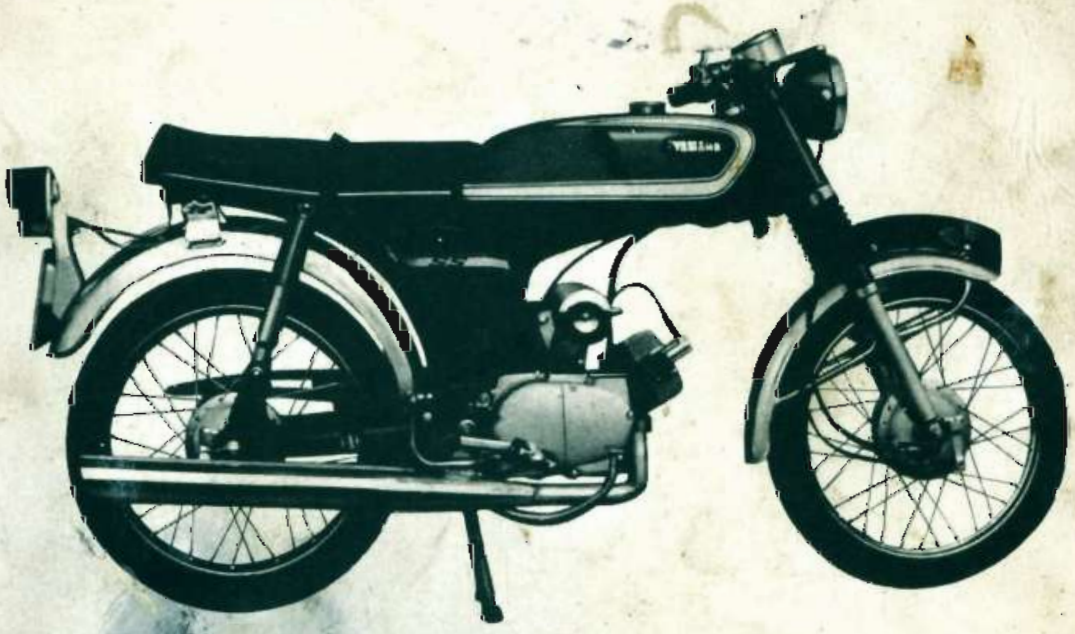
YAMAHA
FS1-E
SERVICE MANUAL



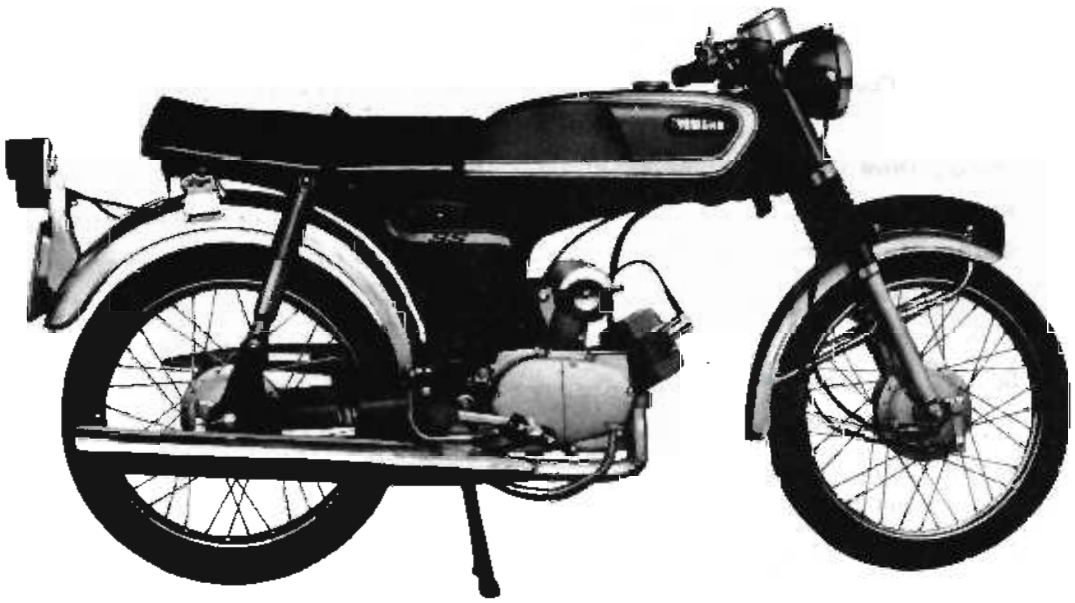
YAMAHA MOTOR CO., LTD.

SVM-394-05

FOREWORD

This Service Manual to the Yamaha FS1-E contains technical information as well as maintenance instructions required for servicemen charged with the task of keeping the machine in top condition.

We hope that the information included in this manual will help the rider enjoy many design rotary valve, primary kick starter, and waterproof/dustproof brake drums - which assure long service life of the machine.



YAMAHA MOTOR CO.,LTD.
SERVICE DEPARTMENT

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CHAPTER 1. GENERAL

1–1 Features

1. High Performance Rotary Valve Engine with Yamaha Autolube
   Yamaha's 2-stroke rotary valve engine provides stable performance at low speed and smooth running at high speed as well as maximum acceleration at all speeds.

2. Sturdy 7-bone Style Frame
   The new unique design of the frame provides greater strength for both off and on the road riding.

3. Easy Starting
   The engine can also be started by simply pulling in the clutch lever and kicking the starter without shifting the transmission gear back to neutral.

4. Larger Lights
   Larger tail lights along with the easy-check speedometer insure additional safety for riders in heavy traffic.

5. Easy Start Feature
   The starting feature within the carburetor assures easy starting in all types of weather.

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

1–2 Specifications

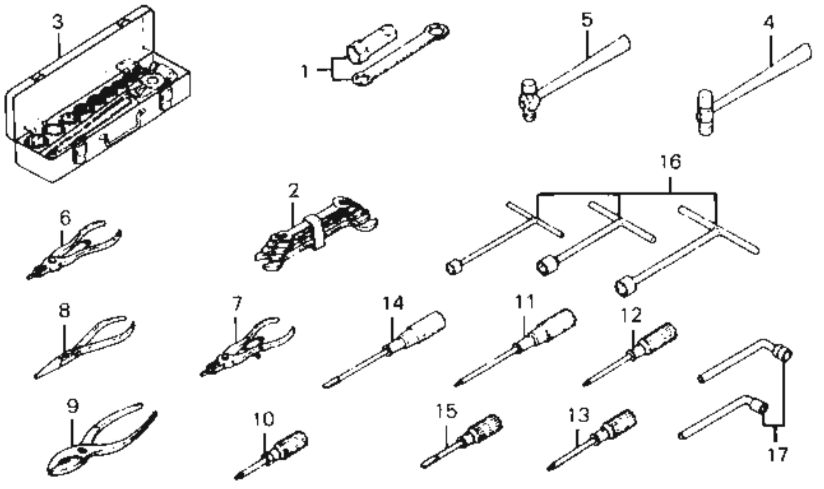
Item \ Models	FS1-E
Dimensions:	
Overall length	69.1 in. (1,755 mm)
Overall width	21.9 in. (555 mm)
Overall height	36.8 in. (935 mm)
Wheelbase	45.7 in. (1,160 mm)
Min. ground clearance	5.3 in. (135 mm)
Weight	
Net	155 lbs (70 kg)
Performance	
Max. speed	45 mph (73 km/h)
Fuel consumption (on level paved roads)	188 mile/US gal. 19 mph (80 km/ℓ at 30 km/h)
Climbing ability	18°
Min. turning radius	70.9 in. (1,800 mm)
Braking distance	23 ft/22 mph (7 m/35 km/h)
Engine type	2-stroke, gasoline, air-cooled
Model	394
Lubricating system	Mixed fuel of gasoline and oil
Mixing ratio	20 : 1
Cylinder arrangement	Single, forward inclined
Displacement	2.99 cu.in (49 cc)
Bore and stroke	1.575 in. x 1.563 in. (40 mm x 39.7 mm)
Compression ratio	7.1 : 1
Max. output	4.8 B.H.P/7,000 r.p.m. (4.8 ps/7,000 r.p.m.)
Max. torque	3.8 ft-lbs/6,000 r.p.m. (0.52 kg-m/6,000 r.p.m.)
Starting method	Kick-starter
Ignition method	Flywheel magneto
Carburetor	VM-16SC
Air cleaner	Dry, paper filter
Power Transmission	
Clutch	Wet, multi-disc
Primary reduction method	Gear
Primary reduction ratio	3.895 (74/19)
Transmission	4-speed, constant mesh

Gear ratio: 1st	3.077
2nd	1.899
3rd	1.304
4th	1.038
Secondary reduction method	Chain
Secondary reduction ratio	2.785 (39/14)
Chassis	
Frame	Pressed steel back bone
Model	394
Suspension (front)	Telescopic fork
Suspension (rear)	Swing arm
Cushion (front)	Coil spring oil damper
Cushion (rear)	Coil spring oil damper
Steering	
Steering angle	
Caster	63.5
Trail	3.0 in. (75.6 mm)
Brakes	
Type	Internal expansion
Operation method (front)	Right hand-operation
Operation method (rear)	Right foot-operation
Tire (front)	2.25 - 17 - 4PR
Tire (rear)	2.50 - 17 - 4PR
Fuel tank capacity	1.6 US gal. (6.0 ℓ)
Oil tank capacity	1.5 US qt. (1.4 ℓ)
Generator	
Model	FAZ-1QL or F11-L40
Manufacturer	Mitsubishi Electric or Hitachi
Spark plug	B-7HS
Battery	
Model	BST2-6
Capacity	6V, 4AH
Lights	
Head light	6V 18W/18W
Tail/stop light	6V 5W/21W
Neutral light	6V 3W
Meter light	6V 1.5W

1–3 Tools and Instruments for Service Shop

The following tools and instruments are required to service the FS1-E.

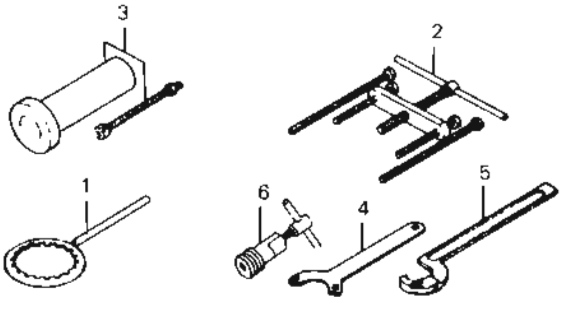
1. General Tools



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

Fig. 1-3-1

2. Special Tools and Instruments

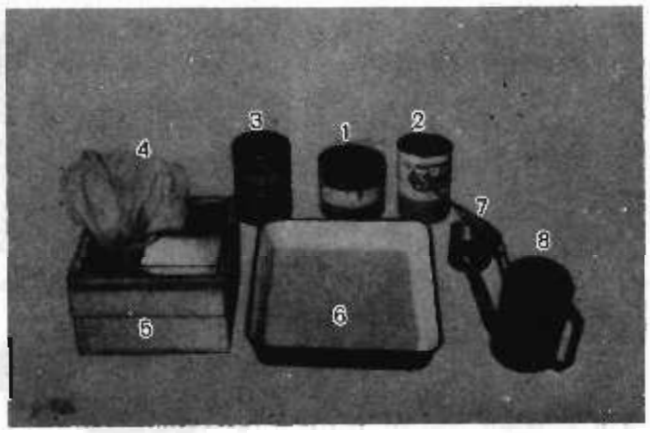


1. 100L 1 clutch holding tool
2. Crankcase disassembling tool
3. Crankshaft assembling tool
4. Flywheel magnet holding tool
5. New-type exhaust ring nut wrench
6. Flywheel magnet puller

Fig. 1-3-2

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

3. Other Tools



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

Fig. 1-3-3

The use of a wooden box as shown in the above photo will facilitate engine service and overhaul.

Consumable parts (such as gaskets) and replacement parts must also be on hand.

CHAPTER 2. ENGINE

The engine should be disassembled in an orderly sequence for easy and efficient work.

● Caution on Engine Disassembly.

1. Before removing the engine from the chassis, clean dirt and dust from the cylinder head, cylinder and crankcase, and keep these components clean during disassembly.
2. Always use clean tools, and use them correctly to avoid damaging parts.
3. Keep the disassembled parts on the parts trays separately in each group.

2–1 Removing the Engine

1. Drain the transmission oil after running the engine for 1 to 2 minutes.

Note:

The transmission oil can be quickly drained after 1 to 2 minutes of engine warming up.
Oil amount: 0.64 qt. (600 cc)
(SAE 10/30W or Yamaha gear oil)

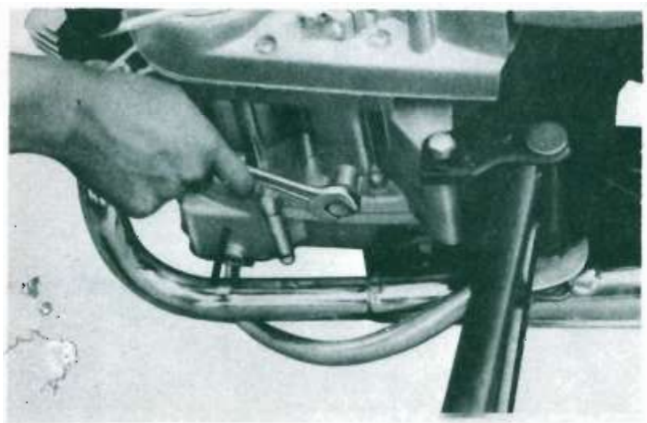


Fig. 2-1-1

2. Remove the exhaust pipe.

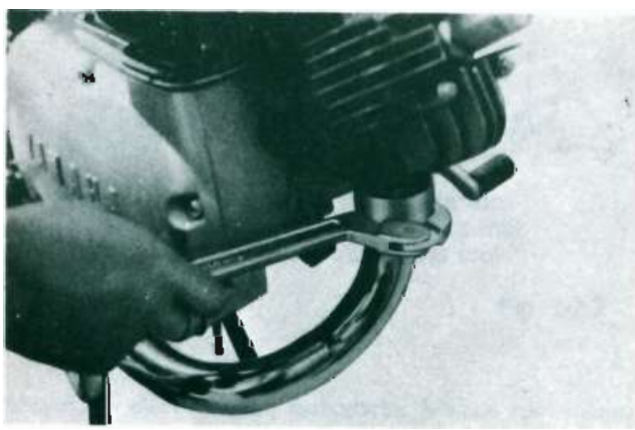


Fig. 2-1-2

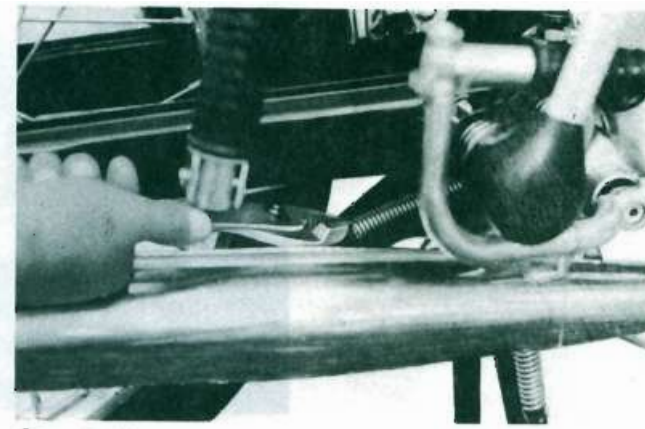


Fig. 2-1-3

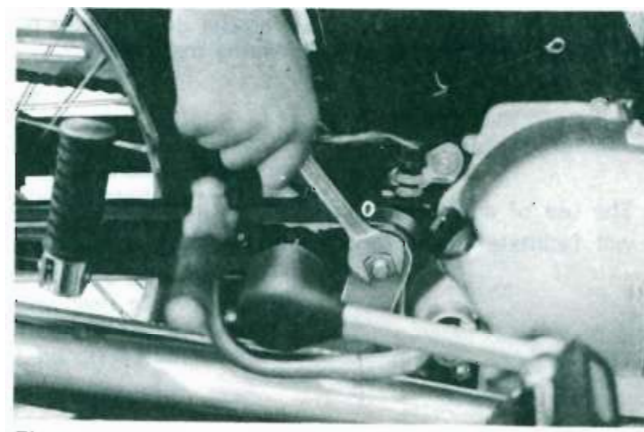


Fig. 2-1-4

3. Remove the chain case cover.

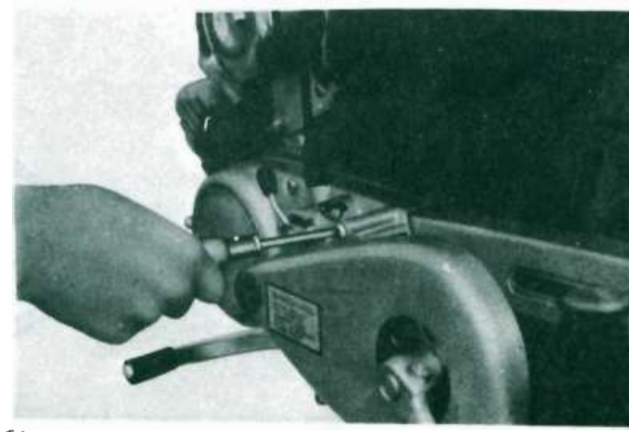


Fig. 2-1-5

4. Remove the chain joint from the chain.

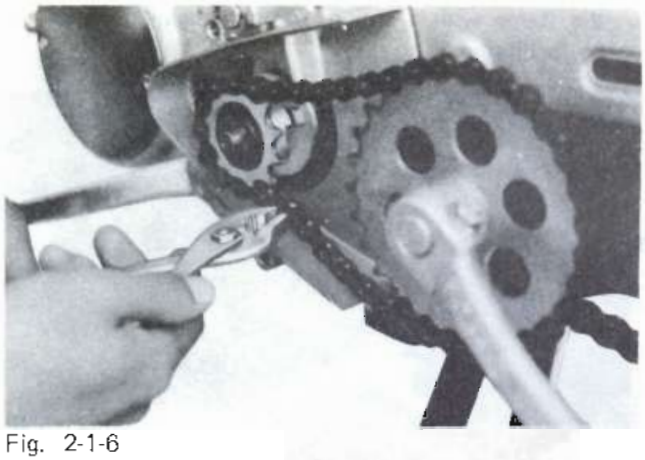


Fig. 2-1-6

5. Remove the circlip, and then remove the drive sprocket, transmit change spring and transmit change dog.

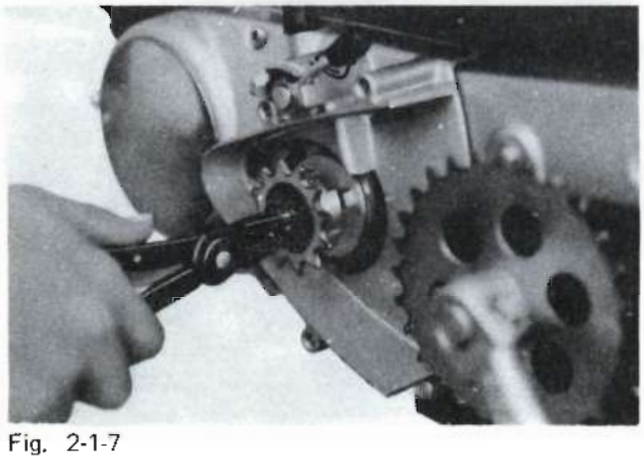


Fig. 2-1-7

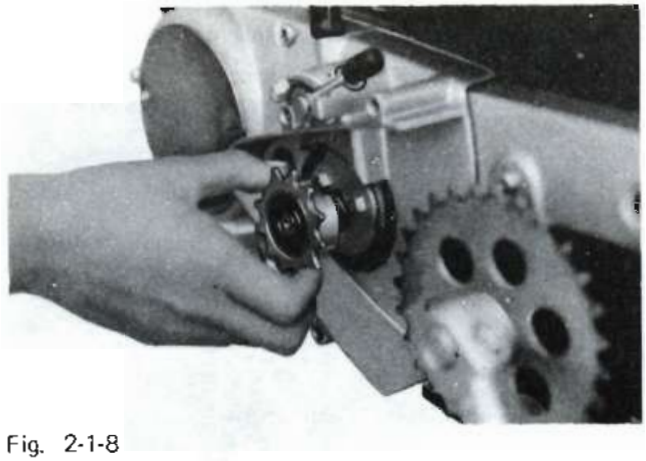


Fig. 2-1-8

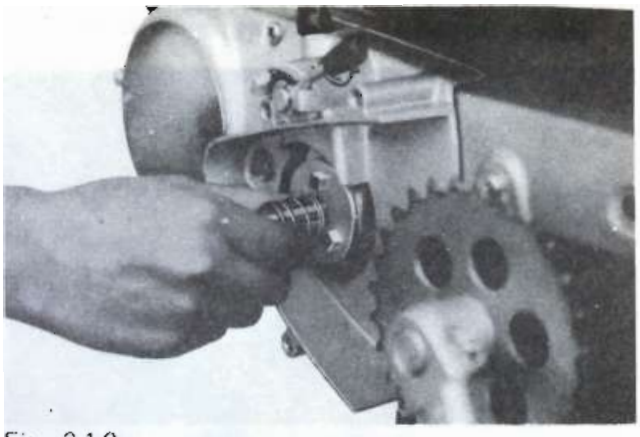


Fig. 2-1-9

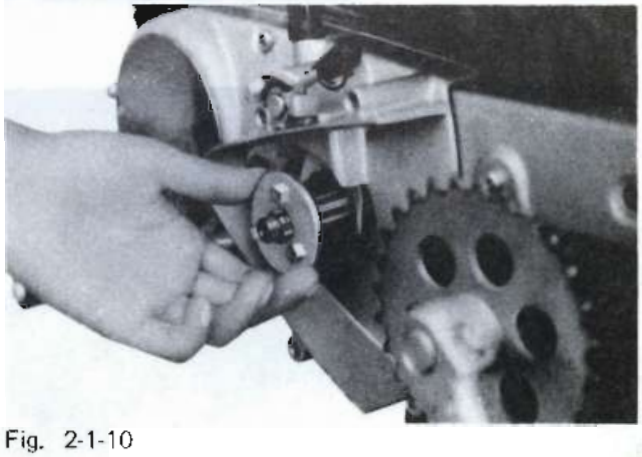


Fig. 2-1-10

6. Remove the change pedal.

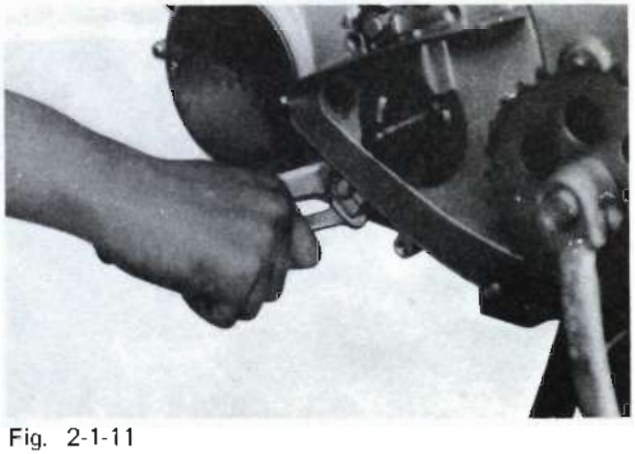


Fig. 2-1-11

7. Remove the crankcase cover. (L)

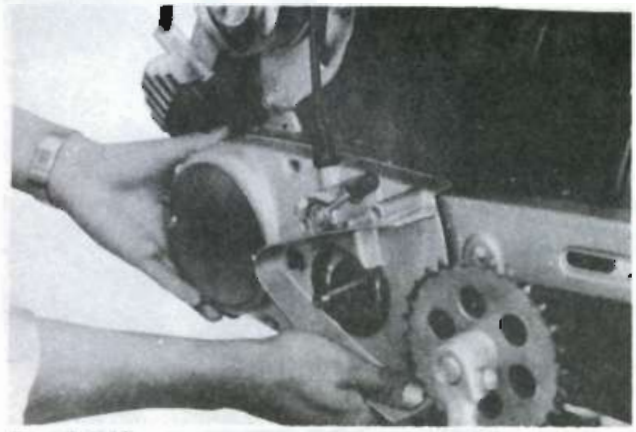


Fig. 2-1-12

8. Remove the flywheel magneto.

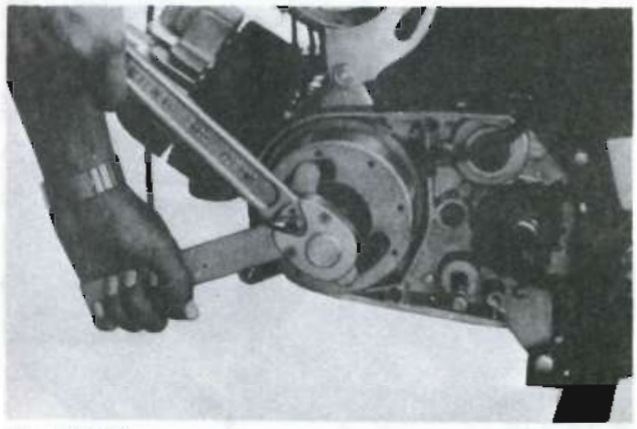


Fig. 2-1-13

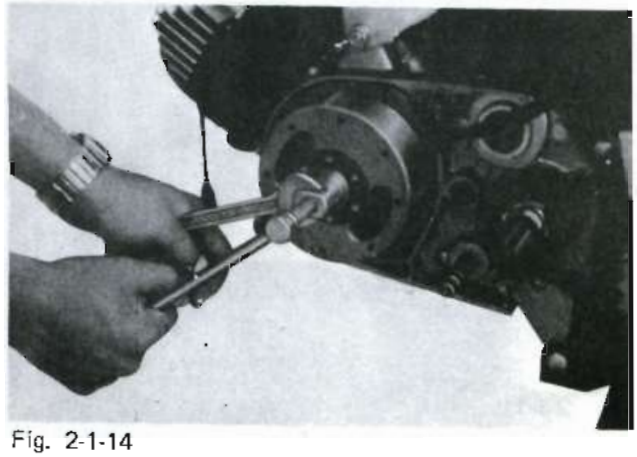


Fig. 2-1-14

9. Remove the flywheel magneto base, and hold it to the frame with a spring, so that engine removal can be facilitated.

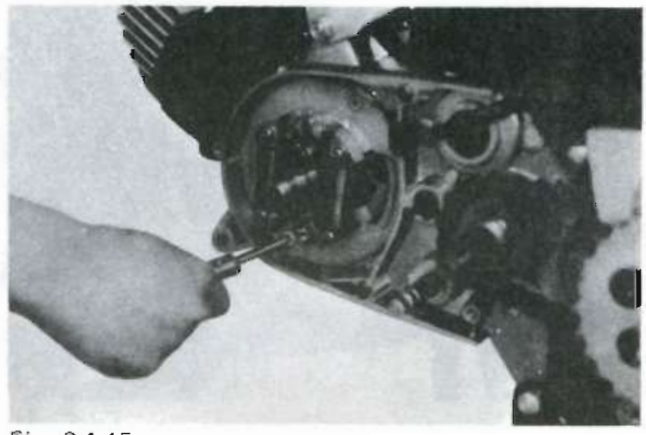


Fig. 2-1-15



Fig. 2-1-16

10. Pry out the woodruff key (segment key) with a slot-head screwdriver.



Fig. 2-1-17

11. Disconnect the chain case (lower), and remove the chain from the joint.

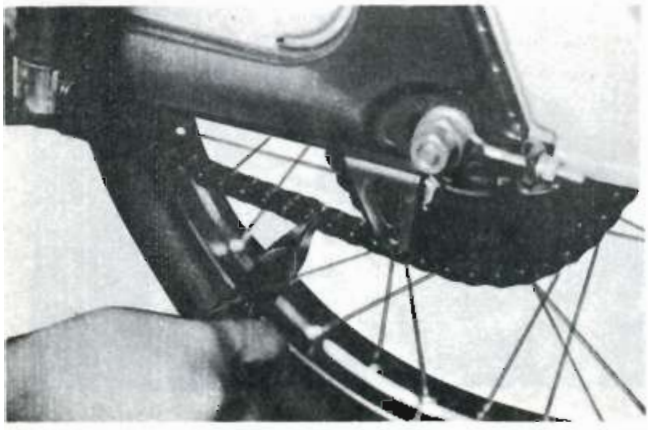


Fig. 2-1-18

12. Remove the carburetor cover.

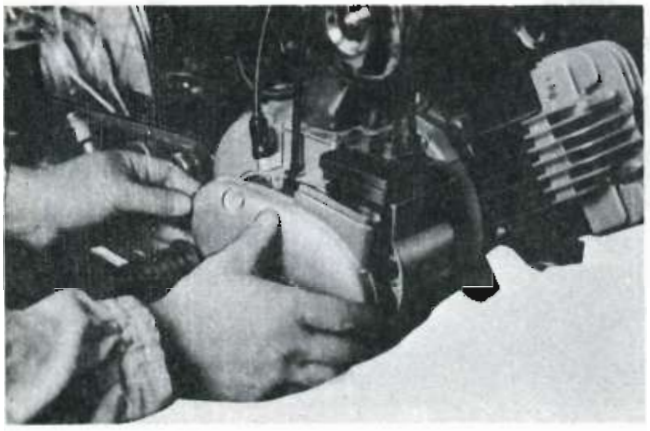


Fig. 2-1-19

13. Turn the fuel cock to the STOP position, and remove the carburetor.

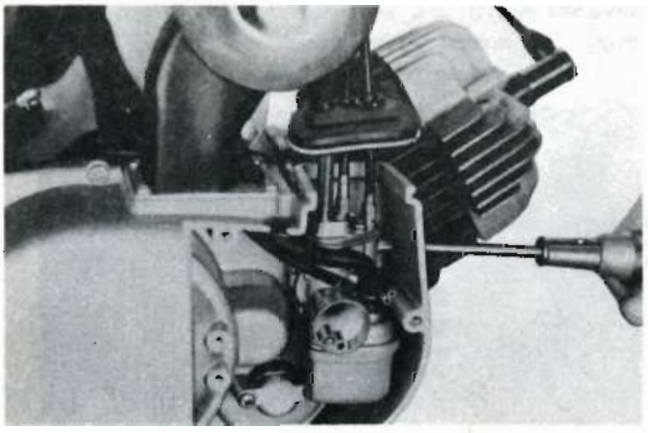


Fig. 2-1-20

14. Remove the air cleaner.



Fig. 2-1-21

15. Pull out the two mounting bolts on the upper part of the engine, and loosen the foot rest mounting bolt. Then tilt the engine forward.

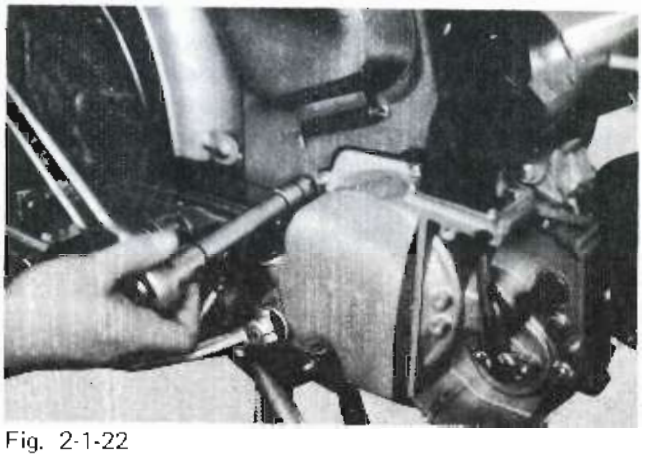


Fig. 2-1-22

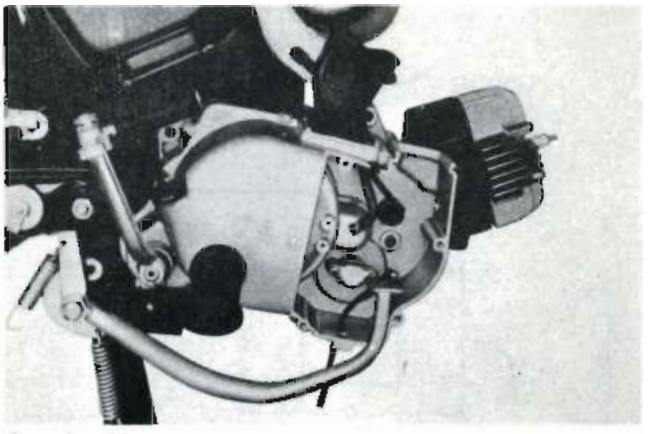


Fig. 2-1-23

16. Disconnect the cable from the neutral light switch.

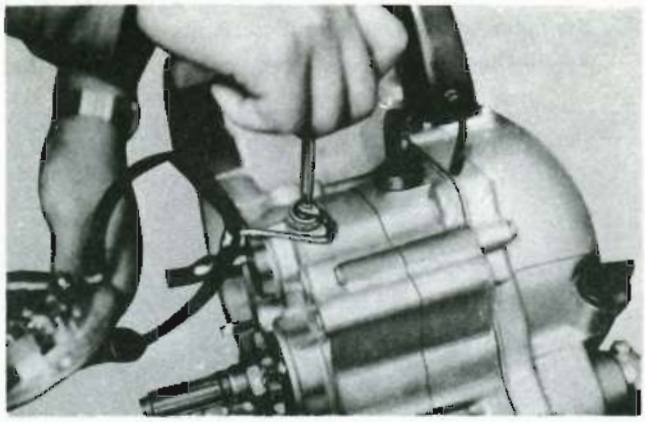


Fig. 2-1-24

17. Pull out the foot rest mounting bolt, and remove the engine from the chassis.

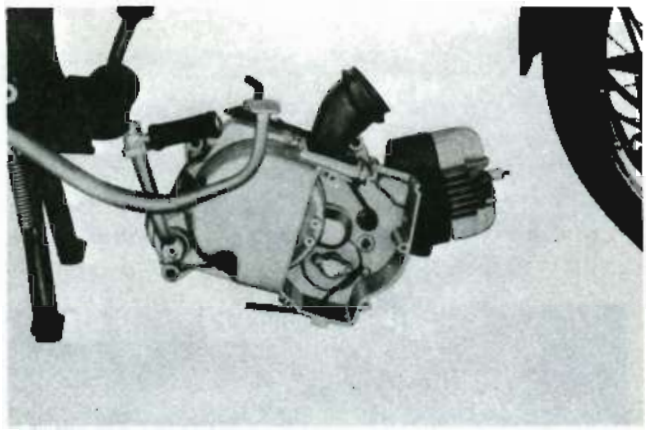


Fig. 2-1-25

2–2 Cylinder Head

A. Removal and Reinstallation

Remove the spark plug. Remove the four nuts from the top of the cylinder head, and remove the cylinder head gasket. For reinstallation, reverse the above sequence. Replace any deformed gasket.

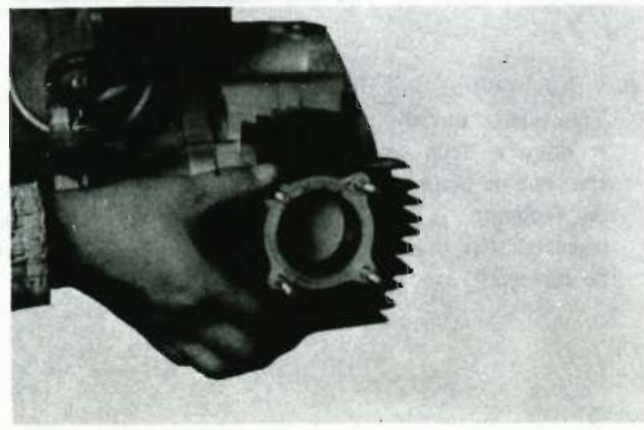


Fig. 2-2-1

B. Removing Carbon

Carbon build-up in the combustion chamber of the cylinder head increases the compression ratio, causing pre-ignition, overheating, and greater fuel consumption. Clean the cylinder head.

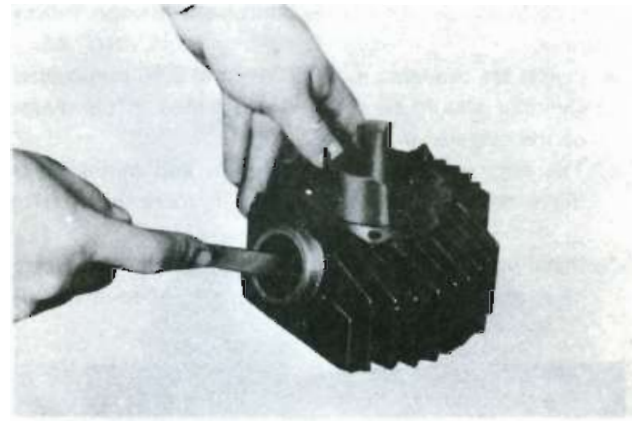


Fig. 2-2-2

2–3 Cylinder

A. Checking Cylinder Wear

Measure the cylinder bore diameter at four different depths with a bore measuring micrometer or a cylinder gauge placed parallel with, then at right angles to the crankshaft, for 8 measurements in each cylinder. If the difference between the maximum and minimum diameters measured exceeds 0.05 mm, rebore and hone the cylinder.

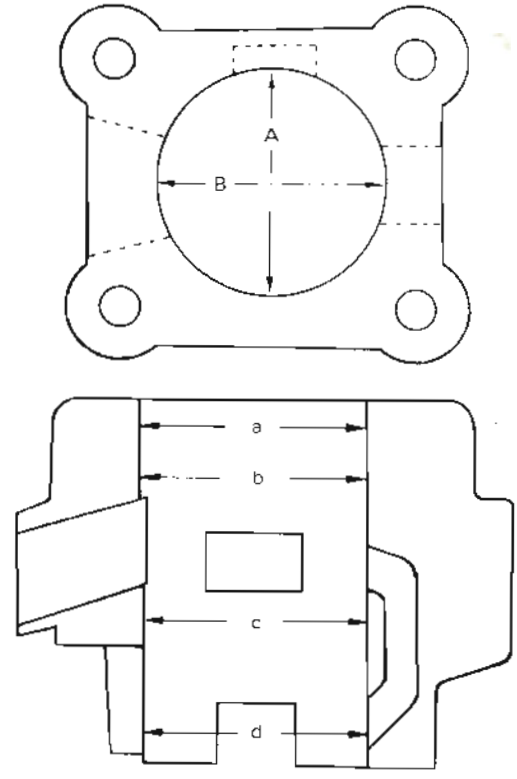


Fig. 2-3-1 Measuring Positions of the Bore

B. Minimum Clearance between Piston and Cylinder
The minimum clearance between the piston and the cylinder should be below
0.035 - 0.040 mm

Cylinder Reconditioning
The cylinder should be reconditioned in the following manner.
a. Piston are available in 0.25 mm and 0.50 mm oversizes.
b. Cylinder should be rebored and honed to the diameter of the oversize piston.
c. The error between the maximum and minimum bore diameters after honing should be no more than 0.01mm.

C. Installing Cylinders
1) Always use new cylinder gaskets when overhauling the engine.

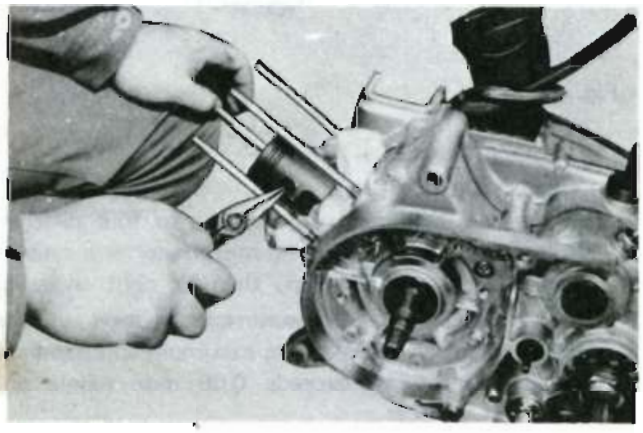


Fig. 2-3-3

2) When installing the cylinder over the piston, squeeze the piston rings into their grooves (The ring ends should be positioned close on the respective locating pins), so that they will not catch and break on the bottom of the cylinder. (Careless handling may break rings.)



Fig. 2-3-4

D. Removing Carbon
Carbon tends to accumulate heavily on the wall of the cylinder exhaust port. Scrape the carbon off with a screwdriver.

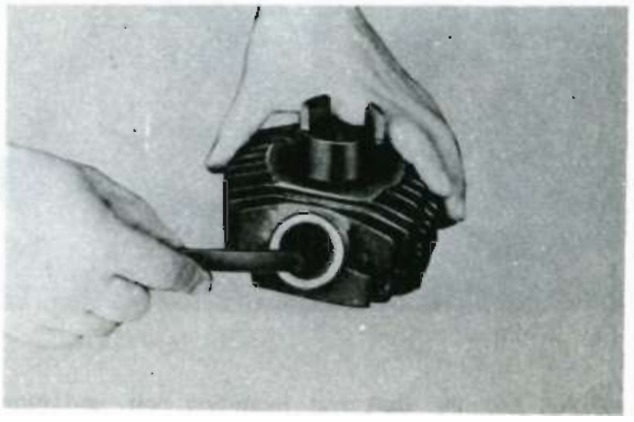


Fig. 2-3-5

2–4 Piston Pin

A. Driving Out the Piston Pin
Remove the clip at each end of the piston pin, with needle nose pliers, and push the pin out from the piston with a finger or a screwdriver.
Before removing the piston pin clips, cover the crankcase with a clean rag to prevent the clips from entering the crankcase.

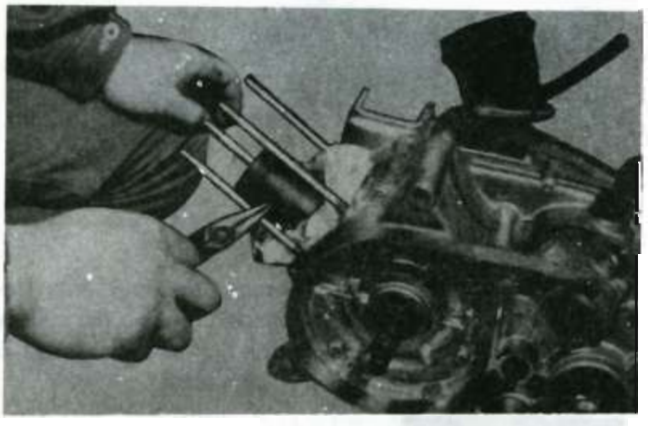


Fig. 2-4-1

B. Piston-to-Piston Pin Fit
The piston pin should fit snugly in its bore so that it drags a little when it is pushed with a finger. If the pin is loose, the pin and/or the piston should be replaced. A pin with step-wear should also be replaced. (In this case, the needle bearing also should be replaced).

2–5 Piston Rings

A. Removing Rings

Put both thumbs at each end of the piston ring and pull the piston ring ends apart, and slide it out of the groove on the other side of the ring ends.

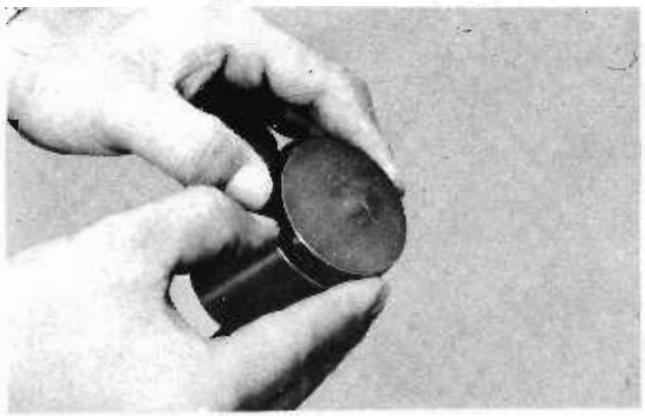


Fig. 2-5-1



Fig. 2-5-2

B. Fitting the Rings

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

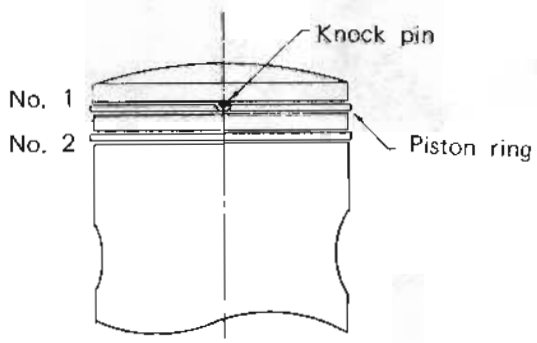


Fig. 2-5-3

C. Checking Piston Rings

1) Measuring Piston Ring Wear

Put each ring into the cylinder so that the ring is parallel with the cylinder bottom, and measure the end gap with a feeler gauge.

Each gap should be between 0.15 and 0.35 mm for both No.1 and No.2 rings.



Fig. 2-5-4

2) Removing Carbon

Carbon on the piston rings and in the ring grooves will make the rings stick to the piston. Remove the ring from the piston, and clean the carbon from the rings and grooves.

2–6 Piston

A. Checking and Reconditioning the Piston

1) Measuring Piston Clearance

Piston clearance mentioned here is defined as the difference between the minimum cylinder bore diameter and the maximum outside diameter of the piston. As described in 2-3 Cylinder, piston clearance should be 0.035~0.040mm. To determine the maximum piston outside diameter, measure it with a micrometer at right angles to the skirt and 10mm above the bottom edge.



Fig. 2-6-1

2) Checking and Correcting Scratches
Pistons showing signs of seizure are noisy and keep the engine from developing full power. If a piston that has seized up is used again without correction, another seizure will develop at the same point, causing damage to the cylinder. Lightly sand these seizure "high spots" on the piston with # 400 sandpaper.



Fig. 2-6-2



Fig. 2-6-3

3) Removing Carbon
Carbon accumulations on the piston head should be carefully removed with a knife or a other scraper. (Fig. 2-6-4)
Carbon accumulations on the piston ring groove make the ring stick to the piston.
Remove the carbon (Fig. 2-6-5)

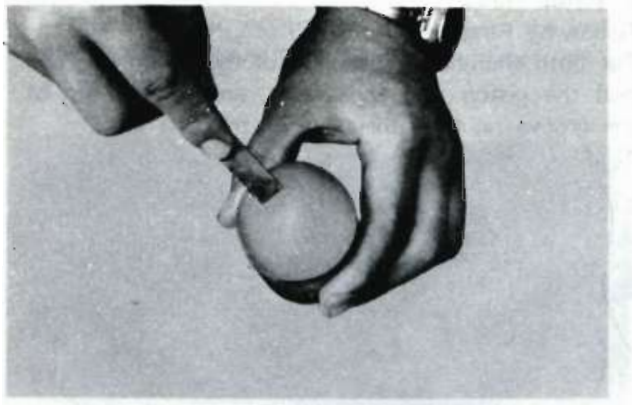


Fig. 2-6-4



Fig. 2-6-5

B. Installing the Piston in its Proper Direction
Install piston with the arrow marked on the piston head pointing downward (toward the exhaust port).

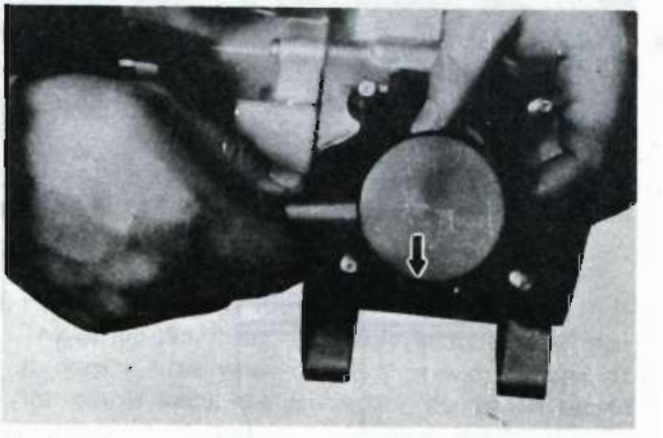


Fig. 2-6-6

2–7 Crankcase Cover (R)

A. Removal

1) Remove the kick starter crank clamping bolt, and remove the kick starter crank.

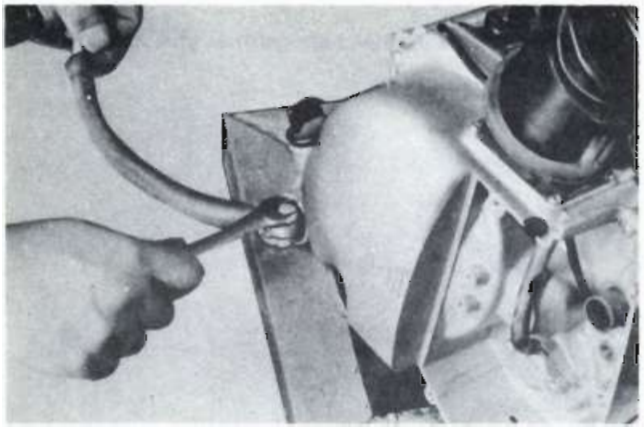


Fig. 2-7-1

3) Remove the pan-head screws from the crankcase cover (R), and take off the cover.

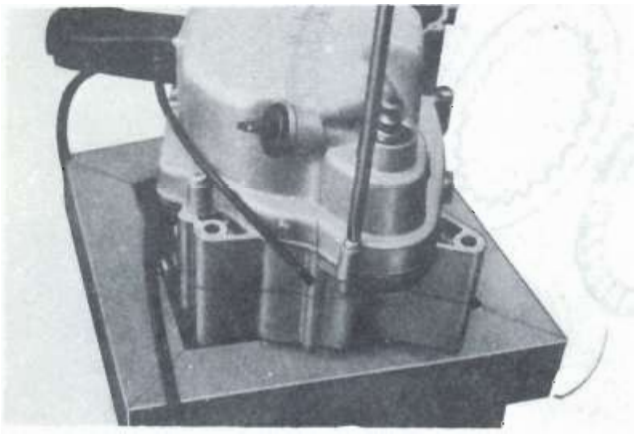


Fig. 2-7-3

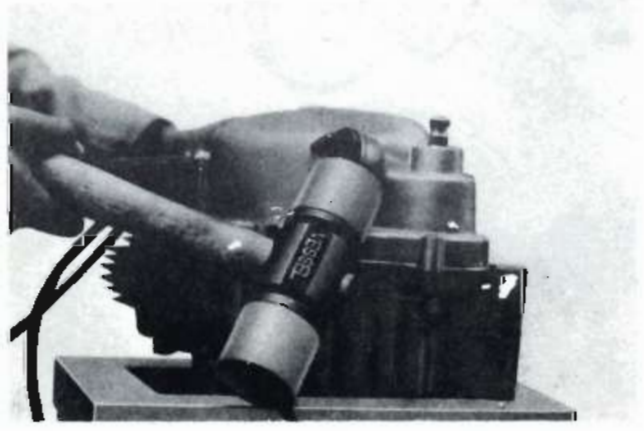


Fig. 2-7-4

4) Replace the crankcase cover gasket, if damaged.

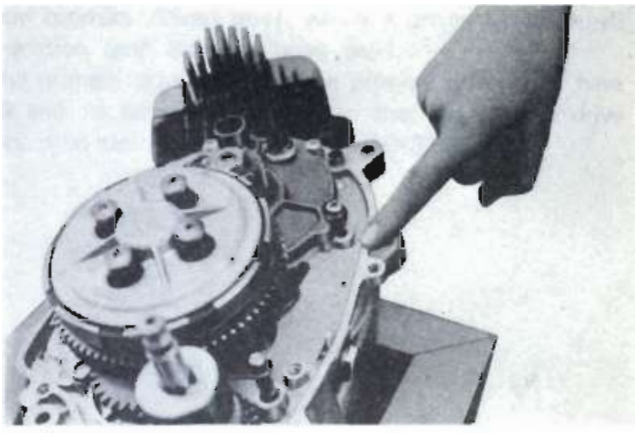


Fig. 2-7-5

B. Reinstallation

Apply the crankcase (R) sealing surface with gasket paste (Yamaha Bond No.5); and place the crankcase cover gasket upon it, and then install the crankcase cover.

Be sure to apply Yamaha Bond No.5 to prevent oil leakage.

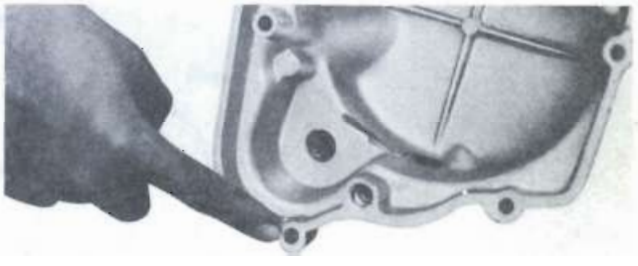


Fig. 2-7-6

2–8 Clutch

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

The clutch housing is integrated with the large reduction gear (primary driven gear), which is driven by the small reduction gear (primary drive gear).

The primary drive gear and the primary driven gear have 19 and 74 teeth respectively, so that the primary drive reduction ratio is 3.895 : 1 (74/19=3.895)

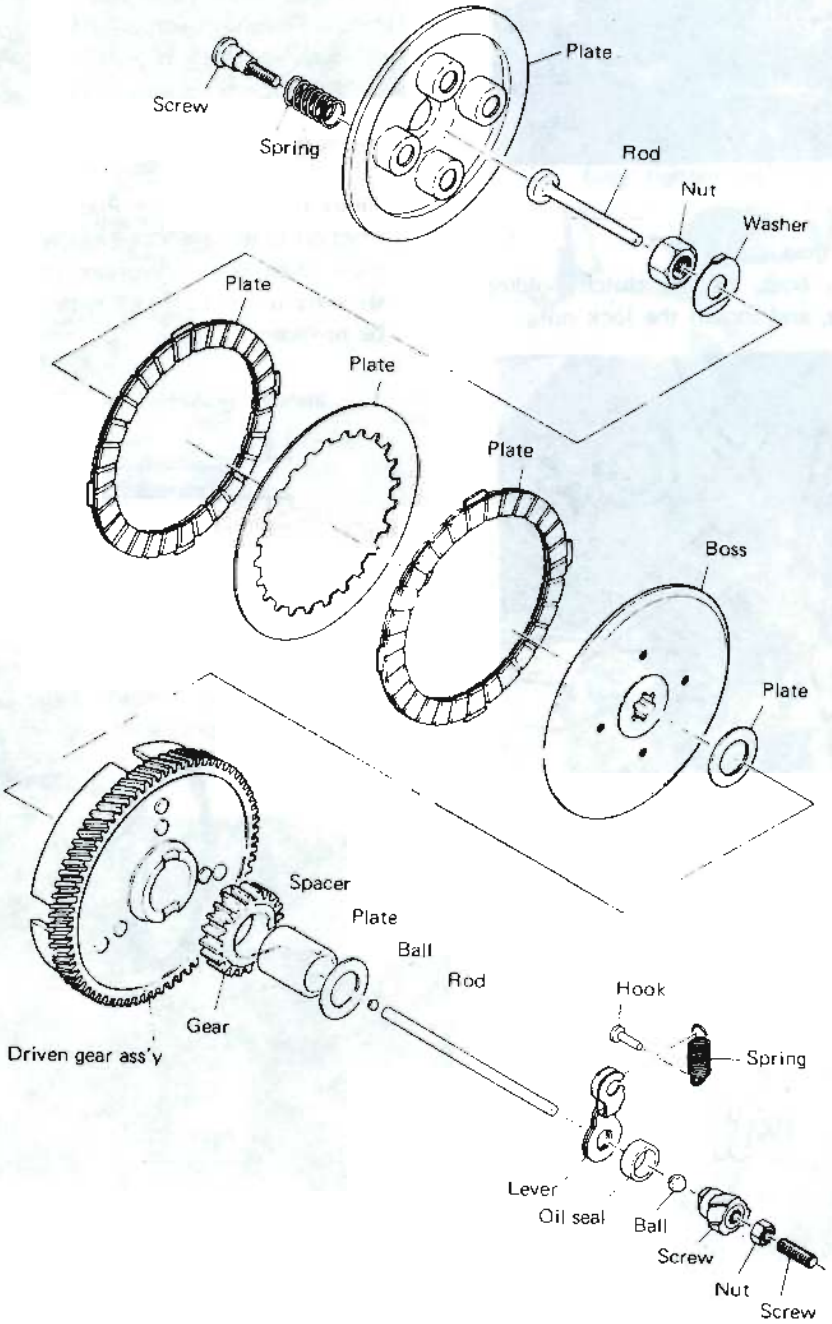


Fig. 2-8-1

A. Removing the Pressure Plate

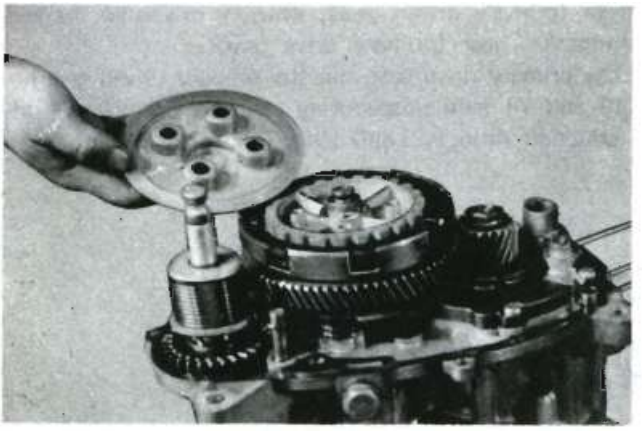


Fig. 2-8-2

B. Removing the Clutch Boss

To remove the clutch boss, fit the clutch holding tool on the clutch boss, and loosen the lock nut.

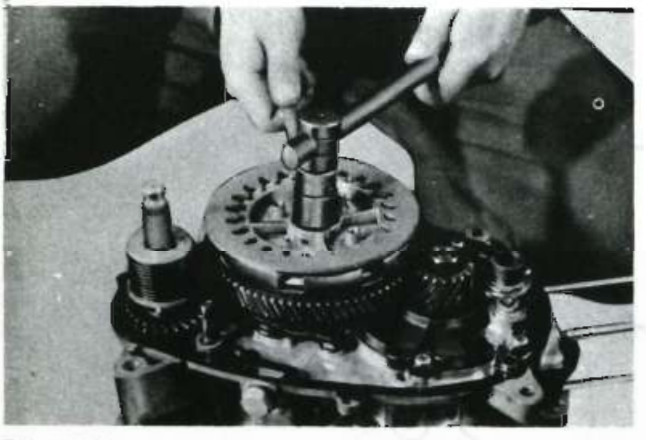


Fig. 2-8-3

C. Checking Clutch Springs

Measure the free length of each clutch spring, and replace any spring more than 1 mm shorter than the standard free length.

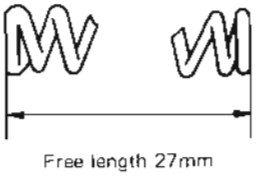


Fig. 2-8-4

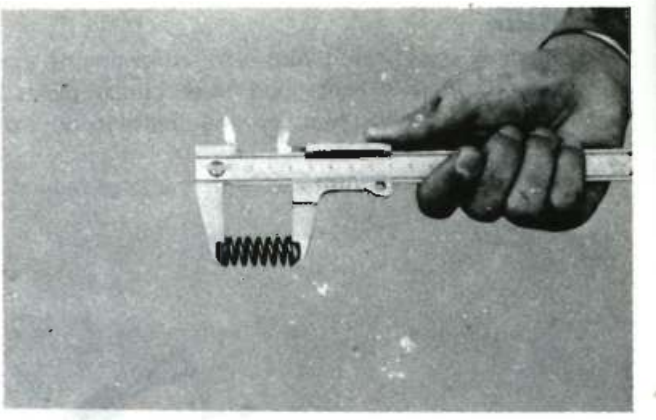


Fig. 2-8-5

D. Checking the Friction Plates

Friction plates are not everlasting, so that plates worn more than 0.3 mm under the standard thickness or showing uneven contact with the clutch plates should be replaced.

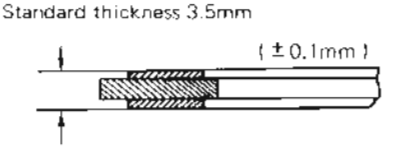


Fig. 2-8-6



Fig. 2-8-7

E. Clutch Housing Ass'y (Intergrated with the Primary Driven Gear)

A rubber thrust cushion O-ring is fitted between the clutch housing and the primary driven gear to eliminate the transfer of gear noise at low speed revolution.

1) Checking

Insert the primary gear retaing collar in the primary driven gear boss, and check it for radial play and scratch that could cause noise. If any scratch is found, smooth it out with an oil stone or fine grain sandpaper, because it will impair clutch action. If the play is excessive, replace the gear retaining collar because it will cause excessive noise. (Fig. 2-8-8)

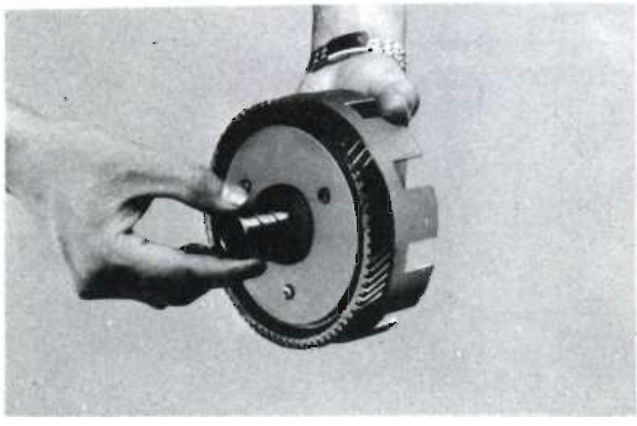


Fig. 2-8-8

F. Checking the Primary Gear Spacer

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

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

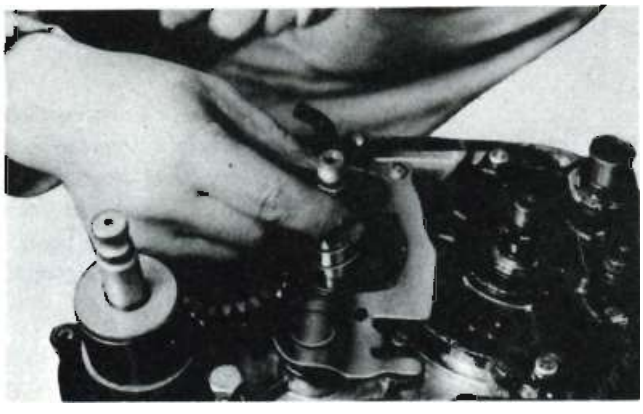


Fig. 2-8-9

G. Caution on Reassembling the Clutch

On both ends of the primary gear spacer are thrust washers. If these washers are incorrectly installed, or omitted, the clutch boss will directly contact with the primary driven gear, impairing clutch actions.

Before fitting the clutch boss, install the clutch plates, friction plates, and then install the clutch boss. For this installation, the markings painted should be aligned.

H. Adjusting the Clutch

1) Remove the chain case cover and loosen the push screw lock nut.

Fasten the push screw to a lightly seated position, and back it off 1/4 turn to set the screw. Then fully tighten the lock nut.

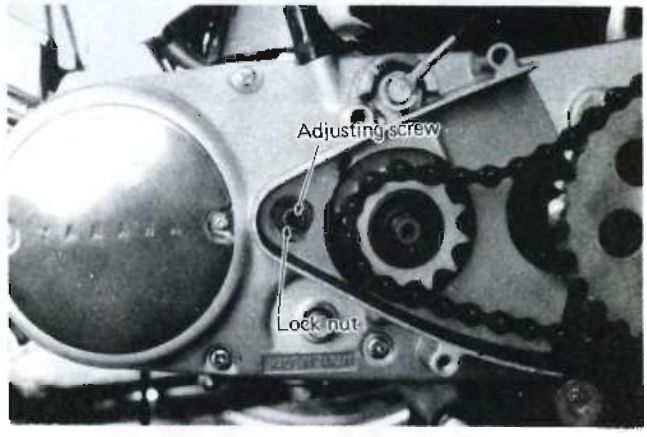


Fig. 2-8-10

2) Adjusting Clutch Cable Tension

The clutch cable becomes slackened after being used for a long time. Adjust the cable so that the play of the clutch handle is from 2 to 3 mm. (1/16 – 1/8")

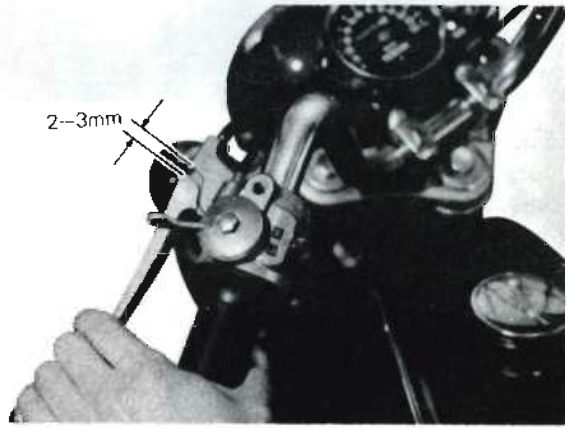


Fig. 2-8-11

3) Adjustment
   a. Loosen the lock nut fitted on the crankcase cover (L).
   b. To reduce lever play, loosen the adjusting bolt, and tighten it to increase play.
   c. After the adjustment, tighten the lock nut.



Fig. 2-8-12

2–9 Primary Drive Gear

1) Removal

Feed a rolled-up rag between the teeth of the primary drive gear and primary driven gear to lock them, and loosen the primary drive gear lock nut.



Fig. 2-9-1

2–10 Kickstarter

A. Removal

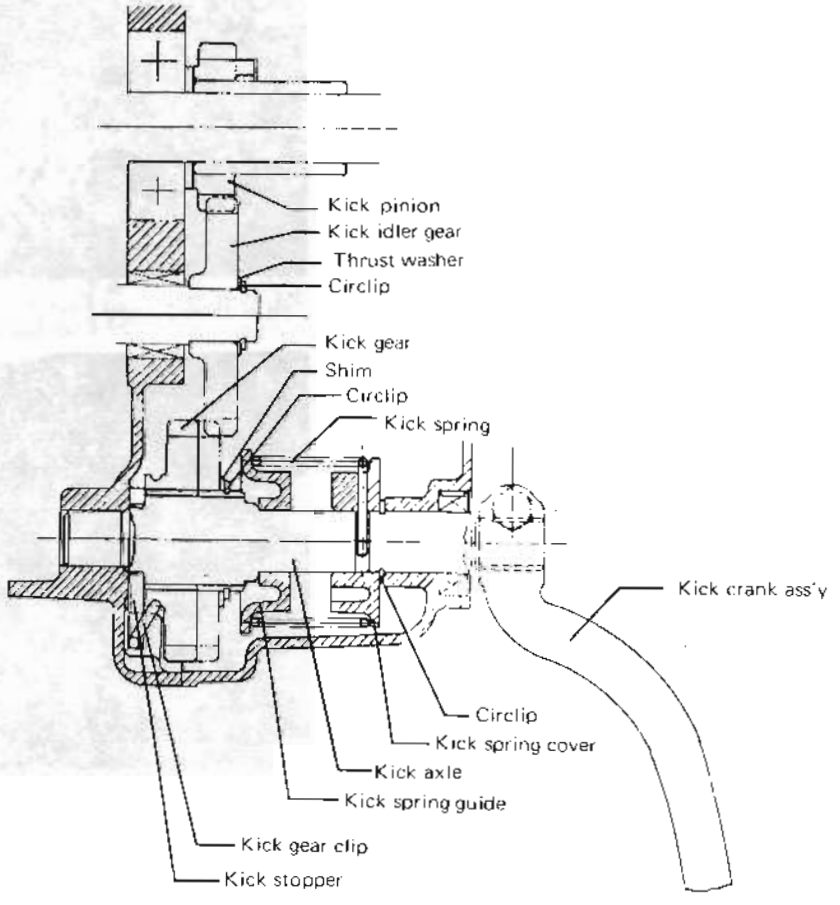


Fig. 2-10-1

Mechanism

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

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

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.

As the kick starter axle is turned, the kick gear splined to the kick axle having special splines on its surface is slid upward along the axle. (In this case, the kick gear moves only axially without rotating by means of the kick gear clip fitted in the kick gear.)
When the kick gear moves upward, teeth of the kick gear may clash against teeth of the idle gear in most cases. (although there will be possibility of smooth meshing without clashing.)
The kick gear clip is designed to absorb the impact of clashing, and at the same time, cause the kick gear to rotate so that the kick gear will smoothly come into mesh the idle gear.
(Refer to Figs. 2-10-2 and 3) After the kick gear has meshed with the idle gear, the kick gear is further slid upward without rotating. At the instant that the back of the kick gear contacts with the circlip the thrust load is imposed on the kick gear, thereby giving it turning force and rotating the crankshaft to start the engine.

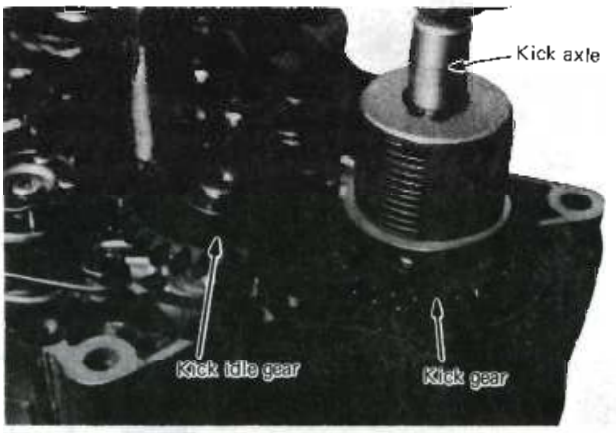


Fig. 2-10-2

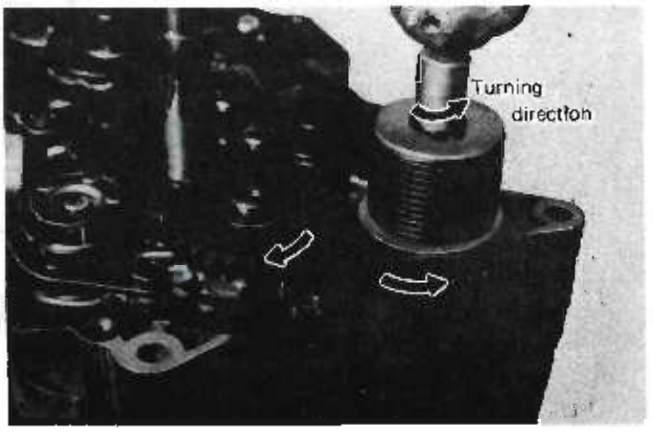


Fig. 2-10-3

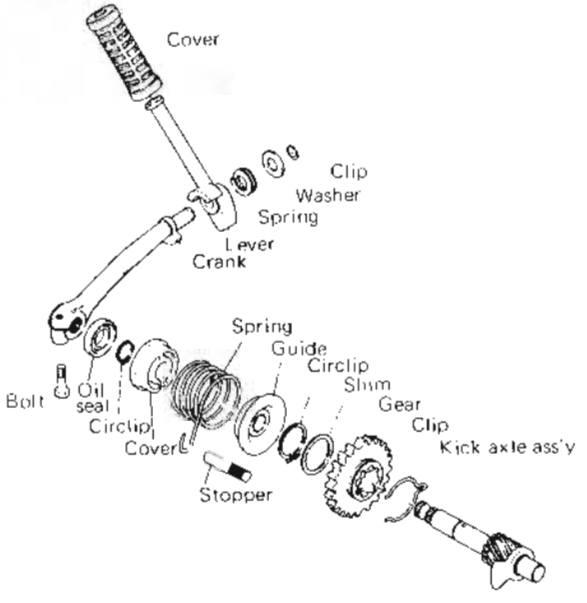


Fig. 2-10-4 Exploded View of the Kickstarter

1) Detach the spring from kick axle and remove the spring.

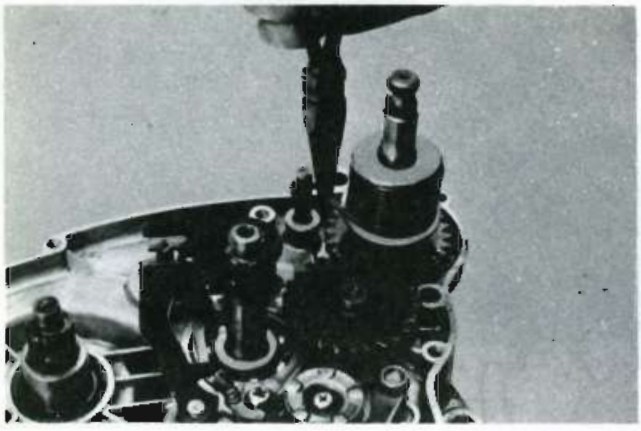


Fig. 2-10-5

2) Remove the kick starter assembly in the manner as shown in right.

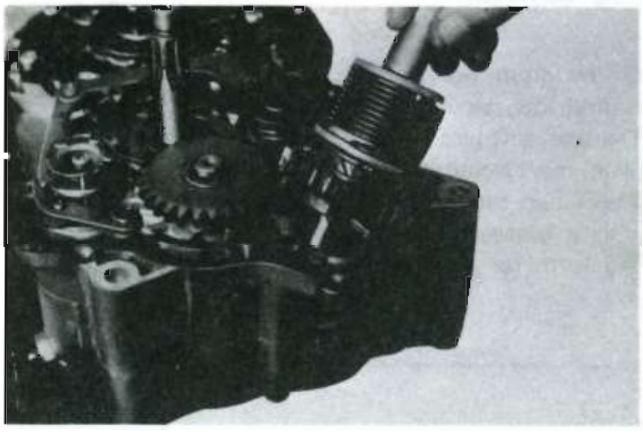


Fig. 2-10-6

B. Removing the Kick Idler Gear

Remove the clip with pliers, and the kick idler gear can easily be removed.



Fig. 2-10-7

2–11 Shifting Mechanism

Construction and Operation

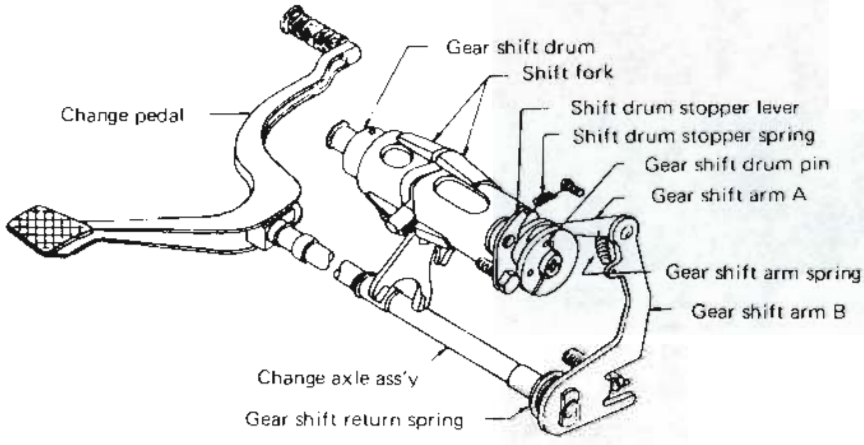


Fig. 2-11-1 Shifting Mechanism

When the gear shift lever is depressed, the gear shift arm B moves the gear shift arm A back and forth, and the gear shift arm A pushes the gear shift drum pins mounted on the gear shift drum, thus turning the gear shift drum.

The gear shift drum is equipped with five gear shift drum pins, and designed to make 1/5 turn each time the gear shift lever is depressed. In other words, one full turn of the drum will shift the transmission at five stages: neutral low, second third and top.

The gear shift pins are held by the disc so that the stopper plate may secure each position of the five stages.

The outer surface of the gear shift drum is provided with a groove, along which the shift forks travel back and forth for shifting the gear.

A. Removing the Change Axle Ass'y

To pull off the gear shift arm A, remove the left circlip and washer, and push up the change shaft ass'y A from the right side of the engine.

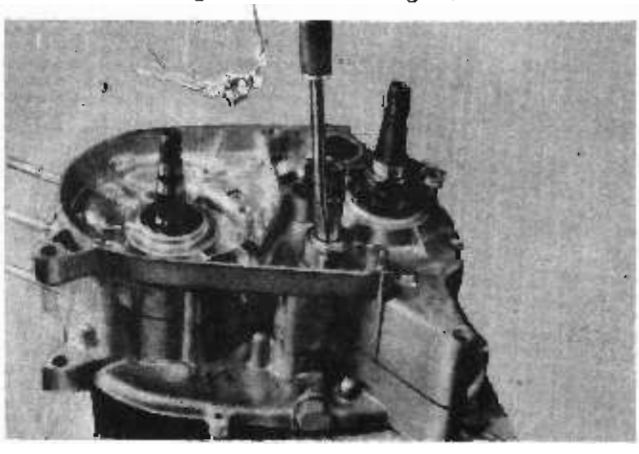


Fig. 2-11-2



Fig. 2-11-3

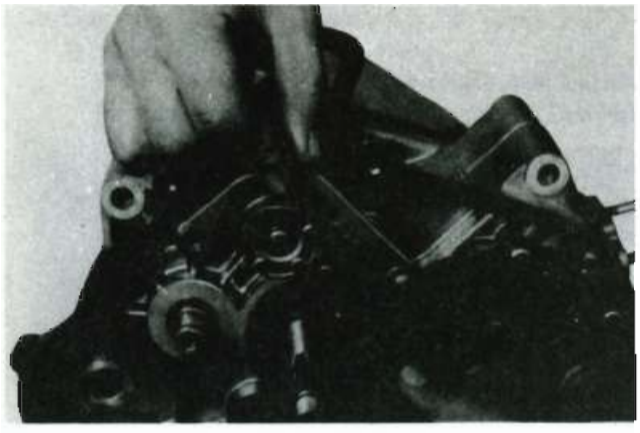


Fig. 2-11-4

B. Checking Change Axle Parts

1) Checking the Gear Shift Return Spring
Check the gear shift return spring for fatigue and damage. Any broken or fatigued gear shift return spring will impair the returning action of the shifting system.

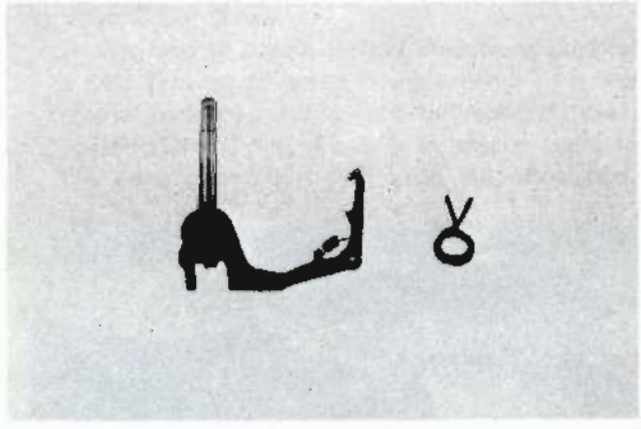


Fig. 2-11-5

2) Any broken or fatigued gear shift arm spring will impair shifting actions.

C. Gear Shift Arm

1) Removal
Remove the gear shift arm mounting bolt.

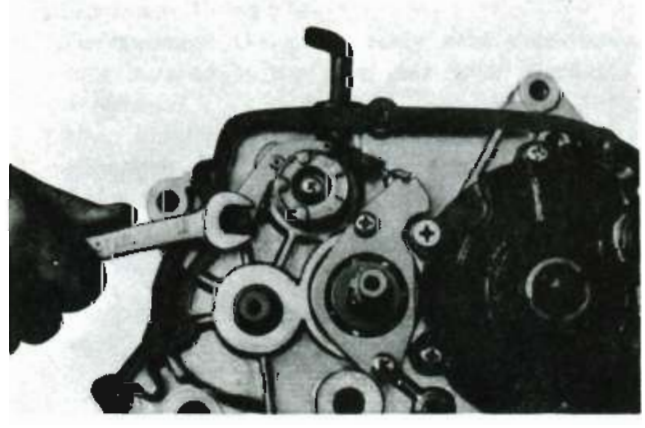


Fig. 2-11-6

2) Checking the Gear Shift Arm Spring
Any fatigued or broken gear shift arm spring may cause the gear shift arm to skip shift drum pins. Check the spring, and replace it if weakened or broken.

2–12 Rotary Valve

A. Removal

1) Remove the valve cover mounting bolts and remove the valve cover.

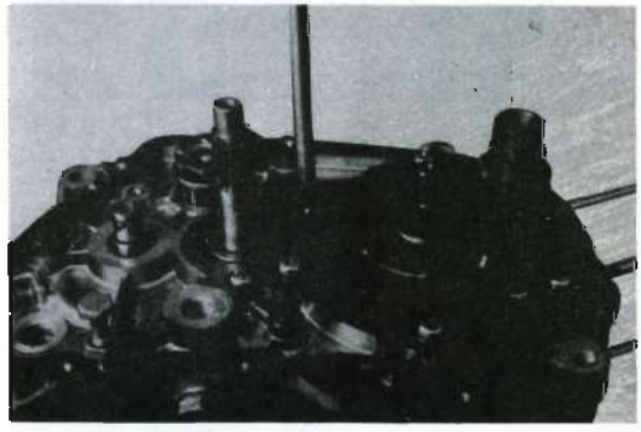


Fig. 2-12-1

2) Removing the Valve Knock Pin
As shown in Fig. 2-12-2, push out the valve knock pin from the other side, with a nail or wire. Be careful not to damage the crankcase surface.

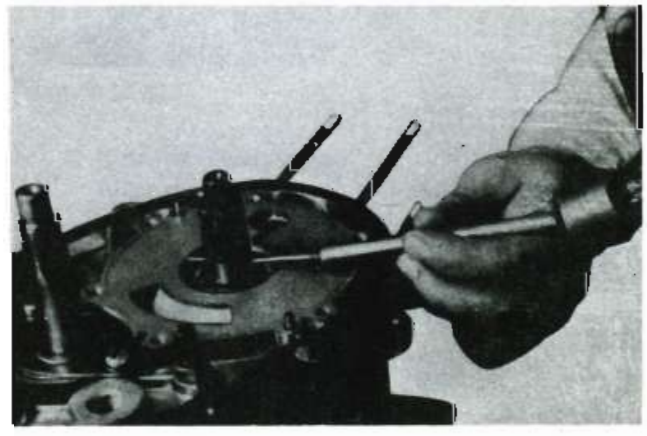


Fig. 2-12-2

B. Checking

1) Valve and Valve Unit Collar

Fit the valve over the valve unit collar and check for play. If play is excessive, replace the valve.



Fig. 2-12-3

If the valve unit collar is worn with step, replace it.

2) Valve Cover O-ring

O-rings tend to stretch slightly after being used for a long time. A stretched O-ring will not fit in the groove perfectly, and should be replaced. When installing the O-ring, grease it so that it sticks to the valve cover, thus facilitating the installation.



Fig. 2-12-4

3) Crankshaft O-ring

The crankshaft O-ring may easily get scratched when it is installed in the valve unit collar. Replace it if damaged.

When installing the valve unit collar, take care not to scratch the O-ring. For this purpose, grease the O-ring before installation.

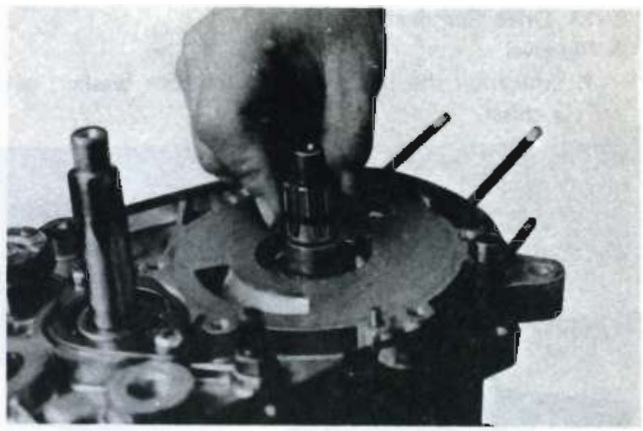


Fig. 2-12-5

4) Valve Cover Oil Seals

Apply grease of good quality to the lip surface when replacing the oil seal.

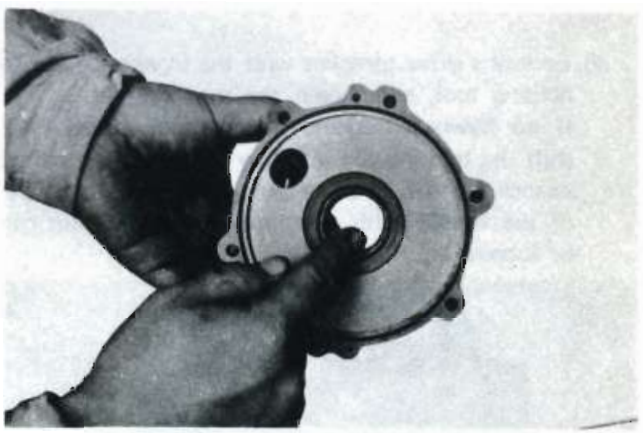


Fig. 2-12-6

5) Note on Assembling

Align the match mark of the valve with the locating pin on the crankshaft as shown in the figure below.

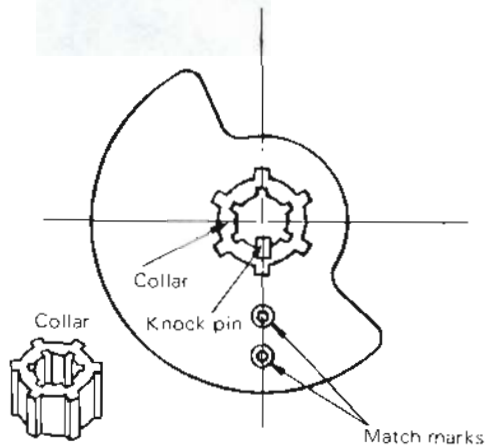


Fig. 2-12-7

2–13 Drive Sprocket

A. Removal

1) Straighten the bent edge of the lock washer, with a chisel.



Fig. 2-13-1

2) Lock the drive sprocket with the flywheel magneto holding tool, and loosen the sprocket nut.
If no flywheel magneto holding tool is available, shift the transmission into low gear, and fit a socket wrench on the sprocket nut. Then tap the holder of the wrench with a hammer so that the nut can be loosened.

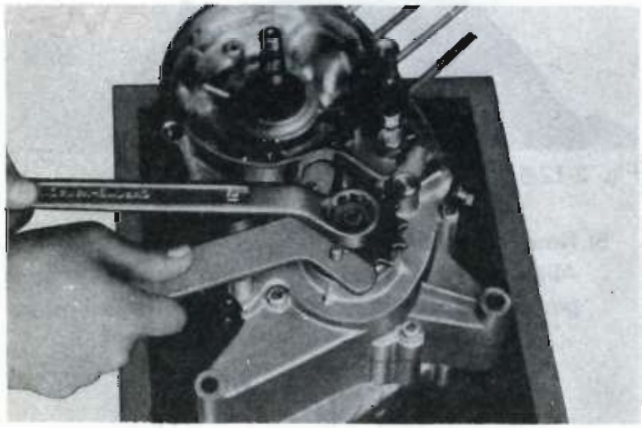
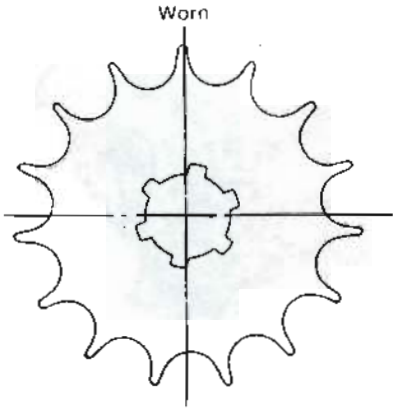


Fig. 2-13-2

B. Checking the Drive Sprocket

Any worn drive sprocket may result in excessive noise and shorten the life of the chain.
Check the sprocket, and replace it if worn.



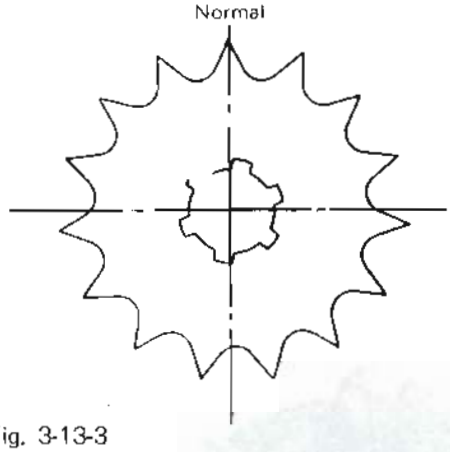


Fig. 3-13-3

2–14 Splitting the Crankcase Halves

A. Splitting

The crankcase may be split from either side, but to facilitate the subsequent servicing operations, the dividing tool should be installed on the right half of the crankcase.

1) Remove the pan-head screw from the left side half of the crankcase.

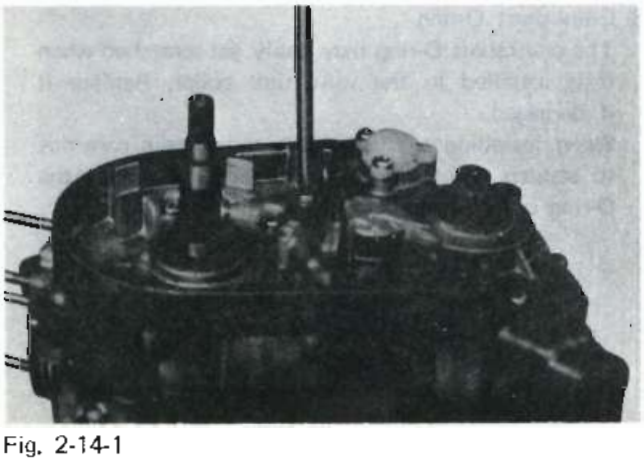


Fig. 2-14-1

2) Install the crankcase dividing tool on the right half of the crankcase, and alternately tap the transmission main axle and the side of the right half with a plastic tip hammer, so that the crankcase can be divided into two halves.

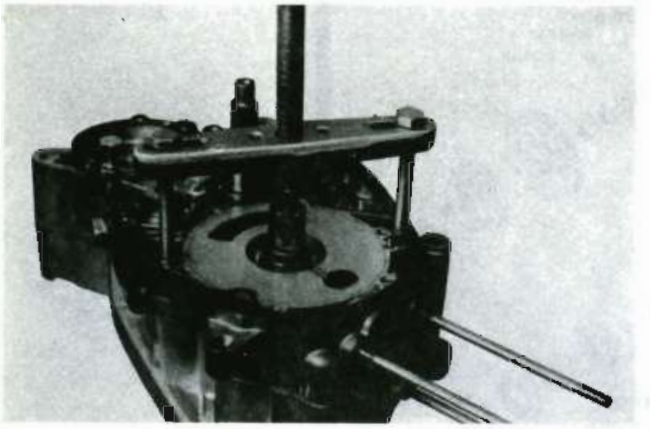


Fig. 2-14-2

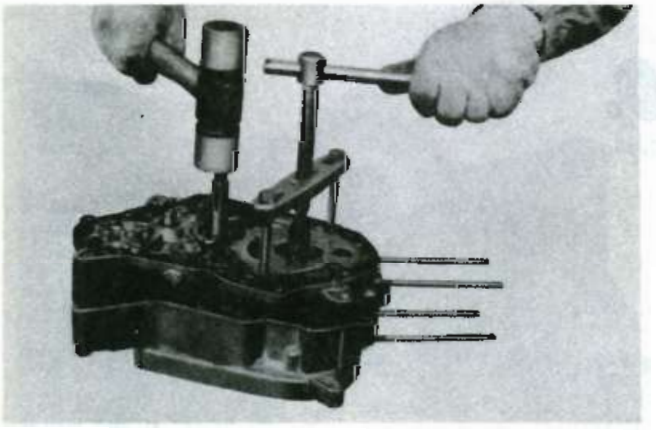


Fig. 2-14-3

Note:
Fully tighten the bolts of the dividing tool while keeping the body in a horizontal position.

B. Reassembling
When reassembling the crankcase, be sure to apply Yamaha Bond No.4 to the mating surfaces of the crankcase.

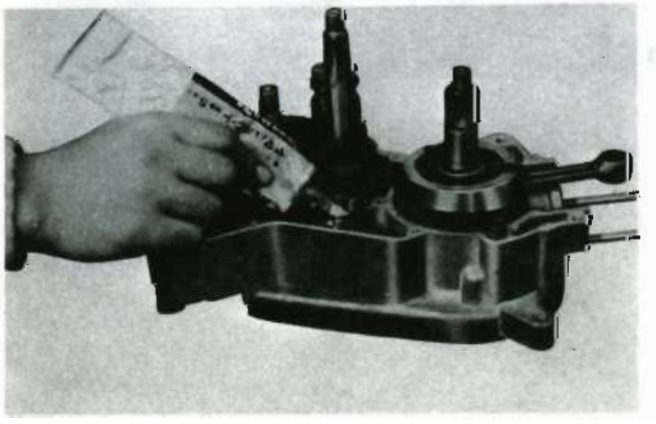
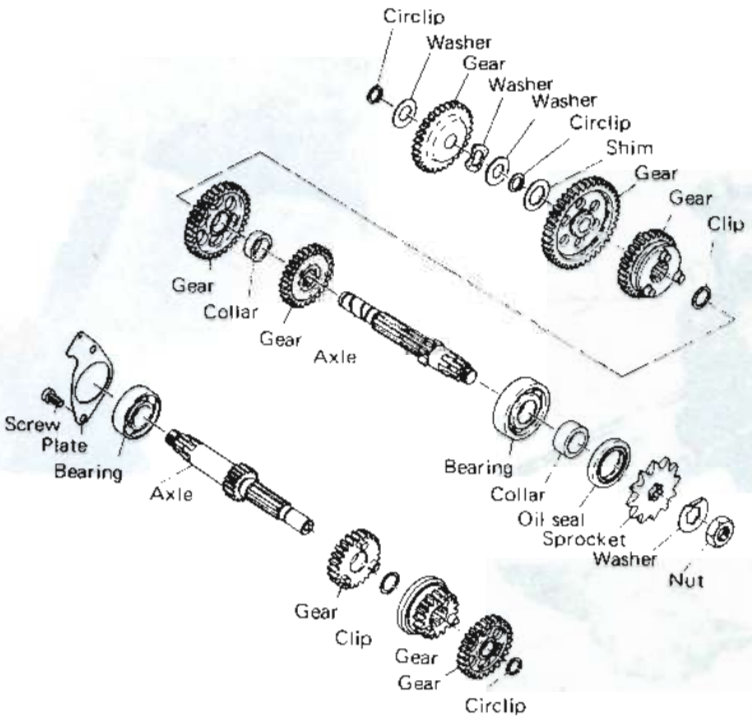


Fig. 3-14-4

2–15 Transmission Assembly

FS1-E Exploded View of Transmission



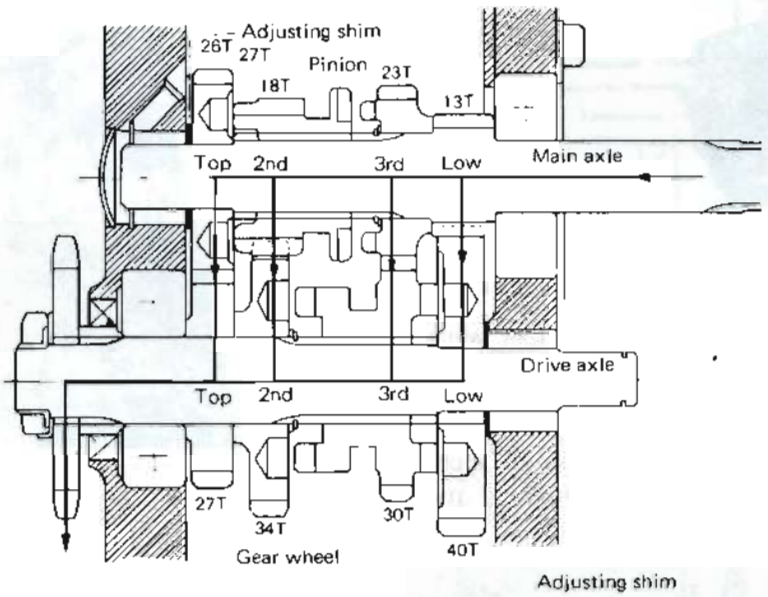


Fig. 2-15-1

		FS1-E
Primary reduction ratio		74/19=3.895
Secondary reduction ratio		39/14=2.785
Gear ratio	1st	40/13=3.077
	2nd	34/18=1.889
	3rd	30/23=1.304
	4th	27/26=1.038

For arrangement and component parts of the transmission, refer to Fig. 2-15-1.

A. Removal

1) Remove the shift drum seal cover and clip.

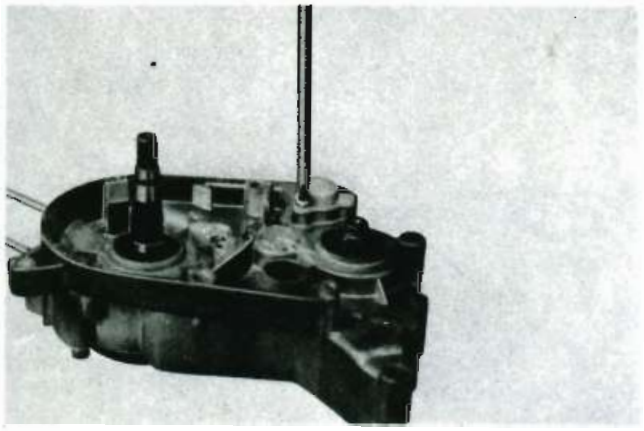


Fig. 2-15-2

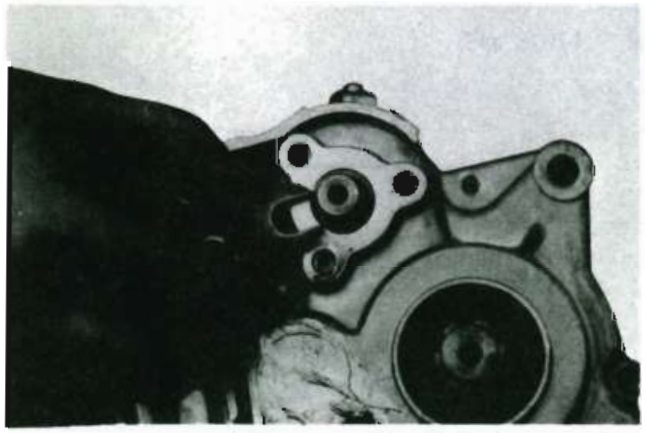


Fig. 2-15-3

2) Remove the transmission and the shifter at the same time.

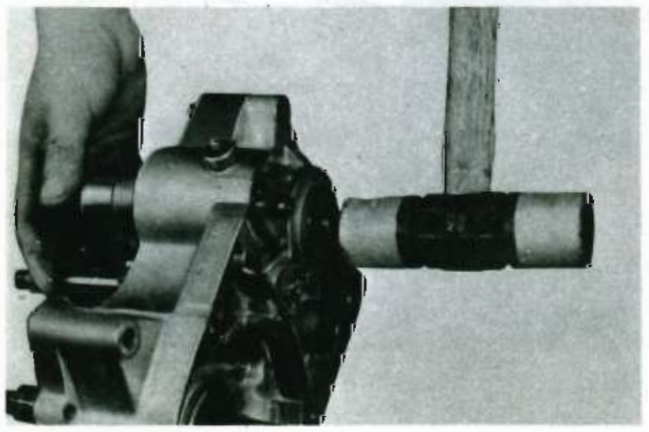


Fig. 2-15-4

B. Reinstallation

Reverse the above procedures for reinstallation, but be sure to put all washers in their proper places. First assemble the transmission and shifter, and then fit it into the crankcase.

2–16 Crankshaft

Of all engine parts, the crankshaft requires the highest degree of accuracy in engineering, manufacturing and servicing. The crankshaft is "delicate", so handle it very carefully.

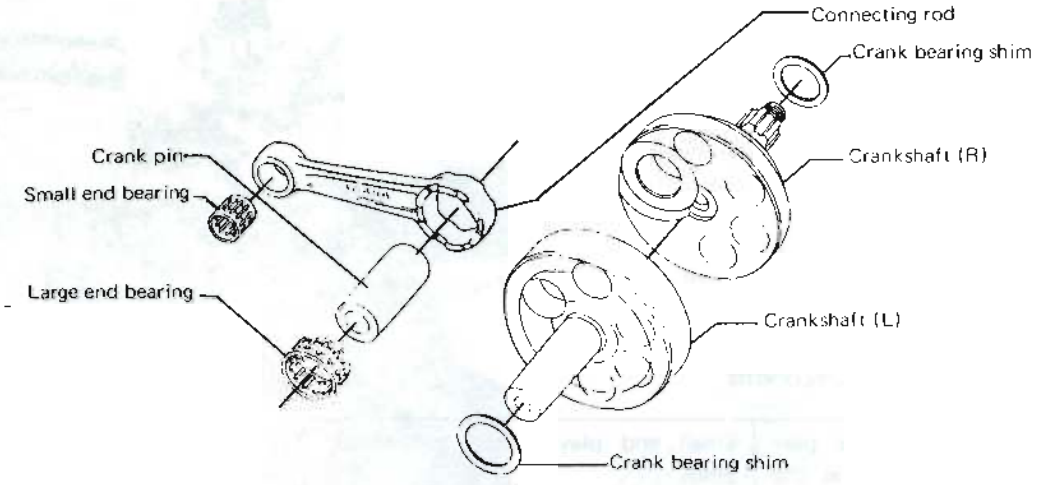
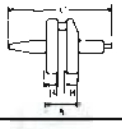


Fig. 2-16-1 Crankshaft Components

A. Dimensions of Crankshaft Ass'y



A	B	C
$38^{-0.05}_{-0.10}$mm	15mm	180mm

Fig. 2-16-2

B. Removing the Crankshaft Ass'y

1) Remove the crankshaft ass'y, with the crankcase disassembling tool.

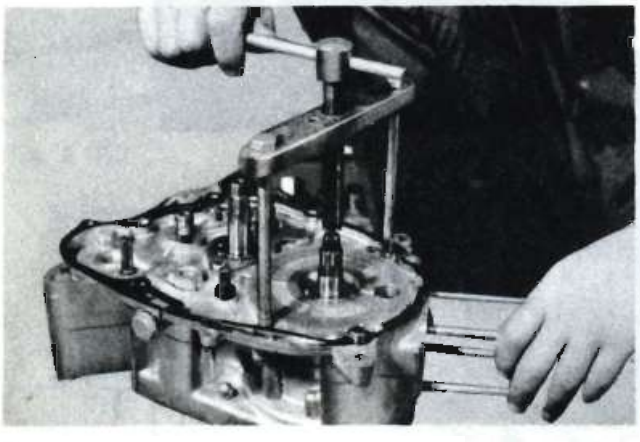


Fig. 2-16-3

Note:

Fully tighten the bolts of the disassembling tool, and keep the tool body in a horizontal position.

C. Reinstalling the Crankshaft Ass'y

Put shims on both ends of the crankshaft, and reinstall the crankshaft by using the crankshaft assembling tool. Hold the connecting rod at top dead center with one hand while turning the handle of the installing tool with the other so that the connecting rod will not contact the crankcase.

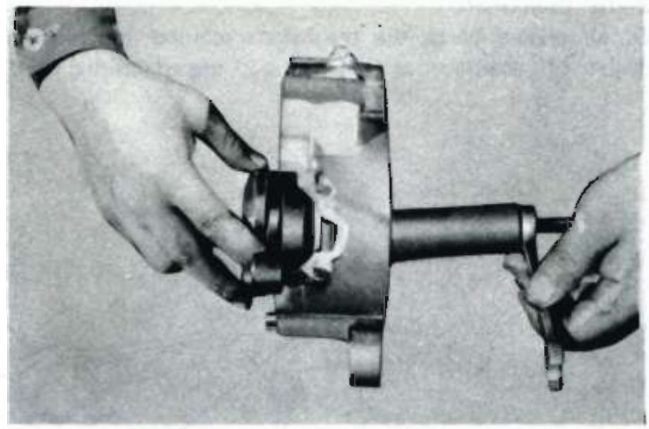


Fig. 2-16-4

D. Checking and Servicing

1) Checking the Crankshaft Components

Check connecting rod axial play at small end (to determine the amount of wear of crank pin and bearing at large end). (Fig.2-16-5)	Small end play should not exceed 2mm.	If small end play exceeds 2mm, disassemble the crankshaft, check connecting rod, crank pin and large end bearing. Replace defective parts. Small end play after reassembly should be within 0.8 ~ 1.0 mm.
Check the connecting rod for axial play at large end. (Fig. 2-16-6)	Move the connecting rod to one side and insert a feeler gauge. Large end axial play should be within 0.1 ~ 0.3 mm.	If excessive axial play is present, disassemble the crankshaft and replace any worn parts.
Check accuracy of the crankshaft ass'y. (Misalignment of parts of the crankshaft)	Dial gauge readings should be within 0.03mm.	Correct any misalignment by tapping the flywheel with a brass hammer and by using a wedge.

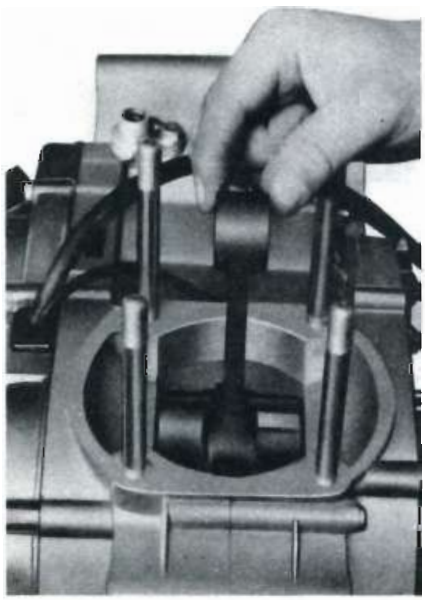


Fig. 2-16-5

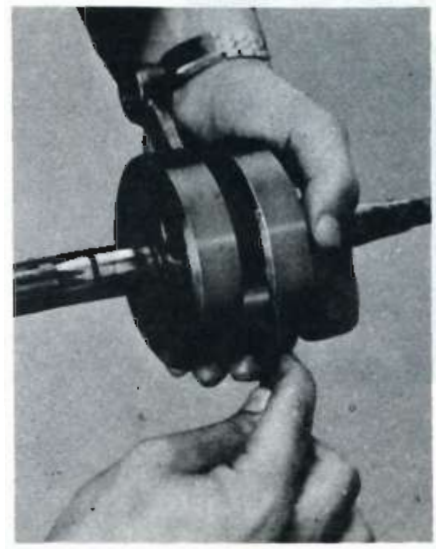


Fig. 2-16-6

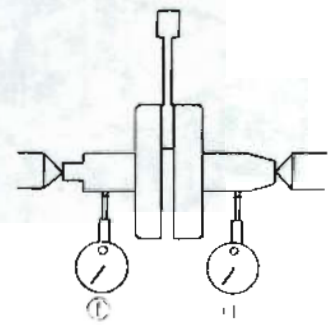


Fig. 2-16-7

2–17 Bearings and Oil Seals

A. Removal and Reinstallation

The crankcase should preferably be heated to approximately 120°C (250°F) to remove or install oil seals and bearings, but the following procedure is satisfactory.

1) Removal

a. Pry the oil seals out of place with a slot head screwdriver.

Replace the oil seals when overhauling the engine.

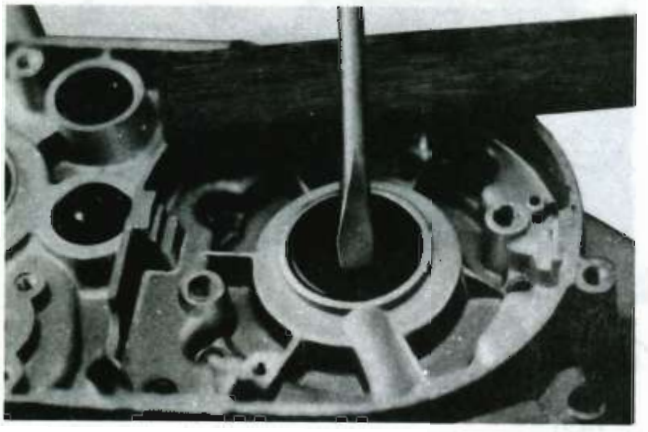


Fig. 2-17-1

b. Remove the bearing with a bearing puller.

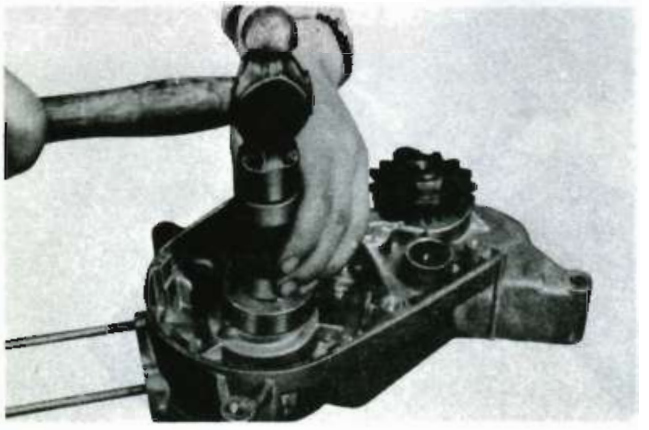


Fig. 2-17-2

2) Reinstallation

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

When installing them, grease them fully.

2–18 Carburetor

A. Checking the Carburetor

1) Float

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

2) Float Valve

Replace the float valve if its seating end is worn with step or scratched. Check the float valve spring for fatigue. Depress the float valve with a finger, and make sure that it properly seats against the the valve seat when released. If the float valve spring is weakened, fuel may overflow, flooding the float chamber while the machine is running at certain speeds or under certain road conditions.

3) Overflowing

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

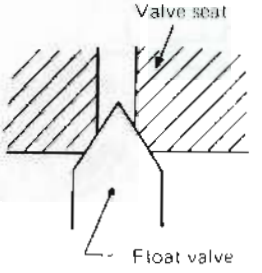


Fig. 2-18-1

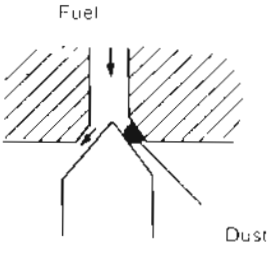


Fig. 2-18-2

4) Cleaning the Carburetor

Disassemble the carburetor, and wash all its parts in clean gasoline. Blow fuel passages in the carburetor with compressed air. All jets and other delicate parts should be cleaned by blowing compressed air through them, because cable or other hard, pointed cleaning tools may damage their precision-machined surfaces.

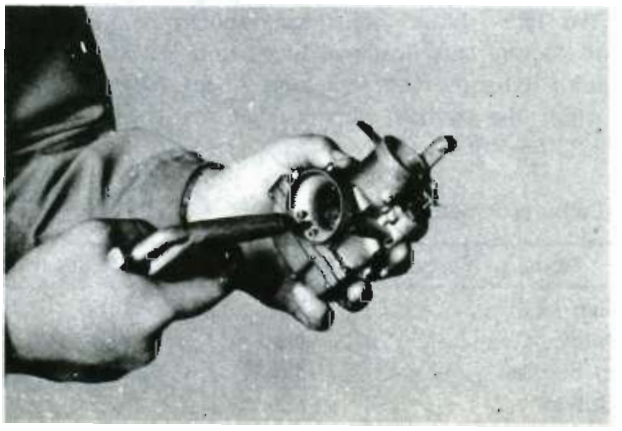


Fig. 2-18-3

B. Float Level Adjustment

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

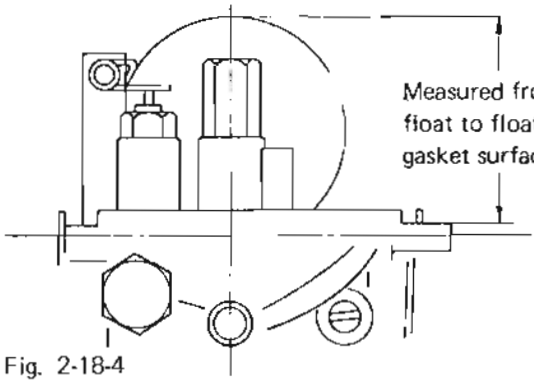


Fig. 2-18-4

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

C. Idle Mixture-Idle Speed Adjustments

The idle mixture adjustment should be set exactly to factory specifications. First, turn the air screw in until it lightly seats then back it out 1¾ turns. Next, adjust the throttle stop so that the engine idles at 1,250 ~ 1,350 r.p.m.

D. Carburetor Setting

Name of Parts	Abbreviation	Specification
Main jet	M.J.	#150
Needle jet	N.J.	W-4
Jet needle	J.N.	3G9-3
Pilot jet	P.J.	#25
Starter jet	G.S.	#50
Throttle valve cut away	C.A.	1.5
Air screw setting	A.S.	Back out 1¾ turns.
Idling speed	—	1,250~1,350 r.p.m.
Ident. mark	—	257E2
Model	—	VM16SC

Fig. 2-18-5

2–19 Air Cleaner

A. Removal

The air cleaner is incorporated in the cleaner case above the engine. To detach the cleaner, remove the cleaner case cover.



Fig. 2-19-1

B. Cleaning

Clean the filter element with compressed air. (Fig. 3-19-2)

The element is made of filter paper. It should be kept from water or oil.



Fig. 2-19-2

2–20 Transmission oil

Transmission oil amount . . . . . Motor Oil SAE 10W/30 600~650 cc (0.64~0.68 qt.)

CHAPTER 3. CHASSIS

The Yamaha FS1-E has been designed with an emphasis on improving the running stability and maneuverability. Their performance can well be comparable to conventional 90 cc class motorcycles. The 7-bone style frame assures improved rigidity and longer service life. To simplify servicing the rear wheel components, the separate type hub clutch has been employed. It can be said that they offer much better performance than any other makes of the same class.

3–1 Front Wheel

A. Structure

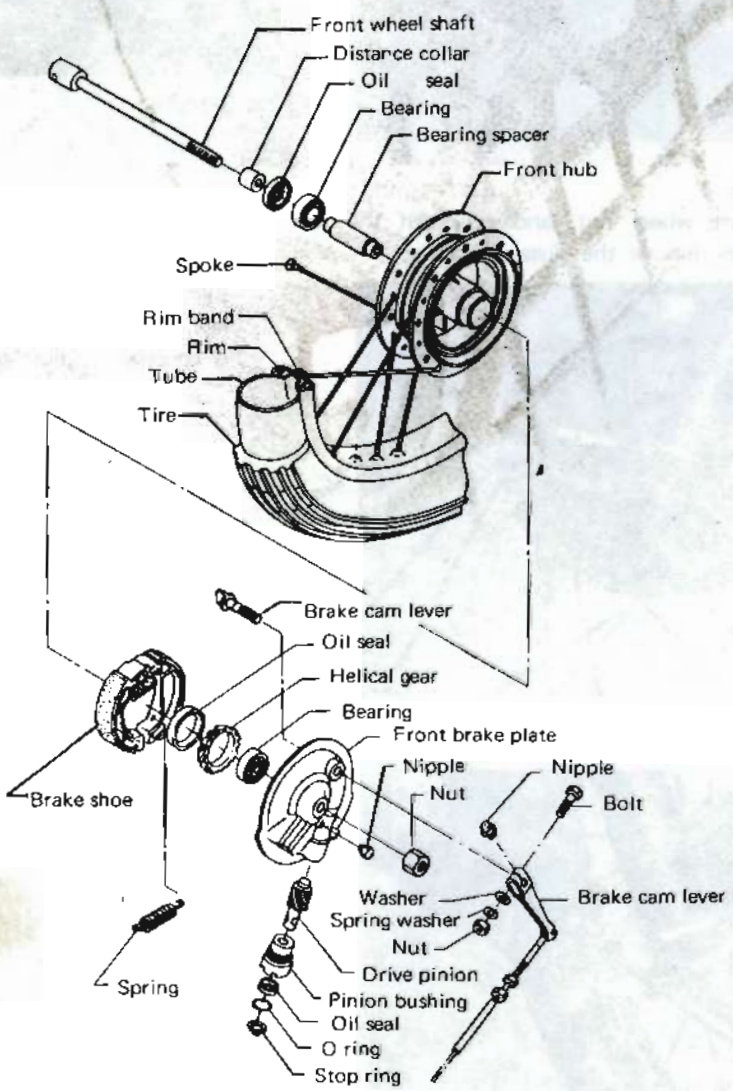


Fig. 3-1-1

B. Removal

1) Disconnect the front brake cable and speedometer cable from the front brake shoe plates.

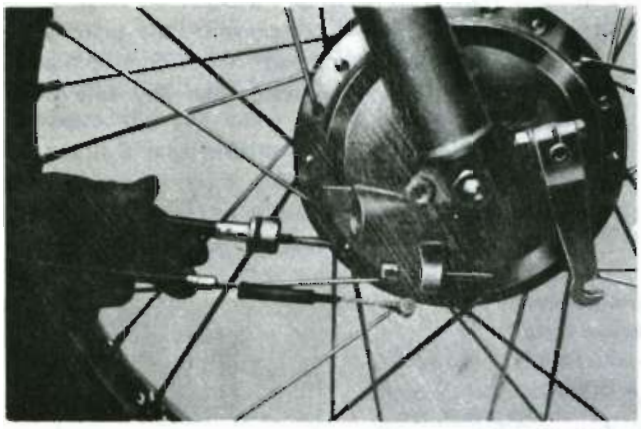


Fig. 3-1-2

2) Remove the front wheel nut, and pull out the wheel shaft. Then remove the distance collar.

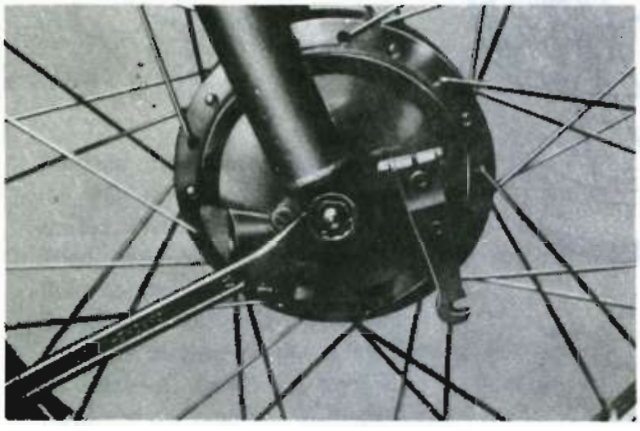


Fig. 3-1-3

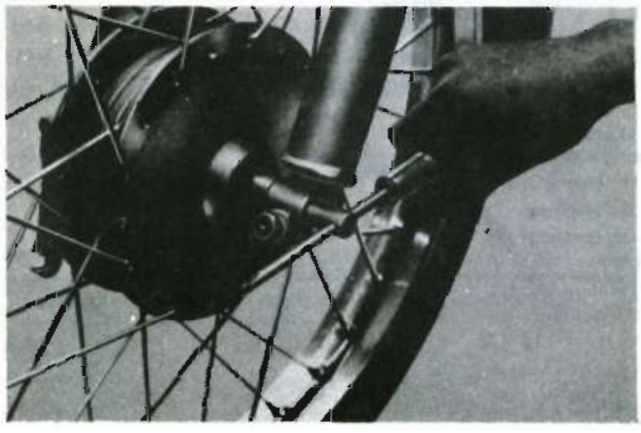


Fig. 3-1-4

When removing the distance collar, take care not to damage the oil seal lip. To remove the distance collar, grease it and turn it gently in or out.

3) Remove the front wheel ass'y.



Fig. 3-1-5

C. Checking

1) Runout of the Rim

As shown in Fig. 3-1-5, measure, the runout of the rim with a dial gauge.

Limit of runout . . . . . 3mm (0.11 in.) or less.

If necessary, adjust spoke tension or replace the rim.

Fig. 3-1-6

2) Brake Shoe
Measure the outside diameter of the brake shoe with slide calipers. If it measures 105 mm (4.14") or less, replace it.

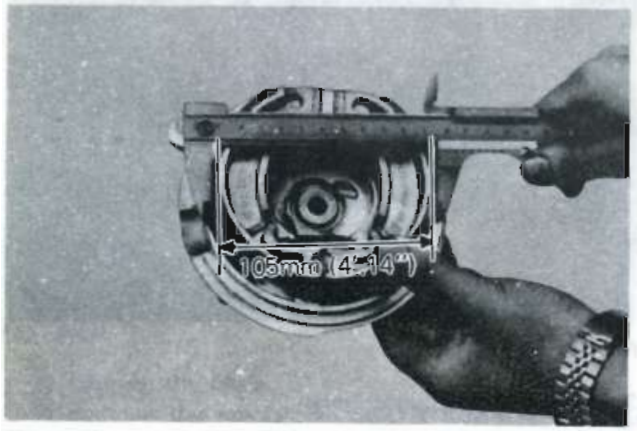


Fig. 3-1-7

3) Brake Drum
Oil or scraches on the inner surface of the brake drum will result in poor functioning or noise. Clean or smooth out the surface with a rag or sandpaper.



Fig. 3-1-8

3-2 Rear Wheel

A. Construction View

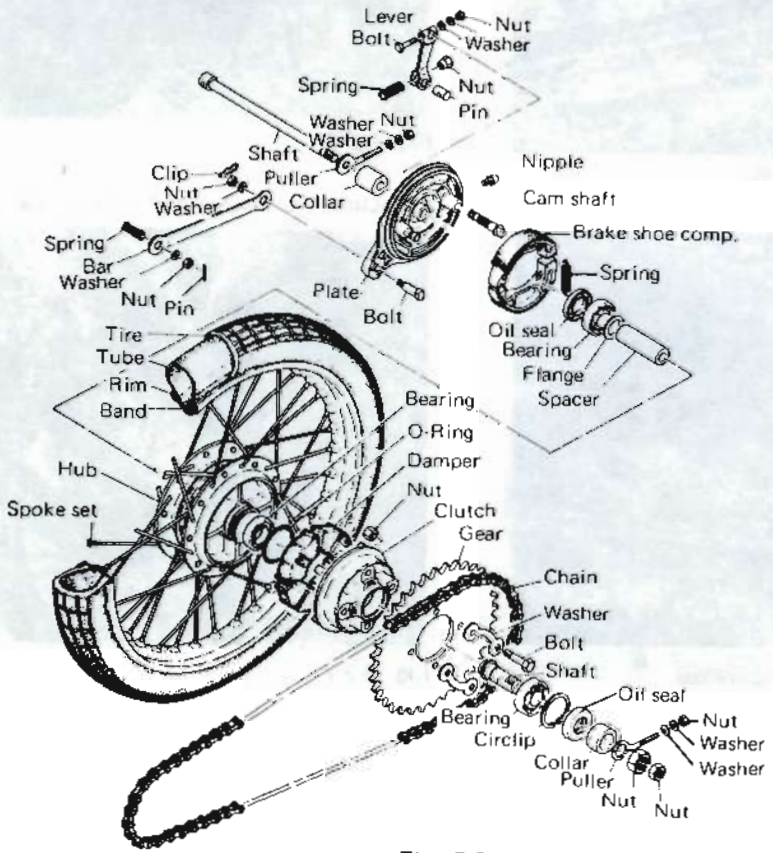


Fig. 3-2-1

B. Removal

1) Remove the anchor bar and brake rod attached to the rear brake shoe plate.

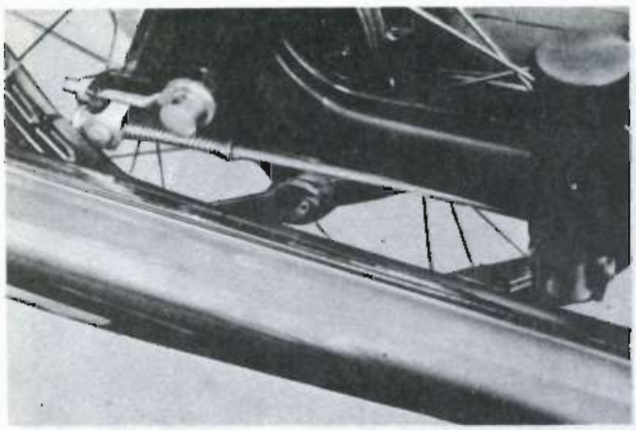


Fig. 3-2-2

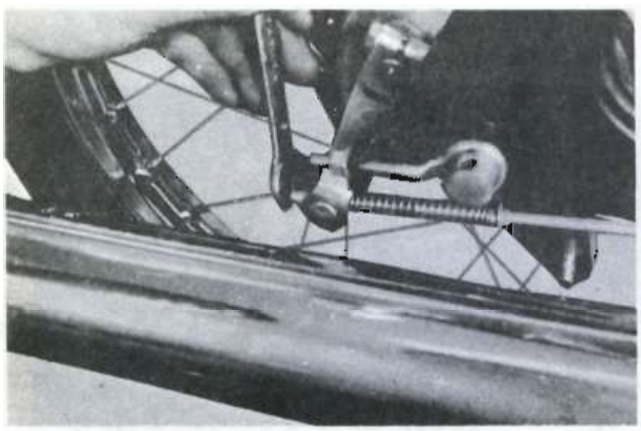


Fig. 3-2-3

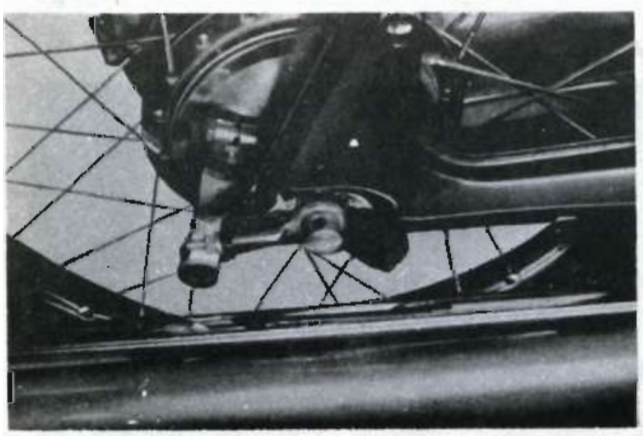


Fig. 3-2-4

2) Remove the nut and remove the rear wheel shaft.

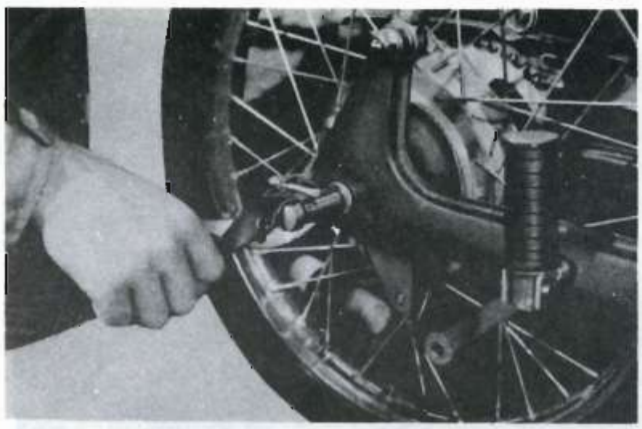


Fig. 3-2-5

3) Remove the distance collar.

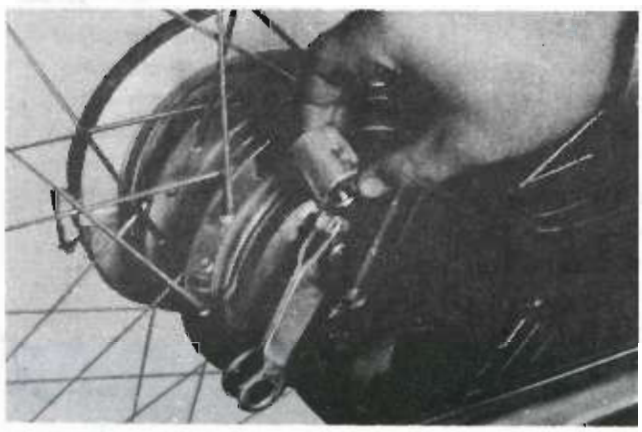


Fig. 3-2-6

4) Incline the chassis and remove the rear wheel.



Fig. 3-2-7

5) Remove the chain.

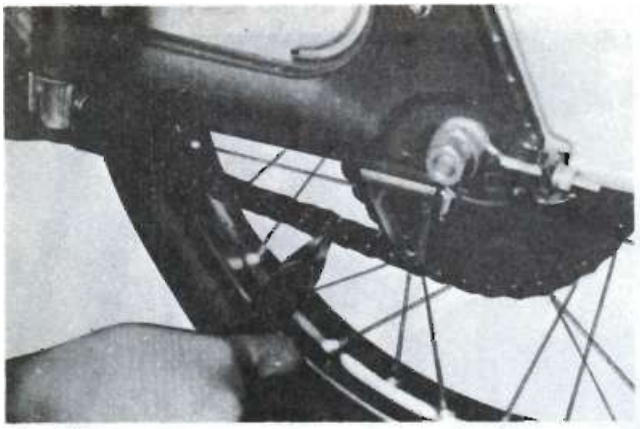


Fig. 3-2-8

6) Remove the chain.
7) Remove the special hexagon nut and remove the rear clutch ass'y.

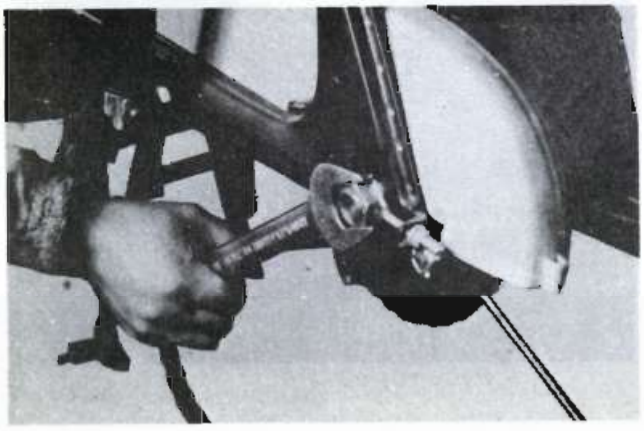


Fig. 3-2-9

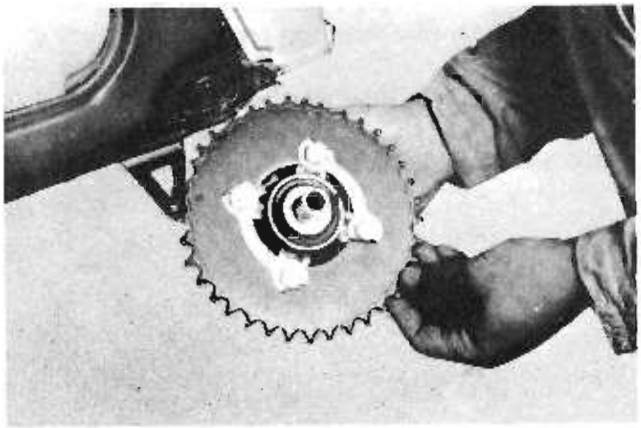


Fig. 3-2-10

C. Checking

1) Runout of the Rim
Check the rim for runout in the same manner as the front wheel. Limit of runout . . . . . 3 mm (0.11") or less.
2) Brake Shoe
Check the rear brake shoe in the same manner as the front brake shoe. Limit of size . . . . 105mm (41.4") or less.
3) Brake Drum
Check the rear brake drum in the same manner as the front wheel.
4) Rear Sprocket
Replace an excessively worn rear sprocket.

3–3 Front Fork

Check the front fork for bend and oil leakage, and correct any defect in the following manner.

1) Remove the front fender, and remove the inner tube mounting bolt.

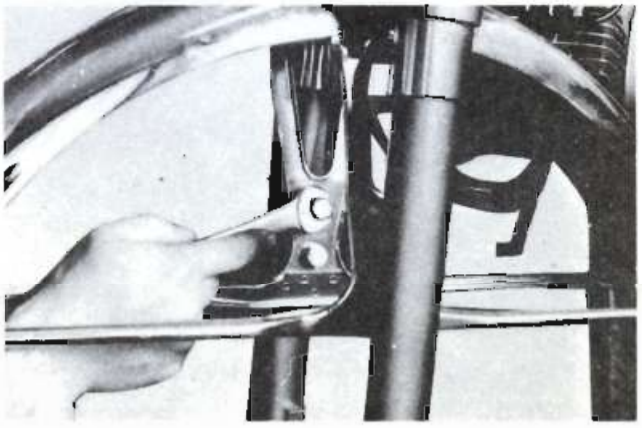


Fig. 3-3-1



Fig. 3-3-2

2) Loosen the inner tube mounting bolt on the lower bracket and pull off the fork downward.

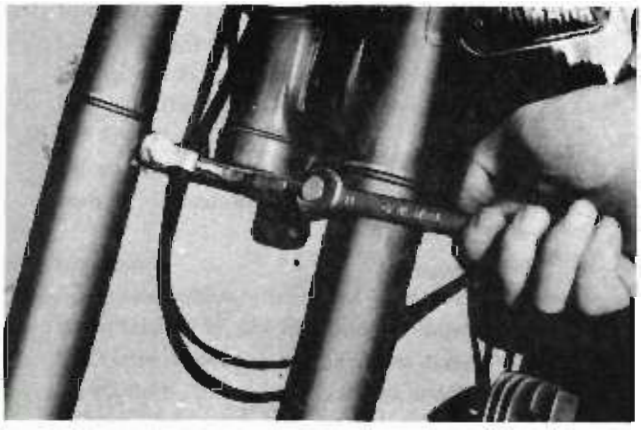


Fig. 3-3-3



Fig. 3-3-4

B. Disassembling the Fork

1) Drain the oil from the fork.
2) Place a rubber pad or rubber tube around the outer tube nut.
3) Squeeze the outer tube with a strap wrench, and turn it counterclockwise.
   The inner tube can be separated from the outer.

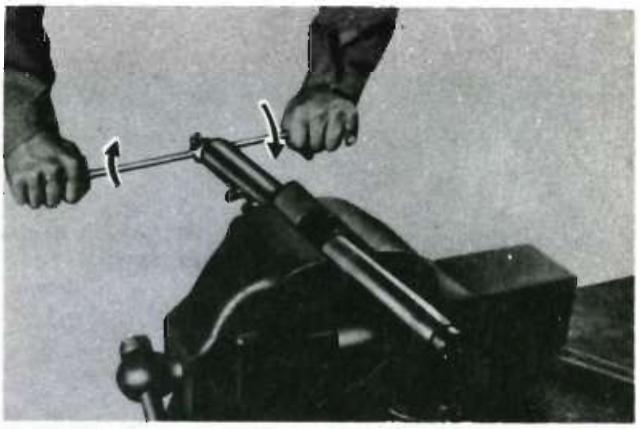


Fig. 3-3-5

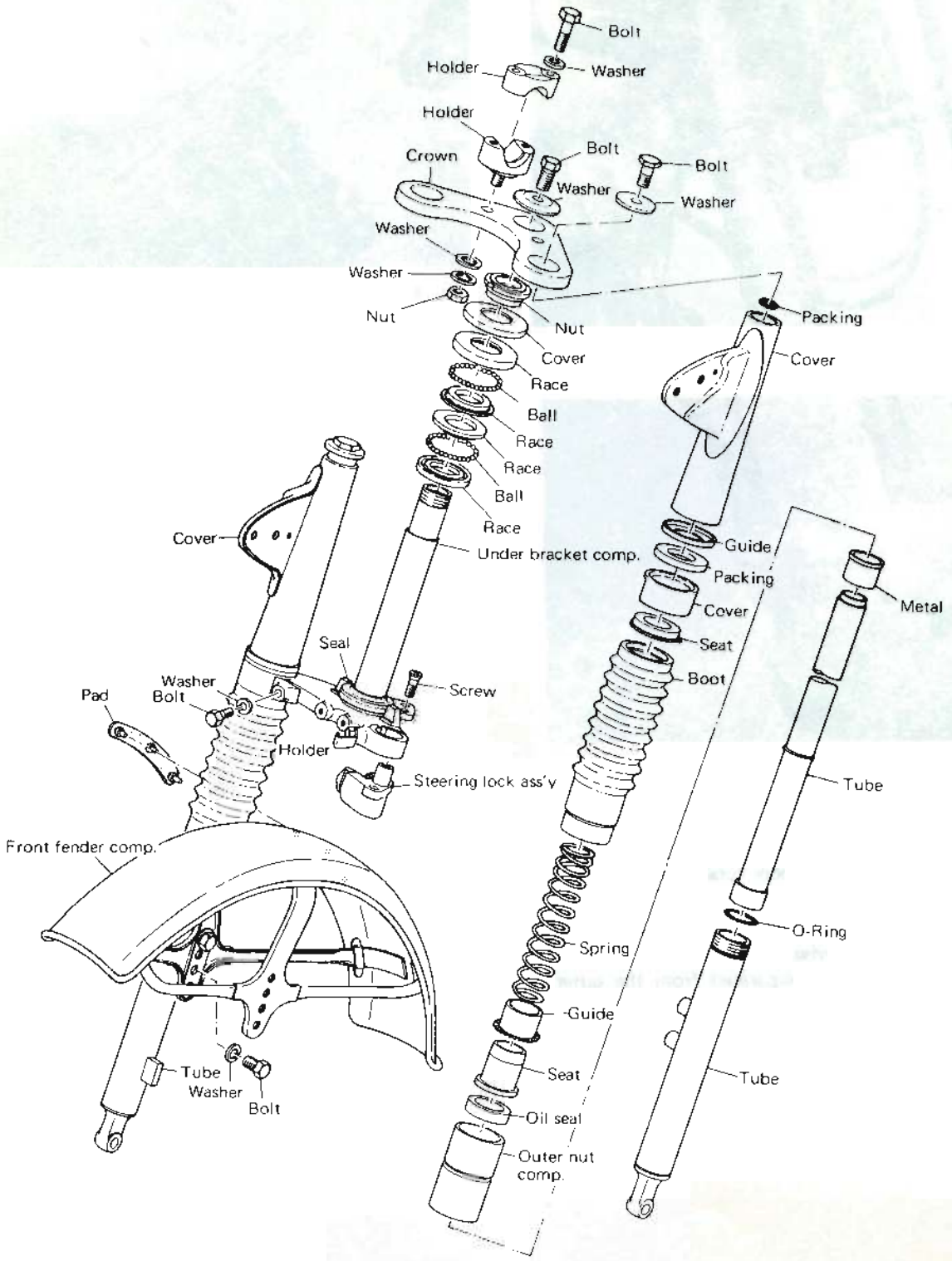

Bolt
Holder
Washer
Holder
Crown
Bolt
Washer
Bolt
Washer
Washer
Washer
Nut
Nut
Cover
Race
Ball
Race
Race
Ball
Race
Cover
Under bracket comp.
Seal
Screw
Pad
Washer
Bolt
Holder
Steering lock ass'y
Front fender comp.
Tube
Washer
Bolt
Packing
Cover
Guide
Packing
Cover
Seat
Boot
Metal
Tube
O-Ring
Spring
Guide
Seat
Oil seal
Outer nut comp.
Tube

Fig. 3-3-6

C. Checking

1) Inner Tube
Check the inner tube for bend and scratch.
Slight bends can be corrected by a press machine, but it is the best to replace the tube.

2) Oil Seal
Be sure to replace the oil seals whenever the front fork is disassembled.

D. Reassembling

1) For reassembling the front fork, reverse the order of disassembly as mentioned above. When fitting the outer tube nut in the inner tube, take care not to damage the oil seal fitted in the outer tube. Grease the tube and cover the inner tube with a nylon cloth before reassembling.
Check the inner tube for smooth sliding after reassembling is done.



Fig. 3-3-7



Fig. 3-3-8

2) By using a front fork puller, set the front fork in position, and tighten the lower bracket mounting bolt.

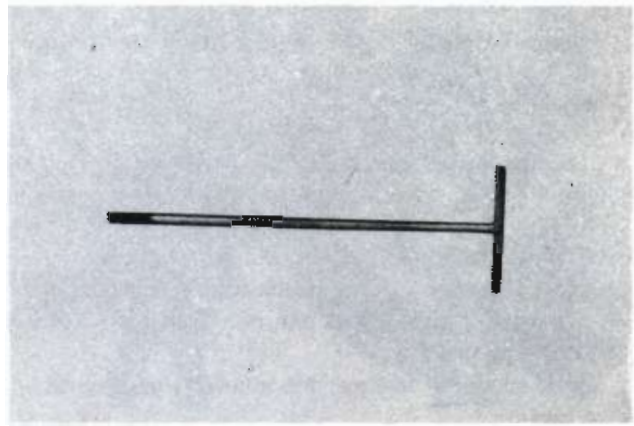


Fig. 3-3-9

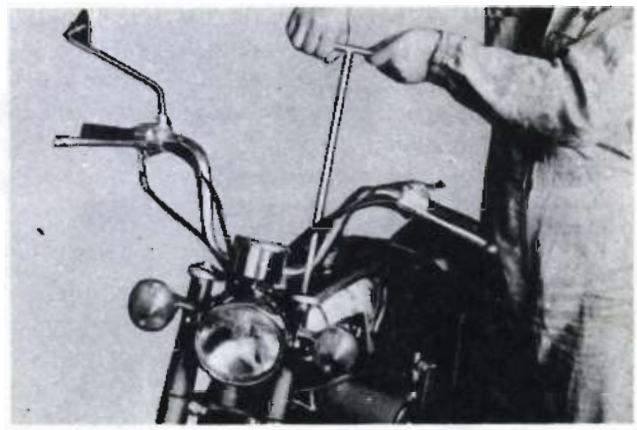


Fig. 3-3-10

3) Feed front fork oil into the inner tube through the upper opening.
Oil amount:

Oil amount:
154 cc (5.2 fl.oz) for right
136 cc (4.6 fl.oz) for left

Oil:
Motor oil SAE 10W/30
(or a 80 : 20 mixture of motor oil #30 and spindle oil #60)

4) Finally, tighten the inner tube mounting fork.

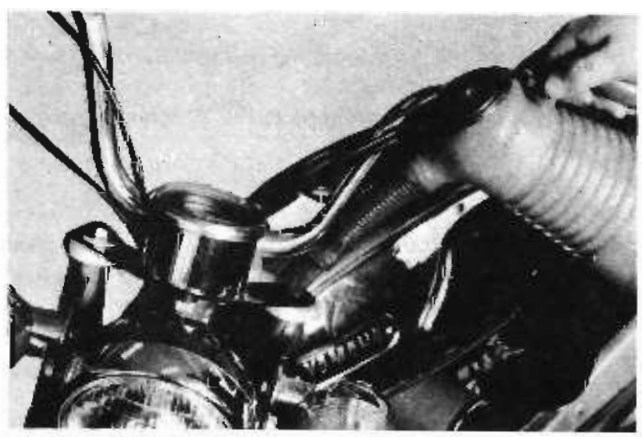


Fig. 3-3-11

3–4 Rear Cushion

The rear cushion can not be disassembled into parts. Therefore, this section will discuss on how to check oil leakage.

A. Checking Oil Leakage

Occasional oil seepage may be seen on the bottom of the outer cover, as viewed from the outside of the rear cushion. This oil seepage may be often mistaken for an oil leakage of the rear cushion.

Such oil seepage mostly results from the melted grease on the inner spring, and will not impair the function of the rear cushion.

For checking oil leakage, the following measure should be taken.

1) Remove the rear cushion, and depress it with your hand two or three times. If the spring quickly restores half-way, and gradually stretches for the last 10 mm (2/5"), the cushion is considered to be in good condition. If the spring restores entirely with quick motion, there may be oil leakage. In this case, replace the whole rear cushion ass'y.

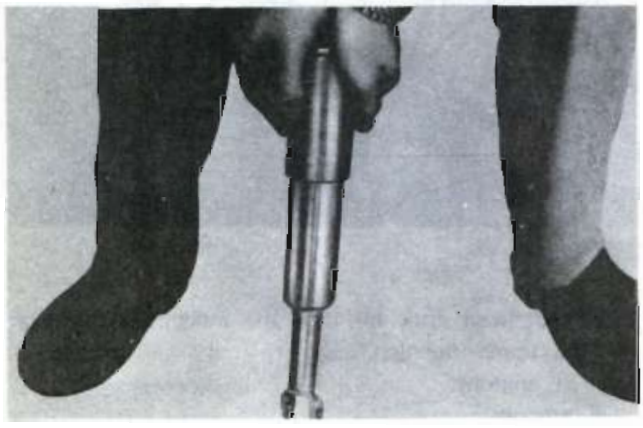


Fig. 3-4-1

3–5 Steering Head

A. Checking

1) Ball Races and Steel Balls

Full checking is required for a motorcycle which has been in use for a long time. Balls having uneven wear or cracks will impair the maneuverability. Therefore, if such defects are found, replace the balls and ball races.

Replace any ball having scratches or streaks resulting from wear.

Note:

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

3–6 Crank Pedal

1. Remove the chain case cover.

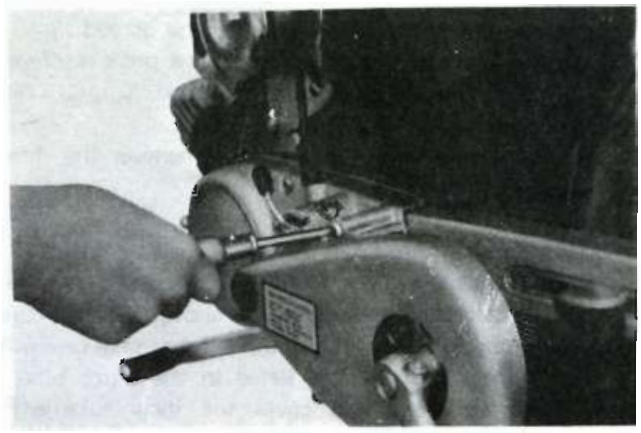


Fig. 3-6-1

2. Remove the chain joint from the chain.

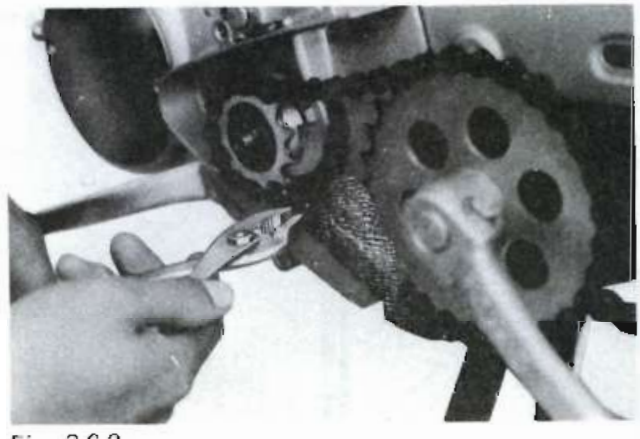


Fig. 3-6-2

3. Remove the circlip, and then remove the drive sprocket, transmit change spring and transmit change dog.

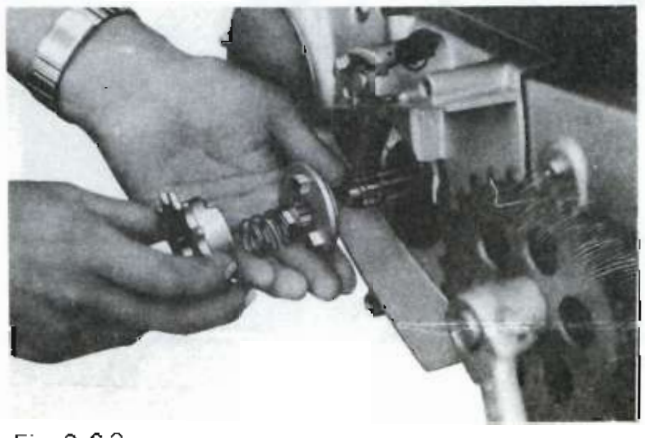


Fig. 3-6-3

4. Remove the change pedal.

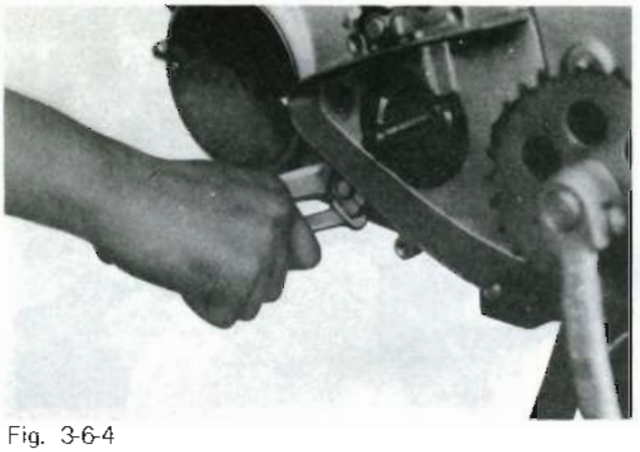


Fig. 3-6-4

5. Remove the crankcase cover. (L)

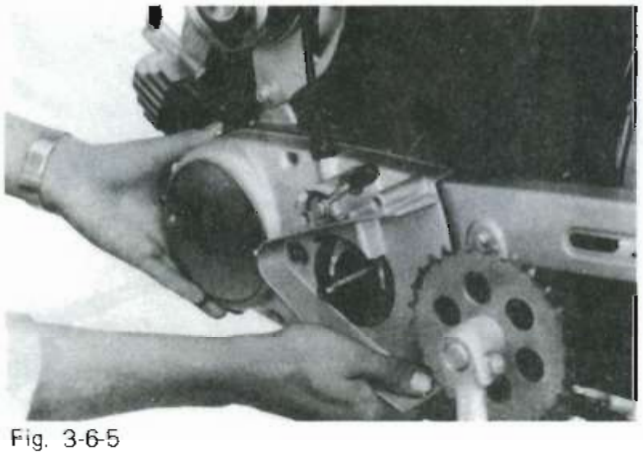


Fig. 3-6-5

6. Remove the nut and then remove the crank pedal pin.

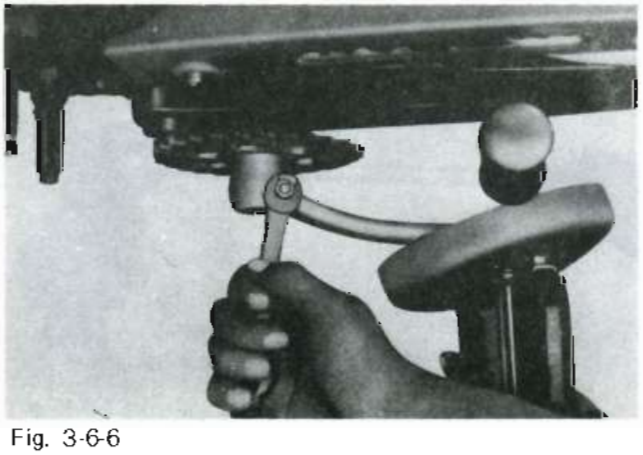


Fig. 3-6-6

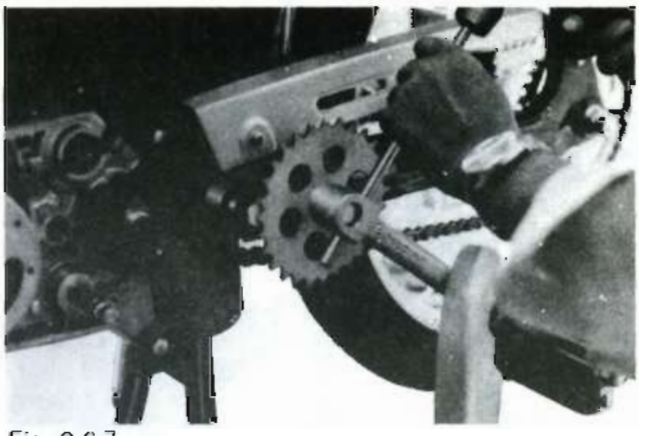


Fig. 3-6-7

7. Remove the crank pedal comp. (L)

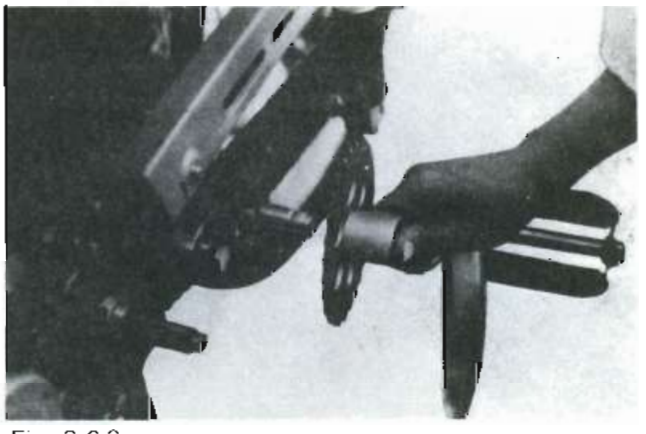


Fig. 3-6-8

8. Pull out the crank pedal ass'y. (R)

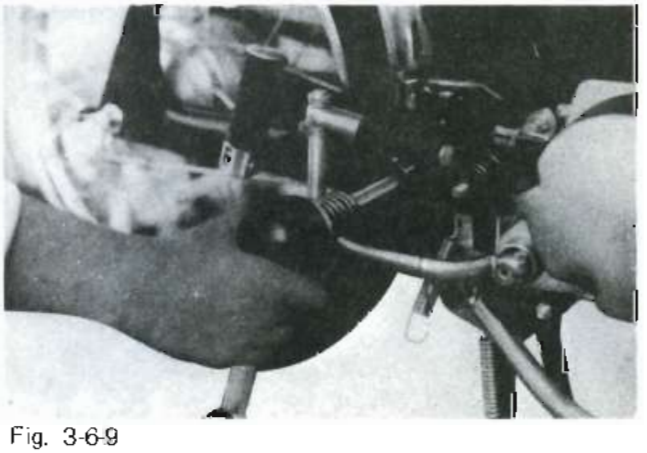


Fig. 3-6-9

9. Remove the crank pedal cover.



Fig. 3-6-10

10. Remove the circlip, and then remove the return spring.

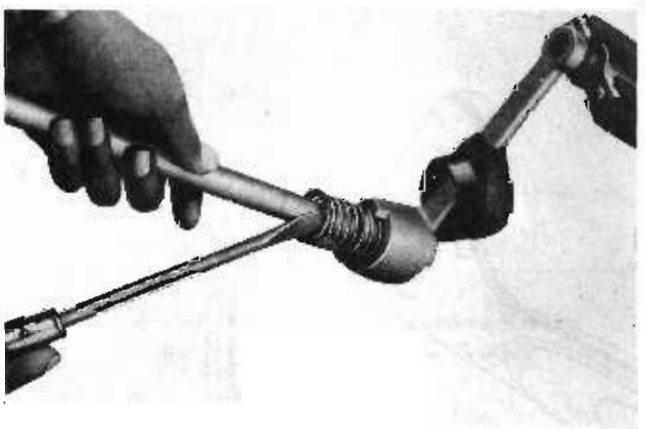


Fig 3-6-11

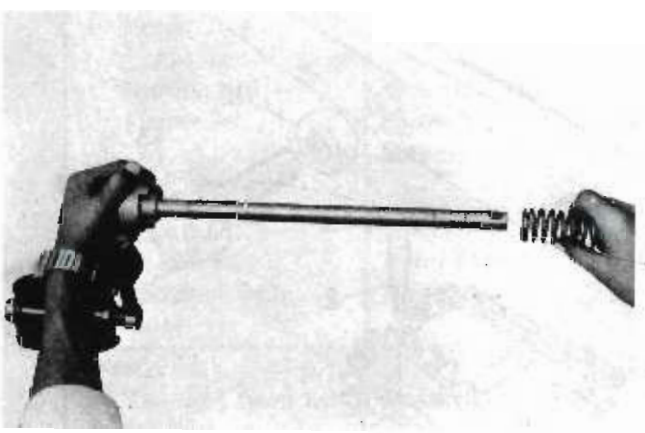


Fig. 3-6-12

11. Remove the circlip with clip pliers, and then remove the crank pedal.



Fig. 3-6-13

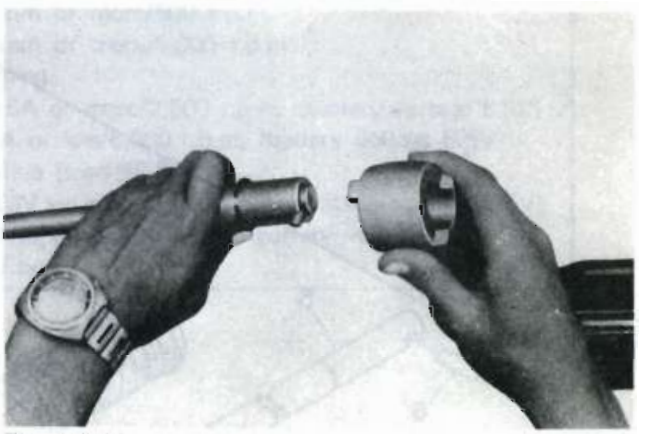


Fig. 3-6-14

12. Remove the pipe shaft.

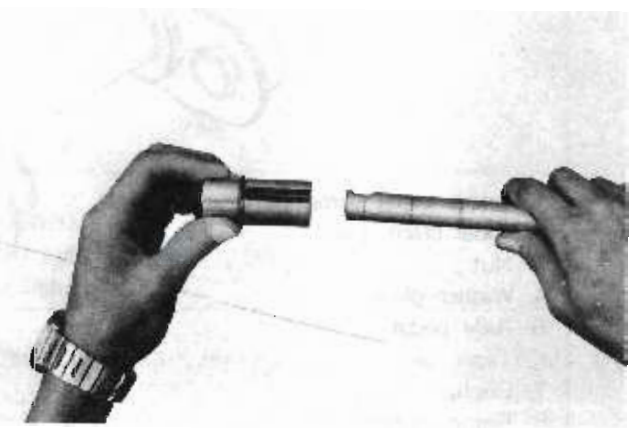
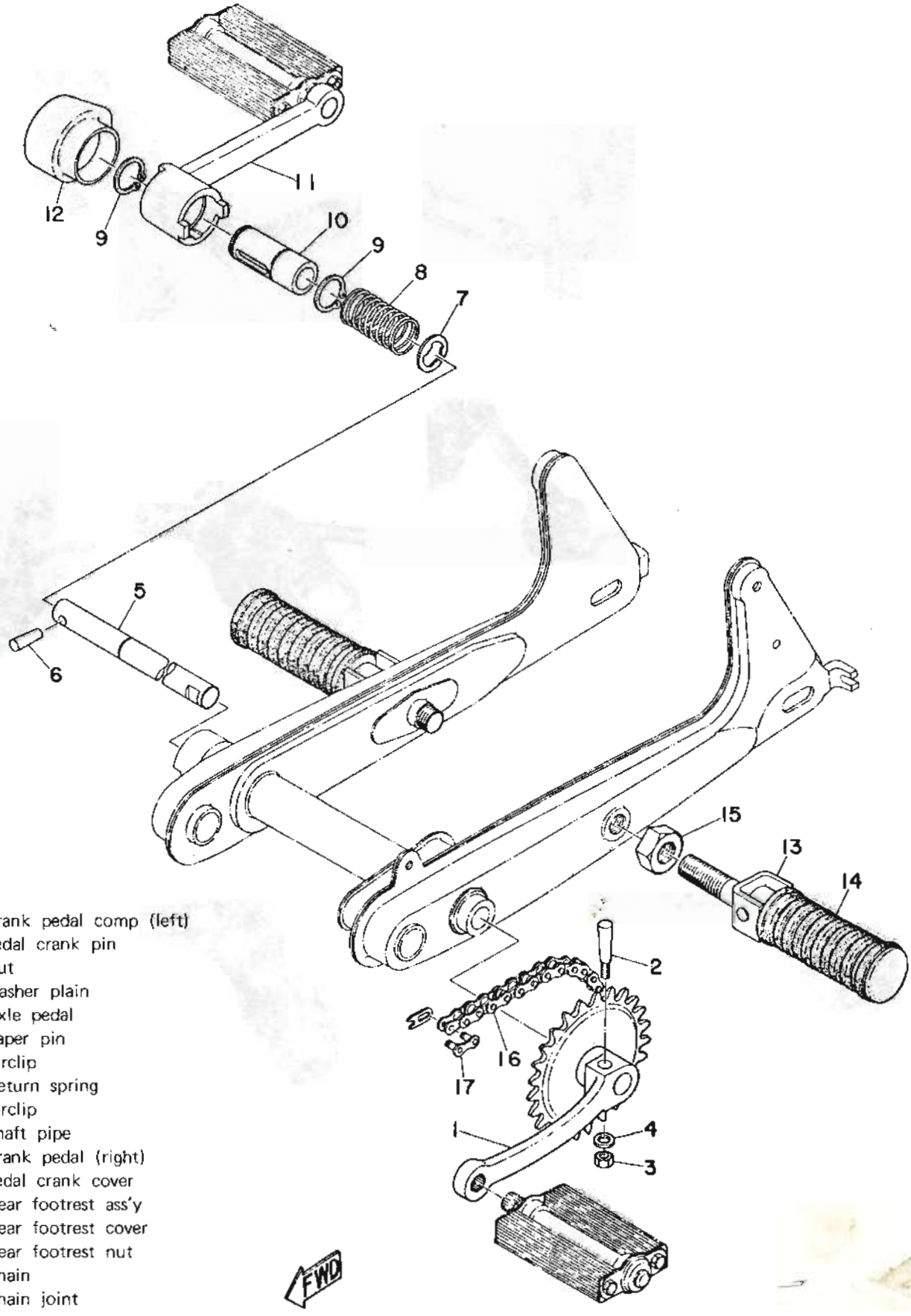


Fig. 3-6-15



1. Crank pedal comp (left)
2. Pedal crank pin
3. Nut
4. Washer plain
5. Axle pedal
6. Taper pin
7. Circlip
8. Return spring
9. Circlip
10. Shaft pipe
11. Crank pedal (right)
12. Pedal crank cover
13. Rear footrest ass'y
14. Rear footrest cover
15. Rear footrest nut
16. Chain
17. Chain joint

Fig. 2-6-16

CHAPTER 4. ELECTRICAL EQUIPMENT

4–1 Electrical Equipment

FS1-E is proviced with electrical parts of 6 volt capacity and a flywheel magneto designed to provide easy access for checking and servicing. The flywheel magneto supplies electricity required for the ignition system, battery and lights. Even at low engine speeds, it provides a sufficient electricity, assuring better spark and greater charging current.

4–2 List of Electrical Components

Name of Part	Name of Manufacturer	Model and Specification
Engine:		
Flywheel magneto	Mitsubishi Elec. Hitachi	FAZ-1QL or F11-L40 Sparking 7mm or more/500 r.p.m. 8mm or more/5,000 r.p.m. Charging 0.5A or more/2,500 r.p.m. (battery voltage 6.5V) 4A or less/8,000 r.p.m. (battery voltage 8.5V) Lighting (load 18.5W) 6.3V or more/2,500 r.p.m. (battery voltage 8.5V) 8.7V or less/8,000 r.p.m. (battery voltage 7V)
Neutral switch	Asahi Elec.	YNS type
Frame:		
Battery	Furukawa Battery Yuasa Battery G.S	 BST 2-6
Main switch	Asahi Elec.	
Silicon rectifier	Fuji Elec. Yuasa	CD2-H 1/1 SZ-3A
Horn	Imasen Elec.	SM3, 6V
Ignition coil	Mitsubishi Elec.	HP-B1
Flasher relay	Showa Elec. Mitsuba Elec.	B-9
Fuse holder		10A, 2 pcs.
Front End:		
Head light	Koito Elec.	6V, 15W/D
Speedometer	Nippon Seiki	Neutral light 6V, 3W Meter light 6V, 1.5W
Rear End:		
Tail light (stop light)	Imasen Elec.	6V, 3W/10W (for F5/J5)
Swing Arm:		
Stop switch	Asahi Elec.	YS10

4–3 Connection Diagram

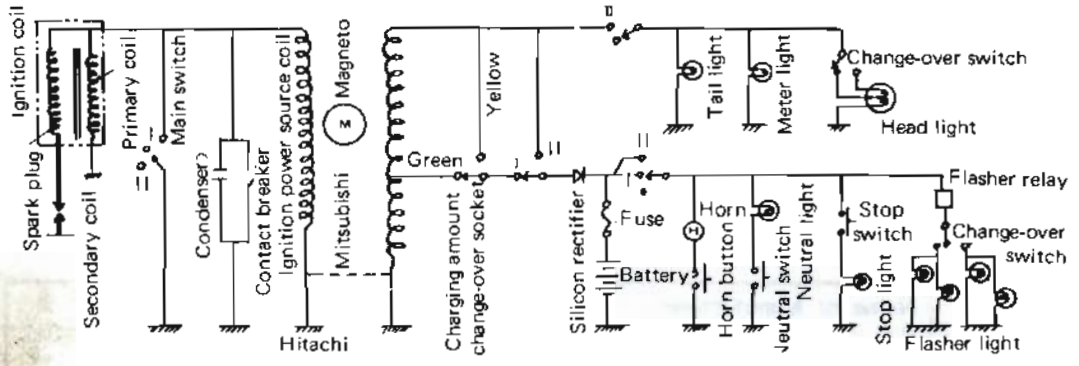


Fig. 4-3-1

4–4 Ignition System-Function and Service

A. Function

The ignition system consists of the components as shown in Fig. 4-4-1. As the flywheel rotates, the contact breaker points begin to open and close, alternately. This make-and-break operation develops an electromotive force in the ignition power source coil, and produces a voltage in the primary coil. 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 7,000 ~ 10,000V by mutualinduction, and the electric spark jumps across the spark plug electrodes.

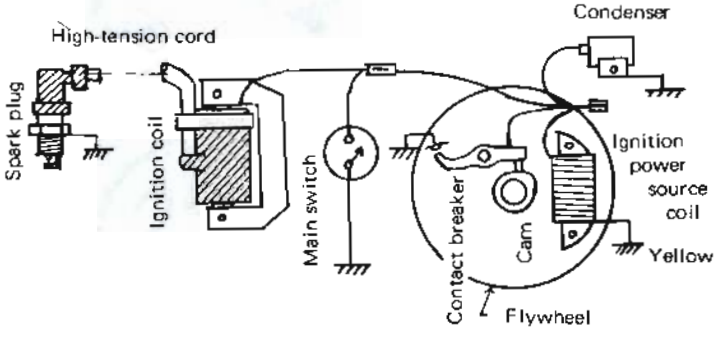


Fig. 4-4-1

B. Service Standards

1) Ignition Timing & Point Gap

1.8° ± 0.15 mm B.T.D.C. at 0.30~0.35 mm (0.012").

Ignition timing can be correctly adjusted by simply setting the maximum point gap to the specified value.

Smooth away any roughness on the point surface with fine grain sandpaper (#400 ~ #600). Clean greasy points with a rag damped with gasoline.

2) Ignition Coil

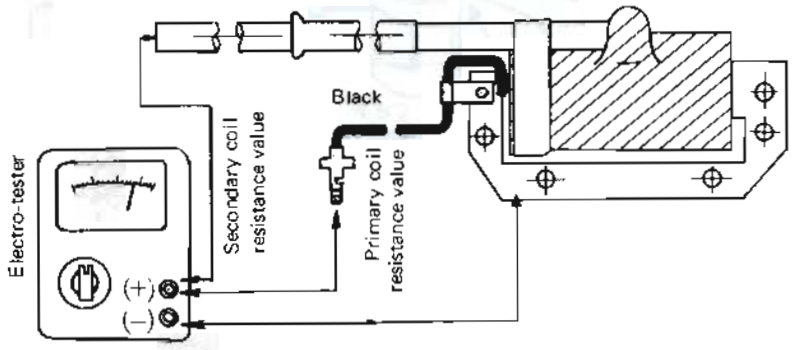
Primary coil resistance value

0.6 Ω ± 10%

Secondary coil resistance value

5 KΩ ± 10%

(For measuring methods, refer to Fig. 4-4-2)



Set the tester on the "Resistance" position.

Fig. 4-4-2

Note:

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

Sparking:

7mm or more (between 3 points)

Remove spark plug from cylinder head and reconnect the high voltage lead.

Then ground the spark plug and see if it sparks as you crank the kickstarter.

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

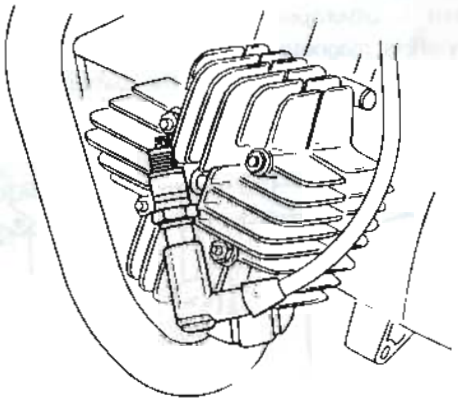


Fig. 4-4-3

3) Condenser

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

The condenser minimizes the burning of the contact points greatly affecting 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.

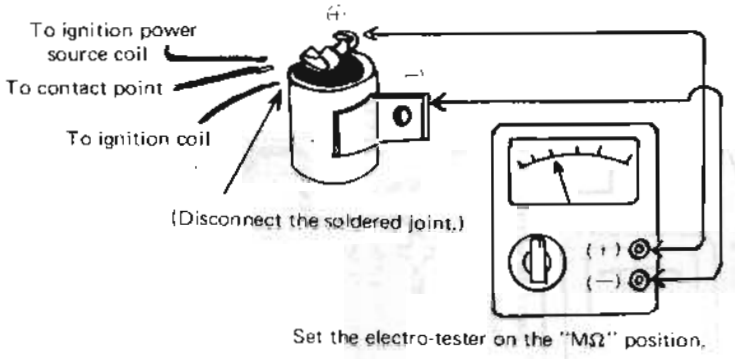


Fig. 4-4-4

Insulation resistance tests should be conducted by connecting the tester as shown in Fig. 4-4-4. If the pointer swings fully and the reading is more than 3MΩ, the insulation is in good condition. If the insulation is punctured, the pointer will stay pointing the uppermost reading.

Note:

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

Capacity tests can be performed by simply setting the tester to the condenser capacity. The tester should be connected with the condenser in the same way as in the case of the insulation resistance test.

Before this measurement, be sure to set the tester correctly.

If the reading is within 0.22μF ±10%, the condenser capacity is correct.

4–5 Charging and Lighting Systems-Function and Checking

A. Function of the Charging System

According to the same theory as the ignition coil, an electromotive force of A.C. current is developed in the lighting coil (brown) of the flywheel magneto.

As the main switch circuit is closed, the A.C. current flows to the silicon rectifier, by which the current is rectified into a half-wave current and charged to the battery.

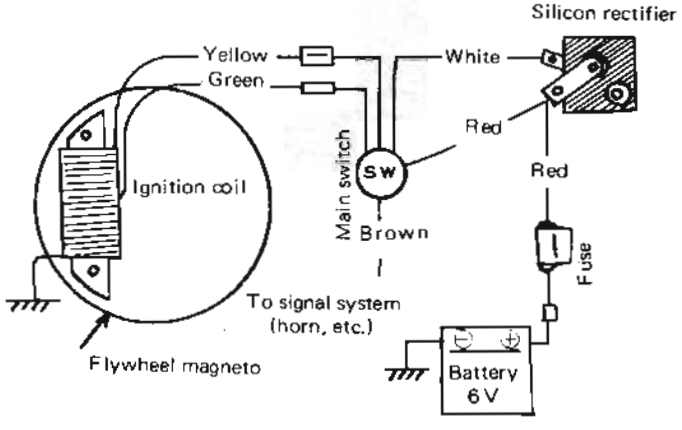


Fig. 4-5-1

B. Checking the Charging System

Motorcycles, which usually travel in urban areas or at low speed, required such special connection as shown in Fig. 4-5-2 so that the battery can be sufficiently charged even during day-time travelling. In this case, the battery should be checked once a month and refilled with electrolyte.

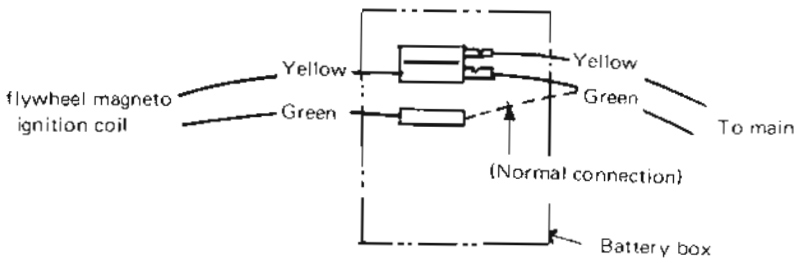


Fig. 4-5-2

1) Measuring the Charging Current

(Use an ammeter with a full scale of 5A) As shown in Fig. 4-5-3 hook up the tester and measure the current with specific engine r.p.m. The figure in parentheses denotes the battery voltage.

0.5A or more/2,500 r.p.m. (65V)

4A or less/8,000 r.p.m. (8.5V)

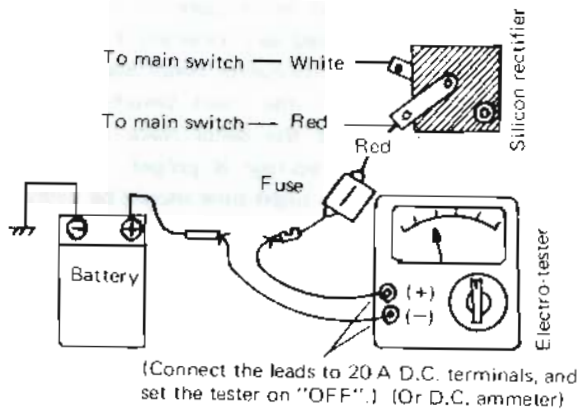


Fig. 4-5-3

Note:

The measurement should be performed under no load, with the main switch set on the "night" position. (The lights including neutral light are not lit up.) If the battery voltage does not agree with the figure in parentheses, the charging current reading will be incorrect. Before the measurement, be sure to measure the voltage of the battery.

2) Checking the Silicon Rectifier

For measurements, an ohmmeter can be used. However, this section discusses only the checking method by means of the ohmmeter.

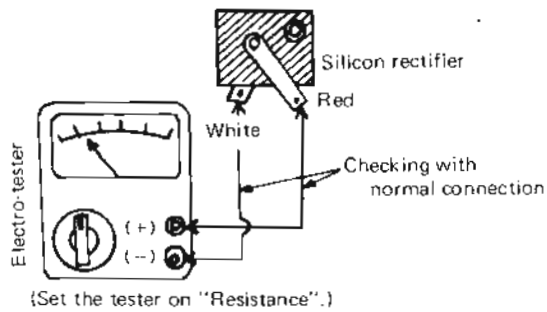


Fig. 4-5-4

Checking with Normal Connection

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

Standard value: 9 — 10 Ω

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

Checking with Reversal Connection

Connect the tester the other way round.

Standard value:

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

3) Magneto Output Voltage

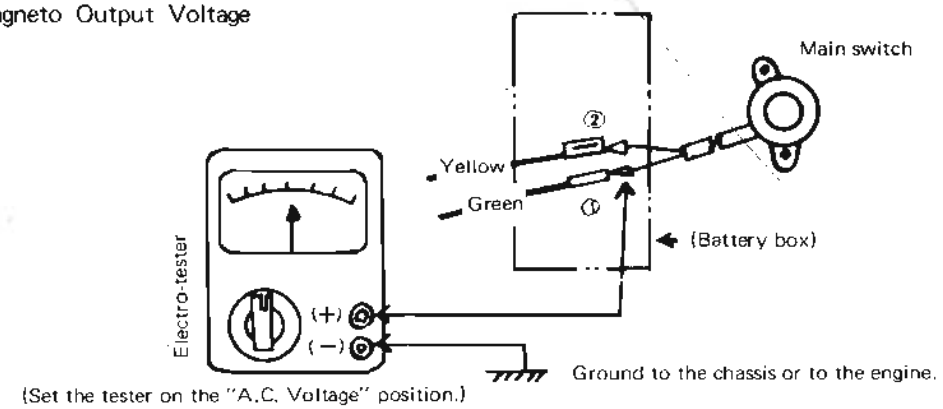


Fig. 4-5-5

The output voltage for day-time should be measured, with the tester connected in parallel. In Fig. 4-5-5, the tester positive lead is connected to the green lead's connector (the connector is not disconnected.) In this measurement, the main switch is on the Day-time position, If the tester reads any voltage, the magneto output voltage is proper.

The output voltage for night-time should be measured, with the tester connected in parallel. In Fig. 4-5-5, the tester positive lead is connected to the yellow lead. In this measurement, the main switch is on the Night-time position. If the tester reads more than 6 volts at 2,500 r.p.m., the magneto output voltage is sufficient.

4) Short-Circuit of Wiring and Switch

Connect the tester as shown in Fig. 4-5-6, and measure the voltage. If the reading is more than 6 volts at 2,500 r.p.m., the wiring and main switch are in good condition.

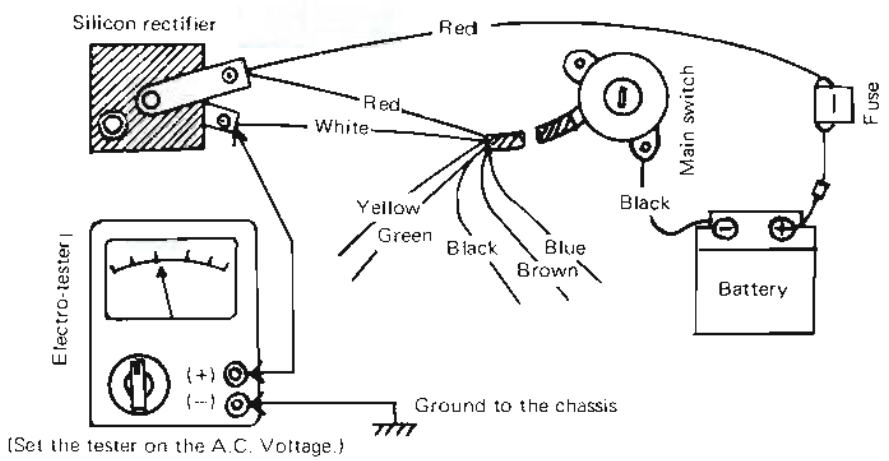


Fig. 4-5-6

4–6 Checking the Main Switch (Removed from the Chassis)

Key "O" position (Off)
Black ⟷ Switch body
Key "I" position (for day)
Green ⟷ White
Red ⟷ Brown
Key "II" position (for night)
Yellow ⟷ White
White ⟷ Blue
Red ⟷ Brown

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

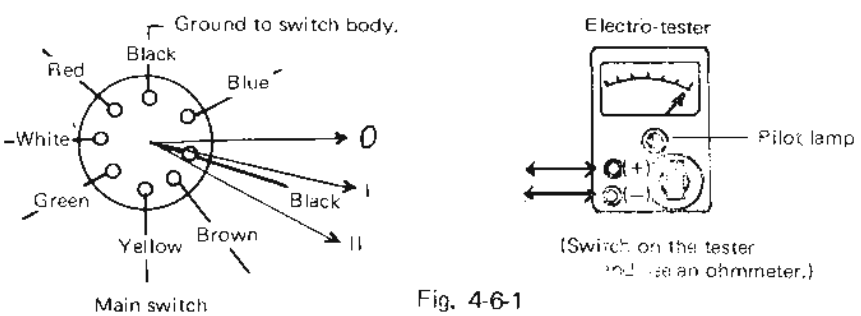


Fig. 4-6-1

4–7 Battery

1. Checking
   a. If sulfation occurs on plates due to lack of the 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, if 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 current of more than 8.4 volts in order to supply a current at a rate of 1 amp, per hour for 10 hours.

2. Service Life
   The service life of a battery is usually 2 to 3 years, but lack of care as described below will shorten the life of the battery.
   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 or sulfuric acid containing impurities when re-filling the battery.

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

4. Service Standards
   Battery: BST2-6

Battery Spec.	6V - 4AH	
Electrolyte-Specific gravity and quality	1.26 - 1.27, 170cc	At full charge
Initial charging current	0.4A for 25 hours	Brand new motorcycle
Charging current	0.4A for 13 hours (Charge until specific gravity reaches 1.26-1.27)	When discharged
Refilling of electrolyte	Distilled water up to the max. level line.	Once a month

4–8 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 according to 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 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 (500 miles). Clean the electrodes of carbon and adjust the electrode gap to 0.5 ~ 0.6 mm (0.023"). Be sure to use standard plug as replacements to avoid any error in reach.

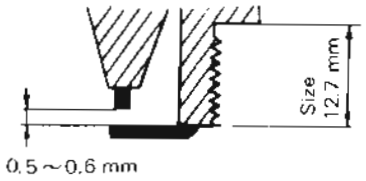


Fig. 4-8-1

Standard spark plug: B-7HS

Milimeters to Inches

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0		0.0039	0.0079	0.0118	0.0157	0.0197	0.0236	0.0276	0.0315	0.0354
1	0.0394	0.0433	0.0472	0.0512	0.0551	0.0591	0.0630	0.0669	0.0709	0.0748
2	0.0787	0.0827	0.0666	0.0906	0.0945	0.0984	0.1024	0.1063	0.1102	0.1142
3	0.1181	0.1200	0.1260	0.1299	0.1339	0.1378	0.1417	0.1457	0.1496	0.1535
4	0.1575	0.1614	0.1654	0.1693	0.1732	0.1772	0.1811	0.1850	0.1890	0.1929
5	0.1969	0.2000	0.2047	0.2087	0.2126	0.2165	0.2205	0.2244	0.2283	0.2323
6	0.2362	0.2402	0.2441	0.2480	0.2520	0.2559	0.2598	0.2638	0.2677	0.2717
7	0.2756	0.2795	0.2835	0.2874	0.2913	0.2953	0.2992	0.3031	0.3071	0.3130
8	0.3150	0.3189	0.3228	0.3268	0.3307	0.3346	0.3386	0.3425	0.3465	0.3504
9	0.3543	0.3583	0.3622	0.3661	0.3701	0.3740	0.3780	0.3819	0.3858	0.3898
10	0.3937	0.3976	0.4016	0.4055	0.4094	0.4134	0.4173	0.4213	0.4252	0.4291

0.01mm = 0.004" 0.03mm = 0.0012" 0.05mm = 0.020" 0.07mm = 0.028" 0.09mm = 0.0035"
0.02mm = 0.008" 0.04mm = 0.0016" 0.06mm = 0.024" 0.08mm = 0.0031" 0.10mm = 0.0039"

Inches to Milimeters

	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0		0.254	0.508	0.762	1.016	1.270	1.524	1.778	2.032	2.286
0.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
0.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
0.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
0.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
0.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
0.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
0.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
0.8	20.320	20.574	20.828	21.062	21.336	21.590	21.844	22.098	22.352	22.606
0.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146
1.0	25.400	25.654	25.908	26.162	26.416	26.670	26.924	27.178	27.432	27.686

0.001" = 0.0254mm 0.003" = 0.0762mm 0.005" = 0.1270mm 0.007" = 0.1778mm 0.009"== 0.2286mm
0.002" = 0.0508mm 0.004" = 0.1016mm 0.006" = 0.1524mm 0.008" = 0.2032mm 0.010" = 0.254mm

CONVERSION TABLE

LENGTHS

Multiply	By	To Obtain	Multiply	By	To Obtain
Milimeters (mm)	0.03937	Inches	Kilometers (km)	0.6214	Miles
Inches (in)	25.4	Milimeters	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)	28.25	Grams

VOLUMES

Cubic centimeters (cc)	0.06102	Cubic inches	Imperial gallons	277.274	cu.in
Cubic inches (cu.in.)	16.387	cc.	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	cc.
Imperial gallons	4.537	Liters			

OTHERS

Metric horsepower (ps)	1.114	bhp	Foot-pounds (ft-lbs)	0.1383	kg-m
Brake horsepower (bph)	0.9859	ps.	Kilometers per liter (km/ℓ)	2.352	mpg
Kilogram-meter (kg-m)	7.234	Foot-pounds	Miles per gallon (mpg)	0.4252	km/ℓ
Kilogram-sq.cm (kg/cm^2)	14.22	Pounds/sq.in. (lbs/in^2 or psi)			
Centigrade(C°)	(C° x 9/5) + 32 Fahrenheit (F°)				

TORQUE SPECIFICATIONS

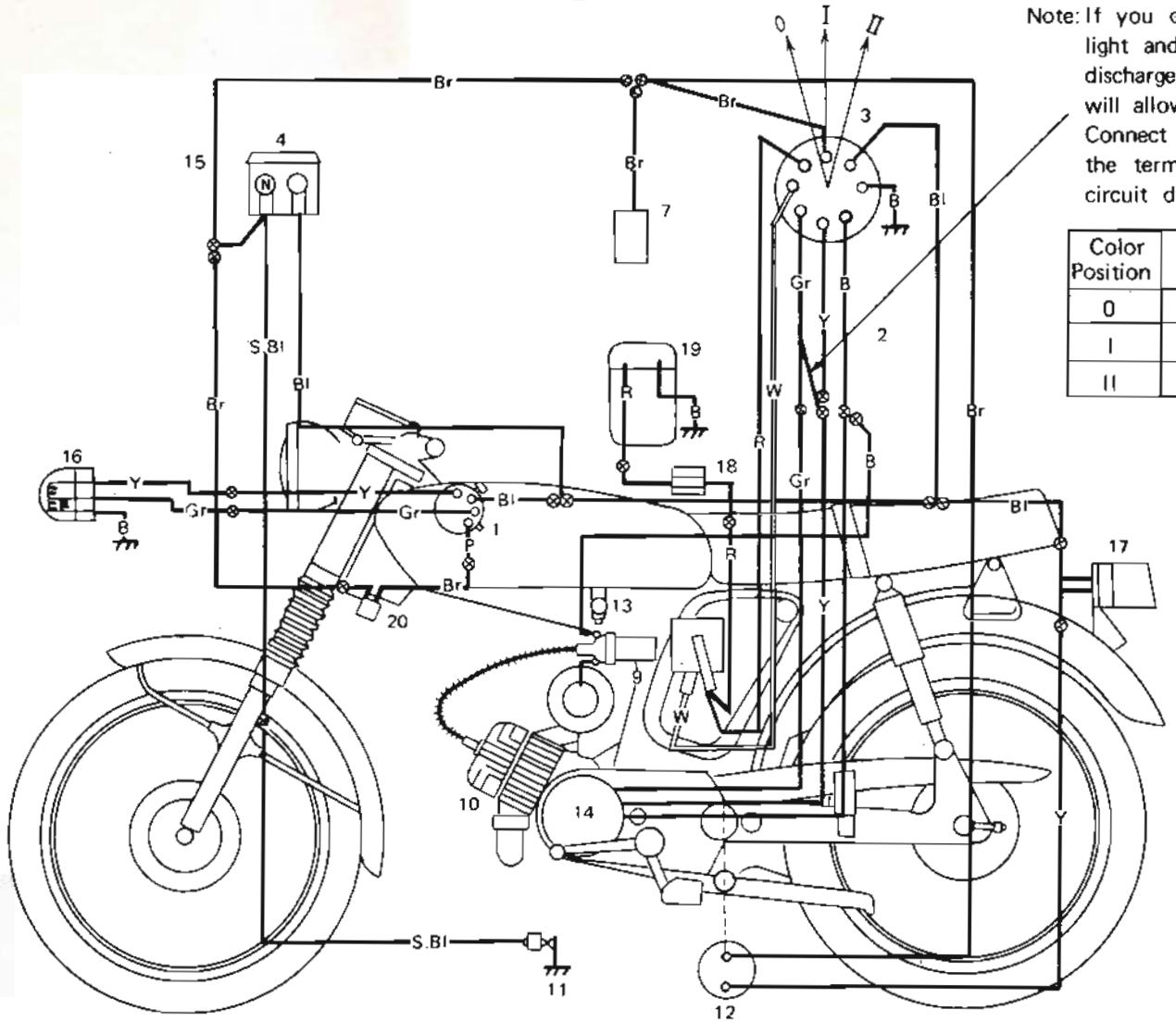
Stud size	kg-m	In-lbs*
6 mm	1.0	90
7	1.5	135
8	2.0	180
10	3.2-4.0	300-350
12	4.0-4.6	350-400
14	4.6-5.2	400-450
17	5.87-7.0	500-600

* Ft-lbs = In-lbs divided by 12

Chart of wire colors

Engine stop circuit	Black	B
Magnet (for day driving) circuit	Green	Gr
Magnet (for night driving) circuit	Yellow	Y
Battery (+) circuit	Red	R
Earth circuit	Black	B
Stop light circuit	Blue	Bl
Neutral light circuit	Sky blue	S.Bl
Light circuit	Blue	Bl
Flasher (R) circuit	Dark Green	D.Gr
Flasher (L) circuit	Dark Brown	D.Br
Common circuit	Brown	Br
Head light main circuit	Yellow	Y
Head light sub circuit	Green	Gr
Horn circuit	Pink	P
Silicon circuit (used in Selenium rectifier (–) circuit (used in	White	W
Flasher relay circuit	White Brown/White Light/White	W Br/W L.W
Ignition coil circuit (R)	Gray	G
Ignition coil circuit (L)	Orange	Or
Tail light circuit	Blue	Bl
Rear brake stop light circuit	Yellow	Y
Armature circuit	White	W
Field circuit	Green	Gr
Front brake stop light circuit	Green/Yellow	Gr/Y
Light switch circuit	Red/Yellow	R/Y
Head/meter light circuit	Blue (L.W)	Bl
Ground circuit	Black	B
Rectifier circuit	White	W
Starting switch circuit	Light Blue, Blue/White (CS2E) only	
Starter circuit	Light Green	L.Gr
AC-G (for night driving) circuit (YL1)	Yellow	Y
AC-G (for day driving) circuit (YL1)	White	W
AC-G silicon circuit (YL1)	Green	Gr
Stop lamp circuit, head light-up (YL1, YL1-E)	Blue	Bl
Daytime charging circuit (CT1, RT1)	Green	Gr
Night time charging circuit (CT1, RT1)	Green/Red	Gr/R

FS1-E



Note: If you often drive at slow speed or use the stop light and flasher light frequently, the battery will discharge, the following slight change in the circuit will allow better charging.
Connect the green lead wire of the main switch to the terminal of the yellow as illustrated in the circuit diagram with a dotted line.

Color Position	Black-earth	Green-white	Yellow-white	Yellow-blue	Red-brown
0	●	×	×	×	×
I	×	●	×	×	●
II	×	×	●	●	●

1. Horn switch
2. Sub switch
3. Main switch
4. Speedometer
5. Front flasher light
6. Flasher relay
7. Rear flasher light
8. Ignition coil
9. Spark plug
10. Neutral switch
11. Stop switch
12. Silicone rectifier
13. Flywheel magneto
14. Meter light 6V 1.5W
    Neutral pilot light 6V 3W
15. Head light 6V 15W D
16. Tail lamp 6V 3W
    Stop lamp 6V 10W
17. Fuse 10A
18. Battery 6V 4AH
19. Horn

M E M O



YAMAHA MOTOR CO., LTD.

SINCE 1887

HAMAMATSU, JAPAN

Printed in U.K. by The Granby Press Ltd., 5 Herne Hill Road, London, S.E.24