YAMAHA

100 LS2

SERVICE MANUAL

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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 LS2 SERVICE MANUAL

1st Edition

SEP 1971

ENGINEERING & SERVICE DEPARTMENT
YAMAHA MOTOR COMPANY
HAMAMATSU, JAPAN

FOREWORD

The new Yamaha LS2 is an improved version of the HS1 - a 90 c.c. sportster highly acclaimed for superior engine performance and outstanding maneuverability. The special cast iron sleeved 5—Port aluminum cylinders, combined with Yamaha Autolube, assures stable engine performance throughout the whole range of operation.

The crankcase is designed to be split into upper and lower halves. This provides easier access for service work, requiring no special crankcase dividing tools.

Besides having all of these features, the LS2 incorporates many attractive innovations — separate, easy to read, large speedometer and tachometer; polished cylinders cylinder heads and crankcase as well as chrome-plated front and rear fenders.

This service manual is prepared to furnish all Yamaha dealers and service men with the technical information and repair instructions required to keep the Yamaha LS2 in top condition. We hope that you will find this manual most helpful and valuable in carrying out your jobs.

YAMAHA MOTOR CO., LTD

Engineering and Service Department

CONTENTS

CHAPTER 1 GENERAL

(1) Employment of 5-port Engine

Aluminium cylinders lined with sleeves of special cast iron of a true 5-port system are employed to improve scavenging efficiency. Consequently, the engine performance is superior, and outstanding torque is obtained particularly in the low through intermediate speed ranges.

(2) Highly Reliable Yamaha Autolube Engine

Lubrication of engine is of Yamaha's patented Autolube system. This improved lubrication system ensures the greatest reliability and durability.

(3) Well Balanced 5-speed Transmission

The ideal arrangement of reduction ratios, in the 5-speed transmission enable the selection of the suitable gear for any driving condition, in congested city traffic, hill climbing or riding at high speeds along highways.

(4) Carburetor with Starting Mechanism To Enable Easy Starting

A single kick is enough to start the engine. The starting mechanism which is incorporated in the carburetor fully exhibits its efficiency, particularly when starting during the cold months.

(5) Highly Effective Brake System

The patented fully waterproof and dust proof brake drums for both front and rear brakes consistently provide stabilized braking force even when riding in the rain and on rough roads.

3-way Adjustable Rear Suspension

(6) The rear suspension is a 3-way adjustable type.

The spring tension can be changed in three ways according to the choice of the rider and driving conditions, i.e., conditions of road surface and speed.

Easily Readable Separate Tachometer and Speedometer

(7) The tachometer which is important for fully registering engine's performance is separate from the speedometer to improve functional beauty. Both tachometer and speedometer are installed on brackets in anti-vibration rubber for riding on rough roads.

Employment of Primary Kick

(8) A mechanism is employed that enables kick starting regardless of the position of transmission if the clutch is disengaged. This mechanism conveniently enables quick restarting when the engine stalls while riding or at a crossing.

(9) Highly Reliable Frame

A combination of highly tempered steel pipes and steel pipes for machine structure form the frame. This frame, which is light in weight and yet highly rigid can be used in a racing machine without modification.

(10) Light Styling

The slim fuel tank and narrow engine adds to the styling and controllability enabling the rider to travel long distances without fatigue.

General View

Right-hand side

Left-hand side

Specifications and Performance

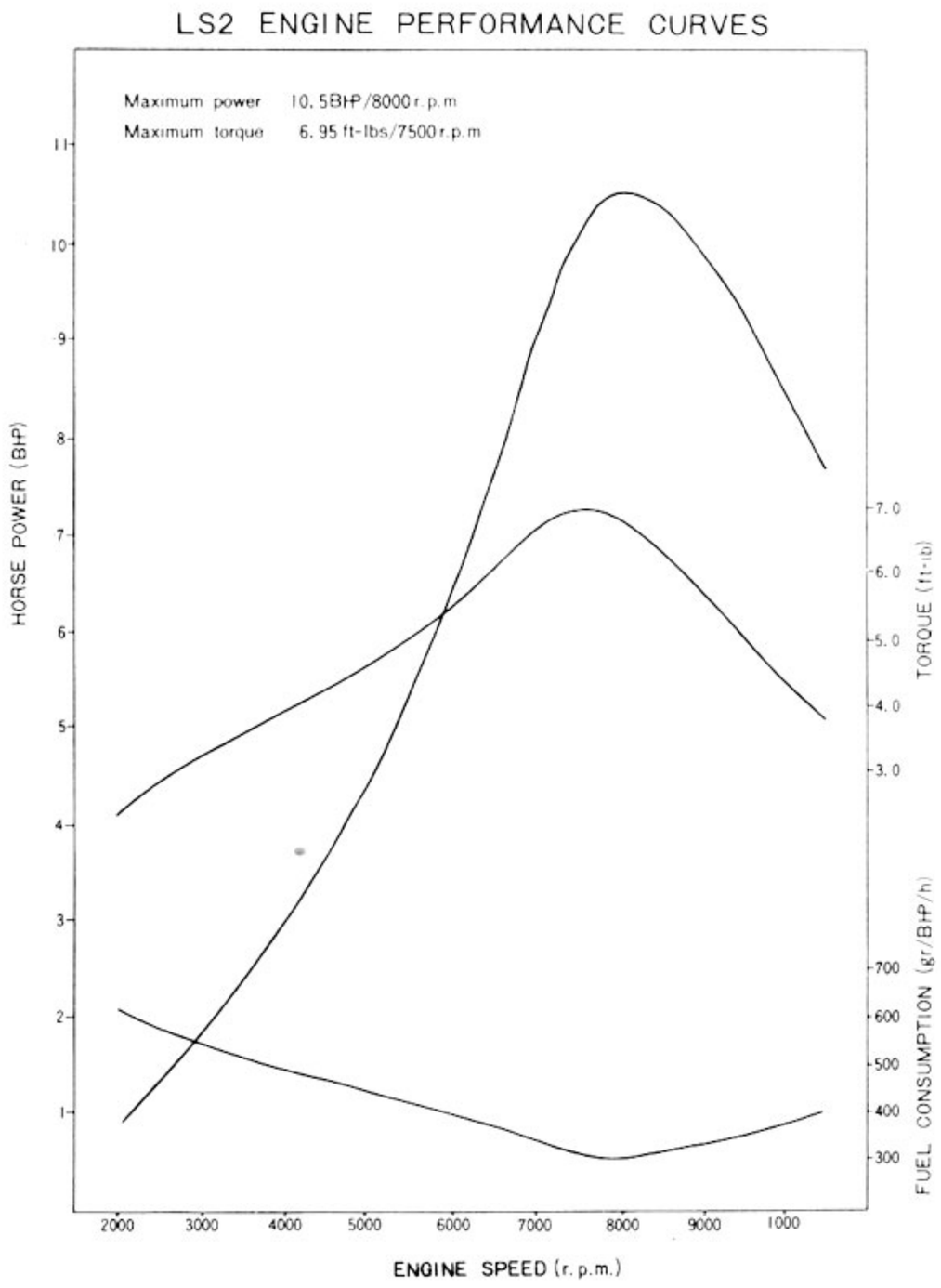
Model	LS2
Dimensions:	
Overall length	73.2 in. (1,860 mm)
Overall width	29.5 in. (750 mm)
Overall height	39.4 in. (1,000 mm)
Wheelbase	47.2 in. (1,200 mm)
Min. ground clearance	6.3 in. (160 mm)
Weight:	
Net	209 lbs. (95 kg)
Gross	
Performance:	
Max. speed	69 mph (110 km/h)
Fuel consumption	153 mpg at 25 mph
(on paved level road)	65 km/lit. at 40 km/h)
Climbing capacity	22.5 degrees
Min. turning radius	78.7 in. (2,000 mm)
Braking distance	24.6 ft. at 22 mph (7.5 m at 35 km/h)
Engine:	
Type	LS2, 2 stroke, air cooled.
Cylinder	Two in parallel, forward inclined, 5-port.
Lubrication system	Separate lubrication (Yamaha Autolube)
Displacement	5.919 cu.in. (97 c.c.)
Bore & Stroke	1.496 x 1.693 in. (38 x 43 mm)
Compression ratio	7.0 : 1
Max. output	10.5 BHP/8,000
Max. torque	6.95 ft.lbs/7,500 rpm (0.96 kg-m/7,500 rpm)
Starting system	Kick starter
Ignition system	Battery ignition
Carburetor:	VM17SC x 2
Air cleaner:	Dry, paper filter type.
Power transmission:	
Clutch	Wet, multi-disc type.
Primary reduction system	Helical gear
Primary reduction ratio	3.894 (74/19)
Gear Box:	
Type	Constant mesh, 5-speed forward
Reduction ratio 1st	3.181 (35/11)
Reduction ratio 2nd	1.812 (29/16)
Reduction ratio 3rd	1.300 (26/20)
Reduction ratio 4th	1.045 (23/22)
Reduction ratio 5th	0.840 (21/25)
Secondary reduction ratio	3.000 (42/14)
Secondary reduction system	Chain

Model	LS2
Chassis:	
Type of frame	Pipe, diamond
Suspension system, front	Telescopic fork
Suspension system, rear	Swing arm
Cushion system, front	Coil spring, oil damper
Cushion system, rear	Coil spring, oil damper
Steering system:	
Caster	62° 30'
Trail	3.5 in (90 mm)
Braking system:	
Type	Internal expansion
Operation method, front	Right hand operation
Operation method, rear	Right foot operation
Tire, front	2.50-18-4PR
Tire, rear	2.50-18-4PR
Fuel tank capacity	2.0 gals (7.5 liters)
Oil tank capacity	1.5 qts. (1.4 liters)
Generator:	
Model	K108-12
Manufacturer	HITACHI
Spark plug:	B-7HS
Battery:	
Model	AYT2-12
Capacity	12V 5.5AH
Lights:	
Headlight	12V 25W/25W
Taillight/Stoplight	12V 8W/27W
Flasher lights	12V 27W
Neutral light	12V 3W
Meter lights	12V 3W x 2
High beam indicator light	12V 2W
Flasher pilot light	12V 3W

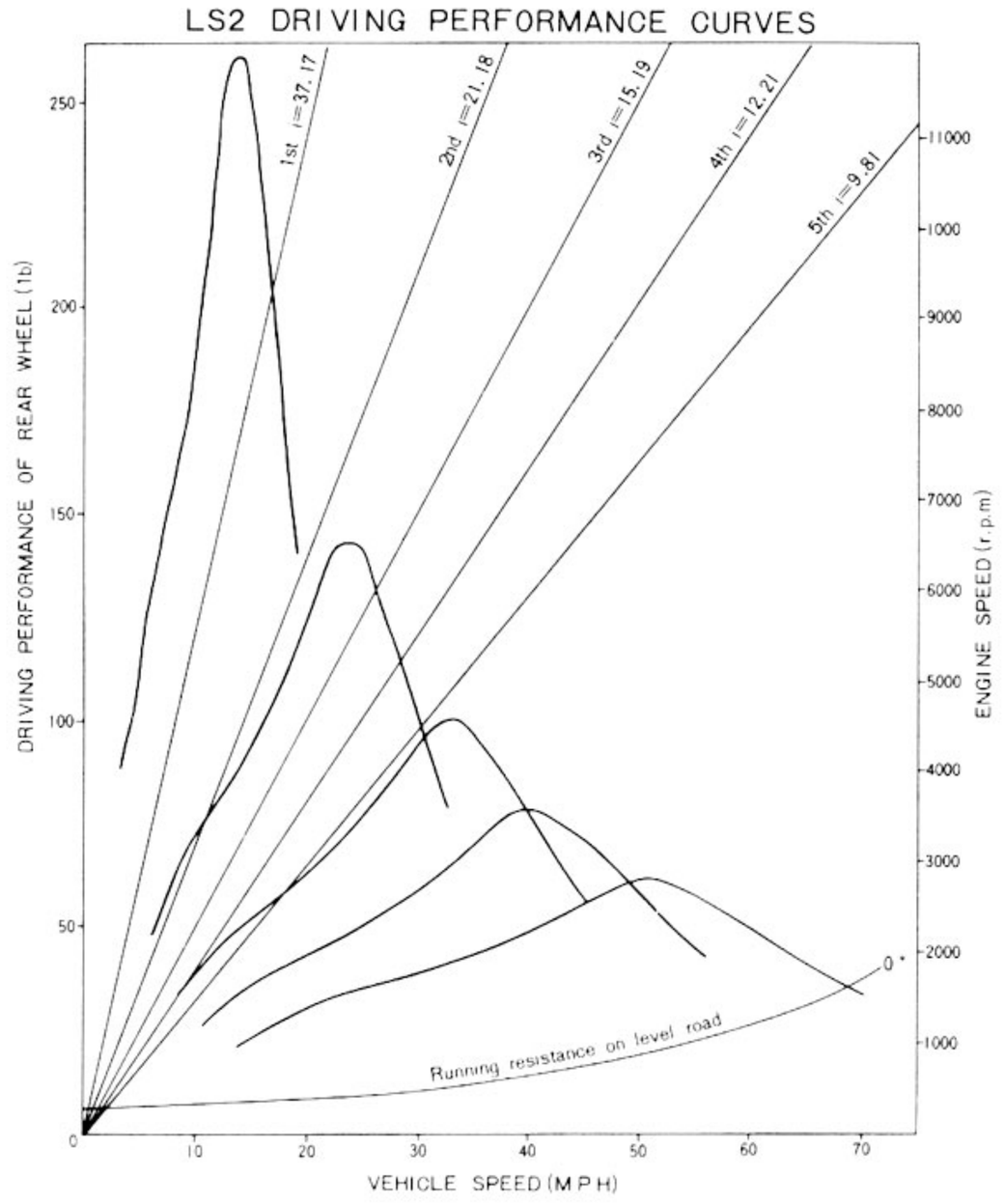
The following data subject to change without notice.

Performance Curves

Engine Performance Curve



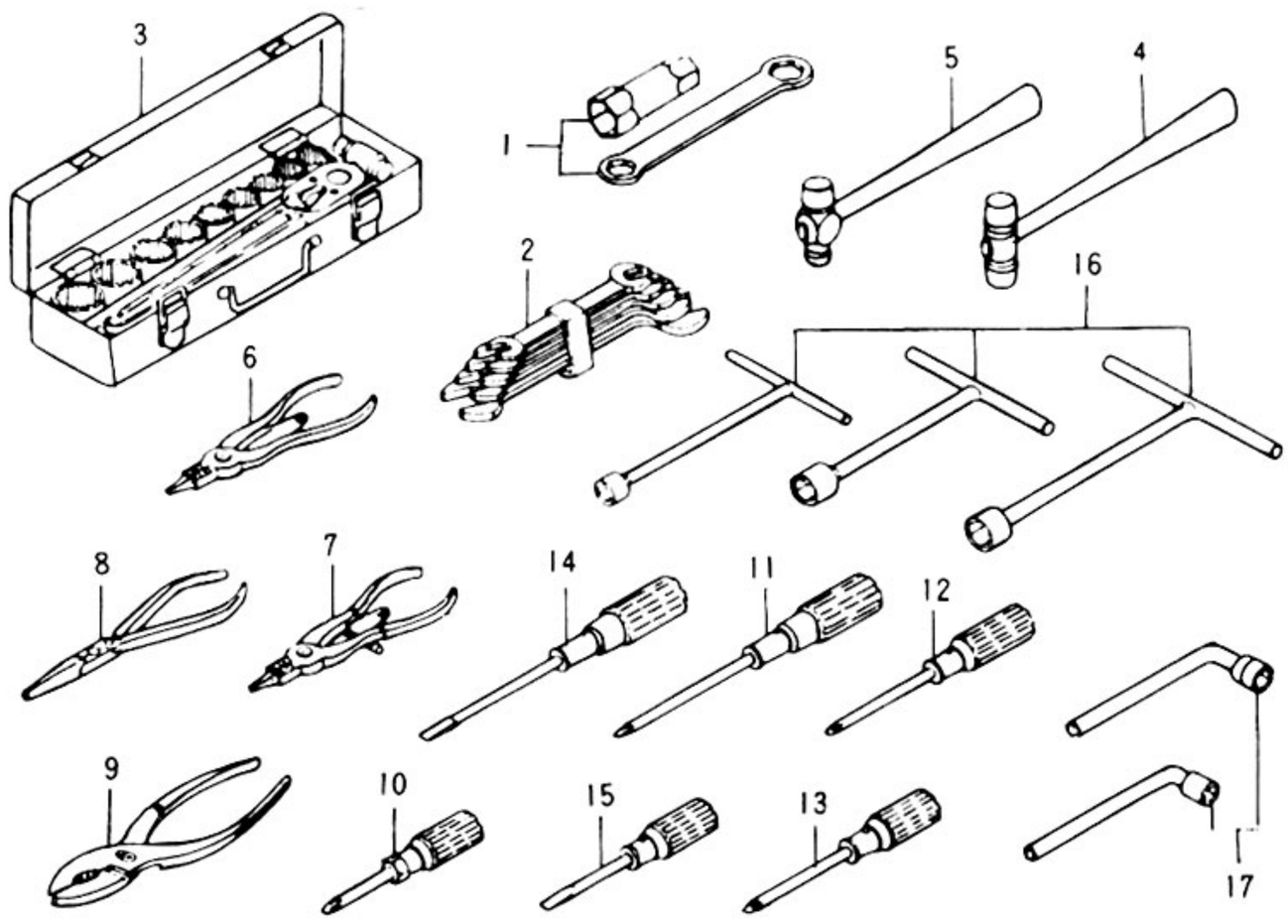
Driving Performance Curve



Tools and Instruments Required for Servicing

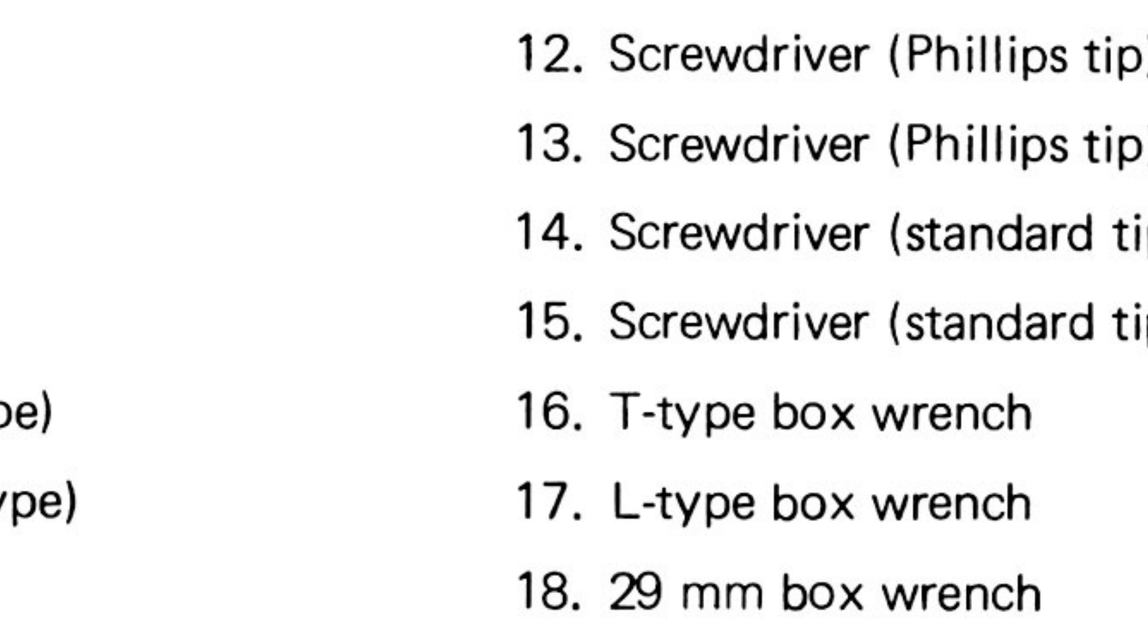
Tools and instruments required for servicing Yamaha 100 LS2 are as described below.

1. Standard Tools



1. Spark plug wrench, 23 x 29
2. Spanner set
3. Box wrench set
4. Plastic hammer
5. Steel hammer
6. Clip pliers (ST type)
7. Clip pliers (RT Type)
8. Long nose pliers
9. Pliers
10. Screwdriver (Phillips tip)
11. Screwdriver (Phillips tip), large
12. Screwdriver (Phillips tip), medium
13. Screwdriver (Phillips tip), small
14. Screwdriver (standard tip), medium
15. Screwdriver (standard tip), small
16. T-type box wrench
17. L-type box wrench
18. 29 mm box wrench
19 Torque wrench
20. 13 mm box (for torque wrench)
21. 10 mm box (for torque wrench)

2. Special Tool and Instrument



In addition to the above special tools, the YAMAHA electrotester, tachometer (engine speedometer, gravimeter, etc, are required.

3. Other Miscellaneous Tools

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

When servicing the engine, the work will be greatly facilitated if the engine is placed on the kind of a wooden box as shown. Consumable parts, such as gaskets and other spare parts for replacement of damaged parts, should also be prepared prior to commencement of servicing work.

CHAPTER 2 YAMAHA AUTOLUBE SYSTEM

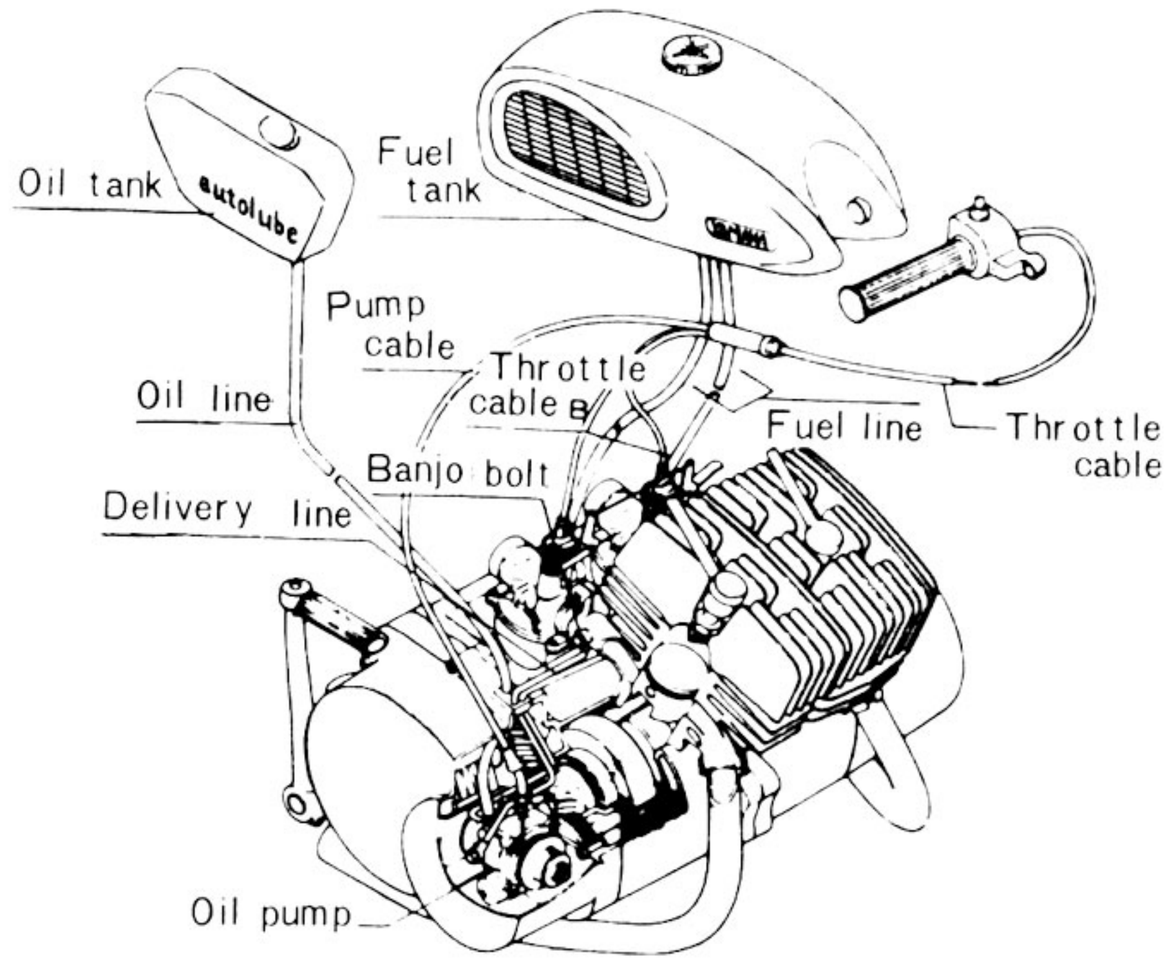
(AUTOMATIC SEPARATE LUBRICATION SYSTEM)

1 What is Yamaha Autolube?

A 2-stroke engine is normally lubricated by a mixture system which uses fuel mixed with lubricating oil.

However, Yamaha Autolube System is an automatic separate lubrication system.

This system keeps the lubricating oil in a separate tank apart from fuel and, by the action of an oil pump, delivers oil to the engine at an automatically regulated rate.



YAMAHA Autolube

2 Features of Yamaha Autolube

* The oil pump is driven by engine revolution which is reduced. It is also operated by linkage with the throttle valve (accelerator grip) of carburetor.
* The lubricating oil is delivered by the oil pump to the engine at a rate most suitable to the driving conditions relating to engine revolution and variation of throttle opening.
* This Yamaha Autolube System eliminates the disadvantages inherant to 2-stroke engines which tend to occur in a conventional mixed lubrication system, and thereby the functions and features of the 2-stroke engine can be fully exhibited.

(1) Oil is delivered to the engine at a rate suitable to operating condition.

* Oil consumption is reduced.
* Carbon deposits are reduced.
* Exhaust smoke is reduced.
* Lubrication is improved.

(2) Fuel supply is facilitated.

* Fuel is supplied independently.
* Fuel is cleaner.

*3) Lubrication is reliable.

* There is no need for anxiety regarding the quality of oil or mixing ratio.

CHAPTER 3 PERIODIC INSPECTION

Lubrication Items

			300 miles	1,000 miles	2,000 miles	every 2,000 miles	every 4,000 miles
1	Brake cam shaft	G		○	○	○	
2	Wheel bearing	G			○		○
3	Brake wire	M/O		○	○	○	
4	Clutch wire	M/O		○	○	○	
5	Tacho, speedometer cable	G			○	○	
6	Meter gear unit	G			○	○	
7	Steering ball race	G					○
8	Front fork oil	M/O	○		○	○	
9	Brake pedal shaft	G		○	○	○	
10	Change pedal shaft	M/O, G			○	○	
11	Axle grip	G		○	○	○	
12	Transmission oil	M/O	○	○	○	○	
13	Dynamo lubricator	G					○
14	Stand shaft	M/O, G					○
15	Rear arm pivot shaft	G			○	○	
16	Drive chain	M/O		○	○	○	

Periodic Inspection Items

		Pre-operation check	300 miles	1,000 miles	2,000 miles	every 2,000 miles	every 4,000 miles
1	Front and rear brake adjustment (F. R)	○	○	○	○	○	
2	Clutch adjustment		○	○	○	○	
3	Transmission oil replacement	○	○	○	○	○	
4	Front fork oil replacement		○		○	○	
5	Grease up			○	○	○	
6	Battery electrolyte refilling	○	○	○	○	○	
7	Spark plug cleaning	○	○	○	○	○	
8	Ignition timing adjustment			○	○	○	
9	Fuel pet cleaning		○	○	○	○	
10	Carburetor adjustment			○	○	○	
11	Carburetor cleaning						○
12	Air cleaner cleaning	○		○	○	○	
13	Cylinder, piston cleaning			○		○	
14	Silencer muffler cleaning			○		○	
15	Drive chain adjustment, oiling		○	○	○	○	
16	Autolube pump adjustment	○	○	○	○	○	
17	F.R wheel inspection	○		○	○	○	
18	Bolt, Nut retightening		○	○	○	○	
19	Spoke, Rim inspection			○	○	○	

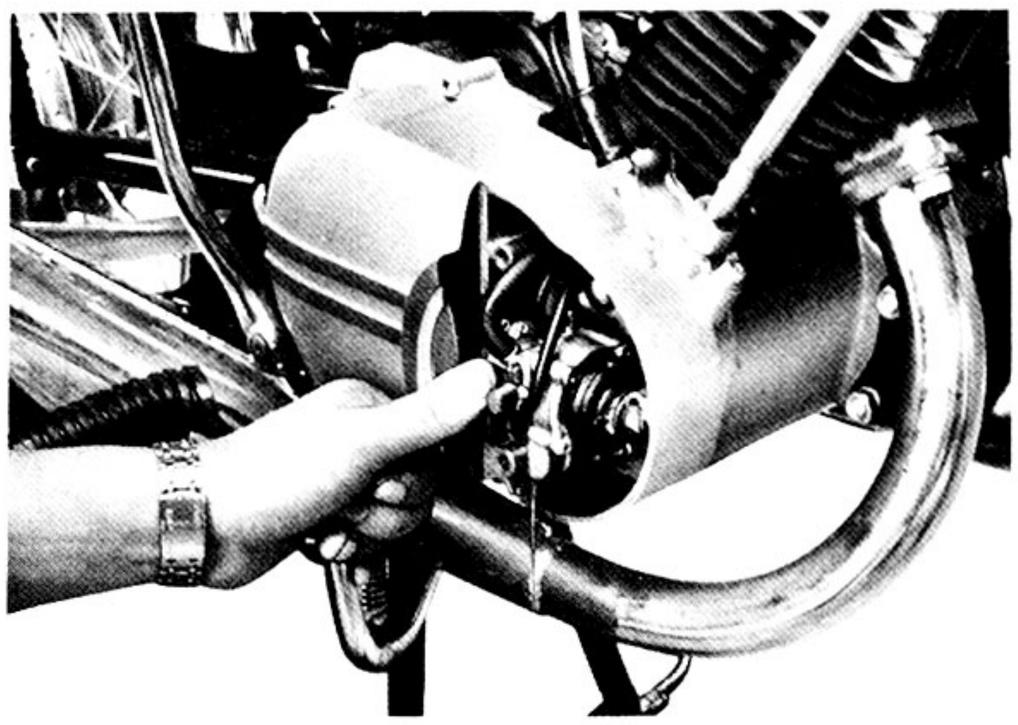
Be sure to chcch the above points before long-distance touring.

Inspection and Adjustment of Autolube Pump

1. Bleeding

Air bleeding should be performed, in addition to the occasions of periodic maintenance, after the pump is removed and when oil is refilled because entry of oil into the pump case will case irregular oil flow.

Remove the bleeder bolt of the pump and then feed oil with pump operation by turning the starter plate (manual feed mechanism) in the direction shown by the arrow stamped on the plate.
(Hold the adjust pulley and maintain the pump in fully operating condition at this time so that the plunger stroke is maximum.)



Oil will flow out of the bleeder bolt hole. Tighten the bleeder bolt when all the oil flowing out becomes free of air bubbles.

After the pump is removed and reinstalled, it is necessary to feed a large amount oil.

This may be accomplished by starting the engine and running at idling speed after proper setting. Pull the pump cable so that the stroke of the pump plunger is at its maximum. One minute or two of warming up is required.

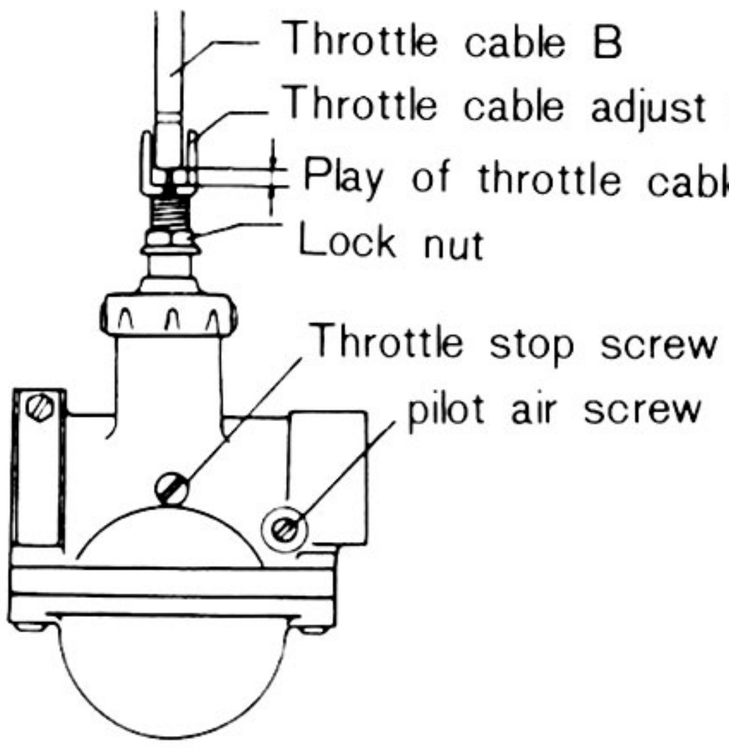
* Observe the oil flow in the delivery pipe.

Air is completely bled if whitish air bubbles are gone.

2. Method of Setting of Carburetor and Pump

(1) Start the engine and adjust the idling speed after the engine is sufficiently warmed up.

Assure that the pilot air screw is returned by 1 3/4 turns from full close.

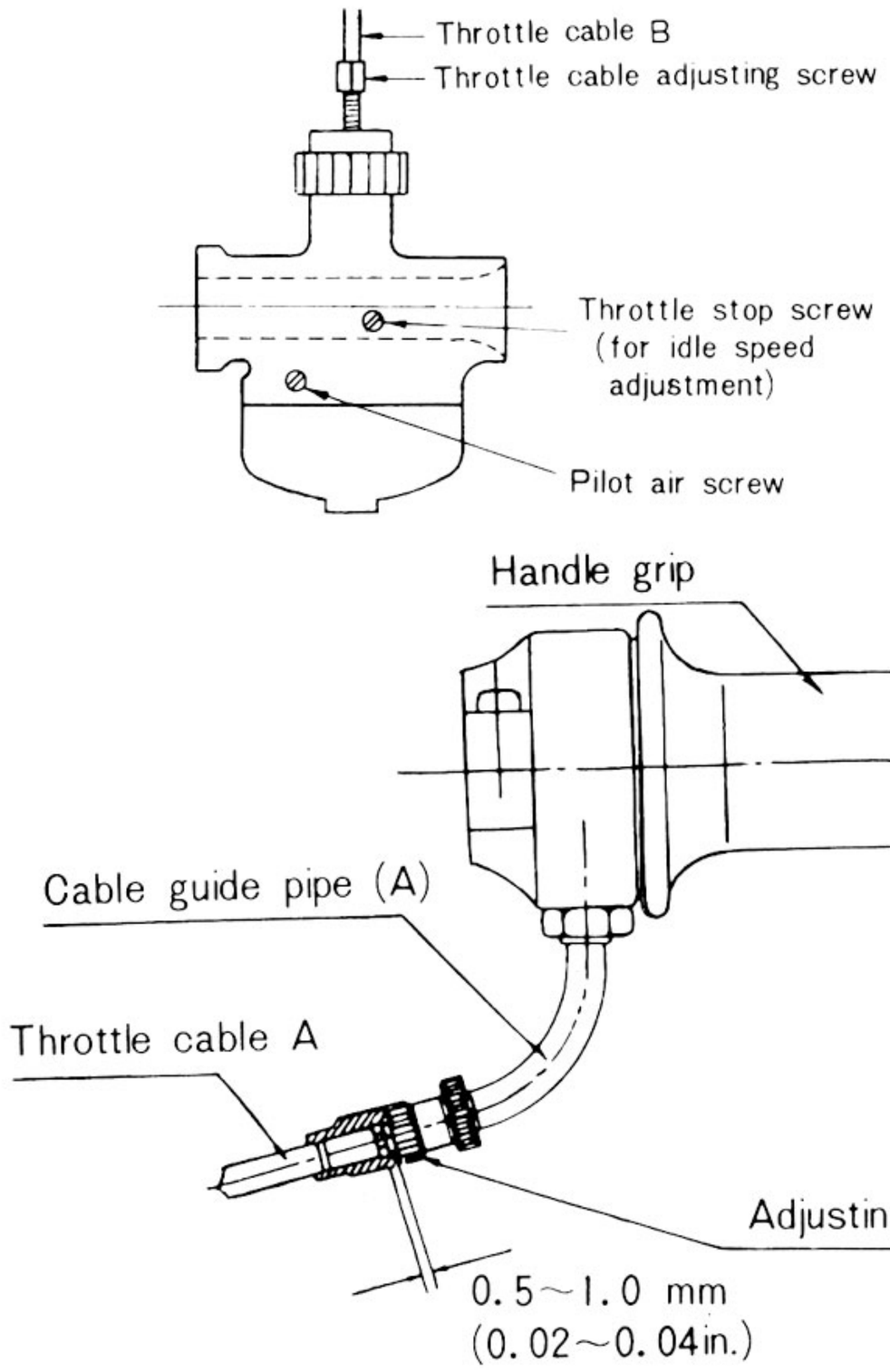


Adjust throttle stop screws so that the combustion of R.H. and L.H. cylinders become uniform. (Use of a tachometer is the best method; however, if unavailable, determine by exhaust noise and exhaust pressure.)

(2) Adjust R.H. and L.H. throttle valves so they operate simultaneously.

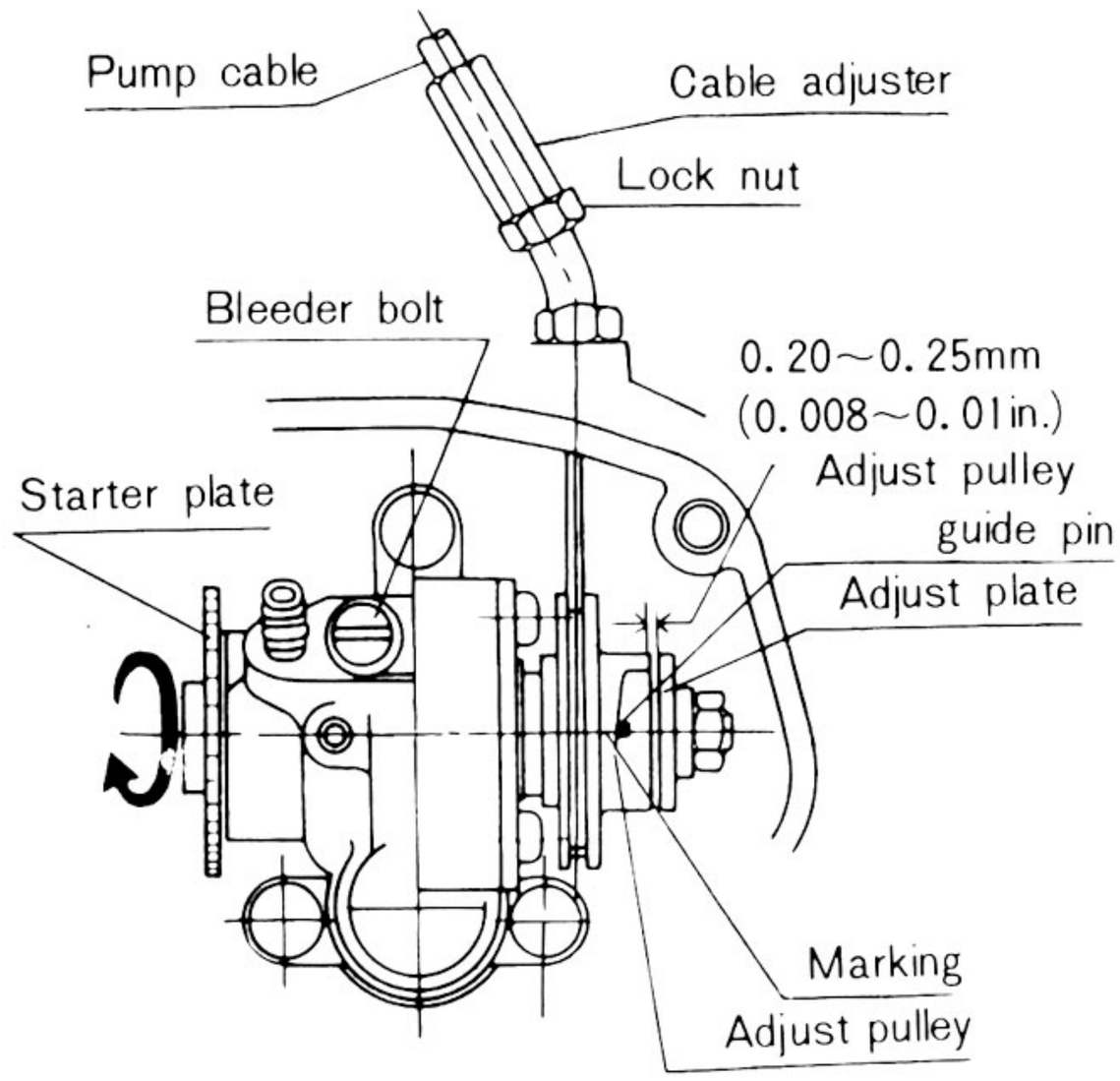
a. Eliminate free play of R.H. and L.H. throttle cable B by throttle cable adjust screws.
Hold throttle cable B with the fingers and make zero adjustment by moving it up and down.
Make adjustment without applying excessive tension to the cable, otherwise the idling speed will becomes too high. Adjust R.H. and L.H. throttle valves so that they operate simultaneously.

b. Then adjust the free play of throttle cable at part A of handle grip to 0.5 - 1.0 mm.
Make adjustment with the adjust nut on the cable guide pipe.



(3) Make pump setting after adjustment of throttle cable at carburetor.

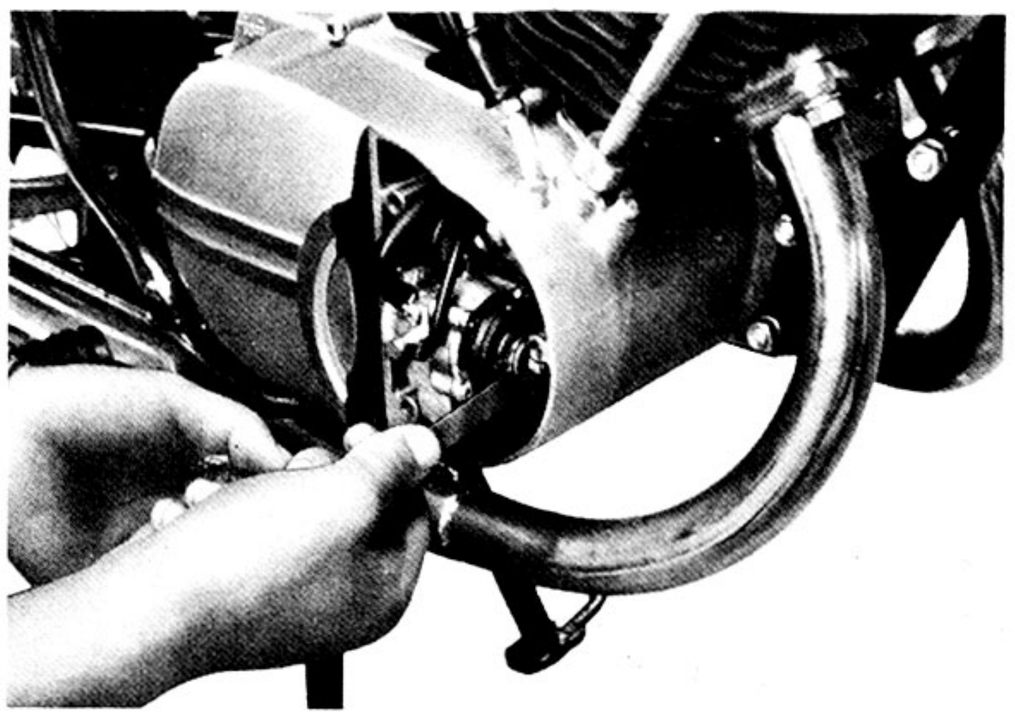
a. Gradually turn the accelerator grip to open the throttle, and adjust pump cable so that the alignment mark on the adjust pulley of the pump is aligned with the adjust pulley guide pin when the free play of throttle cable at part A is eliminated (movement of accelerator grip becomes heavy when the free play becomes zero).



3. Spection of Pump's Minimum Stroke

(1) Turn the accelerator grip to fully close the throttle.

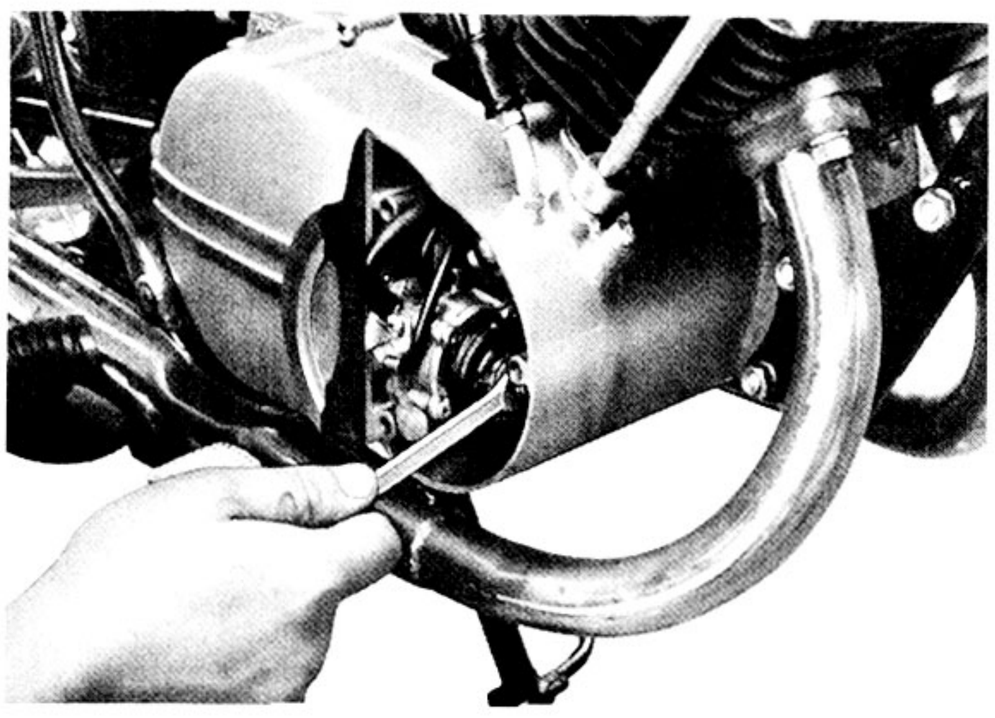
(2) Operate the pump by turning the starter plate in the direction shown by the arrow marked on the plate and place the pump plunger at the position of its maximum stroke and measure the clearance by using thickness gauge or service gauge.

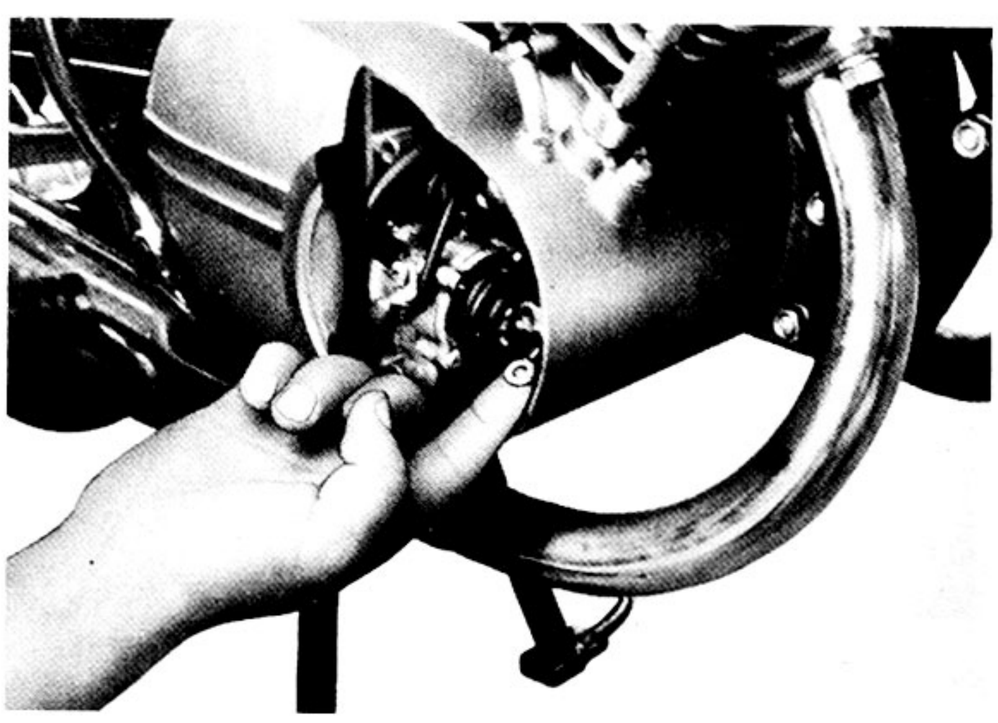


a. Serviceable Limit

- Serviceable limit: 0.15 mm
- Standard value: 0.20 - 0.25 mm

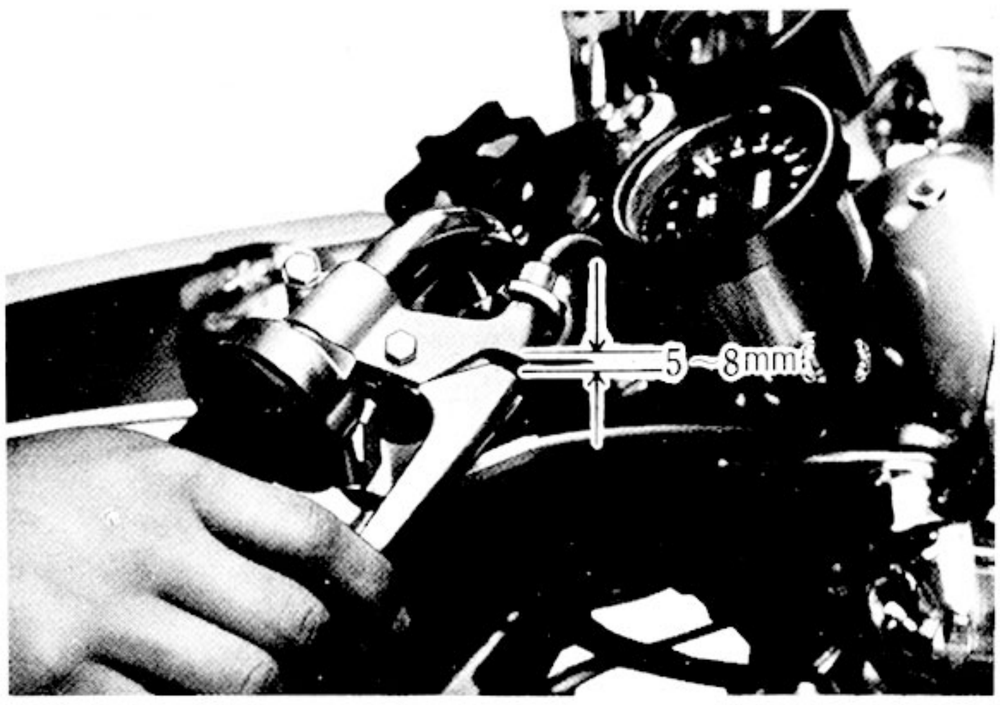
Remove the adjust plate and insert adjust shims of 0.1 mm to obtain the specified value if the measured clearance is less than the serviceable limit.





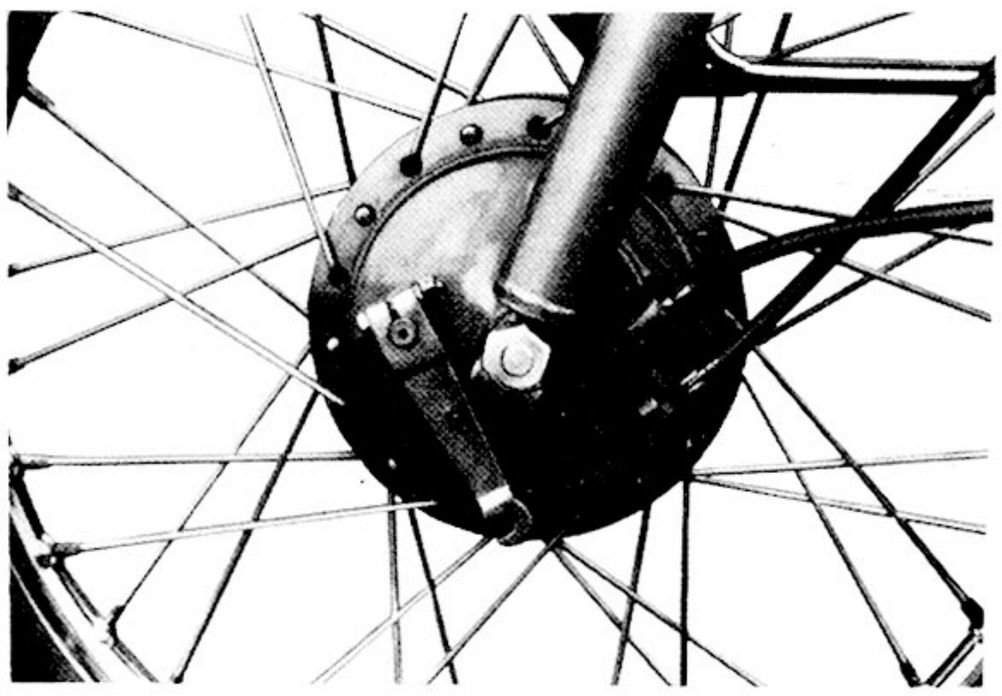
Adjustment of Brakes

The brakes are the most important safety equipment on a motorcycle. In order to maintain them in top condition, make sure to adjust both front and rear brakes on the occasions of periodic maintenance.



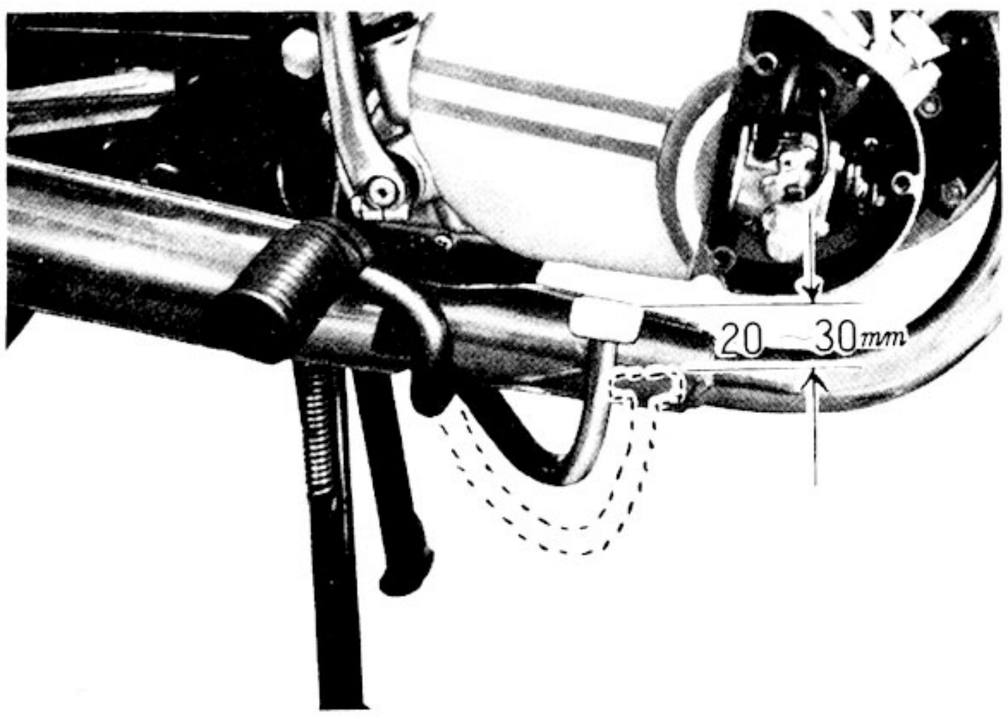
Inspection and Adjustment of Front Brake

(1) Pull the front brake lever and check whether free play of 5 - 8 mm exists before the brake starts to operate.



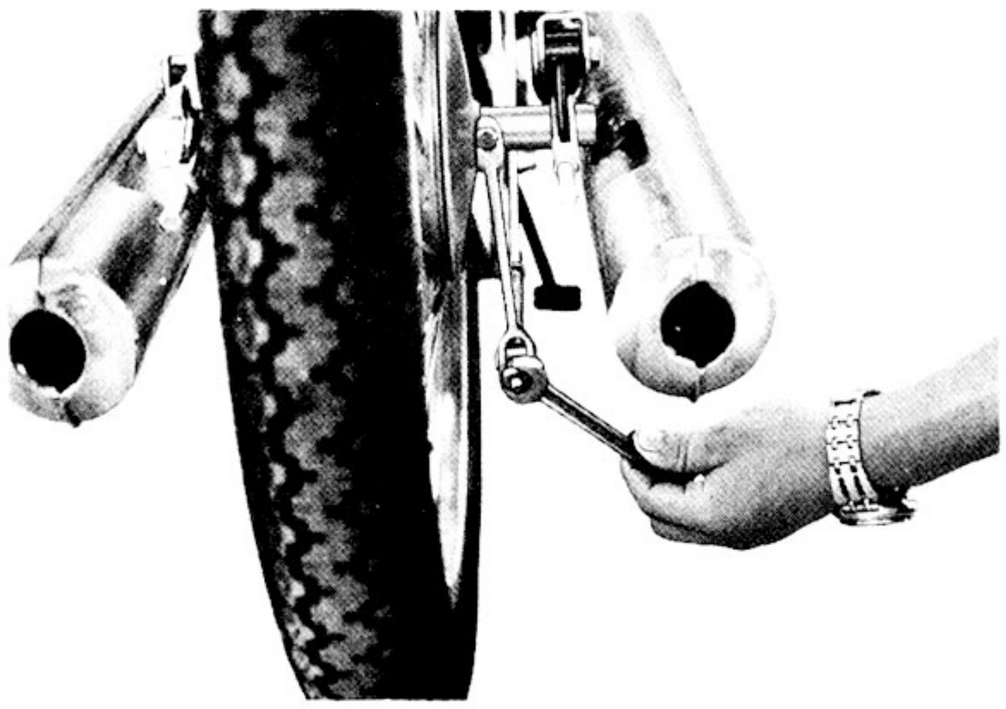
(2) Loosen the lock nut of brake shoe plate and turn the adjusting bolt for adjustment of lever free play.

(3) Assure that the proper free play is obtained and tighten the lock nut without fail.



Adjustment of Rear Brake

(1) Gradually depress the rear brake pedal and check whether free play of 20 - 30 mm exists at the tip of the pedal before the brake starts to operate.



(2) Turn the adjusting nut of brake rod for adjustment of pedal free play.

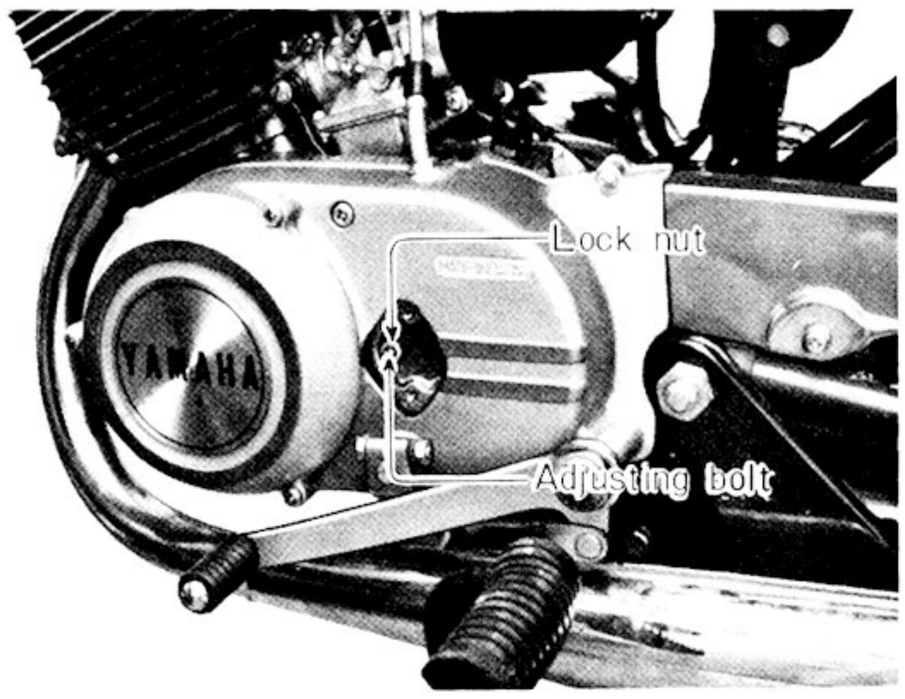
(3) Make sure that the adjusting nut is properly located upon completion of adjustment.

Adjustment of Clutch

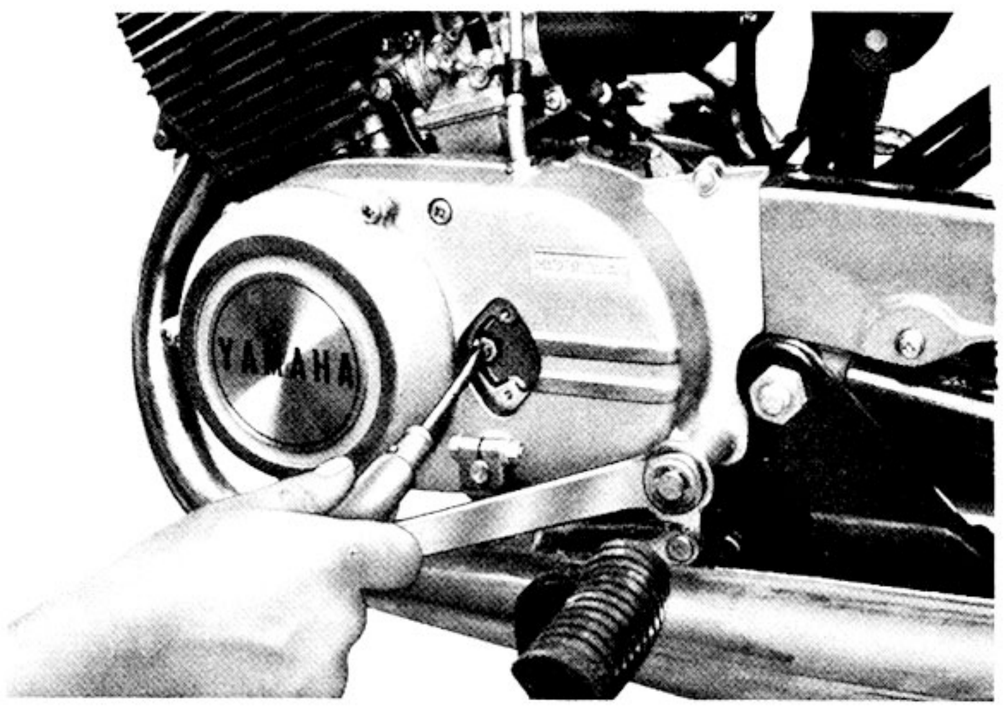
For the proper control of the motorcycle and to sufficiently transmit engine performance to the rear wheel, it is essential that the clutch be properly adjusted.

Adjustment of clutch is normally made at the lever; however, this is based on the provision that the clutch push screw is properly cut.

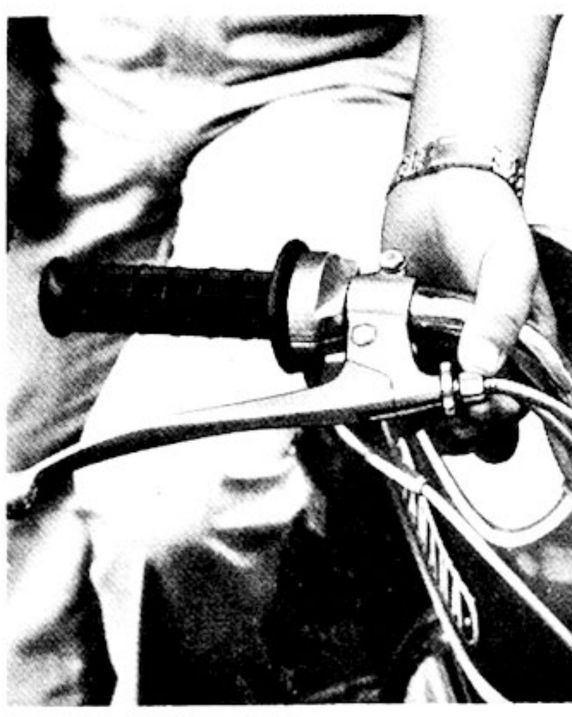
Proper method of clutch adjustment (that is, to adjust at clutch lever after adjustment of clutch push screw) is described below.



(1) Remove clutch adjusting cover and loosen lock nut.



(2) Gradually turn the adjusting screw in until movement of the screw becomes relatively heavy. Reverse turn the screw from the above state by 1/4 turn and then tighten the lock nut.



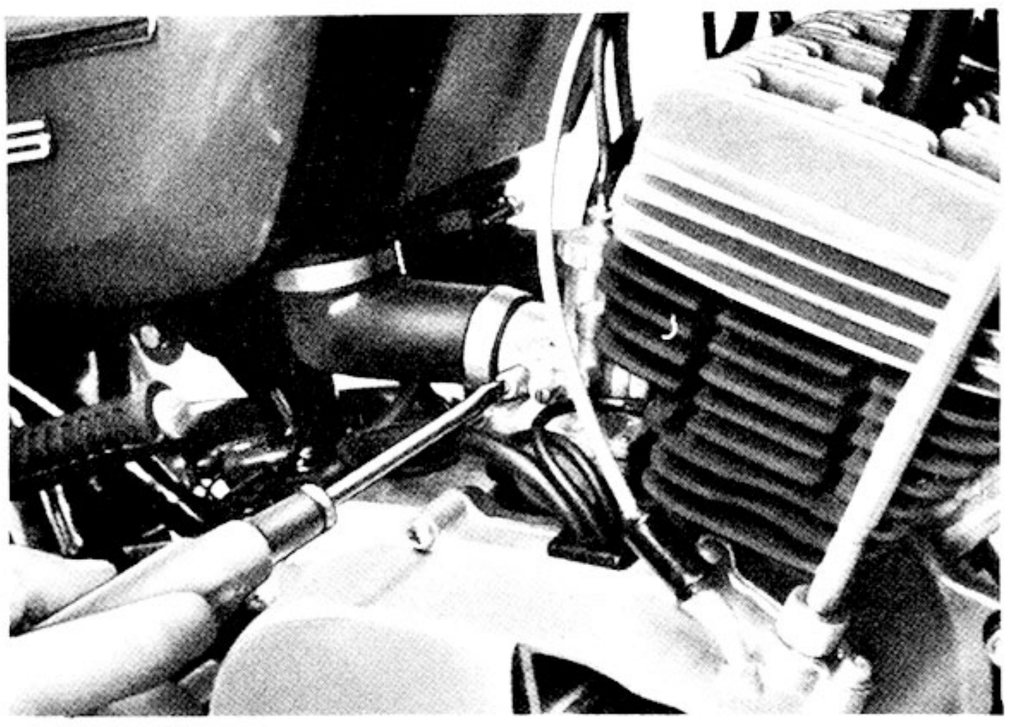
The adjustment of push screw is completed when (1) and (2) above are carried out and clutch adjusting cover is reinstalled.

(3) Loosen the lock nut of clutch lever and adjust the clutch lever free play to 2 - 3 mm at the tip by turning the adjusting bolt.

(4) Make sure to tighten the lock nut upon completion of adjustment.

Adjustment of Carburetor

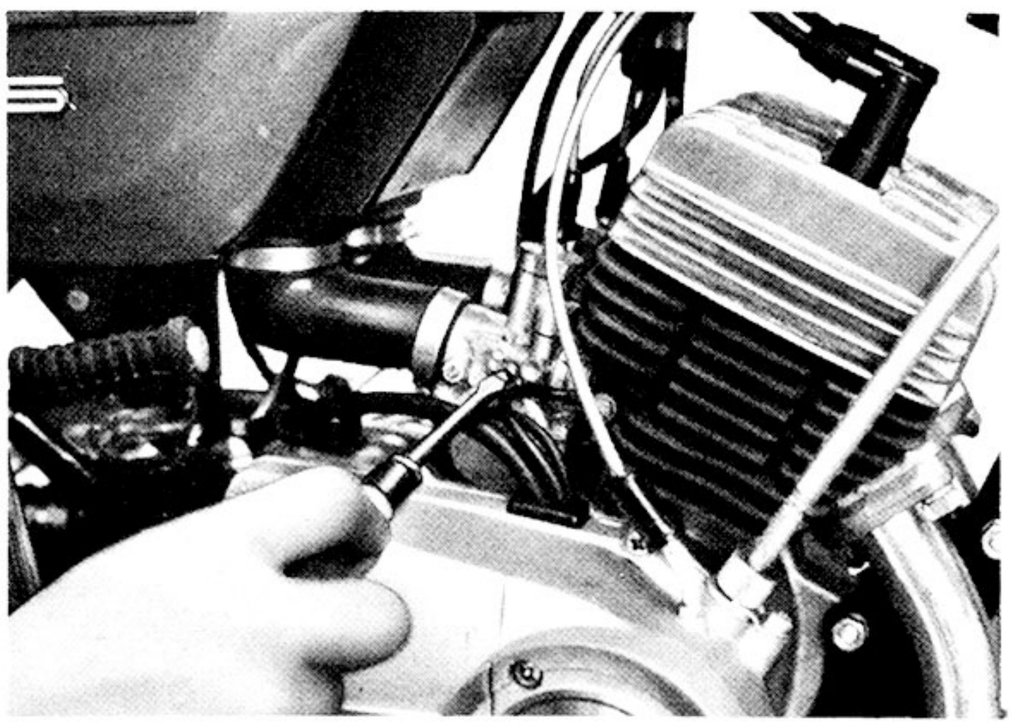
Make adjustment of idling speed of engine by the carburetor with the accelerator grip in fully returned position.



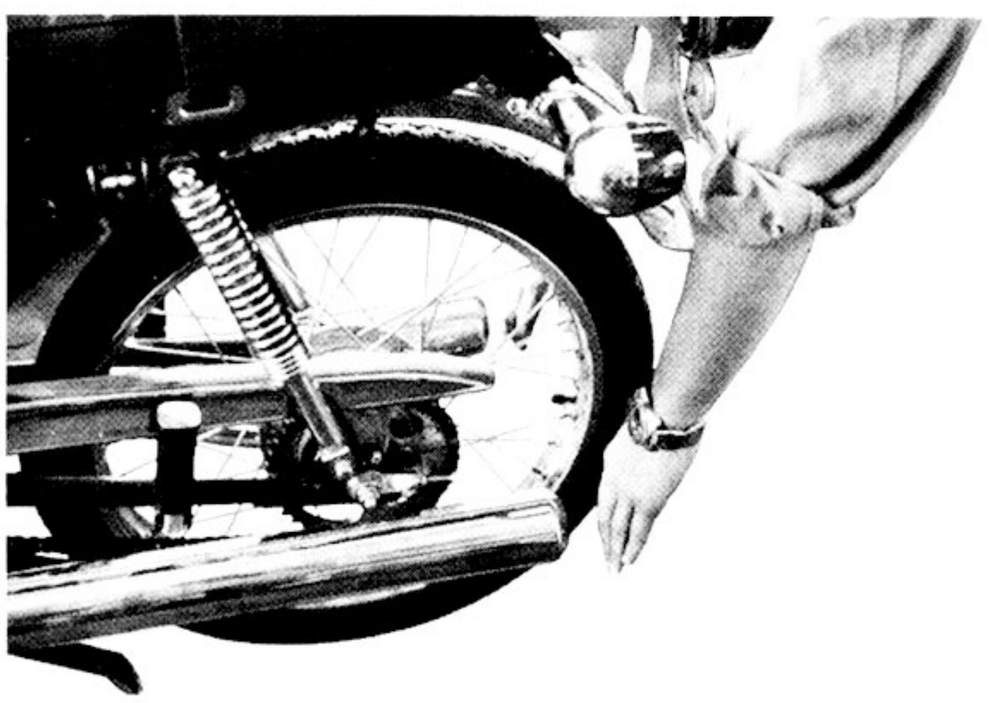
Adjustment of Idling Speed

(1) Turn the pilot air screw in until movement becomes stiff. Then gradually back off by turns.

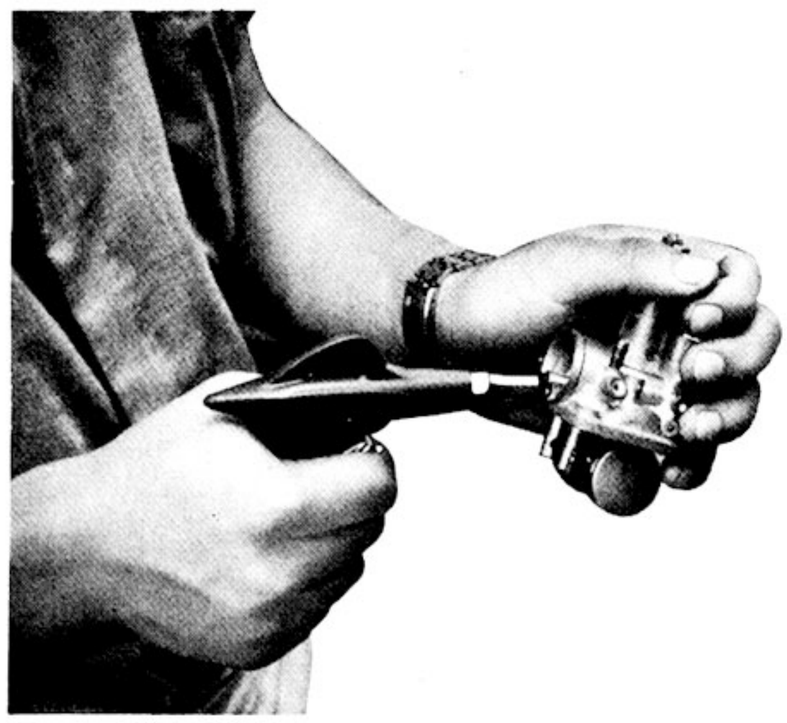
Make adjustment on each of R.H. and L.H. carburetors.



(2) Turn the throttle stop screws of both carburetors so that the specified idling speed is obtained.



(3) The adjustment is satisfactory if exhaust pressures from either muffler is identical.

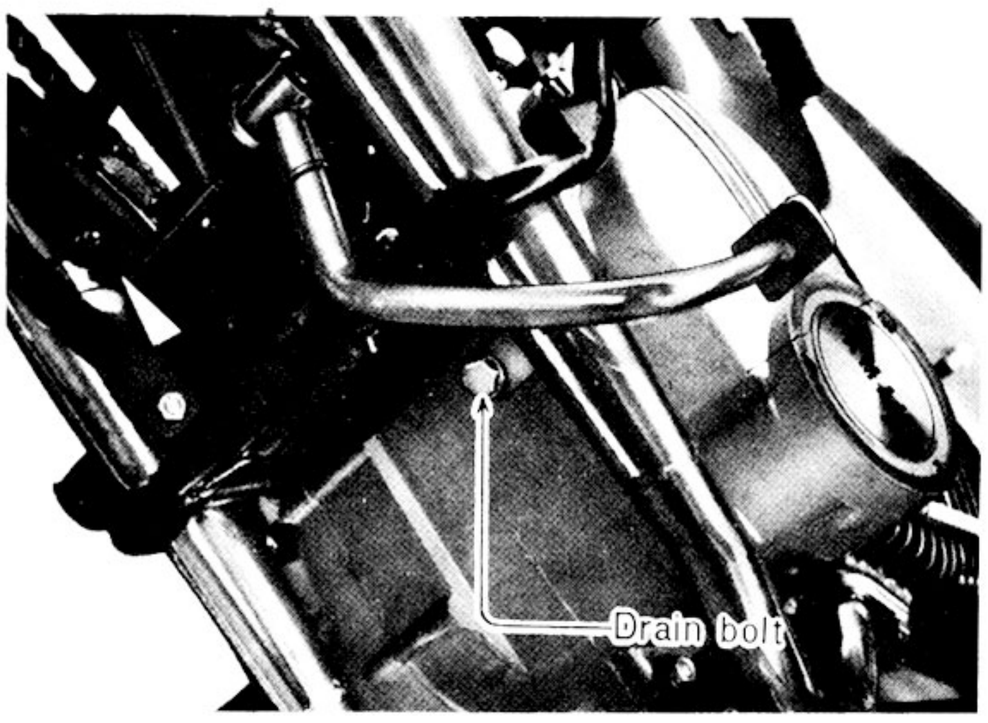


Disassembly and Cleaning of Carburetor

(1) Remove float chamber body of carburetor. Remove float and float valve and then clean the respective holes by using compressed air.

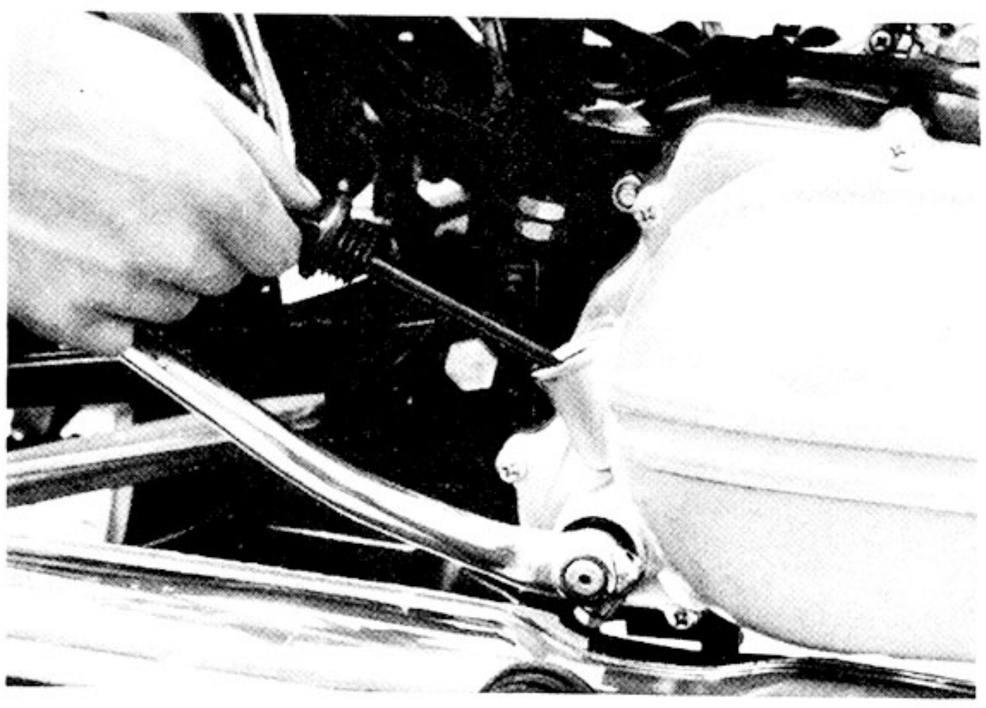
Change of Transmission Oil

The major purpose of a lubricating oil is to reduce wear by means of the antifriction property of the oil. However, this antifriction property of oil is reduced with use, consequently, it should be changed periodically. Change of transmission oil is normally required every 2,000 miles; however, while the machine is new, it is necessary to change oil frequently until the engine and transmission components become adapted.



(1) Remove drain plug and drain oil.

Motor oil	:	SAE 10W/30
Recommended oil	:	750cc (0.8 US qt)



(2) Pour transmission oil through the oil filler in the quantity marked in relief on the right-hand side of the crankcase cover.

Inspection of Spark Plugs

The spark plugs correctly indicate the operating condition of the engine and proper selection of spark plugs directly affects the performance of engine. Consequently, spark plugs should be periodically checked and spark plugs suitable for the operating condition should be selected.

(1) Check the electrodes of spark plugs.

(a) The choice of heat range is proper if brownish-white deposit is found.

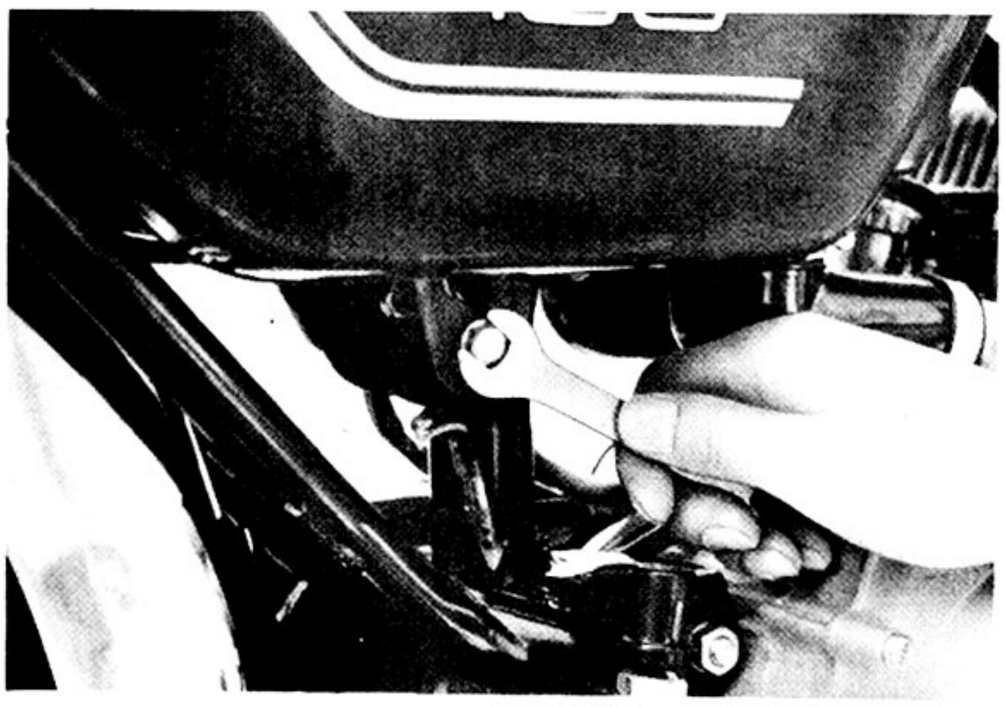
(b) Heat range of plugs is too low if electrode is burnt to a whitish color.

(c) Heat range of plugs is too high if electrode is sooted.

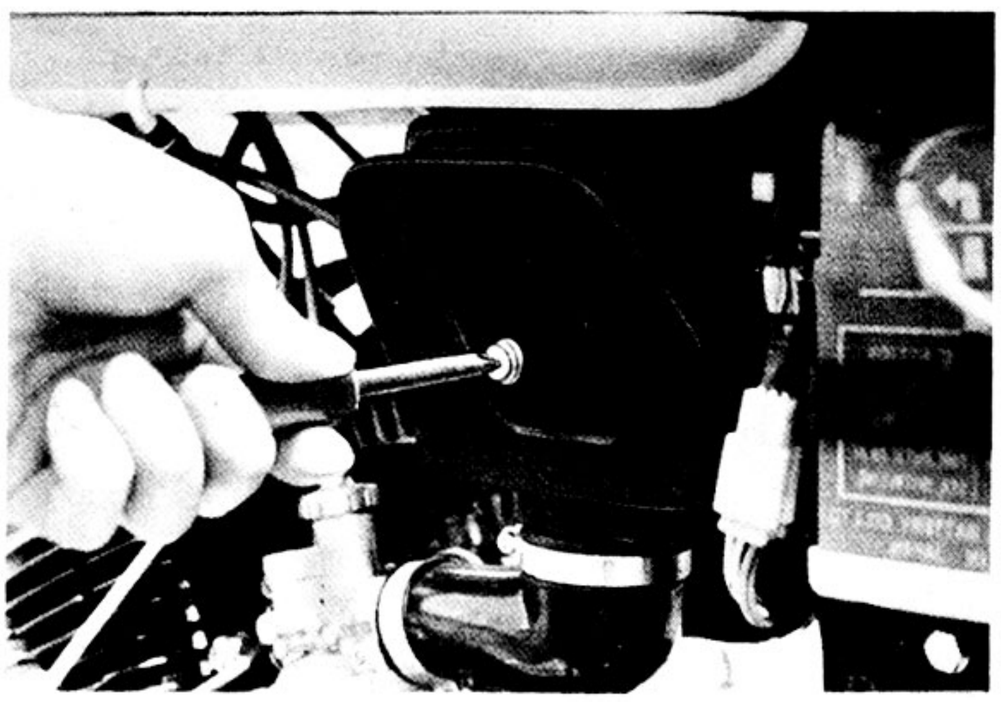
(2) Replace spark plugs with those of a proper heat range in the case of either (b) or (c) above. The case of paragraph (a) above is satisfactory. But if the symptom is as described in paragraph (b) above, it is necessary to replace spark plugs by the ones of higher heat range, and in the case of paragraph (c) by the ones of lower heat range.

Cleaning the Air Cleaner

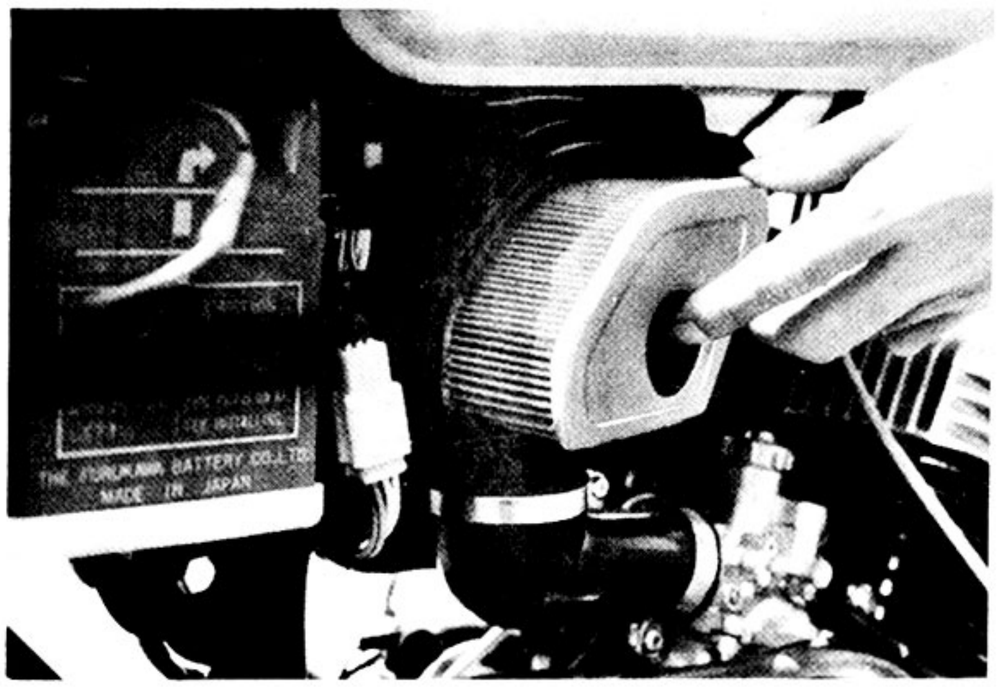
The air cleaner is the breather mask of a motorcycle. If it becomes clogged with dust, the rate of air suction into the engine becomes insufficient. Consequently, it should be always kept clean.



(1) Remove oil tank and side cover.



(2) Remove air cleaner case cap and take air cleaner element out.



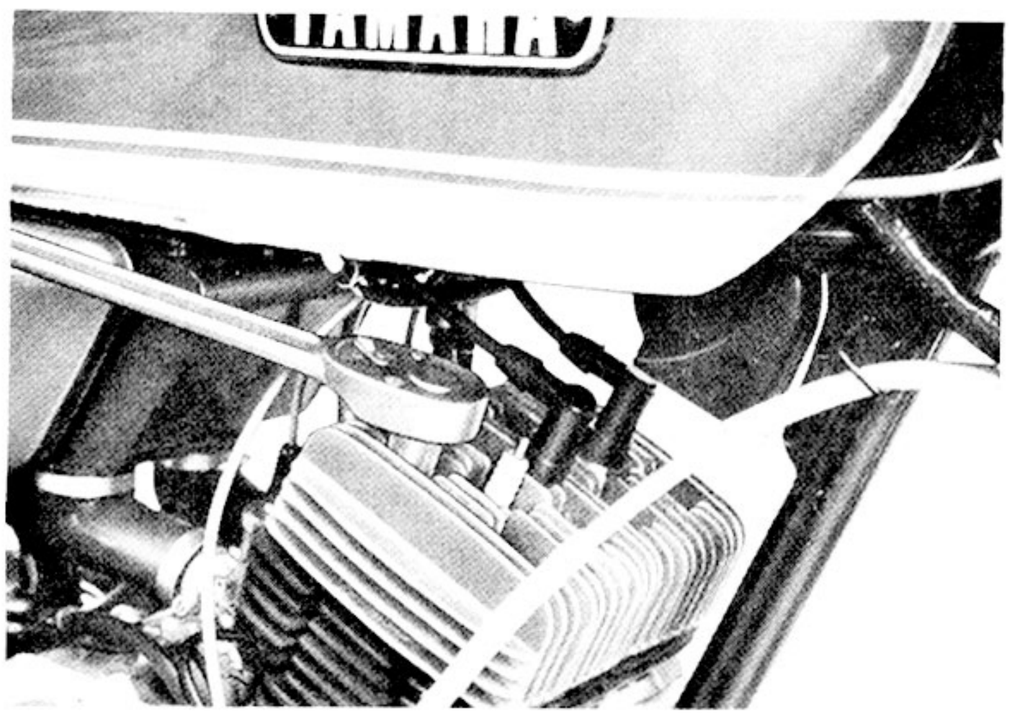
(3) Remove dust on the element by blasting with compressed air.

Tap the element lightly if air compressor is unavailable.

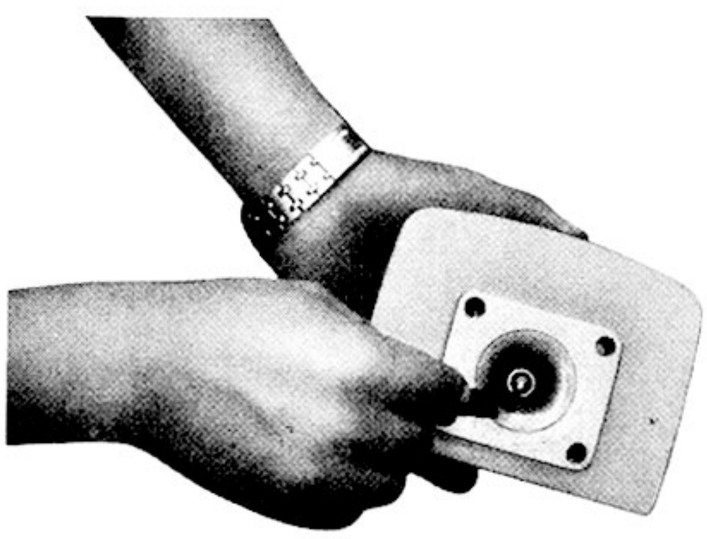
Note: See that the element is free from moisture or grease.

Cleaning of Cylinder and Piston

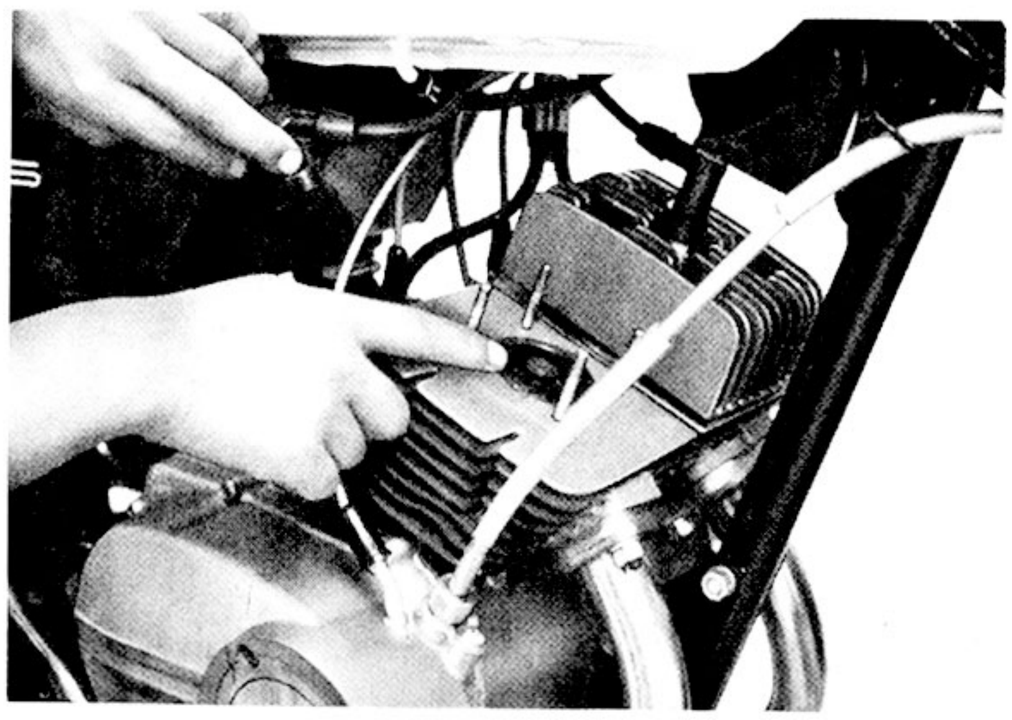
Carbon deposit will form on the exhaust ports of cylinders and on the piston heads. As excessive accumulation of carbon may result in premature ignition and burning of engine, carbon deposit should be removed periodically.



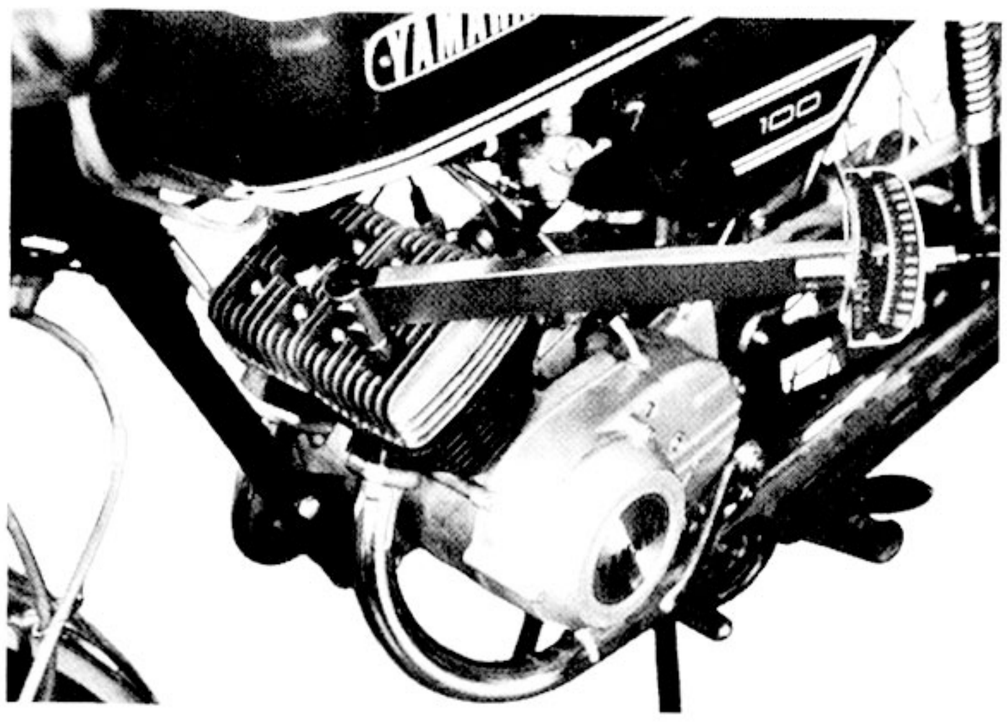
(1) Remove cylinder head retaining nuts.



(2) Remove carbon deposit on the inside wall of combustion chambers in cylinder heads with a saw blade or the like.



(3) Remove carbon deposit on the piston heads. Place pistons at top dead center and fill the piston with grease to cylinder clearance in order to prevent removed carbon entering into crankcase.

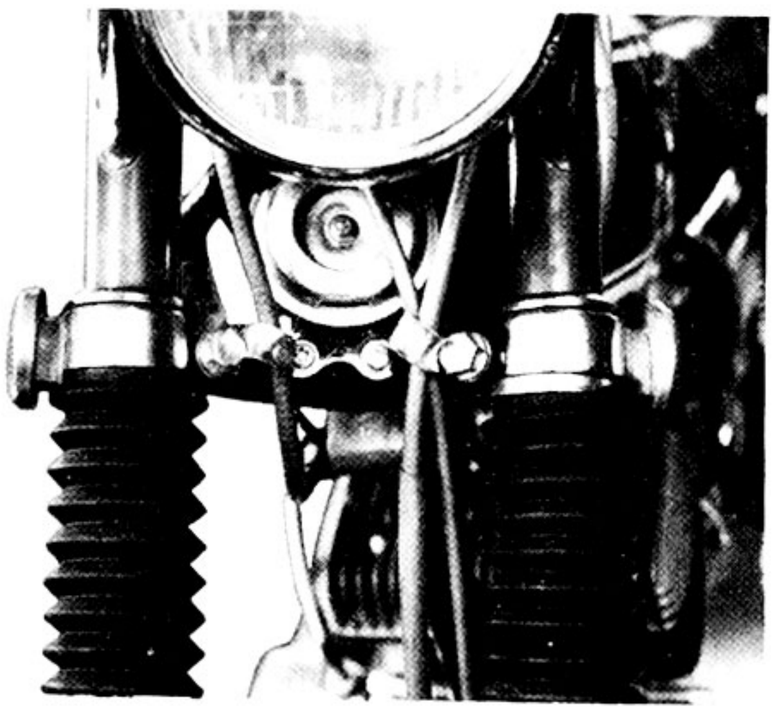


(4) Tighten retaining nuts to specified torque with a torque wrench.

Change of Front Fork Oil

The front fork is of an oil damper type, and the inner tubes of oil dampers are filled with oil to the specified level.

This oil should changed periodically, as it deteriorates and the viscosity drops if used for an extended period.



(1) Remove front wheel assy.

(2) Remove front fender.

(3) Remove front fork cap bolts.

(4) Loosen under bracket bolts and pull out the front fork.

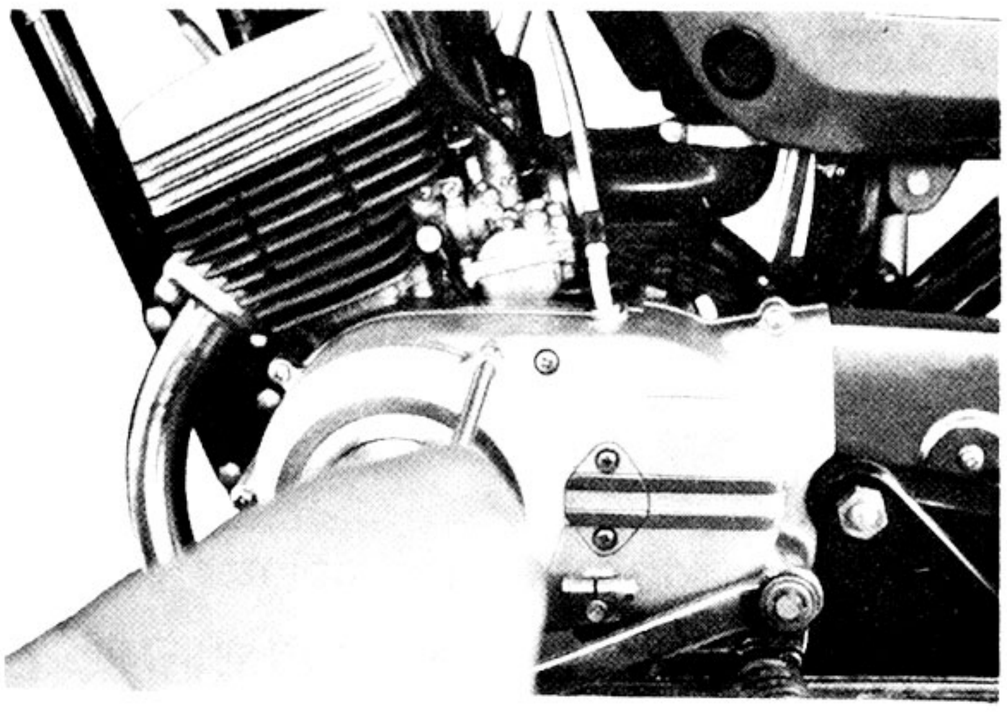
(5) Turn the front fork upside down and drain oil while sliding inner tubes.

(6) Fill inner tubes with oil up to the specified level after reinstalling. (See page 85)

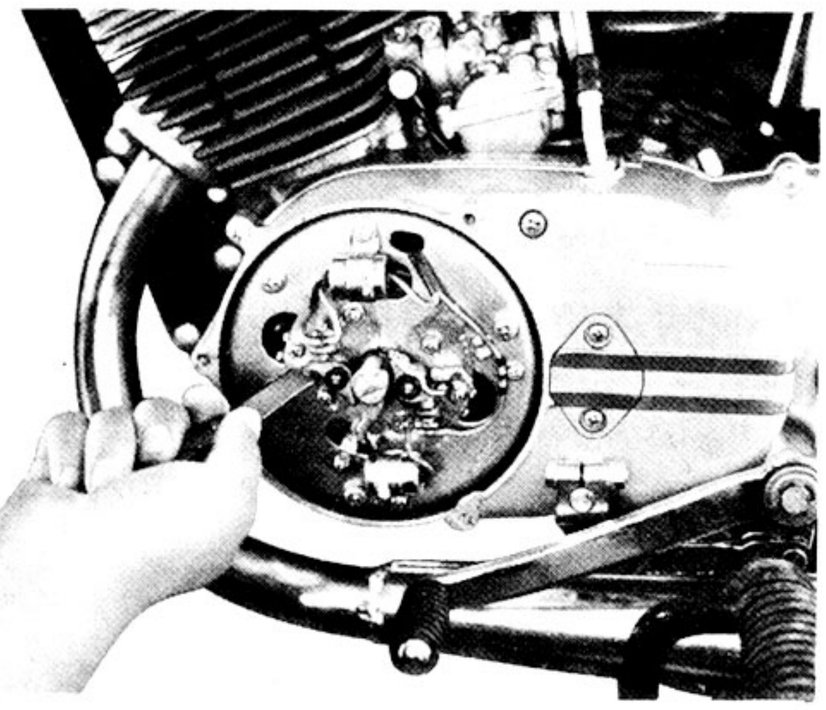
Adjustment of Ignition Timing

For the engine to give top performance, it is essential to generate the spark at a point slightly before top dead center.

This timing is determined for each model, and adjustment of ignition timing means the timing to the specified value.



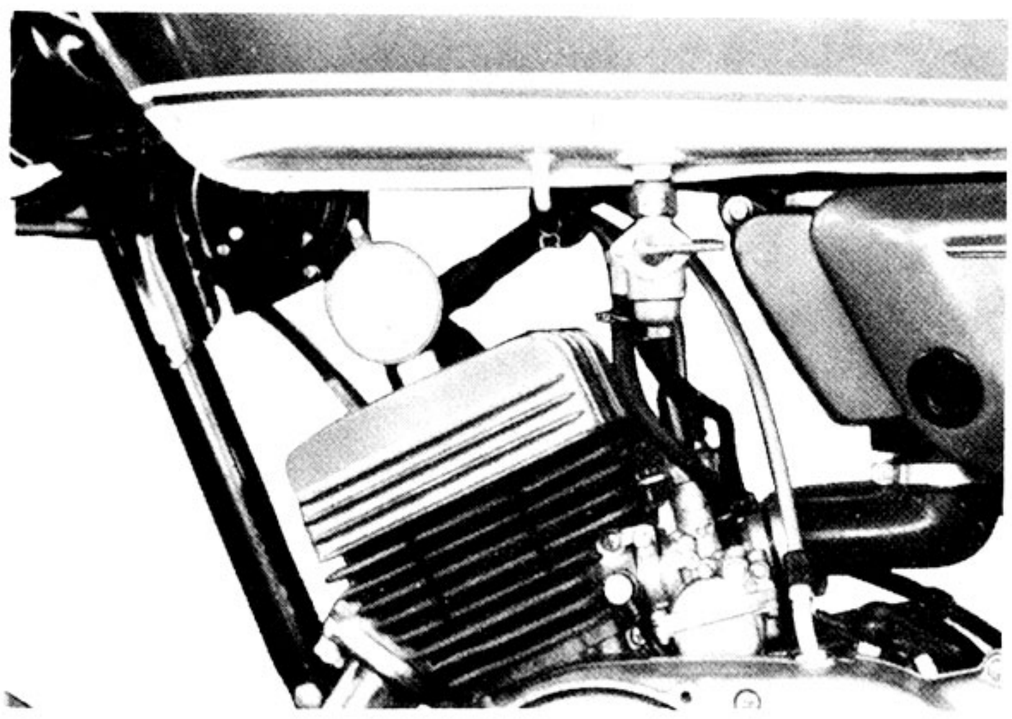
(1) Remove generator cover.



(2) Adjust the point gap to 0.3 - 0.35 mm.

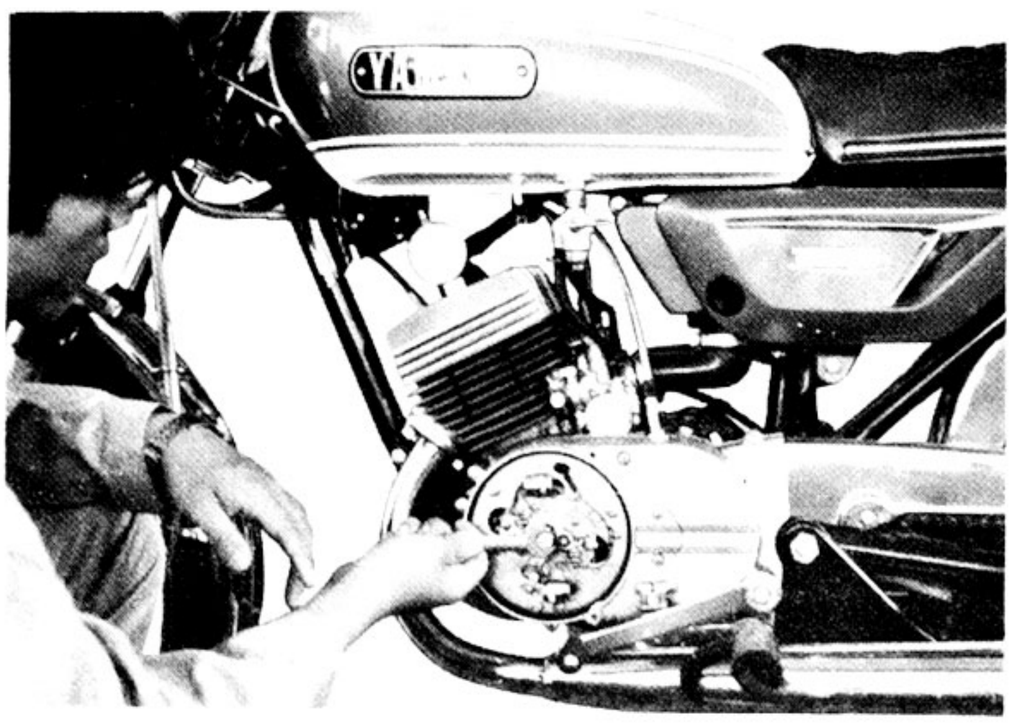
(a) Rotate crankshaft counterclockwise and insert a thickness gauge of 0.3 - 0.35 mm with the point gap at maximum. The gap is satisfactory if the thickness gauge can be inserted.

(b) Make adjustment as shown if the gap is not proper.

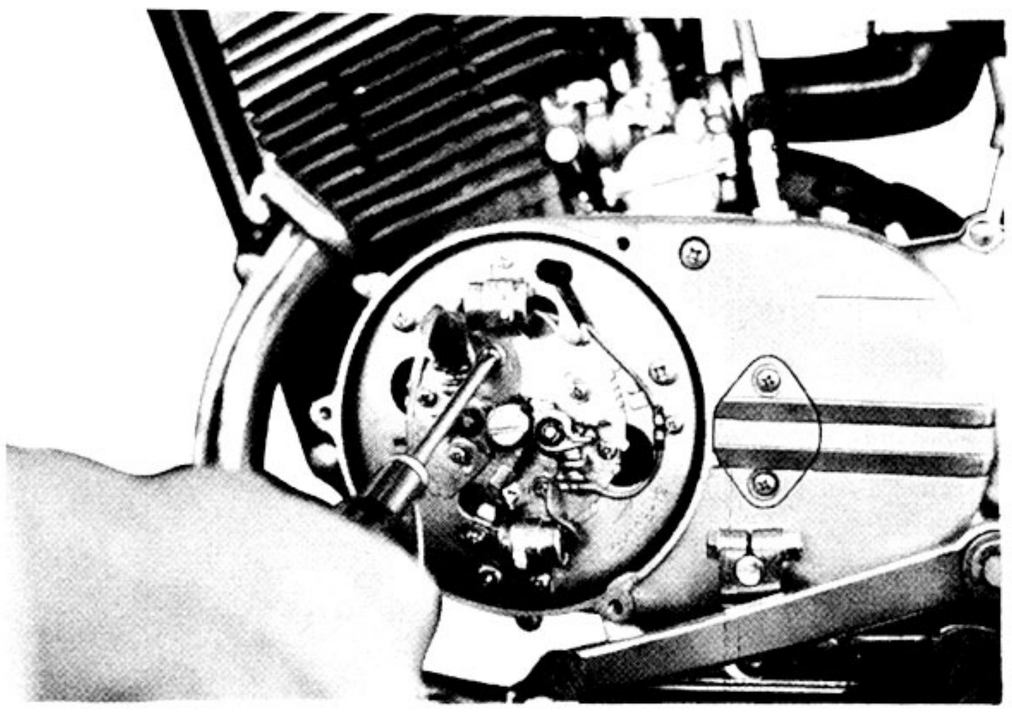


(3) Adjust the ignition timing

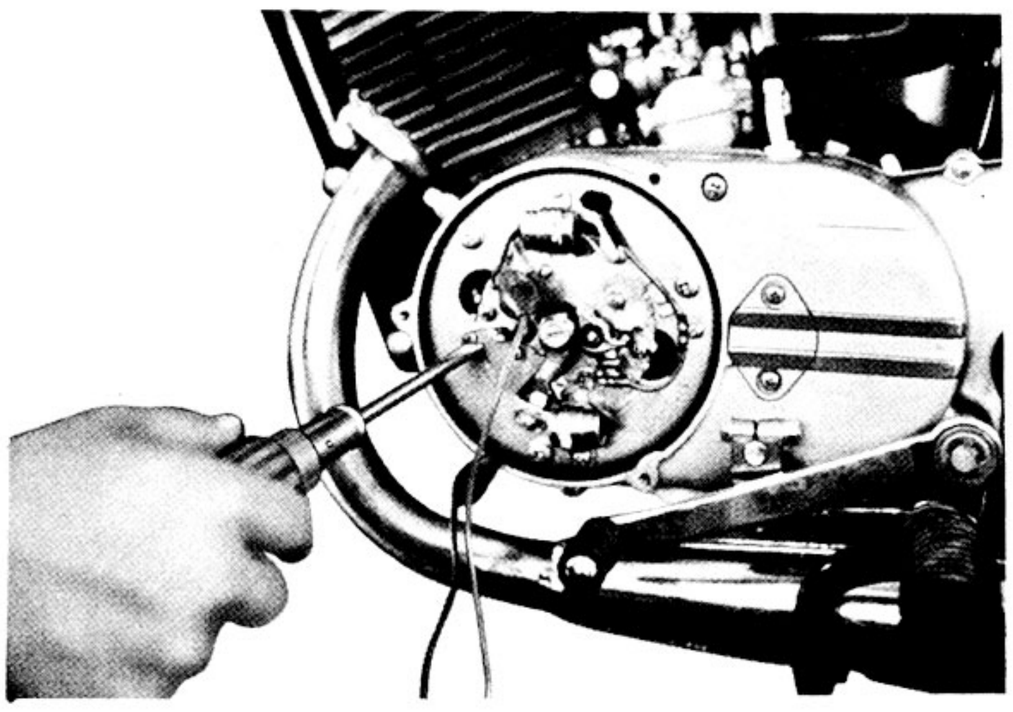
(a) Set a dial gauge.



(b) Rotate crankshaft counterclockwise and stop at the point where the pointer of dial gauge stops and starts to make a reverse turn. Set this position to zero point.



(c) Connect red lead of point checker to the R.H. point for adjustment of R.H. cylinder and to the L.H. point for adjustment of L.H. cylinder. Ground the black lead.



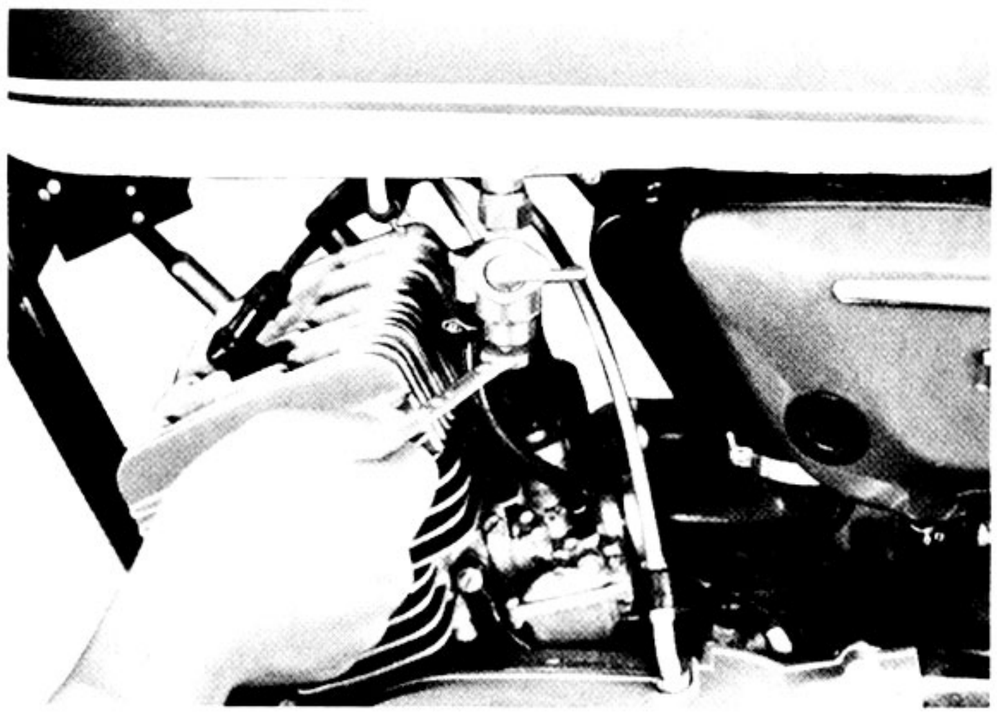
(d) Turn the switch of point checker on and slowly rotate crankshaft clockwise. The timing is correct if the pointer of the point checker moves to "CLOSE" position from "OPEN" position when 1.8 mm before top dead center is reached.

(e) Make adjustment as shown if timing is not proper.

(f) Make sure to fix the point upon completion of adjustment. Make same adjustment for the other cylinder.

Cleaning of Fuel Strainer

The fuel strainer is provided to filter dust in the fuel. It should be cleaned periodically, as the fuel flow becomes impeded when the strainer is clogged.



(1) Remove the cup of fuel cock and take strainer out.

(2) Reinstall the strainer after thoroughly cleaning with gasoline.

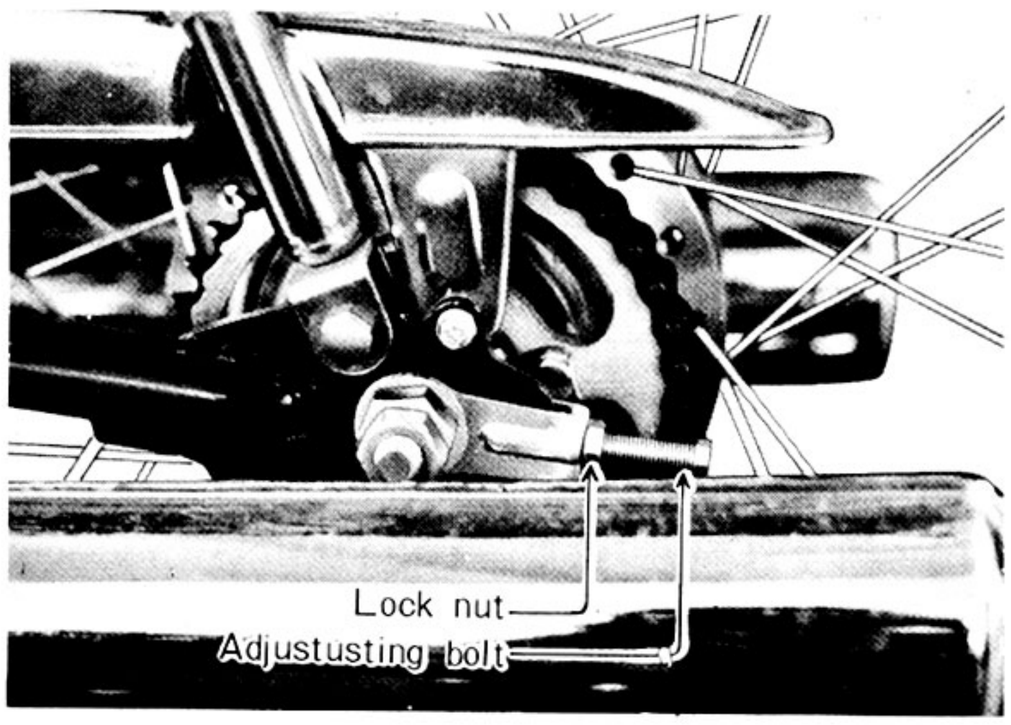
Lubrication to Drive Chain

If the drive chain is not lubricanted, elongation and wear of chain will result. Lubricate drive chain periodically.

Frequent lubrication is required particularly when the chain is still new, because elongation of chain is accelerated during this period.

Adjustment of Driving Chain Tension

The driving chain requires a deflection of 20 - 30 mm (both up and down at the intermediate part with both wheels on the ground. Make adjustment according to the instruction below if the tension is not proper.



(1) Loosen brake adjusting nut.

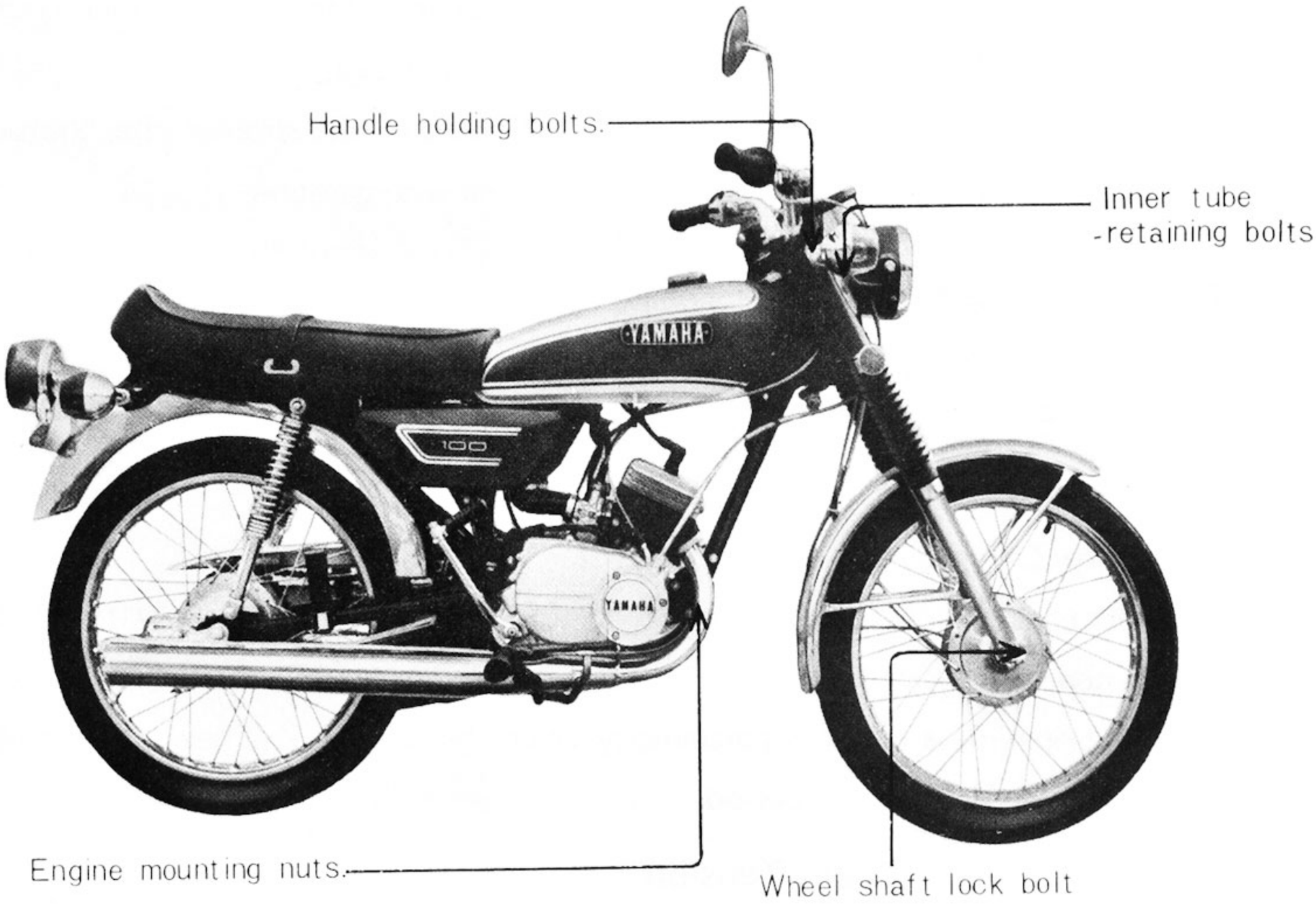
(2) Loosen wheel axle nuts and sprocket shaft nuts.

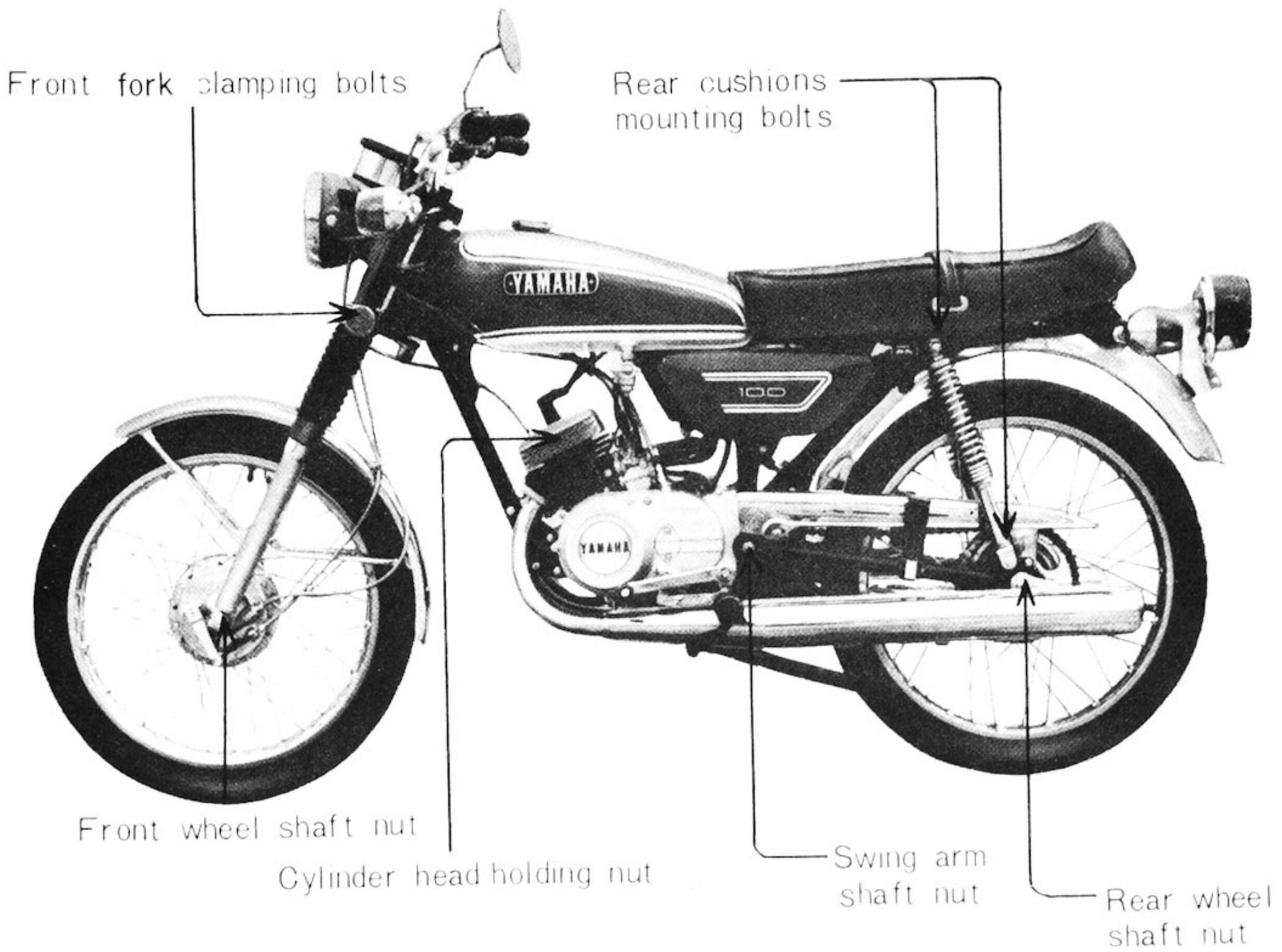
(3) Loosen chain puller lock nut and make adjustment of chain tension by turning the chain puller bolt in or out until proper deflection is obtained.
(Make same adjustment on both sides so that the dials of swing arms indicate same values.)

(4) Securely tighten nuts upon completion of adjustment.

(5) Make adjustment of rear brake. See the section for adjustment of brakes for the method of adjustment.

Retightening of Bolts and Nuts





CHAPTER 4. 5-PORT CYLINDER

1 Description of 5-Port Cylinder

The Schnuerle loop scavenging system is the most commonly used induction system for two-stroke engines. In the schnuerle loop system, transfer ports on the right and left sides of the cylinder are employed to transfer 2 streams of fresh fuel in the loop design that had proved to be the most effective induction system until the innovation of Yamaha's 5-port cylinder. This conventional schnuerle loop system had a design limit in that the transfer ports could not be made large enough to completely clear the combustion chamber of exhaust gases because of the position of the intake and exhaust ports. This would result in a portion of exhaust gas remaining in the central area of the combustion chamber that would contaminate the fresh fuel charge.

The rotary valve induction system incorporates the use of a 3rd transfer port at the back of the cylinder that directs a fresh fuel charge to the dead area containing the remaining exhaust gases. But to incorporate the rotary valve system causes excessive engine width and unattractive appearance which restricts such an engine design.

Yamaha's Research and Engineering Departments, therefore, designed and perfected the five-port cylinder induction system that is used on the R5 . This new fiveport system with the incorporration of two additional specially designed transfer ports completely removes all the exhaust gases previously left in the dead area of the cylinder.

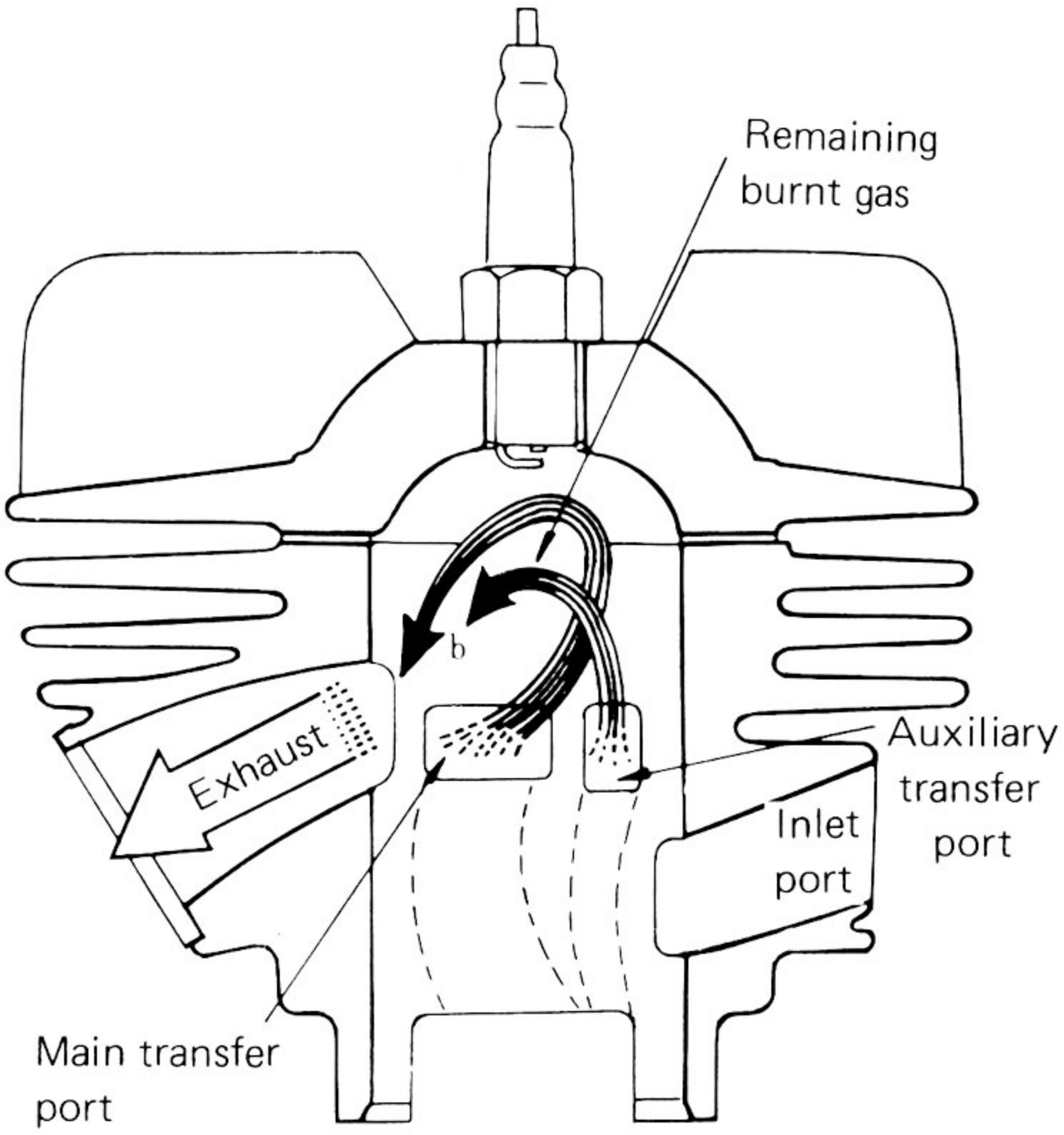
2 Construction and Features

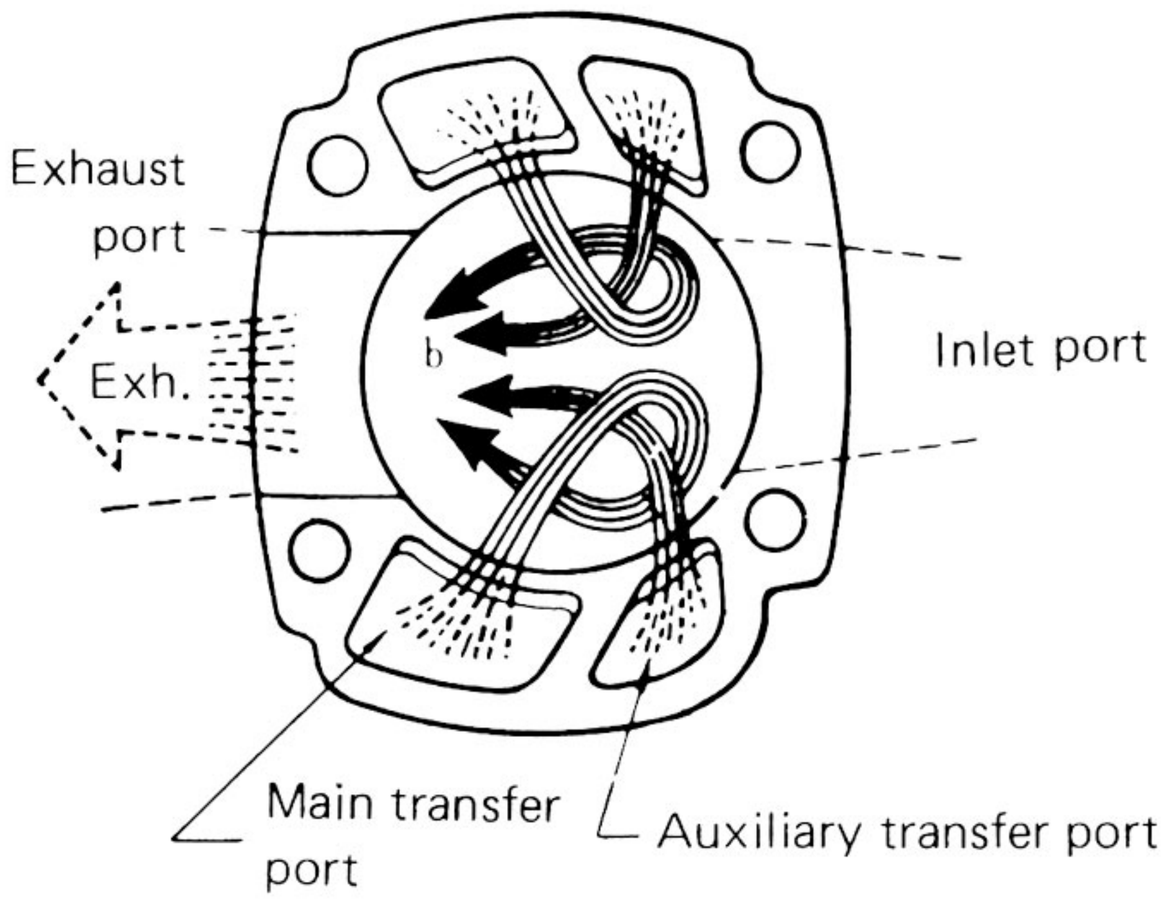
The 5-port cylinder induction system is similar to the Schnuerle loop scavenging system in that the two main streams (a) of fresh fuel meet at the cylinder wall opposite the exhaust ports, and deflect upward. Then, the streams again deflect downward, forcing out the burnt gases through the exhaust ports.

Additionally, in the 5port cylinder induction system, two auxiliary transfer passages are so arranged that these two ports run from the bottom of the cylinder up to the same height as the main transfer ports. Therefore, when the piston comes down to bottom dead center, these two transfer passages are opend and fuel is pushed up from the crankcase to the cylinder.

In the conventional Schnuerle system of porting, the burnt gases (b) cannot be completely cleared out of the cylinder, remaining in the center of the combustion chamber. However, the design of the 5-port cylinder induction system has successfully eliminated such a disadvantage the additional ports are designed to direct their fresh charge (c)at the area containing the remaining burnt gases,completely forcing the exhaust gases out of the cylinder.

Another advantage of the 5-port induction system is that the piston is cooled by the exhaust gases passing through it. This greatly increases the engine power in combination with the new design of 5-porting system.





CHAPTER 5 ENGINE

When disassembling and reassembling the engine, work in such sequence to facilitate later working process.

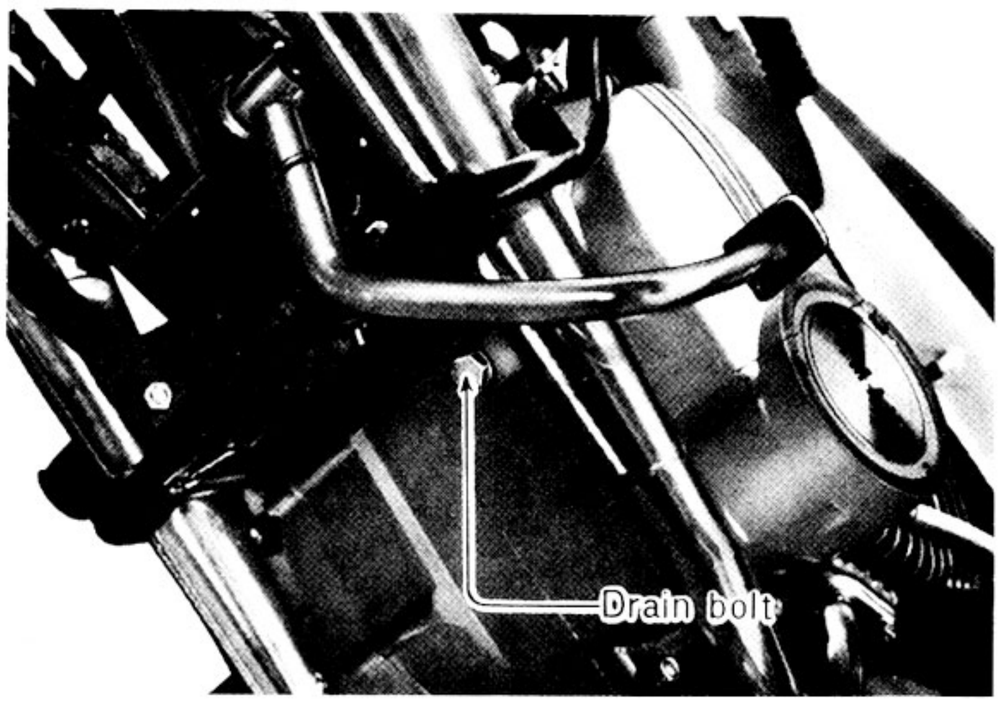
* Precautions for Engine Disassembly

(1) Make sure to remove dust around cylinder head, cylinder and crankcase prior to dismounting the engine, to prevent dust entering into the engine interior during disassembly.

(2) Always use clean tools in proper manner exercising care not to damage the motorcycle components.

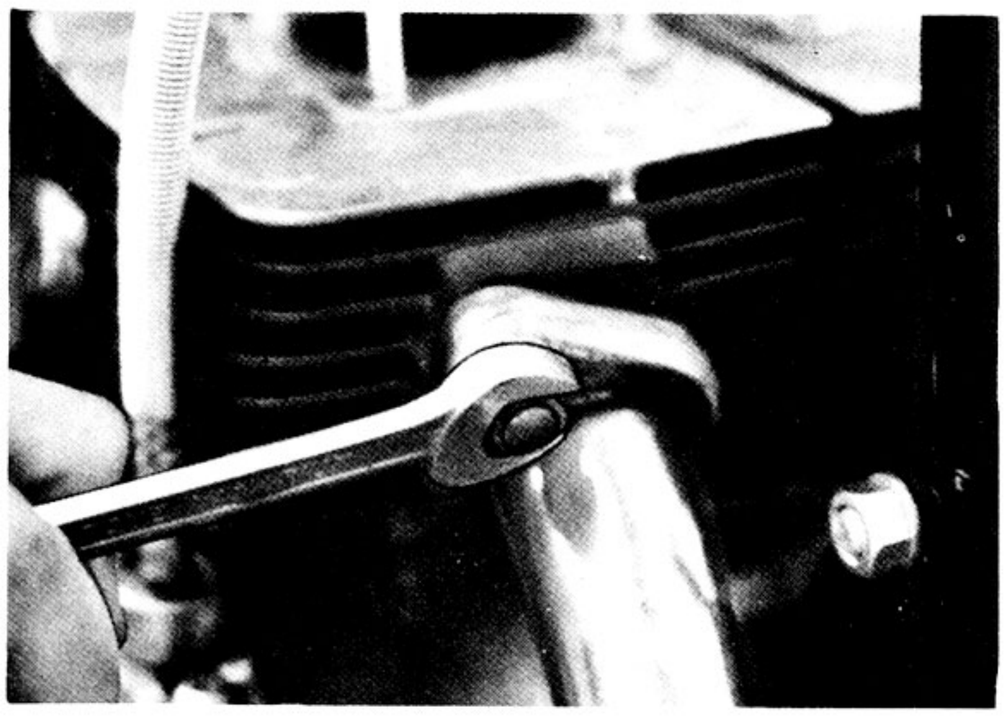
(3) Place removed parts in parts tray in groups so as not to mislay any of them.

Engine Dismounting Procedure



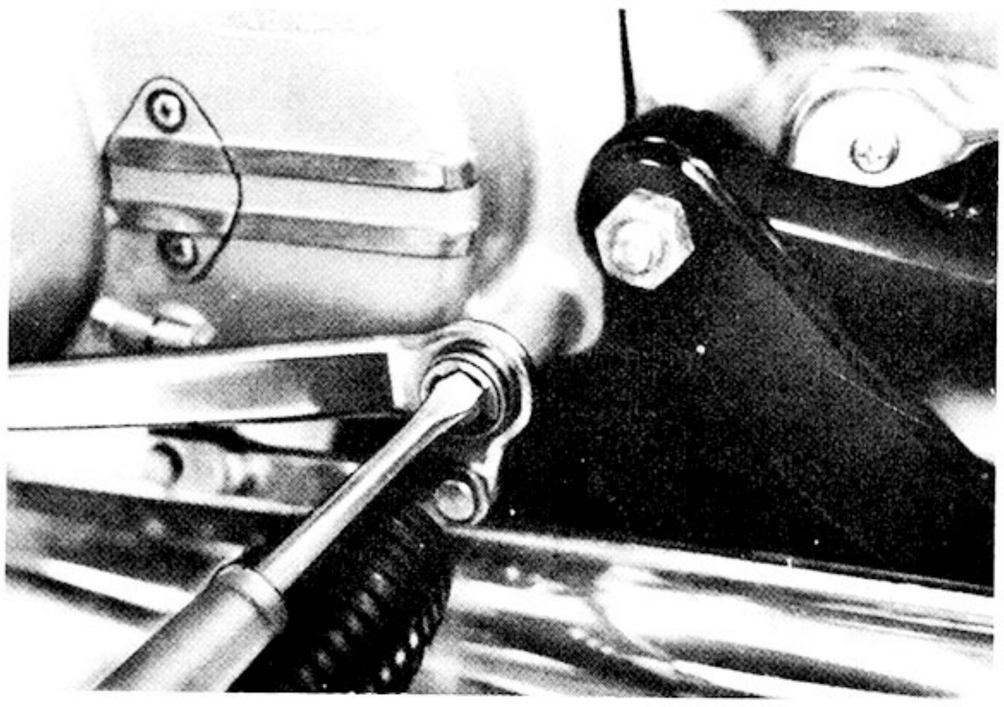
(1) Drain transmission oil after running the engine for one or two minutes.

Recommended transmission oil is Yamaha gear oil. Amount of oil 750cc



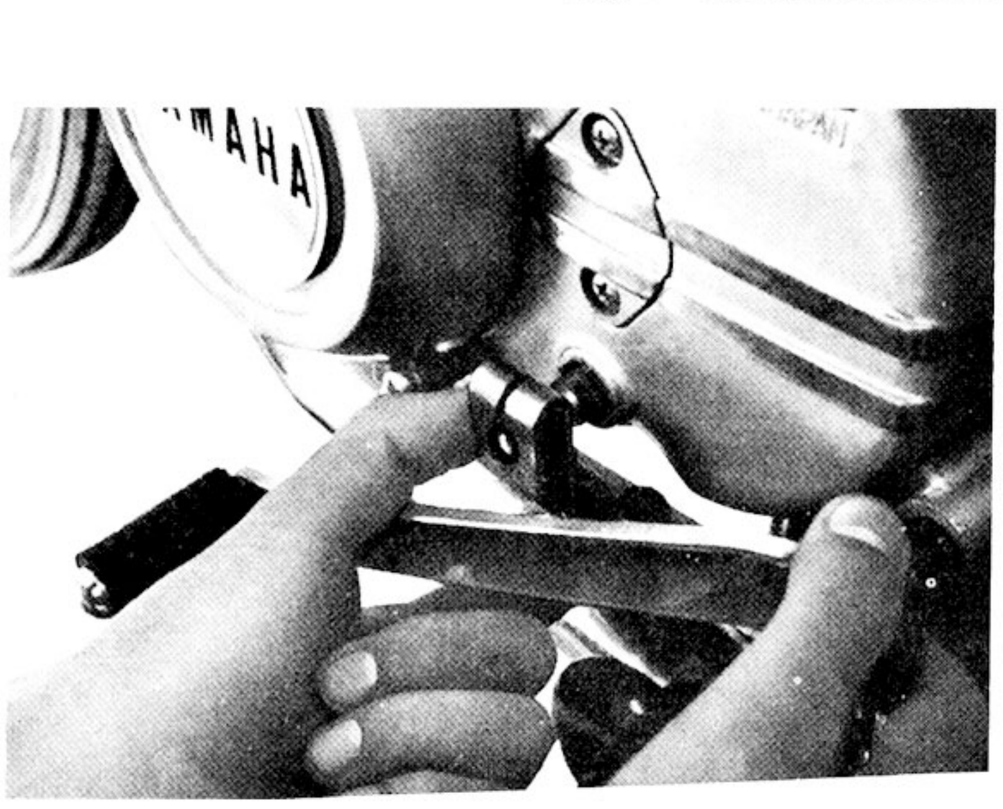
2. Remove mufflers and exhaust pipes on both sides.

Remove mufflers by turning inward by 180 degrees.

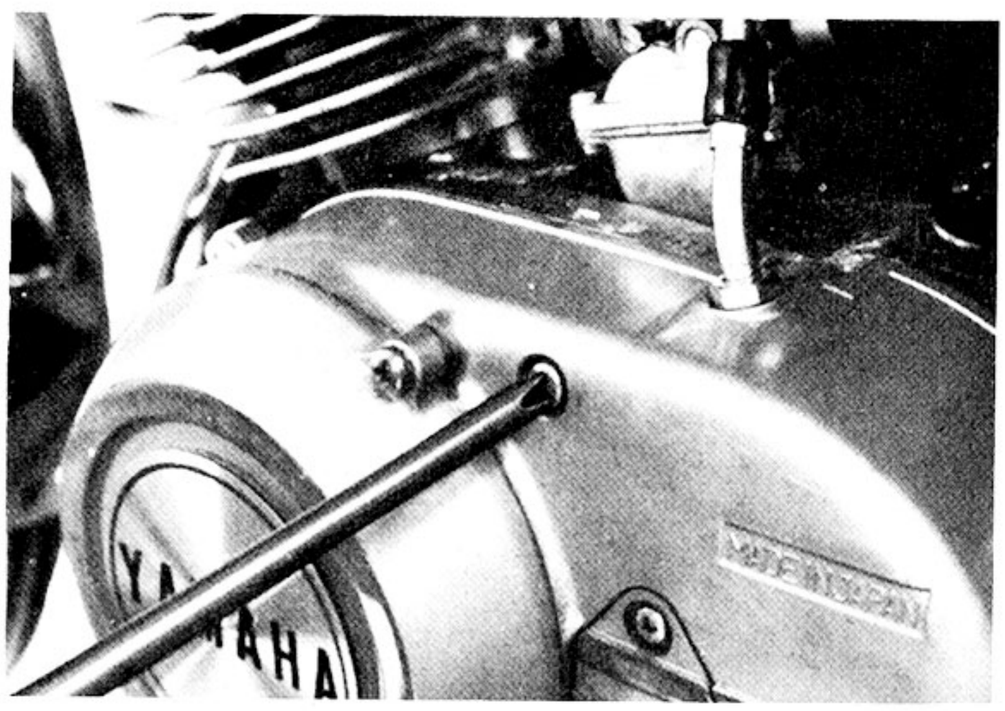


3. Remove foot rests and gear shift pedal.
   (a) Remove circlips.

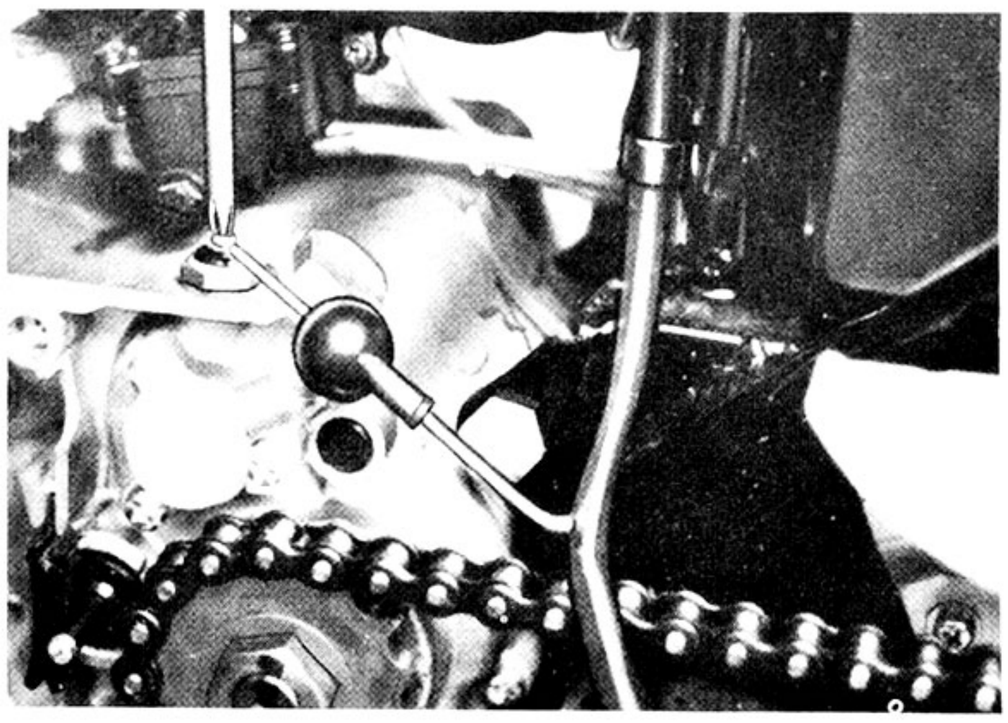
(b) Remove the gear shift pedal bolt.



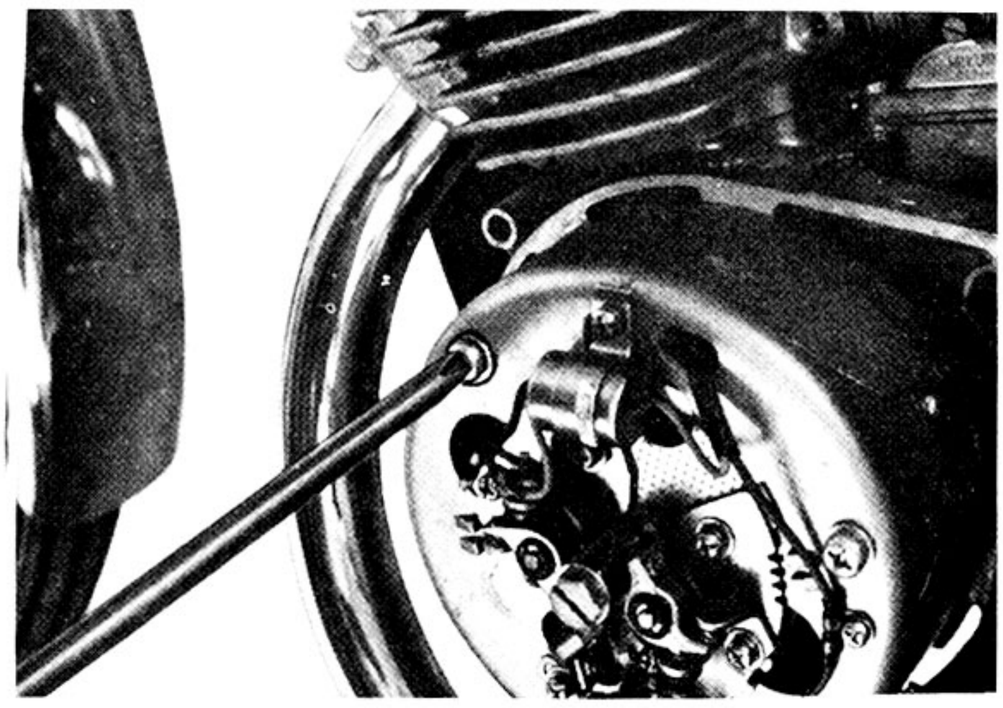
(c) Remove gear shift pedal.



4. Remove crankcase cover (L).

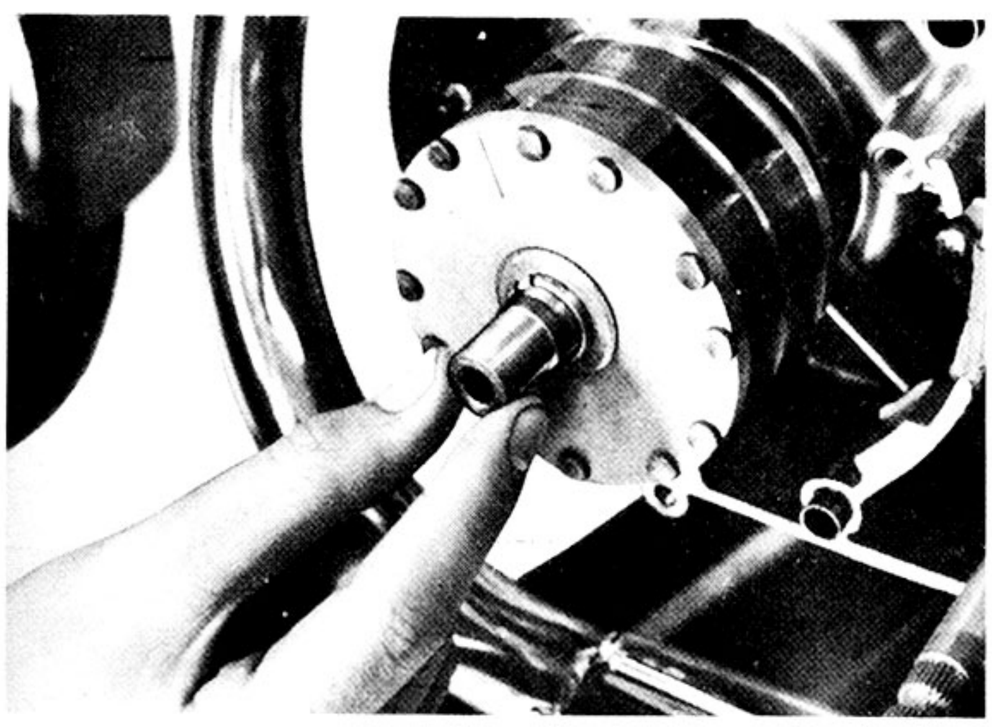


5. Disconnect wiring for neutral pilot lamp.

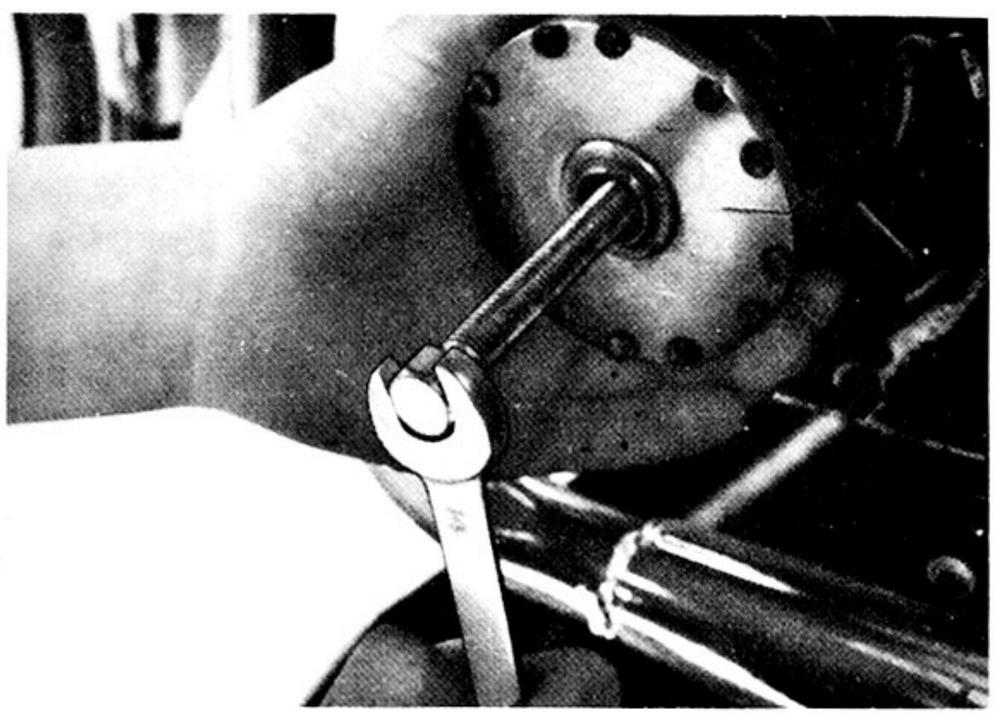


6. Remove A.C. generator assy.

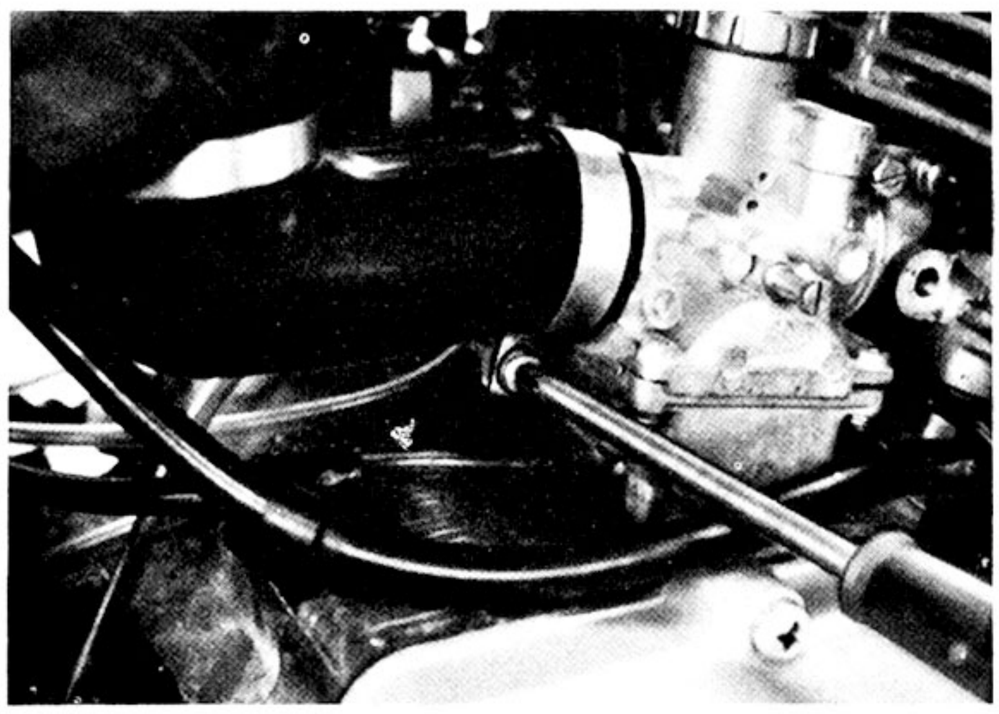
   (a) Remove stator assy.



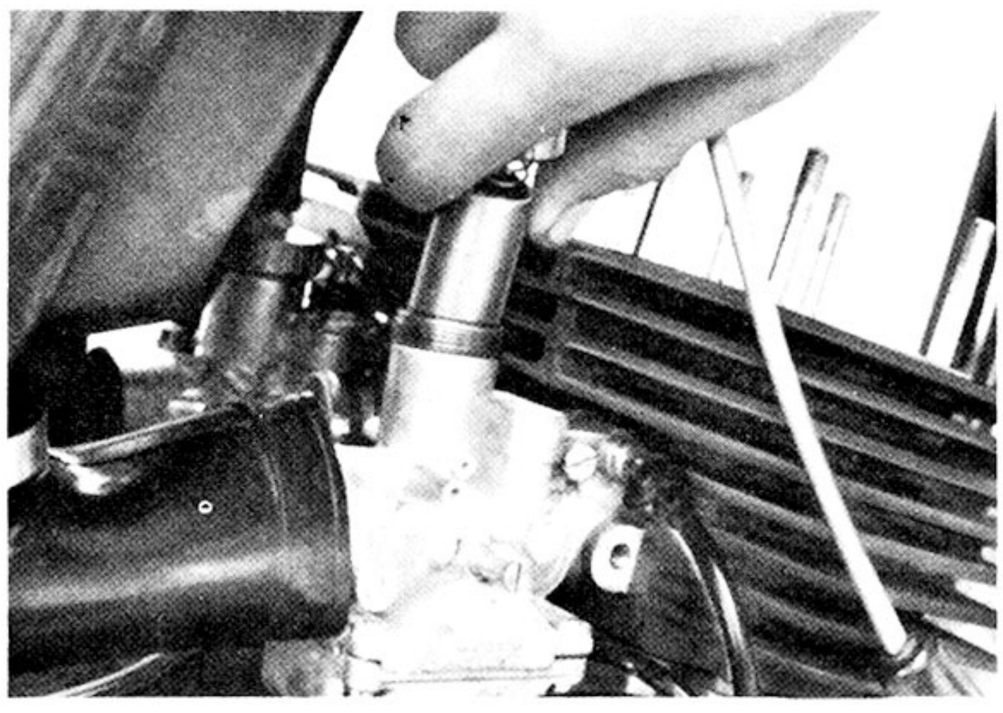
   (b) Remove cam.



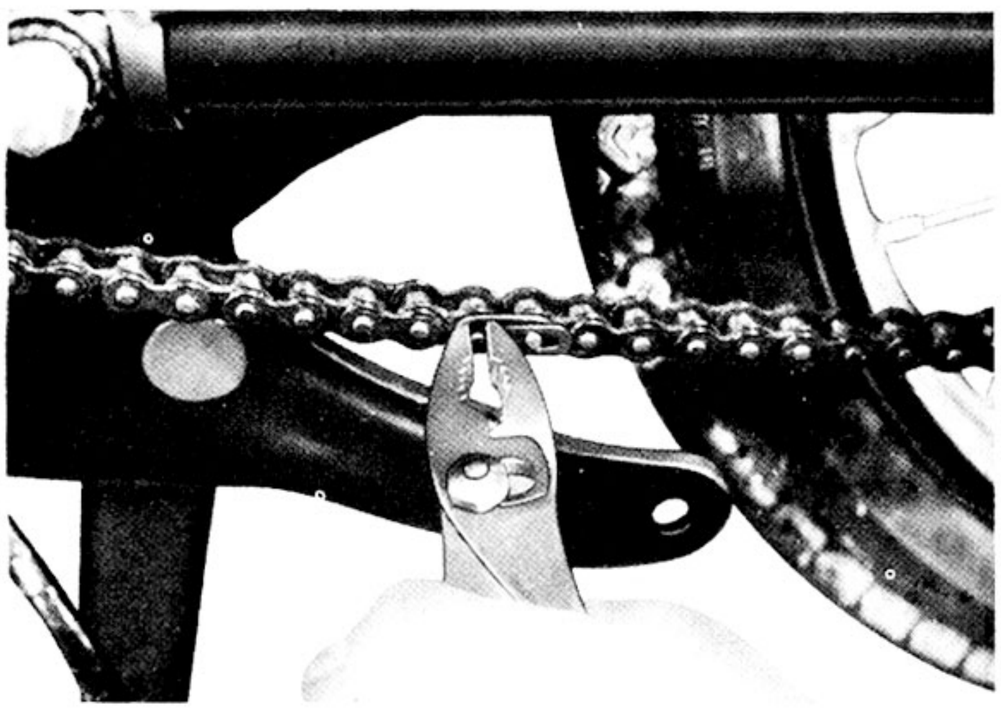
   (c) Remove rotor by using an armature removing bolt.



7. Loosen air cleaner joint band.



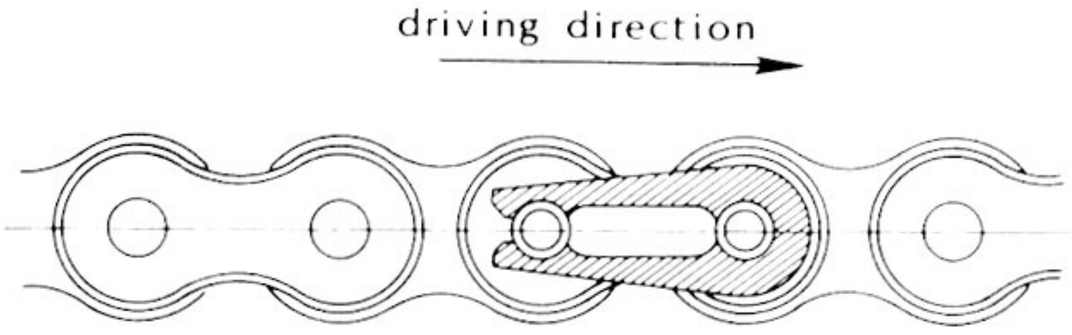
8. Remove throttle valves from carburetors.

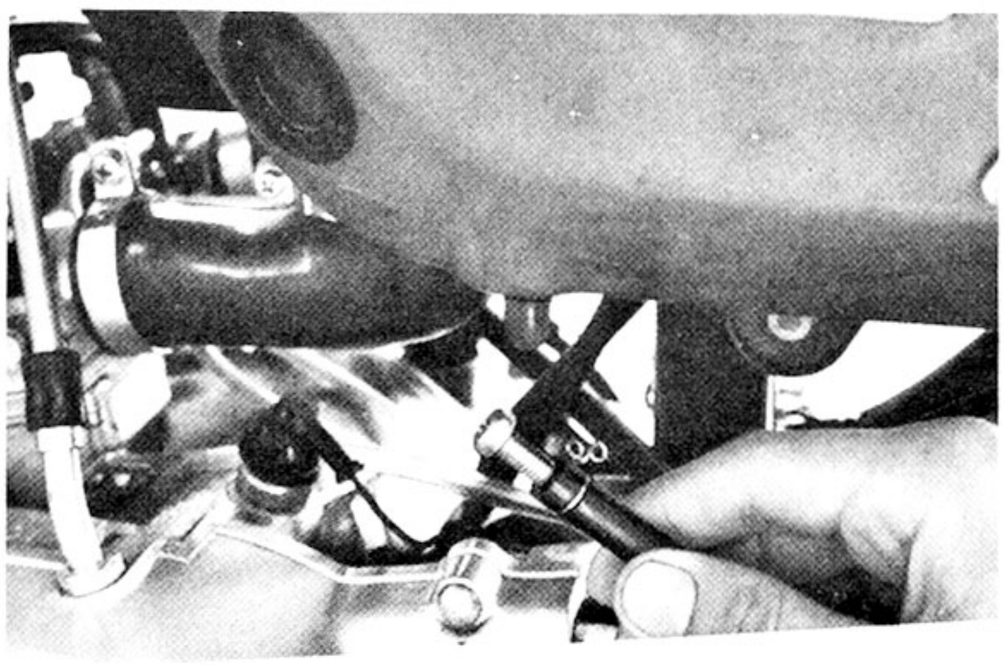


9. Remove drive chains.

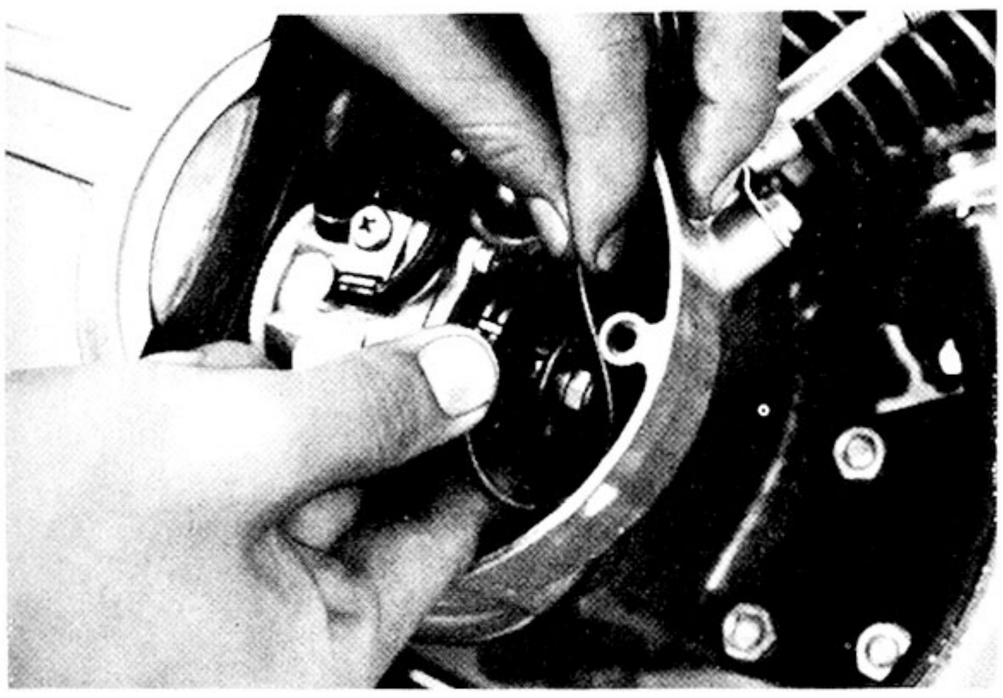
   The driving chains can be easily installed at sprocket wheel.

Make sure to place circlips as shown.

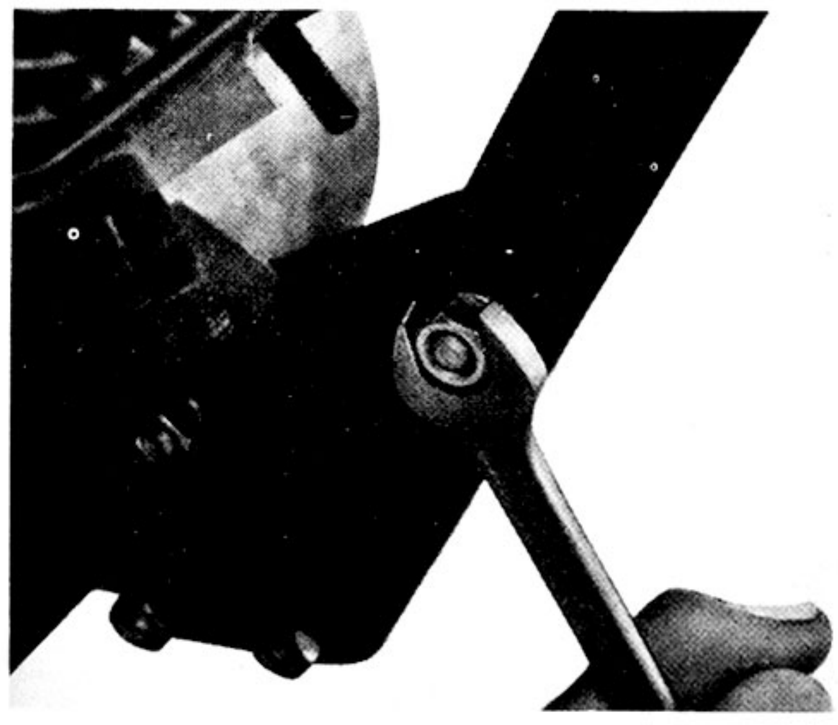




10. Remove oil pipe from the bottom of oil tank. Plug up the oil tank to prevent leakage of oil from the tank.
    It is recommended to use the exhaust tube caps fitted on new batteries for plugging oil tank.



11. Remove tachometer cable, oil pump cover and disconnect pump cable.



12. Remove engine mount bolts.
    Do not forget the directions of engine mounting bolts.

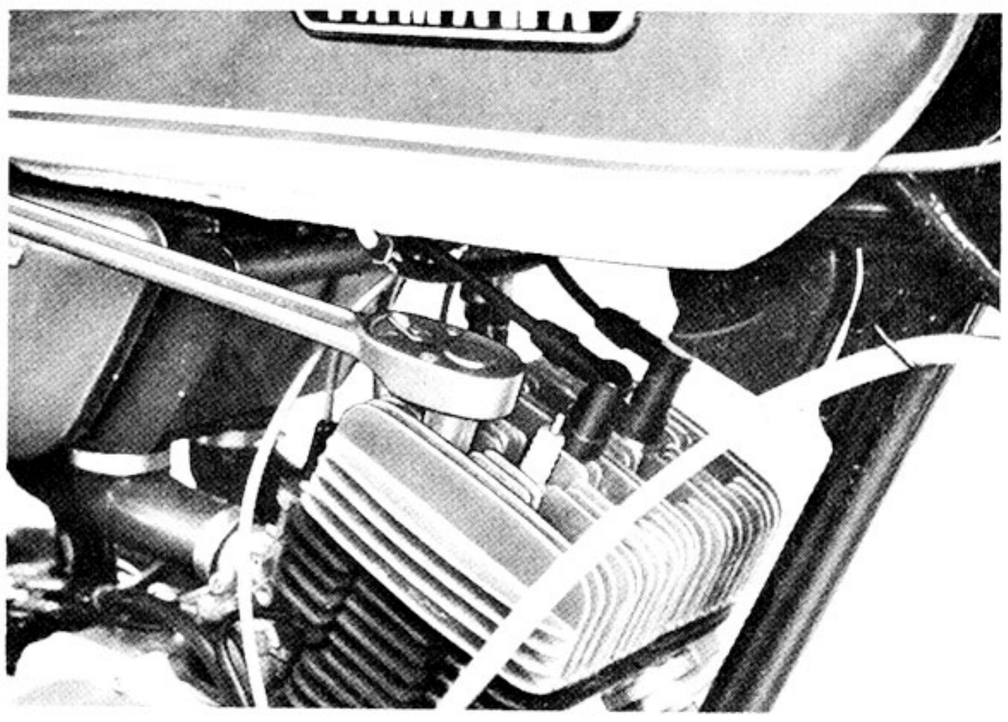
13. Dismount the engine from motorcycle frame.
    Hold the exhaust port of cylinder with the left hand and kick crank with the right hand and move the engine out to right-hand of the frame.

For remounting the engine on motorcycle frame, work in the sequence opposite to that of dismounting. Do not forget to make the following adjustment upon completion of remounting.

(1) Adjustments of Autolube pump

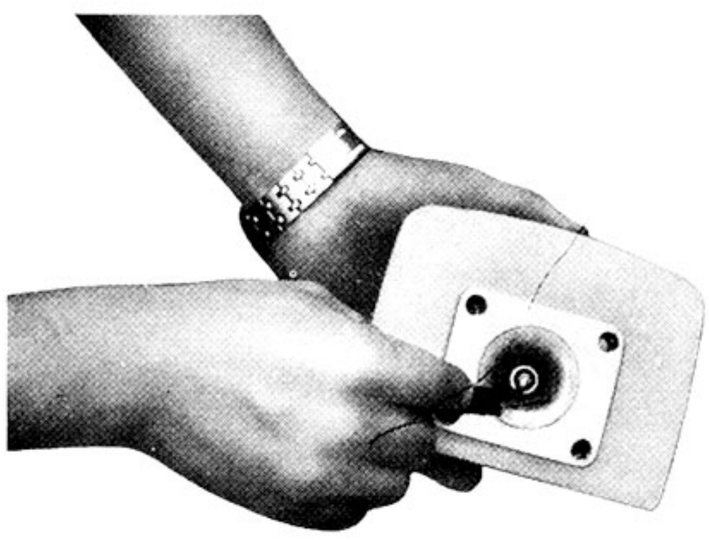
(2) Adjustment of clutch

Cylinder Head



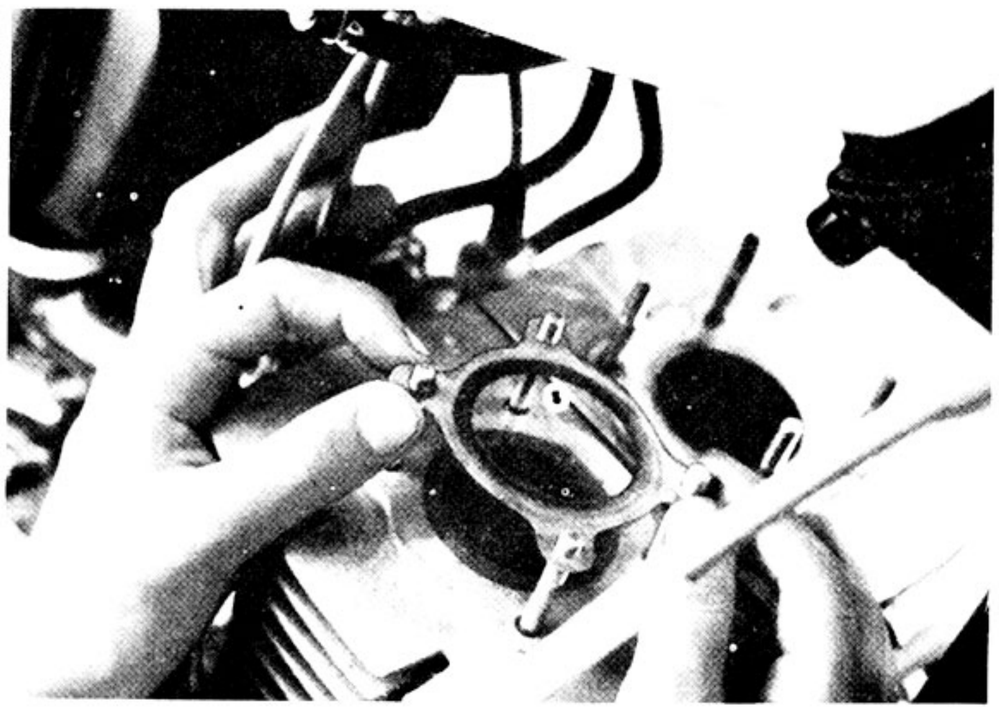
Disassembly

1. Remove cylinder head retaining nuts and then remove cylinder head.



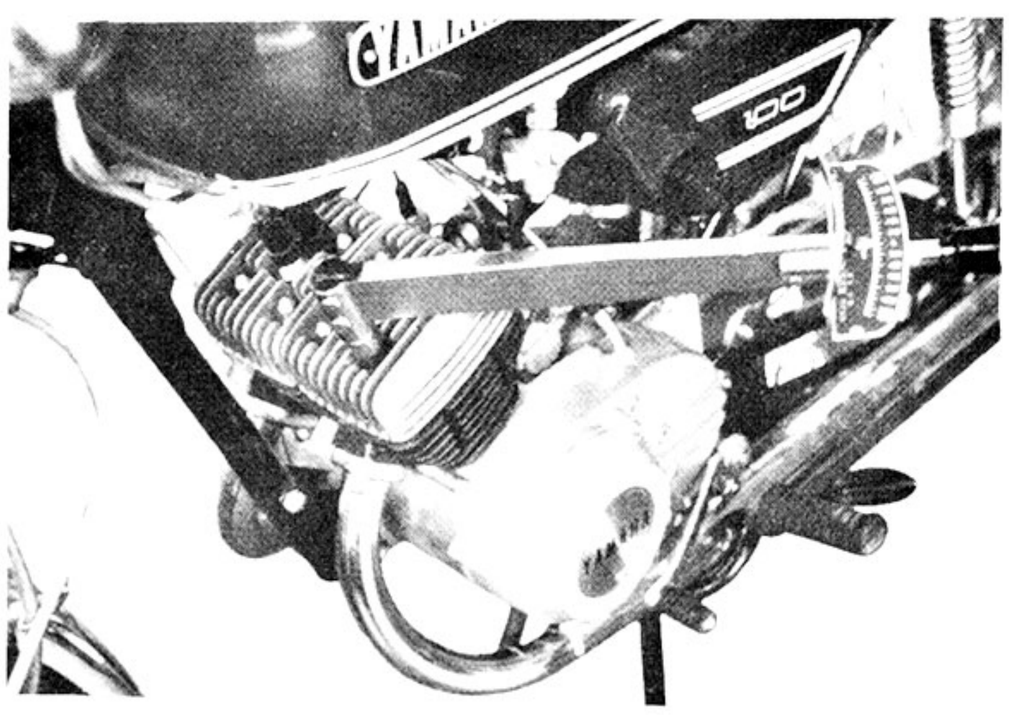
Inspection

1. Remove carbon from cylinder head.



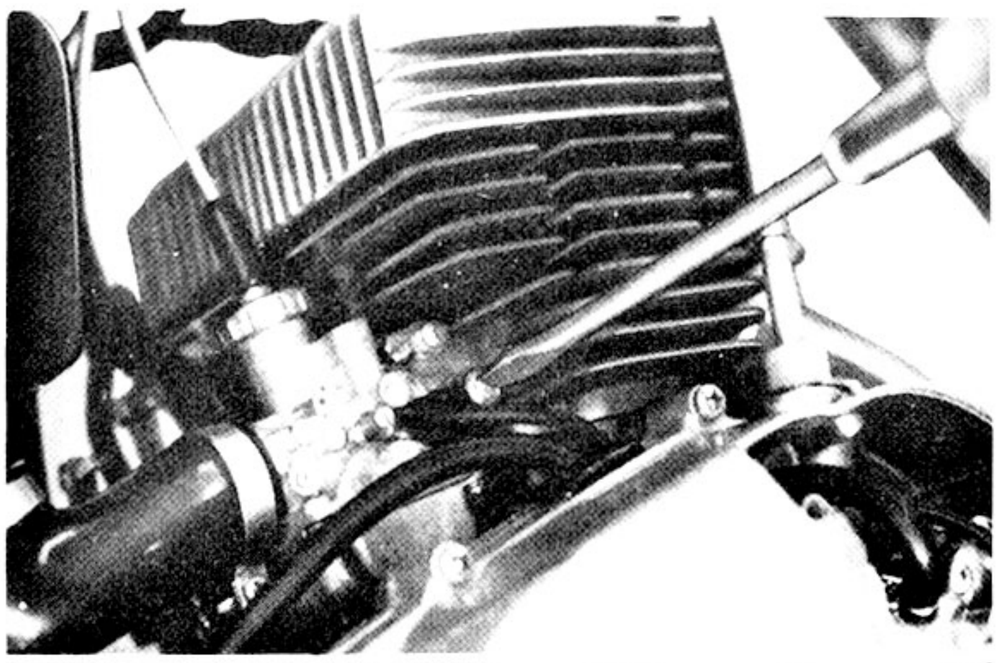
Reassembly

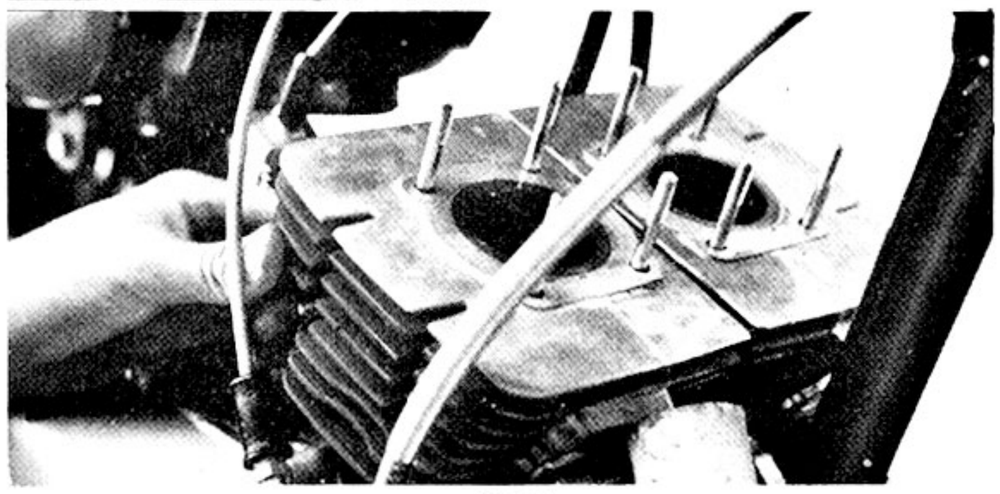
1. Always replace gasket with a new one whenever cylinder head is disassembled.

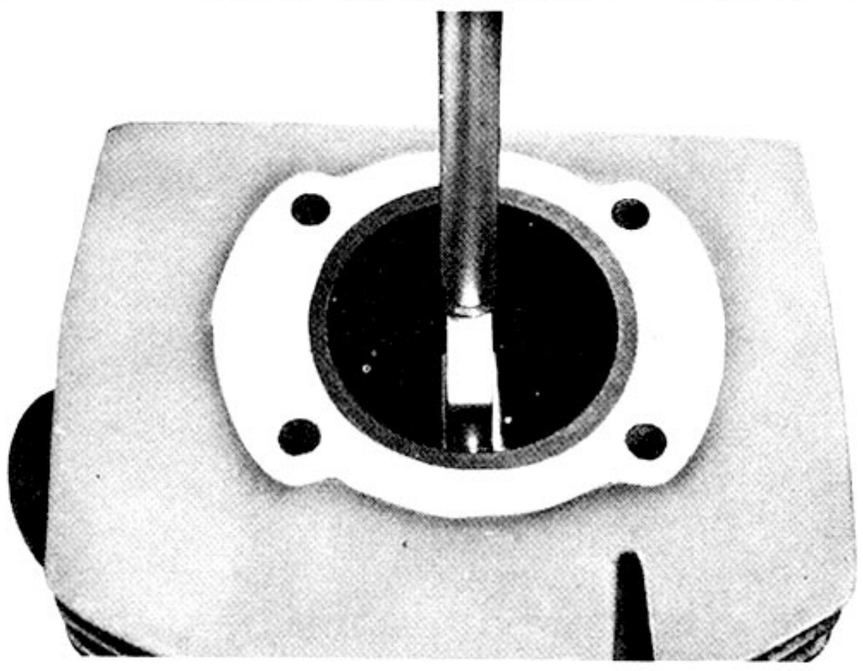


2. Tighten cylinder head retaining bolts in diagonal sequence to the specified torque with a torque wrench.

Cylinder







Disassembly

1. Remove exhaust pipe retaining nuts.
2. Remove carburetor.
3. Remove the banjo bolt.
4. Remove cylinder head.
5. Remove cylinder while lightly tapping the cylinder.

Inspection

1. Measure the extent of wear of cylinder by using a cylinder gauge (at four places equally spaced in the cylinder in two directions, i.e., axial direction and a directional normal to axial direction).
   Bore the cylinder and finish with honing if the difference between minimum and maximum measurement is 0.05 mm or more.
   The minimum allowable piston to cylinder clearance is 0.035 - 0.040mm

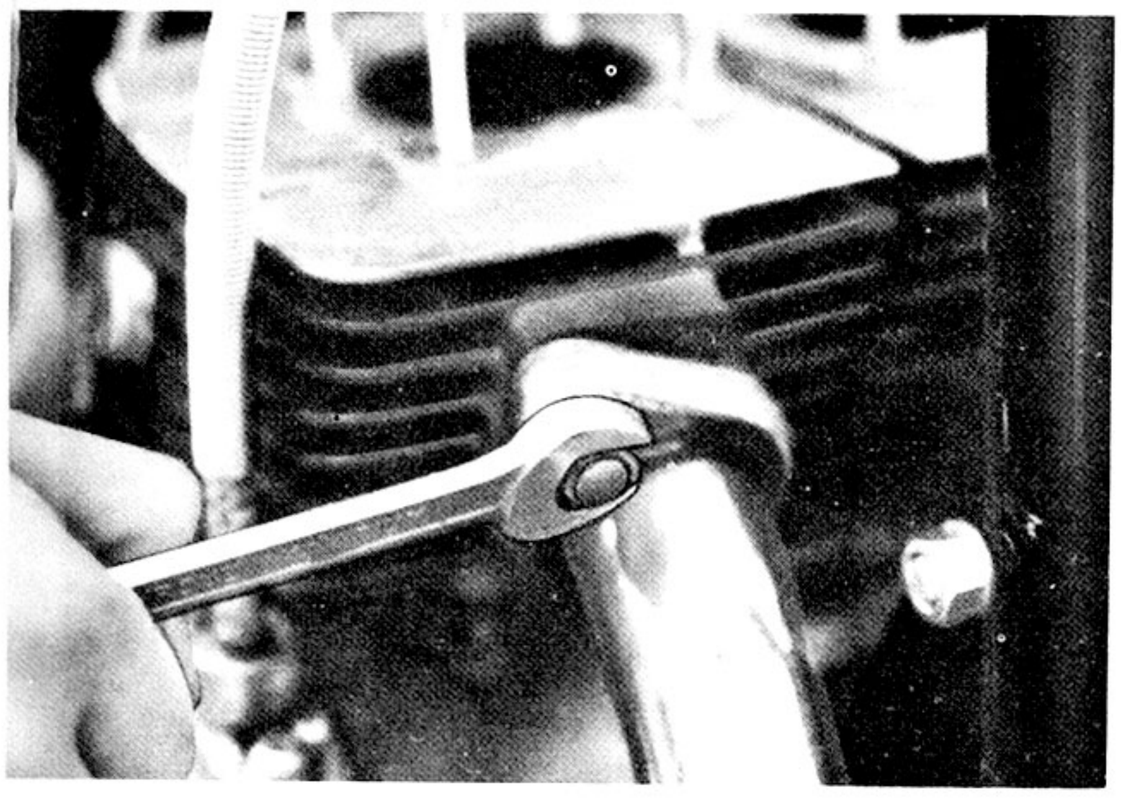
Correcting Procedure

Correct the cylinder as instructed below if necessary.

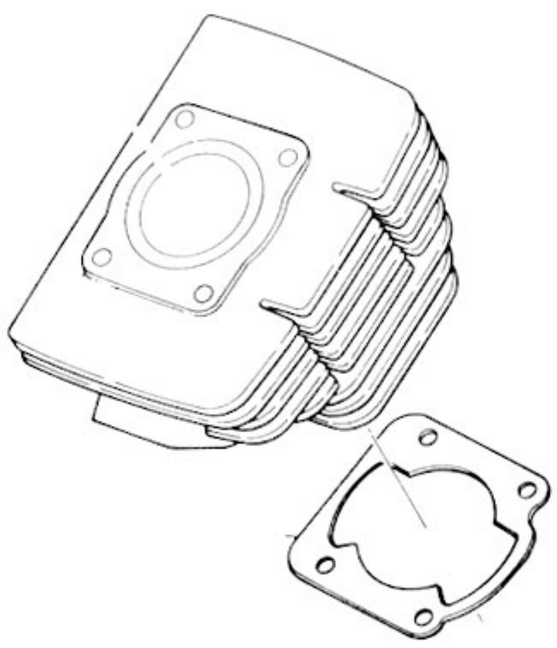
a) Oversize pistons are prepared in two different dimensions, i.e., 0.25 mm and 0.50 mm.

b) Bore the cylinder and finish with honing according to the size of oversize piston to be used.

c) The difference in the bore measurement after honing should be kept to 0.01 mm or less.

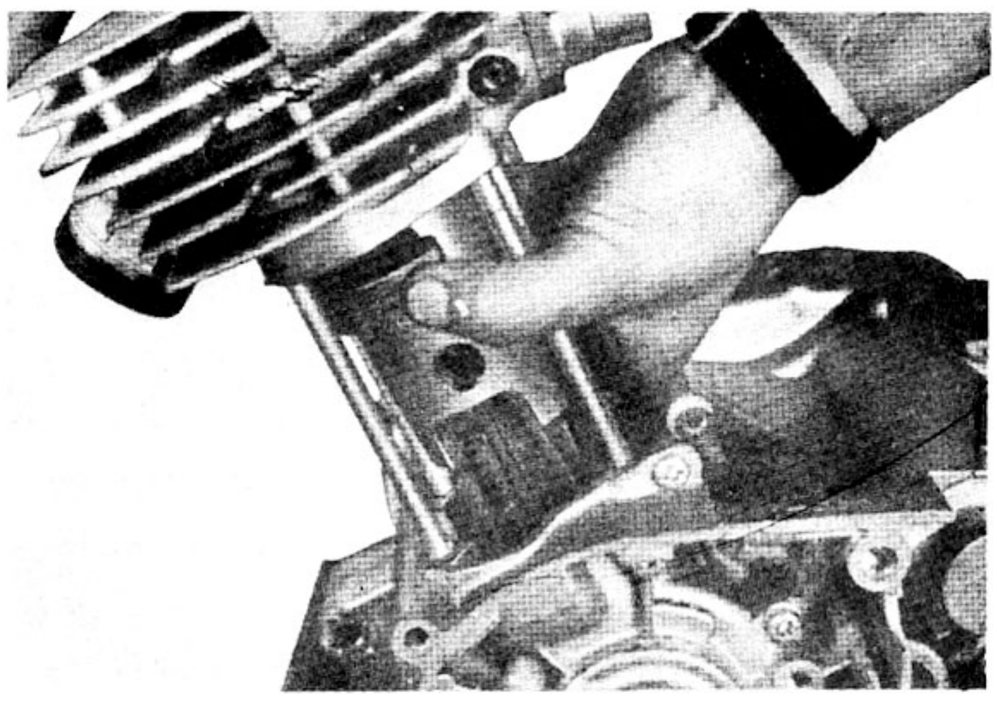


2. Remove carbon.
   Carbon deposit will easily form around the exhaust port. Remove carbon by using a screwdriver or the like.



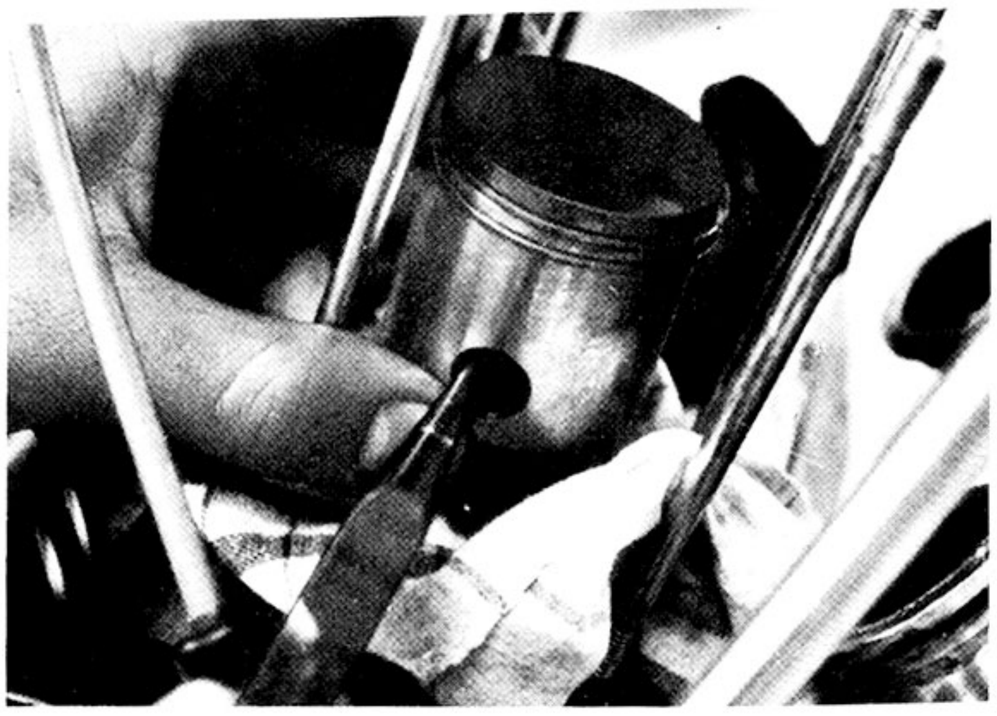
Reassembly

1. Completely remove the old cylinder gasket and install new gasket.



2. Assure that the gaps of piston rings are aligned with the locating pins of the pistons and then insert into cylinders while holding piston rings by hand so that they do not interfere with cylinders. (Otherwise, piston rings may be broken.)
   Be sure to apply oil on both pistons and cylinders before inserting pistons into cylinders.

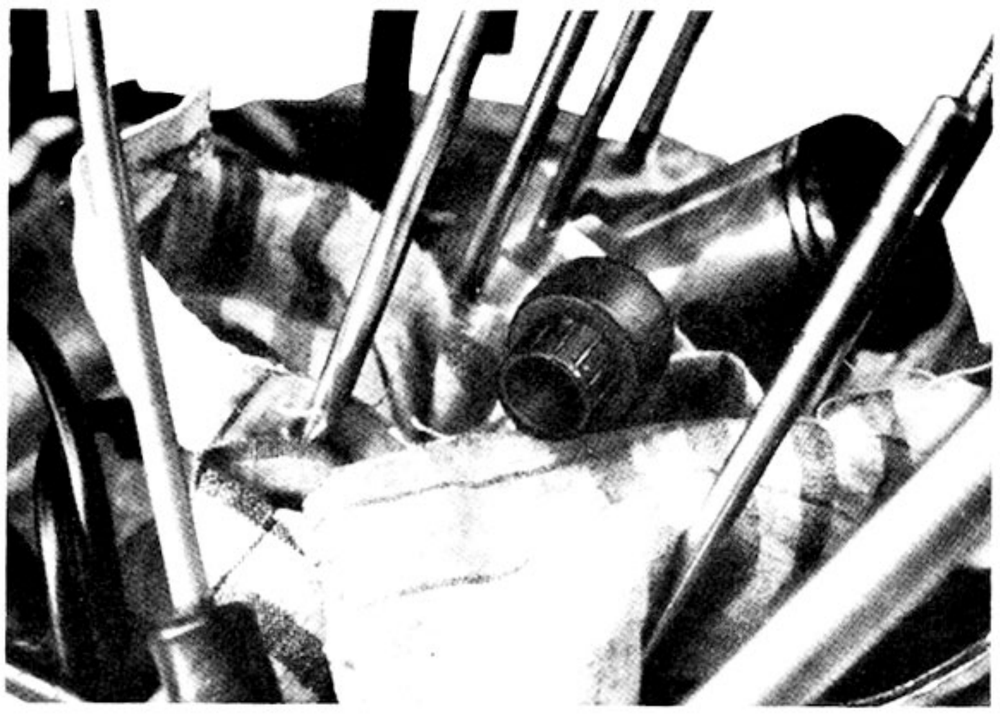
Piston Pins and Pistons



Removal of Piston Pins and Pistons

1. Remove clips at both ends of pistons by using long nose pliers and then push out piston pins with the fingers or a screwdriver.

Note: Cover up the crankcase with rag so that the clips do not drop into the crankcase.



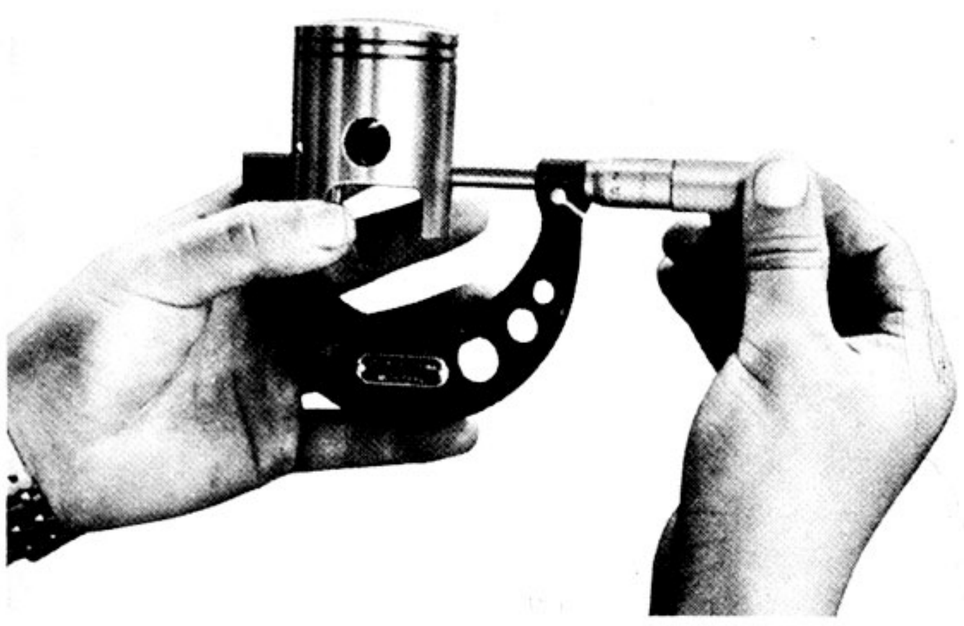
2. Pistons and small end bearings can be removed after removal of piston pins.

Removal of Piston Rings

1. Open the gap of each piston ring with the thumbs of both hands and take it out in the direction opposite to the gap.

Inspection

1. Fitting of piston pins and pistons:
   Proper fitting of piston pin and piston should such whereas the piston pin can be inserted when forced by finger. Replace piston or piston pin if loose. Replace piston pin if its center is worn in steps.
   (Replace needle bearing at the same time in this case.)

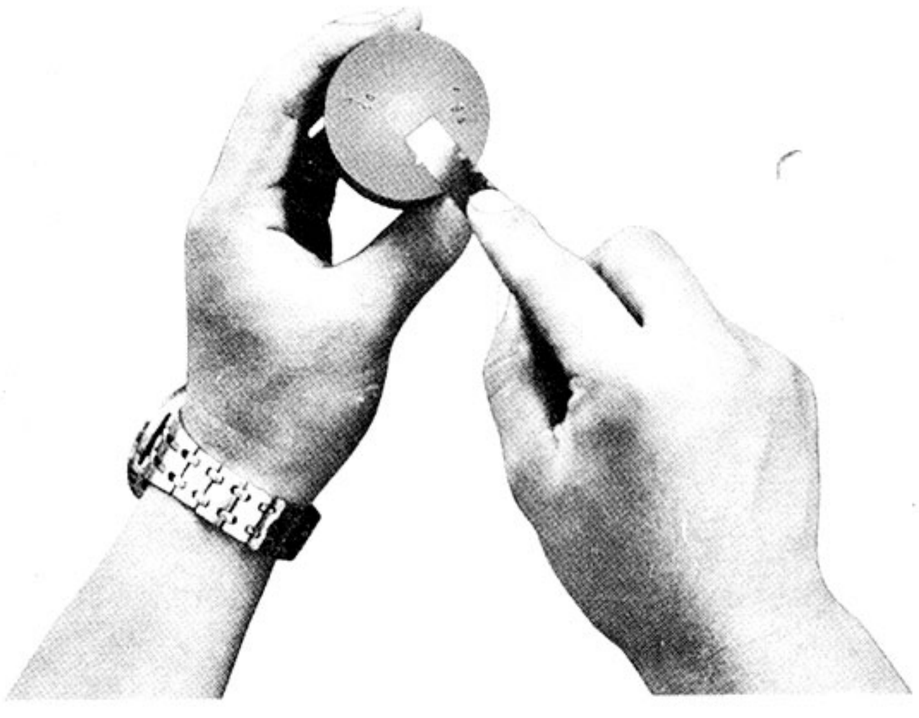


2. Measurement of piston clearance:
   Piston clearance means the difference between minimum cylinder bore and maximum piston outside diameter,
   This clearance should be between 0.035 and 0.040 mm as described in the section of cylinder. The maximum piston outside diameter is obtained at a location 10 mm above the bottom end of piston in the direction normal to skirt. Measure the dimension at this point by using a micrometer.

3. Inpsection for flaw

If the piston is once seized or if any flaw occurs in the piston, it will reduce the engine output and cause excessive noise and may damage the cylinder.

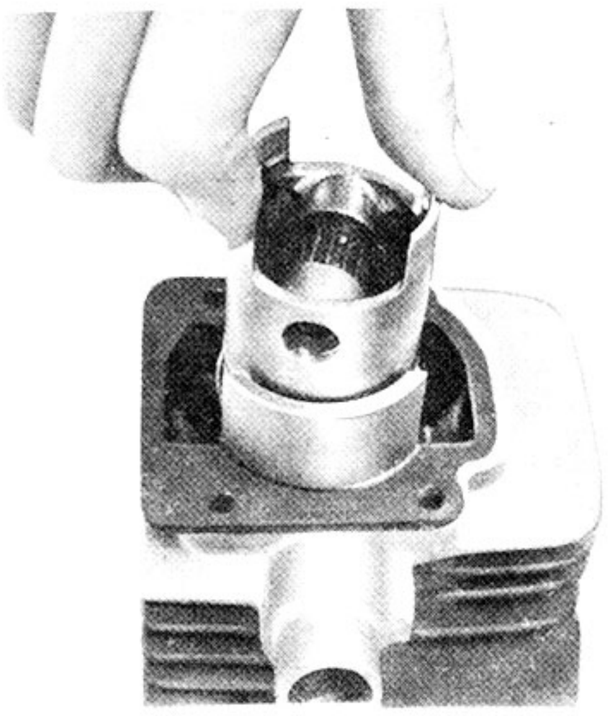
If a seized piston is used continually, it may seize often at the same place. If any flaw due to seizure or the like is located, correct with emery cloth of No. 400 or with oil stone until the flaw disappears.



4. Removal of carbon

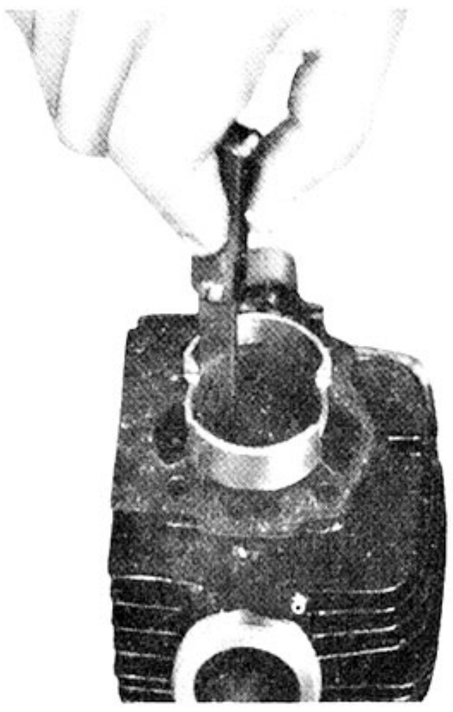
Carbon deposit will form on the piston heads. Remove this by using a screwdriver or saw blade.

Also remove carbon from the piston ring grooves, as piston rings may be stuck.



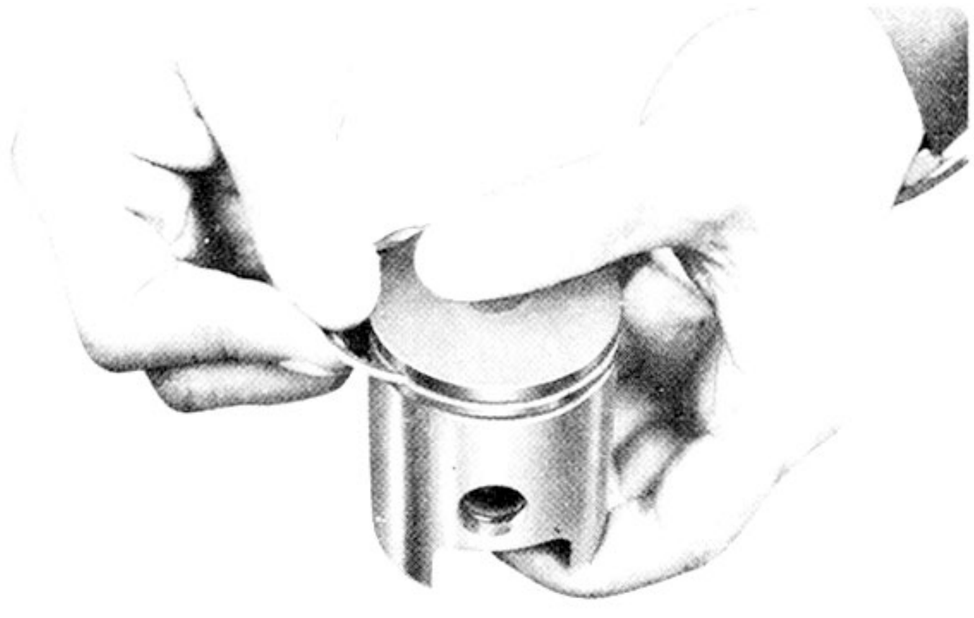
5. Measurement of wear of piston rings

(a) Fit piston rings into cylinder horizontally by using a piston.



(b) Measure the clearance of ring gap with thickness gauge.

The clearance should be between 0.10 and 0.30 mm for both 1st and 2nd rings.



(c) Removal of carbon

If carbon deposit is formed on piston rings and in ring grooves, rings are stuck and become inoperative as rings.

Remove rings from pistons and remove carbon on rings and in ring grooves.

(d) Piston ring to ring groove clearance a keystone ring is used as 1st ring and a plane ring is used as 2nd ring for LS2. Consequently, make this inspection only with 2nd ring.

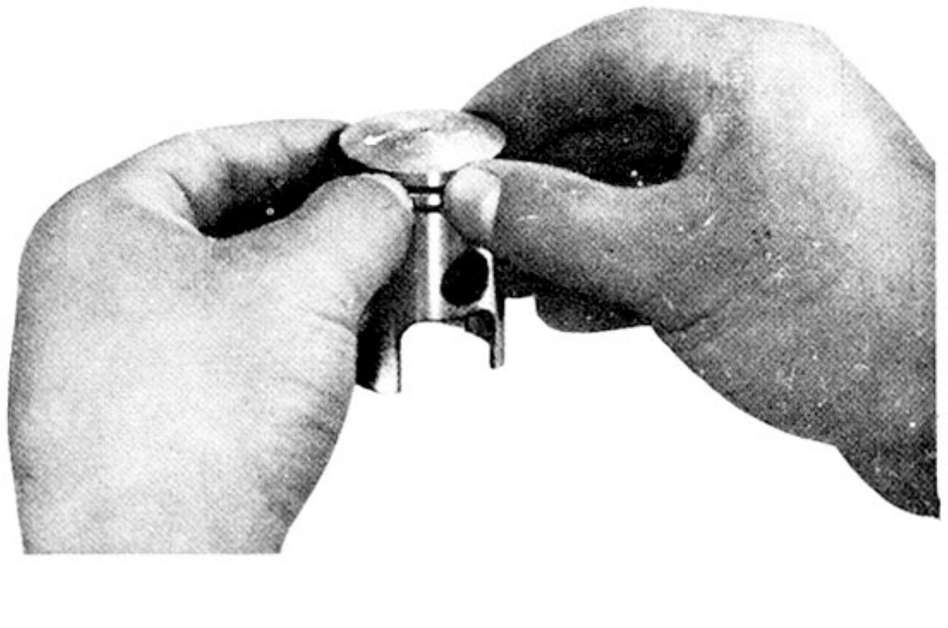
2nd ring to groove clearance

. . . . 0.03 - 0.07 mm

Reinstallation of Piston Rings

1. Because different rings are used for 1st ring and 2nd ring, the 1st and 2nd rings are not interchangeable.

   Make sure to install rings after checking the designation of each ring.

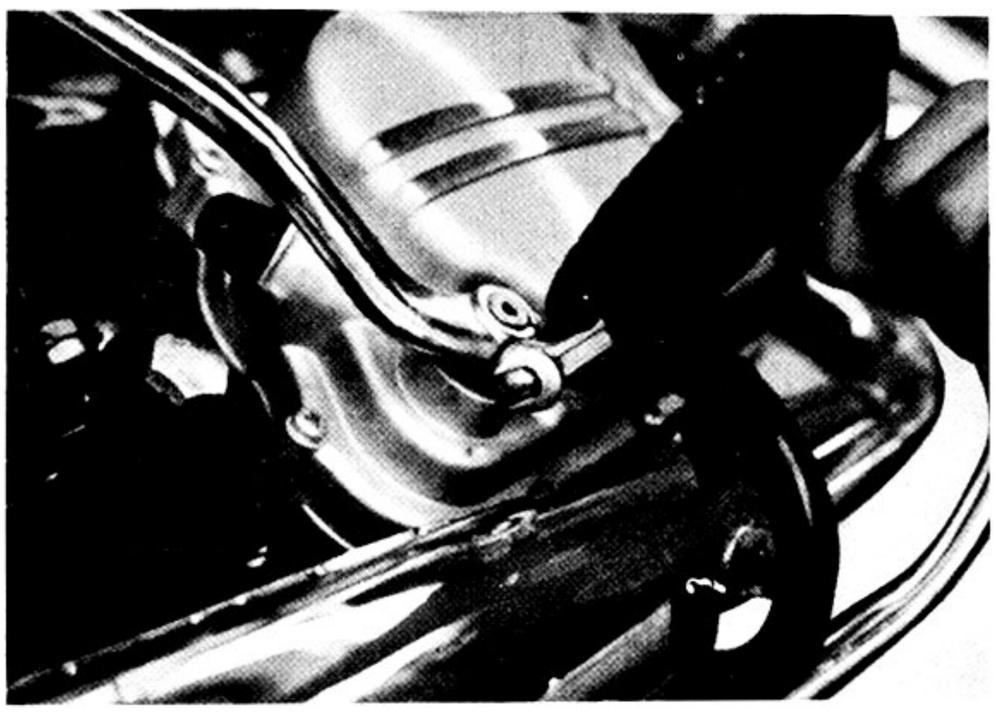


2. Installation shall be performed in the sequence opposite to disassembly.

Installation of Piston

1. Fit small end bearing in the small end of connecting rod and lubricate.
   Then install piston with the arrow mark on the piston head facing toward exhaust port..

Crankcase Cover (R)

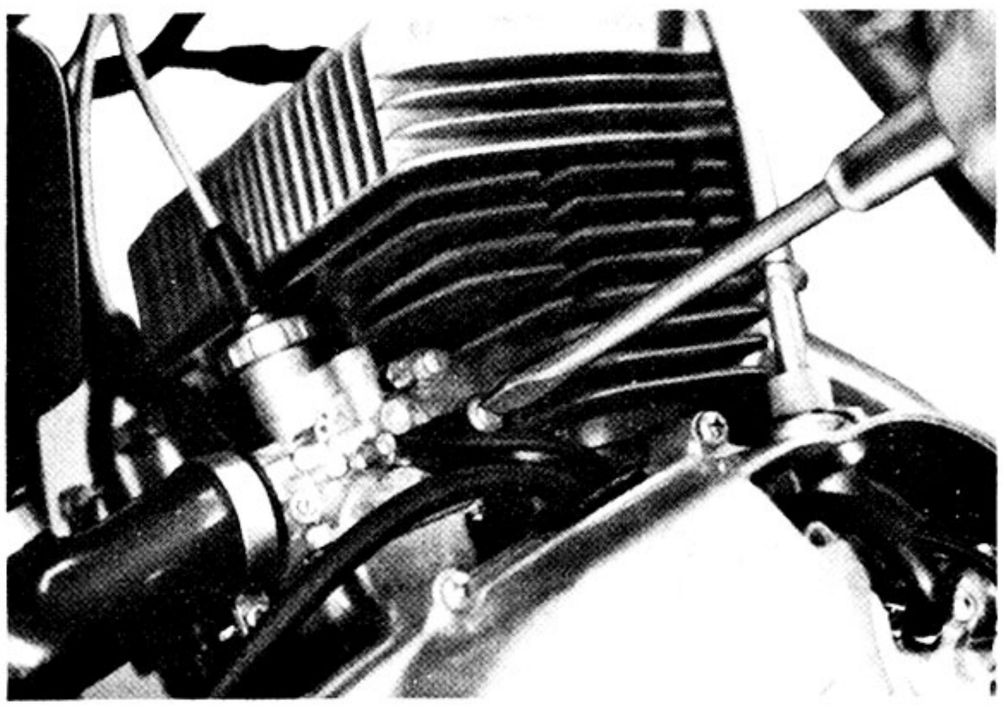


Removal

(1) Drain transmission oil.

(2) Remove foot rests

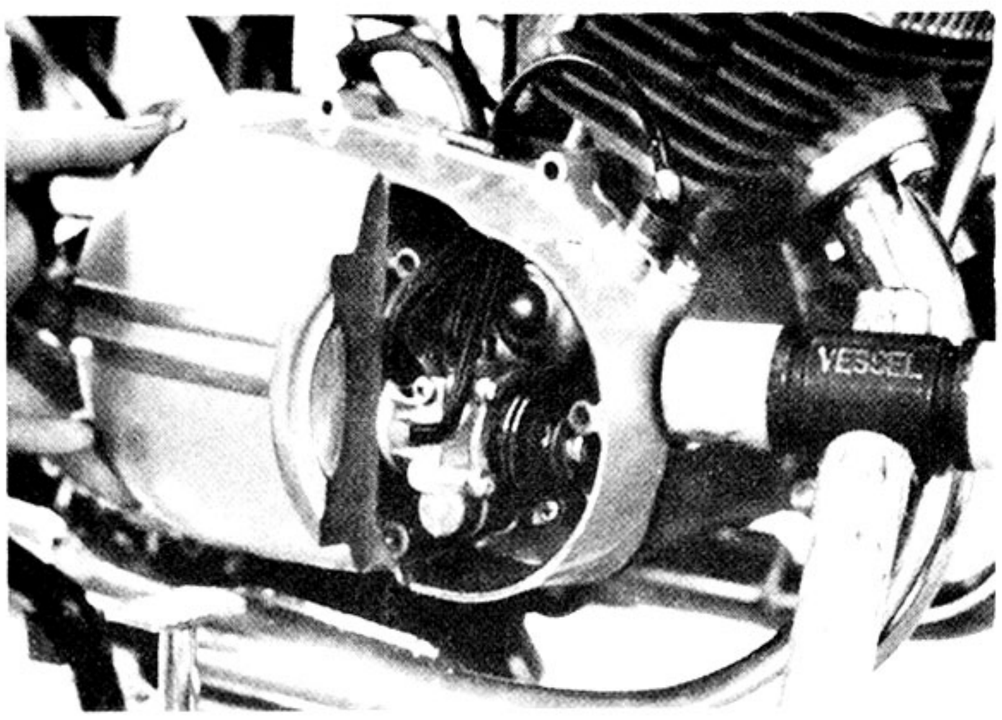
(3) Remove kick crank retaining bolts and remove kick crank.



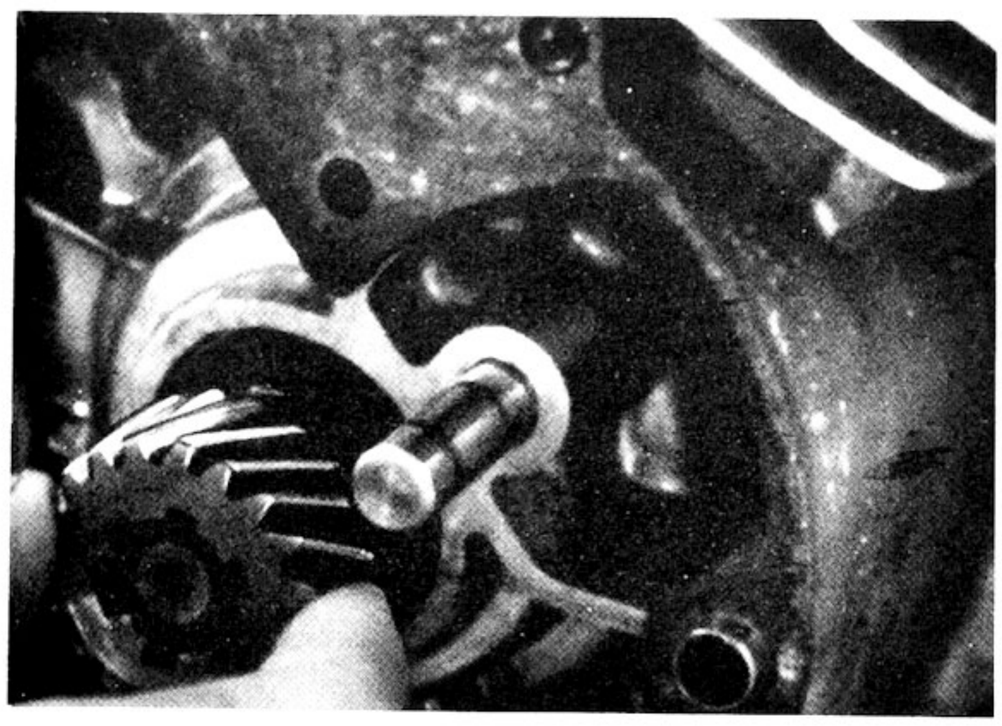
(4) Disconnect oil pipe at oil tank.

(5) Disconnect pump cable.

(6) Remove delivery pipe banjo bolt.

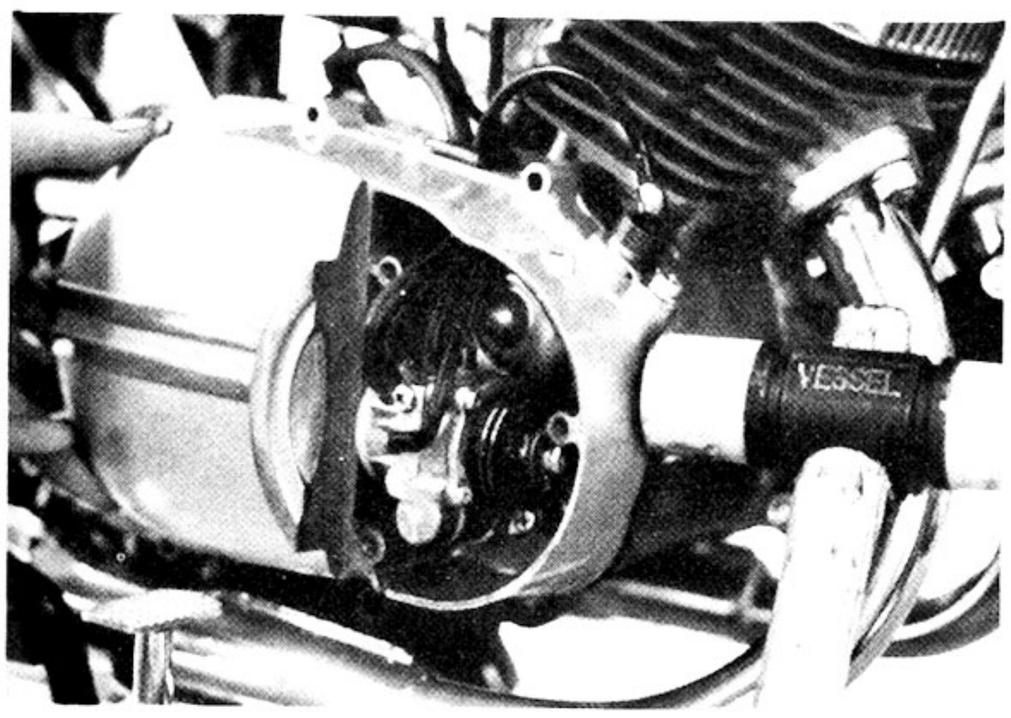


(7) Remove crankcase cover (R) retaining screws and then remove crankcase cover (R) while tapping it lightly with a soft hammer.



Installation

1. Uniformly apply Yamaha Bond No. 5 on the mating surface of crankcase (R).
   Fit case cover gasket and then install crankcase cover (R).

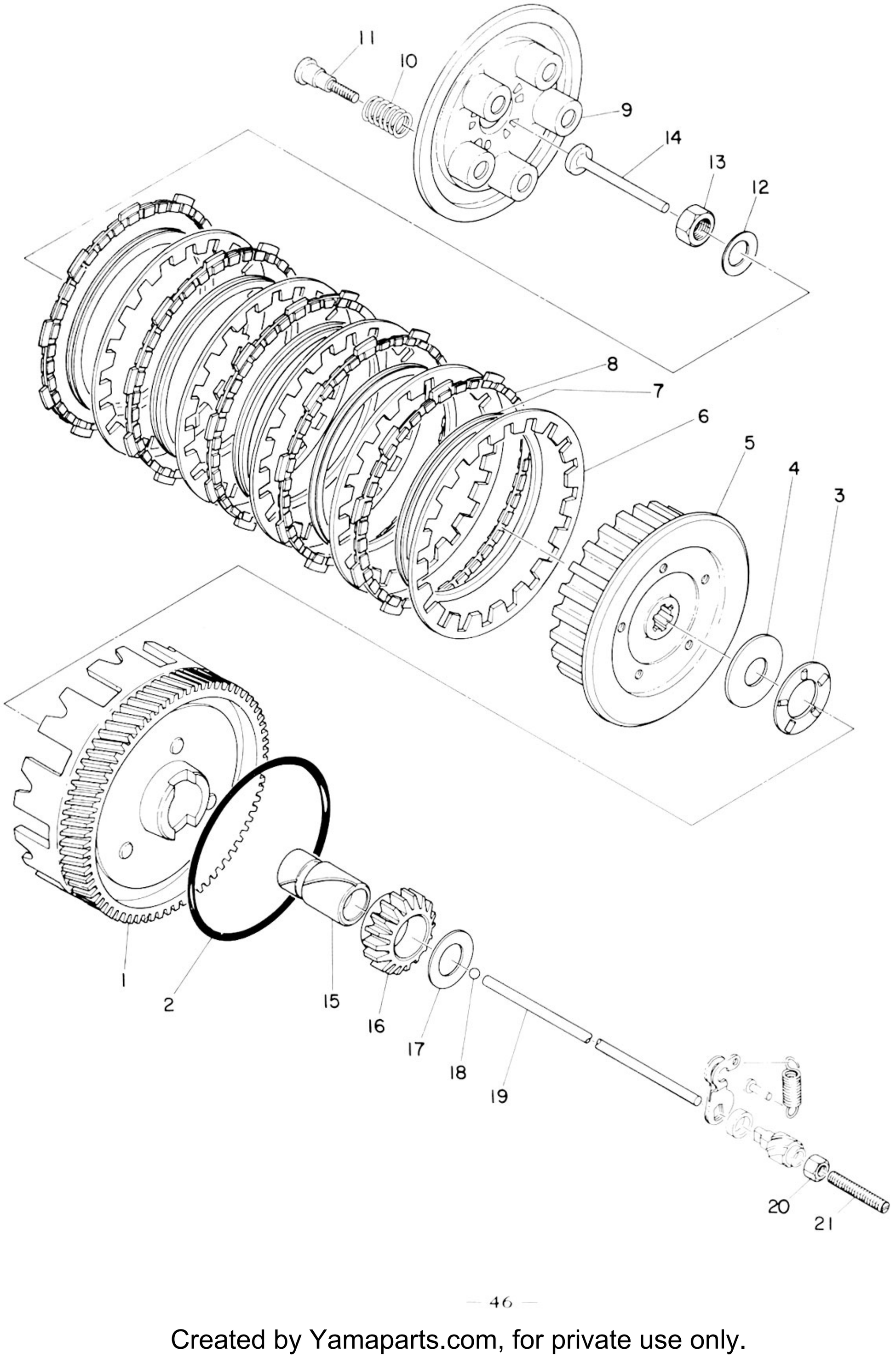


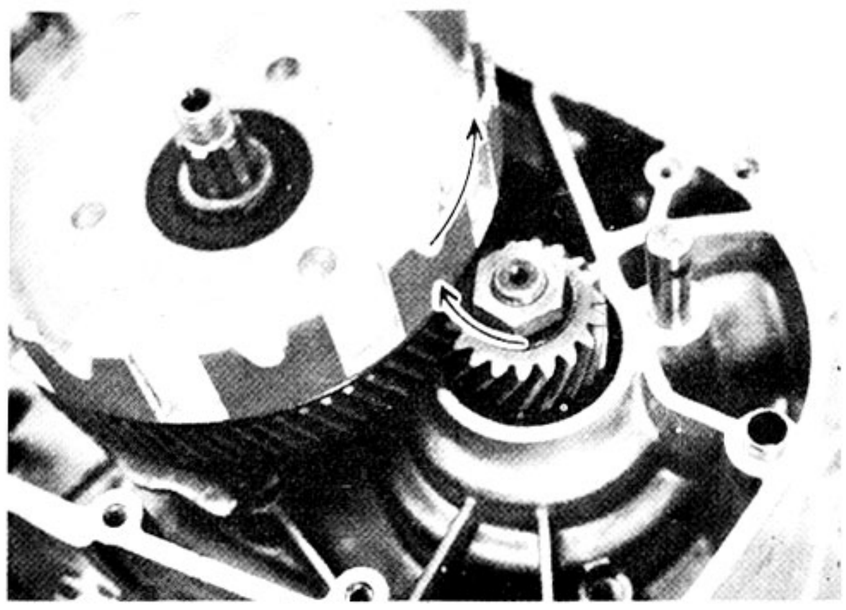
Note: Make sure to apply Yamaha Bond No. 5, otherwise oil leakage may result.
The pump drive gear installed in crankcase cover (R) may not be well engaged with primary drive gear. In such a case, temporarily install kick crank and slightly rotate the crankshaft to completely engage these gears.

Clutch

The clutch is of multi disc wet type comprising five friction plates and five clutch plates and is installed on the main axle.

The clutch housing is of unit construction with the reduction gear of primary drive, and the reduction gear is engaged with reduction pinion. Consequently, primary drive is of gear drive type. The primary reduction ratio is 74/19 = 3.894, as the primary drive gear is of 19 teeth and primary driven gear is of 74 teeth.

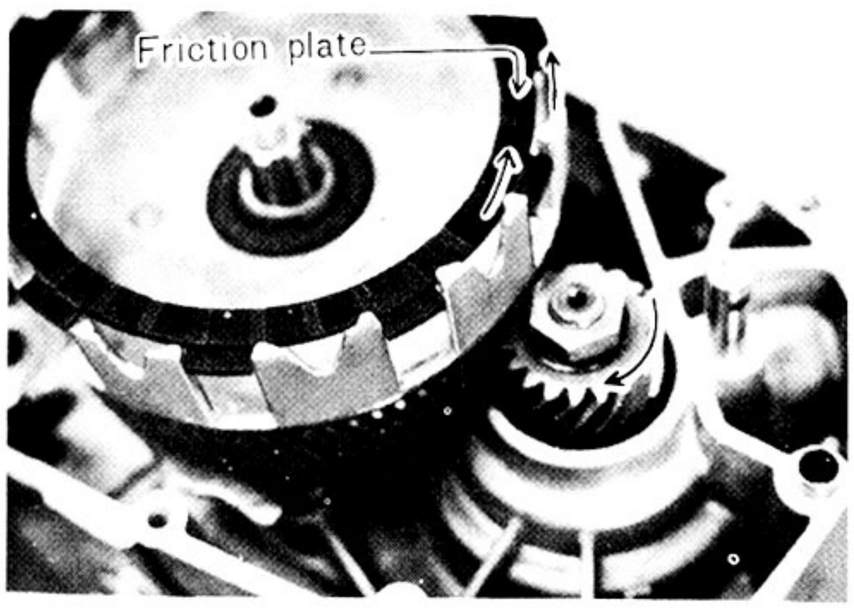




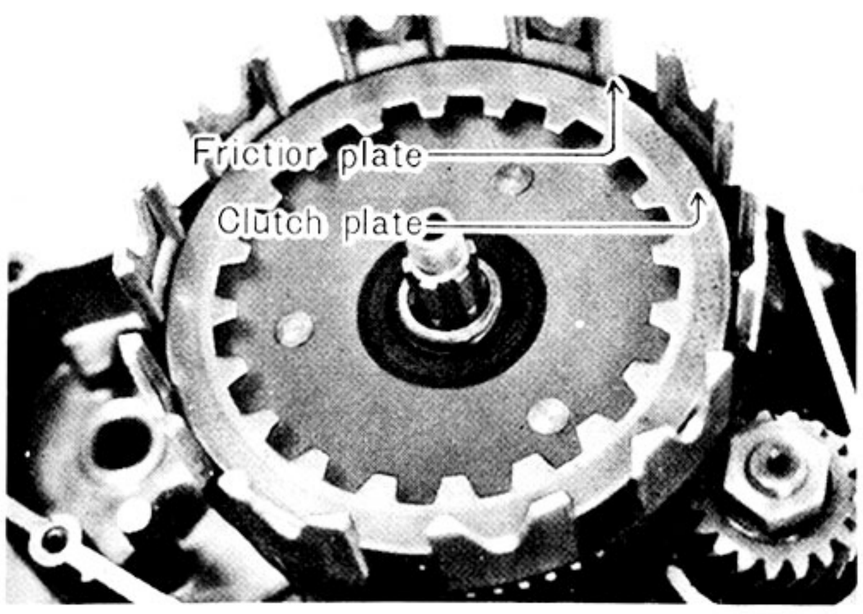
Power Train

(1) Primary drive gear

Transmission by engagement of gears

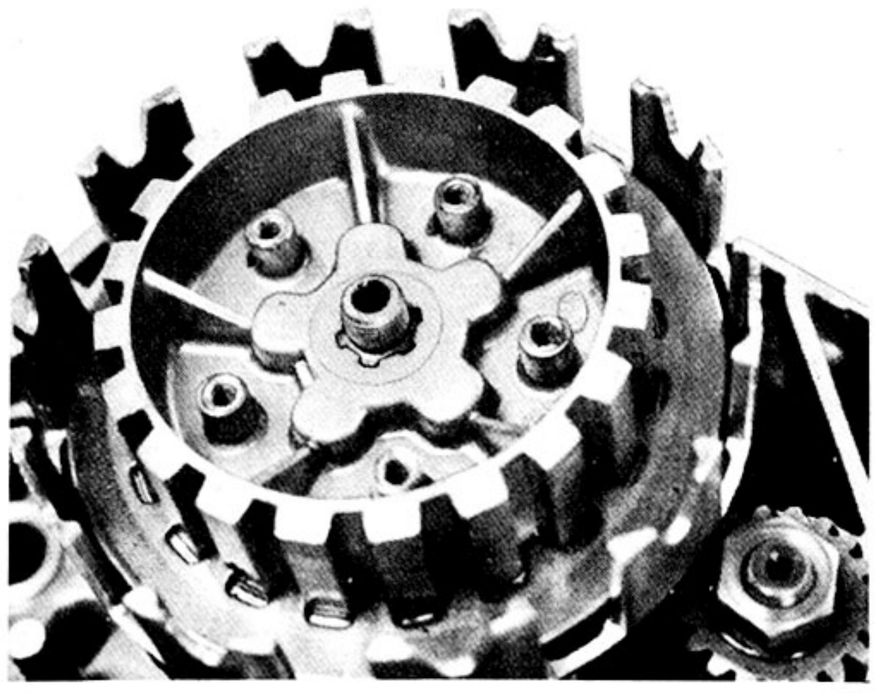


(2) Primary driven gear



(3) Friction plates

Friction force by clutch spring



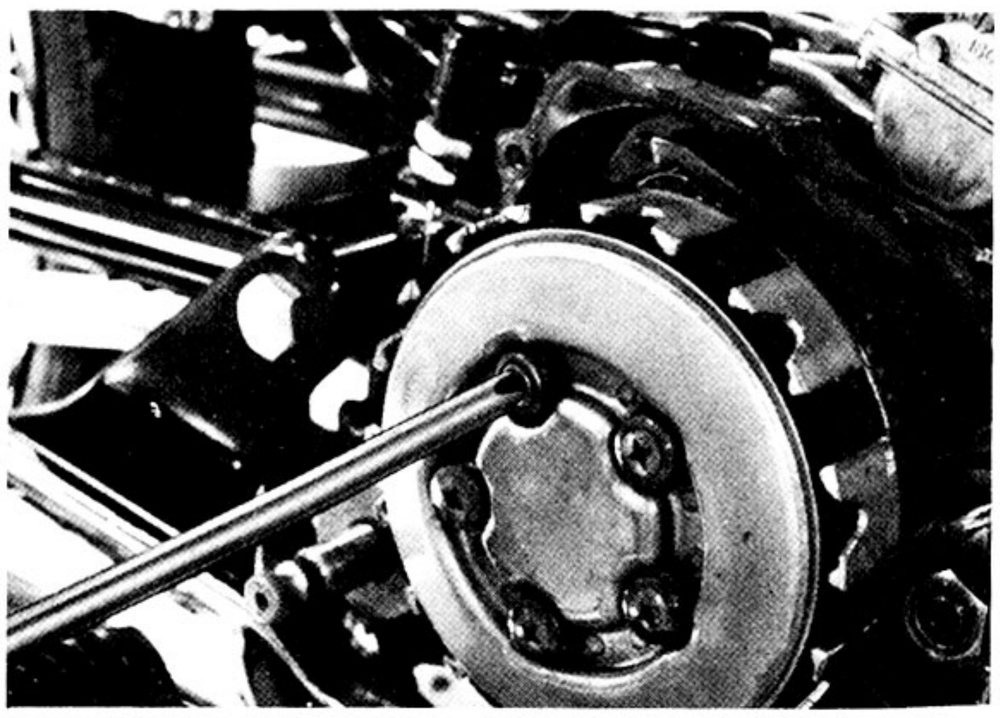
(4) Clutch plates

Fitting through splines

Clutch boss

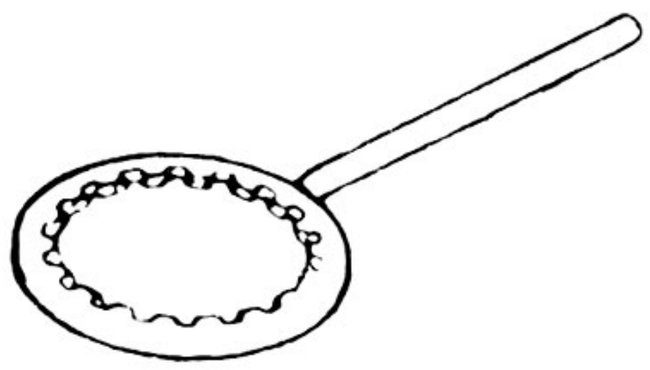
Fitting through splines

Main axle

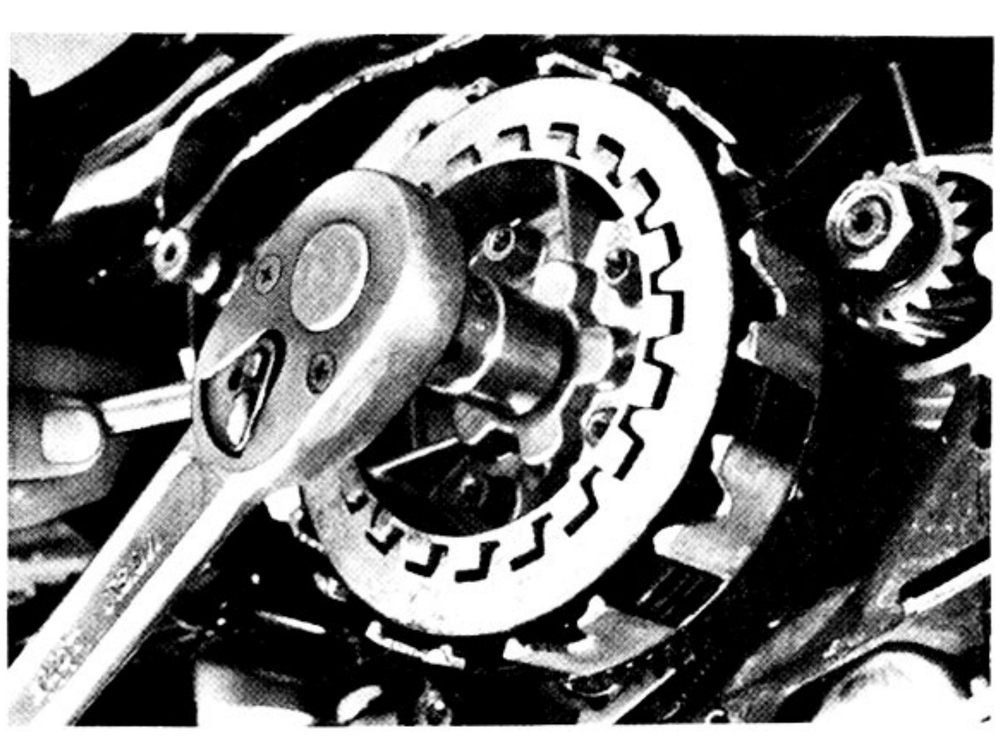


Disassembly

1. Remove crank case cover (R).
2. Remove clutch spring.



3. Prepare a clutch holding tool.

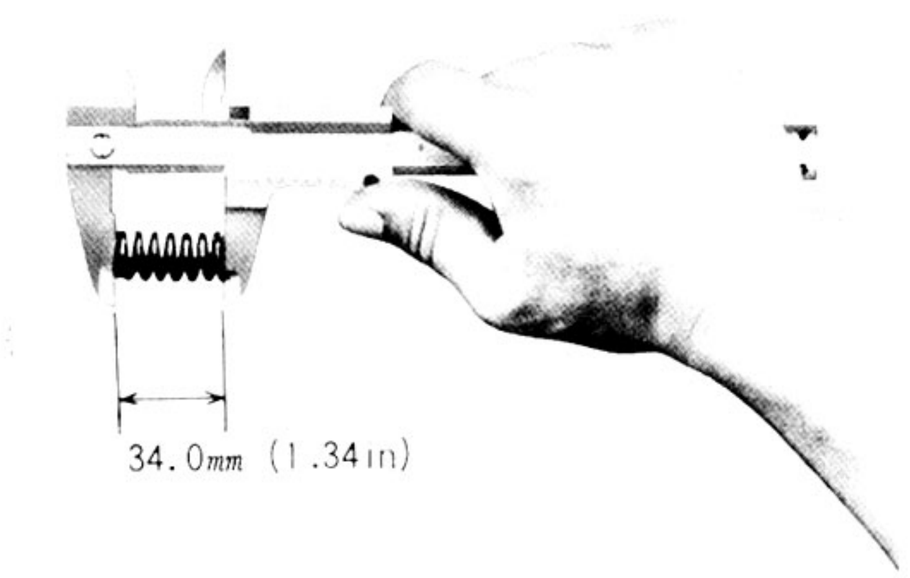


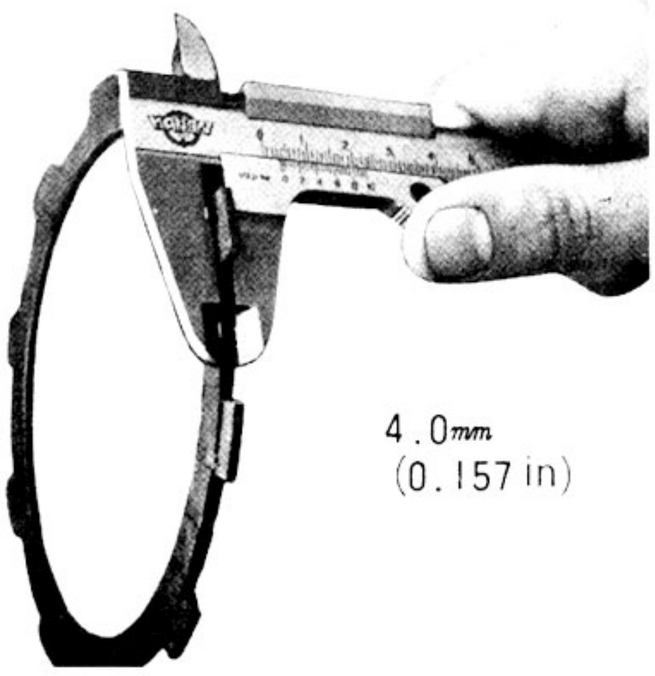
4. Remove one clutch plate and remove nut with clutch holding tool.

Inspection

1. Inspection of clutch spring

Check the free length of clutch spring and replace with a new one if free length if less than the standard by 1.0 mm or more.

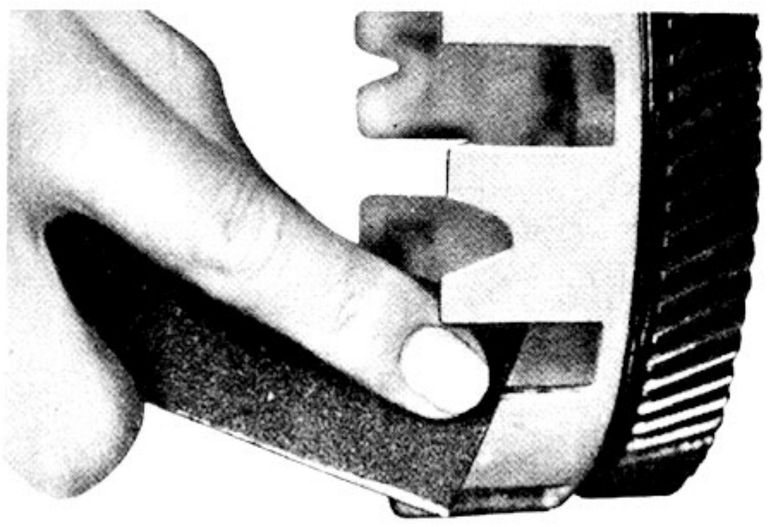




2. Inspection of friction plates

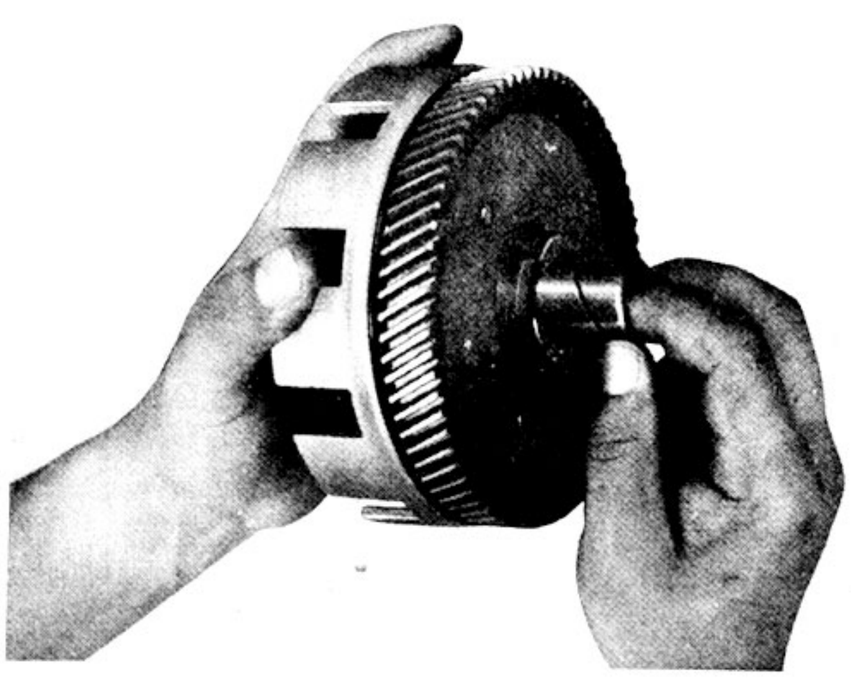
Friction plates are consumable parts.

Replace with new ones if worn by 0.3 mm or more or if face bearing is uneven.



3. Disengagement of clutch becomes poor when steps are formed in the grooves of clutch housing.

Correct the condition with emery cloth if such condition is recognized.

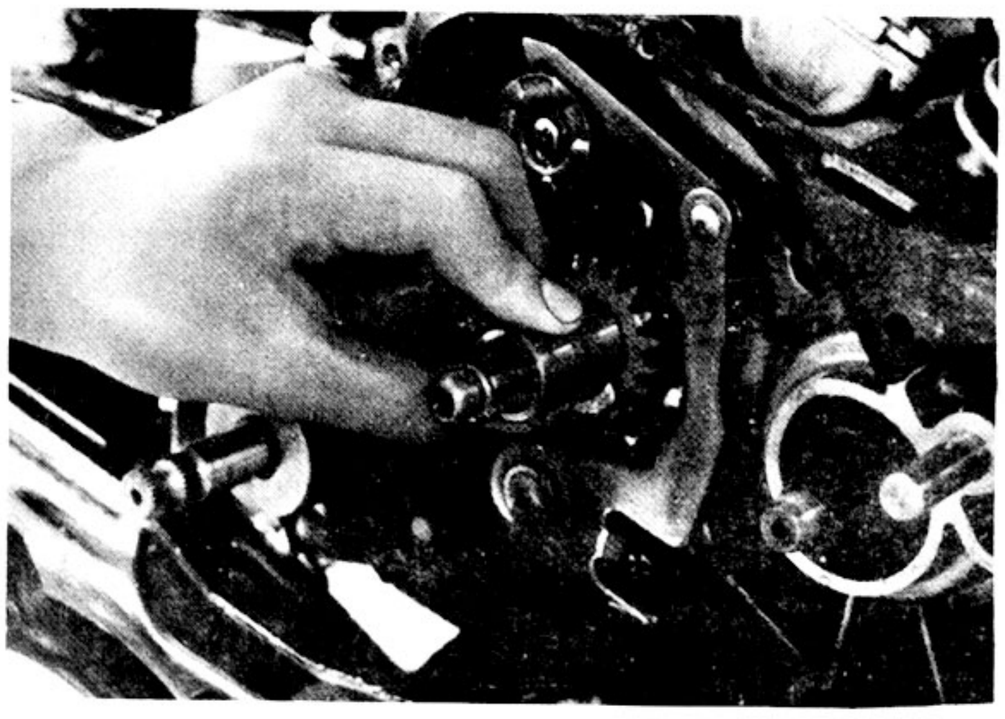


4. Inspection of clutch housing and spacer

Insert spacer into the boss bore of primary driven gear to check for looseness and damage.

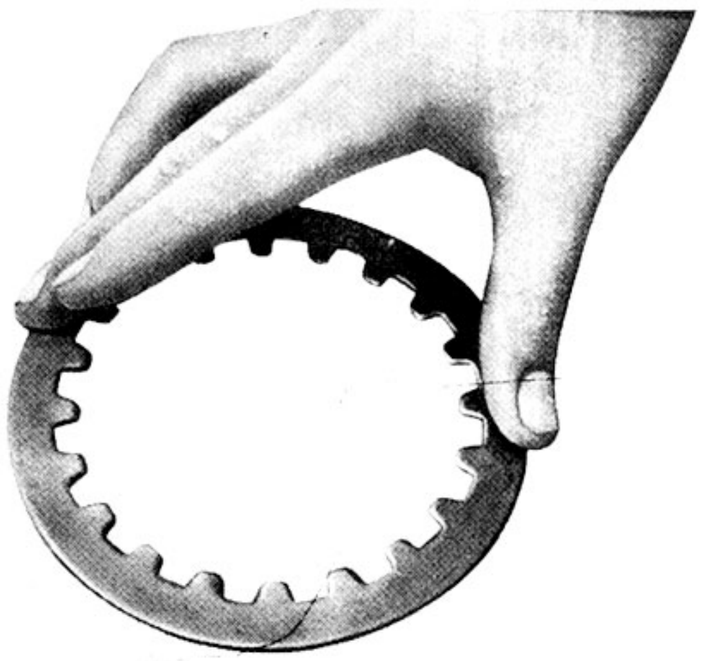
Disengagement of clutch becomes poor if damaged. Correct the condition with oil stone or fine emery cloth.

Noise is generated if loose. Replace spacer.



5. Inspection of spacer and main axle

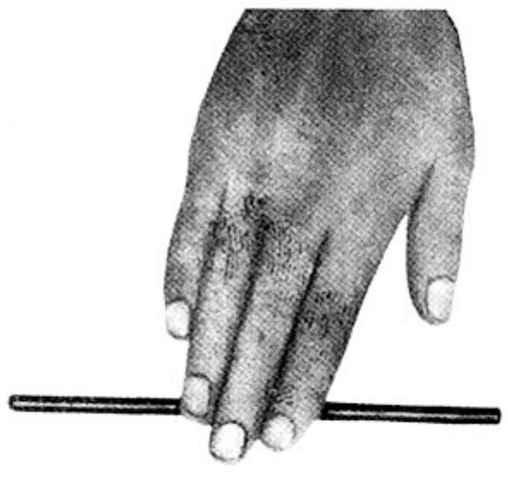
Insert spacer into main axle and check for looseness. Replace spacer if loose. Replace spacer if stepped wear is recongnized on the external periphery.



6. Inspection for deflection of clutch plates

   Apply red lead on a stool and check clutch plates for deflection.

   Replace clutch plates if deflection is located.



7. Inspection of push rod

   Pull out push rod from L.H. side of engine and check for bend by rolling on a stool.

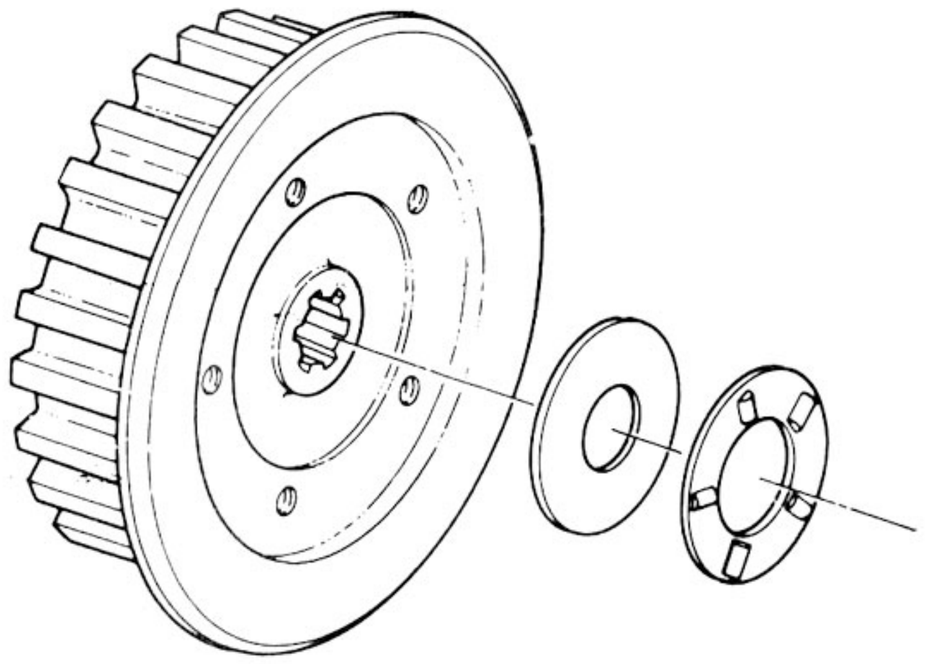
   Correct or replace if bent,

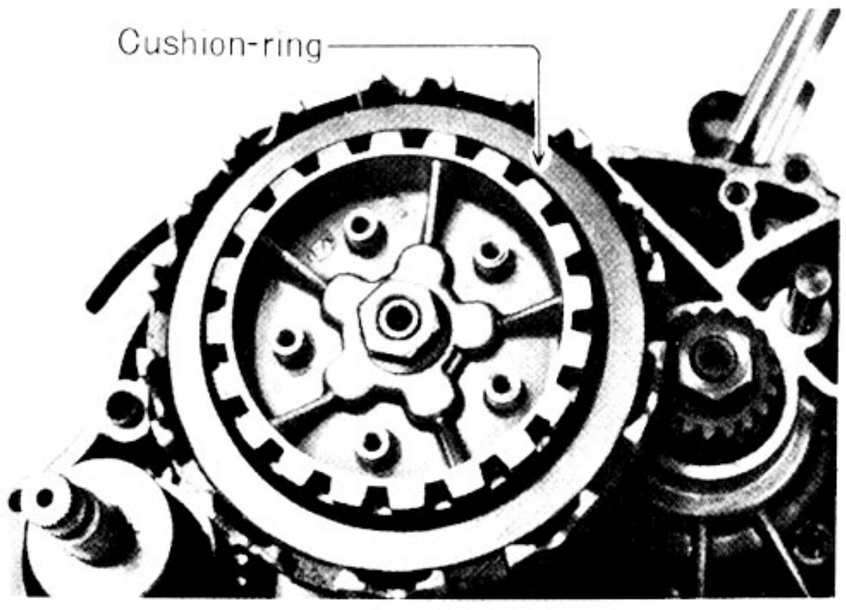
Installation

Reinstall clutch in the sequence opposite to that of disassembly, exercising care on the following points.

* Washers and thrust bearings are installed at both ends of the spacer. If these washers and thrust bearings are misfitted or omitted, the clutch boss may directly contact the end face of primary driven gear, and may result in such a trouble wherein clutch cannot be disengaged. Make sure to install washers and thrust bearings at correct locations.
* Thrust bearings are fitted on the external periphery of the spacer. If the work is carelessly performed when installing the clutch boss, the thrust bearings may move off the spacer.

  The work will be facilitated if clutch boss is installed with both faces of thrust bearing coated with grease.





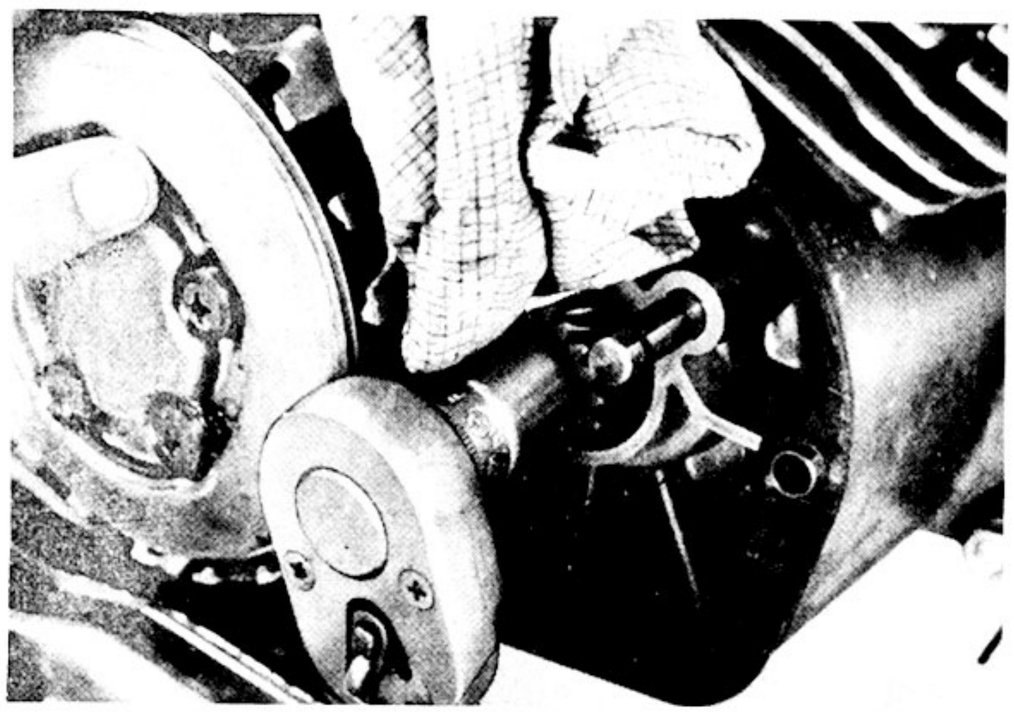
1. Installation of cushion ring

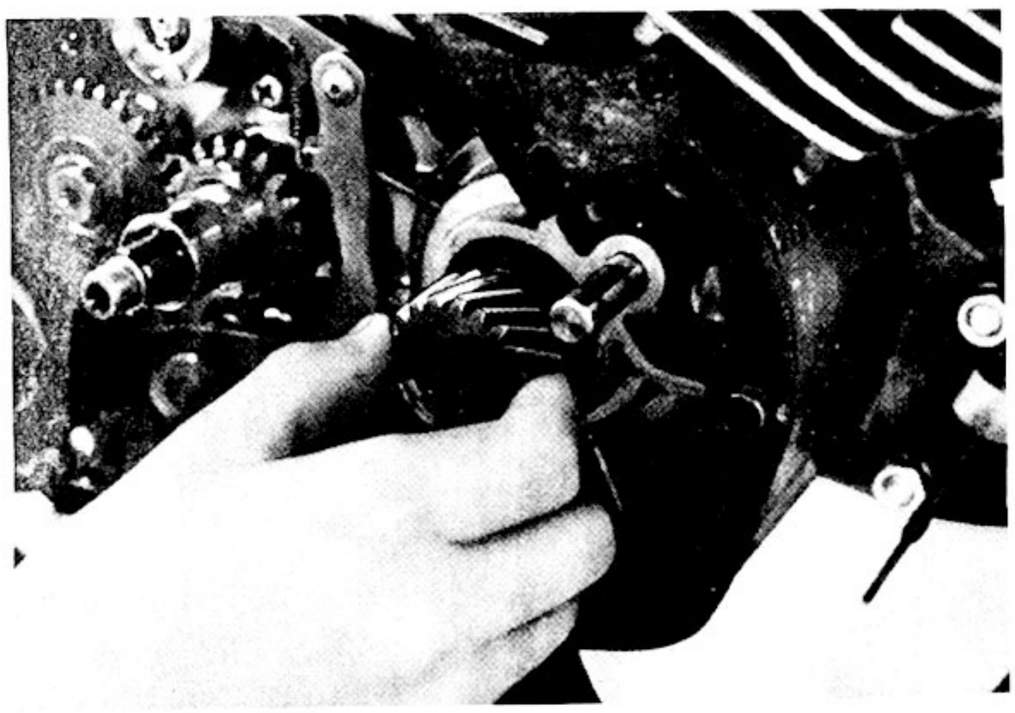
   The cushion ring is fitted between clutch boss and friction plate and functions to secure disengagement of clutch.

   Therefore, the cushion ring should be properly installed and it should not be twisted.

See the section of clutch in the description of periodic inspection for adjustment of clutch.

Primary Drive Gear



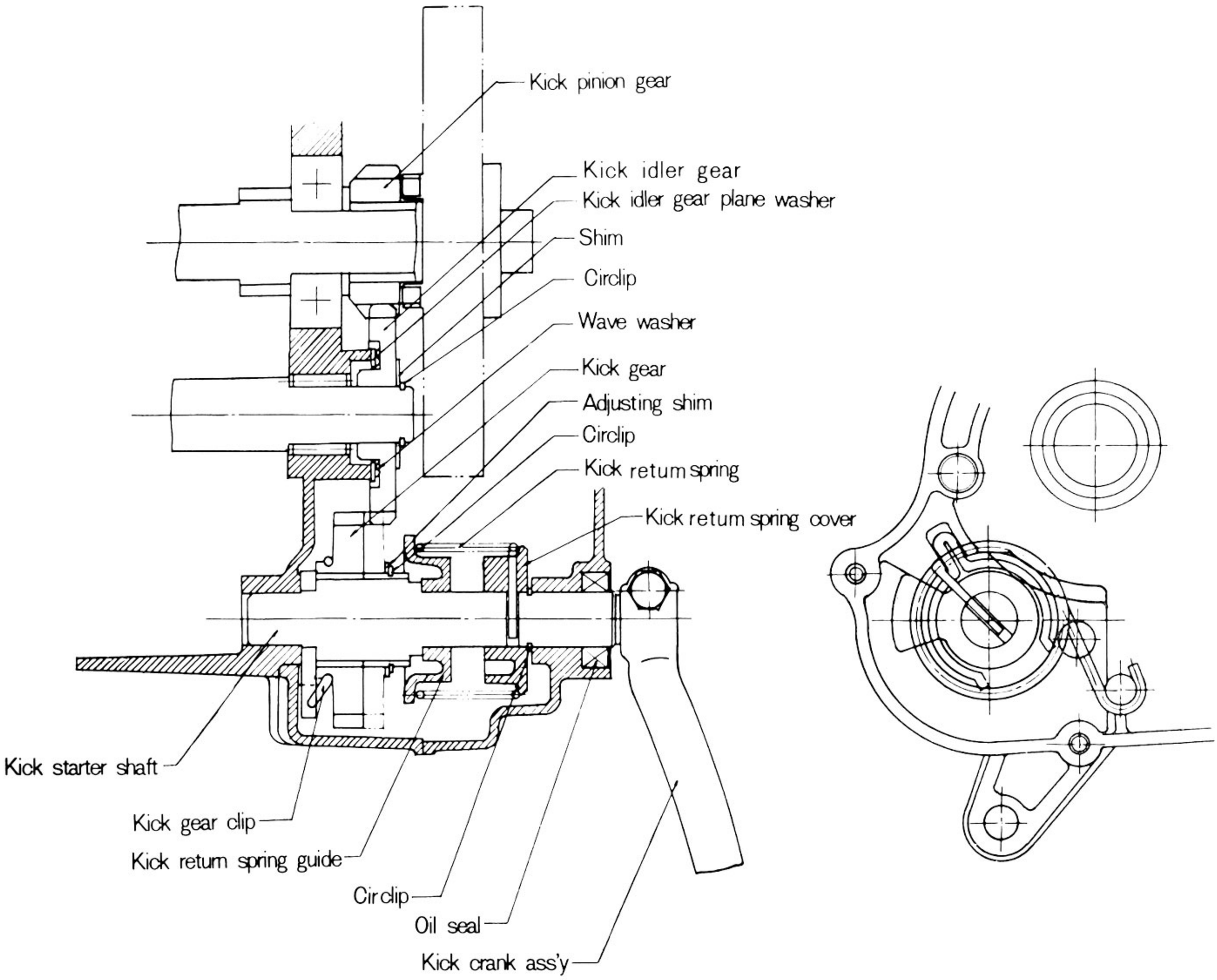


Removal

1. Remove crankcase cover (R).
2. Loosen lock nuts of primary drive gear with rag placed between gear teeth so that the gear does not rotate.
3. Pull out distance collar with the finger tips or with pliers.

   Apply sufficient amount of grease on the lip groove of oil seal fitted on the external periphery of distance collar when installing. Insert the collar from the end which has larger chamfer, otherwise the oil seal lips will be damaged.

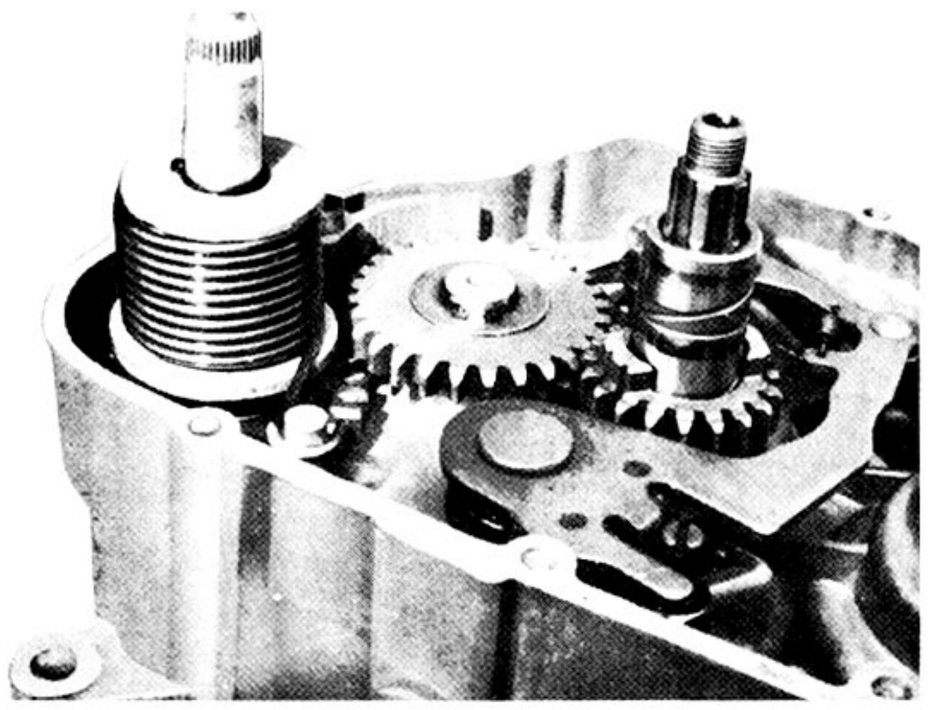
Kick Starter Mechanism

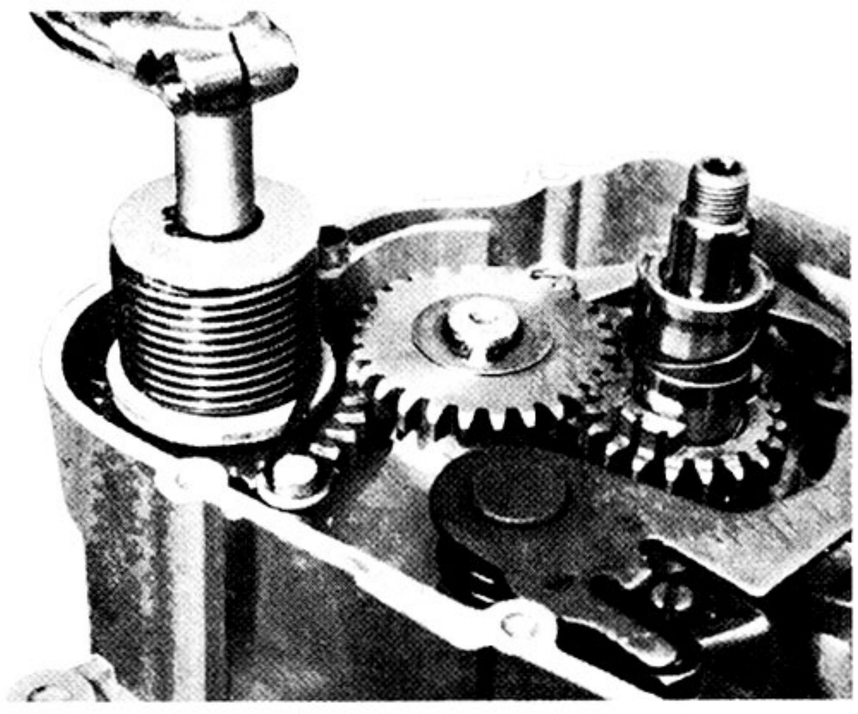


Mechanism

The primary kick-starter system (one-touch kick-starter) is employed. However, a new "bon-constant-mesh" mechanism has been introduced into the HS1 kick-starter, instead of the constant-mesh kick gear type, such as the ratchet and roller-lock systems.

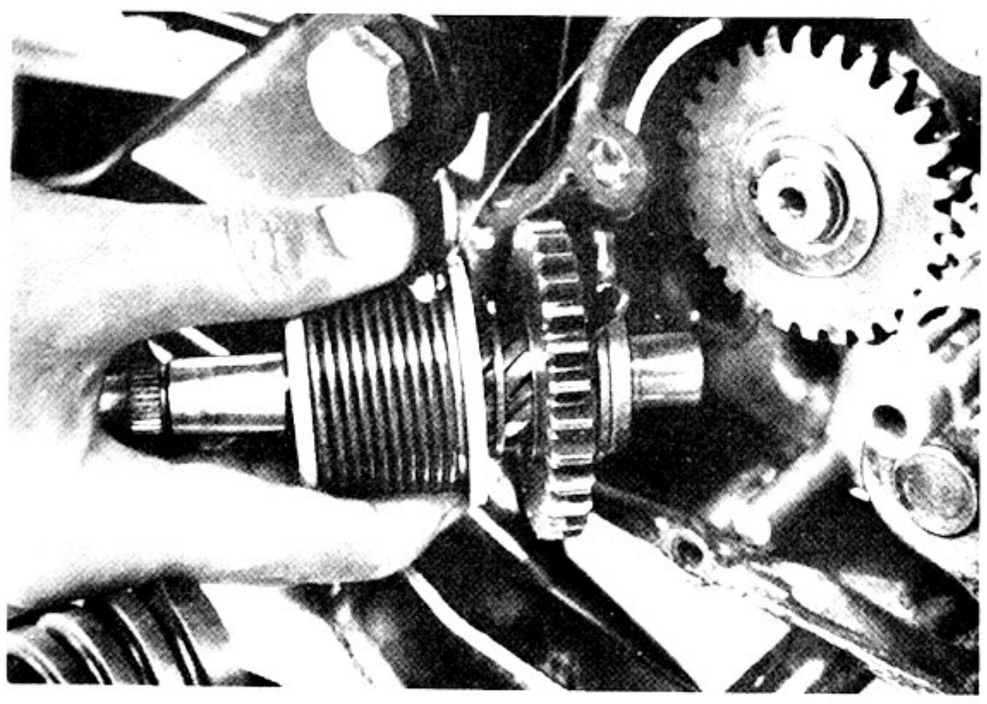
That is, the kick gear meshes with hte idler gear only when the kick-starter pedal is kicked. After the engine is started, the kick gear is disengaged from the idler gear. This mechanism not only eliminates noise resulting from the constant mesh of the kick gear with the idler gear, but also greatly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





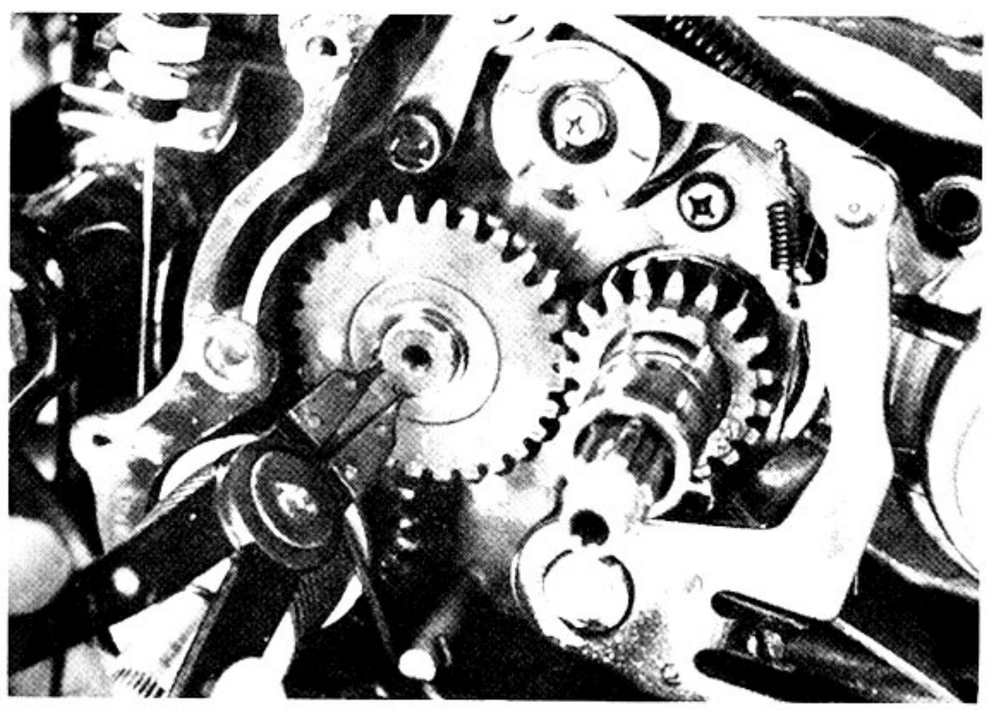
As the kick starter axle is turned, the kick gear splined to the kick axle, having apiral splines on its surface, is slid upward along the axle. (In this case, the kick gear moves only axially without rotating because of the kick gear clip fitted in the kick gear.) When the kick gear moves upward, teeth of the kick gear may clash against teeth of the idler gear. (Although there will be possibility of smooth meshing without clashing.) The kick gear clip is designed to absorb the impact of clashing, and at the same time cause the kick gear to rotate so that the kick gear will smoothly come into mesh with the idler gear.

After the kick gear has meshed with the idler gear, the kick gear is further slid upward without rotating. At the instant that the back of the kick gear contacts the circlip, the thrust load is imposed on the kick gear, thereby giving it turning force and rotating the crankshaft to start the engine.

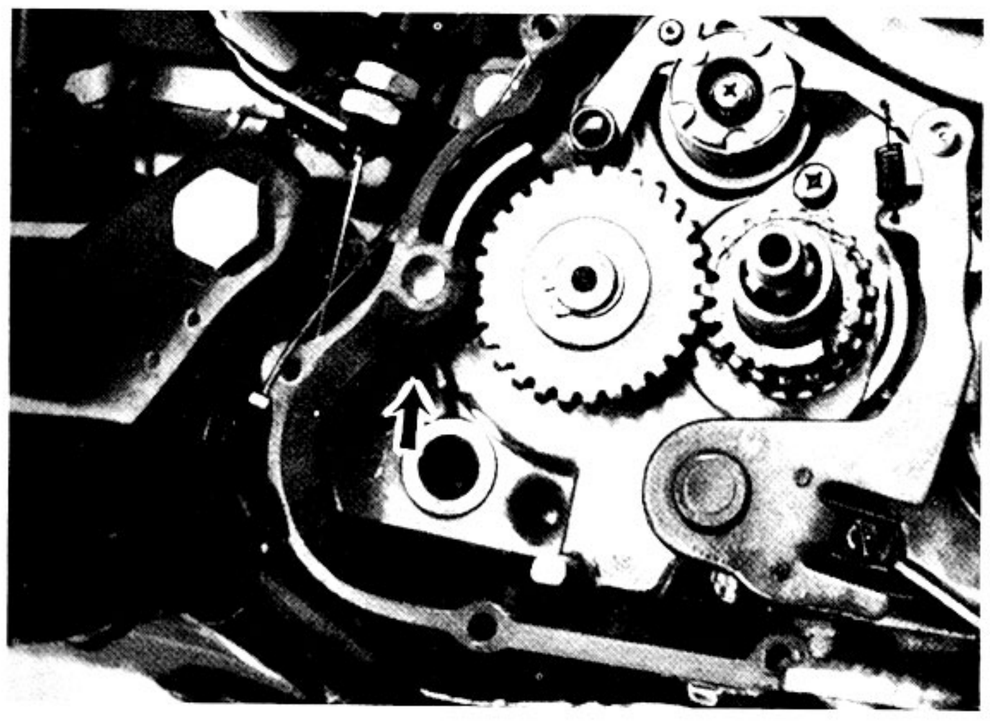


Removal

1. Remove crankcase cover (R)
2. Remove kick crank ass'y.

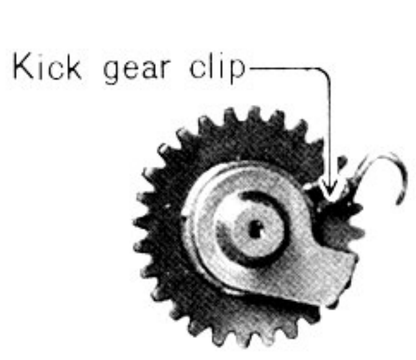


3. Remove kick idle gear.

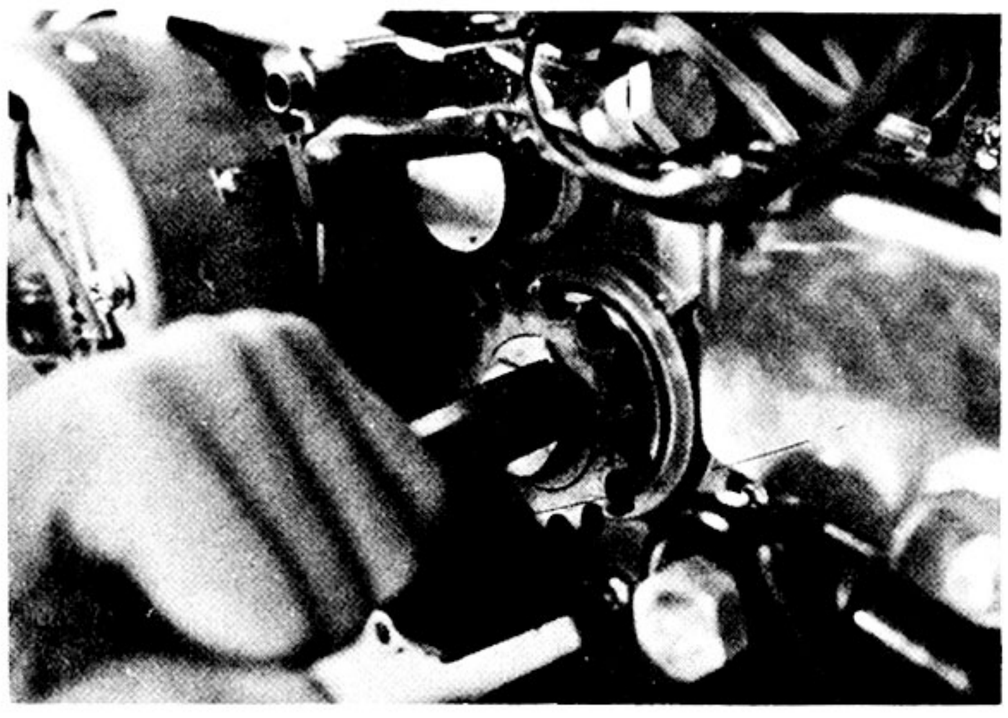


Installation

1. Set the kick gear clip to hole of crankcase (R)



Drive Sprocket



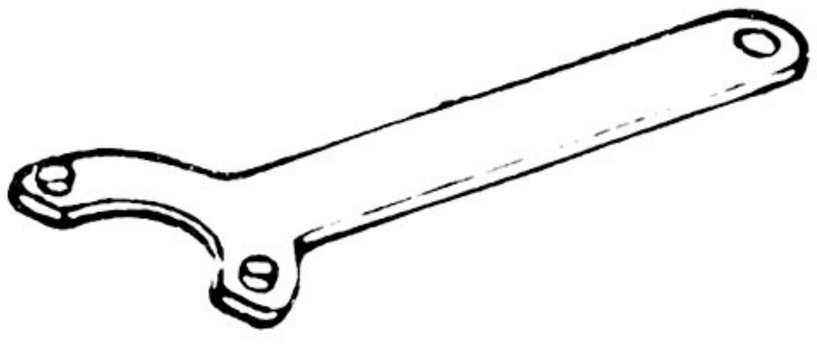
Removal

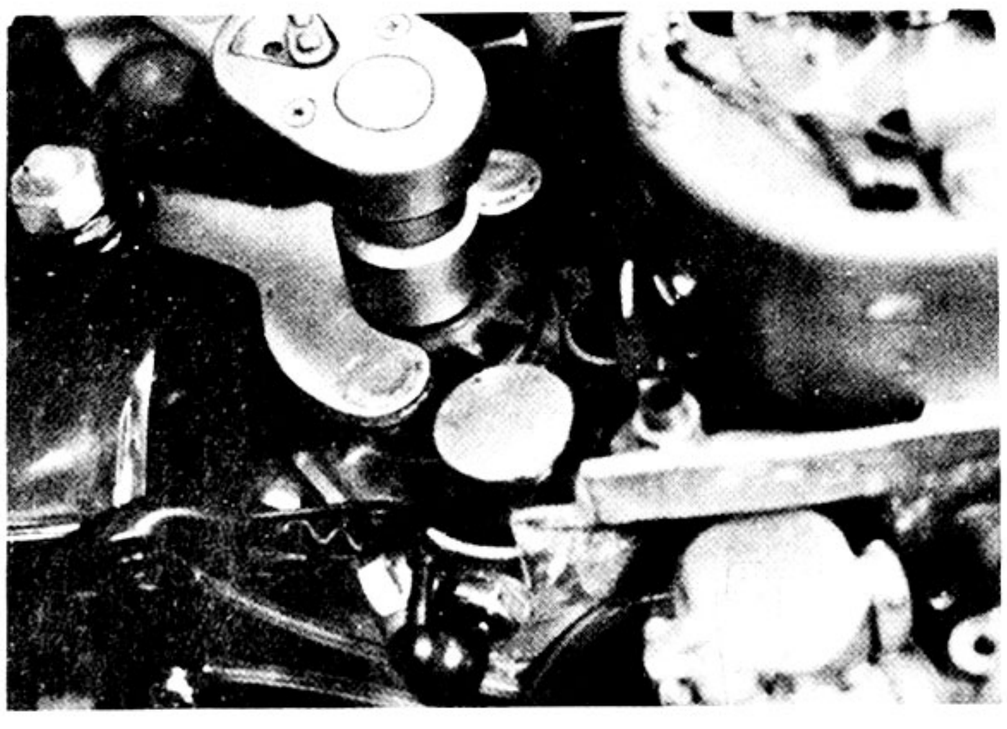
(1) Remove crankcase cover (L).

(2) Extend lock washers by using a chisel or a screwdriver.

(3) Remove driving chain.

(4) Prepare flywheel magneto holder.

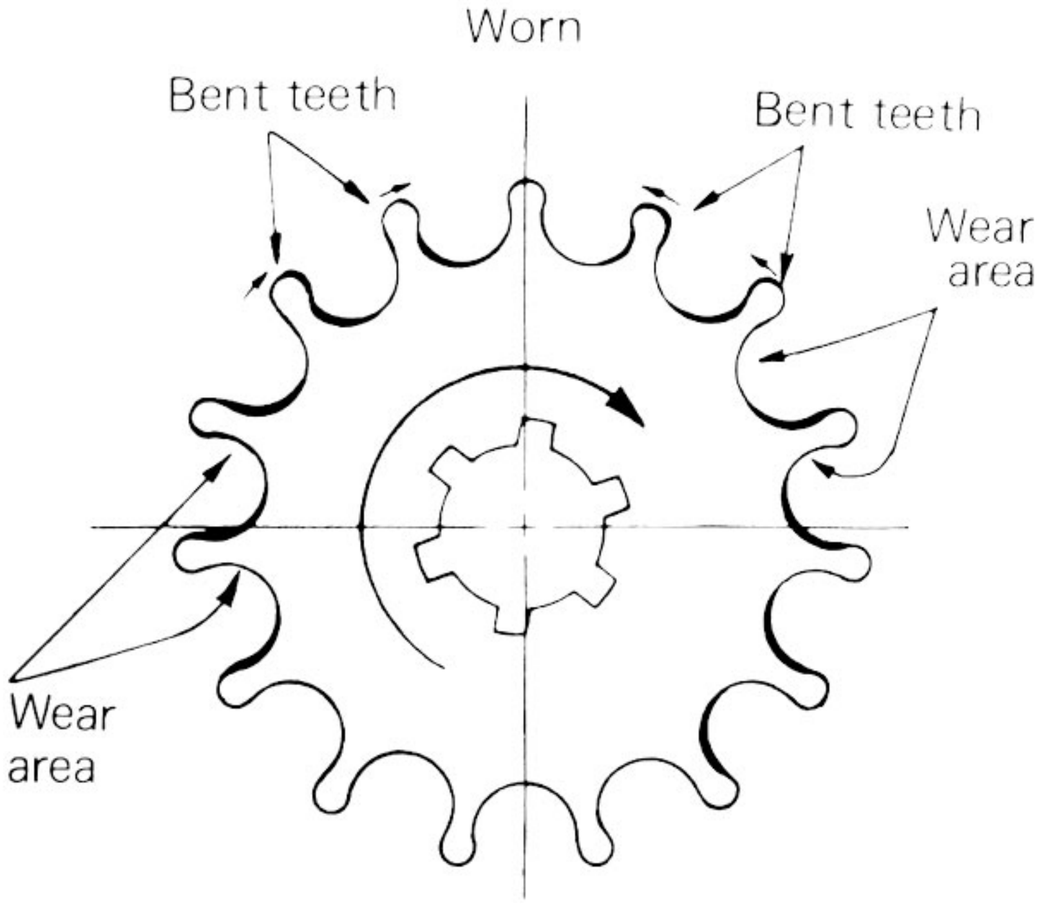


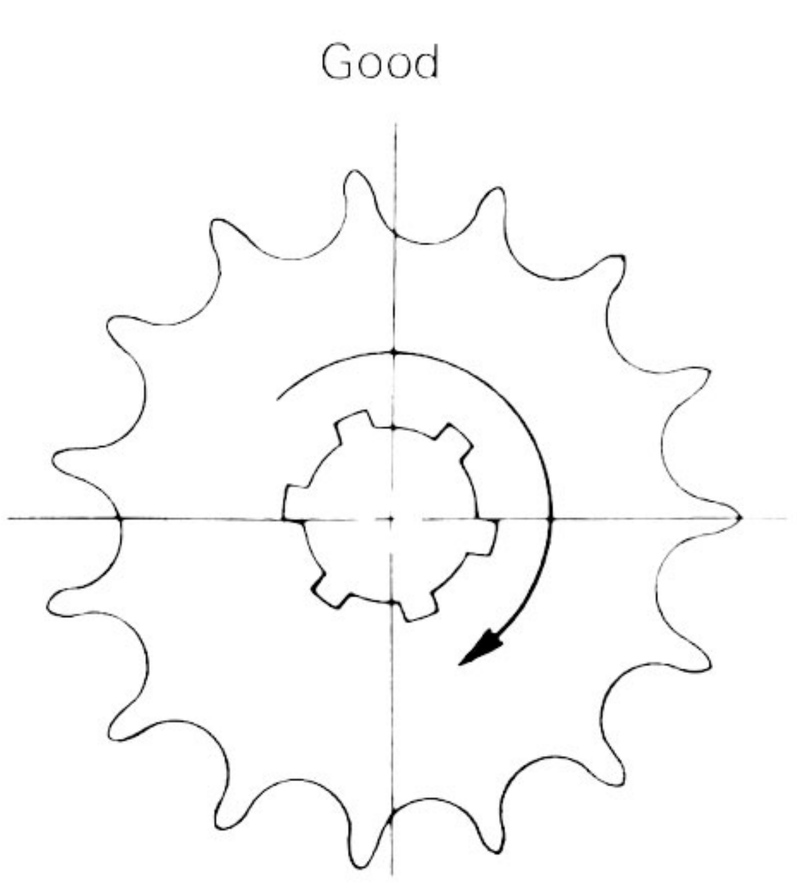


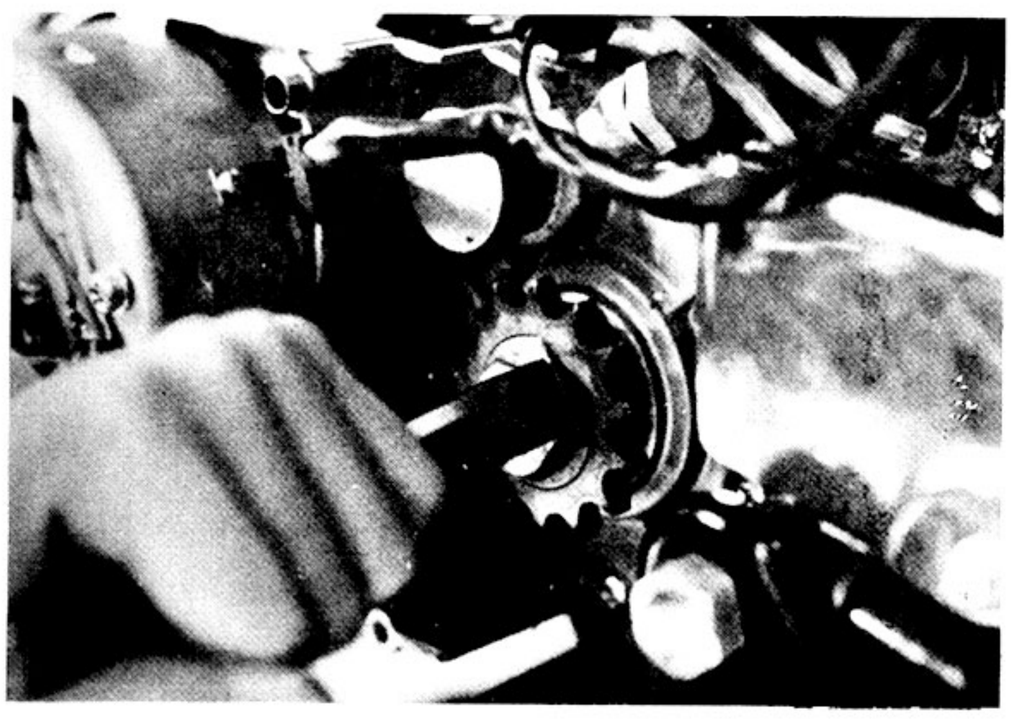
(5) Loosen nuts by holding the drive sprocket against movement by using a flywheel magnet holder.

Inspection of drive sprocket

1. If drive sprocket is worn, abnormal noise will be produced and service life of chain will be extremely shortened.
   Check the tooth shape and replace the sprocket if worn.



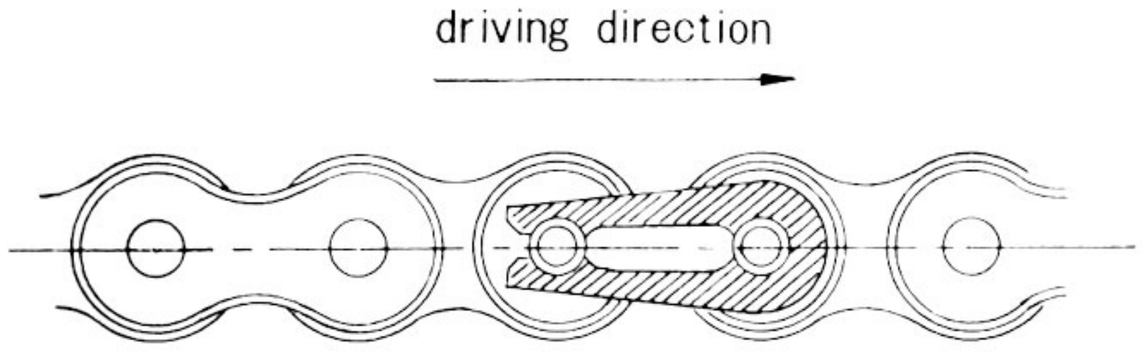




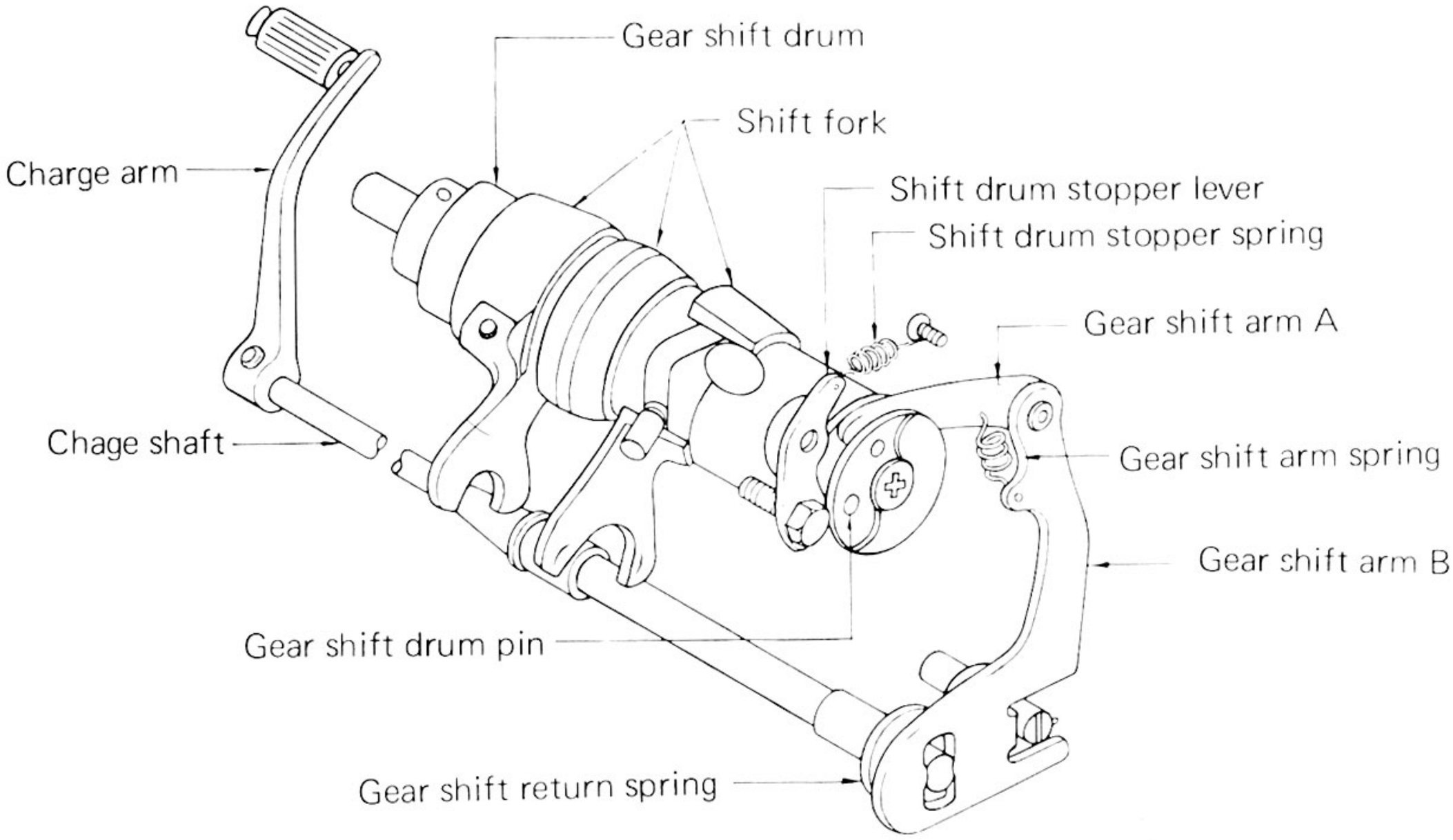
Installation

(1) Make sure to bend lock washers securely after installation.

(2) The chain clip should be installed in proper direction.



Shifting Mechanism

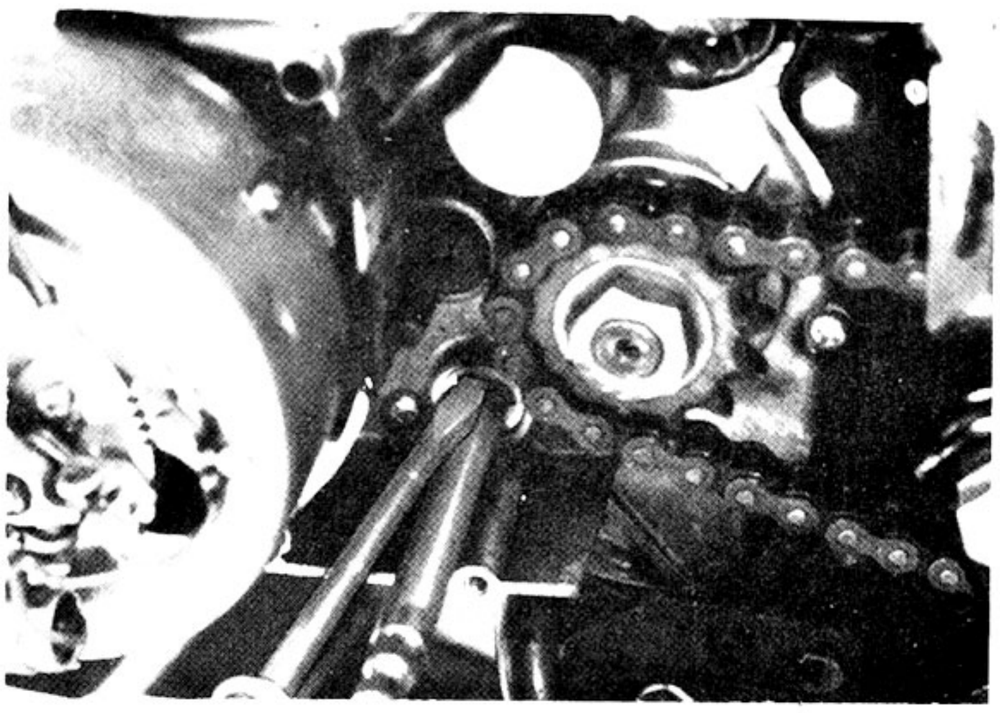


When the gear shift lever is depressed, the gear shift moves gear shift arm B back and forth, which in turn causes, gear shift arm A to push the gear shift drum pins mounted on the gear shift drum, thus turning the gear shift drum.

The gear shift drum is equipped with five gear shift drum pins, and is designed to make 1/5 of a turn each time the gear shift lever is depressed. In other words, one full turn of the drum will shift the transmission through five stages first, second, thrid, fourth and fith. The gear shift pins are held by the disc so that the stopper plate may secure each position of the five stages.

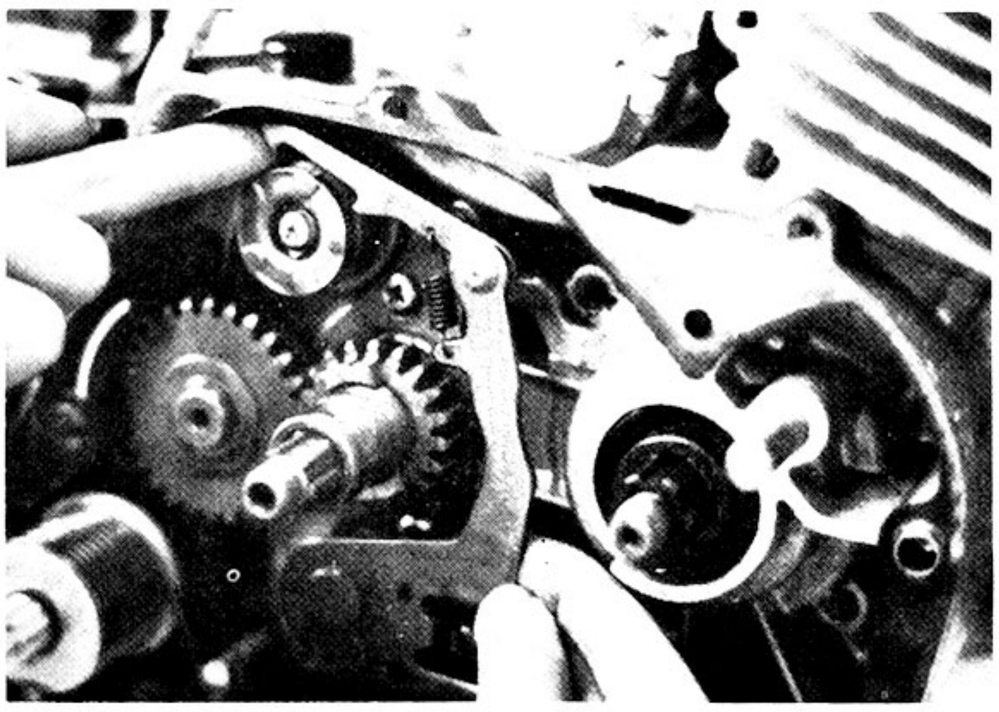
The outer surface of the gear shift drum is provided with slots, along which the shift forks travel back and forth when shifting gears.

The neutral position is located between the first and second gear shift drum pins, and the stopper mechanism is located on the left side of the shift drum.

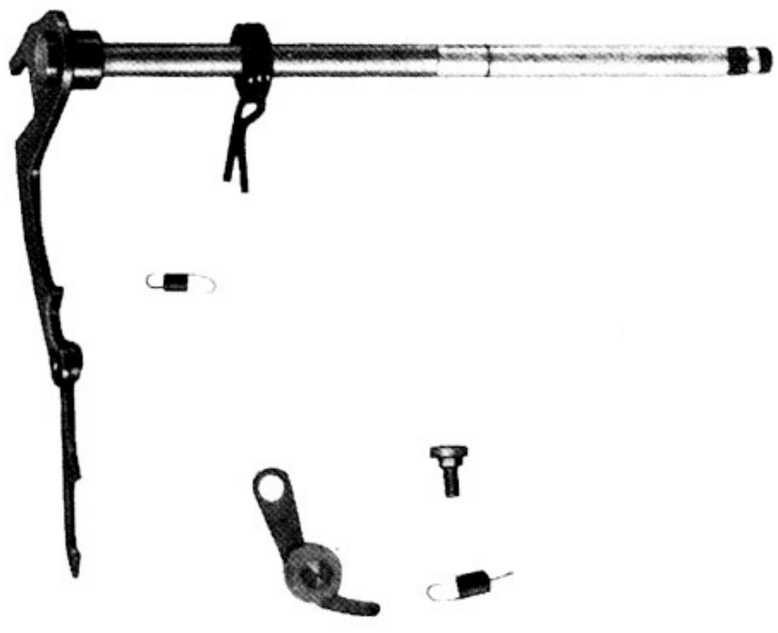


Removal of gear shift arm shaft

1. Remove crankcase covers (R) and (L).
2. Remove clutch ass'y.
3. Remove circlip and washer on the lefthand side of engine.

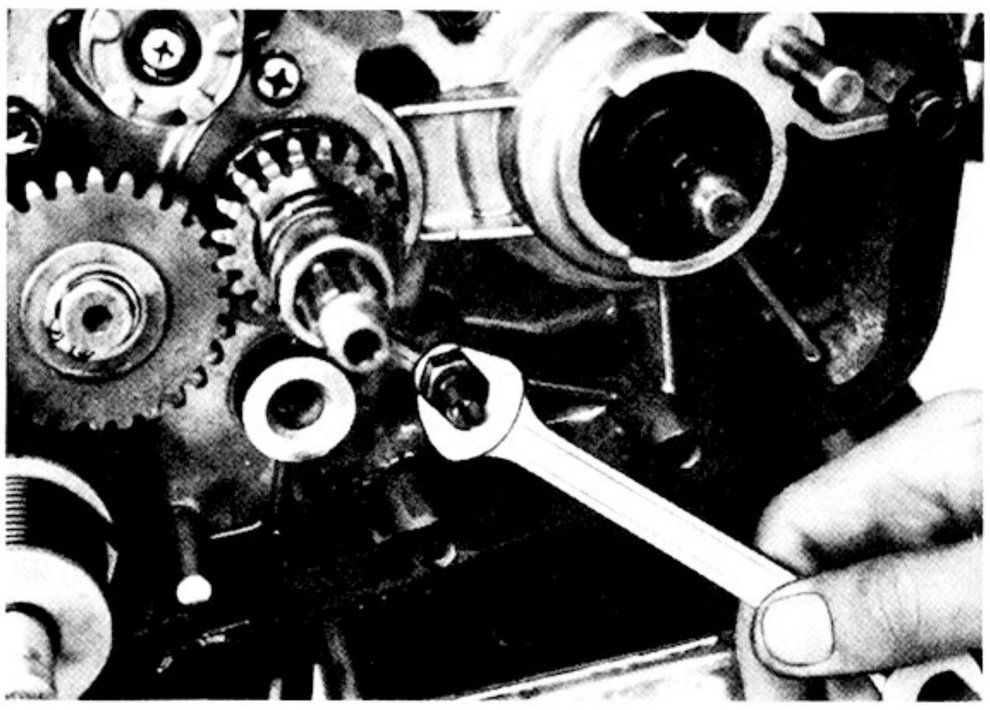


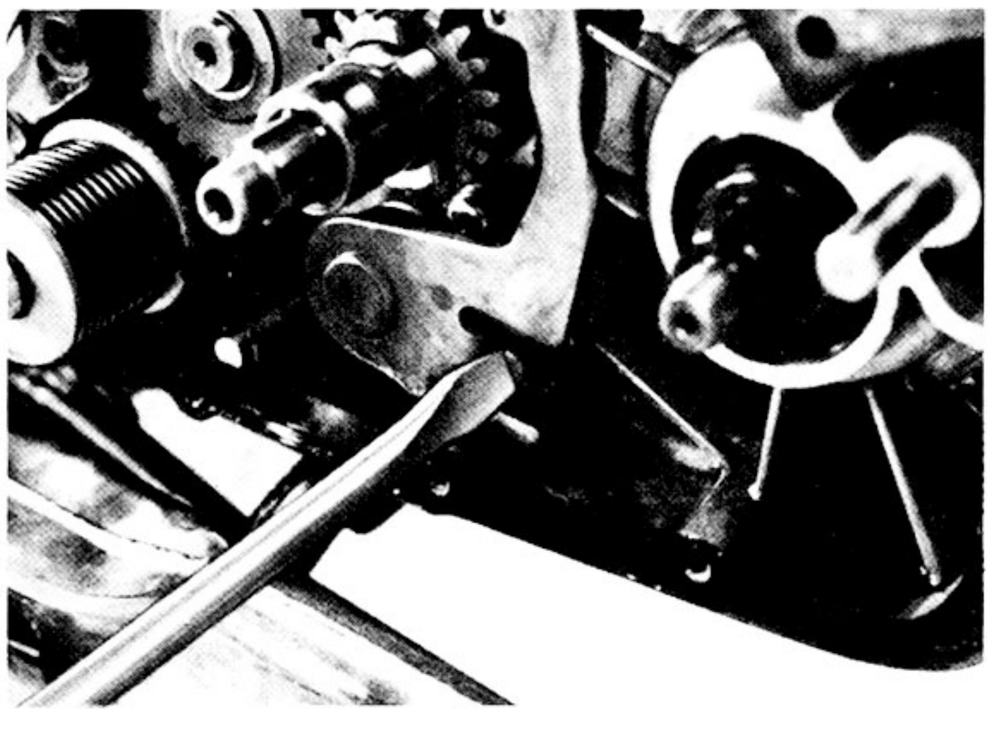
4. Remove gear shift arm.



Inspection

1. Check the gear shift pedal return spring for insufficient tension and failure, as weak or broken spring causes poor return of gear shift arm.
2. Check gear shift arm return spring for insufficient tension and failure, as weak or broken spring makes gear shifting difficult.





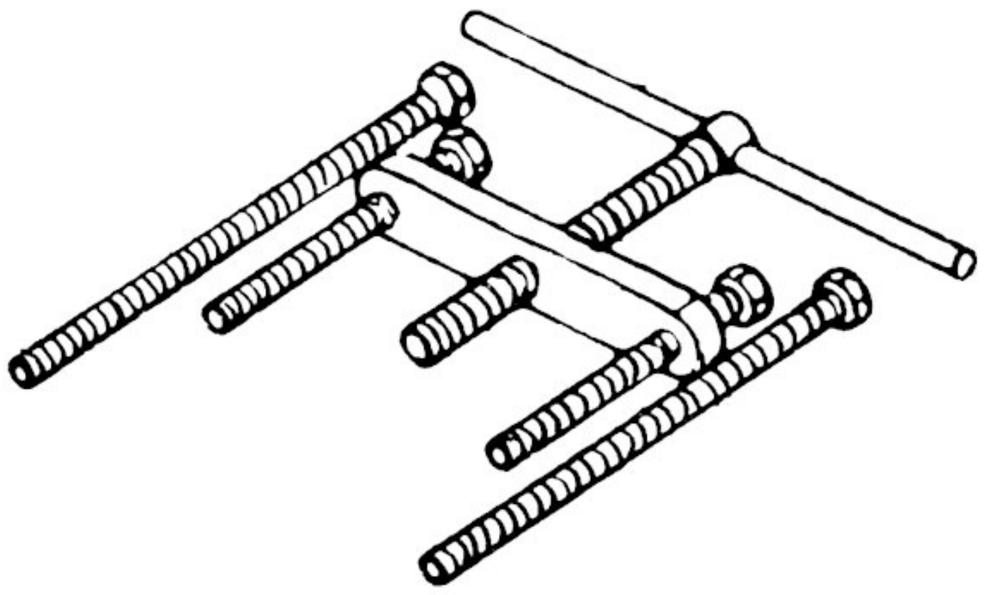
Adjustment

1. If over-shifting (excessive turning of gear shift drum) or short-shifting (insufficient turning of gear shift drum) occurs, make adjustment of the stroke of gear shift arms by turning the stop screw (eccentric bolt) at the gear shift arm return spring.

   Make adjustment so that a becomes identical to a'. Make sure to tighten lock nuts upon completion of adjustment.

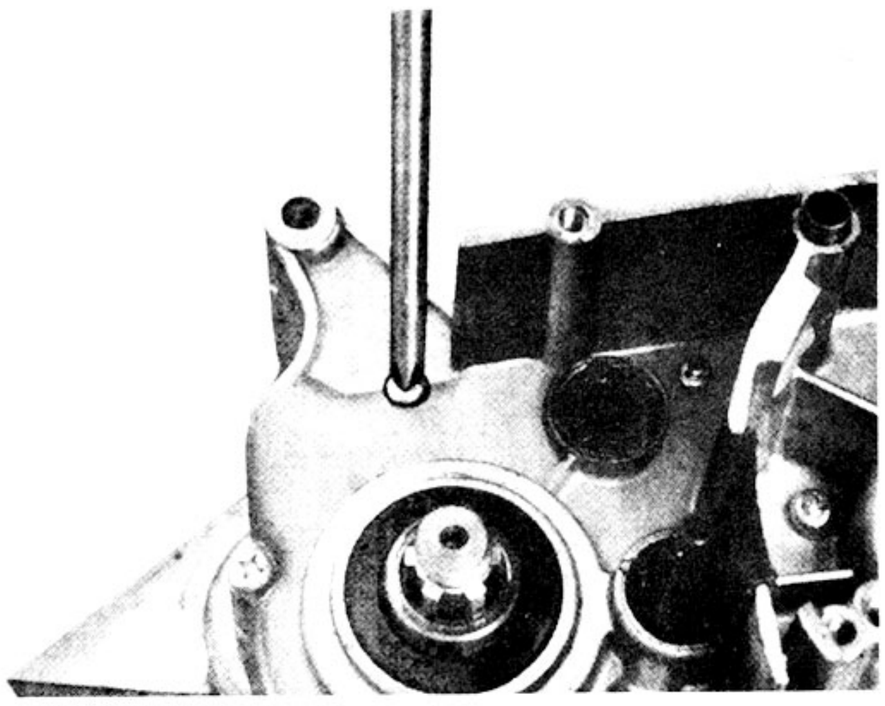
Crankcase

The crankcase may be disassembled from either right-hand side or left-hand side, but it is recommended to split the crankcase from right-hand side to facilitate the following jobs.

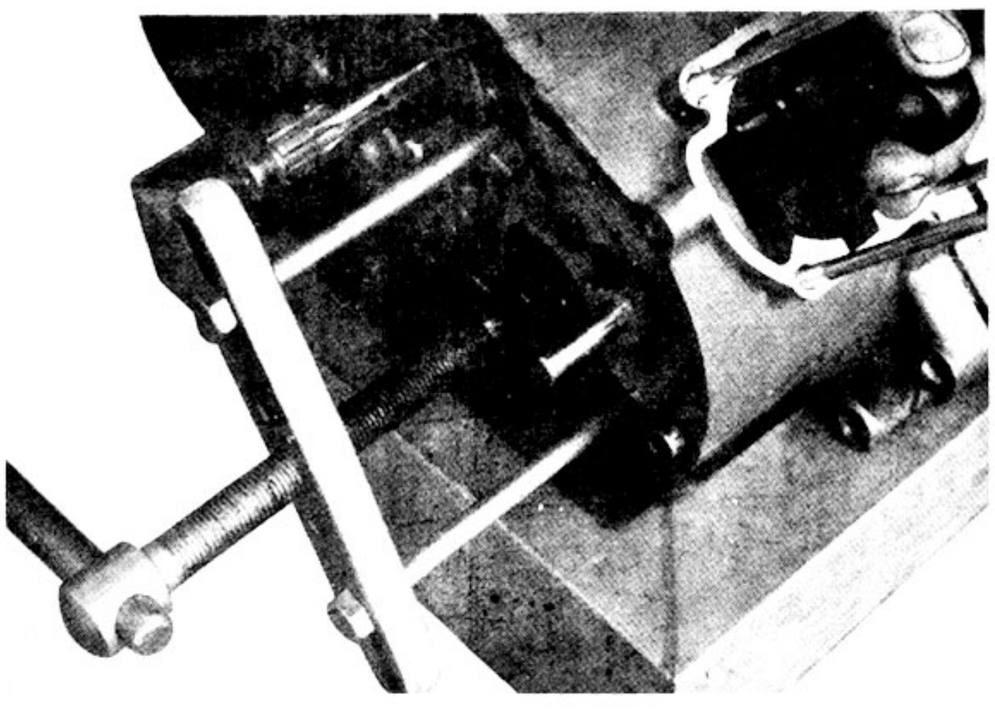


Removal

1. Dismount engine from the motorcycle frame.
2. Remove cylinders and pistons.
3. Remove crankcase covers (R) and (L).
4. Remove primary drive gear and clutch assy.
5. Remove gear shift pedal shaft and gear shift arms.
6. Remove drive sprocket.
7. Prepare crankcase disassembling tool.



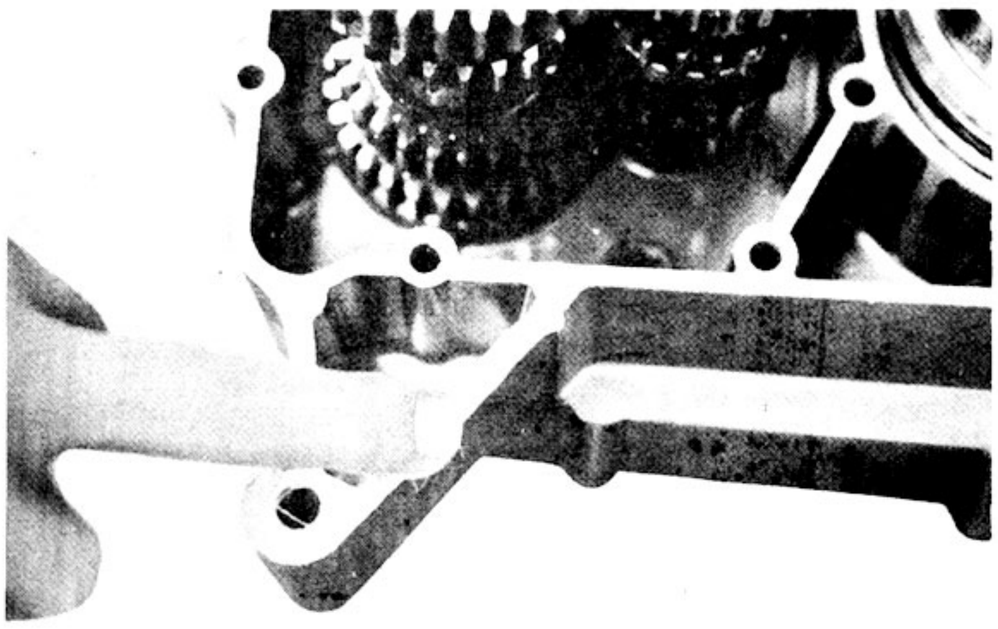
8. Remove pan head screws on L.H. side of crankcase.



9. Attach crankcase disassembly tool and split crankcase into L.H. unit and R.H. unit by tapping main axle and crankcase alternately with a plastic hammer.

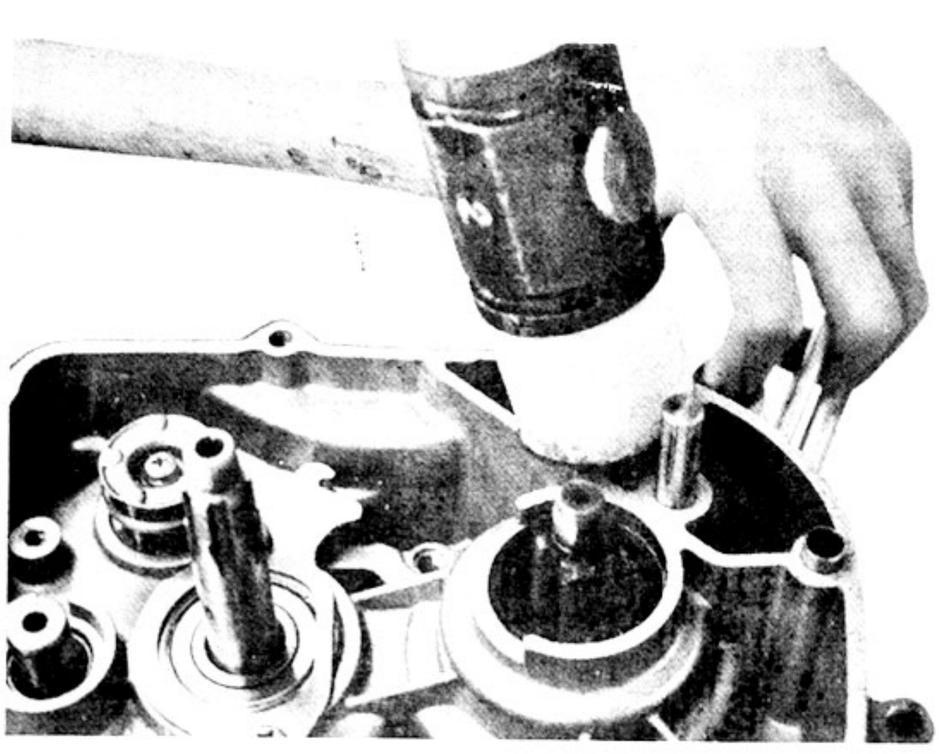
Note:

(1) The bolts of special tool should be well tightened and should be held in level positon.

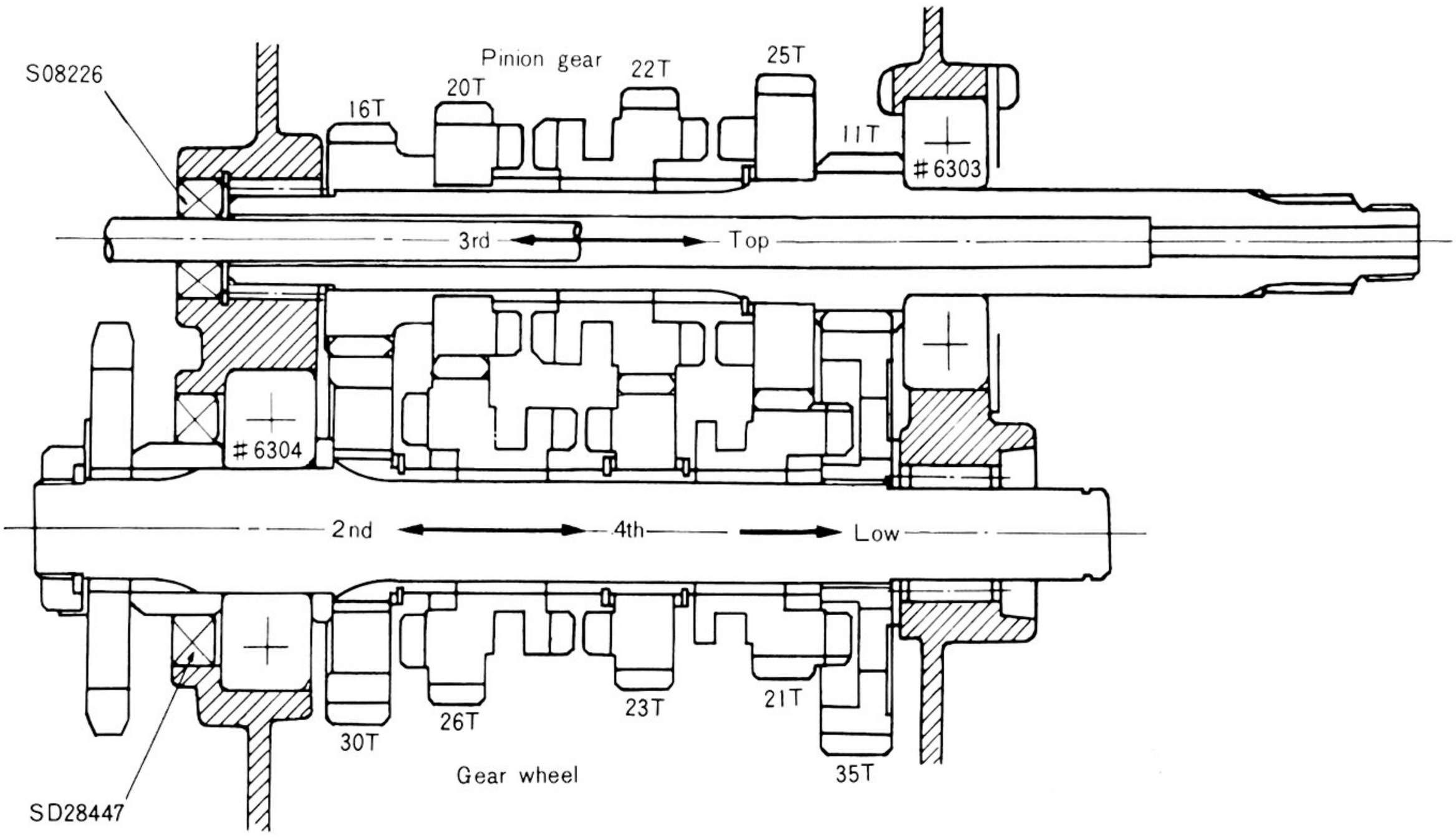


Installation

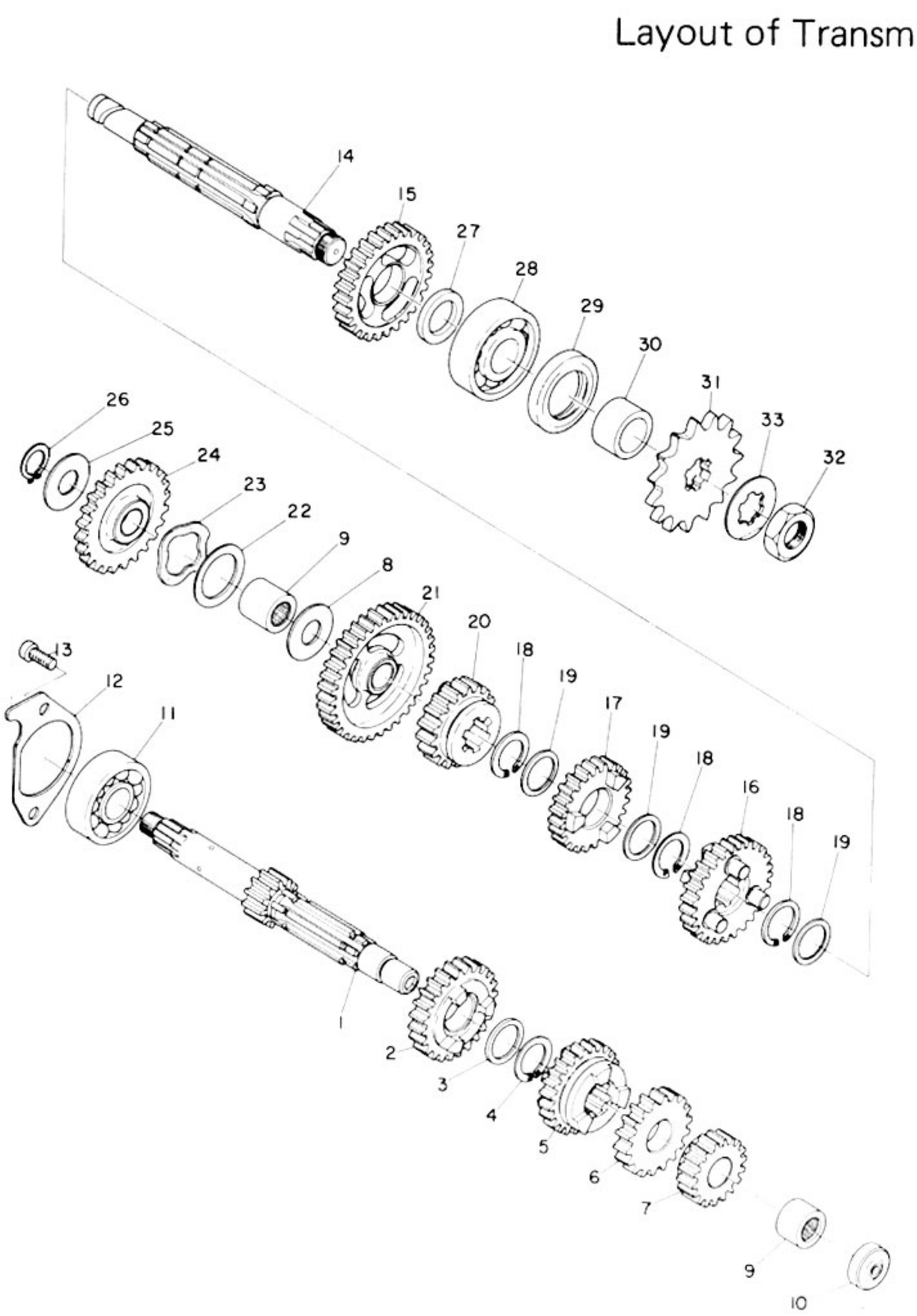
Completely remove the adhesive on the mating surfaces of crankcase and uniformly apply Yamaha Bond No. 4 before reassembly.



Transmission Ass'y



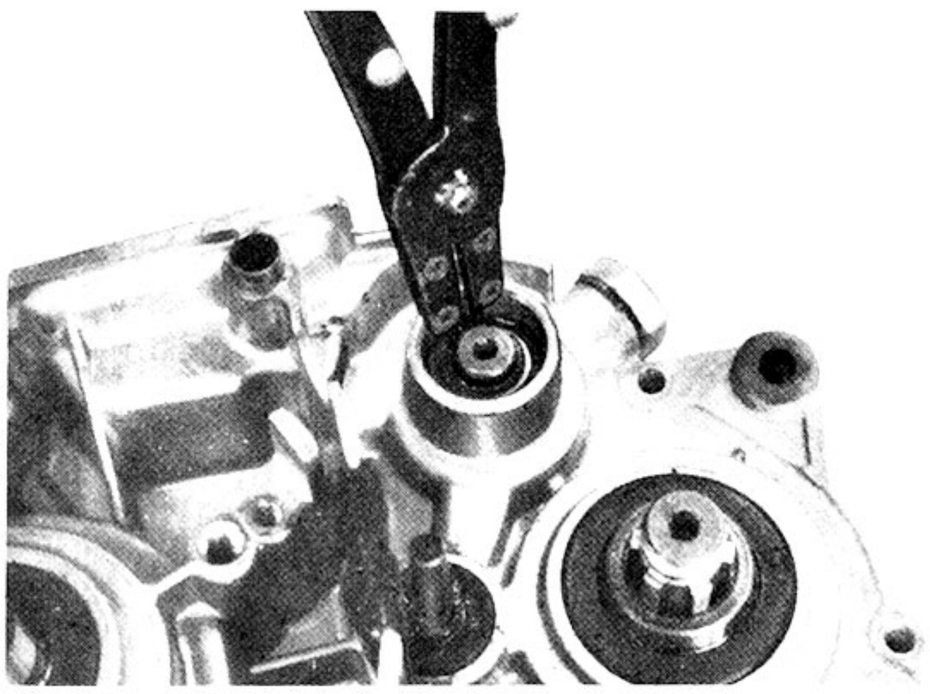
Layout of Transmission Gears



1 AXLE, main (11T)
2 GEAR, 5th pinion (25T)
3 WASHER, gear hold (20-25-1.0)
4 CLIP, main axle
5 GEAR, 4th pinion (22T)
6 GEAR, 3rd pinion (20T)
7 GEAR, 2nd pinion (16T)
8 SHIM, drive axle (15.2-30-0.8)
SHIM, drive axle (15.2 30-1.0)
SHIM, drive axle (15.2-30-1.2)
9 BEARING
10 SEAL, push rod
11 BEARING (6303Z)
12 PLATE, bearing cover
13 SCREW, pan head
14 AXLE, drive
15 GEAR, 2nd wheel (29T)
16 GEAR, 3rd wheel (26T)
17 GEAR, 4th wheel (23T)
18 CLIP, main axle
19 WASHER, gear hold
20 GEAR, 5th wheel (21T)
21 GEAR, 1st wheel (35T)
22 WASHER, plain (15.3-22-1.
23 WASHER, wave
24 GEAR, kick idle (28T)
25 SHIM, drive axle (15.2-20-
26 CIRCLIP (S-15)
27 SPACER (20-30-3)
28 BEARING (6304)
29 OIL SEAL (SD-28-44-7)
30 COLLAR, distance (20-28-
31 SPROCKET, drive (13T)
SPROCKET, drive (14T)
SPROCKET, drive (15T)
SPROCKET, drive (16T)
32 NUT, sprocket
33 WASHER, sprocket

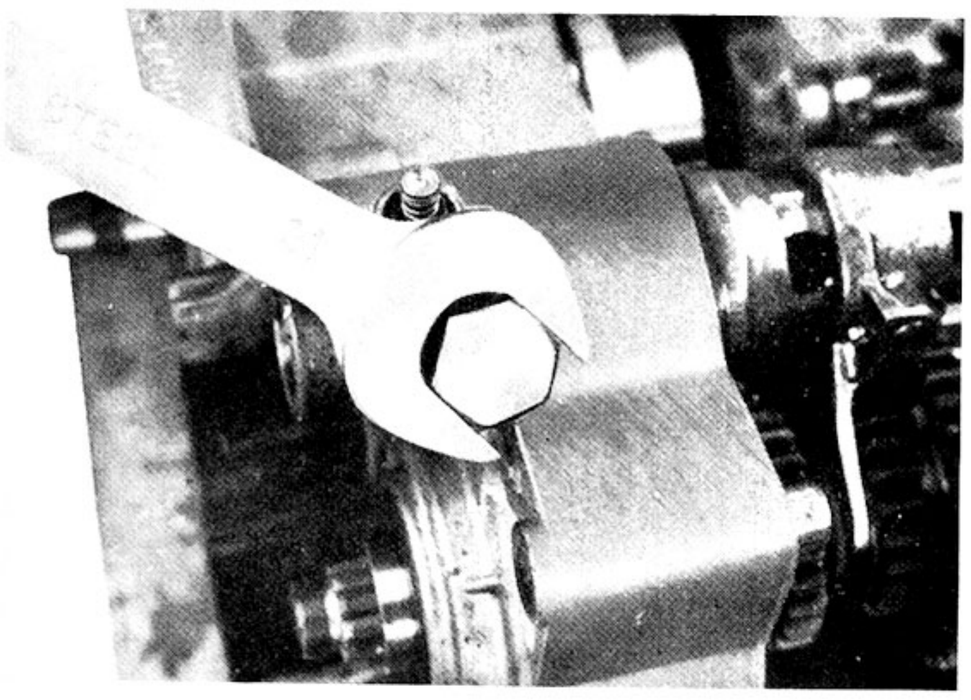
Exploded View of Transmission

	Primary reduction ratio	Transmission gear reduction	Secondary reduction	Total reduction ratio
1st	3.894 (74/19)	3.182 (35/11)	3.000 (42/14)	37.177
2nd	" (")	1.812 (29/16)	" (")	21.177
3rd	" (")	1.300 (26/20)	" (")	15.189
4th	" (")	1.045 (23/22)	" (")	12.215
5th	" (")	0.840 (21/25)	" (")	9.814

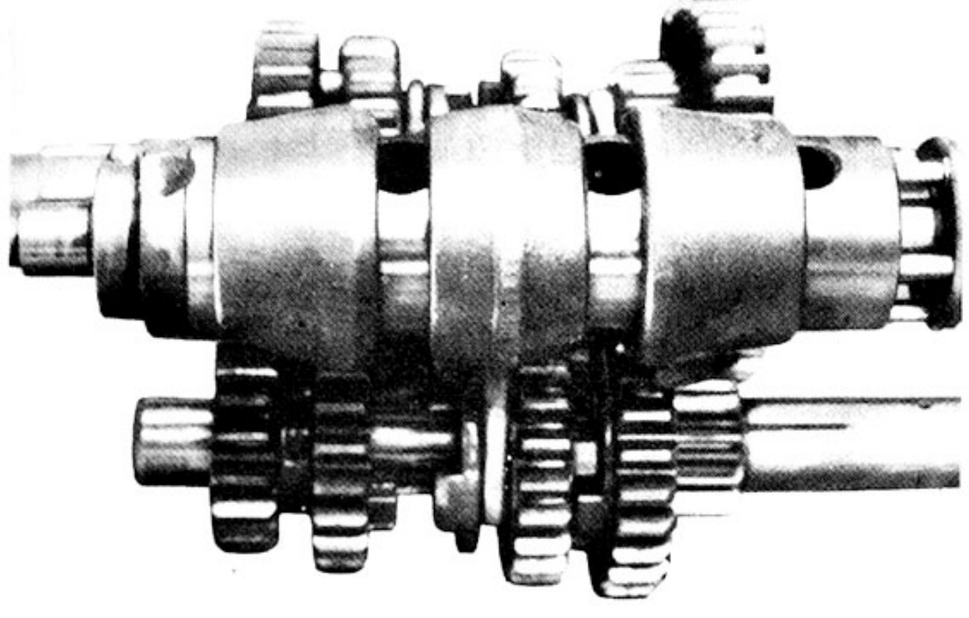


Removal

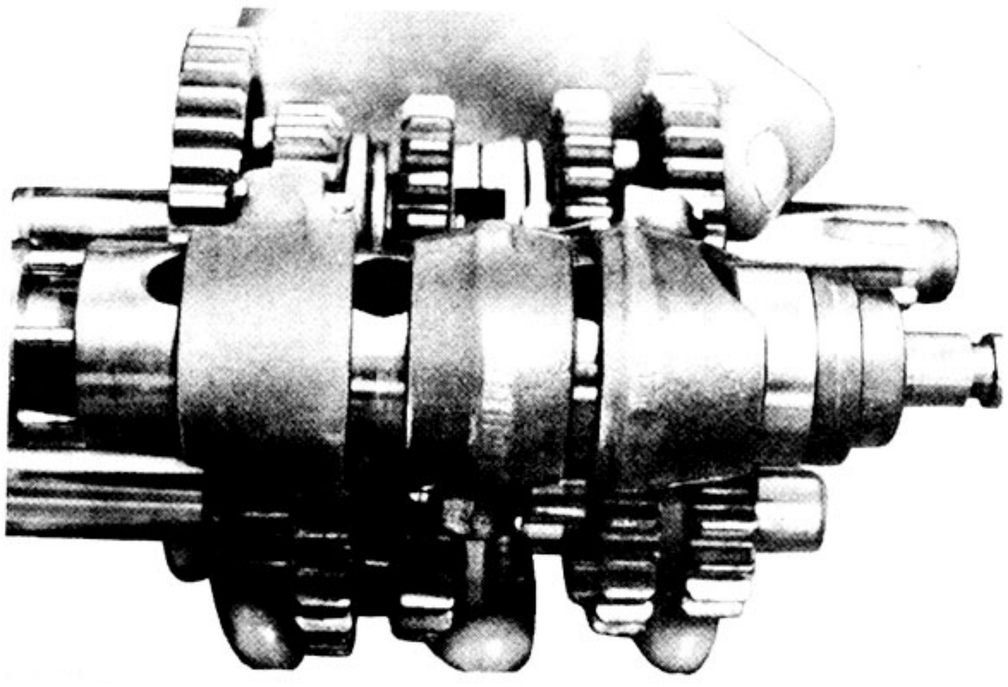
1. Split crankcase.
2. Remove gear shift drum retaining clips, holders and washer.



3. Remove neutral stopper.



4. Remove transmission and shifter at the same time.



Installation

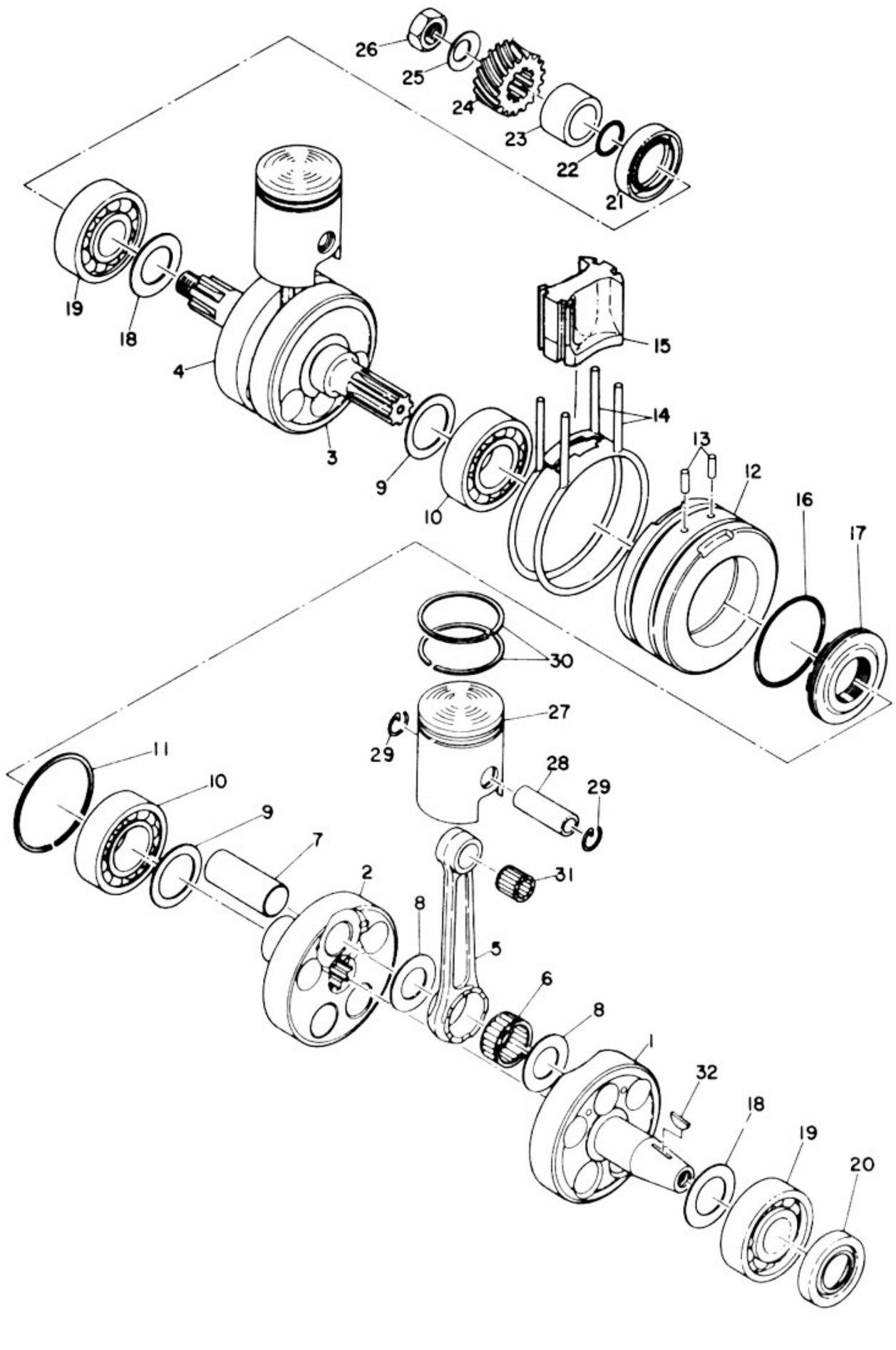
1. Simultaneous installation of transmission and shifter

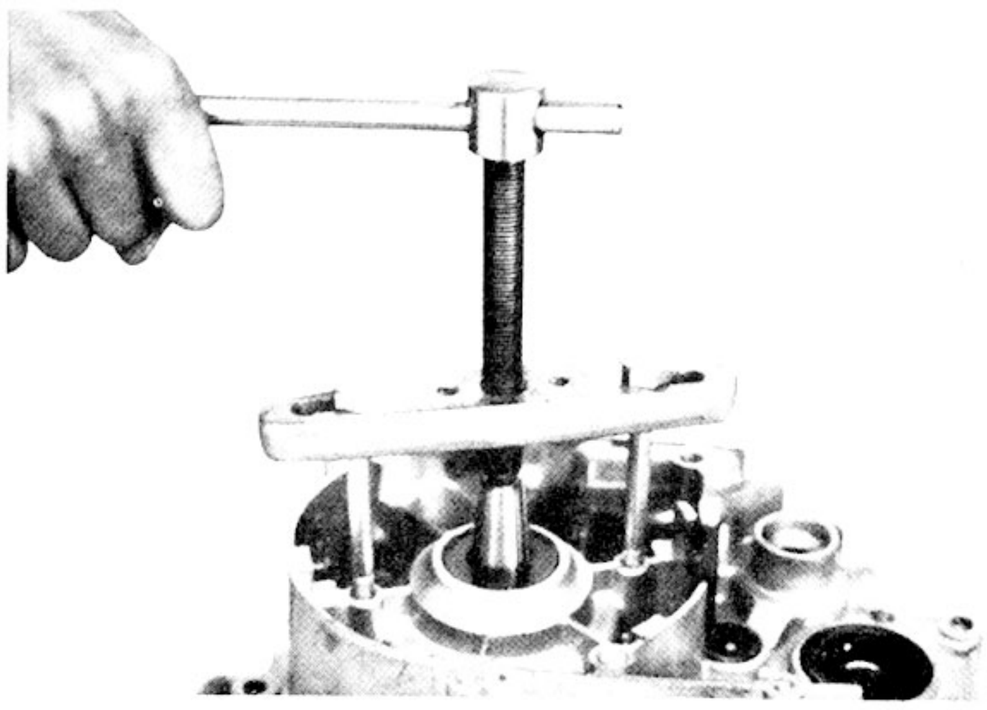
   Transmission and shifter shall be made into a single unit after subassembly and assemble into the left-hand side of the crankcase. They cannot be installed independently.

Crankshaft

The crankshaft requires highest accuracy and it has a consumable aspect. Consequently, utmost care is required in handling crankshaft.

The crankshaft assy of Yamaha 100 LS2 employs labyrinth packing made of aluminium as center oil seal. This solves the problems of oil resistance, heat resistance and wear resistance, which has not been possible when using oil seals made of rubber.

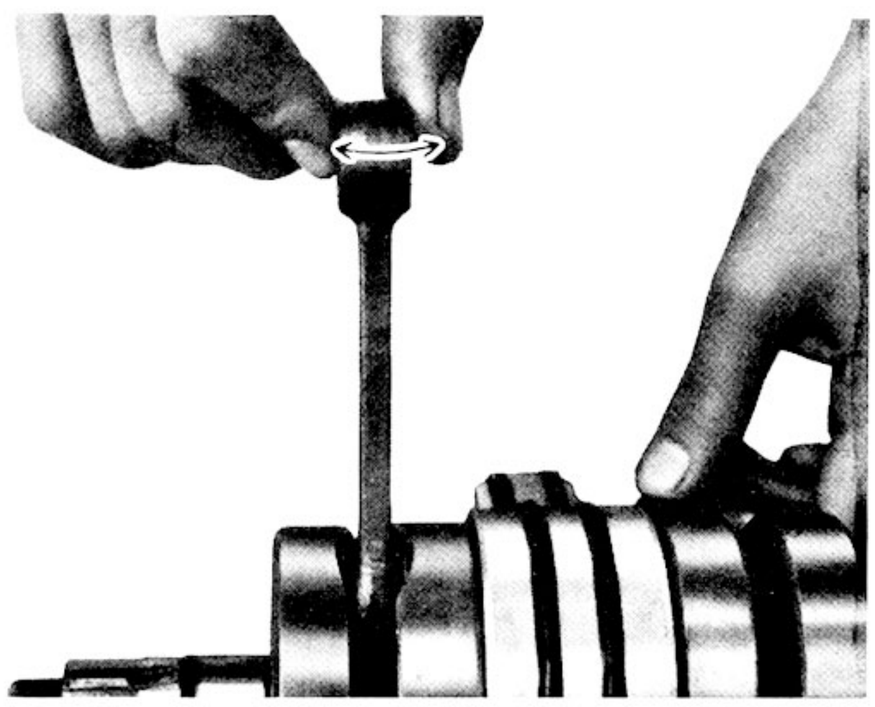




Removal

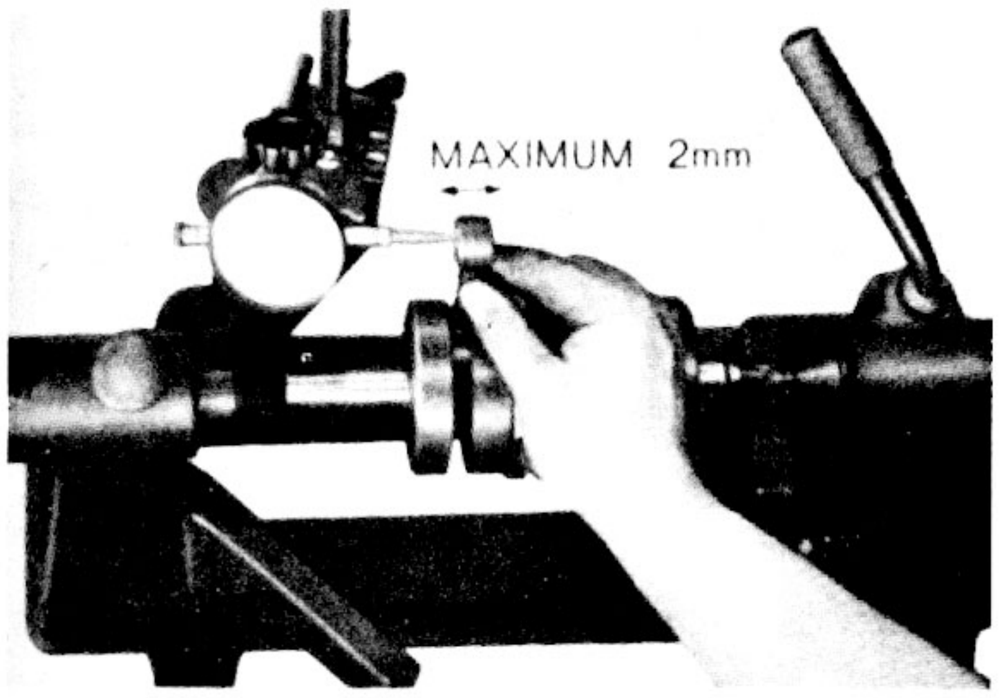
1. Disassemble crankcase.
2. Remove crankshaft by using a crankcase disassembly tool.

CAUTION: Never drop the crankshaft.



Inspection

1. Axial runout of connecting rod small end (to determine the extent of wear of crank pin and bearing at big end)
   Hold small end of connecting rod with the fingers and chcek axial runout.

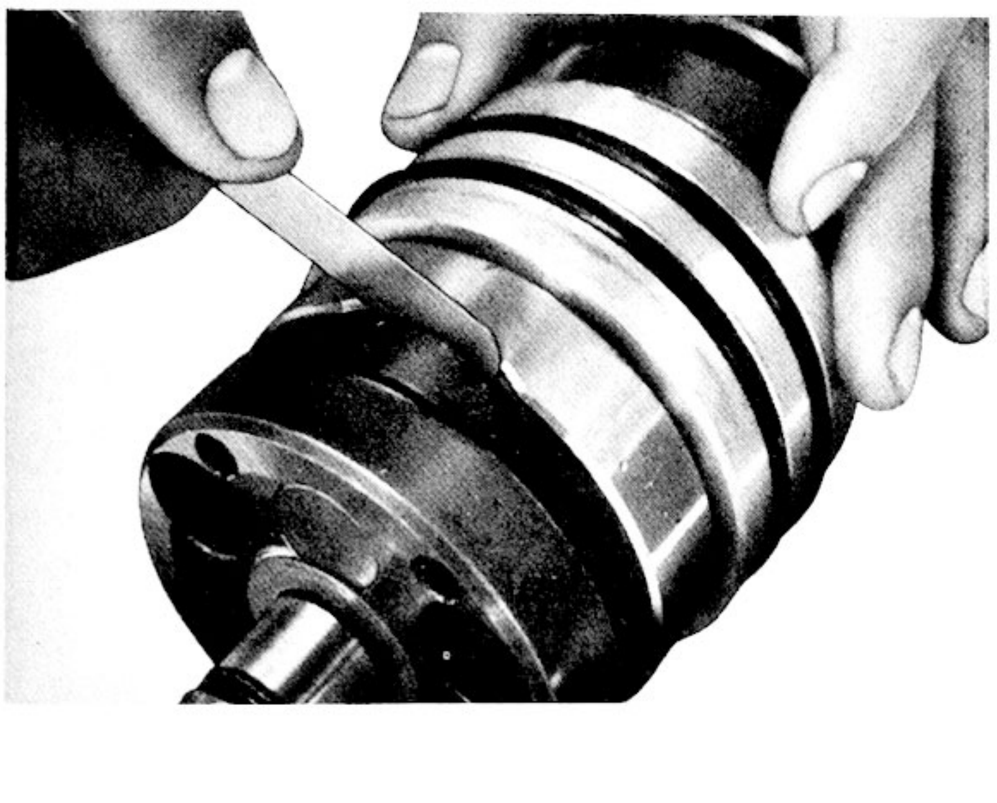


Standard Value

(a) Reading of dial gauge should be 2 mm or less.
   If the reading is over 2 mm, disassemble the crankshaft and replace defective parts.
(b) Runout should be 0.8 - 1.0 mm after correction.

2. Axial clearance of connecting rod big end

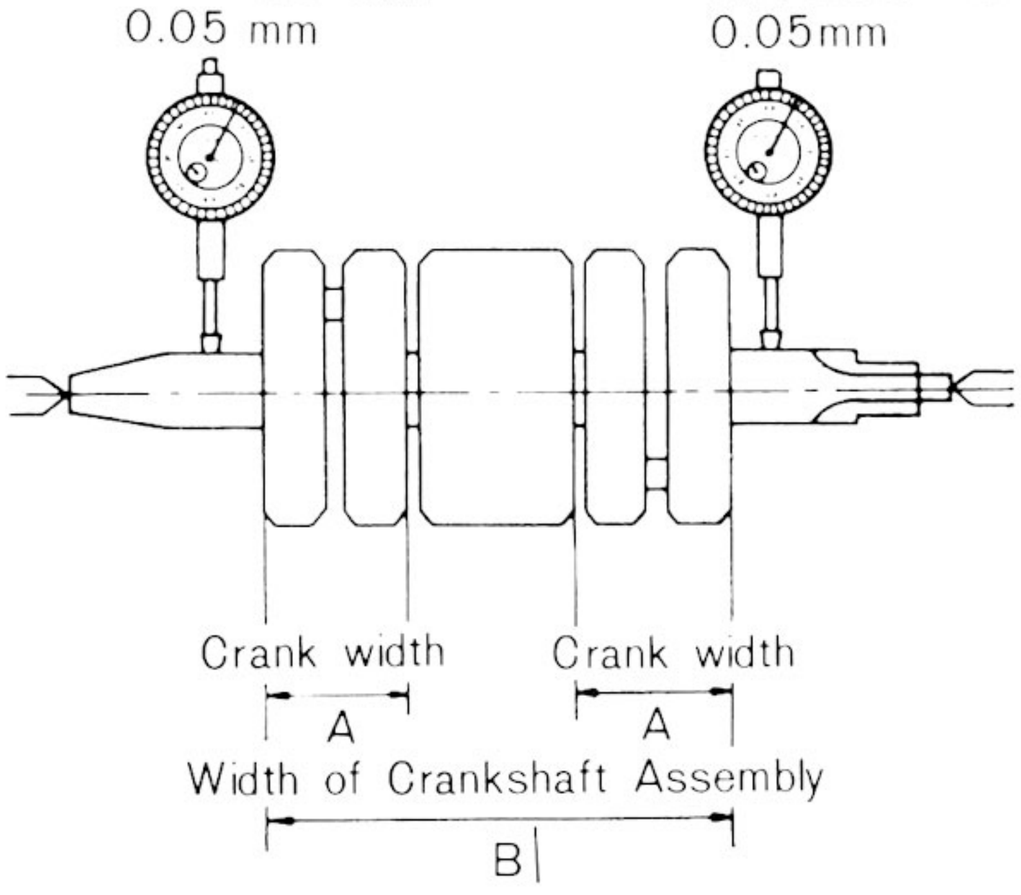
   Move connecting rod to one side and measure the clearance with a thickness gauge.



Standard Value

(1)0.1 - 0.3 mm

3. Assembled width and runout of crankshaft



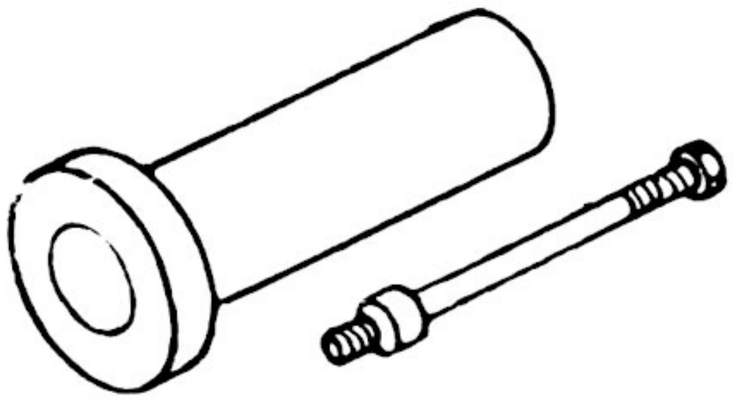
Standard Value

(a) Assembled width of crankshat

A . . . . . 43 $^{-0.05}_{-0.10}$

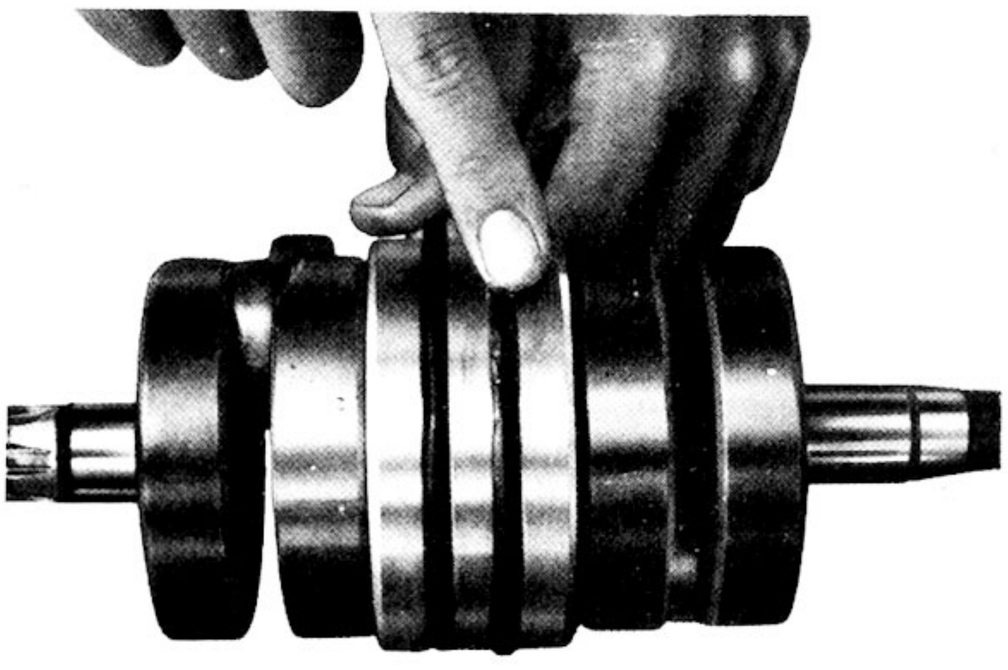
B . . . . . 126 $^{0}_{-0.20}$

(b) Radial runout . . . . . 0.05mm or less

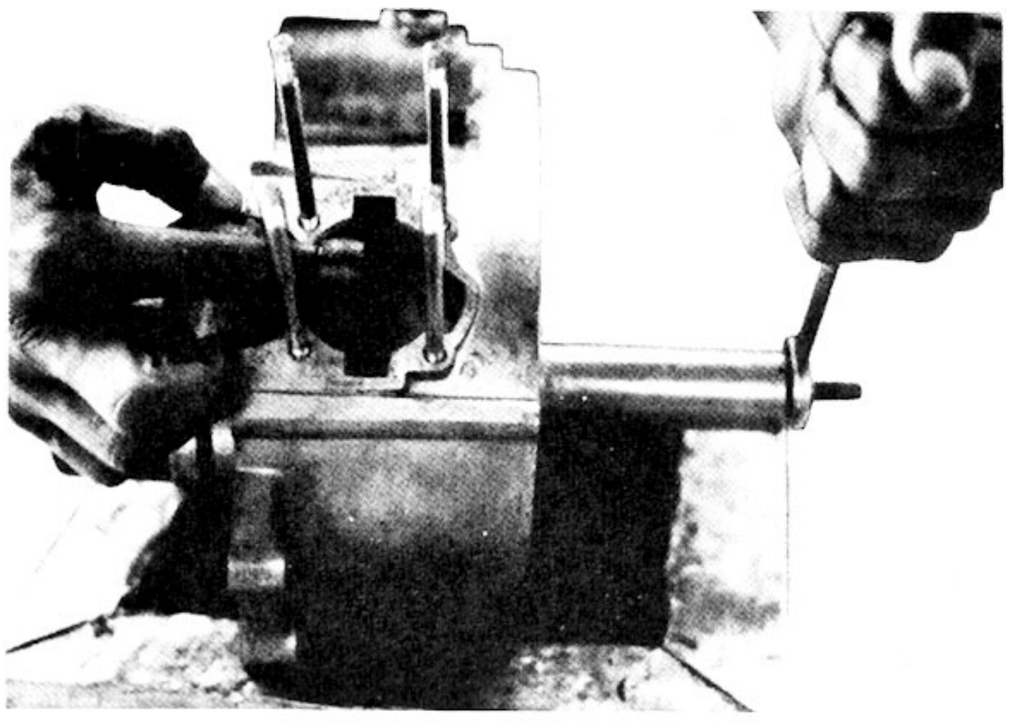


Installation

1. Prepare crankshaft assembly tool.

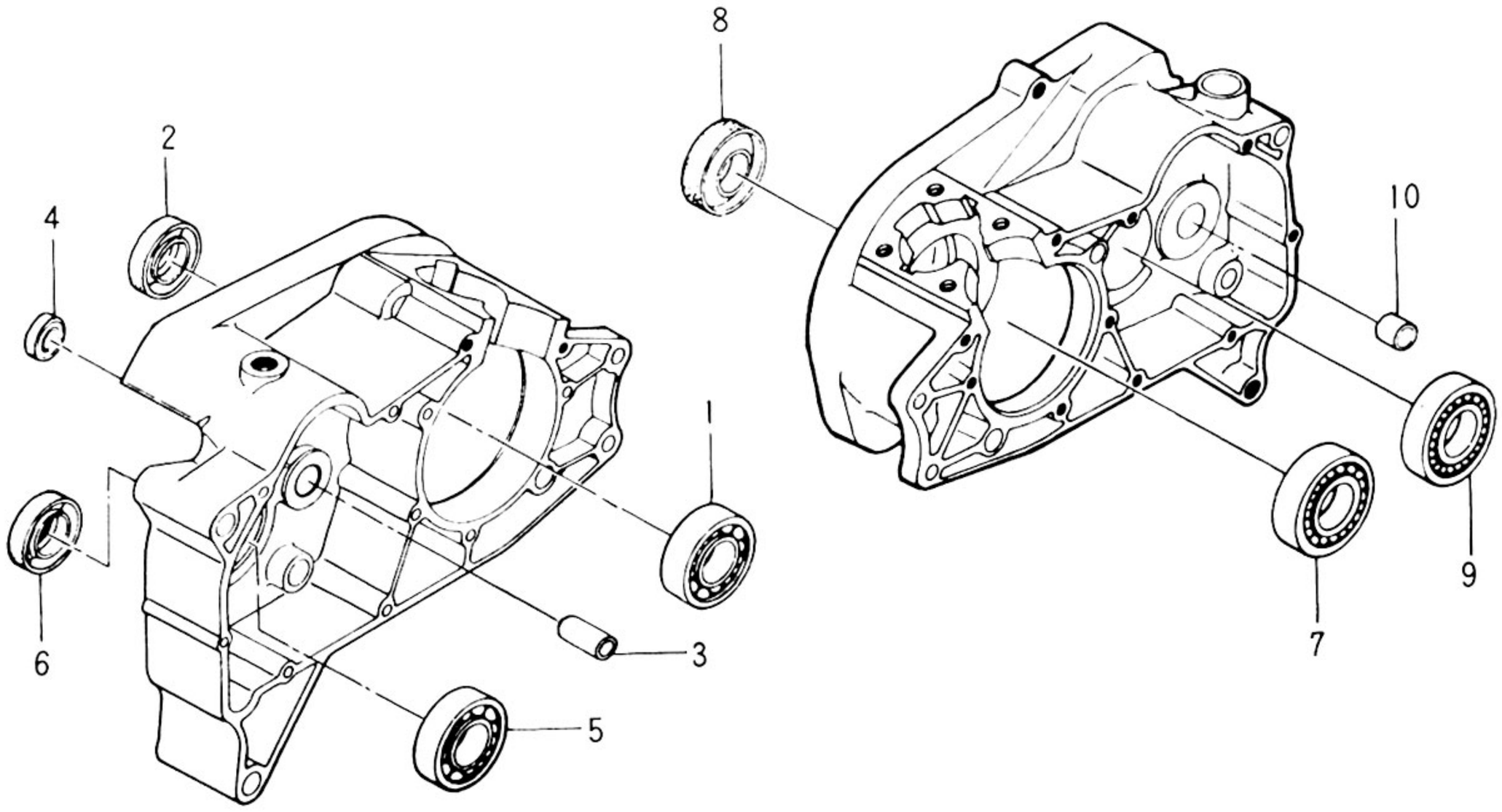


2. Do not forget to prepare crankshaft shims.
3. Apply grease on filler metal gasket and on oil seal and set crankcase assembly tool.



4. Place connecting rods at top dead center and install crankshaft assy. in place. Fit in until movement becomes stiff.

Bearings and Oil Seals

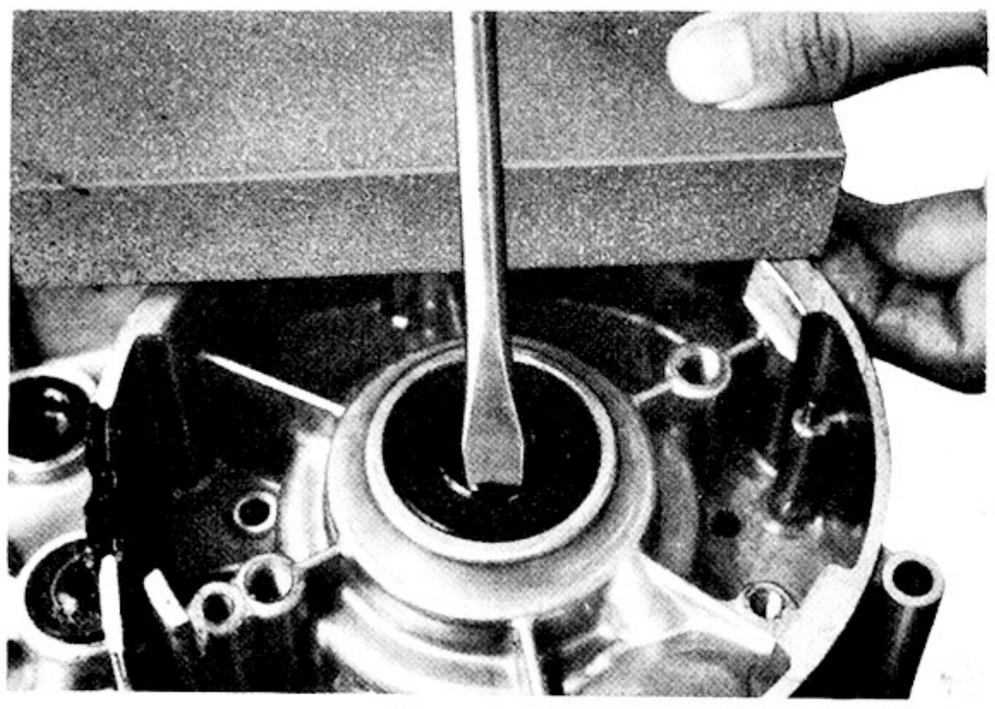


Locations of Bearings and Oil Seals

1. Bearing (#6304C3)
2. Oil Seal (SD20408)
3. Needle bearing
4. Oil seal
5. Bearing (#6304)
6. Oil seal (SD28447)
7. Bearing (#6304C3)
8. Oil seal (SW28408)
9. Bearing (#6303Z)
10. Needle bearing (same as 3 above)

1. Removal and Installation

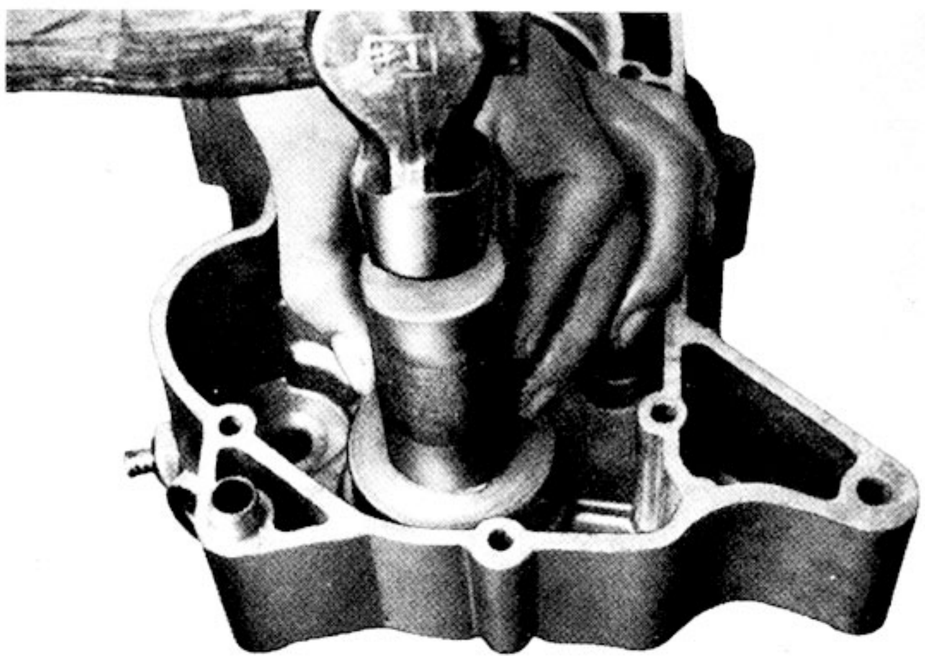
It is ideal to perform removal and installation of bearings and oil seals by heating crankcase to about 120° C, but the work may also be accomplished in the following manner.



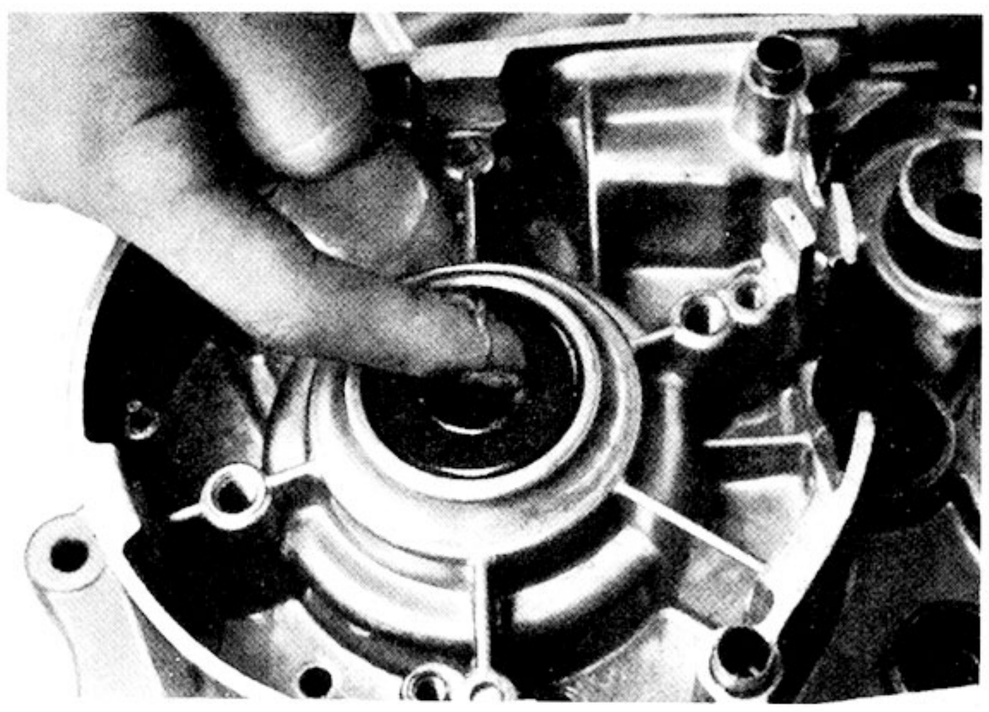
Removal

(a) Remove oil seals by prying with a standard tip screwdriver.

Replace oil seals with new ones after overhauling.



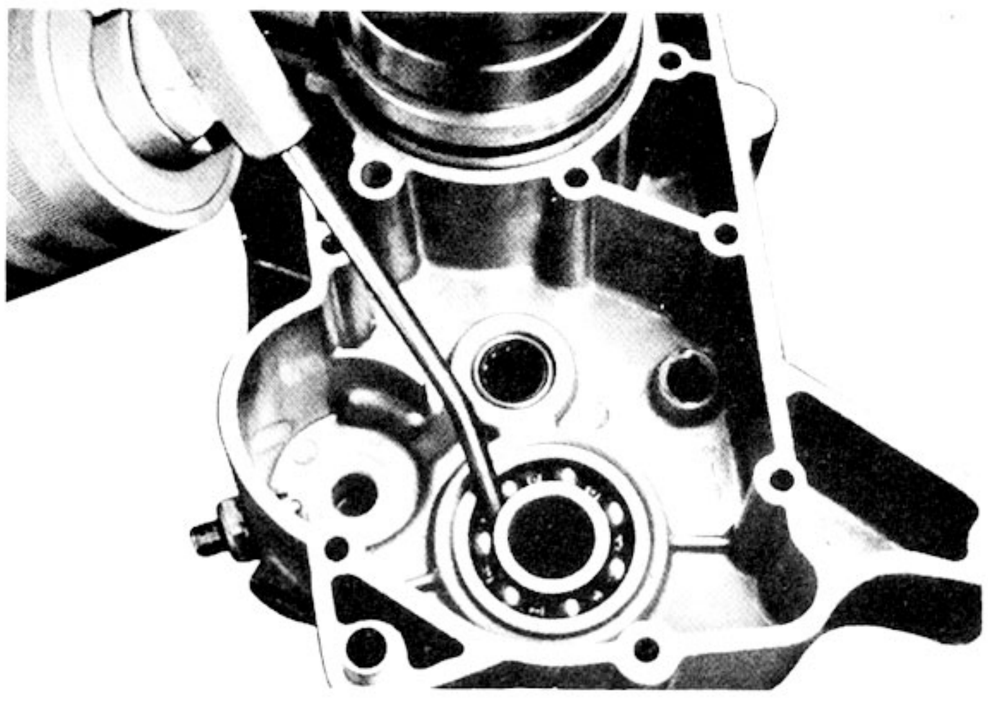
(b) Remove bearing by using a bearing removing tool.



Installation

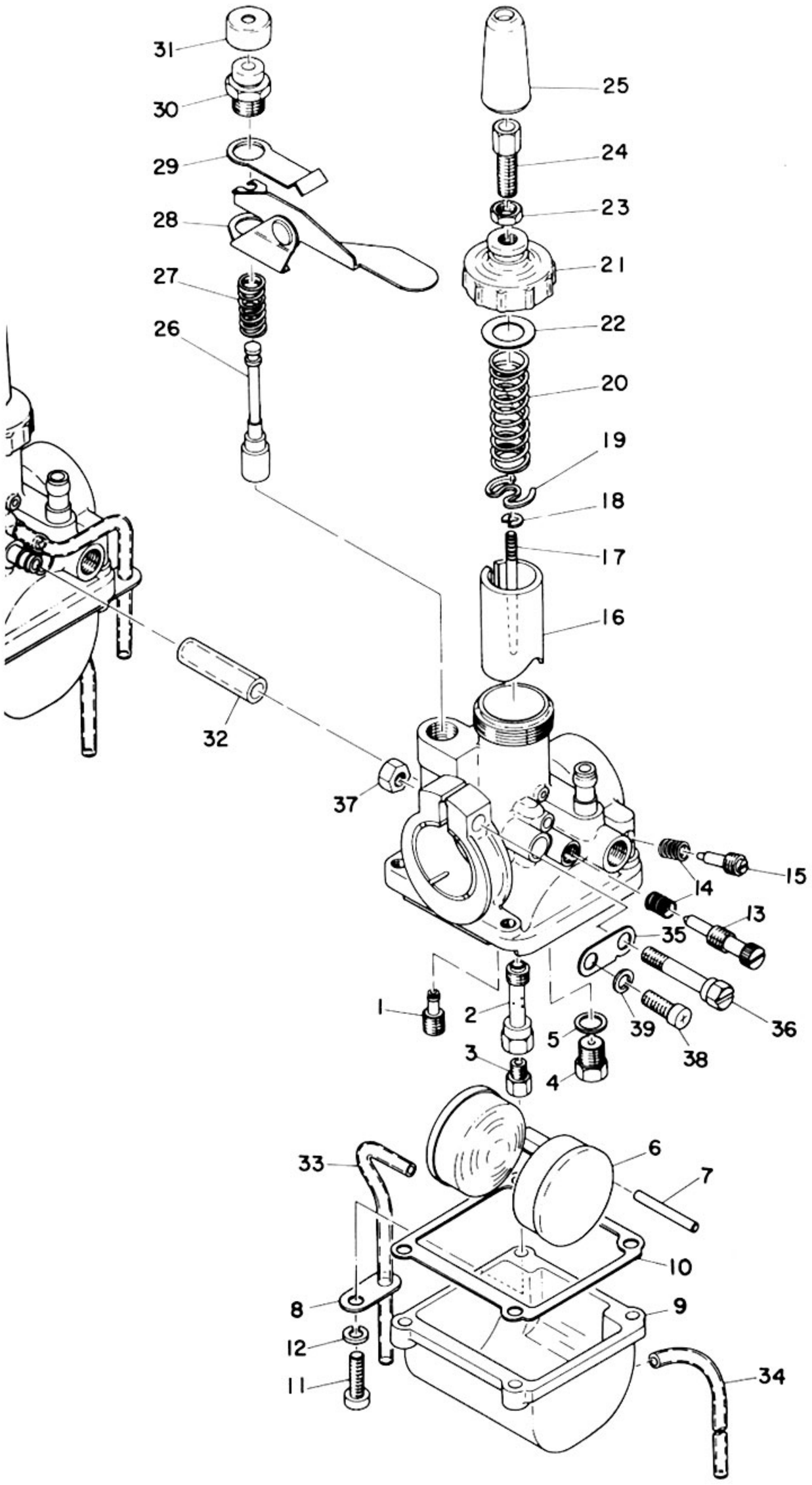
Install bearings and oil seals with the sides entered by maker's identification mark or numeral facing outward.

Fill bearings with sufficient amount of grease before installation.



Carburetor

Two carburetor of AMAL type made by Mikuni (Type VM17SC) are used in Yamaha 100 LS2.



0-1 CARBURETOR ASS'Y, left

0-2 CARBURETOR ASS'Y, right

1 JET, pilot

2 NOZZLE, main

3 JET, main

JET, main

JET, main

4 VALVE SEAT ASS'Y

5 WASHER, valve seat

6 FLOAT

7 PIN, float

8 PLATE

9 BODY, float chamber

10 GASKET, float chamber

11 SCREW, pan head

12 WASHER, spring

13 SCREW, throttle

14 SPRING, air adjusting

15 SCREW, air adjusting

16 VALVE, throttle left

VALVE, throttle right

17 NEEDLE

18 CLIP

19 SEAT, spring

20 SPRING, throttle valve

21 TOP, mixing chamber

22 PACKING

23 NUT, wire adjusting

24 SCREW, wire adjusting

25 CAP

26 PLUNGER, starter

27 SPRING, plunger

28 LEVER, starter

29 PLATE, starter lever

30 CAP, plunger

31 COVER, plunger

32 PIPE, joint

33 PIPE, over flow

34 PIPE, air vent

35 PLATE

36 SCREW, body fitting

37 NUT

38 SCREW, pan head

39 WASHER, spring

1. Checking the Carburetor

1) Float

If fuel leaks into the float while the engine is running, the float chamber fuel level will rise and make the combustion mixture too rich. Shake the float so you can feel or hear any gasoline inside. Replace the float if it is deformed or leaking.

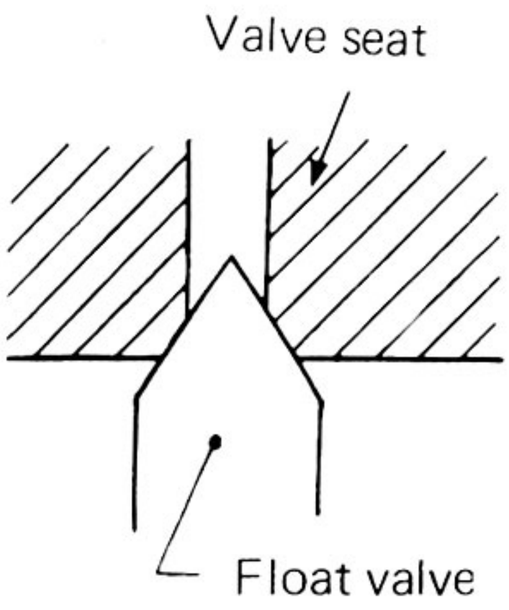
2) Float Valve

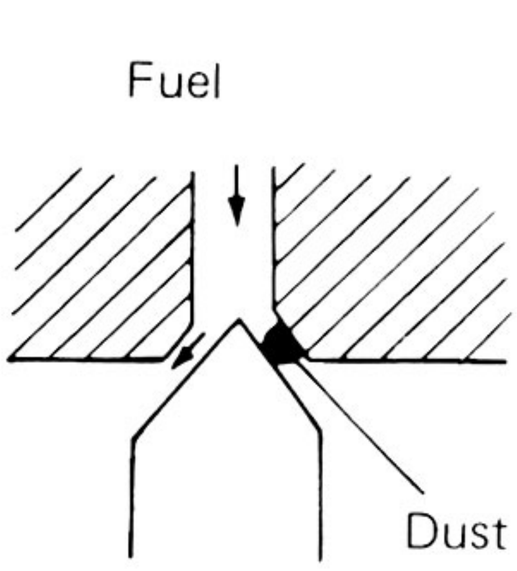
Replace the float valve if its seating end is grooved or scratched. Check the float valve spring for fatigue. Depress the float valve with your finger, and make sure it properly seats against the valve seat.

If the float valve spring is weakened, fuel may overflow, flooding the float chamber when the machine is running at certain speeds, or over a certain type of road.

3) Overflowing

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





4) Cleaning the Carburetor

Disassemble the carburetor, and wash all its parts in a suitable solvent. Blow all air and fuel passages in the carburetor with compressed air.

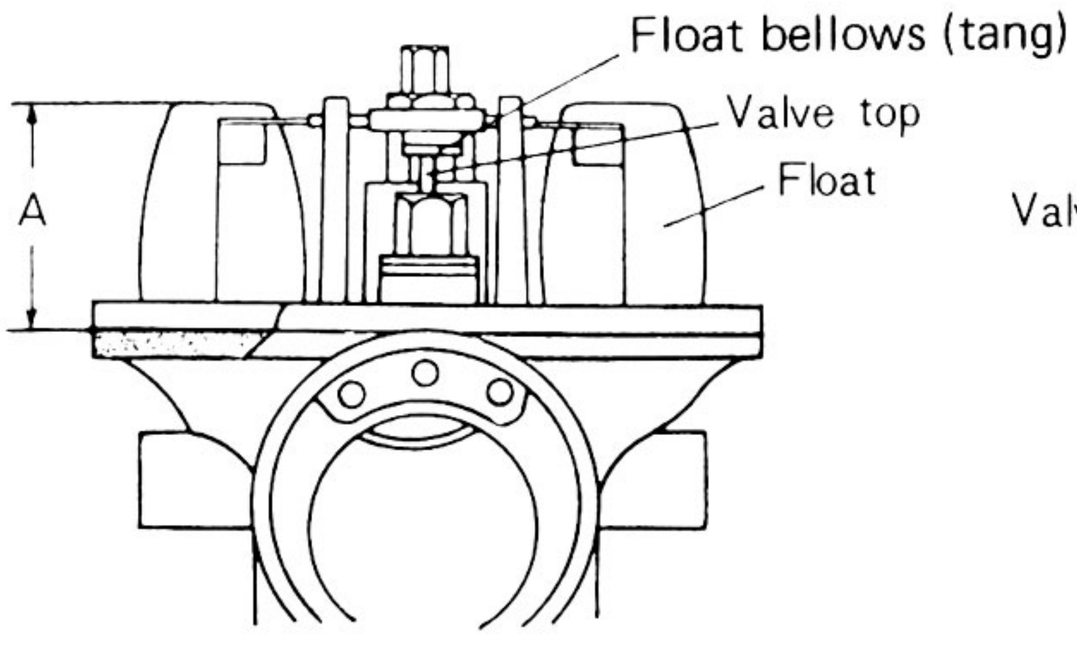
All jets and other delicate parts should be cleaned by blowing compressed air through them, because wire or other hard, pointed cleaning tools may damage their precision-machined surfaces.

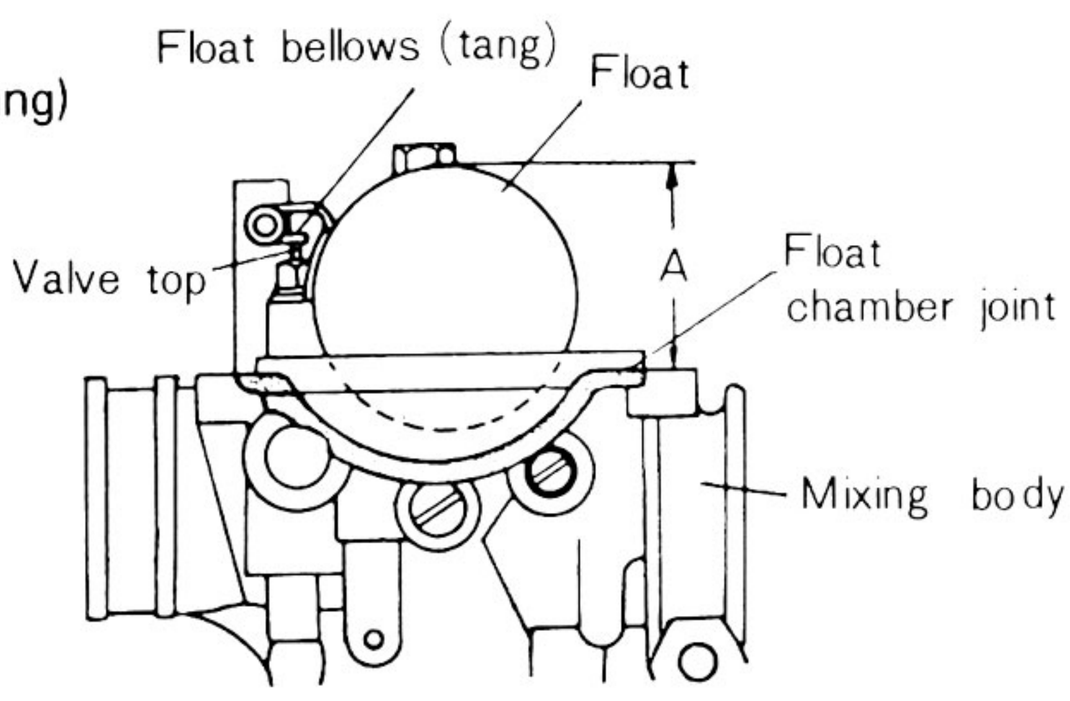
2. Adjusting the fuel level

The fuel level of the carburetor is strictly checked out before delivery of the machine, but it may fluctuate because of a worn needle valve or a deformed float arm.

If the fuel level rises above the specified level, the air-fuel mixture becomes too rich. If the fuel level is below the specified level, the mixture becomes lean.

Any incorrect fuel level should be adjusted in the following manner.





1) Remove the float chamber body, and invert the mixing chamber body. Slowly push the float downward with your fingers until the float contacts the top of the float needle. Do not push hard enough to compress the needle valve spring.
2) Then measure height A in (From the top of the float to the float chamber gasket seat.)

Standard measurement: 22.2 mm.

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

3. Synchronizing Carburetors

Both cylinders will not pull evenly unless the carburation system for each side in identical. If one slide is higher in the carburetor bore than the other slide, overall poor engine performance will be the result.

1) With the engine not running, remove the rubber air filter connectors.
2) Twist the throttle grip fully open os that the slides lift completely up.
3) Reach into the air intake of both carburetors with the fingers of one hand (a side angle mirror placed in front of the air intakes will also allow the slide positions to be checked) and feel the top of the bores for the throttle slides.

4) Slowly close the throttle grip until the throttle slides just begins to enter the bore.

5) Both slides must be synchronized to enter the bore at exactly the same time.

If the slide are not synchronized, then make an adjustment at the top of the carburetor, using the cable adjuster, to raise or lower one slide to match the other.

4. Adjusting the Idle Speed

1) Turn the throttle stop screws equally, a couple turns, to raise the throttle slides from fully closed position. This prevents the engine from quitting while the idle speed is being adjusted.

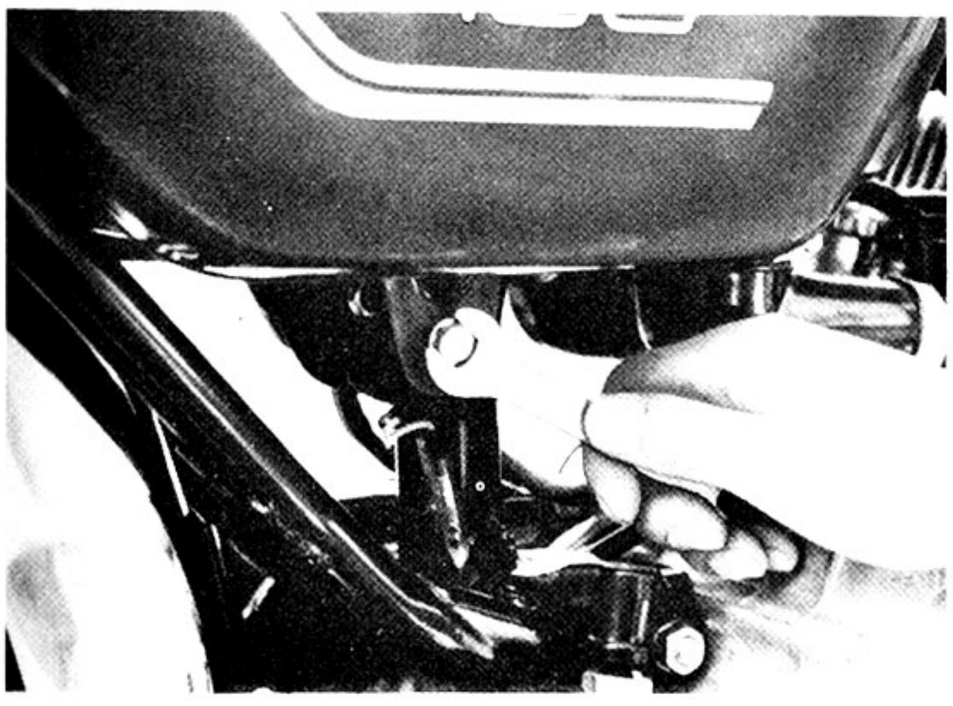
2) Start the engine.

3) Begin with either carburetor and alternately screw the idle speed screw in, then out. While doing this, take note of the increase and decrease in engine rpm. At the point where both cylinders are idling at the same speed there will be no increase and decrease in engine rpm for approxi-mately 1¾ turns. At this point the idle rpm may exceed the specified rpm, but this can be corrected by backing off both idle speed screws an equal amount until the rpm's drop to the proper level, (1200～1300 rpm's)

5. Carburetor Setting Values

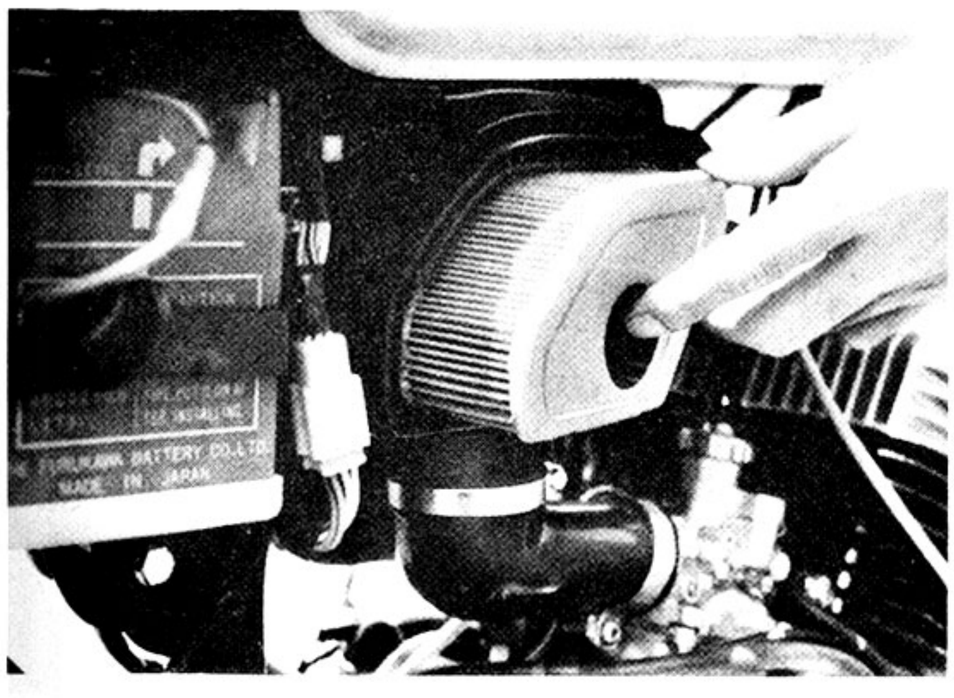
Item		
1	Main jet	#70
2	Needle jet	0 - 0
3	Needle jet clip-No. of steps	3D12-3 steps
4	Throttle valve cutaway	2.0
5.	Pilot jet	#15
6	No. of turns to back off pilot air screw	1 3/4
7	Starter jet	#40
8	Idling speed	1200～1300 rpm
9	Identification mark	326A1

Cleaner

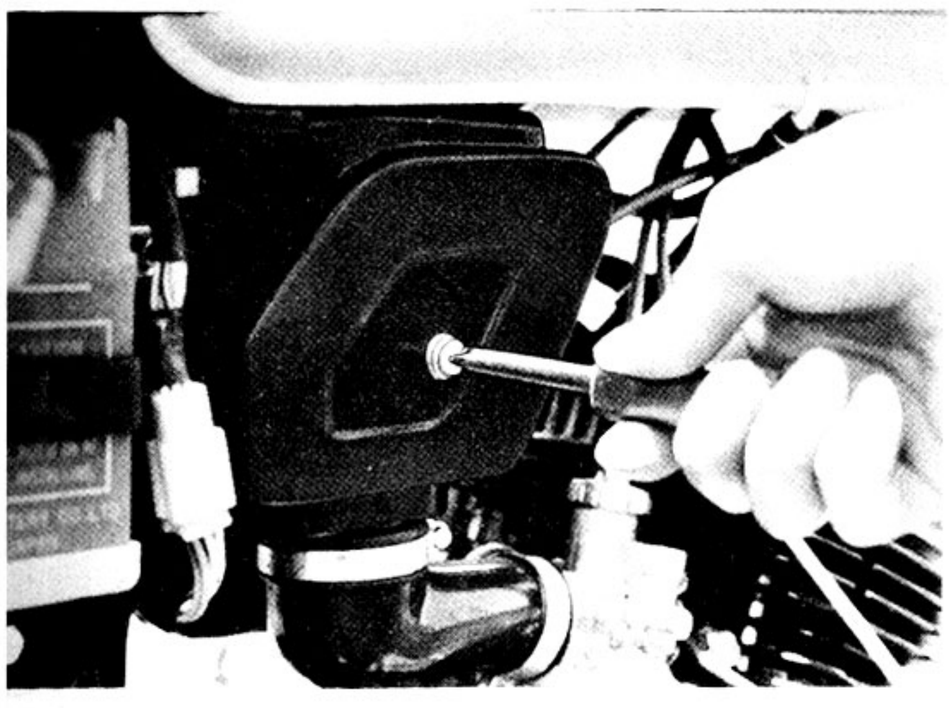


Removal

(1) Remove R.H. and L.H. side covers.



(2) Loosen air cleaner case retaining bolts and carbureotr joint band and remove the air cleaner together with the case.



(3) Take air cleaner element out by opening the cleaner case cap.

Cleaning

Clean the air cleaner element by blasting with compressed air. As the element is of paper filter type, never allow moisture or oil to come in contact with the element.

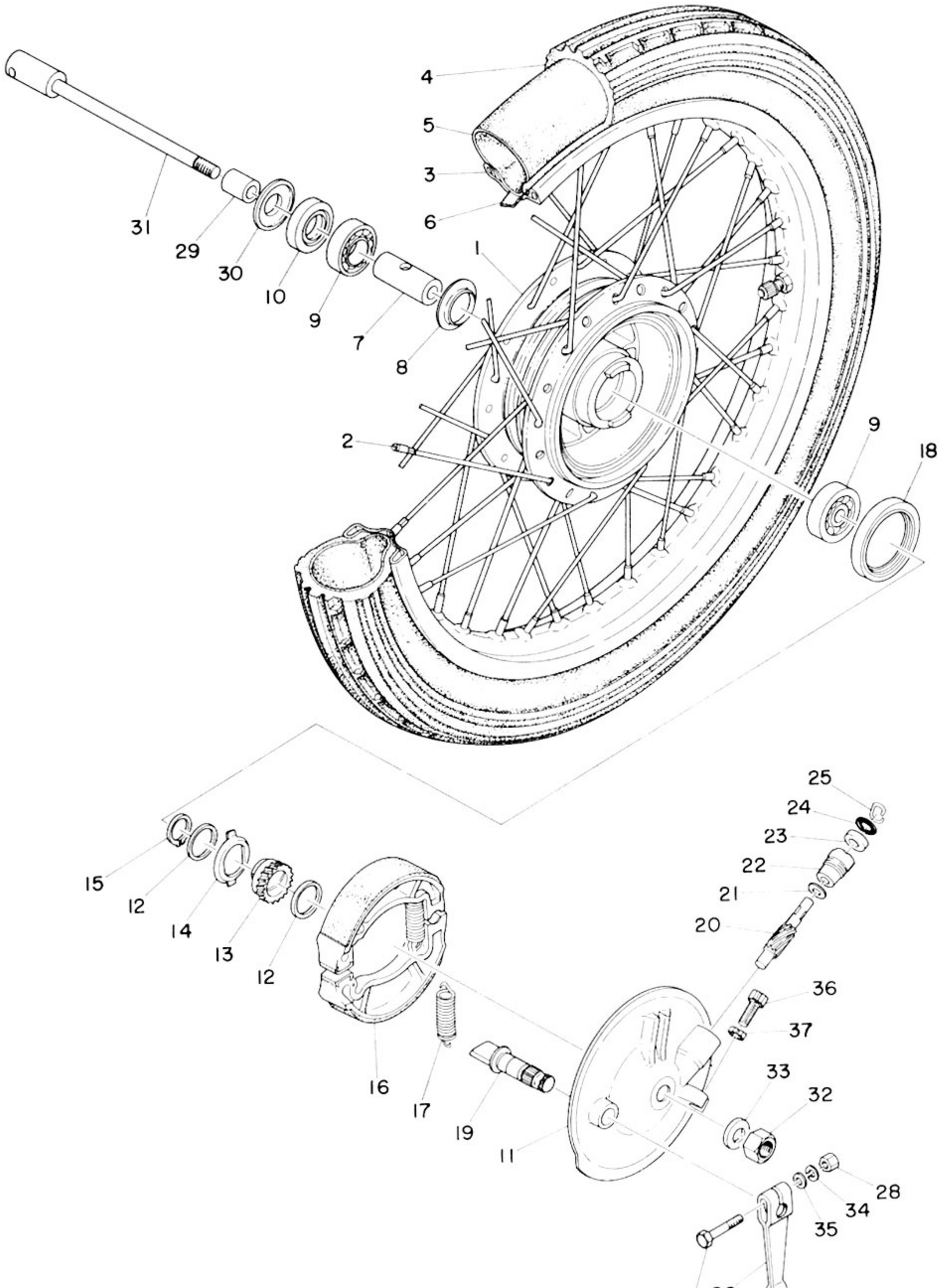
The element may be washed in clean gasoline if accumulation of dust is excessive.

CHAPTER 6. CHASSIS

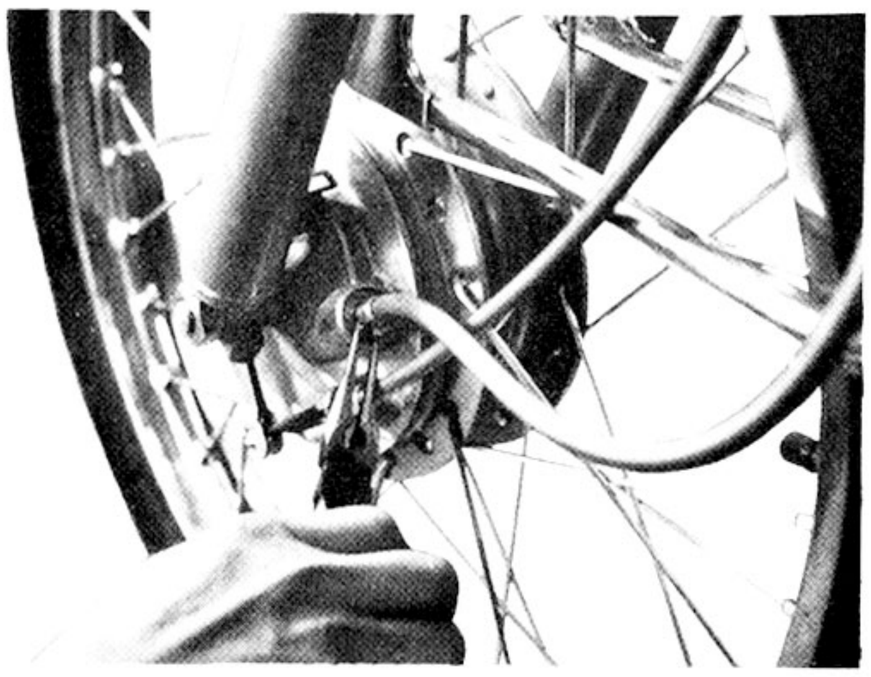
Yamaha Sports 100 LS2 is designed to provide durability, driving stability and improved controllability comparable to conventional sports machines of 180cc class, yet light in "feel" as a machine of 90cc class with simplified controls. Steel pipe diamond frame is adopted to reduce the weight and to increase rigidity.

Uniform distribution of stress is accomplished by minimizing the number of components.

FRONT WHEEL

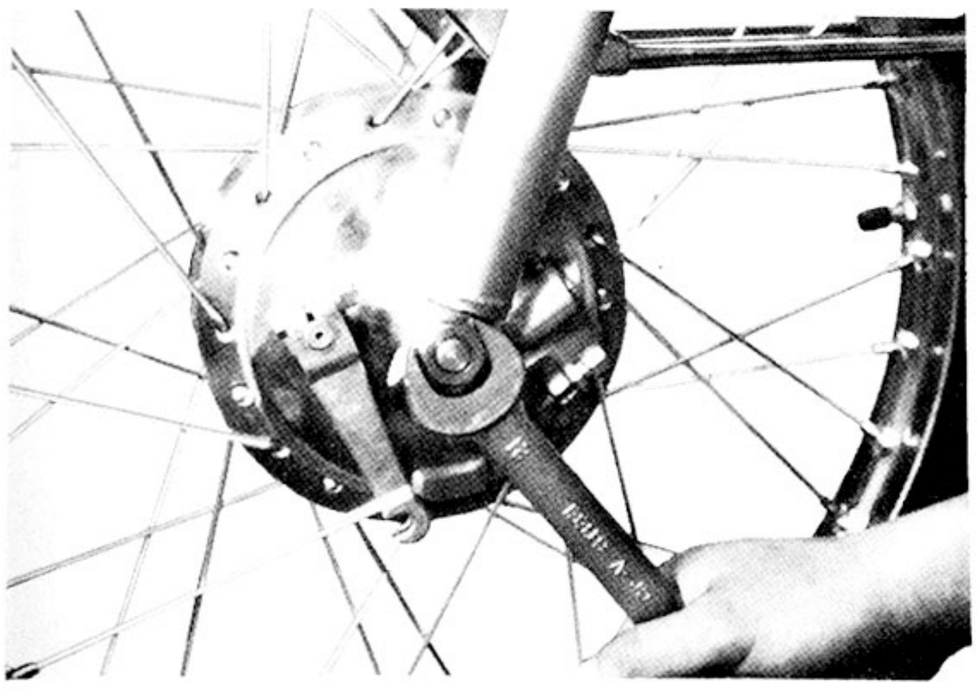


1 HUB
2 SPOKE SET
3 RIM (1.40-18)
4 TIRE (2.50-18-9PR)
5 TUBE (2.50-18)
6 BAND, rim (2.50-18)
7 SPACER, bearing
8 FLANGE, spacer
9 BEARING (6301Z)
10 OIL SEAL (SD-18-37-8)
11 PLATE, brake shoe
12 WASHER, thrust 2 (20.5-26-1.0)
13 GEAR, drive
14 CLUTCH, meter
15 CIRCLIP (S-20)
16 BRAKE SHOE COMP.
17 SPRING, return
18 OIL SEAL (SDD-47-58-7)
19 CAM SHAFT
20 GEAR, meter
21 WASHER, thrust 1 (7-12-0.8)
22 BUSHING
23 OIL SEAL (SO-7-14-4)
24 O-RING
25 RING, stop
26 LEVER, cam shaft
27 BOLT
28 NUT
29 COLLAR, wheel shaft
30 COVER, wheel shaft
31 SHAFT, wheel
32 NUT
33 WASHER, spring
34 WASHER, spring
35 WASHER, plain
36 BOLT, wire adjusting
37 NUT, wire adjusting

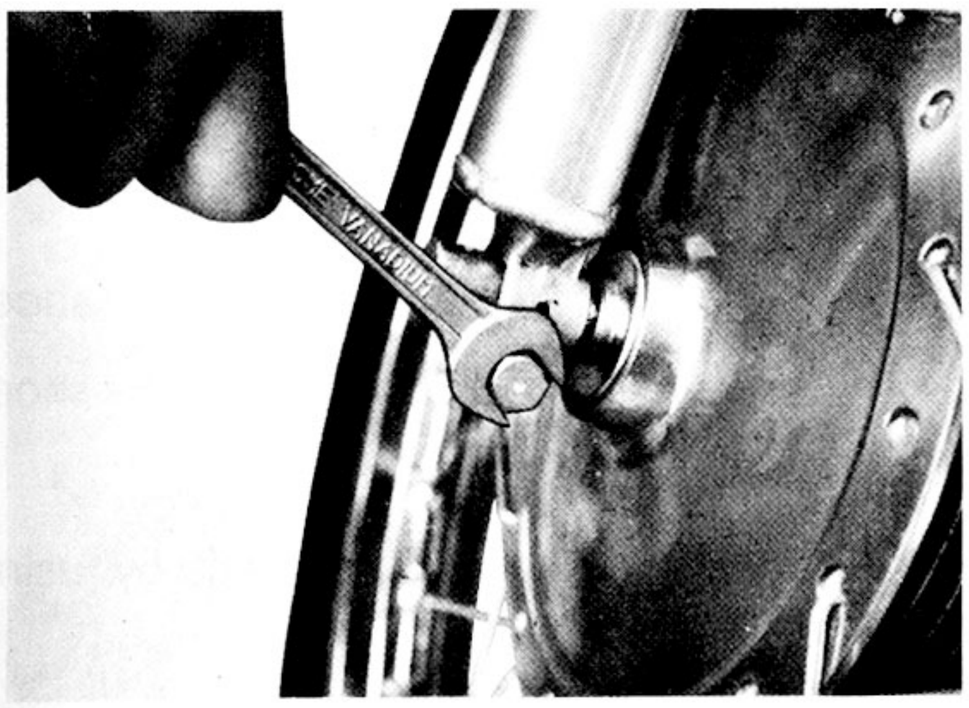


Removal

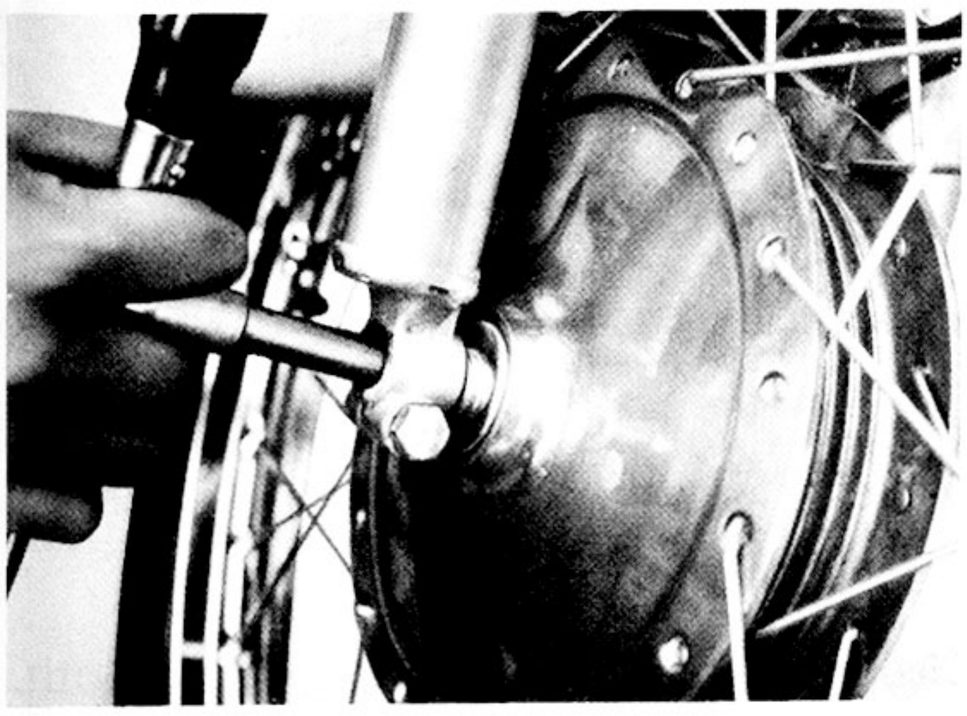
(1) Disconnect brake cable and speedometer cable at front brake shoe plate.



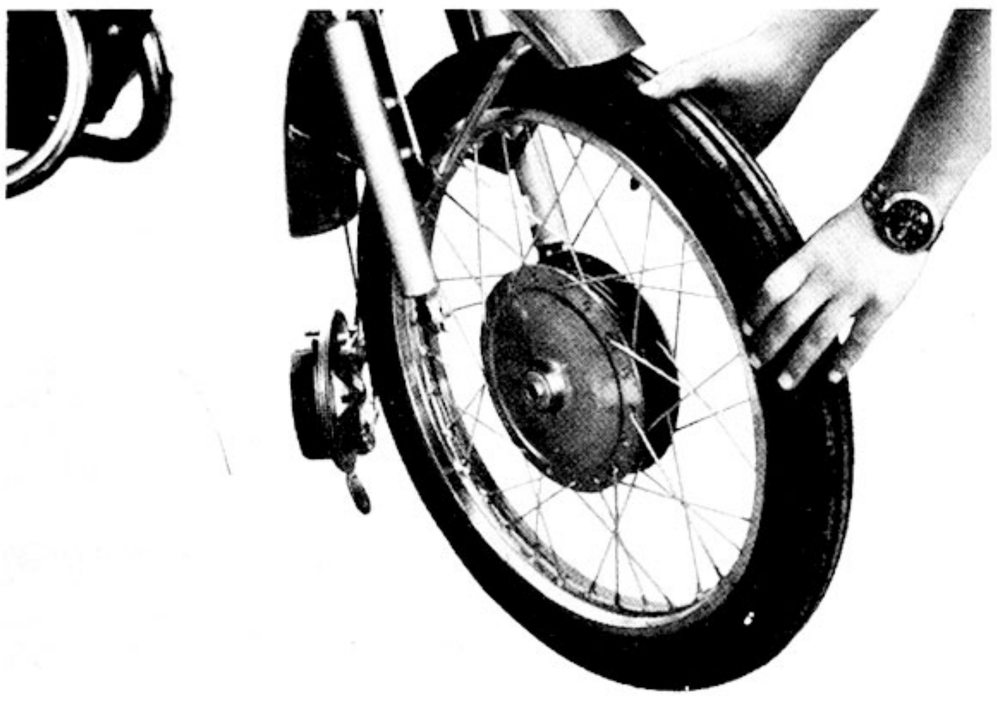
(2) Remove front wheel shaft nut.



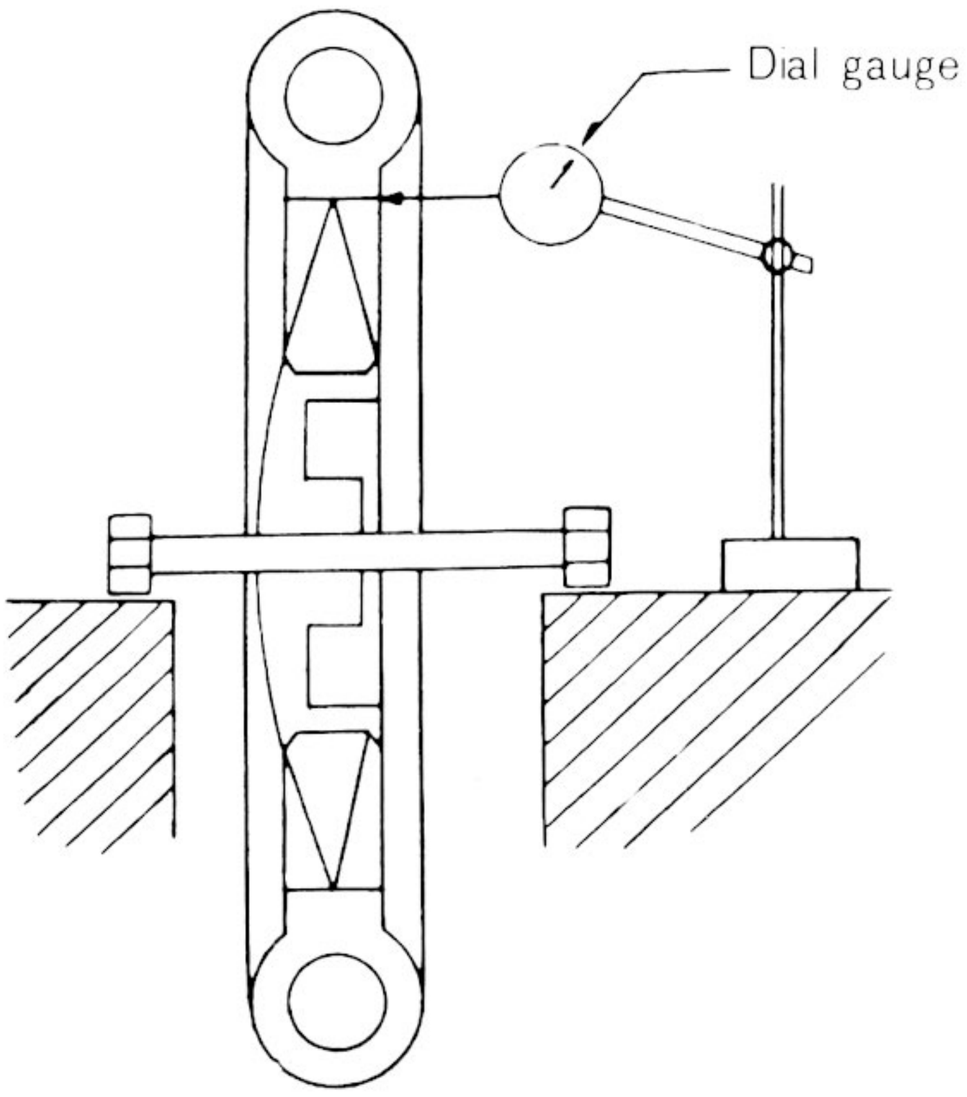
(3) Loosen front wheel shaft lock bolt.



(4) Pull out the shaft.



(5) Remove front wheel assy.

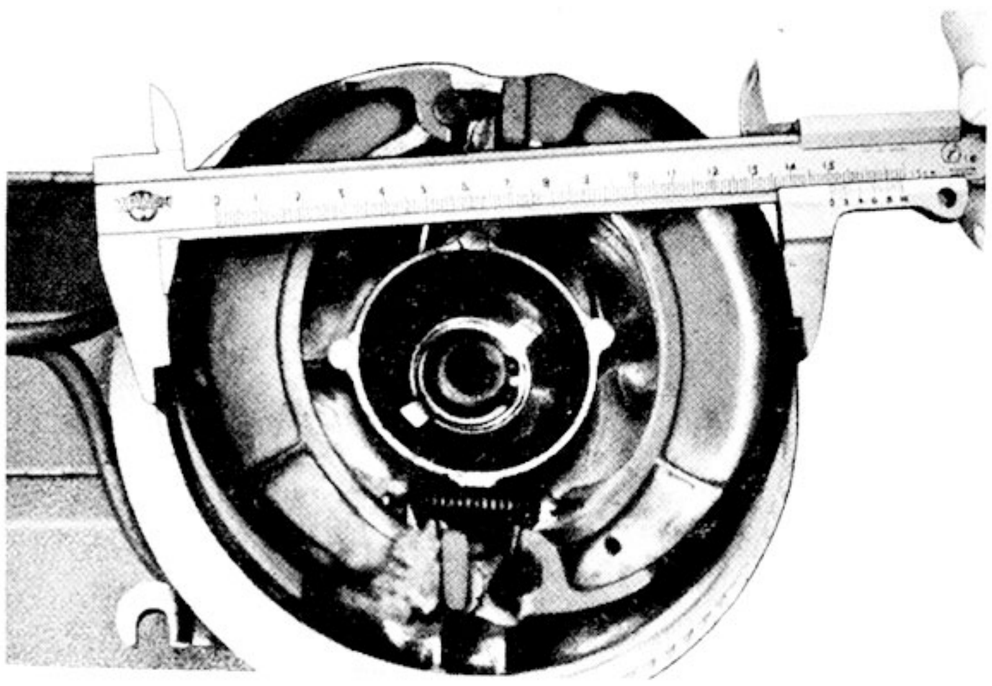


2. Inspection

(1) Runout of rim

Measure the runout of rim by using a dial gauge.

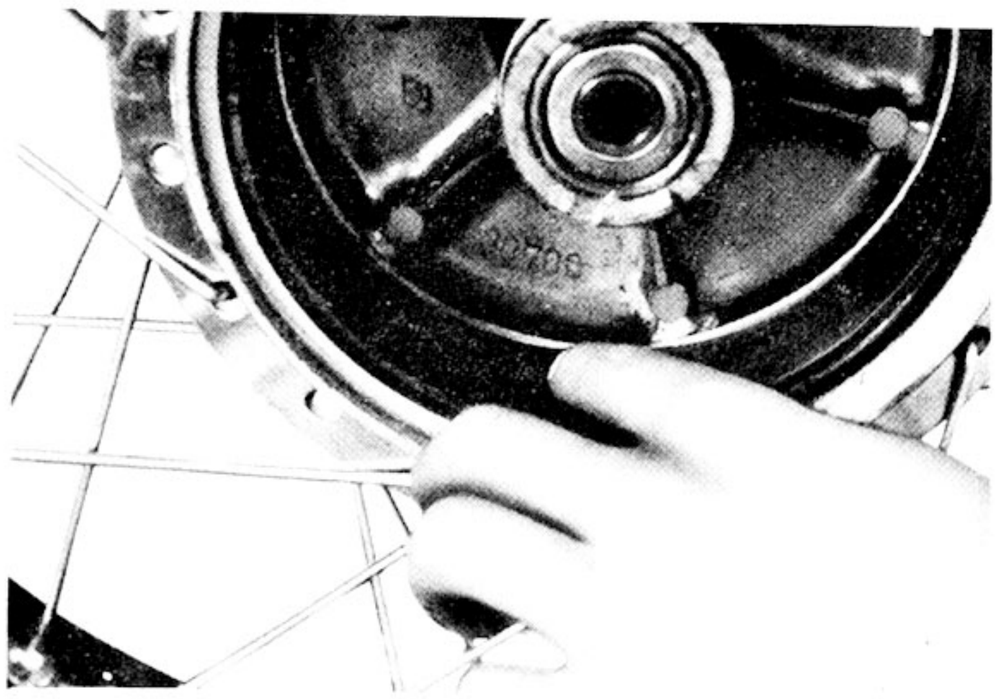
The allowable limit is 2 mm.



(2) Brake showe

Measure the outside diameter of brake shoes by using vernier calipers. Replace brake shoes if they are worn to 104 mm or less.

If the surfaces are rough, correct by using emery cloth or file.

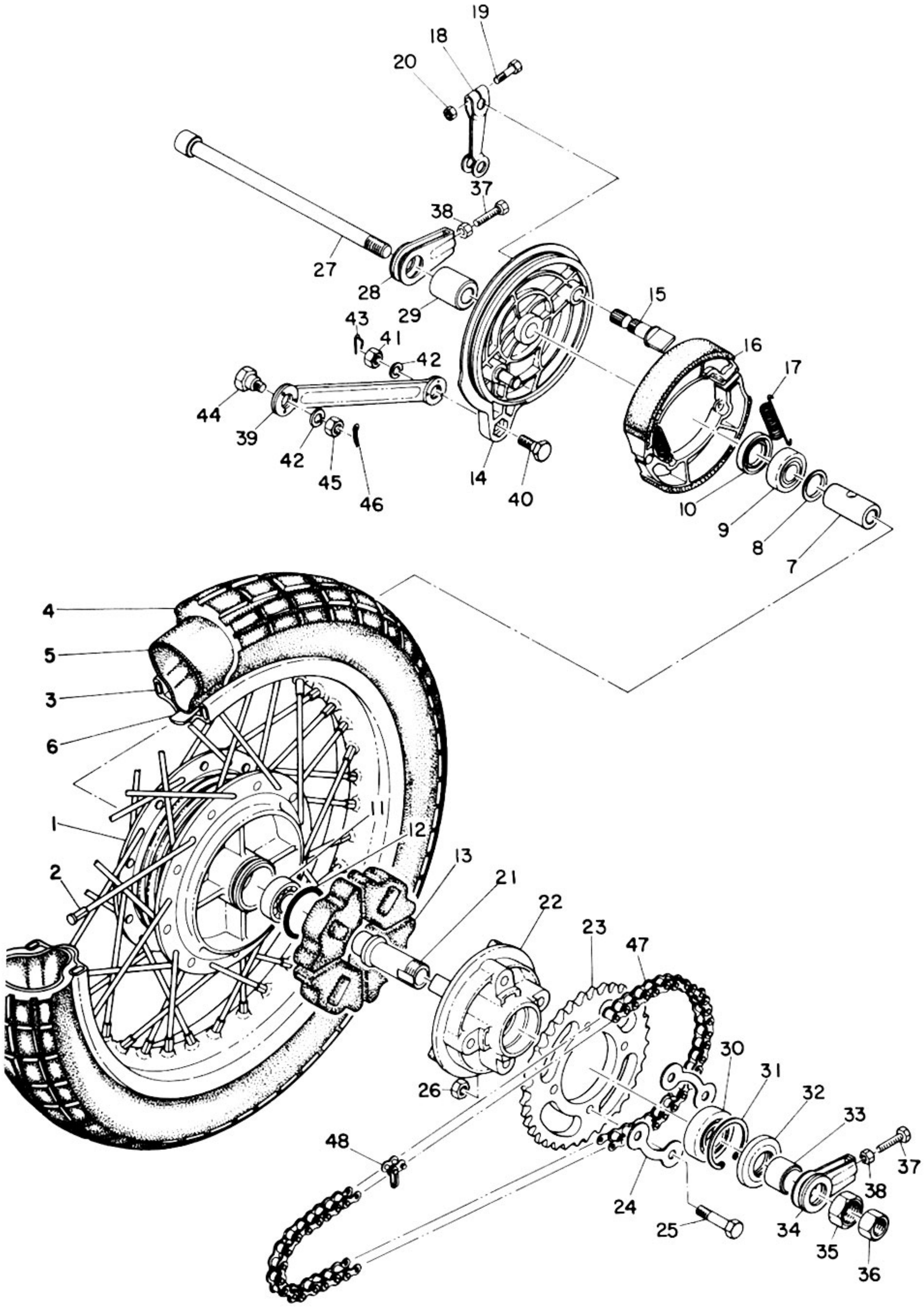


(3) Brake drum

If oil adheres or if there is any scratched flaw on the inner surface of brake drum, brake effectiveness will drop or abnormal noise will occur.

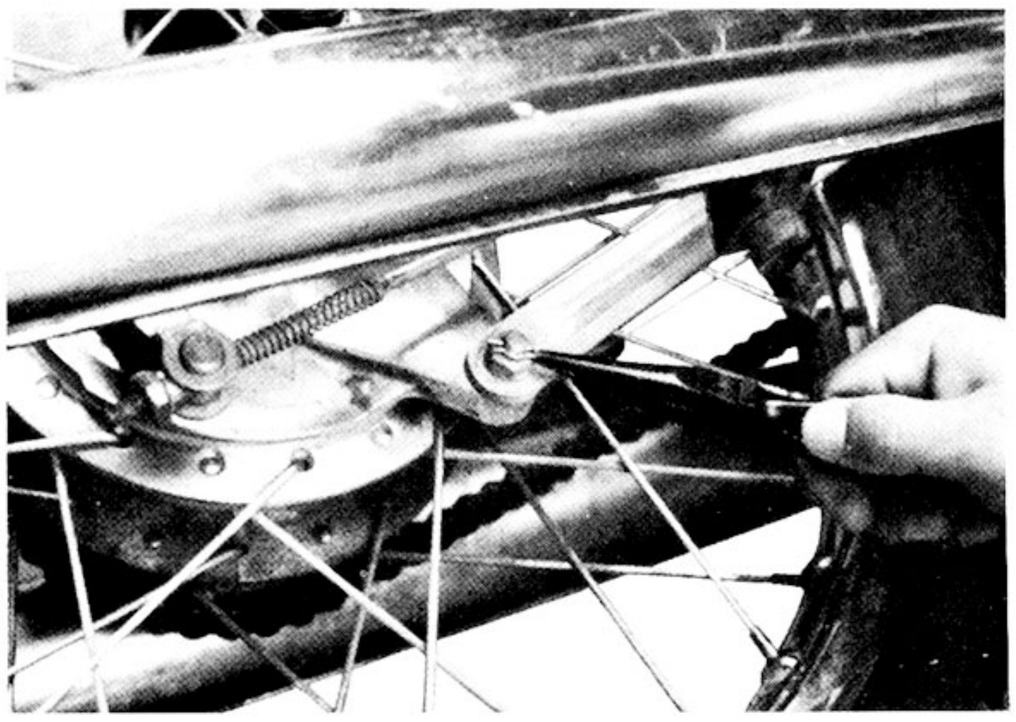
Clean with rag or correct with emery cloth.

Rear Wheel

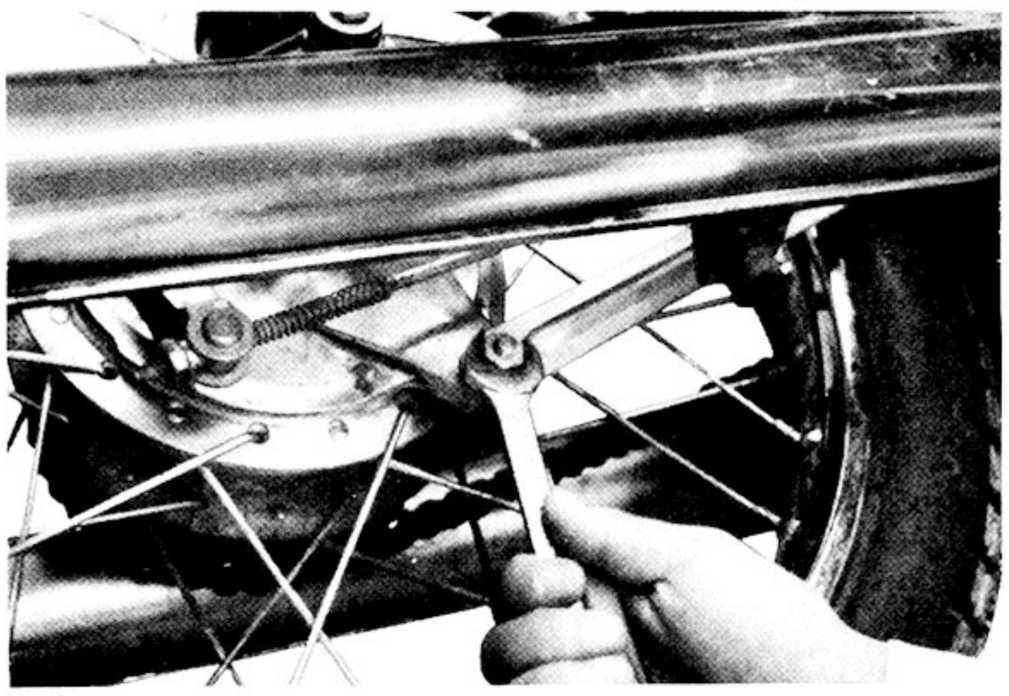


1 HUB
2 SPROKE SET
3 RIM
4 TIRE
5 TUBE
6 BAND, rim
7 SPACER, bearing
8 FLANGE, spacer
9 BEARING
10 OIL SEAL
11 BEARING
12 O-RING
13 DAMPER, clutch
14 PLATE, brake shoe
15 CAMSHAFT
16 BRAKE SHOE COMP
17 SPRING, return
18 LEVER, camshaft
19 BOLT
20 NUT
21 SHAFT, sprocket
22 CLUTCH, hub
23 GEAR, sprocket wheel
GEAR, sprocket wheel
GEAR, sprocket wheel
24 WASHER, lock
25 BOLT, fitting
26 NUT
27 SHAFT, wheel
28 PULLER, chain
29 COLLAR, wheel shaft
30 BEARING
31 CIRCLIP
32 OIL SEAL
33 COLLAR, sprocket shaft
34 PULLER, chain
35 NUT, sprocket wheel
36 NUT
37 BOLT, chain puller
38 NUT
39 BAR, tension
40 BOLT, tension bar
41 NUT
42 WASHER, spring
43 CLIP, tension bar
44 BOLT, tension bar
45 NUT
46 PIN, cotter
47 CHAIN
48 JOINT, chain

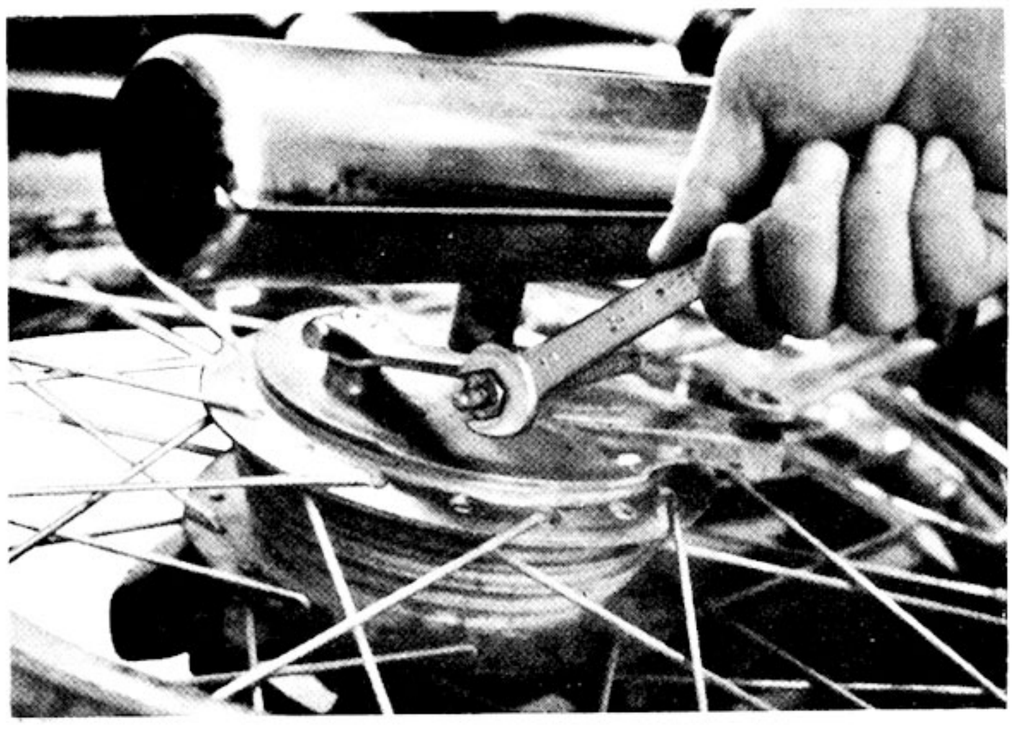
Removal



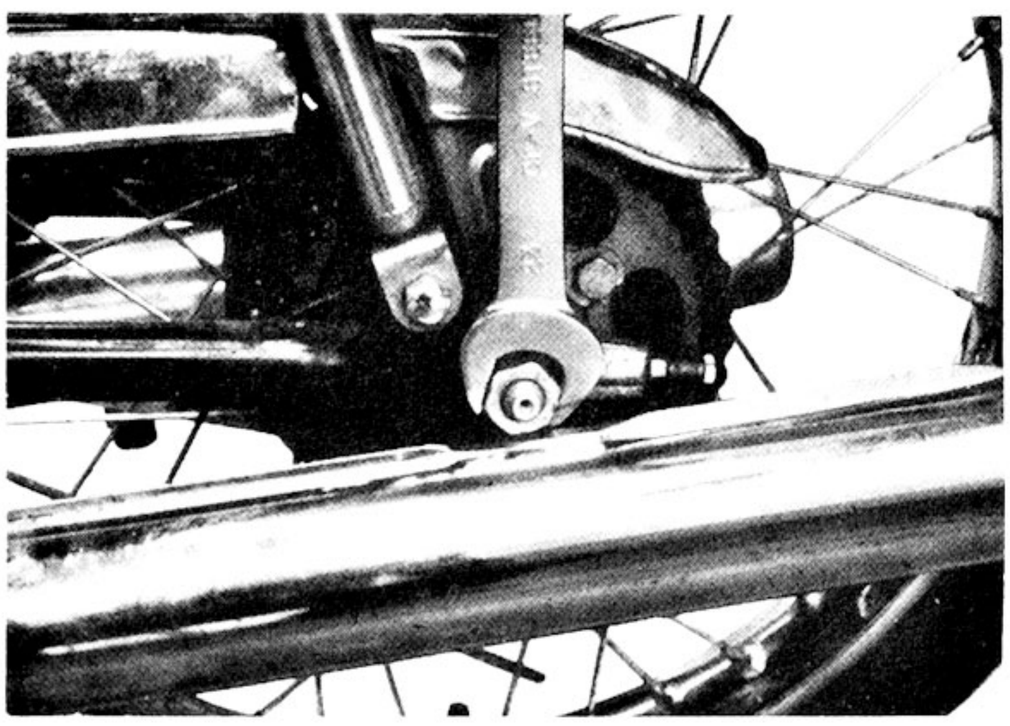
1. Remove clip.



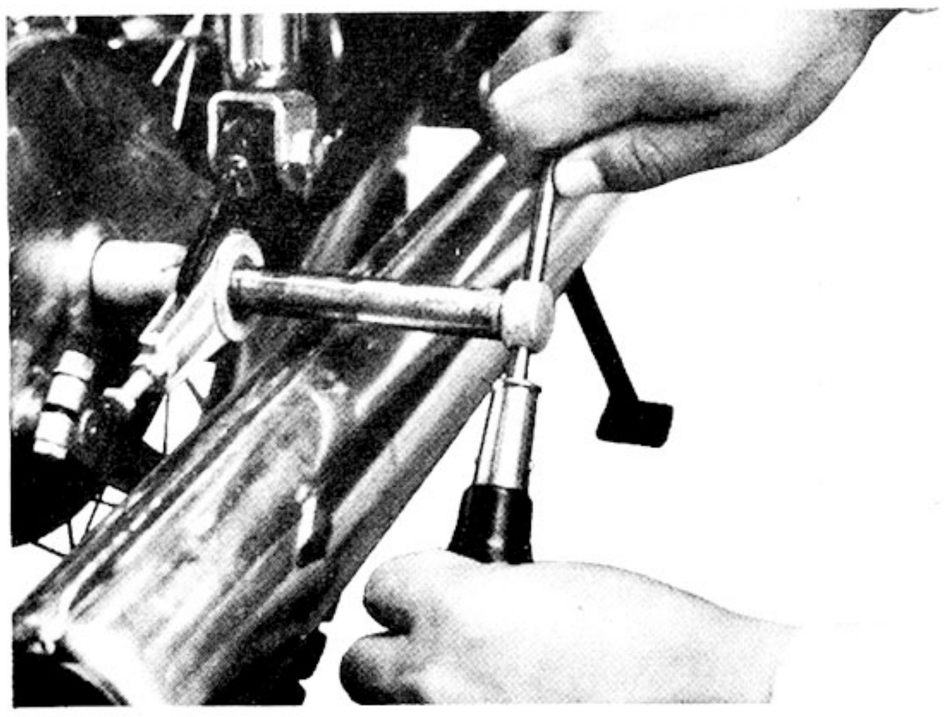
2. Remove tension bar.



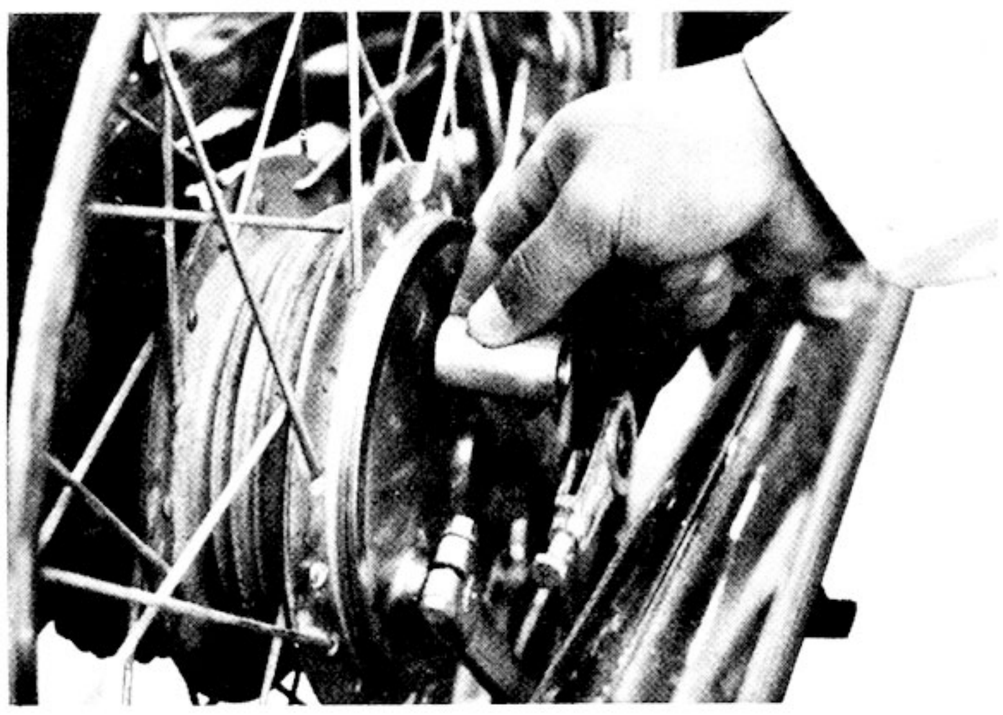
3. Remove brake rod from rear brake shoe plate.



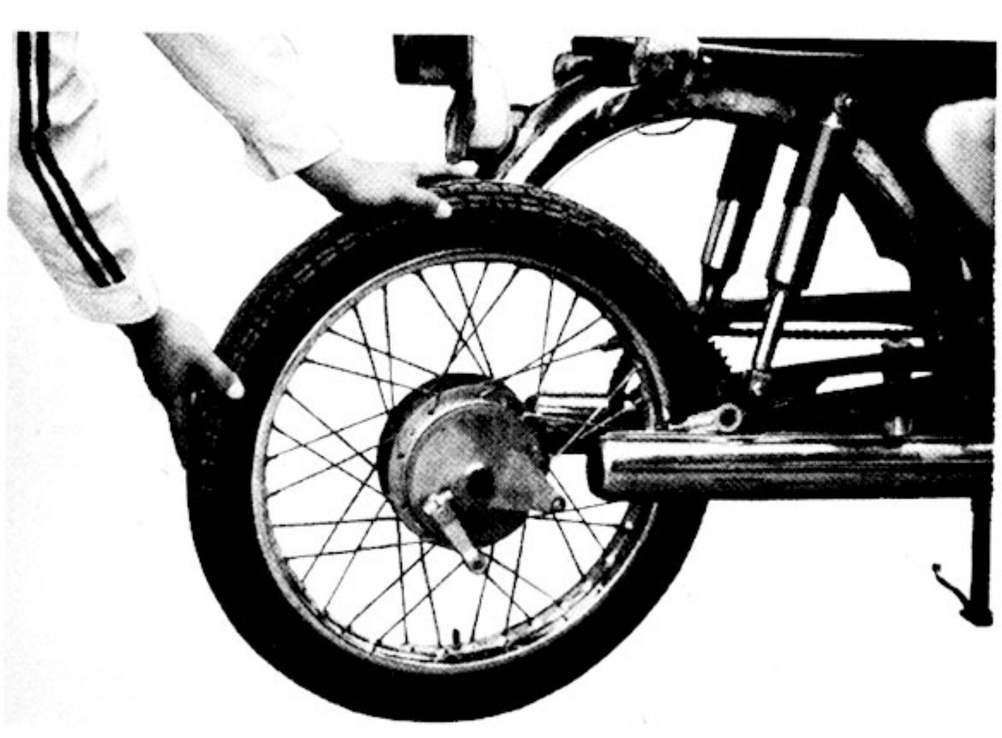
4. Remove rear wheel axle nut.



5. Pull out the axle.



6. Remove distance collar.



7. Remove rear wheel ass'y.

Inspection

(1) Runout of rim

Check in the manner identical to that for front wheel rim.

Serviceable limit is 2 mm.

(2) Brake shoes

Check in the manner identical to that for front brake shoes.

Serviceable limit is 125 mm.

(3) Brake drum

Check in the manner identical to that for front brake drum.

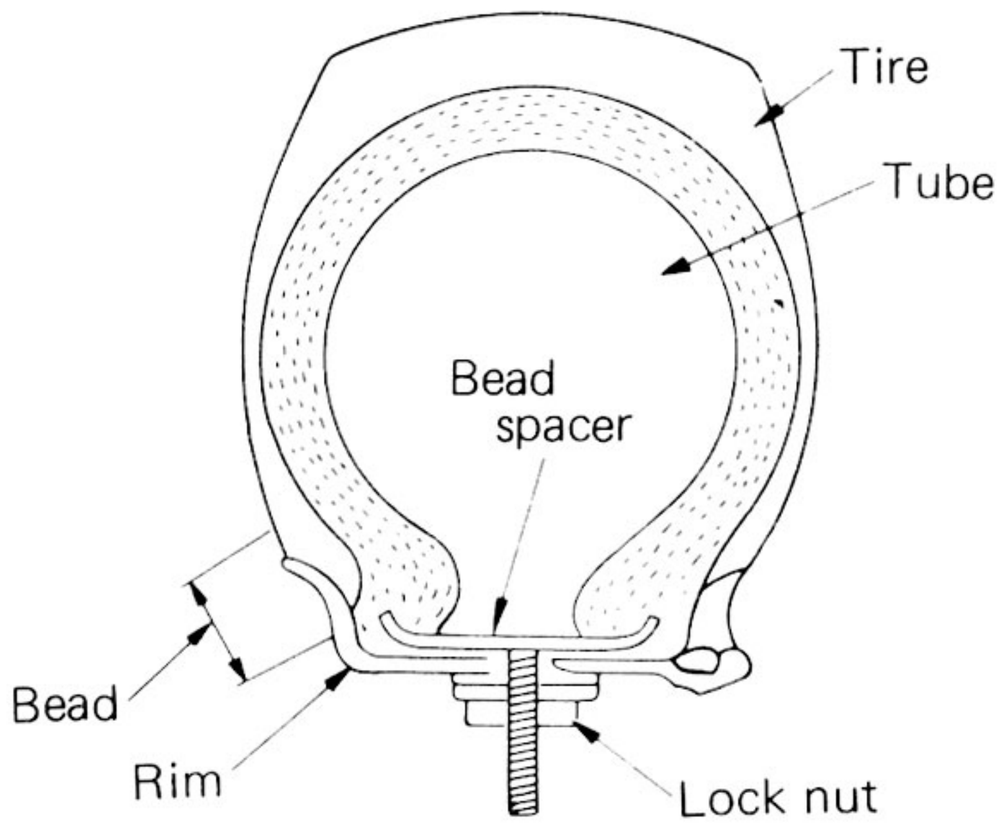
Replacing Tires

R emoval

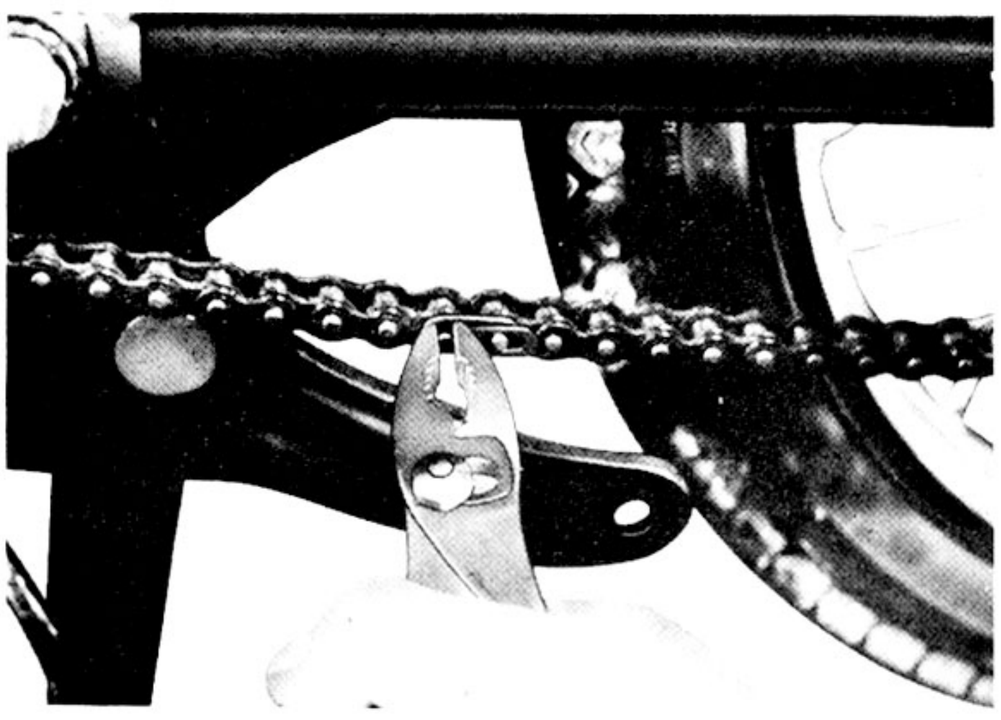
a. Remove the valve cap and lock nut from the tire valve, and deflate the tire.
b. Remove the tire from the wheel rim by the use of two tire levers. (Exercise care to avoid damaging the inner tube with the levers.)

Installation

a. Replace the tube between the tire and the wheel rim, and inflate the tube half. Be sure that the valve stem is directed toward the wheel shaft.
b. Mount the tire on the wheel rim by the use of tire levers. For this operation, it is advisable that the bead on one side of the tire be pushed in toward the rim flange.
c. To avoid pinching the tube between the tire and the rim, tap the tire with a hammer.
d. Tighten the tire valve lock nut, and inflate the tire to the recommended pressure then install the valve cap.

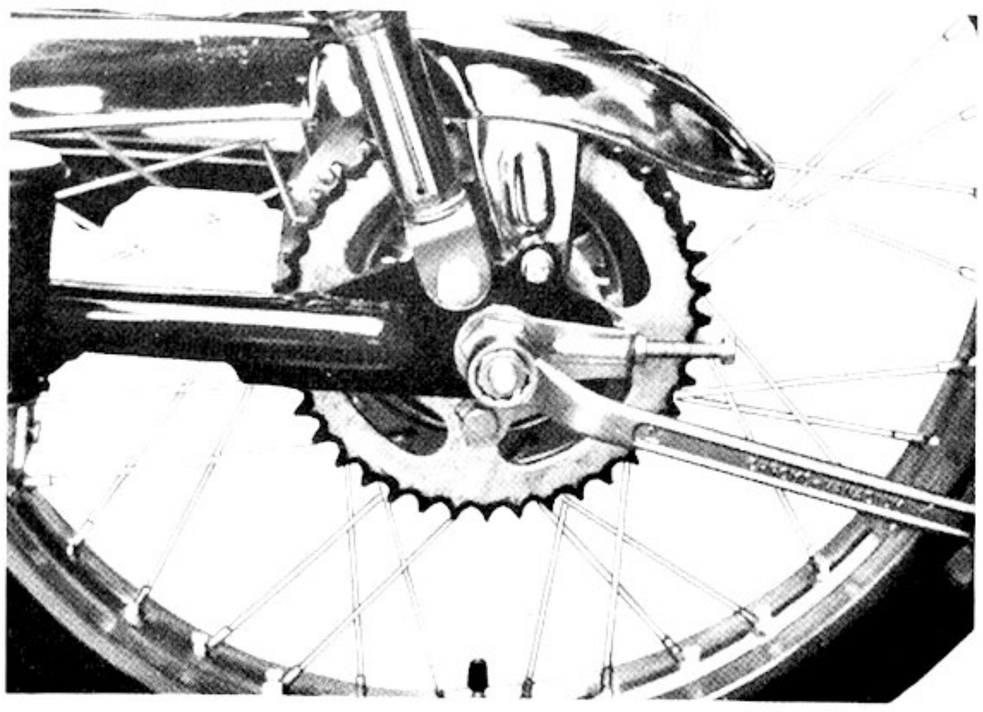


Rear Sprocket Wheel

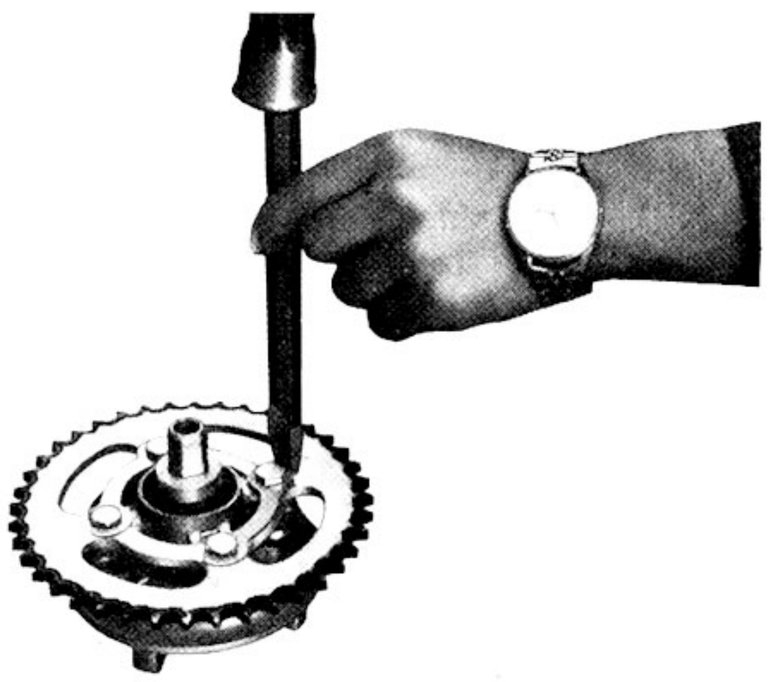


Removal

1) Disconnect the chain joint and remove the chain.



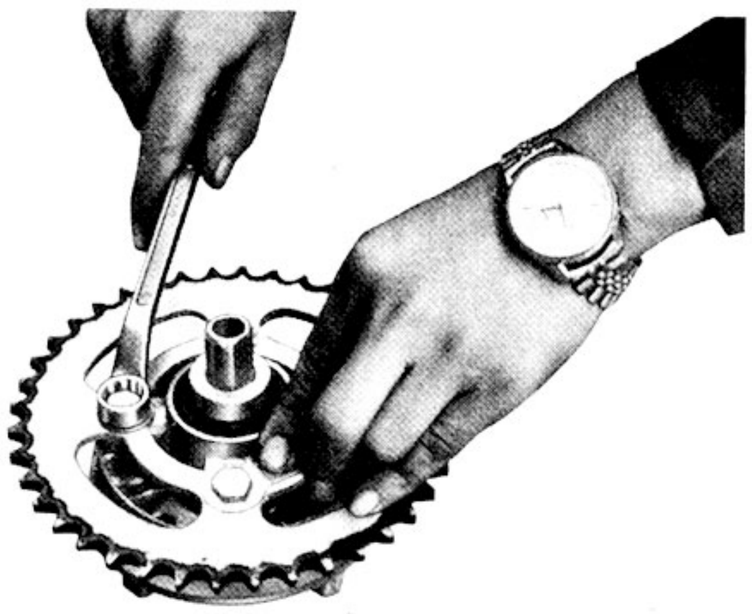
2) Remove the sprocket shaft nut, then the sprocket.



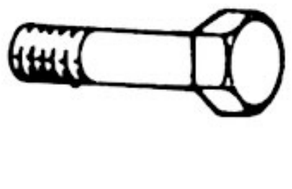
Suspension and Adjustment

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

1) Remove the sprocket.
   a. Flatten the lock washer.



   b. Remove the sprocket mounting bolts.

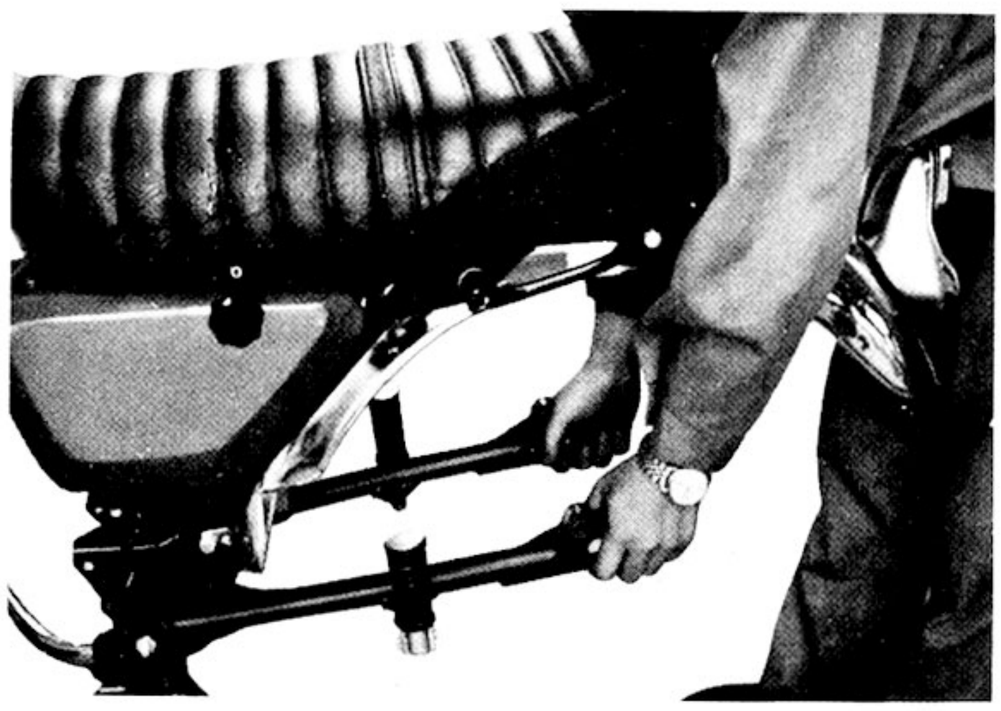


2) Checking

   Check the lock washers and hexagonal bolts for breakage and damage. If the sprocket wheel lock washer is damaged or not bent to lock the hexagonal bolt, the bolt may come loose while travelling, and cause an accidnet, Therefore, the bolt should be fully tightened and secured by the lock washer.

   The sprocket wheel should be checked for wear in the same manner as in the case of the drive sprocket.

Rear Arm



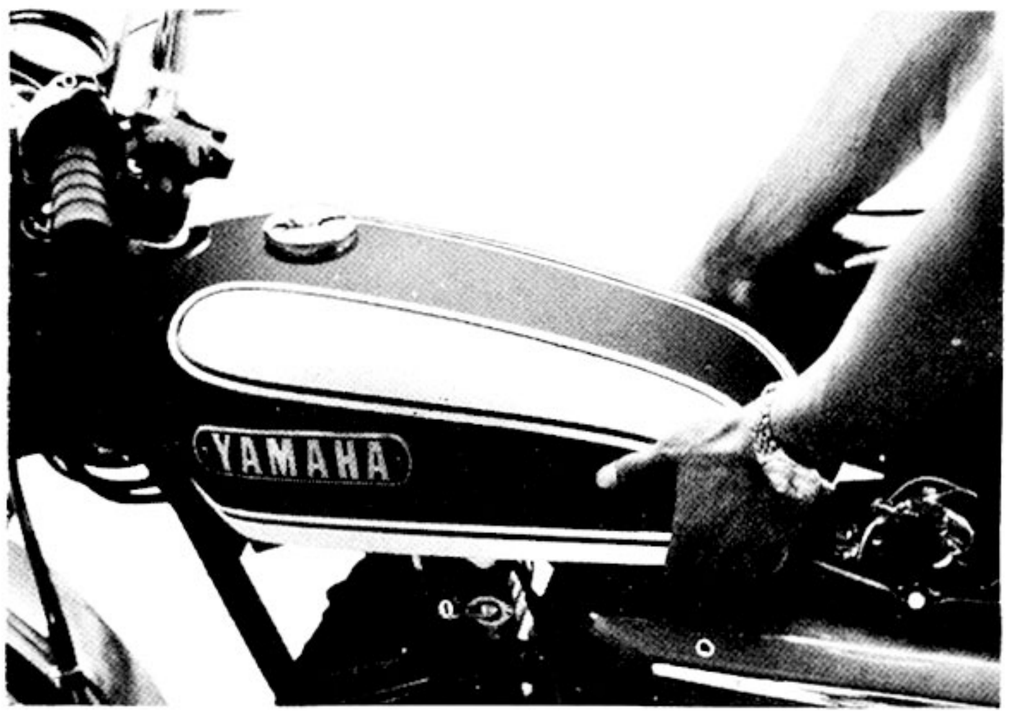
Inspection

If rear arm shaft becomes loose, rear wheel will shimmy, while driving and driving stablility will be adversely affected.

Move the rear arm side to side Fig. and replace the rear arm bush in the interior if the looseness is excessive.

Fuel Tank

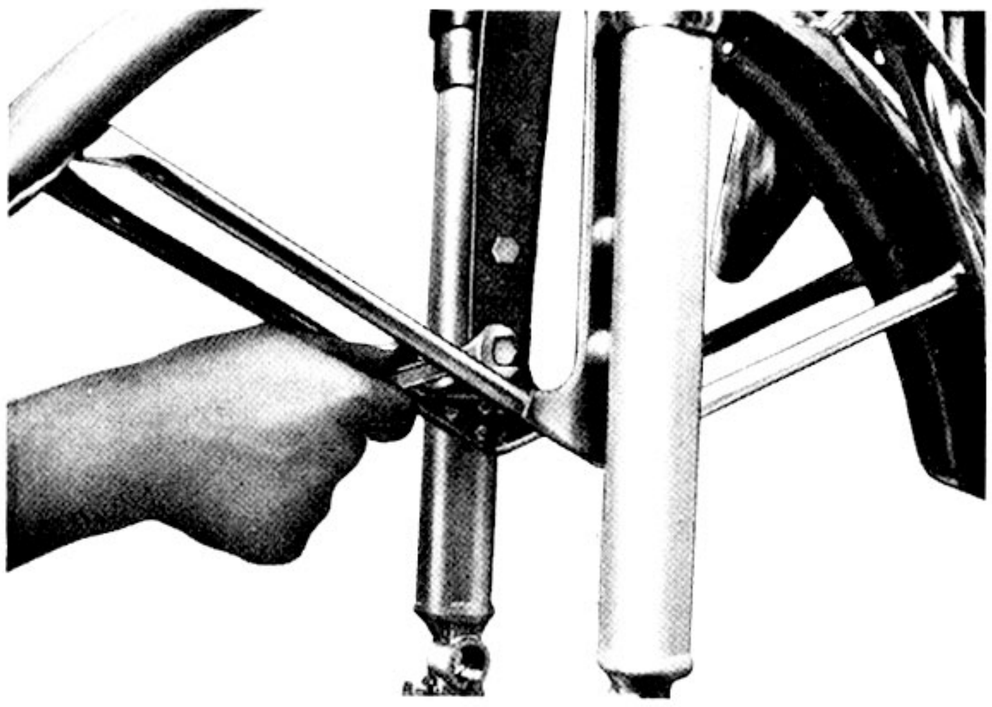
Separate side covers are provided on the fuel tank body to minimize the possibility of damage if the machine tips over and falls violently.



Removal

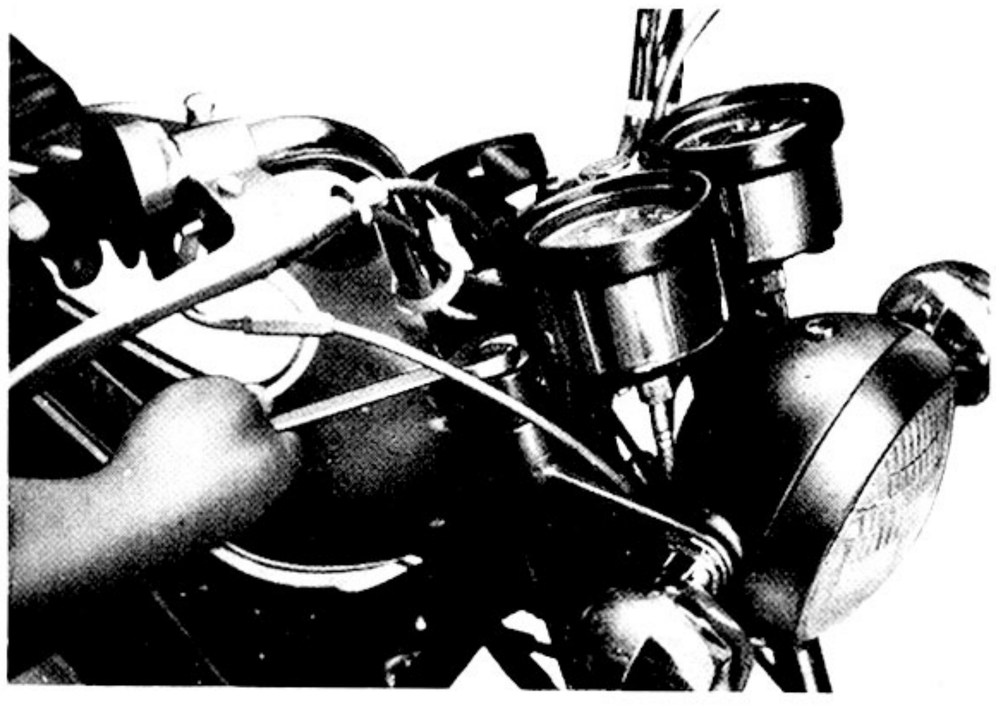
1. Raise seat
2. Drain the fuel
3. Disconnect the cross over pipe.
4. Remove tank by lifting the tail and sliding back-word.

Front Fork

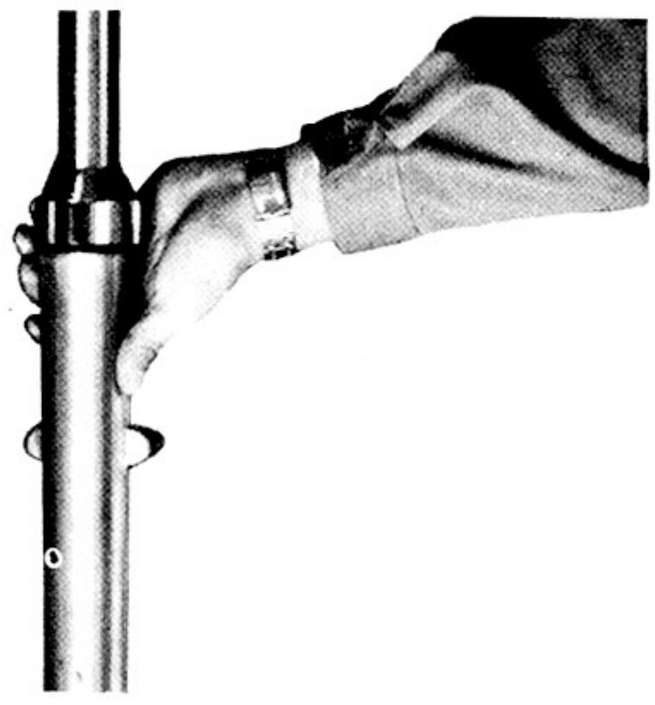


Removal

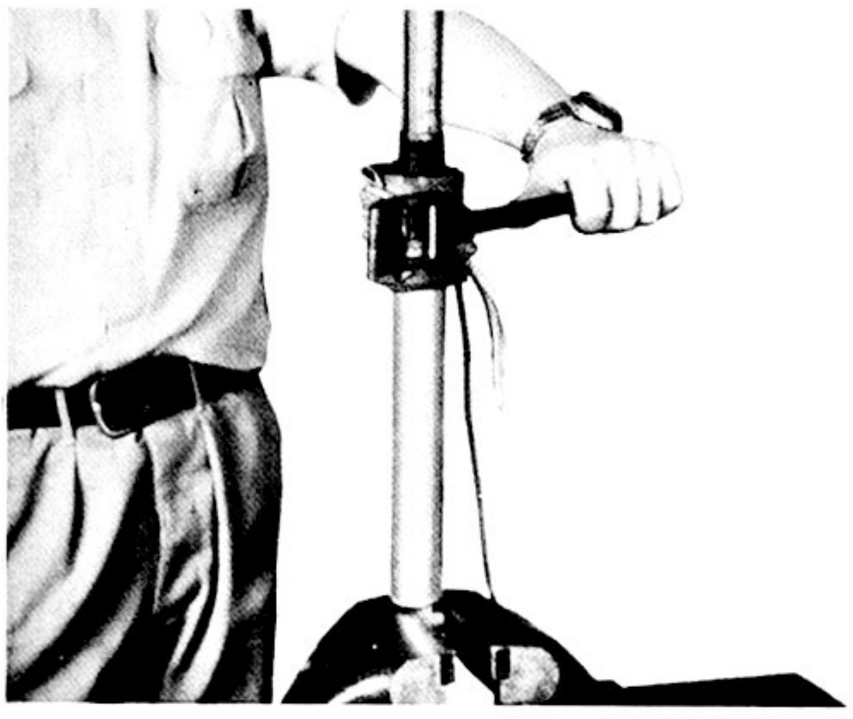
(1) Remove front fender and remove inner tube retaining bolts at the top ends of inner tubes.



(2) Loosen inner tube retaining bolts on under bracket.

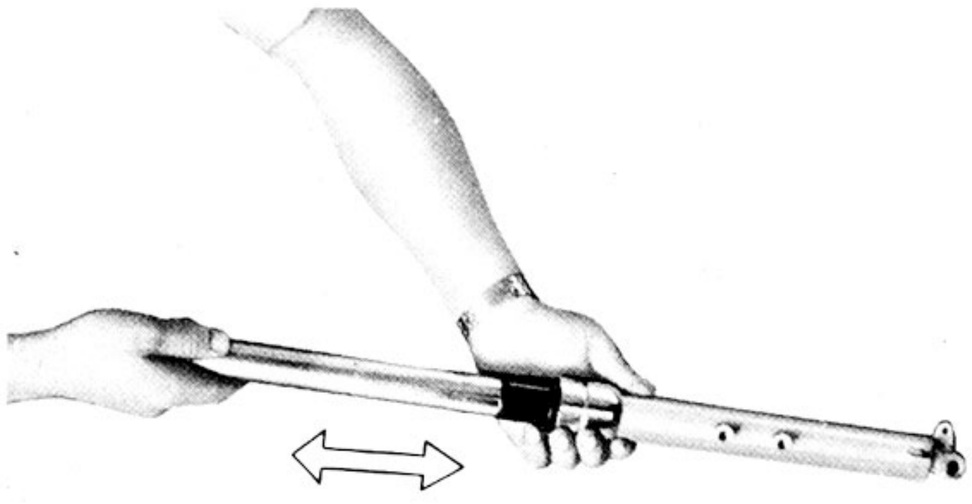


(3) Hold the outer tube and pull out downward.



Disassembly of Outer and Inner tubes

(1) Wind sheet rubber, tire tube or the like on the outer tube and disassemble.

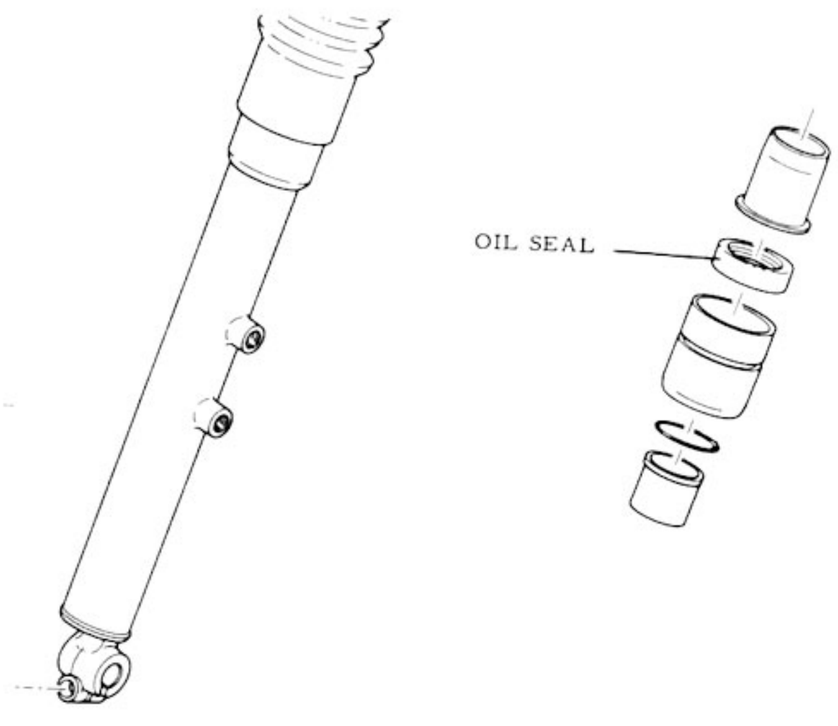


Inspection

(1) Inner tube

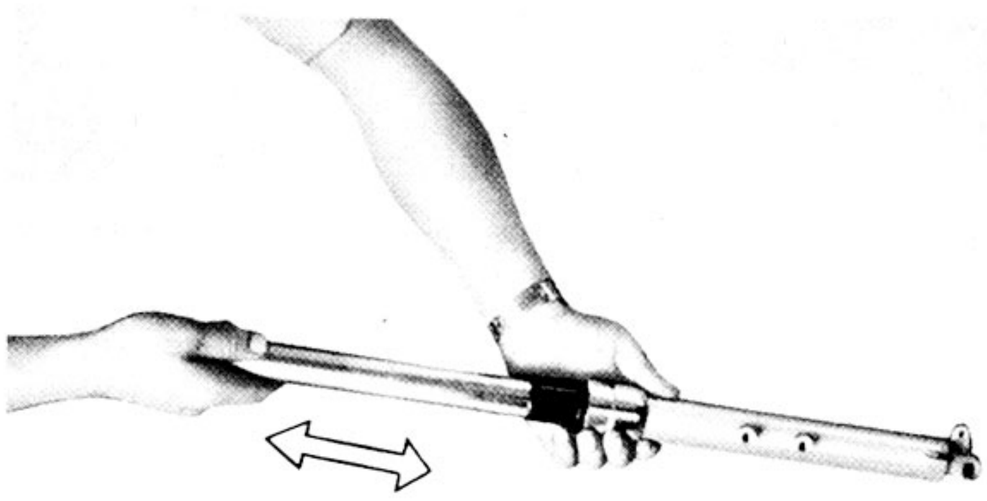
Check inner tubes for bend and damage.

Minor bend can be corrected by means of a press; however, it is recommended to replace with a new one.



(2) Oil seal

Make sure to replace oil seals after disassembly of front fork.

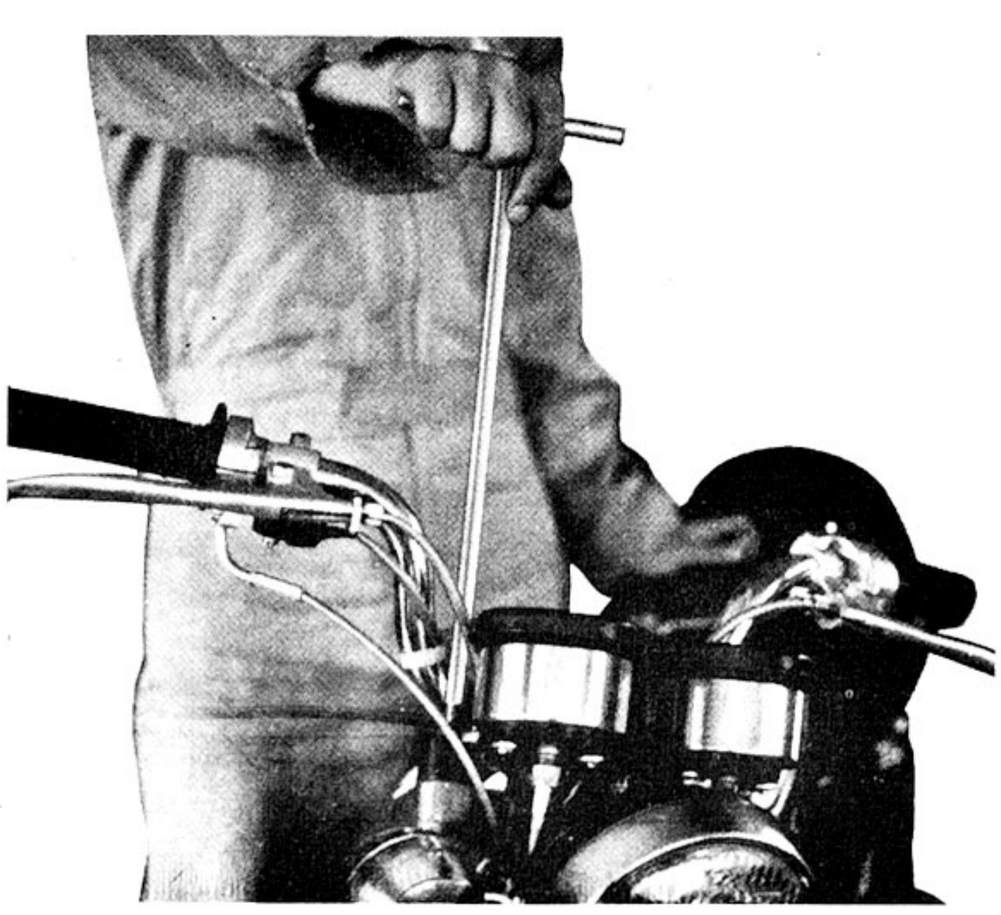


Reassembly

Sub-assembly of Front Fork Unit

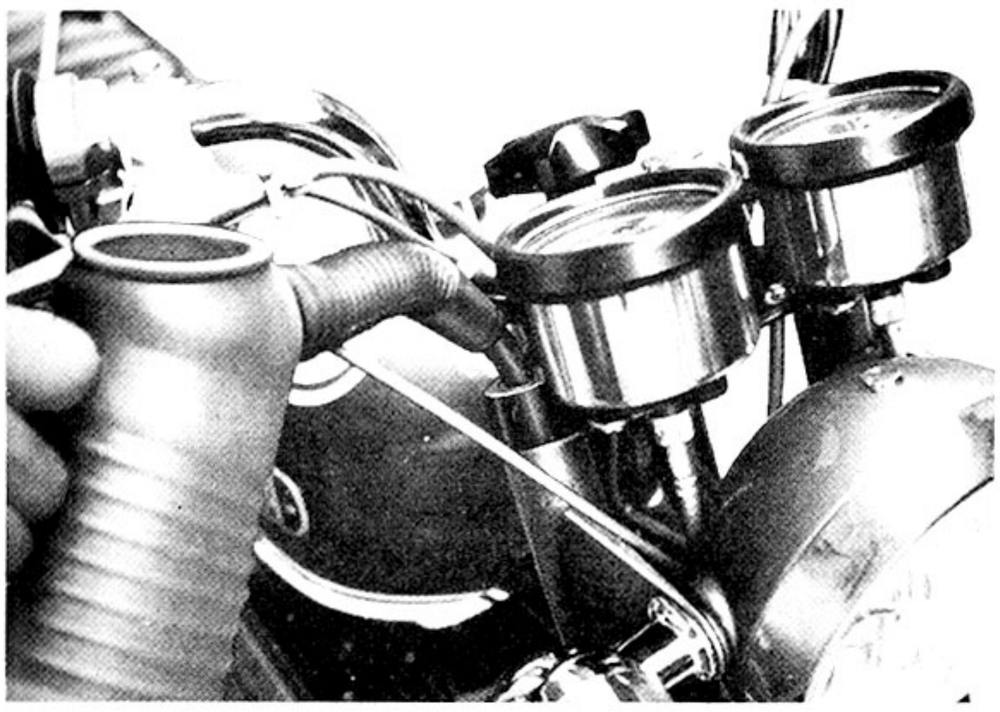
(1) Reassemble front fork unit in the sequence opposite to that of disassembly.

Check after assembly whether the inner tubes slide amoothly.



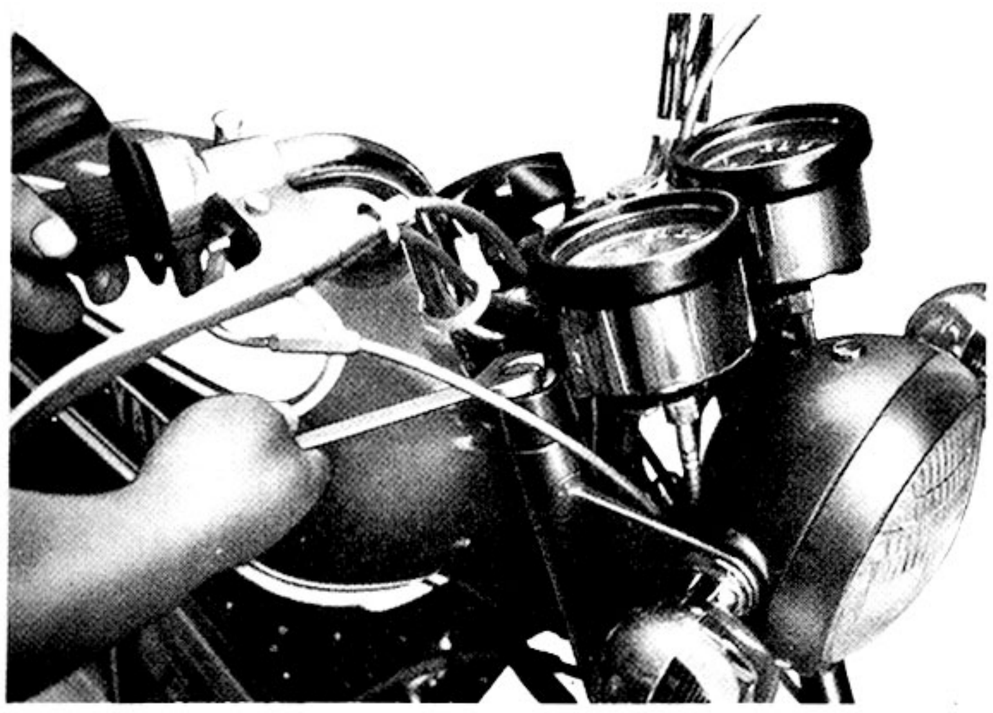
Installation to Frame

(1) Fully pull up to the specified position by using a front fork puller and then tighten retaining bolts on under bracket.



(2) Then fill inner tubes with front fork oil through the top opening.

* Capacity: 147 + 4 cc on each side
* Oil to be used
  (i) A mixture of moblie oil #30 (80%) and spindle oil #60 (20%); or
  (ii) Yamaha Gear Oil (A)



(3) Finally install inner tube retaining bolts.

Rear Cushion

Rear cushions (shock absorbers) cannot be disassembled.
Consequently, method of oil leakage inspection is described here.

How to Check for Oil Leakage

When the rear cushions are observed from the exterior, oil seepage can be noticed occasionally in the lower part of outer covers. Accordingly, it may be judged that oil is leaking from rear cushion. However, many of the cases described above are due to the grease applied on the springs in the interior. Such flow-out of grease has no adverse effect from the functional standpoint.
Check for leakage of oil according to the instructions given below.

(1) Remove rear cushion and depress it several times by hand.
The function is satisfactory if it quickly returns to a certain extent to the orginal condition, and then slowly in the last 10 mm.
If the cushion returns rapidly to its original position, it indicates that oil is leaking.
The cushion assembly should be replaced.

CHAPTER 7 ELECTRICAL EQUIPMENT

1 Outline of Electrical Equipment of Yamaha Sprots 100 LS2

An A.C. generator is used for LS2. The A.C. power generated, it is rectified by a silicon rectifier of single phase bridge type and supplies power directly to battery for charging, ignition coil, head light, tail light, stop light, neutral pilot light, flasher light, flasher pilot light and horn.

2 Main Components

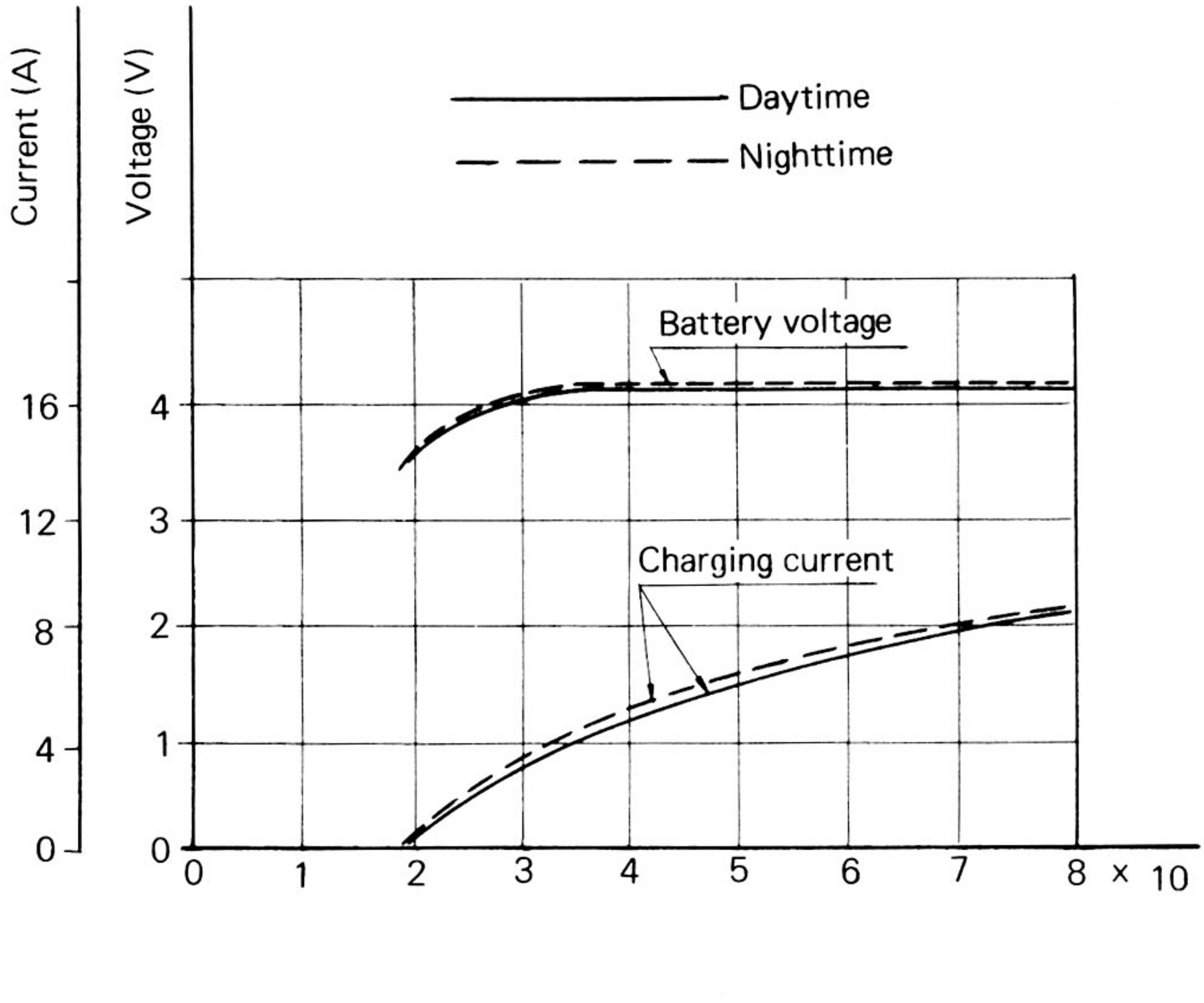
A.C. Generator

This is a magnetic generator that generates power by revolution of 6-pole permanent magnet in the interior of the armature, and its principle of operation is entirely identical to that of flywheel magnetos. The A.C. generator is provided with the following advangtages as compared with conventional ignition dynamo and starter dynamo.

(1) Structure is simple and rigid and causes little trouble.

(2) There is no voltage regulator requiring adjustment, therefore handling is easy.

A.C. Generator Performance Curve



2. Specification of A.C. Generator

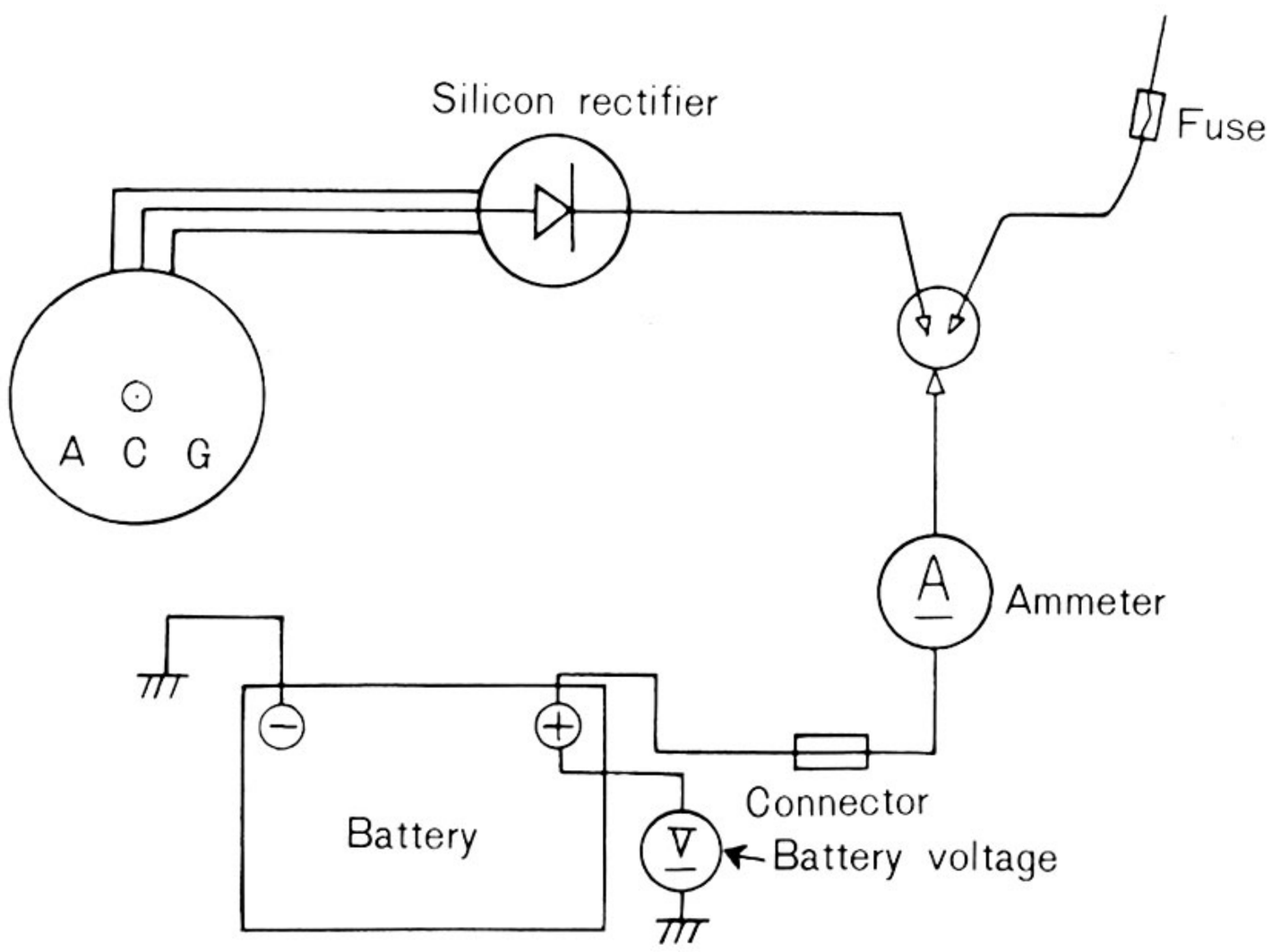
Item	Specification
Maker	Hitachi, Ltd.
Type	K108-12
Direction of rotation and revolution	Counterclockwise, 300 - 10,000 rpm
System voltage	12V
Normal load	Battery (12V, 5.5AH) + 2 ignition coils
Night load	Normal load + head lamp (12V, 35W) + tail lamp (12V, 8W) + meter lamp (12V, 3W×2)
Charging characteristic	Commences charging at 2,000 rpm
(Daytime)	or less
	1.6 ± 0.5A/5,000 rpm
	2.2 ± 0.7A/8,000 rpm
(Night time)	1.3 ± 0.5A/5,000 rpm
	1.9 ± 0.7A/8,000 rpm
Breaker point gap	0.3 - 0.40 mm
Breaker closing angle	140° ± 5° /point gap of 0.35 mm
Condenser capacity	0.15 ± 10% μF
Ignition timing	1.8 ± 0.1 mm B.T.D.C.

Inspection of A.C. Generator

If the head light gives insufficient illumination and/or if battery discharges within a short period of time, make the following checks.

Measurement of Charging Current

1. Disconnect the battery's red lead wire at connector.
2. Connect a D.C. ammeter (of about 5A) as shown.
3. Start the engine and measure the charging current at specified engine rpm with the switch placed in daytime position and in night time position.
4. The amperage reading will be slightly higher than the normal value if battery tends to discharge.



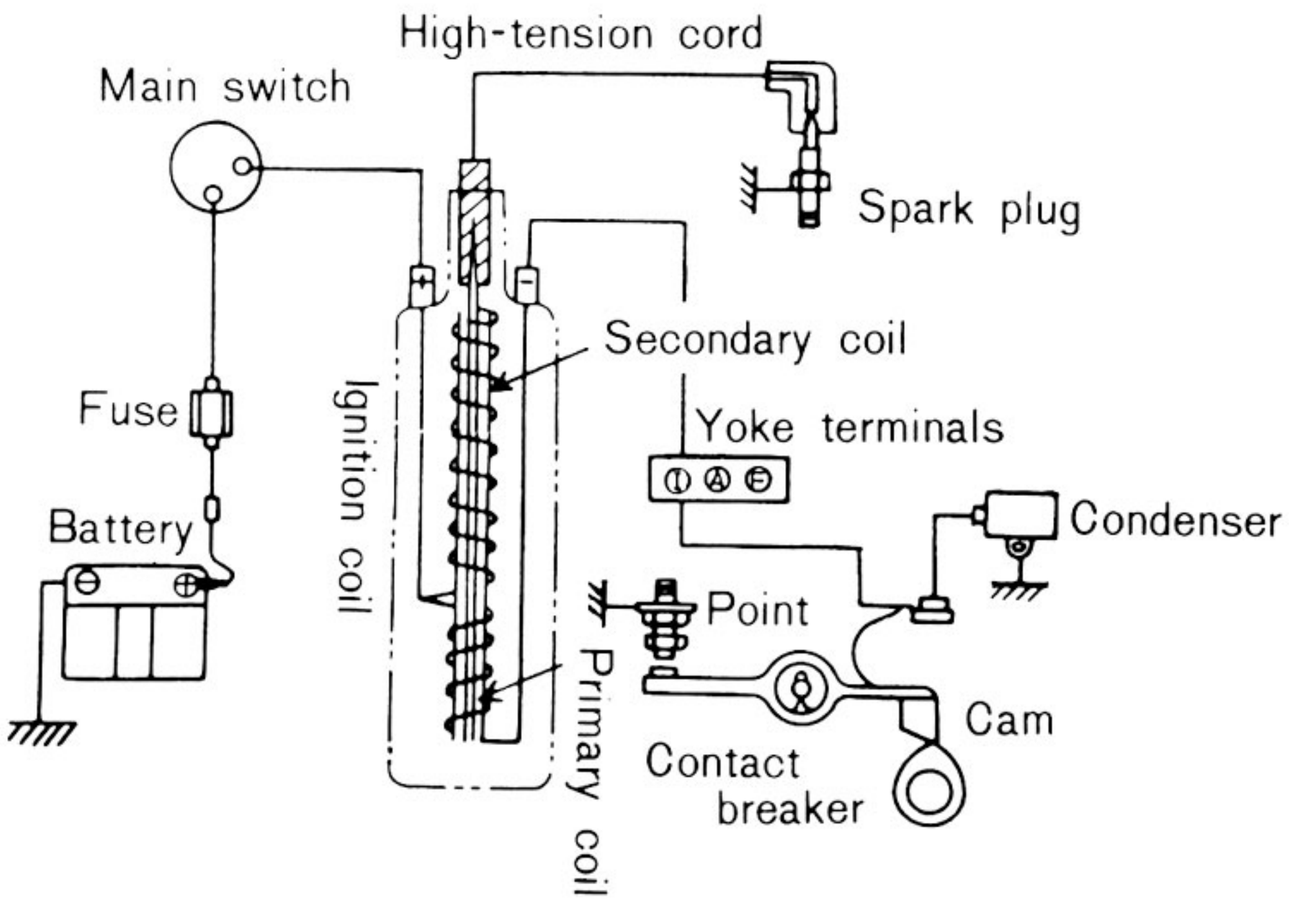
Standard Value

Engine Speed	Daytime	Night Time
5,000 rpm	1.6 ± 0.5A	1.3 ± 0.5A
8,000 rpm	2.2 ± 0.5A	1.9 ± 0.5A

Ignition Coil

The ignition coil is a kind of transformer having primary coil to secondary winding ratio of nearly 50, and when the current flowing to the primary coil (primary current from battery) is interrupted by the breaker, a voltage of 150 - 300V is generated in the primary coil due to self induction. This voltage is boosted to a voltage of 7.000 - 10,000V due to mutual induction of secondary coil and generates sparks at spark plugs.

The type of the ignition coils used in LS2 is identical to the ones used in conventional motorcycles equipped with dynamos.

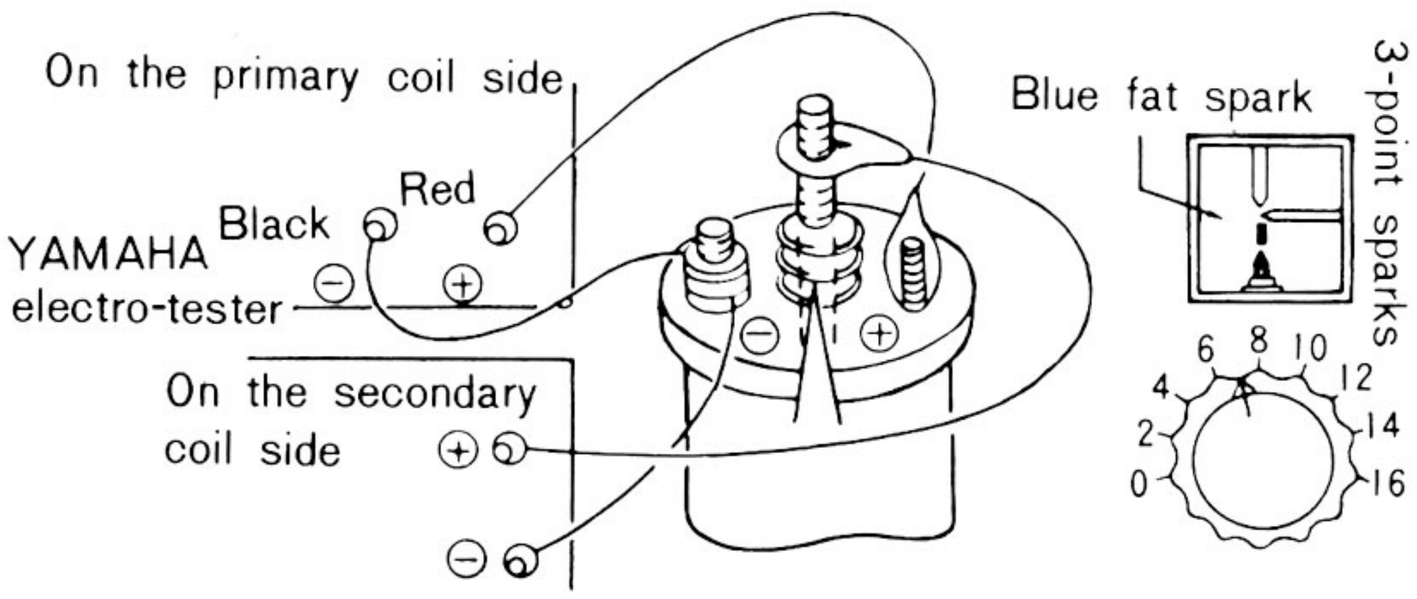


1. Specification of Ignition Coil

Item	Specification
Maker	Hitachi, Ltd.
Type	CM11-50B
Spark performance	Battery 8V: 8mm min at 300 rpm
	Battery 14V: 7mm min at 7,000 rpm

2. Inspection

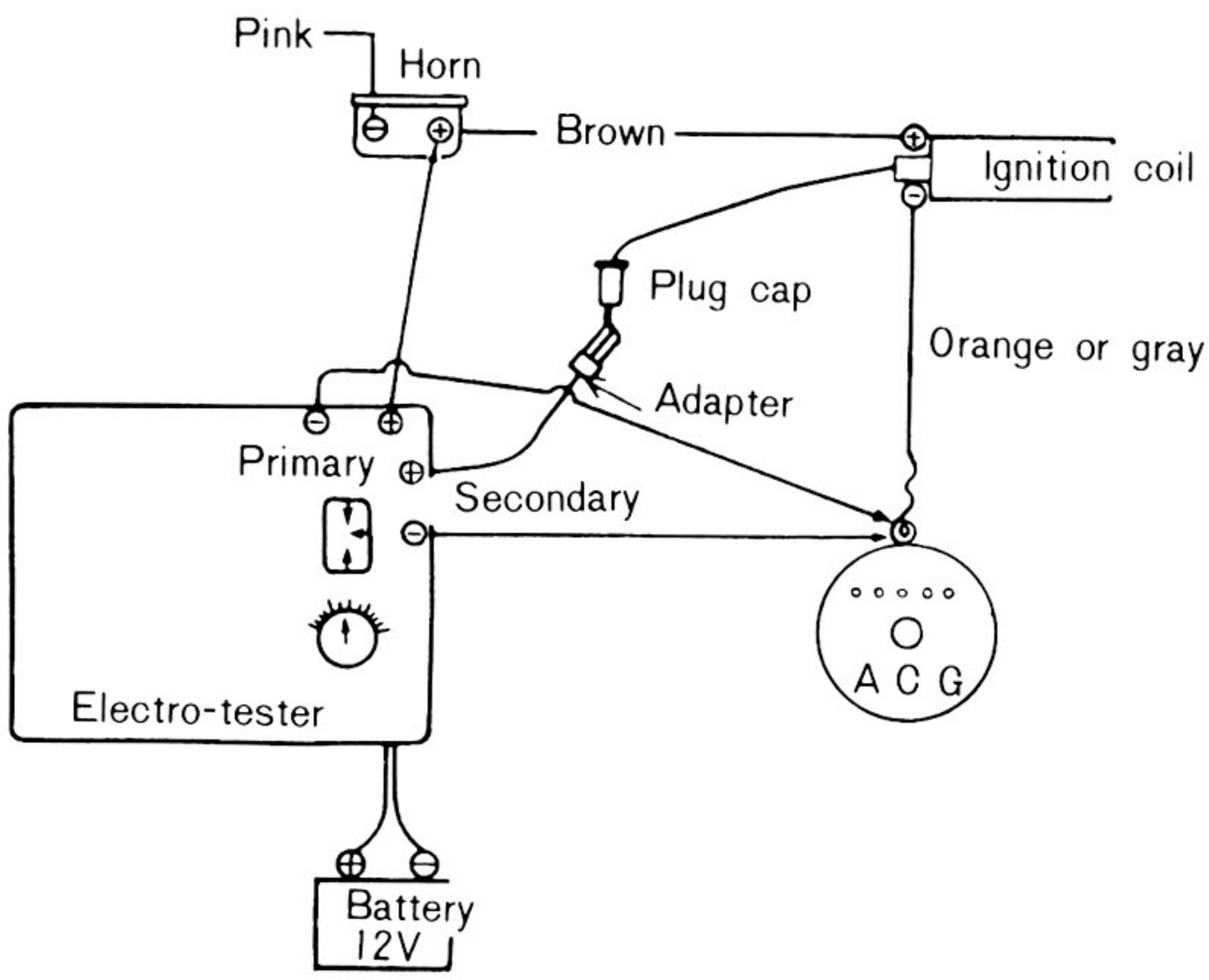
If no sparks are generated at spark plugs or if sparks are weak, check the ignition coil together with contact breaker.



* Independent coil test

(1) A 12V battery should be used for testing with the coil dismounted from motorcycle. The condition is satisfactory if sparks of 7 mm or longer are observed.

(2) Test with the coil as mounted on the motorcycle (practical test)



1) Connect negative cords of primary and secondary sides of the tester to the cords disconnected from I terminal of A.C. generator.
2) Remove high tension cord from spark plug. Install an adaptor (copper wire or steel wire) to the plug cap and connect the adaptor to the positive cord on secondary side of the tester.
3) Connect positive cord of primary side of the e tester to the terminal of brown wiring of the horn.
4) Use a 12V battery as power supply for tester.
5) The conditoin is satisfactory if the sparks measured by the tester is 7 mm or longer.

The condition of ignition coil may also be judged by measuring the resistance value of primary and secondary sides.

Silicon Rectifier

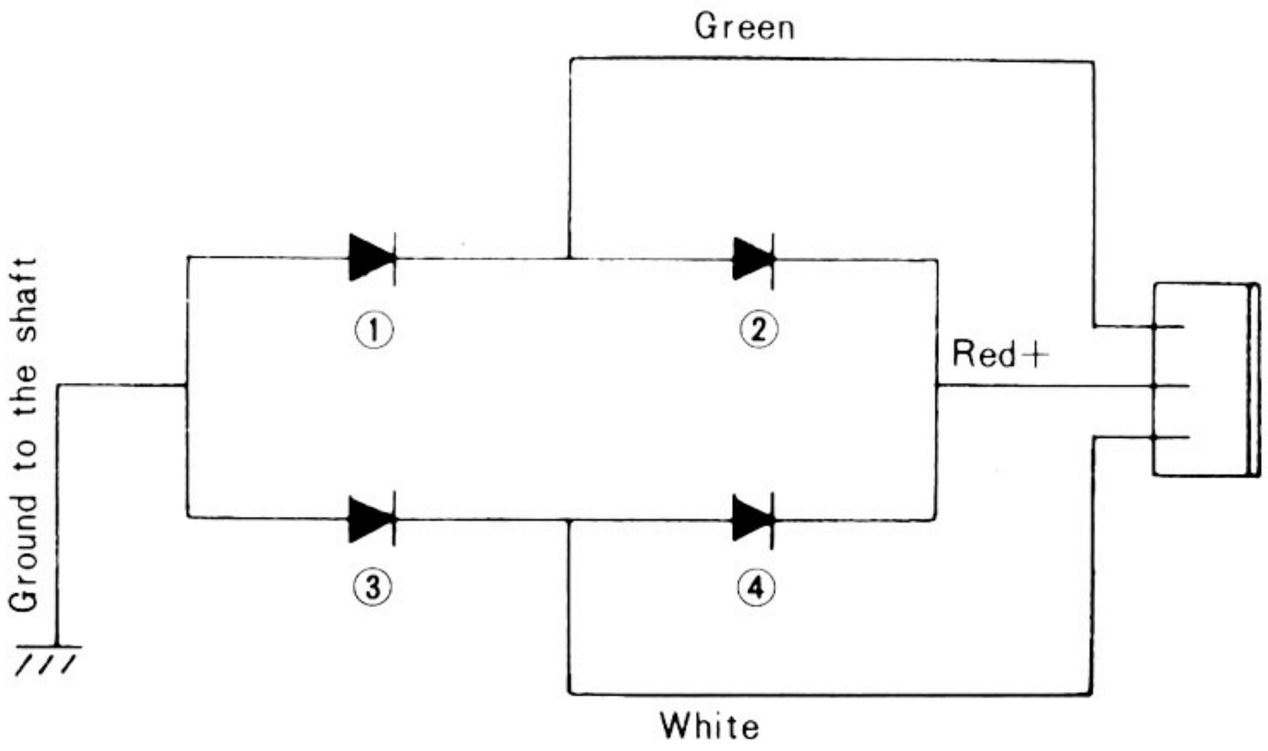
The silicon rectifier functions to rectify the A.C. power generated by the A.C. generator into D.C. power, and it is of single phase bridge wiring as to the type of circuit.

Type SB4-5

1. Green
2. White
3. Red

1. Wiring of rectifier
   1. Green
   2. Red +
   3. White ~
   4. Grounded to shaft

Fig. 6-2-10



Note: * +designates output terminal

Connected to fuse

main switch (red)

* ~ designates input terminal

White and green leads are connected to white and green leads of A.C. generator respectively.

* Output terminal (−) is the shaft.

2. Easy Measurement of Silicon Rectifier

Connect green lead and shaft for inspection of element (1);

Connect red lead and green lead for inspection of element (2);

Connect white lead and shaft for inspection of element (3); and

Connect red lead and white lead for inspection of element (4) alternately between positive and negative by the resistance measuring terminals of a tester (resistance meter).

The condition is normal if continuity is nil when connection is made in one way (for example, when positive is conencted to green lead and negative is connected to shaft for inspection of element (1)) and if continuity is observed when connection is made in another way.

If continuity is observed in either way, the element under inspection is shorted and if continuity is nil in neither way, the element under inspection is broken, and the elements are defective in both cases.

D. Battery

The battery mounted in LS2 is of 12V, 5.5A (10AH) made by (Type), and is identical to the one mounted in

The specifie gravity of battery electrolyte should be 1.280 at 20 ° C.

E. Other Electrical Equipment

Equipment	Rating	Remarks
Head lamp	12V, 25WD	
Tail/stop lamp	12V 8W/27W	
Speedometer	Illumination lamp 12V, 3W	
	Flasher pilot lamp: 12V, 3W	
	Neutral pilot lamp: 12V, 3W	
Horn	12V, 1.5A	HYP-AYA1
Flasher lamps	12V, 27W	
Spark plug	B-7HS	

6-3 Precautions for Handling Electrical Equipment

1. Do not disconnect battery from electrical circuit while riding.

   The no-load voltage (400V/9,000 rpm) of A.C. generator and the surge voltage of ignition coil will be impressed on the silicon rectifier resulting in failure of rectifier. Same trouble will occur if fuse is blown or any connector of battery wiring becomes loose while riding.

   Because of the fact that the silicon rectifier is grounded to the shaft, care should be exercised in installation of silicon rectifier to the adaptor plate and installation of adaptor plate to frame.

2. Do not make opposite connections to battery.

   If misconnection is made to the battery (that is, connection is made to opposite terminals), the battery will be shorted through the rectifier resulting in its failure due to the passing through of excessive current. Never make opposite connections to battery.

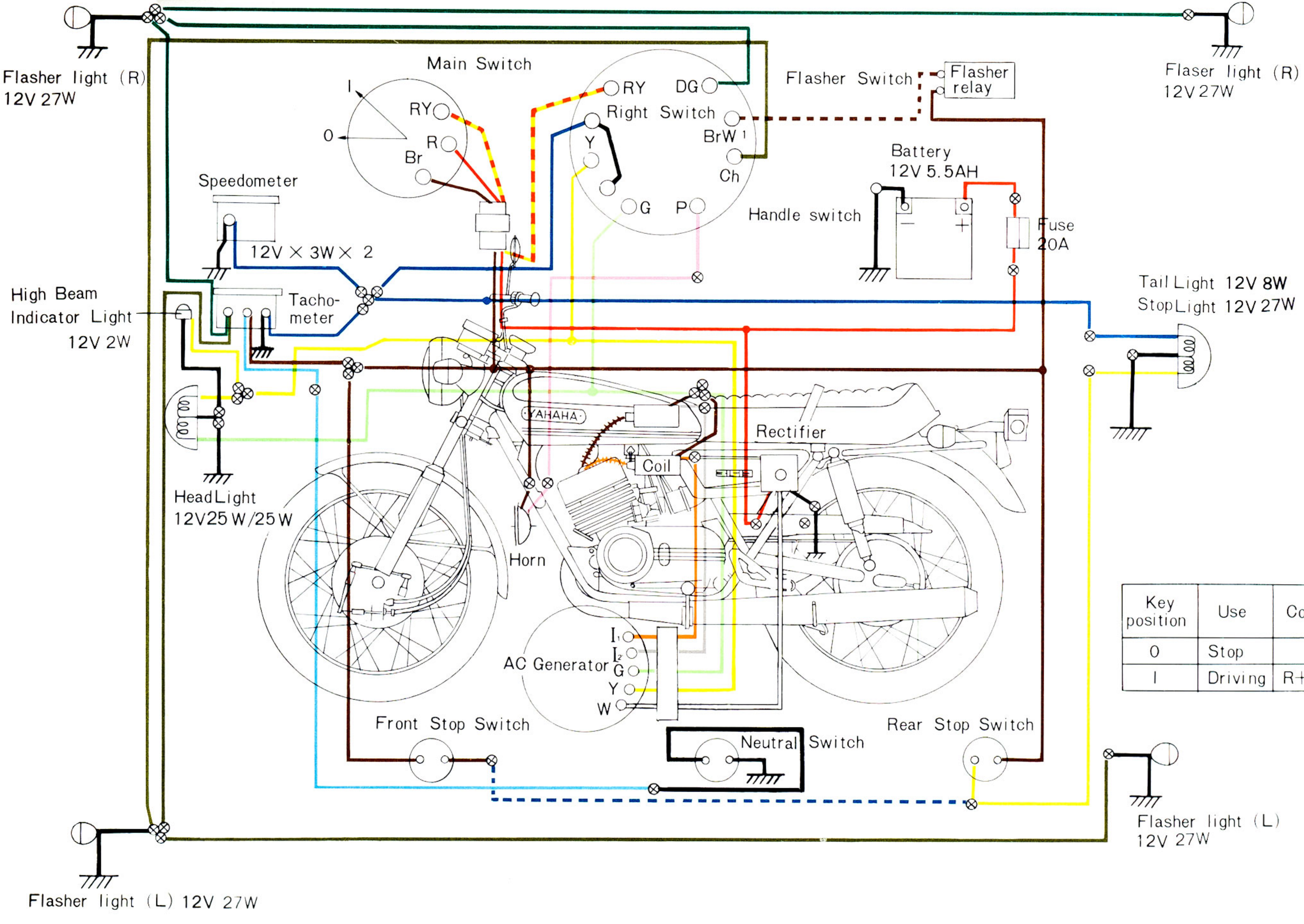
3. Use proper load.

   The battery charging current is determined to be appropriate when the load is as described in the section of charging performance of A.C. generator. The charging current drops when the load is increased and the increases when the load is decreased, and the battery discharges or is overcharged accordingly.

4. Inspection of Battery Electrolyte

   The charging by the A.C. generator is a charging system very close to constant-current charging system, and consumption of battery electrolyte is considerably great as compared with the charging system of constant voltage by starter dynamo or igniton dynamo.

   Consequently, frequent inspection of battery electrolyte is required.



Key position	Use	Connection
0	Stop	
I	Driving	R+Br+RY

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