



YAMAHA

DT200L

Service Manual

DT200L

SERVICE MANUAL

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NOTICE

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha motorcycles have a basic understanding of the mechanical concepts and procedures inherent in motorcycle repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.

Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications are significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

OVERSEAS SERVICE
OVERSEAS OPERATIONS
YAMAHA MOTOR CO., LTD.

HOW TO USE THIS MANUAL PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.

NOTE:

A NOTE provides key information to make procedures easier or clearer.

CAUTION:

A CAUTION indicates special procedures that must be followed to avoid damage to the motorcycle.

WARNING:

A WARNING indicates special procedures that must be followed to avoid injury to a motorcycle operator or person inspecting or repairing the motorcycle.

MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.

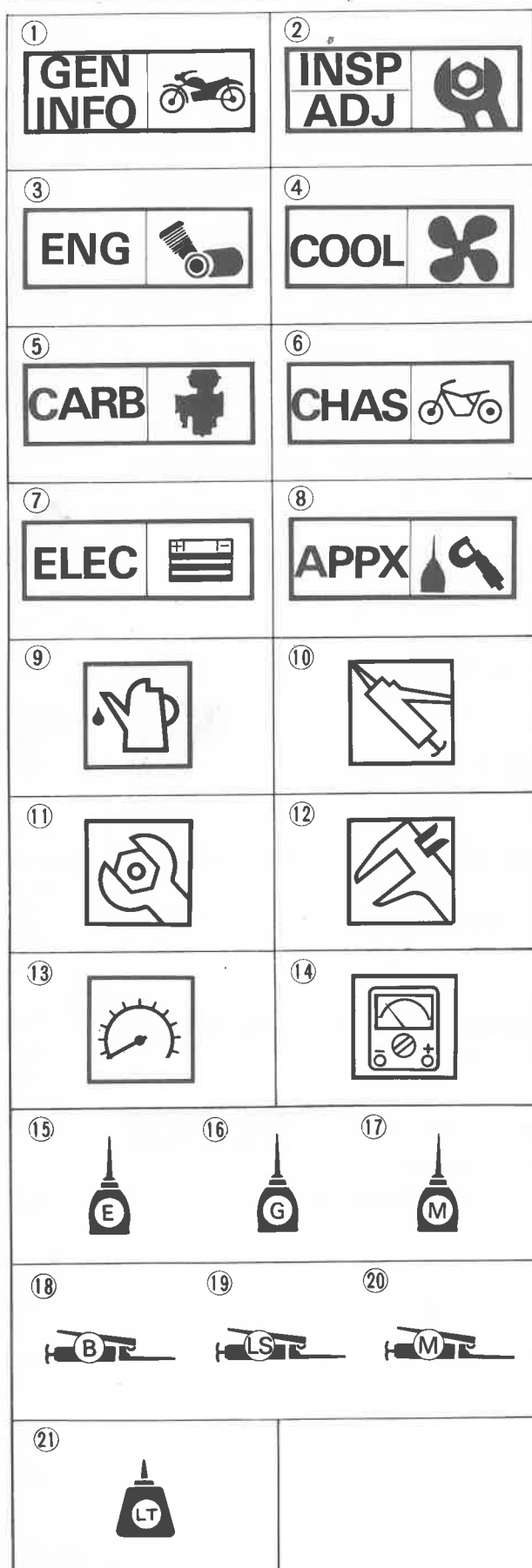
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings;

Pitting/Damage → Replace.

EXPLODED DIAGRAM

Each chapter provides exploded diagrams before each disassembly section for ease in identifying correct disassembly and assembly procedures.



SYMBOL MARKS

(Refer to the illustration)

Symbol marks ① to ⑧ are designed as thumb tabs to indicate the chapter's number and content.

- ① General information
- ② Periodic inspection and adjustment
- ③ Engine
- ④ Cooling system
- ⑤ Carburetion
- ⑥ Chassis
- ⑦ Electrical
- ⑧ Appendices









Symbol marks ⑨ to ⑭ indicate specific data as the following items:

- ⑨ Recommended liquid
- ⑩ Recommended grease
- ⑪ Tightening torque
- ⑫ Wear limit
- ⑬ Engine speed
- ⑭ Ω , V, A

Symbol marks ⑮ to ㉑ in the exploded diagram indicate grade of lubricant and location of lubrication point.

- ⑮ Apply engine oil
- ⑯ Apply gear oil
- ⑰ Apply molybdenum disulfide oil
- ⑱ Apply wheel bearing grease
- ⑲ Apply lightweight lithium soap base grease
- ⑳ Apply molybdenum disulfide grease
- ㉑ Apply locking agent (LOCTITE®)

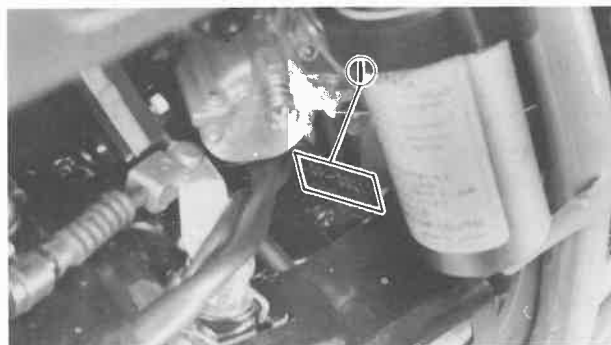
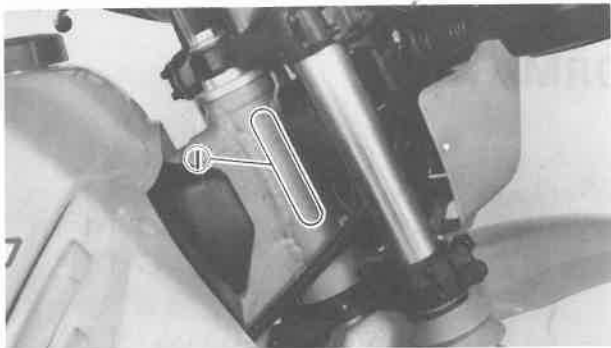
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CHAPTER 1. GENERAL INFORMATION

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GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER

The frame serial number ① is stamped into the right side of the steering head pipe.

ENGINE SERIAL NUMBER

The engine serial number ① is stamped into the elevated part of the left rear section of the engine.

NOTE:

The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.

Starting Serial Number:

39L-000101

NOTE:

Designs and specifications are subject to change without notice.





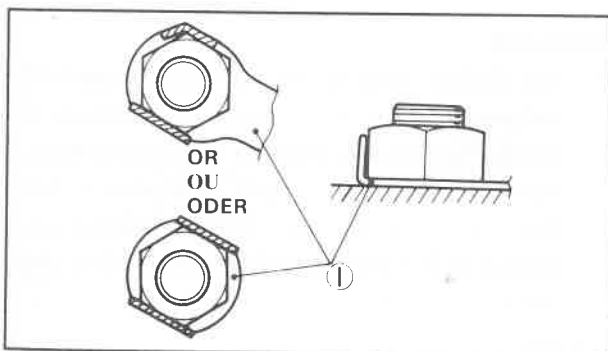
IMPORTANT INFORMATION

ALL REPLACEMENT PARTS

1. Use only genuine Yamaha parts for all replacements. Use oil and/or grease recommended by Yamaha for assembly and adjustment. Other brands may be similar in function and appearance, but inferior in quality.

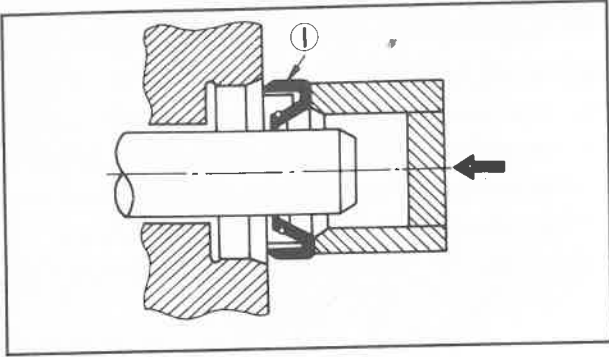
GASKETS, OIL SEALS, AND O-RINGS

1. All gaskets, seals, and O-rings should be replaced when an engine is overhauled. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



LOCK WASHERS/PLATES AND COTTER PINS

1. All lock washers/Plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.

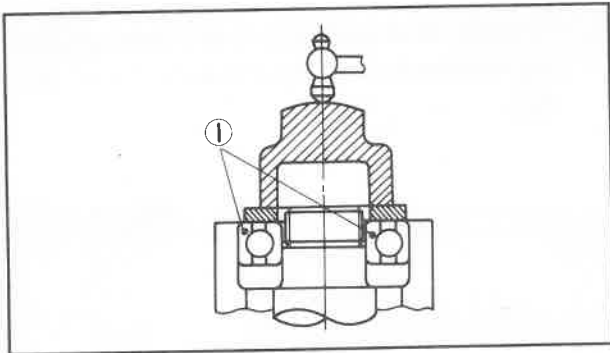


BEARINGS AND OIL SEALS

1. Install the bearing(s) and oil seal(s) with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light

① Oil seal

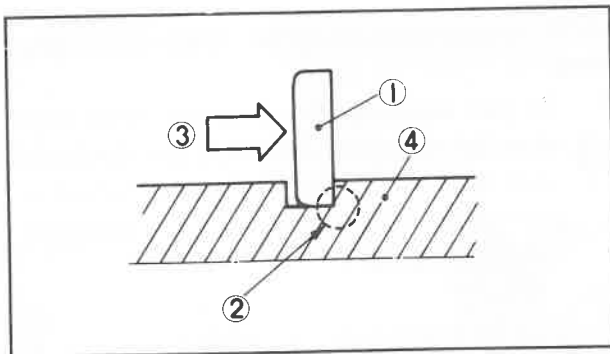
coating of light-weight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.



CAUTION:

Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces.

① Bearing



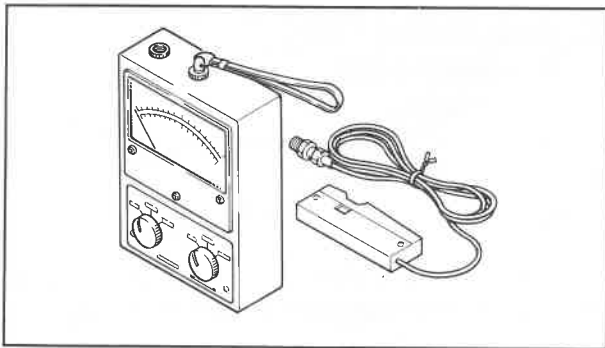
CIRCLIPS

1. All circlips should be inspected carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp edged corner ② is positioned opposite to the thrust ③ it receives. See the sectional view.

④ Shaft

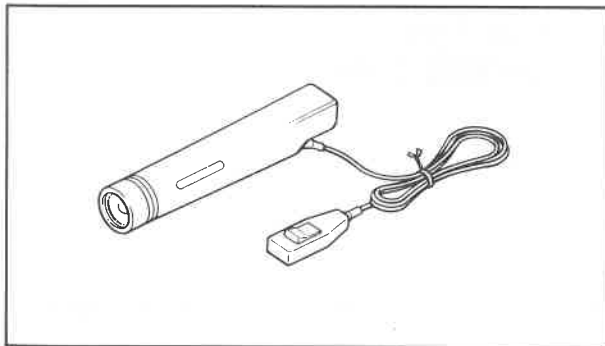
**SPECIAL TOOLS**

The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.

**FOR TUNE UP**

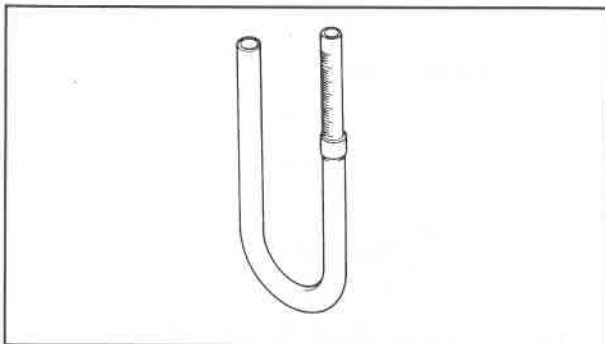
1. Inductive Tachometer
P/N 90890-03082

This tool is needed for detecting engine rpm.



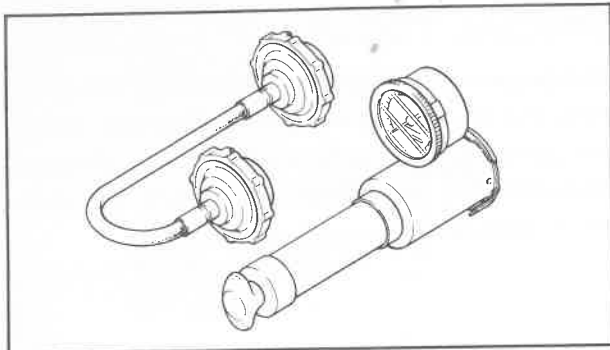
2. Inductive Timing Light
P/N 90890-03109

This tool is necessary for adjusting timing.



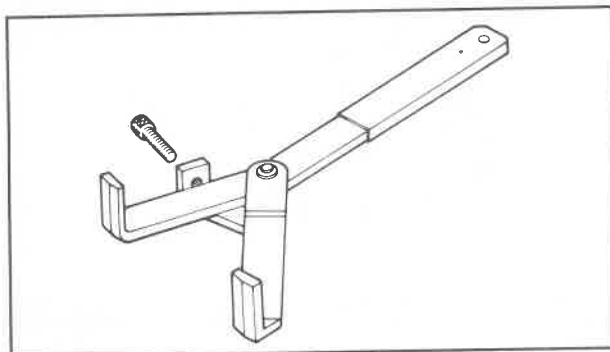
3. Fuel Level Gauge
P/N 90890-01312

This gauge is used to measure the fuel level in the float chamber.



4. Cooling System Tester
P/N 90890-01325

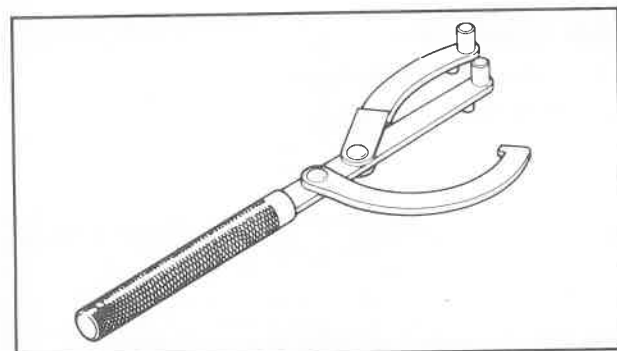
This tester is needed for checking the cooling system.



FOR ENGINE SERVICE

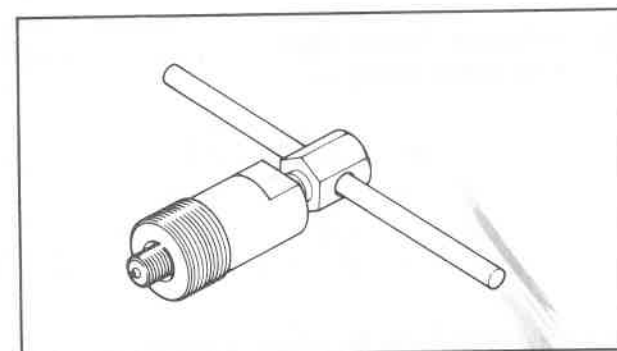
1. Universal Clutch Holder
P/N 90890-04086

This tool is used to hold the clutch when removing or installing the clutch boss locknut.



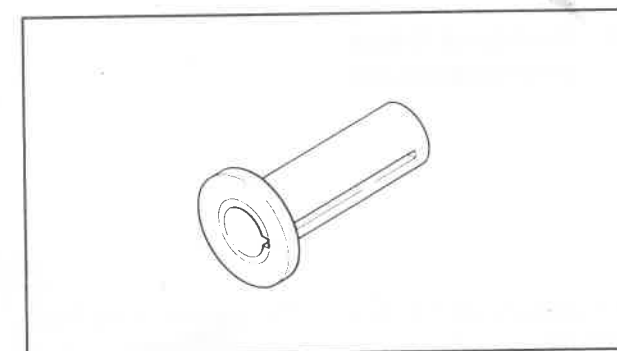
2. Rotor Holding Tool
P/N 90890-01235

This tool is used to hold the rotor when removing or installing the flywheel magneto securing nut.



3. Rotor Puller
P/N 90890-01189

This tool is needed to remove the flywheel magneto.

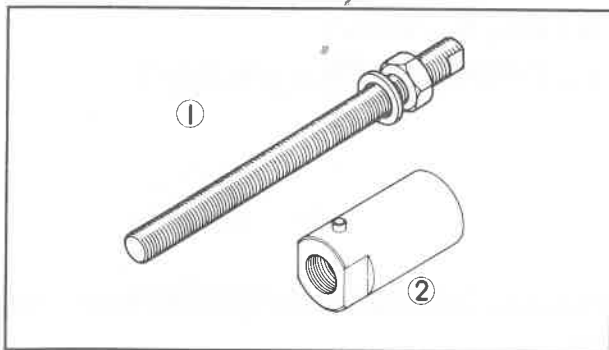


4. Crank Installer Pot
P/N 90890-01274

This tool is used to install the crankshaft.

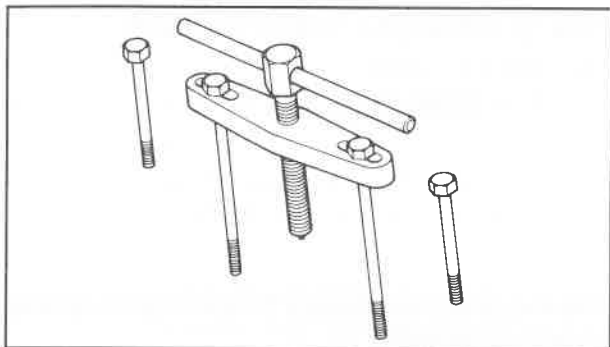
SPECIAL TOOLS

**GEN
INFO**



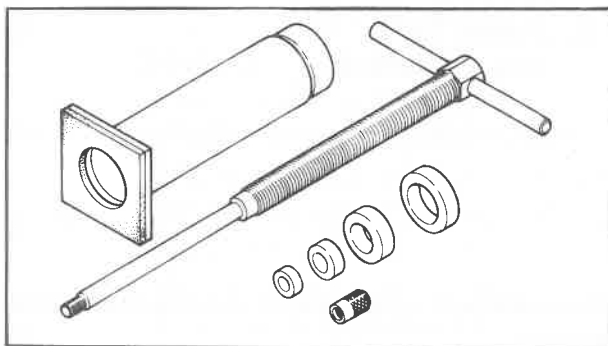
5. Crank Installer Bolt
P/N 90890-01275 — ①
Crank Installer Adapter
P/N 90890-01278 — ②

This tool is used to install the crankshaft.



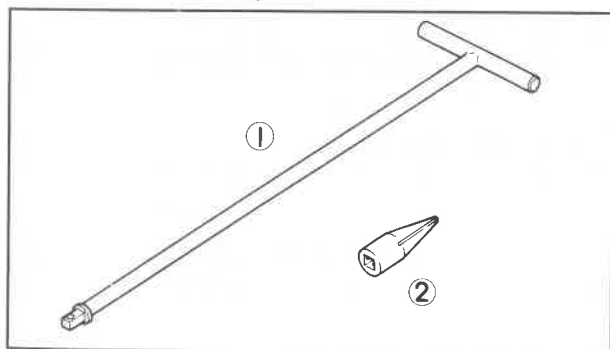
6. Crankcase Separating Tool
P/N 90890-01135

This tool is needed to separate the crankcases.



7. Piston Pin Puller
P/N YU-01304

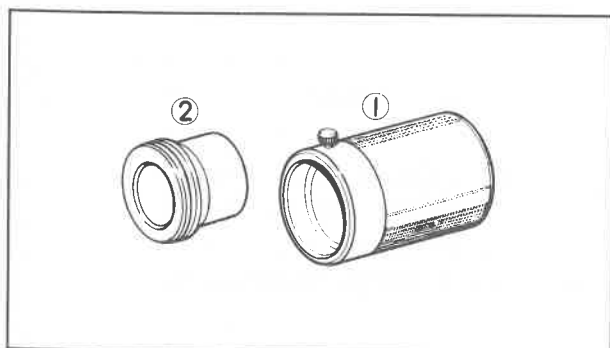
This tool is used to remove the piston pin.



FOR CHASSIS SERVICE

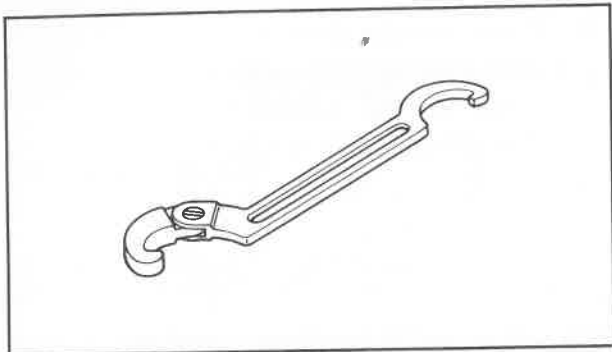
1. T-Handle
P/N 90890-01326 — ①
Damper Rod Holder
P/N 90890-01294 — ②

This tool is used to loosen and tighten the front fork cylinder holding bolt.



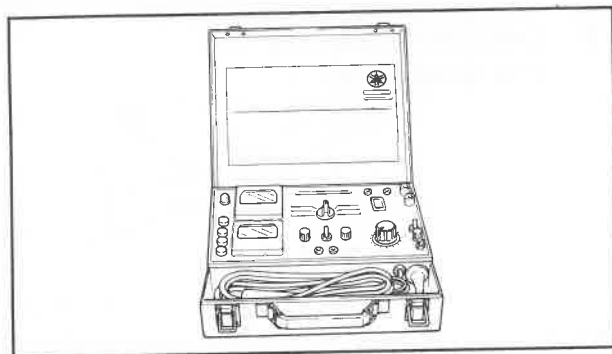
2. Front Fork Seal Driver (Weight)
P/N 90890-01367 — ①
Adapter
P/N 90890-01370 — ②

These tools are used when installing the fork seal.



3. Ring Nut Wrench
P/N 90890-01268

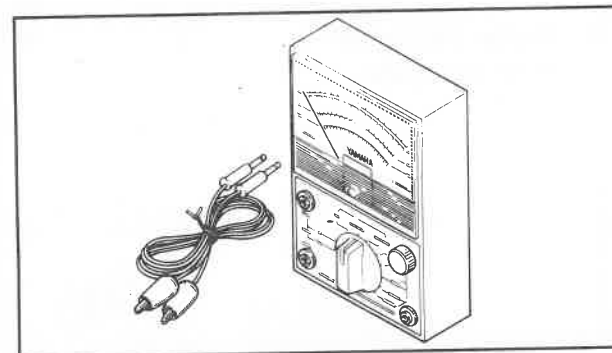
This tool is used to loosen and tighten the steering ring nut.



FOR ELECTRICAL COMPONENTS

1. Electro Tester
P/N 90890-03021

This instrument is necessary for checking the ignition system components.



2. Pocket Tester
P/N 90890-03104

This instrument is invaluable for checking the electrical system.

CHAPTER 2.

PERIODIC INSPECTIONS AND ADJUSTMENTS

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PERIODIC INSPECTIONS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE/LUBRICATION

Unit: km (mi)

ITEM	REMARKS	BREAK-IN 1,000 (600)	EVERY	
			6,000 (4,000) or 6 months	12,000 (8,000) or 12 months
Spark plug(s)	Check/Clean or replace.	○	○	○
Air filter	Clean. Replace if necessary.		○	○
Carburetor*	Check/Adjust/idle speed, starter operation.	○	○	○
Fuel line*	Check fuel hose for cracks or damage.		○	○
Transmission oil	Replace (Warm engine before draining) every, 24,000 (16,000) or 24 months.	REPLACE	CHECK	CHECK
Autolube pump*	Check/Adjust*/Air bleeding.*	○	○	○
Brake*	Check operation/fluid leakage/See NOTE/Adjust if necessary.	○	○	○
Clutch*	Check operation./Adjust if necessary.		○	○
Rear arm pivot shaft*	Check rear arm assembly for looseness. Moderately repack.***	CHECK	○	○
Rear suspension link pivots*	Check operation. Moderately repack.***	CHECK	○	○
Wheels*	Check balance/damage/runout/spoke tightness.		○	○
Wheel bearings*	Check bearings assembly for looseness/damage. Replace if damaged.		○	○
Steering bearing*	Check bearings assembly for looseness. Moderately repack every 24,000 (16,000) or 24 months.**	CHECK		CHECK
Front forks*	Check operation/oil leakage.		○	○
Rear shock absorber*	Check operation/oil leakage.		○	○
Cooling system*	Check/Repair as required/Replace coolant every 24,000 (16,000) or 24 months.		CHECK	CHECK
Drive chain	Check tension/alignment/clean/lube.		EVERY 500 (300)	
Fittings/Fasteners*	Check all chassis fittings and fasteners.	○	○	○
Battery*	Check specific gravity. Check breather pipe for proper operation.		○	○

*: It is recommended that these items be serviced by a Yamaha dealer.

**: Medium weight wheel bearing grease.

***: Lithium soap base grease.

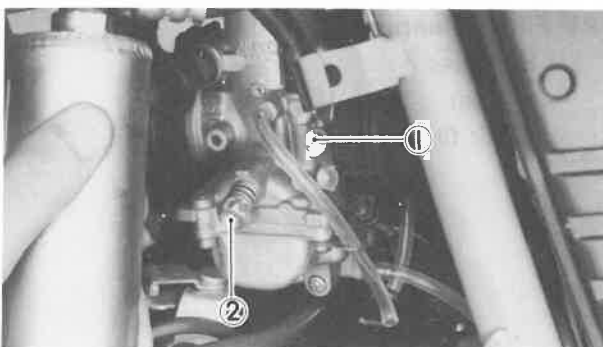
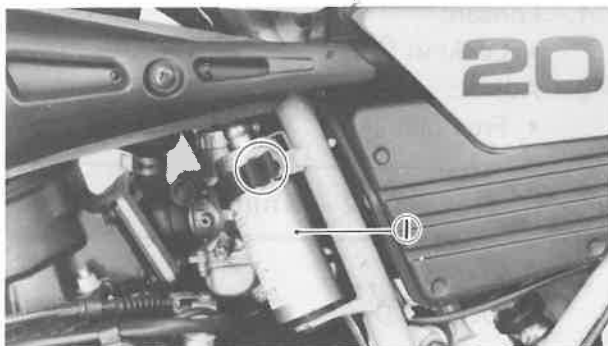
NOTE:

Brake fluid replacement.

1. When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2. On the inner parts of the master cylinder and caliper cylinder, replace the oil seals every two years.
3. Replace the brake hoses every four years, or if cracked or damaged.

IDLING SPEED ADJUSTMENT /THROTTLE CABLE ADJUSTMET

INSP
ADJ



ENGINE

Idling Speed Adjustment

1. Remove:
 - Rear shock absorber gas chamber ①
2. Tighten:
 - Pilot air screw (lightly) ①
3. Loosen:
 - Pilot air screw ①

Back it out from its lightly seated position.

- ① Pilot air screw
② Throttle stop screw

Standard Turned Out: 1 and 1/2

4. Start the engine, and let it warm up.

5. Adjust:
 - Idling speed

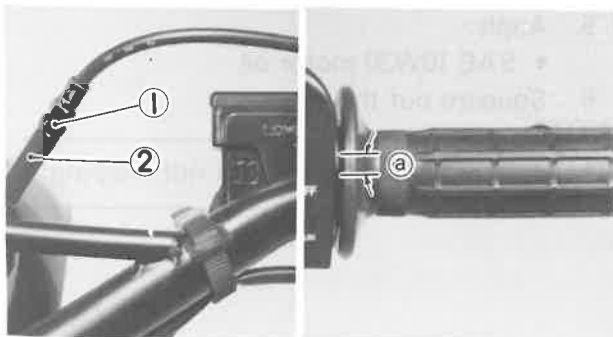
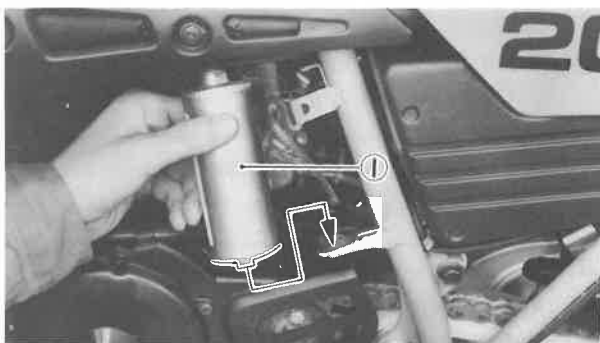
Turn the throttle stop screw ② to adjust.



Idling speed: 1,350 r/min

6. Install:
 - Rear shock absorber gas chamber ①

NOTE: _____
Insert the projection on the gas chamber into the hole on the gas chamber bracket.



Throttle Cable Adjustment

NOTE: _____
Before adjusting the throttle cable free play, the engine idling speed should be adjusted.

- ① Locknut
② Adjuster
a Free play

AIR FILTER CLEANING

1. Loosen:
 - Locknut ①
2. Adjust:
 - Free play ②

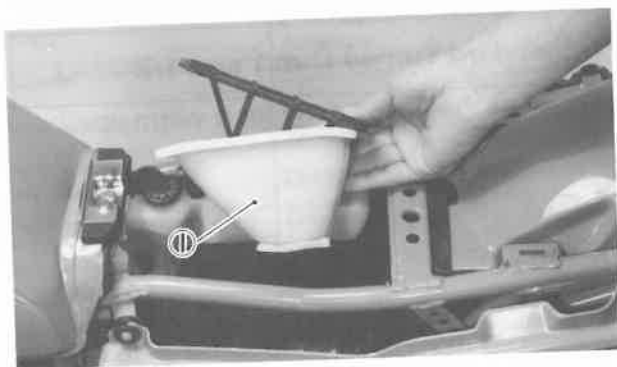
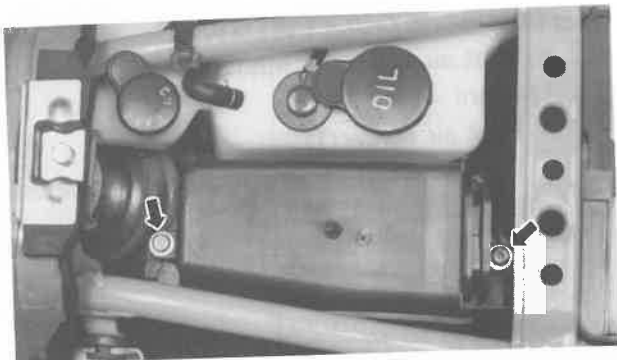


Free play: 2 ~ 5 mm (0.08 ~ 0.20 in)

3. Tighten:
 - Locknut ①

Air Filter Cleaning

1. Remove:
 - Seat
 - Air filter case cover



2. Remove:
 - Air filter element ①

CAUTION:

The engine should never be run without the air cleaner element; excessive piston and/or cylinder wear may result.

3. Clean:
 - Air filter element
 Clean it with solvent.

NOTE:

After cleaning, remove the remaining solvent by squeezing the element.

4. Inspect:
 - Element
 Damage → Replace.

5. Apply:
 - SAE 10W/30 motor oil

6. Squeeze out the excess oil.

NOTE:

The element should be wet but not dripping.



7. Install:
 - Air filter element

NOTE:

Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

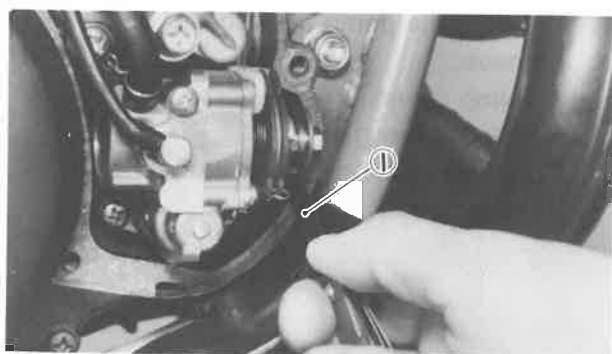
- Air filter case cover
- Seat

Minimum Pump Stroke Adjustment

1. Remove:
 - Oil pump cover
2. While running the engine at idle, observe the pump adjust plate carefully. Stop the engine moment that the adjust plate moves out to its limit.
3. Measure:
 - Gap (Between the raised boss on the pump adjust pulley and adjust plate)

**Minimum Pump Stroke:**

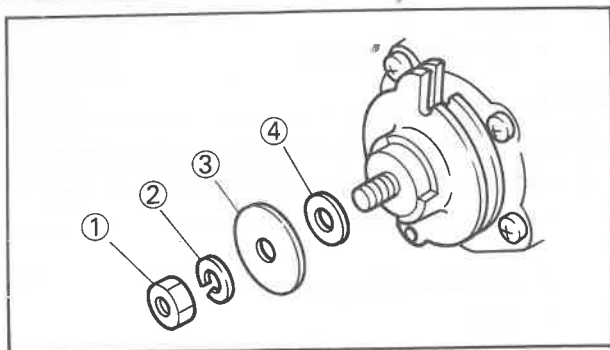
0.35 ~ 0.40 mm (0.014 ~ 0.016 in)

**NOTE:**

When inserting the thickness gauge between the adjust plate and the adjust pulley, be careful so that neither the plate nor the pulley is moved. In other words, do not force the thickness gauge into the gap.

① Thickness gauge

4. Repeat steps "2" and "3" above a few times. When the gap measured is the largest, the pump stroke is considered to be at a minimum.
5. If clearance is not correct, adjust as follows:

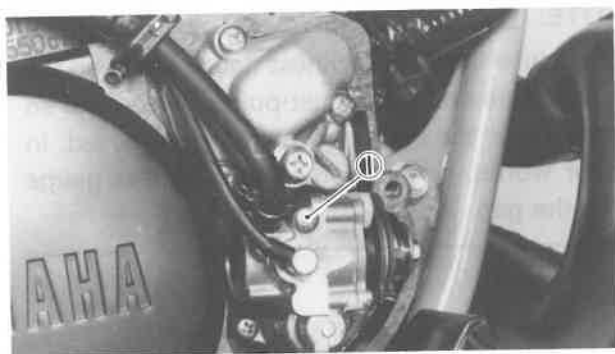


- a. Remove:
 - Locknut ①
 - Spring Washer ②
 - Adjust plate ③
- b. Remove or add:
 - Adjust shim ④
- c. Install:
 - Components in above list (step "a")
- d. Measure:
 - Gap

Autolube Pump Air Bleeding

The Autolube pump and delivery line must be bled on the following occasions:

- Setting up a new motorcycle out of the crate.
- Whenever the Autolube tank has run dry.
- Whenever any portion of the Autolube system is disconnected.



1. Bleeding the pump case and/or oil pipe
 - a. Remove:
 - Pump cover
 - Bleed screw ①
 - b. Keep the oil running out until air bubbles disappear.
 - c. Inspect:
 - Bleed screw gasket
Damage → Replace
 - d. Install:
 - Components in above list (step "a")

ENGINE OIL LEVEL INSPECTION

INSP
ADJ



2. Bleeding the pump distributor and/or delivery pipe
 - a. Start the engine.
 - b. Pull the pump cable all the way out to set the pump stroke to a maximum.

NOTE:

It is difficult to bleed the distributor completely with the pump stroke at a minimum, and therefore the pump stroke should be set to a maximum.

- c. Keep the engine running at about 2,000 r/min for two minutes or so, and both distributor and delivery pipe can be completely bled.

Engine Oil Level Inspection

1. Place the motorcycle on a level place.

NOTE:

Be sure the motorcycle is positioned straight up and on both wheels when inspecting the oil level.



2. Start the engine, and let it warm up.
3. Inspect:
 - Engine oil levelOil level low → Add sufficient oil.
By the following inspection steps.

- ① "OIL" warning indicator light



ENGINE OIL LEVEL INSPECTION



Recommended Oil:
Air Cooled 2-stroke Oil

Oil Capacity:

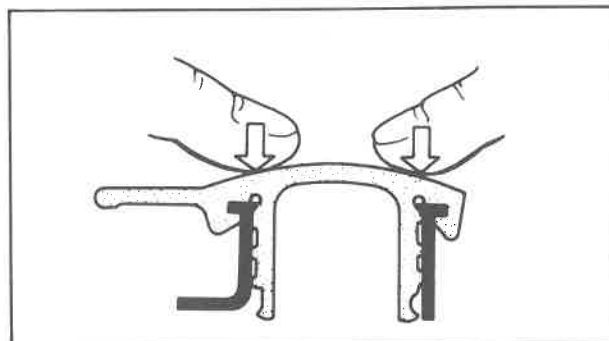
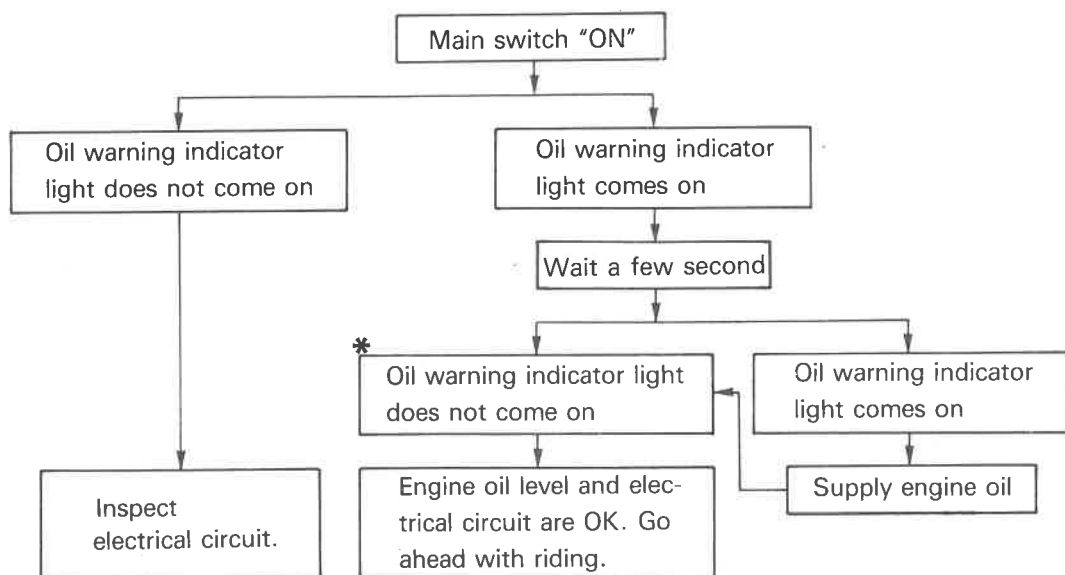
Total:

1.2L (1.1 Imp qt, 1.3 US qt)

CAUTION:

Always use the same type of engine oil. Mixing different types of engine oils may result in a harmful chemical reaction and lead to poor performance.

Engine Oil Level Visual Inspection Steps:



NOTE:

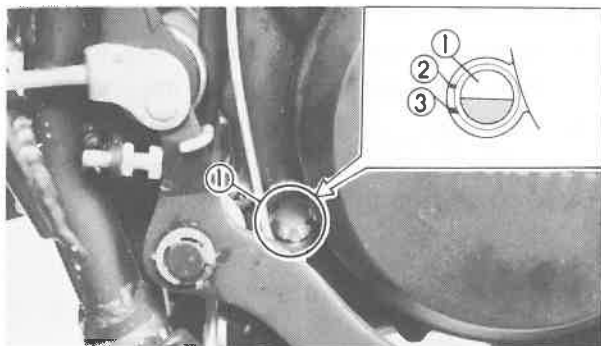
* If the main switch is turned on immediately the oil level warning light went off, the light will not come on in some cases, but this is a problem.

NOTE:

Install the oil tank filler cap and push it fully into the filler.

TRANSMISSION OIL LEVEL INSPECTION

INSP
ADJ



Transmission Oil Level Inspection

1. Inspect:

- Transmission Oil Level
Oil level low → Add sufficient oil.
By the following inspection steps.

- ① Level window
- ② Maximum mark
- ③ Minimum mark

Transmission Oil Level Visual Inspection Steps:

- Place the motorcycle on a level place, and warm up the engine for several minutes.

NOTE: _____

Be sure the motorcycle is positioned straight up and on both wheels.

When inspecting the oil level, a slight tilt toward the side can produce false readings.

- Stop the engine and visually inspect the oil level through the level window ①.



Recommended Oil:

SAE 10W30 Type SE Motor Oil

Oil Capacity:

Total Amount:

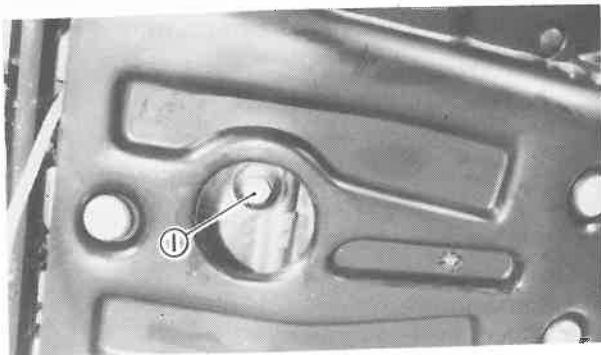
0.63L (0.55 Imp qt, 0.67 US qt)

CAUTION: _____

Do not add any chemical additives. Transmission oil also lubricates the clutch and additives could cause clutch slippage.

CAUTION: _____

Be sure no foreign material enters the crankcase.



Transmission Oil Replacement

1. Warm up the engine for several minutes, then place an oil pan under the engine.
2. Remove:
 - Drain plug ①
Drain the transmission oil.
3. Tighten:
 - Drain plug



20 Nm (2.0 m·kg, 14 ft·lb)

4. Fill:
 - Transmission oil



Recommended Oil:

SAE 10W30 Type SE Motor Oil

Oil Capacity:

Periodic Oil Change:

0.55 L (0.48 Imp qt, 0.58 US qt)

CAUTION:

Do not add any chemical additives. Transmission oil also lubricates the clutch and additives could cause clutch slippage.

CAUTION:

Be sure no foreign material enters the crankcase.

5. Inspect:
 - Oil leaks

HANDLING NOTES OF COOLANT /COOLANT LEVEL INSPECTION

INSP
ADJ



Handling Notes of Coolant

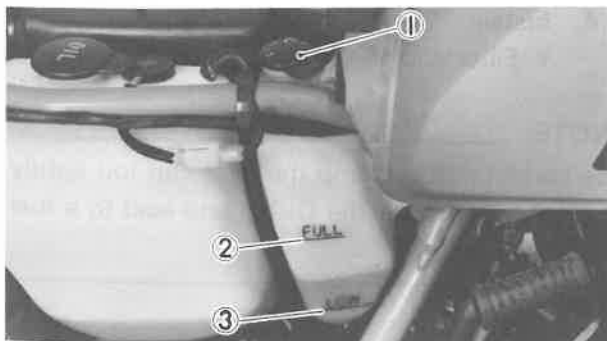
The coolant is harmful so it should be handled with special care.

CAUTION:

Hard water or salt water is harmful to the engine parts. You may use boiled water or distilled water, if you can't get soft water.

WARNING:

- When coolant splashes to your eye;
Thoroughly wash your eye with water and see your doctor.
- When coolant splashes to your clothes;
Quickly wash it away with water and then with soap.
- When coolant is swallowed;
Quickly make him vomit and take him to a doctor.



Coolant Level Inspection

1. Inspect:
 - Coolant level
Coolant level low → Add tap water (Soft water).

- ① Coolant reservoir tank cap
- ② "FULL" level
- ③ "LOW" level



FUEL COCK CLEANING



Reservoir Tank Capacity:

Total:

0.13L (0.114 Imp qt, 0.137 US qt)

Form "LOW" to "FULL" level:

0.11L (0.10 Imp qt, 0.12 US qt)

NOTE:

Change the coolant every two years. Refer to "CHAPTER 4. COOLING SYSTEM."

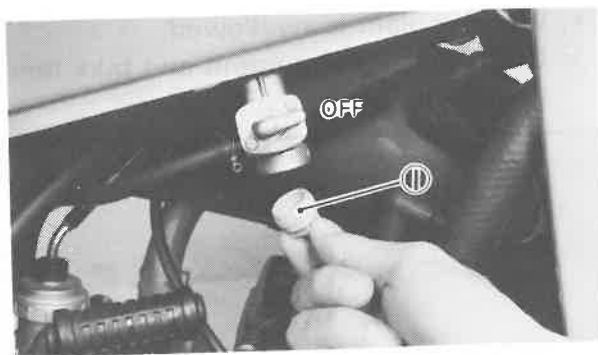
CAUTION:

Hard water or salt water is harmful to the engine. You may use distilled water if you

can't get soft water.

WARNING:

Do not remove the radiator cap when the engine is hot.



CHASSIS

Fuel Cock Cleaning

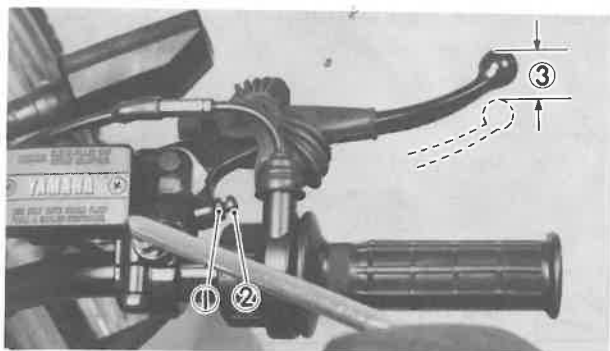
1. Turn the fuel cock lever to the "OFF".
2. Remove:
 - Filter cup ①
3. Clean:
 - Filter cup
 - Clean it with solvent.
4. Install:
 - Filter cup

NOTE:

Be careful not to clamp the filter cup too tightly as this may unseat the O-ring and lead to a fuel leak.

FRONT BRAKE ADJUSTMENT

INSP
ADJ



Front Brake Adjustment

1. Loosen:
 - Locknut ①
2. Adjust:
 - Free play
Turn the adjuster ② until the free play ③ is within the specified limits.



5 ~ 8 mm (0.2 ~ 0.3 in)

WARNING:

Check the brake lever free day. Be sure the brake is working properly.

WARNING:

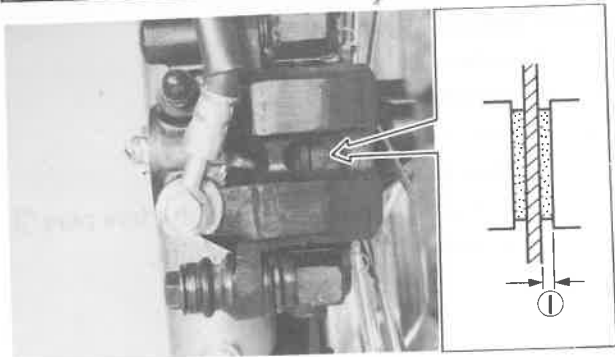
A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the system will cause greatly diminished braking capability and can result in loss of control and an acci-

dent. Inspect and bleed the system if necessary.

3. Tighten:
 - Locknut



FRONT BRAKE PAD INSPECITON /BRAKE FLUID LEVEL INSPECTION



Front Brake Pad Inspection

1. Remove:
 - Blind plug
2. Inspect:
 - Wear limit ①
 Out of specification → Replace pads.



0.8 mm (0.031 in)



Brake Fluid Level Inspection

1. Inspect:
 - Brake fluid level
 Brake fluid level low → Replenish fluid.

① Lower level



DOT #3

NOTE:

Be sure that:

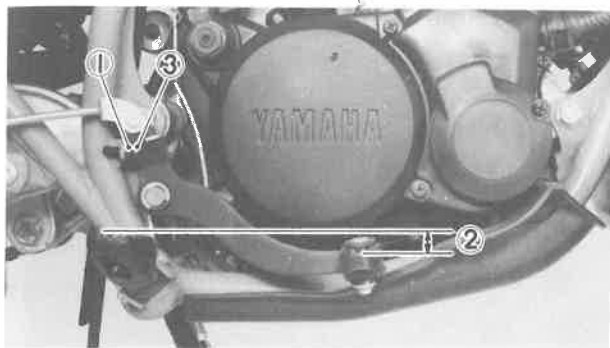
- Spilled fluid is cleaned up immediately to prevent painted surfaces or plastic parts from eroding.

WARNING:

1. Use only the designated quality brake fluid, otherwise poor brake performance will result.
2. Water does not enter the master cylinder when refilling, otherwise poor brake performance.

REAR BRAKE ADJUSTMENT /REAR BRAKE LINING INSPECTION

INSP
ADJ



Rear Brake Adjustment

1. Pedal height
 - a. Loosen:
 - Locknut ①
 - b. Adjust:
 - Brake pedal height ②

Turn the adjuster ③ until the brake pedal position is at the specified height.



Brake Pedal Height:
10 mm (0.4 in)
Below the Top of the Footrest

WARNING:

After adjusting the pedal height, adjust

brake pedal free play.



2. Free play
 - a. Adjust:
 - Free play ①

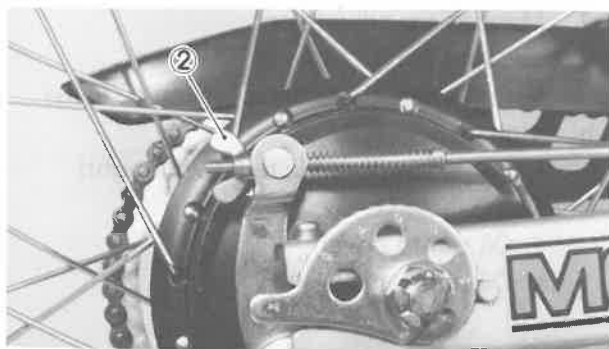
Turn the adjuster ② until the free play is within the specified limits.



20 ~ 30 mm (0.8 ~ 1.2 in)

WARNING:

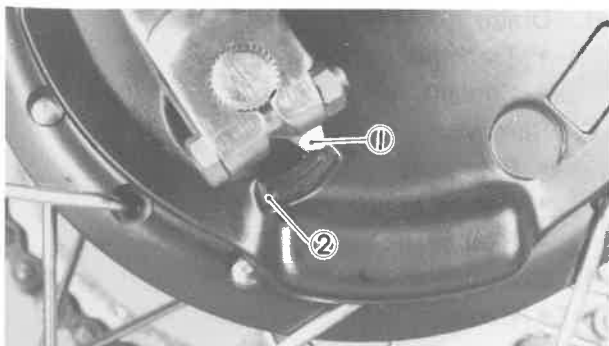
Check the operation of the brake light after adjusting the rear brake.



Rear Brake Lining Inspection

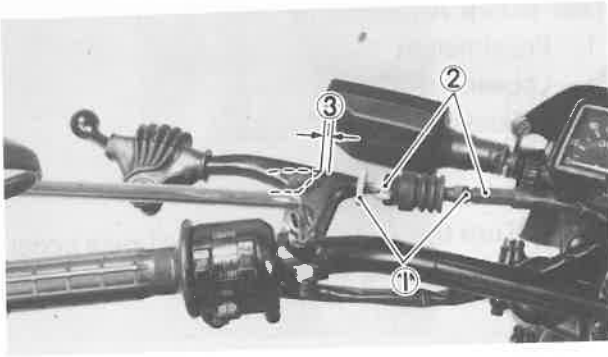
1. Depress the brake pedal.
2. Inspect:
 - Wear indicator ①

Indicator reaches the wear limit line ② → Replace shoes.





CLUTCH ADJUSTMENT



Clutch Adjustment

1. Free play adjustment
 - a. Loosen:
 - Locknuts ①
 - b. Adjust:
 - Free play ③

Turn the adjusters ② until the free play ③ is within the specified limits.



2 ~ 3 mm (0.08 ~ 0.12 in)

- c. Tighten:
 - Locknuts

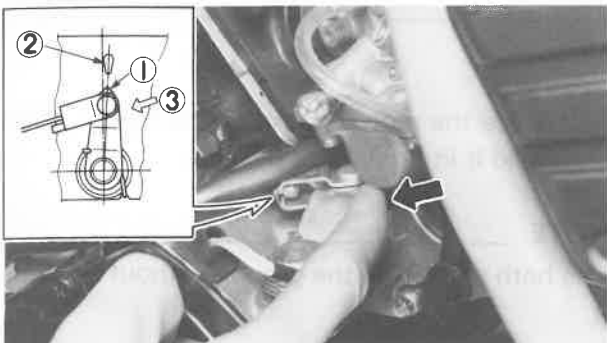
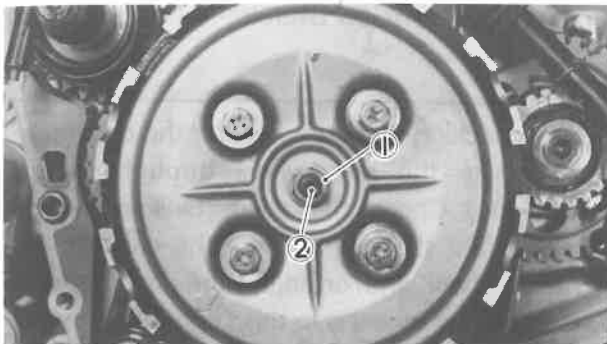
NOTE:

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

2. Mechanism adjustment
 - a. Loosen:
 - Cable length adjuster locknuts (Fully)
 - b. Tighten:
 - Cable length adjusters (Until tight)
 - c. Remove:
 - Oil pump cover
 - Oil pump cable
 - d. Drain:
 - Transmission oil
 - Coolant
 - e. Remove:
 - Pipe joint
 - Engine guard
 - Rear brake
 - f. Disconnect:
 - Radiator hose

CLUTCH ADJUSTMENT

INSP
ADJ



- g. Remove:
 - Kick crank
 - Crankcase cover
- h. Loosen:
 - Locknut ①
- i. Push the push lever toward the front of the engine with your finger until it stops.

② Adjuster

- j. Adjust:
 - Free playWith the push lever in this position, turn the adjuster either in or out until the push lever mark ① and crankcase match mark ② are aligned.

③ Push

- k. Tighten:
 - Locknut



8 Nm (0.8 m·kg, 5.8 ft·lb)

- l. Install/Connect/Fill:
 - Components in above list (Steps "g, f, e, d, c").
- m. Adjust:
 - Clutch cable free play

Drive Chain Tension Check

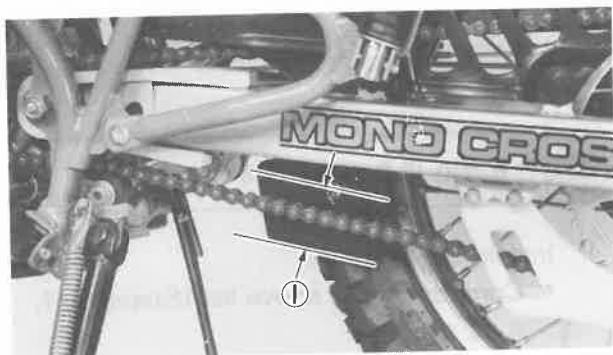
NOTE:

Before checking and/or adjusting the chain tension, rotate the rear wheel through several revolutions. Check the chain tension several times to find the point where the chain is the tightest. Check and/or adjust the chain tension where the rear wheel is in this "tight chain" position.

1. Place the motorcycle on a level place, and hold it in an upright position.

NOTE:

The both wheels on the ground without rider on it.



2. Check:

- Drive chain deflection ①
- Out of specification → Adjust.

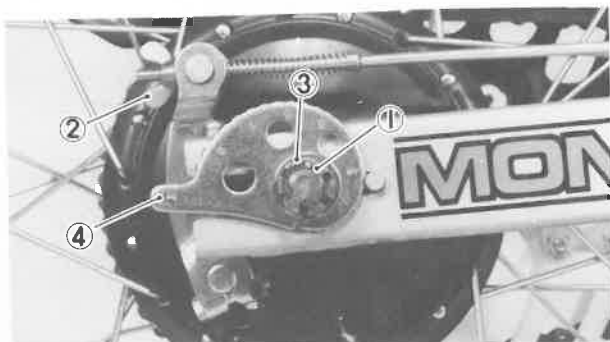


Drive Chain Deflection:
35 ~ 45 mm (1.4 ~ 1.8 in)

Drive Chain Tension Adjustment

CAUTION:

Excessive chain tension will overload the engine and other vital parts; keep the tension within the specified limits.



1. Remove:
 - Cotter pin ①
2. Loosen:
 - Adjuster ②
 - Axle nut ③
3. Adjust:
 - Drive Chain Deflection
Turn the chain pullers ④ until axle is situated in same position.

DRIVE CHAIN LUBRICATION

INSP
ADJ



4. Tighten:
 - Axle nut



85 Nm (8.5 m·kg, 61 ft·lb)

5. Install:
 - Cotter pin

NOTE:

Bend the end of the cotter pin.

WARNING:

Always use a new cotter pin on the axle nut.

6. Adjust:
 - Rear brake free play

WARNING:

Check the operation of the brake light after adjusting the rear brake.

Drive Chain Lubrication

The chain consists of many parts which work against each other. If the chain is not maintained properly, it will wear out rapidly, therefore, form the habit of periodically servicing the chain. This service is especially necessary when riding in dusty conditions.

This motorcycle has a drive chain with small rubber O-rings between the chain plates. Steam cleaning, high-pressure washes, and certain solvent can damage these O-rings. Use only kerosene to clean the drive chain. Wipe it dry, and thoroughly lubricate it.

FRONT FORK OIL CHANGE

Do not use any other lubricants on the drive chain. They may contain solvents that could damage the O-rings.



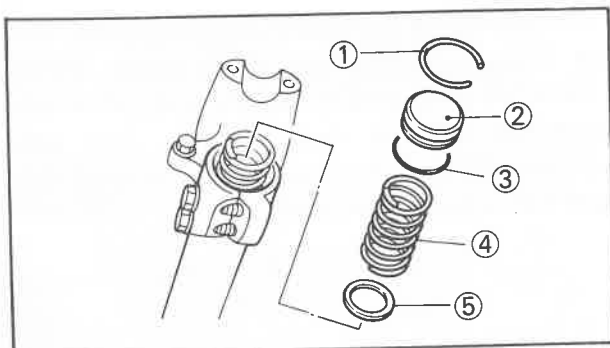
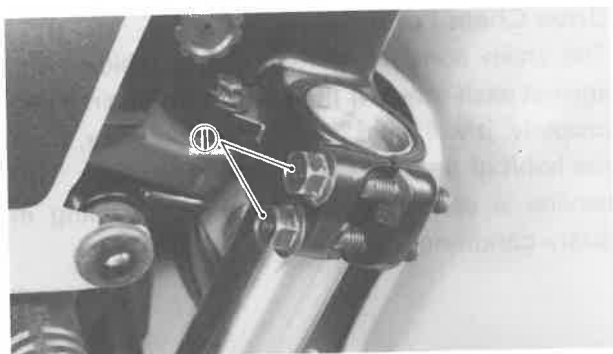
SAE 30 ~ 50 W Motor Oil

Front Fork Oil Change

WARNING:

1. Fork oil leakage can cause loss of stability and safe handling. Have any problem corrected before operating the motorcycle.
2. Securely support the motorcycle so there is no danger of it falling over.

1. Elevate the front wheel by placing a suitable stand under the engine.



2. Remove:
 - Handlebars
 - Rubber cap
3. Loosen:
 - Pinch bolts ①
4. Depress the cap bolt to remove the stopper ring.
5. Remove:
 - Stopper ring ①
 - Use a small screwdriver.
 - Cap bolt ② together with O-ring ③
 - Fork spring (small) ④
 - Spring seat ⑤

FRONT FORK OIL CHANGE

INSP
ADJ



6. Place the open container under each drain hole.
7. Remove:
 - Drain bolt ①Drain the fork oil.

WARNING:

Do not let oil contact the disc brake com-

ponents. If any oil should contact the brake components, it must be removed before the motorcycle is operated. Oil will cause diminished braking capacity and will damage the rubber components of the brake assembly.

8. Inspect:
 - Cap bolt O-ring
 - Drain bolt gasketDamage → Replace.
9. Install:
 - Drain bolt

10. Fill:
 - Fork oil



Fork Oil Capacity (Each Fork):
366 cm³ (12.9 Imp oz, 12.4 US oz)
Recommended Oil:
SAE 10W30 Type SE Motor Oil

After filling, pump the forks slowly up and down to distribute the oil.

11. Install:
 - Components in above list (Step "5").

WARNING:

Always use a new stopper ring (spring wire circlip).

STEERING HEAD ADJUSTMENT

12. Tighten:
- Pinch bolts



23 Nm (2.3 m·kg, 17 ft·lb)

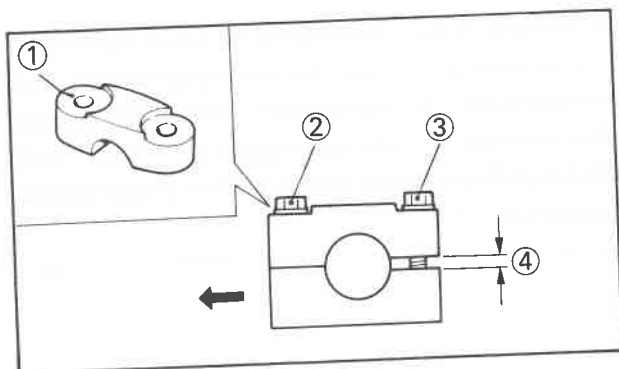
13. Install:
- Handlebars



**Handlebar Installation Bolt:
15 Nm (1.5 m·kg, 11 ft·lb)**

NOTE:

The upper handlebar holder should be installed with the punched mark forward.



- ① Punched mark
- ② 1st
- ③ 2nd
- ④ Gap

CAUTION:

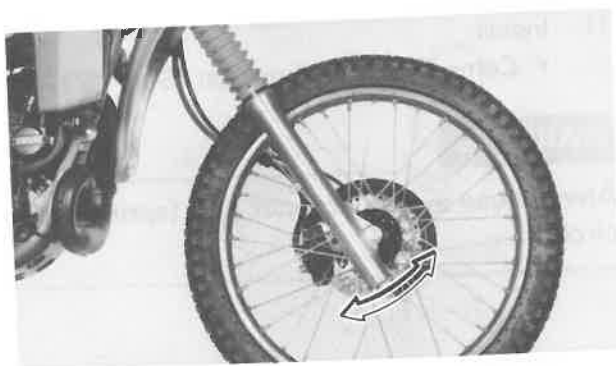
First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.

Steering Head Inspection

WARNING:

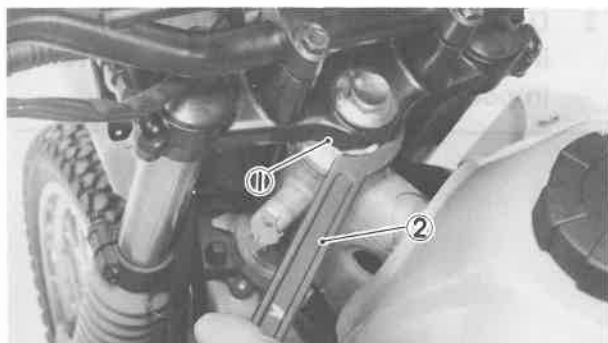
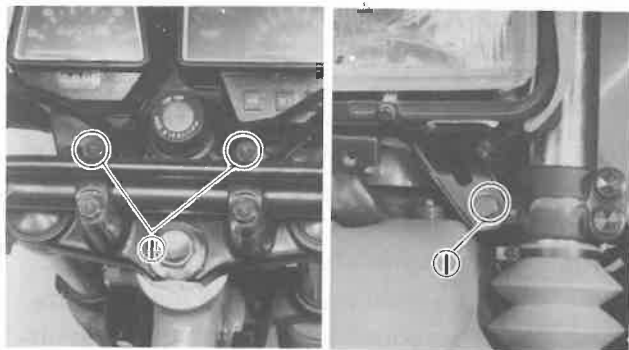
Securely support the motorcycle so there is no danger of it falling over.

1. Elevate the front wheel by placing a suitable stand under the engine.
2. Check:
 - Steering assembly bearings
Grasp the bottom of the forks and gently rock the fork assembly back and forth.
Looseness → Adjust steering head.



STEERING HEAD ADJUSTMENT

INSP
ADJ



Steering Head Adjustment

WARNING:

Securely support the motorcycle so there is no danger of it falling over.

1. Loosen:
 - Headlight stay securing bolts ①
2. Loosen:
 - Fork pinch bolt ①
 - Steering fitting bolt ②
3. Tighten:
 - Ring nut ①Use the Ring Nut Wrench ② (90890-01268).



38 Nm (3.8 m·kg, 27 ft·lb)

WARNING:

Avoid over tightening.

4. Tighten:
 - Steering fitting bolt
 - Fork pinch bolt



Steering Fitting Bolt:
58 Nm (5.8 m·kg, 42 ft·lb)
Fork Pinch Bolt:
23 Nm (2.3 m·kg, 17 ft·lb)

- Headlight stay securing bolts
5. Check:
 - Steering assembly bearingsLooseness → Adjust steering head.



REAR SHOCK ABSORBER ADJUSTMENT

Rear Shock Absorber Adjustment

WARNING:

This shock absorber contains highly pressurized nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling.

1. Do not tamper with or attempt to open the cylinder assembly.
2. Do not subject shock absorber to an open flame or other high heat source. This may cause the unit to explode due to excessive gas pressure.
3. Do not deform or damage the cylinder in any way. Cylinder damage will result in poor damping performance.

1. Spring

NOTE:

The spring preload of the rear shock absorber can be adjusted to suit rider's preference, weight, and the course conditions.

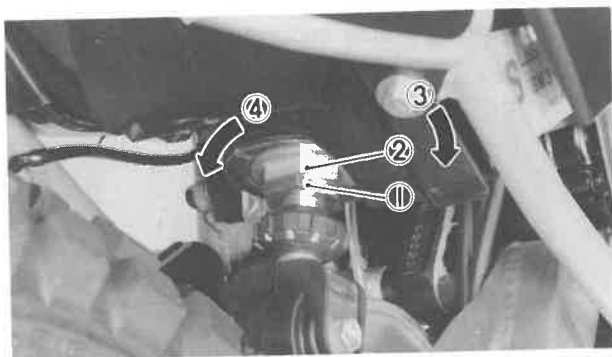
a. Loosen:

- Locknut ①

b. Adjust:

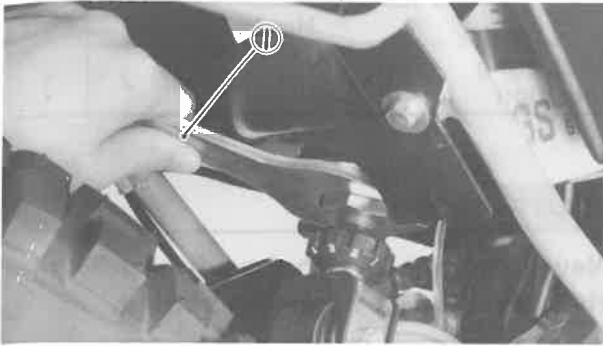
- Spring set length
Turn the adjuster ② to increase or decrease the spring preload.

- ③ Increase spring preload
- ④ Decrease spring preload



REAR SHOCK ABSORBER ADJUSTMENT

INSP
ADJ



Standard Length (Installed):
198 mm (7.8 in)
Minimum Length (Installed):
188 mm (7.4 in)
Maximum Length (Installed):
208 mm (8.2 in)

Use a Special Wrench ①.

NOTE:

One complete turn of the adjuster will change the preload 1 mm (0.04 in). Make changes in increments of 2 mm (0.08 in) at a time.

CAUTION:

Never attempt to turn the adjuster beyond the maximum or minimum setting.

c. Tighten:

- Locknut



55 Nm (5.5 m·kg, 40 ft·lb)

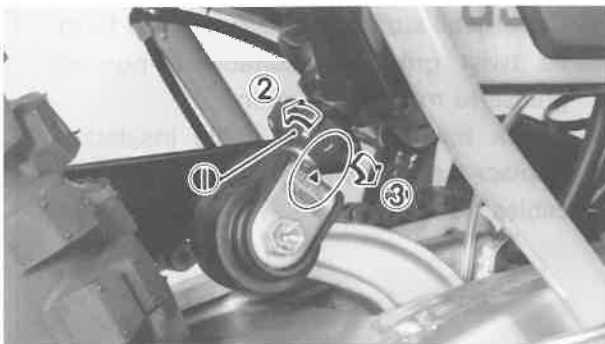
CAUTION:

Always tighten the locknut against the spring adjuster and torque the locknut to specification.

2. Damping

NOTE:

The damping of the rear shock absorber can be adjusted to suit rider's preference, weight, and course conditions.



a. Adjust

- Damping

Turn the adjuster ① to increase or decrease the damping.

- ② Decrease damping
- ③ Increase damping



WHEEL BEARINGS CHECK / CABLE INSPECTION AND LUBRICATION

	Hard			STD	Soft
Adjusting position	5	4	3	2	1

CAUTION:

Never attempt to turn the adjuster beyond the maximum or minimum setting.

Wheel Bearings Check

1. Front Wheel
 - a. Check:
 - Front wheel bearings

Raise the front end of the motorcycle, and spin the wheel by hand. Touch the axle or front fender while spinning the wheel.

Excessive vibration → Replace bearings.

2. Rear wheel
 - a. Remove:
 - Rear wheel
 - b. Check:
 - Bearing movement

Roughness → Replace bearings.

Cable Inspection and Lubrication

Cable Inspection and Lubrication Steps:

- Remove the two screws that secure throttle housing to handlebar.
- Hold cable end high and apply several drops of lubricant to cable.
- Coat metal surface of disassembled throttle twist grip with suitable all-purpose grease to minimize friction.
- Check for damage to cable insulation. Replace any corroded or obstructed cables.

TIRES CHECK

INSP
ADJ



- Lubricate any cables that do not operate smoothly.



SAE 10W30 Motor Oil

Tires Check

1. Measure:
 - Tire pressure
Out of specification → Adjust.

Basic weight: With oil and full fuel tank	100 kg (243 lb)	
Maximum load*	156 kg (344 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	127 kPa (1.3 kg/cm ² , 18 psi)	147 kPa (1.5 kg/cm ² , 22 psi)
90 kg (198 lb) ~ Maximum load*	147 kPa (1.5 kg/cm ² , 22 psi)	177 kPa (1.8 kg/cm ² , 26 psi)
High Speed Riding	147 kPa (1.5 kg/cm ² , 22 psi)	177 kPa (1.8 kg/cm ² , 26 psi)

*Load is the total weight of cargo, rider, passenger, and accessories.

WARNING:

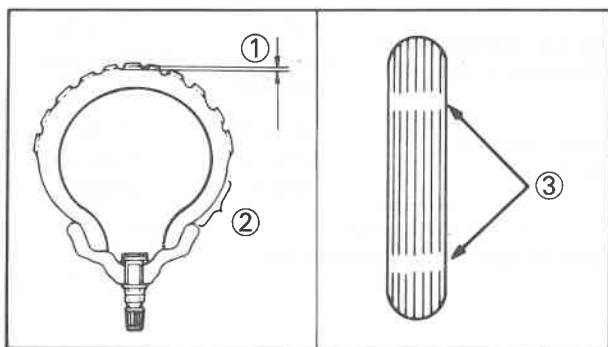
Tire inflation pressure should be checked and adjusted when the temperature of the tire equals the ambient air temperature. Tire inflation pressure must be adjusted according to total weight of cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model), and vehicle speed.

WARNING:

Proper loading of your motorcycle is important for the handling, braking, and other performance and safety characteristics of your motorcycle. Do not carry loosely packed items that can shift. Securely pack your heaviest items close to the center of the motorcycle, and distribute the weight evenly

ly from side to side. Properly adjust the suspension for your load, and check the condition and pressure of your tires. **NEVER OVERLOAD YOUR MOTORCYCLE.** Make sure the total weight of the cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model) does not exceed the maximum load of the motorcycle. Operation of an overloaded

motorcycle could cause tire damage, an accident, or even injury.



2. Inspect:

- Tire surfaces
Wear/Damage → Replace.



Minimum Tire Tread Depth:
Front and Rear:
1.0 mm (0.04 in)

- ① Tread depth
- ② Side wall
- ③ Wear indicator

WHEELS CHECK



WARNING:

1. It is dangerous to ride with a wornout tire. When a tire tread begins to show lines, replace the tire immediately.
2. Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.

Wheels Check

1. Inspect:
 - Wheel
Crack/bend/warpage → Replace
 - Spoke
Tight/Damage → Adjust/Repalce

WARNING:

Never attempt even small repairs to the wheel.

NOTE:

Always balance the wheel when a tire or wheel has been changed or replaced.



WHEELS CHECK

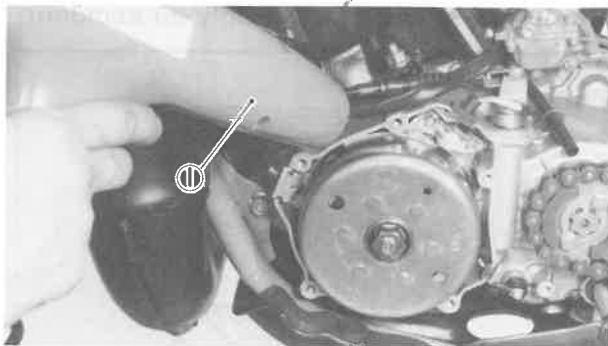
2. Tighten:
 - Valve stem locknut



1.5 Nm (0.15 m·kg, 1.1 ft·lb)

WARNING:

Ride conservatively after installing a tire to allow it to seat itself properly on the rim.



ELECTRICAL

Ignition Timing Check

1. Remove:
 - Crankcase cover (Left)
2. Connect the Timing Light ① (90890-03109) to spark plug lead.
3. Warm up the engine, and let it idle at the specified idle speed of 1,350 r/min.
4. Check:
 - Ignition timing
As the engine runs faster, the mark on the rotor should move to the advance position.
Incorrect → Check ignition system



NOTE:

Refer to "CHAPTER 7. ELECTRICAL" for further information.



- ① BTDC 8° at 1,350 r/min
- ② BTDC 30° at 4,000 r/min

Battery Inspection

1. Inspect
 - Battery fluid level
Battery fluid level low → Fill.
Fluid level should be between upper and lower level marks.
- ① Upper level
 - ② Lower level

CAUTION:

Normal tap water contains minerals which are harmful to a battery; therefore, refill only with distilled water.

WARNING:

Battery fluid on the chain can cause



premature failure and possibly an accident.



WARNING:

Battery electrolyte is poisonous and dangerous, causing severe burns, etc. It contains sulfuric acid. Avoid contact with skin, eyes or clothing.

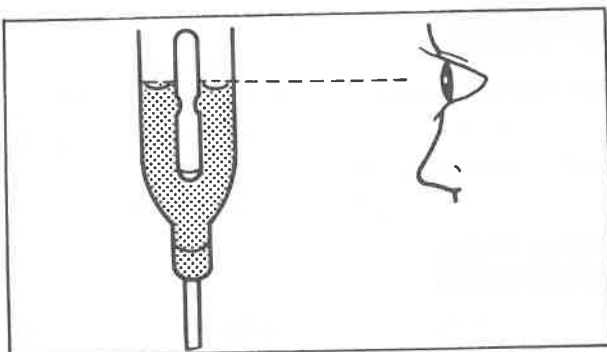
Antidote: **EXTERNAL**-Flush with water. **INTERNAL**-Drink large quantities of water or milk. Follow with milk of magnesia,

beaten egg, or vegetable oil. Call a physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention. Batteries produce explosive gases. Keep sparks, flame, cigarettes etc., away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries.

KEEP OUT OF REACH OF CHILDREN.

2. Remove:
 - Battery

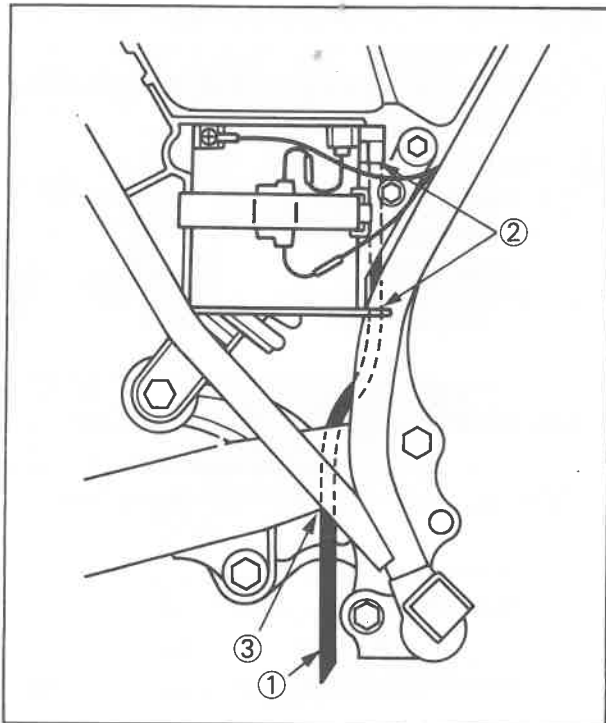


3. Inspect:
 - Battery fluid specific gravity
Out of specification → Charge

Charging Current:
0.3 Amps/10 Hrs.
Specific Gravity:
1,260 at 20°C (68°F)

SPARK PLUG INSPECTION

INSP
ADJ



4. Install:

- Battery

5. Connect/Inspect:

- Battery breather pipe ①

Be sure the pipe is properly attached and routed.

② Pass through guide

③ Inside reararm

CAUTION:

When inspecting the battery, be sure the breather pipe is routed correctly. If the breather pipe touches the frame or exits in such a way as to cause battery electrolyte or gas to exit onto the frame, structural and cosmetic damage to the motorcycle can occur.

6. Inspect:

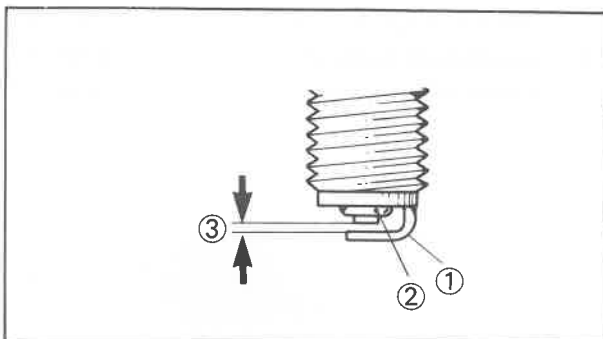
- Battery breather pipe
Obstruction → Remove
Damage → Replace

Spark Plug Inspection

1. Inspect:

- Electrode ①
Wear/Damage → Replace
- Insulator color ②
Normal condition is a medium to light tan color.
Distinctly different color → Check the engine condition.

③ Spark plug gap



SPARK PLUG INSPECTION

2. Clean:
 - Spark plug
Clean the spark plug with a spark plug cleaner or wire brush.
3. Inspect:
 - Spark plug type
Incorrect → Replace

Standard Spark Plug: BR8ES (NGK)

4. Measure:
 - Spark plug gap
Out of specification → Regap.
Use a wire gauge.



Spark Plug Gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

5. Tighten:
 - Spark plug

NOTE:

Before installing a spark plug, clean the gasket surface and plug surface.



20 Nm (2.0 m·kg, 14 ft·lb)

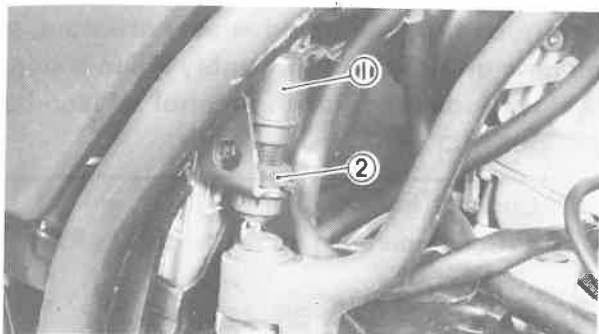
NOTE:

If a torque wrench is not available when you are installing a spark plug, a good estimate of the correct torque is 1/4 to 1/2 turns part finger

tight. Have the spark plug torqued to the correct value as soon as possible with a torque wrench.

BRAKE LIGHT SWITCH ADJUSTMENT/ HEADLIGHT BULB REPLACEMENT

INSP
ADJ



Brake Light Switch Adjustment

1. Adjust:

- Brake light operating timing
Hold the main body ① of the switch with your hand so it does not rotate, and turn the adjuster ② until the operating timing is correct.



Headlight Bulb Replacement

1. Remove:

- Headlight cowling

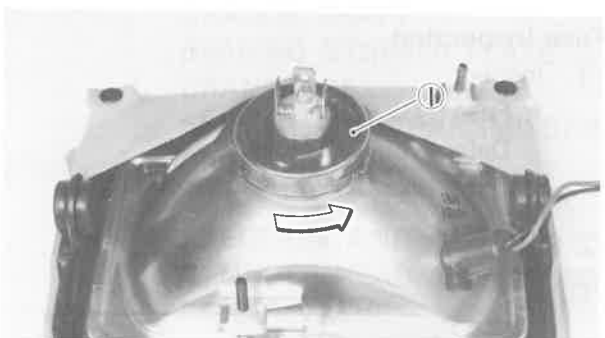


2. Remove:

- Headlight unit assembly

3. Disconnect:

- Headlight leads



4. Remove:

- Defective bulb

Turn the bulb holder ① counter-clockwise to release bulb.

WARNING:

Keep flammable products or your hands away from the bulb while it is on, it will be hot. Do not touch the bulb until it cools down.

5. Install:

- Bulb (New)

Secure the new bulb with the bulb holder.

CAUTION:

Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and il-



HEADLIGHT BEAM ADJUSTMENT/FUSE INSPECTION

luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Connect/Install:
 - Components in above list (Steps "3, 2, 1".)
7. Adjust:
 - Headlight beam

Headlight Beam Adjustment

1. Adjust
 - Headlight beam (Horizontally)

Horizontal Adjustment	
Right	Turn the adjusting screw ① counterclockwise.
Left	Turn the adjusting screw ① clockwise.

2. Adjust:
 - Headlight beam (Vertically)

Vertical Adjustment	
Higher	Turn the adjusting screw ② clockwise.
Lower	Turn the adjusting screw ② counterclockwise.



Fuse Inspection

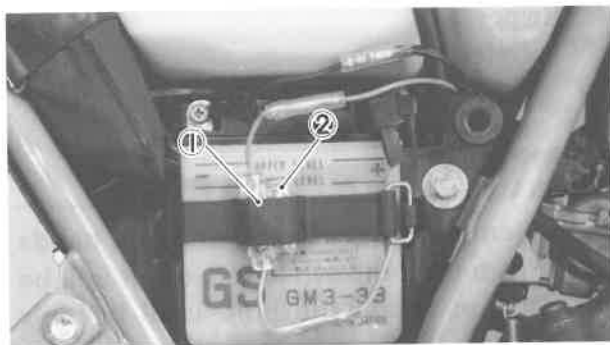
1. Inspect:
 - Fuse ①
 - Defective → Replace.
 - Blow fuse (New) → Inspect circuit.

② Spare fuse

CAUTION:

Do not use fuses of higher amperage rating than those recommended.
 Substitution of a fuse of improper rating can cause extensive electrical system damage and possibly a fire.

Description	Amperage	Quantity
Main	10A	1
Reserve	10A	1





CHAPTER 3.

ENGINE OVERHAUL

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ENGINE OVERHAUL

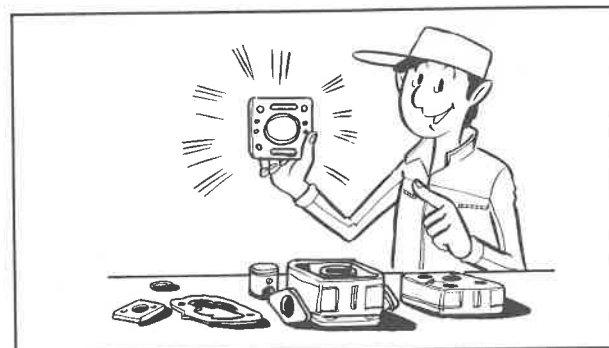
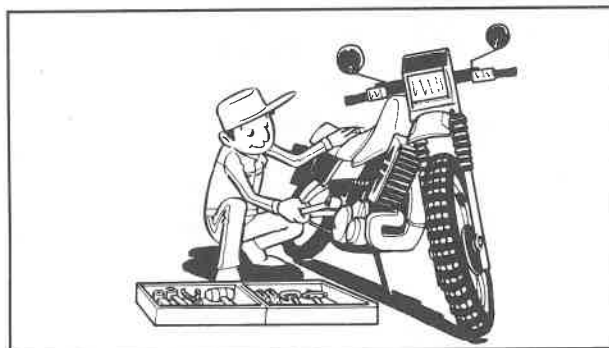
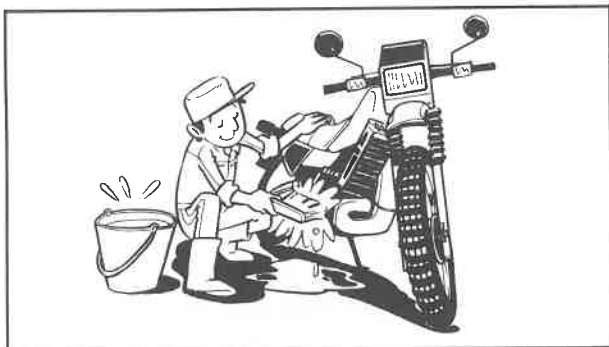
ENGINE REMOVAL

NOTE:

It is not necessary to remove the engine in order to remove the following components:

- Cylinder head
- Cylinder

- Piston



Preparation for Removal

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to "CHAPTER 1. GENERAL INFORMATION-SPECIAL TOOLS" section.

NOTE:

When disassembling the engine, keep mated parts together. This includes gears, cylinder, piston and

other parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.

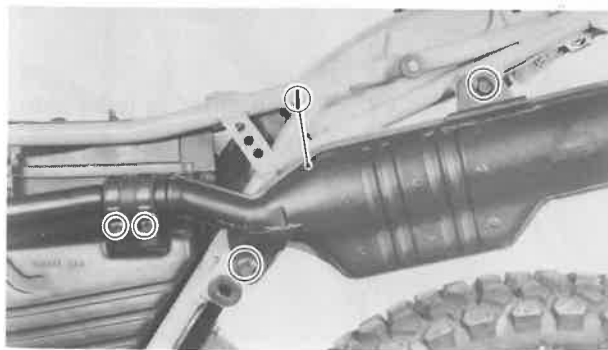
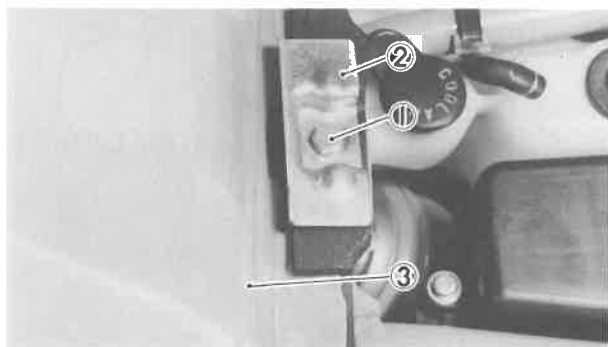
3. During engine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled in the engine.



4. Remove the engine guard. Place the motorcycle on a suitable stand.
5. Start the engine and allow it to warm up.
6. Drain the transmission oil completely. Refer to "CHAPTER 2. PERIODIC INSPECTIONS AND ADJUSTMENTS — Transmission Oil Replacement" section.
7. Drain the coolant completely. Refer to "CHAPTER 4. COOLING SYSTEM — Coolant Replacement" section.

Fuel Tank

1. Remove:
 - Side covers (Left and Right)
 - Seat
2. Turn the fuel cock to the "OFF" position.
3. Disconnect:
 - Fuel pipe
4. Remove
 - Holding bolt ①
 - Holding plate ②
 - Fuel tank ③

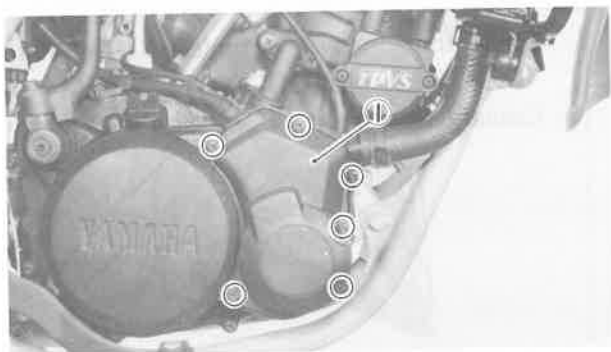


Exhaust Pipe

1. Remove:
 - Muffler ①

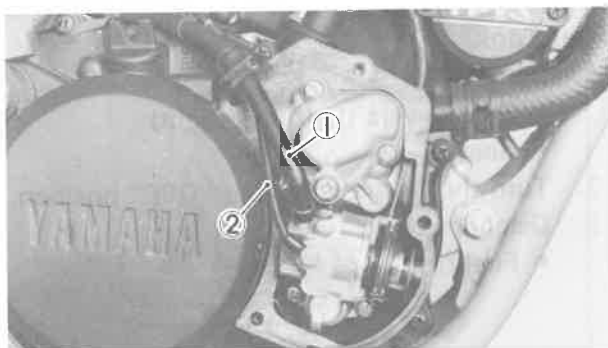


2. Remove:
 - Exhaust pipe



Wiring and Cables

1. Disconnect:
 - Spark plug lead
2. Remove:
 - Oil pump cover ①

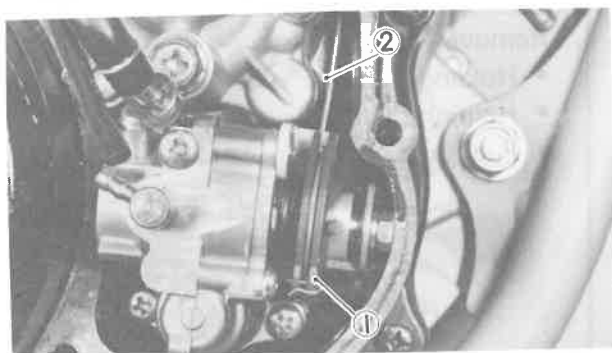


3. Disconnect:
 - Oil pipe ①

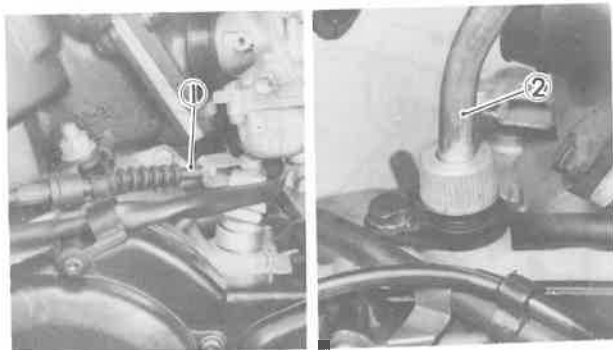
NOTE:

Plug the oil pipe so the oil will not run out of the oil tank.

- Oil delivery pipe ②



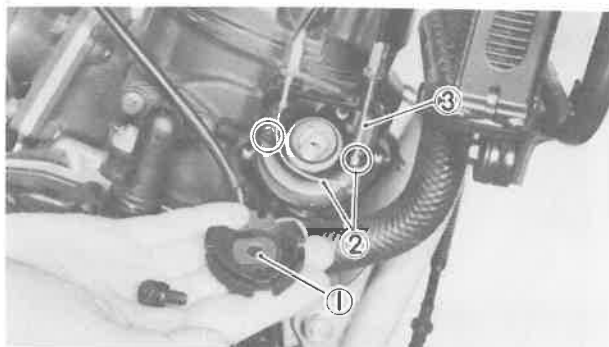
4. Remove:
 - Wire clip ①
 - Oil pump cable ②
 Rotate the pump pulley to the full throttle position.



5. Disconnect:
 - Clutch cable ①
First disconnect the handlebar lever side, and then crankcase side.
 - Tachometer cable ②



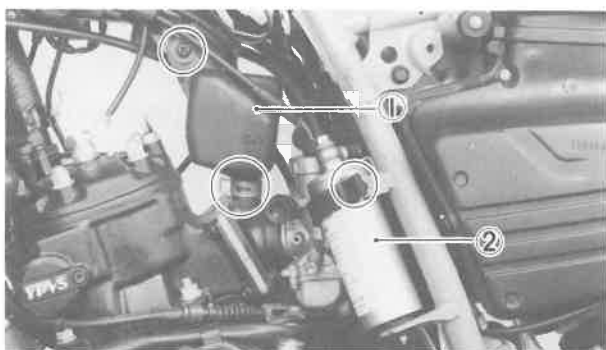
6. Remove:
 - Power valve seal cap ①
7. Turn the adjusters ② clockwise.



8. Remove:
 - Pulley ①
9. Disconnect:
 - Pulley cables ②
10. Remove:
 - Power valve cover ③

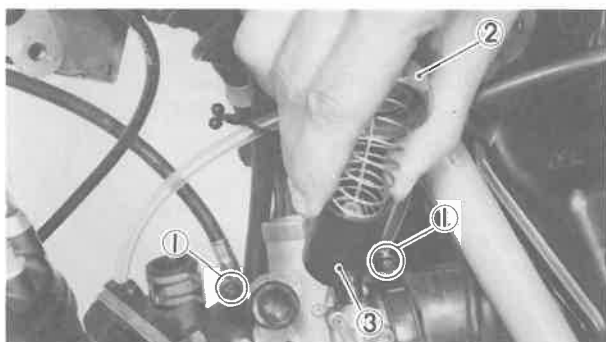


11. Disconnect:
 - Thermo-unit lead ①



Carburetor

1. Remove:
 - Y.E.I.S. air chamber ①
 - Rear shock absorber gas chamber ②



2. Loosen:
 - Carburetor joint holding screws ①
3. Remove:
 - Carburetor top ② together with throttle valve ③



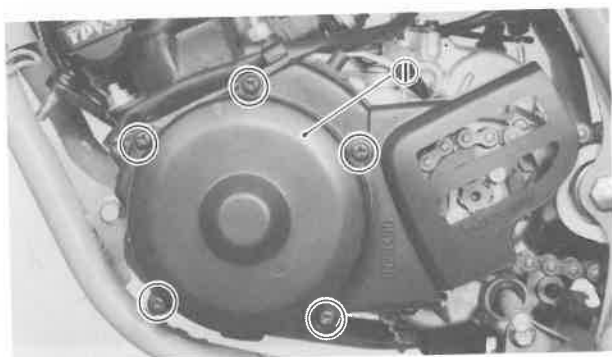
4. Remove:
 - Carburetor

NOTE:

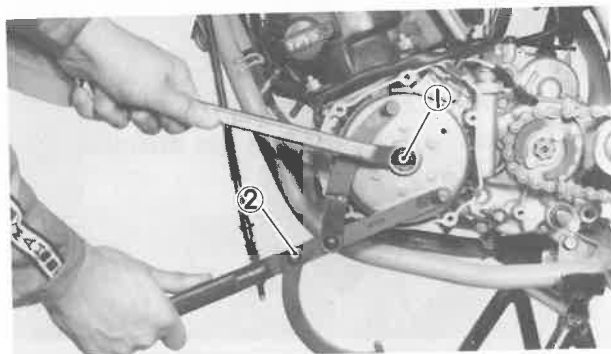
Cover the carburetor with a clean rag to prevent dirt or foreign matter into the carburetor.

Change Pedal

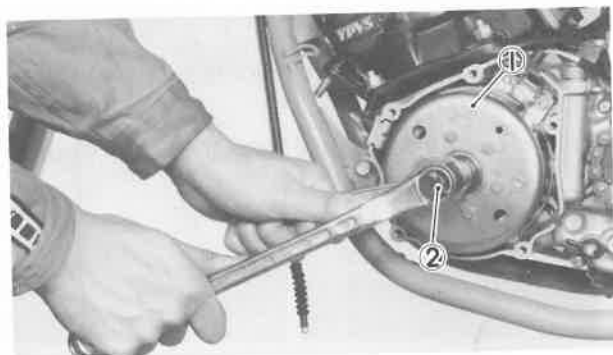
1. Remove:
 - Change pedal

**CDI Magneto**

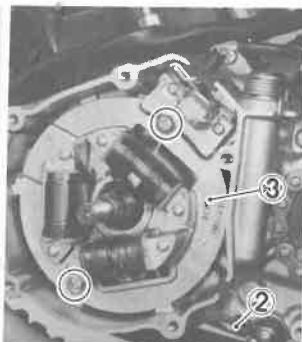
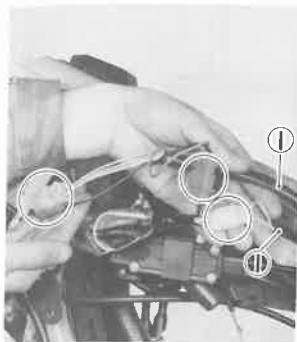
1. Remove:
 - Crankcase cover (Left) ①



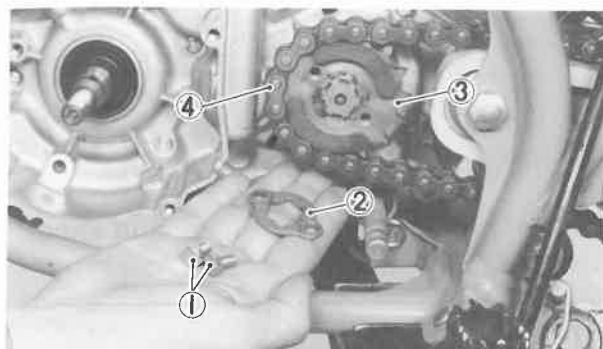
2. Remove:
 - Magneto securing nut ①
 - Use Rotor Holding Tool ② (90890-01235) to lock the magneto.



3. Remove:
 - CDI magneto ①
 - Use Rotor Puller ② (90890-01189).

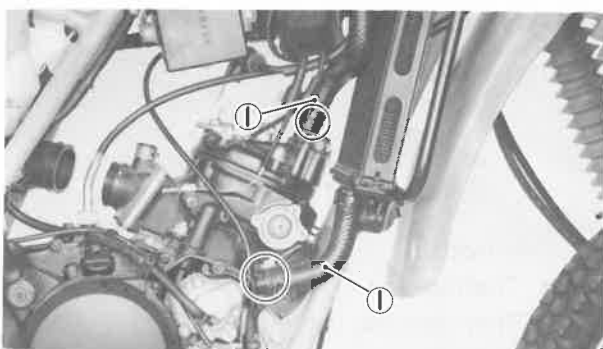


4. Disconnect:
 - Magneto leads ①
 - Neutral switch lead ②
5. Remove:
 - Starter assembly ③
 - Woodruff key



Drive Chain

1. Remove:
 - Securing bolts ①
Apply the rear brake.
 - Holding plate ②
 - Drive sprocket ③
 - Drive chain ④



Engine Removal

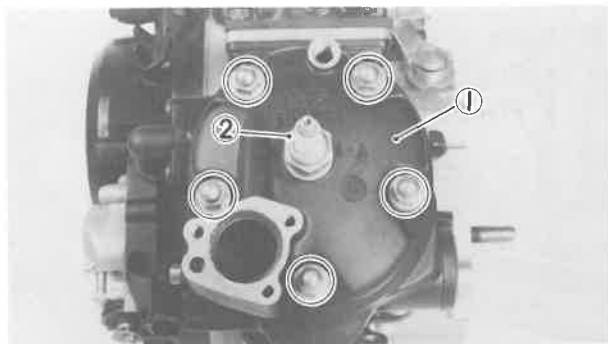
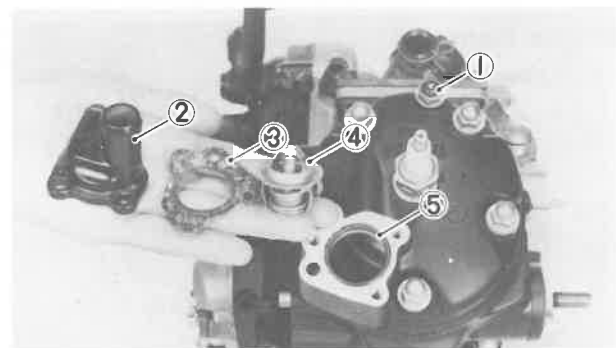
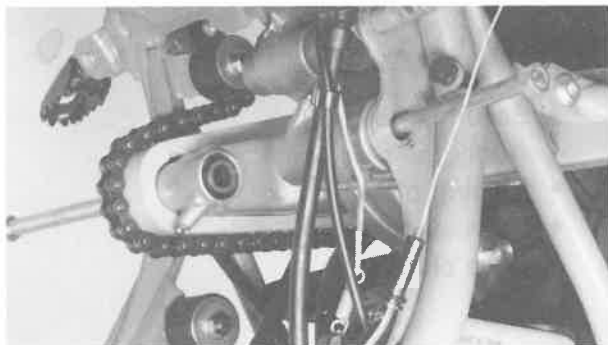
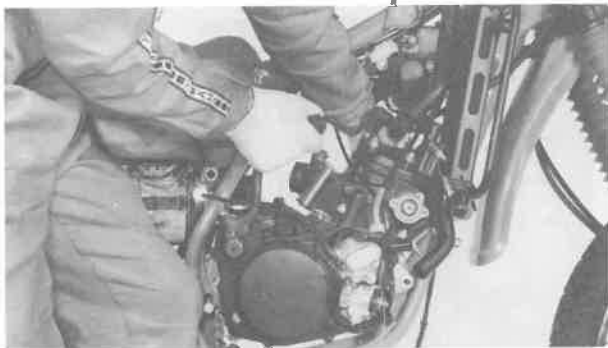
1. Disconnect:
 - Radiator hoses ①



2. Remove:
 - Brake pedal assembly



3. Remove:
 - Engine mounting bolts ①
 - Pivot shaft ②



4. Remove:
 - Engine
 - To the right.

NOTE:

The engine and swingarm are installed using the same pivot shaft. Therefore, take care so that the pivot shaft is pulled, not entirely out, but for

enough to set the engine free.

CAUTION:

Avoid damping the rubber hose and shock absorber gas chamber.

DISASSEMBLY**Cylinder Head**

1. Remove:
 - Thermo-unit ①
 - Thermostatic valve cover ②
 - Gasket ③
 - Thermostatic valve ④
 - O-ring ⑤

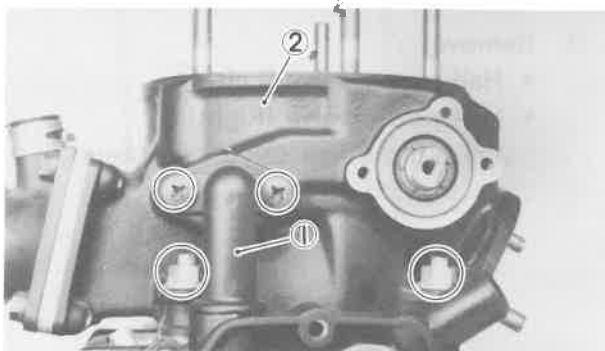
WARNING:

Handle the thermo-unit with special care. Never subject it to strong or allow it to be dropped. Should it be dropped, it must be replaced.

2. Remove:
 - Cylinder head ①
 - Cylinder head gasket

NOTE:

1. Before loosening the cylinder head, loosen the spark plug ②.
2. The cylinder head holding nuts should be loosened 1/2 turn each time, and remove.

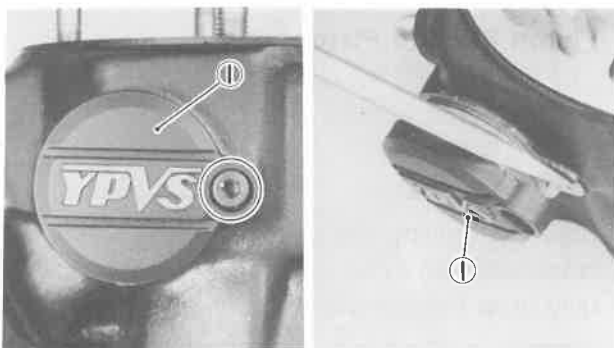
**Cylinder**

1. Remove:

- Joint pipe ①
- Cylinder ②
- Cylinder gasket



2. Place the cylinder in an inverted position, and drain the coolant.

**Power Valve**

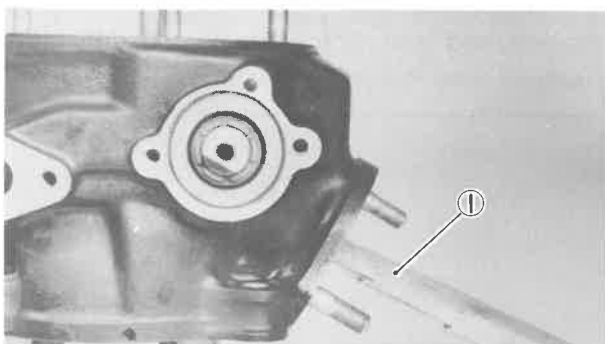
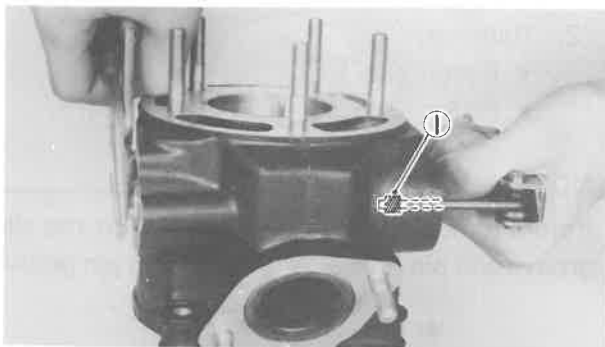
1. Remove:

- Power valve holder (Left) ①

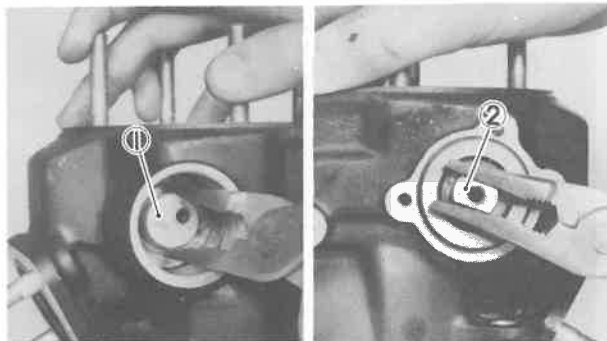
2. Remove:

- Hexagon socket head bolt ①

Hold the right end of the power valve with pliers.

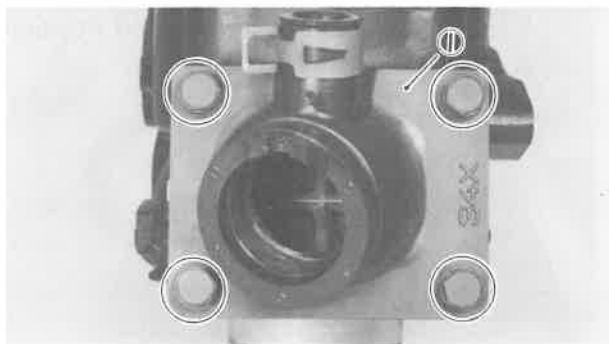
**NOTE:**

If stiff, use a wooden piece ① through the exhaust port to steady the valve.



3. Remove:

- Half power valve (Left) ①
 - Half power valve (Right) ②
- Pry out the half valve with pliers.

**Reed Valve**

1. Remove:

- Reed valve assembly ①

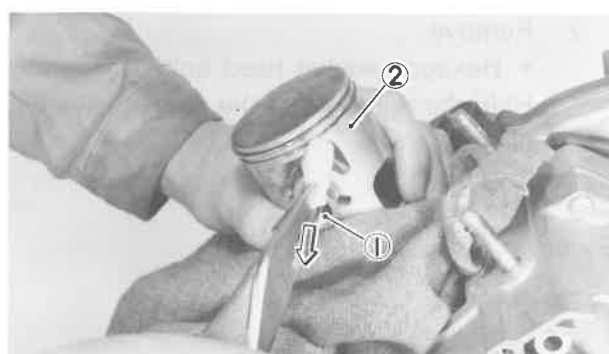
**Piston Pin and Piston**

1. Remove:

- Piston pin clip ①

NOTE:

Before removing the piston pin clip, cover the crankcase with a clean rag so you will not accidentally drop the clip into the crankcase.



2. Remove:

- Piston pin ①
- Piston ②

NOTE:

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

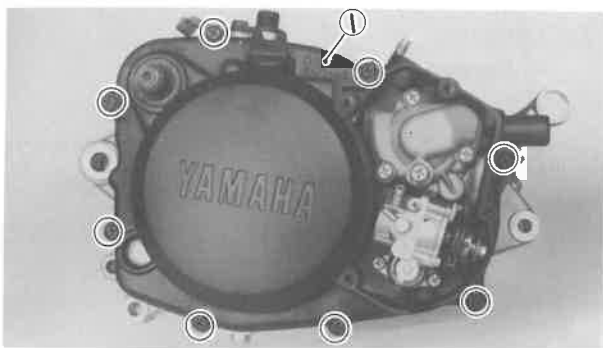
is deburred and piston pin is still difficult to remove, use Piston Pin Puller (YU-01304)

**CAUTION:**

Do not use a hammer to drive the piston pin out.

Kick Crank

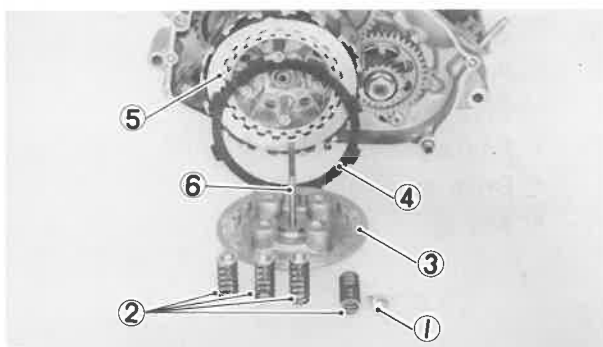
1. Remove:
 - Kick crank

**Crankcase Cover (Right)**

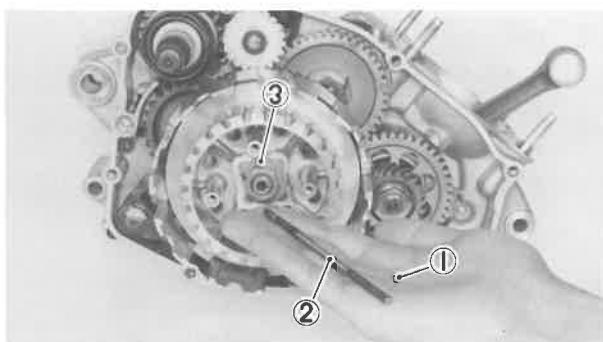
1. Remove:
 - Crankcase cover (Right) ①

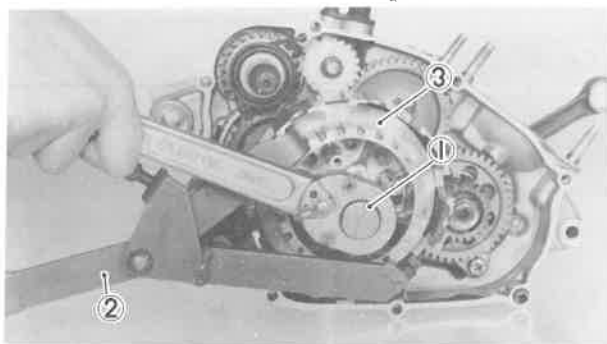
NOTE:

The crankcase cover can be removed without removing the Autolube pump and water pump.

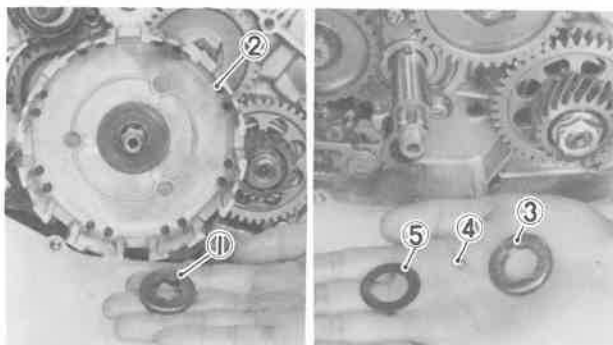
**Clutch and Primary Drive Gear**

1. Remove:
 - Clutch spring holding screws ①
 - Clutch springs ②
 - Pressure plate ③
 - Friction plates ④
 - Clutch plates ⑤
 - Push rod #1 ⑥
2. Remove:
 - Ball ①
 - Push rod #2 ②
3. Straighten:
 - Lock washer tab ③

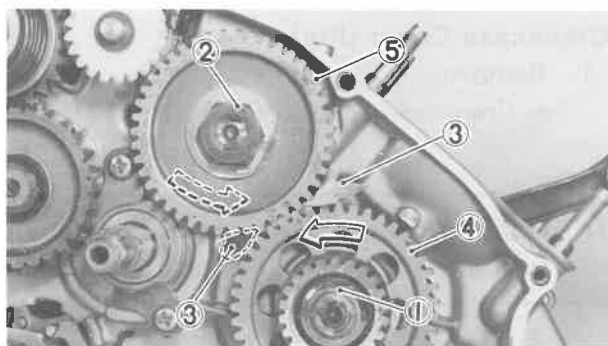




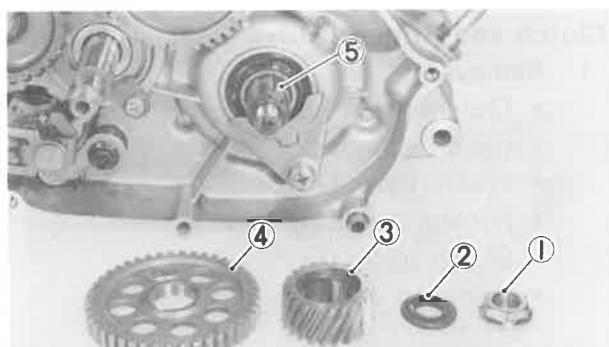
4. Remove:
 - Locknut ①
 - Lock washer
 - Use Universal Clutch Holder ② (90890-04086) to hold the clutch boss.
 - Clutch boss ③



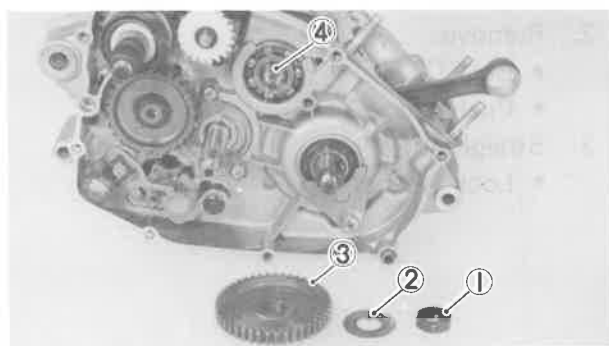
5. Remove:
 - Holding plate ①
 - Primary driven gear ②
 - Spacer ③
 - Knock pin ④
 - Shim ⑤
6. Straighten:
 - Lock washer tab (Balancer gear)



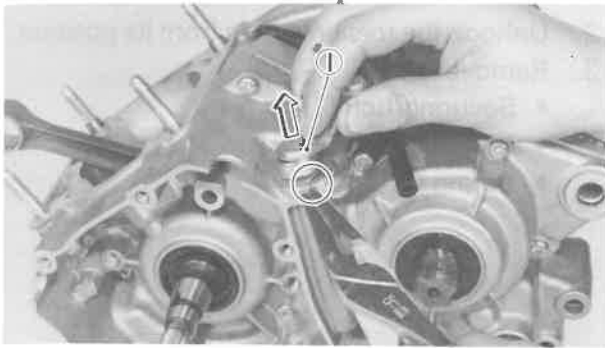
7. Loosen:
 - Primary drive gear nut ①
 - Balancer gear nut ②
 - Place a folded rag ③ between the teeth of the drive gear ④ and balancer gear ⑤ to lock them.



8. Remove:
 - Primary drive gear nut ①
 - Spring washer ②
 - Primary drive gear ③
 - Drive gear ④
 - Key ⑤

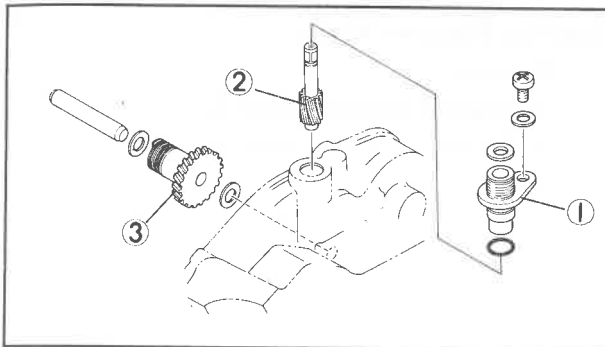


9. Remove:
 - Balancer gear nut ①
 - Lock washer ②
 - Balancer gear ③
 - Key ④



10. Remove:

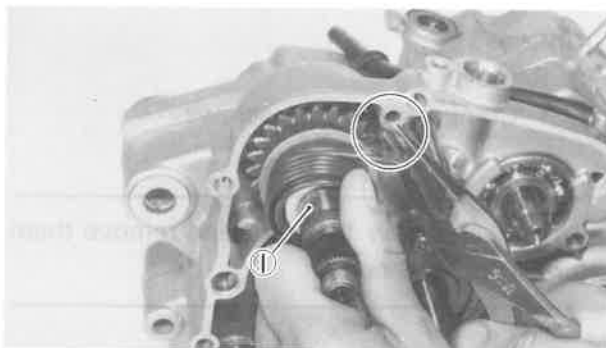
- Clutch push lever axle assembly ①



Tachometer Gear

1. Remove:

- Stopper plate ①
- Tachometer driven gear ②
- Tachometer drive gear ③

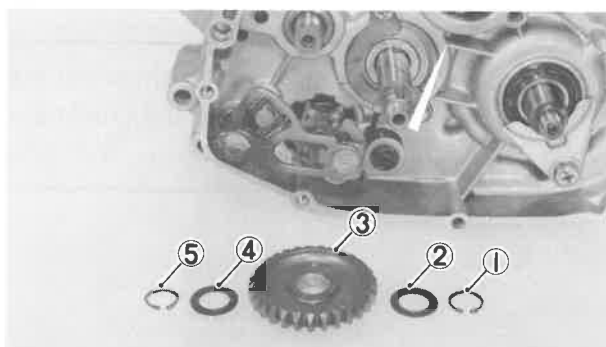


Kick Axle

1. Unhook the kick spring from its position.

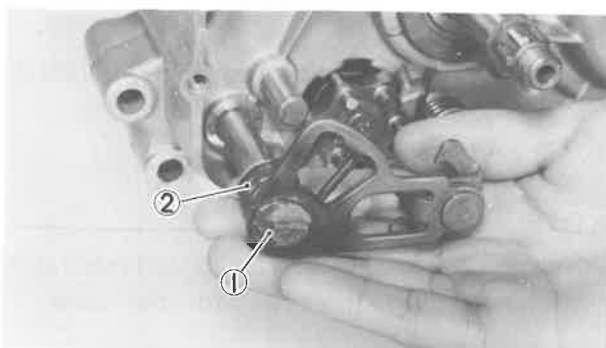
2. Remove:

- Kick axle assembly ①
- Rotate the shaft counterclockwise.



3. Remove:

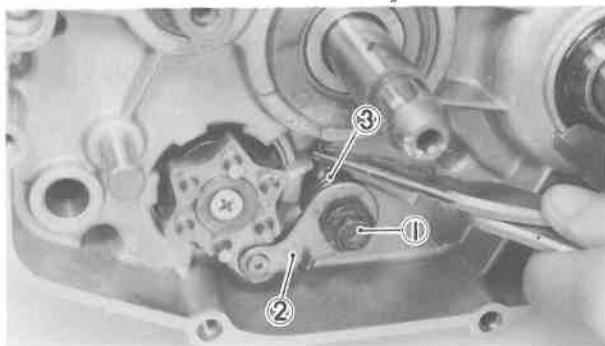
- Circlip ①
- Plain washer ②
- Kick idle gear ③
- Plain washer ④
- Circlip ⑤



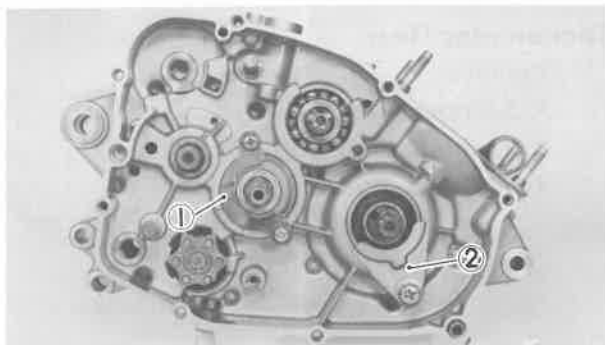
Change Shaft

1. Remove:

- Change lever ①
- Spring ②

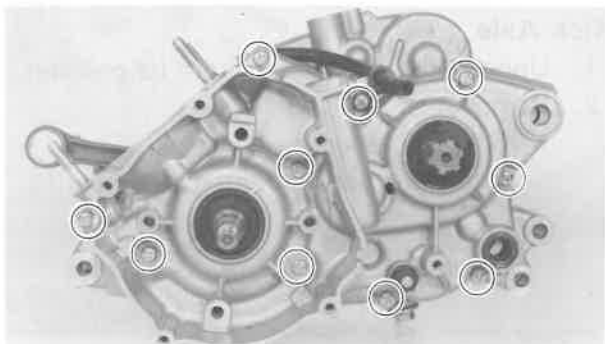


2. Unhook the torsion spring from its position.
3. Remove:
 - Securing bolt ①
 - Stopper lever ②
 - Spring ③



Bearing Stopper Plate

1. Remove:
 - Bearing stopper plate ①
 - Oil seal stopper plate ②



Crankcase

1. Remove:
 - Crankcase holding screws

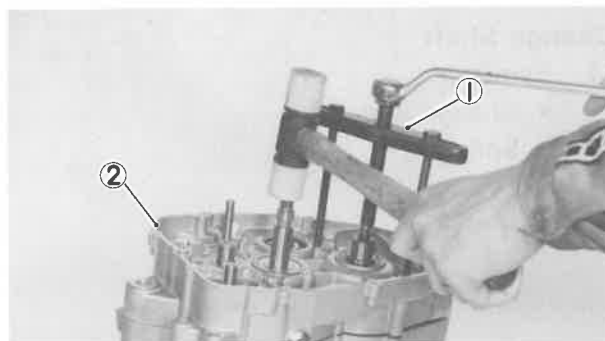
NOTE:

Loosen each screw 1/4 turn, and remove them after all are loosened.



NOTE:

Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when separating the crankcase.



2. Attach:
 - Crankcase Separating Tool (90890-01135) ①
3. Remove:
 - Crankcase (Right) ②

NOTE:

Fully tighten the tool holding bolts, but make sure the tool body is parallel with the case. If



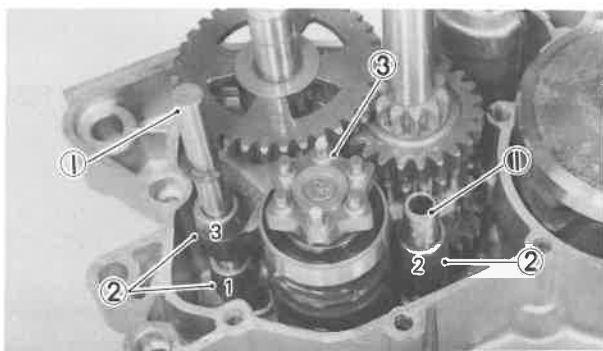
necessary, one screw may be backed out slightly to level tool body.

4. As pressure is applied, alternately tap on the front engine mounting boss, transmission shafts, and shift cam.

CAUTION:

Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. 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. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

**Shifter and Transmission**

1. Remove:
 - Guide bars ①
 - Shift forks ②
 - Shift cam ③

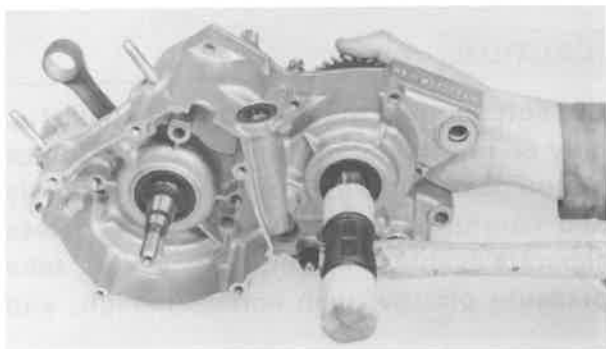
NOTE:

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

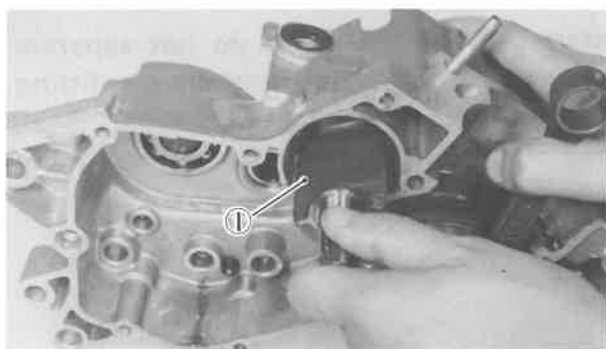
2. Install:
 - O-ring ①

**NOTE:**

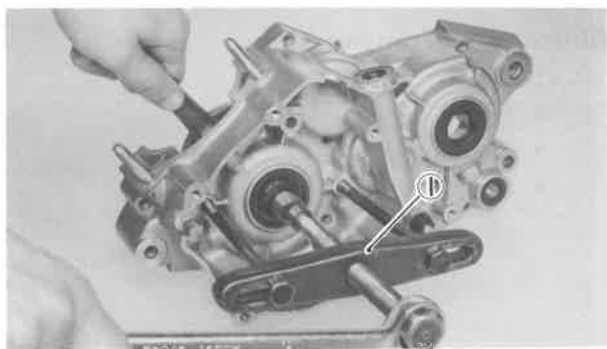
While removing the drive axle from the crankcase, pay careful attention to the oil seal lip. A recommended practice is to fit the O-ring and to apply grease over the fitted area.

**3. Remove:**

- Transmission assembly
Tap lightly on the transmission drive shaft with a soft hammer.

**4. Remove:**

- Balancer weight ①

**Crankshaft****1. Attach:**

- Crankcase Separating Tool (90890-01135)
①

2. Remove:

- Crankshaft

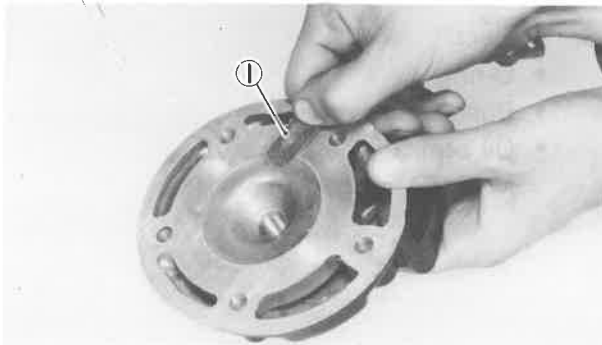
**INSPECTION AND REPAIR****Cylinder Head**

1. Remove:

- Carbon deposits
Use a rounded scraper ①.

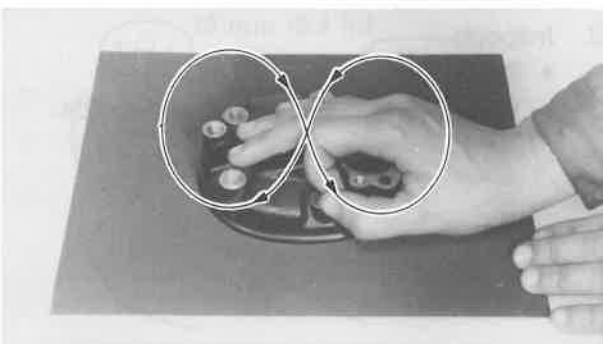
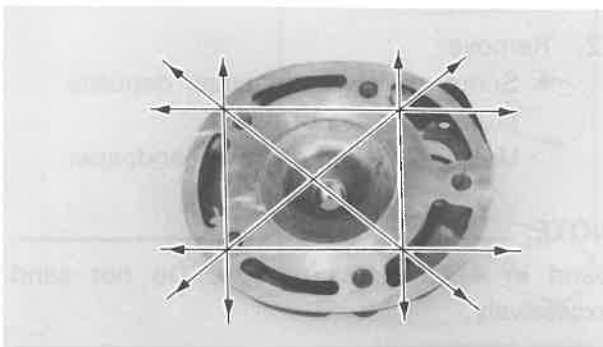
NOTE:

Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the aluminum.



2. Inspect:

- Cylinder head water jacket Crust of minerals/Rust → Remove.
- Cylinder head warpage out of specification → Re-surface.

**Warpage Measurement and Re-surfacing Steps:**

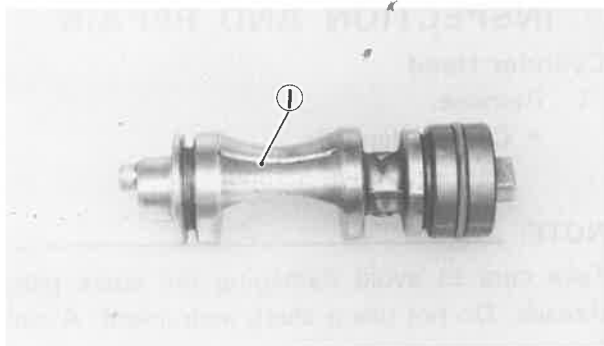
- Attach a straight edge and a thickness gauge on the cylinder head.
- Measure the warpage limit.

Warpage Limit:**0.03 mm (0.0012 in)**

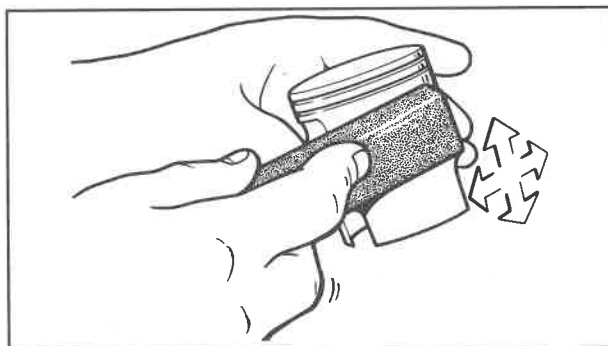
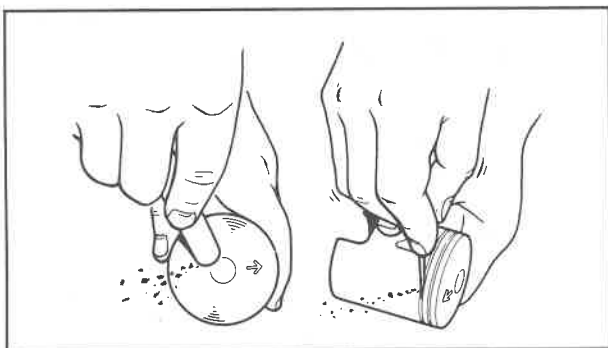
- If the warpage is out of specification, re-surface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and re-surface the head using a figure-eight sanding pattern.

NOTE:

Rotate the head several times to avoid removing too much material from one side.

**Power Valve**

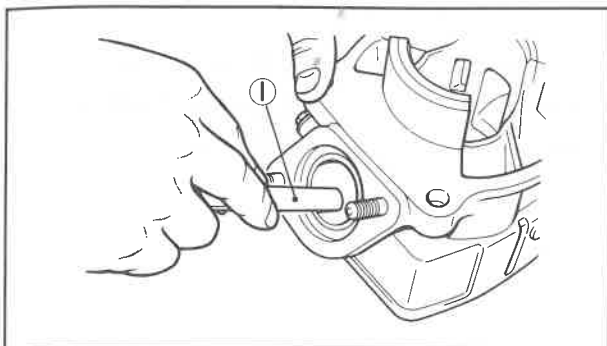
1. Remove:
 - Carbon deposits
From exhaust port surface.
2. Remove:
 - Score marks and lacquer deposits
From curved surface (especially cleaning groove ①).
3. Inspect:
 - O-ring
 - Bush
 - Oil seal
Wear/Damage → Replace.

**Piston**

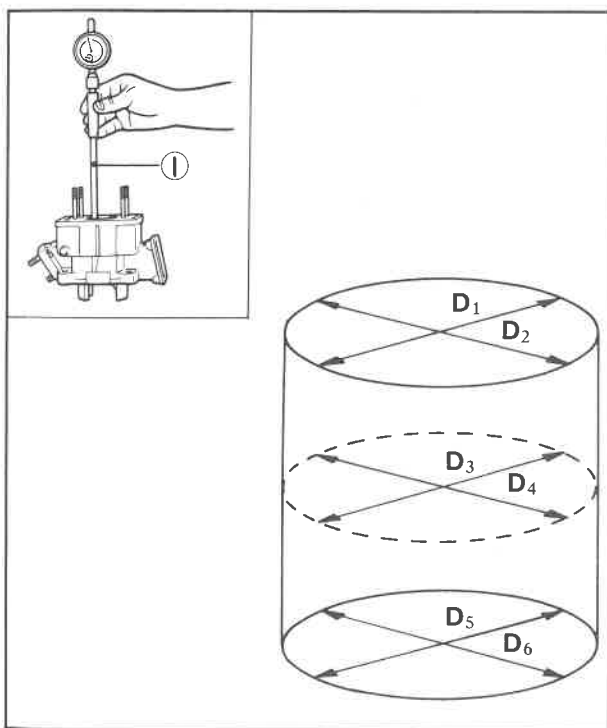
1. Remove:
 - Carbon deposits
From the piston crown and ring grooves.
2. Remove:
 - Score marks and lacquer deposits
From the sides of piston.
Use a 600 ~ 800 grit wet sandpaper.

NOTE: _____
 Sand in a crisscross pattern. Do not sand excessively.

3. Inspect:
 - Piston wall
Wear/Scratches/Damage → Replace.

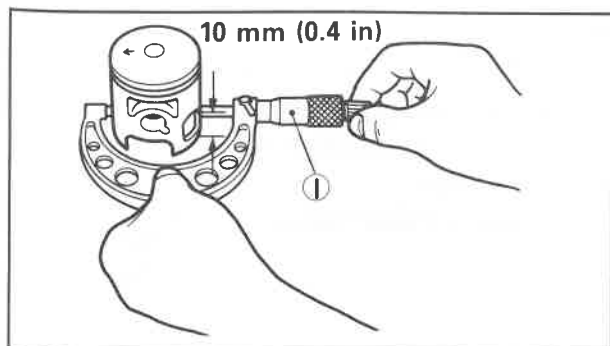
**Cylinder**

1. Remove:
 - Carbon deposits
Use a rounded scraper ①.
2. Inspect:
 - Cylinder water jacket
Crust of minerals / Rust → Remove.
 - Cylinder wall
Wear/Scratches → Rebore or replace.



3. Measure:
 - Cylinder bore "C"
Out of specification → Rebore.
Use a Cylinder Bore Gauge ①.

	Standard	Wear Limit
Cylinder Bore "C"	66.00 mm (2.598 in)	66.10 mm (2.602 in)
Taper "T"	—	0.08 mm (0.003 in)
Out of Round "R"	—	0.05 mm (0.002 in)
C = Maximum D T = (Maximum D₁ or D₂) – (Minimum D₅ or D₆) R = (Maximum D₁, D₃ or D₅) – (Minimum D₂, D₄ or D₆)		



4. Measure:
 - Piston outside diameter "P"
Out of specification → Replace.
Use a Micrometer ①.

NOTE: _____

Measurement should be made at a point 10 mm (0.4 in) above the bottom edge of the piston.



	Size
Standard	66.00 mm (2.598 in)
Oversize 1	66.25 mm (2.608 in)
Oversize 2	66.50 mm (2.618 in)

5. Measure:

- Piston Clearance
Out of specification → Rebore cylinder or replace piston.

**Piston Clearance:**

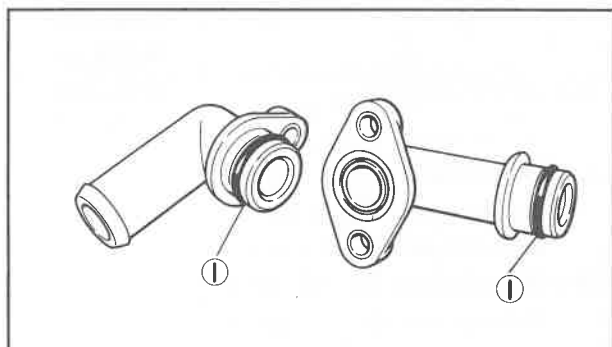
0.060 ~ 0.065 mm
(0.0024 ~ 0.0026 in)

$$A = C - P$$

A: Piston clearance

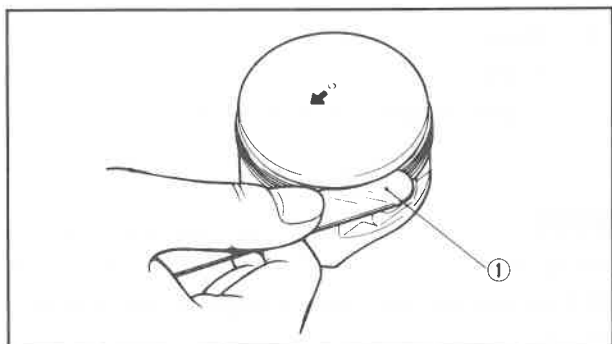
C: Cylinder bore

P: Piston outside diameter

**Radiator Pipe and Joint Pipe**

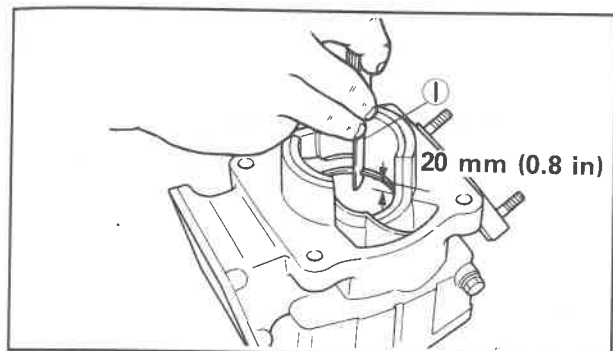
1. Inspect:

- Radiator pipe and joint pipe
Crack → Replace.
- O-ring (1)
Damage → Replace.

**Piston Rings**

1. Measure:

- Side clearance
Out of specification → Replace piston and/or rings.
Use a Feeler Gauge (1).



	Side Clearance	Top	0.03 ~ 0.05 mm (0.0012 ~ 0.0020 in)
		2nd	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)

2. Install:

- Piston ring
(Into the cylinder)
Push the ring with the piston crown.

3. Measure:

- End gap
Out of specification → Replace rings as a set.
Use a Feeler Gauge ①.

	Standard	Limit
Top Ring	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.70 mm (0.028 in)
2nd Ring	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.80 mm (0.032 in)

Oversize Piston Ring	
Oversize 1	66.25 mm (2.608 in)
Oversize 2	66.50 mm (2.618 in)

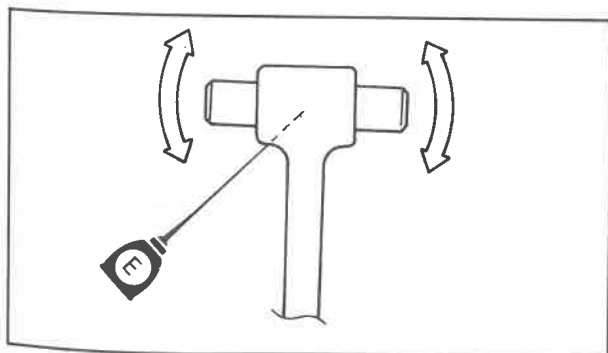
Piston Pin and Bearing

1. Lubricate:

- Piston Pin (lightly)

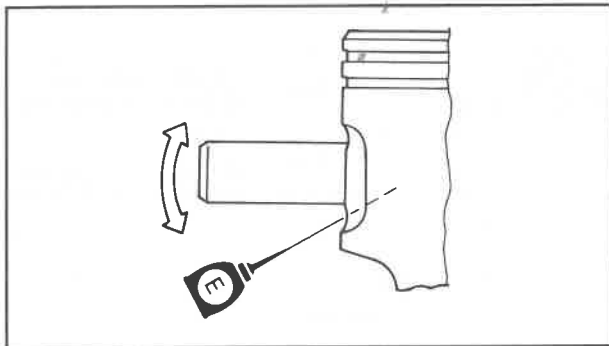
2. Install:

- Piston pin
(Into the small end of connecting rod)



3. Check:

- Free play
There should be no noticeable for the play.
Free play exists → Inspect the connecting rod for wear / Replace the pin and/or connecting rod as required.



4. Install:
 - Piston Pin
(Into the piston pin hole).
5. Check:
 - Free play (when the piston pin is in place in the piston)
There should be no noticeable for the play.

Free play exists → Replace piston pin and/or piston.

6. Inspect:
 - Piston pin and bearing
Signs of heat discoloration → Replace.

Autolube Pump

Wear or an internal malfunction may cause pump output to vary from the factory setting. This situation is, however, extremely rare. If improper output is suspected, inspect the following:

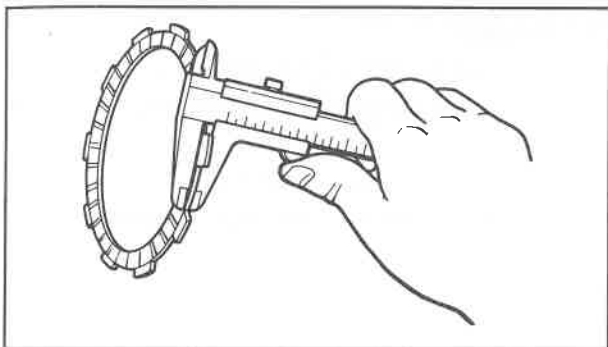
1. Inspect:
 - Delivery line
Obstructions → Blow out.
 - Pump body seal/Crankcase cover seal
Wear/Damage → Replace
 - Check ball/Spring
Miss/Improper → Repair.
2. Inspect:
 - Allowing air
Air exists → Air bleed.
3. Check:
 - Pump output
Out of specification → Adjust.

**Minimum Output/200 Stroke:**

0.88 ~ 1.01 cm³ (0.031 ~ 0.036 Imp oz,
0.030 ~ 0.034 US oz)

Maximum Output/200 Stroke:

4.65 ~ 5.15 cm³ (0.164 ~ 0.181 Imp oz,
0.157 ~ 0.174 US oz)

**Clutch**

1. Inspect:

- Friction plate

Damage/Wear → Replace friction plate as a set.

2. Measure:

- Friction plate thickness

Out of specification → Replace friction plate as a set.

Measure at all four point.

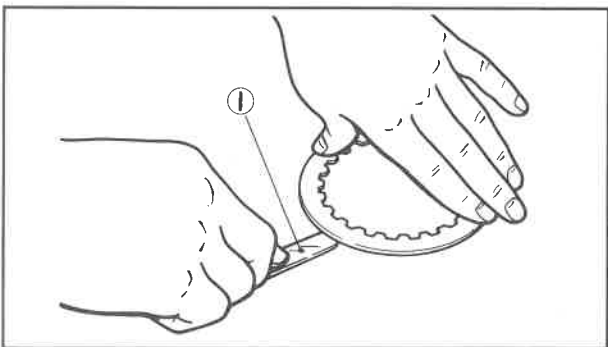


Wear Limit: 2.7 mm (0.11 in)

3. Inspect:

- Clutch plate

Damage → Replace clutch plate as a set.



4. Measure:

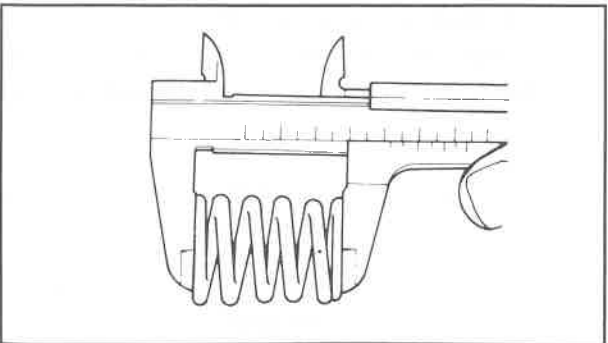
- Clutch plate warpage

Out of specification → Replace clutch plate as a set.

Use a surface plate and feeler gauge ①.



Warp Limit: 0.05 mm (0.002 in)



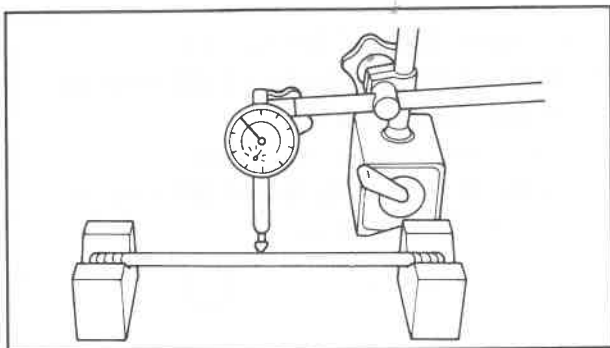
5. Measure:

- Clutch spring free length

Out of specification → Replace spring as a set.



**Clutch Spring Minimum Length:
30.0 mm (1.18 in)**

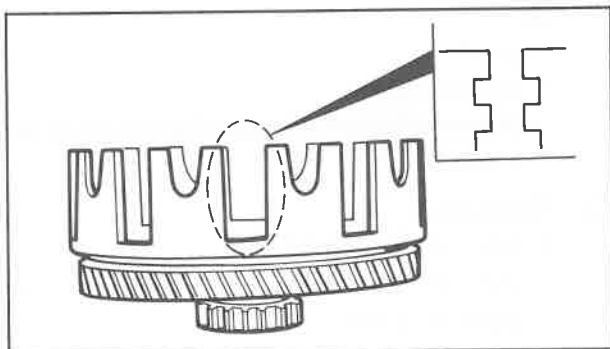


6. Measure:

- Push rod runout (long rod)
Out of specification → Replace.
Use V-Blocks and Dial Gauge (90890-03097).

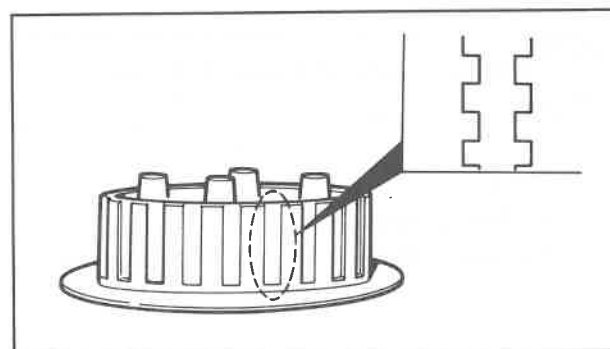


Bending Limit: 0.15 mm (0.006 in)



7. Inspect:

- Dogs on the clutch housing
Cracks/Wear/Damage → Deburr or replace.
- Clutch housing bearing
Chafing/Wear/Damage → Replace.



8. Inspect:

- Clutch boss splines
Scoring/Wear/Damage → Replace clutch boss.

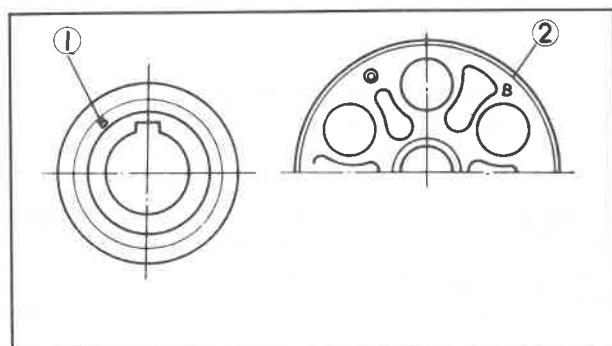
NOTE: _____

Scoring on the clutch boss splines will cause erratic operation.

Primary Drive

1. Inspect:

- Drive gear and driven gear
Pitting/Wear/Damage → Replace.



2. It is always advisable to pay strict attention to the lash numbers (mark) during replacement. Marks are scribed on the side of each gear. Match these marks.

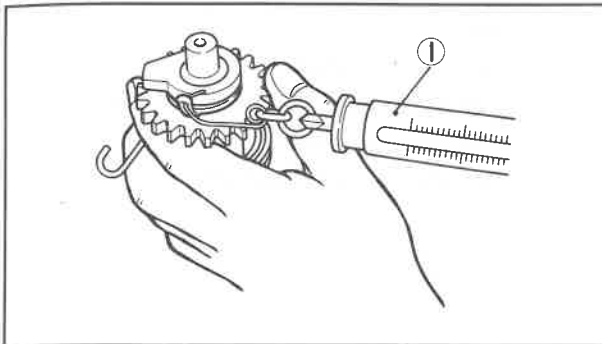
① Drive gear ② Driven gear

INSPECTION AND REPAIR

ENG



Primary Drive Gear		Primary Driven Gear		Lash Tolerance
Lash Number	Indicated Mark	Lash Number	Indicated Mark	
76 75	D	90 91	D	166 ± 1
74 73	C	92 93	C	
72 71	B	94 95	B	



Kick Starter

- Inspect:
 - Kick axle
Damage/Wear → Replace.
- Measure:
 - Kick spring tension
Out of specification → Replace.
Use a spring balance ①.

Standard Tension: 1.0 kg (2.2 lb)

CAUTION:

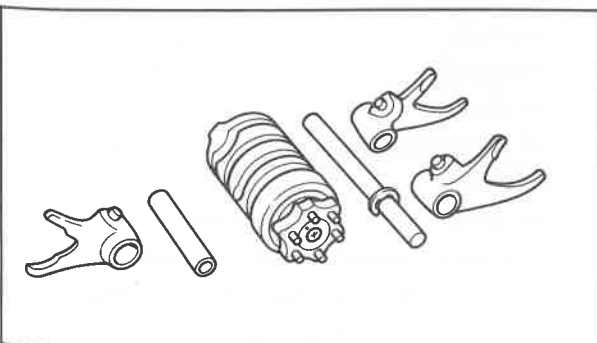
Do not try to bend the clip.

Shifter

- Inspect:
 - Shift return spring
Damage → Replace.
 - Change shaft
Damage/Bends/Wear → Replace.

Transmission

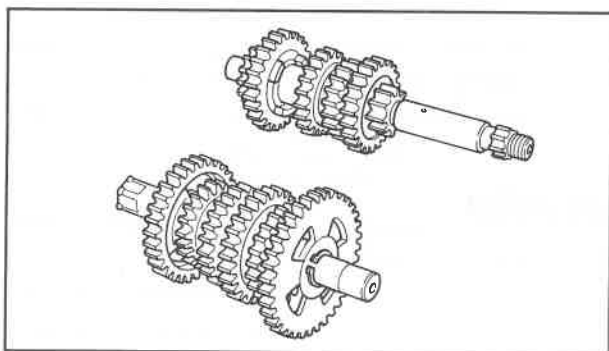
- Inspect:
 - Shift forks (Gear and shift cam contact surfaces)
Wear/Chafing/Bends/Damage → Replace.
 - Guide bars
Bends/Wear → Replace.





2. Check:
 - Shift fork movement
(on its guide bar)
Unsmooth operation → Replace
Shift fork and/or guide bar.

3. Inspect:
 - Shift cam grooves
Wear/Damage/Scratches → Replace.
 - Shift cam segment
Damage/Wear → Replace.



4. Measure:
 - Axle runout
Out of specification → Replace.
Use centering device and Dial Gauge (90890-03097).

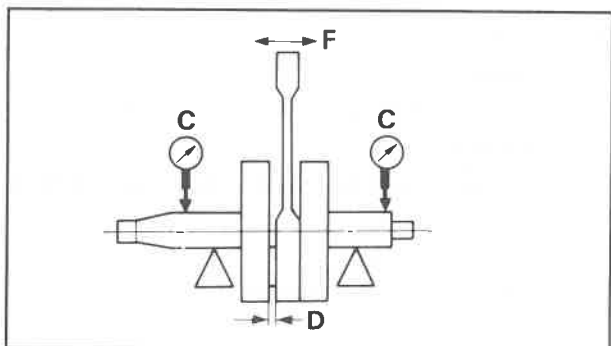


Runout Limit: 0.08 mm (0.0031 in)

5. Inspect:
 - Gears
Damage/Wear → Replace.
6. Check:
 - Gear movement
Unsmooth operation → Replace.
7. Inspect:
 - Mating dogs
Cracks/Wear/Damage → Replace.

Crankshaft

1. Measure:
 - Runout limit "C"
 - Connecting rod big end side clearance "D"
 - Small end free play limit "F"
Out of specification → Replace.
Use V-Blocks, Dial Gauge (90890-03097) and thickness gauge.





Runout Limit "C":

0.03 mm (0.0012 in)

Connecting Rod Big End Side
Clearance "D":

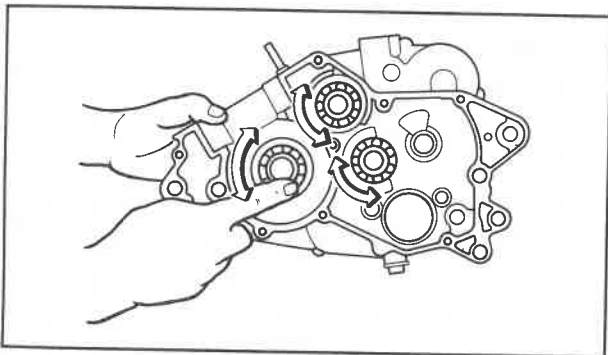
0.4 ~ 0.7 mm (0.016 ~ 0.028 in)

Small End Free Play Limit "F":

2 mm (0.08 in)

Tachometer Gear

1. Inspect:
 - Drive and driven gear
Damage/Wear → Replace.
2. Check:
 - Gear movement
Unsmooth operation → Replace.



Bearings and Oil Seals

1. Inspect:
 - Bearings
Pitting/Damage → Replace.
 - Oil seal lips
Damage/Wear → Replace.

Crankcase

1. Thoroughly wash the case halves in mild solvent.
2. Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
3. Inspect:
 - Crankcase
Cracks/Damage → Replace.
 - Oil delivery passages
Clog → Blow out with compressed air.

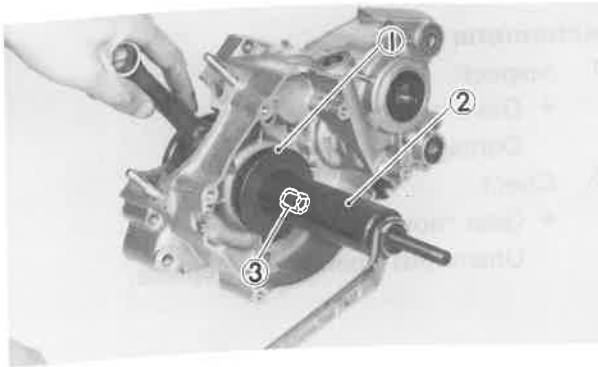


ENGINE ASSEMBLY AND ADJUSTMENT

Crankshaft

CAUTION:

To protect the crankshaft against scratches



or to facilitate the operation of the installation.

Apply the grease to the oil seal lips, and apply the engine oil to each hearing.

1. Attach:
 - Crankshaft Installing Tool
(90890-01274 ①, 90890-01275 ② and 90890-01278 ③)

2. Install:
 - Crankshaft

NOTE:

Hold the connecting rod at top dead center with one hand while turning the nut of the Installing Tool with the other. Operate the Installing Tool until the crankshaft bottoms against the bearing.

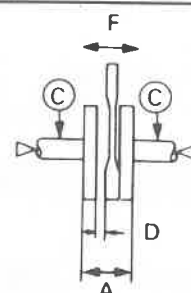


CRANKSHAFT/PISTON/BALANCER

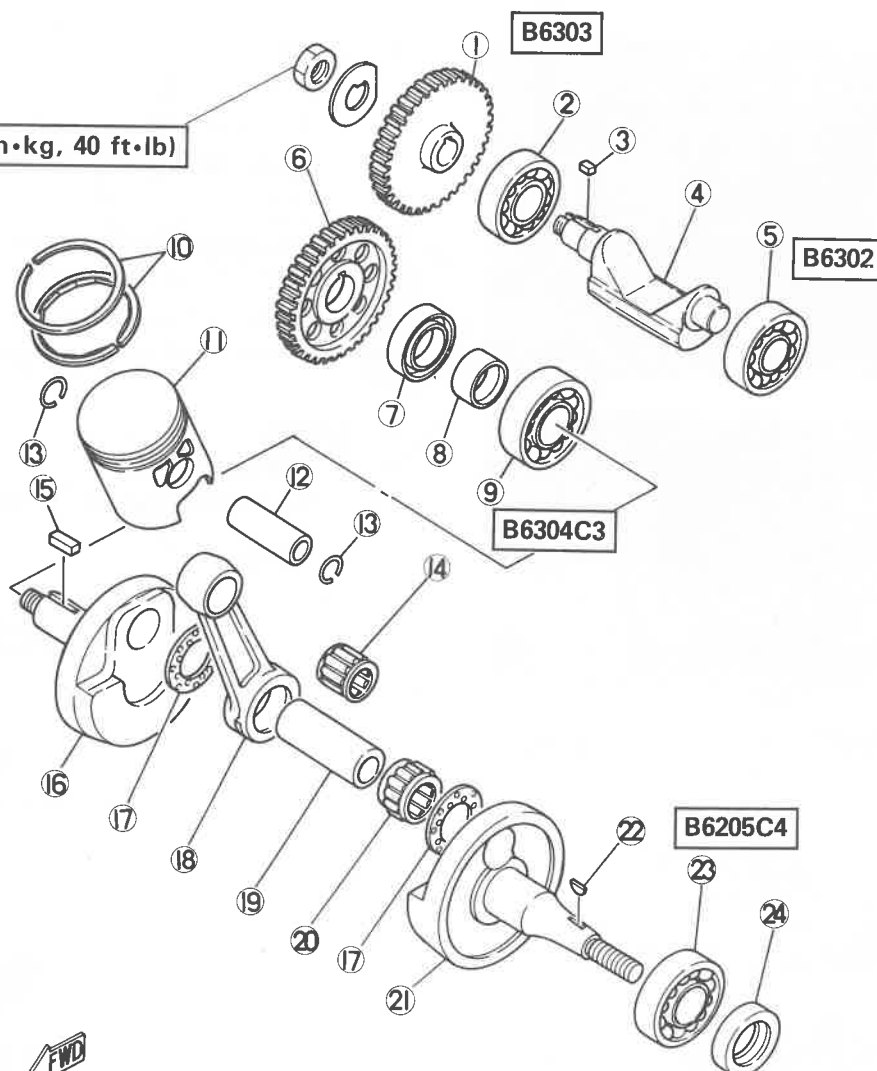
- | | | |
|-------------------|-----------------------|-----------------------|
| ① Balancer gear | ⑩ Piston ring set | ⑲ Crank pin |
| ② Bearing | ⑪ Piston | ⑳ Cylindrical bearing |
| ③ Straight key | ⑫ Piston pin | ㉑ Crank (Left) |
| ④ Balancer weight | ⑬ Piston pin clip | ㉒ Woodruff key |
| ⑤ Bearing | ⑭ Cylindrical bearing | ㉓ Bearing |
| ⑥ Drive gear | ⑮ Straight key | ㉔ Oil seal |
| ⑦ Oil seal | ⑯ Crank (Right) | |
| ⑧ Collar | ⑰ Washer | |
| ⑨ Bearing | ⑱ Connecting rod | |

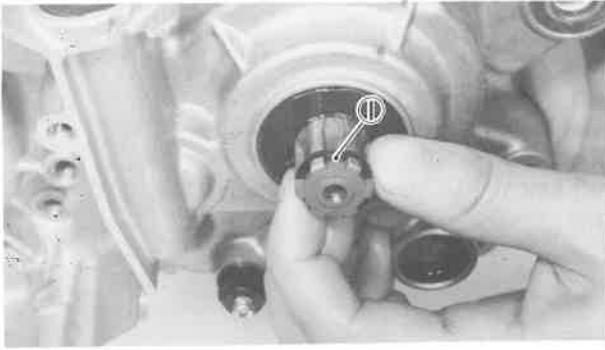
A	PISTON TO CYLINDER CLEARANCE: 0.060 ~ 0.065 mm (0.0024 ~ 0.0026 in)
B	END GAP (INSTALLED): 0.30 ~ 0.45 mm (0.012 ~ 0.018 in)

C CRANKSHAFT:	
A:	58.00 $\begin{smallmatrix} -0.05 \\ -0.10 \end{smallmatrix}$ mm (2.283 $\begin{smallmatrix} -0.0020 \\ -0.0040 \end{smallmatrix}$ in)
C:	0.03 mm (0.0012 in)
D:	0.4 ~ 0.7 mm (0.016 ~ 0.028 in)
F:	2 mm (0.08 in)



55 Nm (5.5 m·kg, 40 ft·lb)





Shifter and Transmission

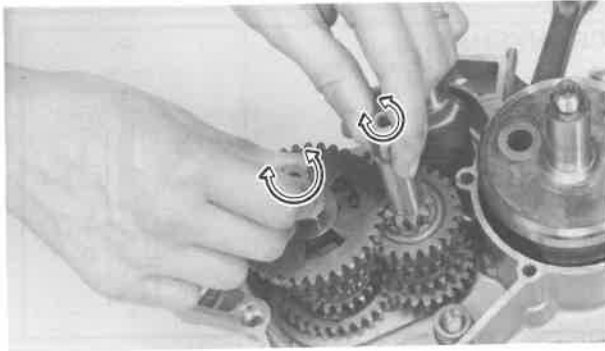
1. Install:

- Balancer weight
- Transmission assembly

NOTE:

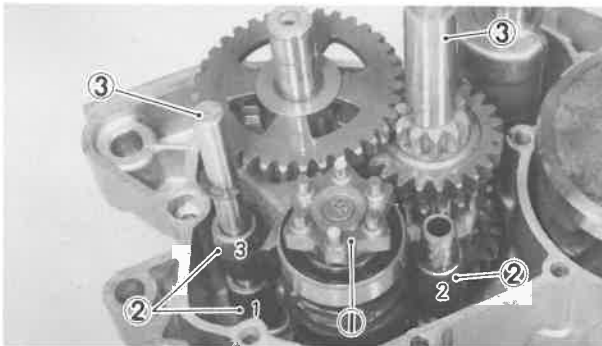
While installing the drive axle into the crankcase, pay careful attention to the oil seal lip. A recommended practice is to fit the O-ring ①

and apply grease over the fitted area.



2. Check:

- Transmission operation
- Unsmooth operation → Repair.

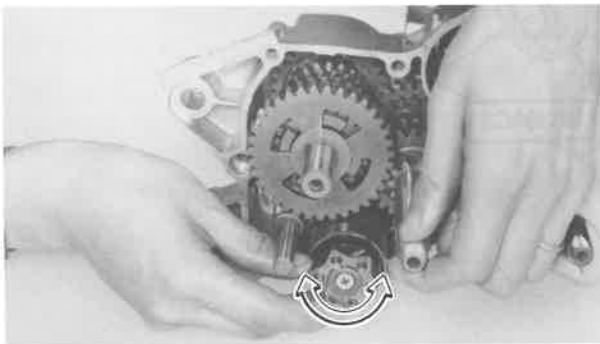


3. Install:

- Shift cam ①
- Shift forks ②
- Guide bars ③

NOTE:

Each shift forks is identified by a number cast on its side. All the numbers should face the left side.



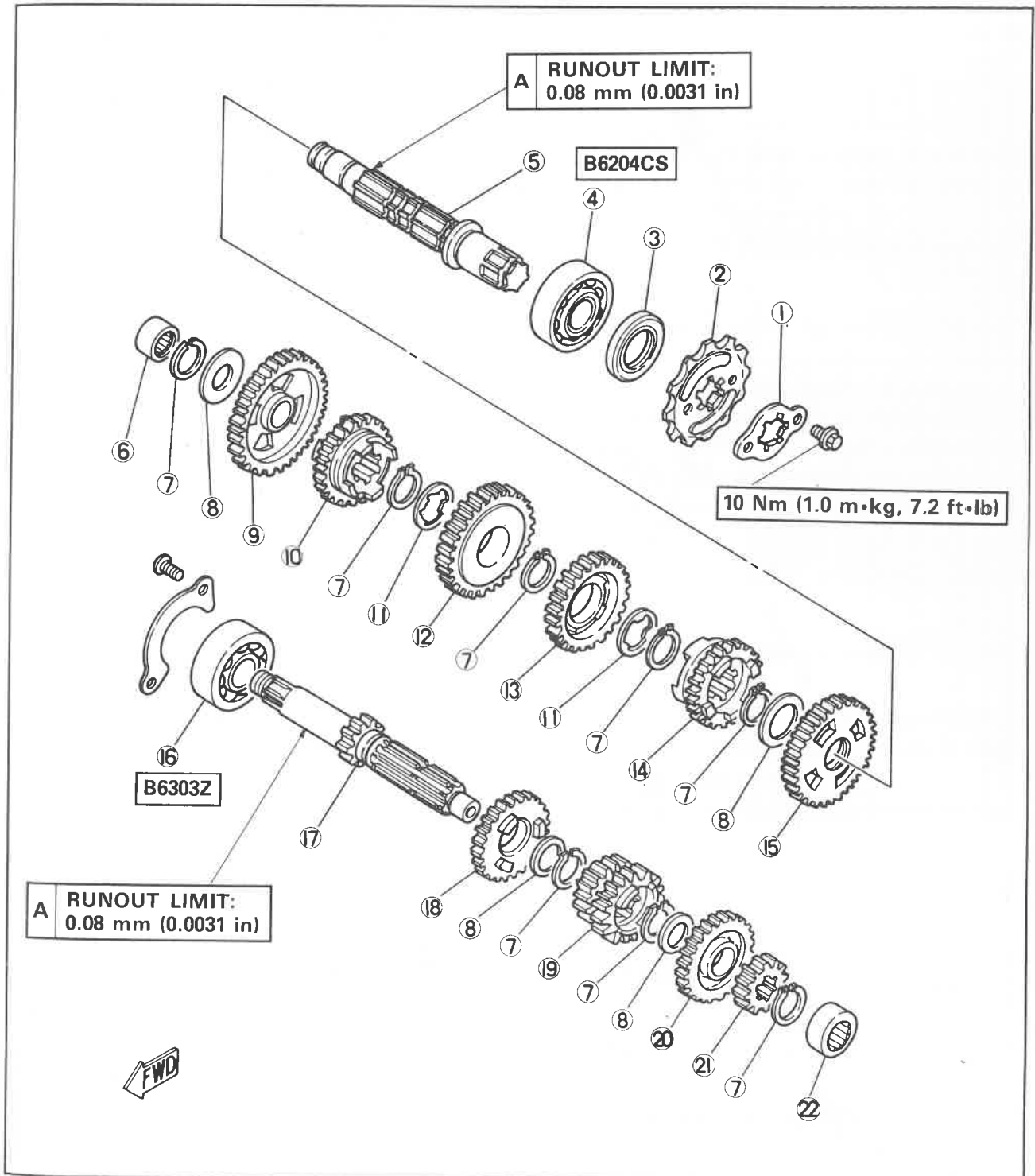
4. Check:

- Shifter operation
- Unsmooth operation → Repair.



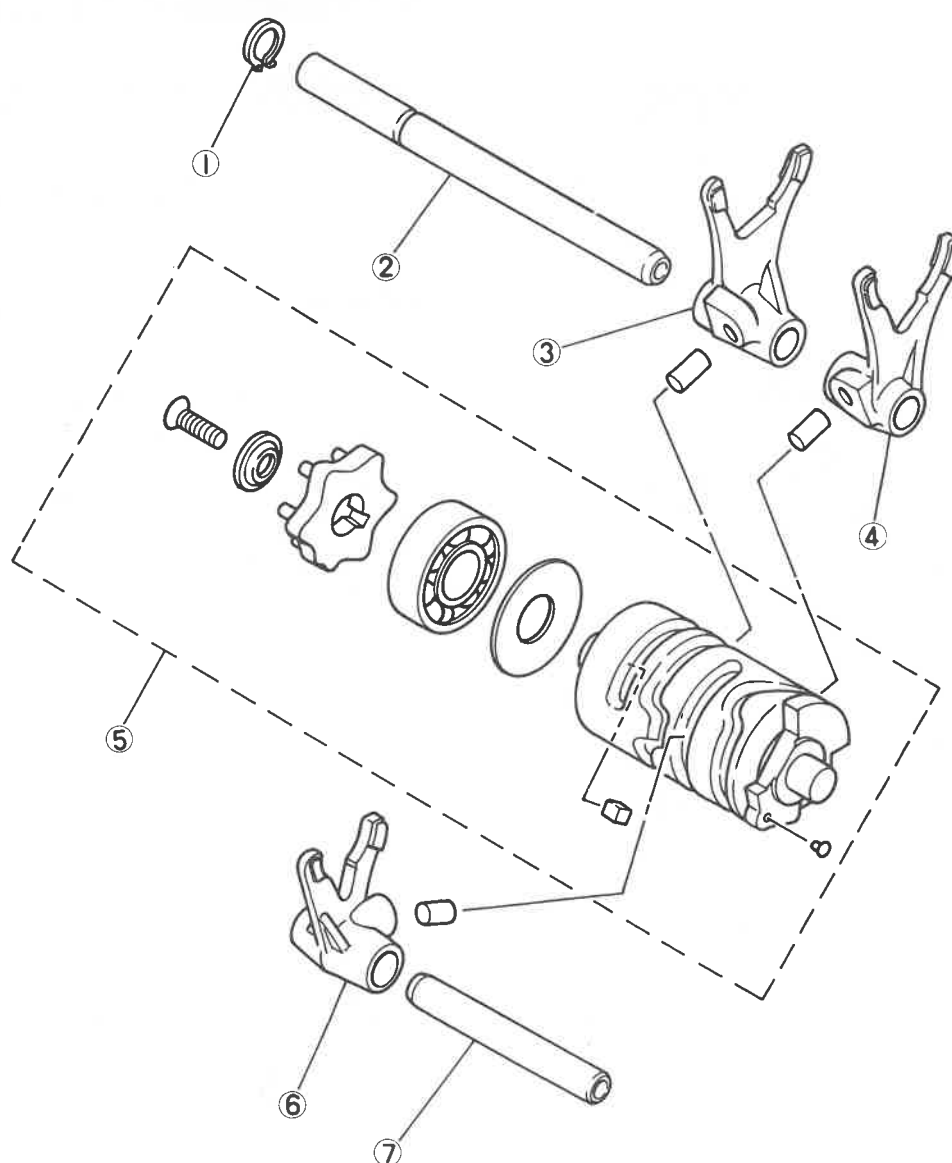
TRANSMISSION

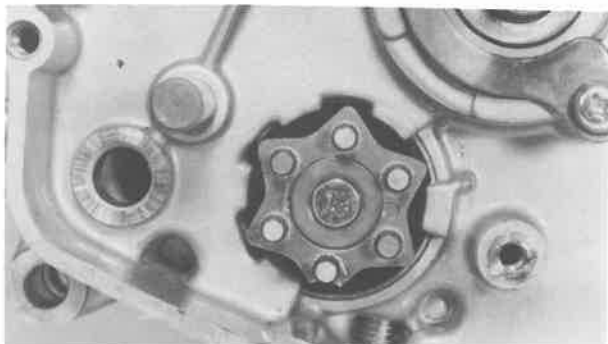
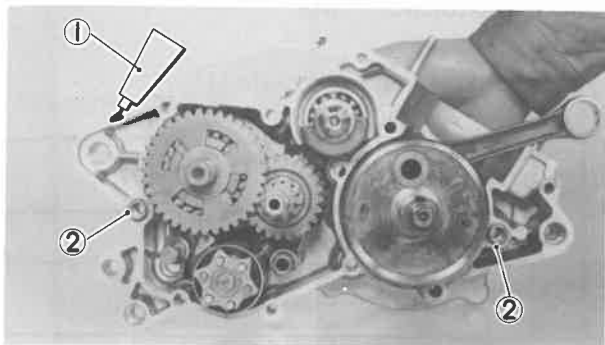
- | | | |
|------------------------|-------------------------|------------------------------|
| ① Holding plate | ⑩ 5th wheel gear (22T) | ⑲ 3rd pinion gear (17T, 21T) |
| ② Drive sprocket (13T) | ⑪ Special washer | ⑳ 6th pinion gear (22T) |
| ③ Oil seal | ⑫ 3rd wheel gear (24T) | ㉑ 2nd pinion gear (16T) |
| ④ Bearing | ⑬ 4th wheel gear (24T) | ㉒ Cylindrical bearing |
| ⑤ Drive axle | ⑭ 6th wheel gear (18T) | |
| ⑥ Cylindrical bearing | ⑮ 2nd wheel gear (30T) | |
| ⑦ Circlip | ⑯ Bearing | |
| ⑧ Plain washer | ⑰ Main axle (11T) | |
| ⑨ 1st wheel gear (35T) | ⑱ 5th pinion gear (23T) | |



**SHIFTER**

- ① Circlip
- ② Guide bar 1
- ③ Shift fork (#3)
- ④ Shift fork (#1)
- ⑤ Shift cam assembly
- ⑥ Shift fork (#2)
- ⑦ Guide bar 2





Crankcase

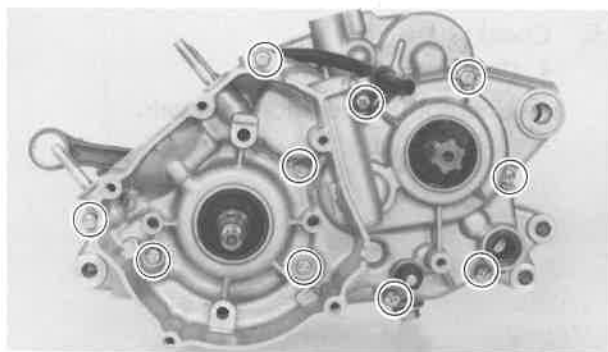
1. Apply:
 - Yamaha Bond #4 (90890-05143) ①
To the mating surfaces of both case halves.
2. Install:
 - Dowel pins ②
3. Fit the left crankcase onto the right case. Tap lightly on the case with a soft hammer.

NOTE:

Turn the shift cam to the position shown in the figure so that it does not contact the crankcase when installing the crankcase.

CAUTION:

Before installing and torquing the crankcase holding screws, be sure to check whether the transmission is functioning properly by manually rotating the shift cam either way.



4. Tighten:
 - Crankcase holding screws

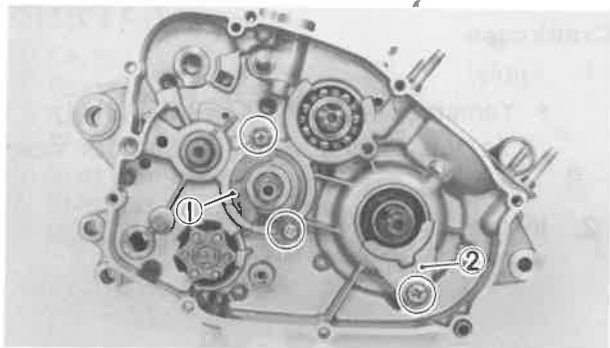
NOTE:

Tighten the crankcase holding screws in stage, using a crisscross pattern.



8 Nm (0.8 m•kg, 5.8 ft•lb)

5. Apply:
 - 2-stroke oil
To the crank pin, bearing and oil delivery hole.
6. Check:
 - Crankshaft and transmission operation
Unsmooth operation → Repair.

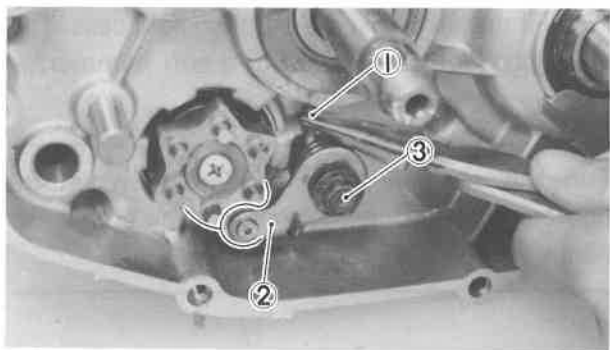
**Bearing Stopper Plate**

1. Install:

- Bearing stopper plate ①
- Apply LOCTITE®.

**10 Nm (1.0 m•kg, 7.2 ft•lb)**

- Oil seal stopper plate ②

**16 Nm (1.6 m•kg, 11 ft•lb)****Change Shaft**

1. Install:

- Spring ①
- Stopper lever ②
- Securing bolt ③

2. Set the stopper lever and torsion spring as properly position.

3. Tighten:

- Securing bolt
- Apply LOCTITE®.

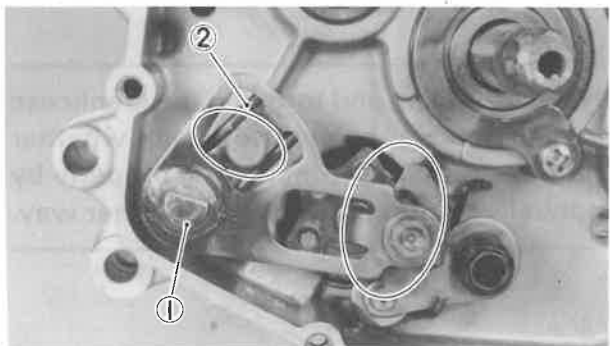
**14 Nm (1.4 m•kg, 10 ft•lb)**

4. Install:

- Change lever ①
- Spring ②

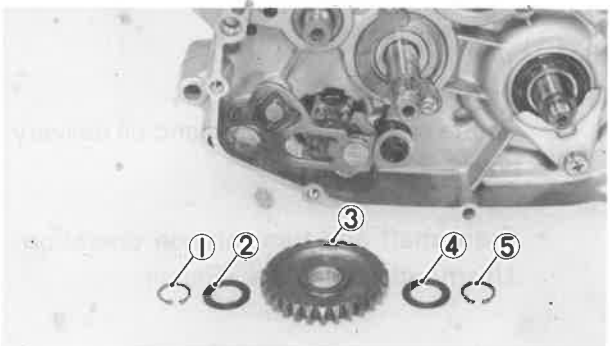
5. Check:

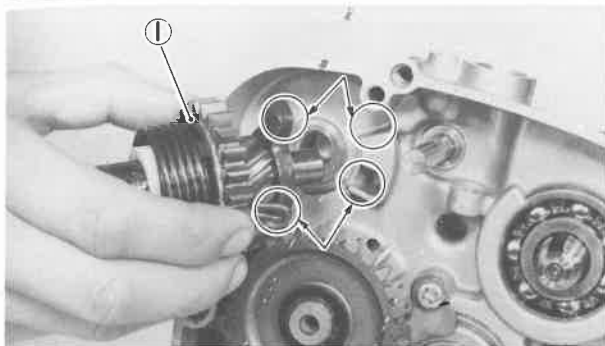
- Change operation
- Unsmooth operation → Repair.

**Kick Axle**

1. Install:

- Circlip ①
- Plain washer ②
- Kick idle gear ③
- Plain washer ④
- Circlip ⑤





2. Install
 - Kick axle assembly ①
 Rotate the shaft clockwise.

NOTE:

1. Make sure that the kick stopper is stopped at the projection of the crankcase.
2. Make sure that the spring is engaged with

the crankcase hole.



3. Set the kick spring ① to the spring hook.
4. Check:
 - Kick axle operation
 Unsmooth operation → Repair.

Tachometer Gear

1. Install:
 - Tachometer drive gear
 - Tachometer driven gear
 - Stopper plate



5 Nm (0.5 m•kg, 3.6 ft•lb)


CLUTCH

- | | |
|------------------------|-------------------------|
| ① Compression spring | ⑩ Spacer |
| ② Pressure plate | ⑪ Conical spring washer |
| ③ Push plate | ⑫ Knock pin |
| ④ Clutch plate (#1) | ⑬ Push rod #1 |
| ⑤ Clutch plate (other) | ⑭ Ball |
| ⑥ Friction plate | ⑮ Push rod #2 |
| ⑦ Clutch boss | ⑯ Push lever axle |
| ⑧ Holding plate | ⑰ Primary drive gear |
| ⑨ Primary driven gear | |

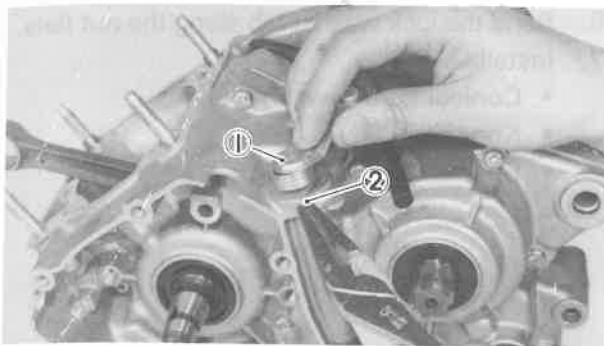
A	CLUTCH SPRING FREE LENGTH LIMIT:	
	30.0 mm (1.18 in)	
B	FRICTION PLATE WEAR LIMIT:	
	2.7 mm (0.11 in)	
C	CLUTCH PLATE WARP LIMIT:	
	0.05 mm (0.002 in)	
D	CLUTCH PLATE THICKNESS:	
	E	#1
		1.6 mm (0.068 in)
	F	OTHER
		1.2 mm (0.047 in)

6 Nm (0.6 m·kg, 4.3 ft·lb)

55 Nm (5.5 m·kg, 40 ft·lb)

80 Nm (8.0 m·kg, 58 ft·lb)



**Clutch and Primary Drive Gear**

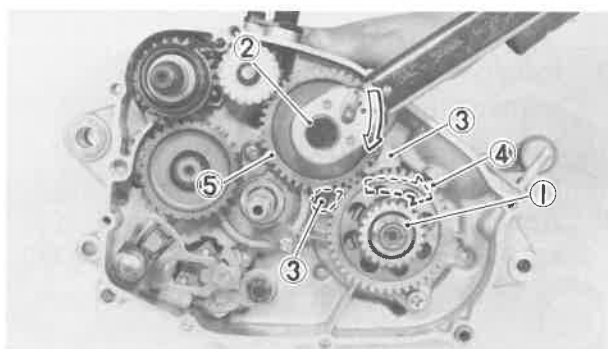
1. Install:
 - Clutch push lever axle assembly ①
2. Set the push lever axle spring ② to its position.



3. Install:
 - Balancer gear ①
 - Drive gear ②

NOTE:

Note that there is the punched mark ③ on the drive gear and punched mark ③ on the balancer gear which must be aligned to install the balancer gear.



4. Install:
 - Key (Balancer gear)
 - Lock washer (New lock washer)
 - Balancer gear nut
 - Key (Drive gear)
 - Primary drive gear
 - Spring washer
 - Primary drive gear nut

5. Tighten:
 - Primary drive gear nut ①
 - Balancer gear nut ②

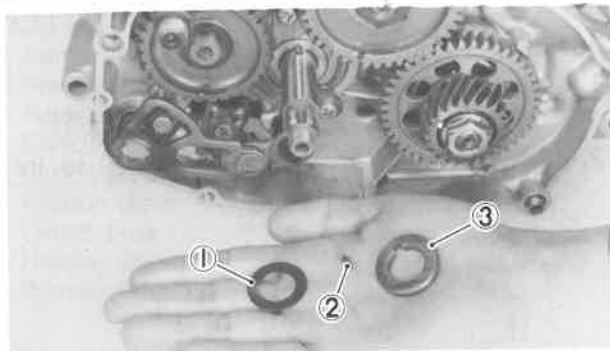
Place a folded rag ③ between the teeth of the drive gear ④ and balancer gear ⑤ to lock them.

**Primary Drive Gear Nut:**

80 Nm (8.0 m•kg, 58 ft•lb)

Balancer Gear Nut:

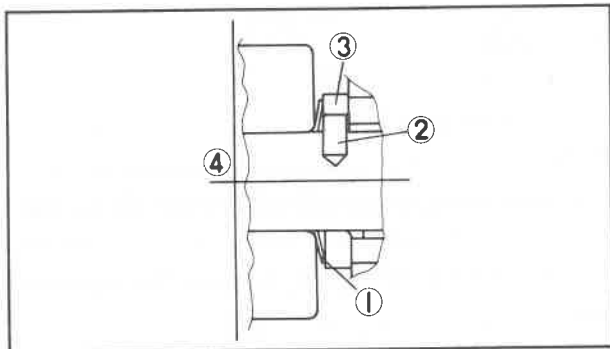
55 Nm (5.5 m•kg, 40 ft•lb)



6. Bend the lock washer tab along the nut flats.

7. Install:

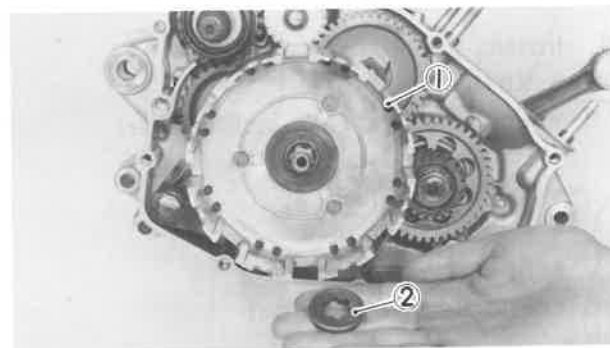
- Conical spring washer ①
- Knock pin ②
- Spacer ③



NOTE:

Be careful to install the conical spring washer in proper position as shown.

④ Crankcase side

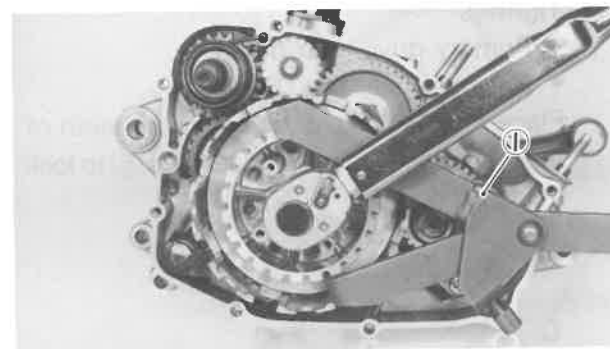


8. Install:

- Primary driven gear ①
- Holding plate ②

NOTE:

Install the primary driven gear while turning the kick idle gear, primary drive gear and balancer gear.



9. Install:

- Clutch boss
- Lock washer (New lock washer)
- Locknut

10. Attach:

- Universal Clutch Holder ① (90890-04086)
To hold the clutch boss.

11. Tighten:

- Clutch boss lock nut



55 Nm (5.5 m•kg, 40 ft•lb)

12. Bend the lock washer tab along the nut flats.



13. Install:

- Push rod #2
- Ball
- Clutch plates (#1 and other)
- Friction plates

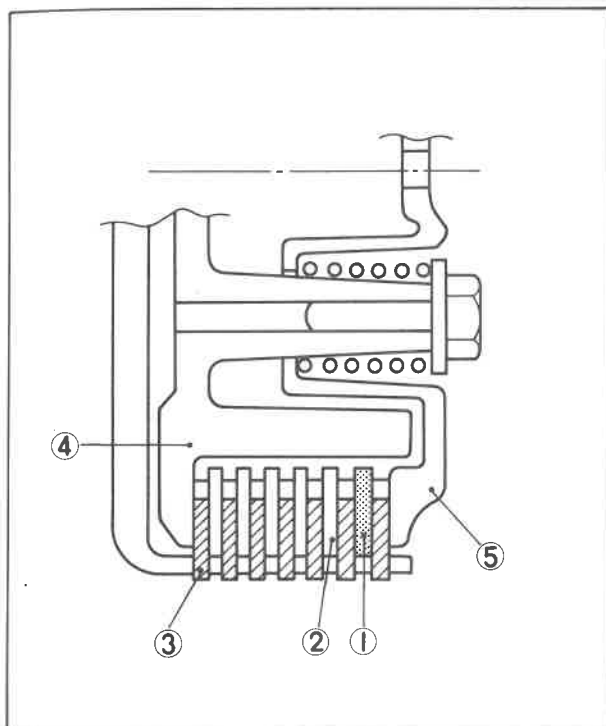
NOTE:


Install the clutch plates and friction plate alternately on the clutch boss, starting with a friction

plate and ending with a friction plate.

CAUTION:

The clutch plate (#1) ① must be installed closest to the pressure plate ⑤.



	Thickness	Quantity
Clutch plate (#1)	1.6 mm (0.063 in)	1
Clutch plate (Other)	1.2 mm (0.047 in)	5

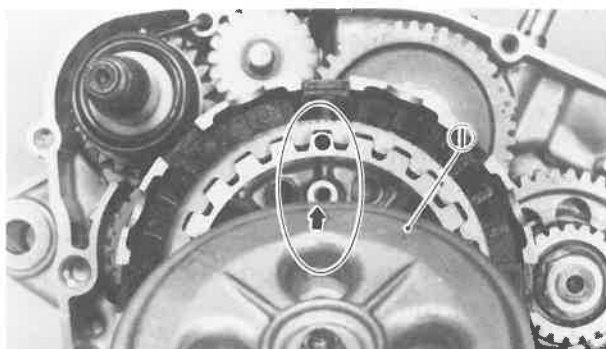
- ② Clutch plate (other)
- ③ Friction plate
- ④ Clutch boss

14. Install:

- Clutch pressure plate ①

NOTE:

Align the punched mark on the clutch boss with the arrow mark on the clutch pressure plate.



15. Install:

- Clutch springs
- Clutch spring holding screws

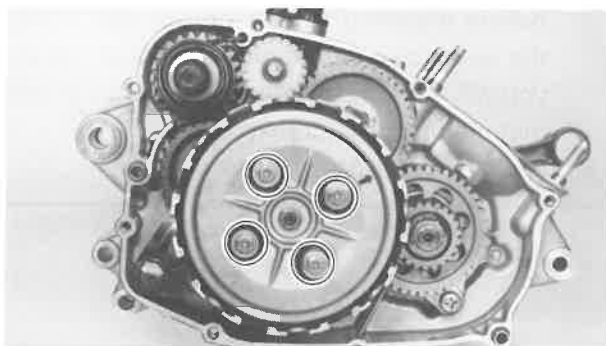


6 Nm (0.6 m•kg, 4.3 ft•lb)

16. Adjust

- Clutch mechanism free play

Refer to "CHAPTER 2. Clutch Adjustment" section.



**Crankcase Cover (Right)**

1. Install:

- Crankcase cover (Right) ①

NOTE:

Tighten the crankcase cover holding screws in stage, using a crisscross pattern.



10 Nm (1.0 m•kg, 7.2 ft•lb)

Kick Crank

1. Install:

- Kick crank

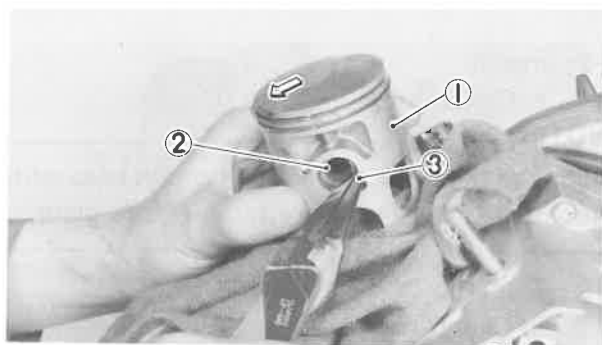


65 Nm (6.5 m•kg, 47 ft•lb)

Piston Pin and Piston

1. Apply:

- 2-stroke oil
To the piston pin, bearing, piston ring grooves and piston skirt areas.



2. Install:

- Small end bearing
- Piston ①
- Piston pin ②
- Piston pin clip ③

NOTE:

1. The arrow on the piston must point to the front of the engine.
2. Before installing the piston pin clip, cover the crankcase with a clean towel or rag so you will not accidentally drop the pin clip and material into the crankcase.
3. Always use a new piston pin clip.



Reed Valve

1. Install:

- Reed valve assembly

NOTE:

Tighten the reed valve holding bolts in stage, using a crisscross pattern.

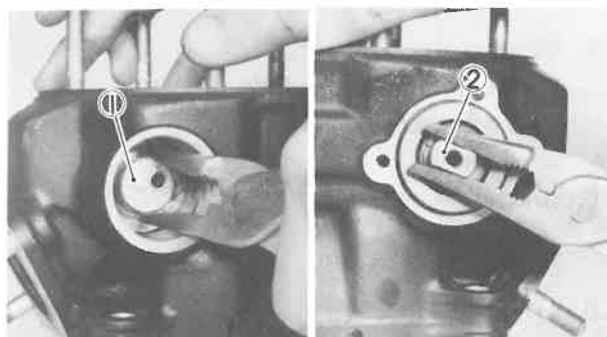


8 Nm (0.8 m•kg, 5.8 ft•lb)

Power Valve

1. Apply:

- Molybdenum disulfide grease
To the O-rings on the valve holders (Left and right.)



2. Install:

- Half power valve (Left) ①
- Half power valve (Right) ②

Insert the half valve with pliers.

3. Install:

- Hexagon socket head bolt

Hold the right end of the power valve with pliers.

- Power valve holder (Left)

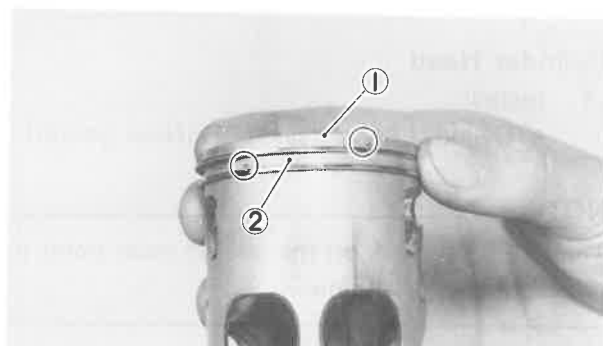


Socket Head Bolt:

6 Nm (0.6 m•kg, 4.3 ft•lb)

Valve Holder (Left):

5 Nm (0.5 m•kg, 3.6 ft•lb)



Cylinder

1. Install:

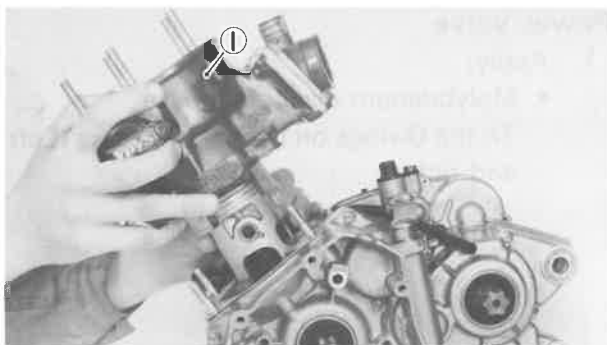
- Dowel pins
- Cylinder gasket (New gasket)

2. Offset the piston ring end gaps as shown.

- ① 1st ring
- ② 2nd ring

**NOTE:**

1. Be sure to check the manufacturer's marks or numbers stamped on the rings are on the top side of the rings.
2. Before installing the cylinder, apply a liberal coating of 2-stroke to the piston rings.

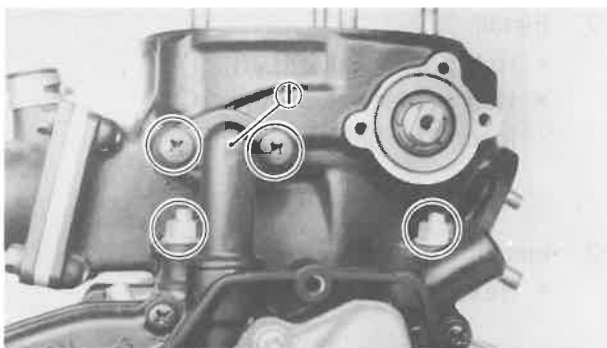


3. Install:

- Cylinder (1)

NOTE:

Install the cylinder with one hand while compressing the piston rings with the other hand.



4. Apply:

- Molybdenum disulfide grease
To the O-ring (New O-ring) of the joint pipe.

5. Install:

- Joint pipe (1)
- Cable holder (2)

6. Tighten:

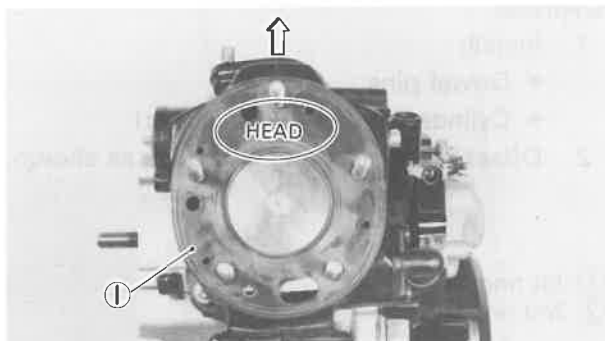
- Cylinder holding nuts
- Joint pipe holding screws

**Cylinder Holding Nuts:**

25 Nm (2.5 m•kg, 18 ft.lb)

Joint Pipe Holding Screws:

10 Nm (1.0 m•kg, 7.2 ft.lb)

**Cylinder Head**

1. Install:

- Cylinder head gasket (1) (New gasket)

NOTE:

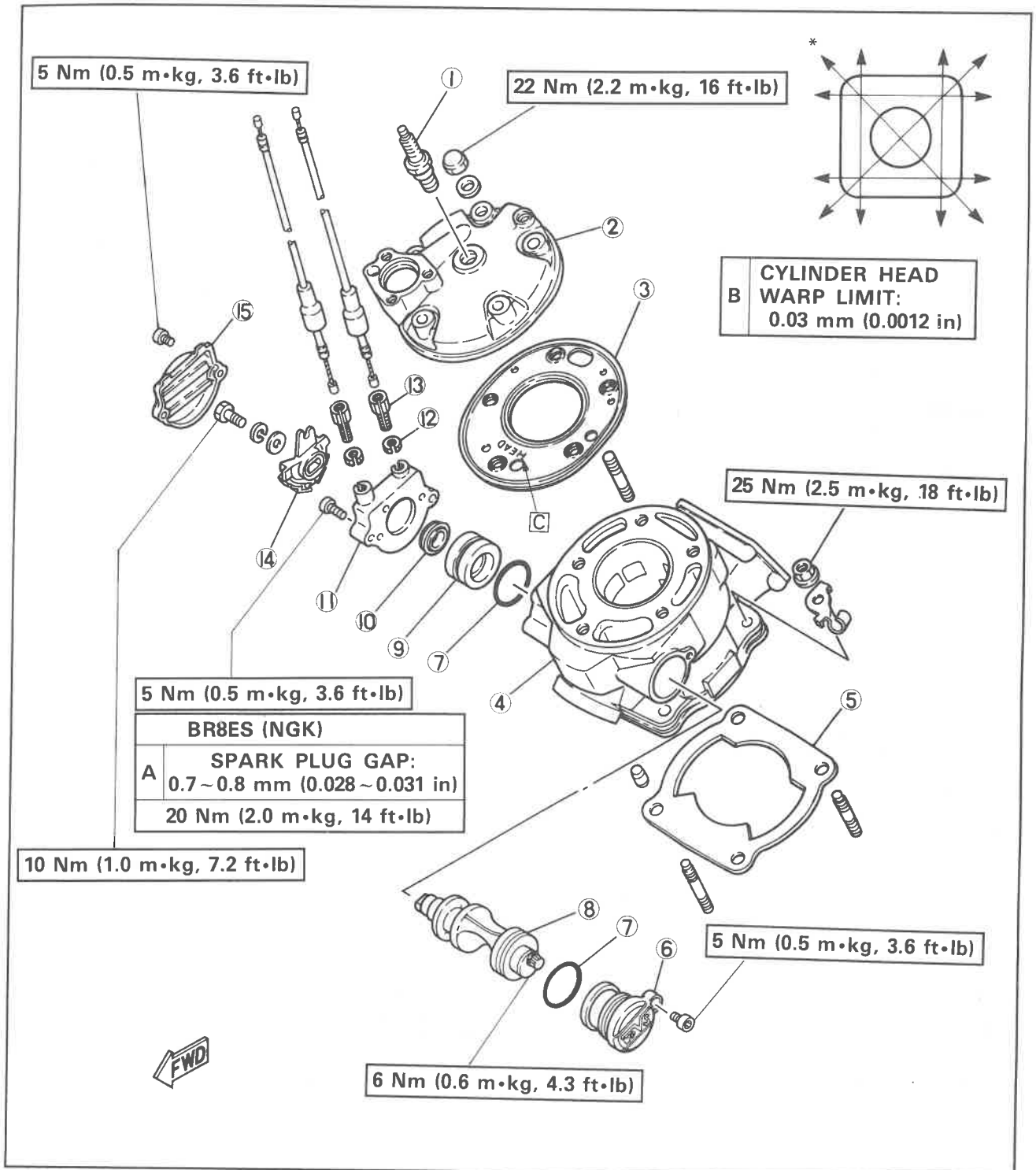
The "HEAD" mark on the gasket must point to the front of the engine.

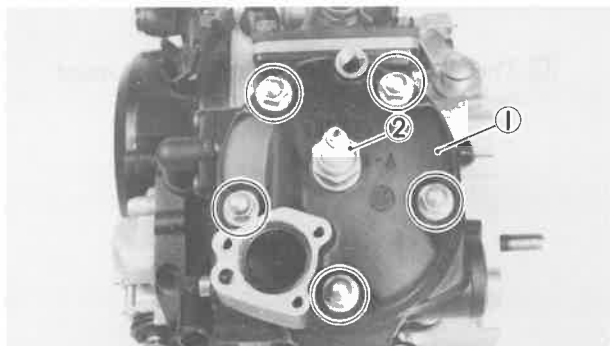


CYLINDER HEAD/CYLINDER

- | | |
|------------------------------|---------------------|
| ① Spark plug | ⑩ Oil seal |
| ② Cylinder head | ⑪ Power valve cover |
| ③ Cylinder head gasket | ⑫ Locknut |
| ④ Cylinder | ⑬ Adjuster |
| ⑤ Cylinder gasket | ⑭ Pulley |
| ⑥ Power valve holder (Left) | ⑮ Power valve cap |
| ⑦ O-ring | |
| ⑧ Power valve | |
| ⑨ Power valve holder (Right) | |

Ⓢ The "HEAD" mark on the gasket must point to the front of the engine.





2. Install:

- Cylinder head ①
- Spark plug ②

NOTE:

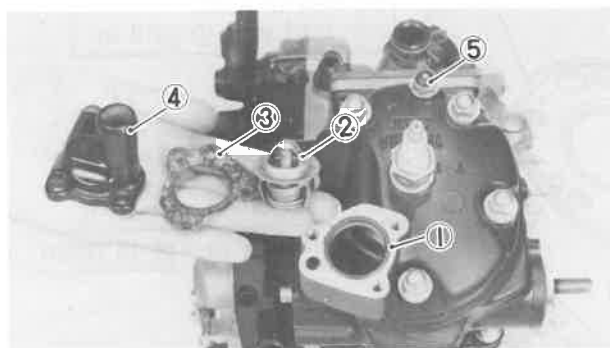
Tighten the cylinder head holding nuts in stage, using a crisscross pattern.

**Cylinder Head Holding Nuts:**

22 Nm (2.2 m•kg, 16 ft•lb)

Spark Plug:

20 Nm (2.0 m•kg, 14 ft•lb)

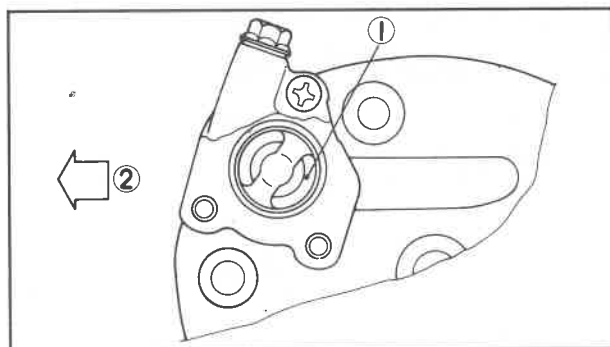


3. Install:

- O-ring ①
- Thermostatic valve ②
- Gasket ③
- Thermostatic valve cover ④
- Thermo-unit ⑤

NOTE:

The thermostatic valve breather hole ① must be installed in backward direction.



② F.W.D

4. Tighten:

- Thermostatic valve cover holding screws
- Thermo-unit

WARNING:

Avoid overtightening.



Thermostatic Valve Cover:
8 Nm (0.8 m•kg, 5.8 ft•lb)



Thermo-unit:
14 Nm (1.4 m•kg, 10 ft•lb)

CDI Magneto

1. Install:

- Woodruff Key
- Startor assembly



10 Nm (1.0 m•kg, 7.2 ft•lb)

2. Connect:

- Neutral switch lead

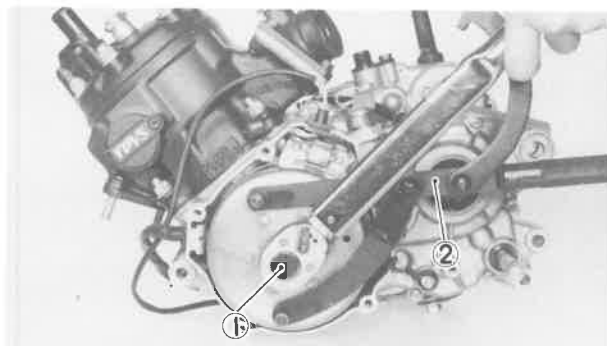
3. Install:

- CDI magneto
- Plain washer
- CDI magneto securing nut

NOTE:

When installing the CDI magneto, make sure the

woodruff key is properly seated in the key way of the crankshaft. Apply a light coating of lithium soap base grease to the tapered portion of the crankshaft end.



4. Tighten:

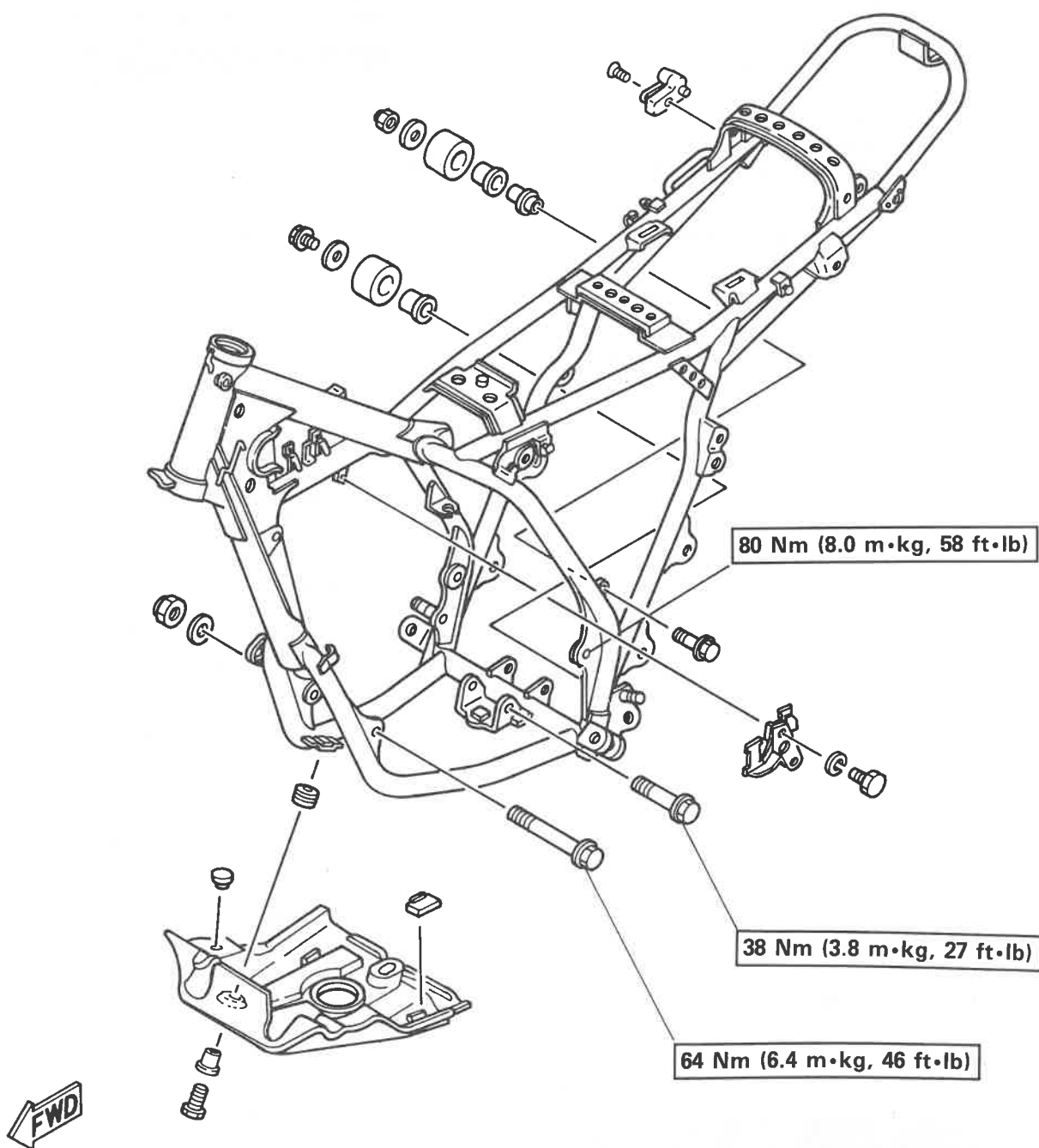
- Magneto securing nut ①
Use Rotor Holding Tool ② (90890-01235)
to lock the magneto.



83 Nm (8.3 m•kg, 60 ft•lb)



Remounting Engine





Remounting Engine

When remounting the engine, reverse the removal procedure.

Note the following points.

1. Install:
 - Engine mounting bolts
 - Pivot shaft



Engine Mounting Bolts:

Front:

64 Nm (6.4 m•kg, 46 ft•lb)

Rear:

38 Nm (3.8 m•kg, 27 ft•lb)

Pivot Shaft:

80 Nm (8.0 m•kg, 58 ft•lb)

2. Install:
 - Brake pedal assembly

NOTE:

After installing the brake pedal assembly, adjust the brake free play.

3. Install:
 - Drive chain
 - Drive sprocket
 - Holding plate
 - Securing bolts



10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

After installing the drive chain, adjust the drive chain tension.

4. Install:
 - Crankcase cover (Left)



8 Nm (0.8 m•kg, 5.8 ft•lb)



- Change pedal

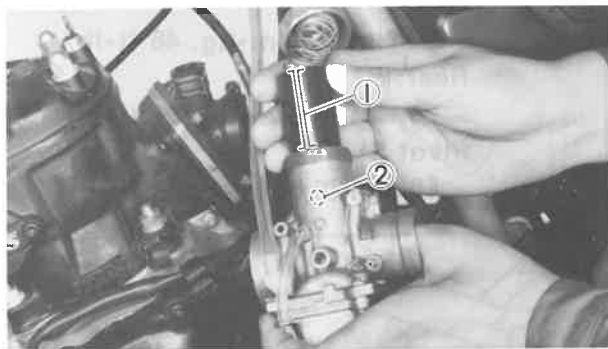


15 Nm (1.5 m•kg, 11 ft•lb)

5. Install:
- Carburetor
 - Carburetor top together with throttle valve

NOTE:

When installing the throttle valve into the carburetor, align the groove ① of the throttle valve with the projection ② of the carburetor.



6. Install/Connect:
- Power valve cover ①
 - Pulley cables ②
 - Pulley ③



Power Valve Cover:

5 Nm (0.5 m•kg, 3.6 ft•lb)

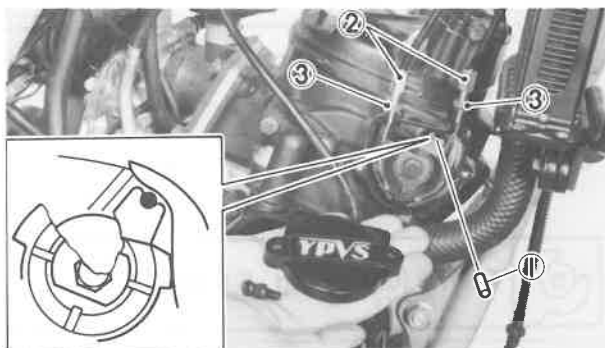
Pulley:

10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

Check to see that pulley moves freely prior to connecting the pulley cables.

7. Adjust:
- Pulley cable free play.



Cable Free Play Adjustment Steps:

- Align the ident portion on the pulley with the hole into the valve cover.
- Insert the 4 mm (0.16 in) pin ① into the hole in order to steady as well as adjust the valve.
- Turn the adjusters ② counterclockwise so that the free play becomes zero mm (zero in).



- Turn the adjusters 1/4 turn clockwise, and tighten the locknuts ③.
- Remove the pin.
- Turn on the main switch, and check that the aligning marks are aligned.
- If not aligned, repeat above steps.

8. Install:

- Power valve seal cap



5 Nm (0.5 m•kg, 3.6 ft•lb)

9. Connect:

- Clutch cable

NOTE:

After connecting the clutch cable, adjust the clutch cable free play.

10. Connect:

- Oil delivery pipe
- Oil pipe

NOTE:

After connecting the pipes, bleed the air.

11. Install:

- Oil pump cover



10 Nm (1.0 m•kg, 7.2 ft•lb)

- Exhaust pipe



18 Nm (1.8m•kg, 13 ft•lb)



12. Apply:

- Transmission oil
- Coolant

**Transmission Oil:****Total:****0.63 L (0.55 Imp qt, 0.67 US qt)****Coolant:****Radiator:****0.64 L (0.56 Imp qt, 0.68 US qt)****Reservoir Tank:****0.13 L (0.114 Imp qt, 0.137 US qt)**

13. Inspect:

- Oil leakage
- Coolant leakage



CHAPTER 4. COOLING SYSTEM

COOLANT	4-1
COOLANT REPLACEMENT	4-1
WATER PUMP	4-4
DISASSEMBLY	4-4
INSPECTION	4-5
OIL SEAL REPLACEMENT	4-6
ASSEMBLY	4-6
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REMOVAL	4-8
INSPECTION	4-9
ASSEMBLY	4-10
RADIATOR	4-10
REMOVAL	4-10
INSPECTION	4-10
ASSEMBLY	4-11



COOLING SYSTEM

COOLANT

Coolant Replacement

WARNING:

Do not remove the radiator cap when the engine and radiator are hot. Scalding hot

fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, open the radiator cap by the following procedure: Remove the radiator cover by removing the screw. Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to

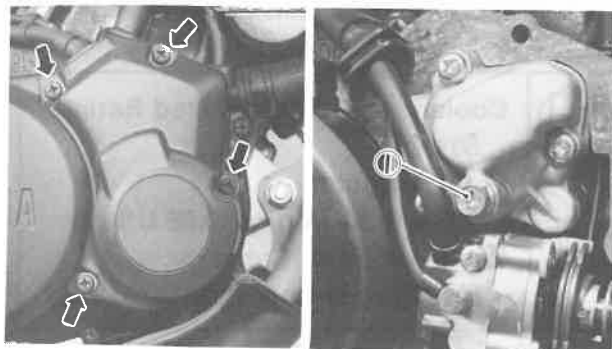
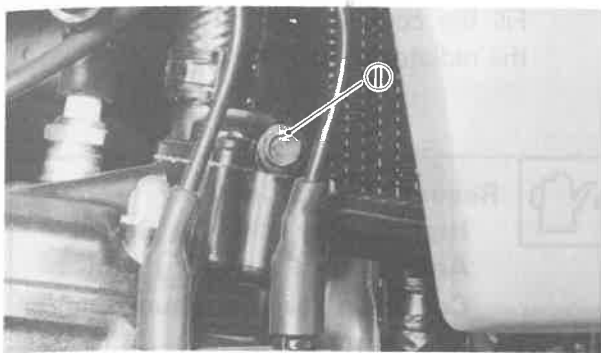
escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.



1. Place an open container under the engine.
2. Remove:
 - Radiator cover ①



3. Remove:
 - Radiator cap ①



4. Remove:
- Drain bolt ①

5. Remove:
- Oil pump cover
 - Drain bolt ①

6. Drain:
- Coolant (Completely)

NOTE:

Thoroughly flush the cooling system with clean tap water.

7. Inspect:
- Drain bolt gaskets
Damage → Replace
8. Tighten:
- Drain bolts (Cylinder and water pump cover)



**Drain Bolt (Cylinder and
Water Pump Cover):**

10 Nm (1.0 m·kg, 7.2 ft·lb)

9. Fill:
- Coolant

COOL



COOLANT

Fill the coolant into the radiator until the radiator is full.



Recommended Coolant:
High Quality Ethylene Glycol
Anti-Freeze Containing Anti-
Corrosion for Aluminum Engine
Inhibitors



Coolant and Water Mixed Ratio:
50%/50%
Total Amount:
0.64L (0.56 Imp qt, 0.68 US qt)
Reservoir Tank Capacity:
0.13L (0.114 Imp qt, 0.137 US qt)



From "LOW" to "FULL" Level:
0.11L (0.10 Imp qt, 0.12 US qt)

CAUTION:

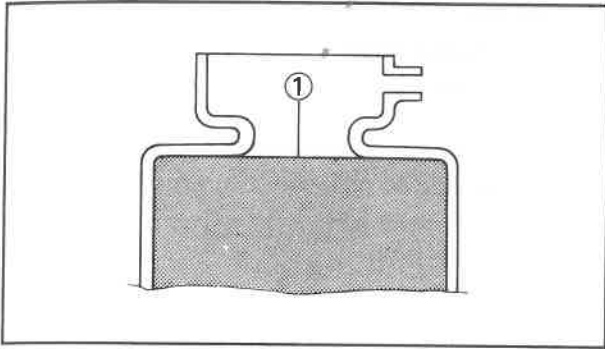
1. Hard water or salt water is harmful to the engine. You may use distilled water if you can't get soft water.
2. Do not mix more than one type of ethlen glycol antifreeze containing cor-

rosion for aluminum engine inhabitants.

10. Install:
 - Radiator cap
11. Run the engine several minutes.

WATER PUMP

COOL



12. Inspect:
 - Coolant level ① in the radiatorCoolant level low → Fill.
Fill the coolant until it reaches the top of the radiator.
13. Fill:
 - Coolant

Fill the coolant in the reservoir tank until it reaches the "FULL" level of the reservoir tank.

14. Install:
 - Radiator cover
15. Inspect:
 - Cooling systemCoolant leaks → Repair.

CAUTION:

Always check coolant level, and check for coolant leakage before starting engine.

WATER PUMP

Disassembly

NOTE:

It is necessary to disassemble the water pump, unless there is no abnormality such as excessive change in coolant temperature and/or level,

discoloration of coolant, or milky transmission oil.

1. Drain:
 - Coolant (Completely)
 - Transmission oil



2. Remove:
 - Oil pump cable
 - Oil pipe

NOTE:

Plug the oil pipe so oil will not run out of oil tank.

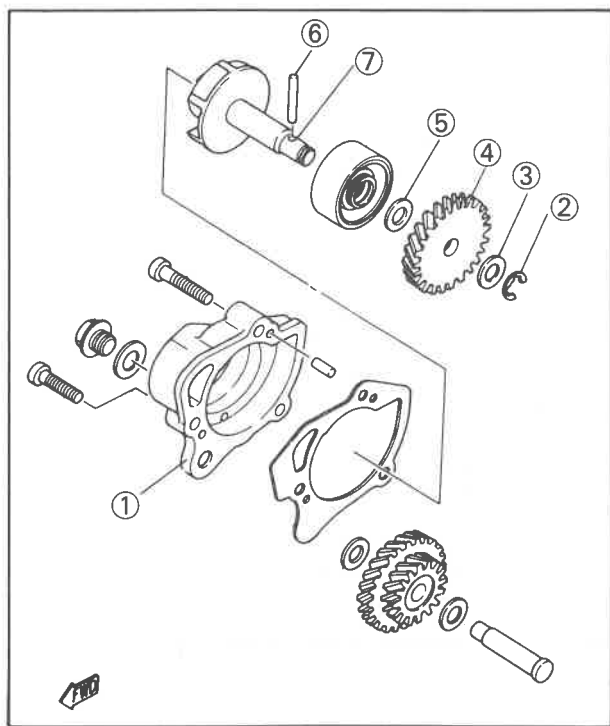
- Delivery pipe

3. Remove:
 - Joint pipe
 - Oil pump cover
 - Crankcase cover (Right)

CAUTION:

Drain the coolant out of the water pump while taking care so that it does not splash

to the Autolube pump.



4. Remove:
 - Water pump housing cover ①
 - Circlip ②
 - Plain washer ③
5. Remove:
 - Impeller shaft gear ④
 - Plain washer ⑤
 - Knock pin ⑥
6. Pull out the impeller shaft assembly ⑦.
7. Eliminate deposits from the impeller and water pump housing.

Inspection

1. Inspect:
 - Impeller
Cracks/Wear/Damage → Replace.
 - Oil seal
Wear/Damage → Replace

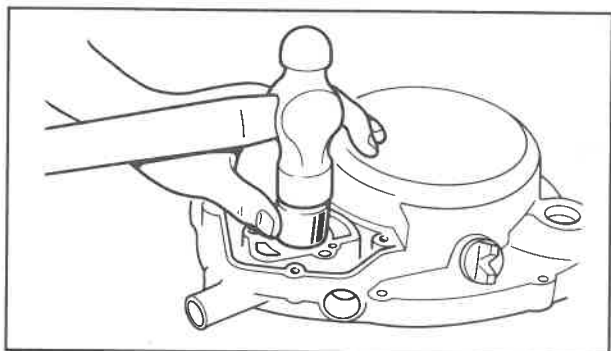
**Oil Seal Replacement**

1. Remove:
 - Oil sealTop off it from the crankcase cover.
2. Apply:
 - Lightweight lithium base grease.

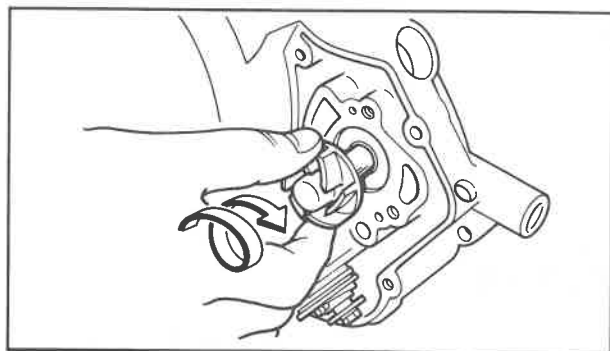
Apply a light coating of grease to oil seal lips.

3. Install:
 - Oil seal

NOTE: _____
Install the oil seal with the "WATER SIDE" mark is on the inside.



NOTE: _____
Press-fit the oil seal until they contact the bottom.

**Assembly**

1. Apply:
 - Lightweight lithium base greaseApply a grease to oil seal and impeller shaft.
2. Install:
 - Impeller shaftInstall the shaft while turning it.

NOTE: _____
Take care so that the oil seal lip is not damaged or the spring does not slip off its position.

COOL



WATER PUMP

3. Install:
 - Components in above list (Disassembly-Steps "5 and 4".)
4. Install:
 - Crankcase cover (Right)
 - Oil pump cover



**Crankcase Cover and Oil
Pump Cover:**
10 Nm (1.0 m·kg, 7.2 ft·lb)

CAUTION:

Always use a new gasket.

5. Install:
 - Joint pipe

NOTE:

When installing the joint, grease the O-rings on the joint.



10 Nm (1.0 m·kg, 7.2 ft·lb)

CAUTION:

Always use the new O-ring.

6. Install/Fill:
 - Components in above list (Disassembly-steps "2 and 1".)

CAUTION:

After warming up the engine, proceed as follows:

1. Retighten the pump cover screws to specification.
2. Check for coolant leakage, particularly leakage into the transmission case.

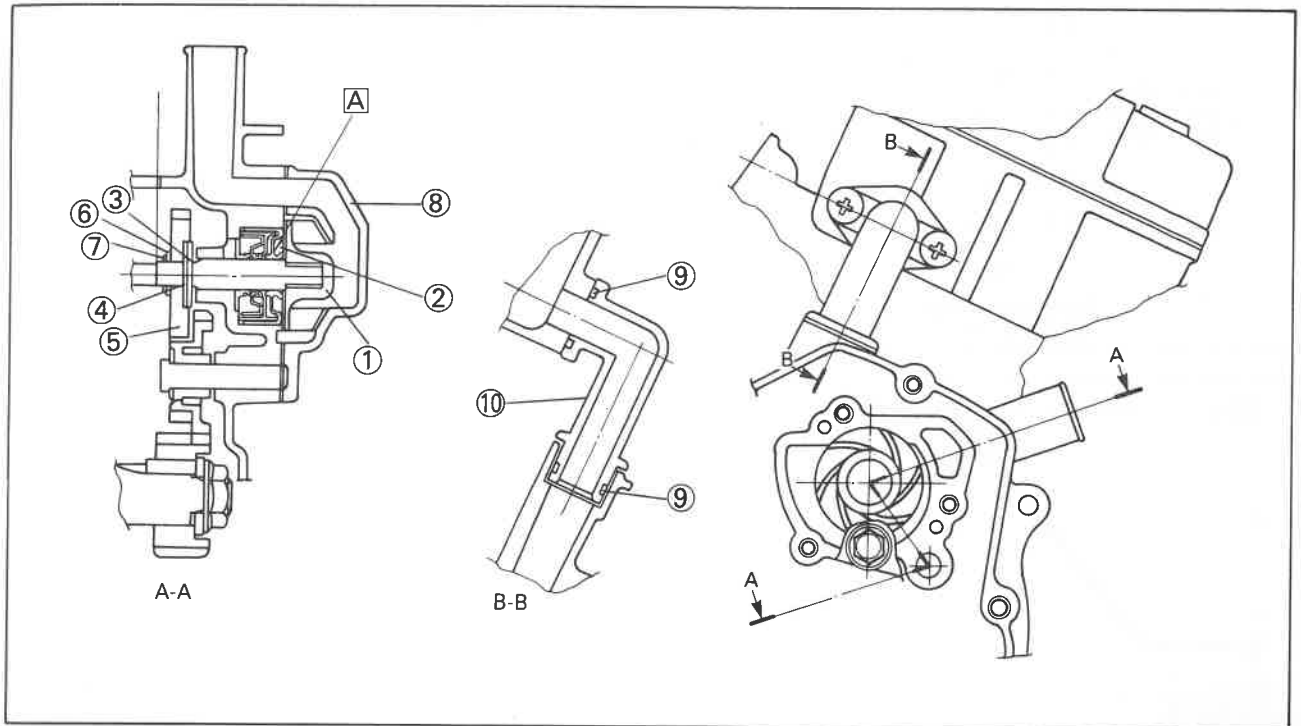
THERMOSTATIC VALVE

COOL



- ① Impeller shaft assembly
- ② Oil seal
- ③ Plain washer
- ④ Knock pin
- ⑤ Impeller shaft gear
- ⑥ Plain washer
- ⑦ Circlip
- ⑧ Housing cover
- ⑨ O-ring
- ⑩ Joint pipe

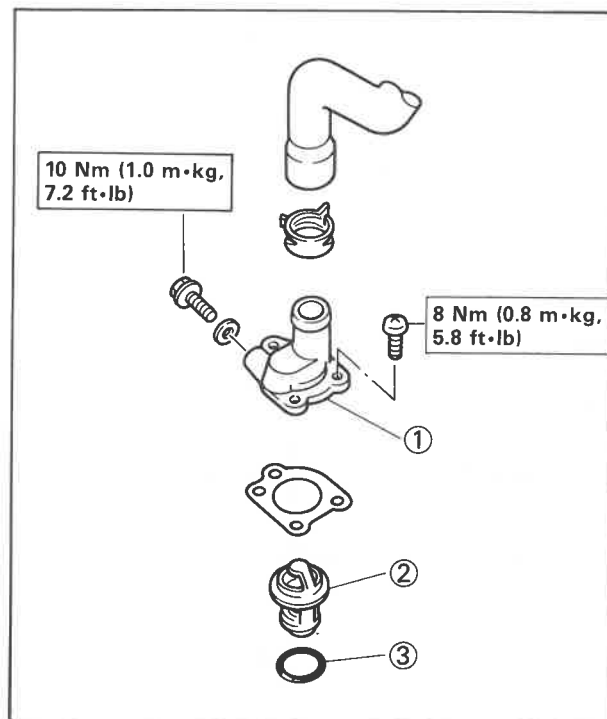
A "WATER SIDE" mark



THERMOSTATIC VALVE

Removal

1. Remove:
 - Thermostatic valve cover ①
 - Thermostatic valve ②



③ O-ring

COOL

THERMOSTATIC VALVE

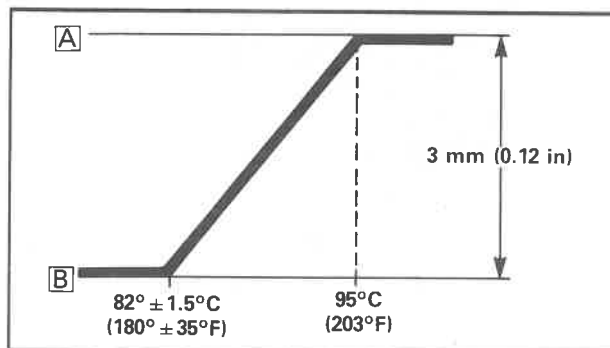
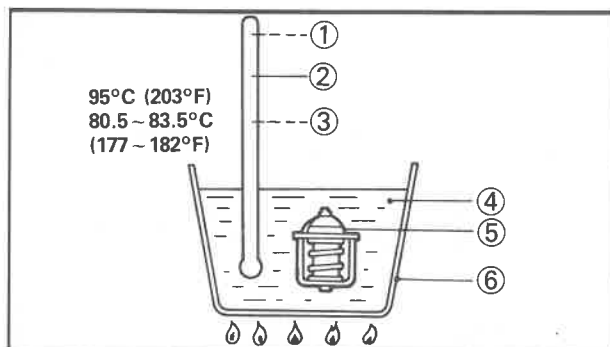
Inspection

1. Inspect:

- Thermostatic valve
Valve does not open at $80.5 \sim 83.5^{\circ}\text{C}$
($177 \sim 182^{\circ}\text{F}$) → Replace.

Inspection Steps:

- Suspend thermostatic valve in a vessel.
- Place reliable thermometer in a water.
- Heat water slowly.
- Observe thermometer, while stirring water continually.



- ① Thermometer
- ② Full open
- ③ Opening sequence begins

- ④ Water
- ⑤ Thermostatic valve
- ⑥ Vessel

- A Open
- B Close

NOTE:

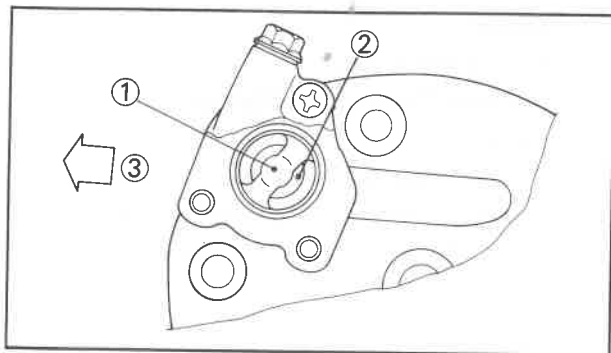
Thermostatic valve is sealed and its setting is specialized work. If its accuracy is in doubt, always it. A faulty unit could cause serious overheating or overcooling.

2. Inspect:

- O-ring
Wear/Damage → Replace.
- Gasket
Damage → Replace.

RADIATOR

COOL



Assembly

1. Install:
 - Thermostatic valve ①

NOTE:

The thermostatic valve breather hole ② must be installed in backward direction.

③ F.W.D.

2. Install:
 - Thermostatic valve cover



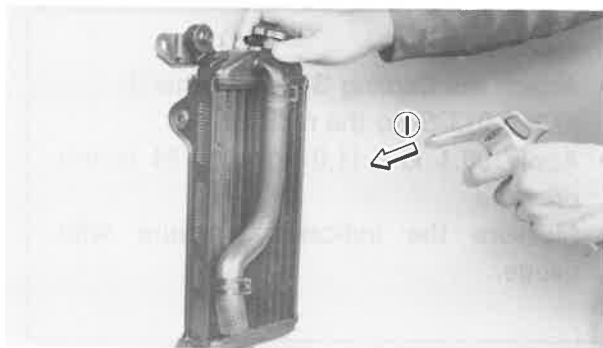
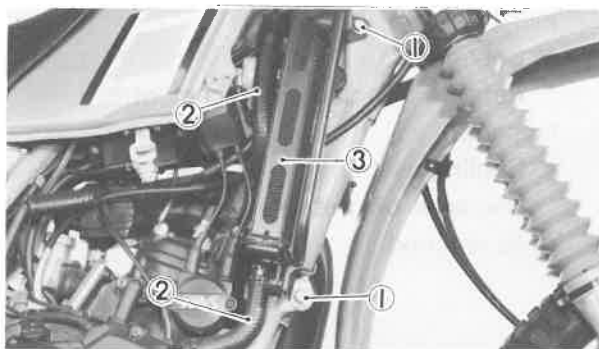
8 Nm (0.8 m·kg, 5.8 ft·lb)



RADIATOR

Removal

1. Remove:
 - Radiator cover ①
2. Drain off the coolant.
3. Remove:
 - Radiator mounting bolts ①
4. Disconnect:
 - Coolant hoses ②
5. Remove:
 - Radiator ③



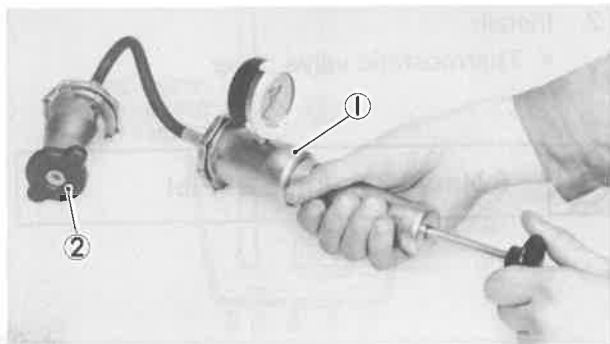
Inspection

1. Inspect:
 - Radiator core

Obstruction → Blow out with compressed air through rear of the radiator.

Flattened fin → Repair/replace.

① Compressed air



2. Inspect:

- Coolant hoses
Crack/Damage → Replace

3. Measure:

- Valve opening pressure
Valve opens at pressure below the specified valve or defective → Replace.

Valve Opening Pressure:

$88 \pm 15 \text{ kPa}$ ($0.9 \pm 0.15 \text{ kg/cm}^2$,
 $13 \pm 2 \text{ psi}$)

Measurement Steps:

- Attach the Cooling System Tester ① (90890-01325) to the radiator cap ②
- Apply the specified pressure for 10 seconds, and make sure there is no pressure drop.

Assembly

1. Install:

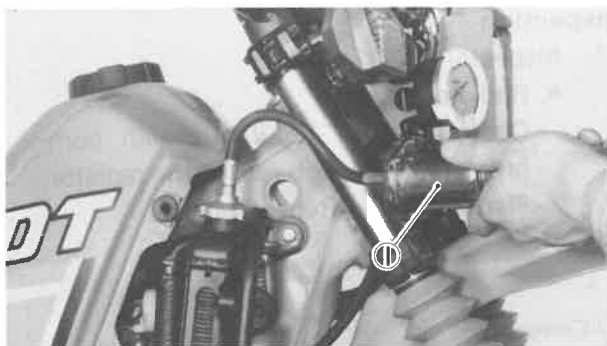
- Radiator
- Coolant hoses

2. Fill:

- Coolant
Refer to "Coolant Replacement."

3. Inspect:

- Cooling system
Decrease of pressure (leaks) → Repair as required.

**Inspection Steps:**

- Attach the Cooling System Tester ① (90890-01325) to the radiator.
- Apply 98.1 kPa (1.0 kg/cm², 14 lb/in²) pressure
- Measure the indicated pressure with gauge.



CHAPTER 5.

CARBURETION

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CARBURETION

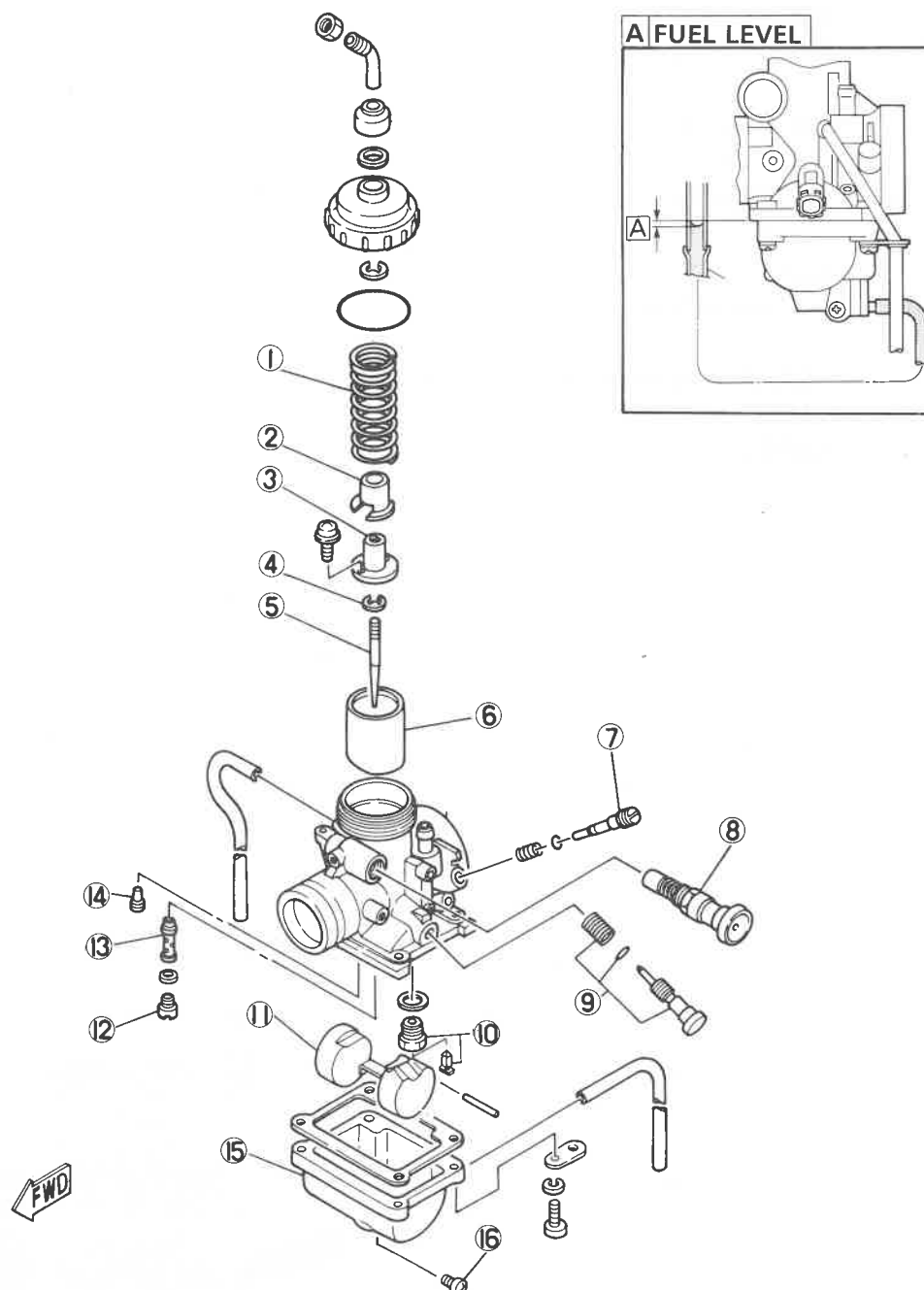
CARBURETOR

- ① Throttle valve spring
- ② Spring seat
- ③ Jet needle cap
- ④ Clip
- ⑤ Jet needle
- ⑥ Throttle valve
- ⑦ Pilot air screw
- ⑧ Starter plunger

- ⑨ Throttle stop screw
- ⑩ Needle valve assembly
- ⑪ Float
- ⑫ Main jet
- ⑬ Main nozzle
- ⑭ Pilot jet
- ⑮ Float chamber cover
- ⑯ Drain screw

SPECIFICATIONS

Main Jet (M.J.)	# 145
Main Air Jet (M.A.J.)	ø0.5
Jet Needle (J.N.)	4J6-4
Needle Jet (N.J.)	P-4
Pilot Jet (P.J.)	# 22.5
Pilot Air Screw (P.A.S.)	1 and 1/2
Float Height (F.H.)	22.0 ± 1.0 mm (0.87 ± 0.04 in)
Fuel Level (F.L.)	0.5 ± 1.0 mm (0.02 ± 0.04 in)
Engine Idling Speed	1,300 ± 50 r/min





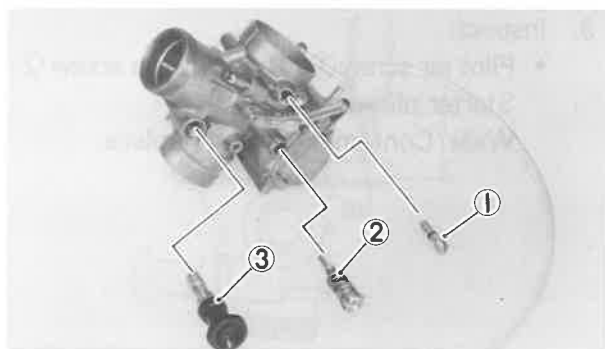
Removal

1. Remove:
 - Carburetor assembly
 Refer to engine removal section.

NOTE:

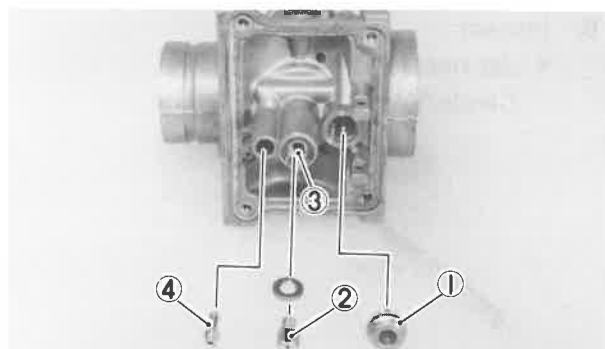
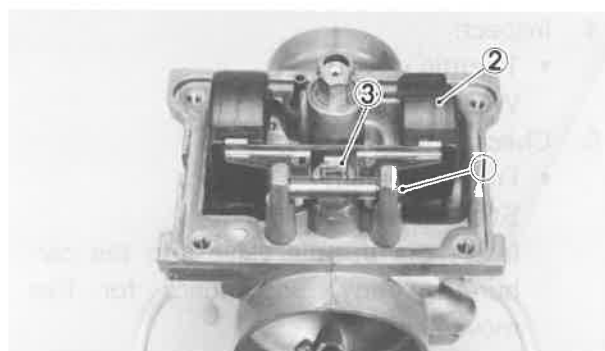
The following parts can be cleaned and inspected without disassembly.

- Throttle valve
- Pilot air screw
- Starter plunger
- Throttle stop screw



Disassembly

1. Remove:
 - Pilot air screw ①
 - Throttle stop screw ②
 - Starter plunger ③
2. Remove:
 - Float chamber cover
 - Float pin ①
 - Float ②
 - Needle valve ③
3. Remove:
 - Valve seat ①
 - Main jet ②
 - Main nozzle ③
 - Pilot jet ④

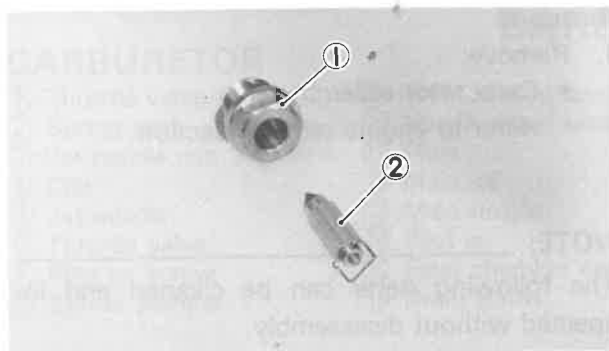


Inspection

1. Inspect:
 - Carburetor body
 Contamination → Clean.

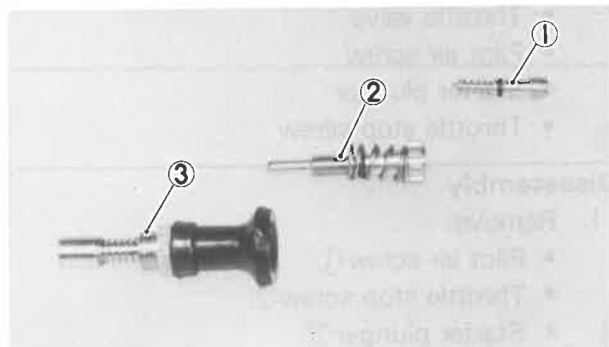
NOTE:

Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.

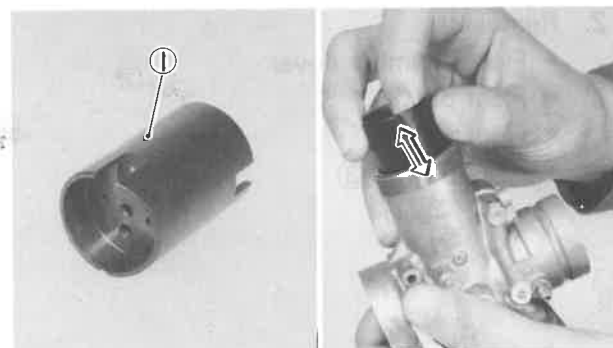


2. Inspect:
 - Valve seat ①/Needle valve ②
 - Wear/Contamination → Replace.

NOTE: _____
 Always replace the needle valve and valve seat as a set.

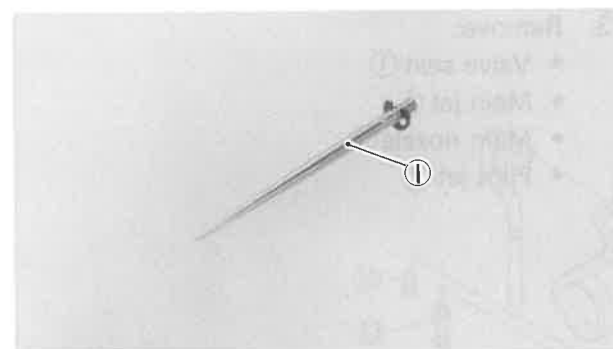


3. Inspect:
 - Pilot air screw ①/Throttle stop screw ②/ Starter plunger ③
 - Wear/Contamination → Replace.

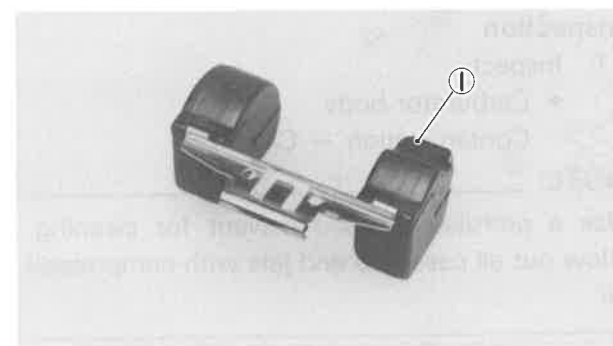


4. Inspect:
 - Throttle valve ①
 - Wear/Damage → Replace.
5. Check:
 - Free movement
 - Stick → Replace.

Insert the throttle valve into the carburetor body, and check for free movement.



6. Inspect:
 - Jet needle ①
 - Bends/Wear → Replace.

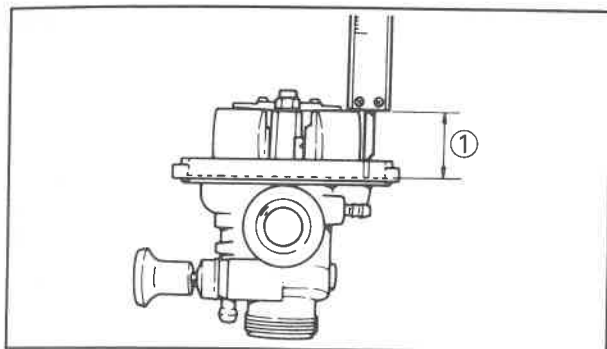


7. Inspect:
 - Float ①
 - Damage → Replace.
 - Gasket/O-ring
 - Damage → Replace.



8. Measure:

- Float height
Out of specification → Adjust.

**Float Height (F.H.):****22.0 ± 1.0 mm (0.87 ± 0.04 in)****Measurement and Adjustment Steps:**

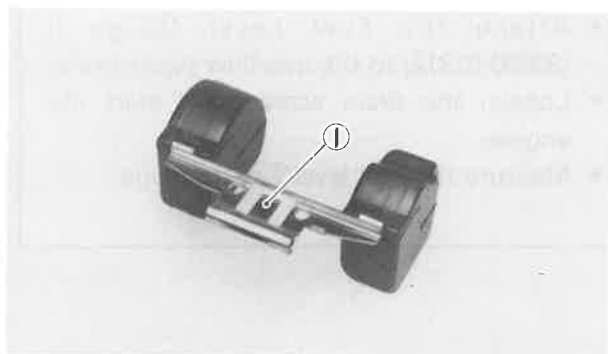
- Hold the carburetor in an upside down position.
- Measure the distance between the mating surface of the float chamber (gasket removed) and top of the float using a gauge.

① Float height

NOTE:

The float arm should be resting on the needle valve, but not compressing the needle valve.

- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tang ① on the float.
- Recheck the float height.

**Assembly**

1. Install:

- Components in above list (Disassembly-Steps "1, 2, 3".)

Reserve the disassembly procedure.

**Installation**

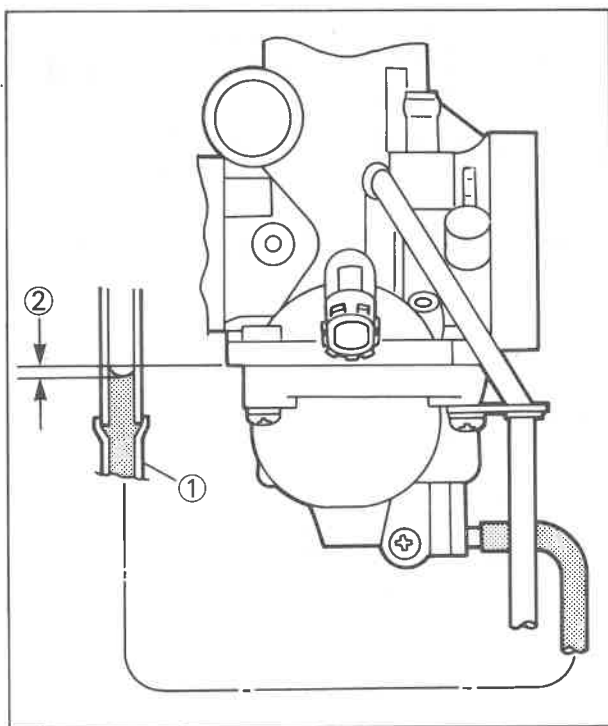
1. Install
 - Carburetor assemblyReserve the removal/procedure.

Adjustment

1. Fuel level
 - a. Measure:
 - Fuel levelOut of specification → Adjust.



Fuel Level:
 $0.5 \pm 1.0 \text{ mm}$ ($0.02 \pm 0.04 \text{ in}$)
below the carburetor body edge.

**Measurement Steps:**

- Place the motorcycle on a level place.
 - Use a garage jack under the engine to ensure that the carburetor is positioned vertically.
 - Disconnect the overflow pipe.
-
- Attach the Fuel Level Gauge ① (90890-01312) to the overflow pipe nozzle.
 - Loosen the drain screw, and start the engine.
 - Measure the fuel level ② with gauge.

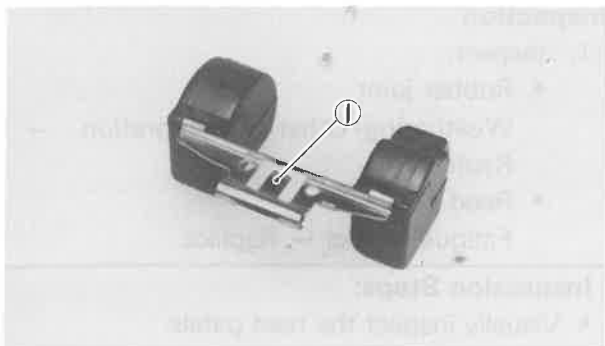
- b. Adjust:
 - Fuel levelIf necessary.

Adjustment Steps:

- Remove the carburetor.
- Inspect the valve seat and needle valve.
- If either is worn, replace them both.

CARBURETOR/REED VALVE

CARB

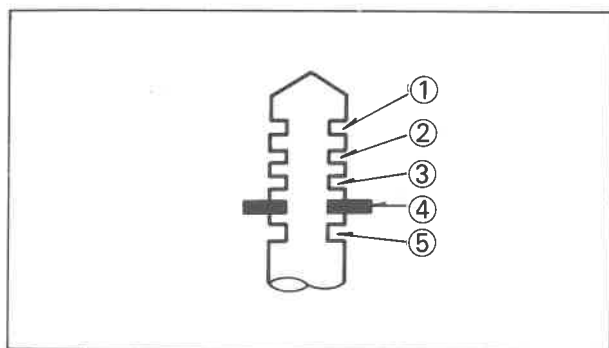


- If both are fine, adjust the float height by bending the float tang ① on the float.
- Recheck the fuel level.

2. Jet needle clip position

- Mid-range air/fuel mixture characteristics of the motorcycle
Poor condition → Jet needle position change.

Jet Needle Type: 4J6
Standard Clip Position:
No. 4 Groove



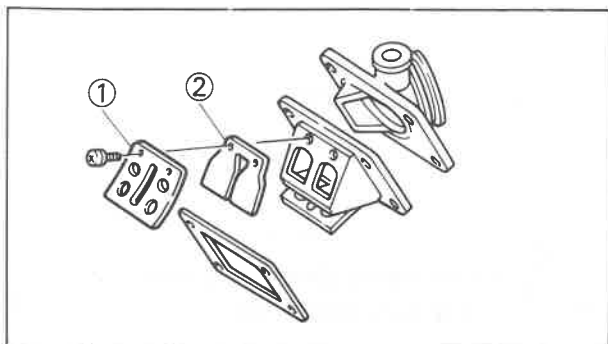
Up	Leaner condition
Down	Richer condition

- ① 1st
- ② 2nd
- ③ 3rd
- ④ 4th (Standard position)
- ⑤ 5th

REED VALVE

Removal

- Remove:
 - Reed valve assembly
Refer to engine removal section.



Disassembly

- Remove:
 - Reed valve stopper ①
 - Reed valve ②

**Inspection**

1. Inspect:

- Rubber joint
Weathering/Other Deterioration → Replace.
- Reed petals
Fatigue Cracks → Replace.

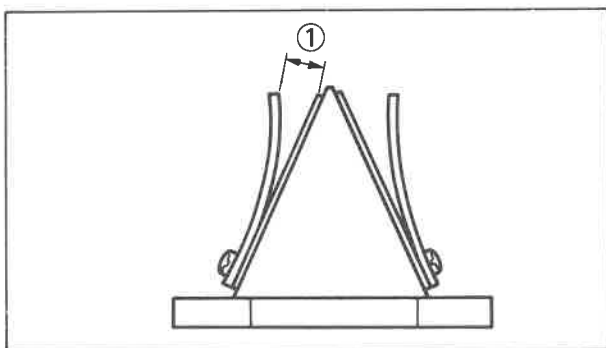
Inspection Steps:

- Visually inspect the reed petals.

NOTE:

Correct 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.



2. Measure:

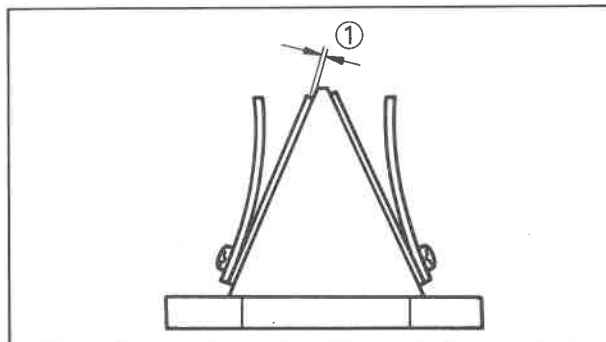
- Valve stopper clearance ①
Out of specification → Adjust stopper/Replace valve stopper.



Valve Stopper Clearance:
10.3 mm (0.41 in)

NOTE:

If it is 0.4 mm (0.016 in) more or less than specified, replace the valve stopper.



3. Measure:

- Reed valve bending limit ①
Out of specification → Replace.



Reed Valve Bending Limit:
0.3 mm (0.012 in)



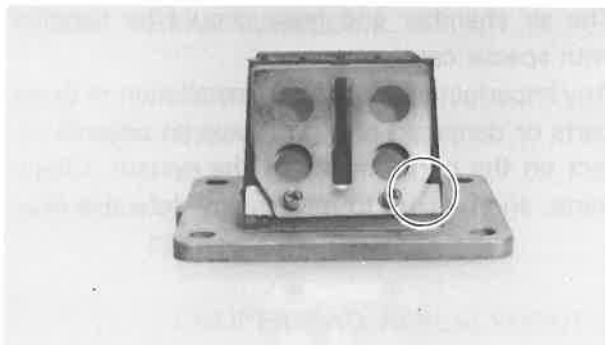
Assembly

When assembling the reed valve, reserve the disassembly procedure. Note the following points.

1. Install:
 - Reed valve
 - Reed valve stopper

NOTE:

Note the cut in the lower corner of the reed and stopper plate.



2. Tighten:
 - Reed valve securing screws

Use LOCTITE.



1 Nm (0.1 m·kg, 0.7 ft·lb)

NOTE:

Tighten each screw gradually to avoid warping.

Installation

When installing the reed valve, reverse the removal procedure. Note the following points.

1. Install:
 - Gasket (New)

2. Tighten:
 - Reed valve securing bolts



8 Nm (0.8 m·kg, 5.8 ft·lb)

NOTE:

Tighten each bolt gradually to avoid warping.



YAMAHA ENERGY INDUCTION SYSTEM (Y.E.I.S.)

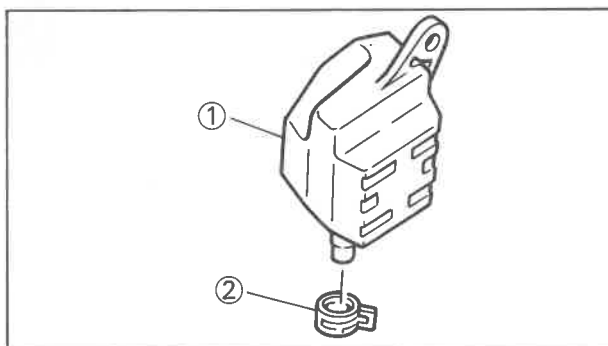
Handling Notes

CAUTION:

Never attempt to modify the Yamaha Energy Induction System.

The air chamber and hose should be handled with special care.

Any imperfect connection or installation of these parts or damaged parts will have an adverse effect on the performance of the system. Check parts, and be sure to replace any defective one.



Inspection

1. Inspect:

- Air chamber ①
Crack/Damage → Replace
- Clip ②
Looseness → Replace



CHAPTER 6.

CHASSIS

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CHASSIS

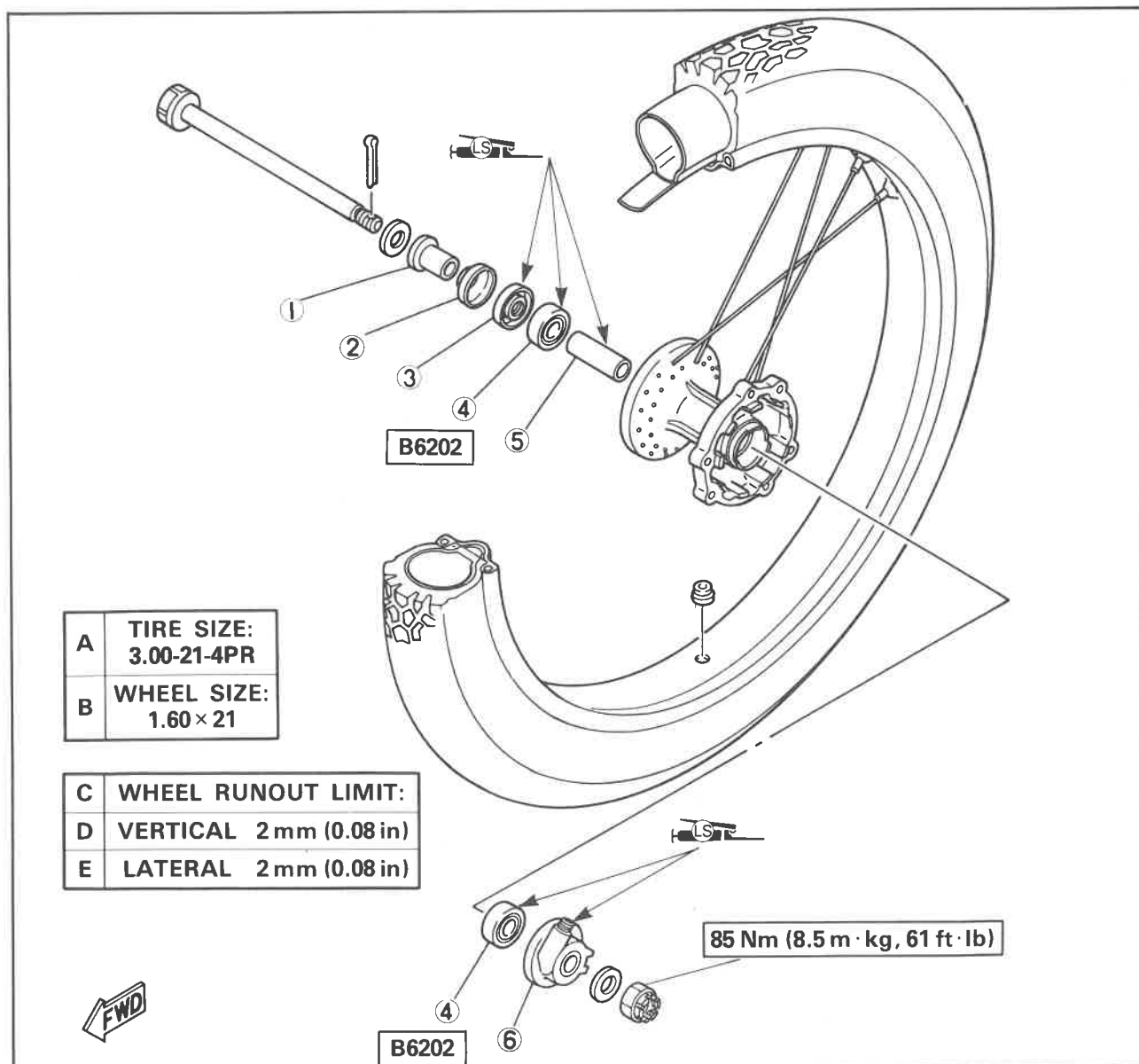
FRONT WHEEL

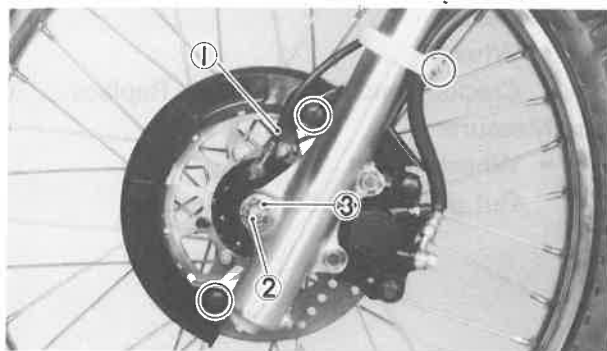
- ① Collar
- ② Dust cover
- ③ Oil seal
- ④ Bearing
- ⑤ Spacer
- ⑥ Gear unit assembly

TIRE AIR PRESSURE

Basic weight: With oil and full fuel tank	110 kg (243 lb)	
Maximum load*	156 kg (344 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load	127 kPa (1.3 kg/cm ² , 18 psi)	147 kPa (1.5 kg/cm ² , 22 psi)
90 kg (198 lb) ~ Maximum load*	147 kPa (1.5 kg/cm ² , 22 psi)	177 kPa (1.8 kg/cm ² , 26 psi)
High speed riding	147 kPa (1.5 kg/cm ² , 22 psi)	177 kPa (1.8 kg/cm ² , 26 psi)

*Load is the total weight of cargo, rider, and accessories.



**Removal**

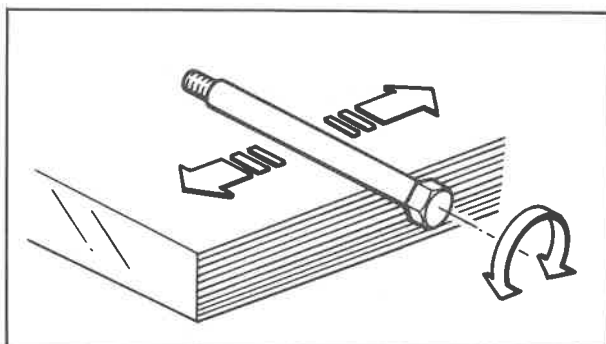
1. Remove:
 - Cable holder
 - Disc cover
2. Disconnect:
 - Speedometer cable ①
- ② Cotter pin
- ③ Axle nut

3. Remove:
 - Cotter pin
4. Loosen:
 - Axle nut
5. Place the motorcycle on a level place.

6. Elevate the front wheel by placing a suitable stand under the engine.
7. Remove:
 - Axle nut
 - Front axle
 - Front wheel

NOTE:

Do not depress the brake lever when the wheel is off the motorcycle as the brake pads will be forced shut.

**Inspection**

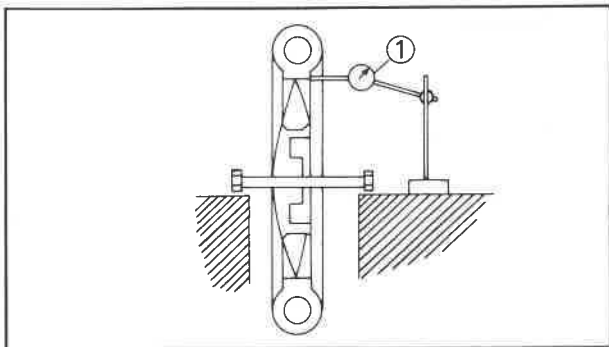
1. Inspect:
 - Front axle
 Roll the axle on a flat surface.
 Bends → Replace.

WARNING:

Do not attempt to straighten a dent axle.



2. Inspect:
 - Wheel
Cracks/Bends/Warpage → Replace.
3. Measure:
 - Wheel runout
Out of specification → Replace.

**Rim Runout Limit:**

Vertical - 2.0 mm (0.08 in)

Lateral - 2.0 mm (0.08 in)

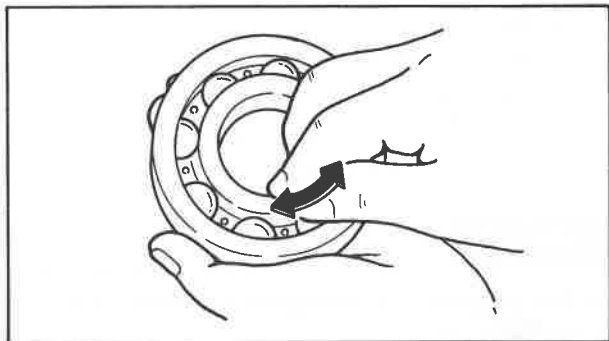
- ① Dial gauge
4. Check:
 - Wheel balance
Out of balance → Adjust.

NOTE: _____Balance wheels with the brake disc installed.
_____**CAUTION:** _____

Be sure the valve stem locknut is tightened
securely after repairing or replacing a tire

and/or wheel.
_____**WARNING:** _____

Ride conservatively after installing a tire to
allow the tire to seat itself correctly on the
rim.

_____

5. Check:
 - Wheel bearings
Bearings allow play in the wheel hub or
wheel turns roughly → Replace.

**Wheel Bearing Replacement Steps:**

- Clean the outside of the wheel hub.
- Drive out the bearing.

WARNING:

Eye protection is recommended when using striking tools.

- Install the new bearing by reversing the previous steps.

NOTE:

Use a socket that matches the outside diameter of the race of the bearing.

CAUTION:

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

6. Inspect/check:

- Brake disc

Wear/Over specified limit → Replace.

**Maximum Deflection:**

0.15 mm (0.006 in)

Minimum Disc Thickness:

3.0 mm (0.12 in)

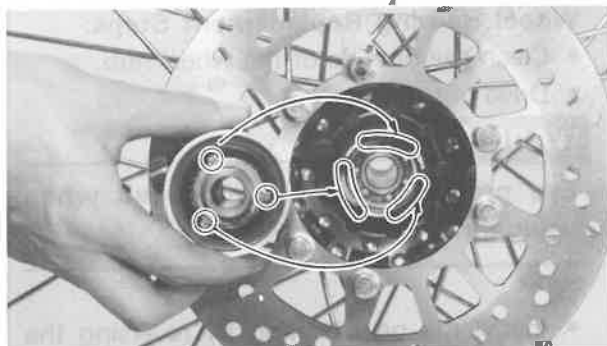
Installation

When installing the front wheel, reserve the removal procedure. Note the following points.

1. Apply:

- Lithium base grease

Lightly grease to the oil seal and gear unit.



2. Install:
 - Gear unit assembly

NOTE:

Make sure the projections inside the gear unit are meshed with the flats in the wheel hub.

3. Install:
 - Front wheel assembly

NOTE:

Be sure the boss on the outer fork tube correctly engages with the locating slot on the gear unit assembly.

4. Tighten:
 - Axle nut



85 Nm (8.5 m·kg, 61 ft·lb)

5. Install:
 - Cotter pin

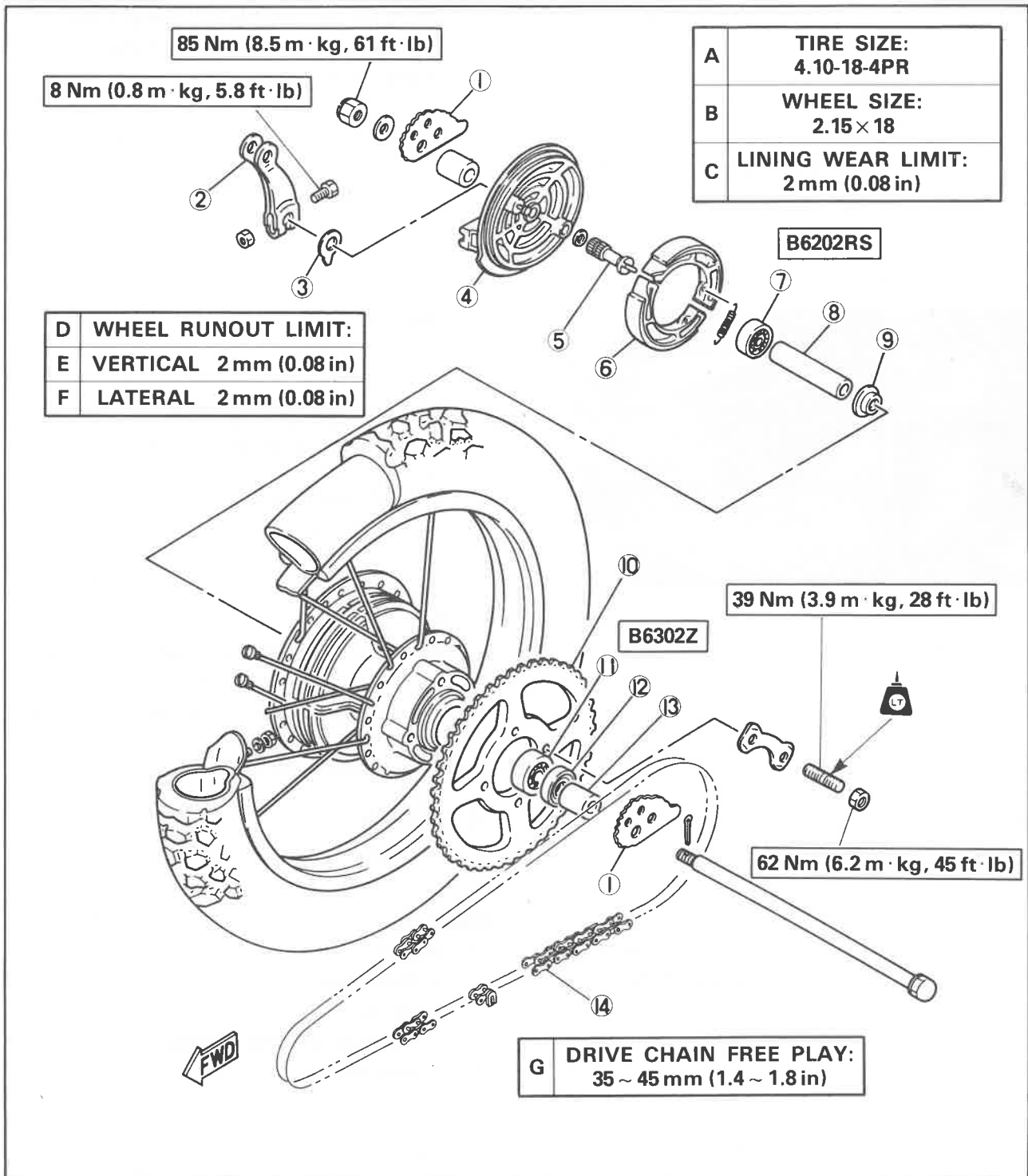
WARNING:

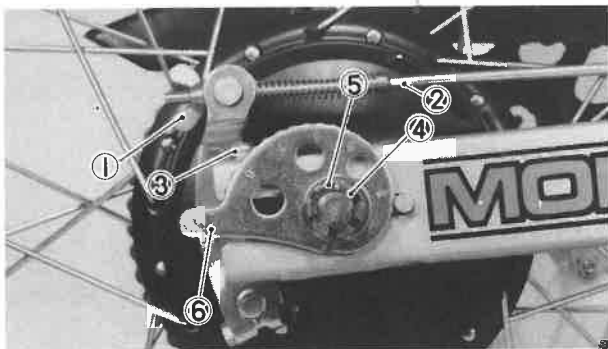
Always use a new cotter pin on the axle nut.



REAR WHEEL

- | | |
|---------------------|-------------------|
| ① Chain puller | ⑨ Spacer flange |
| ② Camshaft lever | ⑩ Driven sprocket |
| ③ Wear indicator | ⑪ Bearing |
| ④ Brake shoe plate | ⑫ Oil seal |
| ⑤ Camshaft | ⑬ Collar |
| ⑥ Brake shoe lining | ⑭ Drive chain |
| ⑦ Bearing | |
| ⑧ Bearing spacer | |

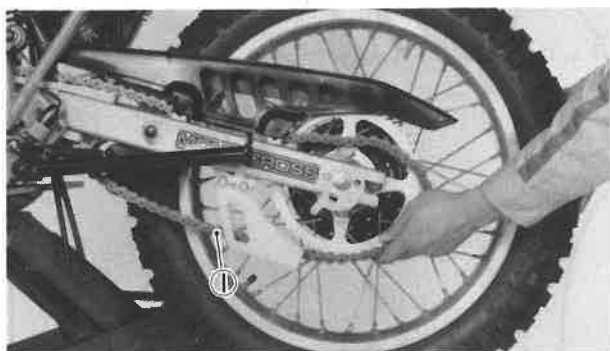


**Removal**

1. Remove:
 - Adjuster ①
 - Brake rod ②
 - Swingarm end screw ③
 - Cotter pin ④
2. Loosen:
 - Axle nut ⑤

⑥ Chain puller

3. Place the motorcycle on a level place.
4. Elevate the rear wheel by placing a suitable stand under the engine.



5. Remove:
 - Drive chain ①

NOTE:

Before removing the drive chain, push the wheel forward.

NOTE:

A special tool is usually required for separating the chain; however, it is usually not necessary to unlink the chain to remove or reinstall the rear wheel.

6. Remove:
 - Rear wheel assembly

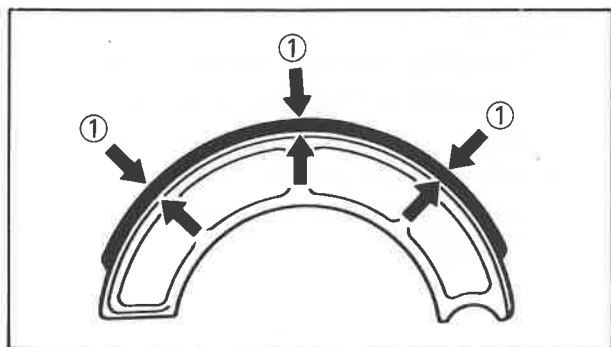
Inspection

1. Inspect:
 - Rear axle
 - Wheel

Refer to "FRONT WHEEL — Inspection" section.



2. Measure:
 - Wheel runout
Refer to "FRONT WHEEL — Inspection" section.
3. Check:
 - Wheel balance
Refer to "FRONT WHEEL — Inspection" section.
4. Check:
 - Wheel bearings
Refer to "FRONT WHEEL — Inspection" section.
5. Inspect:
 - Brake lining surface
Glazed areas → Remove.
Use a coarse sand paper.



NOTE:

After using the sand paper, clean of the polished particles with cloth.

6. Measure:
 - Brake lining thickness
Out of specification → Replace.
- ① Measuring points



Brake Lining Thickness:

4 mm (0.16 in)

Wear Limit:

2 mm (0.08 in)

NOTE:

Replace the brake shoes as a set if either is found to be worn to the wear limit.

7. Inspect:
 - Brake drum inner surface
Oil/Scratches → Remove.



Oil	Use a rag soaked in lacquer thinner or solvent.
Scratches	Use a emery cloth (lightly and evenly polishing)

8. Inspect:

- Camshaft face
Wear → Replace.

NOTE:

Before removing the cam lever, put a match mark (punches) on the cam lever and camshaft to indicate their positions for easy assembly.

Installation

When installing the rear wheel, reverse the removal procedure. Note the following points.

1. Apply:

- Lithium base grease
Lightly grease to the oil seal lips.



2. Install:

- Rear wheel assembly

NOTE:

1. Be sure the swingarm boss correctly engages the locating slot on the brake shoe plate.
2. Make sure the rear wheel axle is inserted on the left-hand side and that the chain pullers are installed with the punched side outward.

3. Tighten:

- Axle nut



85 Nm (8.5 m·kg, 61 ft·lb)

REAR WHEEL

CHAS



4. Install:
 - Cotter pin

WARNING:

Always use a new cotter pin on the axle nut.

5. Adjust:
 - Drive chain tension
 - Rear brake free play

WARNING:

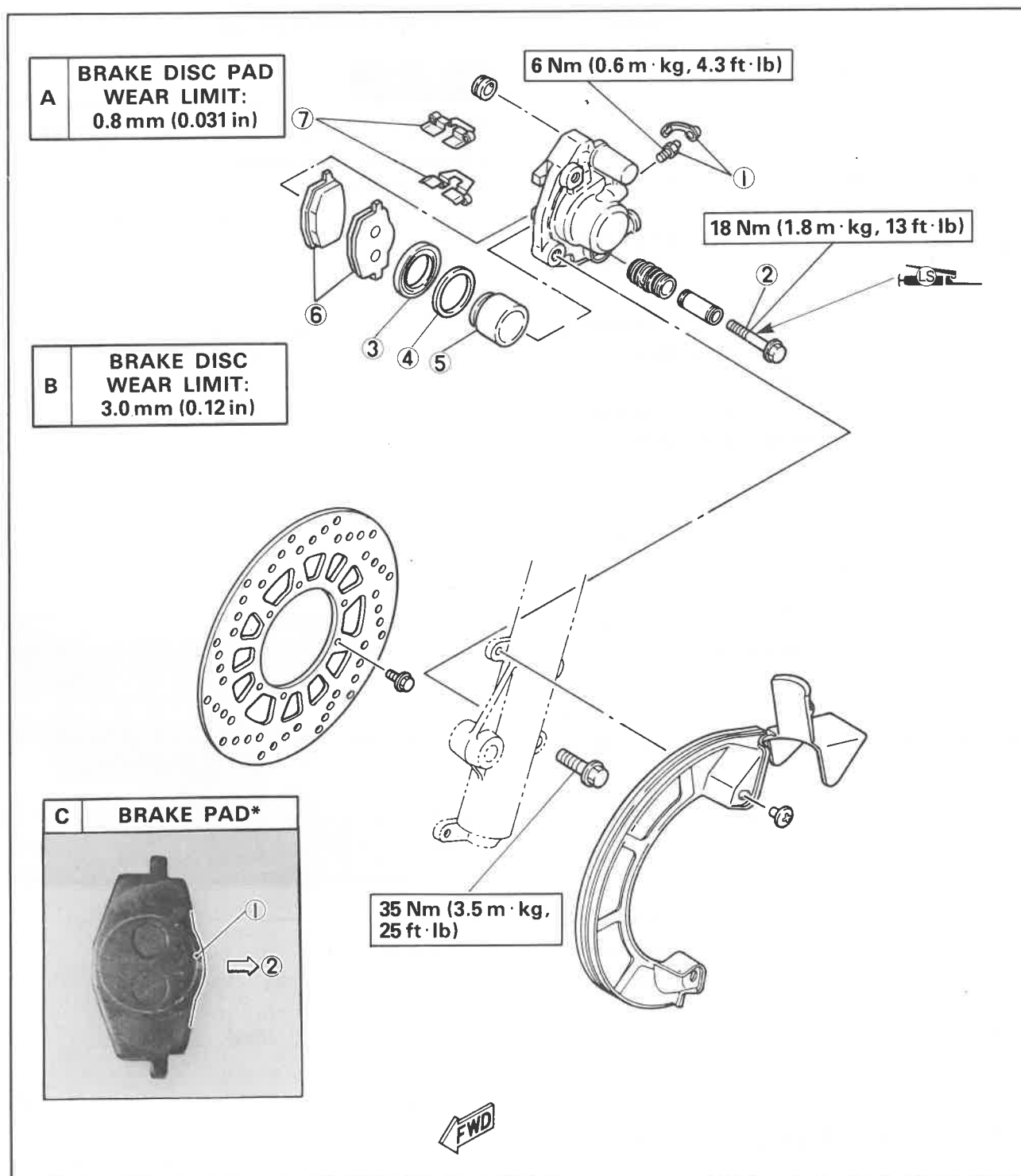
Check the operation of the brake light after adjusting the rear brake.



FRONT BRAKE

- ① Air bleed screw
- ② Retaining bolt
- ③ Dust seal
- ④ Piston seal
- ⑤ Piston
- ⑥ Brake pads
- ⑦ Pad spring

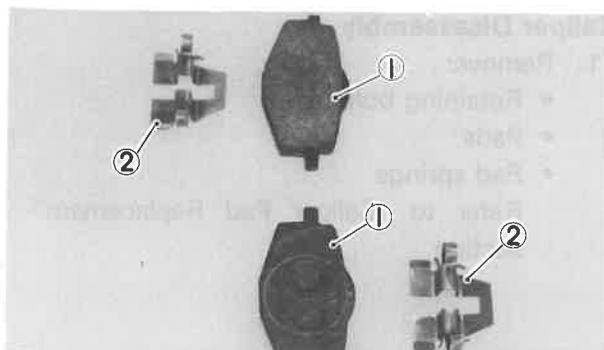
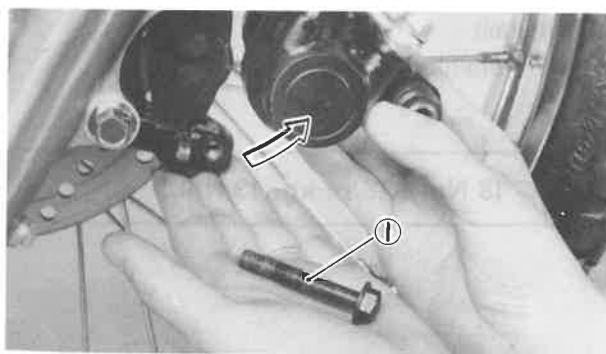
*Be sure to position the pad so that its round side ① is backward ②.



**CAUTION:**

Disc brake components rarely require disassembly. Do not disassemble components unless absolutely necessary. If any hydraulic connection in the system is opened, the entire system should be disassembled, drained, cleaned and then properly filled and bled upon reassembly. Do not use solvents on brake internal components.

Solvents will cause seals to swell and distort. Use only clean brake fluid for cleaning. Use care with brake fluid. Brake fluid is injurious to eyes and will damage painted surfaces and plastic parts.

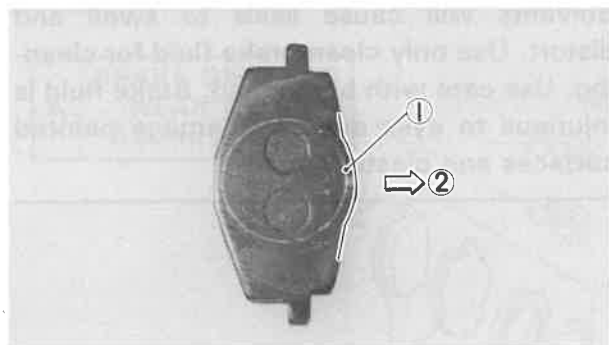
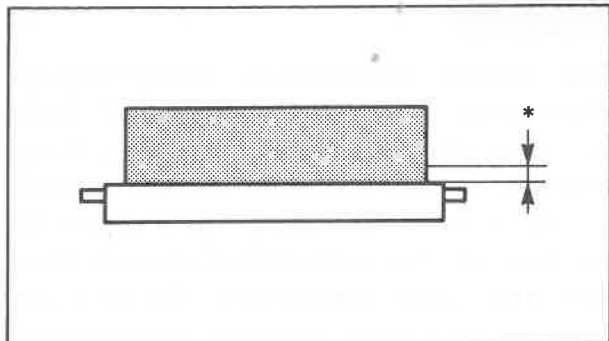
**Caliper Pad Replacement**

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Remove:
 - Retaining bolt (1)
2. Turn the caliper body counterclockwise.
3. Remove:
 - Pads (1)
 - Pad springs (2)

NOTE:

1. Replace the pad springs as a set if pad replacement is required.



2. Replace the pads as a set if either is found to be worn to the wear limit.



* 0.8 mm (0.031 in)

4. Install:
 - Pad springs (New)
 - Pads (New)

NOTE:

Be sure to position the pad so that its round side ① is backward ②.

5. Apply:
 - Lithium base greaseApply a light coating of grease to the retaining bolt.
6. Set the caliper body at the original position.

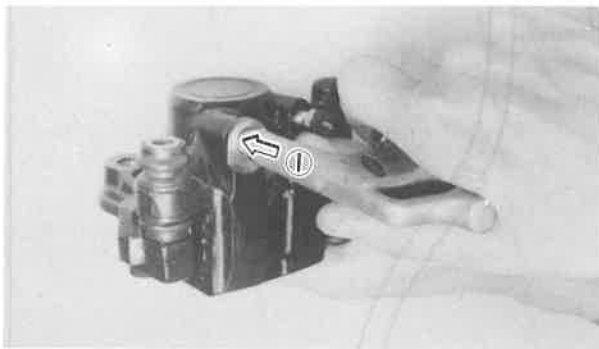
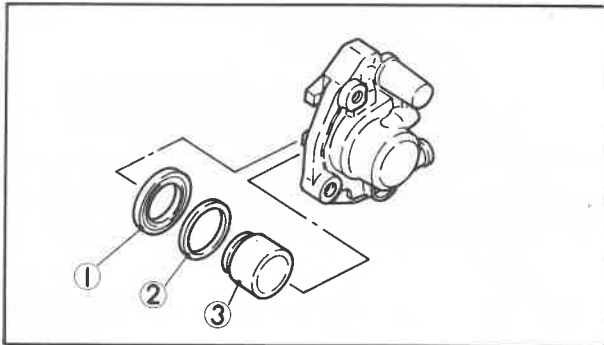
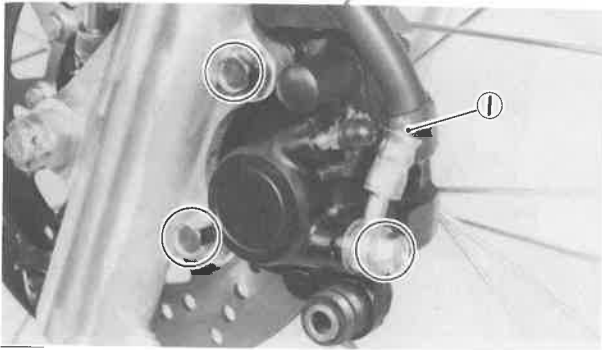
7. Install:
 - Retaining bolt



18 Nm (1.8 m·kg, 13 ft·lb)

Caliper Disassembly

1. Remove:
 - Retaining bolt
 - Pads
 - Pad springsRefer to "Caliper Pad Replacement" section.



2. Remove:

- Brake hose ①

Place the open hose end into a container and pump the old fluid out carefully.

- Caliper body

3. Remove:

- Dust seal ①
- Piston seal ②
- Piston ③

Caliper Piston Removal Steps:

- Blow compressed air ① into the tube joint opening to force out the caliper piston

from the caliper body.

WARNING:

Never try to pry out the caliper piston.

WARNING:

Cover the piston with a rag. Use care so that piston does not cause injury as it is expelled from the cylinder.

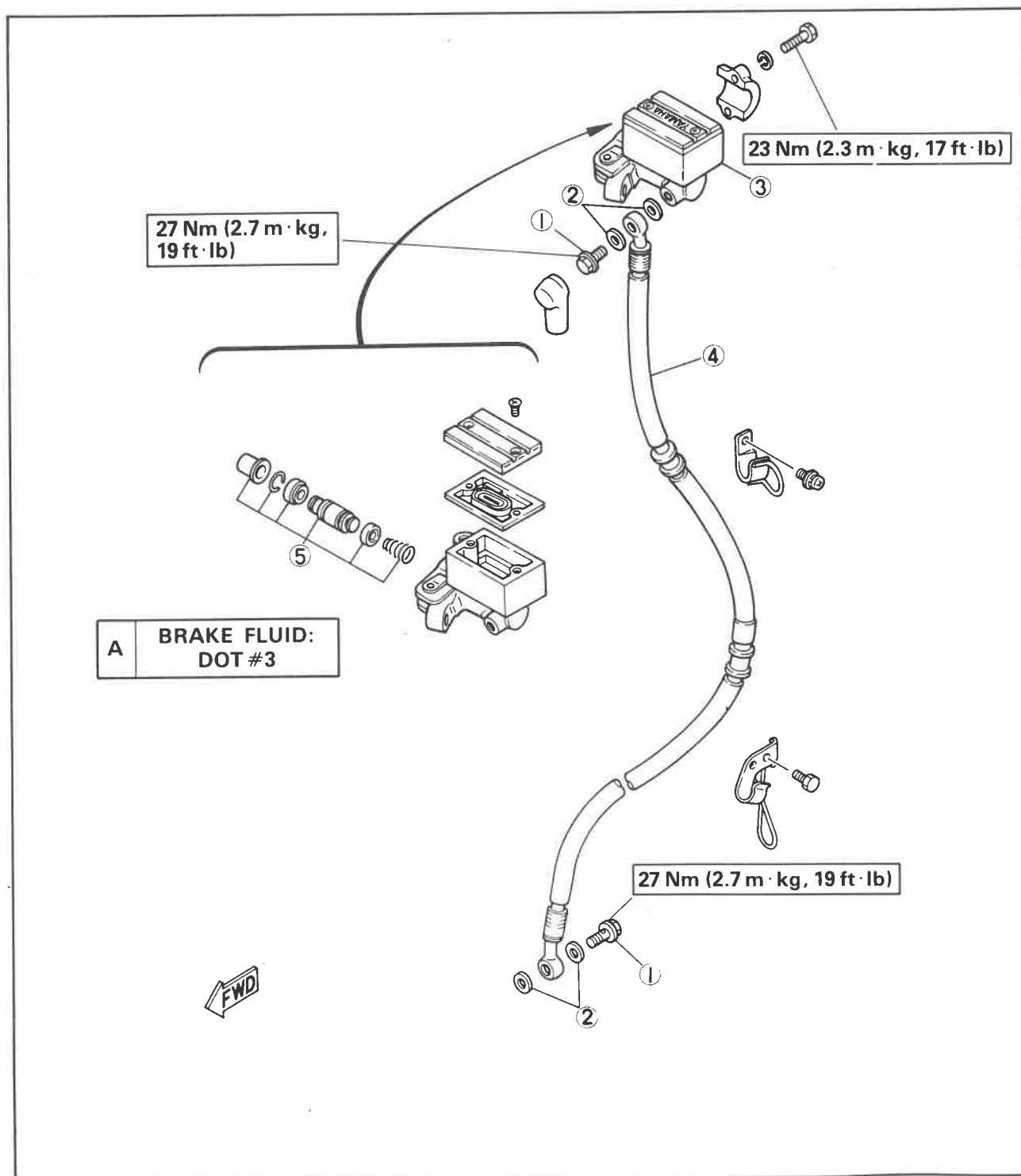
Master Cylinder Disassembly**NOTE:**

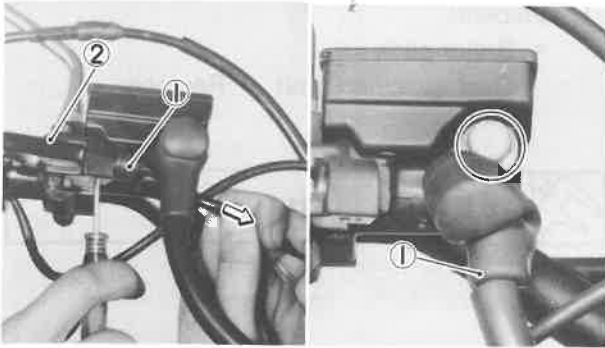
Drain the brake fluid before removing the master cylinder.



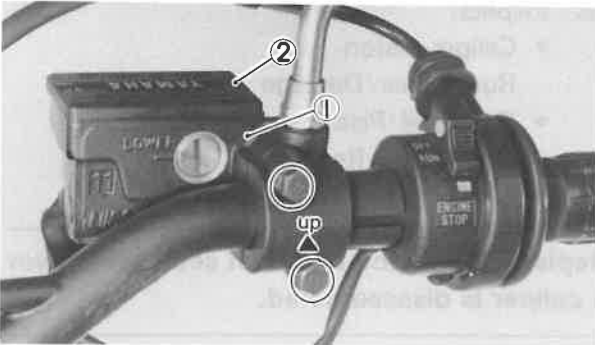
FRONT BRAKE

- ① Union bolt
- ② Copper washer
- ③ Master cylinder
- ④ Brake hose
- ⑤ Master cylinder kit





1. Remove:
 - Brake light switch ①
 - Brake lever ②
 - Lever spring
 - Brake hose ①

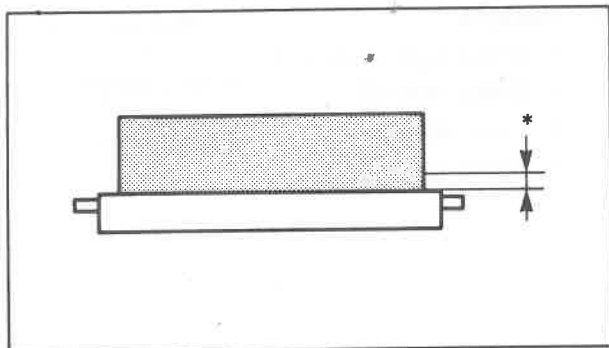


2. Remove:
 - Master cylinder ①
 - Master cylinder cap ②

3. Remove:
 - Dust boot
 - Circlip
 - Master cylinder cup assembly

Brake Inspection and Repair

Recommended Brake Component Replacement Schedule:	
Brake Pads	As required
Piston Seal Dust Seal	Every two years
Brake Hoses	Every four years
Brake Fluid	Replace only when brakes are disassembled.



1. Inspect:
 - Brake padsOver specified limit → Replace.



* 0.8 mm (0.031 in)

2. Inspect:
 - Caliper pistonRust/Wear/Damage → Replace.
- Dust seal/Piston seal
Damage → Replace.
WARNING:

Replace the piston and dust seals whenever a caliper is disassembled.

3. Inspect:
 - Master cylinder bodyScratches/Wear → Replace.

NOTE:

Clean all passages with new brake fluid.

4. Inspect:
 - Brake hoseCracks/Wear/Damage → Replace.

Brake Reassembly

1. Caliper
- When assembling the caliper, reserve the disassembly procedure. Note the following points.

WARNING:

1. All internal parts should be cleaned in new brake fluid only.

FRONT BRAKE

CHAS

2. Internal parts should be lubricated with brake fluid when installed.

**DOT #3**

- a. Install:

- Caliper body

**35 Nm (3.5 m·kg, 25 ft·lb)**

- Brake hose

**27 Nm (2.7 m·kg, 19 ft·lb)**

2. Master cylinder

When assembling the master cylinder, reserve the disassembly procedure. Note the following points.

- a. Install:

- Master cylinder cup

NOTE:

The cylinder cups are installed with the larger diameter (lips) inserted first.

- b. Install:

- Master cylinder

**23 Nm (2.3 m·kg, 17 ft·lb)**

NOTE:

The master cylinder bracket should be installed with the "UP" mark unit on top.

- c. Install:

- Brake hose

**27 Nm (2.7 m·kg, 19 ft·lb)**

- d. Fill

- Brake fluid



Air Bleeding

WARNING:

If the brake system is disassembled or if any brake hose has been loosened or removed, the brake system must be bled to remove air from the brake fluid. If the brake fluid level is very low or brake operation is incorrect, bleed the brake system. A dangerous loss of

braking performance may occur if the brake system is not bled.

**Air Bleeding Steps:**

- a. Add proper brake fluid to the reservoir.
- b. Install the diaphragm. Be careful not to spill or overflow the reservoir.
- c. Connect the clear plastic tube tightly to

the caliper bleed screw.

- d. Put the end of the tube into a container.
- e. Slowly apply the brake lever several times.
- f. Pull in lever. Hold the lever in "on" position.
- g. Loosen the bleed screw. Allow the lever

to travel slowly toward its limit.

- h. When the limit is reached, tighten the bleed screw.
- i. Repeat steps (e) to (h) until of the air bubbles have been removed from the system.



- j. Add brake fluid to the level line on the reservoir.



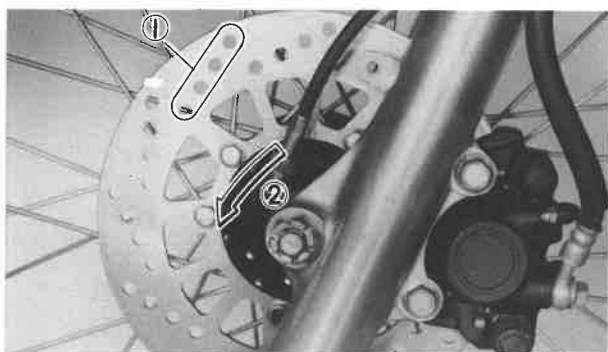
Bleed Screw:

6 Nm (0.6 m·kg, 4.3 ft·lb)

NOTE:

If bleeding is difficult, it may be necessary to let

the brake fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.



Brake Disc Installation

1. Install:
 - Brake disc

NOTE:

When installing the brake disc, the slots on the disc should be positioned as shown.

- ① Slot
- ② Rotating direction



FRONT FORK

FRONT FORK

- | | | |
|-----------------------|----------------------------------|-----------------|
| ① Rubber cap | ⑨ Damper rod (Cylinder complete) | ⑰ Seal spacer |
| ② Circlip | ⑩ Rebound spring | ⑱ Guide bush |
| ③ Cap bolt | ⑪ Inner tube | ⑲ Outer tube |
| ④ O-ring | ⑫ Slide bush | ⑳ Drain bolt |
| ⑤ Fork spring (small) | ⑬ Oil lock piece | ㉑ Securing bolt |
| ⑥ Spring seat | ⑭ Dust cover | |
| ⑦ Fork spring (Large) | ⑮ Retaining clip | |
| ⑧ Damper rod ring | ⑯ Oil seal | |

9 Damper Rod (Cylinder Complete)

10 Rebound Spring

11 Inner tube

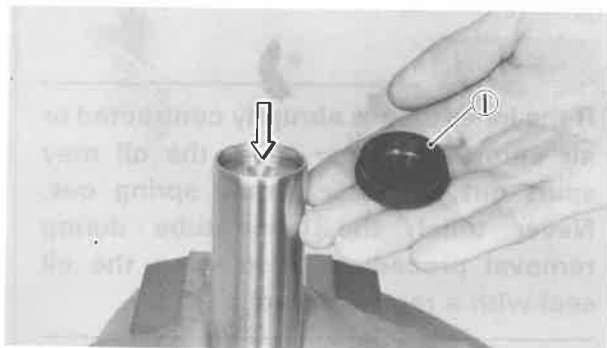
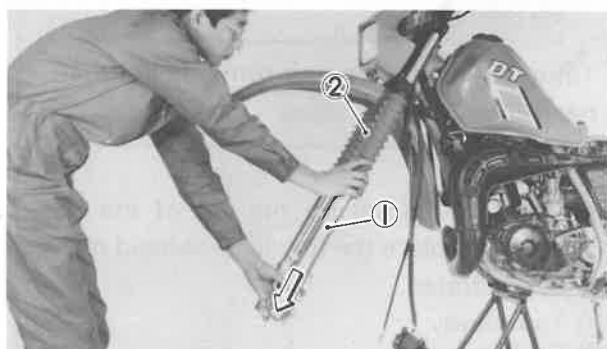
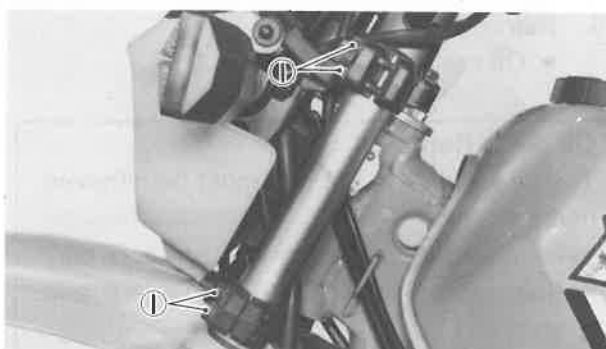
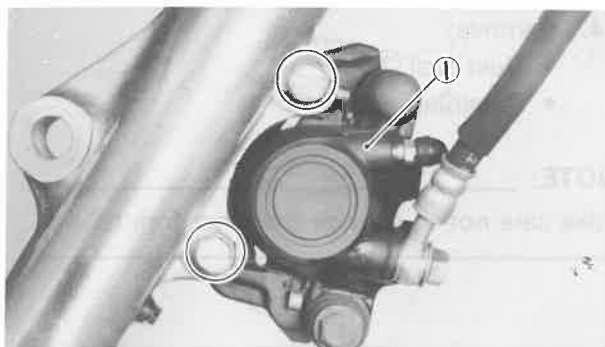
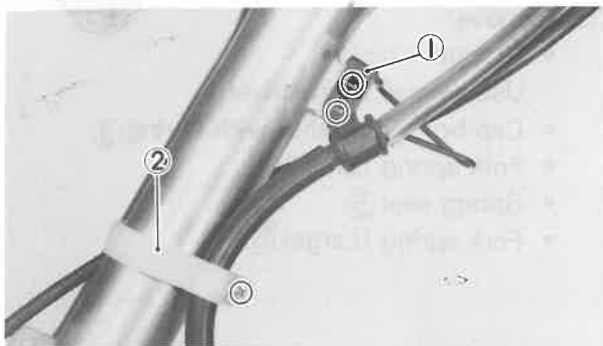
(Sorry oil stains on the original)

A	FORK OIL CAPACITY (EACH FORK):
	366 cm³ (12.9 Imp oz, 12.4 US oz)
B	RECOMMENDED OIL: SAE 10W30 TYPE SE MOTOR OIL

20 Nm (2.0 m · kg, 14 ft · lb)



20 Nm (2.0 m · kg, 14 ft · lb)



Removal

WARNING:

Securely support the motorcycle so there is no danger of it falling over.

1. Remove:
 - Front wheel
 - Brake hose holder ①
 - Speedometer cable holder ②
2. Remove:
 - Brake caliper assembly ①

NOTE:

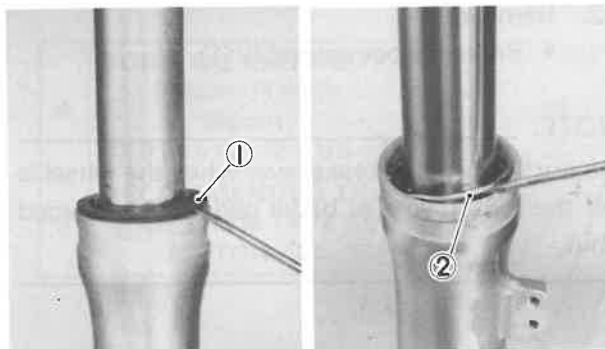
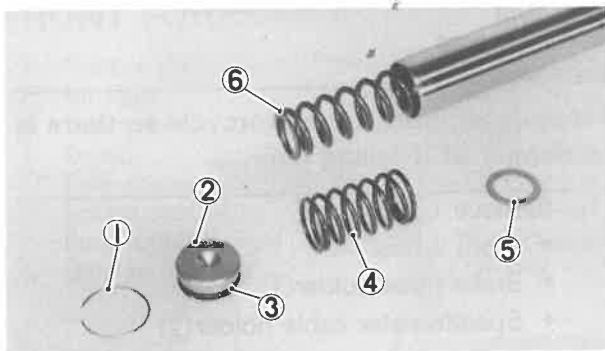
Do not depress the brake lever when the wheel is off the motorcycle as brake pads will be forced shut.

3. Loosen:
 - Front fork pinch bolts ①

4. Remove:
 - Front fork ①
 - Rubber boot ②

Disassembly

1. Remove:
 - Rubber cap ①
2. Depress the cap bolt to remove the stopper ring.



3. Remove:

- Stopper ring ①
Use a small screwdriver.
- Cap bolt ② together with O-ring ③
- Fork spring (Small) ④
- Spring seat ⑤
- Fork spring (Large) ⑥

4. Remove:

- Dust seal ①
- Retaining clip ②

NOTE:

Take care not to scratch the inner fork tube.

5. Remove:

- Oil seal

Oil Seal Removal Steps:

The oil seal in the fork leg must be removed hydraulically.

- Fill the fork completely with the fork oil.
- Reinstall the cap bolt (with O-ring) and stopper ring.

CAUTION:

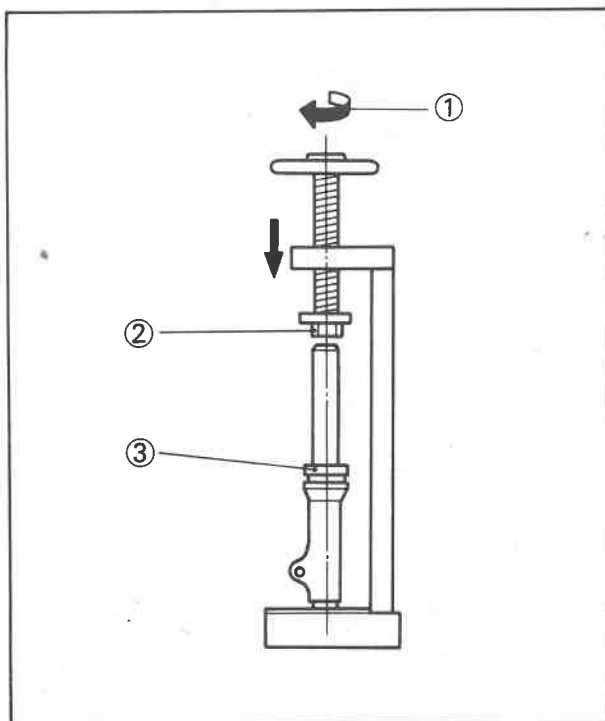
Take care so that no air remains in the inner tube.

- Place the socket on the top of the cap bolt, and place the fork leg in a hand press as illustrated.

- ① Turn slowly
- ② Socket
- ③ Wrap with rag

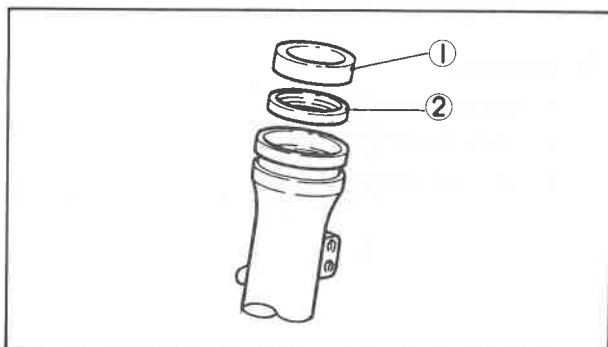
CAUTION:

If the inner tube is abruptly contracted or air enters the inner tube, the oil may spurt out or oil seal may spring out. Never touch the inner tube during removal procedure. Also wrap the oil seal with a rag for safety.





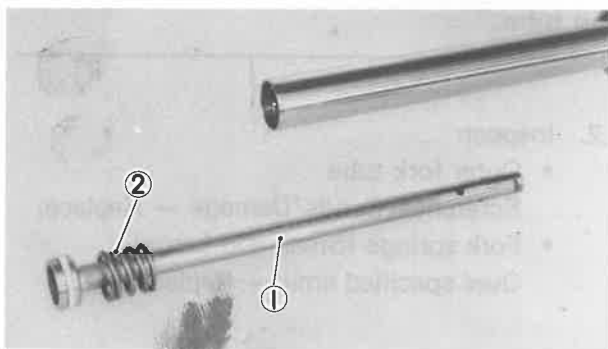
- Remove:
 - Stopper ring
 - Cap bolt
- Place an open container under the fork and turn the fork upside down and drain the oil.



- Remove:
 - Oil seal (1)
 - Seal spacer (2)



6. Remove:
 - Cylinder securing bolt
 Use Damper Rod Holder (90890-01294) (1) and T-Handle (90890-01367) (2) to lock the damper rod.

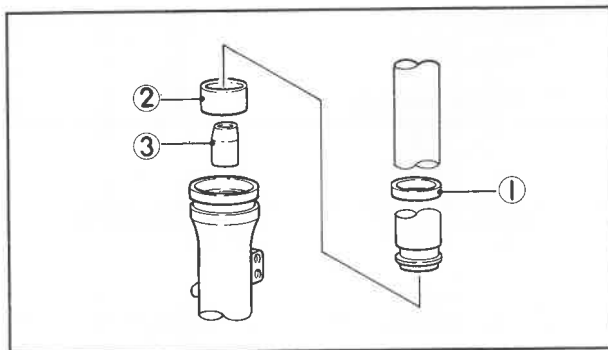
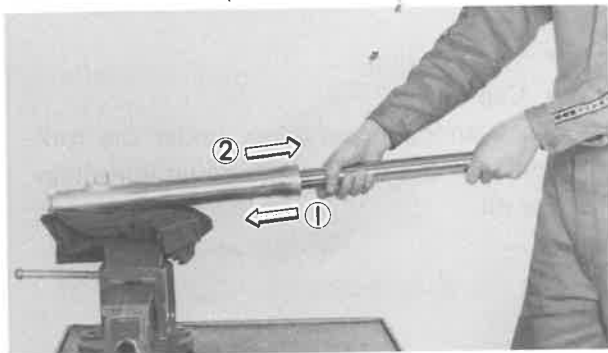


7. Remove:
 - Damper rod (cylinder complete) (1)
 - Rebound spring (2)

8. Remove:
 - Guide bush
 - Slide bush

Fork Bushes Removal Steps:

- Hold fork leg in a vise horizontally.
- Put in the inner fork tube just before it bottoms out and then pull it back quickly.



- Repeat this step until the inner fork tube can be pulled out from the outer fork tube (usual 2 or 3 times).

- ① Put in slowly
- ② Pull back quickly

CAUTION:

Don't bottom out the inner fork tube in the above step, or the oil lock piece will be damaged.

- Remove:
 - Guide bush ①
 - Slide bush ②
 - Oil lock piece ③

Inspection

1. Inspect:
 - Inner fork tube
Scratches/Bends → Replace.

WARNING:

Do not attempt to straighten a bent inner fork tube as this may dangerously weaken the tube.

2. Inspect:
 - Outer fork tube
Scratches/Bends/Damage → Replace.
 - Fork springs (Small and Large)
Over specified limit → Replace.

**Fork Spring Free Length (Limit):**

Large:

570.6 mm (22.46 in)

Small:

53.2 mm (2.09 in)



3. Inspect:

- O-ring (cap bolt)
Damage → Replace.
- Damper rod
Wear/Damage → Replace
Contamination → Blow out all oil passages with compressed air.
- Oil lock piece
Damage → Replace.

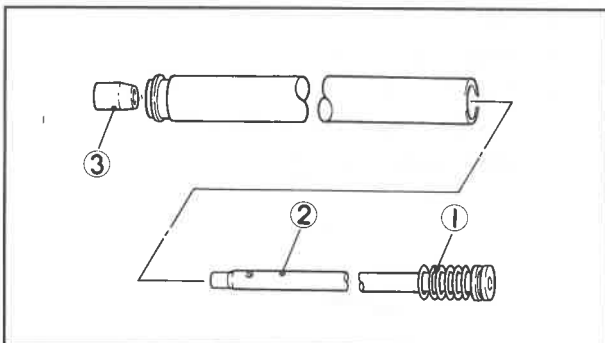
Assembly

Before assembling, clean and inspect all parts and replace when necessary.

NOTE:

In front fork assembly, be sure to use following new parts.

- Guide bush
- Slide bush
- Oil seal
- Dust seal



1. Install:

- Rebound spring ①
- Damper rod ②
Slide the damper rod into inner fork tube from its top.
- Oil lock piece ③
Fit oil lock piece over damper rod sticking out of inner fork tube.

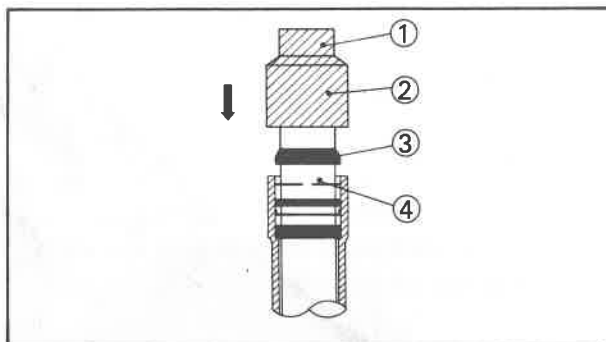
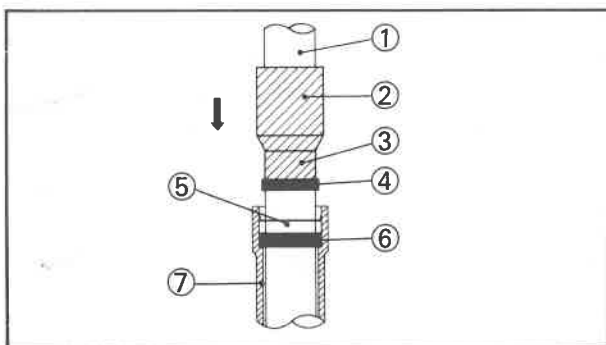
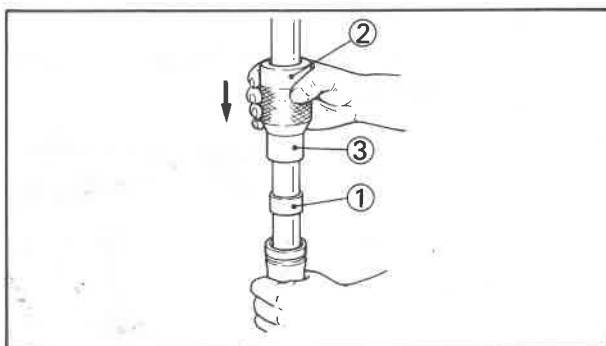


2. Install:
 - Inner fork tube
(Into outer tube)
3. Apply:
 - Thread-locking compound such as
LOCTITE®
To cylinder securing bolt.

4. Tighten:
 - Cylinder securing bolt
Use Damper Rod Holder (90890-01294)
and T-Handle (90890-01367) to lock the
damper rod.



20 Nm (2.0 m·kg, 14 ft·lb)



5. Install:
 - Guide bush (1)
(Into outer tube)
Use Fork Seal Driver Weight
(90890-01367) (2) and Adapter
(90890-01370) (3).
6. Apply:
 - Oil
To oil seal (4).
7. Install:
 - Seal spacer (5)
 - Oil seal
Use Special Tools (90890-01367,
90890-01370) (2), (3).
8. Install:
 - Retaining clip (4)
 - Dust seal (3)
Use Special Tools (90890-01370,
90890-01367) (1), (2).

① Inner tube ⑦ Outer tube
⑥ Guide bush

FRONT FORK

CHAS

9. Install:
 - Fork spring (Large)
 - Spring seat
 - Fork spring (Small)

10. Fill:
 - Front fork



Fork Oil Capacity (Each Fork):
366 cm³ (12.9 Imp oz, 12.4 US oz)



Recommended Oil:
SAE 10W30 TYPE SE
MOTOR OIL

NOTE:

After filling slowly pump the forks up and down to distribute the oil.

11. Install:
 - Cap bolt together with O-ring
 - Stopper ring
 - Rubber boot
 - Rubber cap

Installation

1. Install:
 - Front fork

NOTE:

Fit the front fork by pushing it up until its top is flush with the handle crown top end. Holding the front fork in this position, temporarily tighten the pinch bolts with fingers.



2. Tighten:
 - Pinch bolts



Pinch Bolts (Handle Crown):

23 Nm (2.3 m·kg, 17 ft·lb)

Pinch Bolts (Under Bracket):

20 Nm (2.0 m·kg, 14 ft·lb)

3. Install:
 - Brake caliper assembly



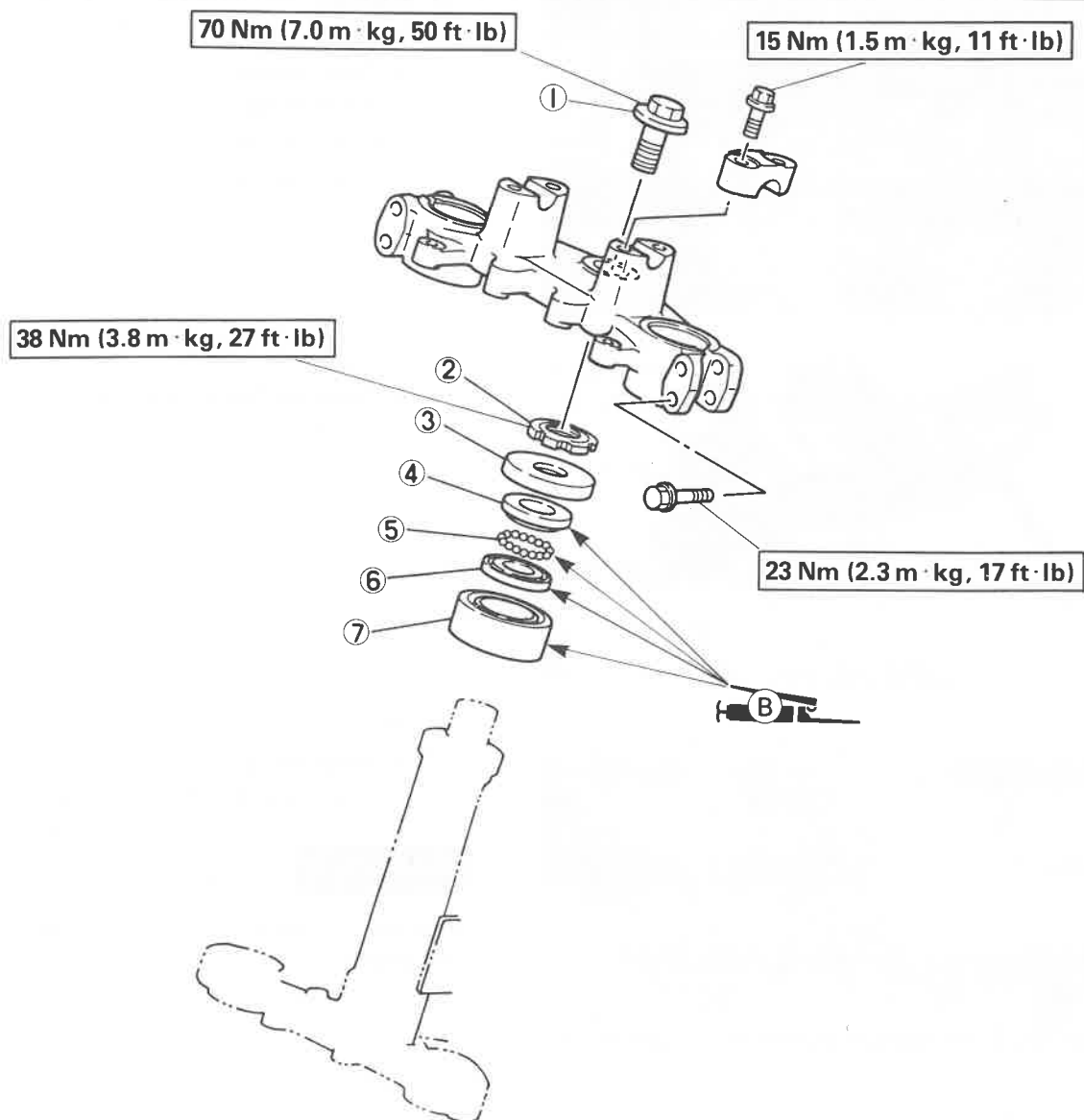
35 Nm (3.5 m·kg, 25 ft·lb)

4. Install:
 - Speedometer cable holder
 - Brake hose holder
 - Front wheel

Refer to "FRONT WHEEL" section.

**STEERING HEAD**

- ① Steering fitting bolt
- ② Ring nut
- ③ Ball race cover
- ④ Ball race (Upper)
- ⑤ Balls
- ⑥ Ball race (Lower)
- ⑦ Taper roller bearing

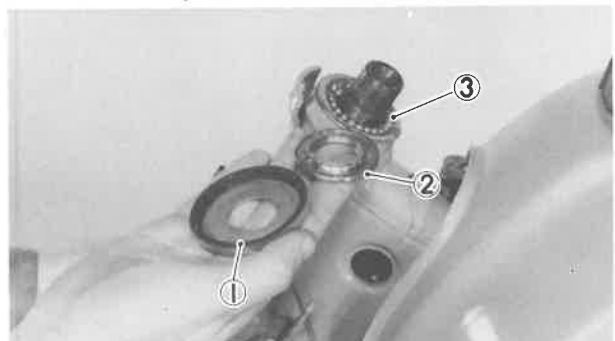
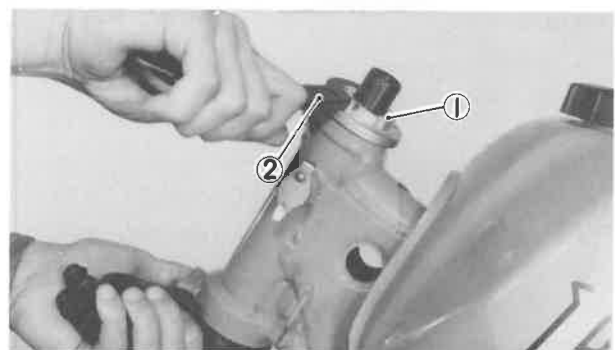
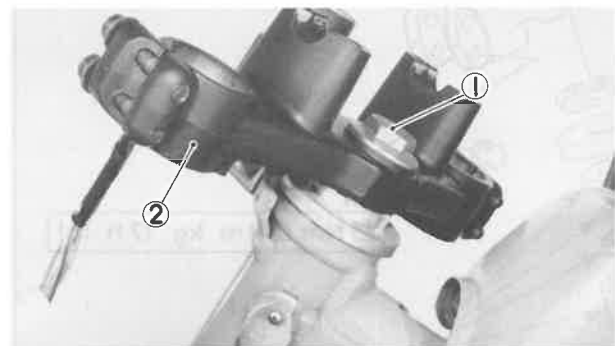
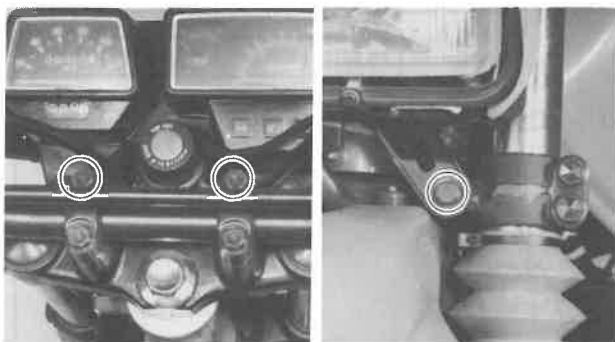




Removal

WARNING:

Securely support the motorcycle so there is no danger of it falling over.



1. Elevate the front wheel by placing a suitable stand under the engine.

2. Remove:

- Handlebars
- Front wheel
- Front forks
- Headlight stay
- Front fender

3. Remove:

- Steering fitting bolt ①
- Handle crown ②

4. Remove:

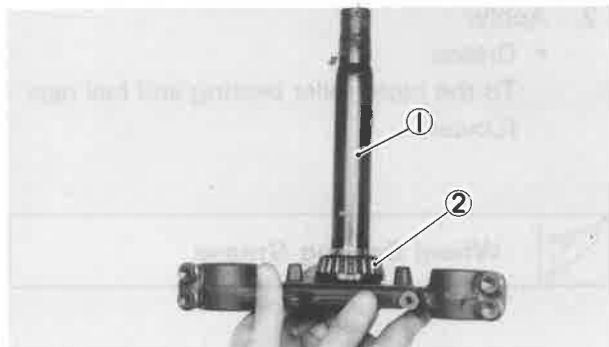
- Ring nut ①
Use Ring Nut Wrench (90890-01268) ②.

WARNING:

Support the under bracket so that it may not fall down.

5. Remove:

- Ball race cover ①
- Ball race (Upper) ②
- Balls ③



6. Remove:
 - Under bracket ①
 - Taper roller bearings ②

7. Remove:
 - Ball race (Lower)
Use a drift pinch and a hammer.

NOTE:

Work the race out gradually by tapping lightly around its complete backside diameter.

Inspection

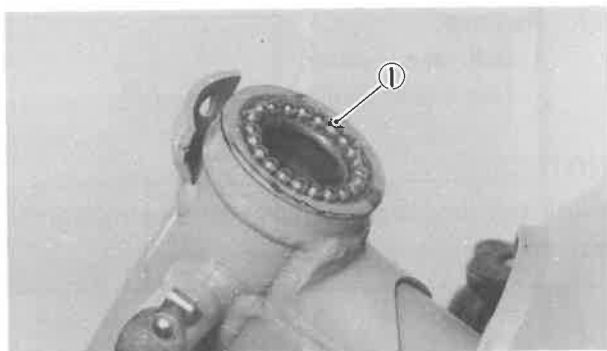
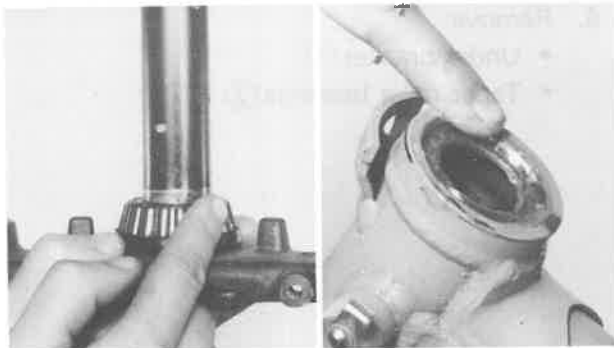
1. Wash the bearings in a solvent.
2. Inspect:
 - Bearings
Pitting/Damage → Replace.
 - Bearing race
Pitting/Damage → Replace.

NOTE:

Always replace bearing and race as a set.

Assembly

1. Install:
 - Ball race (Lower)
Tap in the new race.
 - Taper roller bearing
To the under bracket.



2. Apply:
 - Grease
To the taper roller bearing and ball race (Lower).

**Wheel Bearing Grease**

3. Install:
 - Balls ①
Arrange the balls around race, and apply more grease.

Ball Quantity/Size:
22 pcs./ 3/16 in

4. Install:
 - Under bracket

CAUTION:

Hold the under bracket until it is secured.

- Ball race (Upper)
- Ball race cover

5. Tighten:
 - Ring nut



38 Nm (3.8 m·kg, 27 ft·lb)

WARNING:

Do not overtighten.

6. Install:
 - Handle crown
 - Steering fitting bolt



70 Nm (7.0 m·kg, 50 ft·lb)



8. Check:

- Steering operation
Turn the steering from lock to lock.

9. Install:

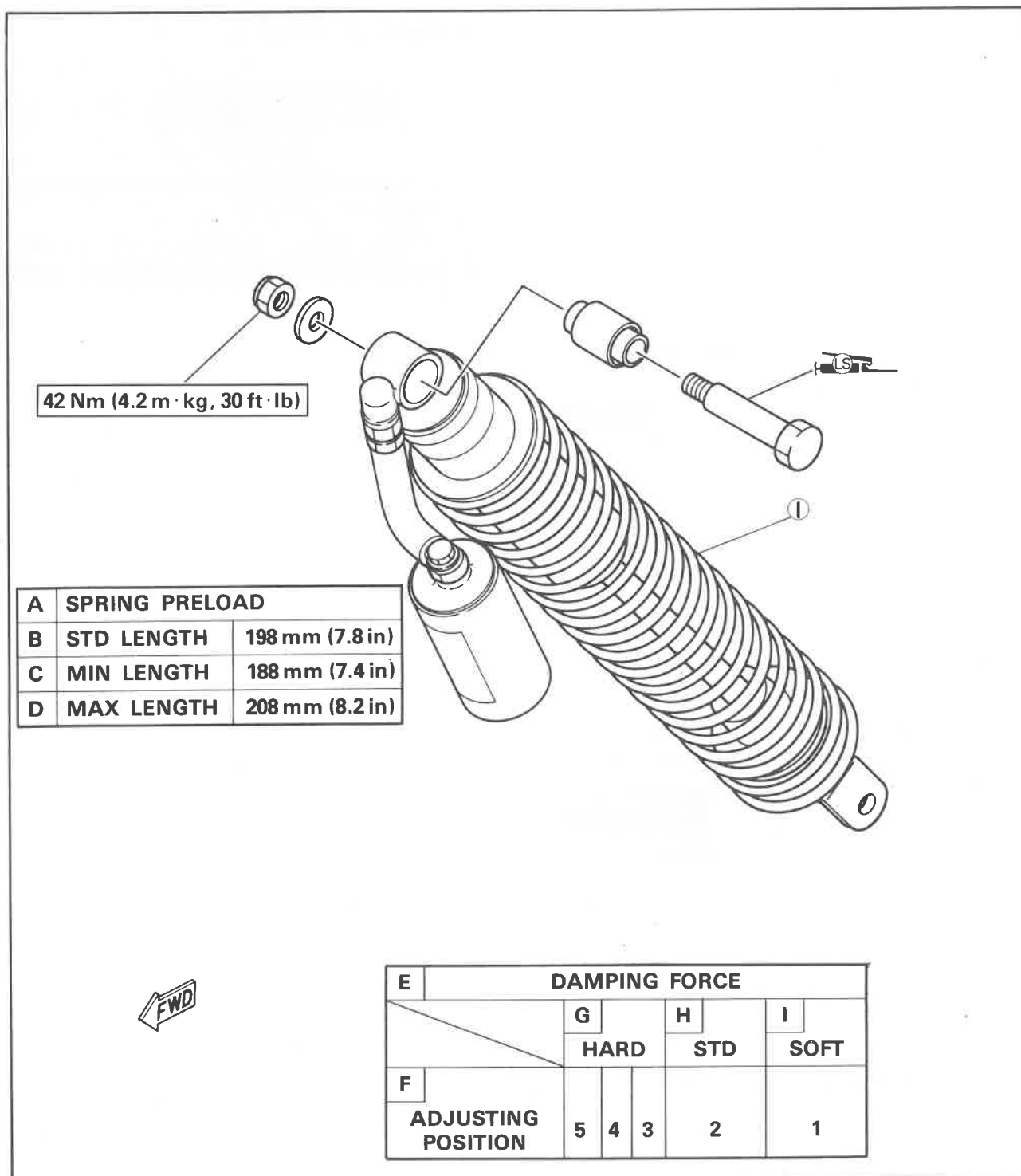
- Components in above list (Removal Step "2")

Refer to "FRONT WHEEL, FRONT FORK and Steering Head Adjustment" section.



REAR SHOCK ABSORBER (MONOCROSS SUSPENSION "DE CARBN" SYSTEM)

- ① Rear shock absorber assembly





Handling Notes

WARNING:

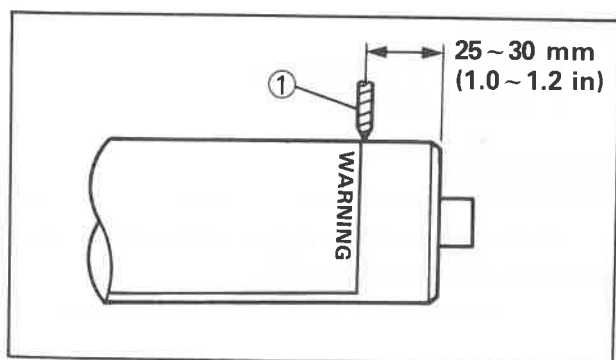
This shock absorber contains highly pressurized nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result

from improper handling.

1. Do not tamper with or attempt to open the cylinder assembly.
2. Do not subject shock absorber to an open flame or other high heat source. This may cause the unit to explode due to excessive gas pressure.
3. Do not deform or damage the cylinder in any way. Cylinder damage will result

in poor damping performance.

4. Take care not to scratch the contact surface of the piston rod with the cylinder; or oil could leak out.
5. When scrapping the shock absorber, follow the instructions on disposal.

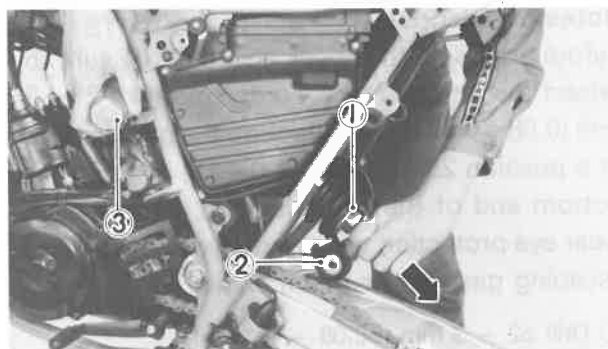
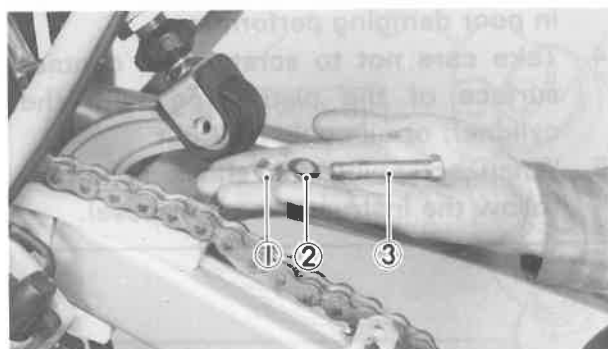
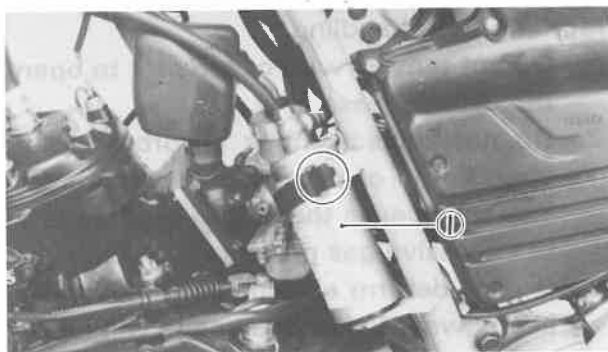
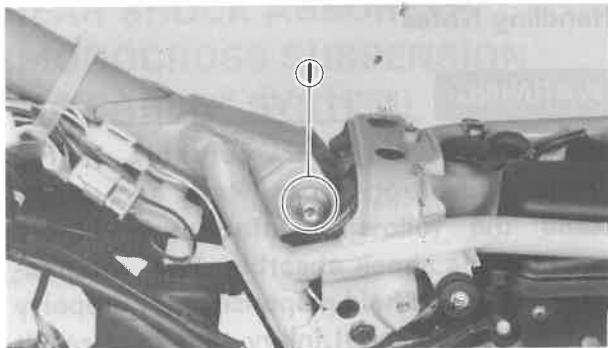


Notes on Disposal

Before disposing the shock absorber, be sure to extract the nitrogen gas. To do so, drill a 2 ~ 3 mm (0.08 ~ 0.12 in) hole through the gas chamber at a position 25 ~ 30 mm (1.0 ~ 1.2 in) from the bottom end of the gas chamber. At this time, wear eye protection to prevent eye damage from escaping gas and/or metal chips.

- ① Drill $\phi 2 \sim 3$ mm ($\phi 0.08 \sim 0.12$ in)

tection to prevent eye damage from escaping gas and/or metal chips.



Removal

1. Remove:
 - Seat
 - Fuel tank
 - Rear wheel
 - Chain case
 - Shock absorber top holding bolt ①
2. Remove:
 - Rear shock absorber gas chamber ①
3. Remove:
 - Shock absorber bottom holding nut ①
 - Plain washer ②
 - Shock absorber bottom holding bolt ③
4. Remove:
 - Rear shock absorber ①
 - Rubber boot ②

CAUTION:

Avoid damaging the rubber hose and shock absorber gas chamber ③.

Inspection

1. Inspect:
 - Shock absorber rod
Bends/Damage → Replace absorber assembly.
 - Shock absorber
Oil leaks → Replace absorber assembly.



2. Inspect:

- Spring

Fatigue → Replace absorber assembly.
Move spring up and down.

Assembly

When assembling the rear shock absorber, reserve the removal procedure. Note the following points.

1. Adjust:

- Spring preload/damping force
Refer to "Rear Shock Absorber Adjustment" section.

2. Apply:

- Lithium base grease
To pivot points.

3. Tighten:

- Shock absorber holding nuts (Top and Bottom)

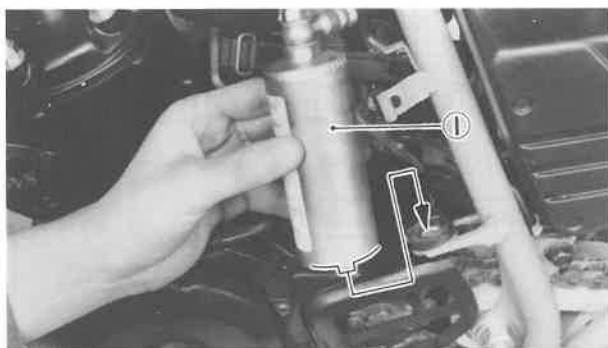


Holding Nut (Top):

42 Nm (4.2 m·kg, 30 ft·lb)

Holding Nut (Bottom):

42 Nm (4.2 m·kg, 30 ft·lb)



4. Install:

- Rear shock absorber gas chamber ①

NOTE:

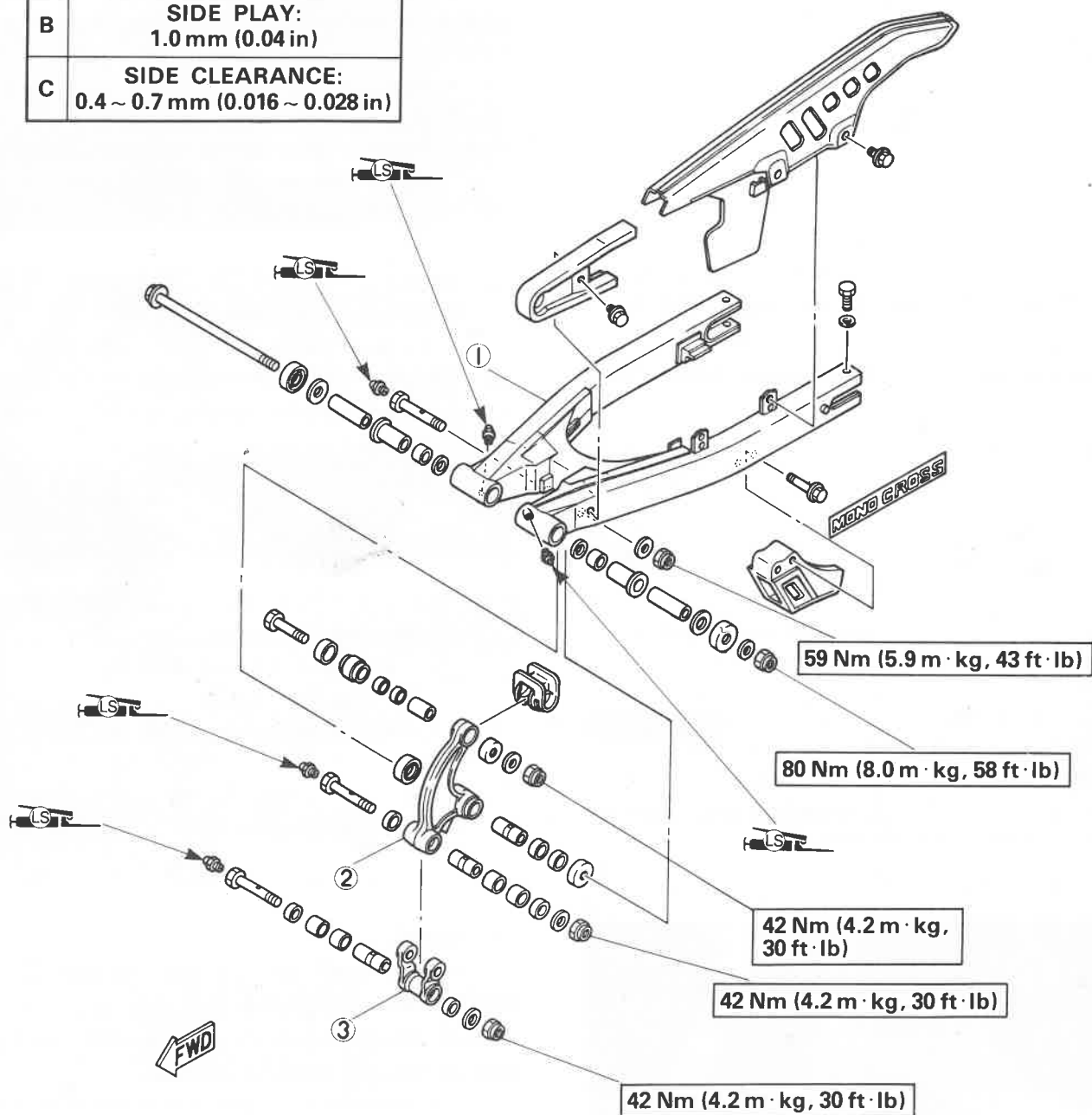
Insert the projection on the gas chamber into the hole on the gas chamber bracket.



SWINGARM

- ① Swingarm
- ② Relay arm
- ③ Relay arm connecting rod

A	SWINGARM:
B	SIDE PLAY: 1.0 mm (0.04 in)
C	SIDE CLEARANCE: 0.4 ~ 0.7 mm (0.016 ~ 0.028 in)





Inspection

1. Remove:

- Rear wheel
- Rear shock absorber



2. Check:

- Swingarm (side play)
Over specified limit → Replace bushing or bearings.
Move swingarm from side to side.

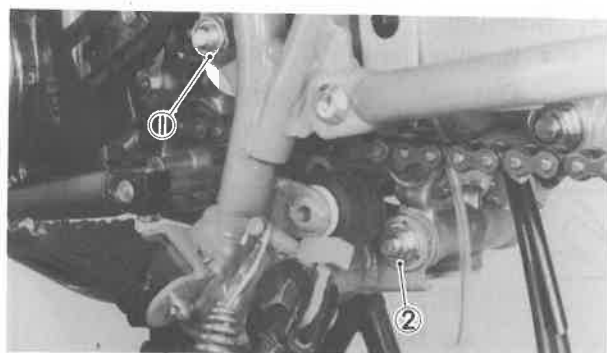


Side Play (At End of Swingarm):
1.0 mm (0.04 in)



3. Check:

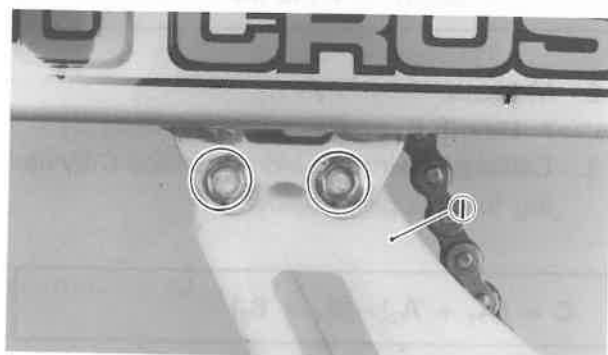
- Swingarm (Vertical movement)
Tightness/Binding/Rough Spots → Replace bearings.
Move swingarm up and down.



Removal

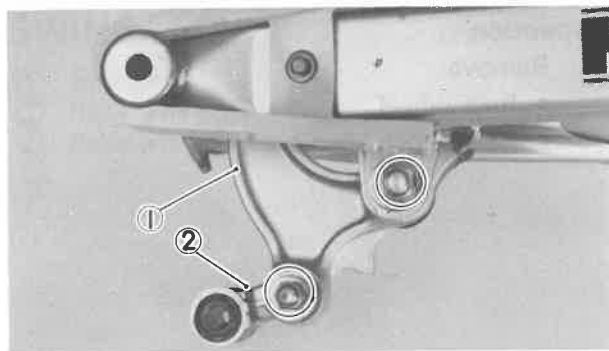
1. Remove:

- Pivot shaft securing nut ①
- Relay arm connecting rod securing nut ②



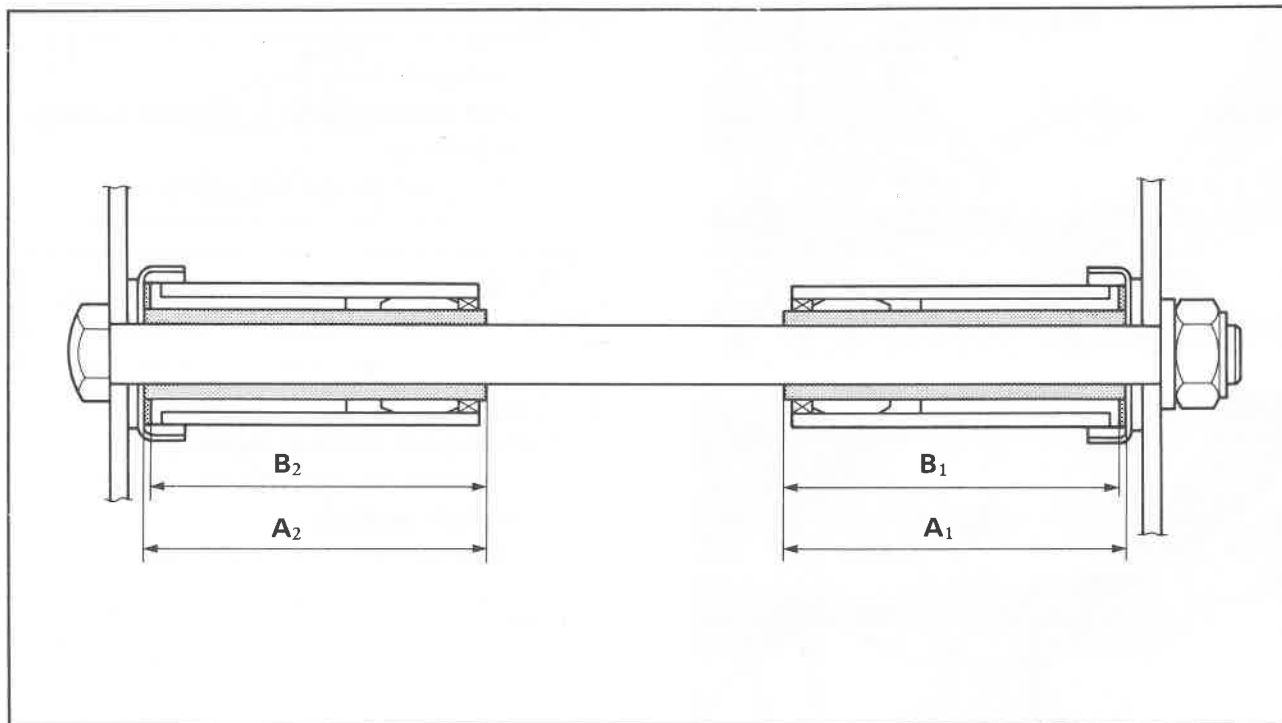
2. Remove:

- Chain guide ①
- Swingarm assembly ②



3. Remove:
 - Relay arm ①
 - Relay arm connecting rod ②

Adjustment



1. Measure:
 - Bushing length A_1 and A_2
Out of specification → Replace bushings



Specified Length:

A_1 : 68.75 ~ 69.05 mm
(2.707 ~ 2.719 in)

A_2 : 68.75 ~ 69.05 mm
(2.707 ~ 2.719 in)

2. Measure:
 - Length B_1 and B_2
3. Calculate swingarm side clearance C by using formula given below:

$$C = (A_1 + A_2) - (B_1 + B_2)$$



Side Clearance:

0.4 ~ 0.7 mm (0.016 ~ 0.028 in)

Out of specification → Adjust side clearance by means of shim.

4. Adjust:

- Side clearance
Use the shim(s).



Shim Thickness:

0.3 mm (0.012 in)

NOTE:

If only one shim is used, install it on the left side.
Two shims must be installed both sides.



Inspection and Lubrication

1. Inspect:

- Thrust covers and oil seals
Damage → Replace.
- Bushings
Scratches/Damage → Replace.

2. Install:

- New bushings

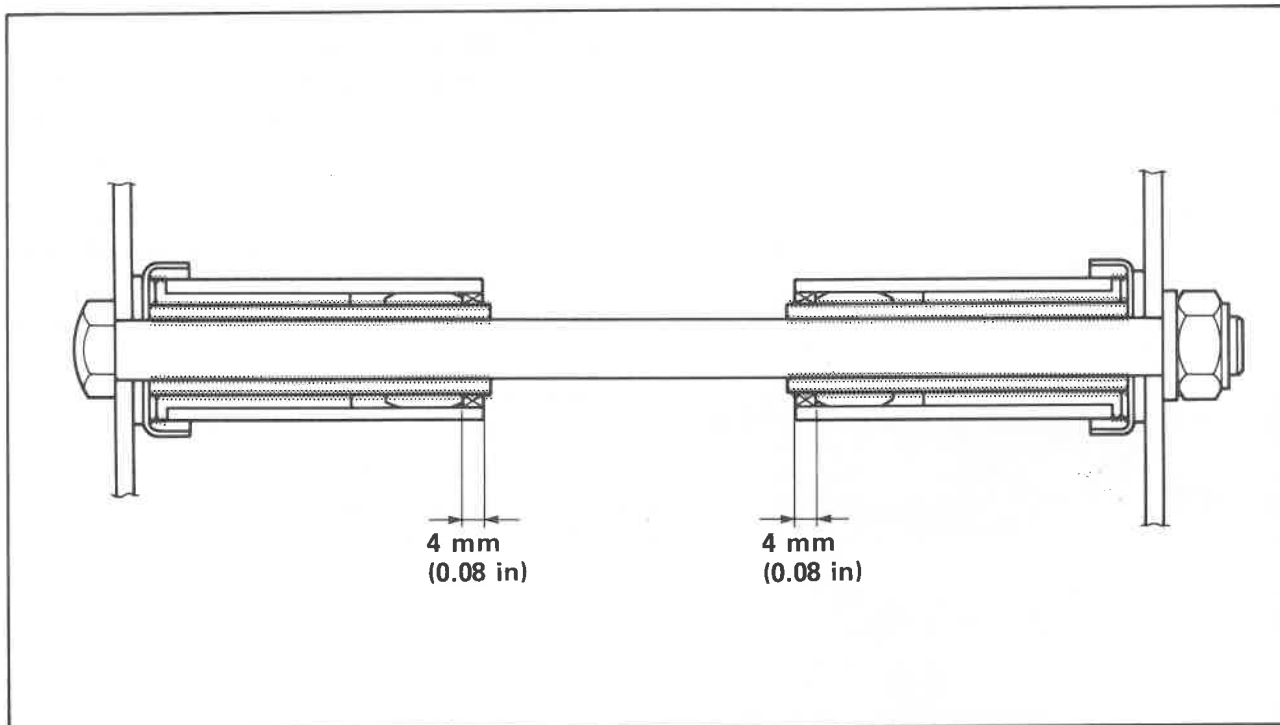
NOTE:

When pressing the new bushings, note attention to the following points:

1. Bushings should be exactly located as shown in the installation [4 mm (0.16 in) from each side.]



2. Grease them liberally with lithium base waterproof wheel bearing grease.



Assembly

When assembling the swingarm, reverse the removal procedure. Note the following points.

1. Tighten:
 - Securing nuts



Relay Arm and Relay Arm Connecting Rod:

42 Nm (4.2 m·kg, 30 ft·lb)



Swingarm and Relay Arm:

59 Nm (5.9 m·kg, 43 ft·lb)

Relay Arm Connecting Rod and Frame:

42 Nm (4.2 m·kg, 30 ft·lb)

SWINGARM/DRIVE CHAIN AND SPROCKETS

CHAS**Pivot Shaft:****80 Nm (8.0 m·kg, 58 ft·lb)**

2. Apply:
 - Lithium base grease
To pivot points (Refer to page 6-40.)
3. Check:
 - Swingarm movement

DRIVE CHAIN AND SPROCKETS

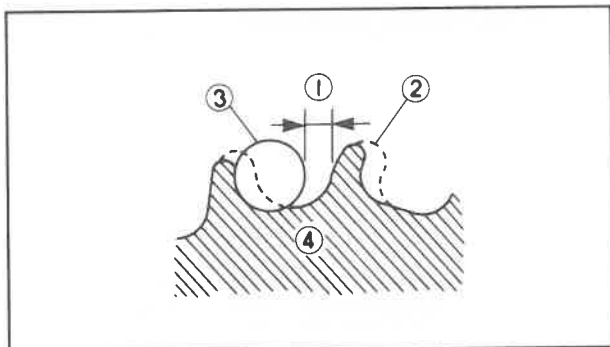
Removal

1. Drive sprocket
 - a. Flatten:
 - Lock washer tab
Use a blunt chisel.
 - b. Remove:
 - Sprocket securing bolts
 - c. Remove:
 - Lock washers
Apply the rear brake.
2. Driven sprocket
 - a. Remove:
 - Rear wheel
 - b. Flatten:
 - Lock washer tab
Use a blunt chisel.
 - c. Remove:
 - Sprocket securing nuts
 - Lock washers
 - Driven sprocket

**Inspection**

1. Inspect:

- O-rings
Damage/Miss → Replace.
- Rollers and side plates
Damage/Wear → Replace.



2. Inspect:

- Drive and driven sprockets
Wear/Damage → Replace.

- ① 1/4 tooth
- ② Correct
- ③ Roller
- ④ Sprocket

Assembly

When assembling the sprockets, reverse the removal procedure. Note the following points.

1. Tighten:

- Sprockets

**Drive Sprocket:**

10 Nm (1.0 m·kg, 7.2 ft·lb)

**Driven sprocket:**

62 Nm (6.2 m·kg, 45 ft·lb)

2. Adjust:

- Drive chain
- Rear brake



CHAPTER 7.

ELECTRICAL

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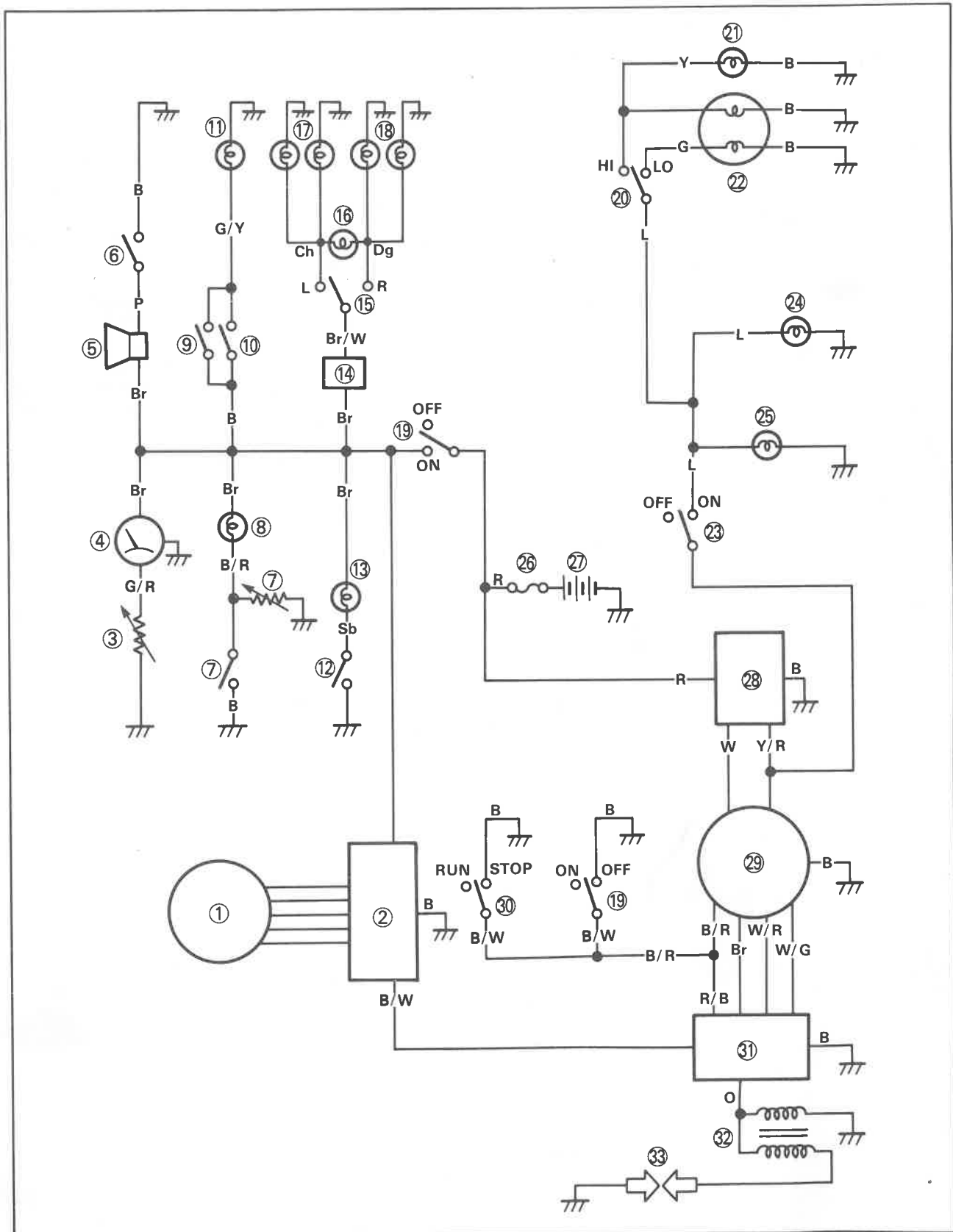
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ELECTRICAL

DT200L CIRCUIT DIAGRAM



CIRCUIT DIAGRAM

ELEC



- ① Servomotor
- ② YPVS Control unit
- ③ Thermo-unit
- ④ Temperature gauge
- ⑤ Horn
- ⑥ "HORN" switch
- ⑦ Oil level switch
- ⑧ "OIL" warning indicator light
- ⑨ Front brake switch
- ⑩ Rear brake switch
- ⑪ Brake light
- ⑫ Neutral switch
- ⑬ "NEUTRAL" indicator light
- ⑭ Flasher relay
- ⑮ "TURN" switch
- ⑯ "TURN" indicator light
- ⑰ Flasher light (Left)
- ⑱ Flasher light (Right)

- ⑲ Main switch
- ⑳ "LIGHTS" (Dimmer) switch
- ㉑ "HIGH BEAM" indicator light
- ㉒ Headlight
- ㉓ "LIGHTS" switch
- ㉔ Taillight
- ㉕ Meter light
- ㉖ Fuse
- ㉗ Battery
- ㉘ Rectifier with regulator
- ㉙ CDI magneto
- ㉚ "ENGINE STOP" switch
- ㉛ CDI unit
- ㉜ Ignition coil
- ㉝ Spark plug

Color Code

B	Black
Br	Brown
Ch	Chocolate
Dg	Dark green
G	Green
Gy	Gray
L	Blue
O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow

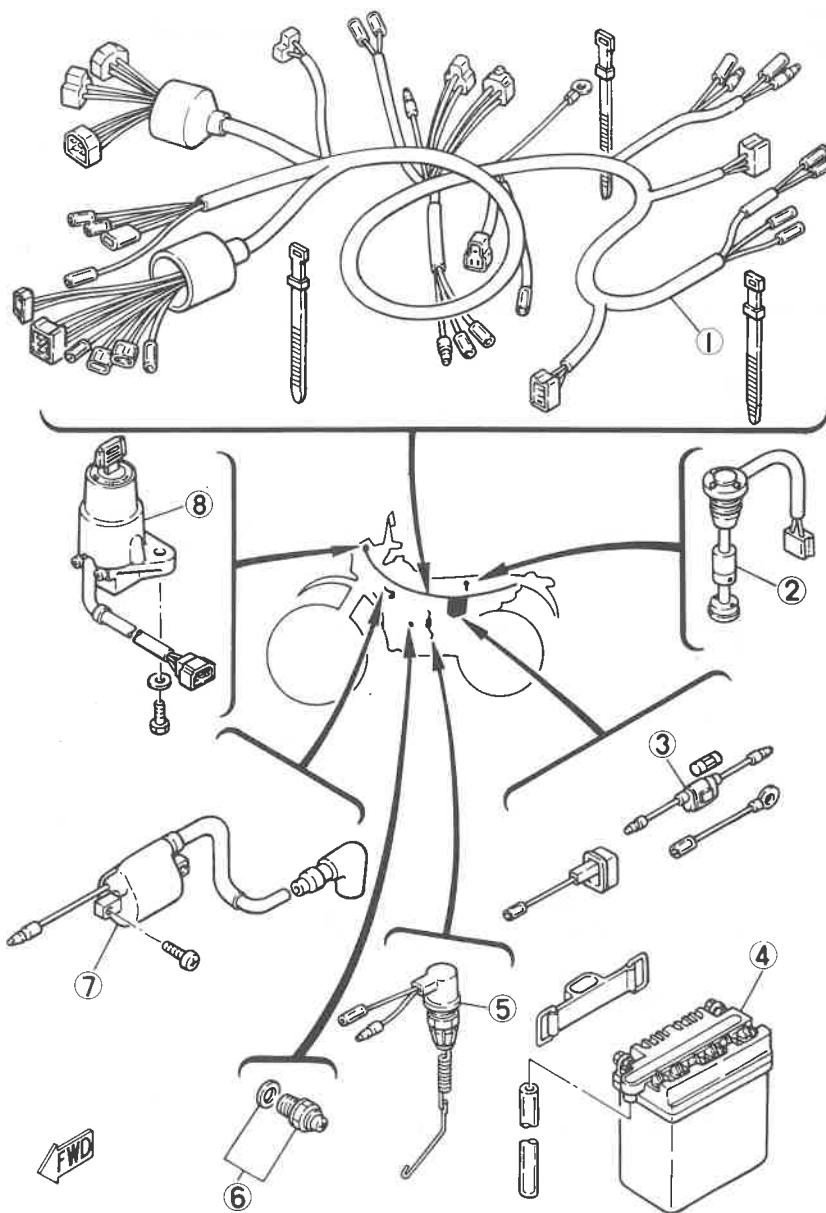
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/W	Brown/White
G/R	Green/Red
G/Y	Green/Yellow
L/R	Blue/Red
R/B	Red/Black
W/B	White/Black
W/G	White/Green
W/R	White/Red
Y/L	Yellow/Blue
Y/R	Yellow/Red



ELECTRICAL COMPONENTS 1

- ① Wire harness
- ② Oil level switch
- ③ Fuse
- ④ Battery
- ⑤ Rear brake switch
- ⑥ Neutral switch
- ⑦ Ignition coil
- ⑧ Main switch

SPECIFICATIONS	RESISTANCE
IGNITION COIL: PRIMARY	$0.6\Omega \pm 10\%$
SECONDARY	$6.6k\Omega \pm 20\%$

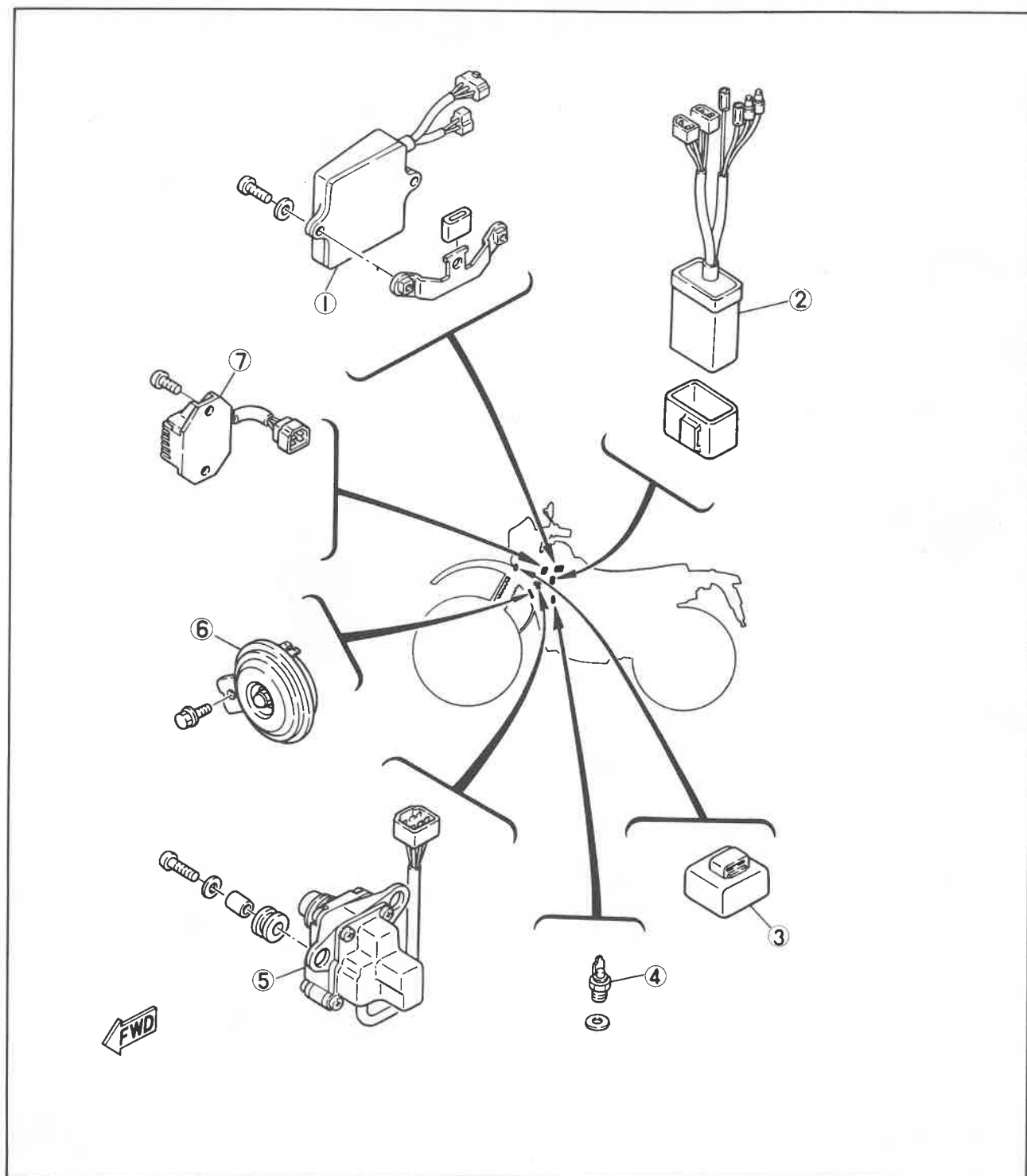


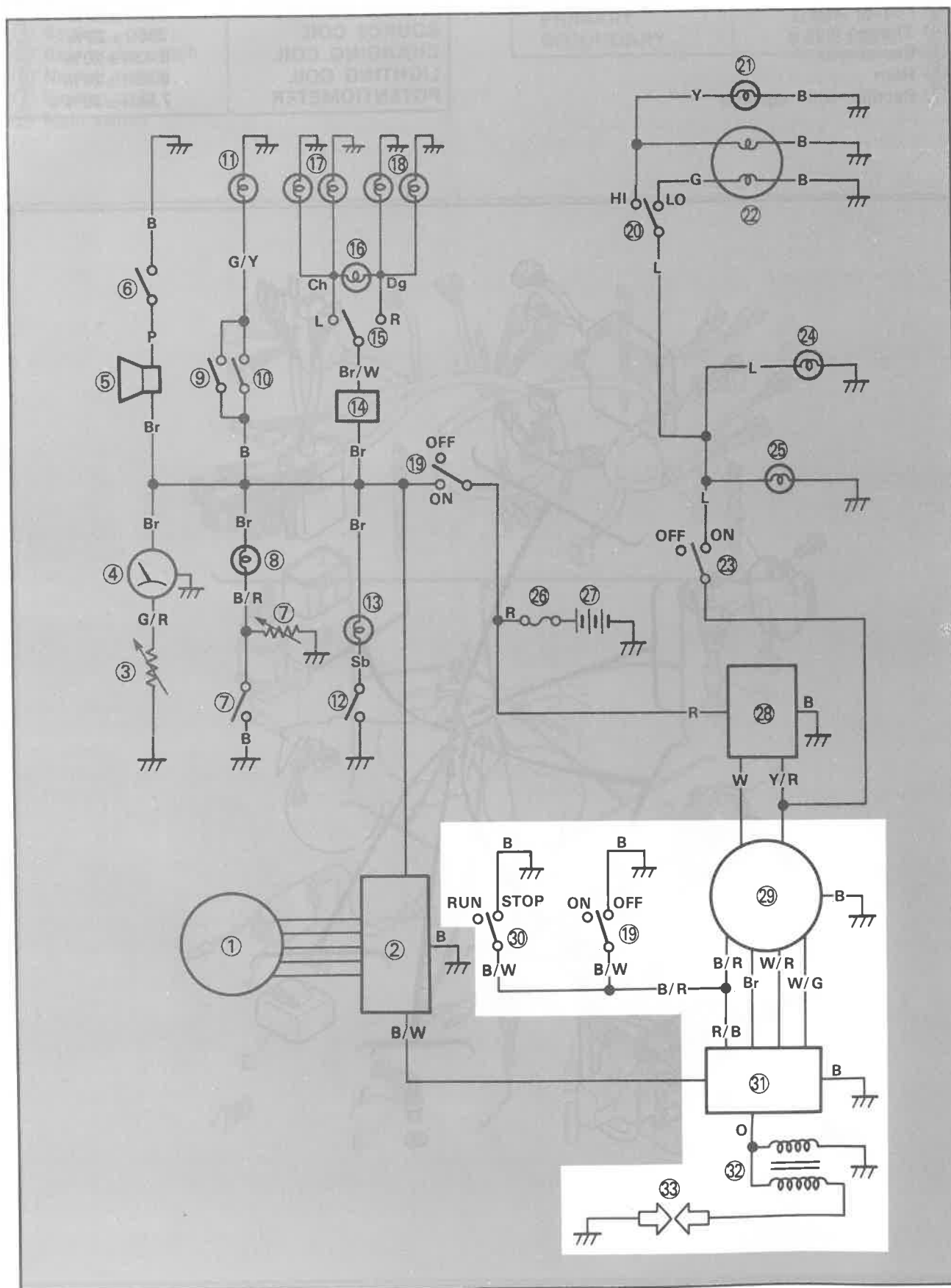


ELECTRICAL COMPONENTS 2

- ① Y.P.V.S. Control unit
- ② CDI unit
- ③ Flasher relay
- ④ Thermo-unit
- ⑤ Servomotor
- ⑥ Horn
- ⑦ Rectifier with regulator

SPECIFICATIONS	RESISTANCE
PICKUP COIL	$350\Omega \pm 20\%$
SOURCE COIL	$355\Omega \pm 20\%$
CHARGING COIL	$0.43\Omega \pm 20\%$
LIGHTING COIL	$0.35\Omega \pm 20\%$
POTENTIOMETER	$7.5k\Omega \pm 30\%$





IGNITION SYSTEM

ELEC

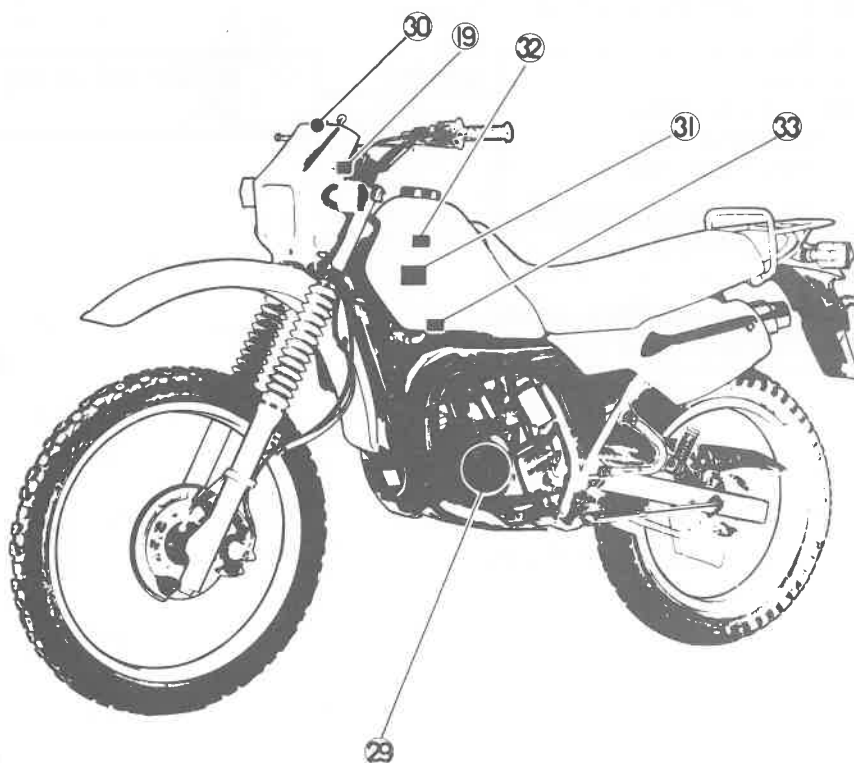


Aforementioned circuit diagram shows ignition circuit in wiring diagram.

NOTE:

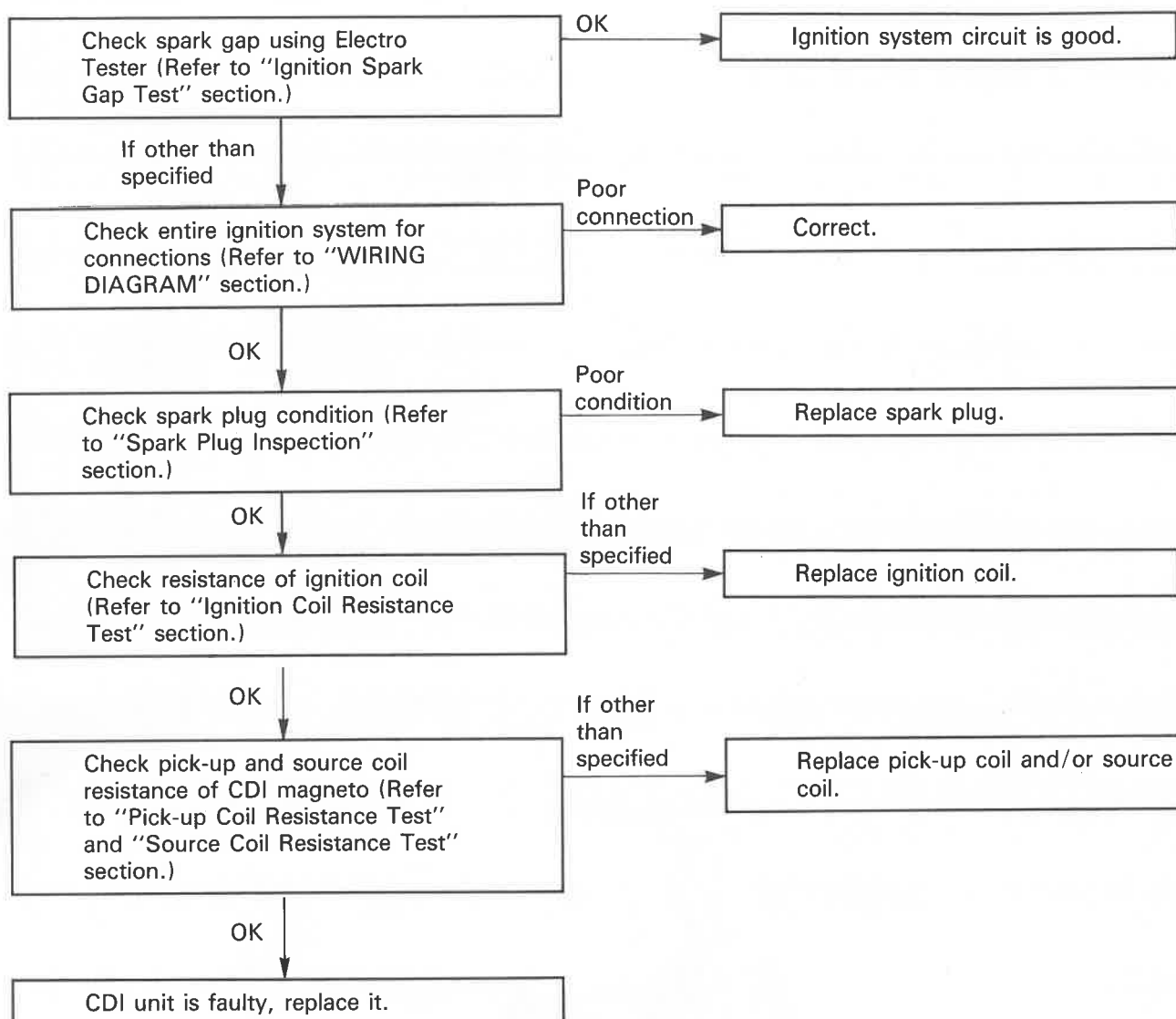
For the encircled numbers and color codes, see page 7-3.

- ① Main switch
- ② CDI magneto
- ③ "ENGINE STOP" switch
- ④ CDI unit
- ⑤ Ignition coil
- ⑥ Spark plug



**Troubleshooting**

If the ignition system should become inoperative (No spark or intermittent spark), the troubleshooting aids will be useful.



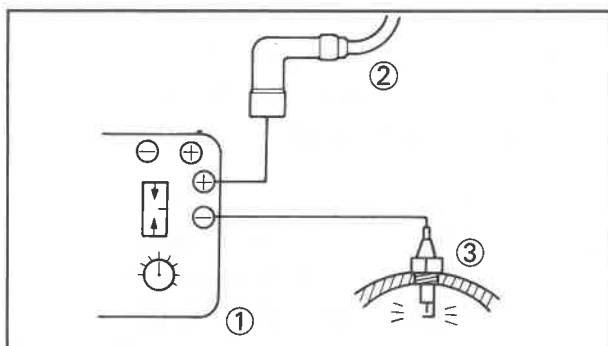


Ignition Timing Check

Refer to "CHAPTER 2. Ignition Timing Check" section.

Ignition Spark Gap Test

1. Warm up engine thoroughly so that all electrical components are at operating temperature.
2. Connect:
 - Electro Tester (90890-03021) ①
3. Check:
 - Minimum spark gap
Start the engine, and increase the spark gap until misfire occurs (Test at various revolution between 1,300 ~ 8,000 r/min.)



- ② Spark plug lead
③ Spark plug

CAUTION:

Do not run the engine in neutral above 6,000 r/min for more than 1 or 2 seconds.

Minimum Spark Gap:
6 mm (0.24 in)

Faulty ignition system operation (at the minimum spark gap or smaller) → Follow the troubleshooting chart until the source of the problem is located.

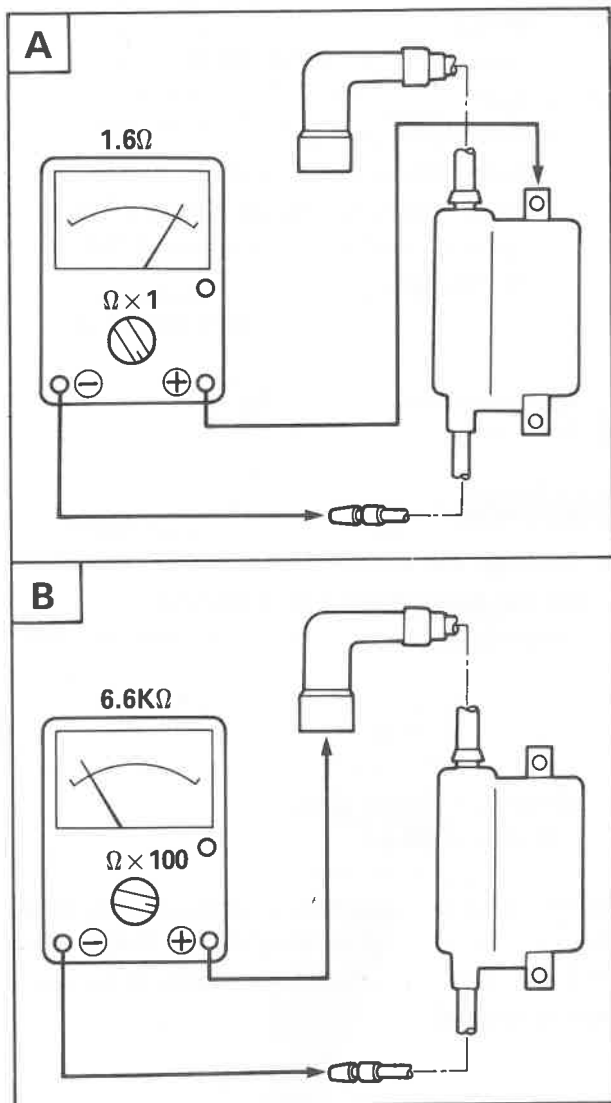
Spark Plug Inspection

Refer to "CHAPTER 2. Spark Plug Inspection" section.



Ignition Coil Resistance Test

1. Remove:
 - Fuel tank
2. Disconnect:
 - Ignition coil lead
 - Spark plug lead
3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "Ohm $\times 1$ " (For primary winding resistance check) or "Ohm $\times 100$ " (For secondary winding resistance check) position.
4. Measure:
 - Primary coil resistance **A**
 - Secondary coil resistance **B**
Out of specification \rightarrow Replace.



Primary Coil Resistance:

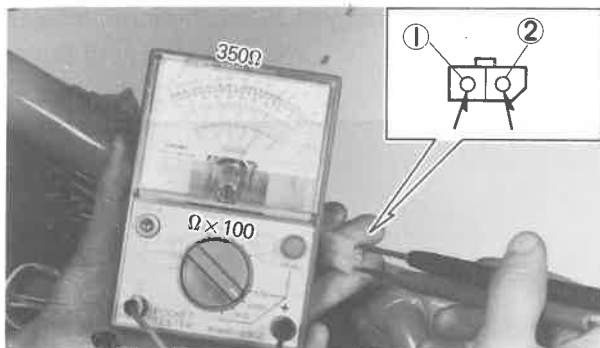
$1.6\Omega \pm 10\%$ at 20°C (68°F)

Secondary Coil Resistance:

$6.6k\Omega \pm 20\%$ at 20°C (68°F)

Pick-up Coil Resistance Test

1. Remove:
 - Fuel tank
2. Disconnect:
 - Pick-up coil connector (White/Red - White/Green)
(from CDI magneto)



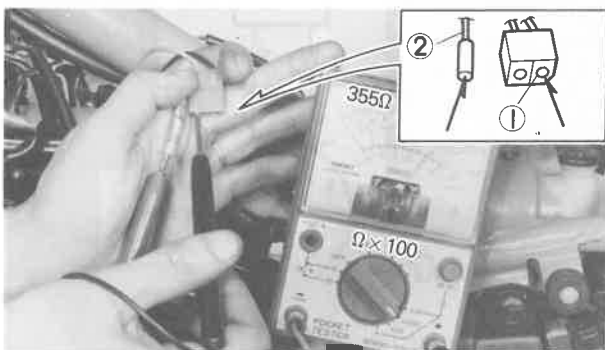
3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "Ohm × 100" position.
 4. Measure:
 - Pick-up coil resistance
Out of specification → Replace.
- ① White/Red
② White/Green



Pick-up Coil Resistance:
350 Ω ± 20% at 20°C (68°F)

Source Coil Resistance

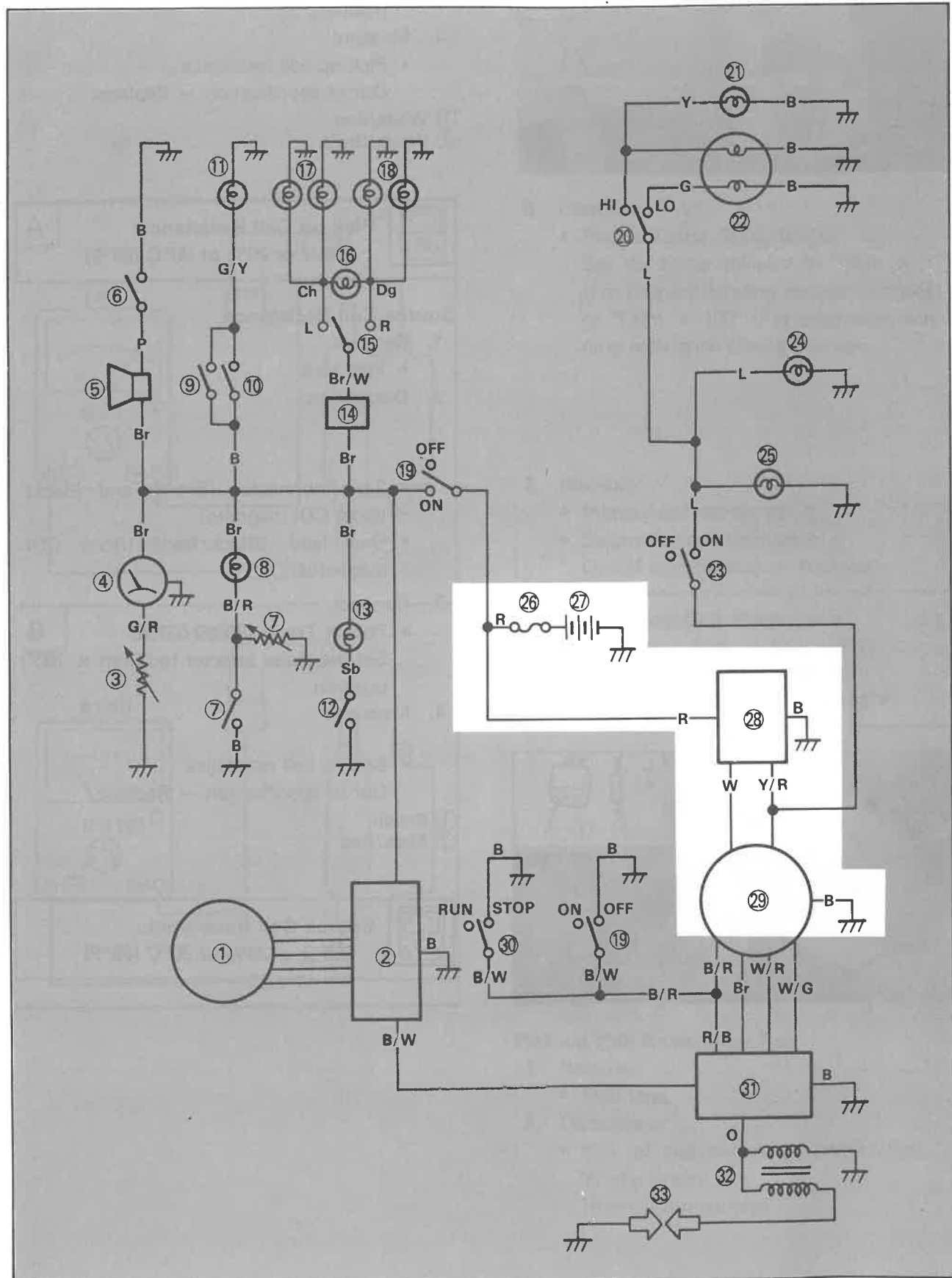
1. Remove:
 - Fuel tank
 2. Disconnect:
 - 2-pin connector (Brown and Black) (from CDI magneto)
 - One lead (Black/Red) (from CDI magneto)
 3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "Ohm × 100" position.
 4. Measure:
 - Source coil resistance
Out of specification → Replace.
- ① Brown
② Black/Red



Source Coil Resistance:
355 Ω ± 20% at 20°C (68°F)

CHARGING SYSTEM

Circuit Diagram



CHARGING SYSTEM

ELEC

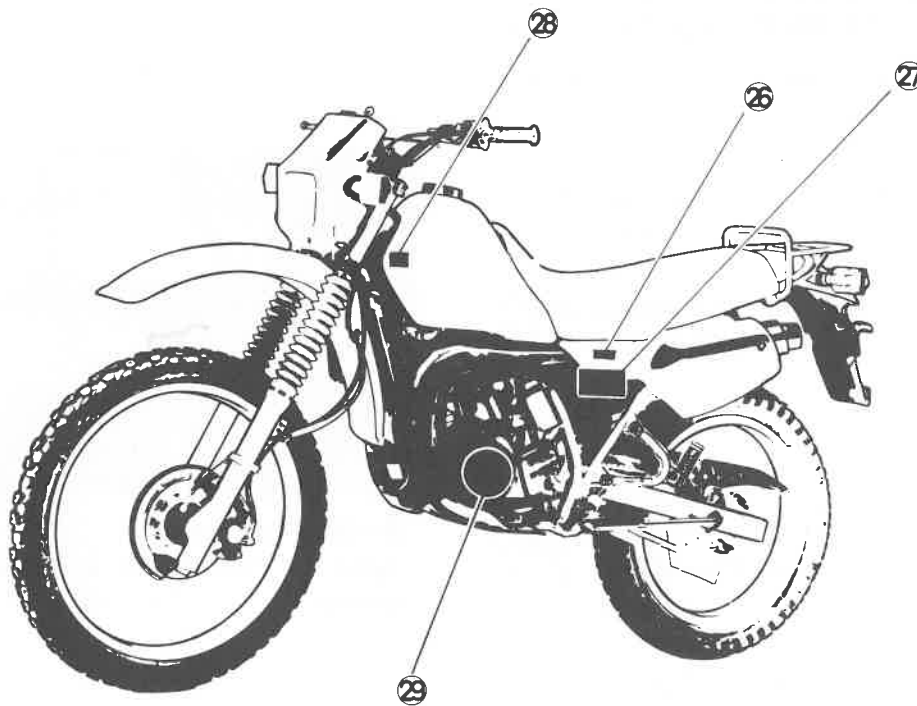


Aforementioned circuit diagram shows charging circuit in wiring diagram. *

NOTE:

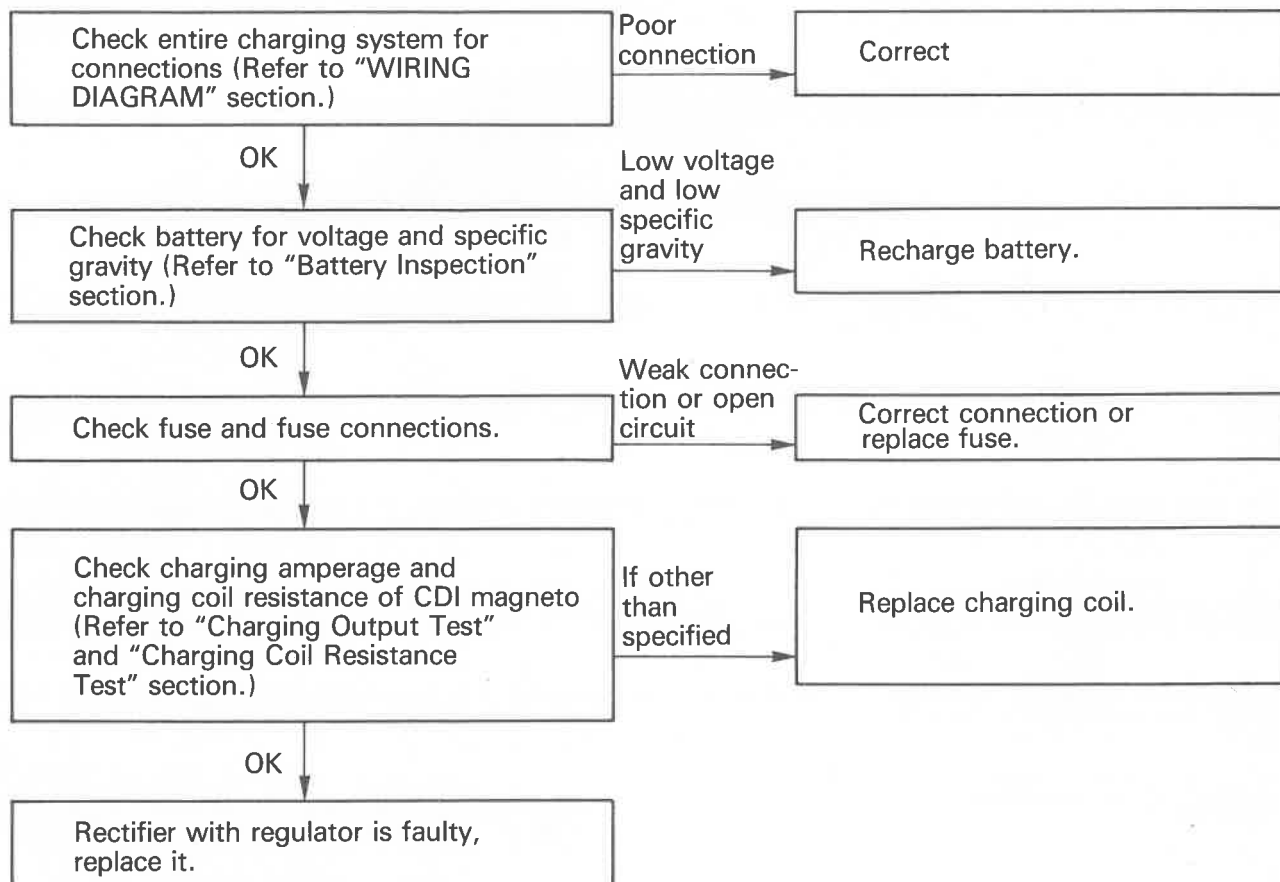
For the encircled numbers and color codes, see page 7-3.

- ②6 Fuse
- ②7 Battery
- ②8 Rectifier with regulator
- ②9 CDI magneto



**Troubleshooting**

If the charging system should become inoperative, the troubleshooting aids will be useful.

**Battery Inspection**

Refer to "CHAPTER 2. Battery Inspection" section.



Charging Output Test

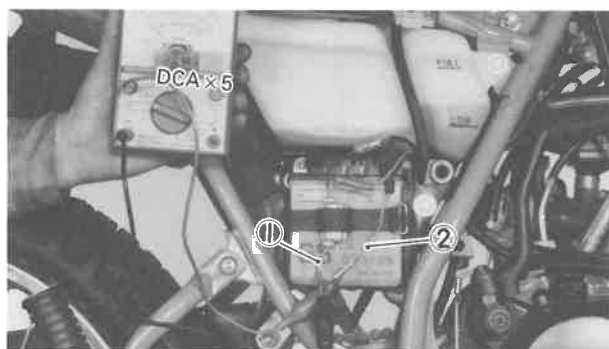
NOTE:

The battery must be fully charged when testing the charging output.

1. Remove:
 - Fuel tank
2. Disconnect:
 - Fuse positive lead (Red)
3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "DC A \times 5" position.
4. Start the engine.
5. Accelerate the engine to specifications and check the charging amperage.

CAUTION:

Never disconnect the leads from the battery before stopping the engine.



6. Measure:
 - Charging output amperage
Out of specification → Perform the next test.
- ① Fuse positive lead
② Battery positive lead

**Charging Output Amperage:****Day:**

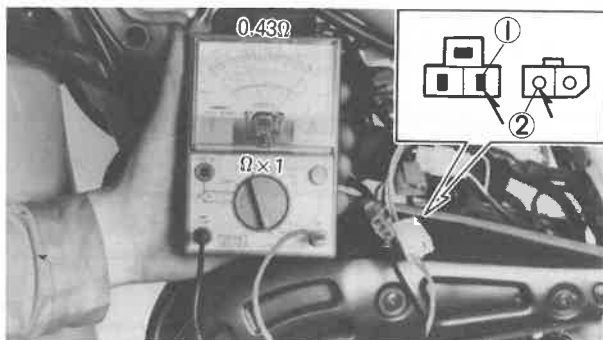
0.7 A or more 2,000 r/min
1.8 A or less 8,000 r/min

Night:

0.3 A or more 2,000 r/min
1.8 A or less 8,000 r/min

**Charging Coil Resistance Test**

1. Remove:
 - Fuel tank
2. Disconnect:
 - 3-pin connector (Sky blue, White and Yellow/Red) (from CDI magneto)
 - 2-pin connector (Brown and Black) (from CDI magneto)



3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "Ohm × 1" position.
4. Measure:
 - Charging coil resistance
Out of Specification → Replace.

- ① White
② Black

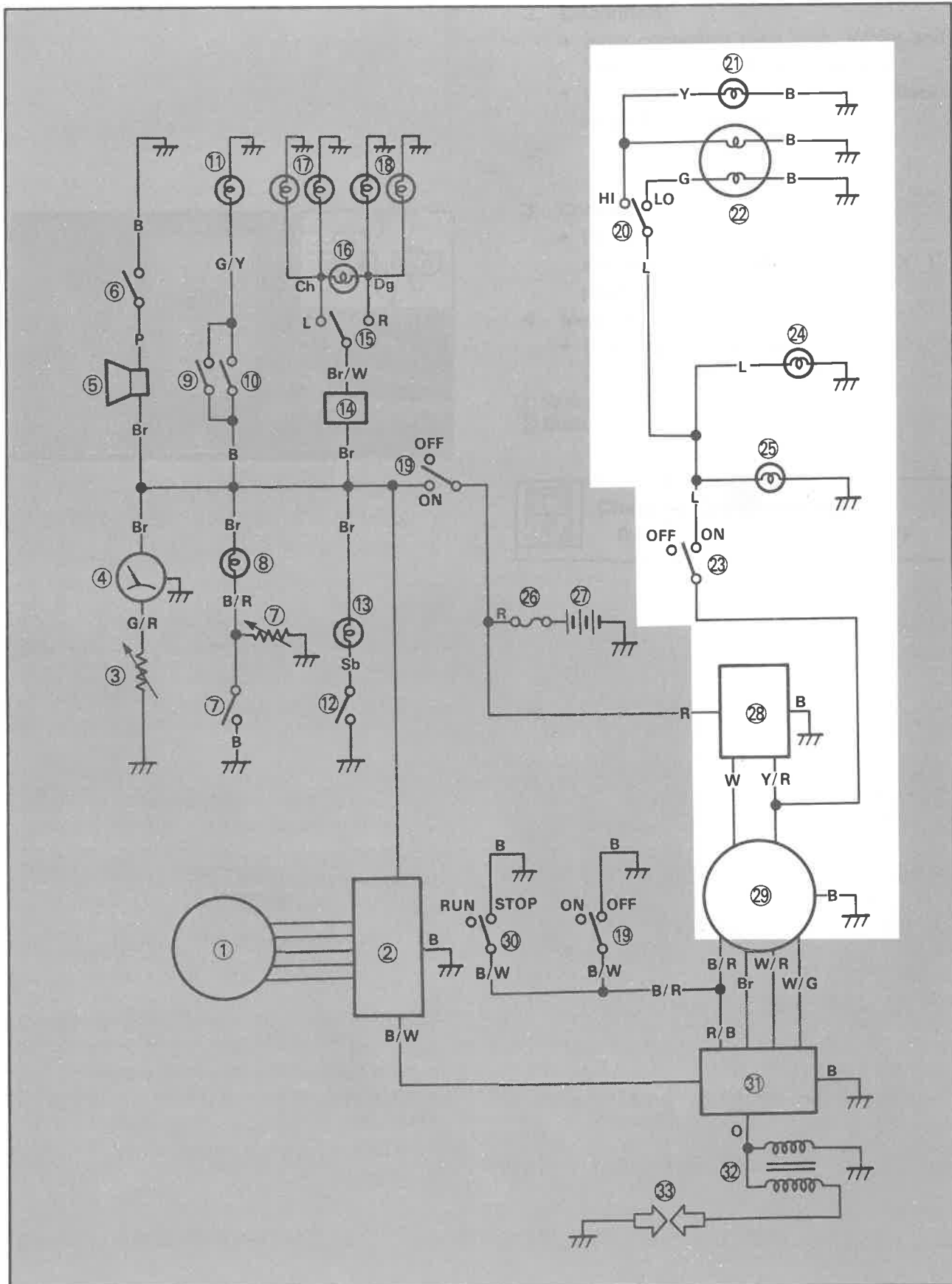
**Charging Coil Resistance:**

$0.43 \Omega \pm 20\%$ at 20°aC (68°F)



LIGHTING SYSTEM

Circuit Diagram



LIGHTING SYSTEM

ELEC

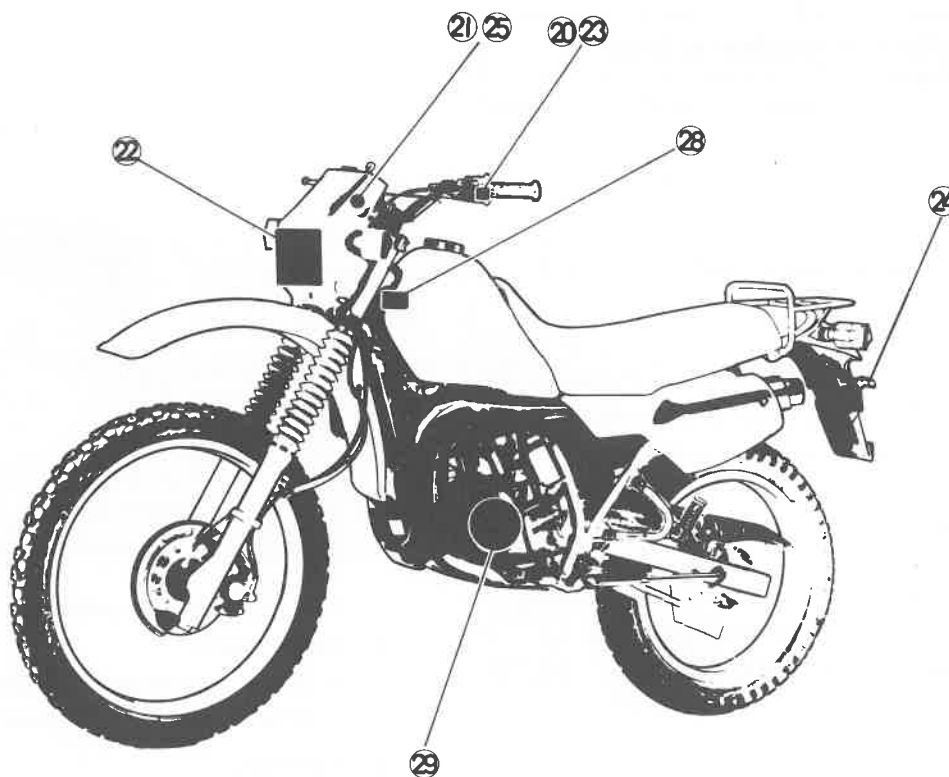
Aforementioned circuit diagram shows lighting circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-3.

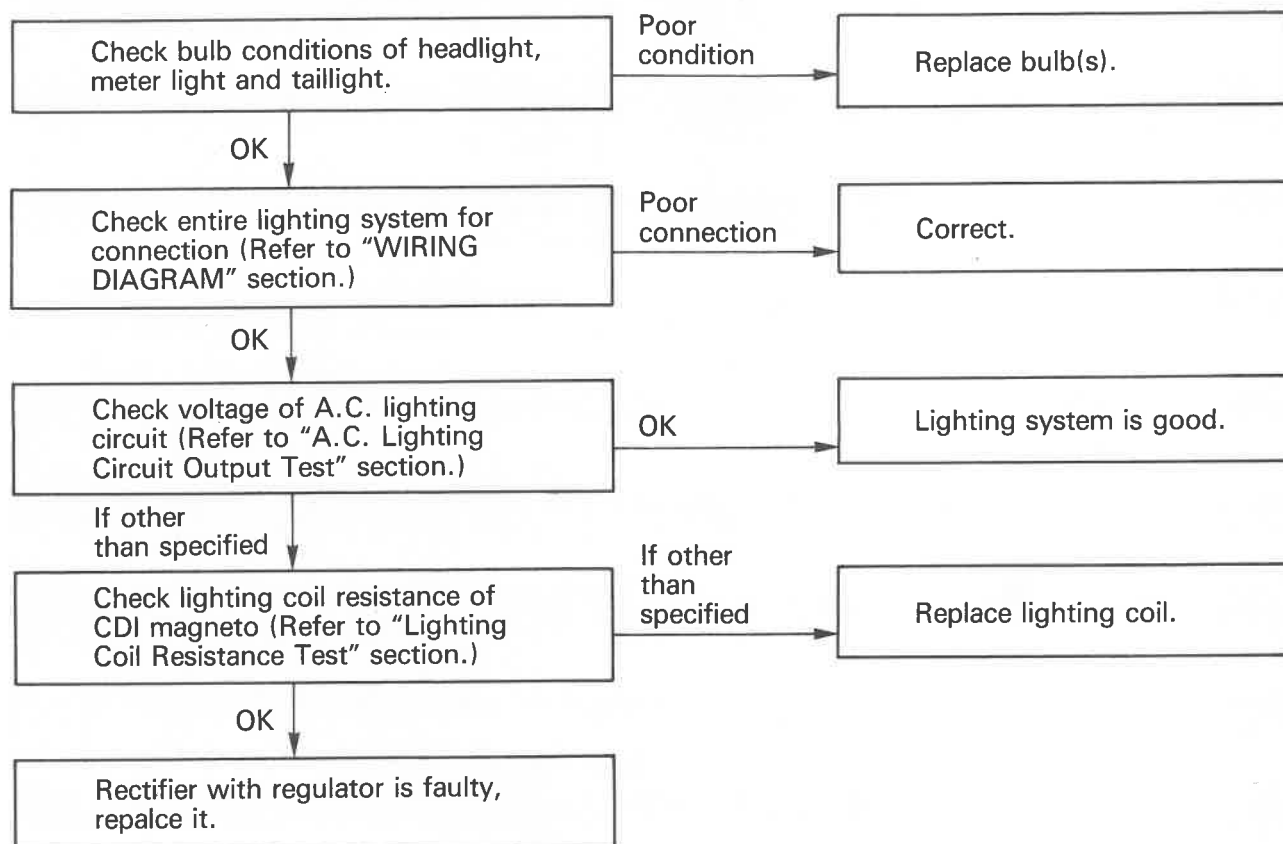
- ② "LIGHTS" (Dimmer) switch
- ① "HIGH BEAM" indicator light
- ② Headlight
- ③ "LIGHTS" switch
- ④ Taillight
- ⑤ Meter light

- ⑧ Rectifier with regulator
- ⑨ CDI magneto

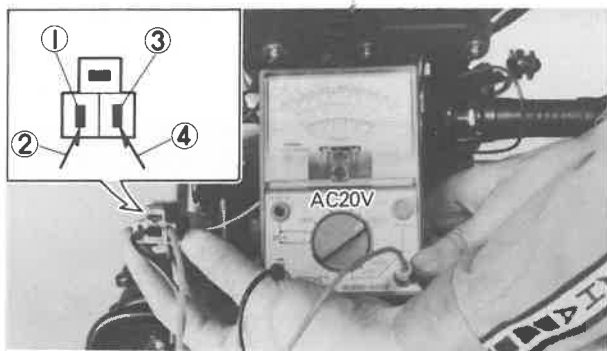


**Troubleshooting**

If the lighting system should become in-operative, the troubleshooting aids will be useful.

**A.C. Lighting Circuit Output Test**

1. Remove:
 - Headlight lens unit
2. Disconnect:
 - 3-pin connector (Yellow, Green and Black) (from wire harness)
3. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "AC20V" position.
4. Start the engine.



5. Accelerate the engine to specifications and check the output voltage.

CAUTION:

Do not run the engine in neutral above 6,000 r/min for more than 1 or 2 seconds.

- | | |
|----------|---------|
| ① Yellow | ③ Black |
| ② Black | ④ Red |

6. Measure:

- Lighting voltage

Out of specification → Perform the next test.



Lighting Voltage:

12 V or more 2,000 r/min

18 V or less 8,000 r/min

Lighting Coil Resistance Test

1. Remove:

- Fuel tank

2. Disconnect

- 3-pin connector (Sky blue, Yellow/Red and White) (from CDI magneto)
- 2-pin connector (Brown and Black) (from CDI magneto)

3. Connect:

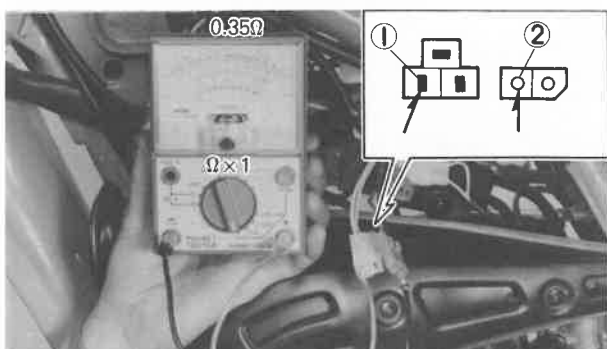
- Pocket Tester (90890-03104)
Set the tester selector to "Ohm × 1" position.

4. Measure:

- Lighting coil resistance

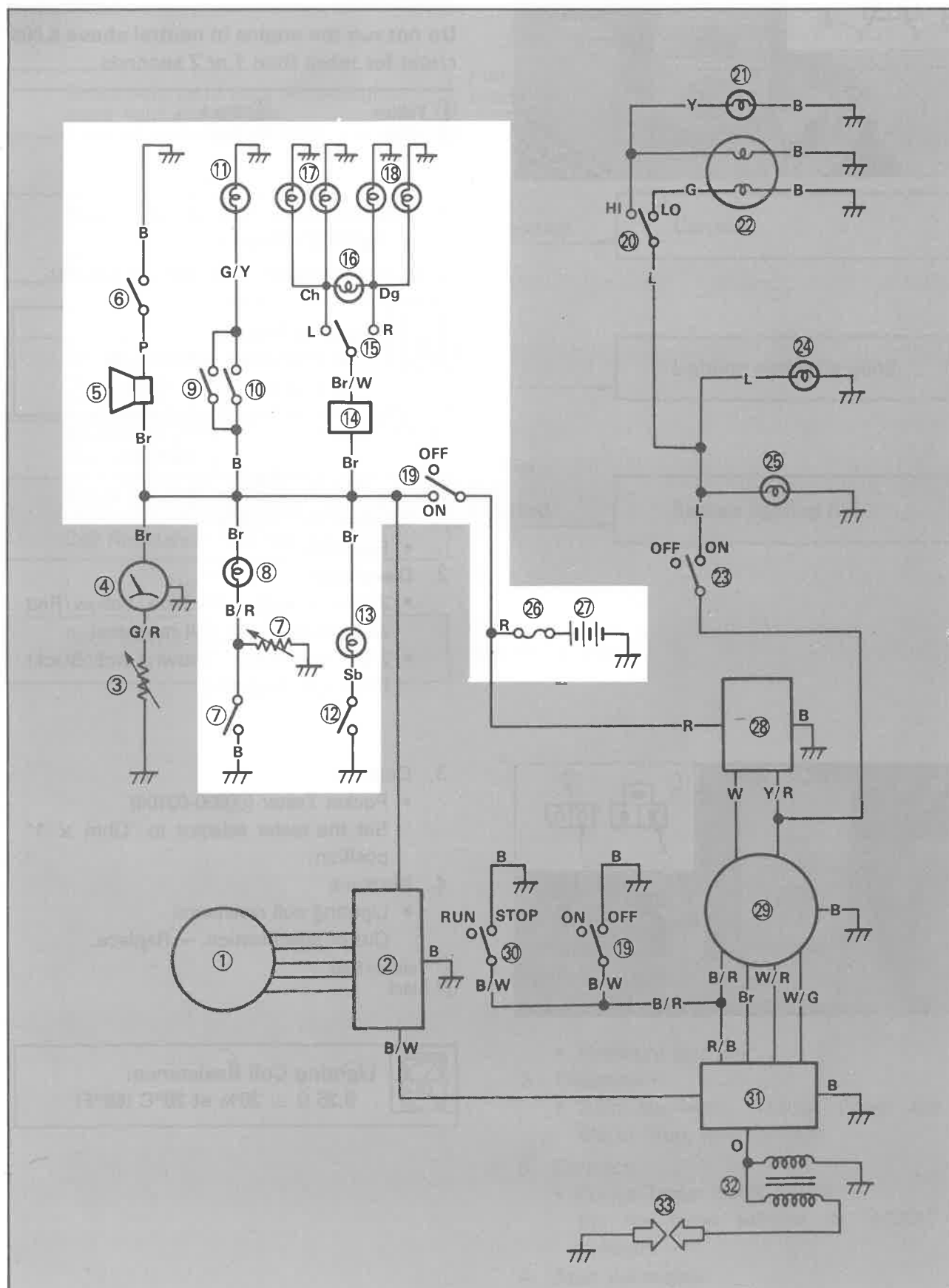
Out of specification → Replace.

- | |
|--------------|
| ① Yellow/Red |
| ② Black |



Lighting Coil Resistance:

0.35 Ω ± 20% at 20°C (68°F)



SIGNAL SYSTEM

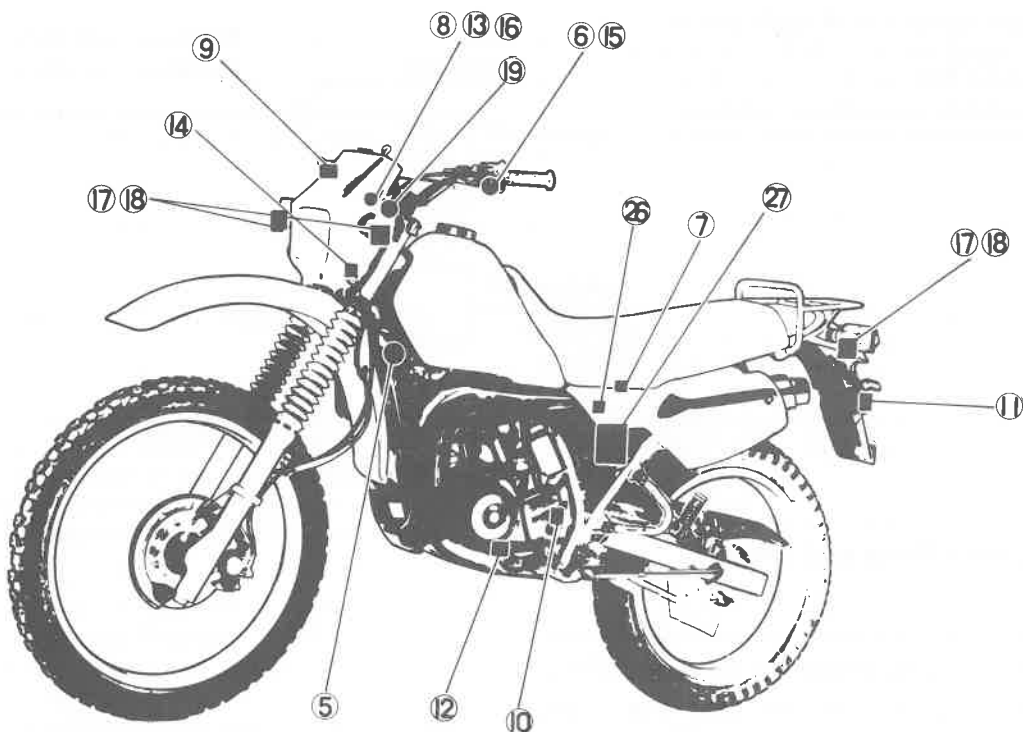
ELEC

Aforementioned circuit diagram shows signal circuit in wiring diagram..

NOTE:

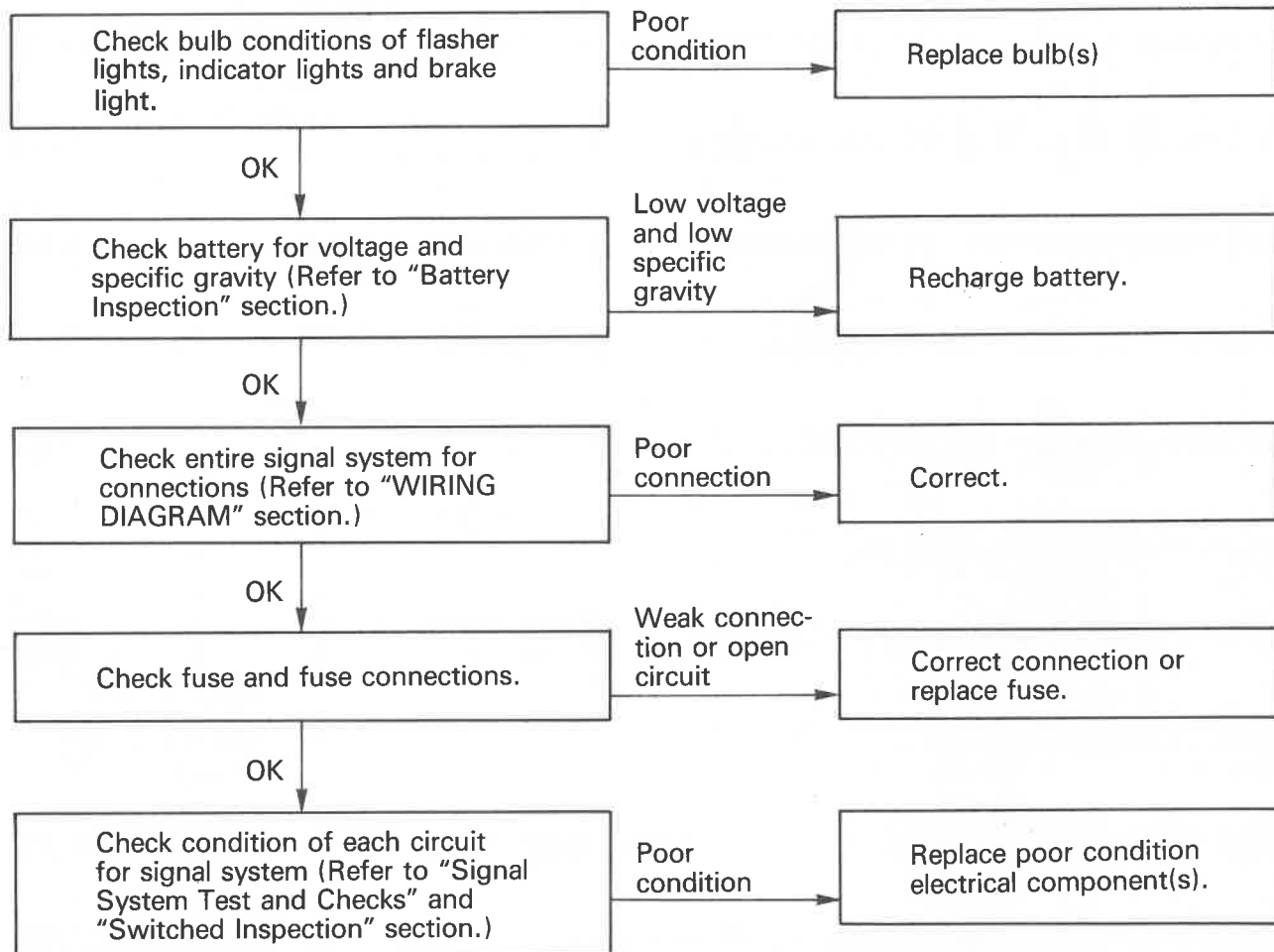
For the encircled numbers and color codes, see page 7-3.

- ⑤ Horn
- ⑥ "HORN" switch
- ⑦ Oil level switch
- ⑧ "OIL" warning indicator light
- ⑨ Front brake switch
- ⑩ Rear brake switch
- ⑪ Brake light
- ⑫ Neutral switch
- ⑬ "NEUTRAL" indicator light
- ⑭ Flasher relay
- ⑮ "TURN" switch
- ⑯ "TURN" indicator light
- ⑰ Flasher light (Left)
- ⑱ Flasher light (Right)
- ⑲ Main switch
- ⑳ Fuse
- ㉑ Battery



**Troubleshooting**

If the signal system should become inoperative, the troubleshooting aids will be useful.

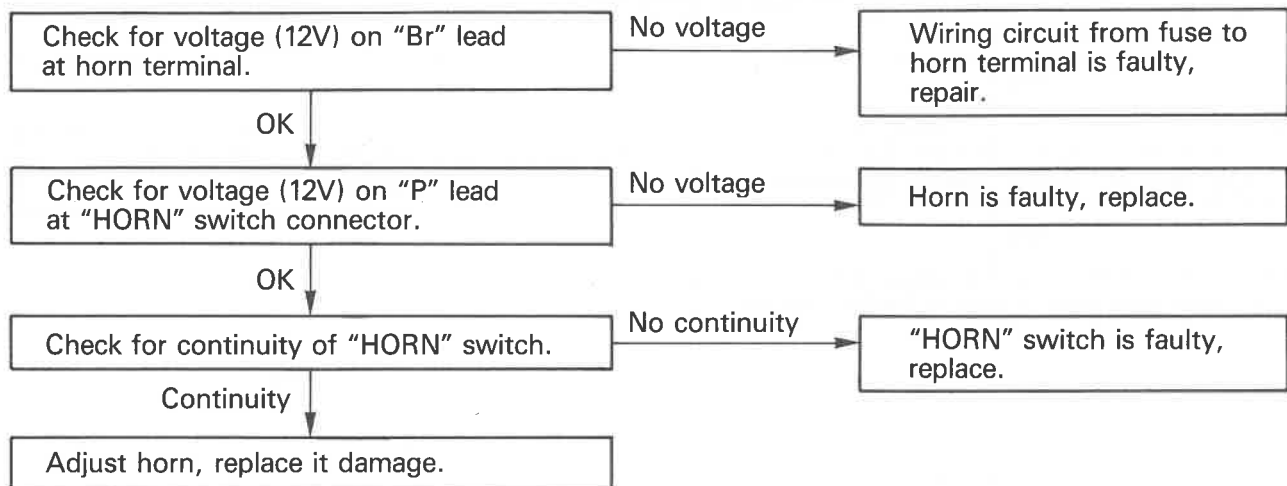
**Signal System Tests and Checks****NOTE:**

The battery provides power for operation of the horn, flasher lights, indicator light and brake light. If none of the above operates, always check the battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery electrolyte, or a defective

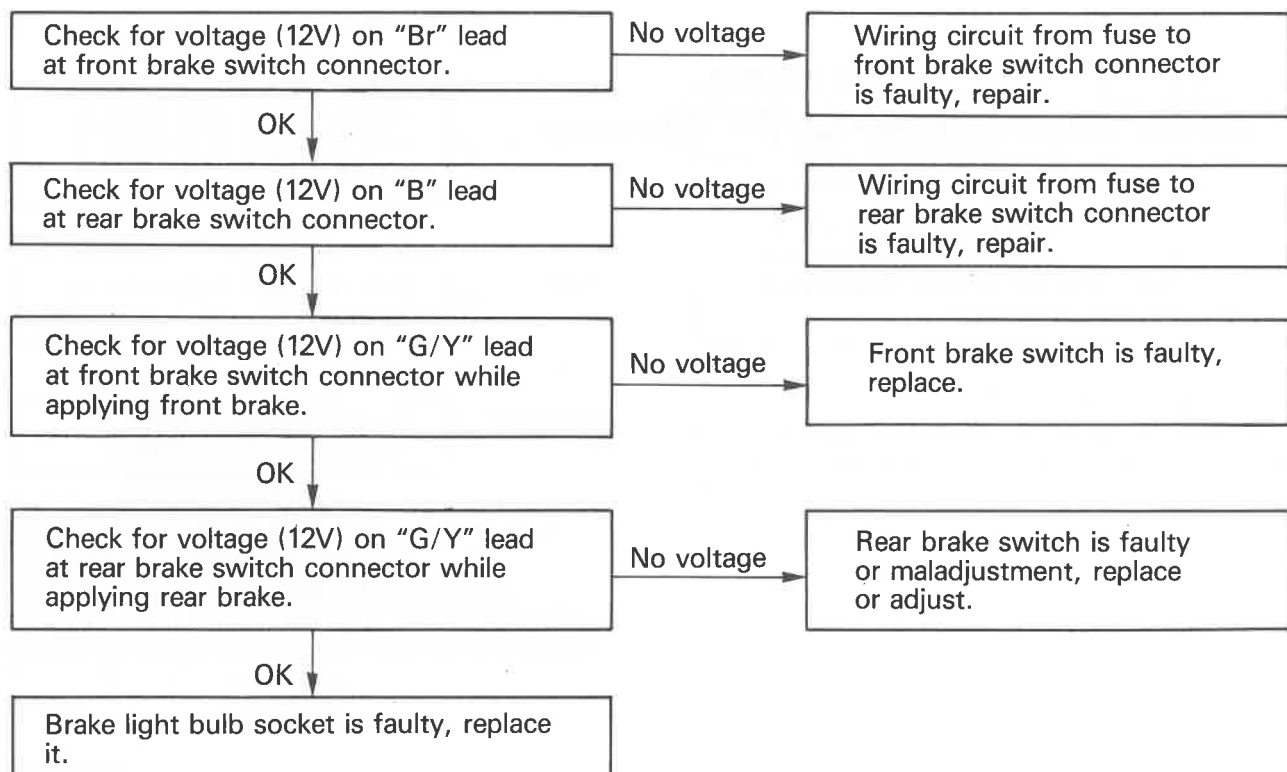


charging system. See "CHARGING SYSTEM" for checks of the battery and charging system. Also, check the fuse condition. Replace the fuse if necessary.

1. Horn does not work

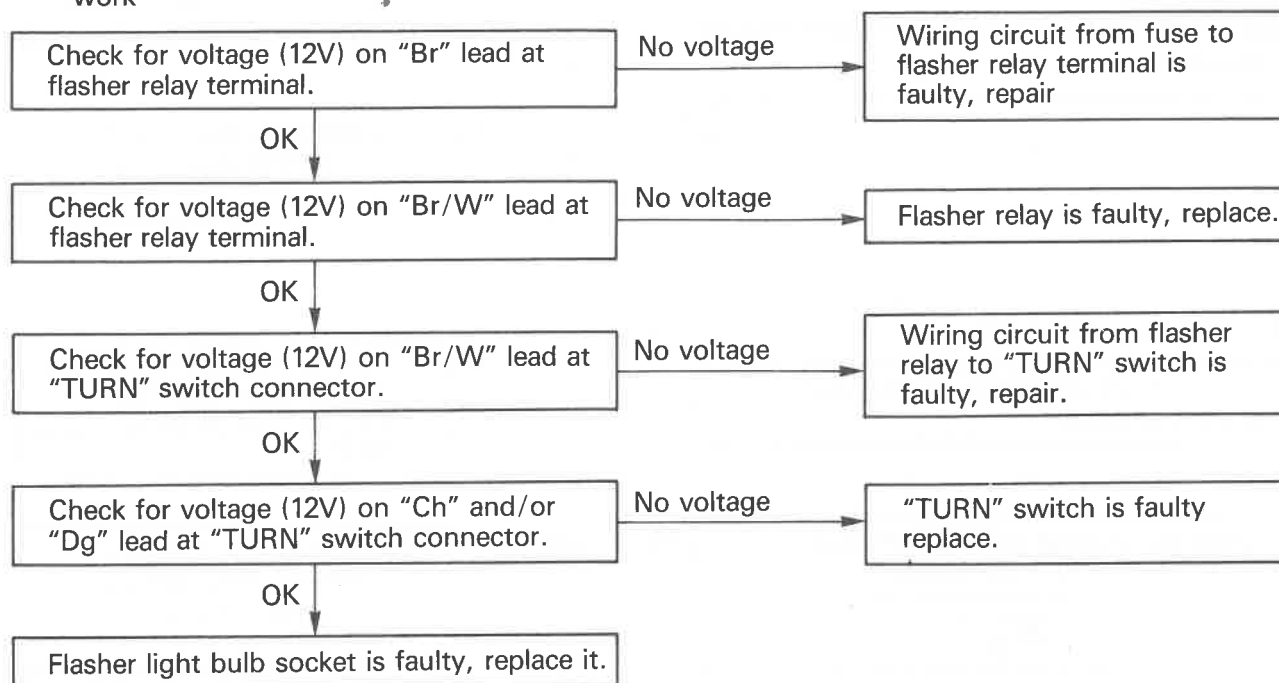


2. Brake light does not work

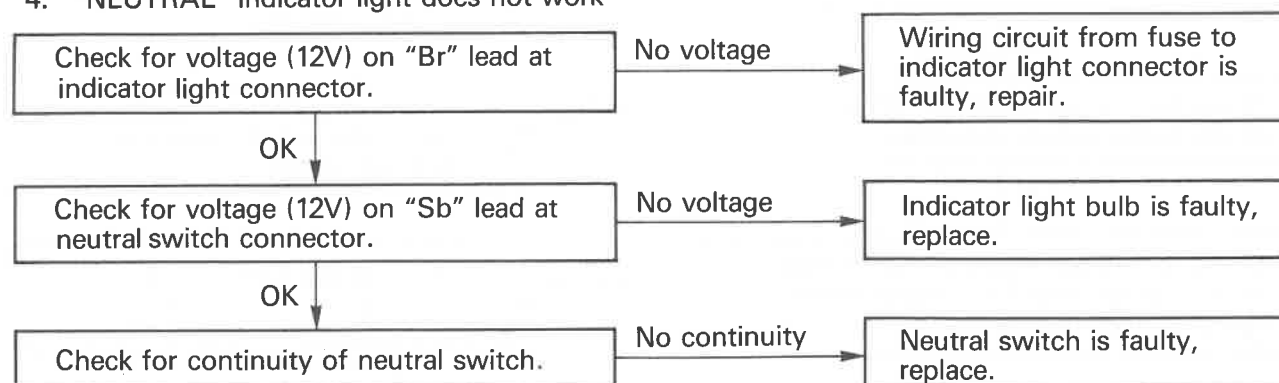




3. Flasher lights (left and/or right) do not work

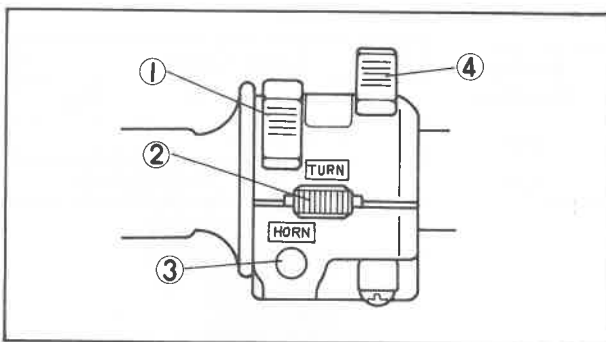
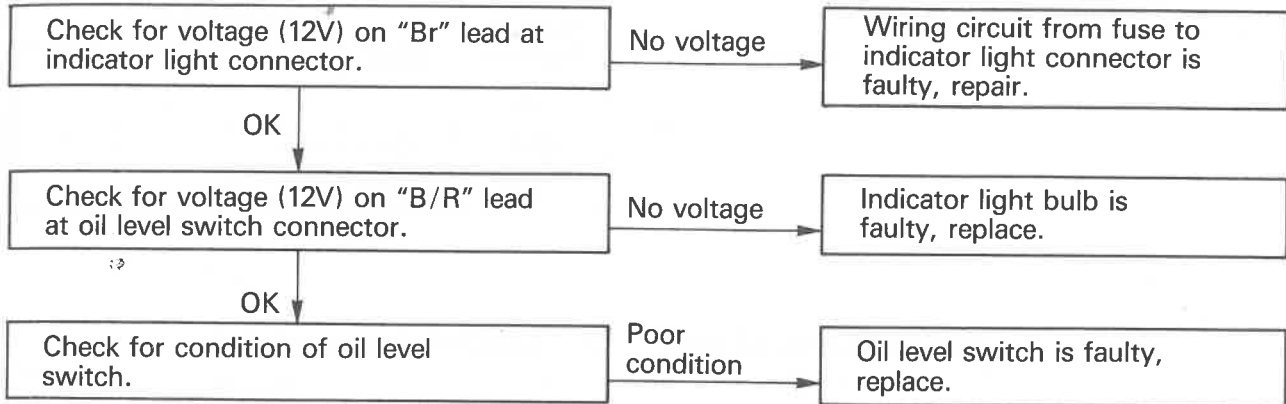


4. "NEUTRAL" indicator light does not work





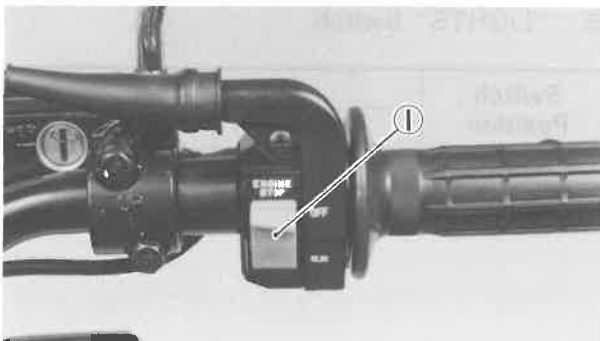
5. "OIL" warning indicator light does not work



Switches Inspection

Switches may be checked for continuity with a Pocket Tester (90890-03104) on the "Ohm \times 1" position.

- ① "LIGHTS" (Dimmer) switch
- ② "TURN" switch
- ③ "HORN" switch
- ④ "LIGHTS" switch



- ① "ENGINE STOP" switch



1. Main switch

Switch Position	Lead Color			
	B/W	B	R	Br
ON			○ — ○	
OFF	○ — ○			
LOCK	○ — ○			

2. "LIGHTS" (Dimmer) switch

Switch Position	Lead Color		
	Y	L	G
HI	○ — ○		
LO		○ — ○	

3. "HORN" switch

Switch Position	Lead Color	
	P	B
OFF		
ON	○ — ○	

4. "TURN" switch

Switch Position	Lead Color		
	Ch	Br/W	Dg
OFF	○ — ○		
ON		○ — ○	

5. "LIGHTS" Switch

Switch Position	Lead Color	
	Y/R	L
OFF		
ON	○ — ○	

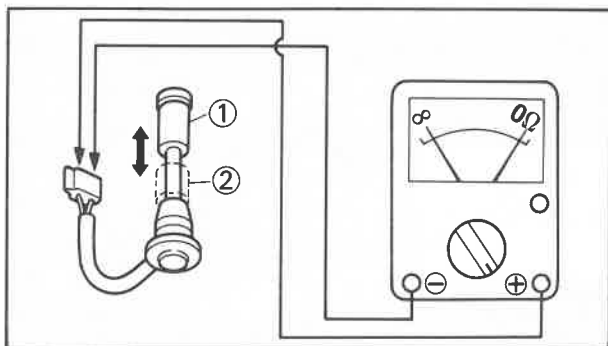


6. "ENGINE STOP" switch

Switch Position	Lead Color	
	B/W	B
RUN		
OFF		

Oil Level Switch Test

1. Remove:
 - Oil level switch
2. Connect:
 - Pocket Tester (90890-03104)
 Set the tester selector to "Ohm $\times 1$ " position.



3. Measure:
 - Oil level switch resistance
 Out of specification → Replace.

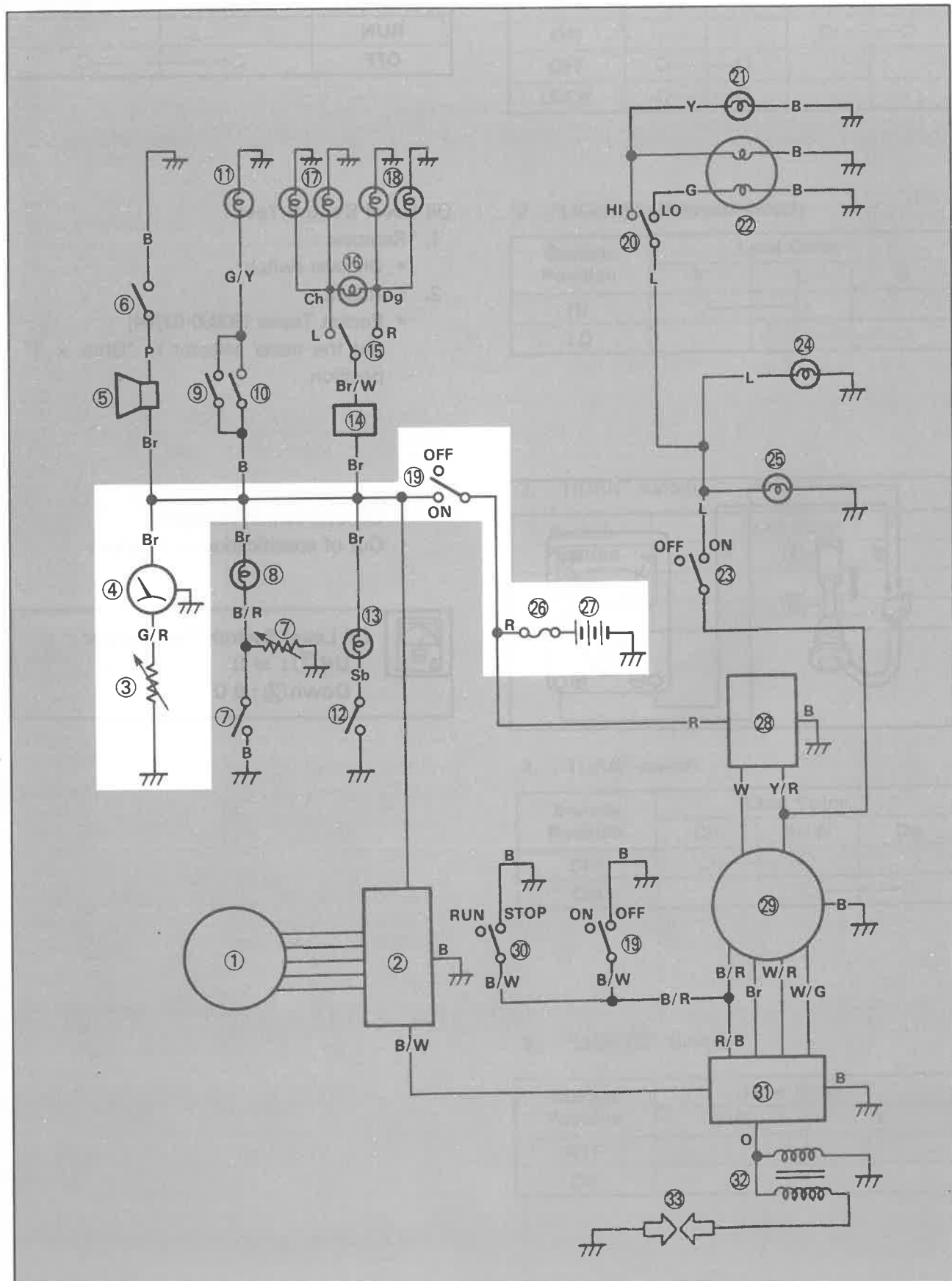


Oil Level Switch Resistance:

UP ① : $\infty \Omega$ Down ② : 0Ω

COOLING SYSTEM

Circuit Diagram



COOLING SYSTEM

ELEC

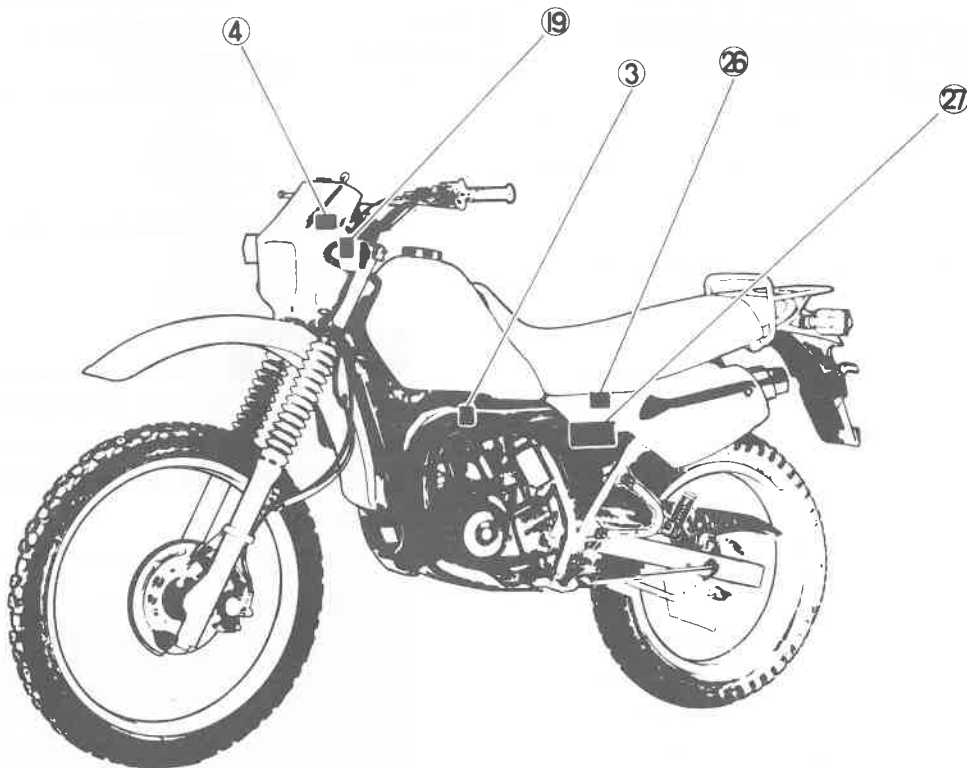


Aforementioned circuit diagram shows cooling circuit in wiring diagram.

NOTE:

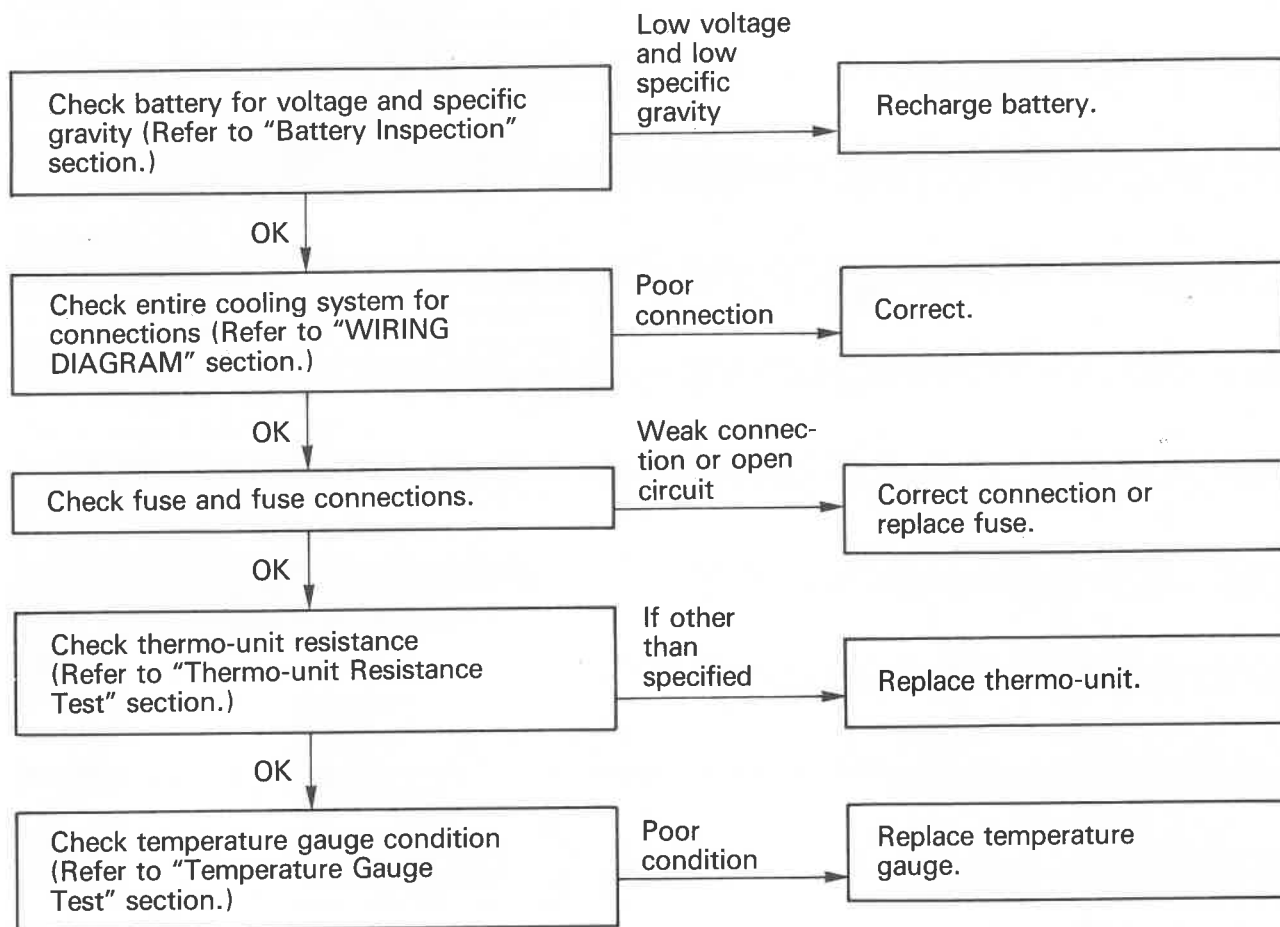
For the encircled numbers and color codes, see page 7-3.

- ③ Thermo-unit
- ④ Temperature gauge
- ①⑨ Main switch
- ②⑥ Fuse
- ②⑦ Battery



**Troubleshooting**

If the cooling system should become inoperative, the troubleshooting aids will be useful.

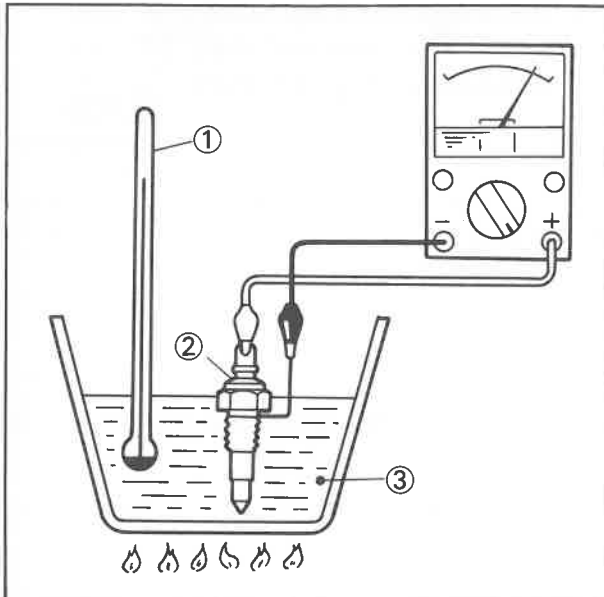
**Thermo-unit Resistance Test**

1. Remove:
 - Thermo-unit

WARNING:

Handle the thermo-unit with special care. Never subject it to strong or allow it to be dropped. Should it be dropped, it must be replaced.

2. Connect:
 - Pocket Tester (90890-03104)
Set the tester selector to "Ohm $\times 100$ " position.
3. Measure:
 - Thermo-unit resistance
Out of specification \rightarrow Replace.

**Thermo-unit Resistance Measurement****Steps:**

- Immerse the thermo-unit ② in coolant ③.
- Measure the resistance at each temperature as tabulated.

Coolant Temperature	Resistance
31 ~ 49°C (88 ~ 90°F)	579 Ω
80°C (146°F)	127 Ω
110°C (200°F)	47.9 Ω
109.5 ~ 120.5°C (229 ~ 219°F)	41.6 Ω

- After measuring the thermo-unit, install the unit.



14 Nm (1.4 m·kg, 10 ft·lb)

CAUTION:

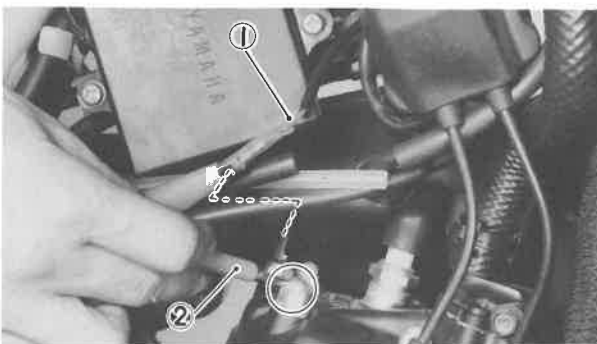
Avoid overtightening.

- Check the coolant level and leakage.

① Temperature gauge

Temperature Gauge Test

1. Turn the ignition to "ON" position.
2. Disconnect:
 - Thermo-unit lead ① (Green/Red) (from thermo-unit)
3. Connect:
 - Test lead ② (To thermo-unit lead ①)
4. Check:
 - Temperature gauge operation
Malfunction → Replace.



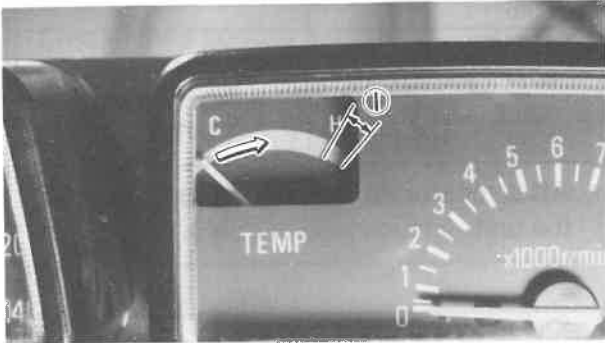
**Temperature Gauge Operation Check Steps:**

- Ground the test lead.

CAUTION:

Do not keep the ground more than few seconds on any one attempt.

- The temperature gauge should "H" (Red zone). If it does not read "H", the temperature gauge is broken.



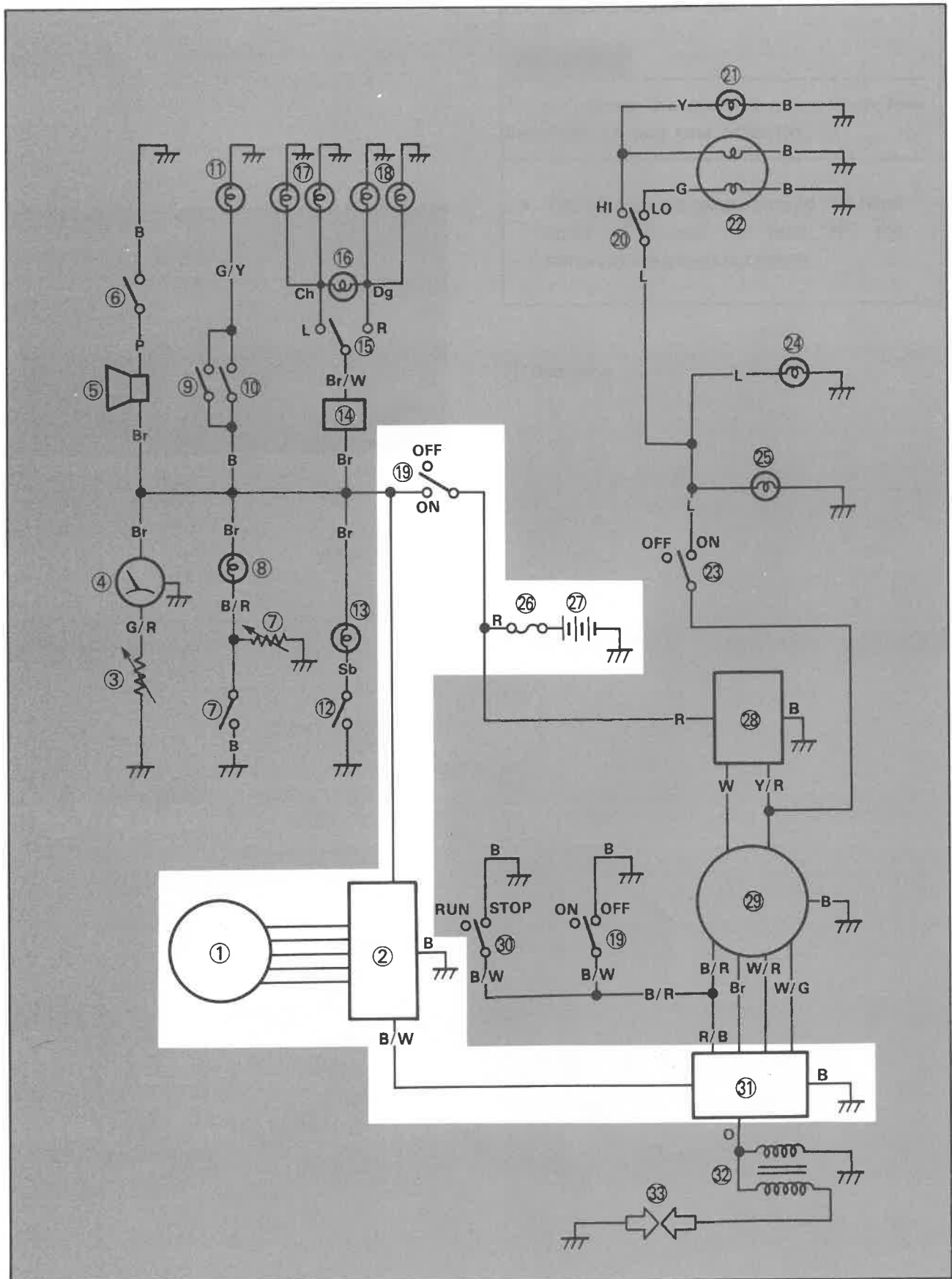
① Red zone





YAMAHA POWER VALVE SYSTEM

Circuit Diagram



YAMAHA POWER VALVE SYSTEM

ELEC



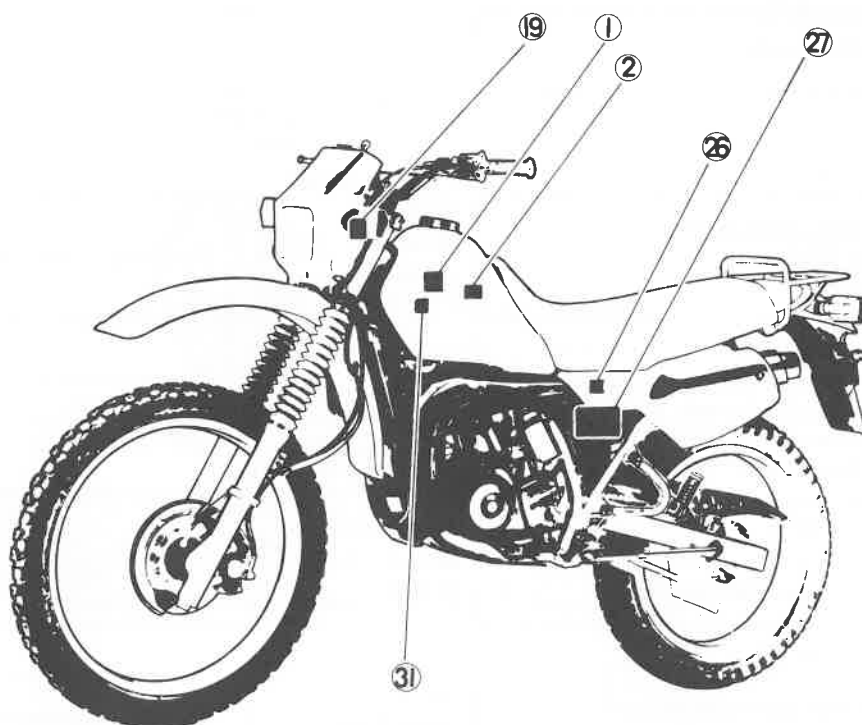
Aforementioned circuit diagram shows Yamaha Power Valve System Circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-3.

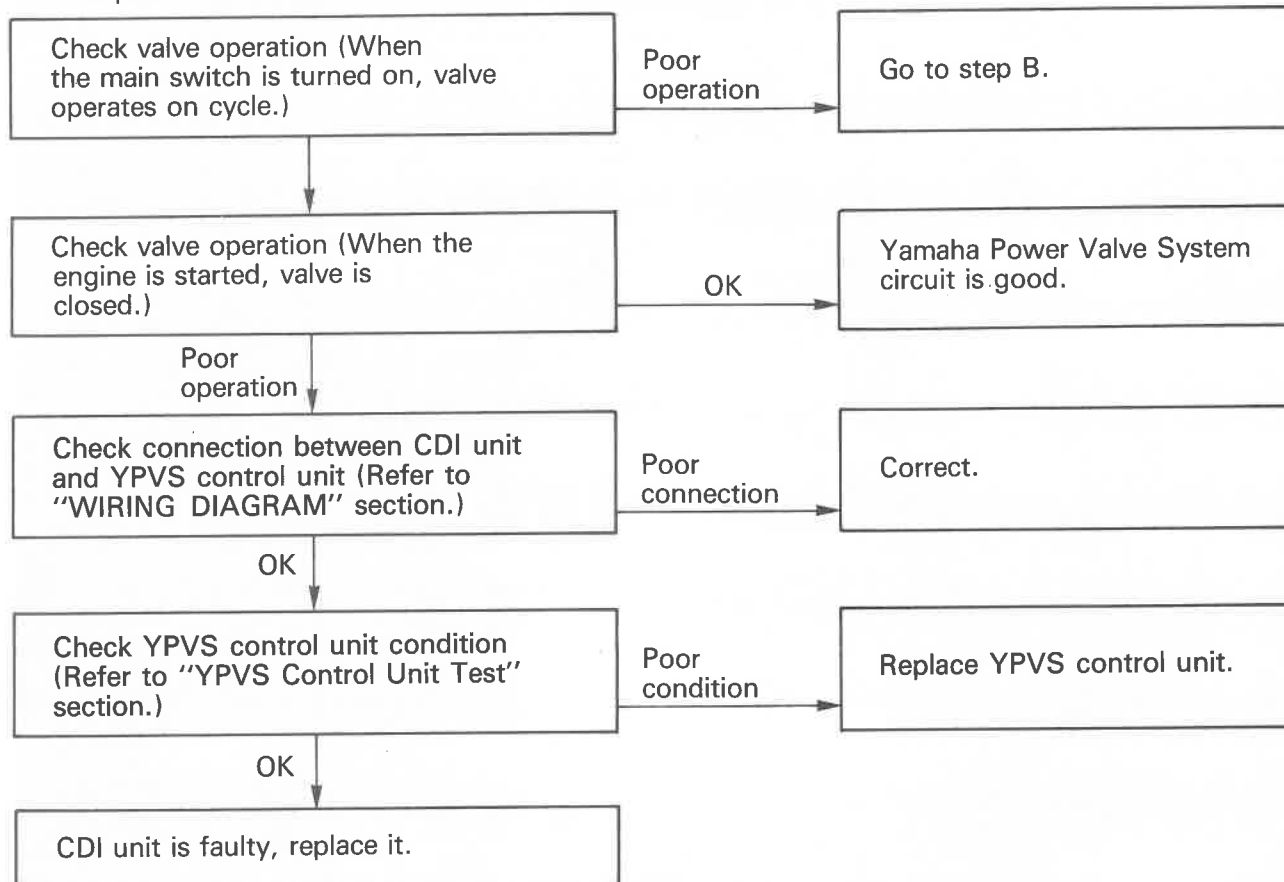
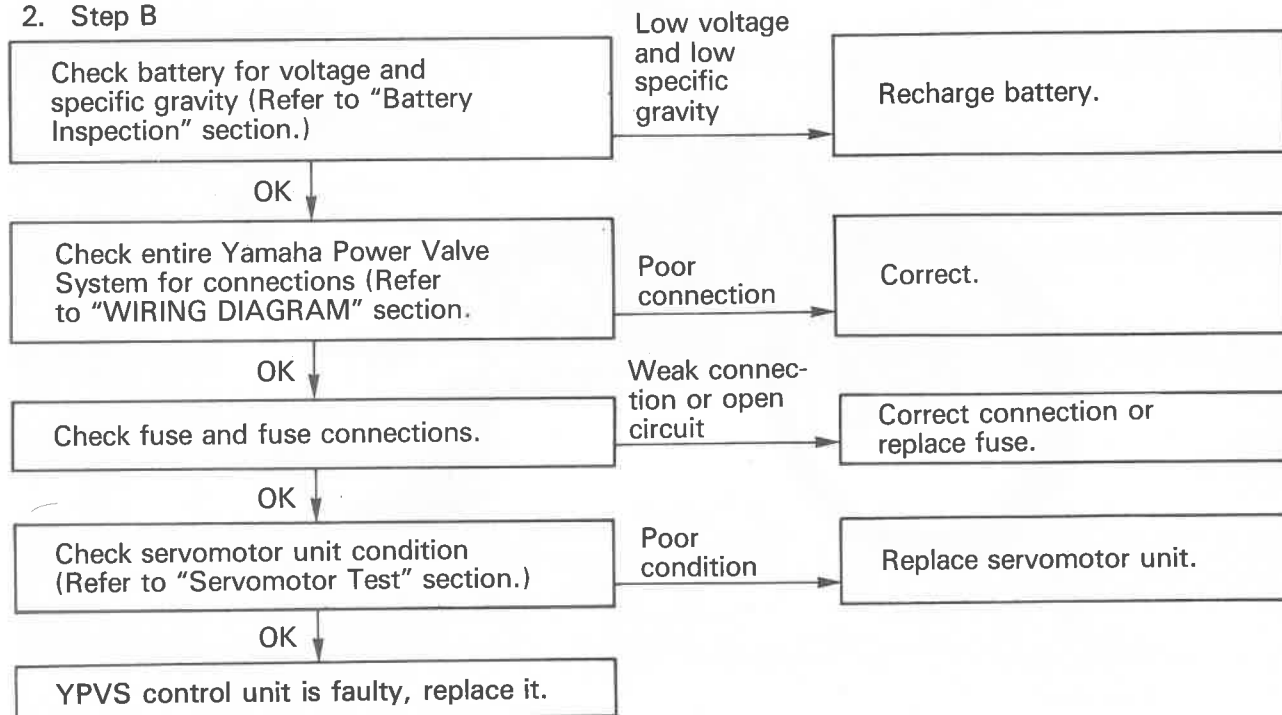
- ① Servomotor
- ② YPVS Control unit
- ⑱ Main switch
- ⑳ Fuse

- ㉗ Battery
- ㉛ CDI unit



**Troubleshooting**

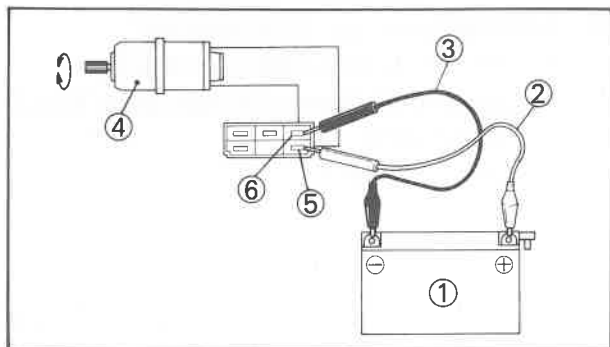
If the Yamaha Power Valve System should become inoperative, the troubleshooting acids will be useful.

1. Step A**2. Step B**



Servomotor Unit Test

1. Remove:
 - Fuel tank
2. Disconnect:
 - 5-pin connector (Yellow/Blue, Black/Red, White/Red, White/Black and Black/Yellow) (from servomotor unit).



3. Connect:
 - Battery (12 V) ①

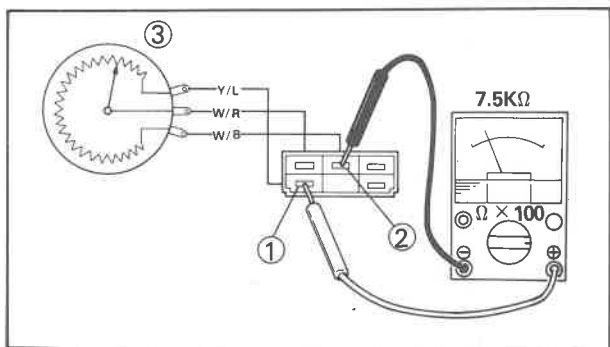
NOTE:

The battery must be fully charged when testing the servomotor unit.

- Test leads (Red ② and Black ③)

- ④ Servomotor ⑥ Black/Red
⑤ Black/Yellow

4. Check:
 - Servomotor operation
Malfunction → Replace.
Good operation → Perform the next test.
5. Disconnect:
 - Components in above list (Step "3".)

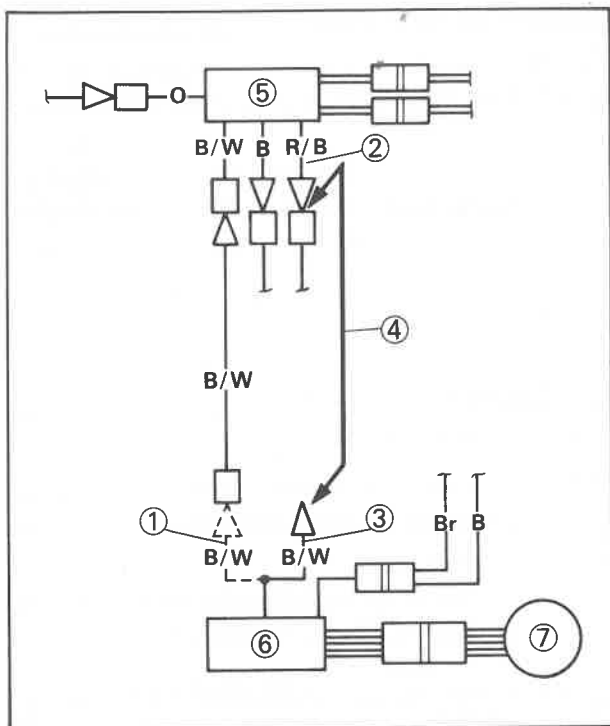


6. Connect:
 - Pocket Tester (90890-03104)
Set the tester selection to "Ohm × 100" position.
7. Measure:
 - Potentiometer resistance
Out of specification → Replace.

- ① Yellow/Blue
② White/Black
③ Potentiometer



Potentiometer Resistance:
7.5 kΩ ± 30% at 20°C (68°F)



- 7-40



CHAPTER 8. APPENDICES

SPECIFICATIONS	8-1
I. GENERAL SPECIFICATIONS	8-1
II. MAINTENANCE SPECIFICATIONS	8-4
GENERAL TORQUE SPECIFICATIONS	8-14
DEFINITION OF UNITS	8-14
CABLE ROUTING	8-15
DT200L WIRING DIAGRAM	8-21

SPECIFICATIONS

I. GENERAL SPECIFICATIONS

Model	DT200L
Model Code Number	39L
Frame Starting Number	39L-000101
Engine Starting Number	39L-000101
Dimensions:	
Overall Length	2,150 mm (84.6 in)
Overall Width	820 mm (32.3 in)
Overall Height	1,190 mm (46.9 in)
Seat Height	850 mm (33.5 in)
Wheelbase	1,365 mm (53.7 in)
Minimum Ground Clearance	290 mm (11.4 in)
Basic Weight:	
With Oil and Full Fuel Tank	110 kg (243 lb)
Minimum Turning Radius	2,000 mm (78.7 in)
Engine:	
Engine Type	Liquid cooled, 2-stroke, gasoline, torque induction
Cylinder Arrangement	Single cylinder, Forward inclined
Displacement	195 cm ³
Bore × Stroke	66.0 × 57.0 mm (2.598 × 2.244 in)
Compression Ratio	6.2 : 1
Starting System	Kick starter
Lubrication System	Separate lubrication (Yamaha Autolube)
Oil Type or Grade:	
Engine Oil	Air cooled 2-stroke engine oil
Transmission Oil	SAE 10W30 type SE motor oil
Oil Capacity:	
Oil Tank (Engine Oil)	1.2 L (1.1 Imp qt, 1.3 US qt)
Transmission Oil	
Periodic Oil Change	0.55 L (0.48 Imp qt, 0.58 US qt)
Total Amount	0.63 L (0.55 Imp qt, 0.67 US qt)
Radiator Capacity:	
(Including All Routes)	0.64 L (0.56 Imp qt, 0.68 US qt)
Reservoir Tank Capacity	0.13 L (0.114 Imp qt, 0.137 US qt)
Air Filter	Wet type element



Model	DT200L
Fuel: Type Tank Capacity Reserve Amount	Regular gasoline 10 L (2.2 Imp gal, 2.6 US gal) 1.5 L (0.3 Imp gal, 0.4 US gal)
Carburetor: Type/Manufacturer	VM26SS/MIKUNI
Spark Plug: Type/Manufacturer Gap	BR8ES/NGK 0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Clutch Type	Wet, multiple-disc
Transmission: Primary Reduction System Primary Reduction Ratio Secondary Reduction System Secondary Reduction Ratio Transmission Type Operation Gear Ratio 1st 2nd 3rd 4th 5th 6th	Gear 52/17 (3.058) Chain drive 41/13 (3.153) Constant mesh, 6-speed Left foot operation 35/11 (3.181) 30/16 (1.875) 24/17 (1.411) 24/21 (1.142) 22/23 (0.956) 18/22 (0.818)
Chassis: Frame Type Caster Angle Trail	Steel tube, Semi double cradle 28° 114 mm (4.5 in)
Tire: Type Size (F) Size (R)	With tube 3.00-21-4PR 4.10-18-4PR
Tire Pressure (Cold tire): Up to 90 kg (198 lb) load* (F) (R) 90 kg (198 lb) load* ~ 156 kg (344 lb)load* (F) (R) High Speed Riding (F) (R)	127 kPa (1.3 kg/cm ² , 18 psi) 147 kPa (1.5 kg/cm ² , 22 psi) 147 kPa (1.5 kg/cm ² , 22 psi) 177 kPa (1.8 kg/cm ² , 26 psi) 147 kPa (1.5 kg/cm ² , 22 psi) 177 kPa (1.8 kg/cm ² , 26 psi)

*Load is the total weight of cargo, rider, passenger, and accessories.

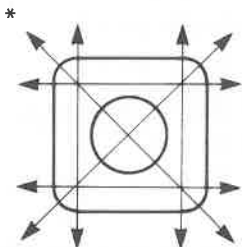
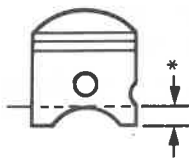
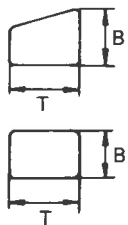
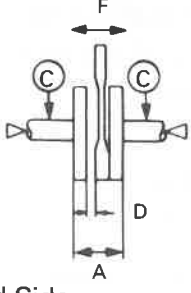


Model	DT200L
Brake: Front Brake Type Operation Rear Brake Type Operation	Disc brake (Single) Right hand operation Drum brake Right foot operation
Suspension: Front Suspension Rear Suspension	Telescopic fork Swing arm (Monocross suspension)
Shock Absorber: Front Shock Absorber Rear Shock Absorber	Coil spring, Oil damper Gas, Coil spring, Oil damper
Wheel Travel: Front Wheel Travel Rear Wheel Travel	240 mm (9.4 in) 210 mm (8.3 in)
Electrical: Ignition System Generator System Battery Type or Model Battery Capacity	C.D.I. Magneto Flywheel magneto FB3L-B or GM3-3B 12V, 3AH
Headlight Type	Quartz bulb
Bulb Wattage/ Quantity: Headlight Tail/ Brake Light Flasher Light Meter Light	45W/45W × 1 5W/21W × 1 23W × 4 3.4W × 2
Indicator Light Wattage/ Quantity: "NEUTRAL" "HIGH BEAM" "OIL" "TURN"	3.4W × 1 3.4W × 1 3.4W × 1 3.4W × 1





II. MAINTENANCE SPECIFICATIONS

A. ENGINE

Model	DT200L
Cylinder Head: Warp Limit 	$<0.03 \text{ mm (0.0012 in)}>$ *Lines indicate straightedge measurement.
Cylinder: Bore Size Taper Limit Out of Round Limit	$66.00^{+0.020}_0 \text{ mm (2.598}^{+0.0008}_0 \text{ in)}$ $<0.08 \text{ mm (0.003 in)}>$ $<0.05 \text{ mm (0.002 in)}>$
Piston: Piston Size/ Measuring Point* Piston Clearance 	$66.00^{+0.06}_0 \text{ mm (2.598}^{+0.0024}_0 \text{ in)}/10 \text{ mm (0.4 in)}$ $0.060 \sim 0.065 \text{ mm (0.0024} \sim 0.0026 \text{ in)}$
Oversize 1st 2nd Piston offset	$66.25 \text{ mm (2.608 in)}$ $66.50 \text{ mm (2.618 in)}$ Zero mm (Zero in)
Piston Ring: Sectional Sketch 	Keystone $B = 1.2 \text{ mm (0.047 in)}$ $T = 2.6 \text{ mm (0.102 in)}$ Plain with expander $B = 1.2 \text{ mm (0.047 in)}$ $T = 2.4 \text{ mm (0.094 in)}$
End Gap (Installed) Top Ring 2nd Ring Side Clearance (Installed) Top Ring 2nd Ring	$0.30 \sim 0.45 \text{ mm (0.012} \sim 0.018 \text{ in)}$ $0.30 \sim 0.45 \text{ mm (0.012} \sim 0.018 \text{ in)}$ $0.03 \sim 0.05 \text{ mm (0.0012} \sim 0.0020 \text{ in)}$ $0.03 \sim 0.09 \text{ mm (0.0012} \sim 0.0028 \text{ in)}$
Crankshaft: 	$58.00^{+0.05}_{-0.10} \text{ mm (2.283}^{+0.0020}_{-0.0040} \text{ in)}$ $<0.03 \text{ mm (0.0012 in)}>$
Crank Width "A" Runout Limit "C" Connecting Rod Big End Side Clearance "D" Small End Free Play Limit "F"	$0.4 \sim 0.7 \text{ mm (0.016} \sim 0.028 \text{ in)}$ $<2 \text{ mm (0.08 in)}>$



Model	DT200L
Clutch: Friction Plate Thickness/ Quantity Wear Limit Clutch Plate Thickness/ Quantity Warp Limit Clutch Spring Free Length/ Quantity Clutch Spring Minimum Length Clutch Housing Thrust Clearance Clutch Housing Radial Clearance Primary Reduction Gear Backlash Tolerance Clutch Release Method Push Rod Bending Limit	3.0 mm (0.12 in) × 7 <2.7 mm (0.11 in)> #1: 1.6 mm (0.063 in) × 1 #2: 1.2 mm (0.047 in) × 5 <0.05 mm (0.002 in)> 32.5 mm (1.26 in) × 4 <30.0 mm (1.18 in)> 0 mm (0 in) 0.015 ~ 0.049 mm (0.0006 ~ 0.0020 in) 166 ± 1 (B—B, C—C, D—D) Inner push, cam push <0.15 mm (0.006 in)>
Shifter: Shifting Type	Cam drum, Guide bar
Kick Starter Type: Kick Clip Friction Force <Min. ~ Max.>	Kick and mesh type P = 1.0 kg (2.2 lb) <0.8 ~ 1.2 kg (1.8 ~ 2.6 lb)>
	
Air Filter Oil Grade (Oiled Filter)	Air cooled 2-cycle oil
Carburetor: Type/ Manufacturer/ Quantity I.D. Mark Main Jet (M.J.) Main Air Jet (M.A.J.) Jet Needle-clip Position (J.N.) Needle Jet (N.J.) Cutaway (C.A.) Pilot Jet (P.J.) Pilot Air Screw (P.A.S.) Valve Seat Size (V.S.) Starter Jet (G.S.) Float Height (F.H.) Fuel Level (F.L.) Engine Idling Speed	VM26SS/ MIKUNI/ 1 37F00 #145 ø0.5 4J6-4 P-4 2.0 #22.5 1 and 1/2 ø2.5 #25 22.0 ± 1.0 mm (0.87 ± 0.04 in) 0.5 ± 1.0 mm (0.02 ± 0.04 in) 1,300 ± 50 r/min
Reed Valve: Thickness* Valve Stopper Height Valve Bending Limit	0.2 mm (0.008 in) 10.3 mm (0.41 in) 0.3 mm (0.012 in)
	

SPECIFICATIONS

APPX



Model	DT200L
Lubrication System: Autolube Pump Color Code Minimum Stroke Maximum Stroke Minimum Output/200 Stroke Maximum Output/200 Stroke Adjusting mark (at idle)	Separate lubrication (Yamaha Autolube Pump) Brown 0.35 ~ 0.40 mm (0.014 ~ 0.016 in) 1.85 ~ 2.05 mm (0.073 ~ 0.018 in) 0.88 ~ 1.01 cm ³ (0.031 ~ 0.036 Imp oz, 0.030 ~ 0.034 US oz) 4.65 ~ 5.15 cm ³ (0.164 ~ 0.181 Imp oz, 0.157 ~ 0.174 US oz) Auto adjuster
Cooling: Radiator Core Size -Width -Height -Thickness Radiator Cap Opening Pressure Water Pump	 122.5 mm (4.82 in) 240.0 mm (9.45 in) 32.0 mm (1.26 in) 88 ± 15 kPa (0.9 ± 0.15 kg/cm ² , 13 ± 2 psi) Single-Suction Centrifugal Pump



Tightening Torque							
Parts to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
ENGINE:							
Spark plug	—	M14	1	20	2.0	14	
Cylinder head	Crown nut	M 8	5	22	2.2	16	
	Stud bolt	M 8	5	10	1.0	7.2	
Thermostatic valve cover	Screw	M 6	3	8	0.8	5.8	
Thermo-unit	—	M10	1	14	1.4	10	Do not overtighten
CDI magneto	Nut	M12	1	83	8.3	60	
CDI base (Stator)	Screw	M 6	2	10	1.0	7.2	
Housing cover	Screw	M 6	3	8	0.8	5.8	
Housing cover drain bolt	Screw	M 6	1	10	1.0	7.2	
Oil pump	Screw	M 5	2	5	0.5	3.6	
Reed valve	Bolt	M 6	4	8	0.8	5.8	
Exhaust pipe	Nut	M 8	2	18	1.8	13	
	Stud bolt	M 8	2	10	1.0	7.2	
Crankcase	Screw	M 6	10	8	0.8	5.8	
Crankcase drain bolt	Bolt	M12	1	20	2.0	14	
Neutral switch	—	M10	1	4	0.4	2.9	
Crankcase cover (Left and right)	Screw	M 6	13	10	1.0	7.2	
Oil pump cover	Screw	M 6	4	10	1.0	7.2	
Cylinder	Nut	M 8	4	25	2.5	18	
	Stud bolt	M 8	4	10	1.0	7.2	
Primary drive gear	Nut	M12	1	80	8.0	58	
Clutch assembly	Nut	M12	1	55	5.5	40	
Clutch spring	Bolt	M 5	4	6	0.6	4.3	
Balancer gear	Nut	M12	1	55	5.5	40	
Stopper plate (Oil seal)	Screw	M 8	1	16	1.6	11	

SPECIFICATIONS

APPX



Tightening Torque							
Parts to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Stopper plate (Bearing)	Screw	M 6	2	10	1.0	7.2	Apply LOCTITE
Kick crank boss	Nut	M12	1	65	6.5	47	
Stopper lever	Bolt	M 6	1	14	1.4	10	Apply LOCTITE
Drive sprocket	Bolt	M 6	2	10	1.0	7.2	
Tachometer housing	Bolt	M 6	1	5	0.5	3.6	
YPVS	Valve holder (Left)	Bolt	M 5	1	5	0.5	3.6
	Power valve	Bolt	M 5	1	6	0.6	4.3
	Pulley	Bolt	M 6	1	10	1.0	7.2
	Power valve cover	Screw	M 5	2	5	0.5	3.6
	Power valve seal cap	Bolt	M 5	2	5	0.5	3.6
Change pedal	Bolt	M 6	1	15	1.5	11	



B. CHASSIS

Model	DT200L
Steering System:	
Steering Bearing Type	Ball and Taper Roller Bearing
No./ Size of Steel Balls	22 pcs./ 3/16 in
Bearing Model	HI-CAP 32006 JRRS
Upper	
Lower	
Front Suspension:	
Front Fork Travel	240 mm (9.45 in)
Fork Spring Free Length	ℓ_1 : 576.4 mm (22.69 in), ℓ_2 : 53.7 mm (2.11 in)
<Limit>	< ℓ_1 : 570.6 mm (22.46 in), ℓ_2 : 53.2 mm (2.09 in)>
Spring Rate/ Stroke	K_1 : 1.96 N/mm (0.2 kg/mm, 11.2 lb/in)/ 0 ~ 63 mm (0 ~ 2.48 in) K_2 : 2.94 N/mm (0.3 kg/mm, 16.8 lb/in)/ 63 ~ 240 mm (2.48 ~ 9.45 in)
Optional Spring	No
Oil Capacity or Oil Level	366 cm ³ (12.9 Imp oz, 12.4 US oz) 139.5 mm (5.5 in) (From top of inner tube fully compressed with spring (ℓ_1))
Oil Grade	SAE 10W30 type SE motor oil
Rear Suspension:	
Shock Absorber Travel	74 mm (2.91 in)
Spring Free Length	213 mm (8.39 in)
<Limit>	<211 mm (8.31 in)>
Spring Rate/ Stroke	K_1 : 57.9 N/mm (5.9 kg/mm, 330 lb/in)/ 0 ~ 74 mm (0 ~ 2.91 in)
Optional Spring	No
Enclosed Gas Pressure	1471 kPa (15 kg/cm ² , 213 psi)
Wheel:	
Front Wheel Type	Spoke Wheel
Rear Wheel Type	Spoke Wheel
Front Rim Size/ Material	1.60 × 21/ Steel
Rear Rim Size/ Material	2.15 × 18/ Steel
Rim Runout Limit	
Vertical	<2.0 mm (0.08 in)>
Lateral	<2.0 mm (0.08 in)>
Rear Arm:	
Swing Arm Free Play Limit	
End	<1.0 mm (0.039 in)>
Side	<0.4 ~ 0.7 mm (0.016 ~ 0.028 in)>
Drive Chain:	
Type/ Manufacturer	520VC5/ DAIDO
Number of Links	99L + joint
Chain Free Play	35 ~ 45 mm (1.4 ~ 1.8 in)

SPECIFICATIONS

APPX



Model	DT200L
Disc Brake: Type Front Outside Dia. × Thickness <Limit> Pad Thickness <Limit> Master Cylinder Inside Dia. Caliper Cylinder Inside Dia. Brake Fluid Type	Single disc 220 × 3.5 mm (8.66 × 0.14 in) <3.0 mm (0.12 in)> 6.0 mm (0.24 in) <0.8 mm (0.03 in)> 11.0 mm (0.43 in) 34.9 mm (1.37 in) DOT #3
Drum Brake: Type Rear Drum Inside Dia. <Limit> Lining Thickness <Limit> Shoe Spring Free Length	Leading, trailing 130 mm (5.12 in) <131 mm (5.16 in)> 4 mm (0.2 in) <2 mm (0.08 in)> 36.5 mm (1.44 in)
Brake Lever & Brake Pedal: Brake Lever Free Play Brake Pedal Free Play Brake Pedal Position	5 ~ 8 mm (0.2 ~ 0.3 in) 20 ~ 30 mm (0.8 ~ 1.2 in) 10 mm (0.4 in) (Vertical height below footrest top.)
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in)



Tightening Torque

Parts to be tightened		Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
CHASSIS:							
Front wheel axle and nut		M14	1	85	8.5	61	
Rear wheel axle and nut		M14	1	85	8.5	61	
Sprocket wheel and hub		M10	4	62	6.2	45	
Engine mounting	Front	M10	1	64	6.4	46	
	Rear	M 8	1	38	3.8	27	
Pivot shaft and nut		M12	1	80	8.0	58	
Handle crown and inner tube		M 8	4	23	2.3	17	
Handle crown steering shaft		M14	1	70	7.0	50	
Handle crown and handlebar holder		M 8	4	15	1.5	11	
Steering shaft and ring nut		M25	1	38	3.8	27	
Under bracket and inner tube		M 8	4	20	2.0	14	
Rear hub stud bolt		M 8	4	39	3.9	28	Apply LOCTITE
Rear shock absorber and frame		M10	1	42	4.2	30	
Rear shock absorber and relay arm		M10	1	42	4.2	30	
Connecting rod and relay arm		M10	1	42	4.2	30	
Relay arm and swing arm		M12	1	59	5.9	43	
Connecting rod and frame		M10	1	42	4.2	30	
Brake caliper and front fork		M10	2	35	3.5	25	
Master cylinder and brake hose		M10	1	27	2.7	19	
Brake hose and brake caliper		M10	1	27	2.7	19	



C. ELECTRICAL

Model	DT200L
Voltage	12V
Ignition System: Ignition Timing (B.T.D.C.) Advanced Timing Advancer Type	8° at 1,350 r/min 30° at 4,000 r/min Electrical
<p>Ignition Timing (B.T.D.C.)</p> <p>Engine Speed ($\times 10^3$ r/min)</p>	
C.D.I.: Magneto-Model/ Manufacture Pickup Coil Resistance (Color) Source Coil Resistance (Color) C.D.I. Unit-Model/ Manufacturer	F34Y/YAMAHA 350 Ω \pm 20% at 20°C (68°F) (W/R — W/G) 355 Ω \pm 20% at 20°C (68°F) (Br — B/R) 37F-MO/HITACHI
Ignition Coil: -Model/ Manufacturer Minimum Spark Gap Primary Winding Resistance Secondary Winding Resistance	C2T4/YAMAHA 13 kV or more at 500 r/min 23 kV or less at 8,000 r/min 1.6 Ω \pm 10% at 20°C (68°F) 6.6 k Ω \pm 20% at 20°C (68°F)
Charging System: Type Charging Current	Flywheel Magneto
<p>Charging Current (A)</p> <p>Engine Speed ($\times 10^3$ r/min)</p> <p>Day</p> <p>Night</p>	
Charging Coil Resistance (Color) Lighting Coil Resistance (Color)	0.43 Ω \pm 20% at 20°C (68°F) (B — W) 0.35 Ω \pm 20% at 20°C (68°F) (Y/R — B)



Model	DT200L
Voltage Regulator/ Rectifier: Type Model/ Manufacture No Load Regulated Voltage	Short Circuit Type EHU-01TR07/ MATSUSHITA 14.5V
Battery: Capacity Specific Gravity	12V3AH 1,260
Horn: Type/ Quantity Model/ Manufacturer Maximum Amperage	Plain type × 1 MF-12/ NIKKO 1.5A
Flasher Relay: Type Model/ Manufacturer Self Cancelling Device Flasher Frequency Wattage	Condenser 061300-7110/ NIPPONDENSO No 60 ~ 120 cycle/min 23W × 4 + 3.4W
Oil Level Switch: Model/ Manufacturer	AST1/ TAIHEIYO
Circuit Breaker: Type Amperage for Individual Circuit/ Quantity Main Reserve	Fuse 10A × 1 10A × 1
Control Unit: Model/ Manufacturer	34X-MO/ YAMAHA
Servo Motor Unit: Model/ Manufacturer Potentiometer Resistance (Color)	34X/ YAMAHA 7.5kΩ ± 30% at 20°C (68°F) (Y/ B-W/ B)

GENERAL TORQUE SPECIFICATIONS/ DEFINITION OF UNITS

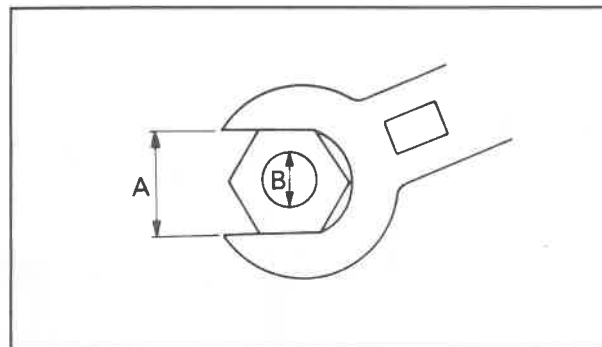
APPX



GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.

A (Nut)	B (Bolt)	General torque specifications		
		Nm	m · kg	ft · lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94



A: Distance across flats
B: Outside thread diameter

DEFINITION OF UNITS

Unit	Read	Definition	Measure
mm	millimeter	10^{-3} meter	Length
cm	centimeter	10^{-2} meter	Length
kg	kilogram	10^3 gram	Weight
N	Newton	$1 \text{ kg} \times \text{m}/\text{sec}^2$	Force
Nm	Newton meter	$\text{N} \times \text{m}$	Torque
m · kg	Meter kilogram	$\text{m} \times \text{kg}$	Torque
Pa	Pascal	N/m^2	Pressure
N/mm	Newton per millimeter	N/mm	Spring rate
L	Liter	—	Volume
cm^3	Cubic centimeter	—	or Capacity
r/min	Rotation per minute	—	Engine Speed



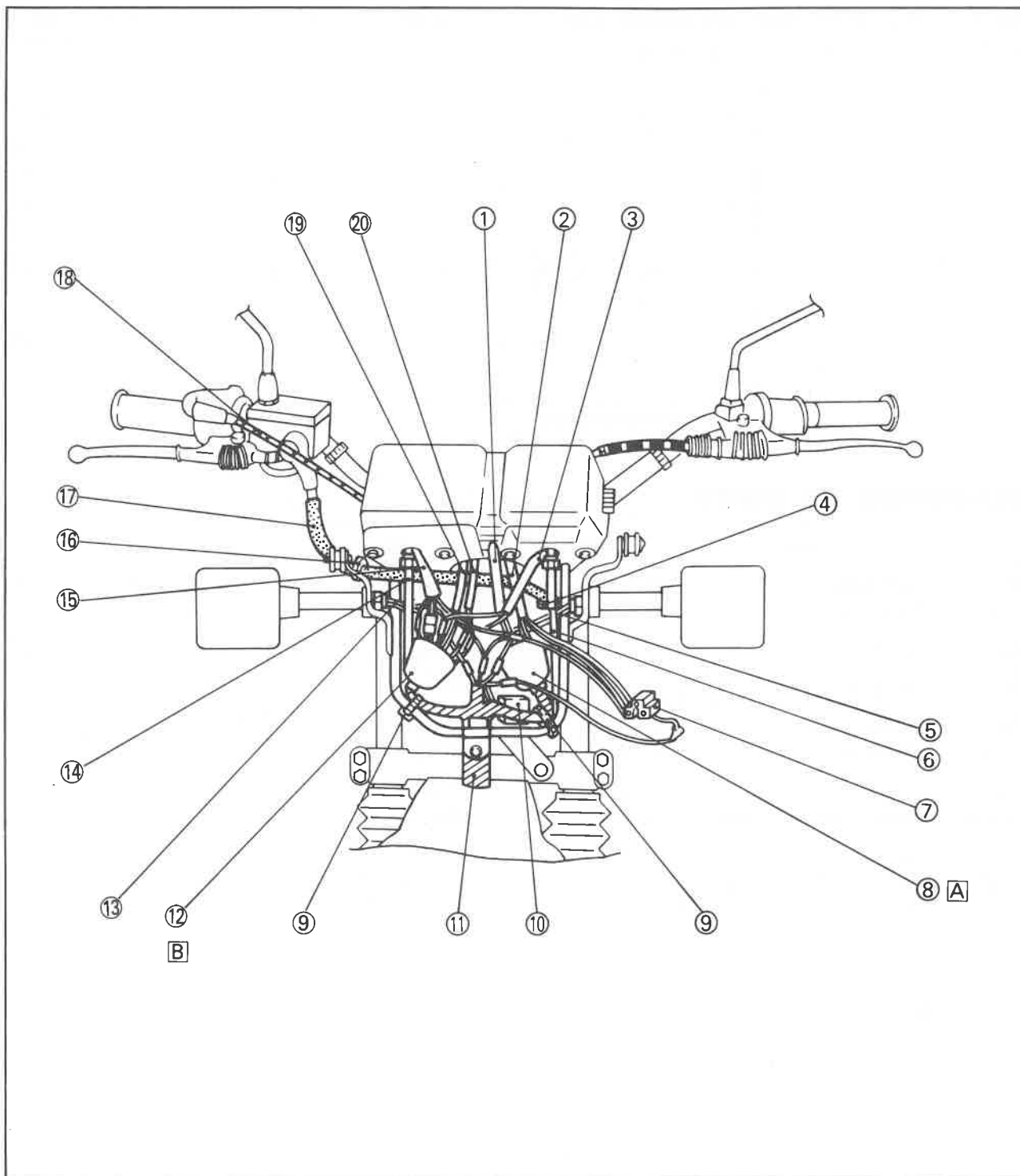
CABLE ROUTING

- ① Main switch lead
- ② Handlebar switch lead
- ③ Speedometer lead
- ④ Clamp
- ⑤ Front flasher light lead (Left)
- ⑥ Speedometer cable
- ⑦ Headlight socket
- ⑧ Connector cover (Left): White taping
- ⑨ Band
- ⑩ Flasher relay
- ⑪ Wire harness

- ⑫ Auxiliary light lead
- ⑬ Connector cover (Right)
- ⑭ Front flasher light lead (Right)
- ⑮ Tachometer cable
- ⑯ Tachometer lead
- ⑰ Clamp
- ⑱ Brake hose
- ⑲ Throttle cable
- ⑳ Front brake switch lead
- ㉑ Engine stop switch lead

Ⓐ After connecting, cover the connector cover (Left).

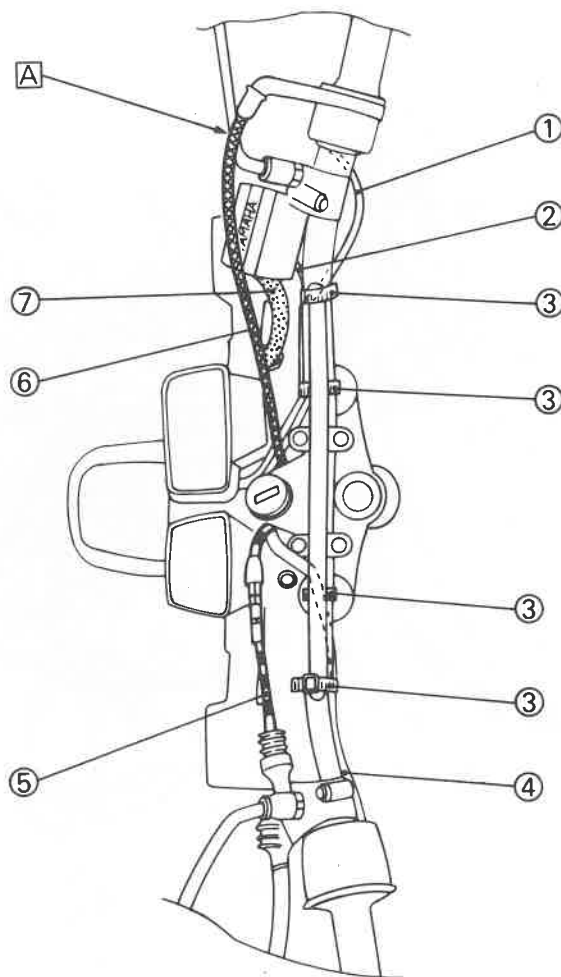
Ⓑ After connecting, cover the connector cover (Right).



**CABLE ROUTING**

- ① Engine stop switch lead
- ② Front brake switch lead
- ③ Handlebar band
- ④ Handlebar switch lead
- ⑤ Clutch cable
- ⑥ Throttle cable
- ⑦ Brake hose

A Pass throttle cable at the back of rear view mirror.





CABLE ROUTING

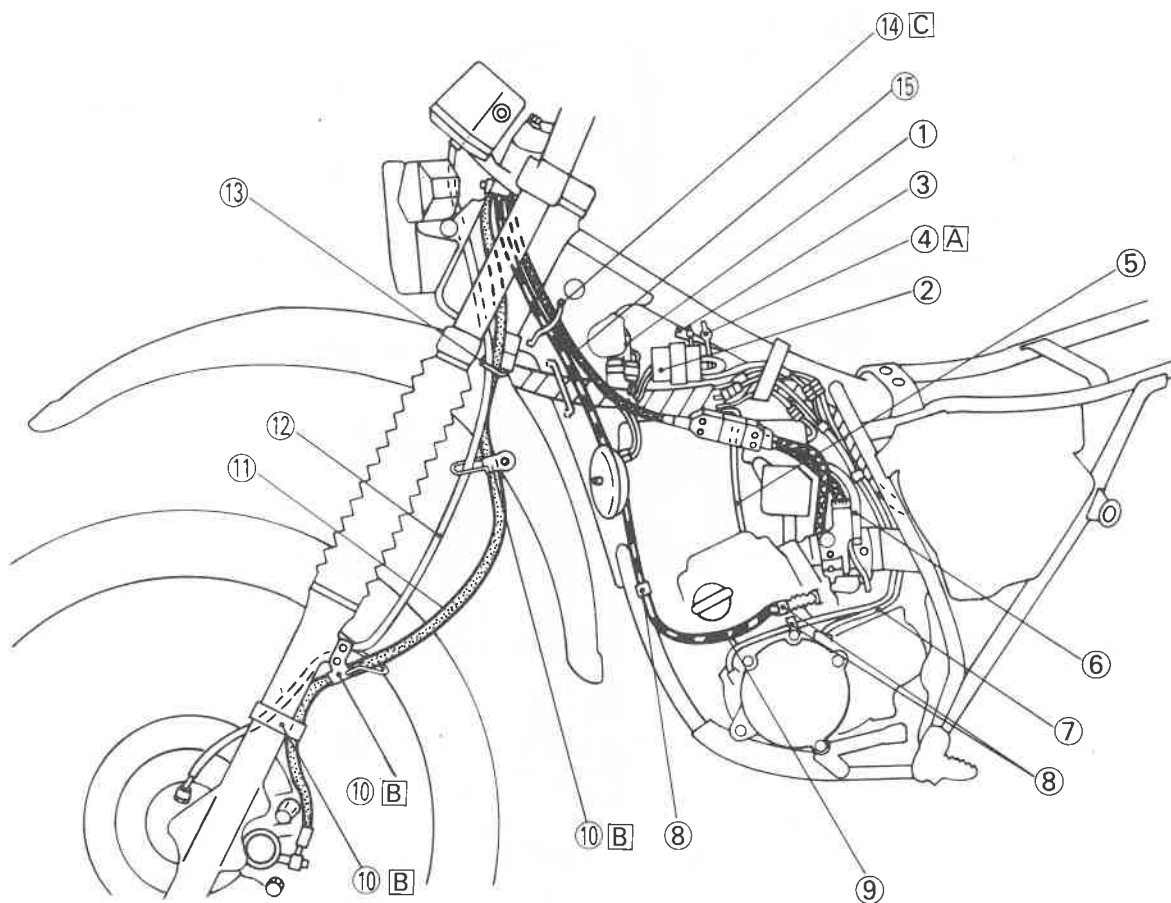
- ① Rectifier with regulator
- ② CDI unit
- ③ Ignition coil
- ④ Ground lead
- ⑤ Thermo-unit lead
- ⑥ Fuel pipe
- ⑦ CDI magneto lead
- ⑧ Clamp
- ⑨ Clutch cable
- ⑩ Cable holder
- ⑪ Brake hose

- ⑫ Speedometer cable
- ⑬ Cable guide
- ⑭ Cable guide
- ⑮ Throttle cable

A Secure the ground lead together with the ignition coil.

B Pass the speedometer cable and brake hose into the cable guide.

C Pass the clutch cable and throttle cable into the cable guide.

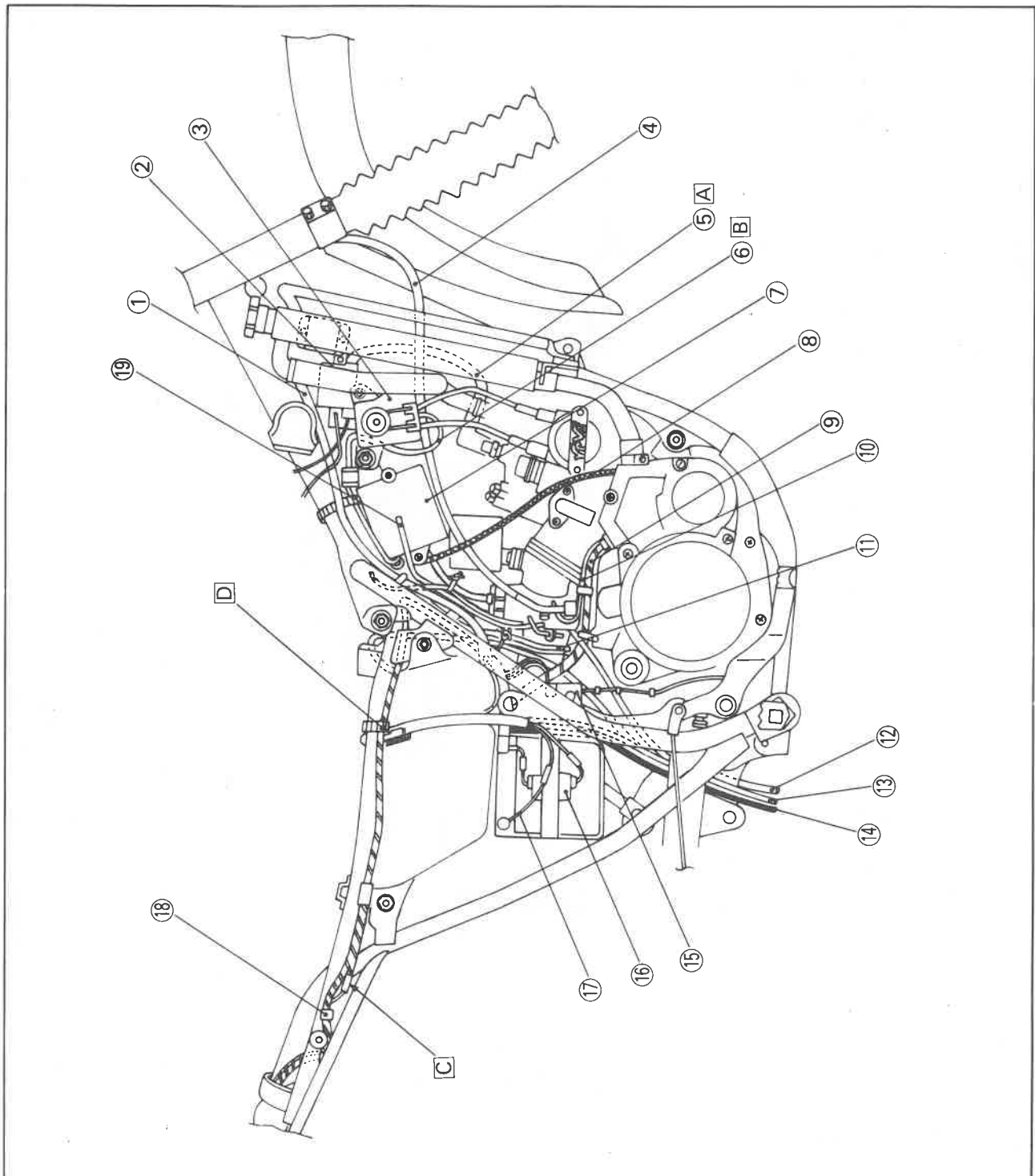




CABLE ROUTING

- | | |
|-------------------------|--------------------------------|
| ① Reservoir hose | ⑫ Carburetor overflow pipe |
| ② Ignition coil | ⑬ Reservoir tank breather pipe |
| ③ Servo motor | ⑭ Battery breather pipe |
| ④ Tachometer cable | ⑮ Rear brake switch |
| ⑤ High tension cord | ⑯ Fuse |
| ⑥ Servo motor lead | ⑰ Battery lead |
| ⑦ Oil pump cable | ⑱ Clamp |
| ⑧ Ignition control unit | ⑲ Fuel pipe |
| ⑨ Oil pipe | |
| ⑩ Oil delivery pipe | |
| ⑪ CDI magneto lead | |

- A** Pass the high tension cord between the frame and radiator.
- B** Pass the servo motor lead between the tension pipe and servo motor.
- C** After connecting the coupler, place the coupler between the seat rail and seat rail lug.
- D** After connecting the coupler, place the coupler in the hollow of the oil tank.





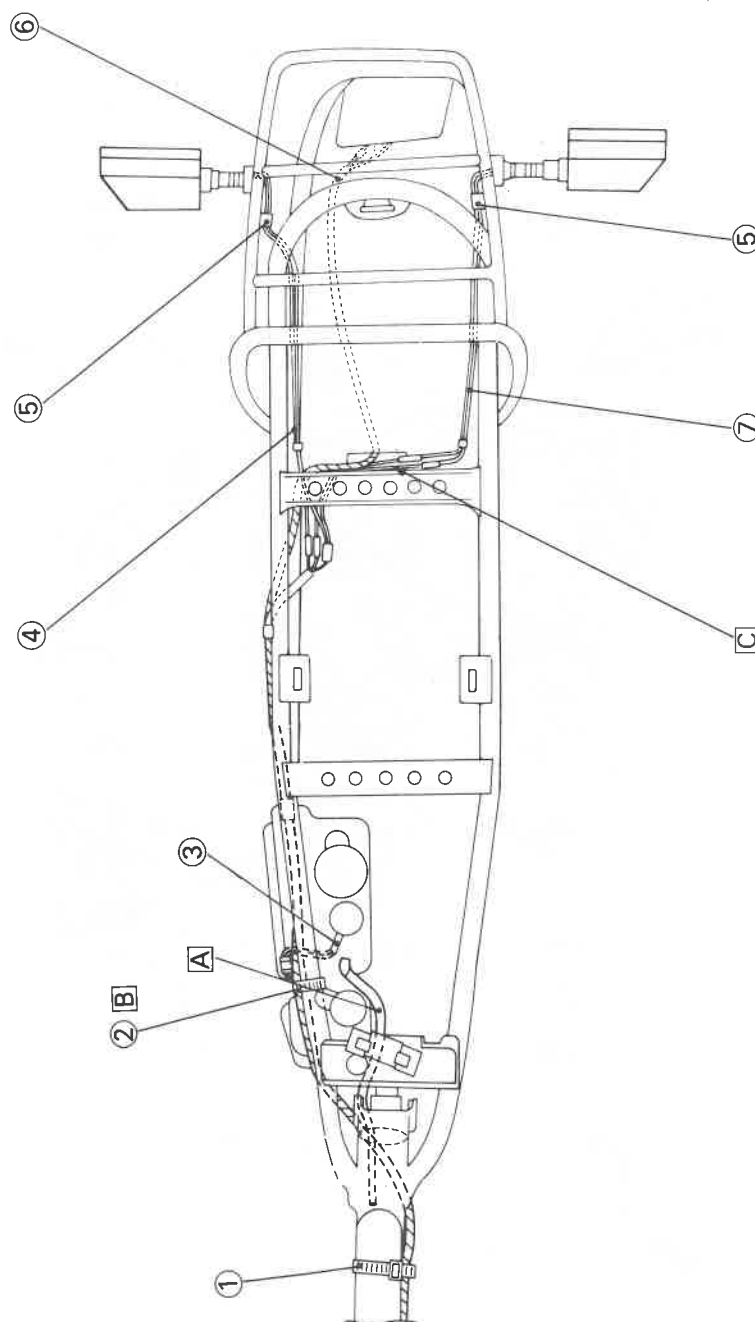
CABLE ROUTING

- ① Band
- ② Band
- ③ Oil level gauge lead
- ④ Rear flasher light lead (Right)
- ⑤ Clamp
- ⑥ Taillight lead
- ⑦ Rear flasher light lead (Left)

A Insert the oil tank breather pipe into the main pipe.

B Align the band position with the hollow of the oil tank.

C After connecting the rear flasher light leads, place the leads in the rear fender hole.



CABLE ROUTING

APPX




DT200L WIRING DIAGRAM

- | | |
|---------------------------|----------------------------|
| ① Spark plug | ⑲ "HORN" switch |
| ② Ignition coil | ⑳ "TURN" switch |
| ③ CDI unit | ㉑ "LIGHTS" (Dimmer) switch |
| ④ CDI magneto | ㉒ "LIGHTS" switch |
| ⑤ Neutral switch | ㉓ Main switch |
| ⑥ Thermo switch | ㉔ Headlight |
| ⑦ Flasher relay | ㉕ Tachometer |
| ⑧ Oil level switch | ㉖ Meter light |
| ⑨ Rear flasher light (R) | ㉗ "OIL" |
| ⑩ Tail/ Brake light | ㉘ "NEUTRAL" |
| ⑪ Rear flasher light (L) | ㉙ "HIGH BEAM" |
| ⑫ Rear brake switch | ㉚ "TURN" |
| ⑬ Battery | ㉛ Temperature gauge |
| ⑭ Rectifier/ Regulator | ㉜ Speedometer |
| ⑮ Servomotor | ㉝ Meter light |
| ⑯ Control unit | ㉞ "ENGINE STOP" switch |
| ⑰ Horn | ㉟ Front brake switch |
| ⑱ Front flasher light (L) | ㊱ Front flasher light (R) |

COLOR CODE

B Black	B/ R . . Black/ Red
Br Brown	B/ W . . Black/ White
Ch Chocolate	B/ Y . . Black/ Yellow
Dg Dark green	Br/ W . Brown/ White
G Green	G/ R . . Green/ Red
Gy Gray	G/ Y . . Green/ Yellow
L Blue	L/ R . . Blue/ Red
O Orange	R/ B . . Red/ Black
P Pink	W/ B . . White/ Black
R Red	W/ G . . White/ Green
Sb Sky blue	W/ R . . White/ Red
W White	Y/ L . . Yellow/ Blue
Y Yellow	Y/ R . . Yellow/ Red

APPX



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