YAMAHA

125AT2 175CT2

SERVICE MANUAL

LIT-11613-14-00

FOREWORD

The Yamaha 125AT2, 175CT2 are originally designed for off-the-road riding as a trials machine or a scrambler, but it is also built to excell in high speed performance over the road or highways.

This manual is offered so that all Yamaha dealers and service engineers will become familiar with the technical information and service instructions essential to the 125AT2, 175CT2.

******* NOTICE *******

This manual has been written by Yamaha Motor Company for use by Authorized Yamaha Dealers and their qualified mechanics. In light of this purpose it has been assumed that certain basic mechanical precepts and procedures inherent to our product are already known and understood by the reader.

Without such basic knowledge, repairs or service to this model may render the machine unsafe, and for this reason we must advise that all repairs and/or service be performed by an Authorized Yamaha dealer who is in possession of the requisite basic product knowledge.

Other information is produced by the U.S. distributor, Yamaha International Corporation, and is necessary to provide total technical coverage regarding the product.

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The Research, Engineering, and Service Departments of Yamaha are continually striving to further improve all models manufactured by the company. Modifications are therefore inevitable and changes in specifications or procedures will be forwarded to all Authorized Yamaha Dealers and will, where applicable, appear in future editions of this manual.

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YAMAHA AT2,CT2, SERVICE MANUAL

1st Edition

July 1971

ENGINEERING & SERVICE DEPARTMENT
YAMAHA MOTOR COMPANY
HAMAMATSU, JAPAN

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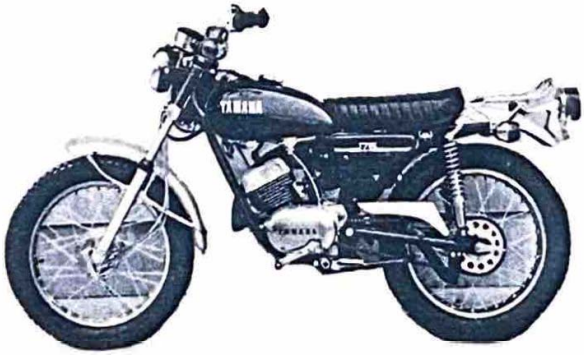
CT2



Features of Yamaha AT2, CT2

1. 7-port Cylinder and Reed Valve Intake

   The newly designed 7-port cylinder has greatly improved scavenging efficiency at all speeds. In addition, the adoption of an improved reed valve for intake ensures steady and smooth engine performance throughout the entire range of speed from low to high.

2. Highly-dependable Yamaha Autolube

   Yamaha Autolube provides superior engine lubrication that extends the life of the engine.

3. Easy Starting

   The engine can be started by simply disengaging the clutch and kicking the kick pedal without shifting gears back to neutral. This is a valuable convenience to the rider. The CT2 is equipped with a magneto. To start the engine, kick the pedal. The AT2 has an electric starter dynamo for easier starting.

4. Powerful Brakes

   Patented waterproof, dustproof brake drums provide safe, fade-free braking on wet or dusty roads.

5. Adjustable Rear Cushion

   The rear cushions are adjustable for five positions. The rider can adjust spring tension to compensate for varying weight, speed, and road conditions.

6. Front Fork Design

   The Yamaha AT2, CT2 employs a front fork design well-known for its strength and superior handling characteristics. Its use assures the rider of the ultimate suspension for even the roughest terrain.

7. Speedometer and Tachometer

Both speedometer and tachometer are standard equipment. Individual units are separately mounted for maximum visibility. An additional feature of the speedometer is an odometer which can be reset to zero for trip or enduro purposes.

8. Tires

The YAMAHA AT2, CT2 are fitted with tires having a universal type tread pattern as standard equipment. This particular tread is one of the most versatile available. It gives maximum trail traction and yet is compatible with road usage.

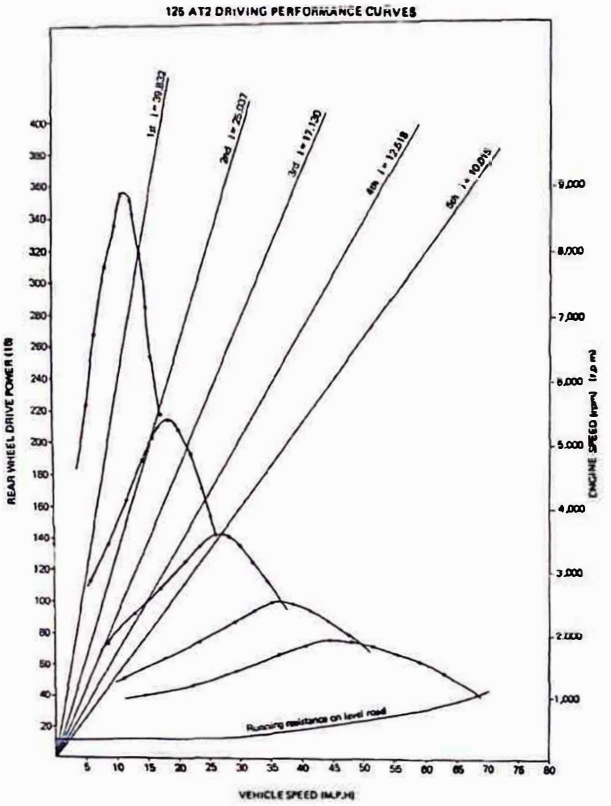
9. Carburetor Starter Feature

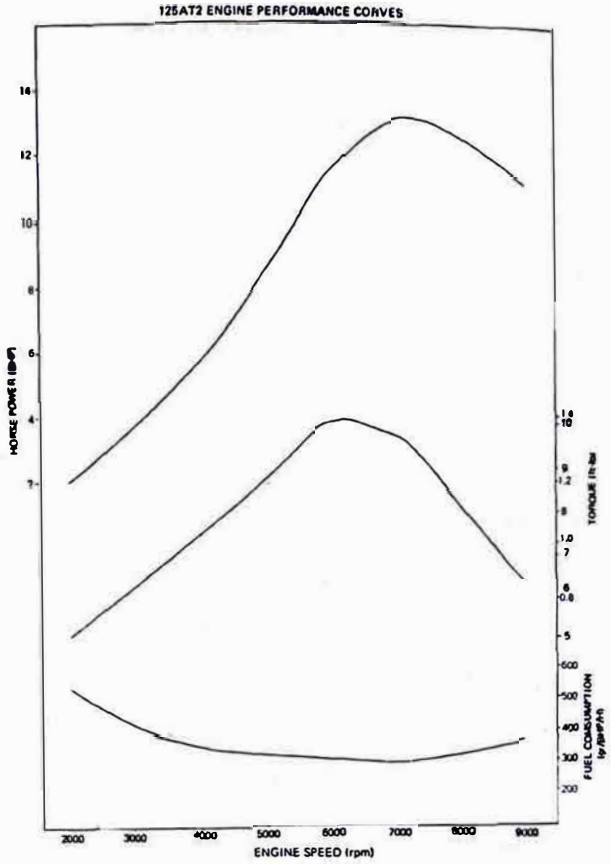
Yamaha's starter feature is already well-known for its easy starting. Equipped with this unique carburetor, the Yamaha AT2, CT2 are quick starting under all conditions.

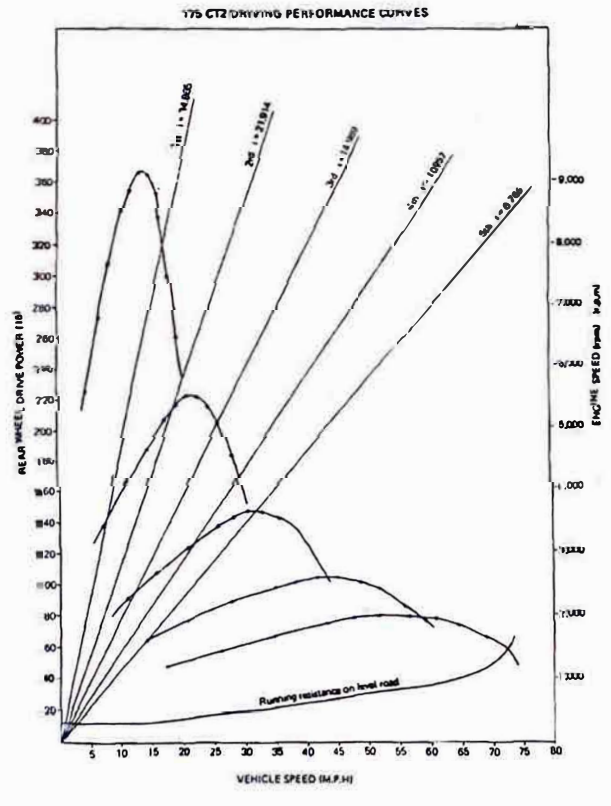
1-3 Specifications & Performance 125 AT2 & 175 CT2

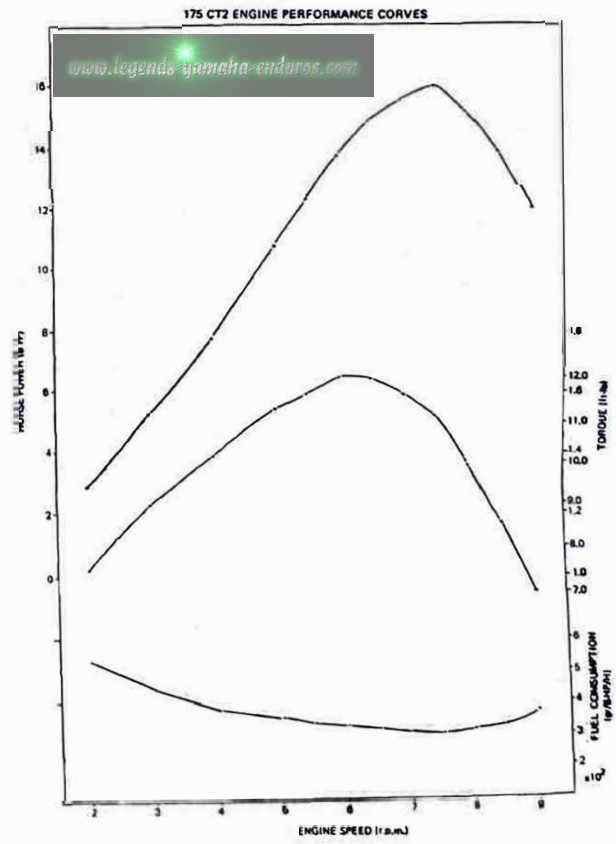
Model:	YAMAHA 125 AT2	YAMAHA 175 CT2
Dimensions:		
Overall length	77.2 in.	78.0 in.
Overall width	35.8 in.	35.8 in.
Overall height	42.9 in.	43.7 in.
Wheelbase	50.6 in.	50.8 in.
Min. ground clearance	8.9 in.	9.4 in.
Weight: Net	221 lbs.	214 lbs.
Performance:		
Max. speed	65 mph plug	67 mph plus
Fuel consumption (on paved level roads)	129.4 mpg at 31 mph	117.6 mpg at 31 mph
Climbing ability	30 degrees	Same as left
Min. turning radius	74.8 in.	74.8 in.
Braking distance	49 ft at 31 mph	49 ft at 31 mph
Engine:		
Model	AT1	CT1
Type	2 stroke Air cools gasoline	Same as left
Lubricating system	Separate lubrication (YAMAHA Autoluve)	Same as left
Cylinder	7 port piston valve and reedvalve	Same as left
Displacement	7.51 cu. in. (123 c.c.)	10.43 cu. in. (171 c.c.)
Bore × Stroke	2.205 in.×1.969 in.	2.508 in.×1.969 in.
Compression ratio	7.1 : 1	Same as left
Max. power	13 BHP/7,000 r.p.m	16 BHP/6,500 r.p.m
Max. torque	10 ft-lb/6,000 r.p.m	11.9 ft-lb/6,000 r.p.m
Starting system	Electric & kick starter	Kick starter
Ignition system	Battery ignition	Magneto ignition
Carburetor:		
Type	VM24SH	VM24SH
Air cleaner:	Wet, foam rubber	Same as left
Spark plug:	NGK B-8ES	NGK B-8ES
Transmission:		
Clutch	Wet, multiple-disk	Same as left
Primary reduction system	Gear	Same as left
Primary reduction ratio	3.894 (74/19)	Same as left

Gear box:		
Type	Constant mesh, 5-speed	Same as left
Reduction ratio 1st	3.181 (35/11)	Same as left
2nd	2.000 (30/15)	Same as left
3rd	1.368 (26/19)	Same as left
4th	1.000 (23/23)	Same as left
5th	0.800 (20/25)	Same as left
Secondary reduction system	Chain	Same as left
Secondary reduction ratio	3.000 (45/15)	2.812 (45/16)
Chassis:		
Frame	Tubular-Double loop	Same as left
Suspension system, front	Telescopic	Same as left
Suspension system, rear	Swinging, arm	Same as left
Cushion system, front	Coil spring, oil damper	Same as left
Cushion system, rear	Coil spring, oil damper	Same as left
Steering system:		
Steering angle	49° both right and left	Same as left
Caster	60°31′	Same as left
Trail	4.7 in.	4.8 in.
Braking system:		
Type of brake	Internal expansion	Same as left
Operation system, front	Right hand operation	Same as left
Operation system, rear	Right foot operation	Same as left
Tire size:		
Front	3.00-18-4PR (Trials Universal)	3.25-18-4PR (Trials Universal)
Rear	3.25-18-4PR (Trials Universal)	3.50-18-4PR (Trials Universal)
Dynamo:		
Model	GS114-01	F130-06
Manufacturer	HITACHI Ltd.	Same as left
Battery:		
Model	12N7-3B or 12N7-3B-1	6N4A-40×1
Capacity	12V 7AH	6V 4AH
Lighting:		
Head light	12V 25W/25W	6V 25W/25W
Tail light	12V 7W	6V 5W
Stop light	12V 27W	6V 5W
Meter light	12V 3W×2	6V 3W/3W
Flasher light	12V 27W	6V 8W
High beam indicator light	12V 2W	6V 1.5W
Tanks:		
Gasoline tank capacity	1.8 US gals.	1.8 US gals.
Oil tank capacity	1.3 US	1.3 US qts.





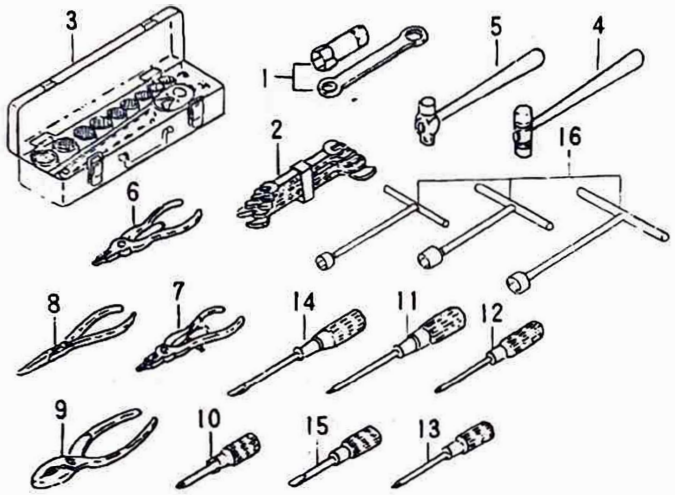




1-5 Tools and Instruments for Shop Service

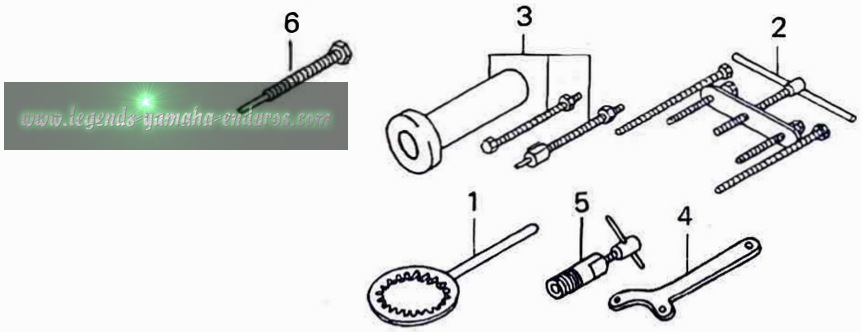
The following tools and instruments are required to service the AT2,CT2

1. General Tools



1) Plug wrench 23 x 29 mm.
2) A set of wrenches
3) A set of socket wrenches
4) Plastic tip hammer
5) Steel hammer
6) Circlip pliers (ST type)
7) Circlip pliers (TR type)
8) Needle nose pliers
9) Pliers
10) Phillips-head screwdriver
11) Phillips-head screwdriver (L)
12) Phillips-head screwdriver (M)
13) Phillips-head screwdriver (S)
14) Slot-head screwdriver (M)
15) Slot-head screwdriver (S)
16) T-handle socket wrench

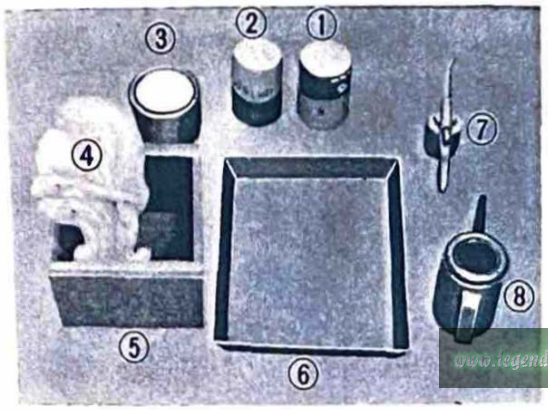
2. Special Tools and instruments



1) Clutch holding tool
2) Crankcase disassembling tool
3) Crankshaft assembling tool
4) Flywheel magneto holding tool (CT2)
5) Flywheel magneto puller (CT2)
6) Armature puller bolt (AT2)

In addition, an electro-tester, tachometer (engine rpm meter) hydrometer, etc. should be obtained.

3. Other Materials



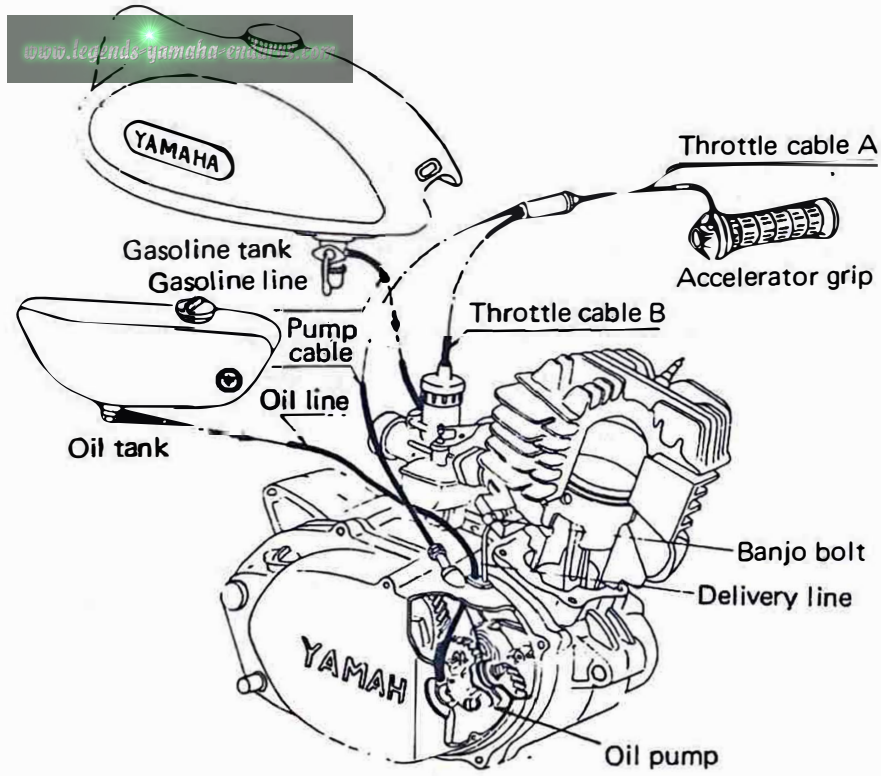
1) Grease
2) Autolube oil
3) Yamaha Bond (No. 4)
4) Wiping material
5) Overhauling stand (Wooden box)
6) Parts tray
7) Oiler
8) Oil jug

The use of a wooden box as shown in the above photo will facilitate engine service and overhaul. Consumable parts (such as gaskets) and replacement parts must also be on hand.

Chapter 2. YAMAHA Autolube
(Automatic, Separate Lubricating System)

2-1 What is YAMAHA Autolube?

Conventional 2-stroke engines are lubricated by oil pre-mixed in gasoline, but YAMAHA's Autolube furnishes an automatic, separate lubrication system. That is, the oil in a separate oil tank is automatically regulated by the oil pump and fed to the engine according to engine speed and load.



2-2 Features of YAMAHA Autolube

The oil pump is driven by the engine through a reduction gear, and is connected to the carburetor throttle cable, which in turn is controlled by the accelerator grip. The oil pump automatically regulates the volume of lubricating oil according to engine speed and throttle valve opening, thus pumping the precise amount of oil for engine lubrication under any operating condition.

This "automatic, separate lubrication" does not merely eliminate disadvantages in the conventional pre-mix system, but it further improves the performance and efficiency of 2-stroke designs by eliminating certain oil-starvation conditions which formerly existed.

A) The Autolube feeds an optimum amount of lubricating oil to the engine under any operating condition, thus featuring:

- Less oil consumption.
  Less carbon accumulation.
- Less exhaust smoke.
- Improved lubricating efficiency.

B) The Autolube simplifies fuel supply, thus featuring:

- Using straight gasoline directly in the gas tank.
- Less fuel contamination.

C) The Autolube improves the reliability of lubrication, thus eliminating:

- Special care concerning oil/fuel mixing ratio.

2-3. Handling 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.

The oil pump is similar in both construction and operation to other Autolube systems. The only difference is the employment of a 5.5 diameter plunger because of larger consumption of oil by a 175 c.c. single cylinder engine.

2-3-A. Checking Minimum Pump Stroke

1) Checking

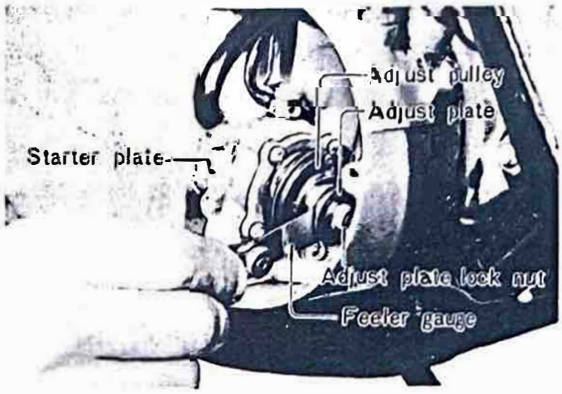
a. Fully close the accelerator grip.

b. Turn the oil pump starter plate in the direction of the arrow marked on the plate. Then measure the gap between the adjustment pulley and the adjustment plate. Keep the gap as wide as possible by observing it with the eye.

c. Insert a feeler gauge (0.15 mm.) into the gap.

When the gap allows it to enter . . . . . Stroke is correct.

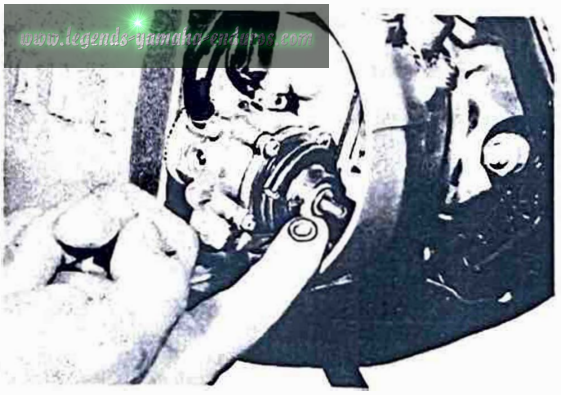
When the gap does not allow . . . . . Stroke is insufficient.



2) Adjustment

a. Remove the adjustment plate lock nut, and then remove the adjustment plate.

b. Install a 0.1 mm. adjustment shim where the adjustment plate was.



c. Reinstall the adjustment plate lock nut, and measure minimum stroke. When the gap allows a 0.20 mm. feeler gauge to enter but does not allow a 0.25 mm, the stroke is correctly adjusted.

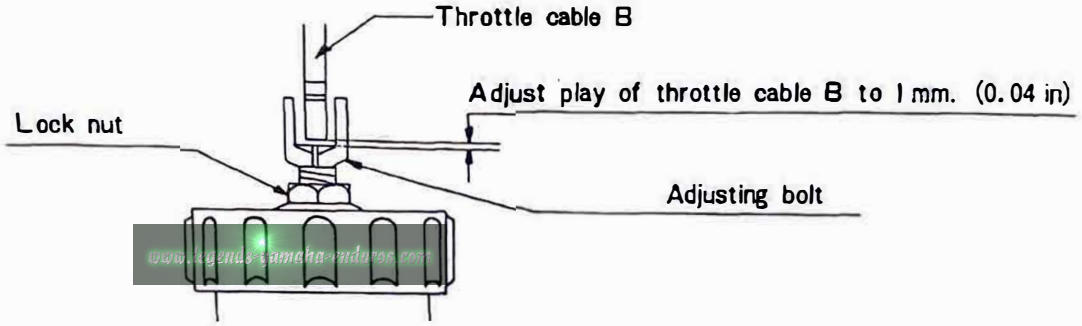
Stroke adjustment clearance . . . . . 0.20 to 0.25 mm.

2-3-B. Carburetor and Autolube Cable Adjustments

Follow the preceeding in section 2-3-A steps to check minimum stroke, and adjust it if incorrect. Then adjust the carburetor and pump as described in the steps below.

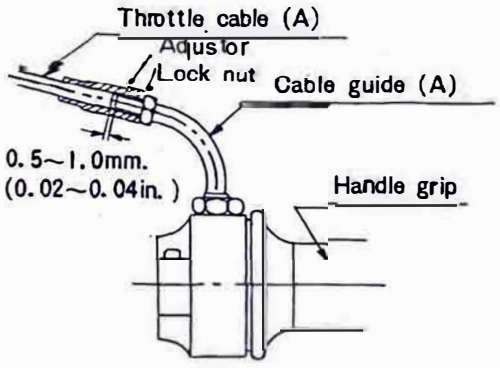
1) Throttle Cable Adjustment

a. Adjust the carburetor with the engine at idle, and remove all but 1 mm of slack from throttle cable B.



- To bring the play of the throttle cable into correct adjustment, loosen or tighten the throttle cable adjustment screw.
- To check this adjustment, lightly pull throttle cable B, and engine speed should slightly increase from idling r.p.m.

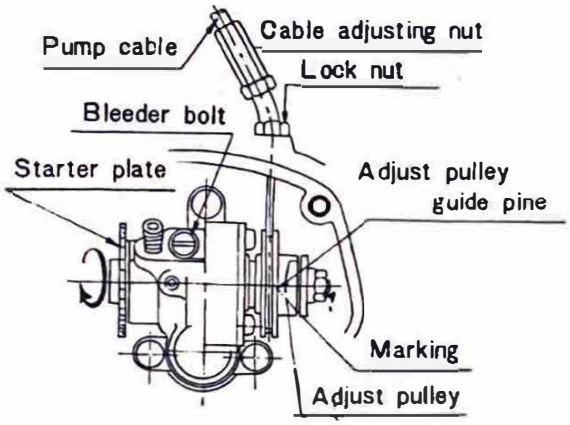
b. Next, adjust throttle cable (A) so that the gap as shown in Fig. 2-3-6 below will be between 0.5 and 1.0 mm. (0.02~0.04 in.)

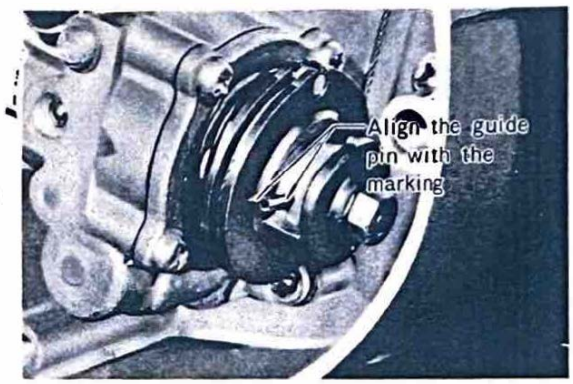


- Check the play of the throttle cable(A) by pulling the outer part of the cable. If the play is excessive or insufficient, adjust the play with the adjustment screw.

2) Autolube Cable Adjustment

a. Adjust the pump cable so that the marking (arrow) on the Autolube pump adjustment pulley is aligned with the guide pin (see Fig. 2-3-8). Begin by fully closing the acclerator grip, then slowly turning it back again so that the slack in the throttle cable is completely taken up. Next, adjust the pump cable so that the marking on the pump adjustment pulley will be aligned with the guide pin, as shown in Fig. 2-3-7. The point of adjustment is at the end of the cable, just before it enters the case. Loosen the lock nut and screw the adjuster in or out, whichever direction is necessary to obtain the correct adjustment.

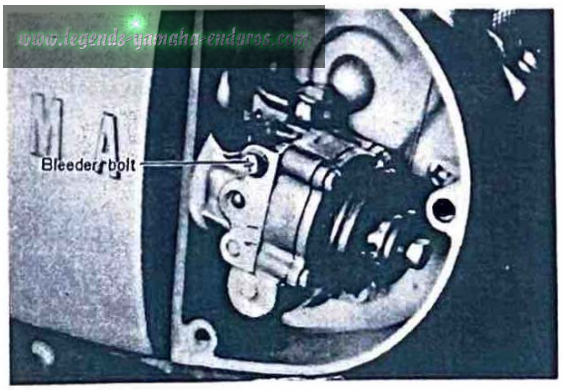




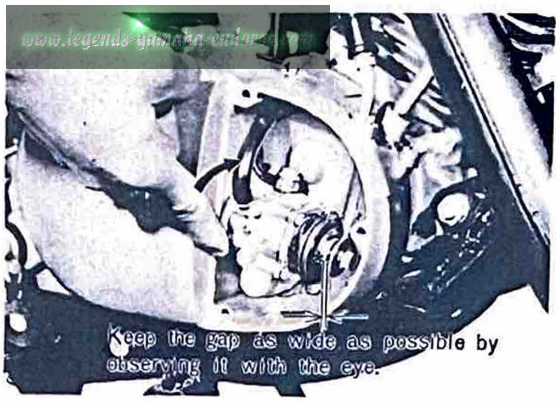
2-3-C. Bleeding

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 such an irregular flow of oil, bleed the pump in the following manner.

1) Remove the bleeder bolt.



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



Chapter 3 Reed Valve and 7-port Cylinder

Reed Valve-construction and Handling

Construction of the Reed Valve

a. Valve

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

b. Case

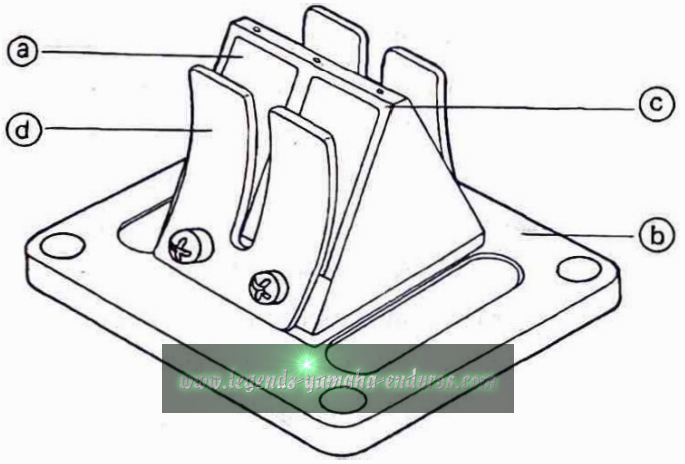
The case is made of a die-cast aluminum alloy.

c. Gasket

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

d. Valve Stopper

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



Handling of the Reed Valve

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

a. Storage

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

b. Inspection

(a) Valve

Check the valve for cracks and breakage.

(b) Valve stopper

The valve stopper limits the movement of the reed valve.

(c) Set-screw

The valve and valve stopper should be fastened with the set-screw. Tightening torque should be correct; otherwise, the valve and valve stopper will be deformed.

Correct tightening torque: 8.0 kg-cm

(d) Gasket

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

c. Valve Service

The reed valve can not be perfect, if any of its components-valve, valve stopper, gasket case and set-screw-is faulty. If so, it is advisable to replace the whole assembly, instead of replacinga faulty aprt.

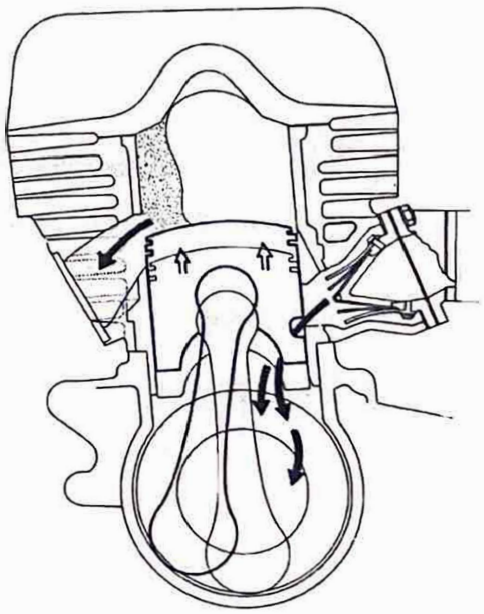
WHAT IS THE 7-PORT CYLINDER REED VALVE SYSTEM?

For better performance of a two-stroke engine, a sufficient amount of fuel-air mixture must be fed to the engine, while the burned gases must be completely forced out of the cylinder.

On the two-stroke engine, if the inlet port timing is increased, the complete close of the port will be slowed, and as a result, the fuel-air mixture may tend to flow back toward the carburetor. To improve the scavenging efficiency of the cylinder, the opening of the transfer port must be sidened.

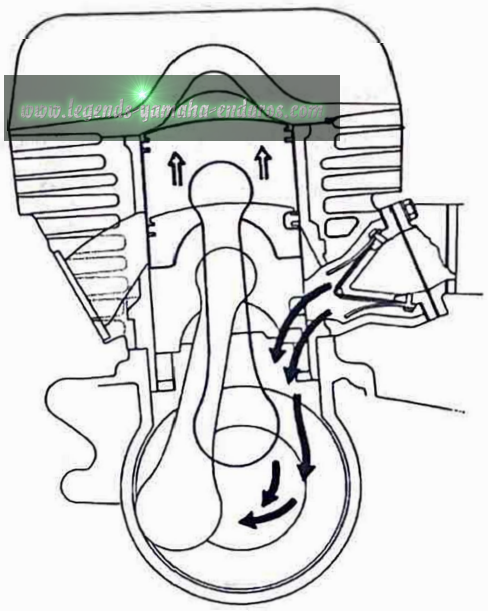
On the two-stroke engine, it is the most important to meet these requirement satisfactorily. As a measure to transfer a sufficient amount of fuel-air mixture to the cylinder and to force the burned gases completely out of the cylinder, the 5-port system has been in use. However, Yamaha has invented a new 7-port reed valve engine to achieve the following improvements; advanced inlet port timing, elimination of any possible reverse flow of fuel-airmixture, and transer of the mixture with full efficiency. As a result, the engine has greatly improved its performance at low speed with the adoption of the reed valve, and in addition, steady performance at any gear grom low to high has been assured by improved scavenging efficiency.

Operation of the 7-port, piston reed valve



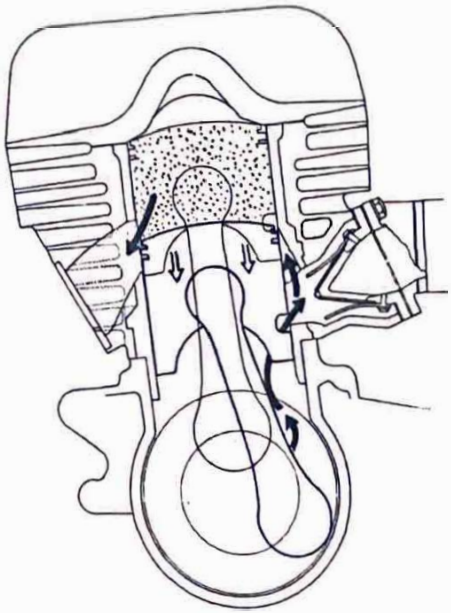
1. Piston Moves Up from BDC and Closes Exhaust Port

   Fuel-air mixture entering cylinder through main, auxiliary transfer and 7th ports forces burned gases toward exhaust port.
   As piston moves up, crankcase pressure decreases, leading to negative.
   As inlet port arranged in piston skirt begins to overlap with cylinder inlet port, negative pressure in crankcase causes reed valve to open, and fuel-air mixture streams into crankcase.



2. Piston Closes Exhaust Port and Moves Up to TDC

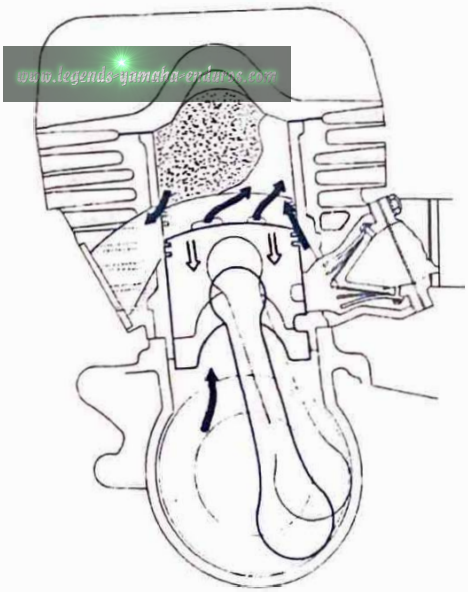
   Fuel-air mixture transferred into cylinder through main, auxiliary transfer and 7th ports is compressed by piston, ignited just BTDC, and burned.
   Piston skirt clears inlet port, fuel-air mixture streams into crankcase through piston inlet port and cylinder inlet port.



3. Piston Moves Down from TDC and Opens Exhaust Port

Heated, high pressure burned gases produced by "explosion" pushes piston downward.

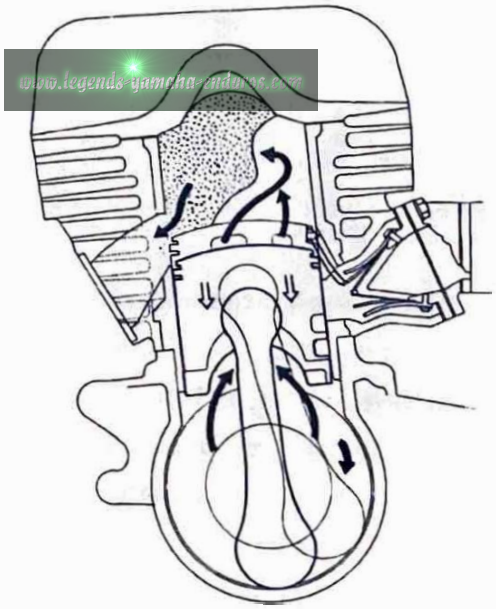
High pressure of burned gases begins to push piston head. As piston lowers, fuel-air mixture entering crankcase in intake stroke is compresses.



4. Piston Opens Exhaust Port and then Opens Transfer Port

Exhaust port is cleared and burned gases is pushed out-in a stream.

a. As piston lowers, fuel-air mixture in crankcase begins to be compressed.



5. Piston Opens Transfer Port and Moves Down to BDC

Main and auxiliary transfer ports open, and fuel-air mixture is induced into cylinder from crankcase and forces burned gases out of cylinder, thereby filling the cylinder.

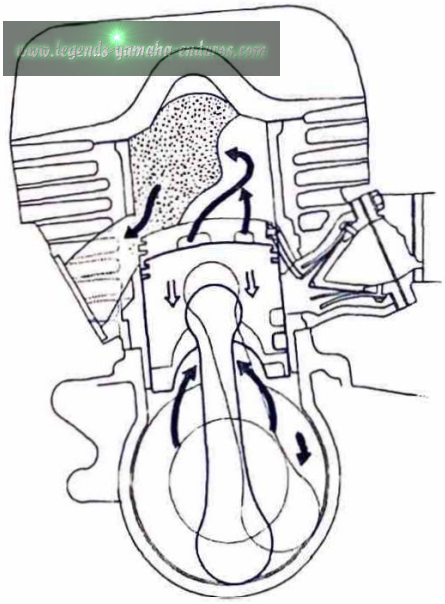
As piston moves down further, main, auxiliary transfer and 7th ports are cleared, and compressed mixture in crankcase streams into cylinder. As a result, crankcase pressure decreases.

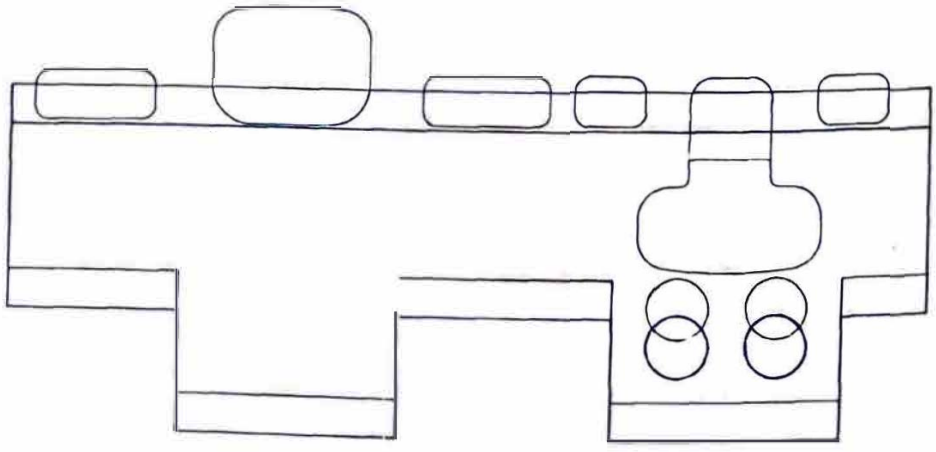
Scavenging by the 7th Port

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

As the piston moves down further, the main, auxiliary and 7th ports are cleared and the fuel-air mixture enters the cylinder in streams.

In this case, the inertia effect of the streams causes the reed valve to open, and the fuel-air mixture passing through the reed valve flows directly into the cylinder through the 7th port (the mixture does not enter the crankcase), thereby forcing the burned gases out of the cylinder. This is the scavenging action of the 7th port.





Chapter 4 Engine

This chapter describes the disassembly and reassembly of the engine, its removal from the chassis, and the necessary service data. However, except when overhauling the crankshaft assembly, transmission, shifter mechanism, or bearings and oil seals in the crankcase, it is suggested that engine be serviced without removing it from the chassis. This will save a lot of time and labor.

Preparation for disassembly of the engine:

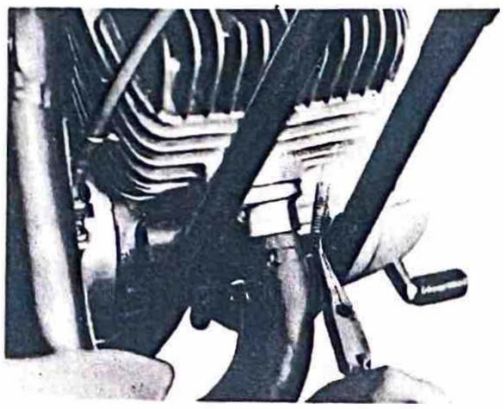
1) All dirt, mud, dust, and foreign material should be thoroughly removed from the exterior of the engine assembly before removal and disassembly. This will prevent any harmful foreign material from entering the interior of the engine assembly.
2) Before engine removal and disassembly, be sure you have proper tools and cleaning equipment so you can perform a clean and efficient job.
3) During disassembly of the engine, clean all parts and place them in trays in order of disassembly. This will make assembly time faster and easier, and insure correct installation of all engine parts.

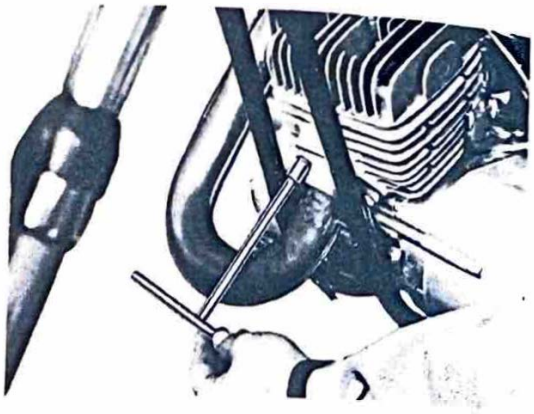
4-1 Engine Removal

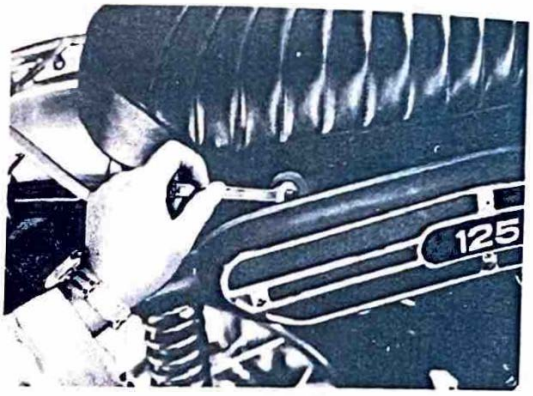
1. Start the engine and warm it up for a few minutes, then turn off the engine and drain the transmission oil

   Amouut of oil: 600 c.c. (0.6 USqt.)
   (SAE10W/30)

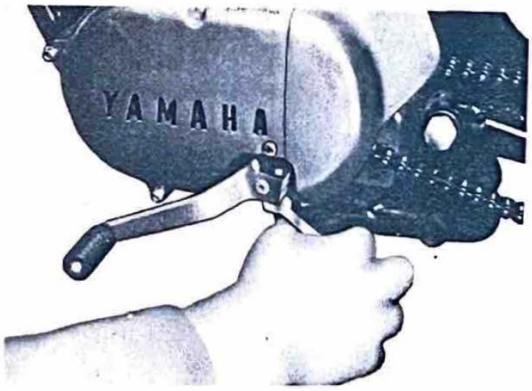
2. Remove the muffler.
   1) Remove the two springs and two bolts.
   2) Remove the muffler holding bolts. then the muffler.



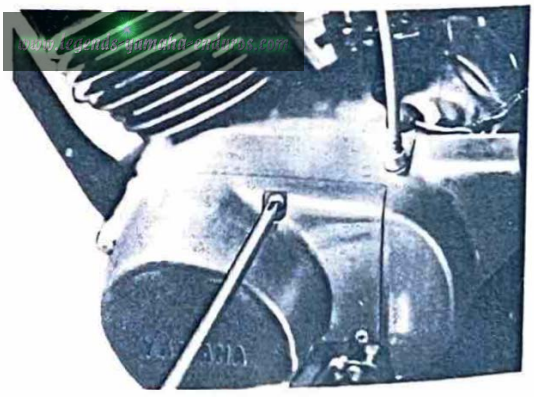




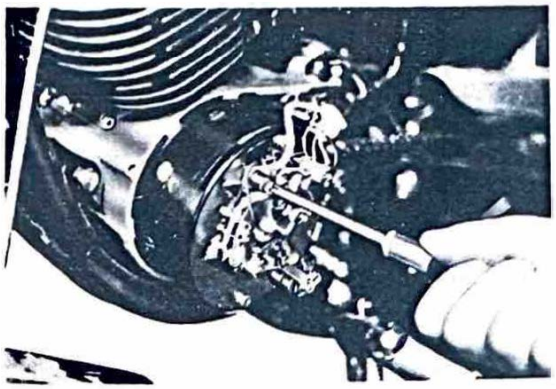
3. Remove the change pedal.



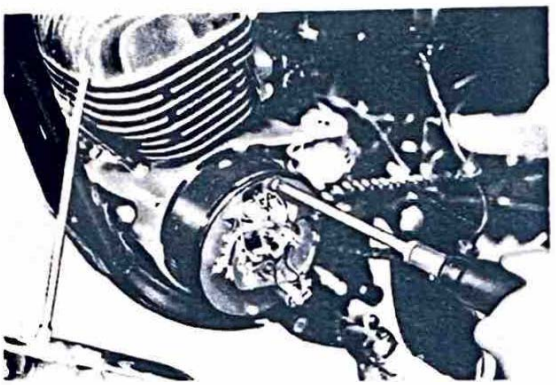
4. Remove the left-hand crankcase cover.



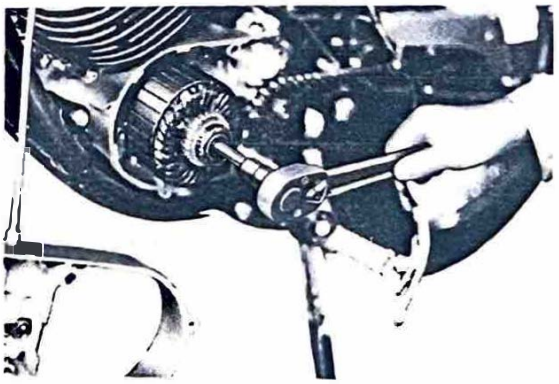
5. a. On the AT2, equipped with a dynamo, all wire leads should be removed from the starter terminals.



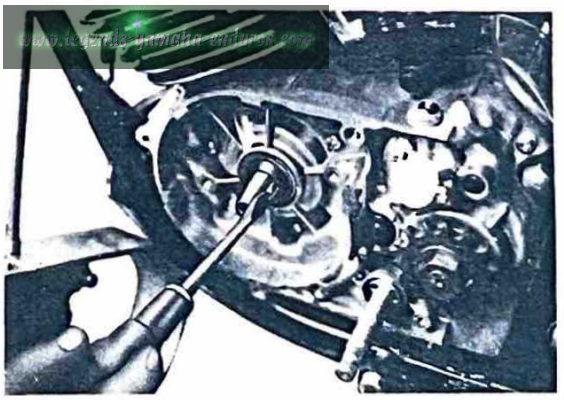
b. Remove the yoke ass'y.



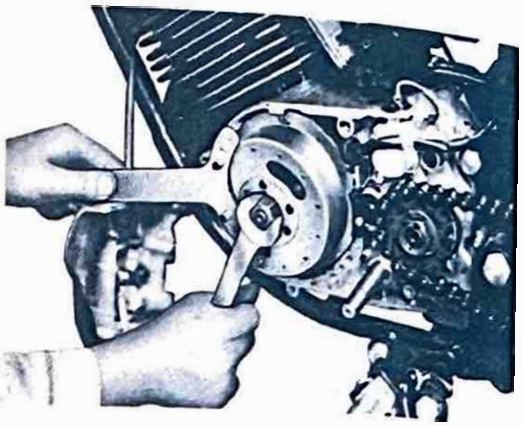
c. Remove the armature by the use of the armature puller bolt.



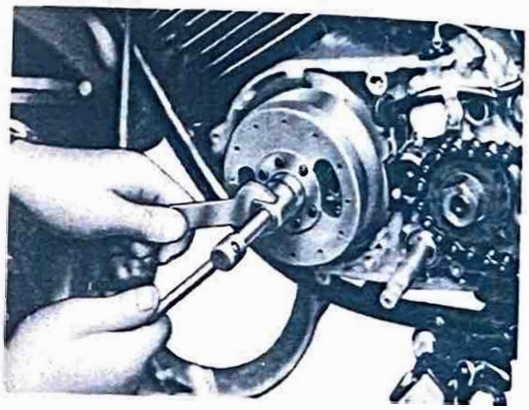
d. Pry out the woodruff key (segment key) with a slot-head screw driver.



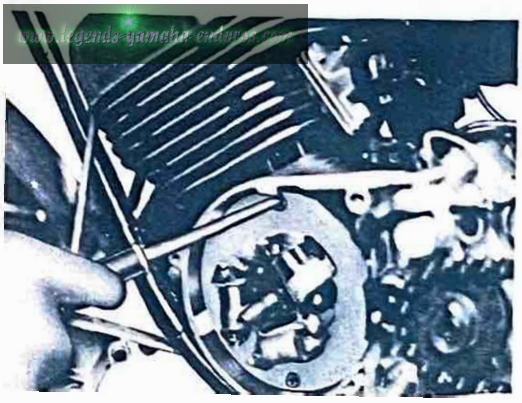
6. a. On the CT2 equipped with a flywheel magneto.



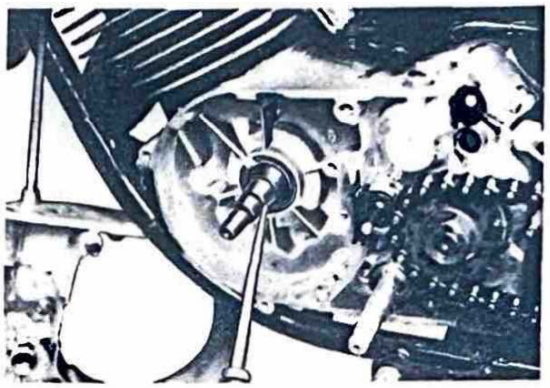
b. Remove the flywheel magneto.



c. Remove the flywheel magneto base, and hold it to the frame with a springs.

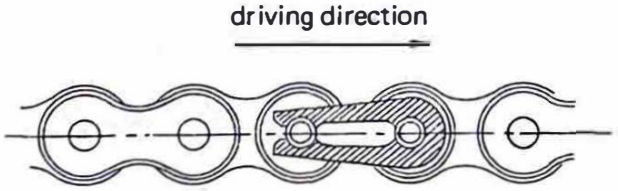


d. Pry out the woodruff key (segment key) with a slot-head screw driver.



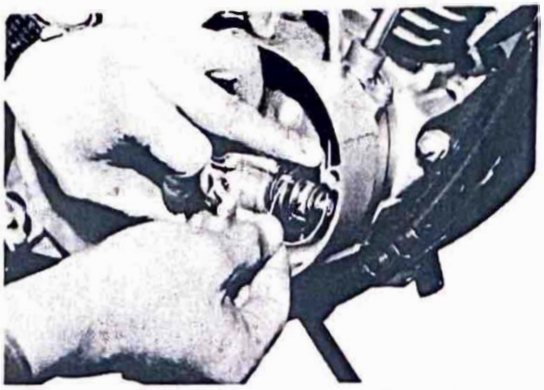
7. Disconnect the master link and remove the chain.

When reconnecting the chain be sure the master link is facing in the correct direction.

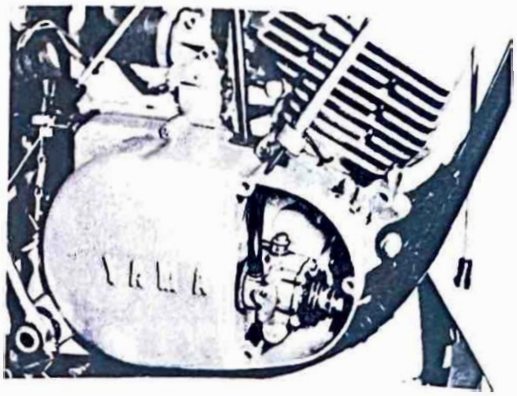


After reconnecting the chain adjust the free play to 25 mm. (1 in.) up and down at the center of the lower section with the rear wheel on the ground.

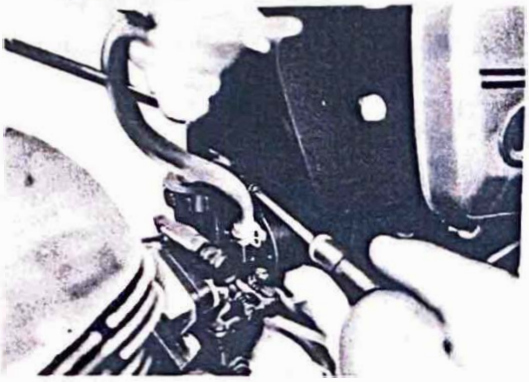
8. Remove the pump cover and pump cable.

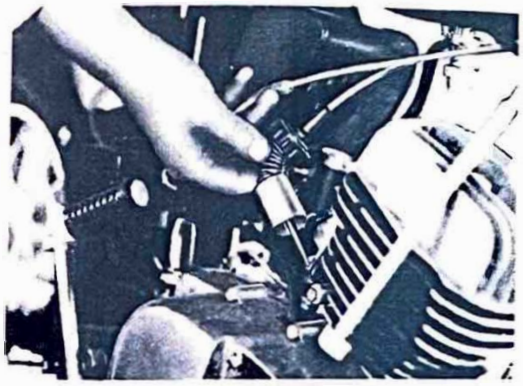


9. Remove the tachometer cable.

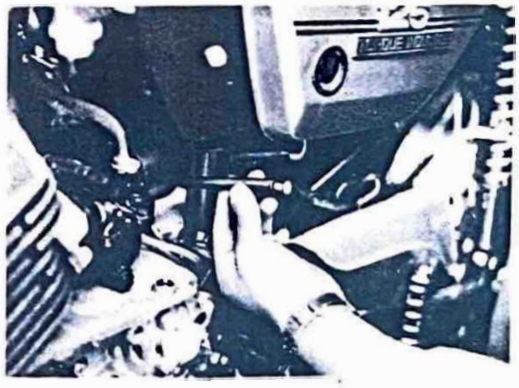


10. Remove the air cleaner rubber and carburetor slide valve.



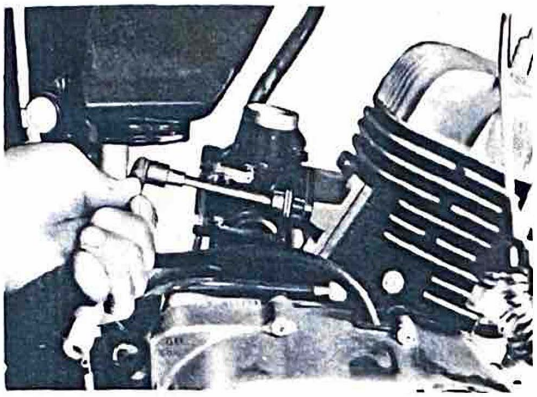


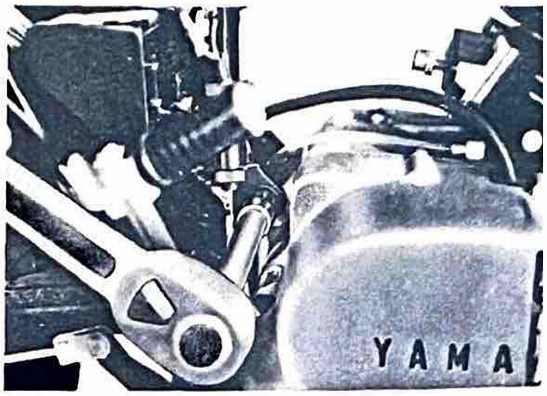
11. Disconnect the oil line and be sure to plug the hole to prevent oil from flowing out.



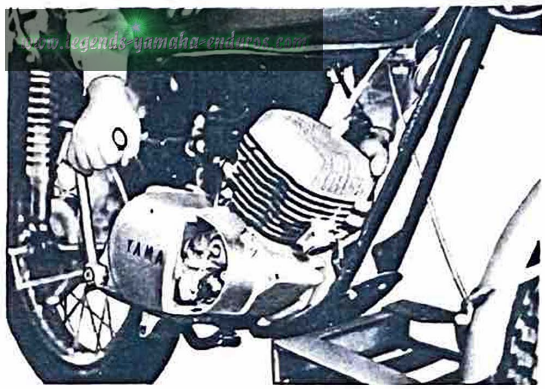
12. Disconnect the fuel line at the bottom of the fuel tank.

13. Remove the carburetor and three engine mounting bolts.





14. Remove the engine from the frame.



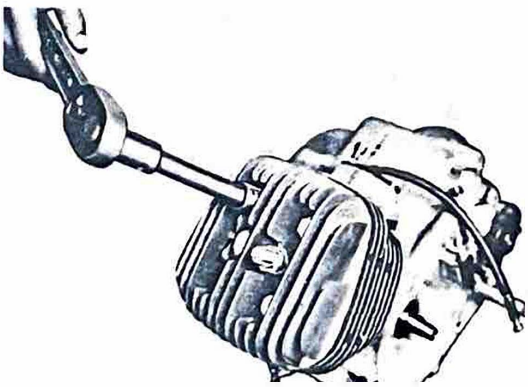
4-2 Cylinder Head

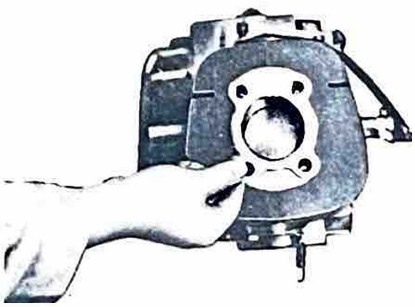
The cylinder head is bolted on the cylinder with special nuts.

A. Removing

Remove the four special nuts from the top of the cylinder head, then the head and head gasket. Reverse the sequence for reinstallation. Replace the gasket, if damaged. Cylinder head tightening torque is 15~18 ft-lbs. (2.0 kg-m)

Note: The special nuts should be loosened (and tightened) in a "cross" pattern and in progressive stages.

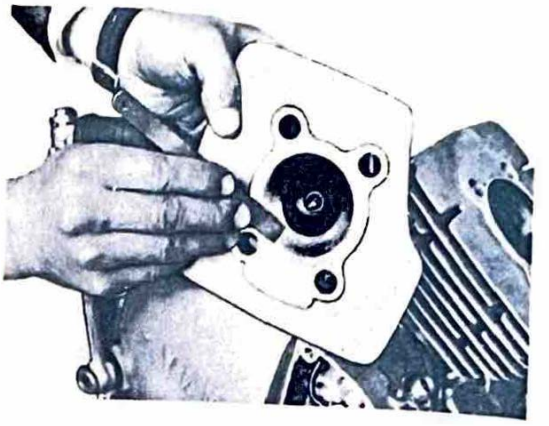




B. Removing Carbon Deposits

Carbon deposits on the cylinder head combustion chamber and top of the piston will result in an increase in the compression ratio, as well as pre-iguition and engine overheating.

Scrape the cylinder head and piston dome clean.



4-3 Cylinder

The Yamaha AT2, CT2 engine employs an aluminum cylinder sleeved with special cast iron, that provides improved cooling efficiency and light weight.

The cylinder is of 7-port design with superior scavenging efficiency.

A. Removing the Cylinder

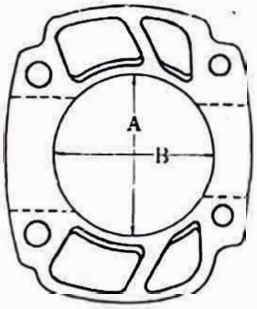
1) Remove the oil delivery line banjo bolt from cylinder.

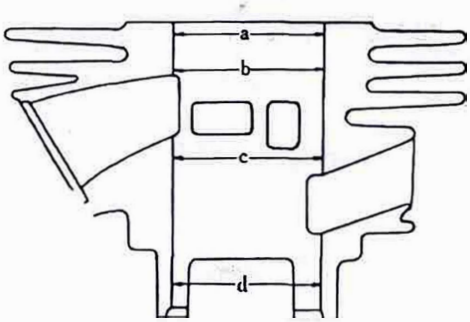
2) Remove the cylinder by striking it lightly with a plastic or rubber hammer.

3) Always replace the cylinder base gasket when reassembling.

B. Checking the Cylinder for Wear

1) Measure the amount of wear of the cylinder wall with a cylinder bore measuring micrometer or cylinder gauge. (Measure it at four depths while positioning the instrument at right angles to the crankshaft.) If the difference between the maximum and minimum diameter exceeds 0.05 mm. (0.0019".), rebore and hone the cylinder.





2) The standard clearance between the piston and the cylinder is 0.040-0.045 mm. (0.0016" and 0.0018")

C. Cylinder Reconditioning

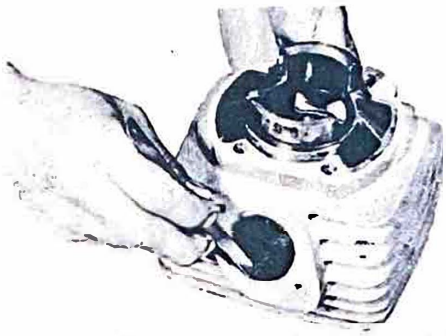
1) Pistons are available in 0.25 and 0.50 mm. (0.010" and 0.020") oversizes.

2) The cylinder should be rebored and honed to the diameter of the oversize piston plus the standard allowable clearance. (4-3-B-2.)

3) The error between the maximum and minimum diameters after honing should be no more than 0.04 mm. (0.0015")

D. Removing Carbon Deposits

Scrape off the carbon accumulation in the exhaust port of the cylinder with the dulled end of a hacksaw blade.



E. Installing the Cylinder

Put your fingers at each end of the piston ring, expand the ring, and slip it onto the piston. Align both ends of the ring with the locating pin in each ring groove.

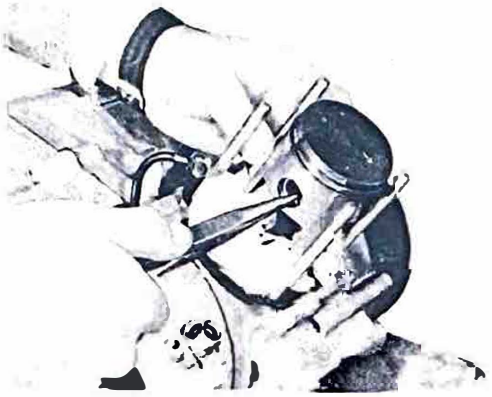
Next, insert the piston into the cylinder. Take care not to damage the rings on the bottom of the cylinder.

4-4 Piston Pin

A. Pulling out the Piston Pin

Remove the clip at the end of the piston pin with 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 clip or other foreign particles into the crankcase.



B. Piston-to-Piston pin Fit

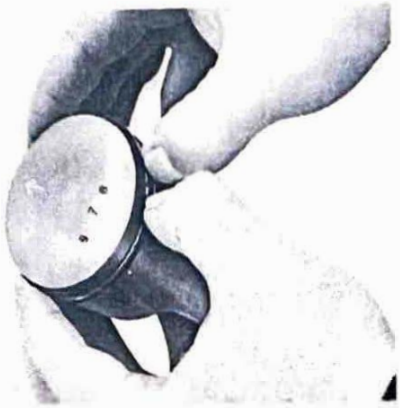
The piston pin should fit snugly in its bore so that it drags a little as you turn it. If the piston pin is loose, replace the pin and/or the piston.

If the center of the pin is step-worn, replace the needle bearing as well as the piston pin. Check the small end of the connecting rod for wear by inserting the piston pin and bearing.

4-5 Piston Ring

A. Removing the Piston Rings

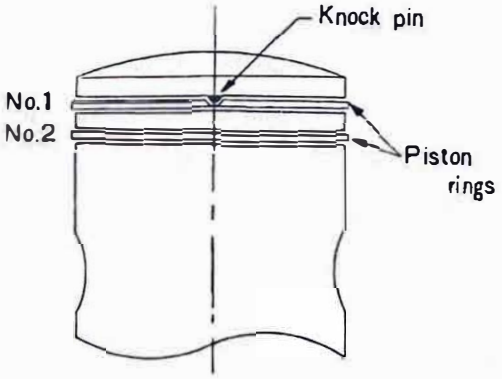
Put your thumbs at each end of the piston ring and pull the piston ring ends apart. Remove the ring by moving the ring off the piston on the other side of the ring ends.



B. Installing the Piston Rings

First fit No. 2 ring (Plane ring) over the piston, and then the No. 1 ring (Keystone ring) and align their end gaps with the locating pin in each ring groove.

The printing on all rings must face up to position the gap properly at the pin.



C. Checking the Piston Rings

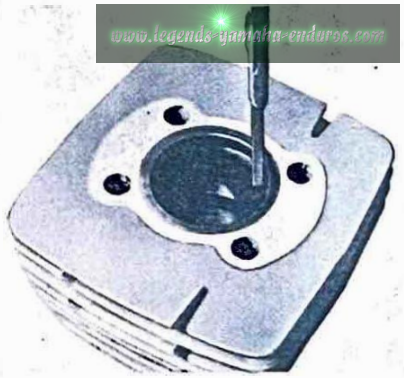
1) Measuring piston ring wear

Put the ring into the cylinder so that the ring is parallel to the cylinder bottom edge, and then measure the end gap with a feeler gauge

End gap

AT2 0.30~0.50mm (both No.1 and No.2)

CT2 0.20~0.40 mm(both No.1 and No.2)



2) Removing carbon

Carbon on the piston rings and in the ring grooves will make the rings stick in the piston, thus causing gas blow-by.

Remove the rings from the piston, and clean the carbon from the rings and ring grooves.

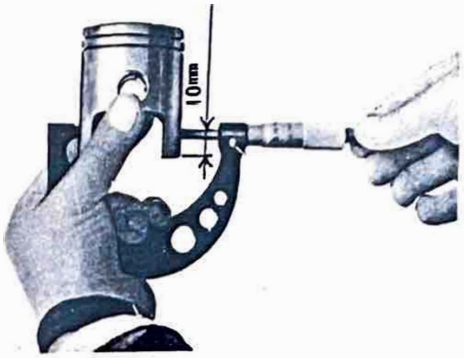
4-6 Piston

The piston is made of a high-silicon aluminum alloy.

A. Checking and Correcting the Piston-to-Cylinder Wall Clearance

1) Measuring piston clearance

Piston clearance is the difference between the minimum cylinder bore diameter and the maximum outside diameter of the piston. As described in 4-3 Cylinder, piston clearance should be 0.040~0.045 mm. (0.0016-0.0018 in.)



To determine the maximum piston diameter, measure the piston with a micrometer at right angles to the skirt 10 mm. (3/8 in.) from its bottom edge.

2) Checking and correcting scratches on the piston

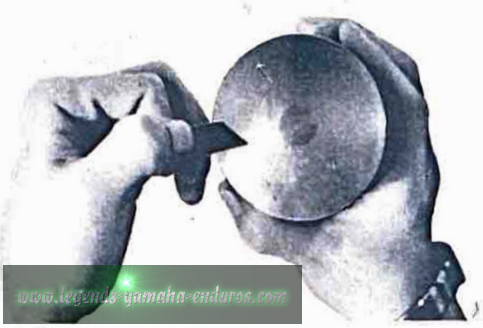
A piston showing signs of seizure will result in noise and loss of engine power. It will also cause damage to the cylinder wall.

If a piston that has seized is used again without correction, another seizure will develop in the same area. Lightly sand the seizure "high spot" on the piston with #400 sandpaper until smooth.

3) Removing Carbon

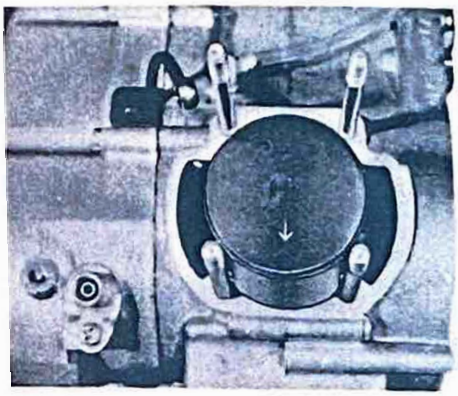
Remove carbon accumulations on the piston crown, using a screwdriver or a saw-blade.

Carbon and gum accumulations in the piston groove will result in piston ring seizure. Remove them from the ring grooves.



B. Piston Installation Direction

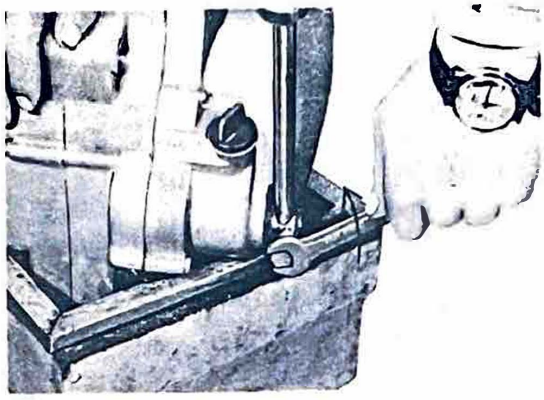
Install the piston with the arrow mark on the head pointing forward (toward the exhaust port of the cylinder).



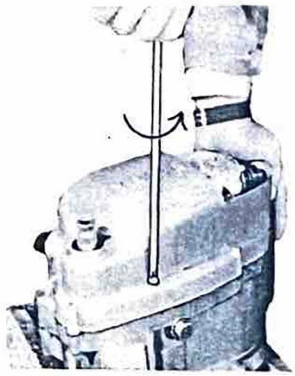
4-7 Crankcase Cover (R.H.)

A. Removal

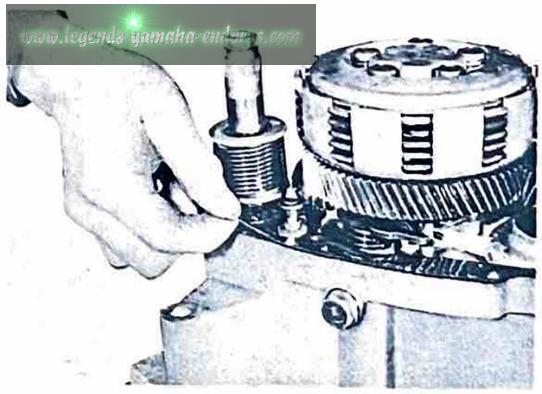
a) Remove the kick crank mounting bolt and the crank.



2) Remove the pan head screws holding the crankcase cover, and then remove the case cover. (The cover can be removed without taking off the oil pump.)



3) Remove the crankcase cover gasket. Replace it, if damaged.



B. Installation

Spread YAMAHA Bond No.5 over the mating surface of crankcase(R). Place the crankcase cover gasket on the crankcase and apply Yamaha Bond No.5 and replace crankcase cover(R). Be sure to apply YAMAHA Bond No.5 to the mating surface; otherwise, Oil will leak.

Note: When installing the crankcase cover(R), make sure that the pump drive gear (make from synthetic resin) is correctly engaged with the primary drive gear.

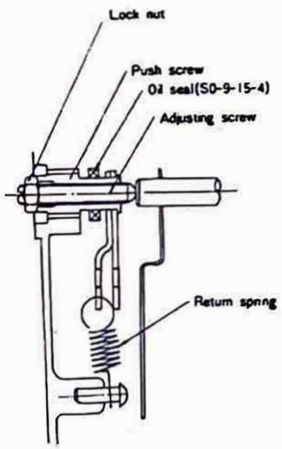
4-8 Clutch

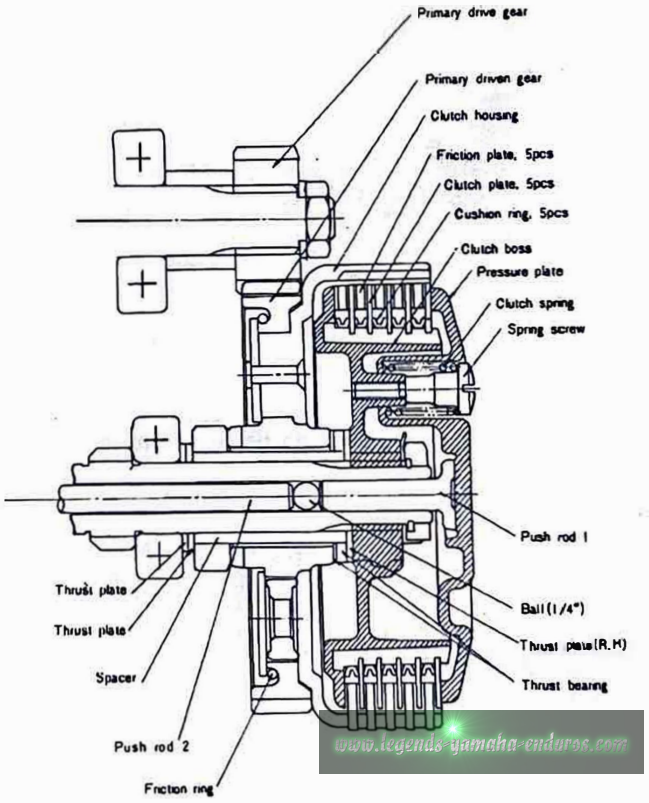
The clutch is a wet, multi-disc type, consisting of five molded cork friction plates and five clutch plates in the clutch housing that is mounted on the transmission main axle. To disengage the clutch, an inner push rod system is employed. The primary driven gear, coupled with the clutch housing, is meshed with a kick pinion gear. This allows the kick starter to be operated with the clutch disengaged or engaged.

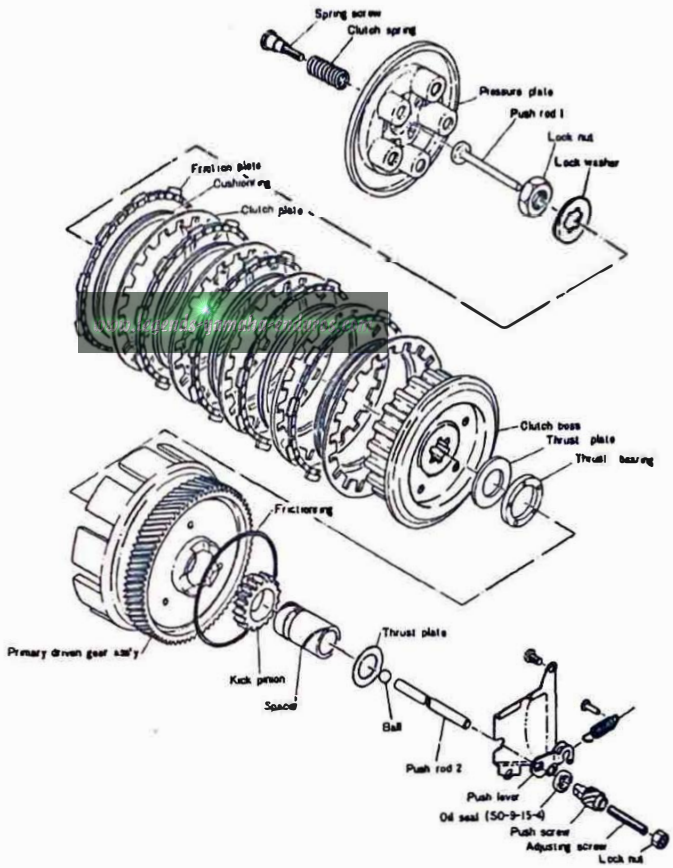
A shock absorber consisting of rubbers is between the primary driven gear and the clutch housing.

The primary drive gear has 19 teeth, and the primary driven gear 74 teeth.

(Primary reduction ratio . . . . . 74/19=3.894)



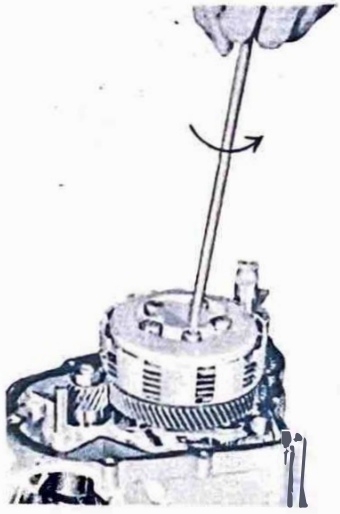


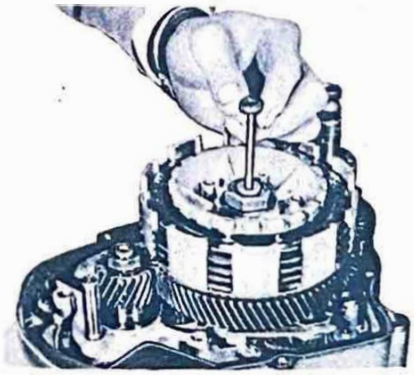


Clutch ass'y exploded view

A. Removing the Pressure Plate

Remove the five clutch spring holding screws, and take out the pressure plate and push rod #1.

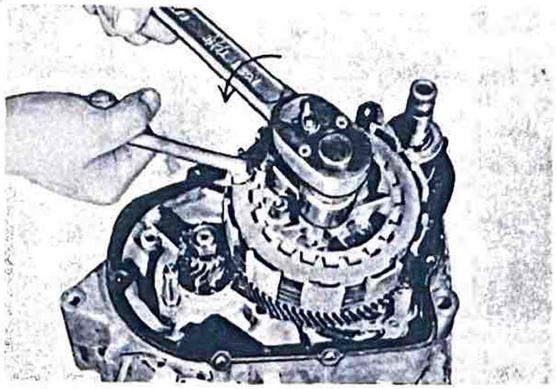




B. Removing the Clutch Boss

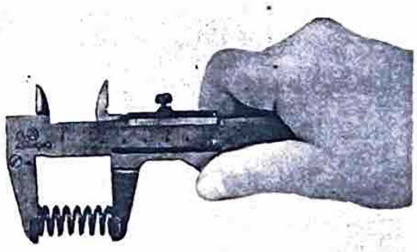
Install the clutch holding tool on the clutch boss.

Loosen the lock nut, and then remove the clutch boss.



C. Checking the Clutch Spring

If the free length of the spring is 1 mm. (0.04 in.) or more shorter than the standard free length, replace it.

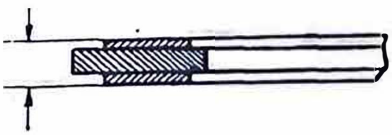


Free length 31.5 mm. (1.240 in.)

D. Checking the Friction Plates

Inspect the friction plates for wear. Replace them if they show 0.4 mm. (0.157 in.) or more uneven contact.

standard thickness 4.0 mm. (0.157 in.)



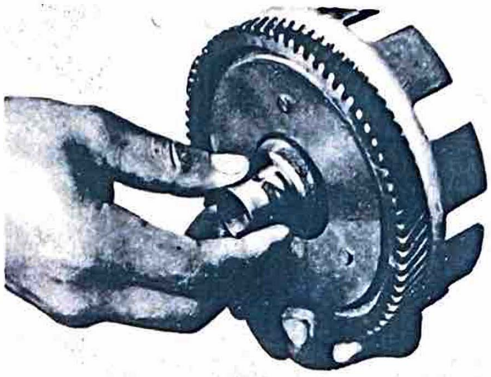
E. Clutch Housing Assembly (integrated with the primary driven gear).

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

1) Inspection

Insert the primary gear retaining collar (spacer) in the primary driven gear boss and check it for radial play. If the play is excessive, replace the gear retaining collar because it will cause excessive noise.

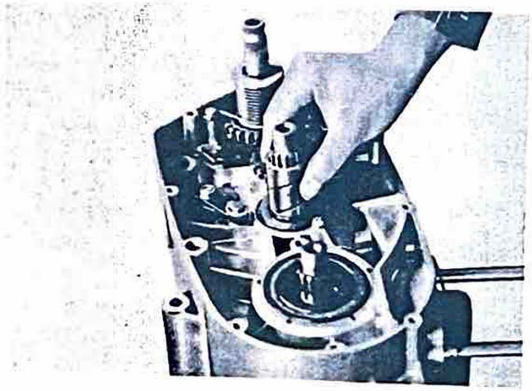
If any scratches are found, replace the spacer to avoid impaired clutch action.



F. Checking the Primary Gear Retaining Collar (Spacer)

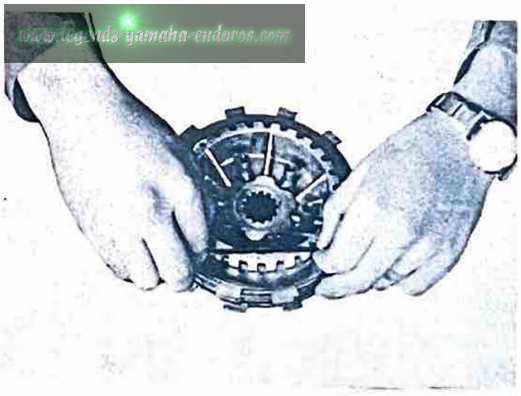
Place the primary gear retaining collar around the main axle and again check it for radial play. If play exists, replace the gear retaining collar.

Replace any collar with step-wear on its outer surface.



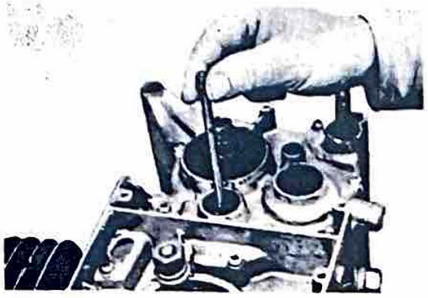
G. Fitting Cushion Rings

A cushion ring is installed between the clutch boss and each of the friction plates to insure even engagement and complete disengagement of the plates. When fitting cushion rings, be sure they are flat and not twisted.



H. Checking the Push Rod

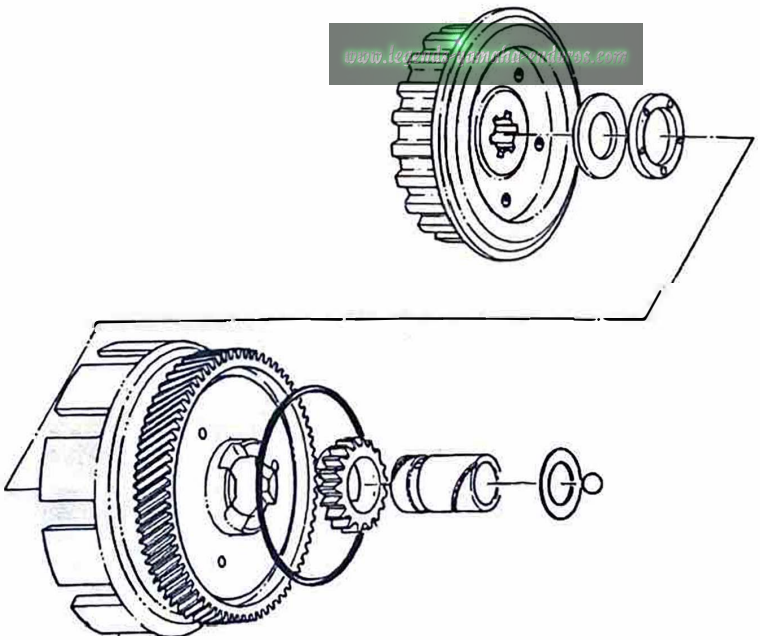
Remove the bush rod #2 and roll it over a surface plate. If the rod is bent, straighten or replace it.



I. Caution on Re-assembling the Clutch

* On both ends of the primary gear spacer are thrust washers and thrust bearing. If these washers and bearings are incorrectly installed, or omitted, the clutch boss will rub directly on the primary driven gear, impairing clutch action.
* The thrust bearing fit on the primary retaining collar, but it may slip out of place when installing clutch boss. Therefore, apply grease to both surface 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.

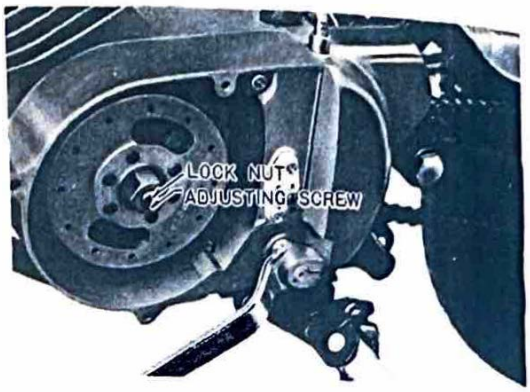


J. Adjusting the Clutch

a) Setting the Adjusting Screw

Turn the adjusting screw in until it lightly seats against the push rod.

Next, back the screw off 1/4 turn to get the proper spacing, then tighten the lock nut.

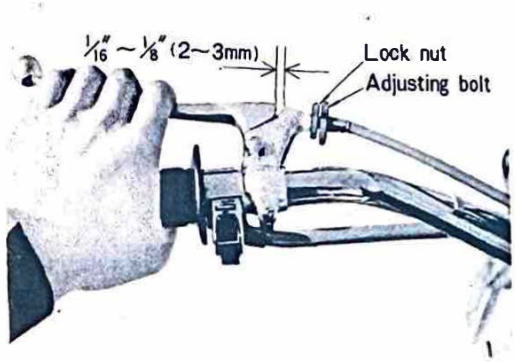


2) Adjusting the Clutch Cable Tension

The clutch cable becomes slackened after being used for a long time.

Occasionally the cable must be adjusted so that the play at the clutch handle is from 2 to 3 mm.

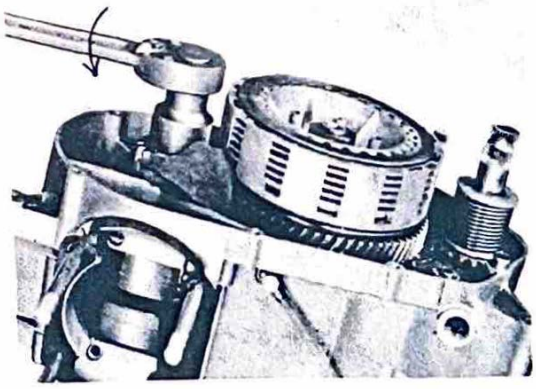
(1/16~1/8 in.)

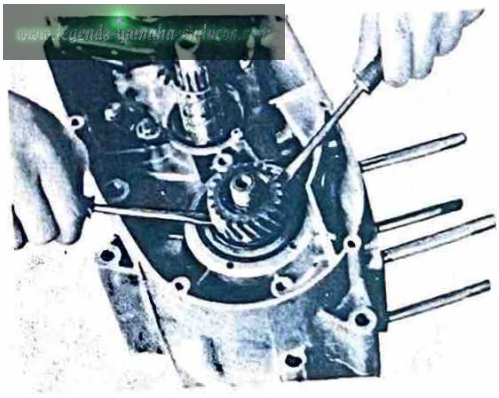


4- 9 . Primary Drive Gear

A. Removal

Feed a rolled-up rag between the teeth of the primary drive gear and the primary driven gear to lock them, and loosen the primary drive gear lock nut. The primary gear can then be forced off by using two screwdrivers.



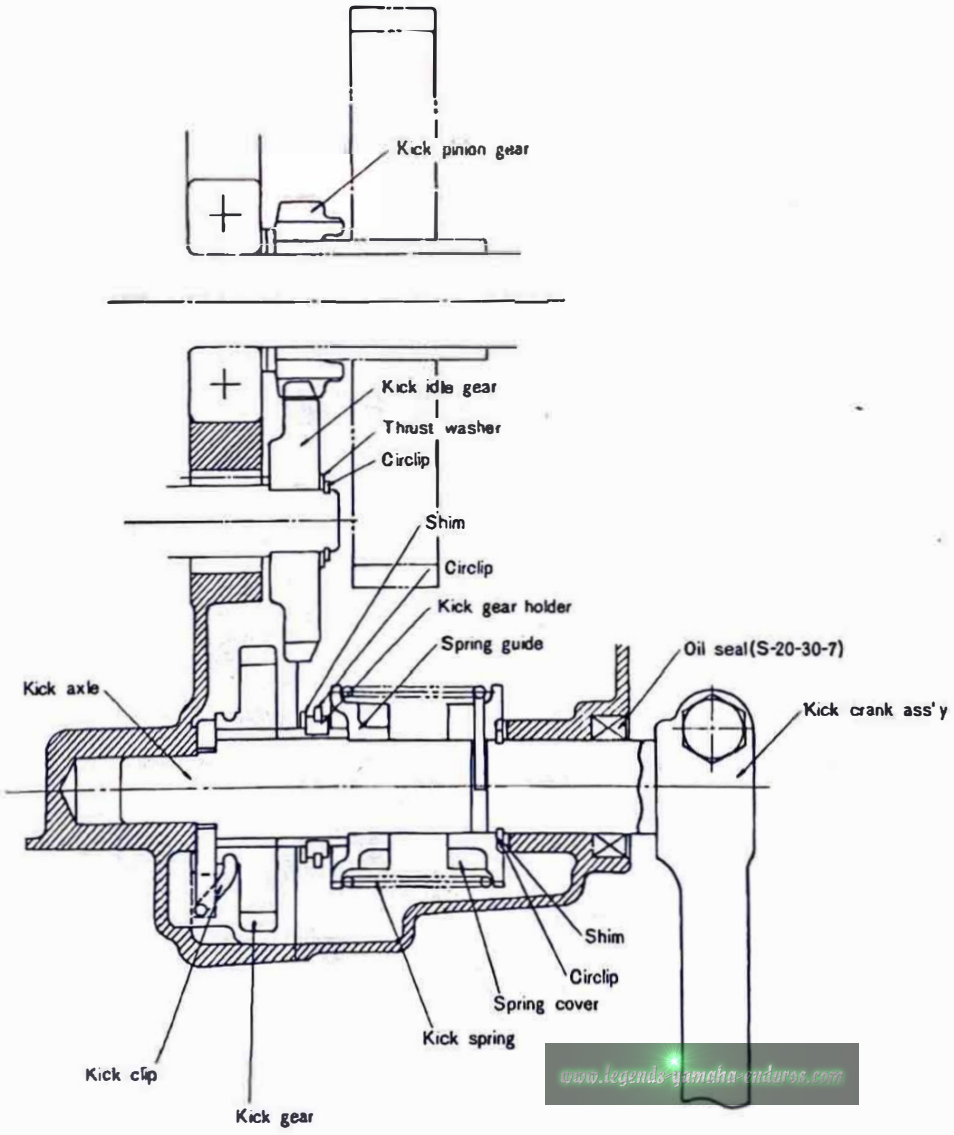


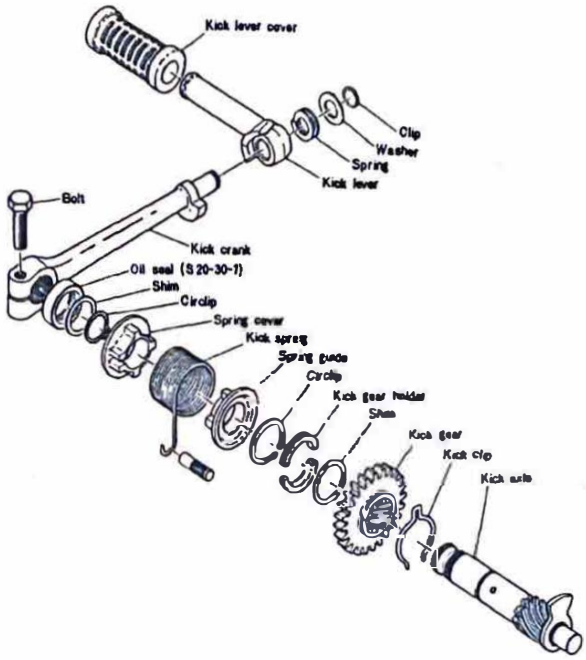
4-10 Kick Starter Mechanism

The primary kick-starter system (one-touch kick-starter) is employed. However, a new "non-constant-mesh" mechanism has been introduced, instead of the constant-mesh kick gear type, such as the ratchet and roller-lock systems.

That is, the kick gear meshes with idler gear only when the kick starter pedal is kicked. After the engine has started, the kick gear and the idler gear disengage.

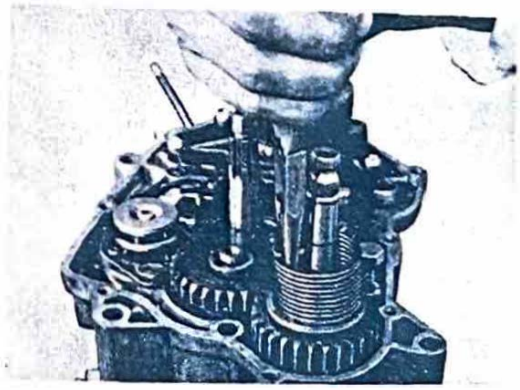
This mechanism not only eliminates noise resulting from the constant mesh of the kick gear with the idler gear, but also greatly contributes to the durability of the kick starter assembly.



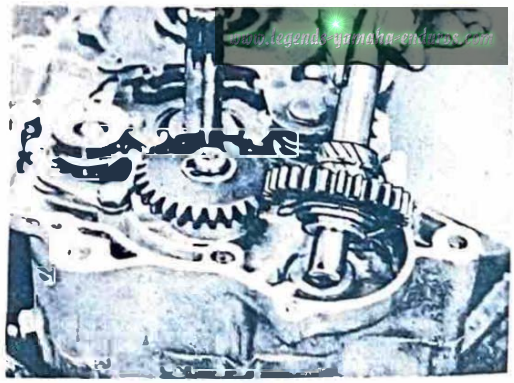


A. Removal

1) Remove the kick spring



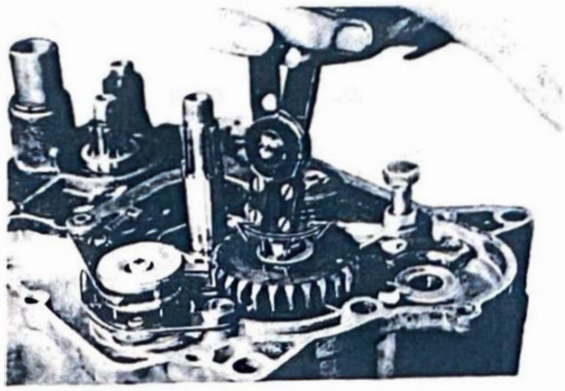
2) Then remove the kick starter assembly



B. .Removing the Kick Idler Gear

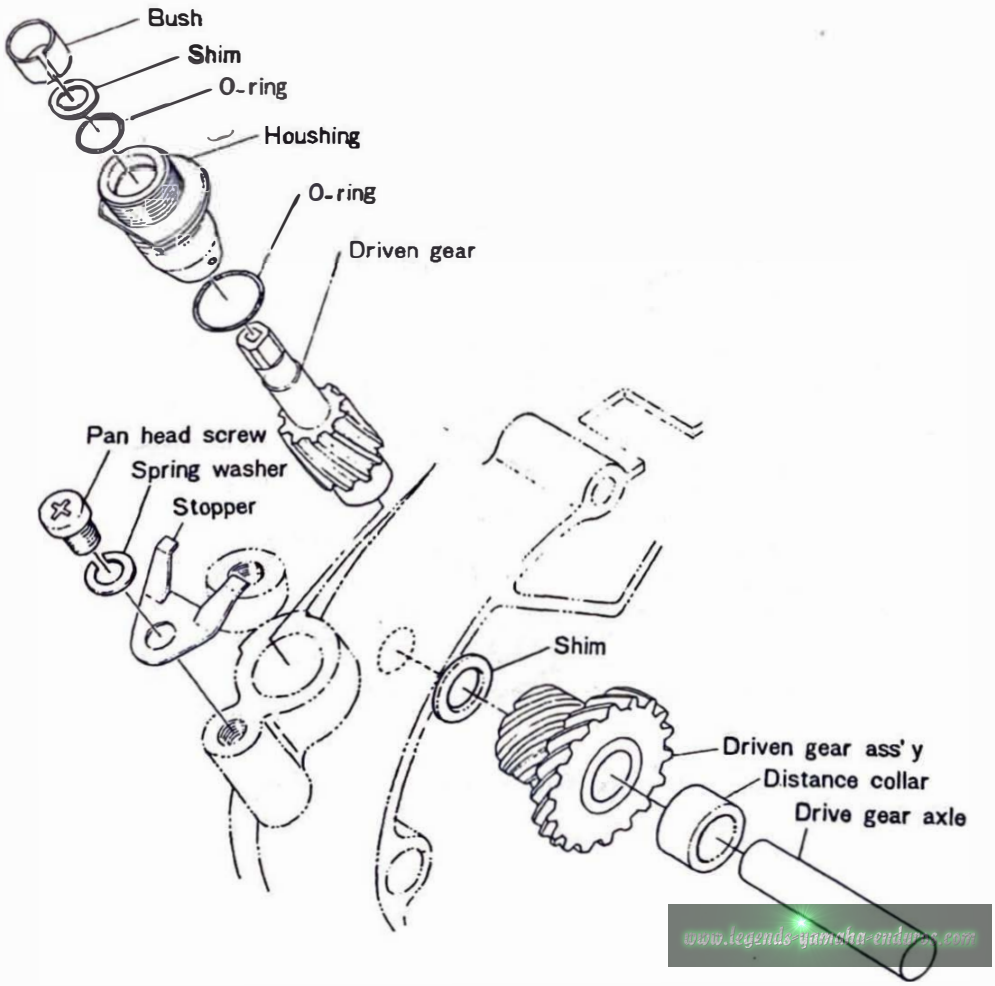
Remove the circlip with clip pliers.

Then the kick idler gear can be easily removed.



C. Tachometer gear units

The tachometer drive gear is engaged with the primary drive gear to convey the revolutions per minute of the crankshaft to the tachometer through the tachometer cable.



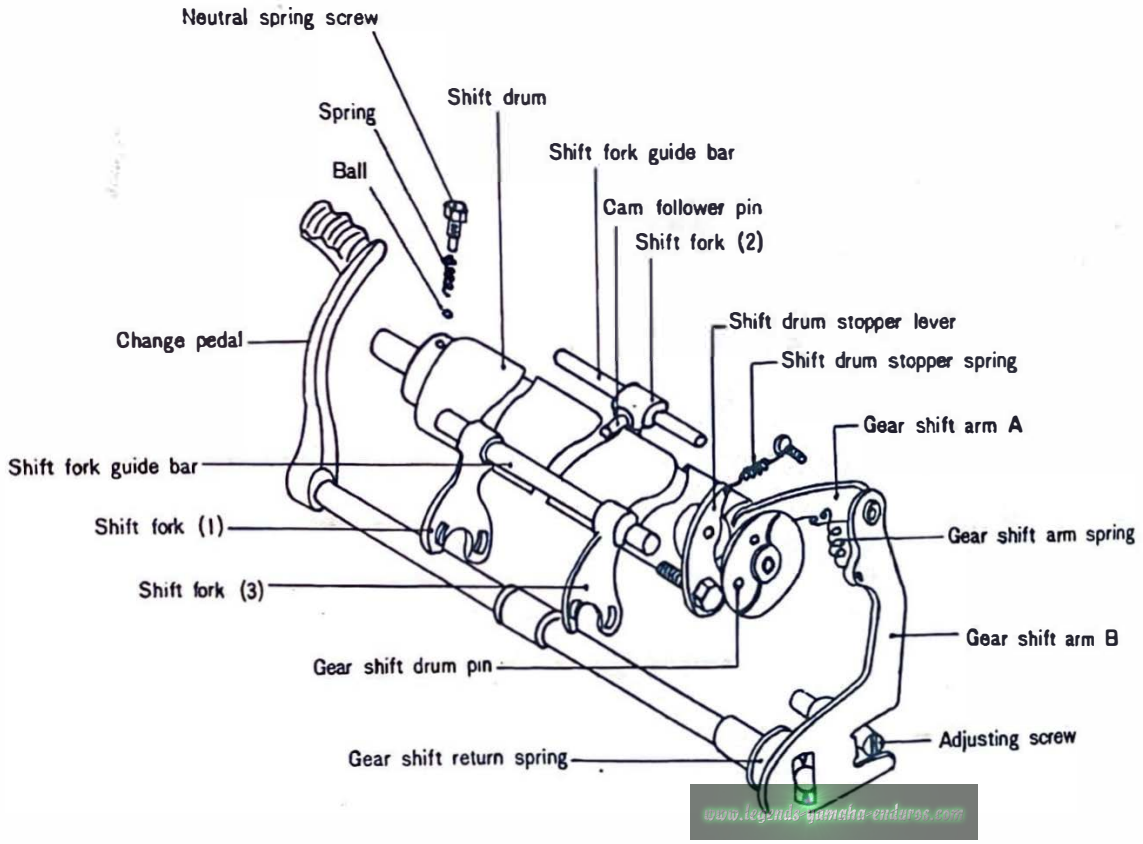
4-11. Shift Mechanism

The AT2, CT2 shift mechanism are operated in five stages by a see-saw type change pedal. As the change pedal is depressed, gear shift arm B moves gear shift arm A, which in turn pushes on one of the gear shift pins attached to the gear shift drum, thereby turning the gear shift drum. A total of five gear shift pins are attached to the drum, and therfore, each time the change pedal is depressed, the drum rotates 1/5 of a revolution.

That is, one full turn of the gear shift drum is made in five stages; 1st, 2nd, 3rd, 4th and 5th.

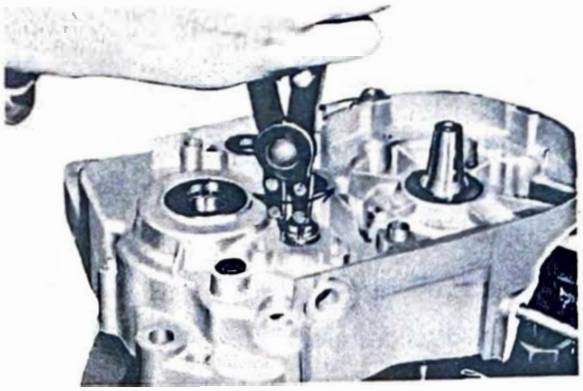
Slotted guides are grooved in the shift drum, and the shift fork cam follower pins are placed in these slotted guides. Therefore, as the drum turns, the shift forks slide back and forth in the slotted guides. Shift fork (1) moves the 2nd and 3rd gears, shift fork (2) the 1st gear, and, shift fork (3) moves the 4th and 5th gears.

The neutral position is located between 1st and 2nd gears, and the neutral stopper mechanism is located on the left side of the shift drum.

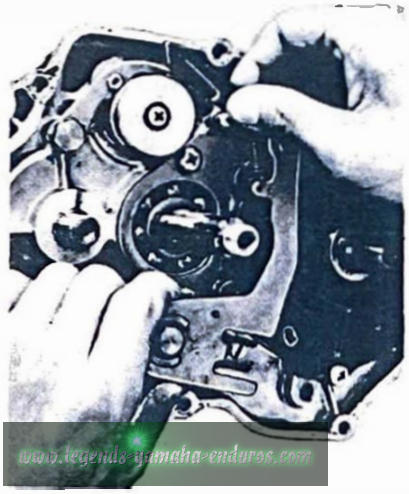


A. Removing the Change Axle Assembly

1) Remove the circlip and washer from the change axle (left side crank case).



2) Turn the engine over, right side up, and pull out the change shaft assembly.

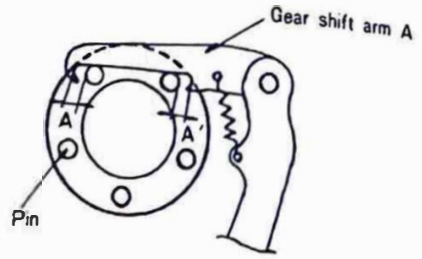


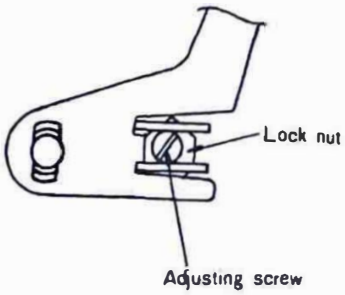
B. Checking the gear shift parts

Checking the Gear Shift Return Spring. A broken or fatigued gear shift return spring will impair the return action of the shifting mechanism.

C. Adjusting the gear shift arm

Adjusting or correcting the travel of the gear shift arm to prevent improper shifting progression (excess feed or insufficient feed of the gear shift arm) is accomplished by turning the gear shift return spring stop screw (eccentric bolt) in or out. Adjust the eccentric bolt until distance A and A' are equal.

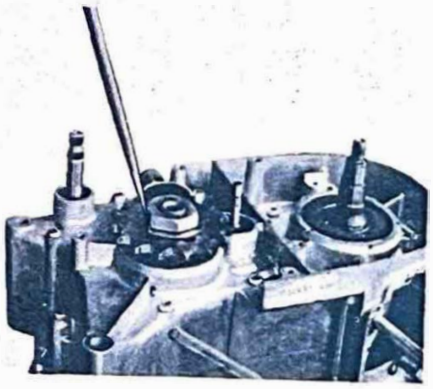




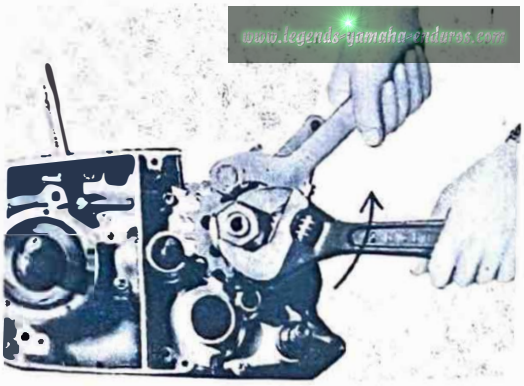
1-12 Drive Sprocket

A. Removal

1) Straighten the bent edge of the lock washer with a blunt-ended metal punch.



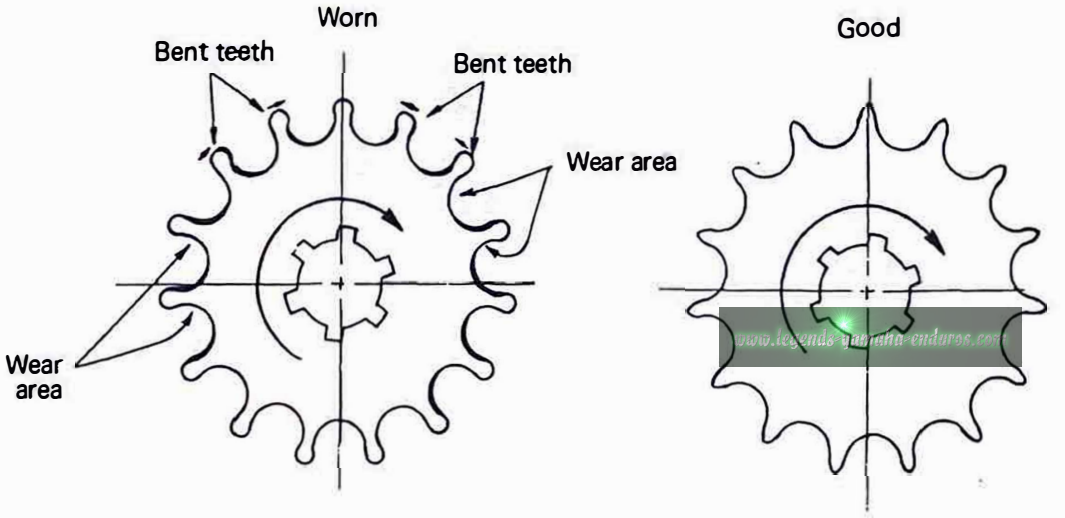
2) Hold the drive sprocket with the flywheel magneto holding tool, and remove the sprocket nut. If the flywheel magneto holding tool is not available, shift the transmission to low gear, and fit a monkey wrench on the sprocket nut. Then tap the handle of the wrench with a hammer and the shock will loosen the nut.



3) Remove the distance collar with pliers.
(When reinstalling the distance collar, apply grease to the oil seal lip groove.)

B. Inspection

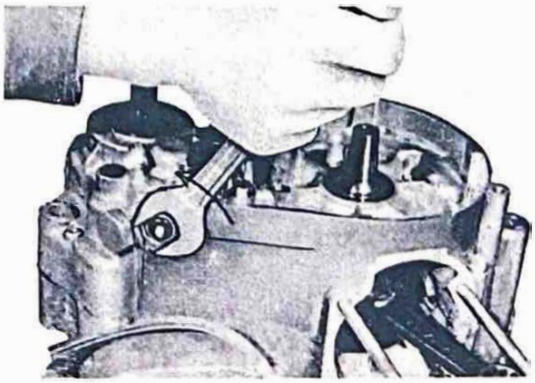
A worn drive sprocket will result in excessive chain noise and shorten the life of the chain. Check the sprocket for worn teeth, and replace if they are worn.

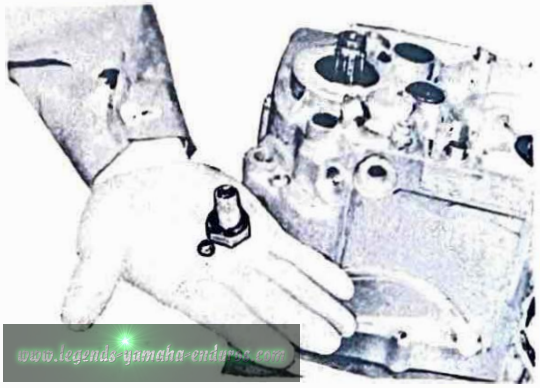


4-13. Crankcase

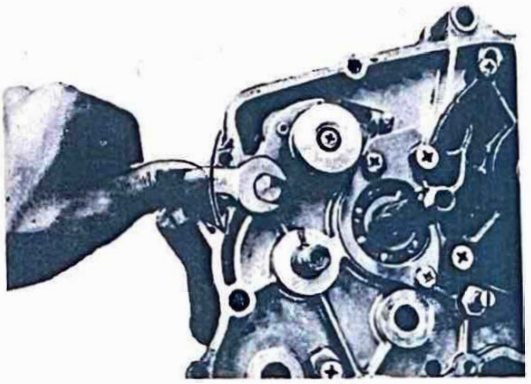
A. Separating

1) Remove neutral stopper.

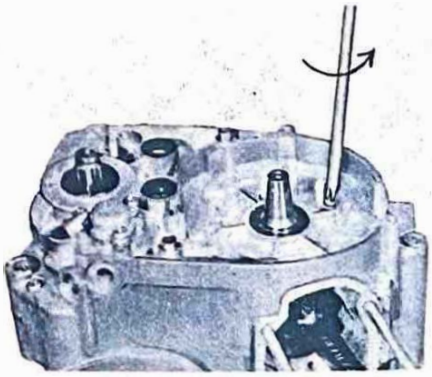




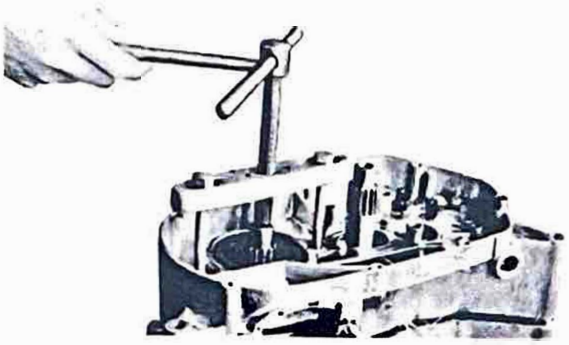
2) Remove the change shift drum stopper lever and stopper spring.

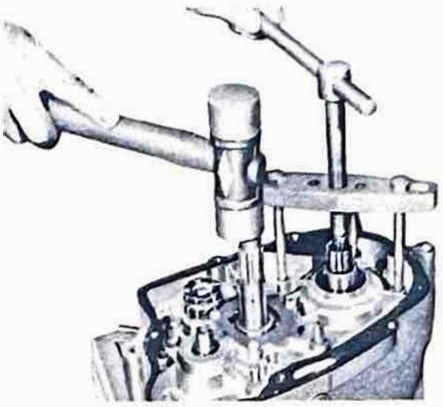


3) Remove the pan head screws from the left crankcase.



4) Install the crankcase separating tool on the right crankcase. Divide the crankcase while alternately tapping the main axle and the crankcase with a rubber tipped hammer



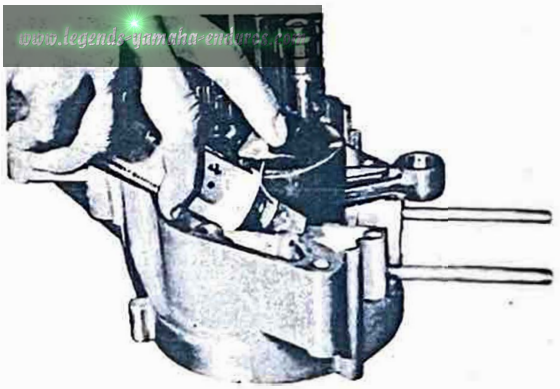


Note: Fully tighten the bolts of the crankcase dividing tool, keeping the tool in a horizontal position.

The crankcase is designed to split into two halves, right and left. Only one drain plug is provided for both the transmission and clutch housings. Both housings can be drained at the same time by removing the drain plug.

B. Reassembling

When reassembling the crankcase, be sure to apply YAMAHA BOND No. 4 to the mating surfaces of both halves after cleaning them thoroughly.



4-14 Transmission Assembly

The constant mesh, wide ratio, 5-speed transmission makes it possible to fully utilize the steady performance of the engine throughout the entire speed range from low to high.

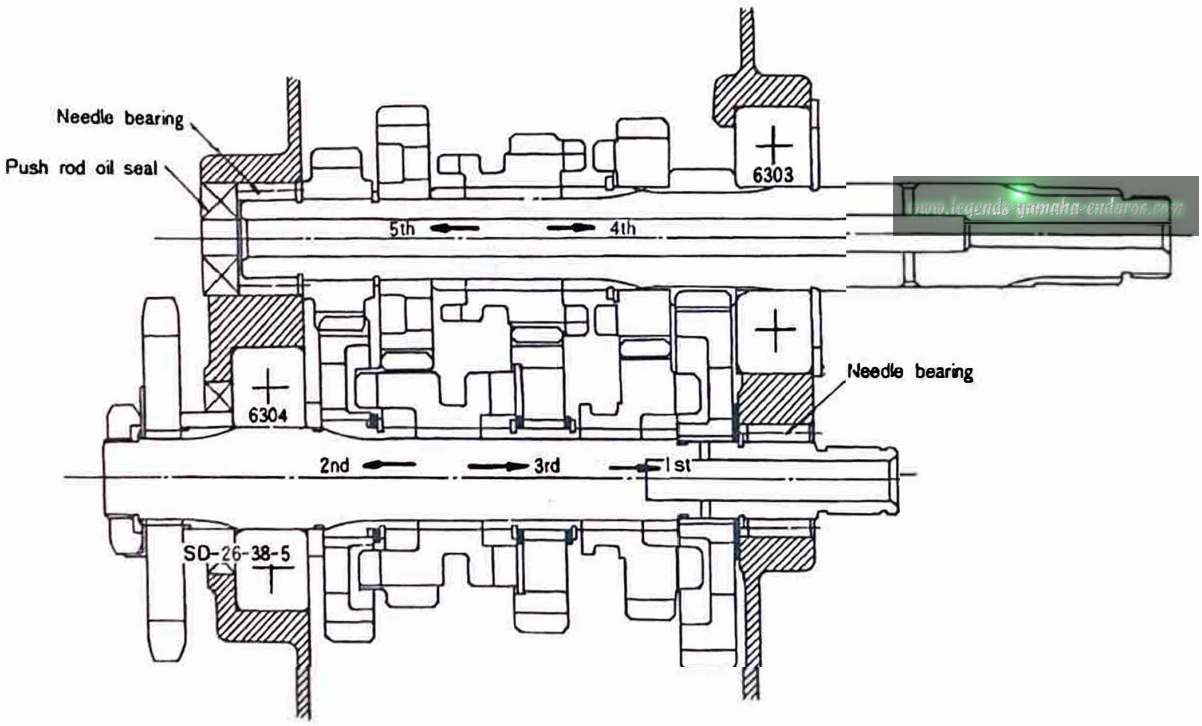
For layout of the transmission and related parts.

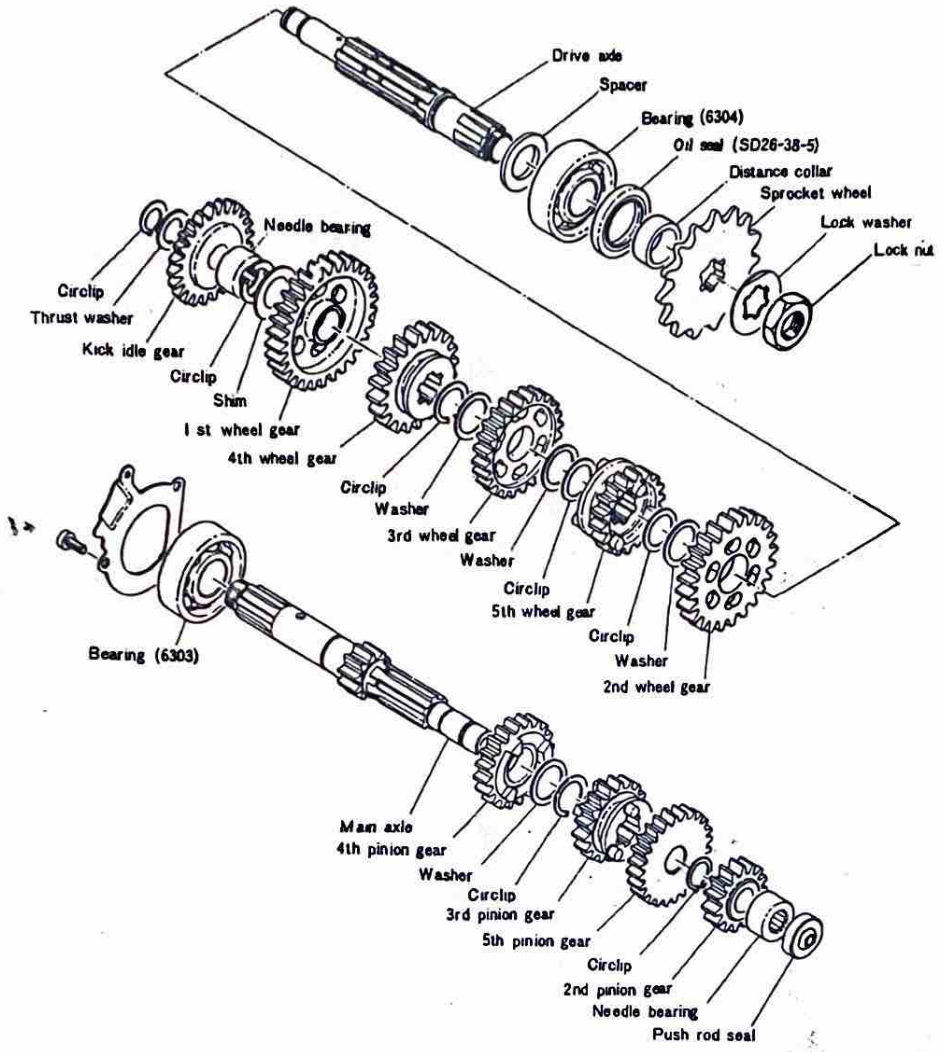
The primary reduction ratio is 74/19=3.895. Therefore the total reduction ratios will be; Primary reduction ratio x Transmission gear reduction x Secondary reduction ratio=Total reduction ratio.

Primary Reduction Ratio. . . . . 74 / 19 = 3.895

Secondary Reduction Ratio . . . . . 45 / 15 = 3.000 (AT2) 45 /16 = 2.813 (CT2)

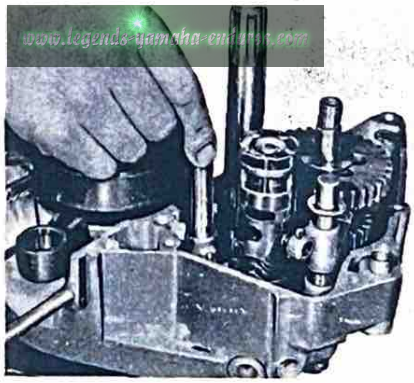
	Transmission Gear Reduction Ratio	Total Reduction Ratio	
		AT2	CT2
1st	35 / 11 = 3.182	39.832	34.865
2nd	30 / 15 = 2.000	25.037	21.914
3rd	26 / 19 = 1.368	17.130	14.989
4th	23 / 23 = 1.000	12.518	10.957
5th	20 / 25 = 0.800	10.015	8.766



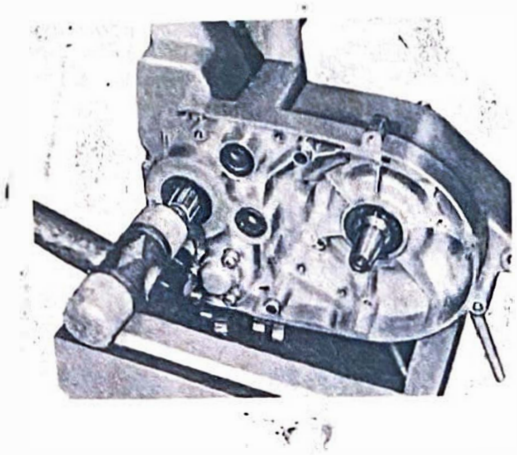


A. Removal

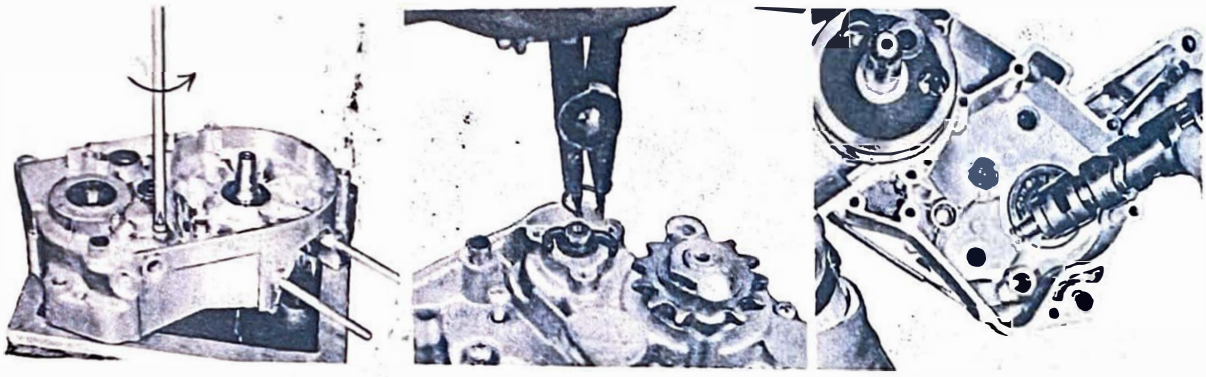
1) Pull out the two shift fork guide bars.



2) Remove both the transmission assembly and the shift forks from the crankcase, while tapping the drive shaft end with a plastic-tip hammer



3) To remove the shift drum, remove the shift cam blind plug set screw on the left side of the crankcase, and remove the shift cam blind plug.
Then remove the Clip and washer from the shift drum, and the shift drum can be pulled out from the opposite side.



B. Reinstallation

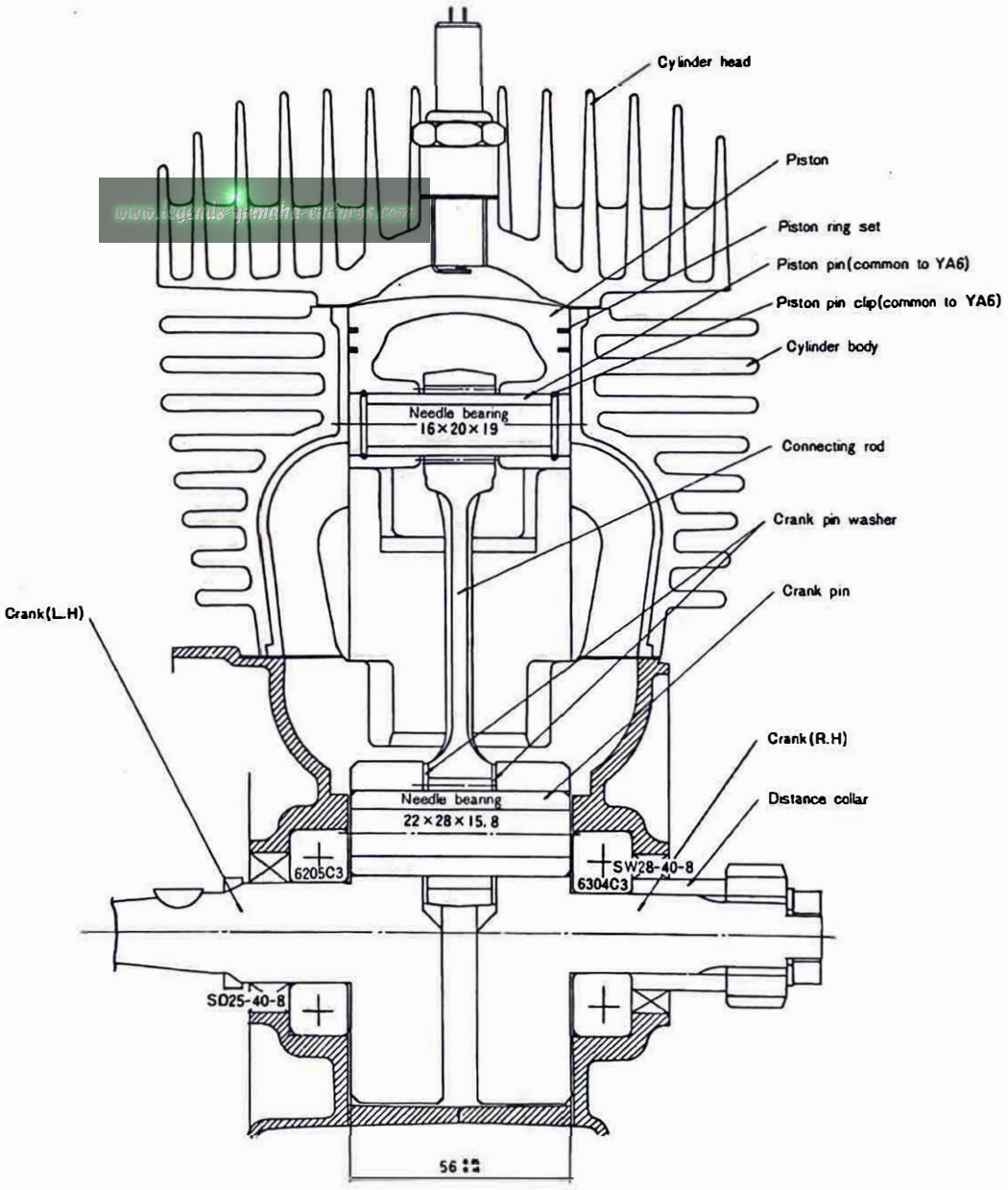
Reinstall the transmission and shifter as a unit in the left crankcase half after they are sub-assembled. They cannot be installed separately. The transmission unit must be in neutral uring installation.

4-15 Crankshaft

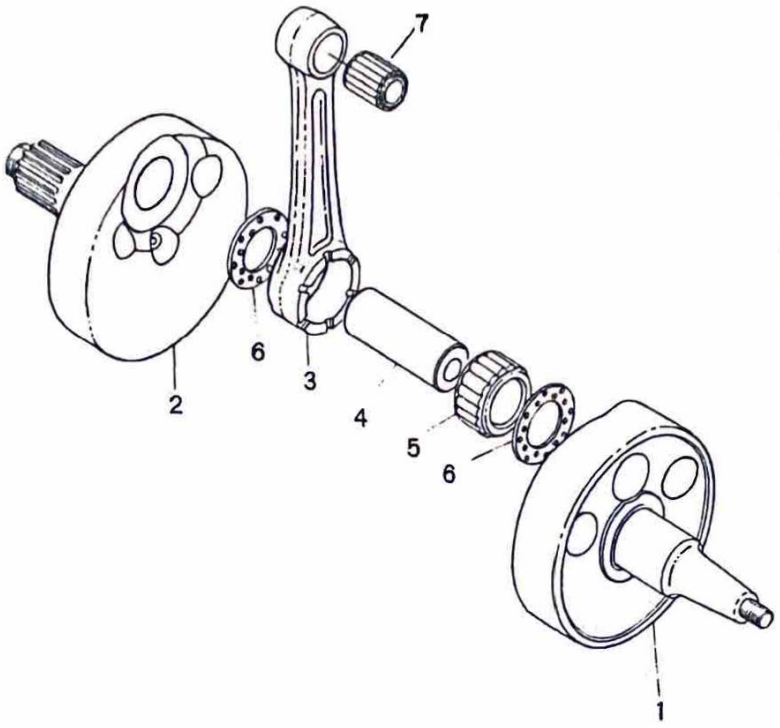
The crankshaft requires the highest degree of accuracy in engineering and servicing of all the engine parts.

The crankshaft is also more susceptible to wear, and therefore, it must be handled with special cabe.

To increase the inertia force of the crank, the diameter of the left crankshaft is increased to 25 mm. (0.98 in.) the thickness of the flywheel to 23.5 mm. (0.93 in.) and its diameter to 87 mm. (3.43 in.)



Crankshaft component parts

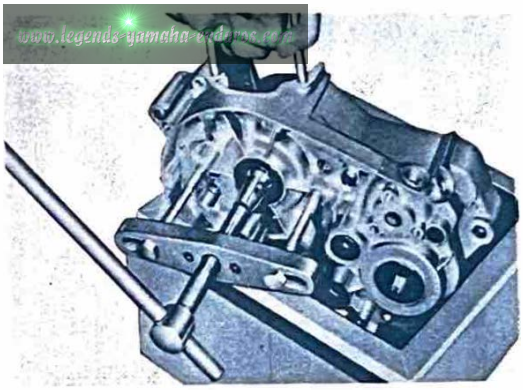


1. Crank (L.H.)
2. Crank (R.H.)
3. Connecting rod
4. Crank pin
5. Bearing
6. Crank pin washer
7. Bearing

A. Removing the Crankshaft Assembly

Remove the crankshaft assembly with the crankcase separating tool.

Note: Fully tighten the bolts of the crankcase dividing tool, and keep the tool parallel with the crankcase surface.



B. Installing the Crankshaft. Assembly

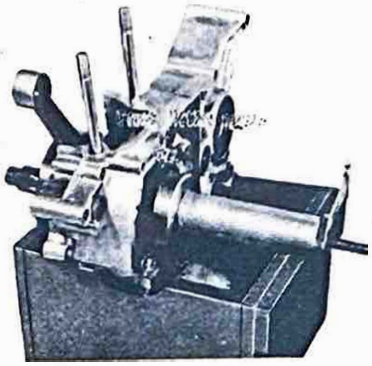
Install the crankshaft assembly by using the crankshaft setting tool.

Hold the connecting rod at top dead center with one hand while turning the handle of the setting tool with the other.

2) Reinstalling the Crankshaft Ass'y

Put shims on both ends of the crankshaft, and install the crankshaft assembly by using the crankshaft installing tool.

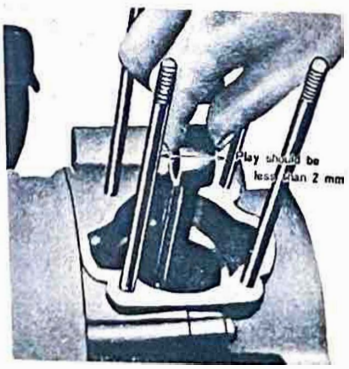
Hold the connecting rod at top dead center with one hand while turning the handle of the installing tool with the other.

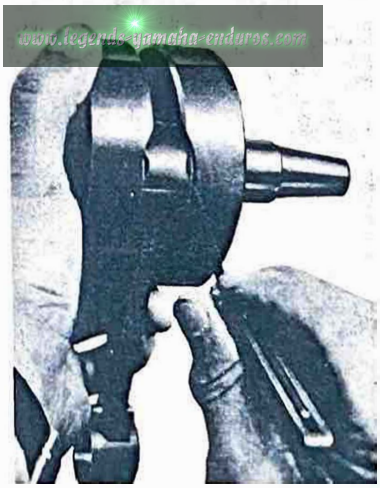


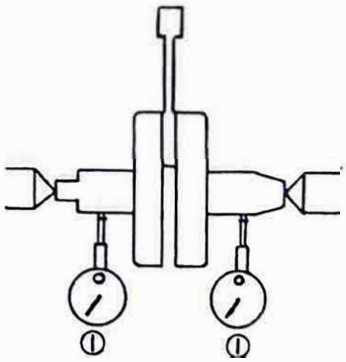
C. Inspection and Servicing

1) Checking the crankshaft components

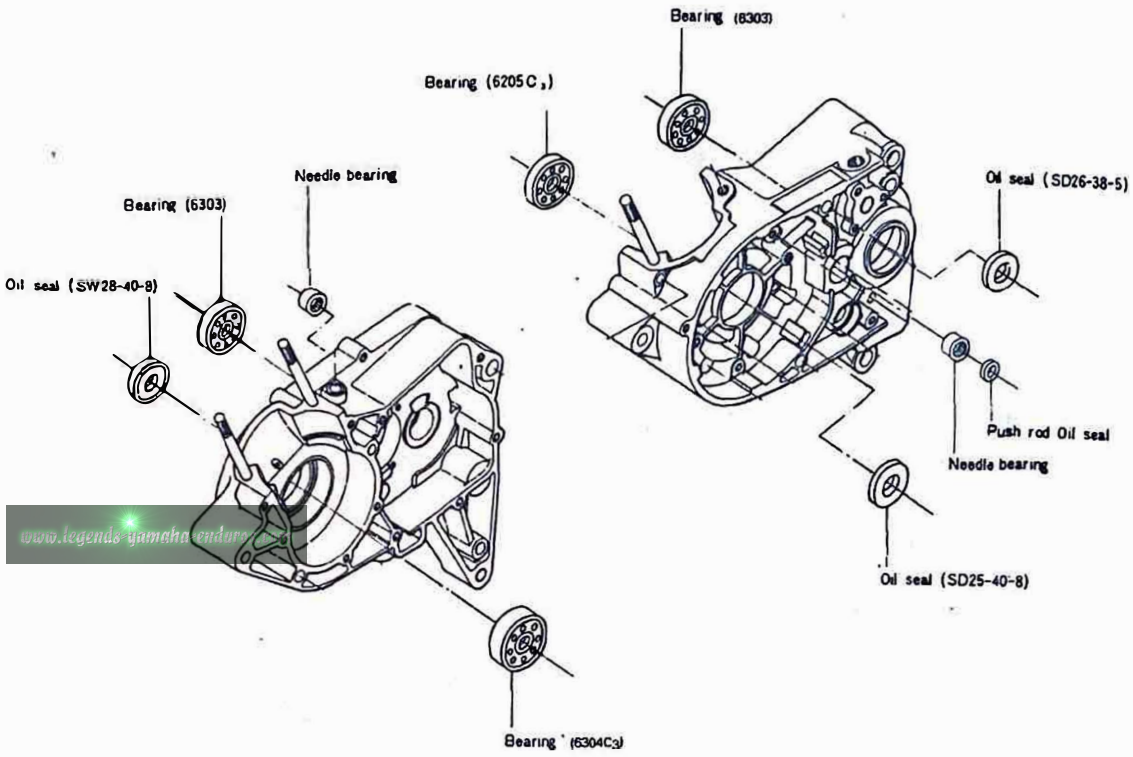
Check connecting rod axial play at small end (to determine the amount of wear of crank pin and bearing at large end)	Small end play should not exceed 2 mm. (0.078 in.)	If small end play exceeds 2 mm, disassemble the crankshaft, check connecting rod crank pin and large end bearing. Replace defective parts. Small end play after reassembly should be within 0.8-1.0 mm. (0.031~0.04 in.)
Check the connecting rod for axial play at large end.	Move the connecting rod to one side and insert a feeler gauge. Large end axial play should be within 0.4-0.5 mm. (0.019 in.)	If excessive axial play is present, (0.6 mm or more) disassemble the crankshaft and replace any worn parts.
Check accuracy of the crankshaft ass'y runout. (Misalignment of parts of the crankshat)	Dial gauge readings should be within 0.03 mm. (0.0012 in.)	Correct any misalignment by tapping the flywheel with a brass hammer and by using a wedge.







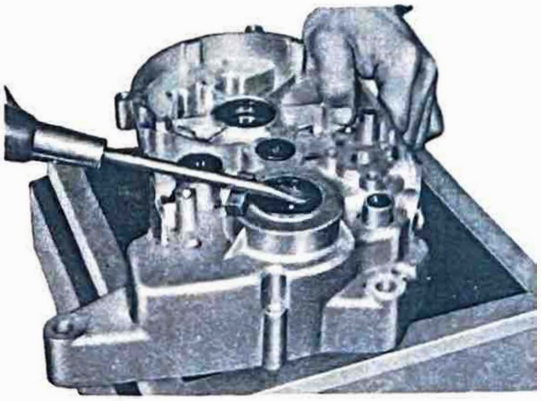
4-16 Bearings and Oil Seals



1. Removal and Installation

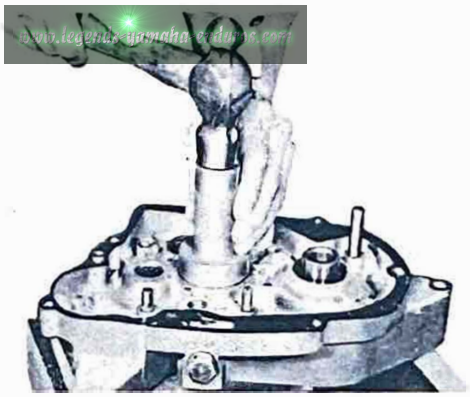
1) Removal

a. Pry the oil seals out of place with a slot head screwdriver.
Always replace the oil seals when overhauling the engine.



b. Drive out the bearing with a bearing tool.

Note: Bearings are most easily removed or installed if the cases are first heated to approximately 200° - 400°F. However, cold removal and installation can often times be done satisfactorily.



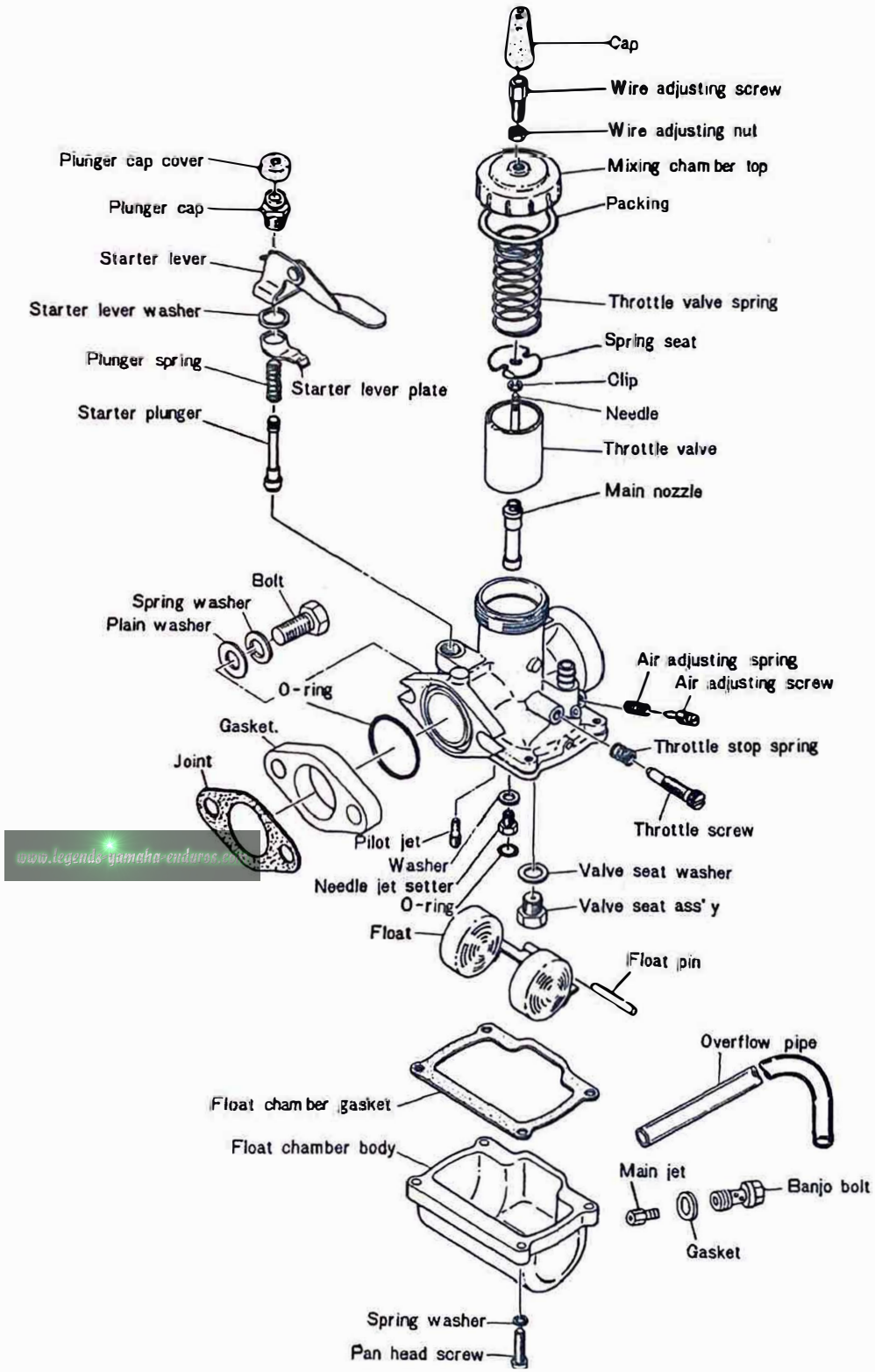
2) Installation

Install bearings and oil seals with their stamped manufacturer's marks or numerals facing outward. (In other words, the stamped letters must be on the exposed view side.)
When installing bearings, pack them with grease.

4-16 Carburetor

The standard AT2, CT2 are equipped with a VM24SH(24 mm.) carburetor that is equip with a built-in starter jet.

The carburetor is bolted to a insulator that is located between the carburetor and reed valve ass'y. This insulator provides more than adequate heat insulation. The carburetor floats have been specially designed to keep the float level from fluctuating due to vibration or shock. The main jet is installed in such a manner to provide quick and easy replacement from the outside by merely removing the jet holder on the bottom left side of the carburetor float bowl.



A. Checking the Carburetor

1) Float

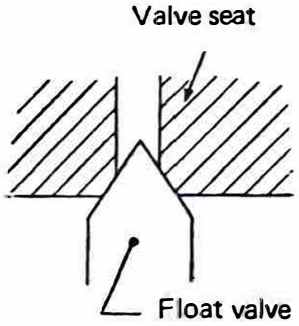
Remove the float and shake it to check if gasoline is inside. If fuel leaks into the float while the engine is running, the float chamber fuel level will rise and make the fuel mixture too rich. Replace the float if it is deformed or leaking.

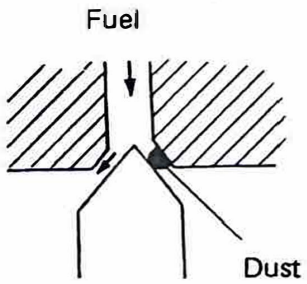
2) Float valve

Replace the float valve if its seating end is worn with a step or if it is scratched. Check the float valve spring for fatigue. Depress the float valve with your finger, and make sure that it properly seats against the valve seat. If the float valve spring is weakened, fuel will overflow flooding the float chamber while the gas is on.

3) Overflowing

If fuel overflows, check the carburetor as described in 1) and 2) above. If neither 1) nor 2) cures the overflowing, it may be caused by dirt or dust in the fuel preventing the float valve from seating properly. If any dirt or dust is found, clean the carburetor, petcock and gas tank.

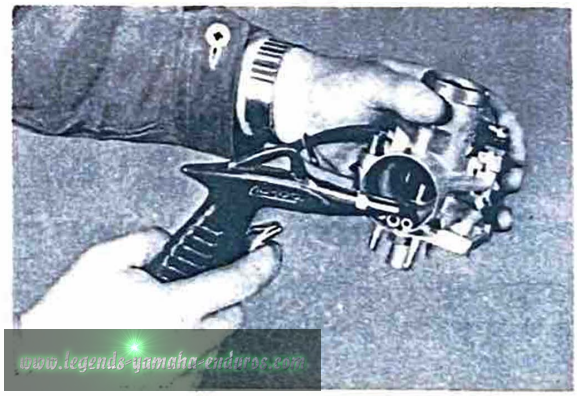




4) Cleaning the carburetor

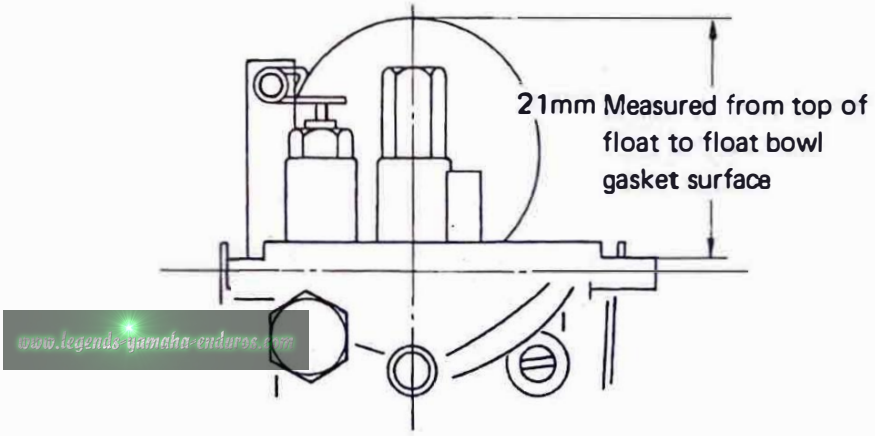
Disassemble the carburetor, and wash all its parts in a suitable solvent.

Then blow all the parts off with compressed air. All jets and other delicate parts should be cleaned by blowing compressed air through them after the float bowl has been removed.



B. Float Level Adjustment

The carburetor float level is checked by the Yamaha factory during assembly and testing. But rough riding, worn needle valve, or bent float arm can cause the float level to fluctuate. If the float level raises, this will cause a rich fuel/air mixture that can cause poor performance and spark plug fouling. If the float level decreases,this can cause a lean fuel/air mixture that can result in engine damage. If the machine is subjected to continuous rough riding or many miles of travel, the float level should be checked and set regularly and in the following manner.



1) Remove the float chamber body, and turn over the mixing body. Let the float arm rest on the needle valve without compressing the spring.
2) Then measure the distance from the top of the float to the float bowl gasket surface.
   Standard measurement 21mm (AT2,CT2)
3) When the distance measures less than the recommended distance, bend the tang up. If it is greater, bend the tang down. (with carburetor body upside down.)

C. Idle Mixture-Idle Speed Adjustments

The idle mixture adjustment should be set exactly to factory specifications. First, turn the air screw in until it lightly seats then back it out 1¾(AT2),2.0(CT2) turns. Next, adjust the throttle stop so that the engine idles at 1300-1400rpm.

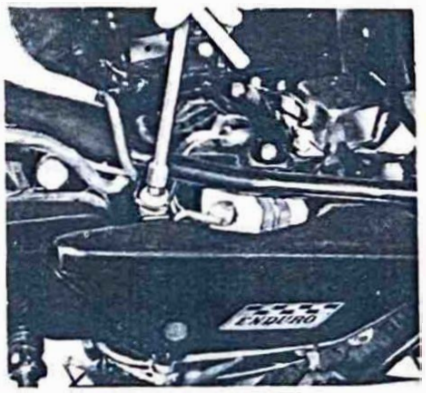
D. Carburetor Setting Table

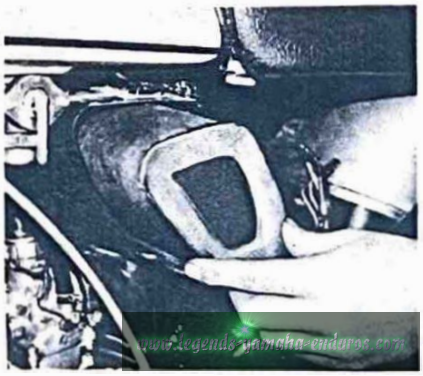
Name of Parts	Abbreviation	Specifications	
		AT2	CT2
Main jet	M. J	#230	#200
Needle jet	N. J	O – 6	O – 6
Jet needle	J. N	4F 10-3 stages	4L6-3 stages
Pilot jet	P. J	#25	#25
Starter jet	G. S	#40	#40
Throttle valve cut away	C. A	1-5	2.0
Air screw setting	A. S	1¾	2.0
Idling speed	–	1300 - 1400 rpm	1300 - 1400 rpm
I dent. Mark	–	316E1	314E1

4-18 Air Cleaner

A. Removal

To remove the air filter, first remove two oil tank fitting bolts. Next, remove the air cleaner case cap fitting spring and air cleaner case cap. Then the element can be removed.





B. Cleaning

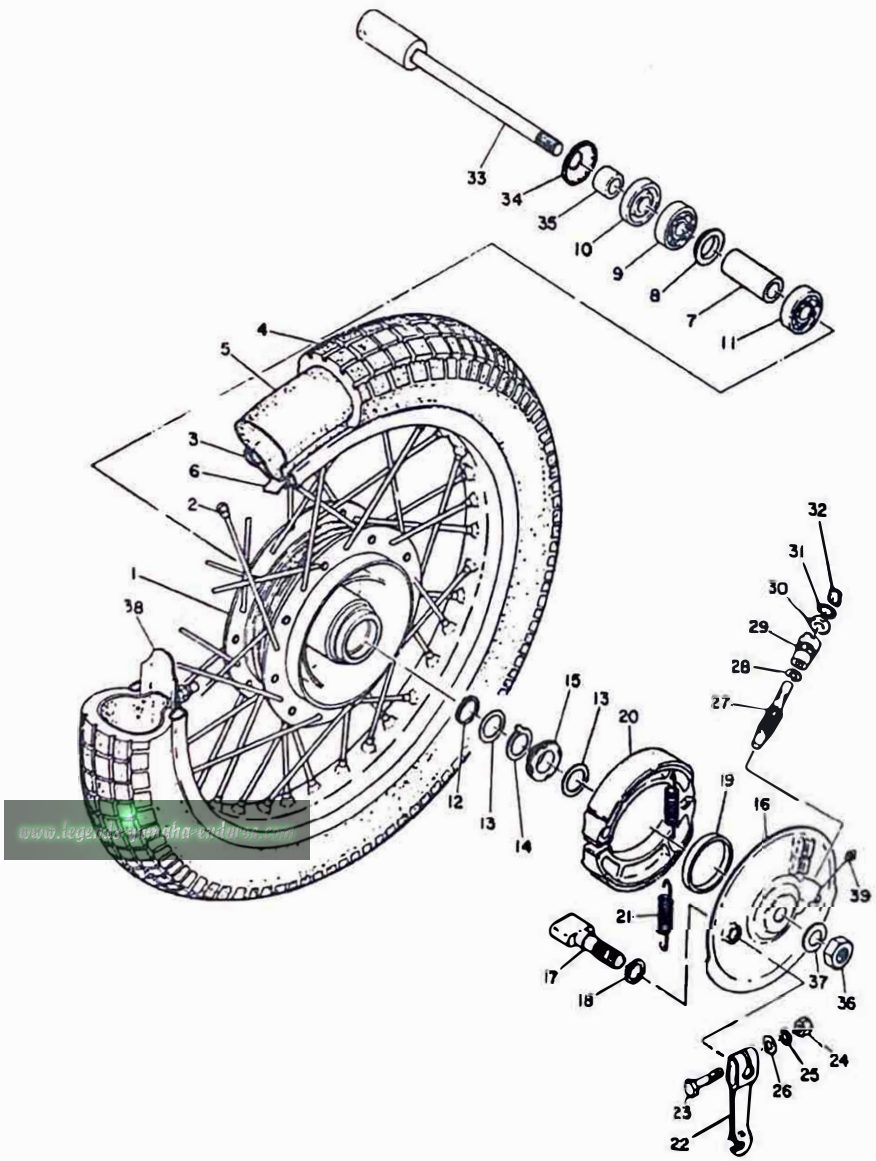
Wash the foam filter, thoroughly in solvent until all dirt has been removed. Squeeze all the solvent out. Pour oil onto the filter (any grade of 20 or 30 wt), work it completely in, and then squeeze out the surplus oil. The filter should be completely impregnated with oil, but not "dripping" with it.

Chapter 5 Chassis

The Yamaha AT2, CT2 have been designed for versatility. They are rquipped with all necessary street legal equipment to insure pleasurable road or street riding. This machine can be quickly converted to a competition machine and therefore have been engineered to have a minimum weight factor Yet with the reduction in weight; rigidity; strength, and safety have been incorporated in the design of the frame to provide an unexcelled competition machine.

5-1 Front Wheel

The 18" front wheel is equipped standard with a 3.25-18" Trials Universal tire.



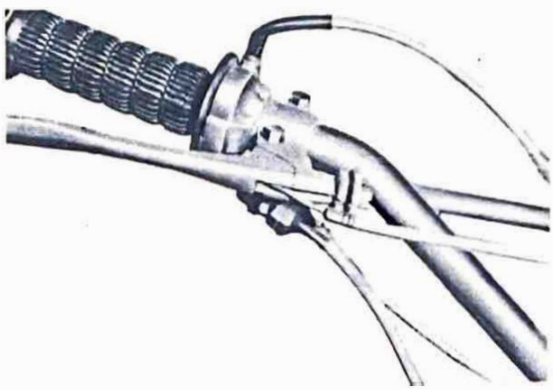
Construction

1. Hub
2. Spoke set
3. Rim
4. Front tire
5. Tube
6. Rim band
7. Bearing spacer
8. Spacer flange
9. Bearing
10. Oil seal
11. Bearing
12. Circlip
13. Thrust washer 2
14. Meter clutch
15. Drive gear
16. Brake shoe plate
17. Shaft cam
18. Cam shaft shim
19. Oil seal
20. Brake shoe complete
21q Brake shoe return spring
22. Cam shaft lever
23. Bolt
24. Nut
25. Spring washer
26. Plain washer
27. Meter gear
28. Thrust washer 1
29. Bushing
30. Oil seal
31. O ring
32. Stop ring
33. Wheel shaft
34. Hub dust cover
35. Wheel shaft collar
36. Shaft nut
37. Spring washer
38. Bead spacer
39. Grease nipple

This tire gives the rider assurance of maximum performance and safety for both road riding and trail riding. The front wheel brake size is 110 mm. x 25 mm. (4.33 x 0.98 in.) A labyrinth seal is installed between the wheel hub and brake plate to provide a seal against dust and water.

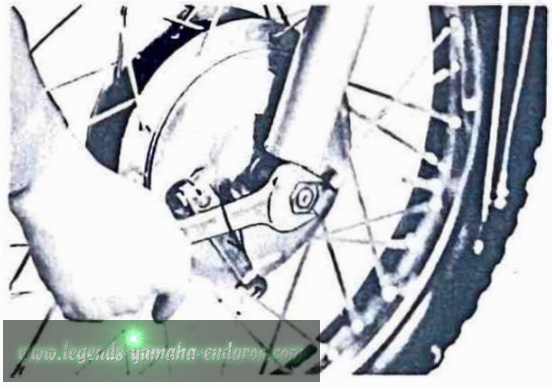
A. Removal

1) Disconnect the brake cable at the front brake lever.

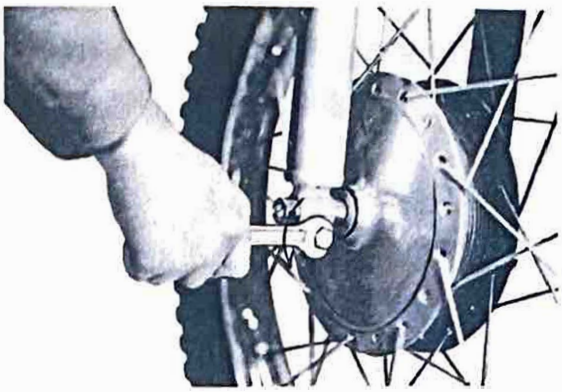


2) Disconnect the speedometer cable from the front wheel hub plate.

3) Loosen the front wheel axle pinch bolt.



4) Remove the front wheel nut.



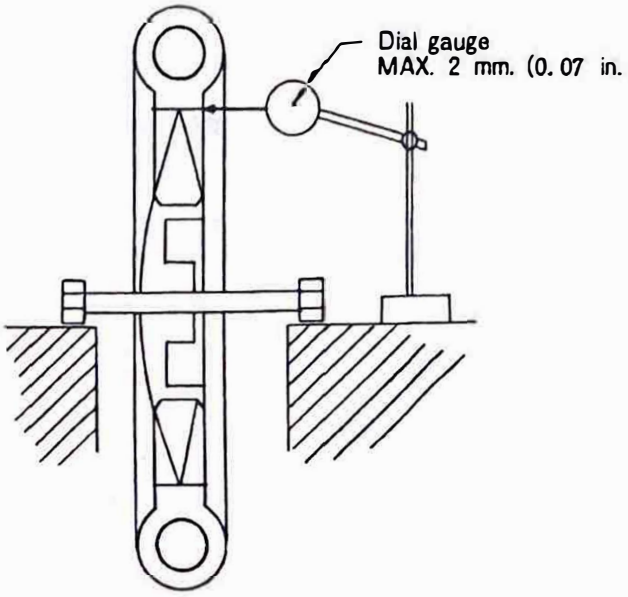
5) Remove the front wheel axle by simultaneously twisting and pulling out on the axle.

6) Raise the front of the machine and set it on a box. Then remove the wheel assembly.

B. Checking

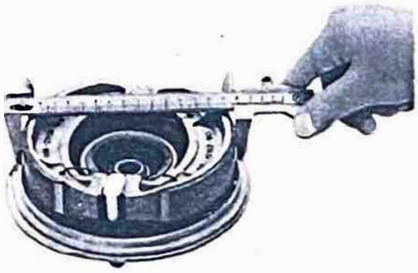
1) Run out of the rim

Measure the runout of the rim with a dial gauge. Run out limits : 2 mm. (0.07 in.) or less.



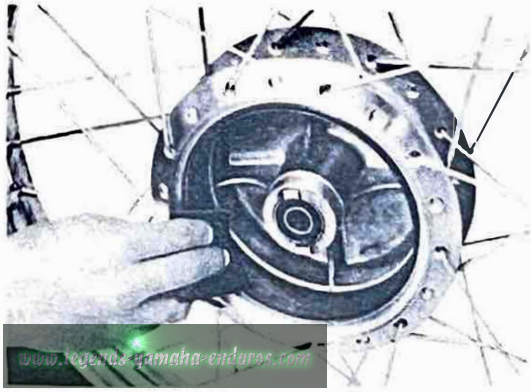
2) Brake shoe

Measure the outside diameter at the brake shoe with slide calipers. If it measures less than 104 mm. (4.09 in.), replace it. Smooth out a rough shoe surafce with sandpaper or with a file.



3) Brake drum

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



4) Check the spokes. If they are loose or bent, tighten or replace them. If the machine is ridden in rough country often, or raced, the spokes should be checked regularly.

5) Repairing the brake shoe

If the brake shoe has uneven contact with the brake drum, or is scratched, smooth out the surface with sandpaper or hand file.

6) If the tire is excessively worn, replace it.

7) Regularly check the tires for damage.

8) If the bearings allow excessive play in the wheel or if it does not turn smoothly, replace the bearnig.

9) Replace a bent or damaged front wheel axle.

10) If the tooth surface of the helical speedometer drive gear is excessively worn, replace it.

11) Check the lips of the seals for damage or warpage. Replace if necessary.

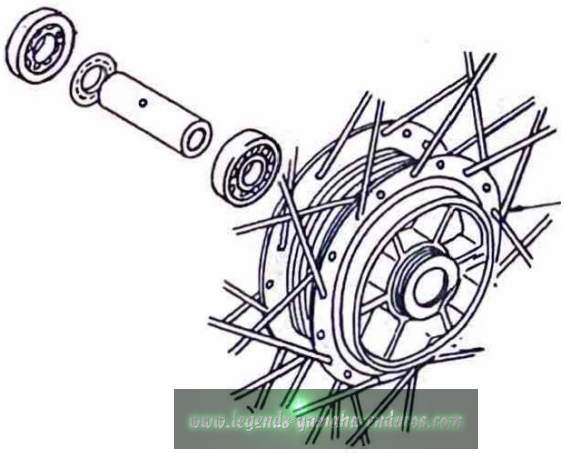
Replacing the Wheel Bearing

a. First clean the outside of the wheel hub.

b. Insert the bent end of the special tool into the hole located in the center of the bearing spacer, and drive the spacer out from the hub by tapping the other end of the special tool with a hammer. (Both bearing spacer and space flange can easily be removed.)

c. Then push out the bearing on the other side.

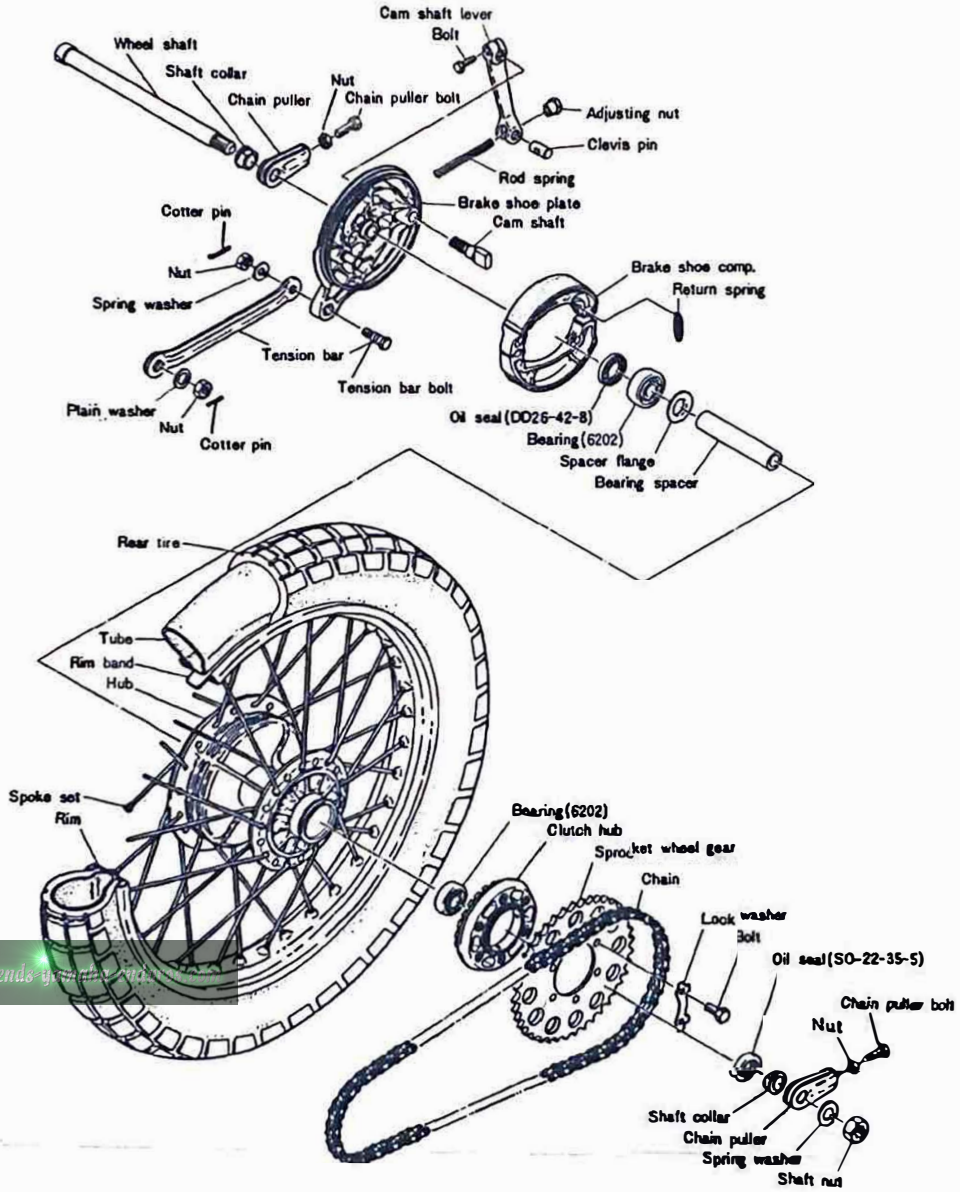
d. To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation and use the bearing fitting tool (furnished by Yamaha).



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

5-2 Rear Wheel

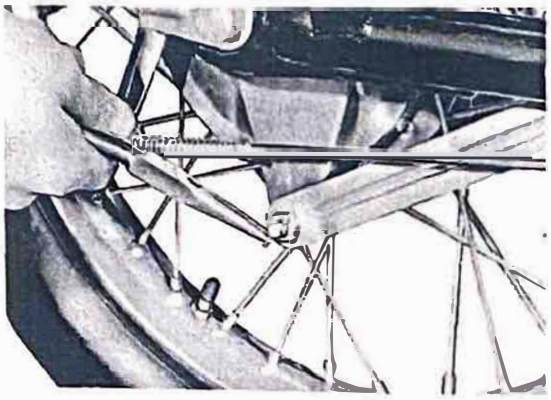
The rear wheel is 18-in. size, and the rear tire is the 3.50-18 Trials Universal. The single leading shoe type brake is 130 mm. x 28 mm. (5.12 x 1.10 in.) in size. A labyrinth seal between the wheel hub and the brake plate is provided to prevent water and dust leakage. The brake tension bar is of link design to minimize the shifting of the brake cam lever position when the rear swing arm is moving up and down. The rear fender is steel, and rubber mounted on the frame. It is also wide enough to protect the engine unit from dust and water.

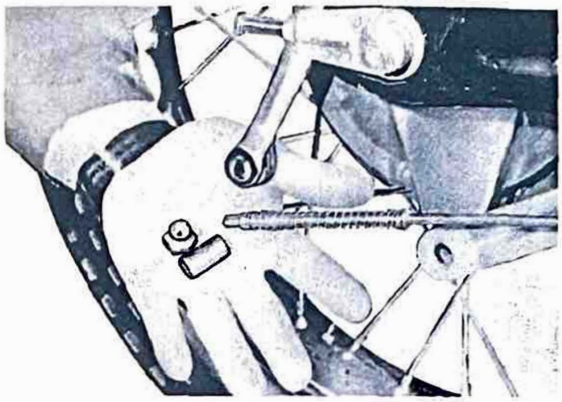


Rear Wheel Construction

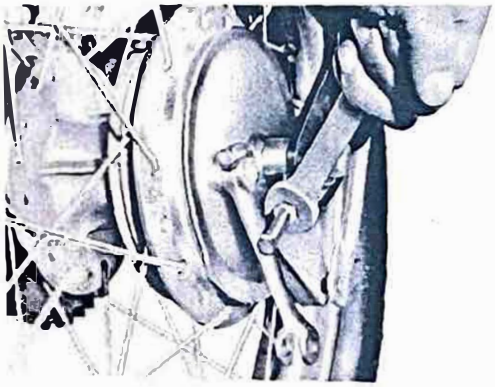
A. Removal

1) Remove the tension bar and brake rod from the rear shoe plate.

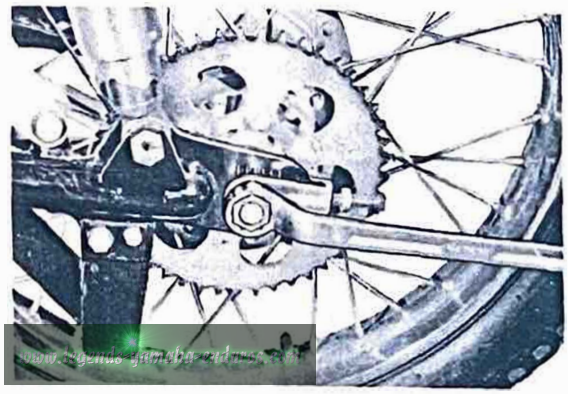




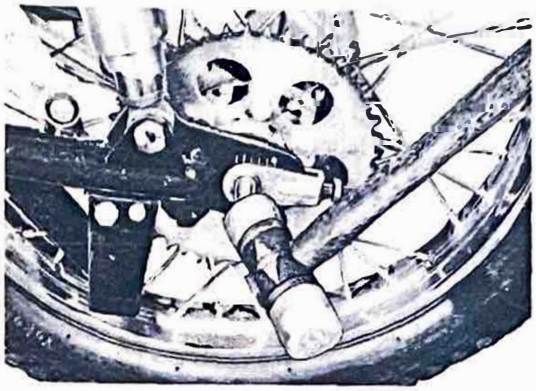
2) Loosen the chain tension adjusting nuts and bolts on both right and left sides.



3) Remove the rear wheel shaft nut.

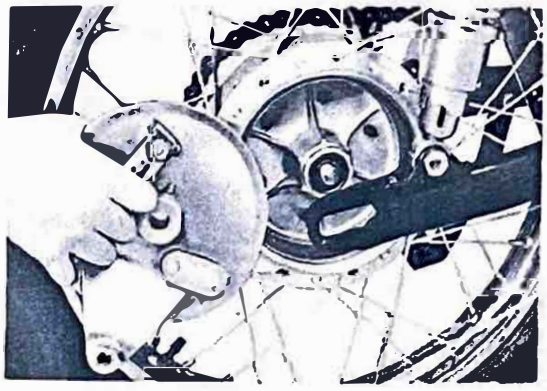


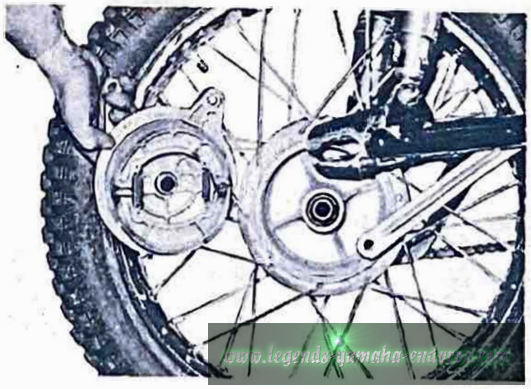
4) Pull out the rear wheel shaft by striking it with a plastic tip hammer.



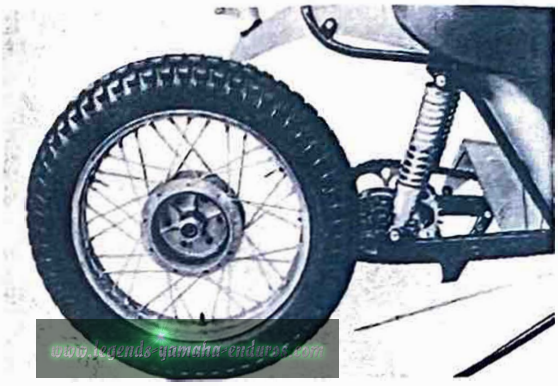
5) Remove the right-hand chain adjuster and distance collar.

6) Remove the rear brake shoe plate.





7) Lean the machine to the left and remove the rear wheel assembly.



Replacing the Wheel Bearing

- Replace the wheel bearing in the same way as the front wheel bearing.

Replacing Tires

1) Removal

a. Remove the valve cap and lock nut (12 mm.) 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.)

It is noted that to remove the inner tube, one side of the tire should be pried out of the wheel rim.

2) Installation

a. Insert the tube between the tire and the wheel rim, and inflate the tube to remove creases. Be sure that the valve stem is directed toward the wheel shaft. At this time the tire is still halfway off the rim.

b. Force the tire completely back on the wheel rim by the use of tire levers. For this operation. it is advisable that the bead on the other side of the tire be pushed in toward the rim flange.

c. To avoid pinching the tube between the tire and the rim, tap the tire with a hammer as the tire is partially inflated.

d. Tighten the tub valve lock nut, and inflate the tire to the recommended pressure, then install the valve cap.

B. Inspection

1) Run out of the rim

Check the rim for run out in the same way as the front wheel. Maximum limit of run out . . . . . 2 mm. (0.07 in.) or less.

2) Brake shoe

Check the brake shoe in the smae way sa the front wheel.Minimum limit . . . .124mm. (4.9 in.)

3) Brake drum

Check the brake drum in the same way as the front wheel.

4) The spokes are measured in the same way as the front wheel. A loose spoke should be tightened.

5) If the bearing has excessive play or it does not turn smoothly, replace it.

6) If the tire or the pattern is worn out, replace the tire.

7) If the lip of the oil seal is damaged or warped, replace it.

5-3 Rear Wheel Sprocket

A. Checking and Adjustment

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

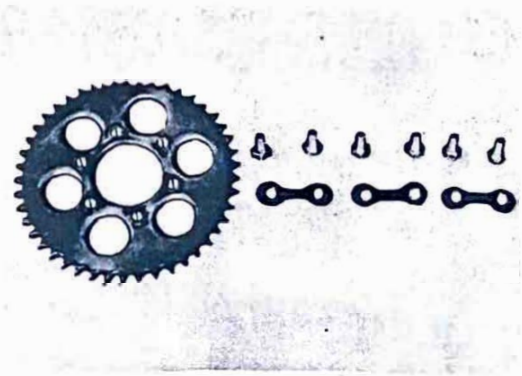
1) Removing the sprocket

a. Bend the lock washer ears flat.

b. Remove the sprocket mounting bolts.

2) Checking

Check the lock washer and hexagonal bolt for breakage and damage. If the lock washer is not bent over the hexagon bolt head, or is broken, or if the bolt is loose, the sprocket can come loose. Make sure that both lock washers and the mounting bolts are tight.



5-4 Tires and Tubes

1) Normal tire pressure

Though tire pressure is the rider's choice, the standard tire pressure is as follows.

a. On-the-road riding

Front . . . . . 14 lbs./in². (1.0 kg./cm².)

Rear . . . . . 17 lbs./in². (1.2 kg./cm².)

When the tire pressure is reduced below the specified value because of some reason, the tire may slip around the rim.

To prevent this slipping of the tire, bead stoppers should be used.

5-5 Front Forks

The AT2, CT2 are equipped with competition designed telescopic double dampening front forks. These specially designed front forks provide excellent riding comfort along with handling superiority. The maximum stroke travel is almost 5.8 inches (145 mm.)

The combination of fork stability and long stroke travel provides safety and handling ease for the rider over even the roughest terrain. This front fork design also reduces weight, eases maintenance, and gives functional and attractive appearance. The simplicity and dependability of the front forks is provided by the installation of the fork spring inside of the fork tube.

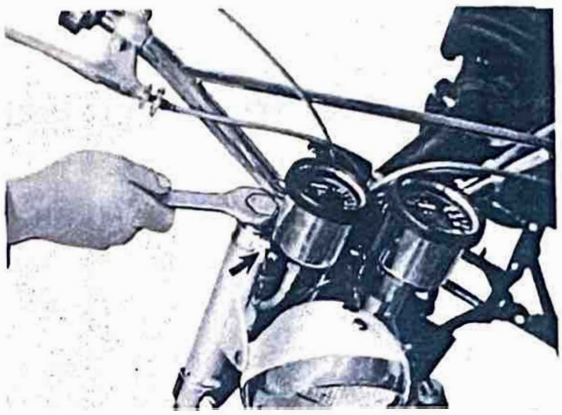
The AT2, CT2 front fork can be used for the 250 DT2, without modification.

A. Removal

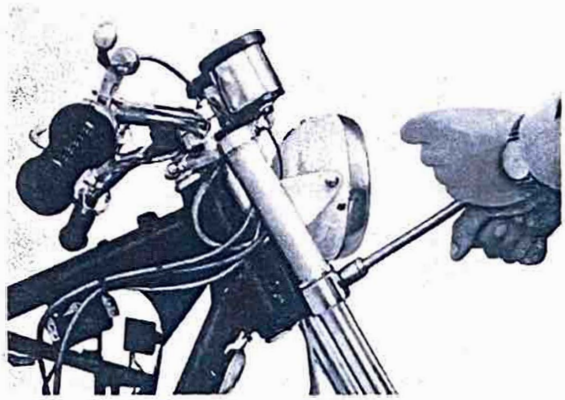
1) Remove the front fender

The light-weight aluminum front fender is rubber-mounted.

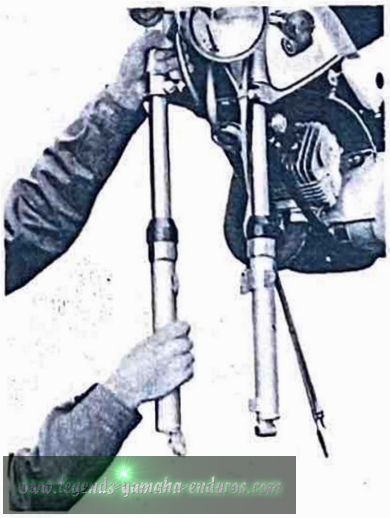
2) Remove the inner tube cap bolt.
You must loosen the arrow marked pinch bolt before the cap bolt is loosened.



2) Loosen the inner tube pinch bolt on the underbracket.



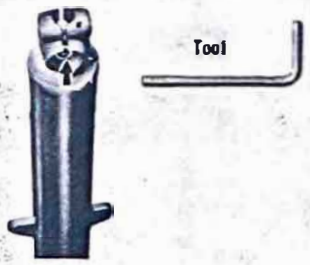
3) Pull the outer tube downward.



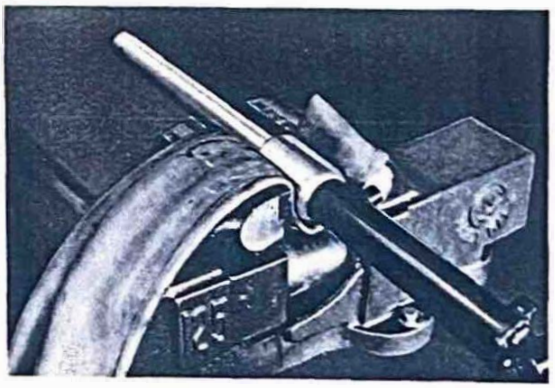
B. Disassembling the Inner and Outer Tubes

1) Drain the oil from the fork.

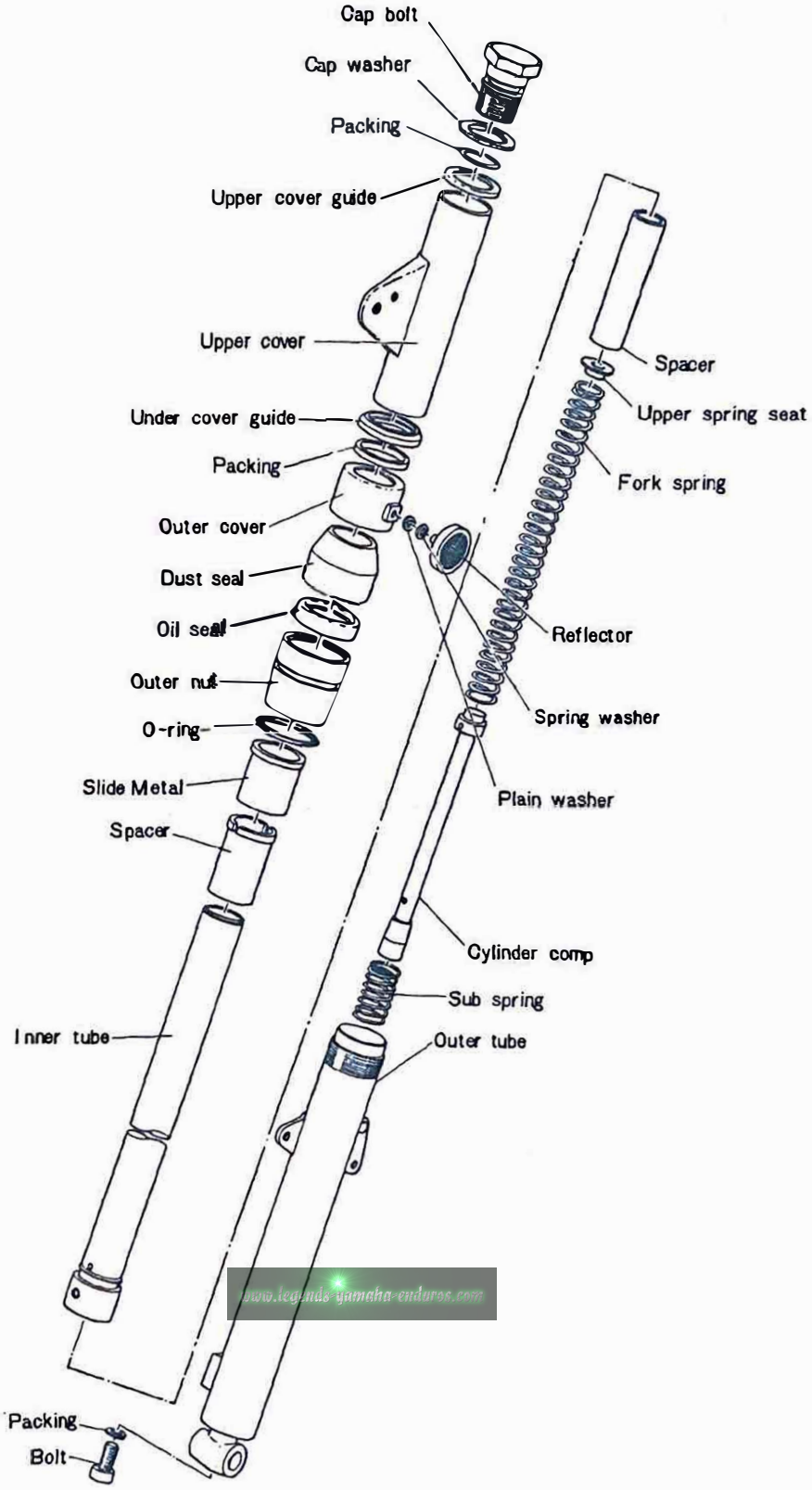
2) Remove the special bolt (arrow marked) from the bottom of the outer tubes.



3) Place a rubber sheet or tire tube around the outer tube nut.



4) Squeeze the outer tube with a strap wrench, and turn it counter-clockwise. The inner tube can be separated from the outer.



Front Fork Exploded View

C. 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 recommended, however, to replace the tube if possible.

2) Oil seal

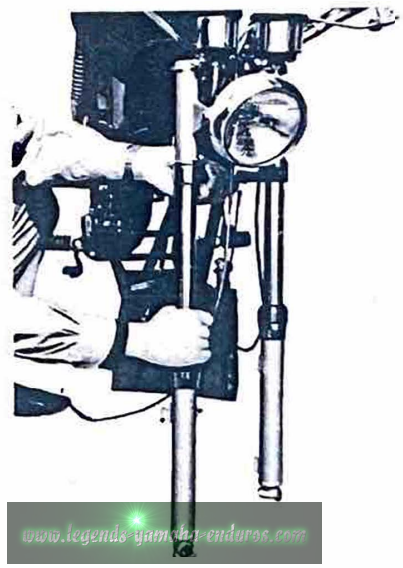
When disassembling the front fork, replace the oil seal in the outer tube nut.

D. Assembling

1) When assembling the front fork, reverse the order of disassembly. Check if the inner tube slides in and out smoothly.

2) Installing the front fork on the frame.

a. Bring up the front fork to the correct position and partially tighten the underbracket mounting bolt.



b. Pour oil into the inner tube through the upper end opening. Front fork oil: Motor oil 10W/30 120 cc (4.1 fl.oz) per fork leg.

c. Install the cap bolt, then completely tighten the lower and upper pinch bolts.

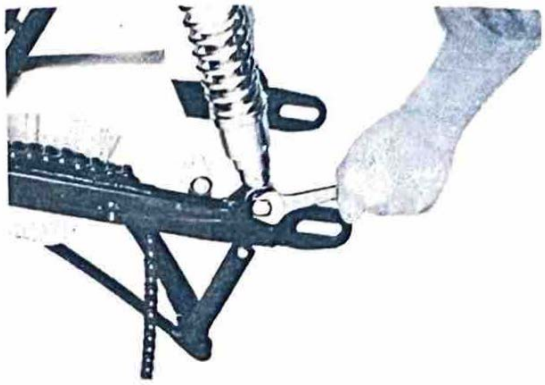
5-6 Rear Shocks

The rear shocks have a maximum stroke of 90 mm. (3.54 in.) The rear cushion features superb damping and 5-position adjustable springs, that allow the rider to adjust the rear shocks to suit any riding condition.

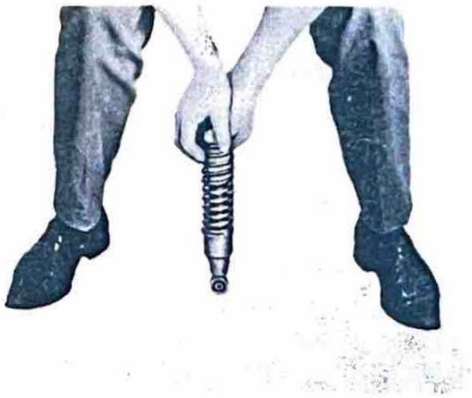
It is possible to use the DT2 rear cushions for the AT2, CT2, without modifying them.

A. Checking the Condition of the Damping Units.

1) Remove the rear shock assembly.



2) Compress the shock by applying weight and release it.
If the shock quickly restores halfway and then slowly returns to the original position, the rear shocks are in good condition. But if the cushion returns quickly to the original position, check the cushion for oil leakage, and replace the assembly if it leaks.

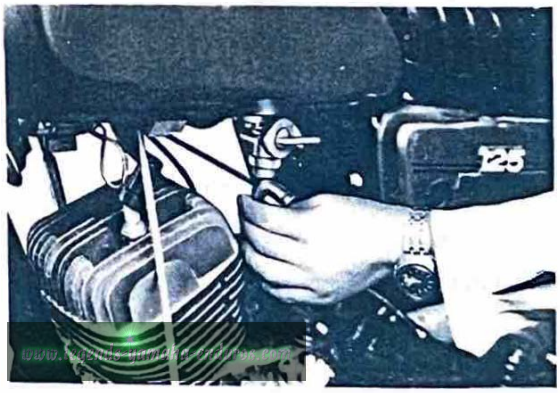


5-7 Gas Tank

The front of the tank is held to the frame by a hook on the tank that slips over a pin, and the rear is held by a rubber band. Tank capacity is 7.2 litres (1.9 U.S. gals.)

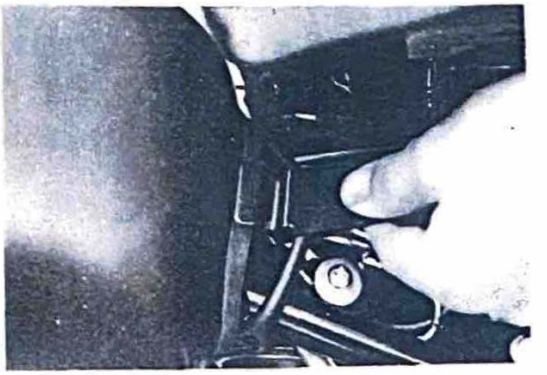
A. Removing

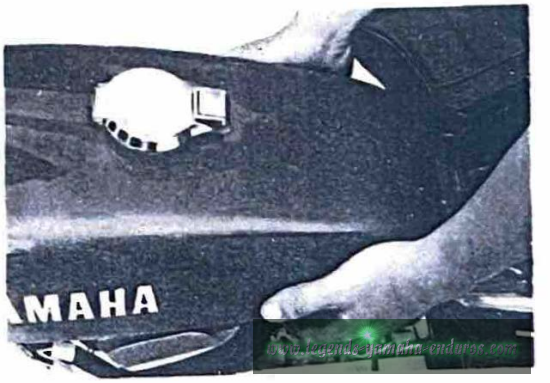
1) Set the petcock lever at the "Stop" position and disconnect the fuel line at the petcock.



2) Open the seat.

3) Remove the gas tank.



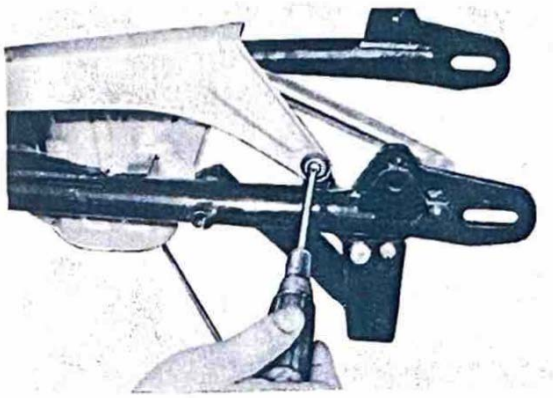


5-8 Rear Swing Arm

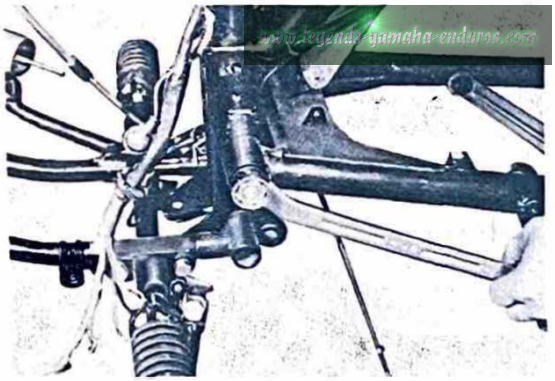
The rear swing arm is made of steel tube that improves the strength and torsional rigidity. The pivot employs permanently lubricated bearings.

A. Removing

1) Remove the chain case mounting bolts.

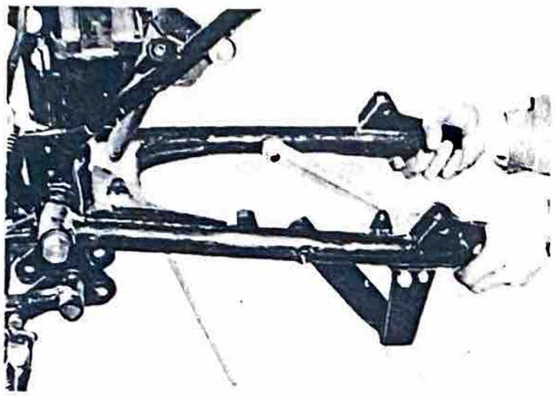


2) Remove the rear swing arm shaft nut, pull out the shaft, and remove the rear swing arm.



B. Checking

1) Check the play of the rear swing arm by shaking it as shown in Fig. 5-8-3, with the rear swing arm installed. If the play is excessive, replace the rear swing arm bushing or the rear swing arm shaft.
2) Insert the bushing as indicated and check it for play. It the play is excessive, replace the bushing.



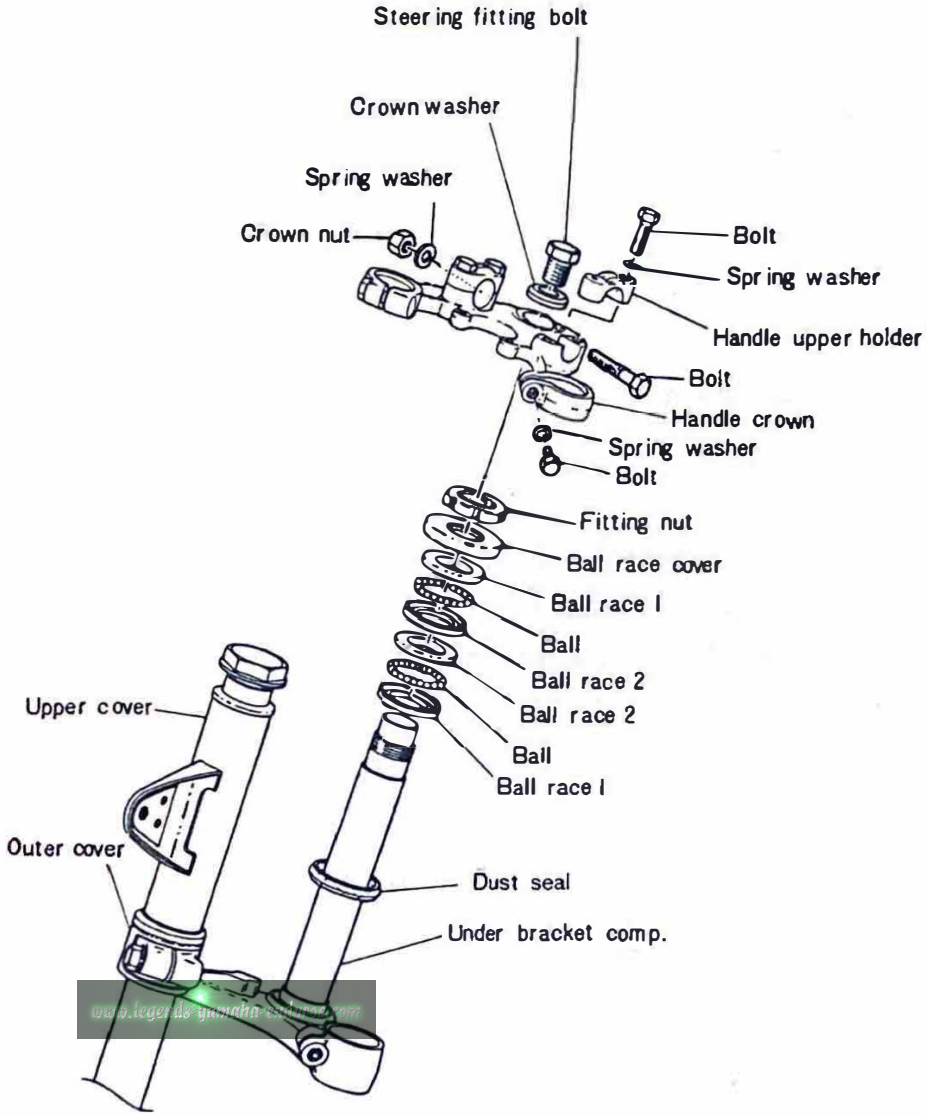
3) Grease the rear arm shaft periodically.

Replacing Rear Swing Arm Bushings

On motorcycles being used only 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.

5-9 Steering Head

A. Sectional View of the Steering Head



B. Checking

1) Ball Races and Steel Balls

Check the ball races and steel balls for pitting or wear. Check them very carefully if the machine has been in long use. If they are worn or cracked, replace all of them, because defective ball races or steel balls adversely affect the maneuverability of the machine. Replace any ball race having scratches or streaks resulting from wear. Clean and grease the balls and races periodically.

Note: Do not use a combination of new balls and used races or vice versa. If any of these are found defective, replace the whole ball and race assembly.

5-10 Oil Tank, Battery Box and Tool Box

The oil tank is located on the left side under the seat. It is designed to be as narrow as possible so that it will not contact the rider's lower limbs when he stands upright on the footrests. To fill the autolube oil tank, lift the seat and the tank cap will be exposed.

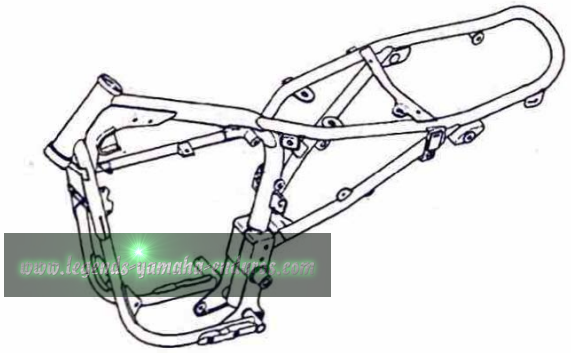
Oil tank capacity . . . . . 1.2 litres. (1.3 u.s qts)

The battery box is located right under the seat.

And the tool box is located under cleaner box.

5-11 Frame

The double cradle-type frame is made of high tension steel tubes that provide strength, rigidity and light weight. Other dimensional features include high ground clearance, narrow width, and long wheelbase. The engine is bolted to the frame at three positions. The caster is measured at 60° 31'.



5-12 Handlebars

The upswept type longer handlebars are ideal for motocross events and are provided with deep-cut pattern grips to prevent hand slippage. The lever holder is provided with adjusting screws for clutch cable and brake cable free play.

The meter bracket is mounted on the ends of the handle crown, to carry the speedometer on its left side and the tachometer on its right side.

5-13 Miscellaneous

The footrest is made of a single steel tube extending under the lower part of the frame, and bolted to the frame. The engine guard is bolted to the frame to protect the entire crank-case . . . . . covering from the exhaust system to the drain plug.

Chapter 6 Electrical System for AT2

6-1 Description

The YAMAHA125 AT2 is equipped with a large-sized starter dynamo, which serves as a high-output D-C generator as well as a starter. This enables all electrical terminals to keep voltages almost constant at all times regardless of engine speeds.

All electrical parts are of 12-V capacity.

6-2 Table of Component Parts

Parts	Manufacturer	Model & Type	Remarks
Starter dynamo	Hitachi Ltd.	M100-03	
Spark plug	NGK	B-8ES	
Head light	Koito Mfg.	12V25WD High beam indicator light 12V2W	Metal-back sealed beam
Speedometer	Nippon Seiki	Meter light 12V3W	
Tachometer	Nippon Seiki	Meter light 12V 3W	
Left handlebar switch	Asahi Denso		Is interchangeable with DT1
Right handlebar switch	Asahi Denso		
Main switch	Asahi Denso		
Ignition coil	Hitachi Ltd.	CM-61-50	
Horn	Nikko Kinzoku	MF-12	
Battery	Furukawa Battery	12N7-3B1-1,12V7AH	
Regulator	Hitachi Ltd.	T107-17A	
Starting switch	Hitachi Ltd.	A104-35	
Fuse	Osachi Mfg.	20A x 2	
Front stop switch	Asahi Denso		Is interchangeable with DT1
Rear stop switch	Asahi Denso		
Tail/Stop light	Stanley Elec.	12V 7/27W	(TRADE No.1157)

6-3 Main Components

1. Ignition System

The main parts consist of:

Contact breaker (connected to the dynamo)

Condenser (connected to the dynamo)

Ignition coil, spark plug, high tension lead, and battery.

6-4 Charging and starting System

Charging system: The purpose of the charging system is to charge the battery equipment (lights, horn, etc) while the machine is runing.

Starting system: Electric starter system is used to crank the engine.

The main parts of these two systems are:

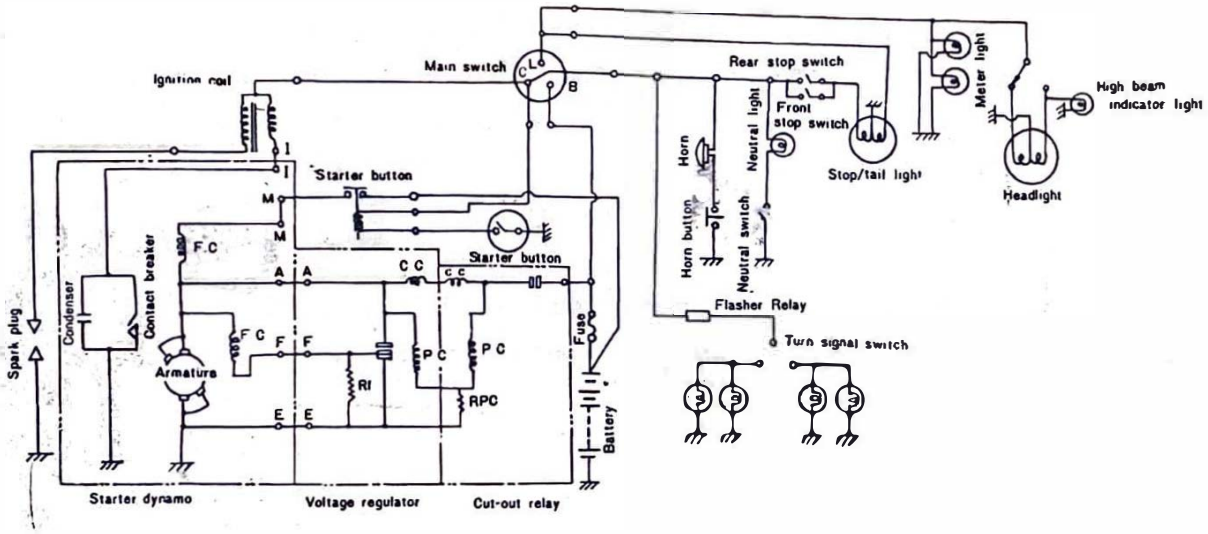
Dynamo (yoke, armature, brushes), regulator (with cutout relay), starter button (with starting switch), fuse and battery (power source).

3. Lighting and Signal Systems

The lighting and signal systems consist of signal lights, switch and meter lights (signal system) and illumination lights for night travel.

Signal system: Horn, stoplight, and switches.

Lighting system: Headlight, taillight, and meter lights.



6-5 Starter Dynamo

The dynamo ass'y is made up of the yoke ass'y (field coil, contact breaker, condenser, etc), the armature ass'y (armature coil, commutator) and the cam ass'y, and supplies power to the ignition and charging systems.

Ignition system:

The ignition system consists of the contact breaker, condenser, and cam. The system interrupts the current flowing from the battery to the primary coil, thereby inducing a high voltage charge in the secondary coil.

a. Contact Breaker Ass'y

Incorrect ignition timing results in irregular engine speeds, thereby causing an engine knock or vibrations. It also causes loss of engine power or engine overheating, thus shortening engine life. Check the contact breaker periodically.

b. Condenser

The condenser stores electricity from the breaker points when the points open, and discharges the static when the points close. It prevents sparking between the points, minimizing burning by absorbing an abrupt increase in electricity when the breaker points open, and it amplifies the effect of the primary ignition coil.

Charging System:

The charging system of the starter dynamo consists of the yoke ass'y (shunt field coil and brushes) and the armature ass'y (commutator). The armature coil cuts through the magnetic lines of force of the field coil as the engine runs so that a flow of alternating current is induced. The alternating current is converted into a direct current through the commutator brushes. The direct current voltage is kept constant by the voltage regulator, and supplied to each load of the ignition, lighting and signal systems as well as to the battery.

Starting System:

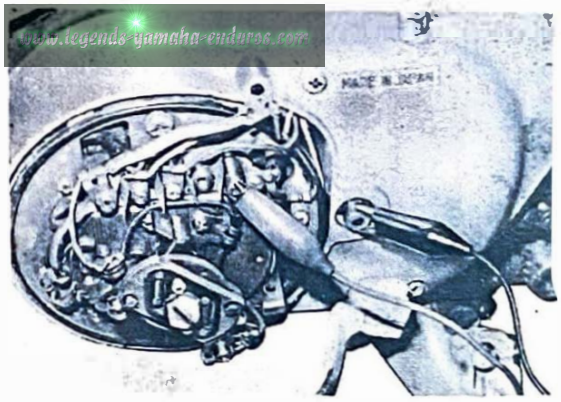
In the starting system of the starter dynamo, the series coil and the armature, working as a D.C. motor, generate a great amount of torque, by which the engine is cranked.

1. Inspection and Repairs

A. Checking the Dynamo

First disconnect the wires from the terminals A (white) and F (green), then ground the terminal F to E .....

(black), with a jumper wire. Connect the positive lead of the tester to terminal A (white), and ground the negative tester lead to the engine. Start the engine and keep it running at 2,000 rpm. If the electricity generated reads more than 14V on the tester, the generator is in good working condition.



Caution: Do not run the engine at more than 2,000 rpm in this test. If you run the engine at more than 2,000 rpm, a high voltage current generated will ruin the coil, lead wire, etc.

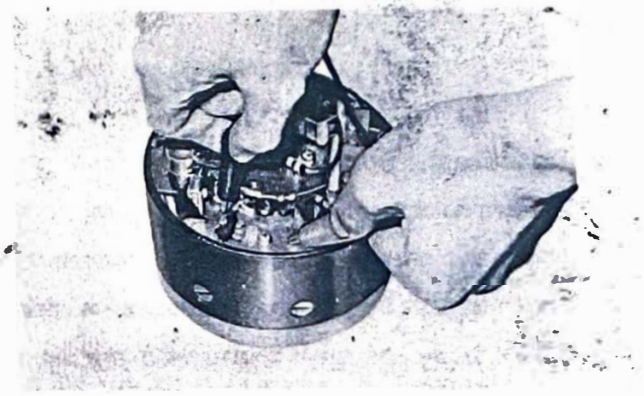
B. Checking the Yoke Ass'y

Clean the yoke with a rag to remove dust, oil, and carbon from brush wear, etc.

1) Field Coil Brush Insulation Test

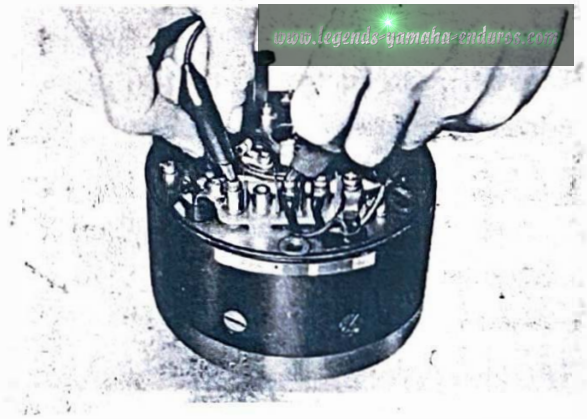
The positive brush of the field coil is insulated from the yoke and by using the tester, you can check its insulation. If the insulation is bad, the circuit between the field coil or the brush holder, and the yoke is shorted.

(Note: The negative brush is not insulated.)



2) Conductivity Test of Field Coil

Check the continuity between the terminals M,A, and F. If continuity is bad, the field coil is broken Check the visible coil connections. If the coil connections are good then the coil is broken inside and it should be replaced because repairs are very difficult.



3) Checking the Brushes

The brushes are one of the most important parts in the dynamo. Take out the brushes and check the condition of their contact surfaces. Each brush must contact the commutator with more than ¾ of its surface area.

If both brush and commutator surfaces are rough, check both the crankshaft and armature for alignment. Smooth down any burrs on the edge of the armature's tapered bore, and clean it throughly.

If either brush is worn past the minimum length mark, replace them both with new ones.

4) Materials of the Brush

Use the brush having the model No. "MH-33" on its side.

5) Handling the Brushes

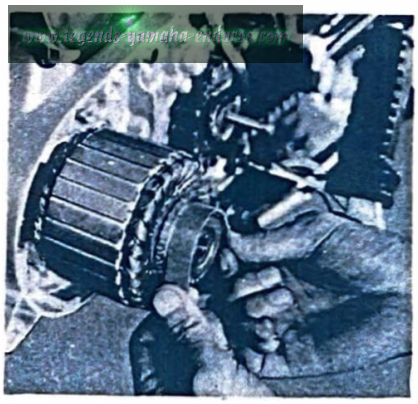
5) Handling the Brushes

When replacing the brushes, be sure the braided lead of the positive brush does not touch the edge of the breaker plate or brush holder, and that the lead of the negative brush does not touch the positive brush spring.

The friction of the braided lead against other parts as a result of vibrations may wear through the insulation and cause a short circuit.

C. Checking the Armatuer Ass'y

1) Throughly clean the commutator of oil and dirt. If the commutator is rough or dulled with brush dust, polish it with fine grain sandpaper (#400-600) by rotating the armature. Partial polishing will only deform the commutator and shorten brush life.

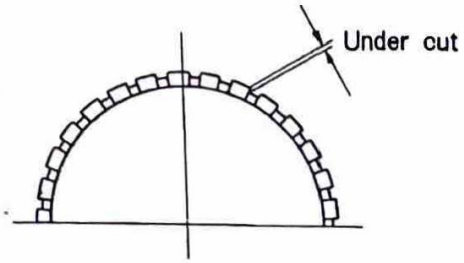


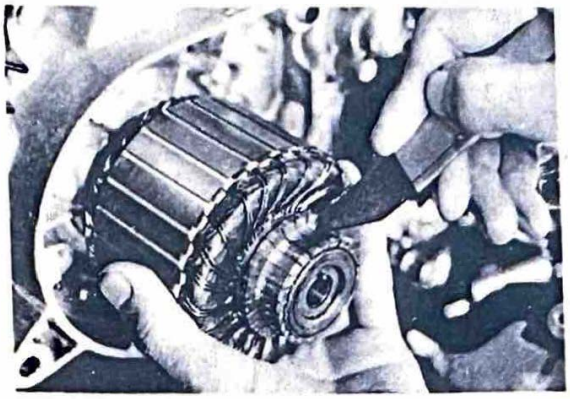
If the commutator is burned, out of round, or too rough to be sandpapered, turn it on a lathe no more than 2 mm under the standard 40 mm diameter

2) Checking the Commutator Mica Under-Cut

If the commutator is worn and if it has high mica, the mica should be undercut with a saw blade:

Sand off all burrs with sandpaper. be sure the mica is cut away clean between segments, leaving no thin edge next to segments.



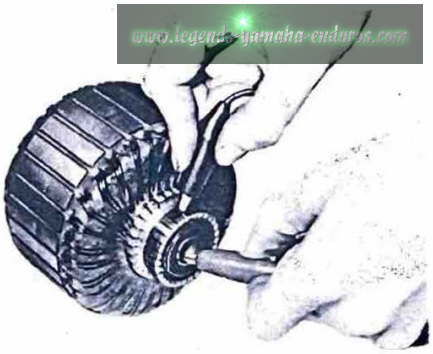


Mica undercut inspection limits: 0.5-0.8 mm

Mica undercut correction limits: 0.2 mm

3) Checking the Armature for Insulation

If there is electical leakage between the commutator and shaft, replace the whole armature.

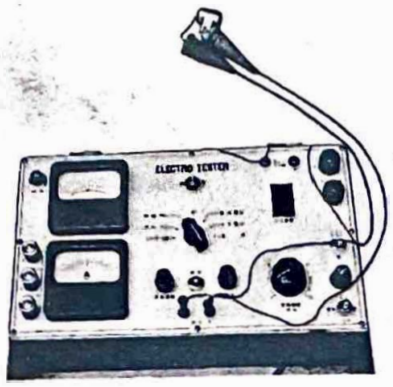


4) It the field coil is perfectly insulated and conductivity is also good, but the dynamo will not generate electricity, the core of the armature coil might be short-circuited. Check the armature with a growler at a special service shop.

D. Checking the Condenser

1) Insulation Tests

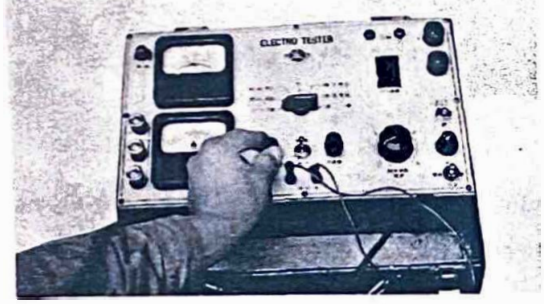
Hook up an electro tester (service tester) for the insulation resistance test, and attach the tester terminals to those of the condenser. If the tester needle swings once and then returns to its original position, the condenser is in good condition. Condenser leakage will hold the needle at a maximum reading. If the reading is more than 3MΩ, the condenser is good. Ground the condenser terminals to discharge the stored electricity.

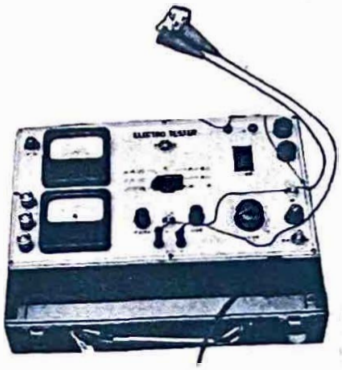


2) Capacity Tests

Set the service tester for the condenser capacity position, and connect its terminals to those of the condenser.

Condenser capacity should be no more than 0.22μF ± 10%. Before testing the condenser, adjust the capacity of the service tester.





Note: When you make this test with the condenser mounted on the dynamo, disconnect the wires from the terminals, and insert a piece of cardboard between the breaker points.

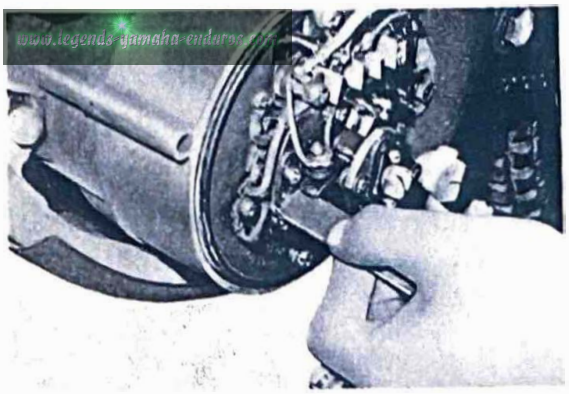
In this test, the insulation resistance of the contact breaker can be tested at the same time. If the insulation resistance is too low, disconnect the lead wires from the condenser, and test it again.

E. Contact Breaker

1) Periodically inspect the breaker points and check the point gap, If the gap is incorrect, adjust it.

2) Periodically inspect the breaker points for any pitting.

Excessive pitting should be smoothed out with sandpaper (#400-600), and wiped off with soft cloth.

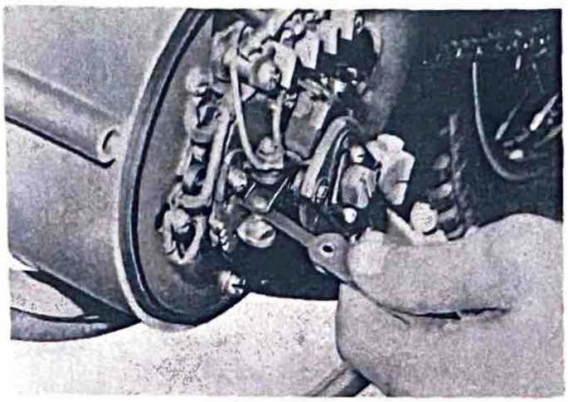


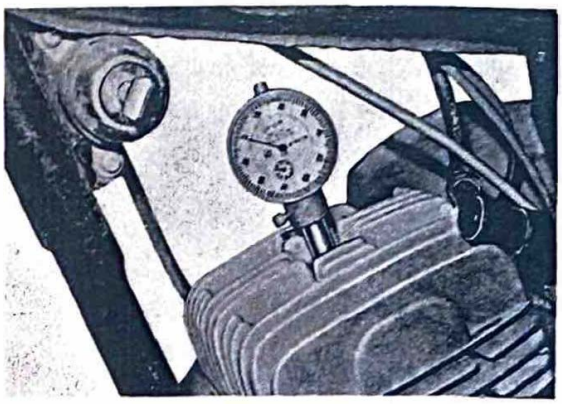
3) After every 5,000 km (3,000 miles) inspect the breaker cam lubricator and grease it a little.
4) Oil or dust on the points impairs spark performance.
   The oil on the points will considerably shorten point service life. Wipe it off from time to time.

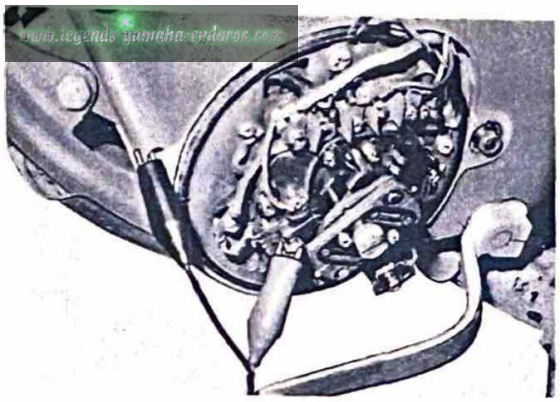
F. Adjusting Ignition Timing

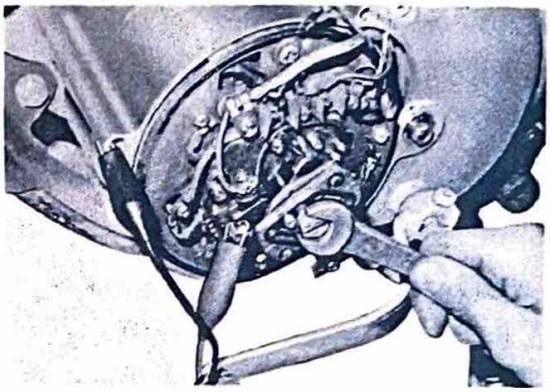
1) Tools and instruments for adjusting:
   Dial gauge (accuracy-1/100 mm)
   Dial gauge adapter
   Continuity testing lamp, YAMAHA electro tester or YAMAHA point checker
   Point wrench
   Slot-head screw driver
   12mm wrench
2) Adjust ignition timing
   a) Set the point gap at 0.30-0.40 mm (0.012~0.014")
   b) Remove the spark plug and screw the dial indicator holder into the plug hole. Next, insert the dial indicator into the holder. Bring the piston up to T.D.C. and set the zero on the dial face to line up exactly with the dial indicator needle.

   Remove the lead wire from terminal I. Connect the positive (+) tester lead to the terminal I, and ground the tester's negative lead to the frame.
   f) Turn the crankshaft back well past 1.8 mm, to eliminate play in the gears, and then bring the piston up to exactly 1.8 mm B.T.D.C.

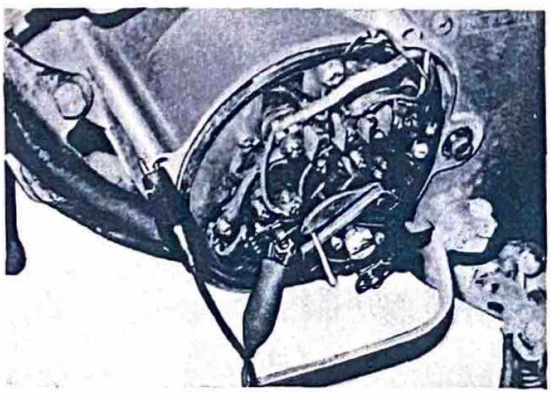








d) Wedge the governor, fully open. Then loosen the breaker plate holding screws, and turn the braker plate. When the points just start to open (the testing lamp lights up), tighten the holding screws. (Do not fully loosen the breaker plate holding screw, because the breaker plate tends to shift its position). Turning the breaker plate in the engine rotation direction causes ignition timing to delay, and turning it in the opposite direction advances ignition timing.



8) Dynamo Adjustment Standards

Part	Item	Maintenance	Inspection
Field	Resistance Shunt Series	4.8Ω@20°C (68°F) 0.0268Ω@20°C (68° F)	When voltage is irregular
Brushes	Material Number Width x thickness x length Minimum length Spring capacity	MH-33 4 9 x 4.5 x 20.5 mm 9 mm 400 ± 10%-560 ± 10% (initial use)	First 6,000 km (4,000 mi.) Every 4,000 km thereafter (2,500 mi.)
Commutator	Diameter Minimum diameter Mica undercut Minimum mica undercut Difference between max. and min. diameter	38.5ϕ mm 36.5ϕ mm 0.5-0.8 mm 0.2 mm 0.03 mm	
Breaker	Point gap Point pressure Ignition timing Automatic spark advance	0.30-0.40 mm 800 ~ 1,000 g BTDC 1.8 mm Starting 1,350 ± 150 rpm Final 1,600 ± 100 rpm Advance 12 ± 2°	Every 3,000 km (2,000 mi.) (High rpm irregular) (Ignition irregular)
Others	Dynamo dia. (outer) Armature taper Cut-in rpm	130 ± mm 20ϕx 1/5 2,000 rpm	
Capacity	Rated output rp,	14V/2,000 rpm	

6-6 Regulator (Voltage Regulator)

The dynamo alone can not provide stable electric current because fluctuating engine rpm affects the voltage. The regulator (also called a voltage relay) stabilizes the voltage generated by breaking the field coil circuit when the voltage exceeds a pre-set level.

A cutout relay (also called a charging relay) is built into the regulator. It allows stable electric current from the dynamo to charge the battery. However, when the engine stops, or when its speed is so low that the dynamo output is lower than that of the battery voltage, it breaks the circuit to the battery so the battery will not drain. The starting switch is provided to direct a flow of current to the starter dynamo when the engine is started.

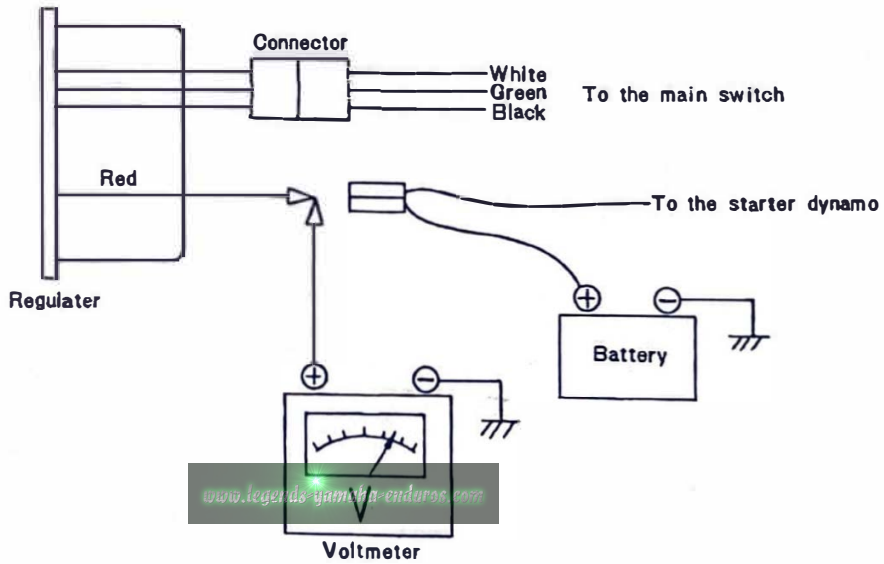
1. Inspection and Adjustment

If the regulator can no longer control the voltage, the battery will be drained or over-charged, and all electrical parts may be burned out. So use a good tester when inspecting or adjusting the regulator. (It is advised that you learn how to adjust the regulator at training courses because it is very difficult.)

A. No-Load Voltage

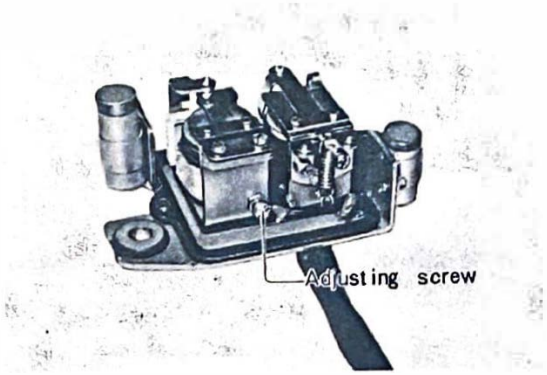
1) Inspection

- O Disconnect the lead wire (red) of the regulator and connect the positive tester lead to the lead wire (red). Then ground the negative tester lead.
- O Start the engine and keep it running at 2,500 rpm. Your regulator is correct if the tester reads 15.8-16.5 V.
- O Start the engine and keep it running at 5,000 rpm. Your regulator is correct if the tester reads less than 16.9V.



2) Adjustment

If the measured voltage is more or less than specified, adjust it by tightening or loosening the adjusting screw on the voltage relay side.

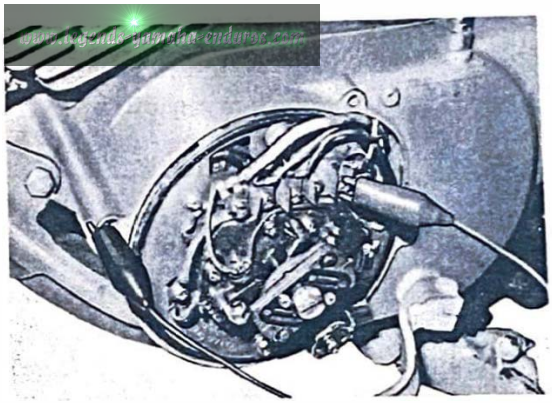


B. Cut-in voltage of the Cutout Relay

1) Inspection

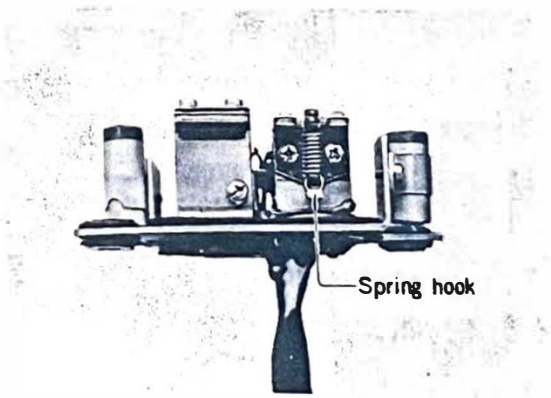
Disconnect the lead from the dynamo A terminal, connect the tester positive lead to the A terminal, then ground the negative lead to the engine.

Start the engine, and increase engine speeds slowly. The cutout relay is correctly set if its breaker points close at 12.5-13.5 V.



2) Adjustment

If the breaker points will not close at the specified voltage, adjust the cutout relay by changing its spring tension.



In actual practice, there will rarely be need to adjust the cutout relay.

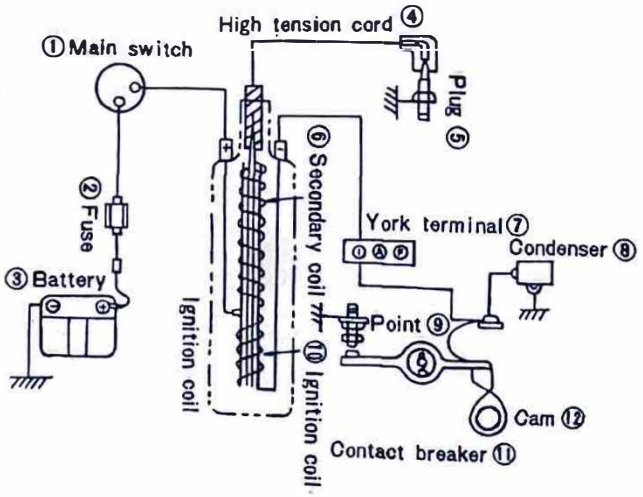
If the point surfaces of the voltage and cutout relays are worn or pitted, polish them with fine sandpaper (#400-600) before making any adjustment.

3) Regulator Maintenance Standards

	Item	Maintenance standards	Inspection
Voltage regulator	No load voltage adjustment value	15.8-16.5V/2,500 rpm	When voltage is irregular
Voltage relay	Voltage coil resistance value	11.8Ω/20°C (68°F)	
	Compensation value	10Ω/20°C (68°F)	
	Core gap	0.4-0.7 mm	
	Point gap	0.4-0.5 mm	
Cutout relay	Cut-in voltage	13±0.5V	
	Reversing current	5A or less	
	Voltage coil resistance value	11.2Ω/20°C (68°F)	
	Core gap	0.8-1.0 mm	
	Point gap	0.6~0.8 mm	

6-7 Ignition Coil

The ignition coil is a kind of transfomrer, with approximately 50 times the number of windings in the secondary coil as in the primary. If the electric current supplied to the primary coil (from the battery) is interrupted by a contact breaker, the primary coil will create a 150 - 300 V current by selfinduction. This current is boosted to 12,000 - 14,000 V by mutual induction in the larger number of secondayr coil windings, thereby making a spark jump the plug electrodes.

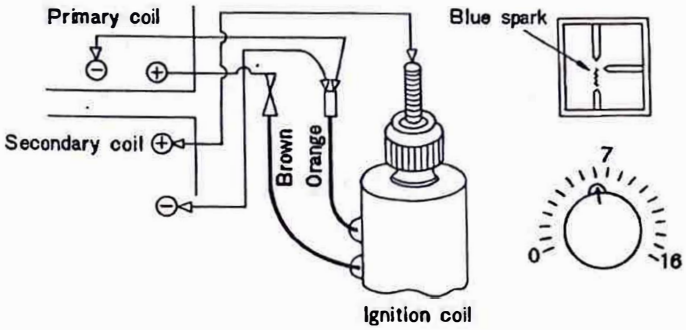


1. Inspection

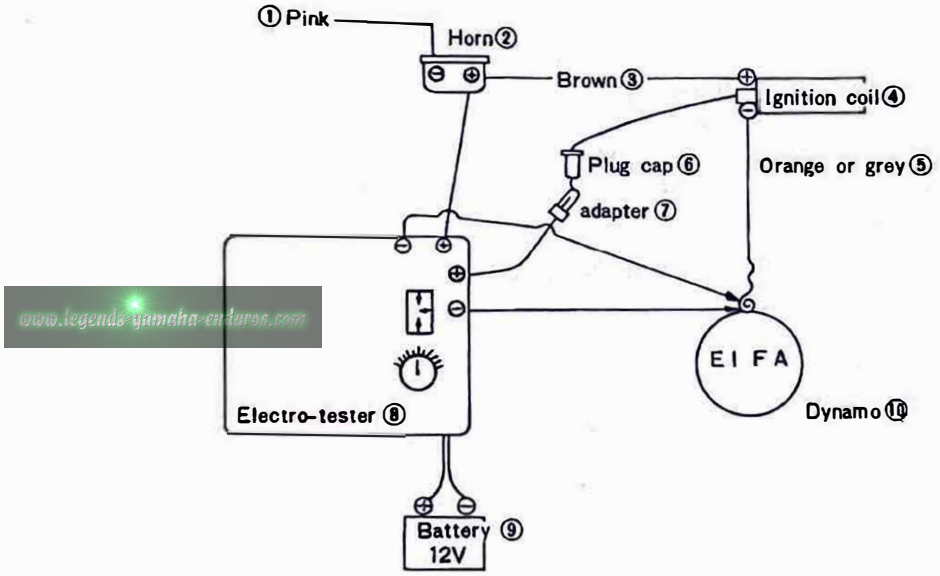
If no spark, or a arther weak spark jumps the plug gap, inspect the ignition coil as well as the contact breaker.

a. When you test the coil alone, use a 12V battery as power source.

A spark of 7 mm or more means the coil is in good condition.



b. Test with Coil Installed (practical test)



Disconnect the lead attached to the ignition dynamo terminal 1 and connect the negative primary and negative secondary leads of the tester to it.

Detach the high tension lead from the plug, attach an adapter (copper or iron wire) to the plug lead cap, and connect this adapter lead to the positive secondary lead of the tester.

Connect the positive primary lead of the tester to the brown lead terminal of the horn.

Use a 12V battery as power source for the tester.

If the tester shows a spark of 7 mm or more, the coil is in good condition.

Chapter 7 Electrical System for CT2.

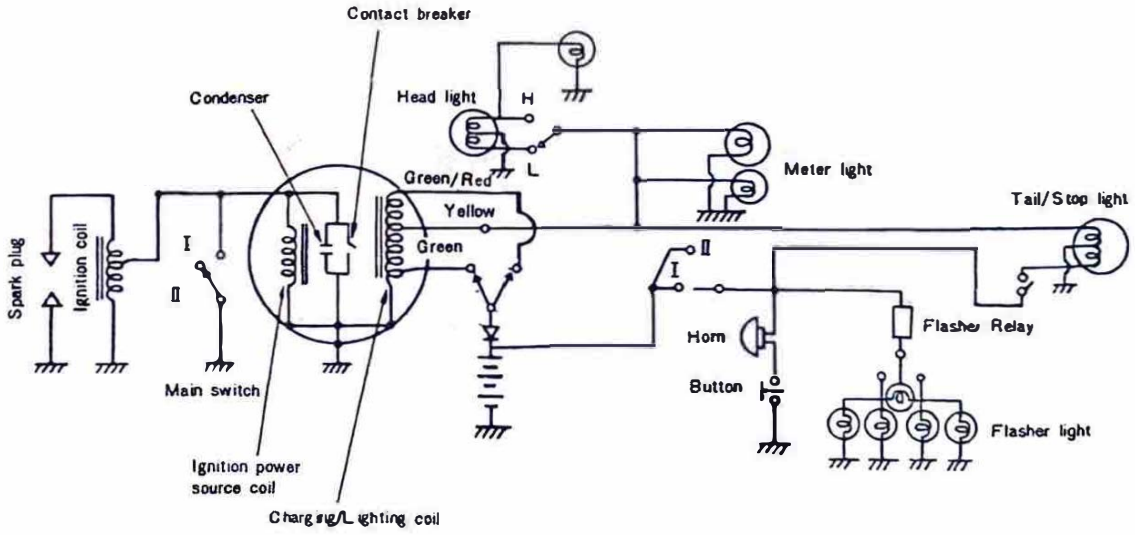
7-1 Description

The CT2 employs a flywheel magneto for its ignition system, same as in the DT2.

7-2 Table of Component Parts

Parts	Manufacturer	Model & Type
Flywheel magneto	Hitachi Ltd.	F-130
Spark plug	NGK	B-8ES
Headlight	Koito Mfg.	6V 25W/25W
		Neutral pilot light 6V3W
Speedometer	Nippon Seiki	Meter light 6V3W
Tachometer	Nippon Seiki	Meter light 6V3W
Handlebar Switch	Asahi Denso	
Main switch	Asahi Denso	
Ignition coil	Hitachi Ltd.	CM61-50
Horn	Nikko Kinzoku	MF-6
Battery	Nippon Battery	MV1-6D
Rectifier	Mitsubishi Elec.	DS10HJ
Fuse	Osachi Mfg.	10A x 2
Stop switch	Asahi Denso.	
Taillight	Koito Mfg.	6V 23W/7W

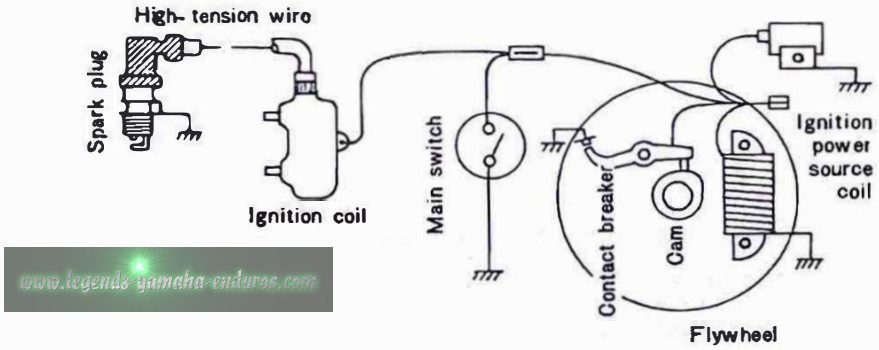
7-3 Connection Diagram



7-4 Ignition System — Function and Service

1. Function

The ignition system consists of the components. As the flywheel rotates, the contact breaker points begin to open and close, alternately. This make-and-brake operation develops an electromotive force in the ignition power source coil, and produces a voltages in the ignition coil primary windings. The ignition coil is a kind of transformer, with a 1:50 turn ratio of the primary to the secondary winding. The voltage (150-300 V) which is produced in the primary coil, is stepped up to 12,000-14,000 V by mutual-induction and the electric spark jumps across the spark plug electrodes.



7-5 Ignition Timing

Remove the spark plug and screw the dial indicator holder into the plug hole. Next, insert the dial indicator into the holder. Bring the piston up to T.D.C. and set the zero on the dial face to line up exactly with the dial indicator needle. The crankshaft should then be turned backwards, so that the piston travels down past 1.8 mm B.T.D.C. and slowly brought back up to precisely 1.8 mm B.T.D.C. (This removes any slack in the gears). Adjust the points so that they are just beginning to open with the piston in this position. A low resistance point checker (100 Ohms or less) should be used to determine the opening and closing of the ignition points.

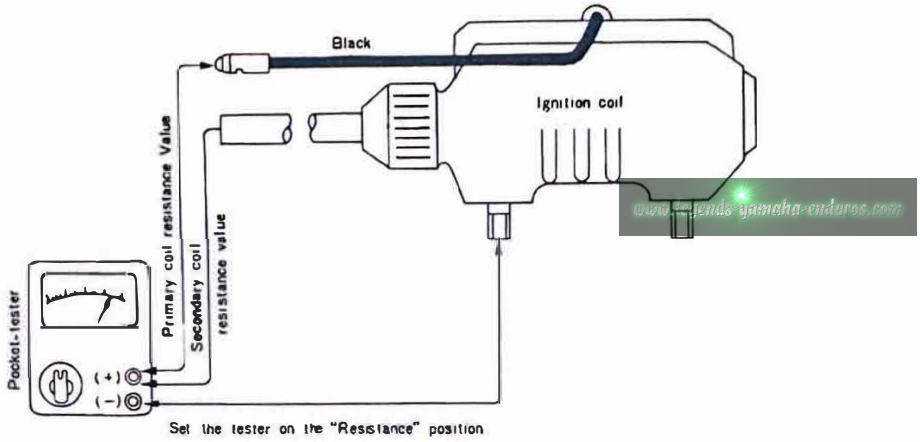
Ignition Timing, 1.8 mm. B.T.D.C.

Maximum ignition point gap 0.3 to 0.4 mm. (0.012''-0.015'')

7-6 Ignition Coil

Primary coil resistance value . . . . . 4.9Ω± 10% (20°C or 68°F)

Secondary coil resistance value . . . . . 11Ω ± 10% (20°C or 68°F)



Note: When measuring the secondary coil resistance value, disconnect the plug cap. Otherwise, the resistance of the 5KΩ noise suppressor incorporated in the plug will be added to the tester reading.

Spark Test:

Remove the spark plug from the cylinder head and reconnect the high voltage lead. Then hold the spark plug approximately 7 mm away from the head and see if it sparks as you crank the kickstarter.

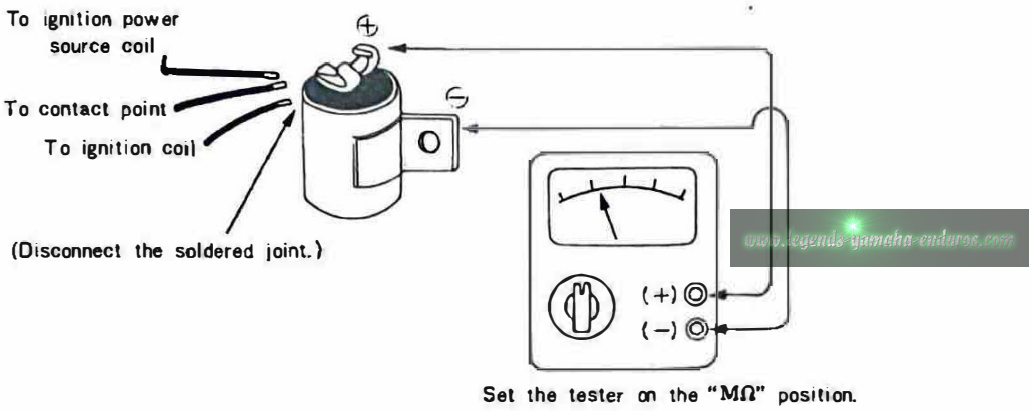
If it sparks at 7 mm. or so, and has blue white color, the ignition coil should be considered to be in good condition.

7-7 Condenser

The condenser instantly stores a static electric charge as the contact breaker points separate, and the energy stored in the condenser discharges instantly when the points are closed. If it were not for the condenser, an electric are would jump across the separating contact points, causing them to burn.

Burned contact points greatly affect the flow of current in the primary winding of the ignition coil.

If the contact points show excessive wear, or the spark is weak (the ignition coil is in good condition), check the condenser.



Set the tester on the "MΩ" position.

Insulation resistance tests should be conducted by connecting the tester. If the pointer swings fully and the reading is more than 3MΩ, the insulation is in good condition. If the insulation is faulty, the pointer will stay pointing at the uppermost reading, indicating very little resistance.

Note: After this measurement, the condenser should be discharged by connecting the positive and negative sides with a thick wire.

Capacity tests can be performed by simply setting the tester to the condenser capacity. The tester should be connected with the condenser in the same way as in the case of the insulation resistance test. Before this measurement, be sure to set the tester correctly.

If the reading is within 0.30 μF ± 10%, the condenser capacity is correct.

7-8 Charging System

The charging system consists of the flywheel magneto (charging and lighting coils), rectifier, and battery.

1. Flywheel Magneto

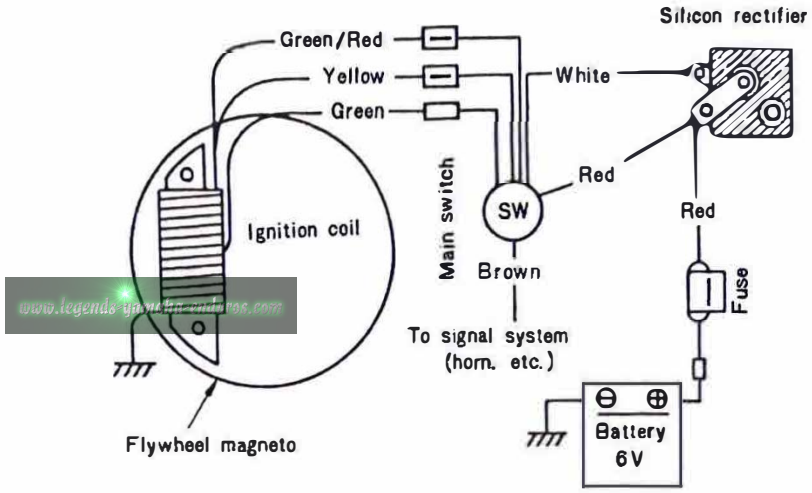
As the flywheel rotates, an alternating current is generated in the charging and, lighting coils and converted to a half-wave current by means of a silicon rectifier.

This half-wave current charges the battery.

Charging Capacity (Daytime)

Green lead: Charging begins at 2,000 r.p.m.

4.5 A or less at 8,000 r.p.m.



Lighting Capacity (Night time)

(With normal loads and normal wiring.)

5.7 V or more at 2,500 r.p.m.

8.5 V or less at 8,000 r.p.m.

* The charging and lighting capacity is obtained when the battery is fully charged. If the battery is in a low state of charge and low in voltage, the charging rate will be not exactly the same as above. However, it is desirable that the figures are as close as possible.

2. Silicon Rectifier

The alternating current, which is generated by the flywheel magneto, is rectified and charged to the battery. For this rectification, a single-phase half-wave silicon rectifier is employed.

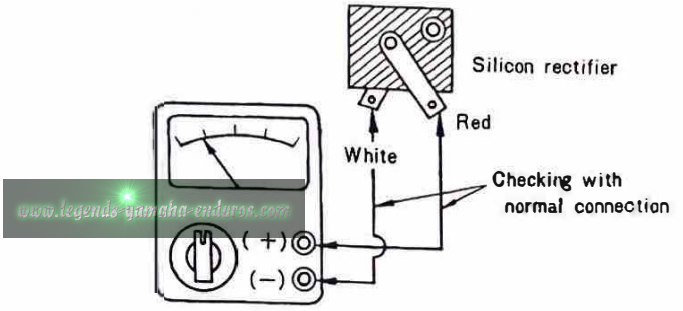
Characteristics: Rated output—4A,

Rated peak inverse voltage 400 V.

Polarity:

a. Checking the Silicon Rectifier

For measurements, an ohmmeter can be used.



(Set the tester on "Resistance.")

Checking with Normal Connection

Connect the tester's red lead (+) to the silicon rectifier's red terminal, and connect the tester's black lead (−) to the rectifier's white terminal.

Standard value: 9−10Ω

If the tester's pointer will not swing back over from the scale, the rectifier is defective.

Checking with Reversal Connection

Connect the tester the other way around.

Standard value: If the pointer will not swing, the rectifier is in good condition. If the pointer swings, the rectifier is faulty.

3. Operational Note

The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a continuity check.

7-9 Battery

The battery is a 6 volt-4 AH unit that is the power source for the horn and stoplight. Because of the fluctuating charging rate due to the differences in engine R.P.M.s, the battery will lose its charge if the horn and stoplight are excessively used. The charging of the battery begins at about 3,000 R.P.M. Therefore, it is recommended to sustain engine R.P.M.s at about 3,000 to 4,000 R.P.M. to keep the battery charged properly. If the horn and stop-

light are used very often, the battery water should be checked regularly as continuous charging will dissipate the water. If the battery will not retain a charge (and the battery is in good condition) the White/Red wire of the flywheel magneto can be connected to the green wire of the wiring harness. This will increase the charging rate. But if the machine is ridden for long periods of time at high speeds with this wiring connection, the battery may be overcharged and damaged.

1. Checking
   1) If sulfation occurs on plates due to lack of battery electrolyte, showing white accumulations, the battery should be replaced.
   2) If the bottoms of the cells are filled with corrosive material falling off plates, the battery should be replaced.
   3) If the battery shows the following defects, it should be replaced.
   ◯ The voltage will not rise to a specific value even after long hours charging.
   ◯ No gassing occurs in any cell.
   ◯ The 6 V battery requires a charging current of more than 8.4 volts in order to supply a current at a rate of 1 amp. per hour for 10 hours.
2. Service Life

   The service life of a battery is usually 2 to 3 years, but lack of care as described below will shorten the life of the battery.
   1) Negligence in re-filling the battery with electrolyte.
   2) Battery being left discharged.
   3) Over-charging by rushing charge.
   4) Freezing
   5) Feeding of water or sulfuric acid containing impurities when re-filling the battery.
3. Storage

   If any motorcycle is not used for a long time, remove the battery and have it stored by a battery service shop. The following instructions should be observed by shops equipped with chargers.
   1) Recharge the battery.
   2) Store the battery in a cool, dry place, and avoid temperatures below 0°C. (32°F)
   3) Recharge the battery before mounting it on the motorcycle.

4. Service Standards

Battery: 6N4A-4D (Nippon Battery)

Battery spec. 6V-4AH	
Electrolyte-Specific gravity and 1.25~1.27, 200 c.c. quantity	At full charge

5. Checking the Main Switch (removed from the chassis)

Key "O" position (Off)

B/W↔B

Switch body Key "I" position (for daytime)

R↔Br

G↔W

Key "II" position (for nighttime)

R↔Br

Br↔L

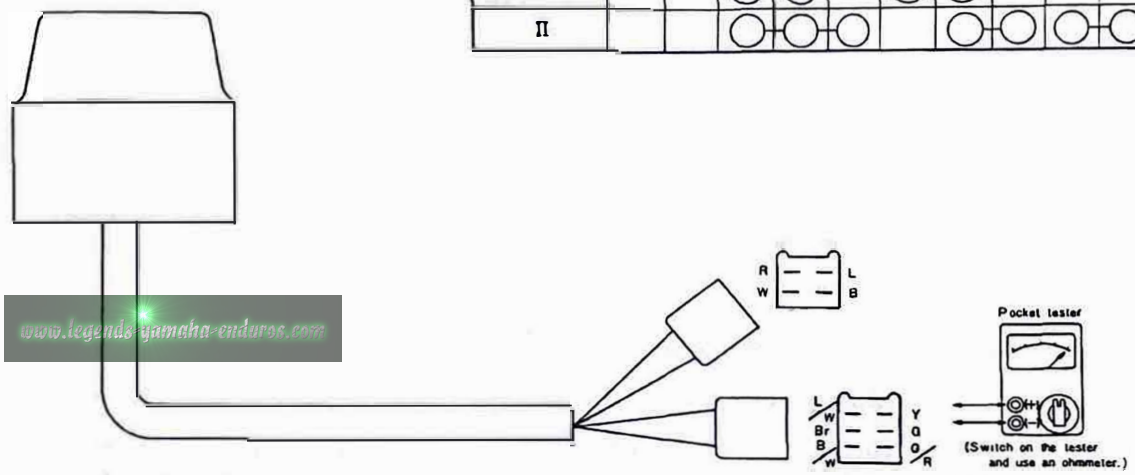
R↔L

W↔Gr

L/W↔Y

Connecting list

Position \ Wire Color	B/W	B	R	Br	L	G	W	G/R	L/W	Y
OFF	○	○								
I			○	○		○	○			
II			○	○	○		○	○	○	○



If the readings or the above 8 measurements are nearly 0 Ω, and no short-circuit is noticed between the terminals, as well as between the lead terminal and the switch body, the main switch is in good condition.

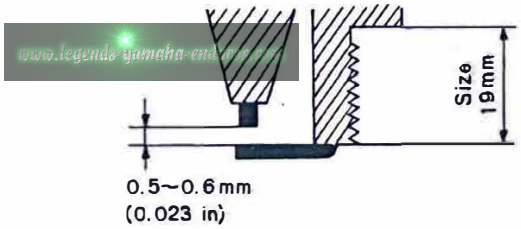
7-11 Spark Plug

The life of a plug and its discoloring vary, according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with suitable ones determined by the color and condition of the bad plugs. One machine may be ridden only in urban areas at low speeds, whereas another may be ridden for hours at high speeds, so confirm what the present plugs indicate by asking the rider how long and how fast he rides, and recommend a hot, standard, or cold plug accordingly. It is actually economical to install new plugs every 3,000 km (2,000 miles) since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

1. How to "read" spark plug (condition)
   a. Best . . . . . When the porcelain around the center electrode is a light tan color.
   b. If the electrodes and porcelain are black and some what oily, replace the plug with a hotter-type for low speed riding.
   c. If the porcelain is burned white and/or the electrodes are partially burned away, replace the plug with a colder-type for high speed riding.
2. Inspection

   Instruct the rider to:

   Inspect and clean the spark plug at least once a month or every 1,000 km. (600 miles) Clean the electrodes of carbon and adjust the electrode gap to 0.5-0.6 mm. (0.023 in.) Be sure to use standard B-8ES plug as replacements to avoid any error in reach.



7-12 Lighting and Signal Systems

The lighting and signal systems consist of the horn and stoplight (power source-battery) and the headlight, taillight, meter lamps, flasher light, speedometer and tachometer (power source-flywheel magneto).

1. Headlight

   The headlight has double 6V, 25W bulbs, and a 6V, 1.5W neutral pilot light on its top. A beam directing adjusting screw is fitted on the right side of the light rim so that the horizontal direction of the beam can be adjusted (not vertically).

2. Taillight and Stoplight

   A 6V. 7W taillight and a 6V, 23W stoplight are mounted. The lens of the taillight is provided with reflectors on its three sides—rear, right and left.

3. Horn

   The horn is a 6V, flat type, and has a tone-volume adjusting nut on its back.

   After adjustment is made, apply paint or lacquer to the nut for water proofing purposes.

4. Speedometer

   A circular type speedometer is mounted on the bracket. For illumination, a 6V, 3 W bulb is provided.

ɔ. Tachometer

As in the case of the CT2 , the tachometer is separated from the speedometer.

The revolutions per minute (r.p.m.) of the crankshaft are carried from the primary drive gear to the tachometer drive gear in the crank case, and through the worm gear meshing with the drive gaer to the tachometer cable. The light for illumination is of 6V,3W capacity

Note: Use bulbs of the correct capacity for the headlight, taillight, meterlight , flasher light and neutrallight which are directly connected to hte flywheel magneto. If large capacity bulbs are used, the voltage will drop, giving a poor light. On the contrary, if smaller capacity bulbs are used, the voltage will rise, shortening the life of bulbs. Avoid the use of 12V bulb, because shorter service life will result.

When the headlight beam switch is operated to change the beam from one to another, the headlight is designed to keep both bulbs turned on, and the beam is changed. This is to protect other light bulbs — meterlight, taillight, etc., from burning out as a result of turning off the headlight, though temporaily. If one of these light bulbs burns out while the machine is running, it will put other bulbs under an overload condition, thus shortening their service life. In this case, it is necessary to reduce the engine speed and replace the burnt out bulb as quickly as possible.

YAMAHA AT2 WIRING DIAGRAM

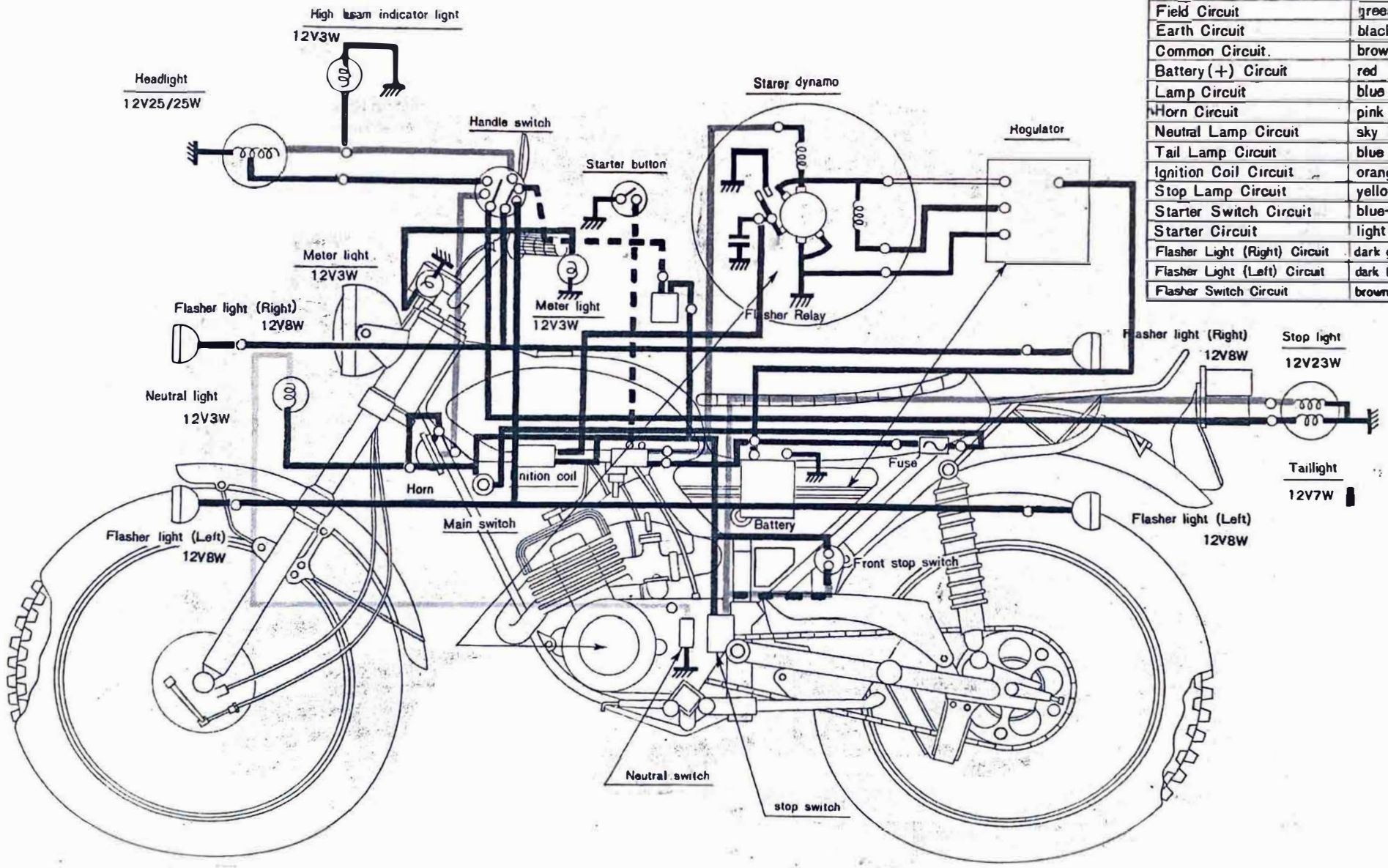
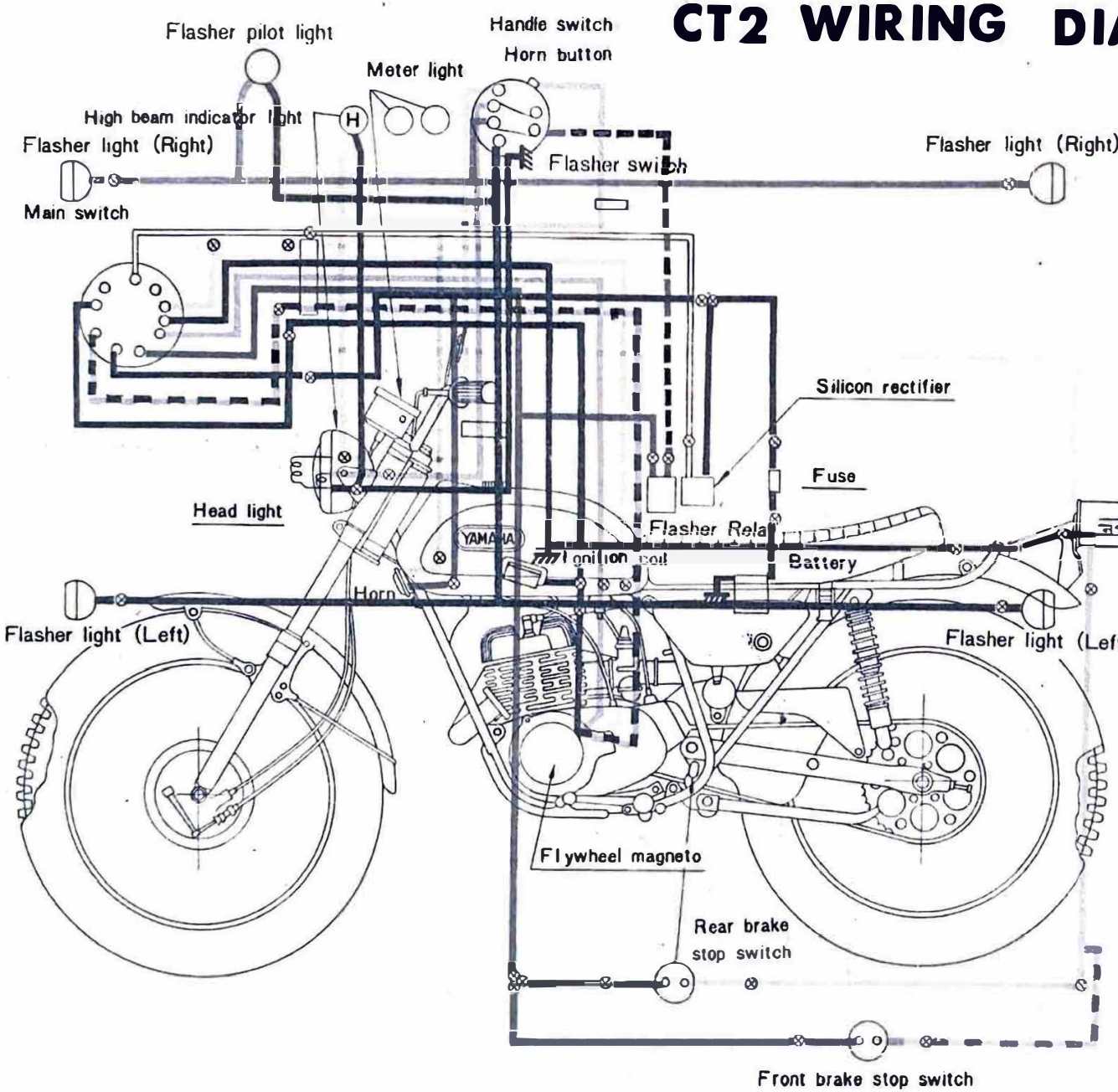


Chart of wire colors

Armature Circuit	white
Field Circuit	green
Earth Circuit	black
Common Circuit.	brown
Battery (+) Circuit	red
Lamp Circuit	blue
Horn Circuit	pink
Neutral Lamp Circuit	sky blue
Tail Lamp Circuit	blue
Ignition Coil Circuit	orange
Stop Lamp Circuit	yellow
Starter Switch Circuit	blue-white
Starter Circuit	light green
Flasher Light (Right) Circuit	dark green
Flasher Light (Left) Circuit	dark brown
Flasher Switch Circuit	brown-white

CT2 WIRING DIAGRAM



Position \ Color	E	B	R	Br	L	G	W	GR	LW	Y
OFF	○—○									
I			○—○		○—○					
II			○—○—○			○—○		○—○		

Chart of wire colors

Daytime charging circuit	Green
Night time charging circuit	Green/Red
Battery (+) circuit	Red
Ground circuit	Black
Front brake stop light circuit	Green/Yellow
Rear brake stop light circuit	Yellow
Tail light circuit	Blue
Head/Meter light circuit	Blue(L.W)
Common circuit	Brown
Head light main circuit	Yellow
Head light sub circuit	Green
Horn circuit	Pink
Rectifier circuit	White
Flasher circuit	Brown/White
Flasher light (R) circuit	Dark Green
Flasher light (L) circuit	Dark Brown