YAMAHA

GT 80B
GT MXB

Service Manual

LIT-11613-93-01

FOREWORD

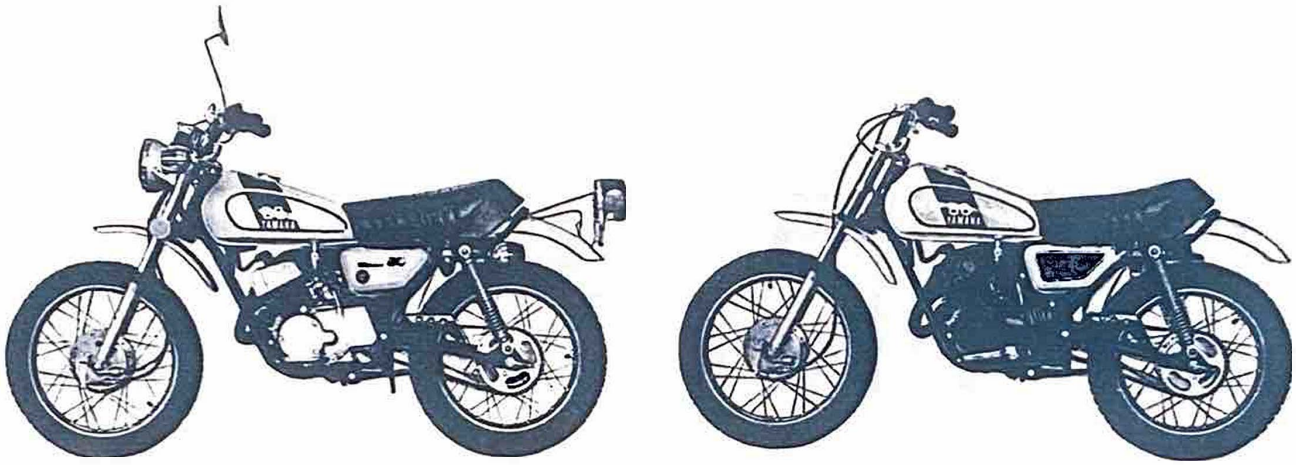
This manual is intended to provide vital technical service information to keep the GT80B/GTMXB in good working conditions. It is urged, therefore, that all YAMAHA dealers and mechanics become familiar with handling and servicing of the GT80B/GTMXB thereby make their sales and service more efficient and profitable.

SERVICE DEPARTMENT
YAMAHA MOTOR COMPANY LTD.

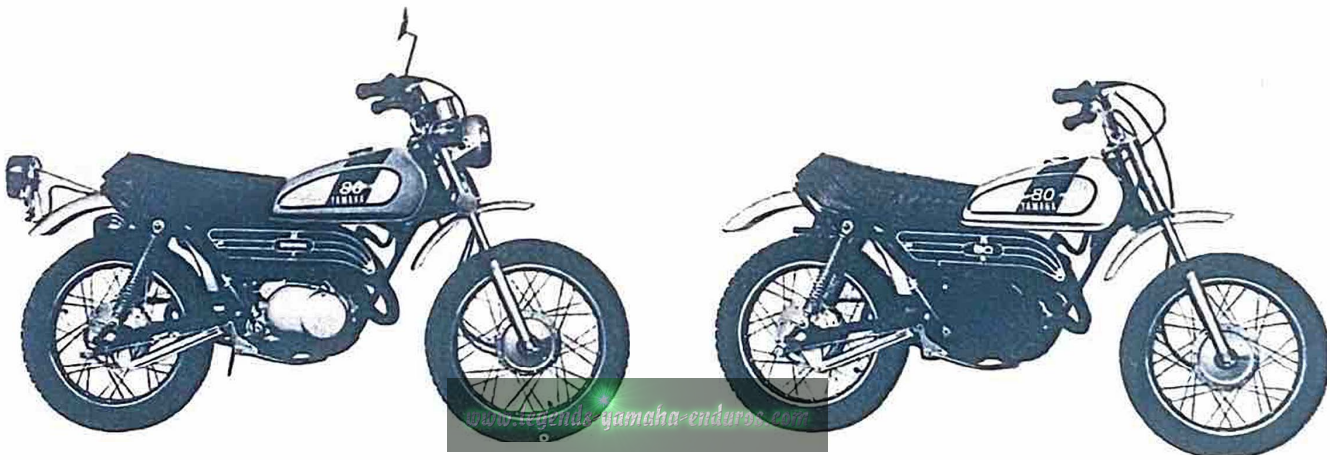
CONTENTS

CHAPTER 1 GENERAL

A. Profile



Lefthand side view



Righthand side view

B. Features of Yamaha GT80B-GTMXB

1. Torque Induction
   The newly designed 5-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 r.p.m. range.

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 GT80B-GTMXB is equipped with a magneto. To start the engine, kick the kick pedal.

4. Powerful Brakes
   Exclusive design brake drums provide safe, fade-free braking in wet or dusty condition.

6. Front Fork Design
   The Yamaha GT80B-GTMXB 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.

6. Tires
   The Yamaha GT80B-GTMXB is fitted with tires having a trials 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 at moderate speeds.

7. Carburetor Starter Feature
   Yamaha's starter feature is already well-known for its easy starting. Equipped with this unique carburetor, the Yamaha GT80B-GTMXB is quick starting under all conditions.

C. Specifications

Model	GT80B	GTMXB
Dimensions:		
Overall length	63.4 ins. (1,610 mm.)	61.0 ins. (1,550 mm.)
Overall width	27.2 ins. (690 mm.)	27.2 ins. (690 mm.)
Overall height	36.6 ins. (930 mm.)	36.6 ins. (930 mm.)
Wheelbase	41.1 ins. (1,045 mm.)	41.1 ins. (1,045 mm.)
Minimum ground clearance	7.7 ins. (195 mm.)	7.7 ins. (195 mm.)
Weight:		
Dry	141 lbs (64 kgs.)	130 lbs. (59 kgs.)
Performance:		
Max. speed	47 m/h (75 km/h)	47 m/h (75 km/h)
Fuel consumption	176 mpg at 19 mph	176 mpg at 19 mph
(on paved level road)	(75 km/lit. at 30 km/h)	(75 km/lit. at 30 km/h)
Climing ability	20 degrees	20 degrees
Min. turning radius	59.1 ins. (1,500 mm.)	59.1 ins. (1,500 mm.)
Braking distance	24.6 ft at 22 mph	24.6 ft at 22 mph
	(7.5 m. at 35 km/h)	(7.5 m. at 35 km/h)
Engine:		
Model	393	367
Type	2-cycle, gasoline	2-cycle, gasoline
Lubricating system	Separate lubrication (Autolube Yamaha)	Separate lubrication (Yamaha · Autolube)
Cylinder	Single, forward inclined, 5 port, reed valve	Single, forward inclined, 5 port, reed valve
Displacement	4.39 cu.in. (72 c.c.)	4.39 cu.in. (72 c.c.)
Bore and Stroke	1.850 x 1.654 ins. (47 x 42 mm.)	1.850 x 1.654 ins. (47 x 42 mm.)
Compression ratio	6.8 : 1	6.8 : 1
Starting system	Primary kick starter	Primary kick starter
Ignition system	Magneto ignition	Magneto ignition
Ignition timing	B.T.D.C. 1.8 ± 0.15 mm.	B.T.D.C. 1.8 ± 0.15 mm.
Carburetor:		
Type	Y16P-3	Y16P-3
M.J.	# 94	# 94
J.N.	049-2	049-2
A.S.	2.0 turns	2.0 turns
N.J.	2.080	2.080
C.A.	1.0	1.0
P.J.	# 34	# 34
A.J.	2.5ϕ - 3.0ϕ	2.5ϕ - 3.0ϕ
Float level	23.0 ± 2.5 mm.	23.0 ± 2.5 mm.
Air Cleaner:	Oiled foam rubber	Oiled foam rubber
Transmission:		
Clutch	Wet, multiple disc	Wet, multiple disc
Primary reduction system	Gear	Gear
Primary reduction ratio	3.578 (68/19)	3.578 (68/19)
Oil quantity:	500 ± 50 c.c.	500 ± 50 c.c.

Model	GT80B	GTMXB
Gear box.:		
Type	Constant mesh, 4-speed forward	Constant mesh, 4-speed forward
Reduction ratio 1st	3.250 (39/12)	3.250 (39/12)
Reduction ratio 2nd	2.000 (34/17)	2.000 (34/17)
Reduction ratio 3rd	1.428 (30/21)	1.428 (30/21)
Reduction ratio 4th	1.125 (27/24)	1.125 (27/24)
Secondary reduction system	Chain	Chain
Secondary reduction ratio	2.928 (41/14)	2.928 (41/14)
Chassis:		
Model	393	367
Frame	Tubular double loop	Tubualr double loop
Suspension system, ftont	Telescopic fork	Telescopic fork
Suspension system, rear	Swinging, arm	Swinging, arm
Shock absorber system, front	Coil spring, oil damper	Coil spring, oil damper
Shock absorber system, rear	Coil spring, oil damper	Coil spring, oil damper
Steering system:		
Caster	63° 30′	63 ° 30′
Trail	2.7 ins. (68 mm.)	2.7 ins. (68 mm.)
Braking system:		
Type of brake	Internal expansion	Internal expansion
Operation system, front	Right hand operation	Right hand operation
Operation system, rear	Right foot operation	Right foot operation
Tire size:		
Front	2.50-15-4PR	2.50-15-4PR
Rear	2.75-14-4PR	2.75-14-4PR
Flywheel magneto		
Model	F11-L48	F000T00173
Manufacturer	HITACHI Ltd.	MITSUBISHI
Battery:		
Model	6N4-2A-2	
Manufacturer	NIPPON Battery	
Capacity	6V 4AH	
Lighting:		
Headlight	6V, 15W/15W	
Taillight	6V, 5.3W	
Stop light	6V, 25W	
Meter light	6V, 3W	
Flasher light	6V, 17W	
High beam Indicator light	6V, 1.5W	
Tanks:		
Gasoline tank capacity	1.3 US gals. (4.8 liters)	1.3 US gals. (4.8 liters)
Oil tank capacity	0.7 qts. (0.7 liters)	0.7 qts. (0.7 liters)

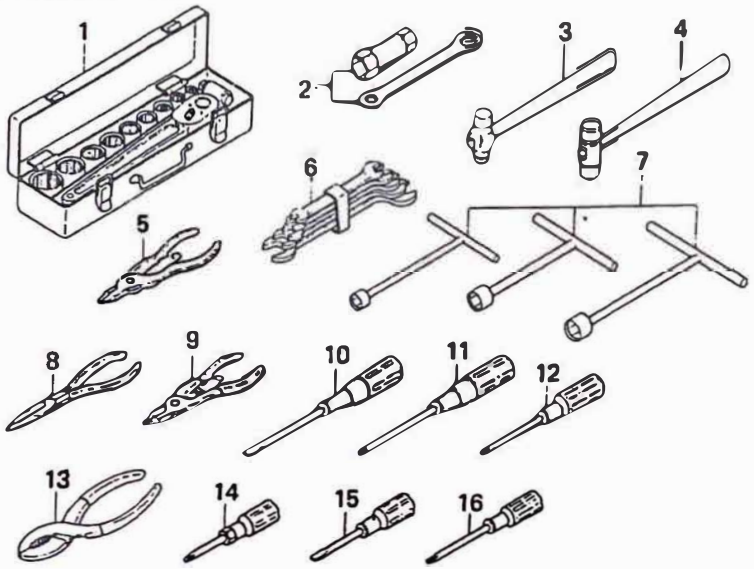
Maintenance Specifications

ENGINE TOP END	
Piston clearance	0.0014 - 0.0016 in. (0.035 - 0.040 mm.)
Piston wear limit	0.004 in. (0.1 mm.)
Ring end gap (free)	0.30 in. (7.5 mm.)
Ring end gap (installed)	0.004 - 0.006 in. (0.15 - 0.35 mm.)
Connecting rod/crank	0.016 - 0.020 in. (0.4 - 0.5 mm.)
ENGINE CLUTCH	
Friction plate thickness	0.138 in. (3.5 mm.)
Clutch spring free length	1.24 ins. (31.5 mm.)
Clutch plate warp allowance	0.002 in. (0.05 mm.)
CHASSIS	
Front brake shoe diameter	3.7 ins. (95 mm.)
Front brake shoe replacement limit	3.5 ins. (90 mm.)
Rear brake shoe diameter	4.3 ins. (110 mm.)
Rear brake shoe diameter limit	4.1 ins. (105 mm.)
Wheel run-out limit (VERTICAL)	0.08 in. (2 mm.)
Wheel run-out limit (LATERAL)	0.08 in. (2 mm.)
Front fork spring free length	16.5 ins. (418.8 mm.)
TORQUE VALUES	
Cylinder head nut	85 in-lbs. (1.0 m-kg.)
Fork tube pinch bolts	300 - 350 in-lbs. (3.5 - 4.0 m-kgs.)
Front axle nut	350 - 400 in-lbs. (4.0 - 4.5 m-kgs.)
Handle crown bolt	300 - 350 in-lbs. (3.5 - 4.0 m-kgs.)
Rear axle nut	350 - 420 in-lbs. (4.0 - 4.8 m-kgs.)
Drive sprocket nut	350 - 400 in-lbs. (4.0 - 4.5 m-kgs.)
Driven sprocket bolts	175 in-lbs. (2.0 m-kgs.)
Spark plug	235 - 250 in-lbs. (2.7 - 2.9 m-kgs.)

D. Tools and Instruments for Shop Service

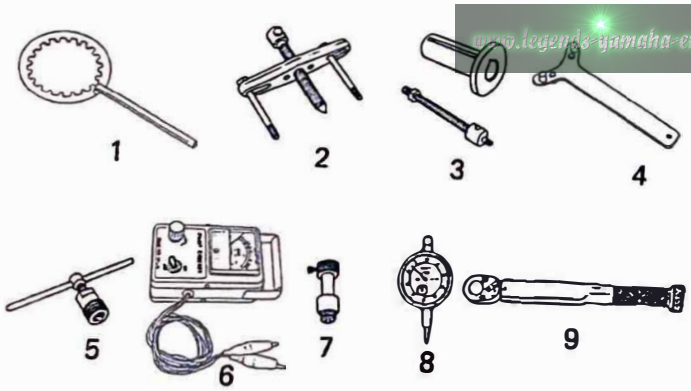
The following tools and instruments are required to service the GT80B-GTMXB.

1. General Tools



1. Socket set
2. Plug wrench 23x29 mm.
3. Steel hammer
4. Plastic tip hammer
5. Circlip pliers (ST type)
6. A set of wrenches
7. T-handle socket wrench
8. Needle nose pliers
9. Circlip pleirs (RT type)
10. Slot-head screwdriver (L)
11. Phillips-head screwdriver (L)
12. Phillips-head screwdriver (M)
13. Pliers
14. Phillips-head screwdriver (S)
15. Slot-head screwdriver (S)
16. Slot-head screwdriver (M)

2. Special Tools and Instruments



1. Clutch holding tool
2. Crankcase disassembling tool
3. Crankshaft assembling tool
4. Flywheel magneto holding tool
5. Flywheel magneto puller
6. Point checker
7. Dial gauge stand
8. Dial gauge
9. Torque wrench

In addition, an electro-tester, tachometer (engine rpm meter), hydrometer, etc. are required.

3. Other Materials

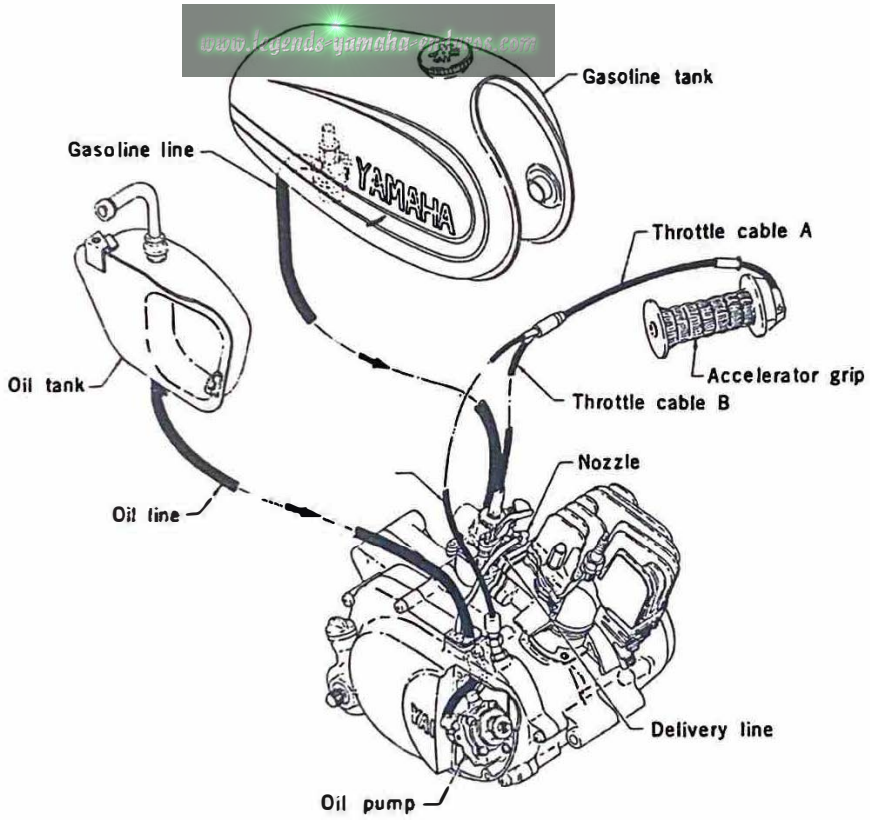
1. Gear oil
2. Autolube oil
3. Yamaha Bond (No. 4)
4. Yamaha Bond (No. 5)
5. Grease
6. Overhauling stand (Wooden box)
7. Shop rags
8. Parts tray
9. Graduate
10. Oil can
11. Oiler

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
(Separate Automatic Lubricating System)

A. What is YAMAHA Autolube ?

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



B. 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.

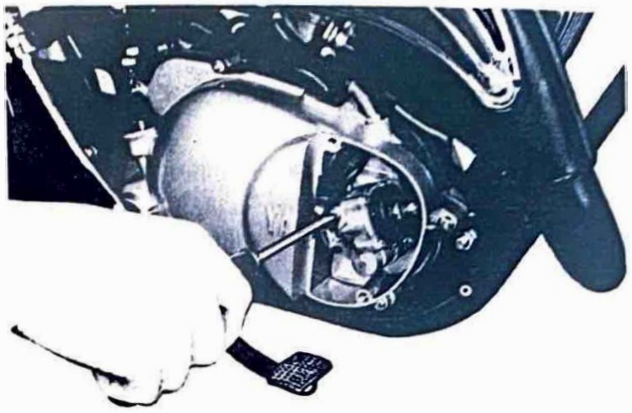
This "separate automatic lubrication" not only eliminates disadvantages in the conventional pre-mix system, but it improves the performance and efficiency of two-stroke designs by eliminating certain oil-starvation conditions which formerly existed.

1) 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.
2) The Autolube simplifies fuel supply, thus featuring:
   - Using straight gasoline directly in the gas tank.
   - Less fuel contamination.
3) The Autolube improves the reliability of lubrication, thus eliminating:
   - Special care concerning oil/fuel mixing ratio.

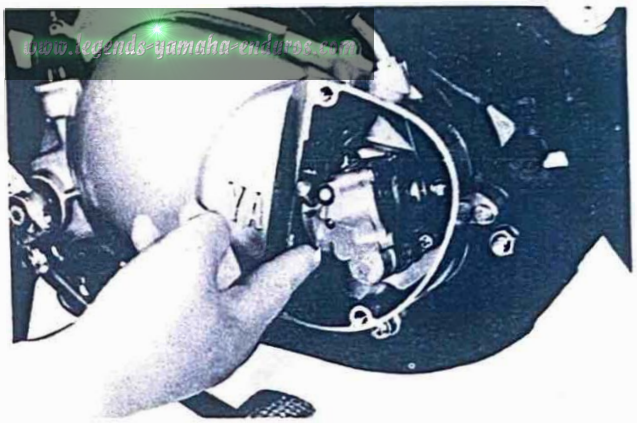
C. Autolube Pump-Inspection and Adjustment

1. Bleeding pump

1) Remove the pump cover.
2) Remove the pump bleeder bolt.

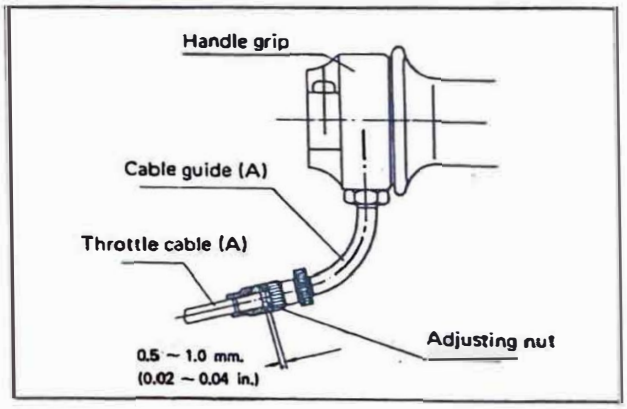


3) Feed the oil by operating the pump. The pump can be operated by turning the starter plate. (Hold the adjusting pulley with the hand so that the pump plunger stroke is maximum.) Fully open the throttle valve, and bleed the pump by turning the starter plate until no air bubbles appear in the oil.
4) Replace the pump bleeder bolt.
5) Replace the pump cover.

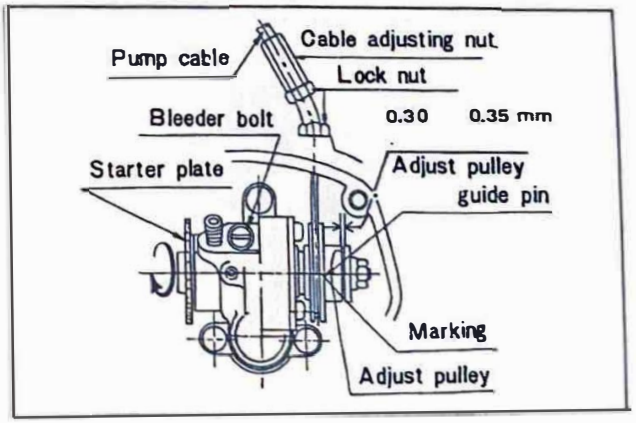


2. Carburetor and Pump Setting

1) Start and warm up the engine for a few minutes. Then adjust the engine idling speed.
   * For the idling speed adjustment, refer to "Carburetor."
2) Remove all the slack in the throttle wire.
3) By turning the adjusting nut, adjust the play of the throttle wire at the handle grip to 0.5 ~ 1.0 mm.

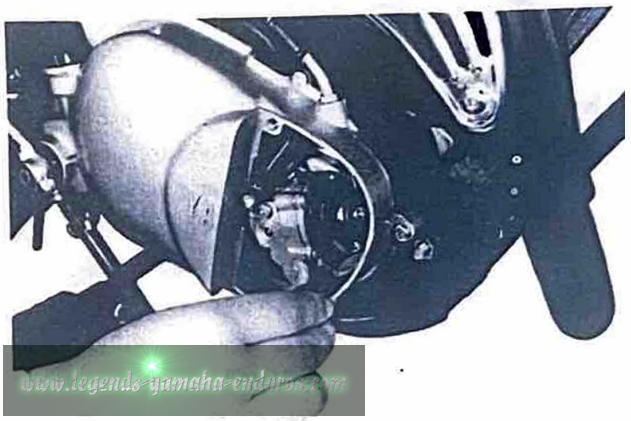


4) Next adjust the pump setting.
   Slowly open the throttle grip. When the throttle wire becomes tight, adjust the pump wire so that the mark on the adjusting pulley is aligned with the adjusting pulley guide pin.



3. Checking the Minimum Pump Stroke

1) Stop the engine.
2) Close the throttle grip.
3) Rotate the starter plate in the direction of the arrow. When the pump stroke is maximum, measure the clearance between the adjusting pulley and the adjusting plate with a feeler gauge.



Minimum stroke: 0.30 ~ 0.35 mm.

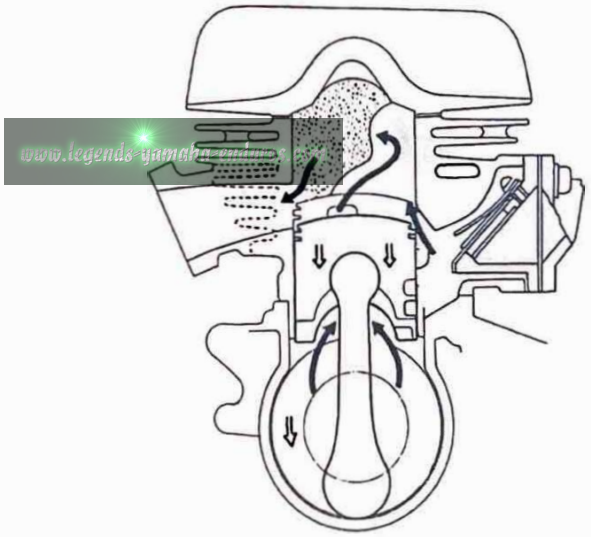
If the clearance is 0.15 mm. or less, remove the adjusting plate, and adjust the clearance by installing one or two 0.1 mm. shims.

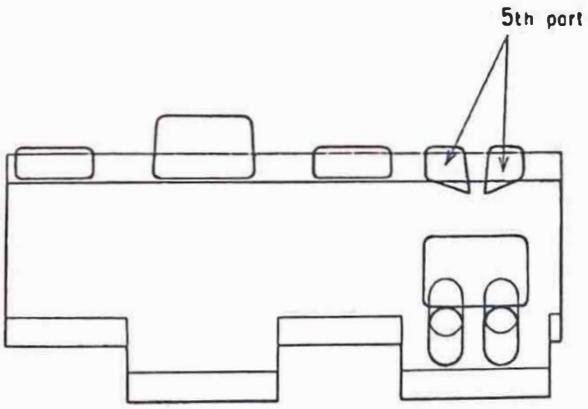
CHAPTER 3. WHAT IS THE TORQUE INDUCTION

For better performance of a two-cycle 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-cycle engine, if the inlet port timing is increased, complete closure 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 width of the transfer ports must be increased.

In order 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 previously used. However, Yamaha has invented a new torque induction (reed valve) engine to achieve the following improvements; advanced inlet port timing, elimination of any possible reverse flow of fuel-air mixture, and transfer of the mixture with full efficiency. As a result, the engine has greatly improved performance at low speeds and in addition, steady performance at any gear from low to high has been assured by improved scavenging efficiency.





A. Reed Valve-construction and Handling

1. Construction of the Reed Valve

1) Valve

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

2) Case

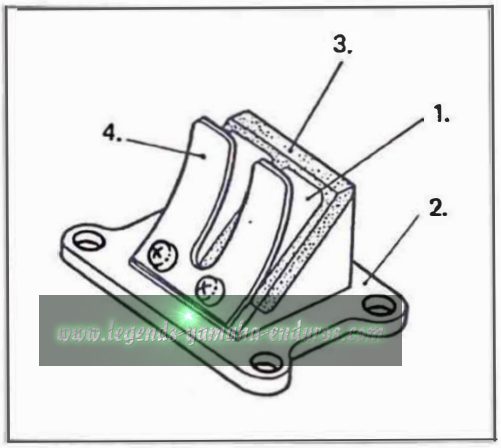
The case is made of a die-cast aluminum alloy.

3) Seat

Made of heat and oil-resisting rubber, the gasket is bonded to the case with heat.

4) Valve Stopper

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



2. Handling of the Reed Valve

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

1) 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 touching the valve.

2) 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 cm-kgs.

d. Seat

It should be checked for separation from the case. If the seat becomes loose, it may fail to achieve a good seal with the valve.

3) Valve Service

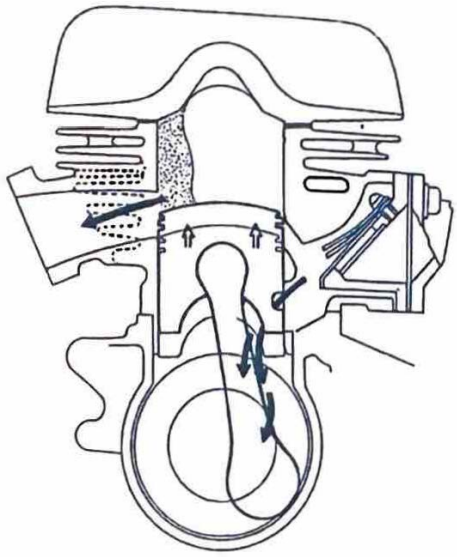
The reed valve will not function properly if any of its components are faulty. It is advisable to replace the whole assembly, instead of replacing a faulty part.

B. Action of Piston in Torque Induction

1. Piston Moves Up from B.D.C. and Closes Exhaust Port

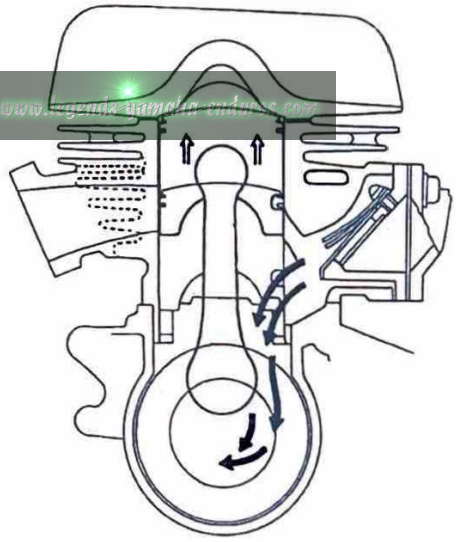
Fuel-air mixture entering cylinder through main, auxiliary transfer and 5th ports forces burned gases toward exhaust port.

As piston moves up, crankcase pressure decreases to a negative valve (vacuum). As inlet port (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 T.D.C.

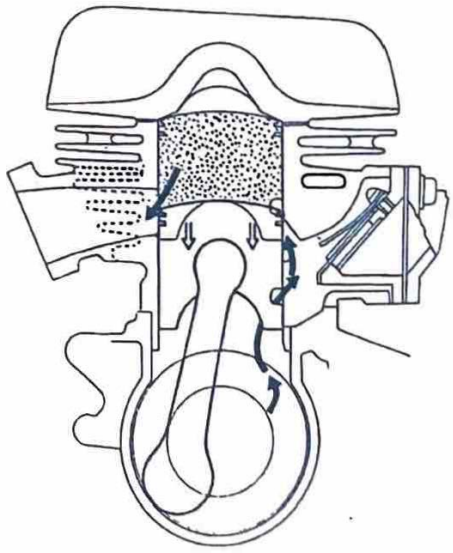
Fuel-air mixture transferred into cylinder through main, auxiliary transfer and 5th ports is compressed by piston, ignited just B.T.D.C., and burned. Piston skirt clears inlet port, fuel-air mixture streams into crankcase through piston inlet port and cylinder inlet port.



3. Piston Moves Down from T.D.C. 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 moves downward, fuel-air mixture which entered crankcase during intake stroke is compressed.

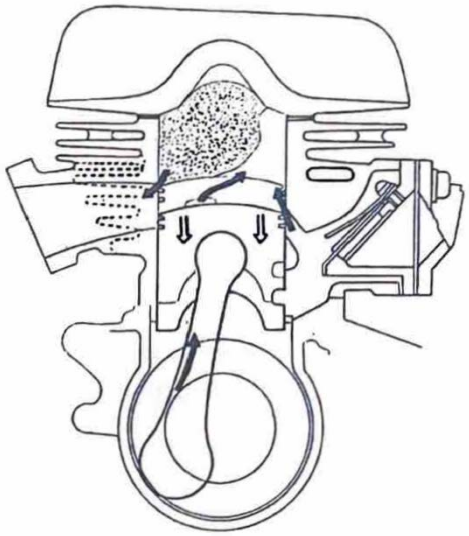


4. Piston Opens Exhaust Port and then Opens Transfer Port.

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

As piston moves downward, fuel-air mixture in crankcase begins to be compressed.

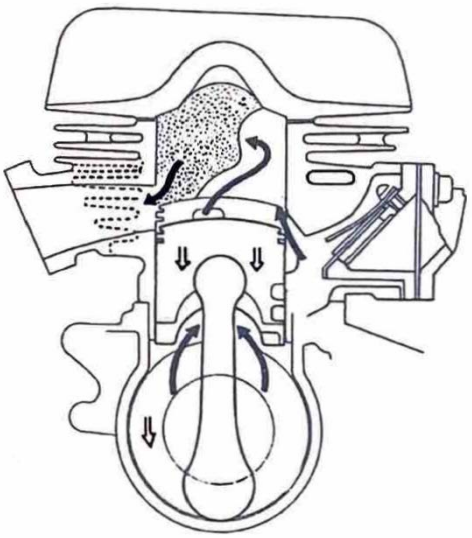
As piston moves further downward, main auxiliary transfer and 5th ports are cleared, and compressed mixture in crankcase streams into cylinder. As a result, crankcase pressure decreases.



5. Piston Opens Transfer Port and Moves Down to B.D.C.

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.

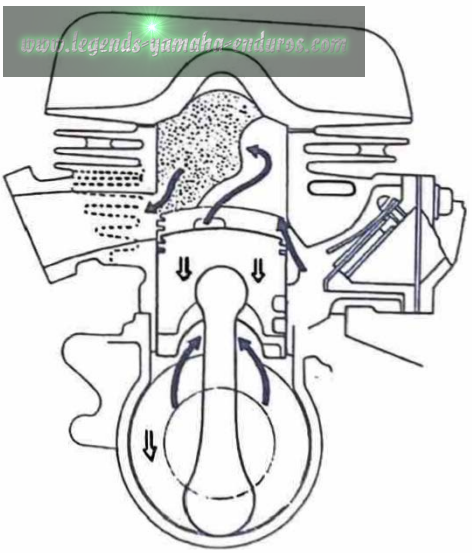
As piston moves down further, main, auxiliary transfer and 5th ports are cleared, and compressed mixture in crankcase streams into cylinder. As a result, crankcase pressure decreases.



6. Scavenging by the 5th Ports

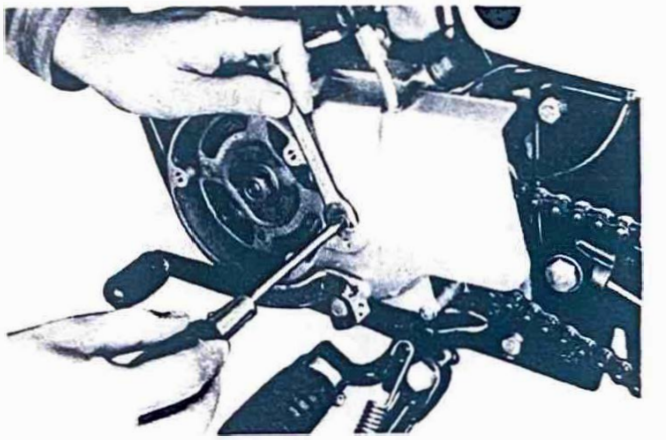
On the 5-port cylinder, the auxiliary transfer ports are positioned on the same level as the main transfer ports. As the piston lowers to the position as illustrated, the fuel-air mixture in the cylinder is compressed and is going to stream into the cylinder through the main and auxiliary transfer ports. With torque induction, 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 5th ports are cleared and the fuel-air mixture enters the cylinder. In this case, the inertia effect of the cases causes the reed valve to open, and the fuel-air mixture passing through the reed valve flows directly into the cylinder through 5th ports (the mixture does not enter the crankcase), thereby forcing the burned gases out of the cylinder. This is the scavenging action of the 5th ports.



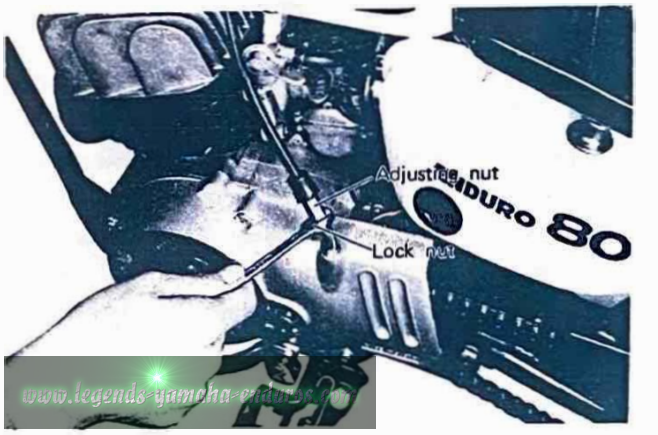
CHAPTER 4. MECHANICAL ADJUSTMENTS

A. Clutch Adjustment

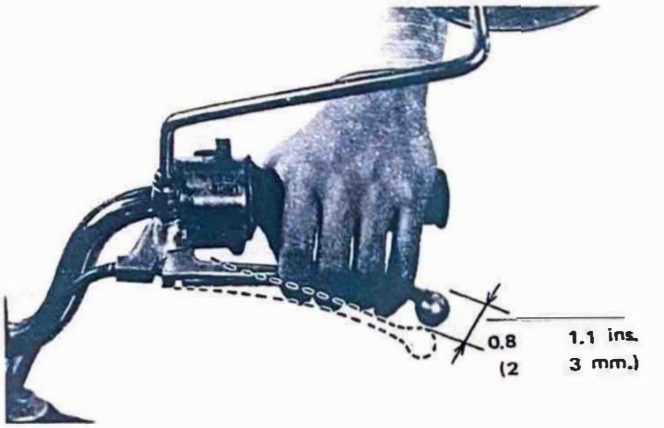


After reinstalling or replacing the clutch, if should be adjusted in the following order:

1) First, the adjusting screw position should be adjusted. Remove the generator cover from the crankcase cover (L), and loosen the adjusting screw lock nut. Screw in the adjusting screw until tight, and back out 1/4 turn, and tighten the adjusting screw lock nut.



2) Next, the clutch cable should be adjusted. Loosen the lock nut located on top of the crankcase cover (L), and adjust the play of the clutch lever to 2 to 3 mm. by turning the adjusting nut on top of the crankcase cover (L). After the adjustment, tighten the lock nut.



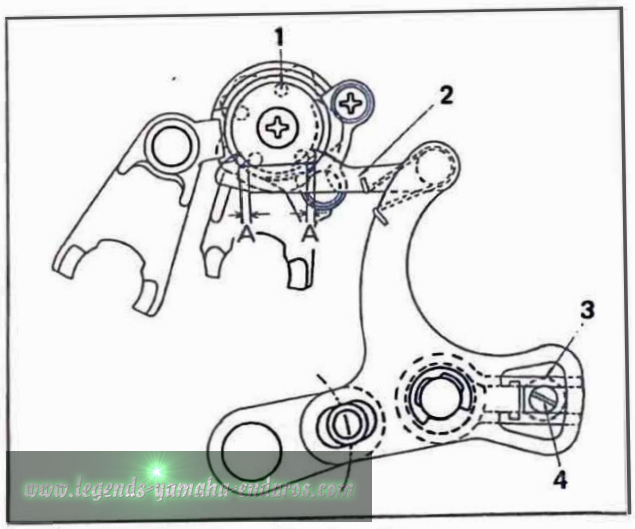
B. Shift Adjustment

Shift transmission to second gear. Check clearance between hooks of change lever and their adjacent pins. (See illustration)

If A equals A', they are considered to be in correct adjustment. If they are positioned incorrectly, gear shifting will not be smooth.

To adjust:

1) Loosen lock nut.
2) Turn the adjusting screw until A equals A'.

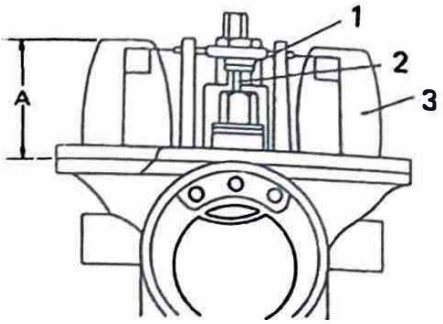


1. Shift cam pin
2. Change arm
3. Return spring
4. Adjusting bolt

C. Carburetor Adjustment

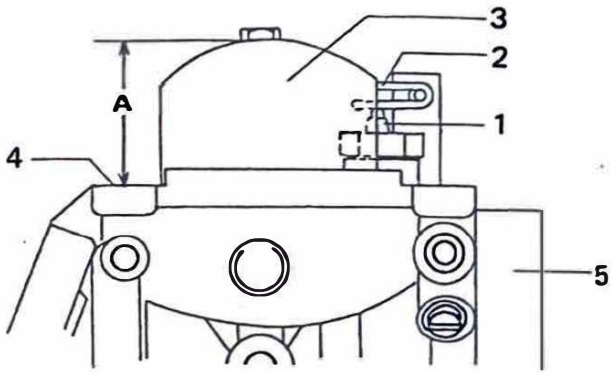
1. Adjusting the Fuel Level

The fuel level of the carburetor is strictly checked out before delivery of the machine, but it may fluctuate because of a worn needle valve or a deformed float arm. If the fuel level rises above the specified level, the air-fuel mixture becomes too rich. If the fuel level is below the specified level, the mixture becomes lean.
Any incorrect fuel level should be adjusted in the following manner.



1. Float holding plate
2. Needle head
3. Float

1) Remove the float chamber body, and invert the mixing chamber body. Slowly push the float downward with your finger until the float contacts the top of the float needle. Do not push hard enough to compress the valve spring.
2) Then measure height "A" (From the top of the float to the float chamber gasket seat.)
3) If A measures more or less than the standard value, bend the tang a little so that a correct measurement is obtained.



1. Needle head
2. Float holding plate
3. Float
4. Float chamber gasket seat.
5. Mixing chamber

2. Adjusting the Idle Speed

1) Back out the throttle stop screw so that the engine runs at the lowest possible speed.
2) Turn the air screw in until it lightly seats, then back out to the specified turns.

SPECIFIED TURNS OUT:	2.0

3) Repeat above steps (1,2) two or three times for getting best engine idling speed.
4) Finally, turn the throttle stop screw in or out until the engine idles at the specified speed.

SPECIFIED ENGINE SPEED: 1,300 r.p.m.

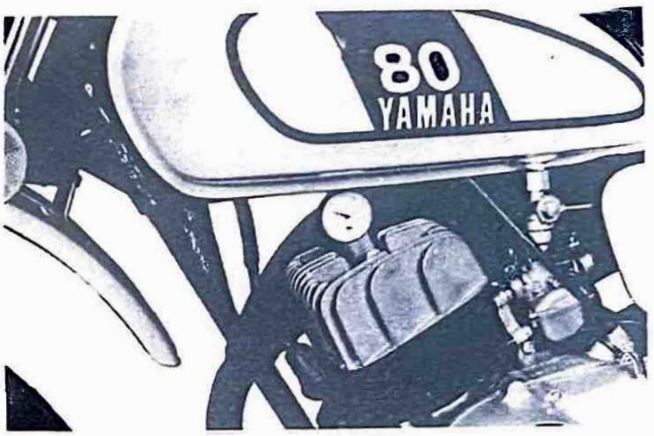
Note:

It is advisable to use an electrical tachometer for checking the engine speed.

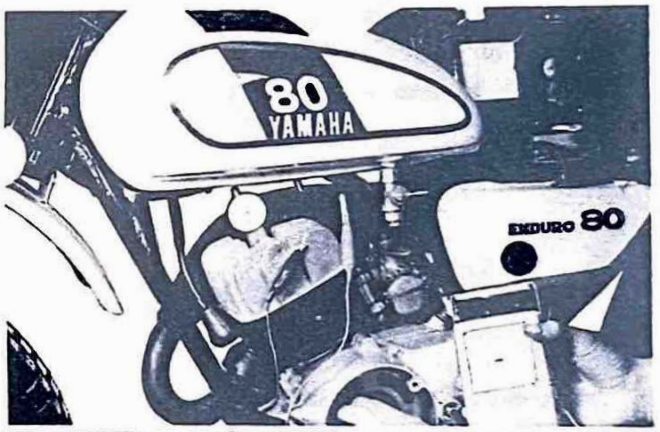
D. Ignition Timing Adjustment

Ignition timing must be set with a dial indicator (to determine piston position) and a low-range ohm-meter (to determine exactly when contact breaker points begin to open). Proceed as follows:

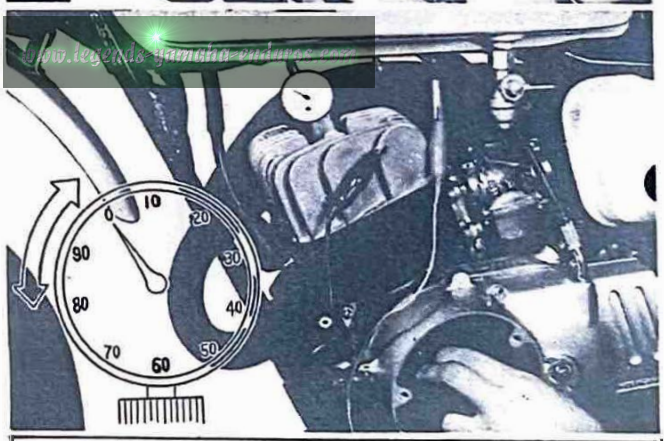
1) Remove spark plug and screw "Dial Gauge Stand" into spark plug hole.
2) Insert "Dial Gauge Assembly" into spark plug stand.
3) Remove left crankcase cover to gain access to contact breaker assembly (ignition points).



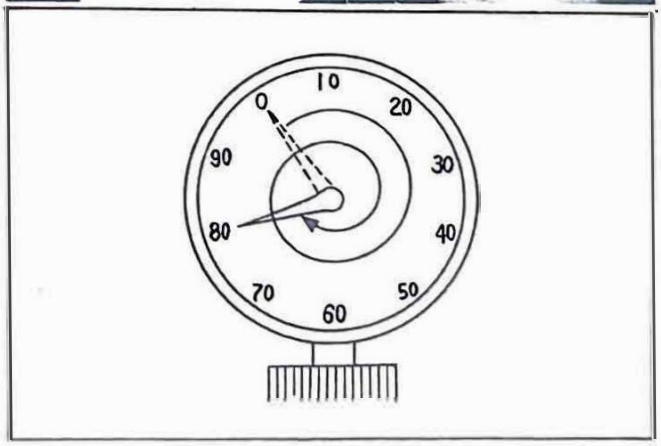
4) Connect red lead wire of point checker to black wire in wire harness coming from magneto.
5) Connect black lead wire of "Point Checker" (or Ohm-Meter) to unpainted surface of cylinder fin or crankcase bolt or screw.



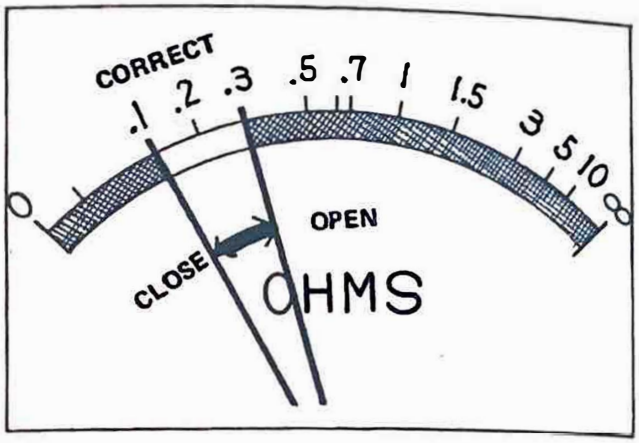
6) Rotate magneto flywheel until piston is at top-dead-center (T.D.C.). Tighten set screw on dial gauge stand to secure dial gauge assembly. Set the zero on dial indicator face to line up exactly with dial indicator needle.
   Rotate flywheel back and forth to be sure that indicator needle does not go past zero.



7) Starting at T.D.C. rotate flywheel clockwise until dial indicator reads approximately 0.07 in. (1.8 mm.) before top-dead-center (B.T.D.C.).

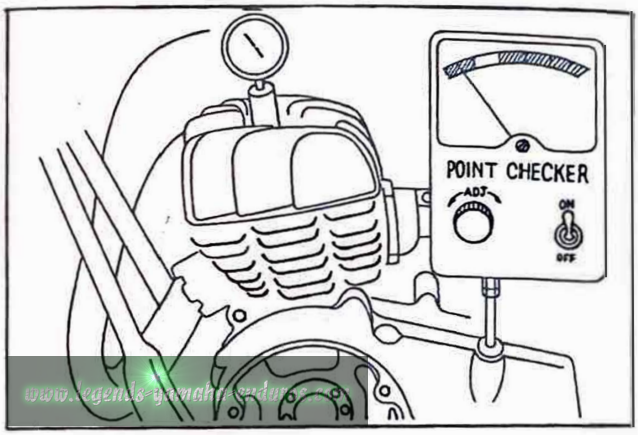


8) With the point checker being connected, reverse the flywheel and stop it in the specified position before T.D.C. If the point checker pointer swings the moment that the dial gauge pointer indicates the specified position before B.T.D.C., the ignition timing is considered to be correct.

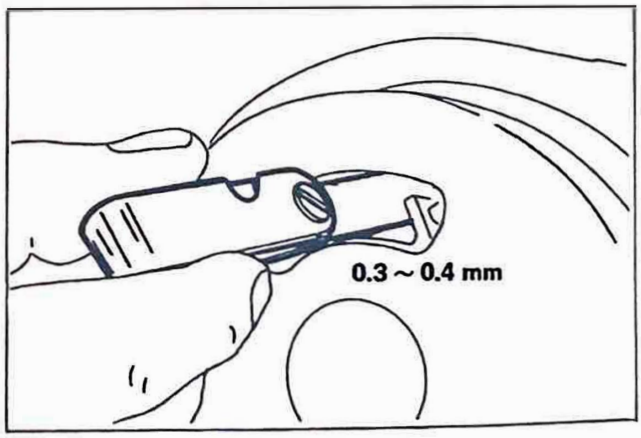


Note:

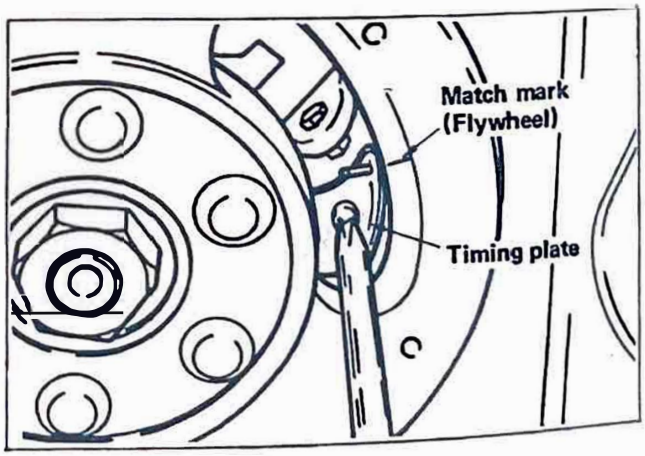
If the point checker is placed as closely to the dial gauge as possible, the above operation will become easier. If no point checker is available, a meter lamp can be used in place of it.



9) Check the contact breaker point gap (0.3~0.4 mm). If it is incorrect, recheck ignition timing inspect point condition and, if necessary, replace points.

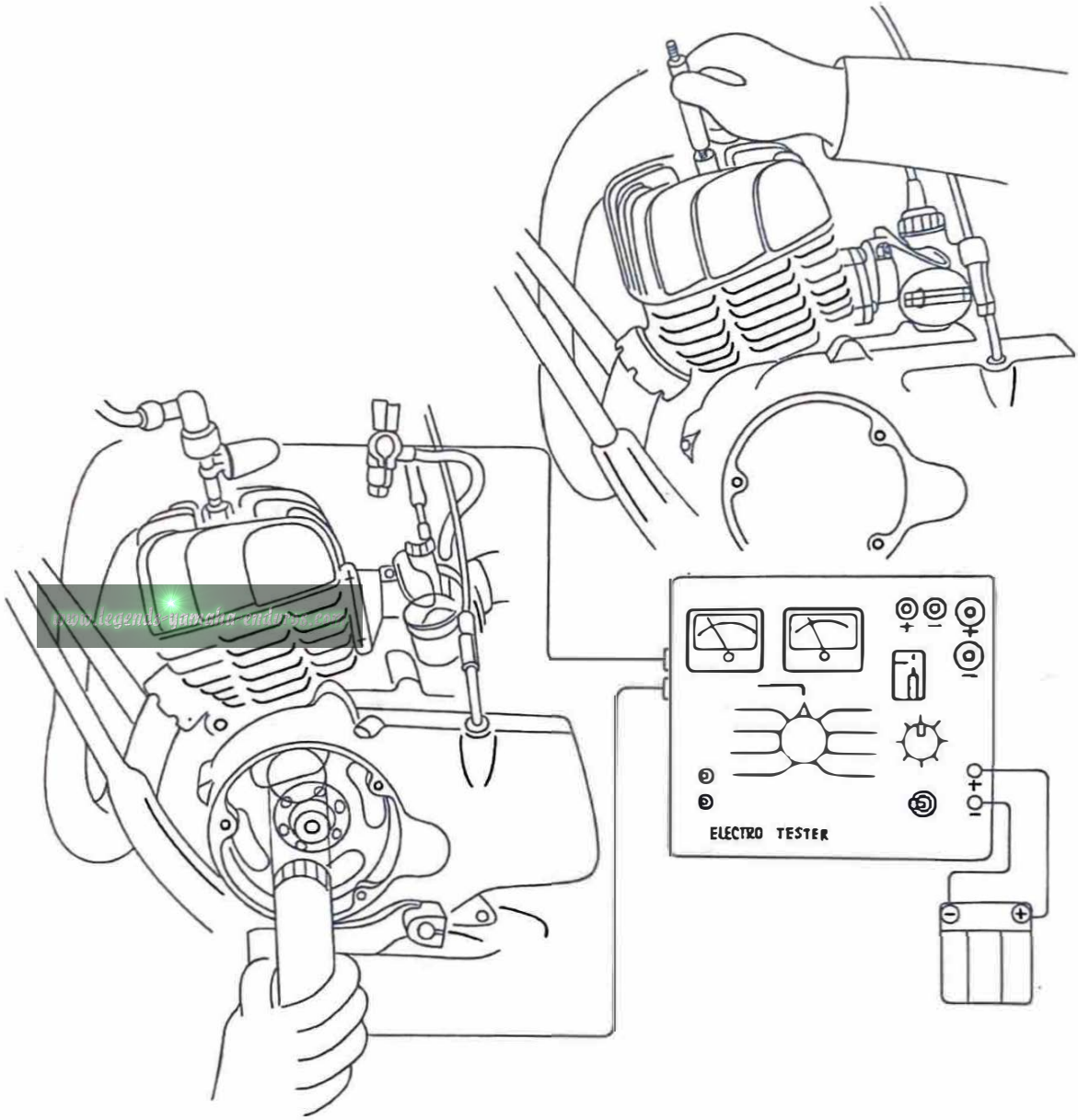


10) After the adjustment, align the timing plate mark with the flywheel match mark so that the following check can be performed.



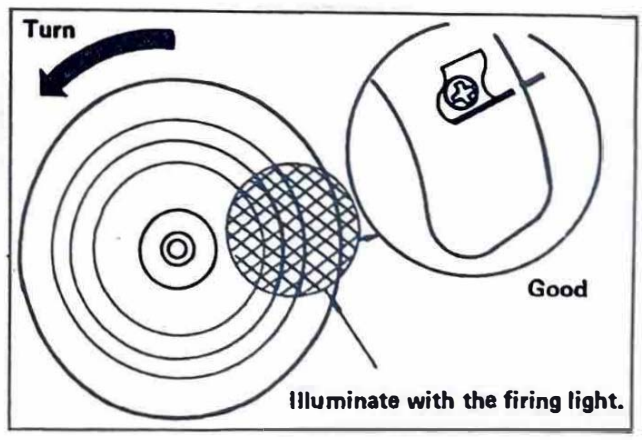
11) Checking the ignition timing

Upon completion of the ignition timing adjustment, connect a timing light as shown below, and check the ignition timing. This method can be used to ascertain whether the ignition timing is correct or not before adjusting the ignition timing.



Start the engine, and illuminate the match marks with the timing light for checking.

If the ignition is timed to the moment that the flywheel match mark becomes aligned with the timing plate mark, the adjustment is correct. If not, readjustment is required.



Note:

If doubt exists as to the accurate placement of the match marks, check timing with dial gauge and point checker.

CHAPTER 5. ENGINE REMOVAL AND OVERHAULING

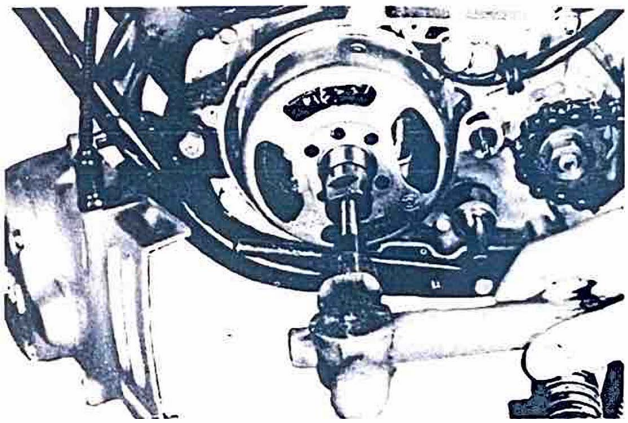
A. Engine Removal

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

QUANTITY: 500 ± 50 c.c. (0.53 - 0.58 US qts.) (SAE 10W/30)

2) Remove the muffler.
Remove the exhaust pipe with exhaust pipe ring nut wrench and 13 mm. open end wrench.

3) Remove the change pedal and left hand crankcase cover, then remove the magneto flywheel using the flywheel puller. If tight, tap the head of the puller with a hammer slightly. Remove the magneto base.



4) Remove the woodruff key.

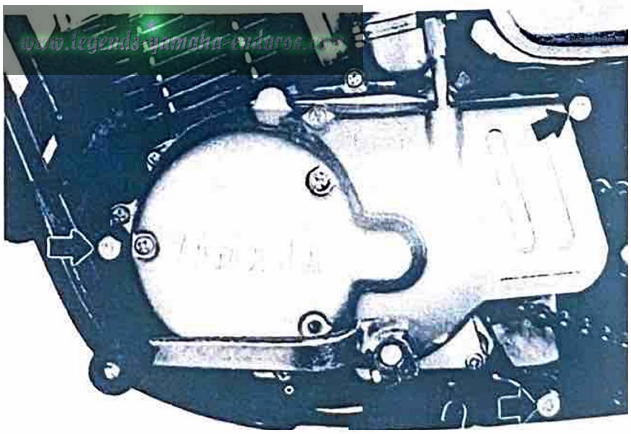
5) Disconnect the master link and remove the chain.

6) Remove the oil pump cover and pump cable.

7) Loosen the carburetor joint band, then disconnect the oil line and fuel line.

8) Remove the carburetor mixing chamber top and fuel tank.

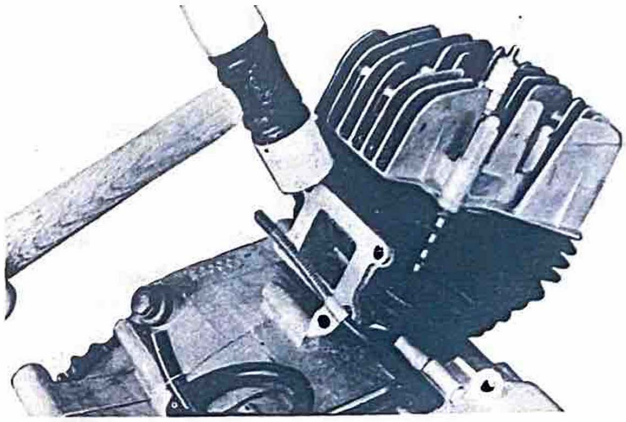
9) Remove the engine from the frame. Engine is mounted with three bolts.



B. Overhauling

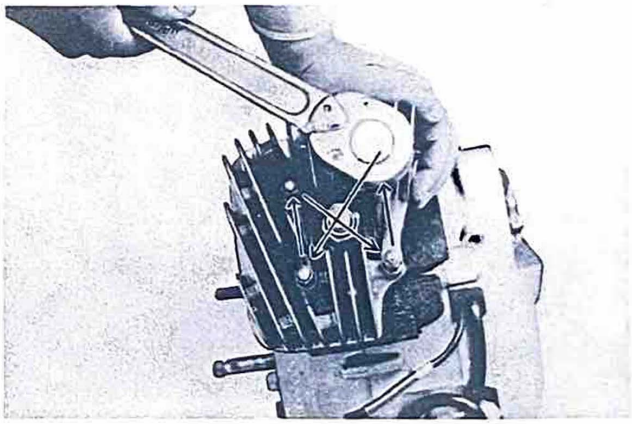
1. Reed Valve

Remove the carburetor, oil delivery line and reed valve assembly. If it is difficult to remove the reed valve, tap its body with a rubber hammer.



2. Cylinder and Cylinder head

a. Remove four special nuts from cylinder head, then remove cylinder head and cylinder head gasket.



Note:

The special nuts should be loosened in a crisscross pattern and in progressive stages.

b. Remove the cylinder by striking it lightly with a plastic hammer. Stuff a clean shop rag into crankcase cavity to prevent dirt and other foreign particles from entering.

3. Removing the Piston Pin and Piston

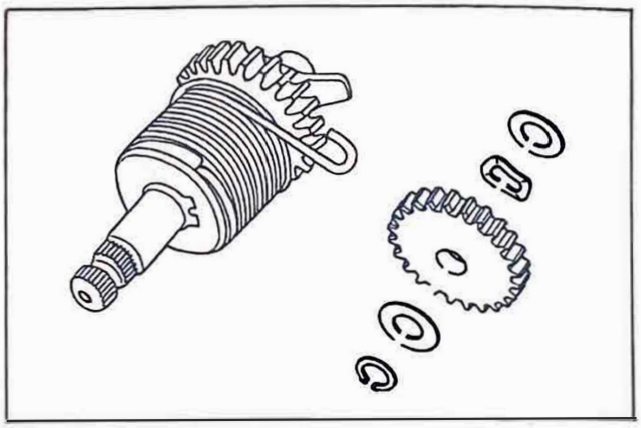
Remove the clip from one side of the piston with needle nose pliers, and press out the piston pin by hand or with a slot head screw driver.

4. Crankcase Cover (R.H.)

Remove the kick crank and crankcase cover. (The cover can be removed without taking off the oil pump.) If it is difficult to remove, tap the corner of the cover with a soft hammer.

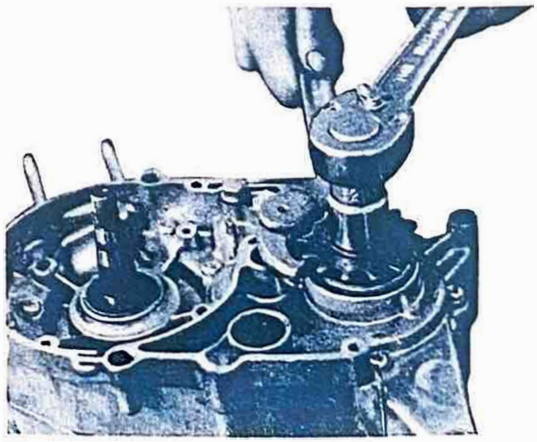
5. Removing the Clutch
   a. Remove the four clutch holding screws then take out the pressure plate and push rod.
   b. Straighten the lock washer with a chisel and install the clutch holding tool on the clutch boss.
   c. Loosen the primary drive gear and clutch lock nuts and then remove the clutch boss, thrust plates, primary driven gear, spacer, primary drive gear and spacer.

6. Kick Starter
   Remove the kick axle assembly, kick idle gear, thrust washers, wave washer and circlip.



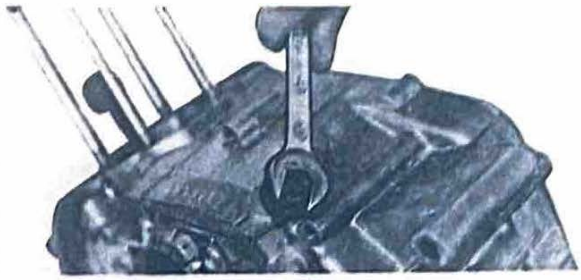
7. Remove the Change Shaft
   a. Remove the circlip and washer from the change shaft (left side crankcase).
   b. Turn the engine over, right side up, and pull out the change shaft assembly.

8. Drive Sprocket Removal
   a. Straighten the bent edge of the lock washer with a chisel, then hold the drive sprocket with the flywheel magneto holding tool and remove the sprocket.

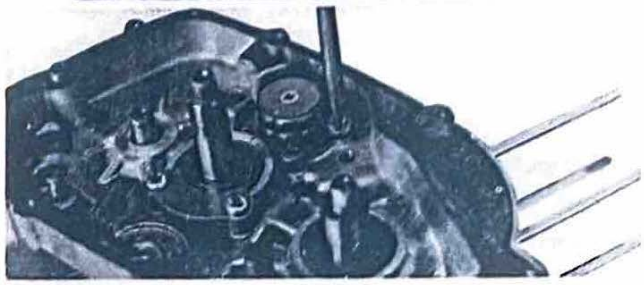


9. Crankcase Separating

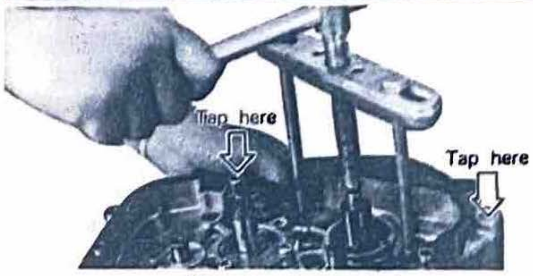
a. Remove the shift cam stopper, stopper spring and spring screw.



b. Remove the stopper plate.



c. Remove all crankcase holding bolts then install the crankcase separating tool on the right crankcase.

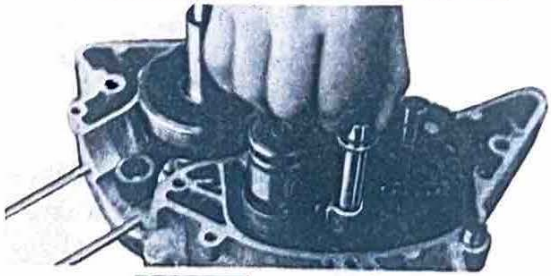


Note:

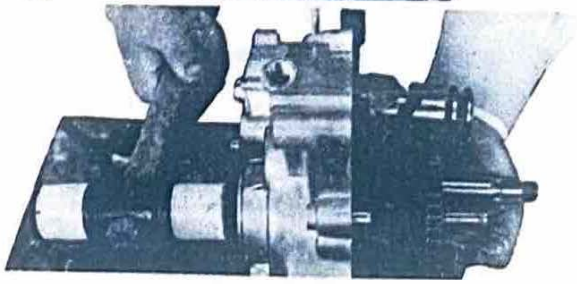
Separate the crankcase while alternately tapping the main axle and the crankcase with a rubber hammer. Fully tighten the bolts of the crankcase separating tool, keeping the tool in the horizontal position.

10. Transmission Removal

a. Pull out the shift fork guide bar and shift fork.

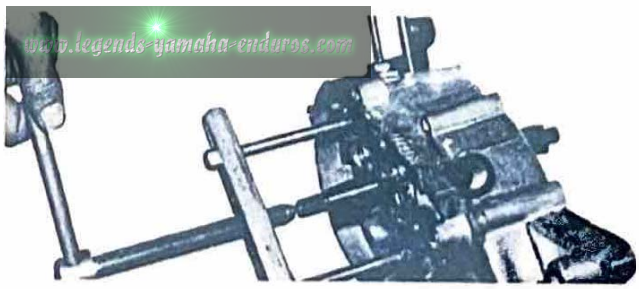


b. Remove both transmission assembly, shift cam assembly and the shift fork as an assembly from the crankcase, while tapping the drive shaft end with a soft hammer.



11. Removing the crankshaft

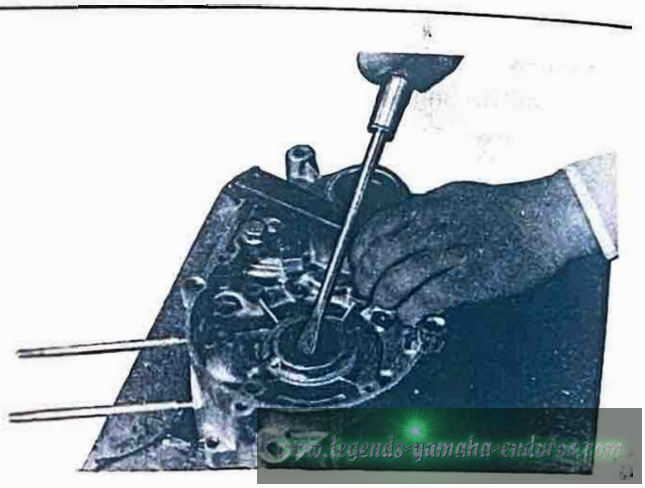
Removing the crankshaft assembly with the crankcase separating tool.



Note:

Fully tighten the bolts of the crankcase separating tool, and keep the tool parallel with the crankcase surface.

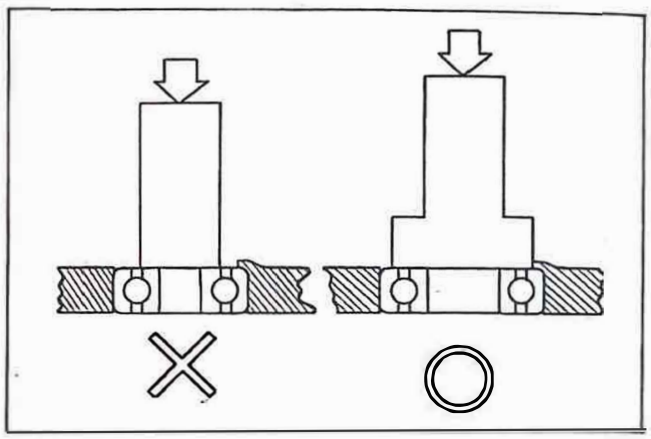
12. Remove the Oil Seals and Bearings.
    a. Pry the oil seals out with a slot head screw driver. Always replace all oil seals when overhauling engine.



Note:

Place a piece of wood under the screw driver to prevent damage to case.

b. Drive out the bearings with a bearing tool or large socket. An iron cylinder of 5 mm. in thickness can be used for the bearing tool after it is cut to a length of approximately 15 cm. For this purpose, be sure to use a cylinder whose outer diameter is more than the diameter of the inner bearing race but not more than that of the outer race. See the illustration.
The bearing must be driven in and out perpendicular to the case. If it is driven in with a slot head screw driver or the like, the axes of the bearing and crankshaft will not be parallel with each other, thereby causing the bearing to wear earlier and make noise.



Note:

Bearings are most easily removed or installed if the cases are first heated to approximately 200 ~ 250°F. However, cold removal and installation may be done satisfactory.
Install bearings and oil seals with their stamped numerals facing outwards. (In other words, the stamped letters must be on the exposed view side.)
When installing bearings or seals, apply a light coating of light-weight lithium base grease to balls and seal lips.

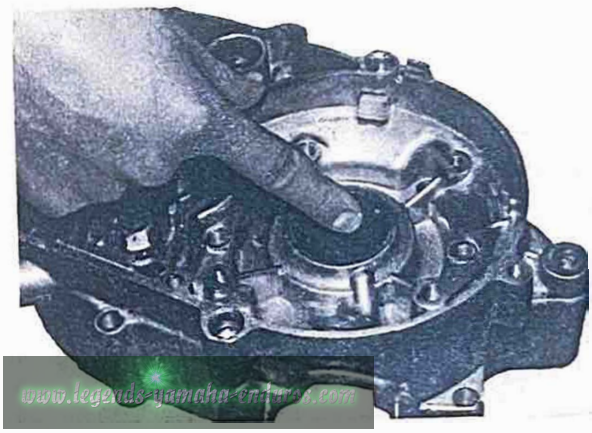
CHAPTER 6. ENGINE ASSEMBLING AND MOUNTING

The assembly procedure is described in the order that the mechanic should follow, and the correct service tools should be used in the correct manner. Failure to do this may result in poor performance and danger to the rider.
To assemble the machine correctly, proper special tools, supplies and working space are required. (See page 9.)

A. Crankcase

1. Next items should be done before assembling.
   a. All parts should be cleaned with solvent.
   b. If necessary, replace the crank bearings, crank oil seals, transmission oil seals.

   Note: Replace all seals regardless of condition.



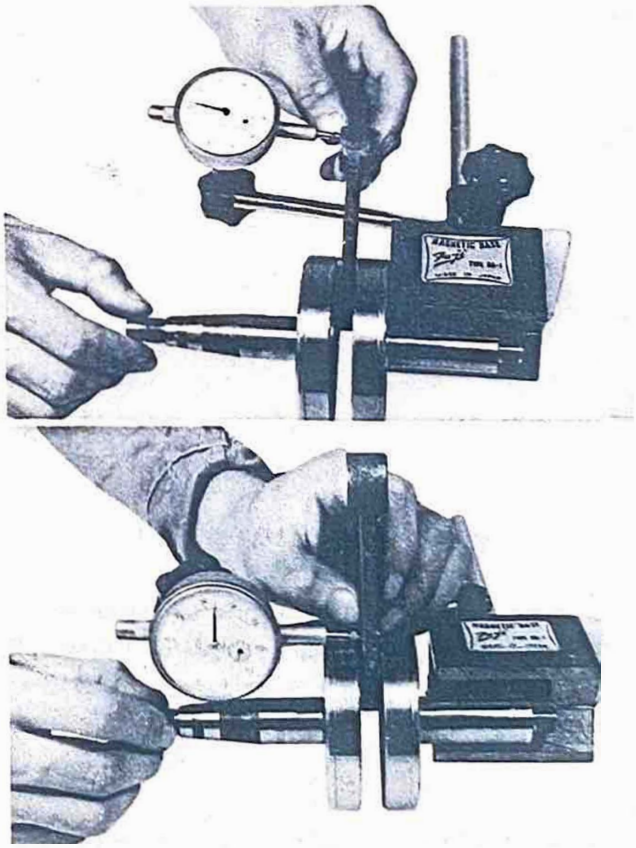
B. Crankshaft

Because the crankshaft operates at extremely high speed, it is more susceptible to wear, and therefore, it must be serviced with special care.

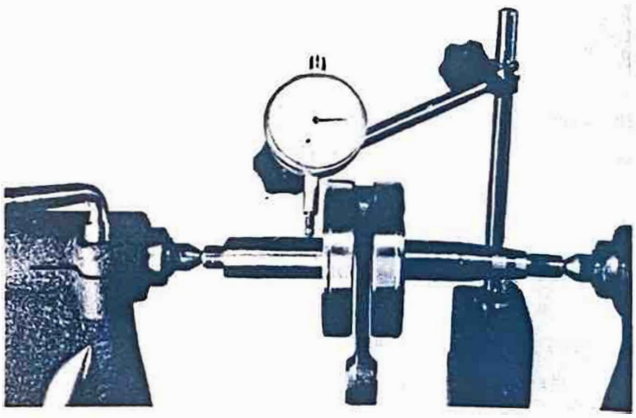
1. Inspection and servicing
   a. Checking the crankshaft components.
      Check connecting rod axial play at small end. (To determine the amount of wear of crank pin and bearing at large end.)
      If small end play exceed 0.078 in. (2.0 mm.), disassemble the crank shaft, check connecting rod, crank pin and large end bearing. Replace defective parts. Small end play after reassembling should be within 0.031 - 0.04 in. (0.8 - 1.0 mm.)

   b. Check the connecting rod side clearance at large end with dial gauge.

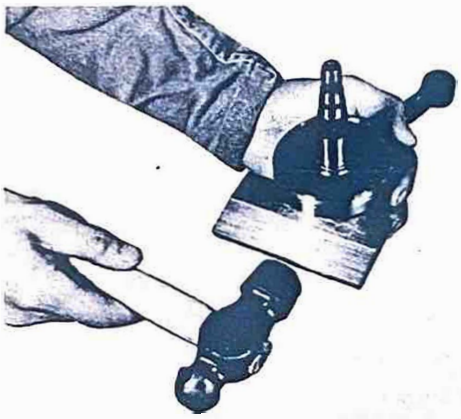
SIDE CLEARANCE:	0.016 ~ 0.020 in. (0.4 ~ 0.5 mm.)

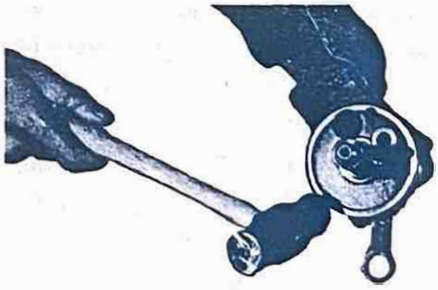


If excessive side play is prevent, disassemble the crankshaft and replace any worn parts.
Check the crankshaft assembly runout.

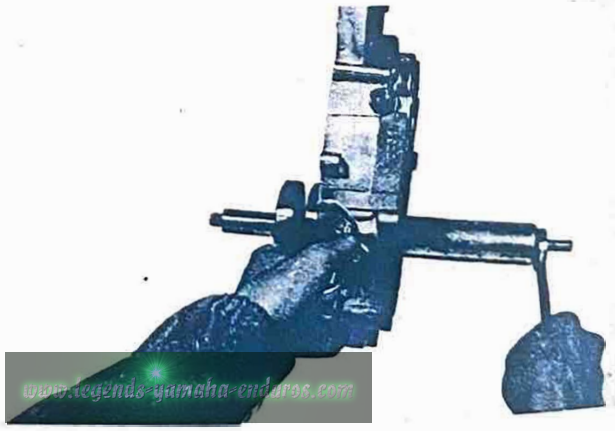


Correct any misalignment by tapping the flywheel with a brass hammer or by using the wedge.
Within 0.0012 in. (0.03 mm.)

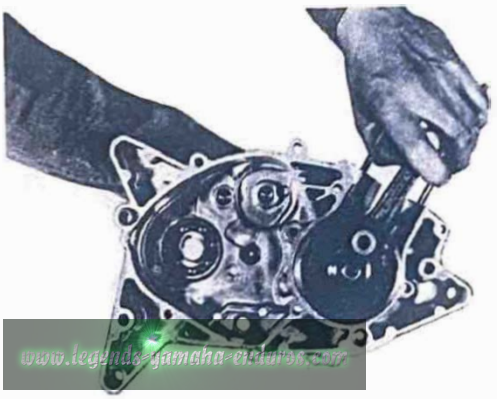




c. Install the crankshaft assembly by using the crankshaft setting tool.
   1) To keep the crankcase steady, hold the engine mount bracket (rear of the case) in a vice with pieces of wood on each side to prevent damage to the case.

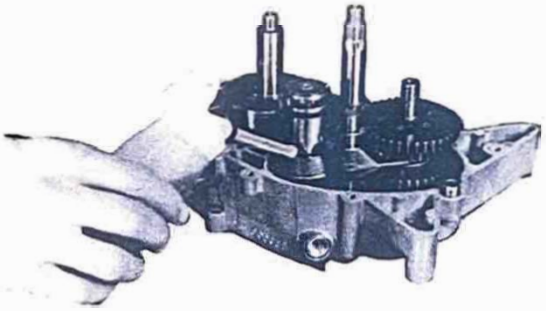


2) Assemble the installing tool correctly on the crankshaft end, while keeping the connecting rod at T.D.C. with one hand, turn the nut with a spanner. While the nut is being turned, the crank tends to turn in the same direction, so the connecting rod must be held at the top dead center. For this step the crankshaft should be covered with a thin coat of engine oil.

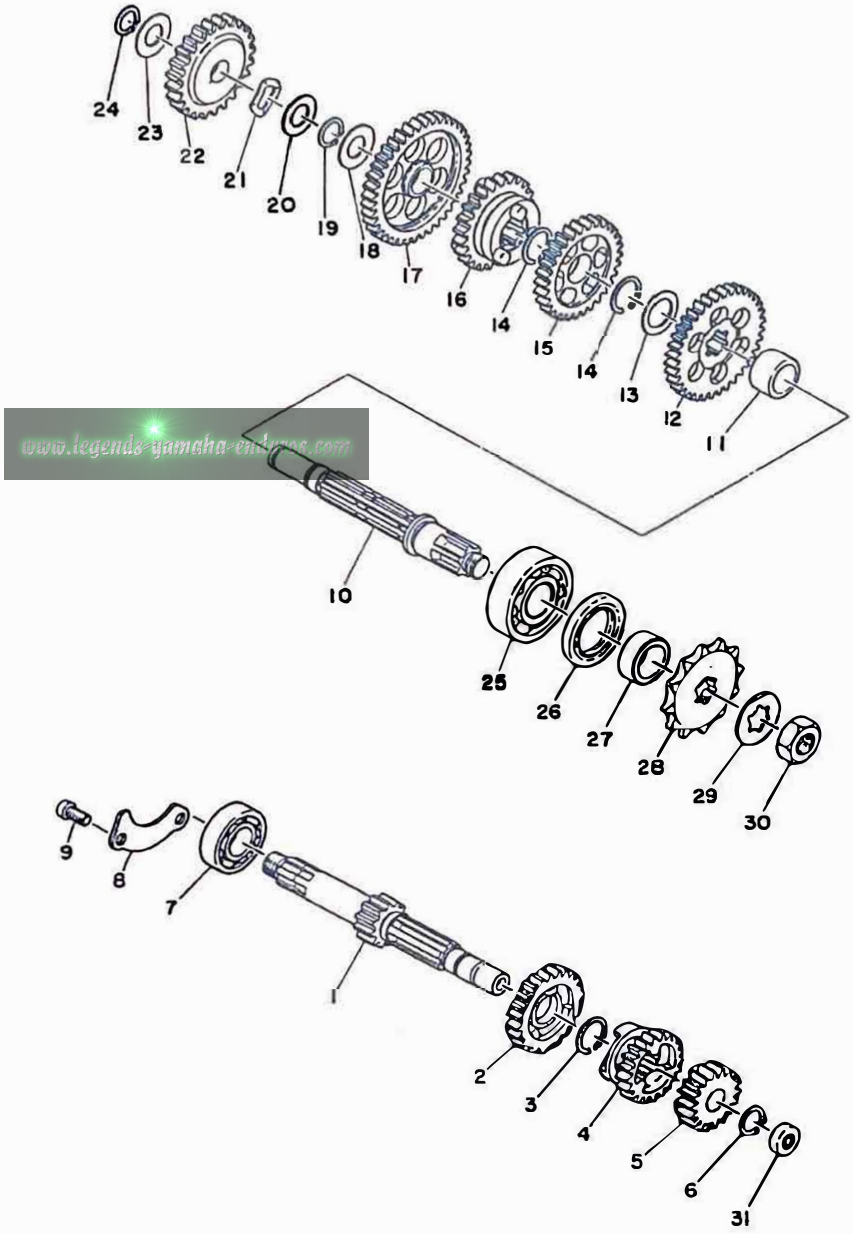


Note:

1. The installing tool must be at right angles with the crankcase and centered on the crank to prevent cocking of the crank bearings.
2. After installating, make sure that the crankshaft turns smoothly.
3. Supply oil to the gears, shift fork, shift cam and big end bearing.

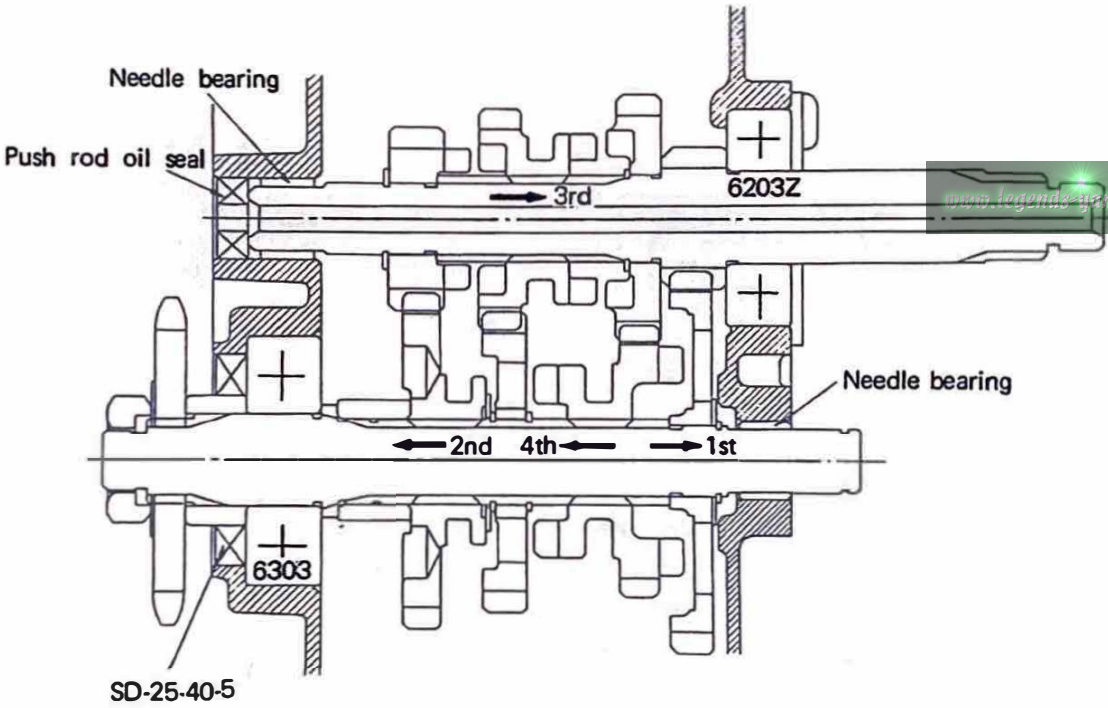


C. Transmission Assembly



1. Main axle
2. 4th pinion gear
3. Clip
4. 3rd pinion gear
5. 2nd pinion gear
6. Circlip
7. Bearing (6203Z)
8. Bearing cover plate
8. Pan head screw
10. Drive axle
11. Collar
12. 2nd wheel gear
13. Drive axle shim
14. Clip
15. 3rd wheel gear
16. 4th wheel gear
17. 1st wheel gear
18. Shim
19. Circlip
20. Thrust washer
21. Wave washer
22. Kick idler gear
23. Change shaft washer
24. Circlip
25. Bearing (6303)
26. Oil seal (SD-25-40-5)
27. Distance collar
28. Sprocket wheel
29. Lock washer
30. Lock nut
31. Push rod oil seal

Primary Reduction Ratio . . . . . 68/19 = 3.578		
Secondary Reduction Ratio . . . . . 41/14 = 2.928		
	Transmission Gear Reduction Ratio	Total Reduction Ratio
1st	39/12 = 3.250	34.064
2nd	34/17 = 2.000	20.962
3rd	30/21 = 1.429	14.973
4th	27/24 = 1.125	11.791

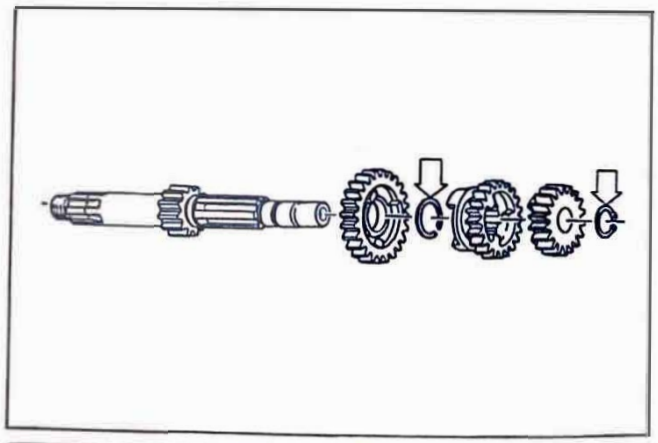


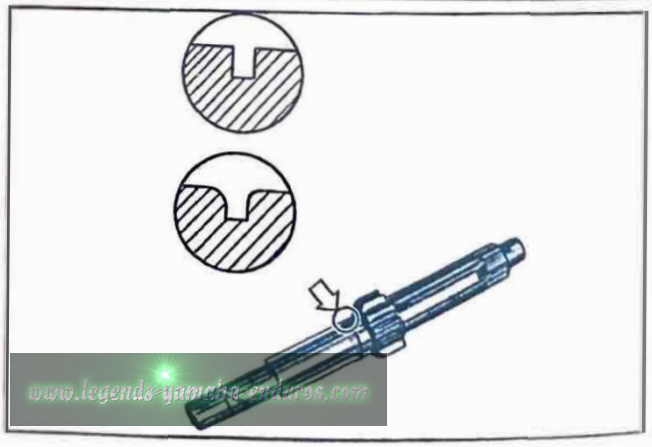
For layout of the transmission and related parts, refer to illustration. The primary reduction ratios will be 68/19 = 3.578. Therefore the total reduction ratios will be; Primary reduction ratio x Transmission gear reduction ratio x Secondary reduction ratio = Total reduction ratio.

1. Inspection and Service

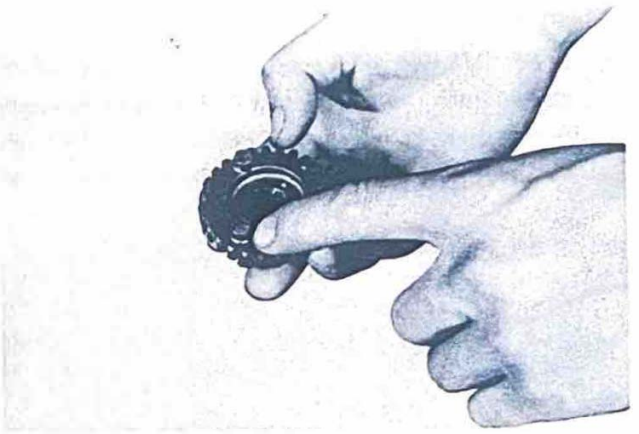
Pinion gears wheel gears and axles

1) Four pinion gears can be taken apart with the removal of the main axle circlip. The 2nd and 4th pinions are idle gears. Check these gears for flaws made by seizure on the surfaces contacting the axle and also for axial looseness. Replace ones that are found to be badly affected. See illustration.

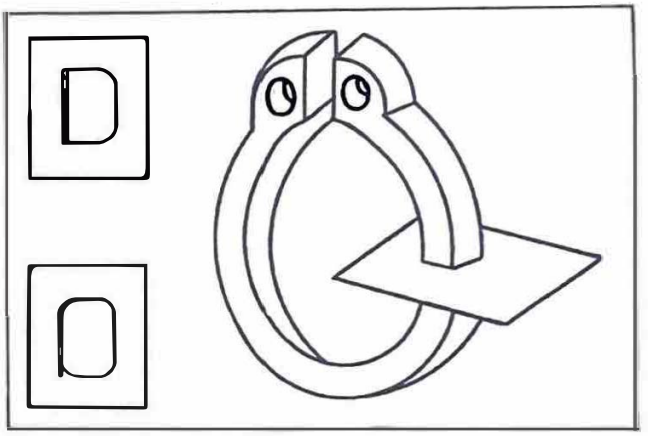




2) Check the dog clutch of each gear for wear (especially in the corner; whether it has ended up with arounded corner) and for any damage.



3) Check the circlip corner to be fitted in the shaft groove for any wear. See the illustration.



4) While fitting the gears, check each axle groove for the circlip for a crushed corner with the consequent burrs preventing the sliding gears from working properly.

Slightly damaged groove: Use a #600 sand for correction.

Badly damaged groove: Replace the axle.

5) The wheel gears can be removed one by one with removal of the three circlips on the drive axle. Check respectively according to items 1 through 4.

6) Check the two thrust washers on the drive axle for wear. 2nd wheel gear holding washer:

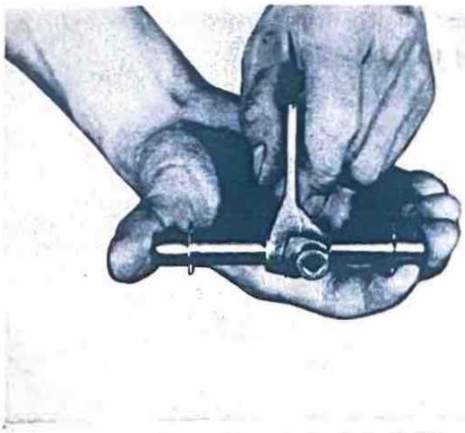
t = 0.3, 0.5, 0.7, 0.9 respectively
Inner dia. = 17ϕ
Outer dia. = 25 ϕ

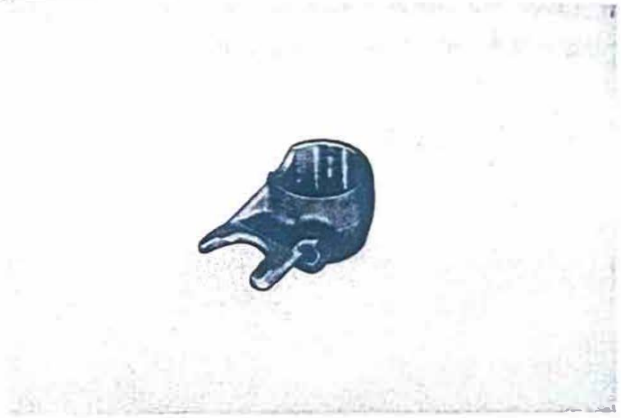
Note:

Clearance of the 2nd wheel gear should be 0.1 to 0.2 mm. in the thrust direction. See the illustration.

b. Shift Fork

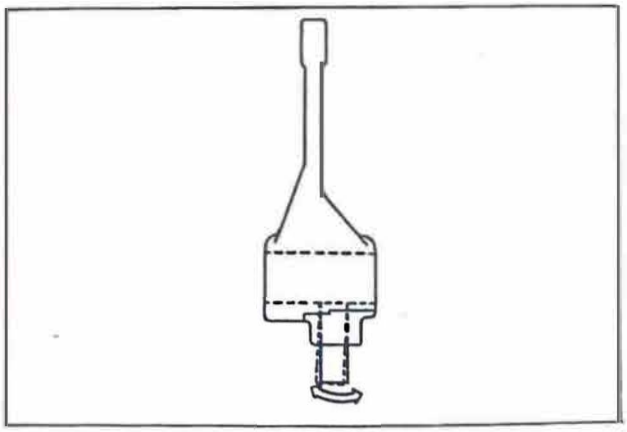
1) Check shift fork ends for any wear, deformation and discoloration. Replace any shift fork that is discolored from seizure because it is probably bent or twist and can cause faulty gear shifting or jumping out of gear.





2) Cam Follower Pin

Another cause of jumping out of gear is excessive clearance between the cam follower pin and the shift fork. In this case, replace both the shift fork and cam follower pin.

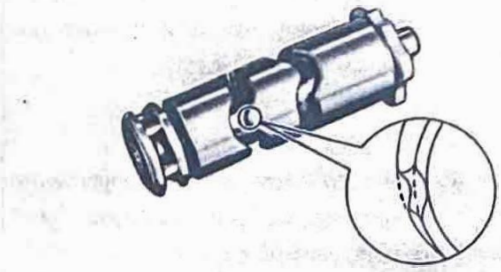


Insert the pin fully into the shift fork and check freeplay at the end of the pin.

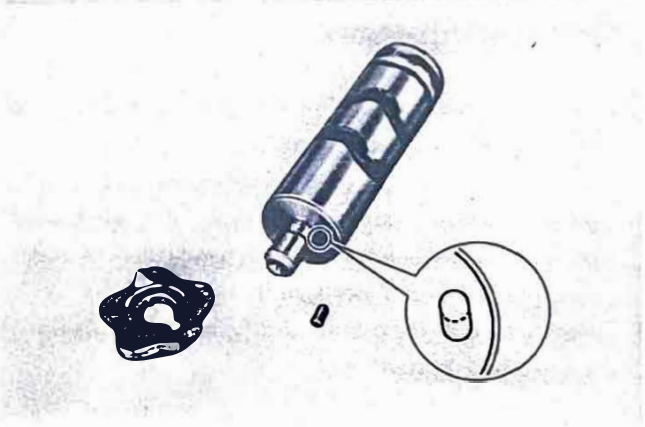
If it measures more than 0.04 in. (1.0 mm.), replace the pin or shift fork.

c. Shift Cam

1) Check the shift cam groove. If it is found to be worn or damaged, replace the shift cam. See the illustration.

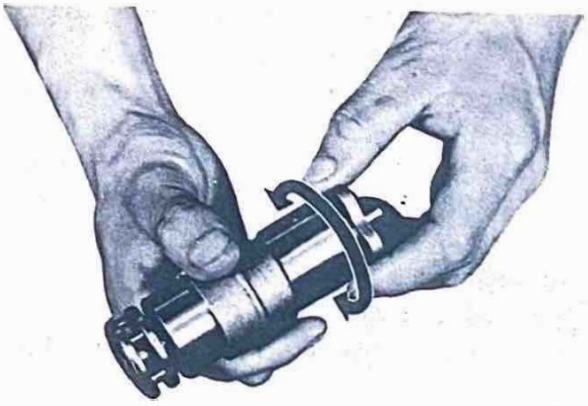


2) Excessive clearance between the cam stopper plate and the shift cam can be the cause of faulty gear shifting and jumping out of the gear. In many instances, this is caused by a dowel pin hole in the shift cam that has become enlarged from wear.

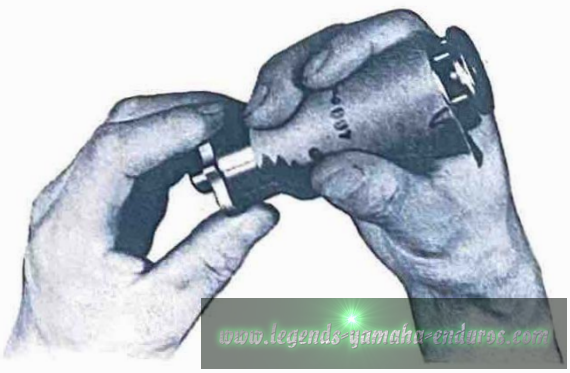


3) Carefully check the end of the shift cam around dowel pin holes. Replace shift cam if damaged.

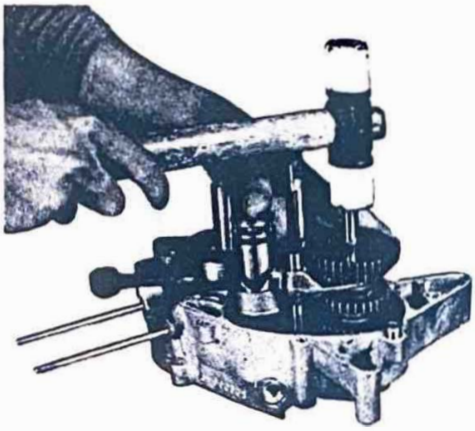
4) Hold the shift fork with one hand and with the other rotate shift cam (without the cam follower pin installed) to see whether it binds or catches.



If there is a scratch that causes the shift fork to catch, correct it with a #600 sand paper. If scratch is severe, replace shift cam.



2. Installation
   Reinstall the transmission and shifter as a unit in the left crankcase half after they are sub-assembled. They can not be installed separately without shift fork (2), and shift fork guide bar. The transmission unit must be in neutral during installation.

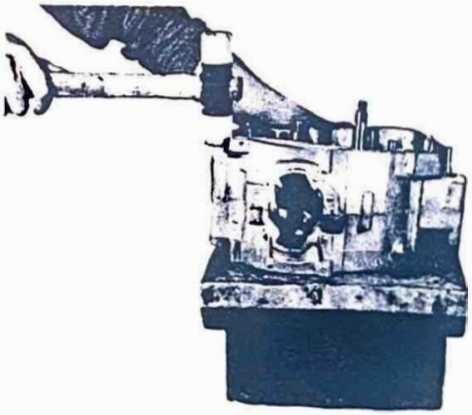


Note:

Never strike the axle and shift cam strongly with hammer. If it is tight to install, pull out again and check to avoid damaging each part.

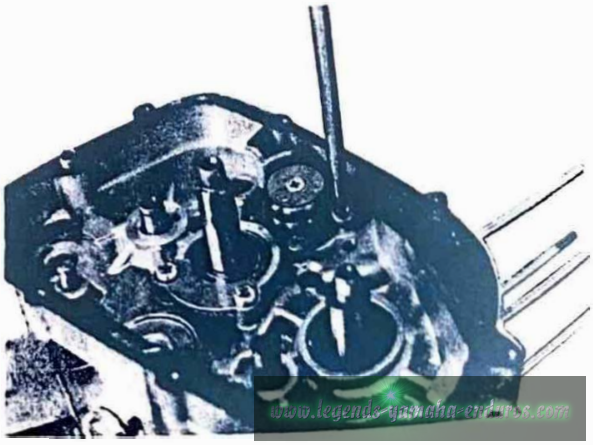
D. Crankcase Reassembly

1. Apply thin, even coat of Yamaha Bond No. 5 to entire crankcase mating surface.
2. Tap the righthand crankcase into place with a soft hammer. While doing this, be careful to keep cases parallel to each other and perpendicular to transmission shifts and crankshaft.
3. Install all crankcase bolts and tighten in stages using a crisscross pattern.



Note:

1. After the cases are put together, see that the crank shaft turns smoothly. Check the main and drive axles in the same manner. Then turn the shift cam to see whether it shifts smoothly into each gear.
2. Pay attention to the lengths of the bolts which hold the cases. A shorter bolt tends to damage the threaded portion in the case when tightened. All the bolts should be 10 to 12 mm. above the surface before being screwed in.
   After tightening, turn the crankshaft, each axle and shift cam to see whether they rotate smoothly or not.
3. Install the cam stopper plate and primary drive gear collar. Be careful not to damage the oil seal lip.



E. Shifter Installation

Shift Mechanism

The GT89B/GTMXB shift mechanism is designed to select four speeds.

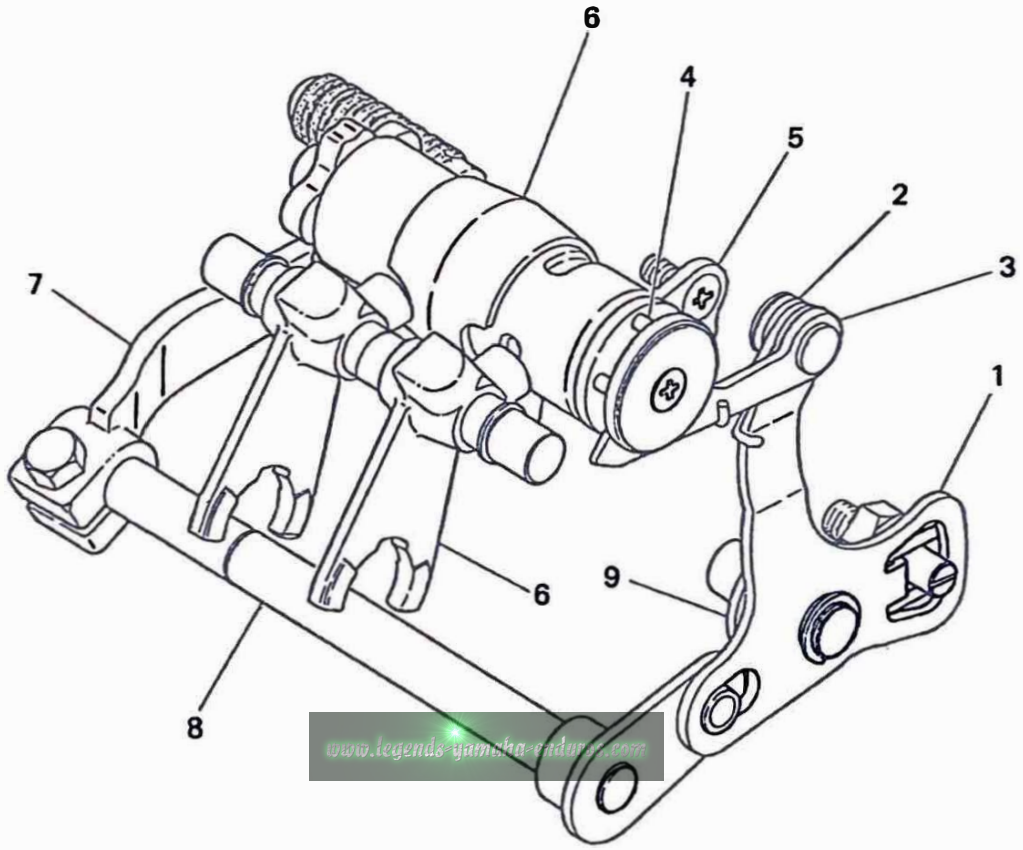
When the change pedal is moved the gear shift arm A is moved back or forward by the gear shift arm B.

The gear shift cam pin attached to the gear shift cam is pushed by the gear shift arm A, and the gear shift cam begins to rotate.

A total of four gear shift pins are attached to the gear shift cam. When the change pedal is moved the unit is designed to shift through five stages, Neutral, Low, Second, Third and Forth, throughout one complete turn of the gear shift cam.

The stopper plate holds the gear shift cam pin so that gear shifting can be correctly positioned at each gear position.

The gear shift cam is provided with grooves on its outer surface, and the shift forks move back and forth along their respective grooves to change gears.



1. Gear shift arm B
2. Gear shift arm spring
3. Gear shift arm A
4. Gear shift drum pin
5. Shift drum stopper lever
6. Shift fork
7. Change pedal
8. Change axle ass'y
9. Gear shift spring

2 Install the cam stopper plate.

3. Checking

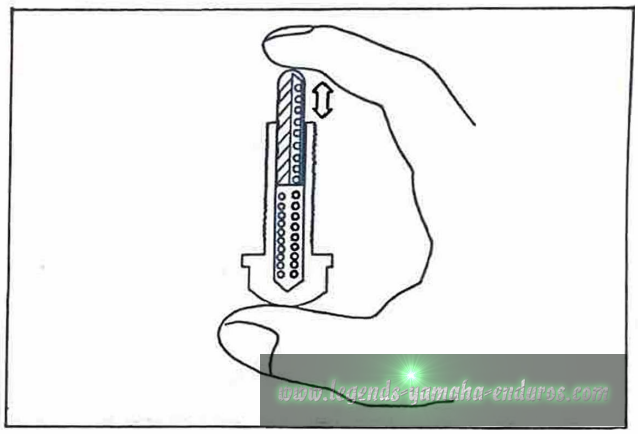
a. Cam stopper

1) Cam stopper spring

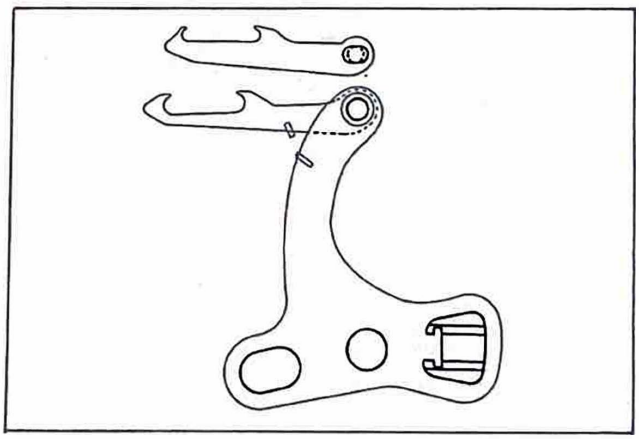
OVERALL LENGTH: 1.583 ins. (40.2 mm.)

Replace any that are shorter than specified or damaged.

2) Fit the spring and stopper to the spring screw, then see whether they move smoothly or they are too loose. Replace them with new ones where necessary.



b. Check the return spring for fatigue and also the change lever assembly for looseness at the riveted portion. (See the drawing.)



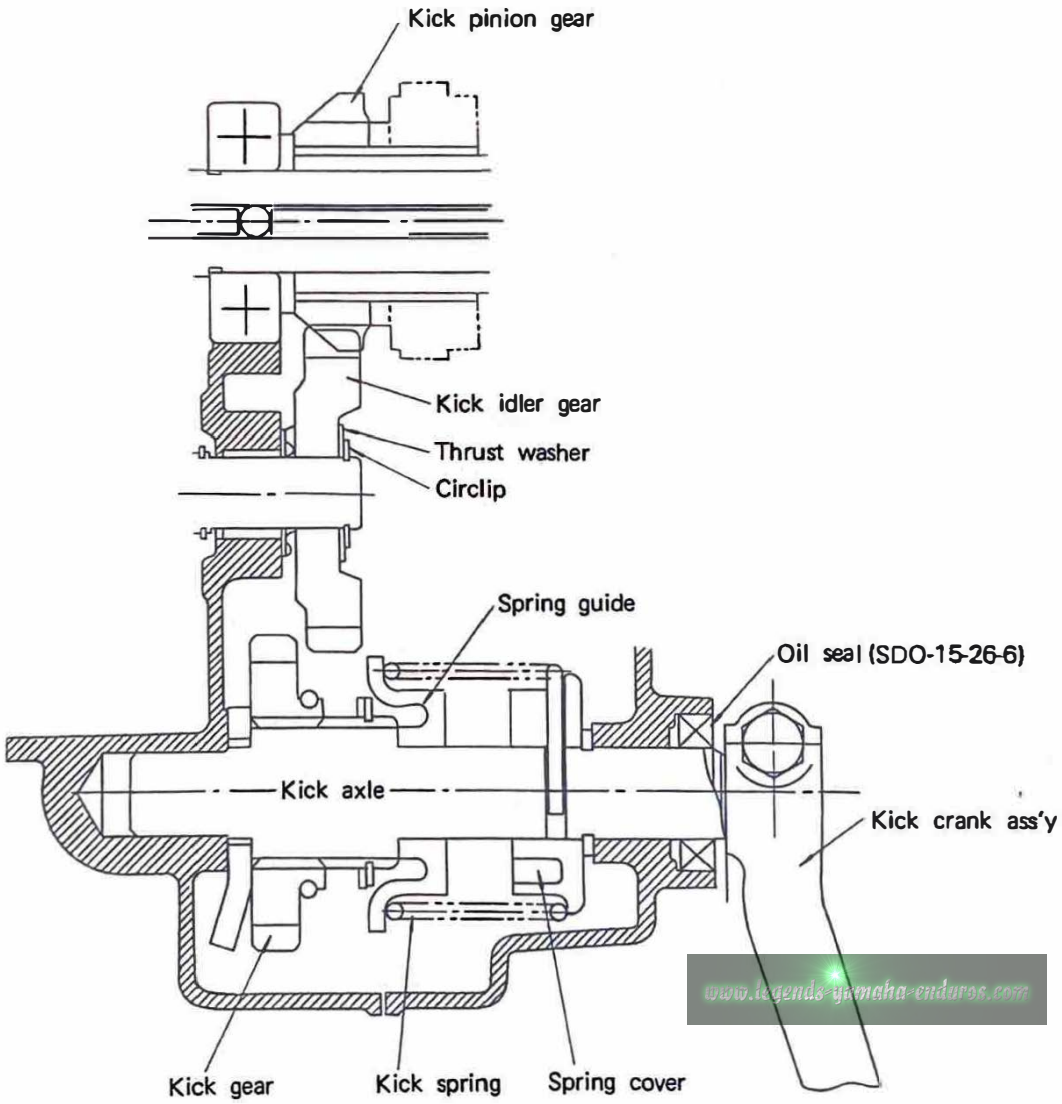
4. Assembling

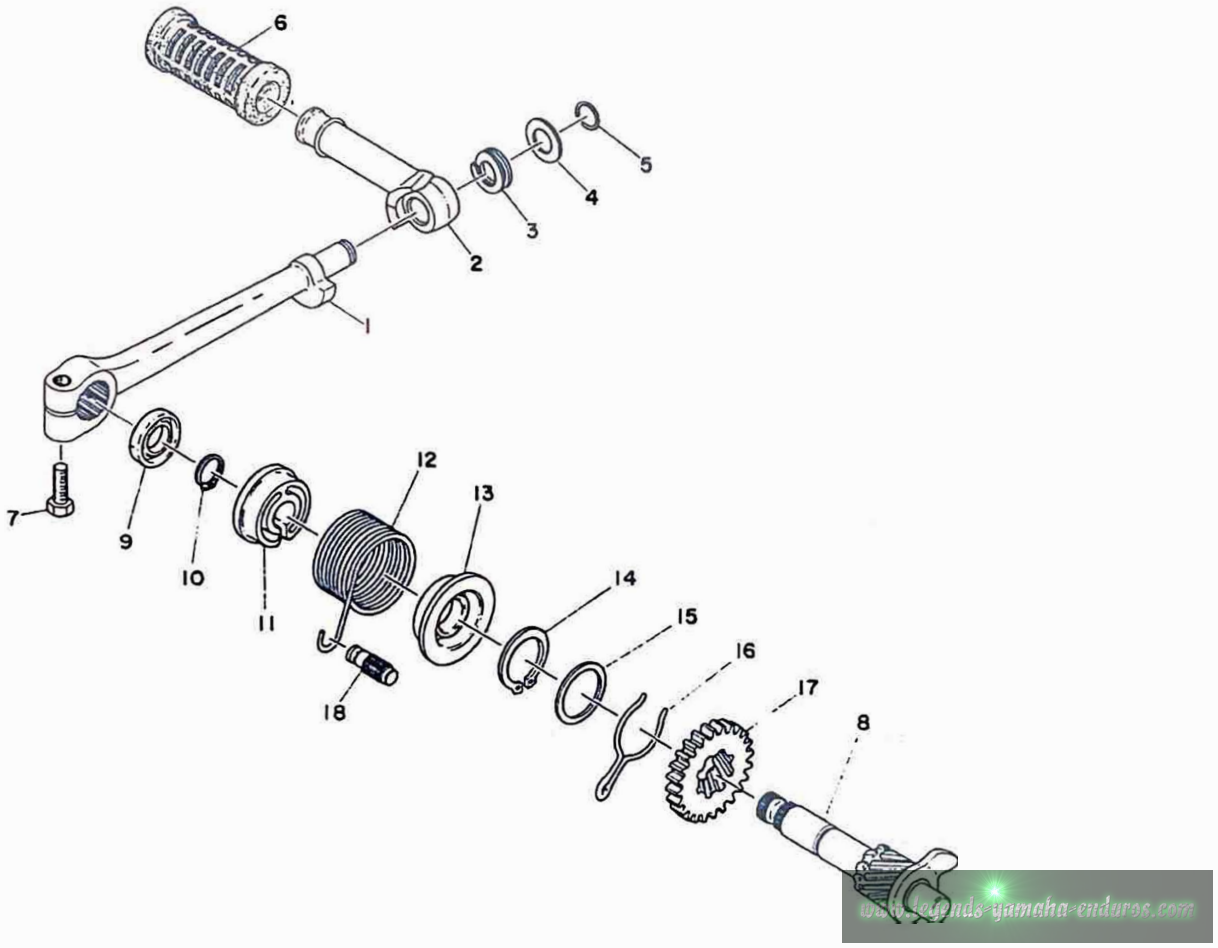
a. Installing the change shaft assembly then install the change lever assembly and set the clips. (for change shaft and change lever.)

5. Adjusting the Gear Shift Arm (See page 18)

F. Kick Starter Mechanism

1. The primary kick-starter system (one-touch kick-starter) is employed. However, a new "non-constant-mesh" mechanism has been introduced into the GT80B · GTMXB kick-starter, instead of the constant-mesh kick gear type, such as the ratchet and rollerlock 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.





1. Kick crank
2. Kick lever
3. Kick crank spring
4. Kick lever washer
5. Kick lever clip
6. Kick lever cover
7. Bolt
8. Kick axle ass'y
9. Oil seal
10. Circlip
11. Kick spring cover
12. Kick spring
13. Kick spring guide
14. Circlip
15. Shim
16. Kick clip
17. Kick gear
18. Kick spring stopper

1. Checking

a. Kick axle assembly

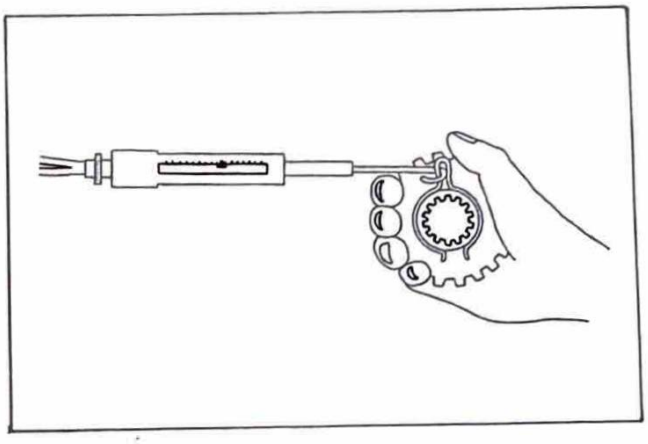
1) Remove the each parts from axle assembly.

b. Kick clip

1) The pressure of the kick clip is 4.85 lbs. (2.2 kgs.). (Measured as illustration.)

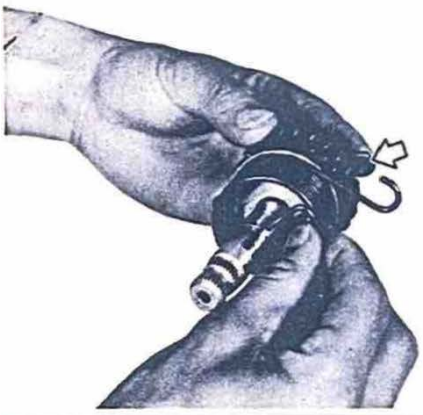
If above pressure is too strong, spring wear and kick starter slipping will result. On the other hand, if it is too weak, the same slippage will occur particularly at low temperatures. Do not try to bend the clip.

2) Check the clip for damage and wear, and determine whether or not it should be replaced, taking the above (item 2) into consideration.



c. Relative position between kick spring and kick axle.

Insert the kick spring into the axle as illustrated. If it is inserted in the wrong direction, the kick crank will not return fully to the original position or the hook on the spring cannot be engaged in the stopper due to excessive tention.

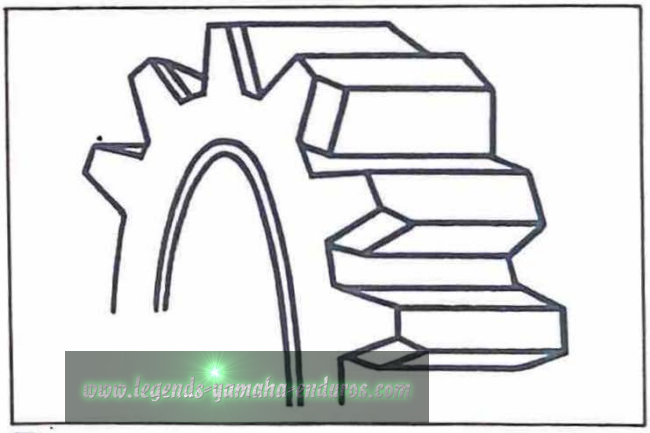


2. Kick gear

Install the kick gear with chamfered side of the teeth facing the kick spring. Clean the kick gear in solvent and check the following:

a. Scratches, damage and cracks.

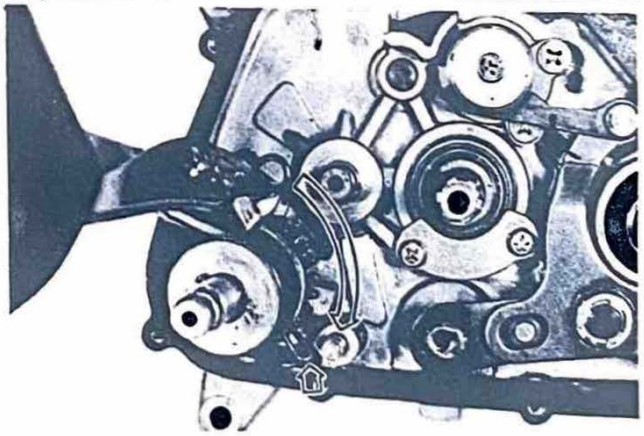
b. Wear in the axle hole.



3. Reassembling

a. The kick axle is fitted with the stopper. If axle is located in the wrong position to the case, it bites the stopper on the case side and cannot be correctly set. Fit the axle stopper within the limits shown In the illustration.

After that, engage the end of the kick spring on the hook.



b. Kick idle gear

Put the washer in place (refer to the illustration).

This gear is chamfered in, the same manner as the kick gear. Install the gear with the chamfered portion facing the inside of the case; both gears should be installed with chamfered sides facing inward.

G. Clutch

1. Outline

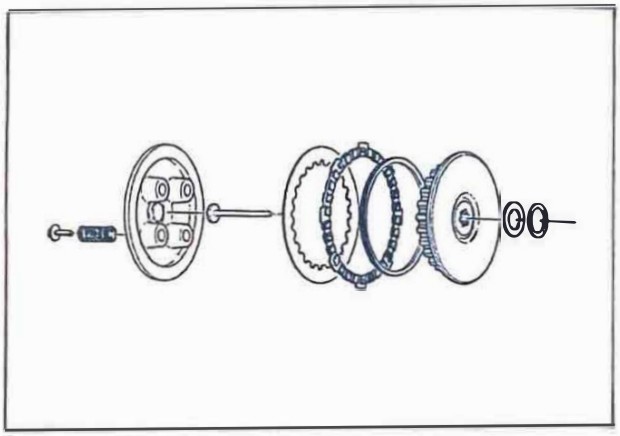
The clutch is wet, multi-disc type, consisting of three molded cork friction plates and two clutch plates in the clutch housing that is mounted on the transmission main axle.

To disengage the clutch, an inner push rod type 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 rubber is between the primary driven gear and the clutch housing. The primary drive gear has 19 teeth, and the primary driven gear 68 teeth.

(Primary reduction ratio . . . . . 68/19 = 3.578)

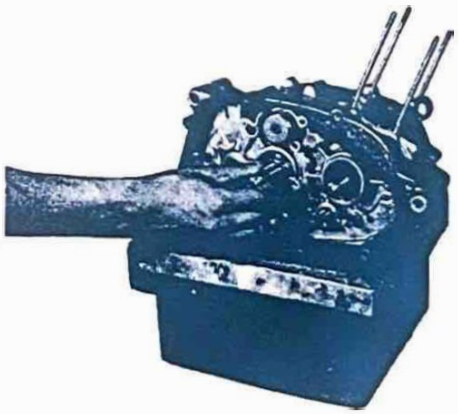


2. First install the collar, then the primary gear. Check the collar for any wear or scratches.

3. Primary Drive 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 collar.

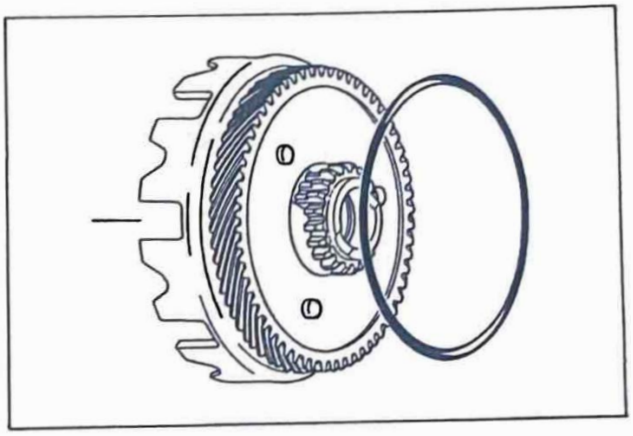
Replace any collar with step-wear on its outer surface.



4. Checking the push rod

Roll the push rod over a surface plate. If the rod is bent, straighten or replace it. Check the surface of the rod. If excessive wear is present, replace it.

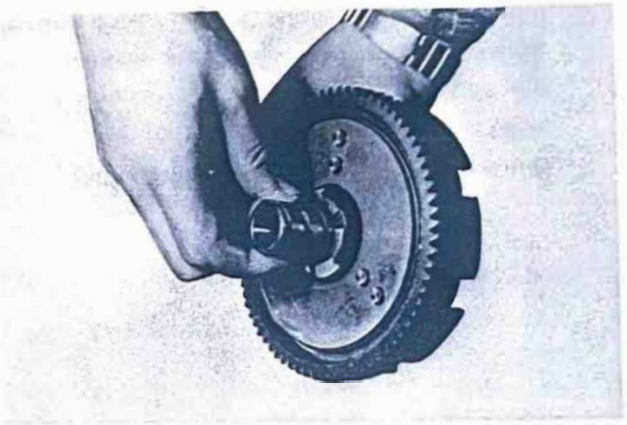
5. Clutch housing assembly
There is a rubber friction ring around the outside of the clutch between the primary driven gear and the clutch housing. It reduces gear noise at low engine speeds. Replace if damaged.



a. Inspection

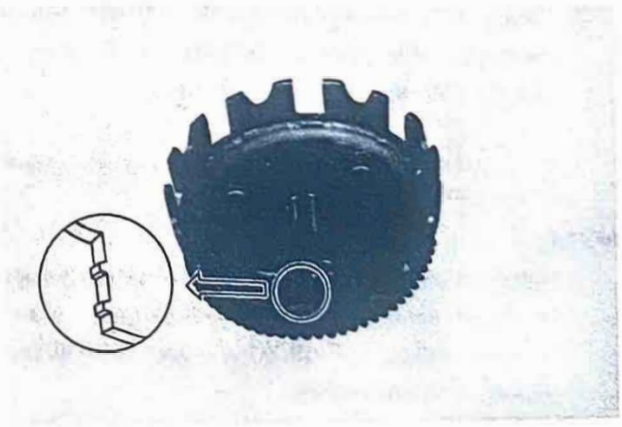
1) Insert the primary gear retaining collar in the primary driven gear boss and check it for radial play.
If the play is excessive, replace the gear retaining collar to avoid excessive noise.

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



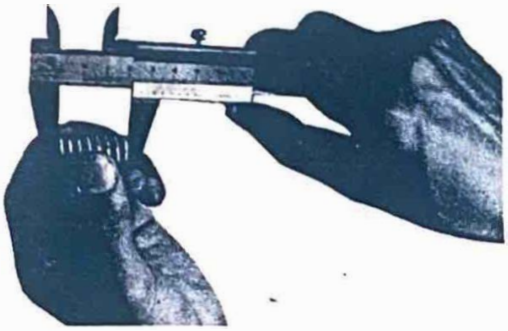
3) Check damage on pinion gear. Look for cracks and signs of galling on edges.
If moderate, de-burr. If severe, replace.

4) Check splines on clutch boss and housing for signs of galling. If moderate, de-burr. If severe, replace.

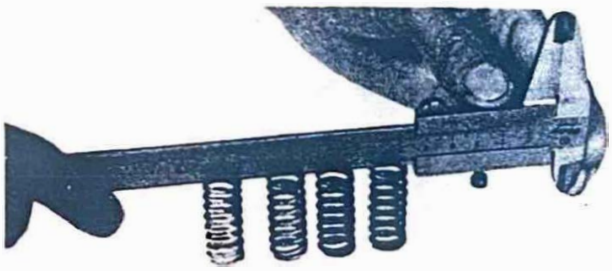


5) Measure each clutch spring. If beyond tolerance, replace.

CLUTCH SPRING FREE LENGTH:	1.22 ins. (31.5 mm.)
WEAR LIMIT:	1.20 ins. (30.5 mm.)

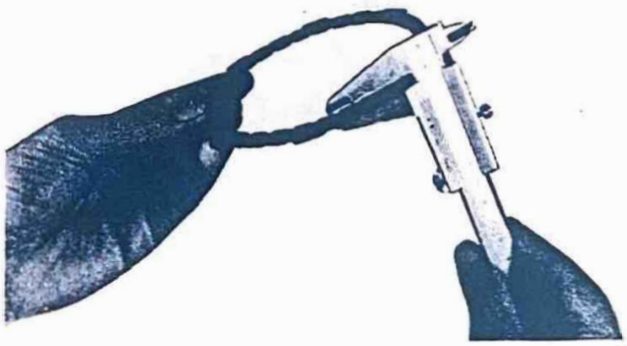


6) Stack the clutch spring set on a level surfade. Rotate each spring until all are at approximately the same vertical angle and maximum apparent height. Place straight edge across set. If any spring exceeds tolerance, replace that spring.



7) Measure the friction plates at three or four points If their minimum thickness exceeds tolerance, replace.

FRICTION PLATE THICKNESS:	0.138 in. (3.5 mm.)
WEAR LIMIT:	0.126 in. (3.2 mm.)



8) Check each clutch plate for signs of heat damage warpage. Place on surface plate (Plate glass is acceptable) and use thickness gauge.

CLUTCH PLATE WARP ALLOWANCE:	None

NOTE:

Galling on either friction plate of the clutch housing or clutch plate splines of the clutch boss. Look for crack and signs of galling on edges. If moderate, du-burr. If severe, replace.

b. Assembling

1) Fit the clutch thrust bearing against the thrust plate with a light film of oil on all parts. Check for smooth rotation. Check all parts for signs of excessive wear. Replace as necessary.

STANDARD THICKNESS:	0.059 in.	(1.5 mm.)
WEAR LIMIT:	0.051 in.	(1.3 mm.)

2) If clutch operation has been abnormal, and the above procedures show no major failures, install the clutch housing on the transmission main axle with thrust plates, bearing spacer, and clutch boss in their proper positions for reassembly. Install lock washer and clutch securing nut. Torque to standard assembly value.

3) With transmission and primary driven gear stationary, clutch boss should turn easily, indicating insufficient housing end play, check thrust plates and thrust bearing for incorrect thickness. Correct by installing thinner thrust plates. Clutch housing end play is given in table and can be measured with a dial gauge.

CLUTCH BOSS LOCK NUT TORQUE:	29 - 33 ft-lbs. (4.0 - 4.5 m-kgs.)
CLUTCH SPRING SCREW TORQUE:	7 ft-lbs. (1.0 m-kg.)

Caution:

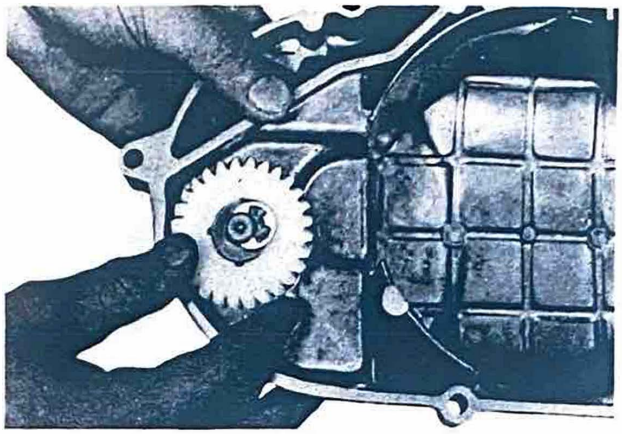
Do not forget to install the push rod (1) and steel ball.

H. Crankcase Cover

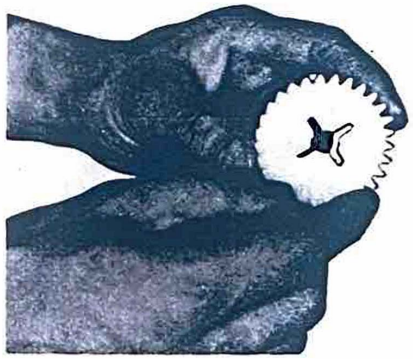
Before assembling, clean and check the crankcase cover (R.H.).

1. Look for cracks and other damage.
2. Remove all traces of the old casecover gasket.
3. Check the kick axle oil seal for damage, replace as required.

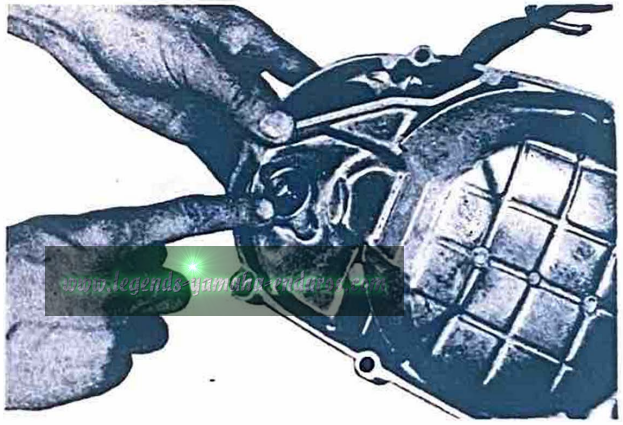
4. Check oil pump drive gear circlip. If the circlip is too loose or coming off, it sometimes means that the knock pin fixing the drive gear is coming off too. Inspect carefully.



5. Remove the pump drive gear and check it for any wear or damage in the teeth. Replace if it is badly worn or damaged.



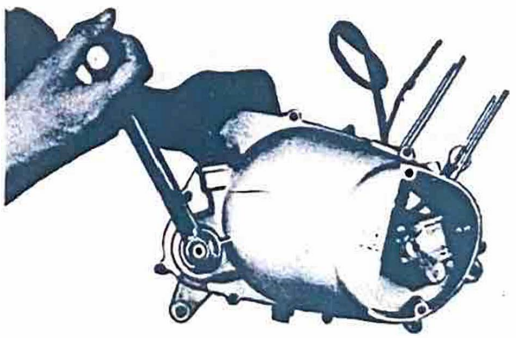
6. Check the worm shaft oil seal for any damage.



Note:

It is often unnecessary to use gasket sealant on the meating surface of the crankcase (R.H.).

When installing the crankcase cover (R.H.), make sure that the pump drive gear (made from synthetic resin) is correctly engaged with the primary drive gear. If cover doesn't fit easily, rotate the kick axle and push the cover down lightly.



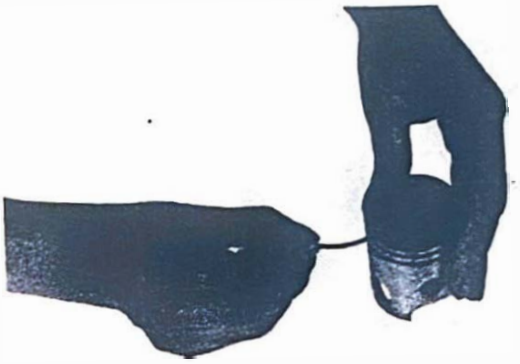
I. Piston, Piston Rings and Piston Pin

1. Inspection and Service

a. Piston

1) Using a rounded scraper, remove carbon deposits from piston crown.

2) Break a used piston ring in two. File end square. De-burr edges to avoid scratching ring groove and clean carbon deposits from ring grooves.



3) Using 400-600 grit wet sandpaper, lightly sand score marks and lacquer deposits from sides of piston. Sand in cross-hatch pattern. Do not sand excessively.

4) Wash piston in solvent and dry.

5) Using an outside micrometer, measure piston diameter. The piston is cam-ground and tapered. The only measuring point is at right-angles to the wrist pin holes about 0.5 in. (12.7 mm.) from bottom of the piston skirt. Compare piston diameter to cylinder bore measurements (bottom two measurements at right angles to wrist pin line.)

Piston maximum diameter subtracted from minimum cylinder diameter gives piston clearance. If beyond tolerance, replace piston or bore cylinder as required.

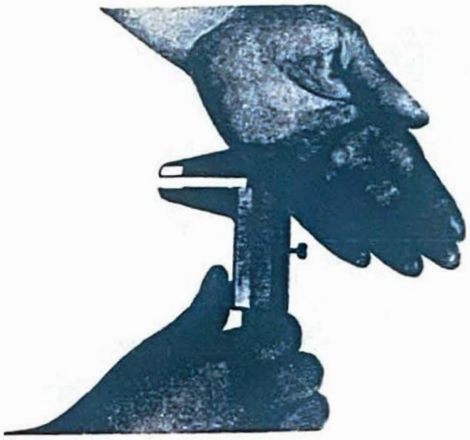
NOMINAL PISTON CLEARANCE:
0.00157 - 0.0076 in. (0.040 - 0.045 mm.)

MAXIMUM WEAR LIMIT:
0.00236 in. (0.060 mm.)

b. Piston Rings

1) Measure the ring end gap in free position. If beyond tolerance, replace.

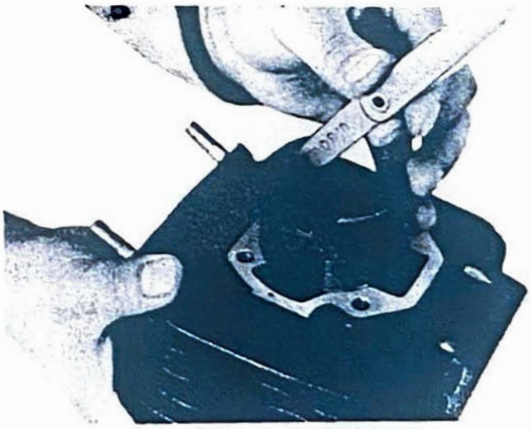
RING END GAP, FREE: 0.197 in. (5 mm.)



2) Insert ring into cylinder. Push down approximately 3/4" using piston crown to maintain right-angle to bore. Measure installed end gap. If beyond tolerance, replace.

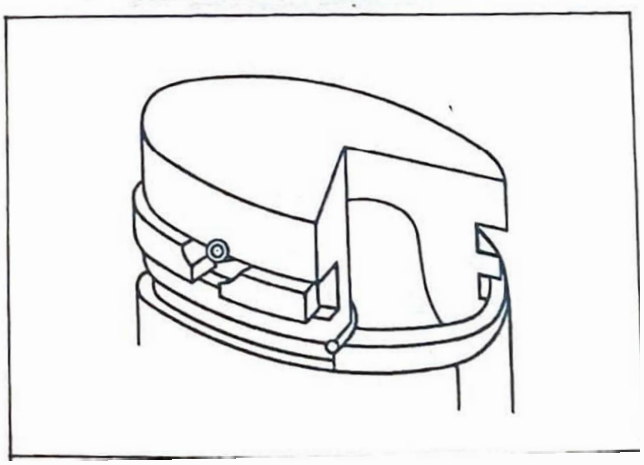
RING END GAP, INSTALLED
0.006 in. (0.014 mm.)

3) During installation, make sure ends are properly fitted around locating pin in piston groove. Apply liberal coating of two-stroke oil to ring.



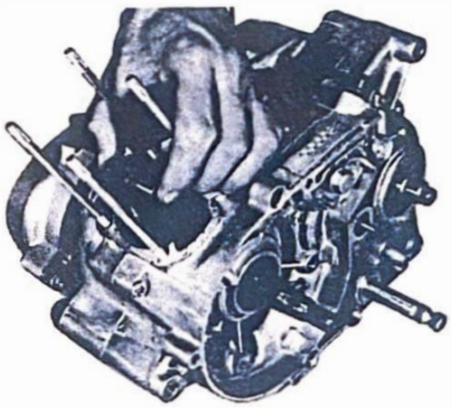
Note:

New ring requires break-in. Follow first portion of new machine break in procedure.



c. Piston pin

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 pin has step-wear in its center, 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.



2. Installing

a. Piston

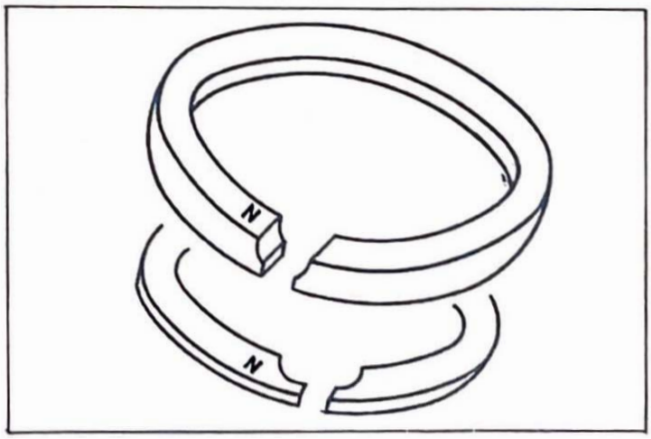
1) Install the piston with the arrow mark on the crown pointing forward. (toward the exhaust port of the cylinder.)
2) Before installing the piston pin clips, cover the crankcase with a clean rag, so you will not accidentally drop the clip or other foreign particles into the crankcase.

b. Piston rings

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

Note:

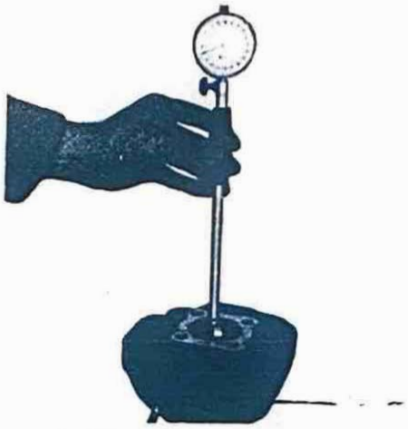
The printing on all rings must face up to position the gap properly at the pin.



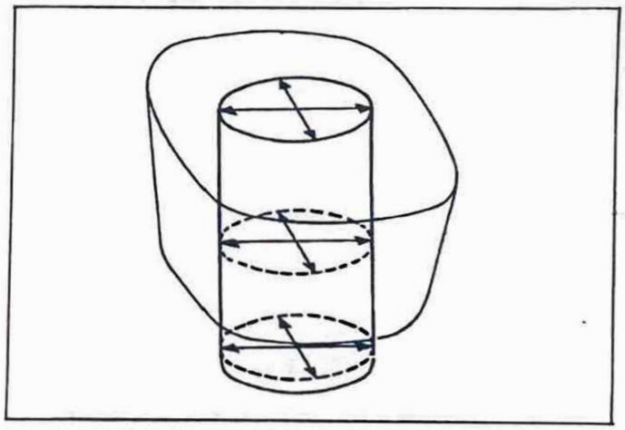
J. Cylinder

YAMAHA GT80B/GTMX8 engine employs a special cast iron cylinder. The cylinder is 5-port design with superior scavenging efficiency.

1. Inspection and Service
   a. Remove the cylinder gasket and clean gasket seat on cylinder and crankcase thoroughly.
   b. Using the rounded scraper, remove the carbon deposits from exhaust port.
   c. Check cylinder bore. Using a cylinder gauge set to standard bore size, measure the cylinder. Measure at six points; at top, center and 0.5 in. from bottom of cylinder, in line with the wrist pin and at light angle to pin. Compare to piston measurements. If over tolerance, replace piston or cylinder as required.

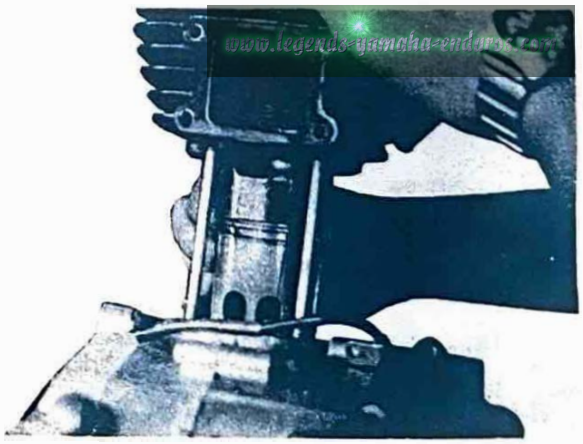


   d. During reassembly, always use a new cylinder base gasket.



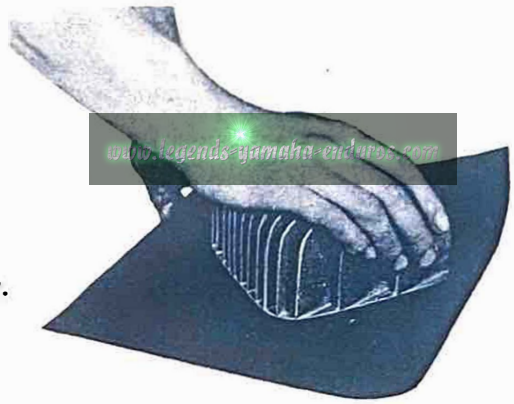
2. Assembling

Use one hand to compress the piston rings (make certain ring ends straddle locating pins) and install cylinder over piston with other hand. Carefully rock cylinder from side to side until piston rings are inside cylinder bore.



K. Cylinder Head

1. Inspection and Service
   a. Using a rounded scraper, remove the carbon deposits from combustion chamber. Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the metal surface.
   b. Place the head on a surface plate. There should be no warpage. Correct by re-surfacing. (Place 400～600 grit, wet emery sandpaper on surface plate and re-surface head using a figure eight sanding pattern. Rotate head several times to avoid removing too much material from one side.)
   c. Clean the spark plug gasket mating surface thoroughly.
   d. Wash the head in solvent and wipe dry.
   e. Install new cylinder head gasket during reassembly.



CYLINDER HEAD NUT TORQUE:
7.3 ft-lbs. (1.0 m-kg.)

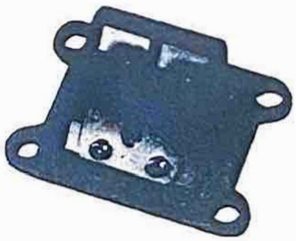
Note:
The cylinder securing nuts should be tightened in a crisscross pattern and in progressive stages.

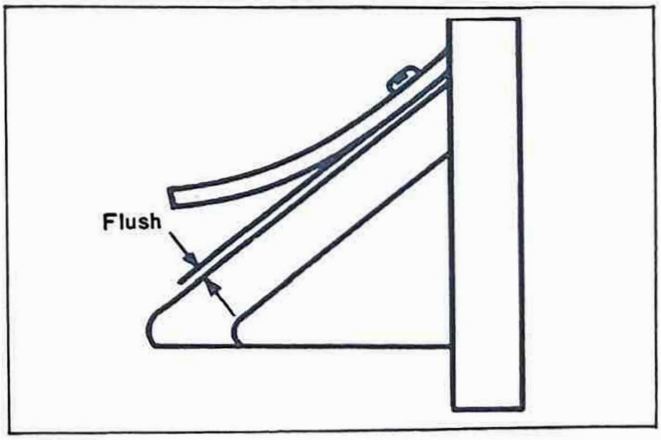
L. Reed Valve

The reed valve is located between cylinder and carburetor.

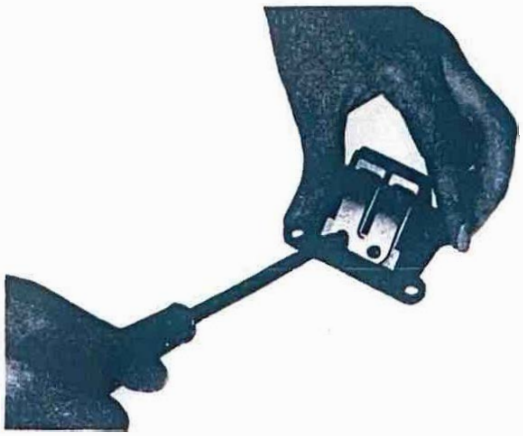
1. With carburetor removed, remove four bolts holding the intake manifold and reed valve assembly to the cylinder. Remove the reed valve assembly.

2. Inspect reed petals for signs of fatigue cracks. Reed petals should fit flush against neoprene seats. If in doubt as to sealing ability, apply suction to carburetor side of assembly. Leakage should be slight to moderate.





3. If disassembly of the reed valve is required, proceed as follows;
   a. Remove the phillips screws securing stopper plate and reed to reed block. Handle reed carefully. Avoid scratches and do not bend. Note from which side of the reed block and reed and stopper plate were removed. Re-install on same side.
   b. During reassembly, clean reed block, reed and stopper plate thoroughly. Apply "Lock-tite" to threads of phillips screws. Tighten each screw gradually to avoid warping. Tighten the screws to specified torque.



Caution:

DO NOT OVER-TIGHTEN SECURING SCREWS, STOPPER PLATES MAY WARP.

SECURING SCREW TORQUE:	6.9 in-lbs.	(8.0 cm-kgs.)

Note:

During re-assembly, observe the cut in the lower corner of the reed and stopper plate. Use as aid to direction of reed installation.

   c. During re-assembly of the reed valve and manifold, install new gaskets and torque the securing bolts gradually and in pattern.

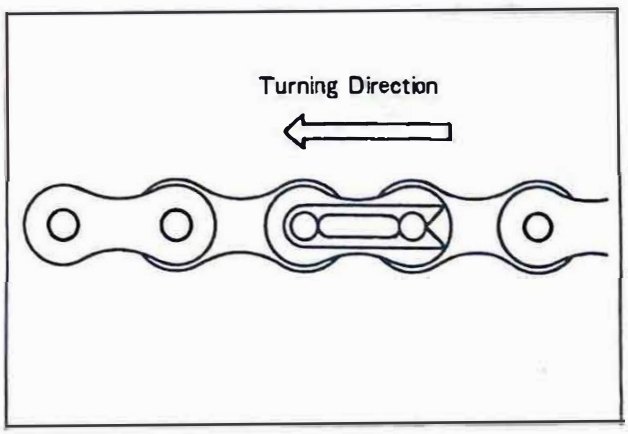
M. Mounting the Engine

The engine can be mounted in the reversed procedure in accordance with "ENGINE REMOVAL" in CHAPTER 5. See the illustration.

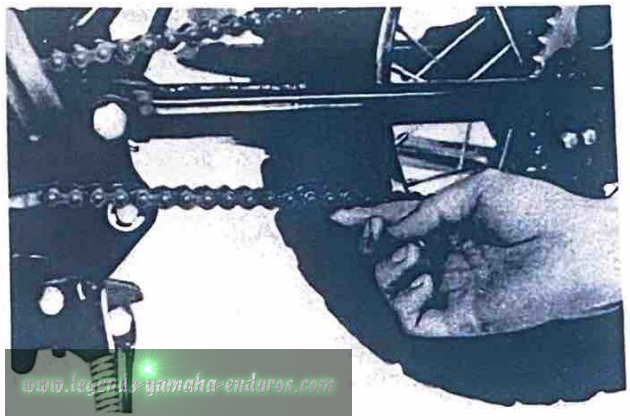
Note:

MOUNTING BOLT TORQUE:	180 - 200 in-lbs.	(2.0 - 2.2 m-kgs.)
CARBURETOR SETTING BOLT TORQUE:	130 - 180 in-lbs.	(1.4 - 2.0 m-kgs.)

1. When re-connecting the chain, be sure the master link clip is facing in the direction of rotation.



2. After re-connecting the chain, adjust the free play to 1.0 in. (25 mm.) up and down at the center of the lower section with the rear wheel. Adjust rear brake after chain adjustment.



3. After setting the pump, cable, see whether it is correctly fitted in the adjust pulley groove by turning the throttle grip a few times.

4. The carburetor throttle valve may not close fully if the throttle wire is not properly adjusted. Check this point.

5. Adjust the clutch play. For adjustment refer to page 17.

CHAPTER 7. CARBURETOR

The GT80B/GTMXB is equipped with a Mikuni carburetor (VM type) with a starter jet built in. This carburetor is compact is design and has the ability to maintain proper starting fuel level even when the machine is on an incline.

A. Purposes of the Carburetor

1. The carburetor regulates the amount of fuel-air mixture provided to the engine.
   In other words, as the amount of mixture increases, the engine speed increases. On the contrary, the smaller the amount of mixture, the lower the engine speed. Therefore, the engine speed can be varied by increasing or decreasing the amount of mixture.

2. The carburetor regulates the fuel-air mixing ratio according to the operating conditions of the engine. To ignite and explode the fuel drawn in the engine, the gasoline must be mixed with a proper amount of air, because explosion takes place through a reaction between the gasoline and the oxygen contained in the air. However, to cause this reaction, the mixing ratio of gasoline to air must be maintained within certain limits. If the mixing ratio is out of the limits, no explosion will occur. The carburetor produces a mixture whose ratio is within these limits.

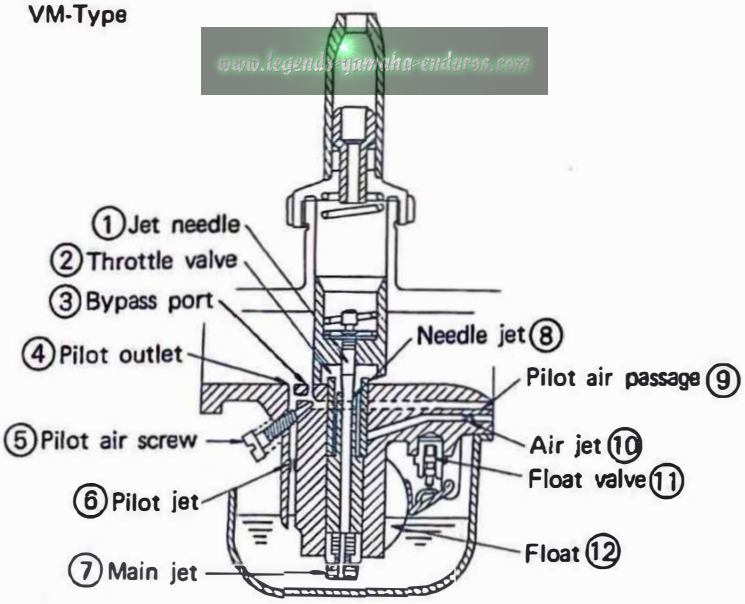
3. The carburetor produces a mixture which is atomized evenly.
   The carburetor must feed the fuel to the engine at an optimum mixing ratio according to operating conditions. When the engine runs at low speed, the mixture must be slightly richer than the theoretically calculated mixing ratio. The carburetor is designed to meet every operating condition of the engine.

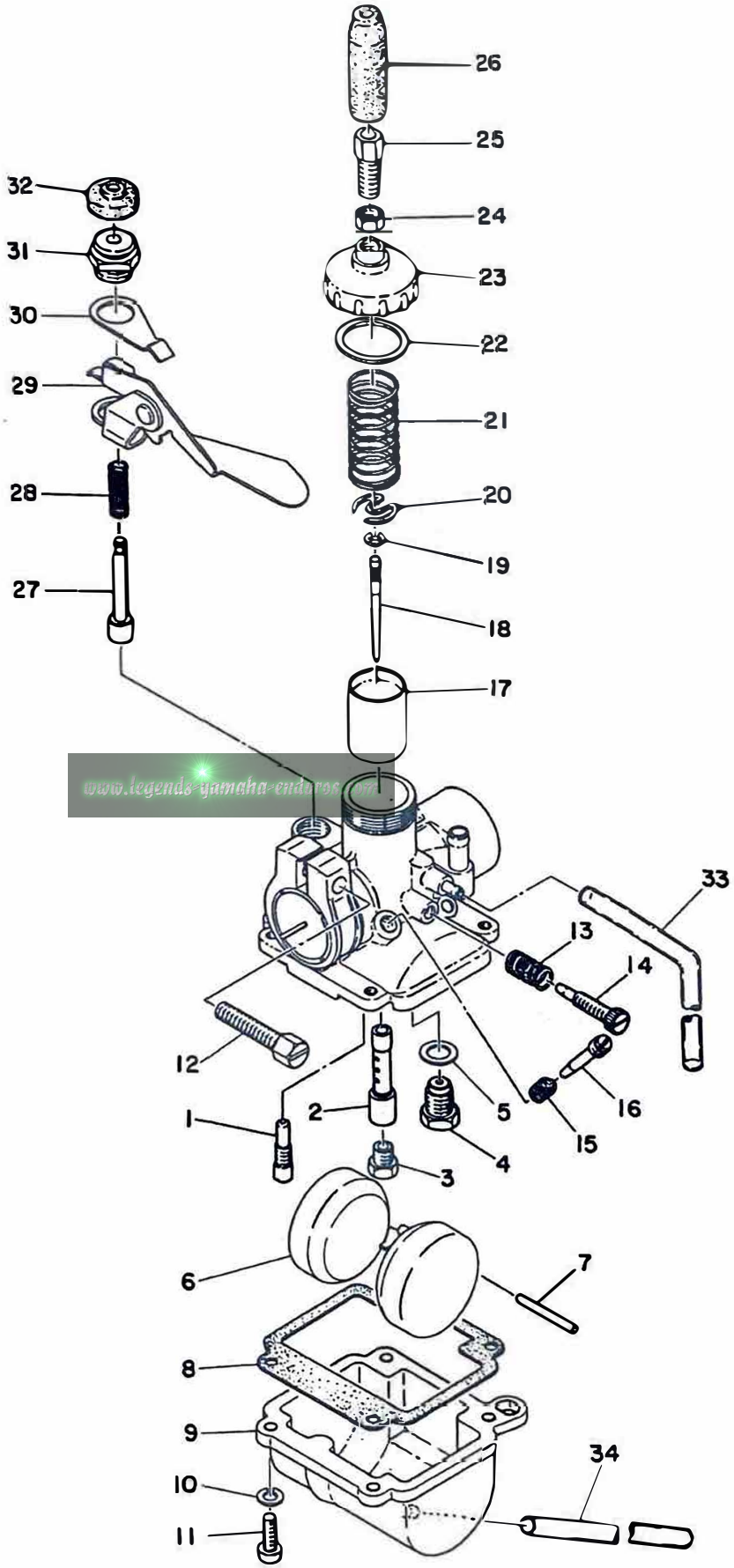
B. Construction

The carburetor is made up of many small parts, with three basic sections:

1. Float chamber.
2. Mixing chamber.
3. Other sub-assemblies (starter, etc.)

VM-Type





1. Pilot jet
2. Main nozzle
3. Main jet
4. Valve seat ass'y
5. Valve seat washer
6. Float
7. Float pin
8. Gasket
9. Float chamber body
10. Spring washer
11. Panhead screw
12. Body fitting screw
13. Pilot adjusting spring
14. Pilot adjusting screw
15. Air adjusting spring
16. Air adjusting screw
17. Throttle valve
18. Needle
19. Clip
20. Spring seat
21. Throttle valve spring
22. Packing
23. Mixing chamber cap
24. Wire adjusting nut
25. Wire adjusting screw
26. Cap
27. Starter plunger
28. Plunger spring
29. Starter lever
30. Stopper
31. Plunger cap
32. Plunger cap cover
33. Pipe
34. Over flow pipe

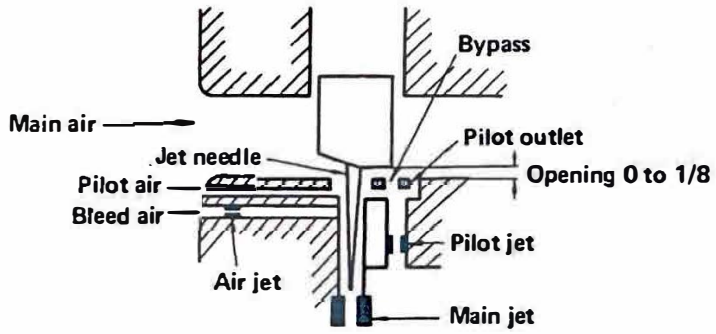
C. Operation of the VM-Type Carburetor

1. Throttle opening 0 to 1/8

As the piston moves up, a partial vacuum is produced in the crankcase (two-cycle engine). This causes the air to flow through the air cleaner into the carburetor.

If the throttle valve is almost closed, the air passes through the pilot air passage, thus causing a partial vacuum around the pilot jet. The fuel streams out of the pilot outlet, where the vacuum is greater, into the air horn and is added to the air. On the other hand, a partial vacuum is also produced around the jet needle, but it is so small that no fuel streams out from the main nozzle. At idle, the mixture is richer than the theoretical strength because the fuel is not fully atomized.

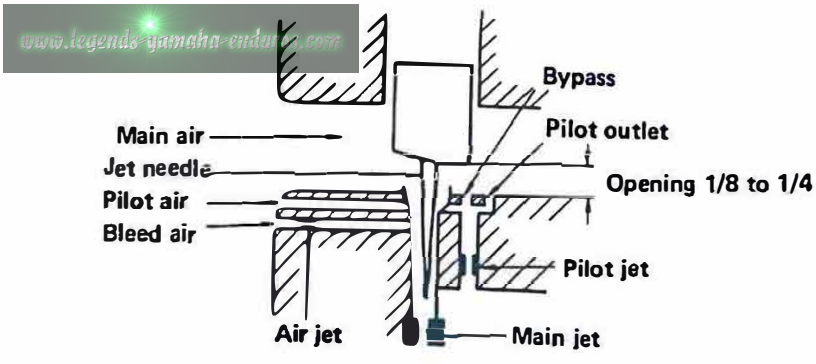
On a carburetor having a smaller air horn, it has a pilot outlet but not a bypass. On the other hand, a carburetor having a larger air horn is provided with a pilot outlet and a bypass in order to ensure the smooth supply of fuel when the throttle opening is changed from half to full.



2. Throttle valve opening 1/8 to 1/4

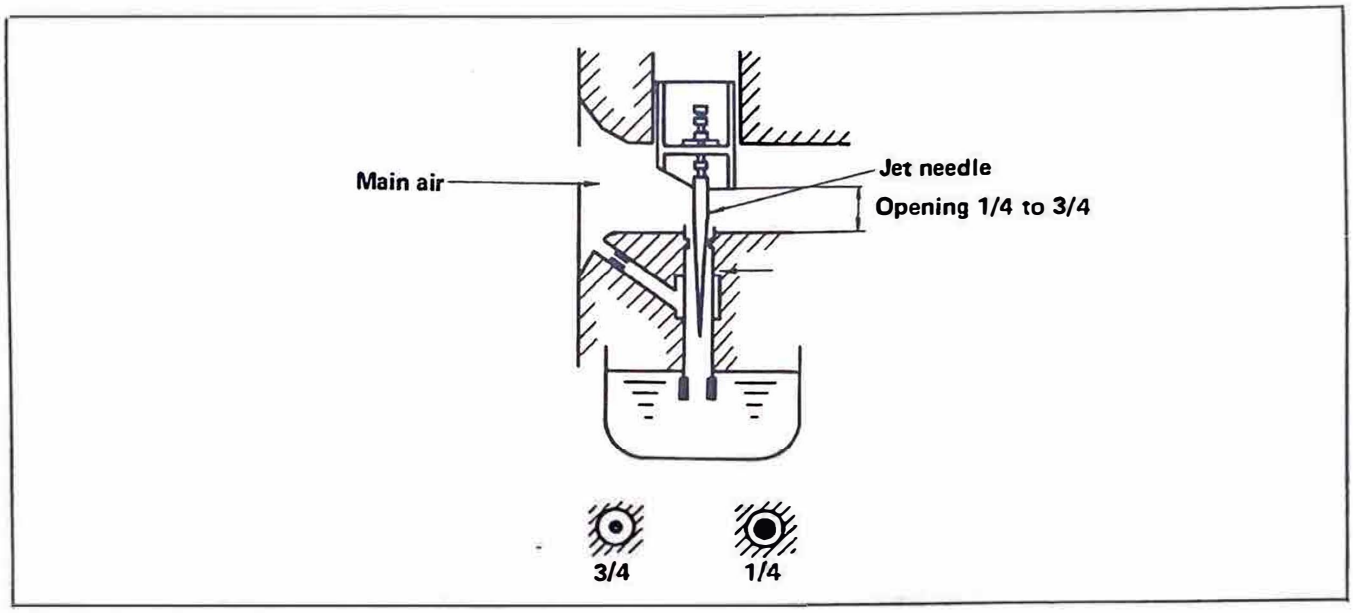
When the throttle valve opening is within this range, the mixture is fed from the pilot outlet, and at the same time, supplied from the bypass.

A partial vacuum is also produced around the main nozzle in order to make the fuel flow out of it. In this case both pilot and main circuits are controlled by the cut-away of the throttle valve.



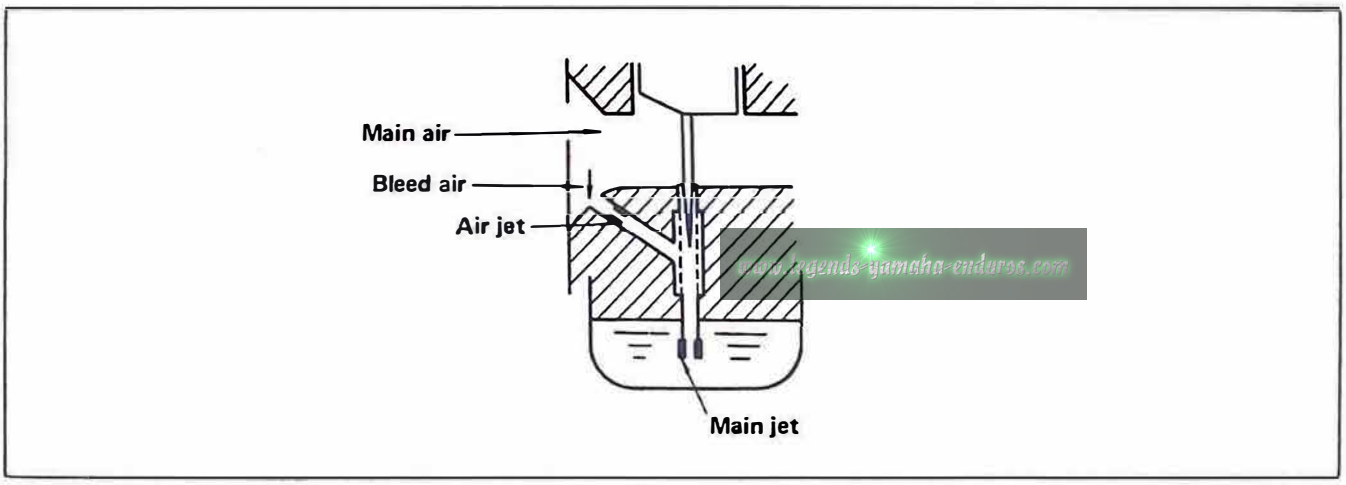
3. Throttle valve opening 1/4 to 3/4

The air flow in the main nozzle increases, but as the throttle valve still acts as a venturi, the vacuum at the main nozzle will become greater, thus causing it to spray a greater amount of fuel. To regulate the spray of fuel, tapered "jet needle" is positioned inside the needle jet. The jet needle is tapered so that it can regulate the fuel flow in the needle jet in accordance with the air horn.



4. Throttle valve opening 3/4 to 1/1

The setting in this high speed circuit is an important factor in determining the maximum output of the engine. As the throttle valve is opened almost full, the resistance of the throttle valve to the air flow becomes smaller, thus allowing the air flow to increase. At this stage, the main jet alone is required to regulate the fuel flow. But the actual mixing ratio is changed by variation in the distance between the fuel level in the float chamber and the main jet nozzle end, pulsation and inertia of the air flow, or by variation in the engine speed resulting from change in the coefficient of the fuel flow in the main jet.



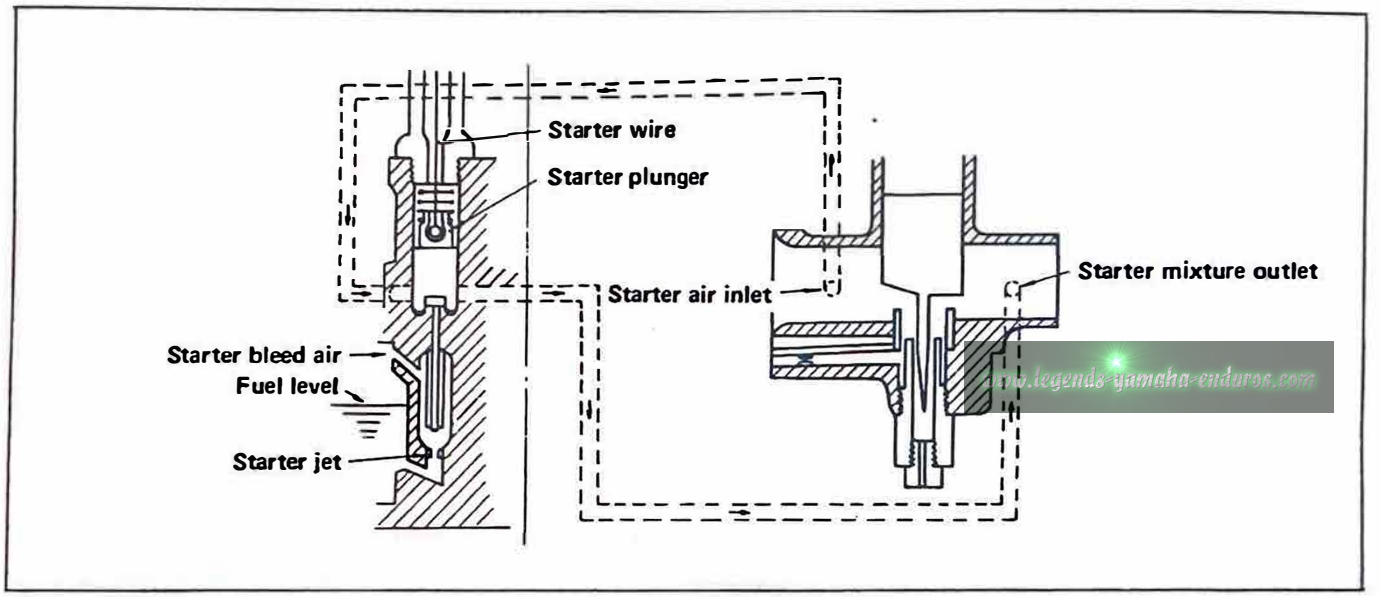
D. Starter Jet System

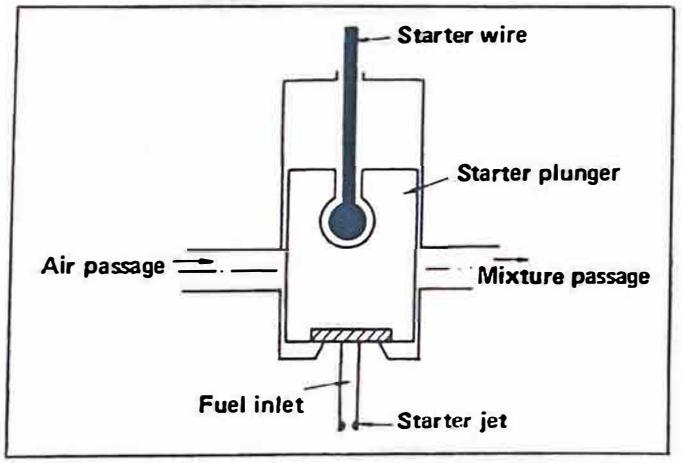
Both tickler and choke have an intimate relation with the main circuit, and both require some experience in operation. To eliminate this inconvenience, the starter jet system was developed. It ensures proper mixture for starting the engine without requiring any operating skill.

The starter jet is incorporated in the main carburetor body, but it is independent of the main circuit.

Operation

As the starter lever is pulled, the starter plunger moves up. This opens the air passage closed by the starter plunger, and the air flows into the starter air inlet. The air stream produces a partial vacuum around the starter jet nozzle, thus causing the fuel to flow out of the starter jet.





The plunger is cylindrical and has a rubber pad on its bottom.

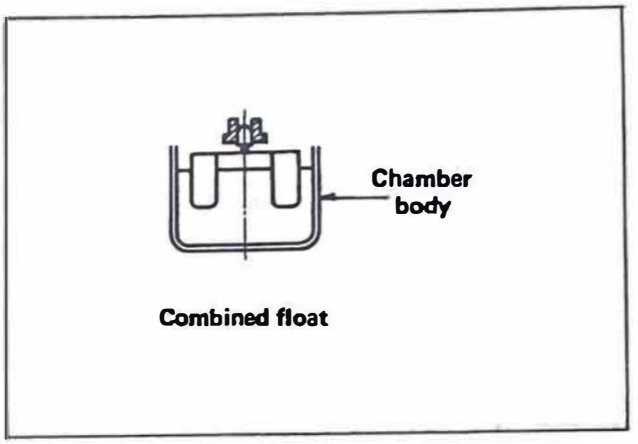
Both mixture and air passages are on the same level, and when the plunger moves up, both passages are opened at the same time.

E. Float Chamber

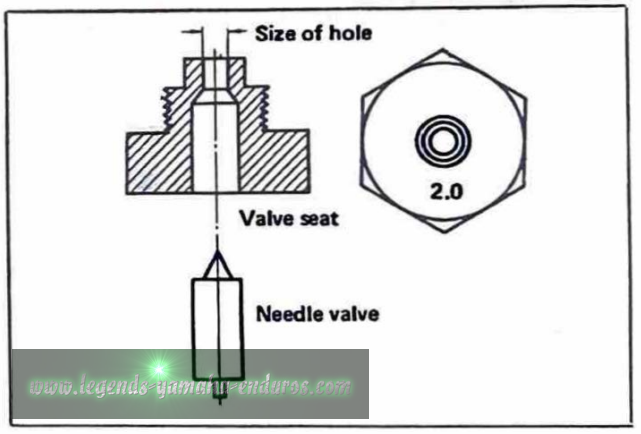
The fuel flows from the fuel tank, through the fuel petcock and the fuel line, to the carburetor float chamber. To prevent the fuel from overflowing the float chamber, a special device is provided. The device varies from carburetor to carburetor, but it is made up mainly of the following parts.

1. Float chamber body.
   The fuel is temporarily stored in the float chamber body having an overflow pipe and starter jet. On some types of carburetors the main jet is incorporated in the float chamber for easy replacement.

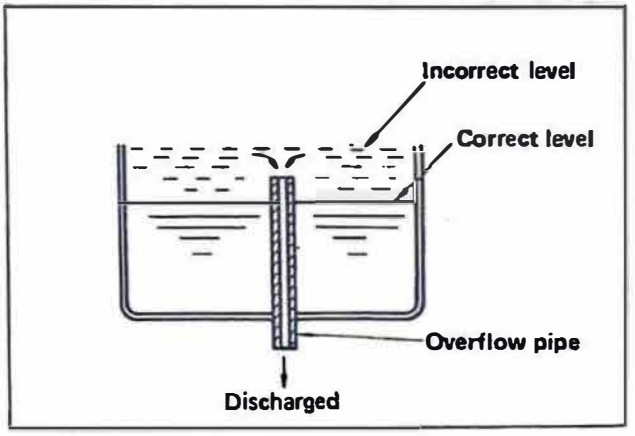
2. Float
   The float opens and closes the float valve according to fluctuations in the fuel level in the float chamber. It is made of a thin metallic sheet or a thin plastic sheet. There are two types of floats, combined and separate types.



3. Float valve assembly
   The float valve regulates the flow of fuel to the float chamber. It consists of a valve seat and needle valve and their contact surfaces are finished with high accuracy. Therefore, special care is required when the carburetor is disassembled. The calibration (e.g., 1.5 or 2.0) marked on the float valve denotes the size of the valve seat, which corresponds to the flow rate of fuel to the float chamber. The larger the figure the greater the flow rate.



4. Overflow pipe
   If the float valve is faulty or if the motorcycle is overturned, the fuel level in the float chamber will rise unnecessarily. The overflow pipe allows the excessive fuel to flow out from the float chamber.

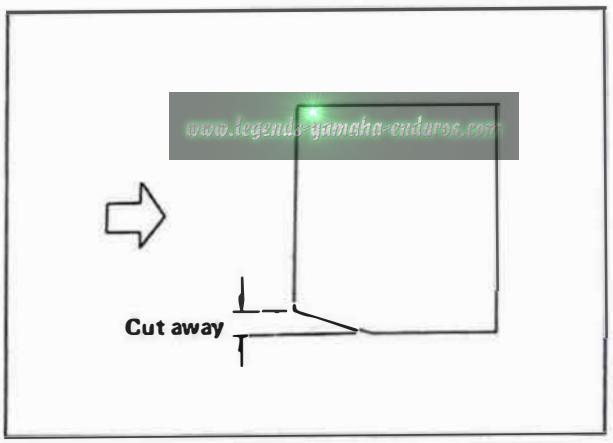


F. Mixing Chamber

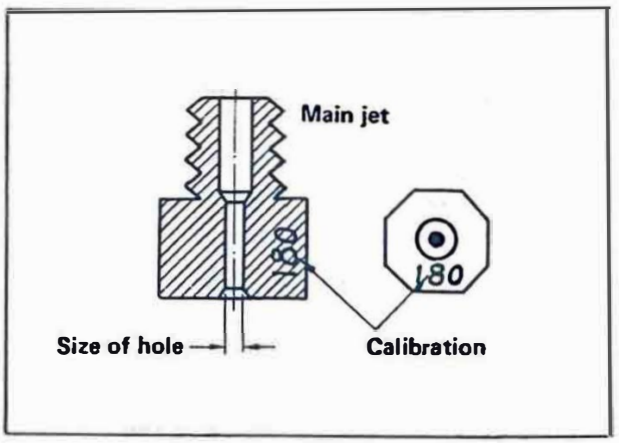
The mixing chamber meters both fuel and air and produces the correct fuel/air mixture for the engine. It is made up of many parts comprising the air circuit, fuel circuit and mixture circuit.

1. Mixing chamber body
   The mixing chamber is the "heart" of the carburetor. It consists of many parts machined with high accuracy. All fuel/air mixture is produced in the mixing chamber and fed to the engine.

2. Throttle valve
   The throttle valve is the most effective control device in the carburetor and greatly affects engine performance in the entire range of engine speeds from low to high.
   The fuel/air mixing ratio at low speeds is regulated largely by the throttle valve cut-away.
   Throttle valve cut-away (C.A.):
   The figure marked on the throttle cut-away denotes the size of the cut-away. The larger the number, the greater the cut-away size. That is, the resistance to the air flow will be smaller, and thus the mixture will be leaner. On the contrary, if the number is smaller, the mixture will be richer.

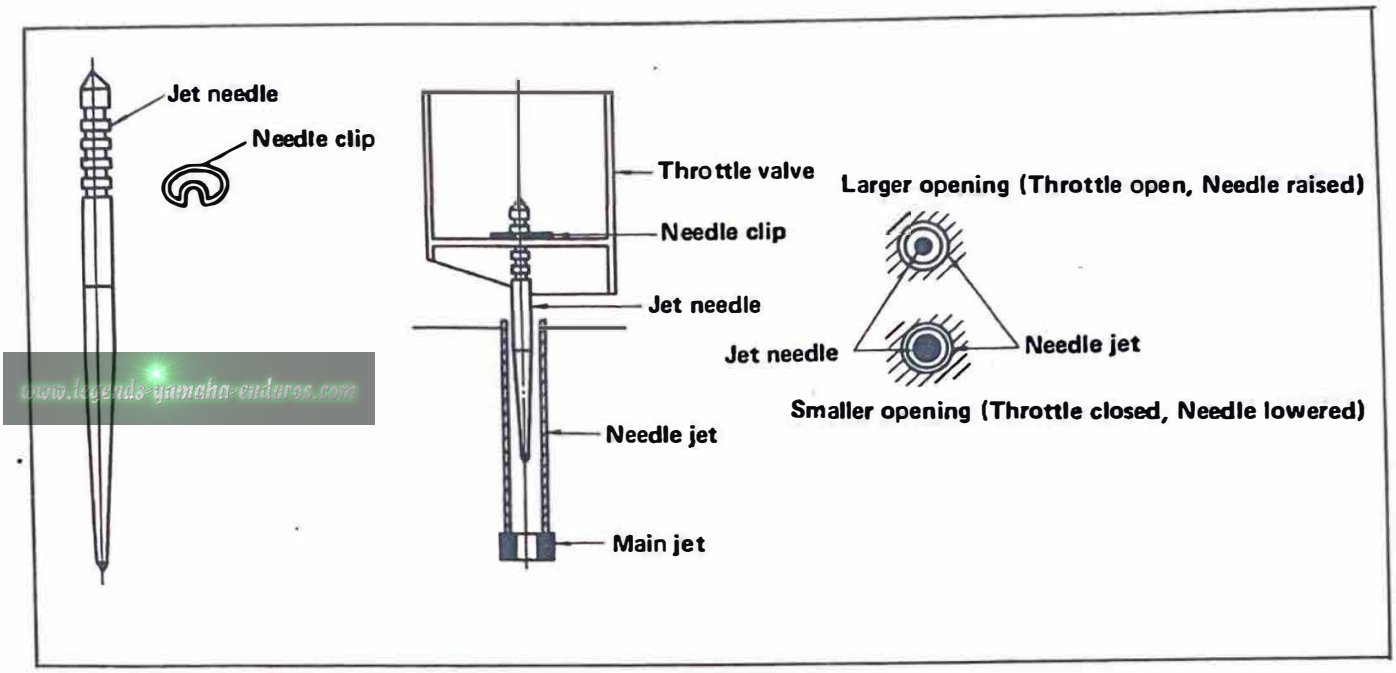


3. Main jet
   The main jet regulates the flow rate of fuel and affects the engine performance at high speeds.
   It has a through hole to regulate the fuel flow rate. The larger the hole, the greater the fuel flow rate. The number on the main jet indicates the fuel flow rate.



4. Jet needle

The jet needle is tapered at one end and has five grooves provided to position the needle clip. The jet needle is attached to the throttle valve and works with the needle jet to regulate the fuel flow rate in the speed range from medium to high. There are two types of needle jet which are to be used for flow rate curve adjustment; the air bleed type and the primary choke type.



5. Pilot jet

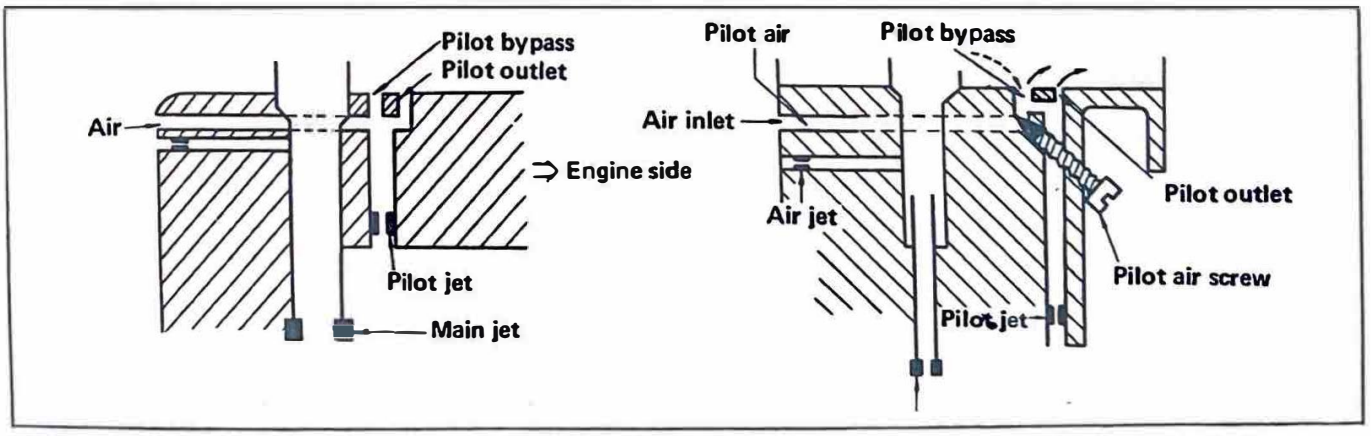
The pilot jet regulates the fuel flow rate at low speed operation. The number on the pilot jet denotes the size of the jet, that is, it indicates the fuel flow rate.

6. Pilot outlet

The pilot outlet allows the mixture to stream out into the air horn at low speed operation. It is located nearer the engine than any other jet so that it is greatly affected by the negative pressure in the engine.

7. Pilot bypass

The pilot bypass adds air to the mixture from the pilot outlet, thus making it a proper mixture. If the mixture from the pilot outlet is not enough for the engine at high speeds, an additional mixture is supplied through the pilot bypass



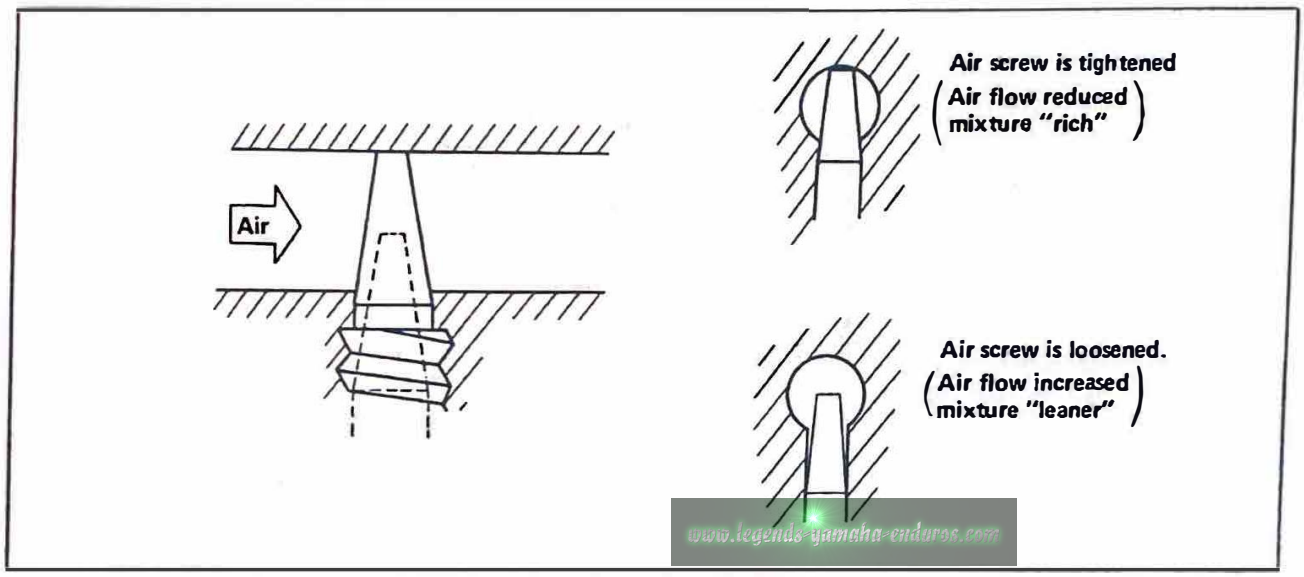
8. Air jet

The air jet supplies additional air to the fuel in the main circuit, thus regulating the mixture strength and improving the atomization to the fuel.

The number on the air jet denotes the air flow rate. The larger the number, the larger the hole. Some air jets are removable for replacement, and other are a matched fit with the mixing chamber and not removable. Lastly, some are merely drilled holes in the carburetor body.

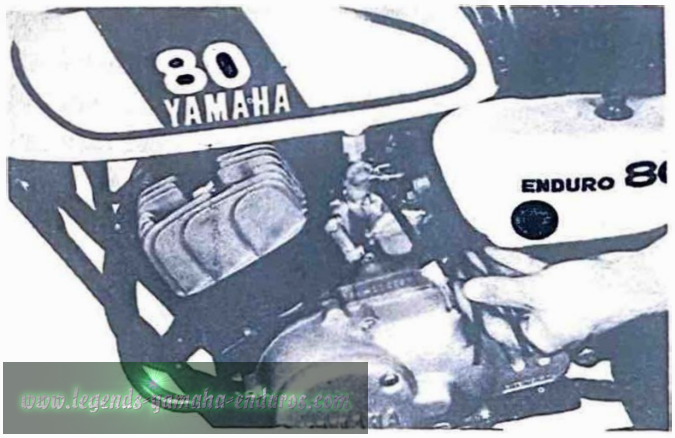
9. Pilot air screw

The pilot air screw is fitted in the pilot circuit and regulates the amount of pilot air, thus regulating the mixture strength indirectly.

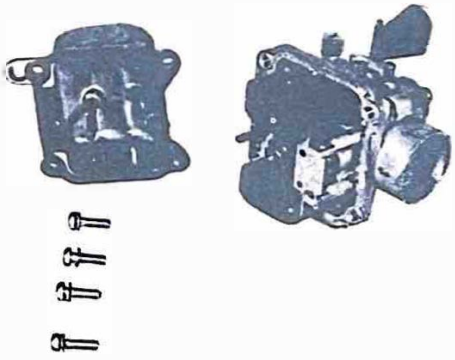


G. Overhauling and Cleaning

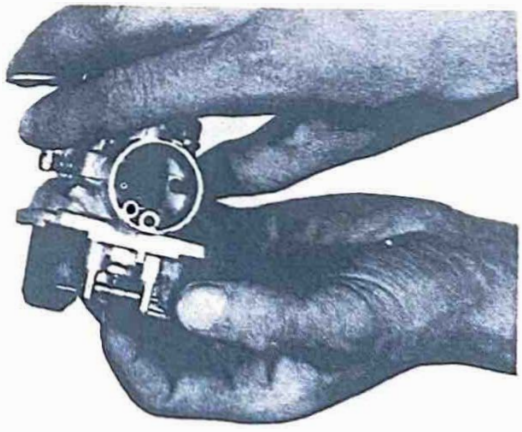
a. Turn fuel petcock lever to the "OFF" position.
b. Remove the gasoline tank fuel line from the fitting at the carburetor.
c. Loosen the manifold and inlet joint bands (hose clamps).
d. Push the air cleaner joint (hose) off the carburetor inlet.
e. Rotating the carburetor body, work it off the cylinder manifold joint.
f. Noting the location, and routing of all vent and overflow tubes, pull the carburetor toward you.
g. Unscrew the mixing chamber top. Remove the slide and needle assembly.



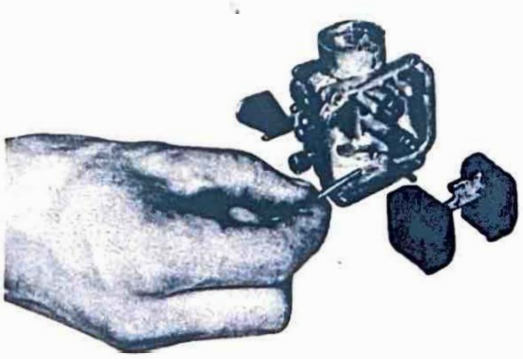
h. Remove the Phillips screws (4) holding float bowl to body. Hold carburetor upright and remove float bowl. Pour out gasoline.



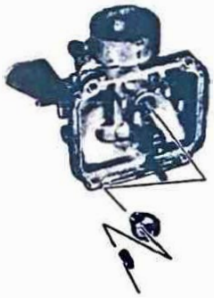
i. Carefully set body aside and inspect float. Note its installation position.



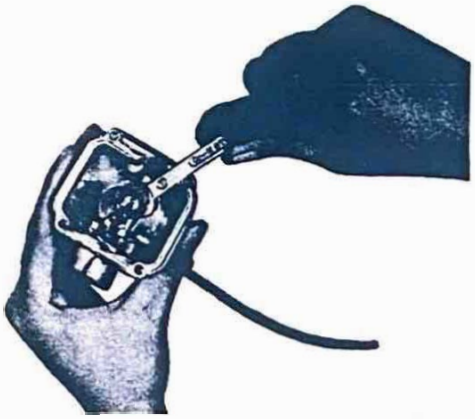
j. Remove float
Remove float. If the float is damaged, replace.
If there is gasoline inside the float, replace.



k. Remove the inlet needle directly beneath the float arm tang. Inspect the needle and seat for signs of excessive wear or attached foreign particles. Replace as required. (Replace inlet needle and inlet valve seat as an assembly.)

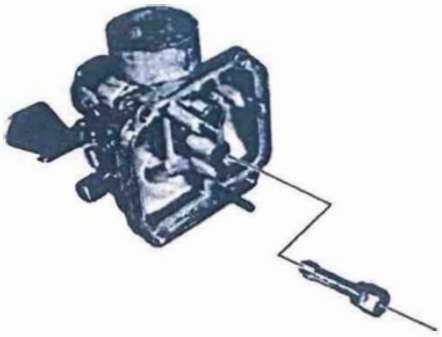


l. Remove, in order, the following components.
1) Main jet

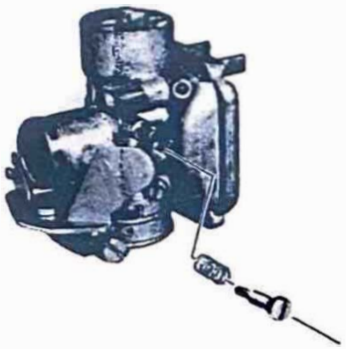


2) Pilot Jet

3) Needle Jet (push from bottom through venturi).



4) Throttle Screw (Idle Speed Screw)



5) Air Adjusting Screw (Idle Mixture Screw)

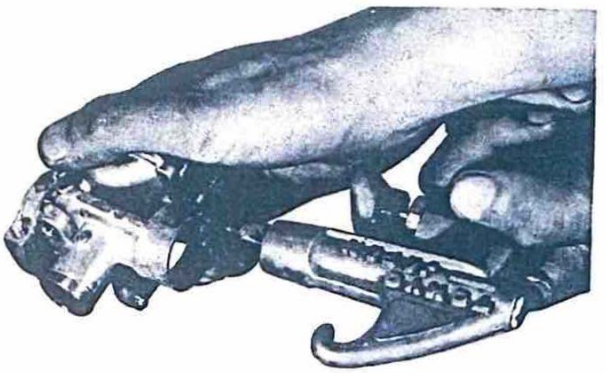
6) Starter jet.

m. Wash the carburetor in mild solvent. Wash all associated parts.

Note:

It is usually not necessary to use special carburetor cleaning solutions.
If deposits warrant this procedure, be sure to remove the starter jet assembly to avoid damaging the jet's neoprene valve.

n. Using high pressure air to blow out all passage and jets.



Caution:

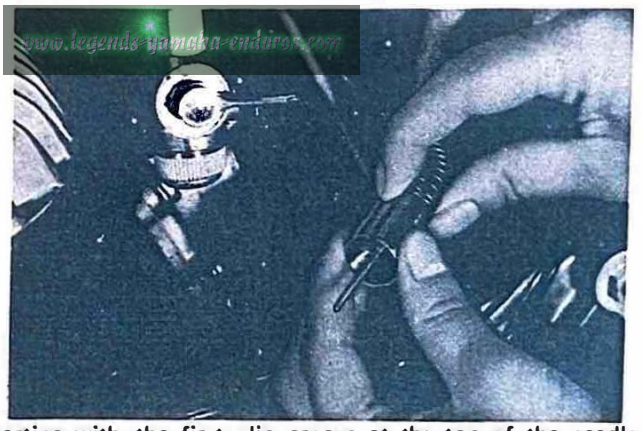
Never direct high pressure air into carburetor with float bowl installed. Damage to floats will occur.

o. Reinstall components, with the exception of the float bowl.

p. Float level
Refer to page 19 .

q. Install the float bowl

r. Push needle out of seat in throttle valve (slide). Inspect for bending, replace as required.



s. Check needle clip position. Clip position is counted starting with the first clip groove at the top of the needle. Replace clip if loose.

JET NEEDLE TYPE:	049-2
CLIP POSITION:	No. 2 Groove

t. Check throttle valve (slide) for signs of wear. Insert into carburetor body and check for free movement. If slide, or body, is out of round causing slide to stick, replace as required.

u. Install throttle valve and needle assembly in carburetor mixing chamber. Tighten mixing chamber top as tight as possible by hand.

Caution:

Do not use pliers as they may deform the mixing chamber shape, causing the throttle valve to stick during operation.

v. Install the mixing chamber top cover and all overflow and vent tubes. Reinstall carburetor. Check tightness of all fittings. Make sure carburetor is mounted in a level position.

Note:

After installation, check throttle cable adjustment and check to ensure that slide is free by turning and releasing throttle.

H. Carburetor Adjustment

The carburetor is made up of many precision-machined parts. It maintains a constant fuel level and produces an air-fuel mixture at an optimum mixing ratio according to the operating conditions of the engine. To produce the air-fuel mixture, the negative pressure in the engine causes the flow of air in the carburetor. Carburetor failures result mostly from dust (causing clogging), worn parts and fluctuations in the fuel level. If a carburetor is not in good working condition the air-fuel mixing ratio cannot be correct, thus reducing the efficiency of the engine.

The carburetor is so built that individual component parts must be adjusted to provide correct mixture at all throttle openings.

First check whether the air-fuel mixture is rich or lean, and then find at what throttle opening the problem occurs. The chart shows typical systems. Adjustments should be made in the following sequence.

Mixture is too rich.	Mixture is too lean.
Engine makes a dull noise intermittently.	Engine overheats.
When starter jet is actuated or choke valve is closed, engine runs roughly.	When starter is opened or when choke lever is closed, engine runs smoothly.
When engine is warmed up, it shows poor performance.	Acceleration is unsatisfactory.
Spark plug becomes sooty.	Spark plug runs too hot.
When air cleaner is removed, engine runs smoothly.	Engine runs irregularly and lacks power.
Exhaust is very smoky.	Exhaust is thin.

1. Throttle Valve Opening: 0 ~ 1/8 (Idling)

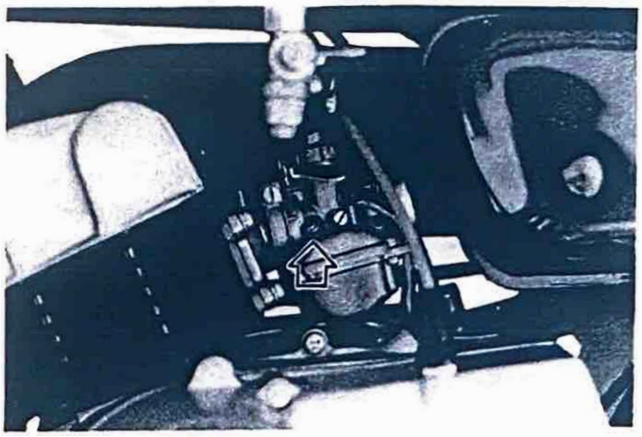
a. Fuel is too Rich

Cause	Remedy
Pilot air passage is clogged.	Wash with gasoline and blow with compressed air.
Pilot jet bleed hole is clogged.	Wash with gasoline and blow with compressed air.
Pilot jet is loose.	Tighten
When starter lever is released, starter plunger is not in closed position.	Make sure that starter plunger is in closed position, if not, adjust starter cable.
Inlet valve is stuck open or leaking	Jar it loose or replace valve.

b. fuel is too Lean

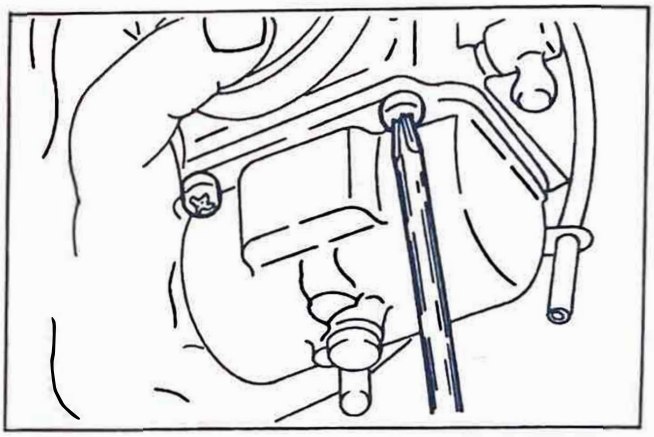
Pilot jet is clogged.	Wash with gasoline and blow with compressed air.
Bypass or pilot outlet is clogged.	Remove pilot jet, and wash with gasoline and blow with compressed air.
Carburetor joint is leaky.	Replace gasket, and retighten.
Throttle valve is worn and loose.	Replace.

Back off the pilot air screw as specified from a lightly seated position, and adjust it by turning it in and out 1/8 turn at a time to achieve the smoothest idle.



Pilot Jet Removal

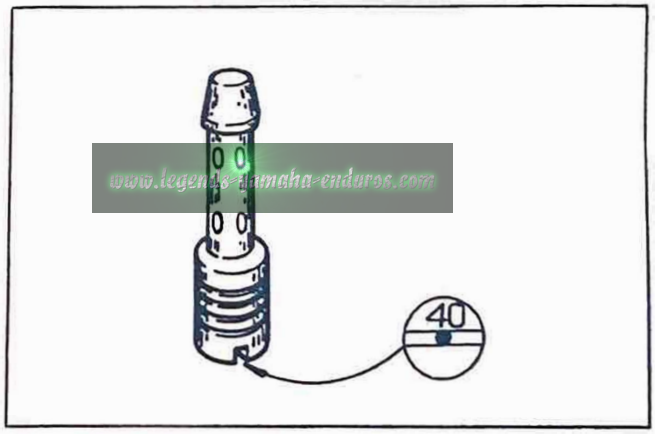
1. Remove the carburetor.
2. Remove the float chamber body.



3. Remove the pilot jet.

Inspection

Check the pilot jet for clogging. If clogged, clean it with compressed air.



2. Throttle Valve Opening: 1/8 ~ 1/4 (Starting and low speed)

a. Fuel is too Rich

Cause	Remedy
Follow procedures specified for 0 ~ 1/8 throttle openings.	Follow procedures specified for 0 ~ 1/8 throttle openings.
Main air passage or bleed air passage is clogged.	Wash with gasoline and blow with compressed air.
Jet needle (straight portion) or needle jet (bore) is worn.	If worn, replace
Needle jet or main jet is loose.	If necessary, retighten.

If the above check-ups are not helpful, replace the throttle valve with a new one having a larger cut away and perform adjustments.

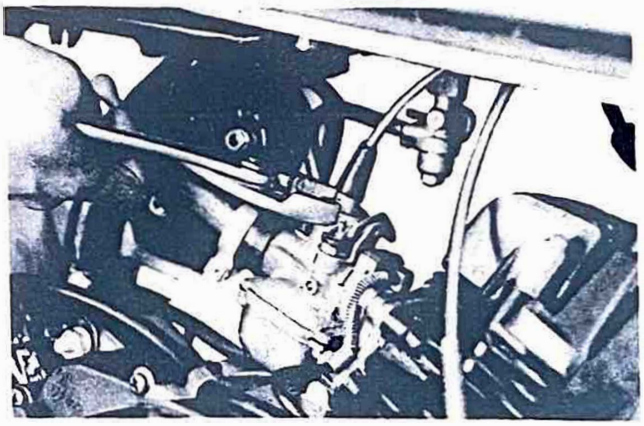
b. Fuel is too Lean

Cause	Remedy
Follow procedures specified for 0 ~ 1/8 throttle openings.	Follow procedures for 0 ~ 1/8 throttle openings.
Main jet or needle jet is clogged.	Wash with gasoline and blow with compressed air.

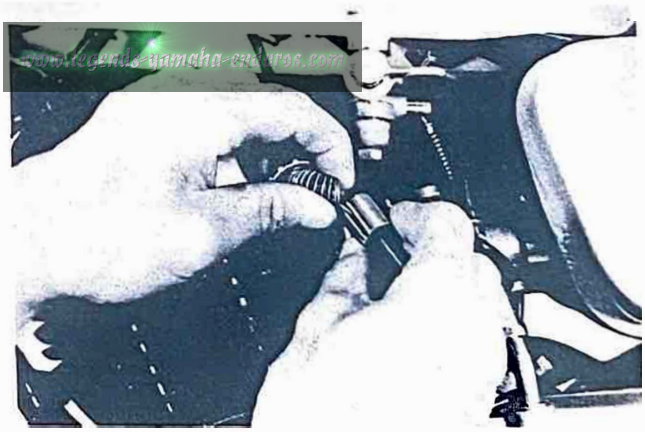
If the above Check-ups are not helpful, replace the throttle valve with a new one having a smaller cut-away.

Throttle Valve Removal

1. Remove the mixing chamber cap, and remove the throttle valve.



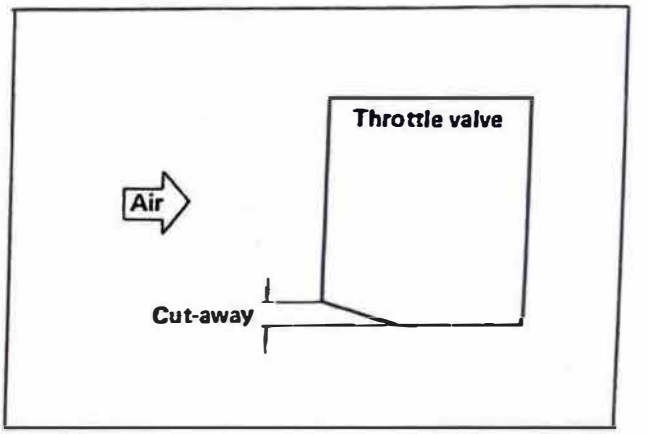
2. Slacken the throttle cable, and remove the throttle valve.



3. Remove the jet needle by pushing it upward.

Installation

1., Install the throttle valve with the cut-away facing to the rear (the air cleaner side).



3. Throttle Valve Opening: 1/4 ~ 3/4 (Normal speed)

a. Fuel is too Rich

Cause	Remedy
Primary air passage or bleed air passage is clogged.	Wash with gasoline and blow with compressed air.
Needle jet bleed hole is clogged.	Remove needle jet, and wash it with gasoline, then blow with compressed air.
Needle jet or main jet is loose.	Retighten.

If no irregularity is found, move up the jet needle one position. If it is still not helpful, replace both jet needle and needle jet.

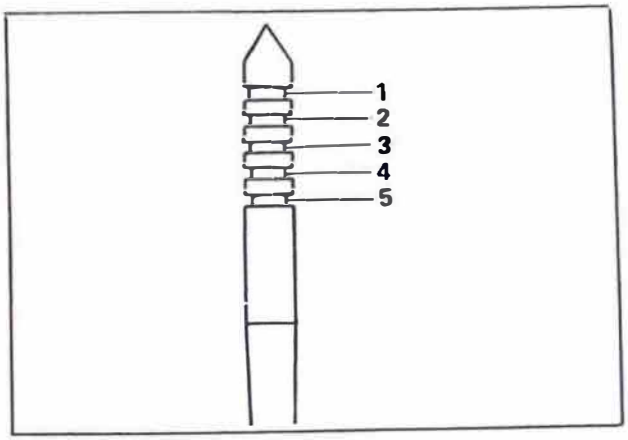
b. Fuel is too Lean

Cause	Remedy
Needle jet or main jet is clogged.	Wash with gasoline and blow with compressed air.

If no irregularity is found, move the jet needle down one position. If it is still not helpful, replace both jet needle and needle jet.

Adjusting Jet Needle Clip Position

1. Remove the mixing chamber cap, and remove the throttle valve.
2. Remove the throttle valve,
3. Remove the jet needle.
4. Properly change the clip position with pliers.



4. Throttle Valve Opening: 3/4 ~ FULL (Full speed)

a. Fuel is too Rich

Cause	Remedy
Primary air passage or bleed air passage is clogged.	Wash with gasoline, and blow with compressed air.
Needle jet bleed hole is clogged.	Remove needle jet, and wash with gasoline, then blowing with compressed air.
Main jet or needle jet is loose.	Retighten.

If no irregularity is found, change the main jet with a new one having a smaller number.
The main jet is numbered with a constant difference of 5 for under No. 100 and 10 for No. 100 or more.

b. Fuel is too Lean

Cause	Remedy
Main jet or needle jet is clogged.	Wash with gasoline, and blow with compressed air.

If no irregularity is found, change the main jet with a new one having a larger calibration No.

Removing the Main Jet

1. Remove the carburetor.
2. Remove the float chamber.
3. Remove the main jet.

Inspection

1. When checking the main jet for clogging, clean the fuel passage with compressed air.

I. Fuel Leakage (overflow)

Fuel leakage will result from a poor seating of the needle valve, weakened valve spring, dust attached to the needle valve, broken float or malfunction of the float. To repair oil leakage, it is important to detect the cause of the trouble.

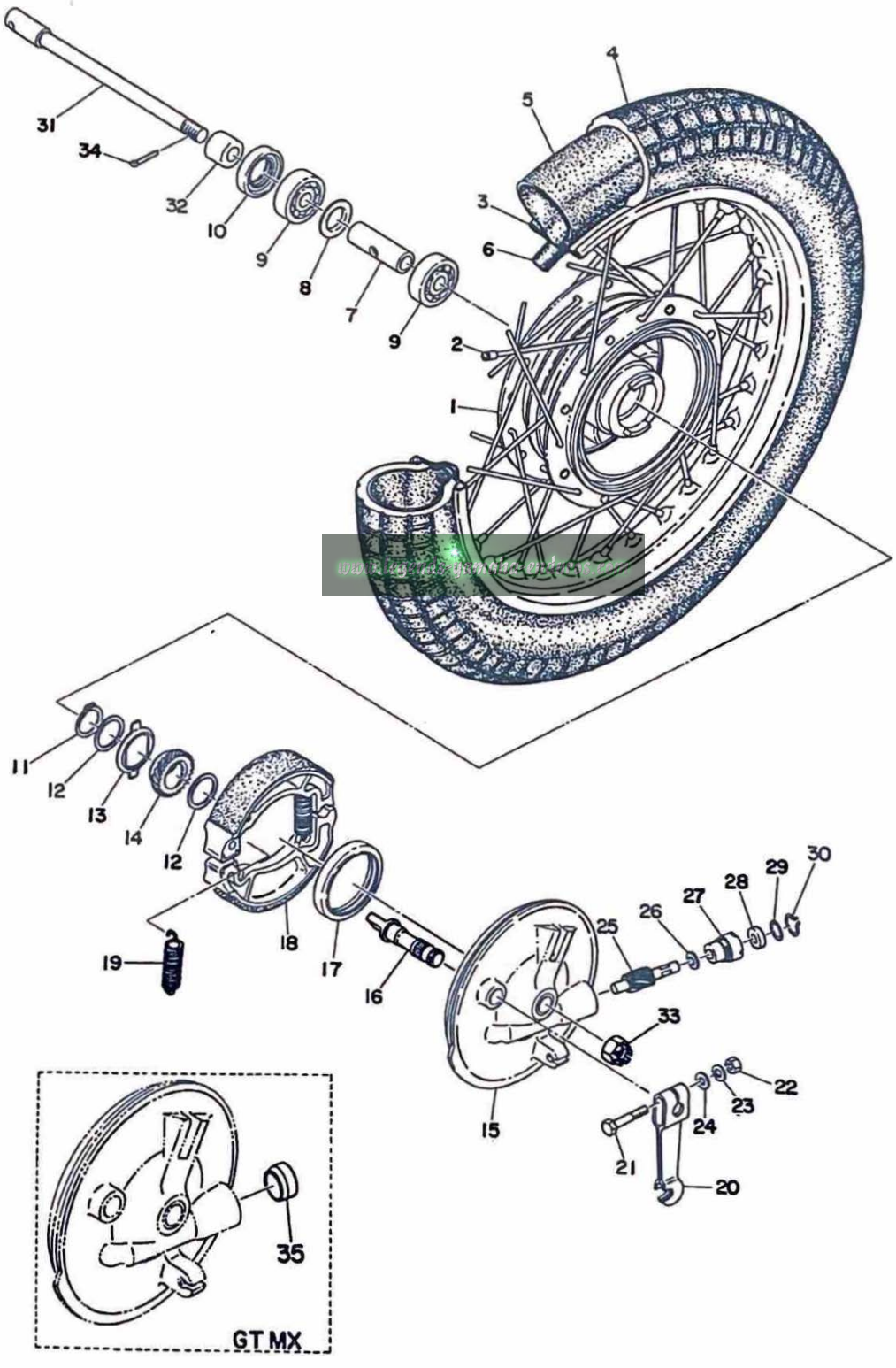
Fuel Leakage and Remedies.

Cause	Symptom	Remedy
Poor seating of needle valve due to worn or scratched needle valve.	Seapage.	Replace both needle valve and valve seat as an assembly.
Weak valve spring.	Leaks under certain running condition or urider any running condition.	Replace both needle valve and valve seat as an assembly.
Punctured or deformed float.	Leaks while parking and running (Amount of leaks differs depending on the condition of the float.)	Replace with a new one.
Inoperative float.	Undue leaks.	Check float movement for any obstructions.
Worn contact surfaces between float arm and needle valve.	Leaks from time to time.	If the float valve and valve seat are worn, replace the float arm.
Dust.	Leaks from time to time, but in large quantity.	Thoroughly wash the needle valve. If dust is found frequently, check fuel tank and fuel strainer for irregularities.

CHAPTER 8. CHASSIS

A. Front Wheel

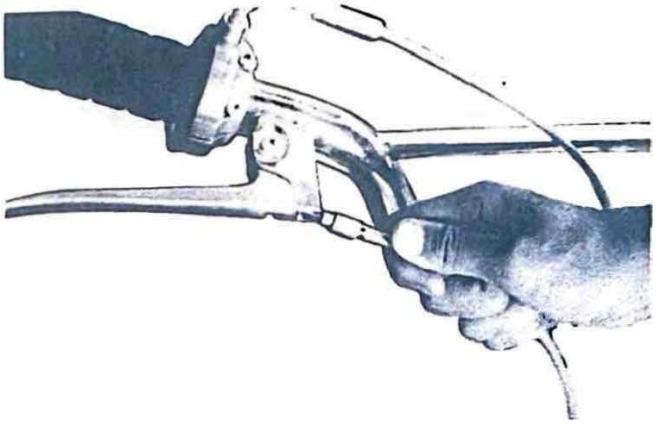
The 15" front wheel is equipped standard with a 2.50-15" Trials Universal tire.



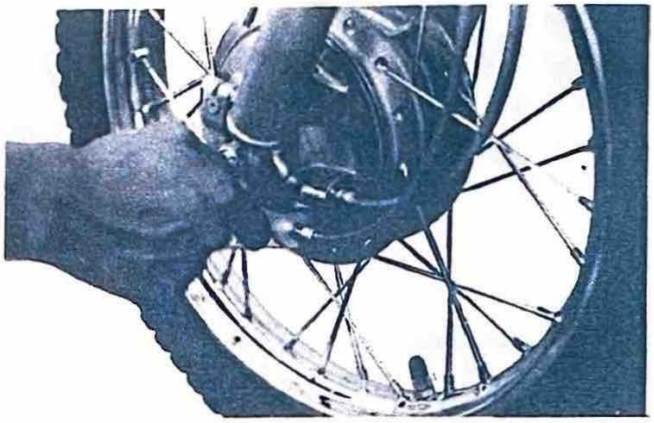
1. Hub
2. Spoke set
3. Rim
4. Tire
5. Tube
6. Rim band
7. Bearing spacer
8. Spacer flange
9. Bearing
10. Oil seal
11. Circlip
12. Thrust washer 2
13. Meter clutch
14. Drive gear
15. Brake shoe plate
16. Cam shaft
17. Oil seal
18. Brake shoe comp.
19. Return spring
20. Cam shaft lever
21. Bolt
22. Nut
23. Spring washer
24. Plain washer
25. Meter gear
26. Thrust washer 1
27. Bushing
28. Oil seal
29. O-ring
30. Stop ring
31. Axle
32. Axle collar
33. Axle nut
34. Cotter pin
35. Blind plug

1. Removal

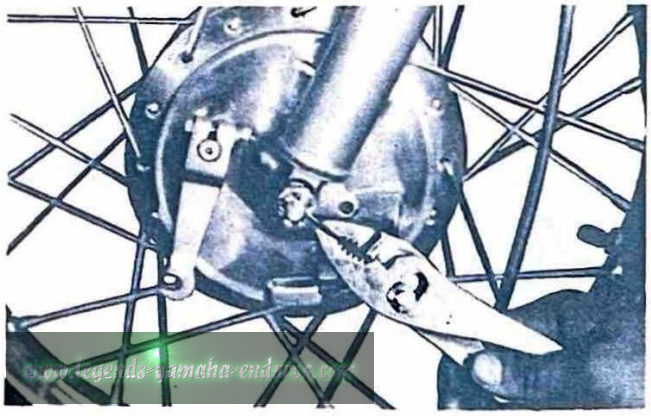
1) Disconnect the brake cable at the front brake lever.



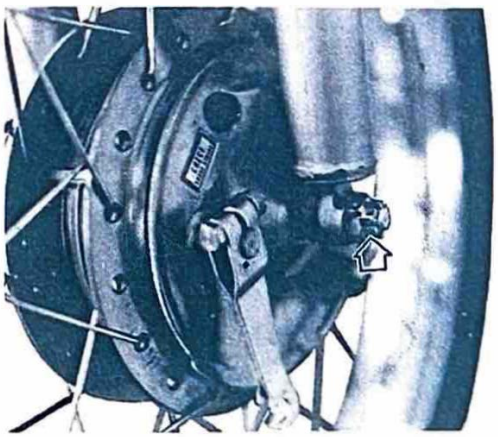
2) Disconnect both the brake cable and speedometer cable from the front brake shoe plate.



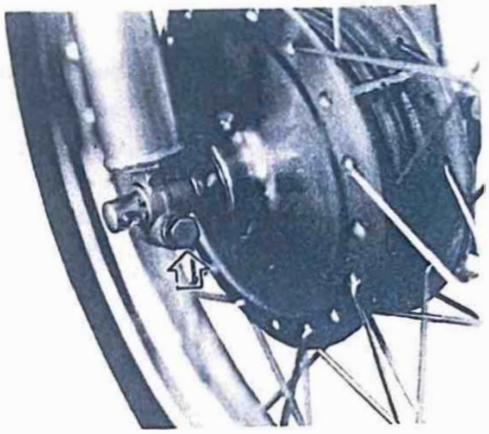
3) Remove the cotter pin.



4) Remove the front wheel axle nut.



5) Loosen the front wheel axle pinch bolt.



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

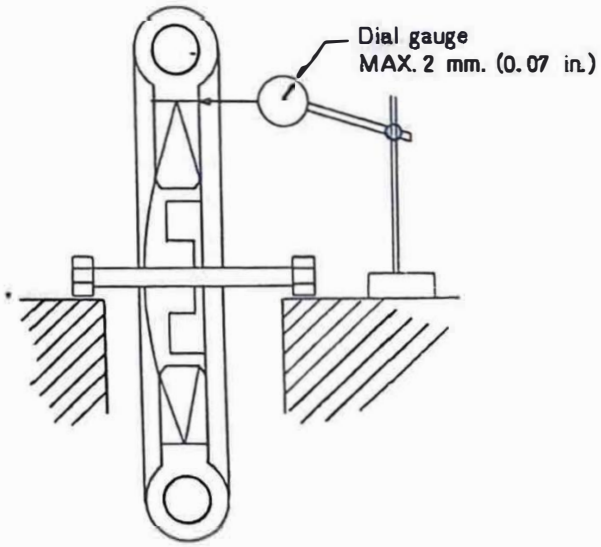
7) Raise the front of the machine and set it on a box. Then remove the wheel assembly.

2. Checking

1) Runout of the rim

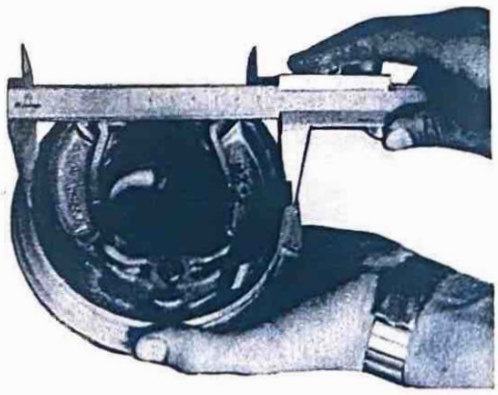
Measure the runout of the rim with a dial gauge as shown.

RUNOUT LIMITS: 0.07 in. (2 mm.) or less.

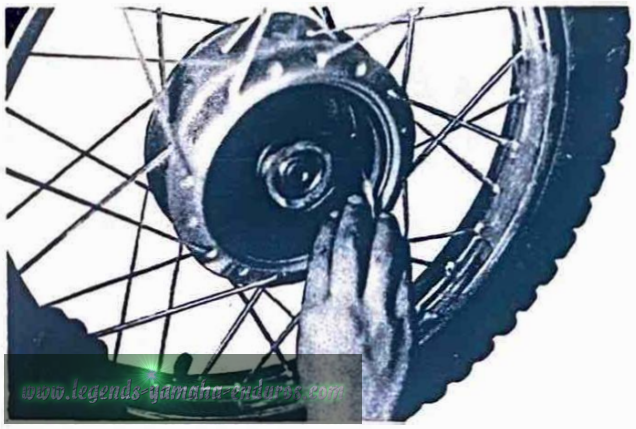


2) Brake shoe
Measure the outside diameter of the brake shoe with slide calipers. If it measures less than 4.3 ins. (110 mm.), replace it. Smooth out a rough shoe surface with sandpaper or with a file.

BRAKE SHOE DIAMETER:
4.3 ins. (110 mm.)



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

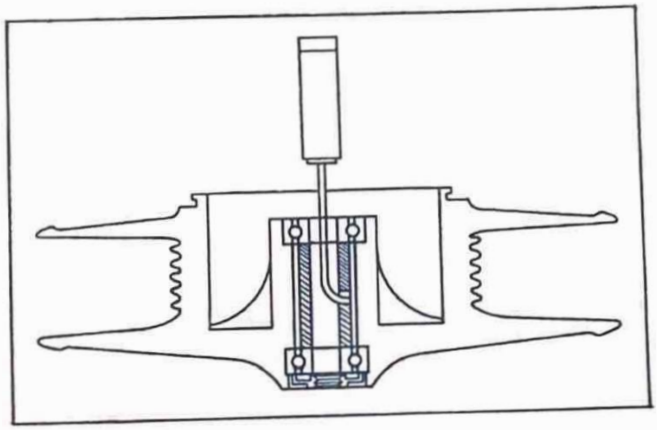


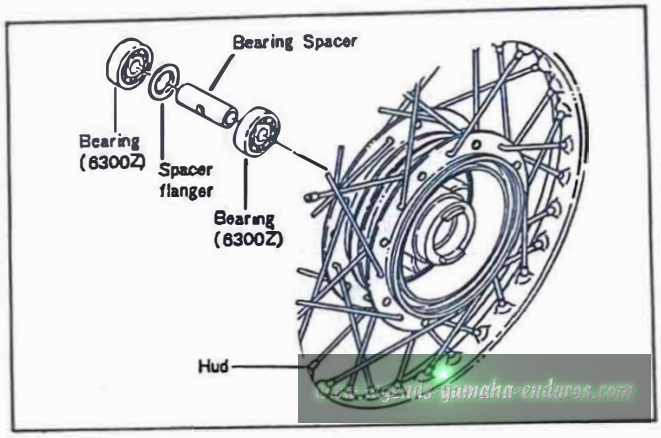
4) Check the spokes. If they are loose or bent, tighten or replace them. If the machine is ridden in rough country, or raced, the spokes should be checked regularly.

5) Repairing the brake shoe
If the brake shoe makes uneven contact with the brake drum or has scratches, 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 excessively play in the wheel or if it does not turn smoothly, replace the bearing.
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.

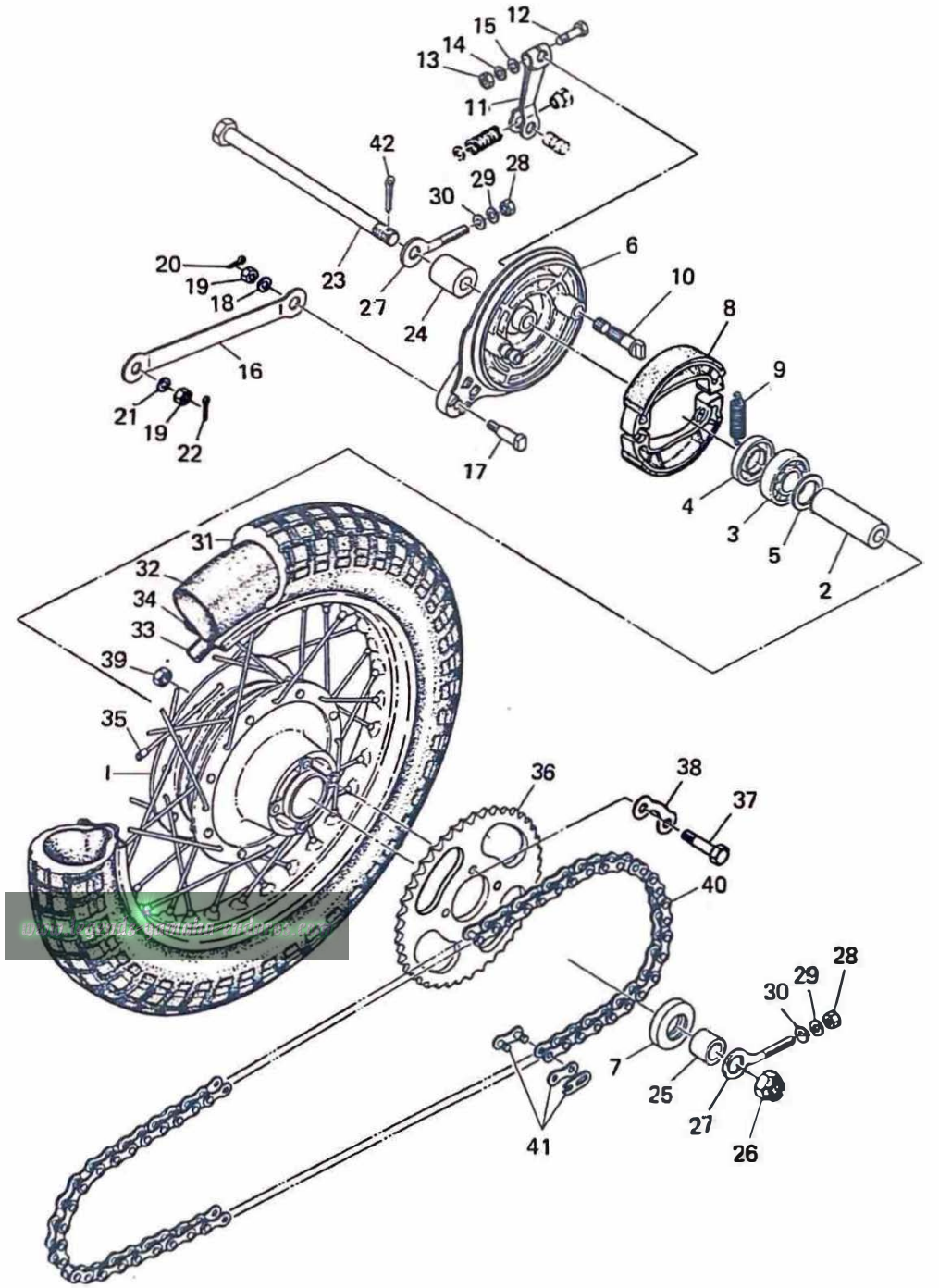
3. Replacing the Wheel Bearing
   a. First clean the outside of the wheel hub.
   b. Insert the bent end of the special tool (as shown in illustration) into the hole located in the center of the bearing spacer, and drive the spacer out from the hub by tapping the other end of the special tool with a hammer. (Both bearing spacer and spacer 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.





B. Rear Wheel

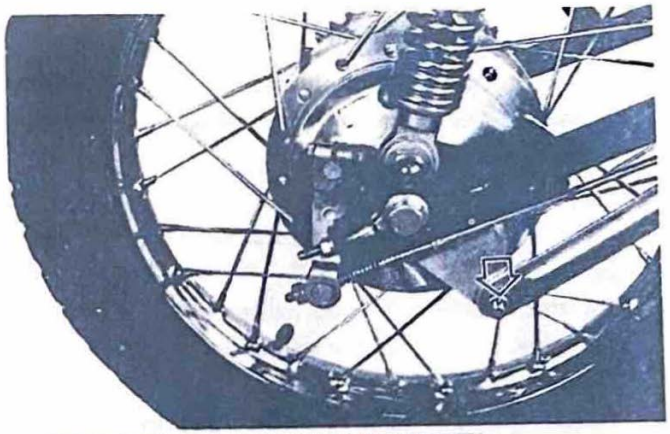
The rear wheel is 14 in. size, and the rear tire is the 2.75-14" Trials Universal. The single leading shoe type brake is 4.30 x 1.10 ins. (110 mm. x 28 mm.) in size. A labyrinth seal between the wheel hub and the brake plate is provided to prevent water and dust leakage. The brake tension bar is of link 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.



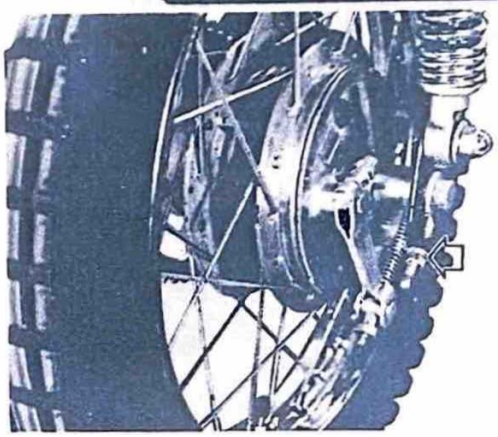
1. Hub
2. Bearing spacer
3. Bearing
4. Oil seal
5. Spacer flange
6. Brake shoe plate
7. Oil seal
8. Brake shoe comp.
9. Return spring
10. Cam shaft
11. Cam shaft lever
12. Bolt
13. Nut
14. Spring washer
15. Plain washer
16. Tension bar
17. Tension bar bolt
18. Spring washer
19. Nut
20. Cotter pin
21. Plain washer
22. Cotter pin
23. Axle
24. Axle collar
25. Axle collar
26. Axle nut
27. Chain puller
28. Nut
29. Spring washer
30. Plain washer
31. Tire
32. Tube
33. Rim band
34. Rim
35. Spoke set
36. Sprocket wheel gear
37. Fitting bolt
38. Lock washer
39. Nut
40. Chain
41. Chain joint
42. Cotter pin

1. Removal

1) Disconnect the chain joint and remove the chain.
2) Remove the cotter pin and then remove the tension bar and brake rod from the rear shoe plate.



3) Loosen the chain tension adjusting nuts right and left sides.
4) Remove the cotter pin, and then remove the rear axle nut.
5) Remove the axle.



6) Remove the righthand chain adjuster and distance collar.
7) Remove the rear brake plate.
8) Remove the rear wheel assembly.

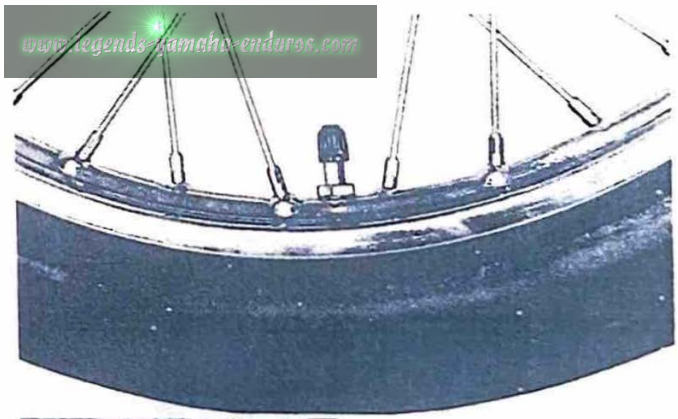
2. Replacing the Rear Wheel Bearing

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

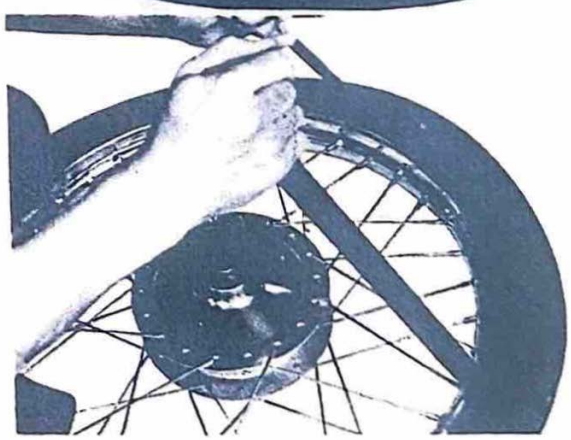
3. Replacing Tires

a. Removal

1) Remove the valve cap and lock nut from the tire valve, and deflate the tire.

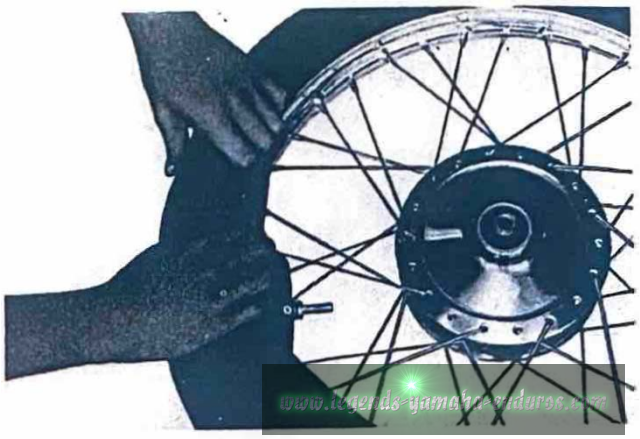


2) Remove the tire from the wheel rim using the two tire irons (Exercise care to avoid damaging the inner tube with the levers). To remove the inner tube, only one side of the tire needs to be pried off the wheel rim.



b. Installation

1) Insert the tube between the tire and the wheel rim, and momentarily inflate the tube allowing the tube to fit the tire. Be sure that the valve stem is not cocked to one side.



2) Mount the tire completely back on the wheel rim using tire irons.
For this operation, it is advisable that the bead on the other side of the tire be pushed in toward the middle of the rim.

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

4. Inspection

1) Runout of the rim
Check the rim for runout in the same way as the front wheel. Maximum limit of runout ..... 0.080 in. (2 mm.) or less.

2) Brake shoe
Check the brake shoe in the same way as the front brake. Minimum limit .... 4.30 ins. (110 mm.)

3) Brake drum
Check the brake drum in the same way as the front brake drum.

4) The spokes are measured in the same way as the front spokes. 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 is worn out or damaged, replace the tire.

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

C. Rear Sprocket

1. Checking and Adjustment
The rear wheel sprocket is installed on the rear wheel 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 damaged. 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.

D. Tires and Tubes

Normal tire pressure

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

On-the-road riding

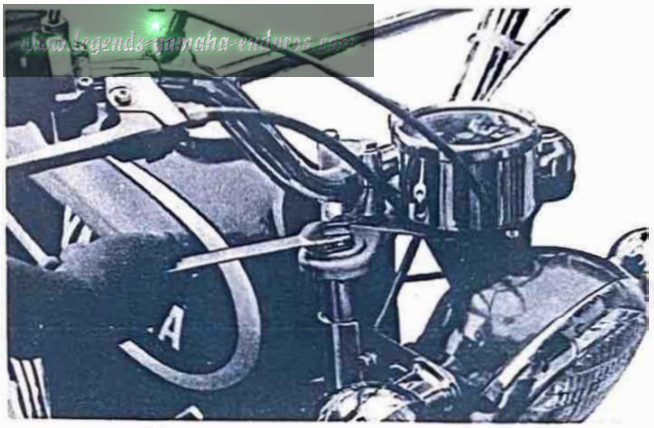
Front	(23 lbs./in.^{2})	1.6 kgs./cm.^{2}
Rear	(31 lbs./in.^{2})	2.2 kgs./cm.^{2}

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

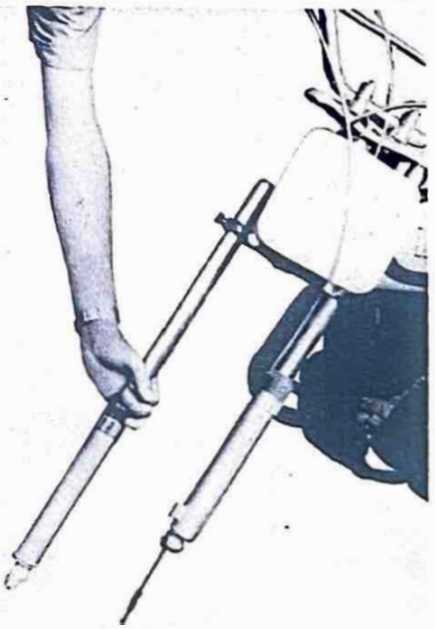
E. Front Forks

The GT80B · GTMXB is equipped with competition designed telescopic double dampening front forks. These front forks provide excellent riding comfort along with handling superiority. The maximum stroke travel is almost 3.0 ins. (75 mm.)

1. Removal
   1) Remove the front fender.
   2) Loosen the inner tube pinch bolt on the under-bracket.
   3) Remove the inner tube cap bolt.



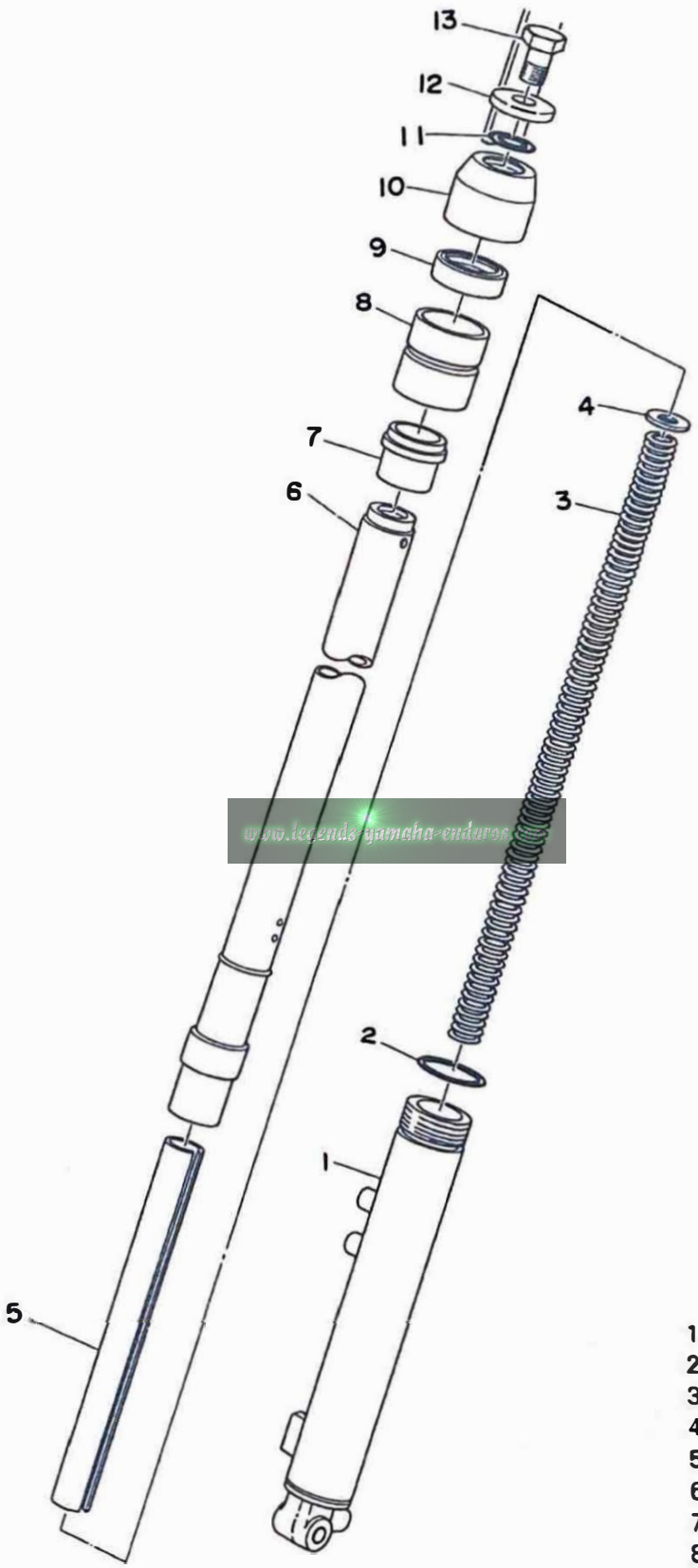
   4) Pull the outer tube downward.



2. Disassembling the Inner and Outer Tubes

1) Drain the oil from the fork.

2) Place tire tube around the outer tube nut and wind a strap wrench or outer tube nut wrench around it. Turn it counterclockwise to remove the nut. Inner tube can now be separated from outer tube.

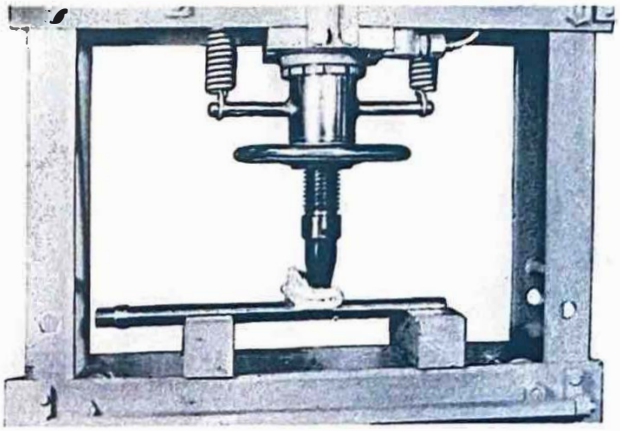


1. Outer tube
2. O-ring
3. Fork spring
4. Spring upper washer
5. Spacer
6. Inner tube
7. Side metal
8. Outer nut comp.
9. Oil seal
10. Dust seal
11. Packing
12. Cap washer
13. Cap bolt

3. Checking

1) Inner tube

Check the inner tube for bends or scratches. If the bend is slight, it can be corrected with a press. It is recommended, however, to replace the tube if possible.

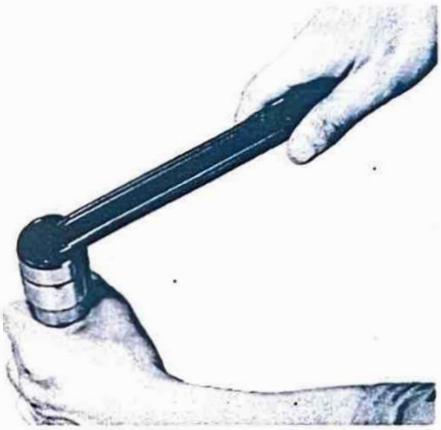


2) Slide metal

Check slide metal for wear, scratches or damages. If necessary, replace it.

3) Oil seal

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



4. Assembling

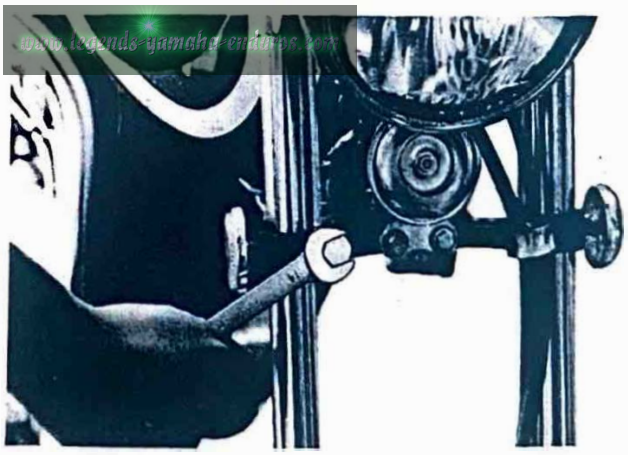
1) When assembling the front fork, reverse the order of disassembly.

Note:

When fitting the outer tube nut over the inner tube, cover the inner tube top with a vinyl cloth to prevent damage to the oil seal lip in the outer tube nut.

2) Installing the front fork on the frame

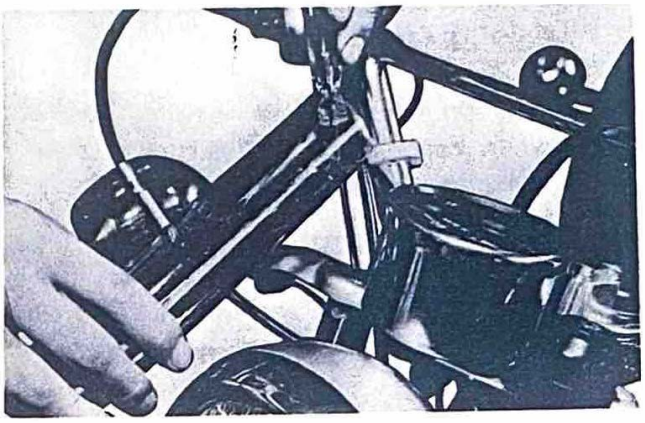
a. Fit the inner tube to the correct position and tighten the inner tube pinch bolt of the under bracket.



b. Pour oil into the inner tube through the upper end opening.

FRONT FORK OIL:	Motor oil 10W/30
FORK OIL QUANTITY:	L 96 c.c. R 120 c.c.

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



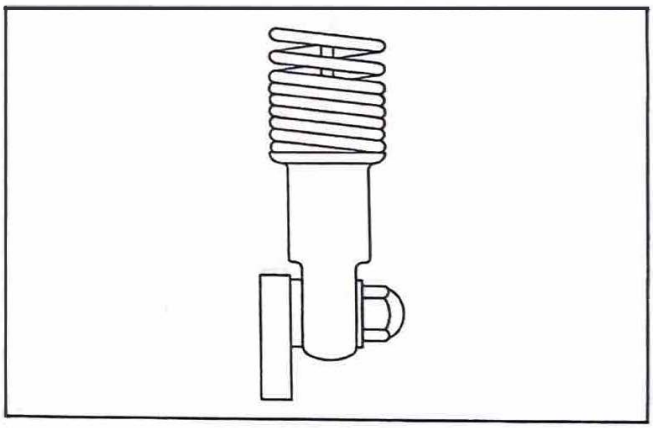
F. Rear Shock Absorbers

The rear shock absorbers have a maximum stroke of 2.16 ins. (55 mm.)

1. Checking the Condition of the Damping Units
   1) Remove the rear shock absorber assembly.
   2) Make sure that the rear shock absorber moves up and down completely from bottom to top. Then, depress the absorber assembly a few times. If the spring quickly rebounds half-way and slowly to the last 10 mm., the shock absorber is in good condition. If the spring quickly rebounds all the way, the absorber must be leaky. Replace it with a new one.

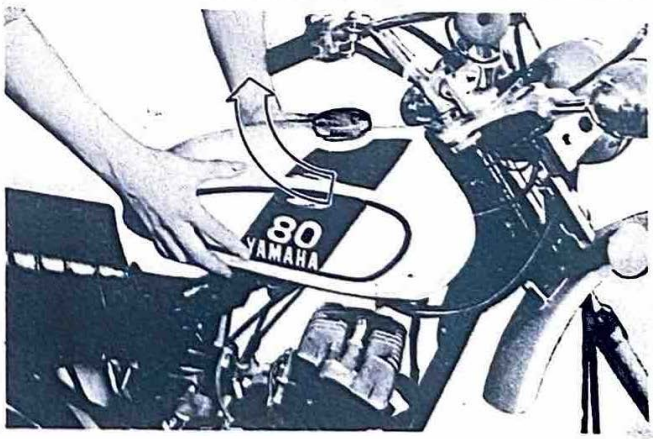
Note:

Rear shock absorber should be installed as illustration.



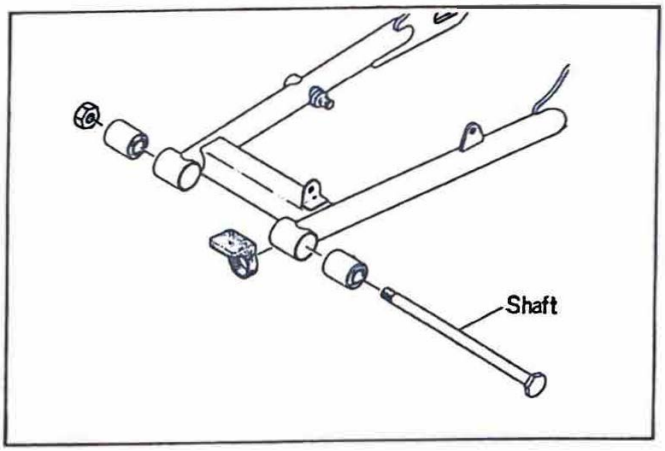
G. Gas Tank

1. Removing
   1) Set the fuel petcock lever at the "Stop" position and disconnect the fuel line at the petcock.
   2) Open the seat.
   3) Remove the gas tank by pulling up and back.



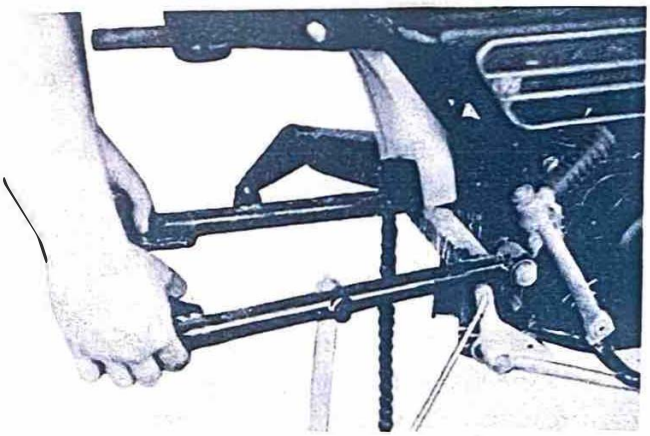
H. Rear Swing Arm

The rear swing arm is made of steel tubing for improved strength and torsional rigidity. The pivot employs permanently lubricated bearings.

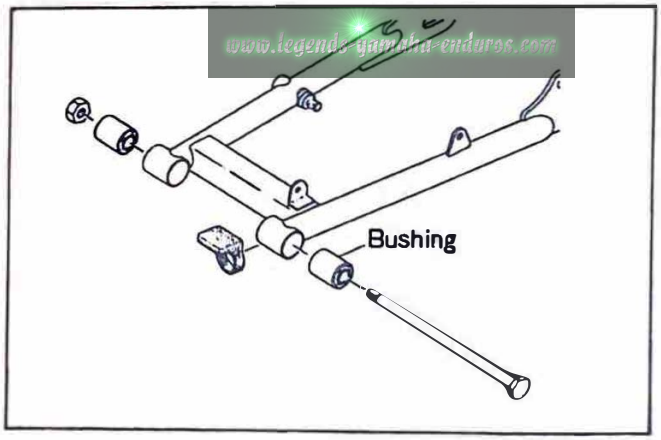


1. Removing
   1) Remove the chain case mounting screws.
   2) Remove the rear swing arm shaft nut, pull out the shaft, and remove the rear swing arm.

2. Checking
   1) Check the play of the rear swing arm by moving from side to side as shown below, with the rear swing arm installed. If the play is excessive, replace the rear swing arm bushings or the rear swing arm shaft.



   2) Insert the bushing and check it for play. If the play is excessive, replace the bushing.
   3) Grease the rear arm shaft periodically.

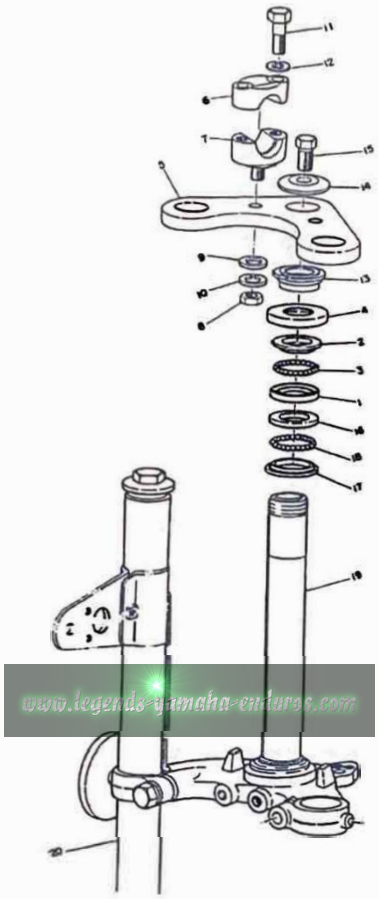


3. Replacing Rear Swing Arm Bushings

On motorcycles being used only for on-the-street riding, rear swing arm bushings should be replaced every 6,000 miles (10,000 km). 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).

I. Steering Head

1. Exploded View of the Steering Head



1. Ball race 2
2. Ball race 1
3. Ball
4. Ball race cover
5. Handle crown
6. Handle upper holder
7. Handle under holder
8. Nut
9. Plain washer
10. Spring washer
11. Bolt
12. Spring washer
13. Fitting nut
14. Crown washer
15. Fitting bolt
16. Ball race 2
17. Ball race 1
18. Ball
19. Under bracket comp.
20. Inner tube

2. Checking

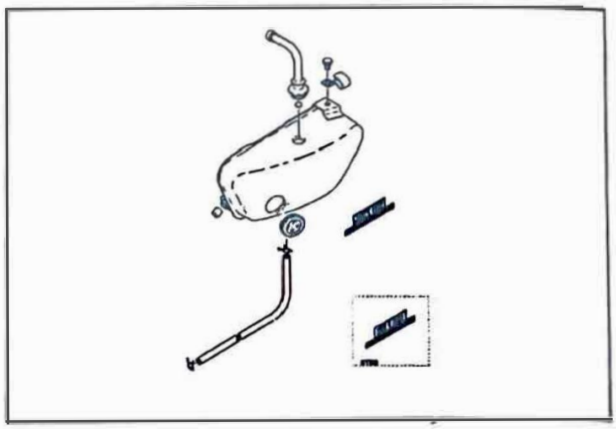
1) Ball Races and Steel Balls

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 the balls and races and relubricate periodically.

Note:

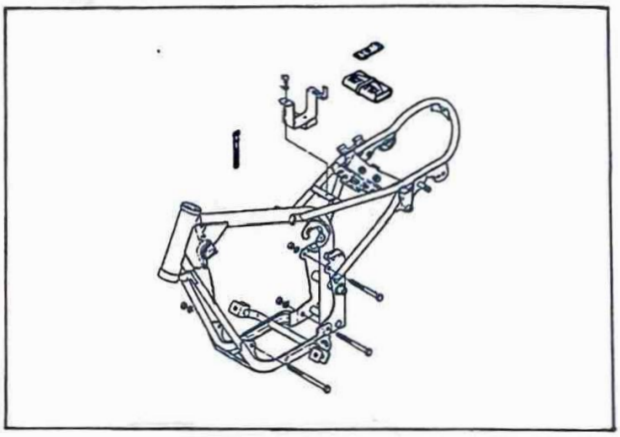
Do not use a combination of new balls and used races or vice versa. If any of these are found defective, replace the whole ball and race assembly.

J. Oil Tank, Battery Box and Tool Box



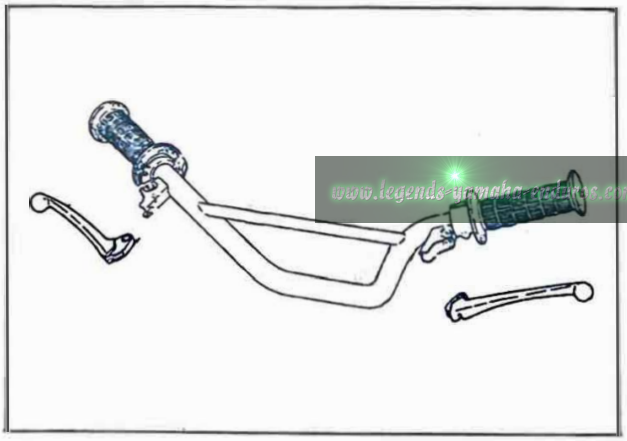
The oil tank is located on the left side under the seat. It is designed to be as narrow as possible so that it will not contact the rider's lower limbs when the stands upright on the footrests. To fill the autolube oil tank, lift the seat and the tank cap will be exposed.
The battery box is located right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

K. Frame



The double cradle-type frame is made of steel tubing that provides 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 points.

L. Handlebar



The upswept type longer handlebars are provided with deep-cut pattern grips to prevent hand slippage.
The meter bracket is mounted on the ends of the handle crown, to carry the speedometer.

M. 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 crankcase ..... covering from the exhaust system to the drain plug.

CHAPTER 9. ELECTRICAL SYSTEM

A. Description

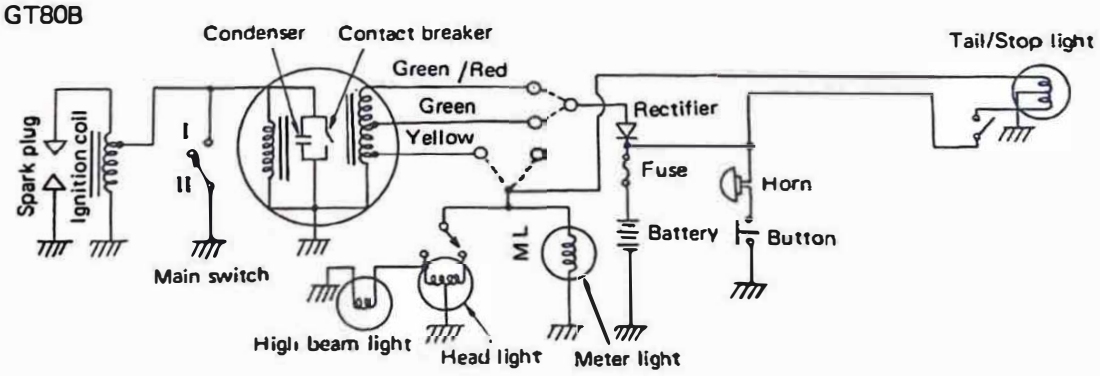
The GT80B/GTMXB employs a flywheel magneto for its ignition system.

B. Table of Component Parts

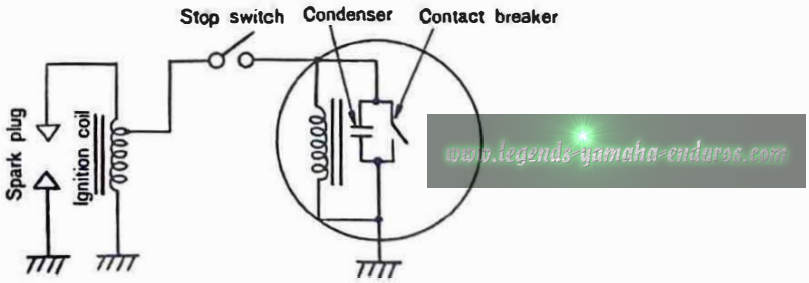
Parts	Manufacturer	Model & Type	
		GT80B	GTMXB
Flywheel magneto	Hitachi Ltd.	F11-L48	F000T00173 Mitsubishi Ltd.
Spark plug	NGK	B-8HS	B-8HS
Headlight	Koito Mfg.	6V 15/15W Flasher pilot light 6V 3W	
Speedometer	Nippon Seiki		
Handlebar switch	Asahi Denso		
Ignition coil	Hitachi Ltd.	CM-61-20H	CM-61-20H
Horn	Nikko Kinzoku	GF-6	
Battery	Nippon Battery	6N4-2A	
Rectifier	Stanley Elec.	DE2304	
Fuse	Taiko Mfg.	10A	
Stop switch	Asahi Denso		
Taillight	Koito Mfg.	6V 25W/5.3W	

C. Connection Diagram

GT80B



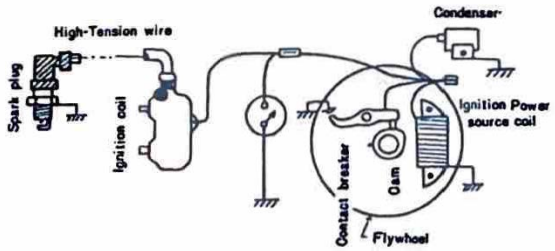
GTMXB



D. Ignition System-Function and Service

1. Function

The ignition system consists of the components as shown. As the flywheel rotates, an electromotive force develops in the ignition power source coil, and produces a voltage 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 300V) which is produced in the primary coil, is stepped up to 12,000 14,000V by mutual-induction and the electric spark jumps across the spark plug electrodes.



E. Ignition Timing

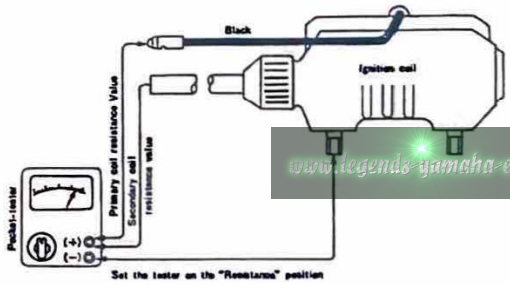
Refer to page 20 ~ 22.

F. Ignition Coil

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

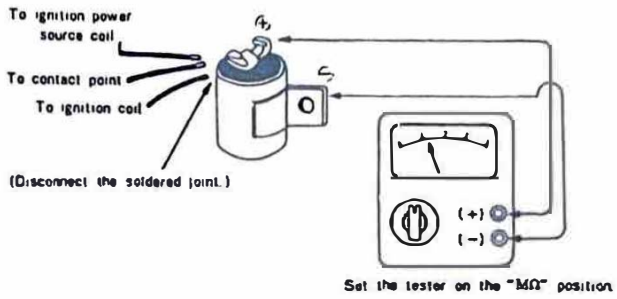
Secondary coil resistance value .....
6.0KΩ ±10% (20°C or 68°F)

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.



G. Condenser

Electric arc 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.
Insulation resistance tests should be conducted by connecting the tester as shown at right. If the reading is more than 3MΩ, the insulation is good and the capacity test can be performed.



Note:

After this measurement, the condenser should be discharged by connecting the positive and negative sides.

Capacity tests can be performed by simply setting the tester to "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 0.30μF ± 10%, the condenser capacity is correct.

H. Charging System

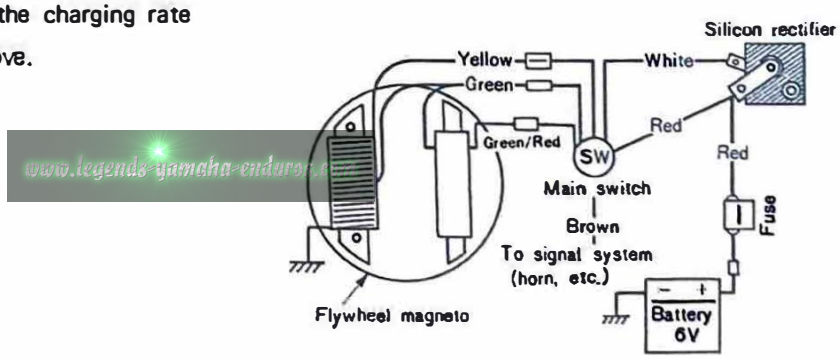
The charging system consists of the flywheel magneto (charging and lighting coils), rectifier, and battery.

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. 4.0A or less at 8,000 r.p.m.
Charging Capacity (Nighttime)	Green/Red:	Charging begins at 2,000 r.p.m. 1.5 ± 0.3A or less at 8,000 r.p.m.
Lighting Capacity (Nighttime) (with normal loads and normal wiring)		5.7V or more at 2,500 r.p.m. 8.0V 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 not be exactly the same as above.

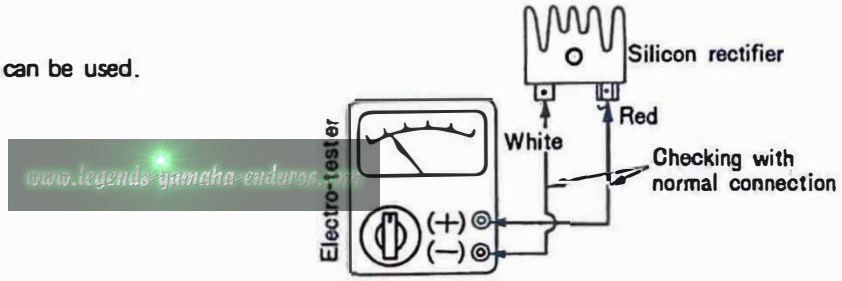


2. Silicon Rectifier

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 – 400V

a. Checking the Silicon Rectifier
For measurements, an ohmmeter can be used.



(Set the tester on "Resistance".)

b. 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 ~ 10 Ω
If the tester's pointer will not swing back over from the scale, the rectifier is defective.

c. 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.

d. 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.

I. Battery (GT80B)

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. the battery will lose its charge if the horn and stoplight are excessively used. The charging of the battery begins at about 2,000 R.P.M. Therefore, it is recommended to sustain engine R.P.M. at about 3,000 to 4,000 R.P.M. to keep the battery charged properly. If the horn and stoplight are used very often, the battery water should be checked regularly as continuous charging will dissipate the water.

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 6V battery requires a charging voltage 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) Using water containing impurities when re-filling the battery.

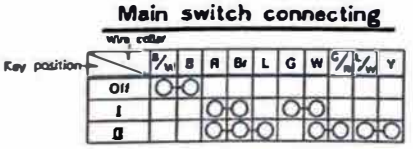
3. Storage

   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.

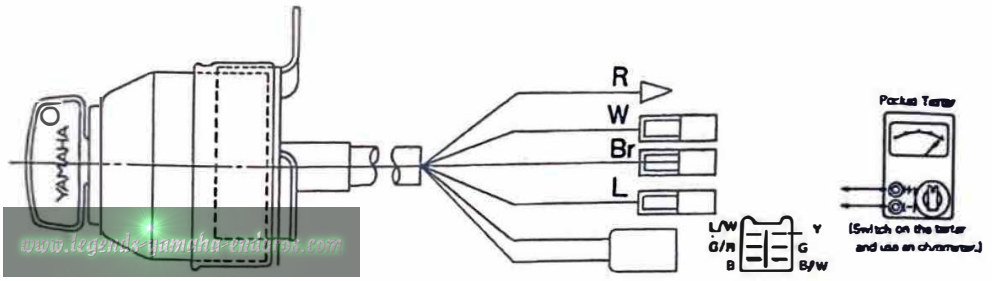
4. Service Standards

Battery Capacity	6V-4AH	
Electrolyte specific gravity	1.26, (one cell) quantity 11 c.c.	At full charge
Initial charging current	0.2A for 25 hours	New battery
Charging current	0.2A for 13 hours (Charge until specific gravity reaches 1.26)	When discharged
Refilling of electrolyte	Distilled water up to the max. level line.	As required

J. Checking the Main Switch (removed from the chassis) GT80B



Key "Off" position
B/W ⟷ B
Key "I" position
R ⟷ Br
G ⟷ W
Key "II" position
R ⟷ Br
R ⟷ L/W
Br ⟷ L/W
W ⟷ G/W
L ⟷ Y



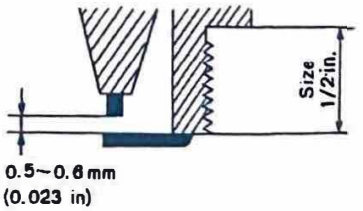
If the readings or the above eight measurements are nearly 0Ω, and no short-circuit is noticed between the terminals, as well as between the lead terminal and the switch body, the main switch is in good condition.

K. 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 2,000 miles (3,000 km.) 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 somewhat 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 600 miles (1,000 km.). Clean the electrodes of carbon and adjust the electrode gap to 0.023 in. (0.5 ~ 0.6 mm.). Be sure to use standard B-8HS plug as replacement to avoid any error in reach.



L. Lighting and Signal Systems (GT80B)

The lighting and signal systems consist of the horn and stoplight (power source – battery) and the headlight, taillight, meter lamps, speedometer.

1. Headlight
   The headlight has two 6V, 15W bulbs. A beam direction 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, 5.3W taillight and a 6V, 25W stop light 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 nut for water proofing purposes.

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

5. Flasherlights
   6V 8W bulbs are mounted, and are actuated by condenser type flasher relay.

CONVERSION TABLES

LENGTHS

Multiply	By To Obtain	Multiply	By To Obtain
Millimeters (mm)	0.03937 Inches	Kilometers (km)	0.6214 Miles
Inches (in)	25.4 Millimeters	Miles (mi)	1.609 Kilometers
Centimeters (cm)	0.3937 Inches	Meters (m)	3.281 Feet
Inches (in)	2.54 Centimeters	Feet (ft)	0.3048 Meters

WEIGHTS

Kilograms (kg)	2.205 Pounds	Grams (g)	0.03527 Ounces
Pounds (lbs)	0.4536 Kilograms	Ounces (oz)	28.35 Grams

VOLUMES

Cubic centimeters (cc)	0.061 Cubic inches	Imeprial gallons	277.274 cu.in.
Cubic inches (cu.in.)	16.387 c.c.	Liters (ℓ)	1.057 Quarts
Liters (ℓ)	0.264 Gallons	Quarts (qt.)	0.946 Liters
Gallons (gal.)	3.785 Liters	Cubic centimeters (cc)	0.0339 Fluid ounces
U.S. gallons	1.2 Imperial gals.	Fluid ounces (fl. oz.)	29.57 c.c.
Imperial gallons	4.537 Liters		

OTHERS

Metric horsepower (ps)	1.014 bhp.	Foot-pounds (ft-lb)	0.1383 kg-m
Brake horsepower (bhp)	0.9859 ps.	Kilometers per liter (km/ ℓ)	0.2352 mpg
Kilogram-meter (kg-m)	7.235 ft-lbs	Miles per gallon (mpg)	0.4252 km/ ℓ

GAS (FUEL) TO OIL RATIO CHART

Gas/Oil Ratio	12:1	16:1	20:1	24:1	28:1	32:1	36:1	40:1
Oil (qt) per 1 Gal. Gas	0.33	0.25	0.2	0.2	0.14	0.13	0.11	0.1
Oil (oz) per 1 Gal. Gas	10.7	8.0	6.4	6.4	4.6	4.0	3.6	3.2
Oil (qt) per 5 Gal. Gas	1.66	1.25	1.0	1.0	0.72	0.63	0.55	0.5
Oil (oz) per 5 Gal. Gas	53.5	40.0	32.0	32.0	22.8	20.0	17.8	16.0

(U.S. Gallons)

GT80B WIRING DIAGRAM