YAMAHA

RD200A

397-000101

SERVICE MANUAL

FOREWORD

This Service Manual has been written to acquaint the mechanic with the disassembly, reassembly, maintenance, and troubleshooting procedures required to provide optimum performance and longevity of the unit.

The information enclosed should be closely studied to avoid unnecessary repairs and to provide the owner with a sound, safe, dependable machine.



YAMAHA MOTOR CO., LTD.
SERVICE DEPARTMENT

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CHAPTER 1. GENERAL

1-1. Machine Identification

The frame serial number is located on the right-hand side of the headstock assembly. The first three digits identify the model. This is followed by a dash. The remaining digits identify the production number of the unit. Yamaha production usually begins at 000101.

The engine serial number is located on a raised boss on the upper rear, left-hand side of the engine. Engine identification follows the same code as frame identification.

Normally, both serial numbers are identical; however, on occasion they may be two or three numbers off.

Starting Serial Number	
RD200A	397-000101



Fig. 1-1 Frame Serial Number

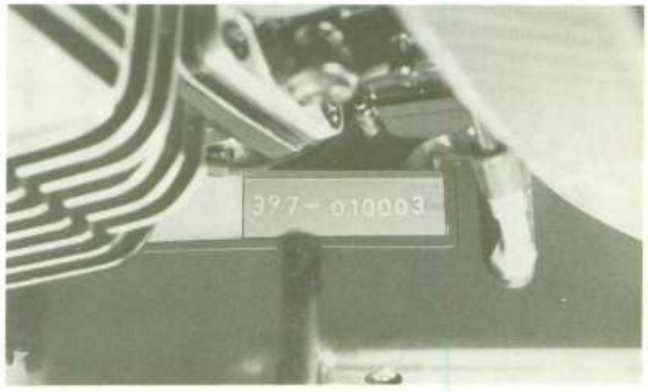


Fig. 1-2 Engine Serial Number



Fig. 1-3



Fig. 1-4

1-2. Specifications

A. General Specifications

Model	RD200A
DIMENSIONS:	
Overall Length	76.6 in. (1,945 mm.)
Overall Width	29.1 in. (740 mm.)
Overall Height	39.6 in. (1,005 mm.)
Seat Height (unloaded)	30.3 in. (770 mm.)
Wheelbase	49.0 in. (1,245 mm.)
Min. Ground Clearance	6.1 in. (115 mm.)
Weight:	
Net	256 lbs. (116 kg.)
Performance:	
Min. Turning Radius	82.7 in. (2,100 mm.)
Braking Distance	46ft. at 31 m.p.h. (14 m. at 50 km/h.)
Engine:	
Model/Type	397/2-Stroke Gasoline
Lubricating System	Separate Lubrication (YAMAHA Autolube)
Cylinder	Two in parallel, Forward Inclined, Torque Induction
Displacement	11.89 cu.in. (195 c.c.)
Bore and Stroke	2.047 x 1.811 in. (52 x 46 mm.)
Starting System	Electric and Primary Kick Starter
Ignition System	Battery Ignition
Ignition Timing	1.8 mm. B.T.D.C.
Spark Plug	B—8HS
Carburetor:	
Type	Y20P—1A
M.J.	#94
J.N.	4F51—3
Air Cleaner:	Wet, Foam Rubber
Primary Drive	
Clutch	Wet, Multiple-disk
Primary Reduction System	Helical Gear
Primary Reduction Ratio	53/16 (3.312)
Capacities:	
Gasoline Tank/Type Fuel	11.5 lit. (3.0 US gals.) Low-Lead Gasoline
Oil Tank/Type	2.0 lit. (2.1 US qts.) Yamalube 2-cycle
Transmission/Type	800 — 850 c.c. (0.84 — 0.90 US qts.) Yamalube 4-cycle
Front Forks/Type	157 c.c. (5.3 ozs.) Yamalube shock fluid
Transmission:	
Type	Constant Mesh 5-speed Forward

Model		RD200A	
Transmission			
Reduction Ratio	1st	34/12	(2.833)
	2nd	29/17	(1.705)
	3rd	25/20	(1.250)
	4th	23/22	(1.045)
	5th	22/24	(0.916)
Secondary Reduction System		Chain	
Secondary Reduction Ratio		36/14 (2.571)	
Chassis:			
Model		397	
Frame		Steel tubing, diamond structure	
Suspension System, Front		Telescopic Fork	
Suspension System, Rear		Swinging, Arm	
Cushion System, Front		Coil Spring, Oil Damper	
Cushion System, Rear		Coil Spring, Oil Damper	
Steering System:			
Caster		62°30'	
Trail		3.7 in. (95 mm.)	
Braking System:			
Type of Brake		Internal Expansion	
Operation System, Front		Right Hand Operation	
Operation System, Rear		Right Foot Operation	
Tire Size:			
Front		2.75 — 18-4PR	
Rear		3.00 — 18-4PR	
Starter Dynamo			
Model		GS214 — 02	
Manufacturer		Hitachi	
Battery:			
Model		12V. 9A. — 3A1	
Capacity		12 V. 9AH	
Lighting:			
Headlight		12V. 35W./25W.	
Taillight		12V. 8W.	
Stoplight		12V. 27W.	
Meter Light		12V. 3W. x 2	
Flasher Light		12V. 27W.	
High Beam Indicator Light		12V. 2W.	
Neutral Light		12V. 3W.	
Charge Light		12V. 3W.	

Note:

The Research and Engineering Departments of Yamaha are continually striving to further perfect all models. Improvements and modifications are therefore inevitable.

In light of this fact, all specifications within this manual are subject to change without notice. Information regarding changes is forwarded to all Authorized Yamaha Dealers as soon as available.

B. External Views

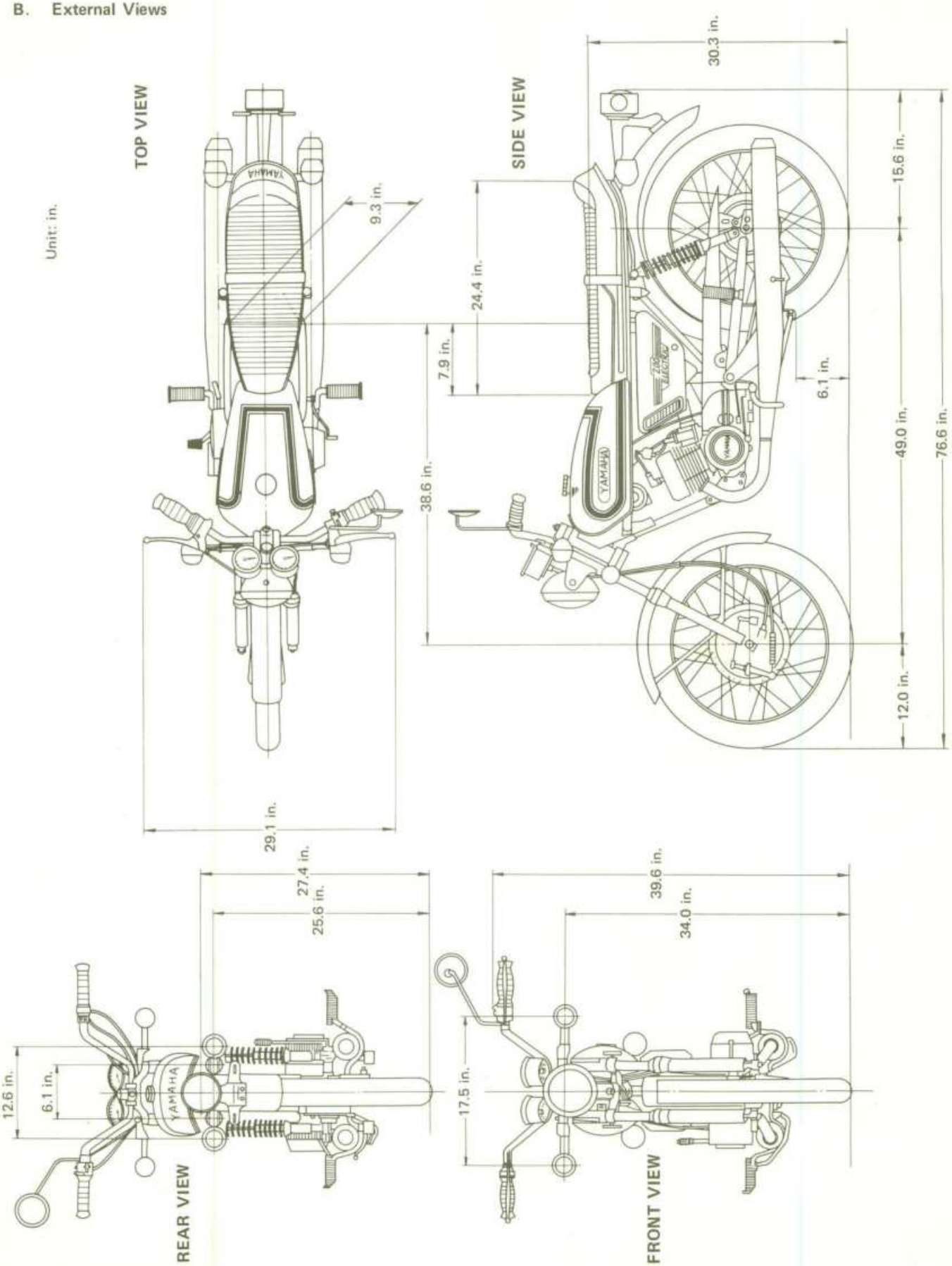
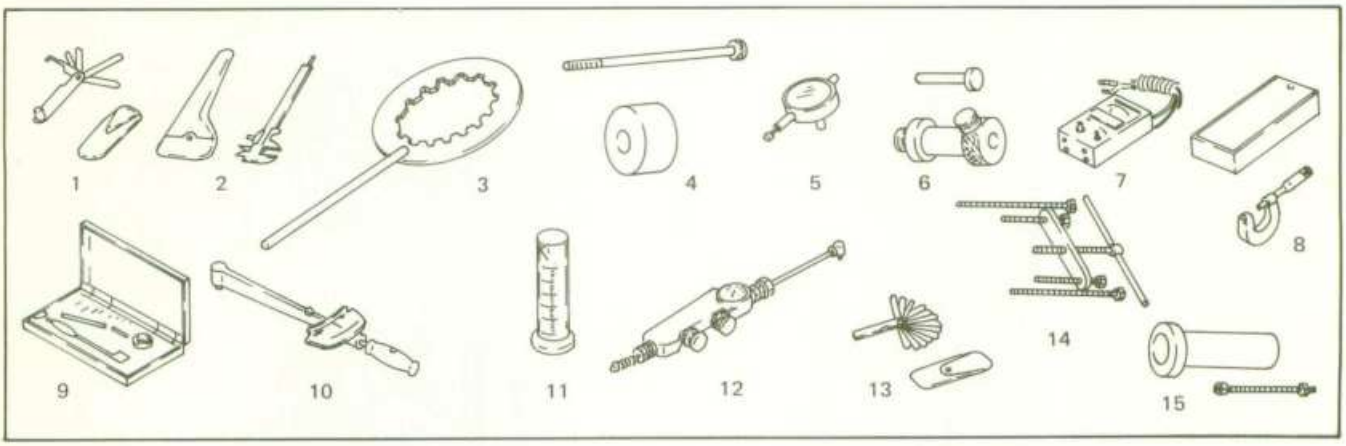


Fig. 1-5

1-3. Tools

The special tools are given below. For your convenience, we have also included a list of additional recommended hand tools and supplies.

A. Special Tools and Instruments

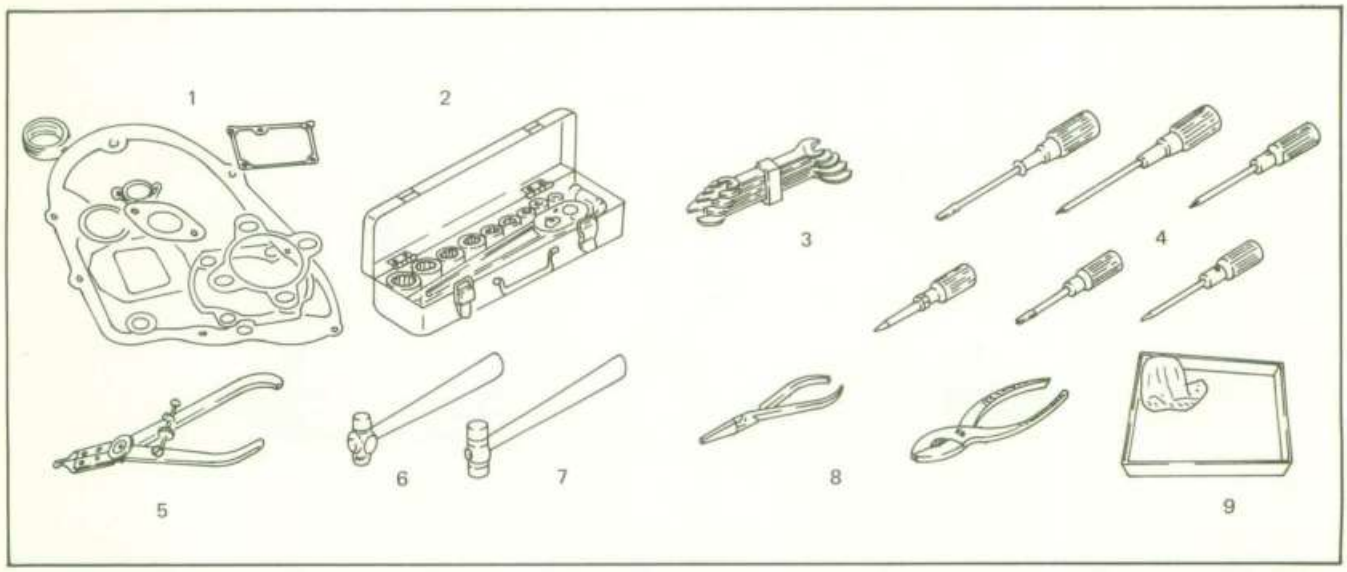


* 1. Autolube Feeler Gauge
* 2. Vernier Calipers
* 3. Clutch Holding Tool
* 4. Armature Shock Puller
* 5. Dial Gauge (mm.)
* 6. Dial Gauge Stand
* 7. Point Checker for Continuity Checker
* 8. Outside Micrometer (50-75 mm.)
* 9. Cylinder Gauge (50-100 mm.)
10. Torque Wrench (0-10 kg-m. or 0-600 in-lb.)
11. Measuring Cup (0-250 cc. 10 cc. Increments)
12. Tire Pressure Gauge (Dial Type Recommended)
13. Feeler Gauge Set
14. Crankcase Disassembly Tool
15. Crankcase Assembly Tool

Fig. 1-6

Note:
Those items marked with an asterisk (*) are available from Yamaha.

B. General Tools and Materials



1. Gasket Set
2. Socket Wrench Set (mm.)
3. Combination Wrench Set (mm.)
4. Selection of Phillips and Slotted Head Screwdrivers
5. Circlip Pliers (outside)
6. Steel Hammer
7. Soft Faced Hammer
8. Selection of Pliers and Wire Cutters
9. Parts Trays and Shop Rags

Fig. 1-7

1-4. Maintenance Specifications

Item	RD200A		
	Nominal (New)	Minimum Allowable	Maximum Allowable
AUTOLUBE			
Pump Plunger Diameter	0.16 in. (4 mm.)	—	—
Pump Stroke (Max. Throttle)	—	0.081 in. (2.05 mm.)	0.089 in. (2.25 mm.)
Pump Stroke (Min. Throttle)	—	0.008 in. (0.20 mm.)	0.010 in. (0.25 mm.)
IGNITION			
Minimum Spark Length	—	0.28 in. (7 mm.)	—
Ignition Coil—Primary Resistance	4.0 Ω ± 10% at 20° C	—	—
Ignition Coil—Secondary Resistance	11 KΩ ± 20% at 20° C	—	—
Ignition Coil—Condenser Capacity	0.22 μF	—	—
Ignition Point Gap	0.014 in. (0.35 mm.)	0.012 in. (0.30 mm.)	0.016 in. (0.40 mm.)
Spark Plug Type/Manufacturer	B-8HS/N.G.K.	—	—
Spark Plug Gap	—	0.024 in. (0.6 mm.)	0.028 in. (0.7 mm.)
Ignition Timing (B.T.D.C.)	0.071 in. (1.8 mm.)	0.065 in. (1.65 mm.)	0.077 in. (1.95 mm.)
ENGINE - TOP END			
Cylinder Head Volume	12.2 c.c.	11.95 c.c.	12.45 c.c.
Cylinder Allowable Taper	0.0003 in. (0.008 mm.)	—	0.002 in. (0.05 mm.)
Cylinder Allowable Out-of Round	—	—	0.0004 in. (0.01 mm.)
Ring End Gap, Free - Top	0.16 in. (4.0 mm.)	—	—
Ring End Gap, Free - 2nd	0.18 in. (4.5 mm.)	—	—
Ring End Gap, Installed - Top	—	0.006 in. (0.15 mm.)	0.014 in. (0.35 mm.)
Ring End Gap, Installed - 2nd	—	0.006 in. (0.15 mm.)	0.014 in. (0.35 mm.)
Ring Groove Clearance - Top	—	0.0012 in. (0.03 mm.)	0.0031 in. (0.08 mm.)
Ring Groove Clearance - 2nd	—	0.0012 in. (0.03 mm.)	0.0031 in. (0.08 mm.)
Piston Clearance	—	0.0016 in. (0.040 mm.)	0.0018 in. (0.045 mm.)
ENGINE - CLUTCH			
Friction Plate Thickness	0.16 in. (4.0 mm.)	0.15 in. (3.7 mm.)	—
Clutch-Warp. Allowance	—	—	0.002 in. (0.05 mm.)
Housing Bushing I.D.	$1.024^{+0.0006}_{-0.0002}$ in. ($26^{+0.016}_{-0.005}$ mm.)	—	1.024 ins. (26.02 mm.)
Bushing Spacer O.D.	$1.024^{+0.0008}_{-0.0009}$ in. ($26^{+0.020}_{-0.023}$ mm.)	—	1.022 ins. (25.95 mm.)
Bushing/Spacer Clearance	0.001 — 0.002 in. (0.020 — 0.040 mm.)	—	0.002 in. (0.060 mm.)
Main Shaft O.D.	$0.787^{+0.0003}_{-0.0008}$ in. ($20^{+0.007}_{-0.020}$ mm.)	—	0.785 in. (19.95 mm.)
Bushing Spacer I.D.	$0.787^{+0.0394}_{-0.0002}$ in. ($20^{+0.012}_{-0.006}$ mm.)	—	0.788 in. (20.02 mm.)
Shaft/Spacer Clearance	0.00004 — 0.00157 in. (0.001 — 0.040 mm.)	—	0.007 in. (0.050 mm.)
Housing End Play	0.008 in. (0.2 mm.)	0.004 in. (0.1 mm.)	0.012 in. (0.3 mm.)
Spring Free Length	1.34 in. (34 mm.)	1.30 in. (33 mm.)	—

Item		RD200A	
	Nominal (New)	Minimum Allowable	Maximum Allowable
Primary-Drive Gear "Lash" No.	85 to 88	—	—
Primary-Driven Gear "Lash" No.	39 to 45	—	—
Primary-Lash Tolerance	27-129	—	—
Primary-Reduction Ratio	3.312	—	—
ENGINE-TRANSMISSION			
Main Axle Clearance	0.020 in. (0.5 mm.)	—	—
Drive Axle Clearance	0.020 in. (0.5 mm.)	—	—
ENGINE - CRANKSHAFT			
Small End Play	Less than 0.08 in. (2 mm.)	—	—
Large End Clearance	—	0.004 in. (0.1 mm.)	0.012 in. (0.3 mm.)
Run-out Clutch Side	—	—	0.0012 in. (0.03 mm.)
Run-out Ignition Side	—	—	0.0012 in. (0.03 mm.)
Flywheel Width	$1.85\ ^{-0.002}_{-0.004}$ in. ($47\ ^{-0.05}_{-0.10}$ mm.)	—	—
Width of Crankshafft Assembly	$5.51\ ^{+0}_{-0.008}$ in. ($140\ ^{+0}_{-0.20}$ mm.)	—	—
CARBURETION			
Manufacturer	Teikei	—	—
Model Number	Y20P-1A	—	—
I.D. Number	39763	—	—
Venturi Size	20φmm.	—	—
Jet Needle/Clip Position	4F51-3	—	—
Cutaway	2.0	—	—
Pilot Jet	#42	—	—
Air Jet	0.9 φ	—	—
Starter Jet	#70	—	—
Air Screw (Turns Out)	1-1/4	—	—
Idle Speed	1,150 — 1,250 r.p.m.	—	—
Float Level	0.79 ± 0.098 in. (20.0 ± 2.5 mm.)	—	—
CHASSIS			
Front Brake Shoe Diameter	7.1 in. (180 mm.)	6.9 in. (175 mm.)	—
Rear Brake Shoe Diameter	7.1 in. (180 mm.)	6.9 in. (175 mm.)	—
Front Tire			
Manufacturer	Yokohama		
Pressure	23 lbs/in.^{2} (1.6 kg/cm^2)	—	—
Rear Tire			
Manufacturer	Yokohama		
Pressure	28 lbs/in.^{2} (2.0 kg/cm^2)	—	—
Wheel Run-out Limits-Lateral	0.08 in. (2 mm.)	—	—
Wheel Run-out Limits-Vertical	0.08 in. (2 mm.)	—	—
Drive Chain-Size			
Pitch	DK428		
No. of Links	108 L		

Item	RD200A		
	Nominal (New)	Minimum Allowable	Maximum Allowable
Front Fork Oil Capacity (each leg)	157 c.c. (5.55 oz.)	—	—
Type	Yamalube - shockfluid	—	—
Steering Ball Race Quantity/Size - (Upper)	19/1/4 in.	—	—
Steering Ball Race Quantity/Size - (Lower)	19/1/4 in.	—	—
Swing Arm Free Play Limits	0.4 in. (1.0 mm.)	—	—
TORQUE VALUES			
Drive Sprocket Nut	610 – 780 in-lbs. (7.0 – 9.0 m-kgs.)	—	—
Engine Mounting Bolt 8 mm.	217.0 – 304 in-lbs. (2.5 – 3.5 m-kgs.)	—	—
Cylinder Head Nut	86.8 in-lbs. (1.0 m-kgs.)	—	—
Clutch Securing Nut	560 – 700 in-lbs. (6.5 – 8.0 m-kgs.)	—	—
Primary Drive Gear Securing Nut	390 – 620 in-lbs. (4.5 – 7.2 m-kgs.)	—	—
Reed Valve Securing Screw	0.70 in-lbs. (8.0 m-kgs.)	—	—
Front Axle Nut	570 – 1210 in-lbs. (6.6 – 10.5 m-kgs.)	—	—
Front Axle Pinch Bolt	139 – 226 in-lbs. (1.6 – 2.6 m-kgs.)	—	—
Wheel Spoke (F-8R)	25 in-lbs. (0.3 m-kgs.)	—	—
Driven Sprocket Securing Bolt	300 – 350 in-lbs. (3.5 – 4.0 m-kgs.)	—	—
Front Fork Cap Bolt	130 – 260 in-lbs. (1.5 – 3.0 m-kgs.)	—	—
Handlebar Mounting Bolt	95 – 156 in-lbs. (1.1 – 1.8 m-kgs.)	—	—
Swing Arm Pivot Shaft Nut	590 – 910 in-lbs. (6.6 – 10.5 m-kgs.)	—	—

1-5. Maintenance and Lubrication Intervals

These charts should be considered strictly as a guide to general maintenance and lubrication intervals. You must take into consideration that weather, terrain, geographical location, and variety of individual uses all tend to demand that each owner alter this time schedule to match his environment. For example, if the motorcycle is continually operated in an area of high humidity, then all parts must be lubricated much more frequently than shown on the chart to avoid damage caused by water to metal parts.

Maintenance Intervals

Page	Item	Remarks	Initial (miles)				Thereafter every (miles)		
			250	500	1,000	2,000	1,000	2,000	8,000
26 – 27	*Brake System (Complete)	Check/Adjust as required — Repair as required		○	○			○	
24	*Clutch	Check/Adjust as required		○	○			○	
107	*Battery	Top-off/Check specific gravity as required — Monthly or →	○	○	○		○		
96, 97	*Spark Plug	Inspect/Clean or Replace as required	○	○	○		○		
114 – 120	*Wheels & Tires	Pressure/Spoke-tension/Runout	○	○	○		○		
—	*Fittings & Fasteners	Tighten before each trip and/or →	○	○	○		○		
22 – 24	*Autolube	Cable operation/Adjustment	○	○	○			○	
28, 29	*Drive Chain	Tension/Alignment	○	○	○		○	○	
25	*Transmission Oil Level Check	Includes transmission/Autolube tank #1	○	○	○		○		
20 – 22	*Air Filter	Foam type — See "Service Notes" #2, #4	○	○	○		○		
—	Fuel Petcock	Clean/Flush tank as required	○		○			○	
18 – 20	Ignition Timing	Adjust/Clean or Replace parts as required		○	○			○	
20, 21	Carburetor Adjustment	Check operation/Fittings		○	○			○	
82 – 88	Carburetor Overhaul	Clean/Repair as required — Refit/Adjust				○			○
—	Cylinder Compression	Preventive maintenance check		○	○			○	
—	Engine Decarbonization	Includes exhaust system			○			○	

*indicates pre-operational check items. (#3)

Service Notes:

#1. Check Autolube tank level before each ride. Top off when oil level shows at the sight glass or before any prolonged use. See "Lubrication Intervals" for type of oil to use.

#2. Foam element air filters must be damp with oil at all times to function properly. Remove, clean, and oil filter at least once per month or every 250 — 500 miles; whichever occurs first. (If extremely hard usage, such as dirt riding, clean and lube daily.) See "Lubrication Intervals" for additional details.

#3. Pre-operational checks should be made each time the machine is used. Such an inspection can be thoroughly accomplished in a very short time, and the added safety it assured the rider is more than worth the minimal time involved.

#4. For additional information regarding drive chain, engine oil level, wet-type air filter, see "Lubrication Intervals".

Lubrication Intervals

Page	Item	Remarks	Type	Period							
				Initial (miles)				Thereafter every (miles)			
				250	500	1,000	2,000	1,000	2,000	4,000	8,000
22	*Autolube	See "Service Notes"	#1	See "Service Notes"							
25	*Transmission Oil	Warm engine before draining	#2					Check			
121, 122	*Drive Chain	Lube/Adjust as required	#3	See "Service Notes"							
121, 122	*Drive Chain	Remove/Clean-Lube/Adjust	#3								
20—22	*Air Filter	Foam Type	#9	See "Service Notes"							
—	Control / Meter Cables	Apply thoroughly	#4		○				○		
—	Throttle Grip / Housing	Light application	#5		○				○		
—	Tacho / Speedo Gear Housings	Light application	#5			○				○	
—	Rear Arm Pivot Shaft	Apply until shows	#6			○			○		
—	Brake Pedal Shaft	Light application	#5			○			○		
—	Change Pedal Shaft	Light application	#5			○			○		
—	Stand Shaft Pivot	Light application	#5			○			○		
124 — 127	Front Forks	Drain Completely/Check Specs.	#3		Check		○		Check	○	
—	Steering Ball Races	Inspect thoroughly—Med.pack	#7				○			○	
	Point Cam Lubricating Wick	Very light application	#8			○				○	
	Wheel Bearings	Do not overpack	#7				○			○	

*indicates pre-operational check items.

No.1 Check tank level before each ride. Top off when oil level is at sight glass or before any prolonged use. Use the following lubricant (in order of preference):

Yamalube "2-cycle" or; two-stroke oil labeled "BIA certified for service TC-W"

No.2 At ambient temperatures of 45 — 90°F, use Yamalube 4-cycle. Do not use "additives" in oil.

No.3 Use 10W/30"SE" motor oil (If desired, specialty type lubricants of quality manufacture may be used.)

"Drive Chains"—Lube every 150 — 200 miles. If severe usage, every 50 — 100 miles.

No.4 Use graphic base type (specialty types available—use name-brand, quality manufacturer).

No.5 Light duty-smooth light-weight "white" grease. Heavy duty standard 90wt lube grease (do not use 90wt lube grease on throttle/housing)

No.6 Use standard 90wt lube grease-smooth, not coarse.

No.7 Medium-weight wheel bearing grease of quality manufacturer-preferably waterproof.

No.8 Light-weight machine oil.

No.9 Air filters-foam element air filters must be damp with oil at all times to function properly. Clean and lube monthly or per mileage.

If hard usage, clean and lube daily. Do not over-oil. Use SAE 10W/30"SE"

MEMO

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2

CHAPTER 2. ENGINE TUNING AND CHASSIS ADJUSTMENTS

In general, the following chapter covers those points on the motorcycle which would require servicing if the machine were just being set-up prior to delivery (new machine); coming in for a minor tune-up; or, if the engine or other components had been removed for overhaul or troubleshooting.

In other words, in addition to performing those adjustments required when a component is disassembled, the following items must be covered thoroughly prior to delivering the machine to the customer.

For more detailed information regarding individual components, please refer to the appropriate section further on in this manual, and/or the following:

Basic Assembly Manual
Individual Model Assembly Manual
Yamaha Shop Guide (Y.I.C.)
Basic Service Manual (Y.M.C.)

If the information is not available, or not clearly understood, contact your nearest Distributor.

In the United States:
Yamaha International Corp.,
P.O. Box 6600
Buena Park, California 90620
USA

Maintenance and Minor Repairs

The following sections provide information for the disassembly, troubleshooting and maintenance of various components of the motorcycle. If you do not have the necessary tools and an understanding of the mechanical principles involved, please refrain from attempting repairs. The use of improper tools and/or procedures can cause major damage to the unit with resultant additional repair costs.

2-1. Special Tools

A. Point Checker
P/N90890-03031

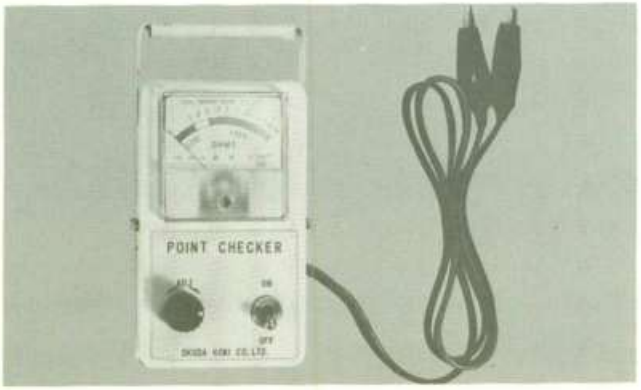


Fig. 2-1

B. Dial Gauge Assembly
P/N90890-03002

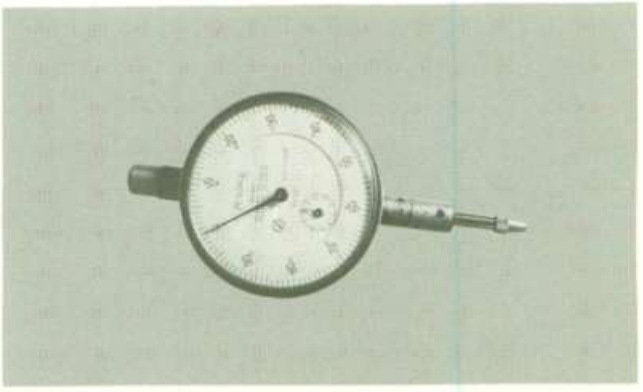


Fig. 2-2

C. Dial Gauge Stand
P/N90890-01039

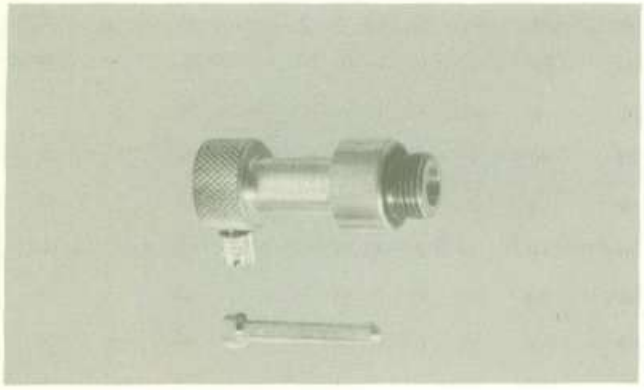


Fig. 2-3

D. Steering Nut Wrench
P/N90890-01051

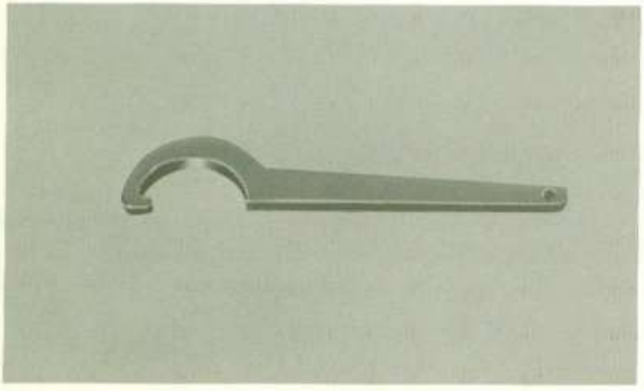


Fig. 2-4

E. Feeler Gauge
P/N90890-03001

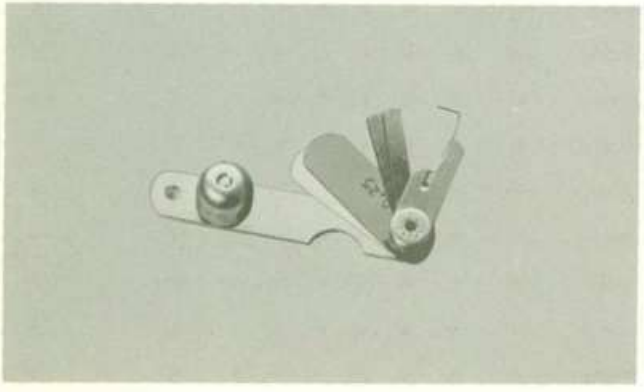


Fig. 2-5

F. Hydrometer
P/N90890-03036

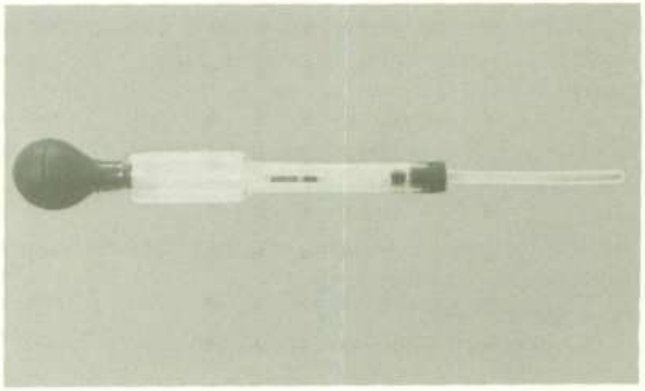


Fig. 2-6

2-2. Engine Tuning

A. Ignition Timing

Ignition timing must be set with a dial gauge (to determine piston position) and a low-range ohmmeter (to determine exactly when contact breaker points begin to open). Proceed as follows:

1. Remove spark plug and screw dial gauge stand into spark plug hole.

2. Insert dial gauge assembly into stand.



Fig. 2-7

3. Adjust ignition timing separately for the right and left cylinders.

4. Rotate the armature until the points are at their widest gap. Adjust point gap with a feeler gauge to 0.011 — 0.016 in. (0.30 — 0.40 mm.). Repeat this procedure for each set of points.

5. Turn the armature shaft counterclockwise until the piston reaches top dead center. At this point the dial gauge needle will pause.
   Turn the dial gauge face until the zero indicator lines up with needle.

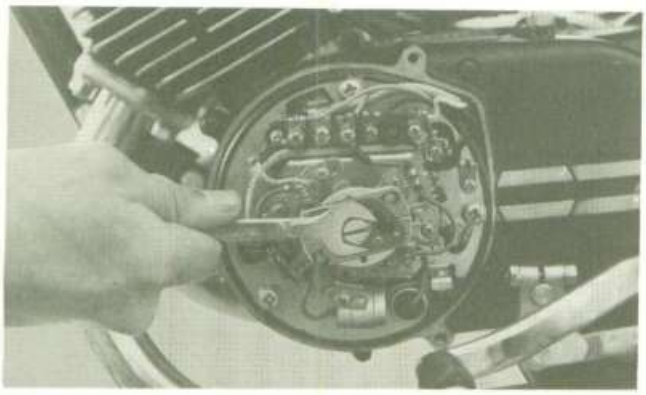


Fig. 2-8

6. Insert a match, bent spoke or other suitable material into the hole in the advance plate of the governor assembly. This will hold the governor assembly at the maximum advance position. This governor assembly must be at the maximum advance position before the engine is timed.

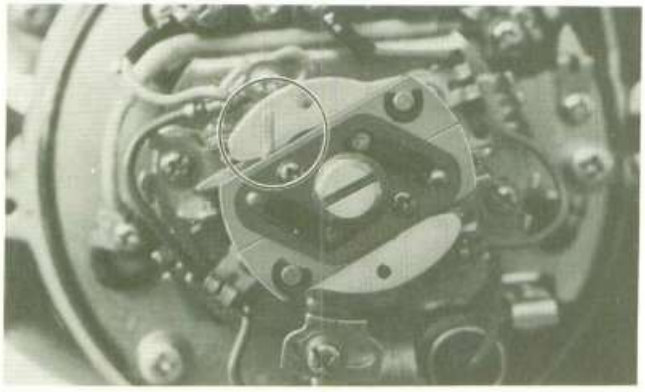
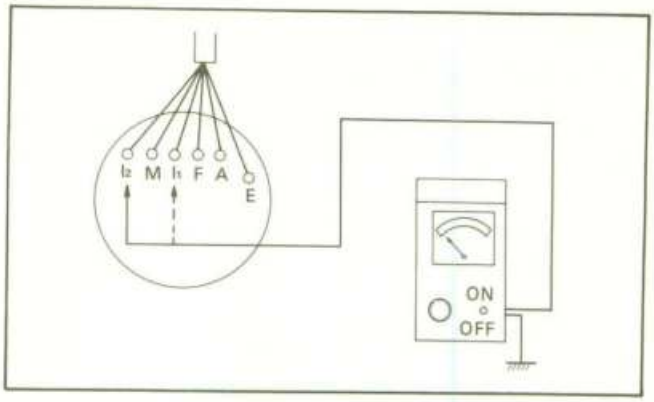


Fig. 2-9

7. Connect the point checker or electrotester terminals to the point assembly.
   Positive (+) lead to I_1 (grey) or I_2 (orange).
   Negative (—) to a good ground.



I_2 : Orange
M : Light green
I_1 : Gray
F : Green
A : White
E : Black

Fig. 2-10

8. Starting at T.D.C. rotate the armature shaft clockwise until dial gauge reads approximately 0.13 in. (3.0 mm.) before—top—dead—center (B.T.D.C.)

9. Slowly turn armature shaft counterclockwise until dial gauge reads ignition advance setting listed in Specifications Table. At this time, the point checker needle should swing from "CLOSED" to "OPEN" position, indicating the contact breaker (ignition points) have just begun to open.

10. Repeat steps 8 and 9 to verify point opening position. If points do not open within specified tolerance, they must be adjusted.

11. Adjust ignition points by barely loosening Phillips head screw and carefully rotating contact breaker assembly with a slotted screwdriver. Make minor adjustment and retighten Phillips head screw before rechecking timing. Recheck timing by repeating.

12. When correct ignition timing has been accomplished, check maximum point gap by turning armature shaft until maximum point opening occurs. Measure point gap with thickness gauge. See Specifications Table.

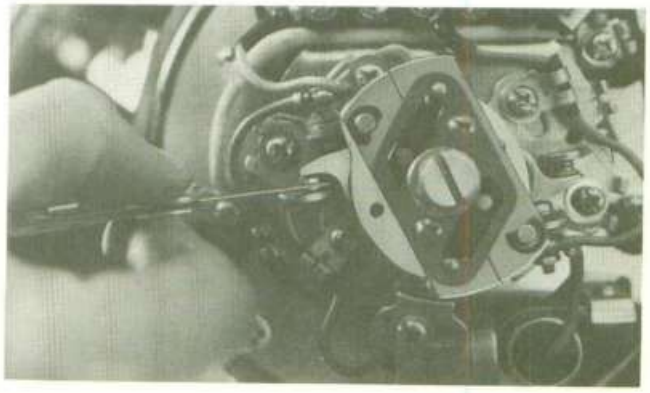


Fig. 2-11

Note:

If the maximum point gap is over tolerance the point rubbing block is probably worn and the contact breaker assembly should be replaced. Do not attempt to bond the fixed point bracket to decrease maximum point gap. This will only result in point misalignment, difficulty in setting timing and premature point failure.

Ignition Timing Specifications				
Model	Point Gap			Timing (B.T.D.C.)
	Nominal	Minimum	Maximum	
RD200A	0.014 in. (0.35 mm.)	0.012 in. (0.30 mm.)	0.016 in. (0.40 mm.)	0.071 ± 0.006 in. (1.8 ± 0.15 mm.)

13. Remove dial gauge assembly and stand.

14. Disconnect point checker.

15. Replace generator cover.

B. Spark Plug

The spark plug indicates how the engine is operating. If the engine is operating correctly, and the machine is being ridden correctly, then the tip of the white insulator around the positive electrode of the spark plug will be a medium to light tan color. If the porcelain "donut" around the positive electrode is a very dark brown or black color, then a hotter heat range might be required. This situation is quite common during the engine break-in period.

If the insulator tip shows a very light tan or white color or is actually pure white or if electrodes show signs of melting, then a spark plug with a colder heat range is required.

Remember, the insulator area surrounding the positive electrode of the spark plug must be a medium-to-light tan color. If it is not, check carburetion, timing and ignition adjustments.

The spark plug must be removed and checked prior to using the machine. Check electrode wear, insulator color, and negative to positive electrode gap.

Spark Plug Gap:
0.24 — 0.28 in. (0.6 — 0.7 mm.)

Engine conditions will cause any spark plug to slowly break down and erode. If erosion begins to increase, or if the electrodes finally become too worn, or if for any reason you believe the spark plug is not functioning correctly, replace it.

Standard Spark Plug: NGK B — 8 HS

When installing the plug, always clean the gasket surface, use a new gasket, wipe off any grime that might be present on the surface of the spark plug, torque the spark plug properly.

Spark Plug Tightening Torque:
230 — 250 in-lbs. (2.5 — 3.0 m-kgs.)

C. Carburetion and Air Filter

1. Carburetion

a. Idle mixture and idle speed

The idle mixture and idle speed screws are separate adjustments but they must be adjusted at the same time to achieve an optimum operating condition at engine idle speeds.

1) Idle mixture screw

Turn idle mixture screws until it is lightly seated, then back it out to turn specified in Specifications.

This adjustment can be made with engine stopped.

Air screw (turns out): 1-1/4 ± 1/8

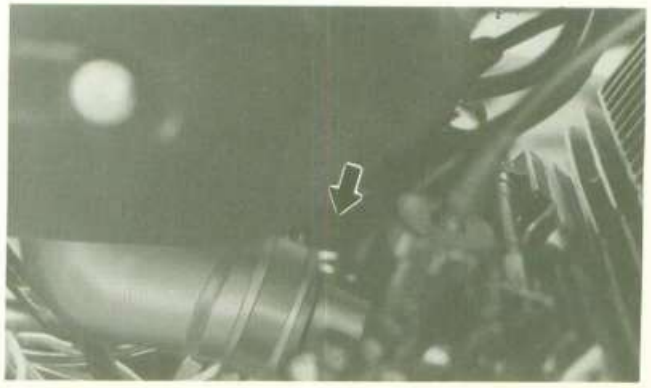


Fig. 2-12

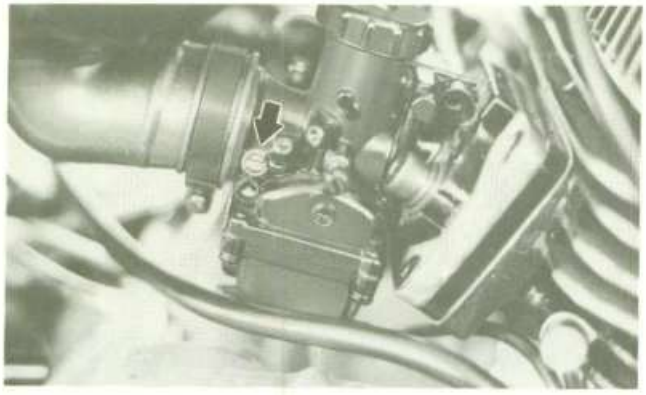


Fig. 2-13

2) Start the engine and let it warm up.
3) Idle speed screws
Turn idle speed screws in or out to achieve smooth engine operation at idle speed specified in Specifications.

Idling speeds: 1150 — 1250 r.p.m.

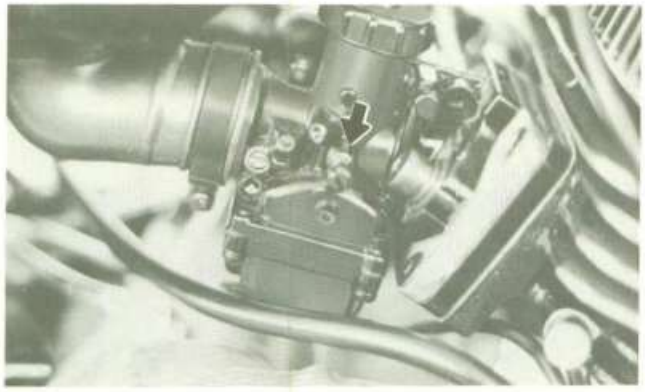
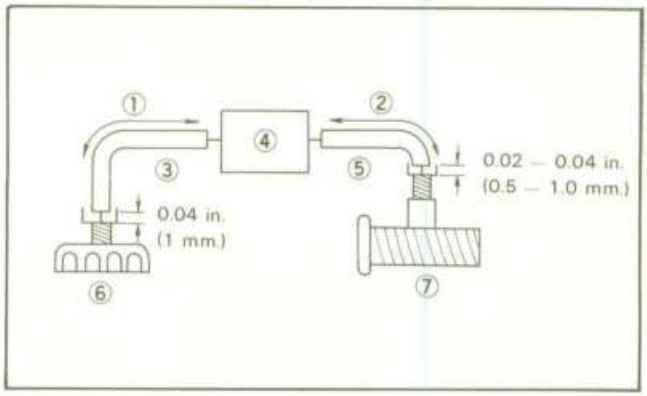


Fig. 2-14



Fig. 2-15

b. Throttle cable
1) After engine idle speed is set, make cable slack adjustment at cable adjustor near throttle grip. Loosen lock nut and turn adjustor until there is 0.02 — 0.04 in. (0.5 — 1.0 mm.) slack between throttle cable housing and cable adjustor. Retighten lock nut.
2) Loosen cable adjustor lock nut (at top of carburetor) and turn cable adjustor until there is 0.04 in. (1.0 mm.) slack in cable "B". Retighten lock nut.



1. Slide
2. Slide
3. Cable "B"
4. Junction Block
5. Cable "A"
6. Carburetor cap
7. Throttle grip

Fig. 2-16

2. Air filter
a. Remove the right side cover and oil tank.
b. Remove the air cleaner caps.
c. Remove the air filter element assemblies.

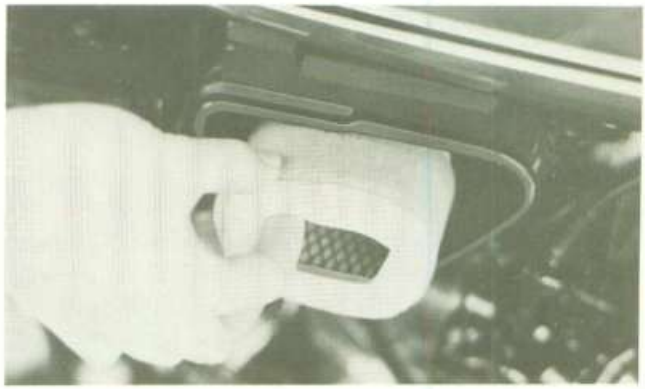


Fig. 2-17

d. Slip the element off the wire mesh guide.

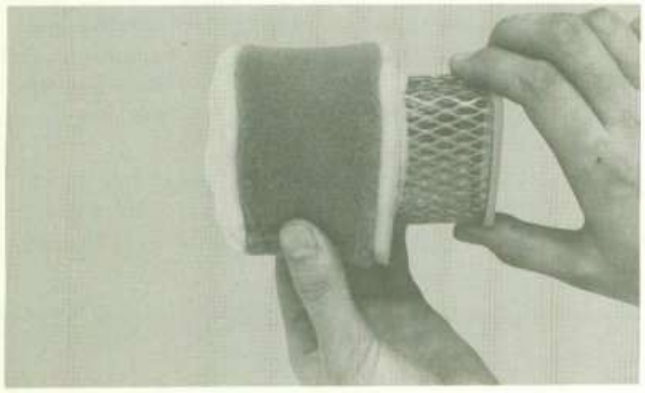


Fig. 2-18

e. Wash the element gently, but thoroughly, in solvent.
f. Squeeze excess solvent out of element and dry.

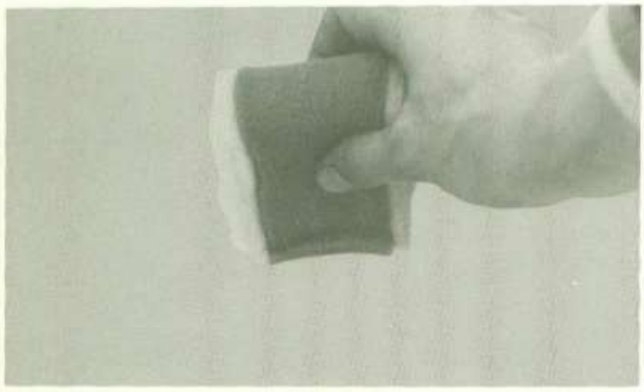


Fig. 2-19

g. Pour a small quantity of motor oil onto filter element and work thoroughly into the porous foam material.

Note:

In order to function properly, the element must be damp with oil at all times...but not "dripping" with oil.

h. Re-insert the wire mesh filter element guide into the element.
i. Coat the upper and lower edges of the filter element with 90wt lube grease. This will provide an air-tight seal between the filter case cover and filter seat.
j. Re-install the element assembly, case cover and seat.

Note:

Each time filter element maintenance is performed, check the air inlet to the filter case for obstructions. Check the air cleaner joint rubber to the carburetor and manifold fittings for an air-tight seal. Tighten all fittings thoroughly to avoid the possibility of unfiltered air entering the engine. See lubrication chart for maintenance intervals.

Caution:

Never operate the engine with the air filter element removed.

This will allow unfiltered air to enter, causing rapid wear and possible engine damage. Additionally, operation without the filter element will affect carburetor jetting with subsequent poor performance and possible engine overheating.

D. Adjusting Autolube

1. Cable adjustment

a. Remove oil pump cover, which is located on forward portion of the right-hand crankcase cover.



Fig. 2-20

b. Rotate throttle until all slack is removed from all cables. Hold this position.
c. Check to see that Autolube pump plunger pin is aligned with the mark on the Autolube pump pulley.



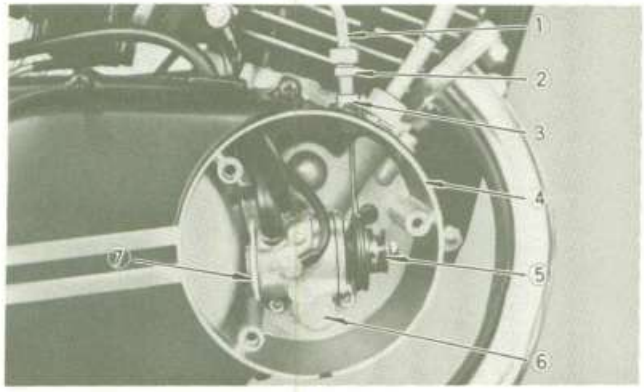
Fig. 2-21

d. If the mark and pin are not in alignment, loosen cable length adjustor lock nut on upper edge of crankcase cover and adjust cable length until alignment is achieved.

Tighten adjustor lock nut.

Note:

Before adjusting Autolube cable, always set throttle cable free play first. (See page 21)



1. Pump cable
2. Cable adjusting bolt
3. Lock nut
4. Crankcase
5. Adjusting plate
6. Oil pump
7. Starter plate

Fig. 2-22

2. Pump stroke adjustment

a. With throttle closed, rotate starter plate until the pump plunger moves fully out and away from the pump body to its outermost limit.

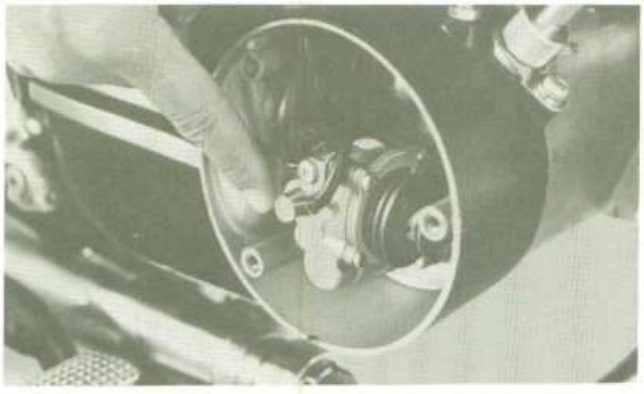


Fig. 2-23

b. Measure gap between raised boss on pump cable pulley and pump stopper plate. If clearance is incorrect, remove adjust plate locknut and adjusting plate.

Minimum Pump Stroke: 0.008 — 0.010 in. (0.20 — 0.25 mm.)
Maximum Pump Stroke: 0.081 — 0.089 in. (2.05 — 2.25 mm.) ★

★ Pump stroke at full throttle.

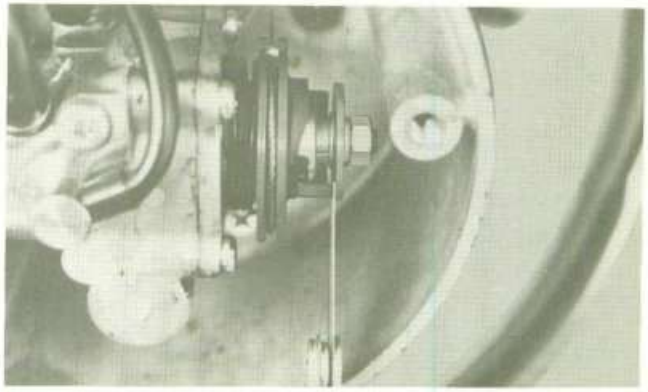


Fig. 2-24

c. Remove or add an adjustment shim as required.

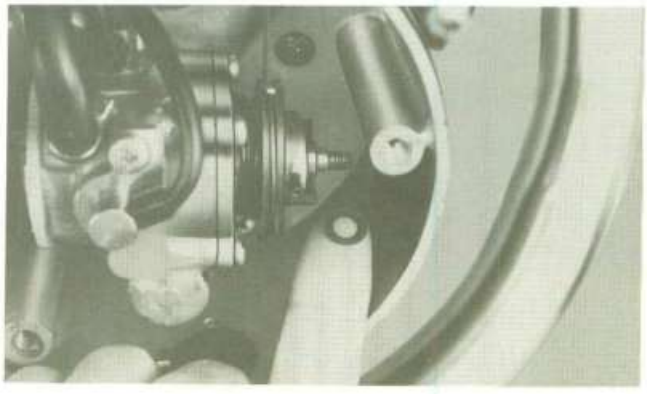


Fig. 2-25

d. Re-install adjusting plate and lock nut. Tighten the lock nut.
Re-measure gap. Repeat procedure as required.

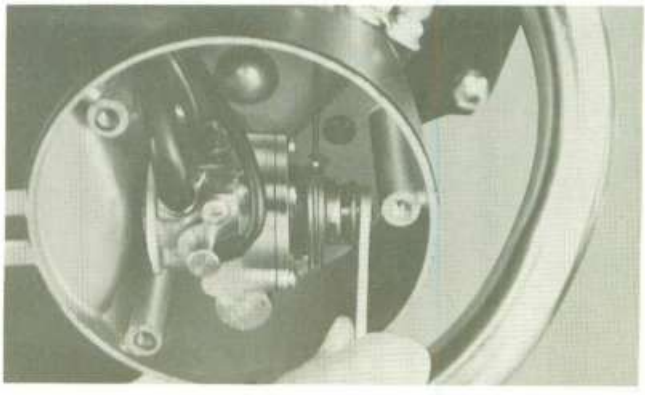


Fig. 2-26

3. Bleeding the pump

a. The Autolube pump and delivery lines must be bled on any of the following occasions:
   1) A new machine out of the crate.
   2) Whenever the Autolube reservoir tank has run dry.
   3) Whenever any portion of the Autolube system is disconnected.

b. Remove the pump cover.

c. Remove the pump bleed screw, and allow 3 to 5 minutes to fill pump with oil and begin to drain from bleed screw hole.

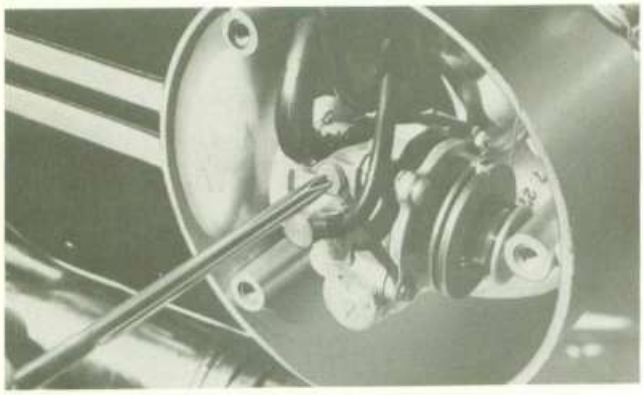


Fig. 2-27

d. Turn the throttle to the full open position.

e. Rotate the starter plate until a steady flow of oil, with no air bubbles, comes out.

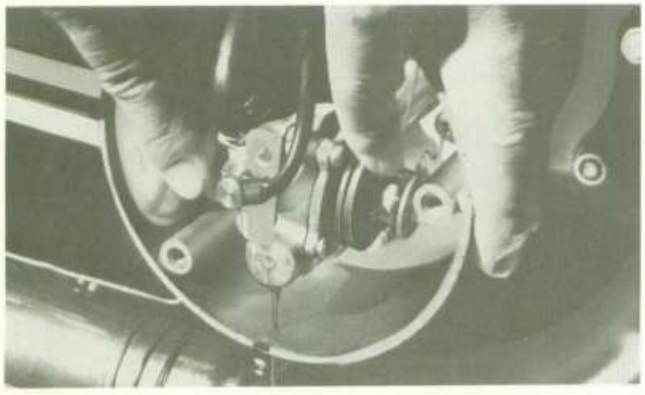


Fig. 2-28

f. Re-install bleed screw and pump cover.

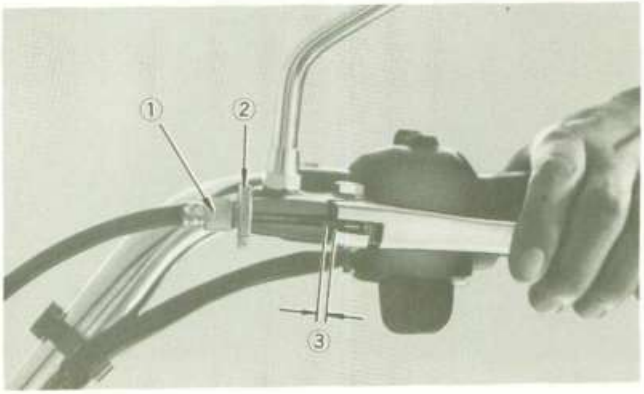
E. Clutch Adjustment

The clutch push lever is so designed that it is positioned behind the push lever axle before it is operated and ahead after it is operated. Therefore, if the clutch push lever does not moves as specified, adjustment is necessary.

Proper clutch adjustment requires two separate procedures.

1. Loosen cable and adjusting screw lock nut.

2. Turn clutch cable adjustor (at lever) all the way into the lever.



1. Adjuster
2. Adjusting screw lock nut
3. 0.07 — 0.12 in. (2 — 3 mm.)

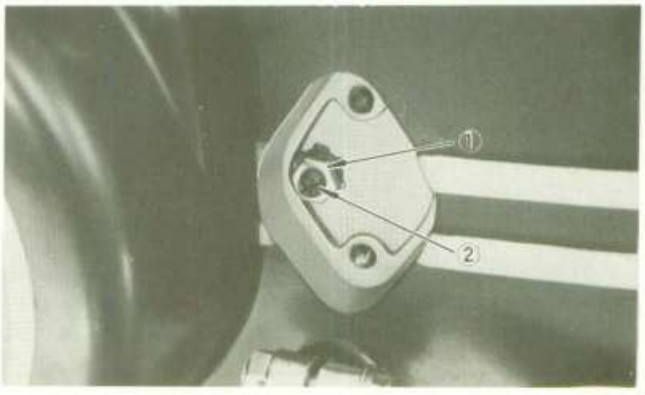
Fig. 2-29

Note:

The above procedure provides for maximum cable free play to allow for proper clutch actuating mechanism adjustment.

3. Remove the cap cover.

4. Loosen the adjusting screw lock nut, and slowly tighten the adjusting screw until resistance is felt. This means that the play of the push rod is removed, then back it off a 1/4 turn.



1. Adjusting screw lock nut
2. Adjusting screw

Fig. 2-30

5. Tighten lock nut.

6. At clutch lever assembly, on left handlebar, turn cable length adjustor in or out until free play at lever pivot equals 0.07 — 0.12 in. (2 — 3 mm.)

7. Tighten adjusting bolt lock nut.

8. Re-install cap cover.

F. Transmission and Shifter

1. Transmission

a. The dip stick is located above and slightly in front of the kick crank. To check level, start the engine and let it run for several minutes to warm and distribute oil. Unscrew the dip stick and clean. Set the dip stick as illustrated. Remove and check level.

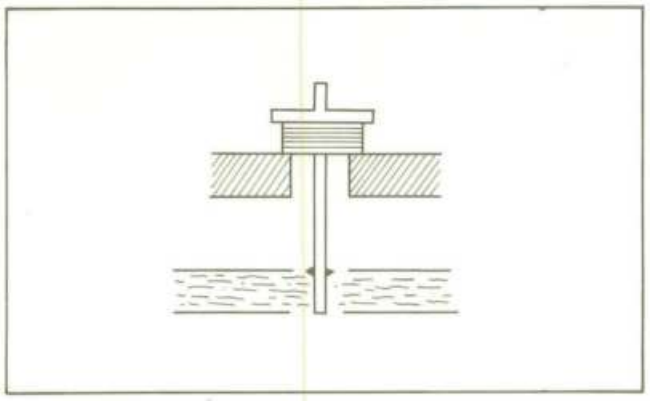


Fig. 2-31



Fig. 2-32

Note:

Machine must be in level position during above measurement.

b. The stick has Minimum and Maximum marks. The oil level should be between the two. Top off as required.

Recommended Oil: Yamalube 4-cycle

c. A drain bolt is located on the bottom of the crankcase. With the engine warm, remove the plug and drain oil. Re-install plug and add fresh oil.

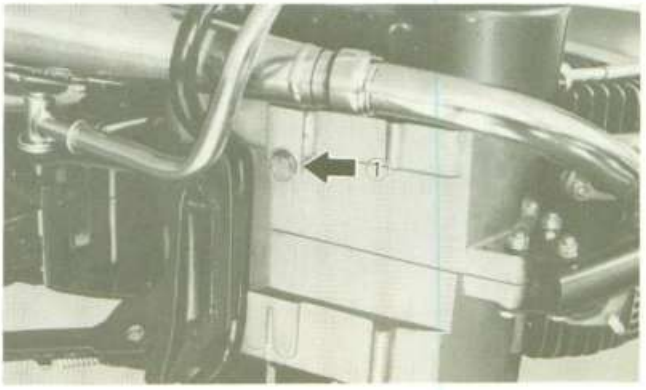
Transmission Drain Plug Torque: 174 — 217 in-lbs. (2.0 — 2.5 m-kgs.)

Transmission Oil Quantity: 800 — 850 c.c.

Transmission oil should be replaced several times during the break-in period. If the unit is used for competition, oil replacement should also be made as often as possible. See Maintenance Chapter.

Caution:

Under no circumstances should any additives be included in the transmission oil. This oil also lubricates and cools the clutch. Many additives will cause severe clutch slippage.



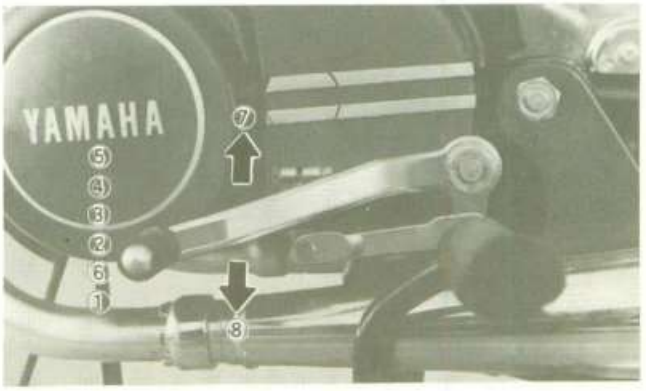
1. Drain bolt

Fig. 2-33

2. Shifting

A 5-speed transmission is employed. Low gear is at the bottom of the shift pattern; high gear at the top of the shift pattern; neutral is located half-way between first and second positions.

The shift mechanism is of the ratcheting type common to most motorcycles. Allow the lever to return to its "at rest" position prior to selecting another gear. Neutral is selected by pulling up or depressing on the shift lever half-way between first and second gears.



1. First
2. Second
3. Third
4. Fourth
5. Fifth
6. Neutral
7. Acceleration
8. Reduction

Fig. 2-34

With the engine running in the neutral position, disengage the clutch (pull in clutch lever), press down on the shift lever until low gear is engaged, remove foot from shift lever, increase engine speed slightly, slowly release clutch lever while advancing throttle. Repeat procedure for remaining gears.



Fig. 2-35

2-3. Chassis Adjustments

A. Front Brake & Wheel

Front brake should be adjusted to suit rider preference with a minimum cable slack of 0.20 — 0.32 in. (5 — 8 mm.) play at the brake lever pivot point.

1. Loosen lock nut on front brake actuating cam connecting rod.

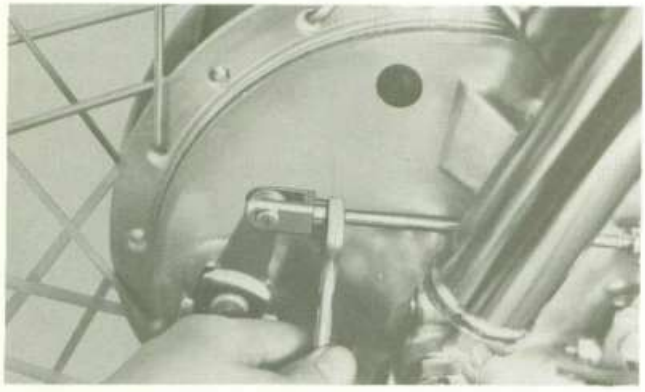


Fig. 2-36

2. Actuate front brake lever

3. Turn connecting rod, forcing camshaft levers 1 and 2 out, towards wheel rim, until all slack is removed and rod is fairly tight. Tighten rod lock nut.

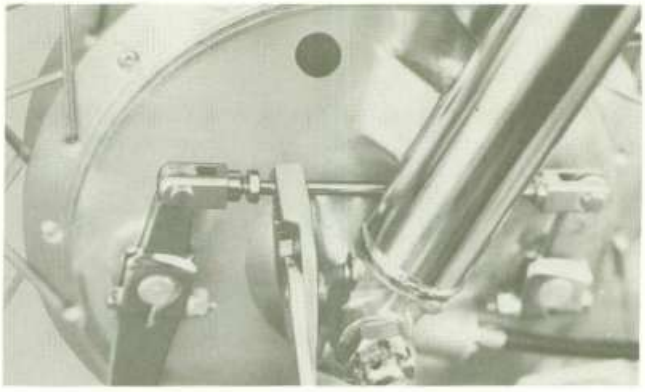
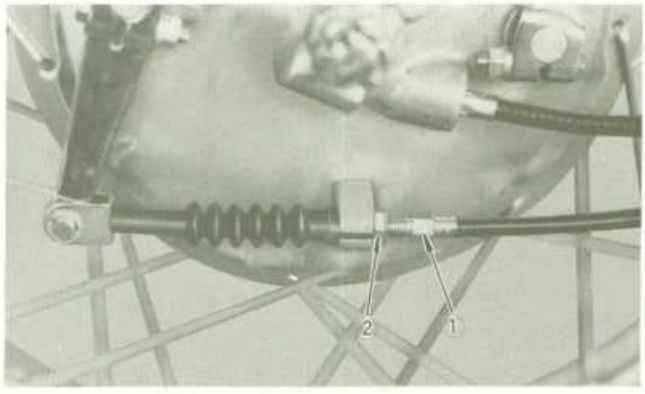


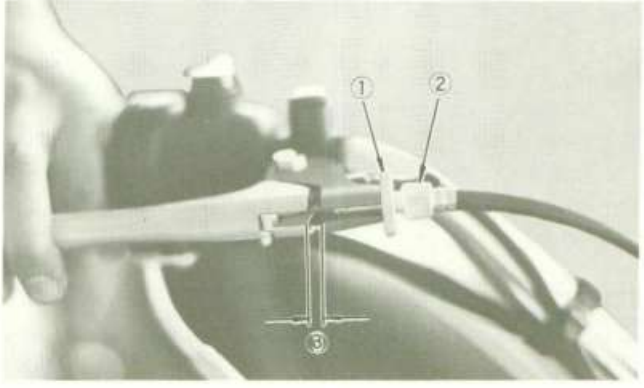
Fig. 2-37

4. Using cable length adjustor at lever and/or at front wheel hub, adjust cable length until there is a 0.20 — 0.32 in. (5 — 8 mm.) free play at lever pivot point.



1. Adjusting bolt
2. Lock nut

Fig. 2-38



1. Lock nut
2. Adjusting bolt
3. 0.20 — 0.32 in. (5 — 8 mm.)

Fig. 2-39

5. Tighten the adjusting bolt lock nut.

6. Raise the wheel off the ground. Spin. Check rim runout.

Rim Runout Limits	
Vertical	0.08 in. (2 mm.)
Lateral	0.08 in. (2 mm.)

7. Check each spoke for tightness.

Spoke Torque	
Front Wheel	25 in-lbs. (0.3 m-kg.)
Rear Wheel	25 in-lbs. (0.3 m-kg.)

Note:

If loose spokes are found, tighten. Repeat step 4.

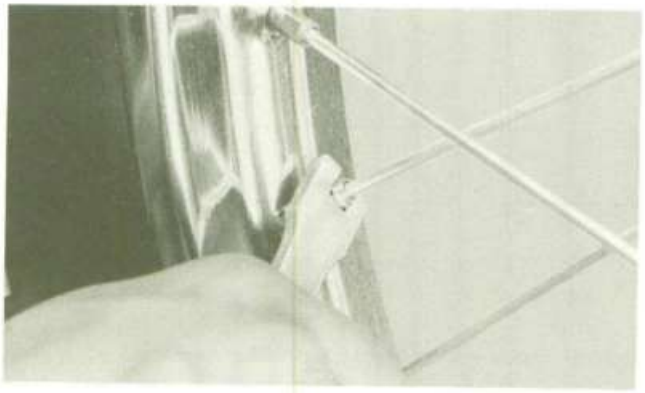


Fig. 2-40

8. Check axle nut

Front Axle Nut Torque:
570 — 910 in-lbs. (6.6 — 10.5 m-kgs.)

9. Check fork pinch bolt

Pinch Bolt Torque:
139 — 226 in-lbs. (1.6 — 2.1 m-kgs.)

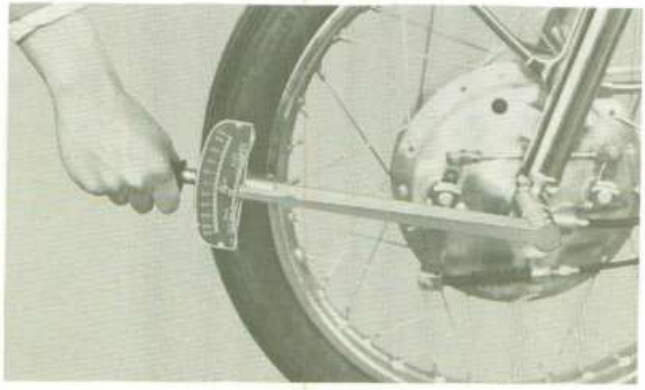
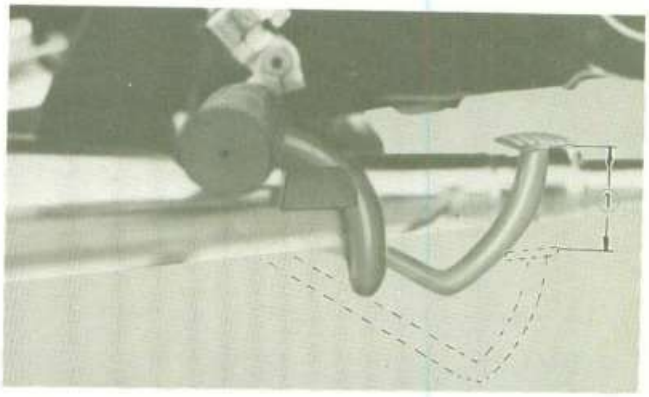


Fig. 2-41

B. Rear Brake & Wheel

Adjust rear brake pedal play to suit, providing a minimum of 25 mm. free play. Adjustment is accomplished as follows:

1. Using a 13 mm. wrench, turn the adjusting nut on the rear brake ferrule in or out until brake pedal free play is suitable (25 mm. minimum free play).



1. 1.0 in. (25 mm.)

Fig. 2-42

Note:

Rear brake pedal adjustment must be checked whenever chain is adjusted or rear wheel is removed and then re-installed.

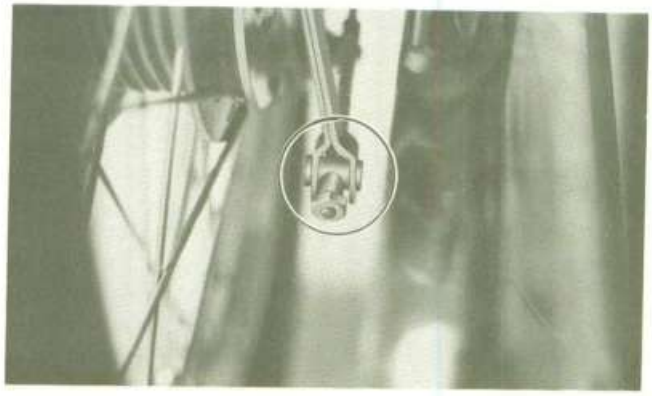


Fig. 2-43

2. Adjust rear wheel spoke tension per front wheel instructions.

C. Drive Chain Adjustment

To adjust drive chain, proceed as follows:

1. Remove rear axle cotter pin

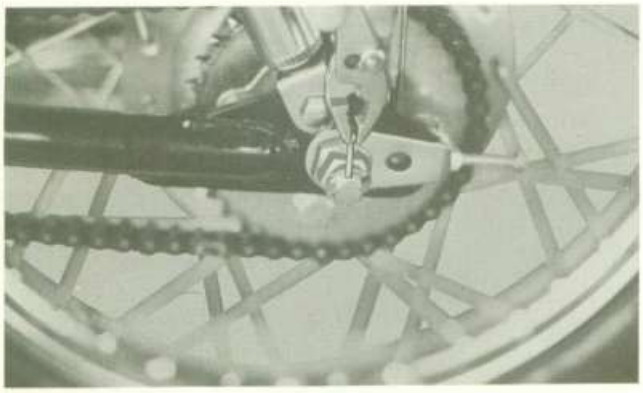
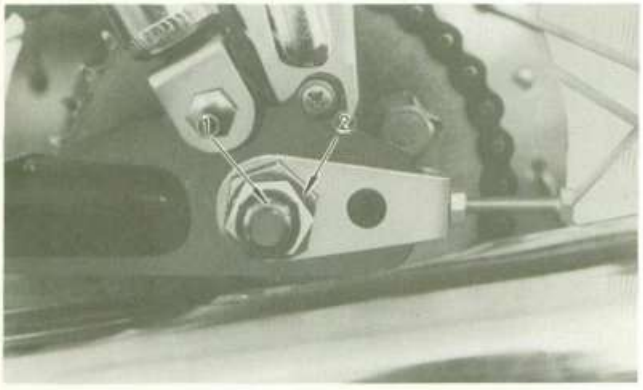


Fig. 2-44

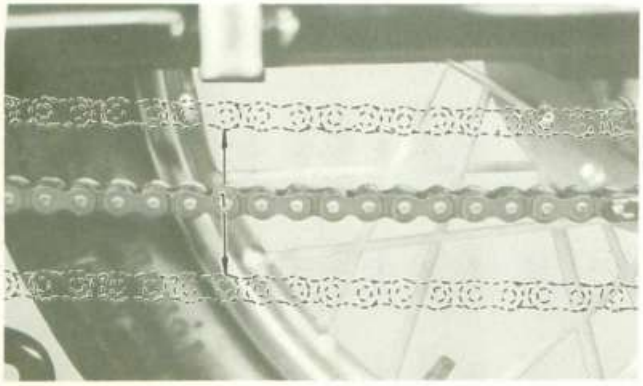
2. Loosen rear axle securing nut and sprocket shaft nut.



1. Rear axle securing nut
2. Sprocket shaft nut

Fig. 2-45

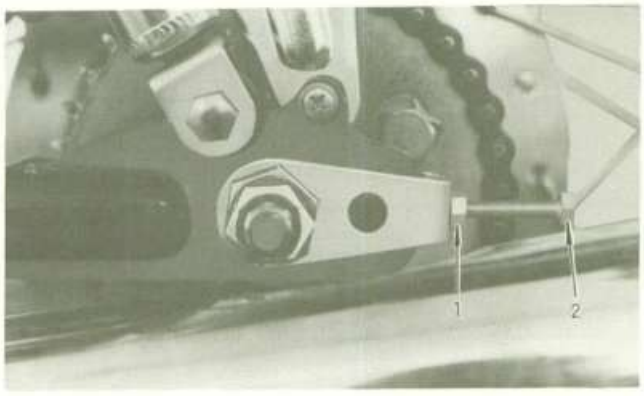
3. With rider in position on machine, both wheels on ground, set axle adjustors until there is 15 to 20 mm. slack in the drive chain at the bottom of the chain at a point midway between the drive and driven axles.



1. 0.6 — 0.8 in. (15 — 20 mm.)

Fig. 2-46

4. Turn adjustors both left and right, until axle is situated in same positions as shown by position marks on swing arm axle tabs.



1. Lock nut
2. Adjuster

Fig. 2-47

5. Tighten the rear axle securing nut.

Axle Nut Torque:
570 — 910 in-lbs. (6.6 — 10.5 m-kgs.)

6. Install a new cotter pin, bend the ends over. Cut off excess.

D. Suspension, Steering & Swing Arm

1. Steering head adjustment
   The steering assembly should be checked periodically for any looseness. Do this as follows:

a. Block machine up so that front wheel is off the ground.

b. Grasp bottom of forks and gently rock fork assembly backward and forward. Checking for any looseness in the steering assembly bearings.



Fig. 2-48

c. If steering head needs adjustment, loosen crown nut.

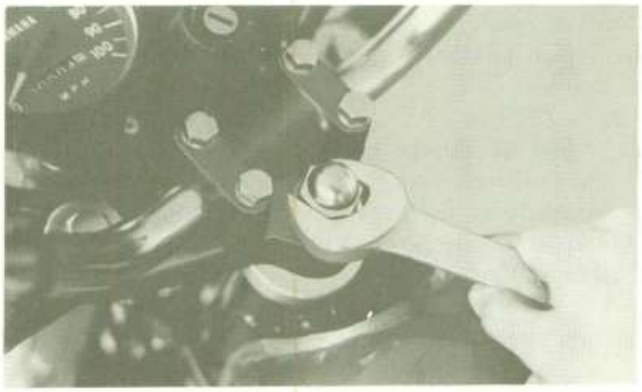


Fig. 2-49

d. Using steering nut wrench, adjust steering head fitting nut until steering head is tight without binding when forks are turned.

Note:

Excessive tightening of this nut will cause rapid wear of ball bearings and races.

Re-check for looseness and freedom of movement.

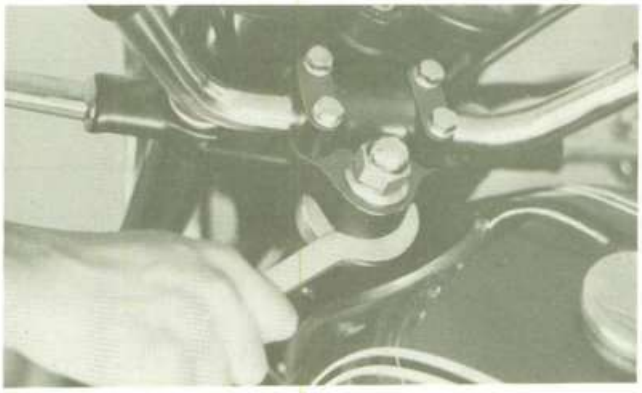


Fig. 2-50

e. Tighten crown nut.

Note:

After completing steering adjustment, make certain forks pivot from stop to stop without binding. If binding is noticed, repeat adjustment.

2. Suspension

a. Check all suspension for proper operation.
Check rear cushions (R & L) for identical adjustment.

b. Check all securing bolts for proper tightness.

3. Swing arm

a. Check for freedom of up and down movement.

b. Check side to side free play.

Swing Arm Free Play:
0.040 in. (1.0 mm.) at end of swing arm

c. Check all securing bolts for proper tightness.

E. Miscellaneous

1. Check for proper cable routing of all components. See cable routing diagrams in appendices section of this manual.

2. Check for proper control location.

3. Check securing bolts on controls for proper tightness.

2-4. Miscellaneous

A. Gasoline and Oil

1. Gasoline

Use gasoline with an octane rating of 86 or more. Some regular gasolines and most midrange gasolines have such ratings. High-test or Ethyl grade gasolines usually have octane ratings in excess of 94. In addition, they often have considerable tetra-ethyl lead added, which can cause spark plug problems. Always use fresh, name-brand gasoline....

Low-lead or unleaded gasolines are suitable provided they meet the minimum (86 or more) octane requirements.

Caution:

With the Autolube feature it is unnecessary and even harmful to the engine to mix oil with the gasoline. Never mix oil with the gasoline. Always use straight gasoline.

2. Oil

a. Autolube Oil

We recommend that your first choice be "Yamalube 2-cycle" which can be purchased from any Authorized Yamaha Dealer. If for any reason you should use another type, the oil should meet or exceed BIA certification "TC-W". Check container top or label for service specification. If above oils are not available, use a 30 or 40 wt. 2-stroke oil.

Caution:

Under extremely cold conditions (+32 degrees Fahrenheit or below) 30 wt. and 40 wt. oils become very thick and will not flow readily to the Autolube pump. This may cause oil pump starvation. "Yamalube" will flow normally to the pump at ambient temperatures down to zero degrees Fahrenheit.

Note:

See transmission section for proper oil to use.

b. Autolube tank

Always check Autolube tank oil level before operating machine. If oil level shows at sight glass window:

1) Raise seat
2) Remove filler cap and top off tank.

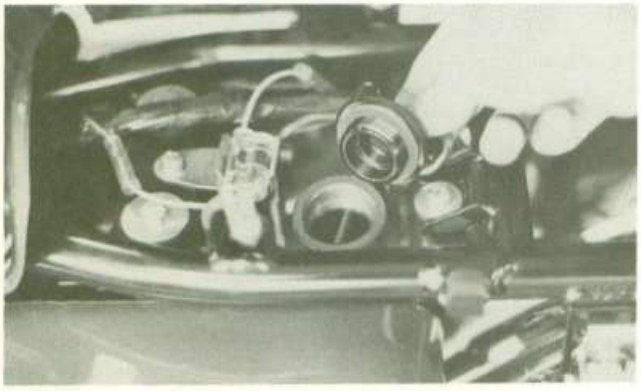


Fig. 2-51

B. Break-in

You must not put an excessive load on the engine during the first ten to twenty hours of operation.

If speedometer mileage is maintained, use the following break-in procedure:

0 to 100 miles:

Avoid operation above one half throttle. (4000 r.p.m.)

100 to 250 miles:

Avoid full throttle operation. Allow the motorcycle to run freely through the gears but do not use full throttle at any time. Avoid prolonged operation above 5,000 r.p.m.

250 to 500 miles:

Avoid prolonged full throttle operation. Avoid cruising speeds in excess of one half throttle or 6,000 r.p.m. Vary speeds occasionally.

500 miles and beyond:

Avoid prolonged full throttle operation. Avoid speeds in excess of r.p.m. red line. Vary speeds occasionally.

Note:

See owner's warranty guidebook for complete warranty information.

C. Pre-operation Check Chart

Item	Routine	Page
Brakes	Check operation/adjustment	26 — 27
Clutch	Check operation/lever adjustment	24
Autolube Tank	Check oil level/top-off as required	30
Transmission	Check oil level/top-off as required	25
Drive Chain	Check alignment/adjustment/lubrication	28, 29
Spark Plugs	After break-in, check color condition weekly/500 miles	96, 97
Throttle	Check for proper throttle and Autolube cable operation	—
Air Filters	Foam type must be clean and damp with oil at all times	20 — 22
Wheels/Tires	Check pressure/runout/spoke tightness/axle nuts	114 — 120
Fittings/Fasteners	Check and tighten as necessary	—

Pre-operation checks should be made each time the machine is used. Such an inspection can be thoroughly accomplished in a very short time; and the added safety it assures is more than worth the time involved.

D. Cleaning and Storage

1. Cleaning

Frequent thorough cleaning of your motorcycle will not only enchance its appearance but will improve general performance and extend the useful life of many components.

a. Before cleaning the machine:
   1) Block off end of exhaust pipe to prevent water entry; a plastic bag and strong rubber band may be used.
   2) Remove air cleaner or protect it from water with plastic covering.
   3) Make sure spark plugs, gas tank cap, oil tank cap, transmission oil level gauge cap and battery caps are properly installed.

b. If engine case is excessively greasy, apply degreaser with a paint brush. Do not apply degreaser to chain, sprockets, or wheel axles.

c. Rinse dirt and degreaser off with garden hose, using only enough hose pressure to do the job. Excessive hose pressure may cause water seepage and contamination of wheel bearings, front forks, brake drums, and transmission seals.

   Many expensive repair bills have resulted from improper higy-pressure detergent applications such as those available in coin-operated car washers.

d. Once the majority of dirt has been hosed off, wash all surfaces with warm water and mild, detergent-type soap. An old tooth brush or bottle brush is handy to reach those hard-to-get-to places.

e. Rinse machine off immediately with clean water and dry all surfaces with a chamois skin, clean towel, or soft absorbent cloth.

f. Immediately after washing, remove excess moisture from chain and lubricate to prevent rust.

g. Chrome-plated parts such as handlebars, rims, spokes, forks, etc., may be further cleaned with automotive chrome plate.

h. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.

i. Automotive-type wax was may be applied to all painted and chrome-plated surfaces. Avoid combination cleaner-waxes.

   Many contain abrasives which may mar paint or protective finish on fuel and oil tanks.

j. After finishing, start the engine immediately and allow to idle for several minutes.

2. Storage

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

a. Drain fuel tank, fuel lines, and carburetor float bowl(s).

b. Remove empty fuel tank, pour a cup of 10W to 30W oil in tank, shake tank to coat inner surfaces thoroughly and drain off excess oil. Reinstall tank.

c. Remove spark plugs, pour about one tablespoon of 10W to 30W oil in spark plug holes and reinstall spark plugs.

   Kick engine over several times (with ignition off) to coat cylinder walls with oil.

d. Remove drive chain. Clean thoroughly with solvent and lubricate with graphite-base chain lubricant. Reinstall chain or store in a plastic bag (tie to frame for safe-keeping).

e. Lubricate all control cables.

f. Remove battery and charge. Store in a dry-cool place and re-charge once a month. Do not store battery in an excessively warm or cold place (less than 32° F or more than 90° F).

g. Block up frame to raise both wheels off ground. (Main stands can be used on machines so equipped.)

h. Deflate tires to 1.5 psi.

i. Tie a plastic bag over exhaust pipe outlets to prevent moisture from entering.

   If storing in humid or stale-air atmosphere, coat all exposed metal surfaces with a light film of oil. Do not apply oil to rubber parts or seat cover.

j. During long-term storage, it is beneficial to periodically (every 15 — 20 days) crank the engine several times to re-distribute the oil film over internal engine parts.

MEMO

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CHAPTER 3. ENGINE, CLUTCH AND TRANSMISSION

3-1. Special Tools

A. Press Box
P/N 90890-02202

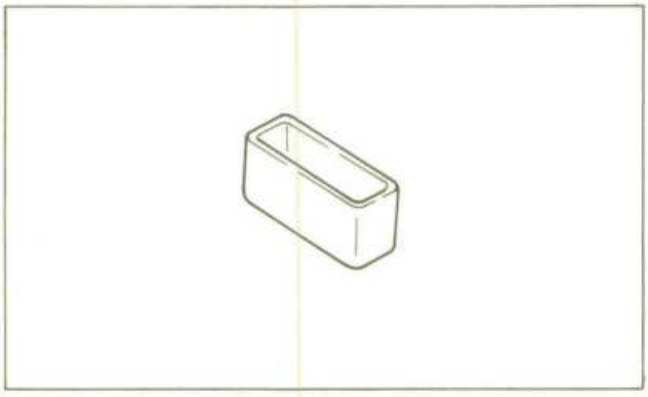


Fig. 3-1

B. Crankshaft Jig
P/N 90890-02300

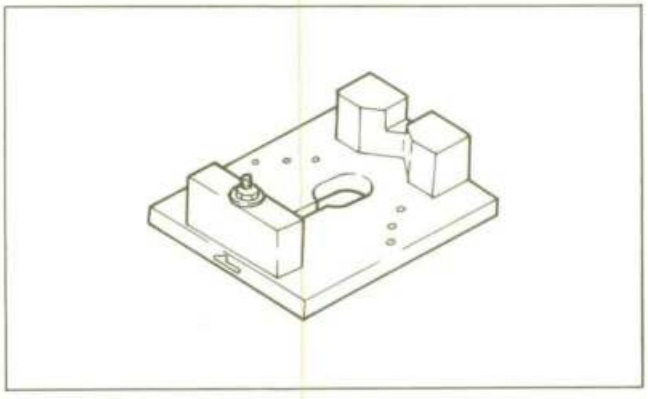


Fig. 3-2

C. Press Pin
P/N 90890-02203

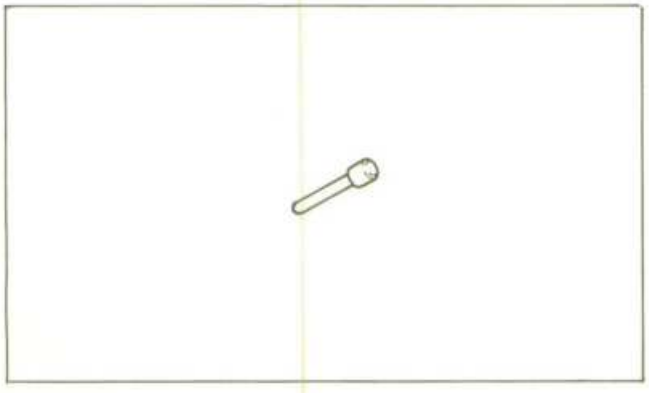


Fig. 3-3

D. Support Plates (2/Set)
P/N 90890-02204

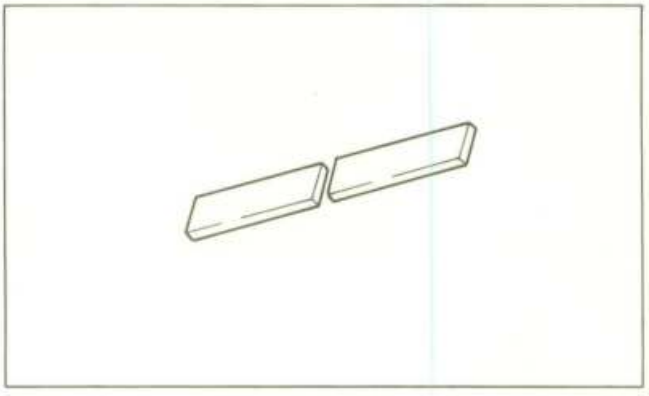


Fig. 3-4

E. Wedge
P/N 90890-02205

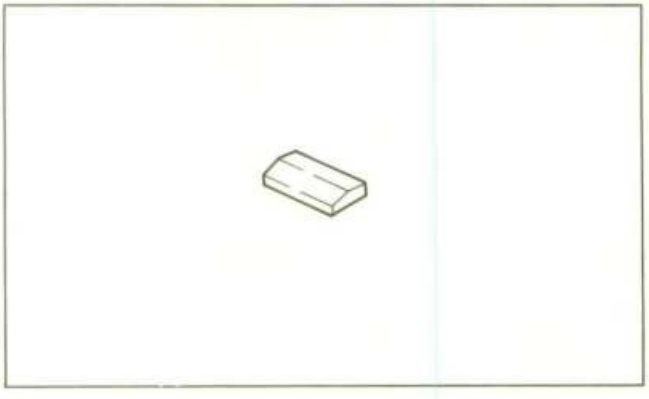


Fig. 3-5

F. Stops - 47 mm.
P/N 90890-02209

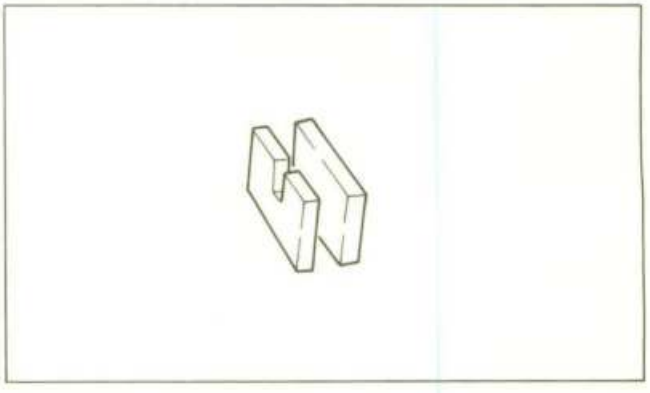


Fig. 3-6

G. Crankshaft Separator
P/N 90890-02101

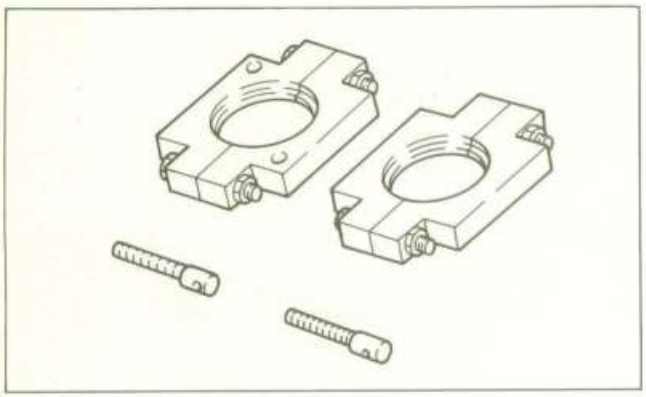


Fig. 3-7

H. Crank Setting
P/N 90890-01012

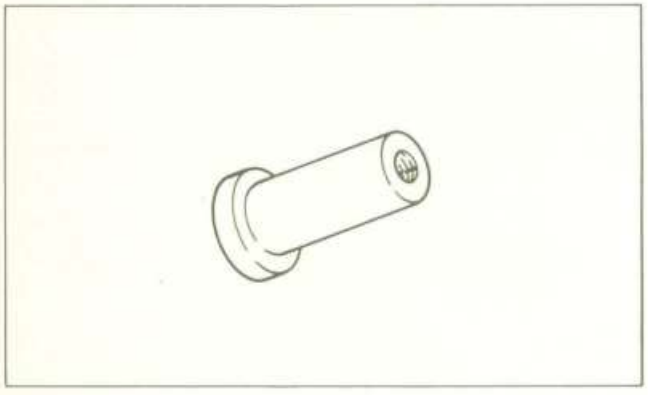


Fig. 3-8

I. Crank Setting Bolt
P/N 90890-01015

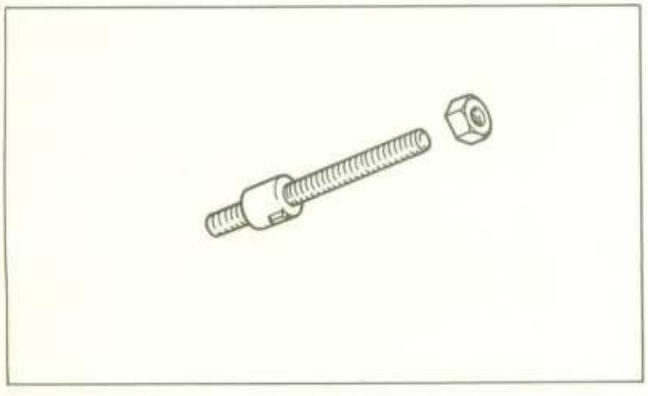


Fig. 3-9

J. Clutch Holder
P/N 90890-01022

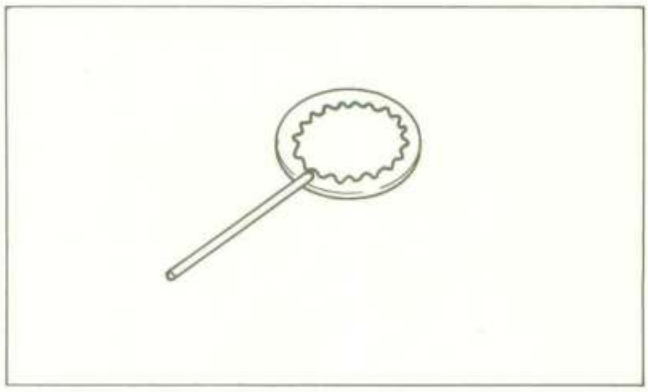


Fig. 3-10

K. Crankcase Separating Tool
P/N 90890-01011

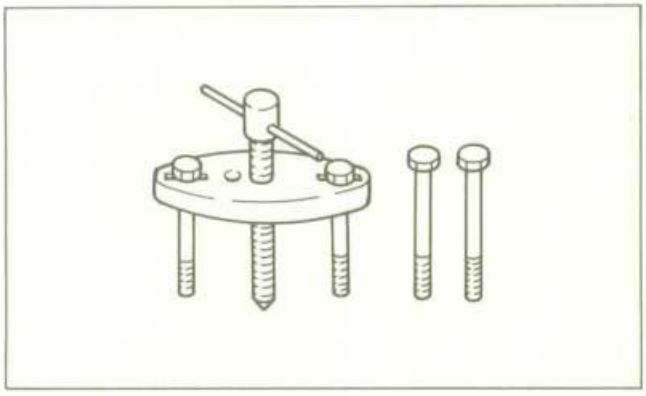


Fig. 3-11

L. Armature Puller
P/N 90890-01036

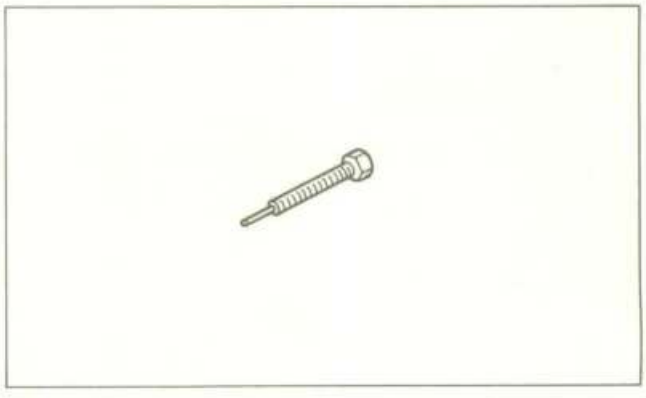


Fig. 3-12

M. Armature Shock Puller and Weight
P/N 90890-01049
P/N 90890-01050

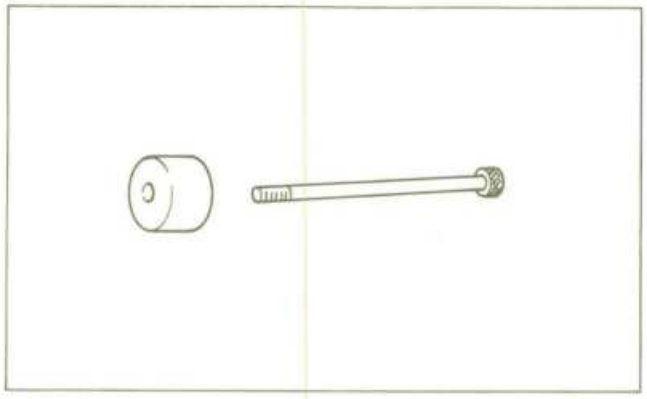


Fig. 3-13

3-2. Description

The RD200A engine have been designed with emphasis on high speed road riding. The incorporation of the evenly spaced five-speed transmission and seven-port Torque Induction system insures complete riding versatility for the owner. The width, height, and weight of the engine have 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.

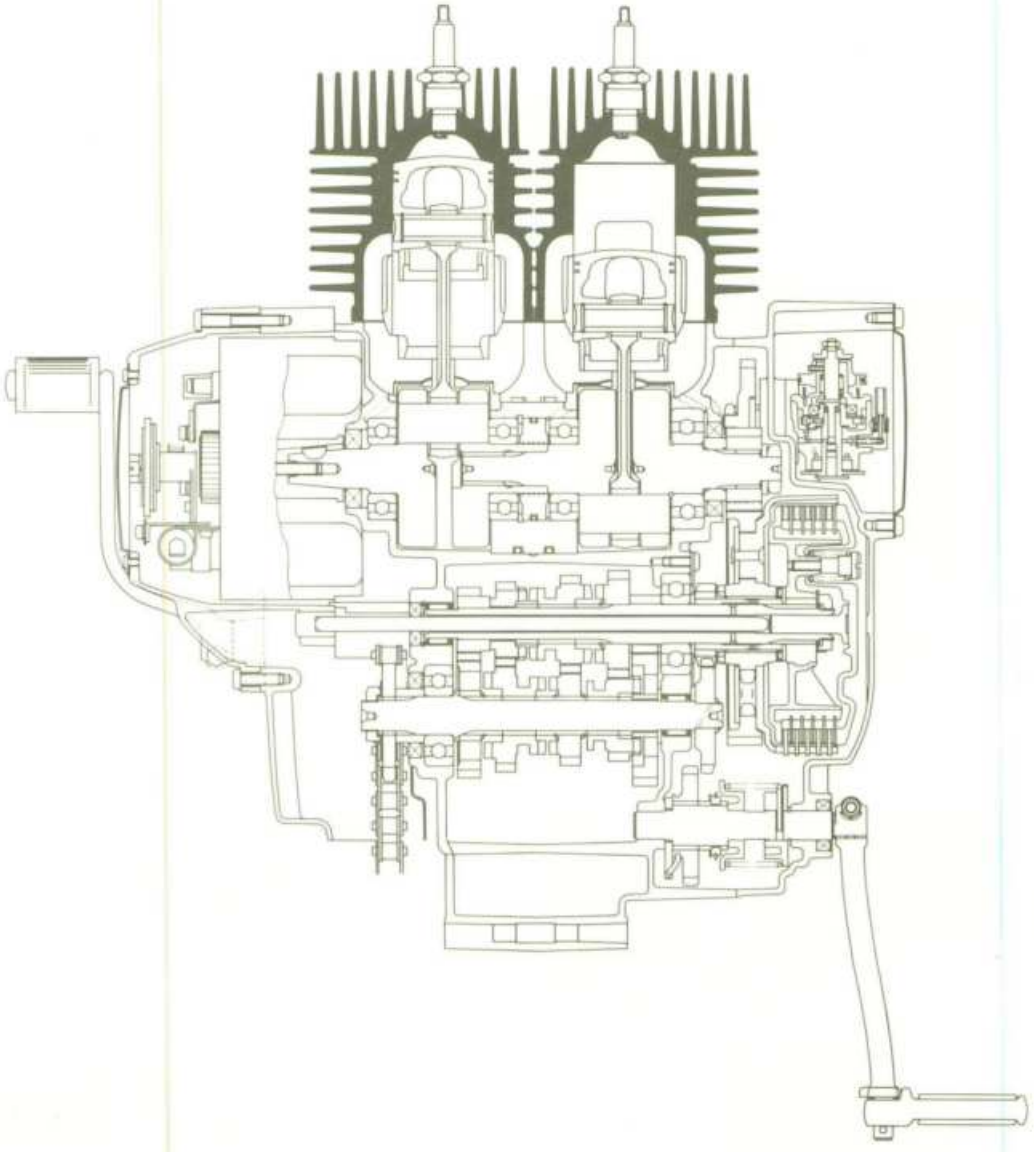


Fig. 3-14

3-3. Engine Removal

A. Preparation for Removal and Disassembly

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 reinstallation of all engine parts.
4. Start the engine and warm it for a few minutes; turn off and drain transmission oil.

Transmission Oil	
Volume	800 — 850 c.c.
Type	Yamalube 4-cycle

B. Removal

1. Remove the right and left muffler.

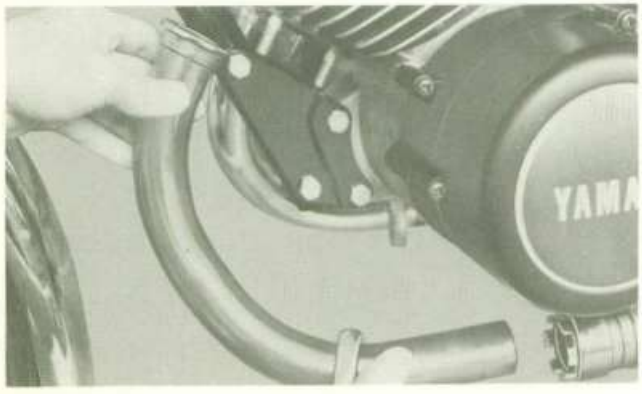
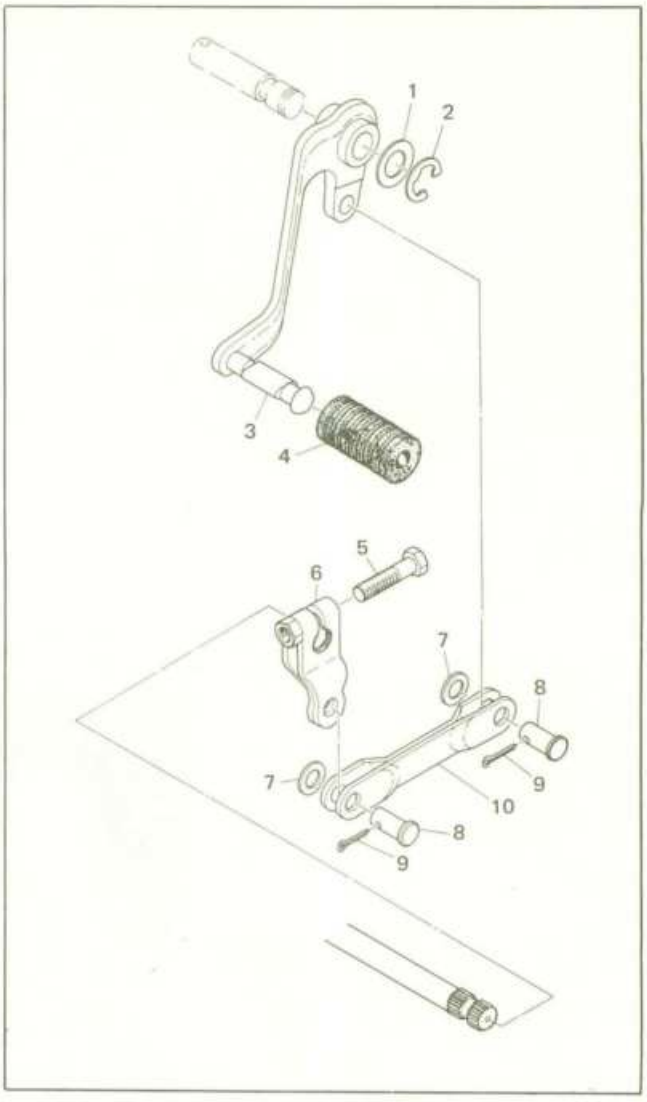


Fig. 3-15

2. Remove the foot rest change pedal with change rod.



Fig. 3-16



1. Washer (12-5-22-1.6)
2. Circlip (E-10)
3. Change pedal
4. Change pedal cover
5. Bolt
6. Change arm
7. Washer (8.2-14-1.0)
8. Joint pin
9. Cotter pin
10. Change rod

Fig. 3-17

3. Remove the left crankcase cover.



Fig. 3-18

4. Remove the clutch wire end from push lever.

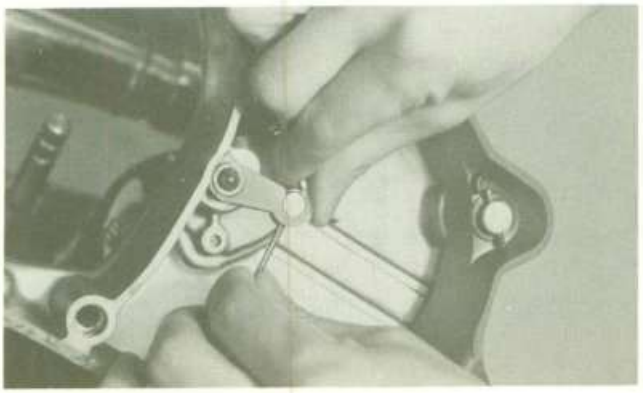


Fig. 3-19

5. Remove the neutral switch lead wire by loosening the neutral switch screw.

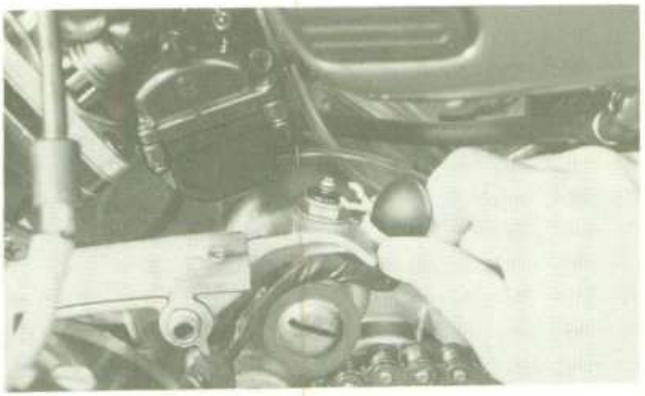


Fig. 3-20

6. Remove the wire harness.

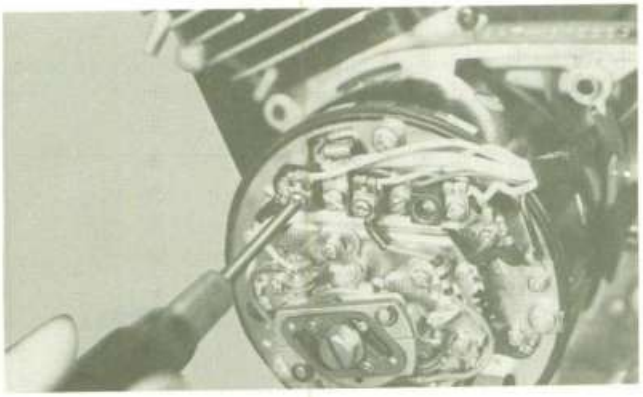


Fig. 3-21

7. Remove the oil pump cover.

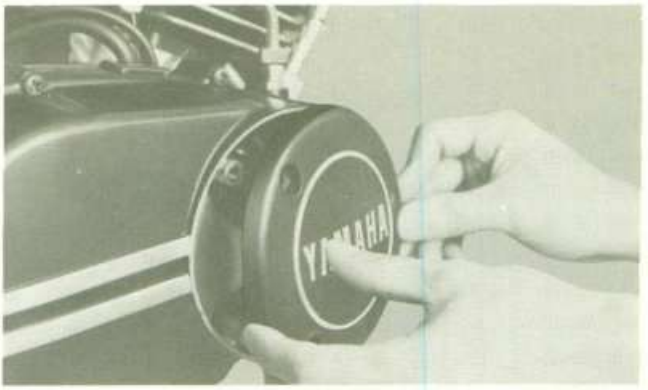


Fig. 3-22

8. Remove the oil line from the oil tank bottom, and plug the oil tank outlet to prevent oil from flowing out.

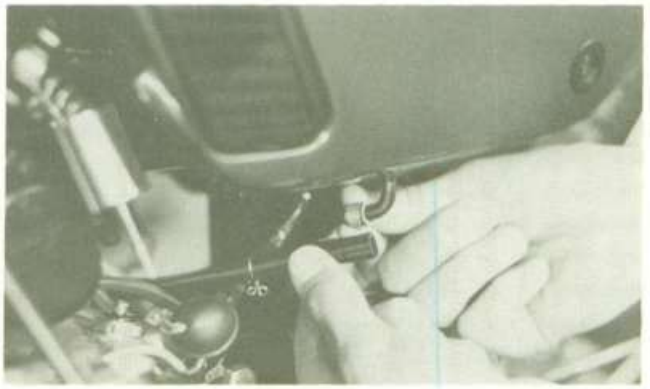


Fig. 3-23

9. Rotate the pump pulley to a full throttle position and remove the cable end from pulley seat.



Fig. 3-24

10. Loosen the 10 mm. lock nut holding the autolube pump cable adjusting bolt to the side case. Remove the adjusting bolt and cable complete.



Fig. 3-25

11. Remove spark plug cap lead wires.

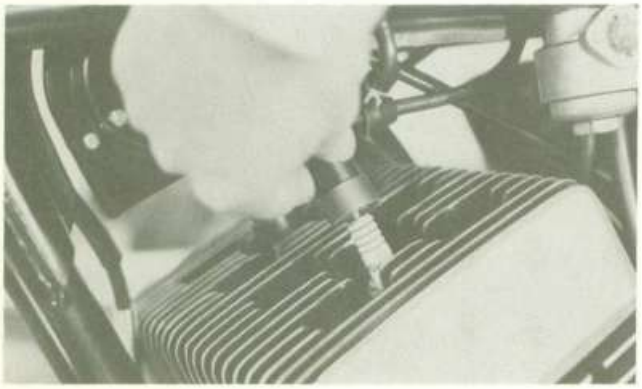


Fig. 3-26

12. Disconnect the tachometer cable.



Fig. 3-27

13. To ease sprocket and distance collar removal, proceed as follows:
    a. Bend down lock tab.
    b. Put transmittion in gear.
    c. Apply rear brake

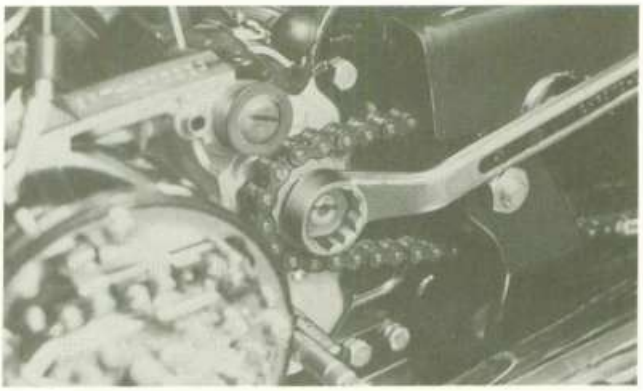


Fig. 3-28

d. Remove sprocket securing nut.

Drive sprocket securing nut torque:
610 — 780 in-lbs. (7.0 — 9.0 m-kg.)

14. Drive chain
    a. Disconnect the master link and remove the chain.

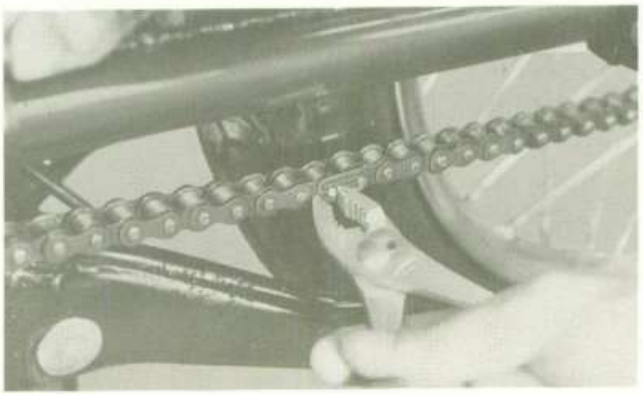
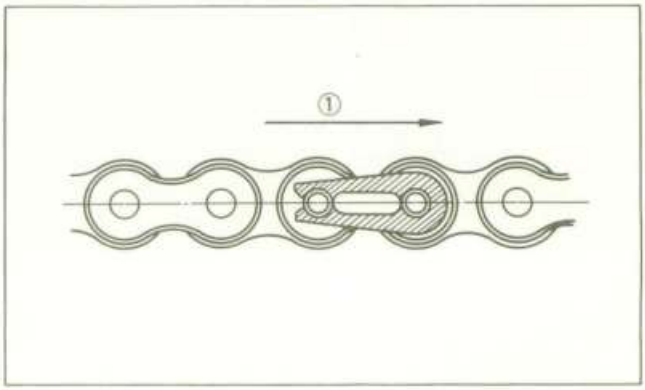


Fig. 3-29

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



1. Driving direction

Fig. 3-30

c. After replacing, adjust the chain free play to 0.6 — 0.8 in. (15 — 20 mm.) total at the center of the lower section with the rear wheel on the ground, rider in position. (See Chassis Adjustments)

15. Carburetor
a. Loosen the air cleaner join bands.
b. Remove the mixing chamber caps and slide assembly.

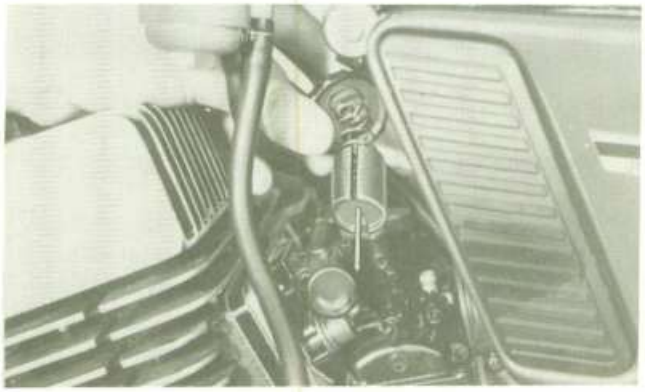


Fig. 3-31

16. Disconnect the fuel line and level pipe and remove the fuel tank.

Note:

Lift up rear of tank and slide back. During installation, note routing of all wires and cables. Install carefully to avoid disturbing routing of wires.



Fig. 3-32

17. Remove the six engine mounting bolts and engine stays.

Tightening Torque	
Bolt Size	Torque
8 mm.	217 — 304 in-lbs. (2.5 — 3.5 m-kgs.)

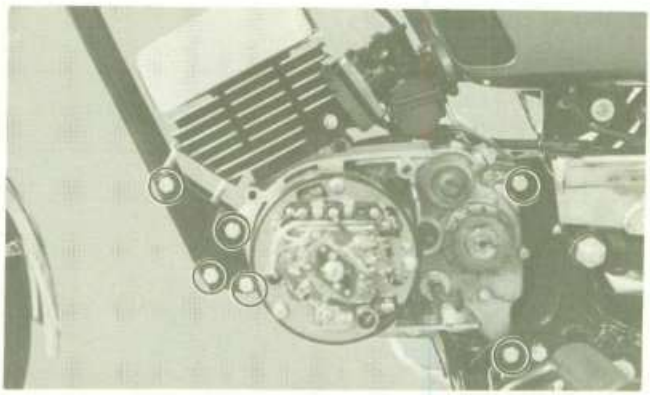


Fig. 3-33

18. Remove the engine from the frame.

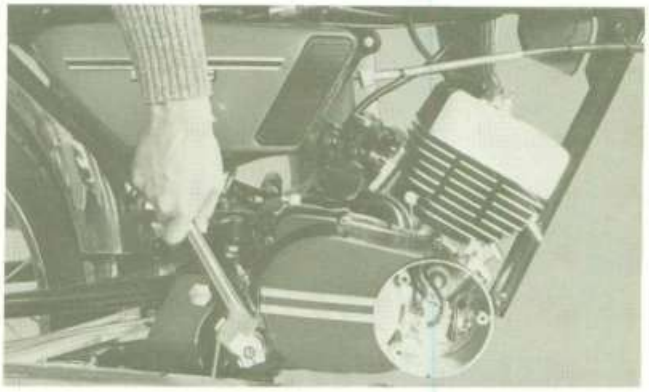


Fig. 3-34

C. Installation

1. Reverse the foregoing procedure.
2. Pay particular attention to cable and wire routing and proper torque on fasteners and fittings.
3. See 2-2, Engine Tuning, for proper setup procedure.

3-4. Cylinder Heads

Cylinder head volume (c.c.) (one cylinder)	12.2 ± 0.25

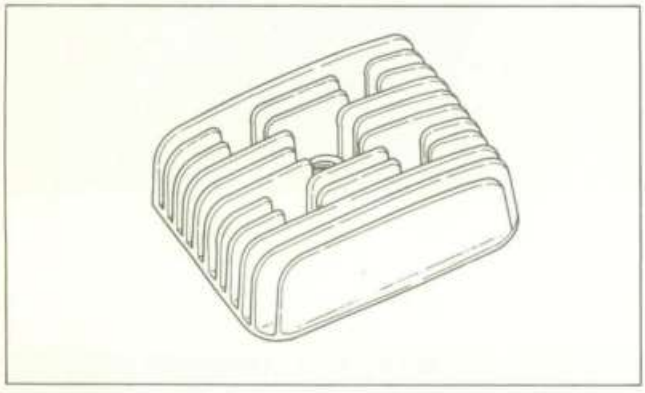


Fig. 3-35

A. Removal

1. Remove the carburetor securing bolts. Remove the carburetors with carburetor packings.

Note:

Replace the carburetor packings during reassembly.

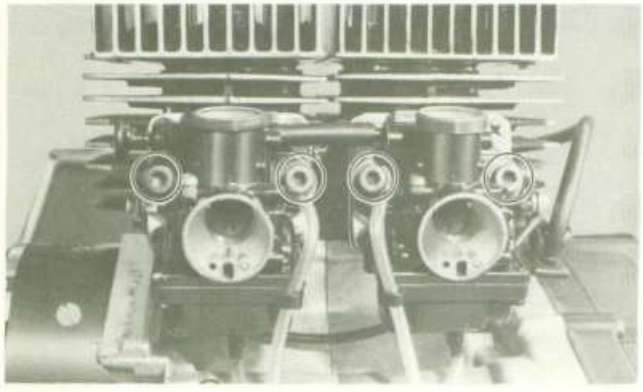


Fig. 3-36

2. Remove nuts (8) holding cylinder head to cylinder. Remove cylinder heads and gaskets.

Note:

Break each nut loose (1/4 turn) prior to removing any one nut.

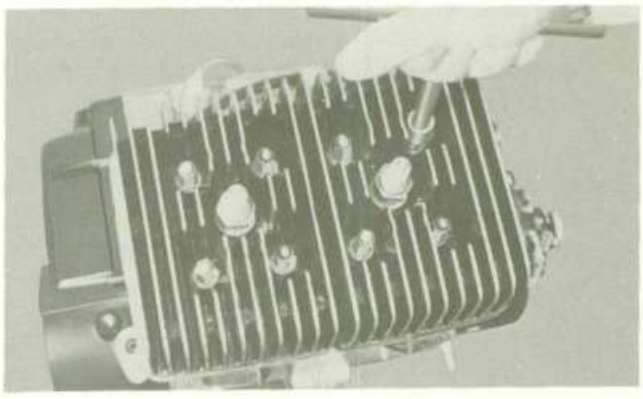


Fig. 3-37

B. Maintenance — Cylinder Head

1. Remove spark plugs.
2. Using a rounded scraper, remove carbon deposits from combustion chamber. Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the aluminum.

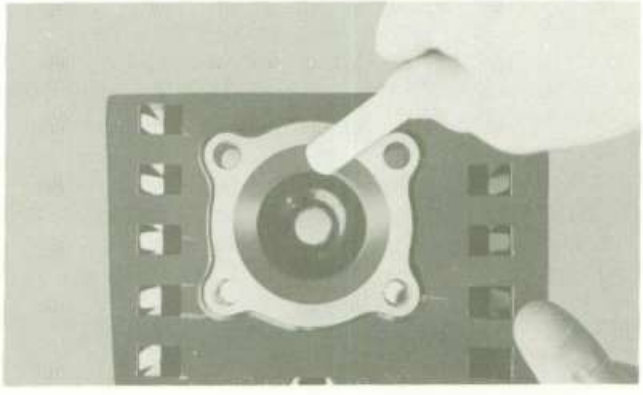


Fig. 3-38

3. Place head on a surface plate. There should be no warpage. Correct by re-surfaciing. (Place 400-600 grit wet sandpaper on surface plate and re-surface head using a figure-eight sanding pattern. Rotate head several times to avoid removing too much material from one side.)

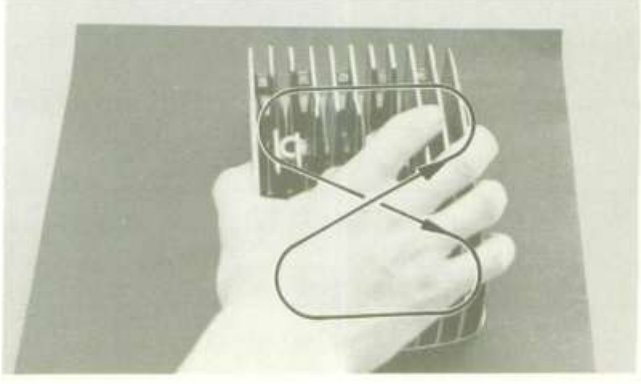


Fig. 3-39

4. Clean spark plug gasket mating surface thoroughly.
5. Wash head in solvent and wipe dry.
6. Install new cylinder head gasket during reassembly.

Cylinder head nut torque:
86.8 in-lbs. (1.0 m-kgs.)

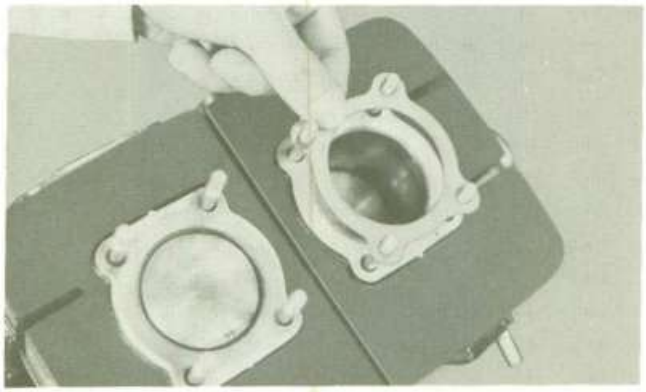
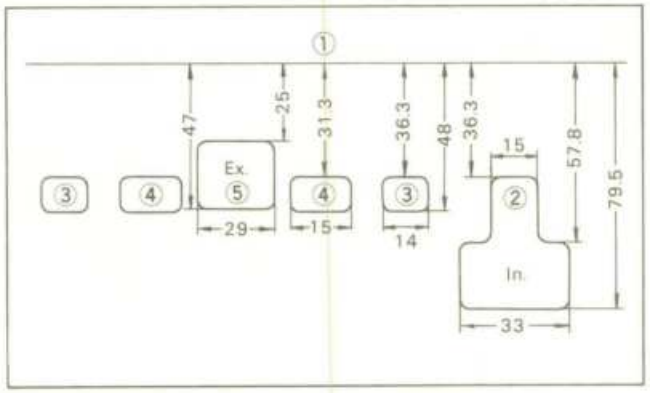


Fig. 3-40

3-5. Cylinder

Cylinder Port Dimensions

Unit: mm.



1. Top of cylinder
2. 7th-port
3. 5th-port
4. Main transfer port
5. Exhaust port
6. Inlet port

Fig. 3-41

A. Removing Cylinder

1. Remove banjo bolts (2) securing oil pump delivery line to cylinder.

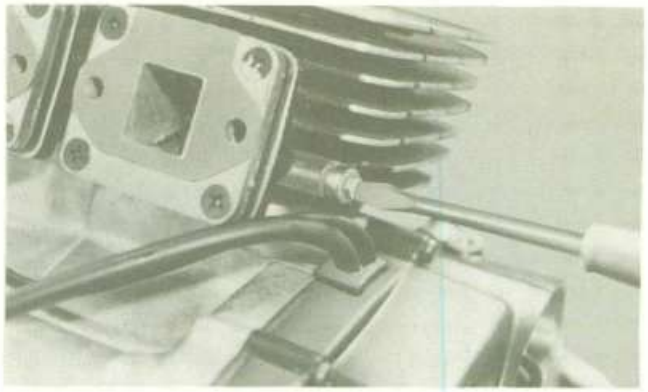


Fig. 3-42

2. If necessary, loosen the cylinder by striking it lightly with a rubber or rawhide hammer.
3. With piston at Top Dead Center, raise cylinder until cylinder skirts clear crankcase. Stuff a clean shop rag into crankcase cavity, around rod, to prevent dirt and other foreign particles from entering. Remove cylinder.

B. Maintenance — Cylinder

1. Remove reed valve assembly.



Fig. 3-43

2. Using a rounded scraper, remove carbon deposits from exhaust port.

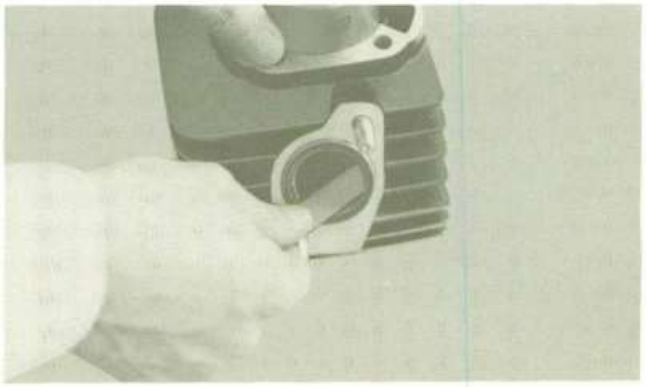


Fig. 3-44

3. Remove cylinder base gasket and clean gasket seat on cylinder and crankcase thoroughly.

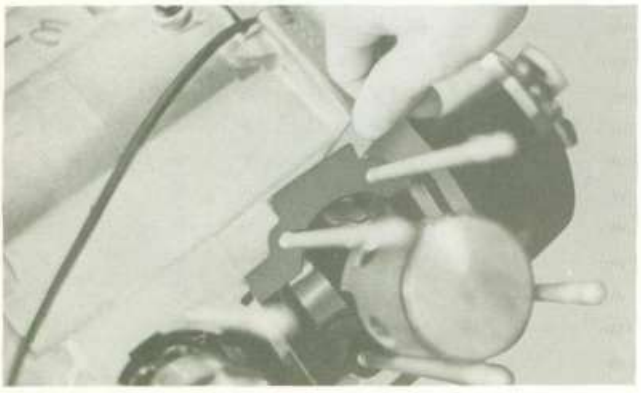


Fig. 3-45

4. Check cylinder bore. Using a cylinder hone, remove any scoring, hone lightly, using smooth stones. Hone no more than required to avoid excessive piston clearance.
5. Using a cylinder gauge set to standard bore size, measure the cylinder. Measure at eight points, at top, center, and 0.4 in. (10 mm.) from bottom of skirts, in line with the piston pin and right angle to pin. Compare minimum and maximum measurements. If over tolerance, and not correctable by honing, rebore to next over-size.

Max. allowable taper:	0.002 in. (0.05 mm.)
Max. allowable out-of-round:	0.0004 in. (0.01 mm.)

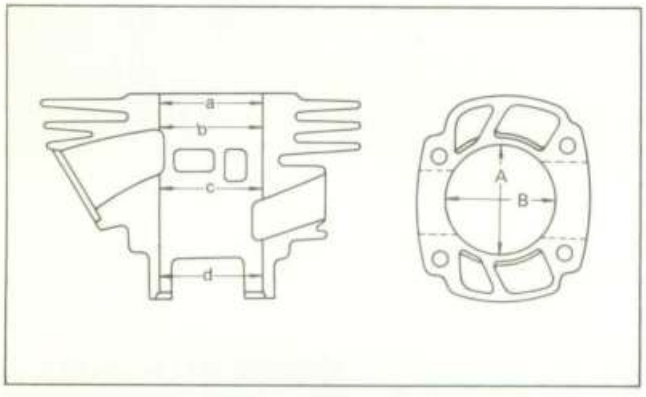


Fig. 3-46

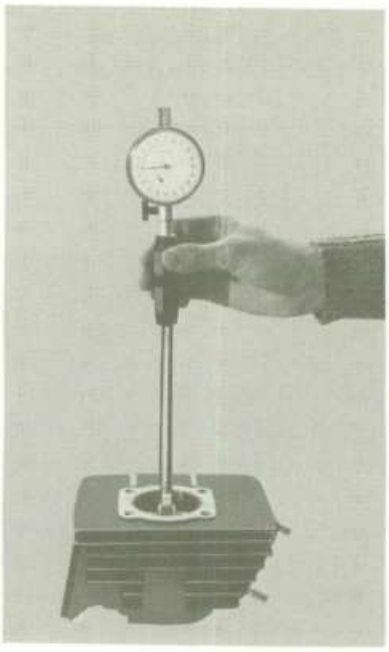


Fig. 3-47

6. Wash cylinder thoroughly with soap and water. Dry coat walls with light oil film immediately.
7. During re-assembly, always use a new cylinder base gasket.

C. Maintenance — Muffler/Spark Arrester

1. Using a rounded scraper, remove excess carbon deposits from manifold area of muffler. Check exhaust gasket condition. The gasket seat is located around the cylinder exhaust port.

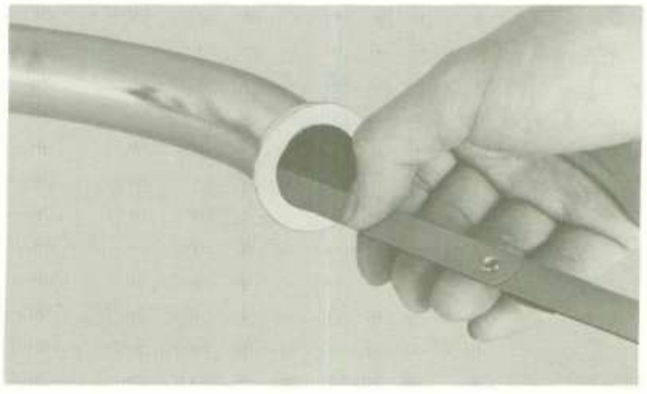


Fig. 3-48

2. Remove silencer by loosening silencer securing screw. Clean carbon out of silencer with brush.

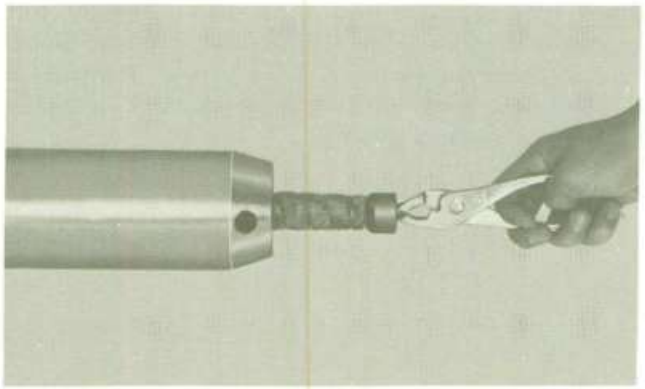


Fig. 3-49

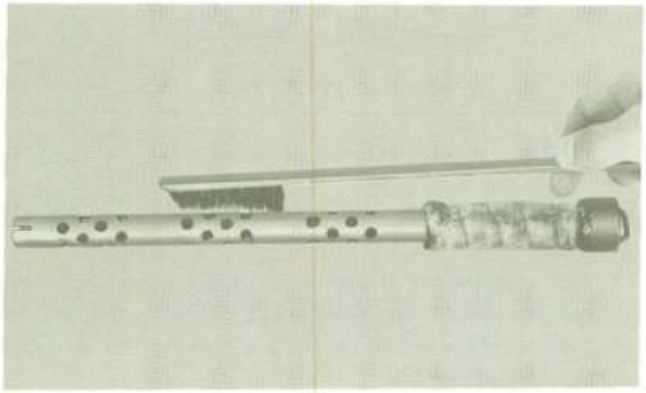


Fig. 3-50

3. Carbon deposits within the muffler may be removed by lightly tapping the outer shell with a rawhide hammer and then blowing out with compressed air. Heavy wire, such as a coat hanger, may be inserted to break loose deposits. Use care. Reinstall silencer.

3-6. Piston Pins and Bearings

A. Piston Pin Removal

1. Remove piston pin clips from pistons.

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.

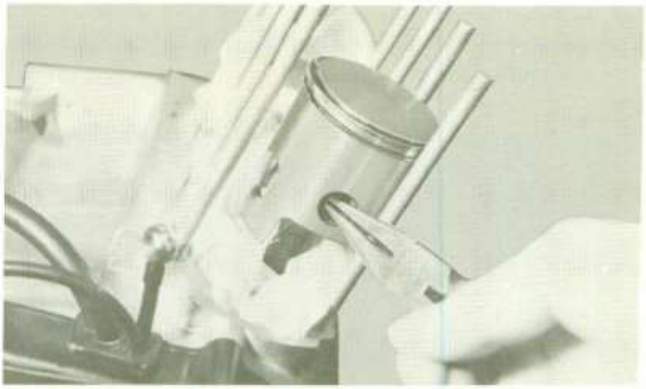


Fig. 3-51

2. Push piston pin from opposite side, then pull out. Protect pin with rag as shown in illustration.

Note:

Before removing piston pin, deburr clip groove and pin hole area.

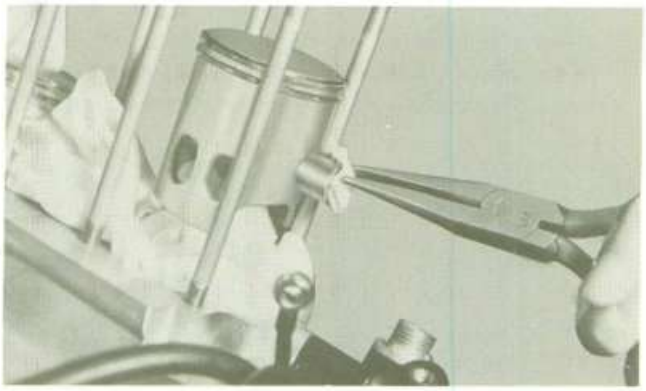


Fig. 3-52

B. Maintenance — Piston Pin and Bearing

1. Check the pin for signs of wear. If any wear is evident, replace pin and bearing.
2. Check the pin and bearing for signs of heat discoloration. If excessive (heavily blued), replace both.

Note:

Shinny spots on pin from race wear are normal. Replace pin and bearing only if wear is excessive. (Indentation on pin, etc.)

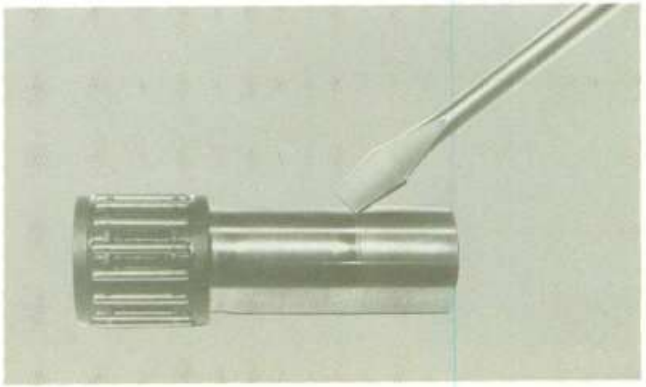


Fig. 3-53

3. Check the bearing cage for excessive wear. Check the rollers for signs of flat spots. If found, replace pin and bearing.

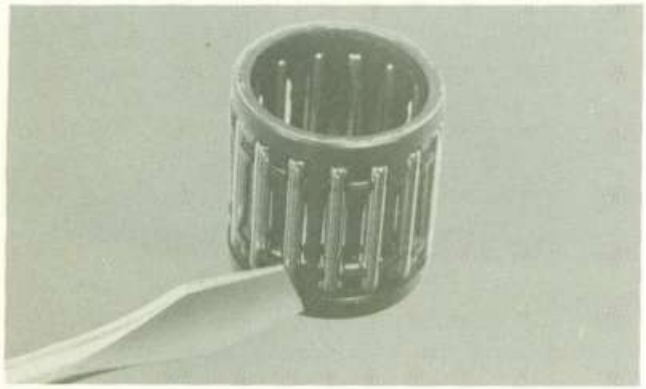


Fig. 3-54

4. Apply a light film of oil to pin and bearing surfaces. Install in connecting rod small end. Check for play. There should be no noticeable vertical play. If play exists, check connecting rod small end diameter and wear. Replace pin and bearing or all as required.

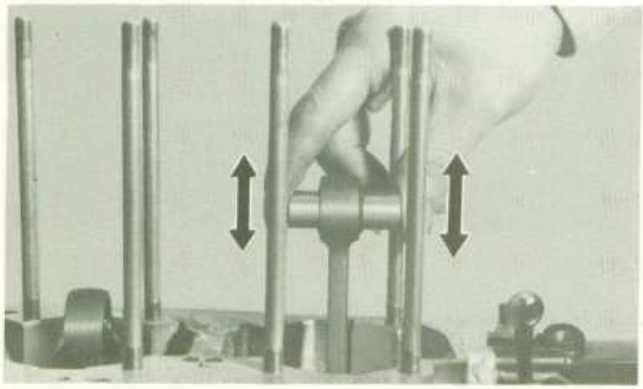


Fig. 3-55

5. 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.

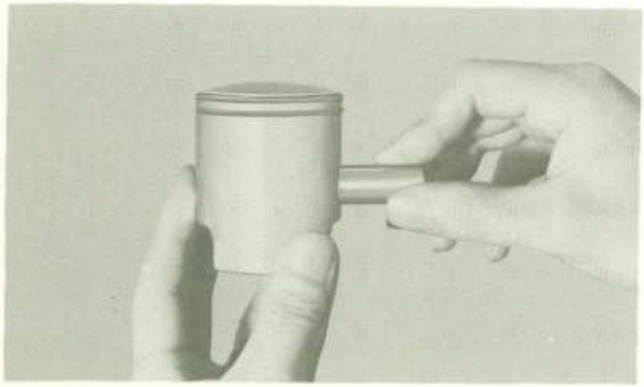


Fig. 3-56

3-7. Piston Rings

L Type Keystone Ring

The L type keystone ring is installed in the top ring groove as illustrated. The ring provides increased output through better combustion pressure sealing. The taper of 6° 45' on the lower part of the ring aids in increased sealing and prevents sticking.

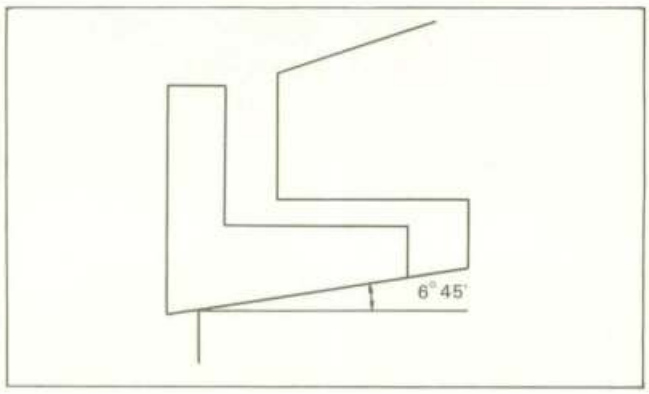


Fig. 3-57

A. Removal

1. Put your thumb at each end of the piston ring and pull the piston ring ends apart. Remove the ring by moving the ring off the ring groove at the side opposite the ring ends.

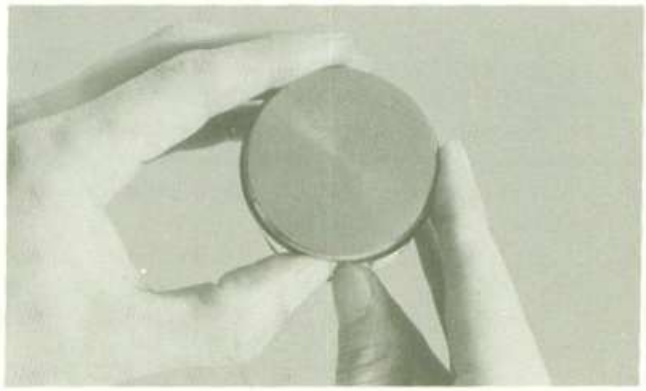


Fig. 3-58

2. Remove ring expand from lower ring groove.

B. Maintenance — Piston Rings

1. Check rings for scoring. If any severe scratches are noticed, replace set.
2. Measure ring end gap in free position. If beyond tolerance, replace set.

Top ring end gap, free	Approx. 0.16 in. (4.0 mm.)
2nd ring end gap, free	Approx. 0.18 in. (4.5 mm.)

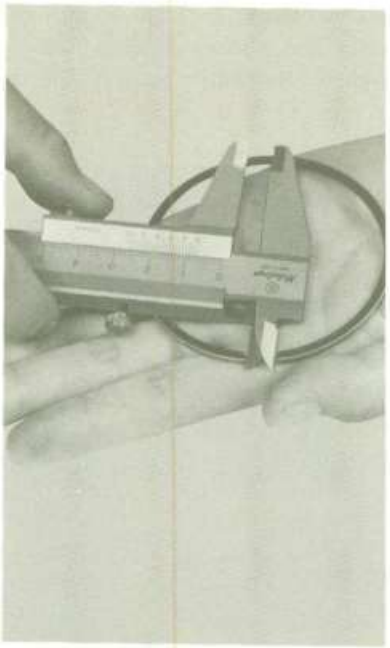


Fig. 3-59

3. Insert each ring into cylinder. Push down approximately 3/4 in. (20 mm.) into cylinder using piston crown to maintain right angle to bore. Measure installed ring end gap. If beyond tolerance, replace set.

	Min.	Max.
Top ring end gap, installed	0.006 in. (0.15 mm.)	0.014 in. (0.35 mm.)
2nd ring end gap, installed	0.006 in. (0.15 mm.)	0.014 in. (0.35 mm.)

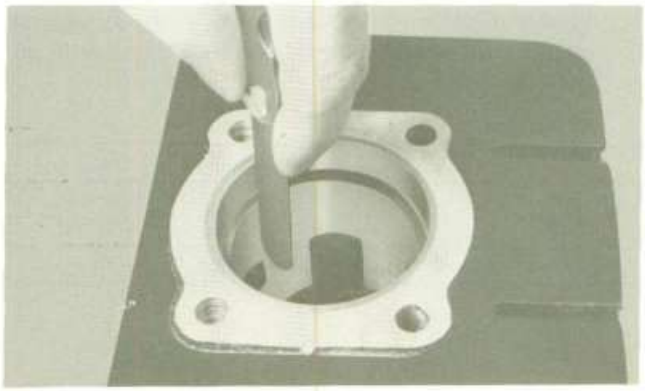


Fig. 3-60

4. Holding cylinder towards light, check for full seating of ring around bore. It not fully seated, check cylinder. If cylinder is not out-of-round, replace ring set.
5. Check ring expander. If worn excessively, or broken, replace ring set.
6. With rings installed in grooves, insert feeler gauge between ring side and groove. If beyond tolerance, replace ring/or piston as required.

	Min.	Max.
Top ring groove, clearance	0.0012 in. (0.03 mm.)	0.0031 in. (0.08 mm.)
2nd ring groove, clearance	0.0012 in. (0.03 mm.)	0.0031 in. (0.08 mm.)

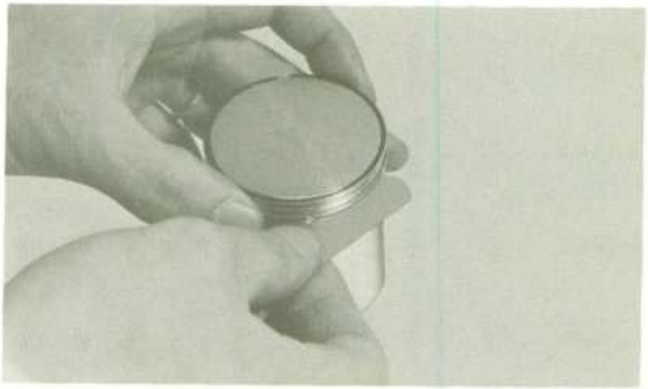
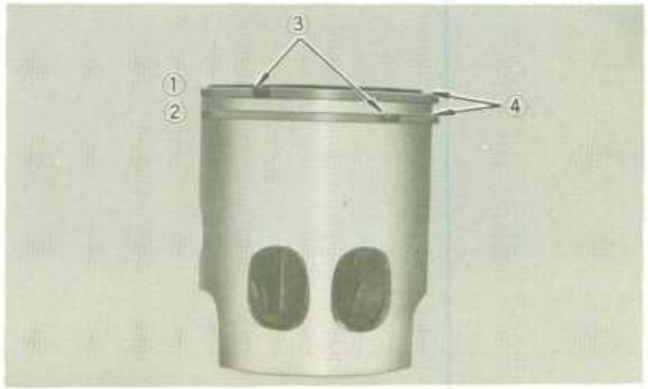


Fig. 3-61

C. Installing the Piston Rings

1. During installation, make sure ring ends are properly positioned on either side of locating pin in ring groove. Make sure ring expander is positioned in like manner. Apply liberal coating of two-stroke oil to rings.



1. First
2. Second
3. Knock pin
4. Piston ring

Fig. 3-62

2. New rings require break-in. Follow new machine break-in procedure.

3-8. Piston

A. Maintenance - Piston

1. Using a rounded scraper, remove carbon deposits from piston crown.



Fig. 3-63

2. Break a used piston ring in two. File end square. Deburr edges to avoid scratching ring groove and clean carbon deposits from ring grooves.

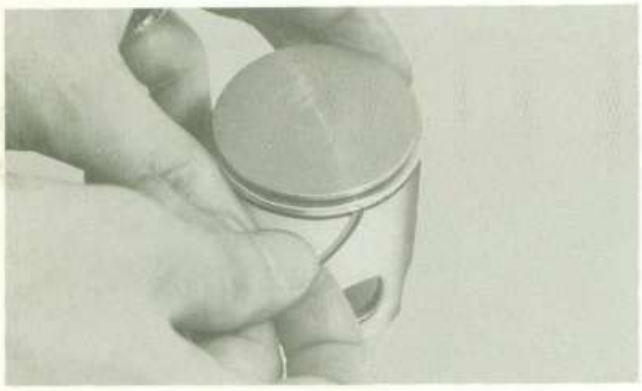
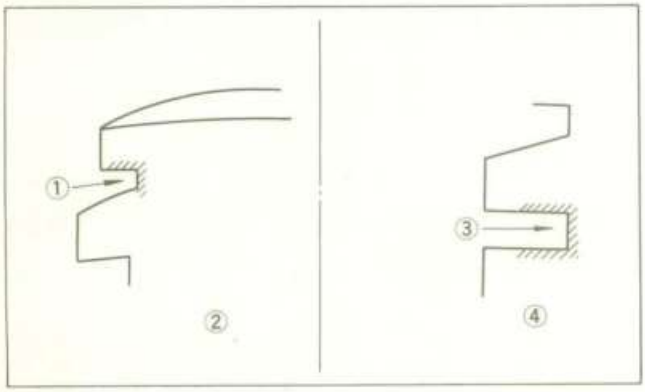


Fig. 3-64



1. Carbon
2. Top ring
3. Carbon
4. Second ring

Fig. 3-65

3. Using 400-600 grit wet sandpaper, lightly sand score marks and lacquer deposits from sides of piston. Sand in cross-hatch pattern. Do not sand excessively.



Fig. 3-66

4. Wash piston in solvent and wipe dry.
5. Using an outside micrometer, measure piston diameter. The piston is cam-ground and tapered. The only measuring point is at right-angles to the piston pin holes about 0.4 in. (10 mm.) from bottom of piston. Compare piston diameter to cylinder bore measurements.

   Piston maximum diameter subtracted from minimum cylinder diameter gives piston clearance. If beyond tolerance, hone cylinder to tolerance or re-bore to next over-size and fit new piston.

	Min.	Max.
Piston clearance	0.0016 in. (0.040 mm.)	0.0018 in. (0.045 mm.)
Maximum wear limit	0.004 in. (0.1 mm.)	

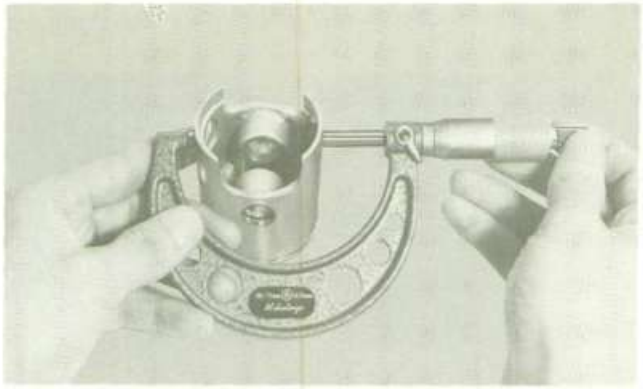


Fig. 3-67

B. Installation — Piston

1. During re-assembly, coat the piston skirt areas liberally with two-stroke oil.
2. Install new piston pin clips and make sure they are fully seated within their grooves.

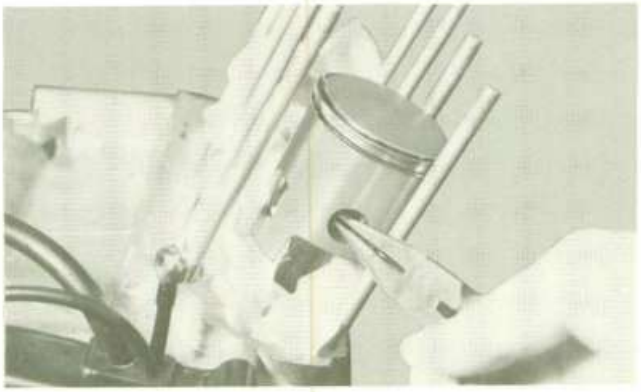


Fig. 3-68

3. Take care during installation to avoid damaging the piston skirts against the crankcase as the cylinder is installed. Note the two induction holes in the piston skirt. These must be to the rear during installation.

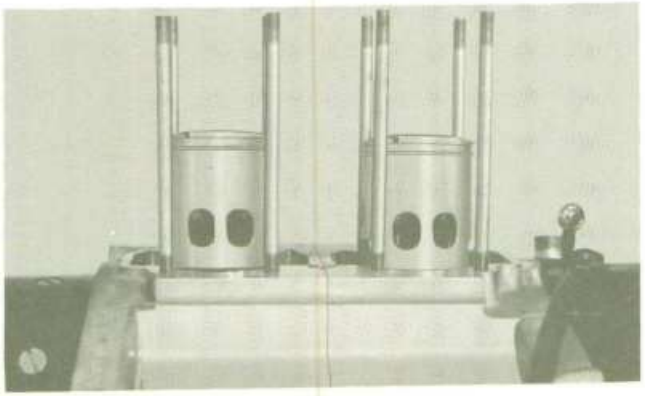


Fig. 3-69

4. Make sure the rings are properly positioned as the cylinder is installed.

3-9. Starter Generator

A. Starter Removal

Note:

For timing procedure, see chapter 2, "Engine Tuning, Ignition Timing". For theory of operation and troubleshooting, see "Electrical" chapters.

1. Remove the governor securing bolt, and then remove the governor.

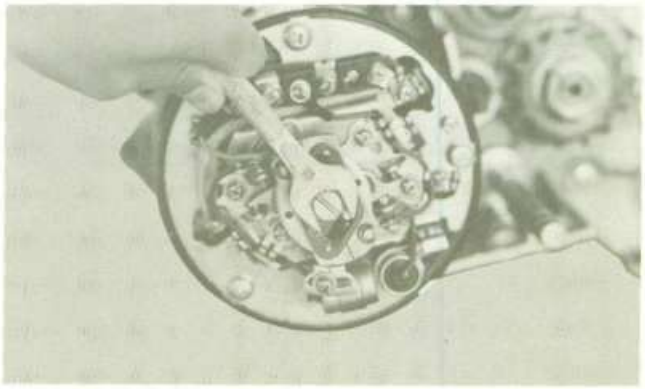


Fig. 3-70

2. Pull up the four brushes, and hold the brushes by brush springs.

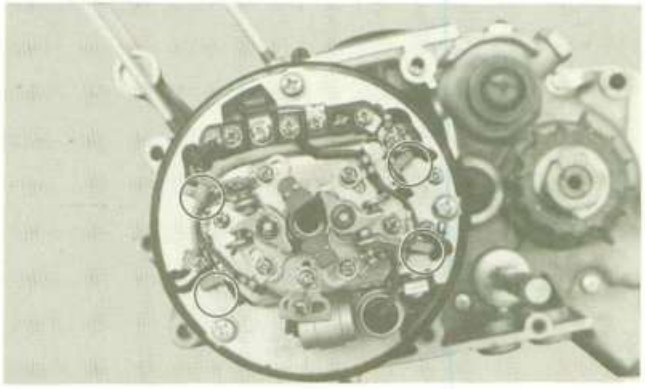


Fig. 3-71

3. Remove the starter holding screws, and then remove the starter.

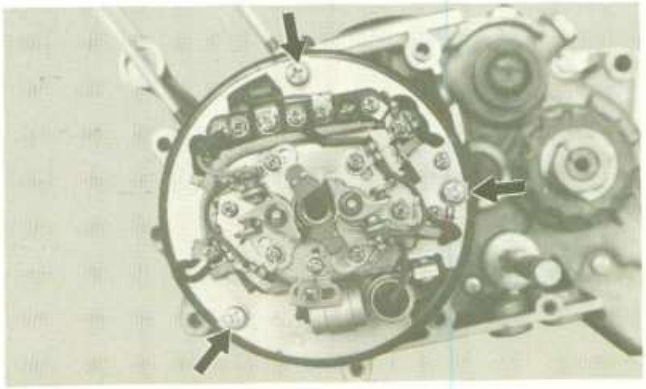


Fig. 3-72

4. Remove the armature by using the armature shock puller or armature puller.

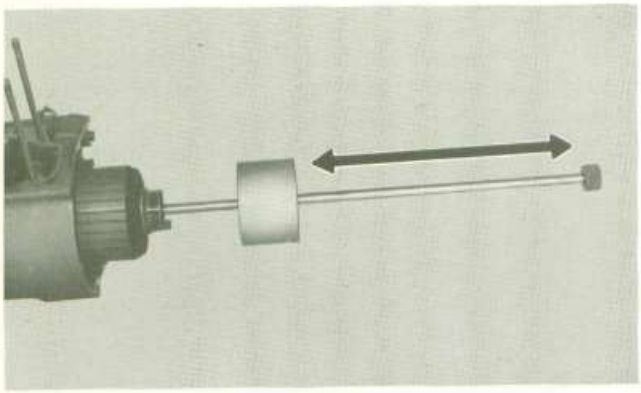
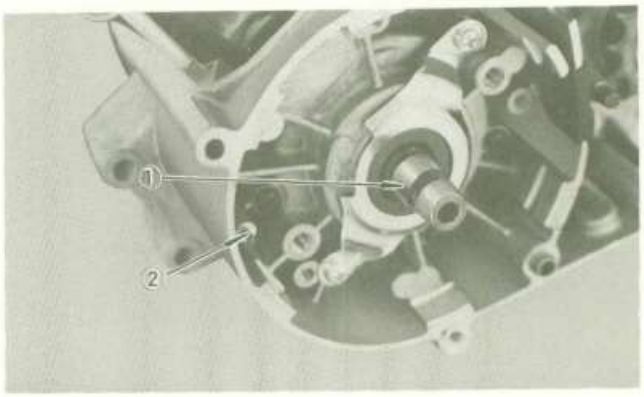


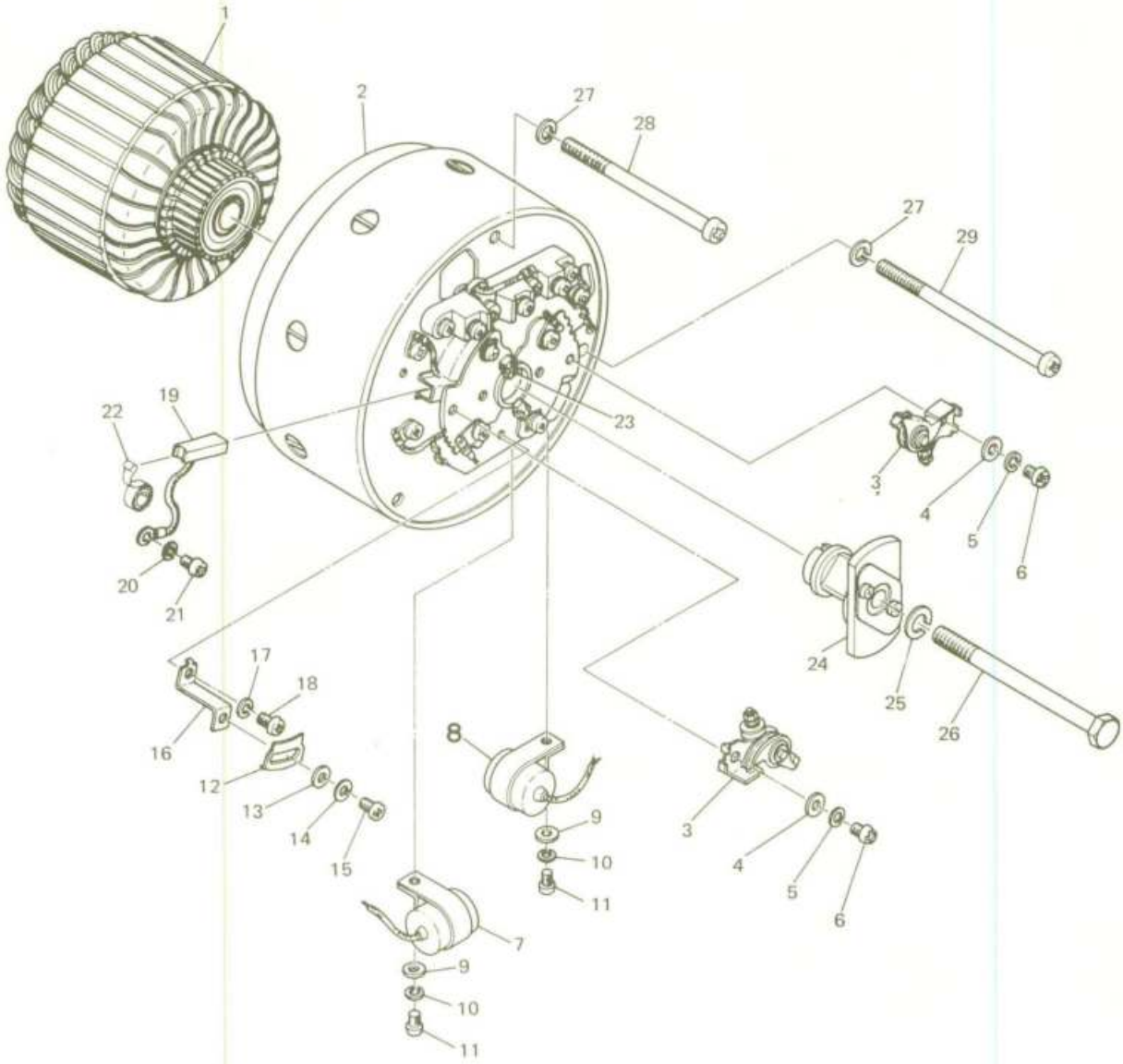
Fig. 3-73

5. Pry out the woodruff key. Remove the dowel pin.



1. Woodruff key
2. Dowel pin

Fig. 3-74



1. Armature
2. Stator assembly
3. Contact breaker assembly
4. Plain washer
5. Spring washer
6. Cylinder head screw (4-8)
7. Left condenser
8. Right condenser
9. Plain washer
10. Spring washer
11. Pan head screw
12. Timing plate
13. Plain washer
14. Spring washer
15. Cylinder head screw (4-6)
16. Timing plate fixture
17. Spring washer
18. Pan head screw
19. Brush
20. Spring washer
21. Pan head screw
22. Brush spring
23. Lubricator
24. Governor assembly
25. Spring washer
26. Bolt
27. Spring washer
28. Pan head screw
29. Pan head screw

Fig. 3-75

B. Maintenance

1. Apply a few drops of light-weight machine oil or distributor lubricant to the point cam lubricating wick.
2. The ignition points can be lightly filed with an ignition point file or sanded with 400-600 grit sandpaper. Place a piece of clean paper between the points, let them close, and repeatedly remove the paper until no residue shows. The paper may be dipped in lacquer thinner or point cleaning fluid to provide a solvent to remove oil and sanding residue from point surfaces.
3. Point replacement should only occur when point gap exceeds maximum tolerance; when the points are severely pitted; or if the points become shorted or show faulty operation.
4. When replacing certain components, soldering is required.
   Use a low wattage gun. Do not allow wiring to overheat as lacquer insulation on coil windings may destroyed. The use of a heat sink is recommended.
5. When installing armature, make sure woodruff key is properly seated in keyway in crankshft. Apply a light coating of lithium soap base grease to tapered portion of crankshaft end. Carefully install armature taking care to align for woodruff key.
6. Install the dowel pin. Install the stater after making sure that the four brushes are pulled up.
7. Install the governor.

Note:

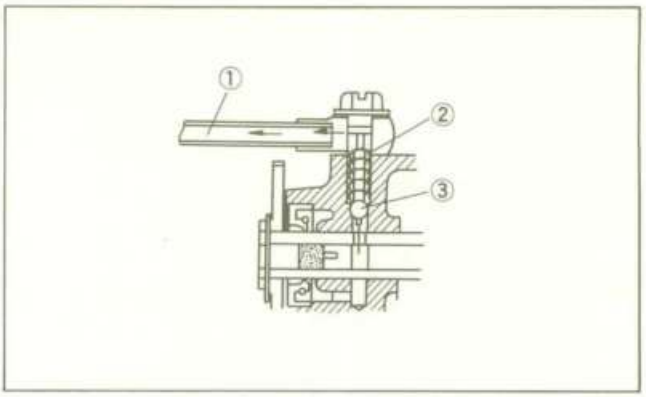
Whenever the starter generator is removed, ignition timing must be reset.

3-10. Autolube

The adjustments and servicing of the Autolube pump are covered in Chapter 2, Section 2, Engine Tuning. The following information pertains to disassembly and troubleshooting of the pump assembly.

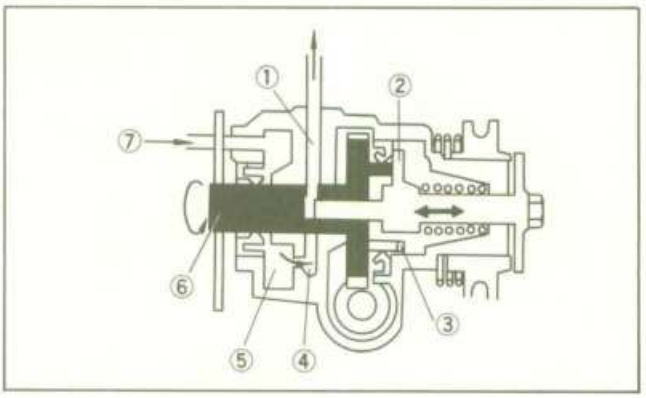
A. Description of Operation

1. The pump is driven by the crankshaft through reduction gears. Its output is controlled by the throttle-grip setting and the engine.
2. Oil flow to the pump from the Autolube tank is via gravity feed. If Yamalube is used as a lubrication oil, normal ambient temperatures are of no concern as far as the possibility of oil viscosity limiting or impeding oil delivery to the pump.
3. Oil flow from the pump to the cylinder is via rubber tubing and banjo bolts and fittins. Oil is delivered directly into the cylinder intake port where it is atomized by the carburetor air stream prior to delivery to the bottom end and cylinder walls.
4. A spring-loaded check ball at the delivery line junction prevents backflow to the pump when the engine is not running.



1. Delivery pipe
2. Check-ball spring
3. Check-ball

Fig. 3-76



1. Outlet
2. Guide pin
3. Cam
4. Inlet
5. Oil chamber
6. Distributor
7. Oil

Fig. 3-77

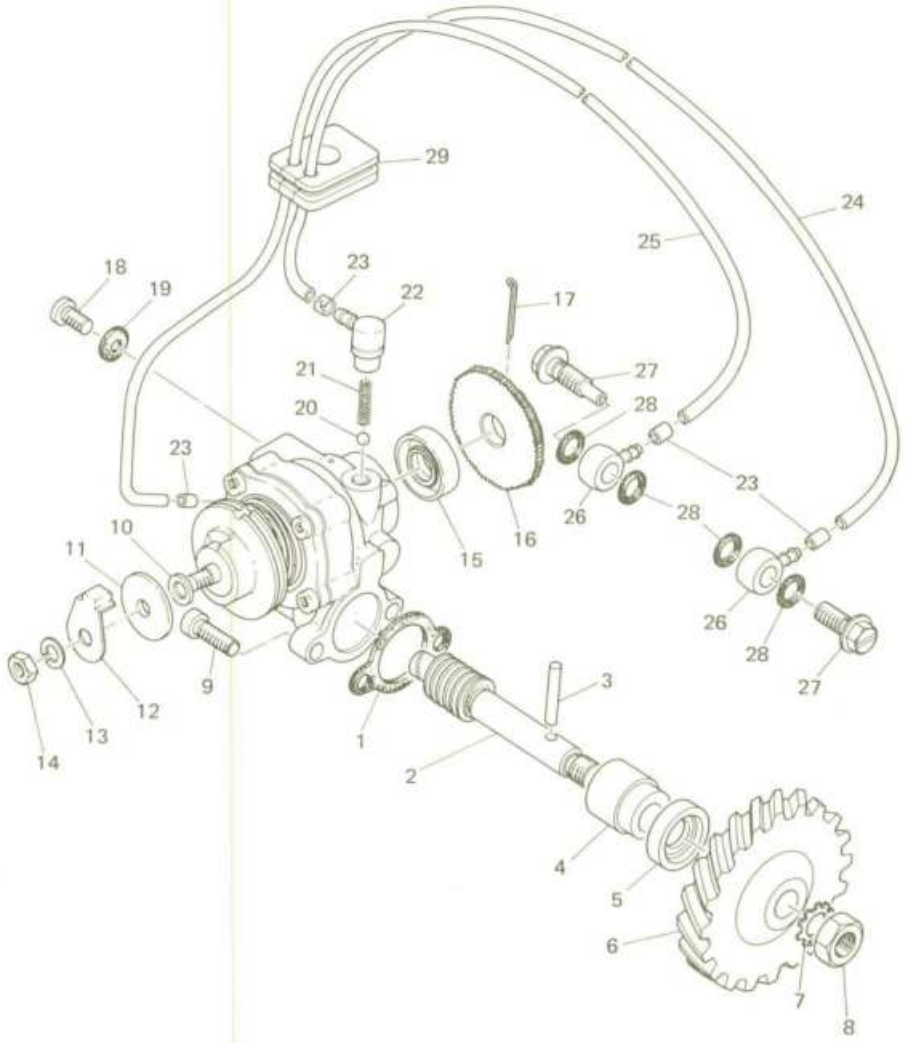
B. Removal and Disassembly

1. Remove pump cover.
2. Remove fitting on right-hand crankcase cover securing pump cable.



Fig. 3-78

Oil Pump



1. Pump case gasket
2. Worm shaft
3. Dowel pin (3-21.8)
4. Worm shaft outer metal
5. Oil seal (S-10-22-7)
6. Drive gear (20T)
7. Tooth washer
8. Nut
9. Pan head screw
10. Shim (5.8-10-0.1)
11. Adjusting plate
12. Cover
13. Spring washer
14. Nut
15. Oil seal (S-10-21-5)
16. Starter plate
17. Cotter pin
18. Bind screw
19. Breather gasket (4.2-8.5-0.5)
20. Ball (5/32 inch)
21. Check ball spring
22. Nozzle
23. Delivery pipe clip
24. Delivery pipe (3-420)
25. Delivery pipe (3-130)
26. Delivery pipe banjo
27. Banjo bolt 2
28. Banjo bolt gasket (6-13-0.5)
29. Oil pipe holder

Fig. 3-79

3. Remove cable end from pump pulley. Remove cable and fitting.

Note:

If side cover only is being removed, pump removal is not necessary. Proceed with steps 1, 3 and then remove side cover.

4. Remove Phillips screws (2) securing pump to crankcase cover.

   Remove banjo fittings and delivery line. Remove pump.

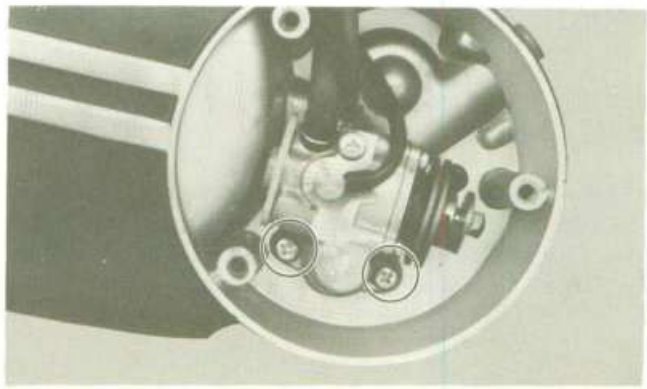


Fig. 3-80

5. The pump is a sealed unit. Its output has been checked and adjusted at the factory, and the pump assembled. Except for the components shown in the illustration, no further disassembly of the pump should be attempted.
6. Disassembly is straightforward and can be accomplished by reviewing the parts illustration.
   Reference numbers 2 — 6, worm shaft and drive gear components, require crankcase cover removal prior to disassembly.

C. Troubleshooting and Repair

1. Wear or an internal malfunction may cause pump output to vary from the factory setting.
   This situation is, however, extremely rare. If output is suspect, check the following:
   a. Obstructions in delivery line to pump or from pump to cylinder.
   b. Worn or damaged pump body seal or crankcase cover seal.
   c. Missing or improperly installed check ball or spring.
   d. Improperly installed or routed oil delivery lines.
   e. Loose fittings allowing air entry to pump and/or engine.
2. If all inspections show no obvious problems, and pump output is still suspect, connect a delivery line from the pump to a graduated container (c.c.). Keep the delivery line short. Rotate the pump bleed wheel while counting pump plunger strokes. If output is not to specification, replace pump assembly.

Autolube Pump Specifications

	Maximum Throttle		Minimum Throttle	
Pump output at 200 strokes	Min.	Max.	Min.	Max.
	5.15 c.c.	5.65 c.c.	0.50 c.c.	0.64 c.c.

	Maximum Throttle		Minimum Throttle	
Pump stroke length	Min.	Max.	Min.	Max.
	0.081 in. (2.05 mm.)	0.089 in. (2.25 mm.)	0.009 in. (0.20 mm.)	0.010 in. (0.25 mm.)

	Primary Drive to Pump Drive Gear		Worm Shaft to Worm Wheel		Overall Reduction Ratio
Pump gear ratios	Teeth	Ratio	Teeth	Ratio	
	16/20	0.080	1/55	0.017	0.014

Pump plunger diameter	0.17 in. (4 mm.)

D. Reassembly and Installation

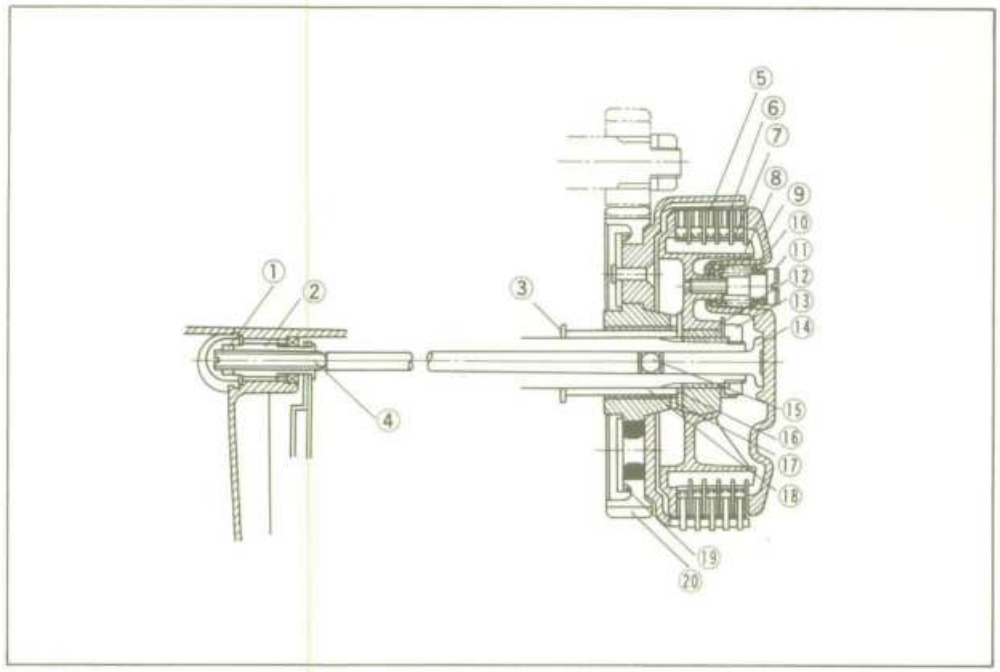
1. Always install a new pump case gasket.
2. During installation, make sure the worm shaft in the crankcase cover is properly meshed with the worm wheel in the pump body.
3. Whenever the pump cable is removed or the pump partially disassembled, the pump must be bled and the cable must be adjusted. See Chapter 2, paragraph 2-2-D, Adjusting Autolube.

3-11. Clutch

A. Description

The clutch is a wet, multi-disc type, consisting of molded cork friction plates (5 pcs.), five clutch plates and five cushion rings 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 with the clutch disengaged (or engaged in neutral).

A shock absorber system consisting of rubber damper is mounted between the primary driven gear and the clutch housing to absorb shock loads on the drive train.



1. Lock nut
2. Push screw
3. Thrust plate
4. Adjusting screw
5. Friction plate
6. Clutch plate
7. Cushion ring
8. Clutch plate
9. Pressure plate
10. Clutch spring
11. Spring screw
12. Lock washer
13. Lock nut
14. Push crown
15. Ball (5/16")
16. Thrust plate
17. Thrust bearing
18. Spacer
19. Friction ring
20. Primary driven gear assembly

Fig. 3-81

B. Removal and Disassembly

1. Cover removal

a. Remove pan head screws securing right crankcase cover.

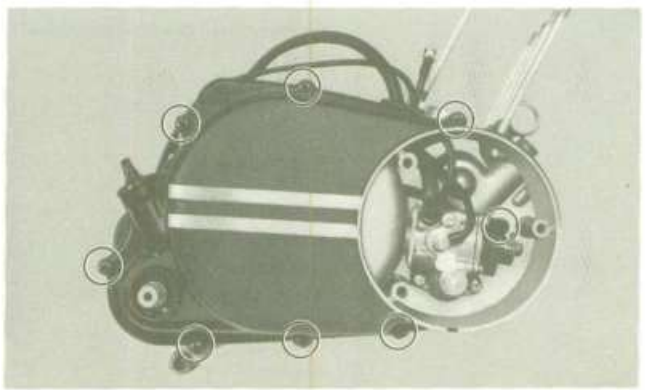


Fig. 3-82

b. Remove crankcase cover.
The crankcase cover can be removed without taking off the oil pump.

Note:
If cylinder is in place, remove banjo bolt securing oil delivery line.

c. Remove crankcase cover gasket. Replace during reassembly.

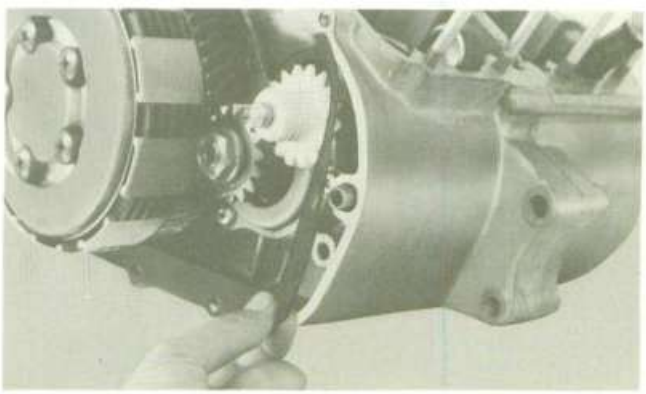


Fig. 3-83

2. Cover installation

a. Spread YAMAHA Bond No. 5 over the mating surface of the right-hand crankcase.

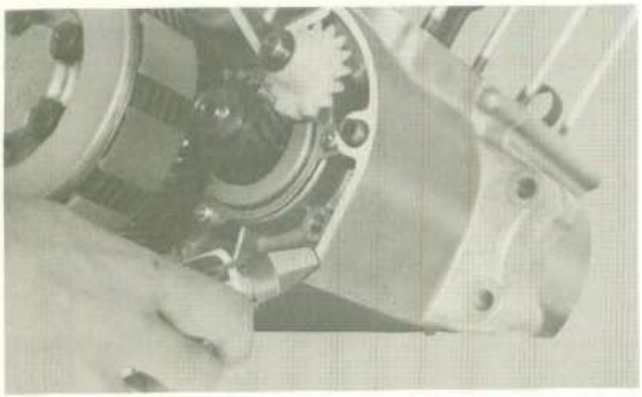


Fig. 3-84

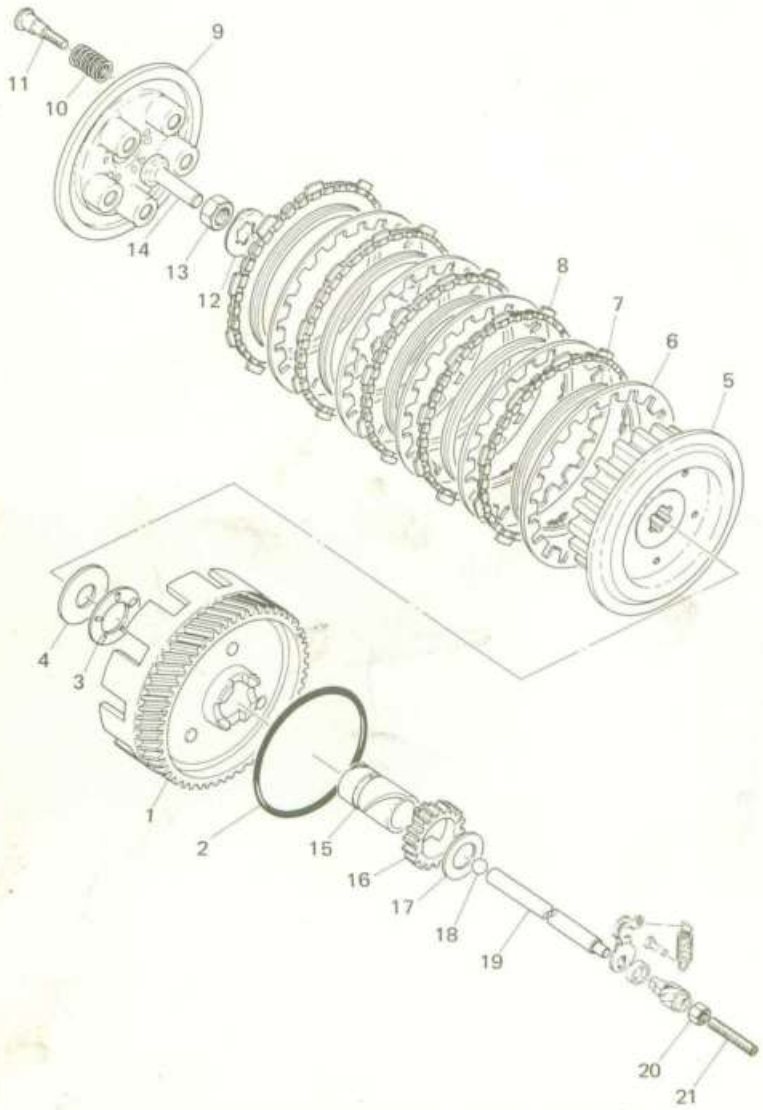
b. Place the crankcase cover gasket on the crankcase.

c. Install the right-hand crankcase cover.

Note:

When installing the crankcase cover (R), make sure that the pump drive gear is correctly engaged with the primary drive gear.

Clutch



1. Primary driven gear complete (53T)
2. O-ring
3. Thrust bearing
4. Thrust plate (20-38-2.0)
5. Clutch boss
6. Clutch plate
7. Cushion ring
8. Friction plate
9. Pressure plate
10. Clutch spring
11. Spring screw
12. Lock washer
13. Lock nut
14. Push rod 1
15. Distance collar
16. Kick pinion gear (18T)
17. Thrust plate (20.2-31-2.0)
18. Ball (5/16 inch)
19. Push rod 2
20. Nut
21. Adjusting screw

Fig. 3-85

3. Remove clutch spring holding screws (5), pressure plate, and push rod 1.

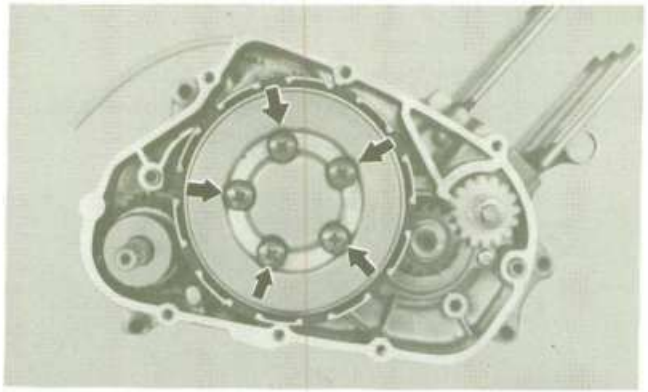


Fig. 3-86

4. Install clutch holding tool on clutch boss.
   Remove lock nut, washer, and clutch boss in that order.

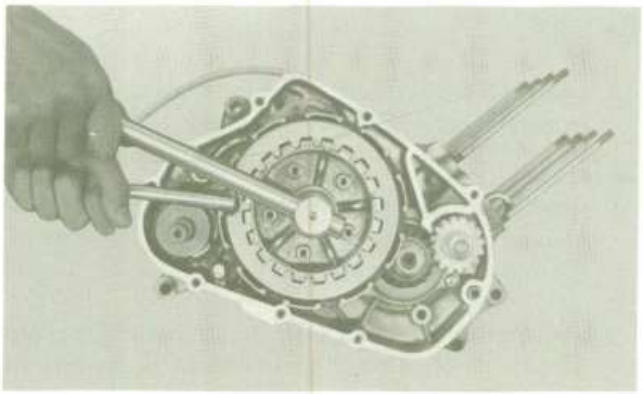
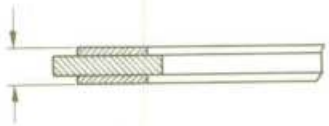


Fig. 3-87

5. If the clutch housing spacer remains on the transmission main shaft, remove it.
   Remove the thrust plate and thrust plate spacers.

C. Troubleshooting and Repair

1. Measure the friction plates at three or four points. If their minimum thickness exceeds tolerance, replace.



	New	Wear Limit
Friction plate thickness	0.16 in. (4.0 mm.)	0.15 in. (3.7 mm.)

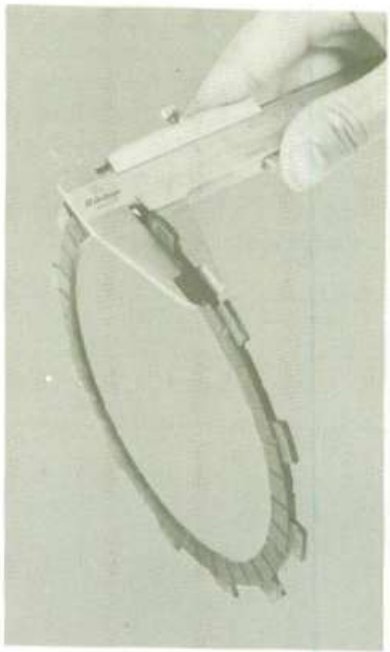


Fig. 3-88

2. Check the friction plates for signs of warpage and heat damage. Replace as required.
3. Check each clutch plate for signs of heat damage and warpage. Place on surface plate (plate glass is acceptable) and use feeler gauge as illustrated. If warpage exceeds tolerance, replace.

Clutch plate warpage allowance: 0.002 in. (0.005 mm. maximum)

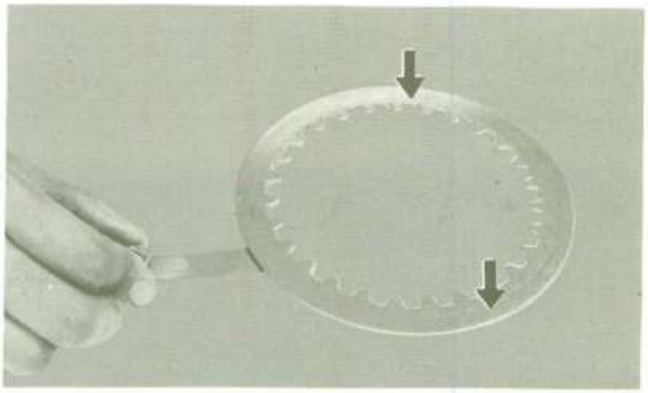


Fig. 3-89

Note:

For optimum performance, if any friction or clutch plate requires replacement, it is advisable to replace the entire set.

4. Thoroughly clean the clutch housing and spacer. Apply a light film of oil on the bushing surface and spacer. Fit the spacer into the bushing. It should be a smooth, thumb-press fit. The spacer should rotate smoothly within the bushing. If appropriate measuring devices are available, measure the minimum I.D. of the clutch housing bushing and the maximum O.D. of the bushing spacer.

	Nominal	Maximum
Clutch Housing Bushing I.D.	1.024 $^{+0.0006}_{-0.0002}$ ins. (26 $^{+0.016}_{-0.005}$ mm)	1.024 ins. (26.02 mm)
Bushing Spacer O.D.	1.024 $^{+0.0008}_{-0.0009}$ ins. (26 $^{+0.020}_{-0.023}$ mm)	1.022 ins. (25.95 mm)
Bushing/Spacer Clearance	0.001 – 0.002 in. (0.020 – 0.040 mm)	0.002 in. (0.060 mm)

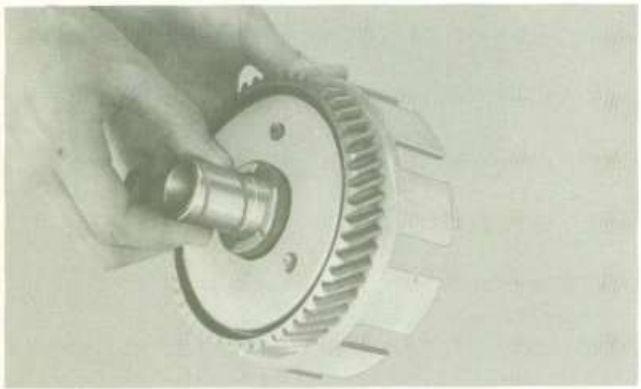


Fig. 3-90

5. Check the bushing, spacer and main shaft for signs of galling, heat damage, etc. If severe, replace as required.

	Nominal	Maximum
Main Shaft O.D.	0.787 $^{+0.0003}_{-0.0008}$ in. (20 $^{+0.007}_{-0.020}$ mm)	0.785 in. (19.95 mm)
Bushing Spacer I.D.	0.787 $^{+0.0394}_{-0.0002}$ in. (20 $^{+0.012}_{-0.006}$ mm)	0.788 in. (20.02 mm)
Shaft/Spacer Clearance	0.00004 – 0.00157 in. (0.001 – 0.040 mm)	0.007 in. (0.050 mm)

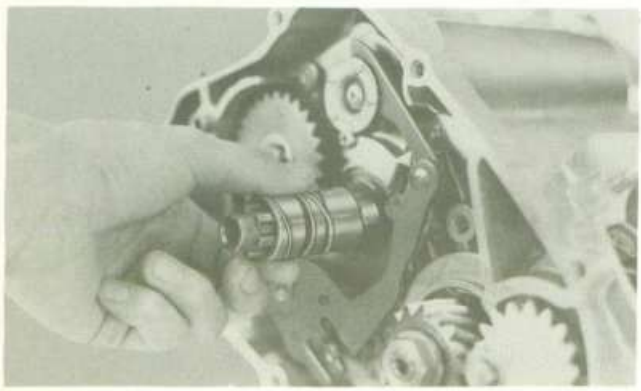


Fig. 3-91

6. Apply thin coat of oil on transmission main shaft and bushing spacer bore slip spacer over main shaft. Spacer should fit with approximately same "feel" as in clutch housing. Replace as required. See measurement tolerances.
7. Check dogs on driven gear (clutch housing). Look for cracks and signs of galling on edges. If moderate, deburr. If severe, replace.

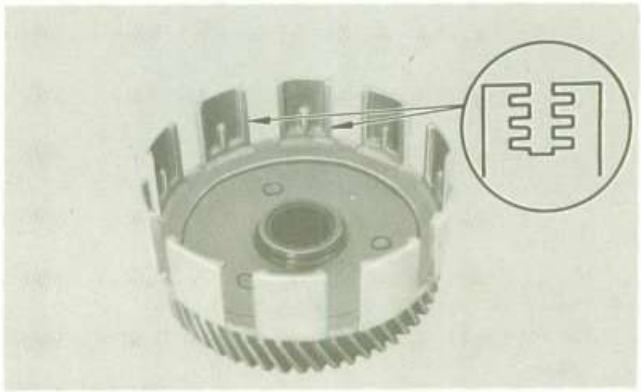


Fig. 3-92

8. Check splines on clutch boss for signs of galling. If moderate, deburr. If severe, replace.

Note:

Galling on either the friction plate dogs of the clutch housing or clutch plate splines of the clutch boss will cause erratic clutch operation.

9. Coat the clutch thrust plate and thrust bearing with a light film of oil on all parts. Check for smooth rotation. Check all parts or signs of excessive wear. Replace as necessary.
10. If clutch operation has been abnormal, and the above procedures show no major failures, install the clutch housing on the transmission main shaft with thrust plates, thrust bearing and clutch boss in their proper positions for reassembly. Do not install clutch or friction plates. Install lock washer and clutch securing nut. Torque to standard assembly value.

Clutch securing nut torque:
560 — 700 in-lbs. (6.5 — 8.0 m-kgs.)

11. With transmission in neutral and primary driven gear stationary, the clutch boss should turn without excessive drag within the clutch housing. If housing does not turn easily, indicating insufficient housing end play, check thrust plates and thrust bearing for incorrect thickness.
    Correct by installing thinner thrust plates.
    Clutch housing end play is given in table and can be measured with a dial gauge.

	Nominal	Minimum	Maximum
Clutch Housing End Play	0.008 in. (0.2 mm.)	0.004 in. (0.1 mm.)	0.012 in. (0.3 mm.)

12. Measure each clutch spring. If beyond tolerance, replace.

	New	Minimum
Clutch Spring Free Length	1.34 in. (34.0 mm.)	1.30 in. (33.0 mm.)

Note:

For optimum clutch operation it is advisable to replace the clutch springs as a set if one or more are faulty.

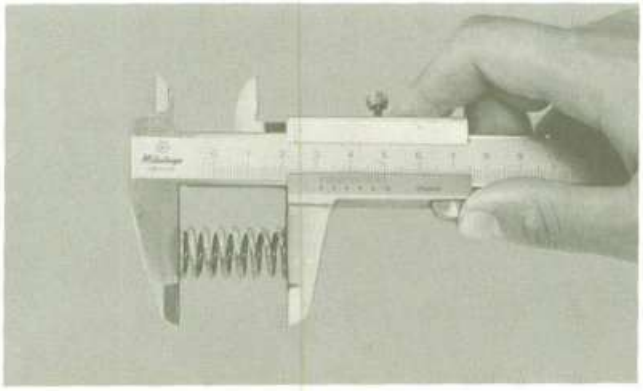
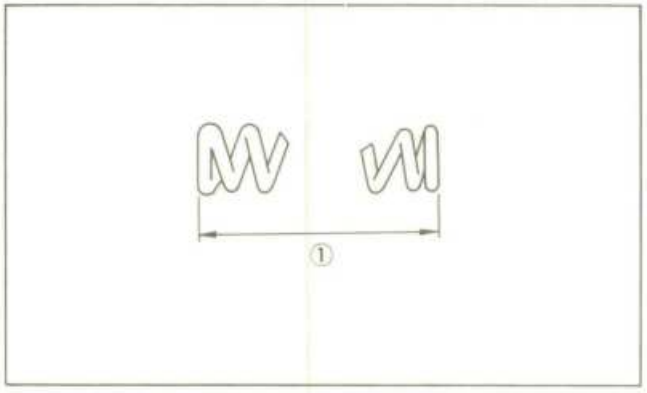


Fig. 3-92



1. Free length

Fig. 3-93

13. Stack the clutch spring set on a level surface. Rotate each spring until all are at approximately the same vertical angle and maximum apparent height. Place a straight edge across the set. If any spring exceeds tolerance, replace that spring.

Clutch spring set maximum length difference: 0.04 in. (1 mm.)

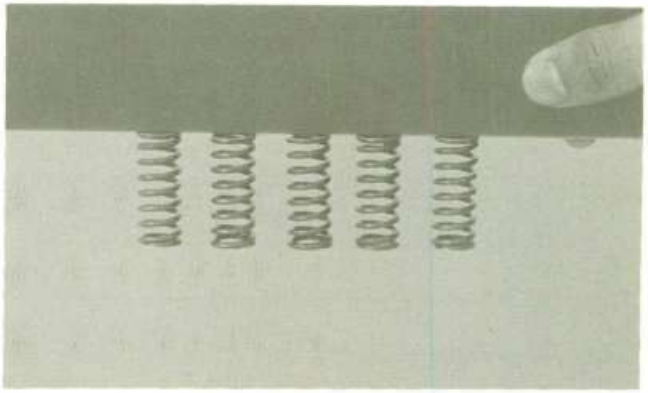


Fig. 3-94

14. Lay the machine, the push rod and ball should slide out of the main shaft. If not, use a small magnet to retrieve.
15. Roll the push rod across a surface plate. If rod is bent, replace it.

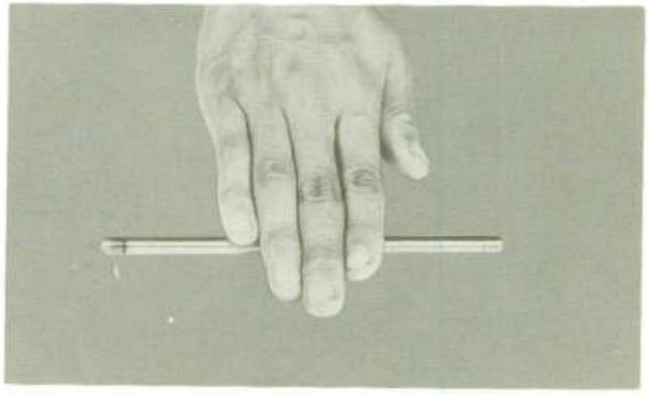


Fig. 3-95

D. Installation

1. During installation of the clutch assembly, take care that the thickest clutch plate is installed on the clutch boss first. Take care that the thrust plates do not slip out of position as the housing and clutch boss are installed. Install all parts with a heavy coat of 10W.-30 motor oil on their mating surfaces.

Note:

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

Clutch securing nut torque: 560 — 695 in-lbs. (6.5 — 8.0 m-kgs.)

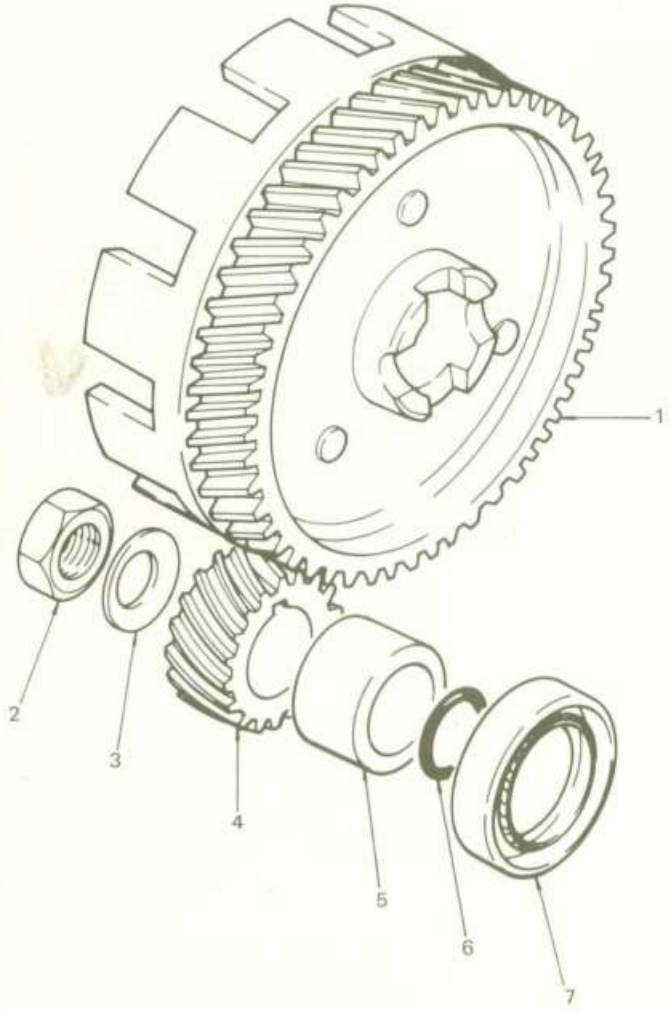
3-12. Primary Drive

A. Description

1. Primary drive is via helical cut gears. The drive gear is mounted on the crankshaft and the driven gear is integral with the clutch assembly and mounted on the transmission main shaft.

Primary Reduction Ratio		
No. of Teeth		Ratio
Drive	Driven	
16	53	3.312

Primary Drive Gears



1. Primary driven gear complete (53T)
2. Lock nut
3. Bellevile spring
4. Primary drive gear (16T)
5. Distance collar
6. O-ring (1.2-17.6)
7. Oil seal (SW-32-48-8)

B. Removal and Disassembly

With the right-hand crankcase cover removed, remove the primary drive gear securing nut and washer as follows:

Note:

The securing nut can most easily be removed with the clutch assembly installed.

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 locknut. Remove the locknut, belleville spring, the gear and plain key.

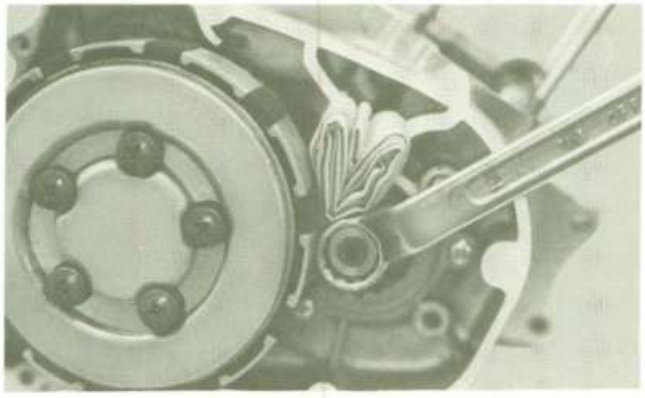


Fig. 3-97

C. Troubleshooting and Repair

1. Check the drive gear for obvious signs of wear or damage from foreign material within the crankcase. Repeat procedure for driven gear.
2. If primary drive gears exhibit excessive noise during operation, gear backlash may be incorrect. Numbers are scribed on the side of each gear. Add these numbers. If their total exceeds tolerance, replace with a numbered gear that will bring total within specification.

Note:

This procedure is rarely required. However, if a gear must be replaced due to damage, it is always advisable to pay strict attention to the backlash numbers during replacement.

Backlash Numbers	
Primary drive gear	85 – 88
Primary driven gear	39 – 45
Backlash tolerance (Drive + driven)	127 – 129

3. Check the shoulder on the primary drive gear where the crankshaft seal rides. It should not be severely worn or galled. If so, replace gear and seal.
4. Check the O-ring on the crankshaft. If damaged or misshapen, replace.

D. Reassembly and Installation

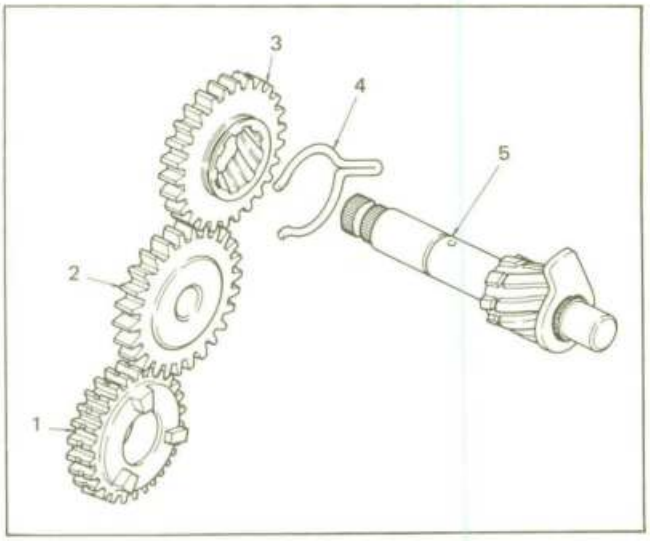
1. Primary driven gear installation is covered within Section 3-11. D., Clutch.
2. Reverse steps B. 1. a. —c. for primary drive gear installation.

	Securing Nut Torque
Drive gear	390 – 620 in-lbs. (4.5 – 7.2 m-kgs.)
Drive gear	560 – 700 in-lbs. (6.5 – 8.0 m-kgs.)

3-13. Kick Starter and Tachometer Drive

A. Description

1. The kick starter employs a ratcheting mechanism wherein the kick gear is in constant mesh with the kick idler gear.
2. The engine can be started in any gear with the clutch disengaged, or in neutral with clutch engaged.

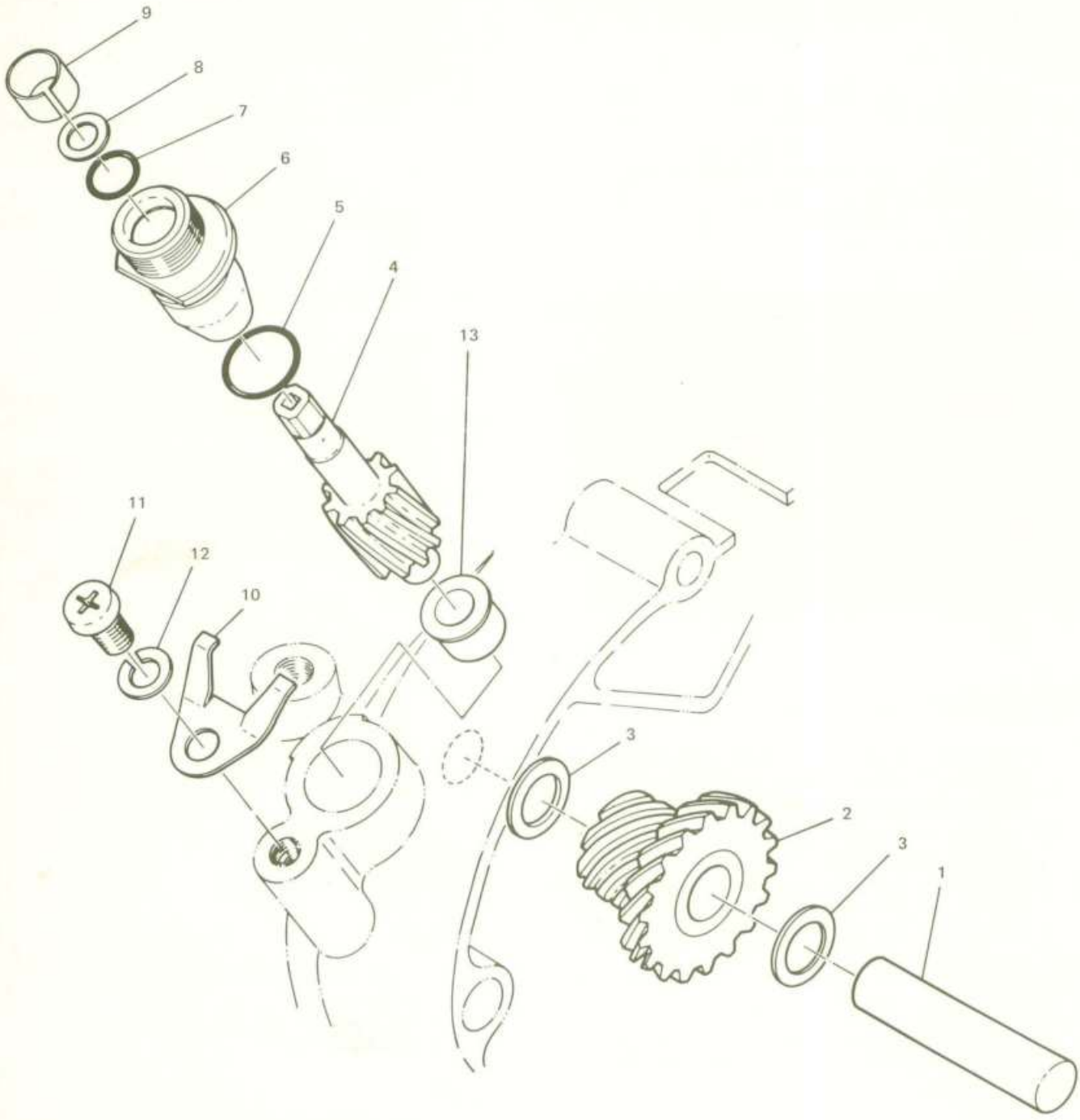


1. Kick pinion gear (18T)
2. Kick idle gear (26T)
3. Kick gear (26T)
4. Kick clip
5. Kick axle assembly

Fig. 3-98

3. As the kick crank is depressed, the kick axle rotates freeing the ratchet wheel from its detent. The ratchet is pushed out by the ratchet wheel spring and engages the kick gear.
4. The ratchet wheel, which is splined to the kick axle, transfers torque through the kick gear, and kick idle gear to the kick pinion gear which is constantly engaged with the primary driven gear.
5. The tachometer drive gear is made of nylon and driven off the kick idle gear. Maintenance is rarely required. Should disassembly be required, follow the illustration.

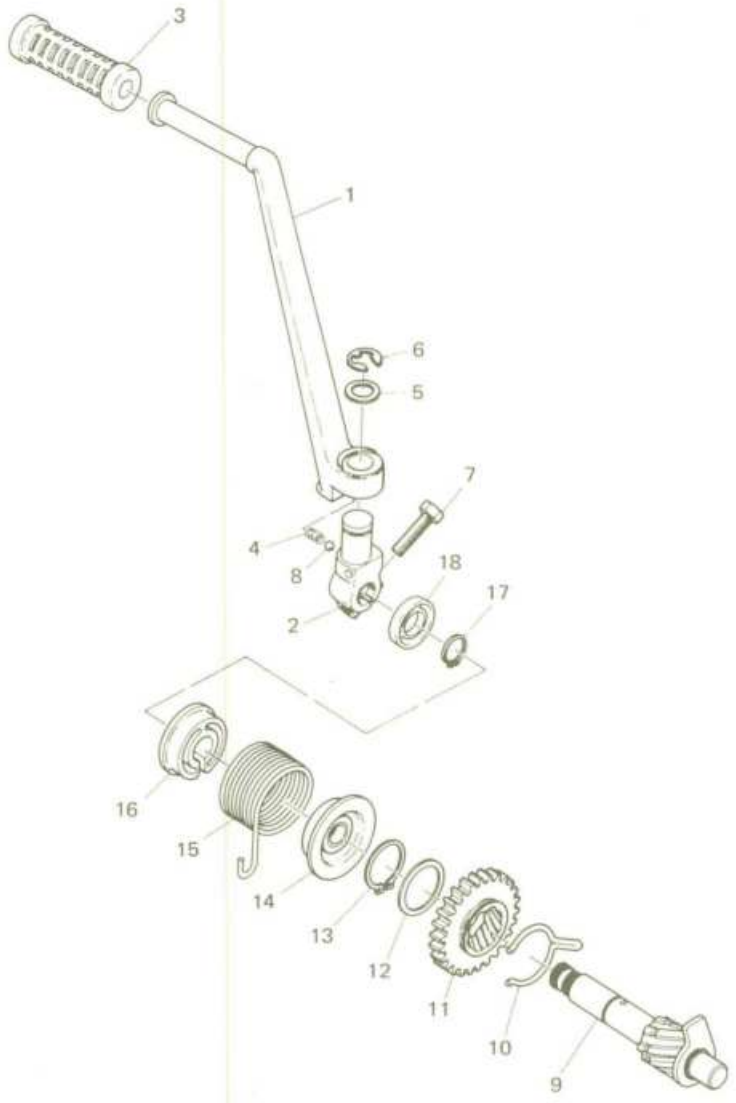
Tachometer Gear



1. Drive gear axle
2. Drive gear
3. Shim (10.2-16-1.0)
4. Drive gear
5. O-ring (1.8-13)
6. Housing
7. O-ring (2.2-7.2)
8. Shim (7.5-10.8-0.4)
9. Bushing
10. Stopper
11. Pan head screw
12. Spring washer
13. Bushing

Fig. 3-99

Kick Starter



1. Kick crank
2. Kick crank boss
3. Kick lever cover
4. Boss stopper spring
5. Washer (15.5-24-1.5)
6. Circlip (E-10)
7. Bolt
8. Ball (7/32 inch)
9. Kick axle assembly
10. Kick clip
11. Kick gear (26T)
12. Shim (25.1-32-1.0)
13. Circlip (S-25)
14. Kick spring guide
15. Kick spring
16. Kick spring cover
17. Circlip (S-15)
18. Oil seal (SDO-15-26-6)

Fig. 3-100

B. Removal and Disassembly

1. Remove kick crank assembly and right-hand crankcase cover.

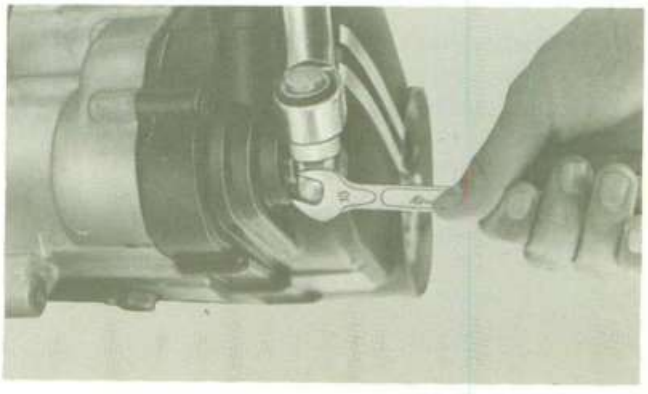


Fig. 3-101

2. Unhook the kick spring from its post in the crankcase. Allow it to relax.
   Then remove the kick starter assembly by rotating the shaft counterclockwise and then pulling out the entire assembly. Check to see that the kick gear spirals freely on the worm shaft. Check the gear teeth for wear and breakage.

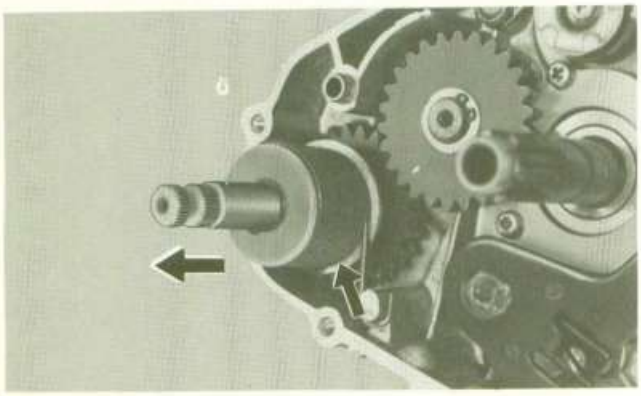


Fig. 3-102

3. The kick axle assembly may be disassembled by removing the circlips holding the kick gear.
4. During disassembly, note the location of all parts as they are removed. Keep them in sequence to ease reassembly.
5. Remove the circlip with clip pliers, and then the kick idler gear can be easily removed.



Fig. 3-103

6. The tachometer drive gear is engaged with the primary drive gear to convey the revolutions per minute of the crankshaft to the tachometer through the tachometer cable. Pull up the tachometer drive gear to remove. Note location of shim.

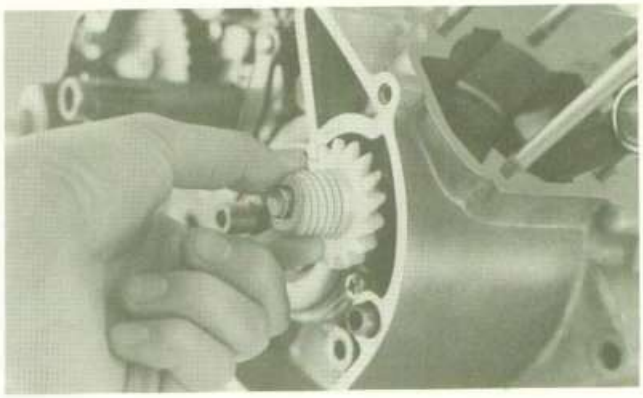


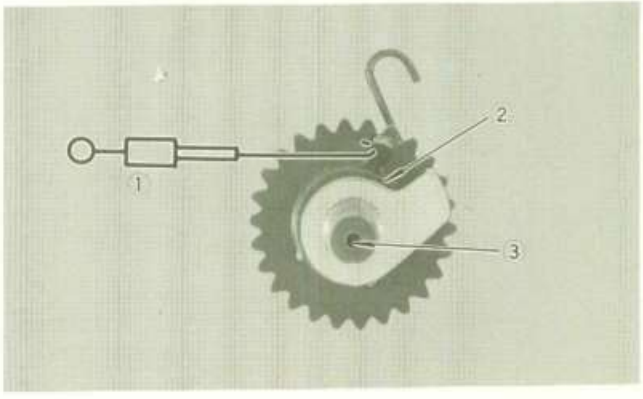
Fig. 3-104

C. Troubleshooting and Repair

1. Check the ratchet teeth on the kick gear and ratchet wheel. The mating edges should fit flush against each other. If there is severe rounding off, replace as set.
2. Check to see that the kick gear spins freely on the kick axle. If not, replace either or both as required. Replace if any signs of galling are found.

3. The kick gear clip is built in the ratchet wheel. The force of the clip is measured by a spring balance placed as illustrated.
   Replace if not within limits.

Standard tension:	800 — 1,500 g.



1. Spring gauge
2. Kick gear clip
3. Kick axle

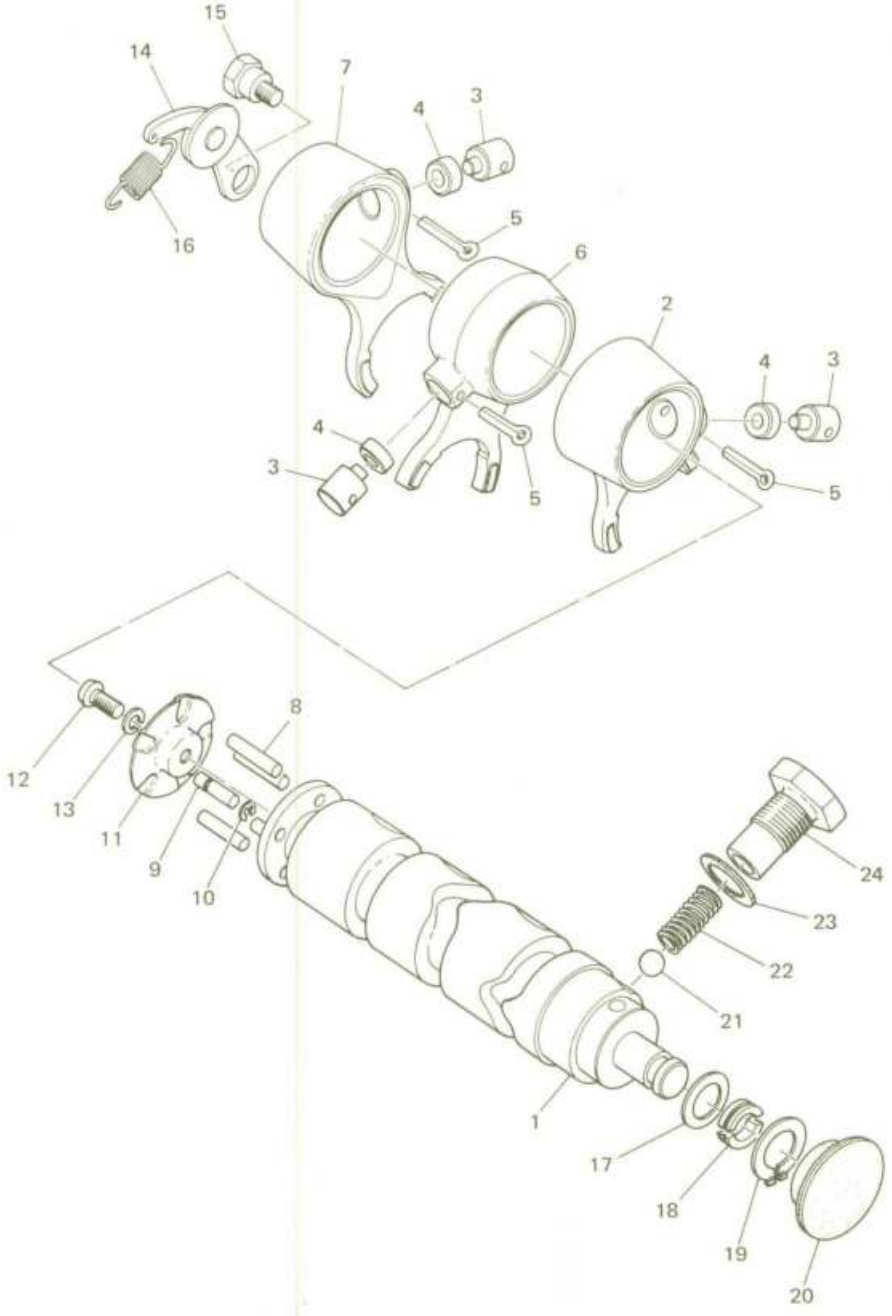
Fig. 3-105

3-14. Shift Mechanism

A. Description

1. The shift mechanism is the ratcheting type with first gear located at the bottom of the shift pattern. Neutral is situated halfway between first and second gears.
2. When the pedal is raised or depressed, the movement is transferred to shift arm.
3. As the change shaft rotates, and the levers in their turn move, the ratchet arm on shift arm pushes or pulls one of the gear shift pins attached to the gear shift drum; turning it. A total of five pins are installed on the drum, providing a total of five positive gear positions.

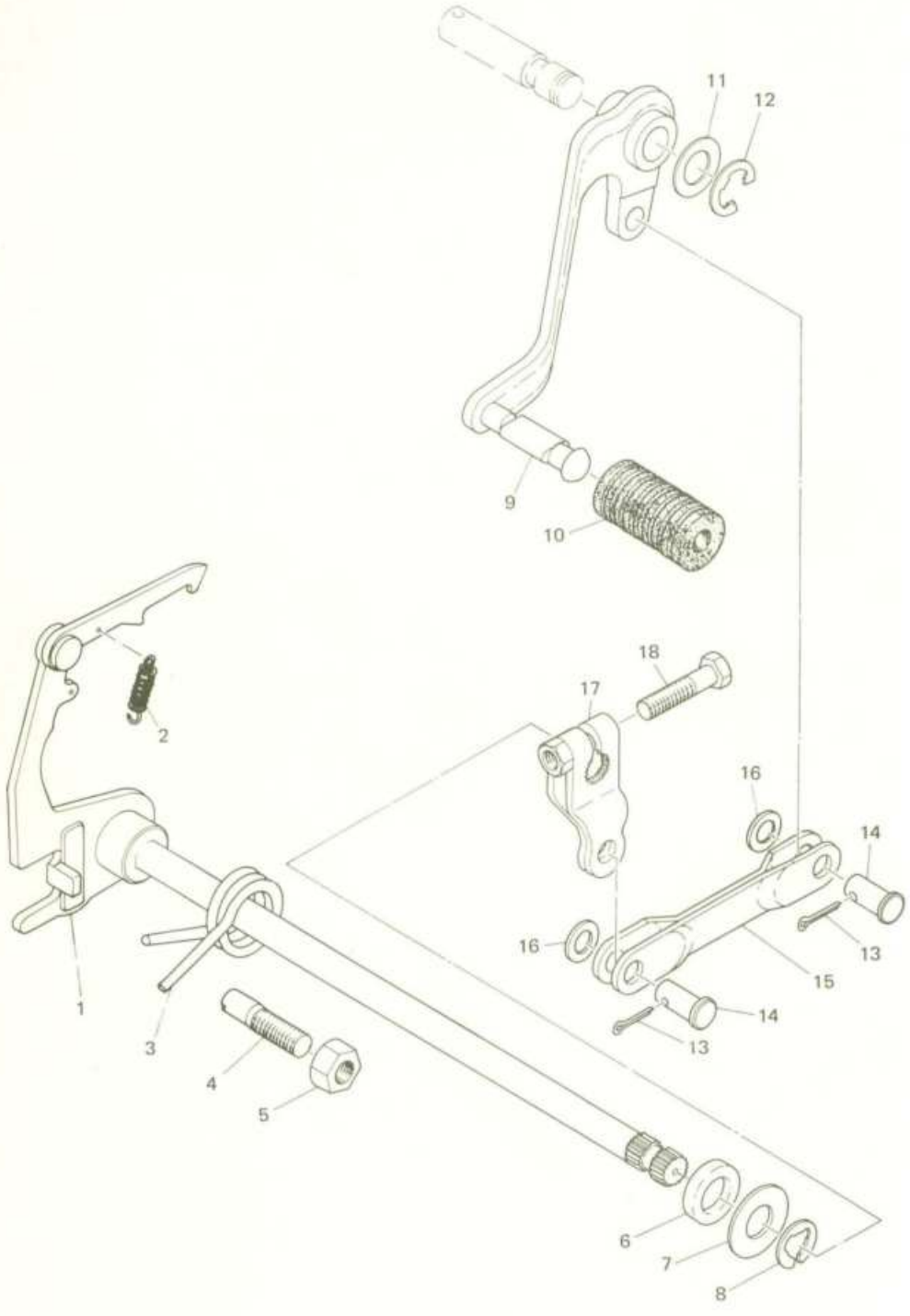
Shifter 1



1. Shift cam
2. Shift fork 1
3. Cam follower pin
4. Cam follower roller
5. Cotter pin
6. Shift fork 2
7. Shift fork 3
8. Dowel pin (4-21-8)
9. Locating pin
10. Circlip (E-2.5)
11. Side plate
12. Pan head screw
13. Spring washer
14. Stopper lever assembly
15. Stopper bolt
16. Stopper spring
17. Plain washer (12.1-18-1.0)
18. Shift cam holder
19. Circlip
20. Blind plug
21. Ball (5/16 inch)
22. Neutral spring
23. Gasket (14.5-21-1.5)
24. Spring screw

Fig. 3-106

Shifter 2



1. Change shaft assembly
2. Shift arm spring
3. Shaft return spring
4. Adjusting screw
5. Nut
6. Oil seal (S-12-22-5)
7. Change axle washer (12.1-26-1.6)
8. Circlip (E-10)
9. Change pedal
10. Change pedal cover
11. Washer (12.5-22-1.6)
12. Circlip (E-10)
13. Cotter pin
14. Joint pin
15. Change rod
16. Washer (8.2-14-1.0)
17. Change arm
18. Bolt

Fig. 3-107

4. As the drum turns, shift fork cam followers move along profiles grooved into the shift drum. This causes the shift forks to move. Each fork controls the movement of a gear within the transmission. Working in concert, their movement allows the selection of the various transmission ratios available.

5. On the opposite end of the shift drum is the stopper plate and mechanism. As the drum rotates, the stopper spring forces the stopper into the plate at each gear position, holding the transmission in that gear.

B. Disassembly and Troubleshooting

Note:

Shifter maintenance and adjustment should be performed with clutch assembly removed.

1. To remove change shaft assembly, remove the circlip and washer. Lift up the shift arm from the shift cam dowel pins, and remove it from the right side of the crankcase.

Note:

Shift return spring will come off with change shaft assembly.

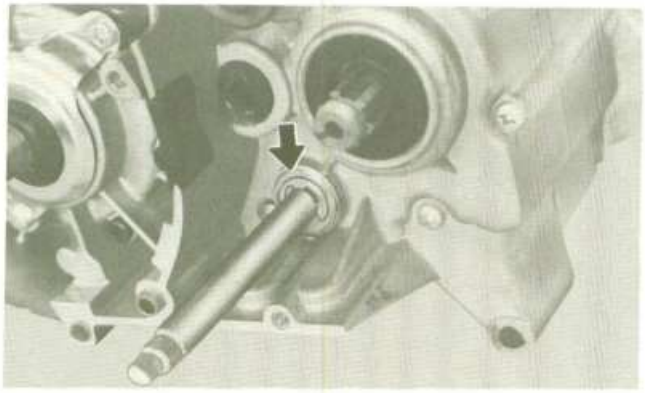


Fig. 3-108

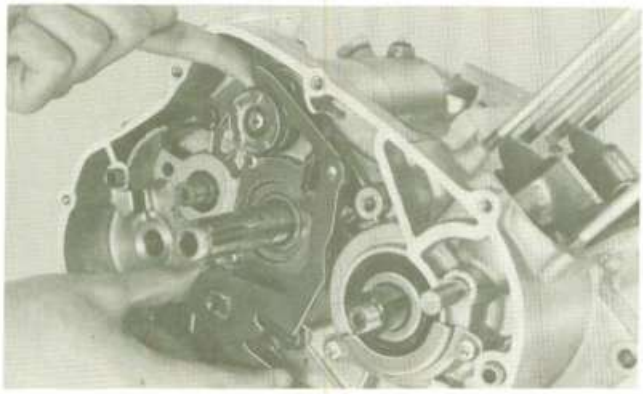


Fig. 3-109

2. Inspect shift return spring. A broken or wear spring will impair the return action of the shifting mechanism.
3. Inspect change shaft assembly for bending of shaft, worn or bent splines, and broken or wear shift arm spring. A bent shaft will cause hard shifting.

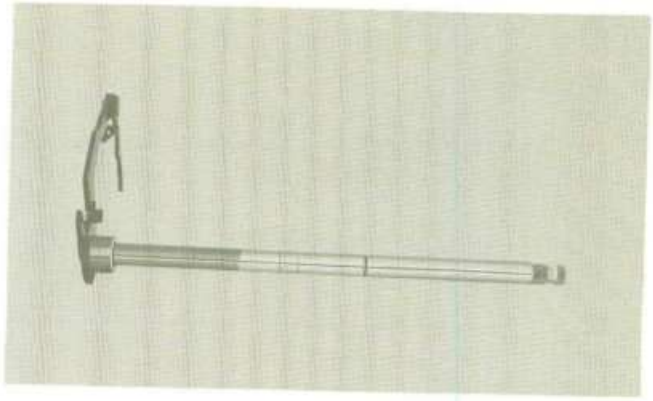


Fig. 3-110

4. Remove the stopper lever assembly.

Note:

To reassembly, apply a "Lock-Tite".

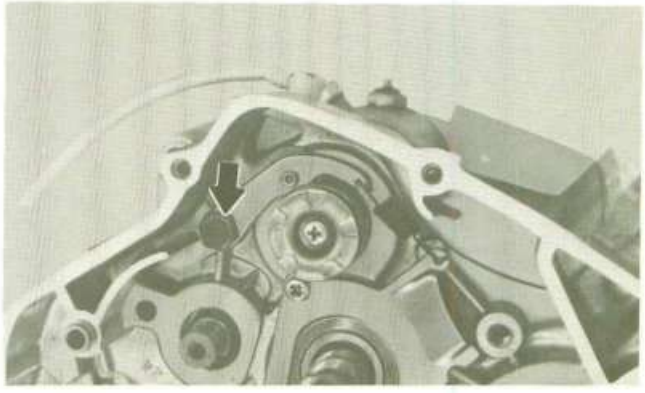
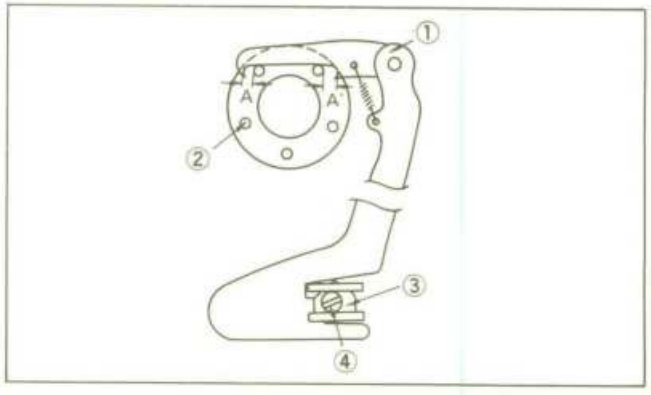


Fig. 3-111

C. Adjustment

To adjust and correct the travel of the gear shift arm to prevent improper shifting progression (excess feed or insufficient feed of the gear shift arm), turn the adjusting screw until distance A and A' are equal. Adjust to gear shifter at the 2nd gear position.



1. Gear shift arm
2. Pin
3. Lock nut
4. Adjusting screw

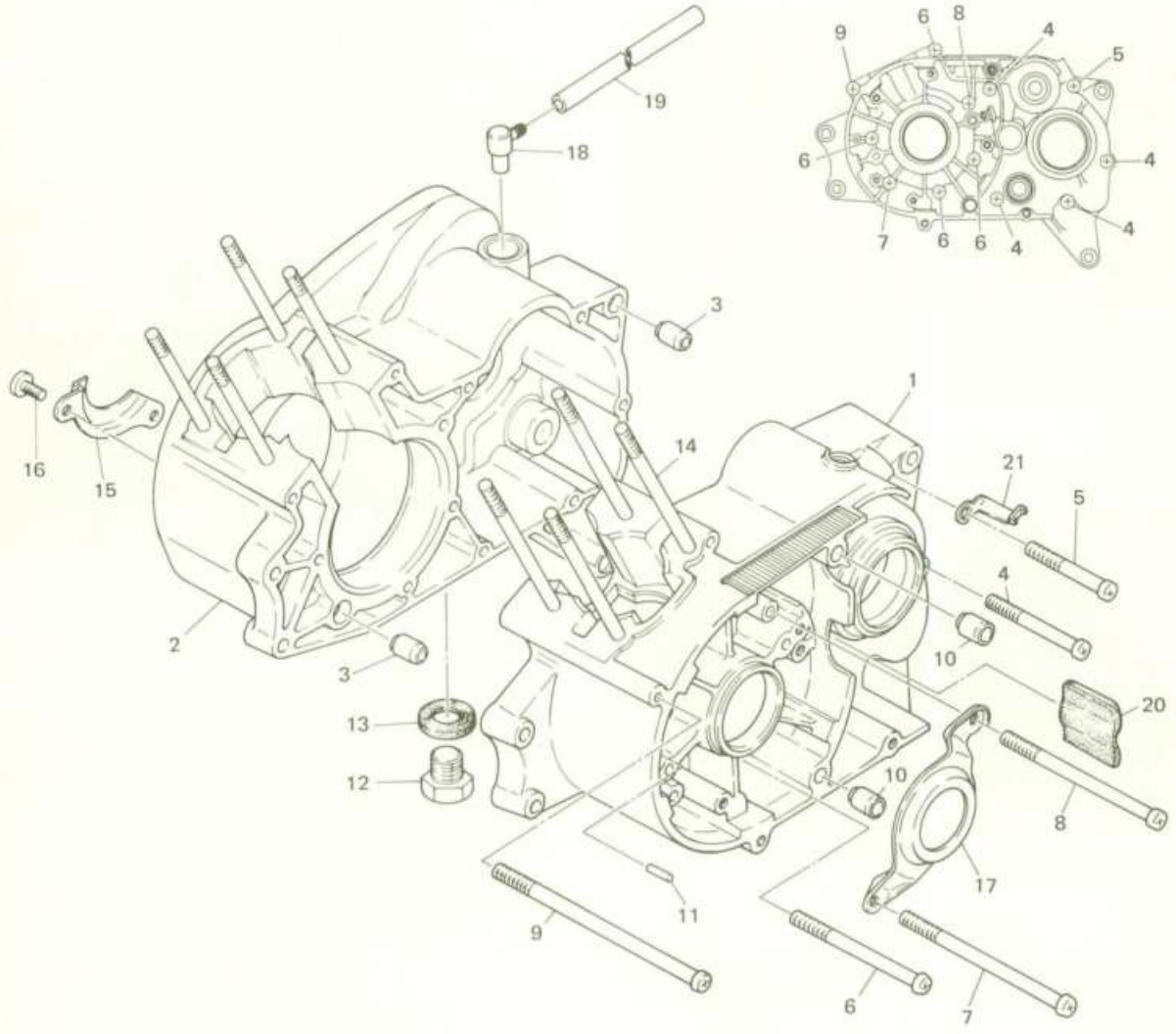
Fig. 3-112

3-15. Crankcase

A. Description

1. The crankcase assembly is manufactured from die-cast aluminum alloy. It separates into right and left halves.
2. Airtight sealing between case halves is accomplished with a sealing agent. No gasket is used. In light of this fact it is important that the case halves be treated carefully and that no damage occur to the mating surfaces of the case halves.
3. Sealing of shafts is accomplished through the use of neoprene seals and/or O-rings. Two-stroke engines require hermetic sealing within the crankshaft area. It is advisable to replace all seals and O-rings whenever the case halves are disassembled.

Crankcase



1. Crank case, left
2. Crank case, right
3. Dowel pin (8.4-12-16)
4. Pan head screw
5. Pan head screw
6. Pan head screw
7. Pan head screw
8. Pan head screw
9. Pan head screw
10. Dowel pin (6.4-10-15)
11. Dowel pin (3-17.8)
12. Drain plug
13. Drain plug gasket (12.5-19-1.5)
14. Cylinder holding bolt
15. Holder
16. Pan head screw
17. Holder
18. Breather
19. Breather pipe
20. Grommet
21. Clamp

Fig. 3-113

B. Notes on Disassembly

Note:

Review Sections 3-4 to 3-14 for components which must be removed prior to crankcase disassembly.

Crankcase disassembly must not be attempted without the proper tools and special equipment as outlined in Section 3-1.

Additional components which must be removed:

1. Chain drive sprocket.
2. Shift drum cam stopper assembly.

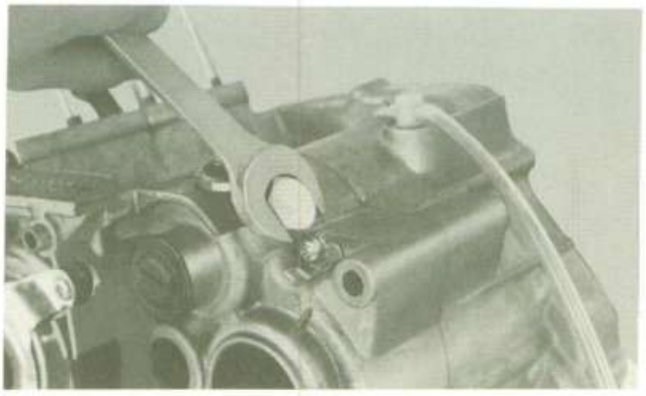


Fig. 3-114

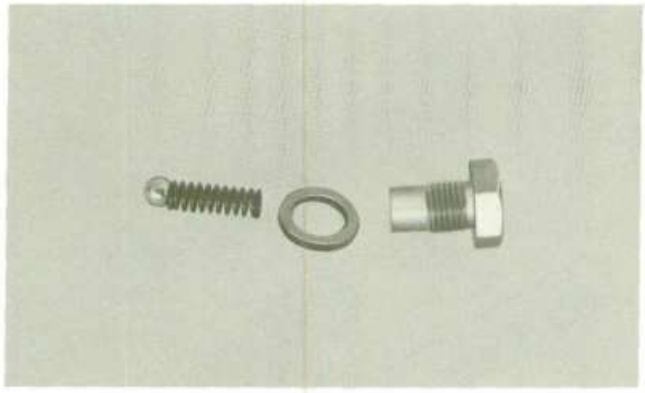


Fig. 3-115

3. Shift cam blind plug, circlip, shift cam holder and plain washer.

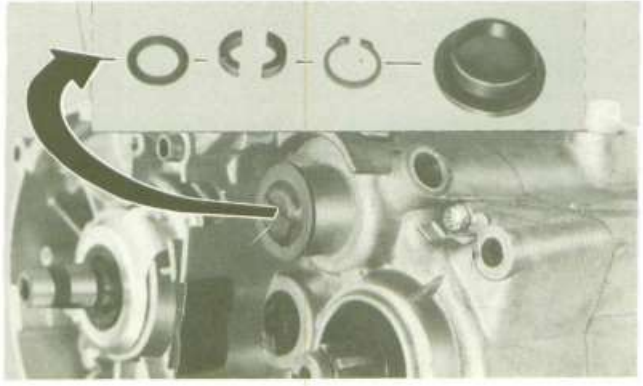


Fig. 3-116

C. Disassembly

1. Working in a cross-pattern, loosen all pan head screws 1/4 turn each until loose. Remove.

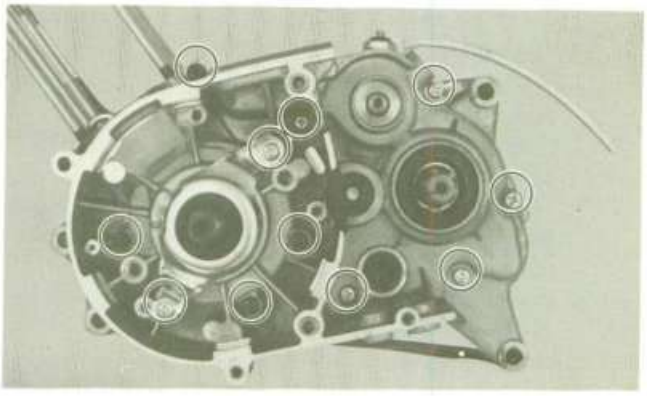


Fig. 3-117

2. Install crankcase separating tool. Tool may be used on either crankcase half, but it is easier to disassemble cases when tool is installed on right case half.
3. Fully tighten the tool securing bolts taking care to see that the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.
4. While keeping the connecting rod at top dead center position, tighten push screw of tool.
5. As pressure is applied, alternately tap on the front and rear of the case half as it rises. If a transmission shaft or the shift drum hang up, tap them back into their seats in the left case half.

Caution:

Use a rubber or rawhide hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface.

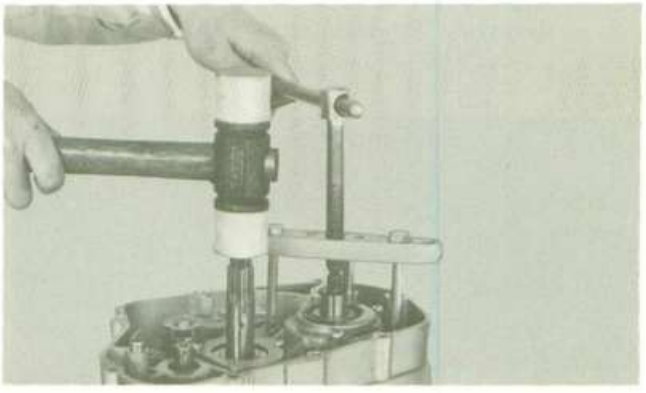


Fig. 3-118

6. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hangs up" take pressure off the push screw, realign and start over.
7. If the halves are reluctant to separate, check for a missed securing screw or fitting. Do not force.

D. Troubleshooting and Repair

Note:

See Section 3-16 to 3-18 prior to following.

1. Thoroughly wash the case halves in mild solvent.
2. Clean all gasket mating surfaces and crankcase half mating surfaces thoroughly.
3. Visually inspect case halves for any cracks, damage, etc.
4. Check all fittings not previously removed for signs of loosening or damage.
5. If bearings have been removed, check their seats for signs of damage; such as the bearing spinning in the seat, etc.
6. Check oil delivery passages in transfer ports for signs of blockage.
7. If bearings have not been removed, oil them thoroughly immediately after washing and drying. Rotate the bearings looking for hard spots indicating damaged races or balls.
8. Check needle bearings in transmission section for damaged cases, needles, etc.
9. See Section 3-18, Bearings and Seals for further information

E. Reassembly

Note:

Prior to reassembly, study Section 3-16 to 3-18.

1. After all bearings and seals have been installed in both crankcase halves and after the crankshaft and transmission have been placed into the left hand crankcase half, assemble the cases.
2. Place the case half in a horizontal position supported on its outside machined surface. Check for correct transmission installation (Section 3-16), and make certain that all loose shims are in place.
3. Apply YAMAHA Bond No. 4 to the mating surfaces of both case halves. Apply thoroughly, over all mating surfaces.



Fig. 3-119

4. Pushing right-hand case downward while tapping on rear of case with soft hammer until completely seated against left-hand case.
5. Install all pan head screws and tighten by stages in a crisscross pattern starting around the crankshaft.

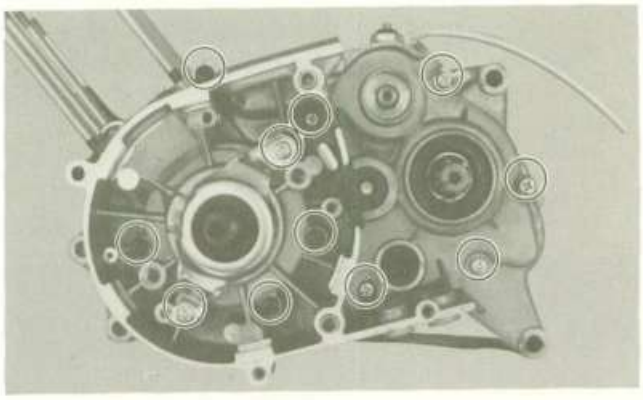
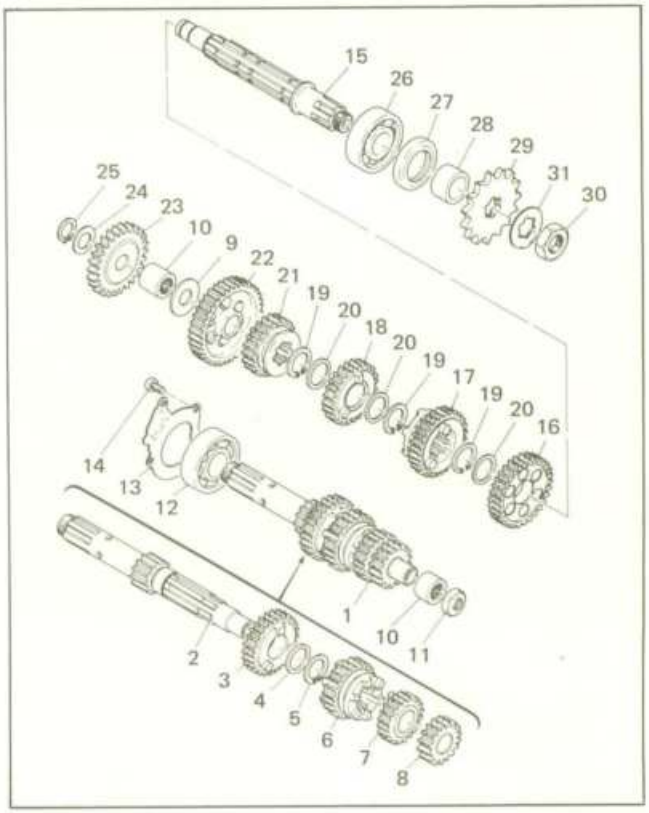


Fig. 3-120

3-16. Transmission



1. Main axle complete
2. Main axle
3. 5th pinion gear
4. Gear hold washer
5. Main axle clip
6. 4th pinion gear
7. 3rd pinion gear
8. 2nd pinion gear
9. Drive axle shim
10. Bearing
11. Push rod seal
12. Bearing
13. Bearing cover plate
14. Pan head screw
15. Drive axle
16. 2nd wheel gear
17. 3rd wheel gear
18. 4th wheel gear
19. Main axle clip
20. Gear hold washer
21. 5th wheel gear
22. 1st wheel gear
23. Kick idle gear
24. Thrust washer
25. Circlip
26. Bearing
27. Oil seal
28. Distance collar
29. Drive sprocket
30. Lock nut
31. Lock washer

Fig. 3-121

A. Removal and Disassembly

1. With the left case half in an upright position, the transmission assembly, shift forks, and shift cam assembly can be removed as an assembly. Tap lightly on the transmission drive shaft with a soft hammer to remove.

Note:

Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.

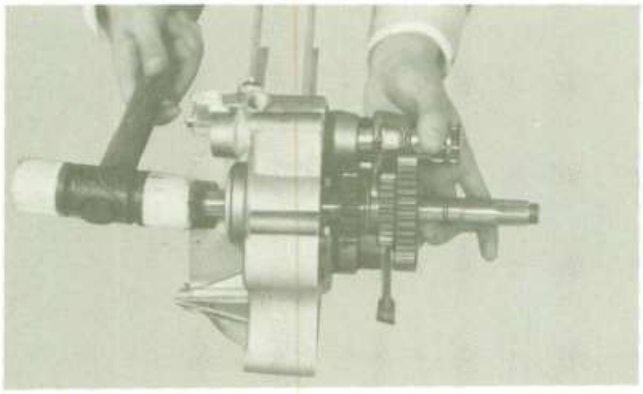


Fig. 3-122

2. Inspect each shift fork for signs of galling on tooth edges. Check for signs of bending. Make sure each fork slides freely on shift cam.
3. Check the shift cam grooves for signs of wear or damage. If any profile has excessive wear and/or any indication of damage, replace cam.

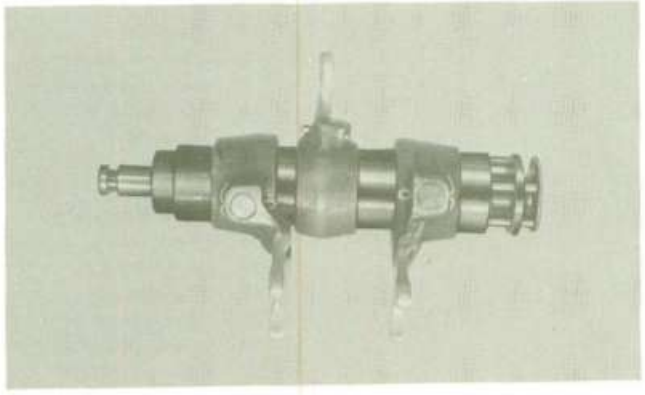


Fig. 3-123

4. Check the cam followers in each shift fork for wear. The follower should fit snugly into its seat in the shift fork, but not over-tight. Check the ends that ride in the grooves in the shift cam. If they are worn or damaged in any way, replace.
5. Check shift cam dowel pin (5) and side plate for looseness, damage, or wear. Repair as required.
6. Check the transmission shafts using a centering device and dial gauge. If any shaft is bent, replace.
7. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the gear teeth for signs of pitting, galling, or other extreme wear.
8. Check to see that each gear moves freely on its shaft.
9. Check to see that all washers and clips are properly installed and undamaged.
10. Check to see that each gear properly engages its counterpart on the shaft. Check the mating dogs for rounded edges, cracks, or missing portions. Replace as required.
11. After repairing transmission, and before installation in left crankcase half, measure transmission shaft overall widths.
12. Next, measure from each case half mating surface to the inner bearing race and/or seat that the transmission shaft ends fit into. Compare these measurements. If clearance is beyond specification, change shim thickness as required.

	Transmission Spacing
	Allowable Clearance
Main axle	0.020 in. (0.5 mm.)
Drive axle	0.020 in. (0.5 mm.)

B. Reassembly and Installation

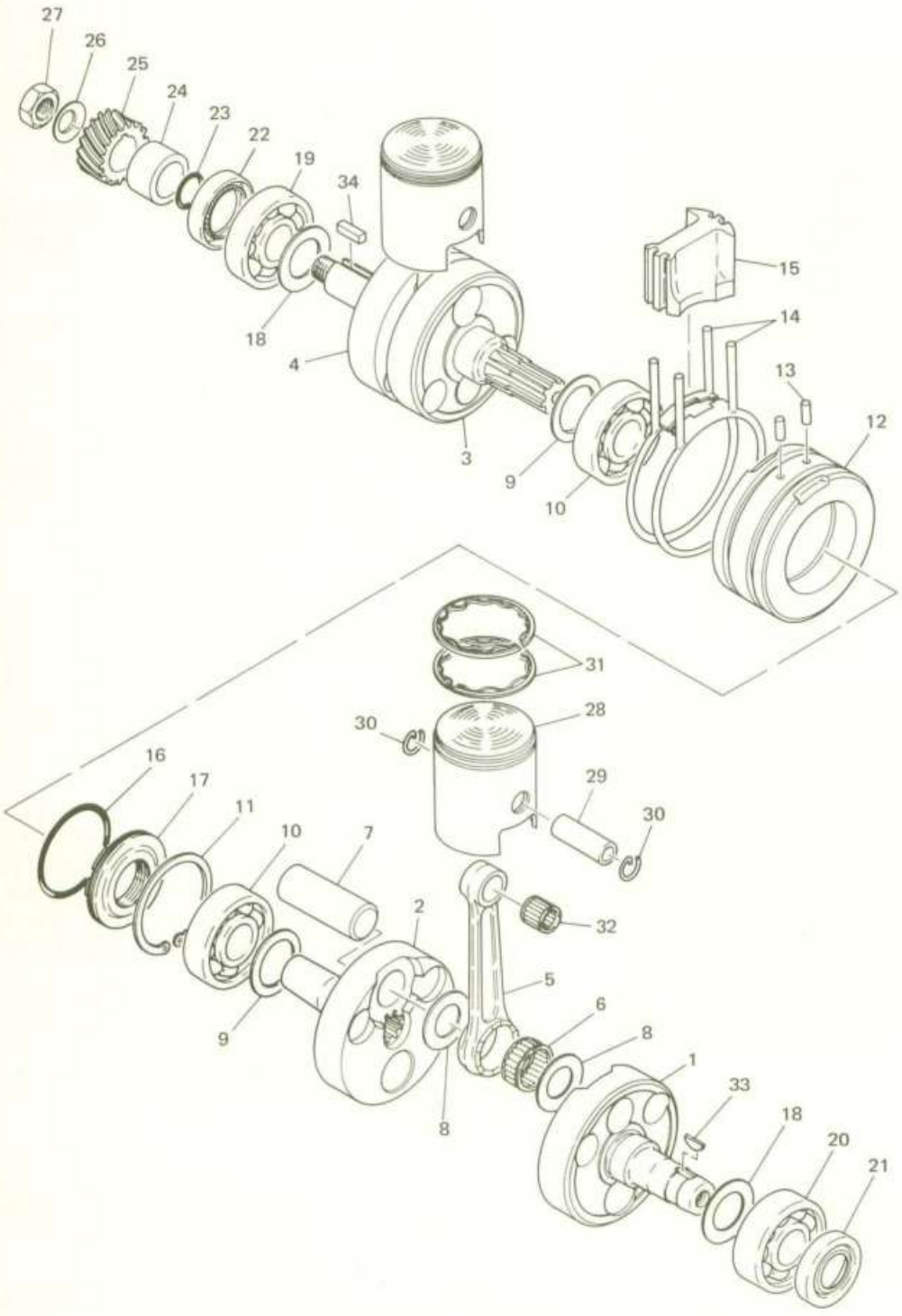
1. Paying particular attention to the parts illustration, assemble the transmission shafts, shift cam, and shift forks and guide bars as an assembly.
2. Install the assembly into the left case half. Tap into place with soft hammer, as required, until all shafts are fully seated.
3. Check to see that all four parts move freely prior to installing right case half.

3-17. Crankshaft

A. Description

1. The crankshaft requires the highest degree of accuracy in engineering and servicing of all the engine parts.
2. The crankshaft is more susceptible to wear, and therefore, the crank bearings must be inspected with special care.

Crank Piston



1. Left crank 1
2. Right crank 1
3. Left crank 2
4. Right crank 2
5. Connecting rod
6. Bearing
7. Crank pin
8. Crank pin washer
9. Crank inside washer
10. Bearing (6205C3)
11. Circlip (52φ)
12. Crank cover
13. Dowel pin (4-17.8)
14. Crank cover seal
15. Filler metal
16. O-ring (3-46.2)
17. Labyrinth seal
18. Crank outside shim
19. Bearing (6305C3)
20. Bearing (6205C4)
21. Oil seal (SD-20-40-8)
22. Oil seal (SW-32-48-8)
23. O-ring (1.2-17.6)
24. Distance collar
25. Primary drive (16T)
26. Bellevile spring
27. Lock nut
28. Piston
29. Piston pin
30. Piston pin clip
31. Piston ring set

Fig. 3-124

B. Crankshaft Assembly

1. Removal.

a. Remove crankshaft assembly with the crankcase separating tool.

Note:

Fully tighten bolts of the crankcase separating tool, and keep tool body parallel with crankcase surface.

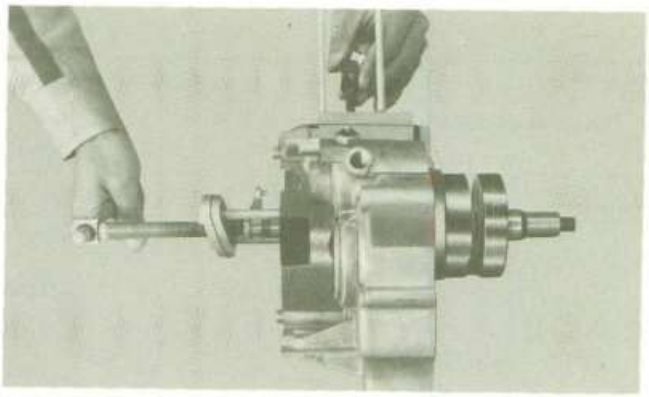
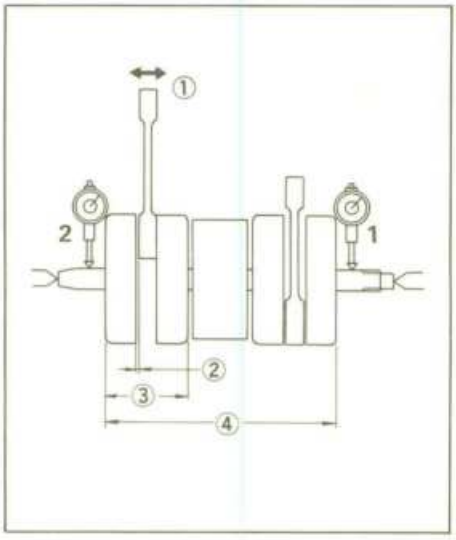


Fig. 3-125

2. Check crankshaft components per chart.

Check connecting rod axial play at small end (to determine the amount of wear of crank pin and bearing at large end).	Small end play should not exceed 0.08 in. (2 mm.).	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 re-assembly should be within 0.036 — 0.039 in. (0.8 — 1.0 mm.).
Check the connecting rod for axial play at large end.	Move the connecting rod to one side and insert a feeler gauge. Large end axial play should be within 0.004 — 0.112 in. (0.1 — 0.3 mm.).	If excessive axial play is present, 0.016 in. (0.4 mm., or more) disassemble the crankshaft and replace any worn parts.
Check accuracy of the crankshaft assembly runout. (Misalignment of parts of the crankshaft.)	Dial gauge readings should be within 0.0012 in. (0.03 mm.).	Correct any misalignment by tapping the flywheel with a brass hammer and by using a wedge.



1. Axial play
2. Side clearance:
3. Flywheel width: F
4. Width of crankshaft assembly: A

Fig. 3-126

Crankshaft Specifications

Unit: in. (mm.)

Defection Tolerance		Flywheel Width	Width of Crankshaft Assembly	Rod Clearance			
				Axial		Side	
1	2	F	A	New	Max.	Min.	Max.
0.0012	0.0012	$1.85\ ^{-0.002}_{-0.004}$	$5.51\ ^{+0}_{-0.008}$	0.031 — 0.039	0.08	0.004	0.012
(0.03)	(0.03)	$\left(47\ ^{-0.05}_{-0.10}\right)$	$\left(140\ ^{+0}_{-0.20}\right)$	(0.8 — 1.0)	(2.0)	(0.1)	(0.3)

C. Reinstalling Crankshaft Assembly

1. Put shim on left side of the crankshaft, and install the crankshaft into left case half using crankshaft installing tool.

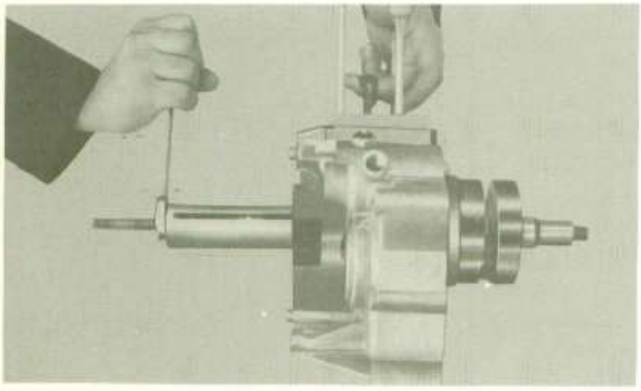


Fig. 3-127

2. Hold the connecting rod at top dead center with one hand while turning the handle of the installing tool with the other.
3. During reassembly, apply a liberal coating of two-stroke oil to the piston pin and bearing. Apply several drops of oil to the connecting rod big end. Apply several drops of oil into each crankshaft bearing oil delivery hole.

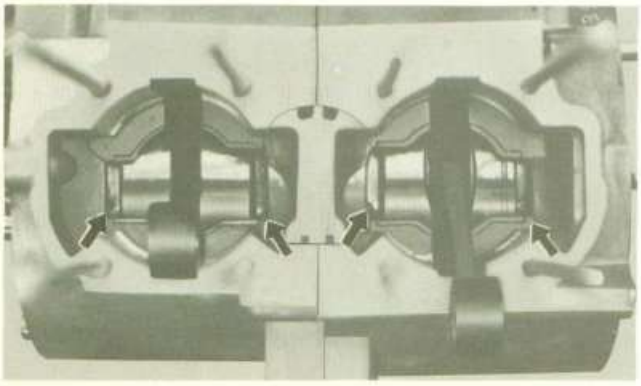


Fig. 3-128

D. Disassembling the Crankshaft Assembly

To disassemble the crankshaft assembly use a set of crankshaft separator.

1. Insert the tool (lower) into the gap between crank webs. Then install the tool (upper) in the same manner as with the other half of the crankshaft.

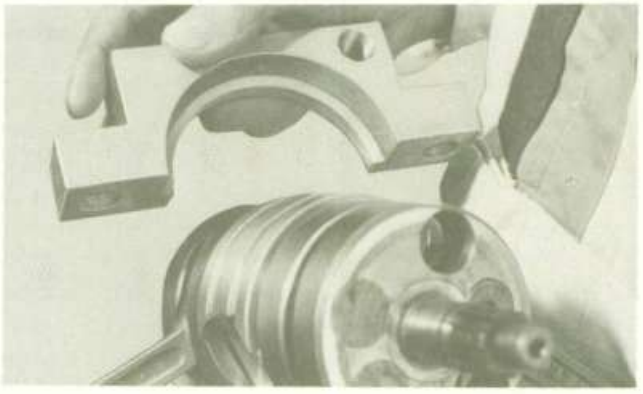


Fig. 3-129

2. Fully tighten the bolts of tools (lower) and (upper). Failure to tighten the bolts completely can result in tool failure.

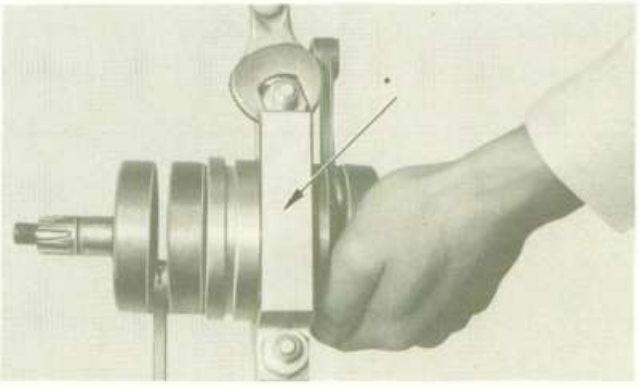


Fig. 3-130

3. Fig. 3-131 shows the tools installed on the crankshaft assembly.

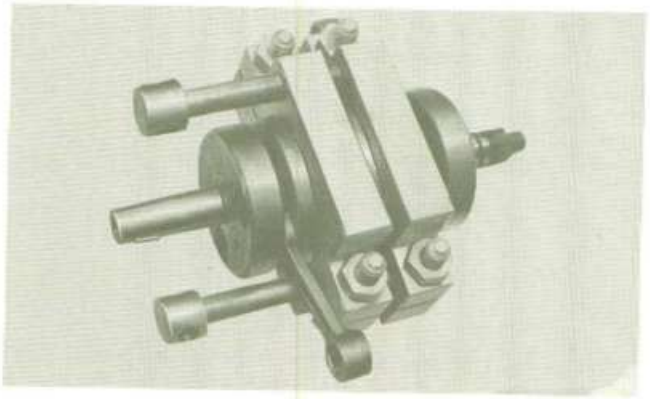


Fig. 3-131

4. Hold the crankshaft assembly in the vice, and disassemble the assembly into two parts by alternately giving one turn to each bolt which is installed on the tool (lower), so that the crankshaft assembly splits into two parts.

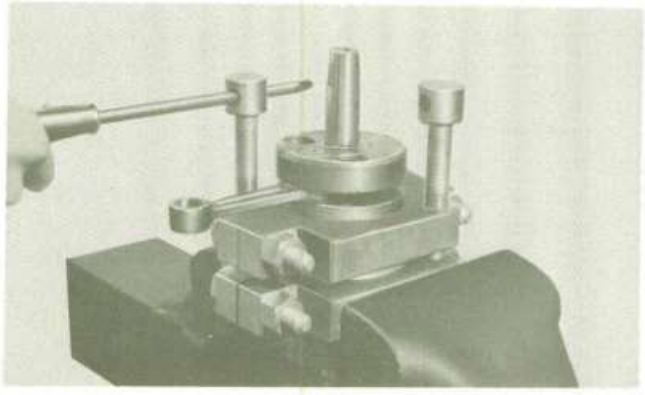


Fig. 3-132

5. Fig. 3-133 shows the disassembly crankshaft assembly. To remove the crank cover and bearing, use a press.

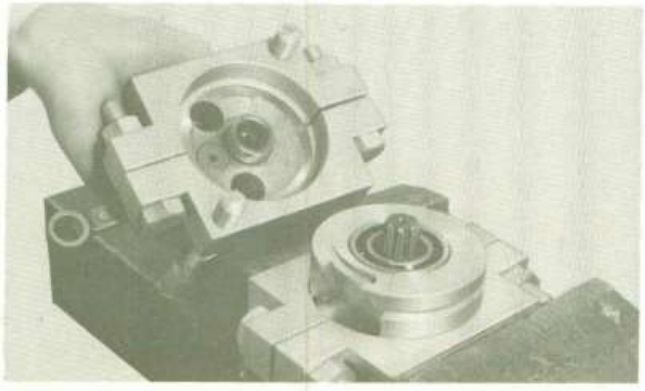


Fig. 3-133

6. Remove the crank pin in the manner as shown in Fig. 3-134. (For this purpose, use the jigs as shown in Fig. 3-2.)

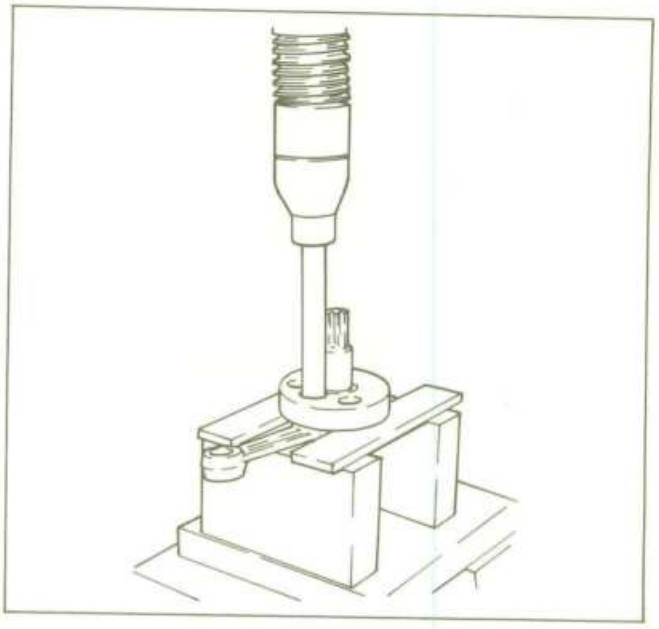


Fig. 3-134

7. Next, take the remaining crank wheel with the crank pin still in it, turn the wheel over, place it on the support plates, and press out the crank pin.
8. Repeat steps 6. and 7. to disassemble the other crank half.

E. Reassembling the Crankshaft Assembly

To reassemble the crankshaft assembly use a set of special jigs.

1. Install the stops (47 mm.) (used to space the crankshaft assembly) on the crankshaft jig.

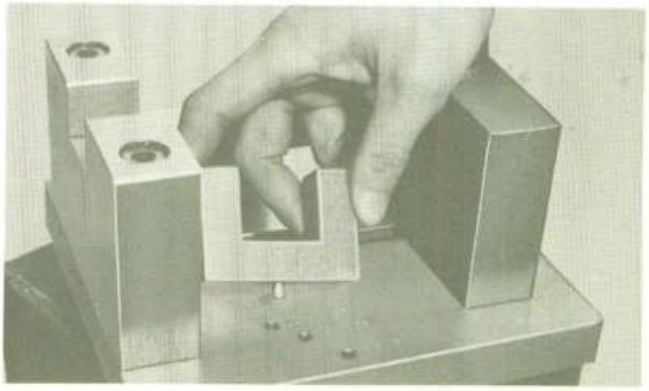


Fig. 3-135

2. Press the crank pin into one crank wheel, and position the crank wheel in the crankshaft jig. Then install the connecting rod on the crank pin.

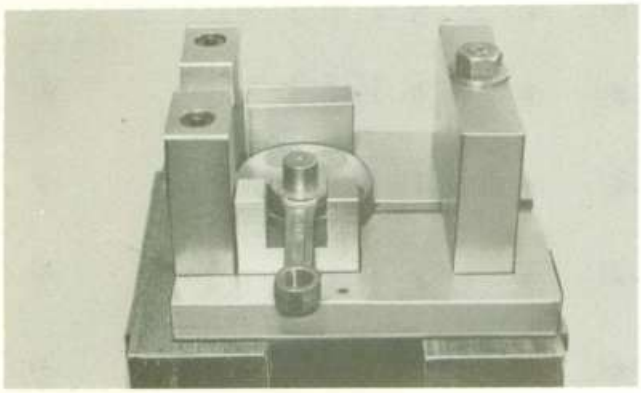


Fig. 3-136

3. Place the other crank wheel in position and lightly tap in onto the crank pin. Keep the crank wheel horizontal when tapping it in place.
   Position the slide plate against the rim of the crank wheel, and tap the slide plate until it contacts the crank wheel (to align the crankshaft temporarily) using a brass hammer.

Note:
When using the hammer, keep the slide plate bolt lock nut loose.

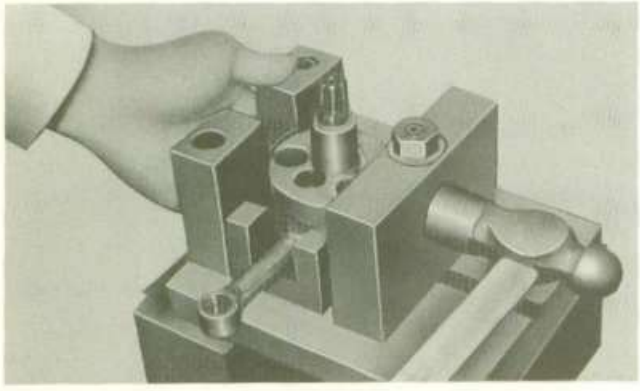


Fig. 3-137

4. Fully tighten the slide plate lock nut.

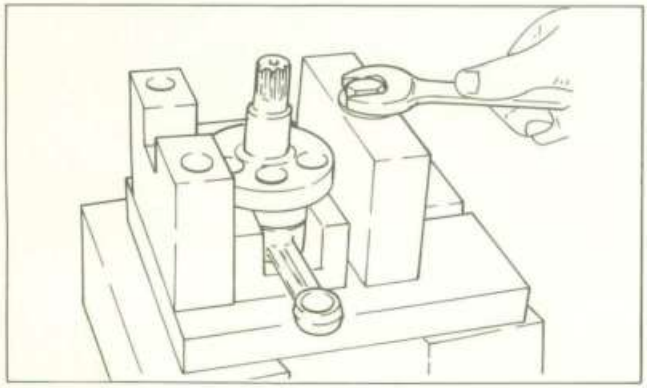
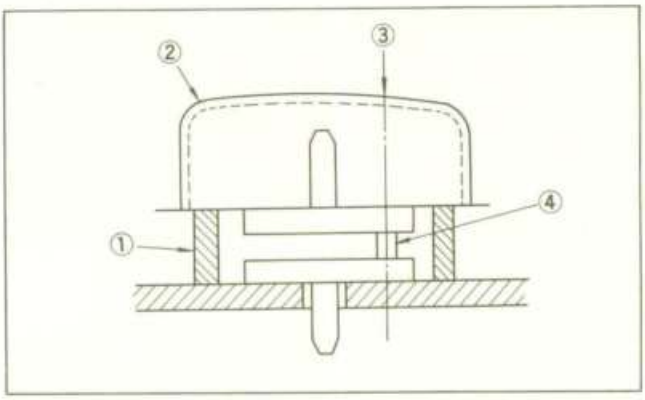


Fig. 3-138

5. Place the press box on the face of the crank wheel and press the wheel downward with a hand press until the press box comes in contact with the top of the stops (47 mm.).
   Then continue pressing until the pressure load reaches 5 tons. (Pressure should be applied in the center line of the crank pin.)



1. Stops (47 mm.)
2. Press box
3. Press this side
4. Crank pin

Fig. 3-139

6. First, install the crank cover over the male center spline. Then join the two crank halves together, making sure the rods are 180° apart. Note that the crankshaft wedge is placed between the upper crank wheels to prevent the crank wheels from butting against the rods. When you are sure center splines are mating correctly, apply pressure on the order of 10 tons and more. Remove the crankshaft and check overall width. If overall width is correct the entire crank assembly may now be aligned. Then align the whole crankshaft assembly.

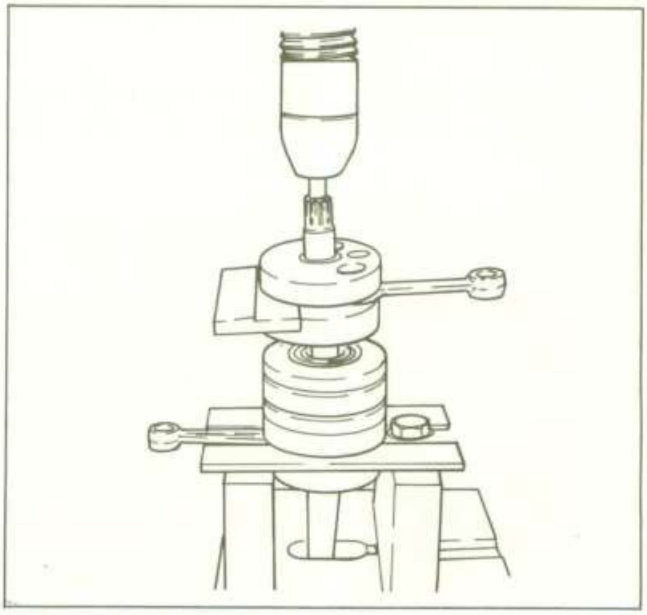
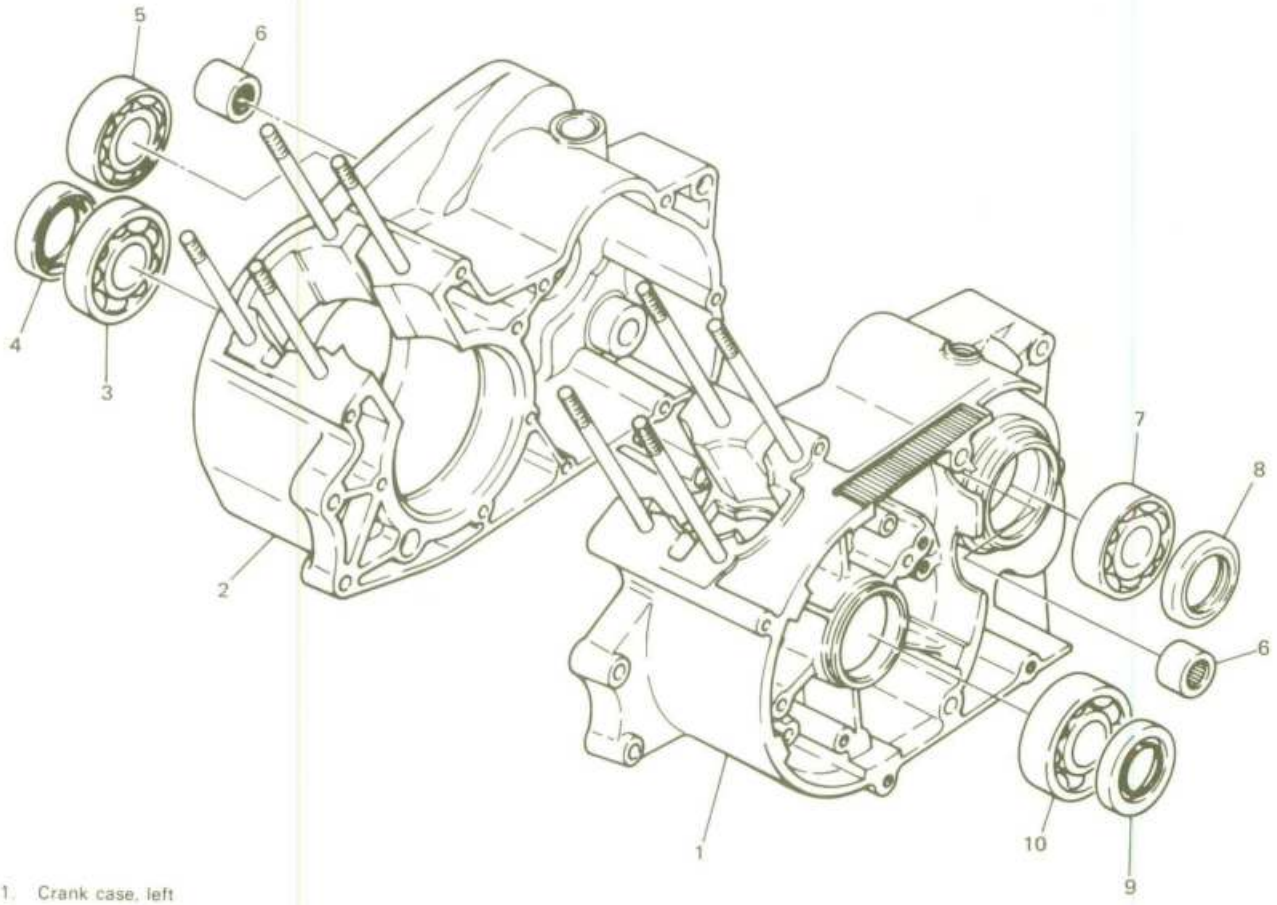


Fig. 3-140

7. Check the crankshaft. Refer to 3-17.B.2. on page 73.

3-18. Bearing and Oil Seals



1. Crank case, left
2. Crank case, right
3. Bearing (6305C3)
4. Oil seal (SW-32-48-8)
5. Bearing (6304Z)
6. Bearing
7. Bearing (6304)
8. Oil seal (SD-28-44-7)
9. Oil seal (SD-20-40-8)
10. Bearing (6205C4)

Fig. 3-141

A. Removal

1. Pry the oil seals out of place with a slotted head screwdriver. Always replace all oil seals when overhauling engine.

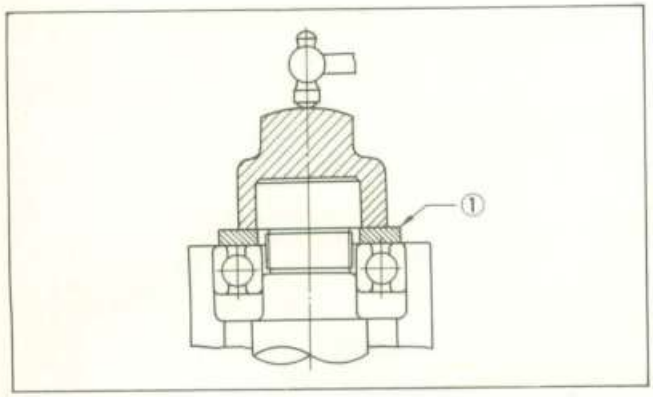
Note:

Place a piece of wood under the screwdriver to prevent damage to case.

2. Drive out bearings with a bearing tool.

Note:

Bearings are most easily removed or installed if the cases are first heated to approximately 200° F. However, cold removal and installation may be done satisfactorily.



1. Spacer

Fig. 3-142

B. Installation

1. Install bearings and oil seals with their stamped manufacturer's marks or numerals facing outward. (In other words, the stamped letters must be on the exposed view side). When installing bearings or seals, apply a light coating of light-weight lithium base grease to balls and seal lips.

CHAPTER 4. CARBURETION

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4

CHAPTER 4. CARBURETION

4-1. Special Tools

A. Vernier Caliper
P/N 90890-03004

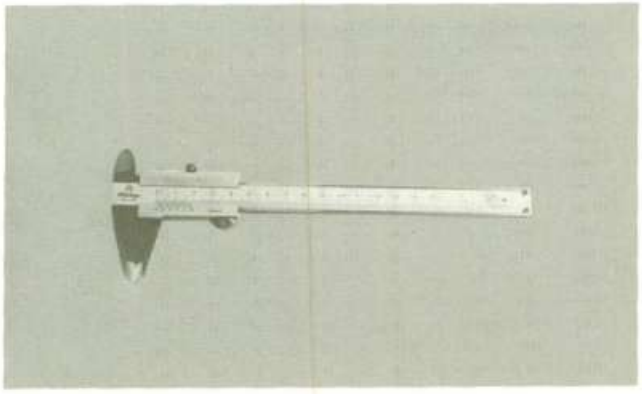


Fig. 4-1

4-2. Air Filter

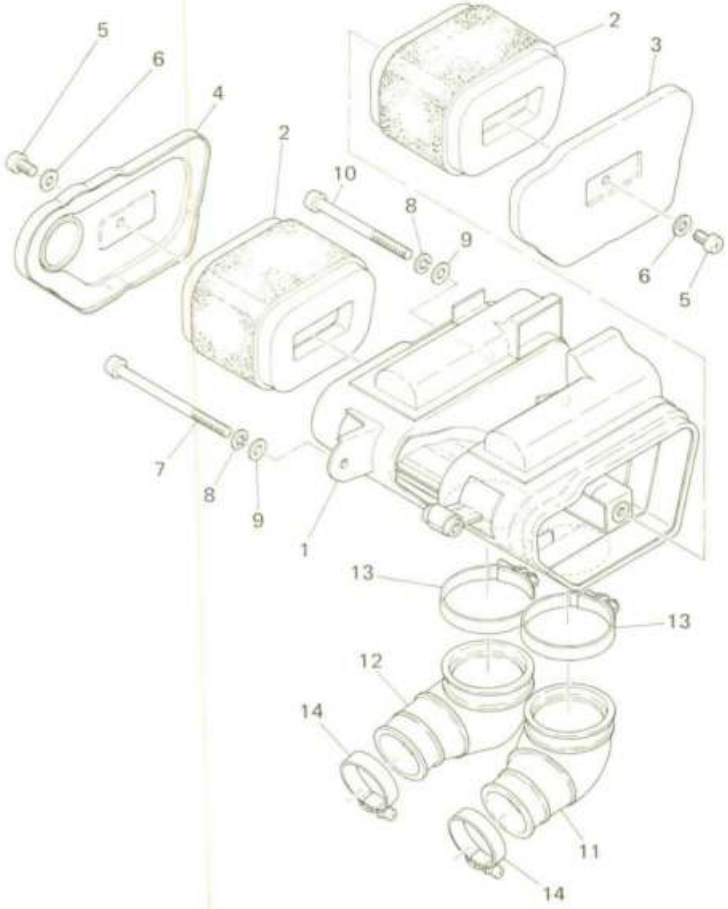
A. Description

1. The air filter is housed within a case below the oil tank.

2. The filter is made of Polyurethane foam with a stiff bristle covering.

3. For carburetion to function properly, the filter must be in place; must be clean; and must be damp with oil to provide adequate protection to vital engine parts.

Air Cleaner



1. Air cleaner case
2. Air cleaner element
3. Cleaner left cap
4. Cleaner right cap
5. Pan head screw
6. Plain washer
7. Pan head screw
8. Spring washer
9. Plain washer
10. Pan head screw
11. Air cleaner left joint
12. Air cleaner right joint
13. Band
14. Band

Fig. 4-2

4. For air filter maintenance see Chapter 2, Section 2-D.

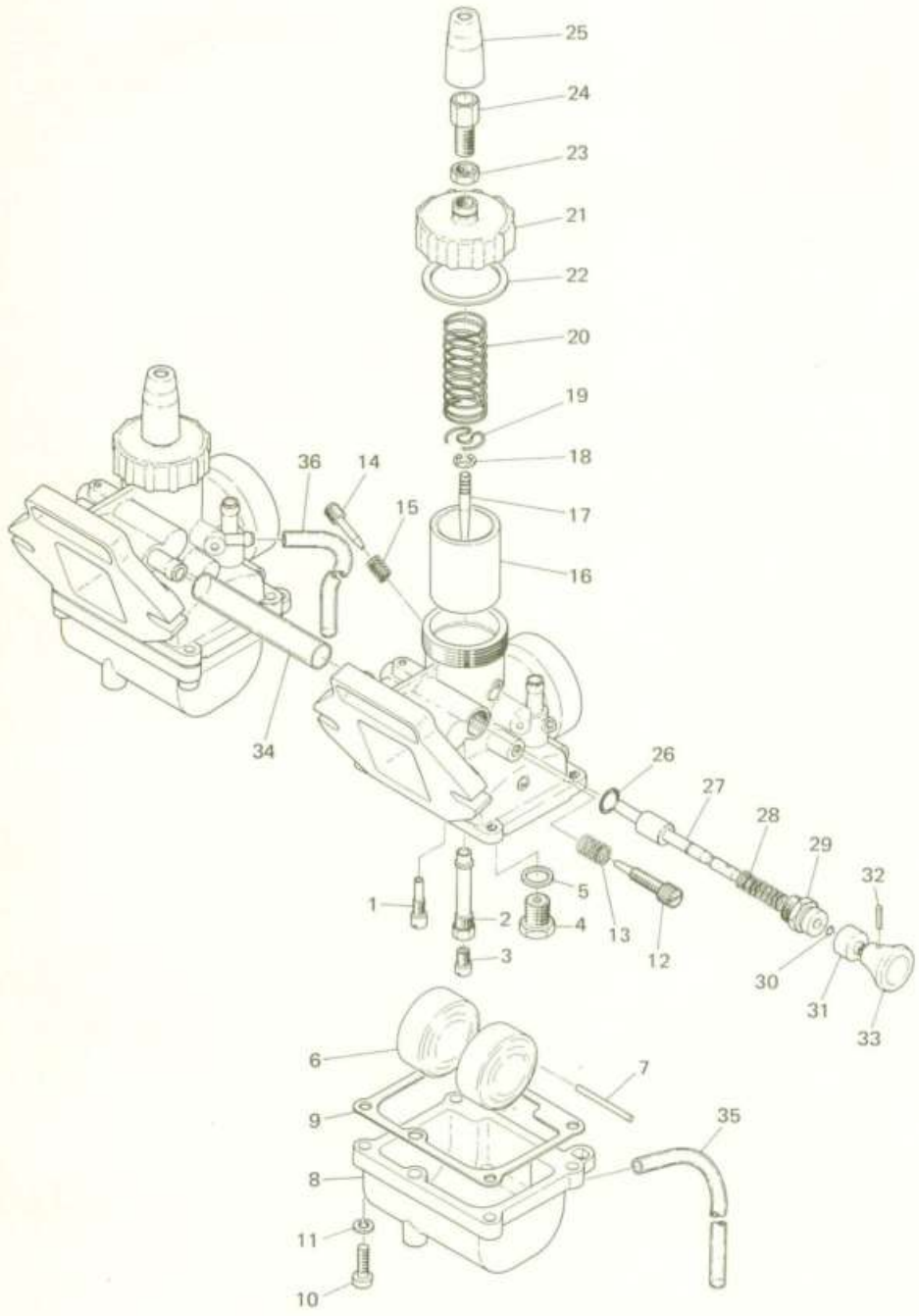
4-3. Carburetor

A. Description

1. The carburetor is of primary concern to proper engine operation. Considerable care should be taken during disassembly, inspection, and maintenance to see that all circuits are working correctly and that all adjustments are properly made.

2. Prior to carburetor disassembly, study the sections on air filter, spark plug, Autolube and ignition timing thoroughly. Each of these components works in conjunction with the carburetor to provide maximum performance and longevity.

Carburetor



1. Pilot jet (#42)
2. Main nozzle
3. Main jet
4. Valve seat assembly (#2.5)
5. Valve seat washer
6. Float
7. Float pin
8. Float chamber body
9. Float chamber gasket
10. Pan head screw
11. Spring washer
12. Pilot adjusting screw
13. Pilot adjusting spring
14. Air adjusting screw
15. Air adjusting spring
16. Throttle left valve (C.A2.0)
16. Throttle right valve (C.A2.0)
17. Needle (4F51-3)
18. Clip
19. Throttle spring receiver
20. Throttle valve spring
21. Mixing chamber cap
22. Packing
23. Wire adjusting nut
24. Wire adjusting screw
25. Cap
26. O-ring
27. Starter plunger
28. Plunger spring
29. Plunger cap
30. Plunger clip
31. Plunger cap cover
32. Spring pin
33. Knob
34. Joint pipe
35. Over flow pipe (3-160)
36. Air vent pipe (3-220)

Fig. 4-3

B. Removal

1. Turn fuel petcock lever to the "OFF" position.

2. Remove the gasoline tank fuel line from fittings at carburetors.

3. Unscrew the mixing chamber caps. Remove the throttle valve and needle assemblies.

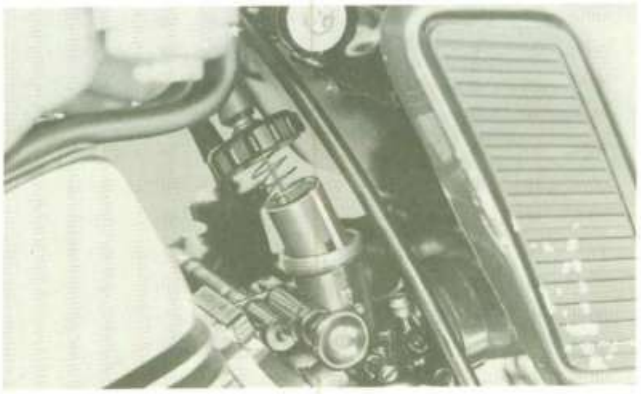


Fig. 4-4

4. Loosen the hose clamp screws and remove the air cleaner joints (L.R.)



Fig. 4-5

5. Remove the hexagon bolts holding the carburetors.



Fig. 4-6

6. Remove the carburetors and disconnect starter jet joint hose.

7. Remove the carburetor packings. Replace them during reassembly.

C. Disassembly

Note:

Right carburetor does not incorporate starter jet assembly, and both right and left carburetor are connected by joint pipe. Carburetor assemblies are identical and all disassembly, maintenance and troubleshooting procedures are also identical.

1. Remove the Phillips screws (4) holding float bowl to body. With carburetor in upright position, remove float bowl.

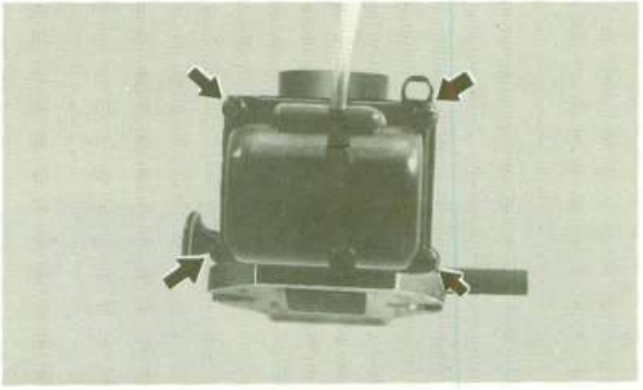


Fig. 4-7

2. On the caburetor body, remove the float pin securing the float assembly. Remove the float assembly.
If fuel has entered a float, replace float assembly. If float arm is loose or missing, or if the floats are damaged in any fashion, replace.

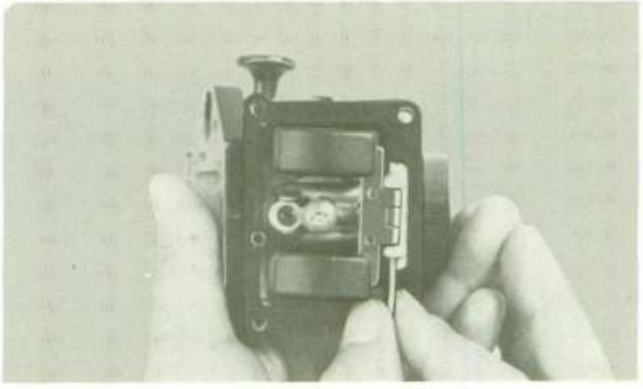


Fig. 4-8

3. Remove the inlet needle directly beneath the float arm tang. Inspect the needle and seat for signs of excessive wear or attached foreign particles. Replace as required. Always replace inlet needle and inlet valve seat as an assembly.

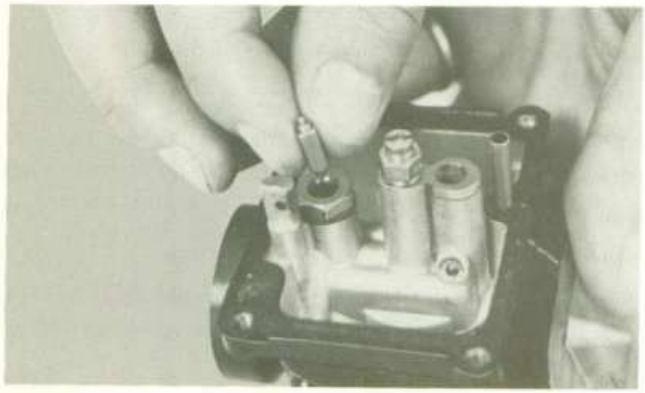


Fig. 4-9

4. Remove in order, the following components:

a. Main jet

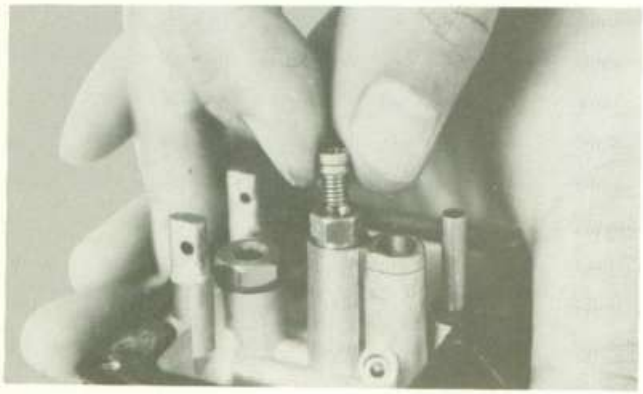


Fig. 4-10

b. Pilot jet



Fig. 4-11

c. Main nozzle

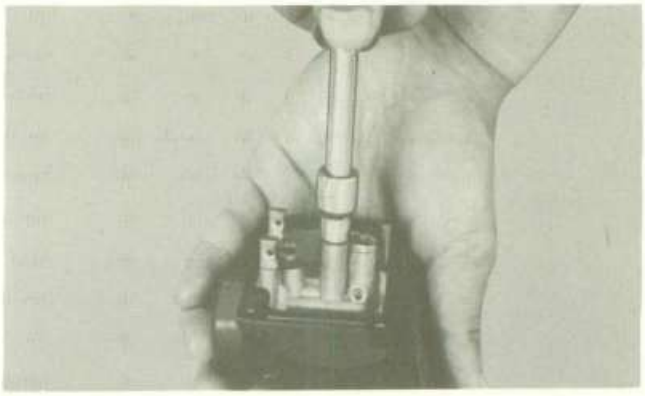


Fig. 4-12

d. Throttle stop screw (Idle speed screw).

e. Air adjusting screw (Idle mixture screw).

5. Pull the starter jet knob to open the circuit. (Left-hand carburetor)

D. Maintenance

1. Wash the carburetor in petroleum base solvent. Wash all associated parts.

Note:

It is rarely necessary to "boil" the carburetor in a warm or hot carburetor bath. If deposits warrant this procedure, remove the starter jet assembly to avoid damaging the jet's neoprene valve seat.

2. Using high pressure air, blow out all passages and jets.

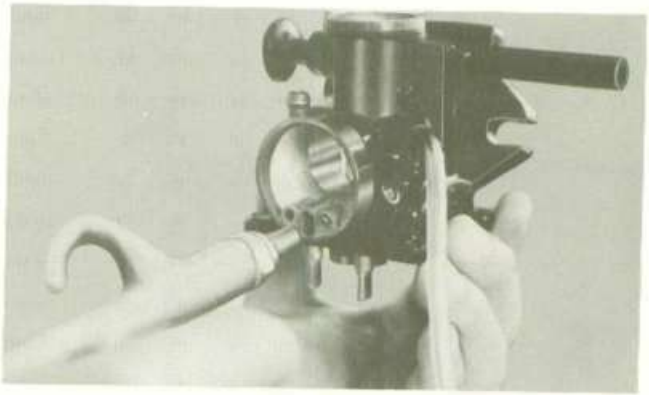


Fig. 4-13

Note:

Never direct high pressure air into carburetor with float bowl installed. Damage to floats may occur.

3. Re-install all components with the exception of the float bowl.

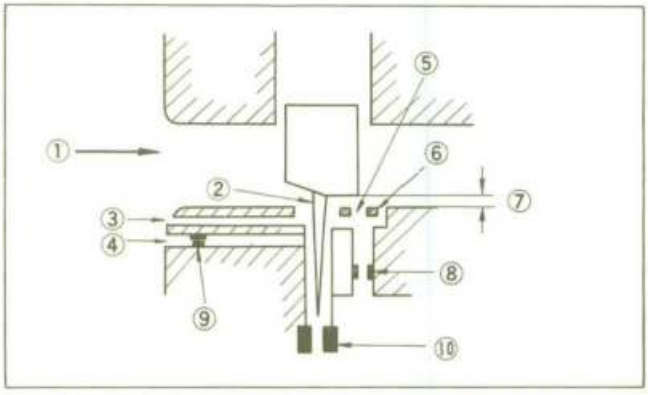
Carburetor Specifications		
Part Name	Abbrev.	Setting
Manufacturer . Model	—	Teikei Y20P-1A
I.D.Number	—	37763
Venturi Size	—	20 φmm.
Main Jet	M.J.	#94
Needle Jet	N.J.	N80
Jet Needle/Clip Position	J.N.	4F51-3
Cut Away	C.A.	2.0
Pilot Jet	P.J.	#42
Air Jet	A.J.	0.9 φ
Starter Jet	S.J.	#70
Air Screw (Turns Out)	A.S.	1 ¼
Idle Speed (r.p.m.)	—	1,150 — 1,250 r.p.m.
Float Level	F.L.	0.79 ±0.098 in. (20 ±2.5 mm.)

E. Troubleshooting and Repair

Cylinder porting, combustion chamber compression, ignition timing, muffler design, and carburetor size and component selection are all balanced to achieve optimum performance. However, variations in temperature, humidity and altitude, to name a few, will affect carburetion and consequently, engine performance.

The following list gives each of the major components of the carburetor that can be readily changed in order to modify carburetor performance if required.

1. Idle air mixture screw
   Controls the ratio of air to fuel in the idle circuit. Turning the screw in decreases the air supply giving a richer mixture.
   OPERATING RANGE MOST AFFECTED BY THIS ADJUSTMENT: ZERO TO 1/8 THROTTLE



1 Main air
2. Jet needle
3. Pilot air
4. Bleed air
5. Bypass
6. Pilot outlet
7. Opening 0 to 1/8
8. Pilot jet
9. Air jet
10. Main jet

Fig. 4-14

2. Pilot jet

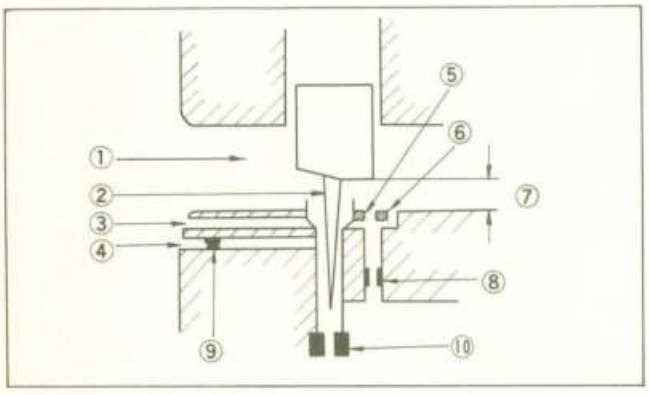
Controls the ratio of fuel to air in the idle circuit. Changing the jet to one with a higher number supplies more fuel to the circuit giving a richer mixture.

OPERATING RANGE MOST AFFECTED BY THIS JET: ZERO TO 1/8 THROTTLE.

3. Throttle valve (slide)

The throttle valve (slide) has a portion of the base cut away to control air flowing over the main nozzle. A wider angle (more "cutaway") will create a leaner mixture. Throttle valves are numbered according to the angle of the cutaway. The higher the number, the more the cutaway, the leaner the mixture.

OPERATING RANGE MOST AFFECTED BY THE THROTTLE VALVE: 1/8 TO 1/4 THROTTLE.



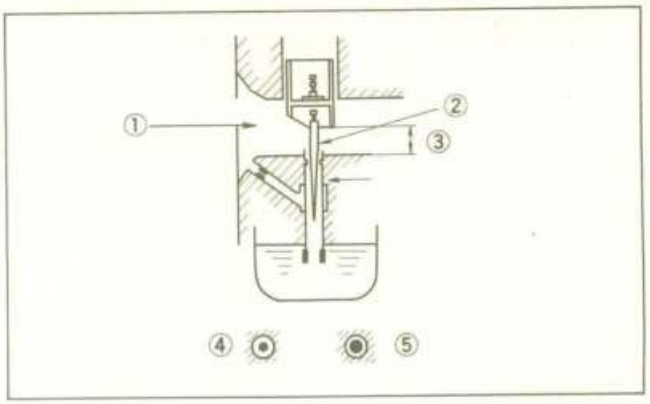
1. Main air
2. Jet needle
3. Pilot air
4. Bleed air
5. Bypass
6. Pilot outlet
7. Opening 1/8 to 1/4
8. Pilot jet
9. Air jet
10. Main jet

Fig. 4-15

4. Jet needle

The jet needle is fitted within the throttle valve. The tapered end of the needle fits into the main nozzle outlet. Raising the needle allows more fuel to flow out of the nozzle outlet giving a richer mixture. There are five circlip grooves at the top of the needle. Moving the needle clip from the first, or top groove, through the fifth, or bottom groove, will give a correspondingly richer mixture.

OPERATING RANGE MOST AFFECTED BY THE JET NEEDLE: 1/4 TO 3/4 THROTTLE.



1. Main air
2. Jet needle
3. Opening 1/4 to 3/4
4. 3/4
5. 1/4

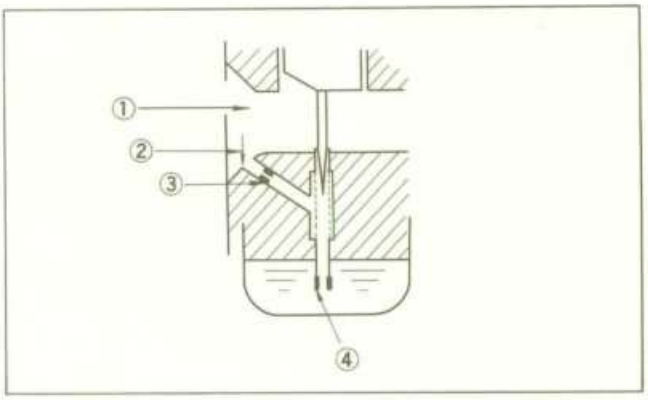
Fig. 4-16

5. Main jet

The main jet controls overall fuel flow through the main nozzle.

Changing the jet to one with a higher number supplies more fuel to the main nozzle giving a richer mixture.

OPERATING RANGE MOST AFFECTED BY THE MAIN JET: 3/4 TO FULL THROTTLE.



1. Main air
2. Bleed air
3. Air jet
4. Main jet

Fig. 4-17

Note:

Excessive changes in main jet size can affect overall performance.

Caution:

The fuel/air mixture ratio is a governing factor upon engine operating temperature.

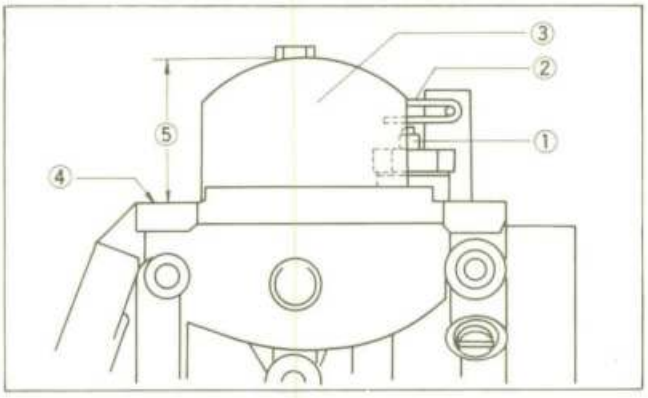
Any carburetor changes, whatsoever, must be followed by a thorough test of spark plug temperature during actual engine operation.

6. Float level

a. Float level is one factor within the carburetor which will change with use.

b. If float level within the carburetor float chamber body decreases, the fuel/air mixture ratio will be leaner. If the level increases, mixture will be richer.

c. The level is set according to the design of the carburetor and float bowl chamber. Under no circumstances should float level be altered in an attempt to correct a performance problem. Look for the problem in other related components or carburetor circuits.



1. Needle head
2. Float holding plate
3. Float
4. Edge of the mixing chamber
5. Float level

Fig. 4-18

d. Using a vernier caliper, measure the distance of the float arm from the top of the float chamber gasket seat (gasket removed) to the float.

Float level:
0.79±0.10 in. (20±2.5 mm.)

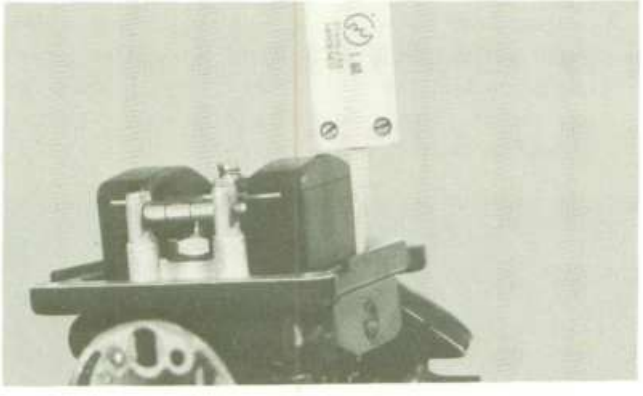


Fig. 4-19

Note:

The float arm tang should be just resting on, but not depressing, the spring loaded inlet needle.

e. To correct float level remove the float assembly and bend the tang a slight amount as required.
Both the right and left sides of the float arm should measure indentically.
Correct as required.

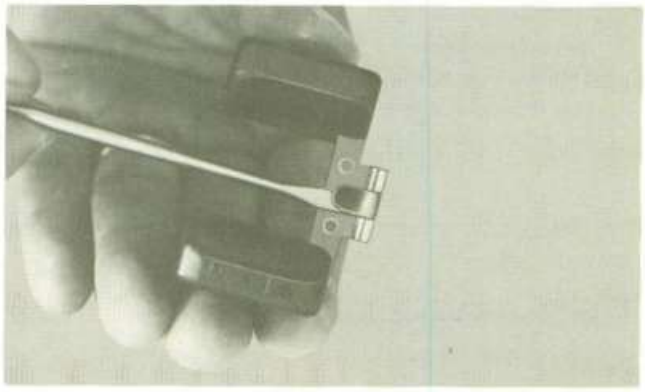


Fig. 4-20

F. Reassembly and Installation

1. Install the float bowl.

2. Push needle out of seat in throttle valve (slide). Inspect for signs of bending, scratches or wear.
Replace as required.

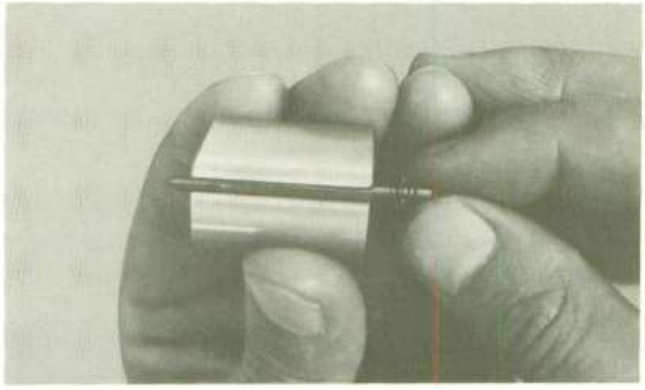


Fig. 4-21

3. Check needle clip position.
Clip position is counted starting with the first clip groove at the top of the needle.

Jet Needle Type:	4F51
Clip Position:	3

4. Check throttle valve (slide) for signs of wear. Insert into carburetor body and check for free movement. If slide, or body, is out of round causing slide to stick, replace.

5. Install throttle valve and needle assembly in carburetor mixing chamber. Tighten mixing chamber cap as tight as possible by hand.
Do not use pliers or vise-grips as they may deform the mixing chamber shape, causing the throttle valve to stick during operation.

6. Install all overflow and vent tubes. Re-install carburetors. Install starter jet joint hose.
Check position and routing of all tubes. Check tightness of all fittings. Make sure carburetor is mounted in a level position.

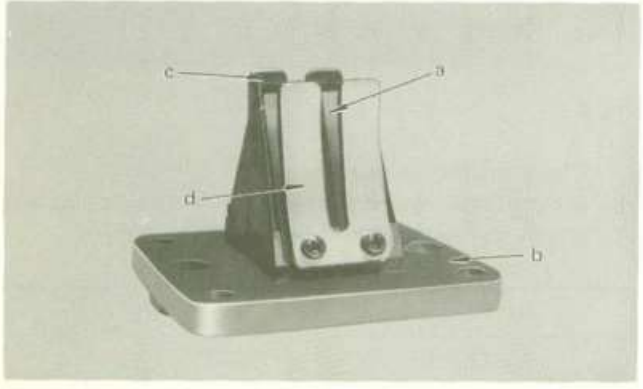
7. After installation, re-adjust throttle cable and Autolube pump cable per directions in "cable routing diagrams"

4-4. Reed Valve Assembly

A. Description

1. Yamaha has designed a unique stainless steel reed valve located between the carburetor and cylinder. The valve works independently on a demand basis. There's no mechanical device, such as a rotary valve or piston skirt to govern its opening and closing.

2. Construction of Reed Valve Assembly
a. Valve
The valve is made of special flexible stainless steel and designed to open and close the inlet port.
b. Case
The case is made of a die-cast aluminum alloy.
c. Gasket
Made of heat-and oil-resisting rubber, the gasket is "welded" to the case by heat.
d. Valve stopper
The valve stopper is made of highly-durable cold-rolled stainless steel plate, and controls the movement of the valve.



a. Valve
b. Case
c. Gasket
d. Valve stopper

Fig. 4-22

3. Handling the reed valve
a. As explained earlier, the reed valve is operated by changes in crankcase pressure and by the inertia effect of the fuel-air stream. It is a high-precision piece, and therefore, it must be handled with special care.

4. Storage
a. The reed valve must be stored in a clean and dry place and must not be exposed to the sun. Particularly, it must be kept free from salt. Avoid touching the valve.

B. Removal and Troubleshooting

With carburetor removed, proceed as follows:
1. Remove the flat head screws holding the reed valve assembles to cylinders.
Remove assembly.

2. Inspect reed petals for signs of fatigue and cracks. Reed petals should fit flush or nearly flush against neoprene seats. If in doubt as to sealing ability, apply suction to carburetor side of assembly. Leakage should be slight to moderate.

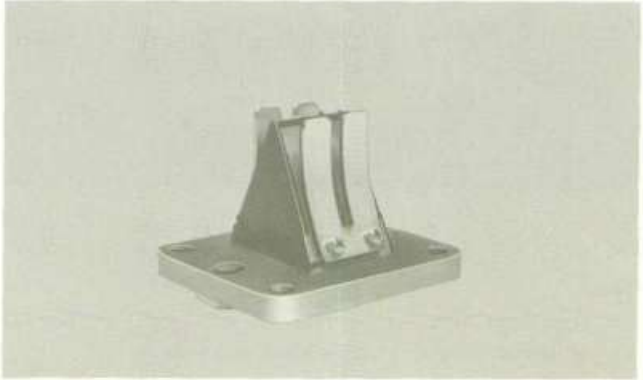


Fig. 4-23

3. If disassembly of the reed valve assembly is required, proceed as follows:

a. Remove Phillips screws (2) securing stopper plate and reed to reed block. Handle reed carefully. Avoid scratches and do not bend.
Note from which side of the reed block the reed and stopper plate were removed. Re-install on same side.

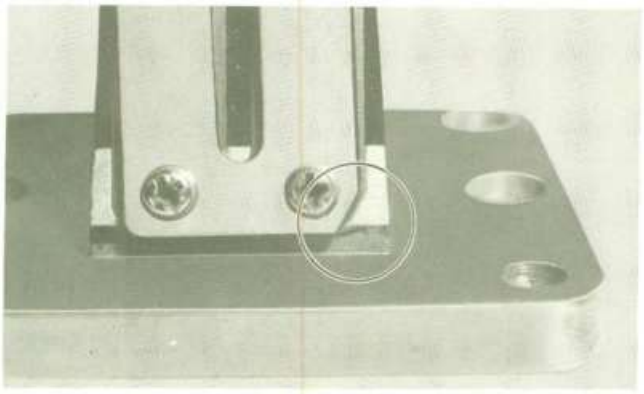


Fig. 4-24

b. During reassembly, clean reed block, reed, and stopper plate thoroughly. Apply a holding agent, such as "Lock-Tite", to threads of Phillips screws. Tighten each screw gradually to avoid warping.

Torque:
0.70 in-lbs. (8.0 cm-kgs.)

Note:

During reassembly, note the cut in the lower corner of the reed and stopper plate. Use as aid to direction of reed installation.

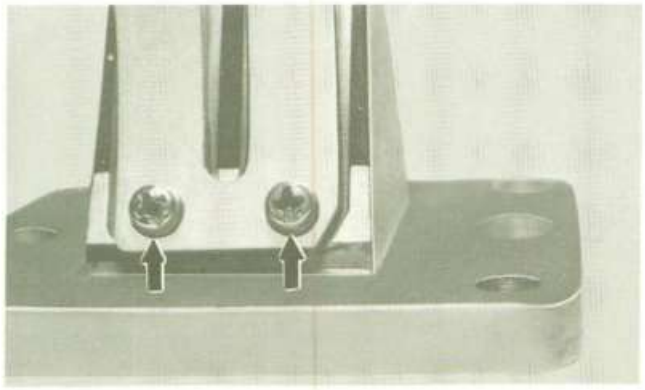


Fig. 4-25

4. During reassembly of the reed valve assembly, install new gaskets and torque the flat head screws gradually and in pattern. Tighten thoroughly.

5. Valve stopper
The valve stopper controls the movement of the valve. Check clearance "a".

Standard value:
"a"—0.38 in. (9.6 mm.)

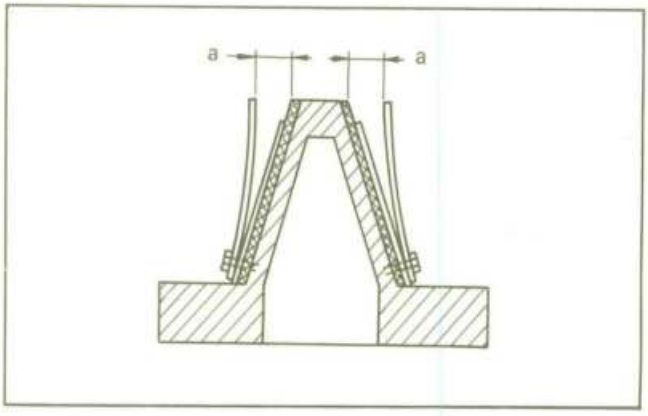


Fig. 4-26

Note:

If clearance "a" is larger than specified, the valve will be broken. If smaller, valve performance can be impaired.

CHAPTER 5. ELECTRICAL SYSTEM

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5

CHAPTER 5. ELECTRICAL SYSTEM

5-1. Special Tools

A. Pocket Tester

P/N90890-03029

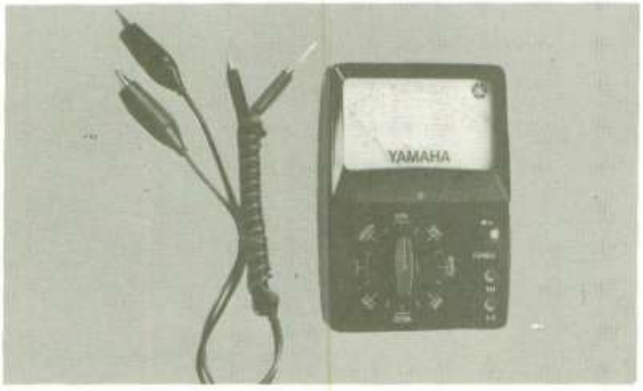


Fig. 5-1

B. Electro-Tester

P/N90890-03021

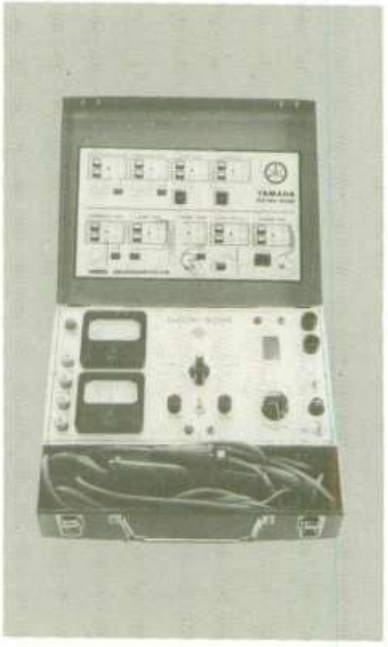


Fig. 5-2

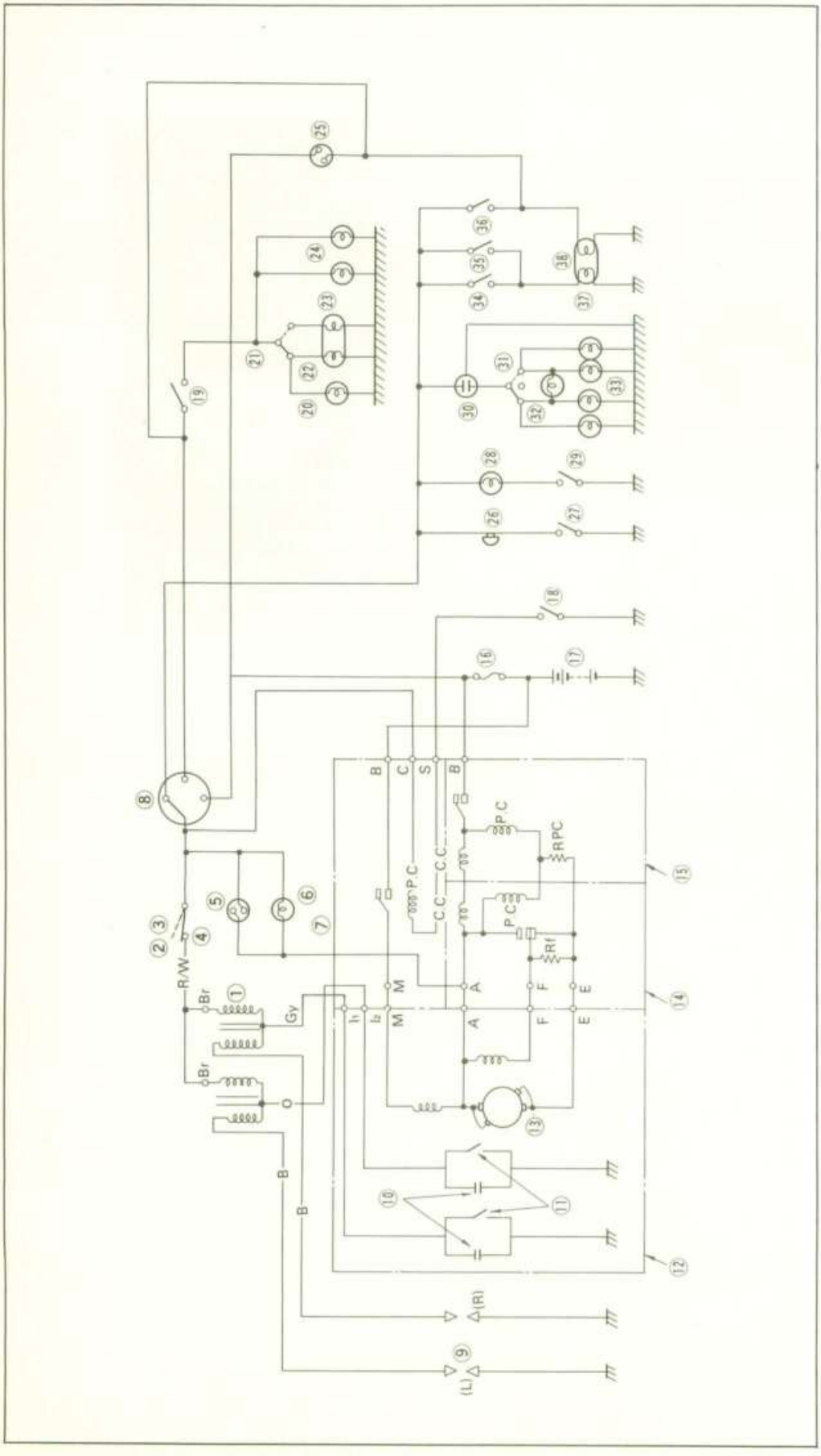
5-2. Description

The RD200A is equipped with a 12-volt starter-dynamo wihch serves as a combination starter and direct current generator. All electrical components are powered directly by the 12-volt storage battery.

A. Electrical Components

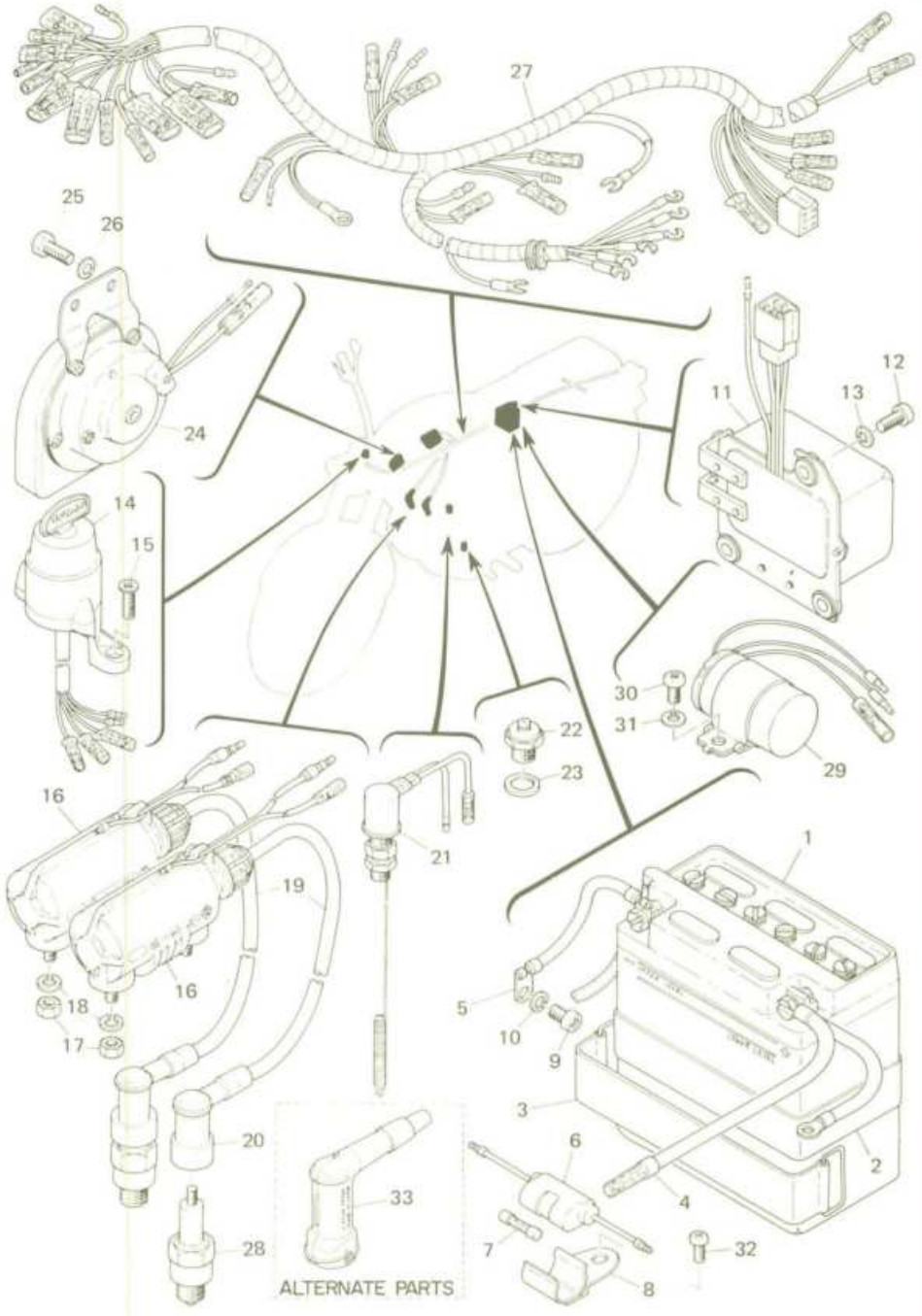
Parts Name	Manufacturer	Type
Spark Plug	N.G.K.	B—8HS
Ignition Coil	Hitachi	CM11—50B
Starter Dynamo	Hitachi	GS214—02
Regulator	Hitachi	T107—58
Fuse		20A x 2
Battery	G.S.	12N9A—3A—1
Front Stop Switch	Asahi Denso	
Rear Stop Switch	Asahi Denso	
Headlight		12V35W/25W
Tail/Stop Light Bulb		12V8W/27W
Flasher Bulbs		12V27W
High Beam Indicator Bulb		12V2W
Neutral Light Bulb		12V3W
Speedometer Bulb		12V3W
Tachometer Bulb		12V3W
Flasher Indicator Light Bulb		12V3W
Flasher Relay	Nippon Denso	061300—3790
Horn	Nikko Kinzoku	YP—12

B. Connection Diagram



1. Ignition coil
2. Kill switch
3. Off
4. On
5. Main switch II
6. Charge light
7. Magnetic switch
8. Main switch I
9. Spark plug
10. Condenser
11. Contact breaker
12. Starter dynamo
13. Armature
14. Voltage regulator
15. Cutout relay
16. Fuse
17. Battery
18. Starter switch
19. Lighting switch
20. High beam indicator
21. Dimmer switch
22. High beam
23. Low beam
24. Meter light
25. Main switch III
26. Horn
27. Horn switch
28. Neutral light
29. Neutral switch
30. Flasher relay
31. Flasher switch
32. Flasher indicator light
33. Flasher light
34. Front stop switch
35. Rear stop switch
36. Lighting switch
37. Stop light
38. Tail lamp

Fig. 5-3



1. Battery cap
2. Battery band
3. Battery band
4. Plus lead wire
5. Minus lead wire
6. Fuse holder assembly
7. Fuse
8. Fuse holder
9. Pan head screw
10. Spring washer
11. Voltage regulator assembly
12. Pan head screw
13. Spring washer
14. Main switch assembly
15. Flat head screw
16. Ignition coil assembly
17. Nut
18. Spring washer
19. High-tension cord
20. Plug cap assembly
21. Stop switch assembly
22. Neutral switch assembly
23. Gasket
24. Horn
25. Bolt
26. Spring washer
27. Wire harness assembly
28. Spark plug (B-8HS)
29. Flasher relay assembly
30. Pan head screw
31. Spring washer
32. Pan head screw
33. Plug cap assembly (with noise suppressor)

Fig. 5-4

5-3. Spark Plug

The life of a spark plug and its discoloring vary according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with suitable ones determined by 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 often since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

A. How to "read" spark plug (condition)

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



Fig. 5-5

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

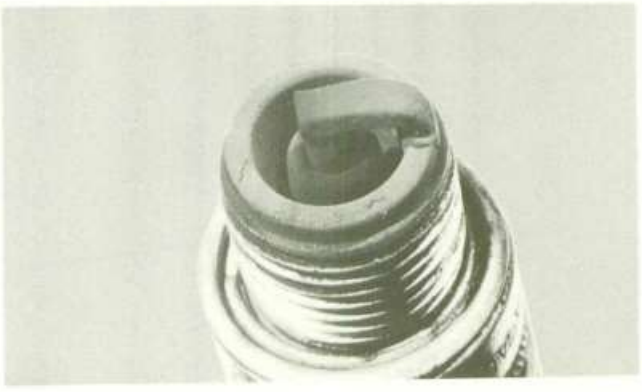


Fig. 5-6

3. 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.

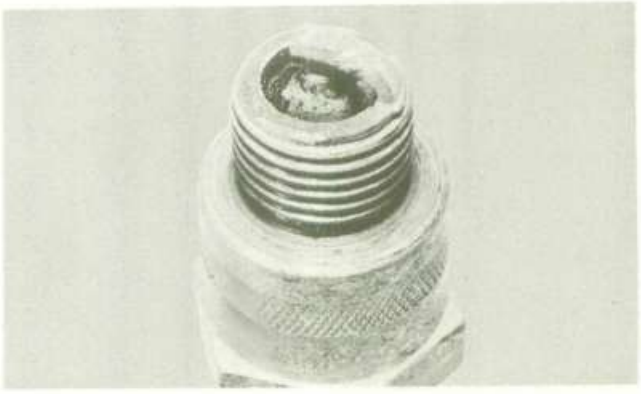


Fig. 5-7

B. Inspection

Instruct the rider to:

1. Inspect and clean the sprak plug at least once per month or every 500, 1000 miles.
2. Clean the electrodes of carbon and adjust the electrode gap.
3. Be sure to use the proper reach plug as replacement to avoid overheating, fouling, or piston damage.

Spark Plug Type	B—8HS
Spark Plug Gap	0.024 — 0.028 in. (0.6 — 0.7 mm.)



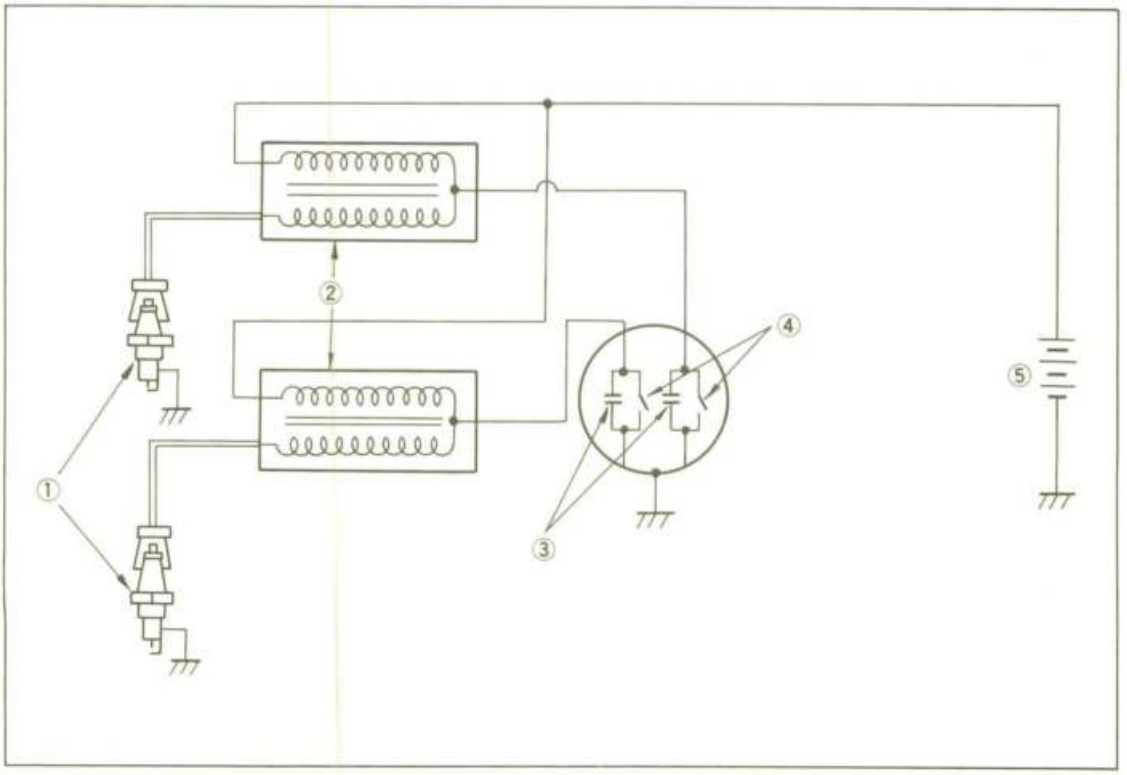
1. Excessive reach (will overheat)
2. Proper reach
3. Insufficient reach (will foul)

Fig. 5-8

5-4. Ignition System

A. Description of Operation

The ignition system consists of the parts as shown in the following diagram. As the switch is turned on, the crankshaft begins to rotate, and the cam attached to the armature makes the contact points open and close. This causes the current to flow and stop flowing alternately, thus inducing a voltage in the primary circuit. The voltage produred in the primary winding by self-induction is stepped up by mutual-induction, and a high voltage is generated in the secondary winding in proportion to the turn ratio of the primary winding to the secondary. This high voltage causes a spark across the spark-plug gap.



1. Spark plug
2. Ignition coil
3. Condenser
4. Contact breaker
5. Battery

Fig. 5-9

B. Iginition Timing

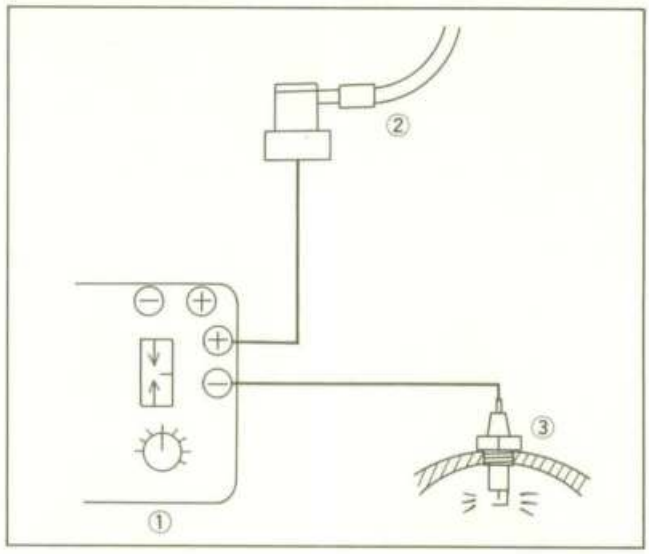
Refer to Chapter 2. Engine Tuning. for ignition timing procedure.

C. Ignition Coil

The entire ignition system can be checked for misfire and weak spark using the Electro-Tester. If the ignition system will fire across a sufficient gap, the entire ignition system can be considered good. If not, proceed with individual component tests until the problem is found.

1. Dynamic Test

a. Warm-up engine thoroughly so that all electrical components are at operating temperature.
b. Stop engine and connect tester as shown.
c. Close the Electro-Tester point gap to zero.
d. Start engine and increase spark gap until misfire occurs. (Test at various r.p.m.'s between idle and red line.)



1. Electro-Tester
2. Plug wire from coil
3. Spark plug

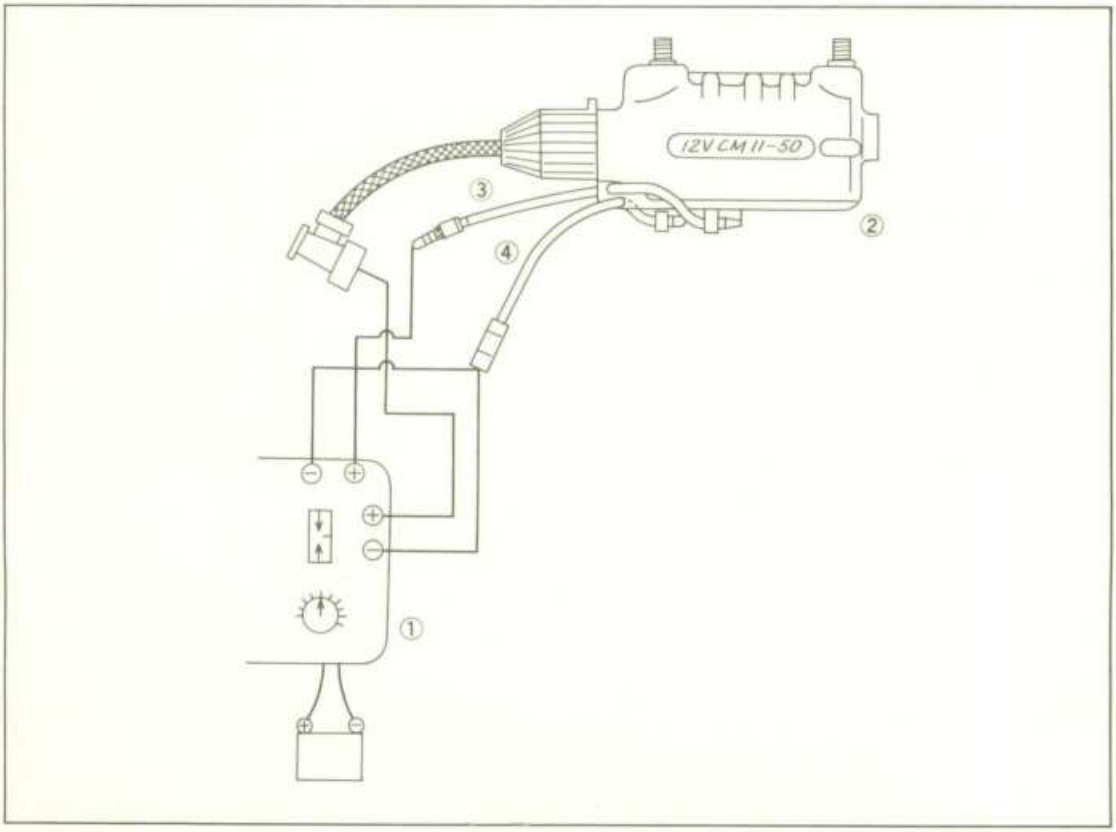
Fig. 5-10

Minimum spark gap:	0.28 in. (7 mm.)

2. Static test

a. Remove fuel tank and disconnect ignition coil landwires from wire harness and spark plug cap.
b. Connect Electro-Tester as shown.
c. Connect fully charged 12 V. battery to tester.
d. Turn on spark gap dial and increase gap until misfire occurs.

Minimum spark gap:	0.28 in. (7 mm.)

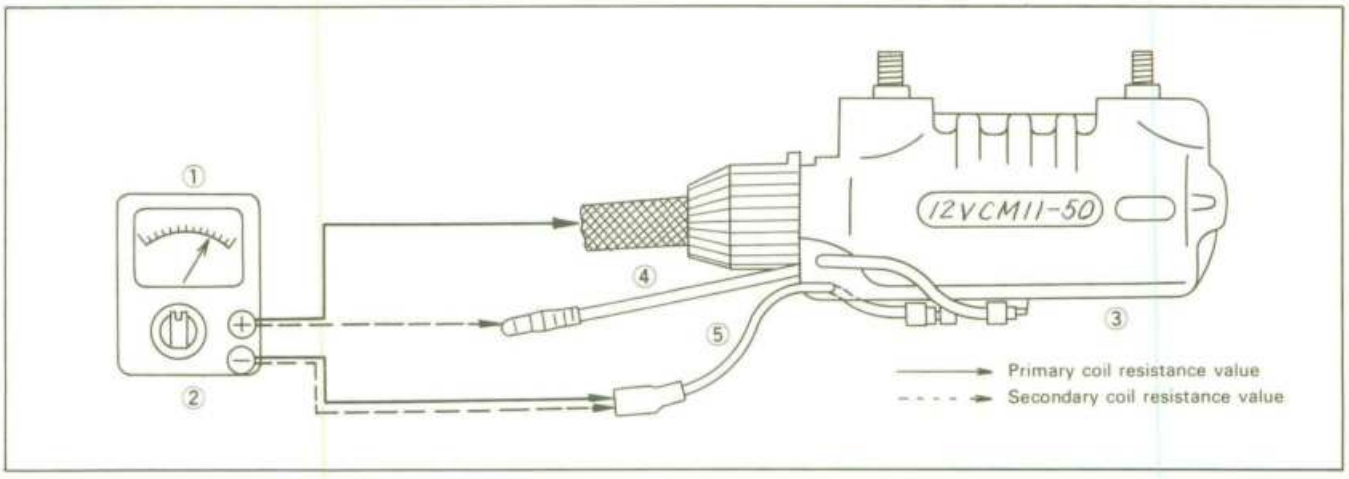


1. Electro-Tester
2. Ignition coil
3. Brown
4. Orange

Fig. 5-11

3. Direct current resistance test
Use a pocket tester or equivalent ohmmeter to determine resistance and continuity of primary and secondary coil windings.

Primary coil resistance (Use "Ω x 1" scale)	4.0Ω±10%/68°F (20°C)
Secondary coil resistance (Use "Ω x 100" scale)	11KΩ±20%/68°F (20°C)



1. Pocket-Tester
2. Set the tester on the "Resistance" position.
3. Ignition coil
4. Brown
5. Orange

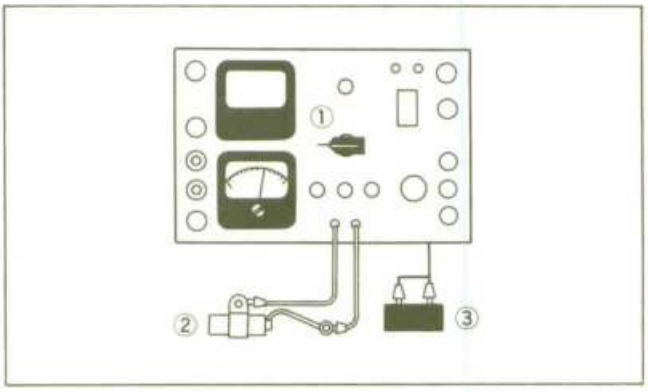
Fig. 5-12

D. 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 electric arc would jump across the separating contact points, causing them to burn.
Burned contact points greatly affect 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.

1. Condenser insulation test (use Electro-Tester)
a. Set ohmmeter to highest resistance scale (Ω x 1000 or higher).
b. Remove condenser from engine and connect ohmmeter as shown below.
c. Resistance reading should be "Infinity" or very close to it.

Minimum resistance:	3MΩ



1. Capacity
2. Condenser
3. Battery

Fig. 5-13

2. Capacity test (use Electro-Tester)
a. Calibrate capacity scale.
b. Connect tester (same as insulation test).
c. Meter needle will deflect and return to center as condenser is charged
After needle stops, note reading on μF scale.

Condenser capacity:	0.22 μF

Caution:
After this measurement, the condenser should be discharged by connecting the positive and negative sides with a thick wire to prevent shock.

5-5. Starting and Charging System

The starter-dynamo has two functions:

① Starting the engine.

② Supplying current to the 12-volt storage battery.

A. Charging Mode

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

The alternating current is converted into a direct current through the commutator brushes. The direct current voltage is kept constant by the voltage regulator, and supplied to each lead of the ignition, lighting and signal system as well as to the battery.

B. Starting Mode

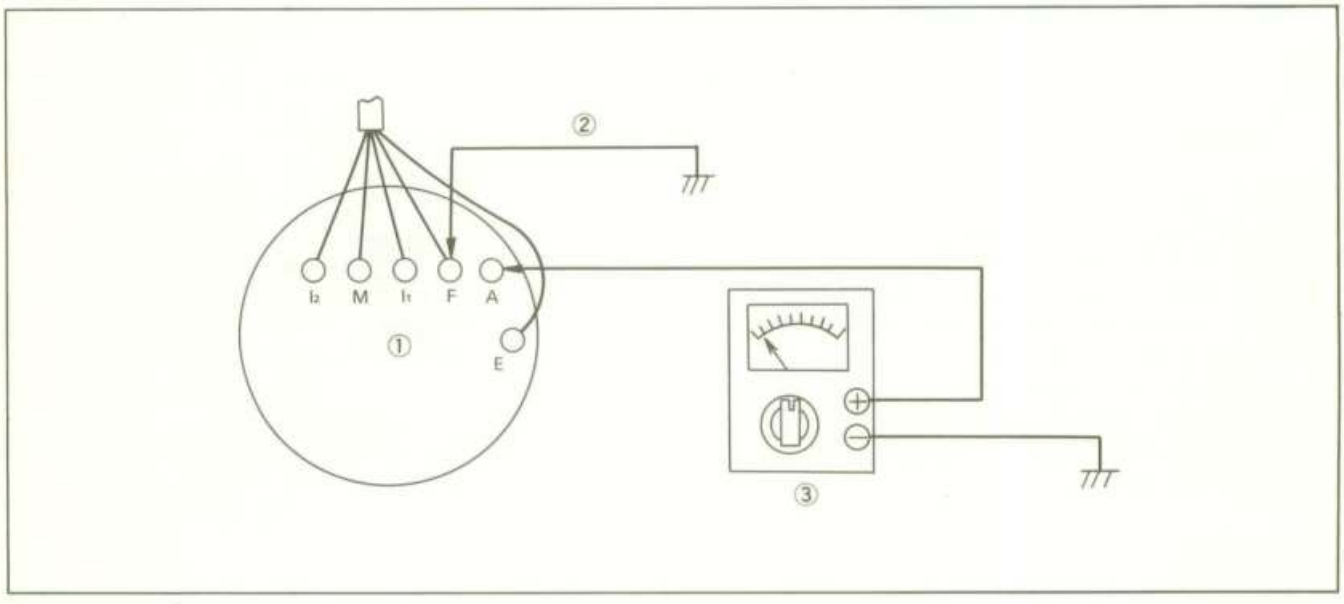
In the starting system of the starter dynamo, the series coil and the armature, working as a D.C. motor, generate a great amount of torque, by which the engine is crancked.

C. Checking the Dynamo

First disconnect the wires from terminal A (white), then ground terminal F, with a jumper wire. Connect the positive lead of the tester to terminal A (white), and ground the negative tester lead to the engine. Start the engine and keep it running at 1,000 — 2,000 r.p.m. If the electricity generated reads more than 10V. on the tester, the generator is in good working condition.

Caution:

Do not run the engine at more than 1000 — 2000 r.p.m. in this test. Otherwise, a high voltage current generated will ruin the coil, lead wire, etc.



1. Starter dynamo
2. Jumper wire
3. Set the tester on the "D.C. Volt" position.

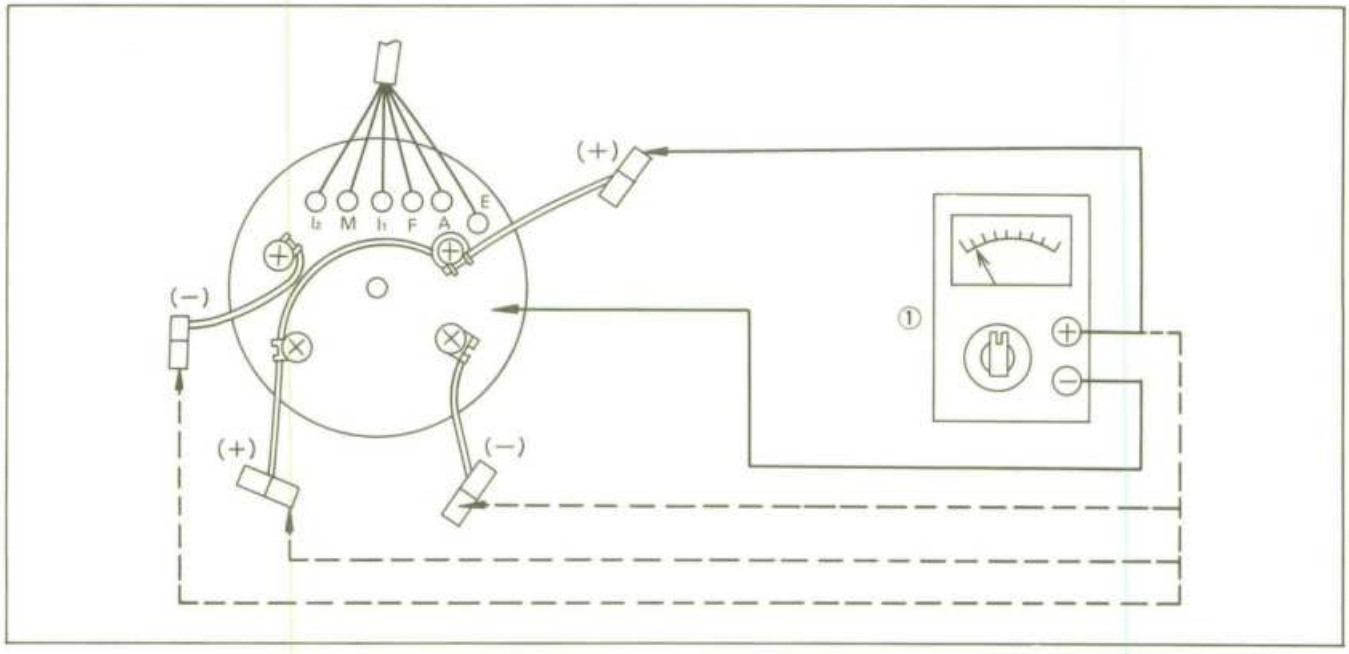
E (Black) I₂ (Orange) M (Light green) I₁ (Gray) F (Green) A (White)

Fig. 5-14

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

a. Field coil brush insulation test
   The positive brush of the field coil is insulated from the yoke and using the tester, you can check its insulation.
   If the insulation is bad, the circuit between the field coil, or the brush holder, and the yoke is shorted.

Note: The negative brush is not insulated.



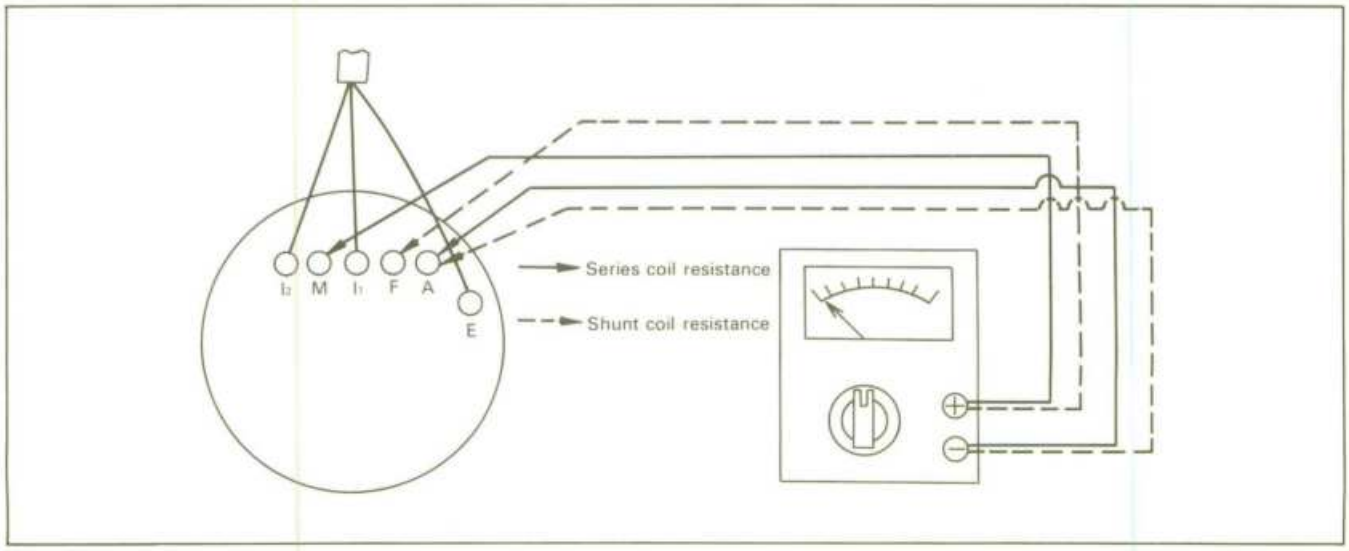
1. Set the tester on the "Resistance" position.

Fig. 5-15

b. Resistance test of field coil
   Check the resistance between terminals M — A and A — F. If resistance is out of specification, the field coil is broken. Check the field coil connections. If the coil connections are good, then the coil is broken inside and it should be replaced.
   be replaced.

Field coil resistance

Shunt Coil (A — F)	4.6Ω±10%
Series Coil (M — A)	0.0135Ω±10%



1. Set the tester on the "Resistance" position.

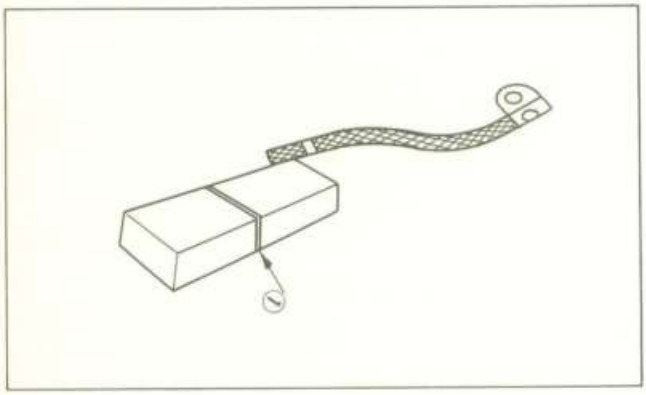
Fig. 5-16

2. Checking the brushes

a. The brushes are one of the most important parts in the dynamo. Take out the brushes and check the condition of their contact surfaces. Each brush must contact the commutator with more than 3/4 of its surface area.

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

2) If either brush is worn past the minimum length mark, replace them both with new ones.



1. Minimum length mark

Fig. 5-17

b. Materials of the brush
Use the brush having the model No. "MH—23" on its side.

c. Handing the brushes
When replacing the brushes, be sure the braided lead of the positive brush does not touch the edge of the breaker plate or brush holder, and that the lead of the negative brush does not touch the positive brush spring. The friction of the braided lead against other parts as a result of vibrations may wear through the insulation and cause a short circuit.

3. Checking the armature assembly

a. Thoroughly clean the commutator of oil and dirt.

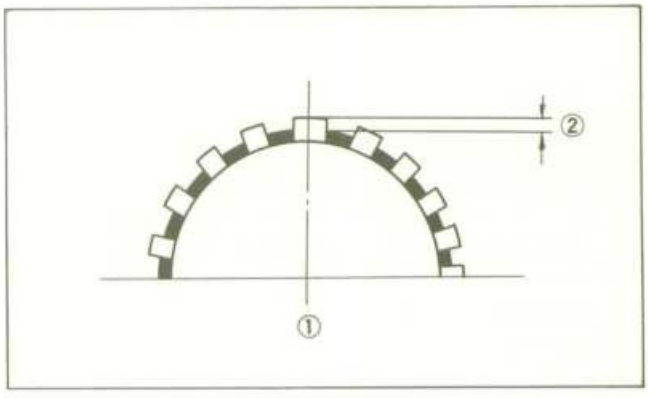
1) If the commutator is rough or dulled with brush dust, polish it with fine grain sandpaper (No. 400 — 600) by rotating the armature. Partial polishing will only deform the commutator and shorten brush life.



Fig. 5-18

2) If the commutator is burned, out of round, or too rough to be sandpapered, turn it on a lathe no more than 0.0079 in. (2 mm.) under the standard 1.5157 in. (38.5 mm.) diameter.

b. Checking the commutator mica undercut
If the commutator is worn and if it has high mica, the mica should be undercut with saw blade.
Sand off all burrs with sandpaper, and be sure the mica is cut away clean between segments, leaving no thin edge next to segments.



1. Commutator
2. Undercut

Fig. 5-19

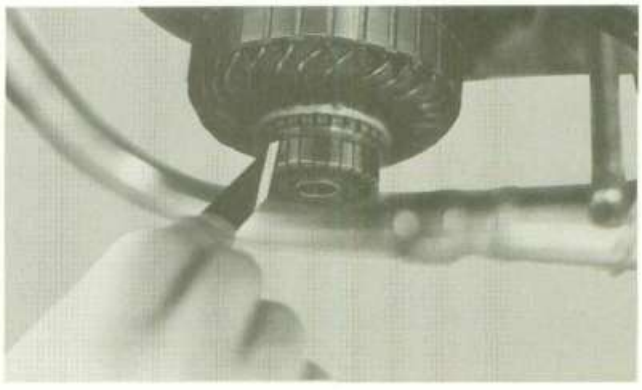


Fig. 5-20

Mica undercut specified value	0.0197 — 0.0315 in. (0.5 — 0.8 mm.)
Mica undercut wear limits	0.0079 in. (0.2 mm.)

c. Checking armature insulation

1) If there is electrical leakage between the commutator and shaft, replace the armature.



Fig. 5-21

2) If the field coil is perfectly insulated and conductivity is also good, but the dynamo coil might be short-circuited. Check the armature with a growler at a special service shop.

4. Dynamo adjustment standards

Part	Item	Maintenance	Inspection
Field coil	Resistance		When voltage is irregular
	Shunt	4.6Ω±10% (68°F or 20°C)	
	Series	0.0135Ω±10% (68°F or 20°C)	
Brushes	Material	MH23	First 4,000 mi. (600 kms.)
			Every 2,500 mi. (4,000 kms.)
	Number	4	Thereafter
	Width x thickness x length	0.31 x 0.18 x 0.83 in. (8 x 4.5 x 21 mm.)	
	Minimum length	9 mm.	
	Spring pressure	600 g.±15%	
Commutator	Diameter	1.51 in. (38.5 mm.)	
	Minimum diameter	1.43 in. (36.5 mm.)	
	Mica undercut	0.019 — 0.032 in. (0.5 — 0.8 mm.)	
	Minimum mica undercut	0.008 in. (0.2 mm.)	
	Difference between max. and min. diameter	0.0012 in. (0.03 mm.)	
Breaker	Point gap	0.012 — 0.016 in. (0.3 — 0.4 mm.)	Every 2,000 mi. (3,000 kms.)
	Point pressure	700±50 g.	(High r.p.m. irregular)
	Ignition timing	B.T.D.C. 1.8±0.15 mm.	(Ignition irregular)
	Automatic spark advance	Starting 1,700±150 r.p.m.	
		Final 2,000±100 r.p.m.	
		Advance 12°±2°	
Others	Dynamo dia. (outer)	5.2 in. (134 mm.)	
	Dynamo dia. (inner)	5.1 in. (130 mm.)	
	Armature taper	28 mm. x 1/5	
	Cut-in r.p.m.	1,700 r.p.m.	
Capacity	Rated output r.p.m.	14V., 7 A./1,900 r.p.m.	

D. Regulator

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

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

The starting switch is provided to direct a flow of current to the starter dynamo when the engine is started.

Inspection and adjustment

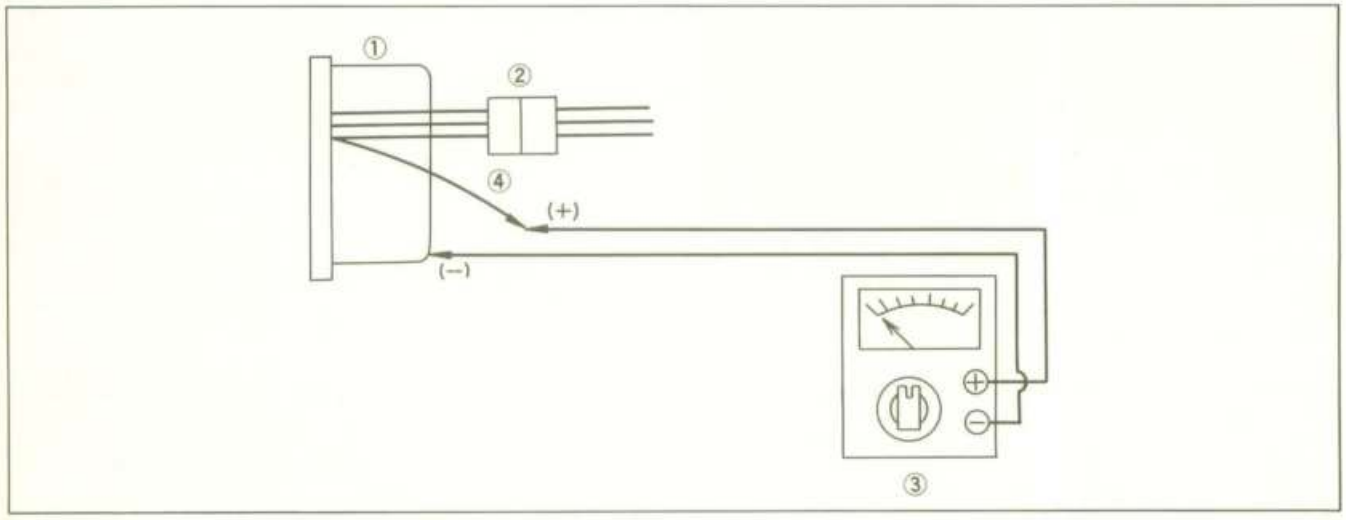
If the regulator can no longer control the voltage, the battery will be drained or over-charged, and all electrical parts may be burned out. So use a good tester when inspecting or adjusting the regulator.

(It is advised that you learn how to adjust the regulator at training courses because it is very difficult.)

1. No-load voltage test

a. Inspection

1) Disconnect the lead wire (red) of the regulator and connect the positive tester lead to the lead wire (red). Then ground the negative tester lead.



1. Regulator
2. Connector
3. Set the tester on the "DC voltage" position.
4. Red

Fig. 5-22

2) Start the engine and keep it running at 2,500 r.p.m. Your regulator is correct if the tester reads 15.8 — 16.5V.

3) Start the engine and keep it running at 5,000 r.p.m. Your regulator is correct if the tester reads less than 16.9V.

b. Adjustment

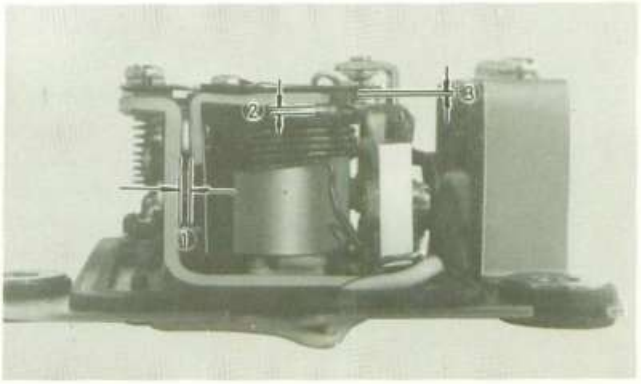
If the measured voltage is more or less than specified, adjust the following.

1) Remove the regulator from the frame, and check the contact points. If the point surfaces are rough, they should be smoothed away with sandpaper (#400 — 600). After sandpapering, thoroughly clean contact points with point contact cleaner.

2) Check the yoke gap, core gap and point gap. If any gap is incorrect, it should be adjusted.

First adjust the yoke gap and then core gap and point gap.

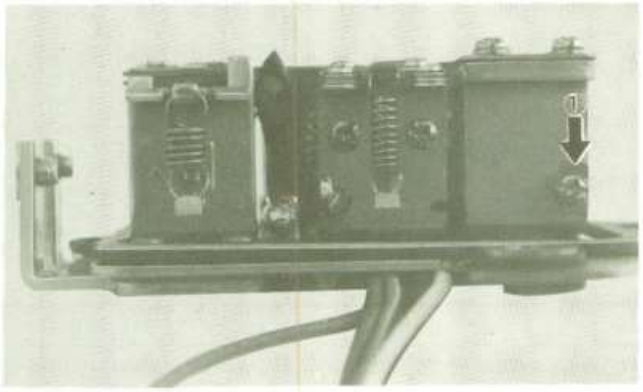
Yoke gap	0.024 — 0.028 in. (0.6 — 0.7 mm.)
Core gap	0.016 — 0.028 in. (0.4 — 0.7 mm.)
Point gap	0.016 — 0.020 in. (0.4 — 0.5 mm.)



1. Yoke gap 2. Core gap 3. Point gap

Fig. 5-23

3) Adjust the no-load voltage by tightening or loosening the adjusting screw on the voltage relay side.
To increase the voltage, turn the adjusting screw clock wise, while to decrease the voltage, turn the screw counterclock wise.



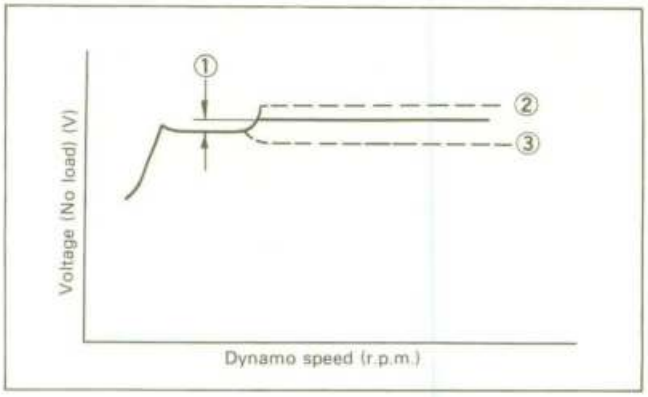
1. Adjusting screw

Fig. 5-24

No-load voltage

15.8—16.5V. at 2,500r.p.m.	16.9V. or less at 5,000r.p.m.

4) After the adjustment, the generated voltage shows slight fluctuations as illustrated.(Fig. 5-24)
When the dynamo speed increases from low (the lower contact is in operation) to high (the upper contact is in operation), the voltage fluctuates slighly, but this is a normal phenomenon.
If the voltage shows a 0.5V. increase, the adjustment is considered to be correct.
If the voltage increase is more or less than 0.5V., the core gap should be readjusted.



1. About 0.5V
2. Core gap (larger)
3. Core gap (smaller)

Fig. 5-25

2. Cut-in voltage test of the cutout relay

a. Inspection

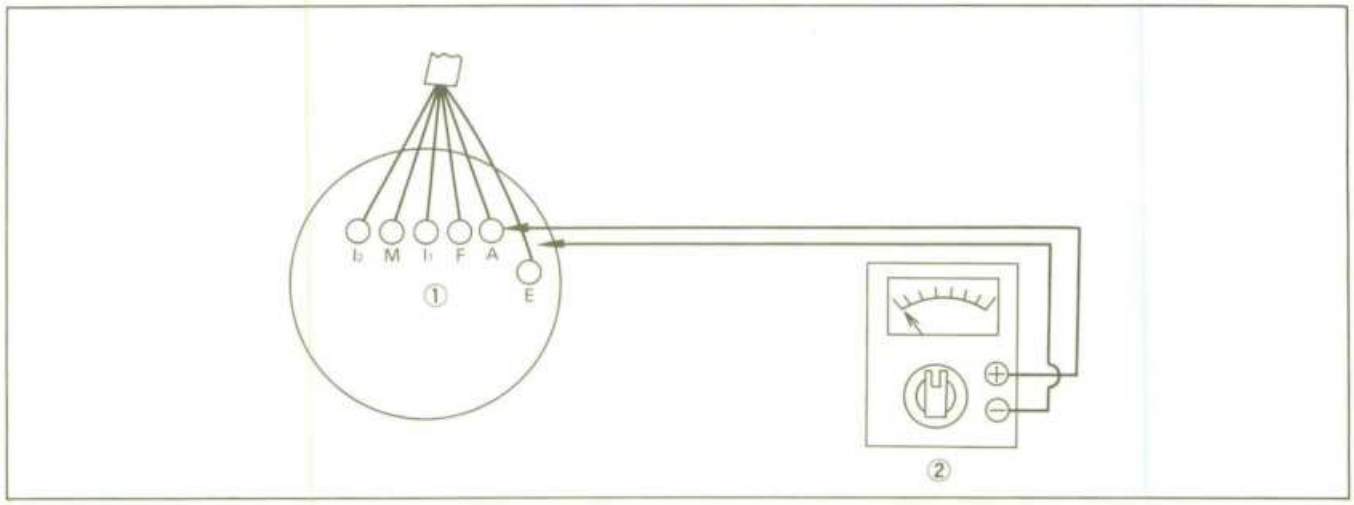
1) Connect the testers positive lead to A (white) terminal, then ground the negative lead to the engine.

2) Start the engine, and increase engine speeds slowly. The cutout relay is correctly set if its breaker points close at 12.5 — 13.5V.

b. Adjustment

If the breaker points will not close at the specified voltage, adjust the cutout relay by changing its spring tension.
When the spring retainer is lowered the voltage rises, and when raised, the voltage drops.

Cut-in voltage	12.5V. — 13.5V.



1. Starter dynamo
2. Set the tester on the "D.C. Volt" position.

E (Black)
I_2 (Orange)
M (Light green)
I_1 (Gray)
F (Green)
A (White)

Fig. 5-26

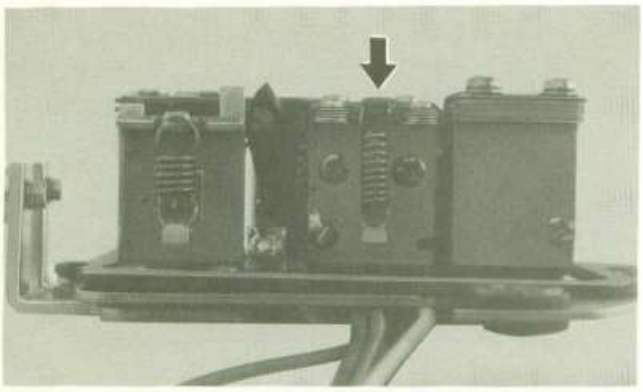


Fig. 5-27

Notes:

In actual practice, there will rarely be need to adjust the cutout relay.

If the point surfaces of the voltage and cutout relays are worn or pitted, polish them with fine sandpaper (#400 — 600) before making any adjustment.

3. Regulator maintenance standards

Part Name	Item	Maintenance Standards	Inspection
Voltage regulator	No-load voltage adjustment value	15.8 — 16.5V./2,500 r.p.m. 16.9V. or less/5,000 r.p.m.	When voltage is irregular
	Voltage coil resistance value	11.8Ω ±15%	
	Yoke gap	0.024 — 0.028 in. (0.6 — 0.7 mm.)	
	Core gap	0.016 — 0.028 in. (0.4 — 0.7 mm.)	
	Point gap	0.016 — 0.020 in. (0.4 — 0.5 mm.)	
Cutout relay	Cut-in voltage	12.5 — 13.5V.	
	Reversing current	5A. or less	
	Voltage coil resistance value	11.2Ω ±15%	
	Core gap	0.031 — 0.039 in. (0.8 — 1.0 mm.)	
	Point gap	0.024 — 0.031 in. (0.6 — 0.8 mm.)	
Magnetic switch	Actuating voltage	10V.	
	Core gap	0.051 — 0.055 in. (1.3 — 1.4 mm.)	
	Point gap	0.055 — 0.059 in. (1.4 — 1.5 mm.)	

5-6. Battery

The battery is a 12 volt — 9 AH. unit that is the power source for the horn, stoplight, neutral light and flasher lights. Because of the fluctuating charging rate due to the changes in engine r.p.m., the battery will lose its charge if the horn and stoplight are excessively used.
The charging of the battery begins at about 2,500 r.p.m. Therefore, it is recommended to sustain engine r.p.m. at about 3,000 to 4,000 r.p.m. to keep the battery charged properly. If the horn, stoplight and starter switch are used very often, the battery water should be checked regularly as continous charging will dissipate the water.

A. Checking

1. If sulfation occurs on plates due to lack of battery electrolyte, showing white accumulations, the battery should be replaced.
2. If the bottoms of the cells are filled with corrosive material falling off plates, the battery should be replaced.
3. If the battery shows the following defects, it should be replaced.

a. The voltage will not rise to a specific value even after long hours charging.
b. No gassing occurs in any cell.
c. The 12 V. battery requires a charging voltage of more than 14 V. in order to supply a current of 0.9 A. for 10 hours.

B. Service Life

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

a. Negligence in re-filling the battery with electrolyte.
b. Battery being left discharged.
c. Over-charging by rushing charge.
d. Freezing.
e. Filling with water or sulfuric acid containing impurities when re-filling the battery.

Service Standards

Battery Specification	6V.-9AH.	
Electrolyte-Specific Gravity	1.27 — 1.28	At Full Charge
Initial Charging Current	0.9A. for 25 Hours	Brand New Motorcycle
Charging Current	0.9A. for 10 Hours (Charge Until Specific Gravity reaches 1.27 — 1.28)	When Discharged
Re-filling of Electrolyte	Distilled Water up to the Max. Level Line.	Once a Month

C. Storage

1. If motorcycle is not used for 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.

a. Recharge the battery.
b. Store the battery in a cool, dry place, and avoid temperatures below 0°C. (32°F).
c. Recharge the battery before mounting it on the motorcycle.

5-7. Lighting and Signal Systems

A. Description

The lighting system consists of the horn, headlight taillight, stoplight, flasher lights, meter lamps and the battery.

Warning:

Use bulbs of the correct capacity for the headlight, taillight, meter lamps and indicator lamps which are directly connected to the battery. 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.

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, tallight, 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.

B. Lighting Tests and Checks

The 12 V. battery provides power for operation of the horn, headlight, taillight, stoplight, neutral light and flasher lights. If none of the above operate, always check battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery water, or a defective charging system.
See Section 5-5, starting and charging system, for checks of battery and charging system.

1. Horn does not work
a. Check for + 12 V. on brown wire to horn (Main switch must be I position)
b. Check for good grounding of horn (pink wire) when horn button is pressed.
2. Headlight does not work
a. Check the bulb
b. High beam does not work
Check for + 12 V. on yellow wire to headlight. (Main switch must be in I or III position and Dimmer Switch must be in "HI" position and Lighting switch must be in "ON" position.)
c. Low beam does not work
Check for + 12 V. on green wire to headlight. (Main switch must be in I or III position and dimmer switch must be in "LO" position and lighting switch must be in "ON" position.)
d. High and low beam do not work.
1) Check for + 12V. on Blue/Red wire to left handlebar switch. (Main switch must be in I or III position, and lighting switch must be in "ON" position.)
2) Check for + 12V. on Red/Yellow wire to right handlebar switch. (Main switch must be in I position.)
3) Check for + 12V. on Blue wire to right handlebar switch. (Main switch must be in III position.)
4) Check for ground on black wire to headlight assembly.
3. Neutral lamp does not work
a. Check bulb
b. Check for ground on light blue wire to neutral light when transmission is in neutral.
c. Check for + 12 V. on brown wire to neutral light.
d. Replace neutral switch.
4. Tail light does not work
a. Check bulb
b. Check for + 12 V. on blue wire to taillight.
c. Check for ground on black wire to tail/stop light assembly.
5. Stoplight does not work
a. Check bulb
b. Check for + 12 V. on yellow wire to stoplight.
c. Check for + 12 V. on brown wire to each stop switch (from brake and rear brake switches.)
d. Check for ground on black wire to tail/stop light assembly.
6. Flasher lights do not work.
a. Check bulbs.
b. Right circuit
1) Check for + 12 V. on dark green wire to light.
2) Check for ground on black wire to light assembly.
c. Left circuit
1) Check for + 12 V. on dark brown wire to light.
2) Check for ground on black wire to light assembly.
d. Right and left circuits do not work.
1) Check for + 12 V. on brown/white wire to flasher switch on left handlebar.
2) Check for + 12 V. on brown wire to flasher relay.
3) Replace flasher relay.
4) Replace flasher switch.

5-8. Switches

The main switch and the right and left handlebar switches may be checked for continuity or shorts with a pocket tester on the "Ω x 1" scale.

Wire color abbreviations			
Red — R	Red/Yellow — R/Y	Green — G	Blue/White — L/W
Brown — Br	Brown/White — Br/W	Blue/Red L/R	
White — W	Dark Brown — Ch	Yellow — Y	
Blue — L	Dark Green — Dg	Pink — P	

A. Main Switch

Switch Position	Wire Color				
	R	Br	W	L	R/Y
OFF					
I	○	○			○
II		○	○		
III	○			○	

B. "ENGINE STOP" Switch (Right Handlebar)

Switch Position	Wire Color	
	R/W	Br
RUN	○	○
OFF		

C. Lighting Switch (Right Handlebar)

Switch Position	Wire Color		
	L	R/Y	L/R
OFF			
ON	○	○	○

D. "START" Button (Right Handlebar)

Button Position	Wire Color	
	L/W	//////
OFF		
PUSH	○	○

E. "DIMMER" Switch (Left Handlebar)

Switch Position	Wire Color		
	Y	L/R	G
HI	○	○	
LO		○	○

F. "TURN" Switch (Left Handlebar)

Switch Position	Wire Color		
	Dg	Br/W	Ch
RIGHT	○	○	
OFF			
LEFT		○	○

G. "HORN" Button (Left Handlebar)

Button Position	Wire Color	
	P	//////
OFF		
PUSH	○	○

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CHAPTER 6. CHASSIS

6-1. Special Tools

A. Vernier Caliper
P/N 90890 - 03005

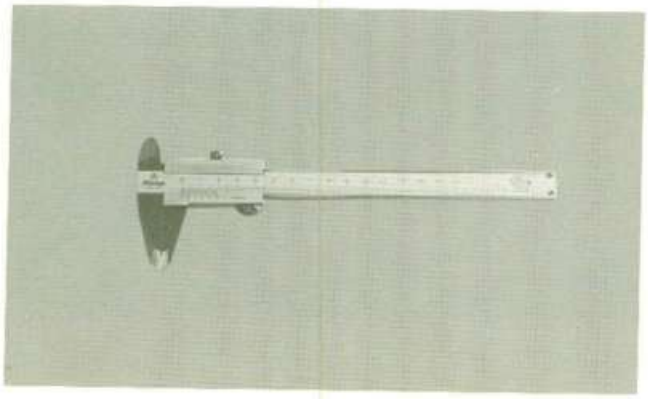


Fig. 6-1

B. Torque Wrench

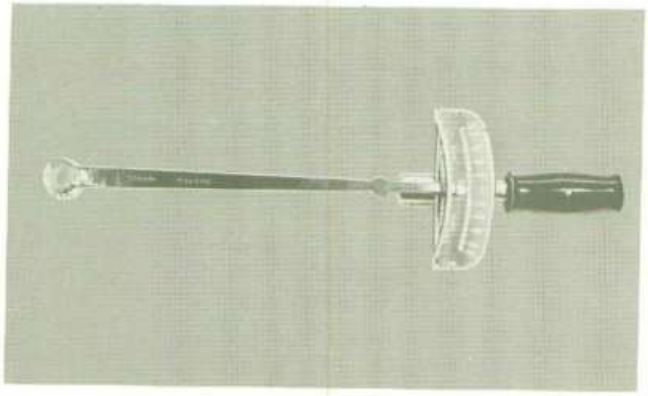


Fig. 6-2

C. Tire Pressure Gauge

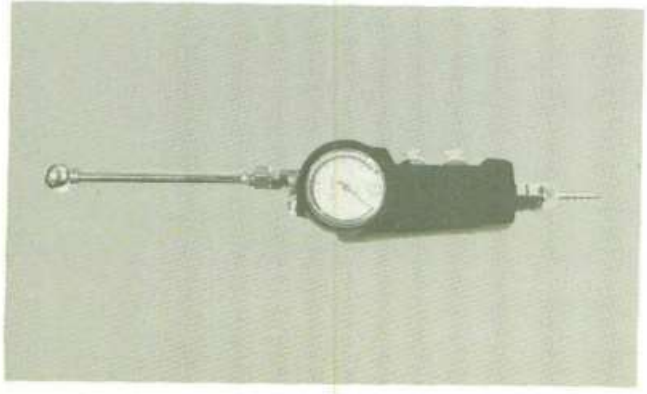


Fig. 6-3

D. Sterring Nut Wrench
P/N 90890 - 01050

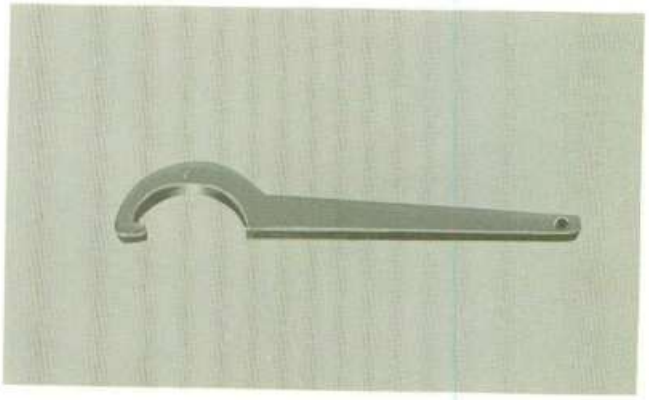


Fig. 6-4

E. Fluid Measuring Cup (CC)



Fig. 6-5

F. Grease Gun (hand pump type)

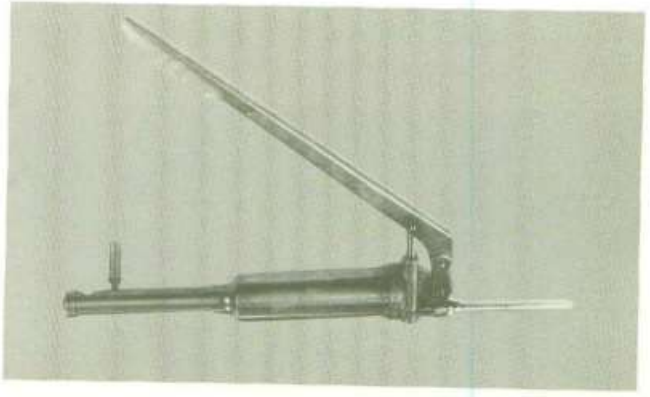


Fig. 6-6

6-2. Front Wheel

A. Removal

1. Disconnect the brake cable.
2. Disconnect the speedometer cable from the front wheel backing plate.

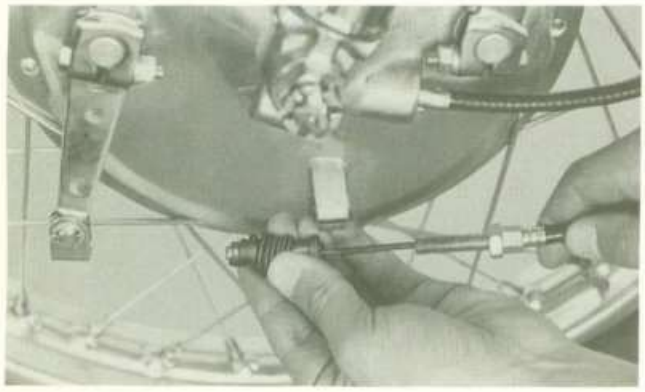


Fig. 6-7

3. Remove cotter pin from front wheel nut.
4. Loosen the axle pinch bolt at the bottom of the right hand fork leg.



Fig. 6-8

5. Remove the front wheel nut.
   (Use a small round shaft in the hole at the end of the axle to keep axle from turning).

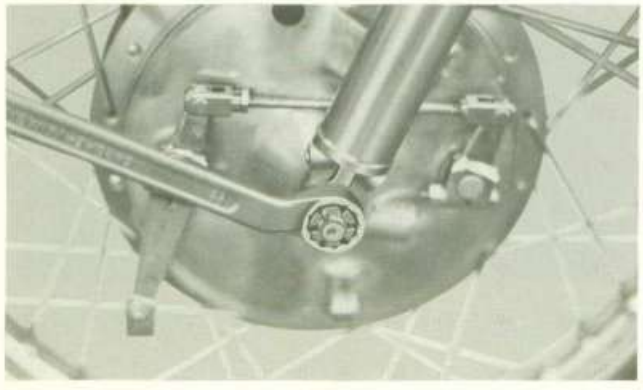


Fig. 6-9

6. Remove the front wheel axle by simultaneously twisting and pulling out on the axle. Then remove the wheel assembly.
   (Raise the front of the machine by placing a support under the engine).

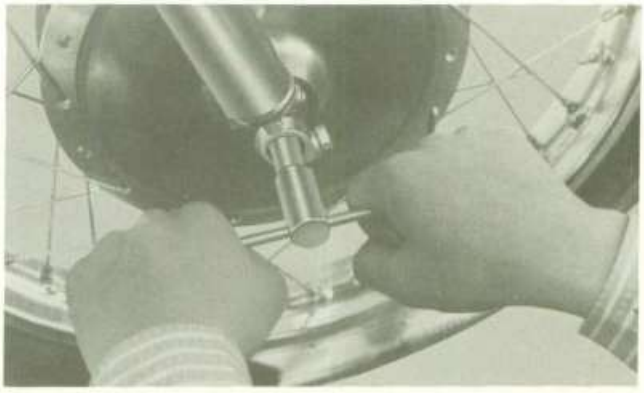


Fig. 6-10

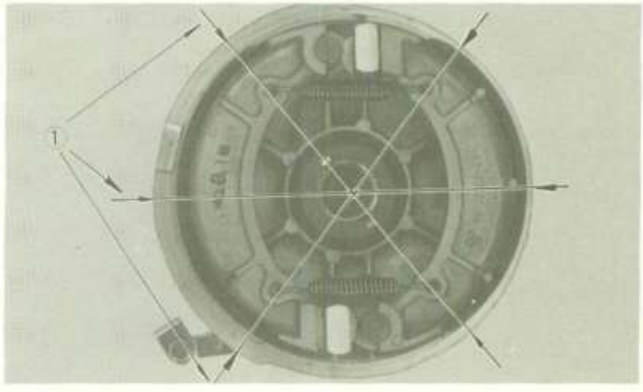
B. Front Axle

Remove any corrosion from the axle with emery cloth. Then place it on a surface plate and check for bending. If bent, straighten or replace.

C. Checking Brake Shoe Wear

Measure the outside diameter at the brake shoe with slide calipers.
If it measures less than specified, replace.

Front brake shoe diameter: 7.1 in. (180 mm.) Replacement limit: 6.9 in. (175 mm.)



1. Measuring point

Fig. 6-11

D. Brake Drum

Oil or scratches on the inner surface of the brake drum will impair braking performance or result in abnormal noises.
Remove oil with a rag soaked in lacquer thinner or solvent.
Remove scratches using emery cloth lightly.

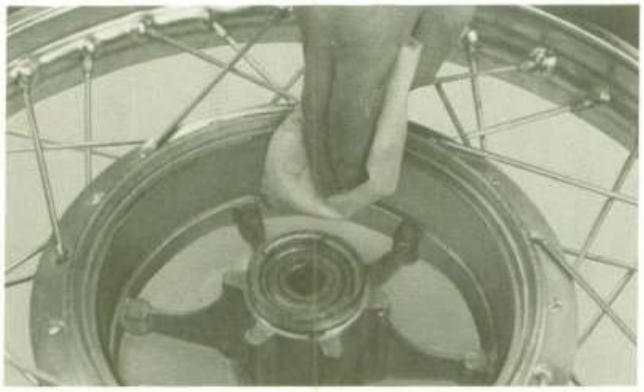


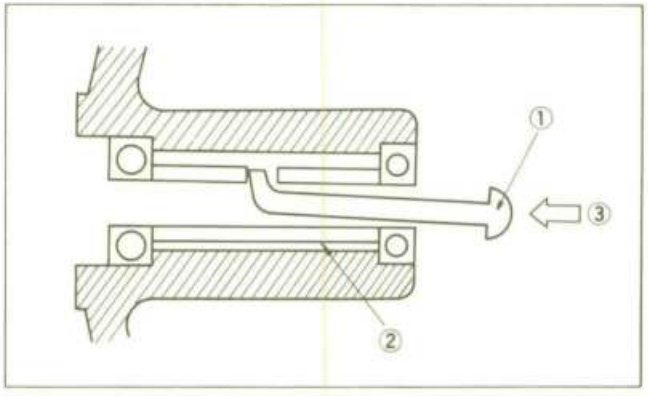
Fig. 6-12

E. Replacing Wheel Bearings

If the bearings allow play in the wheel or if they do not turn smoothly, replace as follow:

1. First clean the outside of the wheel hub.

2. Drive the bearing out by pushing the spacer to one side (the spacer "floats" between the bearings) and tapping around the perimeter of the bearing inner race with a soft metal drift pin and hammer. Either or both bearings can be removed in this manner.



1. L-shaped steel rod
2. Bearing spacer
3. Tap

Fig. 6-13

3. Push out the bearing on the other side.

4. To install the wheel bearings, reverse the above sequence.
   Be sure to grease the bearings before installation.

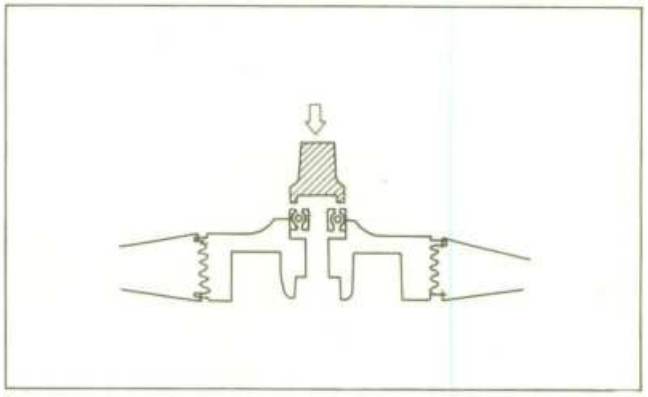


Fig. 6-14

5. If the tooth surface of the helical speedometer drive gear is excessively worn, replace it.

6. Check the lips of the seals for damage or warpage. Replace if necessary.

F. Installing Front Wheel

Caution:

1. After replacing wheel and axle, tighten axle nut FIRST and install a new cotter pin.

Axle nut torque:
570 — 1210 in-lbs. (6.6 — 10.5 m-kgs.)

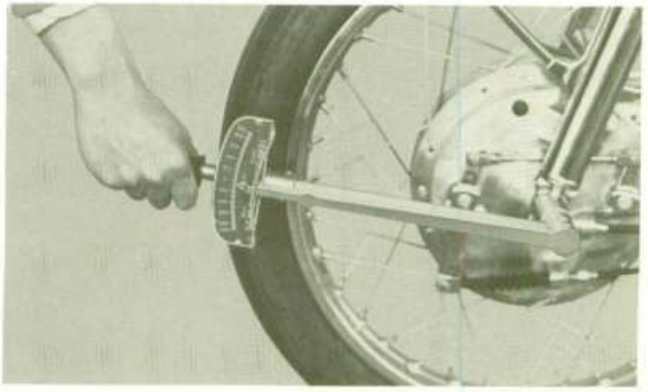
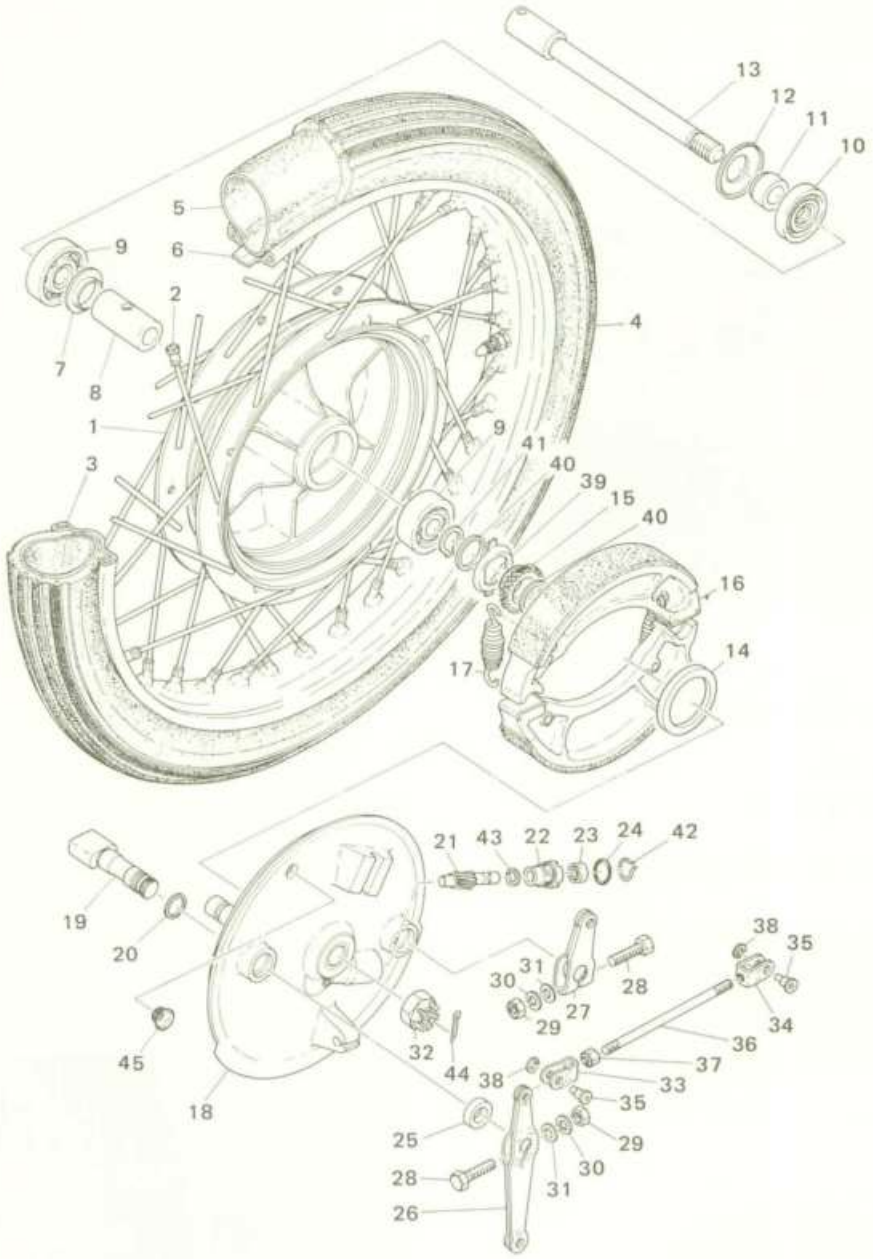


Fig. 6-15

2. Then tighten the axle pinch bolt.

Pinch bolt torque:
177 — 226 in-lbs. (1.6 — 2.6 m-kgs.)

Front Wheel



1. Hub
2. Spoke set
3. Rim (1.60A-18)
4. Front tire (2.75-18-4PR)
5. Tube (2.75-18)
6. Rim band (2.75-18)
7. Spacer flange
8. Bearing spacer
9. Bearing (6302Z)
10. Oil seal (SD-22-42-7)
11. Wheel shaft collar
12. Hub dust cover
13. Wheel shaft
14. Oil seal (SDD-53-65-7)
15. Drive gear
16. Brake shoe complete
17. Return spring
18. Brake shoe plate
19. Cam shaft
20. Cam shaft shim
21. Meter gear
22. Bushing
23. Oil seal (SO-7-14-4)
24. O-ring (2.4-13.8)
25. Cam shaft seal
26. Cam shaft lever 1
27. Cam shaft lever 2
28. Bolt
29. Nut
30. Spring washer
31. Plain washer
32. Wheel shaft nut
33. Rod end 1
34. Rod end 2
35. Rod end pin
36. Connecting rod
37. Nut
38. Circlip
39. Meter clutch
40. Thrust washer 2
41. Circlip
42. Stop ring
43. Thrust washer 1
44. Cotter pin
45. Grommet

Fig. 6-16

6-3. Rear Wheel

The rear wheel is 18-in. size. A single leading-shoe type brake is used. A labyrinth seal between the wheel hub and the brake plate is provided to prevent water and dust leakage.

A. Removal

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

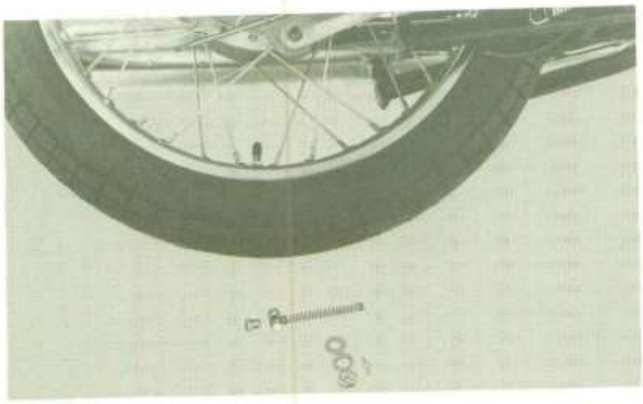


Fig. 6-17

2. Remove cotter pin from rear wheel shaft nut.
3. Remove the rear wheel shaft nut.
4. Pull out the rear wheel shaft by simultaneously twisting and pulling out.

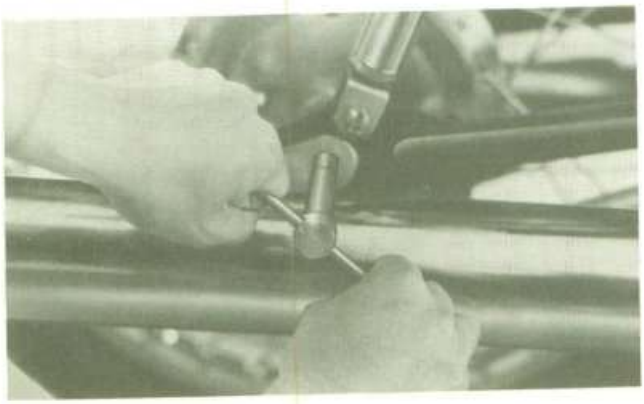


Fig. 6-18

5. Remove the rear brake shoe plate, and wheel shaft collar.

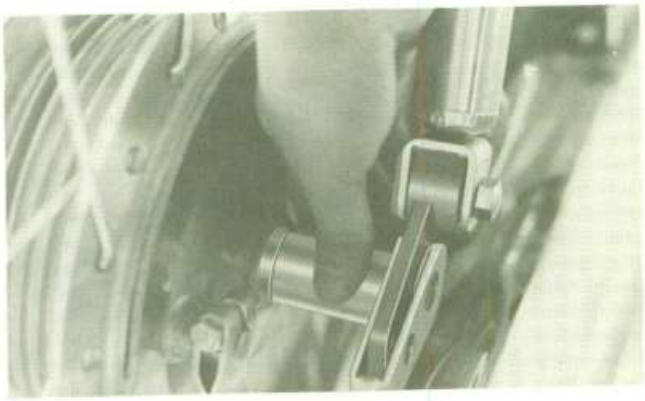


Fig. 6-19

6. Lean the machine over to the left and remove the rear wheel assembly.

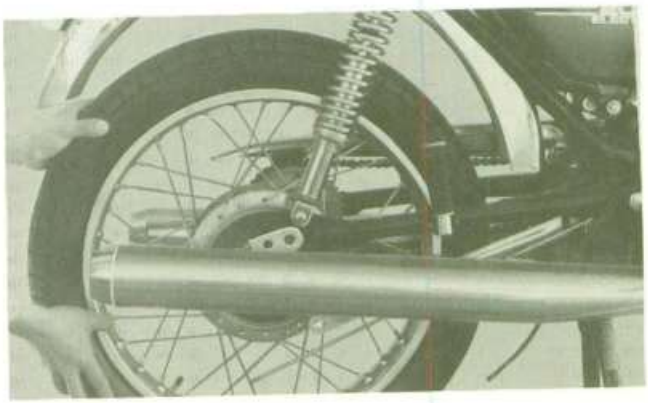
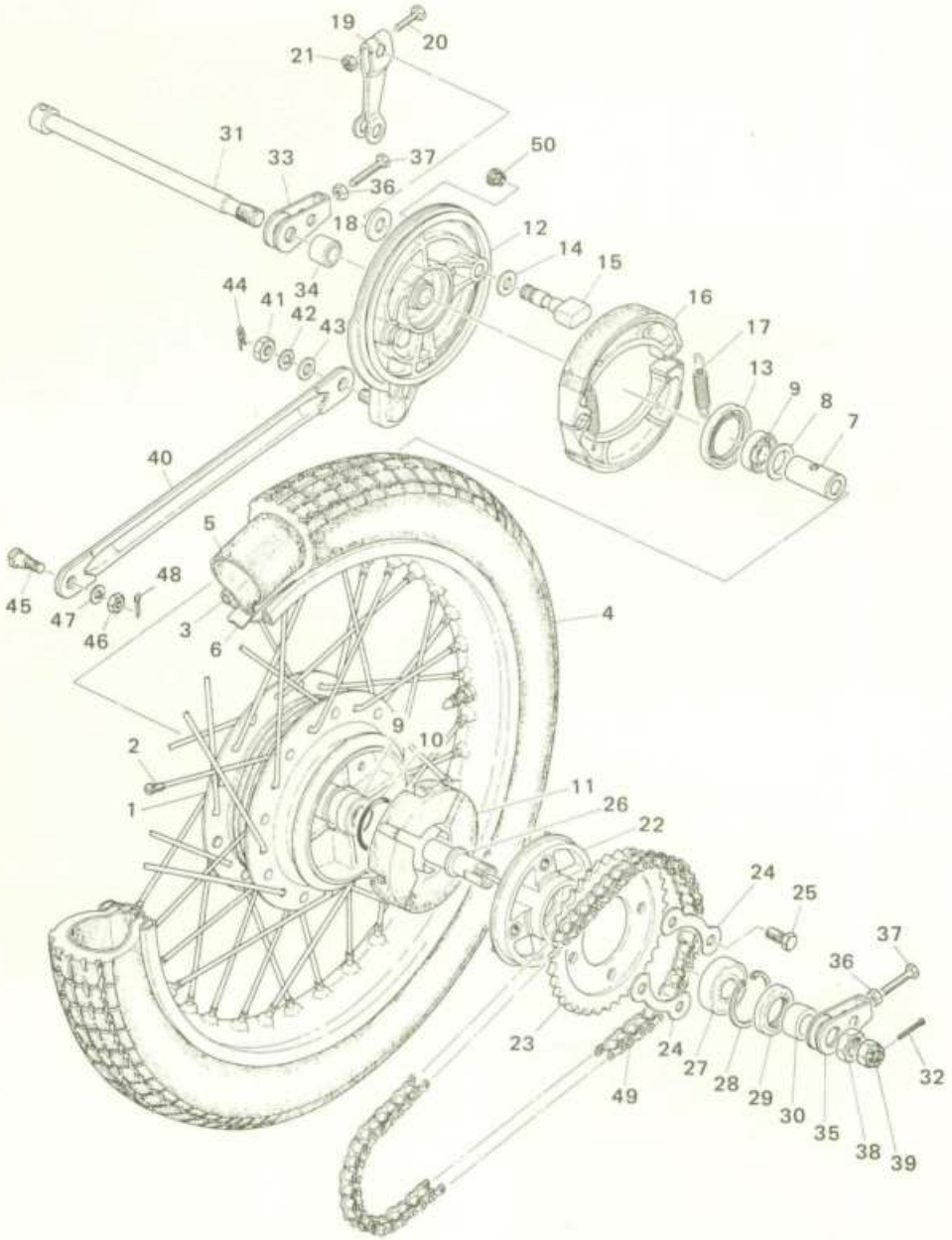


Fig. 6-20

Rear Wheel



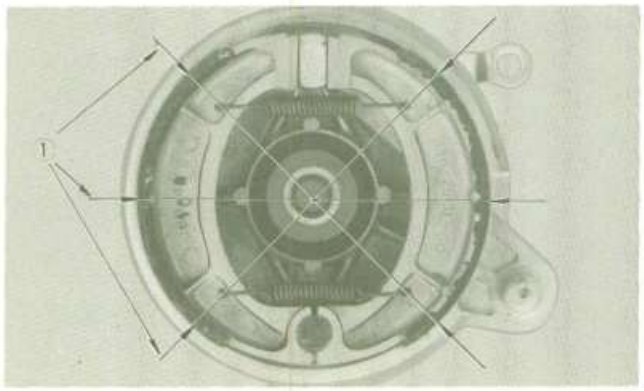
1. Hub
2. Spoke set
3. Rim (1.60A-18)
4. Tire (3.00-18-4PR)
5. Tube (3.00-18)
6. Rim band (3.00-18)
7. Bearing spacer
8. Spacer flange
9. Bearing (6202Z)
10. O-ring (42.5-3.0)
11. Clutch damper
12. Brake shoe plate
13. Oil seal (S-42-56-6)
14. Cam shaft shim
15. Cam shaft
16. Brake shoe complete
17. Return spring
18. Cam shaft seal (12-17-2)
19. Cam shaft lever
20. Bolt
21. Nut
22. Hub clutch
23. Sprocket wheel gear
24. Lock washer
25. Fitting bolt
26. Sprocket wheel shaft
27. Bearing (6204Z)
28. Circlip (R47)
29. Oil seal (DD-30-47-5)
30. Sprocket shaft collar
31. Wheel shaft
32. Cotter pin
33. Chain right puller
34. Wheel shaft collar
35. Chain left puller
36. Nut
37. Chain puller bolt
38. Sprocket shaft nut
39. Nut
40. Tension bar
41. Nut
42. Spring washer
43. Plain washer
44. Tension bar clip
45. Tension bar bolt
46. Nut
47. Spring washer
48. Cotter pin
49. Chain
50. Grommet

Fig. 6-21

B. Checking Brake Shoe Wear

1. Measure the outside diameter at the brake shoe with slide calipers.
   If it measures less than specified, replace.

Rear brake shoe diameter:	7.1 in. (180 mm.)
Wear limit:	6.9 in. (175 mm.)



1. Measuring point

Fig. 6-22

2. Remove any glazed areas from brake shoes using coarse sandpaper or file.

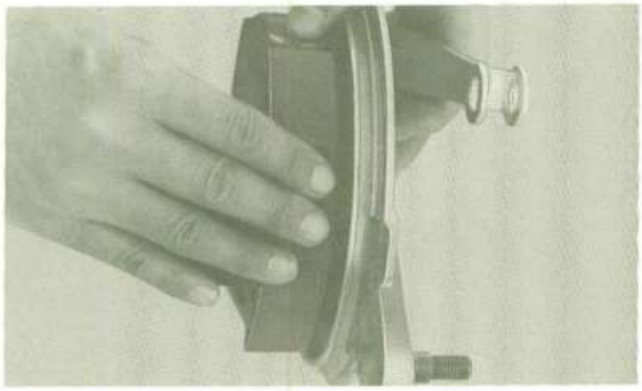


Fig. 6-23

C. Brake Drum

Oil or scratches on the inner surface or the brake drum will impair braking performance or result in abnormal noises. Remove oil with a rag soaked in lacquer thinner or solvent. Remove scratches using emery cloth lightly.

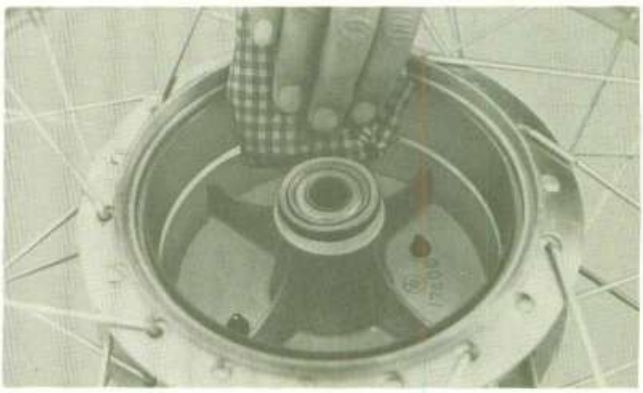


Fig. 6-24

D. Replacing Wheel Bearings

See front wheel section, paragraph 6.

6-4. Rims and Spokes (Front and Rear Wheels)

A. Checking for Loose Spokes

Loose spokes can be checked by bracing the machine off the ground so that the wheel can spin free.
Slowly revolve the wheel and at the same time let the metal shaft of a fairly heavy screwdriver bounce off each spoke. If all the spokes are tightened approximately the same, then the sound given off by the screwdriver hitting the spokes should sound the same. If one spoke makes a dull flat sound, then check it for looseness.

B. Checking Rim "Run-Out"

While you have the wheel elevated, you should check that it does not have too much run-out.
"Run-out" is the amount the wheel deviates from a straight line as it spins. Spin the wheel, and solidly anchor some sort of a pointer about 1/8 in. (3 mm.) away from the side of the rim.
As the wheel spins, the distance between the pointer and the rim should not change more than 1/16 in. (2 mm.) total. Any greater fluctuation should be eliminated by properly adjusting the spokes.

Run-out limits: 0.08 in. (2 mm.) lateral
Run-out limits: 0.08 in. (2 mm.) vertical

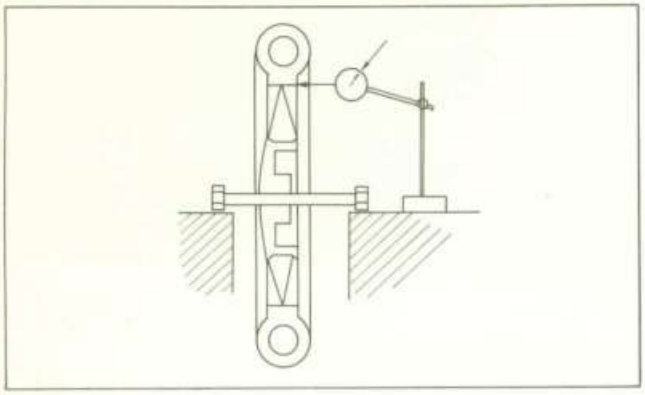


Fig. 6-25

6-5. Tires and Tubes

A. Removal

1. Remove valve cap, valve core, and valve stem lock nut.
2. When all air is out of tube, separate tire bead from rim. (both sides) by stepping on tire with your foot.
3. Use two tire removal irons (with rounded edges) and begin to work the tire bead over the edge of the rim, starting 180° opposite the tube stem.
   Take care to avoid pinching the tube as you do this.
4. After you have worked one side of the tire completely off the rim, then you can slip the tube out. Be very careful not to damage the stem while pushing it back out of the rim hole.

Note:

If you are changing the tire itself, then finish the removal by working the tire off the same rim edge just previously mentioned.

B. Installing Tire and Tube

Reinstalling the tire and tube can be accomplished by reversing the disassembly procedure. The only difference in procedure would be right after the tube has been installed, but before the tire has been completely slipped onto the rim, inflate the tube. This removes any creases that might exist. Release the air and continue with reassembly. Also, right after the tire has been completely slipped onto the rim, make sure that the valve stem comes out of the hole in the rim at a right angle to the rim.

Tire Pressure	Front	23 lbs/in.² (1.6 kg/cm.²)	Normal Riding
	Rear	2.8 lbs/in.² (2.0 kg/cm.²)	

6-6. Drive Chain and Sprockets

A. Chain

Note:

Please refer to Maintenance and Lubrication Intervals charts for additional information.

1. Using a blunt-nosed pliers, remove the master link clip and side plate. Remove the chain.

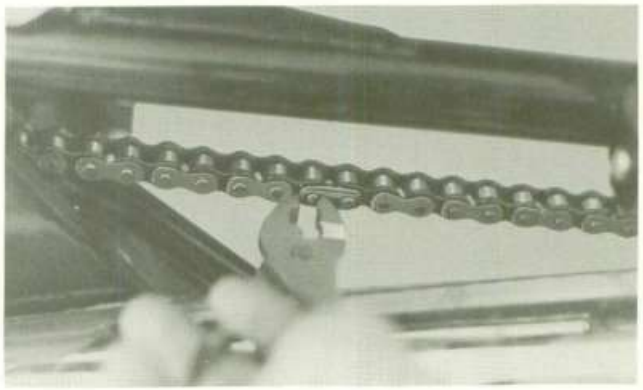
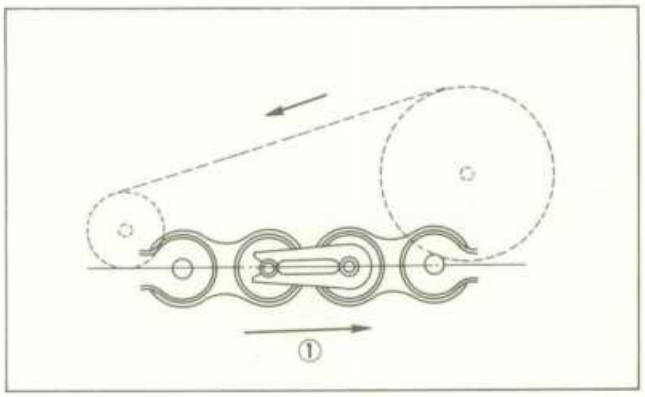


Fig. 6-26

2. During reassembly, the master link clip must be installed with rounded end facing the direction of travel.



1. Turning direction

Fig. 6-27

B. Drive Sprocket

With the left crankcase cover removed, proceed as follows:

1. Using a blunt chisel, flatten the drive sprocket lock washer tab.

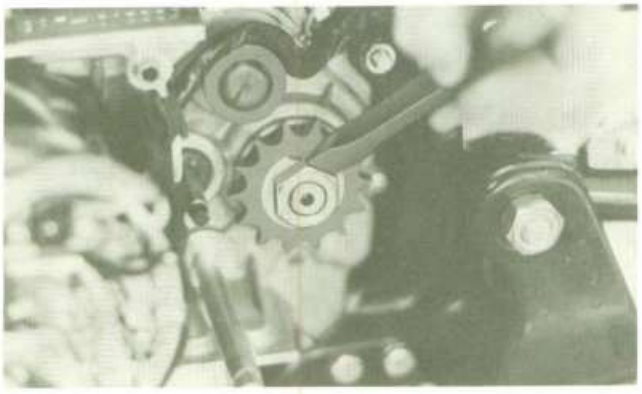
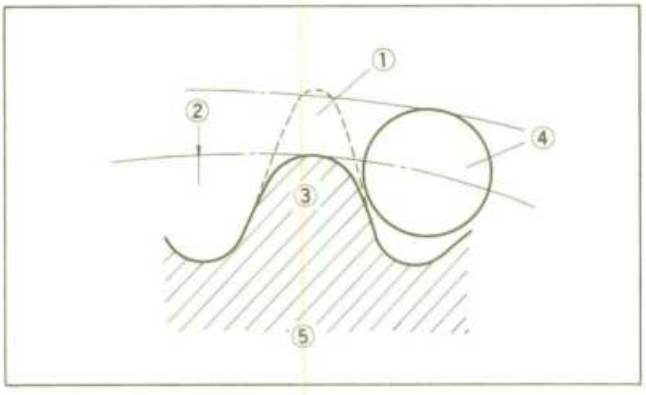


Fig. 6-28

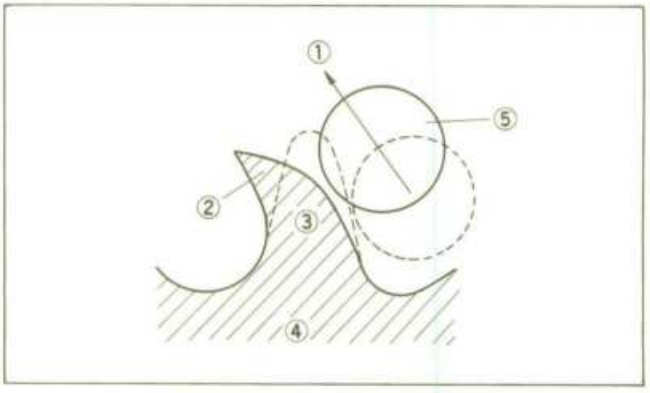
2. With the drive chain in place, transmission in gear, firmly apply the rear brake. Remove the sprocket securing nut. Remove the sprocket.
3. Check sprocket for wear. Replace if wear decreases tooth height to a point approaching the roller center line.



1. Correct
2. Replace
3. Tooth
4. Roller
5. Sprocket

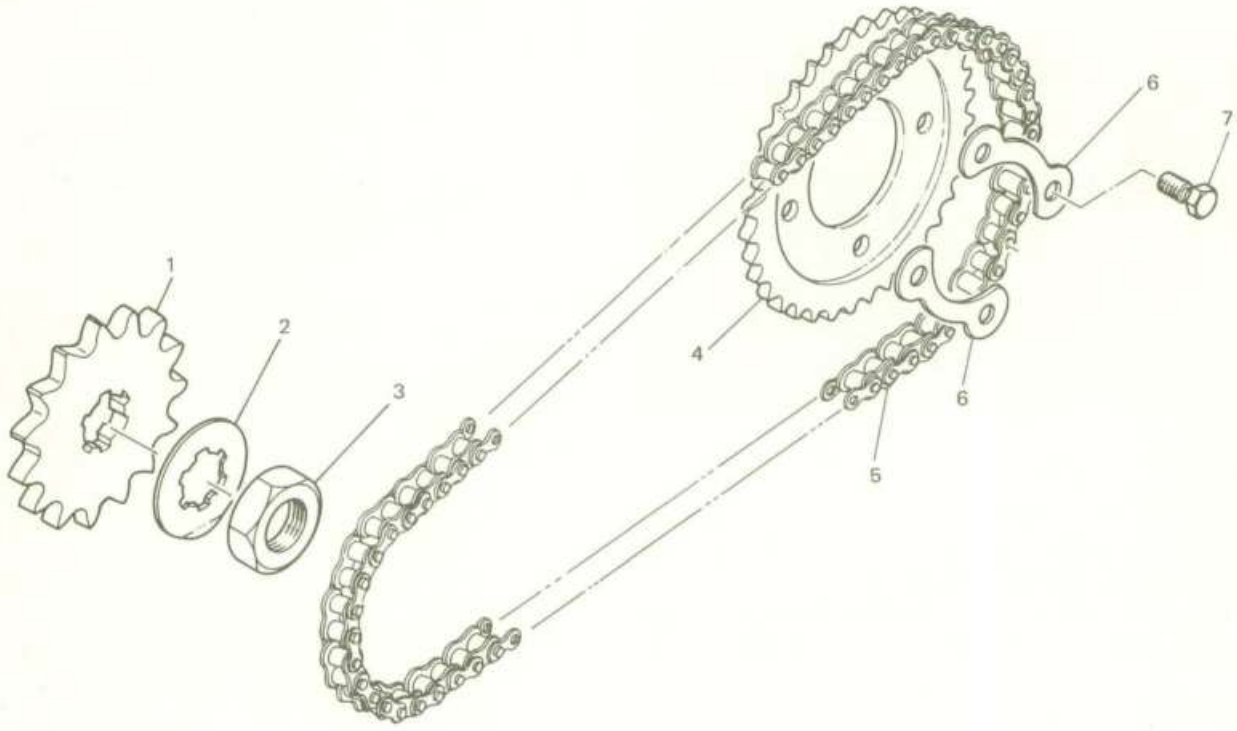
Fig. 6-29

4. Replace if tooth wear shows a pattern such as that in the illustration, or as precaution and common sense dictate.



1. Slip off
2. Replace
3. Tooth
4. Sprocket
5. Roller

Fig. 6-30



1. Drive sprocket
2. Lock washer
3. Locknut
4. Sprocket
5. Chain
6. Lock washer
7. Fitting bolt

Fig. 6-31

5. During reassembly, make sure the lock washer splines are properly seated on the drive shaft splines. Tighten securing nut thoroughly to specified torque value. Bend lock washer tab fully against securing nut flats.

Drive Sprocket Securing Nut Torque:
560 — 780 in-lbs. (6.5 — 9.0 m-kgs.)

C. Driven Sprocket

With the rear wheel removed, proceed as follows:

1. Remove the chain (refer to chain).

2. Remove the sprocket shaft nut and remove the driven sprocket assembly.

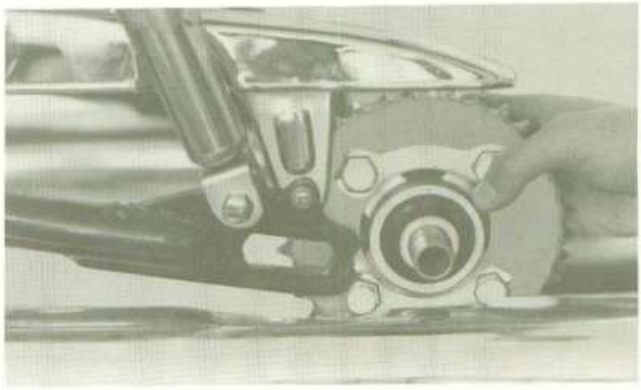


Fig. 6-32

3. Using a blunt chisel, flatten the securing bolt lock washer tabs.
   Remove the securing bolts (4). Remove the lock washers and sprocket.

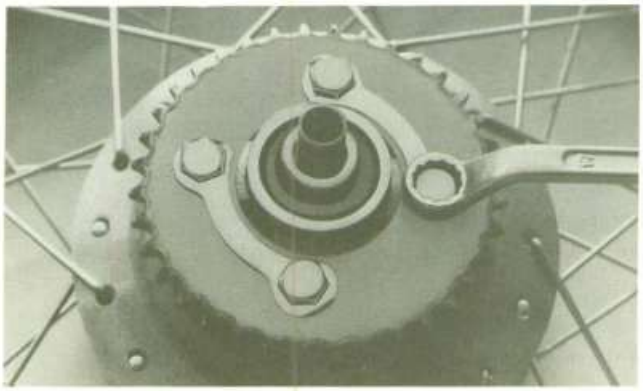


Fig. 6-33

4. Check sprocket wear per procedures for the drive sprocket.
5. Check the sprocket to see that it runs true. Do not heat and hammer to straighten. Use a press. If severely bent, replace.
6. During reassembly, make sure that sprocket and sprocket seat are clean. Tighten the securing bolts in a cross-hatch pattern.
   Bend the tabs of the lock washers fully against the securing bolt flats.

Driven Sprocket Securing Bolt Torque:
300 — 350 in-lbs. (3.5 — 4.0 m-kgs.)

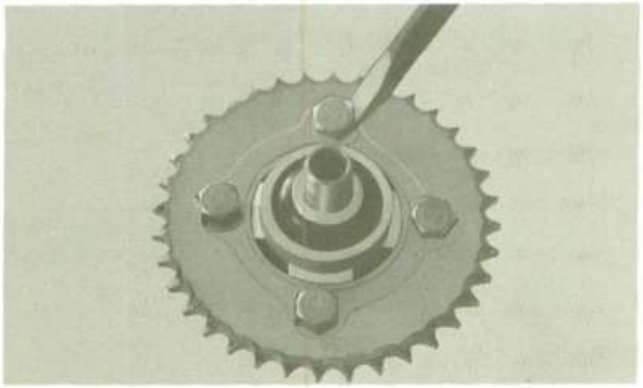
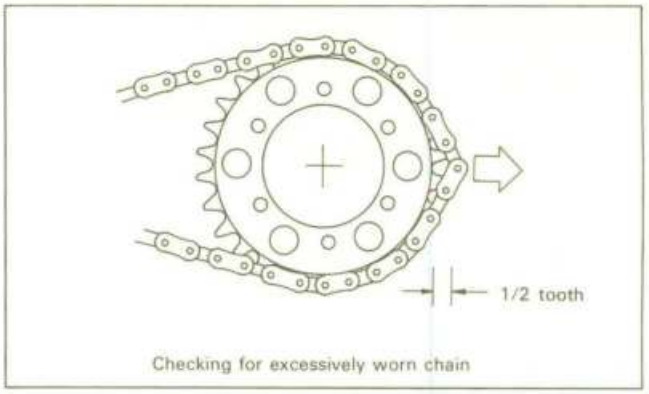


Fig. 6-34

D. Inspection

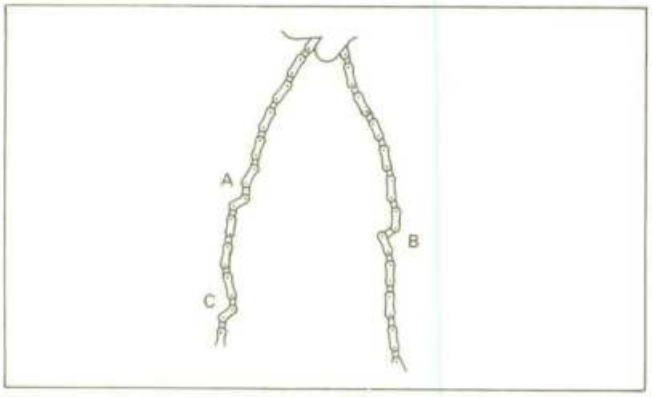
1. With the chain installed on the machine, excessive wear may be roughly determined by attempting to pull the chain away from the rear sprocket. If the chain will lift away more than one-half the length of the sprocket teeth, remove and inspect.
   If any portion of the chain shows signs of damage, or if either sprocket shows signs of excessive wear, remove and inspect.



Checking for excessively worn chain

Fig. 6-35

2. Check the chain for stiffness. Hold as illustrated. If stiff, soak in solvent solution, clean with medium bristle brush, dry with high pressure air. Oil chain thoroughly and attempt to work out kinks. If still stiff, replace.



3. Check the side plates for visible wear. Check to see if excessive play exists in pins and rollers. Check for damaged rollers. Replace as required.

E. Maintenance

The chain should be lubricated per the recommendations given in the Maintenance and Lubrication Intervals charts. More often if possible. Preferably after every use.

1. Wipe off dirt with shop rag. If accumulation is severe, use soft bristle brush, then rag.
2. Apply lubricant between roller and side plates on both inside and outside of chain. Don't skip a portion as this will cause uneven wear.
   Apply thoroughly. Wipe off excess.

Note:

Chain and lubricant should be at room temperature to assure penetration of lubricant into rollers.
Choice of lubricant is determined by use and terrain. SAE 20Wt. or 30Wt. may be used, but several specialty types by accessory manufacturers offer more penetration, corrosion resistance and shear strength for roller protection.
In certain areas, semi-drying lubricants are preferrable. These will resist picking up sand particles, dust, etc.

3) Periodically, remove the chain. Wipe and/or brush excess dirt off. Blow off with high pressure air.
4) Soak chain in solvent, brushing off remaining dirt. Dry with high pressure air. Lubricate thoroughly while off machine. Work each roller thoroughly to make sure lubricant penetrates. Wipe off excess oil. Re-install.

6-7. Front Forks

A. General — The Front Forks

The front forks utilize chrome-plated tubular steel fork legs (inner tubes) and tubular aluminum sliders (outer tubes).

B. Front Fork Oil Change

1. With the front wheel removed or raised off the floor with a suitable frame stand.
2. Remove cap bolts on inner fork tubes.



1. Cap bolt

Fig. 6-36

3. Remove drain screw from each outer tube with open container under each drain hole.

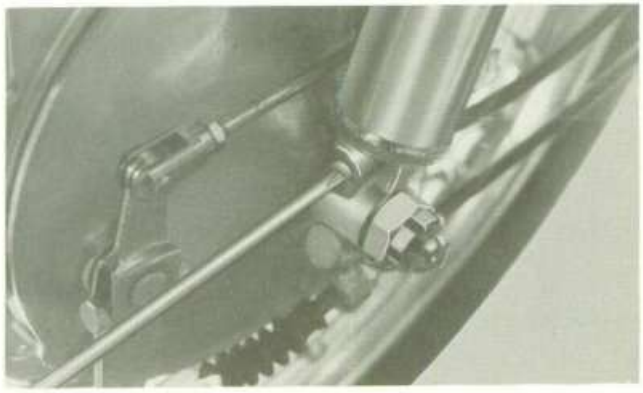


Fig. 6-37

4. After most of oil has drained, slowly raise and lower outer tubes to pump out remaining oil.
5. Replace drain screws.

Note:

Check gaskets. Replace if damaged.

6. Pour specified amount of oil into the inner tube through the upper end opening. Use Yamalube shock fluid.

Note:

Specialty type fork oils of quality manufacture may be used.

Front fork oil capacity:
5.55 oz. (157 c.c.) per side



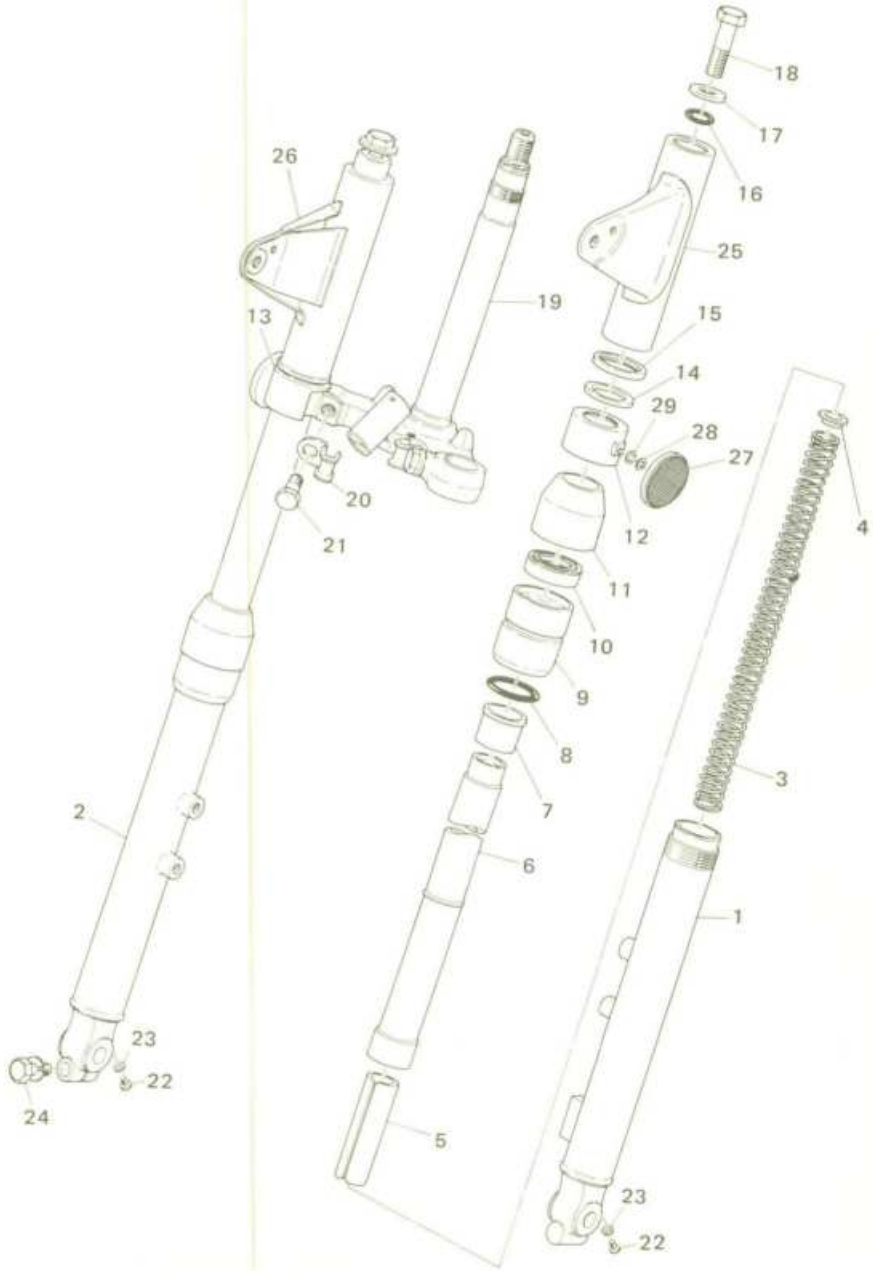
Fig. 6-38

Notes:

Select the weight oil that suits local conditions and rider preference (lighter for less damping; heavier for more damping).

7. After filling slowly pump the outer tubes up and down to distribute the oil.

Front Fork



1. Outer left tube
2. Outer right tube
3. Spring
4. Spring upper seat
5. Spacer
6. Inner tube
7. Slide metal
8. O-ring
9. Outer nut complete
10. Oil seal
11. Dust seal
12. Outer left cover
13. Outer right cover
14. Packing
15. Under cover
16. Packing (O-ring)
17. Cap washer
18. Cap washer
19. Under bracket complete
20. Wire holder
21. Under bracket bolt
22. Drain plug
23. Drain plug gasket
24. Bolt
25. Upper left cover
26. Upper right cover
27. Reflector
28. Spring washer
29. Plain washer

Fig. 6-39

8. Replace fork cap bolts and torque to specification.

Fork cap bolt torque:
130 — 260 in-lbs. (1.5 — 3.0 m-kgs.)

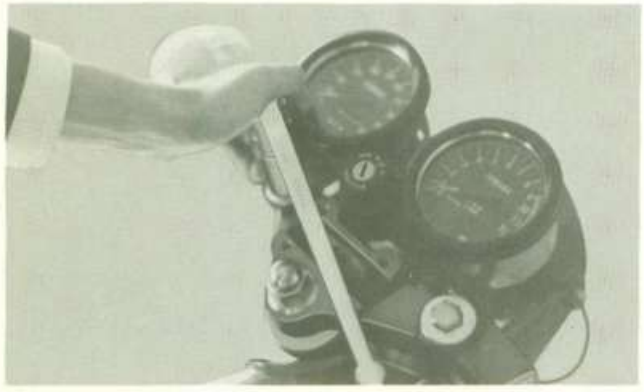


Fig. 6-40

C. Front Fork Disassembly

1. With the front wheel and fork cap bolts removed and the under bracket mounting bolts loosened, the fork legs can be removed from the upper and under brackets.

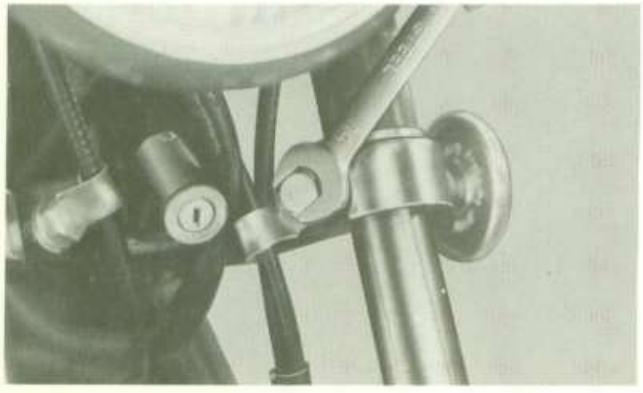


Fig. 6-41

2. Inspect O-ring on fork and replace if damaged.



Fig. 6-42

3. Drain the oil from both fork tubes.

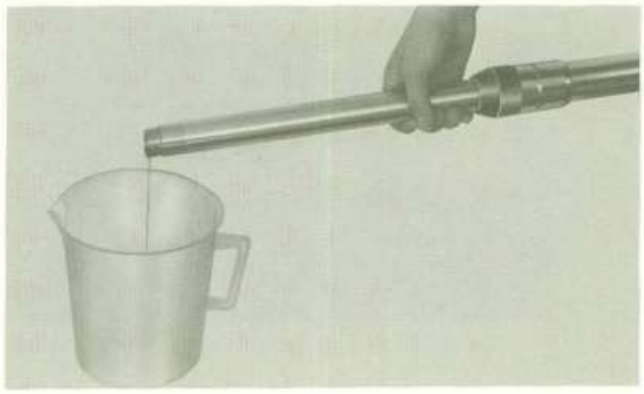


Fig. 6-43

4. Remove the dust seal.

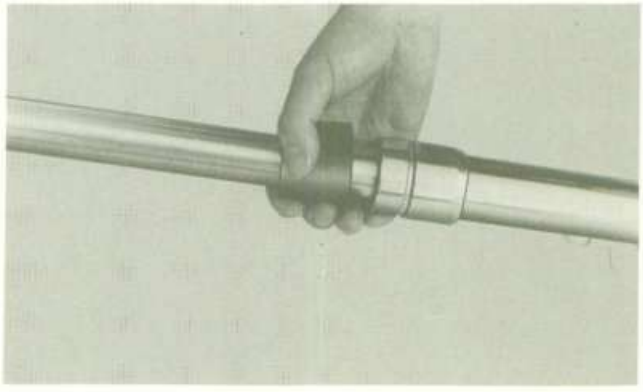


Fig. 6-44

5. Wind a rubber sheet or a tire tube around the outer tube nut, and remove the nut.

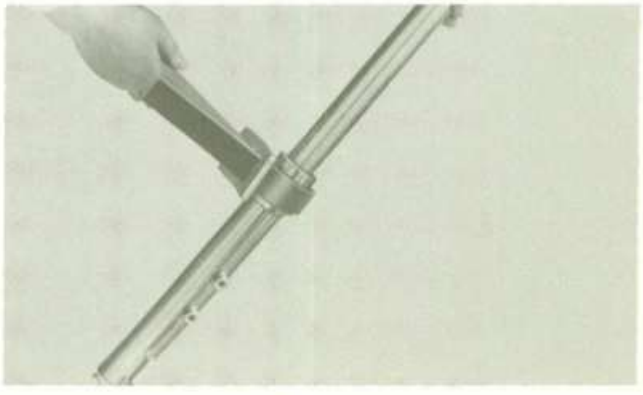


Fig. 6-45

6. Remove inner tube and spring assembly from outer tube.

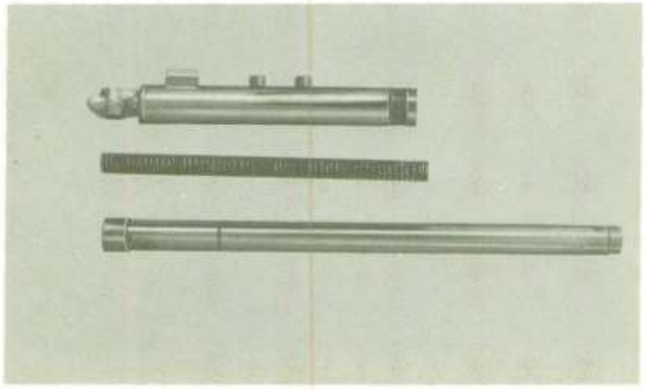


Fig. 6-46

7. Carefully pry out old seal and O-ring without damaging outer tube nut.
   To remove oil seal, tap the under side of the seal using punch and hammer.



Fig. 6-47

8. Inspect the O-ring in the outer tube nut, if damaged, replace it.

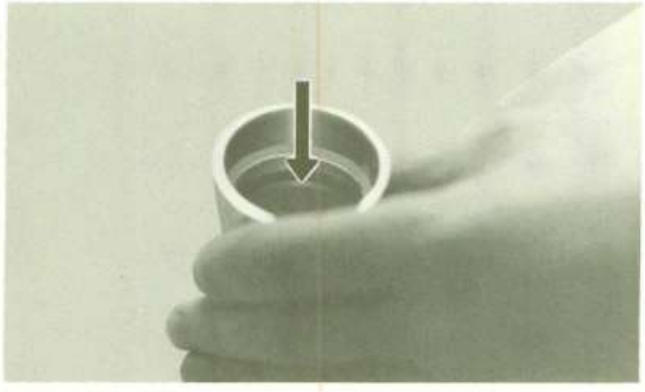


Fig. 6-48

9. Insert new seal with "open" side down using large socket and soft hammer.

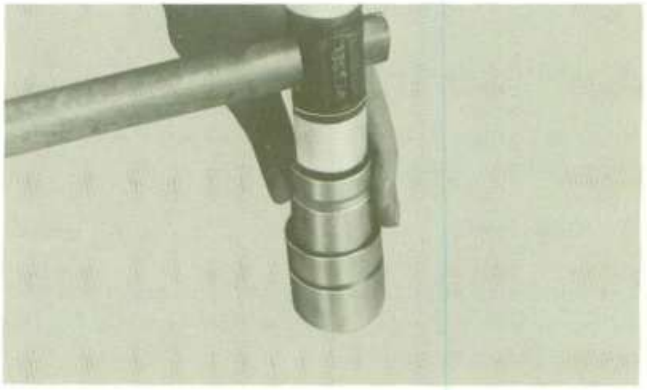


Fig. 6-49

D. Checking

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

E. Assembling

1. When assembling the front forks, reverse the order of disassembly.

Note:

a. When installing the outer tube nut, grease the oil seal lip, and install it with special care.
b. After assembling, check to see if the inner tube slides smoothly.

2. Installing the front forks on the frame.

a. Bring up the front forks to the correct position and partially tighten the underbracket mounting bolt.

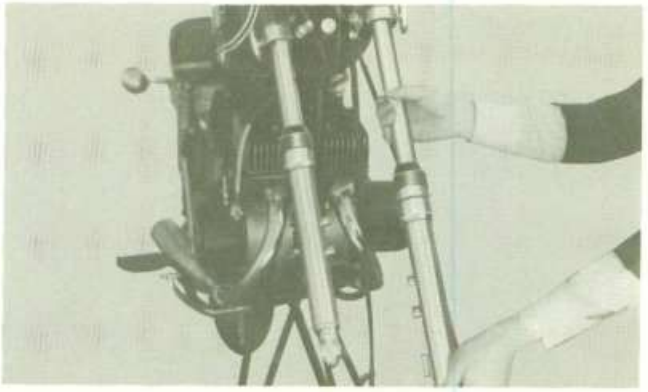


Fig. 6-50

b. Pour specified amount of oil into the inner tube through the upper end opening. Use 10W/30 "SE" motor oil.

Note:

Specialty type fork oils of quality manufacture may be used.

Fork oil capacity: 5.55 oz. (157 c.c.) per side

6-8. Steering Head

The steering head pivot is supported by two sets of uncaged ball and race bearing assemblies.

A. Steering Head Adjustment

Refer to Chapter 2, Section 2-3, paragraph D for steering head adjustment procedure.

B. Disassembly

The front end should be raised off the ground with a support under the engine and the front wheel should be removed (see Section 8-2).

1. Remove headlight from head lamp body.

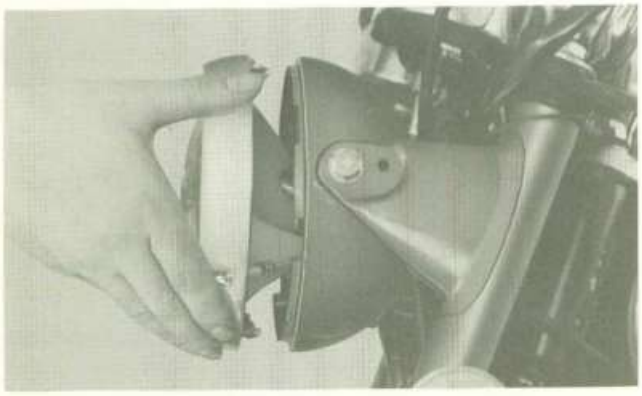


Fig. 6-51

2. Disconnect electrical wire in head lamp body.
3. Disconnect clutch and throttle cables at handlebars.
4. Disconnect tachometer and speedometer cables at instruments.
5. Remove handlebars and put aside.

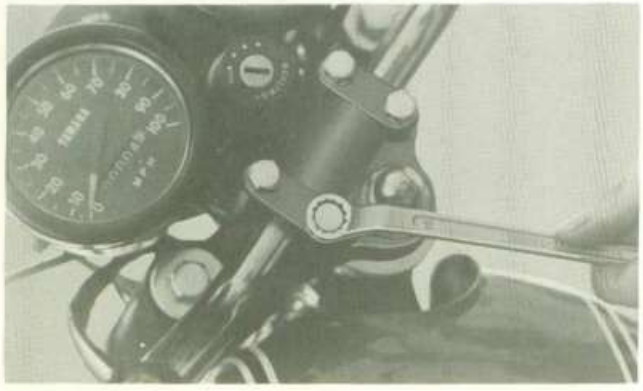


Fig. 6-52

6. Remove the cap bolts and front flasher lamps.

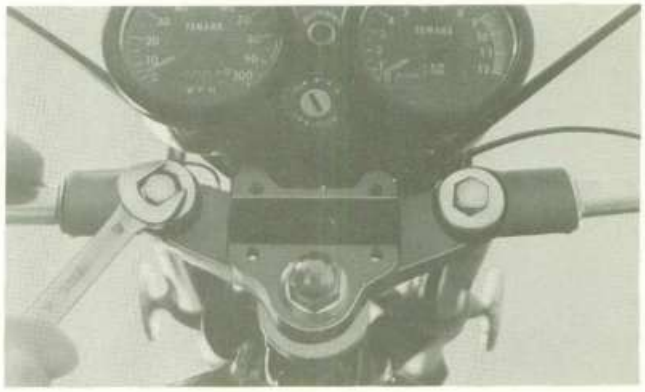


Fig. 6-53

Note:

At this point, removal of the fork tube assemblies is optional. If front fork disassembly is to be done, remove the tubes at this time (see Section 8-7). If not, leave the tubes installed in the lower fork bracket.

7. Remove crown nut and crown washer.

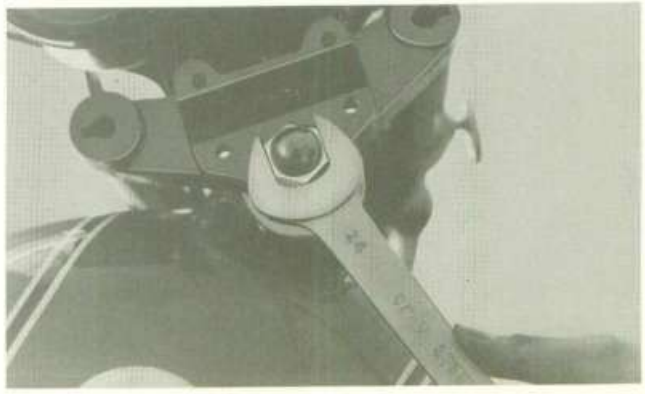
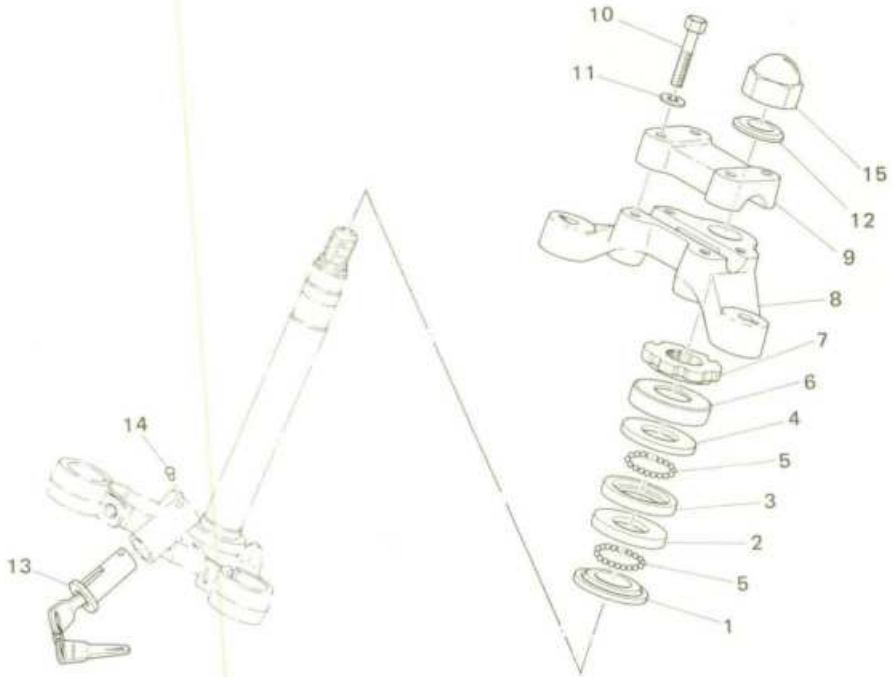


Fig. 6-54



1. Ball race 1
2. Ball race 2
3. Ball race 2
4. Ball race 1
5. Ball (1/4 in.)
6. Ball race cover
7. Fitting nut
8. Handle crown
9. Handle upper holder
10. Bolt
11. Spring washer
12. Crown washer
13. Steering lock assembly
14. Screw rivet
15. Crown nut

Fig. 6-55

8. Remove handle crown (upper bracket) and instruments, at the same time and put aside.



Fig. 6-56

9. Lift off the headlight body and its stays as an assembly.

10. Remove steering ring nut with steering nut wrench.

Caution:

Support the under bracket with a suitable stand to hold the bracket up into the headstock so that the loose bearings will not fall out.



Fig. 6-57

11. While still supporting the under bracket, carefully lift off the upper bearing cover.



Fig. 6-58

12. Lift off the top bearing race and remove all of the ball bearings from the upper bearing assembly.

Ball quantity/Size: 19 / 1/4 in. (6.35 mm.)



Fig. 6-59

13. Remove the supporting stand from the under bracket and remove bracket while being very careful not to lose any bearings from the lower assembly.

Ball quantity/Size: 19 / 1/4 in. (6.35 mm.)



Fig. 6-60

14. To remove, press-fit races from steering head, tap out from back side with long punch. Tap lightly to avoid cracking the race.

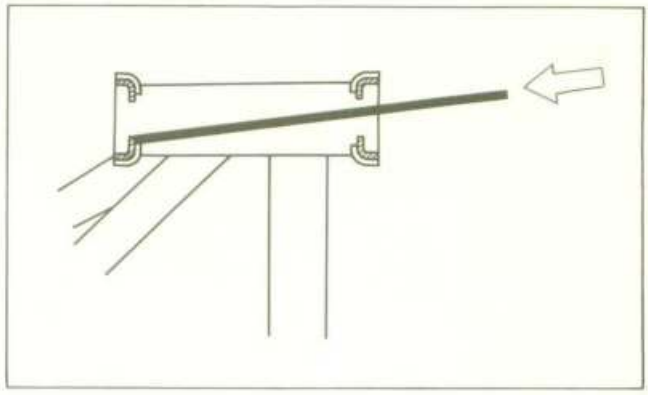


Fig. 6-61



Fig. 6-62

C. Inspection

1. Examine all the balls for pits or partial flatness. If any one is found defective, the entire set (including both races) should be replaced. If either race is pitted, shows rust spots, or is damaged in any way, replace both races and all balls.
2. Examine dust seal under lowest race and replace if worn.

D. Reassembling

1. If pressed-in races have been removed, tap in new races.
2. Grease the lower ball race of the bottom assembly and arrange the balls around it. Then apply more grease.

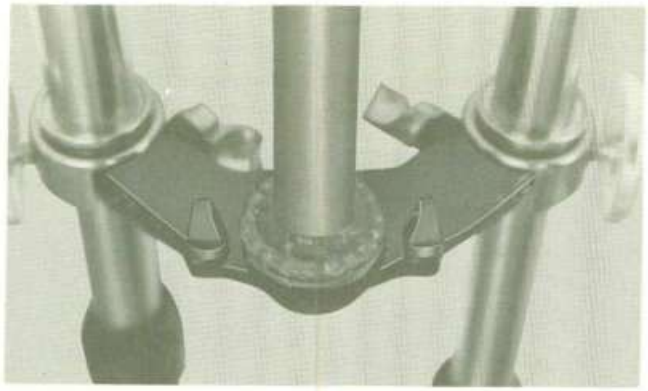


Fig. 6-63

3. Grease the lower ball race of the upper assembly and arrange the balls around it. Then apply more grease and set the top race into place.
   See lubrication chart for lubricant type.

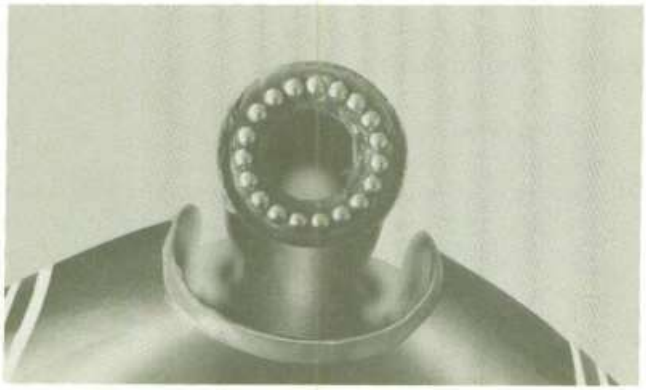


Fig. 6-64

4. Carefully slip the under-bracket stem up into the steering head.
   Hold the top bearing assembly in place so the stem does not knock any balls out of position.

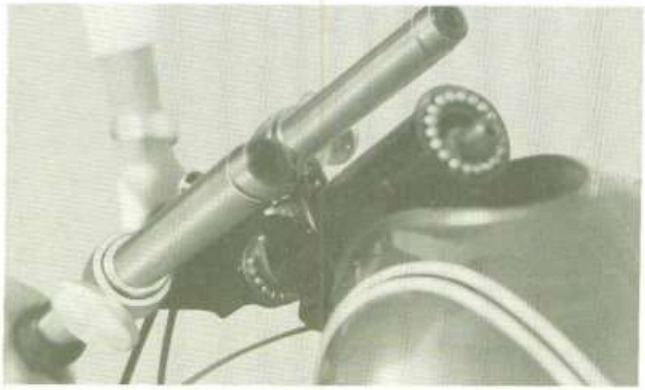


Fig. 6-65

5. Set the upper bearing cover on and thread on the right nut.
   Tighten the ring nut so that all free play is taken up but the bracket can still pivot freely from lock to lock. Recheck for free play after the entire fork unit has been installed. (See Chapter 2, Section 2-3 for adjustment procedure.)

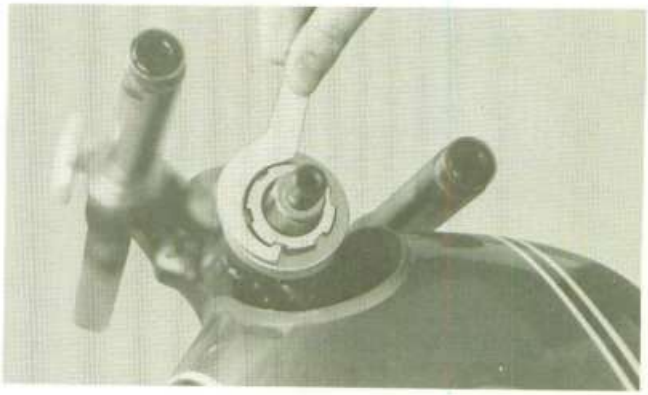


Fig. 6-66

6. Install the fork tubes into the under-bracket if they were previously removed.
7. Replace the headlight body and stays onto the fork tubes with all rubber and steel spacing washers properly in place.

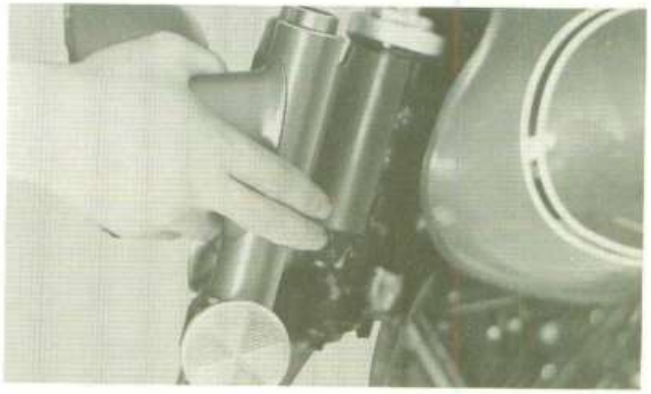


Fig. 6-67

8. Install the upper fork bracket, tighten crown nut and torque to specification.

Crown nut torque:
430 — 520 in-lbs. (5.0 — 6.0 m-kgs.)

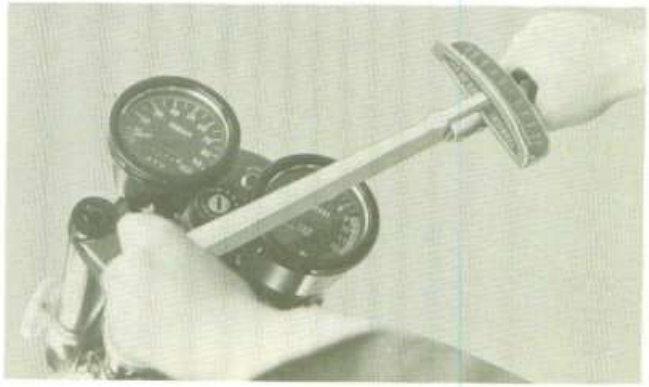


Fig. 6-68

9. Tighten fork cap bolts and torque to specification.

Fork cap bolt torque:
130 — 260 in-lbs. (1.5 — 3.0 m-kgs.)

Note:

Make certain that tops of fork tubes are adjusted to the same level. If necessary, loosen under-bracket pinch bolts and adjust.

10. Install handlebars and torque to specification.

Handlebar mounting bolt torque:
96 — 156 in-lbs. (1.1 — 1.8 m-kgs.)

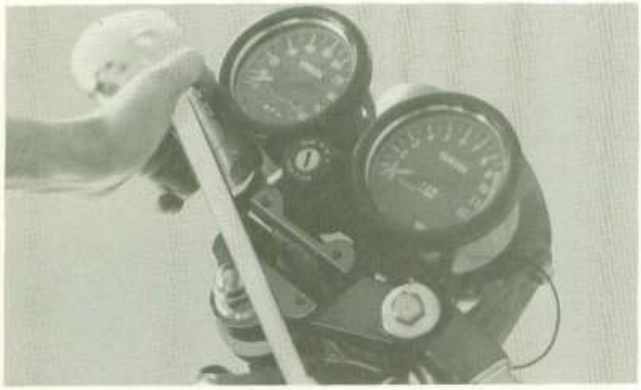


Fig. 6-69

11. Reconnect all electrical wiring and check operation.
12. Install headlight and check operation.
13. Install front wheel.
14. Reconnect speedometer and tachometer cables.
15. Reconnect clutch, front brake and throttle cables, and check operation.

6-9. Rear Shock Absorber

1. Remove the shock absorber from the machine.

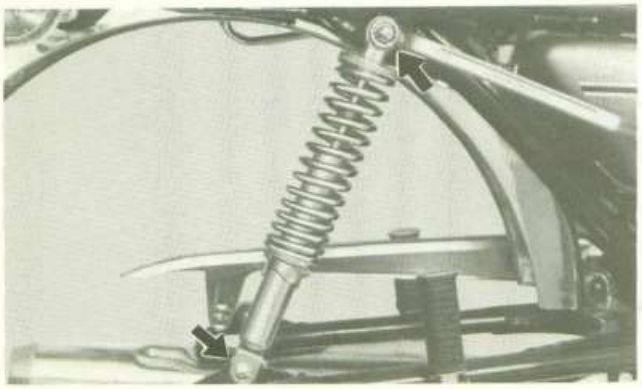


Fig. 6-70

2. Operate shock absorber shaft to check damping. As you push down, only slight damping should be felt. Return stroke will have considerable damping. If there is no damping, replace shock.

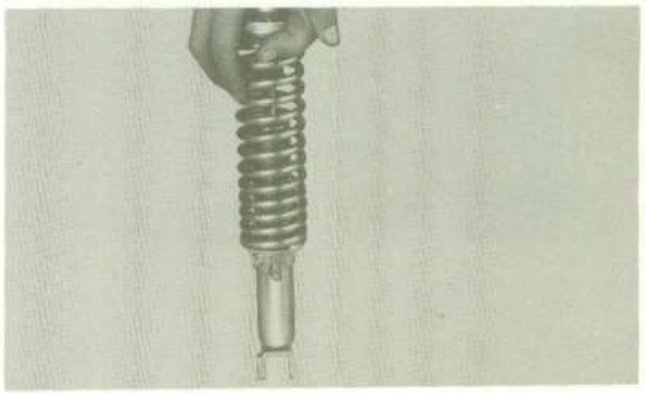


Fig 6-71

6-10. Swing Arm

A. Swing Arm Inspection

01. With rear wheel and shock absorbers removed, grasp the ends of the arm and move from right to left to check for freeplay.

Swing arm free play:	0.04 in. (1.0 mm.)

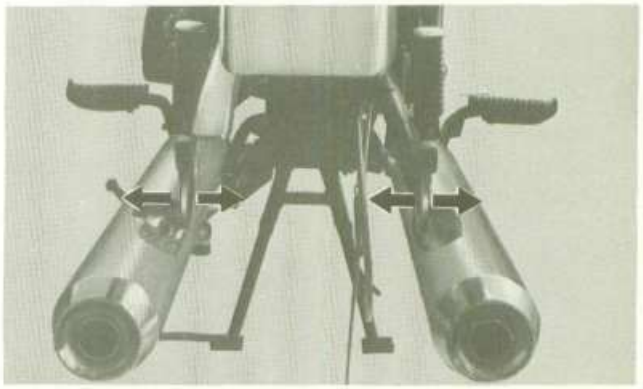


Fig 6-72

2. If free play is excessive, remove swing arm and replace swing arm bushings.

B. Swing Arm Lubrication

1. To lubricate, remove pivot shaft.
2. Apply liberal coating of lube grease on pivot shaft and inside of bushings. Reinstall pivot shaft.

Recommended lubricant:
90 wt. smooth lube grease

3. Wipe off excessive grease.

C. Swing Arm Removal

1. Remove nut on swing arm pivot shaft and tap out shaft with a long aluminum or brass rod.

Note:

Carefully remove the arm while noting the location of distance collar.

Pivot bolt torque:
570 — 910 in-lbs. (6.6 — 10.5 m-kgs.)

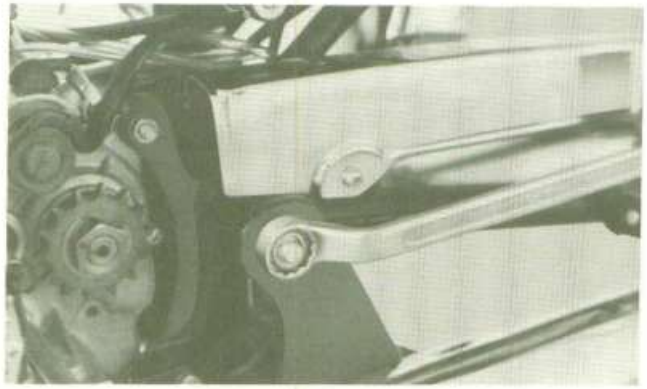


Fig 6-73

2. Tap out old bushing from each side of pivot using the long rod.
3. Install new bushing using a soft hammer.

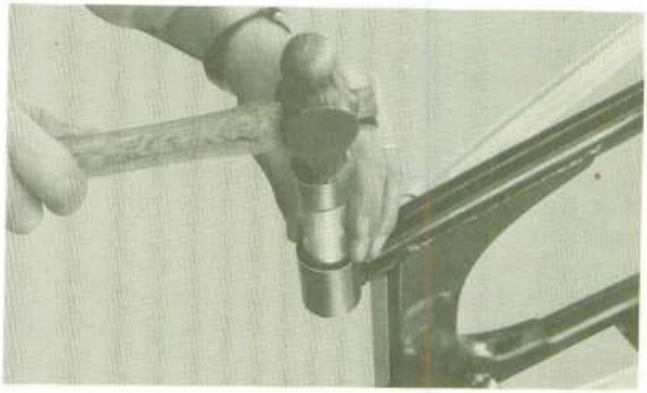


Fig 6-74

Rear Arm

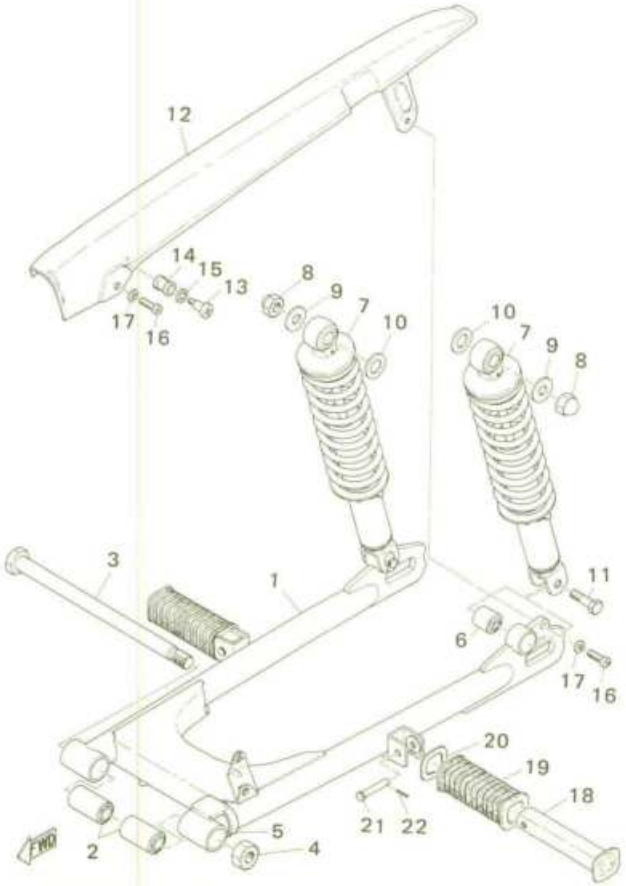


Fig 6-75

1. Rear arm complete
2. Rear arm bushing
3. Pivot shaft
4. Nut
5. Guard seal
6. Rear cushion bushing
7. Rear cushion assembly
8. Crown nut
9. Rear cushion washer (10.5-27-2)
10. Rear cushion washer (14.8-27-2)
11. Bolt (8-29)
12. Chain case half
13. Chain case fitting screw
14. Chain case damper
15. Chain case washer (7.2-15-0.6)
16. Pan head screw
17. Spring washer
18. Rear footrest
19. Rear footrest cover
20. Special washer
21. Crevice pin
22. Cotter pin

6-11. Cables and Fittings

A. Cable Maintenance

Note:

See Maintenance and Lubrication Intervals Charts for additional information.

Cable maintenance is primarily concerned with preventing deterioration through rust and weathering: and providing for proper lubrication to allow the cable to move freely within its housing.

Cable removal is straightforward and uncomplicated. Removal will not be discussed within this section. For details, see the individual maintenance section for which the cable is an integral part.

Cable routing is of paramount importance, however. For details of cable routing, see the cable routing diagrams at the end of this manual.

1. Remove the cable.
2. Check for free movement of cable within its housing. If movement is obstructed, check for fraying of the cable strands. If fraying is evident, replace the cable assembly.
3. To lubricate cable, hold in vertical position. Apply lubricant to uppermost end of cable. Leave in vertical position until lubricant appears at bottom end. Allow excess lubricant to drain and re-install.

Note:

Choice of lubricant depends upon conditions and preference. However, a semidrying, graphite-base lubricant will probably perform most adequately under most conditions. Under certain conditions, a water resisting lubricant is more suitable.

Handle and Cables

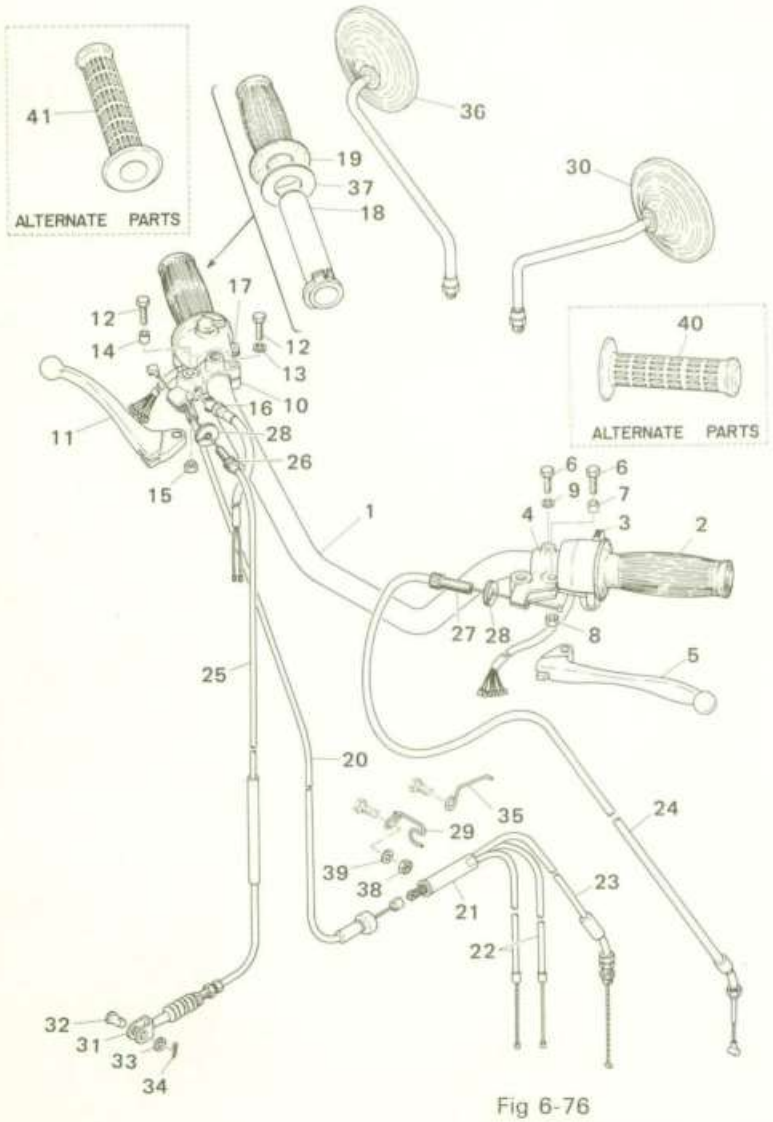


Fig 6-76

1. Handle
2. Left grip
3. Handle 3 switch, left
4. Left lever holder
5. Left lever
6. Bolt
7. Lever collar
8. Nut
9. Spring washer
10. Right lever holder
11. Right lever
12. Bolt
13. Spring washer
14. Lever collar
15. Nut
16. Front stop switch assembly
17. Handle 3 switch, right
18. Guide tube
19. Right grip
20. Throttle wire 1
21. Cylinder
22. Throttle wire 2
23. Pump wire
24. Clutch wire
25. Brake wire
26. Wire adjusting bolt
27. Wire adjusting bolt
28. Wire adjusting nut
29. Wire clip
30. Rear view mirror assembly, left
31. Wire joint
32. Joint link pin 2
33. Pedal link washer
34. Cotter pin
35. Wire guide
36. Rear view mirror assembly, right
37. Leaf ring
38. Nut
39. Spring washer
40. Left grip
41. Right grip

B. Throttle Maintenance

1. Remove two Phillips head screws from throttle housing assembly and separate two halves of housing.
2. Disconnect cable end from throttle grip assembly and remove grip assembly.

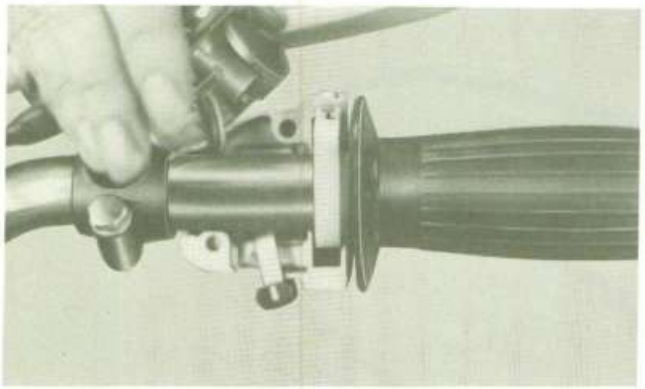


Fig 6-77

3. Wash all parts in mild solvent and check contact surfaces for burrs or other damage. (Also clean and inspect righthand end of handlebars.)
4. Lubricate contact surfaces with light coat of lithium soap base grease and reassemble.

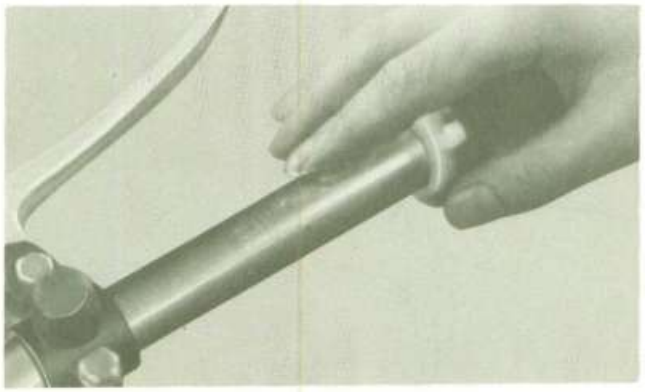


Fig. 6-78

Note:

Tighten housing screws evenly to maintain an even gap between the two halves.

5. Check for smooth throttle operation and quick spring return when released and make certain that housing does not rotate on handlebar.

C. Cable Junction Maintenance

The throttle cable cylinder (junction point for Autolube control cable) must be periodically maintained also.

1. Remove throttle wire 1 from handlebar housing. Remove throttle wire 2 from carburetor mixing chamber top.
3. Remove Autolube pump cable from pump pulley. Remove cable adjustor.
4. Remove seat and fuel tank.
5. Remove wire/cylinder assembly.
6. Remove cylinder cap, throttle wire 2 and Autolube pump cable.
7. Wash assembly thoroughly in solvent.
8. Lubricate all associated cables.
9. Apply a thin coating of fubricant to cable cylinder walls.

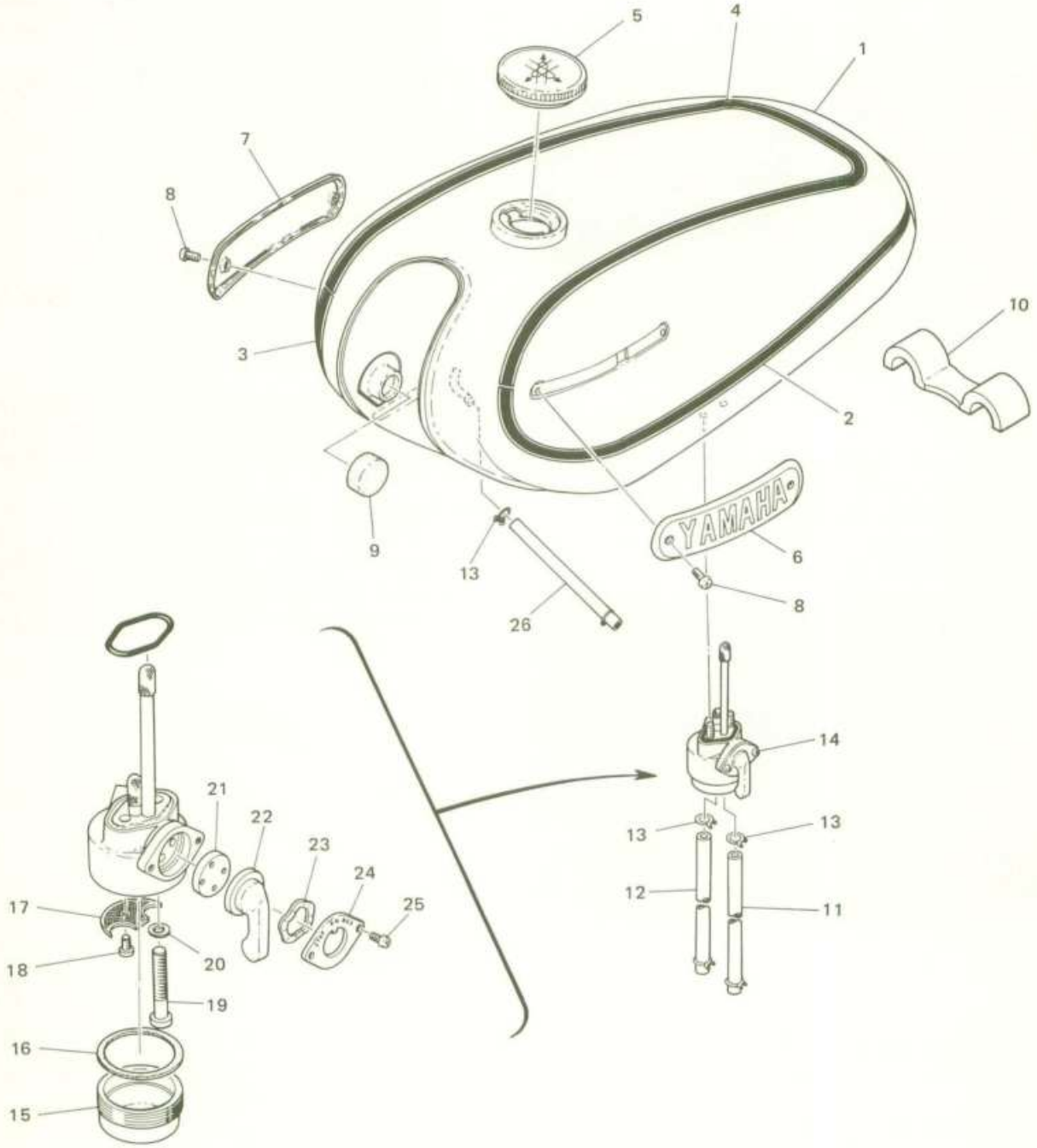
Note:

A small amount of lithium soap base grease may be used in lieu of cable lubricant. However, if machine is to be used in extreme cold, this should be avoided.

10. Reassemble all cables. Make sure cable cylinder is sealed from damage due to weather and riding conditions. Re-install. See cable routing diagrams for correct installation position. See Engine Tuning and Chassis Adjustment for correct cable adjustment.

6-12. Miscellaneous Chassis Components

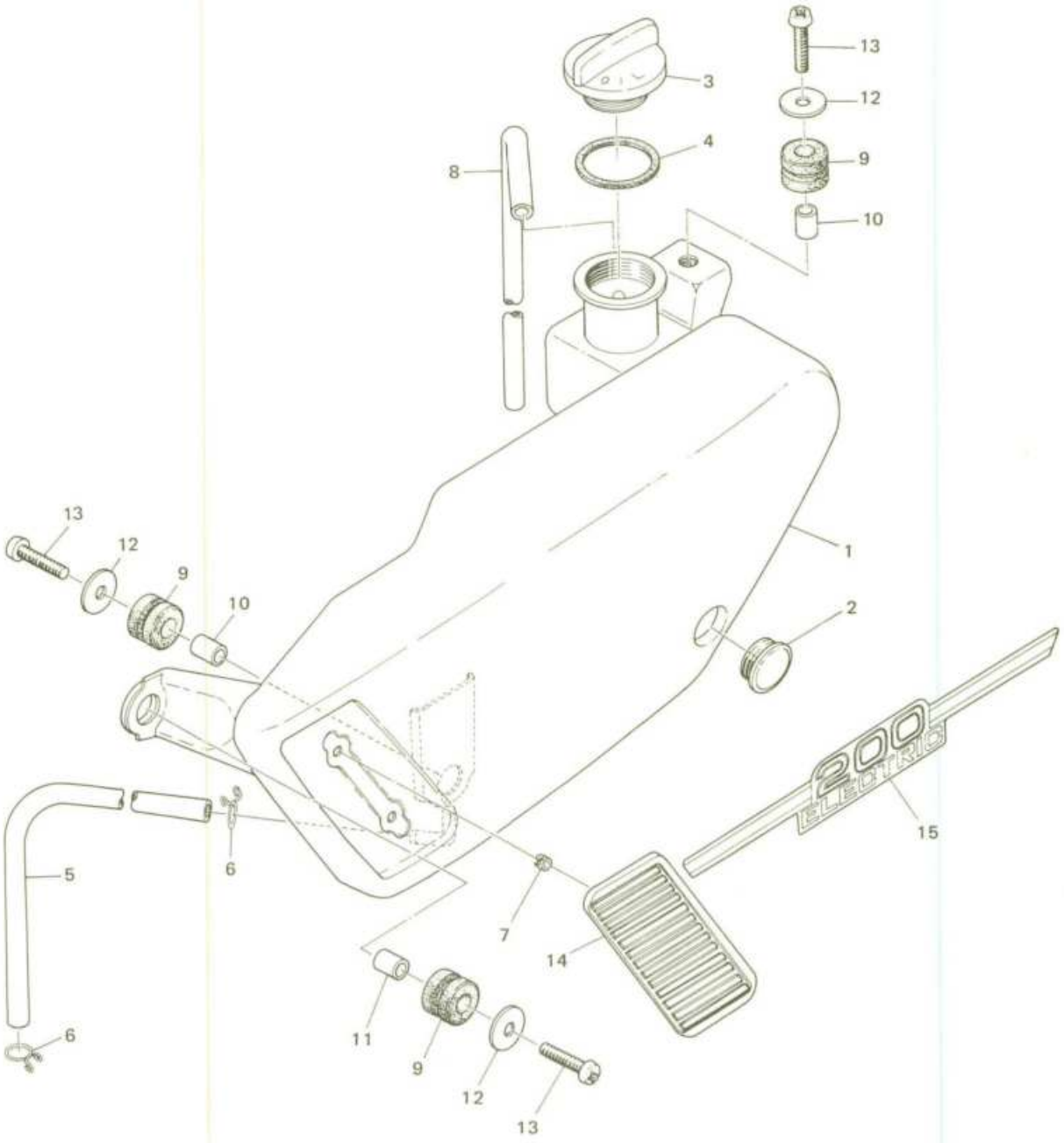
A. Fuel Tank



1. Fuel tank complete
2. Fuel tank graphic, left
3. Fuel tank graphic, right
4. Fuel tank graphic, upper
5. Cap assembly
6. Fuel tank emblem, left
7. Feul tank emblem, right
8. Pan head screw
9. Locating damper
10. Locating damper
11. Fuel pipe (5-135)
12. Fuel pipe (5-190)
13. Pipe clip
14. Fuel cock assembly
15. Filter cup
16. Filter gasket
17. Filter net
18. Pan head screw
19. Pan head screw
20. Gasket
21. Valve
22. Cock lever
23. Wave washer
24. Lever fitting plate
25. Pan head screw
26. Level pipe (5-155)

Fig 6-79

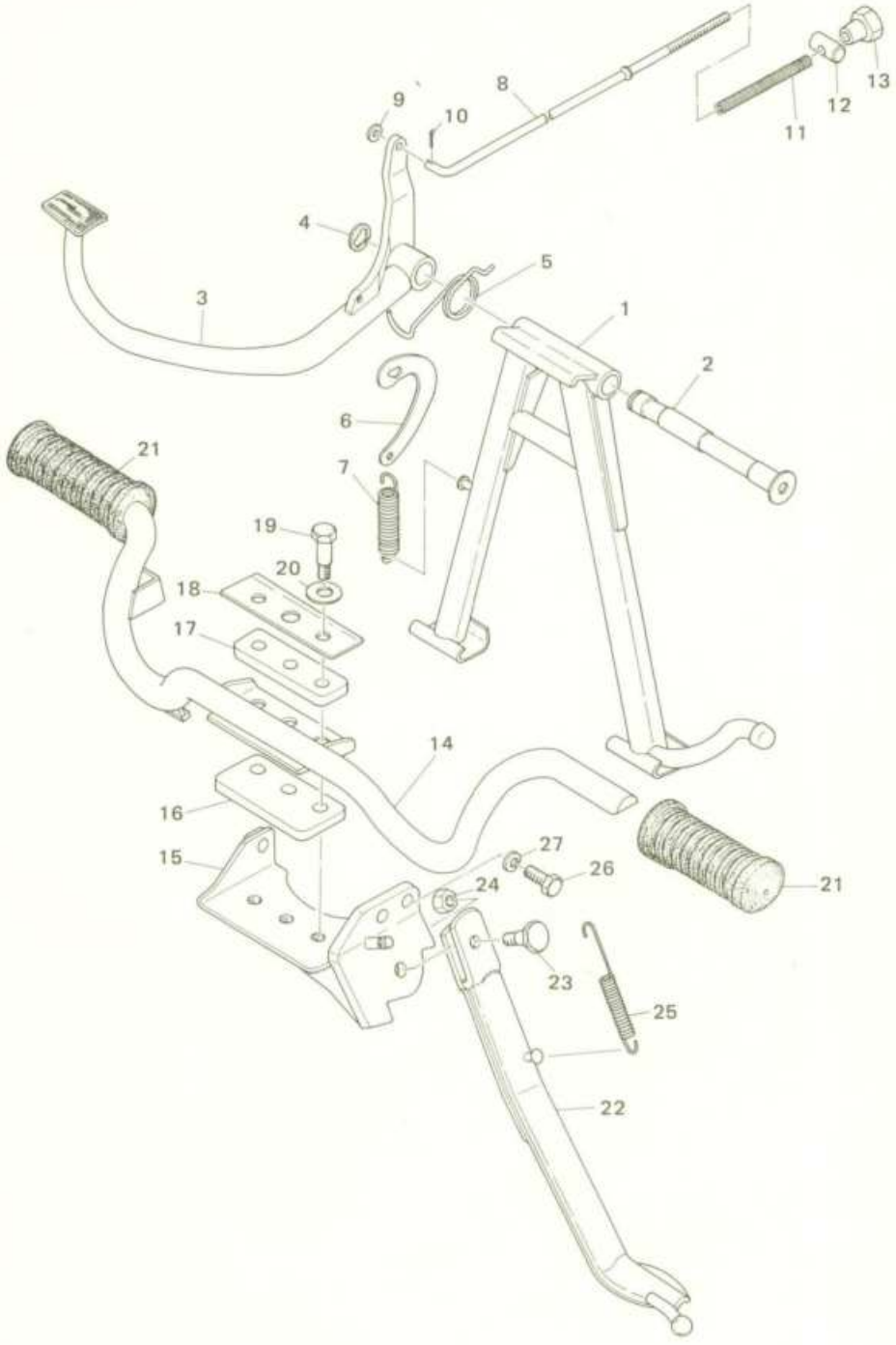
B. Oil Tank



1. Oil tank assembly
2. Level gauge
3. Oil tank cap
4. Cap gasket
5. Oil pipe (5-420)
6. Pipe clip
7. Nut
8. Breather pipe (5-580)
9. Battery box damper 1
10. Fender mount collar
11. Fender collar
12. Leg shield washer
13. Pan head screw
14. Left mold
15. Emblem 200

Fig 6-80

C. Footpeg - Brake



1. Main stand
2. Main stand shaft
3. Brake pedal
4. Circlip (E-12)
5. Return spring
6. Link
7. Main stand spring
8. Brake rod
9. Plain washer
10. Cotter pin
11. Rod spring
12. Crevice pin
13. Adjusting nut
14. Footrest
15. Footrest bracket
16. Rubber damper 2
17. Rubber damper 1
18. Special washer
19. Footrest bolt
20. Special washer (10.5-22-2.6)
21. Footrest cover
22. Side stand
23. Side stand bolt
24. Nut
25. Spring
26. Bolt
27. Spring washer

Fig. 6-81

CHAPTER 7. APPENDICES

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7

CHAPTER 7. APPENDICES

7-1. Troubleshooting Guide

The following guide is not complete in itself. If a problem is found within an individual component mentioned within the chart, refer to the section or chapter involved for inspection procedures.

A. No Start or Difficult to Start

Possible Cause	Remedy
Ignition System	
No Spark	1. Check ignition main switch. 2. Check ignition kill switch. 3. Check point assembly. 4. Check condenser. 5. Check wiring, dynamo coil. 6. Check coil. 7. Check high tension lead. 8. Check spark plug. 9. Check ignition timing.
Weak or Intermittent Spark	1. Use Electro-Tester, spark gap test. 2. Check spark plug. 3. Check high tension lead. 4. Check ignition assembly.
Air/Fuel Systems	
No Fuel	1. Check fuel tank. 2. Check fuel petcock. 3. Remove main jet, check fuel flow.
Intermittent or Poor Fuel Flow	1. Clean fuel tank, check fuel tank cap vent. 2. Clean fuel petcock. 3. Remove carburetor, service.
Bad Fuel	1. Flush fuel system, completely. 2. Add fresh fuel, proper grade.
Blocked Air Intake or Malfunction	1. Clean and lube filter. 2. Check reed valve assembly.

B. Engine/Exhaust Systems

Possible Cause	Remedy
Incorrect Compression Pressure	1. If reading too high, check for excessive carbon. 2. If reading too low, check. a. Cylinder head gasket. b. Cylinder base gasket. c. Piston, rings, cylinder.
Poor Bottom End Compression	Check crankcase seals L. & R.
Blocked Exhaust System	1. Check muffler. 2. Check exhaust port carbon formation. 3. Check exhaust pipe for internal damage.

C. Poor Idle and/or Low Speed Performance

Possible Cause	Remedy
Ignition System	
Spark Plug Fouled or Incorrect Gap	Clean or correct gap, or replace if necessary.
Contact Points Bad	Clean or correct gap, or replace if necessary.
Ignition Timing Incorrect	Reset timing.
Weak Spark	Check ignition coil and condenser.
Air/Fuel Systems	
Tank Cap Vent Plugged	Clean or repair as necessary.
Fuel Petcock Plugged	Clean or repair as necessary.
Carburetor Slow Speed System Inoperative	Clean or repair as necessary.
Pilot Screw improperly adjusted or Plugged	Clean or repair as necessary.
Carburetor Float Level Incorrect	Measure and adjust if required.
Starter Lever on	Check or repair as necessary.
Air Leak	Check or repair as necessary.
Carburetor Not Level	Check or repair as necessary.
Engine/Exhaust Systems	See "No Start".

D. Poor Mid-Range and Poor High Speed Performance

Possible Cause	Remedy
Ignition System	
Spark Plug Incorrect	Clean or correct gap or change plug if necessary.
Spark Advance Defective	Check for correct "retard" to "full advance" position.
Ignition Timing Incorrect	Reset.
Points Set too Close	Regap.
Air/Fuel Systems	
Dirty Air Filter Element	Clean.
Carburetor Float Level Incorrect	Measure and adjust if required.
Incorrect Main Jet Size	Remove jet and check size.
Incorrect Jet Needle Notch	Check position of needle clip.
Cracked or Leaking Reeds	Replace.
Carburetor Not Level	Level.

7-2. Conversion Tables

Metric to Inch System

	Known	Multiplier (Rounded Off)	Result
Torque	m-kgs.	07.235	ft-lbs.
	m-kgs.	86.82	in-lbs.
	cm-kgs.	00.0724	ft-lbs.
	cm-kgs.	00.8682	in-lbs.
Weight	kgs.	02.205	lbs.
	g.	00.03527	oz.
Flow/ Distance	km/lits.	02.352	mpg.
	km/h.	00.6214	mph.
	km.	00.6214	mi.
	m.	03.281	ft.
	m.	01.094	yd.
	cm.	00.3937	in.
	mm.	00.03937	in.
Volume/ Capacity	c.c. (cm^3)	00.03381	oz. (U.S.liq.)
	c.c. (cm^3)	00.06102	cu.in.
	Lits.	02.1134	pt. (U.S.liq.)
	Lits.	01.057	qt. (U.S.liq.)
	Lit.	00.2642	gal. (U.S.liq.)
Misc.	kgs/mm.	56.007	lb/in.
	$kgs/cm.^2$	14.2234	psi. ($lb/in.^2$)
	Centigrade (°C)	5/9 (°F-32)	Fahrenheit (°F)

Inch to Metric System

	Known	Multiplier (Rounded Off)	Result
Torque	ft-lbs.	00.13826	m-kgs.
	in-lbs.	00.01152	m-kg.
	ft-lbs.	13.825	m-kgs.
	in-lbs.	01.1518	m-kgs.
Weight	lb.	00.4536	kg.
	oz.	28.35	g.
Flow/ Distance	mpg.	00.4252	km/lit.
	mph.	01.609	km/h.
	mi.	01.609	kms.
	ft.	00.3048	m.
	yd.	00.9144	m.
	in.	02.54	cm.
	in.	25.4	mm.
Volume/ Capacity	oz. (U.S.liq.)	29.57	c.c. (cm^3)
	cu.in.	16.387	c.c. (cm^3)
	pt. (U.S.liq.)	00.4732	Lit.
	qt. (U.S.liq.)	00.9463	Lit.
	gal. (U.S.liq.)	03.7853	Lits.
Misc.	lb/in.	00.017855	kg/mm.
	psi. ($lb/in.^2$)	00.07031	$kg/cm.^2$
	Fahrenheit (°F)	9/5 (°C+32)	Centigrade (°C)

Definition of Terms:

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

Millimeters to Inches

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0	0.0039	0.0079	0.0118	0.0157	0.0197	0.0236	0.2760	0.0315	0.0354
1	0.0394	0.0433	0.0472	0.0512	0.0551	0.0591	0.0630	0.0669	0.0709	0.0748
2	0.7890	0.0827	0.0866	0.0906	0.0945	0.0984	0.1024	0.1063	0.1102	0.1142
3	0.1181	0.1200	0.1260	0.1299	0.1339	0.1378	0.1417	0.1457	0.1496	0.1535
4	0.1575	0.1614	0.1654	0.1693	0.1732	0.1772	0.1811	0.1850	0.1890	0.1929
5	0.1969	0.2000	0.2047	0.2087	0.2126	0.2165	0.2205	0.2244	0.2283	0.2323
6	0.2362	0.2402	0.2441	0.2480	0.2520	0.2559	0.2598	0.2638	0.2677	0.2717
7	0.2756	0.2795	0.2835	0.2874	0.2913	0.2953	0.2992	0.3031	0.3071	0.3110
8	0.3150	0.3189	0.3228	0.3268	0.3307	0.3346	0.3386	0.3425	0.3465	0.3504
9	0.3543	0.3583	0.3622	0.3661	0.3701	0.3740	0.3780	0.3819	0.3858	0.3898
10	0.3937	0.3976	0.4016	0.4055	0.4094	0.4134	0.4173	0.4213	0.4252	0.4291

0.01 mm. = 0.0004 in. 0.03 mm. = 0.0012 in. 0.05 mm. = 0.0020 in. 0.07 mm. = 0.0028 in. 0.09 mm. = 0.0035 in.
0.02 mm. = 0.0008 in. 0.04 mm. = 0.0016 in. 0.06 mm. = 0.0024 in. 0.10 mm. = 0.0039 in.

Inches to Millimeters

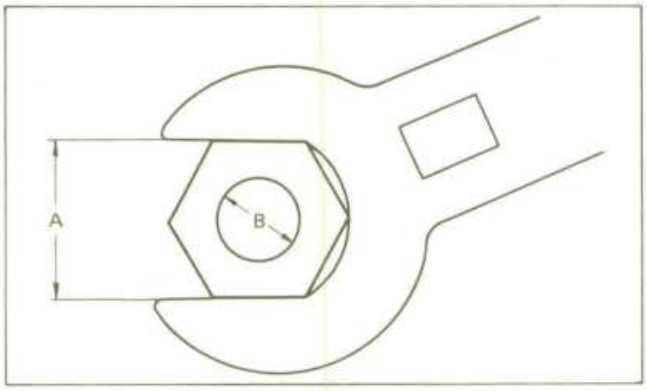
	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0	0.254	0.508	0.762	1.016	1.270	1.524	1.778	2.032	2.286
0.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
0.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
0.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
0.4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

0.001 in. = 0.0254 mm. 0.003 in. = 0.00762 mm. 0.005 in. = 0.1270 mm. 0.007 in. = 0.1778 mm. 0.009 in. = 0.2286 mm.
0.002 in. = 0.0508 mm. 0.004 in. = 0.1016 mm. 0.006 in. = 0.1524 mm. 0.008 in. = 0.2032 mm. 0.010 in. = 0.254 mm.

7-3. Torque Specifications

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

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



A (Nut)	B (Bolt)	Torque Specification		
		m-kgs.	ft-lbs.	in-lbs.
10 mm.	06 mm.	1.0	7.0	085
13 mm.	08 mm.	2.0	15	175
14 mm.	08 mm.	2.0	15	175
17 mm.	10 mm.	3.5 – 4.0	25 – 30	300 – 350
19 mm.	12 mm.	4.0 – 4.5	30 – 35	350 – 400
22 mm.	14 mm.	4.5 – 5.0	30 – 35	400 – 400
26 mm.	17 mm.	6.0 – 7.0	40 – 50	500 – 600
27 mm.	18 mm.	6.0 – 7.0	40 – 50	500 – 600
30 mm.	20 mm.	7.0 – 8.0	50 – 60	600 – 700
Spark Plug		2.5 – 3.0	20 – 22	230 – 250

Section Parts to Tightened	Tightening Torque
Cylinder head holding nut (8 mm.)	1.0 m-kg.
D.C. generator securing screw (6 mm.)	0.7 — 1.1 m-kgs.
Clutch boss securing nut (16 mm.)	6.5 — 8.0 m-kgs.
Drive sprocket securing nut (16 mm.)	6.5 — 9.0 m-kgs.
Crankcase tightening screw (6 mm.)	1.1 — 1.3 m-kgs.
Primary drive gear securing nut (12 mm.)	4.5 — 7.2 m-kgs.
Front wheel shaft securing nut (14 mm.)	6.6 — 10.5 m-kgs.
Front fork tube pinch bolt (10 mm.)	1.6 — 2.6 m-kgs.
Steering shaft securing nut (16 mm.)	5.0 — 6.0 m-kgs.
Engine mounting nut (6 mm.)	2.5 — 3.5 m-kgs.
Pivot shaft securing nut (14 mm.)	6.6 — 10.5 m-kgs.
Rear wheel shaft securing nut (14 mm.)	6.6 — 10.5 m-kgs.

MODEL RD200A

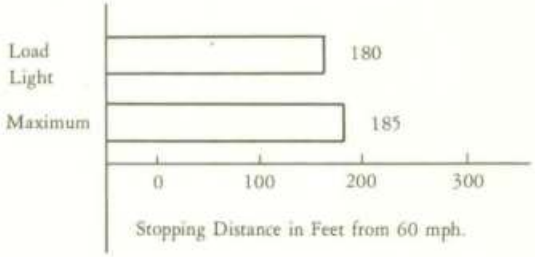
Notice

The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions, and the information may not be correct under other conditions.

STOPPING DISTANCE

This figure indicates braking performance that can be met or exceeded by the vehicles to which it applies, without locking the wheels, under different conditions of loading and with partial failures of the braking system.

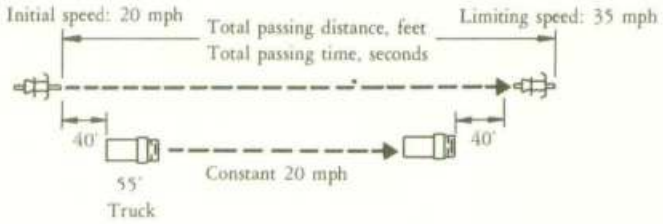
A. Fully Operational Service Brake



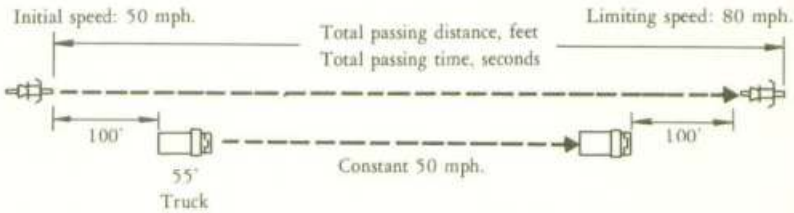
ACCELERATION AND PASSING ABILITY

This figure indicates passing times and distances that can be met or exceeded by the vehicles to which it applies, in the situations diagrammed below. The low-speed pass assumes an initial speed of 20 mph. and a limiting speed of 35 mph. The high-speed pass assumes an initial speed of 50 mph. and a limiting speed of 80 mph.

LOW SPEED PASS



HIGH SPEED PASS

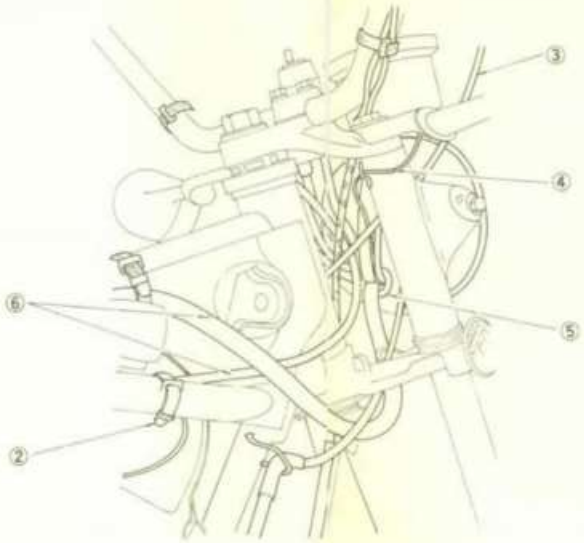


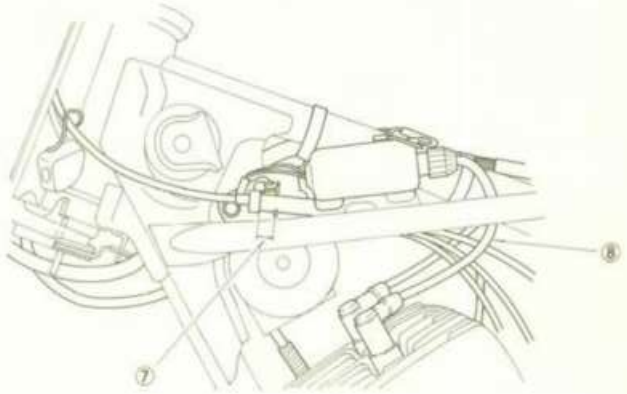
SUMMARY

Low-speed pass ..... 0,365 feet; 07.6 seconds.
High-speed pass ..... 1,330 feet; 15.0 seconds.

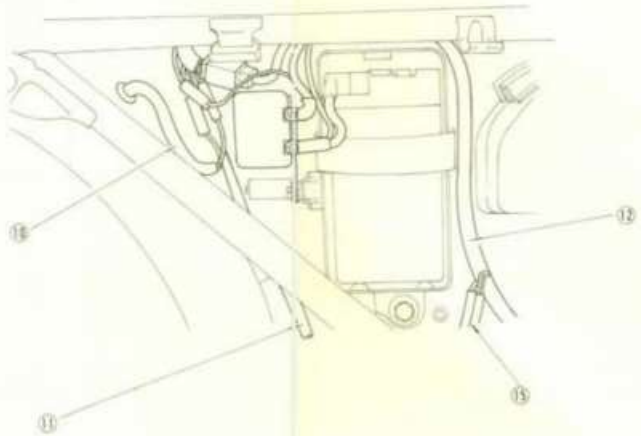
Wire & Pipe Routing Diagrams

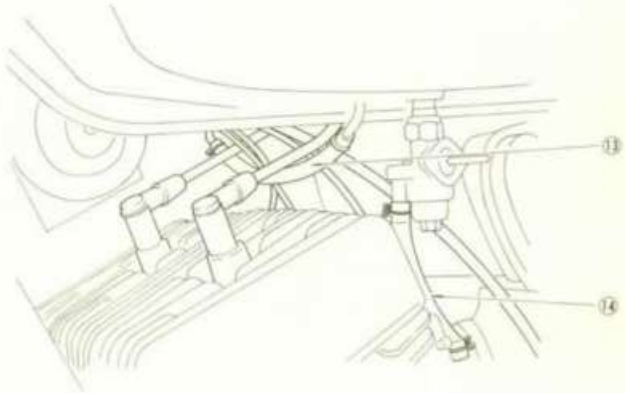








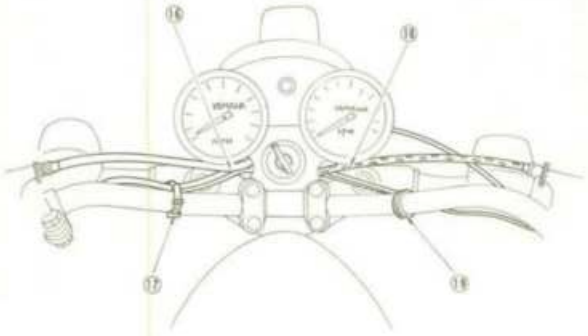


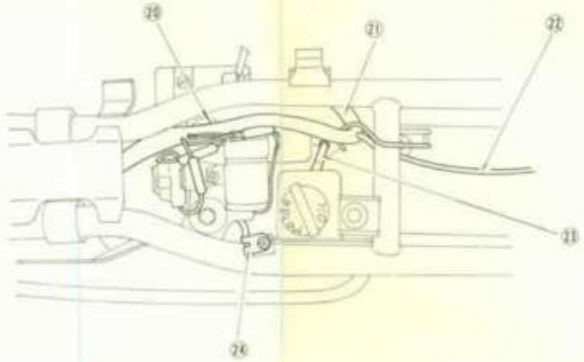


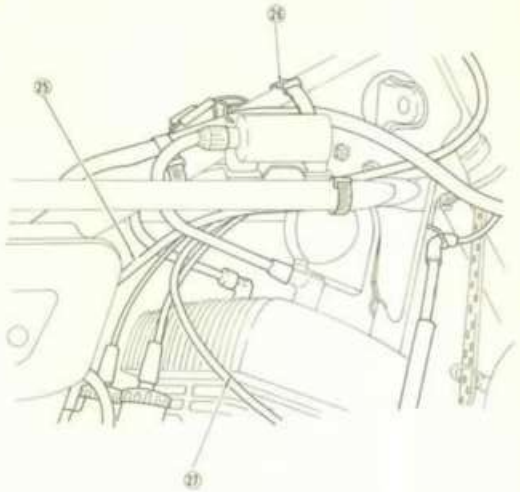
1. Pass stop switch lead wire and switch handle wire along the lower side of the left handelbar. Do not allow too much clearance between each lead and handlebar.
2. Clamp clutch wire with band.
3. Throttle wire, brake wire and clutch wire should be positioned closer to frame than wire harness lead wire, in order of throttle wire, brake wire and clutch wire from frame.
4. Front flasher light lead wires
   Pass along fork, allowing no slack, and clip by bending clip attached to top of lamp stay. Perform the same for both right and left flasher lights.
5. Lead wires to be threaded through headlight body hole.
   - Stop switch lead wire
   - Starter switch lead wire

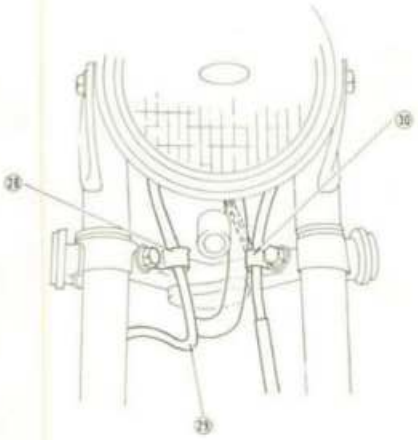
   ——— From right lever holder
   - Handle switch lead wires (2)

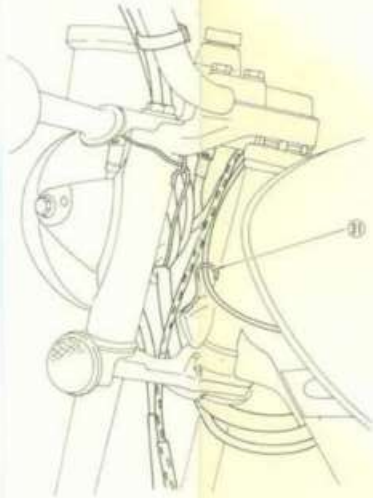
   ——— From left lever holder
   - Main switch lead wire
   - Speedometer lead wire
   - Tachometer lead wire
   - Right front flasher light lead wire
6. Clutch wire and wire harness should be positioned as close to frame as possible.
7. Set the gap between wire clip and wire cylinder cap to 0.039 in. (1.0 mm.). Changes in the gap caused by machine vibrations will be allowed.
8. Pass throttle wires (2) and pump wire, and clutch wire through between right and left high tension cords.
9. Pass lead wires (2) together along the lower side of the left handlebar. Do not allow too much clearance between each lead wire and handlebar.
10. After connecting taillight lead wires, keep them together.
11. Oil tank breather pipe
    Pass between rear arm cross member and rear part of engine bracket, and extend outside the brake pedal.
12. Wire harness extending to dynamo
    Bring it downward from top of battery box, and pass along main pipe.
13. Level pipe should be passed under all wires and cords and inserted into fuel tank. Don't let it stack too much.
14. Pass the fuel pipe (for right carburetor) behind left carburetor throttle wire.
15. Stop switch lead wire.











16. Pass clutch wire and lead wires (2) before handle crown and behind speedometer. At the same time, the two lead wires should be positioned outside of clutch wire.
17. Clamp lead wires (2) with band.
18. Brake wire and lead wires (2) should be passed before handle crown and behind tachometer. The two lead wires should be outside of brake wire.
19. Clamp lead wires (2) with band.
20. After connecting lead wires, keep them together.
21. Hook wire harness.
22. Connect to rear flasher light lead wire in the center of rear fender.
23. Extend oil tank breather pipe downward.
24. Ground.
25. Pass clutch wire under coil bracket, and pass over throttle wires (2) and pump wire.
26. Clamp wire harness with band (at two places).
27. Pump wire should be at least 15 mm off cylinder fins.
28. Clamp tachometer cable.
29. Wire harness and tachometer cable should be so installed as not to contact shaft damper clip.
30. After threading speedometer cable and brake wire, clamp by bending wire guide inward. Do the same for both right and left sides.
31. After threading throttle wire, bend wire guide against head pipe.

Circuit Diagram

Key position	Wire Color				
	R	Br	W	L	R/Y
OFF					
I	○	○			○
II		○	○		
III	○			○	

1. Neutral lamp 12V. 3W.
2. Flasher lamp 12V. 3W.
3. Charge lamp 12V. 3W.
4. Meter lamp 12V. 3W.
5. Tachometer
6. Headlight 12V. 35W./25W.
7. High beam indicator 12V. 27W.
8. Meter lamp 12V. 3W.
9. Speedometer
10. Front flasher light (R) 12V. 27W.
11. Main switch
12. Front stop switch
13. Kill switch
14. Lighting switch
15. Starter button
16. Ignition coil (R)
17. Spark plug
18. Ignition coil (L)
19. Rear flasher light (R) 12V. 27W.
20. Tail/stop light 12V. 8W./27W.
21. Rear flasher light (L) 12V. 27W.
22. Fuse 20A.
23. Regulator
24. Battery 12V. 9AH.
25. Rear stop switch
26. Neutral switch
27. Flasher relay
28. Starter dynamo
29. Horn
30. Horn button
31. Flasher switch
32. Dimmer switch
33. Front flasher light (L) 12V. 27W.

