

SERVO MOTOR

1000 RPM

SEMI

(1970)

1000 RPM

1000 RPM

RTI-MX -

FOREWORD

This Service Manual is directed to acquaint both the owner and mechanic with the operation, service, and maintenance of the RT1 series motorcycle as manufactured by Yamaha Motor Company, Ltd., Hamakita, Japan, during the model years 1970 through 1971. In essence, it is the original RT1B (1971) Service Manual with appropriate information for earlier models. In the rear of the manual you will also find G.Y.T. Kit and Motocross model information.

The RT1 was Yamaha's logical extension of the tremendously successful DT1, first fully street legal motorcycle designed to enable the owner to ride on the street, use for trail or enduro riding or convert (with factory available parts) into a competition-ready scrambler or motocrosser. It "made" the off-the-road market what it is today and we at Yamaha are justifiably proud of the marque.

This manual, and the technical and service information enclosed, should be closely followed to enable you to properly maintain the machine, thereby ensuring continuous good performance and long service life.

Even though this information applies to several models, many of the servicing procedures are identical. Whenever there is a difference in specifications and/or servicing procedure, the individual models will be noted. Unless otherwise marked, consider the information to be universally applicable.

YAMAHA SERVICE DIVISION

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Chapter I General

I - 1 Features of Yamaha Enduro 360 RT1-B

1. Single Cylinder 5-Port Engine

The Yamaha RT1 has a 360 cc single cylinder engine.

This iron sleeved aluminum cylinder is of 5-port design and its improved scavenging efficiency results in optimum engine performance in all gears and from 2,500 to 6,000 (+) R. P. M.

2. Convenient and Reliable Yamaha Autolube

Yamaha Autolube—automatic oil injection lubrication system—is well known for its performance and reliability. Like every other Yamaha model, the Yamaha Enduro 360RT1 also employs the world-renowned Autolube.

3) 5-Speed Transmission

The Yamaha Enduro 360RT1 assures steady engine performance, from low speed off-road riding to high speed road work, because of the 5-speed transmission.

4. Convenient Primary Kickstarter

The primary kickstarter enables the engine to be started either in gear or in neutral.

5. Easy Riding Position and Superb Maneuverability

The light-weight, sturdy frame, combined with its component parts, is ideal for off-the-road riding. Agile, and with a comfortable riding position, the Yamaha Enduro 360RT1 exhibits superb maneuverability and handling over any terrain.

6) Competition Designed Front Forks and Rear Shocks

The Yamaha Enduro 360RT1 has telescopic front forks with internal coil springs such as used for competition racers.

The front forks provide excellent handling qualities over the roughest terrain with longer stroke and superb dampening capacity. The rear shocks have 3-way adjustable springs with a longer stroke.

This insures stability under even the roughest conditions.

7. Separate Tachometer and Speedometer with a Reset Odometer for Mileage Calibration.

A separate tachometer is provided to enable the rider to make best use of engine power.

The speedometer, combined with a trip meter, allows the rider to reset the mileage by tenths for enduros.

8. Trials Univesal Tires for Off-the-road and On-the-Road Riding.

Trials universal tires for off-the-road and on-the-road riding are standard equipment. They are ideal for off-the-road riding as well as on the road riding.

9. Alternate* GYT Parts for Competition Riding.

The GYT kit parts for competition engine tuning are available. You can convert your RT1 into a motorcrosser by simply installing GYT parts and removing all unnecessary parts.

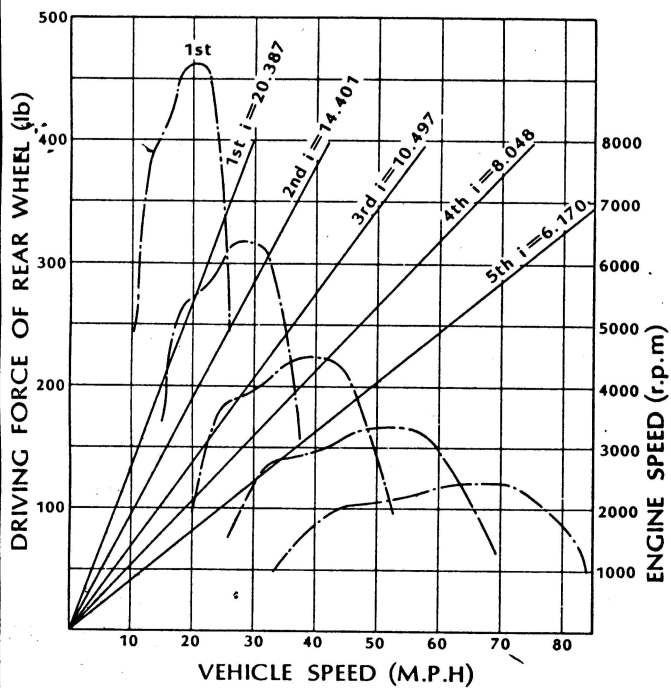
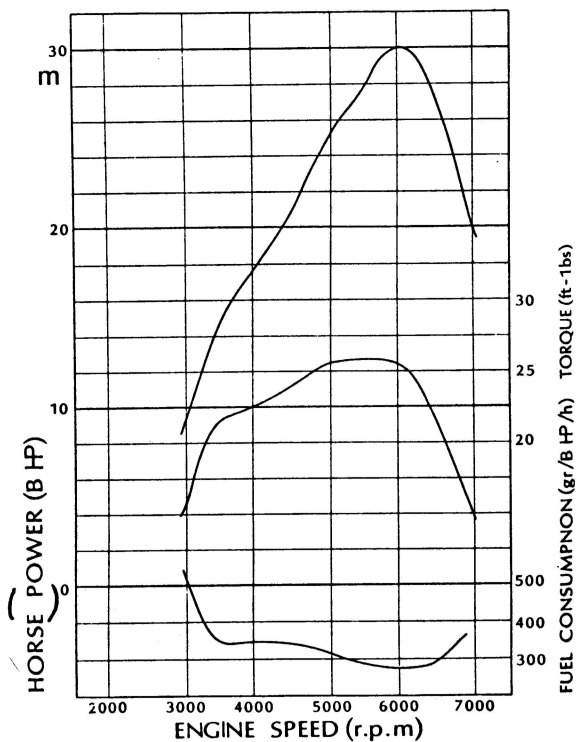
* Genuine Yamaha Tuning

1. MODEL	RT1	RT1-MX	RT1-B	RT1B-MX
2. HORSEPOWER @ RPM	30 @ 6000	36 @ 6500	30 @ 6,000	36 @ 6,500
3. TORQUE @ RPM	26 @ 5500	28.7 @ 6500	26.0 @ 5,500	28.7 @ 6,500
4. BORE & STROKE (mm)	80 x 70	80 x 70	80 x 70	80 x 70
5. ENGINE DISPLACEMENT	351cc 21.50 cu. in.	351cc 21.50 cu. in.	351cc 21.4 cu. in.	351cc 21.4 cu. in.
6. NET WEIGHT (Appx.)	254 lbs.	238 lbs.	258 lbs.	242 lbs.
7. COMPRESSION RATIO	6.6:1	7.5:1	6.3:1	7.2:1
8. IGNITION TIMING B.T.D.C. (mm) Retarded Advanced	2.9mm ±.1 .3-.35mm .011-.013"	3.4mm ±.1 .3-.35mm .011-.013"	2.9mm ±.1 .30-.40mm .012-.015"	2.9mm ±.1 .30-.40mm .012-.015"
9. CONTACT BREAKER POINT GAP SETTING (mm) (inch)	B-9E .5-.6mm	B-9EN .5-.6mm	B-9ES .5-.6mm	B-9EN .5-.6mm
10. SPARK PLUG AND GAP (mm)	MAGNETO	MAGNETO	MAGNETO	MAGNETO
11. VOLT. REG. ADJ. (Volts @ rpm - no load)	.22uF	.22uF	.22uF	.22uF
12. CUTOFF RELAY ADJ. (Cut in voltage)	.050-.055mm .0020-.0022"	.055-.060mm .0022-.0024"	.055-.060mm .0022-.0024"	.055-.060mm .0022-.0024"
13. CONDENSER CAPACITY (Microfarad)	VM32SH	VM34SH	VM32SH Mikuni	VM34SH Mikuni
14. PISTON SKIRT CLEARANCE (mm) (inch)	#220	#280	#240	#310
15. CARBURETOR TYPE & MANUFACTURER	MAIN JET (M.J.)			
AIR JET (A.J.)	-	-	-	-
NEEDLE JET (N.J.)	0-4	P-0	0-4	P-0
JET NEEDLE - clip position (J.N.)	6CF1-2	6DP1-3	6CF1-2	6DH2-3
CUTAWAY (C.A.)	1.5	1.5	1.5	2.5
PILOT JET (P.J.)	30	40	#30	#60
AIR SCREW (Turns out) (A.S.)	1 1/4	1 1/4	1 1/4	1 1/4
STARTER JET (S.J.)	60	60	#60	#60
FLOAT LEVEL (mm) (F.L.)	8.5mm	8.5mm	8.5mm	8.5mm
16. AIR FILTER TYPE	Wet foam rubber	Wet foam rubber	Wet foam rubber	Wet foam rubber
17. PRIMARY REDUCTION RATIO & METHOD	65/21 3.095 gear	65/21 3.095 gear	65/21 3.095 gear	65/21 3.095 gear
18. SECONDARY REDUCTION RATIO & METHOD	39/15 2.600 chain	44/15 2.933 chain	39/15 2.600 chain	44/15 2.933 chain
19. TRANS. GEAR RATIOS 1st (Internal) (No. teeth) (Overall)	2.533 38/15 20.383	2.250 36/16 19.425	2.533 38/15 20.38	2.250 36/16 18.11
2nd	1.789 34/19 14.396	1.650 33/20 14.979	1.789 34/19 14.40	1.650 33/20 13.28
3rd	1.304 30/23 10.493	1.261 29/23 11.838	1.304 30/23 10.49	1.261 29/23 10.15
4th	1.000 26/26 8.047	1.000 26/26 8.078	1.000 26/26 8.05	1.000 26/26 8.05
5th	0.767 23/30 6.172	0.793 23/29 7.199	.767 23/30 6.17	.793 23/29 6.38
20. TRANS. OIL CAPACITY (Qt.)	1.06	1.06	1.06	1.06
21. OIL TANK OR ENGINE SUMP CAPACITY (Qt.)	1.7	1.7	1.7	1.7
22. FUEL TANK CAPACITY (U.S. Gal.)	2.5	2.5	2.5	2.5
23. FRONT FORK OIL CAPACITY	7.1 oz. 210cc	7.1 oz. 210cc	5.9 oz. 175cc	5.9 oz. 175cc
24. TIRE SIZE (Front)	3.25 x 19	2.75 x 21 knobby	3.25-19	2.75-21 knobby
(Rear)	4.00 x 18	4.00 x 18 knobby	4.00-18	4.00-18 knobby
25. TIRE PRESSURE (Lbs.) (Front)	20	14	13	13
(Rear)	24	17	16	16
26. DRIVE CHAIN TENSION (Up & down freelay)	20mm 25/32"	20mm 25/32"	20mm 25/32"	20mm 25/32"
27. OIL PUMP STROKE ADJUSTMENT MIN. (mm)	.25-.30mm	.25-.30mm	.20-.25mm	.20-.25mm
MAX. (mm)	1.90-2.10mm	1.90-2.10mm	1.85-2.05mm	1.85-2.05mm
28. AUTOLUBE CABLE ADJUSTMENT (Throttle position)	At idle	At idle	At idle	At idle
29. VALVE CLEARANCE INTAKE	-	-	-	-
EXHAUST	-	-	-	-

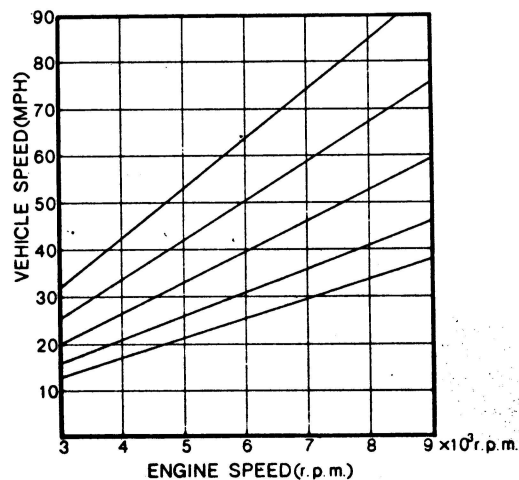
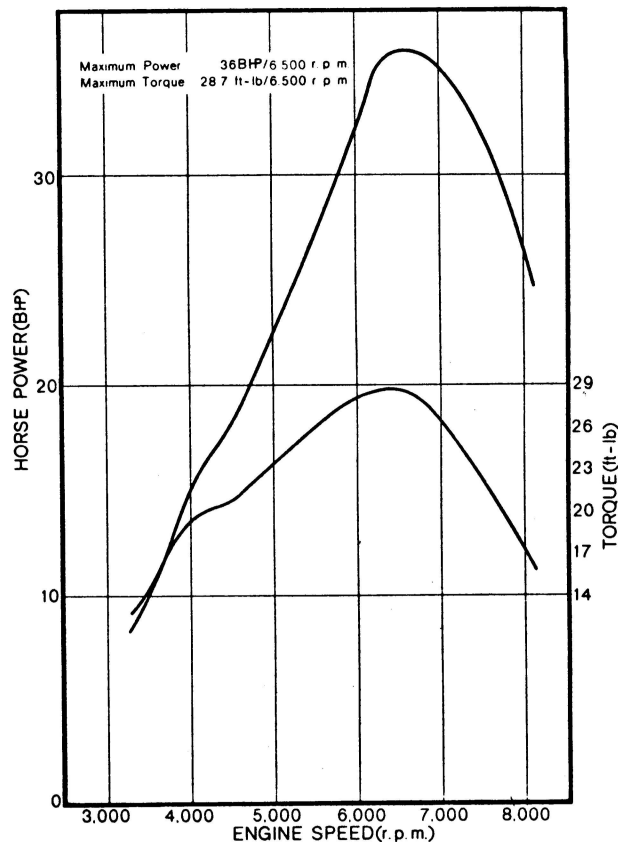
	RT1 & RT1B	RT1 (& B)-MX
Chassis: Frame Suspension Type , front Suspension Type , rear Suspension system, front Suspension system, rear	Tubular-Double loop Telescopic fork Swinging arm Coil spring, oil damper Coil spring, oil damper	ALL SAME
Steering system: Steering angle Caster Trail	49° both right and left 60°30' 5.12 in. 130 mm.	ALL SAME
Braking system: Type of brake Operation system, front Operation system, rear	Internal expansion Right hand, cable Right foot, rod	ALL SAME
Dynamo: Model Manufacturer	FZC-IAIL Mitsubishi Elec.	ALL SAME
Battery: Model Manufacturer Capacity	MV1-6D Nippon Battery. 6V 2AH	NO BATTERY
Lighting: Headlight Flasher light Stoplight, Taillight Meter light	6V 35W/35W 6V 17W 6V 17W , 5.3W 6V 3W×2	NO LIGHTS

I - 4 PERFORMANCE CURVES

RT1 & RT1B



RT1-MX & RT1B-MX



I -5 Tools and Instruments for Shop Service

The following tools and instruments are required to service the RT1.

1. General Tools

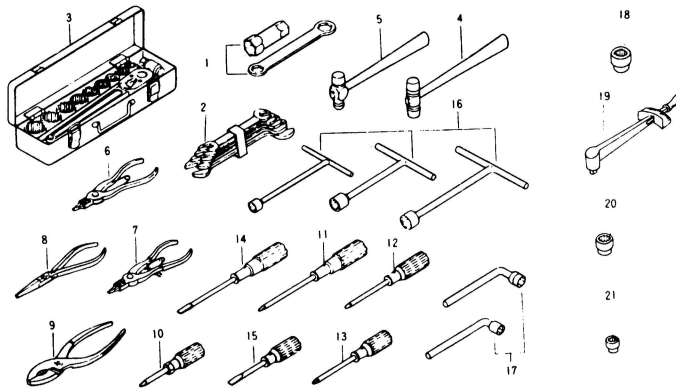


Fig. 1-5-1

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

2. Special Tools and instruments

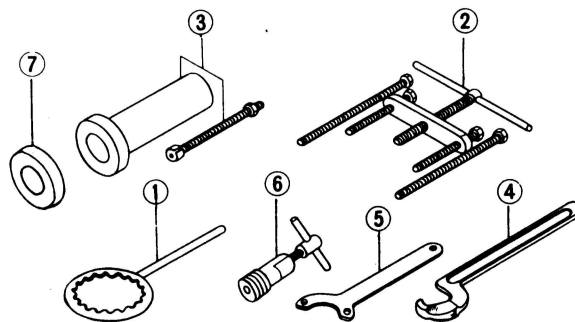


Fig. 1-5-2

- | | |
|--|----------------------------------|
| 1) Clutch holding tool (for YR1 and YM2) | 4) Flywheel magneto holding tool |
| 2) Crankcase disassembling tool | 5) Flywheel magneto puller |
| 3) Crankshaft assembling tool
(for YF1 and YG1) | 6) Dial indicator adaptor |
| | 7) Crankshaft puller pot adaptor |

In addition, an electro-tester, tachometer (engine r.p.m. meter), hydrometer, etc. are needed.

3. Other Materials



Fig. 1-5-3

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

The use of a wooden box as shown in the above photo ⑤ will facilitate engine service and overhaul. Consumable parts (such as gaskets) and replacement parts must also be on hand.

Chapter II. YAMAHA Autolube (Automatic Separate Lubricating System)

II-1 What is YAMAHA Autolube ?

Conventional 2-stroke engines are lubricated by oil premixed in gasoline, but YAMAHA's Autolube furnishes an automatic, separate lubrication system. That is, the oil in a separate oil tank is automatically regulated by the oil pump and fed to the engine according to engine speed and load.

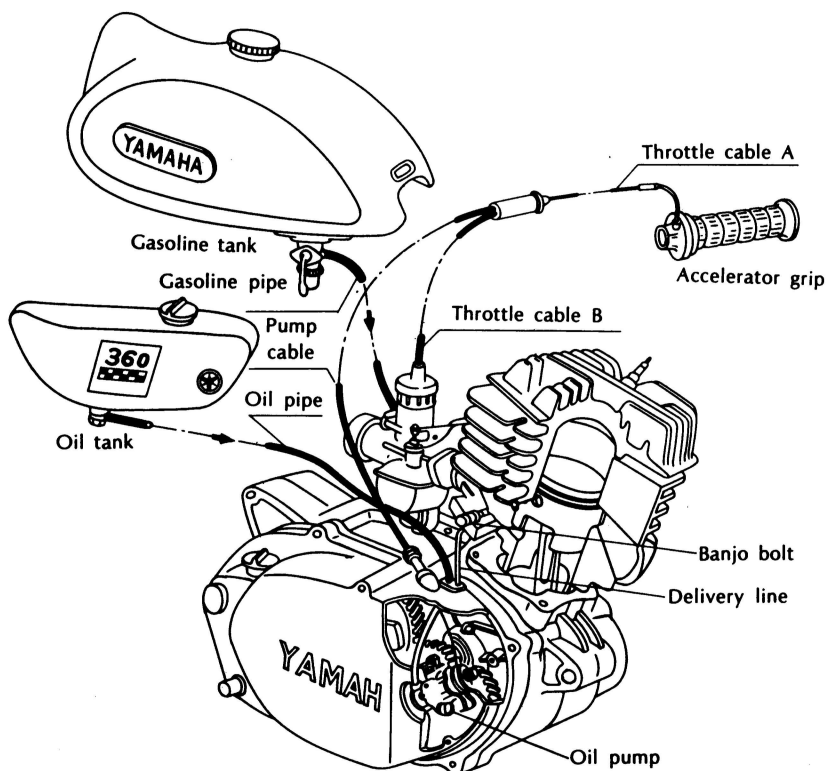


Fig. II-1-1

II-2 Features of YAMAHA Autolube

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

The oil pump automatically regulates the volume of lubricating oil according to engine speed and throttle valve opening, thus pumping the optimum amount of oil for engine lubrication under any operating condition.

This "automatic separate lubrication" does not merely eliminate disadvantages in

the conventional pre-mix system, but it further improves the performance and efficiency of 2-stroke designs by eliminating certain oil-starvation conditions which formerly existed.

- A) The Autolube feeds an optimum amount of lubricating oil to the engine under any operating condition, thus featuring:
- Less oil consumption.
 - Less carbon accumulation.
 - Less exhaust smoke.
 - Improved lubricating efficiency.
- B) The Autolube simplifies fuel supply, thus featuring:
- Using straight gasoline directly in the gas tank.
 - Less fuel contamination.
- C) The Autolube improves the reliability of lubrication, thus eliminating:
Special care concerning oil/fuel mixing ratio.

II -3 Handling the Oil Pump

The oil pump is a precision-machined assembly. Make no attempt to disassemble it. When you remove the oil pump from the engine, protect it from dust, dirt, etc., and after reinstalling it, bleed and adjust the pump correctly. Proper handling will keep the pump free from trouble.

The oil pump is similar in both mechanism and construction to other Autolube systems. The only difference is the employment of a 5.5 ϕ plunger because of the larger need for oil of a 360cc single cylinder engine.

II -3-A. Checking Minimum Pump Stroke

1) Checking

- a. Fully close the accelerator grip.
- b. Turn the oil pump starter plate in the direction of the arrow marked on the plate. Keep the gap as wide as possible by observing it with the eye. Then measure the gap between the adjustment pulley and the adjustment plate.



Fig II-3-1

- c. Insert a feeler gauge (0.15 mm.) into the gap.

When the gap allows it to enter
.....Stroke is correct.

When the gap does not allow
.....Stroke is insufficient.

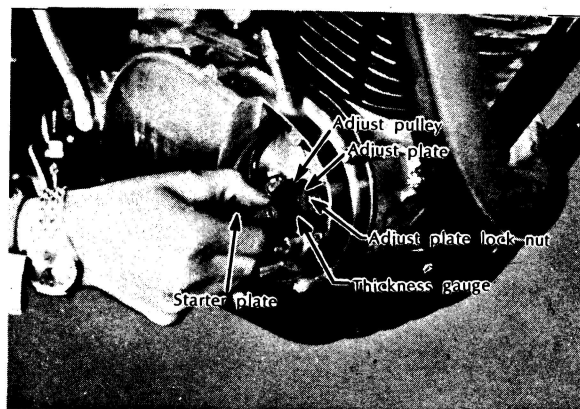


Fig. II-3-2

2) Adjustment

- a. Remove the adjustment plate lock nut, and then remove the adjustment plate.

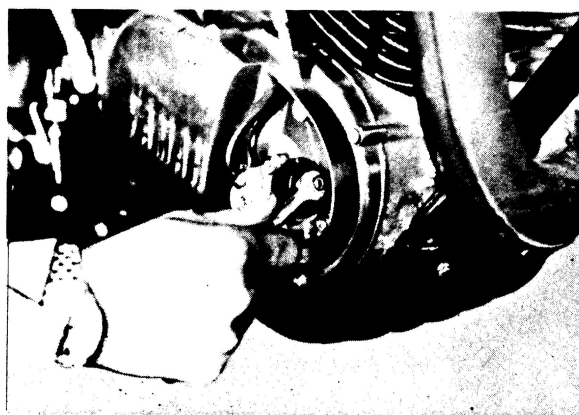


Fig. II-3-3

- b. Install a 0.1 mm. adjustment shim where the adjustment plate was.

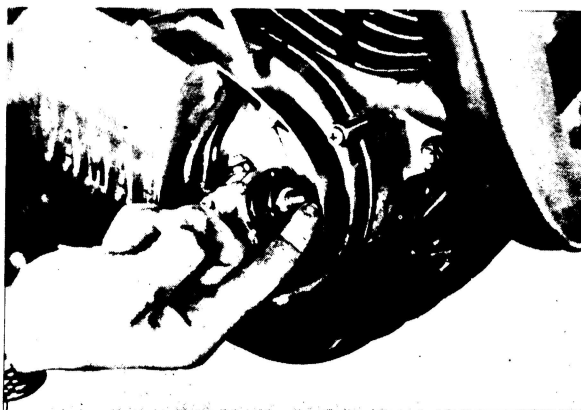


Fig. II-3-4

- c. Reinstall the adjustment plate lock nut, and measure minimum stroke. When the gap allows a 0.20 mm. feeler gauge to enter but does not allow a 0.25 mm, the stroke is correctly adjusted.

Minimum stroke adjustment limit.....0.15 mm.

stroke adjustment tolerance.....0.20 to 0.25 mm.

II-3-B Carburetor and Autolube Cable Adjustments

Perform the preceding steps in section II-3-A to check minimum stroke, and adjust it if incorrect. Then adjust the Autolube and carburetor cables.

1) Throttle Cable Adjustment

- a. To adjust the throttle cable free play with the engine at idle, begin by removing all slack from throttle cable B in Fig. 11-3-5.

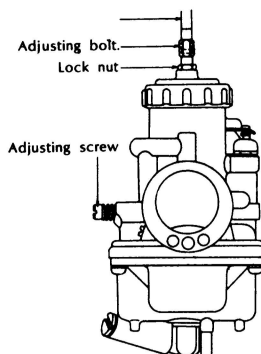


Fig II-3-5

Then remove all the free play from throttle cable A. Loosen or tighten the throttle cable adjustment screw until all slack has been taken up. Next, screw the cable adjuster in at the carburetor until there is 1 mm free play ($1/32''$) in the cable at the top the carburetor.

- b. The next adjustment is at the throttle grip. Loosen the lock nut and screw the adjuster in or out, whichever is necessary to get 0.5—1.0 mm of free play at the cable end. (see Fig. 11-3-6.)

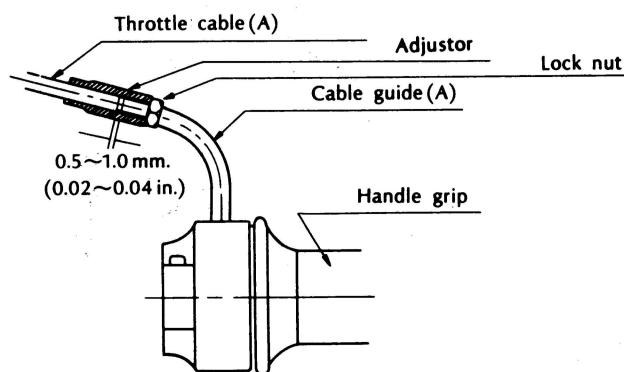


Fig. II-3-6

Twist the throttle grip to check the play of throttle cable A. If the play is excessive or insufficient, adjust the free play with the adjustment screw.

2) Autolube Cable Adjustment

- a. Adjust the pump cable so that the marking (arrow) on the Autolube pump adjustment pulley is aligned with the guide pin (see Figs. 11-3-7 & -8).

Begin by fully closing the accelerator grip, then slowly turning it back again so that the slack in the throttle cable is completely taken up. Next, adjust the pump cable so that the marking on the pump adjustment pulley will be aligned with the guide pin, as shown in Fig. 11-3-7. The point of adjustment is at the end of the cable just before it enters the case. Loosen the lock nut and screw the adjustor in or out whichever direction is necessary to obtain the correct adjustment.

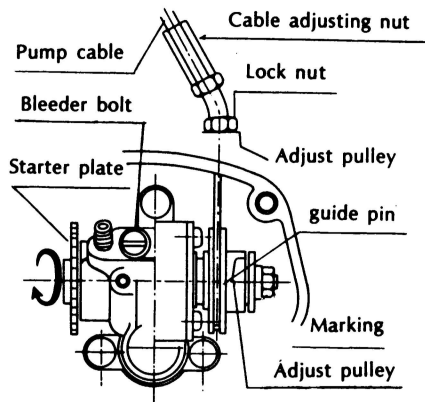


Fig. 11-3-7

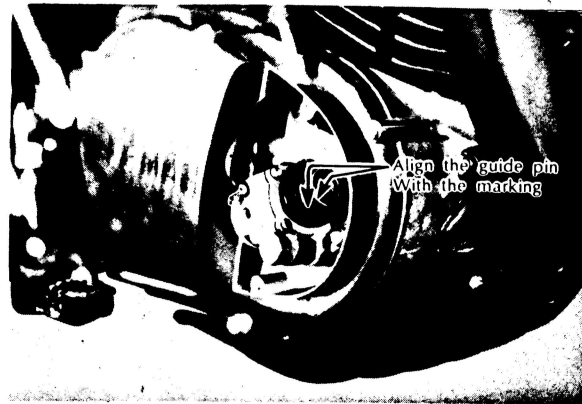


Fig. 11-3-8

II-3-C Bleeding

When the pump has been removed or the Autolube oil has run out, air will enter the pump. The air will cause an irregular flow of oil after the pump is mounted again or the oil tank is refilled. In order to prevent such an irregular flow of oil, bleed the pump in the following manner.

- 1) Remove the bleeder bolt.

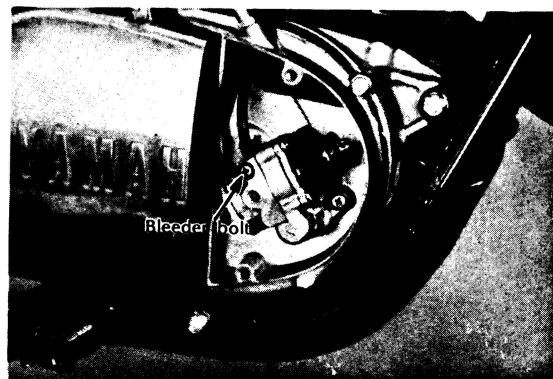


Fig. 11-3-9

- 2) Next, rotate the starter plate in the direction of the arrow marked on the plate. Continue turning the plate until no air remains, and tighten the bleeder bolt. To facilitate this bleeding, fully open the accelerator grip and rotate the starter plate. As the plunger stroke becomes greater, the air can be more quickly bled.

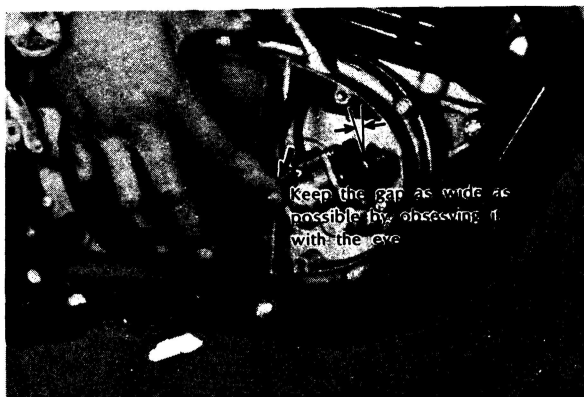


Fig II-3-10

Chapter III 5-Port Cylinder Induction System

III-1 Construction and Design of the 5-port Induction System

Two additional transfer passages are placed to the immediate rear of the standard transfer ports. These two additional ports run from the bottom of the cylinder up to the same height as the standard transfer ports. These additional ports are designed to direct the fresh charge at the area containing the remaining exhaust gases. As the fresh fuel charge enters the combustion area the remaining exhaust gas is forced out the exhaust port leaving the combustion area with an uncontaminated, full, fresh fuel charge.

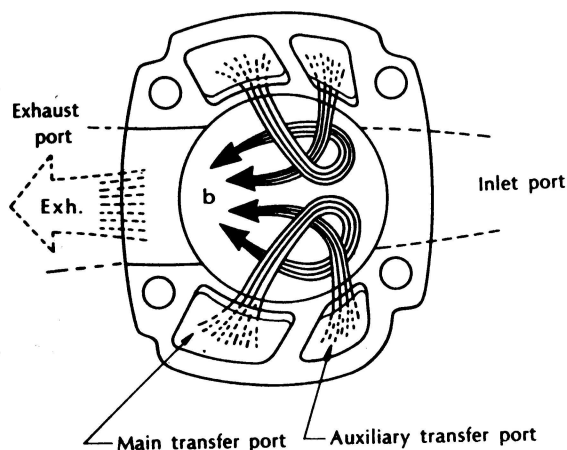
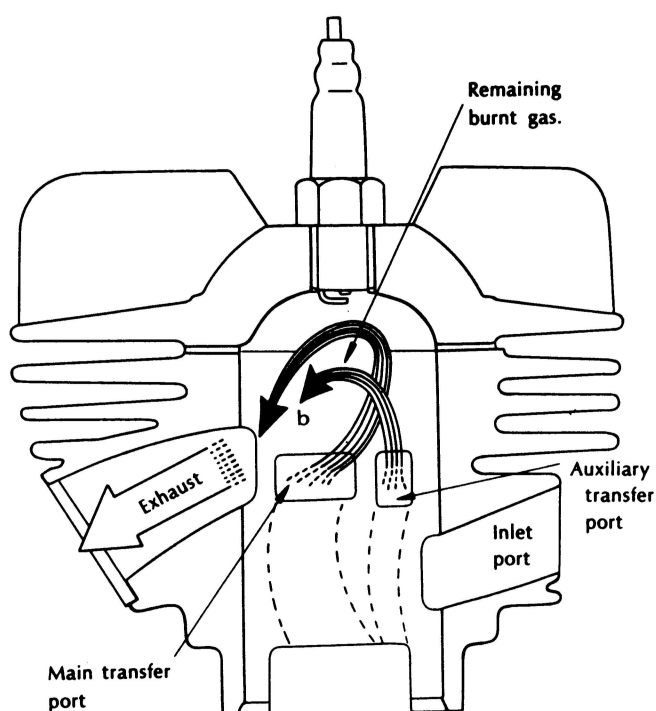


Fig. IV-2-1

Chapter IV Engine

The RT1-B 360cc Enduro engine has been designed with emphasis on both low speed trail riding and high speed road riding. The incorporation of the evenly spaced five-speed transmission and five-port induction system insures complete riding versatility for the owner. The width, height, and weight of the engine has been kept at a bare minimum to insure ease of handling in the roughest terrain.

Disassembly and assembly of the engine and its components should be done in the following manner and order. This will insure correct maintenance and service work for the owner and mechanic.

Preparation for disassembly of the engine:

- 1) All dirt, mud, dust, and foreign material should be thoroughly removed from the exterior of the engine before removal and disassembly. This will prevent any harmful foreign material from entering the interior of the engine assembly.
- 2) Before engine removal and disassembly, be sure you have proper tools and cleaning equipment so you can perform a clean and efficient job.
- 3) During disassembly of the engine, clean and place all parts in trays and in order of disassembly. This will ease and speed assembly time and insure correct re- installation of all engine parts.

IV-1 Engine Removal

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

Volume of oil: (1.0qt.)1,000c.c.

(SAE 10W/30 Motor Oil)

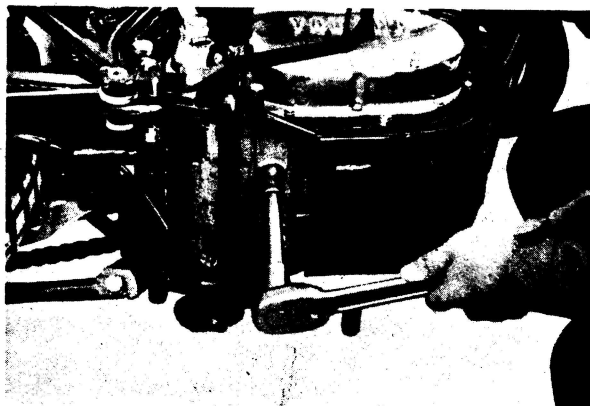


Fig. IV-1-1

- 2) Remove the muffler.
- 1) Remove the two springs.
(Figs. IV-1-2)

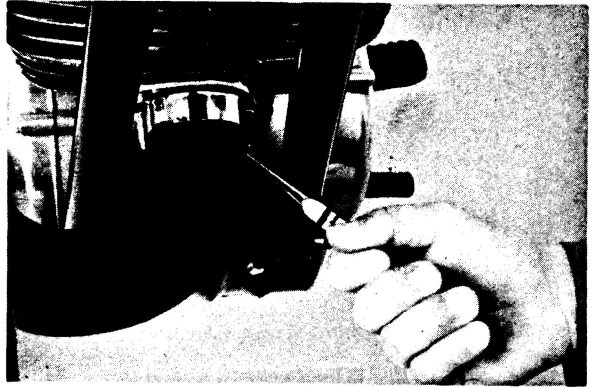


Fig. IV-1-2

- 2) Remove the muffler holding bolts. (Figs. IV-1-3 and 4)

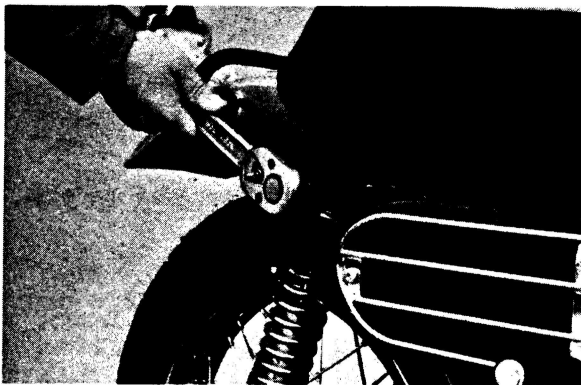


Fig. IV-1-3

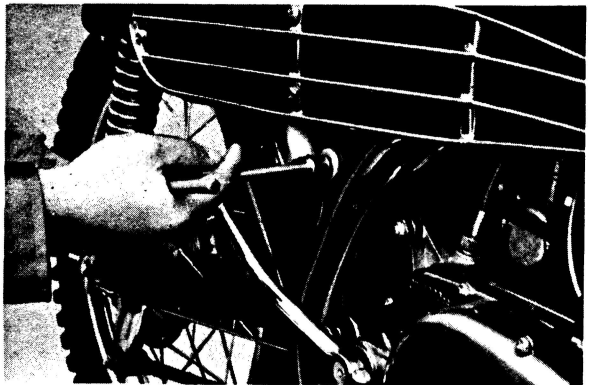


Fig. IV-1-4

3. Remove the change pedal.



Fig. IV-1-5

4. Remove the chain cover and then disconnect the clutch cable.

Trace the wiring loom up from the engine and disconnect all engine wires beneath the seat.

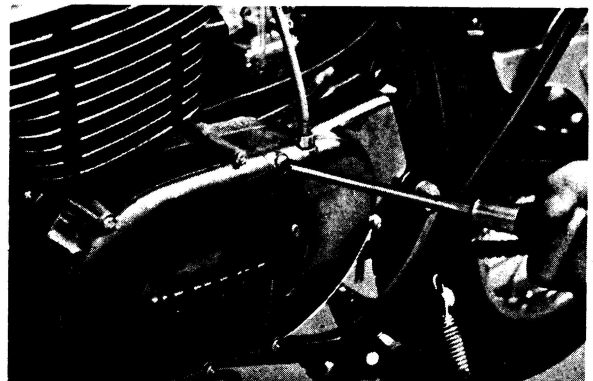


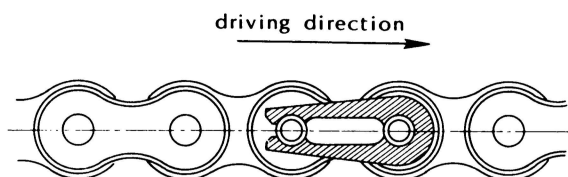
Fig. IV-1-6

5. Disconnect the master link and remove the chain.



Fig. IV-1-7

When replacing the chain, be sure the master link is facing in the correct direction.



After replacing, adjust the chain free play to 25 mm (1 in.) total at the center of the lower section with the rear wheel on the ground, with the rider in position.

6. Remove the pump cover and pump cable.

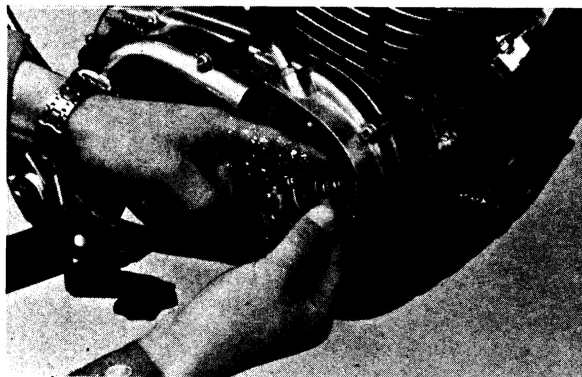


Fig. IV-1-8

7. Remove the tachometer cable.



Fig. IV-1-9

8. Remove the carburetor.

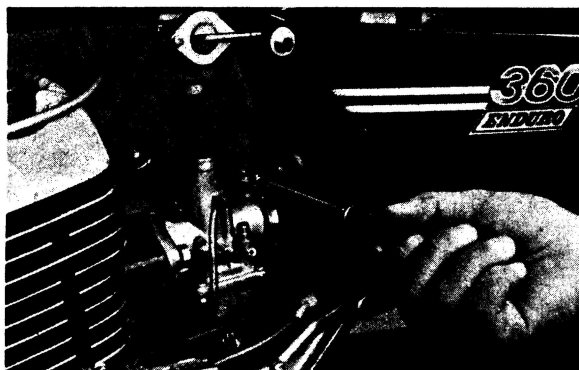


Fig. IV-1-10

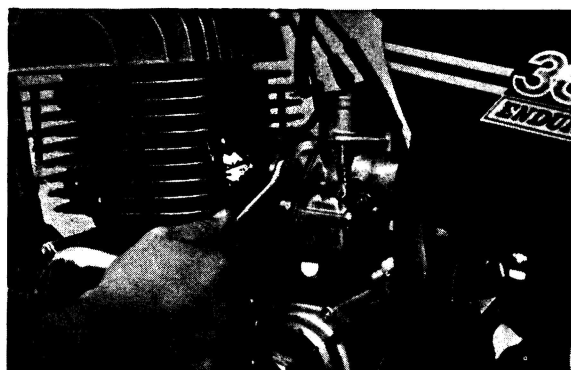


Fig. IV-1-11

9. Disconnect the oil line at the bottom of the oil tank.



Fig. IV-1-12

10. Disconnect the fuel line at the bottom of the fuel tank.

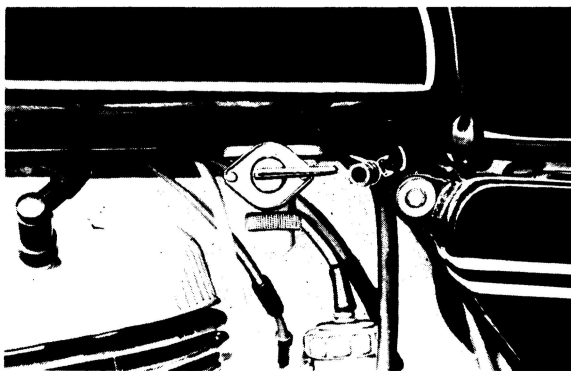


Fig. IV-1-13

11. Remove the four engine mounting bolts.

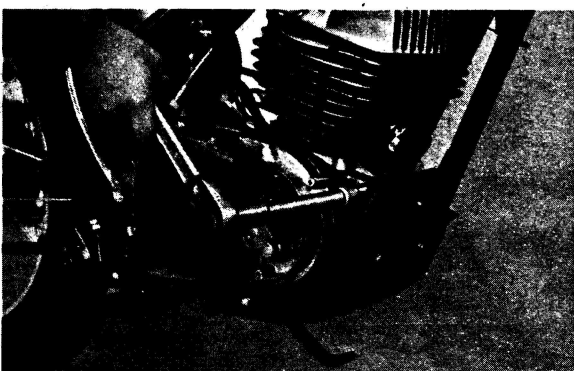


Fig. IV-1-14

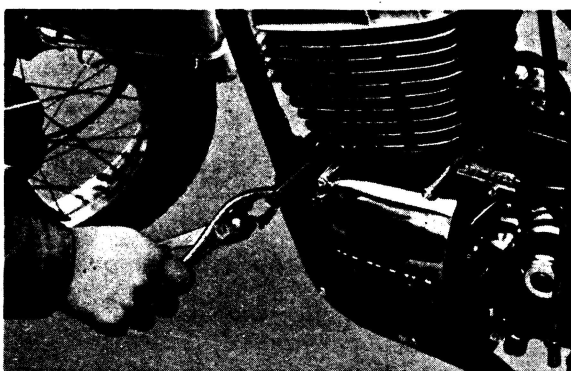


Fig. IV-1-15

12. Remove the engine from the frame.

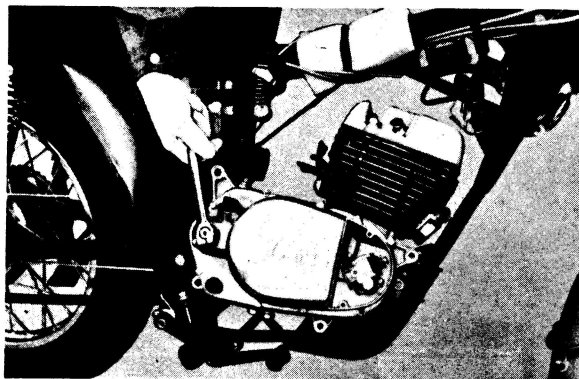


Fig. IV-1-16

IV-2 Cylinder Head

A. Removing

Remove the nuts from the top of the cylinder head, and then the head and gasket. Reverse the sequence for reinstallation. Replace the gasket if damaged.

NOTE: The nuts should be loosened (and tightened) in a 'cross' pattern and in progressive stages.

Cylinder head tightening torque:

10mm studs = 3.5KgM(25 ft lbs)

8mm studs = 2.0KgM(15 ft lbs)

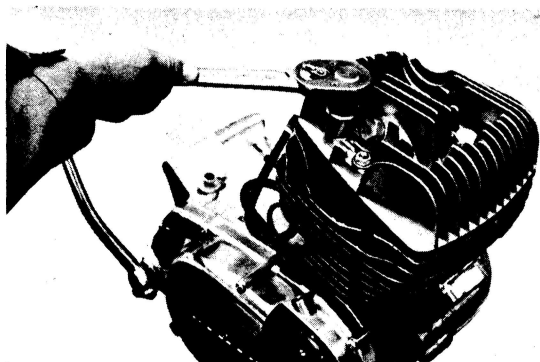


Fig. IV-2-1

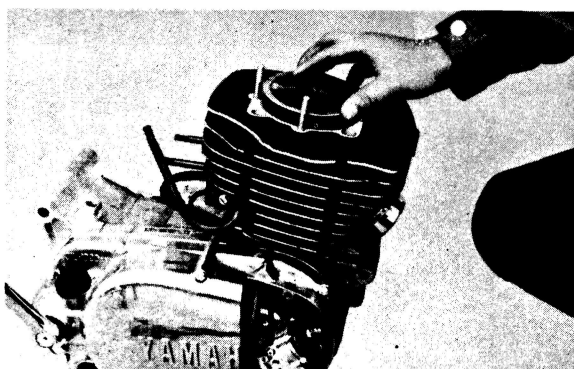


Fig. IV-6-2

B. Removing Carbon Deposits

Carbon deposits on the combustion chamber dome and piston crown will result in an increase in the compression ratio as well as preignition and engine overheating.

Scrape the dome and piston crown clean. Do not gouge the material use a blunt scraper.

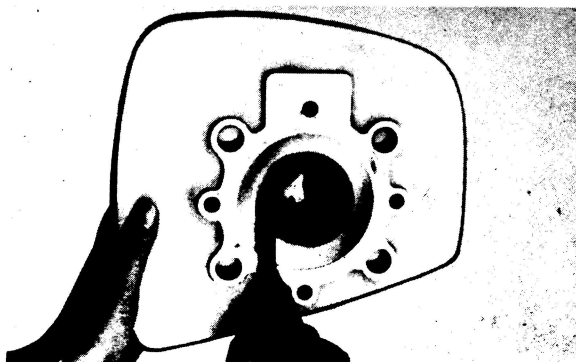


Fig. IV-2-3

A. Removing the Cylinder

- 1) Remove the oil delivery line banjo bolt from cylinder.

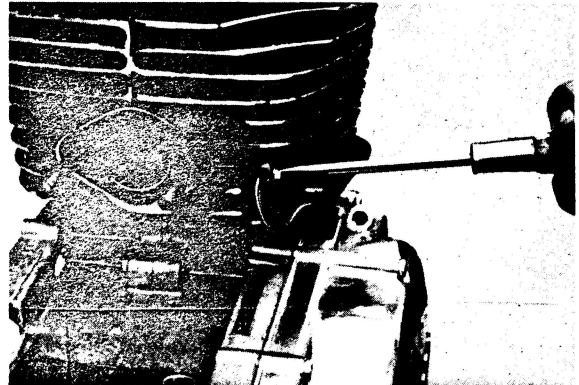


Fig. IV-3-1

- 2) Remove the cylinder by striking it lightly with a plastic or rubber hammer.

NOTE: During removal, stuff a clean rag beneath the piston to prevent particles of dirt or rings from dropping into the crankcase.

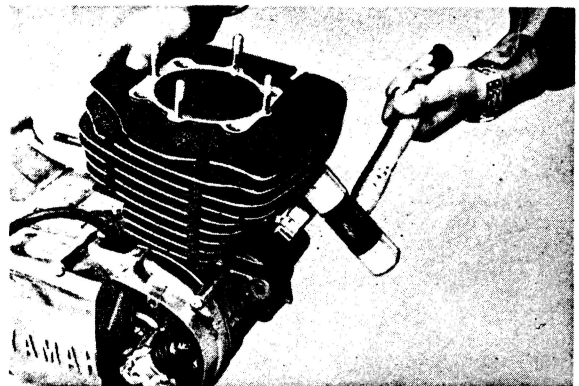


Fig. IV-3-2

- 3) Always replace the cylinder base gasket when reassembling cylinder.

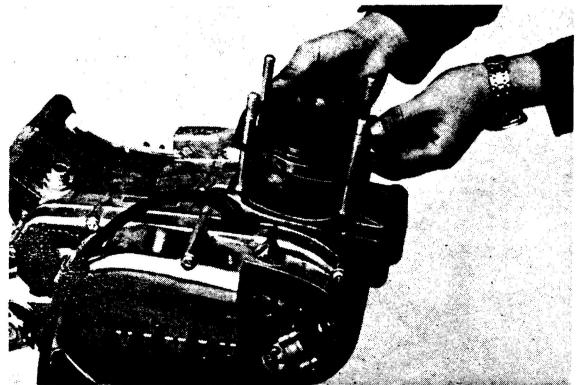


Fig. IV-3-3

B. Checking the Cylinder for Wear

- 1) Measure the amount of cylinder wall wear with a cylinder bore measuring micrometer or cylinder gauge. (Measure it at four depths by positioning the instrument in line and then at right angles to the crankshaft.) If the difference between the maximum and minimum diameter exceeds 0.05 mm. (0.0019"), rebore and hone the cylinder to the next over size.

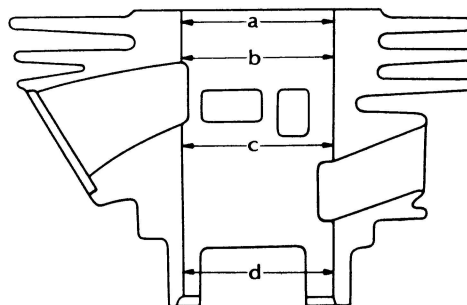
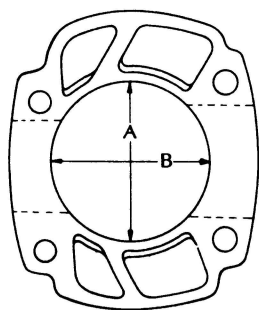


Fig. IV-3-4

- 2) Standard clearance between the piston and cylinder is 0.055 – 0.060mm(.0022 – .0024"). Maximum allowable clearance is 0.100mm(.004").

C. Cylinder Reconditioning

- 1) Pistons are available in 0.25 and 0.50 mm.(0.010" and 0.020") oversizes.
- 2) Cylinder should be rebored and honed to the diameter of the oversize piston plus the minimum allowable clearance.
- 3) The error between the maximum and minimum cylinder diameters after boring and honing should be no more than 0.02 mm.(0.0008")

D. Removing Carbon Deposits

Scrape off the carbon accumulation in the exhaust port of the cylinder with a hacksaw blade dulled at one end.

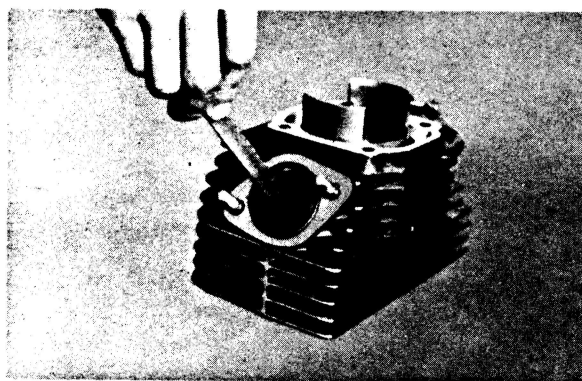


Fig. IV-3-5

E. Installing the Cylinder

Put your fingers at each end of the piston ring, expand the ring, and slip it onto the piston. Align both ends of the ring with the knock pin in each ring groove. Then insert the piston into the cylinder. Take care not to damage the bottom of the cylinder with the rings.

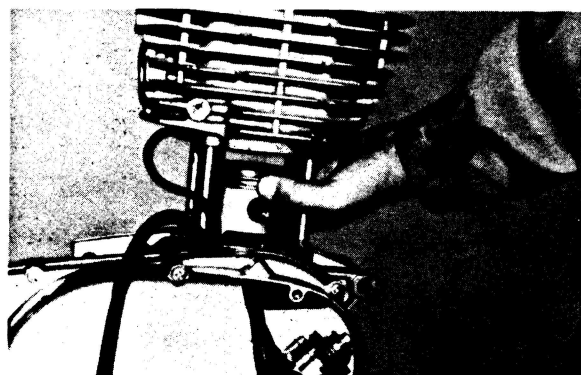


Fig. IV-3-6

IV-4 Piston Pin

A. Pulling out the Piston Pin

Remove the clips at both ends of the piston pin with needle nose pliers, and press out the piston pin with a finger or a slot-head screwdriver.

Note: Before removing the piston pin clips, cover the crankcase with a clean rag, so you will not accidentally drop the clip or other foreign particles into the crankcase.

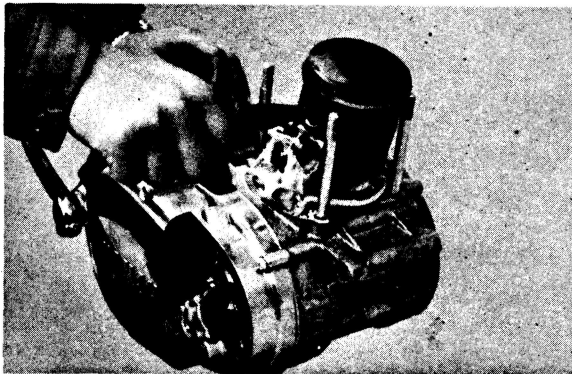


Fig. IV-4-1

B. Piston-to-Piston pin Fit

The piston pin should fit snugly in its bore so that it drags a little as you turn it. If the piston is loose, replace the pin and/or the piston.

If the pin has step-wear in its center, replace the needle bearing as well as the piston pin. Check the small end of the connecting rod for wear by inserting the piston pin and bearing.



Fig. IV-4-2

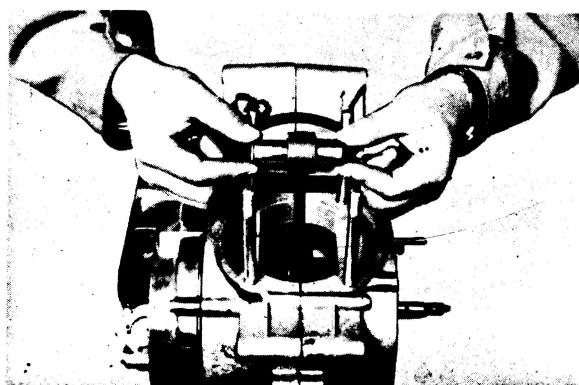


Fig. IV-4-3

IV-5 Piston Ring

A. Removing the Piston Rings

Put your thumbs at each end of the piston ring and pull the piston ring ends apart. Remove the ring by moving the ring off the piston on the other side of the ring ends.



Fig. IV-5-1

B. Installing the Piston Ring

First fit the No.2 ring over the piston, and then the No.1 ring, and align their end gaps with the locating pin in each ring groove. (Fig. IV-5-2)

The printing on all rings must face up to position the gap properly at the pin.

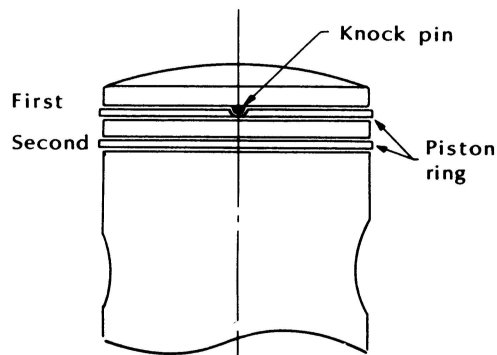


Fig. IV-5-2

C. Checking the Piston Rings

1) Measuring piston ring wear

Put the ring into the cylinder so that the ring is parallel to the cylinder bottom edge, and then measure the end gap with a feeler gauge, (Fig. IV-5-3)

The end gap should be between 0.3 and 0.5 mm. (0.012—0.020 in.) for both No.1 and No.2 rings.[0.4—0.5 mm. (0.016—0.019 in.) with GYT kit.]

2) Removing carbon

Carbon on the piston rings and in the ring grooves will made the rings stick in the piston, thus causing gas blow-by.

Remove the rings from the piston, and clean the carbon from the rings and rings grooves.

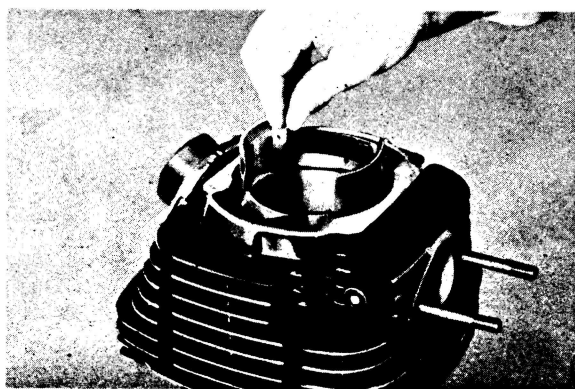


Fig. IV-5-3

IV-6 Piston

The piston is made of a high-silicon aluminum alloy.

A. Checking and Correcting the Piston to Cylinder Wall Clearance

1) Measuring piston clearance

Piston clearance is the difference between the minimum cylinder bore diameter and the maximum outside diameter of the piston.

As described in IV-3 (Cylinder), piston clearance should be 0.055 – 0.060mm (.0022 – .0024").

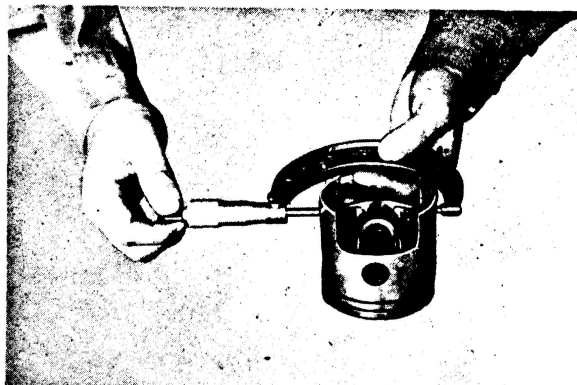


Fig. IV-6-1

To determine the maximum piston diameter, measure the piston with a micrometer at right angles to the piston pin boss, 10mm(3/8") from the bottom edge of the skirt (Fig. IV-6-1).

2) Checking and correcting scratches on the piston.

A piston showing signs of seizure will result in noise and loss of engine power. It will also cause damage to the cylinder wall.

If a piston that has seized is used again without correction, another seizure will develop at the same



Fig. IV-6-2

area. Lightly sand the seizure "high spot" on the piston with #400 sandpaper until smooth. (Fig. IV-6-2) If the marks are deeper than .002" or are over a large surface, replace the piston.

3) Removing Carbon

Remove carbon accumulations on the piston head with a screwdriver or a saw-blade. (Fig. IV-6-3)

Carbon and gum accumulations in the piston groove will result in piston ring seizure. Remove all carbon from the ring groove. (Fig. IV-6-4)

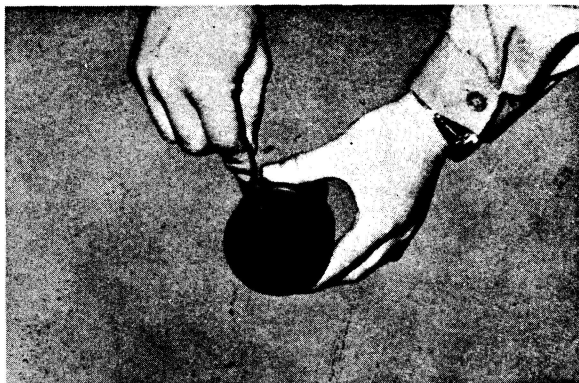


Fig. IV-6-3



Fig. IV-6-4

B. Piston Installation Direction

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

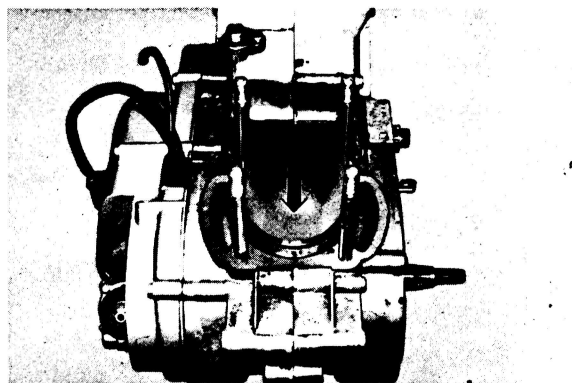


Fig. IV-6-5

IV-7 Flywheel Magneto

A. Remove the dynamo cover.

B. Remove the nut using a flywheel magneto holding tool.



Fig. IV-7-1

C. Install the flywheel magneto puller.

(It has a left-hand thread.)

After the puller is secure, tighten the push screw and the flywheel will break loose. If necessary, tap the end of the tool smartly with a hammer to break the magneto free.

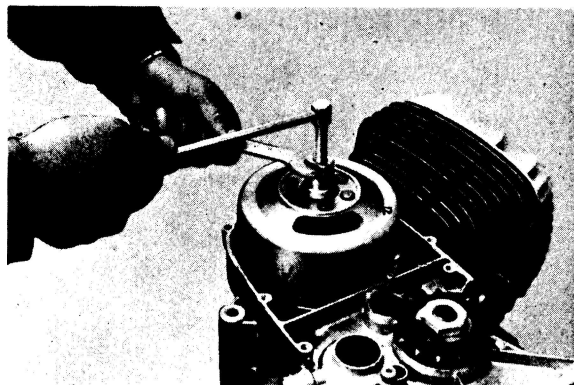


Fig. IV-7-3

D. Remove the three screws holding the flywheel magneto base to the crankcase and remove the flywheel magneto base.

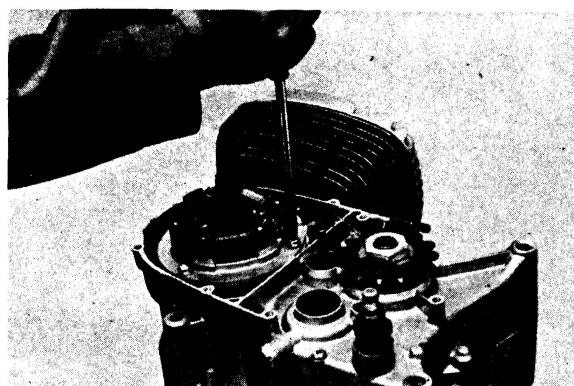


Fig. IV-7-4

E. Remove the woodruff key.

It is advisable to place the woodruff key on the flywheel magnets (using its magnetic force) while the key is removed for engine service in order to keep it from becoming lost.

IV-8 Crankcase Cover (R.H.)

A. Removal

- 1) Remove the kick crank mounting bolt and the crank.

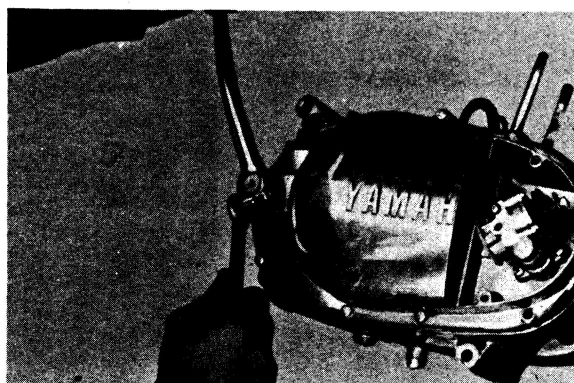


Fig. IV-8-1

- 2) Remove the pan head screws holding the crankcase cover, and then remove the case cover. (The cover can be removed without taking off the oil pump.)

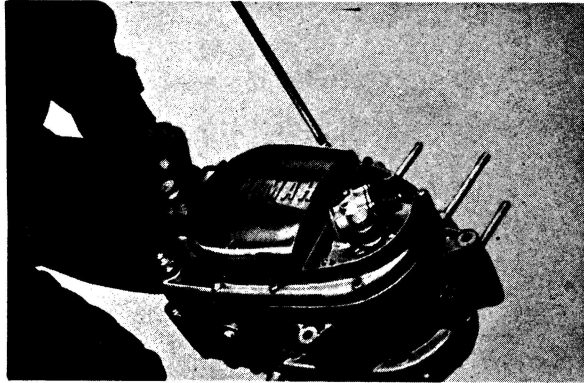


Fig. IV-8-2

- 3) Remove the crankcase cover gasket. Replace it if damaged.

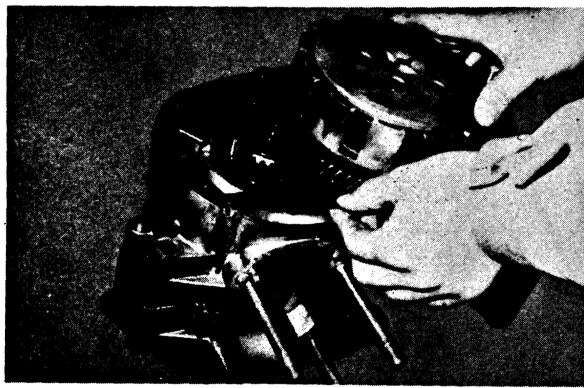


Fig. IV-8-3

B. Installation

Spread YAMAHA Bond No.5 over the mating surface of the right-hand crankcase. Place the crankcase cover gasket on the crankcase, apply Yamaha Bond No.5 and install the right-hand crankcase cover. Be sure to apply YAMAHA Bond No.5 to the mating surface; otherwise, the crankcase may leak.

Note: When installing the crankcase cover (R), make sure that the pump drive gear (made from synthetic resin) is correctly engaged with the primary drive gear



Fig. IV-8-4

IV-9 Clutch

The clutch is a wet, multi-disc type, consisting of six molded cork friction plates

and seven clutch plates in the clutch housing which is mounted on the transmission main axle.

To disengage the clutch, an inner push rod system is employed. The primary driven gear, coupled with the clutch housing, is meshed with a kick pinion gear allowing starting by kicking the starter with the clutch disengaged (or engaged in neutral). A shock absorber consisting of coil springs is between the primary driven gear and the clutch housing.

The primary drive gear has 21 teeth, and the primary driven gear 65 teeth.
(Primary reduction ratio..... $65/21=3.095$)

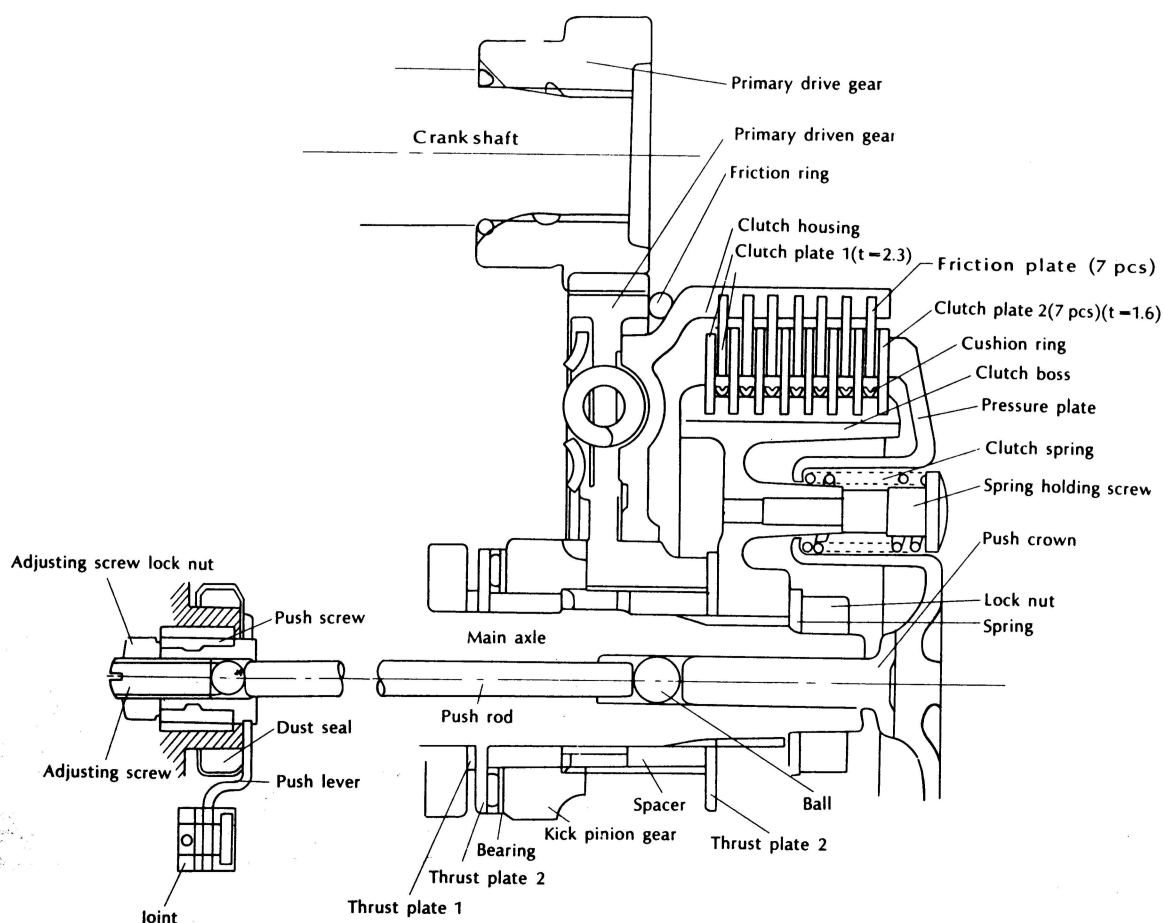
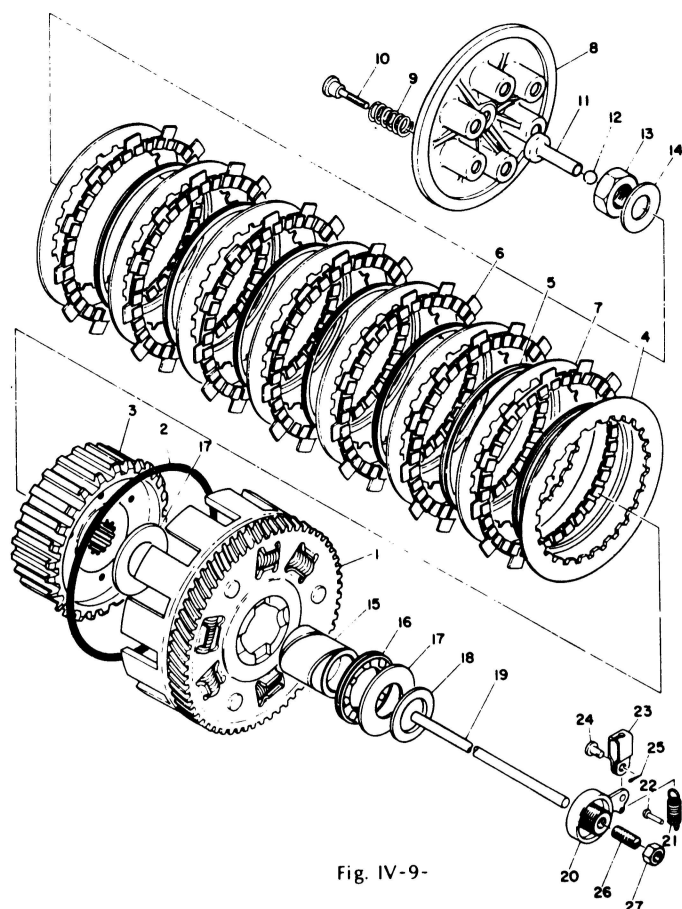


Fig. IV-9-1



1. PRIMARY DRIVEN GEAR COMP.
2. O-RING
3. BOSS, Clutch
4. PLATE, Clutch (1)
5. RING, Cushion
6. PLATE, friction
7. PLATE, clutch (2)
8. PLATE, pressure
9. SPRING, clutch
10. SCREW, spring
11. ROD, push
12. BALL
13. NUT, lock
14. WASHER, spring
15. SPACER
16. BEARING
17. PLATE, thrust (2)
18. PLATE, thrust (1)
19. ROD, push
20. PUSH LEVER ASS'Y
21. SPRING, return
22. HOOK, spring
23. JOINT
24. PIN
25. PIN, cotter
26. SCREW, adjusting
27. NUT, adjusting

Clutch assy exploded view

A. Removing the Pressure Plate

Remove the six clutch spring holding screws, and take out the pressure plate and push crown.

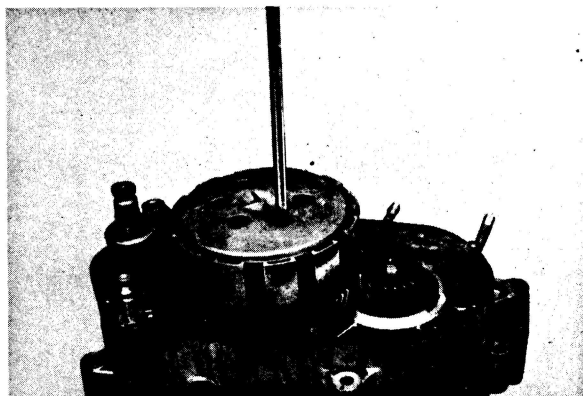


Fig. IV-9-3

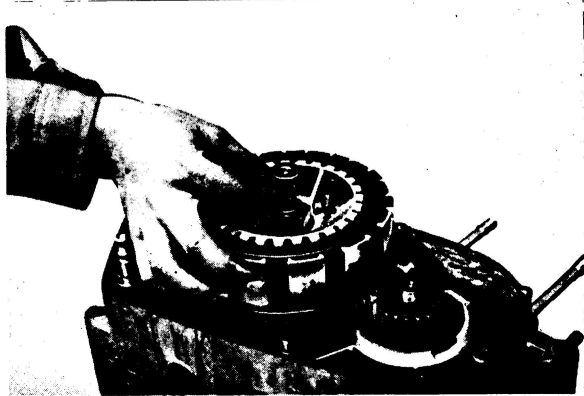


Fig. IV-9-4

B. Removing the Clutch Boss

Install the clutch holding tool (same as R3, DS6,) on the clutch boss. Loosen the lock nut, and then remove the clutch boss.

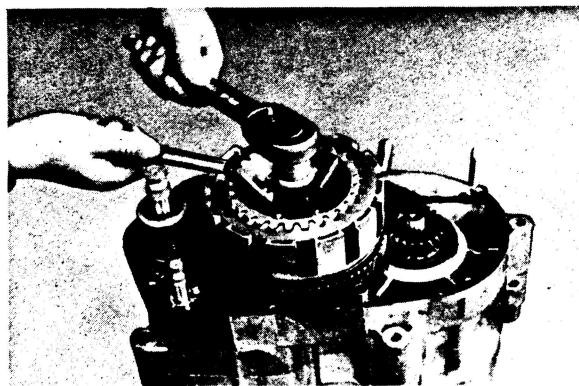


Fig. IV-9-5

C. Checking the Clutch Spring

If the free length of the spring is 1 mm. (0.04 in.) or more shorter than the standard free length, replace it.

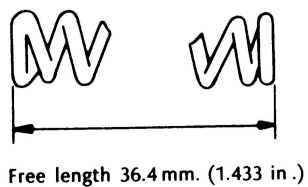


Fig. IV-9-6

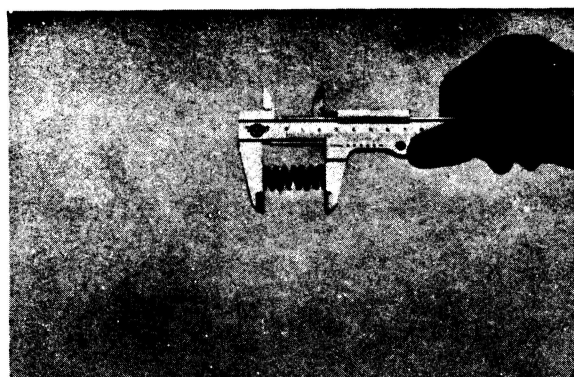


Fig. IV-9-7

D. Checking the Friction Plates

Inspect the friction plates for wear. Replace them if wear equals 0.3 mm. (0.012 in.) or more.

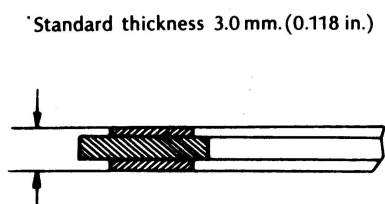


Fig. IV-9-8

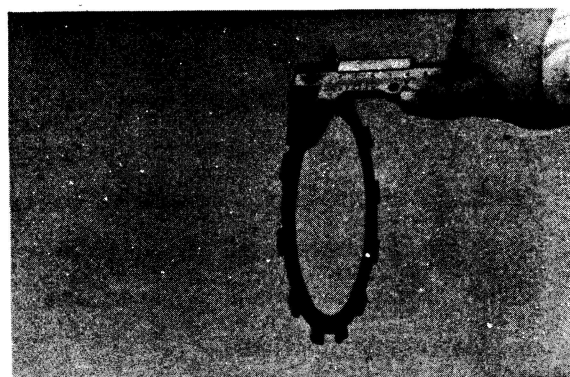


Fig. IV-9-9

E. Clutch Housing Assembly (integrated with the primary driven gear)

A rubber friction ring is placed on the outside of the clutch between the primary driven gear and the clutch housing in order to reduce gear noise at low engine speeds.

1) Inspection

Insert the primary gear retaining collar (spacer) in the primary driven gear boss and check it for radial play.

If any scratches are found, replace it so it will not impair clutch action.

If the play is excessive (allowable clearance is between 0.009~0.048 mm.), replace the gear retaining collar because it will cause excessive noise.

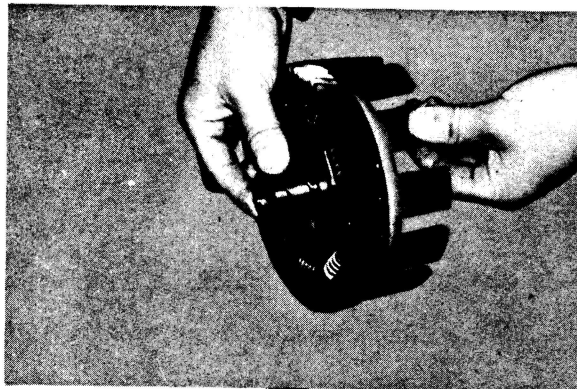


Fig. IV-9-10

F. Checking the Primary Gear Retaining Collar (Spacer)

Place the primary gear retaining collar over the main axle and again check it for radial play.

If play exists (allowable clearance is between 0.020~0.062 mm.) replace the gear retaining collar.

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

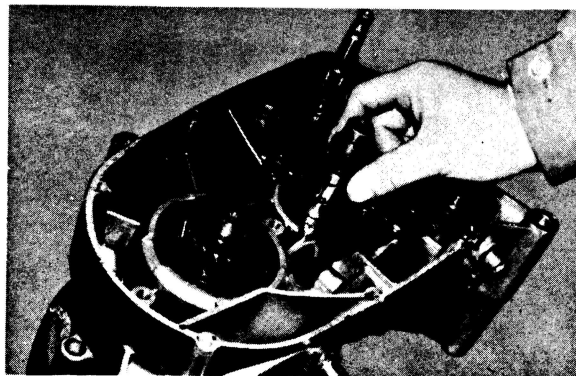


Fig. IV-9-11

G. Fitting Cushion Rings

A cushion ring is installed between each of the clutch plates and the friction plates to insure even engagement and complete disengagement of the plates. When fitting cushion rings, be sure they are flat and not twisted.

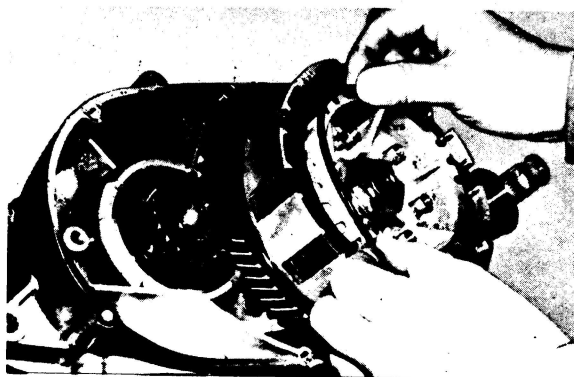


Fig. IV-9-12

H. Checking the Push Rod

Remove the push rod and roll it over a surface plate. If the rod is bent, straighten or replace it.

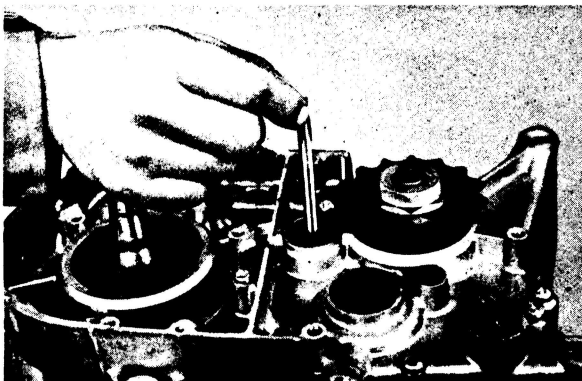


Fig. IV-9-13

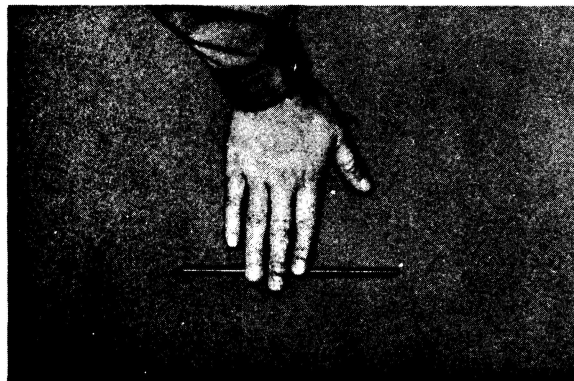


Fig. IV-9-14

I. Caution on Re-assembling the Clutch

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

The thrust bearing assembly fits on the primary retaining collar, but it may slip out of place when installing clutch boss.

Therefore, apply grease to both surfaces of the bearing to make it stick to the gear retaining collar.

Before fitting the clutch boss, install the clutch plates, friction plates, etc., and then install the clutch boss.

Correct

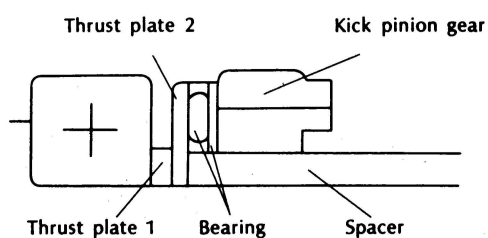


Fig. IV-9-15

Incorrect

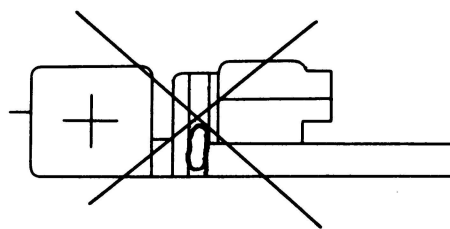


Fig. IV-9-16

J. Adjusting the Clutch

1) Adjusting the Push Screw

Remove the clutch adjustment cover and loosen the push screw lock nut. Rotate the push screw in to a lightly seated position, and back it off $\frac{1}{4}$ turn to get the proper spacing. Then fully tighten the lock nut.

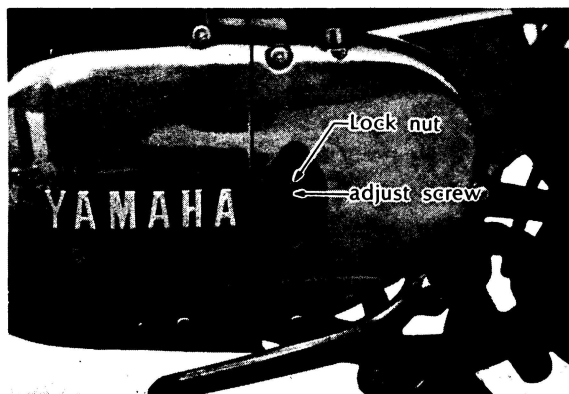


Fig. IV-9-17

2) Adjusting the Clutch Cable Tension

The clutch cable adjustment changes after being used for a long time.

Occasionally the cable must be Re-adjusted so that the play of the clutch handle is from 2 to 3 mm. ($\frac{1}{16}$ - $\frac{1}{8}$ in.) at the pivot.

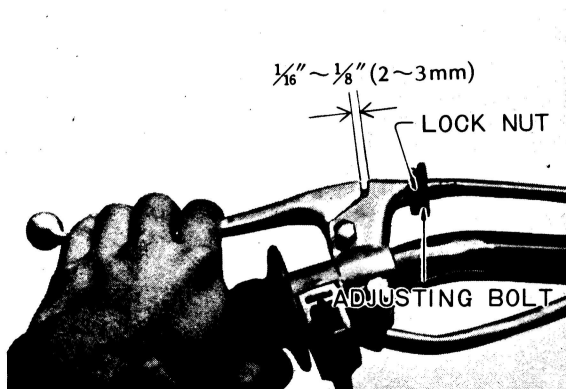


Fig. IV-9-18

IV-10 Primary Drive Gear

A. Removal

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

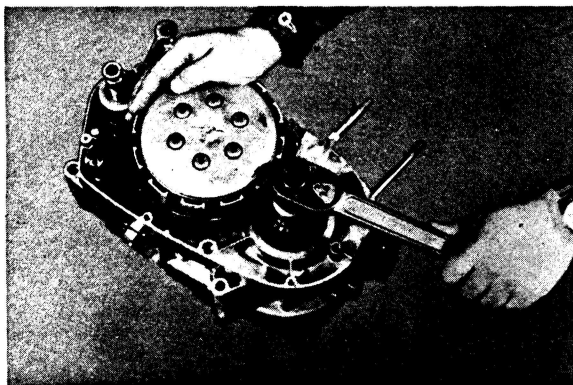


Fig. IV-10-1

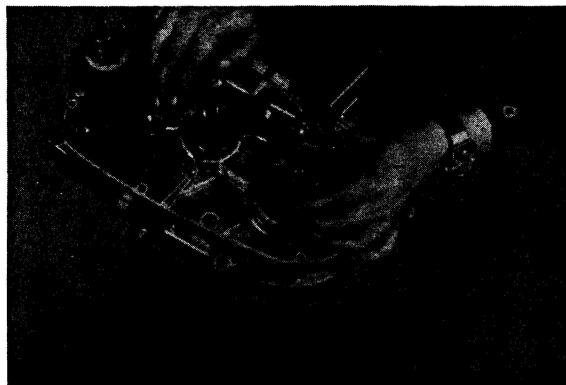


Fig. IV-10-2

IV-11 Kick Starter Mechanism

The kickstarter employs the primary kick system. To start the engine, you just

kick the starter with the clutch disengaged or engaged. The ability to start the engine with the clutch disengaged can be a great advantage when racing. The kick gear is driven the same as the YR1. When the kick shaft rotates, the ratchet wheel is disengaged from the ratchet wheel guide and meshes with the kick gear. The rotation of the kick gear is transmitted through the idler gear to the kick pinion that is engaged with the primary driven gear.

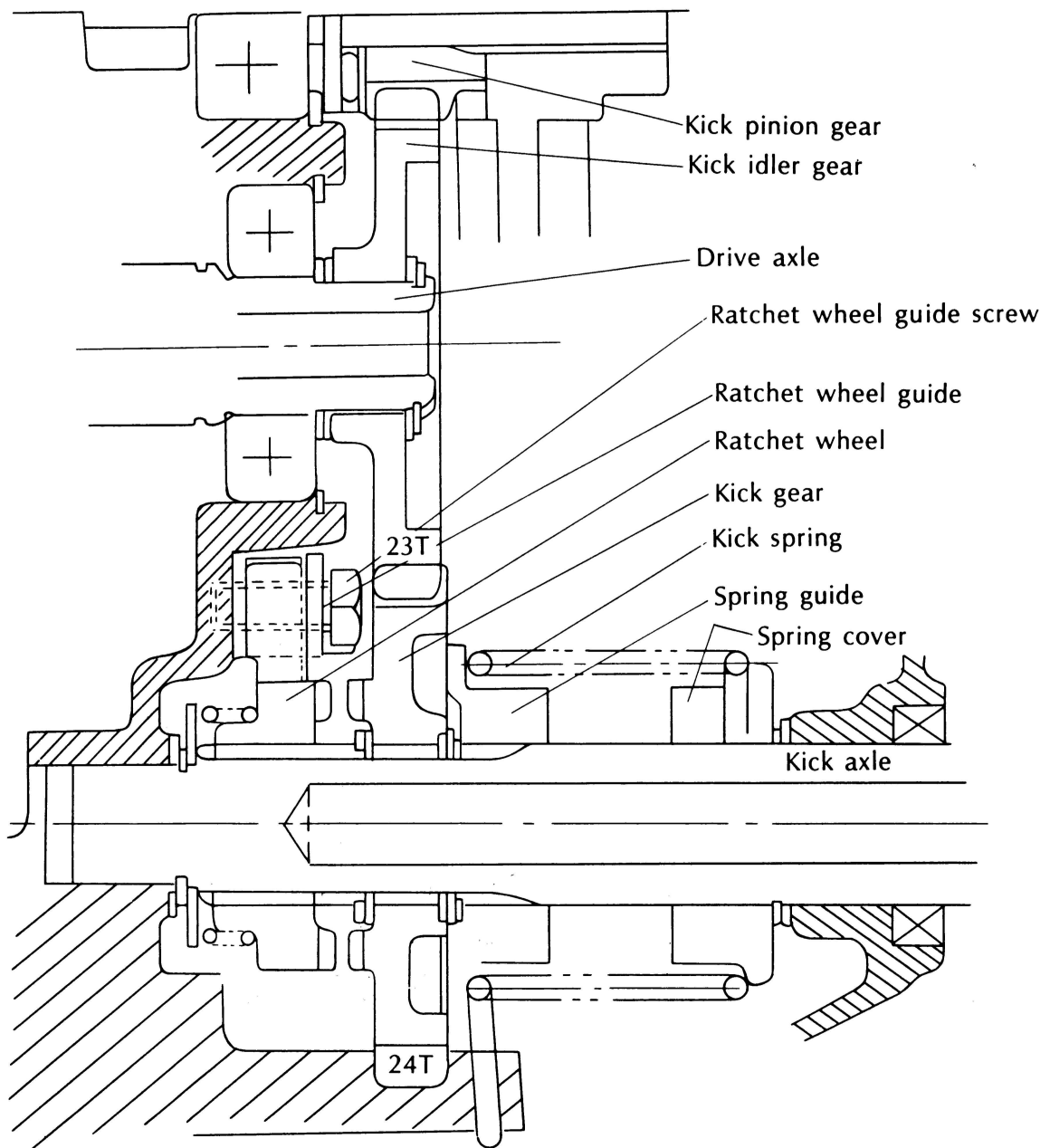
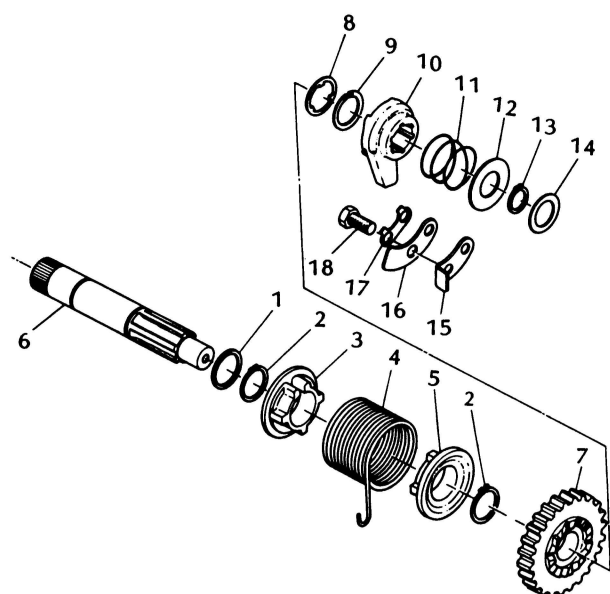


Fig. IV-11-1



1. SHIM (2)
2. CIRCLIP
3. COVER, Spring
4. SPRING, Kick
5. GUIDE, Spring
6. AXLE, Kick
7. GEAR, Kick
8. WASHER
9. CLIP
10. WHEEL, ratchet
11. SPRING, ratchet wheel
12. COVER, Spring
13. CIRCLIP
14. SHIM (1)
15. STOPPER
16. GUIDE, ratchet wheel
17. WASHER, lock
18. SCREW, ratchet wheel guide

Fig. IV-11-2

A. Removal

- 1) Remove the kick spring

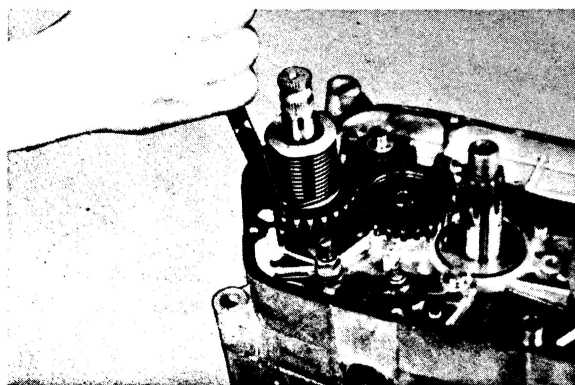


Fig. IV-11-3

- 2) Then remove the kick starter assembly. Note the location of any shims.

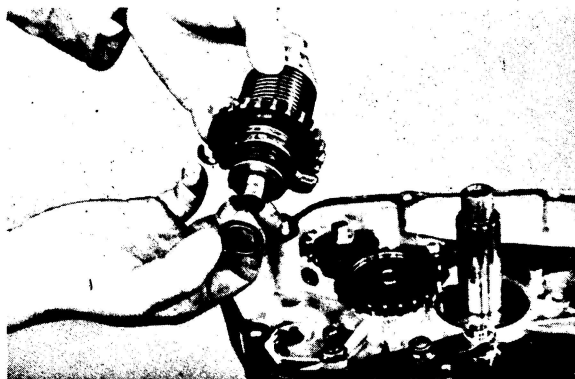


Fig. IV-11-4

B. Reverse the sequence for reinstallation.**Notes on Assembling**

- 1) Align the marking on the kick starter axle with that of the ratchet wheel.
- 2) When installing the kick starter ass'y in the crankcase, slide the ratchet wheel pawl over the ratchet wheel guide toward the stopper attached to the case. Make sure that the pawl is in close contact with the stopper. Then pull the spring forward and hook it on the stopper.

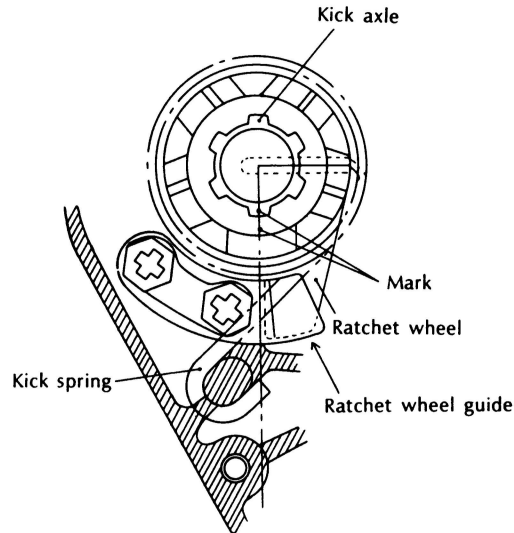


Fig. IV-11-5

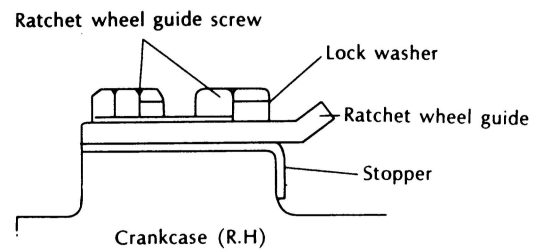


Fig. IV-11-6

C. Removing the Kick Idler Gear

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

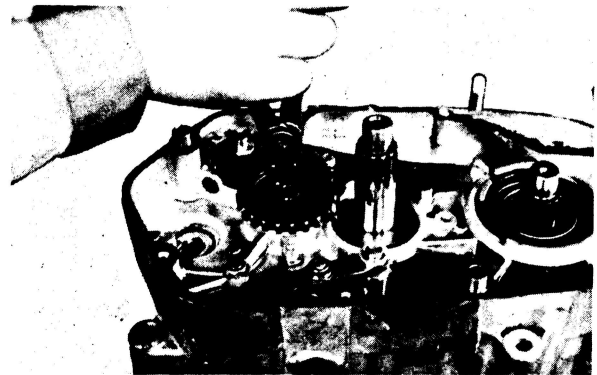


Fig. IV-11-7

D. Removing the Tachometer Drive Gear

The tachometer drive gear is engaged with the kick idler gear to convey the revolutions per minute of the crankshaft to the tachometer through the tachometer cable.

Remove the clip with pliers and the tachometer drive gear can be removed.

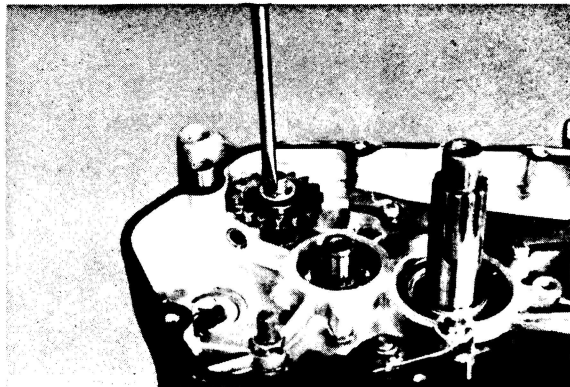


Fig. IV-11-8

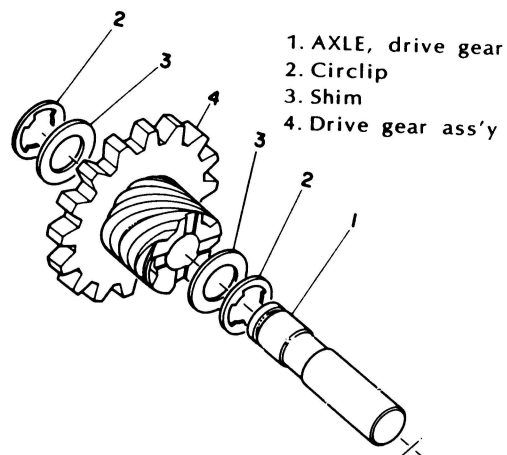


Fig. IV-11-9

IV-12 Shift Mechanism

The shift cam drum has one shift fork and two other shift forks are installed on a guide bar located parallel to the cam drum. These three shift forks slide back and forth in the slotted guides that are grooved in the shift drum. A safety device has been provided to prevent the shifter from by-passing the next gear when a quick or hard shift is made. This provides dependability and assurance for correct shifting for the desired gear even under the roughest conditions such as competition racing.

A see-saw type shifting arrangement is used that enables the rider to shift quickly and easily down for the lower gears and up for the higher gears. Neutral position is located between first and second gears.

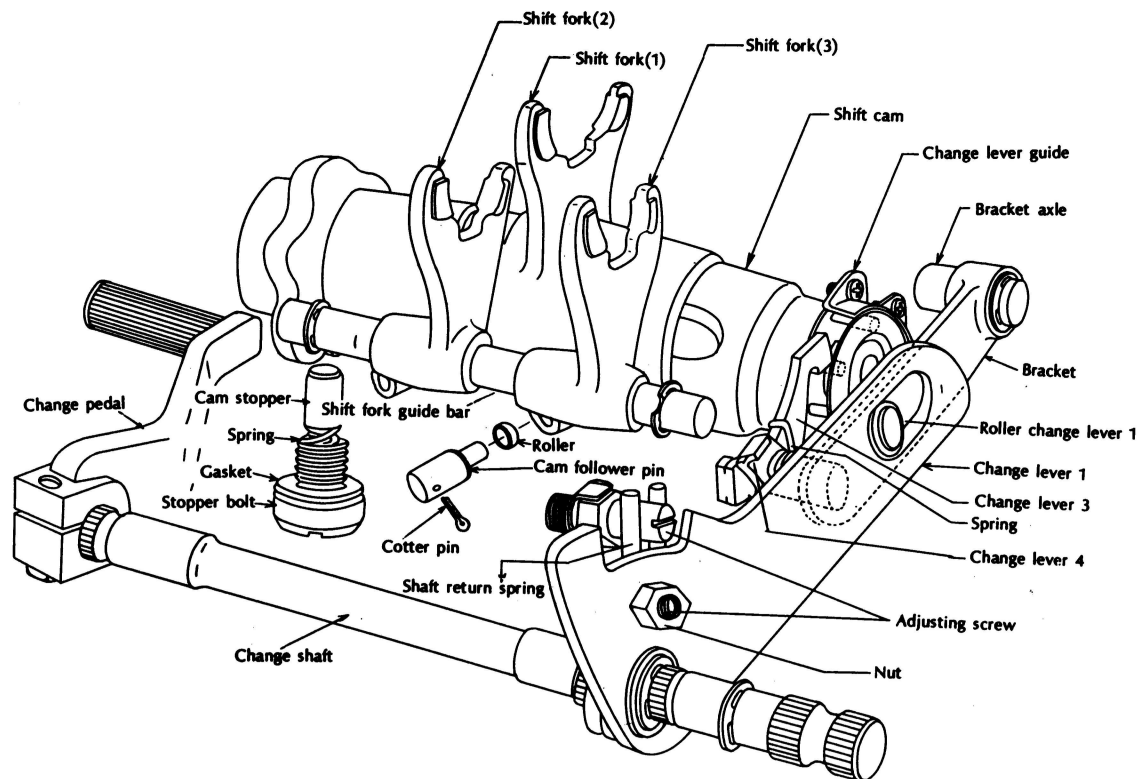


Fig. IV-12-1

A. Removing the Change Axle Assembly

- 1) Remove the change axle sealing boot.

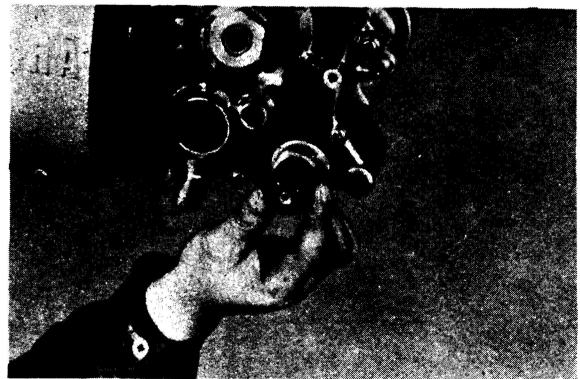


Fig. IV-12-2

- 2) Pull out the change shaft assembly.

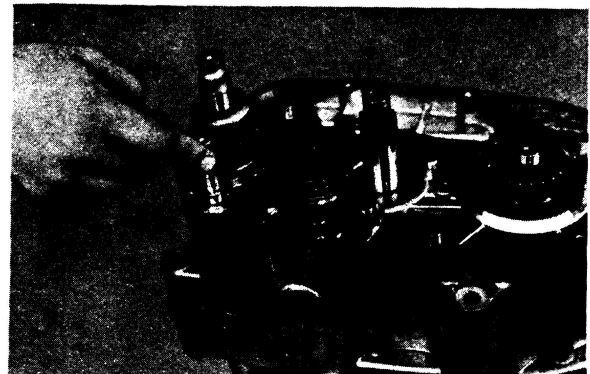


Fig. IV-12-3

B. Checking the Gear Shift Parts

- 1) Check the gear shift return spring.
A broken or fatigued gear shift return spring will impair the return action of the shifting mechanism.

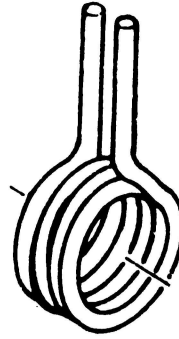


Fig. IV-12-4

C. Removing the Change Lever 3 and 4

Remove the "E" clip with a slot-head screwdriver. The change lever can now be removed.

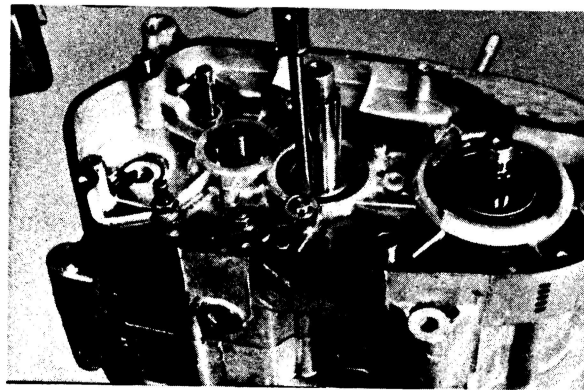


Fig. IV-12-5

D. Checking the Change Lever Spring

Check for a fatigued or broken change lever spring. A faulty change lever spring may result in an improper shifting sequence.

E. Gear Change Adjustment

- 1) Fully move the gear change lever up and down and turn the adjusting bolt (eccentric bolt) on the case so that the clearance (a) will become equal to the clearance (a'). (a) is the clearance between the bent part of change lever 3 and the stopper (shaded area in the drawing) and (a') is the clearance between the bent part and the stopper. The stopper is a device for preventing the shifter from overrunning the correct position. After the adjustment, lock the adjusting screw with the lock nut.
- 2) Next turn the adjusting screw (eccentric screw) on change lever 1 so that the clearance (b) will become even with the clearance (b') on each gear position.

NOTE: Check in 2nd, 3rd,
or 4th gear.

(b) is the clearance between the pin and change lever 4. After the adjustment, lock the adjusting screw with the lock nut. Recheck your adjustment by shifting through several gears.

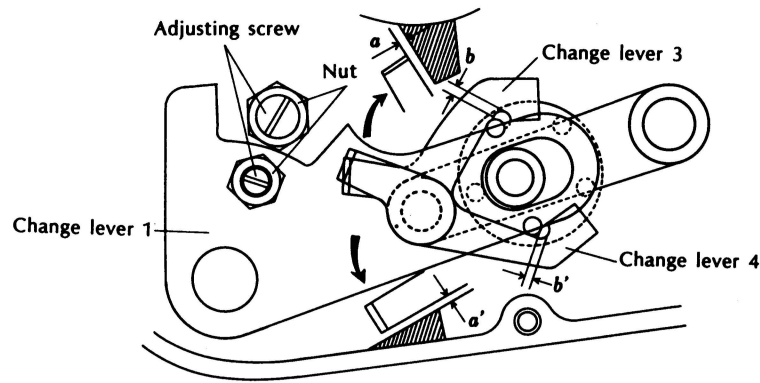


Fig. IV-12-6

IV-13 Drive Sprocket

A. Removal

- 1) Straighten the bent edge of the lock washer with a blunt-ended metal punch.



Fig. IV-13-1

- 2) Keep the drive sprocket from turning with the flywheel magneto holding tool, and remove the sprocket nut.

If the flywheel magneto puller is not available, shift the transmission to low gear, and fit a monkey wrench on the sprocket nut. Then tap the handle of the wrench with a hammer and the shock will loosen the nut.



Fig. IV-13-2

B. Inspection

A worn drive sprocket will result in excessive chain noise, and shorten the life of the chain. Check the sprocket for worn teeth, and replace if it is worn.

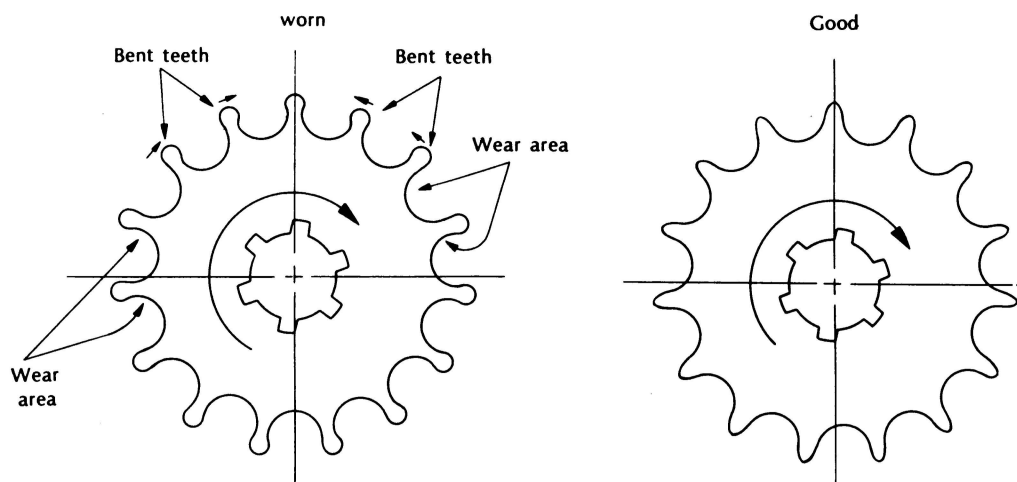


Fig. IV-13-4

IV-14 Crankcase

A. Separating

- 1) Remove the neutral stopper.

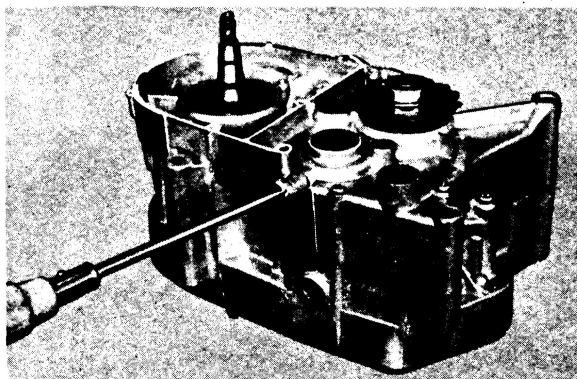


Fig. IV-14-1

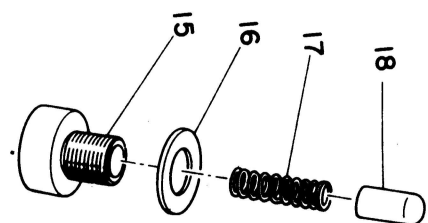


Fig. IV-14-2

- 2) Remove the change lever guide.

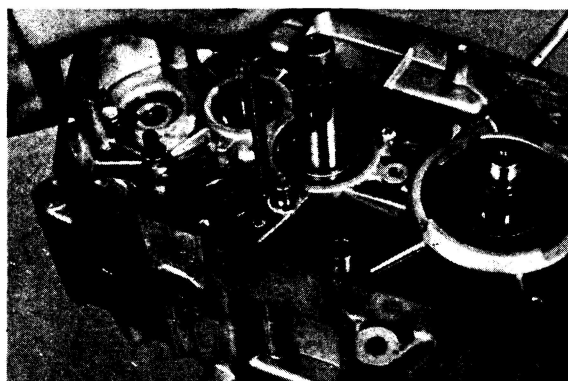


Fig. IV-14-3

- 3) Remove the pan head screws from the left crankcase.



Fig. IV-14-4

- 4) Install the crankcase separating tool on the right crankcase. Divide the crankcase while tapping the main axle and the crankcase alternately with plastic tip hammer.

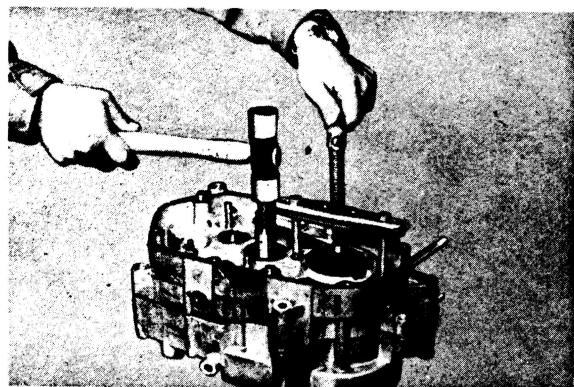


Fig. IV-14-5

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

The crankcase is designed to split into two halves, right and left.

Only one drain plug is provided for both the transmission and clutch housings. Both housings can be drained at once by removing the drain plug.

B. Reassembling

When reassembling the crankcase, be sure to apply YAMAHA BOND No.5 to the freshly cleaved mating surfaces of both halves.

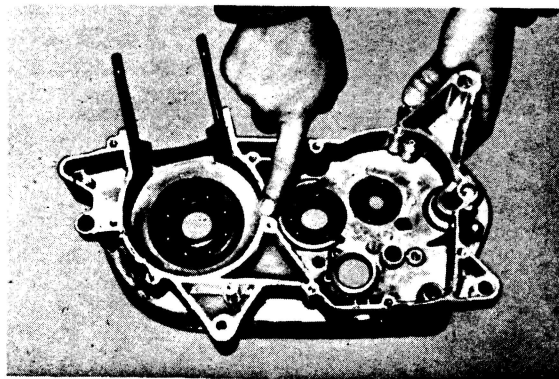
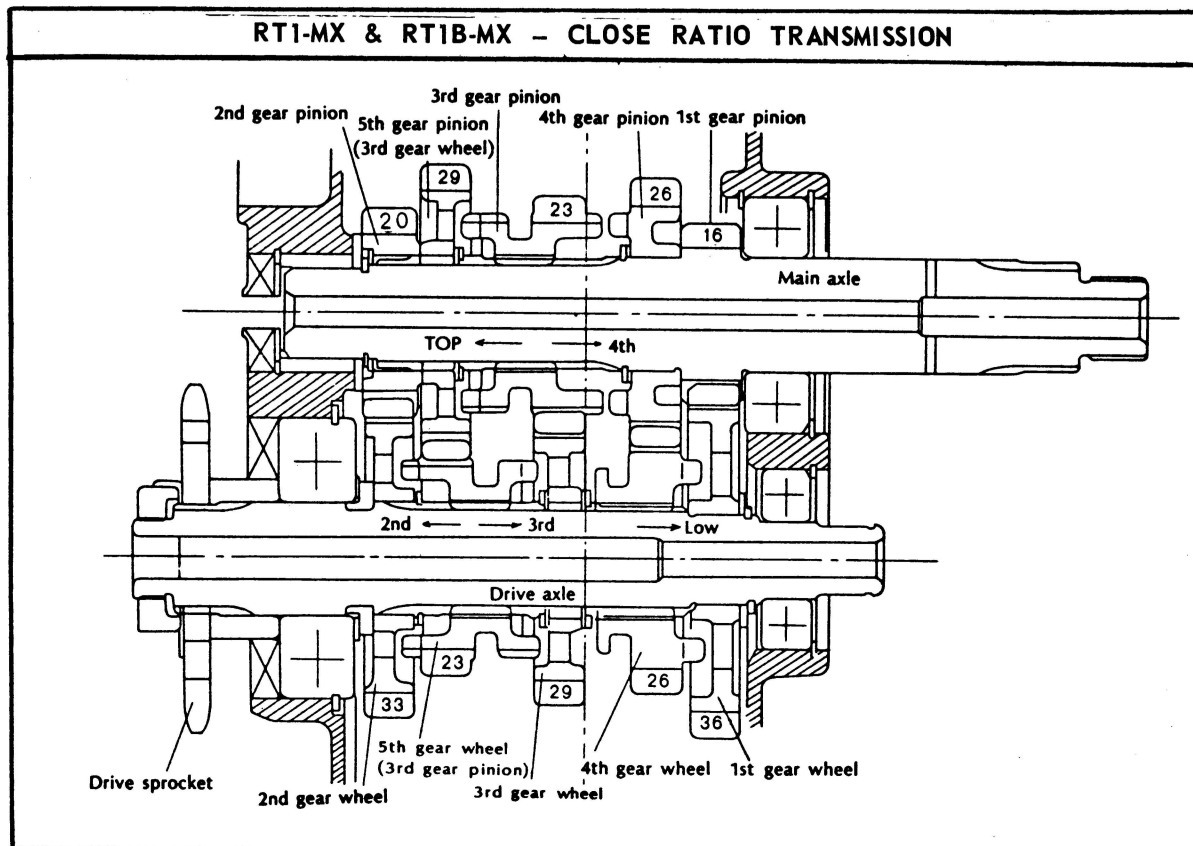
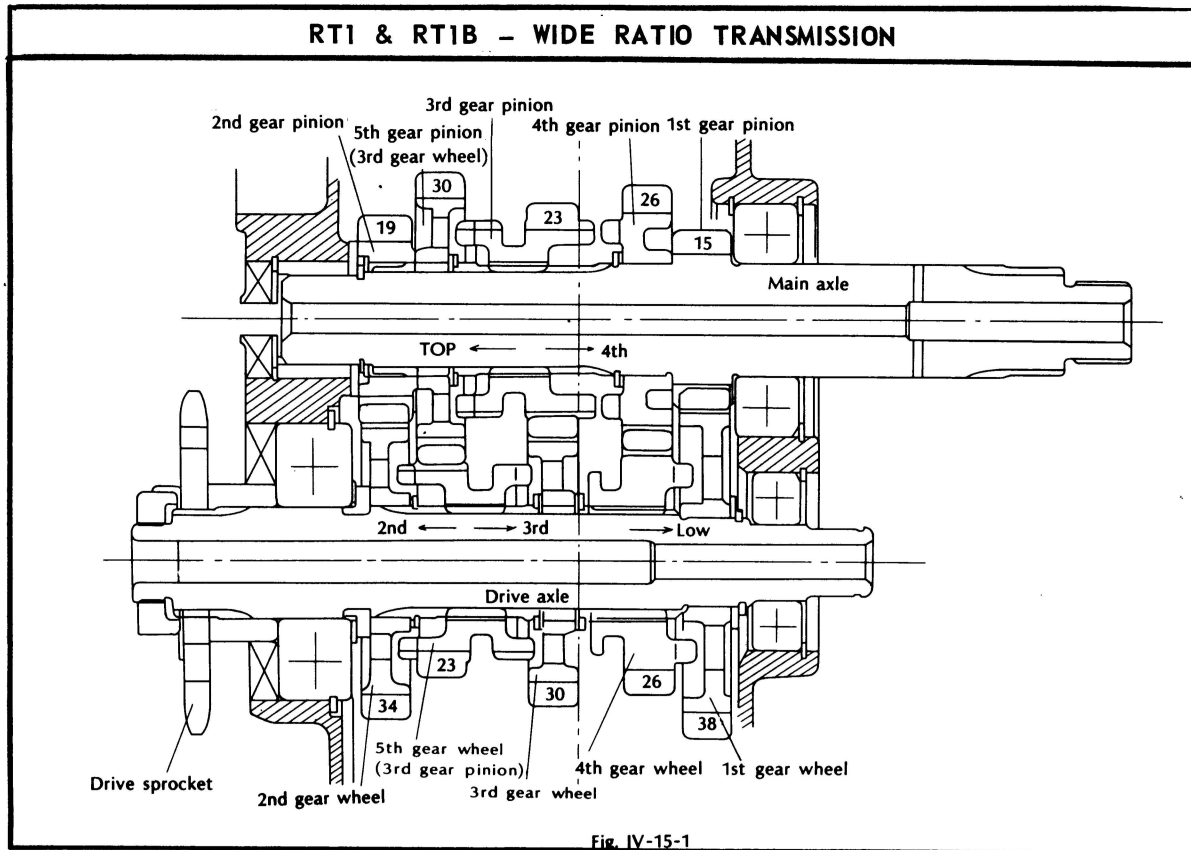


Fig. IV-14-6

IV-15 Transmission Assembly



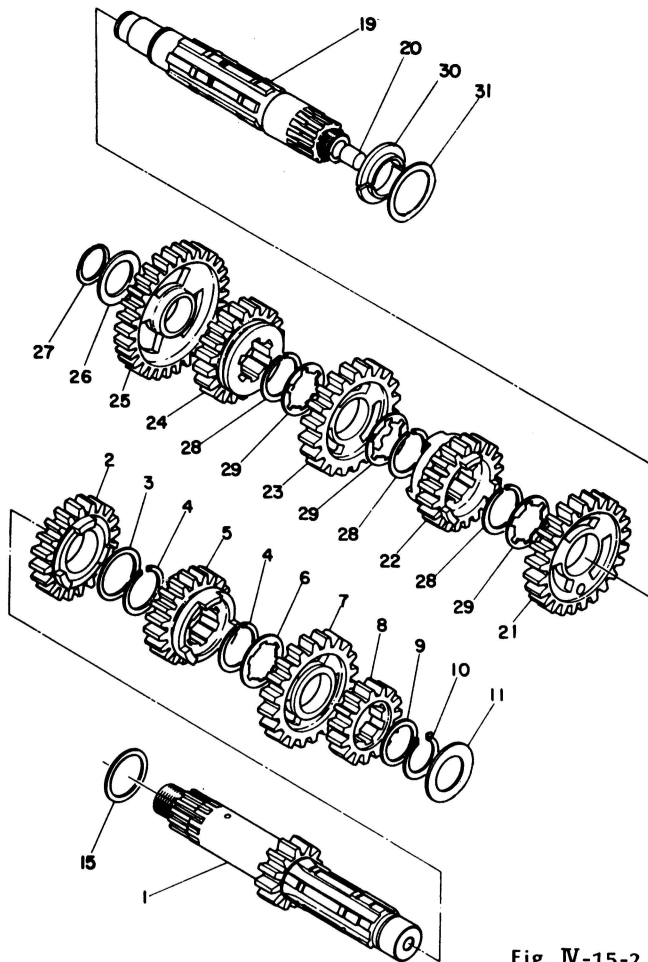


Fig. IV-15-2

1. AXLE main
2. GEAR 4th pinion
3. WASHER gear hold (25-32-1)
4. CIRCLIP
5. GEAR, 3rd pinion
6. WACHER, gear hold
7. GEAR, 3rd wheel
8. GEAR, 2nd pinion
9. WASHER, gear hold (20-25-1)
10. CIRCLIP
11. SHIM (20.2-33-1)
12. BEARING
13. CIRCLIP
14. OIL SEAL
15. SHIM, main axle (25.1-31-0.1, 0.2, 0.3)
16. BEARING
17. CIRCLIP
18. GEAR, kick pinion
19. AXLE, drive
20. PLUG, blind
21. GEAR, 2nd wheel
22. GEAR, 3rd pinion
23. GEAR, 3rd wheel
24. GEAR, 4th wheel
25. GEAR, 1st wheel
26. WASHER, gear hold (20-30-1.5)
27. CIRCLIP
28. CIRCLIP
29. WASHER, gear hold
30. SPACER, drive axle
31. SHIM, drive axle (25-34-0.3, 0.4, 0.5)

A. Removal

Remove the transmission and shifter as a unit. (Fig. IV-15-3)

B. Reinstallation

Reinstall the transmission and shifter as a unit in the left crankcase half after they are sub-assembled. They cannot be installed separately. The transmission unit must be in neutral during installation.

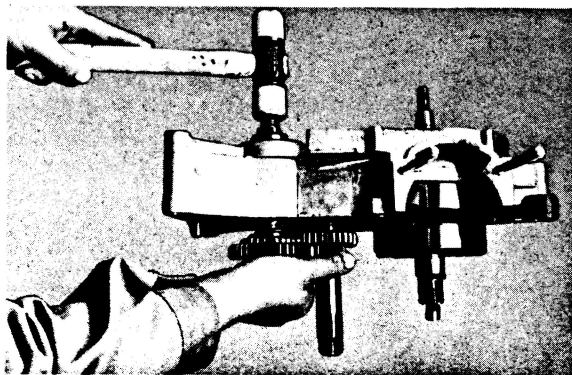


Fig. IV-15-3

VI-16 Crankshaft

The crankshaft requires the highest degree of accuracy in engineering and serving of all the engine parts.

The crankshaft is also more susceptible to wear, and therefore, it must be handled with special care.

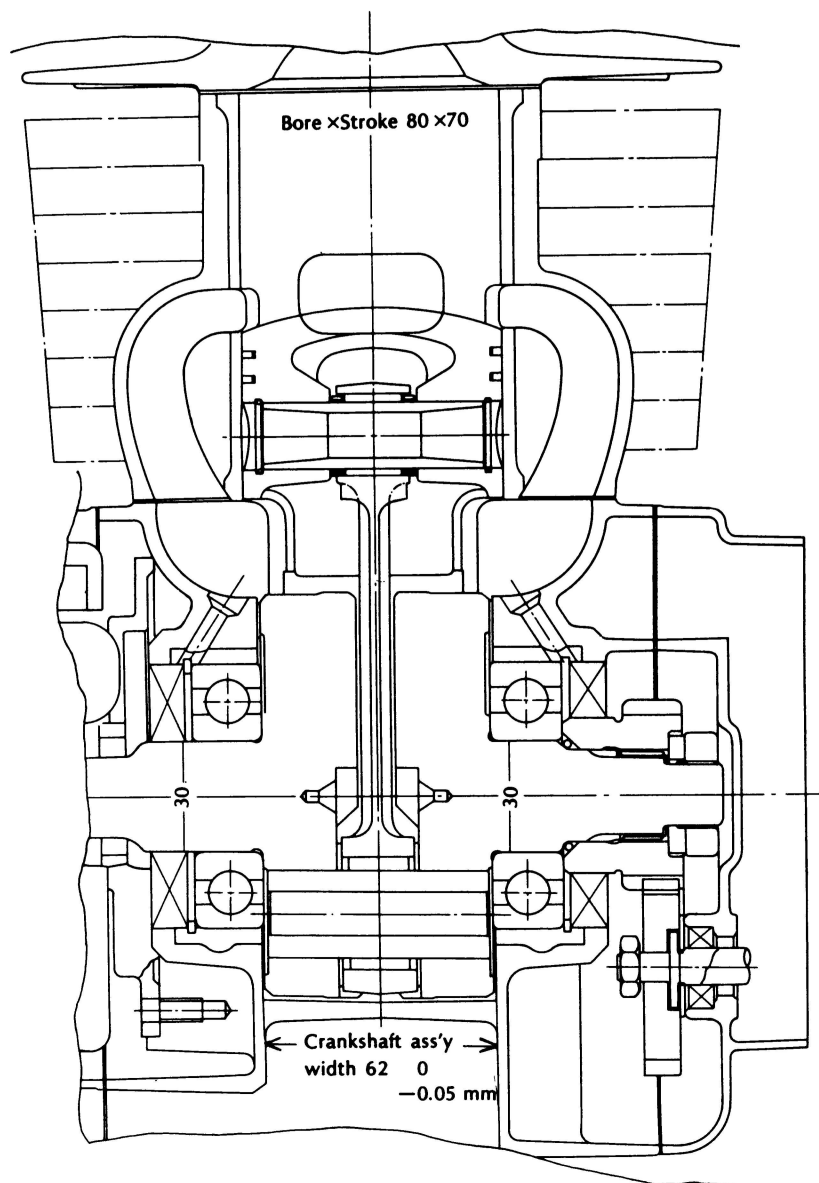


Fig. IV-16-1

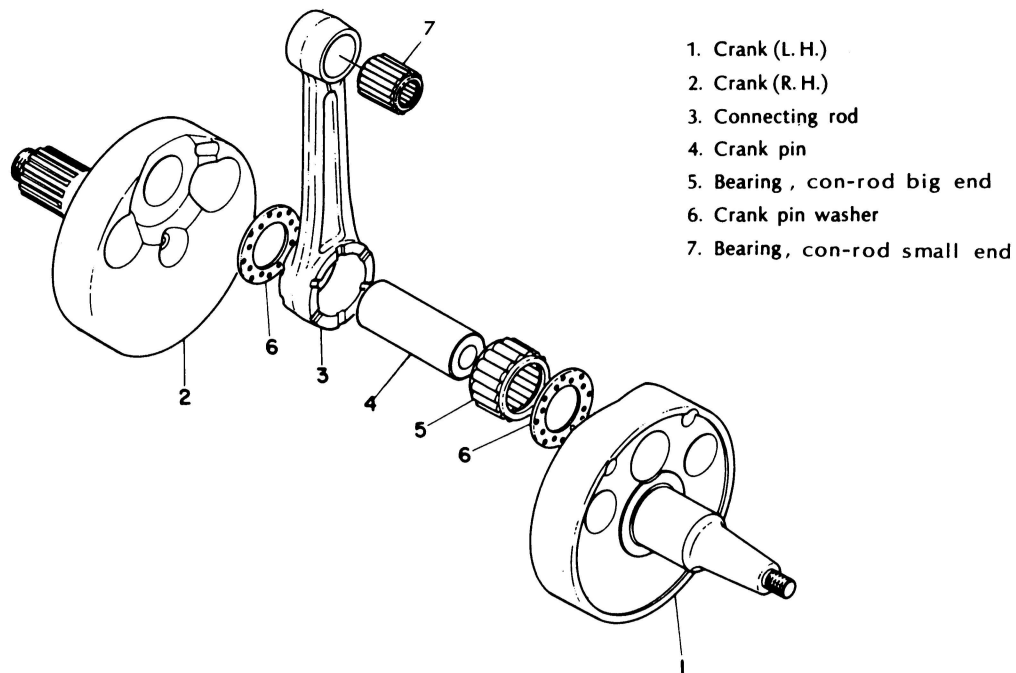


Fig. IV-16-2 Crankshaft component parts

A. Removing the Crankshaft Assembly

Remove the crankshaft assembly with the crankcase separating tool.

Note: Fully tighten the bolts of the crankcase dividing tool, and keep the tool parallel to the crankcase surface.

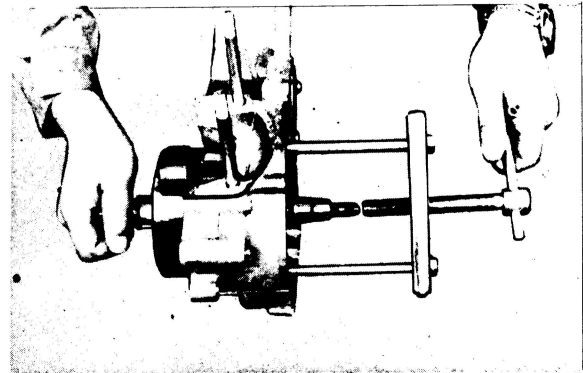


Fig. IV-16-3

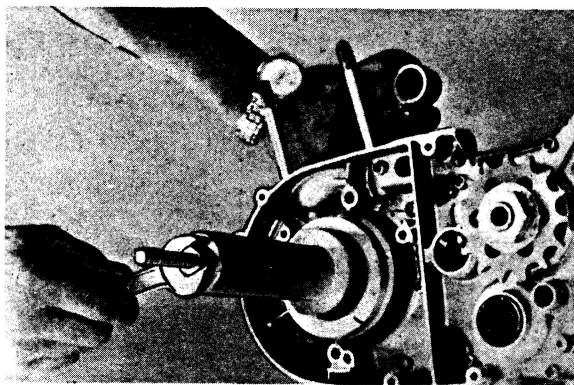
B. Installing the Crankshaft Assembly

Install the crankshaft assembly by using the crankshaft setting tool and the crank fitting spacer.

Hold the connecting rod at top dead center with one hand while turning the handle of the setting bolt with the other.

Note: 1) The crankshaft setting bolt is same as those used for YG1, and YF1.

- 2) The crank fitting spacer(same as DT1) is required because the crankshaft is larger in diameter. In addition, the oil seal is larger in outside diameter than the crankshaft setting tool body.



C. Inspection and Servicing

- 1) Checking the crankshaft components

Check connecting rod axial play at small end (to determine the amount of wear of crank pin and bearing at large end) (Fig. IV-16-5)	Small end play should not exceed 2 mm. (0.078 in.)	If small end play exceeds 2 mm, disassemble the crankshaft, check connecting rod crank pin and large end bearing. Replace defective parts. Small end play after reassembly should be within 0.8-1.0 mm. (0.031~0.04 in.)
Check the connecting rod for axial play at large end. (Fig. IV-16-6)	Move the connecting rod to one side and insert a feeler gauge. Large end axial play should be within 0.4-0.5 mm.(0.019 in.)	If excessive axial play is present, (0.6 mm or more) disassemble the crankshaft and replace any worn parts.
Check accuracy of the crankshaft ass'y runout. (Misalignment of parts of the crankshaft) (Fig. IV-16-7)	Dial gauge readings should be within 0.03 mm. (0.0012 in.)	Correct any misalignment by tapping the flywheel with a brass hammer and by using a wedge.

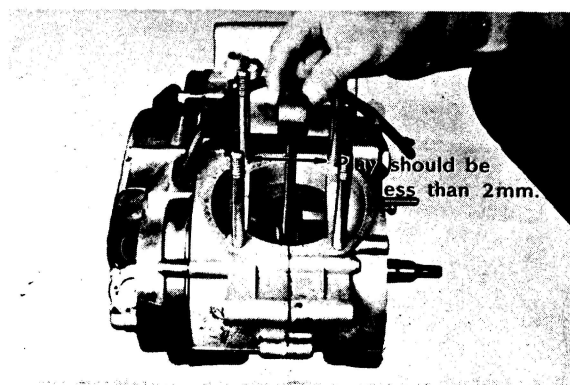


Fig. IV-16-5

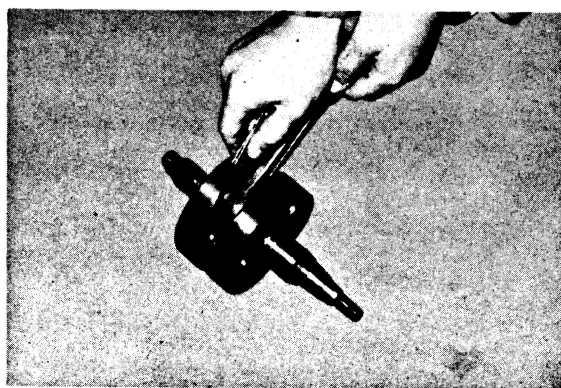


Fig. IV-16-6

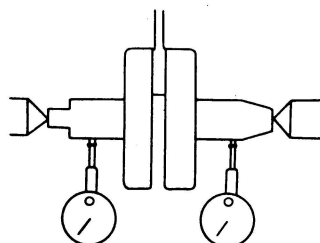


Fig. IV-16-7

IV-17 Bearings and Oil Seals

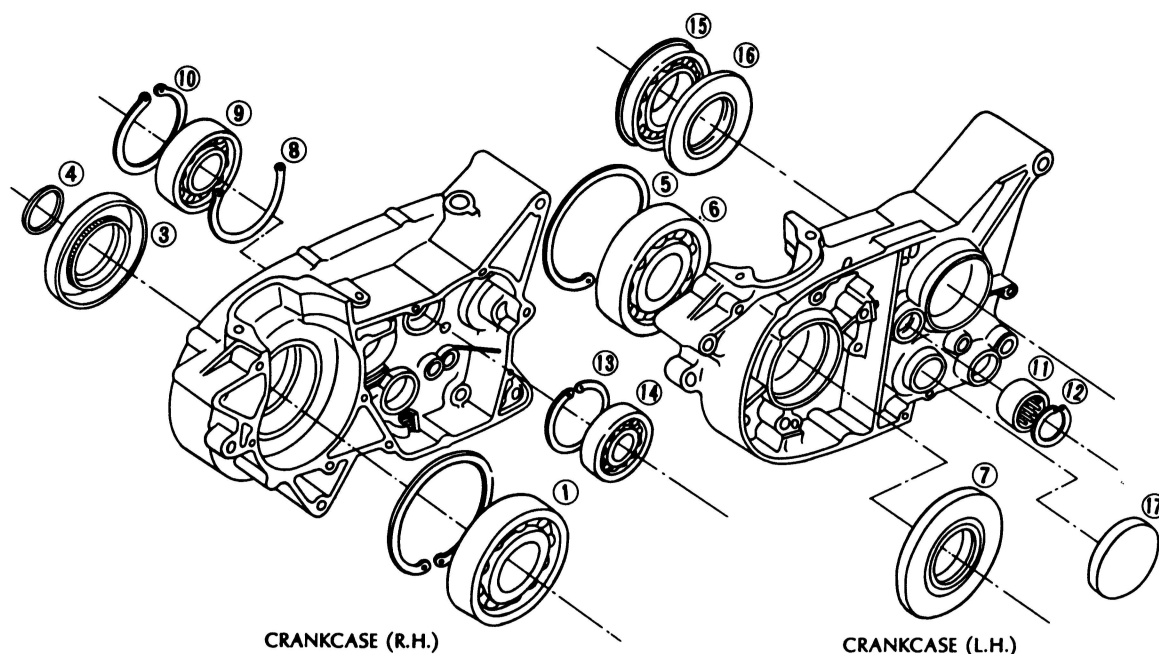


Fig. IV-17-1

- | | | |
|------------------------|-------------------------|-------------------------|
| 1. Bearing 6306 | 7. Oil seal SW30-72-10 | 13. Circlip |
| 2. Circlip R-72 | 8. Circlip 25.1-31-0.3 | 14. Bearing 6203 |
| 3. Oil seal SW42-72-10 | 9. Bearing 6205 | 15. Bearing 6305NR |
| 4. O-ring 3.2-24.5 | 10. Circlip | 16. Oil seal SD-35-62-6 |
| 5. Circlip R-72 | 11. Bearing 20-26-16 | |
| 6. Bearing 6306 | 12. Circlip 25.1-31-0.1 | |

1. Removal and Installation

1) Removal

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

Always replace the oil seals when overhauling the engine.

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

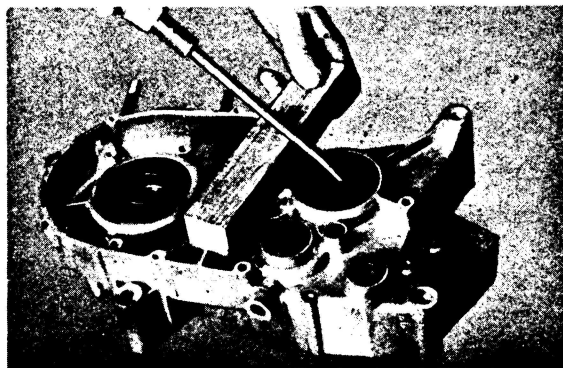


Fig. IV-17-2

- b. Remove the bearing with a bearing puller.

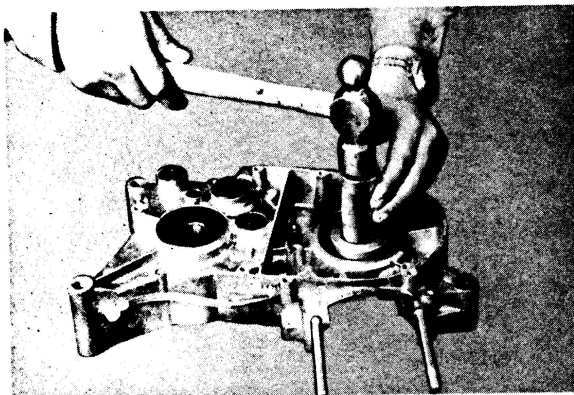


Fig. IV-17-3

2) Installation

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

When installing bearings pack them with grease.

The crankshaft bearing circlip should be installed so that the circlip end gap is aligned with the arrow marked on each of the crankcase halves.

Bearing installation is most easily accomplished by heating the crankcase in an oven to 200°F.

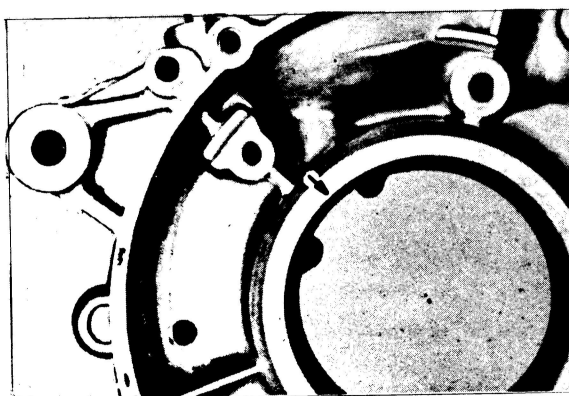
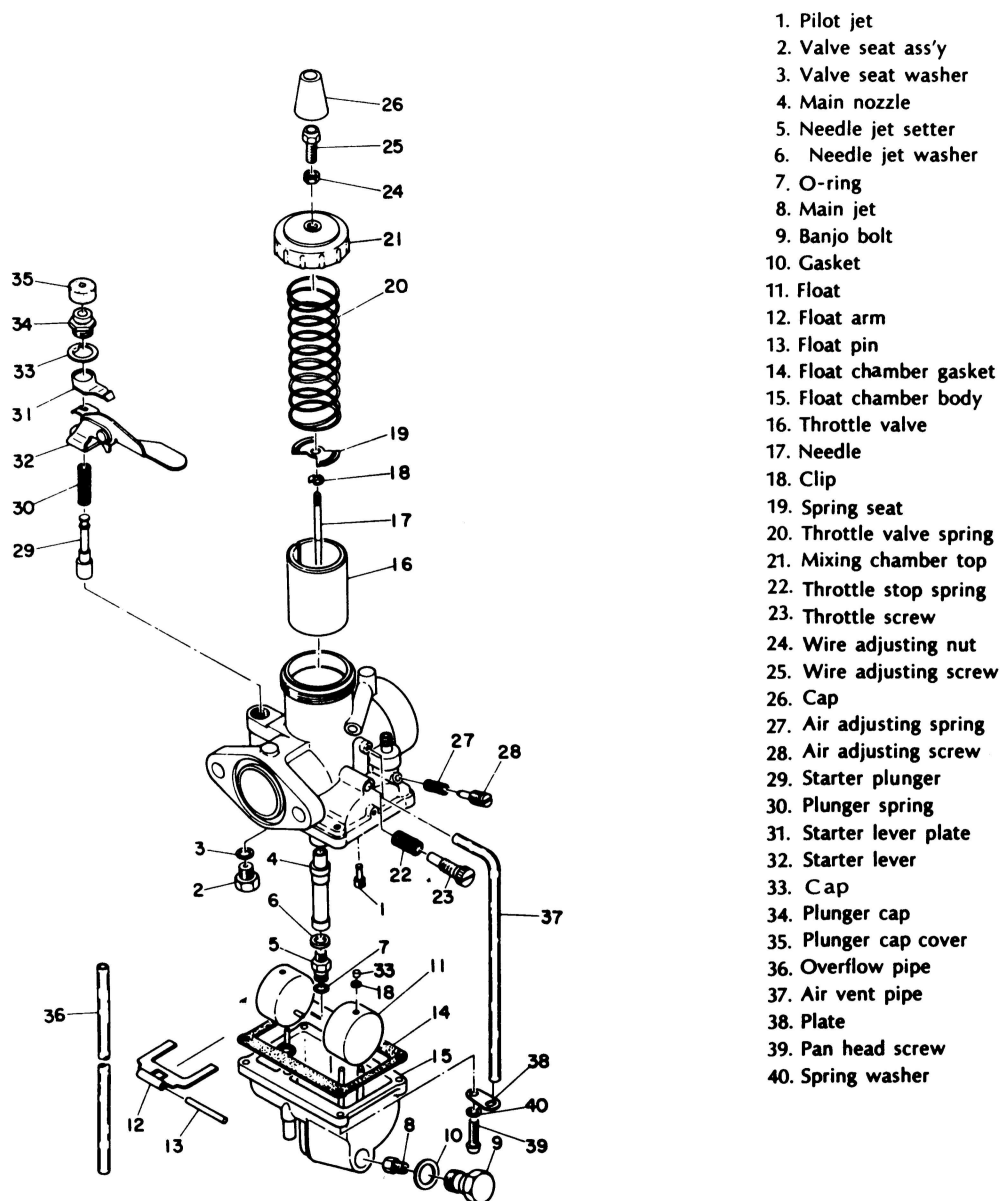


Fig. IV-17-4

IV-18 Carburetor

The RT1 & RT1B are equipped with a 32mm carburetor (VM 32 SH). The RT1-MX & RT1B-MX are equipped with a 34mm carburetor (VM 34 SH). Both size carburetors are equipped with a built-in starter jet.

The carburetor is bolted to a 30 mm. thick bakelite insulator that is between the carburetor and cylinder. This insulator provides more than adequate heat insulation. The carburetor floats have been specially designed to keep the float level from fluctuating due to vibration or shock. The main jet is installed in such a manner to provide quick and easy replacement from the outside by merely removing the jet holder on the bottom left side of the carburetor float bowl.



1. Pilot jet
2. Valve seat ass'y
3. Valve seat washer
4. Main nozzle
5. Needle jet setter
6. Needle jet washer
7. O-ring
8. Main jet
9. Banjo bolt
10. Gasket
11. Float
12. Float arm
13. Float pin
14. Float chamber gasket
15. Float chamber body
16. Throttle valve
17. Needle
18. Clip
19. Spring seat
20. Throttle valve spring
21. Mixing chamber top
22. Throttle stop spring
23. Throttle screw
24. Wire adjusting nut
25. Wire adjusting screw
26. Cap
27. Air adjusting spring
28. Air adjusting screw
29. Starter plunger
30. Plunger spring
31. Starter lever plate
32. Starter lever
33. Cap
34. Plunger cap
35. Plunger cap cover
36. Overflow pipe
37. Air vent pipe
38. Plate
39. Pan head screw
40. Spring washer

Fig. IV-18-1

A . Checking the Carburetor

1) Float

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

2) Float valve

Replace the float valve if its seating end is worn with a step or if it is scratched. Check the float valve spring for fatigue. Depress the float valve with your finger, and make sure that it properly seats against the valve seat when released. If the float valve spring is weakened, fuel will overflow, flooding the float chamber while the gas is on.

3) Overflowing

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

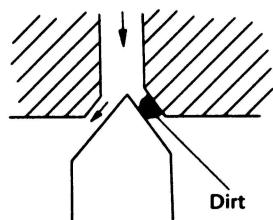


Fig. IV-18-2

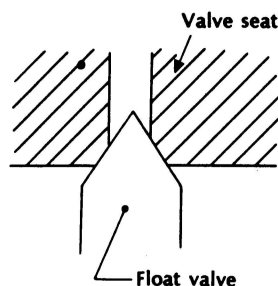


Fig. IV-18-3

4) Cleaning the carburetor

Disassemble the carburetor, and wash all its parts in a suitable solvent. Then blow all the parts off with compressed air. All jets and another delicate parts should be cleaned by blowing compressed air through them.

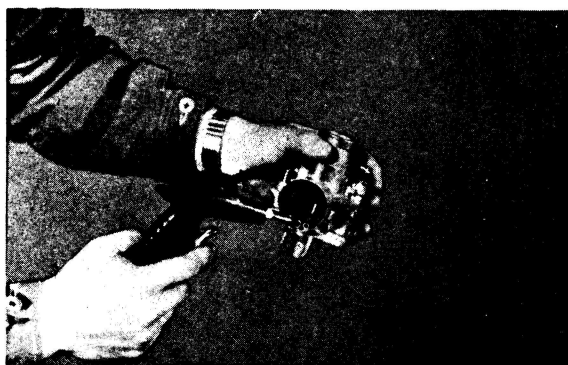


Fig. IV-18-4

B. Float Level Adjustment

The carburetor float level is checked by the Yamaha factory during assembly and testing. But rough riding, a worn needle valve, or bent float arm can cause the float level to fluctuate. If the float level raises, this will cause a rich fuel/air mixture that can cause poor performance and spark plug fouling. If the float level decreases, this can cause a lean fuel/air mixture that can result in engine damage.

If the machine is subjected to continuous rough riding or many miles of travel, the float level should be checked and set regularly and in the following manner.

Carburetor float setting:
(with needle spring unloaded)

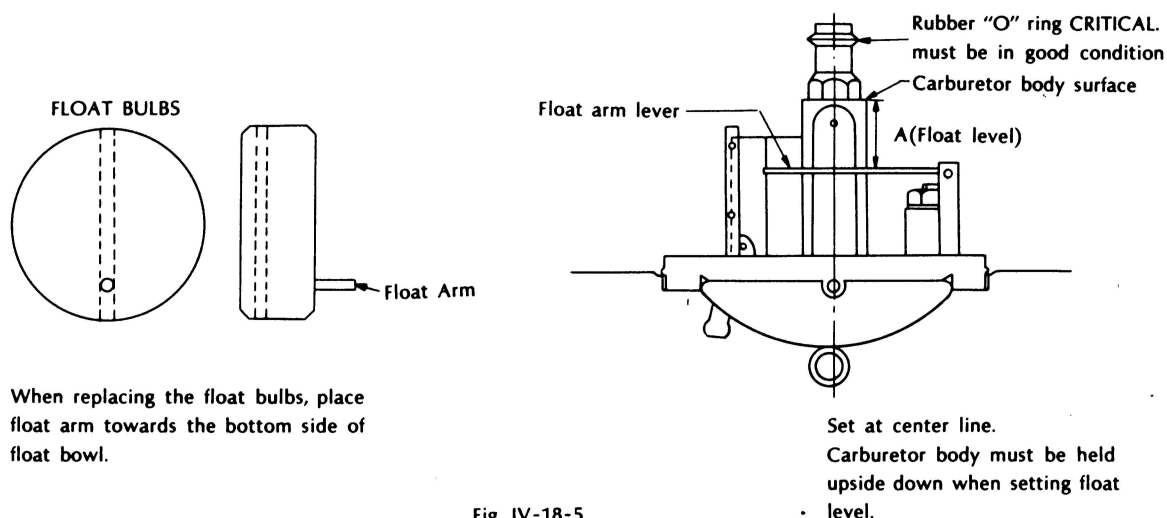


Fig. IV-18-5

- 1) Remove the float chamber body, and turn over the mixing body. Let the float arm rest on the needle valve with the spring fully expanded.
- 2) Then measure the distance "A" from the float arm lever to the float chamber joint surface.
Standard measurement ('A' in drawing above) = 8.5mm (0.33").
- 3) When the A distance measured is less than recommended bend the tang up. If it is greater, bend the tang down. (with carburetor body upside down.)

C. Idle Mixture-Idle speed Adjustment

Turn the idle mixture screw in until lightly seated, then back it out the specified amount of turns. There is no need to experiment. This is a Factory setting that can be set with the engine stopped.

Engine idle speed is set by warming up the engine completely and then screwing the idle speed screw in or out, whichever direction is necessary for the engine to idle between 1,400 and 1,500 rpm.

D. Carburetor Setting Table

MODEL		RT1	RT1-MX	RT1-B	RT1B-MX
MAIN JET	(M.J.)	#220	#280	#240	#310
AIR JET	(A.J.)	-	-	-	-
NEEDLE JET	(N.J.)	0-4	P-0	0-4	P-0
JET NEEDLE - clip position	(J.N.)	6CF1-2	6DP1-3	6CF1-2	6DH2-3
CUTAWAY	(C.A.)	1.5	1.5	1.5	2.5
PILOT JET	(P.J.)	30	40	#30	#60
AIR SCREW (Turns out)	(A.S.)	1¼	1¼	1¼	1½
STARTER JET	(S.J.)	60	60	#60	#60
FLOAT LEVEL (mm)	(F.L.)	8.5mm	8.5mm	8.5mm	8.5mm

IV—19 Air Cleaner

A. Removal

To remove the air filter, open the seat cover and remove four air cleaner mounting screws. Then the element can be removed.



Fig. IV-19-1

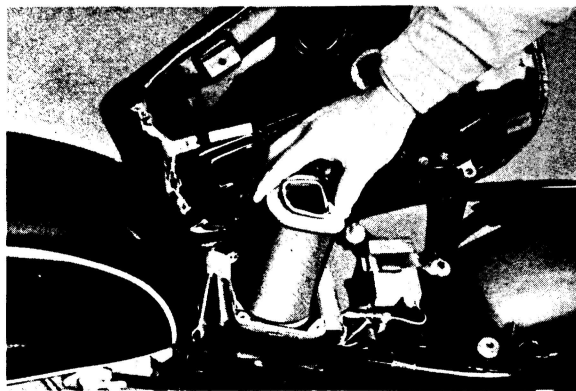


Fig. IV-19-2

B. Cleaning

Wash the foam filter thoroughly in solvent until all dirt has been removed. Squeeze all the solvent out. Pour oil onto the filter (any grade of 20 or 30 wt), work it completely in, and then squeeze out the surplus oil. The filter should be completely impregnated with oil, but not "dripping" with it.

Chapter V Chassis

The Yamaha RT1-B has been designed for versatility and a combination of uses. It is equipped with all necessary street legal equipment to insure pleasurable road or street riding. This machine can be quickly converted to a competition machine and therefore has been engineered to have a minimum weight factor. Yet with the reduction in weight; rigidity, strength, and safety have been incorporated in the design of the frame to provide an unexcelled competition machine.

V-1 Front Wheel

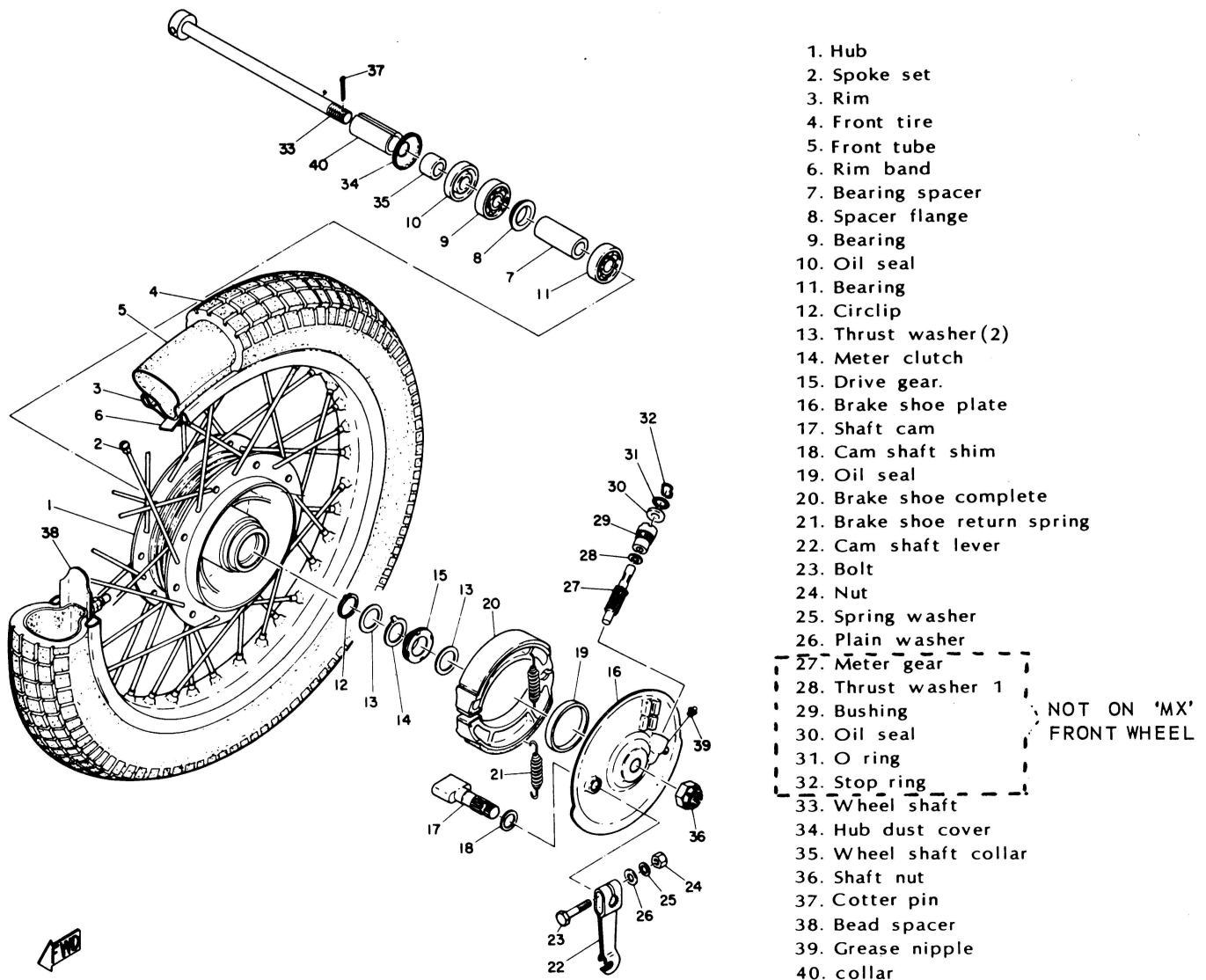


Fig. V-1-1 Construction

This tire gives the rider assurance of maximum performance and safety for both road riding and trail riding. To insure against tire slippage on the rim, a tire bead lock had been installed in the wheel. The front wheel brake size is 150mm. $\times$ 30mm. (5.9 $\times$ 1.18 in.) A labyrinth seal is installed between the wheel hub and brake plate to provide a seal against dirt and water.

A: Removal

- 1) Disconnect the brake cable at the front brake lever.

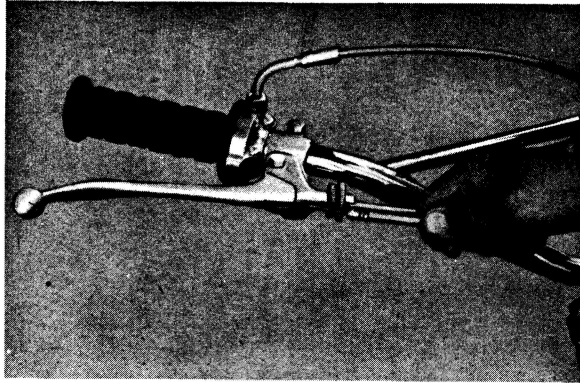


Fig. V-1-2

- 2) Disconnect both the brake cable and speedometer cable from the front wheel hub plate.

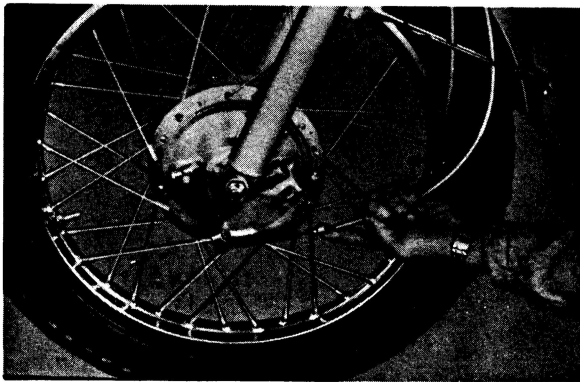


Fig. V-1-3

- 3) Remove the cotter, pin and then remove the front axle lock bolt.

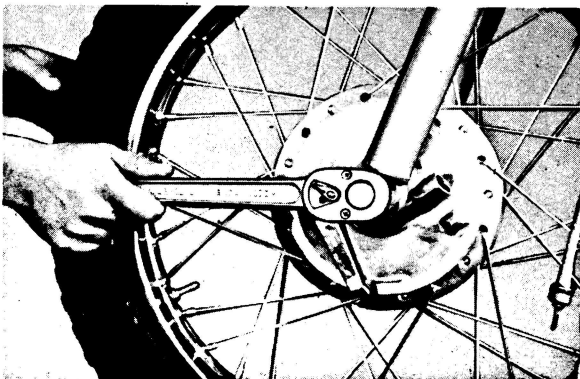


Fig. V-1-4

- 4) Loosen the front wheel axle lock nut.

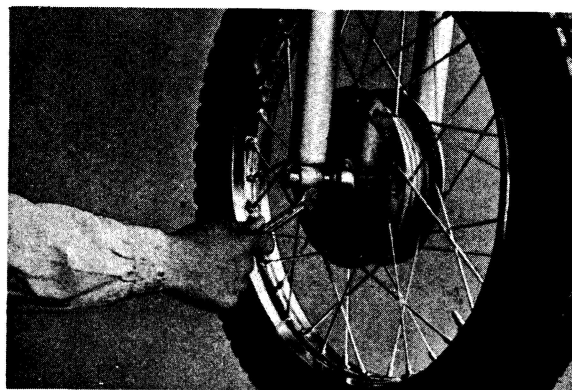


Fig. V-1-5

- 5) Pull out the front wheel axle by simultaneously twisting and pulling on the axle.

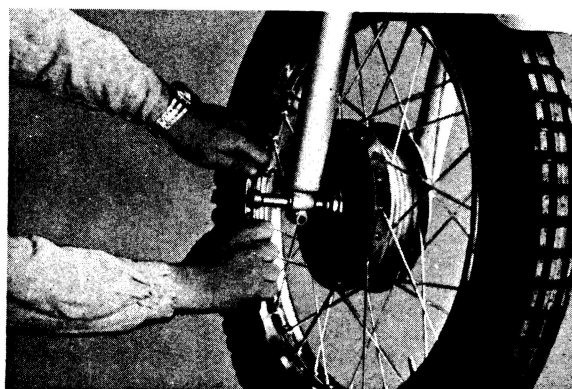


Fig. V-1-6

- 6) Raise the front of the machine and set it on a box. Then remove the wheel assembly.

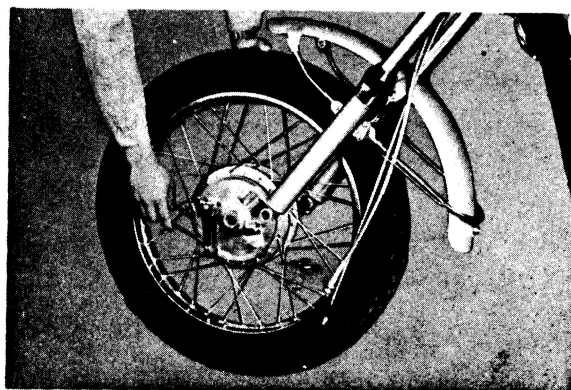


Fig. V-1-7

B: Checking

1) Run out of the rim

As show in Fig. V-1-8, measure the runout of the rim with a dial gauge. Runout limits: 2mm. (0.07 in.) or less.

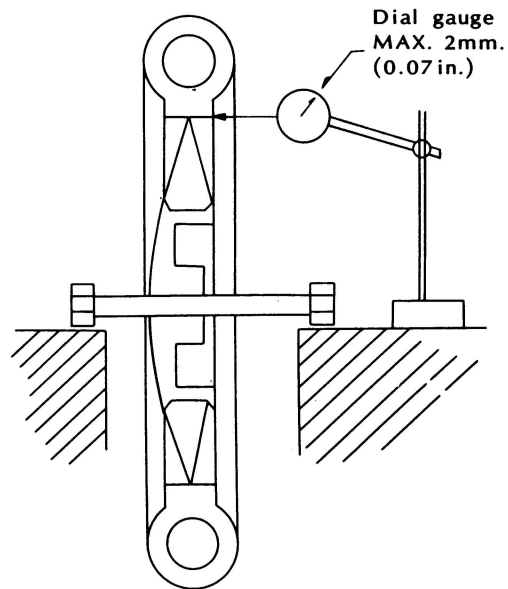
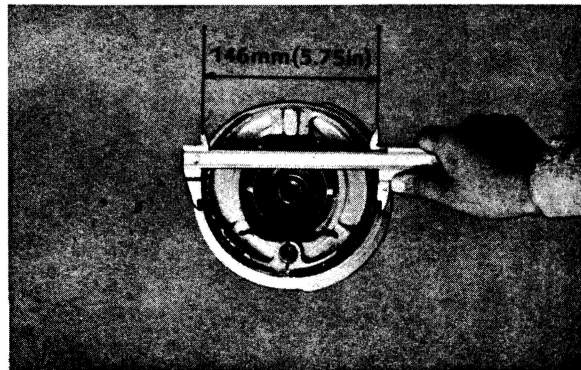


Fig. V-1-8

2) Brake shoe

Measure the outside diameter at the brake shoe with slide calipers. If it measures less than 146mm. (5.75in.), replace it. Smooth out a rough shoe surface with sandpaper or with a file.



3) Brake drum

Oil or scratches on the inner surface of the brake drum will impair braking performance or result in abnormal noise. Clean or smooth out the surface with a rag soaked in laquer thinner or with wet sandpaper.

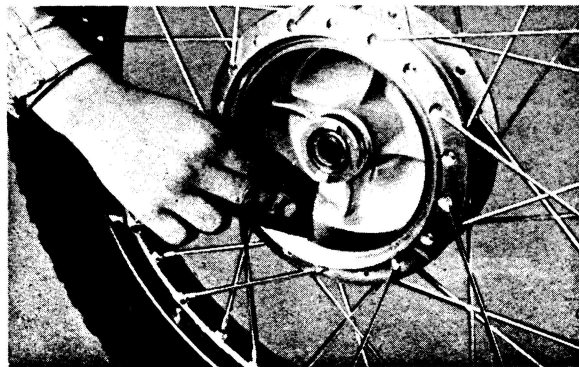


Fig. V-1-10

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

5) Repairing the brake shoe

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



Fig. IV-1-11

6) If the tire is excessively worn replace the tire.

7) Check the tires for damage regularly.

8) If the bearings allow excessive play in the wheel or if it does not turn smoothly, replace the bearing(s).

Replacing the Wheel Bearing

- a. First, clean the outside of the wheel hub.
- b. Insert the bent end of the special tool (as shown in Fig. V-1-13) into the hole located in the center of the bearing spacer, and drive the spacer out from the hub by tapping the other end of the special tool with a hammer. (Both bearing spacer and spacer flange can easily be removed.)
- c. Then push out the bearing on the other side.
- d. To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation and use the bearing fitting tool (furnished by Yamaha.)

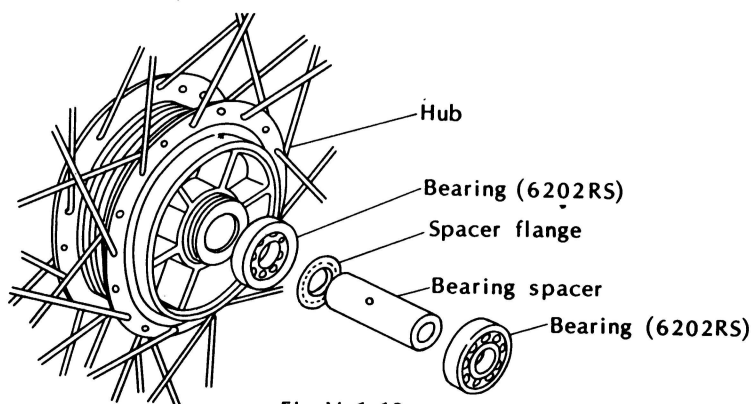
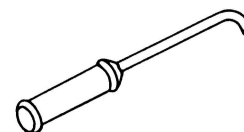


Fig. V-1-12



Insert the bent end of the special tool into the hole located in the center of the bearing spacer.

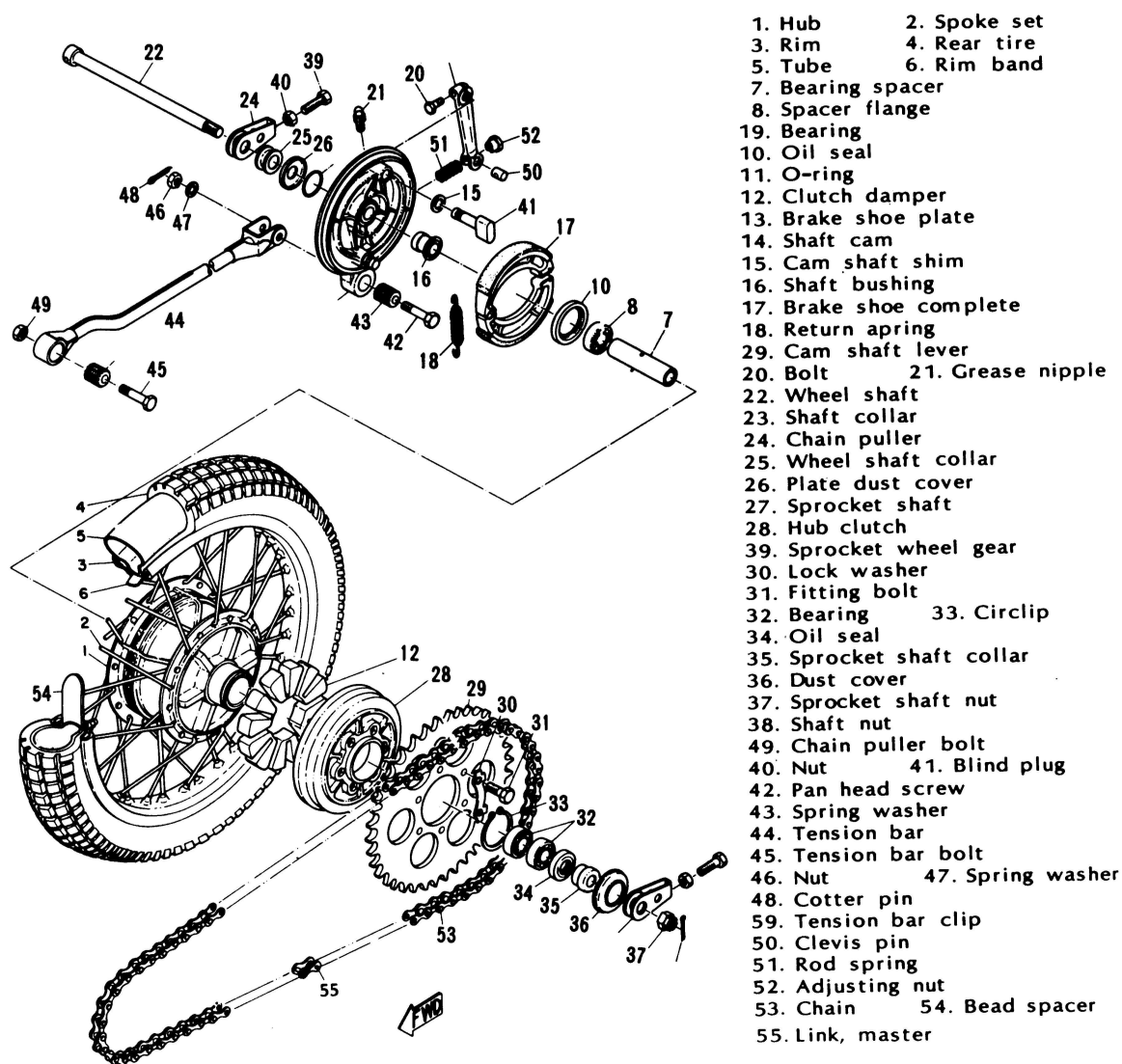
Fig. V-1-13

- 9) Replace a bent or damaged front wheel axle.
10. If the tooth surface of the helical speedometer drive gear is excessively worn replace it.
- 11) Check the lips of the seals for damage or warpage. Replace if necessary.

V-2 Rear Wheel

The rear wheel is 18-in. size, and the rear tire is the 4.00-18 Trials Universal. It is also good for road riding. Two rim locks are provided to prevent tire slippage in the rim. The single leading shoe type brake is of the 150mm X 30mm. size. A labyrinth seal between the wheel hub and the brake plate is provided to prevent water and dust leakage. The brake tension bar is of link design to minimize the shifting of the brake cam lever position when the rear swing arm is moving up and down.

The rear fender is steel and rubber mounted on the frame. It is also wide enough to protect the engine unit from dust and water.



Rear wheel Construction

Fig. V-2-1

A: Removal

- 1) Remove the tension bar and brake rod from the rear shoe plate.

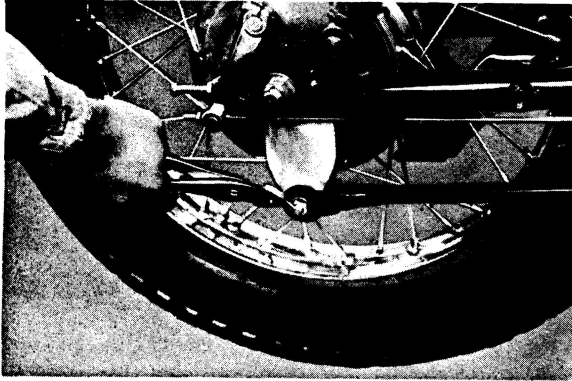


Fig. V-2-2

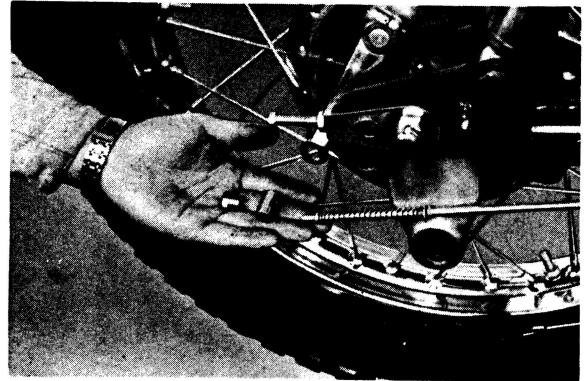


Fig. V-2-3

- 2) Disconnect the master link of the chain and remove the chain.

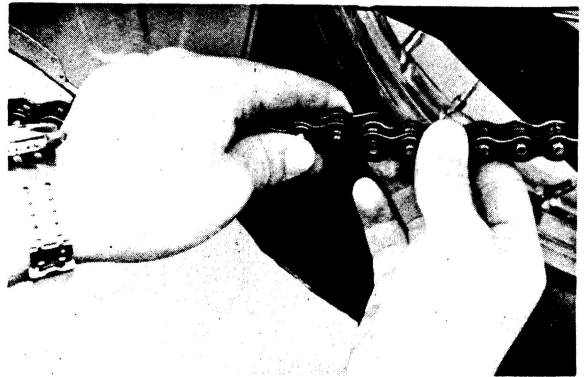


Fig. V-2-4

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

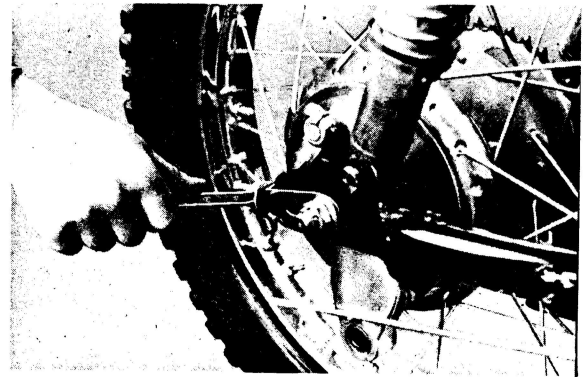


Fig. V-2-5

- 4) Remove the rear wheel shaft nut.

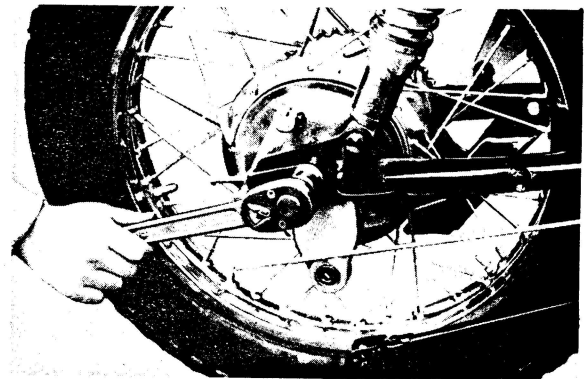


Fig. V-2-6

- 5) Pull out the rear wheel shaft by striking it with a plastic tip hammer.

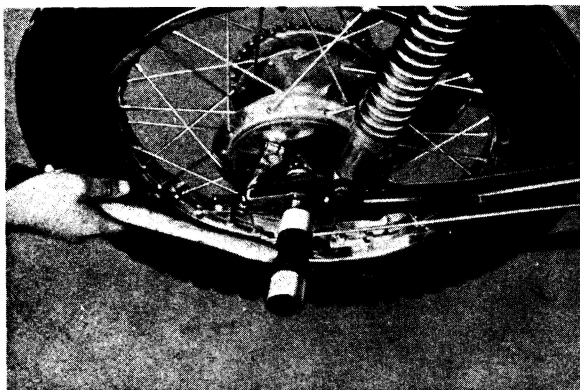


Fig. V-2-7

- 6) Remove the right-hand chain pulley and distance collar.

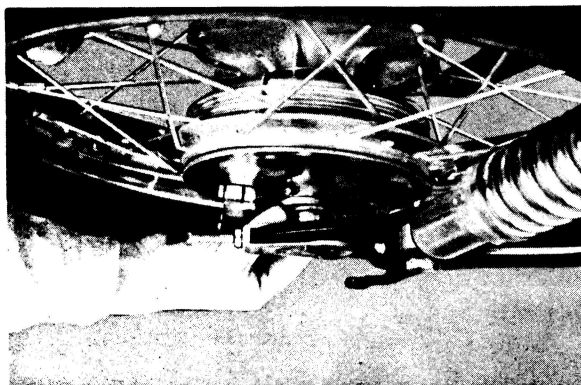


Fig. V-2-8

- 7) Lean the machine to the left and remove the rear wheel assembly.

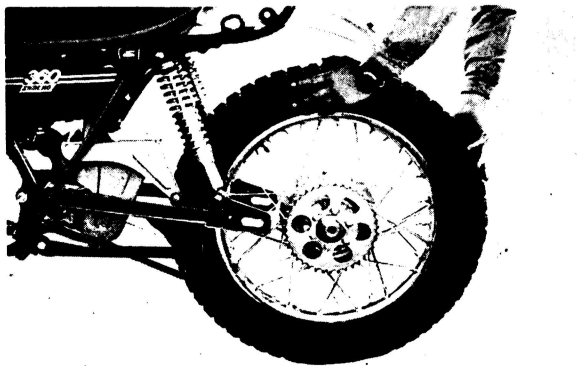


Fig. V-2-9

Replacing Tires

1) Removal

- a. Remove the valve cap and lock nut (12 mm.) from the tire valve, and deflate the tire.
- b. Loosen the bead spacer lock nut (10 mm). Two bead spacers are provided for the rear wheel, and one for the front wheel.
- c. Twist the bead spacer until it slips off the edge of the wheel rim.
- d. Remove the tire from the wheel rim by the use of two tire levers. (Exer-

cise care to avoid damaging the inner tube with the levers.)

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

2) Installation

- a. Pull the bead spacer toward the wheel rim flange.
- b. Replace the tube between the tire and the wheel rim, and half inflate the tube. Be sure that the valve stem is directed toward the wheel shaft. Install the tube in over the same side of the rim that the tube is removed from. Deflate the tube.
- c. 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.
- d. To avoid pinching the tube between the tire and the rim, tap the tire with a hammer.
- e. Tighten the bead spacer lock nut.
- f. Tighten the tire valve lock nut, and inflate the tire to the recommended pressure, then install the valve cap.

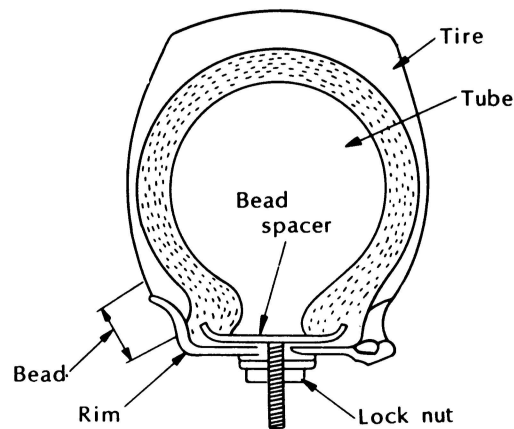


Fig. V-2-11

B: Inspection

1) Run out of the rim.

Check the rim for run out in the same way as the front wheel. Maximum limit of run out 2 mm. (0.07 in.) or less.

2) Brake shoe

Check the brake shoe in the same way as the front wheel. Minimum limit 140 mm. (5.75 in.)

3) Brake drum

Check the brake drum in the same way as the front wheel.

- 4) The spokes are measured in the same way as the front wheel. A loose spoke should be tightened.
- 5) If the bearing(s) have excessive play or do not turn smoothly, replace.
- 6) If the tire or the pattern is worn out, replace the tire.
- 7) If the lip of the oil seal is damaged or warped, replace it.

V-3 Rear Wheel Sprocket

A: Removal

- 1) Removing the sprocket.
 - a. Bend the lock washer ears flat.

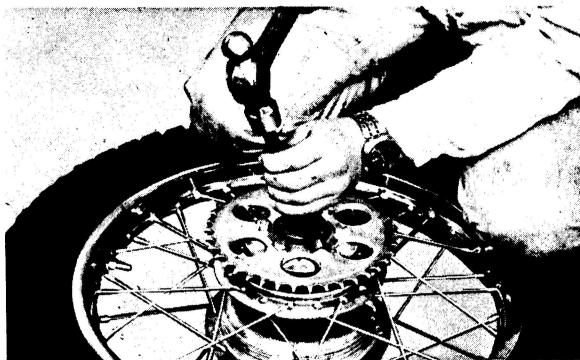


Fig. V-3-1

- b. Remove the sprocket mounting bolts.

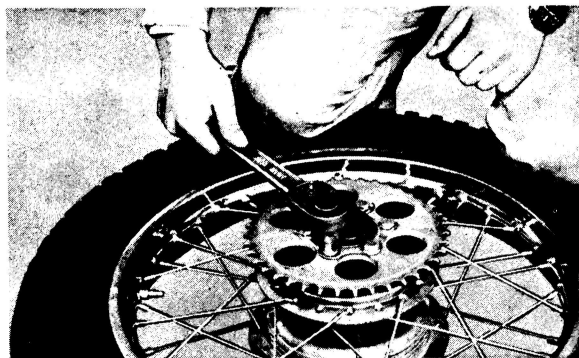


Fig. V-3-2

B: Checking

- 1) Checking

Check the lock washer and hexagonal bolt for breakage and damage. If the lock washer is not bent over the hexagon bolt head or broken, or if the bolt is loose, the sprocket can become loose.

Make sure that both lock washers and the mounting bolts are tight.

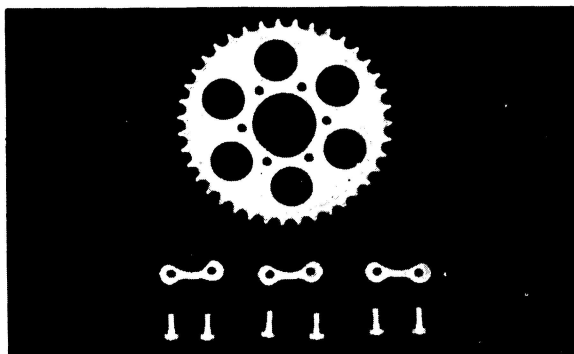


Fig. V-3-3

V-4 Tires and Tubes

1) Normal tire pressure.

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

a. On-the-road riding

Front..... 13 lbs./in². (0.9kg./cm².)

Rear..... 16 lbs./in². (1.1kg./cm².)

b. Off-the-road riding

Front..... 8.5 lbs./in². (0.6kg./cm².)

Rear..... 10 lbs./in². (0.7kg./cm².)

V-5 Front Forks

The entire RT1 series is equipped with competition designed telescopic double dampening front forks. The fork springs are located inside the inner fork tubes for protection.

There is a design difference, but not a difference in operation, between the RT1 (& MX) and RT1-B (& MX). Fork removal from the steering brackets is identical between all models, but disassembly procedures differ. The following instructions will explain the different methods for disassembling the dissimilar fork designs.

A: Removal

1) Remove the front fender.

The RT1(& B) front fender is rubber-mounted and bolted to the fork outer tubes.

The high-type RT1-MX & RT1B-MX front fender is mounted to the bottom of the underbracket.

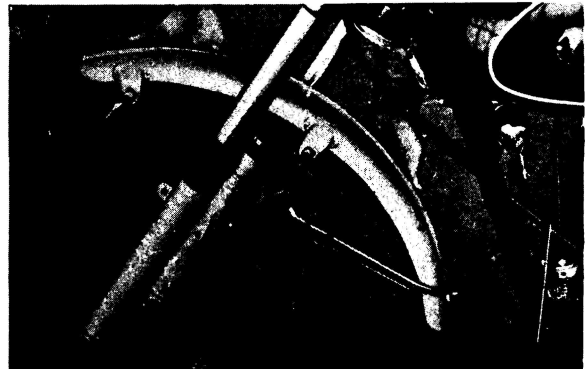


Fig. V-5-1

- 2) Remove the inner tube cap bolt.
Loosening the arrow marked bolt
will ease the cap bolt removal.



Fig. V-5-2

- 3) Loosen the inner tube pinch bolts
on the underbracket.

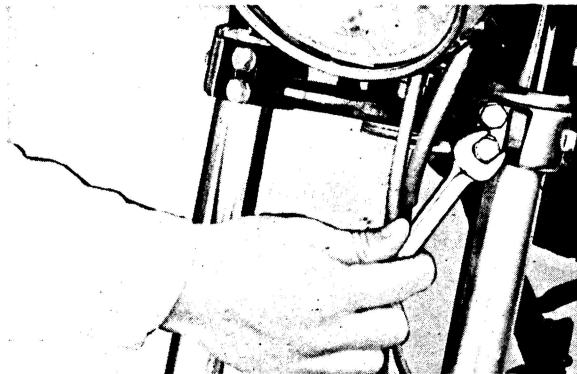


Fig. V-5-3

- 4) Pull the outer tube downward.

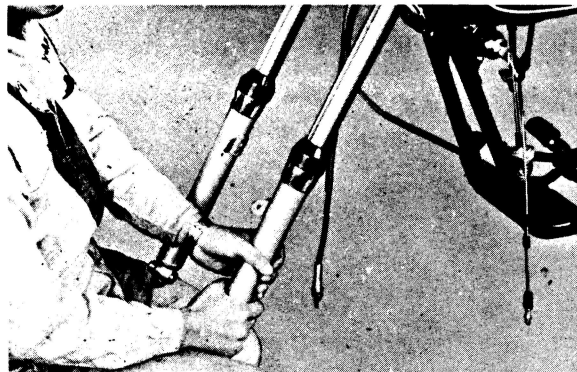


Fig. V-5-4

B. Disassembling the Inner and Outer Tubes

- 1) Drain the oil from the fork.

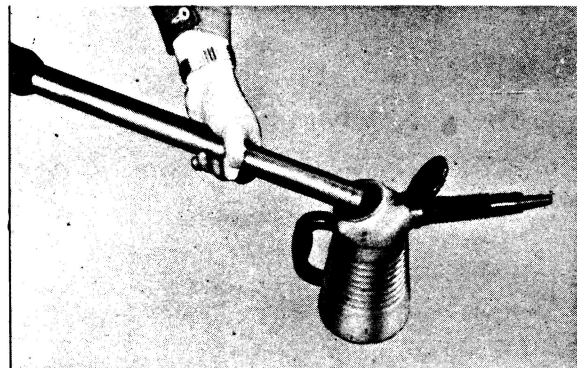


Fig. V-5-5

- 2) Remove the special bolt (arrow marked) from the bottom of the outer tubes.

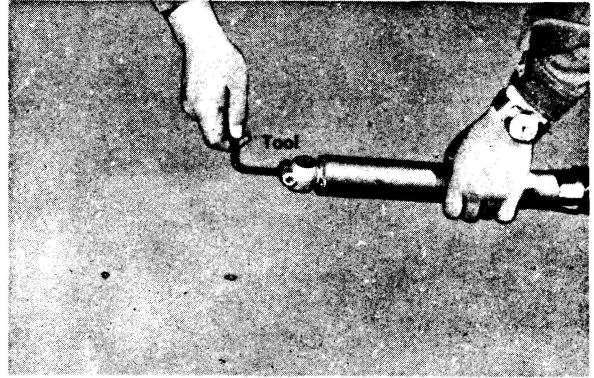


Fig. V-5-6

- 3) RT1 (& MX)

To separate the inner and outer tubes the tube nut must be spun off. Wrap a piece of rubber around the nut, then grip the nut with a strap wrench, and loosen the nut.

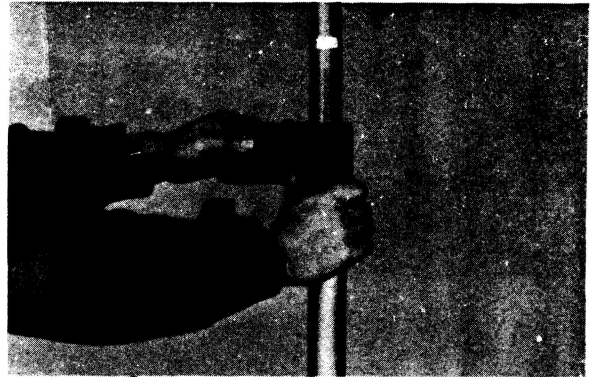
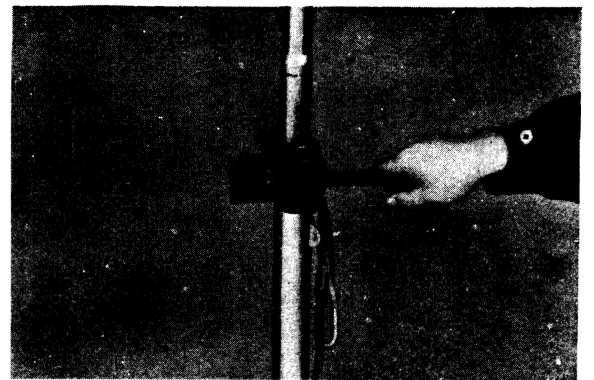


Fig. V-5-7

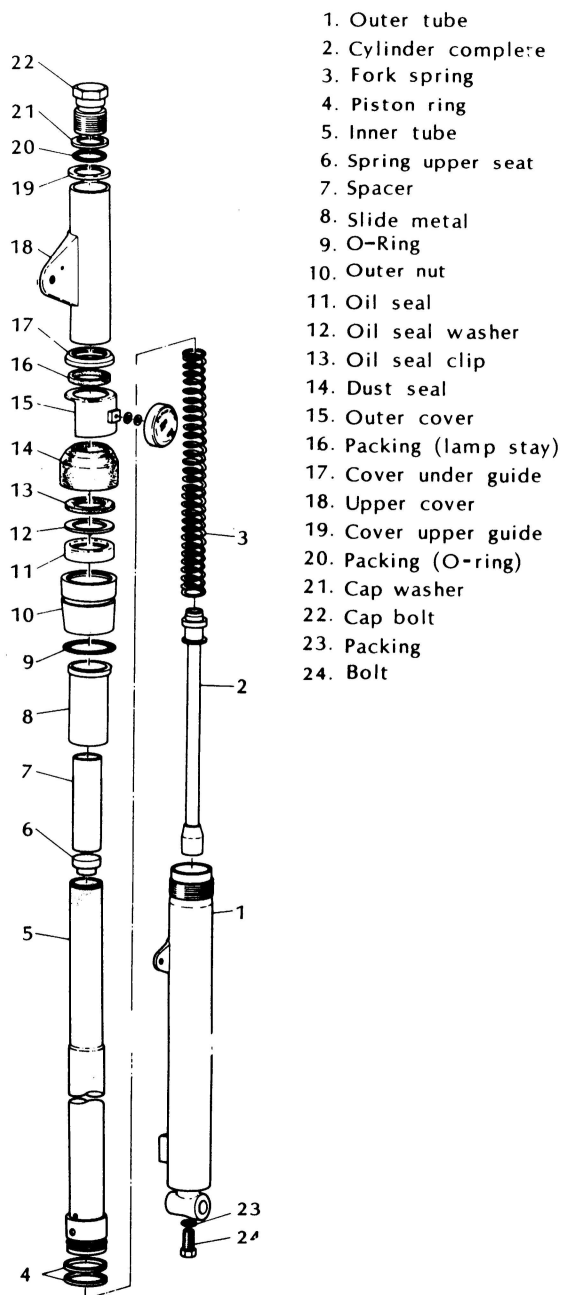
RT1-B (& MX)

This type of inner and outer tube design does not have a tube nut. Follow Step #4 to separate the inner and outer tubes.

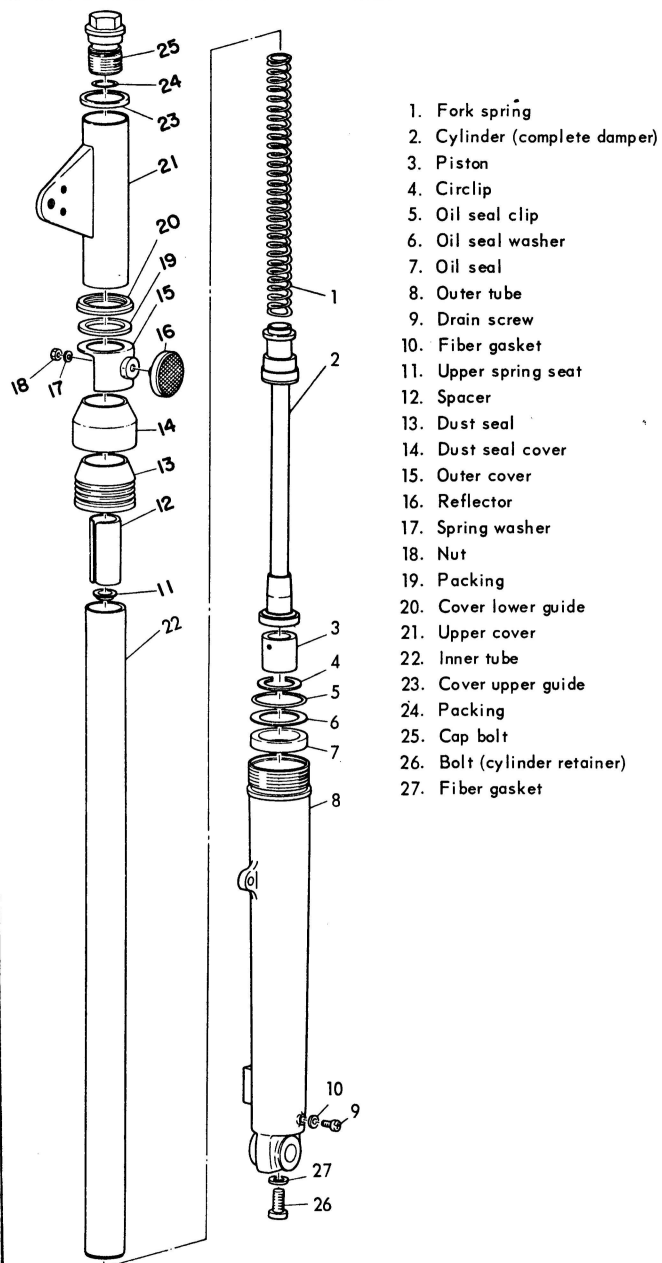
- 4) Pull the inner tube from the outer tube. The damper unit, which will come with the inner tube, can be removed by unhooking the circlip in the bottom of the inner tube. This frees the damper units.



RT1 & RT1-MX



RT1-B & RT1B-MX



C. Checking**1) Inner tube**

Check the inner tube for bending or scratches. If the bend is slight, it can be corrected with a press. It is recommended, however, to replace the tube if possible.

2) Oil seal

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

D. Assembling

1) For assembling the front fork, reverse the order of disassembling. Check if the inner tube slides in and out smoothly.

2) Installing the fork on the frame.

a. Bring up the front fork to the correct position and tighten the under bracket mounting bolts.

b. Pour oil into the inner tube through the upper end opening. Use a 10w/30 motor oil, preferably with non-foaming characteristics.

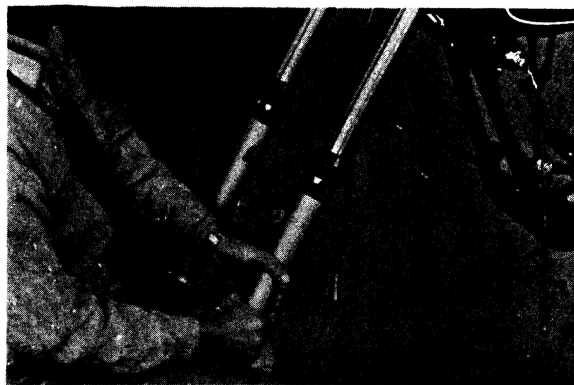


Fig. V-5-10

RT1(& MX) = 7.1 oz. (210cc)
RT1B(& MX) = 5.9 oz. (175cc)

c. Install the cap bolt, then fully tighten the underbracket and fork crown pinch bolts.

V-6 Rear Shocks

The rear shocks have a maximum stroke of 90mm. (3.54in.) The rear cushion features superb damping and 3-position adjustable springs, that allow the rider to adjust the rear shocks to suit any riding condition.

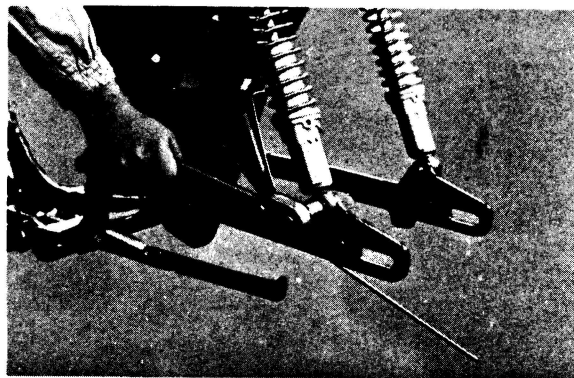
A: Checking the Condition of the Damping Units:**1) Remove the rear shock assembly.**

Fig. V-6-1

- 2) Compress the shocks by applying weight as shown in Fig. V-6-2, and release it.

If the shock quickly restores halfway and then slowly returns to the original position after it reaches 10mm.(3/8in.) before the original position, the rear shocks are in good condition. But if the

cushion returns quickly to the original position, check the cushion for oil leakage, and replace the assembly if oil leaks are apparent.



Fig. V-6-2

V-7 Gas Tank

The gas tank has been shaped so that the rider can freely change his riding position. The front of the tank slips into the tank stays and the rear is held by rubber band. Tank capacity 9.5 litres (2.5 gals.)

A: Removing

- 1) Set the petcock lever at "Stop" position and disconnect the fuel line at the petcock.

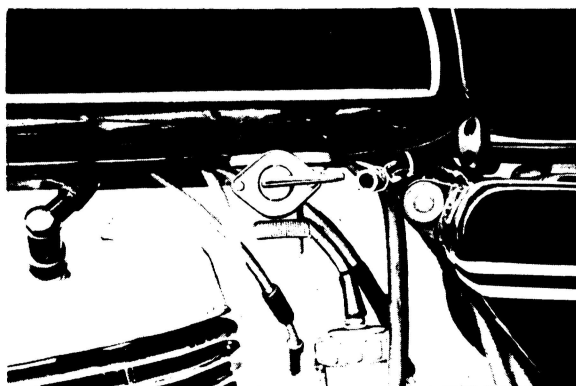


Fig. V-7-1

- 2) Open the seat. Remove the strap



Fig. V-7-2

- 4) Remove the rubber band.

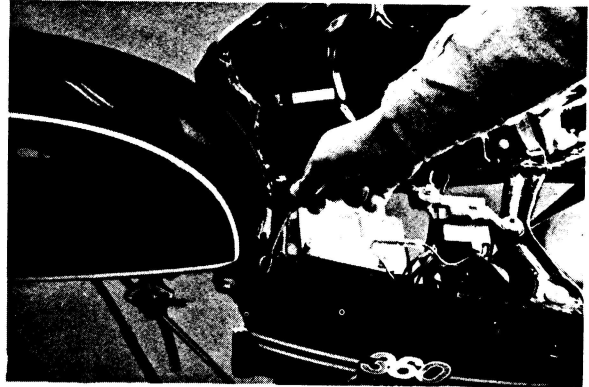


Fig. V-7-3

- 4) Remove the gas tank by sliding it back to clear tank stays and then Lifting up.

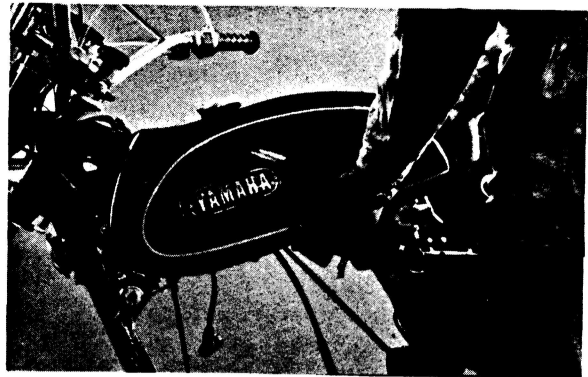


Fig. V-7-4

V-8 Rear Swing Arm

The rear swing arm is made of square steel tubing that improves the strength and torsional rigidity. The pivot employs permanently Lubricated bearings.

A: Removing

- 1) Remove the chain case mounting bolts.

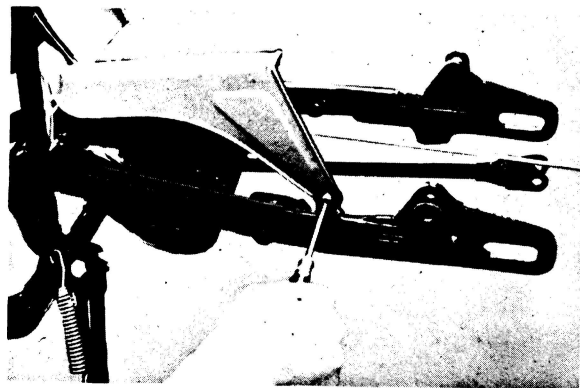


Fig. V-8-1

- 2) Remove the rear swing arm shaft nut, pull out the shaft, and remove the rear swing arm.

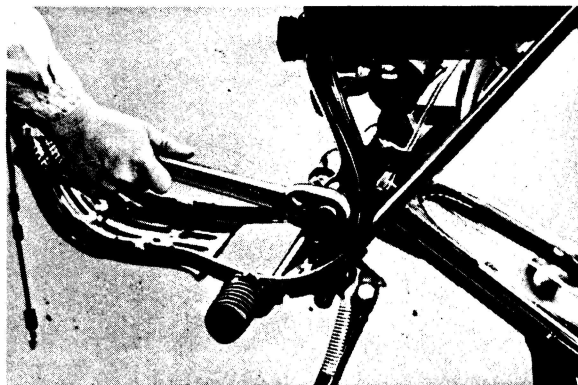


Fig. V-8-2

B: Checking

- 1) Check the play of the rear swing arm by shaking it from side to side, as shown in Fig. V-8-3, with the rear swing arm installed. If the play is excessive, replace the rear swing arm bushing or the rear swing arm shaft.
- 2) Insert the bushing as indicated in Fig. V-8-4, and check it for play. If the play is excessive, replace the bushing.

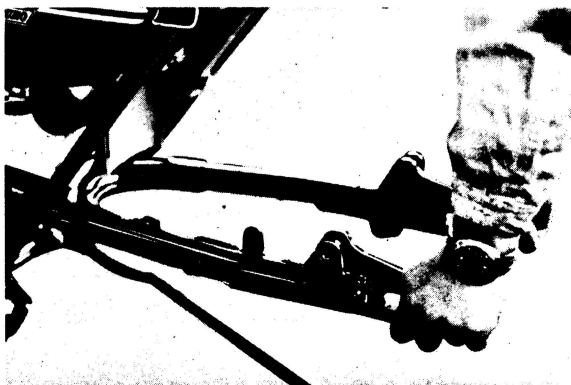


Fig. V-8-3

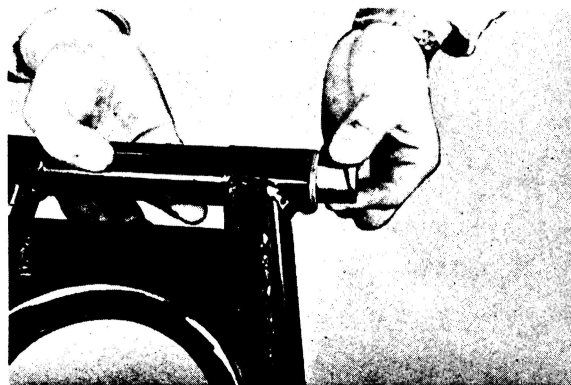


Fig. V-8-4

- 3) Grease the rear arm shaft periodically.

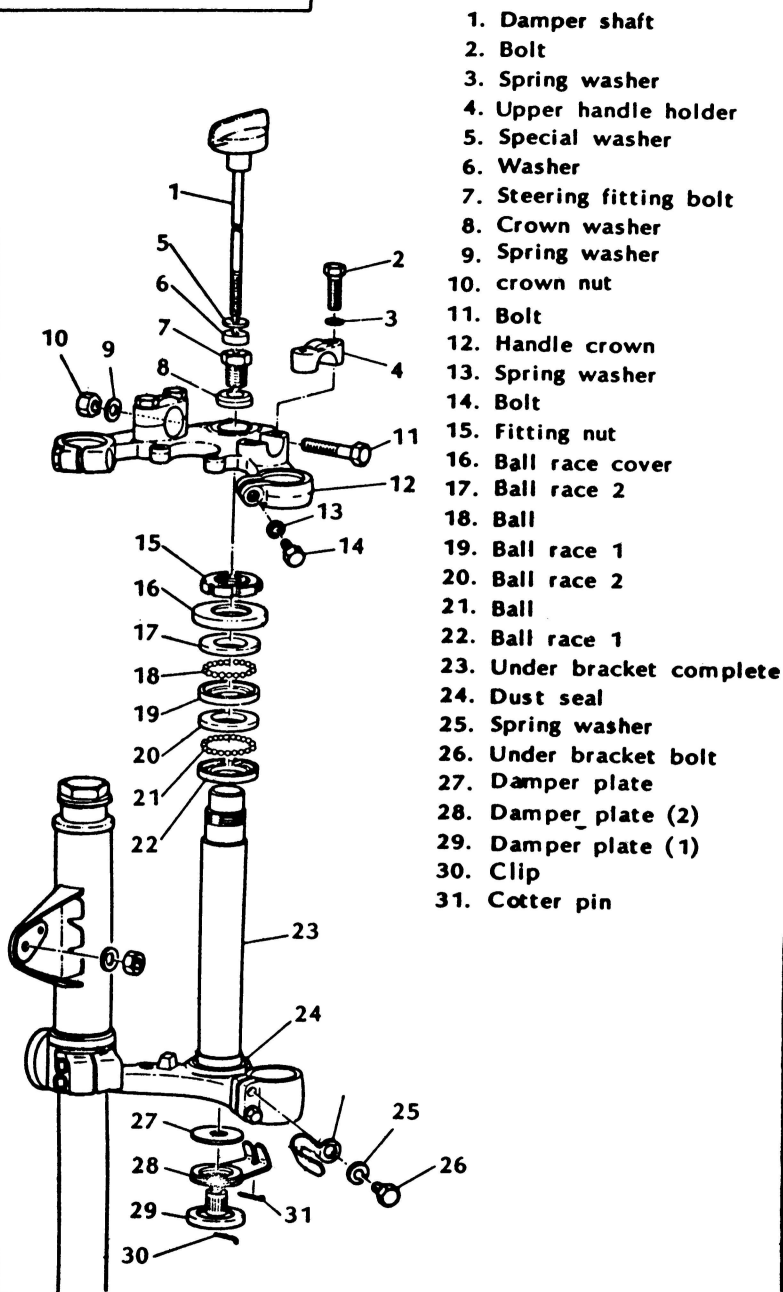
Replacing Rear Swing Arm Bushings

On motorcycles being habitually used for on-the-street riding, rear swing arm bushings should be replaced every 10,000km. (6,000miles).

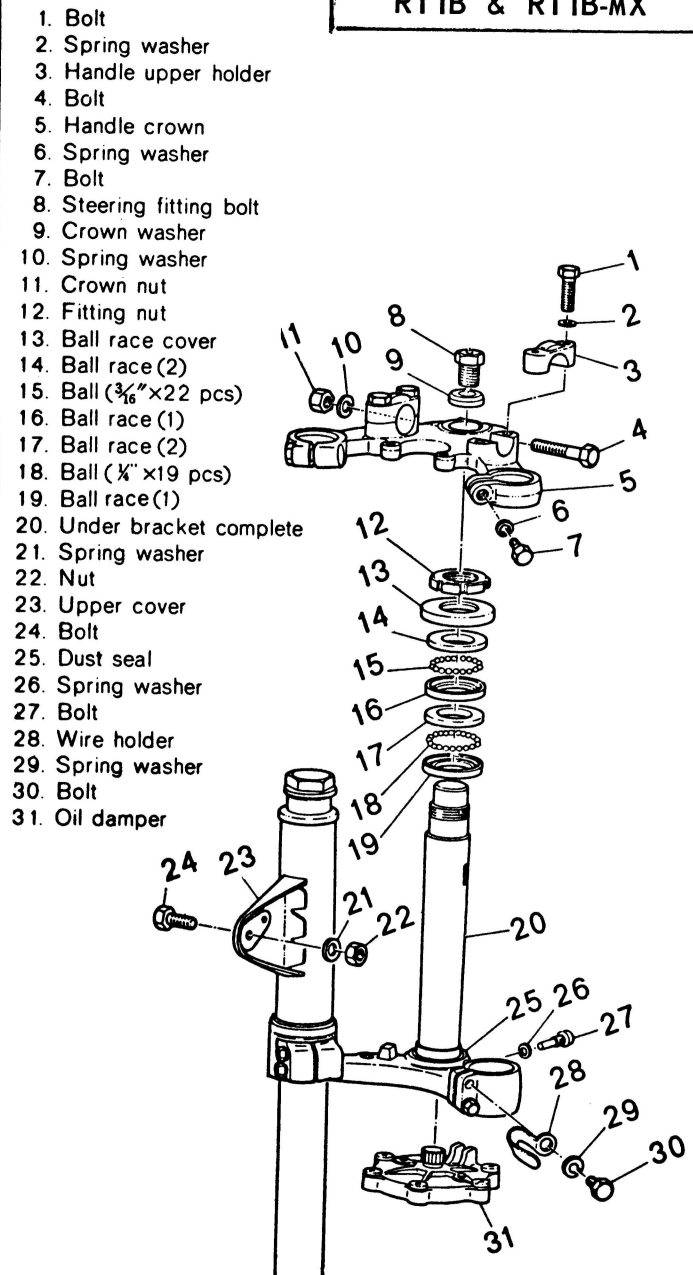
The same may not apply to those used for racing or rough riding. Replacement should be made according to machine condition such as excessive play of the rear swing arm, or hard steering (wander, shimmy or rear wheel hop,) or upon request of the customer.

V-9 Steering Head

RT1 & RT1-MX



RT1B & RT1B-MX



1) Ball Races and Steel Balls.

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

Replace any ball race having scratches or streaks resulting from wear.

Clean and grease the balls periodically.

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

V-10 Oil Tank, Battery Box and Tool Box

The oil tank is located on the left side under the seat. It is designed to be as narrow as possible so that it will not contact the rider's lower limbs when he stands upright on the footrests. To fill the Autolube oil tank, lift the seat and the tank cap will be exposed. Oil tank capacity....1.6 litres. (1.7 qt.)

The battery box and the air cleaner case is located under the seat.

V-11 Frame

The double cradle-type frame is made of high tension steel tubes that provide strength, rigidity and light weight. Other dimensional features include higher ground clearance, narrower width, and longer wheelbase.

The engine is bolted to the frame at four positions.

The caster is measured at 60. 50°.

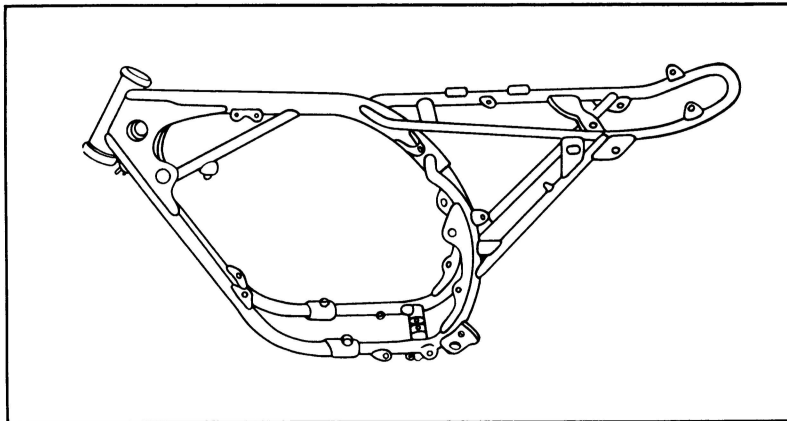


Fig. V-11-1

V-12 Handlebars

The upswept type longer handlebars are ideal for motocross events and are provided with deep-cut pattern grips to prevent hand slippage. The lever holder is provided with an adjusting screw to set clutch and brake cable play.

The meter bracket is mounted on the front of the handle crown to carry the speedometer on its left side and the tachometer on its right side.

V-13 Miscellaneous

The footrest is made of a single steel tube extending under the lower part of the frame and is bolted to the frame. The engine guard is bolted to the frame to protect the entire crankcase...covering from the exhaust system to the drain plug.

Chapter VI Electrical System

VI-1 Description

The RT1 & RT1B are equipped with a full electrical system, including ignition, lights, and charging circuit. The 'MX' models are equipped with just an ignition system.

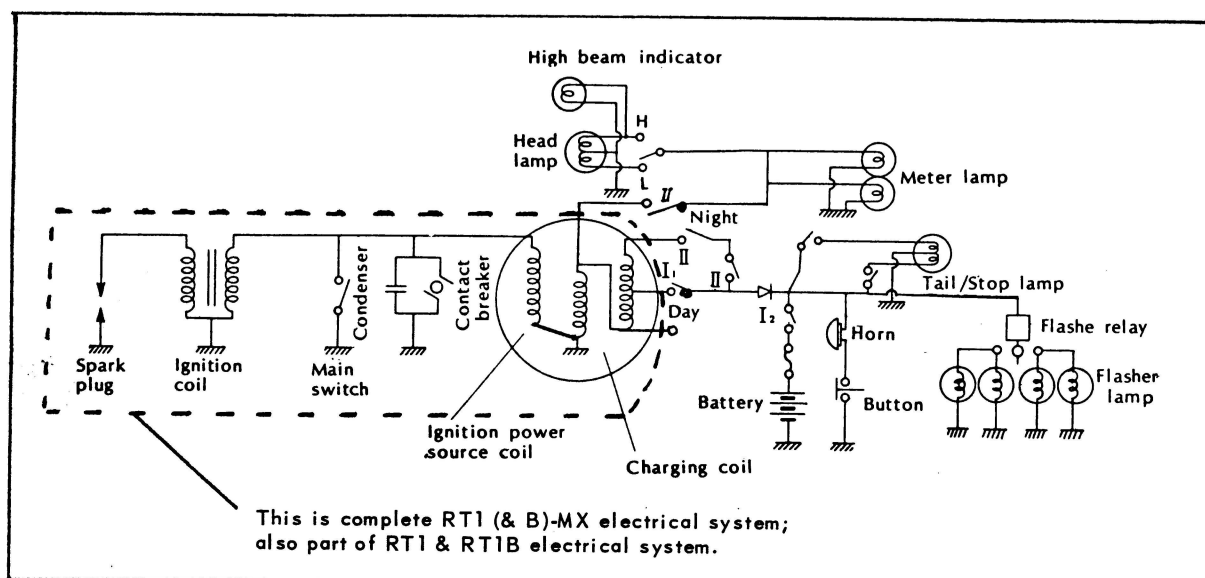
All the RT1 models are equipped with identical magneto and secondary ignition coil parts. The description and servicing procedures are therefore the same. However, the following sections on lights, charging system, and associated information, applies solely to the RT1 and RT1B.

VI-2 Table Of Component Parts

Parts	Manufacturer	Model & Type
*Flywheel magneto	Mitsubishi Elec.	FZC-1AIL
*Spark plug	NGK	B-9E (B9EN for 'MX')
Headlight	Koito Mfg.	6V, 35W/35W
Speedometer	Nippon Seiki	
Tachometer	Nippon Seiki	
Main switch	Asahi Denso	ACS
*Main switch	Asahi Denso	TIM
*Ignition coil	Mitsubishi Elec.	HP-E
Horn	Nikko Kinzoku	MF-6
Battery	Nippon Battery	MV1-6D
Rectifier	Mitsubishi Elec.	DS10HJ1
Fuse	Osachi Mfg.	10 A
Stop switch	Niles. Parts	SH40E
Taillight	Stanley Elec.	6V, 5.3W/17W

* 'MX' models equipped with these parts

VI-3 Connection Diagram



VI-4 Ignition System—Function and Service

1: Function

The ignition system consists of the components as shown in Fig. VI-4-1. As the flywheel rotates, the contact breaker points begin to open and close, alternately. This make-and-break operation develops an electromotive force in the ignition source coil and produces a voltage in the primary coil.

The ignition coil is a kind of transformer, with a 1:50 turn ratio of the primary to the secondary winding. The voltage (150-300V) which is produced in the primary coil, is stepped up to 12,000–14,000 V by mutual-induction, and the electric spark jumps across the spark plug electrodes.

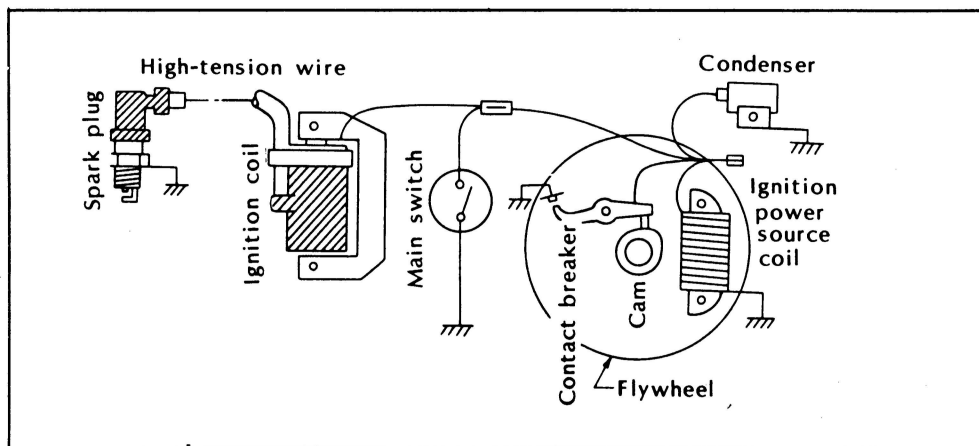


Fig. VI-4-1

VI-5 Ignition Timing

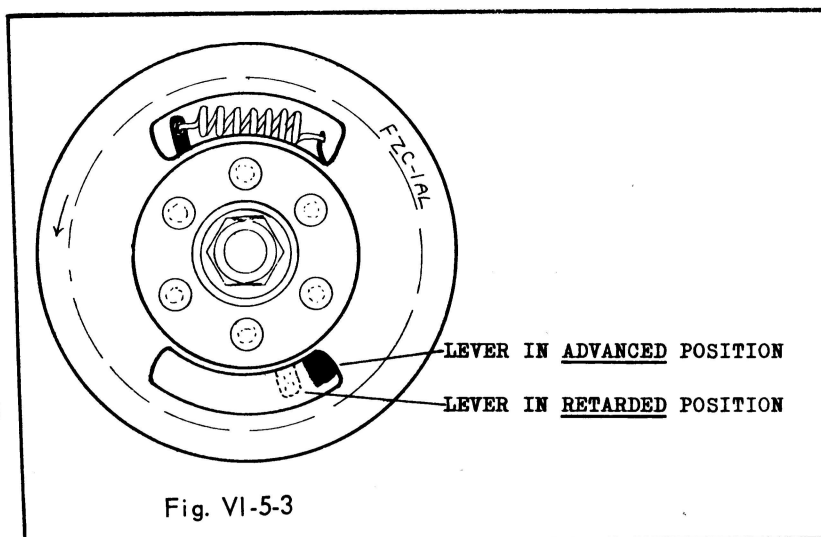
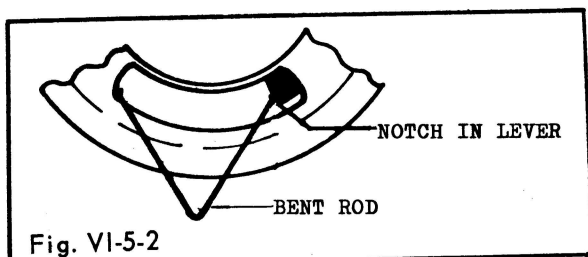
Remove the head and attach the dial indicator holder. Next, insert the dial indicator in the holder (See Fig VI-5-1)

The piston should be brought to T.D.C. and the dial indicator set at Zero.

The crankshaft should then be turned in reverse and the piston brought down below 3.5mm. before T.D.C. The flywheels should then be rotated forward until the piston reaches 2.9mm. Wedge the governor fully open. (See Fig VI-5-2) At this point the ignition points should just be opening. A low resistance point checker (100 Ohms or less) should be used to determine the opening and closing position of the ignition points.

Ignition Timing, 2.9mm. B.T.D.C. (Governor wedged open)

Maximum ignition point gap 0.3 to 0.4mm. (0.012"-0.015")

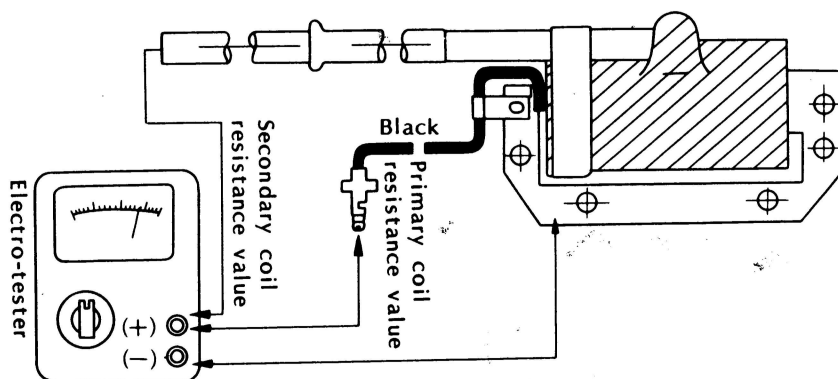


VI-6 Ignition Coil

Primary coil resistance value..... $0.6 \pm \Omega 10\%$ (20°C or 68°F)

Secondary coil resistance value.. $5.8\text{K} \Omega \pm 10\%$ (20°C or 68°F)

(For measuring methods, refer to Fig. VI-6-1)



Note: When measuring the secondary coil resistance value, disconnect the plug cap. Otherwise, the resistance of the $5\text{K} \Omega$ noise suppressor incorporated in the plug will be added to the tester reading.

Spark Test:

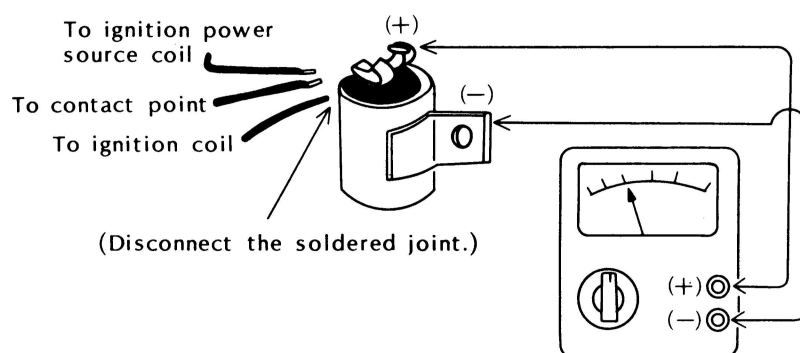
Remove the spark plug from cylinder head and reconnect the high voltage lead. Then ground the spark plug and see if it sparks as you crank the kickstarter.

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

VI-7 Condenser

The condenser instantly stores a static electric charge as the contact breaker points separate, and the energy stored in the condenser discharges instantly when the points are closed. If it were not for the condenser, an electrical charge would arc across the separating contact points, causing them to burn. The condenser minimizes the burning of the contact points, greatly affecting the flow of current in the primary winding of the ignition coil.

If the contact points show excessive wear, or the spark is weak (the ignition coil is in good condition), check the condenser.



Set the electro-tester on the "MΩ" position.

Fig. VI-7-1

a) Insulation test

Insulation resistance tests should be conducted by connecting the tester as shown in Fig. IV-7-1. If the pointer swings fully and the reading is more than $3\text{M}\Omega$, the insulation is in good condition. If the insulation is punctured, the pointer will stay pointing to the $0-1000\Omega$ reading.

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

b) Capacity test

Capacity tests can be performed by simply setting the tester to the condenser capacity. The tester should be connected with the condenser in the same way as in the case of the insulation resistance test. Before this measurement, be sure to set the tester correctly.

If the reading is within $0.22\mu\text{F} \pm 10\%$, the condenser capacity is correct.

VI-8 Charging System (RT1 & RT1B)

The charging system consists of the flywheel magneto (charging and lighting coils), rectifier, and battery.

1: Flywheel Magneto FIG. VI-10-1

As the flywheel rotates, an alternate current is generated in the charging and lighting coils and is then converted to a half-wave D.C. current by means of a silicon rectifier. This half-wave D.C. current charges the battery.

Daytime Charging Output (amps)

- a) Output will be measured in DC amperes. Hook an ammeter in series with the battery red wire (separate red wire at snap connector and hook in meter).
- b) Green magneto lead hooked to main switch green lead (standard);

3,000rpm = .4 amps

8,000rpm = 2.2 amps

- c) White magneto lead hooked to main switch green lead (wiring modified for more amps),

3,000rpm = .8 amps

8,000rpm = 3.7 amps

Nighttime Charging Output (amps)

- a) Leave the ammeter hooked up the same as when checking daytime charging output.
- b) Green/Red magneto lead hooked to main switch Green/Red lead (standard);

3,000rpm = .4 amps

8,000rpm = 1.1 amps

* The charging and lighting capacity is obtained when the battery is fully charged. If the battery is in a low state of charge and low voltage, the charging rate will not be exactly the same as above. However, it is desirable that the figures are as close as possible. If there is a large discrepancy, charge the battery and recheck the circuit.

How to Increase Charging Capacity

The flywheel magneto's green lead wire is connected to the wire harness' green lead. But if the battery is continuously in a low state of charge connect the magneto's white lead to the wire harness' green lead. This will increase the charging rate.

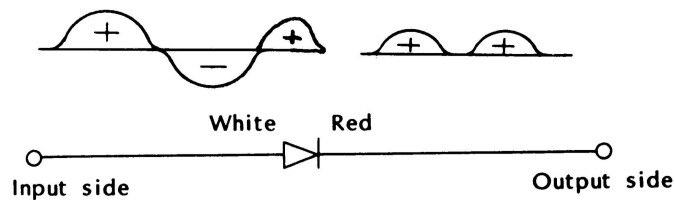
2: Silicon Rectifier

The alternate current, which is generated by the flywheel magneto, is rectified and charges the battery. For this rectification, a single-phase halfwave silicon rectifier is employed.

Characteristics: Rated output—4A,

Rated peak inverse voltage 400V

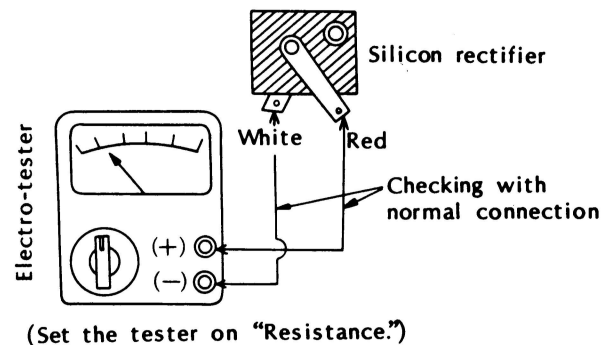
Polarity:



a: Checking the Silicon Rectifier

For measurements, a voltmeter can be used.

However, this section discusses only the checking method by means of the ohmmeter.



b: Checking with Reversed Connection

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

Standard value: 9–10 Ω

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

c: Checking with Normal Connection

Reverse the tester leads.

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

3. Operational Note

The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a continuity check.

VI-9 Battery (RT1 & RT1B)

The battery is a 6 volt—2AH unit that is the power source for the horn, taillight, and stoplight. Because of the fluctuating charging rate due to the differences in engine R.P.M.s, the battery will lose its charge if the horn and stoplight are excessively used at low RPM's. The charging of the battery begins at about 2,500 R.P.M.

Therefore, it is recommended to sustain engine R.P.M.s at about 2,500 to 3,500 R.P.M. to keep the battery charged properly. If the horn and stoplight are used frequently the battery water should be checked regularly as the continuing charging will dissipate the water.

If the battery will not retain a charge (and the battery is in good condition) the white wire of the flywheel magneto can be connected to the green wire of the wiring harness. This will increase the charging rate but if the machine is ridden for long periods of time with this wiring connection, the battery can be overcharged and damaged.

1: Checking

- 1) If sulfation occurs on the battery plates due to lack of electrolyte, it will show as white accumulations. The battery should be repaced.
- 2) If the bottoms of the cells are filled with corrosive material falling off the plates, the battery should be replaced.
- 3) If the battery shows the following defects, it should be replaced.
 - The voltage will not rise to a specific value even after long hours charging.
 - No gassing occurs in any cell. (bubbles during charging.)
 - The 6 V battery requires a charging current of more than 8.4 volts in order to supply a current at a rate of 1 AMP per hour for 10 hours.

2: Service Life

The service life of a battery is usually 2 to 3 years, but lack of care as described below will shorten the life of the battery.

- 1) Negligence in re-filling the battery with electrolyte.
- 2) Battery being left discharged.
- 3) Over charging by rushing charge. (2AH Battery require 0.2a charge rate)
- 4) Freezing.
- 5) Filling with water containing impurities when re-filling the battery.

3: Storage

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

- 1) Recharge the battery.
- 2) Store the battery in a cool, dry place, and avoid temperatures below 0°C. (32°F)
- 3) Recharge the battery before mounting it on the motorcycle and/or. every 1-2 months.

4: Service Standards

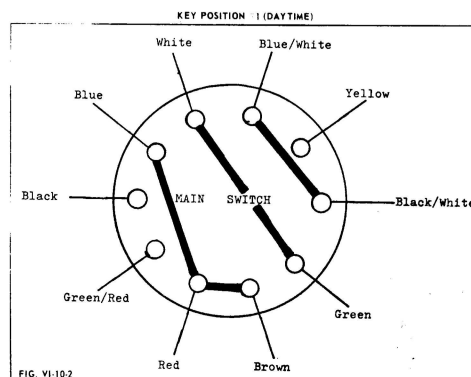
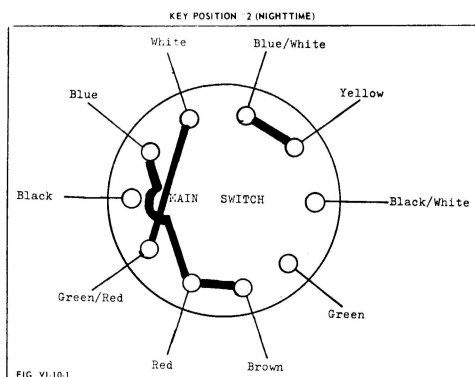
Battery: MV1-6D (Nippon Battery)

Battery Spec.	6V-2AH	
Electrolyte-Specific gravity and quantity	1.26-1.27, 110 c.c.	At full charge
Initial charging current	0.2 A for 25 hours	Brand new motorcycle
Charging current	0.2 A for 13 hours (Charge until specific gravity reaches 1.26-1.27)	When discharged
Refilling	Distilled water up to the max. level line.	Once a month

VI-10 Checking the Main Switch (removed from the chassis)(RT1 & RT1B)

The main switch connects circuits together at the right time. If the switch malfunctions, electricity cannot flow. Listed below are the circuit wires that are connected when the key is in a certain position (Fig. VI-1 & 2).

Use an ohmmeter to check resistance between two main switch wires (example: white wire to green wire, key in daytime position).



If the readings on the above measurements are all nearly 0 ohms, and no short-circuits are noticed between the terminals, as well as between the lead terminal and the switch body, the main switch is in good condition.

VI-11 Spark Plug

The life of a plug and its discoloring vary according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with suitable ones according to the color and condition of the bad plugs.

One machine may be ridden only in urban areas at low speeds, whereas another may be ridden for hours at high speeds, so confirm what the present plugs indicate by asking the rider how long and how fast he rides, and recommend a hot, standard, or cold plug accordingly. It is actually economical to install new plugs every 3,000km (2,000miles) since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

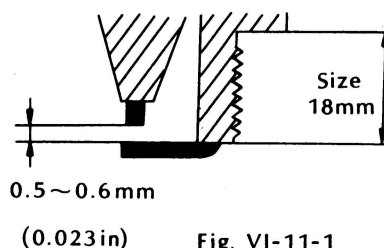
1: How to "read" spark plug (condition)

- a. Best....When the porcelain around the center electrode is a light tan color.
- b. If the electrodes and porcelain are black and somewhat oily, replace the plug with a hotter-type for low speed riding.
- c. If the porcelain is burned white and/or the electrodes are partially burned away, replace the plug with a colder-type for high speed riding.

2: Inspection

Instruct the rider to:

Inspect and clean the spark plug at least once a month or every 1,000km. (500miles) Clean the electrodes of carbon and adjust the electrode gap to 0.5—0.6mm.(0.020—0.023") Be sure to use standard B-9E plug as replacements to avoid any error in reach.



VI-12 Lighting and Signal Systems (RT1 & RT1B)

The lighting and signal systems consist of the horn and stoplight (power source-battery) and the headlight, taillight, meter lamps, high beam indicator, speedometer and tachometer (power source-flywheel magneto).

1: Headlight

The headlight has (a double filament.) 6V, 35W bulb, and a 6V, 1.5W high beam indicator on top of the shell. A beam direction adjusting screw is fitted on the right side of the light rim so that the horizontal direction of the beam can be adjusted. (not vertical).

2: Taillight and Stoplight

A 6V, 5.3W taillight and a 6V, 17W stoplight are mounted. The lens of the taillight is provided with reflectors on three sides-rear, right and left.

3: Horn

The horn is a 6V, flat type, and has a tone-volume adjusting nut on its back. After adjustment is made, apply paint or lacquer to the nut for water proofing purposes.

4: Speedometer

A circular type speedometer is rubber mounted on the bracket. It has a built-in trip meter and a odometer. For illumination, a 6V, 3W bulb is provided.

5: Tachometer

An independent tachometer is mounted separately from the speedometer. The revolutions per minute of the crankshaft are conveyed from the kick idler gear through the gear unit to the tachometer. The meter lamp is of the 6V, 3W type.

Note: Use bulbs of the correct capacity for the headlight, taillight, meter lamp and high-beam indicator which are directly connected to the flywheel magneto. If large capacity bulbs are used, the voltage will drop, giving a poor light. On the contrary, if smaller capacity bulbs are used, the voltage will rise, shortening the life of bulbs. Avoid the use of a 12V bulb, because shorter service life will result.

When the headlight beam switch is operated to change the beam from one to another, the headlight is designed to keep both bulbs burning during the change-over. This is to protect other light bulbs, meter lamps, taillight, etc., from burning out as a result of turning off the headlight, even temporarily. If one of these light bulbs is burnt out while the machine is running, it will overload other bulbs and shorten their Service life. Reduce engine speed and replace a burnt bulb as quickly as possible.

Chapter VII Conversion for Competition

This chapter will describe how a standard RT1 (or RT1B) could be converted to an 'MX' model, with the addition of several non-standard parts (GYT Kit).

The following information can also be used to help maintain a 'MX' model (supplements previous information in this manual).

A. Engine Tune-up

The engine can be tuned up by simply replacing standard parts with the bolt-on GYT kit accessory parts.

List of G.Y.T Kit Parts

Ref.No.	Parts No.	Parts Name	Description	Q'ty	Remarks
1	284-11111-00	HEAD, cylinder		1	
2	284-11311-00	CYLINDER		1	
3	284-11631-00	PISTON (STD)		1	
	284-11635-00	PISTON (1st O.S.)	80.25mm	1	
	284-11636-00	PISTON (2nd O.S.)	80.50mm	1	
4	183-16333-70	SPRING, clutch		6	
5	214-17411-60	AXLE, main	16T	1	
6	214-17121-60	GEAR, 2nd pinion	20T	1	
7	214-17211-60	GEAR, 1st wheel	36T	1	
8	214-17221-60	GEAR, 2nd wheel	33T	1	
9	214-17231-60	GEAR, 3rd wheel	29T	2	
10	241-17819-00	CAP. housing		1	
11	94700-00016	PLUG, spark	NGK B-9EN	1	
12	161-15426-00	COVER, oil pump		1	
13	284-14101-60	CARBURETOR ASS'Y	VM34SH	1	MIKUNI
14	137-14143-62	.JET, main	# 310	1	
	137-14143-64	.JET, main	# 320	1	
	137-14143-66	.JET, main	# 330	1	
	137-14143-68	.JET, main	# 340	1	
	137-14143-70	.JET, main	# 350	1	
15	284-14141-55	NOZZLE, main	Q.5	1	
16	239-14116-06	NEEDLE	6DH2-3	1	
17	285-14610-10	EXHAUST PIPE ASS'Y		1	
18	285-14781-11	STAY, muffler (2)		1	
19	91201-06020	BOLT		1	
20	92901-06100	WASHER, spring		1	
21	92801-06100	NUT		2	
22	285-14791-00	STAY, muffler (3)		1	
23	214-14793-01	PLATE, muffler		1	
24	214-14763-02	SPACER		1	
25	214-14794-00	PLATE, muffler (2)		1	
26	91201-06045	BOLT		1	
27	214-21635-00	NUT, crown		1	
28	92901-06100	WASHER, spring		1	
29	285-14411-00	CASE, air cleaner		1	
30	285-14451-00	ELEMENT		1	
31	285-14458-00	GUIDE, element		1	
32	285-14412-00	CAP, case		1	
33	285-14455-00	BAND		1	
34	284-14453-00	JOINT		1	
35	284-13555-00	JOINT		1	
36	275-11179-00	BOLT, stud		2	
37	92501-06008	SCREW, pan head		4	

b: Modification of the Chassis

Modification of the chassis just requires the removal of the chassis components unnecessary for motocross.

- a) Replace both front and rear tires with those of the motocross specification.
- b) Choose the most suitable secondary sprocket ratio for motocross.
Several types of sprockets, varying in the number of teeth, are available at your Yamaha dealer's shop.
- c) Remove all electrical components together with the wire harness, except for the generator and ignition coil.

Ref.No.	Parts No.	Parts Name	Description	Q'ty	Remarks
1	284-23100-00-35	FRONT FORK ASS'Y		1	
2	263-23485-00	PLATE. number		1	
3	91201-06015	BOLT		2	
4	92901-06100	WASHER. spring		2	
5	156-24187-00	WASHER. special (2)	6.5-26-1.6	2	
6	263-23487-00	STAY. plate		1	
7	93210-67057	O. RING	3-66.5	1	
8	92901-08200	WASHER. plain		2	
9	263-21581-00	STAY. plate fitting (L.H.)		1	
10	263-21591-00	STAY. plate fitting (R.H.)		1	
11	284-21510-00-35	FRONT FENDER COMP.		1	
12	284-21513-00-35	STAY. fender (1)		1	
13	284-21514-00-35	STAY. fender		1	
14	284-21512-00-35	BRACKET. fender		1	
15	91201-06018	BOLT.		2	
16	256-21615-00	WASHER. special	6.5-19-1.2	2	
17	256-21544-00	COLLAR. fender mount		2	
18	256-21541-00	DAMPER. fender mount		2	
19	92901-06200	WASHER. plain		5	
20	92901-06100	WASHER. spring		5	
21	92803-06700	NUT. crown		2	
22	91201-06012	BOLT		1	
23	92801-06100	NUT		1	
24	91201-06012	BOLT		2	
25	97201-08015	BOLT		2	
26	92901-08100	WASHER. spring		2	
27	284-21786-00	EMBLEM. MX		1	
28	94127-21071	TIRE. front	2.75-21-4PR	1	
29	94227-21031	TUBE. front	2.75-21	1	
30	94327-21024	BAND. r.m	2.75-21	1	
31	94416-21038	RIM. front	1.60-21	1	
32	214-25104-10	SPOKE SET		1set	
33	152-25139-00	PLUG. blind		1	
34	94140-18070	TIRE. rear	4.00-18-4PR	1	
35	214-25394-10	SPACER. bead		2	

The RT1M is provided with these these tuning parts.

VII-2 GYT Competition Parts

Installation of the Yamaha GYT Parts and removal of unnecessary equipment, such as lighting, quickly transforms the RT1 into a competition proven racing machine. After installation of the highly tuned GYT parts, the RT1 engine will gain optimum output at midrange and top end.

A: Specifications (comparison of GYT Parts to standard parts):

- 1) Cylinder Head. Volume and shape of combustion chamber changed to increase top end performance. Spark plug hole moved to center of the head.
- 2) Cylinder. Cast iron cylinder liner inside of aluminum cylinder body. Port timing changed to increase performance. Intake port diameter increase.
- 3) Piston. Material changed to Lowex for increased reliability. One cast iron piston ring. Design of piston changed to match port timing of cylinder.
- 4) Carburetor. Size increased to 34 mm. venturi (VM 34SH). Main jet size increased to 310.
- 5) Exhaust System. Tuned exhaust (expansion chamber) to give maximum performance.
- 6) Spark plug. Heat range and type of plug changed to B-9EN.
- 7) Oil Pump. Removed to facilitate installation of GYT cylinder.
- 8) Transmission gear close ratio.

B: Check engine condition before installation of GYT Parts:

After installation of the GYT parts, the engine will be set-up for optimum output. Therefore, to insure reliability, performance, and engine safety, the critical engine components should be checked and set to recommended standards before installation of GYT parts.

- 1) Remove the engine from the frame and disassemble engine. (Refer to section IV Engine.)
 - a. Check the crankshaft assembly, crank bearing, connecting rod, connecting rod big end and small end bearings, and set to recommended standards or replace faulty parts as necessary.
 - b. Oil seals. It is suggested to replace all of the oil seals upon engine disassembly for installation of GYT parts to insure against the slightest possible leakage.
 - c. Replace all gaskets and O rings upon assembly of the engine and use recommended sealant.

C: Installation of GYT Parts:

- 1) Install a cap housing cover over over the tachometer drive opening in the right hand crankcase if the tachometer is removed from the machine.
- 2) Assemble cylinder head, cylinder, and piston with new gaskets.
- 3) Assemble VM 34SH carburetor with 10mm. thick insulator on cylinder.

Carburetor Specifications

Name of Part	Abbreviation	Specifications
Main jet	M.J.	# 310
Needle jet	N J.	P-0
Jet needle	J.N.	6DH2-3
Throttle valve cutaway	C.A.	2.5
Air screw setting	A.S.	1¼
Starter jet	G.S.	# 60
Flont level	F.L.	8.5mm(0.33")

- 4) If the oil pump is removed, install an oil pump cover plate on the crankcase, installing a 6mm. bolt in the inlet hole on the cylinder intake port. Follow the oil manufacturer's recommendation for fuel/oil ratio.
A 15:1 fuel/oil ratio should be mixed in the gas tank when the Autolube pump is removed.
If the oil pump is retained, a 30:1 fuel/oil ratio could be mixed in the gas tank in conjunction with the Autolube pump.
- 5) Secondary sprocket ratio will have to be determined by the owner depending the type of riding or competition conditions to be encountered.
The gearing should be reduced if the machine is to be raced on a short or extremely rough course. If the secondary drive sprocket is changed, be sure to bend the lock washer ears up after installation of the gear.
- 6) After installation of the GYT parts, thoroughly check of the condition of the engine components, the engine should be considered in new condition. Start the engine and run between 4,000 and 5,000 R.P.M. for 5 to 10 minutes. Let the engine cool and repeat this procedure several times. Remove the spark plug and make a reading as the spark plug heat range, main jet size and jet needle position. Adjust as necessary and take the machine for a trial run. Remove the the spark plug again and make another reading for spark plug heat range, main jet size, and a jet needle position.

VII-3 Additional Modification

All of the unnecessary equipment such as lighting, mirrors, etc., should be removed if the machine is to be raced. Removal of the speedometer and/or tachometer will be optional with the rider and depend on the type of riding to be done. Further modification, such as gear ratio, tire changes, suspension changes or modification, installation of 21in. front wheel, etc., is part of personalization and up to the owner.

VII-4 Specifications (GYT)

Piston Clearance:	0.055 ~ 0.060 (0.0022 ~ 0.0024 in.)
Spark plug:	Standard B-9E(N)
Ignition Timing:	B.T.D.C. 2.9 mm.
Secondary reduction:	Chain
Carburetor setting:	Main Jet # 310
	Needle Jet P-0
	Pilot Jet # 40
	Cut away 2.5
	Number of turns backed off-air screw 1¼
Float level	8.5 mm(0.33 in.)
Fuel Mixing ratio:	If the AUTOLUBE is in use 30:1
	If not AUTOLUBE is in use 15:1
Gear Oil amount:	1,000c.c.
Oil Pump	
Minimum stroke:	0.25 ~ 0.30
Maximum stroke:	1.90 ~ 2.10

VII6 Check and Service prior to Racing

The following itemts. should be checked and serviced before racing.

1. Check the cylinder, piston, and crankshaft ass'y for any defects.
2. Make sure that the carburetor is clean and correctly set.
3. Check for ignition timing, lead wire connect on, and insulation.
4. Retighten screws, bolts and nuts in all parts.
5. Check the cables.
6. Clean the gas tank and petcock.
7. Adjust and oil the chain.

Adjust the drive chain so that it has free play of approximately 1 in.(25mm.) up and down at the center of the lower section with the rear wheel on the ground.

CONVERSION TABLES

LENGTHS

Multiply	By To Obtain	Multiply	By To Obtain
Millimeters (mm)	0.03937 Inches	Kilometers (km.)	0.6214 Miles
Inches (in.)	25.4 Millimeters	Miles (mi.)	1.609 Kilometers
Centimeters (cm.)	0.393707 Inches	Meters (m.)	3.281 Feet
Inches (in.)	2.54 Centimeters	Feet (ft.)	0.3048 Meters

WEIGHTS

Kilograms (kg.)	2.20462 Pounds	Grams (g.)	.03527 Ounces
Pounds (lbs.)	0.453592 Kilograms	Ounces (oz.)	28.35 Grams

VOLUMES

Cubic centimeters (c.c.)	.061 Cubic inches	Imperial gallons	277.274 cu. in.
Cubic inches (cu. in)	16.387 c.c.	Liters (l.)	1.057 Quarts
Liters (l.)	0.26418 Gallons	Quarts (qt.)	0.946 Liters
Gallons (gal.)	3.785 Liters	Cubic centimeters (c.c.)	0.0339 Fluid ounces
U.S. gallons	1.2 Imperial gals.	Fluid ounces (fl.oz.)	29.57 c.c.
Imperial gallons	4.537 Liters		

OTHERS

Metric horsepower (ps.)	1.014 bhp.	Foot-pounds (ft-lbs)	.1383 kg-m
Brake horsepower (bhp.)	.9859 ps.	Kilometers per liter (km/l)	2.352 mpg
Kilogram-meter (kg-m)	7.235 Foot-pounds	Miles per gallon (mpg.)	.4252 km/l

GAS (FUEL) TO OIL RATIO CHART

Gas/Oil Ratio	12:1	16:1	20:1	24:1	28:1	32:1	36:1	40:1
Oil (qt.) per 1 Gal. Gas	0.33	0.25	0.2	0.17	0.14	0.13	0.11	0.1
Oil (oz.) per 1 Gal. Gas	10.7	8.0	6.4	5.3	4.6	4.3	3.6	3.2
Oil (qt.) per 5 Gal. Gas	1.66	1.25	1.0	0.84	0.72	0.67	0.55	0.5
Oil (oz.) per 5 Gal. Gas	53.5	40.0	32.0	26.6	22.8	21.32	17.8	16.0

(U.S. Gallons)

M E M O

A series of horizontal dashed lines for writing, spanning the width of the page.

WIRING DIAGRAM

Color Position	E	B	R	Br	L	G	W	GR	LW	Y
OFF	○	○								
I			○	○		○				
II			○	○	○		○	○	○	○

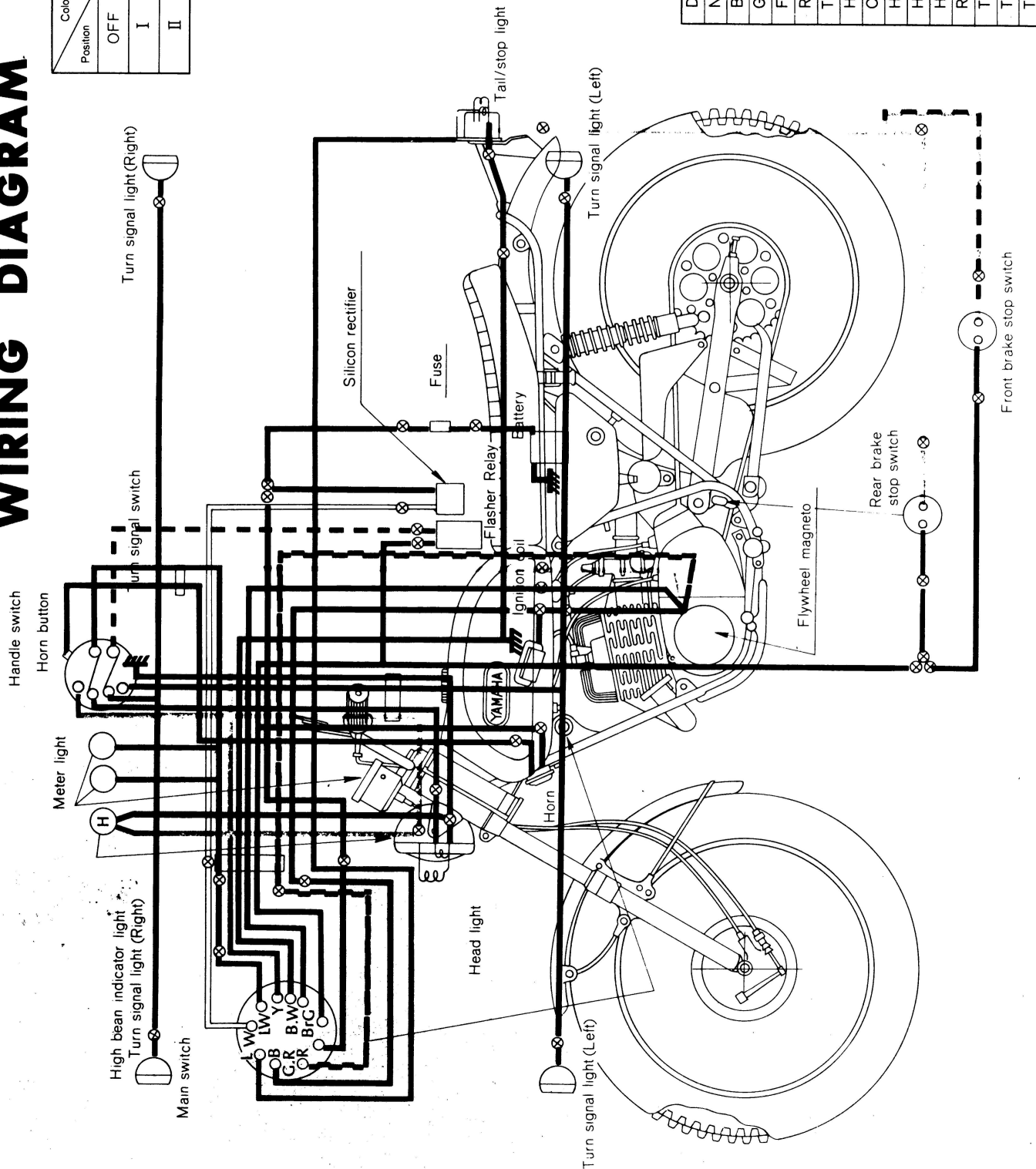


Chart of wire colors

Daytime charging circuit	Green
Night time charging circuit	Green/Red
Battery (st) circuit	Red
Ground circuit	Black
Front brake stop light circuit	Green/Yellow
Rear brake stop light circuit	Yellow
Tail light circuit	Blue
Head/Meter light circuit	Blue(L/W)
Common circuit	Brown
Head light main circuit	Yellow
Head light sub circuit	Green
Horn circuit	Pink
Rectifier circuit	White
Turn signal light (Right) circuit	Dark green
Turn signal light (Left) circuit	Dark Brown
Turn signal relay circuit	Brown/White