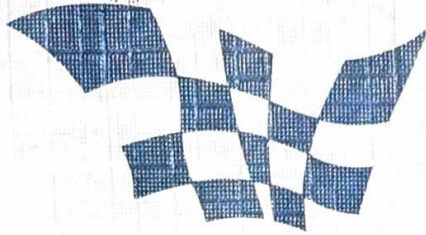


# YAMAHA



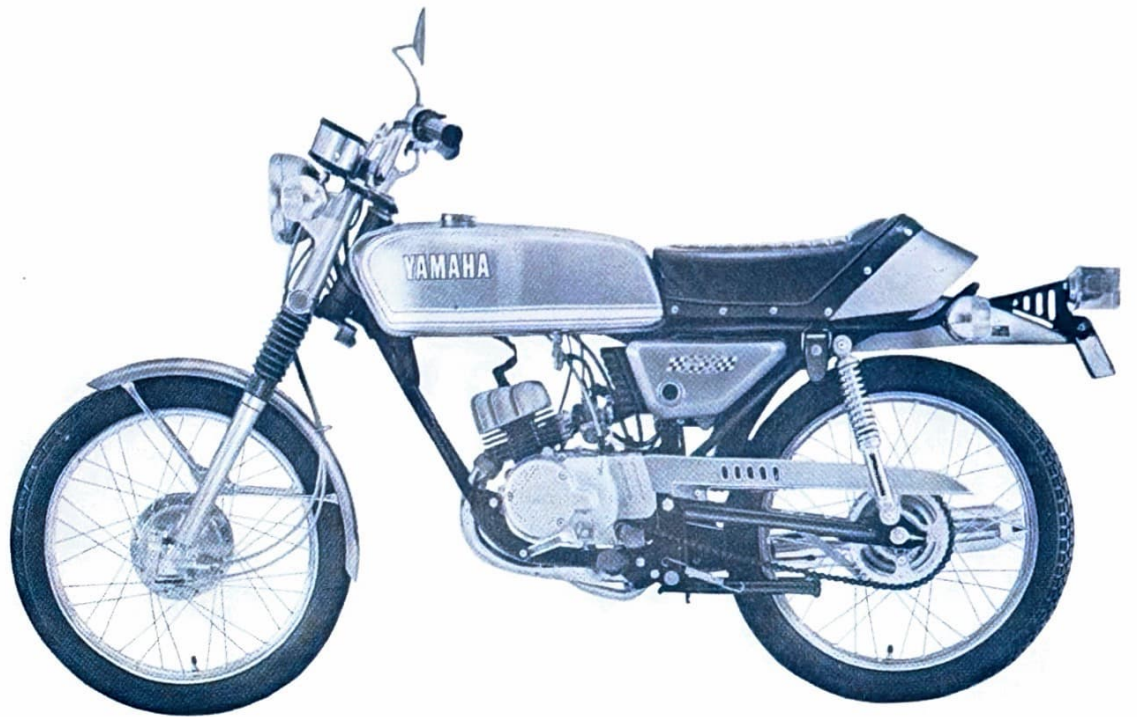
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# **RD60B**

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## **SERVICE MANUAL**

388-28197-10



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# MODEL **RD60B** ('75MODEL)

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## NOTICE

ALL PART NUMBERS CONTAINED IN THIS CATALOGUE ARE COMPRISED OF TEN DIGITS. WHEN ORDERING, PLEASE ADD TWO ZEROS TO THE END OF EACH PART NUMBER REQUIRED TO CONVERT THE TEN DIGITS INTO THE NEW TWELVE DIGIT NUMBERS.

This Parts List is for the exclusive parts for the RD60B. Please refer to RD60(A) Parts List for the parts not listed in this publication.

# NUMERICAL INDEX

Ref No.	Parts No.	Ref No.	Parts No.	Ref No.	Parts No.
1- 2	322-24161-00				
1- 7	353-21711-00-66				
1- 8	353-21721-00-66				
1-20	353-22110-02-33				
1- 1	353-24110-00-X5				
1-10	353-24770-01-66				
1-21	353-25371-00				
1-15	353-26311-02				
1-16	353-26312-02				
1-17	353-26321-02				
1-14	353-26335-02				
1-18	353-26341-02				
1-25	353-83550-01				
1-19	388-21611-00-66				
1- 9	388-21737-10				
1-12	388-23121-60-66				
1-13	388-23131-60-66				
1- 3	388-24244-00				
1- 5	388-24245-00				
1- 4	388-24246-00				
1- 6	388-24247-00				
1-23	388-83510-32				
1-24	388-83540-02				
1-11	388-84130-60-66				
1-26	481-83560-00				
1-22	90109-08060				

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## FOREWORD

This manual is intended to provide vital technical service information to keep the RD60B in good working conditions. It is urged, therefore, that all YAMAHA dealers and mechanics become familiar with handling and servicing of the RD60B thereby make their sales and service more efficient and profitable.

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Service Department  
YAMAHA MOTOR COMPANY LTD.

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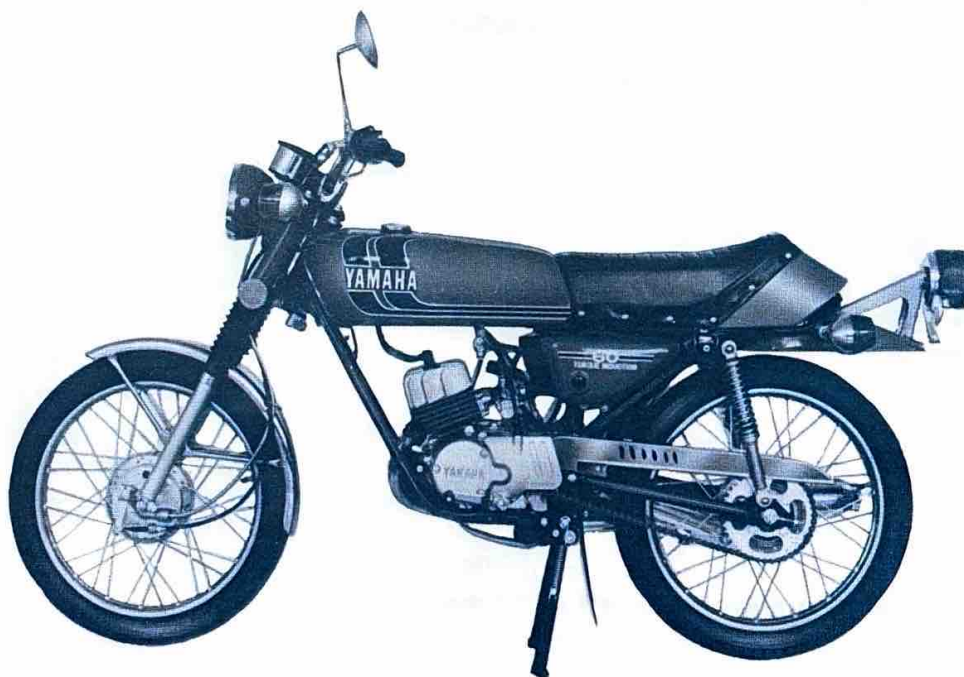
CHAPTER 1 GENERAL

A. Profile



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Righthand side view



Lefthand side view

## A. Features

### 1. Torque Induction

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

### 2. Autolube

The Autolube injection system, pioneered by Yamaha, assures extra reliability and durability for the engine. With Autolube, the necessity for mixing oil and gasoline, as in other 2-stroke machines, is no longer necessary.

### 3. Close-ratio Five Speed Transmission

The close-ratio transmission is designed to meet every requirement of street, highway and off-the-road travel. The transmission design allows for less engine strain and for given engine loads. This will result in longer engine life.

### 4. Primary Kick Starter

A primary kick starter permits the rider to start his machine without shifting gears to neutral. This is a most welcome convenience to the rider who happens to stall his machine, for example, in the midst of heavy traffic.

### 5. Starter Jet

The built-in mixture enrichening jet, the starter jet, which is a design feature on all Yamaha carburetors, permits quick starts even in the coldest weather.

### 6. Water/Dust Resistant Brakes

The design of the brakes, both front and rear, excellently seals out dust and water.

## B. General Specifications

Models	RD60B
Dimensions:	
Overall length	71.9 ins. (1,825 mm.)
Overall width	24.8 ins. ( 630 mm.)
Overall height	38.0 ins. ( 965 mm.)
Wheelbase	46.7 ins. (1,185 mm.)
Ground clearance	5.9 ins. ( 150 mm.)
Weight:	163 lbs (74 kg)
Performance:	
Fuel consumption (on paved level road)	188 mpg at 19 mph (80 km./ℓ at 30 km./h)
Climbing ability	18°
Min turning radius	71.0 ins. (1,800 mm.)
Braking distance	23.0 ft at 22 mph. (7.0 m. at 35 km./h)
Engine:	
Type	Air-cooled, two-stroke, gasoline
Model	353
Cylinder description	Single, tilted forward
Displacement	55 c.c. (3.36 cu.ins.)
Bore and stroke	42 x 39.7 mm.
Starting system	Primary kick
Ignition system	Flywheel magneto
Lubrication system	Separate lubrication by Autolube
Carburetor:	
Manufacturer	MIKUNI
Type	VM16SH
Venturi size	16 ϕ
Main jet	# 95
Jet needle	3E2-2
Pilot jet	# 20
Pilot outlet	0.9
Air jet	2.5
Starter jet	# 30
Pilot air screw	1¼
Float level	22.5 ± 2.5 mm.
Air cleaner:	Oiled foam rubber
Power transmission:	
Primary reduction	Gear
Primary reduction ratio	3.578 (68/19)
Secondary reduction	Chain
Secondary reduction ratio	3.500 (42/12)
Clutch	Wet, multi-disc

Gear box:	
Type	Constant-mesh, 5-speed forward
Operation	Left-foot operated, return type
1st	3.250 (39/12)
2nd	2.000 (34/17)
3rd	1.428 (30/21)
4th	1.125 (27/24)
5th	0.961 (25/26)
Frame:	
Model	353
Type	Tubular, double cradle
Steering:	
Caster	62°
Trail	3.3 ins. (85 mm.)
Tire size (front)	2.50-17-4PR
Tire size (rear)	2.50-17-4PR
Suspension:	
Front	Telescopic
Rear	Swing arm
Shock absorber:	
Front	Coil spring, oil damper
Rear	Coil spring oil damper

Braking system:	
Type	Internal expansion
Operation method, front	Righthand operation
Operation method, rear	Right foot operation
Tire, front	2.50-17-4PR
Tire, rear	2.50-17-4PR
Fuel tank capacity	2.1 gals. (8.0 liters)
Oil tank capacity	1.1 qts. (1.0 liter)
Generator:	
Model	F11-L48
Manufacturer	HITACHI
Spark plug:	B-7HS
Battery:	
Model	6N4A-4D
Capacity	6V, 4AH
Lights:	
Head light	6V, 15W/15W
Tail light	6V, 3W
Stop light	6V, 10W
Flasher lights	6V, 8W
Pilot light (N)	6V, 3W
Pilot light (H)	6V, 3W
Meter lights	6V, 1.5W

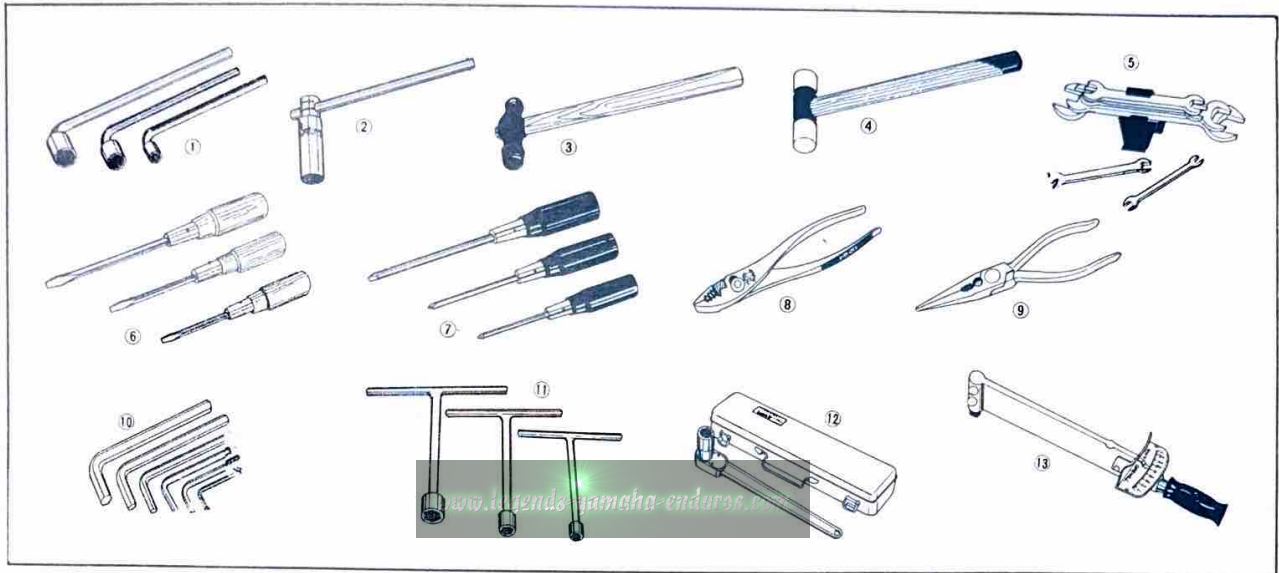
### C. Maintenance Specifications

ENGINE TOP END	
Piston clearance	0.0014 - 0.0016 ins. (0.035 - 0.040 mm.)
Piston wear limit	0.004 ins. (0.1 mm.)
Ring end gap (free)	0.30 ins. (7.5 mm.)
Ring end gap (installed)	0.004 - 0.006 ins. (0.15 - 0.35 mm.)
Connecting rod/crack	0.016 - 0.020 ins. (0.4 - 0.5 mm.)
ENGINE CLUTCH	
Friction plate thickness	0.138 ins. (3.5 mm.)
Clutch spring free length	1.24 ins. (31.5 mm.)
Clutch plate warp allowance	0.002 ins. (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 replacement limit	4.1 ins. (105 mm.)
Wheel run-out limit (lateral)	0.08 ins. (2.0 mm.)
Wheel run-out limit (lateral)	0.08 ins. (2.0 mm.)
Front fork spring free length	16.5 ins. (418.8 mm.)
TORQUE VALUES	
Cylinder head bolt	85 in-lbs. (1.0 m-kg.)
Fork tube pinch bolts	305 - 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.)

(continued)

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 nut	175 in-lbs. (2.0 m-kgs.)
Spark plug	235 - 250 in-lbs. (2.7 - 2.9 m-kgs.)

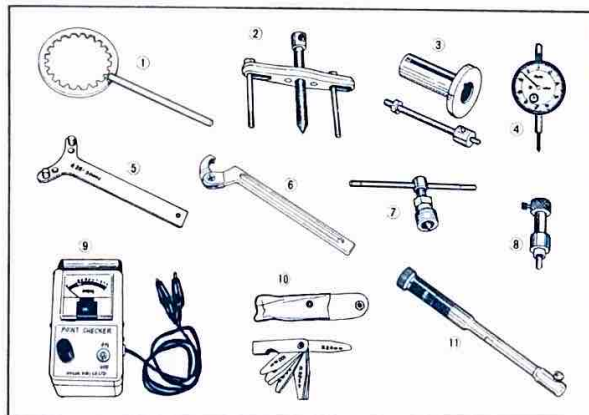
#### D. Service Tools.



- |   |  |
|---|--|
| 1. L-handle socket wrench                                 | 7. Phillips head screwdrivers<br>(Large, Medium and Small) |
| 2. Spark plug wrench                                      | 8. Pliers  |
| 3. Steel hammer   | 9. Long nose pliers  |
| 4. Soft faced hammer                                      | 10. Allen wrench set                                       |
| 5. Open end wrench set                                    | 11. T-handle socket wrench                                 |
| 6. Slotted head screwdrivers<br>(Large, Medium and Small) | 12. Socket wrench set                                      |
|   | 13. Torque wrench  |

#### E. Special Tools

1. Clutch holder (90890-01023)
2. Crankcase separating tool (90890-01011)
3. Crankshaft setting tool (90890-01012) (90890-01014)
4. Dial gauge
5. Magnet holding tool (90890-01031)
6. Ring nut wrench (90890-01040)
7. Flywheel magneto puller (90890-01033)
8. Dial gauge holder
9. Point checker
10. Filler gauge set
11. Torque wrench



## F. Miscellaneous

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



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## CHAPTER 2. YAMAHA AUTOLUBE SYSTEM

### A. Yamaha Autolube

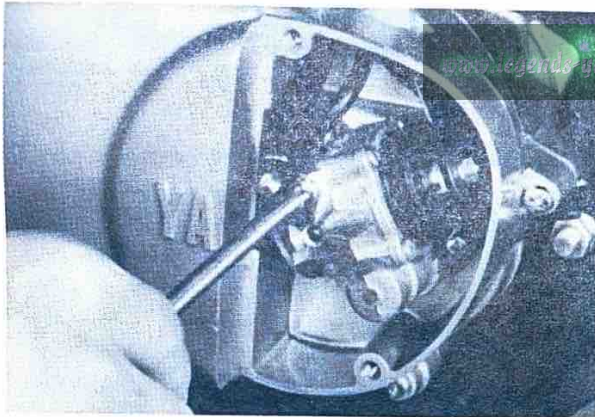
In the Yamaha Autolube system, oil is fed to the area close to the inlet port by the pump. The oil is mixed with an air-fuel mixture from the carburetor and sent into the crankcase.

After entering the crankcase, the oil lubricates the crankshaft bearings, connecting rod small and big ends, cylinder wall and piston. The Autolube pump is interlocked with the throttle grip, and therefore, the oil is supplied in proportion to the throttle openings. In other words, unlike an engine lubricated by pre-mixed oil, the engine is always supplied with the optimum amount of oil. As a result, even when the engine is at a low speed, the exhaust gases are not smoky, and less carbon builds up in the engine. Since the oil is straight, the result is better engine lubrication and heat dissipation.

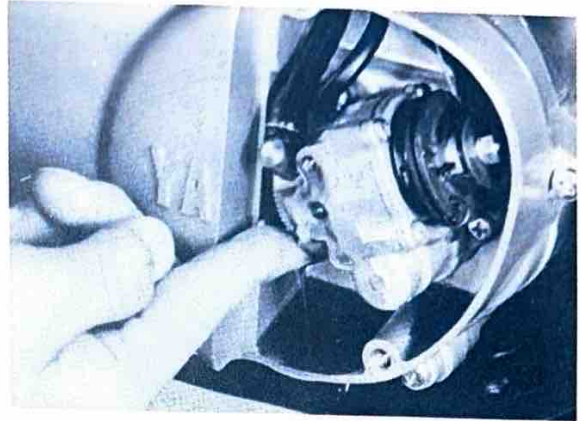
### B. Autolube Pump-Inspection and Adjustment

Bleeding pump

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

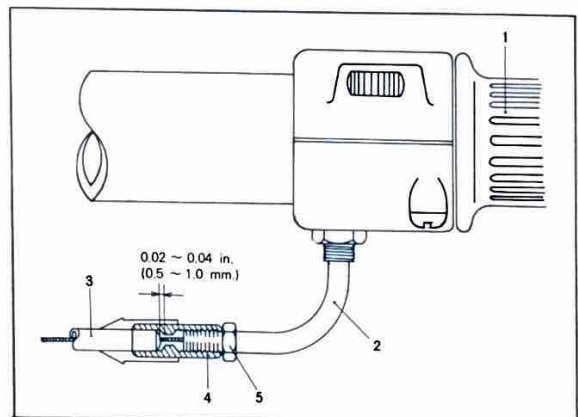


3. Feed the oil by operating the pump. The pump can be operated by turning the starter plate. (Hold the adjusting pulley with the hand so that the pump plunger stroke is maximum.) Fully open the throttle valve, and bleed the pump by turning the starter plate until no air bubbles appear in the oil.



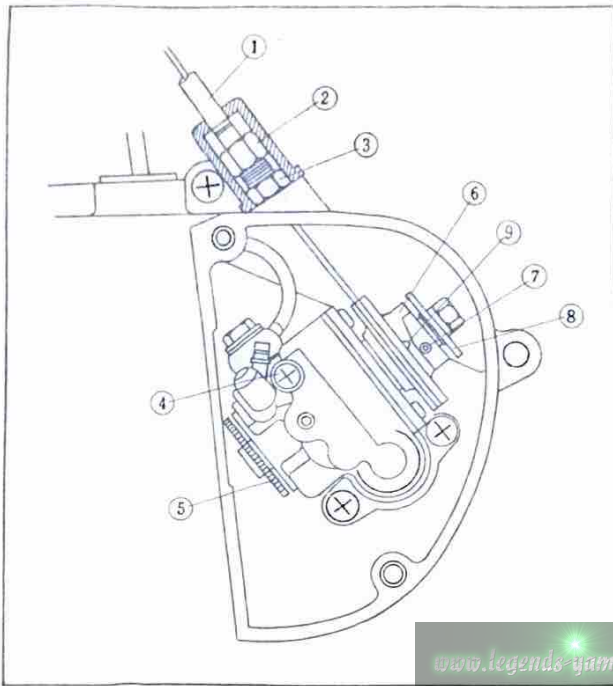
### C. Carburetor and Pump Setting

1. Start the engine, 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 0.02 ~ 0.04 in. (0.5 ~ 1.0 mm.)



1. Handle grip
2. Cable guide
3. Throttle cable A
4. Adjusting nut
5. Lock nut

- 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.



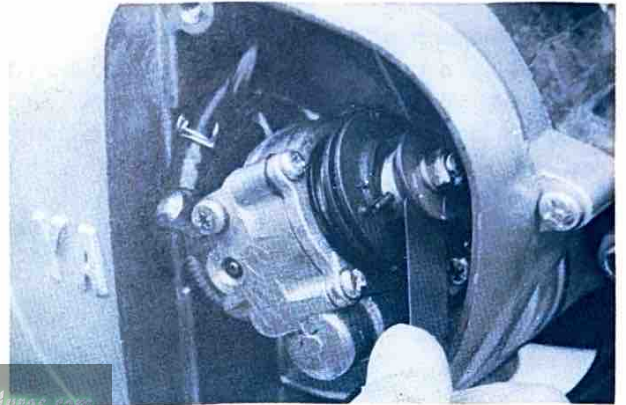
- |                   |                     |
|-------------------|---------------------|
| 1. Pump cable     | 6. Adjusting pulley |
| 2. Cable adjuster | 7. Guide pin        |
| 3. Lock nut       | 8. Adjusting plate  |
| 4. Bleeder bolt   | 9. Marking          |
| 5. Starter plate  |                     |

#### D. Checking the Minimum Pump Stroke

- Stop the engine.
- Close the throttle grip.
- 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. TORQUE INDUCTION

### A. General

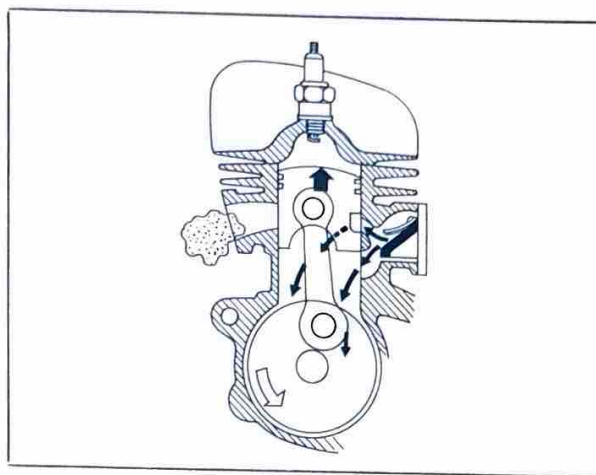
The "Torque Induction" system adopted in the RD50 and GT80 gives more power by improving the intake efficiency. For the improvement, a reed valve is installed between the intake manifold and the carburetor. The reed valve, a flexible, metal plate, is lifted off the cylinder inlet port when a partial vacuum is produced in the crankcase. It rests snugly against the cylinder inlet port when the pressure in the crankcase is increased by the piston moving down.

In order to increase the delivery ratio of the air-fuel mixture to the cylinder, the inlet port timing has been advanced, and the "blow-back" of the mixture to the carburetor, at low speeds, has been eliminated.

At the same time, the scavenging of the burnt gases has been greatly improved. This has resulted in greater engine torque at low speeds, and an increased air-fuel delivery ratio at medium and high speeds because of change in the cylinder pressure caused by the inertia force of the exhaust gas streaming out.

As a result, higher engine power has been obtained. In addition to this, when change in the crankcase is small (in other words, when the engine is cranked), the torque induction system quickly responds and makes for easy engine starting.

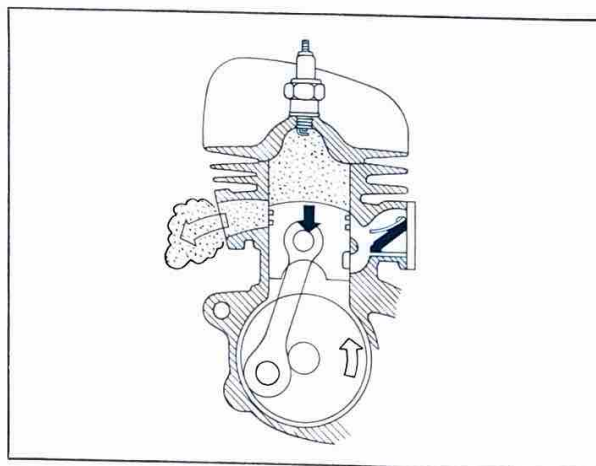
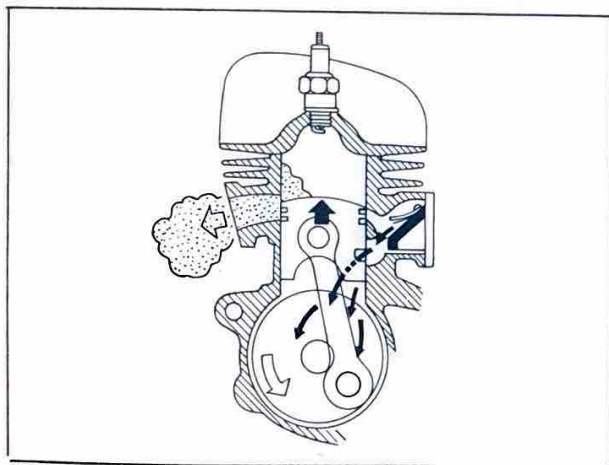
- 2) When the piston moves further upward, the cylinder inlet port opening becomes larger, allowing a greater amount of air-fuel mixture into the crankcase. On the other hand, when the mixture in the cylinder is further compressed, and when the piston reaches a specified position before TDC, the spark plug fires.



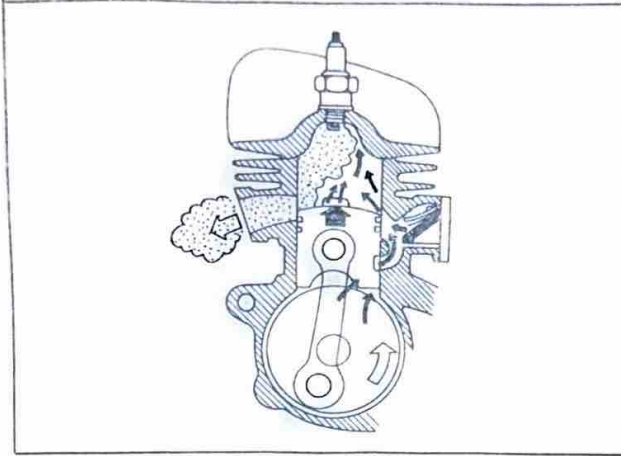
- 3) The mixture explodes, and the combustion pressure forces down the piston. The mixture in the crankcase is compressed by the piston, and the compressed mixture causes the reed valve to close the cylinder inlet port. This quick response of the reed valve to the build up of the crankcase pressure prevents the "blow-back" of the air-fuel to the carburetor.

### B. Operation of the Torque Induction System

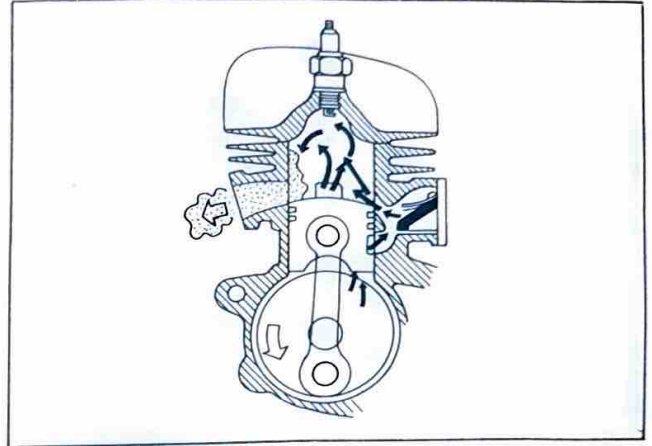
- 1) When the piston moves up and the cylinder inlet port is cleared by the piston skirt inlet port, a fresh air-fuel mixture begins streaming into the crankcase through the reed valve, because the pressure in the crankcase becomes lower than atmospheric pressure. In the meantime, the air-fuel mixture is compressed in the cylinder.



- 4) When the piston moves further downward, the exhaust port is cleared, allowing the exhaust gas to stream out. The inertia force of the exhaust gas streams produces a partial vacuum in the cylinder. At the same time, the mixture in the crankcase is compressed.



- 5) When the transfer ports and the 5th port are cleared by the piston on the downstroke, the mixture streams into the cylinder from the crankcase and the reed valve chamber. When the mixture enters the cylinder in streams from the crankcase and the reed valve chamber, the burnt gases in the cylinder are swept out. All the scavenging of the remaining burnt gases is accelerated by the inertia forces of the mixture streaming into the cylinder and the burnt gases streaming out of the cylinder.



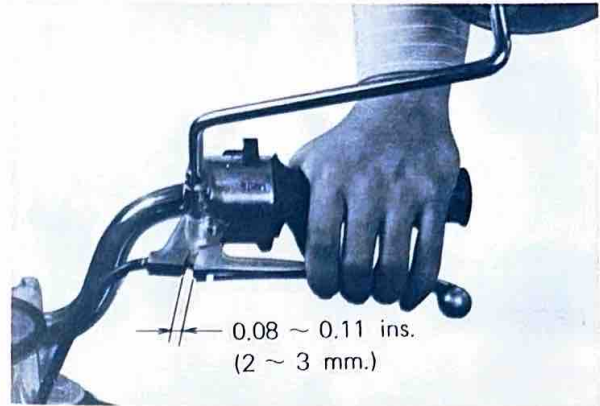
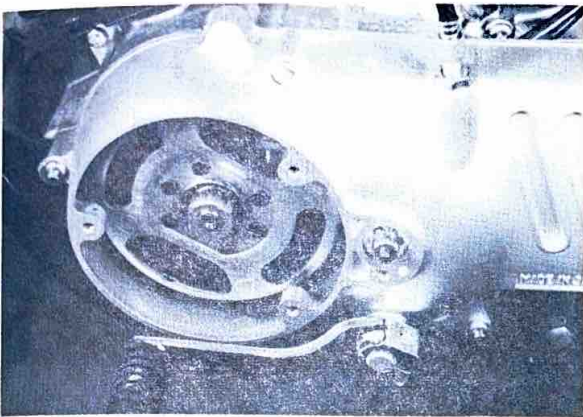
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## CHAPTER 4. MECHANICAL ADJUSTMENTS

### A. Clutch Adjustment

After reinstalling or replacing the clutch, it 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 locknut. Screw in the adjusting screw until tight, and back out 1/4 turn, and tighten the adjusting screw lock nut.



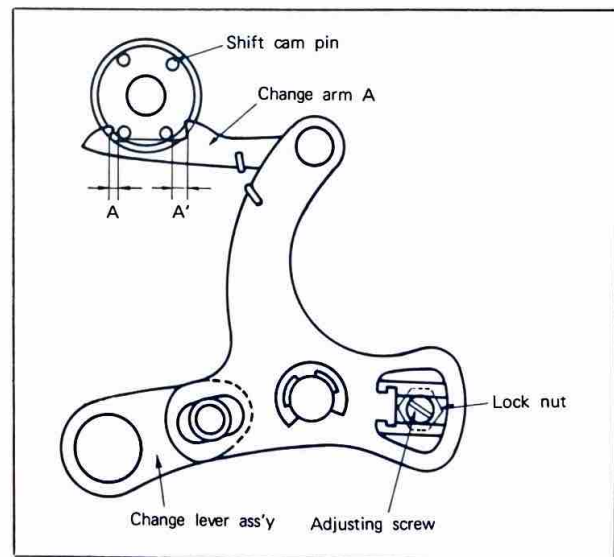
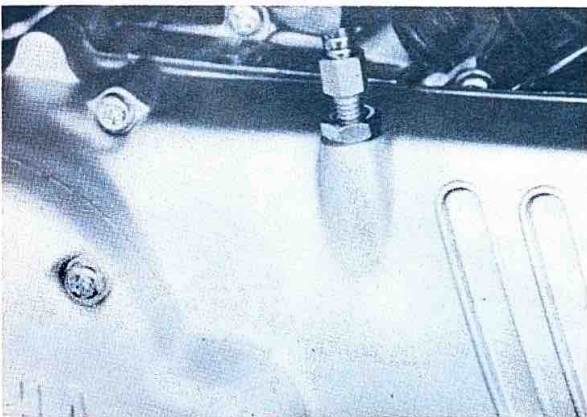
### B. Shift Adjustment

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

If A = 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'.
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.

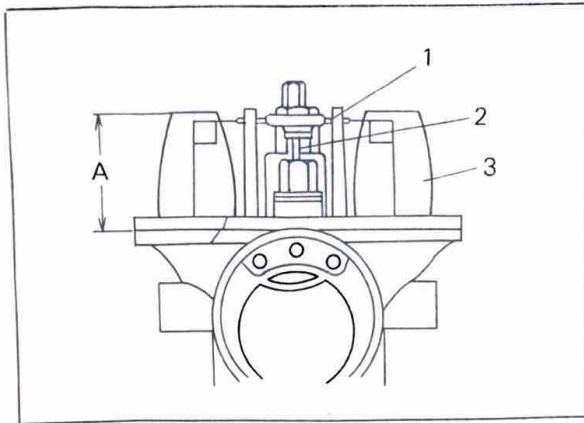


## C. Carburetor Adjustment

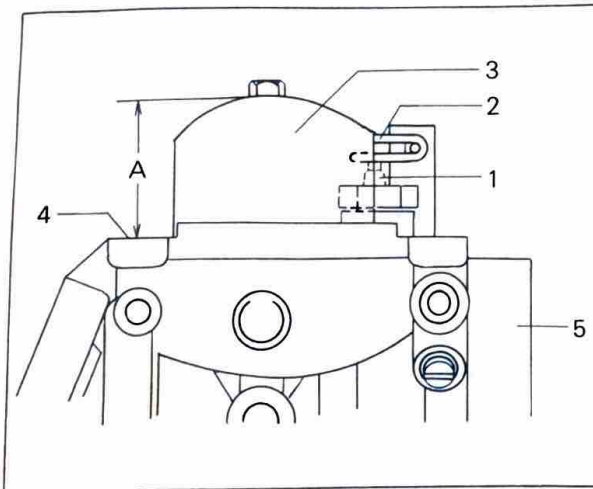
### 1. Adjusting the Fuel

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. Needle head
2. Float holding plate
3. Float
4. Edge of the mixing chamber
5. Mixing chamber

- a. 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.
- b. Then measure height A in Fig. 5-19-6 (From the top of the float to the float chamber gasket seat.)

Standard measurements:  $22.5 \pm 2.5$  mm.

- c. If a measure more or less than the standard value, bent the tang a little so that a correct measurement is obtained.

### 2. Adjusting the Idle Speed

Idle speed adjustments should be performed after the engine is warmed up.

- a. Back out the throttle stop screw so that the engine runs at the lowest possible speed.
- b. Slowly turn in and out the air screw, and the engine speed increase. When the engine idles faster, stop turning the air screw.

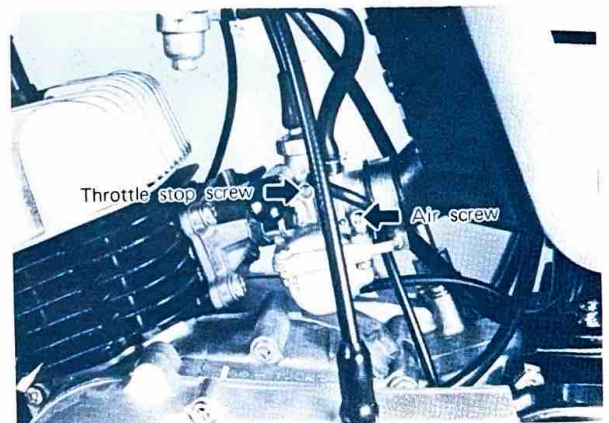
Specified turns out:  $1\frac{1}{2}$

- c. Repeat above steps (1, 2) two or three times for getting best engine idling speed.
- d. Finally, turn in or out the throttle stop screw, so that the engine idles at the specified speed.

Specified engine speed: 1,300 rpm.

### Note:

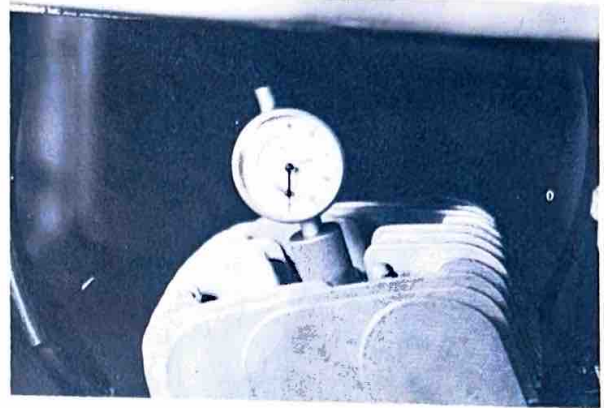
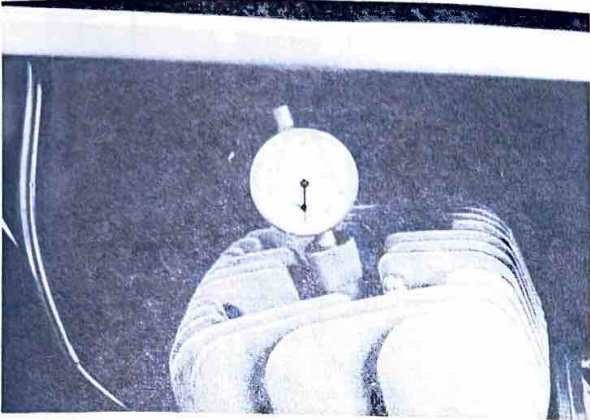
It is advisable that the electrical tachometer can be used for checking the engine speed.



### D. Ignition Timing Adjustment

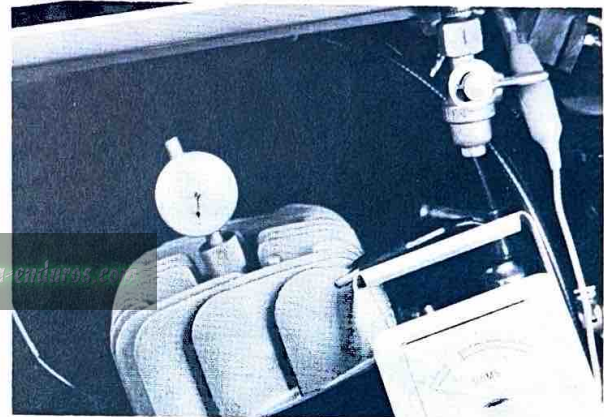
Ignition timing must be set with a dial indicator (to determine piston position) and a low-range ohm-meter (to determine exactly when contact breaker points begin to open). Proceed as follows:

1. Remove spark plug and screw Dial Gauge Stand into spark plug hole.
2. Insert Dial Gauge Assembly into spark plug stand.



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.).

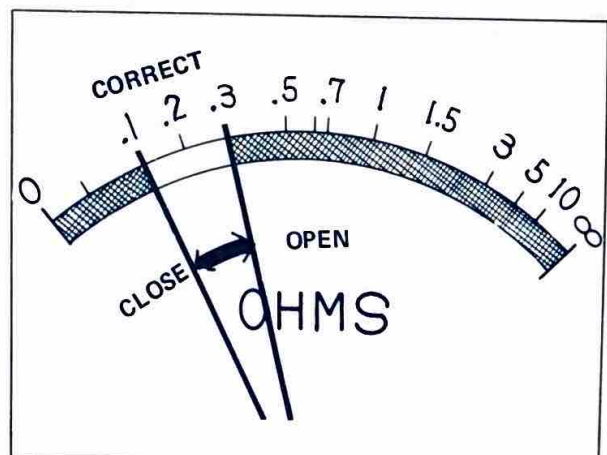
3. Remove left crankcase cover to gain access to contact breaker assembly (ignition points).
4. Connect red lead wire of Point Checker to black wire in wire harness coming from magneto.



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

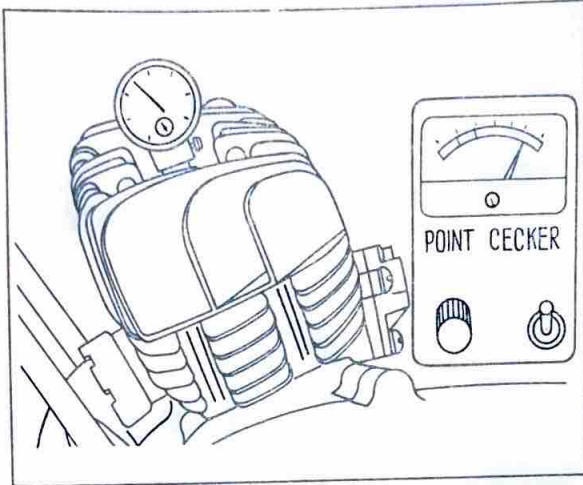
5. Connect black lead wire of Point Checker to unpainted surface of cylinder fin or crankcase bolt or screw.
6. Rotate magneto flywheel until piston is at top-dead-center (T.D.C.). Tighten set screw on dial gauge stand to secure dial gauge assembly. Set the zero on dial indicator face to line up exactly with dial indicator needle.

Rotate flywheel back and forth to be sure that indicator needle does not past zero.

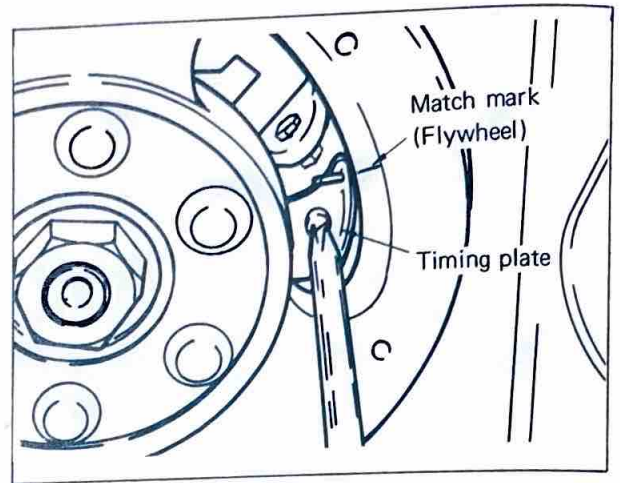


**Note:**

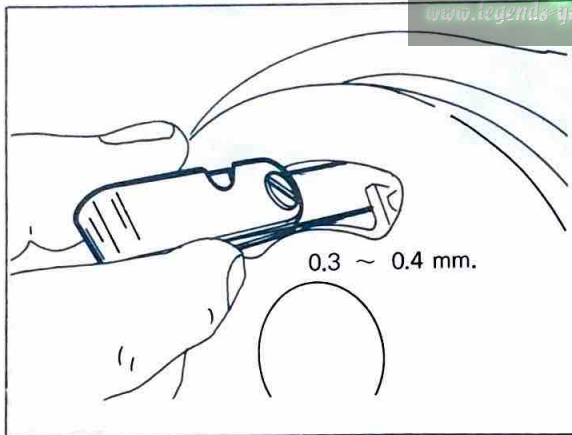
If the point checker is placed as closely to the dial gauge as possible, the above operation will become easier. If no point checker is available, a meter lamp can be used in place of it.



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

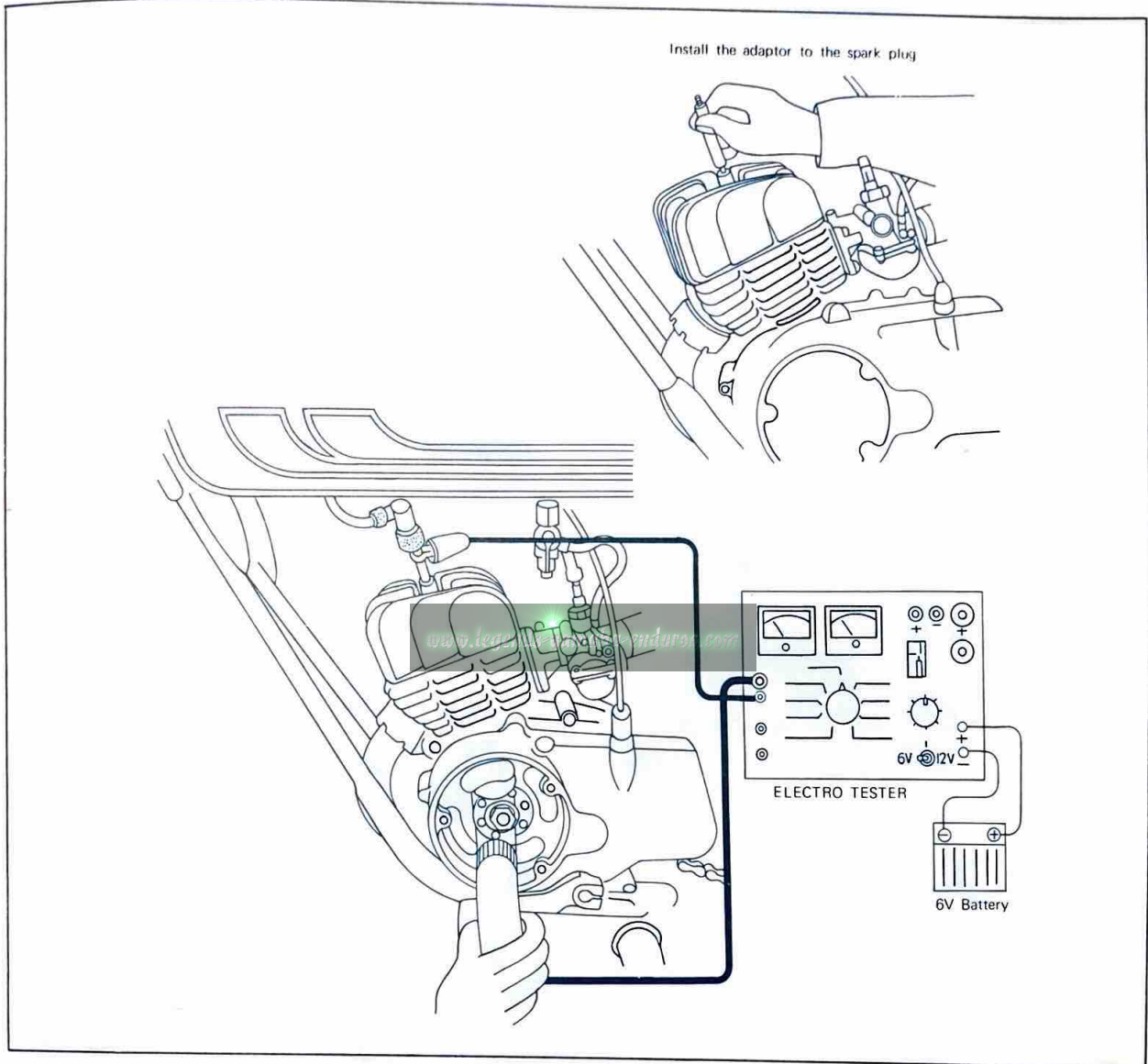


9. Check the contact breaker point gap (0.3~0.4 mm). If it is incorrect, recheck ignition timing inspect point condition and, if necessary, replace points.



## E. 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.

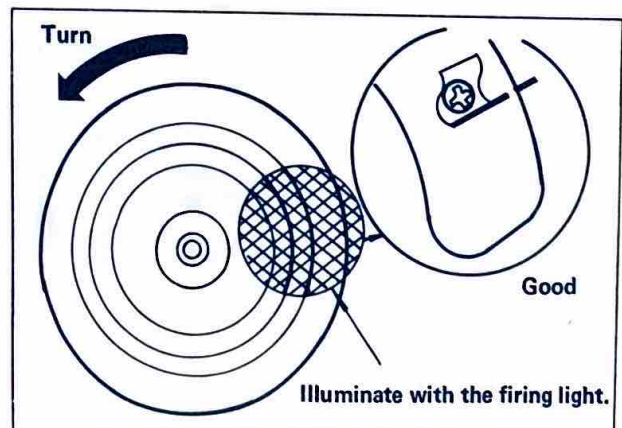


Start the engine, and illuminate the match marks with the timing light for checking.

If the ignition is timed to the moment that the flywheel match mark comes aligns 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.



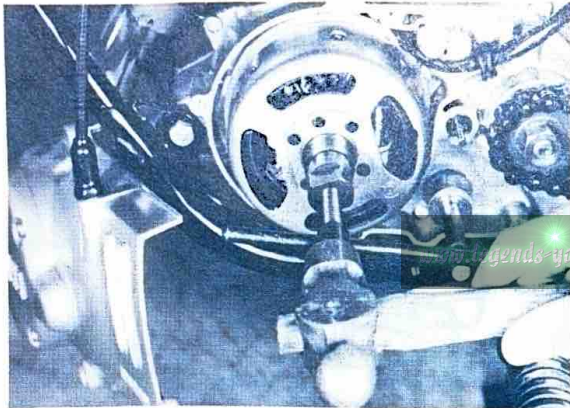
## CHAPTER 5. ENGINE REMOVAL AND OVERHAULING

### A. Engine removal

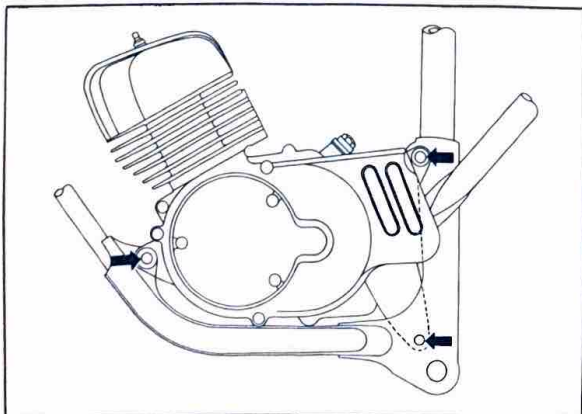
1. Start the engine and warm it up for a few minutes, then turn off the engine and drain the transmission oil.

QUANTITY: 500 c.c. (0.53 US qts.) (SEA 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 magento flywheel using the flywheel puller.  
If tight, tap the head of the puller with a hammer.  
Remove the magneto base.

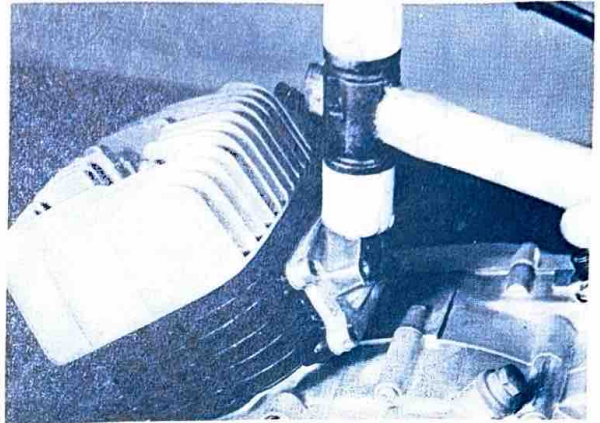


4. Remove the woodruff key.
5. Disconnect the master link and remove the chain.
6. Remove the pump cover and pump cable.
7. Loosen the carburetor joint band, then disconnect the oil line and fuel line.
8. Remove the carburetor mixing chamber top and fuel tank.
9. Remove the tachometer cable.
10. Remove the engine from the frame. Engine is mounted with three bolts.



### B. 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.

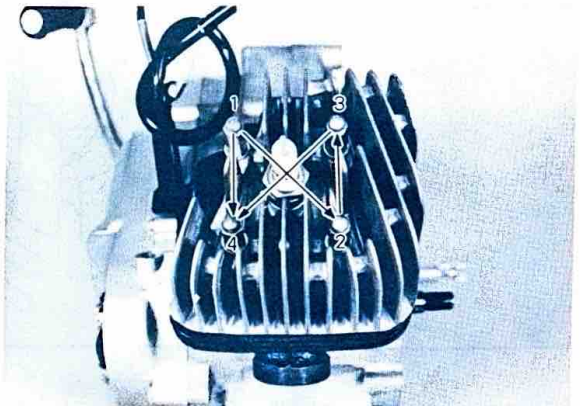


### C. Cylinder and Cylinder head

1. Remove four special nuts from top of cylinder, then cylinder head and cylinder head gasket.

#### Note:

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



2. 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.

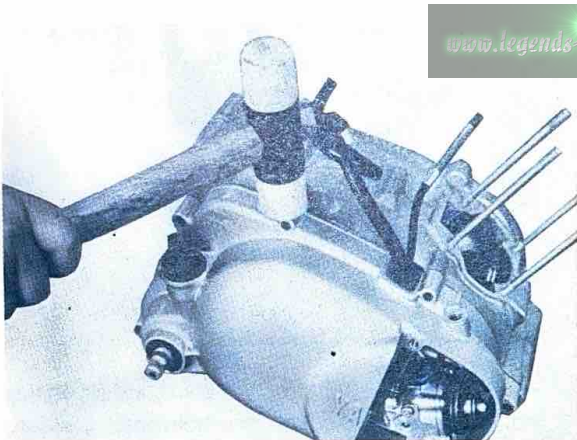


#### D. Removing the piston pin and piston

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.

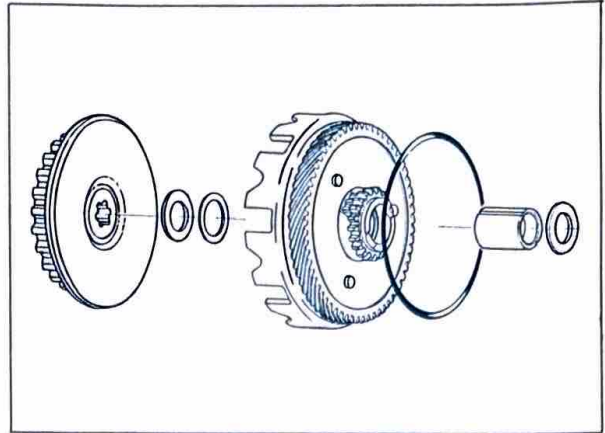
#### E. Crankcase Cover (R.H.)

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.



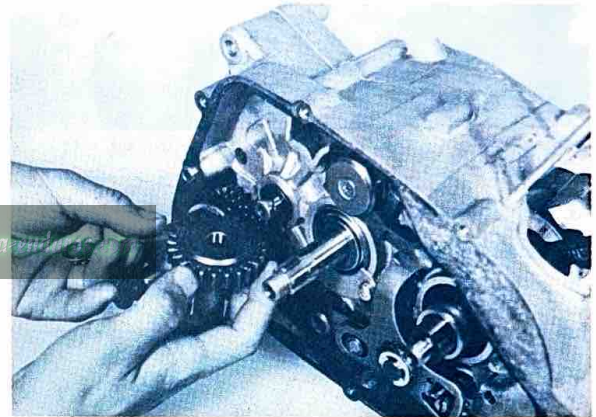
#### F. Removing the clutch

1. Remove the four clutch holding screws then take out the pressure plate and push rod (1).
2. Straighten the lock washer with a chisel and install the clutch holding tool on the clutch boss.
3. 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.



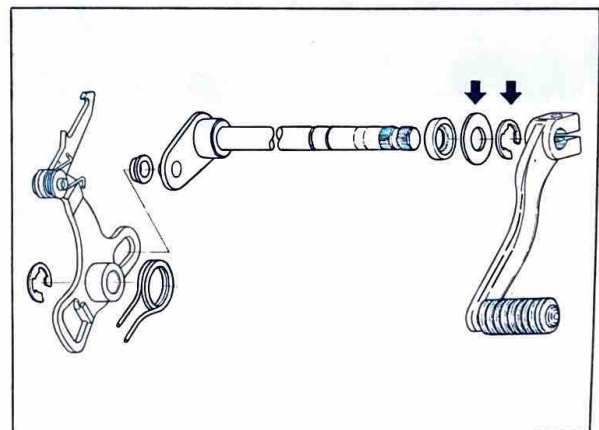
#### G. Kick Starter

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



#### H. Remove the change shaft

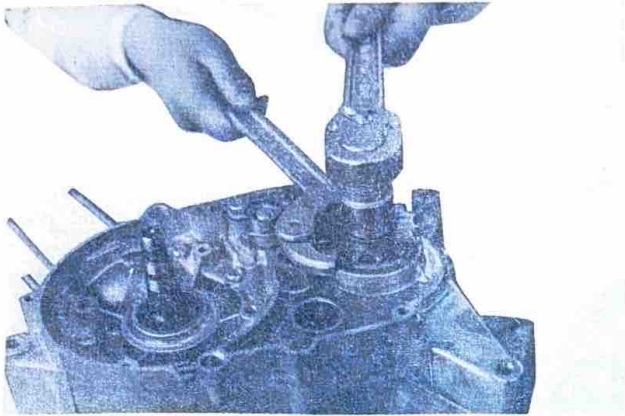
1. Remove the circlip and washer from the change axle (left side crankcase).



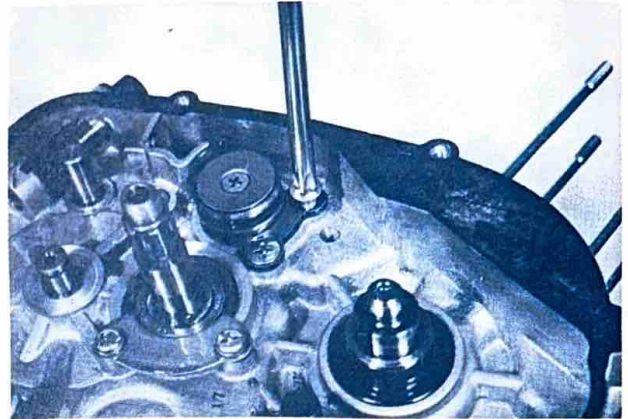
2. Turn the engine over right side up, and pull the change axle assembly out.

### I. Drive Sprocket Removal

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.



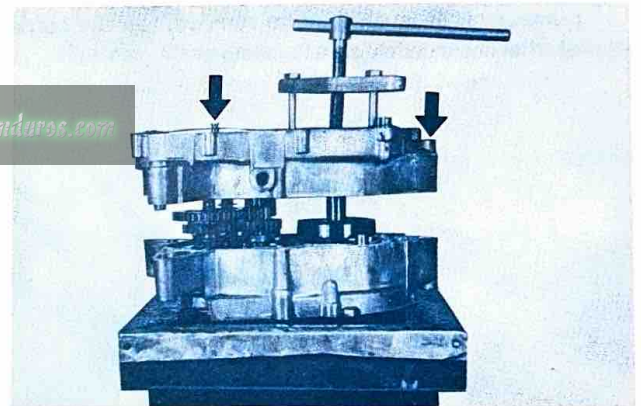
2. Remove the stopper plate.



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

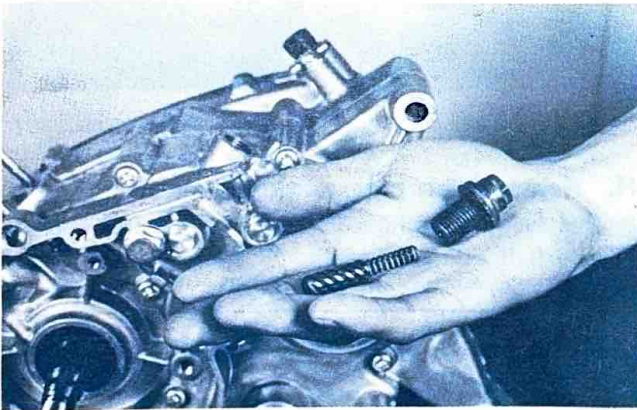
#### Note:

Separate the crankcase while alternately tapping the main axle and the crankcase with a rubber hammer.



### J. Crankcase Separating

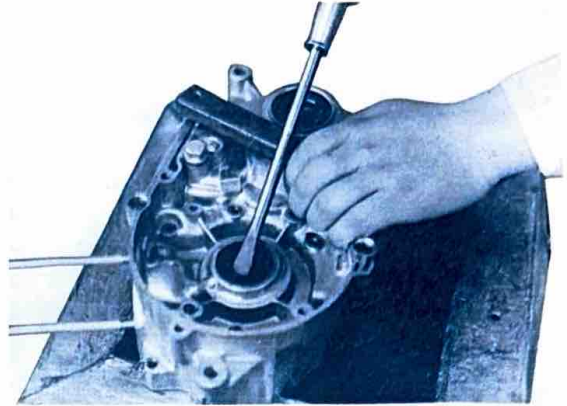
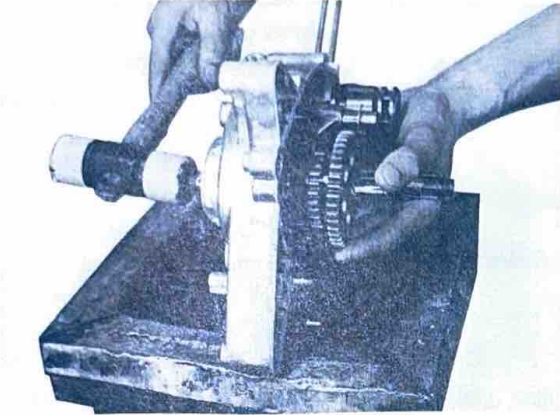
1. Remove the shift cam stopper, stopper spring and spring screw.



Fully tighten the bolts of the crankcase separating tool, keeping the tool in the horizontal position.

## K. Transmission Removal

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



2. 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.

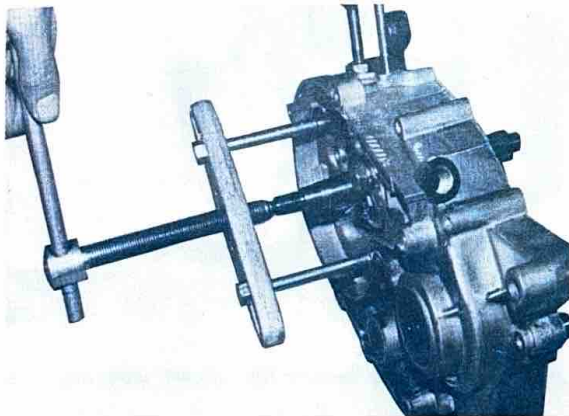
The bearing must be driven in and out perpendicular to the case. If it is driven in with a slot head screw driver or the like, the axis of the bearing and crankshaft will not be parallel with each other, thereby causing the bearing to wear earlier and make noise.

## L. Removing the crankshaft

1. 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.

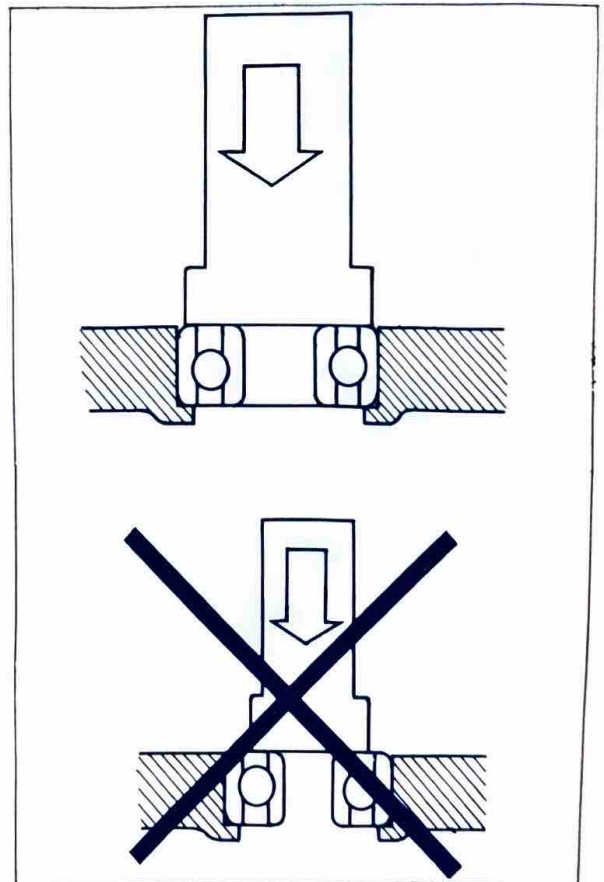


## M. Remove the oil seals and bearings.

1. Pry out the oil seals with a slot head screw driver.

### Note:

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



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**Note:**

Bearings are most easily removed or installed if the case are first heated to approximately 200 - 250° F. However, cold removal and installation may be done satisfactorily.

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.

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## 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 7 ~ 8.)

### A. Crankcase

Next items should be done before assembling.

- a. All parts should be cleaned with solvent.
- b. If necessary, replace the crankbearings, crankoil-seals, transmission oilseals.

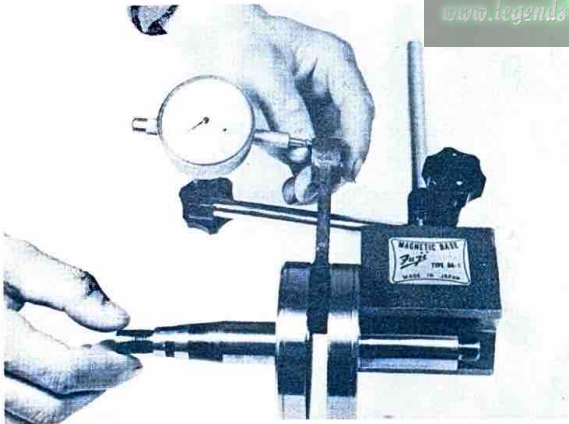
### B. Crankshaft

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.)



Small end play should not exceed 0.078 in. (2.0 mm.)

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 a thickness gauge.

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

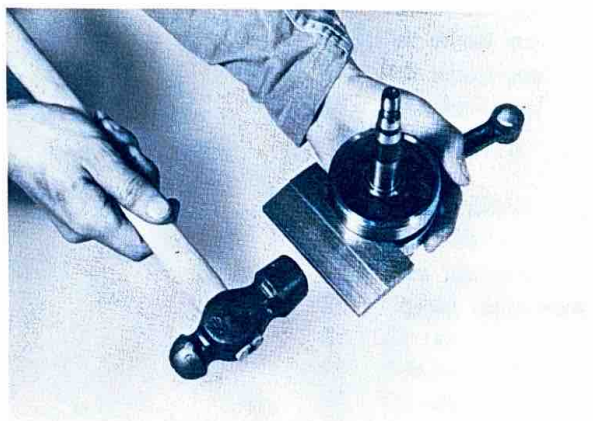


- c. If excessive side play is prevent, disassemble the crankshaft and replace any worn parts. Check the crankshaft assemble runout.



Correct any misalignment by tapping the flywheel with a brass hammer or by using the wedge.

Within 0.0012 in. (0.03 mm.)

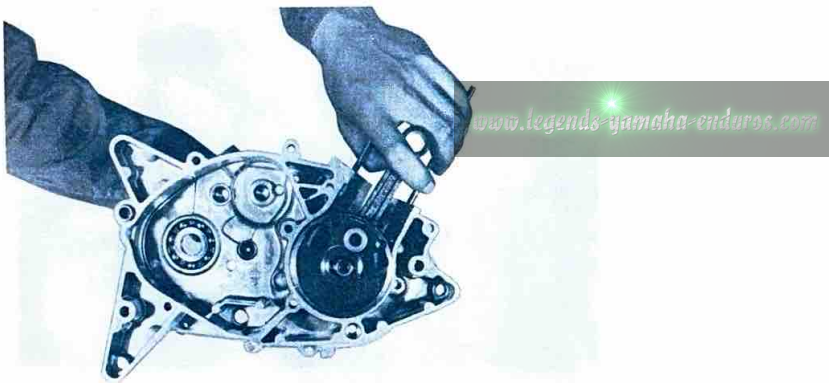
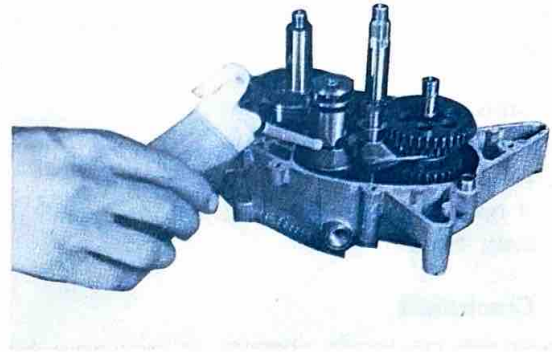
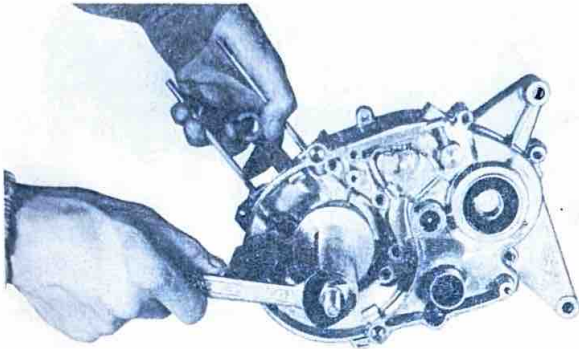


2. Installing the Crankshaft Assembly

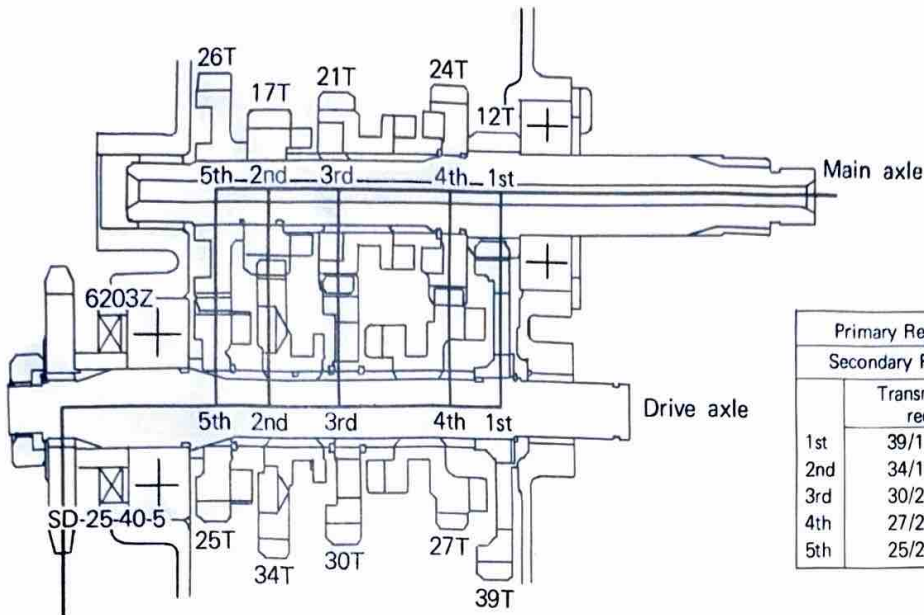
Install the crankshaft assembly by using the crankshaft installing tool. Hold the connecting rod at top dead center with one hand to avoid bending while turning the handle of the installing tool with the other.

**Note:**

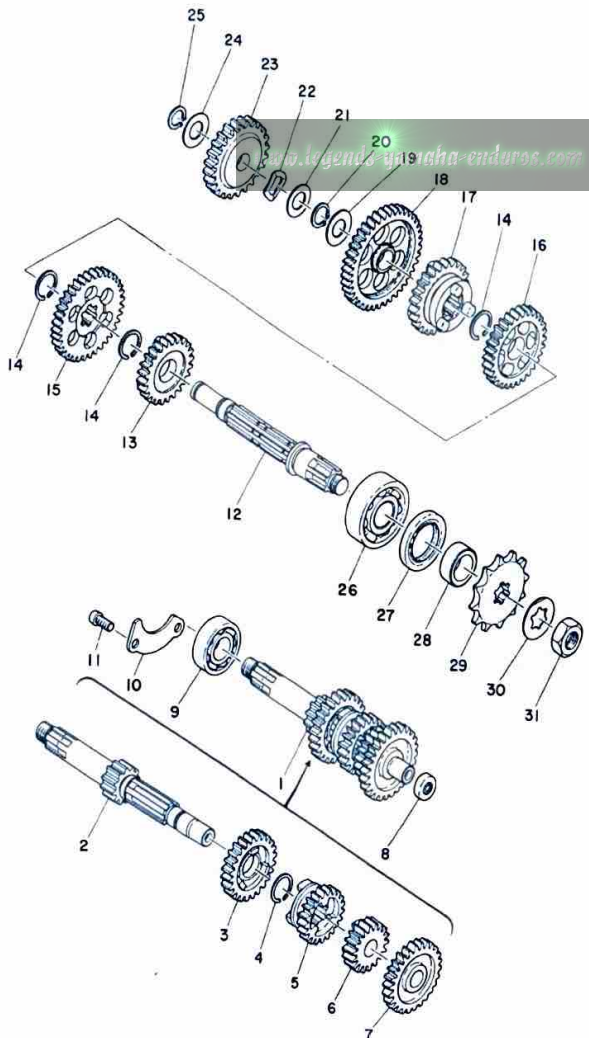
Correctly center the crankshaft installing tool body (See illust.) and fully tighten the crankshaft puller bolt.



### C. Transmission Assembly



Primary Reduction Ratio		$68/19 = 3.578$
Secondary Reduction Ratio		$42/12 = 3.500$
	Transmission gear reduction	Total reduction ratio
1st	$39/12 = 3.250$	40.711
2nd	$34/17 = 2.000$	25.053
3rd	$30/21 = 1.428$	17.895
4th	$27/24 = 1.125$	14.092
5th	$25/26 = 0.961$	12.045



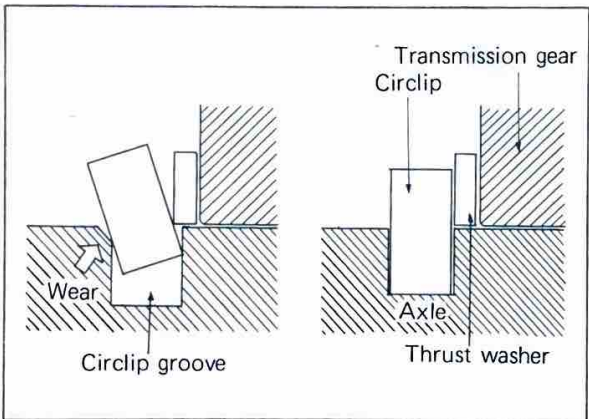
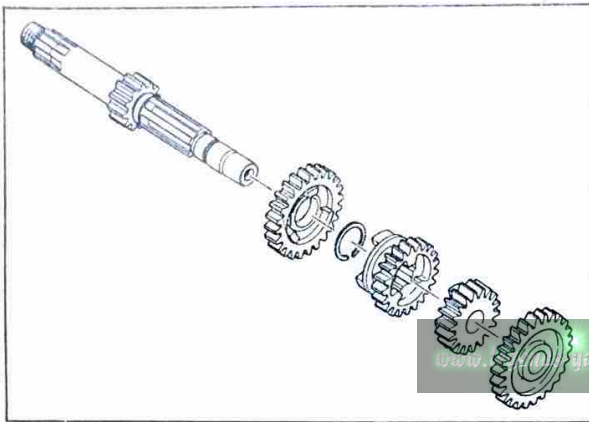
1. Main axle comp
2. Main axle
3. 4th pinion gear
4. Circlip
5. 3rd pinion gear
6. 2nd pinion gear
7. 5th pinion gear
8. Push rod seal
9. Bearing
10. Bearing cover plate
11. Panhead screw
12. Drive axle
13. 5th wheel gear
14. Circlip
15. 2nd wheel gear
16. 3rd wheel gear
17. 4th wheel gear
18. 1st wheel gear
19. Shim
20. Circlip
21. Thrust washer
22. Wave washer
23. Kick idle gear
24. Change shaft washer
25. Circlip
26. Bearing
27. Oil seal
28. Distance collar
29. Drive sprocket
30. Lock washer
31. Lock nut

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

a. Pinion gears, wheel gears and axles.

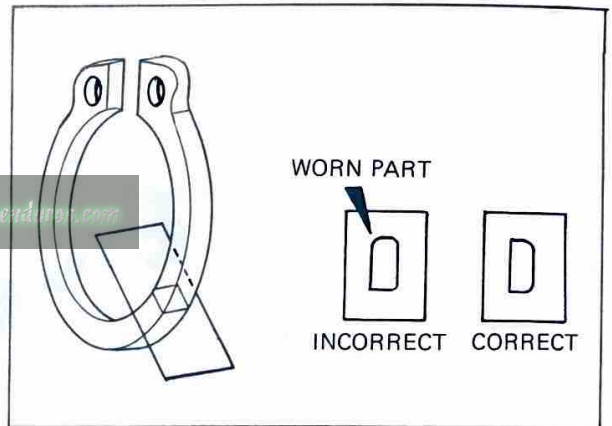
1) Four pinion gears can be taken apart with the removal of the main axle circlip. The 2nd and 4th pinions are idle gears. Check these gears for flows made by seizure on the surface contacting the axle and also for axial looseness. Replace one that are found to be badly affected. See illustration.



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



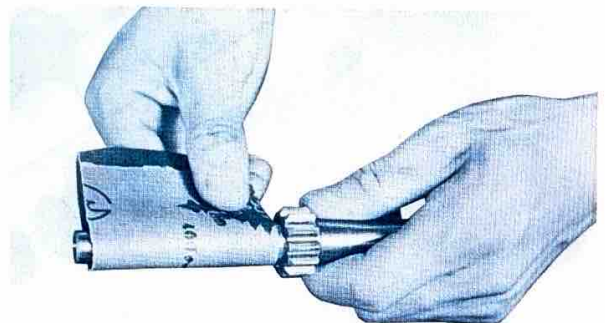
3) Check the circlip corner to be fitted in the shaft groove for any wear. See the illustration.



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 wear. See the illustration.

2nd wheel gear holding washer:

$t = 0.3, 0.5, 0.7, 0.9$  respectively

Inner dia. = 17  $\phi$

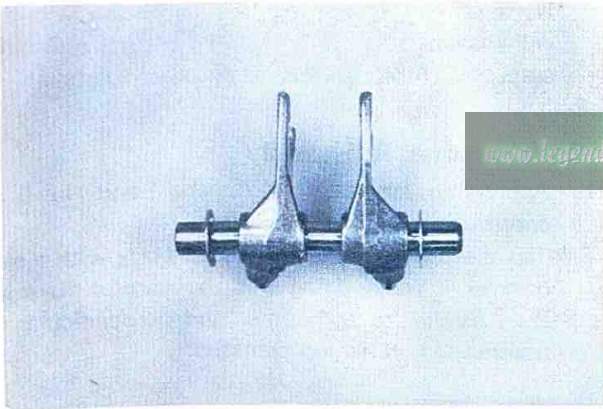
Outer dia. = 25  $\phi$

**Note:**

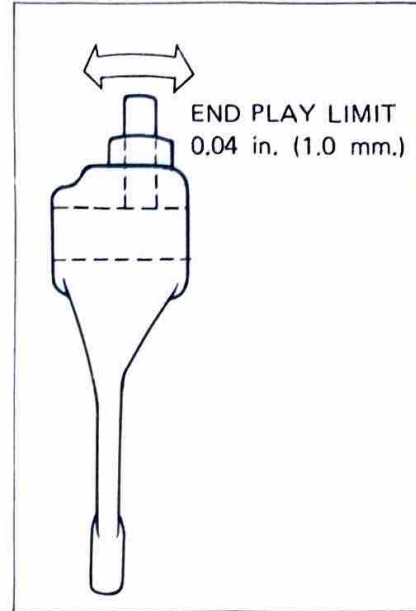
Clearance of the 2nd wheel gear should be 0.1 to 0.2 mm. in the thrust direction. See the illustration.

**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 bear shifting or jumping out of gear.



Insert the pin fully into the shift fork and check freeplay at the end of the pin. If it measures more than 0.059 in. (1.5 mm.), replace the pin or shift fork.

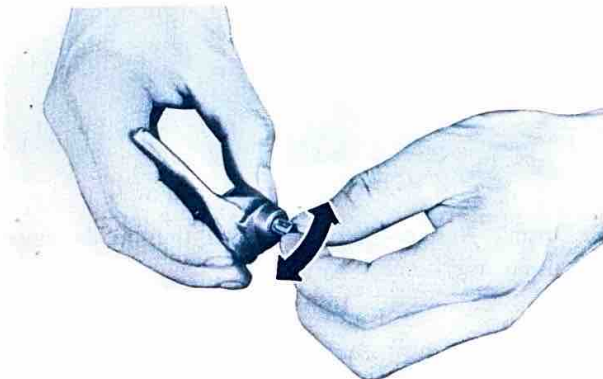
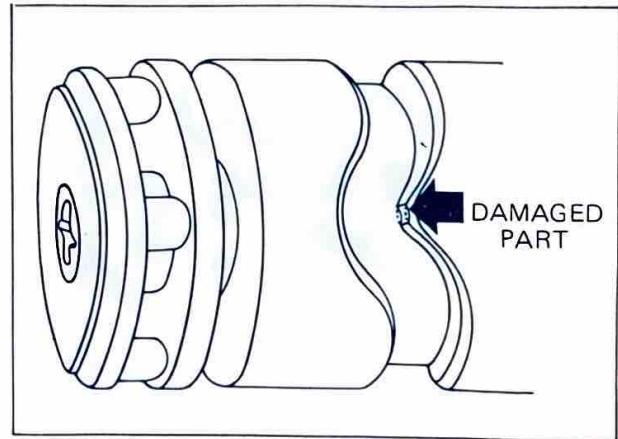


**c. Shift Cam**

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

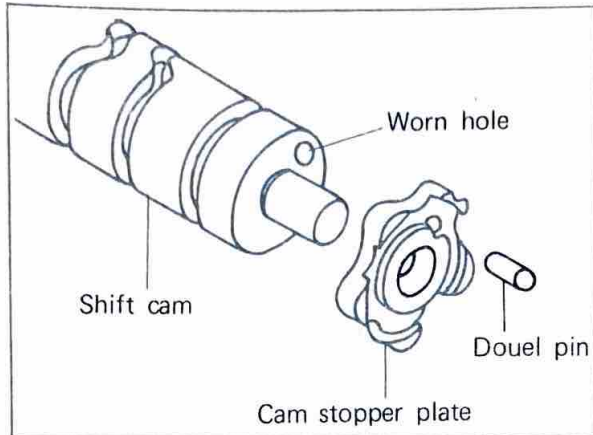
**2) Cam Follower Pin**

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.



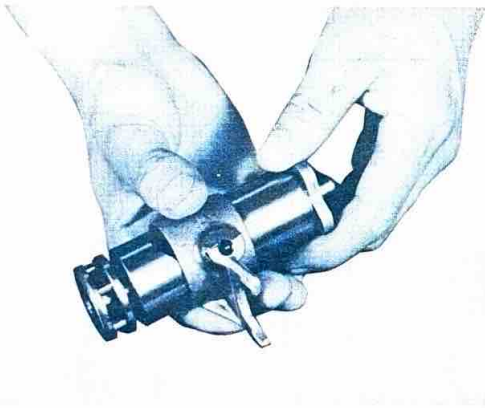
- 2) Excessive clearance between the cam stopper plate and the shift cam can be the cause of faulty gear shifting and jumping out of the gear.

In many instances, this is caused by a dowel pin hole in the shift cam that has become bigger from wear.



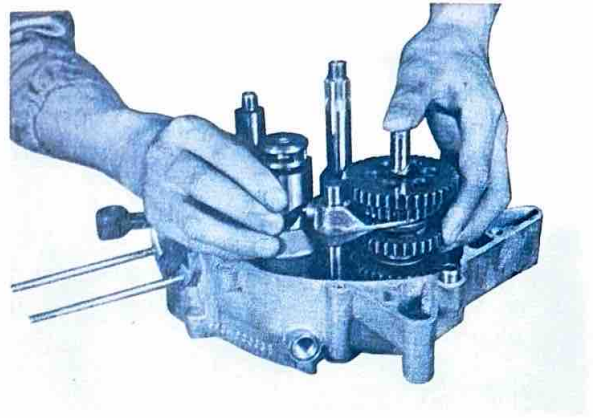
- 3) Carefully check the end of the shift cam around dowel pin holes. Replace shift cam if damaged.

- 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, 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.



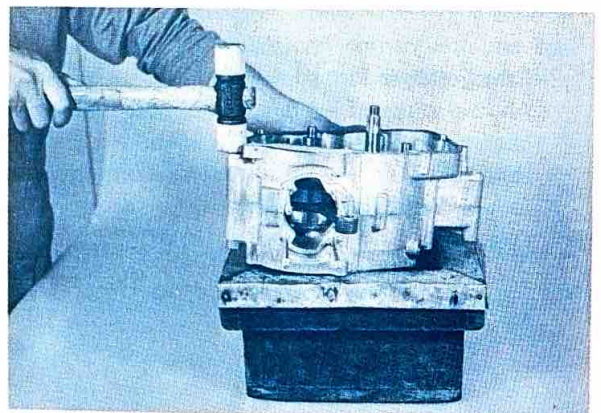
They can not be installed separately without shift fork(2), and shift fork guide bar. The transmission nut must be in neutral during installation.

**Note:**

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

**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.

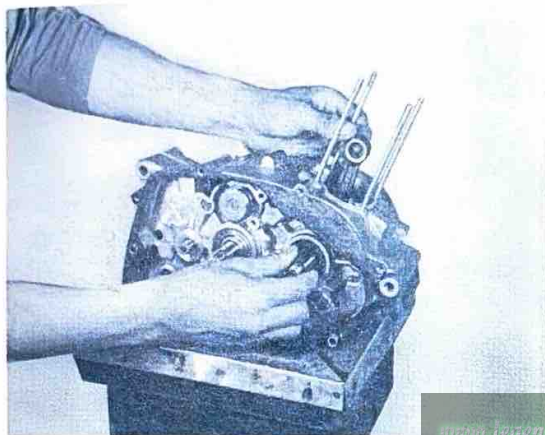
**Note:**

1. After the case 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 holds 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.



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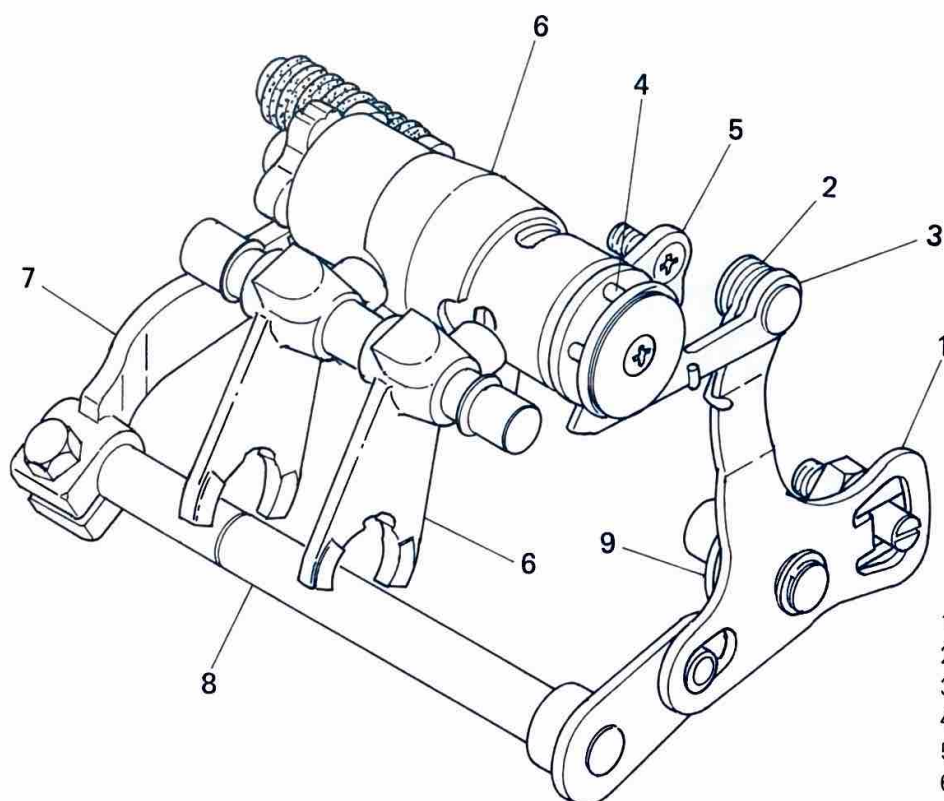
## E. Shifter Installation

### 1. Shift mechanism

The RD60B shift mechanism is designed to select five speeds plus a position neutral position. 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.

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 grooved to change gears.

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 six stages, Neutral, Low, Second, Third, Fourth and Top, through out 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 grooved to change gears.

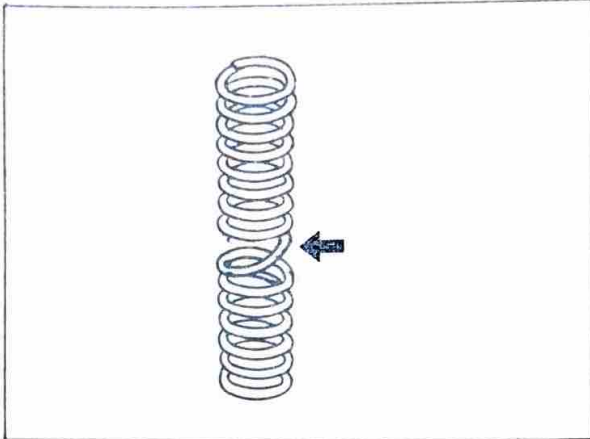


1. Gear shift arm B
2. Gear shift arm spring
3. Gear shift arm A
4. Gear shift cam pin
5. Shift cam stopper plate
6. Shift fork
7. Change pedal
8. Change axle ass'y
9. Lever return spring

2. Install the cam stopper plate.
3. Checking
  - a. Cam stopper
    - 1) Cam stopper spring

Overall Length: 1.58 in. (40.2 mm.)

Replace any that is shorter than specified or is damaged.



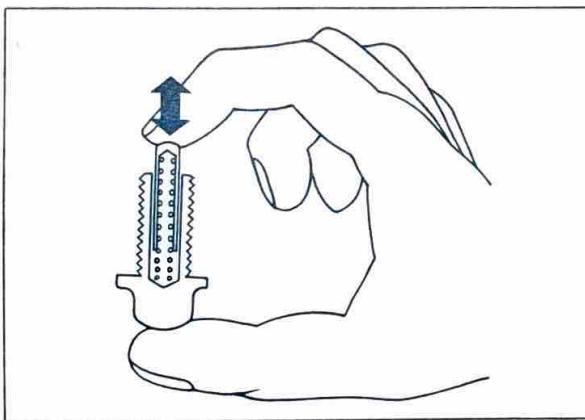
- 3) Check the return spring for fatigue and also the change lever assembly for looseness at the riveted portion. (See the drawing.)



4. Assembling
  - a. Installing the change shaft assembly when install the change lever assembly and set the clips. (for change shaft and change lever)
5. Adjusting the Gear Shift Arm

Refer to page 13.

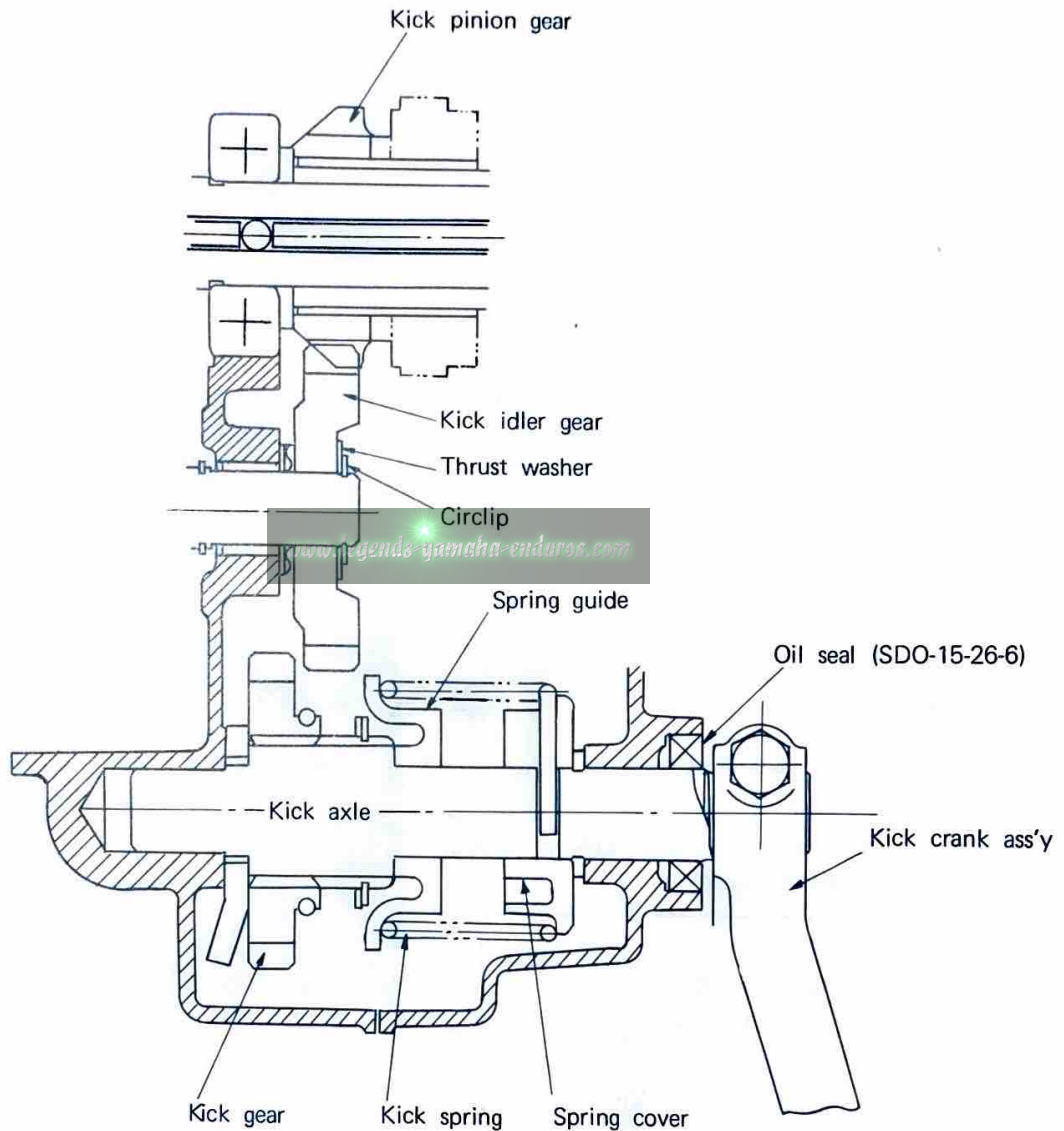
- 2) Fit the spring and stopper to the spring screw. Then see whether they move smoothly or they are too loose. : Replace them with new ones where necessary.

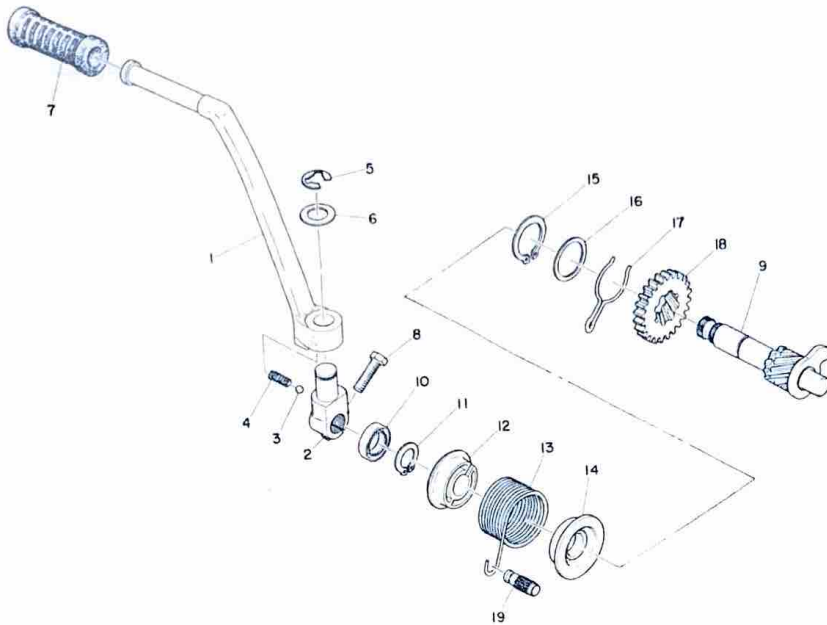


## F. Kick Starter Mechanism

1. The primary kick-starter system (one-touch kick-starter) is employed. However, a new "non-constant-mesh" mechanism has been introduced into the FS1 kickstarter, instead of the constant-mesh kick gear type, such as the ratchet and roller lock systems.

That is, the kick gear meshes with idler gear only when the kick starter pedal is kicked. After the engine has started, the kick gear and the idler gear disengage. This mechanism not only eliminates noise resulting from the constant mesh of the kick gear with the idler gear, but also greatly contributes to the durability of the kick starter assembly.





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

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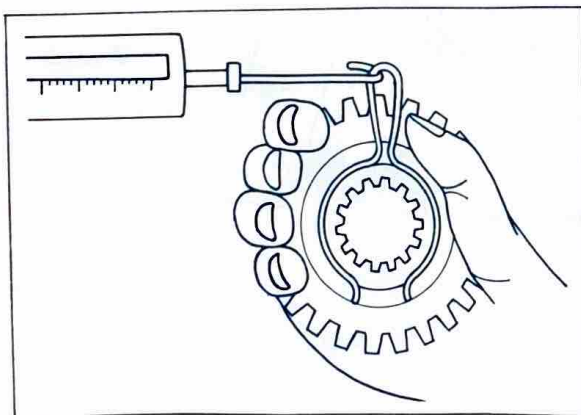
## 2. Checking

### a. Kick axle assembly

Remove the each parts from axle assembly.

### b. Kick clip

- 1) The pressure of the kick clip is 4.86 lbs (2.2 kgs.). (Measured as illustration.)

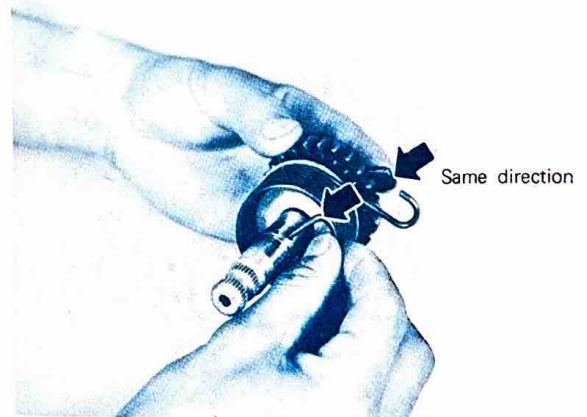


If above pressure is too strong, spring wear and kick starter slipping will result. On the other hand, if it is too weak, the same slippage will occur particularly at low temperatures. Do not try to bend the clip.

- 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

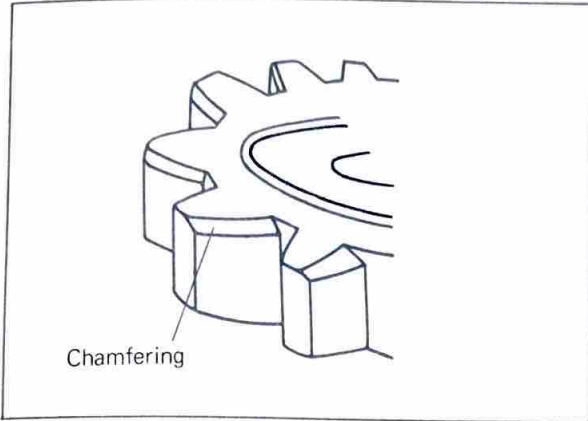
Insert the kick spring into the axle as illustrated. If it is inserted in the wrong direction, the kick crank will not return fully to the original position or the hook on the spring cannot be engaged in the stopper due to excessive tension.



d. 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:

1. Scratches, damage and cracks.
2. Wear in the axle hole.



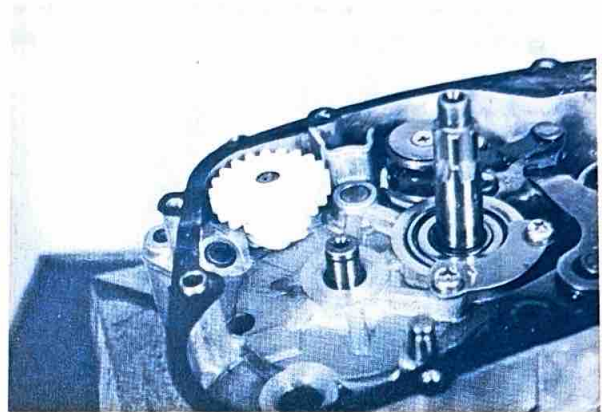
5. Tachometer gear

Install the tachometer gear as illustrated. Clean the gear in solvent and check the followings:

- 1) Scratches, damage and cracks
- 2) Wear in the axle hole

**Note:**

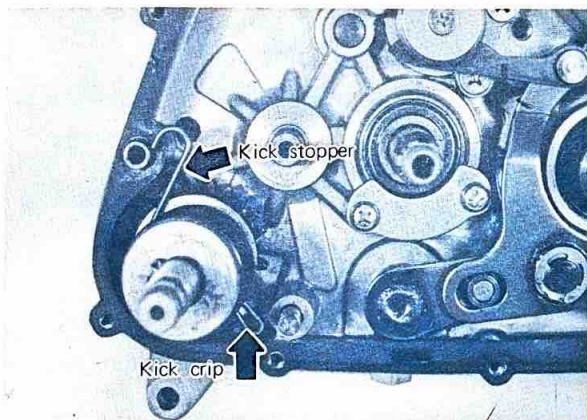
Don't forget to install the thrust washer inside the tachometer gear.



3. Reassembling

a. The kick axle is fitted with the stopper. If axle is located in the wrong position to the case, it hits 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

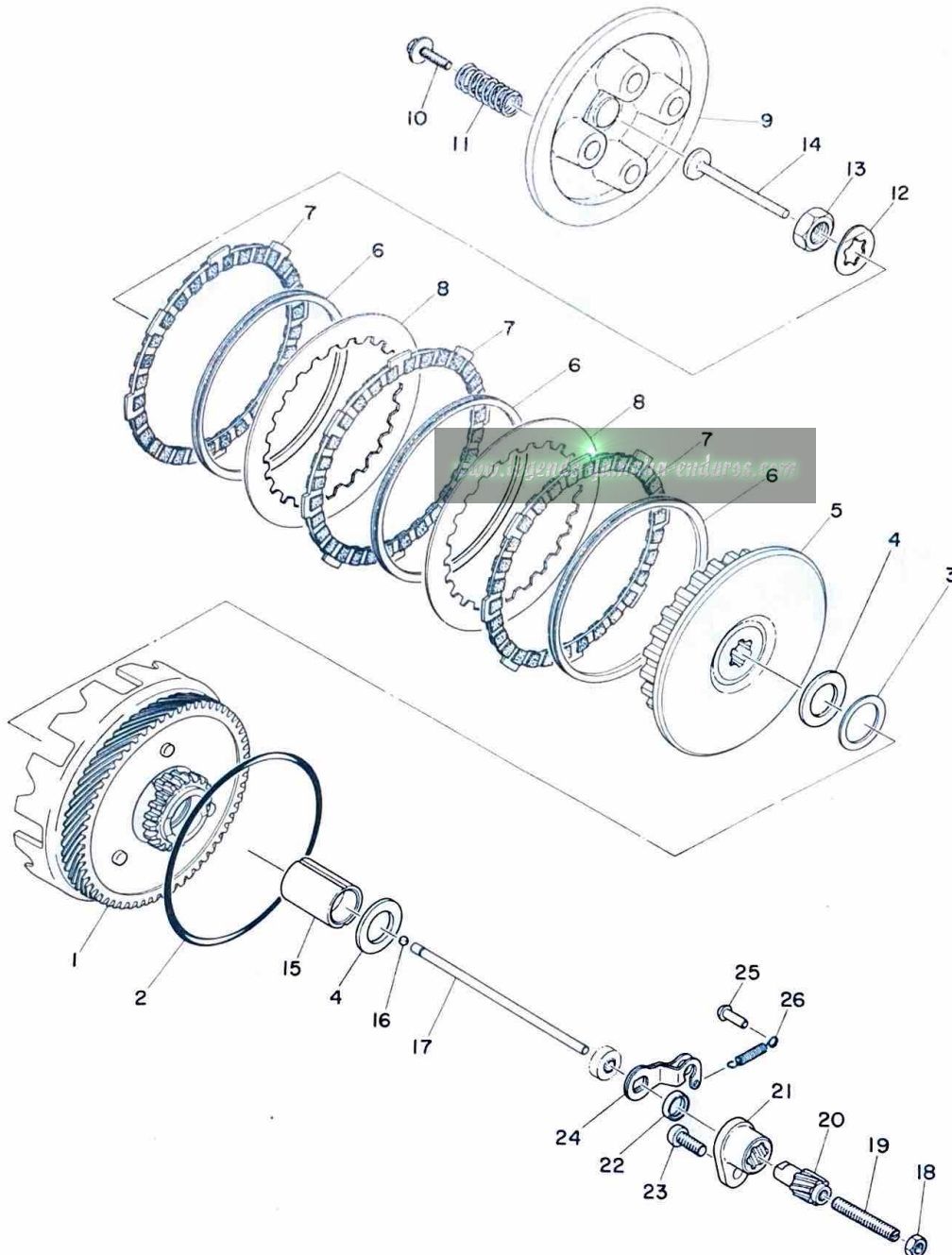
### 1. Outline

The clutch is a 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 system is employed. The primary driven gear, coupled with the clutch housing, is meshed with a kick pinion gear. This allows the kick starter to be operated with the clutch disengaged or engaged.

A shock absorber consisting of 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.

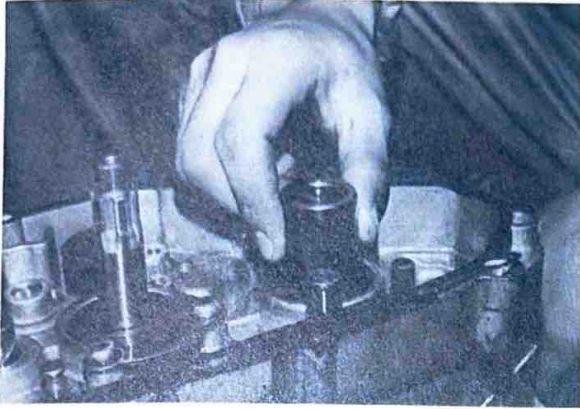
(Primary reduction ratio . . .  $68/19 = 3.578$ )



1. Primary driven gear comp.
2. O-ring
3. Thrust bearing
4. Thrust plate
5. Clutch boss
6. Cushion ring
7. Friction plate
8. Clutch plate
9. Pressure plate
10. Spring screw
11. Clutch spring
12. Lock washer
13. Clutch boss lock nut
14. Push rod 1
15. Spacer
16. Ball
17. Push rod 2
18. Lock nut
19. Adjusting screw
20. Push screw
21. Push screw housing
22. Oil seal
23. Panhead screw
24. Push lever
25. Spring fook
26. Lever return spring

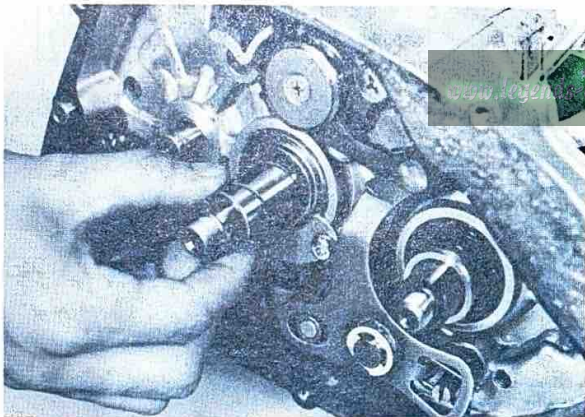
## 2. Primary drive gear

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



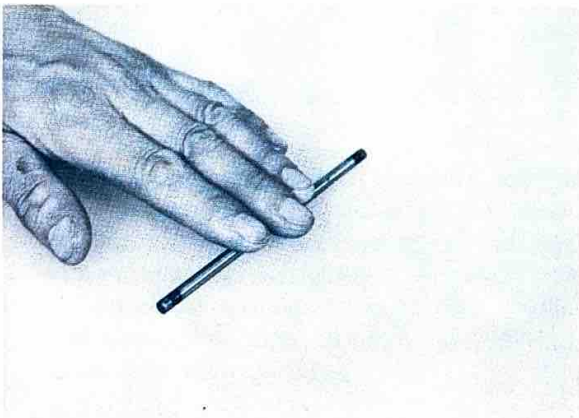
## 3. Primary Drive Gear Retaining Collar (Spacer)

Plate 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.



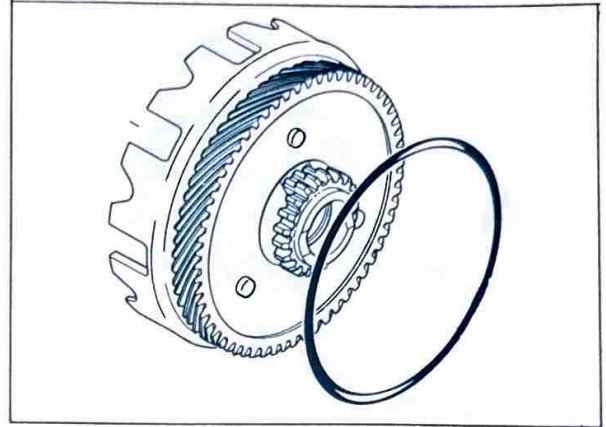
## 4. Checking the push rod

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

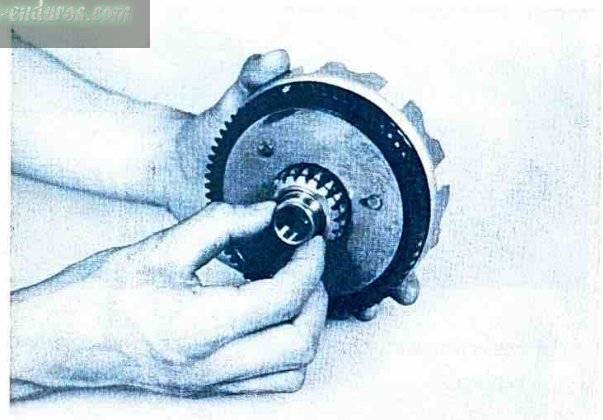
There is a rubber friction ring around the outside of the clutch between the primary driven gear and the clutch housing. It reduces gear noise at low engine speeds. Replace if damaged.



### 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.

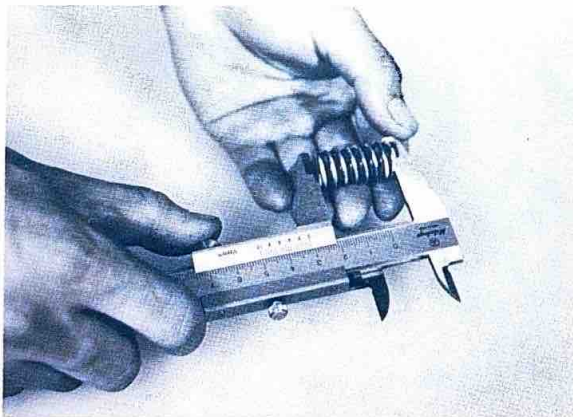


- 4) Check splines on clutch boss and housing for signs of galling. If moderate, de-burr. If severe, replace.

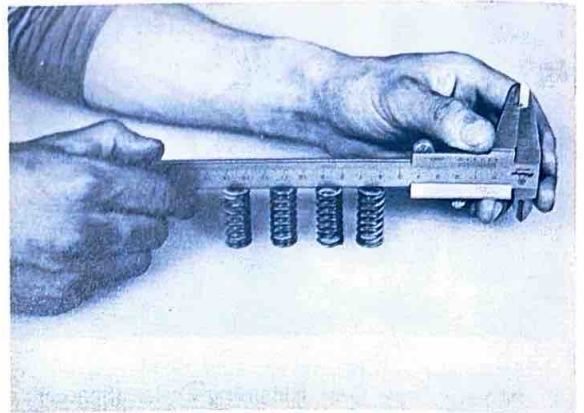


- 5) Measure each clutch spring. If beyond tolerance, replace.

Clutch spring free length: 1.25 ins. (31.5 mm.)  
wear limit: 1.19 ins. (30.0 mm.)

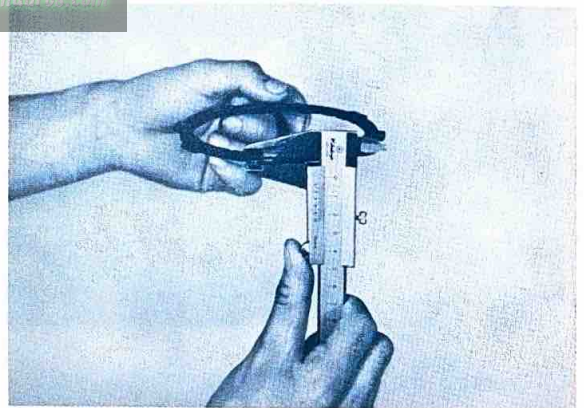


- 6) Stack the clutch spring set on a level surface. Rotate each spring until all are at approximately the same vertical angle and maximum apparent height. Place straight edge across set. If any spring exceeds tolerance, replace that spring.



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

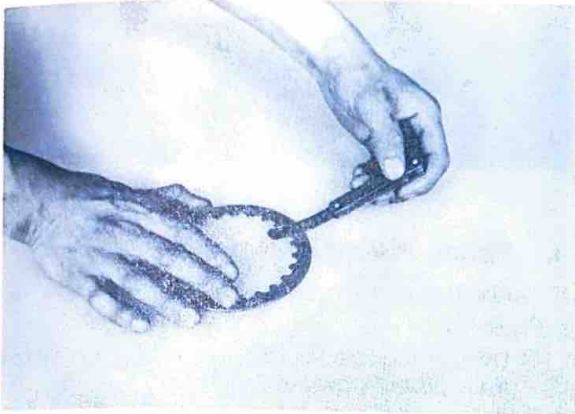
Friction plate thickness: 0.138 ins. (3.5 mm.)  
wear limit: 0.125 ins. (3.2 mm.)



- 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:

0.002 in. (0.05 mm.)



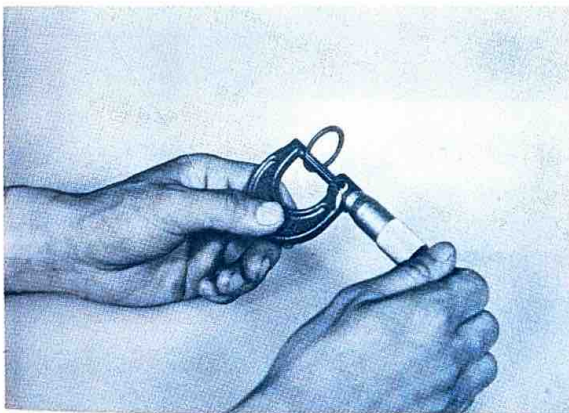
**Note:**

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.

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**b. Assembling**

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



- 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.

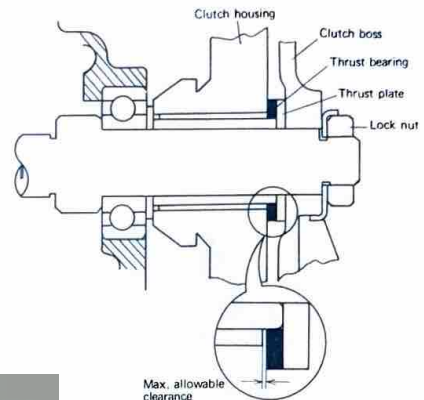
- 3) With transmission and primary driven gear stationary, clutch boss should turn easily, indicating insufficient housing end play, check thrust plates and thrust bearing for incorrect thickness. Correct by installing thinner thrust plates. Clutch housing end play is given in table and can be measured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

Clutch boss lock nut torque:

25 ~ 29 ft-lbs. (3.5 ~ 4.0 m-kgs.)

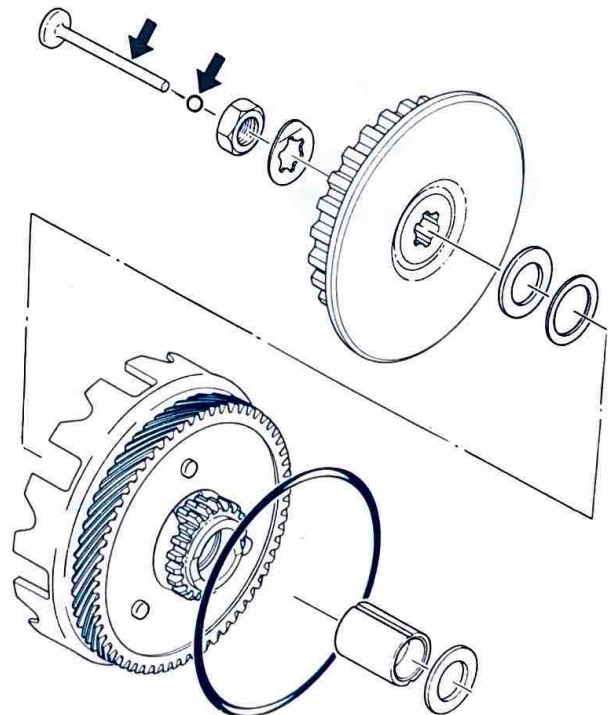
Clutch spring screw torque:

7.2 ft-lbs. (1.0 m-kg.)



**Caution:**

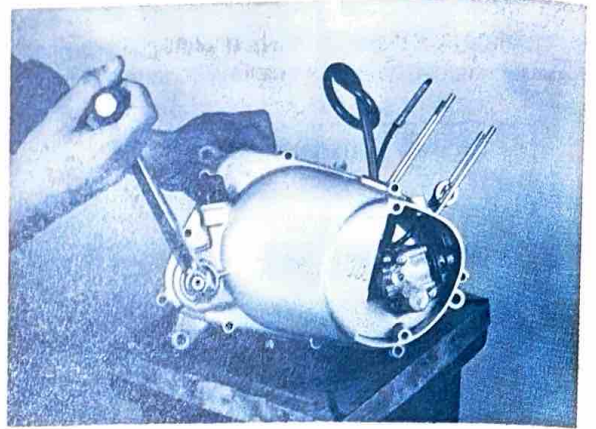
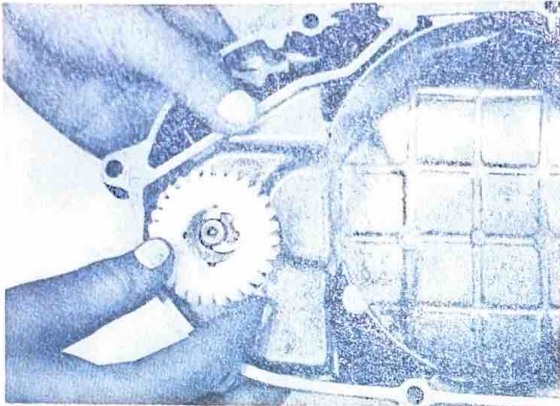
Do not forget to install the push rod (1) and steel ball.



## 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. Be careful in this respect.



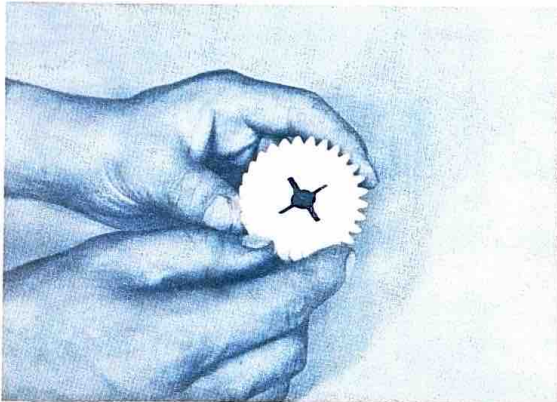
## I. Piston, Piston Rings and Piston Pin

### 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 and square. De-burr edges to avoid scratching ring groove and clean carbon deposits from ring grooves.

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



- 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.

6. Check the worm shaft oilseal with the naked eye for any warp or damage.

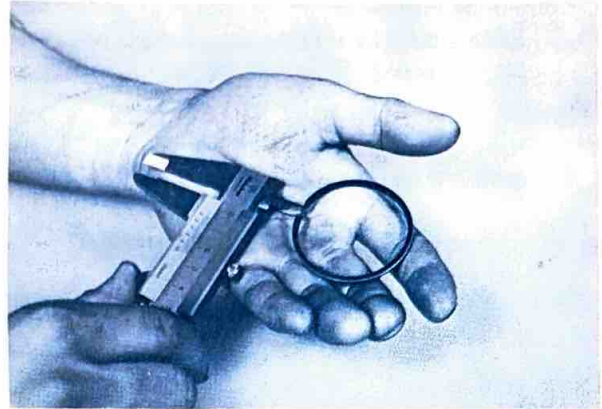
### Note:

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

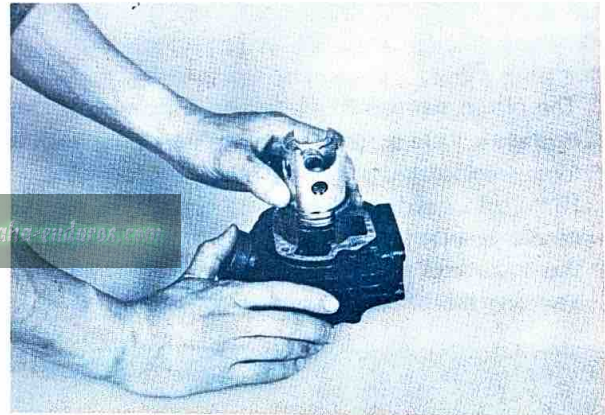
When installing the crankcase cover (R.H.), make sure that the pump drive gear (made from synthetic resin) is correctly engaged with the primary drive gear. If cover doesn't fit easily, rotate the kick axle and push the cover down lightly.



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.)



- 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.



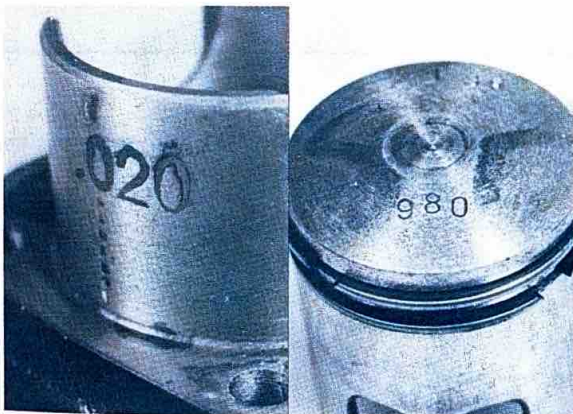
Piston maximum diameter subtracted from minimum cylinder diameter gives piston clearance. If beyond tolerance, replace piston or bore cylinder as required.

Nominal piston clearance:  
0.0016 ~ 0.0017 in. (0.040 ~ 0.045 mm.)

Maximum wear limit:  
0.0024 in. (0.060 mm.)

Ring end gap, installed:

0.0059 ~ 0.0138 in. (0.15 ~ 0.35 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.)

- 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:**

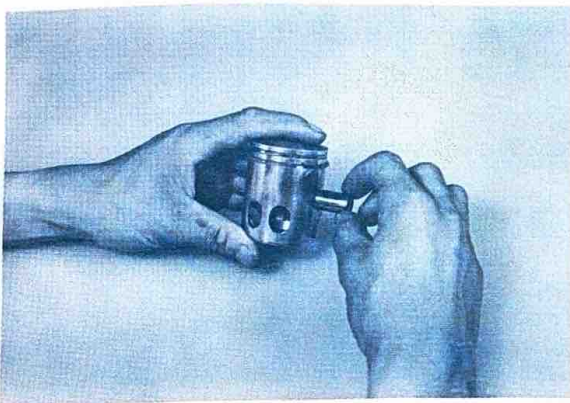
New ring requires break-in. Follow first portion of new machine break in procedure.



- 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.

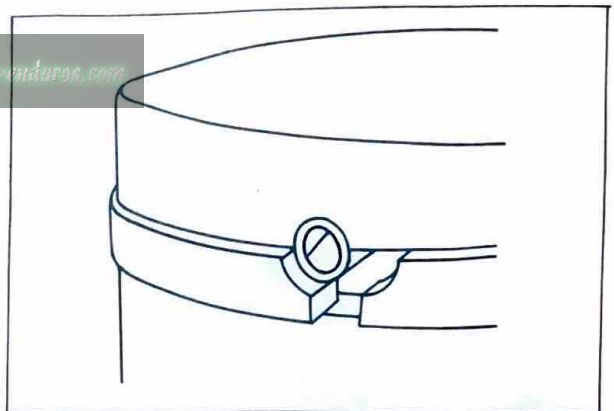
c. Piston Pin

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.



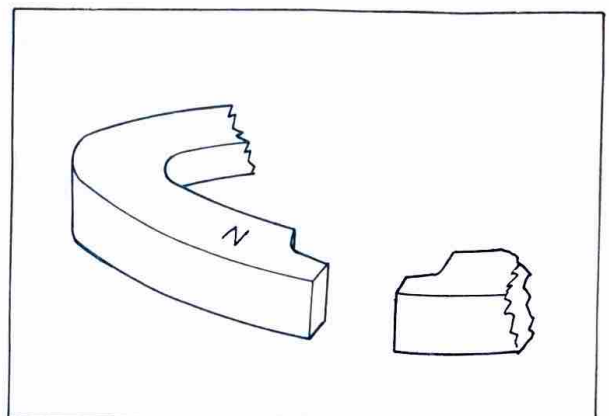
b. Piston Rings

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 ring must face up to position the gap properly at the pin.



2. Installing

a. Piston

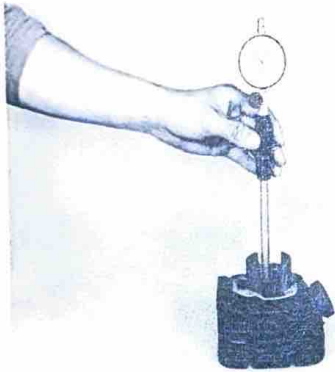
- 1) Install the piston with the arrow mark on the crown pointing forward (toward the exhaust port of the cylinder.)

## J. Cylinder

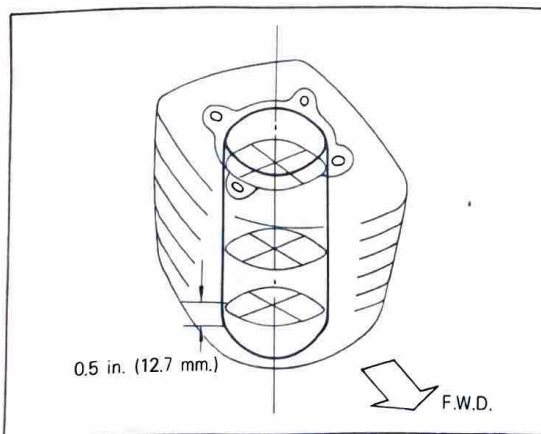
YAMAHA RD60B engine employs a special cast iron cylinder. The cylinder is 5-port design with superior scavenging efficiency.

### 1. Inspection and service

- Remove the cylinder gasket and clean gasket seat on cylinder and crankcase thoroughly.
- Using the rounded scraper, remove the carbon deposits from exhaust port.
- 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. (12.7 mm.) 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.

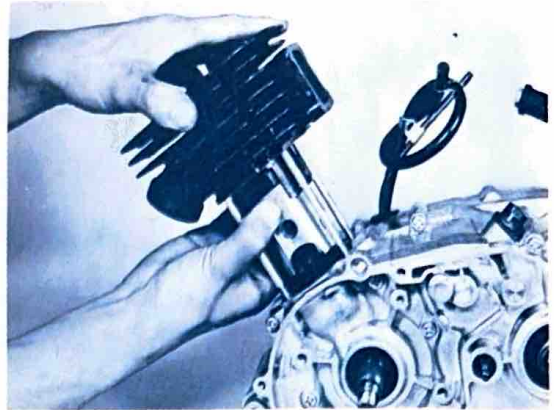


- During reassembly, always use a new cylinder base gasket.



### 2. Assembling

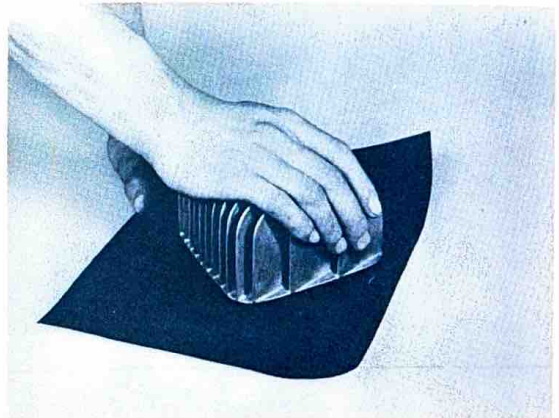
Use one hand to compress the piston rings (make certain ring ends straddle locating pins) and install cylinder over piston with other hand. Carefully rock cylinder from side to side until piston rings are inside cylinder bore.



## K. Cylinder Head

### 1. Inspection and Service

- 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.
- 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.)



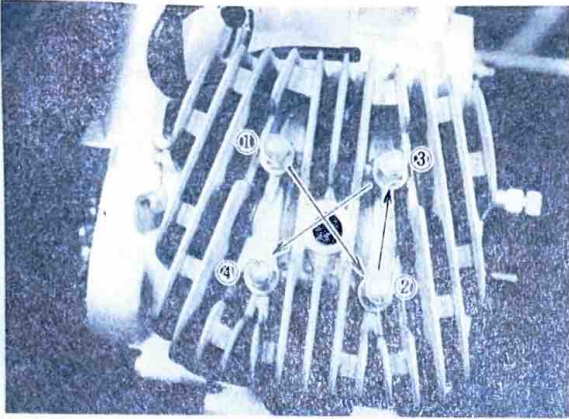
- Clean the spark plug gasket mating surface thoroughly.
- Wash the head in solvent and wipe dry.
- Install new cylinder head gasket during reassembly.

Cylinder head bolt torque:

7.3 ft-lbs. (1.0 m-kgs.)

### Note:

The cylinder securing bolts should be tightened in a crisscross pattern and in progressive stages.



3. If disassembly of the reed valve is required, proceed as follows;
  - a. Remove the Phillips screws (3) 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 the reed and stopper plate were removed. Re-install one same side.
  - b. During reassembly, clean reed block, reed and stopper plate thoroughly. Apply a holding against, such as "Lock-tite" to threads of Phillips screws. Tighten each screw gradually to avoid warping. Tighten the screws thoroughly.

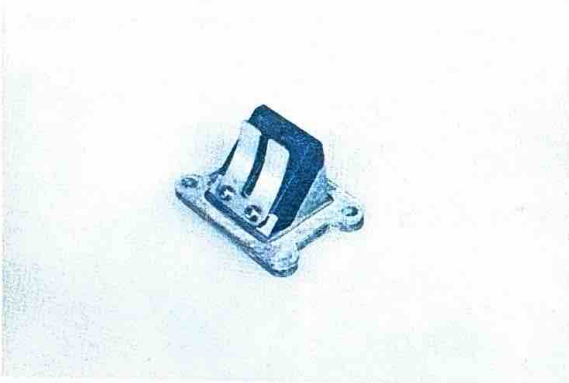
### L. Reed Valve

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 pedals for signs of fatigue cracks. Reed petals should fit flush or neary flush against neoprene seats. If in doubt as to sealing ability, apply section to carburetor side of assembly. Leakage should be slight to moderate.



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#### Caution:

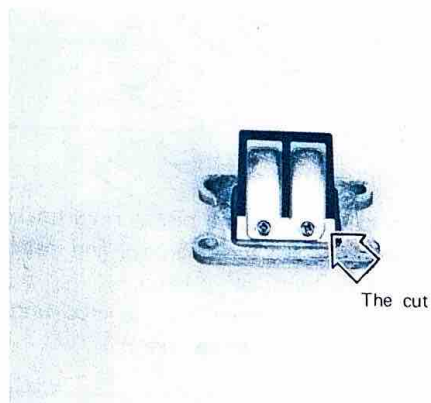
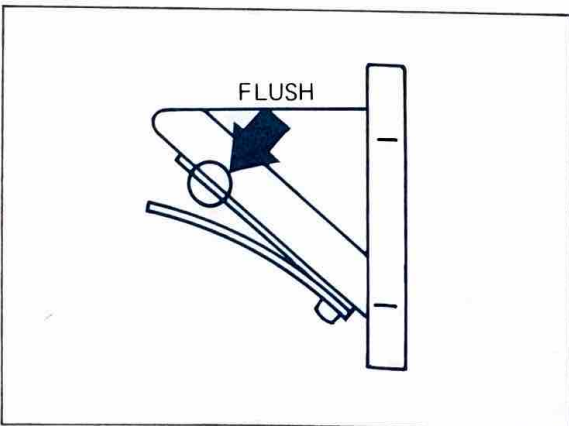
DO NOT OVER-TIGHTEN SECURING SCREWS, STOPPER PLATES MAY WARP.

Securing screw torque: 6.9 in-lbs. (8.0 cm-kg.)

#### 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.

Mounting bolt torque:

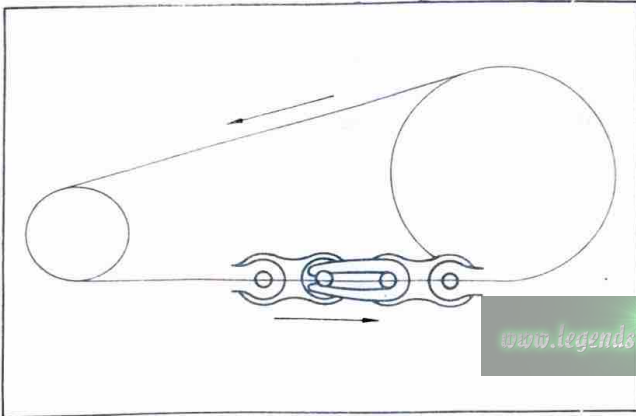
174 ~ 190 in-lbs. (2.0~2.2 m-kgs.)

Carburetor setting bolt torque:

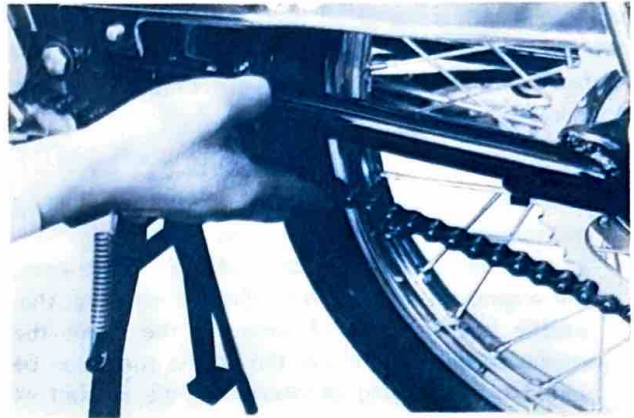
122 ~ 174 in-lbs. (1.4~2.0 m-kgs.)

### Note:

- 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.



- 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 13.

## CHAPTER 7. CARBURETOR

The RD60B is equipped with a Mikuni carburetor (VM type) with a starter jet built in. This carburetor is featured by a starter fuel level even on an inclined machine and also by compactness compared to the other types.

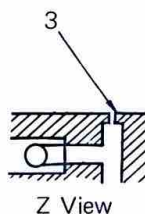
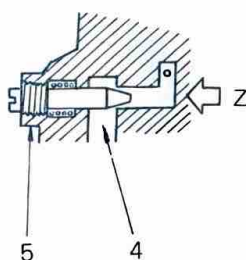
### A. Purposes of the Carburetor

1. The carburetor regulates the amount of air-fuel 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 air-fuel mixing ratio according to the operating conditions of the engine.

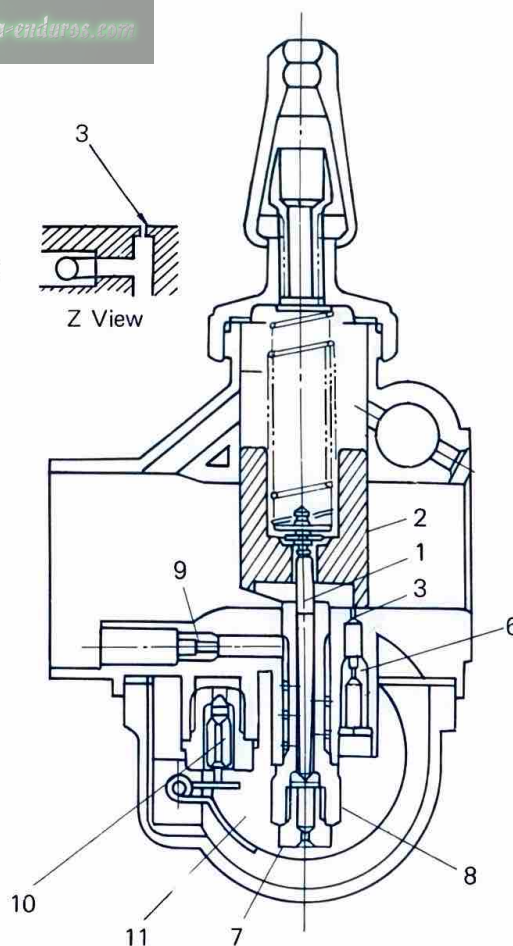
### B. Construction

The carburetor is made up of many small parts, but can be divided largely into the following sections:

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



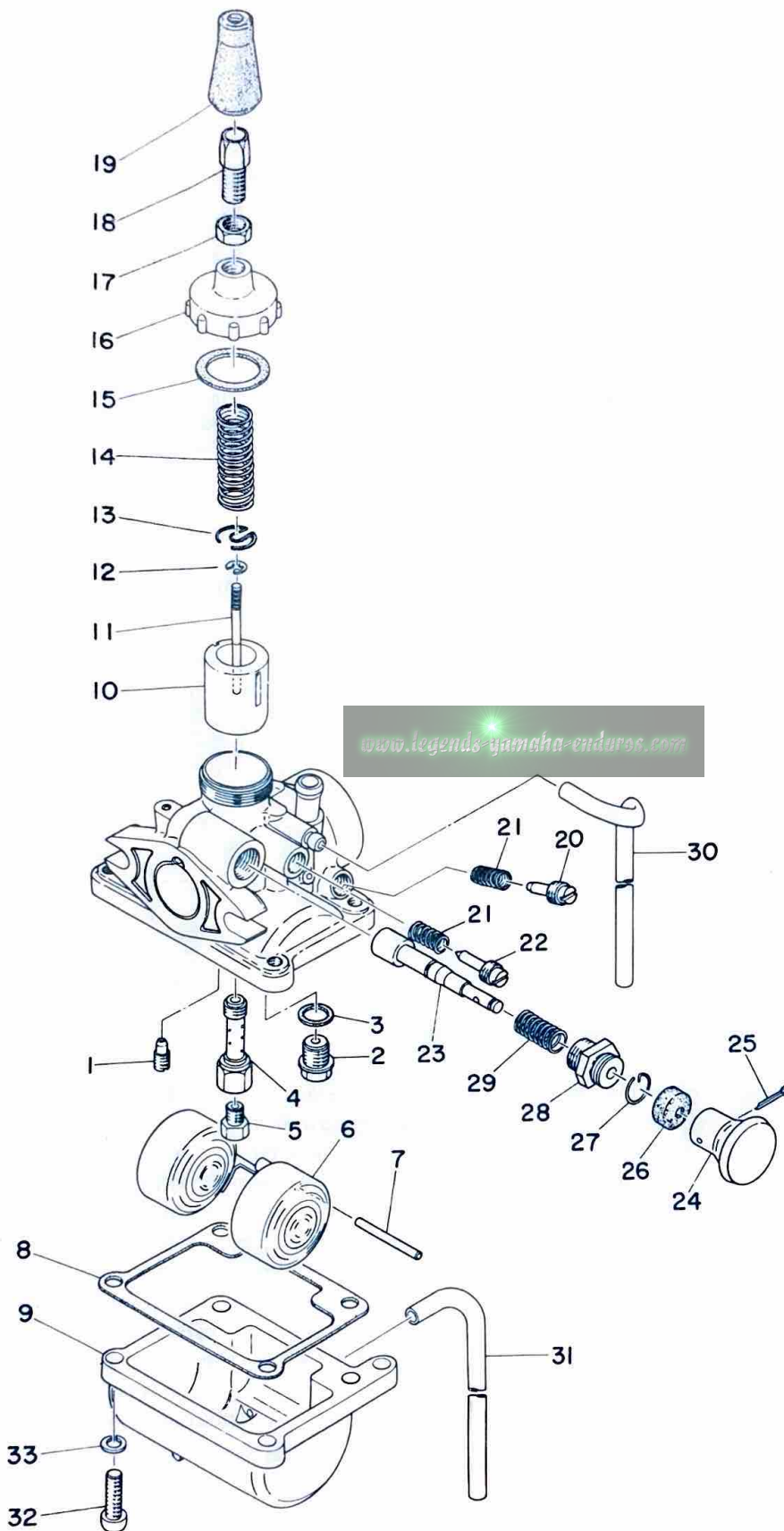
1. Jet needle
2. Throttle valve (slide)
3. Pilot outlet
4. Pilot air bypass
5. Pilot air screw
6. Pilot jet
7. Main jet
8. Needle jet
9. Pilot air jet
10. Float valve
11. Float



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.



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

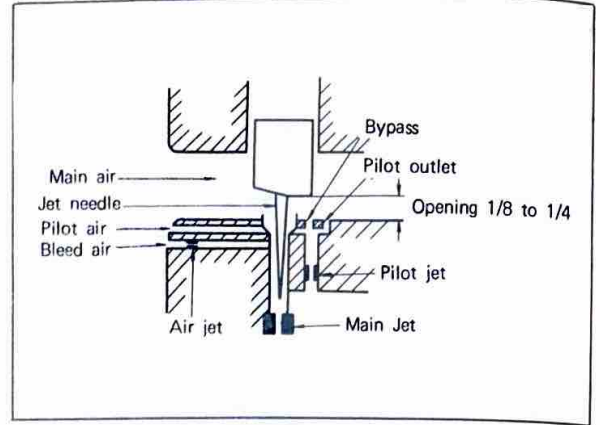
### C. Operation of the VM-type Carburetor

#### 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.

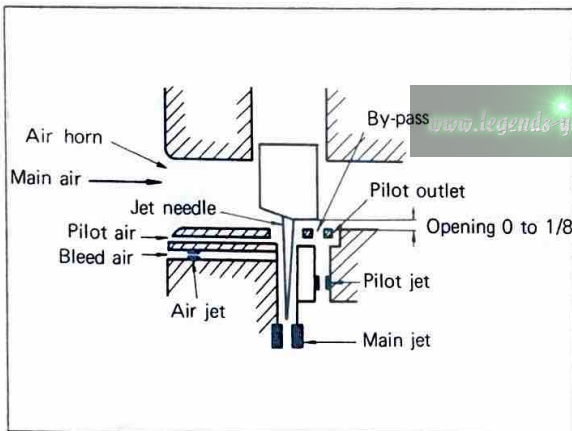
If the throttle valve is almost closed, the air passes through the pilot air passage, thus causing a partial vacuum around the pilot jet. The fuel streams out of the pilot outlet, where the vacuum is greater, into the air horn and is added to the air. On the other hand, a partial vacuum is also produced 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 no 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.



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

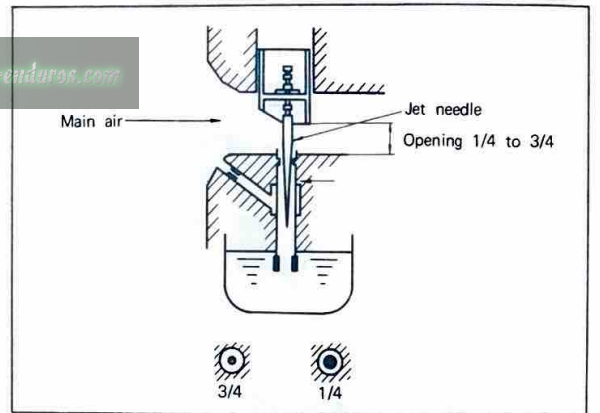
The air flow in the main nozzle increases, but as the throttle valve still acts as a venturi, the vacuum at the main nozzle will become greater, thus causing it to spray a greater amount of fuel. To regulate the spray of fuel, tapered "jet needle" is positioned inside the needle jet. The jet needle is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



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

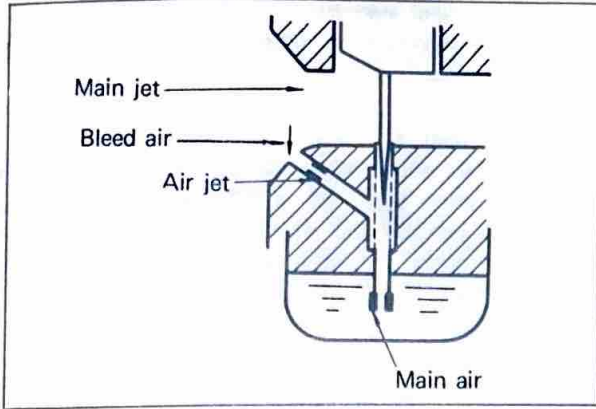
When the throttle valve opening is within this range, the mixture is fed from the pilot outlet, and at the same time, supplied from the bypass.

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.



#### 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.



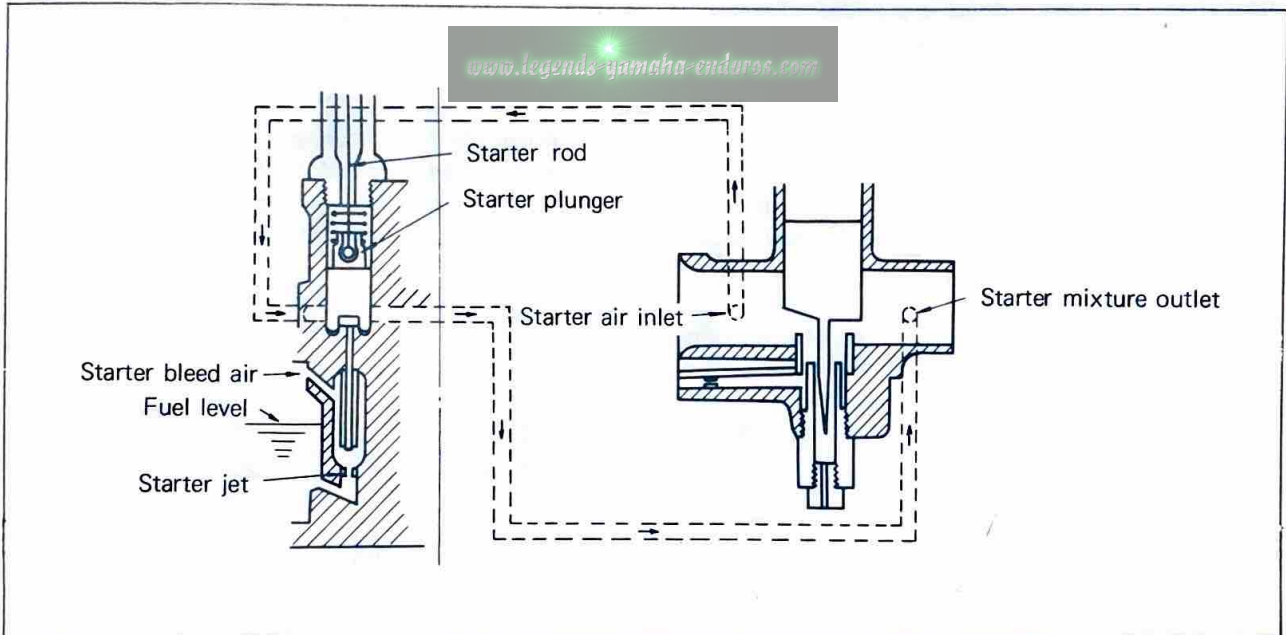
#### D. Starter Jet System

Both thickler and choke have intimate relation with the main circuit, but the use of them requires 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.

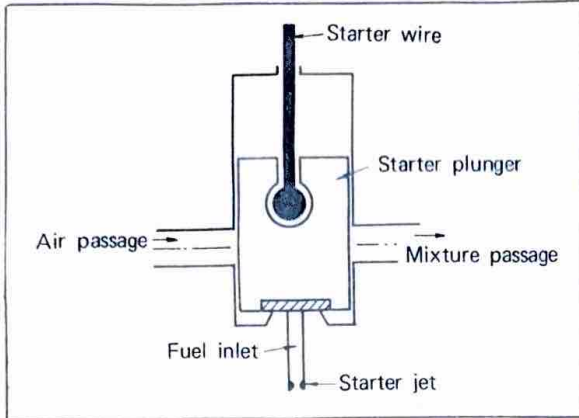
##### 1) Operation

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 pipe, 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.

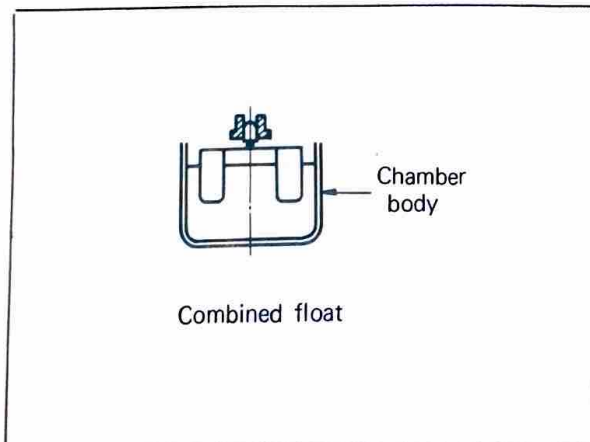
#### 1. Float chamber body.

The fuel is temporarily stored in the float chamber body having an overflow pipe and starter jet.

On some types of carburetor, the main jet is incorporated in the float chamber for easy replacement.

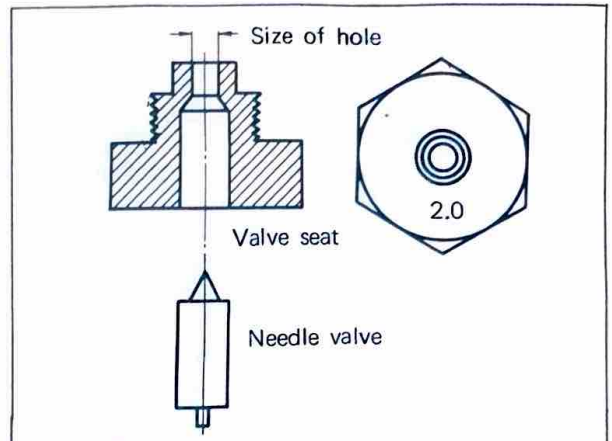
#### 2. Float

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

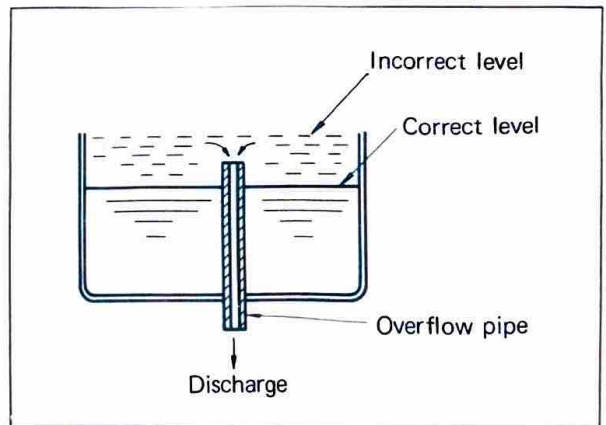
The float valve regulates the flow of fuel to the float chamber. It consists of a valve seat and needle valve and their contact surfaces are finished with high accuracy. Therefore, special care is required when the carburetor is disassembled. The calibration (e.g., 1.5 or 2.0) marked on the float valve 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. Tachometer gear

Install the tachometer gear as illustrated. Clean the gear in solvent and check the followings:

- 1) Scratches, damage and cracks
- 2) Wear in the axle hole



## 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.

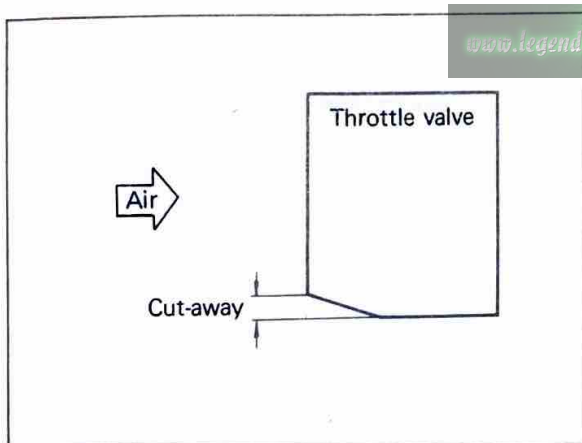
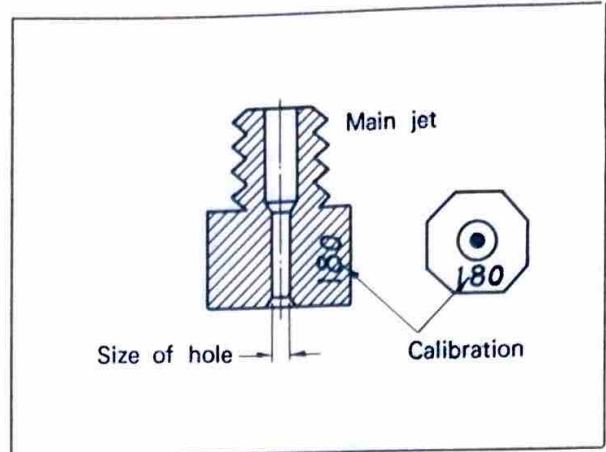
### 2. Throttle valve

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.



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### 3. Main Jet

The main jet regulates the flow rate of fuel and affects the engine performance at high speeds.

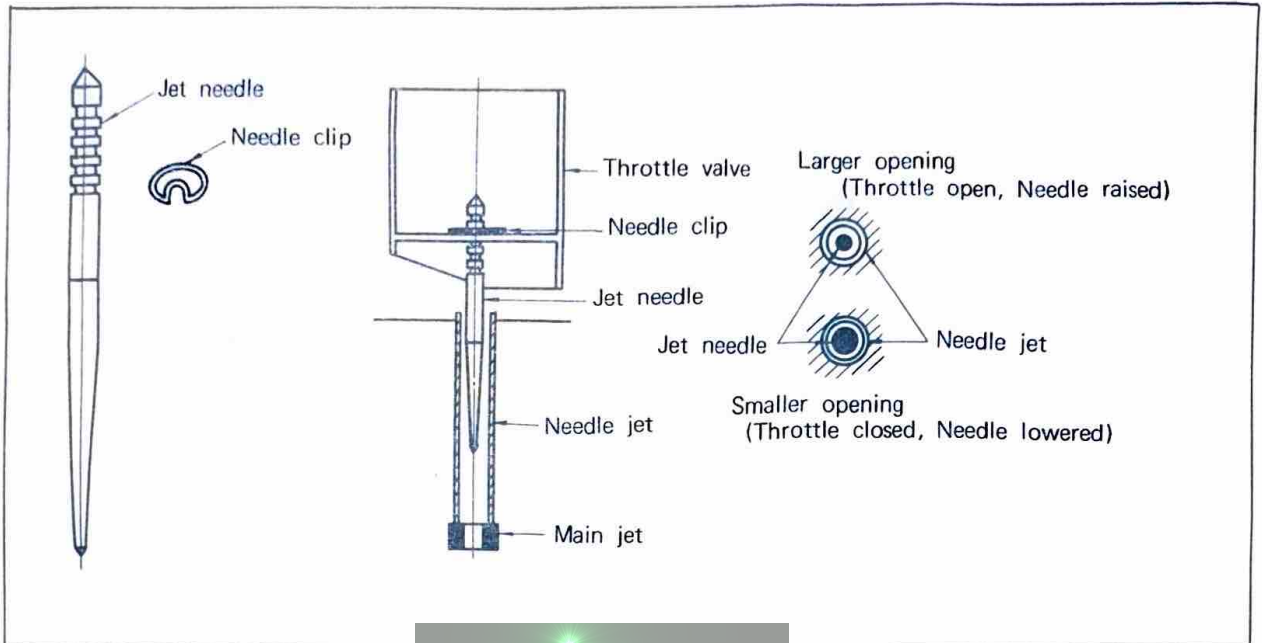
It has a through hole to regulate the fuel flow rate. The larger the hole, the greater the fuel flow rate.

The number on the main jet indicates the fuel flow rate.

4. Jet needle

The jet needle is tapered at one end and provided with five grooves encircling it 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.



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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.

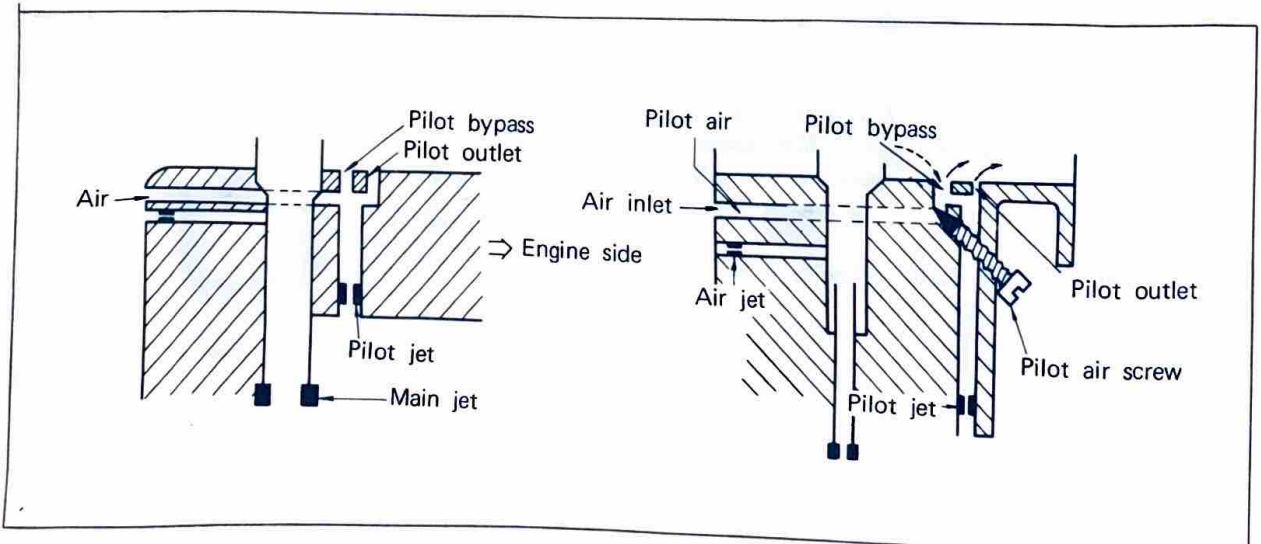
The mixing ratio of the mixture from the pilot outlet is regulated by metering the fuel with the pilot jet and by metering the air with the pilot air screw.

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 more effectively 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.



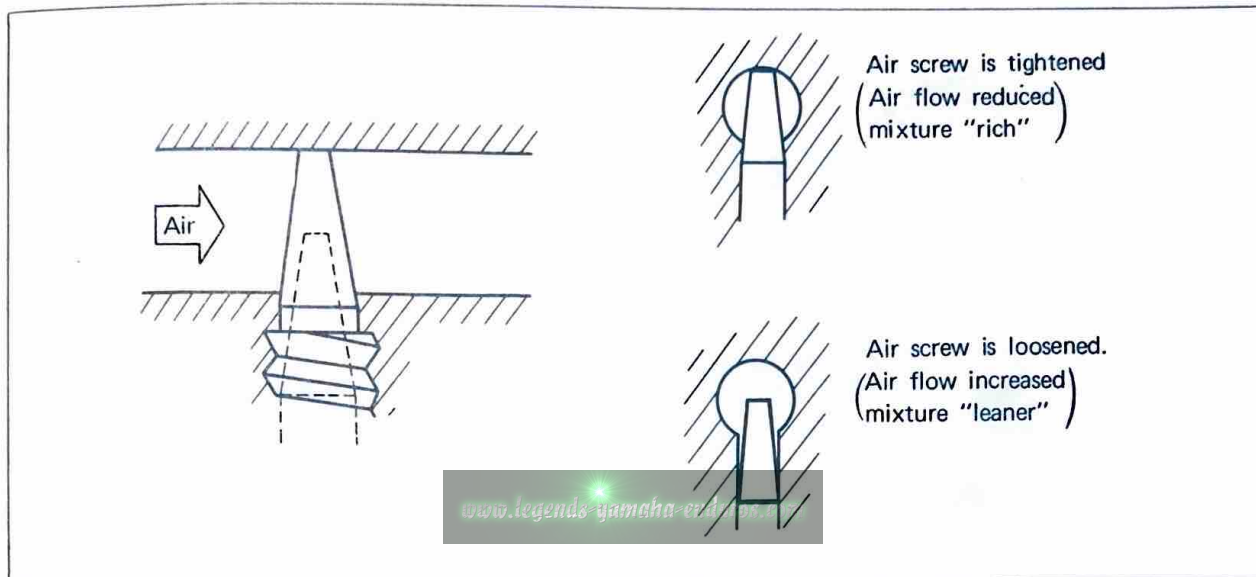
### 8. Air jet

The air jet supplied additional air to the fuel in the main circuit, thus regulating the mixture strength and improving the atomization of the fuel. The number on the air jet denotes the air flow rate. The larger the number, the larger the hole.

This air jet is a matched fit with the mixing chamber and not removable. If necessary, this is merely drilled holes in the carburetor body.

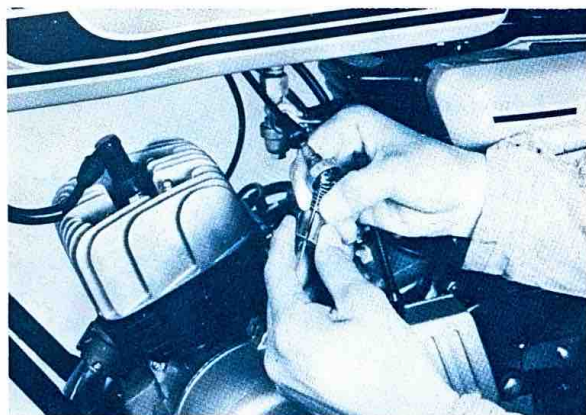
### 9) Pilot air screw

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

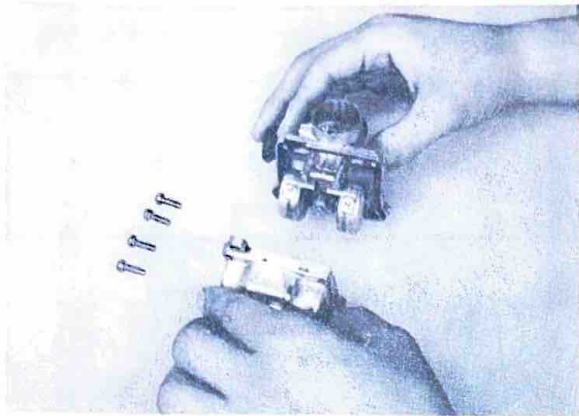


## G. Overhauling and Cleaning

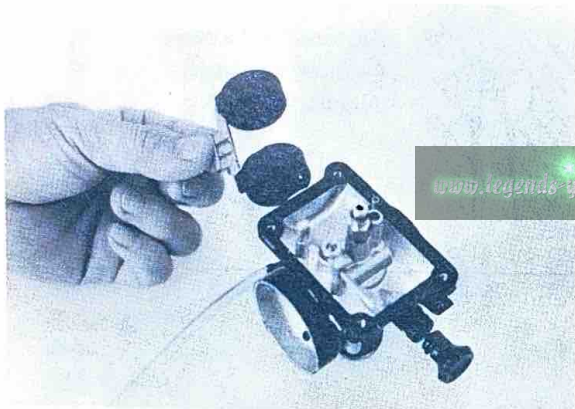
- Turn fuel petcock lever to the "OFF" position.
- Remove the gasoline tank fuel line from the fitting at the carburetor.
- Loosen the manifold and inlet joint bands (hose clamps).
- Push the air cleaner joint (hose) off the carburetor inlet.
- Remove two securing bolts, then work it off the reed valve body.
- Noting the presence, location, and routing of all vent and overflow tubes, pull the carburetor toward you.
- Unscrew the mixing chamber top. Remove the slide and needle assembly.



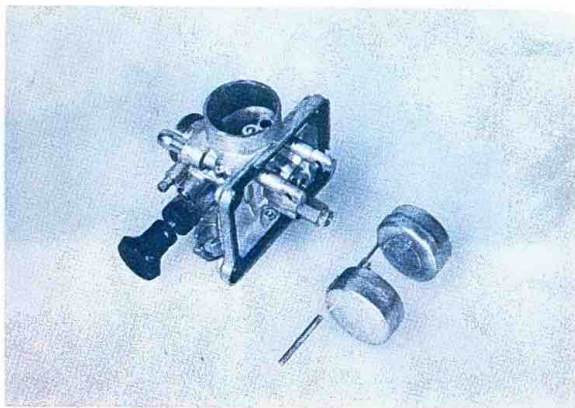
- h. Remove the Phillips screws (4) holding float bowl to body. Hold carburetor upright and remove float bowl. Pour off gasoline.



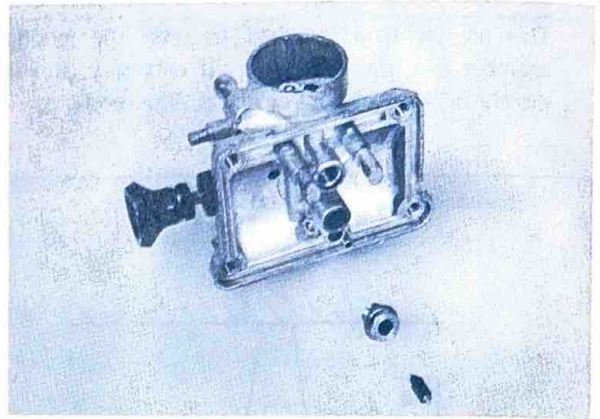
- i. Carefully set body aside inspect float. Note its installation position.



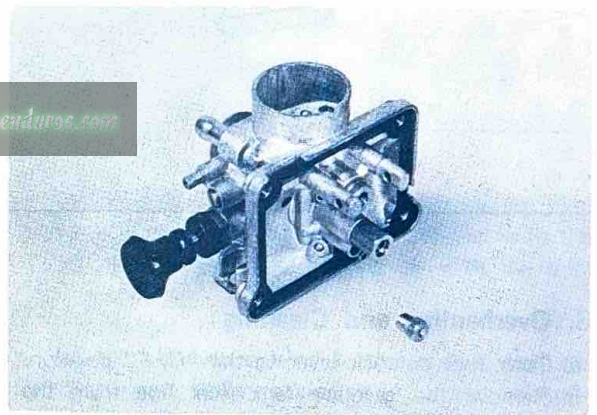
- j. Remove float. If the float is damaged in any fashion, replace.  
If there is gasoline inside the float, replace.



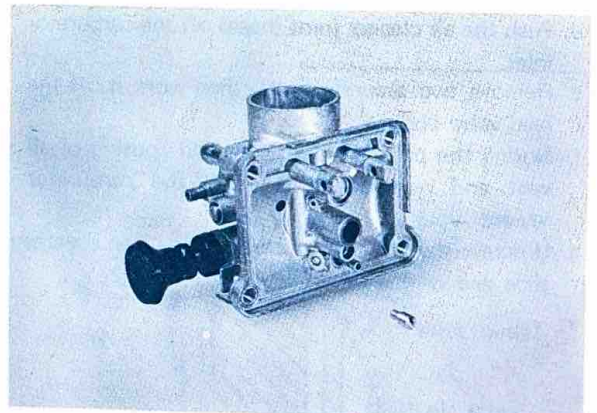
- k. Remove the inlet needle directly beneath the float arm tang. Inspect the needle and seat for signs of excessive wear or attached foreign particles. Replace as required. (Replace inlet needle and inlet valve seat as an assembly.)



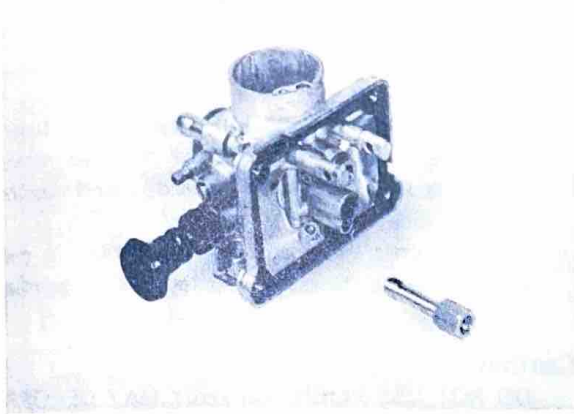
- l. Remove, in order, the following components  
(1) Main Jet



- (2) Pilot Jet



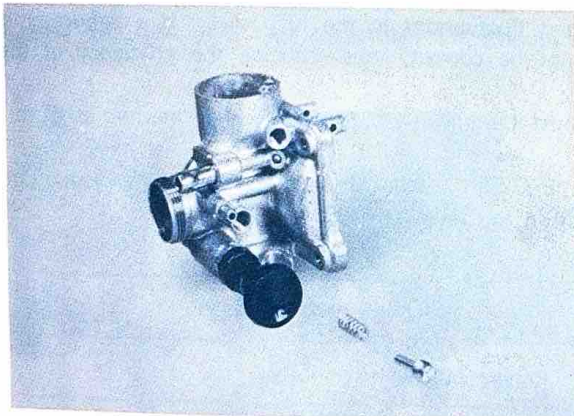
(3) Needle jet (Push from bottom through venturi).



(4) Air Adjusting Screw (Idle Mixture Screw)



(5) Throttle Screw (Idle Speed Screw)



(6) Actuate the Starter Jet control to open the circuit.



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

**Note:**

It is really necessary to use special carburetor cleaning solutions.

If deposits warrant this procedure, remove the starter jet assembly to avoid damaging the jet's neoprene valve.

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

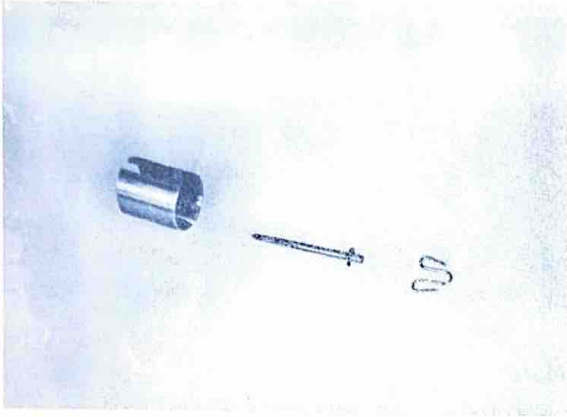


**Caution:**

NEVER DIRECT HIGH PRESSURE AIR INTO CARBURETOR WITH FLOAT BOWL INSTALLED. DAMAGE TO FLOATS MAY OCCUR.

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

- p. Float level  
Refer to page 14.
- q. Install the float bowl.
- r. Going to the machine, 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: 3E2-2

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. Re install 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.

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**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. Adjustment 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, engine runs roughly.	When starter is opened, 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)

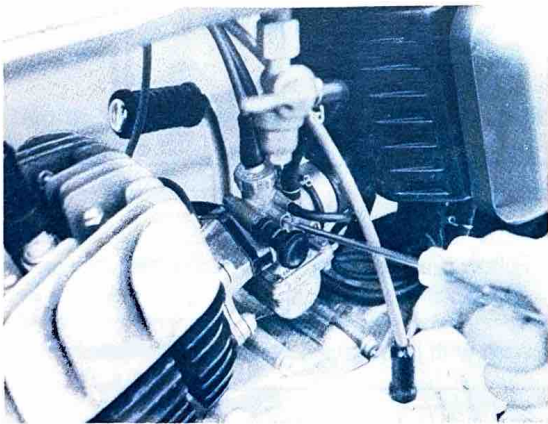
a. Fuel is too rich

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

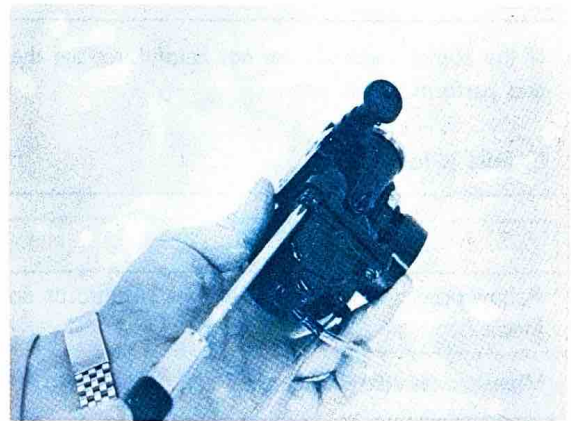
Cause	Remedy
Pilot jet is clogged.	Wash with gasoline and blow with compressed air.
Bypass or pilot outlet is clogged.	Remove pilot jet, and wash with gasoline and blow with compressed air.
Carburetor joint is leaky.	Replace gasket, and retighten.
Throttle valve is worn and loose.	Replace.

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

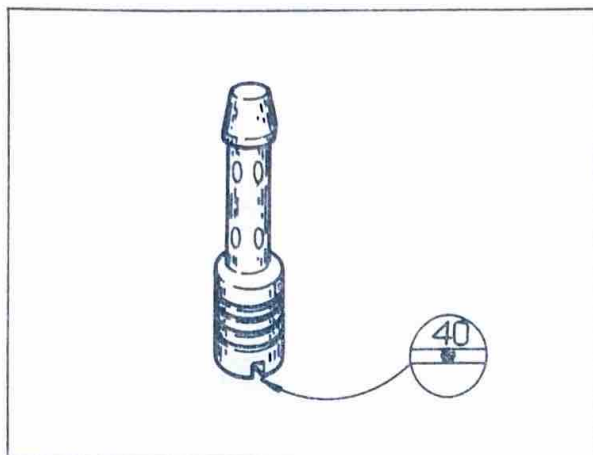
- 1) Remove the carburetor
- 2) Remove the float chamber body.



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.

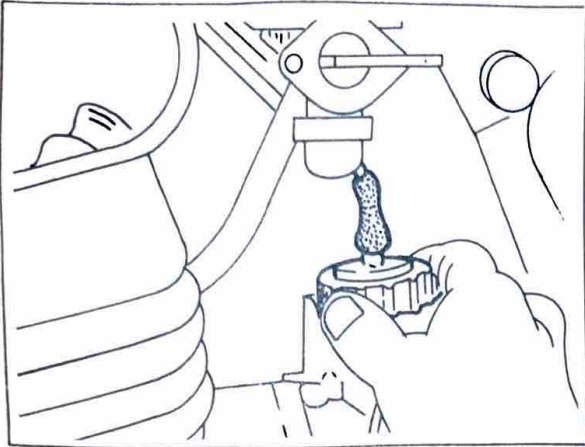
b. Fuel is too lean

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.

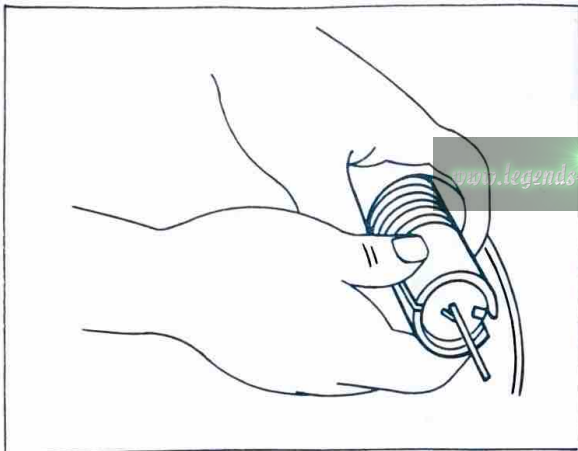
If the above check-ups are not helpful, replace the throttle valve with a new one having a smaller cut-away.

### Throttle Valve Removal

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



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

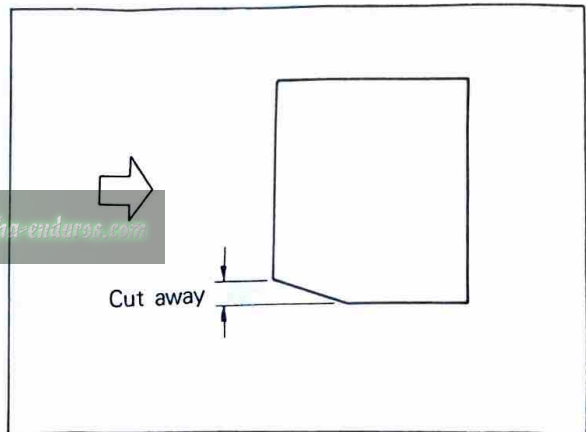


- 3) Remove the jet needle by pushing it upward.



### Installation

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 blowing 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.

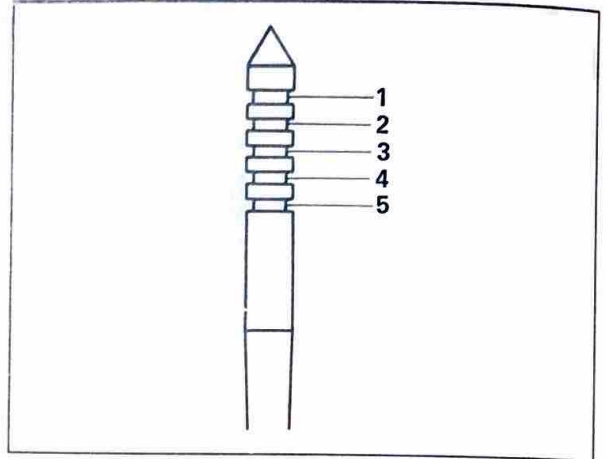
b. Fuel is too lean

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.

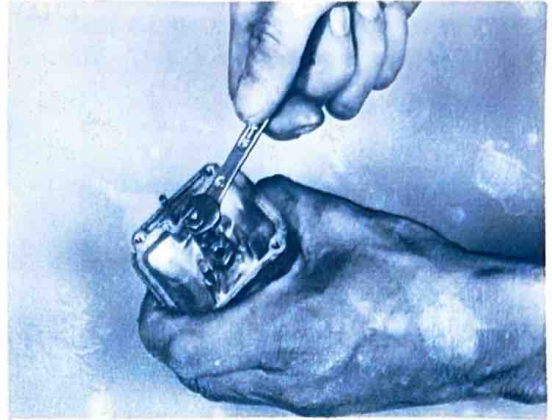
If no irregularity is found, change the main jet with a new one having a larger calibration No.

### 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.



### 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.

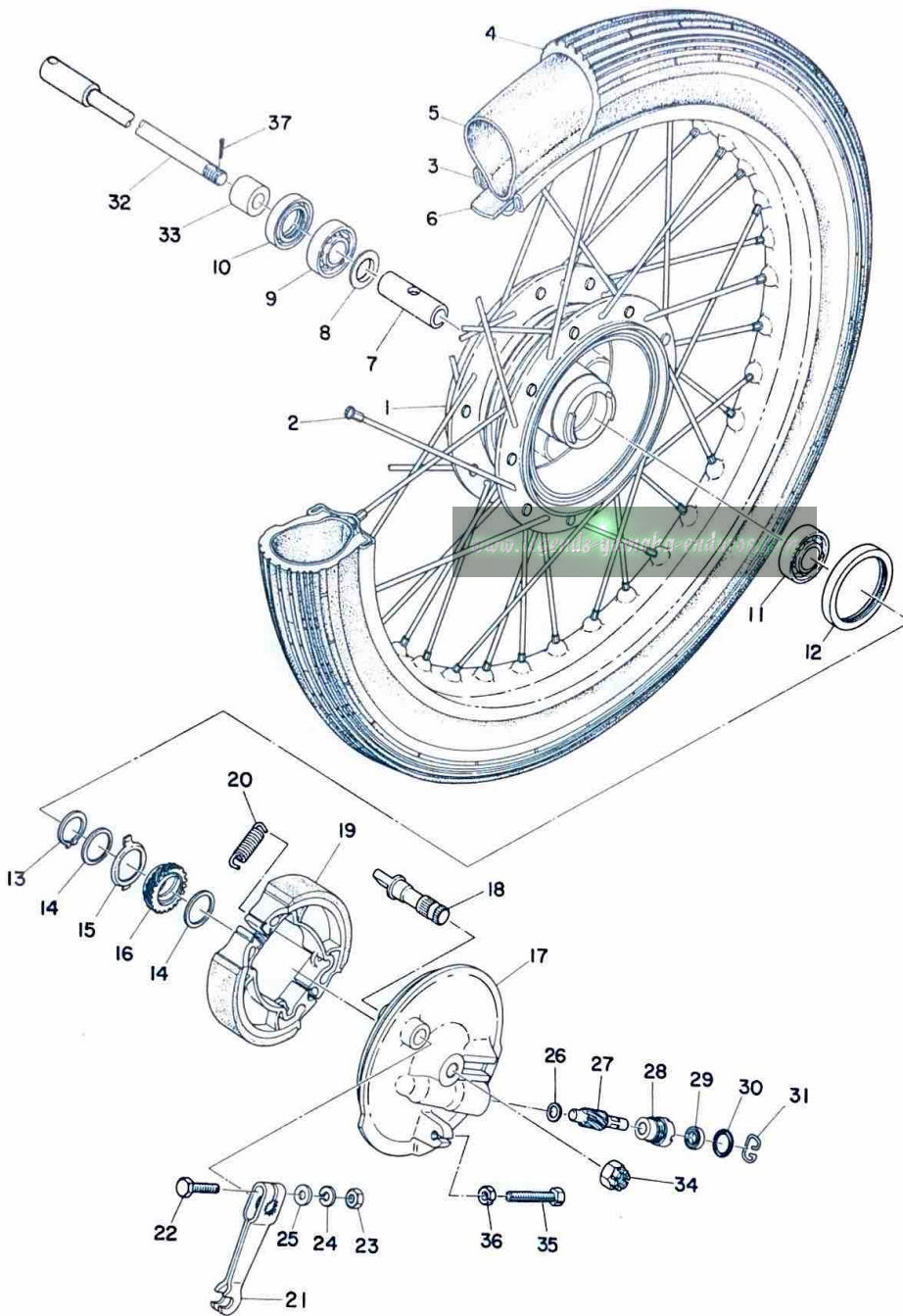
### Fuel Leakage and Remedies

Cause	Sympton	Remedy
Poor seating of needle valve due to worn or scratched needle valve.	Seepage.	Replace both needle valve and valve seat as an assembly.
Weak valve spring	Leaks under certain running condition or under 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.	Move the float with the hand so that it will move smoothly.
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

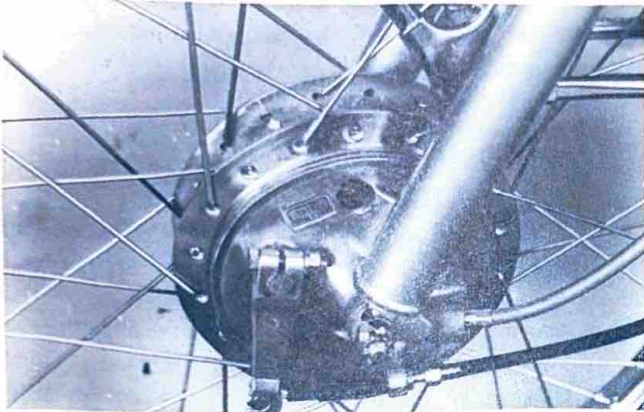
The 17" front wheel is equipped standard with a 2.50-17" tire.



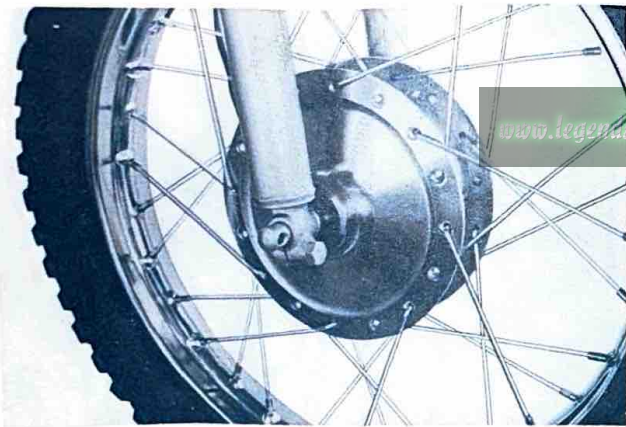
1. Front hub
2. Spoke set
3. Rim
4. Front tire
5. Tube
6. Rim band
7. Bearing spacer
8. Spacer flange
9. Bearing
10. Oil seal
11. Bearing
12. Oil seal
13. Circlip
14. Thrust washer 2
15. Meter clutch
16. Drive gear
17. Brake shoe plate
18. Cam shaft
19. Brake shoe comp.
20. Return spring
21. Cam shaft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

### 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 nut.

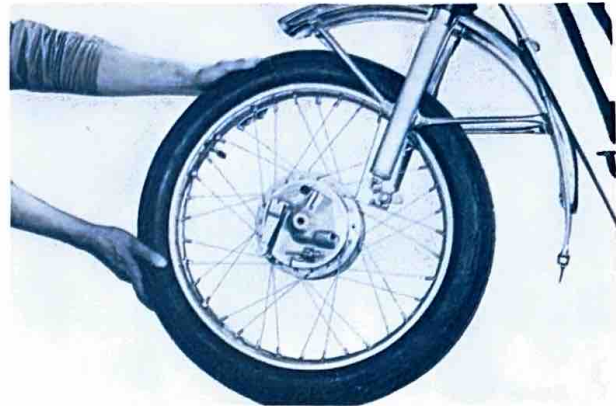


- 5) Loosen the front wheel axle pinch bolt.



- 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.

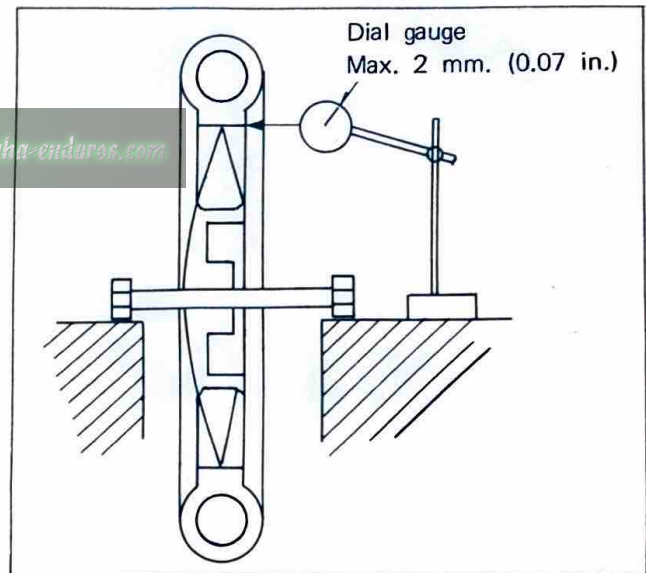


### 2. Checking

#### a. Runout of the rim

As shown below, measure the runout of the rim with a dial gauge.

Runout limits: 0.07 in. (2 mm.) or less.



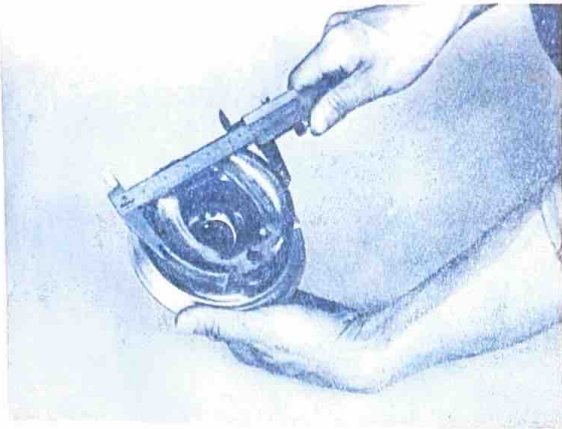
Runout Limits: 0.07 in. (2 mm.)

#### b. Brake shoe

Measure the outside diameter at the brake shoe with slide calipers. If it measures less than 3.5 in. (91 mm.), replace it. Smooth out a rough shoe surface with sandpaper or with a file.

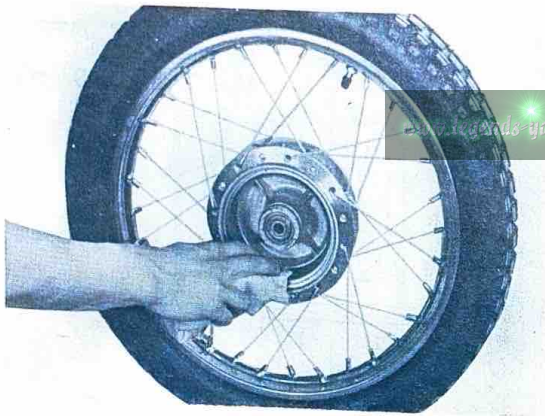
Brake shoe diameter: 3.7 ins. (95 mm.)

Wear limit: 3.5 ins. (91 mm.)



c. 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 tightly and evenly tumbling with emery cloth.



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

e. Repairing the brake shoe

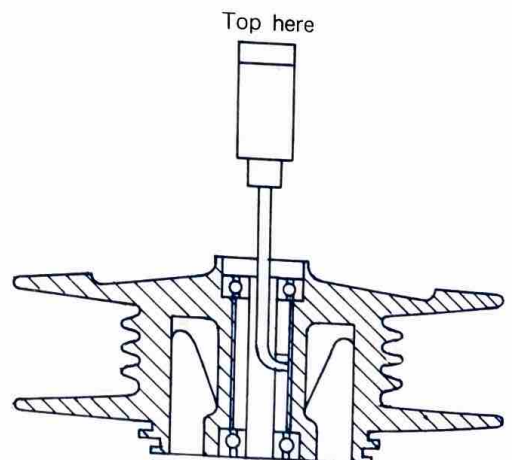
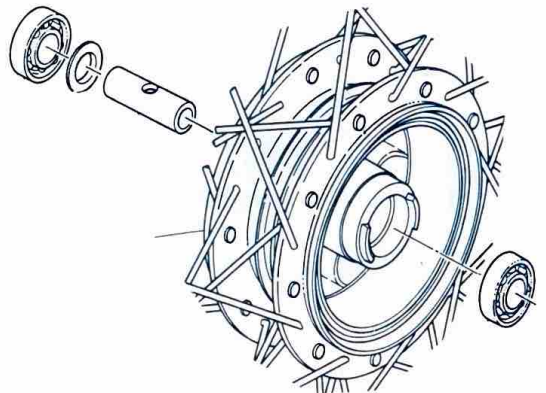
If the brake shoe has uneven contact with the brake drum or scratches, smooth out the surface with sandpaper or hand file.



- f. If the tire is excessively worn, replace it.
- g. Regularly check the tires for damage.
- h. If the bearings allow excessive play in the wheel or if it does not turn smoothly, replace the bearing.
- i. Replace a bent or damaged front wheel axle.
- j. If the tooth surface of the helical speedometer drive gear is excessively worn, replace it.
- k. Check the lips of the seals for damage or warpage. Replace if necessary.

3. Replacing the Wheel Bearing

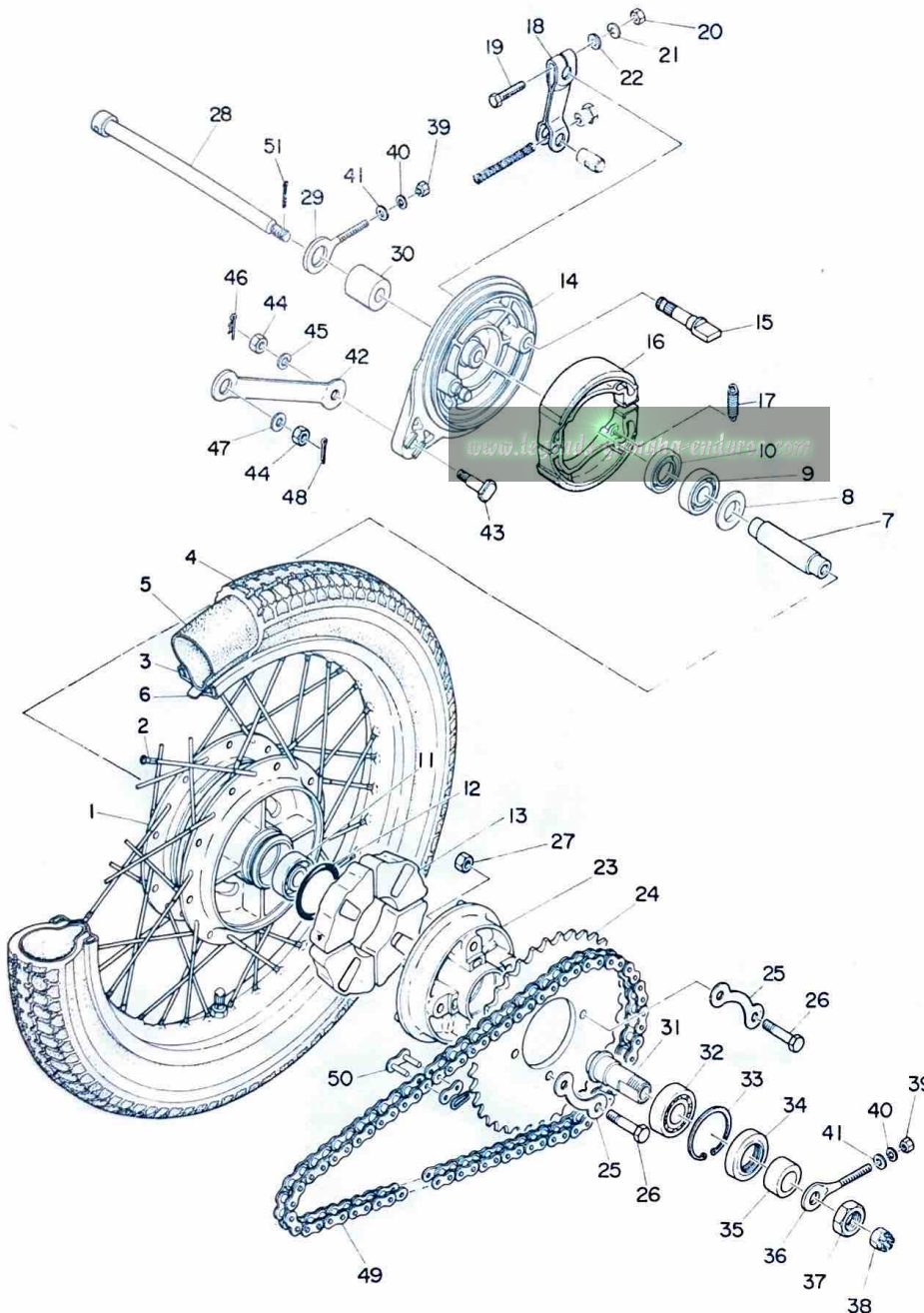
- 1) First, clean the outside of the wheel hub.
- 2) Insert the bent end of the special tool (as shown below into the hole located in the center of the bearing spacer, and drive the spacer out from the hub by tapping the other end of the special tool with a hammer. (Both bearing spacer and space flange can easily be removed.)
- 3) Then push out the bearing on the other side.
- 4) To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation.



## B. Rear Wheel

The rear wheel is 17-in. size, and the rear tire is the 2.50-17". The single leading shoe type brake is 110 mm. x 28 mm. (5.12 x 1.10 in.) in size. A labyrinth seal between the wheel hub and the brake plate is provided to prevent water and dust leakage.

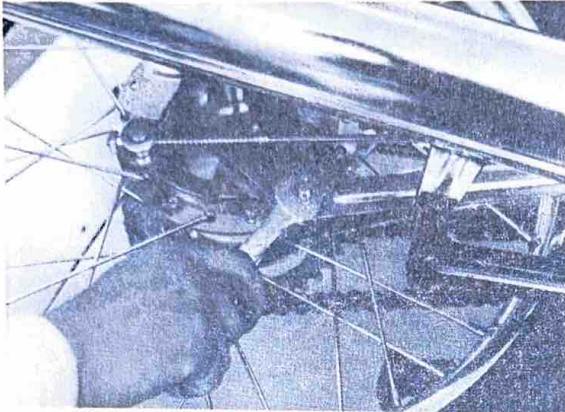
The brake tension bar is of link design to minimize the shifting of the brake cam lever position when the rear swing arm is moving up and down. The rear fender is steel, and rubber mounted on the frame. It is also wide enough to protect the engine unit from dust and water.



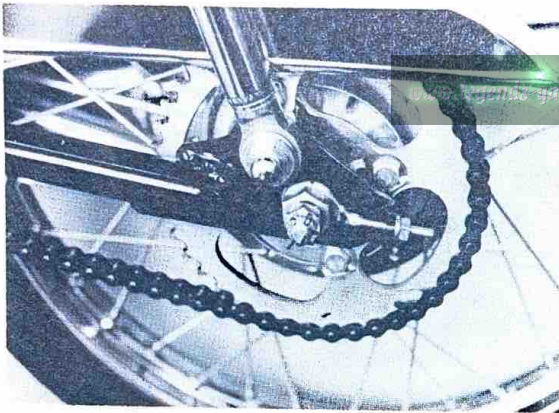
1. Rear hub
2. Spoke set
3. Rim
4. Rear tire
5. Tube
6. Rim band
7. Bearing spacer
8. Spacer flange 1
9. Bearing
10. Oil seal
11. Bearing
12. O-ring
13. Clutch damper
14. Brake shoe plate
15. Cam shaft
16. Brake shoe comp.
17. Brake shoe return spring
18. Cam shaft lever
19. Bolt
20. Nut
21. Spring washer
22. Plain washer
23. Hub clutch
24. Sprocket wheel gear
25. Lock washer
26. Fitting bolt
27. Nut
28. Rear wheel shaft
29. Chain right puller
30. Wheel shaft collar
31. Sprocket shaft
32. Bearing
33. Circlip
34. Oil seal
35. Sprocket shaft color
36. Chain left puller
37. Sprocket shaft nut
38. Shaft nut
39. Nut
40. Spring washer
41. Plain washer
42. Tension bar
43. Tension bar bolt
44. Nut
45. Spring washer
46. Tension bar clip
47. Plain washer
48. Cotter pin
49. Chain
50. Chain joint
51. Cotter pin

## 1. Removal

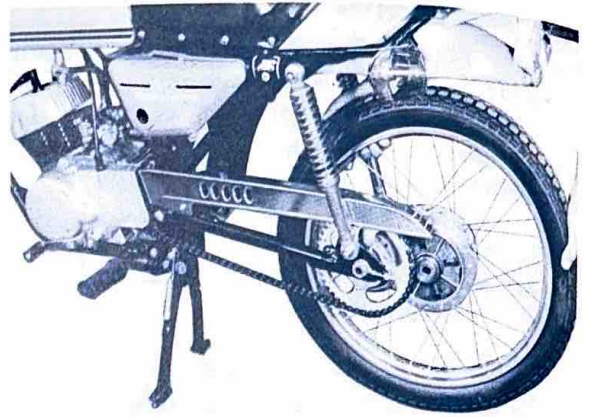
- 1) Disconnect the chain joint and remove the chain.
- 2) Remove the cotter pin and then remove the tension bar and brake rod from the rear shoe plate.



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



- 4) Remove the cotter pin, and then remove the rear axle nut.
- 5) Pull out the axle by striking it with a plastic tip hammer.
- 6) Remove the righthand chain adjuster and distance collar.
- 7) Remove the rear brake plate.
- 8) Lean the machine to the left and remove the rear wheel assembly.



## 2. Replacing the Wheel Bearing

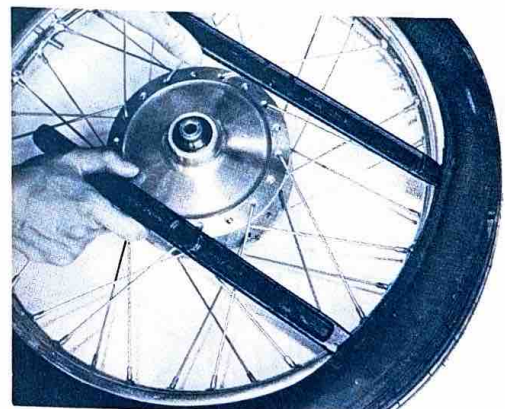
Replace the wheel bearing in the same way as front wheel bearing.

## 3. Replacing Tires

### a. Removal

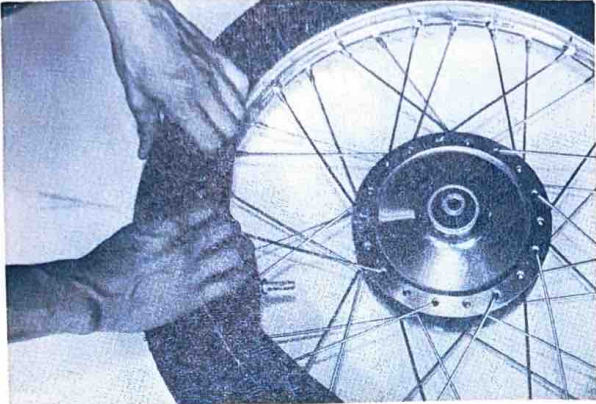
- 1) Remove the valve cap and lock nut from the tire valve, and deflate the tire.
- 2) Remove the tire from the wheel rim using two tire irons. (Exercise care to avoid damaging the inner tube with the levers.)

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

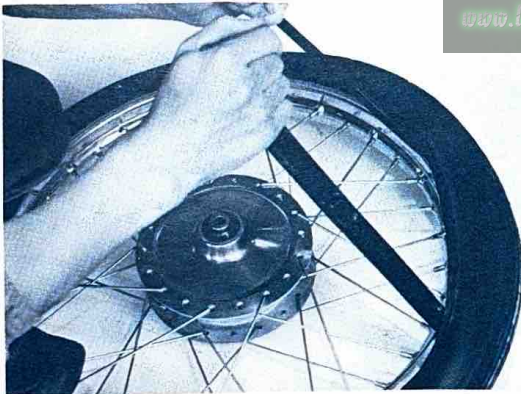


b. Installation

- 1) Insert the tube between the tire and the wheel rim, and momentarily inflate the tube to remove wrinkle. Be sure that the valve stem is not cocked to one side. At this time the tire is still halfway off the rim.



- 2) Force 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

- a. Runout of the rim  
Check the rim for runout in the same way as the front wheel. Maximum limit of runout ..... 2 mm. (0.08 in.) or less. See page 61.
- b. Brake shoe  
Check the brake shoe in the same way as the front wheel. Minimum limit ..... 86 mm. (3.3 in.) See page 6.
- c. Brake drum  
Check the brake drum in the same way as the front wheel.

- d. The spokes are measured in the same way as the front wheel. A loose spoke should be tightened.
- e. If the bearing has excessive play or it does not turn smoothly, replace it.
- f. If the tire is worn out or damaged, replace the tire.
- g. If the lip of the oil seal is damaged or warped, replace it.

### C. Rear Sprocket

#### Checking and Adjustment

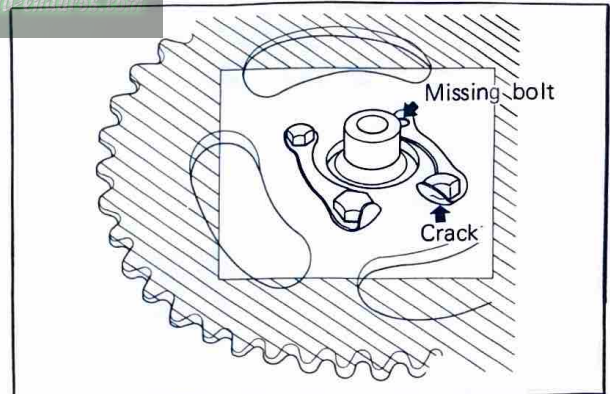
The rear wheel sprocket is installed on the rear wheel hub. To replace the sprocket, take the following steps.

a. Removing the sprocket

- 1) Bend the lock washer ears flat.
- 2) Remove the sprocket mounting bolts.

b. Checking

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



### D. Tires and Tubes

1. Normal tire pressure

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

Front .....	1.6 kg./cm <sup>2</sup> . (23 lbs./in. <sup>2</sup> )
Rear .....	2.2 kg./cm <sup>2</sup> . (31 lbs./in. <sup>2</sup> )

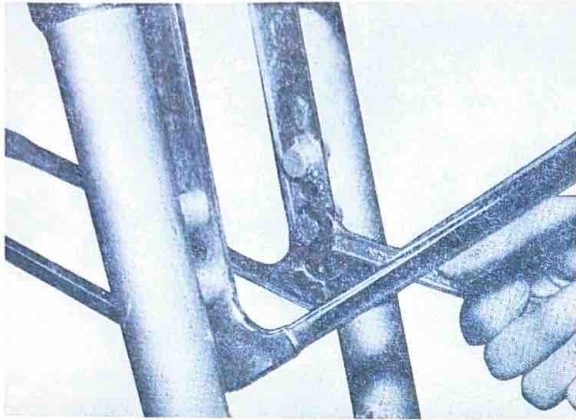
When the tire pressure is reduced below the specified value because of some reason, the tire may slip around the rim.

## E. Front Forks

The RD60B 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 75 mm. (3.0 in.)

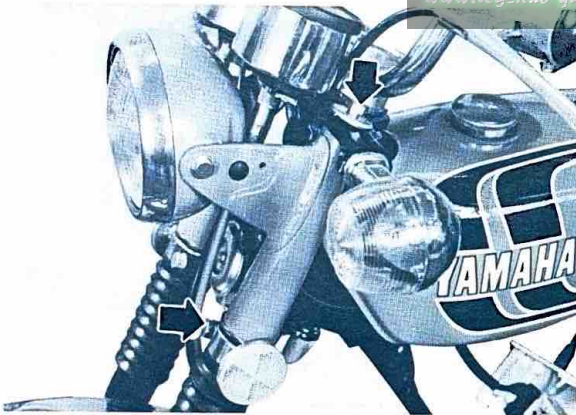
### 1. Removal

- a. Remove the front fender and front wheel.



- b. Remove the inner tube cap bolt.

You must loosen the arrow marked pinch bolt before the cap bolt is loosened.



- c. Loosen the inner tube pinch bolt on the under-bracket.

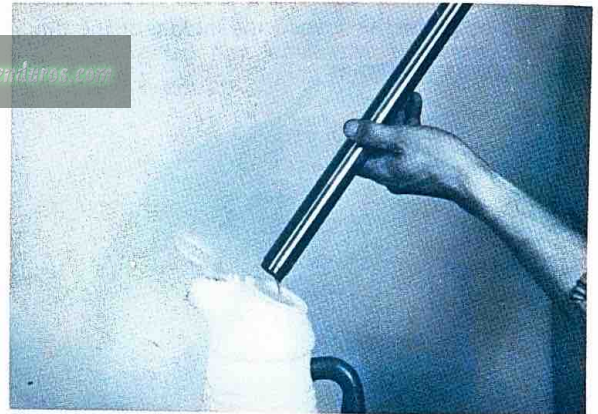


- d. Pull the outer tube downward.

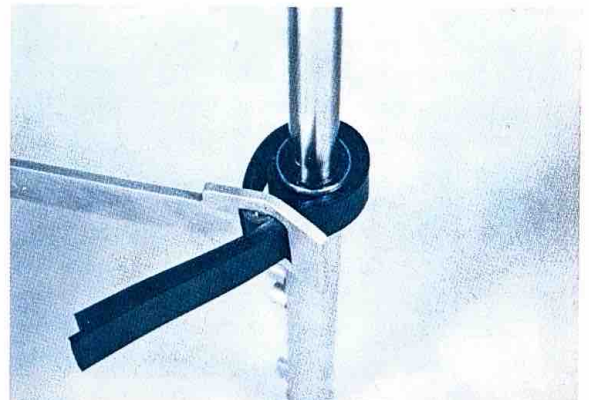


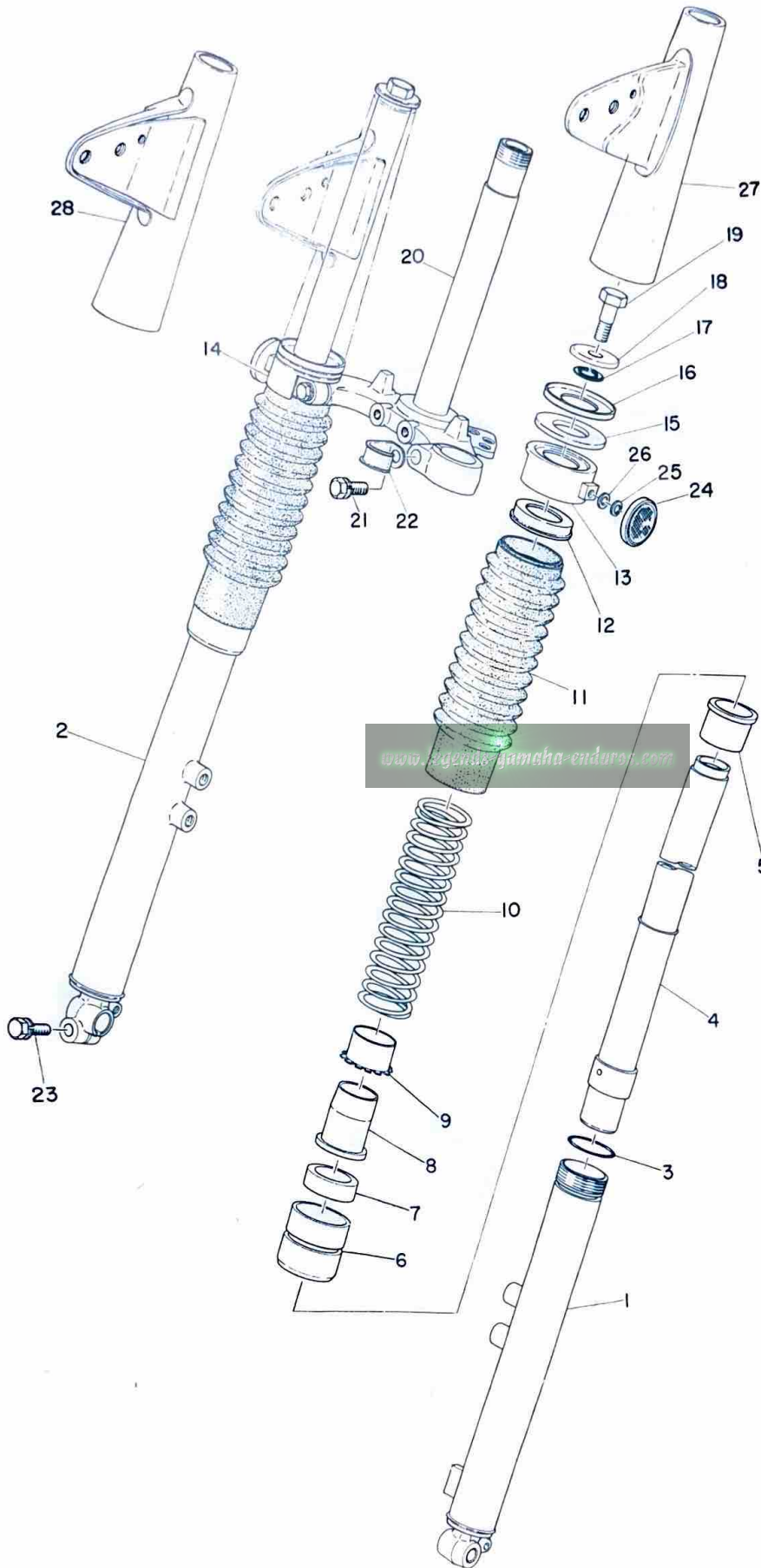
### 2. Disassembling the Inner and Outer Tubes

- a. Drain the oil from the fork.



- b. Place a rubber sheet or tire tube around the outer tube nut, and wind a rope or outer tube nut wrench and turn it counterclockwise, then remove the nut. Inner tube can then be separated from outer tube.





1. Outer tube (left)
2. Outer tube (right)
3. O-ring
4. Inner tube (left)
5. Slide metal
6. Outer nut comp.
7. Oil seal
8. Spring underseat
9. Spring guide
10. Front spring
11. Boot
12. Spring upper seat
13. Outer cover (left)
14. Outer cover (right)
15. Packing
16. Cover under guide
17. Packing
18. Cap washer
19. Cap bolt
20. Under bracket comp.
21. Under bracket bolt
22. Wire holder
23. Front axle pinch bolt
24. Reflector
25. Spring washer
26. Plain washer
27. Upper cover (left)
28. Upper cover (right)

### 3. Checking

#### a. 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.

#### b. Oil seal

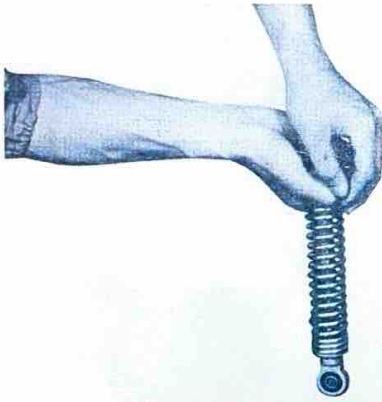
When disassembling the front fork, replace the oil seal in the outer tube nut.

### 4. Assembling

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

#### b. Installing the front fork on the frame.

Bring up the front fork inner tube to the correct position and tighten the under bracket mounting bolt.



Pour oil into the inner tube through the upper end opening. Front fork oil: Motor oil 10W/30.

Front fork oil quantity:	c.c.
--------------------------	------

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

## F. Rear Shocks

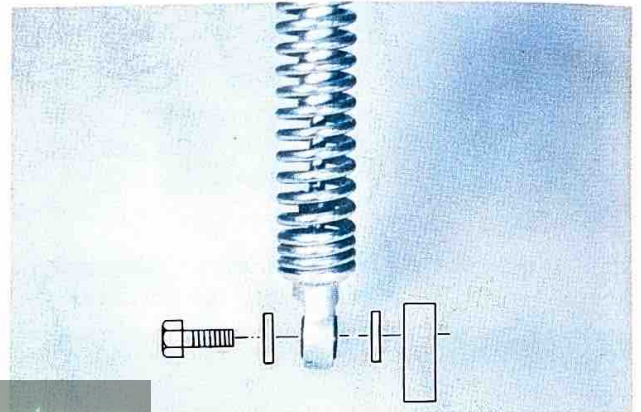
The rear shocks have a maximum stroke of 55 mm. (2.16 in.)

### 1. Checking the Condition of the Damping Units

a. Remove the rear shock assembly.

b. Make sure that the rear cushion 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.



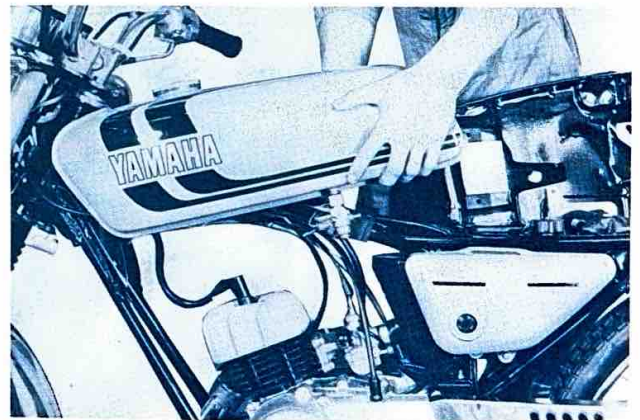
## G. Gas Tank

### 1. Removing

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

b. Open the seat.

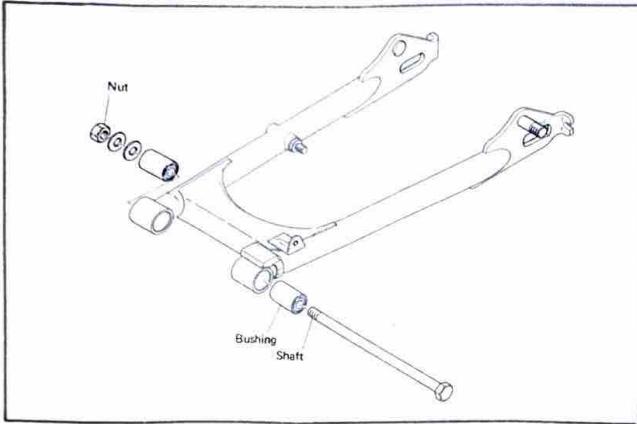
c. Remove the gas tank by pulling up and back.



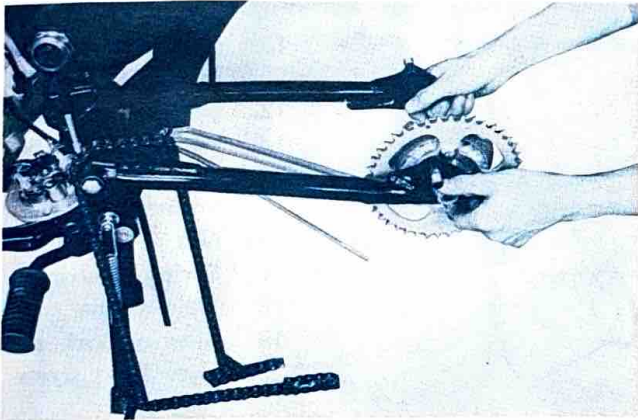
## H. Rear Swing Arm

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

1. Removing
  - a. Remove the chain case mounting screws.
  - b. Remove the rear swing arm shaft nut, pull out the shaft, and remove the rear swing arm.



2. Checking
  - a. 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.



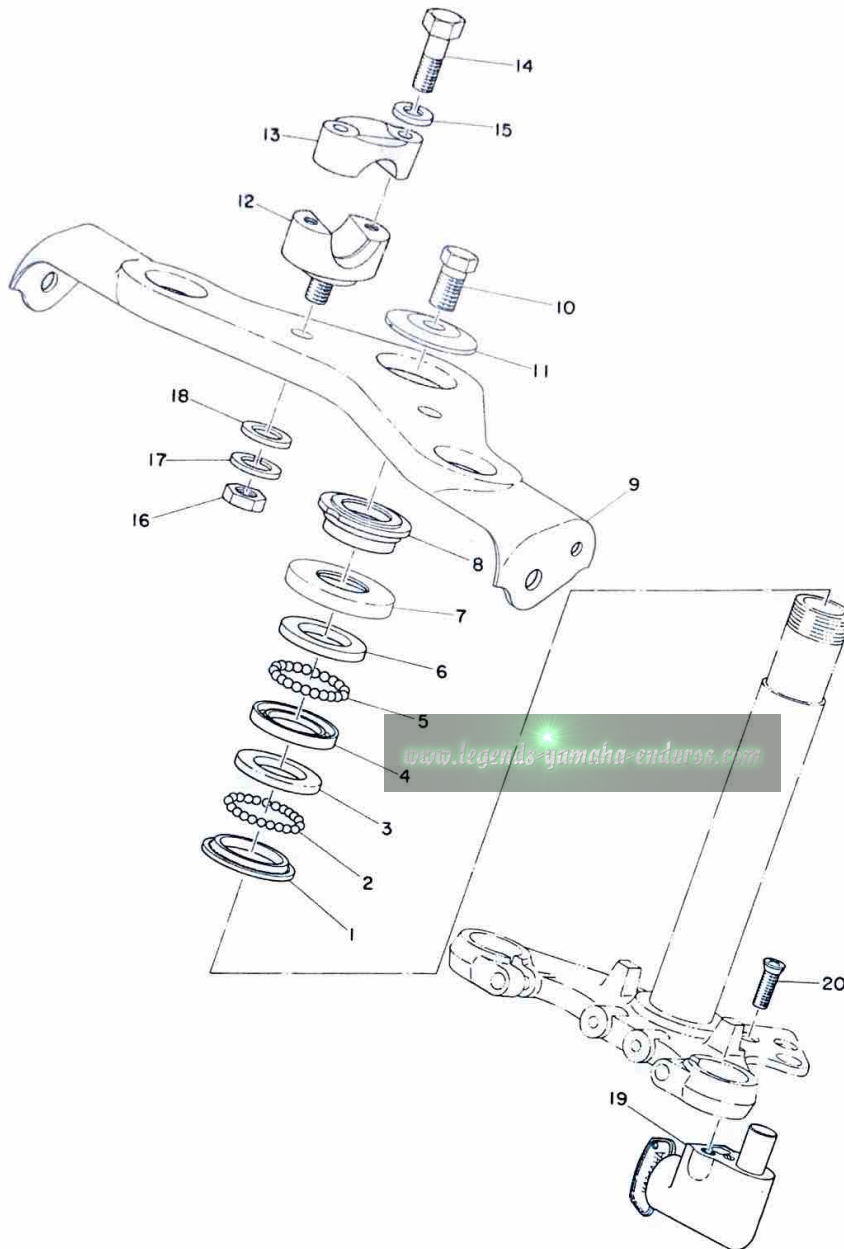
Side play limit: 0.2 in. (5 mm.)

- b. 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 10,000 km (6,000 miles). The same may not apply to those used for 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. Sectional View of the Steering Head



1. Ball race 1
2. Ball
3. Ball race 2
4. Ball race 2
5. Ball
6. Ball race 1
7. Ball race cover
8. Fitting nut
9. Handle crown
10. Fitting bolt
11. Crown washer
12. Handle under holder
13. Handle upper holder
14. Bolt
15. Spring washer
16. Nut
17. Spring washer
18. Plain washer
19. Steering lock ass'y
20. Over head screw

### 2. Checking

#### a. Ball Races and Steel Balls

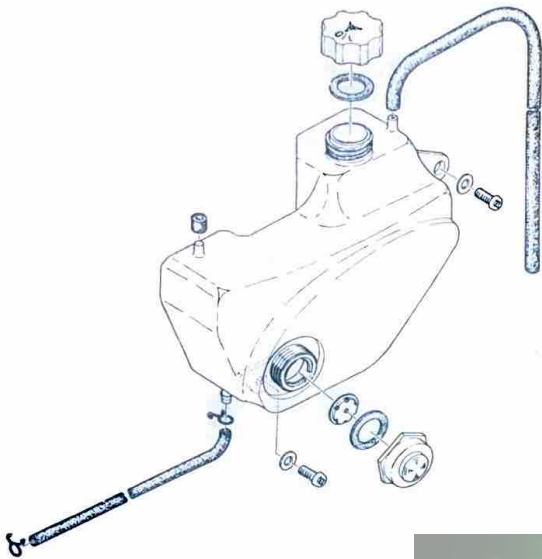
Check the ball races and steel balls for pitting or wear. Check them very carefully if the machine has been in long use. If they are worn or cracked, replace all of them, because defective ball races or steel balls adversely affect the maneuverability of the machine. Replace any ball race having scratches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

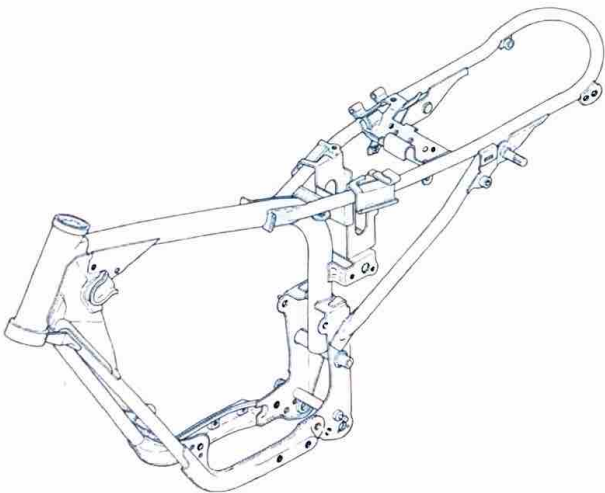
### J. Oil Tank, Battery Box and Tool Box

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 are 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

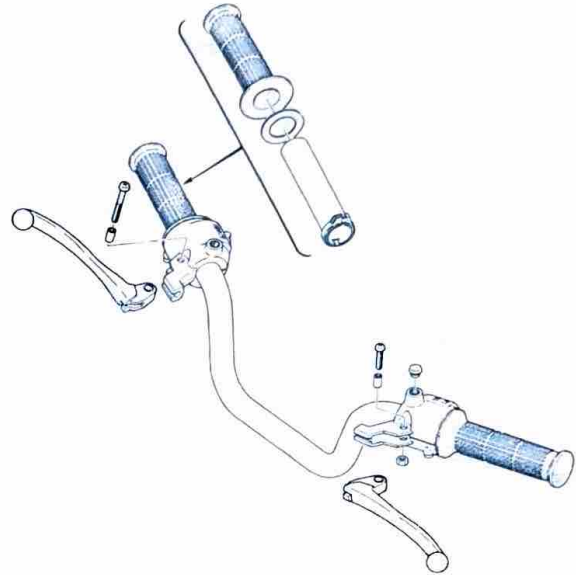
The double cradle-type frame is made of steel tubing that provides strength, rigidity and light weight. Other dimensional features include high ground clearance, narrow width, and long wheelbase. The engine is bolted to the frame at three positions.



### L. Handlebars

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.

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## CHAPTER 9. ELECTRICAL SYSTEM

### A. Description

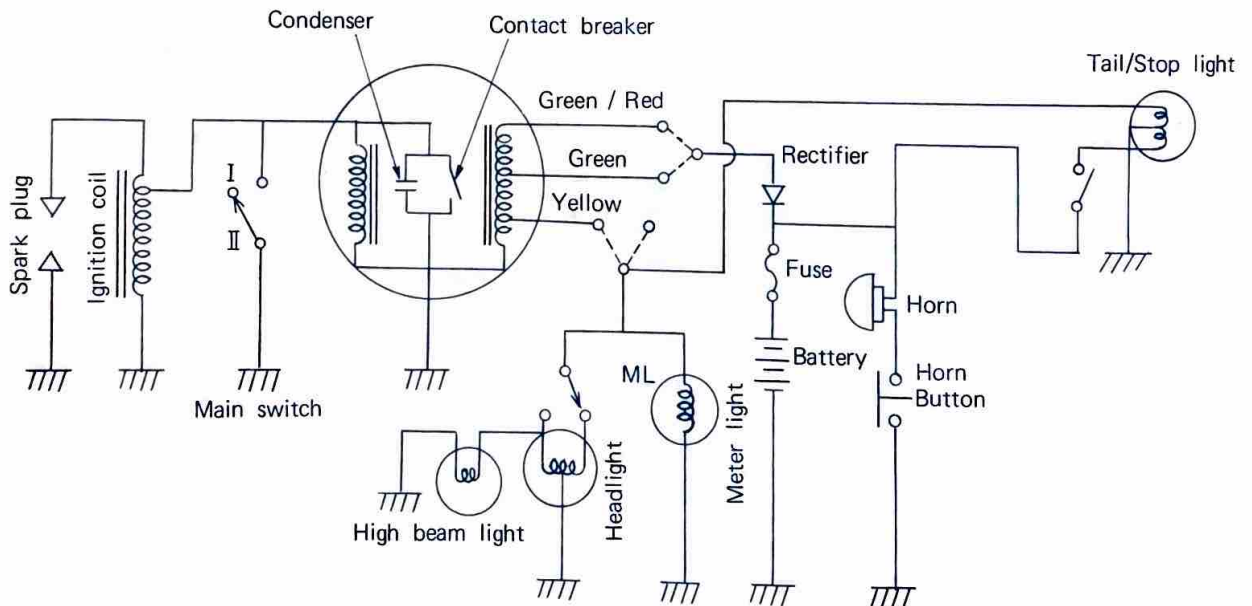
The RD60B employs a flywheel magneto for its ignition system.

### B. Table of Component Parts

Parts	Manufacturer	Model & Type
Flywheel magneto	Hitachi Ltd.	F11-L48
Spark plug	NGK	B-7HS
Headlight	Koito Mfg.	6V 15/15W
Hi-beam indicator, neutral pilot light		6V 3W
Speedometer	Nippon Seiki	—
Handlebar switch	Asahi Denso	—
Ignition Coil	Hitachi Ltd.	CM-61-20H
Horn	Nikko	CF-6
Battery	Nippon Battery	6N4-2A
Rectifier	STANLEY	DE2304
Fuse	Taiko Mfg.	10A
Stop switch	Asahi Denso	—
Tail / Stop light	Koito Mfg.	6V 25W/5.3W

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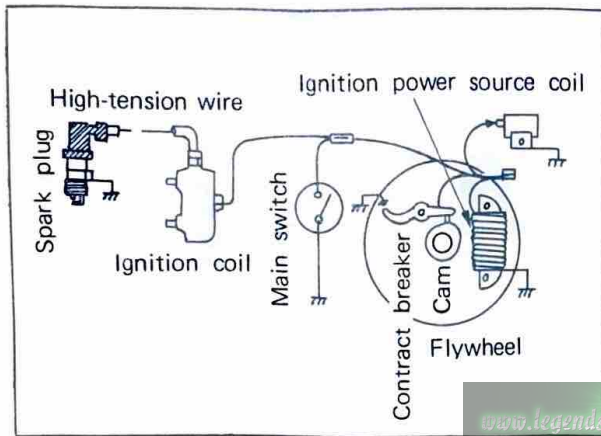
### C. Connection Diagram



## D. Ignition System-Function and Service

### 1. Function

The ignition system consists of the components as shown below. 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.



## F. Ignition Coil

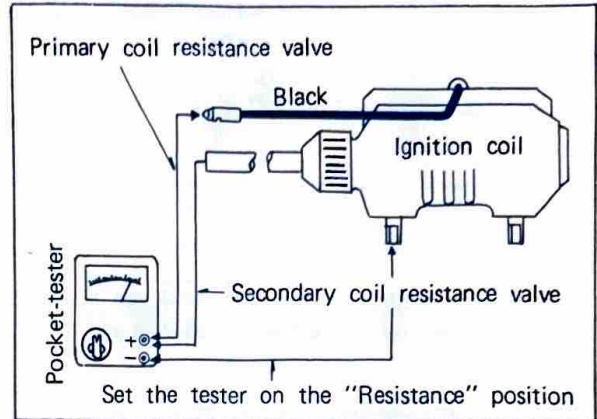
Primary coil resistance value .....

$1.7 \Omega \pm 10\%$  (20°C or 68°F)

Secondary coil resistance value .....

$6.0 \Omega \pm 10\%$  (20°C or 68°F)

(For measuring methods, refer to illustrated below.)



**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.

## E. Ignition Timing

Remove the spark plug and screw the dial indicator holder into the plug hole. Next, insert the dial indicator into the holder. Bring the piston up to T.D.C. and set the zero on the dial face to line up exactly with the dial indicator needle. The crankshaft should then be turned backwards, so that the piston travels down past 1.8 mm. B.T.D.C. and slowly brought back up to precisely 1.8 mm. B.T.D.C. (This removes any slack in the bearings). Adjust the points so that they are just beginning to open with the piston in this position. A low resistance point checker (100 Ohms or less) should be used to determine the opening and closing of the ignition points. See page 15 ~ 17.

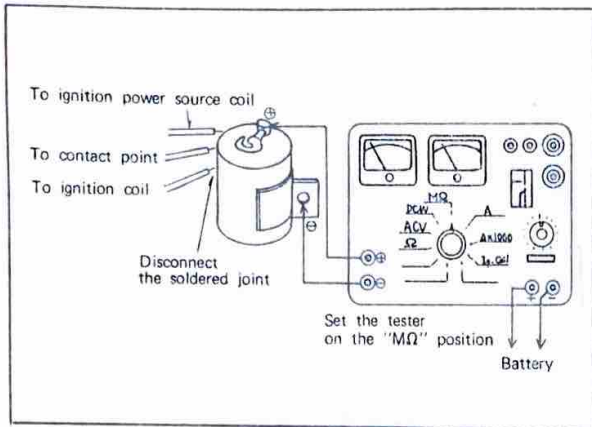
Ignition Timing,  $1.8 \pm 0.15$  mm. B.T.D.C.  
Maximum ignition point gap 0.3 to 0.4 mm.  
(0.012" - 0.015")

## 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 in next page. If the reading is more than  $3M\Omega$ , the insulation is in 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  $0.30\mu F \pm 10\%$ , the condenser capacity is correct.

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**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 rpm  
4.0A or less at 8,000 rpm

**Charging Capacity (Night time)**

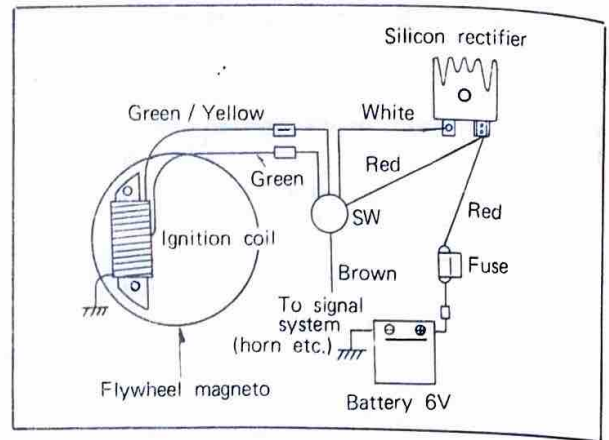
Green/Red: Charging begins at 2,000 rpm  
 $1.5 \pm 0.3A$  or less at 8,000 rpm

**Lighting Capacity (Night time)**

(With normal loads and normal wiring)

5.7V or more at 2,500 rpm  
8.0V or less at 8,000 rpm

\*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.



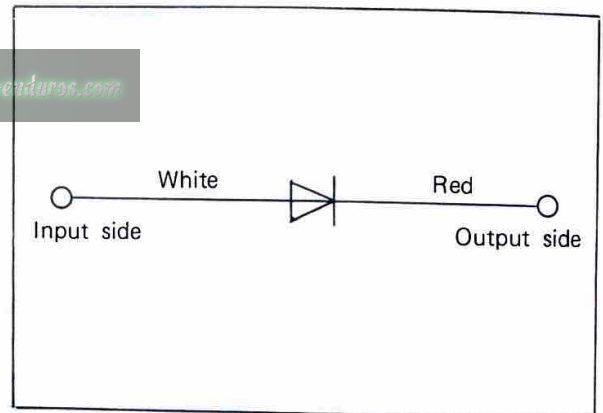
**2. Silicon Rectifier**

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

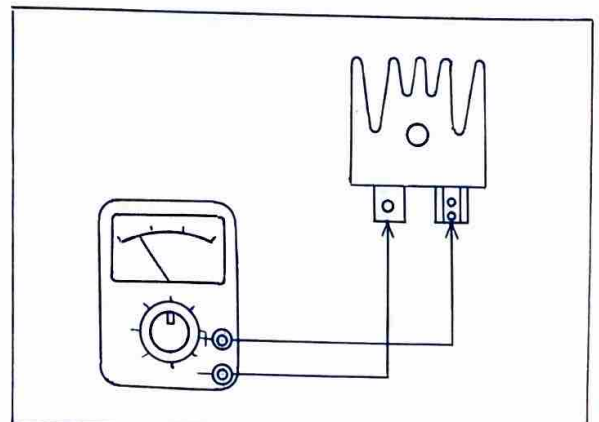
Rated peak inverse voltage – 400V

Polarity:



**a. Checking the Silicon Rectifier**

For measurements, an ohmmeter can be used.



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 ~ 10Ω  
 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**

The battery is a 6 volt – 4AH 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.s at about 3,000 to 4,000 R.P.M. to keep the battery charged properly. If you run continuously in high speed, the battery water should be checked regularly as continuous charging will dissipate the water.

1. Checking

- a. If sulfation occurs on plates due to lack of battery electrolyte, showing white accumulations, the battery should be replaced.

- b. If the bottoms of the cells are filled with corrosive material falling off plates, the battery should be replaced.

- c. 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.

- a. Negligence in re-filling the battery with electrolyte.
- b. Battery being left discharged.
- c. Over-charging by rushing charge.
- d. Freezing.
- e. Feeding of water of sulfuric acid containing impurities when re-filling the battery.

3. Storage

If any motorcycle is not used for a long time, remove the battery and have it stored by a battery service shop. The following instructions should be observed by shops equipped with chargers.

- a. Recharge the battery.
- b. Store the battery in a cool, dry place, and avoid temperatures below 0°C. (32°F)
- c. Recharge the battery before mounting it on the motorcycle.

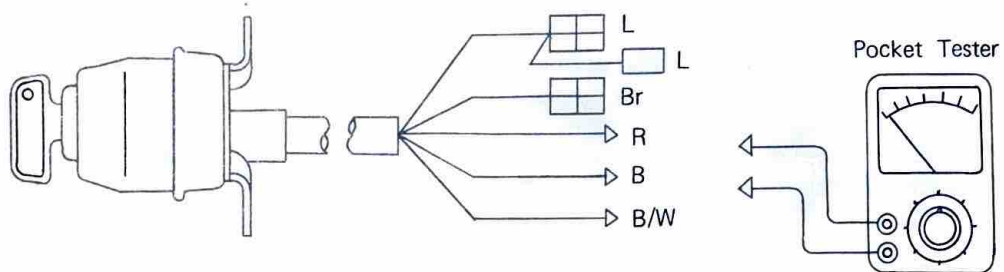
d. Service Standards

Battery Spec.		
Electrolyte specific gravity	1.25–1.27, (one cell) quantity 11 c.c.	At full charge
Initial charging current	0.2A for 25 hours	New battery
Charging current	0.4A for 10 hours (Charge until specific gravity reaches 1.26–1.27)	When discharged
Refilling of electrolyte	Distilled water up to the max. level line.	As required
Capacity	6V-4AH	

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

Main switch connecting

	B	B/W	R	Br
OFF	○—○			
ON			○—○	



If the readings or the above eight measurements are nearly  $0\Omega$ , 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

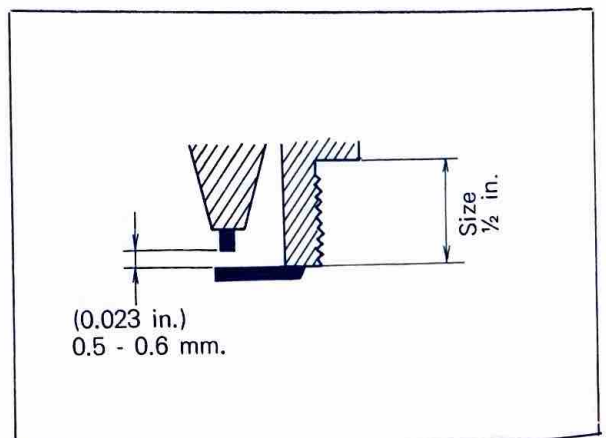
The life of a plug and its discoloring vary, according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with suitable ones determined by the color and condition of the bad plugs. One machine may be ridden only in urban areas at low speeds, whereas another may be 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 3,000 km. (2,000 miles) since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

1. How to "read" spark plug (condition)
  - a. Best ..... when the porcelain around the center electrode is a light tan color.
  - b. If the electrodes and porcelain are black and 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 1,000 km (600 miles). 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-7HS plug as replacement to avoid any error in reach.



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## L. Lighting and Signal Systems

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

### 1. Headlight

The headlight has two 6V, 15W bulbs. A beam directing adjusting screw is fitted on the right side of the light rim so that the horizontal direction of the beam can be adjusted (not vertically).

### 2. Taillight and Stoplight

A 6V, 3W taillight and a 6V, 10W stoplight are mounted. The lens of the taillight is provided with reflectors on its three sides – rear, right and left.

### 3. Horn

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

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

### 4. Speedometer and Tachometer

A circular type speedometer and tachometer are mounted on the bracket. For illumination, a 6V, 1.5W bulbs are provided.

### 5. Flasher light

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

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## 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	Imperial 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-lbs)	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-lb	Miles per gallon (mpg)	0.4252 km/ℓ

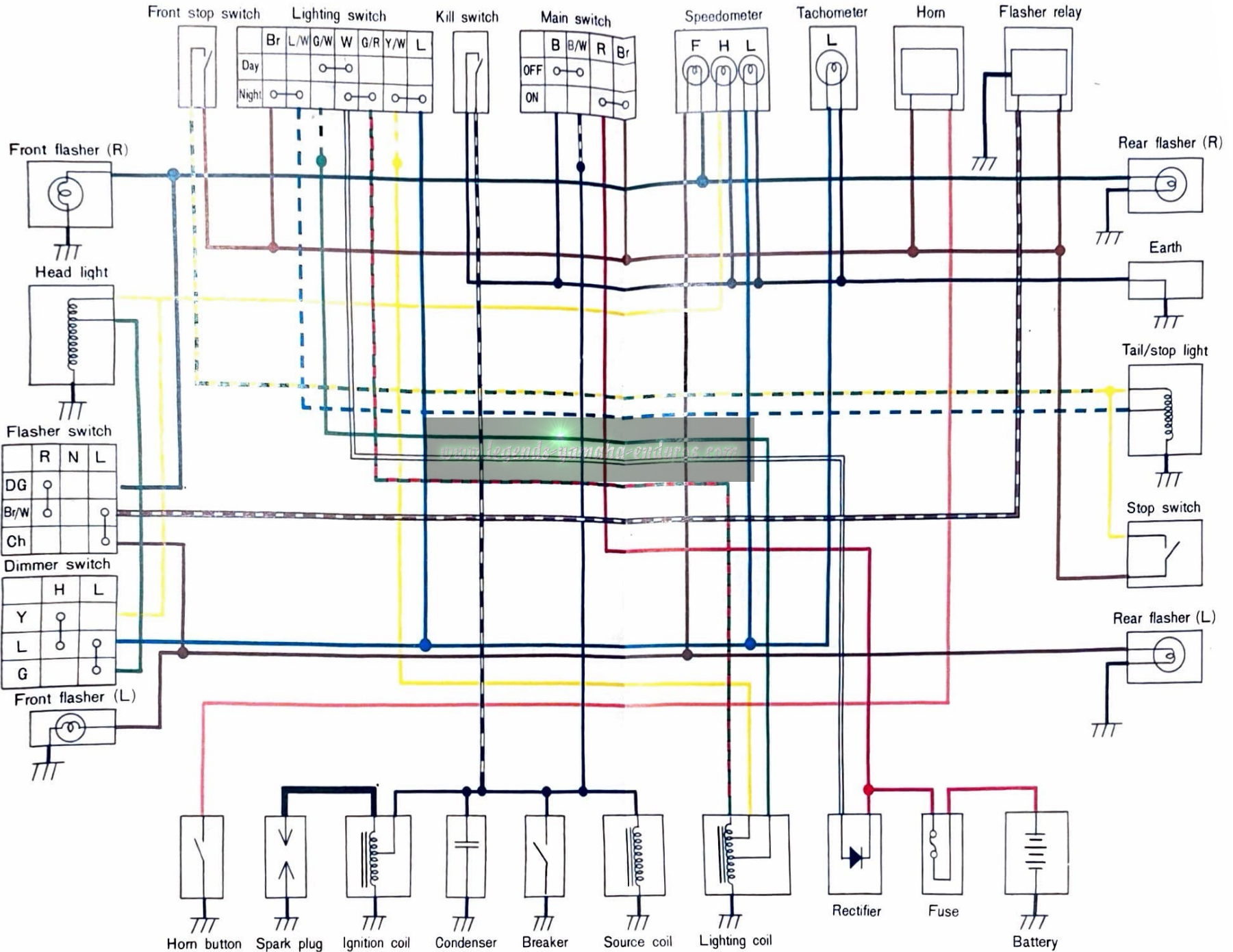
MEMO

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# RD60B CIRCUIT DIAGRAM





SINCE 1887

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