.0 kg/cm² (28 lbs/in²)
   Rear wheel 2.4 kg/cm² (33 lbs/in²)
3) Continuous driving at more than 170 km/h (103 mph)
   Replace the tires with recing tires.

5–6 Front Fork

Check the front fork for bends and oil leakages resulting from an accident, and repair it in the following manner.

1. **Removal**

1) Remove the front fender.

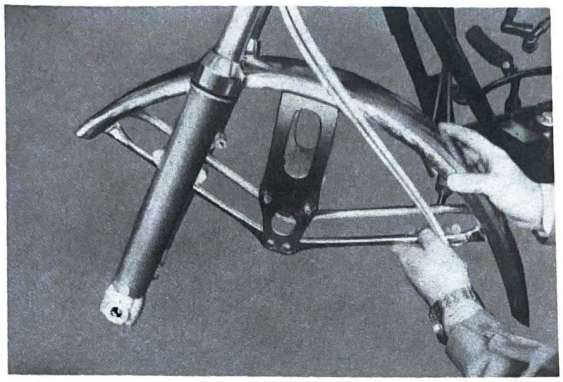


Fig. 5-6-1

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

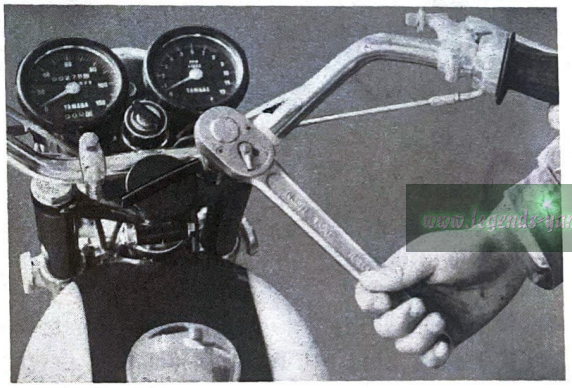


Fig. 5-6-2

3) Remove the inner tube cap bolt.

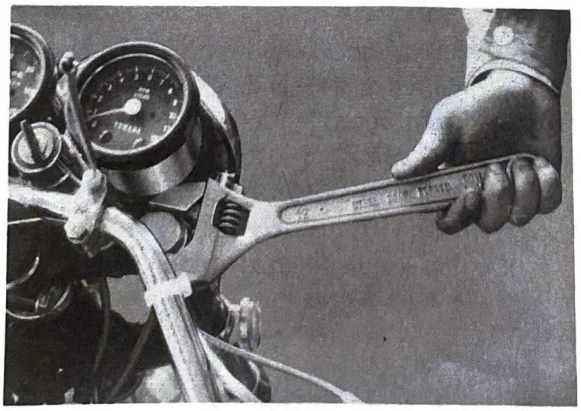


Fig. 5-6-3

4) Loosen the underbracket bolts.

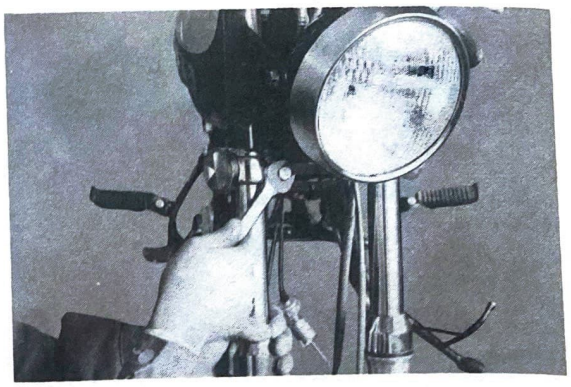


Fig. 5-6-4

5) Pull out the inner tube.

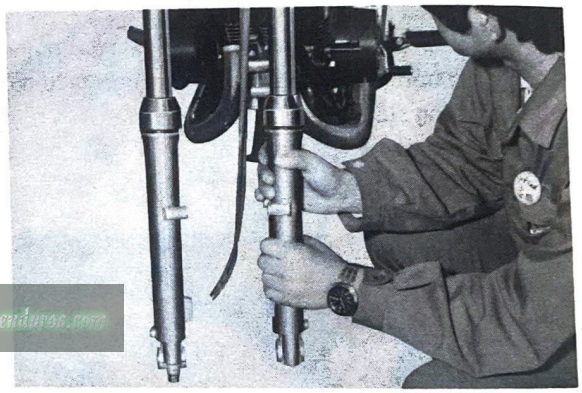


Fig. 5-6-5

2. **Disassembling the Inner and Outer Tubes**

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

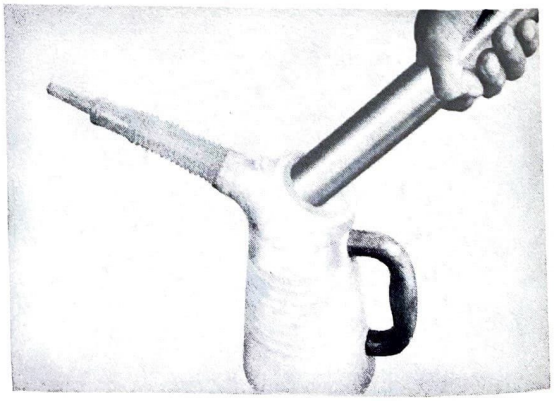
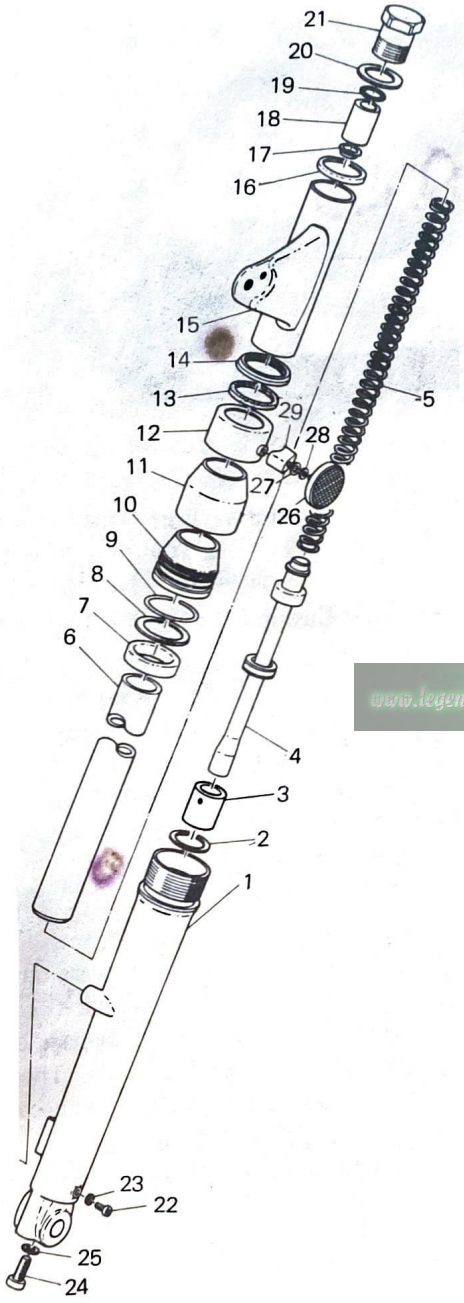


Fig. 5-6-6

3) Remove the screw with hexagonal wrench key, and then the inner tube.

Fig. 5-6-7



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. Spring 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. 5-6-8

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.

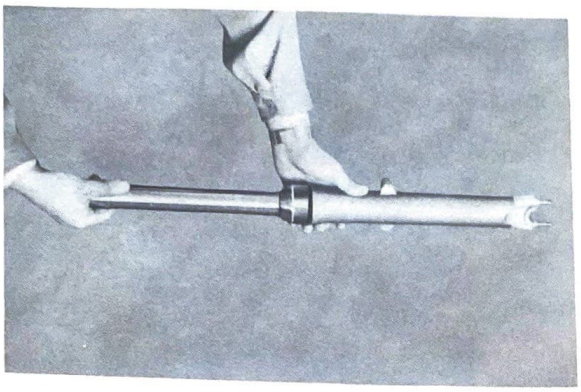


Fig. 5-6-9

5. Installation

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

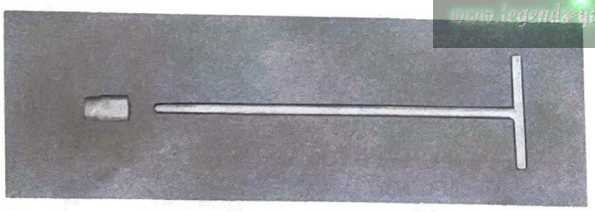


Fig. 5-6-10

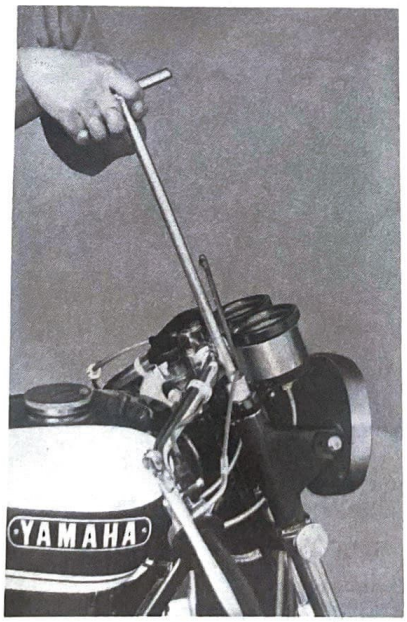


Fig. 5-6-11

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

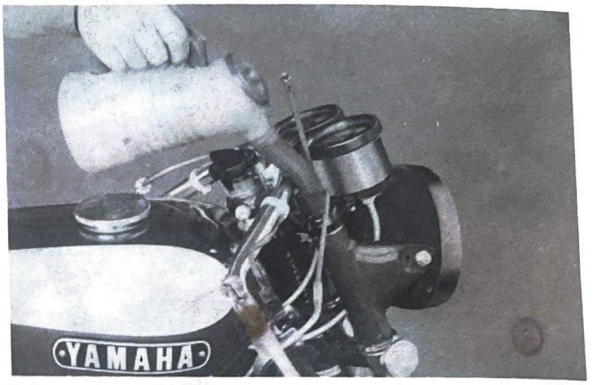


Fig. 5-6-12

3) Install the cap bolt.

5–7 Rear Cushion

The YAMAHA 350 R5 rear cushion is 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 leakage.
To diagnose oil leakage, take the following steps.

1) Remove the rear cushion.

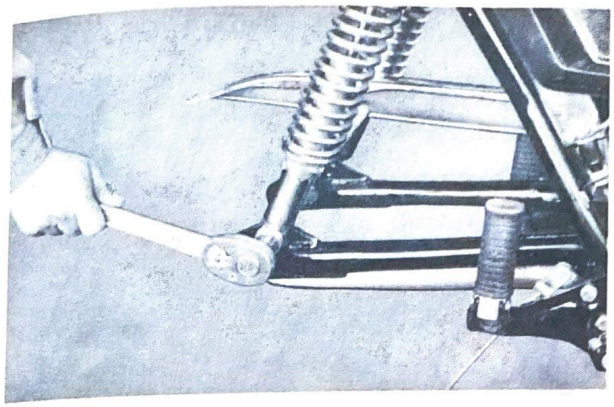


Fig. 5-7-1

2) Depress the rear cushion as shown in Fig. 5-7-2, and release it. If the cushion quickly returns halfway and then slowly returns to the original position, the rear cushion is in good condition.
But if the cushion quickly returns to the original position, check the cushion for very noticeable oil leakages, and replace the whole assembly if the oil leaks.

Fig. 5-7-2

5–8 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 level tube at the tank bottom.
3) Raise the rear part of the tank, and slide it rearward to remove the tank.

Fig. 5-8-1

5–9 Rear Arm

1. Removal

1) Remove the chain case mounting bolts.

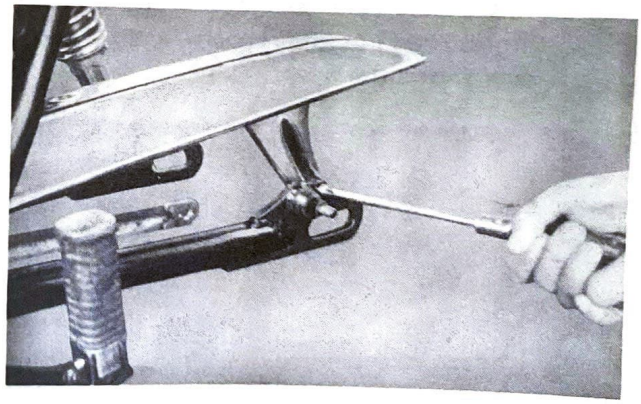


Fig. 5-9-1

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

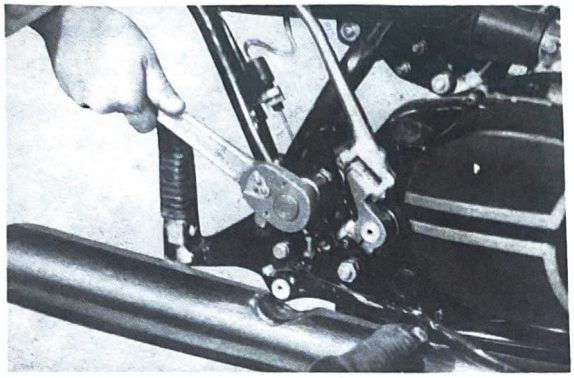


Fig. 5-9-2

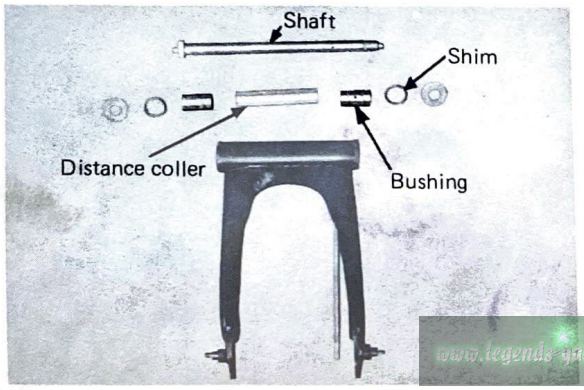


Fig. 5-9-3 Sectional View of Rear Arm

2. Checking

1) Check the play of the rear arm by shaking it as shown in Fig. 5-9-4, with the rear arm installed.
If the play is excessive, replace the rear arm bushing or the rear arm shaft, whichever shows the wear.

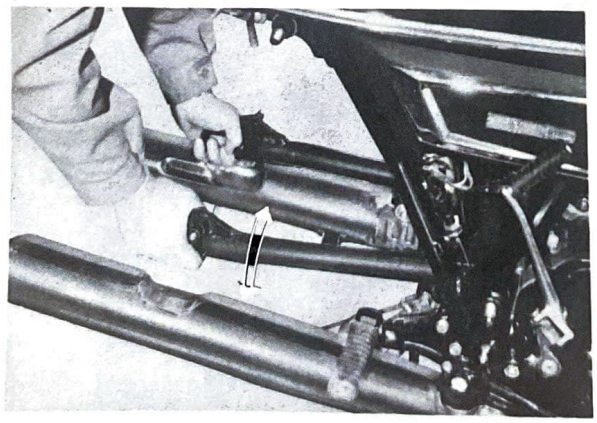


Fig. 5-9-4

2) Insert the bushing as indicated in Fig. 5-9-4, and check it for play. If the play is excessive, replace the bushing.

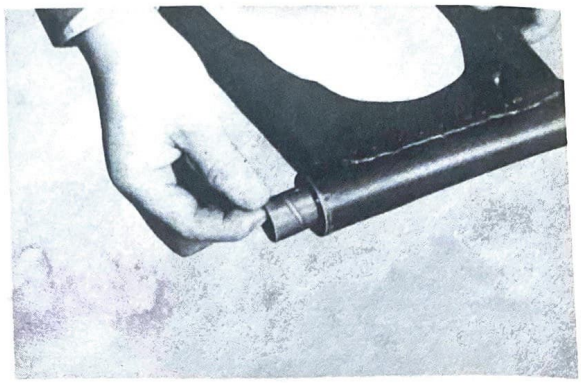


Fig. 5-9-5

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

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.

5-10 Steering Head

1. Sectional View of the Steering Head

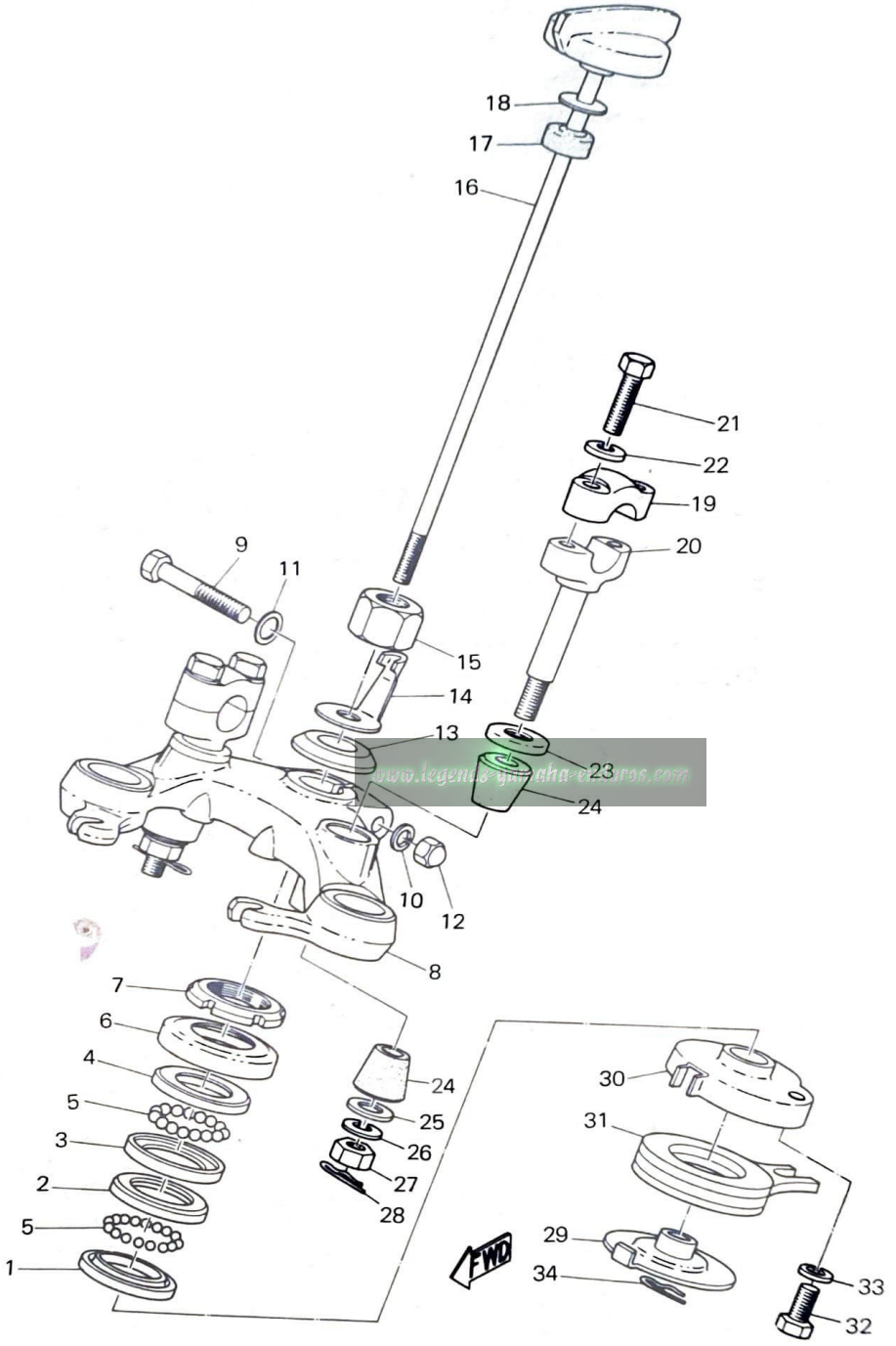


Fig. 5-10-1

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 they 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.

SEE MSN # 274

CHAPTER 6. ELECTRICAL # 185

The R5 electrical system uses an alternator to generate voltage which is then rectified to direct current. This direct current voltage is 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 alternator/rectifier/regulator circuit. Excess voltage is shunted to the battery, if necessary, for recharging. If unneeded, the voltage regulator will decrease alternator output.

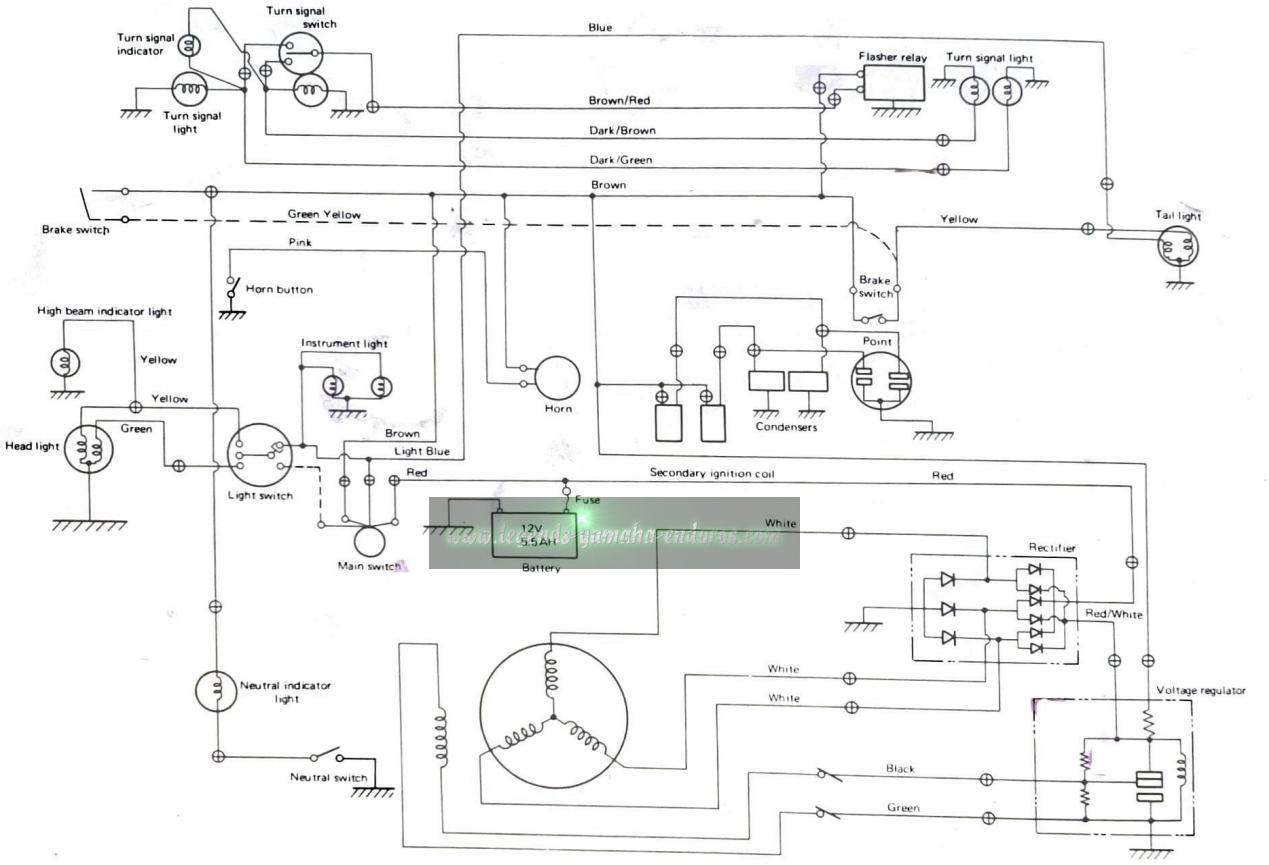


Fig. 6-1-1

6-1 Charging System

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

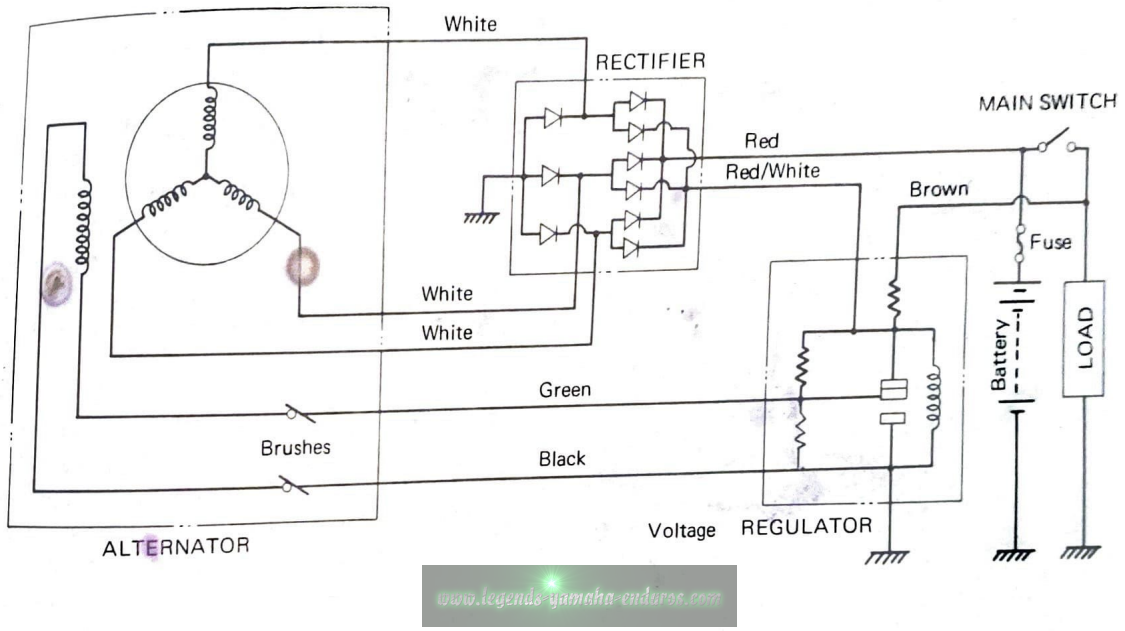
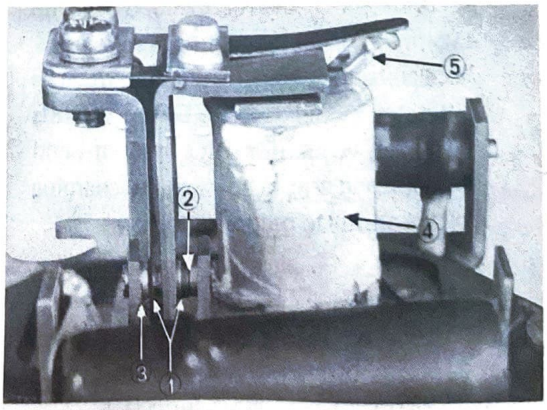


Fig. 6-1-2

1. Regulator

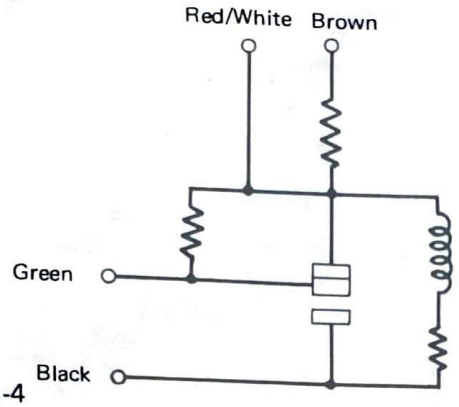
1) The regulator's function is to pass a controlled amount of voltage to the rotor windings which create a magnetic field that produces charging voltage in the stator.

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 resisters 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. 6-1-3



Fi g. 6-1-4

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.

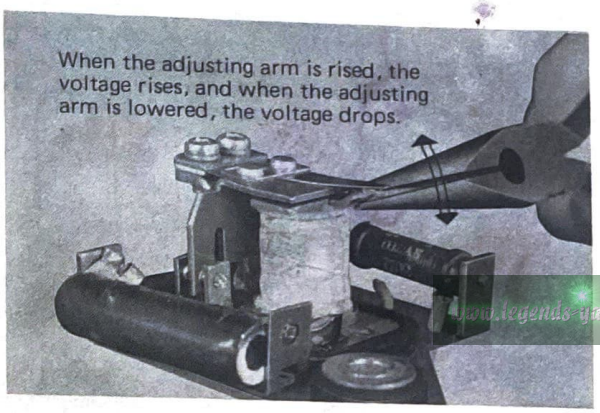


Fig. 6-1-5

4) Start the engine. Disconnect the red wire at connector of the rectifier and hook up a voltmeter from the rectifier to ground. Accelerate the engine to 2,000 rpm. The voltmeter should read ~~13.5 ~ 16.5~~ 14 - 15 volts DC. If it varies from this amount bend the adjusting arm in to raise the charging voltage or out to reduce output.

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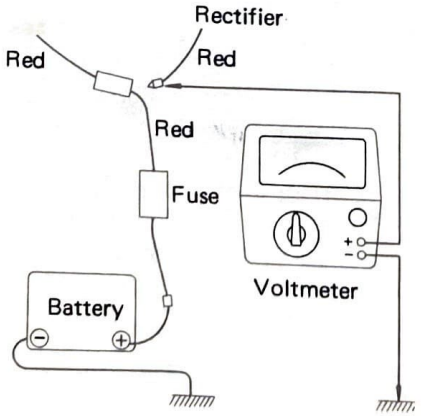


Fig. 6-1-6

2. Rectifier

This unit is a full wave rectifier which charges 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 (electromotive attraction). 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 circuit in terms of voltage "flow". As soon as voltage is present on 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 re-

volves, 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 transmitted 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 holes 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.

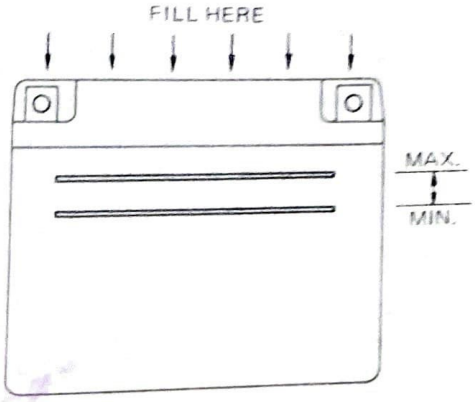


Fig. 6-1-7

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 R5 battery uses a 5.5 amp/hour battery. Do not exceed a one amp input as excessive heat would be generated.

Note:

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

4) Troubleshooting

a) Excessive fluid evaporation from cells: Normal battery operation required 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:

a. First check the alternator output to eliminate the possibility on a low

charging rate. Next, check for loose terminal connections (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 hooked 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 loose 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 identical. 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 of its charge.

b) A used battery should be filled to the maximum level with distilled water, given a complete charge 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. Main 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 break in two stopping current flow. (Loose 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 red wire at the rectifier. Hook up a voltmeter from the rectifier to ground.

a-3 Accelerate the engine to approximately ~~2,500~~ 2000 rpm and check the generated

voltage. It must read between ~~15.5~16.5~~ 14~15 DC.

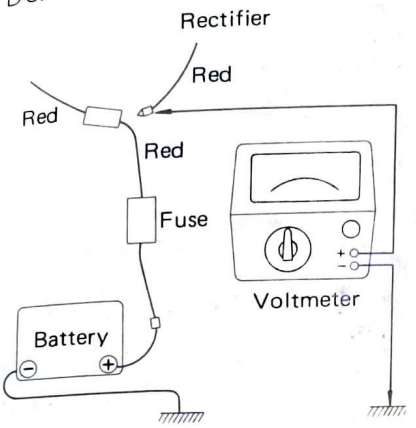


Fig. 6-1-8

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 be 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 trouble-spot. 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 troublespot 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) Hook up an ohmmeter, (0 ~ 20 ohms), one probe attached to the black wire and one probe to the regulator base. It must read zero ohms resistance. Several ohms resistance indicates a frayed or broken black wire.

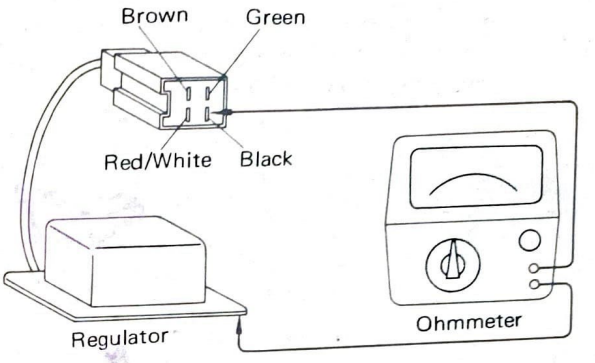


Fig. 6-1-9

d) Hook one meter probe to the red/white wire and the other probe to the green wire.

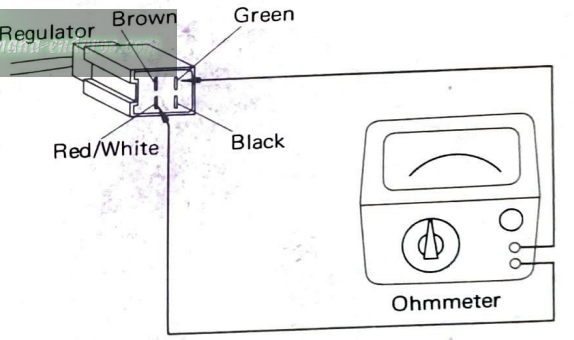


Fig. 6-1-10

e) Remove the regulator cover.

f) With the central contact point held against the right point by the spring (as in the low rpm position), the meter should show no resistance at all (two ohms resistance is too much). If high resistance exists, one of the wires is broken, a soldered joint has separated, or the points are burned. The unit usually required replacement if the problem cannot be cured by cleaning the points.

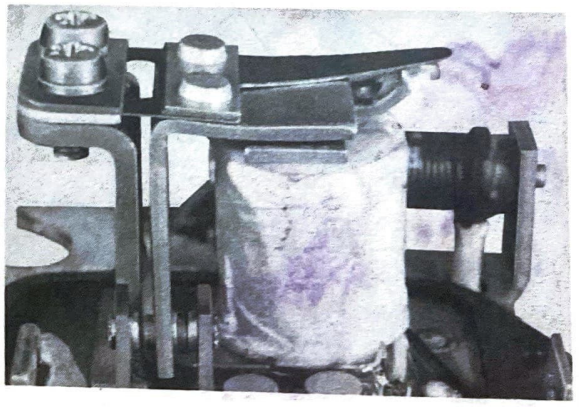


Fig. 6-1-11

g) Maintain the same meter hook-up as step four. Push the central point arm until the point is positioned mid-way between the right and left points. The meter must read 8 ~ 9Ω resistance.

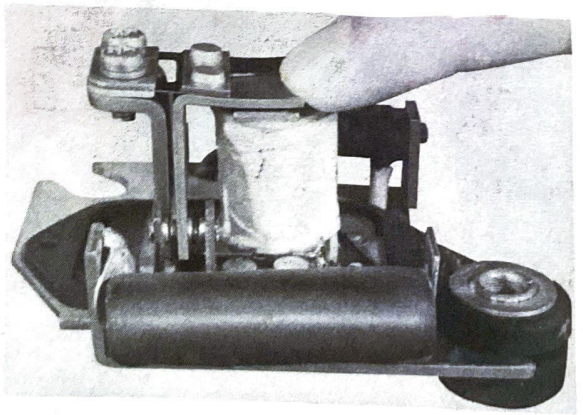


Fig. 6-1-12

h) Maintain the same meter hook-up as step four. Push the central point down until it contacts the bottom point. The meter must show a 6.5 ~ 8Ω resistance value. Check the condition of both contact points as burnt points can cause an improper reading.

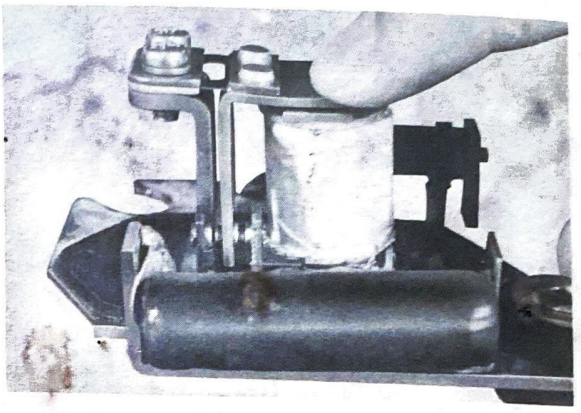


Fig. 6-1-13

i) At the multiple connector, hook the ohmmeter to the black and brown wires. Permit the central point (as in the low rpm position) against the right point and measure the resistance. It must measure 44 ~ 47Ω resistance.

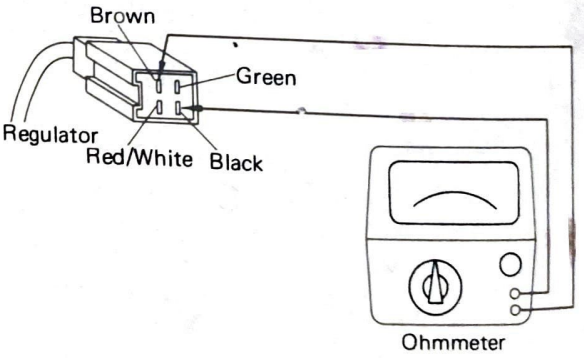


Fig. 6-1-14

j) 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), 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 alternator 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.

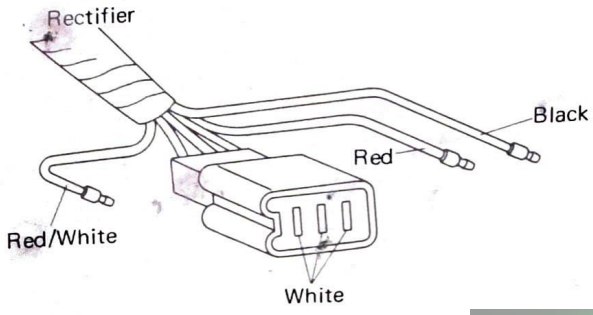


Fig. 6-1-15

c) Visually check all rectifier wires for breaks.

d) Clamp the black probe to the black wire and touch the other 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 (20 ~ 30Ω) reading one way and almost infinite resistance with the probes reversed.

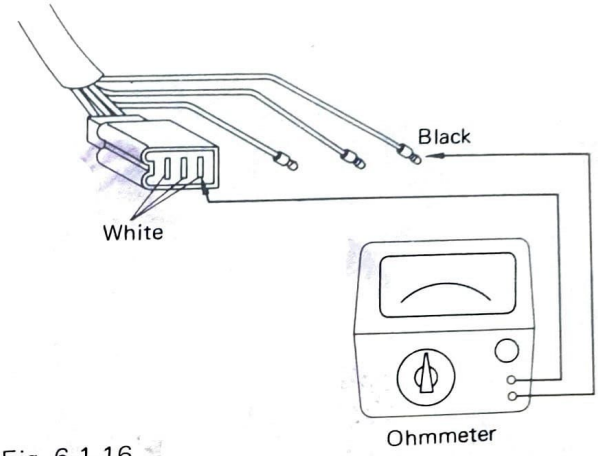


Fig. 6-1-16

e) Attach one meter probe to the red/white wire and again touch each white lead with the other probe. Reverse the probes and again touch each white lead. The resistance readings must be identical to those in d).

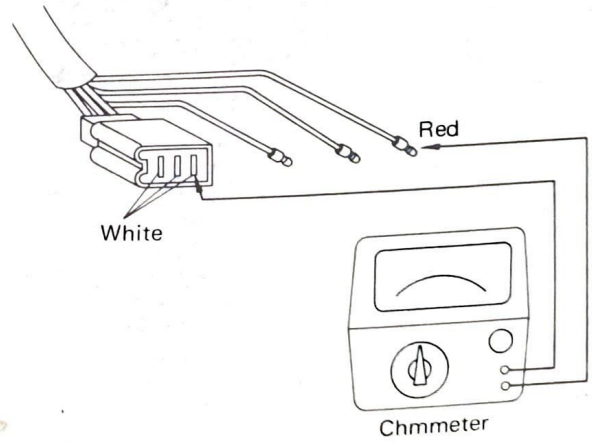


Fig. 6-1-17

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

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.

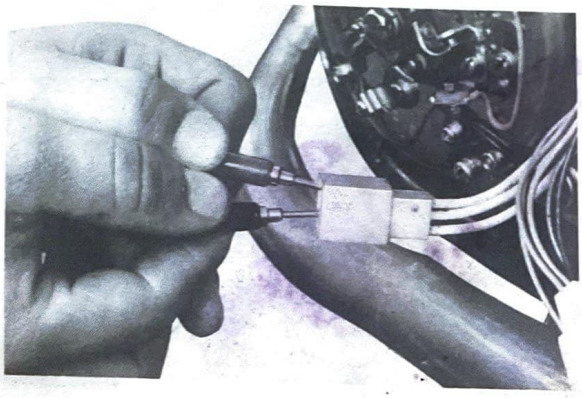


Fig. 6-1-18

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 show 0.3 ~ 0.35Ω resistance.

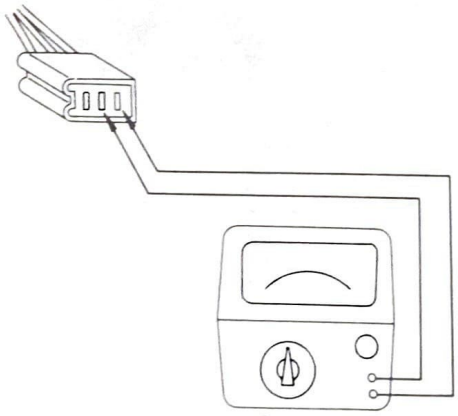


Fig. 6-1-19

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 two & three 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 breakage or wear. Standard brush length is 11.0 mm (0.433"), Wear limit is 6.0 mm (0.236").

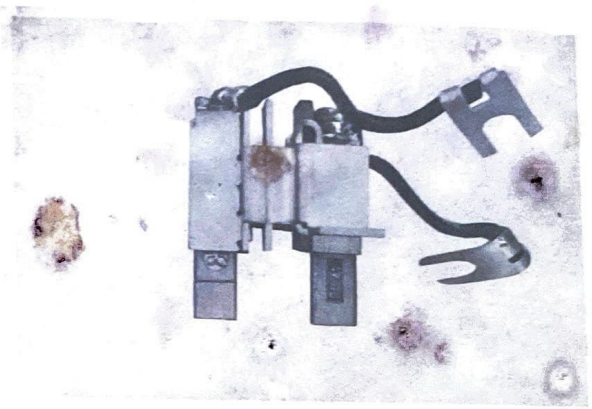


Fig. 6-1-20

c) If any part of the carbon brushes or holder are damaged, replace the entire unit as these parts are permanently attached to one another.

d) If high resistance exists in either wire, it is frayed or broken. Repair or replace the entire wire.

7) Rotor Windings

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

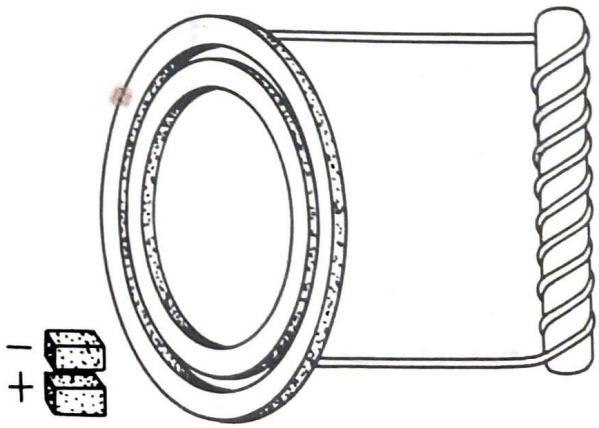


Fig. 6-1-21

b) Use an ohmmeter (Ω x 1) to check resistance from one slip ring to another. Resistance should measure 4 ~ 4.5Ω.

Note:

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

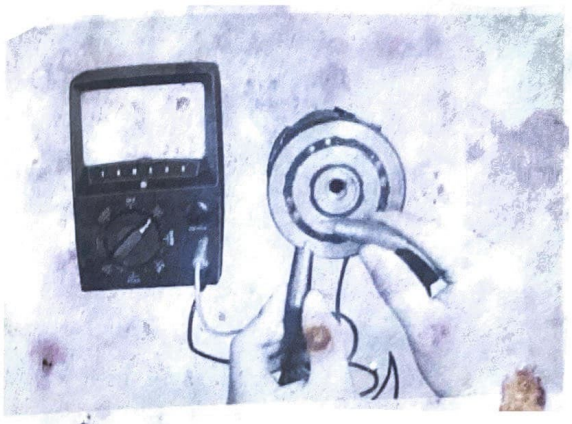


Fig. 6-1-22

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.

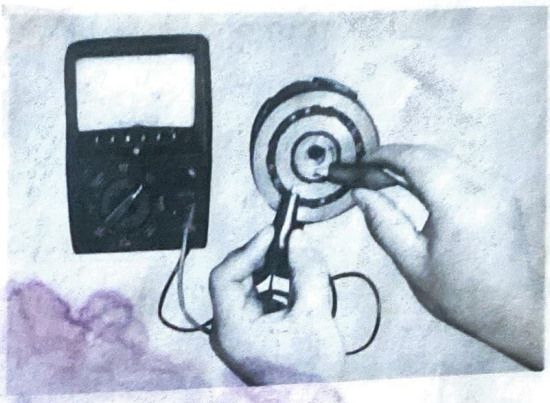
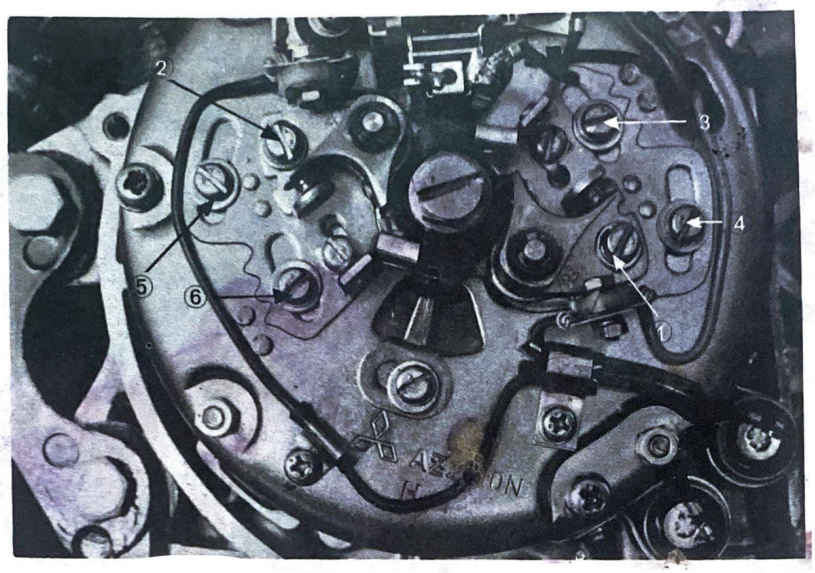


Fig. 6-1-23

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

6–2 Ignition System

1. Ignition Breaker 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. 6-2-1

This unit is equipped with two independent sets of ignition points; one for each cylinder. The 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 closed, 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 normal 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 or 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.

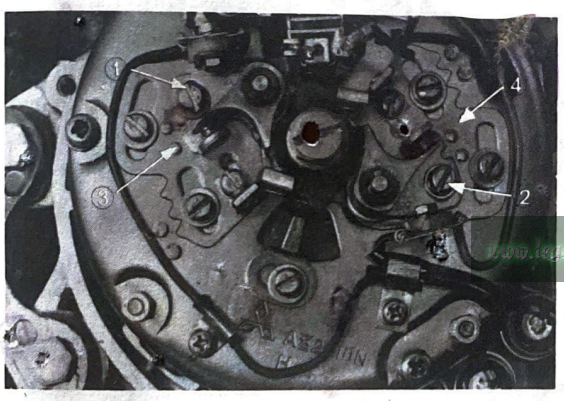


Fig. 6-2-2

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. 6-2-2, 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.

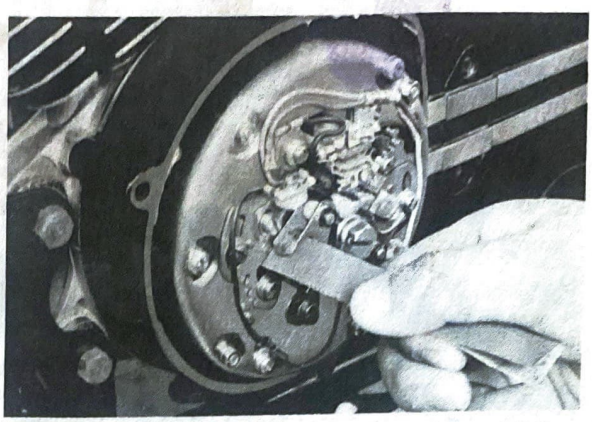


Fig. 6-2-2

d) Next, rotate the crankshaft until the second set of points opens to its widest point. Then perform the same steps as described in the 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 no spark or severe point pitting due 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 momentary flow of current and then the condenser should show at least 54 million ohms resistance between the positive terminal and ground.

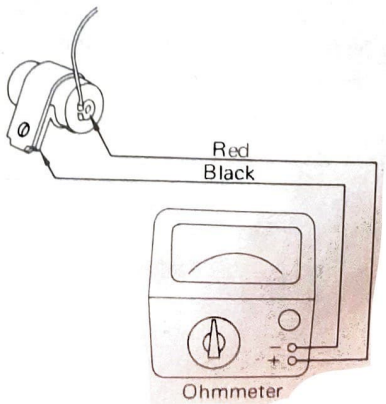


Fig. 6-2-3

2) Capacity Tests

Hook an electrotester to the condenser. Black (Neg) lead to the condenser case, Red (Pos) lead to the wire running from the center of the condenser.

The capacity should not be more than 0.22μF ±10%, so before testing the condenser, adjust the capacity of the electrotester.

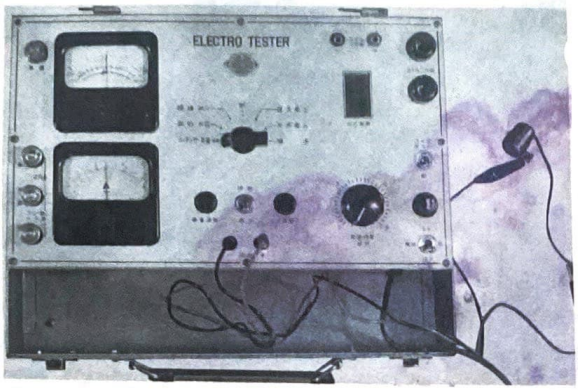


Fig. 6-2-4

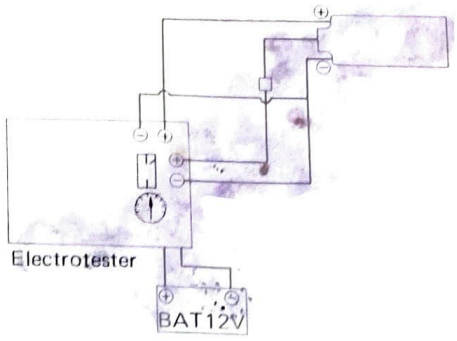


Fig. 6-2-5

4) Dynamic Test:

Follow the diagram at the right 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 run smooth again. Point gap should be at least 7 mm.

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 remove 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.)

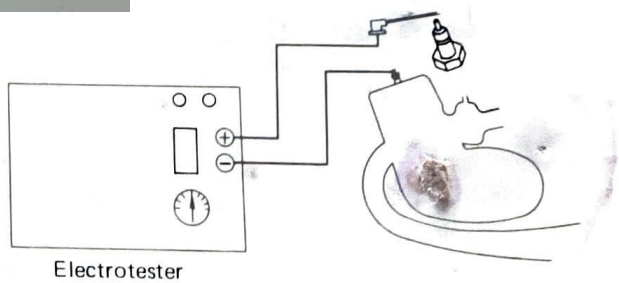


Fig. 6-2-6

4. Spark Plug

1) Standard spark plug is an NGK B-9HC which is a 14 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 the color. After 2,000 ~ 4,000 miles fuel deposits will begin to build up heavily on the plug. This is usually done during a major tune-up.

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-high 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-7Hz) or colder (B9E) 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-9HC, when replacing it.

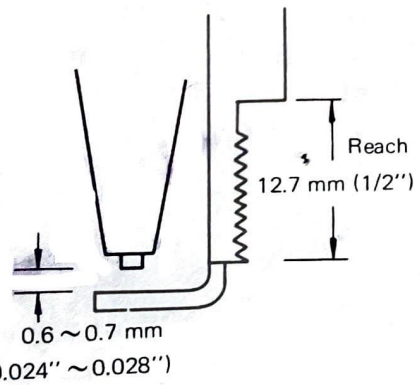


Fig. 6-2-7

5. Adjusting Ignition Tim

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.

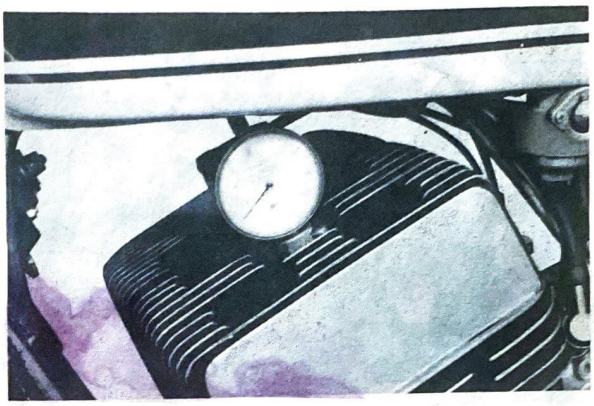


Fig. 6-2-8

2) Set the point gap at 0.3 ~ 0.4 mm (0.012" ~ 0.016") by moving the breaker 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).

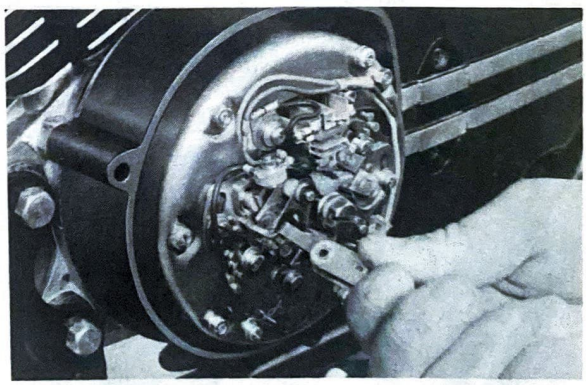


Fig. 6-2-9

3) Connect the positive lead of the point checker to the terminal from which the lead was disconnected. Ground the negative lead of the point checker to the engine or chassis.

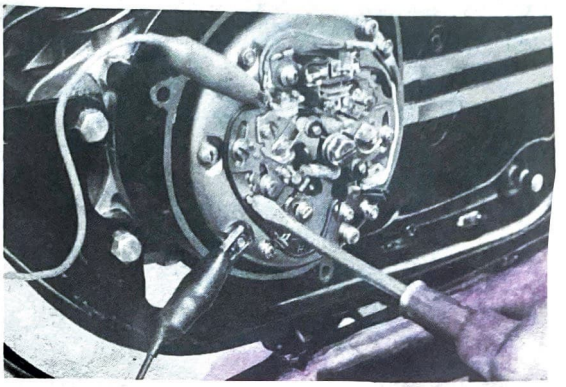


Fig. 6-2-10

4) Loosen the breaker plate setting screw, and move the plate to the right or left with a slot-head screwdriver until the conductivity test lamp lights up 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 plate in the normal rotating direction will delay the ignition timing, while turning it in the reverse direction will advance the ignition timing.

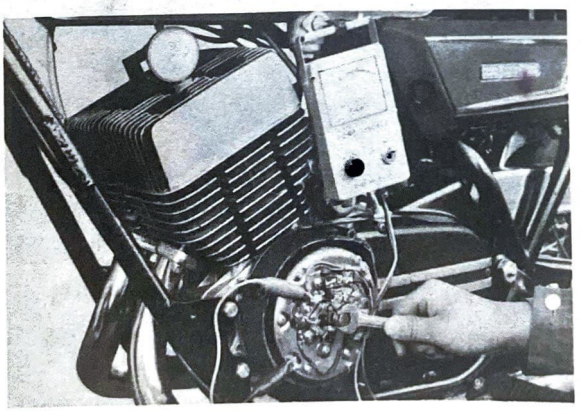


Fig. 6-2-11

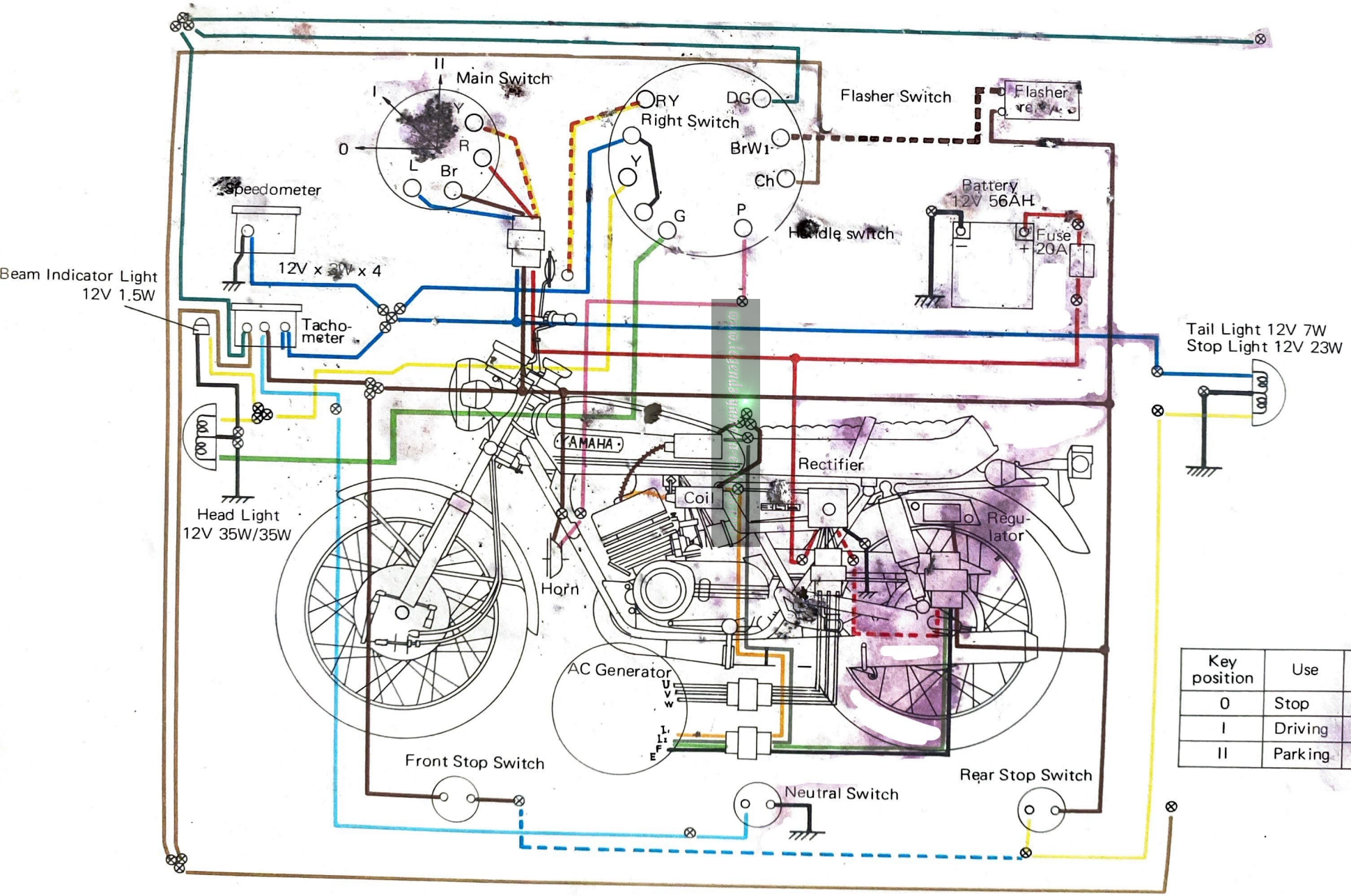
YAMAHA R5 SERVICE MANUAL

1st edition, May 1970

YAMAHA MOTOR CO., LTD.

HAMAMATSU, JAPAN

350 R5 Circuit Diagram



Key position	Use	Connection
0	Stop	
I	Driving	R+Br+RY
II	Parking	R+L

YAMAHA MOTOR CO., LTD.

45.04-3.0 x 1.G.P.C

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