YAMAHA

YL-1
YL1E

Service Manual

LIT 11611-34-00

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

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

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

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

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

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YAMAHA YL-1/YL1E
COMBINED SERVICE MANUAL
2nd EDITION
FEBRUARY 1974

1974 YAMAHA INTERNATIONAL CORPORATION
6600 ORANGETHORPE AVENUE
BUENA PARK, CALIF. 90620

LIT-11611-34-00

FOREWORD

Following the successful YG1 series comes YAMAHA's 100 YL–1, delivering *reliable* performance with a 2-stroke, parallel-twin engine and YAMAHA Autolube.

The YL–1 accelerates quickly, rides smoothly at high speeds, and starts easily in any emergency, thanks to Yamaha's primary-coupled kick starter.

Such built-in features alone mean nothing to our customers unless our dealers offer competent service to back up every machine they sell.

This manual was published so all YAMAHA dealers and mechanics undertaking this important responsibility could study it, become familiar with handling and servicing the YL–1, and thereby make their sales and service more efficient and profitable.



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Chapter 1: GENERAL

A. Features:

1. Two-Stroke Engine and YAMAHA Autolube:

The powerful 2-stroke, parallel twin-cylinder engine is equipped with YAMAHA Autolube, and ideal "separate lubrication system" for 2-strokes, providing reliable highspeed performance: immediate, "clean" acceleration without "burbling;" and extended engine life. The 100 cc YL–1 matches or outperforms 125 cc machines of competitive makes.

2. One-touch (primary-coupled) Kickstarter:

In an emergency, the engine can be started by simply squeezing the clutch and kicking the starter crank without shifting the transmission back to neutral, a welcome convenience to the rider who stalls his machine in heavy traffic.

3. Well-spaced 4-speed Transmission:

Replacing the ball-lock type shifting system used in the YG–1 transmission, is the improved YA6 system. Developed from valuable engineering experience with the YA5 and YA6, the YL–1 transmission insures "soft-touch" shifting and smooth transition from low to high speeds.

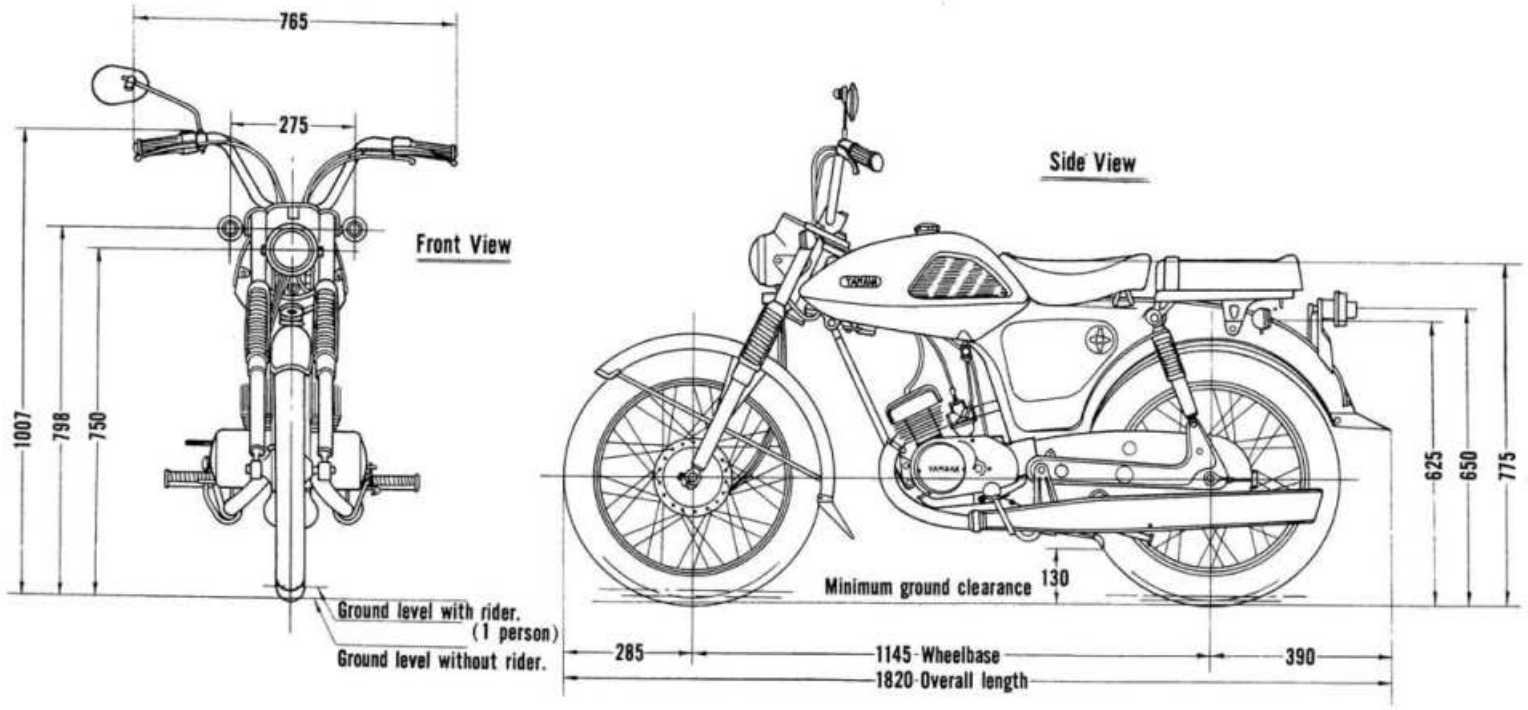
4. Starter-equipped Carburetor:

Starter-jet equipped carburetors make starting easy in any weather.

5. Dependable Brakes:

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

Front and Side Views



B. YAMAHA 100 Specifications:

Model Designation	YAMAHA YL–1
Dimensions:	
Overall length	71.6 in. (1,820 mm)
Overall width	24.8 in. (630 m m)
Overall height	37.3 in. (947 mm)
Wheelbase	45.1 in. (1,145 mm)
Minimum ground clearance	5.1 in. (130 mm)
Curb Weight	180 lbs.
Performance:	
Maximum speed range	65–70 mph (100–110 km/h)
Fuel consumption (on level, paved road)	153 mpg at 19 mph.
Climbing ability	20°
Minimum turning radius	70.1 in. (1,780 mm)
Braking distance	23 ft. at 22 mph
Engine:	
Model Designation	YAMAHA L–1
Type	2-stroke gasoline
Lubricating system	Yamaha Autolube
Spark Plug/Gap	NGK B7HS /0.5 ∽0.6mm
No. of cylinders and arrangement	2, parallel
Piston displacement	97 cc
Bore × stroke	38 × 43 mm
Compression ratio	7.1 : 1
Maximum output	9.5 bhp 8,500 rpm
Ignition Timing	1.8±0.15mm BTDC
Starting method	Kickstarter
Ignition method	Battery ignition
Carburetor Model and No. of Units	VM16SC × 2
Air Cleaner:	Dry, paper element
Power Transmission:	
Clutch	Wet, multiple-disc
Primary reduction method and ratio	Gears, 3.89 : 1 (74/19)
Transmission	4-speed constant-mesh
Gear ratios:	Total reduction:
1st 40/13	3.08 : 1 (27.96)
2nd 34/18	1.89 : 1 (17.17)
3rd 30/23	1.30 : 1 (11.85)
4th 26/27	0.96 : 1 (8.75)
Secondary reduction method and ratio	Chain 2.33 : 1 (35/15)
Frame:	Pressed steel backbone
Suspension:	
Front	Coil spring, oil dampened telescopic fork
Rear	Coil spring, oil dampened, swing arm
Steering Angle:	45° left and 45° right of 0°
Wheels:	
Caster	63°
Trail	90 mm
Front tire	2.50 × 17—4 ply rating
Rear tire	2.50 × 17—4 ply rating

Brakes:	
Type	Internal expanding
Front	Hand operated, cable actuated
Rear	Foot-operated, rod actuated
Fuel Tank Capacity:	1.93 gal. (7.3L)
Oil Tank Capacity:	1.16 qts. (1.1L)
Charging Generator (Dynamo):	
Model designation	GI 206 14V84W
Manufacturer	Hitachi
Voltage Regulator, type:	Tirrell
Spark Plug:	NGK, B7HZ or B8HC
Battery:	
Manufacturer	Furukawa or Yuasa
Model designation	BST3–12 or MG3–12
Capacity	12V, 5.5AH
Lights:	
Head light	12V, 25WD
Tail/stop light	12V, 8W/20W (red)
Neutral pilot light	12V, 3W
Instrument light	12V, 5W
High beam indicator light	12V, 3W

C. Performance Curves:

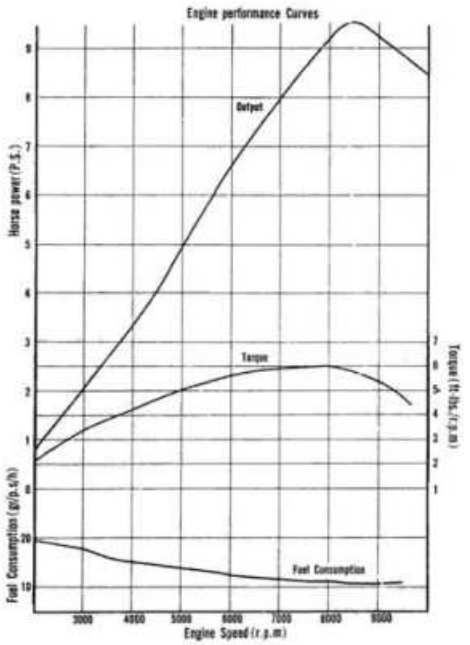


Fig. C-1

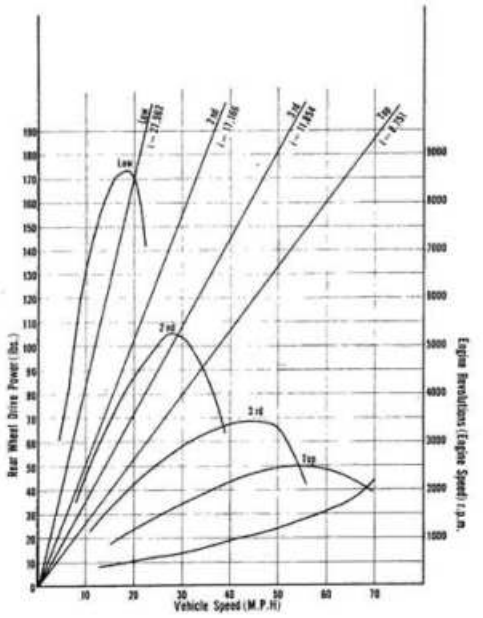
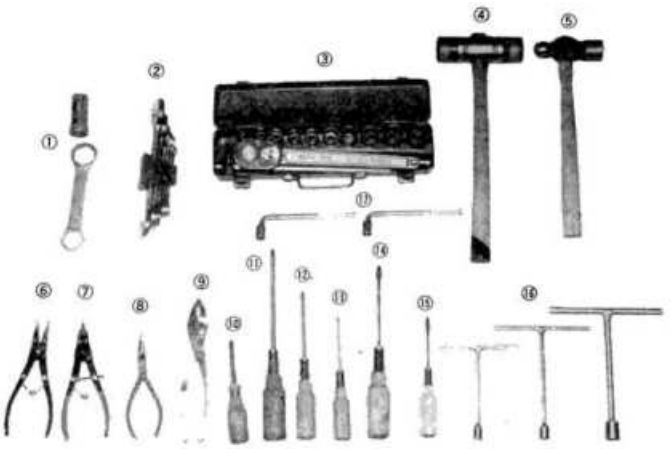


Fig. C-2

D. Tools and Instruments for Shop Servicing:

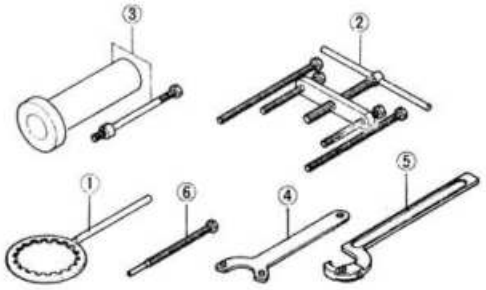
The following tools and instruments are required for shop servicing the YAMAHA YL–1 :

Ordinary Tools:



1. Plug wrench, 13 ×23
2. Set of wrenches
3. Set of socket wrenches
4. Plastic hammer
5. Steel hammer
6. Circlip pliers (ST type)
7. Circlip pliers (RT type)
8. Needle nose pliers
9. Pliers
10. Phillips-head screwdriver, large
11. Phillips-head screwdriver, medium
12. Phillips-head screwdriver, small
13. Slot-head screwdriver large
14. Slot-head screwdriver, medium
15. Slot-head screwdriver, small
16. T-handle socket wrench
17. L-handle socket wrench

Special Tools and Instruments:



1. YA6 clutch holding tool
2. Crankcase dividing tool
3. Crankshaft installing tool (for YG–1, and YA6)
4. Flywheel magneto holding tool
5. New type exhaust ring nut wrench
6. Hitachi armature removing tool

In addition, an electric-tester, tachometer (engine RPM meter), hydrometer, etc should be provided.

Others :



1. Grease
2. 2 Cycle or autolube oil (#30)
3. YAMAHA Bond (No. 5) (gasket paste)
4. Rags
5. Overhauling stand
6. Parts tray
7. Oil can
8. Oil drain pan

Using a wooden box with a drain pan underneath will facilitate engine disassembly and servicing. Expendable parts (such as gaskets) and replacement parts must also be on hand.

Chapter 2: YAMAHA AUTOLUBE

A. What is YAMAHA Autolube?

Ordinary 2-stroke engines are lubricated by motor oil pre-mixed in gasoline, but YAMAHA Autolube completely outdates conventional mixed fuel lubrication. The Autolube system uses a separate oil tank to feed an engine driven oil pump that forces oil directly to the intake passages. Autolube delivers a varying, but always precise volume of oil, because it is engine controlled.

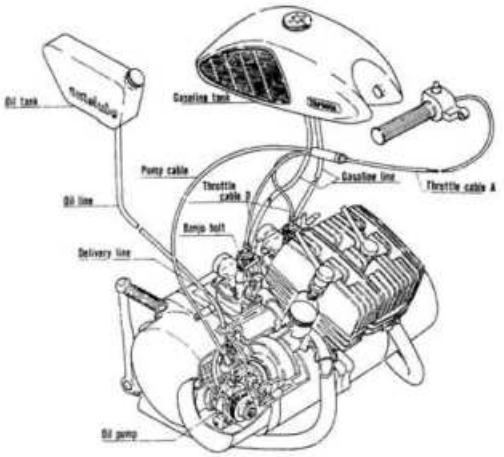


Fig. A-1

B. Features of YAMAHA Autolube

The oil pump is driven by the engine through a reduction gear, and is connected to the carburetor throttle valve cables which are controlled by the accelerator grip. The oil pump automatically regulates the volume of lubricating oil according to engine rpm (engine speed) and the throttle valve opening (load), thus pumping the optimum amount of oil for engine lubrication under any operating condition. This "automatic separate lubrication" does not merely eliminate disadvantages in the pre-mix system, but it further frees the potential efficiency, performance, and durability of 2-stroke design:

AUTOLUBE....

1. ...*eliminates the bother of pre-mixing* gas and oil.
2. ...*maintains optimum lubrication* according to engine RPM *and* throttle position.
3. ...*reduces spark plug fouling* by injecting just enough oil for proper lubrication.
4. ...*can cut oil consumption* to $\frac{1}{3}$ that of conventional 2-strokes, by pumping a precisely *variable* oil volume.
5. ...*reduces exhaust smoke;* no excess oil builds up in the combustion chamber because injection is proportional to engine speed and load.
6. ...*lets you use engine compression as a brake;* oil injection continues according to engine RPM, even with the throttle closed.
7. ...*improves performance;* no excess oil interferes with complete combustion of the gas-air mixture.
8. ...*prolongs engine life;* each injection is clean, undissolved, # 30 2-cycle or outboardoil with high film strength and other lubricating qualities.

RECOMMENDED OIL: YAMALUBE 2-CYCLE, or

Any major brand of two-stroke oil labeled as 'B1A certified for service TC-W.'

Below 15°F use SAE 10W-30
Below −10°F use SAE 5W-20

C. 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 form dust, dirt, etc., and after reinstalling it bleed and adjust the pump correctly. Proper handling will keep the pump free of trouble.

1. Bleeding:

When the oil pump has been demounted, the oil line disconnected, or when there is no oil in the oil tank (on brand new machines), air enters the pump case and interrupts the flow of oil, so the pump must be bled.

Remove the bleeder bolt and rotate the starter plate (manual feed wheel) toward you from the top, to feed oil through the pump. Hold the adjusting pulley back (pull the pump cable) to let the plunger pump at maximum stroke. As you turn the starter plate, oil will begin flowing out of the bleeder hole. When air bubbles no longer appear in the oil, you can install and tighten the bleeder bolt (Fig. B–1)

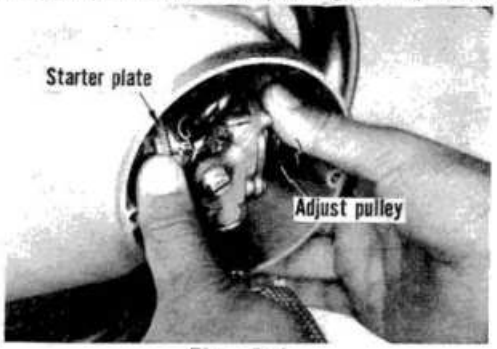


Fig. C-1

An oil pump that has been drained and reinstalled can be bled more quickly if the pump is driven by the engine, and not by hand as described above. First, correctly adjust the oil pump (see page *10*), tnen start the engine, and with the engine idling, pull the pump cable to let the plunger pump at full stroke. It usually takes one or two minutes to expel all the air, so keep your eye on the oil flowing through the delivery line. When clear air bubbles no longer appear in the line, bleeding is complete.

2. Oil Pump and Carburetor Adjustments (Synchronization):

a. Pull up the rubber carburetor caps, and turn the idle screws all the way down.

b. Remove all slack from the two "B" throttle cables: Loosen the lock nut on one carburetor's cable adjuster and alternately tighten the adjusting screw and gently pull up its cable until even the slightest pull on the cable moves the throttle valve; then all free play is gone. Repeat this adjustment on the other carburetor. The throttle control system should have *some* free play, other-wise, when the handlebars are turned, throttle cable A will flex and slightly raise the throttle valves; so turn out (loosen) each cable adjuster one or two turns (So you can pull up the throttle cables 1–2 mm, 1/16," before they move the valves.), and *then* synchronize the throttle valves' movement: Put one finger of your left hand in each carburetor bore, against the bottom edges of the throttle valves, and turn the accelerator grip with your right hand. If you feel one valve start to move

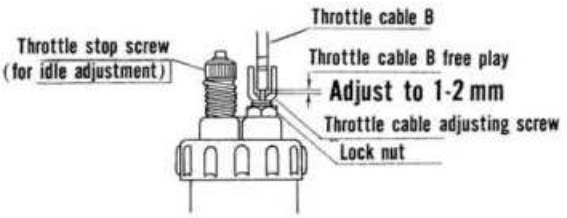


Fig. C-2

before the other, tighten the cable adjuster on the slow opening valve until both valves start to open simultaneously

c. Next, turn both idle screws up 2 or 3 turns and synchronize these approximate settings by again feeling the bottom edges of the throttle valves as you turn the accelerator grip. If the valves start to move at different times, turn up the *idle screw* on the slow opening valve counter (clockwise) until it opens at the same time as the first valve. (Confirm your adjustment later, with the engine running)

d. Start the engine and let it warm up before you make sure its idle speed is between 1200–1500 rpm. Be sure the pilot air screw on each carburetor is backed off $2\frac{1}{2}$ turns from a lightly seated position.

e. Open the accelerator grip slightly to take up the B cables 1–2 mm free play and hold it there while you check the pump setting : adjust the pump cable, if necessary, to align the "V" mark on its adjusting pulley with the pulley's guide pin. After your adjustment, be sure to tighten the pump cable adjuster lock nut.

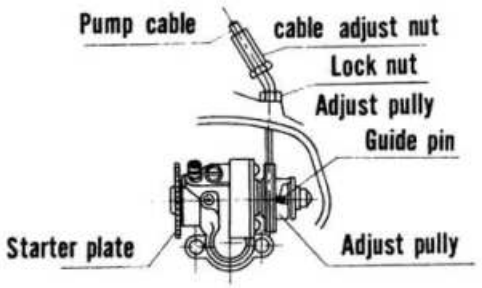


Fig. C-3

3. Checking Minimum Pump (plunger) Stroke:

a. Stop the engine.

b. Turn and release the accelerator grip several times to make sure the throttle valves are fully closed.

c. Turn the oil pump starter plate in the direction of the arrow on its side until the plunger moves in to the end of its stroke. Then measure the narrowest gap between the adjusting pulley and the adjusting plate, with a feeler gauge.

d. Correction Standards :

Inspection limit	0.15 mm
Correction standard	0.25–0.35 mm

If the adjusting plate-to-pulley clearance is less than the inspection limit, remove the adjusting plate and install 0.1–0.2 mm adjusting shim(s) behind it to obtain standard clearance.

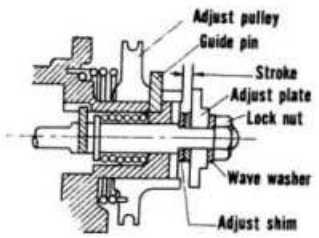


Fig. C-4

Chapter 3: ENGINE

The engine should be disassembled and reassembled in an orderly sequence to make your work easier and more efficient. The procedures outlined here are "examples," not inflexible rules for all repair jobs. Before removing the engine, clean the dirt and dust from its cylinder heads, cylinders and crankcase, to keep these parts clean inside during disassembly. Always use clean tools and use them correctly to avoid damaging parts. Keep disassembled parts on the parts trays in separate groups or sub-assemblies.

A. Removing the Engine:

1. Drain the transmission oil (Fig. A–1).

   Note: Volume of oil: 1⅜ pints. (22 0z) (650cc)

   Type: Yamalube 4-cycle

2. Remove the exhaust pipes and mufflers from both cylinders (Fig. A–2, 3).

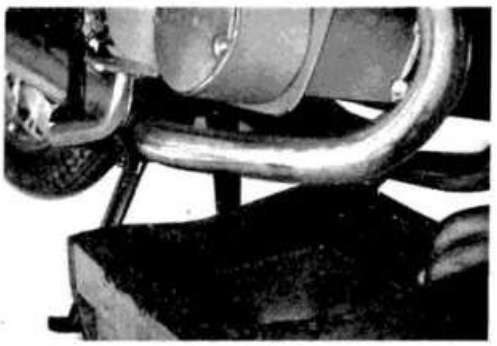


Fig. A-1

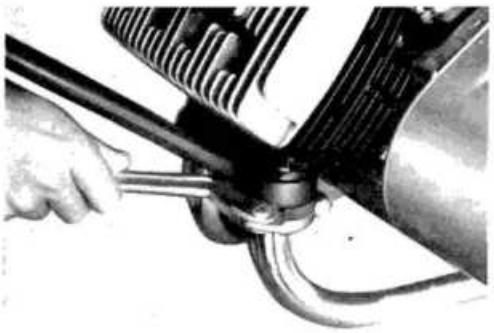


Fig. A-2

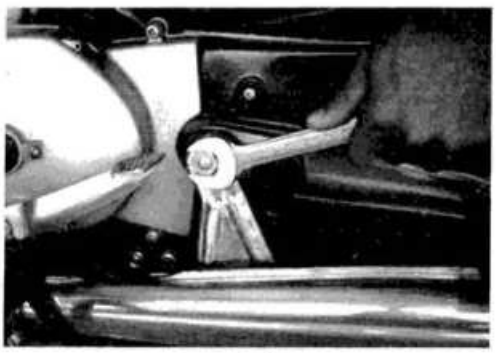


Fig. A-3

3. Remove the foot-rest (Fig. A–4)

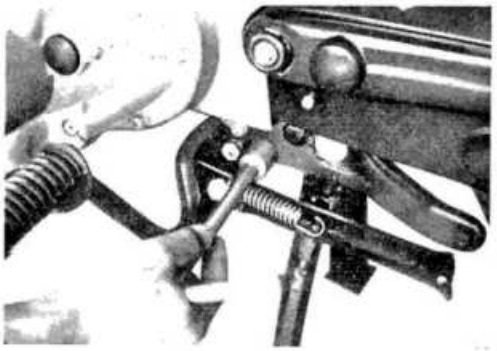


Fig. A-4

4. Remove the right crankcase cover cap, and disconnect the pump cable and oil line from the oil pump. Plug the disconnected end of the oil line with a bolt to keep oil from running out. (Fig. A–5)

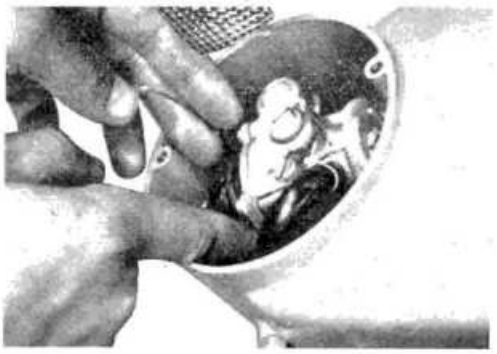


Fig. A-5

5. Remove the delivery line banjo bolts from the cylinders (Fig. A–6).

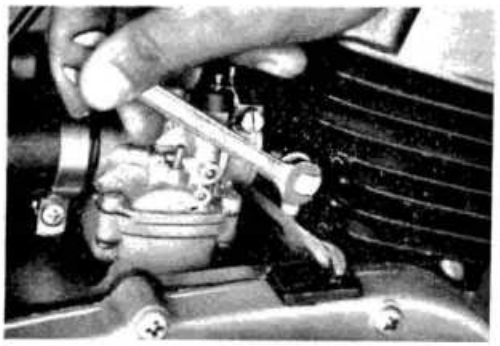


Fig. A-6

6. Remove the foot-operated gear shift lever (Fig. A–7).

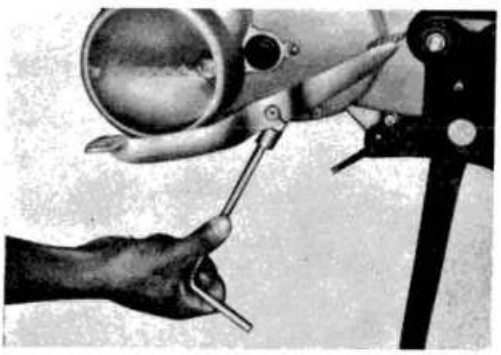


Fig. A-7

7. Remove the left crankcase cover (Fig. A–8).

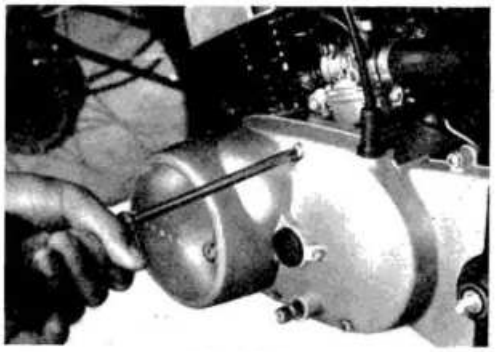


Fig. A-8

8. Disconnect all dynamo leads at the dynamo (Fig. A–9).

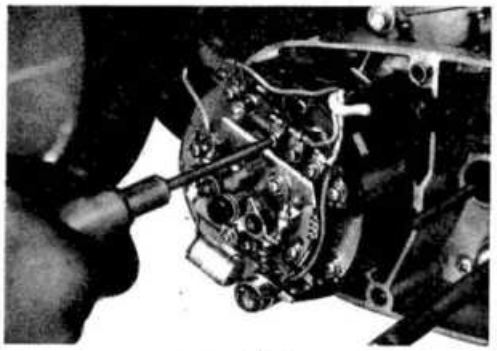
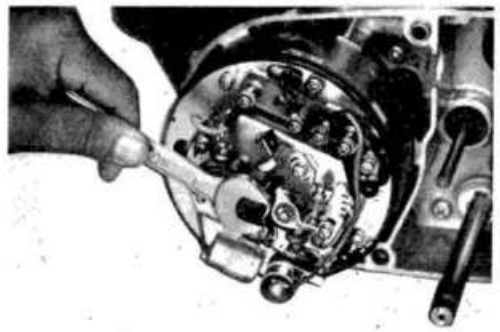


Fig. A-9

9. Remove the armature bolt, and pull out the breaker cam (Fig. A–10).



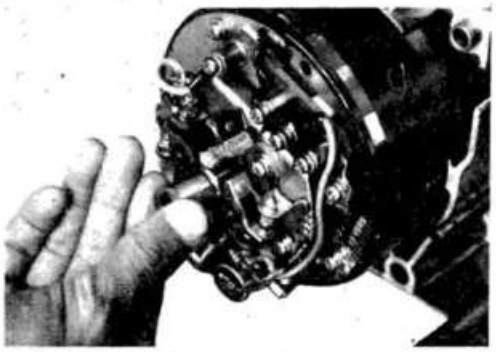


Fig. A-10

10. Remove the two yoke (stator) mounting bolts, and remove the yoke (Fig. A–11).

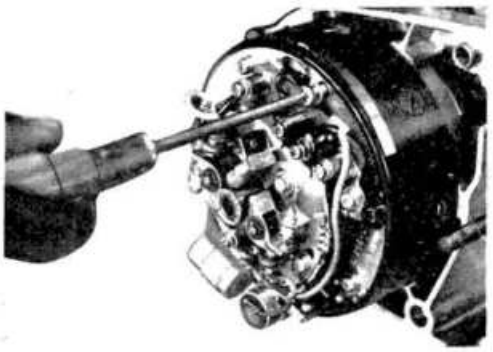


Fig. A-11

11. Remove the armature using the YL1 armature puller bolt (Fig. A–12).



Fig. A-12

12. Pry out the woodruff key with a slot-head screwdriver (Fig. A–13).

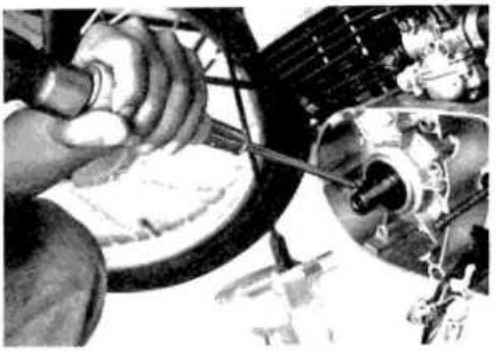


Fig. A-13

13. Disconnect the chain and leave it hanging over the swing arm pivot. (Fig. A–14).



Fig. A-14

14. Disconnect the neutral light lead at the transmission case (Fig. A–15).

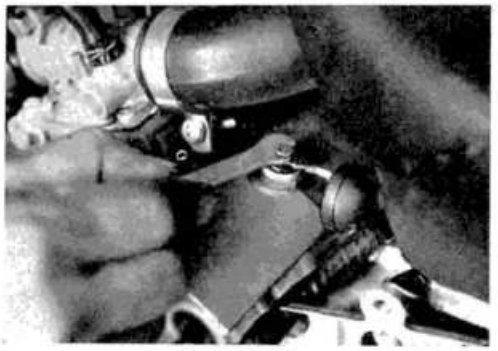


Fig. A-15

15. Loosen the air cleaner hose clamp and disconnect the hose ends from the carburetor air intake (Fig. A–16).

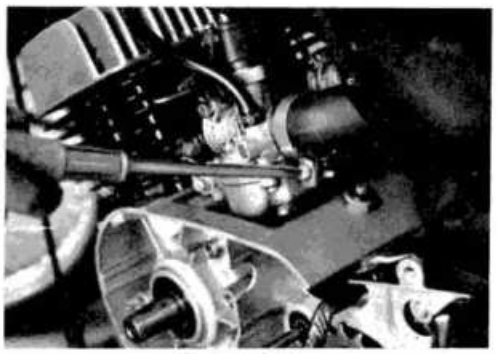


Fig. A-16

16. Pull up the rubber carburetor caps, unscrew the mixing chamber caps, and pull the throttle valves out of the carburetors. (Fig. A–17)

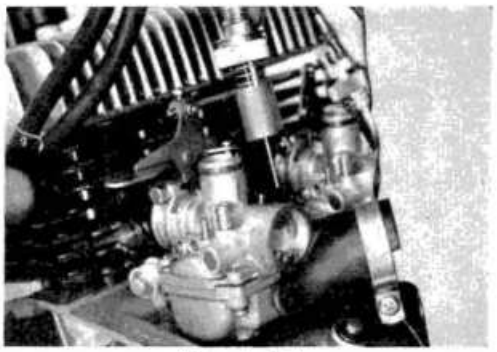


Fig. A-17

17. Loosen the upper bolt in the down tube, remove the four engine mount bolts, and remove the engine from the frame. (Fig. A–18, 19).

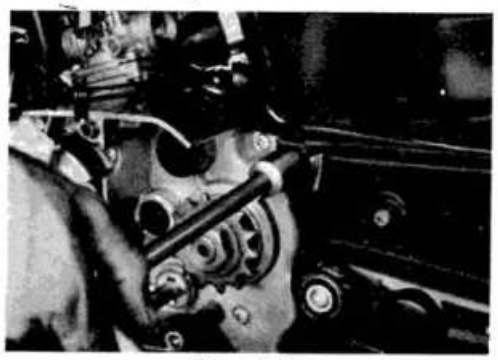


Fig. A-18

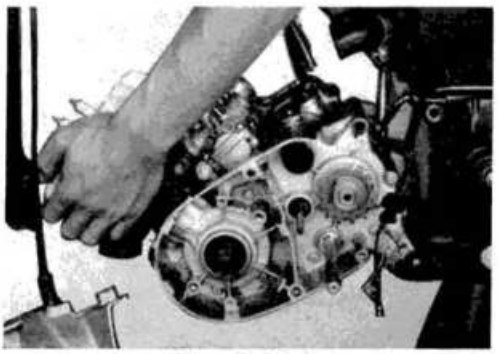


Fig. A-19

B. Cylinder Head:

1. Removal and Replacement:
   Remove the nuts on the four cylinder stud bolts (8 nuts for 2 cylinder heads), remove the cylinder heads and cylinder head gaskets. Reverse the procedure to replace the heads (Fig. B–1). Use new cylinder head gaskets if the old ones are damaged or defective.



Fig. B-1

2. Removing Carbon:
   Carbon accumulation inside the cylinder head (on combustion chamber dome) increases the compression ratio, causing pre-ignition, overheating, and increased fuel consumption, so scrape the cylinder heads clean. (Fig. B–2).

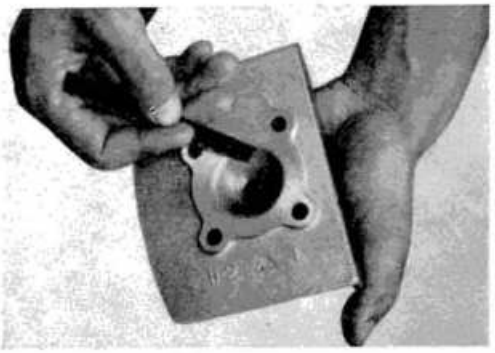


Fig. B-2

C. Cylinder:

1. Checking Cylinder Wear:
   Measure each cylinder's bore diameter at four different depths with a bore-measuring micrometer or a cylinder gauge placed parallel to, then ar right angles to the crankshaft, for 8 measurements in each cylinder. If the difference between the maximum and minimum diameters measured exceeds 0.002 in. (0.05 mm), rebore and hone the cylinder (Fig. C–1, 2).

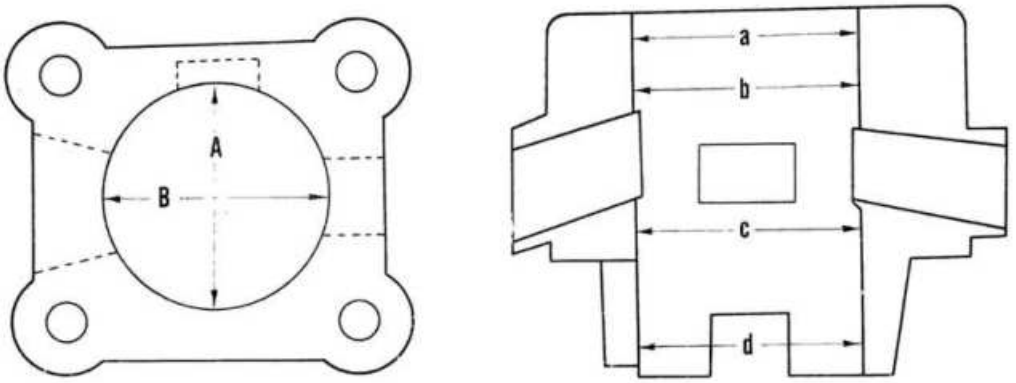


Fig. C-1

2. Notes on Cylinder Reconditioning:

a. Pistons are available in 0.25 mm and 0.50 mm oversizes.

b. Cylinders should be rebored and honed to the diameter of the oversize piston plus piston-to-cylinder clearance.

c. The error between maximum and minimum bore diameters (as measured in Fig. C–1) after honing should be no more than 0.01 mm.

d. Minimum piston-to-cylinder clearance to be added to the oversize piston diameter before boring is 0.0013–0.0016 in. (0.035–0.040 mm)



Fig. C-2

3. Installing Cylinders:

a. Always use new cylinder gaskets when overhauling the engine. (Fig. C–3)

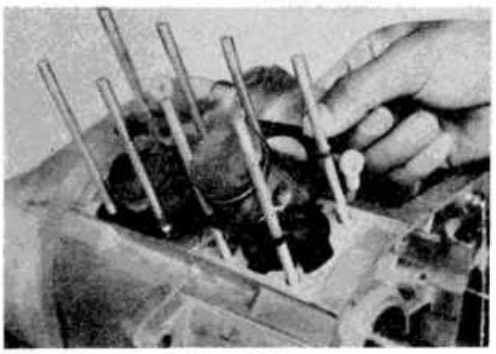


Fig. C-3

b. When installing the cylinder over the piston, squeeze the piston rings into their grooves (their end gaps should close on the locating pins) so they won't catch and break on the bottom of the cylinder. (Fig.. C–4).

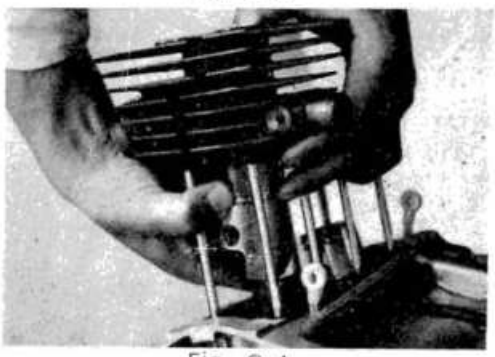


Fig. C-4

4. Removing Carbon:

Carbon tends to accumulate heavily on the walls of the cylinder exhaust ports. Scrape the carbon off with a screwdriver. (Fig. C–5).



Fig. C-5

D. Piston Pin:

1. Driving Out the Piston Pin:
   Remove the clip at one end of the piston pin, with needle nose pliers, and push the pin out from the other side of the piston with a screwdriver (Fig. D–1).
   Before removing the piston pin clips, cover the crankcase opening with a clean rag so you won't accidentally drop the clips into the crankcase.

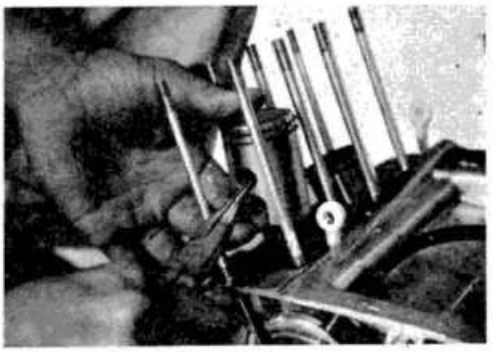


Fig. D-1

2. Piston-to-Piston Pin Fit:
   The piston pin should fit snugly in its bore so that it drags a little as you turn it. If the pin is loose, the pin and/or the piston should be replaced. A pin with step-wear or grooves in its bearing surface should be replaced along with the con rod small end needle bearing.

E. Piston Rings:

1. Removing Rings:
   Put your thumbs at each end of the piston ring and pull the piston ring ends apart, increasing the ring's diameter enough to slide it out of its groove and up off the piston. (Fig. E–1, 2).



Fig. E-1

2. Fitting the Rings:
   First fit the No. 2 (hardened) ring over the piston, and then the No. 1 (chrome) ring, and align their end gaps with the locating pin in each ring groove. (Fig. E–3).



Fig. E-2

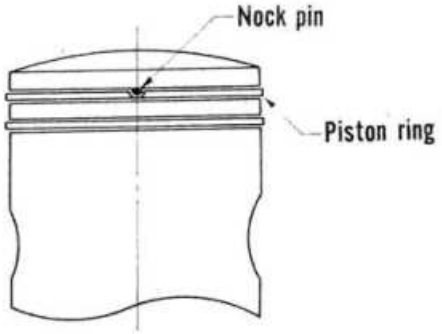


Fig E-3

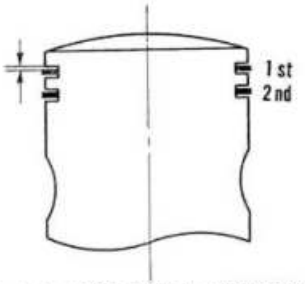
3. Checking Piston Rings:

a. Piston Ring Wear:
Push each ring into its cylinder with an inverted piston and then, measure the end gap with a feeler gauge (Fig. E–4). End gap should be between 0.006 and 0.013 in (0.15 and 0.35 mm) for both No. 1 and No. 2 rings.

b. Removing Carbon:
Carbon on the piston rings and in the ring grooves will make the rings stick to the piston; allowing the exploding fuel mixture to leak between the piston and cylinder wall and promote seizure. Remove the rings from the piston, and clean the carbon from them and their grooves in the piston (Fig. F–5).



Fig. E-4



No. 1 ring 0.0016-0.0031 in. (0.04-0.08 mm)
No. 2 ring 0.0012-0.0028 in. (0.03-0.07 mm)

Fig. E-5

F. Piston:

1. Measuring Piston Clearance:
"Piston clearance" is the difference between the minimum cylinder bore diameter and the maximum outer diameter of the piston. As described in C–2, P. 14, piston clearance should be between 0.0013 and 0.0016 in. (0.035–0.040 mm).
To determine maximum piston diameter, measure the piston with a micrometer at right angles to the skirt 10 mm from its bottom edge. (Fig. F–1).

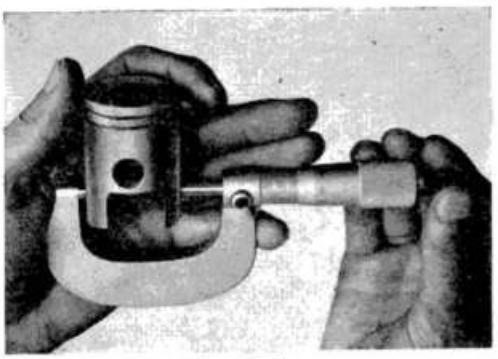


Fig. F-1

2. Checking Piston Condition:
Pistons showing signs of seizure are noisy and keep the engine from developing full power. If a piston that has seized is used again without any correction, another seizure will develop at the same point. Lightly sand these seizure "high spots" on the piston (areas showing excessive friction) in a cross hatch pattern with # 400 sandpaper. (Fig. F–2, 3).

3. Piston Installation Direction:
Remove carbon and other deposits on the piston head with a screwdriver. (Fig. F–4). Install each piston with the arrow marked on its head pointing

downward (toward the exhaust port of the cylinder) (Fig. F–2–6).

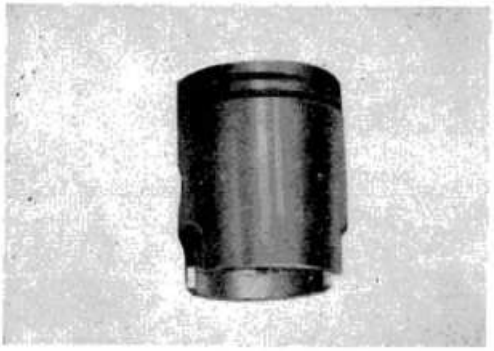


Fig. F-2.

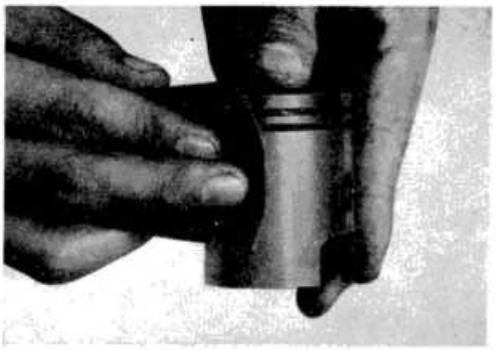


Fig. F-3



Fig. F-4



Fig. F-5

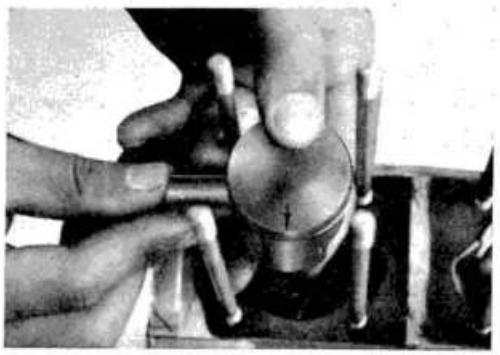


Fig. F-6

G. Right Crankcase Cover:

1. Removing:

a. Remove the starter crank clamping bolt, and remove the crank (Fig. G–1).

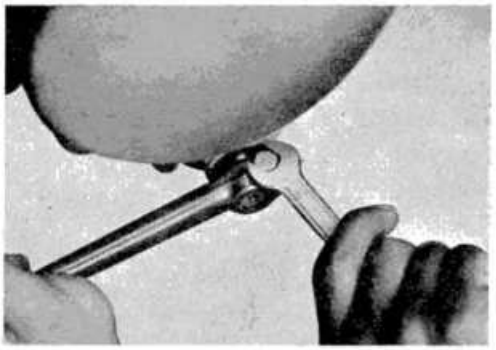


Fig. G-1

b. Remove the pan-head screws from the crankcase cover (R), and take off the cover (Fig. G–2, 3). (The right crankcase cover may be removed with the oil pump still mounted to it.)

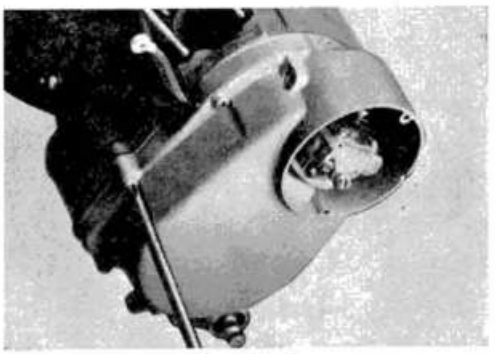


Fig G-2

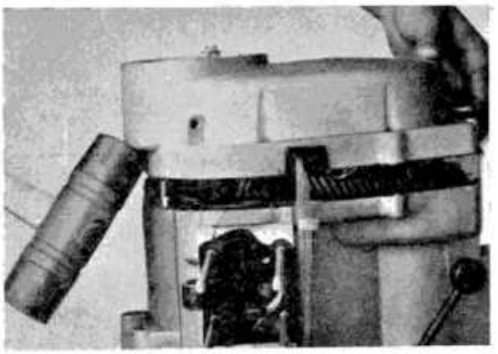


Fig. G-3

c. Replace the crankcase cover gasket, if damaged (Fig. G–4).

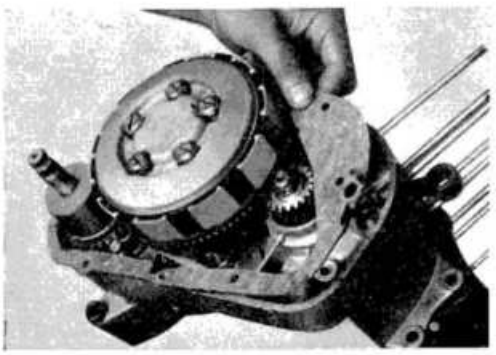


Fig G-4

2. Reinstallation:

Coat the right crankcase sealing surface with gasket paste (YAMAHA BOND No. 5), lay the crankcase cover gasket over it, and then replace the right crankcase cover. (Fig. G–5).

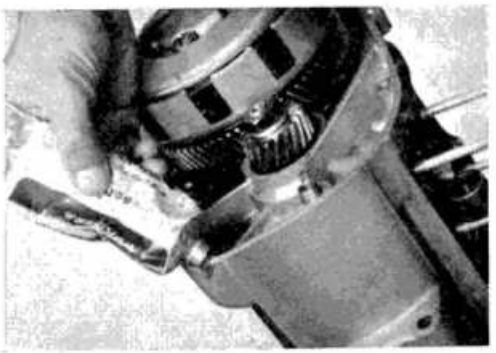


Fig. G-5

H. Clutch:

The wet clutch uses four moulded cork friction plates and five steel clutch plates in a housing mounted on the transmission main shaft. The housing is integrated with the large reduction gear, which is driven by the small reduction gear (primary drive gear). The primary drive gear has 19 teeth and the primary driven gear 74, to make the primary drive reduction ratio 3.894 : 1 (i.e. 74/19).

Layout of Clutch Assembly

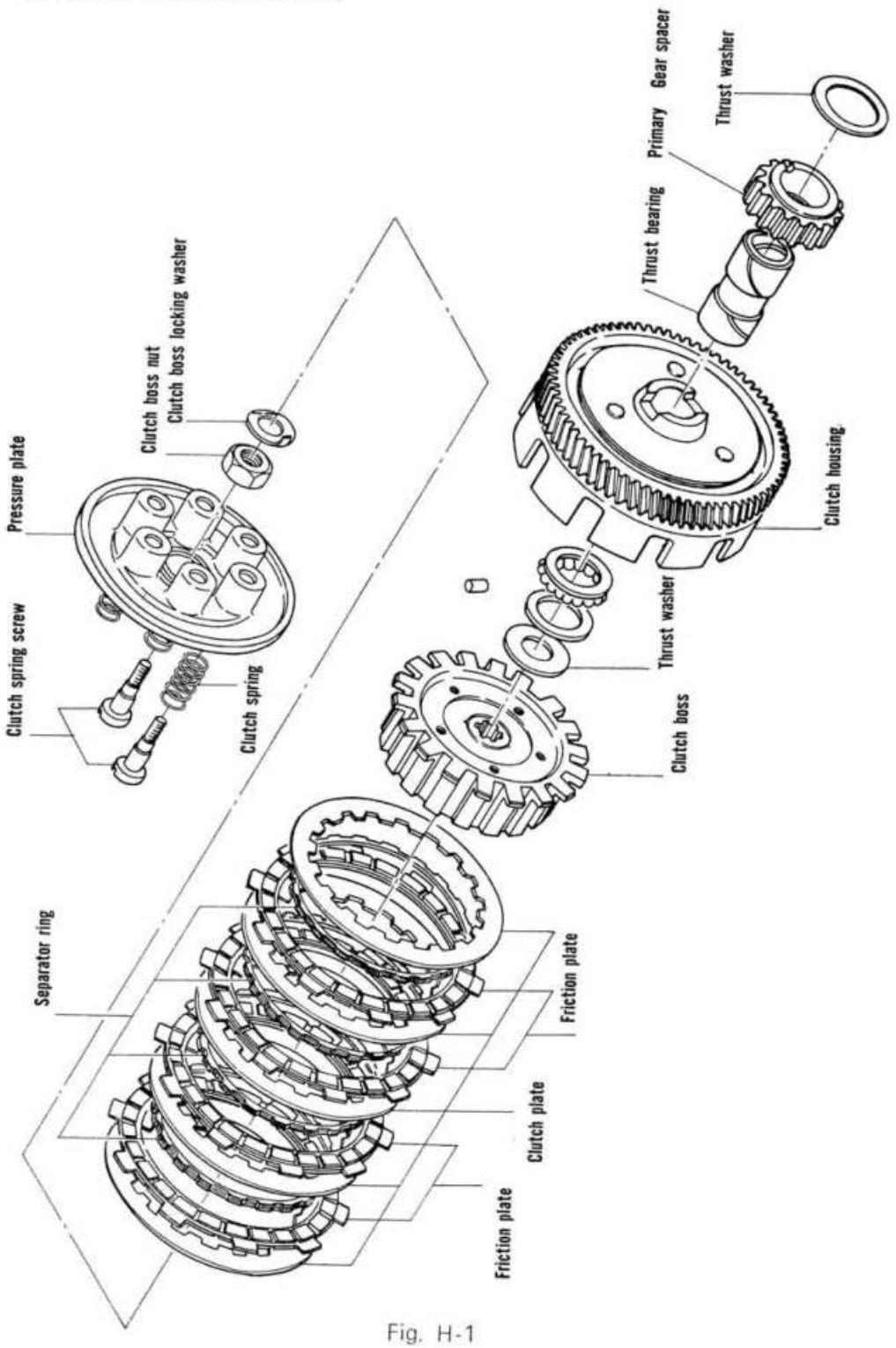


Fig. H-1

1. Removing Pressure Plate:
   Remove the five clutch spring screws, and remove the springs and pressure plate (Fig. H–2).

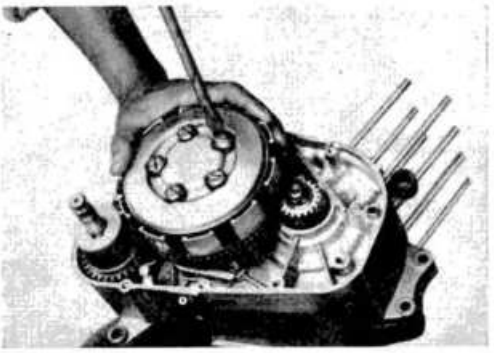


Fig. H-2

2. Checking Clutch Springs:
   Measure the free length of each clutch spring, and replace any spring more than 2 mm (0.08 in.) shorter than standard free length (Figs. H–3, 4).

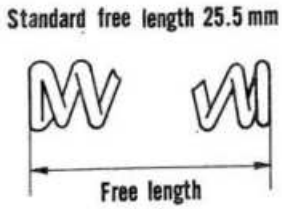


Fig. H-3

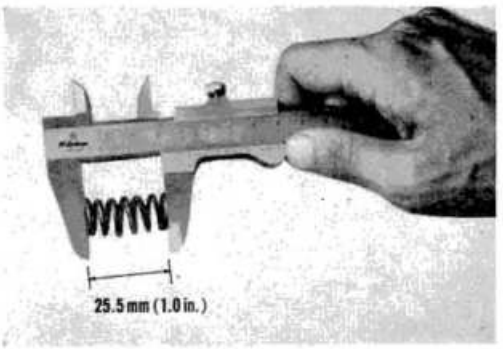


Fig. H-4

3. Checking Friction Plates:
   Friction plates are designed to wear, so plates worn more than 0.012 mm under standard thickness, (4.0 mm) (0.06 in.) or showing uneven contact with the clutch plates should be replaced (Figs. H–5, 6).

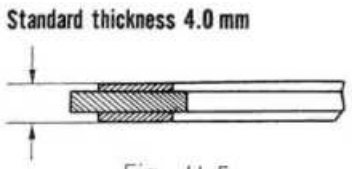


Fig. H-5

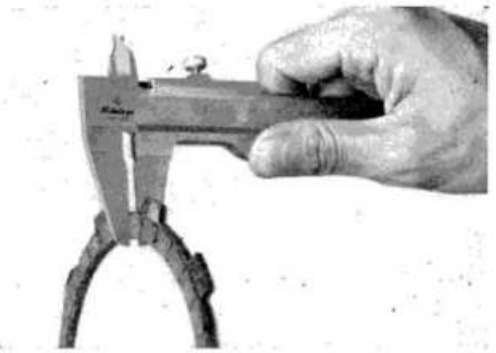


Fig. H-6

4. Fitting Separator Rings:

The separator rings are installed between each clutch-friction plate pair (starting from the outside) to insure even engagement and complete disengagement of the plates. When fitting separator rings, be sure they are flat and not twisted. (Fig. H–7).

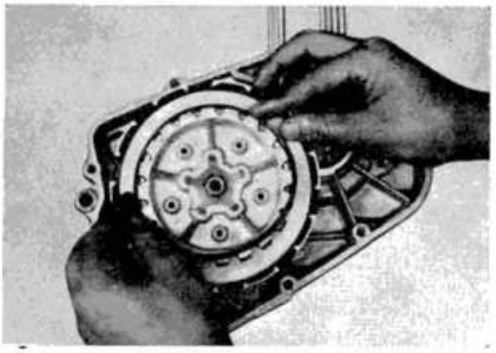


Fig. H-7

5. Removing the Clutch Boss:

Pull out push-rod A, and straighten the bent edges of the clutch boss locking washer. Fit the YA6 clutch holding tool over the clutch boss, remove the nut, and then the boss itself (Figs. H–8, 9).



Fig. H-8

6. Clutch Housing Ass'y (integrated with the primary driven gear):

A rubber thrust cushion O-ring is fitted in the joint groove around the clutch housing-driven gear unit to eliminate transfer of gear noise at low rpm.

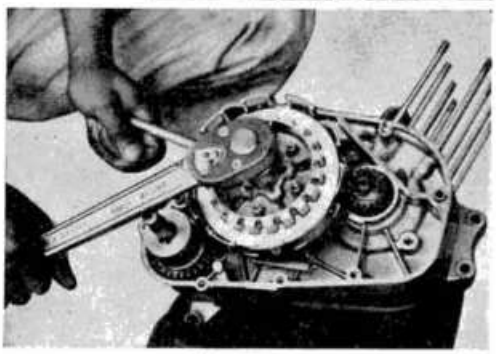


Fig. H-9



Fig. H-10

7. Checking Primary Gear Spacer:

   Insert the primary gear spacer in the primary driven gear boss, and check it for radial play that could cause noise. If the play is excessive, replace the spacer (Fig. H–10). Inspect the spacer for scratches or grooves on its outer and inner surfaces that might impair clutch action. Remove imperfections with an oil stone or very fine grain sandpaper.
   Slip the primary gear spacer on the transmission main shaft, and again check it for radial play. If play exists, replace the spacer (Fig. H–11).

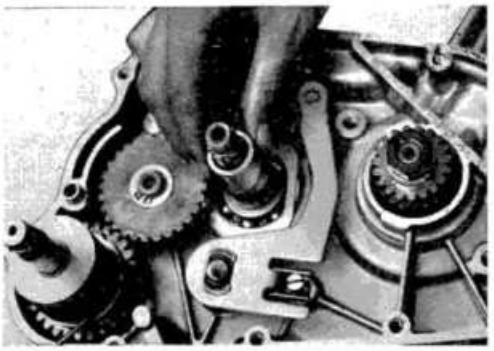


Fig. H-11

8. Checking Push-rod B:

   Remove push-rod B from the clutch boss and roll it over a surface plate. (Fig. H–12). If the shaft is bent, straighten or replace it.

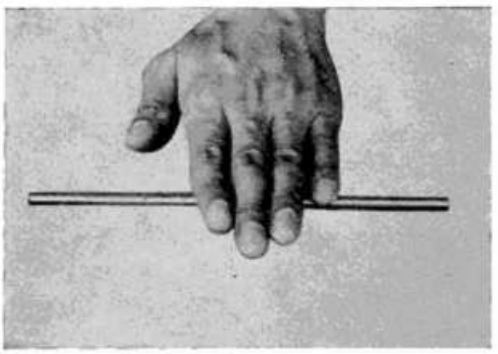


Fig. H-12

9. Important Note for Reassembling Clutch:

   On the clutch boss side of the primary gear spacer is a thrust bearing between 2 thrust washers. A thrust washer is also installed between the kick pinion and the transmission main shaft bearing.
   If the thrust bearing and thrust washers are incorrectly fitted, or omitted, the clutch boss will ride against the primary driven gear and prevent smooth clutching. Be sure the thrust bearing and its washers are correctly installed when reassembling the clutch. (Fig. H–18).

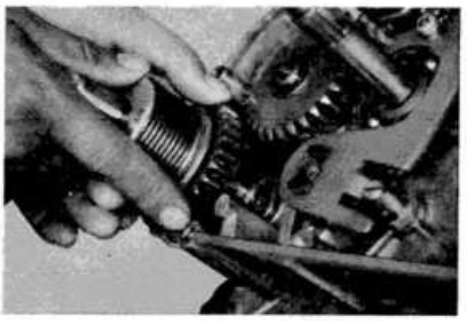


Fig. H-13

The thrust bearing assembly fits on the primary gear spacer, but it may slip out of place when you install the clutch boss, so coat both surfaces of the bearing with grease to make it stick between the thrust washers and stay on the spacer.

10. Clutch Adjustment:

a. Push-rod B Adjusting Screw:

Remove the rubber adjusting screw plug in the left crankcase cover, and loosen the adjusting screw lock nut. Turn the screw so its inner end lightly seats against the outer end of push-rod B, and turn out about ¼ turns to prevent clutch slippage. After your adjustment, hold the adjusting screw in position with a screwdriver and tighten the lock nut. (Fig. H–14).

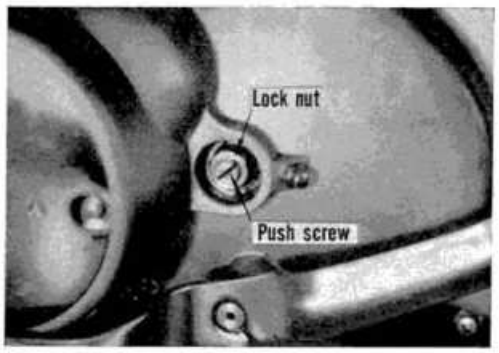


Fig. H-14

b. Adjusting the Clutch Cable:

The clutch cable stretches slightly after being used for a long time, so adjust it from time to time to keep clutch lever play around 2–3 mm. (Fig. H–15).

1) Loosen clutch cable nut (a) on the top of the left crankcase cover.
2) Loosen adjusting nut (b) to reduce clutch lever play, or tighten it to increase play.
3) After your adjustment, hold nut (b) in position with a wrench and tighten lock nut (a) against it.

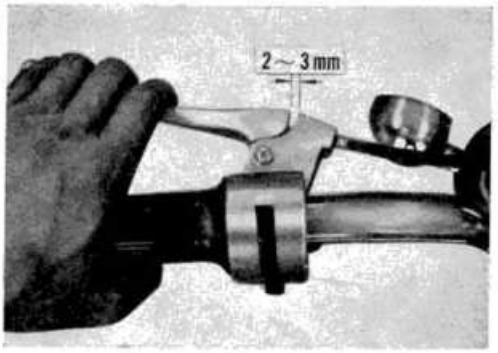


Fig. H-15

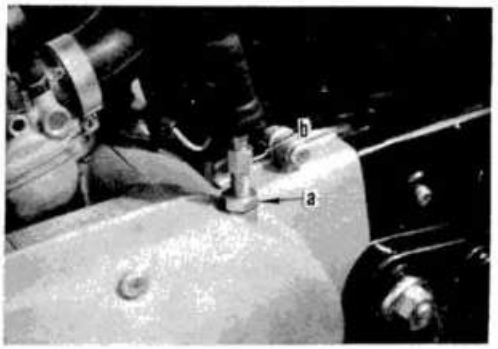
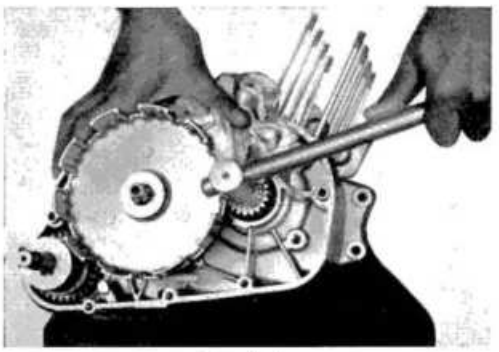


Fig. H-16

I. Removing Primary Drive Gear:

Feed a rolled up rag between the teeth of the primary drive gear and primary driven gear to lock them. Remove the primary drive gear nut from the end of the crankshaft and then take off the gear. (Fig. I–1).


Fig. I-1

J. Drive Gear Spacer:

Remove the O-ring and primary gear spacer from the crankshaft with your fingers or pliers. When reinstalling the spacer, first put an adequate amount of grease in the lip cavity of the crankshaft oil seal into which it fits.
Be sure you install the spacer with its chamfered end inward. (Fig. J–1). If installed with the chamfered end out, the spacer will damage the oil seal lip.

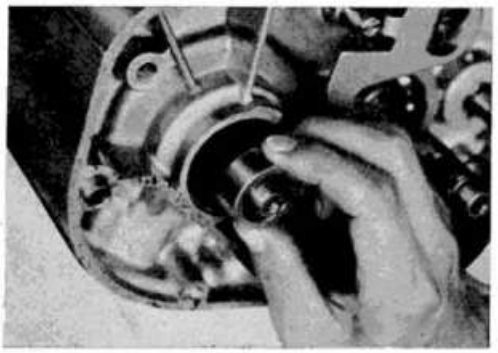


Fig. J-1

K. Kick Starter Assembly:

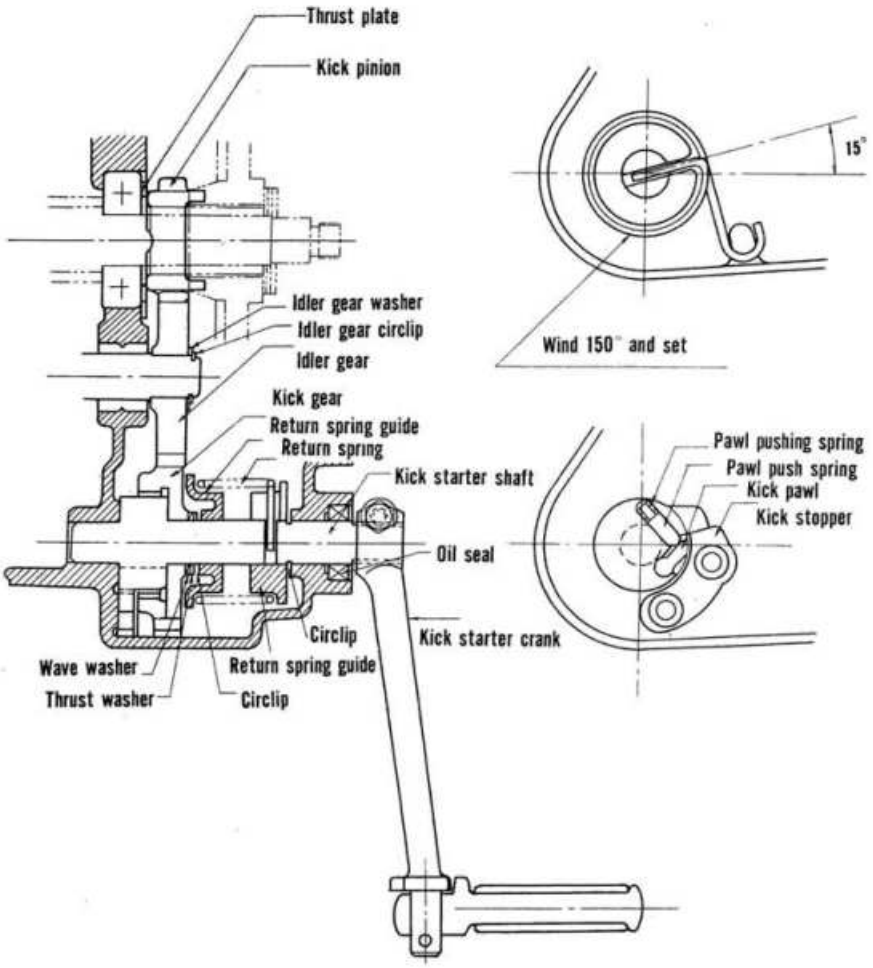


Fig. K-1

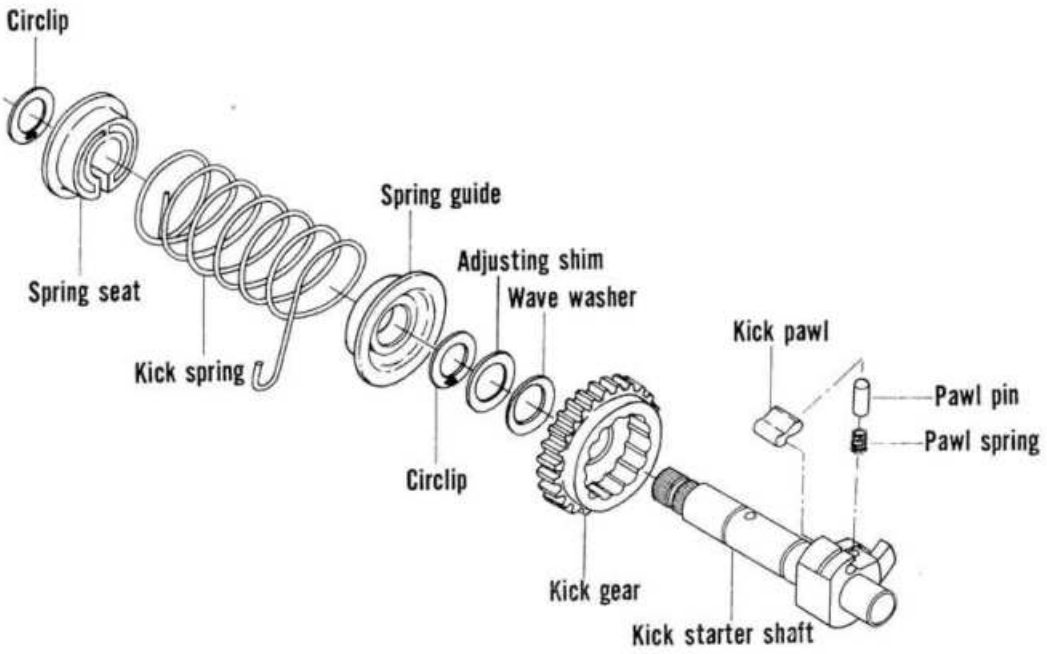


Fig. K-2

Operation:

The primary coupled kick-starter system used on the YL–1 enables the rider to kick-start his stalled machine by simply squeezing the clutch lever and then kicking the starter crank, without shifting the transmission back to neutral. Kicking down the starter crank turns the kick gear mounted on the kick starter shaft. The kick gear turns the idler gear, free mounted on the drive shaft, and the idler gear turns the kick pinion. The kick pinion, next to the primary driven gear, engages the dogs on the driven gear; the driven gear then turns the primary drive gear (mounted on the crankshaft) which turns the crankshaft and starts the engine. When the engine is running, and the kick starter ratchet mechanism has turned the starter shaft back to normal position, the kick pawl is held away from the inner face of the kick gear by the kick stopper. The kick starter system can be removed as an assembly (Fig. K–3).

If the kick-starter slips or breaks, disassemble it and check the following parts:

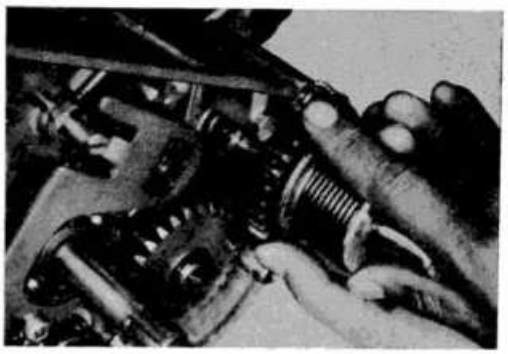


Fig. K-3

1. Kick Gear:

   The inner surface of the kick gear is "ribbed" like an internal gear. If these internal "teeth" are worn, chipped, or otherwise deformed, the kick pawl will slip during each starting cycle. A kick gear with excessively worn "teeth" should be replaced (Fig. K–4).

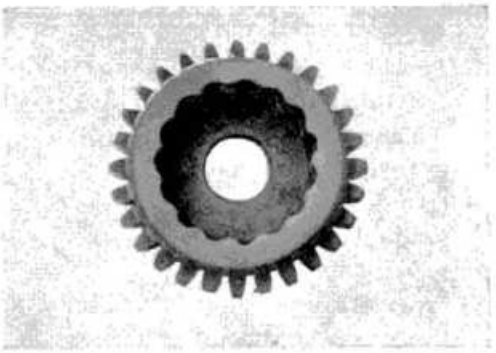


Fig. K-4

2. Kick Pawl:

   A kick pawl with a worn tip also causes slippage, and should be replaced (Fig. K–5).

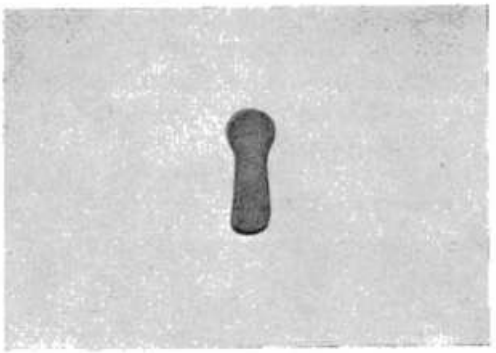


Fig. K-5

3. Pawl Push Pin and Spring:

Foreign material such as metal chips, wedged between the pawl pin and the wall of the pin hole, or between the pawl pin and its spring, will cause kick starter slippage and/or failure. To detect foreign material:

Put the spring and pawl pin in the kick-starter shaft pin hole, and depress the pawl pin with your finger to check its movement (Fig. K–6).

If foreign material is present, you will feel the pin bind or drag against the wall of its hole, or fail to fully seat.

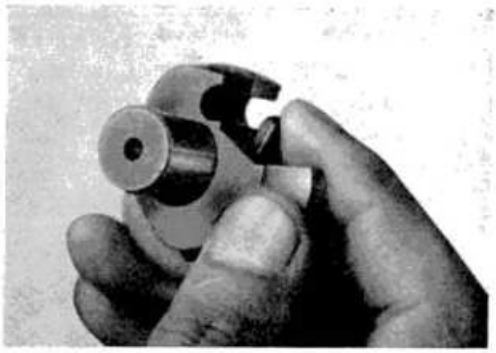


Fig. K-6

Reinstallation:

Reassemble the kick starter ass'y, and then reinstall it in the crankcase. Depress the kick pawl and turn the kickstarter shaft so the pawl seats against the kick-stopper. Then wind up the kick-spring clockwise, and hook its long end on the kick-spring boss of the crankcase (Fig. K–7).

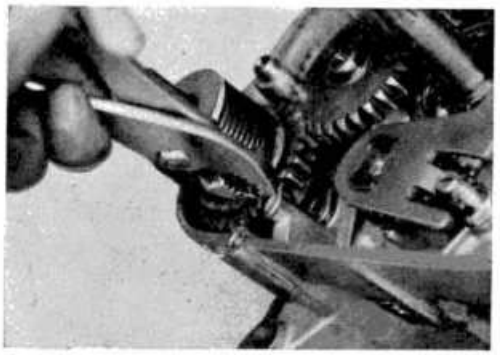


Fig. K-7

Demounting Kick Idler Gear:

Remove the circlip retaining the idler gear with a pair of circlip pliers, and then slide the gear off the *drive* shaft. (Fig. K–8).

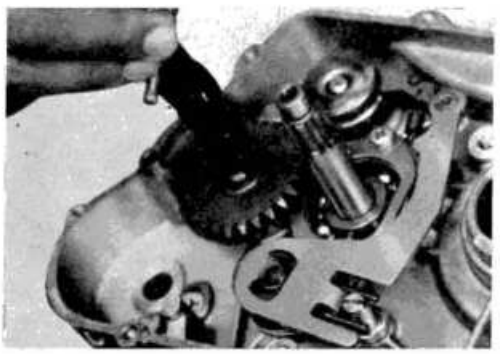


Fig. K-8

L. Drive Sprocket:

1. Removal:
   a. Straighten the bent edge of the locking washer with a screwdriver or a chisel (Fig. L–1).



Fig. L-1

   b. Keep the drive sprocket from turning, with the flywheel magneto holding tool and remove the sprocket nut (Fig. L–2).

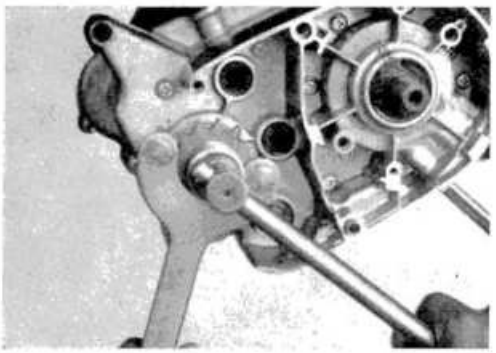
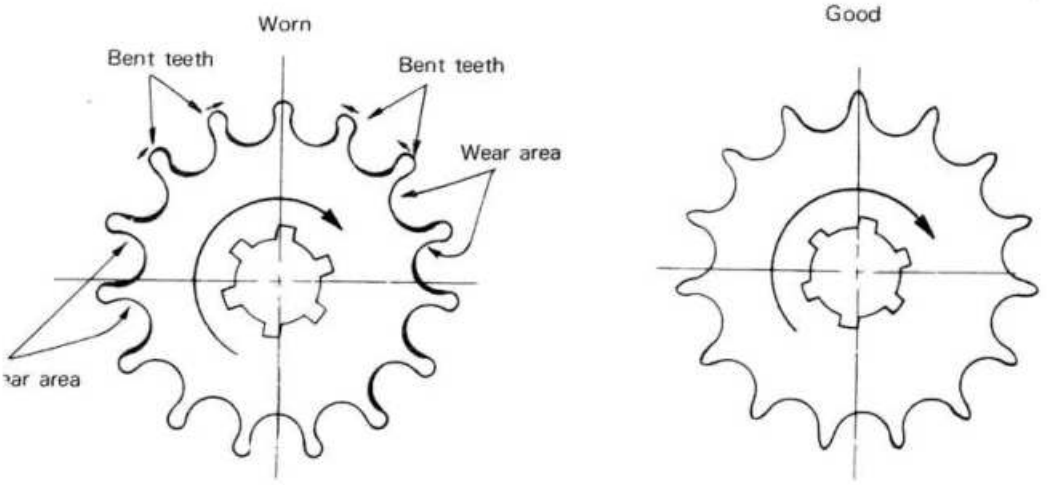


Fig. L-2

   c. If you have no flywheel magneto holding tool, shift the transmission to low gear, fit a socket wrench on the sprocket nut, and hit the handle of the wrench with a hammer so the impact will loosen the nut.

2. Checking Sprocket Wear:
   As the drive sprocket teeth wear, excessive chain noise will develop. A worn sprocket should be replaced because its continued use will only quicken chain wear. (Fig. L–3).



M. Shifting Mechanism: Construction and Operation

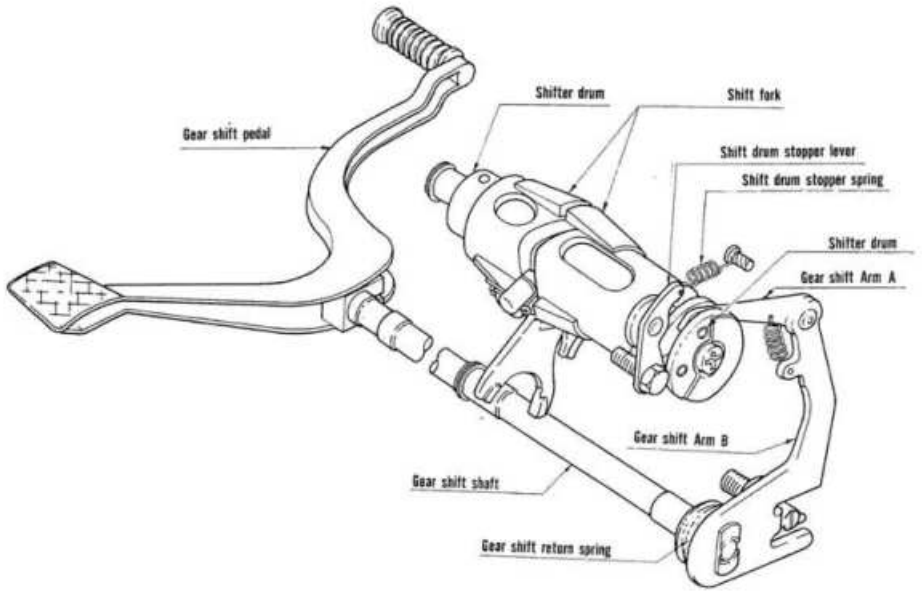


Fig. M-1 Shifting Mechanism

As the gear shift pedal is depressed, the shifter shaft turns, and the double pronged selector arm on its other end hooks one of five equally spaced pins extending axially from around the end of the shifter drum, and pulls it down, turning the drum 1/5 of a full revolution. The shifter drum serves as mounting shaft and actuator for the 2 shift forks. Each fork has a cam follower pin that rides in an irregular or "cam" groove encircling the shifter drum. When the drum turns, the cam follower pins "follow" the cam grooves and the shift fork(s) move laterally as far as the predetermined configuration of each groove will take them in 1/5 revolution. Thus, one full turn of the drum will shift the transmission through all 5 positions : neutral, low, 2nd, 3rd, and top. The horizontal "cage" of shifter drum pins is stopped at each 1/5 turn (held in gear) by a stopper arm that pivots from a (crankcase mounted)bolt at its upper end and has a disc, free mounted, at its middle, that is held against the pin "cage" by a spring on the lower end of the arm. This disc seats in the gap between any two pins : during shifting the selector either pulls (upshifts) or pushes (downshifts) a pin 1/5 of a turn, forcing the disc to ride up and over one pin and seat in the next gap of "gear."

1. Removing Gear Shift Assembly:

Remove the E clip and washer from the gearshift shaft on the left side of the engine, then pull the shaft out of the right side of the engine after pulling the selector arm away from the shifter drum pins (Figs. M–2, 3).

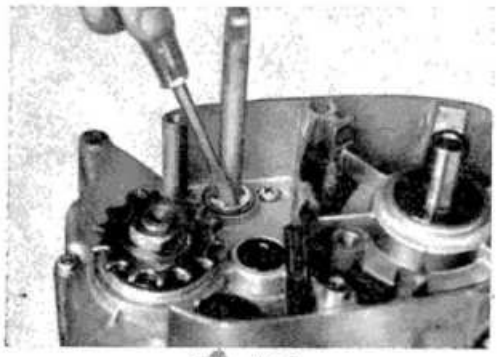


Fig. M-2

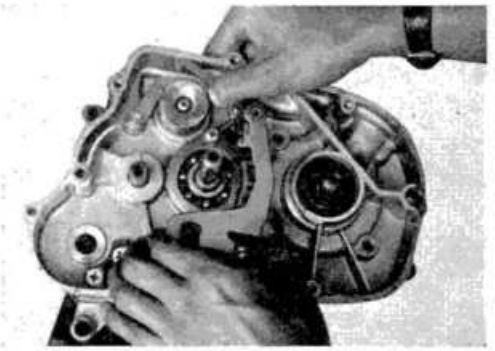


Fig. M-3

2. Checking Gear Shift Shaft Parts (Fig. M–4):

a. Gear Shift Return Spring:
A broken or fatigued gear shift return spring will impair the return action of the shifting system. Check the spring for proper tension and replace it if weak or broken.

b. A fatigued selector arm spring may let the selector arm jump from one shifter drum pin to another and shift in the wrong sequence. Check the spring for proper tension and replace it if weak or broken.

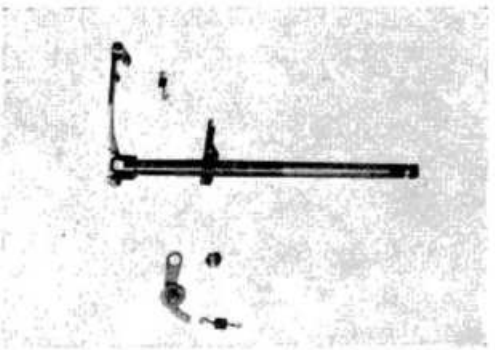


Fig. M-4

3. Selector Arm Removal:

Remove the mounting bolt, and remove the arm together with its spring (Fig. M–5).

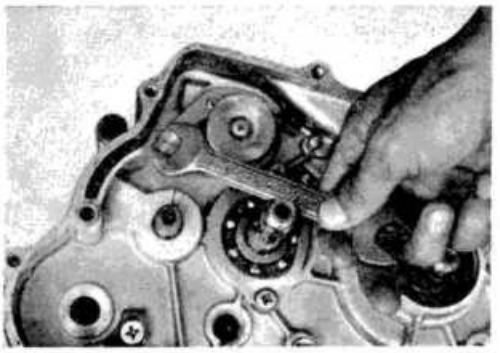


Fig. M-5

N. Crankcase:

1. Dividing:

   The crankcase can be divided from either the left or right side. However, to facilitate 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 crankcase (Fig. N–1).

   b. Install the crankcase dividing tool securely on the right case, and, while dividing the case, alternately tap the transmission main shaft and the side of the right case with a plastic hammer, so the left and right halves will separate evenly. (Figs. N–2, 3).

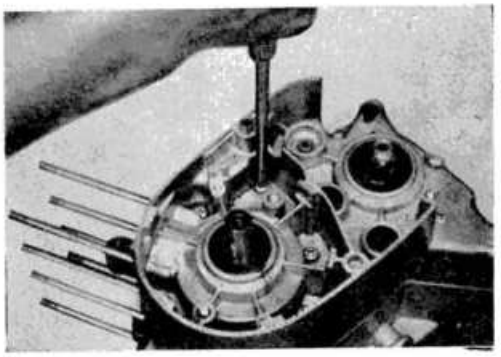


Fig. N-1

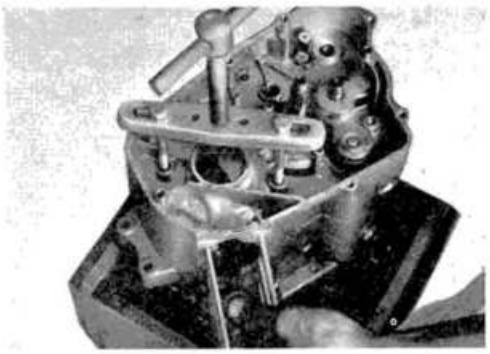


Fig. N-2

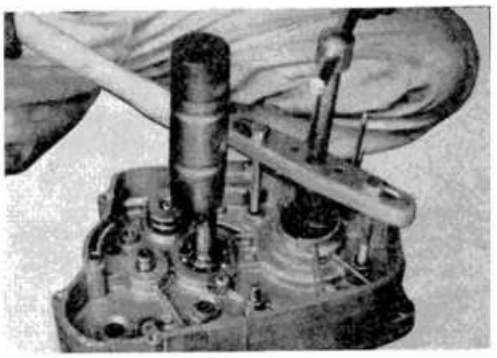


Fig. N-3

Pull the connecting rod out to top dead center so it will clear the crankcase. Insert some sort of thrust bearing (live center) between the end of the crankshaft and the center bolt of the dividing tool to keep the crankshaft from turning, so the connecting rod will stay at top dead center.

2. Reassembling:

   When reassembling the crankcase, be sure to coat the mating surfaces of both halves with gasket paste (Fig. N–4).

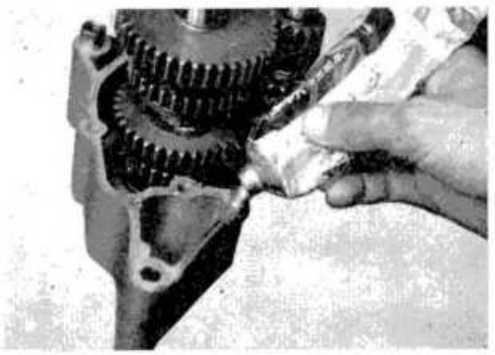


Fig. N-4

O. Transmission Assembly:

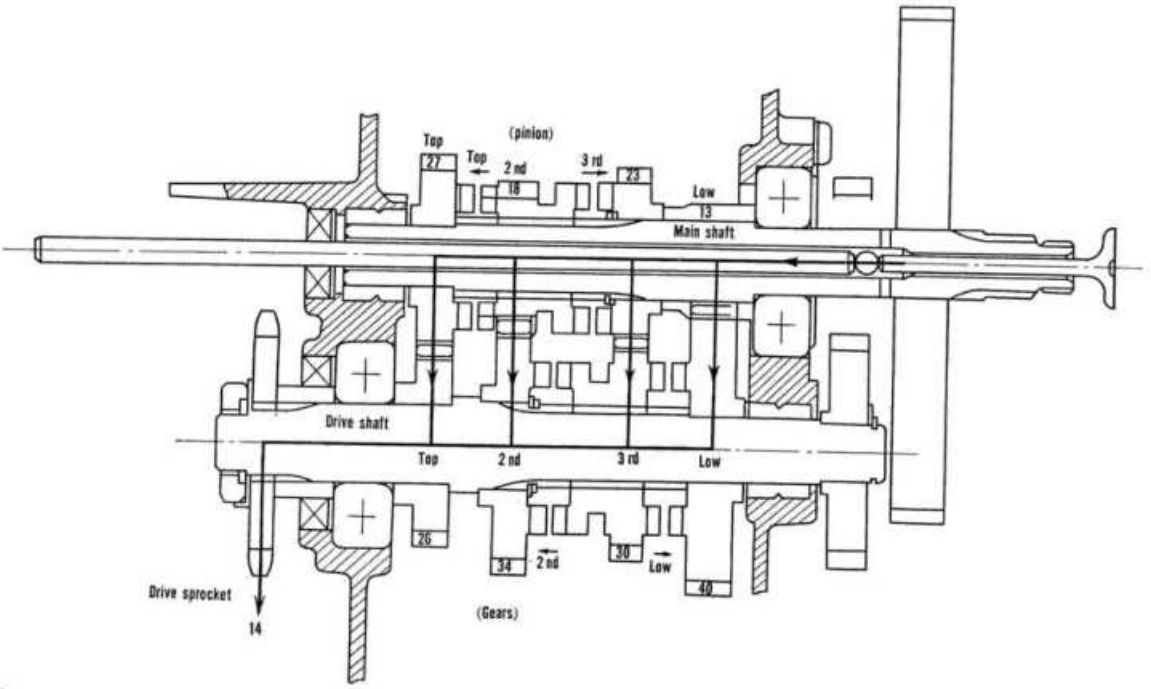


Fig. O-1 Layout of Transmission Gears

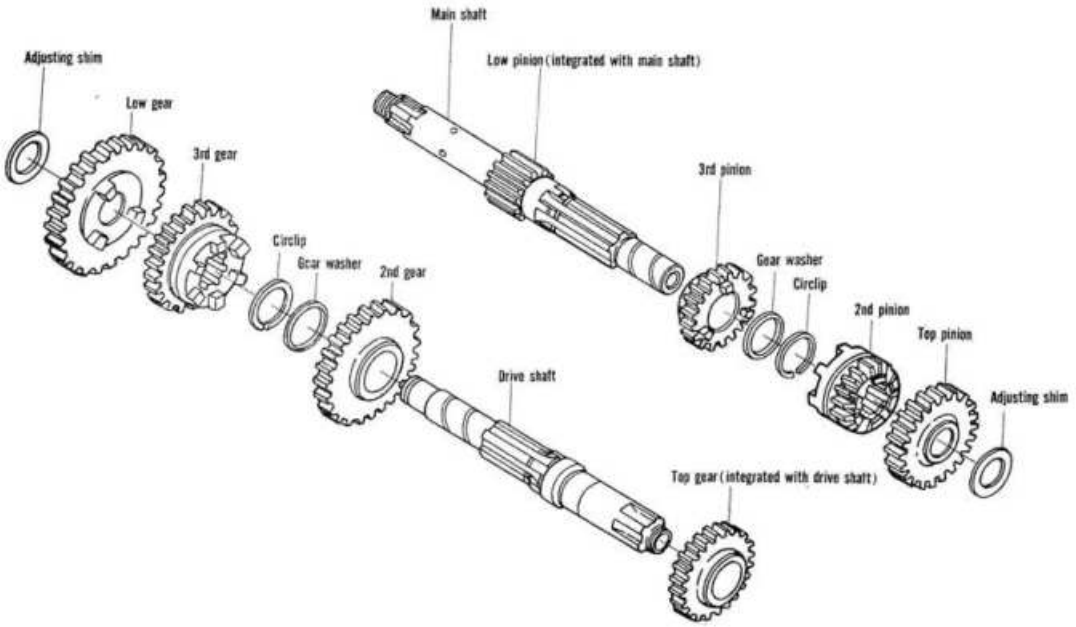


Fig. O-2 Transmission-Disassembled

Figs. O-1 and O-2 show the layout and details of the transmission assembly. The total reduction ratios for low, 2nd, 3rd, and top gears are as follows:

	Primary reduction		Transmission gear reduction		Secondary reduction		Total reduction ratio
Low	74/19	×	40/13	×	35/15	=	27.96 : 1
2nd	74/19	×	34/18	×	35/15	=	17.17 : 1
3rd	74/19	×	30/23	×	35/15	=	11.85 : 1
Top	74/19	×	26/27	×	35/15	=	8.75 : 1

1. Removing Transmission Gears:

   a. Remove the shifter drum mount bolt from the left side of the crankcase (Fig. O–3).

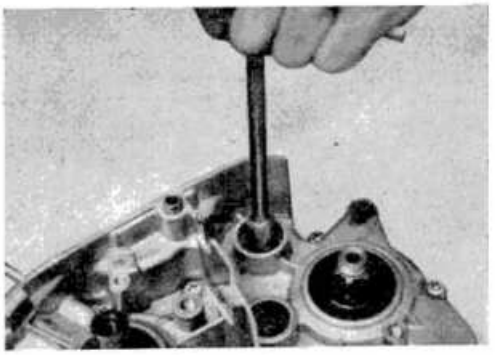


Fig. O-3

   b. Remove the gear assembly and the shifter drum as a unit. (Fig. O–4).

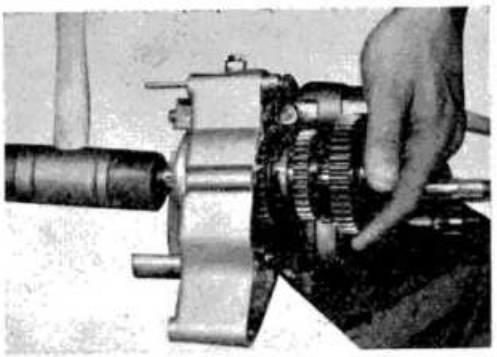


Fig. O-4

2. Reinstallation:

   Reverse the above procedures for reinstallation but be sure to put all washers in their proper places:

P. Crankshaft:

Of all the engine's parts, the crankshaft requires the highest degree of accuracy in engineering, manufacturing and servicing. The crankshaft is "expandable," but it must be handled very carefully.

The crankshaft's oil seal in the YL–1 is a solid aluminum, minimum clearance, labyrinth type, rather than the conventional moulded rubber type that must resist the deteriorating effects of heat, oil, and friction to remain effective.

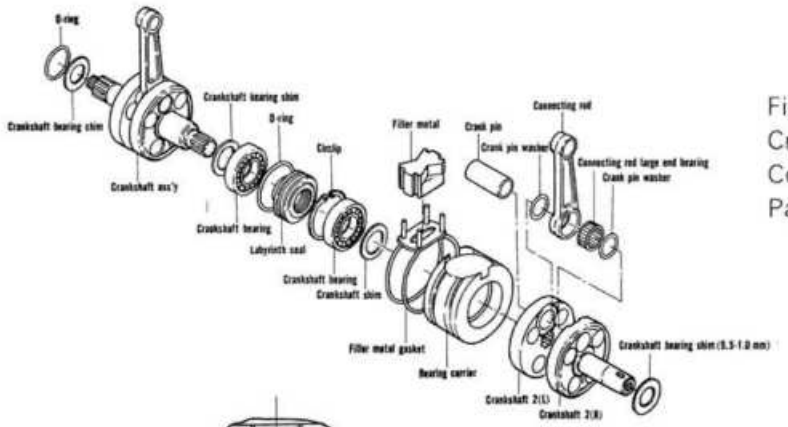


Fig. P–1
Crankshaft Ass'y
Component
Parts

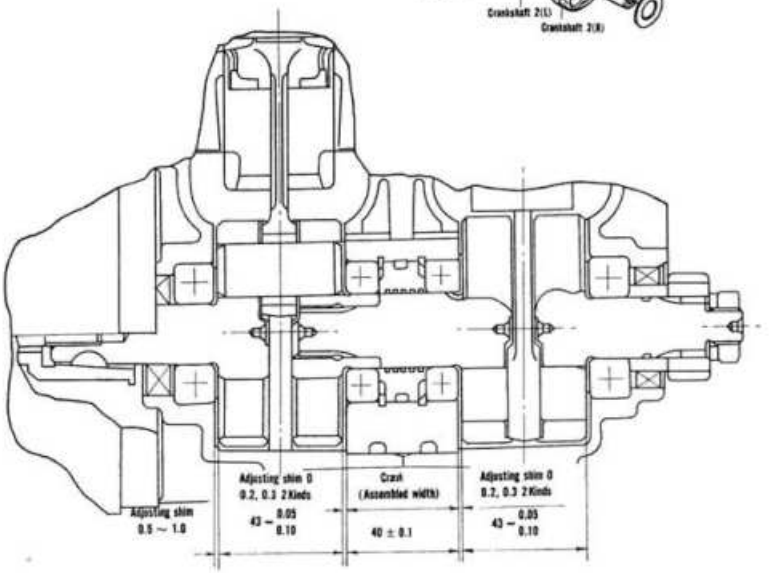


Fig. P–2
Crankshaft
Assembled
Dimensions.

1. Removing Crankshaft Ass'y:
   Push the crankshaft ass'y out of the left half of the crankcase with the crankcase dividing tool (Fig. P–3).
   Tighten the dividing tool bolts equally into the crankcase. Pull the connecting rod up to top dead center so it won't hit the the crankcase, and keep it there by inserting a thrust bearing (live center) between the end of the crankshaft and the center bolt of the dividing tool.

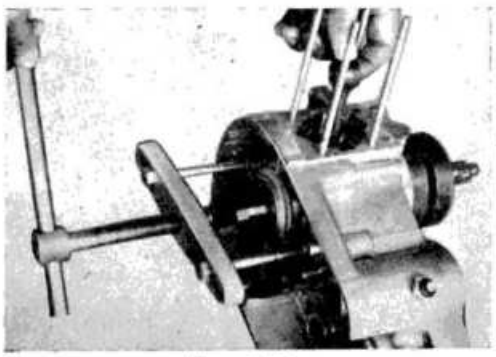


Fig. P-3

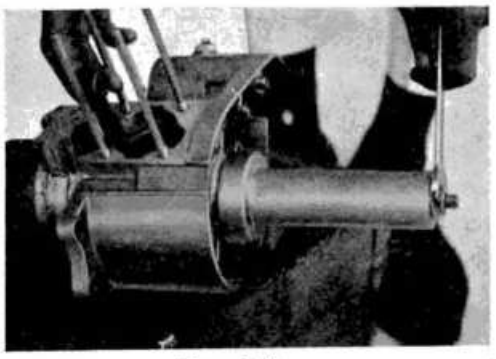
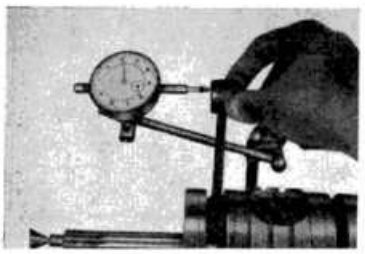
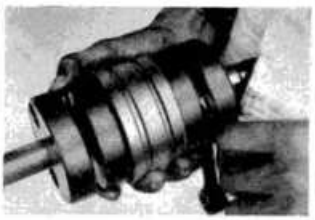
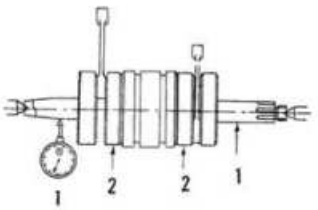


Fig. P-4

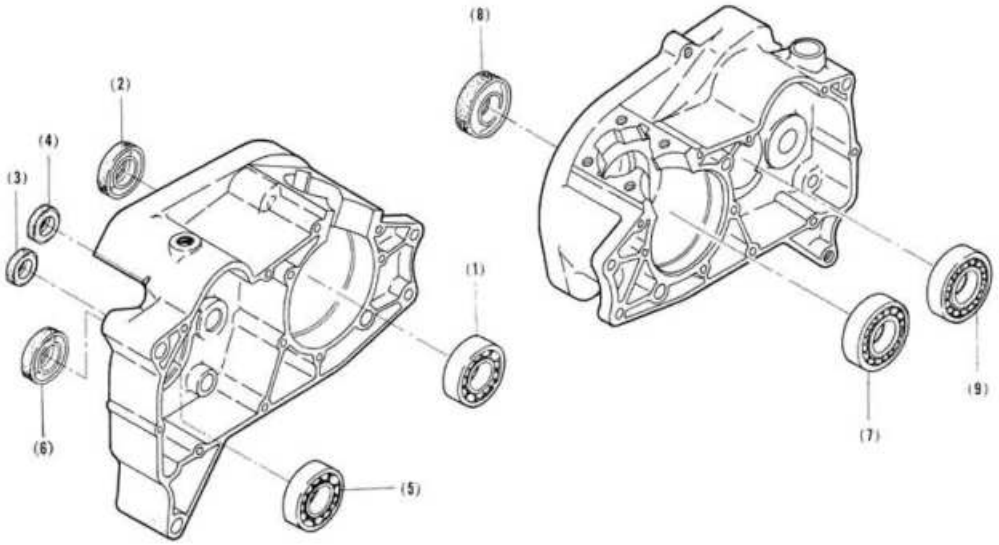
2. Checking Crankshaft Ass'y:

a. Check connecting rod axial play at the small end (to determine the amount of wear in the large end, crank pin, and large end bearing). (Fig. P–5)	Small end play should not exceed 2 mm. Move the connecting rod to TDC and measure the small end deflection with a dial indicator.	If small end play exceeds 2 mm, disassemble the crankshaft, check the connecting rod, crank pin, and large end bearing for wear or other defects. Replace worn parts, so after reassembly small end play is within 0.8–1.0 mm.
b. Check the connecting rod for large end side play (Fig. P–6).	Pry the connecting rod to one side and insert a feeler gauge between the edge of the large end and the counter-weight (crankweb). Large end side play (clearance) should be within 0.1–0.3 mm.	If excessive side play is present, disassemble the crankshaft and replace any worn parts.
c. Checking Assembly Eccentricity. (Check the crankshaft for runout at the four points shown in Fig. P–7).  Fig. P-5	Dial indicator reading at each point of measurement should not exceed 1. 0.03 mm 2. 0.06 mm:  Fig. P-6	If excessive run-out exists, align the crank by striking the shaft or web a glancing blow with a brass hammer at a point 180° opposite the point of lowest dial indicator reading.  Fig. P-7

3. Reinstalling Crankshaft Ass'y:

   a. Put shims on both ends of the crankshaft, and pull the crank assembly into the left case using the crankshaft installing tool (same tool used for YG1). Hold the connecting rod at top dead center with one hand while turning the handle of the installing tool with the other (Fig. P–4).

Q. Bearings and Oil Seals:



1. Bearing (# 6204).
2. Oil seal (SD20408).
3. Oil seal (S 0–6.8–22–7).
4. Oil seal (SD 12225).
5. Bearing (# 6304).
6. Oil seal (SD 28337).
7. Bearing (# 6204).
8. Oil seal (Sw 28408).
9. Bearing (# 6303)

Fig. Q-1 Installation Position of Bearigs and Oil Seals

1. Removal and Reinstallation:

   Ideally, the crankcase should be heated to approximately 120 °C to easily 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 screwdriver (Fig. Q–2), then when the engine is assembled use new oil seals.

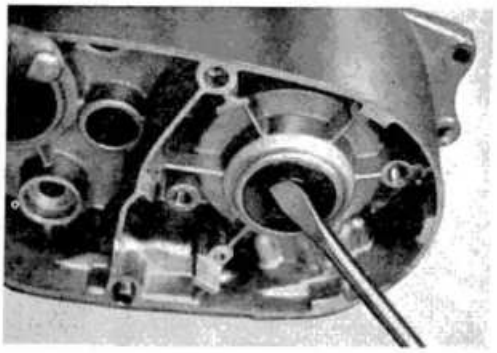


Fig. Q—2

2. Remove the bearings with the bearing removing tool (Fig. Q–3).



Fig. Q—3

b. Reinstallation:

Install all bearings and oil seals with their stamped manufacturer's mark or numerals facing outward.

Pack all bearings with an adequate amount of grease before installation.

R. Carburetor:

The YL–1's engine is equipped with a pair of MIKUNI Model VM16SC carburetors.

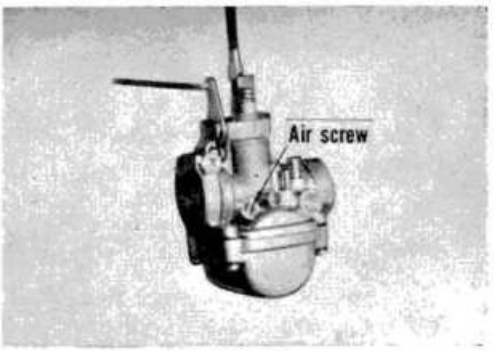


Fig. R—1

8-1 Mixing chamber
2. Float chamber gasket
3. Pilot jet
4. Needle jet
5. Main jet
6. Float valve ass'y
7. Float valve seat gasket
8. Float
9. Float pin
10. Float chamber
11. Pan-head screw
12. Lock washer
13. Nut
14. Screw
15. Adjusting screw spring
16. Air adjusting screw
17. Fiber gasket
18. Banjo connection
19. Banjo bolt
20. Starter plunger
21. Adjusting screw
22. Plunger cap
23. Clip
24. Plunger rubber cap
25. Idle screw rod
26. Throttle valve
27. Jet needle
28. Needle clip
29. Circlip
30. Throttle valve spring
31. Mixing chamber top
32. Nut
33. Adjusting screw
34. Cable adjuster
35. Mixing chamber cap
36. Starter lever (R)
37. Starter lever (L)
38. Rod
39. Pan-head screw
40. Cotter pin

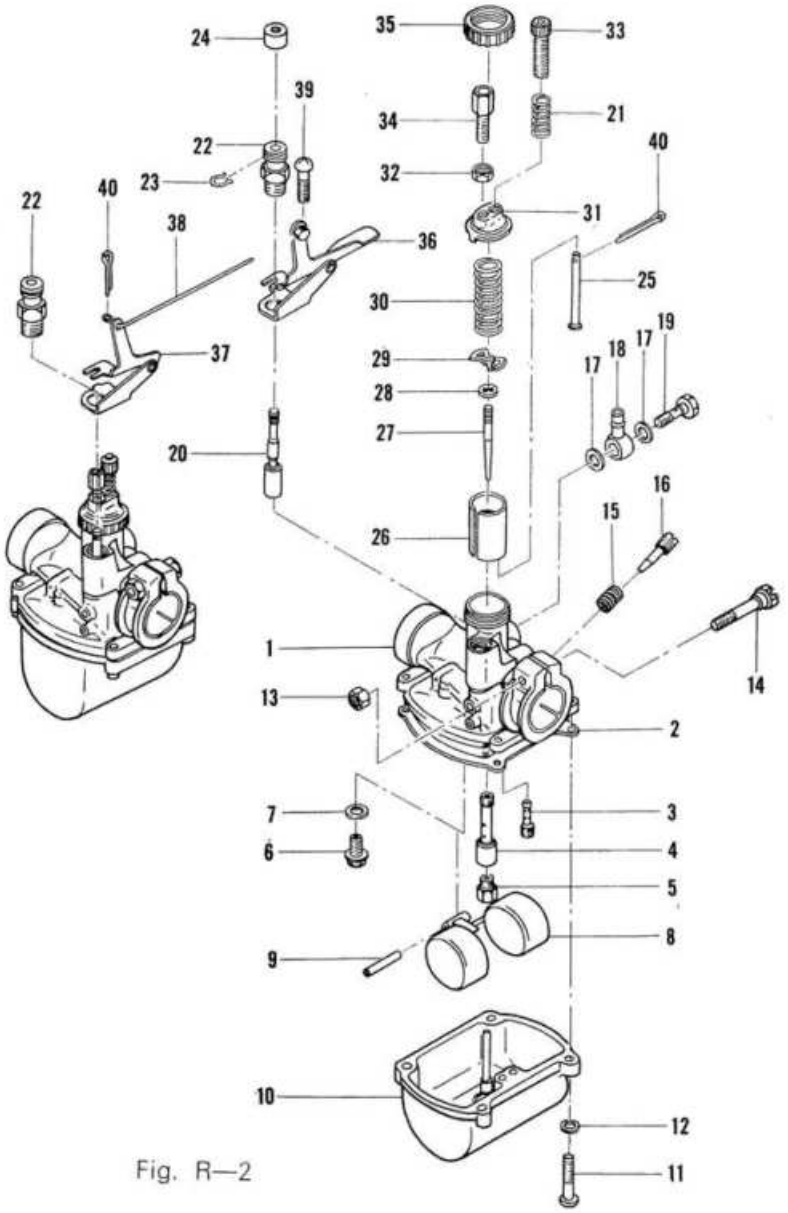


Fig. R—2

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 mixture too rich. Shake the float so you can feel or hear any gasoline inside; Replace the float if it is deformed or leaking.

b. Float Valve:

Replace the float valve if its seating end is grooved or scratched. Check the float valve spring for fatigue: Depress the float valve with your finger, and make sure 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 over a certain type of road.

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 in the fuel preventing the float valve from seating properly (Fig. R–4). Drain the fuel, rinse out the fuel tank with clean gasoline, and clean all other parts of the fuel system, including the float valve and valve seat, with compressed air.

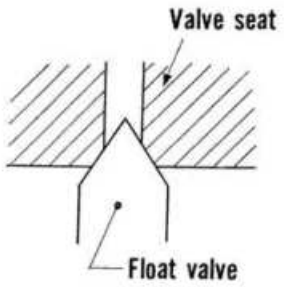


Fig. R—3

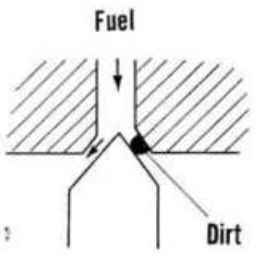
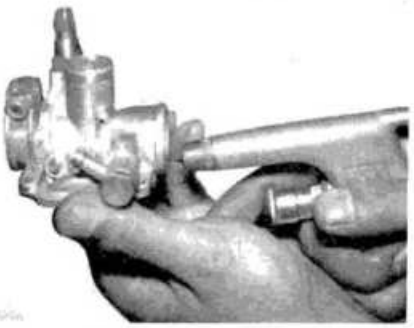


Fig. R—4

d. Cleaning Carburetor:

Disassemble the carburetor, and wash all its parts in clean gasoline. Blow out all air and fuel passages in the carburetor with compressed air (Fig. R–4).
All jets and other delicate parts should be cleaned by blowing compressed air through them, because wire or other hard, pointed cleaning tools may damage their precision-machined surfaces.


Fig. R—5

2. Carburetor Settings:

1. M.J. (Main jet)	#60
2. N.J. (Needle jet)	E–0
3. J.N. (Jet needle setting—the step where J.N. clip is fitted)	3D3–3
4. C.A. (Throttle valve cutaway)	1.5
5. P.J. (Pilot jet)	#17.5
6. A.S. (Air screw setting—the number of turns the A.S. is backed off from a lightly seated position.)	2–1/2 turns
7. G.S. (Starter jet)	#15

S. Air Cleaner:

The air cleaner is mounted in the opening at the center of the frame. It is uniquely designed to reduce air intake noise.



Fig. S—1

1. Removal:
   a. Detach the left side cover, disconnect the battery leads, and remove the battery.
   b. Remove the air cleaner mounting bolt, and take out the air cleaner, lifting it slightly upward (Fig. S–1).
   c. Remove the four screws holding the lid to the air cleaner case, (Fig. S–2). remove the lid, and pull the filter element out of the case (Fig. S–3).

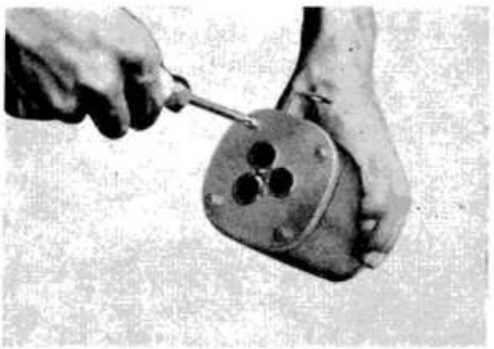


Fig. S—2

2. Cleaning:
   Clean the filter element with compressed air (Fig. S–4).*
   Because the element is made of filter paper, it should never be exposed to water or oil.

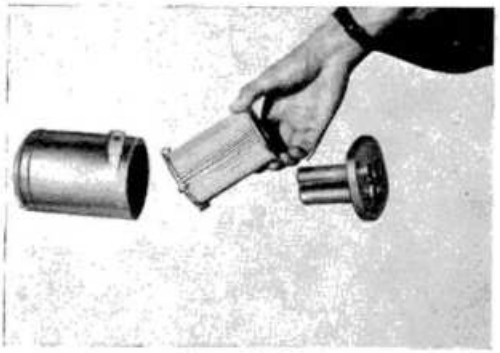


Fig. S—3

T. Transmission Oil:

1. The transmission case should be filled with 1⅜ pt or 22 oz (650 cc) of a high grade SAE #30 motor oil.

Chapter IV: Chassis

The YL–1's styling differs from the YG1 in the design of the fuel tank, seat, and front fender. Because of the increased weight and output of the YL1 100 cc engine, the YG1 frame has been strengthened by adding a "down-tube" to serve as the front engine mount. For disassembly instructions or further description of the following systems refer to the YG1 Service Manual.

A. Features:

1. Design:

The YL1's unique design, in sharp contrast with conventional designs, is characterized by a dynamic streamlined appearance that begins with its slim fuel tank.

2. Frame:

The one-piece steel plate monocoque frame is reinforced by a down-tube or removable engine mount; the strength and rigidity of this combination have been confirmed by repeated durability tests.

3. Suspension:

The front wheel is mounted to a telescopic fork, and the rear wheel to a swing arm fork. The combined action of two coil springs and oil dampers on both front and rear wheels absorbs road shock as well as high frequency vibration. This effective suspension, and a seat upholstered with foam rubber, give the rider real comfort as well as control and handling ease.

4. Brakes:

The internal expanding brakes are actuated by a cable from the front drum to the brake lever, and a rod from the rear drum to the brake pedal. Safe, steady braking is exerted by this system under any road condition. The brake drums are of patented water-proof and dust proof design.

5. Fuel tank:

The fuel tank is separated from the body by rubber mounts that absorb shock and vibration, and make disassembly and maintenance easier.

B. Comparison of major parts with those of YG1:

No.	Name of the part	Improvement
1.	Frame	Designed on the basis of YG1 frame. Rear engine mounts reinforced, battery case cover improved, etc. Down-tube added as front engine mount.
2.	Front fender	Same as YGS–1 front fender
3.	Front fork	Springs stiffened slightly; the rest same as YGS–1.
4.	Handle bars	1. Rubber grips same as YA6. 2. Clutch and brake levers same as YA6.
5.	Fuel tank	New design, Capacity-7.3L(1.9 gal.), Reserve 2L(2.1 qt.)
6.	Seat	Newly designed, two tone upholstery Foam rubber resistance, 20 ±3 kg (40.4±6 lbs)
7.	Rear tandem foot rests	Folding.

C. Front Fork Oil:

Pour 4.4 fluid ounces (130 cc.) of # 30 oil into each side of the front fork.

Chapter V: Electrical Equipment

A. Yamaha YL-1 Electrical Equipment

All electrical parts are of 12V capacity. The conventional flywheel magneto-generator of the YG1 series has been replaced by an ignition dynamo. This excellent system is also used on Yamaha's YDS3 and YM1. The dynamo has certain advantages over the flywheel magneto system:

1. Head light intensity is increased **(YG1 15WD,---YL1-25WD)**
2. Ignition characteristics are more stable.
3. Starting is easier.
4. Charging capacity is greater, for longer battery life.

B. Electrical Systems:

1. Ignition system:

   This system starts the engine by using the spark plug to ignite the fuel-air mixture in the cylinders. The main parts consist of:
   Contact breaker (mounted to flywheel base plate)
   Condenser (mounted to flywheel base)
   Ignition coil, spark plug, high tension lead & battery.

2. Charging system:

   This system charges the battery, which is the primary power source for engine starting and all electrical equipment (lights, horn, etc.)
   Main parts of the charging system:
   Dynamo (yoke, armature, brushes)
   Regulator (with cut out relay)
   Fuse
   Battery (power source)

3. Lights:

   The lighting system includes:
   Signals....horn, stop light, neutral light, and high beam indicator light.
   Lights....head light, tail light and speedometer lights.

C. Electrical Parts List:

Location	Name of part	Manufacturer	Specifications	Remarks
Engine	Ignition generator	Hitachi	G1206–01 Rating output 14V 84W	New design
	Neutral switch	Asahi Denso	YB–9	New design
Frame	Regulator	Hitachi	T–106–01	
	Ignition coil		C–11–17	
	Horn	Nikko Kinzoku	YP–12	
	Battery	Nippon Denchi	MG–3–12 12 V 5.5 AH	
		Furukawa Denchi	BST3–12 12 V 5.5 AH	
	Fuse Holder	Daiko Seisakusho	20 A 3pcs. in a set	
	Main switch	Asahi Denso	YBM9	
Head-light-instru-ment housing	Head light	Koito Seisakusho	14 V 25 WD	
	Speedometer lights	Nippon Seiki	Meter light 12V 12W Neutral light 15 V 3 W High beam indicator light 15 V 3 W	
Handle-bars	Handle switch	Asahi Denso YS10		
Rear fender	Tail light	Koito Seisakusho	14 V 8 W (tail)	

D Wiring Diagram

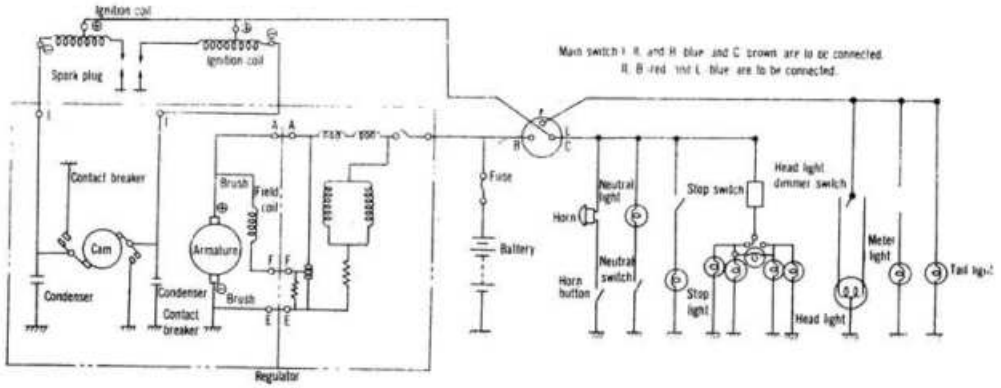


Fig. D—1a

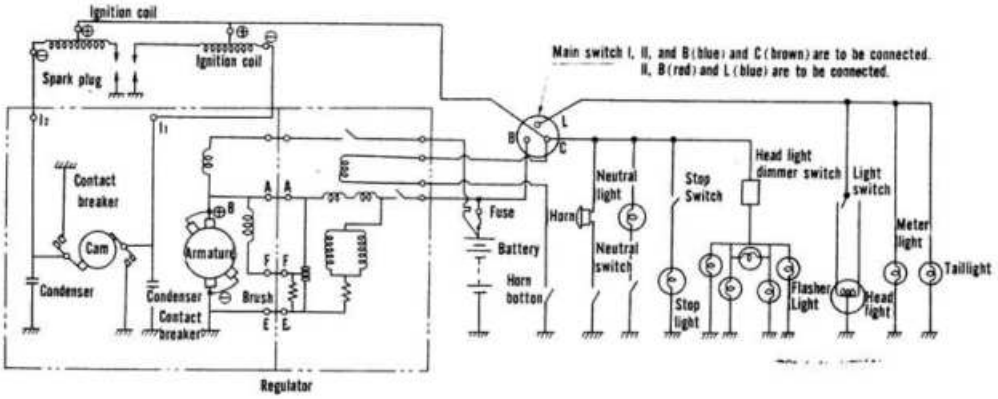


Fig. D—2b

E Ignition Dynamo

1. Checking the generator.

a. Checking generator output:
First disconnect the wires from terminals, A (White) and F (Green) then ground the F terminal to (D) with a copper wire... (Black). Connect the positive lead of the tester to the A (White) terminal, and ground the negative tester lead to the frame. Start the engine and keep it running at 1,700 rpm. if the electricity generated reads more than 14V on the tester, there is nothing wrong with the generator.

(Note: During this test, if you run the engine at more than 1,700 rpm., the high voltage current generated will ruin the coil, lead wire etc., so don't run the engine at high rpm for more than three minutes.)

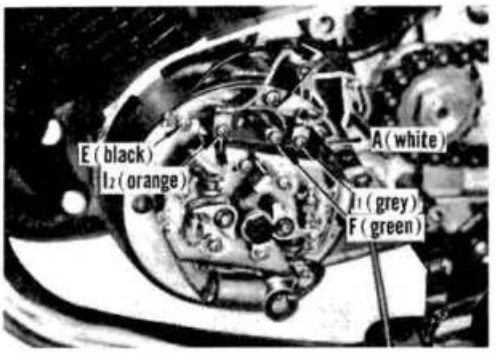


Fig. E—1

b. Checking the yoke assembly:

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

(1) Brush insulation test:

The positive brush is insulated from the yoke, and by using the tester, you can check its insulation as shown in Fig. E–2. If the insulation is bad, sparks will jump between the brush holder, or A terminal, and the yoke.
(Note: The negative brush is not insulated.)

(2) Conductivity test of field coil:

Check the coil for electrical leakage between terminal F and the yoke. (The circuit is grounded)

(3) Conductivity test between A & F:

Check continuity between A and F.

(4) Brush inspection.

The brushes are one of the most important parts in the generator (dynamo). Take out the brushes and check their surface in relation to the commutator. Each brush must contact the commutator with more than $\frac{3}{4}$ of its surface. If both brush and commutator surfaces are rough, check the alignment of the crankshaft and armature. Smooth down any burrs on the edge of the armature's tapered bore, and clean it thoroughly. If either brush is worn past the minimum length mark, replace them both with new ones.
Long hours of head and tail light use with bad brush contact will damage the surface of the commutator and cause rapid brush wear.

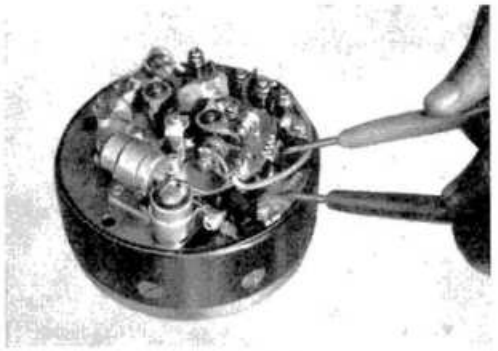


Fig. E—2

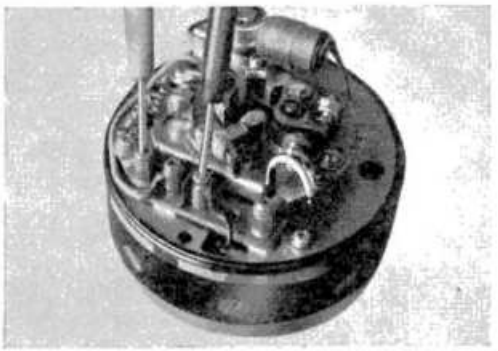


Fig. E—3

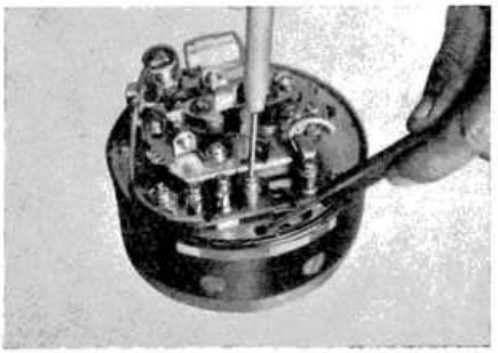


Fig. E—4

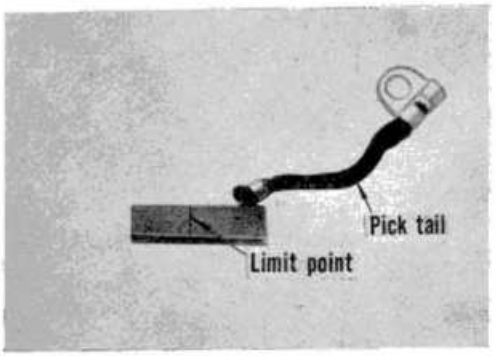


Fig. E—5

(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's spring; the friction from parts vibrating against the brush leads, may wear through their insulation and cause a short circuit.

c. Inspection of armature:

(1) Check the commutator surface:

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. E–6, rotating the armature to polish it evenly; partial polishing will only deform the commutator and shorten brush life.

If the commutator is burned, out of round, or too rough for the sandpaper repair stage, turn it down on a lathe no more than 2 mm. under the standard 37.5 mm diameter. (1.48 in.)

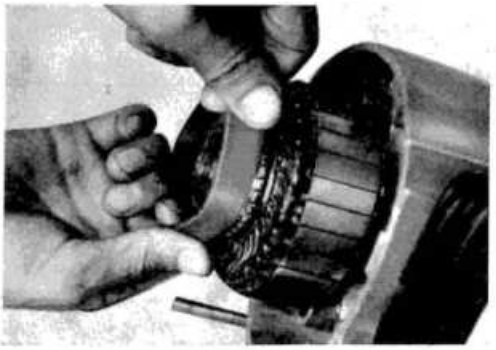


Fig. E-6

(2) Check commutator mica under-cut:

The commutator is composed of alternate segments of copper and mica; the mica surfaces are lower than the copper (undercut) leaving gaps between the copper segments. If the copper is worn down to the mica, but the commutator surface is not rough or out of round, undercut the mica with a saw blade exactly as wide as the gap between segments, to a depth of:

(Mica under-cut inspection limit: 0.01 in. (0.2 mm.)

Mica under-cut correction limit: 0.02—0.03 (0.5–0.8 mm)

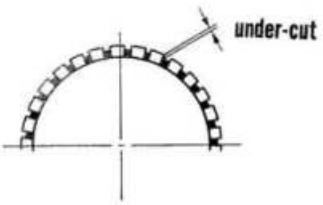




Fig. E—7

(3) Check the armature insulation:

If there is electrical leakage between the commutator and shaft, replace the whole armature. (Fig. E–8)



Fig. E—8

d. Condenser inspection:

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

(1) Insulation test:

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 the maximum reading. If the reading was more than 3 MΩ, ground the condenser terminals to discharge it. (E—10)

(2) Capacity test:

Set the service tester for the condenser capacity position, and connect its terminals to those of the condenser (E—9). Condenser capacity should be no more than 0.22 μF ± 10%, so before testing the condenser, adjust the capacity of the service tester. (E—11, 12)

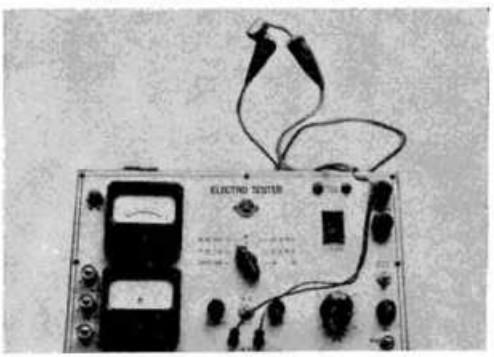


Fig. E—9



Fig. E—10



Fig. E—11

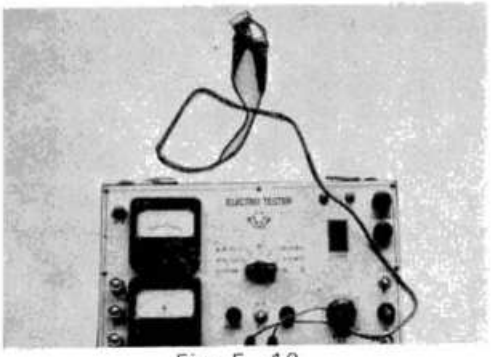


Fig. E—12

e. Contact breaker:

(1) Periodically inspect the breaker points and check the point gap. Scratches, or deposits should be polished away with sandpaper (#400—600) and the points cleaned with a thick strip of paper dipped in solvent and pulled between them. (Fig. E–13)

(2) After every 2,000 miles (3,000 km) inspect the breaker cam lubricator and grease it a little.



Fig. E—13

f. Adjustment of ignition timing:

Tools and instruments for adjusting:

Dial gauge (Accurate to 1/100)
Dial gauge adapter
Testing lamp, Yamaha electro tester, or point checker
Point wrench
Phillips and slot head screwdrivers
12 mm wrench.

1. Ignition timing is adjusted separately for the right and left cylinders.

2. Screw the dial gauge adapter into the plug hole of either cylinder head and install the gauge. Turn the armature bolt until the piston reaches Top Dead Center (the indicator needle reverses direction), then turn the zero on the indicator to exactly that point where the needle stopped before reversing. (Fig. E–14)

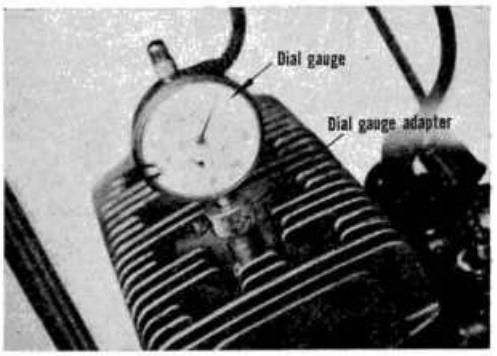


Fig. E—14

3. Set the point gap at 0.012–0.013 in. (0.3 mm–0.35 mm) (Fig. E–15) When adjusting the right cylinder (right in relation to the riding direction), adjust the breaker points of terminal I_1 (orange). For the left cylinder, adjust the points of terminal 1_2 (gray).

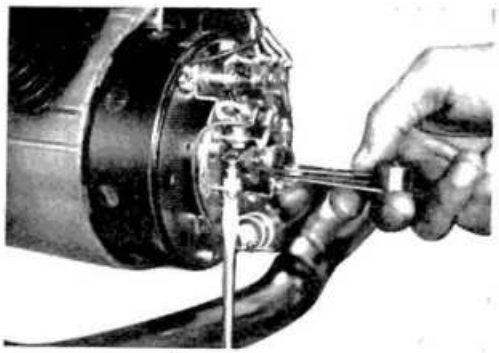


Fig. E—15

4. Remove the lead wires from Terminal 1_1 or 1_2 (of the piston you are checking). Connect the terminal to the positive (+) tester lead, and ground the tester's negative lead to the frame. (Fig. E–16)

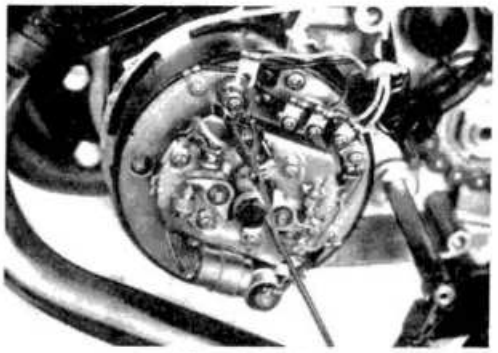


Fig. E—16

5. Turn the armature bolt in the reverse of running direction until the dial indicator needle makes 2 turns Then turn the armature bolt in normal rotation to bring the indicator needle back to 1.8, and if that cylinder's timing is correct, the testing light will go off, because the points (which should be clean and correctly gapped) began to open and broke the circuit at exactly 1.8 mm BTDC.

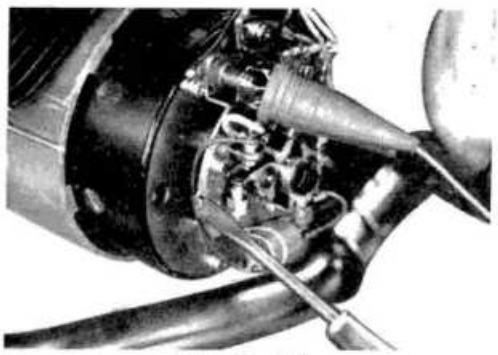


Fig. E—17

6. Loosen the mounting screw in the breaker plate, and pry the plate either way with a slot head screwdriver until indicator needle will move from close to open (or from open to close) when piston is exactly 1.8 mm before T.D.C. then tighten the breaker screw and again check the timing. (Fig. E–17)

7. Check the other cylinder the same way, keeping error between the left and right sides within 3/100 (0.03 mm.)

g. Generator specifications:

part	Item	Maintenance	Inspection
Field (yoke)	Resistance (20°C) Indirect winding	5.2 Ω	When voltage is irregular.
Brushes	Material	GH 45	First 3500 mi. (6000 km.) Every 2500 mi. (4000 km.) thereafter.
	Number	2	
	Width ×thickness ×0.32 × 0.20 ×0.81 in. length	(8 ×5 ×20.5 mm.)	
	Minimum length 0.41 in.	(10.5 mm.)	
	Spring capacity 0.9–1.2 lbs.	(0.4–0.56 kg.)	
Commutator	Diameter 1.5 in.	(37.5ϕ mm).	
	Minimum diameter 1.4 in.	(35.5ϕ mm.)	
	Mica Under-cut 0.02–0.03 in.	(0.5–0.8 mm.)	
	Minimum limit of mica undercut 0.01 in.	(0.2 mm.)	
	Difference between max. and min. dia. 0.0012 in.	(0.03 mm.)	
Breaker	Point gap 0.012–0.014 in.	(0.3–0.35 mm.)	Every 2000 mi. (3000 km) (High rpm irregular) (Ignition irregular)
	Breaker arm pressure 1.1–1.5 lbs	(0.5–0.7 kg.)	
	Condenser capacity	0.22 μF	
	Ignition timing	BTDC 21 (1.8 mm)	
Others	Generator		
	Generator diameter, outside	4.7 in. (120ϕ mm)	
	Generator diameter, inside	4.5 in. (115ϕ mm)	
	Phase	8 phase	
	Air gap	0.012 in (0.3 mm.)	
	Armature taper	20ϕ ×1/10mm.	
	Cut-in rpm	1800 rpm.	
Capacity	Rated output rpm	14V 6A/2000 rpm.	
	Lock torque		

F. Regulator (Voltage regulator):

The generator alone cannot 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 (thereby collapsing the magnetic field) when the voltage exceeds a pre-set level.
A cutout relay (also called a charging relay) is built-into the regulator. It allows stable electric current from the dynamo to charge the battery. However, when the engine stops, or when its speed is so low that the dynamo's output is lower than that of the battery, it breaks the circuit to the battery so the battery won't be drained.

1. Inspection and Adjustment:

If the regulator can no longer control the voltage, the battery will be drained or over charged and all electrical accessories may be burned out, so use a good tester when inspecting or adjusting a regulator.

a. Ignition (load) voltage:

1. Inspection.

Set your tester as in Fig. F-1 using a D/C voltmeter or electro-tester. Start the engine, warm it up, and keep it running at 3,000 rpm. Take out the fuse connector to cut off current to the battery, and the tester should indicate an output of 14.8~15.8 V.

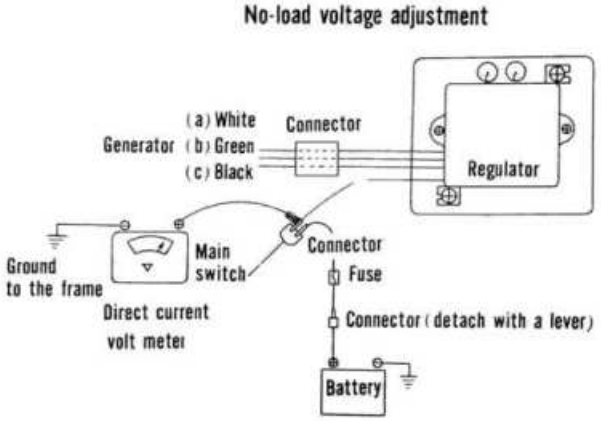


Fig. F-1 Load voltage measurement

2. Adjustment:

If the voltage output is incorrect, remove the regulator cover and raise the voltage by tightening the voltage relay's adjusting screw, or lower the voltage by loosening the screw. (Voltage relay has two contact points.)

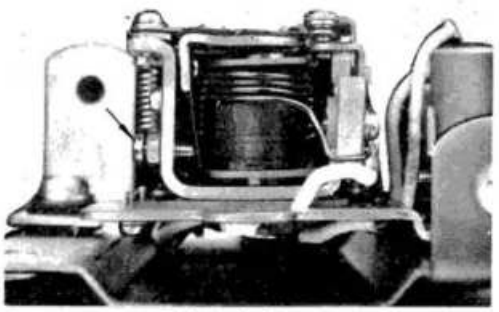


Fig. F-2

b. No-load voltage:

1. Inspection:
Disconnect the wire at terminal B (red) of the regulator and connect the positive tester lead to terminal B (red); then ground the negative tester lead. Start the engine and keep it running at 2,500 rpm: Your regulator is correct if the tester reads 15.6–16.3 volts.

2. Adjustment:
Same as load voltage adjustment.

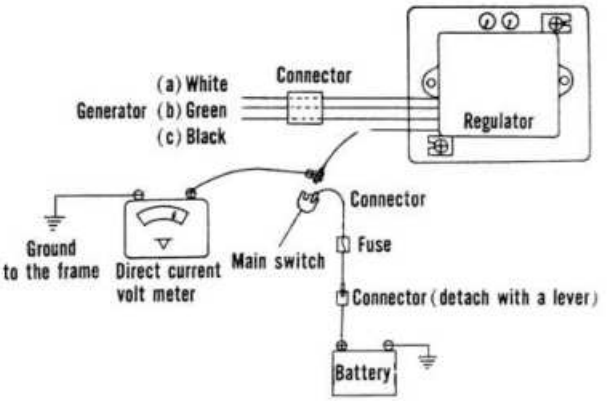


Fig. F—3

c. Cut-in voltage of the cut out relay:

1. Inspection:
Use the same connections used for the ignition load voltage test. Start the engine and increase its rpm slowly. The cut out relay is correctly set if its breaker points close at 12.5–13.5 volts (approx. 1,800 rpm.)

2. Adjustment:
Adjust the cutout relay by changing its spring tension.
In actual practice, there is rarely any 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.

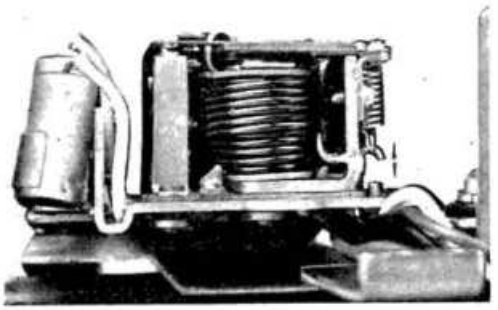
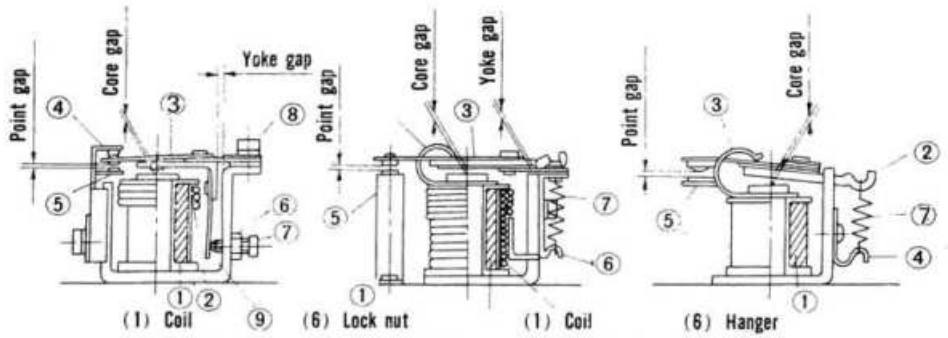


Fig. F—4

2. Regulator Standards:

	Item	Adjustment Standard YL–1	Check
Voltage regulator Voltage relay	No load voltage adjustment value	15.6–16.3 V (2,500 rpm.) under 16.7 V (5.000 rpm.)	When voltage is irregular
	Ignition coil voltage	14.8~15.8 V /3.000 rpm	
	Coil resistance value	12.8Ω/20 °C	
	Field coil input resistance	10.0Ω/20 °C	
	Compensation value	10.0Ω/20 °C	
	Yoke gap	0.6–0.7 mm	
	Core gap	0.4–0.7 mm	
	Point gap	0.4–0.5 mm	
Cutout Relay	Cut-in voltage	13 ±0.5 V	
	Return	under 5 A	
	Coil resistance value	12.8Ω/20 °C	
	Yoke gap	0.2 mm	
	Core gap	0.8–1.0 mm	
	Point gap	0.6–0.8 mm	



(1) Coil (6) Lock nut
(2) Current coil (7) Adjusting screw
(3) Armature (8) Middle screw
(4) Lower contact (9) Adjusting spring
(5) Upper contact

Voltage relay

(1) Coil (6) Hanger
(2) Current coil (7) Spring
(3) Armature
(4) Stopper
(5) Cutout relay contact

Charge Relay (cutout relay)

Fig. F—5

G. 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 150–300 volt current by self-induction. This current is boosted to 7,000–10,000 volts by mutual induction in the larger number of secondary coil windings; enough voltage to make a spark jump the plug electrodes.

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

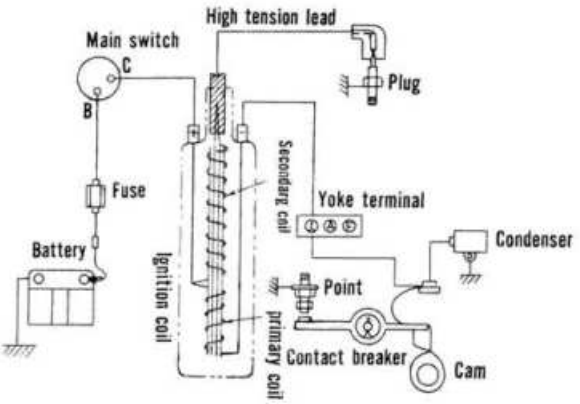
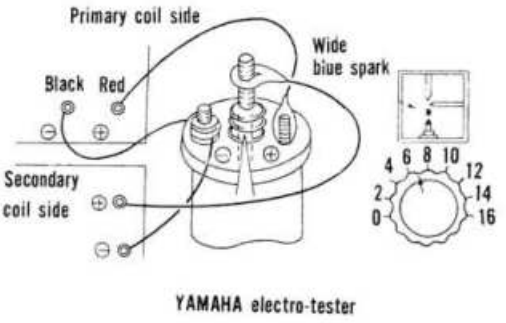


Fig. G–1



YAMAHA electro-tester

Fig. G–2

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

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

2) Test, with coil installed (practical test).

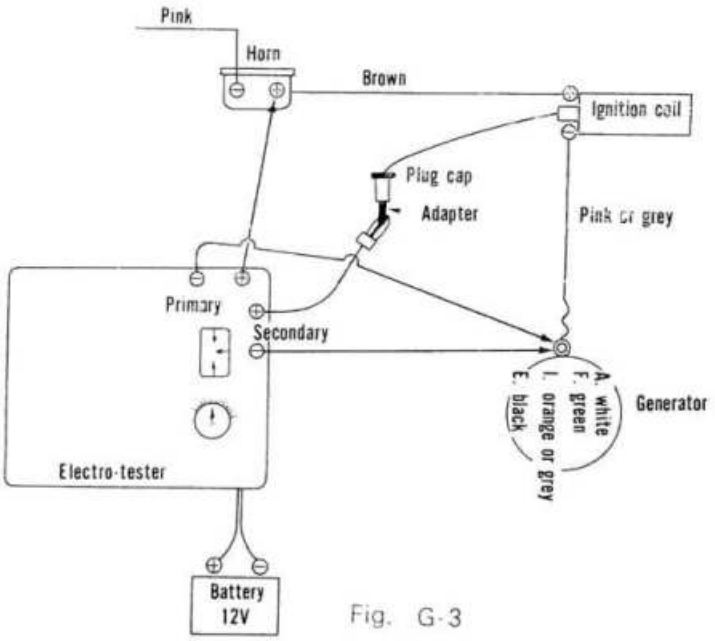


Fig. G-3

a. Disconnect the lead attached to generator terminal I and connect it to the negative primary and secondary leads of the tester.

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

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

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

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

H. Spark Plug:

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

1. How to "read" spark plugs (condition):

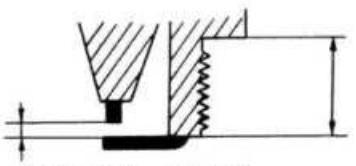
a. Best:....When the porcelain around the center electrode is a light tan color.

b. If the electrodes and porcelain are black and somewhat oily, replace the plug with a hoter-type for low speed riding.

c. If the porcelain is burned white and/or the electrodes are partially burned away, replace the plug with a colder-type for high speed riding.

2. Inspection:

Instruct the rider to:
Inspect and clean the spark plug at least once a month or every 500 miles (1,000 km.) Clean the electrodes of carbon and adjust the electrode gap to 0.025 in. (0.5–0.7 mm). Be sure to use NGK B7HS plugs as replacements to avoid any error in *reach*.



0.025 in (0.6 ~ 0.7 mm)

Fig. H—1

I. Battery:

The battery is the power source for the whole electrical system. When the engine starts, or engine rpm is low and the generator generates very little electricity, the battery supplies power to the ignition system, lights, etc. During riding, the generator supplies the electric power and also recharges the battery.

1. Before the first ride:

   A new battery should be charged by a battery service shop, but if you charge it yourself, take the following steps.

   a. First, fill each battery cell to maximum level with dilute sulphuric acid (specific gravity 1.26)
   b. Then for maximum battery life, charge it with 0.6A electric for 13 hours.
   c. After charging, tilt up a corner of the battery to let out any air. If necessary add more acid to restore it to maximum level, so the specific gravity is between 1.26–1.28. Then tighten all the cell caps.
   d. Wash the battery off with water to remove any sulphuric acid. Dry it well and then mount it in the frame.

2. Periodic inspection & supplementary charging

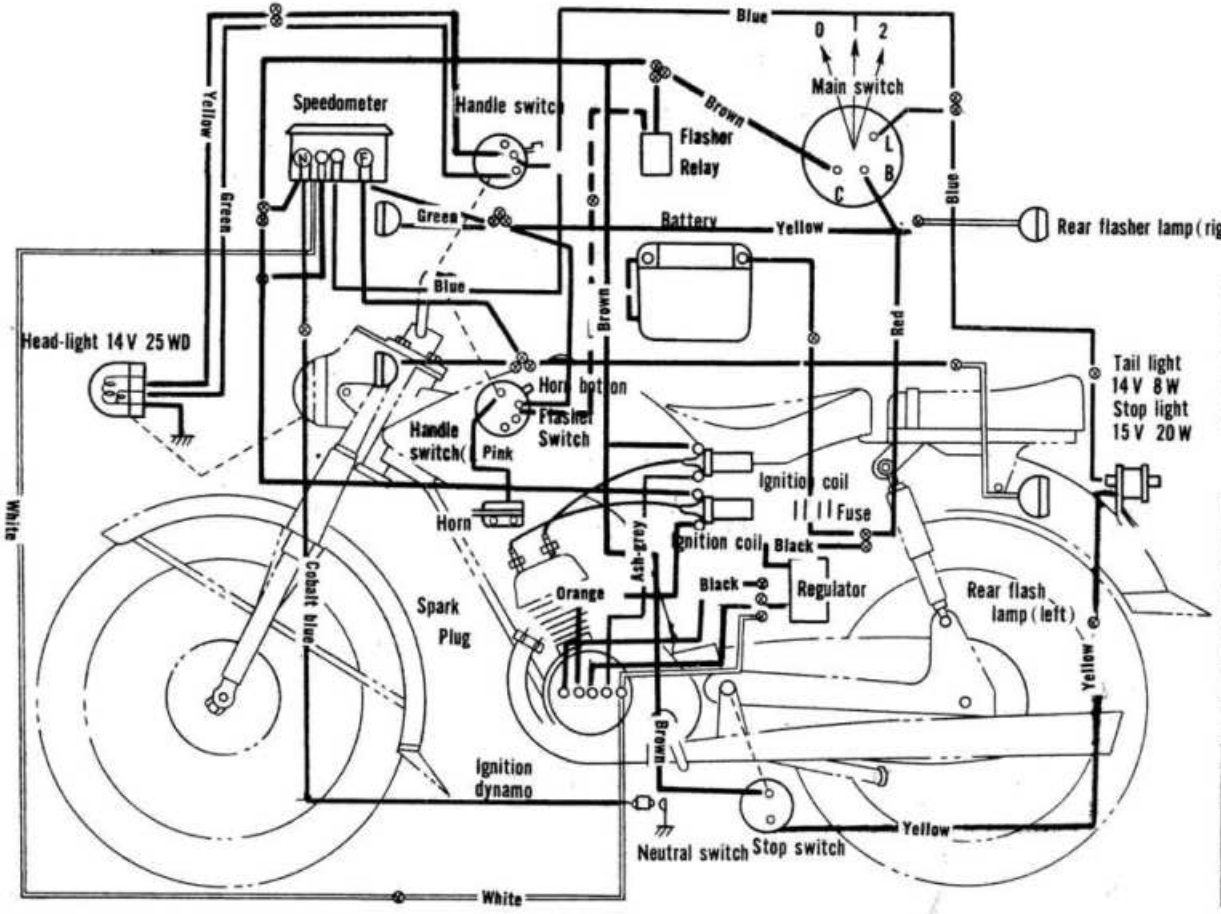
   Inspect the fluid level every month; if it drops below the middle line, instruct the rider to add distilled water to raise the fluid to maximum level.
   If the battery seems to be discharged, recharge it. The secondary charge should also be at 0.6A for 13 hours.

3. Maintenance.

   If your motorcycle will not be used for a long time, remove the battery and have a battery shop store it. In shops equipped with a charger do the following:

   a. Recharge the battery.
   b. Store it in a cool, dry place, and avoid temperatures below 0°.
   c. The battery should be recharged before mounting.

YAMAHA 100 MODEL YL-1 WIRING DIAGRAM



Switch connection

Position	Condition	Connection
0	off	
1	Daytime riding	B + C
2	Night riding	B + C + L

Wiring list

Armature circuit	White
Field circuit	Green
Common circuit	Brown
Ground circuit	Black
Battery (+) circuit	Red
Headlight main circuit	Yellow
Horn circuit	Pink
Neutral light circuit	Cobalt blue
Tail light circuit	Blue
Stop light circuit	Yellow
Ignition coil (R) circuit	Ash-grey
Ignition coil (L) circuit	Orange

Chapter VI: Inspection Maintenance

A. Periodic inspection:

A periodic inspection should be made with preventive maintenance in mind to assure the owner of trouble-free riding.
This care will reduce service labor as well as expense to the owner, and preclude the possibility of claims under warranty coverage.
Dealers should always give new owners a warranty and service booklet.

PERIODIC MAINTENANCE INTERVAL CHART

ITEM		REMARKS	INITIAL				THEREAFTER EVERY	
			250	500	1000	2000	1000	2000
Brake System (Complete)	ALSO PREOPER CHECK	Chk/Adj as req'd - Repair as req'd		0	0			0
Clutch		Check/Adjust as required		0	0			0
Battery		Top-Off/Ck. Spec. Gr. as req'd - monthly - or →	0	0	0		0	
Spark Plug		Inspect/Clean or replace as re'd	0	0	0		0	
Wheels & Tires		Pressure/Spoke Tension/Runout	0	0	0		0	
Fittings & Fasteners		Tighten before each trip and/or →	0	0	0		0	
Autolube		Cable operation/Adjustment	0	0	0			0
Drive Chain		Tension/Alignment	0	0	0		0	
Oil Level Check		Includes Sump/Trans./Oil tank 1 4	0	0	0		0	
Air Filter		Foam Type - See Service Note 2 4	0	0	0		0	
Fuel Petcock		Clean/Flush tank as req'd	0		0			0
Ignition Timing		Adjust/Clean or repl. pts. as req'd		0	0			0
Carburetor Adjustment		Check Operation/Fittings		0	0			0
Carburetor Overhaul		Clean/Repair as req'd/Refit/Adjust				0		8000
Cylinder Compression		Preventive Maintenance Check		0	0			0
Decarbonize Engine		Includes Exhaust System			0	0		0

Service Notes:

1. Check oil tank level before each ride or every 100 miles. Top off when oil level shows at the sight glass or before any long trip. See "Lubrication Intervals" for type oil to use.
2. Foam element air filters must be damp with oil at all times to function properly. Remove, clean, and oil filter at least once per month or every 500 - 1,000 miles; more often if possible. (If extremely hard usage, such as dirt riding, clean and lube daily). See lubrication chart for add"l details.
3. Pre-operational checks should be made each time the machine is used. Such an inspection can be thoroughly accomplished in a very short time; and the added safety it assures the rider is more than worth the minimal time involved.
4. For add'l info-drive chain, Transmission level, wet-type air filter; see lube chart.

LUBRICATION INTERVALS

ITEMS		REMARKS	TYPE	PERIOD						
				INITIAL				THEREAFTER EVERY		
				250	500	1000	2000	1000	2000	4000
Autolube	PREOP CHECK	See Service Notes	#1			See Service Notes				
Transmission Oil		Warm engine before draining	#2		2Str.		0	CHK	0	
Drive Chain		Lube/Adjust as required	#3			See Service Notes				
Drive Chain		Remove/Clean/Lube/Adjust	#3				0		0	
Air Filter		Foam Type	#9			See Service Notes				
Control & Meter Cables		All - Apply Thoroughly	#4		0	(0)			0	
Throttle Grip & Housing		Light Application	#5			0			0	
Tach & Speedo Gear Hsgs.		Light Application	#5			0	0			0
Rear Arm Pivot Shaft		Zirc - Apply until shows	#6			0			0	
Brake Pedal Shaft		Light Application	#5			0			0	
Change Pedal Shaft		Light Application	#5			0			0	
Stand Shaft Pivot(s)		Light Application	#5			0			0	
Front Forks		Drain Completely - Ck Specs	#3		CHK		0		CHK	0
Steering Ball Races		Inspect Thoroughly/Med. Pack	#7				0			0
Point Cam Lubr. Wick		Very Light Application	#8			0				0
Wheel Bearings		Do Not Over-Pack	#7				0			0

#1 Check tank level before each ride or every 100 miles. Top off when oil level is at sight glass or before any long trip. Use the following lubricant (in order of preference): Yamalube, or; two-stroke oil labeled "BIA certified for service TC-W".

#2 At ambient temperatures of 30-90°F use 10W-30 "SE" (two-strokes).

#3 Use 10W-30 "SE" motor oil. (If desired, specialty type lubricants of quality manufacture May be used.) Unless and an automatic oiler is incorporated, lube every 200-250 miles.

#4 Use graphite base type (specialty types available—use name-brand quality manufacturer).

#5 Light duty: Smooth, light-weight, "white" grease. Heavy duty: Standard 90 wt. lube grease (do not use lube grease on throttle/housing).

#6 Use standard 90wt. lube grease—smooth, not coarse.

#7 Medium-weight wheel bearing grease of quality mft.—preferably waterproof.

#8 Light-weight machine oil.

#9 AIR FILTERS— Foam element air filters must be damp with oil at all times to function properly. Clean and lube monthly or per mileage. If hard usage, clean and lube daily. Do not over-oil. Use SAE 10W-30 "SE".

B. Major inspection & maintenance:

1. Engine

a. Removing carbon

YAMAHA Autolube engines accumulate comparatively little carbon. However, you should clean the following parts every 4 months (about every 2,000 miles (3,000 km.) :

1) Cylinder head, piston head and ring grooves.
2) Cylinder exhaust port.
3) Exhaust pipe and silencer.

b. Air cleaner

Dirt will shorten the life of the cylinder and piston and cause a loss of power. When riding on dusty roads the air cleaner should be cleaned at least every 2,000 miles (3,000 km.).

c. Carburetor inspection & cleaning

Hard starting, poor acceleration, rough idling, etc. means the carburetor should be overhauled.

1) Disassemble the float chamber and float from the mixing body and wash them in clean gasoline.
2) Blow dirt out of the bypass holes in the mixing body after cleaning the pilot jet and main jets.
3) Assemble the above parts in correct order, mount the carburetors on the engine, adjust the throttle cables and set the idle.
4) Check the adjustment of the oil pump, too.

d. Clutch adjustment

If clutch cable play is excessive, adjust it to 1/16–2/33" with the clutch adjusting nut on the left crankcase cover.

e. Gear oil

Change the gear oil about every 2,000 miles (3000 km.) before it becomes too dirty. Use $1\frac{3}{8}$ pints. (650 cc) of #30 automotive oil.

2. Chassis

a. Inspect front & rear brakes

1) Adjust the play in the brake cable and brake pedal.
2) Remove the wheels and clean the brake shoes and drums of dirt.

Grease the wheel bearings every 4,000 miles (6,000 km.)

b. Adjust and oil the chain.

1) Periodically adjust chain tension and oil the chain.
2) Every 2,000 miles (3,000 km.) remove the chain and wash it in solvent. When it dries, oil it adequately.

c. Change the front fork oil every 4,000 miles (6,000 km.)

d. Inspect and tighten all bolts and nuts during periodic inspections:
   1) Axle nuts on front and rear wheels.
   2) Swing arm shaft nuts
   3) Foot rest. Brake pedal.
   4) Main stand. Side stand.
   5) Muffler mounting bolts.
   6) Engine mounting bolts
   7) Spokes of front & rear wheels.

e. Oil and grease
   Periodically lubricate all moving parts.

3. Wiring system

a. Inspect and clean the plug
   Check the appearance of the plug, clean it, and adjust the gap between the electrodes to 0.025 in.

b. Ignition timing
   Irregular ignition timing reduces engine power, and causes over-heating, pre-ignition, etc. Periodically check the timing with a strobe light, or dial indicator and point checker, after first cleaning the points and checking point gap.

c. Battery fluid
   Handle the battery carefully when removing it.
   Check the fluid level once a month in summer, once every two months in winter, and add distilled water as necessary.

d. Inspection of generator brushes
   The life of the brushes is proportionate to the machine's mileage.
   Begin regular inspection from 4,000 miles (6,000 Km.) on.
   If the brushes wear below the minimum length line, replace them with new ones.

e. Cleaning the armature commutator
   A dirty commutator lowers the charging rate and limits the capacity of the battery. Brush dust tends to collect in the mica undercut, so polish the commutator surface with fine sandpaper and then remove the dust with a knife blade.

f. Inspection of voltage regulator (Only in case of malfunction)
   Inspection should be made only if:
   The battery is run down or overcharged.
   The generator or regulator is considered to be the cause of irregular voltage.

4. Autolube system

a. Inspect, repair and adjust cables.
   1) Inspect pump and throttle cables for damage
   2) Be sure the cable is working smoothly in the cylinder under the gastank.
   3) Be sure the adjusting pulley returns correctly.
   4) Be sure the throttle valves return correctly.

b. Inspect pump setting
   Refer to the "Carburetor Pump Setting" paragraph R on page 44.

c. Pump stroke inspection
   Measure the minimum plunger stroke with a feeler gauge, while the accelerator grip is closed.
   If the stroke is less than 0.15 mm., remove the nut and adjusting plate, and add an adjustment shim of 0.1 or 0.2 mm., to correct the stroke to 0.25–0.33 mm.

d. Inspection of parts
   Inspect the pump assembly, banjo-bolt joints, oil delivery line, breather bolt, oil line, etc.
   Inspection :
   Tighten the banjo bolts if necessary, and check for oil leaks.
   1) Replace the banjo gaskets with new ones, if necessary.
   2) Delivery line—if cracked, replace.
   3) Oil pump leakage—replace (Slight oozing of oil is *not* considered leakage.)

APPENDIX A

CLEANING AND STORAGE

A. Cleaning

Frequent thorough cleaning of your motorcycle will not only enhance it's appearance but will improve general performance and extend the useful life of many components.

1. Before cleaning the machine:
   a. Block off end of exhaust pipe to present water entry; a plastic bag and strong band may be used.
   b. Remove air cleaner or protect it from water with plastic covering.
   c. Make sure spark plug(s), gas cap, oil tank cap, transmission oil filler cap and battery caps are properly installed.
2. If engine case is excessively greasy, apply degreaser with a paint brush. Do not apply degreaser to chain, sprockets, or wheel axles.
3. Rinse dirt and degreaser off with garden hose, using only enough hose pressure to do the job. Excessive hose pressure may cause water seepage and contamination of wheel bearings, front forks, brake drums, and transmission seals. Many expensive repair bills have resulted from improper high-pressure detergent applications such as those available in coin-operated car washes.
4. Once the majority of dirt has been hosed off, wash all surfaces with warm water and mild, detergent-type soap. An old tooth brush or bottle brush is handy to reach those hard-to-get-to places.
5. Rinse machine off immediately with clean water and dry all surfaces with a chamois skin, clean towel, or soft absorbent cloth.
6. Immediately after washing, remove excess moisture from chain and lubricate to prevent rust.
7. Chrome-plated parts such as handlebars, rims, spokes, forks, etc., may be further cleaned with automotive chrome cleaner.
8. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
9. Automotive-type wax may be applied to all painted and chrome-plated surfaces. Avoid combination cleaner-waxes. Many contain abrasives which may mar paint or protective finish on fuel and oil tanks.
10. After finishing, start the engine immediately and allow to idle for several minutes.

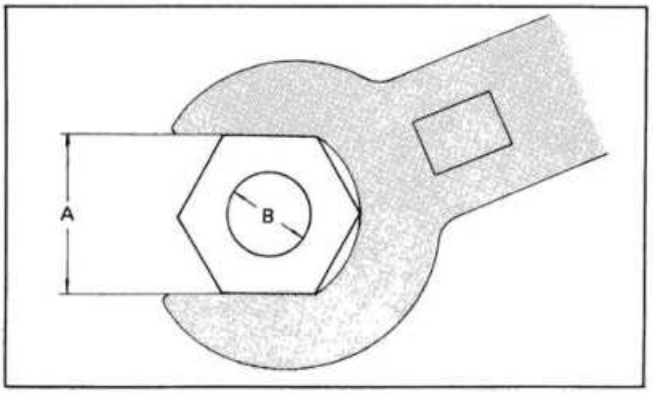
B. Storage

Long term storage (30 days or more) of your motorcycle will require some preventive procedures to insure against deterioration. After cleaning machine thoroughly, prepare for storage as follows:

1. Drain fuel tank, fuel lines, and carburetor float bowl(s).
2. Remove empty fuel tank, pour a cup of 10W to 30W oil in tank, shake tank to coat inner surfaces thoroughly and drain off excess oil. Reinstall tank.
3. Remove spark plug(s), pour about one tablespoon of 10W to 30W oil in spark plug hole(s) and reinstall spark plugs. Kick engine over several times (with ignition off) to coat cylinder walls with oil.
4. Remove drive chain. Clean thoroughly with solvent and lubricate with graphite-base chain lubricant. Reinstall chain or store in a plastic bag (tie to frame for safe-keeping).
5. Lubricate all control cables.
6. Remove battery and charge. Store in a dry place and re-charge once a month. Do not store battery in an excessively warm or cold place (less than 32°F or more than 90°).
7. Block up frame to raise both wheels off ground. (Main stands can be used on machines so equipped.)
8. Deflate tires to 15psi.
9. Tie a plastic bag over exhaust pipe outlet(s) to prevent moisture entering.
10. If storing in humid or salt-air atmosphere, coat all exposed metal surfaces with a light film of oil. Do not apply oil to rubber parts or seat cover.

APPENDIX B

TORQUE SPECIFICATIONS



The list at right covers those stud/bolt sizes with standard I.S.O. pitch threads. Torque specifications for components with thread pitches other than standard are given within the applicable chapter.

Torque specifications call for dry, clean threads. Components such as the cylinder or cylinder head should be at room temperature prior to torquing. A cylinder head or any other item with several fasteners should be torqued down in a cross-hatch pattern in successive stages until torque specification is reached. The method is similar to installing an automobile wheel and will avoid warping the component.

A (Nut)	B (Bolt)	Torque Specification		
		kg-m	ft-lbs	in.-lbs
10mm	6mm	1.0	7.0	85
13mm	8mm	2.0	15	175
14mm	8mm	2.0	15	175
17mm	10mm	3.5 - 4.0	25 - 30	300 - 350
19mm	12mm	4.0 - 4.5	30 - 35	350 - 400
22mm	14mm	4.5 - 5.0	30 - 35	400 - 400
26mm	17mm	6.0 - 7.0	40 - 50	500 - 600
27mm	18mm	6.0 - 7.0	40 - 50	500 - 600
30mm	20mm	7.0 - 8.0	50 - 60	600 - 700
14mm Spark Plug		2.5 - 3.0	20 - 22	230 - 250

GAS (FUEL) TO OIL RATIO CHART

Gas/Oil Ratio	12:1	15:1	20:1	24:1	28:1	30:1	36:1	40:1
Oil(qt.) per 1Gal. Gas	0.33	0.27	0.2	0.17	0.14	0.13	0.11	0.1
Oil(oz.) per 1Gal. Gas	10.7	8.5	6.4	5.3	4.6	4.3	3.6	3.2
Oil(qt.) per 5Gal. Gas	1.66	1.33	1.0	0.84	0.72	0.67	0.55	0.5
Oil(oz.) per 5Gal. Gas	53.5	42.67	32.0	26.6	22.8	21.32	17.8	16.0

(U.S. Gallons)

9-2. Conversion Tables

APPENDIX C

Metric to Inch System

	Known	Multiplier (Rounded Off)	Result
Torque	kg-m	7.235	ft-lbs
	kg-m	86.82	in.-lbs
	kg-cm	.0724	ft-lbs
	kg-cm	.8682	in.-lbs
Weight	kg	2,205	lb
	g	.03527	oz
Flow/ Distance	Km/ℓ	2.352	mpg
	Km/hr	0.6214	mph
	Km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in.
	mm	0.03937	in.
Volume/ Capacity	cc (cm^3)	0.03381	oz (U.S. liq.)
	cc (cm^3)	0.06102	cu in.
	ℓ (Liter)	2.1134	pt (U.S. liq.)
	ℓ (Liter)	1.057	qt (U.S. liq.)
	ℓ (Liter)	0.2642	gal (U.S. liq.)
Misc.	kg/mm	56.007	lb/in.
	kg/cm^2	14.2234	psi ($lb/in.^2$)
	Centigrade (°C)	(°C9/5)+32	Fahrenheit (°F)

Inch to Metric System

	Known	Multiplier (Rounded Off)	Result
Torque	ft-lbs	0.13826	kg-m
	in.-lbs	0.01152	kg-m
	ft-lbs	13.825	kg-m
	in.-lbs	1.1518	kg-m
Weight	lb	0.4536	kg
	oz	28.35	g
Flow/ Distance	mpg	0.4252	Km/ℓ
	mph	1.609	Km/hr
	mi	1.609	Km
	ft	0.3048	m
	yd	0.9144	m
	in.	2.54	cm
	in.	25.4	mm
Volume/ Capacity	oz (U.S. liq.)	29.57	cc (cm^3)
	cu in.	16.387	cc (cm^3)
	pt (U.S. liq.)	0.4732	ℓ (Liter)
	qt (U.S. liq.)	0.9463	ℓ (Liter)
	gal (U.S. liq.)	3.7853	ℓ (Liter)
Misc.	lb/in.	0.017855	kg/mm
	psi ($lb/in.^2$)	0.07031	kg/cm^2
	Fahrenheit (°F)	(°F−32)5/9	Centigrade(°C)

Definition of Terms:

m-kg = Meter Kilograms: Usually torque.
g = Gram(s).
kg = Kilogram(s): 1,000 grams.
km = Kilometer(s).
l = Liter(s).
km/l = Kilometer(s) Per Liter: Mileage.
cc = Cubic Centimeter(s) (cm^3): Volume or Capacity.
kg/mm = Kilogram(s) Per Millimeter: Usually Spring Compression Rate.
kg/cm^2 = Kilogram(s) Per Square Centimeter: Pressure.

Millimeters to Inches

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0		0.0039	0.0079	0.0018	0.0157	0.0197	0.0236	0.0276	0.0315	0.0354
1	0.0394	0.0433	0.0472	0.0512	0.0551	0.0591	0.0630	0.0669	0.7099	0.0748
2	0.0787	0.0827	0.0866	0.0906	0.0945	0.0984	0.1024	0.1063	0.1102	0.1142
3	0.1181	0.1200	0.1260	0.1299	0.1339	0.1378	0.1417	0.1457	0.1496	0.1535
4	0.1575	0.1614	0.1654	0.1693	0.1732	0.1772	0.1811	0.1850	0.1890	0.1929
5	0.1969	0.2000	0.2047	0.2087	0.2126	0.2165	0.2205	0.2244	0.2283	0.2323
6	0.2362	0.2402	0.2441	0.2480	0.2520	0.2559	0.2598	0.2638	0.2677	0.2717
7	0.2756	0.2795	0.2835	0.2874	0.2913	0.2953	0.2992	0.3031	0.3071	0.3110
8	0.3150	0.3189	0.3228	0.3268	0.3307	0.3346	0.3386	0.3425	0.3465	0.3504
9	0.3542	0.3583	0.4016	0.3661	0.3701	0.3740	0.3780	0.3819	0.3858	0.3898
10	0.3937	0.3976	0.4016	0.4055	0.4094	0.4134	0.4173	0.4213	0.4252	0.4291

0.01mm=0.004 0.03mm=0.0012 0.05mm=0.0020 0.07mm=0.0028 0.09mm=0.0035
0.02mm=0.008 0.04mm=0.0016 0.06mm=0.0024 0.08mm=0.0031 0.10mm=0.0039

Inches to Millimeters

	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0		0.254	0.508	0.762	1.016	1.270	1.524	1.778	2.032	2.286
0.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
0.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
0.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
0.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
0.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
0.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
0.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
0.8	20.320	20.574	20.828	21.082	21.336	21.590	21.844	22.098	22.352	22.606
0.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146
1.0	25.400	25.654	25.908	26.162	26.416	26.670	26.924	27.178	27.432	27.686

0.001"=0.0254mm 0.003"=0.0762mm 0.005"=0.1270mm 0.007"=0.1778mm 0.009"=0.2286mm
0.002"=0.0508mm 0.004"=0.1016mm 0.006"=0.1524mm 0.008"=0.2032mm 0.010"=0.2540mm

APPENDIX D

YL1 – YL1E

PERTINENT

PARTS and SERVICE

BULLETINS

Note

THE FOLLOWING INFORMATION MUST BE USED AS A GUIDE ONLY TO INDICATE THE DIRECTION TAKEN BY VARIOUS MODIFICATIONS. IT IS INCLUDED ONLY AS AN AID TO SERVICING YL1/YL1E MODELS AND, SHOULD A QUESTION ARISE REGARDING A CERTAIN PART, THE MECHANIC SHOULD REFER TO AN UP-TO-DATE MODEL PARTS BOOK, SERVICE OR PARTS NEWS BULLETIN, OR THE MANUFACTURER.

YAMAHA SERVICE NEWS

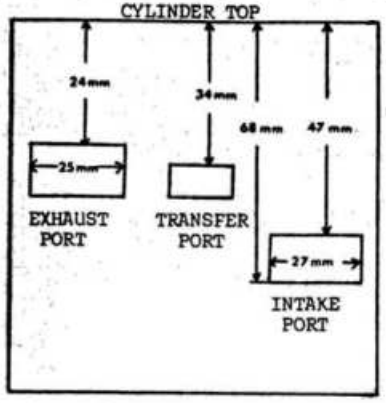
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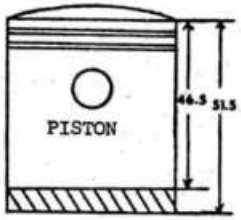
OFFICIAL YL1 GYT MODIFICATION INFORMATION

Below is the first official modification information concerning the YL1. Remember, GYT equals Genuine Yamaha Tuning. GYT Kits will not be available for at least several more months. This official GYT information is the best possible modification procedure

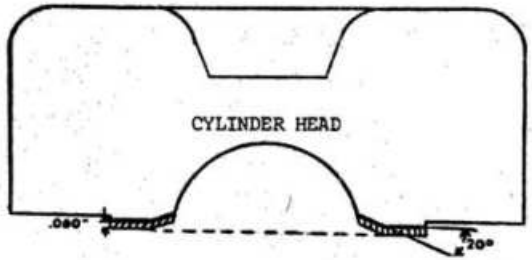
ENGINE PORT TIMING: Change the port timing to correspond with the drawing below. Any dimensions not shown are standard.

PISTON: Cut 5mm from the bottom of the piston skirt all of the way around as shown below. Use the top ring only. Sand the high spots from the piston after approximately five miles of running, repeat as necessary (same as TD1-B procedure).





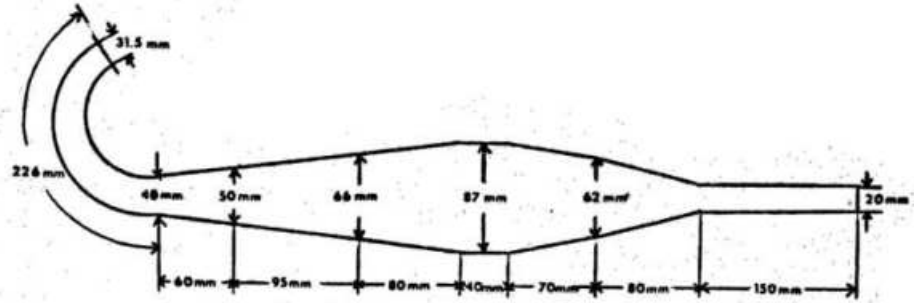
HEAD: Machine .060" from the bottom of the head, then machine the 20° taper back in around the edge of the combustion chamber. See drawing below.



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EXPANSION CHAMBER: A good high rpm expansion chamber can be made from the drawing and dimensions given below.



CLUTCH: Use the YA6 clutch assembly.

SPROCKET RATIOS: For road racing use a 15 or 16 tooth sprocket on the countershaft and a 31 to 35 tooth sprocket on the rear wheel.

FRONT FORKS: Use the YG1 heavy duty springs and 30 to 50 wt. oil.

AUTOLUBE: Remove the Autolube pump and cover the hole with a special plate, part number A6B0848 (same as the TD1-B). Plug the oil feed line holes in the intake port in the cylinder. Mix the gas with Steen-C, Bardahl, Blenzal, or some other good 2-cycle oil at a ratio of 15 or 16 to 1.

SPARKPLUGS: Since there is not a medium reach plug cold enough to use with the modified engine, use a long reach B-10EN or a B-11EN shimmed to the proper height with extra sparkplug washers.

CARBURETION: Use the standard carburetor. Grind the intake ports out to 16mm inside diameter and match the ports to the carburetor. Adjust jetting to suit needs

IGNITION SYSTEM: For all out racing, remove the field windings from the generator case. Put the armature in the lathe and turn off everything but the bare shaft. Disconnect the armature and field wires and run a "total loss system" using only the breaker points, battery and ignition coils.

EXTRA WEIGHT: Remove every bit of excess weight possible.

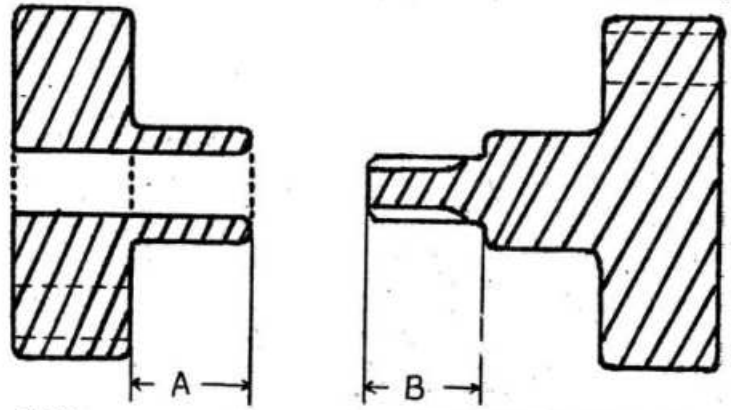
These instructions should keep you in the competition until the GYT Kits are available

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2. YL-1 (100cc)

A. The length of the CENTER CRANKSHAFT SPLINES starting with Engine Number 6888 have been lengthened to prevent loosening. The interchangeability will require both splined wheels. See drawing below.



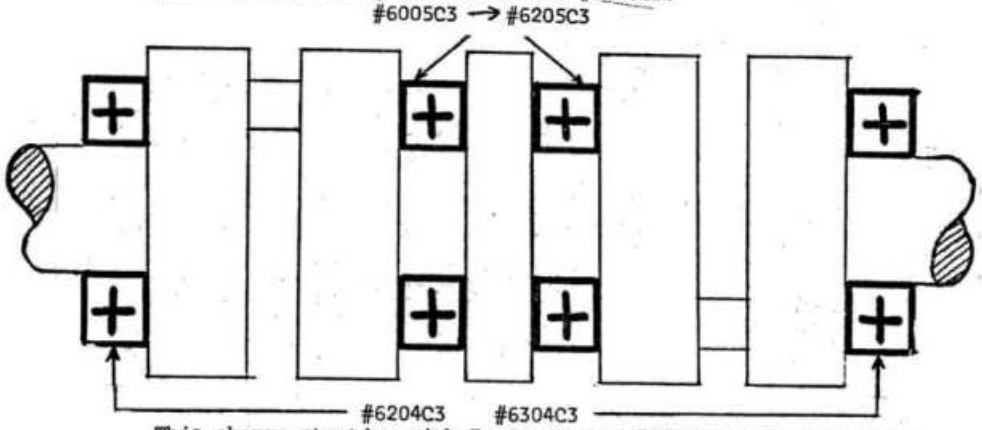
EARLY

A = 12mm
B = 26mm

AFTER ENGINE NUMBER 6888

A = 28mm
B = 42mm

B. The CRANK BEARING SIZE has been increased for added strength. Part Number changes are as follows: Bearing #6204C3 is now #6304C3 and Bearing #6005C3 is now #6205C3.



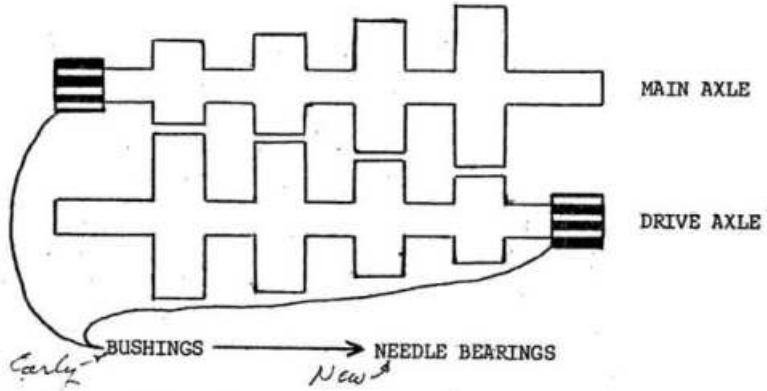
This change starting with Engine Number 39245 also involves the following part changes: Labyrinth Seal and "O" Ring, Bearing Circlip and Shim and the Center Bearing Carrier.

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YL-1 (continued)

C. The LEFT AND RIGHT CRANKCASES have been changed, Engine Number unknown, making interchangeability possible only by using both cases. The new cases use NEEDLE BEARINGS on the transmission mainshaft instead of BUSHINGS. See drawing below.

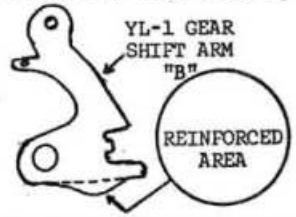


This change will involve the following parts:

1. Main and drive axle
2. Crankcase, left and right
3. Needle bearing circlips
4. Spacer collar
5. Top pinion and low gear wheel
6. Main and drive axle adjusting shims.

D. The SHAPE AND COMPOSITION of the YL-1 GEAR SHIFT ARM "B" has been altered from Engine Number 45598 on. The new arm used "SCM21", a STRENGTHENED STEEL COMPOSITION, compared to the regular steel plate, (SPMA), found in the early models. The interchangeability is okay.

The new SHIFT ARM can be identified by the shape change shown in the drawing on the right.



E. Starting with Engine Number 32601, the CARBURETOR MAIN JET SIZE has been decreased from a #60 to a #55 to lean out the rich air-fuel mixture caused by a new, more efficient AIR CLEANER.

F. From Engine Number 41336 on, the YL-1s are equipped with a new type SHORT RESISTANT IGNITION COIL.

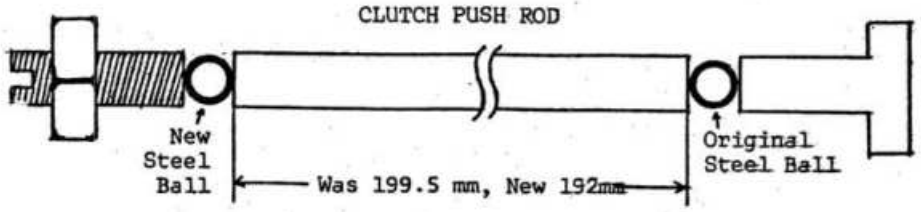
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YL-1 (continued)

G. The length of the PUSH ROD has been decreased to accept the second steel ball to decrease clutch noise. The clutch push rod mechanism is now similar to the YA6. See drawing below.

The Engine Number for this change is 33524 and the interchangeability is okay as a pair. (Push rod plus steel ball.)



H. On the YL-1 GYT Kits, the left ignition point wire on the magneto goes to the right set of points and the right ignition point wire goes to the left set of points.