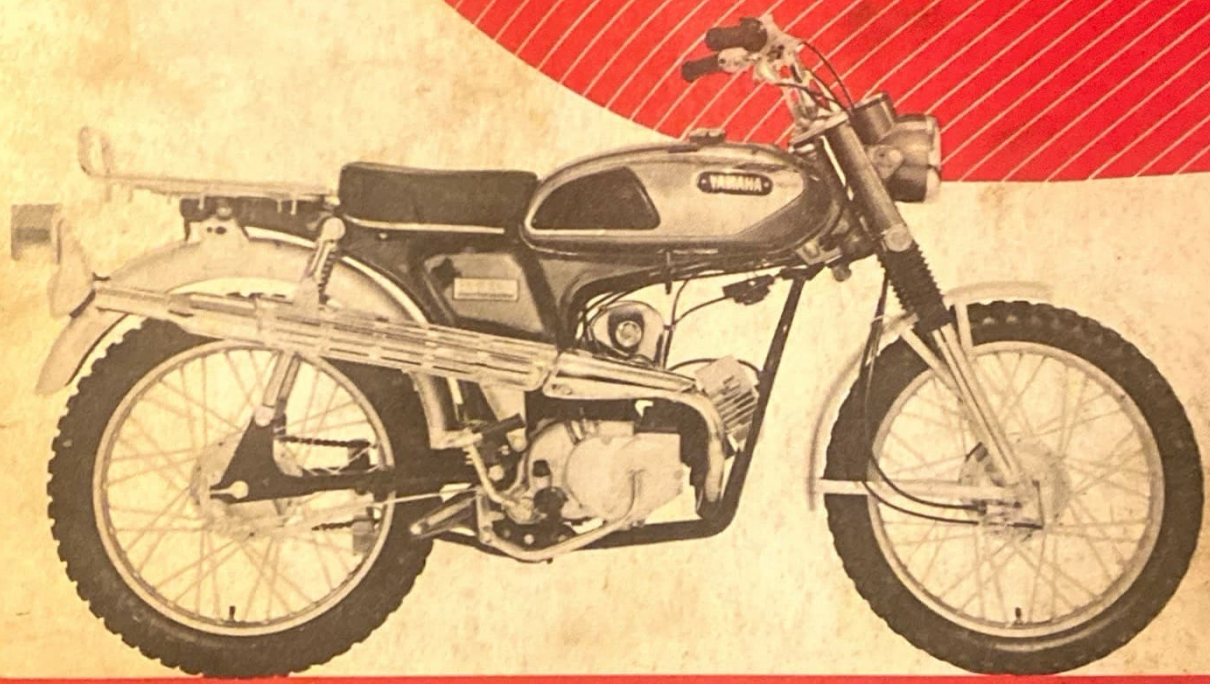
YAMAHA

100 L5TA

SERVICE MANUAL



YAMAHA MOTOR CO., LTD.

YAMAHA 100L5-TA

SERVICE MANUAL

Foreword

Yamaha presents the new top-of-the-trail series 100L5-TA, which incorporates many new, attractive design features. We are confident that this new 100L5-TA will meet the highest expectations of Yamaha fans.

This manual is intended to make Yamaha dealers and mecahnics familiar with the technical features and service instructions required to maintain the Yamaha 100L5-TA in top operating condition.

Contents

Chapter 1. General

1—1 Features

1. High Performance Rotary Valve Engine with Yamaha Autolube

Yamaha's 2-stroke rotary valve engine with the YAMAHA Autolube system provides trouble free 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 required for both off and on the road riding.

3. Easy Starting

The engine is easily started using the standard electric starter.

The engine can also be started by simply pulling in the clutch lever and kicking the manual starter without shifting the transmission to neutral.

4. Trailmatic Transmission

The Yamaha 100L5-TA transmission is provided with a 2-position selector. The selector knob, located on the left side of the crank case cover, offers a choice of TWO DRIVING RANGES: a low range for trail riding, and a high range for the street. This transmission is a 3-speed unit with a rotating drum shift mechanism.

5. Additional Safety

For additional rider safety at night, the 100L5-TA is provided with front reflex reflectors, a stoplight switch for the front brake, and a larger and brighter headlight, taillight and stoplight.

6. Easy Start Feature

The starter jet feature within the carburetor assures easy starting in all types of weather.

7. Powerful Brakes

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

1—2 External View L5—TA

1—3 Specifications

Model ..... YAMAHA 100 L5-TA

Dimensions

Overall length.....70.9in (1800mm)
Overall width 31.7in (805mm)
Overall height.....40.2in (1020mm)
Wheelbase 46.3in (1175mm)
Min. road clearanse... 6.3in (160mm)
Weight (Net) 198lbs (90Kgs)

Performance

Max. speed
High range 55–60mph (88–96Km/h)
Low range 35–40mph (56–64Km/h)
Fuel consumption on level road.....
.....165mpg/19mph (70Km/1/30Km/h)
Climbing ability.....35°
Min. turning radius...70.9in (1800mm)
Braking distance.....27.9ft at 22mph
(8.5m/35Km/h)

Engine

Model.....L5-TA
Lubrication system ...Yamaha autolube
(Oil injection system)
Number & arrangement of cylinders...
.....1, forward inclined
Bore & stroke.....52mm X 45.6mm
Compression ratio.....6.8 : 1
Max. power.....8hp/6000r.p.m
Max. torque.....6.87 ft-lbs/5000r.p.m
(0.95Kg-m/5000r.p.m)
Starting system.....Kick starter &
Electric starter
Ignition system.....Battery ignition
Carburetor .....VM 20 SC
Air cleaner.....Dry paper filter

Transmission

Clutch.....Wet multi-disc type
Primary reduction ratio.....Gear. 3.895
Secondary reduction ratio .....Chain. 2.313
Gear box.....Trailmatic transmis-
sion (2 way. 3-speed)

Gear ratio	High.	Low
1st	2.833	4.647
2nd	1.647	2.702
3rd	1.000	1.640

Chassis

Frame.....Press steel backbone
Suspension. (front)...Telescopic
Suspension (rear).....Swing arm
Shock absorber (front)
.....Coil spring oil damper
Shock absorber (rear)
.....Coil spring oil damper

Steering

Steering angle .....45° right and left
Caster .....63.5°
Trail 3.2in (81.5mm)

Braking

Brake type .....Internal expansion
Braking method (front)
.....Right hand-oparated
Braking method (rear)
.....Right foot-operated

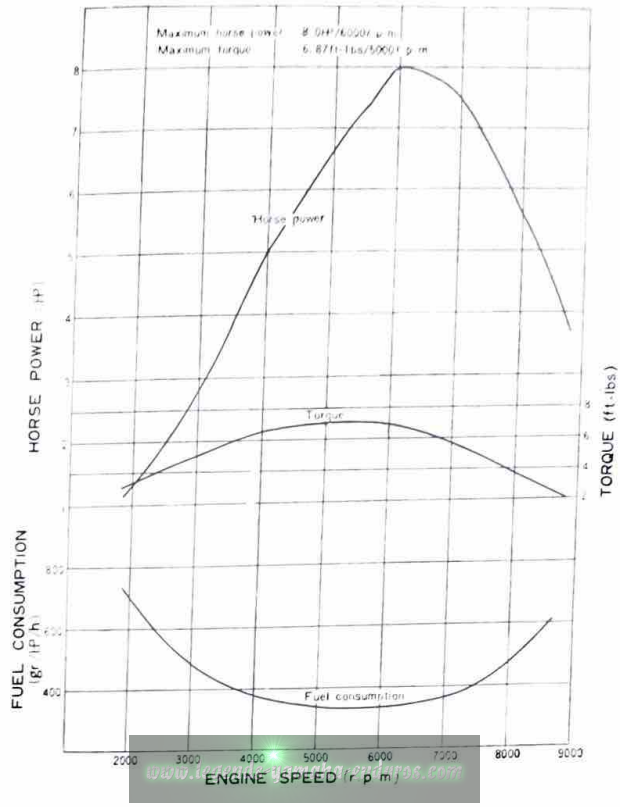
Tire size (front) .....2.75-17-4P.R.
Tire size (rear) .....3.00-17-4P.R.
Fuel tank capacity 1.8gal (6.8l)
Oil tank capacity.....1.5qt (1.4l)
Generator. Model.....CJ-F1R
Maker.....Mitsubisi Electric Co.
Voltage regulating method
.....Tiril type
Spark plug .....NGK. B-8HC
Battery. Maker.....Furukawa or Nippon
Denchi
Model 12N7-3B
Capacity.....12V, 7AH

Lights

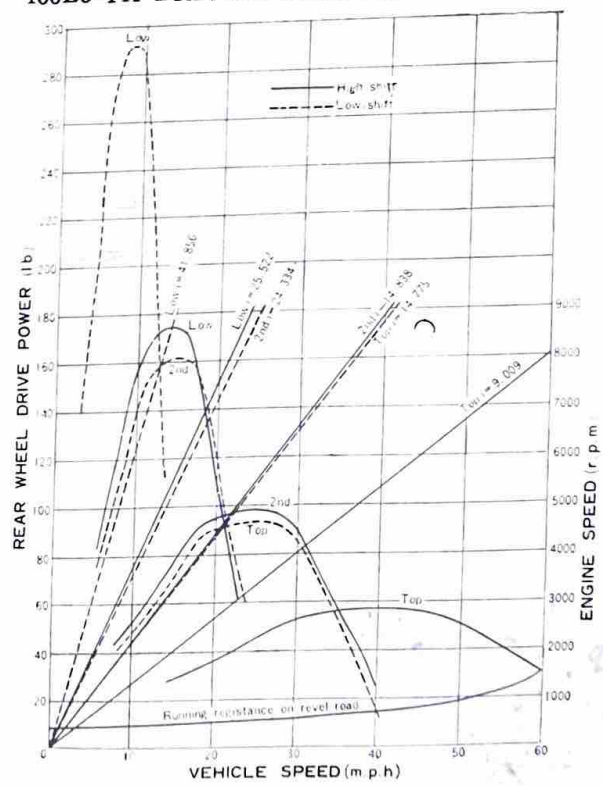
Headlight.....12V 25/25W
Tail/stop light 12V7/23W
Neutral light 12V 2W
Charging light 12V 2W
High beam indicator...12V 2W

1—4 Performance Curves

100L5-TA ENGINE PERFORMANCE CURVES



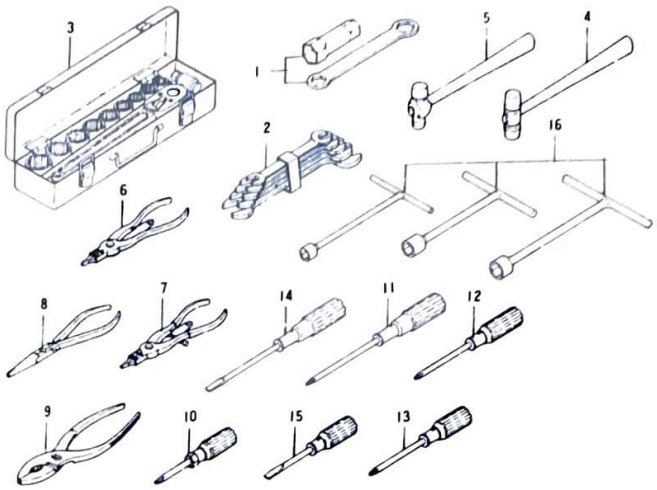
100L5-TA DRIVING PERFORMANCE CURVES



1—5 Tools and Instruments for Shop Service

The following tools and instruments are required to service the L5 TA.

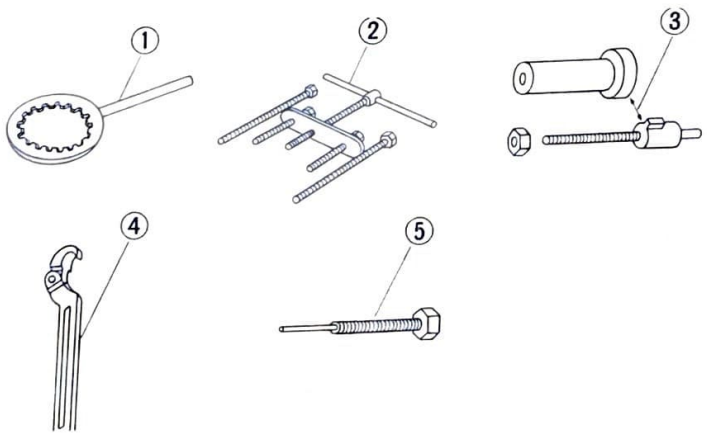
1. General Tools



1) Plug wrench 23×29mm
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 (RT type)
8) Needle nose pliers
9) Pliers
10) Philips-head screwdriver
11) Philips-head screwdriver (L)
12) Philips-head screwdriver (M)
13) Philips-head screwdriver (S)
14) Slot-head screwdriver (M)
15) Slot-head screwdriver (S)
16) T-handle socket wrench

Fig. 1—5—1

2. Special Tools and Instruments

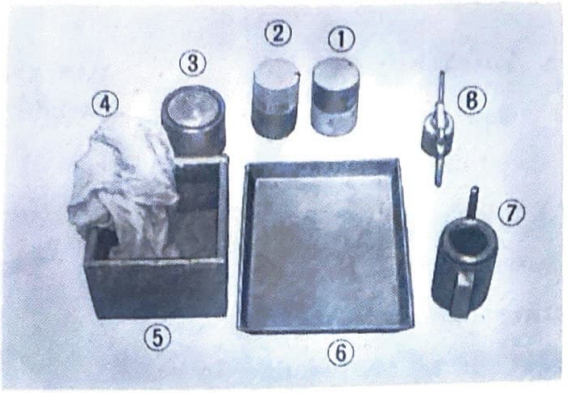


1) Clutch holding tool
2) Crankcase disasembling tool
3) Crankshaft assembling tool
4) Exhaust ring nut wrench
5) Armature removing tool (for 10㎜)

In addition, an electro-tester, tachometer (engine r.p.m. meter) hydrometer, etc. Should be on hand.

Fig. 1—5—2

3. Other Tools



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

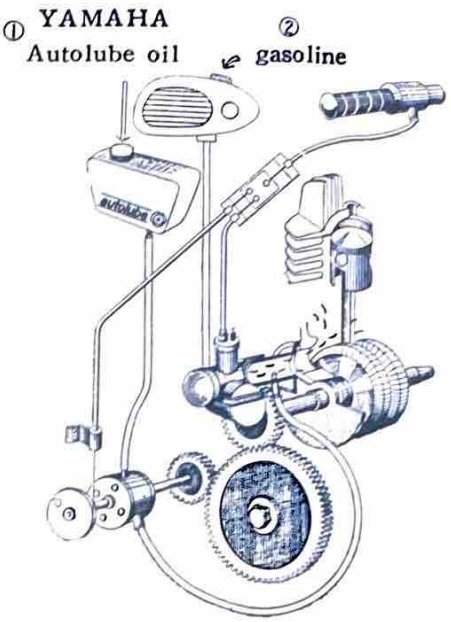
Fig. 1—5—3

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

Chapter 2. Yamaha Autolube

2—1 What is Yamaha Autolube?

Conventional 2-stroke engines are lubricated by motor oil premixed in gasoline. This premixing has been outdated by Yamaha Autolube, which is an automatic lubrication system. It stores oil in the oil tank (separate from the fuel tank), and automatically meters oil to the engine by the oil pump.



Yamaha Autolube

Fig. 2—1—1

2—2 Features of Yamaha Autolube

The oil pump is driven by the engine through a reduction gear, and is connected to the throttle wire which is controlled by the accelerator grip.

The oil pump automatically regulates the volume of lubricating oil according to both engine speed and throttle opening, pumping a proper amount of oil to the engine under all operating conditions.

This "automatic lubrication" eliminates not only many disadvantages of the pre-mixing system, but it furthers the potential efficiency, performance and durability of 2-stroke engines.

1) Autolube feeds the precise amount of oil required to the engine under all operating conditions resulting in:
   - ○ Less oil consumption
   - ○ Less carbon build-up
   - ○ Less exhaust smoke
   - ○ Improved lubrication efficiency
2) Autolube simplifies fuel supply
   - ○ Gasoline only in the fuel tank
   - ○ Cleaner engine
3) Autolube provides highly dependable simplified, lubrication.
   - ○ No special care is required for oil quantity and fuel-oil pre-mixing ratios.

2—3 Handling the Oil Pump

The oil pump is a precision-machined assembly. Make no attempt to disassemble it. When you remove the oil pump from the engine, protect it from dust, dirt, etc. After reinstallation, be sure to bleed the pump and oil lines of air bubbles and set the pump correctly. Proper handling will keep the pump free of trouble.

1. Checking and Adjusting the Minimum Pump Stroke

a. Checking

1) Fully close the accelerator grip. (In this case, pump atroke will be at minimum).

2) Turn the plastic oil pump starter plate in the direction of the arrow marked on the plate. The adjust plate will push out thus causing a gap between the adjust plate and the adjusting pulley. Rotate the starter plate until this gap reaches a maximum.

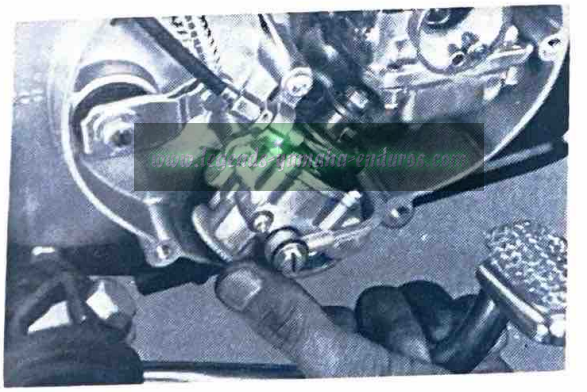


Fig. 2—3—1

3) Using thickness gauges, check the width of the gap. The correct minimum pump stroke tolerance is: 0.20-0.25mm (0.008-0.010 in).

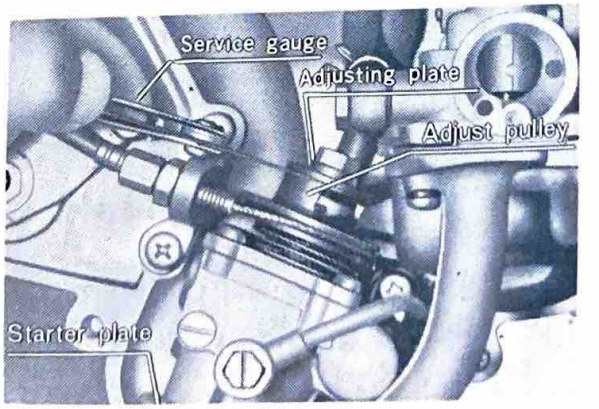


Fig. 2—3—2

b. Adjustment Methods

1) Remove the adjusting plate and add or remove one or more adjusting shims (which are under the plate) to either increase or decrease the minimum pump stroke.

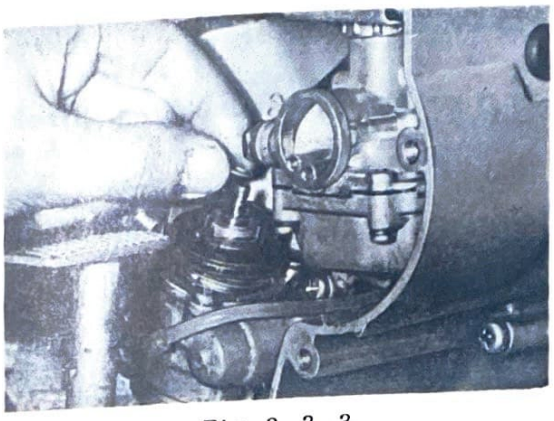


Fig. 2—3—3

2) Replace the adjust plate and recheck the minimum stroke for correct tolerance.

2. Checking and Adjusting the Setting of the Pump and Carburetor

After checking and adjusting the minimum stroke, set the carburetor and the pump in the following manner.

a. Checking

1) Adjust the idle adjusting screw in the carburetor, and then adjust the free play of the throttle cable (B) to 1~2mm (0.04″—0.08″).

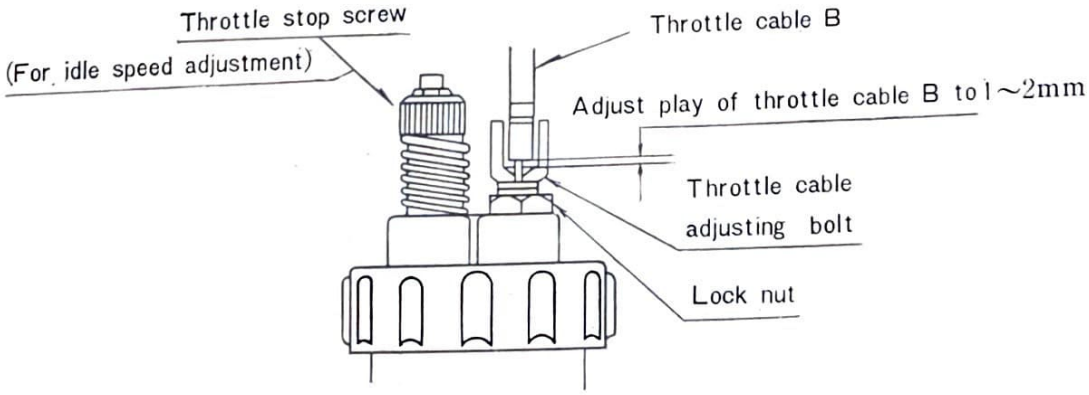


Fig. 2—3—4

2) Slowly open the accelerator grip until the top of the stamped mark (circle) on the throttle valve comes in contact with the top of the main bore; the carburetor is now at half throttle. Check to see if the pump guide pin is aligned with the mark on the adjusting pulley.

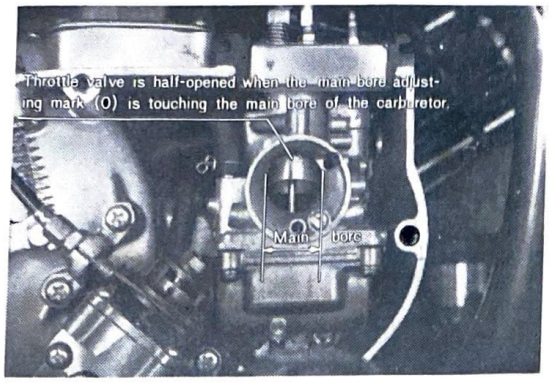


Fig. 2—3—5

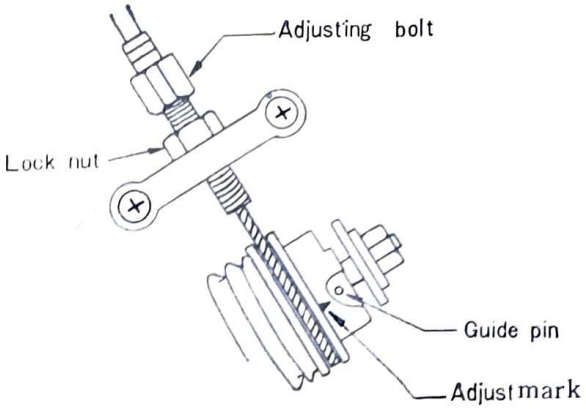


Fig. 2—3—6

b. Adjustment

1) If the pump guide pin is not aligned with the mark on the adjusting pulley, loosen the lock nut shown in Fig. 2-3-6.
To align both markings, turn the adjusting screw in or out to tighten or slacken the pump cable. After this adjustment, fully tighten the lock nut.

3. Bleeding

When the oil pump is removed or when the Autolube oil tank is emptied, air enters the pump case, causing an irregular flow of oil. This is due to air bubbles in the delivery pipe. The pump must be bled.

1) Remove the bleeder bolt.
2) Next turn the starter plate in the direction of the arrow (to the right facing the pump body) to force out all of the air. Then tighten the bleeder bolt. For this bleeding, fully open the accelerator grip and rotate the starter plate so that pump stroke will become greater and air may be expelled more quickly.

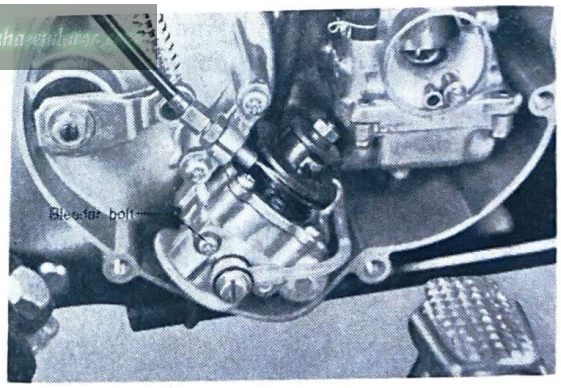


Fig. 2—3—7

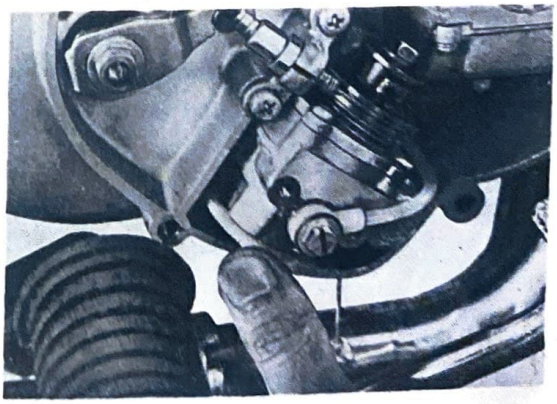


Fig. 2—3—8

Chapter 3. 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 away all 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.

3—1 Removing the Engine

1. Drain the transmission oil after running the engine for 1 to 2 minutes. (Fig. 3-1-1)

   Note: The transmission oil can be quickly drained after 1 to 2 minutes of engine warming up. Oil amount: 600cc · 650cc (SAE 10/30W) (0.64—0.68qt.)

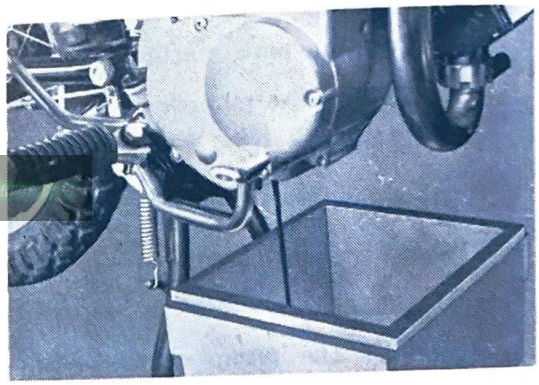


Fig. 3—1—1

2.) Remove the exhaust pipe. (Fig. 3-1-2)

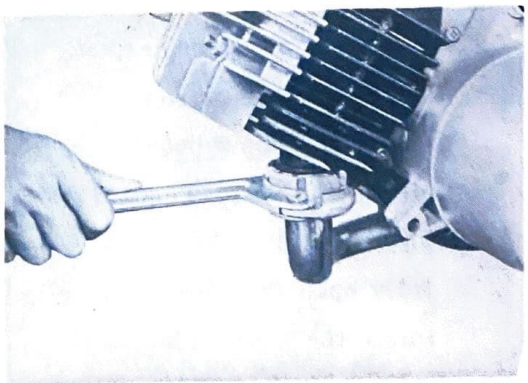


Fig. 3—1—2

3. Remove the change pedal.
(Fig. 3-1-3)

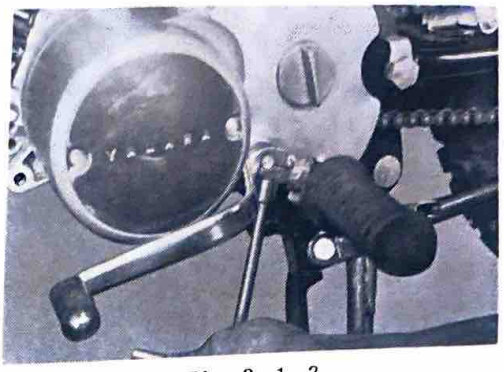


Fig. 3—1—3

4. Romove the crankcase cover (L).
(Fig. 3-1-4)

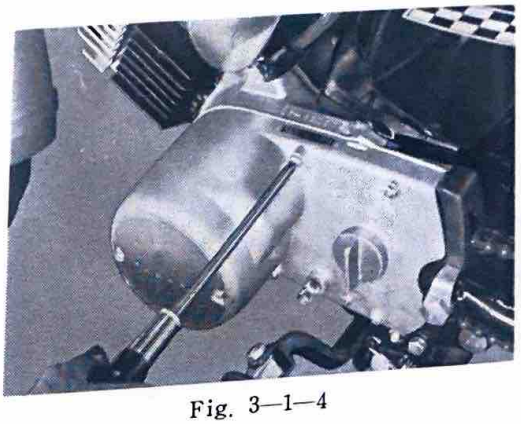


Fig. 3—1—4

5. Remove the generator wiring.
(Fig. 3-1-5)

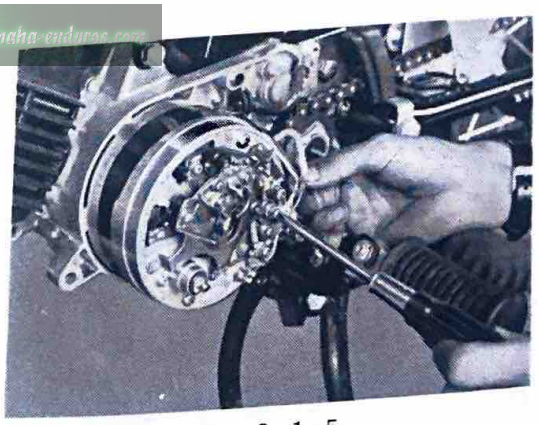


Fig. 3—1—5

6. Remove the governor ass'y mounting bolt and the governor ass'y.
(Fig. 3-1-6)

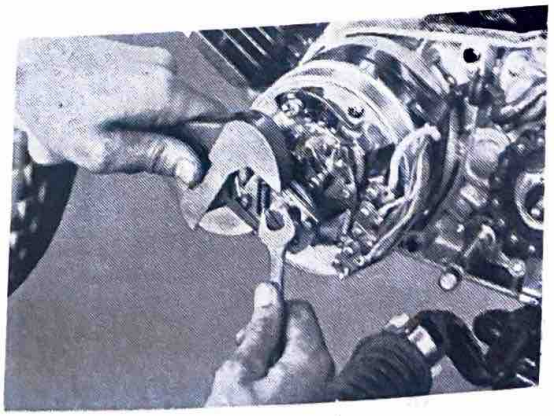


Fig. 3—1—6

7. Remove the yoke ass'y mounting bolt and the yoke. (Fig. 3-1-7)

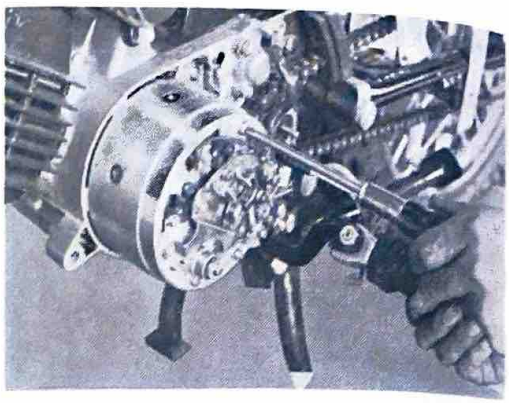


Fig. 3—1—7

8. Pull out the armature with the armature puller bolt or shock puller. (Fig. 3-1-8)

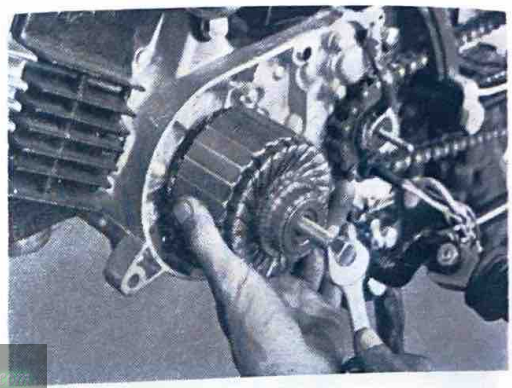


Fig. 3—1—8

9. Pry out the woodruff key (segment key) with a slot-head screw driver. (Fig. 3-1-9)

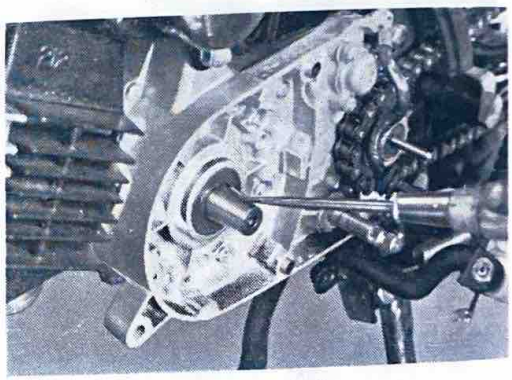


Fig. 3—1—9

10. Disconnect the chain master link and remove the chain from the drive (front) sprocket. (Fig. 3-1-10)

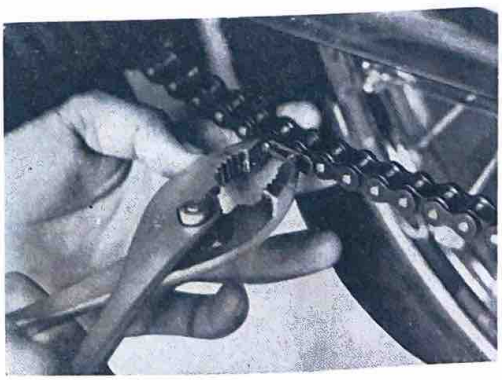


Fig. 3—1—10

11. Remove the carburetor cover. (Fig. 3-1-11)

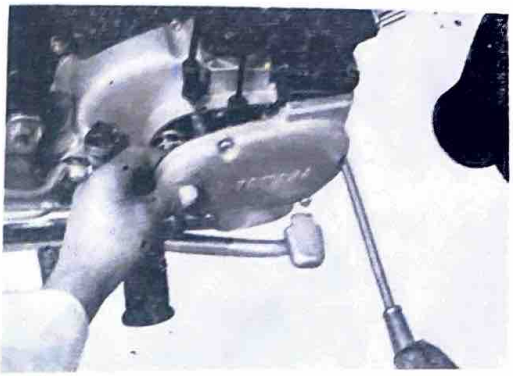


Fig. 3—1—11

12. Turn the fuel cock to the STOP position and remove the carburetor. (Fig. 3-1-12)

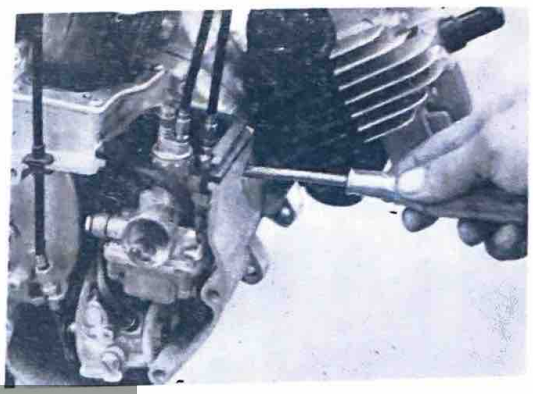


Fig. 3—1—12

13. Disconnect the oil pipe. (Plug the oil tank fitting to prevent loss of oil). (Fig. 3-1-13)

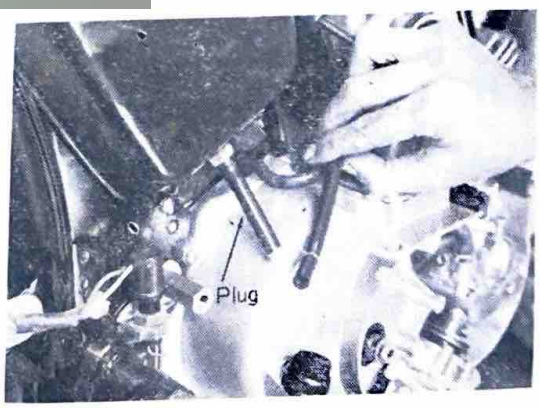


Fig. 3—1—13

14. Disconnect the pump cable and clutch cable together with the adjusting holder. (Fig. 3-1-14)

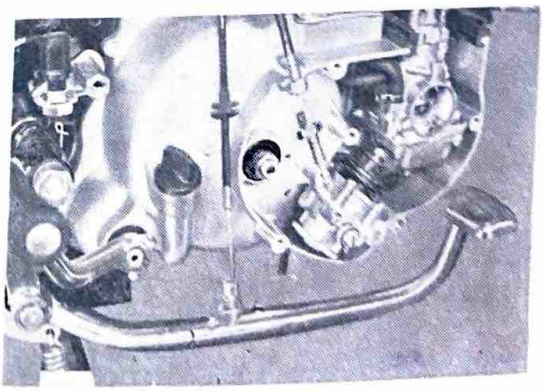


Fig. 3—1—14

15. Remove the air cleaner joint. (Fig. 3-1-15)

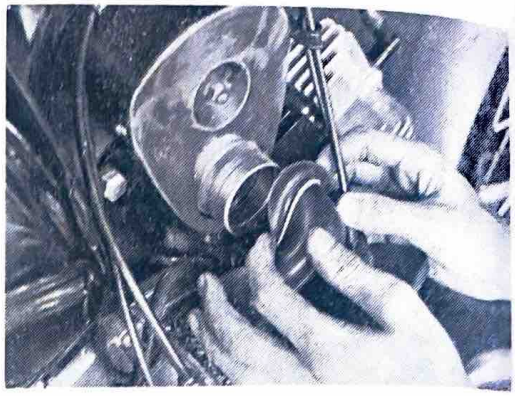


Fig. 3—1—15

16. 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. (Figs. 3-1-16 and 17)

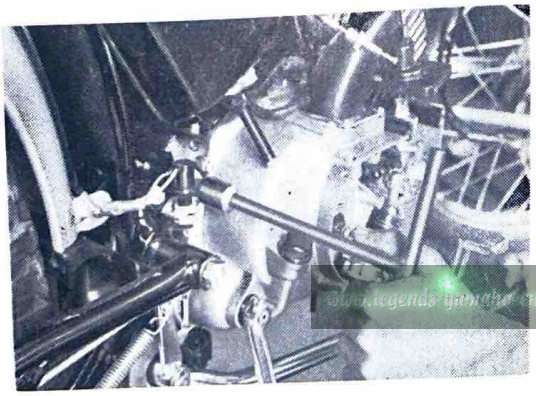


Fig. 3—1—16

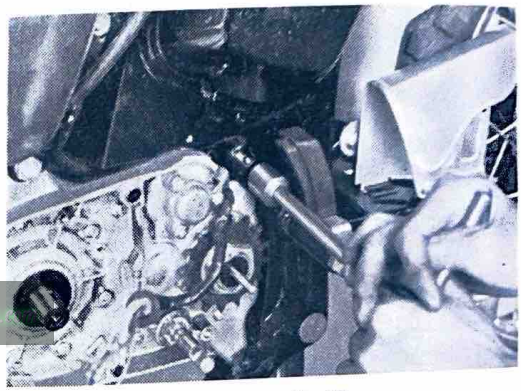


Fig. 3—1—17

17. Disconnect the cable from the neutral light switch. (Fig. 3-1-18)

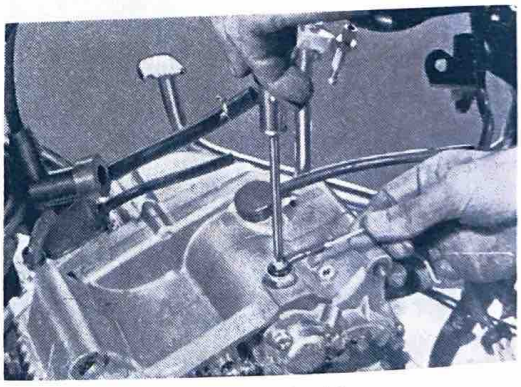


Fig. 3—1—18

18. Pull out the foot rest mountig bolt, and remove the engine from the chassis. (Fig. 3-1-19)

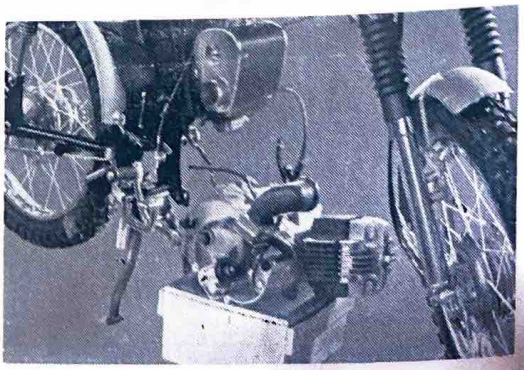


Fig. 3—1—19

3—2 Cylinder Head

1. Removal and Reinstallation

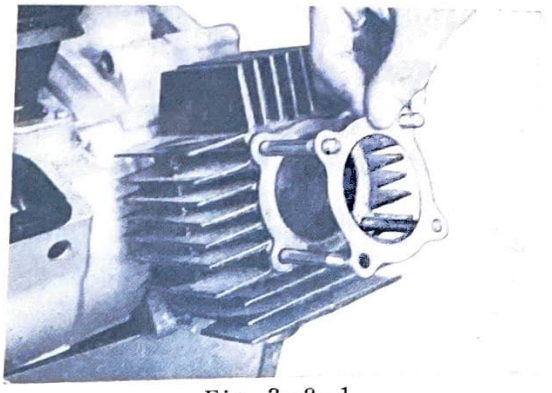


Fig. 3—2—1

Remove the plug. Remove the four nuts from the top of the cylinder head, and remove the cylinder head and gasket. For reinstallation, reverse the above sequence. Replace any deformed or questionable head gasket. (Fig. 3-2-1)

Note: Always install a new cylinder base gasket as the old one will be damaged during disassembly.

2. Removing Carbon

Carbon build-up in the combustion chamber of the cylinder head increases the compression ratio, causing preignition, overheating, and greater fuel consumption. Clean the cylinder head. (Fig. 3-2-2)

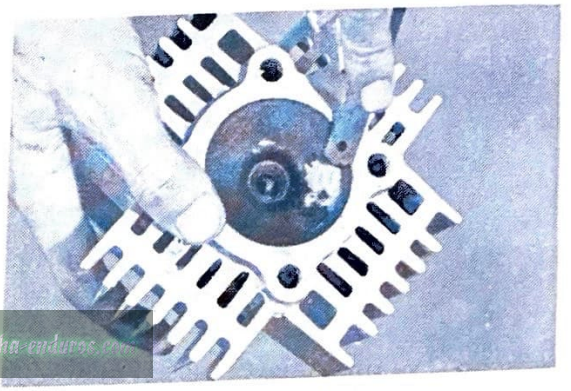
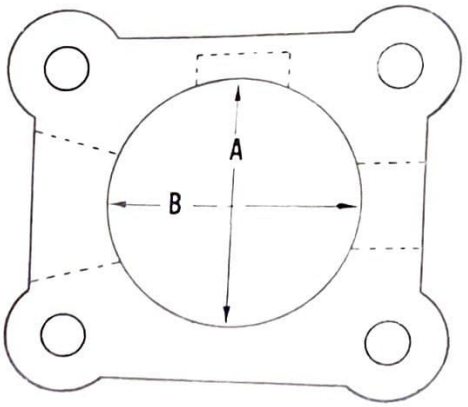


Fig. 3—2—2

3—3 Cylinder

1. 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 fhe maximun and minimum diameters measured exeeds 0.05mm, rebore and hone the cylinder. (Figs. 3-3-1 2, and 3)



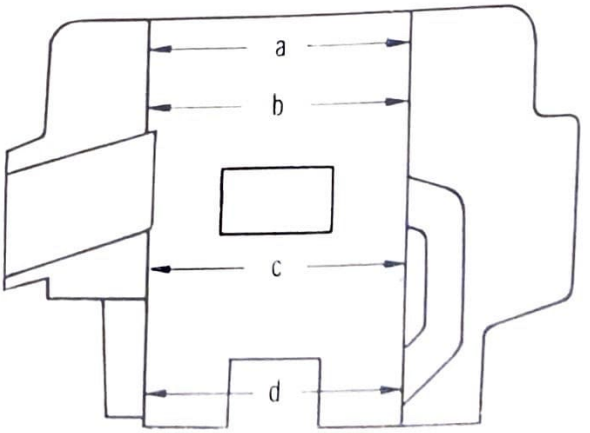


Fig. 3—3—1 Measuring Positions of the Bore Fig. 3-3-2

2. Minimum Clearance between Piston and Cylinder.

The minimum clearance between the piston and the cylinder should be 0.040 to 0.045mm.

Fig. 3—3—3

Cylinder Reconditioning

The cylinder should be reconditioned in the following manner.

a. Pistons are available in 0.25mm and 0.50mm over-sizes.

b. Cylinder should be rebored and honed to the diameter of the oversize piston, plus the clearance.

c. The error between the maximum and minimum bore diameters after honing should be no more tham 0.01mm.

d. The cylinder port edges (upper and lower) are chamfered for proper ring performance. This chamfer must be filed back whenever the cylinder is bored to lst or 2nd O. S.

Figs. 3-13-2a and 3-13-2b show the proper method. Take care during this step and remove only a slight portion of material. Excessive filing can change the cylinder port timing with a correspondingly adverse affect on performance.

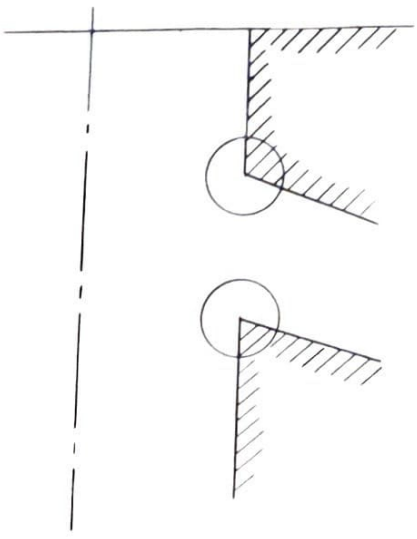


Fig. 3—13—2a
Port edges after boring

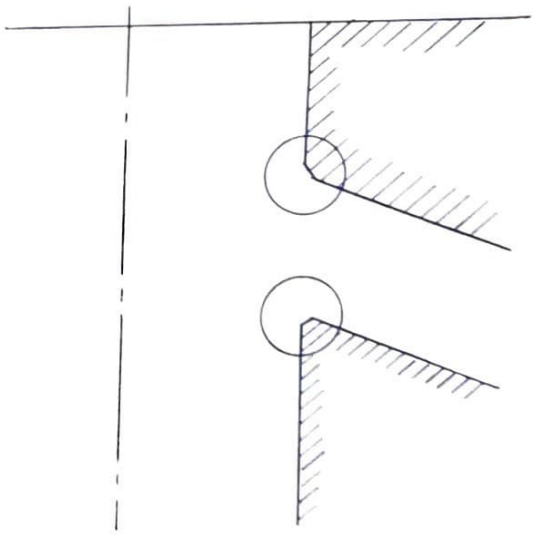


Fig. 3—13—2b
Port edges after finishing

Note: Feilure to do the above steps can result in ring "rattle" and premature ring failure.

3. Installing Cylinders

a. Always use new cylinder base gaskets when overhauling the engine. (Fig. 3-3-3)

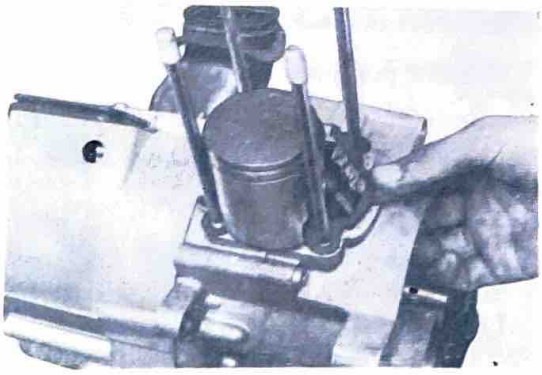


Fig. 3—3—3

b. When installing the cylinder over the piston, squeeze the piston rings into their grooves (the ring ends should be positioned at their respective locating pins), so that they will not catch and break on the bottom of the cylinder. (Careless handling may break rings.)) (Fig. 3-3-4)

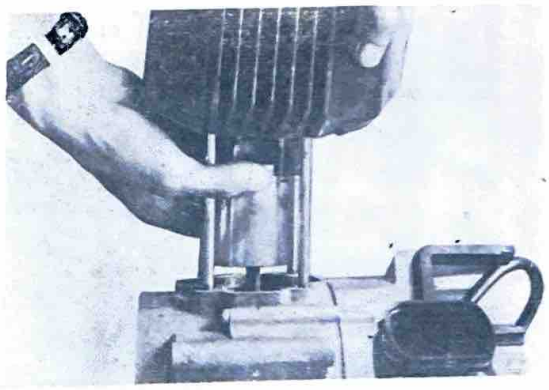


Fig. 3—3—4

4. Removing Carbon

Carbon tends to accumulate heavily on the wall of the cylinder exhaust port. Scrape the carbon off with a screwdriver. (Fig. 3-3-5)

Fig. 3—3—5

3—4 Piston Pin

1. 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 screw driver. (Fig. 3-4-1) Before removing the piston pin clips, cover the crankcase with a clean rag to prevent the clips from entering the crankcase.

Fig. 3—4—1

2. 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).

3—5 Piston Rings

1. Removing Rings

Put both thumbs at each end of the piston ring pull the piston ring ends apart, and slide it out of the groove on the side oposite the ring ends. Then pull the ring forward. (Figs. 3-5-1 and 2)

Fig. 3—5—1

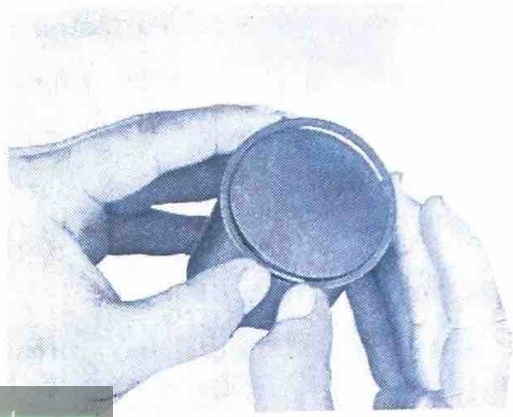
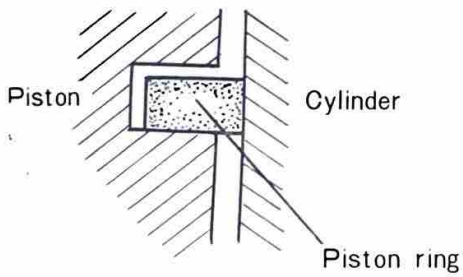


Fig. 3—5—2

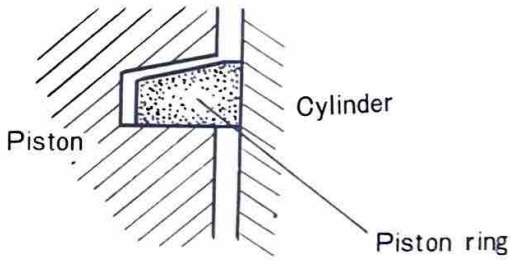
3—6 Piston Ring

1. Keystone Type Piston and Keystone Ring



Plain type piston & piston ring

Fig. 3—6—1



Keystone type piston & piston ring

Fig. 3—6—2

A good seal must be maintained between the piston and cylinder wall for effective use of combustion pressures. It is not practical, however to attempt to secure a perfect seal. With this in mind, importance is placed on effective sealing and prevention of piston ring sticking.

Piston ring sticking is generally caused by gum deposits which are produced through a break down of the fuel and oil from the heat of the combustion process. The gum reduek will deposit itself in the ring lands and rings. The subsequent blow by tends to speed up the accumulation of these gum deposits.

In order to prevent the rings from sticking and to provide more effective sealing of the combustion pressures Yamaha has employed the Keyston piston and ring in its engines. This marks the first time such an application has been made in the history of motorcycle engineering.

The design of the Keystone ring is such that combustion gas pressures force the ring down and out almost simultaneously. This forces the ring tightly against the cylinder wall perventing blow-by. (Fig. 3-6-3)

On the other hand, in the case of the plain ring, combustion pressure first acts on the top of the ring, forcing it down, and then passes between the ring and piston to force the ring against the cylinder wall. This action is considerably slower than that of the Keystone type ring, and will allow more blow-by.

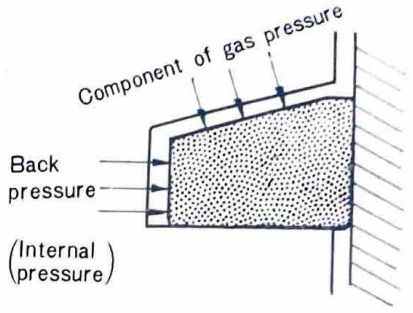
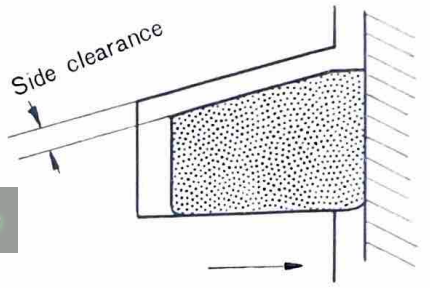


Fig. 3—6—3

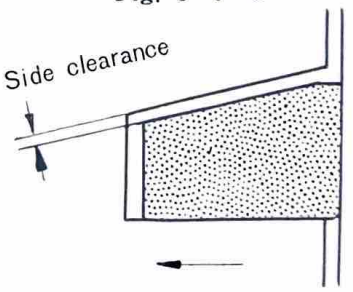
With blow-by, heat cannot be dissipated from the piston ring to the cylinder wall and, as was mentioned earlier, excessive combustion heat will cause the oil film to break down creating additional gum deposits. The Kestone ring allows for much better heat transference than the standard type ring.



Side clearance when piston floats in the direction of the arrow.

Fig. 3—6—4

The most important advantage of the Keyston type ring is that the piston ring land clearance changes as the piston moves up and down. Figs. 3-6-4 and 3-6-5 show variations in the clearance resulting from the floating action of the piston in the cylinder. This variation in ring land clearance produces a 'scrubbing' effect that reduces the accumulation of gum deposits and thus prevents the ring from sticking in the land.



Side clearance when piston floats in the direction of the arrow.

Fig. 3—6—5

Lastly, the outer surface of the ring is coated with Teflon (Fig. 3-6-6). The Teflon coting serves as an cffective aid during ring 'seating'. In addition, the Teflon coating will follow microscopic irregularites in the cylinder bore more faithfully than previous materials thus providing additional resistance against blow-by.

Fig. 3—6—6

Technical notes on keystone rings

The Kestone ring can be handled in the same manner as conventional rings as far as servicing is conserned. However, the Keystone

ring is not interchangeable and must be used as a set with a matching Keystone piston.

The Keystone ring can be identified from the conventional by its unique cross-sectional shape. The conventional ring has a rectangular cross- section whereas the Keystone ring employs a 7° slope on the top.

Important: The Keystone type piston has the "K" mark stamped after the numerals indicating the piton sizes on its head. On the othes hand, the Kystone type piston ring has s symbol such as "1(2)N" or "1(2)T",
(Numeral "1" denotes the lst ring, and Numeral "2" the 2nd ring.)

2. Fitting the Rings

First fit the No. 2 ring over the piston, and then the No. 1 ring and align their end gaps with the locating pin in each ring groove. (Fig. 3-6-7)

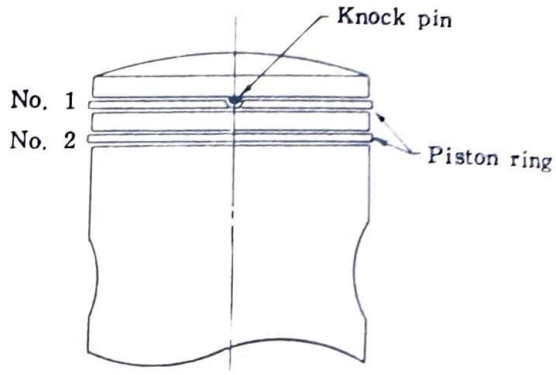


Fig. 3—6—7

3. Checking Piston Rings

a. MeasuringPiston 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. (Fig. 3-6-8)
End gap should be between 0.15 and 0.50mm for both No. 1 and No. 2 rings.

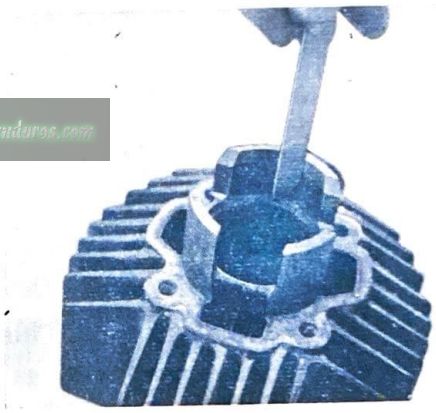


Fig. 3—6—8

b. Removing Carbon
Carbon 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. (Fig. 3-6-9)
No. 1 ring (upper)···0.04 to 0.08mm
No. 2 ring (lower)···0.04 to 0.08mm

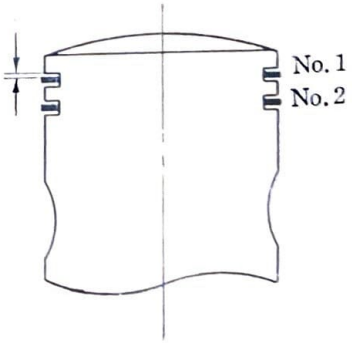


Fig. 3—6—9

3—7 Piston

1. Checking and Reconditioning the Piston

a. 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 3-3 Cylinder, piston clearance should be 0.040mm to 0.045mm. To determine the maximum piston outside diameter, measure it with a micrometer at right angles to the akirt and 10 mm above the bottom edge. (Fig. 3-7-1)

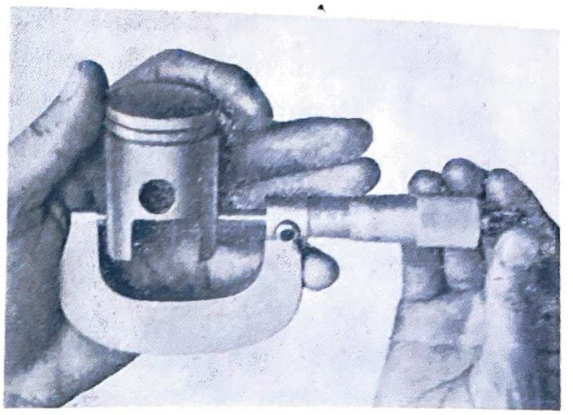


Fig. 3—7—1

b. Checking and Correcting Scratches

Pistons showing sings of seizure are noisy and keep the engine from developing full power. If a piston that has seized up is used agaih 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 wet sandpaper (Figs. 3-7-2 and 3) And then wash the piston thoroughly with soap and water. Dry the piston and apply a light film of oil to all surfaces.

Fig. 3—7—2

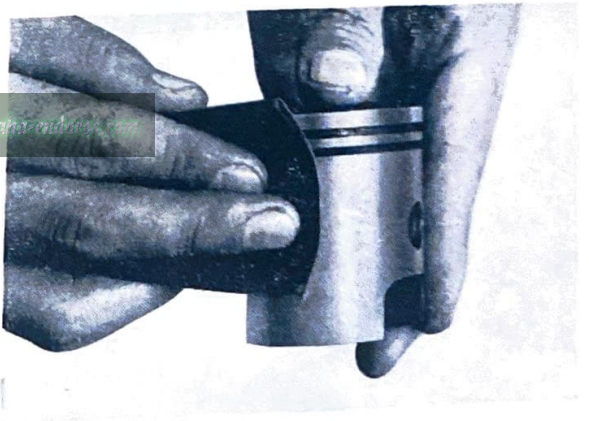


Fig. 3—7—3

c. Removing Carbon

Carbon accumulations on the piston head should be carefully removed with a knife or a other scraper. (Fig. 3-7-4)

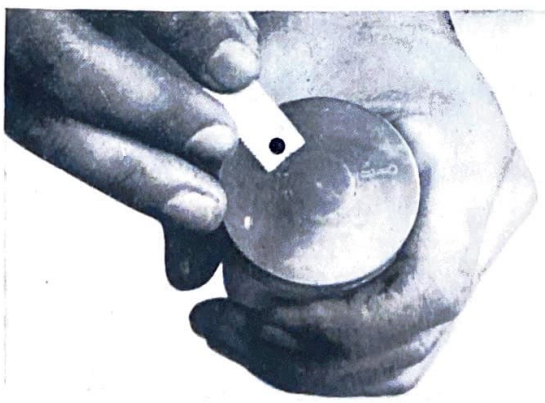


Fig. 3—7—4

Fig. 3—7—5

Do not score the materiac during this operation.

Carbon accumulations in the piston ring groove make the ring stick to the piston. Remove the carbon. (Fig. 3-7-5) An old broken ring makes a good land scraper, Careflilly file down the broked edge first.

2. Installing the Piston in its Proper Direction

Install the piston with the arrow marked on the piston head pointing downward (toward the exhaust port). (Fig. 3-7-6)

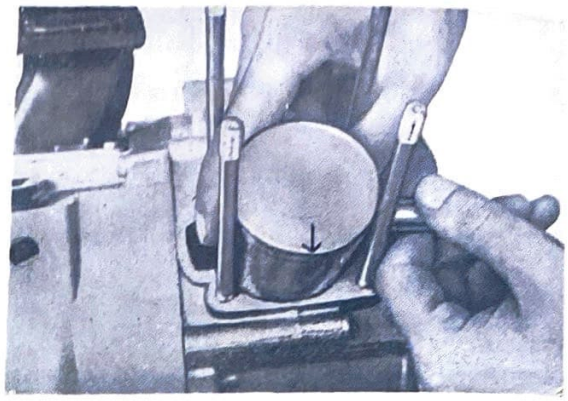


Fig. 3—7—6

3—8 Crankcase Cover (R)

1. Removal

a. Remove the kick starter crank clamping bolt, and remove the kick starter crank. (Fig. 3-8-1)

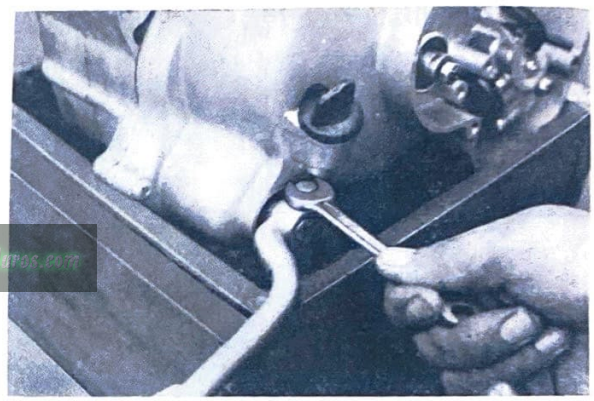


Fig. 3—8—1

b. Remove the banjo bolt from the oil pump delivery pipe at the valve cover. (Fig. 3-8-2)
(The crankcase cover can be removed without removing the oil pump.)

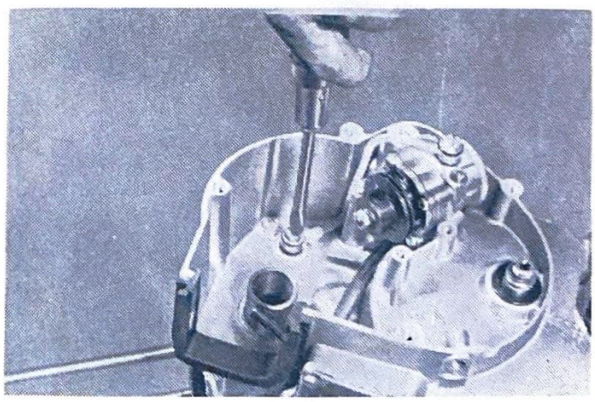


Fig. 3—8—2

c. Remove the pan-head screws from the crankcase cover (R), and take off the cover. (Fig. 3-8-3 and 4)
(The cover can be removed without removing the oil pump.)

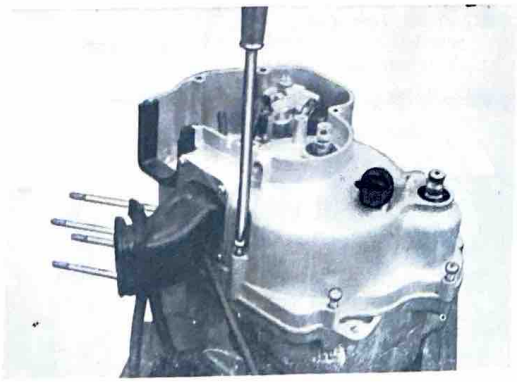


Fig. 3—8—3

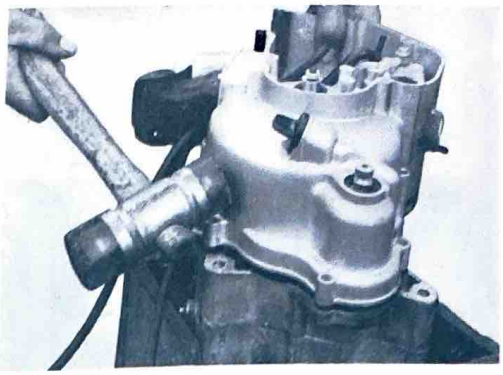


Fig. 3—8—4

d. Replace the crankcase cover gasket, if damaged (Fig. 3-8-5)
If the cover hangs up, Tap it with a rubber hammer.

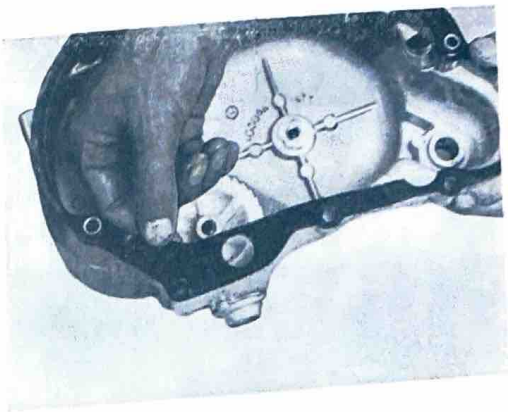


Fig. 3—8—5

2. Reinstallation

Apply gasket paste to the crankcase(R) sealing surface (Yamaha Bond No. 5); and place the crankcase cover gasket upon it, and then install the crankcase cover. (Fig. 3-8-6)

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

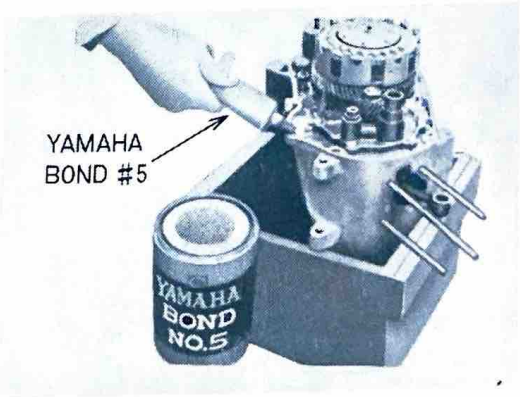


Fig. 3—8—6

3—9 Clutch

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

The clutch housing is mounted on 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 primary drive reduction ratio is 3.894:1 (74/19=3.894)

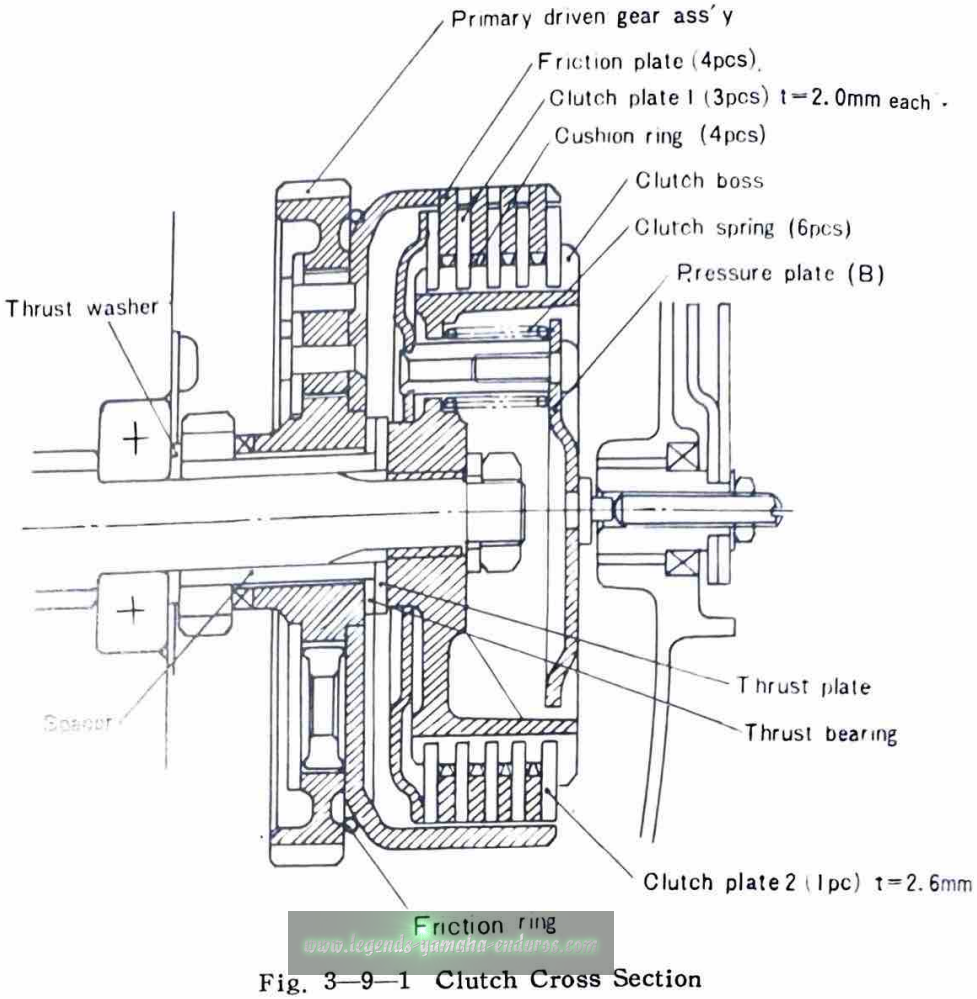


Fig. 3—9—1 Clutch Cross Section

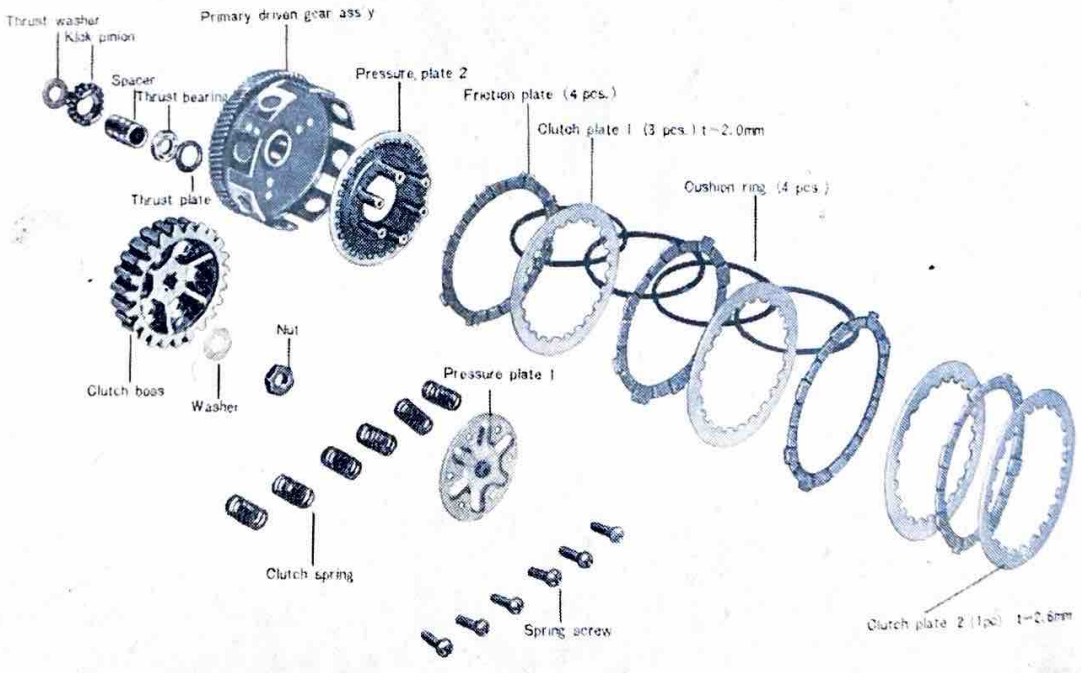


Fig. 3—9—1—2 Exploded View of the Clutch

1. Removing the Pressure Plate

Remove the six clutch spring holding screws and remove the pressure plate 1. (Fig. 3-9-2 and 3)

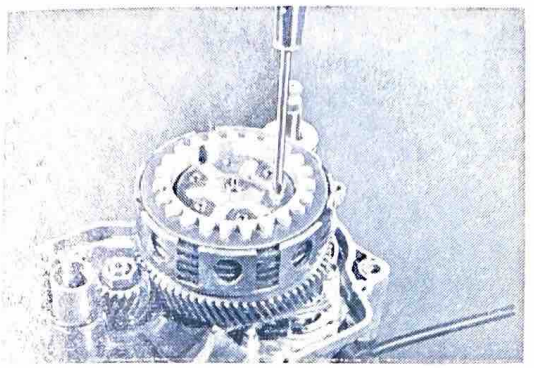


Fig. 3—9—2

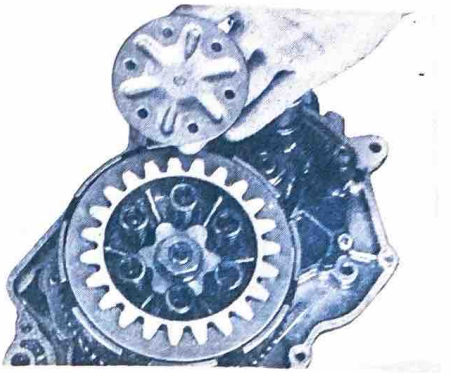


Fig. 3—9—3

2. Removing the Clutch Boss

To remove the clutch boss, fit the clutch holding tool on the clutch boss and looseu the lock nut. (Fig. 3-9-4)

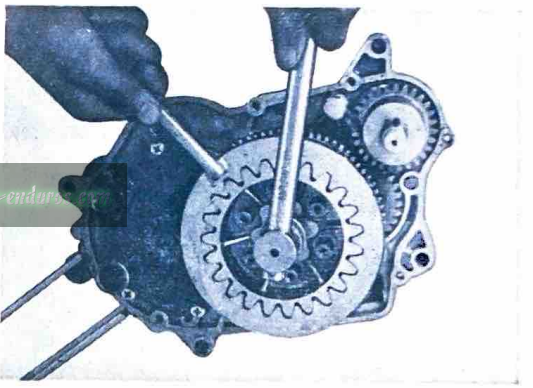
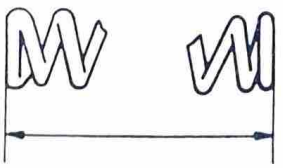


Fig. 3—9—4

3. 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. (Figs. 3-9-5 and 6)



Free length 28.2mm

Fig. 3—9—5

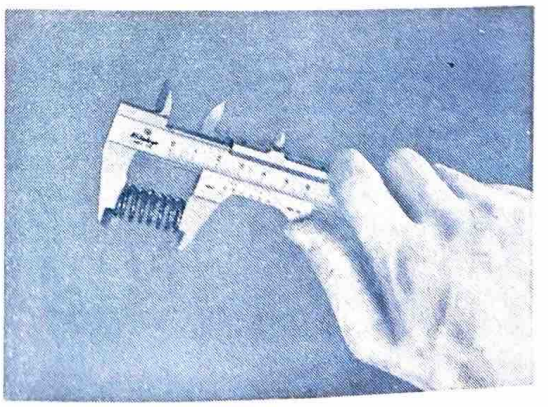


Fig. 3—9—6

4. Checking the Friction Plates

Friction plates worn more than 0.3mm under the standard thickness, or showing uneven contact with the clutch plates, should be replaced. (Figs 3-9-7 and 8)

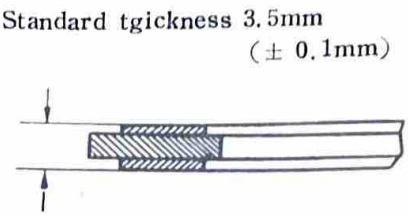


Fig. 3—9—7

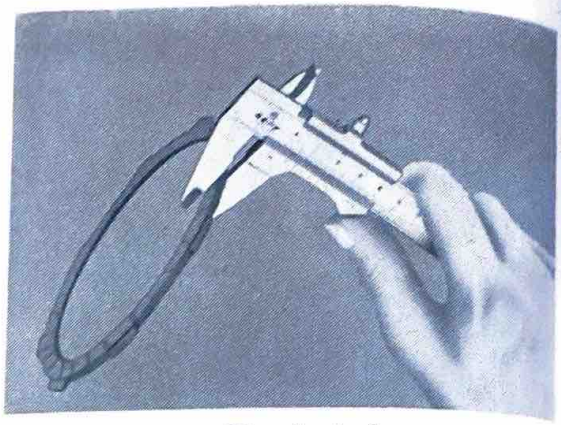


Fig. 3—9—8

a. Checking the pressure plates:

Replace any plates that are gauled or show evideuce of heat damage.

5. Clutch Housing Ass'y (Integrated 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.

a. Checking

Insert the spacer in the primary driven gear boss and check for radial play and scratches that could cause noise. If any scratch is found, smooth it out with an oil stone or wet fine (900-600grit) sandpaper or it will impair clutch action. If the radial play is excessive, replace the spacer because it will cause excessive noise. (Fig. 3-9-9)

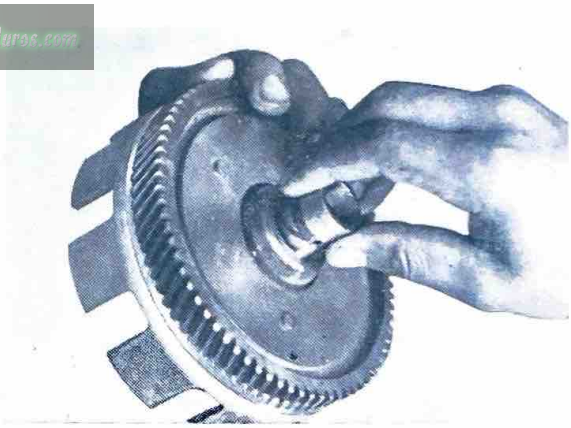


Fig. 3—9—9

6. Checking the Primary Gear Spacer

Place the spacer around the main axle, and again check for radial play. If play exists, replace it.

Replace any spacer with step-wear on its outer surface. (Fig. 3-9-10)

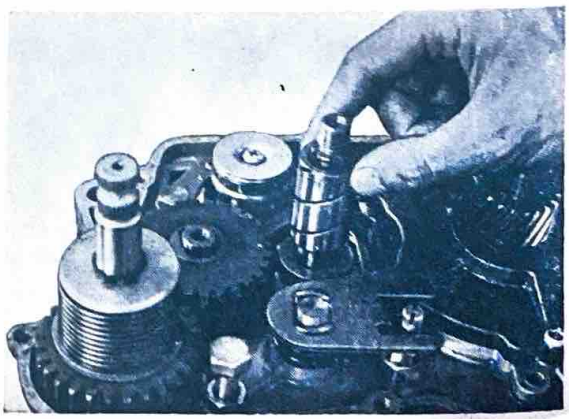


Fig. 3—9—10

7. Fitting Cushion Rings

Each custion ring is installed between the clutch boss and the friction plate to insure even engagement and complete disengagement of the plates. When fitting cushion rings, be sure they are flat and not twisted. (Fig. 3-9-12)

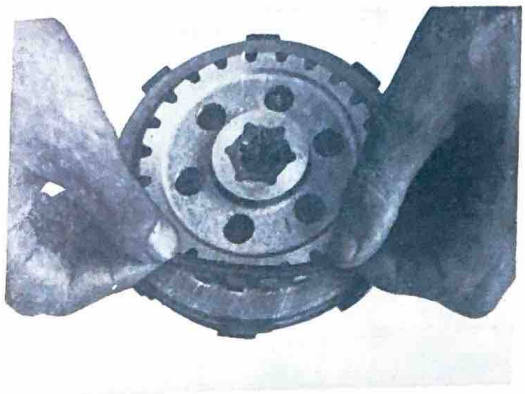


Fig. 3—9—12

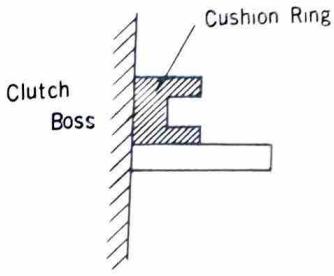


Fig. 3—9—12a

If the ring is installed correctly, the flat side will be towards the clutch boss.

8. Caution on Reassembling the Clutch

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

The thrust bearing assembly fits on the primary gear spacer, but it may slip out of place when installing the clutch boss. Therefore, apply grease to one surface of the bearing to make it stick to the clutch boss.

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

9. Adjusting the Clutch

a. Remove the carburetor cover and loosen the push screw lock nut. Tighten the push screw to a lightly seated position, and back it off $\frac{1}{4}$ turn. Then fully tighten the lock nut. (Fig. 3-9-13)

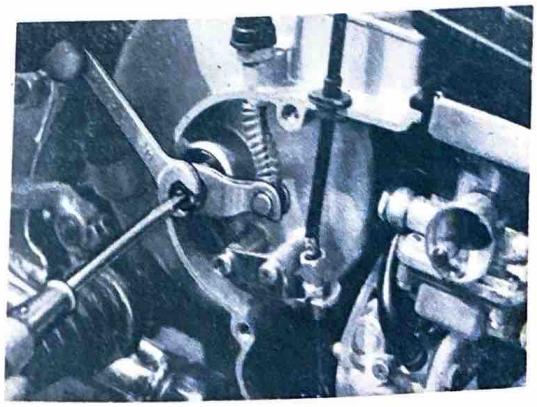


Fig. 3—9—13

b. Adjusting Clutch Cable Tension

The clutch cable becomes misadjusted after being used for a long time. Readjust the cable so that the play of the clutch handle is from 2 to 3mm. (1/16~1/8″) (Fig 3-9-14)

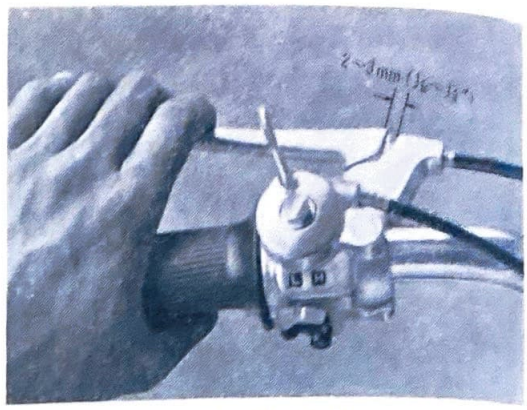


Fig. 3—9—14

c. Adjustment (Fig. 3-9-15)

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

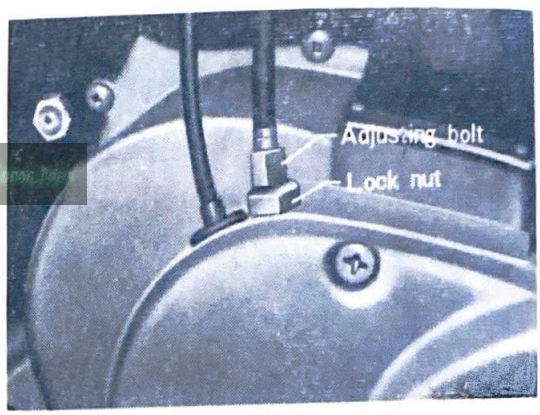


Fig. 3—9—15

3—10 Primary Drive Gear

a. 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. 3-10-1)

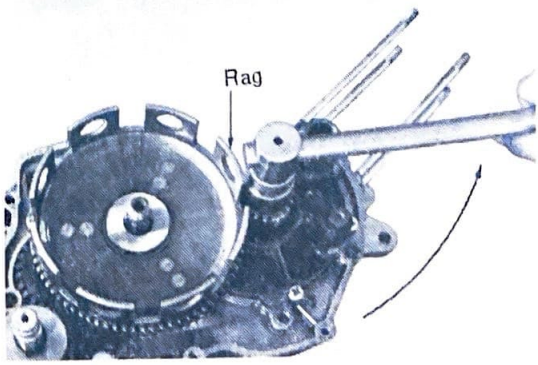


Fig. 3—10—1

3—11 Kickstarter

1. Removal

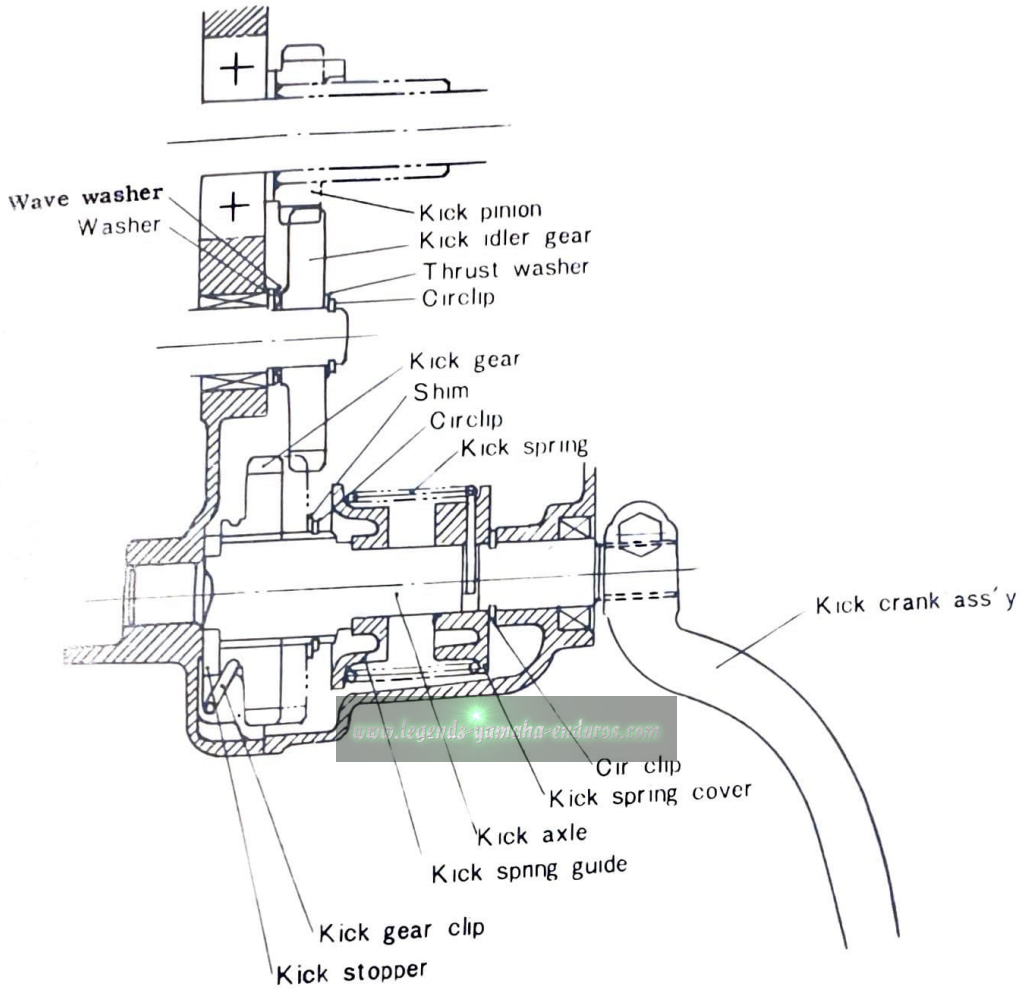


Fig. 3—11—1 Kick starter Cross Section

1. Mechanism

The primary kick-starter system one-touch kick-starter is employed. However, a new "non-constant-mesh" mechanism has been introduced into the L5-T kick-starter, instead of the constant-mesh kick gear type, such as the ratchet and roller-lock systems.

That is, the kick gear meshes with the idler gear only when the kick starter pedal is kicked. After the engine start, the kick gear moves off the idler gear. This mechanism not only eliminates nois 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, which has spiral splines on its surface, is pushed outward 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 outward, teeth of the kick gear may clash against teeth of the idle gear. (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 with the idle gear.
(Refer to Figs. 3-11-2 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 the circlip, the thrust load is imposed on the kick gear, thereby giving it turning force and rotating the crankshaft to start the engine.

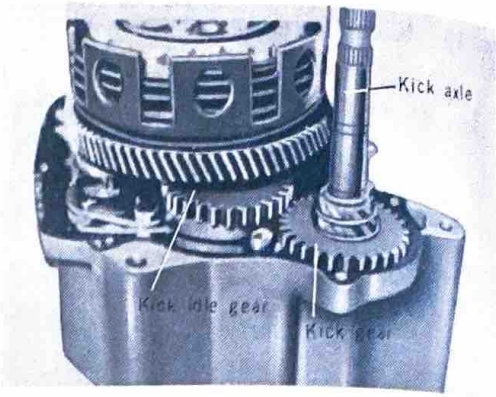


Fig. 3—11—2 Kick gear disengaged

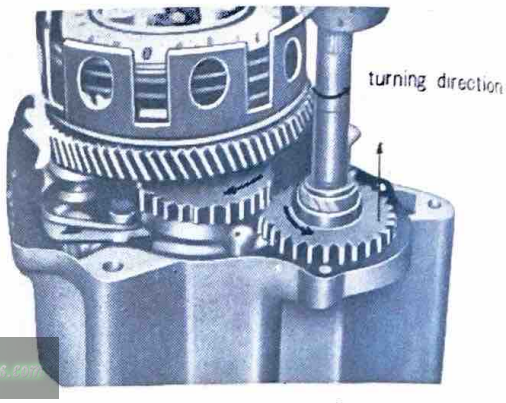


Fig. 3—11—3

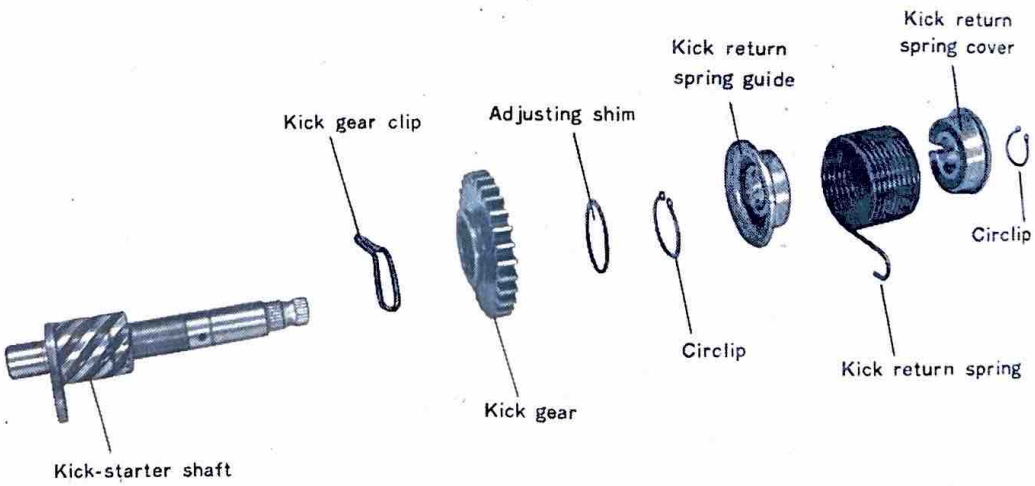


Fig. 3—11—4 Exploded View of the Kickstarter

a. Remove the circlip and spring cover. (Fig. 3-11-5)

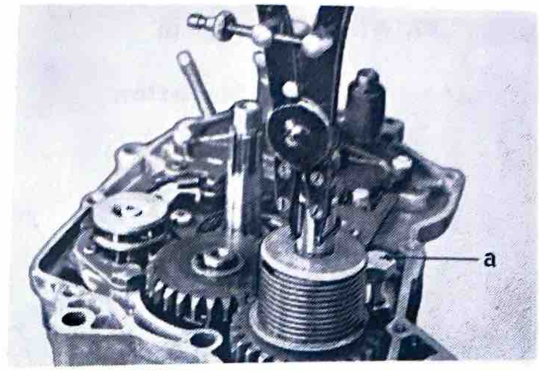


Fig. 3—11—5

b. Detach the spring from kick axle and remove the spring. (Fig. 3-11-6)

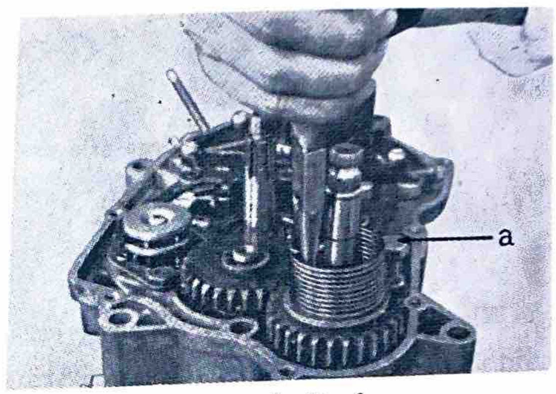


Fig. 3—11—6

c. Remove the kick starter assembly in the manner as shown in right. (Fig. 3-11-7)

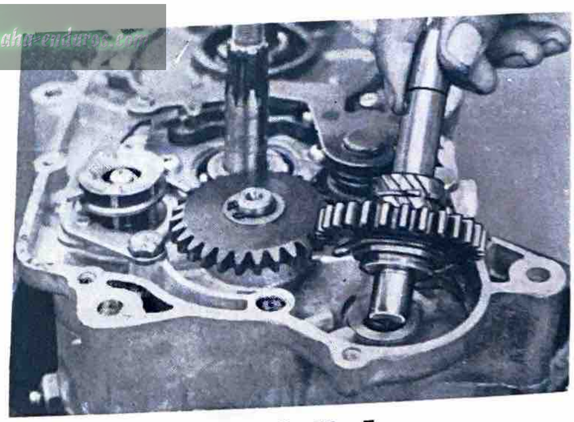


Fig. 3—11—7

NOTE: The above steps are necessary only if you wish to disassemble the kick starter assembly. The entire assembly (shaft and all) can be removed from its seat in the case by removing the spring hook from its seat on bolt "a" and lifting the shaft out of its seat.

2. Removing the Kick Idler Gear

Remove the clip with circlip pliers do not pry it open. The kick idler gear can be removed. (Fig. 3-11-8)

Note the location of the shim under the circlip.

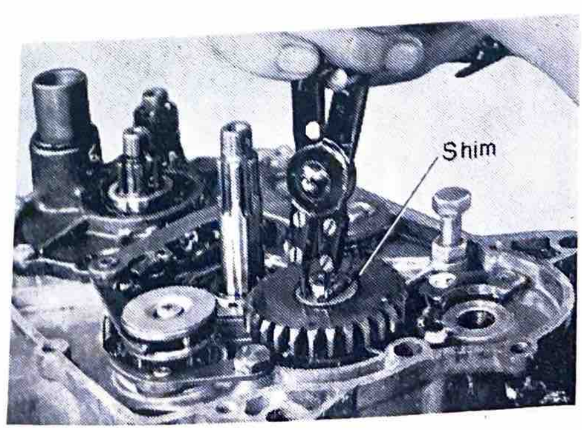


Fig. 3—11—8

3—12 Shifting Mechanism

Construction and Operation

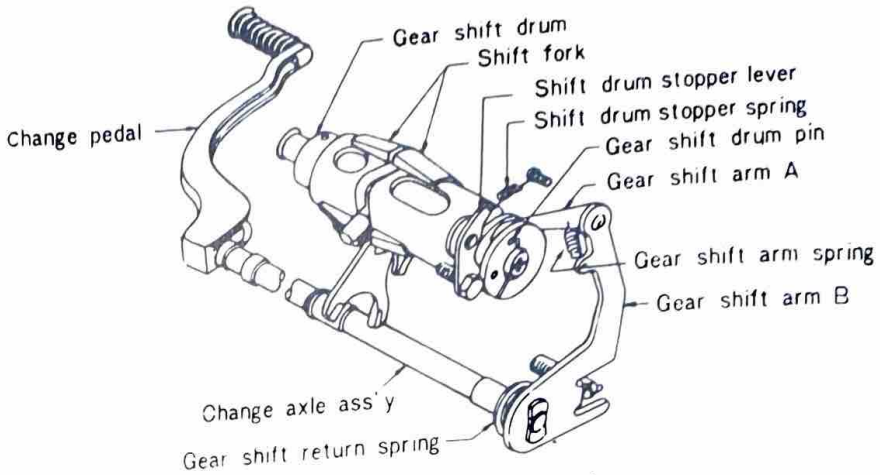


Fig. 3—12—1 Shifting Mechanism

When the gear shift lever is depressed, gear shift arm B moves the gear shift ratchet arm A back and forth. 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 eqipped 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 four stages: neutral, low, second, and top.

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

1. Removing the Change Axle Assy

To remove the change axle assembly remove the left circlip and washer, and push gear shift arm A on the right side of the engine up and away. (Figs. 3-12-2, 3 and 4)

From contact with the shift drum pins before pushing the change axle through the engine.

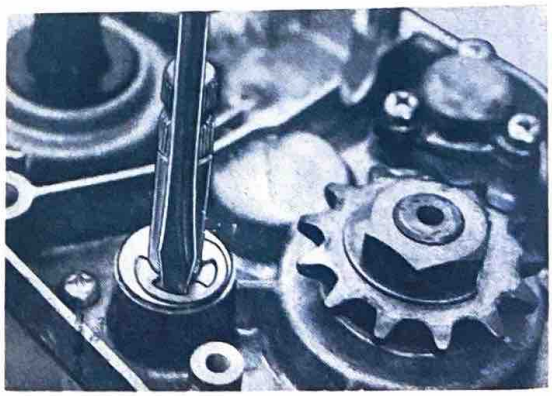


Fig. 3—12—2

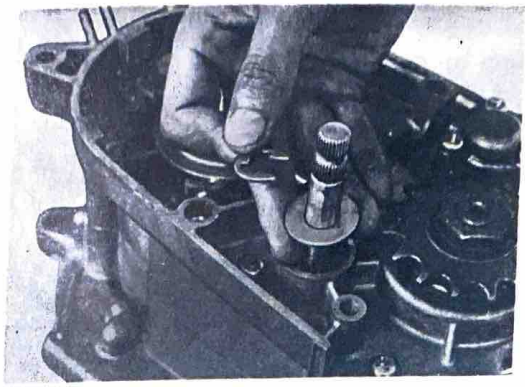


Fig. 3—12—3

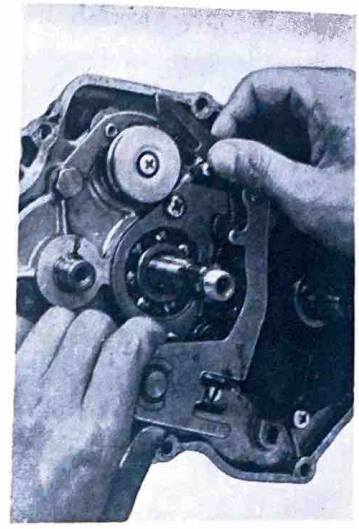


Fig. 3—12—4

2. Checking Change Axle parts (Fig. 3-12-5)

a. 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 return action of the shift mechanism.

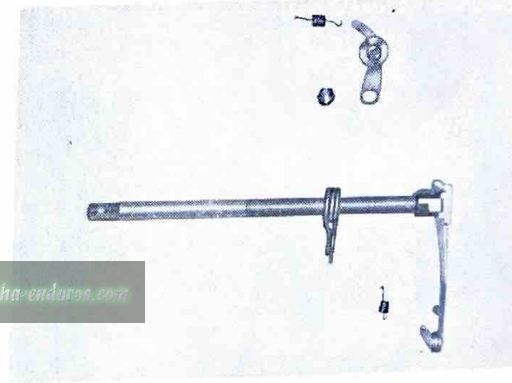


Fig. 3—12—5

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

c. Check point "1" (Fig. 3-12-5) for damage and point "2" for bending replace as necessary.

3. Stopper Lever Ass'y

a. Removal

Remove the stopper lever mounting bolt. (Fig. 3-12-6)

Note: This is a shouldered bolt. During reassembly make sure the shoulder does not pinch the stopper lever. This will keep the drum from rotating.

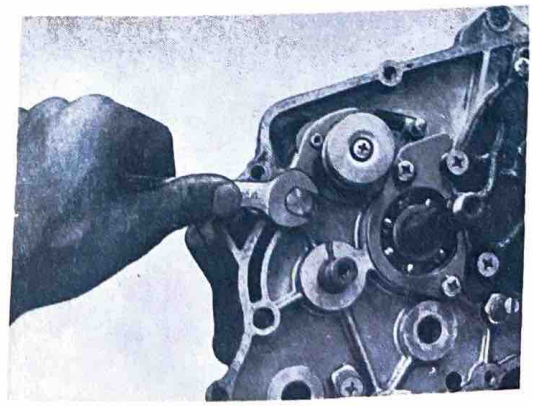


Fig. 3—12—6

b. Checking the Stopper Lever 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,

c. Stopper Lever Roller

Check the Roller (rivetted) for freedom of movement.

3—13 Rotary Valve

1. Removal

a. Remove the valve cover mounting screws and remove the valve cover. (Fig. 3-13-1)

Note: The positions of screws "1" and "2".

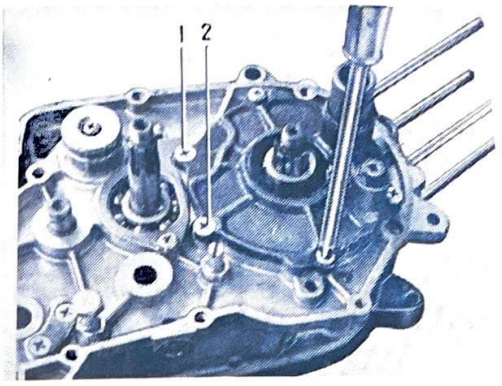


Fig. 3—13—1

b. Removing the Valve Knock Pin

As shown in Fig. 3-13-3, drive out the valve knock pin from the other side with a punch. Be careful not to damage the crankcase surface. (Fig. 3-13-3)

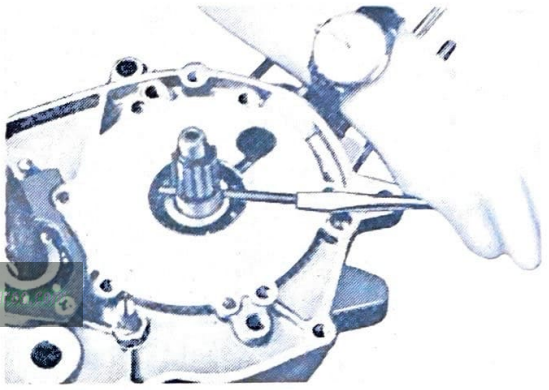


Fig. 3—13—3

2. Checking

a. 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. 3-13-2)

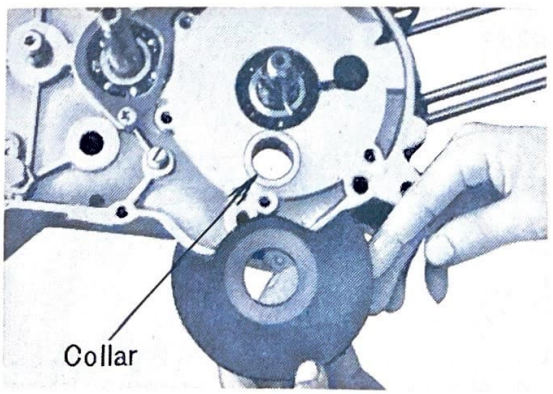


Fig. 3—13—2

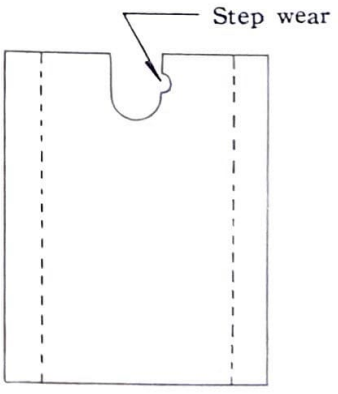


Fig. 3—13—4

If the valve unit collar is worn with a step, replace it. (Fig. 3-13-4)

b. 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. 3-13-5)

Fig. 3—13—5

c. Crankshaft O ring

The crankshaft O ring may easily get scratched when it is installed under 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. 3-13-6)

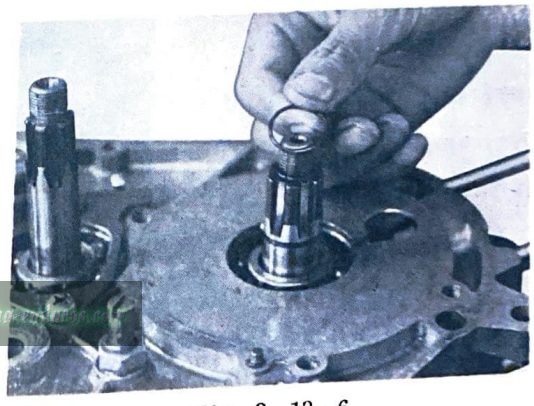


Fig. 3—13—6

d. Valve Cover Oil Seals

Apply grease of good quality to the lip surface when replacing the oil seal. (Fig. 3-13-7)

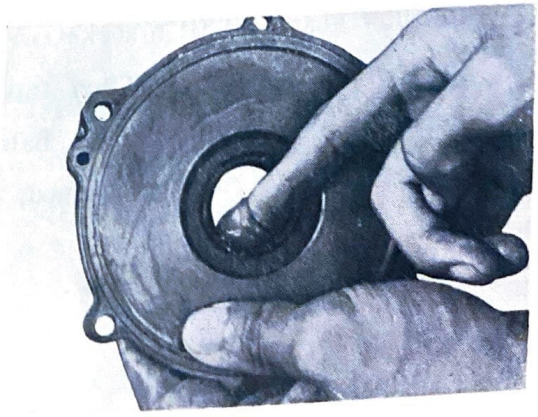


Fig. 3—13—7

3—14 Drive Sprocket

1. Removal

a. Straighten the bent edge of the lock washer, with a chisel. (Fig. 3-14-1)

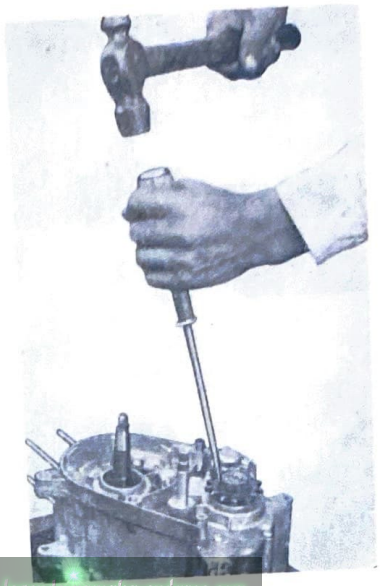


Fig. 3—14—1

b. Lock the drive sprocket with the flywheel magneto holding tool, and loosen the sprocket nut. (Fig. 3-14-2)

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 handle of the wrench with a hammer so that the nut can be loosened.

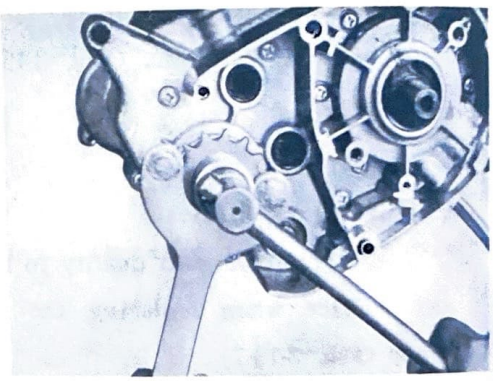


Fig. 3—14—2

2. 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 either if worn. (Fig. 3-14-3)

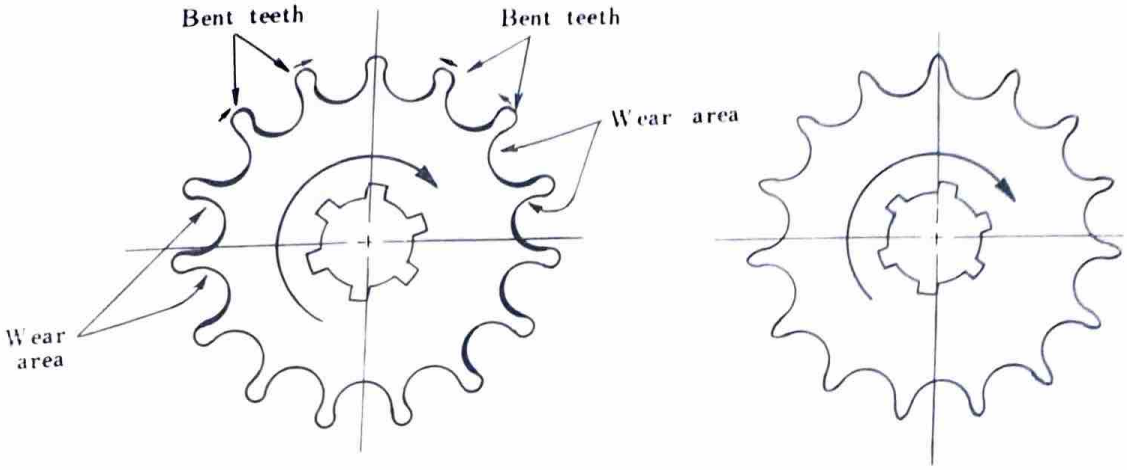


Fig. 3—14—3

Clean the chain with solvent before ckecking it. Then hold the chain in your fingers, as shown in Fig. 3-14-5 and check whether the chain bends without curling.

Next, suspend the chain as shown in Fig. 3-14-6. If the chain exhibits curvatures, (A, B and C) as shown in Fig. 3-14-7, it is defective. Replace it.

Curvatures may often result from lack of lubrication, dirt attached, or rust. In this case, reclean the chain and repeatedly bend it back and forth in detergent oil, then again check it for defects.

Another good test for wear is to mesh the chain with a new sprocket and check for excessive slack. The chain is bad if you can pull it away from the curvature of the sprocket a distance of more than a 1/2 link.

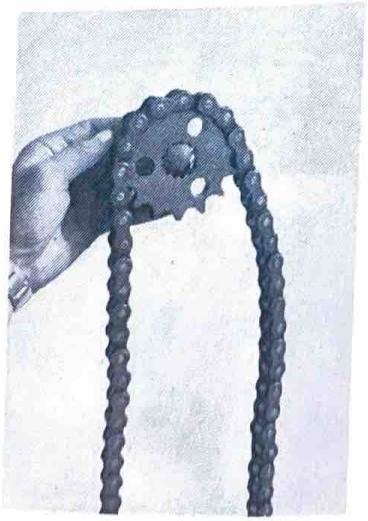


Fig. 3—14—4

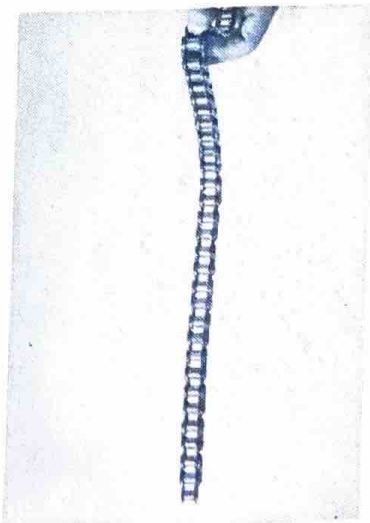


Fig. 3—14—5

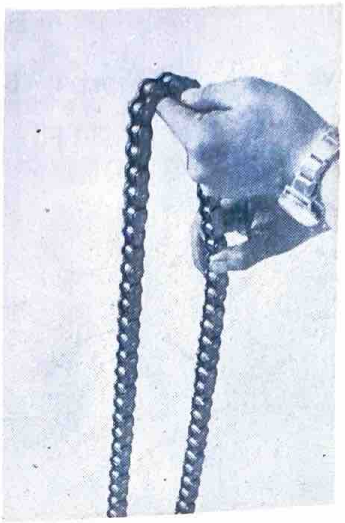


Fig. 3—14—6

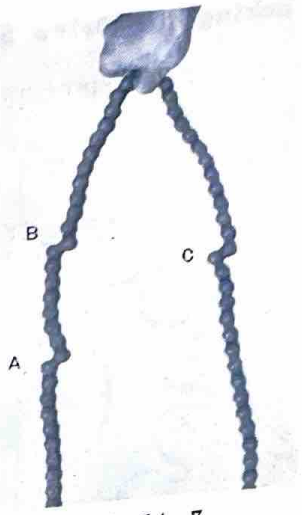


Fig. 3—14—7

3—15 Splitting the Crankcase Halves

1. 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.

a. Remove the pan-head screws from the left side half of the crankcase. (Fig. 3-15-1)

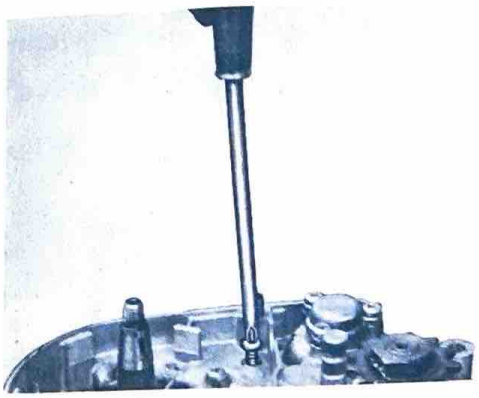


Fig. 3—15—1

b. 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 rubber tip hammer, so that the crankcase can be divided into two halves. (Fig. 3-15-2 and 3)

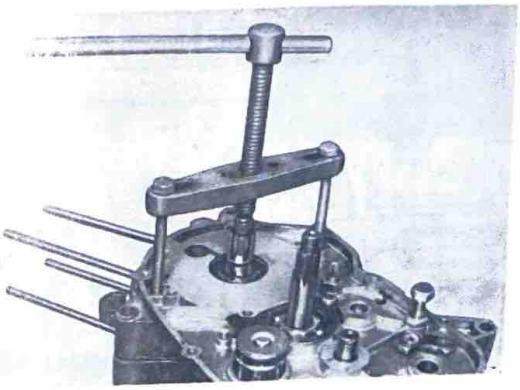


Fig. 3—15—2

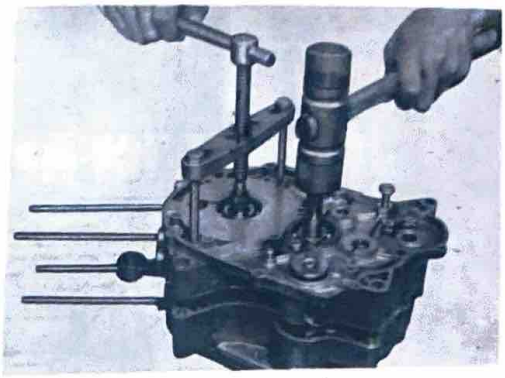


Fig. 3—15—3

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

2. Reassembling

When reassembling the crankcase, be sure to apply Yamaha Bond No. 5 to the freshly clean mating surfaces of the crankcase. (Fig. 3-15-4)

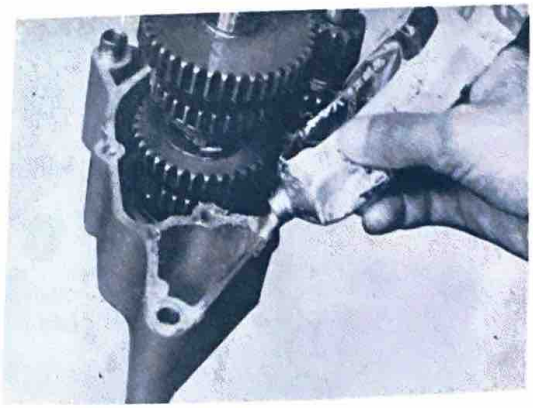


Fig. 3—15—4

3—16 Transmission Assembly

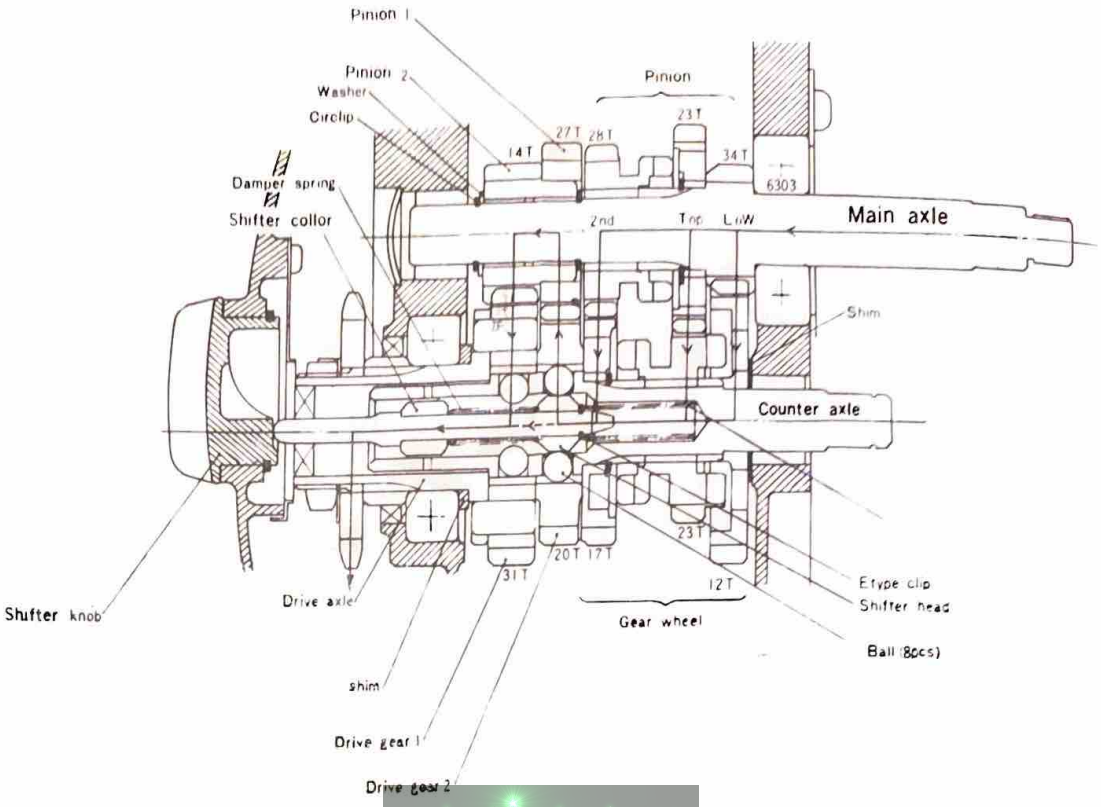


Fig. 3—16—1 Layout of Transmission

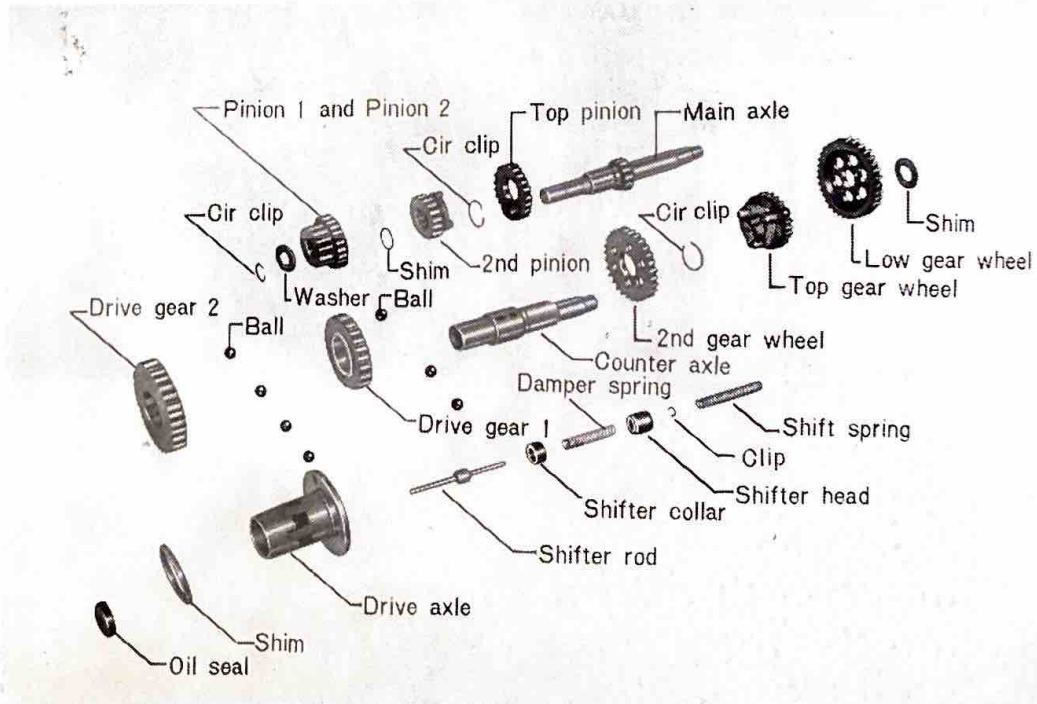


Fig. 3—16—2 Exploded View of Transmission

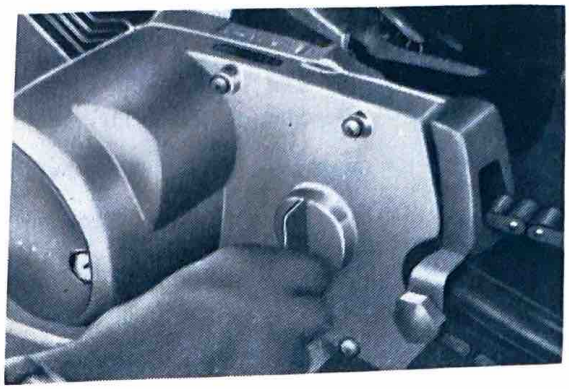


Fig. 3—16—3

The transmission is of constant mesh, 3 speed design. In addition to the low, 2nd and top gears, it is provided with two pairs of additional gears-two pinions (free-mounted) on the main axle, one gear on the counter axle and another one on the drive axle. These gears are designed for 2-position shifting.

As the crankshaft rotates, the turning force is carried to the clutch, thereby applying torque to the main axle, because the clutch is mounted on the main axle. When the transmission is shifted to low range, the lst gear pinion on the main axle turns the lst gear wheel on the counter axle, thereby turning the counter axle.

As portrayed in Fig. 3-16-1, when the shifter knob is switched to the low range position, the shifter head (of the shifter rod) pushes the four balls (of the counter gear) to lock the drive gear 1 to the counter shaft. (while meshed with pinion 1)

When drive gear 1 rotates, it turns both pinions 1 and 2, which are free-mounted on the main shaft, because pinion 1 is locked to the pinion 2.

Since pinion 2 is in mesh with the drive gear 2 (which is locked to the drive axle with a pin.) the turning force is carried through the drive axle to the drive sprocket, thereby turning the rear wheel through the drive chain.

When the the shifter knob, is turnd to the high range position, the shifter rod travels to the left and the shifter head pushes the four balls of the counter shaft to lock the drive gear 2 to the counter shaft. In this case, the engine power ia carried to the rear wheel in the following sequence:

Engine → Clutch → Main axle → Counter axle → Drive gear 2 → Drive axle → Drive sprocket → Rear wheel

On the other hand, when the shifter knob is in the low range position, the engine power is carried to the rear wheel in the following sequence:

Engine → Clutch → Main axle → Counter axle → Drive gear 1 → Pinions 1 & 2 → Drive gear 2 → Drive axle → Drive sprocket → Rear wheel

The primary reduction ratio is 74/19=3.895 and the secondary reduction ratio 37/16=2.313. Therefore, the total reduction ratios will be:

High range (for on-the-road riding)

Primary reduction × Transmission gear reduction × Secondary reduction = Total reduction ratio

Low 74/19 × 34/12 × 37/16 = 24.219

2nd 74/19 × 28/17 × 37/16 = 14.834

Top 74/19 × 23/23 × 37/16 = 9.007

Low range (for off-the-road riding)

Primay reduction × Transmission gear reduction × Secondary transmission gear reduction × Secondary reduction = Total reduction ratio

Low 74/19 × 34/12 × (20/27 × 31/14) × 37/16 = 41.856

2nd 74/19 × 28/17 × (20/27 × 31/14) × 37/16 = 24.331

Top 74/19 × 23/23 × (20/27 × 31/14) × 37/16 = 14.773

1. Removal

a. Remove the shift drum seal cover and clip. (Figs. 3-16-4 and 5)

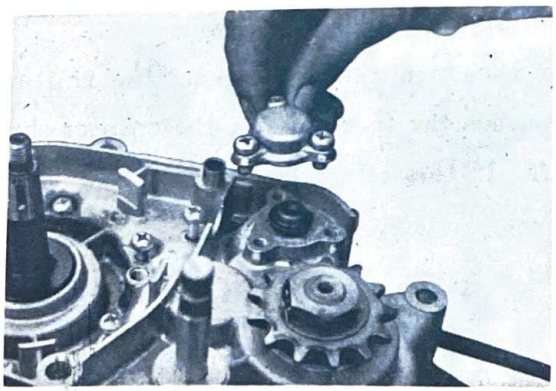


Fig. 3—16—4

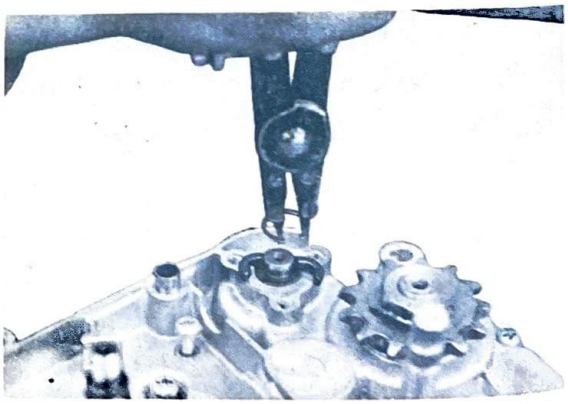


Fig. 3—16—5

b. Remove the transmission and the shifter at the same time. (Fig. 3-16-6)

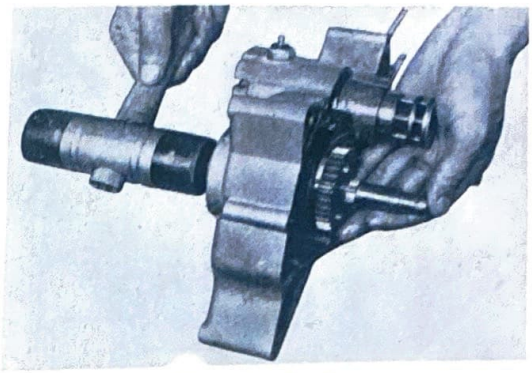


Fig. 3—16—6

2. Reinstallation

Reverse the above procedures for reinstallation. Be sure to put all washers in their proper places.

First assemble the transmission and shifter, and then fit it into the crankcase.

3—17 Crankshaft

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

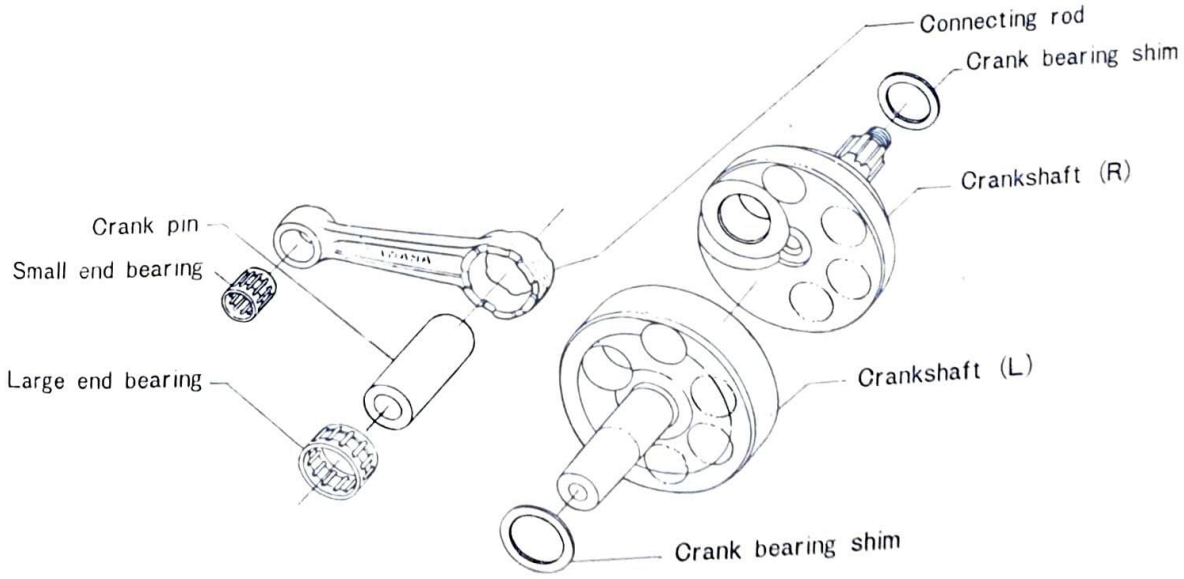


Fig. 3—17—1 Crankshaft Components

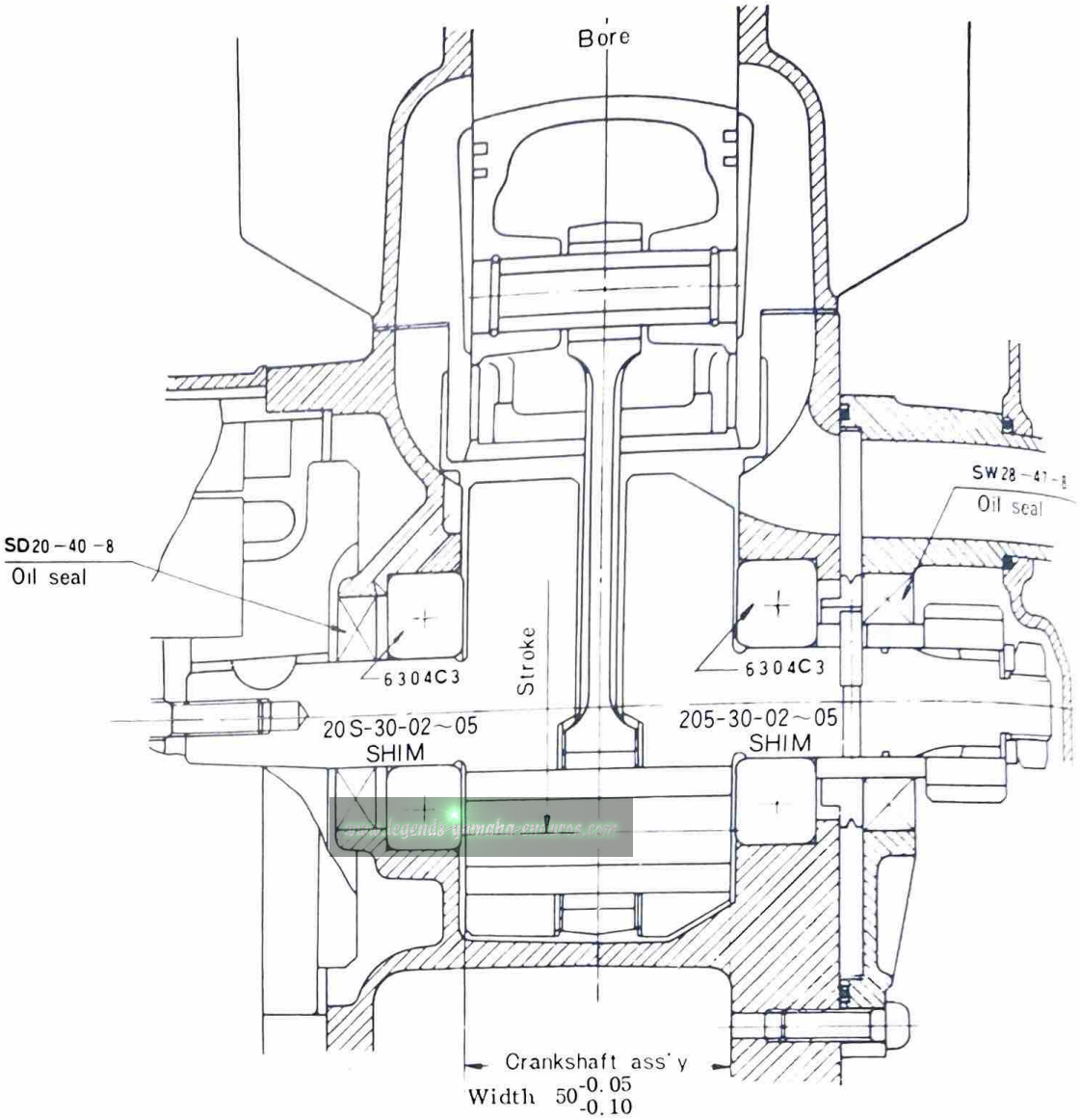


Fig. 3—17—2 **Crankshaft Ass'y Dimensions**

1. Removing the Crankshaft Ass'y

a. Remove the crankshaft ass'y with the cankcase disassembling tool.

(Fig. 3-17-3)

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

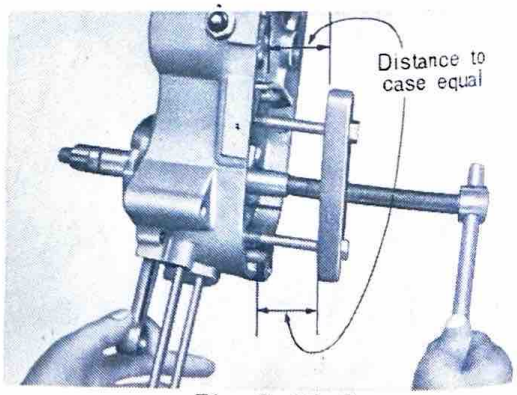


Fig. 3—17—3

Reinstalling the Crankshaft Ass'y

Put shims on both ends of the crankshaft, and reinstall the crankshaft by using the crankshaft assembling tool (for YL2 and YA6). 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. 3-17-4)

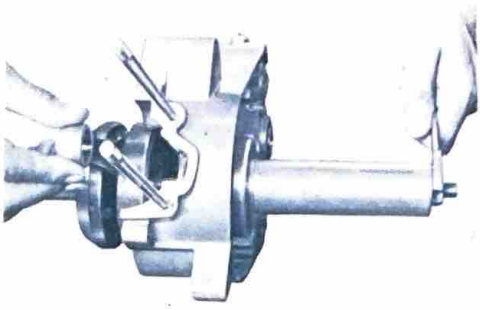


Fig. 3—17—4

3. Checking 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). (Fig. 3-17-5)	Small-end play should not exceed 2 mm. See Fig. 3-17-5	If small-end play exceeds 2 mm, disassemble the crankshaft, check connecting rod, crank pin and large end bearing. Replace defective parts. Small end play after reassembly should be within 0.8-1.0 mm
Check the connecting rod for axial play at large end. (Fig. 3-17-6)	Move the connecting rod to one side and insert a feeler gauge. Large end axial play should be within 0.1-0.3mm. See Fig. 3-17-6	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. ① Fig. 3-17-7	Correct any misalignment by tapping the flywheel with a brass hammer and /or by using a wedge.

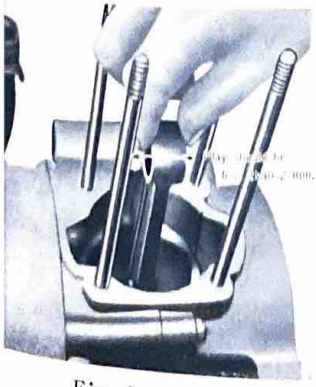


Fig. 3—17—5

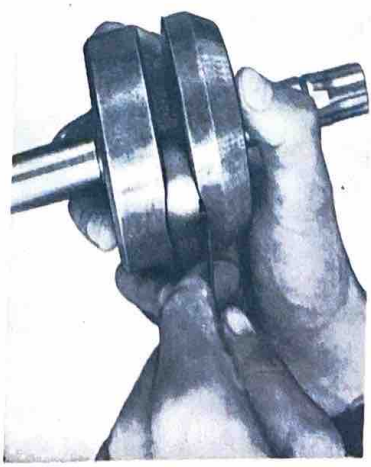


Fig. 3—17—6

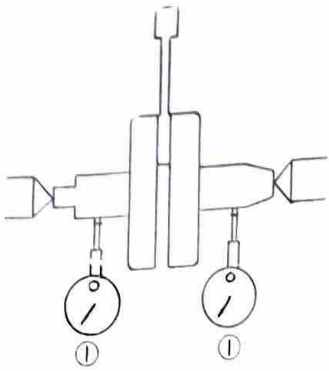
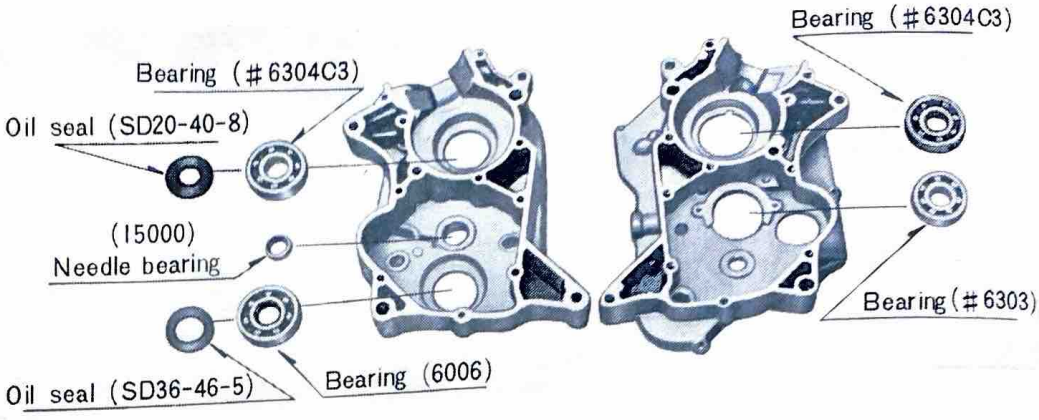


Fig. 3—17—7

3—18 Bearings and Oil Seals



1. Removal and Reinstallation

The cankcase should preferably be heated to approximately 120°C (200°F) to remove or install oil seals and bearings, but the following procedure is satisfactory.

a. Removal

1) Pry the oil seals out of place with a slot head screw driver. (Fig. 3-18-2)
Replace the oil seals when overhauling the engine.

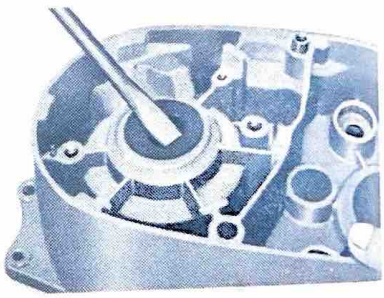


Fig. 3—18—2

2) Remove the bearing with a bearing puller. (Fig. 3-18-3)

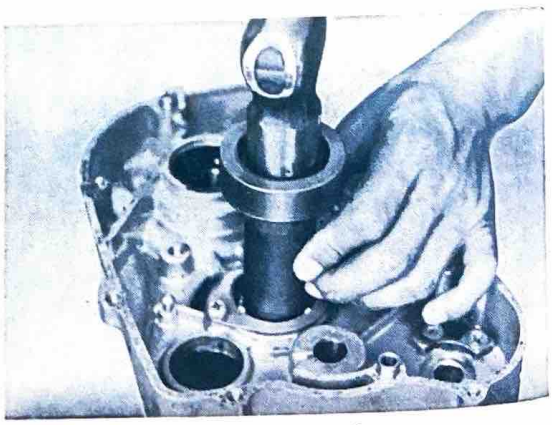


Fig. 3—18—3

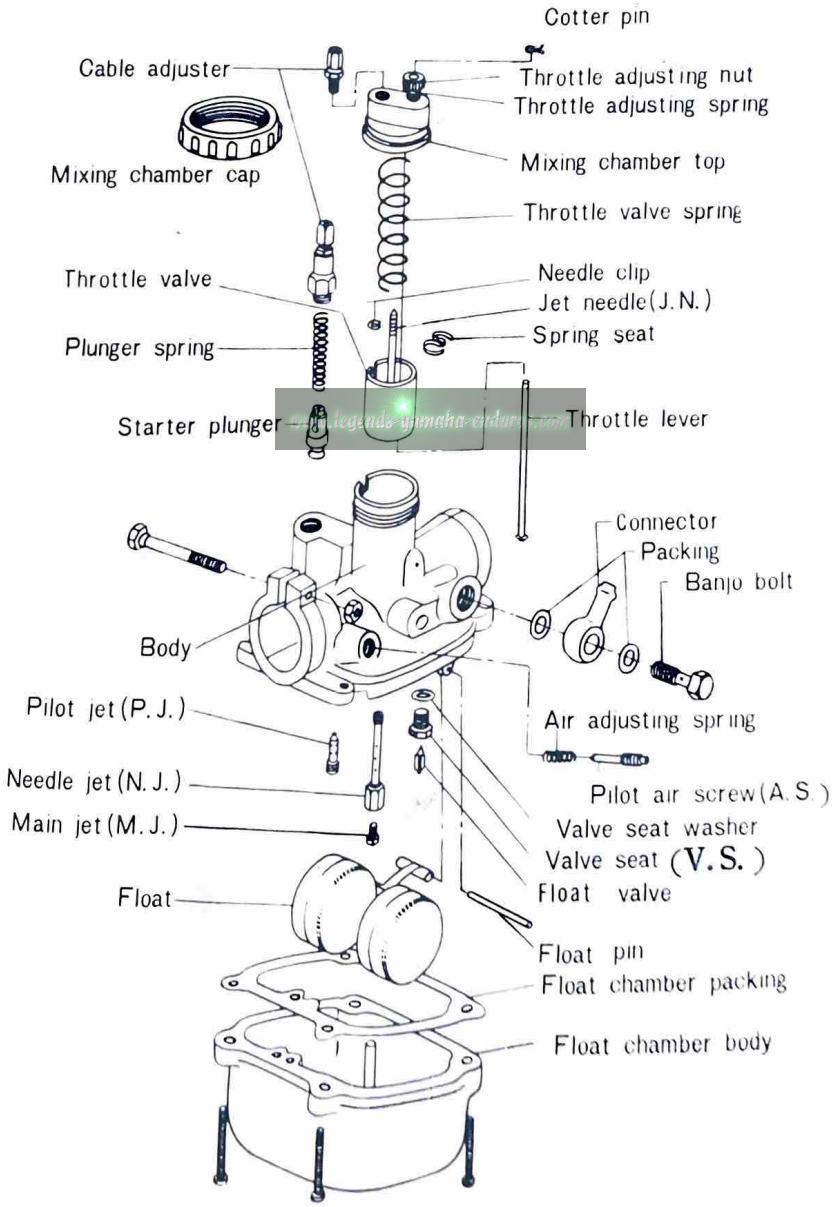
b. Reinstalltion

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-veiw side.)

when installing them, grease them fully.

3—19 Carburetor

The L5-TA carburetor is a VM 20 SC.



Exploded View of Carburetor

1. Checking the Carburetor

a. 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. Do not try to solder the reak as this will change float characteristics + fuel level in the the float bowl.

b. Float Valve

Replace the float valve if its seating end is worn with a 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 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.

c. Overflowing

If fuel overflows, check the carburetor as described in "a,, and "b,, above. If neither "a,, nor "b,, 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 out (Figs. 3-19-1 and 2)

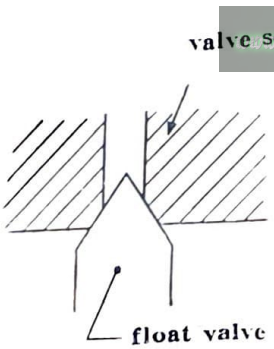


Fig. 3—19—1

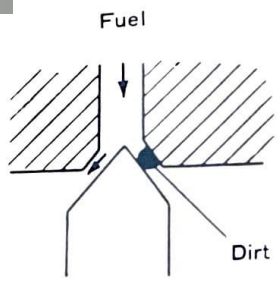


Fig. 3—19—2

d. Cleaning the carburetor

Disassemble the carburetor, and wash all its parts in solvent or carburetor cleaner. Blow out 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 precisionmachined surfaces. (Fig. 3-19-3)

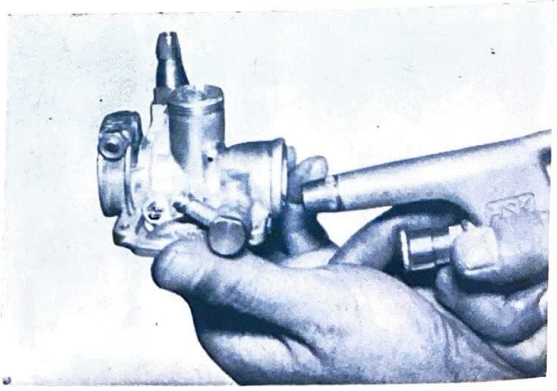


Fig. 3—19—3

2. Readjusting the Carburetor

a. Idle speed adjustments

1) Set the idle air adjusting screw at 1 ¾ turns from the seated position.

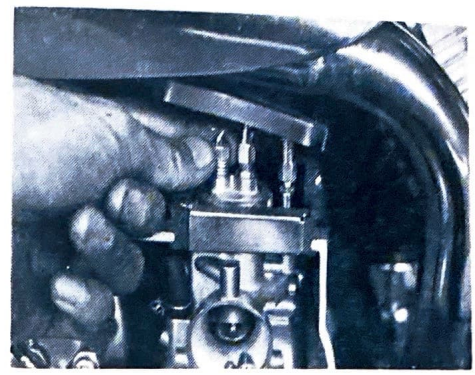


Fig. 3—19—4

2) Set the idle speed screw on top of the carburetor so that the engine idles at approximately 1400 RPM.

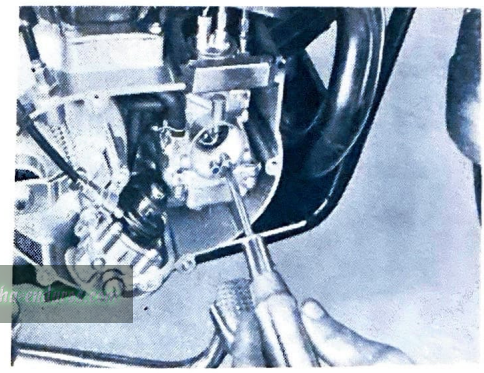


Fig. 3—19—5

3) Set the throttle cable freeplay to 1 or 2mm at the top of the carburetor.

b. Carburetor Settings

Model	VM20SC
M.J. (Main jet)	#180
N.J. (Needle jet)	0-8
J.N. (Jet needle setting)	4D2-3
C.A. (Throttle slide cutaway)	2.0
P.J. (Pilot jet)	#20
A.S. (Air screw back-off)	1¾
G.S. (Starter jet)	#40
V.S. (Valve seat)	
Stamped mark	234E

3—20 Air Cleaner

1. Removal

The air cleaner is housed in the cleaner case above the engine. To remove the cleaner, detach the cleaner case cover. (Fig. 3-20-1)

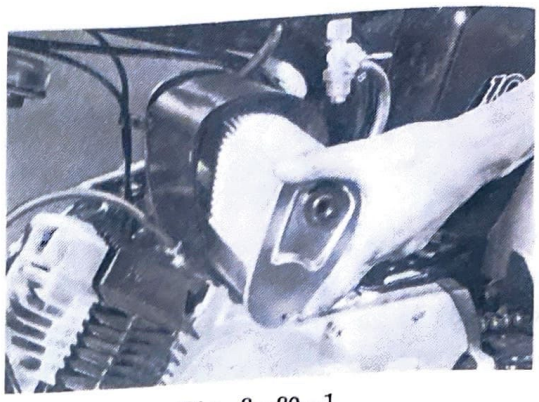


Fig. 3—20—1

2. Cleaning

Clean the filter element with comp ressed air. (Fig. 3-20-2)

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

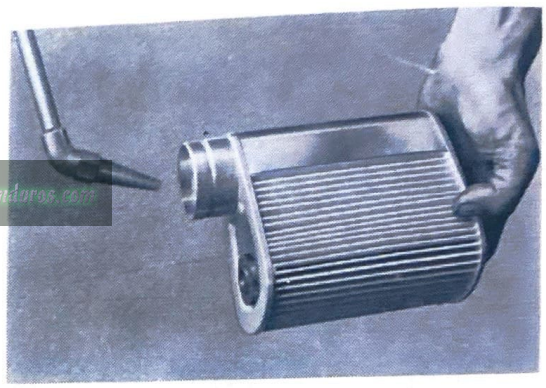


Fig. 3—20—2

3—21 Transmission Oil

Transmission oil amount……Motor oil 10W/30……600 to 650c. c.

Chapter 4. Chassis

The Yamaha 100L5-TA is basically designed for off the road riding as in the case of a trail model or a scrambler, but full design consideration is also incorporated to meet the requirements of on the street riding.

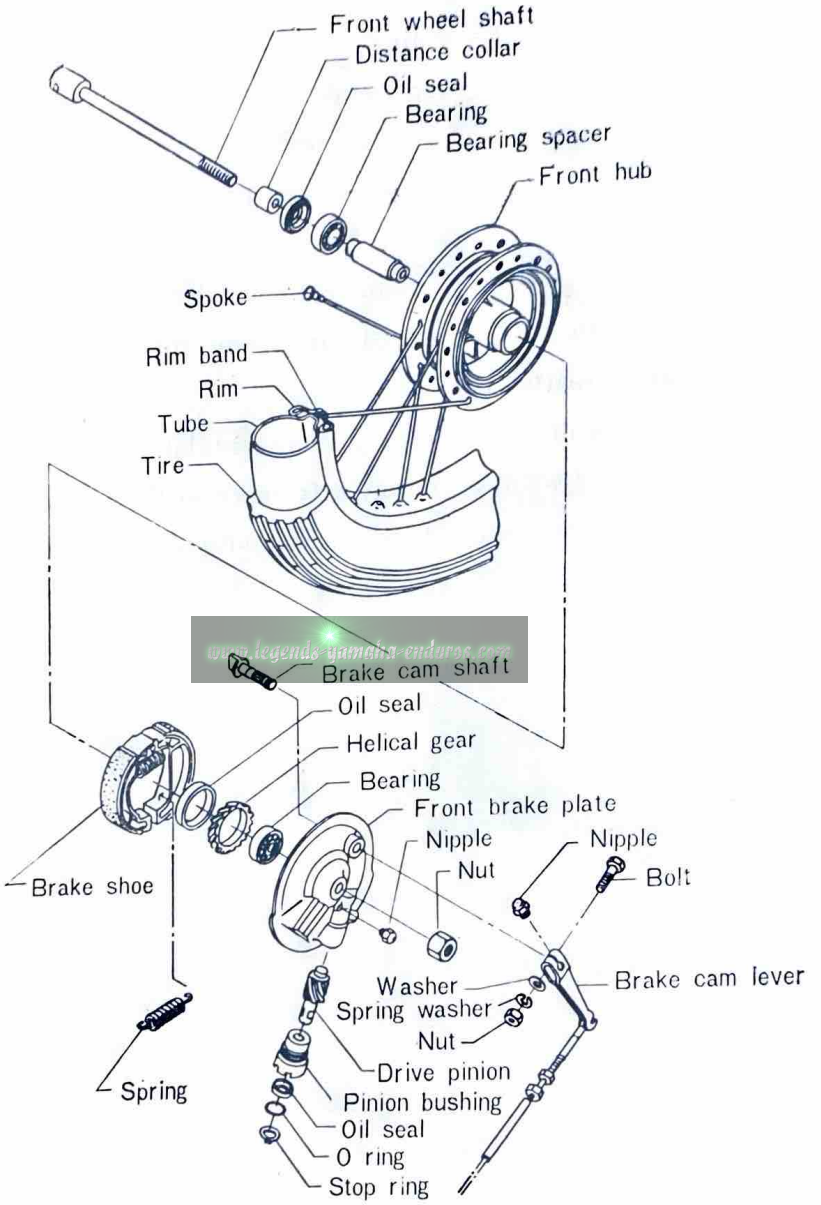
To enable the rider to enjoy riding over rough terrain, it is equipped with block pattern tires for both front and rear wheels, an upswept-type handle bar (with brace) designed for extra strength and rigidity, and engine protector for riding over rocky terrain.

With emphasis on the strength of the frame and related components as well as their performance, the Yamaha 100L5-TA is packed with many improvements,and its stability and durability are also greatly increased.

All electrical equipment is of 12-volt capacity and similar in design, function and performance to that for the L5-TA. The only difference in the two electrical systems is the addition of the front brake stop switch and resultant minor modification to the wire harness of the L5-TA.

4—1 Front Wheel

1. Structure



2. Removal

a. Disconnect the front brake cable and speedmeter cable from the front brake shoe plate. (Fig. 4-1-1)

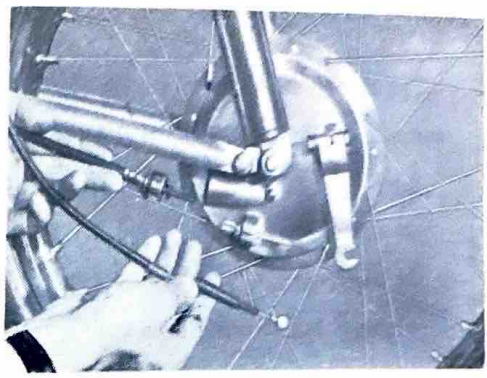


Fig. 4—1—1

b. Remove the front wheel nut and pull out the wheel shaft. Then remove the distance collar.

(Figs. 4-1-2 and 3)

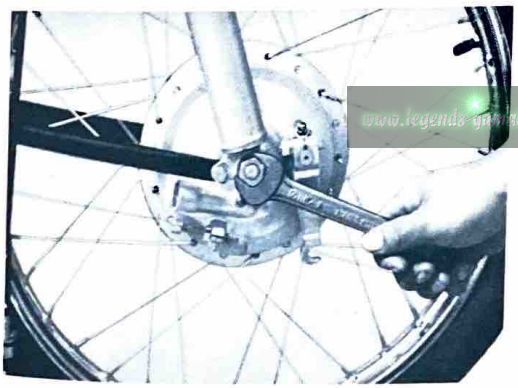


Fig. 4—1—2

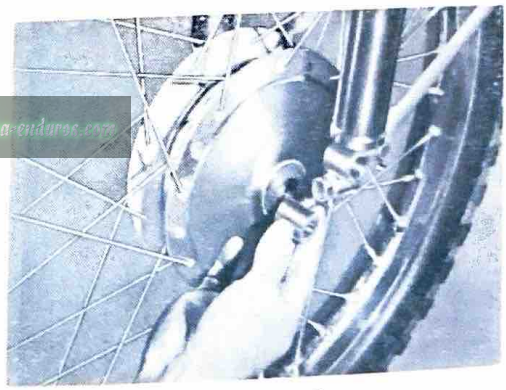


Fig. 4—1—3

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.

c. Remove the front wheel ass'y. (Fig. 4-1-4)

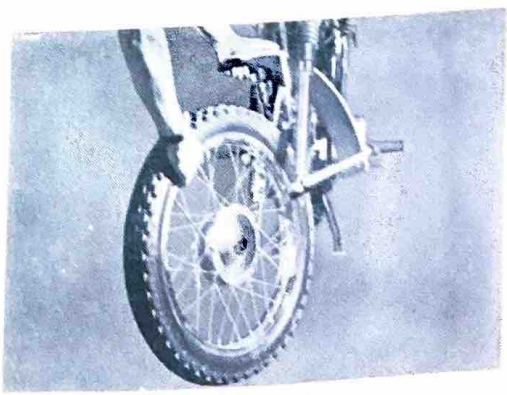


Fig. 4—1—4

3. Checking

a. Runout of the Rim

As shown in Fig. 4-1-5, measure the runout of the rim with a dial gauge.

Limit of runout……3mm (0.11 in.) or less (Fig. 4-1-5)

If necessary, adjust spoke tension or replace the rim.

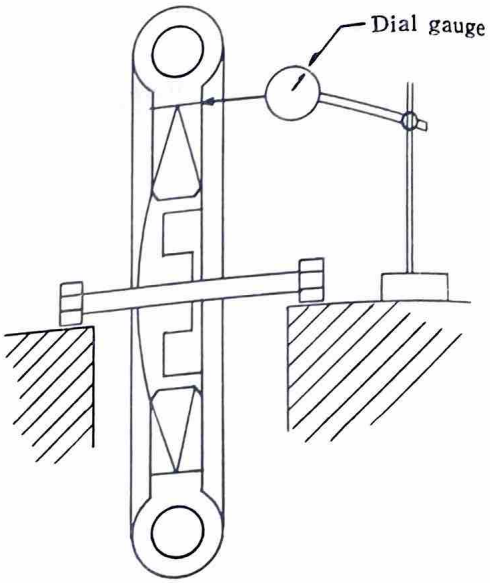


Fig. 4—1—5

b. Brake Shoes

Measure the outside diameter of the brake shoes with slide calipers. If they measure 105mm (4.02 in) or less, replace them (Fig. 4-1-6)

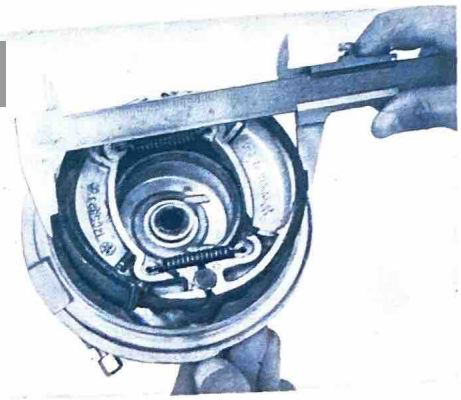


Fig. 4—1—6

c. 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. 4-1-7)

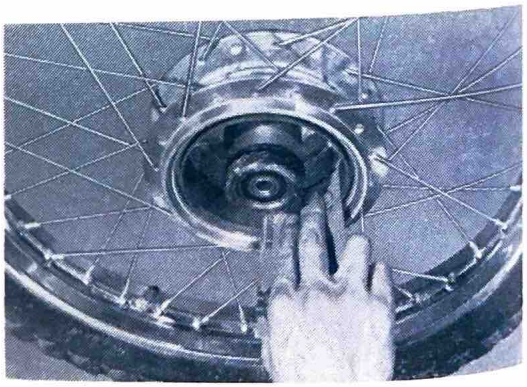


Fig. 4—1—7

4—2 Rear Wheel

1. Constructional View

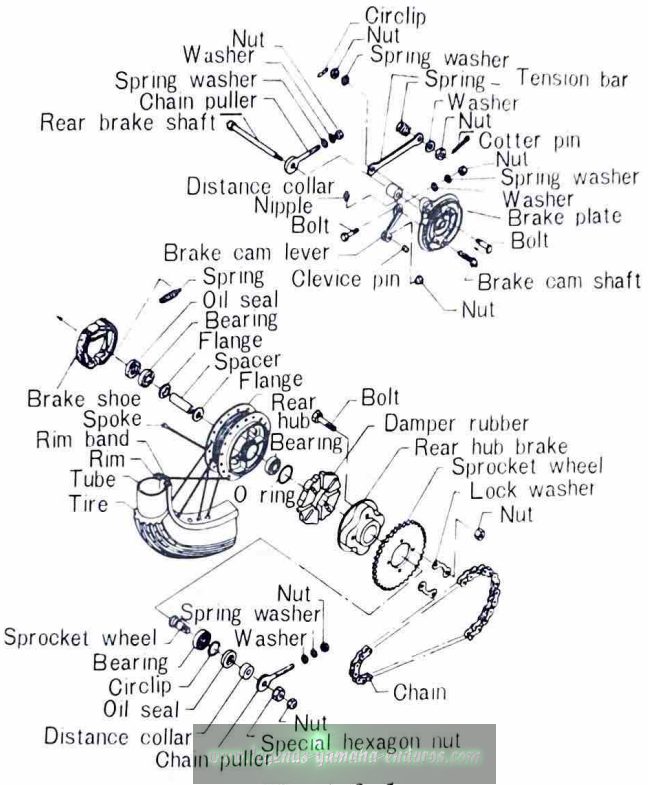


Fig. 4—2—1

2. Removal

a. Remove the anchor bar and brake rod attached to the rear brake shoe plate. (Figs 4-2-2,3 anb 4) Please note the location and condition of all cotter keys and, other safety devices. Reinstall them carefully and correctly and never hesitate to replace them when necessary.

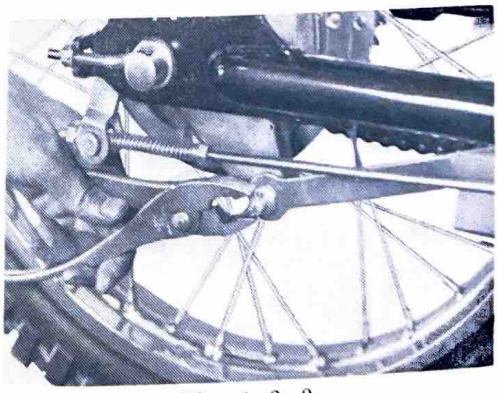


Fig. 4—2—2

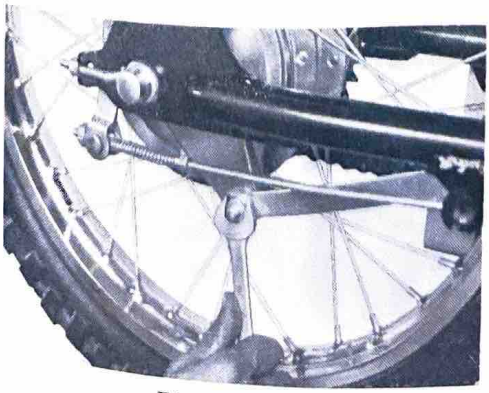


Fig. 4—2—3

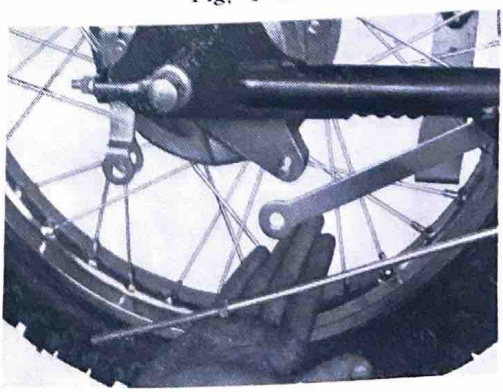


Fig. 4—2—4

b. Remove the nut, then the rear wheel shaft. (Fig. 4-2-5)

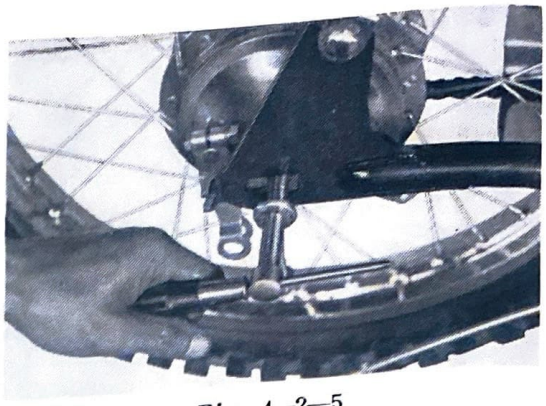


Fig. 4—2—5

c. Remove the distance collar. (Fig. 4-2-6)

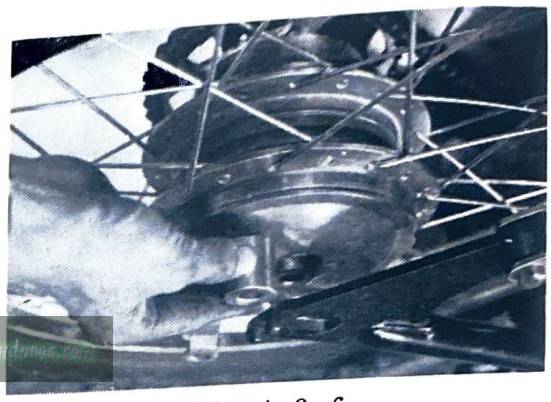


Fig. 4—2—6

d. Incline the chassis and remove the rear wheel. (Fig. 4-2-7)

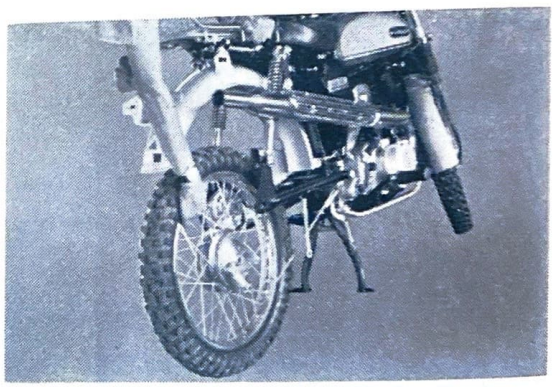


Fig. 4—2—7

e. Pull out the special hexagon nut ant remove the rear clutch ass'y (Figs. 4-2-8 and 9)

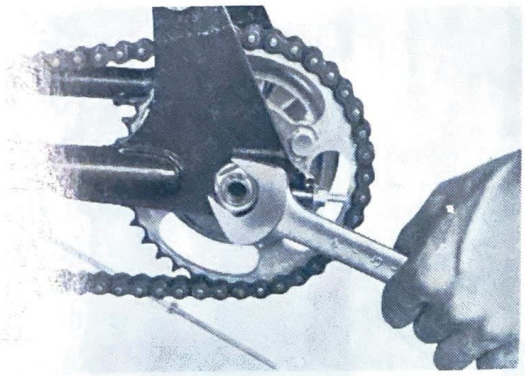


Fig. 4—2—8

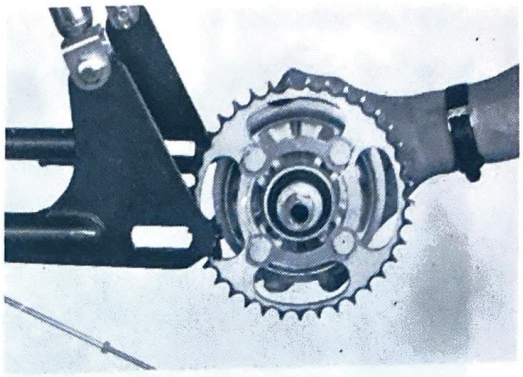


Fig. 4—2—9

3. Checking

a. Runout of the Rim

Check the rim for runout in the same manner as the front wheel. Limit of runout……3mm (0.11 in.) or less

b. Brake Shoes

Check the rear brake shose in the same manner as the front brake shose. Limit of size……105mm (4.02 in.) or less

c. Brake Drum

Check the rear brake drum in the same manner as the front wheel.

d. Rear Sprocket

Replace an excessively worn rear sprocket.

4—3 Front Fork

Check the front fork for bends and oil leakage. Correct any defect in the following manner:

a. Remove the front fender and pull out the inner tube mounting bolt. (Figs. 4-3-1 and 2)

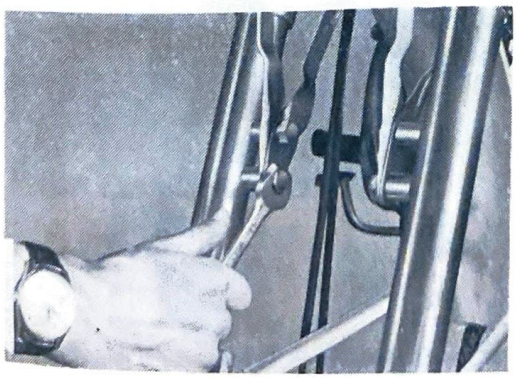


Fig. 4—3—1

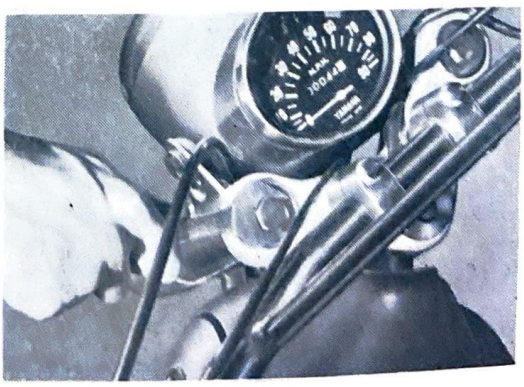
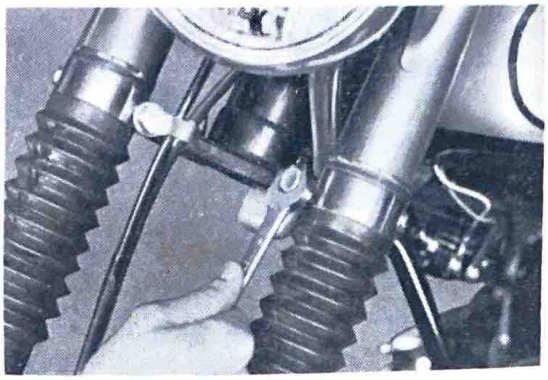


Fig. 4—3—2

b. Loosen the inner tube mounting bolt on the lower bracket and pull the fork downward.
(Figs. 4-3-3 and 4)



Ftg. 4—3—3

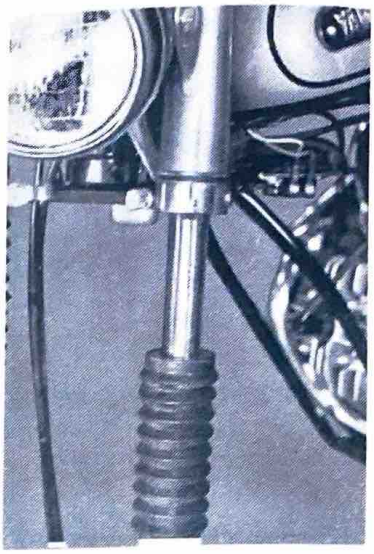


Fig. 4—3—4

2. Disassembling the Fork

a. Drain the oil from the fork.

b. Place a rubber pad or rubber tube around the outer tube nut, and carefully put it in a vice.
Turn the outer tube counterclockwise, and the inner tube can be removed from the outer tube.
(Figs. 4-3-5 and 6)

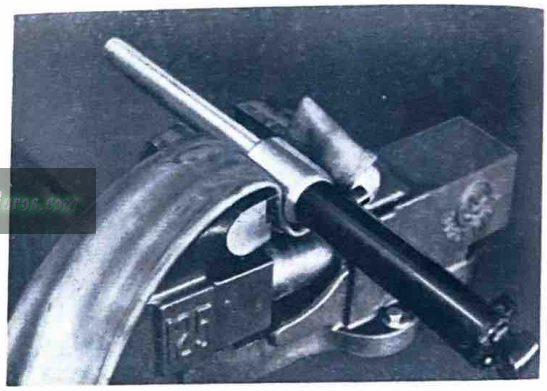


Fig. 4—3—5

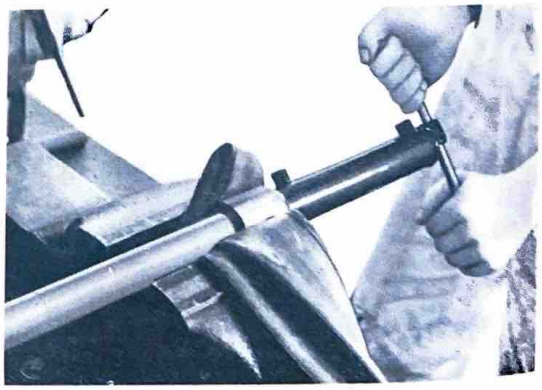
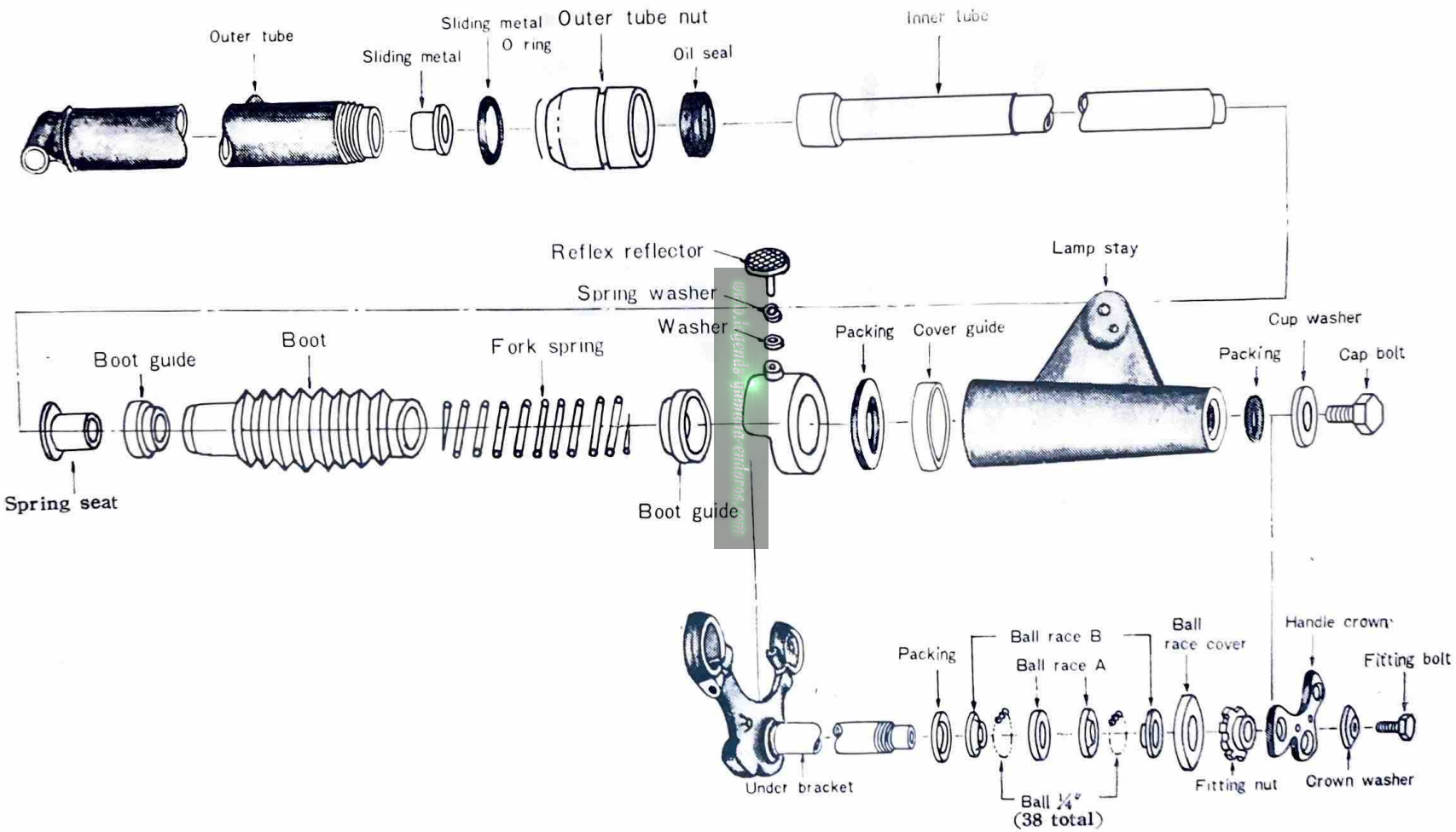


Fig. 4—3—6


Outer tube
Sliding metal
Sliding metal
O ring
Outer tube nut
Oil seal
Inner tube
Reflex reflector
Spring washer
Washer
Lamp stay
Boot guide
Boot
Fork spring
Packing
Cover guide
Packing
Cup washer
Cap bolt
Spring seat
Boot guide
Packing
Ball race B
Ball race A
Ball
race cover
Handle crown
Fitting bolt
Under bracket
Ball ¼"
(38 total)
Fitting nut
Crown washer

3. CheckIng

a. Inner Tube

Check the inner tube for straightness and damage.

Slight bends can be corrected by a press, but it is best to replace the tube.

b. Oil Seal

Be sure to replace the oil seals whenever the front fork is disassembled.

4. Reassembling

a. For reassembling the front fork, reverse the order of disassmbly 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 nut.

Grease the tube and cover the inner tube with a nvlon cloth before reassembling.

After the outer tube nut has started down, remove the cloth.

Check the inner tube for smooth sliding after reassembly is finished.

(Figs. 4-3-8 and 9)

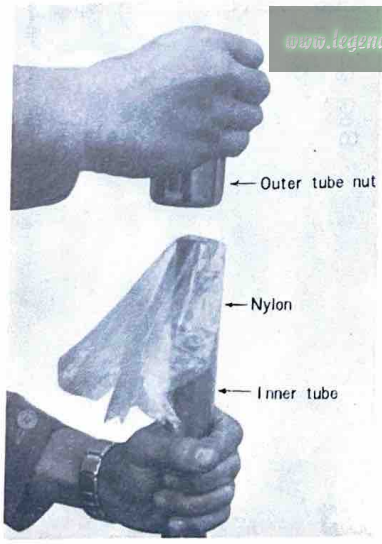


Fig. 4—3—8

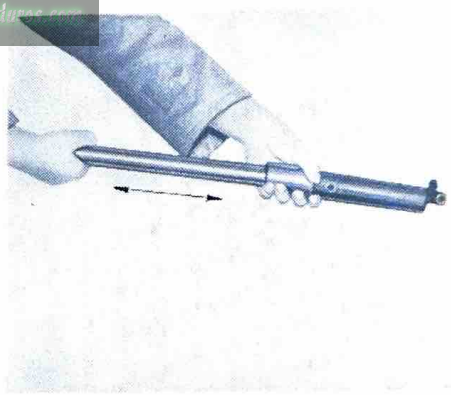


Fig. 4—3—9

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

(Figs. 4-3-10 and 11)

Fig. 4—3—10

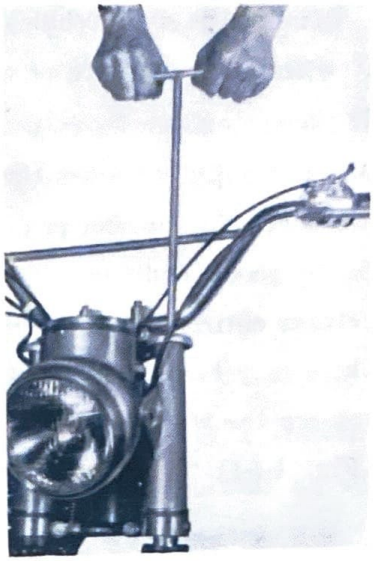


Fig. 4—3—11

c. Feed front fork oil into the inner tube through the upper opening. (Fig. 4-3-12)

Oil amount: each side 140 c.c.

The correct level of the fork oil is 334.6mm below the top of the fork.

Oil ..... A 80:20 mixture of mobile oil #30 and spindle oil #60 should be used.

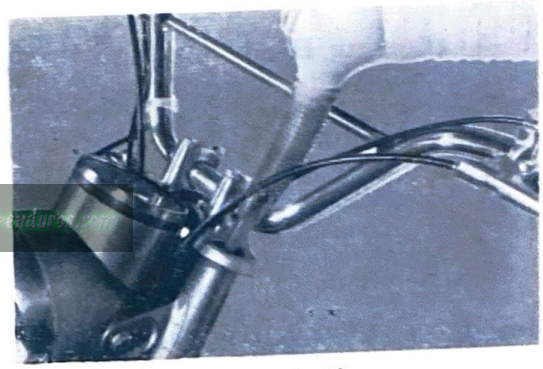


Fig. 4—3—12

d. Finally tighten the inner tube mounting bolt.

e. After the mounting bolt is tight (not before) fully tighten the inner tube mounting bolts (Fig. 4-3-3, p62)

4—4 Rear Cushion

The rear cushion cannot be disassembled. Therefoure, this section covers checking for oil leakage and wear.

1. Checking Oil Leakage

Occassional 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 usually result 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 taken.

a. Remove the rear cushion, and depress it with your hand two or three times. If the spring quickly returns half-way, and gradually stretches the remaining distance, the cushion is considered to be in good condition. If the spring returns entirely with a quick motion, there may be oil leakage. In this case, replace the whole rear custion ass'y. (Fig. 4-4-1)

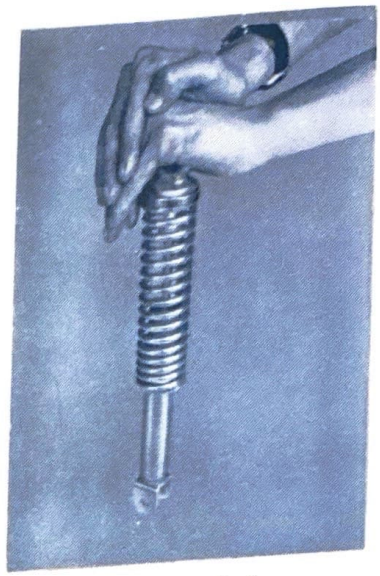


Fig. 4—4—1

4—5 Steering Head

1. Checking

a. 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 will impair maneuverability. Therefore, if such wear is found, replace the ball races.

Replace all the balls if any ball has 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 are found to be worn, replace the whole ball and race assembly.

Chapter 5. Electrical Equipment

5—1 YAMAHA 100L5-TA Electrical Equipment

The YAMAHA TRAIL MASTER 100L5-TA is equipped with a large-sized starter dynamo, which serves as a high-output D-C generator as well as a starter. This enables all electrical terminals to keep voltages almost constant at all times regardless of engine speeds. All electrical parts are of 12-V capacity.

5—2 Main Components

1. Ignition System

The main parts consist of:
Contact breaker (connecfed to the dynamo)
Condenser (connected to the dynamo)
Ignition coil, spark plug, high tension lead, and battery.

2. Charging and Starting Systems

Charging system: The purpose of the charging system is to charge the battery which is the power source for engine starting and all electrical equipment (lights, horn, etc) while the machine is running.

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

The main parts of these two system are:
Dynamo (yoke, armature, brushes), regulator (with cutout relay), starter button (with starting switch), fuse and battery (power source)

3. Lighting and Signal Systems

The ligting and signal systems consist of signal lights, switch and meter lights (signal system) and illumination lights for night travel.
Signal system: Horn, flasher light (flasher relay), stoplight. and switches.
Lighting system: Headlight, taillight, and meter ligts.

5—3 Connection Diagram

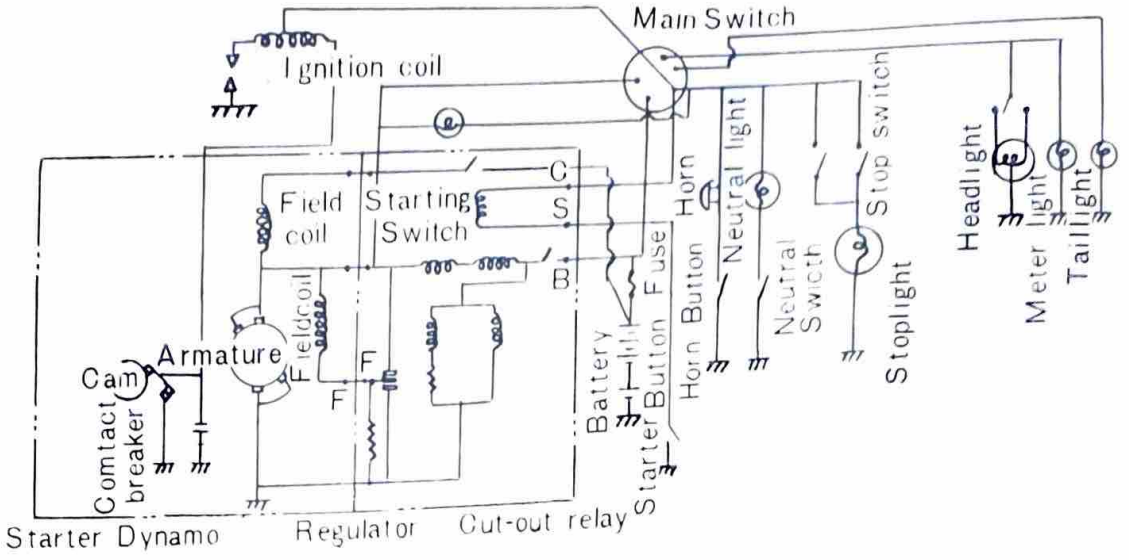


Fig. 5—3—1

5—4 Starter Dynamo

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

Ignition system:

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

a. Contact Breaker Ass'y

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

b. Condenser

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

Charging System:

The charging system of the starter dynamo consists of the yoke ass'y (shunt field coils and brushes) and the armature ass'y (commutator). The armature coil cuts through the magnetic lines of force of the field coils as the engine runs so that a flow of alternating current is induced. The alternating current is converted into

a direct current through the commutator brushes. The direct current voltage is kept constant by the voltage regulator, and supplied to each load of the ignition, lighting and signal systems, as well as to the battery.

Starting System:

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

1. Inspection and Repairs

A. Checking the Dynamo

First, disconnect the wires from the terminals A (white) and F (green), then ground the terminal F to E··· (black), with a jumper wire. Connect the positive lead of the tester to terminal A (white), and ground the negative tester lead to the frame. Set the tester to "DC volts". Start the engine and keep it running at 1,800 rpm. If the electricity generated reads more than 10V on the tester, the generator is in good working condition.

Fig. 5—4—1

Caution: Do not run the engine at more than 1,800 rpm in this test. If you run the engine at more than 1,800 rpm, the high voltage current generated will ruin the coil, lead wire, ect. (Fig. 5-4-1) This is due to the fact that the voltage regulator relay has been disconnected ("F" green).

B. Checking the Yoke Ass'y

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

1) Field Coil Brush Insulation Test. The positive brush of the field coil is insulated from the yoke and by using the tester, you can check its insulation as shown in Fig. 5 4-2. If the insulation is bad, the circuit between the field coil or the brush holder, and the yoke is shorted. (Note: The negative brush is not insulated.)

Fig. 5—4—2

2) Conductivity Test of Field Coil. Check the continuity between the terminals M, A, and F. If continuity is bad, the field coil is broken. Check the

visible coil connections. If the coil connections are good, then the coil is broken inside and it should be replaced because repairs are very difficult.

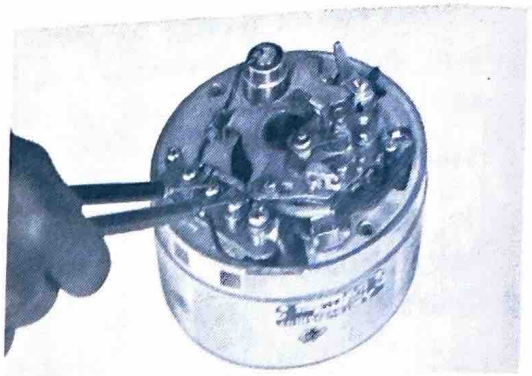


Fig. 5—4—3

3) Checking the Brushes

The brushes are one of the most important parts in the dynamo.

Take out the brushes and check the condition of their contact surfaces. Each brush must contact the commutator with more than ¾ of its surface area.

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

Fig. 5—4—4

If either brush is worn past the minimum length mark, replace them both with new ones. (Fig. 5-4-4)

4) Materials of the Brush

Use the brush having the model No. "6R-1" on its side.

5) Handling the Brushes

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

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

C. Checking the Armature Ass'y

1) Thoroughly clean the commutator of oil and dirt. If the commutator is rough or dulled with brush dust, polish it with fine grain sandpaper (#400 - 600) as shown in Fig. 5-4-5, by rotating the armatnre. Partial polishing will only deform the commutator and shorten brush life.

If the commutator is burned, out

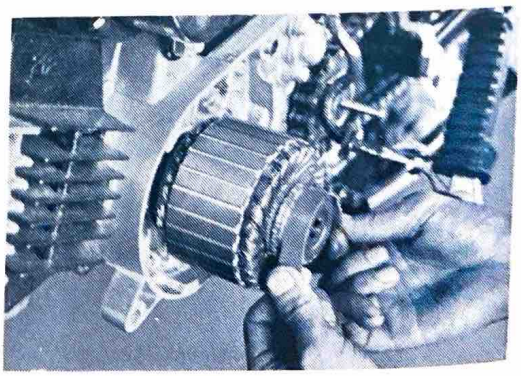


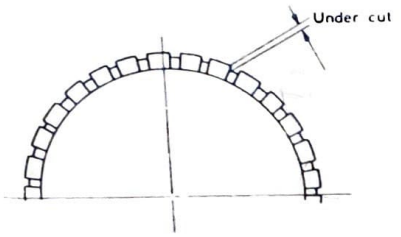
Fig. 5—4—5

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

2) Checking the Commutator Mica Under-Cut

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

Sand off all burrs with sandpaper. Be sure the mica is cut away clean between segments, leaving no thin edge next to segments. (Fig. 5-4-6)



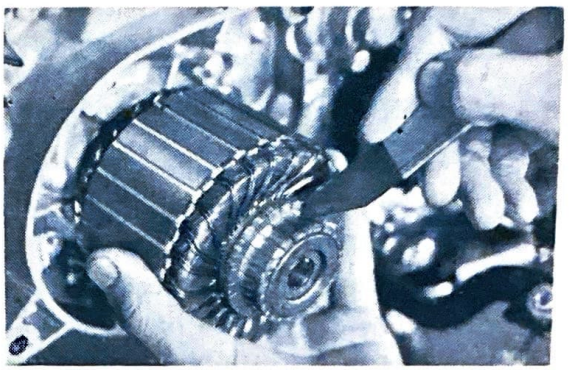


Fig. 5—4—6

Mica under-cut inspection limits: 0.5-0.8 mm

Mica under-cut correction limits: 0.2 mm

3) Checking the Armature for Insulation

If there is electrical leakage between the commutator and shaft, replace the whole armature. (Fig. 5-4-7)

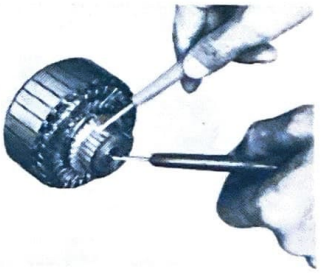


Fig. 5—4—7

4) If the field coil is perfectly insulated and conductivity is also good, but the dynamo will not generate electricity, the core of the armature coil might be short-circuited.

Check the armature with a growler.

D. Checking the Condenser

1) Insulation Tests

Hook up an Electro-tester (service tester) for the insulation resistance test, and attach the tester terminals to those of the condenser. If the tester needle swings once and then returns to its original position, the condenser is in good condition. Condenser leakage will hold the needle at a maximum

reading. If the reading is more than 3MΩ the condenser can be considered to be good. Ground the condenser terminals to discharge electricity. (Figs. 5-4-8 and 9)

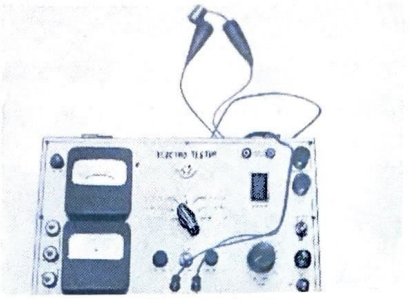


Fig. 5—4—8

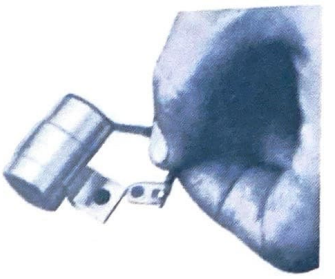


Fig. 5—4—9

2) Capacity Tests

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

Condenser capacity should be no more than 0.22μF ±10%. Before testing the condenser, adjust the capacity of the service tester. (Figs. 5-4-10 and 11)

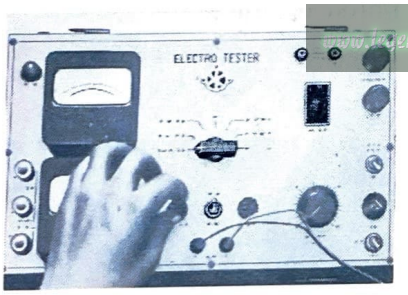


Fig. 5—4—10

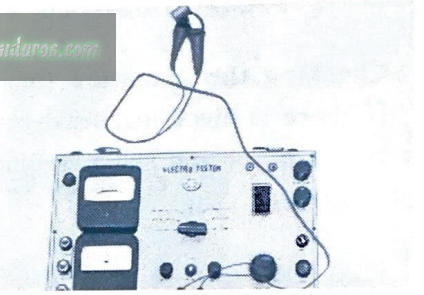


Fig. 5—4—11

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

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

E. Contact Breaker

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

2) Periodically inspect the breaker points for any pitting.

Excessive pitting should be smoothed out with sand paper (#400 - 600), and

wiped off with soft cloth.
(Fig. 5-4-12)

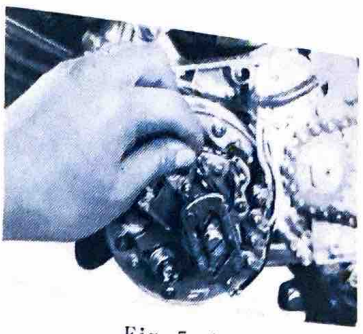


Fig. 5—4—12

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

F. Adjusting Ignition Timing

1) Tools and insturments for adjusting:
Dial gauge (accuracy 1/100 mm)
Dial gauge adapter
Continuity testing lamp, YAMAHA olectro tester or YAMAHA point checker
Point wrench
Slot-head screw driver
12-mm wrench

2) Adjust ignion timing

a) Set the point gap at 0.3-0.35 mm (0.012~0.014″) (Fig. 5-4-13) When the points are at their widest opening.

b) Screw the dial gauge adapter into the plug hole of cylinder head and install the gauge. Turn the armature bolt until the piston reaches top dead center, then turn the zero on the indicator to exactly that point where the needle stopped before reversing. (Fig. 5-4-14)

c) Connect the positive (+) tester lead to the terminal I, and ground the tester's negative lead to rhe frame. (Fig. 5-4-15)

d) Insert a matchwood into the governor, and wedge the governor fully open.

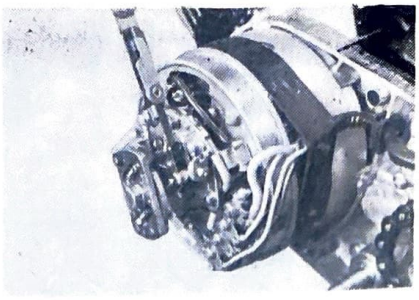


Fig. 5—4—13

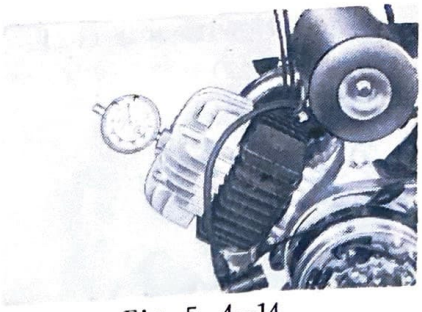


Fig. 5—4—14

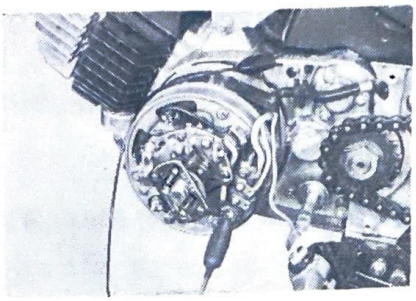


Fig. 5—4—15

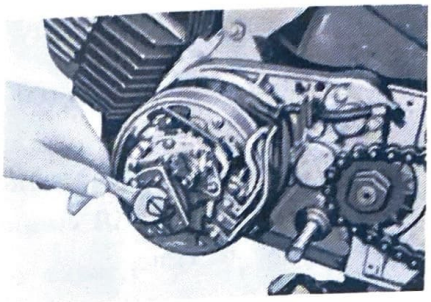


Fig. 5—4—16

e) While watching the dial gauge, turn the govcrnor until the piston lowers to 1.8mm Before top dead center. (Fig. 5-4-16)

f) Then loosen the breaker plate holding screws, and turn the breaker plate. When the points open (the testing lamp lights up), set the serew. (Do not fully loosen the breaker plate holding screw, because the breaker plate tends to shift its position). Turning the breaker plate in the direction of engine rotation causes ignition timing to retard, and turning it in the opposite direction advances ignition timing. (Figs. 5-4-17 and 18)

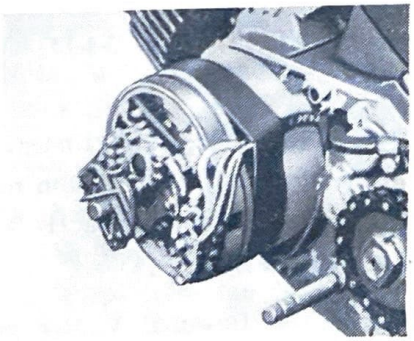


Fig. 5—4—17

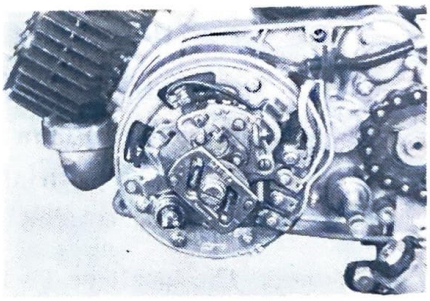


Fig. 5—4—18

Note: With the ignition wire hooked to the coil and points it is possible (See Fig) to check the continuity of the system while timing the engine. However, it is possible, with this hook-up, to damage the test meter if the ignition is turned on. Remove the ignition Key for Safety's Sahe.

8) Dynamo Adjustment Standards

Part	Item	Maintenance	Inspection
Field	Resistance Shunt	6.2Ω @ 20°C (68°F)	When voltage is irregular
	Series	0.0133Ω @ 20°C (68°F)	
Brushes	Material	CG-6R-1	First 6,000 km (4,000mi) Every 4,000km thereafter (2,500mi)
	Number	2	
	Width × thickness × length	8 × 4.5 × 20mm	
	Minimum length	8mm	
	Spring capacity	360±10%-600±10% (initial use)	
Commutator	Diameter	40φmm	
	Minimum diameter	38φmm	
	Mica undercut	0.5-1.0mm	
	Minimum mica undercut	0.2mm	
	Difference between max. and min. diameter	0.03mm	
Breaker	Point gap	0.3-0.35mm	Every 3,000km (2,000mi)
	point pressure	700g±10%	(High rpm irregular)
	Ignition timing	BTDC21°(1.8mm)	(Ignition irregular)
	Automatic spark advance	Starting 1,600±150rpm	
		Final 2,000±100rpm	
		Advance 15.5°	
Others	Dynamo dia. (outer)	123φmm	
	Dynamo dia. (inner)	115φmm	
	No. of poles	6	
	Core gap	0.8mm	
	Armature taper	20φ × 1/10	
	Cut-in rpm	1,800rpm	
Capacity	Rated output rpm	14-V, 4.5A/1,950rpm	

5—5 Regulator (Voltage Regulator)

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

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

1. Inspection and Adjustment

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

A. No-Load Voltage

1) Inspection

I. Start the engine and keep it running at 2,500 rpm.

2. Disconnect the wire at tarminal B (red) of the regulator and connect the positive tester lead to terminal B (red). Then ground the negative tester lead.

3. Your regulator is correct if the testor reads 15.8-16.5V. (Fig. 5-5-1)

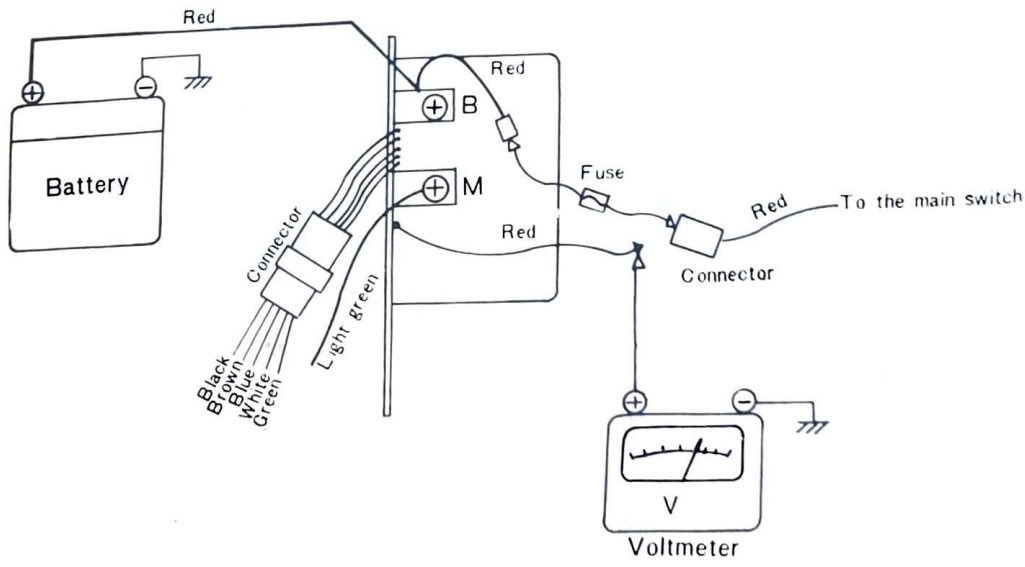


Fig. 5-5-1

2) Adjustment

If the measured voltage is more or less than the allowed, adjust it by raising or lowering the spring hook on the voltage relay side.

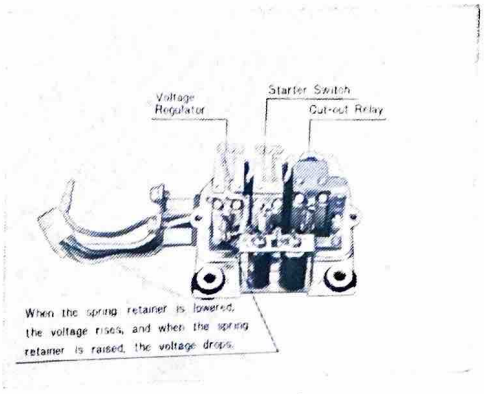


Fig. 5—5—2

B. Cut-in voltage of the Cut-out Relay

1) Inspection

○Disconnect the lead from the dynamo A terminal, connect the tester positive lead to the A terminal, then ground the negative lead to the frame. (Fig. 5-5-3)

○Start the engine, and increase engine speeds slowly. The cut-out relay is correctly set if its breaker points close at 12.5-13.5V. (approx. 1,800 rpm)

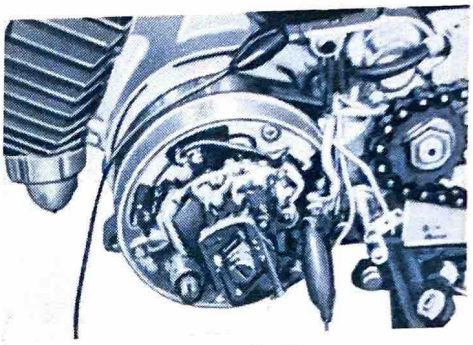


Fig. 5—5—3

2) Adjustment

If the breaker points will not close at the specified voltage. adjust the cutout relay by changing its spring tension. (Fig. 5-5-4)

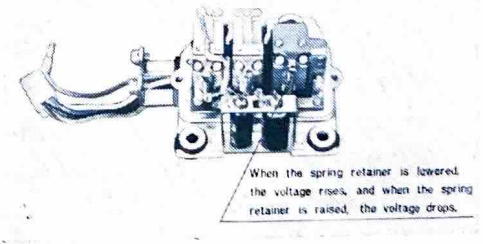


Fig. 5—5—4

In actual practice, there will rarely be need to adjust the cutout relay. If the point surfaces of the voltage and cutout relays are worn or pitted, polish them with fine sandpaper (#400-600) before making any adjustment.

3) Regulator Maintenance Standards

	Item	Maintenance standards	Inspection
Voltage regulator	No load voltage adjustment value	15.8-16.5V/2,500rpm	When voltage is irregular
Voltage relay	Voltage coil resistance value	8.14Ω/20°C (68°F)	
	Field coil input resistance	10Ω/20°C (68°F)	
	Compensation value	16Ω/20°C (68°F)	
	Core gap	1.0–1.2mm	
	Point gap	0.3–0.4mm	
Cutout relay	Cut-in voltage	13±0.5V	
	Reversing current	5A or less	
	Voltage coil resistance value	79.2Ω/20°C (68°F)	
	Core gap	0.5~0.7mm	
	Point gap	0.6~0.8mm	

5—6 Ignition Coil

The ignition coil is a kind of transformer, with approximately 50 times the number of windings in the secondary coil as in the primary. If the electric current supplied to the primary coil (from the battery) is interrupted by a contact breaker, the primary coil will create a 150-1,300V current by self-induction. This current is boosted to 7,000-10,000V by mutual induction in the larger number of secondary coil windings, thereby making a spark jump the plug elecrodes.

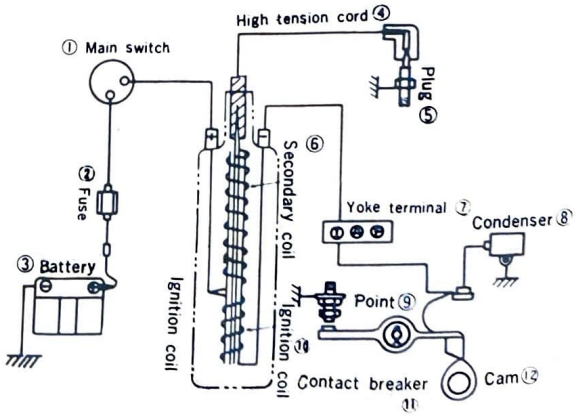


Fig. 5—6—1

1. Inspection

If no spark, or a rather weak spark, jump the plug gep, inspect the ignition coil as well as the contact breaker.

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

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

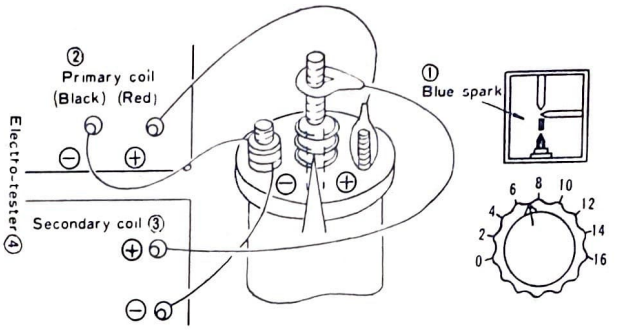


Fig. 5—6—2

b. Test with Coil Installed (practical test)

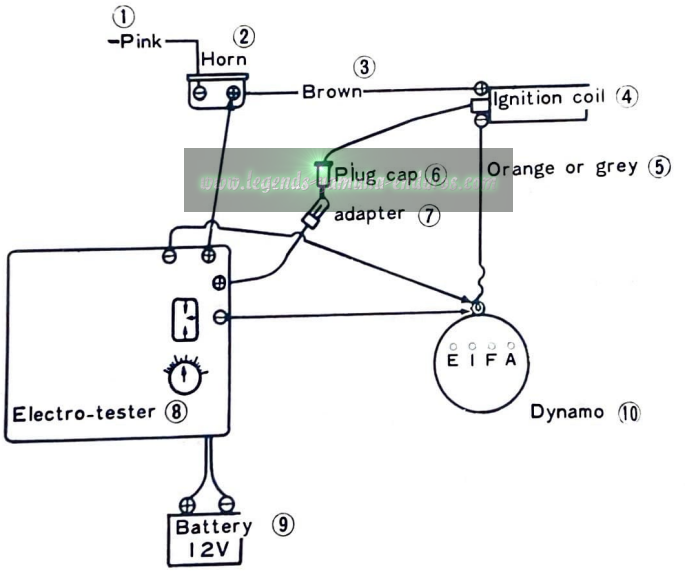


Fig. 5—6—3

○Disconnect the lead attached to the ignition dynamo terminal I and connect the negative primary and negative seconddary leads of the tester to it.

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

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

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

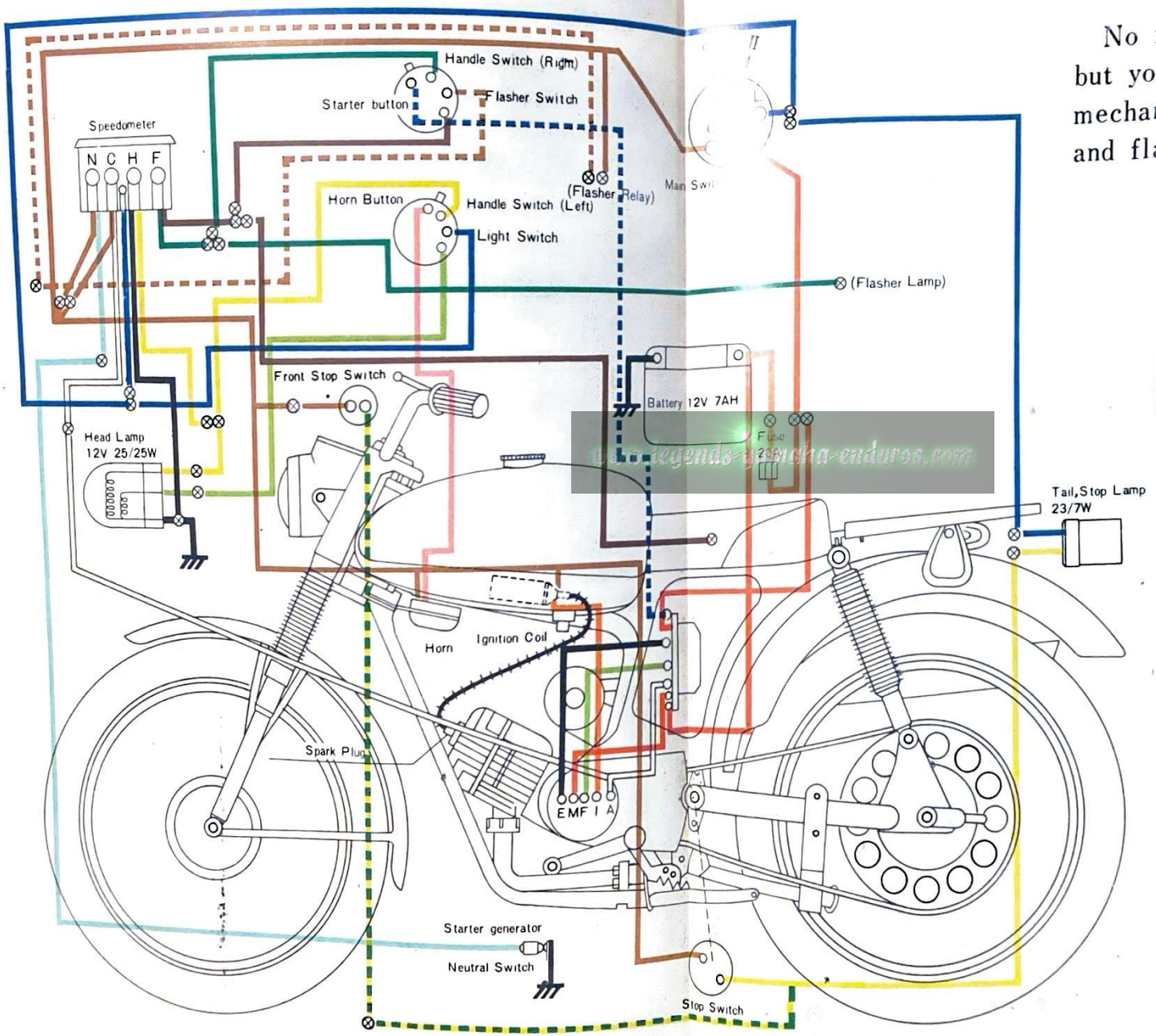
○If the tester shows a spark of 7mm or more, the coil is in good condition.

YAMAHA 100 L5-TA

Service manual

YAMAHA MOTOR CO., LTD.
HAMAMATSU, JAPAN

YAMAHA 100 L5 A CIRCUIT DIAGRAM



No flasher circuit is in this diagram, but you can easily get the flasher light mechanism by fitting only the lamp units and flasher relay.

Main switch connecting

Key position	B-C	B-L	B-T	A-C	
0	×	×	×	×	Stop
I	○	×	×	×	Day driving
II	○	○	○	○	Night driving

Chart of wire colors

Armature Circuit	white	○
Field Circuit	green	
Earth Circuit	black	
Common Circuit	brown	
Battery (+) Circuit	red	
Lamp Circuit	blue	
Horn Circuit	pink	
Neutral Lamp Circuit	sky blue	
Tail Lamp Circuit	blue	
Ignition Coil Circuit	orange	
Stop Lamp Rear Switch Circuit	yellow	
Stop Lamp Front Switch Circuit	yellow/green	
Starter Switch Circuit	blue/white	
Starter Circuit	light green	
Left Turn Sig Circuit	dark brown	
Right Turn Sig Circuit	dark green	
Flasher Circuit	brown/white	

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