YAMAHA

# XVZ1200

## Service Manual

LIT-11616-XV-13

YAMAHA

# XVZ12TK

# Service Manual

LIT-11616-03-35

26H-28197-10

XVZ12TK
SERVICE MANUAL
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P/N LIT-11616-03-35

# 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 to motorcycle repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.

This model has been disgned and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the motorcycle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his motorcycle and to conform with federal environmental quality objectives.

Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and 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.

**NOTE:**
This Service Manual contains information regarding periodic maintenance to the emission control system for the XVZ12TK. Please read this material carefully.

Particularly important information is distinguished in this manual by the following notations:

**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.

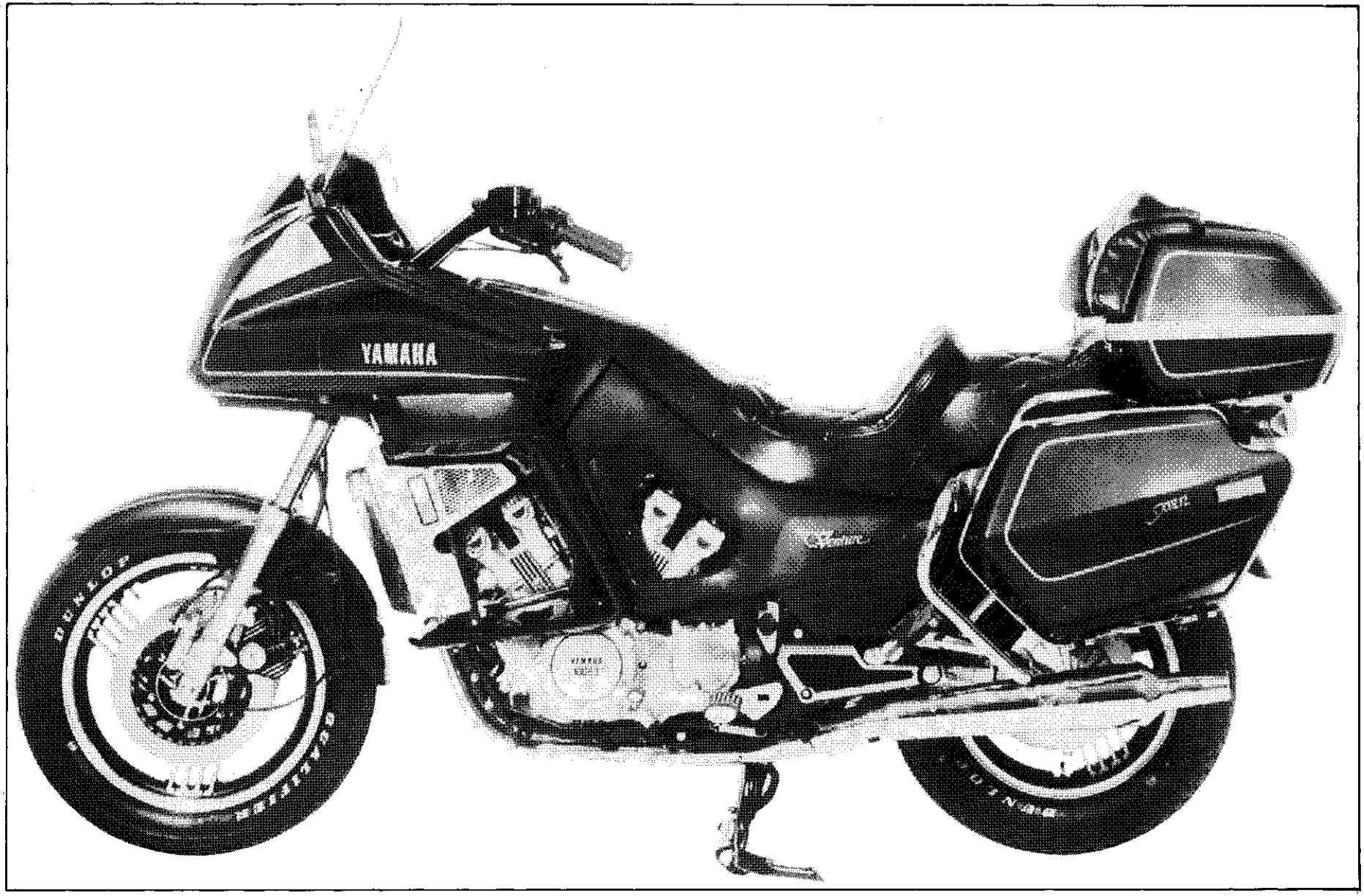
**WARNING:** A WARNING indicates special procedures that must be followed to avoid injury to a motorcycle operator or person inspecting or repairing the motorcycle.

**OVERSEAS SERVICE**
**OVERSEAS OPERATIONS**
**YAMAHA MOTOR CO., LTD.**

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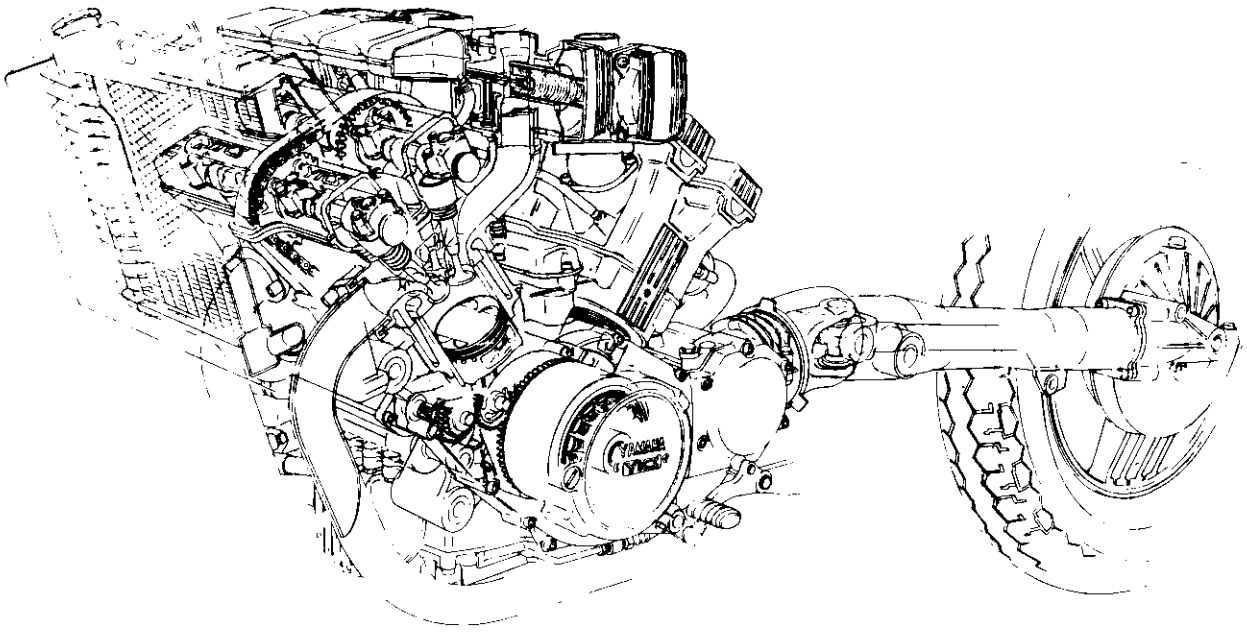
## XVZ12TK FEATURES



# ENGINE:

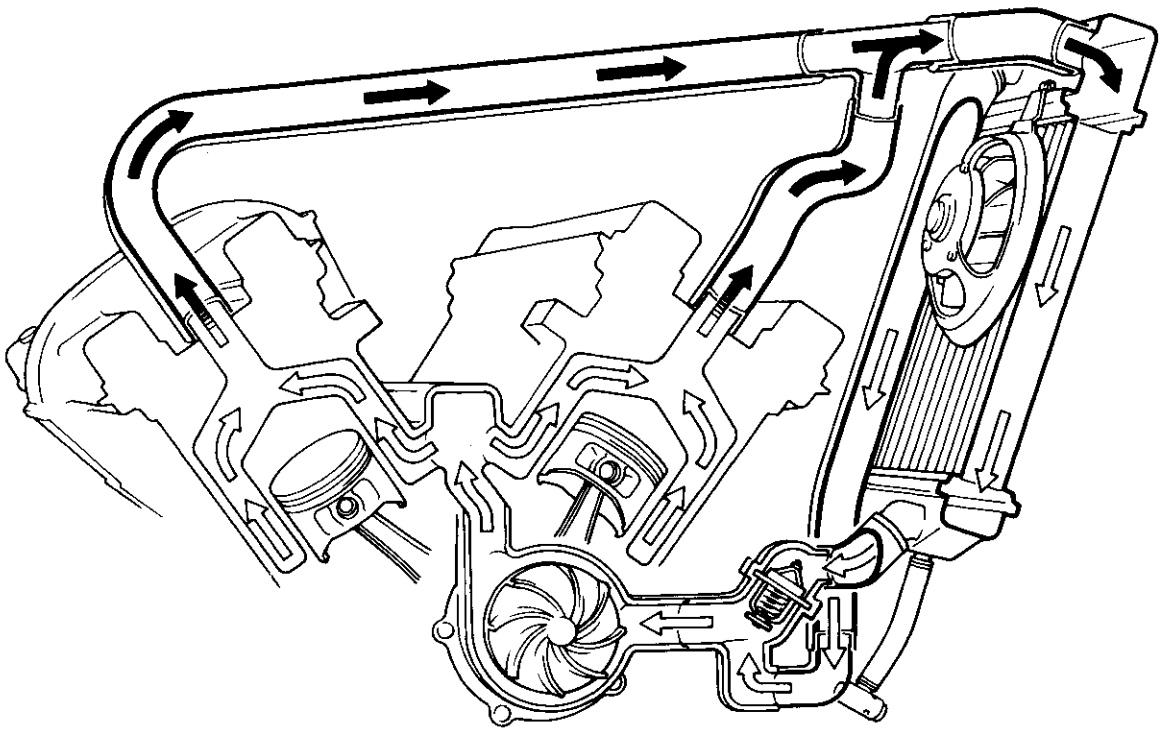
### DOHC, 4-VALUE, LIQUID COOLED V-FOUR ENGINE WITH SHAFT DRIVE

Yamaha's proven lightweight, compact design is applied to the new engine as well. The V-4 engine features an advanced 3-shaft type power train. Virtually maintenance free, the shaft drive incorporates a damper on the engine side and one on the rear wheel in order to increase the riding comfort of this high performance road machine.



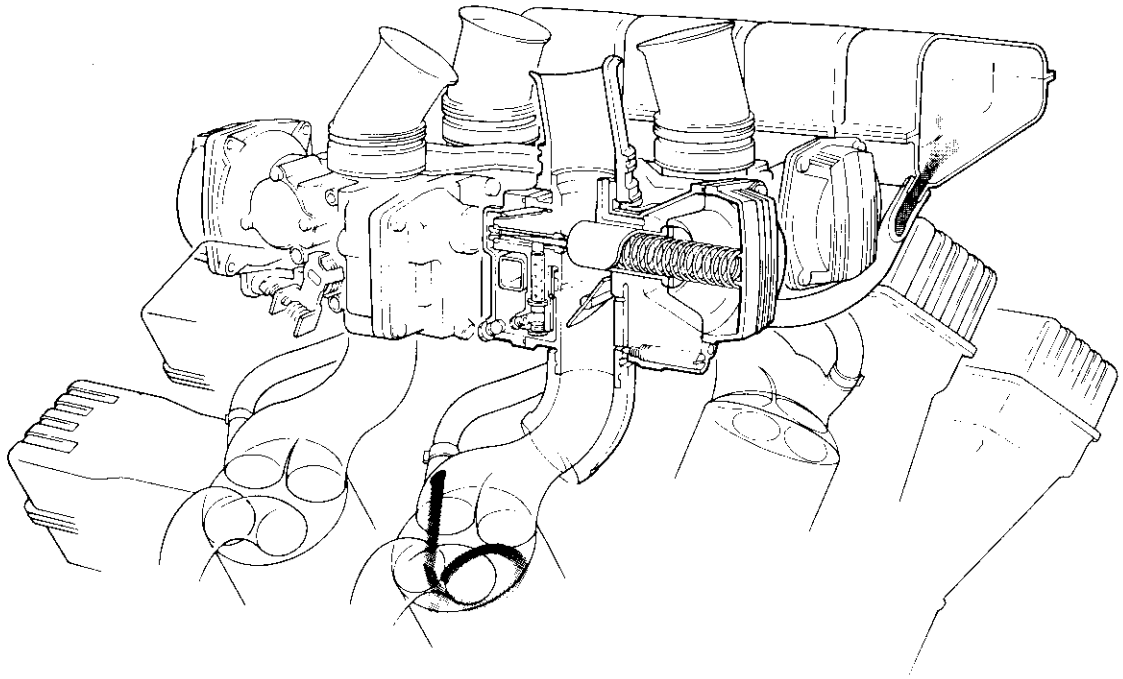
**Liquid-cooled V-4**

The 70° V-4 engine is liquid-cooled to maintain the best operating temperature range. The cooling system features a corrugated aluminum radiator which is extremely light and exhibits excellent heat-dissipating characteristics. An automatically activated electric fan pulls air through the radiator in heavy-traffic situations. The system has an automotive-type expansion and recovery tank which makes air space in the radiator unnecessary and virtually eliminates coolant loss on even the hottest days. A thermostatic valve mounted in the engine block provides quick warmups and stable coolant temperature.



## VENTURI TYPE DOWNDRAFT CARBURETORS AND YICS

Carburetors are arranged within the engine's "V" format, which is the usual design arrangement for all Yamaha V-twin engines. The newly developed V-4 engine has a variable, venturi type, downdraft 4-carb system. This system permits torque to be delivered smoothly in the low to middle speed range, while intake effect is increased over a wide speed range.



### YICS (Yamaha Induction Control System)

To increase fuel economy through more efficient combustion, the engine is equipped with the YICS, and the electronic governor type transistor ignition system with electronic boost control. In this configuration, the YICS consists of a chamber linked to the intake joint by a tube. Upon intake, the vacuum in the manifold creates a vacuum in the chamber; when the intake valve closes, the chamber draws in an air-fuel mixture. When the intake valve reopens, the mixture in the chamber shoots back out through the angled tube and into the cylinder, mixing with and swirling the main intake charge. The swirling charge is then compressed and ignited, burning more completely and producing more power than that of a conventional engine.

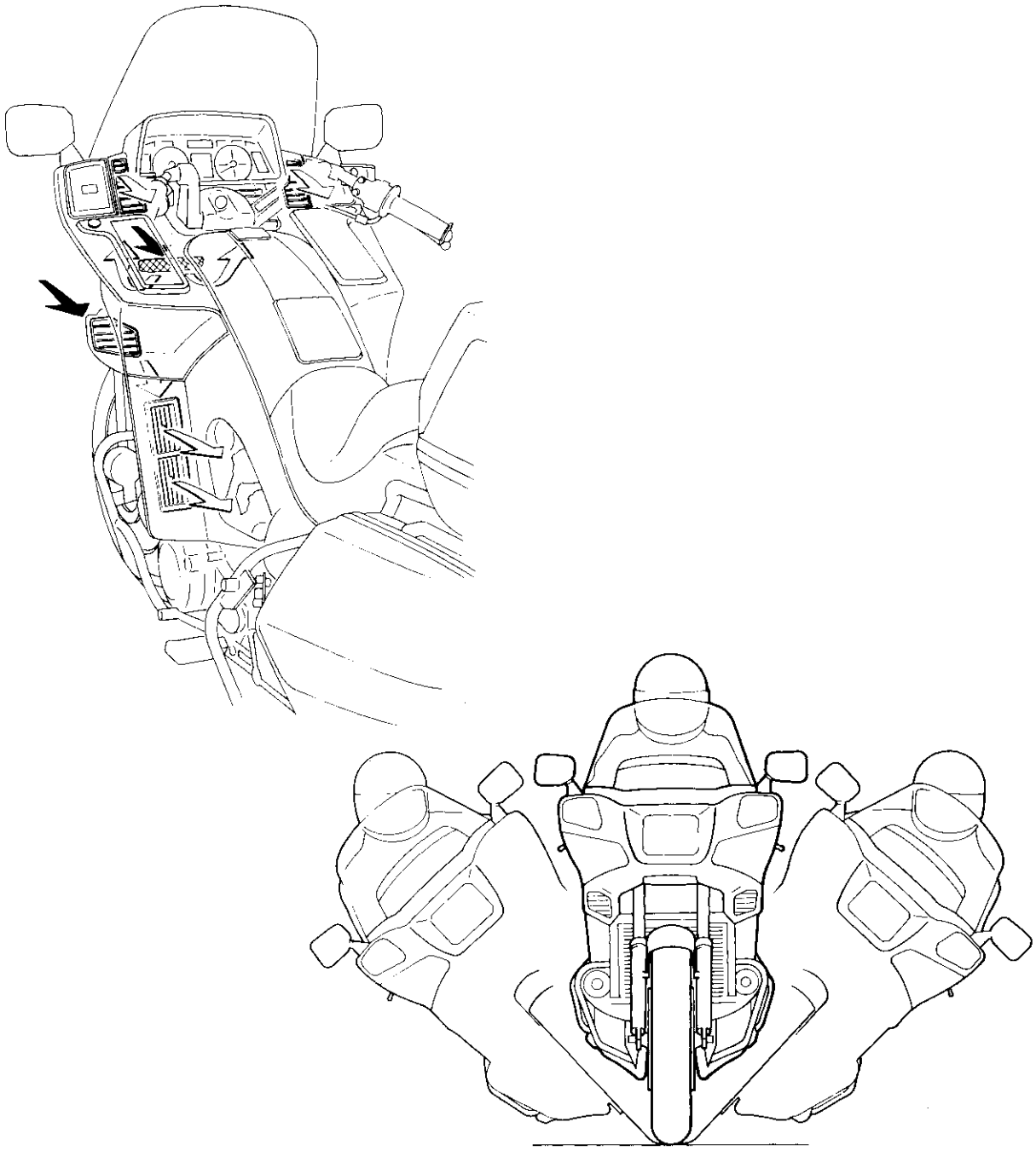
# CHASSIS:

## FULL FAIRING

The newly designed full fairing on this model has an air duct which works to induce the wind around the upper or lower part of the rider's body, as occasion demands, so that he can enjoy a more refreshing ride.

The full fairing adopts an integrated design based on advanced aerodynamics. It was developed through careful, exhaustive wind tunnel testing.

Working in concert with the advanced fairing design, the new V-4 engine has an unusually narrow, head-on profile coupled with a compact, lightweight construction that provides the rider with unparalleled agility, especially when negotiating sharp corners.



## MONO-CROSS SUSPENSION

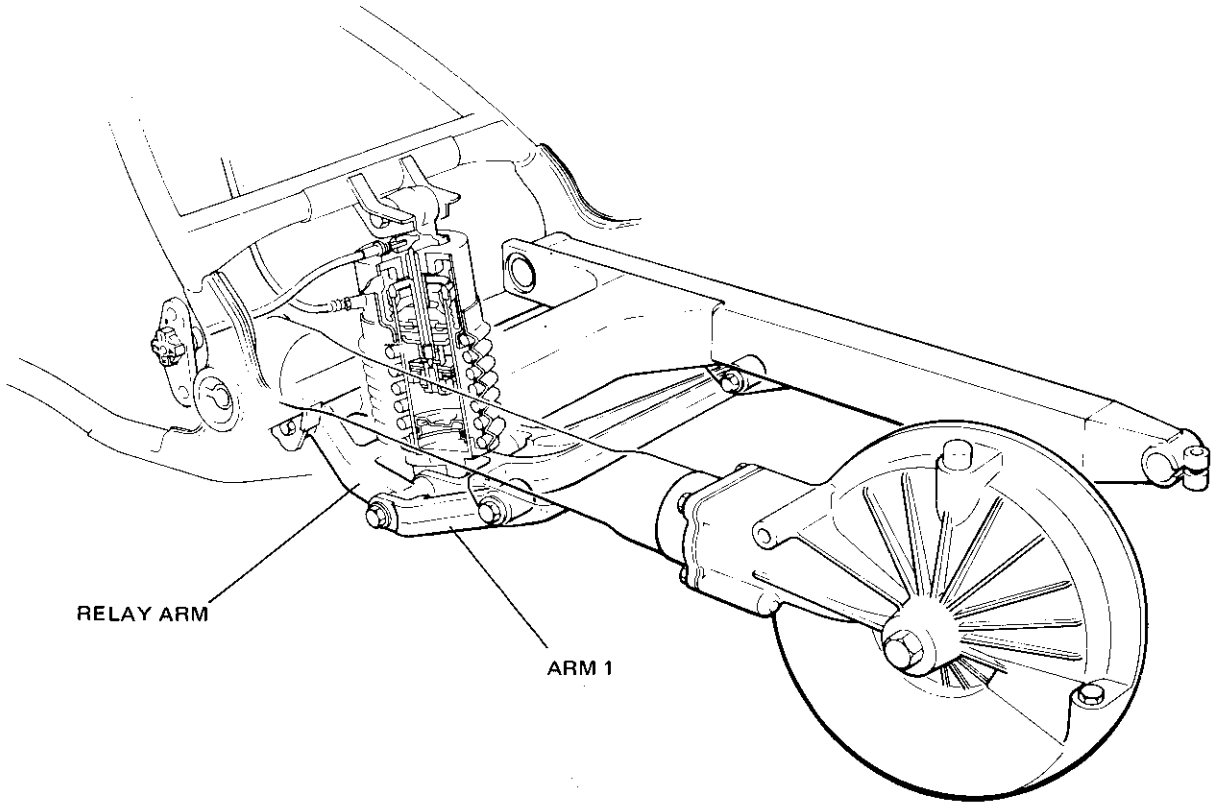
This model has the newly designed rear Monocross suspension system, based on the rising rate type of suspension developed and adopted for the Yamaha racing models.

The shock absorber is almost vertically positioned on the rear wheel side of the swingarm pivot.

The upper part of this shock absorber joins the frame, and the lower part is supported by a relay arm joining the frame. This relay arm extends from the middle lower part of the swingarm and joins arm 1. In brief, the suringarm's action is transmitted through arm 1 to the relay arm. Then the relay arm goes into action to make the shock absorber move upward or downward (expansion or contraction).

The new Monocross suspension system is characteristic of this rising-rate effect. In this system, a heavy, bulky shock absorber can be set low, almost at the center of the chassis, so that the center of gravity is lowered and the total weight better distributed.

The rear shock absorber on the new Monocross suspension system features and air/oil damper with a remote control type adjuster. This damping force can be adjusted so that an optimum damping effect can be obtained under any riding conditions.

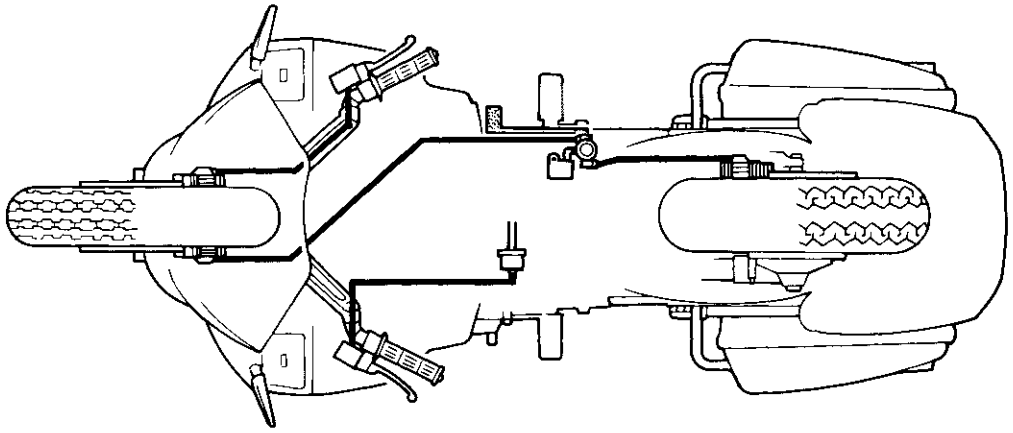


## UNIFIED BRAKE SYSTEM/HYDRAULIC CLUTCH

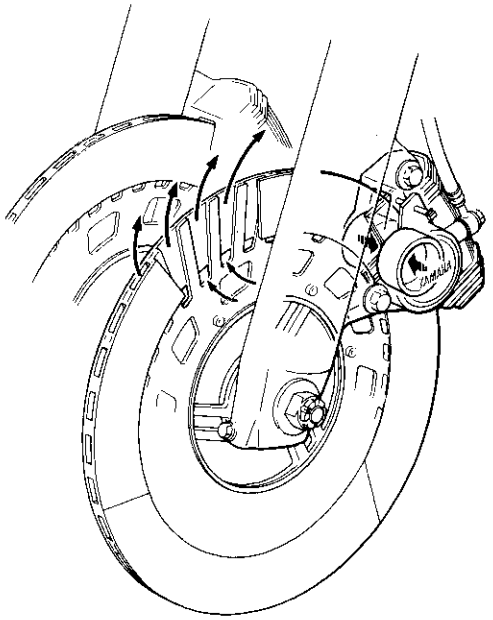
The new model features a unified brake system which enables the rider to brake the front and rear wheels effectively by right foot pedal operation alone.

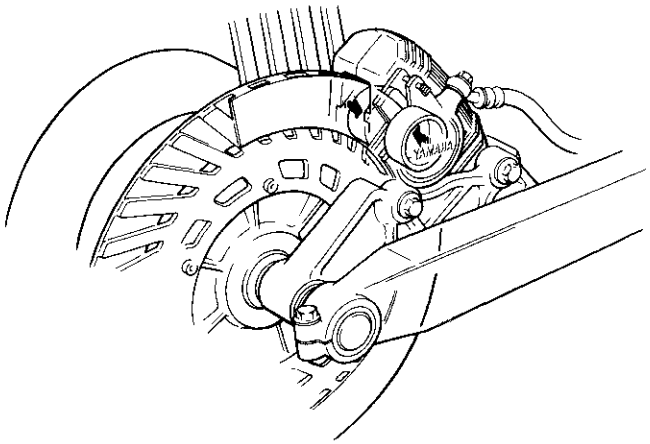
The exclusive advantage to this brake system is that the brake operation requires no skill, and the brake power can be adjusted for a wide variety of riding conditions whether it be carrying a passenger, operating the motorcycle under varied surface conditions and running speeds, or a combination of both.

In addition, the right hand operated front brake can also be used, if occasion demands, so that the brake power is further increased. The newly designed hydraulic clutch is virtually maintenance free.



This model uses dual disc brakes up front and a single unit in back. The discs themselves feature a special construction: The pad contact surfaces are welded to a radially slotted frame, serving effectively to ventilate them. The result is superb, fade-resistant performance. Each lightweight aluminum caliper has live pistons on both sides pushing semimetallic pads; they help prevent squeaking while providing consistent stopping in any kind of weather.

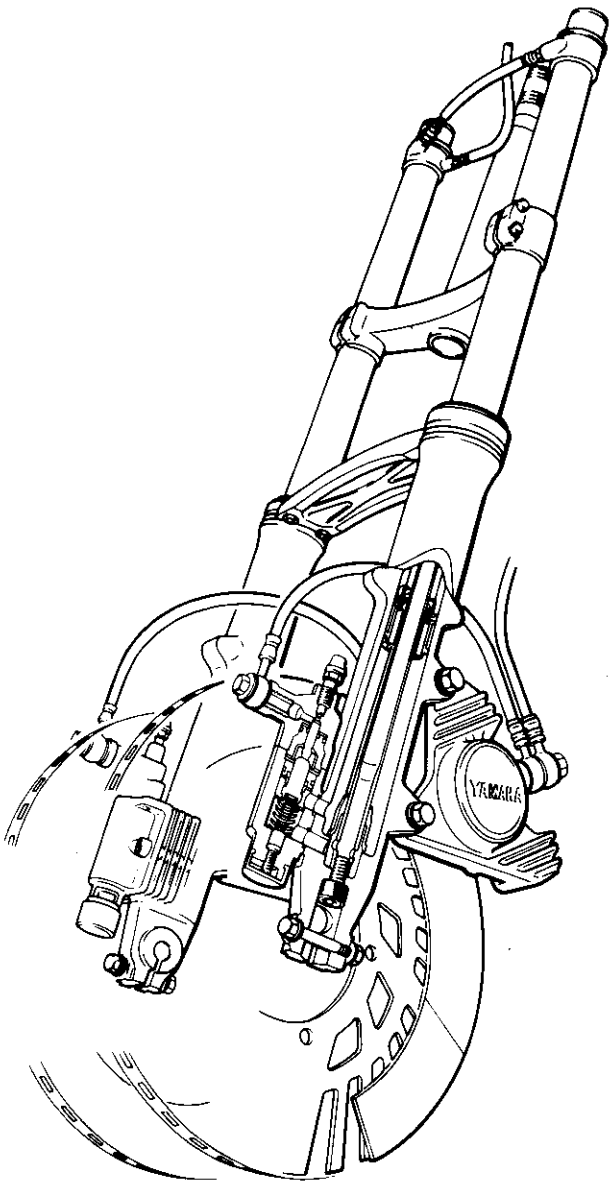




## FRONT FORKS

Along with an increased cushion effect of the rear Mono-Cross suspension system, the front fork assembly also adopts a highly efficient air damper which works softly against light shocks and prevents "bottoming". This is achieved by giving full play to the variable spring rate effect when a hard shock is received. The air damper is also adjustable so that handling stability and riding comfort are increased under varied surface conditions.

This is accomplished by an equalizer pipe which links the left and right front fork inner tubes so that even air pressure is obtained for both.

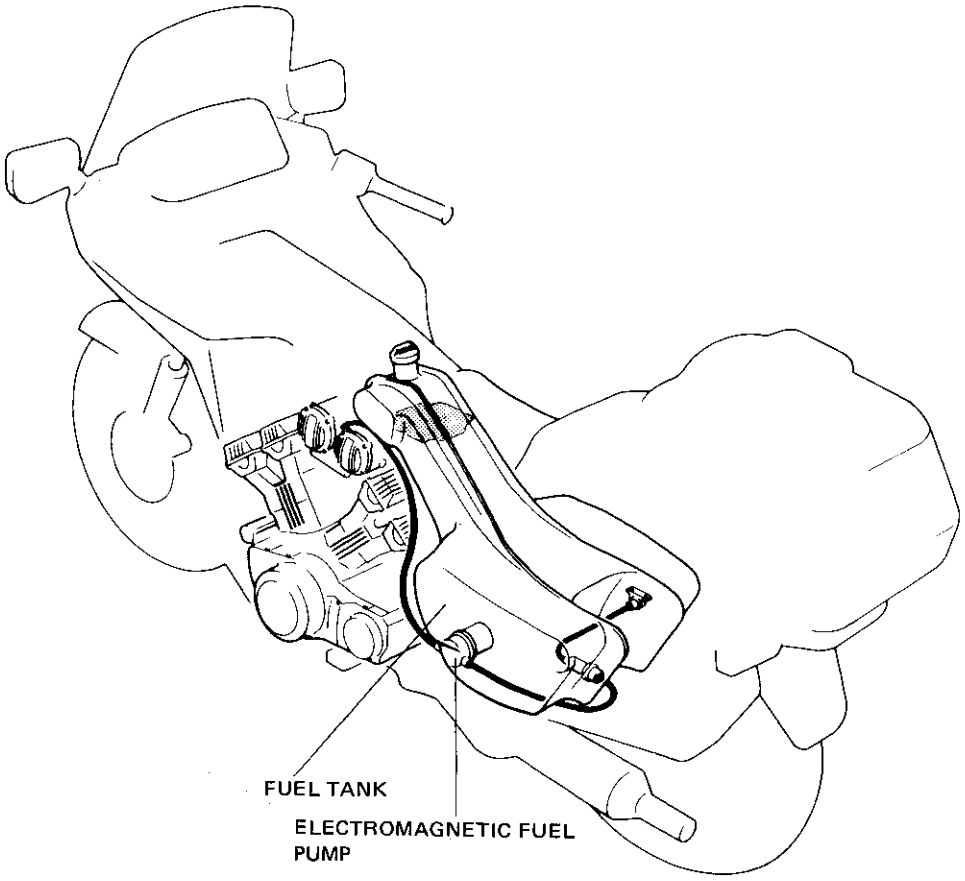


## MIDSHIP TYPE FUEL TANK

The fuel tank is installed under the seat to effect a low center of gravity design format. A large capacity air cleaner and battery are positioned in front of the fuel tank. Refilling the 20-liter capacity fuel tank is achieved by first opening the lid of the fairing's top cover and then removing the fuel tank cap.

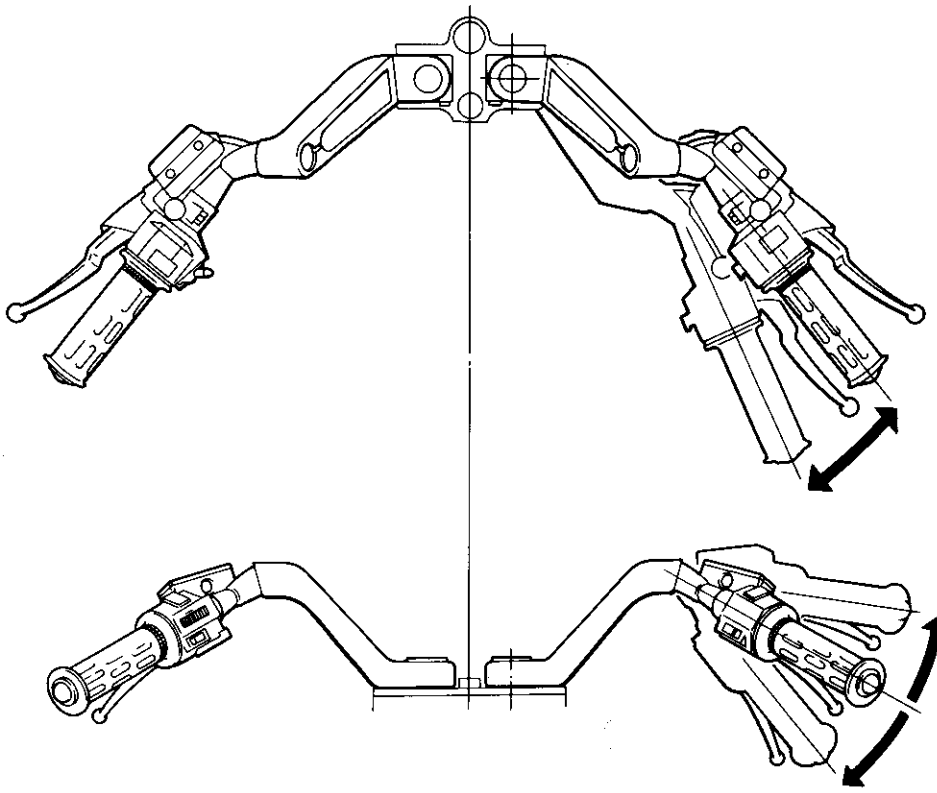
As the fuel tank is positioned midship and low in the frame, and electromagnetic fuel pump is utilized to feed fuel to the carburators.

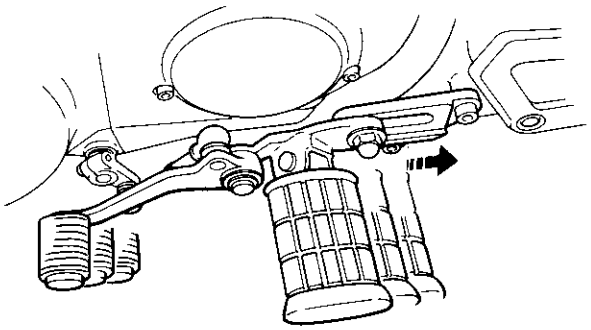
This advanced design causes the least change in the center of gravity, even when fuel has been consumed, thus ensuring a consistently stable ride.

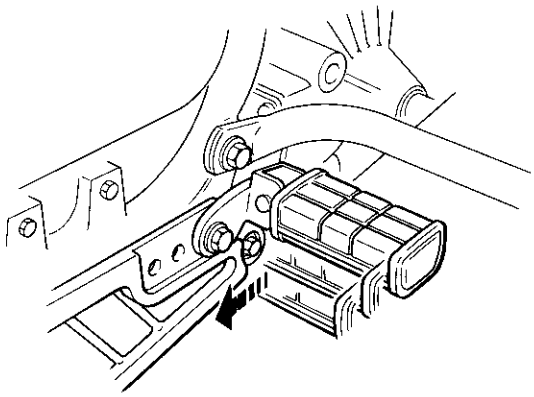


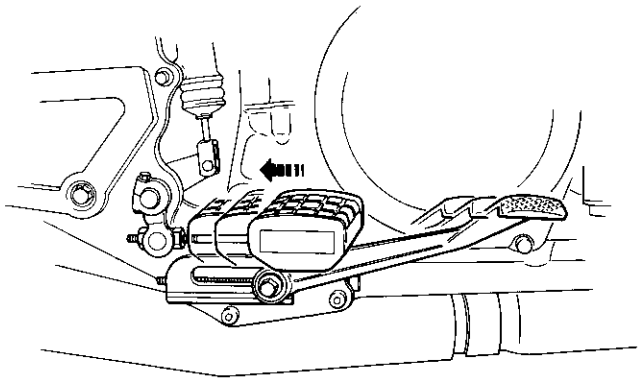
## ADJUSTABLE HANDLEBARS AND FOOTRESTS

Handlebars and footrests are adjustable, resulting in an overall balanced riding position to facilitate ease of comfort and handling stability. The brake pedal, gearshift pedal, and footrests are shifted as one unit.



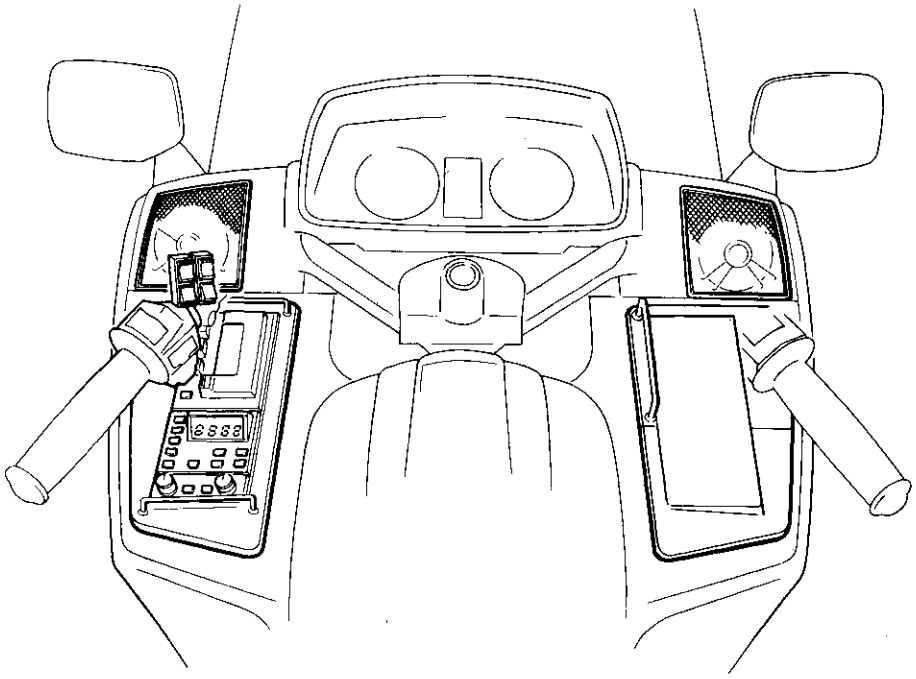


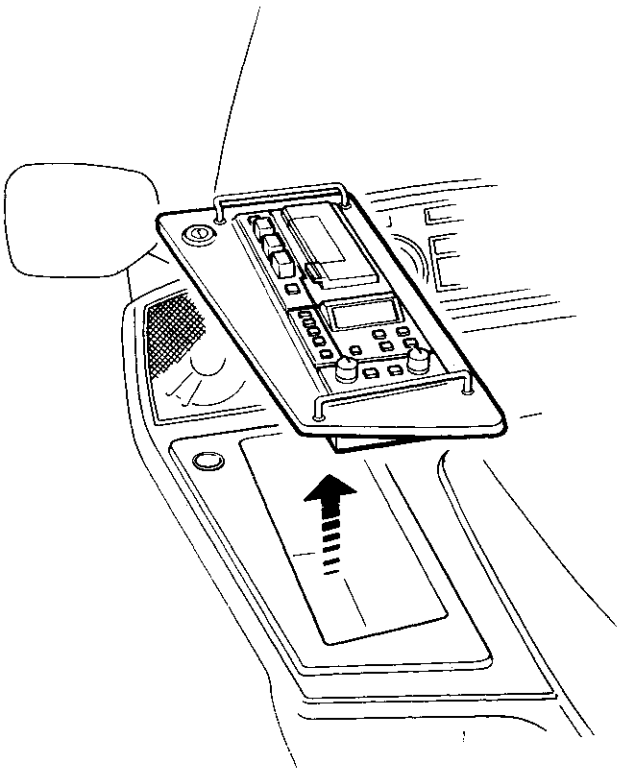




## OPTIONAL HIGE PERFORMANCE ACCESSORIES AVAILABLE

High performance accessories for more comfortable riding are available as optional equipment.
This model can be equipped with a number of high performance accessories to convert it into an upgraded, long range touring motorcycle. These accessories include an AM/FM stereo radio and tape cassette, both incorporated in the console panel on the left side of the fairing. Whenever necessary, these accessories can be unlocked and detached easily, within seconds.

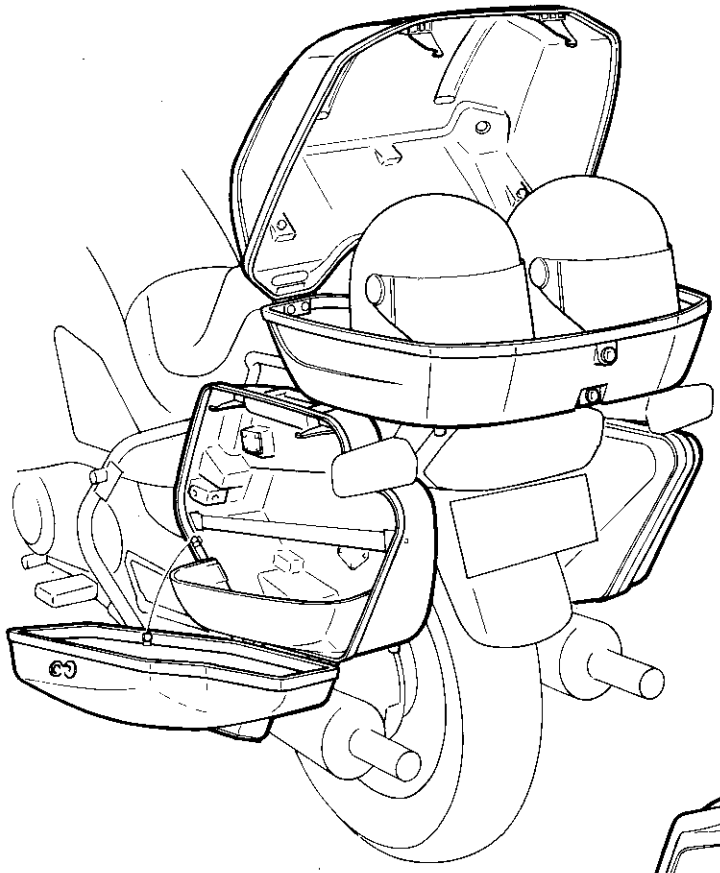


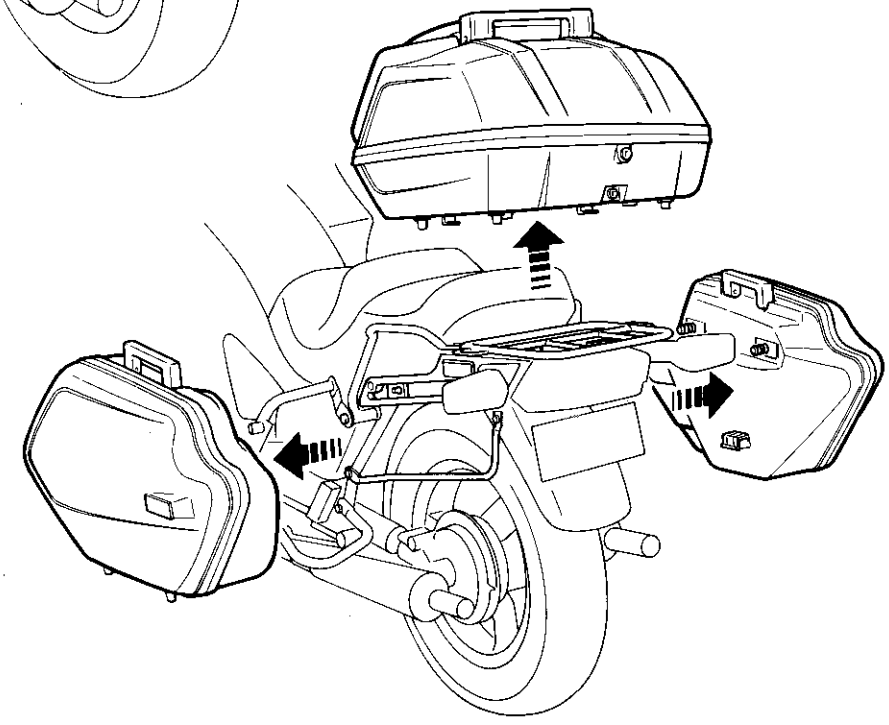


## TRAVEL TRUNK AND SADDLE BAGS

This model has a travel trunk and saddle bags as standard equipment. These have been designed specifically for this grand tourer, thus helping to increase the comfort of long touring to a maximum.

Each accessory can be easily detached from the body within seconds.

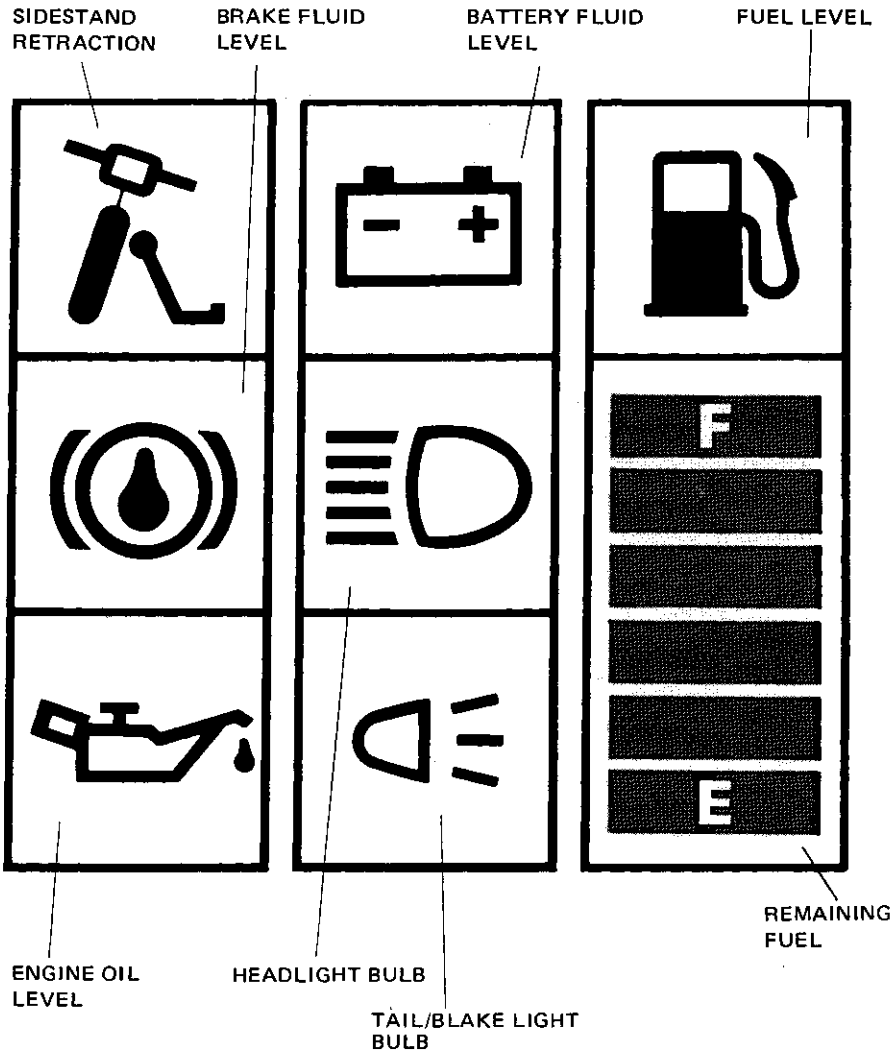




# ELECTRICAL:

## DISPLAY PANEL PICTOGRAPHIC COMPUTER MONITOR SYSTEM (CMS)

### DISPLAY PANEL




Highly reliable, 3-color liquid crystal displays (CM), specifically designed for motorcycle application, are situated in the middle of the instrument panel.

Red display indicates warning that the following functions need attention:

- Sidestand retraction
- Disc brake fluid level
- Engine oil level
- Fuel level (When this indicator is displayed, the remaining fuel is 4.0 L (0.9 Imp gal, 1.1 US gal).

Blue display indicates warning that the following electrical components need attention:

- Battery liquid level
- Headlight bulb
- Tail/brake light bulb

Green display indicates remaining fuel level.

- Six stage display indicates remaining fuel levels.

# CHAPTER 1. GENERAL INFORMATION



MOTORCYCLE IDENTIFICATION . . . . . 1-1
Engine Serial Number . . . . . 1-1
Vehicle Identification Number . . . . . 1-1

SPECIAL TOOLS . . . . . 1-2
For Tune-up . . . . . 1-2
For Engine Service . . . . . 1-2
For Chassis Service . . . . . 1-5
For Middle Gear Service . . . . . 1-5
For Electrical Components . . . . . 1-5

# GENERAL INFORMATION



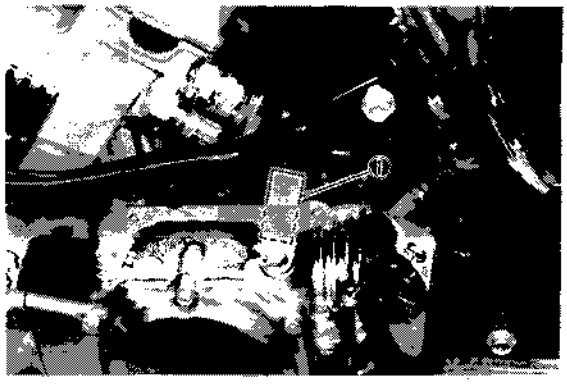
## MOTORCYCLE IDENTIFICATION

### Engine Serial Number

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

Starting serial number:

| | |
|---|---|
| XVZ12TK | 26H-000101 |



1. Engine serial number

**NOTE:**

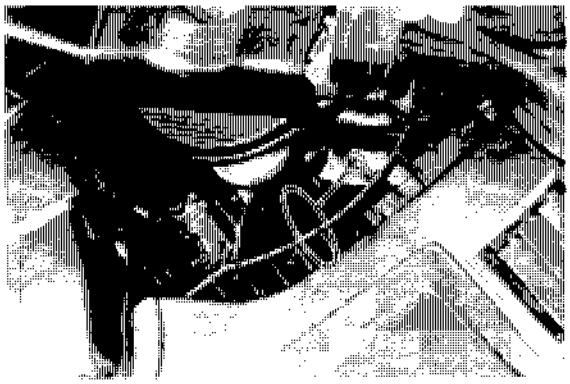
The first three digits of these numbers are for model identification; the remaining digits are the nuit production number.

### Vehicle Identification Number

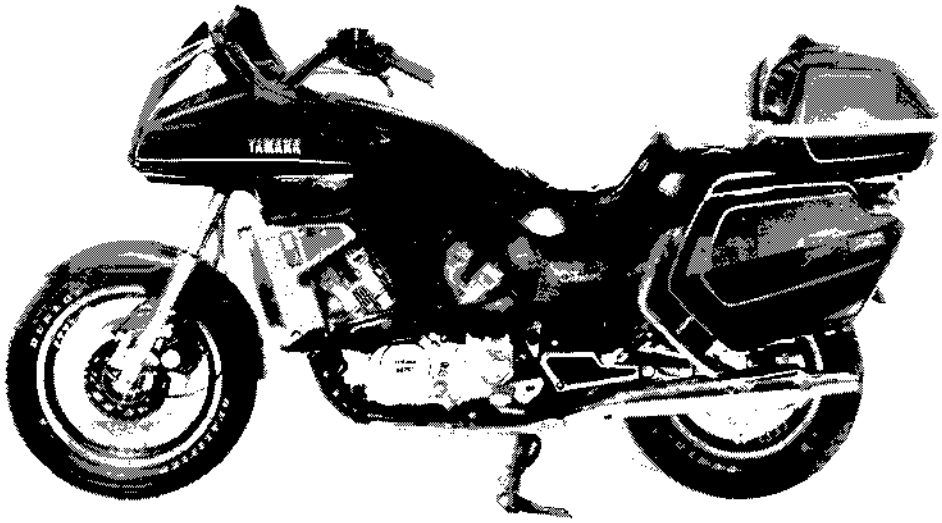
The vehicle identification number is on the left side of the steering head pipe.

Starting serial number:

| |
|---|
| JYA26H00 * DA000101 |



1. Vehicle identification number

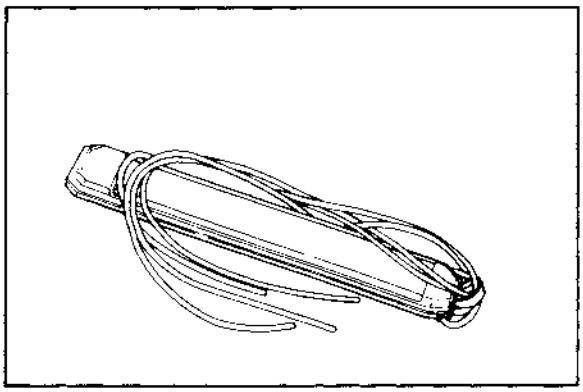


## SPECIAL TOOLS

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**

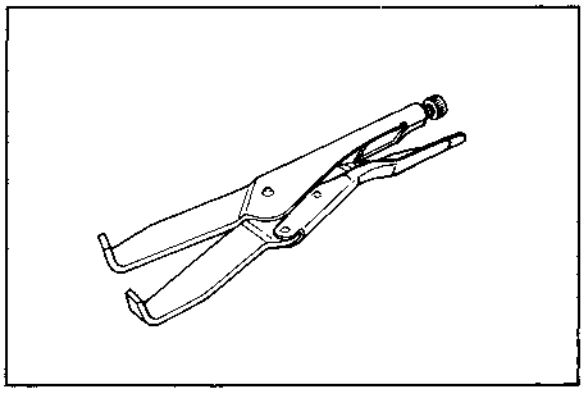
| | |
|---|---|
| Inductive tachometer | (P/N YU-08036) |
| Inductive timing light | (P/N YU-08037) |
| Fuel level gauge | (P/N YM-01312-A) |
| Cooling system tester | (P/N YU-24460) |
| Compression gauge | (P/N YU-33223) |
| Vacuum gauge | (P/N YU-08030) |



This gauge is needed for carburetor synchronization.

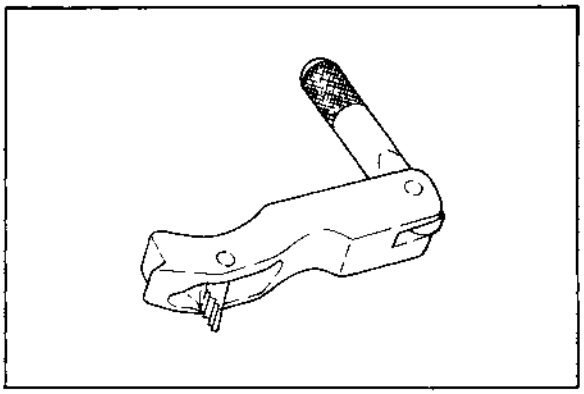
**For Engine Service**

Universal clutch holder (P/N YM-91042)



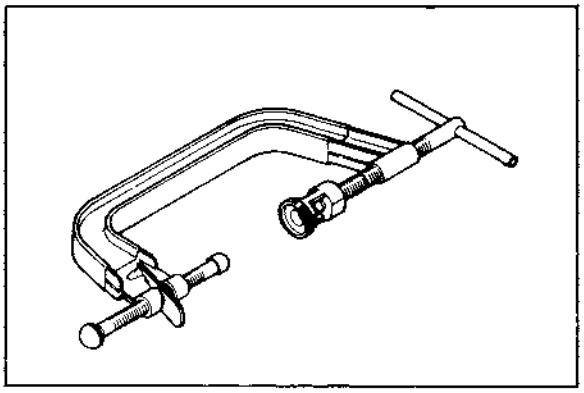
This tool is used to hold the clutch when removing or installing the clutch boss lcoknut.

Tappet adjusting tool (P/N YM-33296)



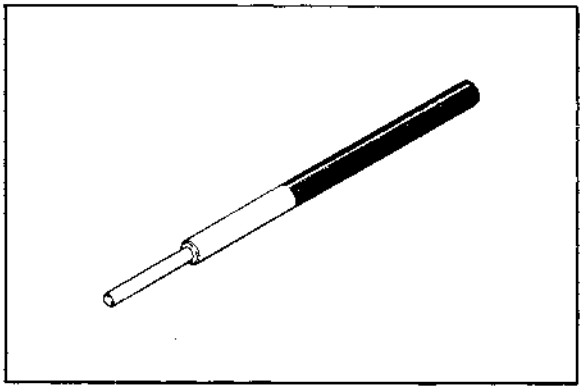
This tool is necessary to replace valve adjusting pads.

Valve spring compressor (P/N YM-04019)



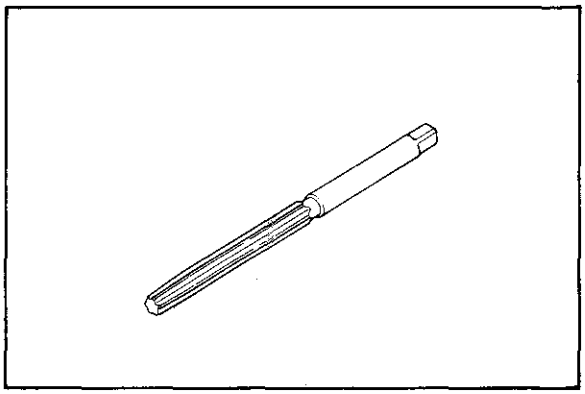
This tool must be used for removing and installing the valve assemblies.

Valve guide remover (P/N YM-04064-A)



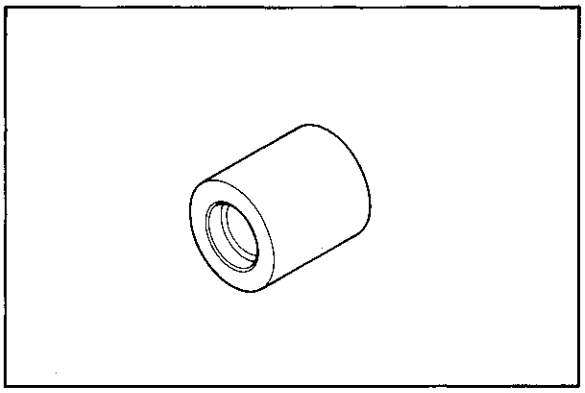
This must be used to remove the valve guides.

Valve guide reamer (P/N YM-04066)



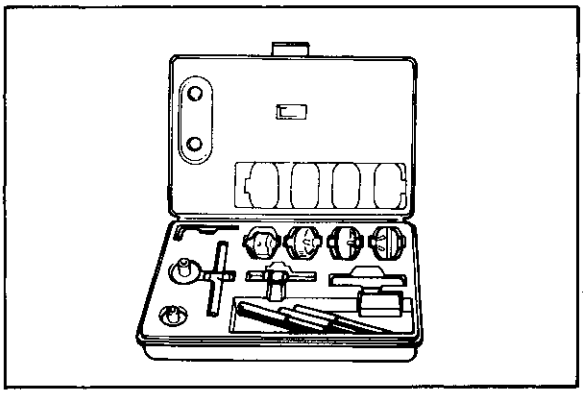
This must be used when replacing the valve guide.

Valve guide installer (P/N YM-04065)



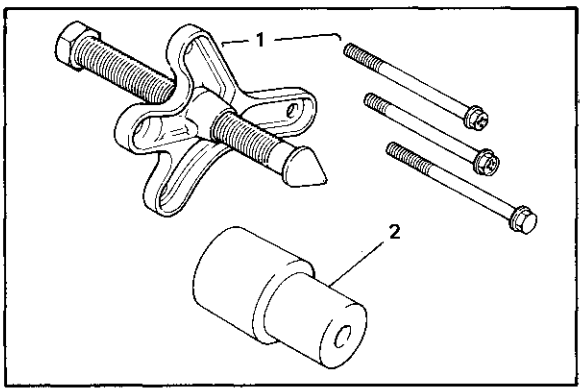
This tool is needed for proper installation of the valve guides.

Valve seat cutter set (P/N YM-91043)



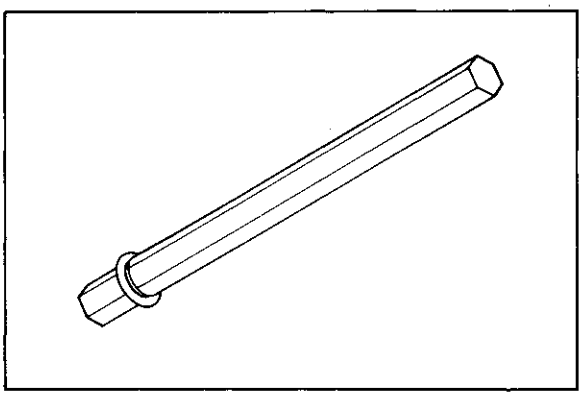
This tool is needed to resurface the valve seat.

Flywheel puller (P/N YU-33270) – 1
Adapter (P/N YM-33282) – 2



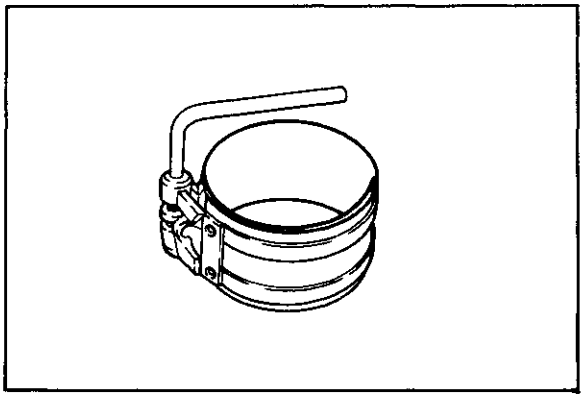

These tools are used for removing the flywheel.

8 mm (0.3 in) wrench adapter (P/N YM-28897)



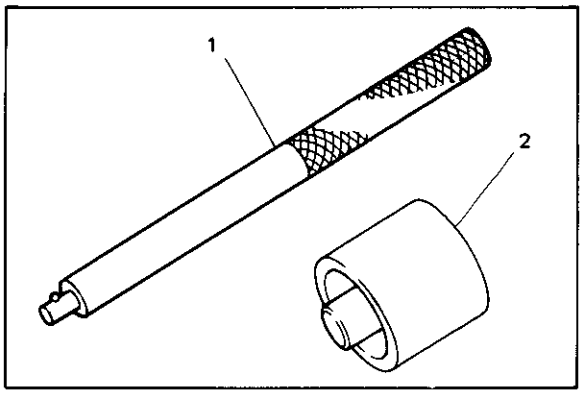
This tool is used to loosen or tighten the cylinder head securing nut.

Piston ring compressor (P/N YM-8037)



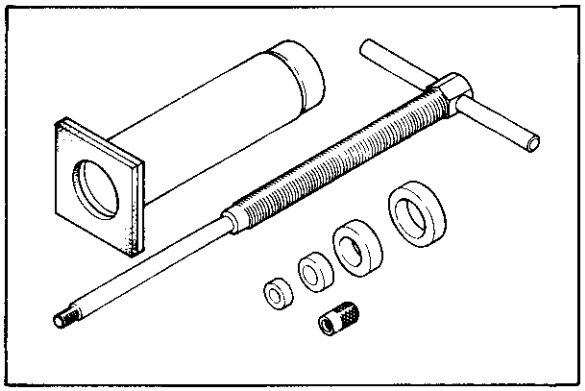
This tool is used when installing the piston into the cylinder.

Water pump seal installer
Handle (P/N YM-04058-1) – 1
Adapter (P/N YM-33221) – 2



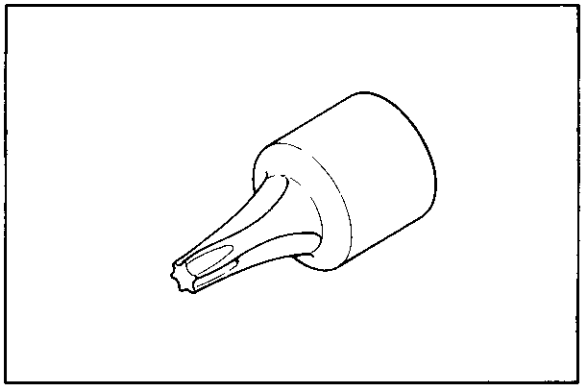

This tool is needed for proper installation of the water pump seal.

Piston pin puller (P/N YU-01304)



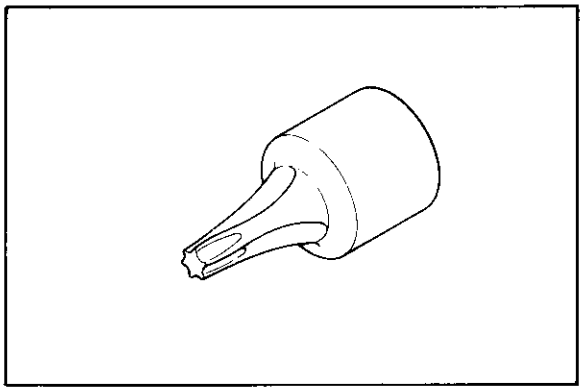
This tool is used to remove the piston pin.

#40 Torx driver (P/N YU-29843-7)



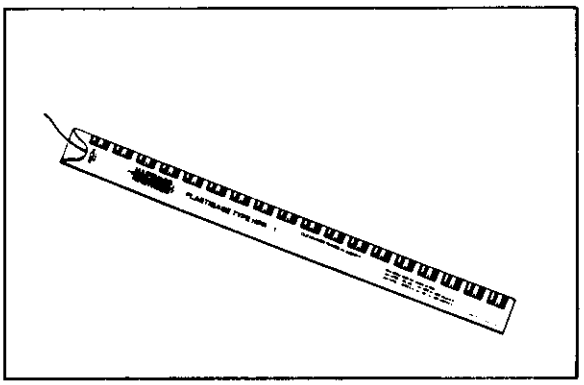
This tool is used to loosen or tighten the middle gear bearing retainer bolt.

#30 Torx driver (P/N YU-29843-6)



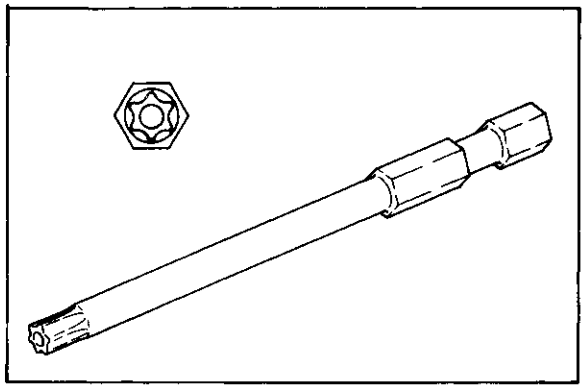
This tool is used to loosen or tighten the shift cam segment securing bolt.

Plastigauge set "Green" (P/N YU-33210)



This gauge is needed when measuring clearance for connecting rod bearing.

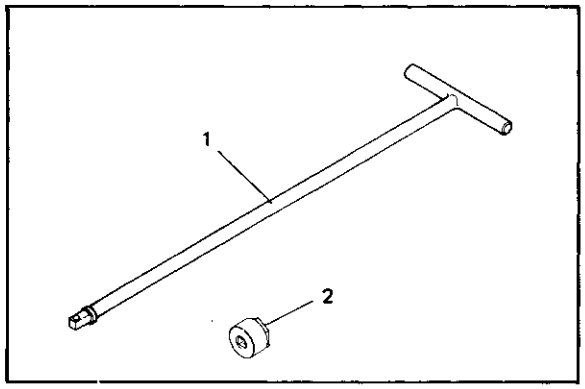
Special torx driver (P/N YU-25359-2)



This tool is used when overhalling the carburetors.

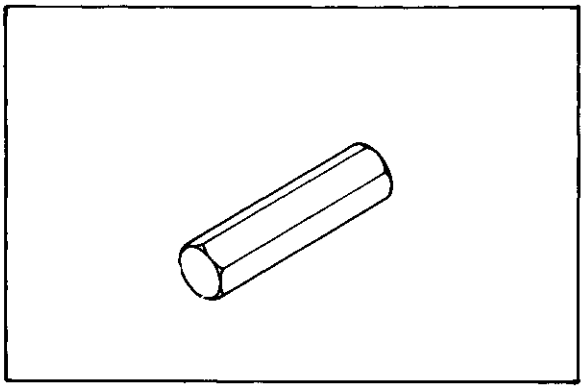
**For Chassis Service**

T-handle (P/N YU-01326) – 1
Damper rod holder 24 mm
(P/N YM-01328) – 2



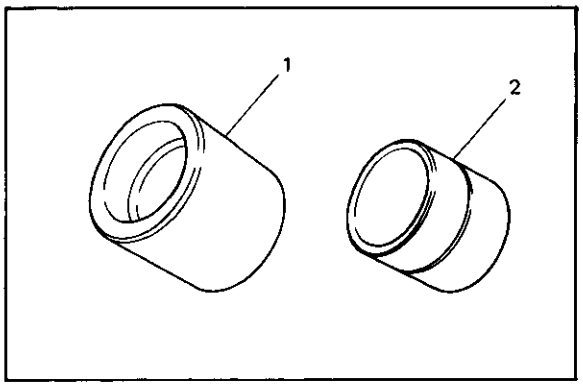

This tool is used to loosen and tighten the front fork cylinder holding bolt.

Front fork cap socket (17 mm)
(P/N YM-01104)



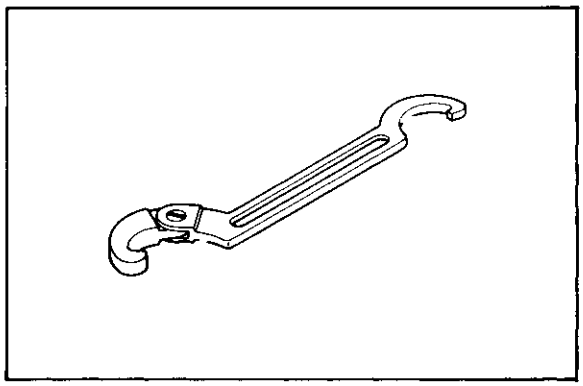
This tool is needed when loosening and tightening the front fork cap bolt.

Front fork seal driver (P/N YM-33963) – 1
Adapter (40 mm) (P/N YM-33964) – 2




These tools are used when installing the fork seal.

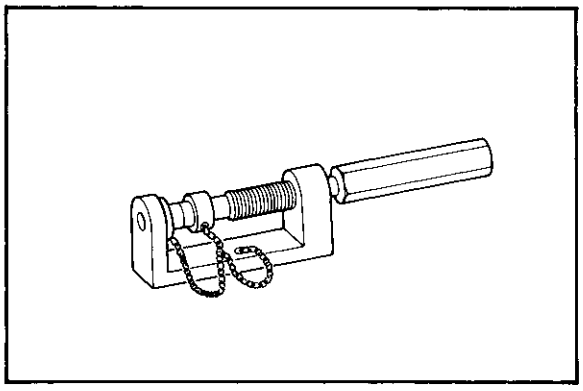
Ring nut wrench (P/N YU-01268)



This tool is used too loosen and tighten the ring nut.

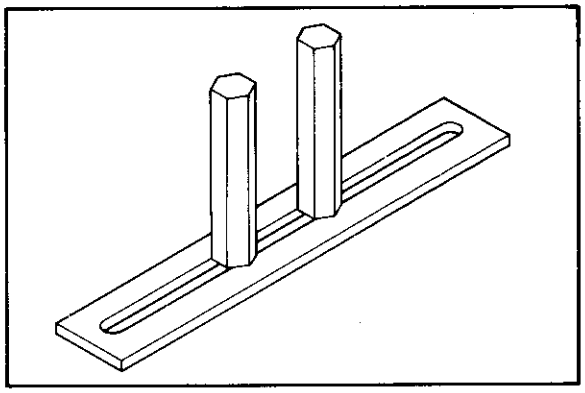
**For Middle Gear Service**

Universal joint holder (P/N YM-04062)



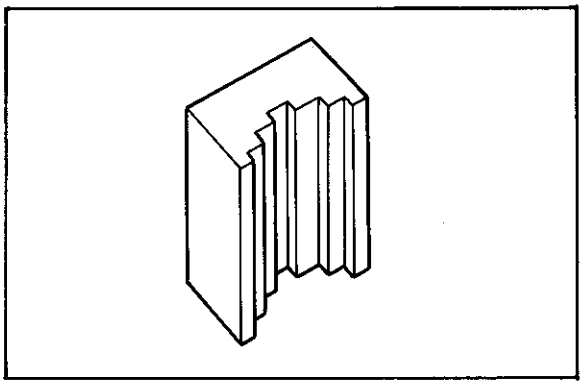
This tool is used when adjusting gear lash, in the middle gear.

Middle drive gear holder (P/N YM-33222)



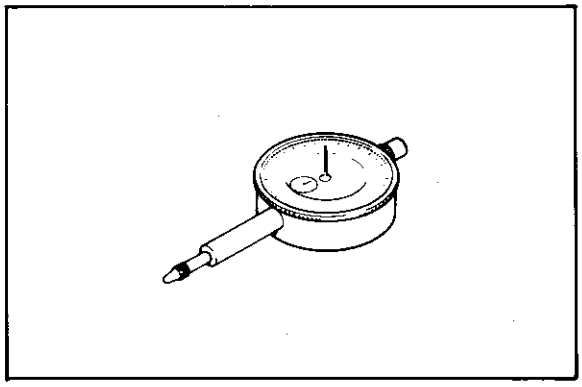
This tool is needed when measuring the middle gear lash.

Damper spring plate (P/N YM-33286)



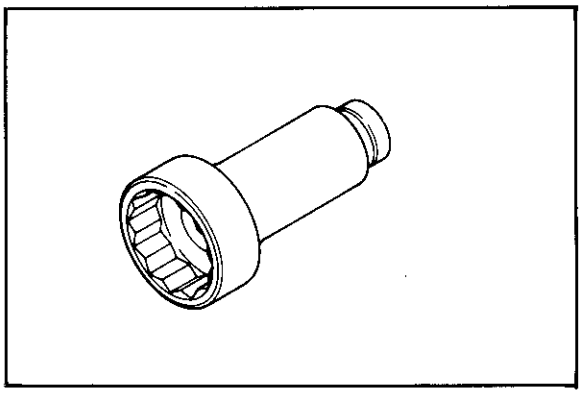
This tool is used with a middle drive gear halder to disassemble and reassemble the middle gear damper.

Dial indicator (P/N YU-03097)



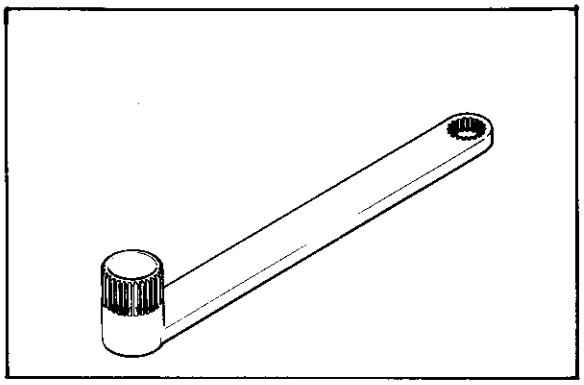
These tools are used when measuring the gear lash for the middle gear and final gear.

55 mm Offset wrench (YM-04054)



This tool is used to loosen and tighten the drive shaft nut.

Final drive shaft holder (P/N YM-01229)

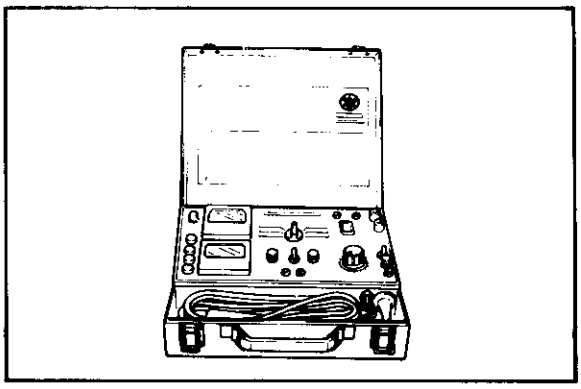


This tool is used when adjusting the gear lash for the final gear.

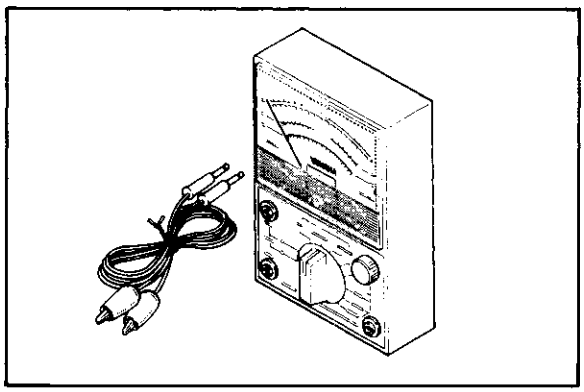
**For Electrical Components**

The use of these tools are described in Chapter 6.

Electro tester (P/N YU-33260)



Pocket tester (P/N YU-03112)



# CHAPTER 2.
# PERRIODIC INSPECTIONS AND ADJUSTMENTS


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EMISSION CONTROL SYSTEM PERIODIC MAINTENANCE . . . . . 2-1

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2

# PERIODIC INSPECTIONS AND ADJUSTMENTS



## INTRODUCTION

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

## MAINTENANCE INTERVALS CHARTS

Preper periodic maintenance is important. Especially important are the maintenance services related to emissions control. These controls not only function to ensure cleaner air, but are also vital to proper engine operation and maximum performance. In the following maintenance tables, the services related to emissions control are grouped separately.

### EMISSION CONTROL SYSTEM PERIODIC MAINTENANCE

| No. | Item | Remarks | Initial break-in | | Thereafter every | |
|---|---|---|---|---|---|---|
| | | | 1,000 km (600 mi) or 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months |
| 1* | Valve clearance | Check and adjust valve clearance when engine is cold. Adjust after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | ○ | | | Adjust every 12,000 km (7,500 mi) or 18 months |
| 2 | Spark Plugs | Check condition. Adjust gap/Clean. Replace after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | | ○ | ○ | Replace every 12,000 km (7,500 mi) or 18 months |
| 3* | Crankcase ventilation system | Check ventilation hose for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 4* | Fuel line | Check fuel hose and vacuum pipe for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 5* | Fuel filter | Replace initial 33,000 km (20,500 mi) and thereafter every 32,000 km (20,000 mi). | | | | Replace every 32,000 km (20,000 mi) |
| 6* | Exhaust system | Check for leakage. Retighten if necessary. Replace gasket(s) if necessary. | | ○ | ○ | |
| 7* | Carburetor synchronization | Adjust synchronization of carburetors. | | ○ | ○ | |
| 8* | Idle speed | Check and adjust engine idle speed. Adjust cable free play. | | ○ | ○ | |

* It is recommended that these items be serviced by a Yamaha dealer or other qualified mechanic.

# GENERAL MAINTENANCE/LUBRICATION

| No. | Item | Remarks | Type | Initial break-in | | Thereafter every | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1,000 km (600 mi) of 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months | 16,000 km (10,000 mi) or 24 months |
| 1 | Engine oil | Warm up engine before draining. | Refer to page 00 | ○ | | | Replace every 12,000 km (7,500 mi) or 18 months | |
| 2 | Oil filter | Replace | — | ○ | | | | |
| 3 | Air filter | Clean with com-Pressed air. | — | | ○ | | ○ | |
| 4 | Cooling system | Check hoses for cracks or damage, replace if necessary. | — | | ○ | ○ | | |
| | | Replace coolant 24 months. | Ethylene glycol anti-freeze coolant | | | | | Every 24 months |
| 5* | Brake system | Adjust free play. Replace pads if necessary. | — | ○ | ○ | ○ | | |
| 6 | Final gear oil | Replace | SAE 80 API GL-4 Hypoid gear oil | ○ | | | ○ | |
| 7* | Control and meter cable | Apply chain lube thoroughly. | Yamaha chain and cable lube or SAE 10W30 motor oil | ○ | ○ | ○ | | |
| 8 | Change/ Brake pedal shaft pivot | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | ○ | ○ | ○ | | |
| 9 | Center and sidestand pivots | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 10* | Steering bearing and races | Check bearings assembly for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 11* | Front fork oil | Drain completely. Refill to specifica-tion. | Yamaha fork oil 10 wt or equivalent | | | | | ○ |
| 12* | Wheel bearings | Check bearings for smooth rotation Replace if necessary. | — — | | ○ | ○ | | |
| 13 | Battery | Check specific gravity. Check breather pipe for proper operation. | — | | ○ | ○ | | |
| 14 | Brake/ Clutch lever pivot shaft | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 15* | Rear arm pivot bearing | Check bearing assembly for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 16* | Rear suspen-sion pivots | Apply chain lube | Lithium soap base grease | | | | | ○ |

* It is recommended that these items be serviced by a Yamah dealer or other qualified mechanic.

## ENGINE

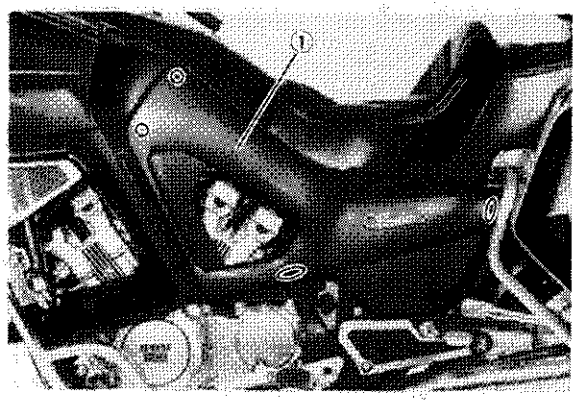
### Valve Clearance Adjustment

Adjust the valve clearance as follows:

**NOTE:**

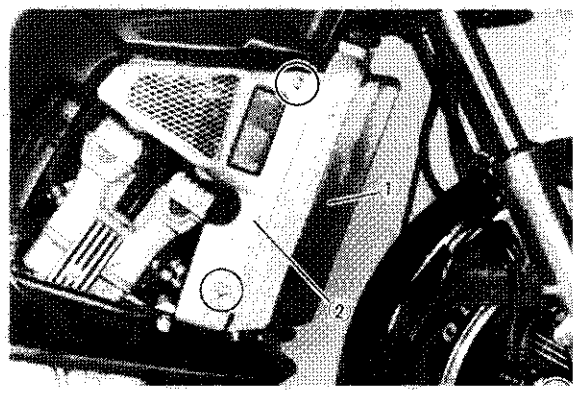
Valve clearance must be measured when the engine is cool to the touch.

1. Remove the side panels



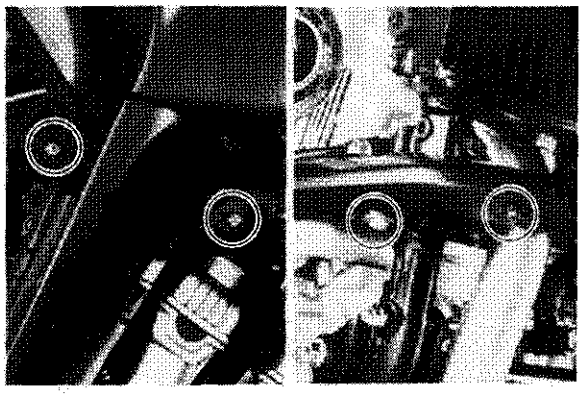
1. Side panel

2. Remove the radiator cover securing screws, the radiator cover, and both radiator side covers.



1. Radiator cover 2. Radiator side cover

3. Remove the lower panels.



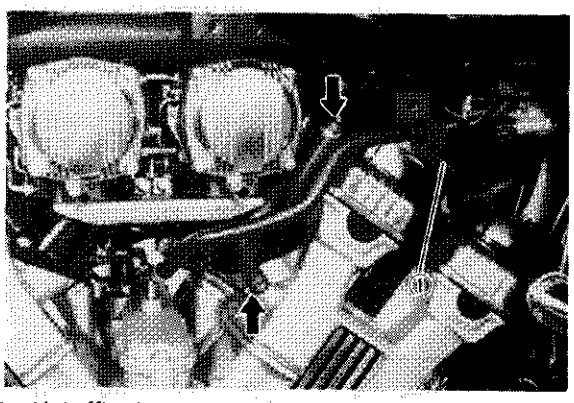
4. Disconnect the right-side horn leads.

5. Remove the radiator securing bolts. Gently but firmly push the electric fan on the radiator assembly towards the front wheel. The upper radiator hose connection should remain in place.

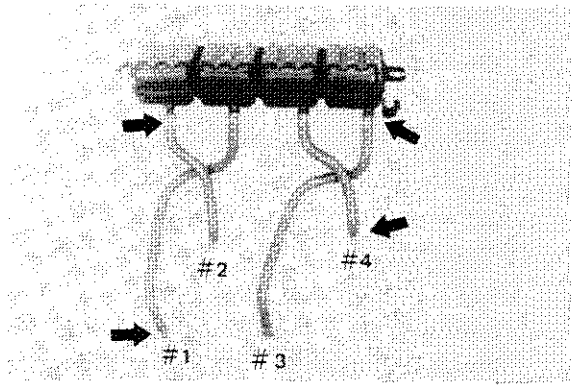
**NOTE:**

It is not necessary to completely remove the radiator from the motorcycle.

6. Disconnect the spark plug caps from each cylinder head.
7. Remove the an baffle plates from the front and rear cylinder head covers.
8. Disconnect the Y.I.C.S. chamber pipes from the cylinder head (for # 1 and # 4 cylinder) and the Y.I.C.S. chamber (for # 2 and # 3 cylinder) as shown.



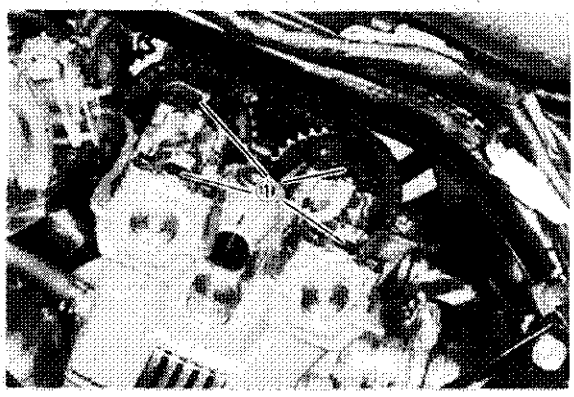
1. Air baffle plate




9. Disconnect the Y.I.C.S. chamber and remove the Y.I.C.S. chamber from the right-side of the motorcycle.

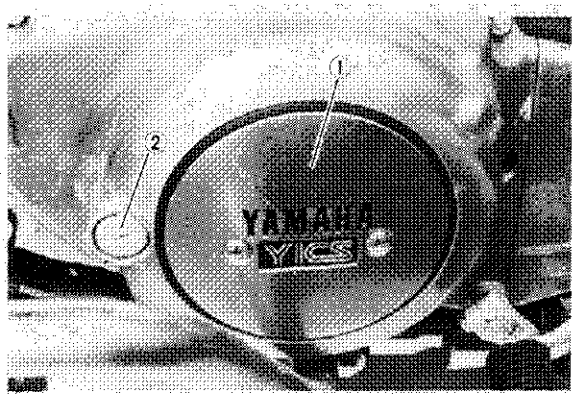
10. Remove the cylinder head covers.

**NOTE:**
Be sure you do not lose the oil plugs on the camshaft caps.



1. Oil plug

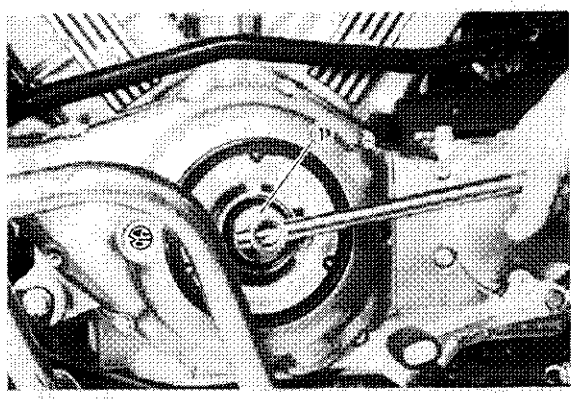
11. Remove the emblem plate and timing plug from the left-side crankcase cover.



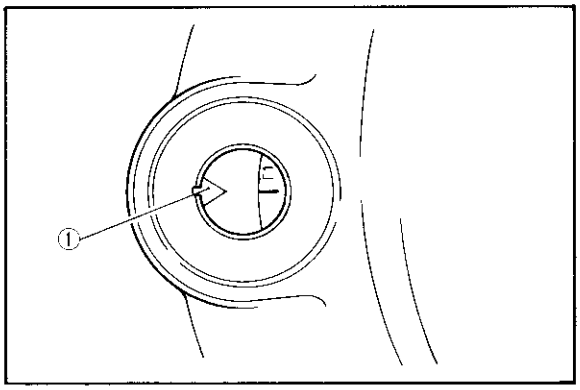

1. Emblem plate 2. Timing plug

12. Align the "TI" mark (for the #1 cylinder) on the flywheel with the stationary pointer on the crankcase cover. The pointer can be viewed through the timing window on the crankcase cover. When the "TI" mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC). Valve clearance should be checked and adjusted when the piston is at TDC on the compression stroke. The piston is at TDC on compression when there is free play in both valve adjusters.

**NOTE:**
The crankshaft should be turned **counterclockwise** with a 32 mm (1.26 in) socket wrench, as viewed from the left side of the motorcycle.

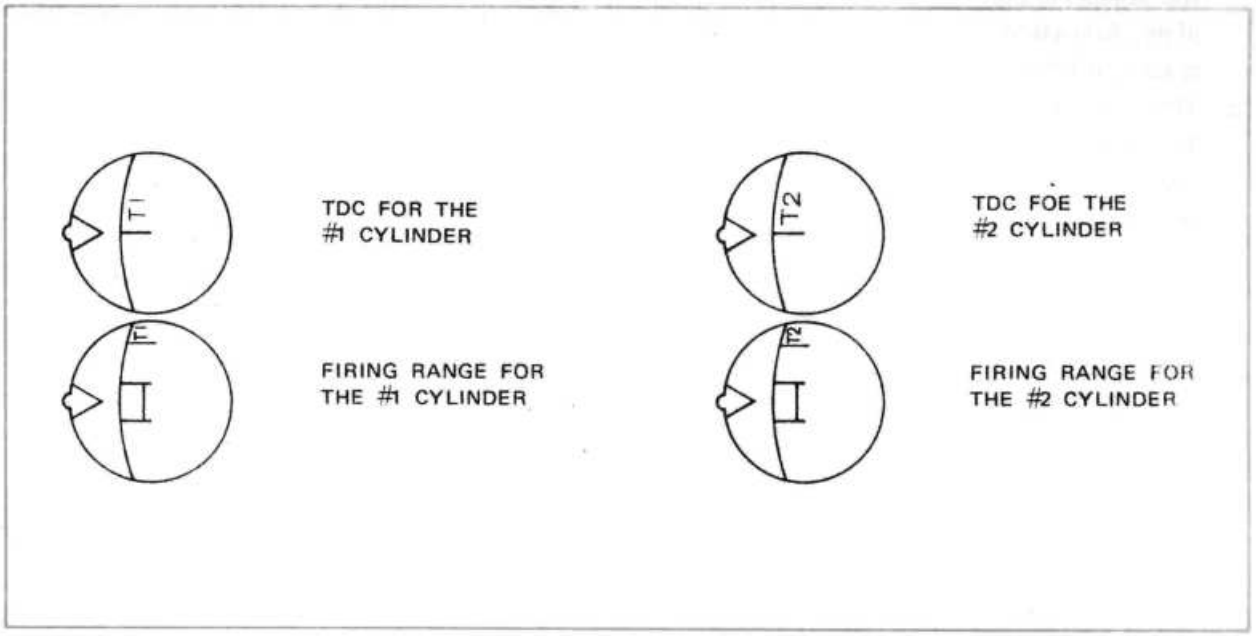


1. 32 mm (1.26 in) socket wrench



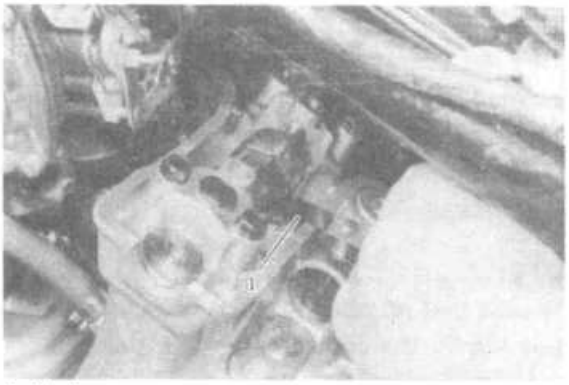

1. Match mark on the left crankcase cover.

The flywheel is marked as follows:




13. Use a feeler gauge to determine the clearance. If clearance is incorrect, record the measured amount of clearance. This must be measured carefully.

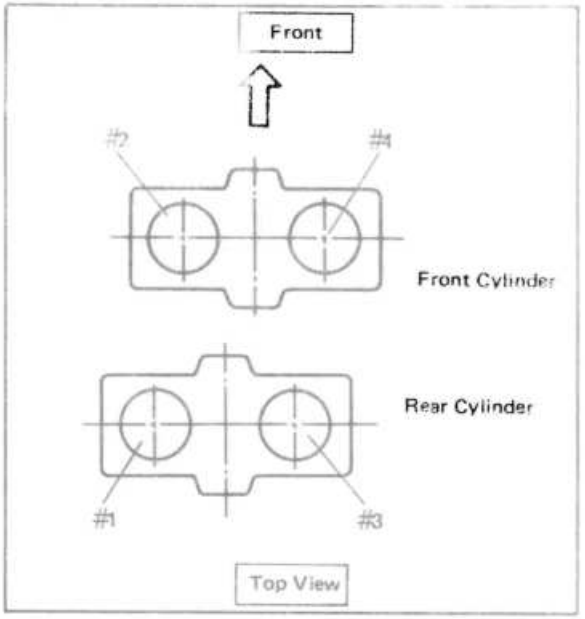
Intake valve (cold):
0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in)
Exhaust valve (cold):
0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in)

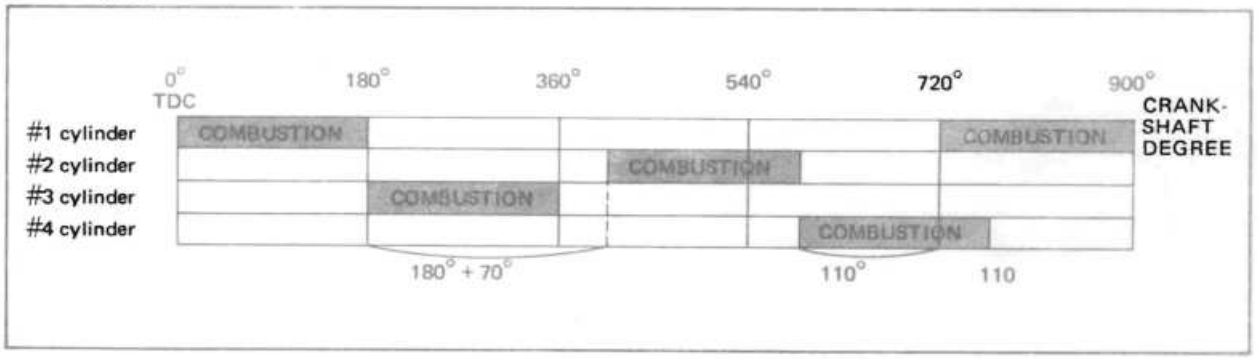


1. Feeler gauge

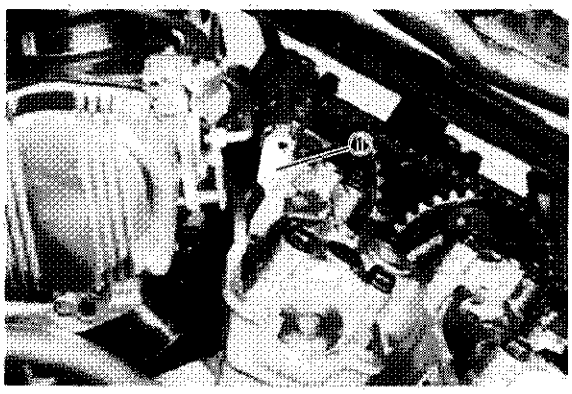
14. Repeat the steps above and check the valve clearance for #3, #4, and #2 cylinder cylinders in that order.

FIRING SEQUENCY:



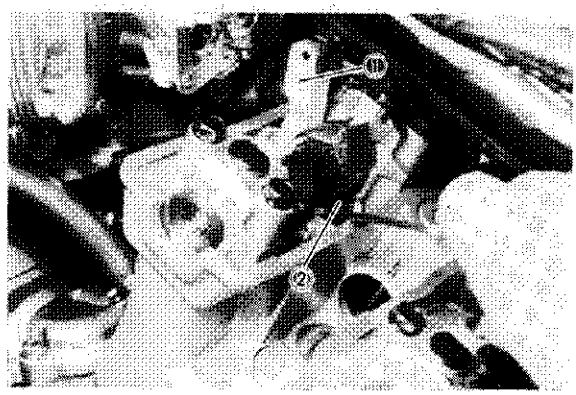



15. Valve clearance is adjusted by replacing the adjusting pad on the top of the valve lifter. Adjustement of the valve clearance is accopmlished as follows:
   a. There are two slots in each valve lifter. The slots must be positioned opposite each other on the exhaust and intake side before the tappet adjusting tool is installed.
   b. Place the tappet adjusting tool onto the camshaft as shown.

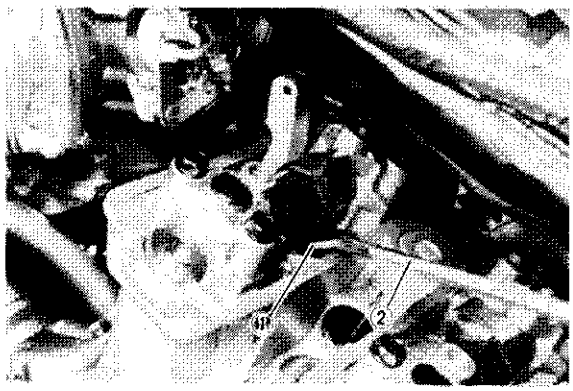


1. Tappet adjusting tool

   c. Remove the pads from the lifters. There is a slot in each lifter. Use a small screwdriver and a magnetic rod to remove the pads. Note the numbers on the pads.



1. Tappet adjusting tool 2. Pad



1. Pad 2. Magnetic rod

**WARNING:**

**Before removing the valve pad, cover the timing chain hole with a clean rag to prevent the pad from entering the crankcase.**

   d. Proper pad selection is made as follows: Adjusting pads are availabe in 25 kinds, ranging from No. 200 [2.00 mm (0.079 in) to No. 320 [3.20 mm (0.130 in)] in steps of 0.05 mm (0.002 in). The thickness of each pad is marked on the pad face that contacts the valve lifter (not the cam).

   e. As the pads can only be selected in 0.05 mm increments, use the following chart to round off the hundreths digit of the original pad number.

| Hundredths digit | Rounded value |
|---|---|
| 0 or 2 | 0 |
| 5 | (NOT ROUNDED OFF) |
| 8 | 10 |

   For example, if the original pad number is 258 (2.58 mm), the rounded off number is 260. Then, using this number, refer to the appropriate chart for the selection of a new pad number.

   f. Find the number 260 on this chart and read down. Find the measured valve clearance on the same chart and read across. At the intesection is a new pad number.

**NOTE:**

The new pad number is to be used as a guide only. Verify the correctness of this choice in the following step(s).

Intake

| MEASURED CLEARANCE | INSTALLED PAD NUMBER | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 |
| 0.00 ~ 0.05 | | | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 |
| 0.06 ~ 0.10 | | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 |
| 0.11 ~ 0.15 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.16 ~ 0.20 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | |
| 0.21 ~ 0.25 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | |
| 0.26 ~ 0.30 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | |
| 0.31 ~ 0.35 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | |
| 0.36 ~ 0.40 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | |
| 0.41 ~ 0.45 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | |
| 0.46 ~ 0.50 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | |
| 0.51 ~ 0.55 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | |
| 0.56 ~ 0.60 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | |
| 0.61 ~ 0.65 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | |
| 0.66 ~ 0.70 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | |
| 0.71 ~ 0.75 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | |
| 0.76 ~ 0.80 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | |
| 0.81 ~ 0.85 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | |
| 0.86 ~ 0.90 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | |
| 0.91 ~ 0.95 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | |
| 0.96 ~ 1.00 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | |
| 1.10 ~ 1.05 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | |
| 1.06 ~ 1.10 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | |
| 1.11 ~ 1.15 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | |
| 1.16 ~ 1.20 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | |
| 1.21 ~ 1.25 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | | |
| 1.26 ~ 1.30 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.31 ~ 1.35 | 320 | | | | | | | | | | | | | | | | | | | | | | | | |

VALVE CLEARANCE (engine cold) 0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in)

* Pad number : (example) Pad No 250 : 2.50 mm (0.098 in)
Pad No 255 2.55 mm (0.100 in)
Always install pad with number down.

Exhaust

| MEASURED CLEARANCE | INSTALLED PAD NUMBER | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 |
| 0.00 ~ 0.05 | | | | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 |
| 0.06 ~ 0.10 | | | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 |
| 0.11 ~ 0.15 | | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 |
| 0.16 ~ 0.20 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.21 ~ 0.25 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | |
| 0.26 ~ 0.30 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | |
| 0.31 ~ 0.35 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | |
| 0.36 ~ 0.40 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | |
| 0.41 ~ 0.45 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | |
| 0.46 ~ 0.50 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | |
| 0.51 ~ 0.55 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | |
| 0.56 ~ 0.60 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | |
| 0.61 ~ 0.65 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | |
| 0.66 ~ 0.70 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | |
| 0.71 ~ 0.75 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | |
| 0.76 ~ 0.80 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | |
| 0.81 ~ 0.85 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | |
| 0.86 ~ 0.90 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | |
| 0.91 ~ 0.95 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | |
| 0.96 ~ 1.00 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | |
| 1.10 ~ 1.05 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | |
| 1.06 ~ 1.10 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | |
| 1.11 ~ 1.15 | 295 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | |
| 1.16 ~ 1.20 | 300 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | |
| 1.21 ~ 1.25 | 305 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | |
| 1.26 ~ 1.30 | 310 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | | |
| 1.31 ~ 1.35 | 315 | 320 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.36 ~ 1.40 | 320 | | | | | | | | | | | | | | | | | | | | | | | | |

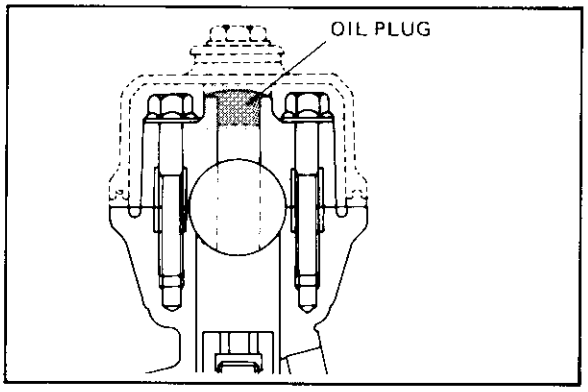
VALVE CLEARANCE(engine cold) 0.16 ~ 0.20mm (0.0062 ~ 0.0079 in)
Example Installed is 250
Measured clearance is 0.32mm (0.013 in)
Replace 250 pad with 265
* Pad number : (example) Pad No.250 = 2.50mm (0.098 in)
Pad No.255 = 2.55mm (0.100 in)
Always install pad with number down

16. Install the new pad in the lifter. Install the pad with the number down.
17. Turn the crankshaft to remove the adjusting tool from the camshaft.
18. Turn the crankshaft to rotate the cam several rotations. This will seat the pad snugly in the lifter.
19. Recheck the valve clearance. If the clearance is incorrect, repeat the proceeding steps until the proper clearance is obtained.
20. To assemble the motorcycle, reverse the disassembly procedures. Pay close attention to installation of the cylinder head cover.
    - Inspect the head cover gasket. If damaged, replace the gasket.
    - Install the head covers, and torque the bolts to specification.

Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)

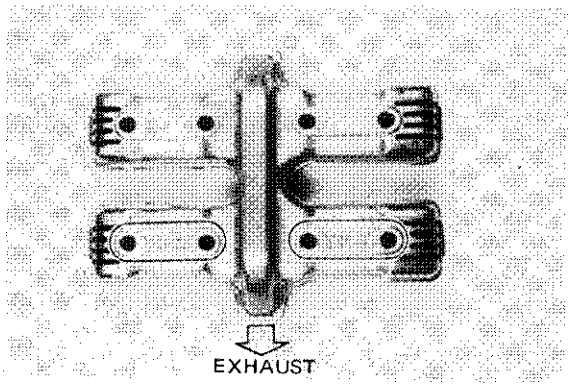
**WARNING:**

**When installing the cylinder head cover, make sure all cam caps are covered with oil plugs.**




**NOTE**

When installing both cylinder head covers, the YICS marks on the cover should face toward the exhaust side.




21. Install the air baffle plates onto the cylinder head covers.
22. Install the Y.I.C.S. chamber onto the frame, and connect the Y.I.C.S. pipes.
23. Install the radiator and radiator covers. Tighten the radiator securing bolts to specification.

Tightening torque:
7 Nm (0.7 m·kg, 5.1 ft·lb)

24. Install both side panels.

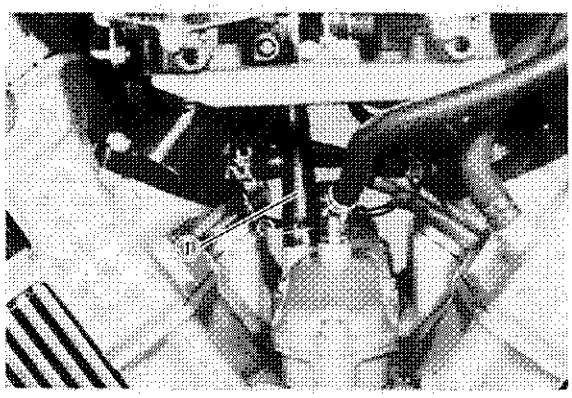
**Spark Plug**

1. Check electrode condition and wear, insulator color, and electrode gap.
2. Clean the spark plug with spark plug cleaner if necessary. Use a wire gauge to adjust the plug gap to specification.
3. If the electrode becomes too worn, replace the spark plug.
4. When installing the plug, always clean the gasket surface, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
DPR8EA-9 (NGK) or
X24EPR-U9 (NIPPON DENSO)
Spark plug gap:
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Spark plug tightening torque:
17.5 Nm (1.75 m·kg, 12.5 ft·lb)

### Crankcase Ventilation System

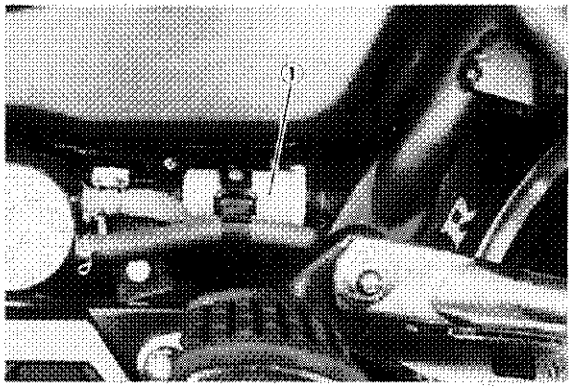
Check the ventilation hose from the cylinder head cover on the each cylinder to the air filter assembly, for cracks or damage; replace if necessary.



1. Crankcase ventilation hose

### Fuel Line

1. Check the fuel pipes for cracks or damage; replace if necessary.
2. Check the fuel filter. If dust and/or water collects in this filter, replace the fuel filter.



1. Fuel filter

### Exhaust system

1. Retighten the exhaust pipe flange bolts and muffler clamp bolts.

Tightening torque:
Exhaust pipe (#1. #3) & joint
7 Nm (0.7 m·kg, 5.1 ft·lb)
Exhaust pipe flange bolt
20Nm (2.0 m·kg, 14 ft·lb)
Muffler clamp bolt
20 Nm (2.0 m·kg, 14 ft·lb)

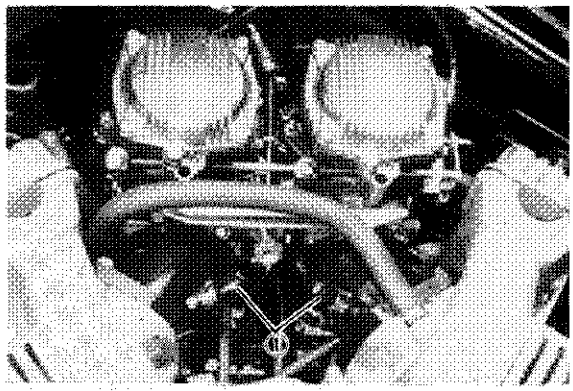
2. Replace the exhaust pipe gasket(s) and/or muffler gasket(s) if necessary.

### Carburetor Synchronization

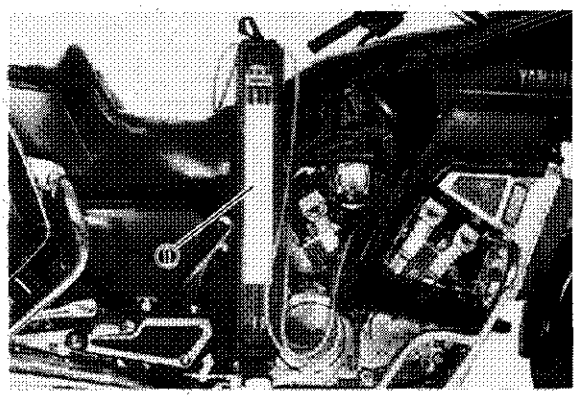
Carburetors must be adjusted to open and close simultaneously. Adjust as follows:

**NOTE:**
Valve clearance must be set properly before synchronizing the carburetors.

1. Remove the vacuum plugs from each carburetor joint, and install the vacuum gauge lines to each carburetor joint.



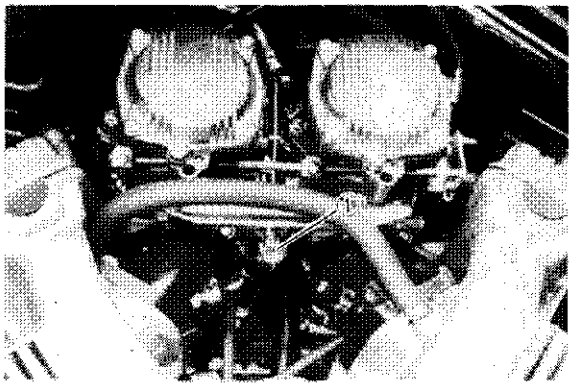
1. Vacuum plug



1. Vacuum gauge

2. Start the engine allow it to warm-up for a few minutes. The warm-up is complete when engine responds normally to the throttle opening.

3. Make sure the engine idle speed is 950 ~ 1,050 r/min. If it is not, adjust the idle speed with the throttle stop screw.



1. Throttle stop screw

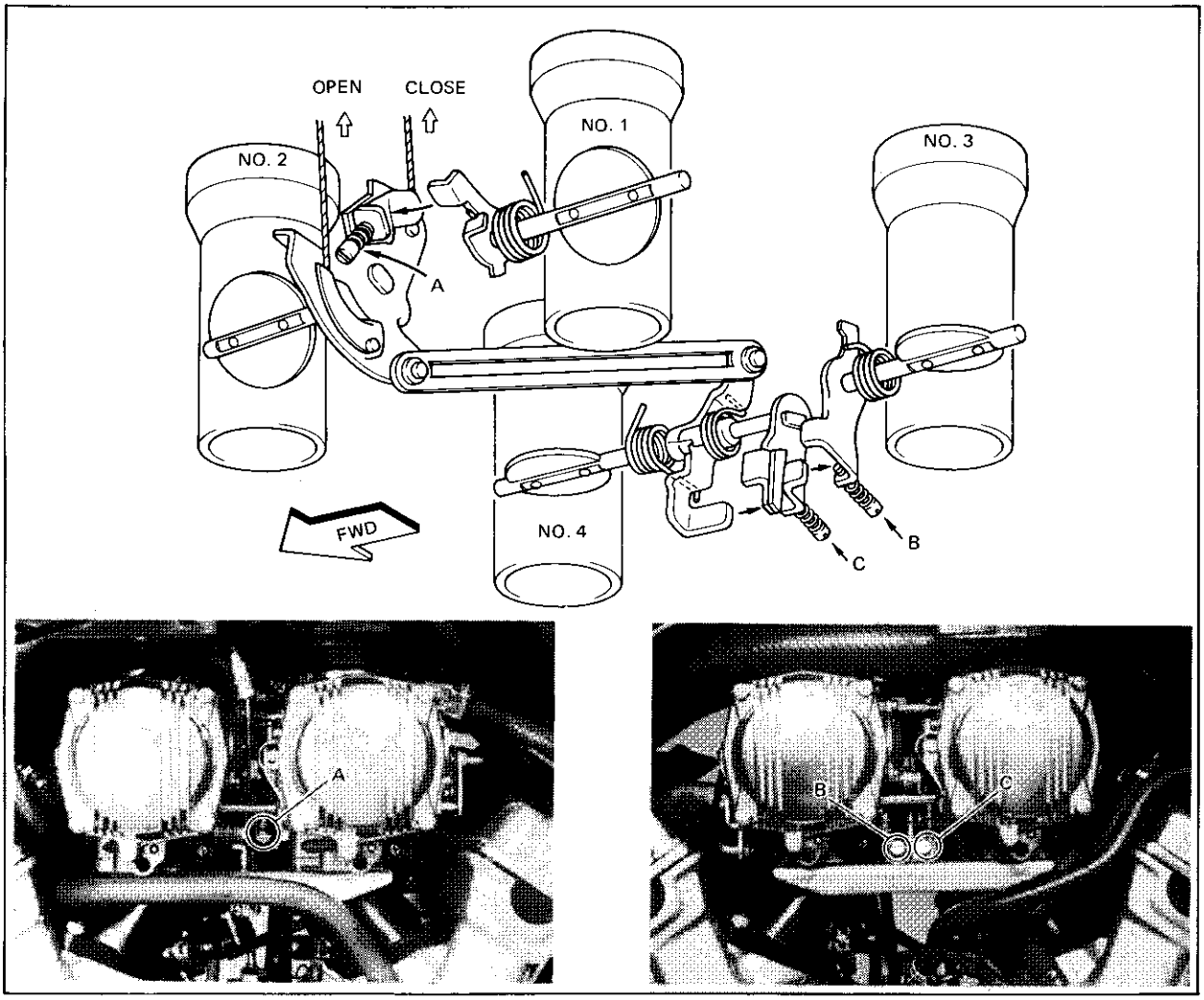
4. Each gauge reading will indicate the same if the carburetors are synchronized. The No. 2 carburetor has no synchronizing screw and the other carburetors are to be synchronized to it in order, one at a time.

First, synchronize carburetor No. 1 to carburetor No. 2 by turning the synchronizing screw "A" until both gauges read the same. Race the engine for a fraction of a second two or three times and check the synchronization once more.

| |
|---|
| Vacuum pressure at idle speed:<br>33.25 kPa (250 mm Hg, 9.84 in Hg)<br>Vacuum synchronous difference:<br>1.33 kPa (10 mm Hg, 0.39 in Hg) |

Second, in the same way synchronize carburetor No. 3 to carburetor No. 4 by turning the cynchronizing screw "B" until both gauges read the same.

Thrid, in the same way synchronize carburetor No. 4 to carburetor No. 2 by turning the synchronizing screw "C" until both gauges read the same.



5. Make sure that the engine now develops and idle engine speed of 950 ~ 1,050 r/min. If it does not, adjust the idle speed with the throttle stop screw and repeat the steps starting with step 3.

**Idle Speed**

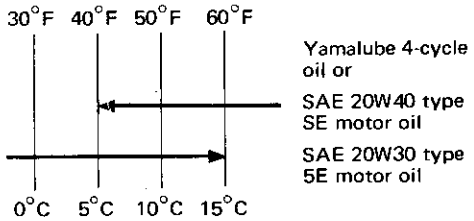
1. Start the engine, and warm it up for a few minutes.
2. Set the engine idle speed to the specified level by adjusting the throttle stop screw. Turning the throttle stop screw clockwise increases the engine speed; turning it counterclockwise decreases the engine speed. Use a tachometer for checking and adjusting the engine speed.

| Engine idle: 1,000 ± 50 r/min |
|---|

**Engine Oil**

Recommended oil

Use Yamalube 4-cycle oil or SAE 20W40 SE motor oil if the temperature does not go below 5°C (40°F). Use SAE 10W30 SE motor oil if the temperature does not go above 15°C (60°F).




Oil level measurement

1. Place the motorcycle on its centerstand. Warm up the engine, for several minutes.

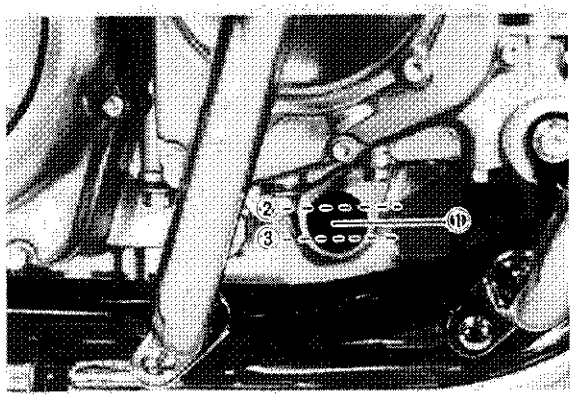
**NOTE:**

Be sure the motorcycle is positioned straight up when checking the oil level; a slight tilt toward the side can produce false readings.

2. With the enigne stopped, check the oil level through the level window located at the lower part of the right side crankcase.

**NOTE:**

Wait a few minutes until the oil level settles before checking.

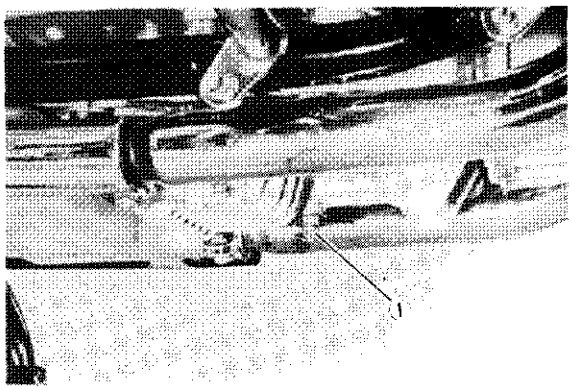



1. Level window
2. Maximum mark
3. Minimum mark

3. The oil level should be between the maximum and minimum marks. If the level is lower, add sufficient oil to raise it to the proper level.

Oil change (without chaning the filter)

1. Start the engine and stop after a few minutes of warm-up.
2. Place an oil pan under the engine and remove the oil filler cap.
3. Remove the drain plug and drain the oil.



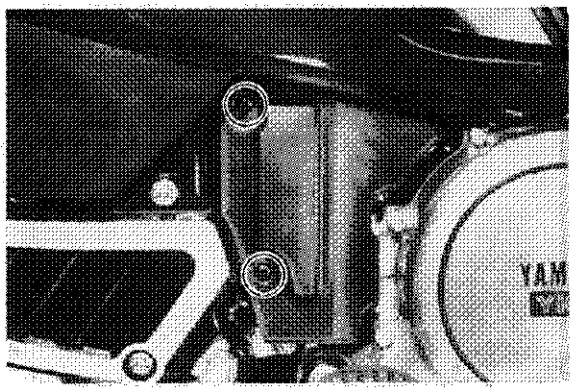

1. Engine drain plug

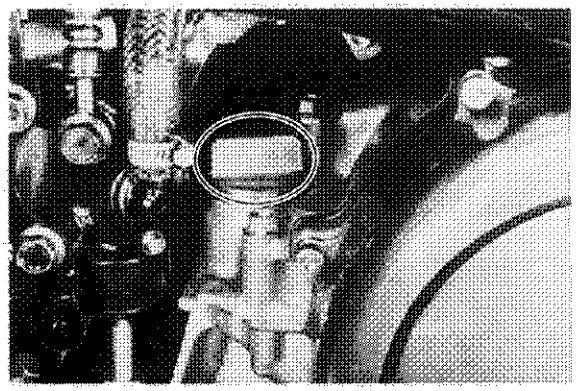
4. Reinstall the drain plug (make sure it is tight).

| Drain plug torque: 43 Nm (4.3 m·kg, 31 ft·lb) |
|---|

5. Remove the right-lower side cover. Remove the filler cap.

6. Add 3.2 L (2.8 Imp qt, 3.4 US qt) of engine oil through the oil filler hole. Reinstall the oil filler cap.





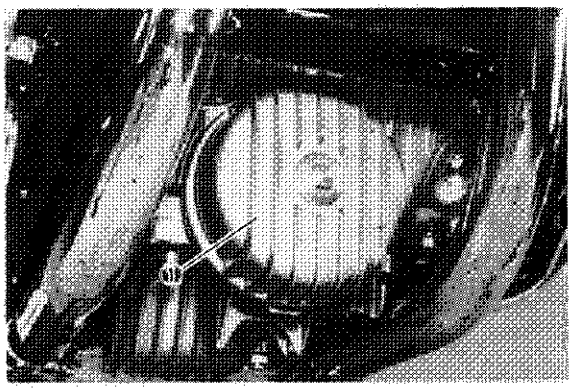
**CAUTION:**

**Be sure you do not allow foreign material to enter the crankcase.**

7. Start the engine, and let it warm up. During warm-up, check for oil leakage. If oil leaks, stop the engine immediately, and check for the cause.
8. Stop the engine and check the oil level.

Oil and oil filter change

1. Remove the oil filter bolt and filter case from the engine.



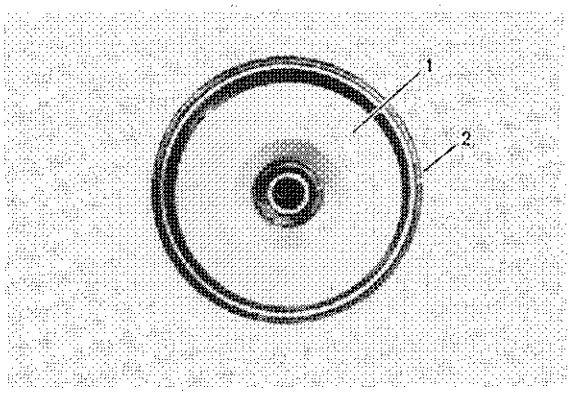
1. Oil filter cover

2. Remove the oil filter element from the filter case.
3. Install the new oil filter element, new O-ring, and filter cover; tighten the oil filter bolt.

| Oil filter bolt: 32 Nm (3.2 m·kg, 23 ft·lb) |
|---|

**NOTE:**

Make sure the O-ring is positioned properly.

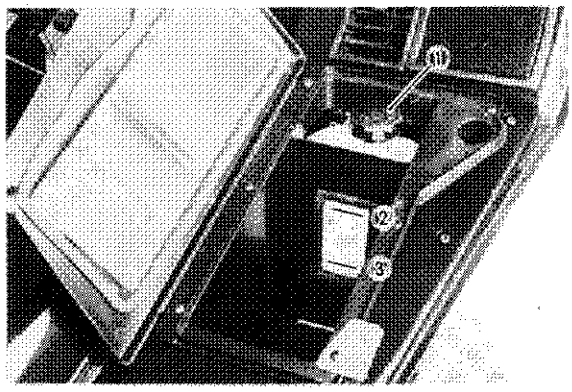



1. Oil filter element 2. Proper O-ring position

4. Add 3.5 L (3.1 Imp qt, 3.7 Us qt) of engine oil through the oil filler. Reinstall the oil filler cap.
5. After the replacement of engine oil and/or oil filter, be sure to check for the oil level and any oil leakage. The oil level indicator light should go off after the oil is filled.

### Coolant

Check the coolant level in the reservoir tank when the engine is cold. The coolant level is satisfactory if it is between the FULL and LOW level on the tank. The coolant level will vary with engine temperature. However, if the level is on or below the LOW level, add tap water (soft water) until the "FULL" level is reached. Change the coolant every two years. (See "COOLING SYSTEM" for more detail.)



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

**WARNING:**

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

**CAUTION:**

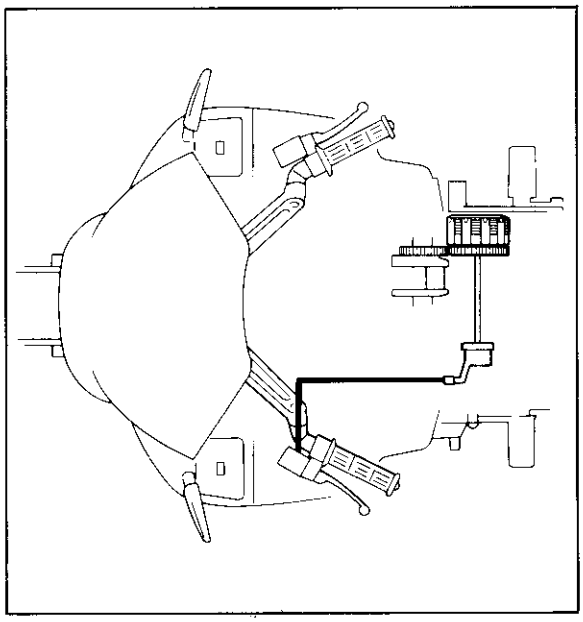
**Hard water or salt water is harmful to the engine parts.**

**You may use boiled or distilled water if you can't get soft water.**

Total amount:
2.8 L (2.5 Imp qt, 3.0 US qt)
Reservoir tank capacity:
0.39 L (0.34 Imp qt, 0.41 US qt)
From LOW to FULL level:
0.25 L (0.22 Imp qt, 0.26 US qt)

### Clutch

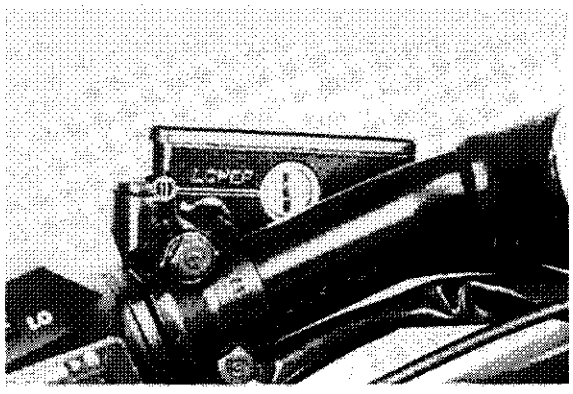
This motorcycle has a hydraulic clutch. There are no adjustments to perform but the clutch system must be inspected periodically for fluid level and leakage. If the control lever freeplay becomes excessive and the motorcycle creeps or stalls when shifted into gear or if the clutch slips, causing acceleration to lag behind engine speed, there is probably air in the clutch system. You must then bleed the system.



### Clutch Fluid

Insufficient fluid may allow air to enter the clutch system, possibly causing the clutch to become ineffective.

Check the fluid level and replenish when necessary, and observe these precautions:



1. Lower level

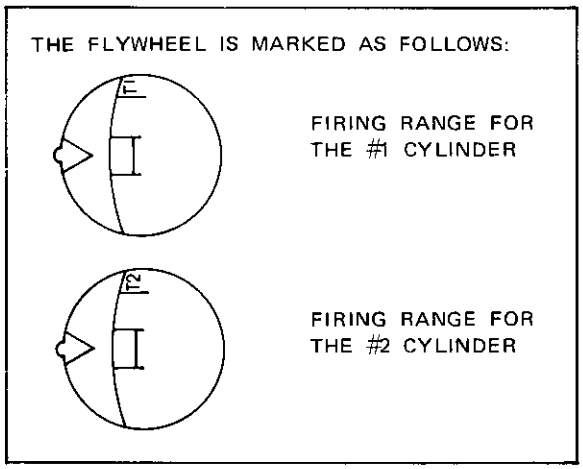
- Use only the designated quality fluid; otherwise, the rubber seals may deteriorate, causing leakage and poor clutch performance.

| Recommended fluid: DOT #3 |
|---|

- Refill with the same type of fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point and may result in vapor lock.
- Fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

**Checking Ignition Timing**

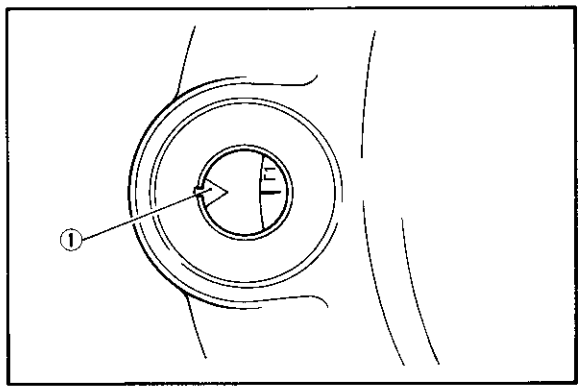
Check the ignition timing with a timing light by observing the stationary pointer and the marks stamped on the flywheel.




1. Remove the emblem plate and timing plug from the left side crankcase cover.
2. Connect the timing light to the #1 and/or #2 cylinder spark plug lead.
3. Start the engine, and keep the engine running at the specified speed. Use a tachometer to check the engine speed.

| Engine Speed: 1,000 ± 50 r/min |
|---|

4. The stationary pointer (in the timing window) should be within the firing range shown on the flywheel. If the pointer is not within the range or if it is not steady, check the flywheel and/or pickup assembly for tightness and/or damage. (See Chapter 7, "ELECTRICAL" for further information.)



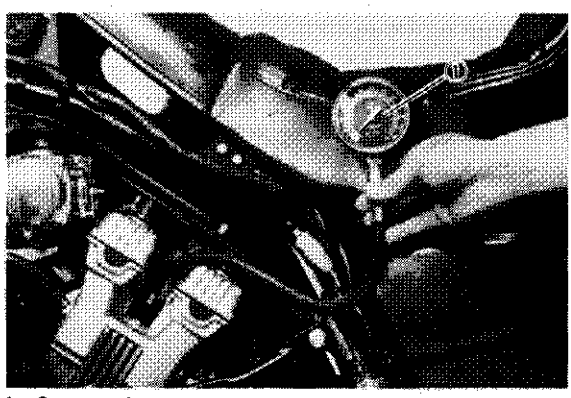

1. Match mark on the left crankcase cover.

5. Reinstall the generator cover.

**Compression Pressure Measurement**

Insufficient compression pressure will result in performance loss and may indicate leaking valves or worn or damaged piston rings.

1. Make sure the valve clearance is correct.
2. Warm up the engine for 2 ~ 3 minutes; stop the engine.
3. Remove both side panels and spork plugs.
4. Install the compression gauge with an adapter.
5. Turn over the engine with the electric starter (make sure the battery is fully charged) with the throttle wide open until the pressure indicated on the gauge does not increase. The compression should be within the specified levels.




1. Compression pressure

Compression pressure (at seal level):
Standard:
980 kPa (10 kg/cm², 142 psi)
Minimum:
882 kPa (9 kg/cm², 128 psi)
Maximum:
1,079 kPa (11 kg/cm², 156 psi)

**WARNING:**

**When cranking the engine, ground the spark plug wires to prevent sparking.**

6. If the pressure is too low, squirt a few drops of oil into the cylinder being measured. Measure compression again. If there is a higher reading than before (without oil), the piston rings may be worn or damaged. If the pressure remains the same after measuring with the oil, one or both rings and valves may be the source of the problem.
7. Check each cylinder. Compression pressure should not vary more than the specified value from one cylinder to the other.

Difference between each cylinder:
Less than 98 kPa (1.0 kg/cm², 14 psi)

## CHASSIS

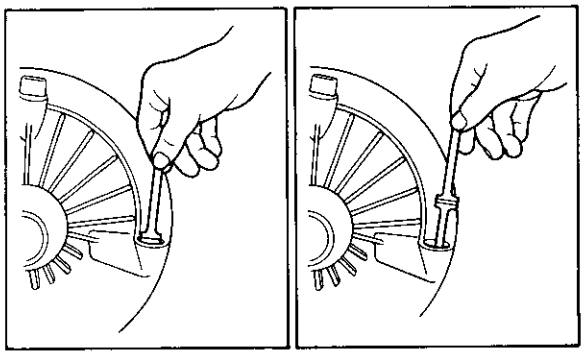
### Final Gear Oil

Oil level measurement

1. Place the motorcycle on a level place, then place it on its centerstand. The engine should be cool (at atmospheric temperature).
2. Remove the oil filler cap. Check the oil level with level gauge (from tool kit) as shown. The correct oil level is between the two marks on each end of the level gauge. Use the tool marked "REAR" for measuring the rear (final) gear case.

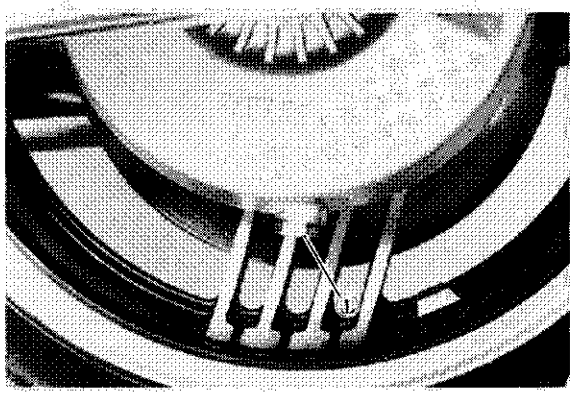
**CAUTION:**

**Be sure you do not allow foreign material to enter the final gear case.**



Gear oil replacement

1. Place an oil pan under the final gear case.
2. Remove the final gear oil filler cap and the drain plug; frain the oil.



1. Final gear drain plug

**WARNING:**

**When draining or filling, be sure you do not allow foreign material to enter the final gear case. Do not to allow the gear oil to contact the tire and wheel.**

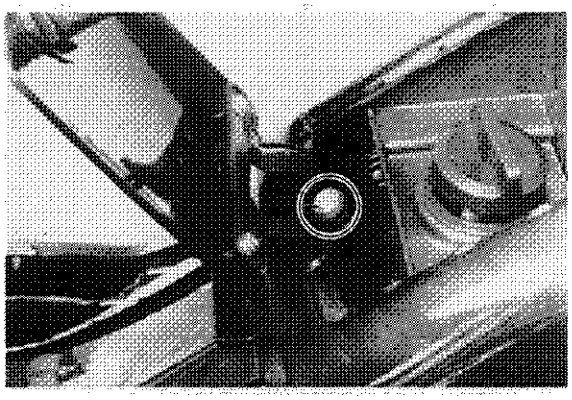
3. Reinstall and tighten the final gear drain plug.
4. Fill the gear case to the specified level.

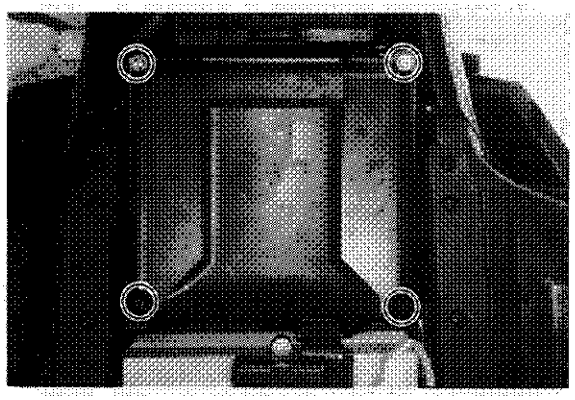
Oil capacity:
0.3 L (0.26 Imp qt, 0.32 US qt)
Recommended oil:
SAE 80 API "GL-4" Hypoid gear oil
If desired, and SAE 80W90 Hypoid gear oil may be used for all conditions.

5. Reinstall the filler cap securely.

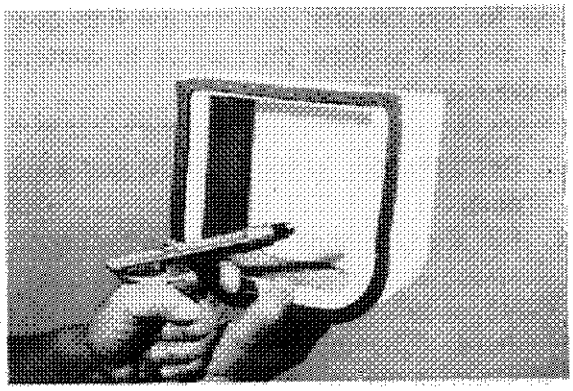
**Air Filter**

1. Remove the top cover securing screw and remove the top cover.
2. Remove the air filter case cover by removing the four screws.





3. Pull out the element.
4. Tap the element lightly to remove most of the dust and dirt; then blow out the remaining dirt with compressed air from the inner surface of the element. If element is damaged, replace it.



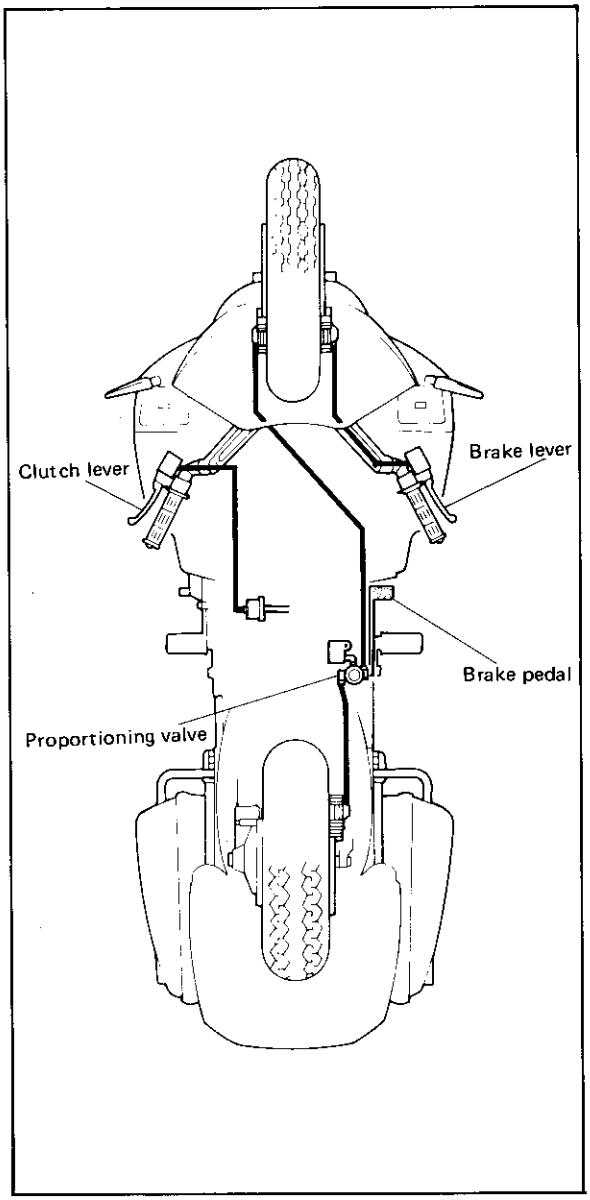
5. Reassembly by reversing the removal procedure. Check whether the element is seated completely against the case.
6. The air filter element should be cleaned at the specified intervals.

**CAUTION:**

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

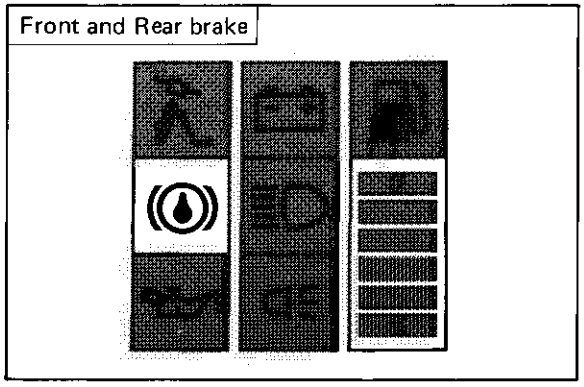
**Front and Rear Brake (Unified Brake System)**

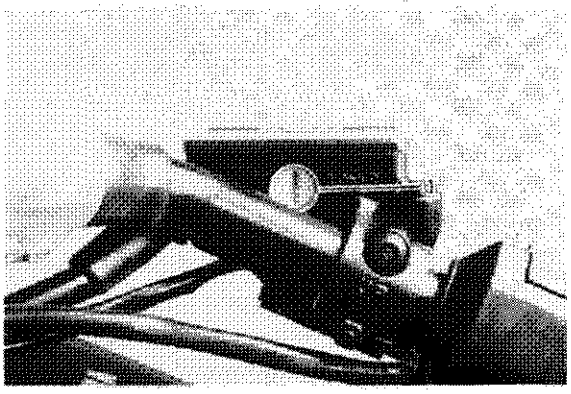
The rear brake and the left-hand front brake are connected to the brake pedal; they are activated at the same time when the brake pedal is applied. The right-hand front brake operates independently; it is activated only by the brake lever.



### Brake Fluid Inspection

Insufficient brake fluid may allow air to enter the brake system, possibly causing the brake to become ineffective. Check the brake fluid level with a computerrized monitor system and replenish when necessary, observing these precautions:



1. Lower level

- Use only the designated quality brake fluid; otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.

| Recommended brake fluid: DOT #3 |
|---|

- Refill with the same type and brand of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water or other contaminants do not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.
- Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

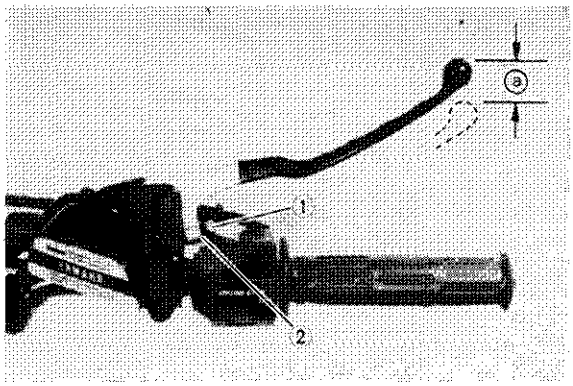
### Front Brake

Front brake lever free play adjustment.

The brake can be adjusted by simply adjusting the free play of the brake lever. The piston in the caliper moves forward as a brake pad wears out, automatically adjusting the clearance between the brake pads and brake disc.

**CAUTION:**

**Proper lever free play is essential to avoid excessive brake drag.**




1. Adjuster 2. Lock nut a. 2 ~ 5 mm (0.08 ~ 0.20 in)

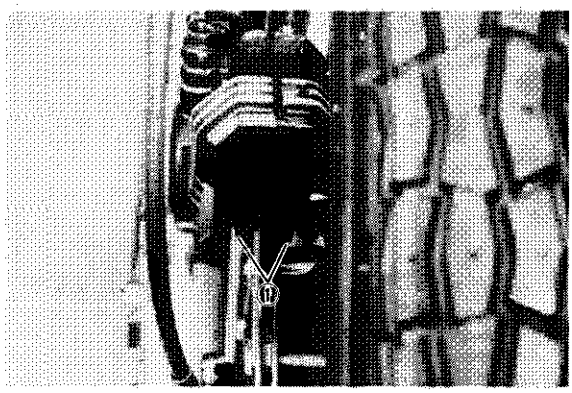
1. Loosen the adjuster locknut on the brake lever.
2. Turn the adjuster so that the brake lever movement at the lever end is 2 ~ 5 mm (0.08 ~ 0.20 in) before the adjuster contacts the master cylinder piston.
3. After adjusting, tighten the locknut.

Front brake pad inspection

A wear indicator is attached to each brake pad to determine its respective wear condition.

This indicator permits visual check without disassembling the pads.

To check, look at the pad wear indicator in back of the caliper. If any pad is worn to the wear limit, replace both pads in the caliper.

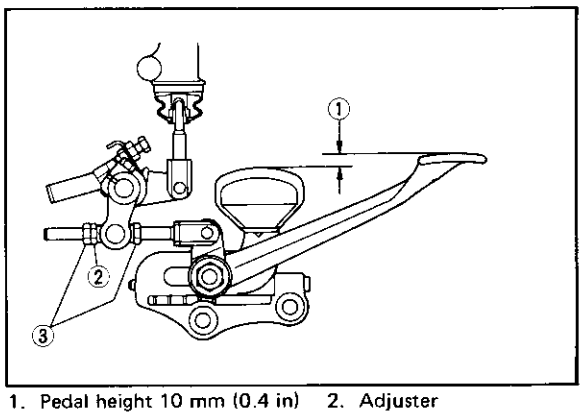


1. Wear indicator

**Rear Brake**

Rear brake pedal height adjustment

1. Loosen the adjuster locknut (for pedal height).
2. By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal position so that its top end is approximately 10 mm (0.4 in) above the top of the footrest.
3. Secure the adjuster lock nut.



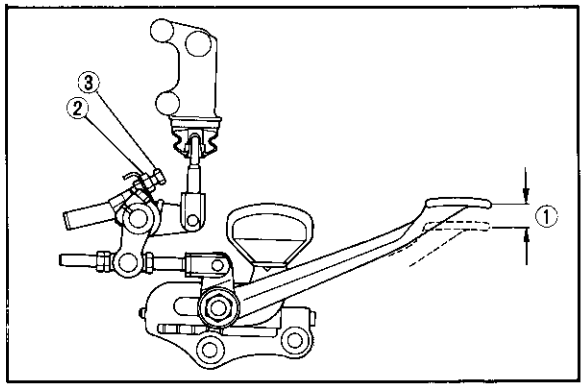

1. Pedal height 10 mm (0.4 in) 2. Adjuster
3. Locknut

**WARNING:**

**After adjusting the pedal height, adjust the brake pedal free play.**

Free play

1. The rear brake should be adjusted to suit the rider's preference, but free play at the end of the brake pedal should be 13 ~ 15 mm (0.5 ~ 0.6 in).
   To adjust, turn the adjuster on the brake rod clockwise to reduce play; turn the adjuster counterclockwise to increase play.



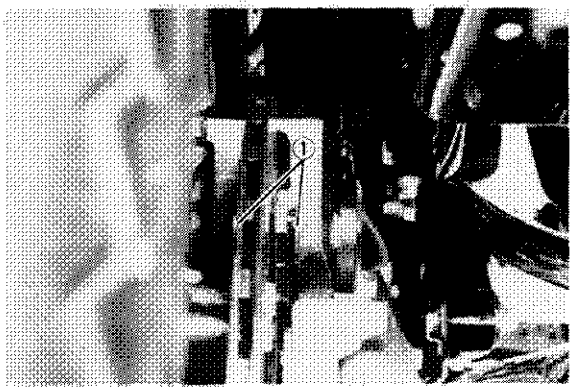

1. Free play 13 ~ 15 mm (0.5 ~ 0.6 in) 2. Lock nut
3. Adjust bolt

**WARNING:**

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

Rear brake pad inspection

To check, examine the wear indicator position while depressing the brake pedal. If the indicator reaches to the wear limit line, replace the pads.

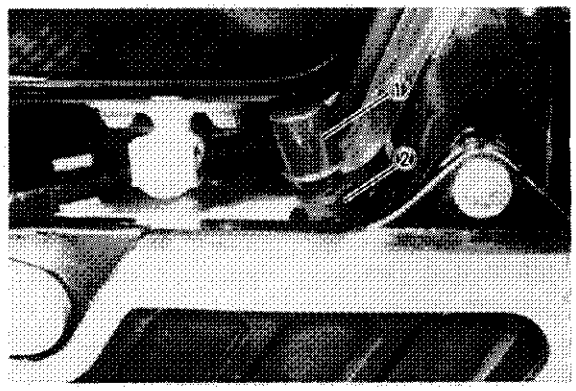



1. Wear indicator

**Brake Light Switch Adjustment**

The brake light switch is operated by the movement of the brake pedal.

To adjust, hold the switch body with your hand so it does not rotate and turn the adjusting nut. Proper adjustment is achieved when the brake light comes on slightly before the brake begins to take effect.




1. Main body 2. Adjusting nut

### Cable Inspection and Lubrication

The throttle twist grip assembly should be greased when the cable is lubricated since the grip must be removed to get at the end of the throttle cable. Two screws clamp the throttle housing to the handlebar. Once these two are removed, the end of the cable can be held high to pour in several drops of lubricant. With the throttle grip disassembled, coat the metal surface of the grip assembly with a suitable all-purpose grease to cut down friction.

1. Damage to the outer vinyl covering of the various cables may cause corrosion. Often free movement will be obstructed creating an unsafe condition. Replace such cables as soon as possible.
2. If the inner cables do not operate sommothly, lubricate or replace them.

Recommended lubricant:
Yamaha chain and cable lube or
10W30 motor oil.

### Brake and Change Pedals/Brake and Clutch Levers

Lubricate the pivoting parts of each lever and pedal.

Recommended lubricant:
Yamaha chain and cable lube or
10W30 motor oil

### Centerstand and Sidestand

Lubricate the centerstand and sidestand at their pivot points.

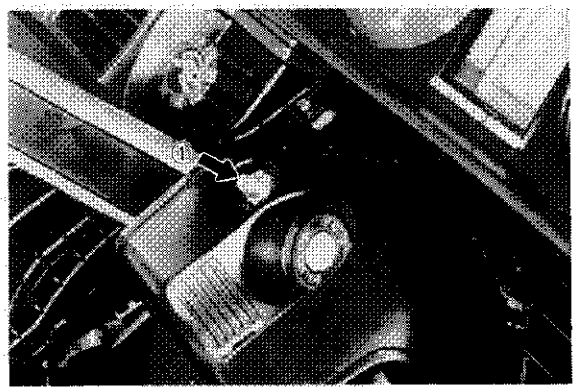
Recommended lubricant:
Yamaha chain and cable lube or
10W30 motor oil

### Front Fork Oil Change

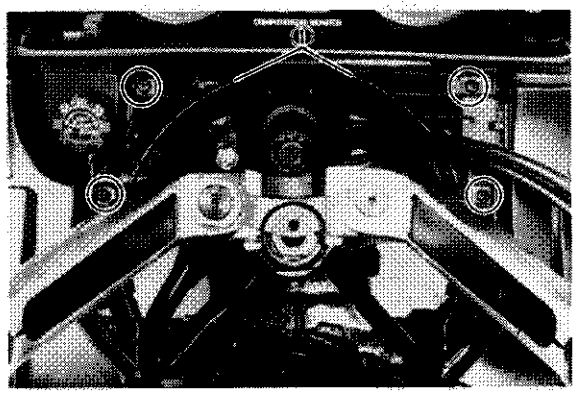
**WARNING:**

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

1. Raise the motorcycle so that there is no weight on the front end of the motorcycle.
2. Remove the air valve cap.
3. Keep the valve open while pressing it for several seconds so that the air can be let out of the inner tube.
4. Remove the hoods.



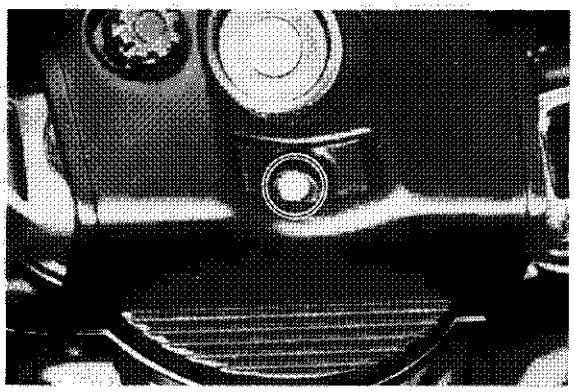
1. Push

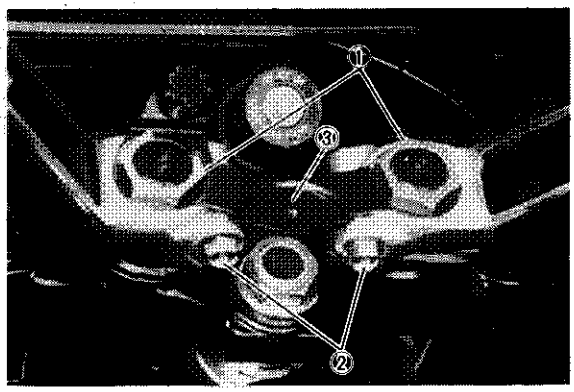


1. Hood

5. Remove the handlebar cover cap and handlebar cover.

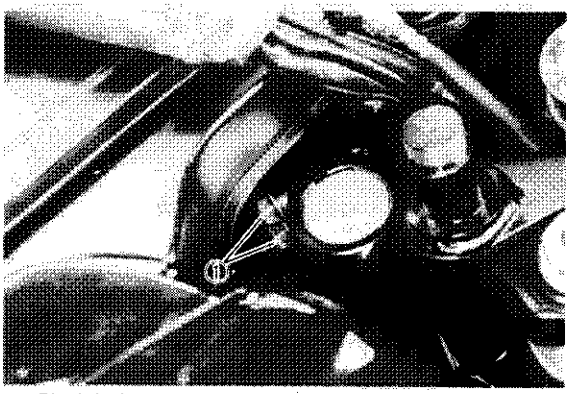
6. Remove the handle securing nuts and loosen the pinch bolts. Remove the handles and the bracket.



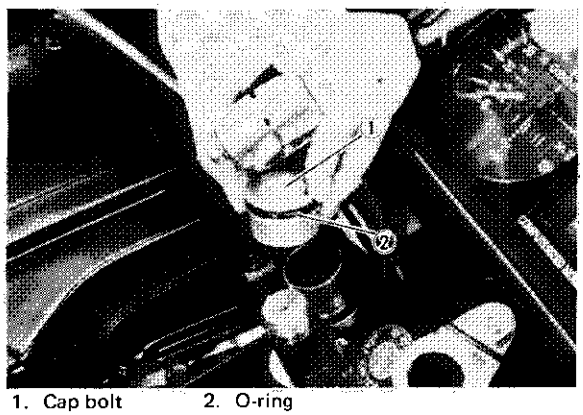


1. Handle securing nut 2. Pinch bolt 3. Bracket

7. Loosen the front frok pinch bolts, and remove the fork cap bolts from the inner fork tubes; use with a front fork cap socket [17 mm (0.67 in)].



1. Pinch bolt

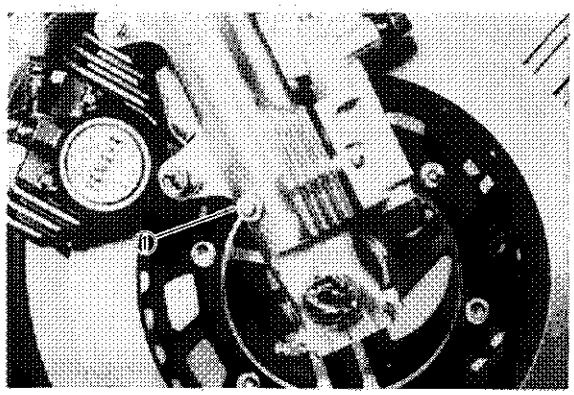


1. Cap bolt 2. O-ring

8. Place an open container under each drain hole. Remove the drain screw from each outer tube.

**WARNING:**

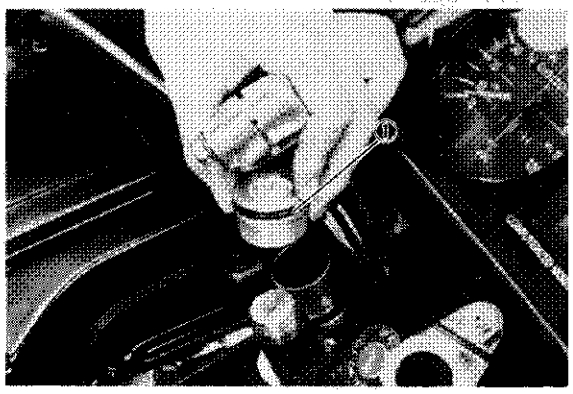
**Do not let oil contact the disc brake components. If any oil should contact the brake components, it must be removed before the motorcycle is operated. Oil will cause diminished braking capacity and will damage the rubber components of the brake assembly.**



1. Drain screw

9. When most of the oil has drained, slowly raise and lower the outer tubes to pump out the remaining oil.

10. Inspect the O-ring on each cap bolt and on the drain bolt gaskets. Replace if damaged.



1. O-ring

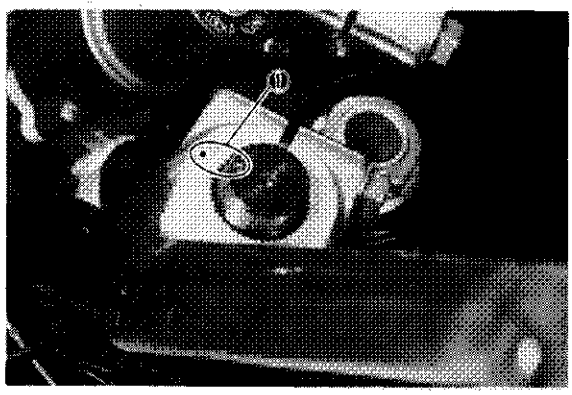
11. Install the drain bolts.
12. Pour the specified amount of oil into both fork inner tubes.

Front fork oil (each fork):
400 $cm^3$ (14.1 Imp oz, 13.5 US oz)
Yamaha Fork Oil 10wt or equivalent

13. After filling, slowly pump the forks up and down to distribute the oil.
14. Install the cap bolts, then tighten the cap and pinch bolts to specification.

Tightening torque:
Cap bolt:
25 Nm (2.5 m·kg, 18 ft·lb)
Pinch bolt:
20 Nm (2.0 m·kg, 14 ft·lb)

15. Install the handles; align the punch mark on the handle with the handlebar shaft (for standard position).



1. Standard position

**NOTE:**
Adjust the handle backward by one notch only, from the standard position. **(Two possible positions only)**

**WARNING:**

**Never tamper with this adjustment device in an attempt at further adjustment. Otherwise, it may cause:**
**The handlebar and cables to contact the fuel tank or allow the cables to be pulled tense, causing the rider to assume an inappropriate riding position. Always adjust the handlebars on each side to the same position. Uneven adjustment will cause an improper riding position.**

16. Install the bracket and handlebar securing nuts. Tighten the nuts and pinch bolts to specification.

Tightening torque:
Handle securing nut:
125 Nm (12.5 m·kg, 90 ft·lb)
Handle pinch bolt:
30 Nm (3.0 m·kg, 22 ft·lb)

17. Install the handlebar cover, cap, and hoods.
18. Install the proper amount of air pressure in the fork legs. Take care not to exceed the maximum allowable air pressure.

Maximum fork air pressure:
118 kPa (1.2 $kg/cm^2$, 18 psi)

19. Install the air valve cap.

**WARNING:**

**Make sure no oil has contacted and disc brake components; oil will cause diminished braking capacity and damage the rubber components of the brake assembly. Make sure all oil is removed from the brake and actuating piston assemblies before they are reassembled and the motorcycle is operated.**

**Front Fork Adjustment**

Front fork air pressure

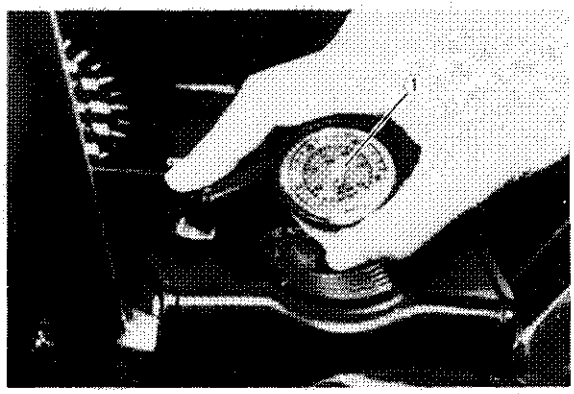
1. Elevate the front wheel by placing the motorcycle on the center stand.

**NOTE:**

When checking and adjusting the air pressure, there should be no weight on the front end of the motorcycle.

2. Remove the air valve cap.
3. Using the air gauge, check and adjust the air pressure.
   If the air pressure is increased, the suspension becomes stiffer and if decreased, it becomes softer.

**To increase:**
Use a manual air pump or other pressurized air supply.
**To decrease:**
Replace the air by pushing the valve pin.




1. Air check gauge

Standard air pressure:
78.5 kPa (0.8 kg/cm², 12 psi)
Maximum air pressure:
118 kPa (1.2 kg/cm², 18 psi)
Minimum air pressure:
78.5 kPa (0.8 kg/cm², 12 psi)
* Never exceed the maximum pressure, or oil seal damage may occur.

4. Install the air valve cap securely.

**Rear Shock Absorber Adjustment**

Rear shock absorber air pressure

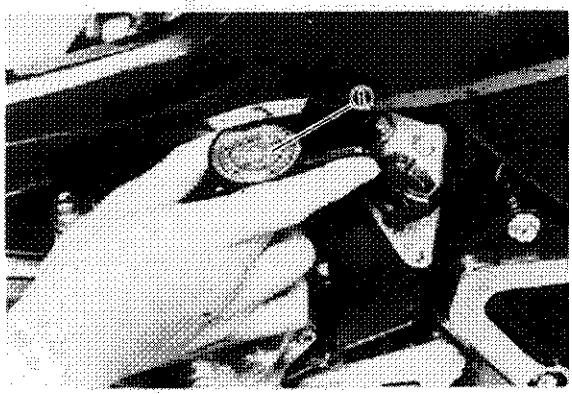
1. Elevate the rear wheel by placing the motorcycle on the centerstand.

**NOTE:**

When checking and adjusting the air pressure, there should be no weight on the rear end of the motorcycle.

2. Remove the air valve cap.
3. Using the aire check gauge, check and adjust the air pressure. If the air pressure is increased, the suspension becomes stiffer, if decreased, it becomes softer.

**To increase:**
Use a manual air pump or other pressurized air supply.
**To decrease:**
Release the air by pushing the valve pin.



1. Air check gauge

Standard air pressure:
98.1 kPa (1.0 kg/cm², 14 psi)
Maximum air pressure:
490 kPa (5.0 kg/cm², 72 psi)
Minimum air pressure:
98.1 kPa (1.0 kg/cm², 14 psi)

**WARNING:**

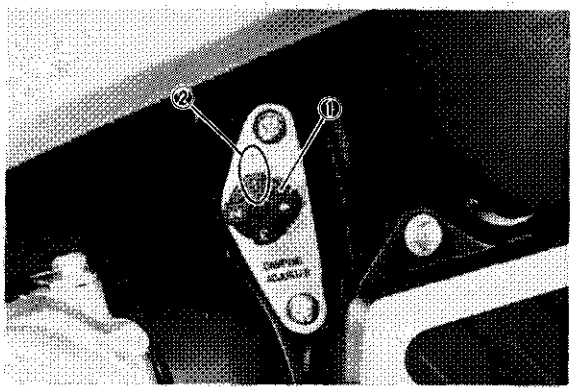
**Never ride the motorcycle with the shock absorber pressure either above the maximum or below the minimum recommended air pressure; it will cause damage to the rear shock absorber and/or loss of control.**

4. Install the air valve cap.

Rear shock absorber damping

1. Turn the damping adjuster to increase or decrease the damping.
2. If the damping adjuster is turned toward the "H", the damping becomes harder; if the adjuster is turned toward the "S" damping becomes softer.

| |
|---|
| Standard position — No. 1<br>No. 1 — Minimum damping<br>No. 4 — Maximum damping |



1. Damping adjuster 2. Standard position

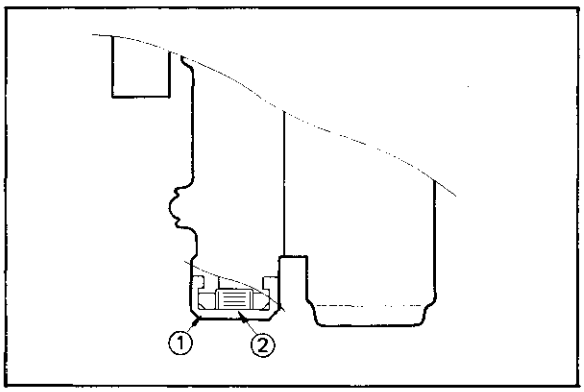
**Recommended combinations of the front fork and the rear shock absorber.**

Use this table as guidance to meet specific riding conditions and motorcycle load.

| Front fork | Rear sshock absorber | | | Loading condition | | |
|---|---|---|---|---|---|---|
| Air pressure | Air pressure | Damping adjuster | Solo rider | With passenger | With accessory equipments | With accessory equipments and passenger |
| 78.5 kPa (0.8 kg/cm$^2$, 12 psi) | 98.1 kPa (1.0 kg/cm$^2$, 14 psi) | 1 or 2 | ○ | | | |
| 78.5 ~ 98.1 kPa (0.8 ~ 1.0 kg/cm$^2$, 12 ~ 14 psi) | 196 ~ 294 kPa (2.0 ~ 3.0 kg/cm$^2$, 28 ~ 42 psi) | 2 or 3 | | ○ | ○ | |
| 78.5 ~ 118 kPa (0.8 ~ 1.2 kg/cm$^2$, 12 ~ 18 psi) | 294 ~ 490 kPa (3.0 ~ 5.0 kg/cm$^2$, 42 ~ 72 psi) | 3 or 4 | | | | ○ |

**Anti-dive Adjustment**

1. Remove the rubber cap from the bottom of the anti-dive unit.
2. Observe the head of the adjusting bolt through the machined slots in the bottom of the anti-dive unit. In the standard position, four lines will be visible on the adjusting bolt head. Consult the fork adjustment chart below to determine the proper setting.

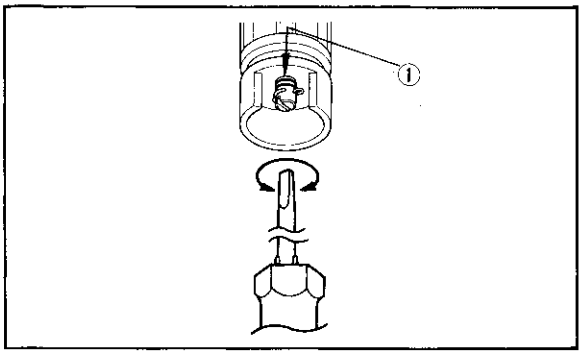


1. Rubber cap 2. Adjusting bolt

3. **To decrease the anti-dive effect,** turn the adjusting bolt counterclockwise until the first line appears level to the top of the machined slot(s).

**WARNING:**

**When the first line appears in the machined slot(s), the adjusting bolt will bottom in the anti-dive unit and a resistance will be felt. Do not attempt to turn the adjusting bolt beyond this point, or the anti-dive unit will be damaged.**

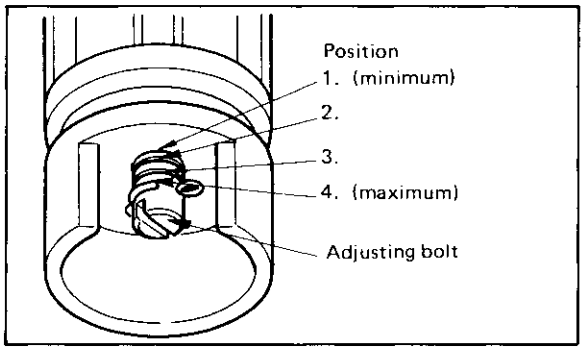


1. Machined slots

4. To increase the anti-dive effect, turn the adjusting bolt clockwise.
5. Install the rubber caps.

**WARNING:**

**The anti-dive settings must be the same on both anti-dive units. So, be sure to perform the above procedure on both anti-dive units.**




| Adjusting bolt position | Loading condition | | |
|---|---|---|---|
| | Solo rider | With accessory equipments or passenger | With accessory equipments and passenger |
| 1 | ○ | | |
| 2 | ○ | ○ | |
| 3 | ○ | ○ | ○ |
| 4 | | ○ | ○ |

**Steering Head Adjustment**

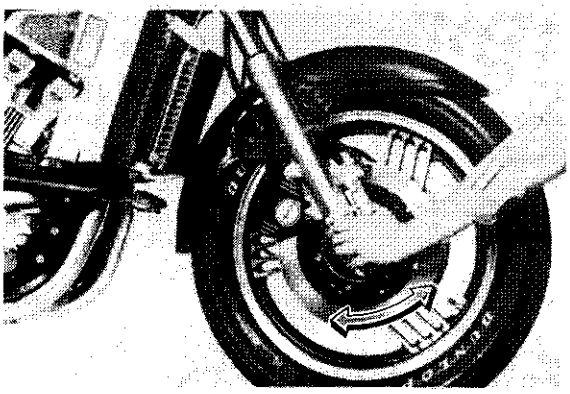
The steering assembly should be checked periodically for looseness.

1. Raise the front end of the motorcycle so that there is not weight on the front wheel.

**WARNING:**

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

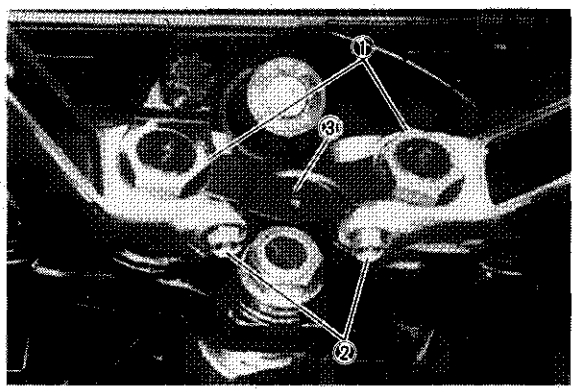
2. Grasp the bottom of the forks and gently rock the fork assembly backward and forward, checking for looseness in the steering assembly bearings.



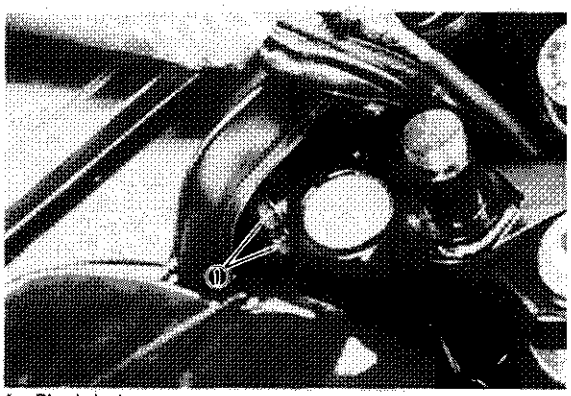
3. If the steering head is loose, adjust it.

a. Remove the handle cover cap, cover, hoods, bracket and handle securing nuts.

b. Loosen the front fork pinch bolts at the steering under bracket.



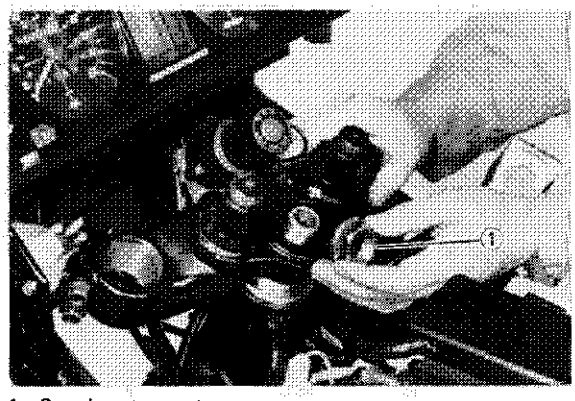

1. Handle securing nut 2. Pinch bolt 3. Bracket



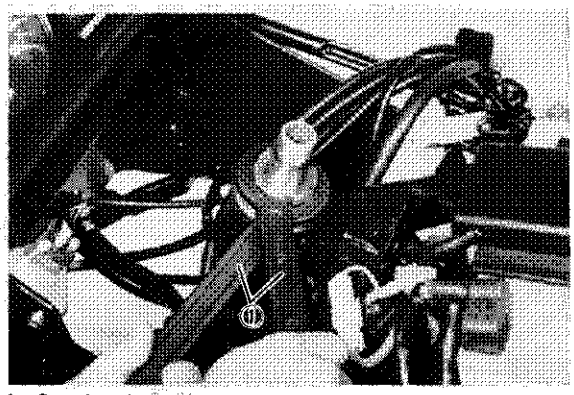

1. Pinch bolt

c. Loosen the steering stam nut and remove the steering crown and ring nut lock washer.

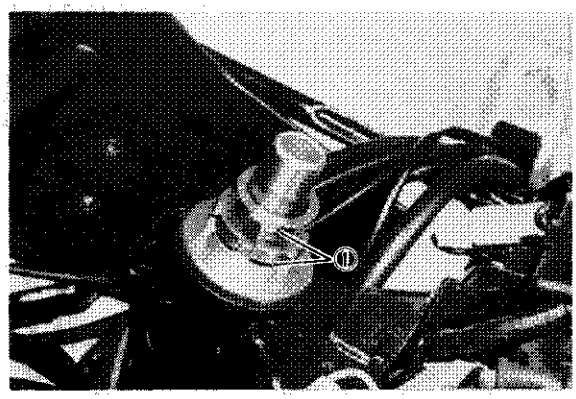
d. Use the ring nut wrenches to tighten the steering ring nuts until the steering head is tight but does not bind when the forks are turned. Refer to "Steering Head Assembly" on page 5-39 for the adjustment.



1. Steering stem nut



1. Steering ring nut



1. Ring nut wrench

e. Tighten the steering stem nut to specification.

| Tightening torque: |
| --- |
| 110 Nm (11.0 m·kg, 78 ft·lb) |

f. Tighten the pinch bolts to specification.

| Tightening torque: |
| --- |
| 20 Nm (2.0 m·kg, 14 ft·lb) |

g. Install the bracket onto the handles and tighten the handle securing nuts to specification.

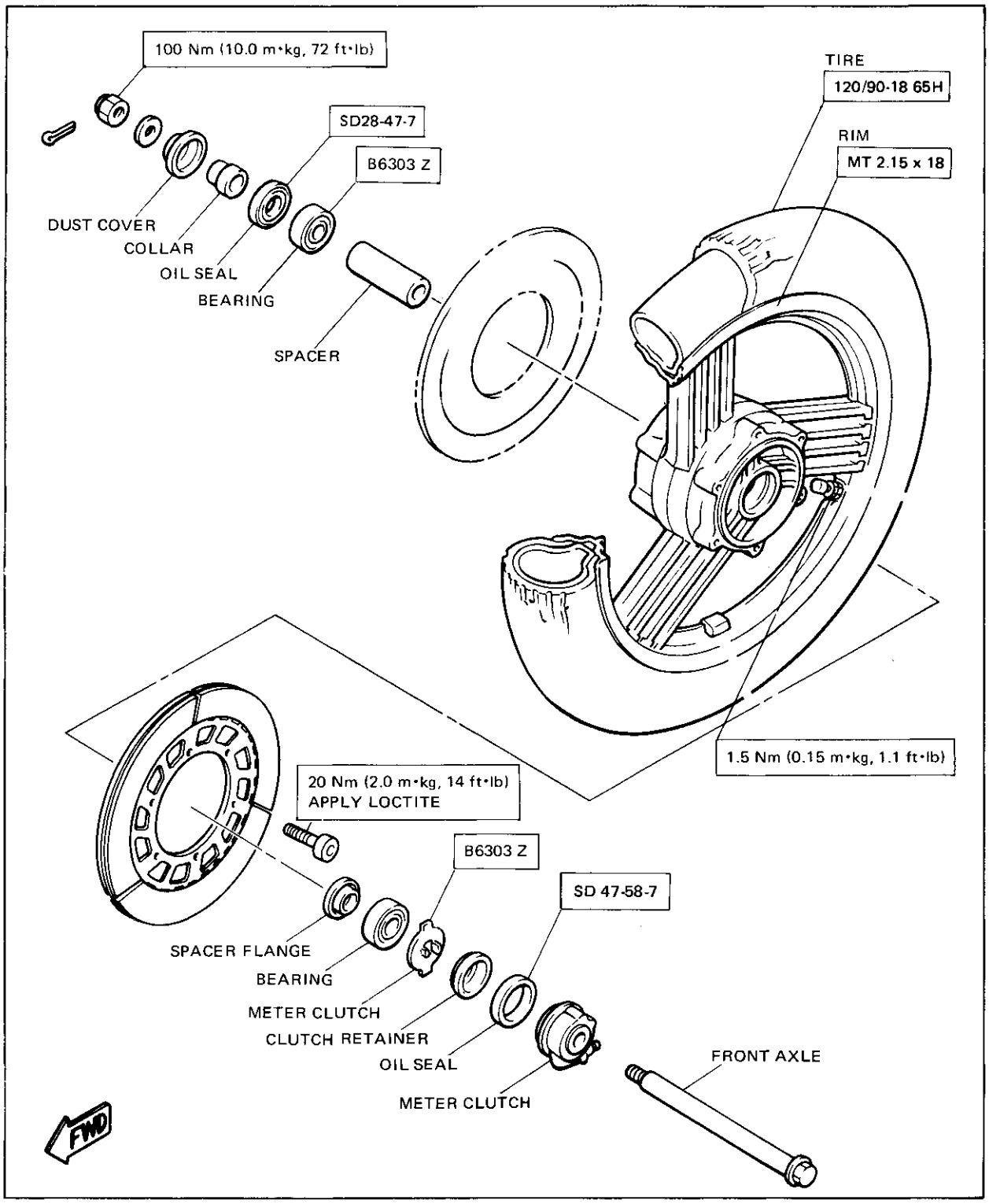
| Tightening torque: |
| --- |
| 125 Nm (12.5 m·kg, 90 ft·lb) |

h. Reinstall the hadle cover, cap, and hoods.

i. Using the air gauge, check and adjust the air pressure. Refer to "Front Fork Adjustment" on page 2-22.

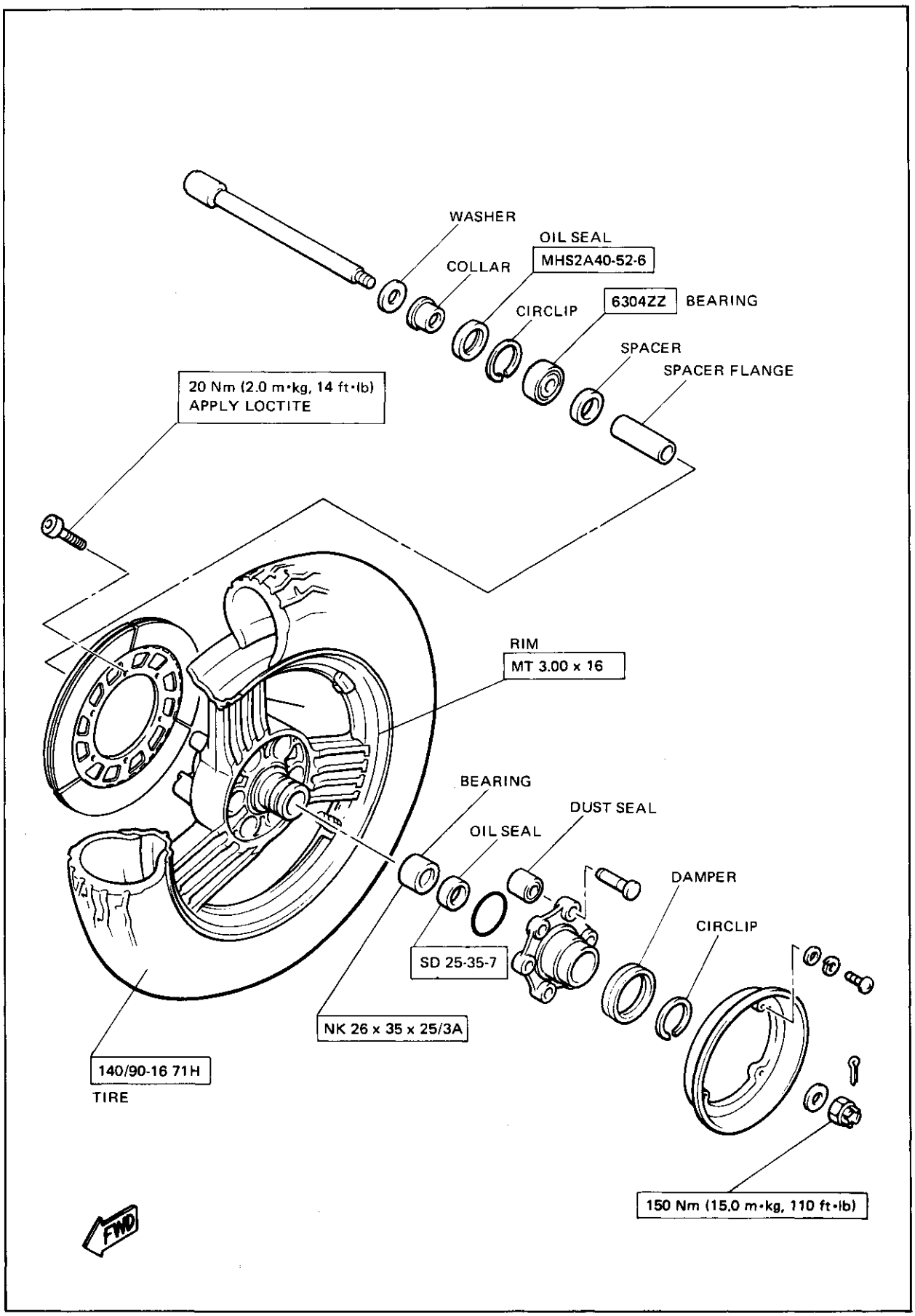
**Wheel Bearings**

Front wheel




1. Raise the front end of the motorcycle, and spin the wheel by hand. Touch the axle or front fender while spinning the wheel. If you feel any excessive vibration, the bearings are rough and should be replaced.

Rear wheel


WASHER
OIL SEAL
MHS2A40-52-6
COLLAR
CIRCLIP
6304ZZ
BEARING
SPACER
SPACER FLANGE
20 Nm (2.0 m·kg, 14 ft·lb)
APPLY LOCTITE
RIM
MT 3.00 x 16
BEARING
DUST SEAL
OIL SEAL
DAMPER
CIRCLIP
SD 25-35-7
NK 26 x 35 x 25/3A
140/90-16 71H
TIRE
150 Nm (15.0 m·kg, 110 ft·lb)
FWD

1. Remove the rear wheel, and check the bearing movement with your finger. Replace the bearings if they are rough or worn.

**Tubeless Tires and Aluminum Wheels**

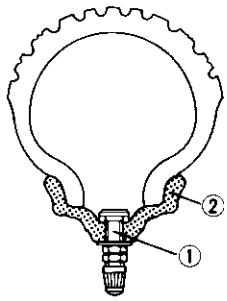
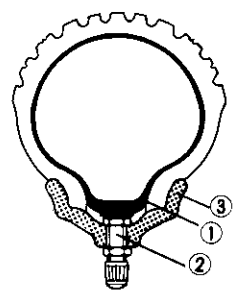
This motorcycle is equipped with aluminum wheels designed to be compatible with either tube or tubeless tires. Tubeless tires are installed as standard equipement.

**WARNING:**

**Do not attempt to use tubeless tires on a wheel designed for use only with tube-type tires. Tire failure and personal injury may result from sudden deflation.**

**Tube-type wheel →**
**Tube-type tires only**
**Tubeless-type wheel →**
**Tube-type or tubeless tires**

**When using tube-type tires, be sure to install the proper tube.**

| Tubeless tire | Tube-type tire |
|---|---|
|  |  |

1. Air valve
2. Aluminum wheel (Tubeless wheel)

1. Tube
2. Air valve
3. Aluminum wheel

To insure maximum performance, long service, and safe operation, note the following precautions:

1. Check tire pressure before riding; adjust as necessary.

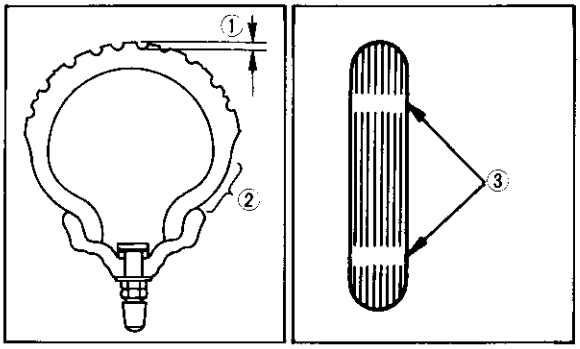
**WARNING:**

**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.**

| Basic weight: With oil and full fuel tank | 333 kg (734 lb) | |
|---|---|---|
| Maximum load* | 197 kg (434 lb) | |
| Cold tire pressure | Front | Rear |
| Up to 90 kg (198 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |
| 90 kg (198 lb) ~ 197 kg (434 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 275 kPa (2.8 kg/cm$^2$, 40 psi) |
| Hight speed riding | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |

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

2. Before operation, always check the tire surfaces for wear and/or damage; look for cracks, glass, nails, metal fragments, stones, etc.



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

Minimum tire tread depth
(Front and rear)
1.0 mm (0.04 in)

3. Always inspect the aluminum wheels before a ride. Place the motorcycle on its centerstand and check for cracks, bends or warpage of the wheels. Do not attempt even small repairs to the wheel. If a wheel is deformed or cracked, it must be replaced.
4. Balance any tire or wheel that has been changed or replaced. Failure to have a wheel assemblely balanced can result in poor performance, adverse handling characteristics, and shortened tire life.
5. After installing a tire, ride conservatively to allow the tire to seat itself on the rim properly. Failure to allow proper seating may cause tire failure resulting in damage to the motorcycle and injury to the rider.

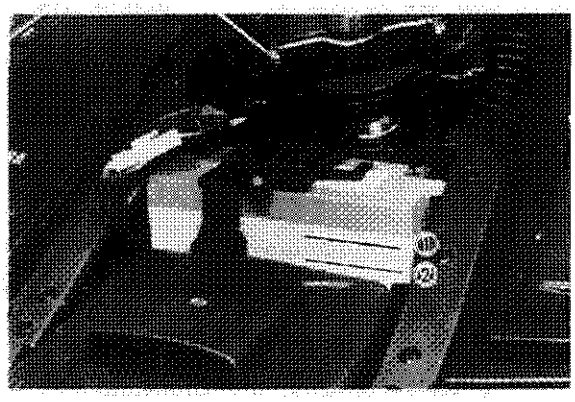
6. After repairing or replacing a tire, check to be sure the valve stem lock nut is securely fastened. If not, torque it as specified.

| Tightening torque: |
| --- |
| 1.5 Nm (0.15 m·kg, 1.1 ft·lb) |

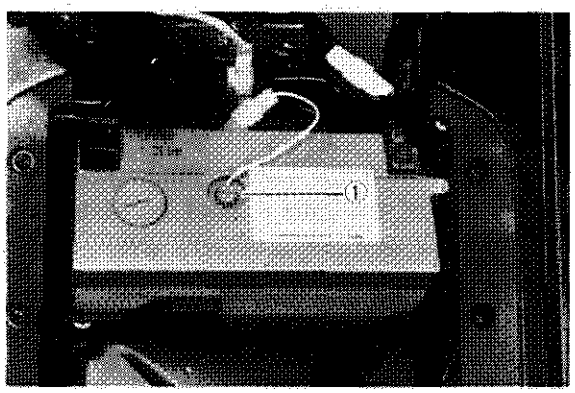
## ELECTRICAL

### Battery

1. The fluid level should be between the upper and lower level marks. Use only distilled water if refilling is necessary.



1. Upper level 2. Lower level

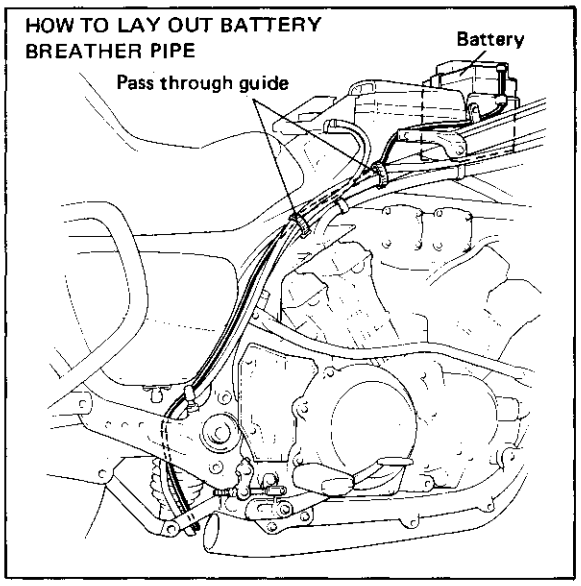


1. Battery sensor

**CAUTION:**

- **Normal tap water contains minerals which are harmful to a battery; therefore, refill only with distilled water.**
- **Do not overfill! If any excess fluid flows from the breather hose, stop filling and rinse affected areas thoroughly with a solution of 1 table spoon baking soda in a cup of water.**

2. Always make sure the connections are correct when installing the battery. Make sure the breather pipe is properly connected, properly routed, and is not damaged or obstructed.




**CAUTION:**

**The battery must be charged before usint to ensure maximum performance. Failure to charge the battery properly before first use or a low electrolyte level will cause premature failure of the battery. Charging current: 2.0 amps/10 hrs. Or until the specific gravity reaches 1,280 at 20° C (68° F).**

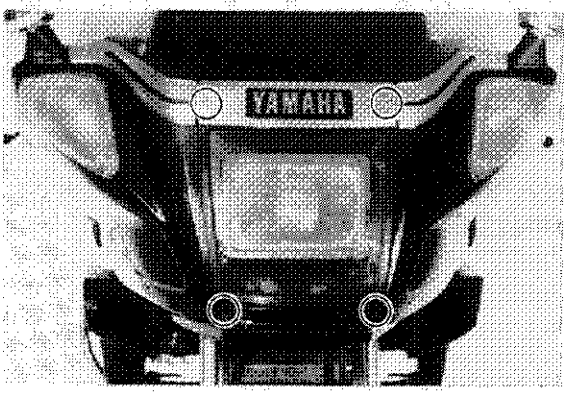
**WARNING:**

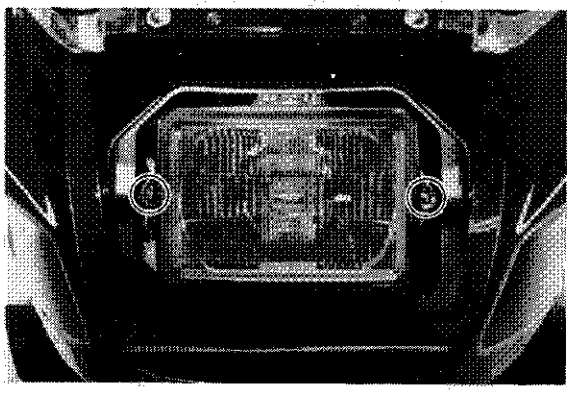
**Battery electrolyte is poisonous and dangerous, causing severe burns, etc. It contains sulfuric acid. Avoid contact with skin, eyes, or clothing.**
**Antidote: EXTERNAL – Flush with water. INTERNAL – Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call 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 closed space. Always shield eyes when working near batteries.**
**KEEP OUT OF REACH OF CHILDREN**

**Headlight**

Headlight bulb replacement

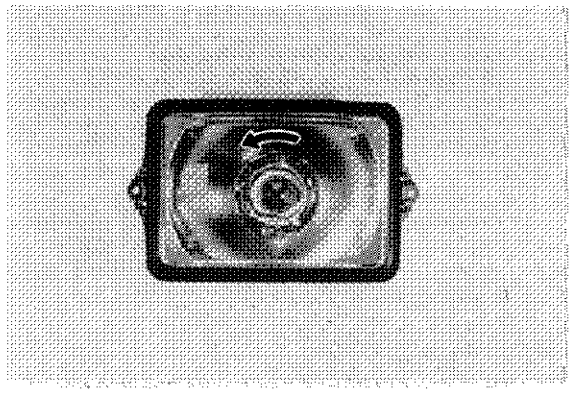
1. Remove the four headlight cover securing screws.
2. Remove the headlight holding screws.



3. Disconnect the lead wires and remove the light unit assembly.
4. Turn the bulb holder counterclockwise and remove the defective bulb.





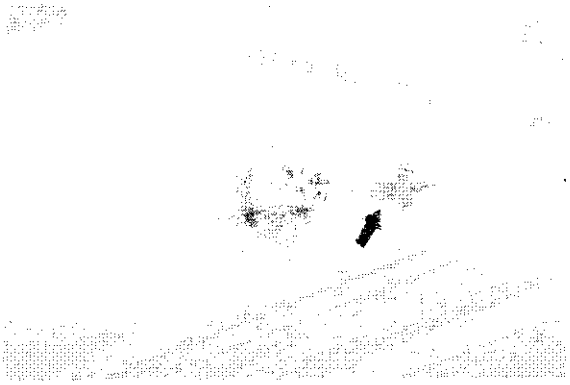
5. Slip a new bulb into position and secure it with the bulb holder.

**CAUTION:**

**Avoid touching the glass part of the bulb and keep it free from oil stains; otherwise, the transparency of the glass, life of the bulb and luminous flux will be adversely affected. If the glass is oil stained, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

**WARNING:**

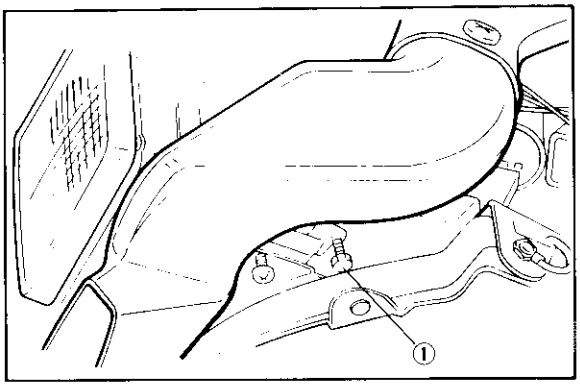
**Keep flammable products or your hands away from the headlight bulb while it is on, since the bulb generates enormous heat. Do not touch the bulb until it cools down.**



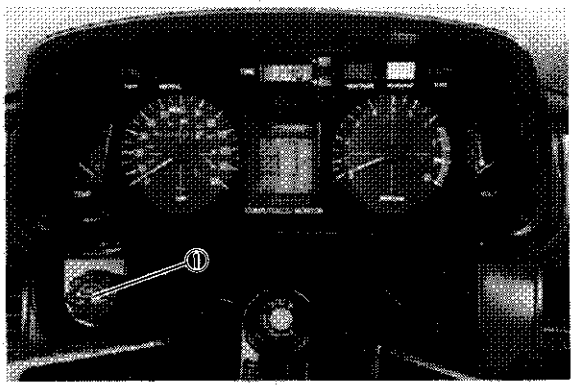
6. Reinstall the light unit assembly to the headlight body. Adjust the headlight beam if necessary.

Headlight beam adjustment

1. Horizontal adjustment:
   To adjust the beam to the right, turn the adjusting screw clockwise.
   To adjust the beam to the left, turn the screw counterclockwise.
2. Vertical adjustment:
   To adjust the beam higher, turn the adjusting knob "UP".
   To adjust the beam lower, turn the adjusting knob "DOWN".



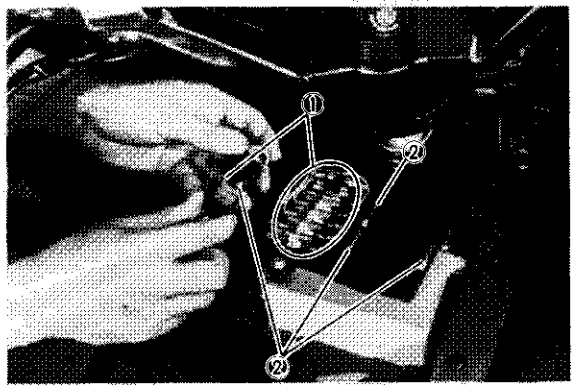
1. Horizontal adjusting screw



1. Headlight vertical adjusting knob

**Fuse**

1. The fuse block is located under the top cover.



1. Fuse 2. Spare fuse

2. If any fuse is blown, turn off the ignition switch and the switch in the circuit in question; install a new fuse of proper amperage. Turn on the switches, and see if the electrical device operates. If the fuse immediately blows again, check the circuit in question (refer to Chapter 6, "ELECTRICAL").

**WARNING:**

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

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# ENGINE OVERHAUL

## ENGINE REMOVAL

**NOTE:**
It is not necessary to remove the engine in order to remove the clutch, carburetor, water pump, and/or the AC magneto.

### Preparation for Removal

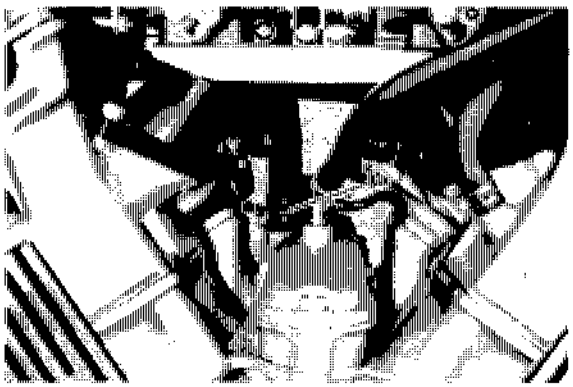
1. All dirt, mud, dust, and foreign material must be removed from the engine before removal and disassembly. This will help keep foreign material out of the engine oil.
2. Before engine removal and disassembly, be sure that you have the proper tools and cleaning equipment. With them, you can perform a clean and efficient job.

**NOTE:**
When disassembling the engine, keep mated parts together. This includes gears, cylinders, pistons, 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. Place the motorcycle on its centerstand. Start the engine and let it warm up. Stop the engine and drain the engine oil.
5. Remove the engine oil and coolant drain bolts. Then drain engine oil and coolant completely.

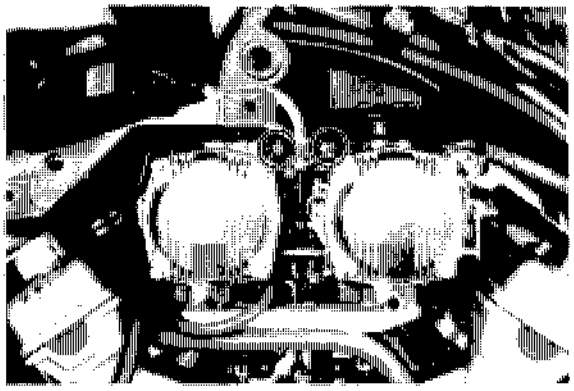
### Carburetor

1. Remove the air cleaner panel, side panel and lower panel.
2. Remove the crankcase ventilation hose from the engine.

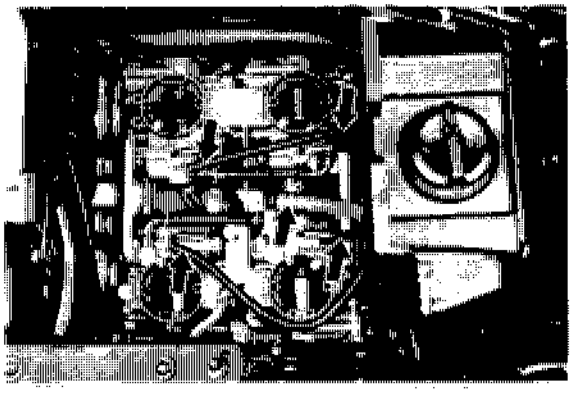


1. Crankcase ventilation hose

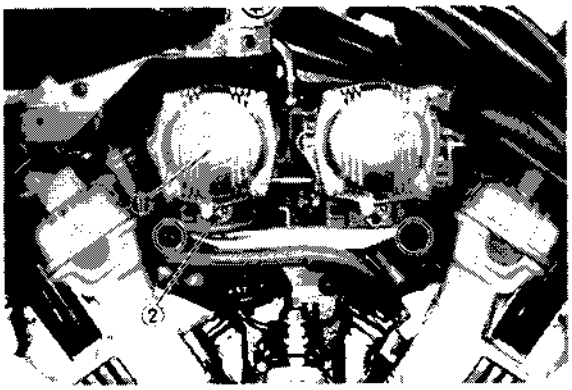
3. Loosen the air cleaner joint clamp screws and remove the air cleaner assembly.



4. Disconnect the fuel hose and fuel overflow hoses.



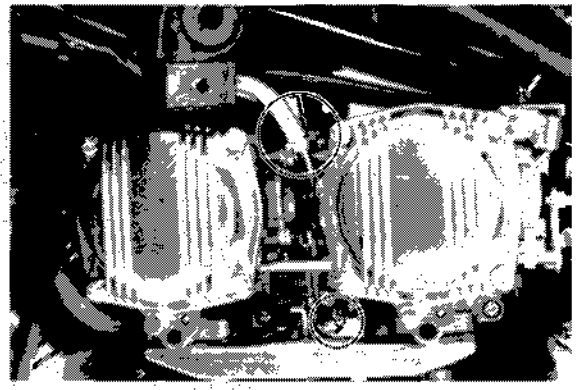
5. Remove the ignition advance vacuum hose from #2 carburetor and loosen the carburetor joint clamp screws.



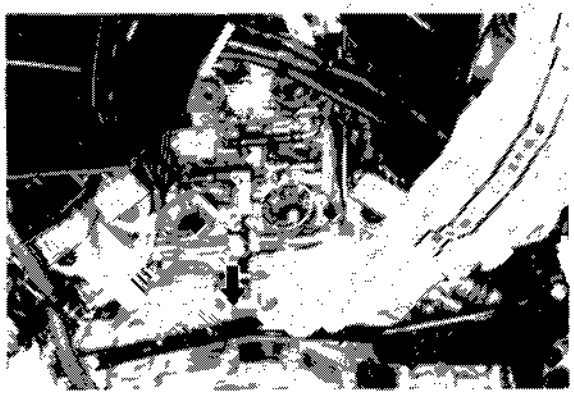

1. #2 Carburetor 2. Ignition advance vacuum hose

6. Remove the choke cable and open side throttle cable.

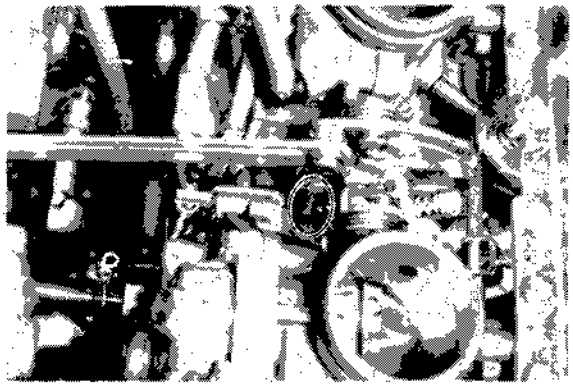




7. Remove the carburetor assembly from the left side of the engine.



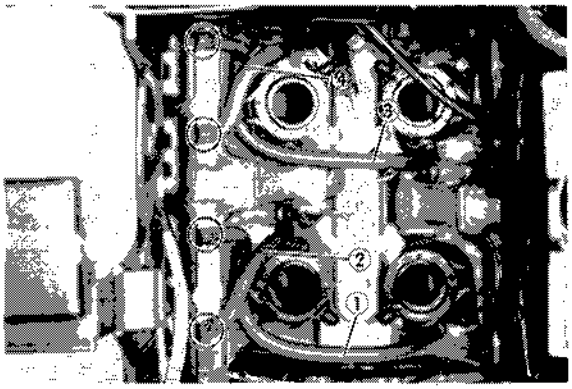
8. Disconnect the closed side throttle cable end and dismount the carburetor from the engine.



9. Insert clean rags into the intake joint holes to prevent dirt or foreign matter from falling into the engine.

**YICS Chamber and Air Baffle Plates**

1. Remove the spark plug caps.
2. Remove the YICS hoses and coolant bypass hose 2.

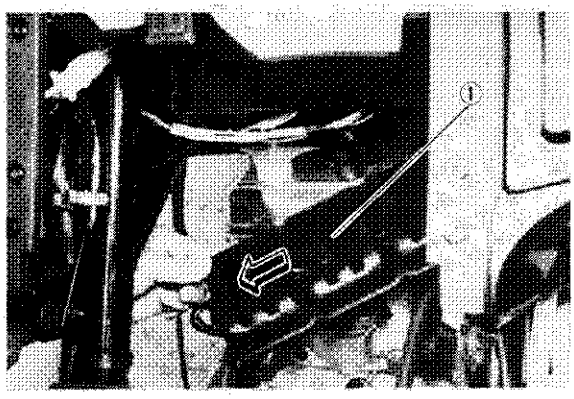


1. #1 cylinder YICS hose 2. #2 cylinder YICS hose
3. #3 cylinder YICS hose 4. #4 cylinder YICS hose



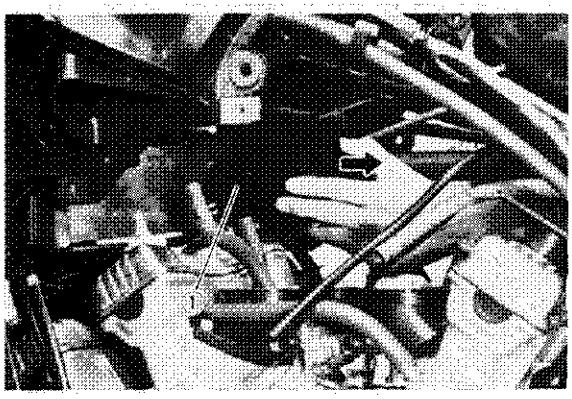
1. Bypass hose 2

3. Push the left side of the YICS chamber towards the front of the motorcycle, pivot the left side of chamber towards you, and pull the unit away towards the left.



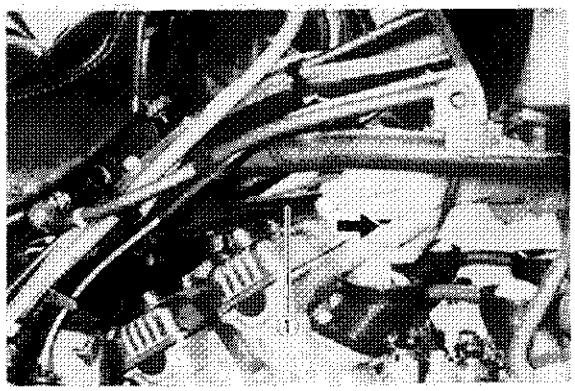
1. YICS chamber

4. Remove the front air baffle plate.



1. Air baffle plate

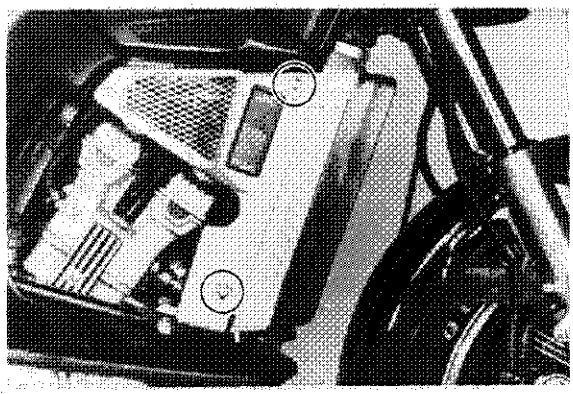
5. Remove the rear air baffle plate.



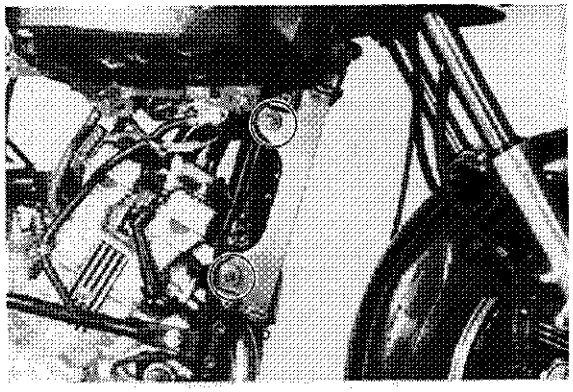
1. Air baffle plate

**Radiator**

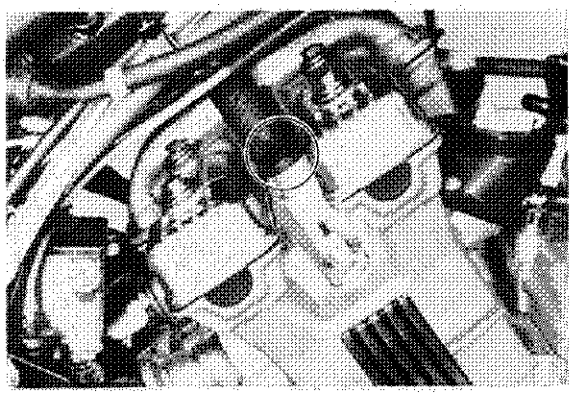
1. Remove the radiator cover and horns.



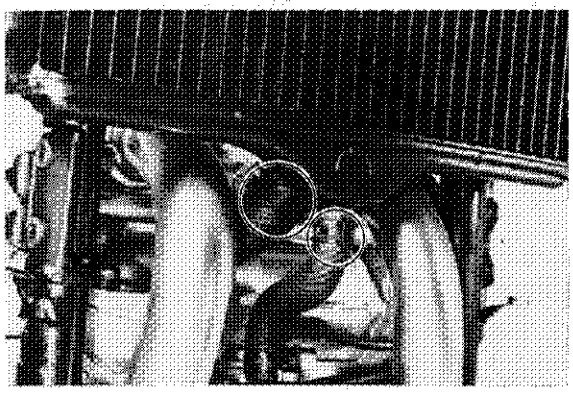
2. Remove the radiator mounting bolts.



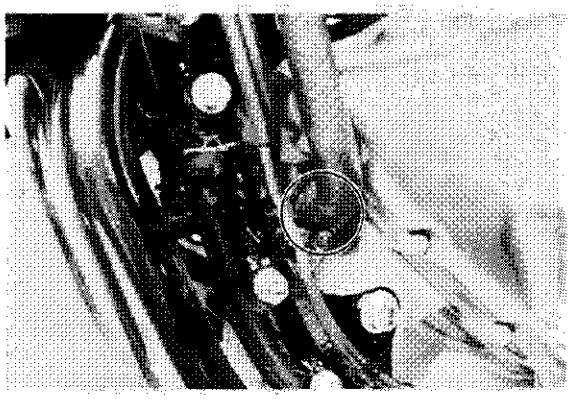
3. Remove the coolant hoses from the front and rear cylinder heads.



4. Remove the lower radiator coolant hoses.

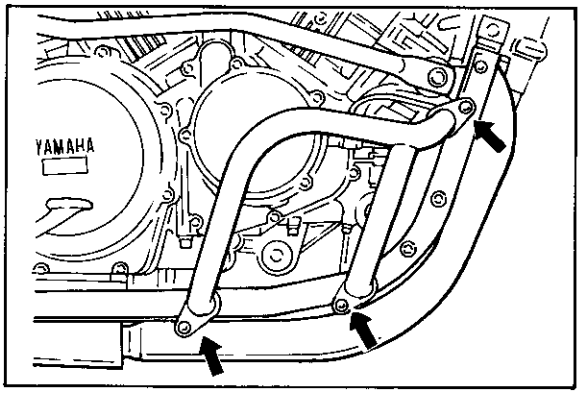


5. Remove the left side coolant hose.



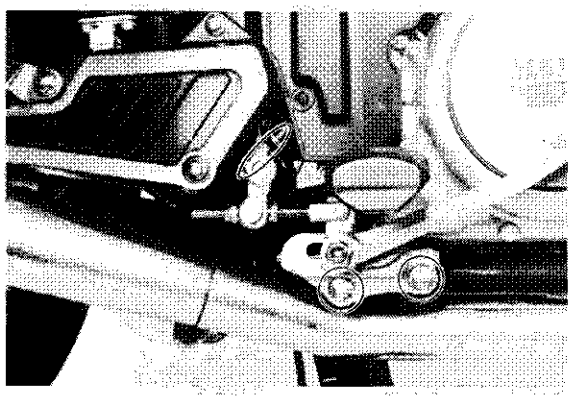
**Engine Guard**

1. Remove the engine guards.

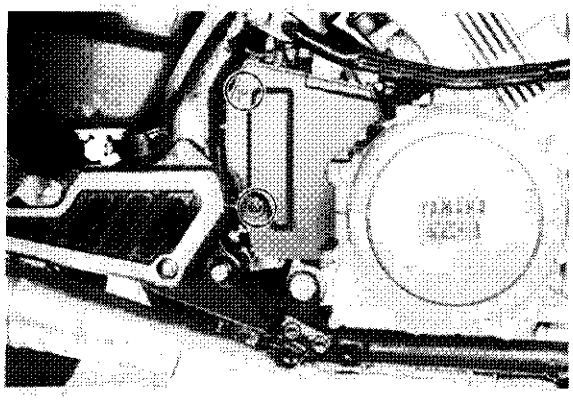



**Right Footrest and Brake Pedal**

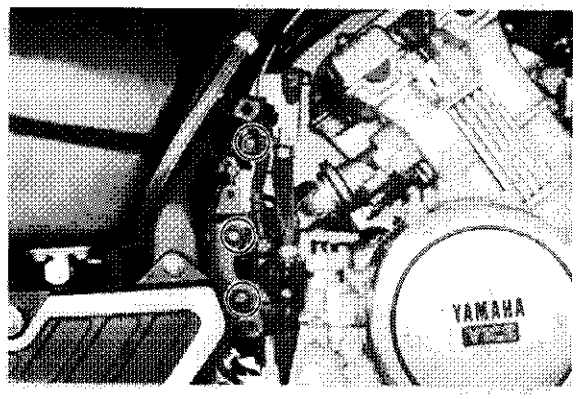
1. Remove the right footrest and brake pedal assembly.



2. Remove the right lower side cover.

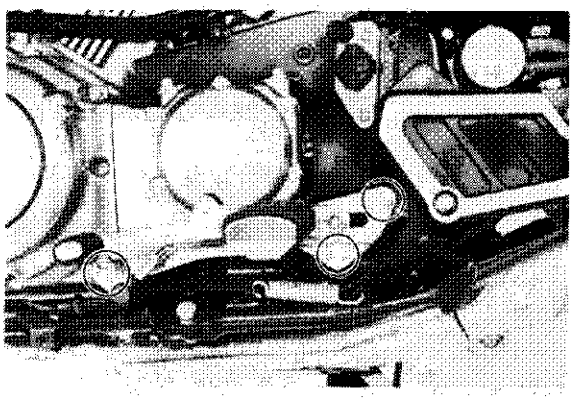


3. Remove the brake-master-cylinder-mounting bolts and brake-fluid-reservoir-mounting bolt with brake hose holder.

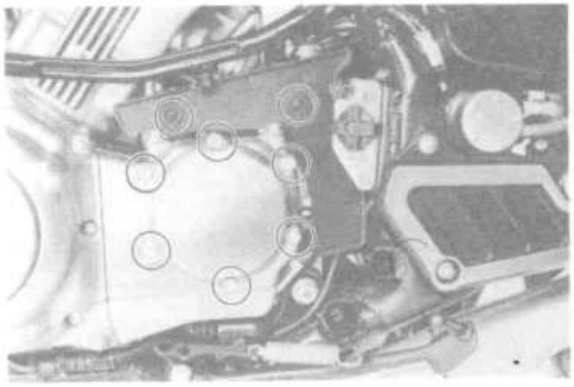



**Left Footrest and Clutch Release Cylinder**

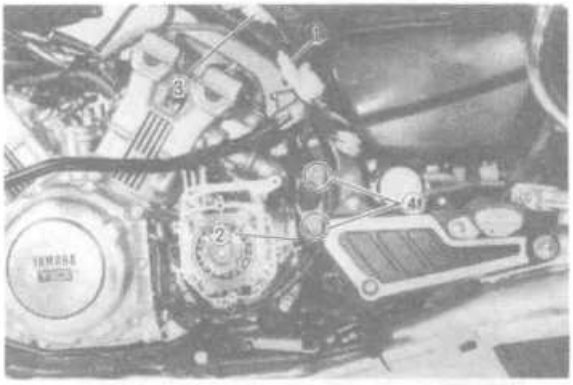
1. Remove the left footrest and change pedal assembly.



2. Remove the middle gear case cover and left lower side cover.

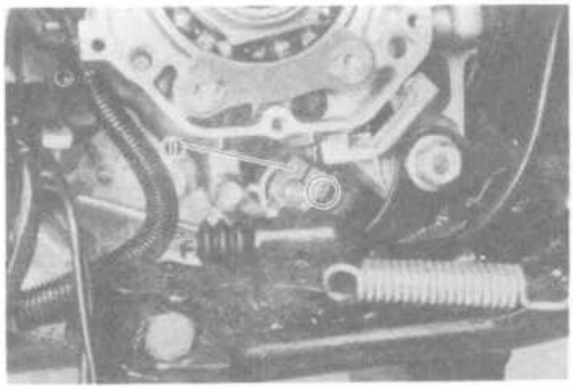


3. Remove the rear shock absorber damping adjuster screws.
4. Disconnect the following couplers and leads.
   - A.C. generator lead
   - Neutral switch lead
   - Pickup coil lead



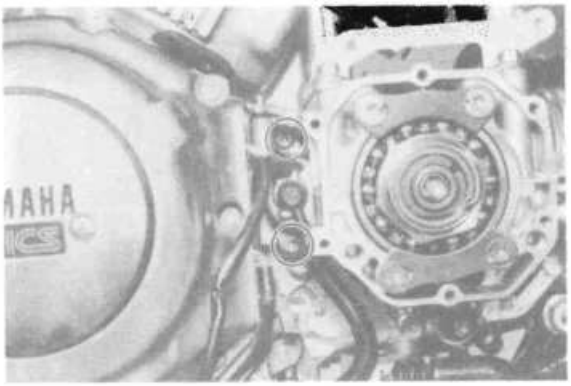
1. AC generator lead
2. Neutral switch lead
3. Pickup coil lead
4. Screw

5. Remove the shift arm from the shift shaft.

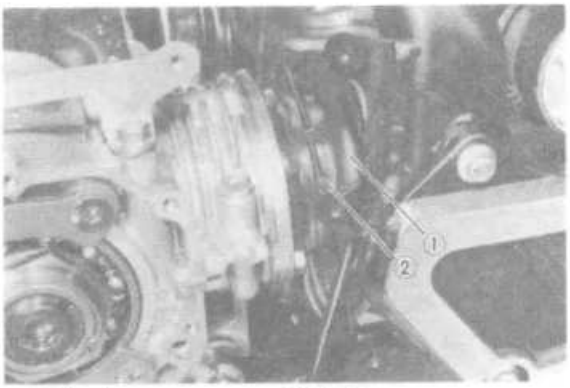


1. Shift arm

6. Remove the clutch release cylinder.



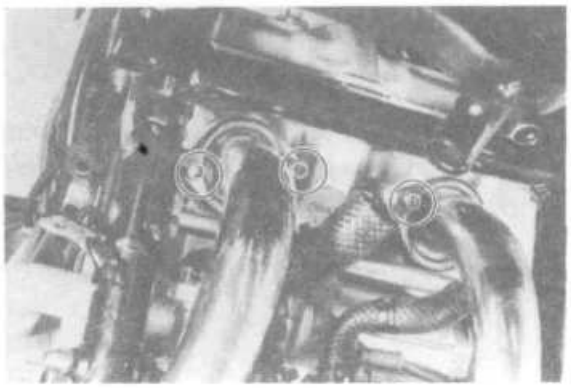
7. Disconnect the rubber boot and spring from crank case.

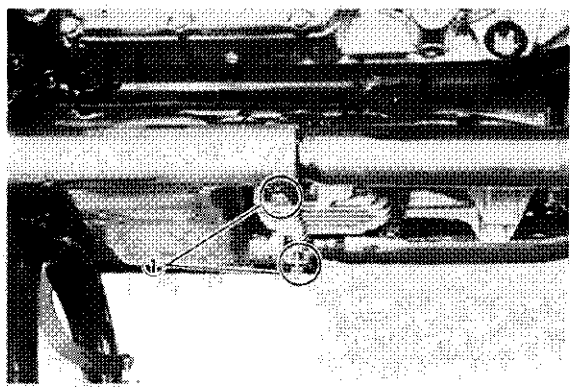


1. Rubber boot
2. Spring

### Exhaust Pipes and Mufflers

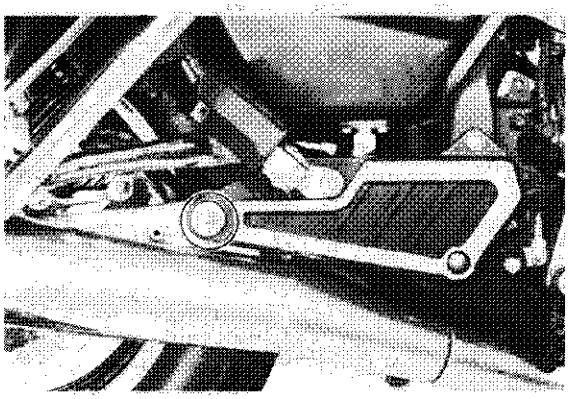
1. Remove the front exhaust-pipe flange bolts from the cylinder head and loosen the front-exhaust-pipe clamp bolts at the muffler chamber. Remove the exhaust pipes.

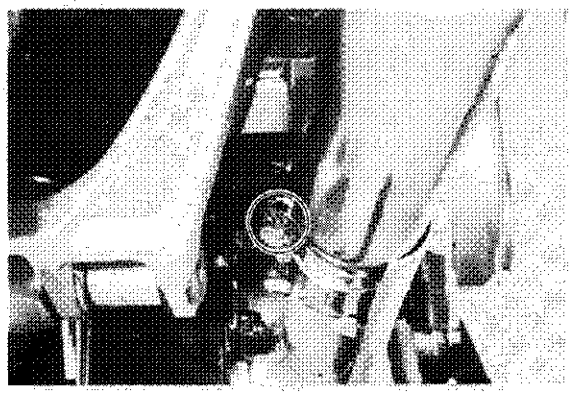




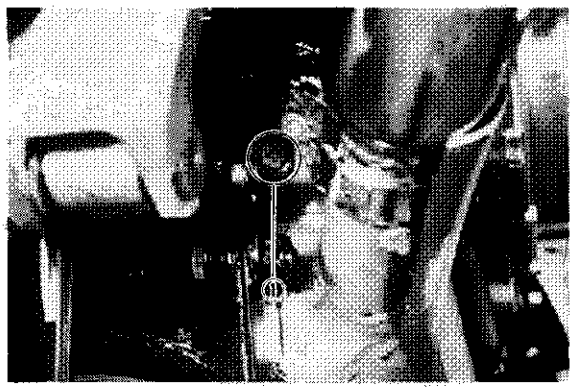
1. Clamp bolt

2. Remove the muffler mounting bolts and loosen the muffler clamp bolts. Remove the mufflers.

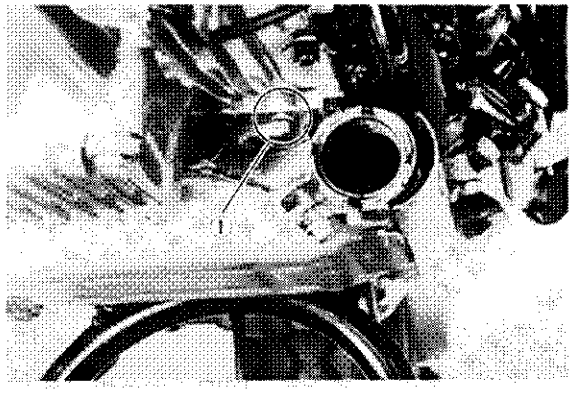




3. Remove the rear exhaust pipe clamp bolts and muffler chamber mounting nuts.

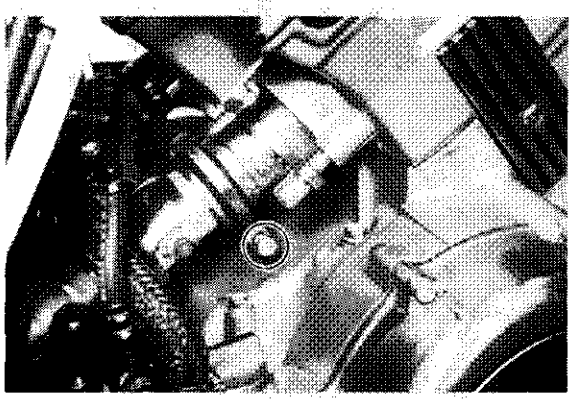


1. Rear exhaust pipe clamp bolt



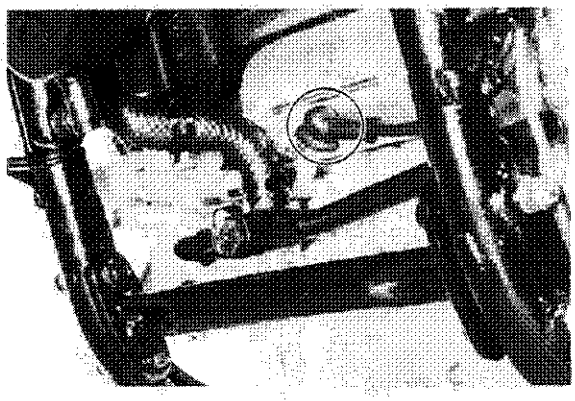
1. Muffler chamber mounting nut

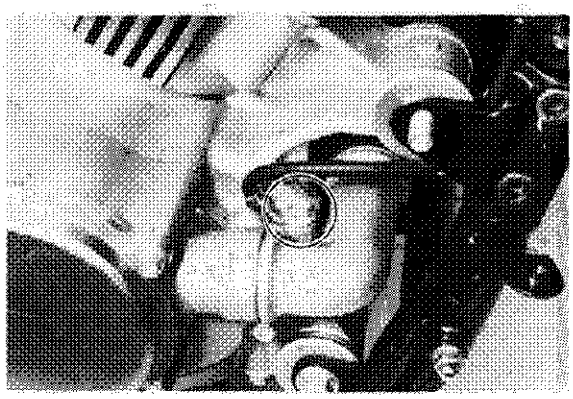
4. Remove the rear exhaust pipe clamp bolts.



### Starter Motor and Ground Lead

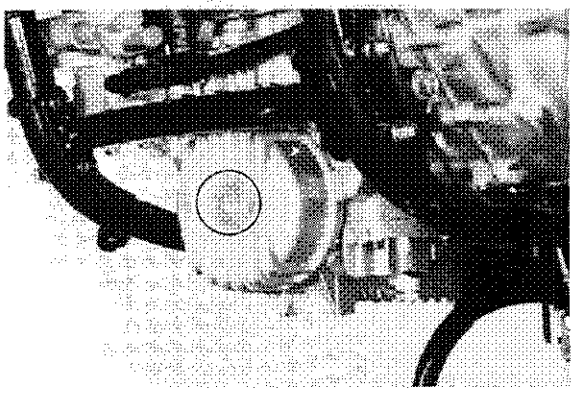
1. Remove the starter motor lead and ground lead.





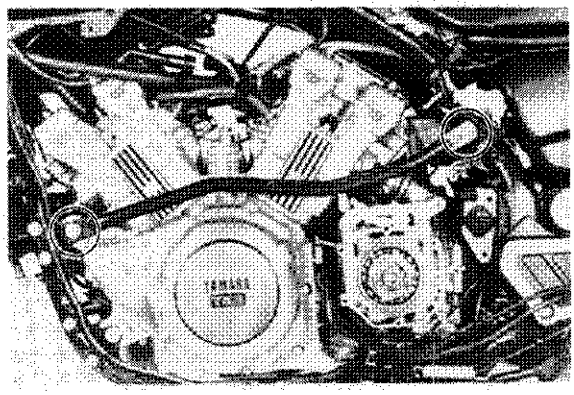
### Oil Filter

1. Remove the oil filter assembly.

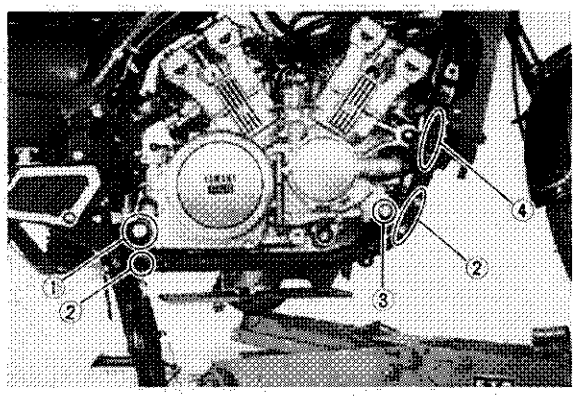


### Engine Removal

1. Remove the right upper panel assembly.
2. Remove the front upper engine mounting bolt and side frame tube.

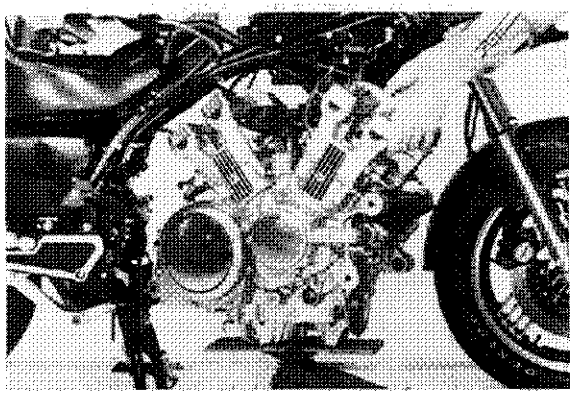


3. Place a suitable stand under the engine and remove the front-lower-engine-mounting bolt, rear engine mounting bolts, right-lower-frame tube mounting bolts and front cross frame tube mounting bolts.




1. Rear engine mounting bolt
2. Right lower frame tube mounting bolt
3. Front lower engine mounting bolt
4. Front cross frame tube mounting bolt

4. Dismount the engine assembly from the right chassis.



NOTE:

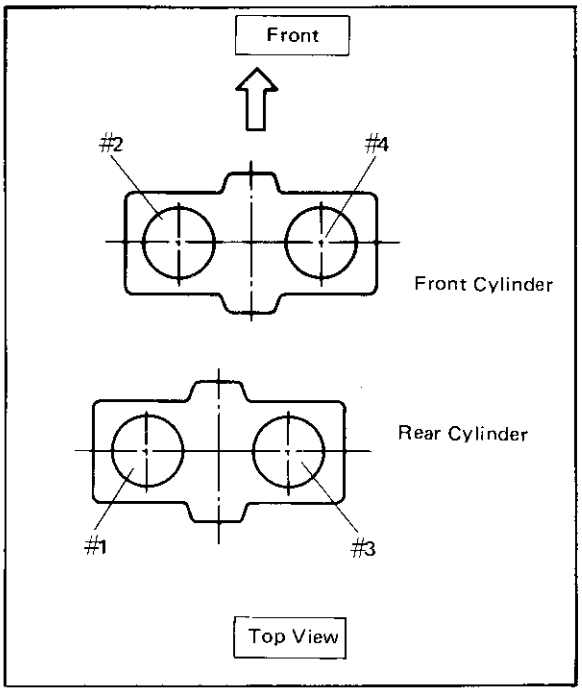
Remove the rear cylinder head cover if difficultie's are encountered with any of the previous steps.

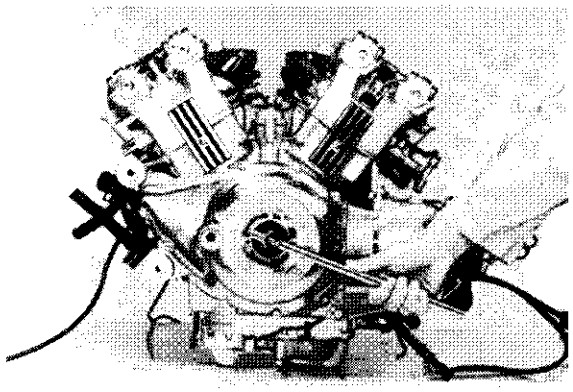
## ENGINE DISASSEMBLY

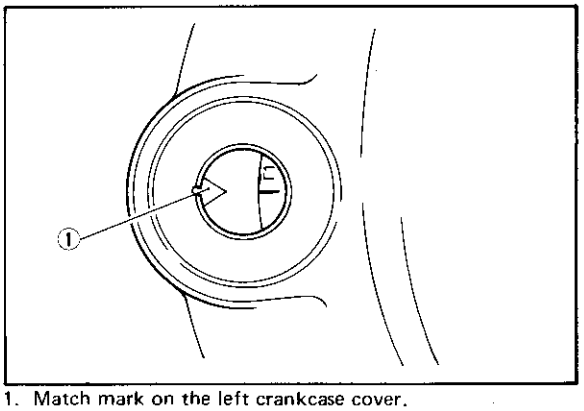
### Cylinder Heads and Camshafts

1. Remove the cylinder head covers.
2. Remove the timing plug and the emblem plate from the left crankcase cover.
3. Rear cylinder head

a. Remove the spark plugs, and by rotating the crankshaft, align the "T-1" mark on the generator rotor with the mark on the left crankcase cover, and set the #1 piston at TDC.

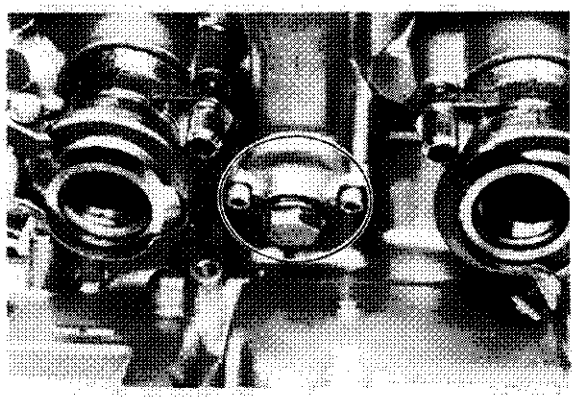


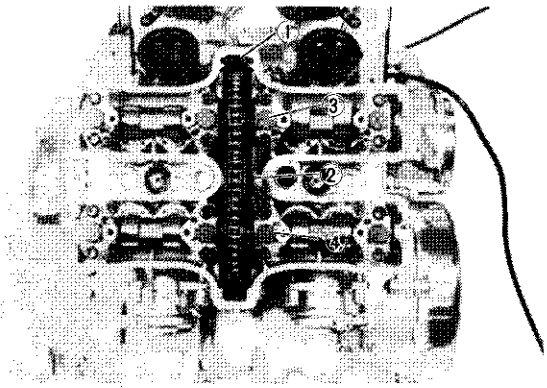



1. Match mark on the left crankcase cover.

b. Remove the cam chain tensioner.

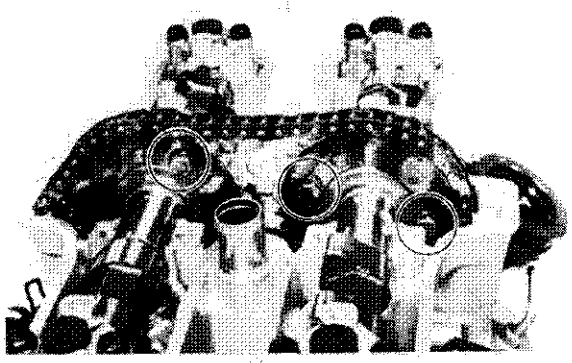


c. Remove the front and upper chain guides. Remove only the intake and enhanst cam caps marked "I-2" and "E-2".




1. Front chain guide
2. Upper chain guide
3. "I-2" intake cam cap
4. "E-2" exhaust cam cap

d. Lock the crankshaft to prevent camshaft rotation, and remove the cam chain sprocket bolts.
Turn the cam shaft 180° and remove the opposite side cam chain sprocket bolts.

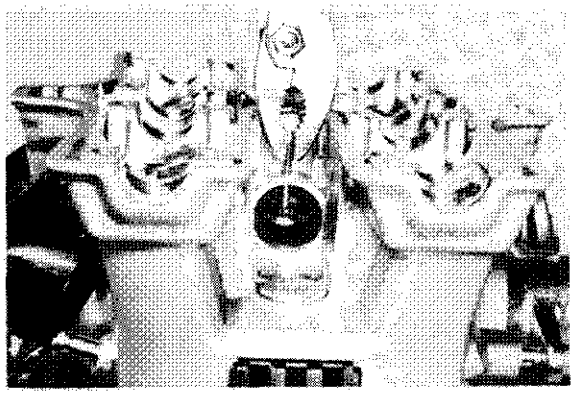


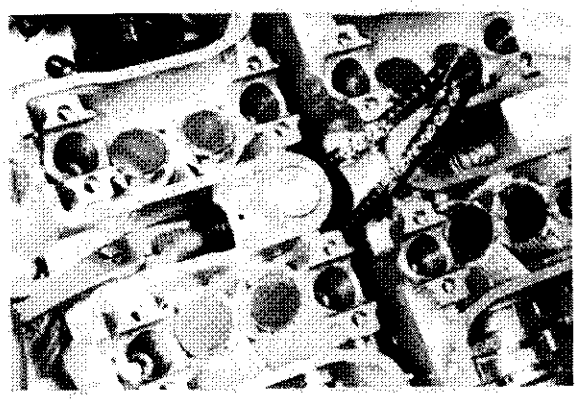
e. Slip each sprocket off its mounting boss on the cam.
Remove the cam cap bolts and the cam caps.

**CAUTION:**

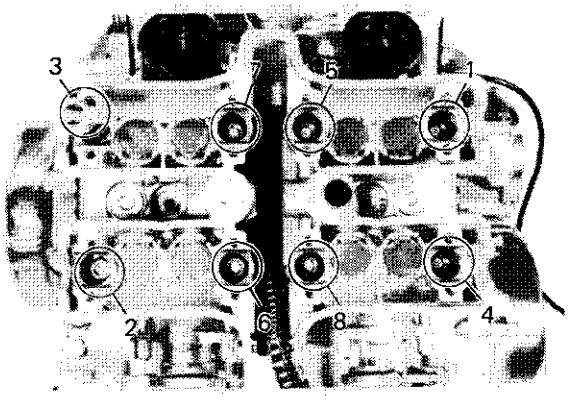
**Loosen the cam cap bolts. Be sure the camshaft cam lobes do not touch the valve lifters.**

f. Slide the cams and sprockets from under the chain and remove the cams and sprockets.
g. Fasten safety wire to the cam chain to prevent its falling into the crankcase cavity.
Remove the lock pin and water jacket joint.

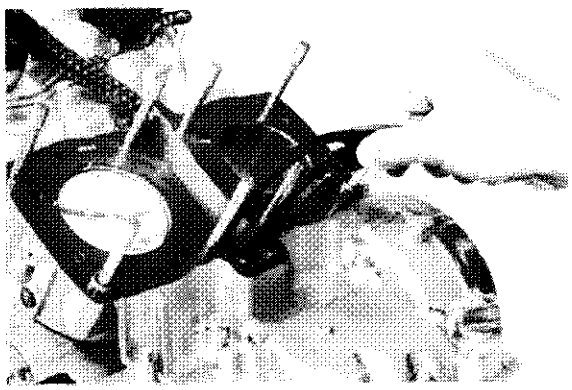




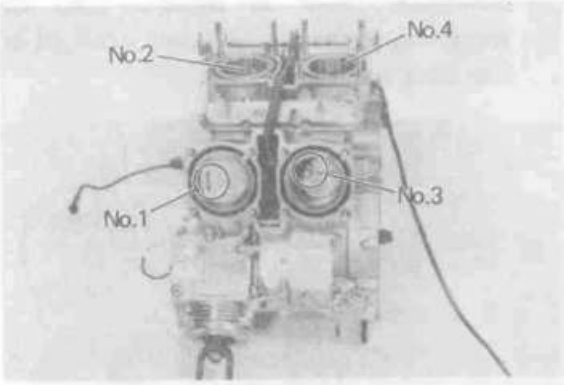
h. Remove the cylinder head nuts in the numerical order as shown. Start by loosening each nut 1/2 turn until all of the nuts are loose.




i. Remove the cylinder head. It may be necessary to tap the cylinder lightly to loosen it from the base gasket.
j. Remove the rear cam chain guide.

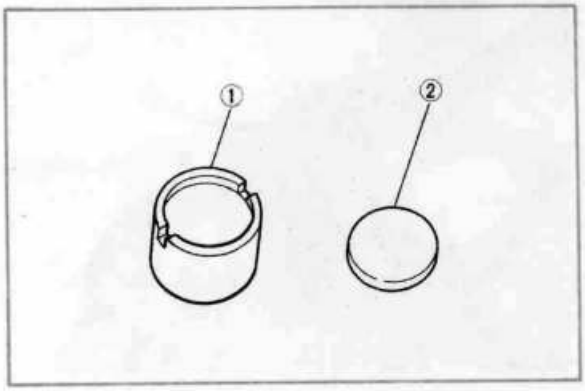


4. Front cylinder head
   a. With the #1 piston set at TDC (The "T-1" mark should be visible on the generator rotor), turn the crankshaft counterclockwise 430°. Align the "T-2" mark on the generator rotor with the match mark on the left crankcase cover. Set the #2 piston at TDC.
   b. Follow steps 3b to 3j (Rear cylinder head).
5. Mark the piston number on each piston as shown below.



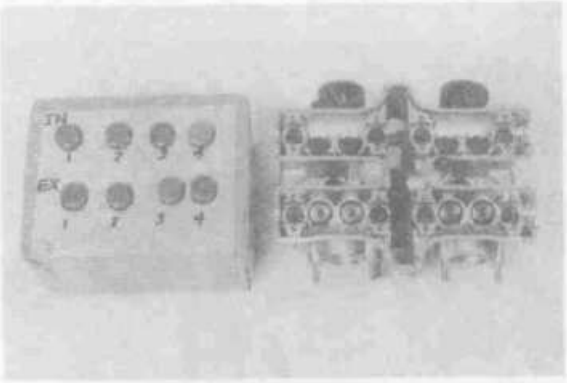

**Valve Lifters, Valve and Valve Springs**

1. **Remove the valve lifters and pads. Be careful not to scratch the lifter bodies or lifter bores in the cylinder head.**
   Identify each lifter's position very carefully so that it can be reinstalled in its original place.

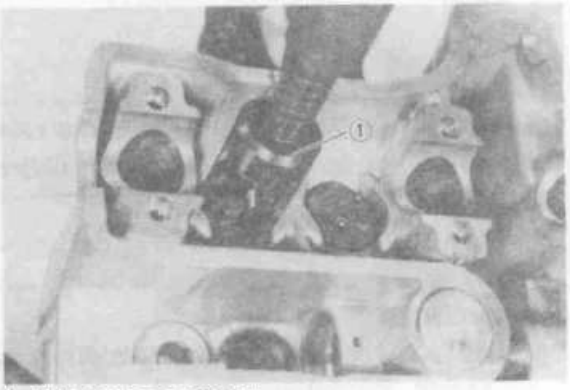



1. Valve lifter 2. Adjusting pad

2. Use a small box to hold the parts and identify the original position of each lifter and valve. Be very careful not to mix the location of these components.



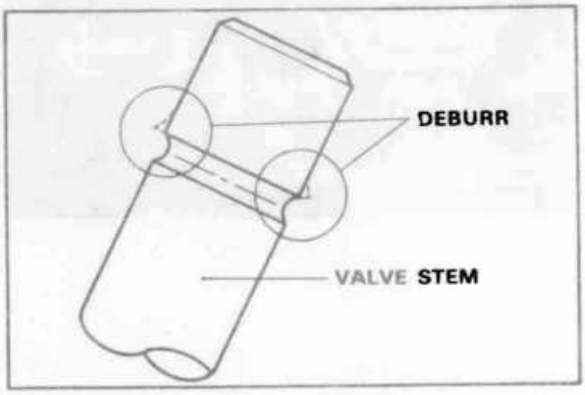
3. Mount the valve spring compressor on the head and depress each valve spring. Take out the retainer and valve spring with tweezers.




1. Valve spring compressor

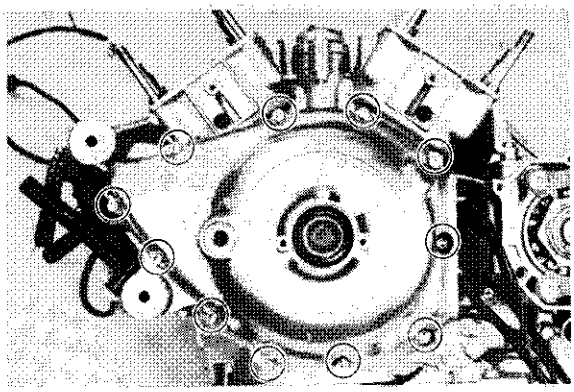
4. Remove valves.

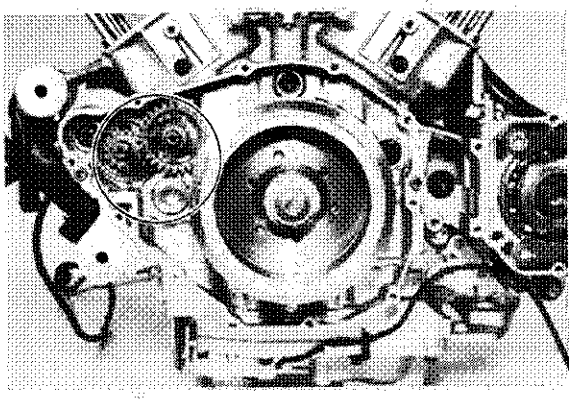
**NOTE:**
**Deburr any deformed valve stem end. Use an oil stone to smooth the stem end. This will help prevent damage to the valve guide during valve removal.**



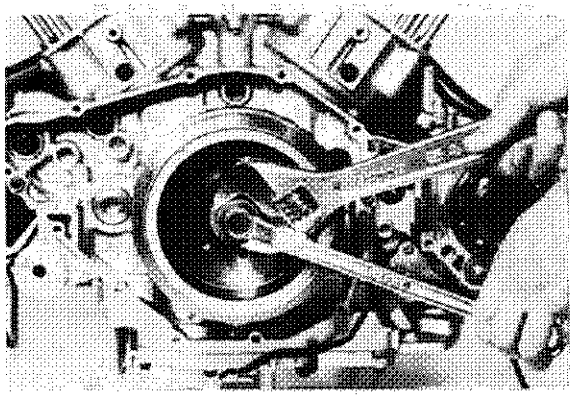
### Starter Gear Train and Generator

1. Remove the left crankcase cover and starter gear train.

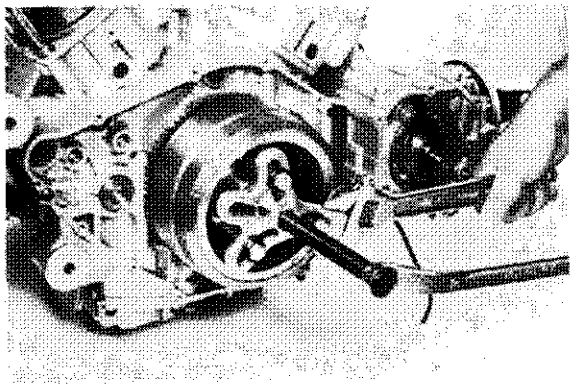




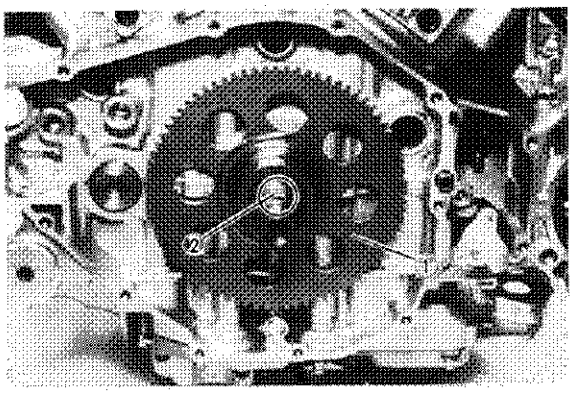
2. Remove the generator securing bolt.



3. Remove the generator rotor using the Rotor Puller with the Puller Attochment (Special tool).



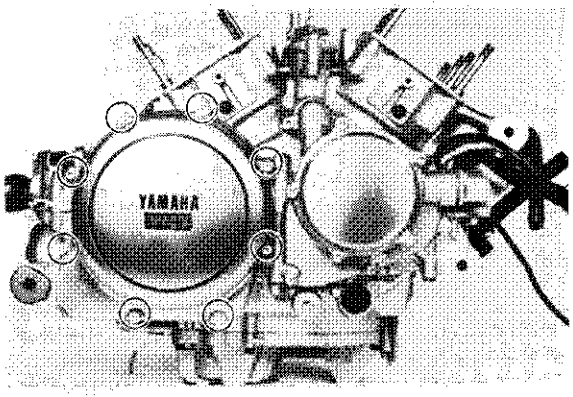
4. Remove the key and starter clutch gear.



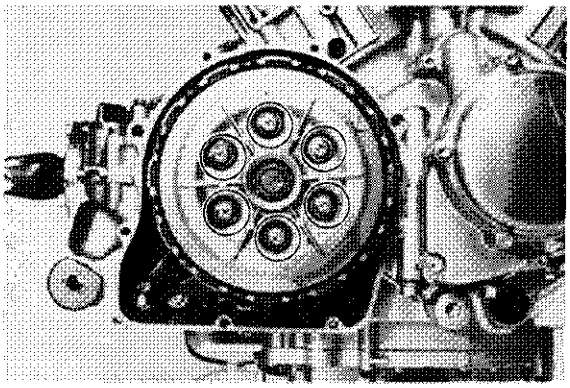
1. Starter clutch gear 2. Key

### Clutch and Oil Pump Drive Gear

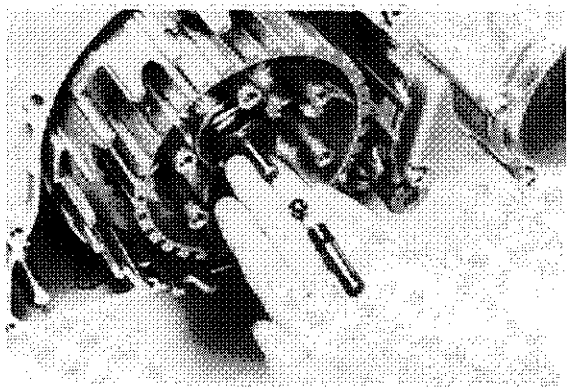
1. Remove right crankcase cover.



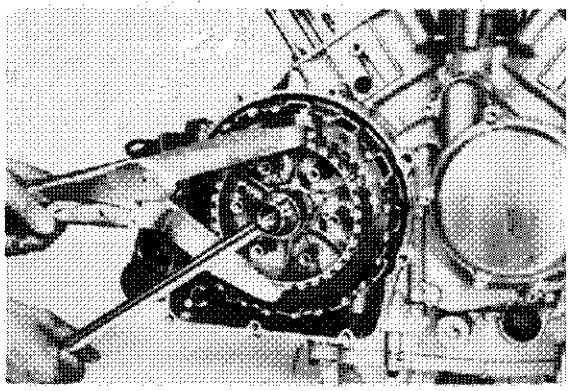

2. Release the tension evenly on the 6 mm (0.24 in) bolts and remove the clutch pressure plate and clutch springs.



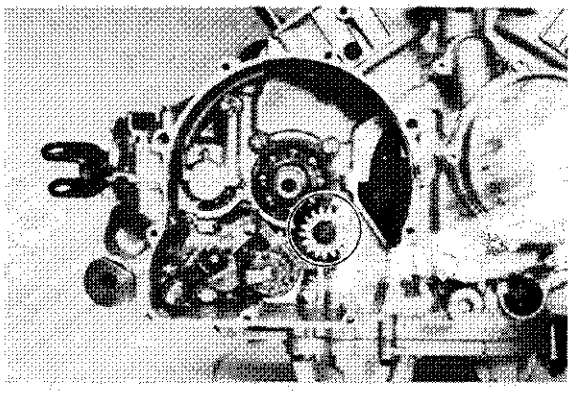
3. Remove the friction plates and clutch plates.
4. Remove the short push rod, ball, and large push rod.



5. Straighten the lock washer tab. Use the Clutch Boss Holder (special tool) to hold the clutch boss and remove the locknut and lock washer.

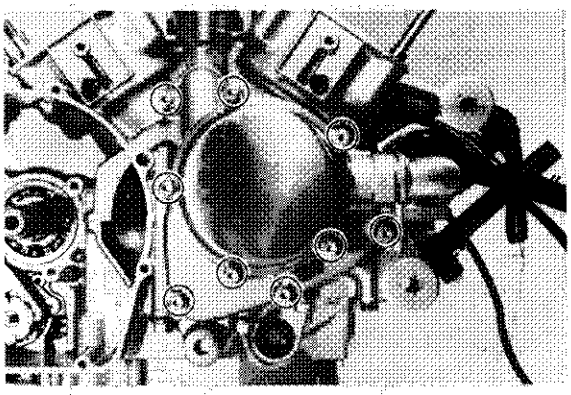


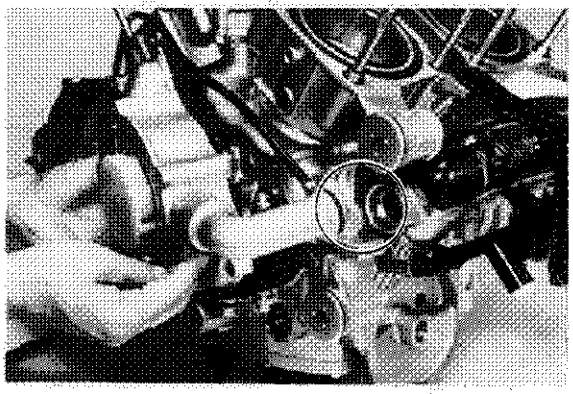
6. Remove the clutch boss, thrust washer and primary driven gear.
7. Remove the circlip and oil pump drive gear.



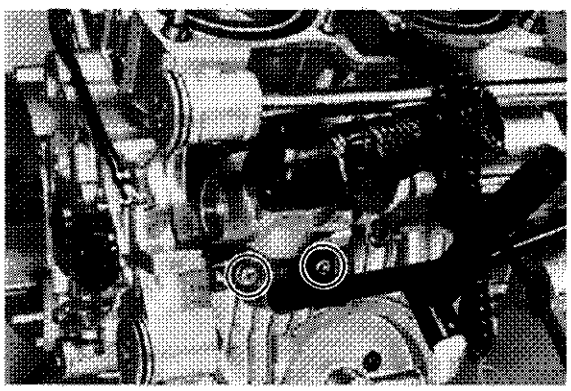
**Water Pump and Thermostatic Valve**

1. Remove the water pump case and cover.



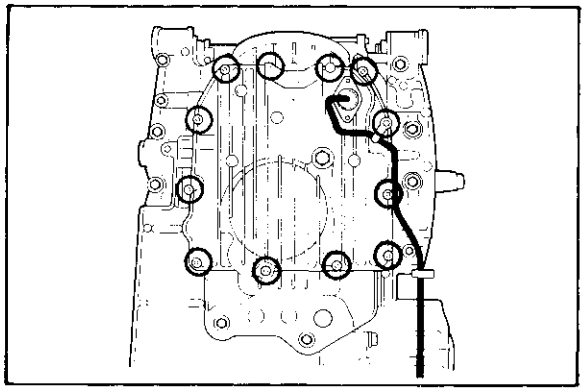


2. Remove the thermostat assembly and pipes.



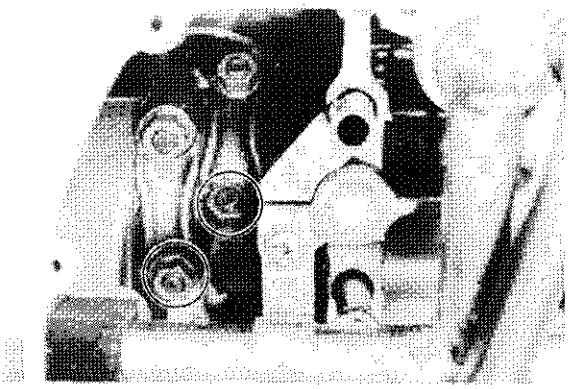
### Oil Pan and Oil Pump

1. Remove the oil pan.

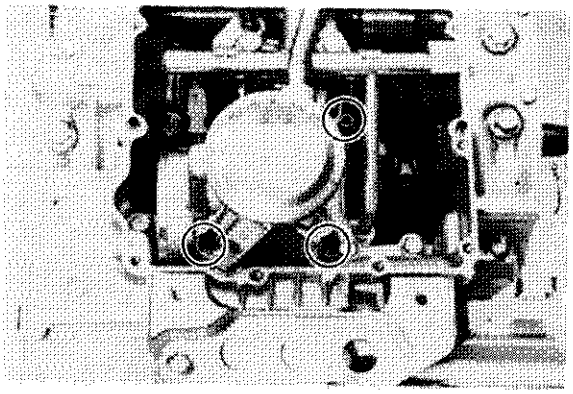


**NOTE:**

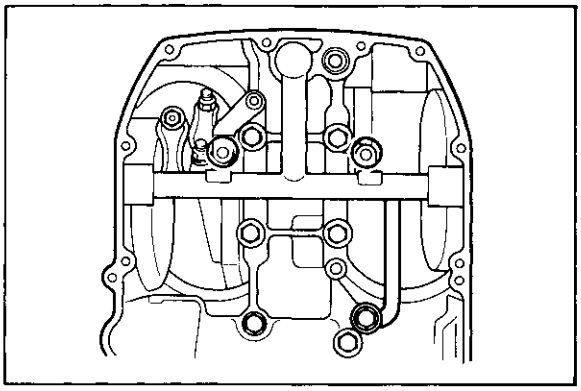
At this stage it is possible to replace the piston, connecting rod, and big-end bearing by simply removing the connecting rod nut. None of the steps below are necessary to replace the above components.



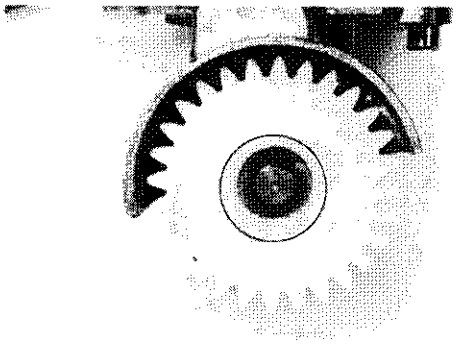
2. Remove the oil pump assembly.



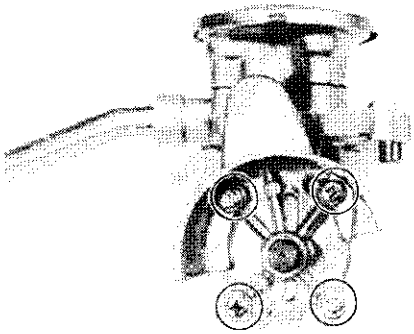
3. Remove the main oil gallery pipes.

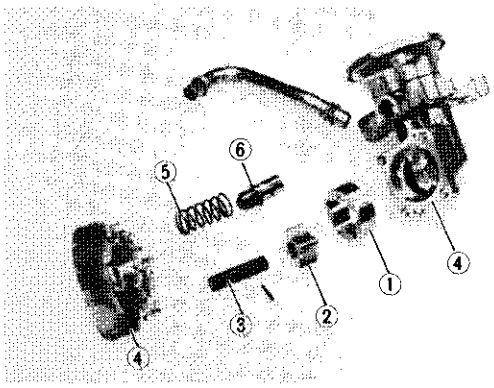


4. Remove the oil pump gear cover and driven sprocket.



5. Remove the oil pump case securing screws and inner parts.





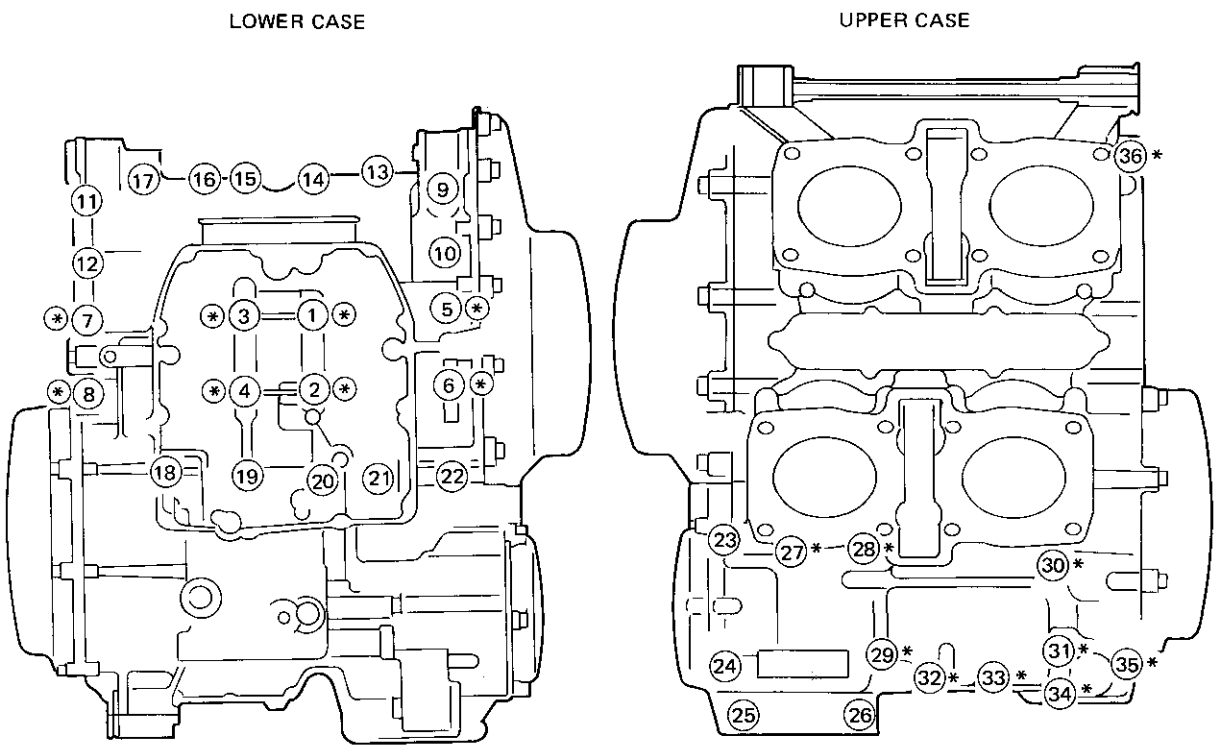

1. Outer rotor
2. Inner rotor
3. Shaft
4. Oil pump case
5. Spring
6. Oil relief valve

**Crankcase Disassembly**

1. Remove the upper crankcase bolts, starting with the highest numbered bolt.

Turn the engine over and remove the lower crankcase bolts.

CRANKCASE TIGHTENING SEQUENCE



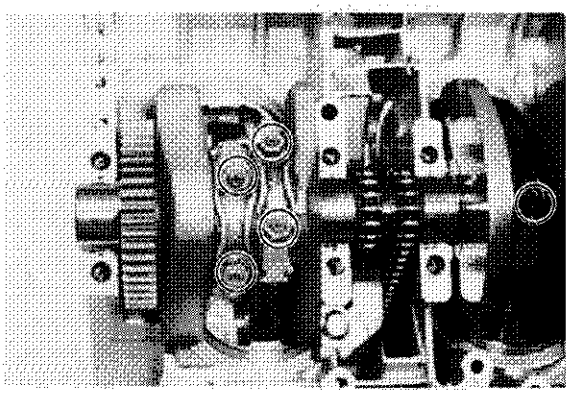

Torque valves

| | | | |
|---|---|---|---|
| * | 6 mm (0.24 in) | : | 12 Nm (1.2 m•kg, 8.7 ft•lb) |
| | 8 mm (0.31 in) | : | 24 Nm (2.4 m•kg, 17.0 ft•lb) |
| ⊛ | 10 mm (0.39 in) | : | 40 Nm (4.0 m•kg, 29.0 ft•lb) |

2. Separate the lower case from the engine. Use a soft rubber hammer to carefully separate the crankcase.

**Upper Crankcase**

1. Remove the balancer shaft, main axle, drive axle, and driven pinion gear assembly from the upper crankcase.
2. Remove the connecting rod cap nuts and connecting rod cap.

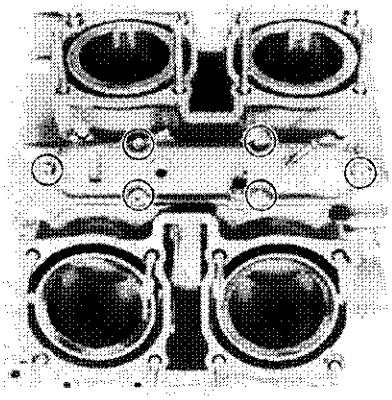


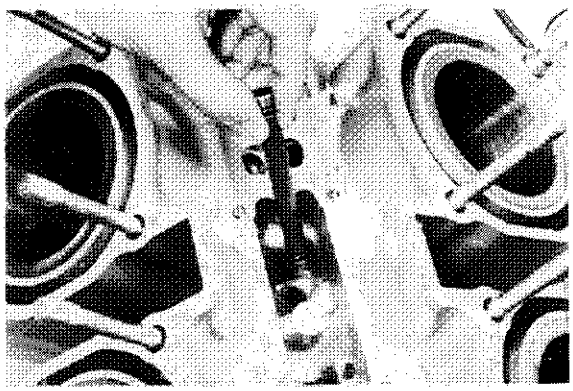
3. Remove the piston and connecting rod assemblies from the cylinder sleeves.

**CAUTION:**

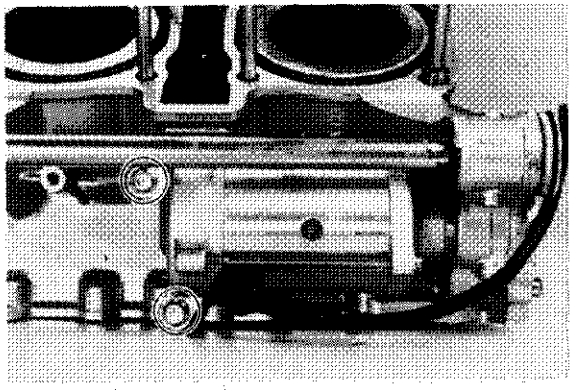
**The connecting rod bolts must be pressed into the rod. Do not hammer out the bolt to remove the piston and connecting rod assembly as this could cause the bolt's retaining nut to loosen and fall off.**

4. Remove breather cover 1 and 2, and the oil pipe.





5. Remove the starter motor.



**Middle Gear**

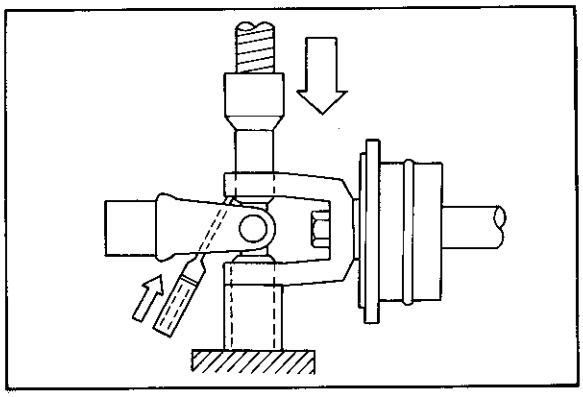
1. Yoke

a. Remove the clips from the bearings in the middle gear yoke.

b. Place the U-joint in a press. With a suitable diameter pipe beneath the yoke, press the bearing into the pipe as shown in the illustration.

**NOTE:**

It may be necessary to lightly tap the yoke with a punch.



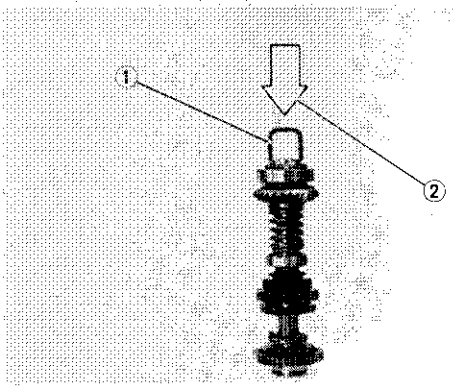
c. Repeat the steps for the opposite bearing, and remove the yoke.

**NOTE:**

It may be necessary to lightly tap the yoke with a punch.

2. Drive pinion gear

a. Place the drive shaft assembly in a press with the Damper Compressor (special tool) in place as shown.



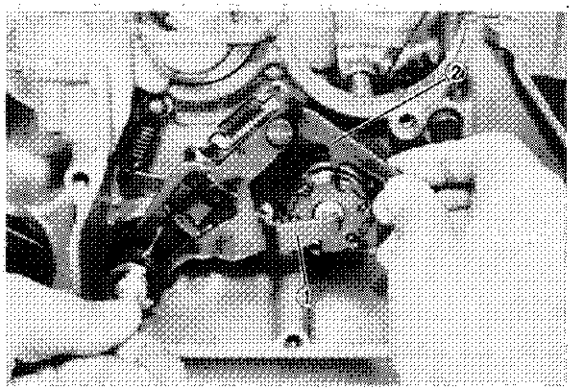

1. Damper compressor 2. Press

b. Press the damper spring and remove the thrust washer.
c. Remove the plain washer, drive pinion gear assembly, damper cam, spring, and spring seat.
d. Loosen the drive pinion gear nut and remove the drive pinion gear shim.

3. Driven pinion gear
a. Loosen the driven pinion gear nut and remove the washer and U-joint.
b. Remove the driven pinion gear, spacer, and collapsible collar from the bearing housing.

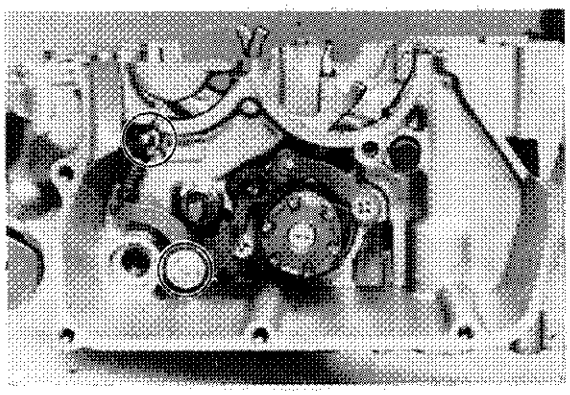
**Lower Crankcase**

1. Raise the shift lever 2 and hold in position while removing the shift shaft assembly.

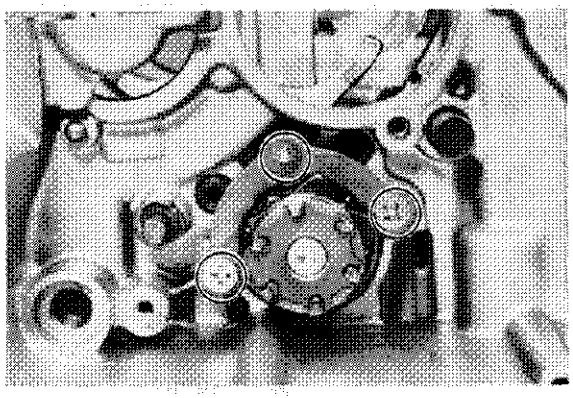


1. Shift lever 1 2. Shift lever 2

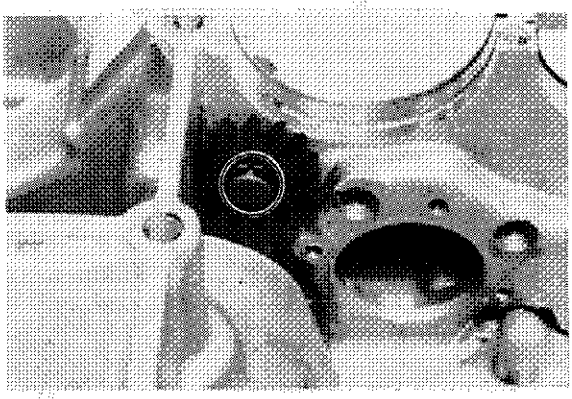
2. Unhook the stopper lever spring from the crankcase and remove the stopper lever retaining screw.



3. Remove the shift cam bearing stopper, and pull out the shift fork shaft and shift cam assembly from the lower crankcase.



4. Remove the oil pump idle gear.



## INSPECTION AND REPAIR

**Cylinder Head Cover**

Place the head cover on a surface plate. There should be no warpage. Correct by resurfacing as follows:

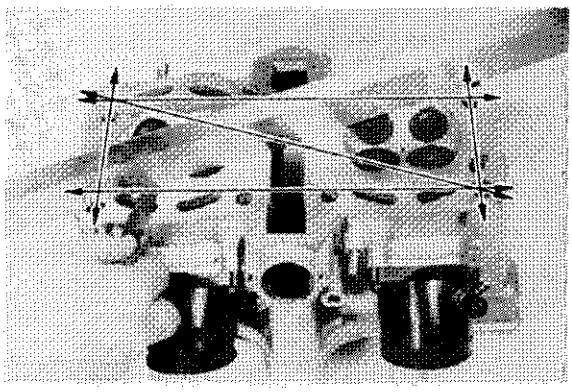
Place #400 or #600 grit wet sandpaper on a surface plate and resurface head cover using a figure-eight sanding pattern. Rotate the head cover several times to avoid removing too much material from one side.

**Cylinder Head**

1. Remove carbon deposits from the combustion chamber.
   Be sure to avoid:
   - Damaging spark plug threads and valve seats.
   - Using a sharp instrument.
   - Scratching the aluminum.

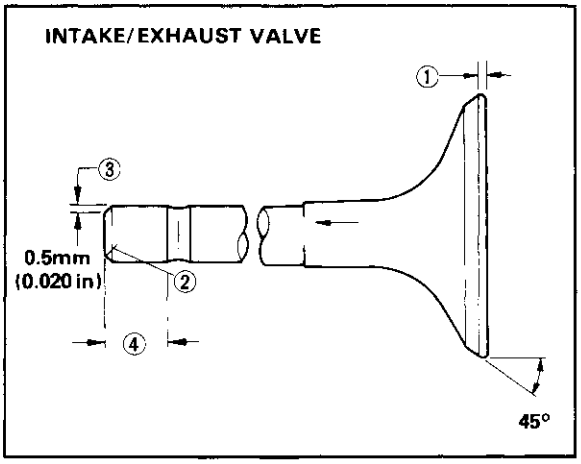
2. Check the cylinder head warpage with a straight edge as shown.
   The warpage should not exceed the specified limit, if necessary resurface. If the warpage exceeds allowable limit, the cylinder head should be replaced with a new one.

| Cylinder head warpage: less than 0.03 mm (0.0012 in) |
|---|



**Valve, Valve Guide, and Valve Seat**

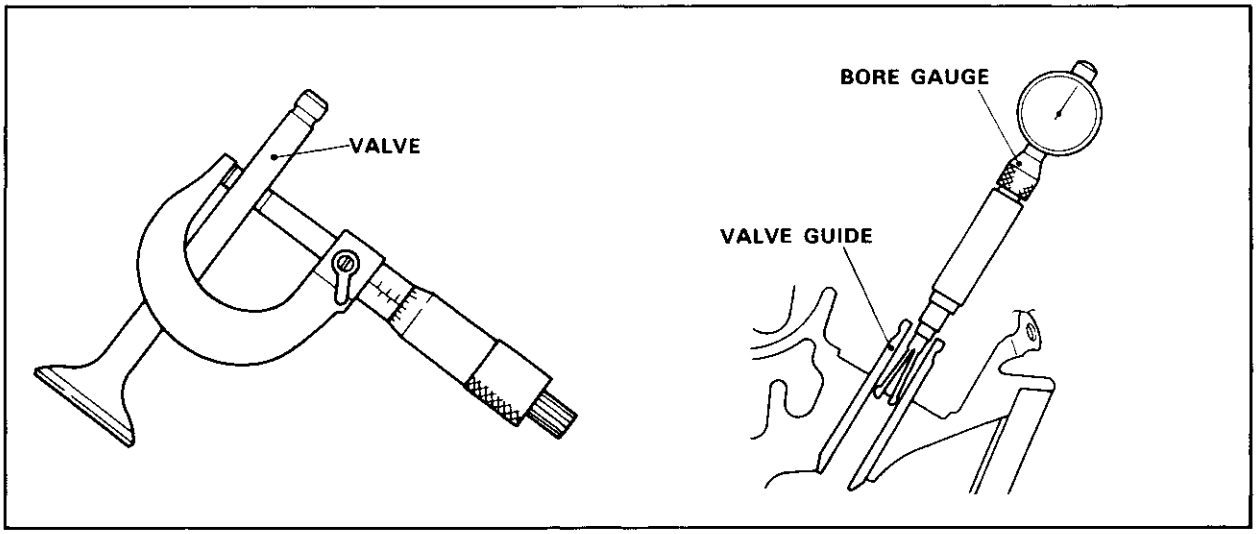
1. Check the valve face and the stem end for wear. If the valve face or the stem end is pitted or worn, regrind the valve with a valve refacer. Replace the valve if any dimension exceeds the specifications in the illustration.




1. Minimum thickness (Service limit) 0.7 mm (0.028 in)
2. Beveled
3. 0.5 mm (0.020 in)
4. Minimum length (Service limit) 4.0 mm (0.020 in)

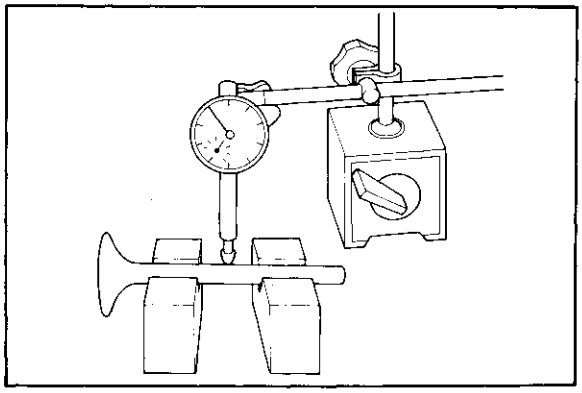
2. Valve stem wear must be measured and then combined with valve guide measurements to guide clearance. This clearance must be within tolerances. If it exceeds the maximum limit, then replace either or both valve and guide, as necessary.

| | Valve stem clearance | Maximum |
|---|---|---|
| Intake | 0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in) | 0.08 mm (0.0031 in) |
| Exhaust | 0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in) | 0.10 mm (0.0089 in) |



3. Inspect the end of the valve stem. If the end has a larger diameter than the rest of the stem or appears "mushroomed", then replace the valve, valve guide, and oil seal.
4. Turn the valve on V blocks and measure the amount of stem runout with a dial gauge. If it exceeds the maximum limit, replace the valve.

| Maximum valve stem runout: 0.01 mm (0.0004 in) |
|---|



5. Valve guide and valve oil seal replacement

Replace the valve guide if:

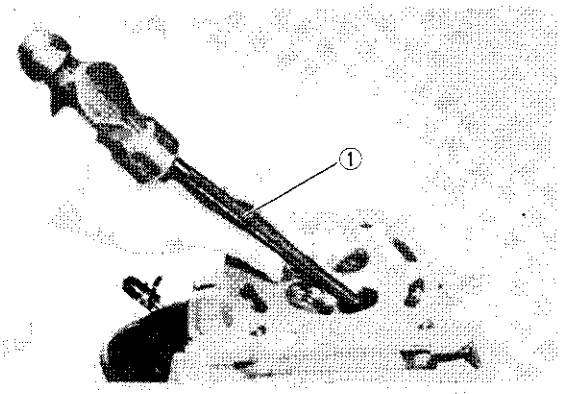
- Oil leaks into the cylinder due to a worn valve guide or if
- The valve is replaced.

**NOTE:**

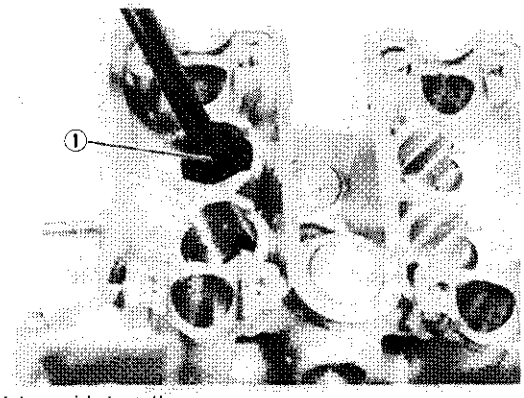
- The valve oil seal should be replaced whenever a valve is removed or replaced.
- Measure the inside diameter of the valve guide with a small bore gauge. If it exceeds the limit, replace it with an oversize valve guide.

| Guide diameter (I.D.): Limit: 6.05 mm (0.238 in) |
|---|

- Heat the head to 100°C (212°F) to ease guide removal and reinstallation, and to maintain the correct interference fit. Use an oven to avoid any possibility of head warpage due to uneven heating.
- Use the appropriately Shouldered Punch (special tool) to drive the old guide out and drive the new guide in.
- When a valve guide is replaced, the O-ring should also be replaced.

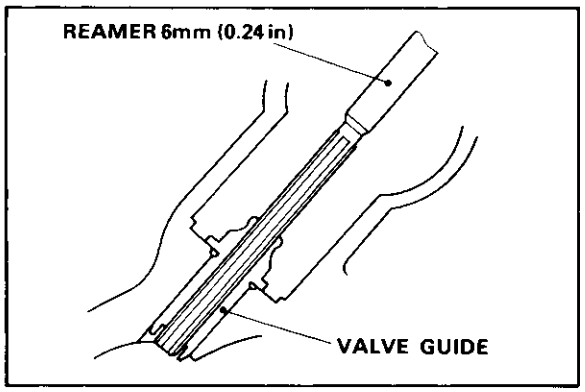



1. Valve guide remover




1. Valve guide installer

- After installing the valve guide, use the 6 mm (0.24 in) Reamer (special tool) to obtain the proper valve-guide-to-valve-stem clearance.

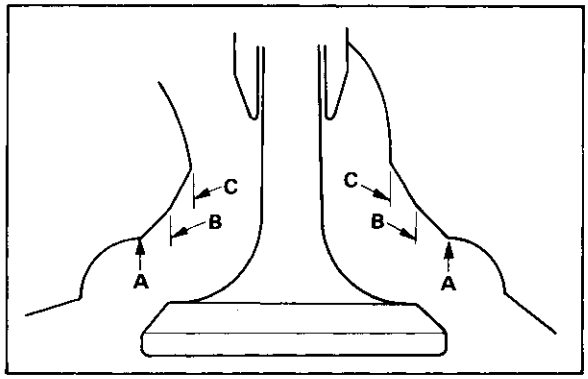



- After installing the valve guide in the cylinder head, the valve seat must be recut. The valve should be lapped to the new seat.

6. Grinding the valve seat

a. The valve seat is subject to severe wear. Be sure to resurface the valve seat at a 45° angle after replacing the valve or resurfacing the valve face.

b. When installing a new valve guide, always recut the valve seat to guarantee complete sealing between the valve face and seat.



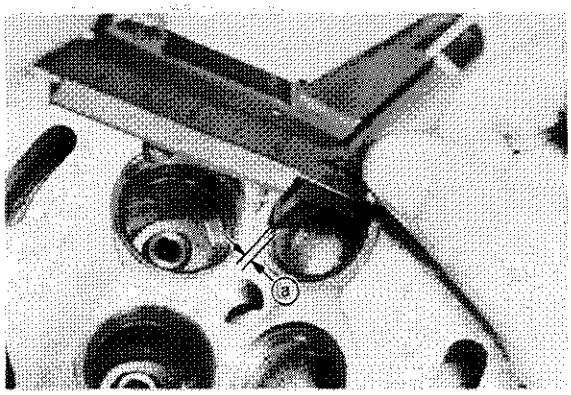

**CAUTION:**

**Be sure to clean any pitted or worn valve seats with a valve seat cutter. Use a 45° cutter keeping an even downward pressure to prevent chatter marks when twisting the cutter.**

c. Use the 30° cutter for cutting section A of the valve seat, the 45° cutter for section B, and the 60° cutter for section C.

d. Measure valve seat width. Apply mechanic's bluing dye (such as Dykem) to the valve face and valve seat. Apply a very small amount of fine grinding compound around the surface of the valve face. Insert the valve into position, and spin the valve quickly back and forth. Lift the valve, clean off all grinding compound, and check the valve seat width.
Wherever the valve seat and valve face made contact, bluing will have been removed. Measure the seat width with vernier calipers. It should measure approximately 1.0 mm (0.039 in). Also, the seat should be uniform in contact area. If valve seat width varies, or if pits still exist, further cutting will be necessary. Remove just enough material to achieve a satisfactory seat.

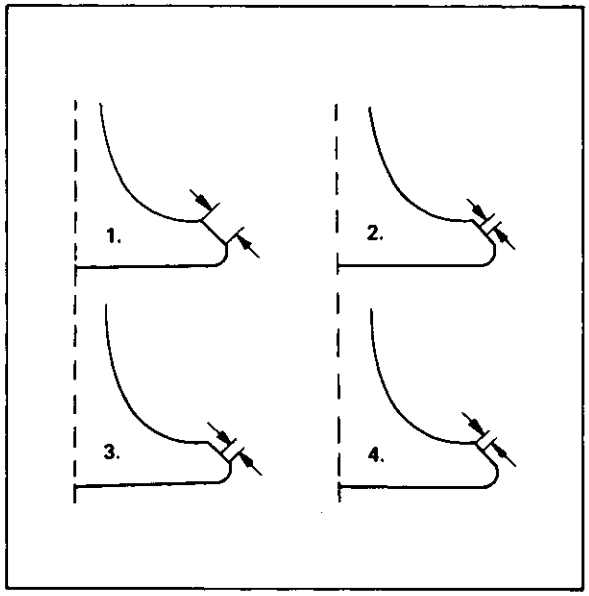
| | Standard width | Wear limit |
|---|---|---|
| Seat width | 1.0 ± 0.1 mm (0.039 ± 0.0039 in) | 1.4 mm (0.055 in) |

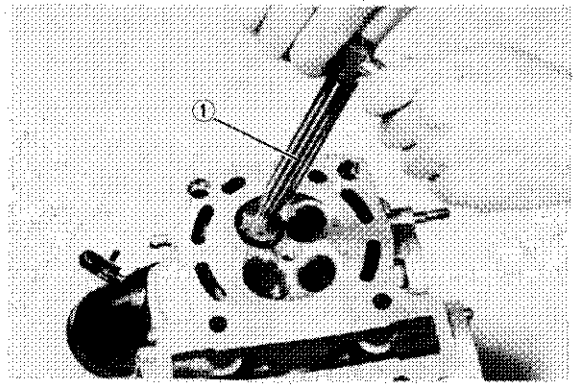



a. Seat width

e. If the valve seat is uniform around the perimeter of the valve face, but too wide or not centered on the valve face, it must be altered. Use either the 30°, 45°, or 60° cutters to correct the improper seat location as described below:

- If the valve face shows that the valve seat is centered on the valve face but too wide, then lightly use both the 30° and the 60° cutters to reduce the seat width to 1.0 mm (0.039 in).





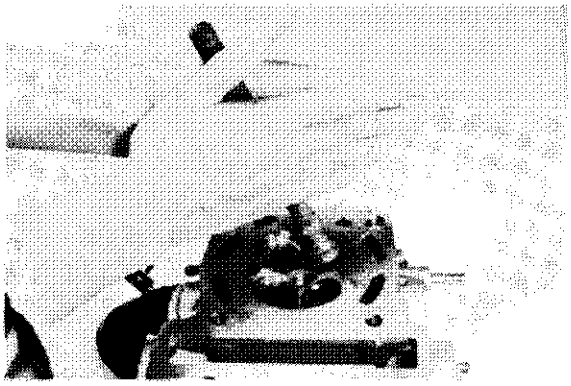
1. Valve seat cutter

- If the seat is in the middle of the valve face but too narrow, use the 45° cutter until the width equals 1.0 mm (0.039 in).
- If the seat is too narrow and right up near the valve margin, then first use the 30° cutter, then the 45° cutter to get the correct seat width.
- If the seat is too narrow and down near the bottom edge of the valve face, then first use the 60° cutter, then the 45° cutter.

7. Lapping the valve/valve seat assembly

a. The valve/valve seat assembly should be lapped if either the seat or valve face is severely worn.

b. Apply a small amount of coarse lapping compound to the valve face. Insert the valve into the head. Rotate the valve until the valve and valve seat are evenly polished. Clean off the coarse compound, then follow the same procedure with fine compound.
Continue lapping until the valve face shows a completely smooth surface all the way around. Clean off the compound material. Apply bluing dye to the valve face and seat, then rotate the valve face for full seat contact. This is indicated by a grey surface all around the valve face where bluing was removed.



c. Valve leakage check

1) After completion of valve and valve seat work and cylinder head assembly, check for proper valve/valve seat sealing. Pour solvent into each of the intake ports, then the exhaust ports. There should be no leakage past the seat.

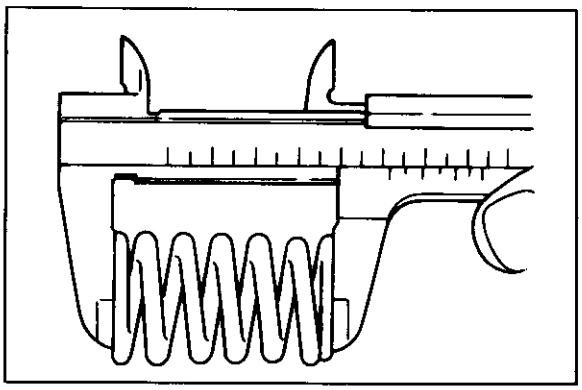
2) If fluid leaks, disassembly and continue to lap with fine lapping compound. Clean all parts thoroughly, reassembly and check again with solvent. Repeat this procedure as often as necessary to obtain a satisfactory seal.

**Valve spring and lifters**

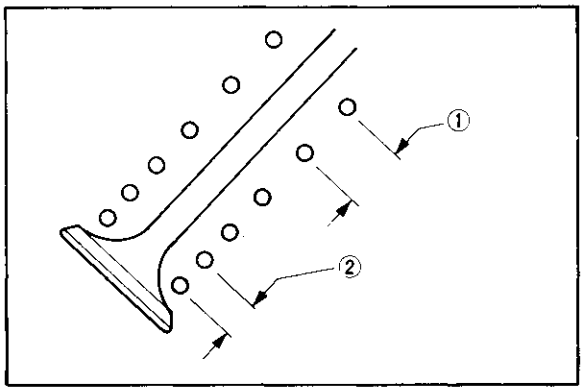
1. Checking valve springs

a. This engine uses two springs of different sizes to prevent valve float or surging. The valve spring specifications show the basic value characteristics.

b. Use a vernier caliper to measure spring free length. If the free length of any spring has decreased more than 2 mm (0.080 in) from its specification or the spring is distorted, replace it.



c. Check all springs for insufficient spring pressure. Use a valve spring compression rate gauge. Test each spring individually. Place it in the gauge, and compress the spring, first to the specified compressed length with the valve closed (refer to previous section, Valve Spring), then to the length with the valve open. Note the poundage indicated on the scale at each setting. Use this procedure with the outer springs, then the inner springs.




1. Larger pitch 2. Smaller pitch

**NOTE:**
All valve springs must be installed with the larger pitch above the lower as shown.

| Valve spring specifications | | |
|---|---|---|
| | OUTER | INNER |
| Free length | 39.45 mm (1.55 in) | 37.3 mm (1.47 in) |
| Installed length (valve closed) | 33.8 mm (1.33 in) | 31.8 mm (1.25 in) |
| Installed pressure | 10.1 ~ 11.9 kg (22.3 ~ 26.2 lb) | 4.57 ~ 5.37 kg (10.1 ~ 11.8 lb) |
| Allowable tilt from vertical | 2.5° or 1.6 mm (0.063 in) | ← |

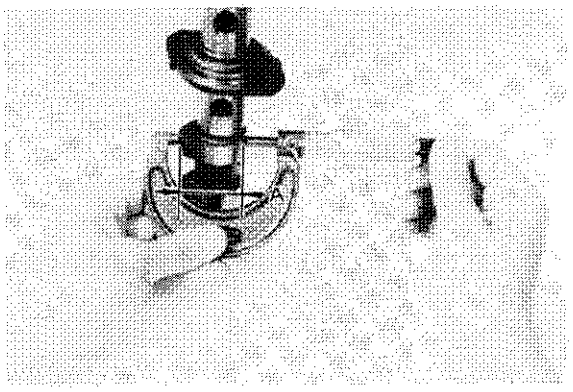
2. Checking valve lifters
a. Check each valve lifter for scratches or other damage. If the lifter is damaged in any way, the cylinder head surface in which it rides is probably also damaged. If the damage is severe, it may be necessary to replace both the lifter and the cylinder head.

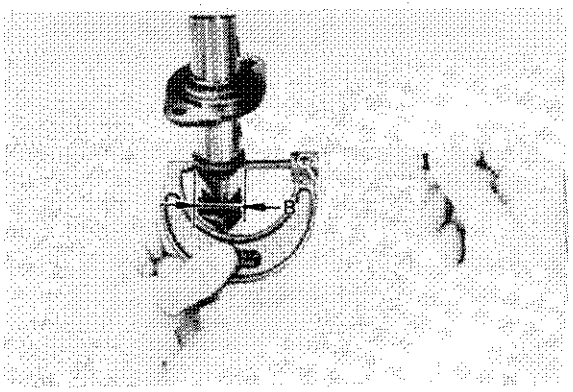
**NOTE:**
For proper valve lifter-to-head clearance, always install lifters on their original valves.

**Camshafts, Cam Chain, and Cam Sprockets**

1. Camshaft
a. Replace the camshaft if any of the following wear conditions are visible: a blue discoloration on the metal surface of the cam lobe (indicates excessive friction), or the metal surface becomes pitted or is flaking off.
b. Measure the cam lobes with a micrometer. Cam lobe wear can occur without scarring the surface and this wear could affect the valve timing and lift. Replace the camshaft if wear exceeds the limits shown below.

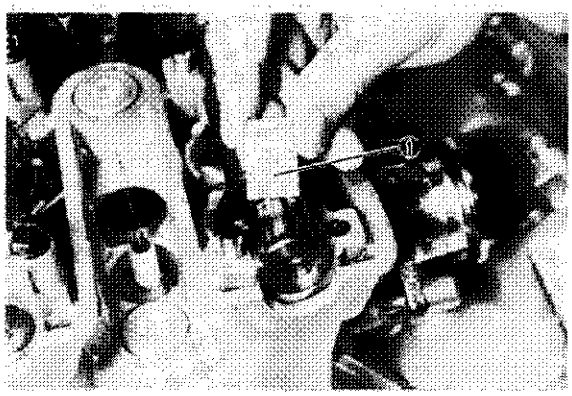
| Wear limit | A | B |
|---|---|---|
| Intake | 35.65 mm (1.403 in) | 28.08 mm (1.11 in) |
| Exhaust | 36.15 mm (1.42 in) | 28.08 mm (1.11 in) |




c. Install the camshaft on the cylinder head. Place a strip of Plastigage between the camshaft and camshaft cap as shown below (lengthwise along camshaft). Tighten the bolts to the specified torque. Remove the camshaft cap and determine the clearance by measuring the width of the flattened Plastigage.

Cap bolt tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)



1. Plastigage

**NOTE:**

- Do not turn the camshaft when measuring clearance with Plastigage.

Camshaft-to-cap clearance:
Standard: 0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)
Maximum: 0.160 mm (0.006 in)

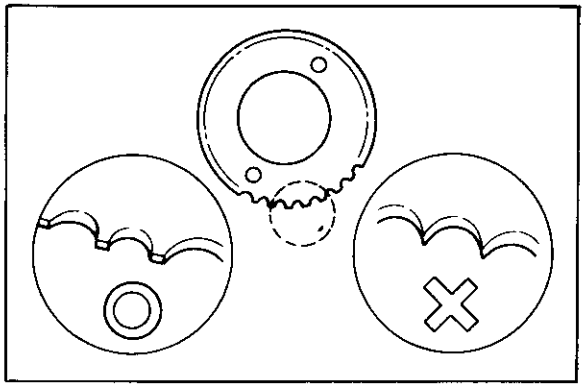
- If the camshaft-to-cap clearance exceeds specification, measure the camshaft bearing surface diameter.

Bearing surface diameter:
Standard: 24.967 ~ 24.980 mm
(0.9830 ~ 0.9835 in)

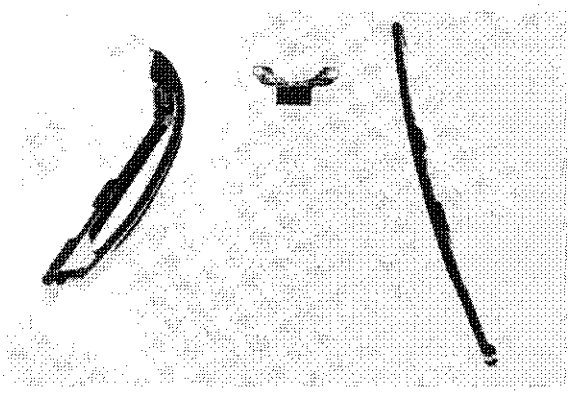
- If the camshaft diameter is less than specification, causing excessive clearance, replace camshaft.
- If the camshaft is within specification and camshaft-to-cap clearance is excessive, replace the cylinder head.

2. Cam chain
Except in cases of oil starvation, the cam chain wears very little. Replace the cam chain if it has stretched excessively and it is difficult to keep the proper cam chain tension adjustment.

3. Cam sprockets
Check cam sprockets for obvious wear.

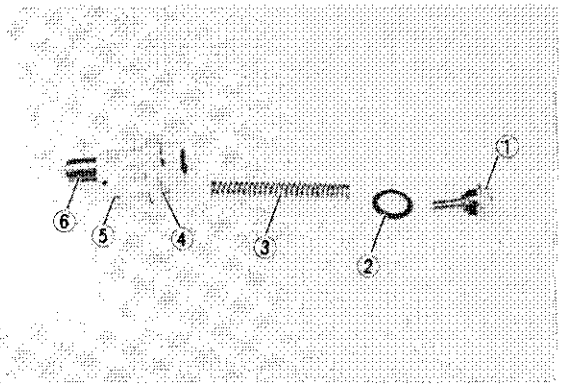


4. Cam chain dampers
Inspect the upper cam chain damper and the two vertical slipper-type dampers for excessive wear. Replace any that show excessive wear. Worn dampers may indicate an improperly adjusted or worn-out cam chain.



5. Cam chain tensioner
a. Make sure the "one way cam" works correctly so that the rod can be pulled out smoothly but cannot be pushed back into the tensioner body.

b. Check all the parts. If damaged, replace them.



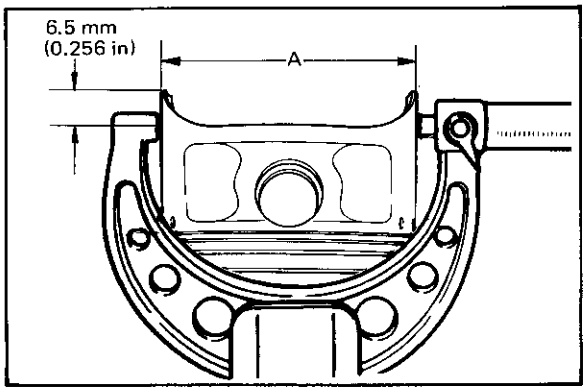
1. End plug
2. Washer
3. Spring
4. Tensioner body
5. One way cam
6. Tensioner rod

**Piston and Piston Rings**

1. Piston

a. Using the micrometer, measure the outside diameter of the piston at the piston skirt. Measurement should be made at a point 6.5 mm (0.256 in) above the bottom edge of the piston by placing the micrometer parallel to and at right angles to the piston pin.

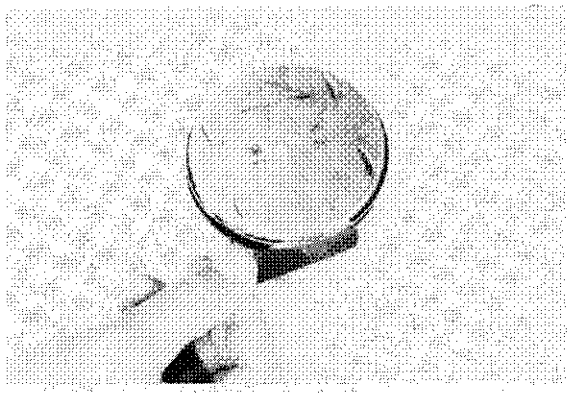
| Piston clearance: |
|---|
| 0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in) |




| | Size A |
|---|---|
| Standard | 76.00 mm (2.992 in) |
| Oversize 1 | 76.25 mm (3.002 in) |
| Oversize 2 | 76.50 mm (3.012 in) |

b. The piston ring to ring groove fit must have the correct clearance. If the piston and ring have already been used in the engine, remove the ring and clean off the carbon, then reinstall. Use a feeler gauge to measure the gap between the ring and the land.

| | | |
|---|---|---|
| Side clearance | Top | 0.03 ~ 0.070 mm (0.0012 ~ 0.0028 in) |
| | 2nd | 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) |



2. Piston ring

The oversize top and middle ring sizes are stamped on top of the ring.

| | |
|---|---|
| Oversize 1 | 0.25 mm (0.0098 in) |
| Oversize 2 | 0.50 mm (0.0197 in) |

The expander spacer of the bottom ring (oil control ring) is color-coded to identify sizes. The color mark is painted on the expander spacer.

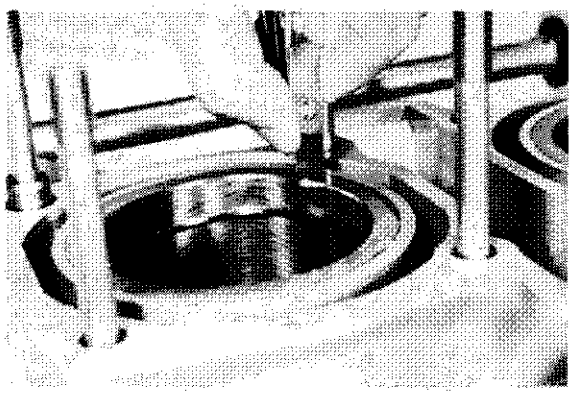
| Size | Color |
|---|---|
| Oversize 1 | Blue |
| Oversize 2 | Red |

a. Measure the end gap of each piston ring. Insert a ring into the cylinder, and push it about 20 mm (0.8 in) into the cylinder. Push the ring with the piston crown so that the ring will be at a right angle to the cylinder bore.

b. Measure the ring end gap with a feeler gauge. If the end gap exceeds tolerance, replace the whole set of rings.

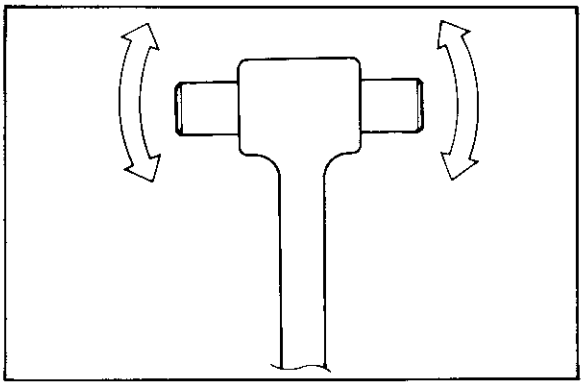
**NOTE:**
You cannot measure the end gap on the expander spacer of the oil-control-ring. If the oil-control-ring rails show excessive gap, replace all three rings.

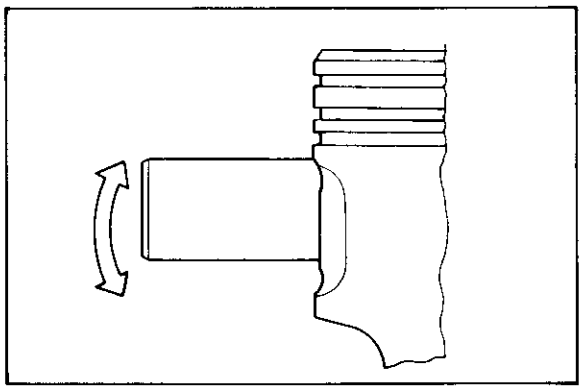
| | Standard | Limit |
|---|---|---|
| Top ring | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) | 0.70 mm (0.0276 in) |
| 2nd ring | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) | 0.80 mm (0.0315 in) |
| Oil control (Rails) | 0.30 ~ 0.90 mm (0.0118 ~ 0.0354 in) | – |



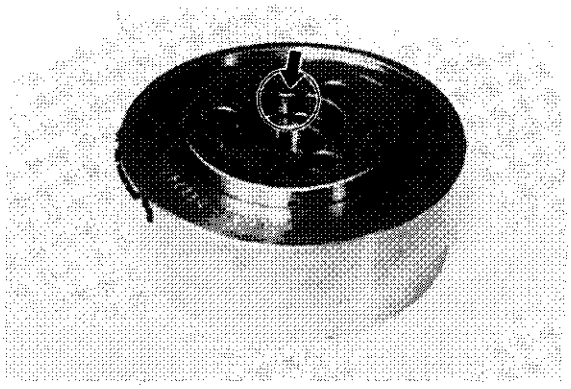
**Piston Pin**

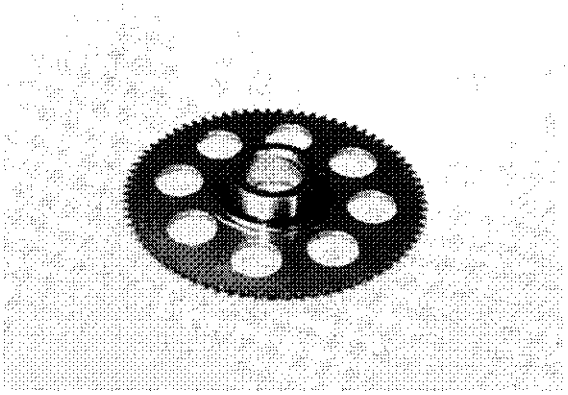
1. Oil the piston pin lightly and install it into the small end of the connecting rod.
2. Check the free play. There should be no noticeable vertical play. If any free play exists, check the connecting rod for wear. Replace the pin and connecting rod as required.
3. Insert the piston pin in the piston, and check the free play. No noticeable free play should exist when the pin is in place. If the piston pin is loose, replace the pin and/or the piston as required.





**Starter Drives**





1. Electric starter clutch and gears
a. Check the surface of the idle gear for pitting or other damage. If severe, replace the gear.
b. Check the spring caps and the springs for deformation or damage. If severe, replace.
c. Check the starter clutch bolts (Allen screw) for looseness. If loose, remove the bolts and replace. Apply a thread locking compound such as LOCTITE® to the threads, and tighten to the specified torque. Stake over the end of the bolts.

| Starter clutch bolt torque: 24 Nm (2.4 m·kg, 17 ft·lb) |
|---|

**Primary Drive**

The drive gear is mounted on the crankshaft; the driven gear is mounted on the transmission and is integrated with the clutch assembly.

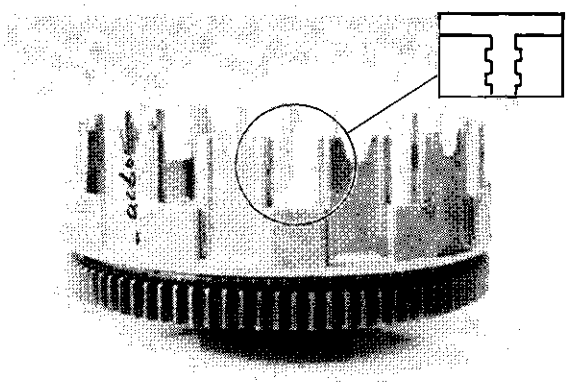
| Primary reduction ratio | | |
|---|---|---|
| No. of teeth | | Ratio |
| Drive | Driven | |
| 49 | 87 | 1.775 |

1. Check the drive gear and the driven gear for obvious signs of wear or damage from foreign material within the primary case.
2. If the primary drive is excessively noisy during operation, replace the drive gear (Crankshaft) and the driven gear.

**Clutch**

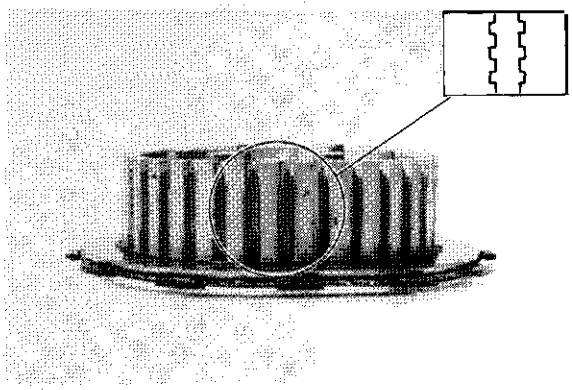
1. Clutch housing
a. Check the dogs on the clutch housing. Look for cracks and signs of chafing on the edges. If damage is moderate, deburr; if severe, replace the clutch.

**NOTE.**
Chafing on the clutch plate splines will cause erratic operation.



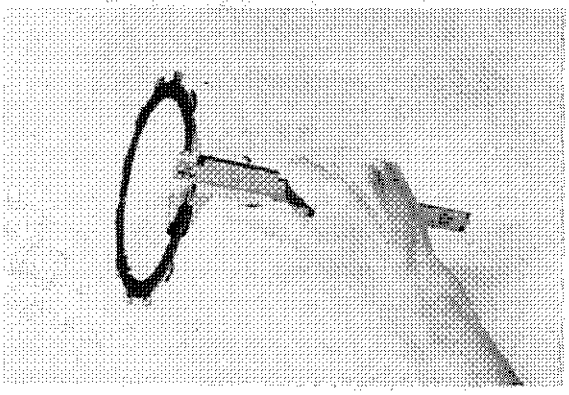
b. Check the clutch housing bearing for damage. If damaged, replace the bearing.
2. Clutch boss
The clutch boss contains a built-in damper beneath the first clutch plate (clutch plate 2). It is not necessary to remove the circlip and disassemble the built-in damper unless there is serious clutch chattering.
a. Check the splines on the clutch boss for chafing. If damage is slight to moderate, deburr. If severe, replace the clutch boss.

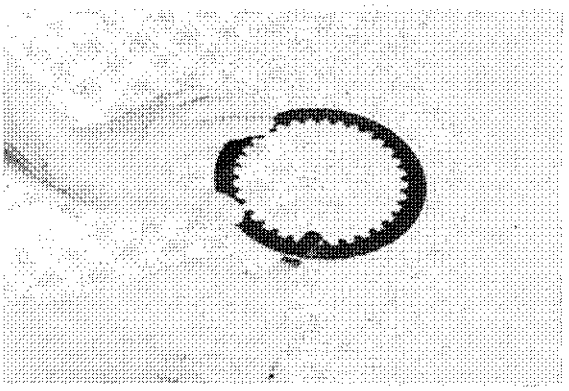
**NOTE:**
Chafing on the clutch plate splines will cause erratic operation.



3. Friction and clutch plates
a. Check the friction and clutch plates for heat damage. Measure friction plate thickness at 3 or 4 points. Measure the clutch plates for warpage using a feeler gauge and surface plate. Replace clutch plates or friction plates, as a set, if any is faulty or beyond wear limits.

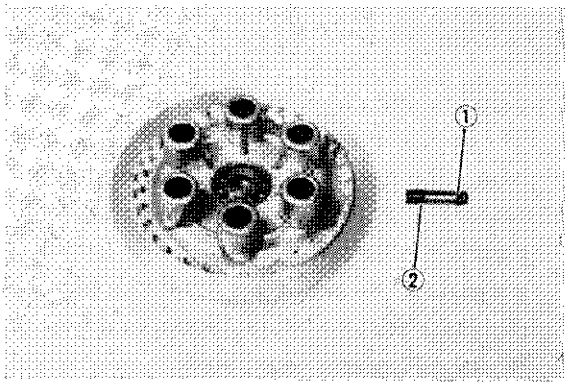
| | Standard | Wear limit |
|---|---|---|
| Friction plate thickness | 3.0 ±0.1 mm (0.12 ±0.004 in) | 2.8 mm (0.11 in) |
| Clutch plate warp limit | — | 0.2 mm (0.0079 in) |



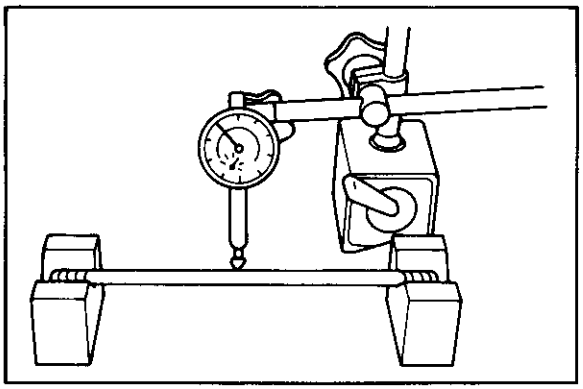


4. Clutch actuating mechanism
a. Check the short push rod and O-ring for wear and damage. Replace if damaged.
b. Check for bends by rolling the long push rod on V-Blocks. Replace any bent push rods.

Bend limit: 0.5 mm (0.02 in)




1. Push rod 2. O-ring



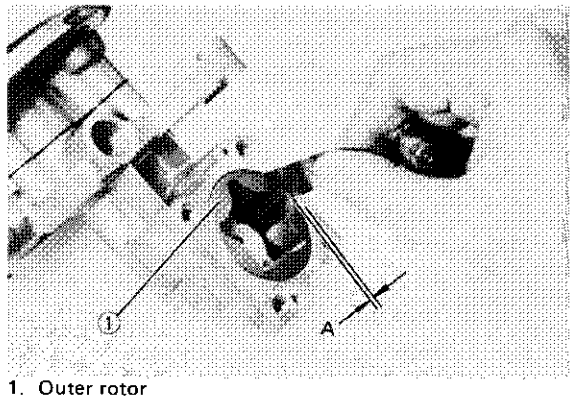
5. Clutch springs
a. Measure the clutch spring free length. Replace the springs as a set if any is less than minimum free length.

Clutch spring minimum length:
40.3 mm (1.59 in)

**Oil Pump**

1. Check the clearance between housing and outer rotor.

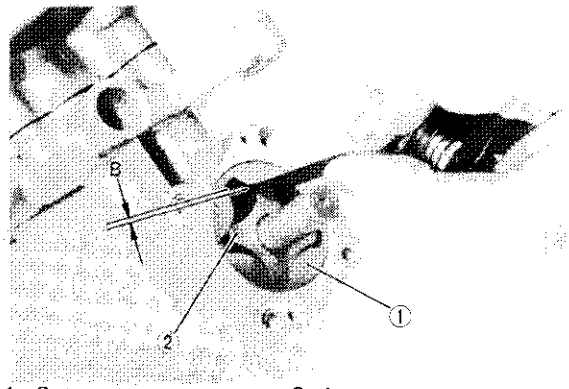
Standard clearance "A":
0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)




1. Outer rotor

2. Check the clearance between outer rotor and inner rotor.
Replace the pump if the clearance exceeds specifications.

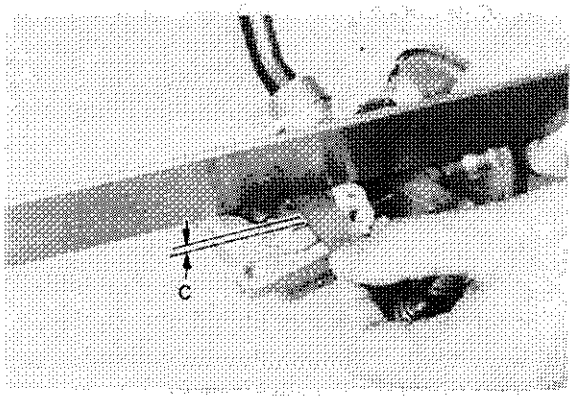
Inner-outer clearance "B":
0 ~0.12 mm (0 ~ 0.0047 in)



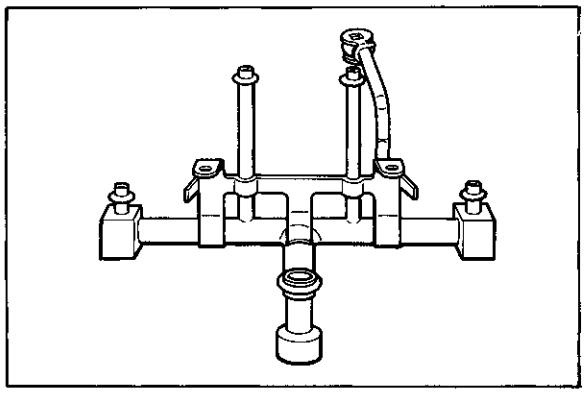

1. Outer rotor 2. Inner rotor

3. Check the clearance between rotor and housing.

| Standard clearance "C": |
| --- |
| 0.03 ~ 0.08 mm (0.0012 ~ 0.003 in) |



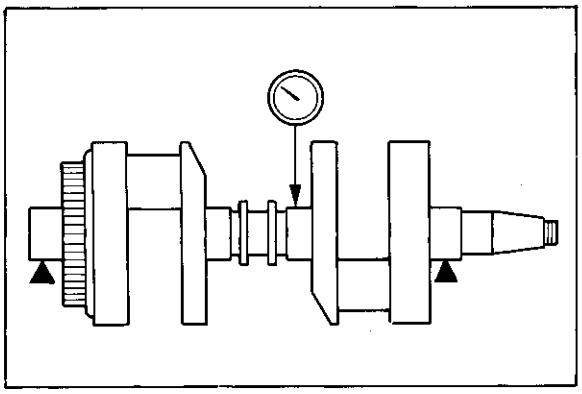

4. Check the main oil gallery pipe and O-rings for damage. Replace if necessary.



**Crankshaft and Connecting Rod**

1. Crankshaft run-out
   Support the crankshaft at both ends on V-blocks. Measure the amount of crankshaft run-out on the main bearing journals with a dial gauge while rotating crankshaft.
   Replace the crankshaft if run-out exceeds the limit.

| Run-out limit 0.03 mm (0.0012 in) |
| --- |



2. Inspection of bearings
   Check the bearings. Replace any if the inner or outer surface is burned, flaked, rough, scratched or worn.
3. Connecting-rod-bearing clearance

a. Thoroughly clean all parts.
b. Install the connecting rod bearing into the connecting rod.
c. Place a piece of plastigage® on the crankpin.
d. Install the rod bearings in the connecting rod, and install the rod onto the crankshaft.
e. Install the connecting rod cap. Apply molybdenum disulfide grease to the bolt threads, and torque both ends of the rod cap evenly. Do not move the connecting rod until the clearance check is completed.

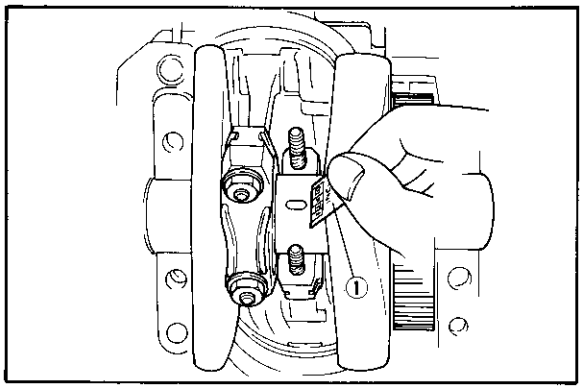
**CAUTION:**

**When tightening the rod cap, apply continuous torque between 3.0 and 3.8 m·kg. Once you reach 3.0 m·kg, torque, DO NOT STOP TIGHTENING until final torque is reached. If tightening is interrupted between 3.0 and 3.8 m·kg, loosen the nut to less than 3.0 m·kg and start again. Tighten to full-torque specification without pausing.**

| Tightening torque: |
| --- |
| 38 Nm (3.8 m·kg, 27 ft·lb) |

f. Carefully remove the connecting rod cap, and measure the width of the Plastigage®.

Connecting-rod-bearing clearance:
0.021 ~ 0.045 mm (0.0008 ~ 0.0018 in)



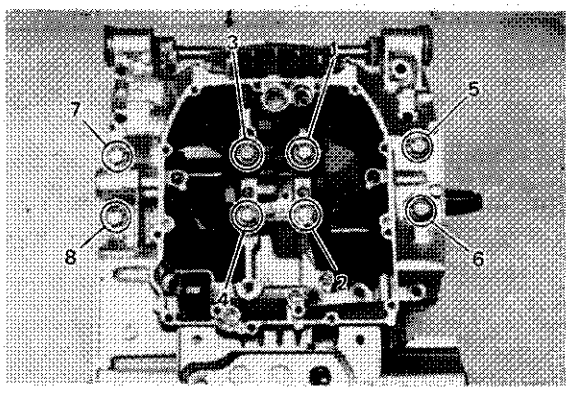

1. Plastigage

4. Crankshaft main bearing clearance
a. Clean all crankshaft and crankcase journal surfaces.
b. Place the upper crankcase half, in an upside-down position, onto a bench. Install bearing inserts into the upper crankcase.
c. Install crankshaft into upper crankcase.
d. Place a strip of Plastigage® on the crankshaft journal surface to be inspected.

**NOTE:**
Do not move crankshaft until clearance check has been completed.

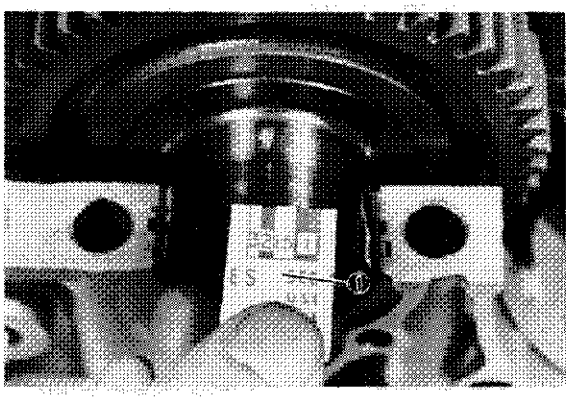
e. Install bearings into bottom crankcase. Carefully, place lower crankcase onto upper crankcase.
f. Install crankcase holding bolts 1 through 8. Tighten to full torque in torque sequence cast on the crankcase.

Crankcase torque (10 mm (0.4 in) bolt):
40 Nm (4.0 m·kg, 29 ft·lb)



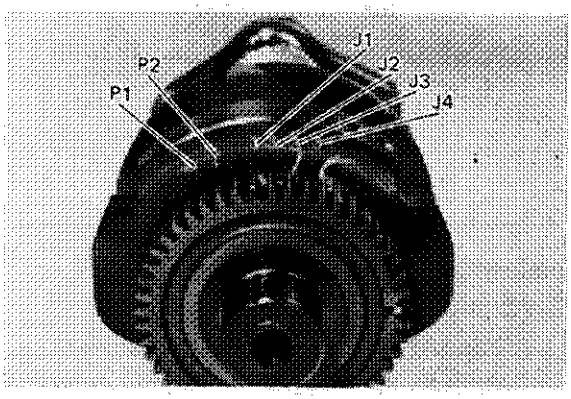

g. Remove bolts in reverse assembly order (8, 7, 6 ... etc.)
h. Carefully remove lower crankcase. Measure width of Plastigage® on crankshaft journals to determine clearance.

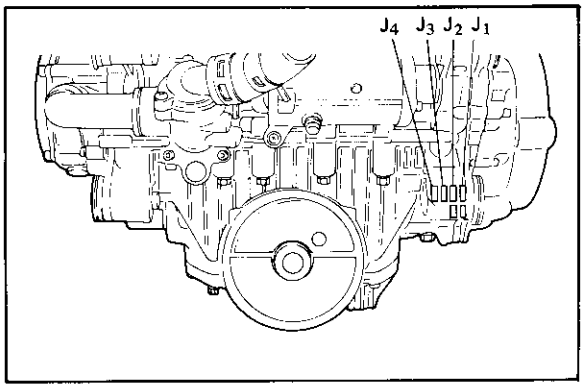
Main bearing oil clearance:
0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in)

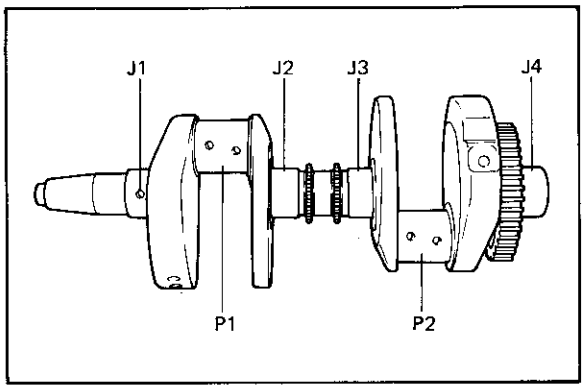



1. Plastigage

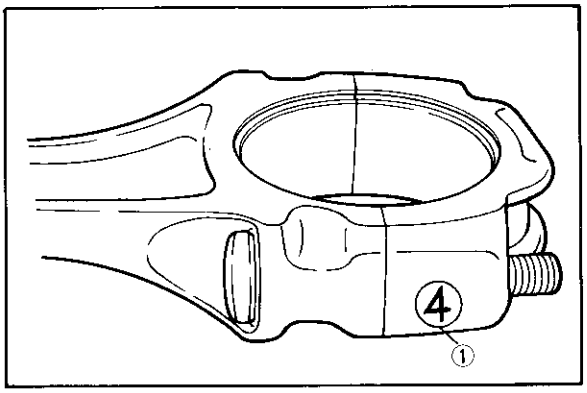
5. Crankshaft main bearing and connecting rod bearing selection
a. Numbers used to indicate crankshaft journal sizes are stamped on the R.H. crankweb. The first two (2) are rod bearing journal numbers, starting with the left journal. The four (4) main bearing journal numbers follow in the same sequence.
The lower crankcase half is numbered J1, J2, J3 and J4 on the front left bosse as shown.






b. The connecting rods are numbered. The numbers are stamped in ink on the rod.




1. Connecting rod size number

c. The proper bearing selection is made by subtracting the crankshaft journal number from the crankcase or connecting rod size number. Use the color code to chose the proper bearing.

| BEARING COLOR CODE | |
|---|---|
| No. 1 | Blue |
| No. 2 | Black |
| No. 3 | Brown |
| No. 4 | Green |
| No. 5 | Yellow |
| No. 6 | Pink |
| No. 7 | Red |

* No. 7 applies only to the crankshaft main bearing selection.

Example 1: Selection of the crankshaft main bearing;
If the crankcase J1 and crankshaft J1 sizes are No. 4 and No. 1, respectively, the bearing size No. is:

Bearing size No. =
Crankcase No. – Crankshaft No. =
4 – 1 = 3 (Brown)

Example 2: Selection of the connecting rod bearing;
If the connecting rod P1 and crankshaft P1 sizes are No. 4 and No. 1, respectively, the bearing size No. is:

Bearing size No. =
Connecting rod No. – crankshaft No. =
4 – 1 = 3 (Brown)

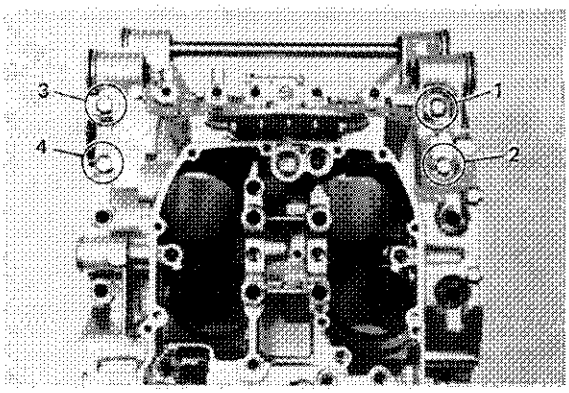
**Balancer Shaft**

1. Balancer shaft bearing clearance
a. Clean all balancer shaft and crankcase journal surfaces.
b. Place the upper crankcase half, in an upside-down position, onto a bench. Install bearing inserts into the upper crankcase.
c. Install balancer shaft into upper crankcase.
d. Place Plastigage® on balancer shaft journal surface to be inspected.

**NOTE:**
Do not move balancer shaft until clearance check has been completed.

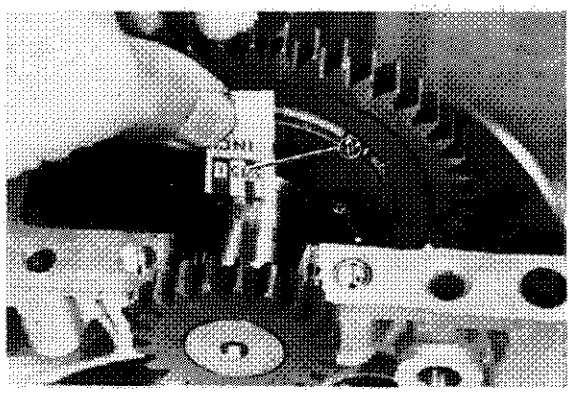
e. Install bearings into bottom crankcase. Carefully place the lower crankcase onto the upper crankcase.
f. Install crankcase holding bolts 1 through 4. Tighten to full torque in torque sequence cast on the crankcase.

Crankcase torque (8 mm (0.31 in) bolt):
24 Nm (2.4 m·kg, 9.6 ft·lb)



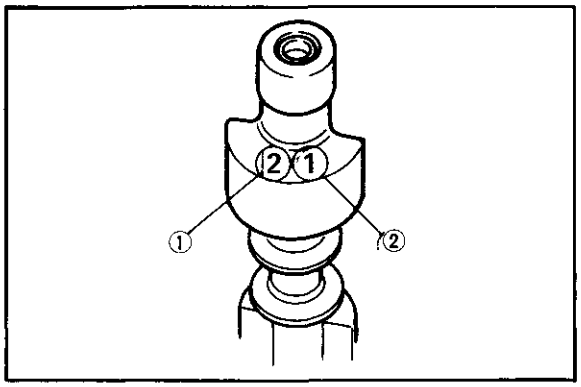

g. Remove bolts in reverse assembly order (4, 3, 2 ... etc.)
h. Carefully remove lower crankcase. Measure width of Plastigage® on balancer shaft journals to determine clearance.

Balancer shaft bearing oil clearance:
0.020 ~ 0.048 mm (0.0008 ~ 0.002 in)

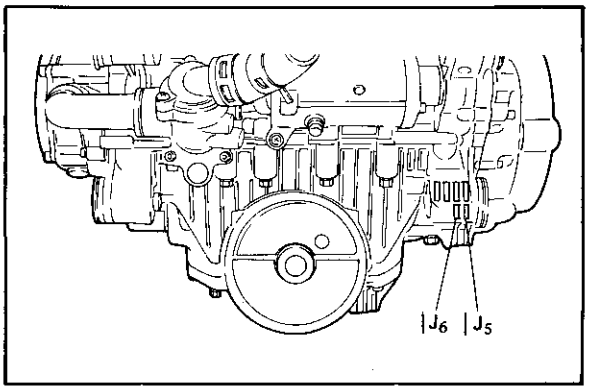


1. Plastigage

2. Balancer shaft bearing selection
a. Numbers used to indicate balancer shaft journal sizes are stamped on the R.H. balancer web corner, starting with the left journal. The lower crankcase half is numbered J5, and J6 as shown.




1. Left balancer shaft jurnal size number
2. Right balancer shaft jurnal size number




b. The proper bearing selection is made by subtracting the balancer shaft journal number from the crankcase size number. Use the color code to choose the proper bearing.

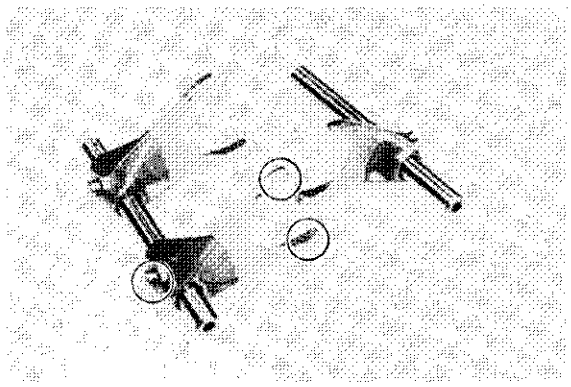
| BEARING COLOR CODE | |
|---|---|
| No. 1 | Blue |
| No. 2 | Black |
| No. 3 | Brown |
| No. 4 | Green |
| No. 5 | Yellow |
| No. 6 | Pink |
| No. 7 | Red |

Example:
If the crankcase J5 and left balancer shaft sizes are No. 4 and No. 1, respectively, the left balancer bearing size No. is:

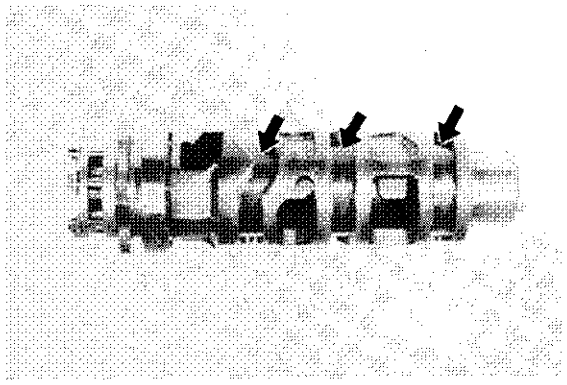
Bearing size No. =
Crankcase No. – Balancer shaft No. =
4 – 1 = 3 (Brown)

**Transmission**

1. Inspect each shift fork for signs of chafing on the gear contact surfaces. Check for bending. Make sure each fork slides freely on its guide bar.



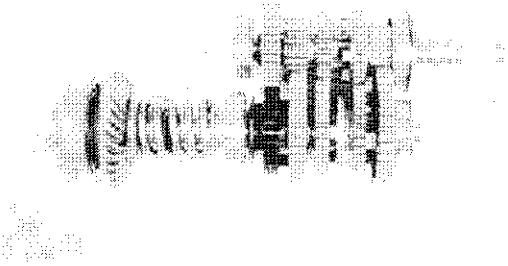
2. Roll the guide bar across a surface plate. Replace the bar if it is bent.
3. Replace the cam if the shift cam grooves are worn or damaged.



4. Check the cam followers on each shift fork for wear. Check the ends that ride in the shift cam grooves. If they are worn or damaged, replace the shift fork.
5. Check the shift cam dowel and side plate for looseness, damage, or wear. Replace as required.
6. Check the shift-cam stopper plate, circlip, and stopper for wear. Replace as required.
7. Check the transmission shafts using a centering device and dial gauge. If any is bent beyond the specified limit, replace the shaft.

| Maximum runout: 0.08 mm (0.0031 in) |
|---|

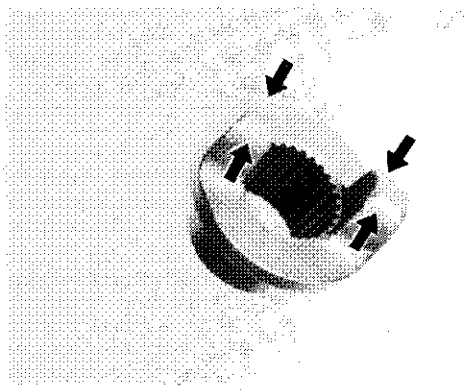
8. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the gear teeth for signs of pitting, chafing, or other extreme wear. Replace as required.
9. Check to see that each gear moves freely on its shaft.
10. Check to see that all washers and clips are properly installed and undamaged. Replace bent or loose clips and bent washers.
11. Check to see that each gear properly engages its counterpart on the shaft. Check the mating dogs for rounded edges, cracks, or missing portions. Replace as required.

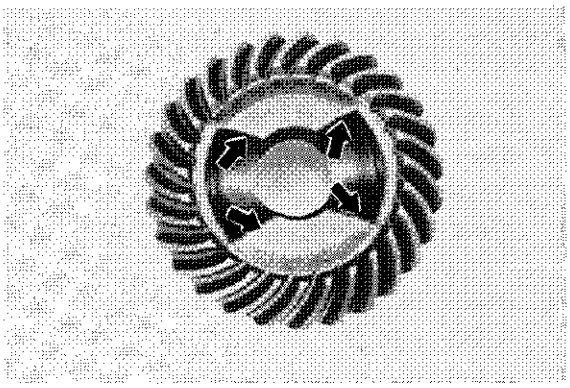


**Middle Gear and Drive Pinion Gear Shim**

1. Middle gear inspection

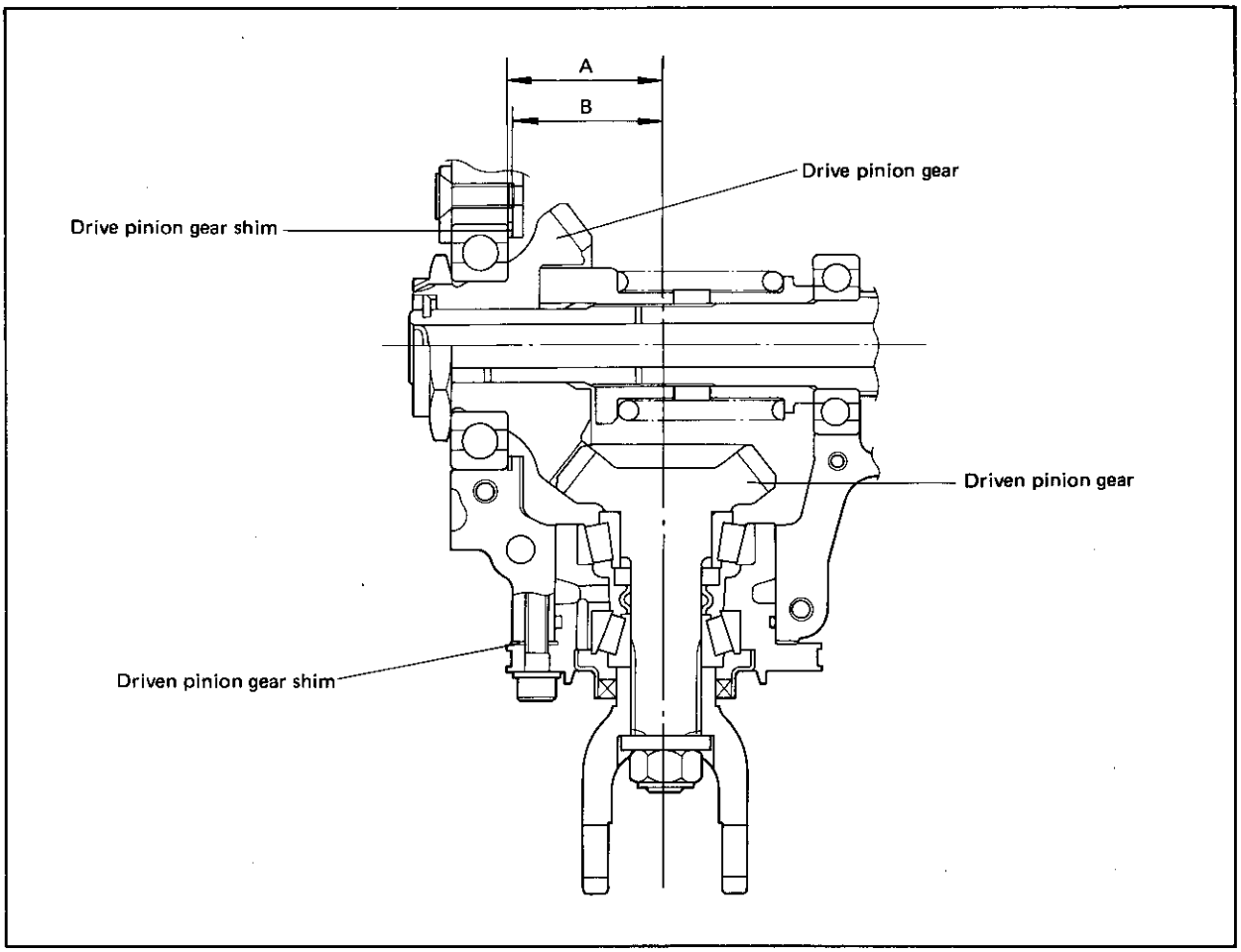
a. Inspect the damper cam surfaces. Check for smooth cam action and excessive wear on the cam surface. If cam surface is severely worn, replace damper and drive pinion gear.





b. Inspect the damper spring for fatigue, wear, and damage. Replace as necessary. Check bearing movement for damage to balls, rough spots, and bearing looseness. Inspect gear teeth. If any gear tooth or bearing is damaged, the gear set or bearing must be replaced.

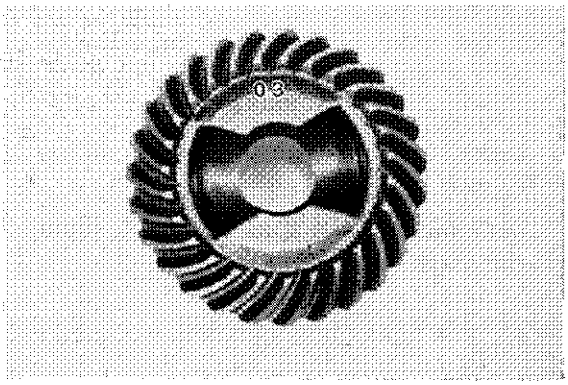
2. Drive pinion gear shim



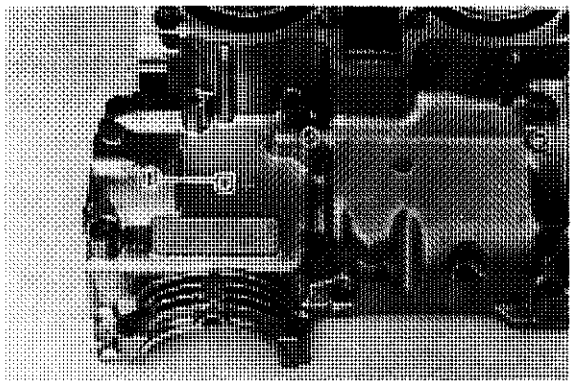

a. Measure the thickness of the drive pinion gear shims and compare with the formula below:

| Shim thickness: T = A – B |
|---|

b. How to calculate the shim thickness formula.
A = 54.5 plus or minus the number stamped on the drive pinion gear.



B = 53 plus the number stamped on the left-side-rear of the upper crankcase.



1. Drive pinion gear No.

For example:
If the drive pinion gear is stamped "03", plus (+03) is implied here since only the minus (—) designations are stamped alongside the numbers, then:
A = 54.5 + 0.03
A = 54.53

**NOTE:**
All stamped numbers are in hundredths of a mm.

c. If the left-side-rear of the upper crankcase is stamped "95", then:
B = 53 + 0.95
B = 53.95
Therefore:
T = A — B
T = 54.53 — 53.95
T = 0.58 mm
The calculated shim thickness is 0.58 mm. Because shims can only be selected in 0.05 mm increments, use the following chart to round off the hundredths digit of the calculated thickness and select the appropriate shim.

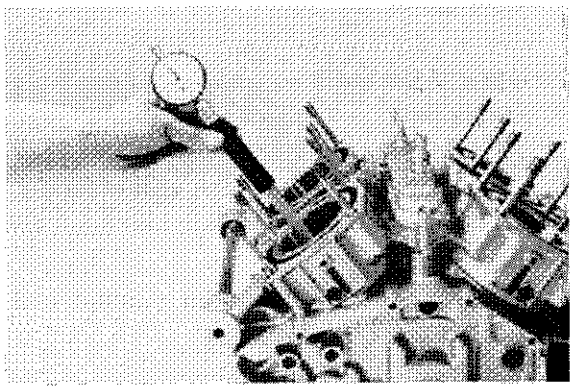
| Hundredths Digit | Rounded Value |
|---|---|
| 0, 1, 2 | 0 |
| 3, 4, 5, 6 | 5 |
| 7, 8, 9 | 10 |

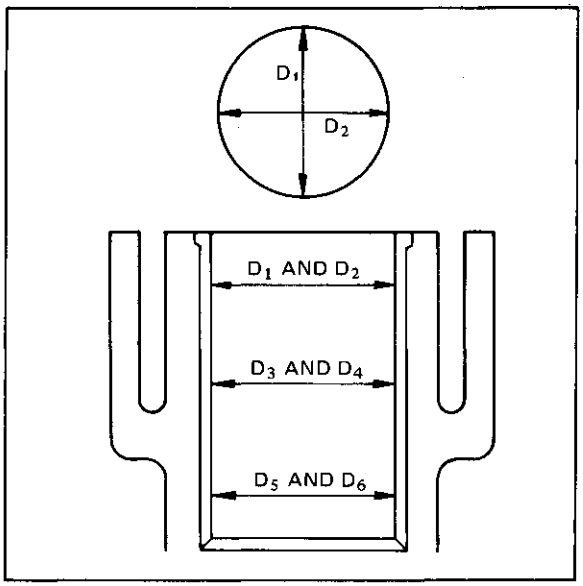
Using the above example, the calculated shim thickness of 0.58 mm is rounded off to 0.60 mm. Therefore, you may choose either 4 — 0.15 mm shims, 2 — 0.30 mm shims, or 1 — 0.30 mm and 2 — 0.15 mm shim as selected from the shim thickness chart below. Shim sizes are supplied in the following thicknesses:

| | |
|---|---|
| Drive Pinion Gear Shim Size (mm) | 0.15 0.30<br>0.40 0.50 |

**Crankcase**

1. Thoroughly wash the case halves in a mild solvent.
2. Visually check the cylinder walls for scratches. If vertical scratches are evident, the cylinder wall should be rebored or the cylinder should be replaced.
3. Measure cylinder wall wear in manner as shown. If wear is excessive, compression pressure will decrease, and engine trouble will occur. Rebore the cylinder wall, and replace the piston and piston rings.
   Cylinder wear should be measured at three depths by placing the measuring instrument parallel to and at right angles to the crankshaft. (See the illustration.) If the cylinder wall is worn beyond the wear limit, it should be rebored.






| | Standard | Wear limit |
|---|---|---|
| Cylinder bore | 76 mm (2.992 in) | 76.1 mm (2.996 in) |
| Cylinder taper | – | 0.05 mm (0.002 in) |

4. Clean all gasket mating surfaces and crankcase mating surfaces thoroughly.
5. Visually inspect the case halves for any cracks, road damage, etc.
6. Check all fittings not previously removed, for signs of looseness or damage.
7. If bearings have been removed, check their seats for signs of damage (such as the bearing spinning in the seat, etc.).
8. Check oil delivery passages for signs of blockage.

**Bearings and Oil Seals**

1. Inspection

a. After cleaning and lubricating the bearings, rotate the inner race with a finger. If rough spots are noticed, replace the bearing.

b. Check the oil seal lips for damage and wear. Replace as required.

2. Removal

a. Pry oil seal(s) out of place with a screwdriver.
Replace all oil seals when overhauling the engine.

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

b. Drive out the bearing(s) with a hydraulic press.

**NOTE:**
Bearing(s) are most easily removed or installed if the cases are first heated to about 95° ~ 125°C (205° ~ 257°F). Bring the case up to proper temperature slowly. Use an oven.

## ENGINE ASSEMBLY AND ADJUSTMENT

**Important Information**

1. Gaskets and seals

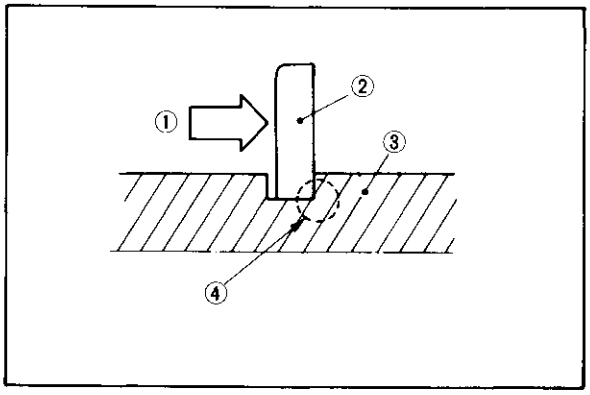
a. All gaskets and seals should be replaced when an engine is overhauled. All gasket surfaces and oil seal lips must be cleaned.

b. Properly oil all mating parts and bearings during reassembly.

2. Circlips

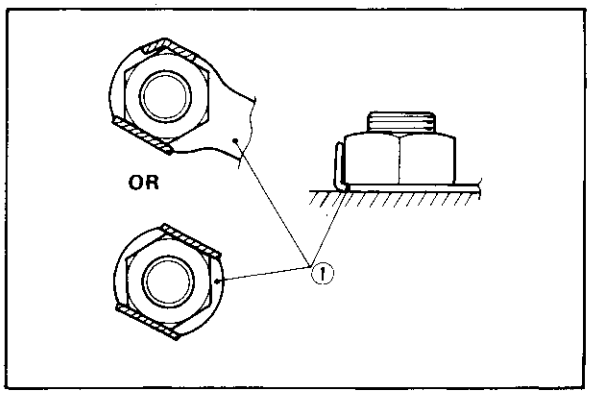
a. Inspect all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips.

b. Make sure the circlip is installed with the sharp-edged corner positioned opposite to the thrust it receives.
See the sectional view below.



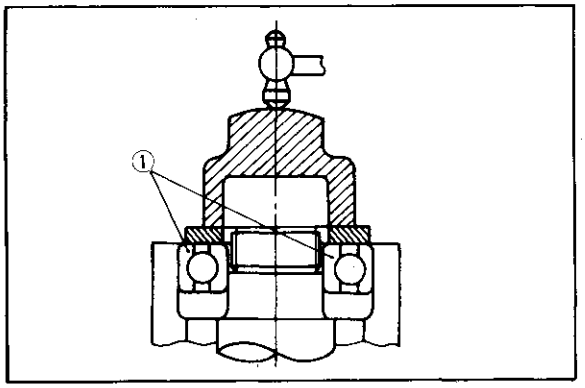

1. Thrust
2. Circlip
3. Shaft
4. Sharp edged corner

3. Lock washers/plates and cotter pins
All lock washers/plates 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.

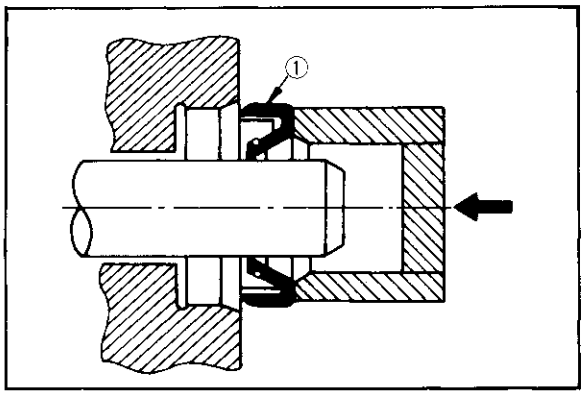



1. Lock washer or lock plate

4. Bearings and oil seals
a. Install the bearing(s) and oil seal (s) with the manufacturer's stamped marks or numbers facing outward, on the side exposed to view.
b. Apply a light coat of lightweight lithium-based grease to the seal lip(s) before installing the oil seal(s).
c. Oil the bearings liberally before installing.



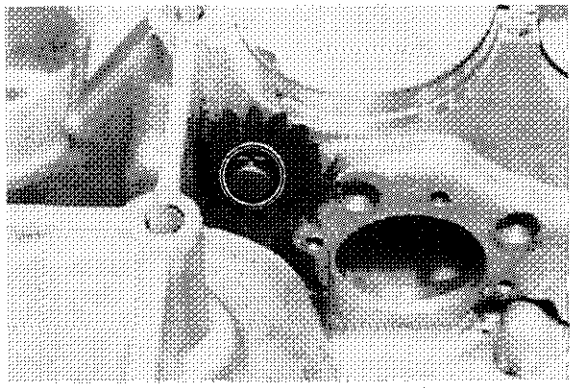

1. Bearing



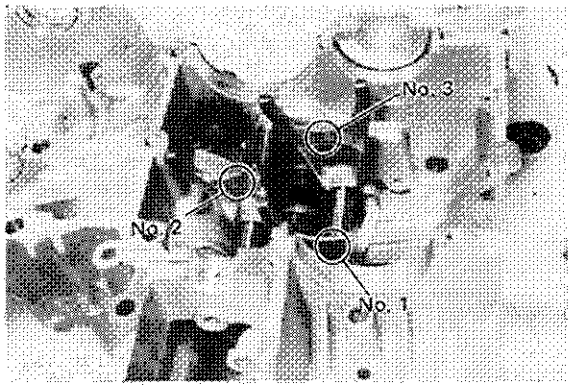

1. Oil seal

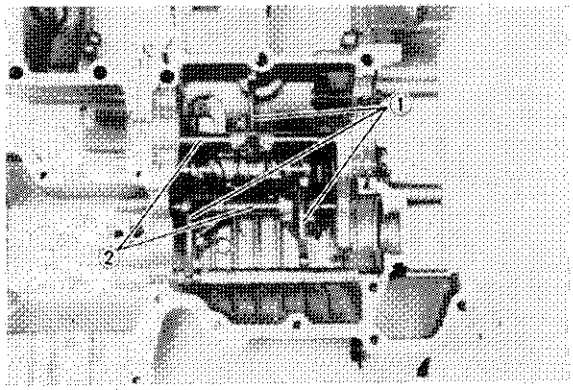
**Lower Crankcase**

1. Install the oil pump idle gear.



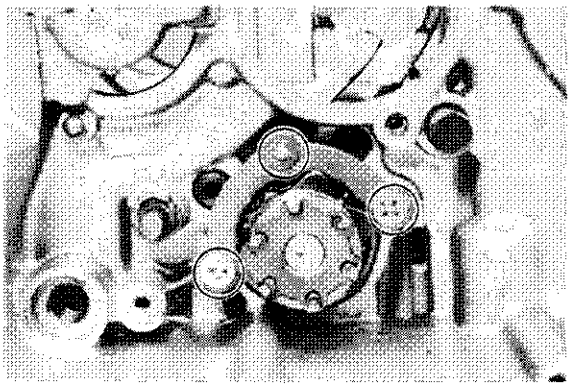
2. Install the shift cam and neutral switch.
3. Install the shift forks and guide bar. Each shift fork is identified by a number cast on its side. All the numbers should face the left side and be numered 1, 2, and 3 beginning from the left.




1. Shift fork 2. Guide bar

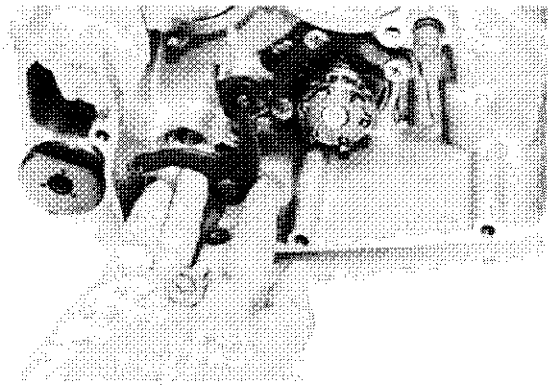
4. Install the shift cam bearing stopper. Use LOCITE® to stopper screw.



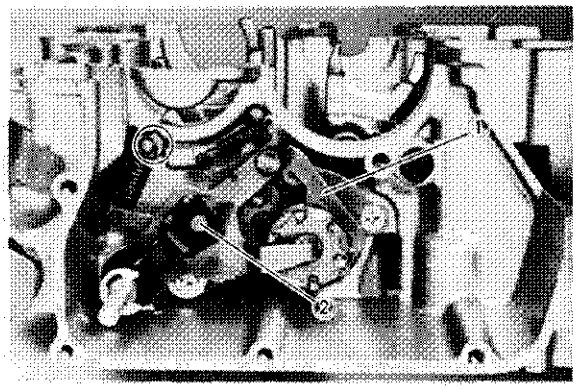
Tighteninr torque:
Bearing stopper:
7 Nm (0.7 m·kg, 5.1 ft·lb)
Cam segment:
12 Nm (1.2 m·kg, 8.7 ft·lb)

5. Stopper lever
a. Install the camshaft assembly, then rotate the camshaft to neutral position.
b. Install the stopper lever assembly. Be sure the stopper lever roller meshes with the camshaft stopper wheel.
c. Apply LOCTITE® to the bolt.

Tightning torque:
8 Nm (0.8 m·kg, 5.8 ft·lb)



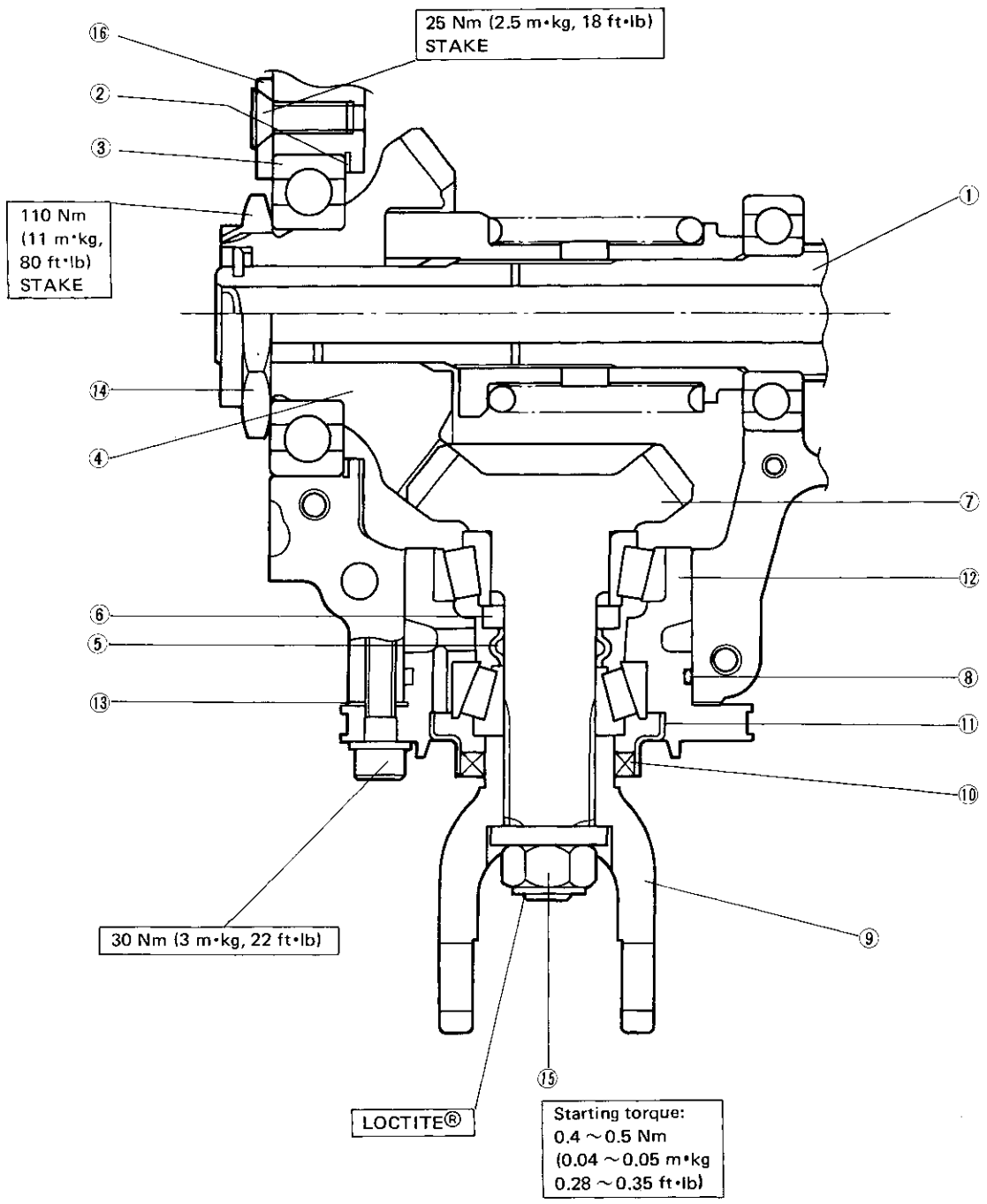
6. Shift shaft assembly
a. Insert a small section of the shifting shaft into the appropriate crankcase bore.
b. Raise shift lever 2 upwards and hold in position while pushing the shift shaft assembly into place.
c. Attach the spring from shift lever 1 to the crankcase dowel then lower shift lever 2 into the camshaft grooves.



1. Lever 2 2. Stopper shaft

7. Bearing installation
Install the proper crankshaft main bearing and balancer shaft bearings on lower crankcase.

## Middle Gear

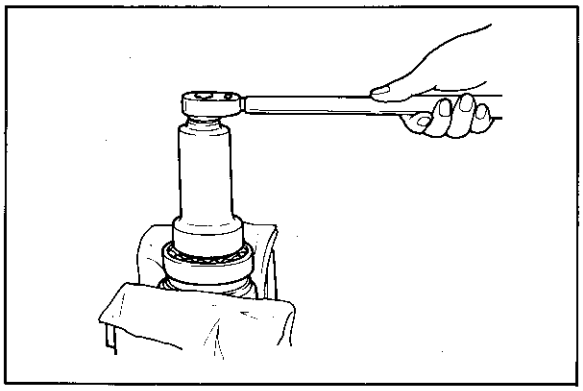



1. Drive axle
2. Drive pinion gear shim
3. Bearing
4. Middle drive pinion gear
5. Collapsibe collar
   (Always use a new one)
6. Spacer
7. Middle driven pinion gear
8. O-ring
9. Universal joint
10. Oil seal
11. Bearing retainer
12. Bearing housing
13. Driven pinion gear shim
14. Drive pinion gear nut
15. Driven pinion gear nut
16. Bearing stopper

1. Drive pinion gear

a. Install the correct shims and appropriate nuts and bearing on the drive pinion gear. Torque-tighten to specification.

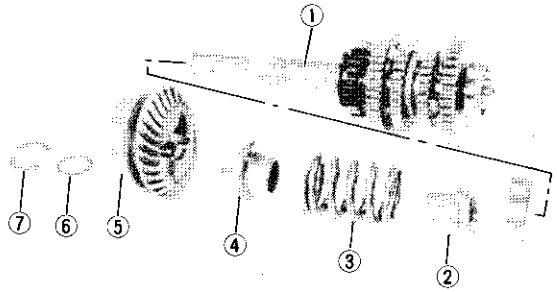
| Drive gear nut tightening torque: 110 Nm (11 m·kg, 80 ft·lb) |
|---|



NOTE:

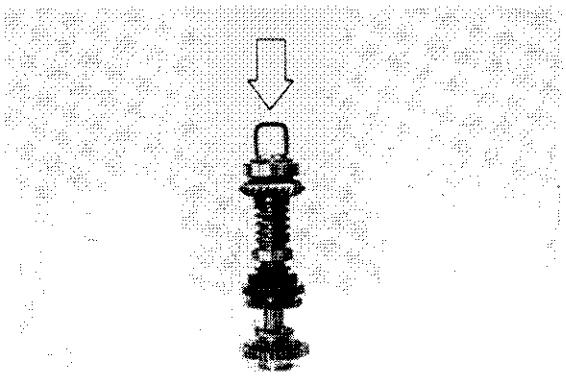
Refer to inspection section page on 3-33; drive pinion gear shims.

b. Install the spring seat, spring, damper cam, drive pinion gear, and washer onto the driver axle.




1. Drive axle
2. Spring seat
3. Spring
4. Damper cam
5. Drive pinion gear
6. Washer
7. Thrust washer

c. Place the drive axle shaft in a hydraulic press, positioning the Damper Compressor (special tool) in place as shown. Install the damper spring and thrust washer onto the drive axle. Then remove the drive axle assembly from the press and position the drive pinion gear onto the drive axle.



2. Driven pinion gear

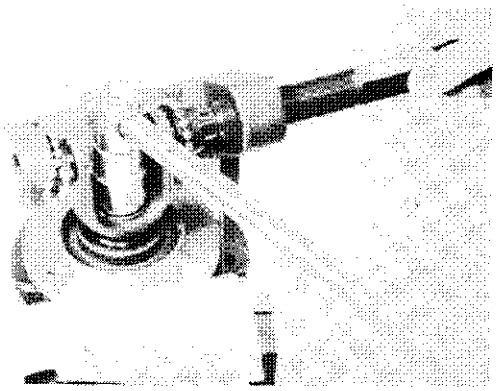
a. Install the new bearing housing assembly onto the driven pinion gear.

CAUTION:

**Do not press the bearing outer race. Always press the inner race with care when installing.**

b. Install the new ring onto the driven gear housing. Apply LOCTITE® to the shaft thread.

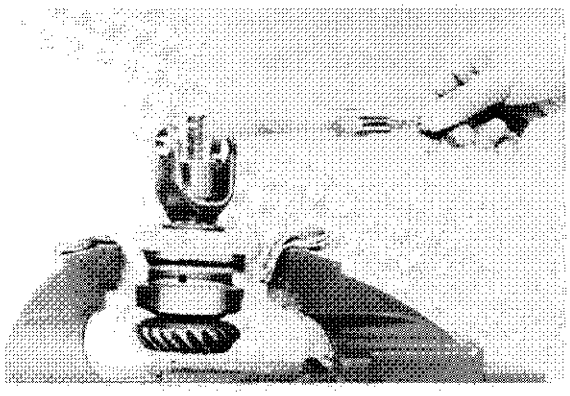
c. Insert the driven gear housing in a vice and install the Universal Joint Holder (special tool) on the U-joint. Carefully tighten the driven pinion gear nut, little by little.



d. Measure the starting torque of the driven pinion gear.

e. Repeat tightening steps c and d to establish the standard starting torque for the driven pinion gear.

| Driven pinion gear starting torque: 0.4 ~ 0.5 Nm (0.04 ~ 0.05 m·kg, 0.29 ~ 0.36 ft·lb) |
|---|

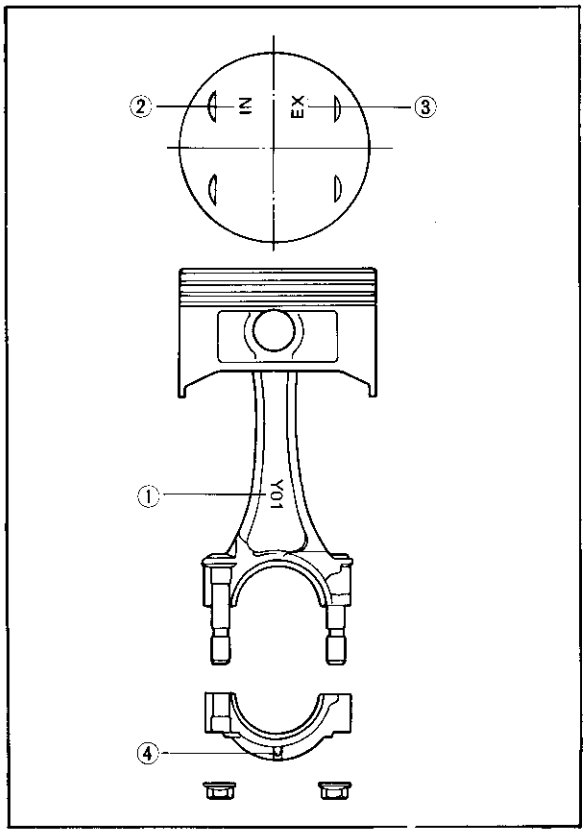


**CAUTION:**

**Never exceed the standard starting torque. Be sure to tighten the driven pinion gear nut slowly, carefully checking measurements each time. Exceeding the standard starting torque may depress the collapsible collar, requiring reassembly. Then you must replace the collapsible collar and repeat the steps in c and d to obtain the standard starting torque.**

Piston and Connecting Rod

1. Install the piston rings and oil ring on the piston.

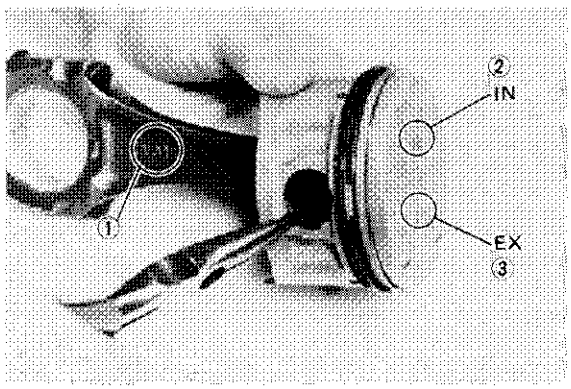



1. "Y" Mark
2. "IN" Intake side
3. "EX" Exhaust side
4. Projection

**NOTE:**

Manufacture's marks or numbers stamped on the rings go on the top side of the rings. Oil the pistons and rings well.

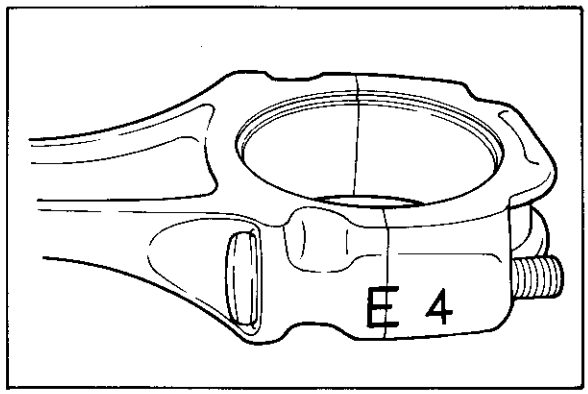
2. Install the piston, on the connecting rod. Be sure the piston is positioned correctly with the intake side to the left, and exhaust side to the right (Marked "IN" and "EX" on the piston head) facing "Y" mark.




1. "Y" Mark 2. "IN" Intake side 3. "EX" Exhaust side

**NOTE:**

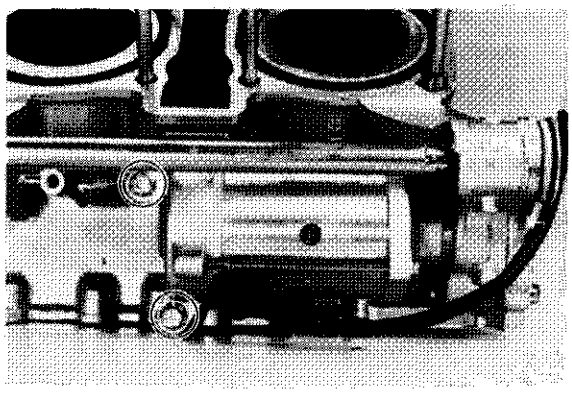
- Always install new piston pin circlips.
- Install the correctly matched rod cap to its corresponding connecting rod. All rod caps and connecting rods have identically stamped, single letters. After installing the rod cap be sure the letters on both components align to forma perfect character. An illegible letter indicates a mismatch of components.



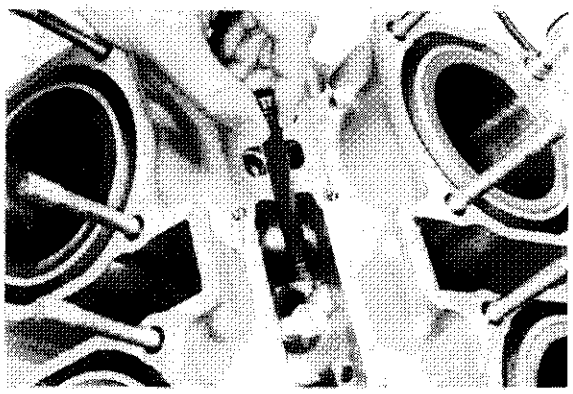
**Upper Crankcase**

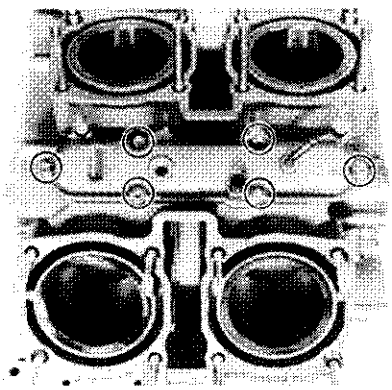
1. Install the starter motor.

| Tightening torque: 10 Nm (1.0 m·kg, 7.2 ft·lb) |
|---|



2. Insert the oil pipe into the upper crankcase and install the breather cover.

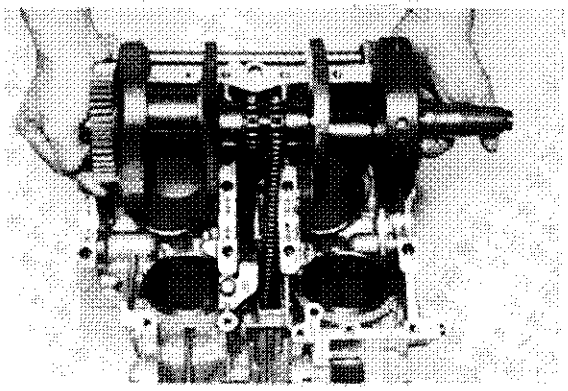




| Tightening torque: 10 Nm (1.0 m·kg, 7.2 ft·lb) |
|---|

3. Install the proper crankshaft main bearings and balancer shaft bearings on the upper crankcase.

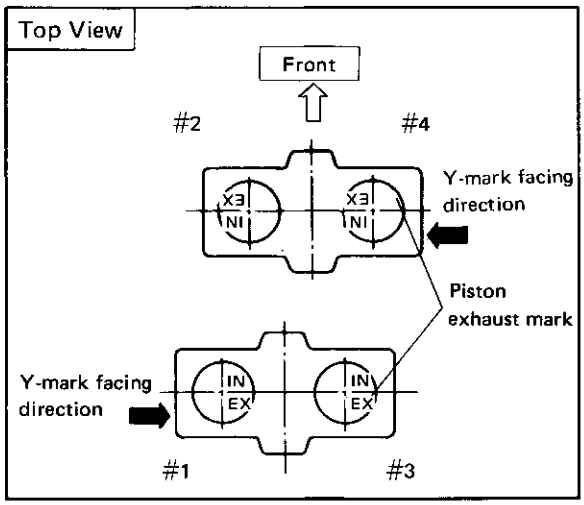
4. Install the cam chains onto the crankshaft spockets. Then install the crankshaft onto the upper crankcase with the tapered (generator) side facing to the left.



**NOTE:**

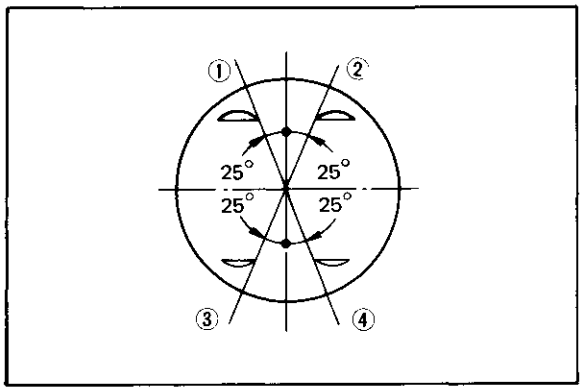
Cam chains must be in their respective cavities. Be sure to attach a retaining wire to the cam chains. This will prevent the chains from falling into the crankcase cavity when the crankcase is inverted after assembly.

5. Install the Piston Ring Compressor (special tool). Compress the piston ring and insert the piston/connecting rod assembly into the cylinder lining as follows:



**NOTE:**

- Set the piston ring ends to the positions shown below.



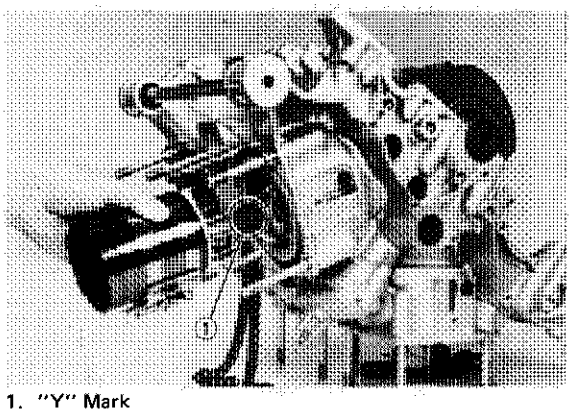

1. TOP
2. OIL RING (LOWER RAIL)
3. OIL RING (UPPER RAIL)
4. 2ND

- Oil the pistons, piston rings, and cylinders liberally before assembly.

**CAUTION:**

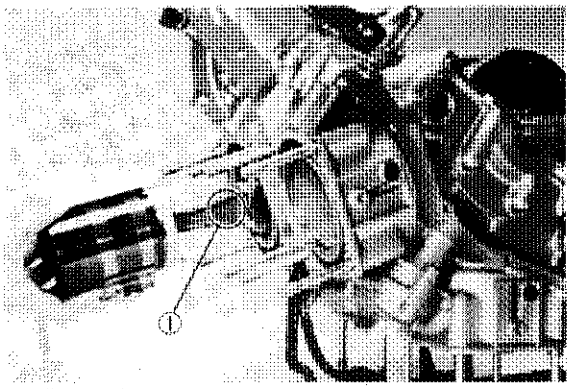
**Make sure the ends of the oil ring expanders do not overlap.**

a. Front cylinder lining
Insert the #2 and #4 pistons into the #2 and #4 cylinders. The stamped "Y" mark on the connecting rods should face towards the right side of the crankcase.



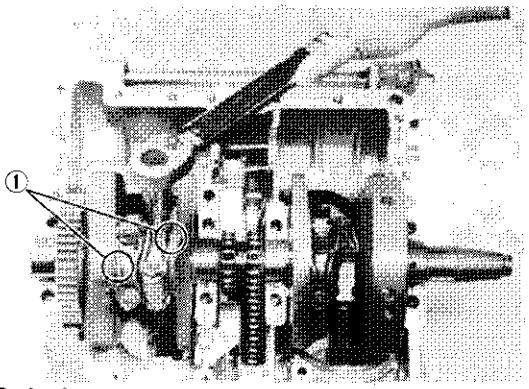

1. "Y" Mark

b. Rear cylinder lining
Insert the No. 1 and No. 3 pistons into the matching cylinders (No. 1 and No.3). Be sure the connecting rod "Y" marks face towards the left side of the crankcase.




1. "Y" Mark

6. Install the proper big-end crankshaft bearings into the rod caps. Then install the connecting rods onto the crankshaft and torque-tighten the rod cap nuts. Be sure the projections on the rod caps and the "Y" marks on the connecting rods face toward their respective crankwebs.




1. Projection

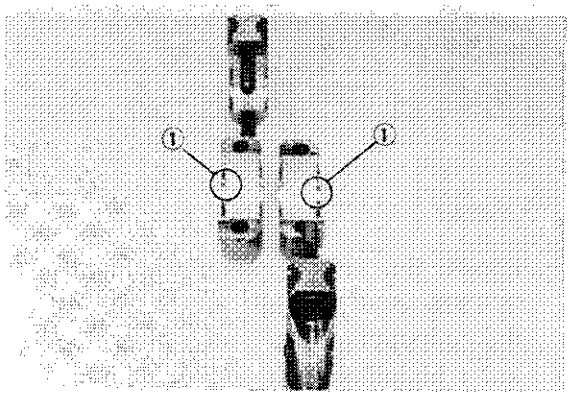
Rod cap torque:
38 Nm (3.8 m·kg, 27 ft·lb)

**NOTE:**

Apply Molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.

**CAUTION:**

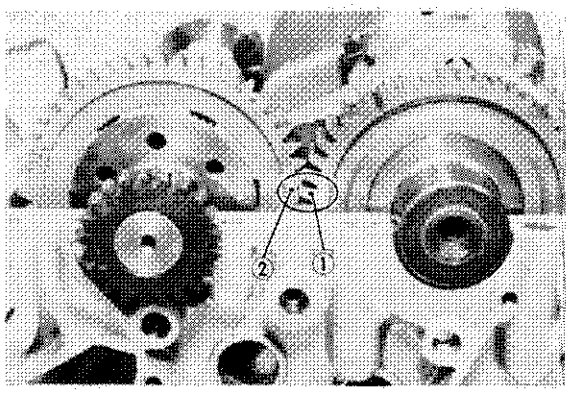
- **The big-end bearings must be positioned into the rod caps so the chamfered edge is on the same side as the rod cap projections.**



1. Chamfered edge

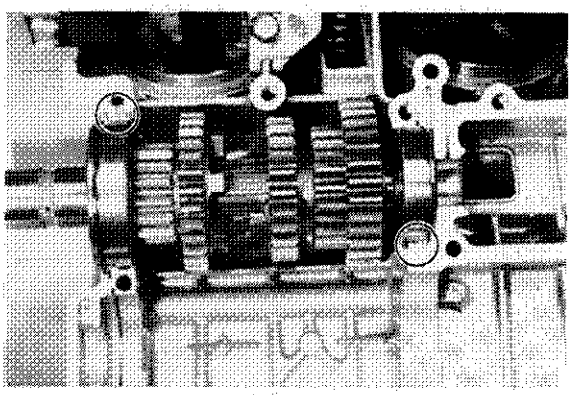
- **When tightening the rod cap, apply continuous torque between 3.0 and 3.8 m·kg. Once you reach 3.0 m·kg of torque, DO NOT STOP TIGHTENING until final torque is reached. If tightening is interrupted between 3.0 and 3.8 m·kg, loosen the nut to less than 3.0 m·kg, and start again. Tighten to full-torque specification without pausing.**

7. Align the mark on the balancer shaft gear with the mark on the crankshaft gear, and place the balancer shaft into the crankcase.

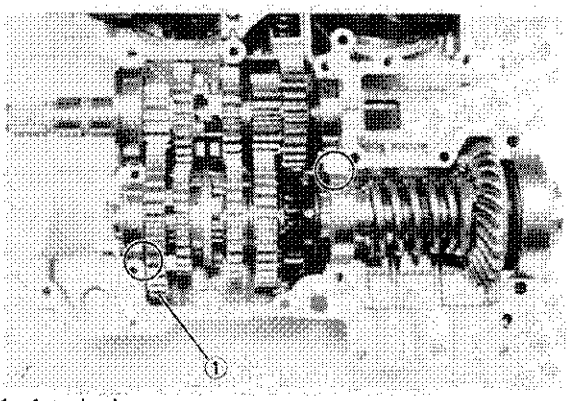


1. Crankshaft gear mark 2. Balance gear mark

8. Place the main axle assembly onto the upper crankcase. Insert the bearing circlip completely into the upper crankcase positioning grooves. Position the bearing pin as shown below.

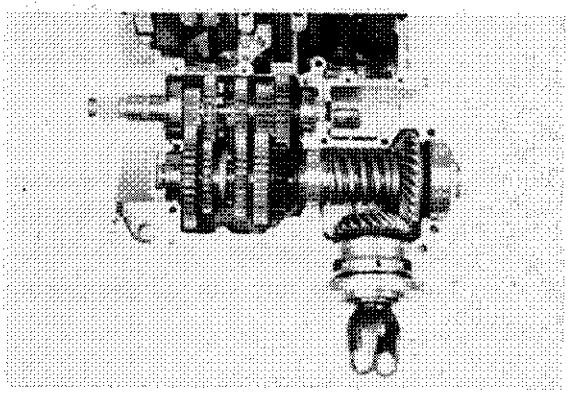


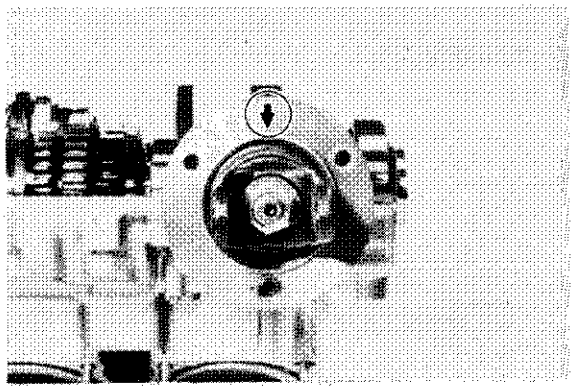
9. Place the drive axle assembly, with the proper drive pinion gear shim installed, onto the upper crankcase. Insert the bearing circlip completely into the upper crankcase positioning grooves. Position the bearing pin as shown in the photo below. Then tap the 1st wheel gear lightly and towards the outside of the crankcase. Use a soft-faced hammer or plastic mallet.



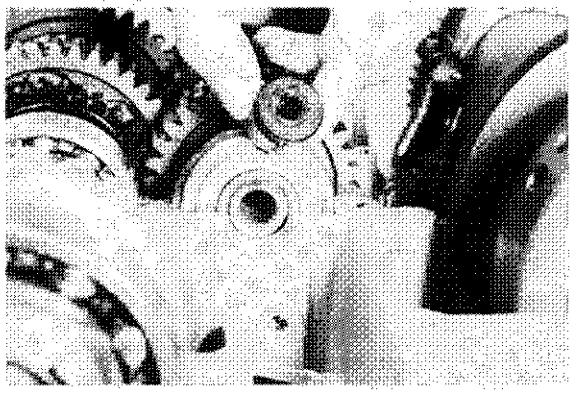
1. 1st wheel gear

10. Mesh the driven pinion gear and the drive gear together. Position the driven pinion gear assembly onto the crankcase with the arrow mark pointing down.





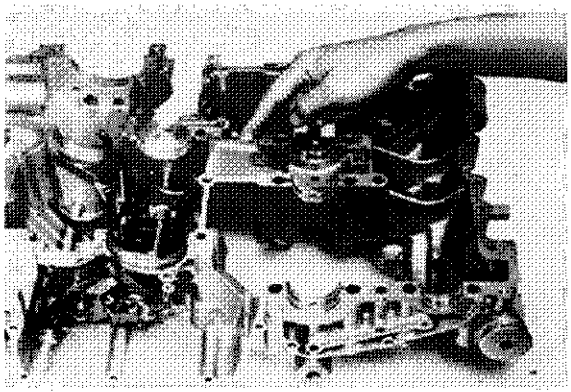
11. Place the push rod support bearing onto the crankcase, inserting the bearing pin into the crankcase grooves. Position the oil seal snugly against the bearing.



12. The transmission gears must be set in neutral position.

**Crankcase Assembly**

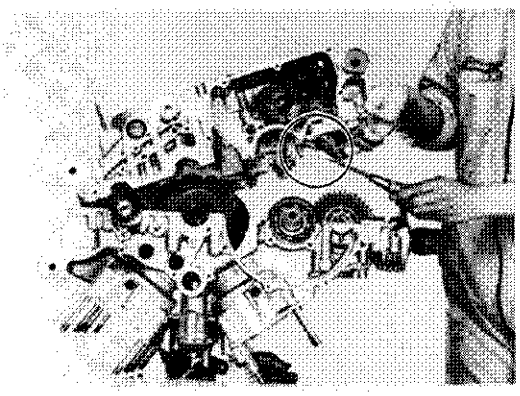
1. Apply Yamabond #4 sealant or equivalent to the crankcase mating surfaces. DO NOT ALLOW any sealant to come in contact with the oil gallery O-ring or crankshaft bearings. It is extemely important, however, to apply sealant around the case stud holes. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the bearings.



**CAUTION:**

- **Failure to apply sealant here will result in reduced oil pressure and possible crank seizure.**
- **Be sure all crankcase dowel pins are installed in the upper crankcase.**

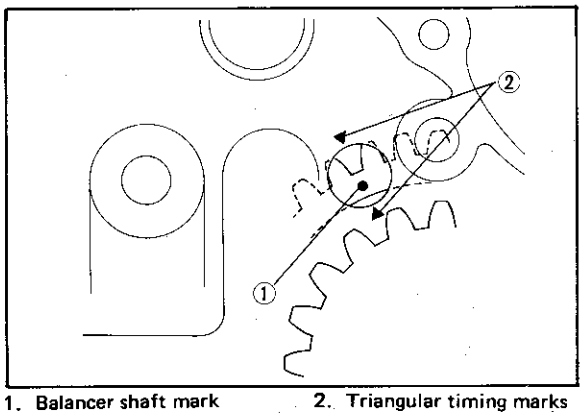
2. Position the front end of the lower crankcase, at a tilted downward angle, over the upper crankcase dowels. Then slowly lower the lower crankcase onto the upper crankcase. Carefully guide the shift forks on the lower crankcase so they mesh smoothly with the transmission gears of the upper crankcase.



**CAUTION:**

**Before tightening the crankcase bolts:**

- **Be sure the gears shift correctly while hand-turning the shift cam.**
- **Be sure the timing mark dot on the balancer shaft gear is aligned so that the dot mark lines up between the triangular timing marks on the upper crankcase when the No. 1 piston is at TDC.**

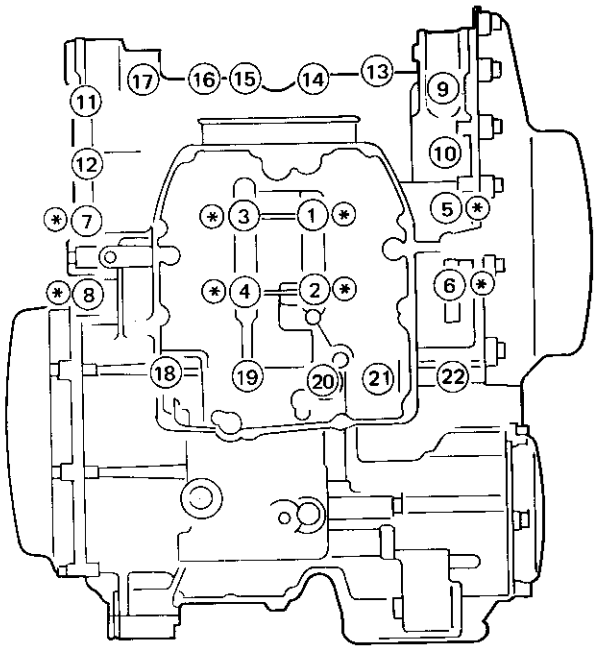



1. Balancer shaft mark 2. Triangular timing marks

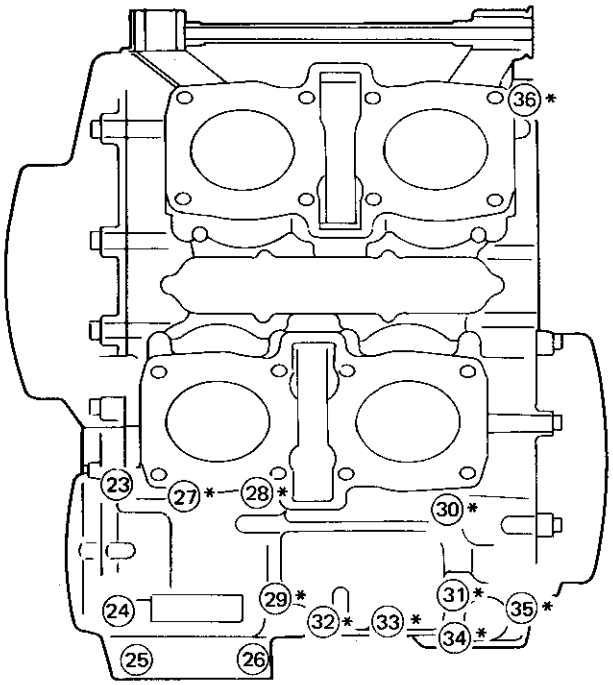
3. Torque the crankcase bolts in proper sequence. Refer to the tightening sequence in the illustration below.

## CRANKCASE TIGHTENING SEQUENCE

LOWER CASE




UPPER CASE

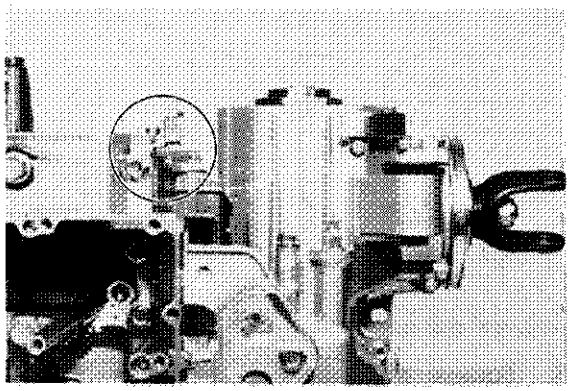



Torque values

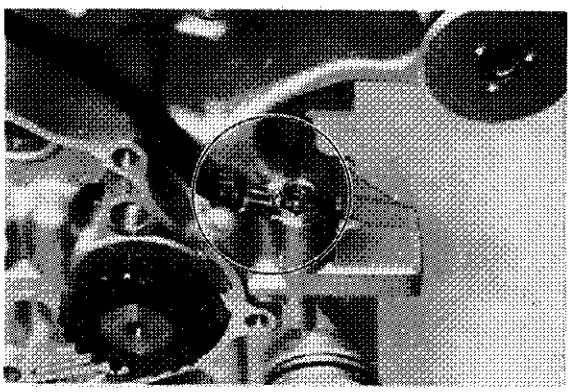
| | | | |
|---|---|---|---|
| * | 6 mm (0.24 in) | : | 12 Nm (1.2 m•kg, 8.7 ft•lb) |
| | 8 mm (0.31 in) | : | 24 Nm (2.4 m•kg, 17.0 ft•lb) |
| * | 10 mm (0.39 in) | : | 40 Nm (4.0 m•kg, 29.0 ft•lb) |

**NOTE:**

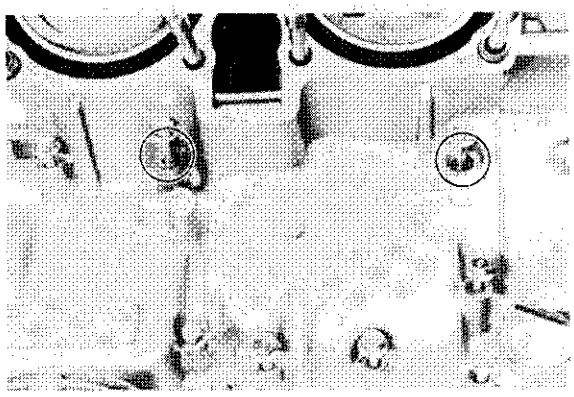
- Install the lead wire bracket on Bolt No. 22.



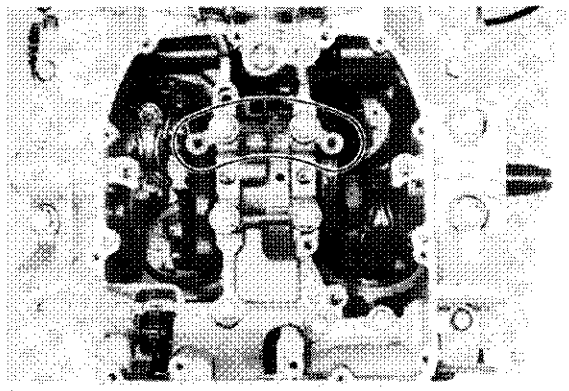
- Install the ground wire on Bolt No. 36.



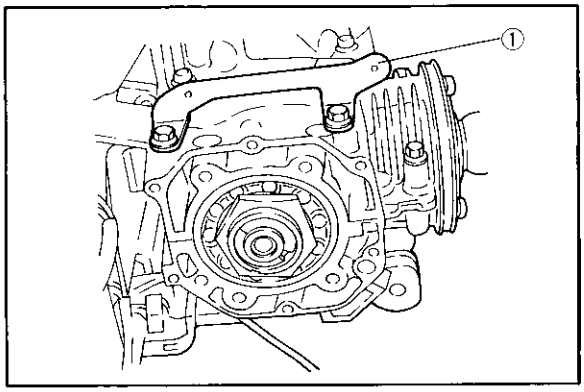
- Install the copper washers on Bolt Nos. 28 and 30.



- Install the oil pipe bracket on Bolt Nos. 1 and 3.

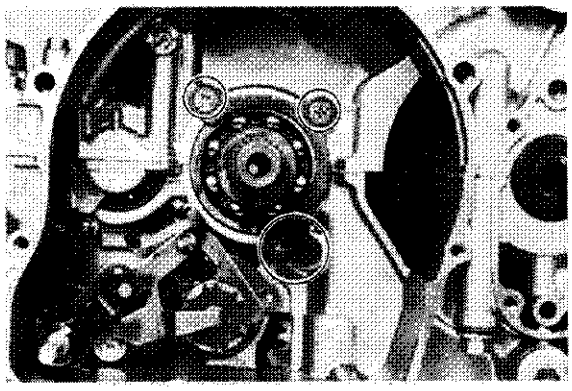


- Install the middle gear cover holder on Bolt Nos. 23 and 24.




1. Middle gear cover holder

4. Install the main axle bearing stopper onto the clutch side of the crankcase. Apply LOCTITE® to the screw threads and tighten the screws to specification.

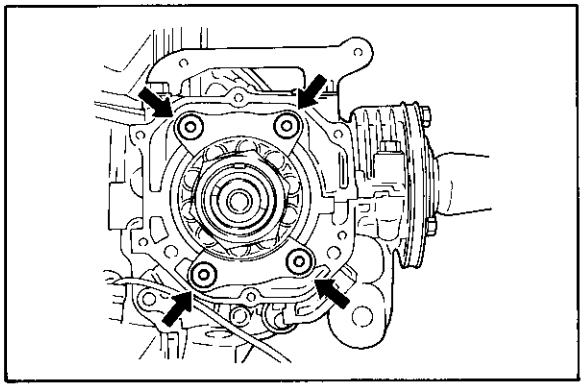


**NOTE:**
Make sure the stopper engages the proper groove on the oil pump idle gear shaft.

Tightening torque:
7 Nm (0.7 m·kg, 5.1 ft·lb)

5. Install the drive pinion gear stopper, then tighten the torx screws and stake the screwhead with a center punch to lock.

Tightening torque:
25 Nm (2.5 m·kg, 18 ft·lb)



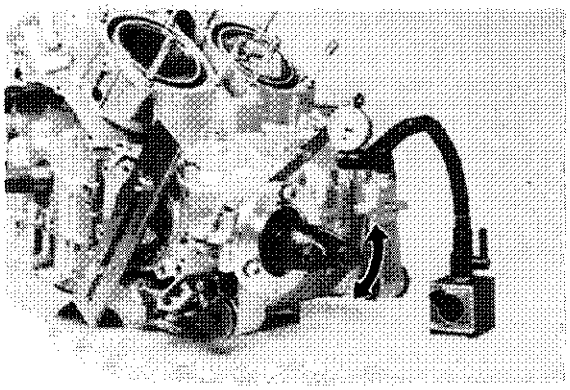
**Middle Gear Lash Adjustment**

1. Gear lash adjustment
   a. Attach Special Tool Bolts to the crankcase cover bolt threads to prevent the drive pinion gear nut from turning.
   b. Install the 3 bolts on the driven bearing housing and tighten. Clearance between the crankcase and driven bearing housing should be about 2 mm.

c. Set the dial gauge on the outside edge of the U-joint so that it is positioned over the centerline of the yoke bearing hole. Gently rotate the U-joint back and forth. Measure the gear lash on the dial gauge.

d. Repeat steps b and c to obtain the correct gear lash. Push in the bearing housing and hold in position while tightening the bearing housing bolts, to obtain the correct gear lash. Measure the gap between the crankcase and bearing housing with a feeler gauge.

Standard middle gear lash:
0.05 ~ 0.10 mm (0.002 ~ 0.004 in)



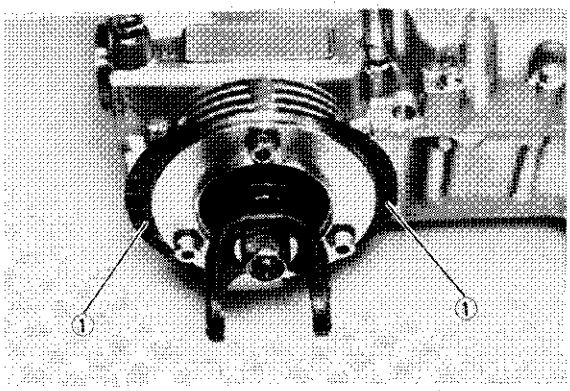
**CAUTION:**

**Do not hammer the U-joint or the collapsible collar of the driven pinion gear may be distorted. This will result in a change in the standard starting torque, requiring replacement of the collapsible collar and reassembly of the driven gear assembly.**

**NOTE:**

Check the gear lash at four positions. Rotate the U-joint 90 degrees each time and repeat the gear lash check.

e. Select the correct shims for the crankcase and pinion gear bearing housing (see step d, "Feeler guage") as shown in the chart below.

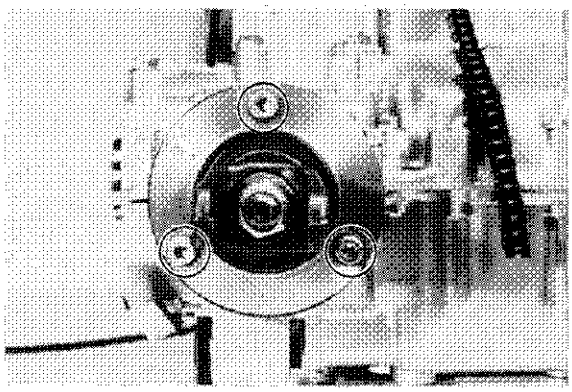



1. Shim

| | | |
|---|---|---|
| Driven pinion Gear shim (mm) | 0.10<br>0.30<br>0.50 | 0.15<br>0.40<br>0.60 |

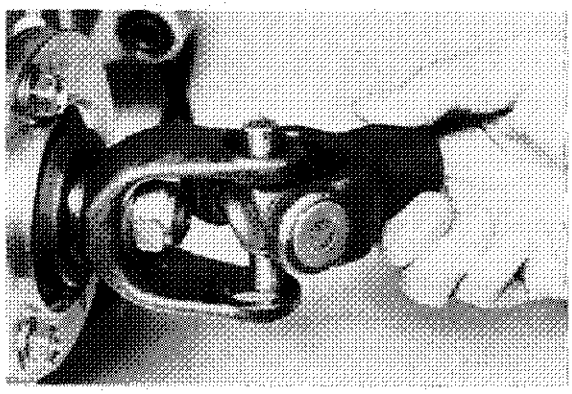
f. Install the proper shims, tighten the bearing housing bolts, and then recheck the gear lash measurement.

Tightenihg torque:
30 Nm (3 m·kg, 22 ft·lb)



2. Yoke installation

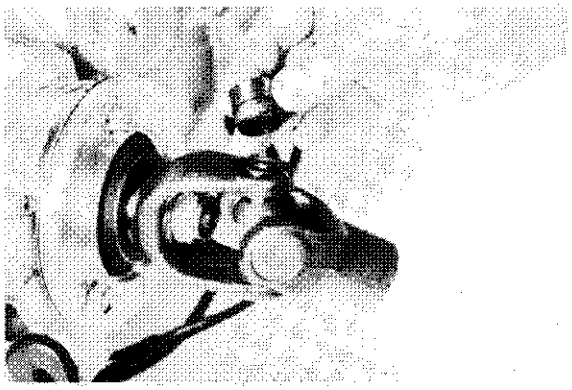
a. Place the yoke into the u-joint.



b. Grease the bearings, and insert them onto the yoke.

**CAUTION:**

**Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.**

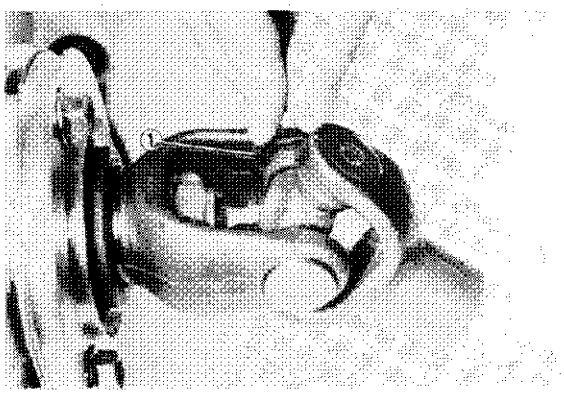


c. Press the bearings into the U-joint with a vase.

**NOTE:**

It may be helpful to tap the U-joint with a soft faced hammer.

d. Using a suitable socket, press each bearing further into the U-joint until the circlip can be installed onto each bearing. The circlip fits into the grove on each bearing.



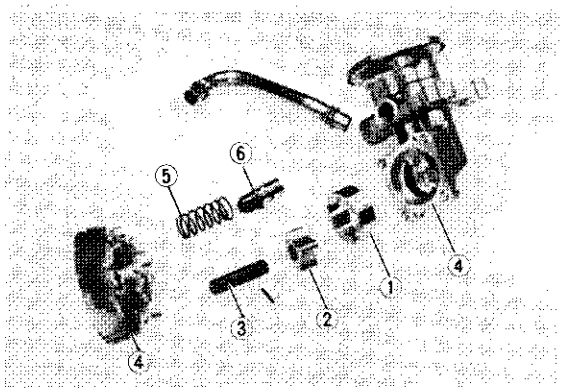
1. Circlip

**Oil Pump and Oil Pan**

1. Oil pump assembly

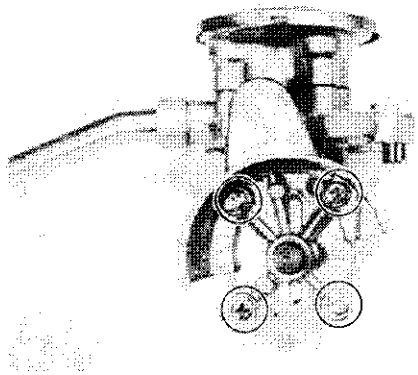
a. Install the oil pump strainer into the pump case.

b. Install the oil pump inner rotor, outer rotor, shaft, spring, and oil relief valve into the oil pump case.



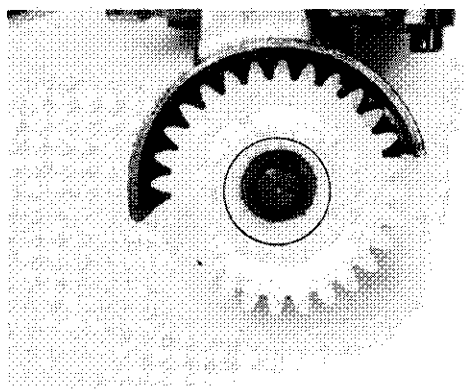

1. Outer rotor
2. Inner rotor
3. Shaft
4. Oil pump case
5. Spring
6. Oil relief valve

c. Tighten the oil pump case.

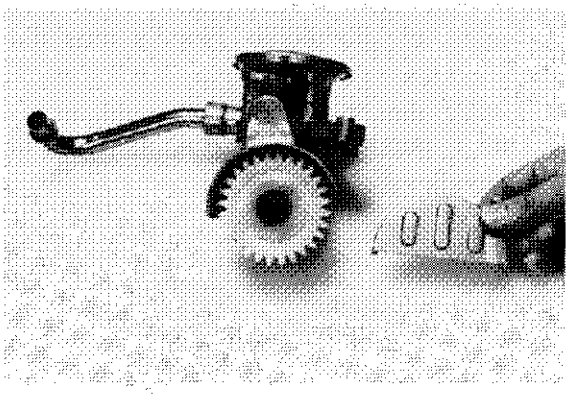


| Tightening torque: |
| --- |
| 7 Nm (0.7 m·kg, 5.1 ft·lb) |

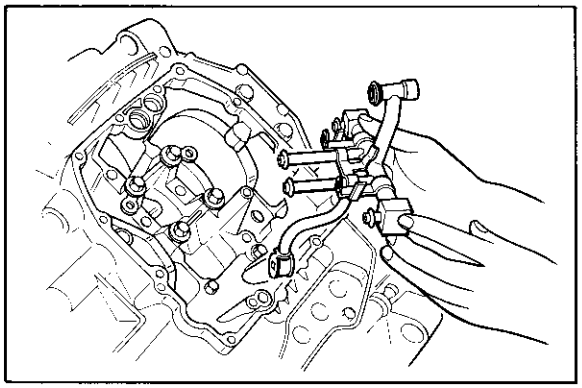
d. Install the oil pump driven sprocket on the shaft.



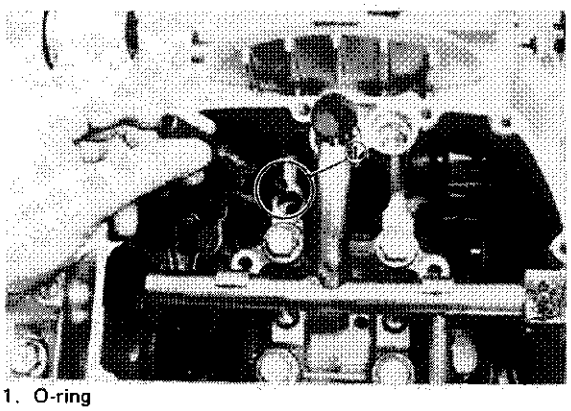
e. Install the gear cover.



2. Install the main oil gallery pipe on the lower crankcase.
   Make sure the correct O-Rings are installed on gallery pipe.

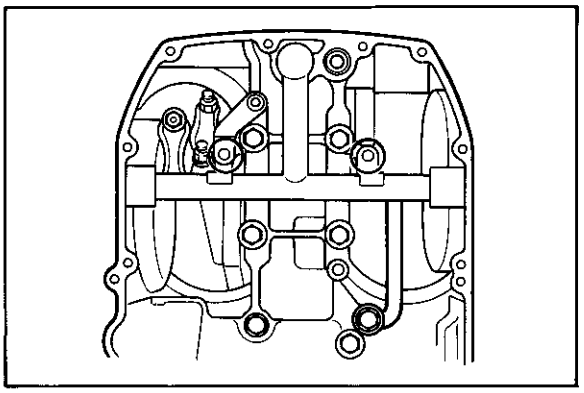


3. Install the oil pipe on the lower crankcase.



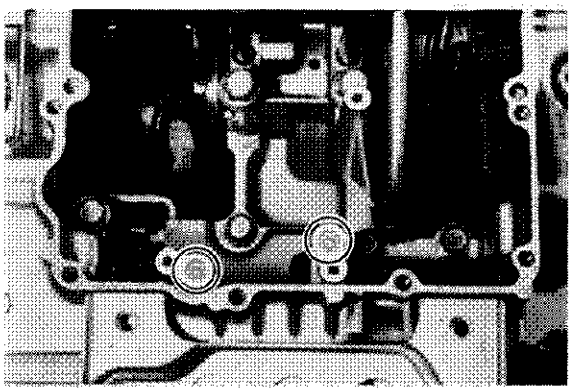
1. O-ring

4. Tighten the main oil gallery pipe bolts.

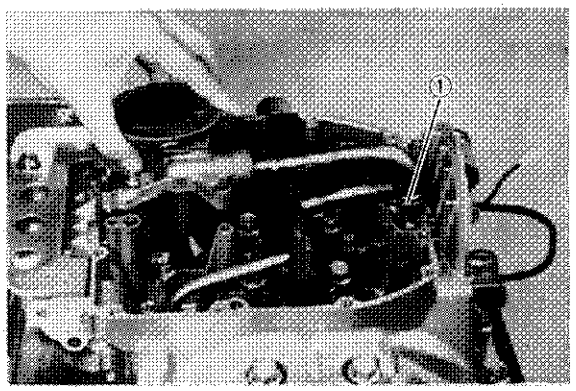


Tightening torque:
- 6 mm Flange bolt
  - 12 Nm (1.2 m·kg, 8.7 ft·lb)
- 8 mm Union bolt
  - 17.5 Nm (1.75 m·kg, 12.5 ft·lb)

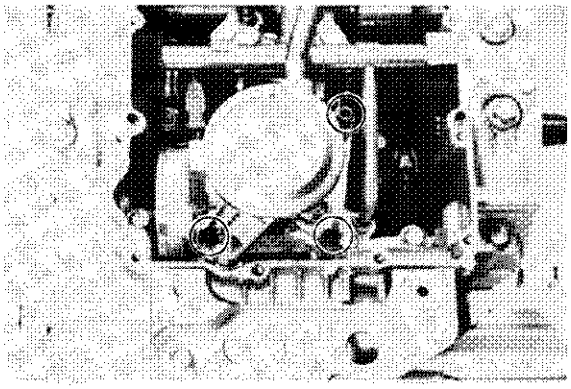
5. Install the oil pump pins on the lower crankcase.



6. Install the oil pump assembly on the lower crankcase.



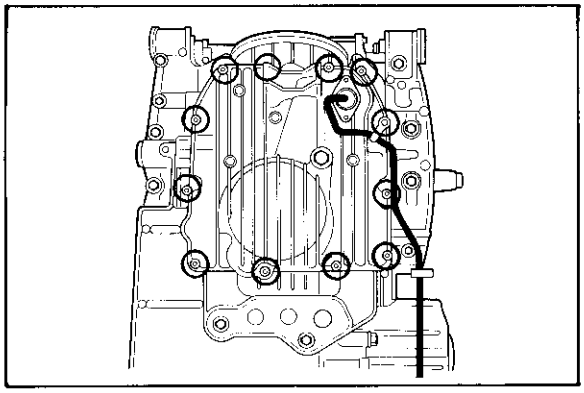

1. O-ring



Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)

**NOTE:**
Insert the oil pipe into the crankcase oil pipe hole until the O-ring can not be seen , then push the oil pump onto the crankcase dowel pin.

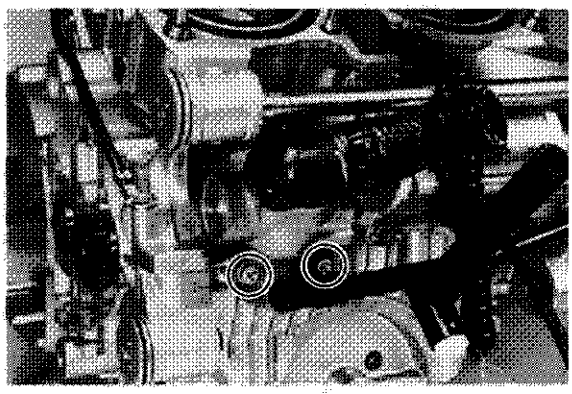
7. Install the oil pan on the lower crankcase.



Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)

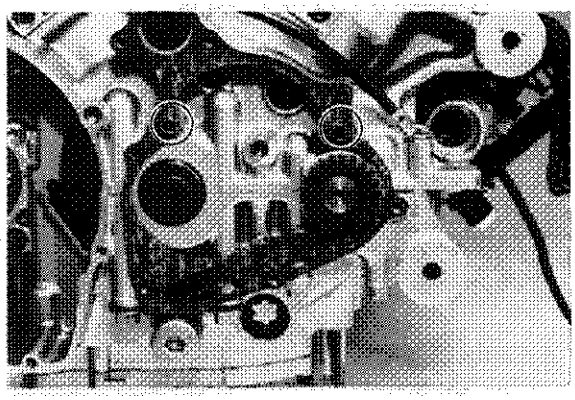
**Water Pump and Thermostatic Valve**

1. Install the thermostat assembly and pipes on the lower crankcase.

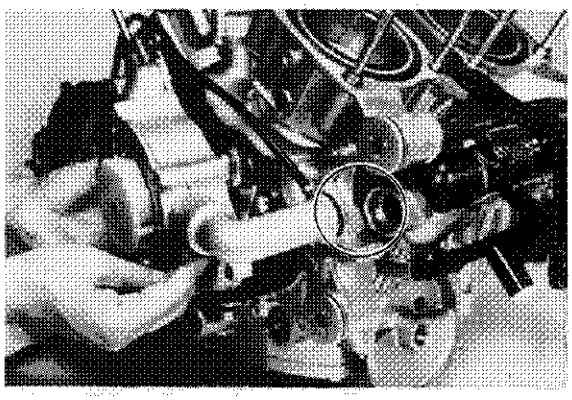


Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)

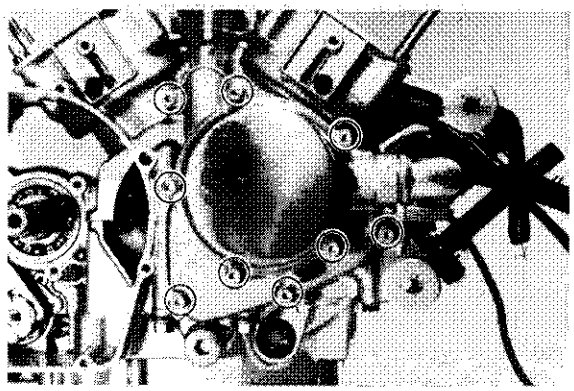
2. Install the water pump case gasket and pins on the right hand side of the crankcase.



3. Install the water pump case assembly on the crankcase.



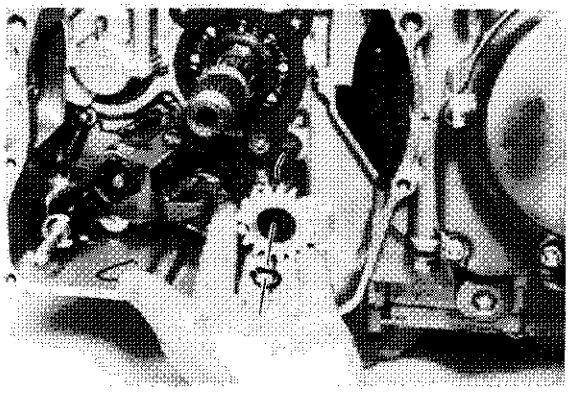
4. Tighten the water pump case and cover.



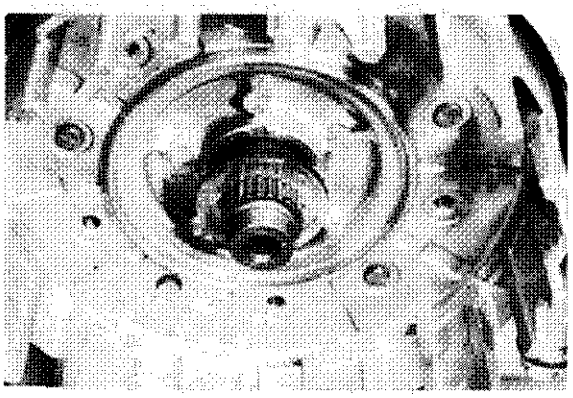
Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)

**Clutch and Oil Pump Drive Gear**

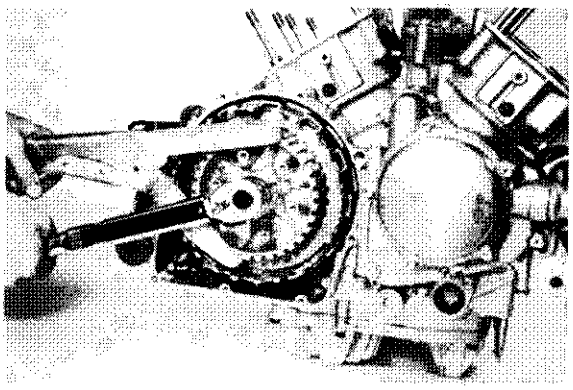
1. Install the oil pump drive gear.



2. Install the primary driven gear and thrust plate.

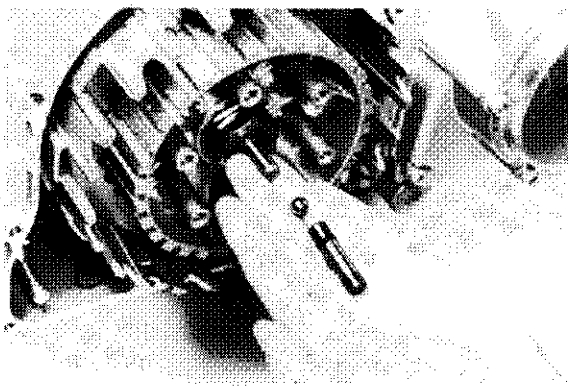


3. Install the clutch boss, a new lock washer and nut, then tighten the nut to the specified torque. Use the Clutch Boss Holder (special tool).



Tightening torque:
70 Nm (7.0 m·kg, 50 ft·lb)

4. Bend the lock washer tabs upward along the sides of the nut.
5. Push the large push rod, ball, and the short push rod into the main axle.

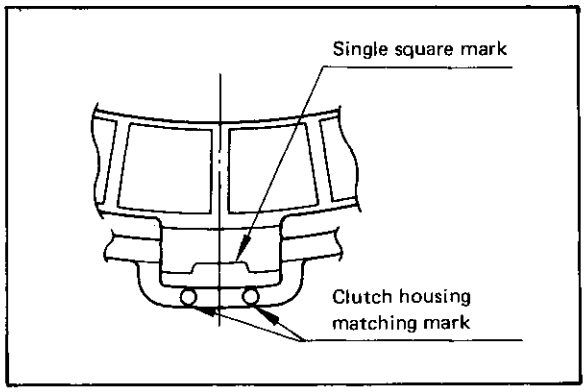


6. Install the friction plates and clutch plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.

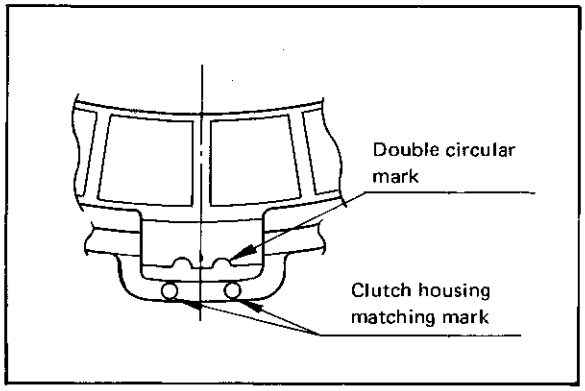
**NOTE:**

Align the slotted friction plates to the clutch housing embossed match marks as follows:

- Position the single, square slotted friction plate so that the wider slot faces the clutch housing embossed match marks. Be sure this friction plate is placed between its respective clutch plate and the pressure plate.



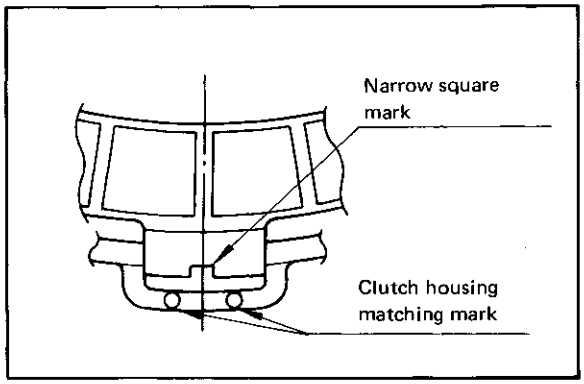

- Postion the six circular slotted friction plates so that the double-slotted end faces the embossed match marks on the clutch housing.



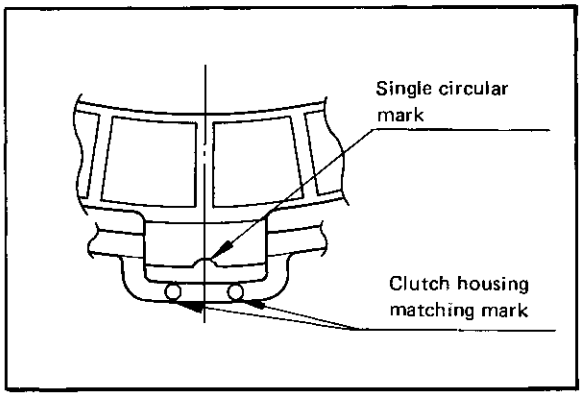

**CAUTION:**

**If the clutch doesn't release due to hard meshing between the friction plate and the clutch housing, check to see if any of the friction plates fit too snugly into the clutch housing. Any tight-fitting friction plates must be repositioned as follows:**

- **Remove the square slotted friction plate, invert, then reinstall the plate so that the narrow slotted end faces the embossed match marks on the clutch housing.**



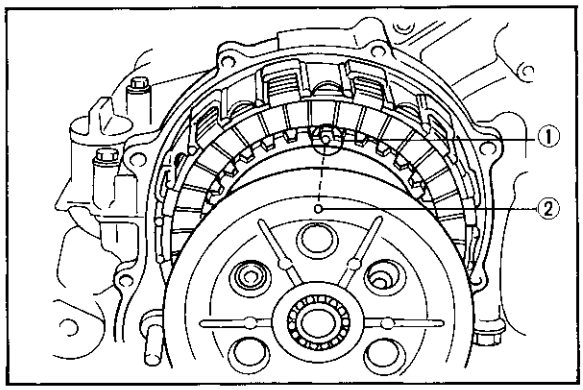

- **Remove any tight-fitting circular slotted friction plates, invert, then reinstall so that the single slotted end faces the embossed match marks on the clutch housing. housing.**




7. Install the pressure plate assembly onto the clutch boss.

NOTE:

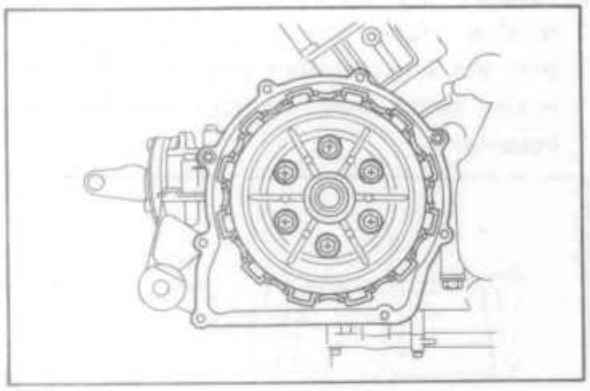
Be sure to match the alignment holes on the pressure plate with those on the clutch boss.



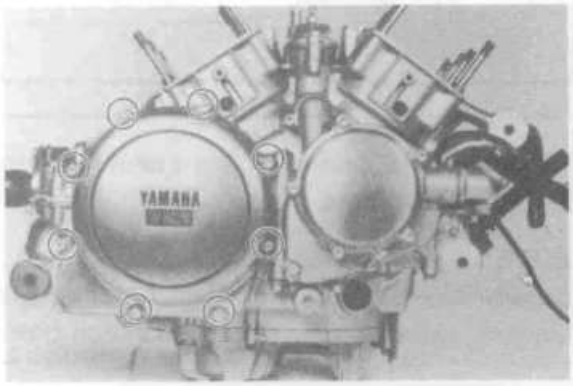

1. Clutch boss hole 2. Clutch plate hole

8. Install the clutch springs and screws. Tighten the screws.
   Install the pins and gasket.

Clutch screw torque:
8 Nm (0.8 m·kg, 5.8 ft·lb)



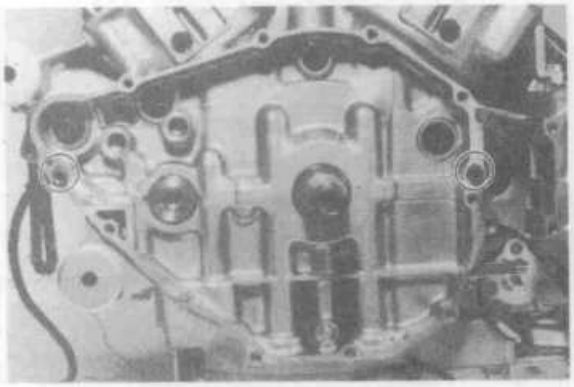
9. Install the clutch cover.




Tightening torque:
12 Nm (1.2 m·kg, 8.7 ft·lb)

**Generator**

1. Install the dowel pins on the crankcase.

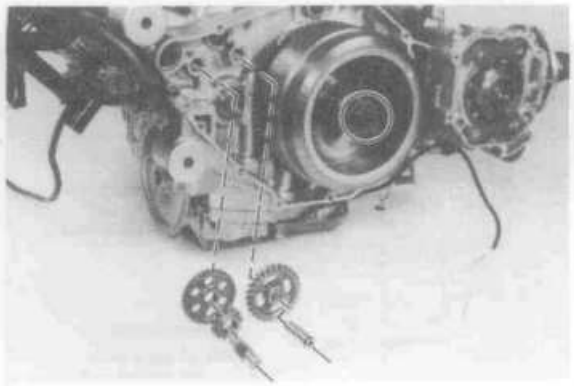


2. Install the starter clutch gear and key on the crankshaft.




1. Starter clutch gear 2. Key

3. Install the generator rotor and starter gear train.



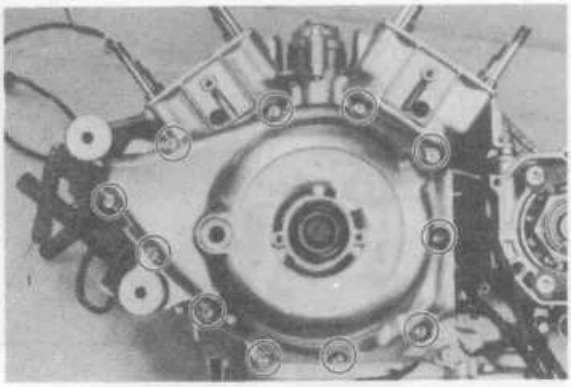
Rotor bolt tightening torque:
130 Nm (13 m·kg, 94 ft·lb)

**NOTE:**

Be sure to remove any oil and or grease from the tapered portion of the crankshaft and rotor a thinner.

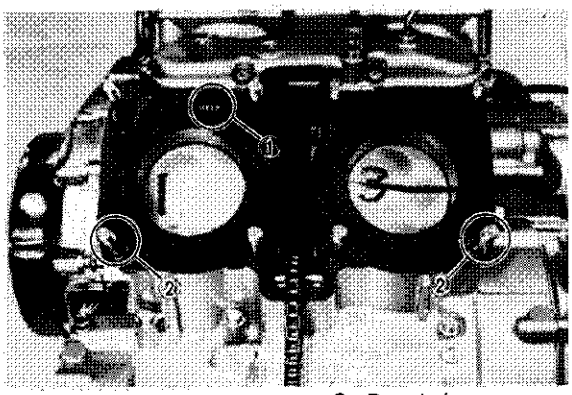
4. Install the AC generator cover and tighten the bolts to specification. Do not forget to install a new gasket.

Tightening torque:
10 Nm (1.0 m·kg, 7.2 ft·lb)



**Cylinder Heads and Camshaft**

1. Fit the dowel pins to the stud bolts and install cylinder head gaskets on the crankcase.

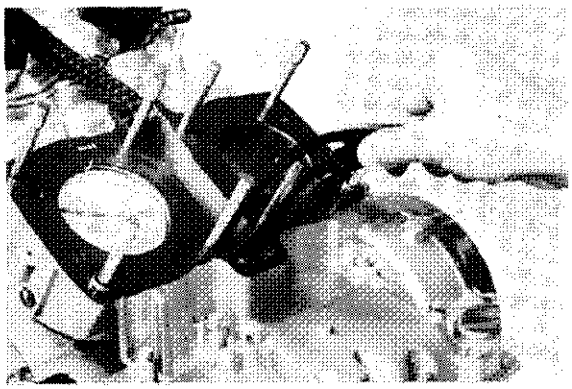


1. "HEAD" mark 2. Dowel pin

**NOTE:**

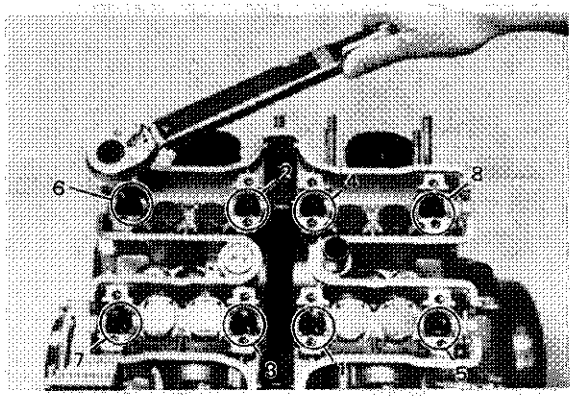
The gasket "HEAD" mark should face upward.

2. Install the rear cam chain guide (chain tensioner side) into the hooked slot on the crankcase.



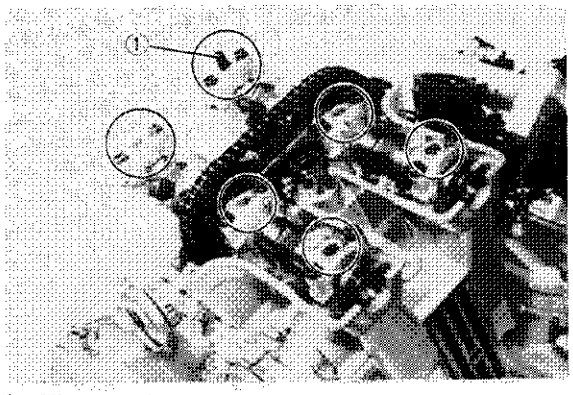
3. Install the cylinder head onto the crankcase.
   Pass the cam chain through the cam chain cavity in the cylinder head and bring it out of the cylinder head top, then secure it with a mechanic's wire so that it does not fall into the crankcase.
4. Place the cylinder head nuts and washers in place. Follow the numbered order in the photo for the proper tightening sequence. Torque all nuts in two stages. Finally, torque the nuts to the specification.

Tightening torque:
43 Nm (4.3 m·kg, 31 ft·lb)



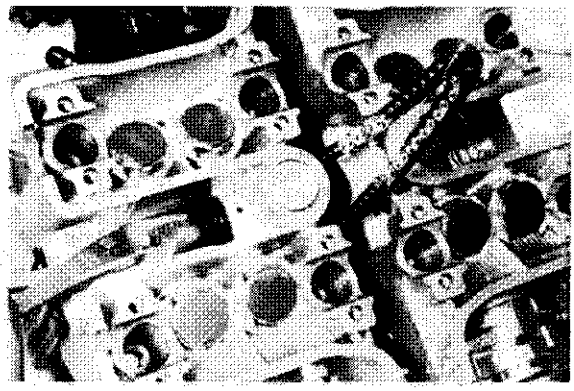
**NOTE:**

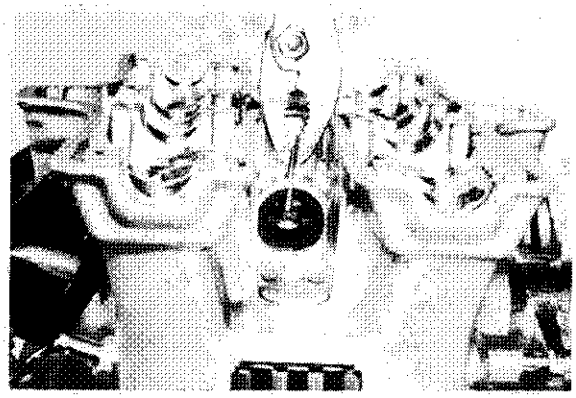
- Be sure not to lubricate the bolt threads with engine oil. Tighten the nuts in two stages, 1/2 torque and then full torque valvue to achieve proper torque tightness.
- Cylinder head nuts may be retightened, when necessary, without removing the camshaft. The steps are as follows:
  a. Remove the rubber caps from the cam cap holes.
  b. Insert a long Allen Wrench (special tool) through each of the combined cam cap/camshaft bores until it engages the cylinder head nut.
  c. Torque-tighten each cylinder head nut to the proper specifications.



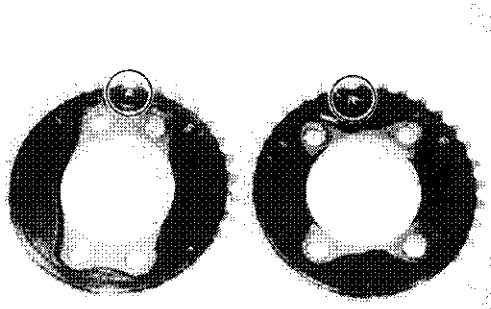
1. Allen wrench

5. Install the water jacket joints through the front and rear cylinder heads. Be sure each joint passes through its corresponding cam cain and into the opposite cylinder. Install the stopper pins to lock the joints.

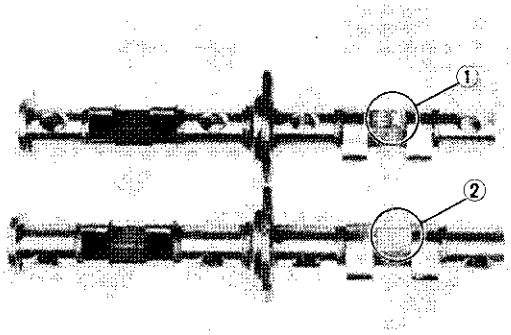




6. Install the rear cylinder head cam chain sprockets onto their respective cam chain sprocket bosses on the intake and exhaust camshafts (marked "IN" and "EX" between the camshaft lobes). Make sure the "F" or "R" marks (Front or Rear cylinder head) on the cam chain sprockets face away from the "IN" and "EX" marks (Intake and Exhaust) on the camshafts.
   Repeat the same step for the front cylinder head cam chain sprockets.

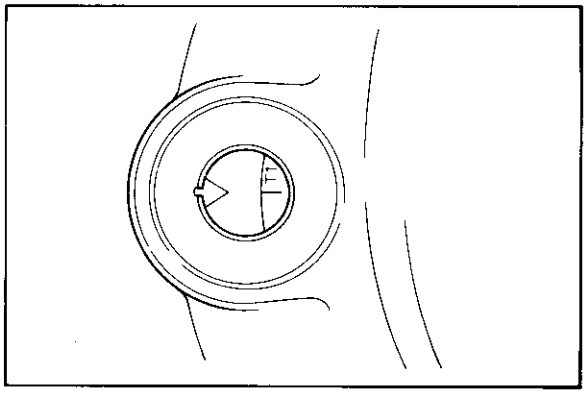


1. "F" mark for front cylinder head cam chain sprocket
2. "R" mark for rear cylinder head cam chain sprocket




1. "EX" for exhaust camshaft
2. "IN" for intake camshaft

7. Cam chain installation (Rear cylinder)
   a. While turning the crankshaft, align the "T-1" mark on the generator rotor with the match mark on the left crankcase cover, and set the No.1 piston at TDC.



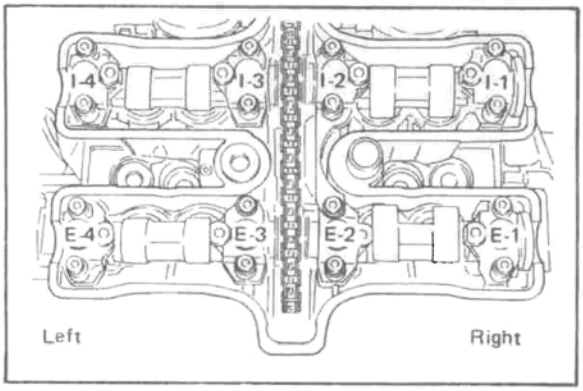
**CAUTION:**

**Never turn the generator rotor installing bolt. Rotating the bolt may loosen it, causing the rotor to fall off.**

   b. Pass each camshaft, with cam chain sprocket installed, through its respective cam chain before positioning the camshafts onto the rear cylinder head.
      - Be sure the intake camshaft is installed closest to the intake manifold.
      - Be sure you install the correctly marked camshafts onto the rear cylinder head. Verify by confirming the "R" marks on the cam chain sprockets.



c. Lubricate all cam cap and cam bearing surfaces liberally with oil.
d. Place the cam caps in their proper positions. The caps are identified from "I-1" to "I-4" for intake and from "E-1" to "E-4" for exhaust. Install the bolts finger tight only.




NOTE:

- The intake and exhaust cam cap numbers start, in sequence, from right to left in the rear cylinder head.
  For example: The intake cam cap numbers would run in this sequence; I-1, I-2, I-3, and I-4. The exhaust cam cap sequence would be E-1, E-2, E-3, and E-4.
- Do not install the No. 2 intake or No. 2 exhaust cam caps at this stage.

CAUTION:

- **Make sure the valve timing mark (○: small hole) on the camshaft faces upward. Then install the cam caps.**
- **The cam caps must be tightened evenly or damage to the cylinder head, cam, and cam caps will result.**

e. Intake camshaft and cam chain sprocket installation.
   1) Rotate the intake camshaft and align the timing mark (○: small hole) with the embossed cam cap match mark.
   2) Adjust the chain links between the crankshaft and the cam chain sprocket as follows:
      - Force the intake camshaft sprocket counterclockwise until all of the chain slack has been removed.
   3) Repeat steps 1 and 2. Then align the "I" mark hole on the cam chain sprocket with the thread hole on the intake camshaft. Temporarily tighten the cam chain sprocket to the camshaft.

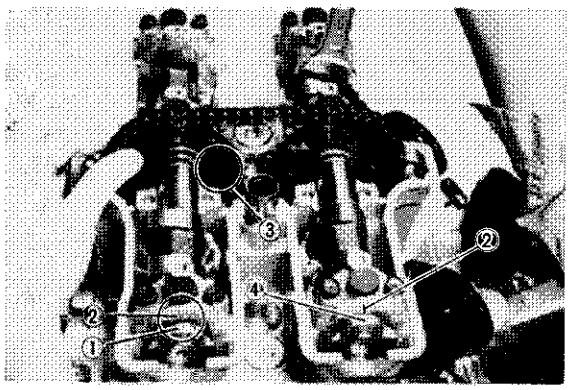



1. Camshaft timing mark (○: Small hole)
2. Cam cap match mark
3. Cam sprocket "I" mark hole

f. Exhaust camshaft and cam chain sprocket installation
   1) Rotate the exhaust camshaft and align the exhaust camshaft timing mark (○: small hole) with the embossed cam cap match mark.
   2) Adjust the chain links between the intake and exhaust cam chain sprockets.
   3) Turn the intake camshaft and align the intake camshaft timing mark with the embossed cam cap match mark.
   4) Repeat steps 2 and 3. Then align the "E" marked hole on the cam sprocket with the thread hole on the exhaust camshaft. Temporarily tighten the cam chain sprocket to the camshaft.

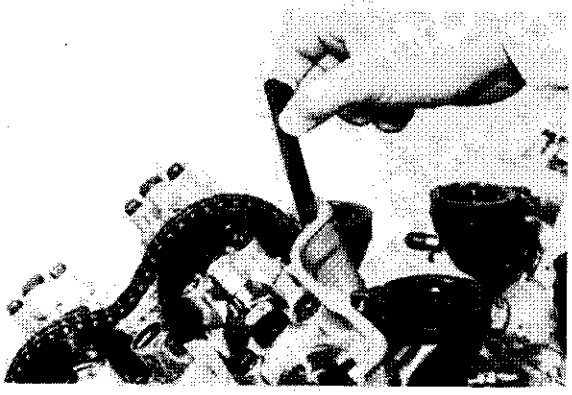
**NOTE:**

At this stage make sure the intake camshaft timing mark is aligned with the embossed cam cap match mark.

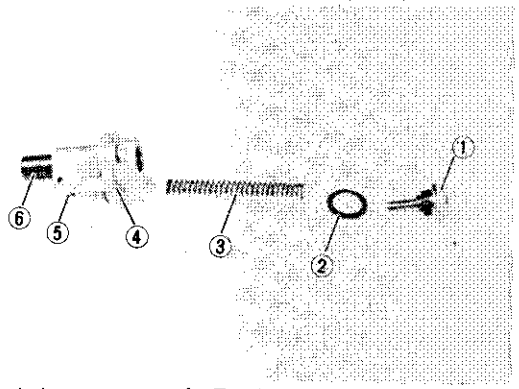


1. Exhaust cam shaft timing mark (○: Small hole)
2. Cam cap match mark
3. Cam sprocket "E" mark hole
4. Intake cam shaft timing mark (○: Small hole)

g. Cam chain guide installation (Front)
Install the front cam chain guide. Secure snugly into the hooked crankcase slot below.



h. Cam chain tensioner installation.
1) Install the cam chain tensioner in the following manner.

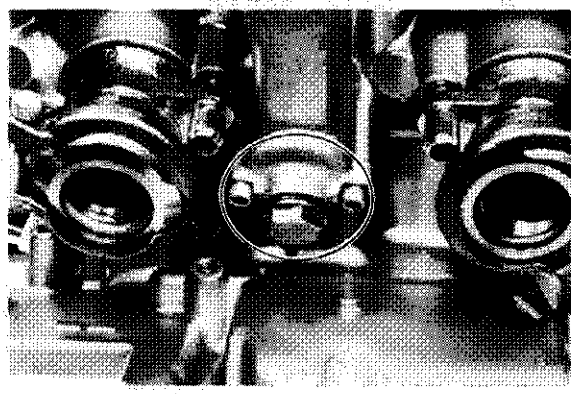


1. End plug
2. Washer
3. Spring
4. Tensioner body
5. Oneway cam
6. Tensioner rod

2) Unlock the oneway cam by pushing it with your finger, then push the tensioner rod into the tesioner body until it stops.
3) Install the tensioner body.

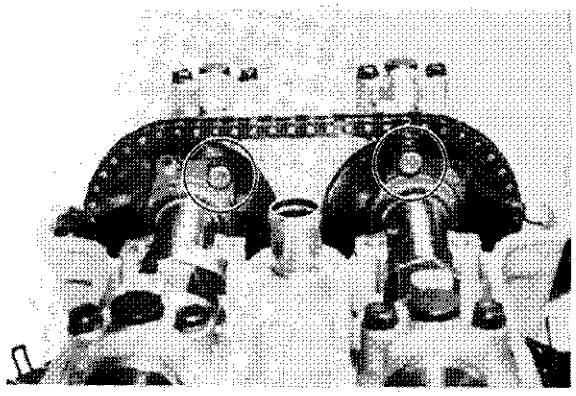
| Tightening torque: |
|---|
| 12 Nm (1.2 m·kg, 8.7 ft·lb) |

4) Reinstall the spring and the end plug with washer. Torque the end plug to specification.



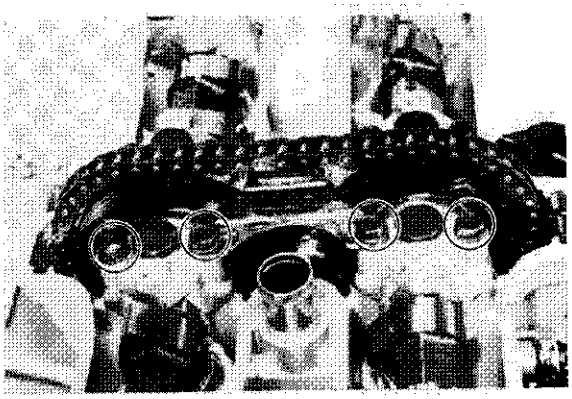
| Tightening torque: |
|---|
| 20 Nm (2.0 m·kg, 14 ft·lb) |

i. Cam chain sprocket final installation
1) Turn the crankshaft counterclockwise until the camshaft rotates 1/2 turn, then temporarily tighten the cam cap bolts.
2) Tighten the four cam sprockets.



| Tightening torque: |
|---|
| 20 Nm (2.0 m·kg, 14 ft·lb) |

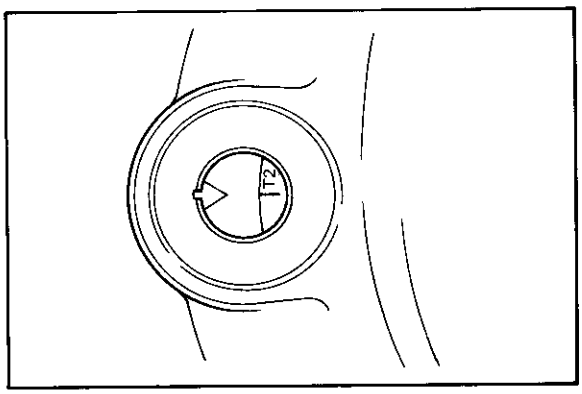
j. Cam chain guide (Upper) and "I-2" and "E-2" cam cap installation
   1) Install the "I-2" and "E-2" cam caps and upper cam chain guide.



   2) Torque-tighten the cam cap bolts in two stages and final torque to specification.

| Tightening torque: |
| --- |
| 10 Nm (1.0 m·kg, 7.2 ft·lb) |

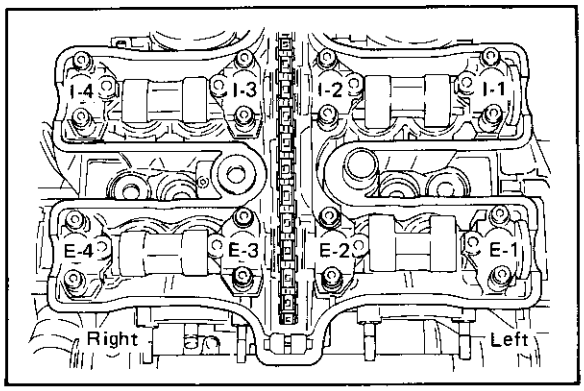
8. Cam chain installation (Front cylinder head)
   a. With the #1 piston set at TDC (The "T-1" mark should be visible on the generator rotor), turn the crankshaft counterclockwise 430°. Align the "T-2" mark on the generator rotor with the match mark on the left crankcase cover. Then set the #2 piston at TDC.




**CAUTION:**

**Although the T-2 mark will appear at 70°, failure to continue rotation to 430° will result in a misalignment.**

   b.c. Same steps as 7 b and c (Rear cylinder head).
   d. Same step as 7 d except for the following note:



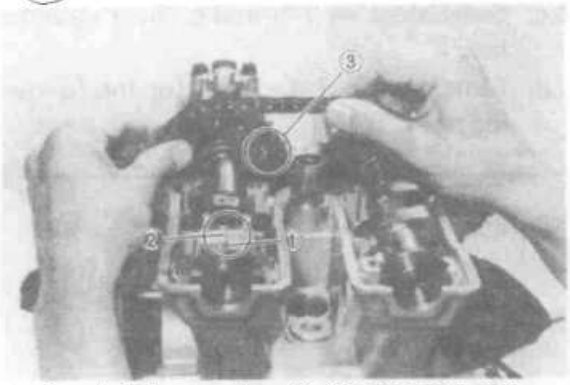

**NOTE:**

Intake and exhaust cam cap number start, in sequence, from left to right in the front cylinder head.

**CAUTION:**

**Make sure the valve timing mark (○: big hole) on the camshaft faces upward. Then install the cam caps.**

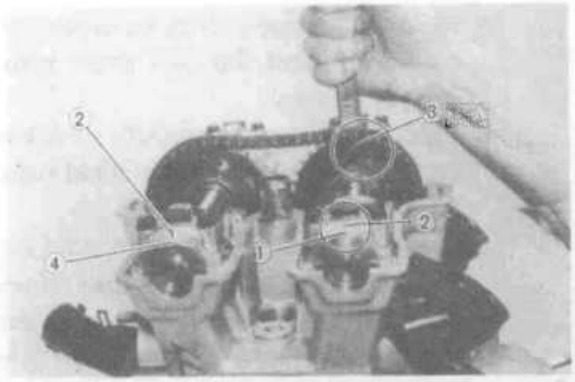
   e. Exhaust camshaft and cam sprocket installation
      1) Rotate the exhaust camshaft and align the timing mark (○: big hole) with the embossed cam cap match mark.
      2) Adjust the chain links between the crankshaft and the cam chain sprocket as follows:
      - Force the exhaust camshaft sprocket clockwise until all of the chain slack has been removed.
      3) Repeat steps 1 and 2. Then align the "E" mark hole on the cam chain sprocket with the thread hole on the exhaust camshaft. Temporarily tighten the camshaft sprocket to the camshaft.



1. Cam shaft timing mark (O: Big hole)
2. Cam cap match mark
3. Cam sprocket "E" mark hole

f. Intake camshaft and cam chain sprocket installation
   1) Rotate the intake camshaft and align the timing mark (O: big hole) with the embossed cam cap match mark.
   2) Adjust the chain links between the intake and exhaust cam chain sprockets.
   3) Repeat steps 1 and 2. Then align the "I" marked hole on the cam sprockets with the thread hole on the intake camshaft. Temporarily tighten the cam chain sprocket to the camshaft.

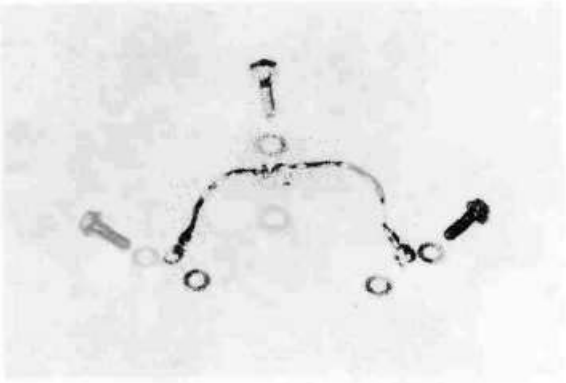
**NOTE:**
At this stage make sure the exhaust camshaft timing mark is aligned with the embossed cam cap match mark.

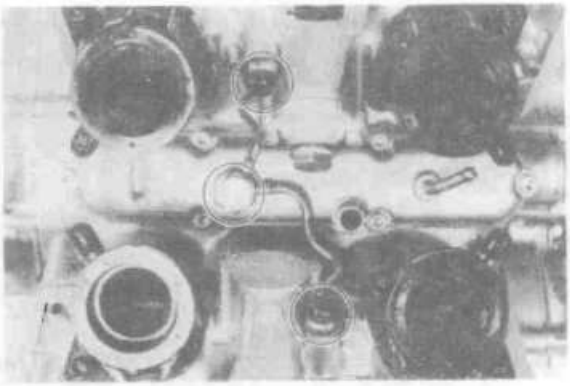


1. Intake cam shaft timing mark (O: Big hole)
2. Cam cap match mark
3. Cam sprocket "I" mark hole
4. Exhaust cam shaft timing mark (O: Big hole)

g. Repeat the same steps as in "Rear cylinder head coma chain installation".
   Refer to steps 7; g to j on pages 3-57 and 3-58.

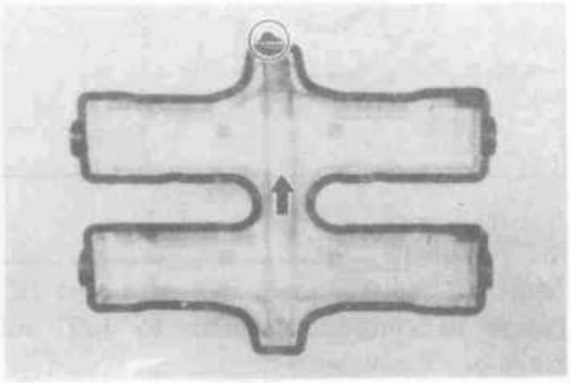
9. Oil pipe installation
   Connect the oil pipe between the cylinder heads and bolt the pipe's center section to the breather cover.



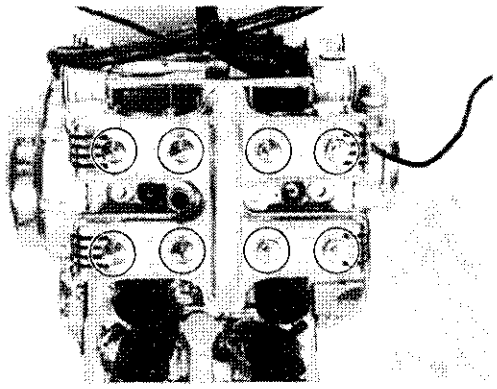


Tightening torque:
(To cylinder head)
17.5 Nm (1.75 m·kg, 12.5 ft·lb)
(To breather cover)
20 Nm (2.0 m·kg, 14 ft·lb)

10. Cylinder head cover gasket installation
    Install a new head cover gasket. Be sure the gasket projection faces the arrow mark on the inside cylinder head cover.



11. Cylinder head cover and spark plug installation
    Install the cylinder head covers and spark plugs on the cylinder heads.



| Tightening torque: |
|---|
| Cylinder head cover |
| 10 Nm (1.0 m·kg, 7.2 ft·lb) |
| Spark plug |
| 17.5 Nm (1.75 m·kg, 12.5 ft·lb) |

**CAUTION:**

**Make sure all rubber caps are installed correctly on the cam caps.**

12. AC Generator cover and screw plug installation
    Install the screw plug and AC generator cover onto the left crankcase cover.

**Remounting Engine**

1. Refer to engine removal. Reverse the applicable removal steps.

**NOTE:**

Be sure to position the rear exhaust pipe assembly between the engine and the chassis before tightening the engine mounting bolts.

2. Install and tighten each component as follows:

a. Engine mounting bolts.

| Front upper: |
|---|
| 40 Nm (4.0 m·kg, 29 ft·lb) |
| Front lower: |
| 40 Nm (4.0 m·kg, 29 ft·lb) |
| Rear: |
| 70 Nm (7.0 m·kg, 50 ft·lb) |
| Front cross frame take: |
| 23 Nm (2.3 m·kg, 17 ft·lb) |
| Right lower frame tube: |
| 32 Nm (3.2 m·kg, 23 ft·lb) |
| Left side frame tube: |
| 15 Nm (1.5 m·kg, 11 ft·lb) |

b. Oil filter mounting bolt.

| 32 Nm (3.2 m·kg, 23 ft·lb) |
|---|

c. Clutch release cylinder bolt.

| 12 Nm (1.2 m·kg, 8.7 ft·lb) |
|---|

d. Footrest bracket bolts.

| 32 Nm (3.2 m·kg, 23 ft·lb) |
|---|

e. Oil drain bolt.

| 43 Nm (4.3 m·kg, 31 ft·lb) |
|---|

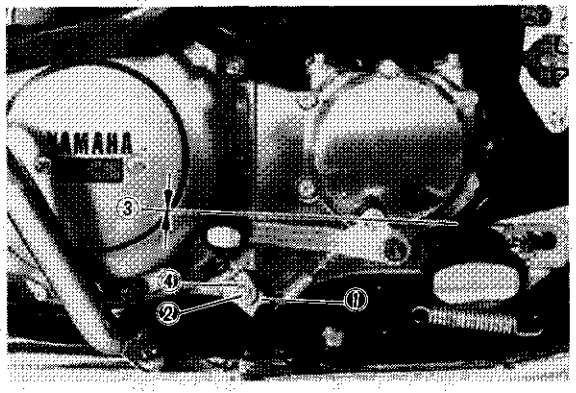
f. Coolant drain bolt.

| 43 Nm (4.3 m·kg, 31.0 ft·lb) |
|---|

3. Install change arm and brake arm as shown below. Adjust change and brake pedal height as necessary.

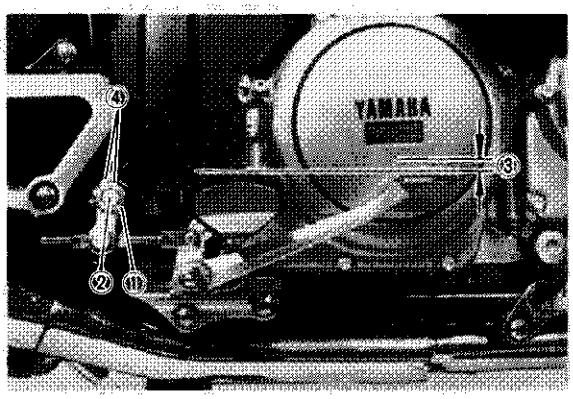
| Std. Change pedal height: 0 mm (0 in) |
|---|
| Std. Brake pedal height: 10 mm (0.4 in) |

a. Change arm



1. Change arm
2. Shaft
3. Std. change pedal height 0 mm (0 in)
4. Matching mark

b. Brake arm



1. Brake arm
2. Shaft
3. Std. brake pedal height 10 mm (0.4 in)
4. Matching mark

4. Add the engine oil into the engine.

| Oil capacity: |
| --- |
| 4.7 L (4.1 Imp qt, 5.0 US qt) |

5. Pour the coolant into the radiator.

| Coolant capacity: |
| --- |
| 2.8 L (2.5 Imp qt, 3.0 US qt) |

# CHAPTER 4. CARBURETION

CARBURETOR . . . . . 4-1
Section View . . . . . 4-2
Specifications . . . . . 4-3

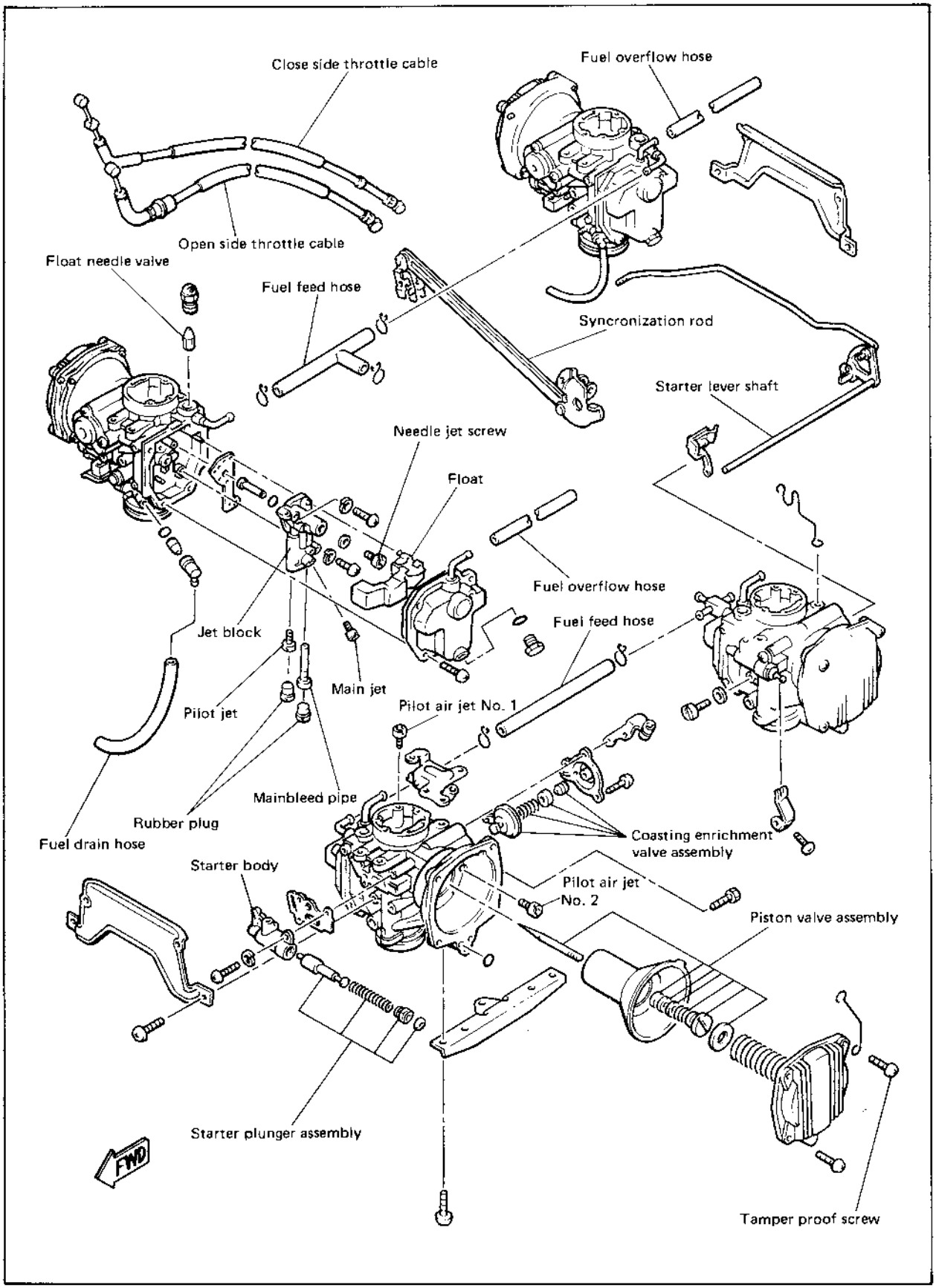
CARBURETOR OVERHALL . . . . . 4-3
Carburetor Separation . . . . . 4-3
Disassembly, Inspection, and Assembly . . . . . 4-4
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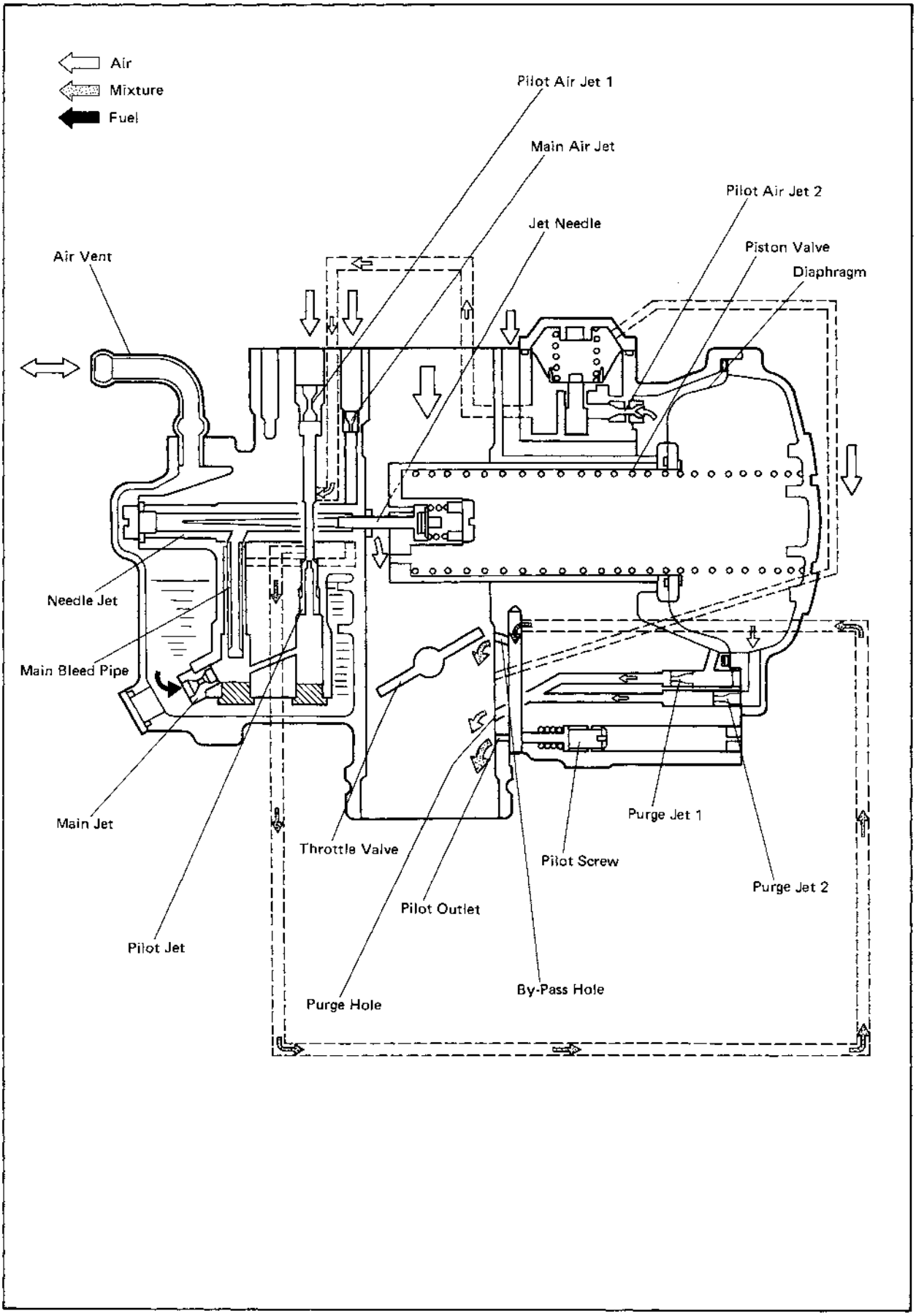
4

# CARBURETION

## CARBURETOR



## Section View



### Specifications

| | XVZ12TK |
|---|---|
| Main jet | #117.5 |
| Main air jet | #65 |
| Jet needle | 5GLZ37 |
| Needle jet | X-6 |
| Pilot jet | #42.5 |
| Fuel level | 14 ± 0.5 mm (0.55 ± 0.020 in) |
| Pilot screw | Preset |
| Float valve seat | $\phi$1.5 |
| Engine idle speed | 1,000 ± 50 r/min |

**CAUTION:**

**The pilot screw settings are adjusted for maximum performance at the factory where specialized equipment is used. Do not attempt to change these settings. Any changes will decrease performance if all other engine system are functioning correctly.**

## CARBURETOR OVERHALL

### Carburetor Separation

NOTE:

Be sure to remove the carburetor assembly before disassembling carburetor. Refer to engine removal section.

**CAUTION:**

**Separation of the carburetors is not recommended.**

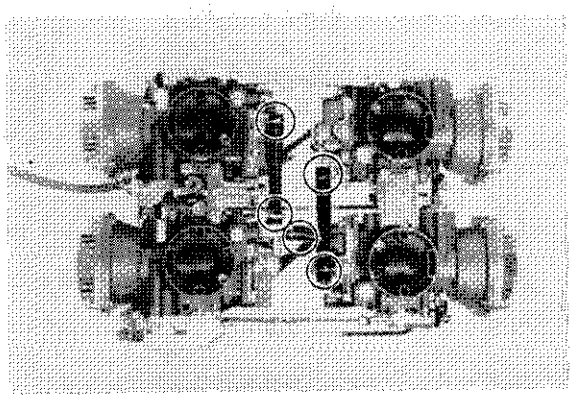
**The following parts can be cleaned and inspected without disassembly.**

- **Piston valve**
- **Starter plunger**
- **Coasting enrichment valve**

**The carburetor body support screws are locked with a locking compound such as "LOCTITE". If the carburetors are separated, misalignmemt will result.**

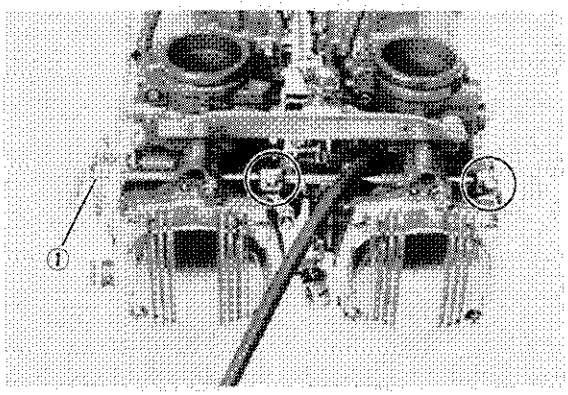
Fuel pipe

1. Remove the fuel pipes from carburetors.



Starter lever shaft

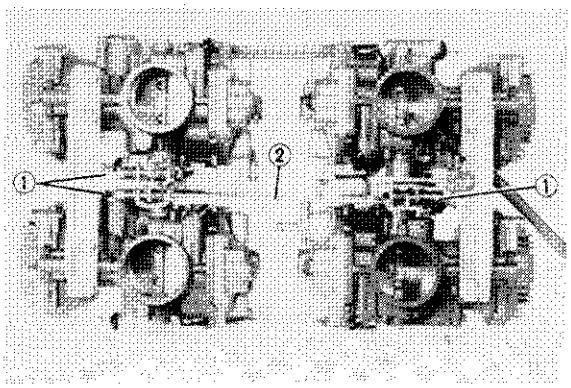
1. Loosen the starter lever securing screws and remove the starter lever shaft.



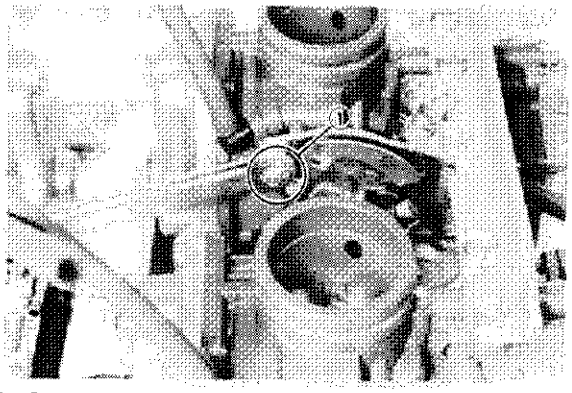
1. Starter lever shaft

Syncronization rod and screw

1. Remove the syncroniztion rod and screws.



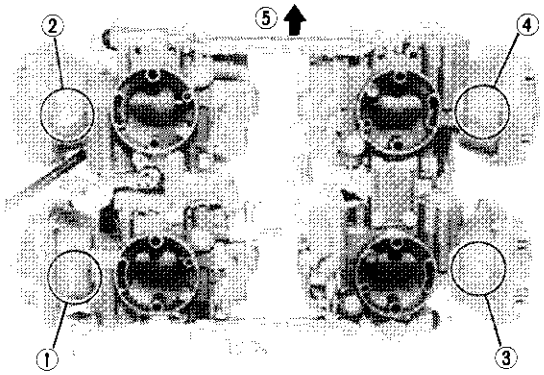
1. Syncronization screw 2. Syncronization rod



1. Circlip

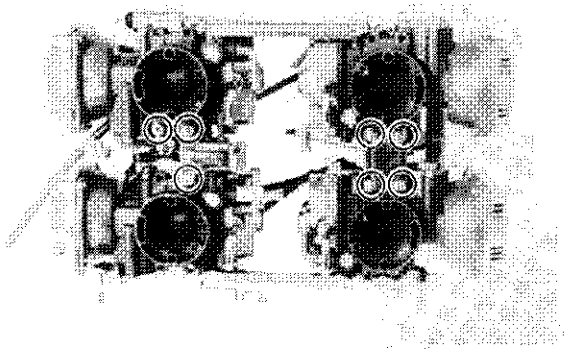
Bracket

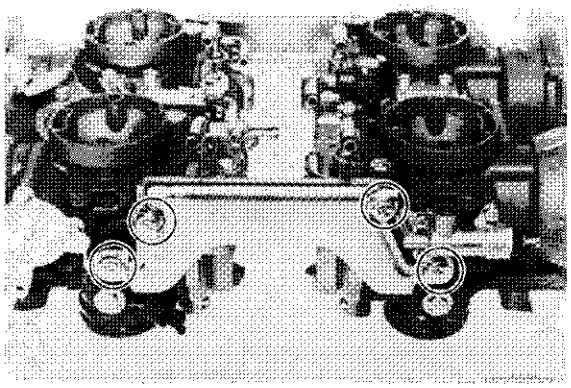
1. Number each carburetor before removing it from the carburetor bracket. This facilitates reassembly and insures that the carburetor will be reinstalled in its proper position.

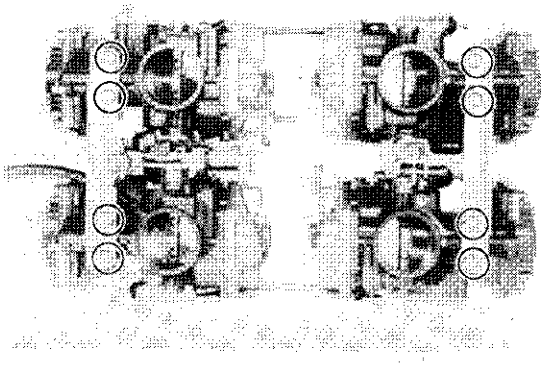


1. #1 Carburetor
2. #2 Carburetor
3. #3 Carburetor
4. #4 Carburetor
5. Front

2. Remove the carburetor joint brackets.







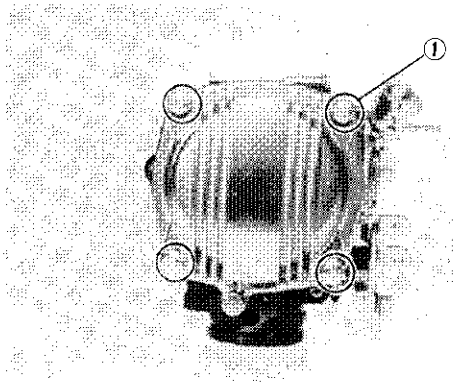
## Disassembly, Inspection, and Assembly

Piston valve

**CAUTION:**

**The plastic piston valve is fragile and highly susceptible to damage. Be sure to handle with extreme care. Do not drop the valve or subject it to undue abuse as this can cause cracks that could severely weaken the piston valve.**

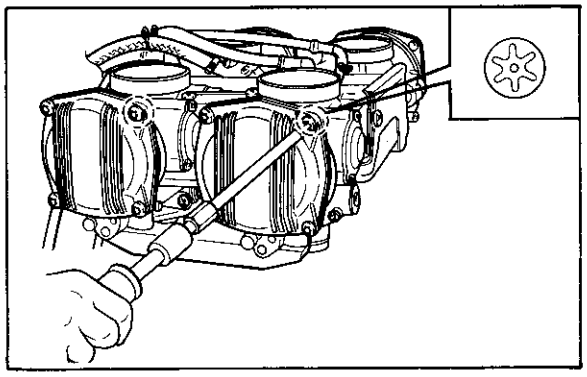
1. Remove the vacuum chamber cover and remove the spring and piston valve assembly.



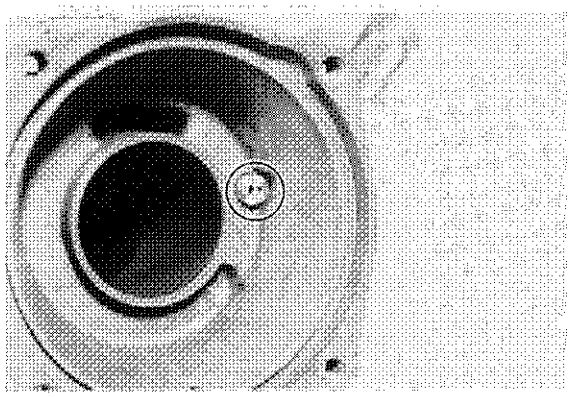
1. Tamper proof screw

**NOTE:**

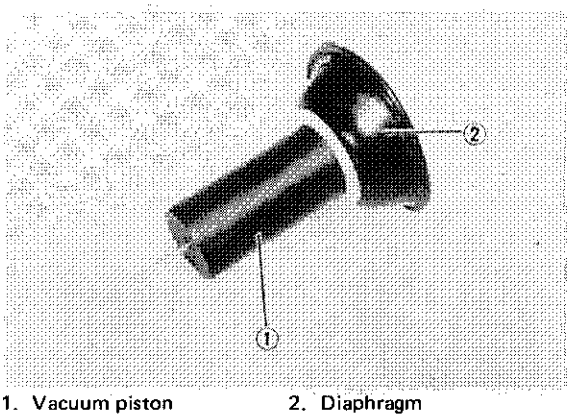
Tamper-proof screws are used on the upper right-side vacuum chamber cover to inhibit possible customer abuse. The special torx wrench is required to loosen or tighten this screw.



2. Remove the pilot air jet 2.



3. Inspect the vacuum piston and rubber diaphragm. If the piston is scratched or the diaphragm is torn, the piston valve assembly must be replaced.

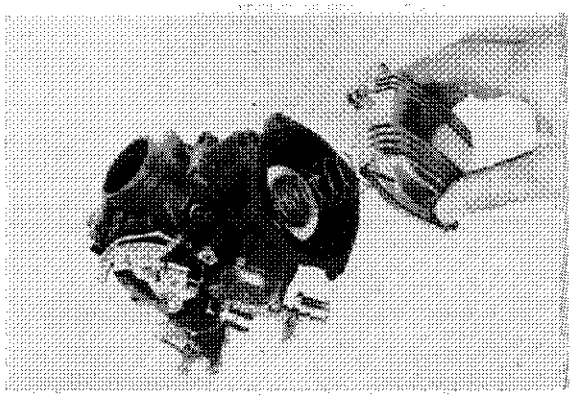



1. Vacuum piston 2. Diaphragm

**NOTE:**

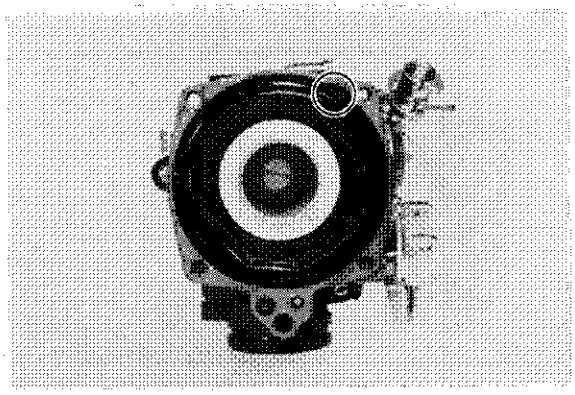
If you suspect the piston valve has been damaged, check the component for cracks by pouring gasoline into the valve. If it leaks, replace with a new piston valve.

4. Install the piston valve assembly, spring and cover.



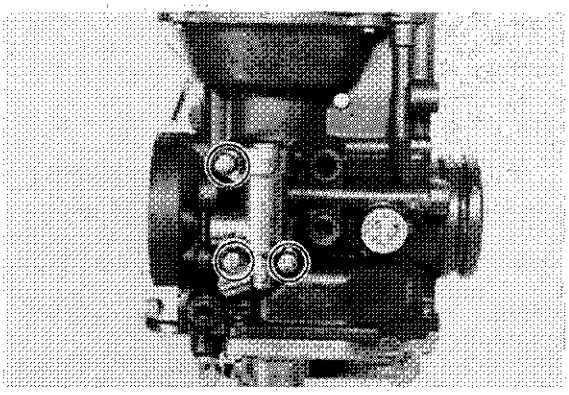
**NOTE:**

There is a tab on the rubber diaphragm and a matching recess in the carburetor body to accept the diaphragm tab.

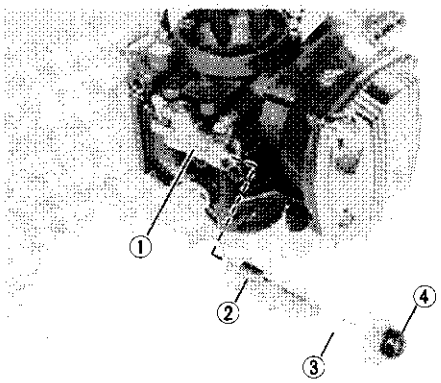


Starter plunger

1. Remove the starter plunger and starter body.
2. Inspect the starter body, plunger, and spring for damage. Replace defective parts.
3. Install starter body on the carburetor.



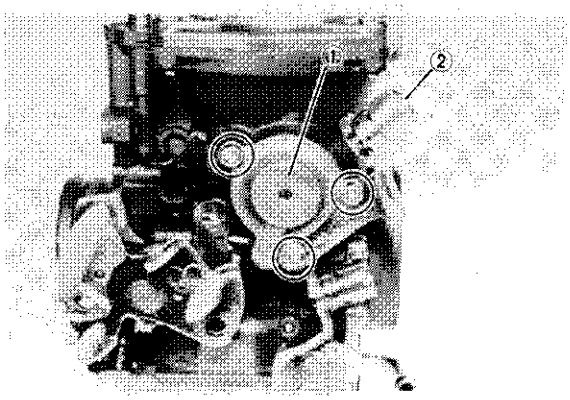
4. Install the plunger, spring and nut into the starter body.



1. Starter body
2. Starter plunger
3. Spring
4. Nut

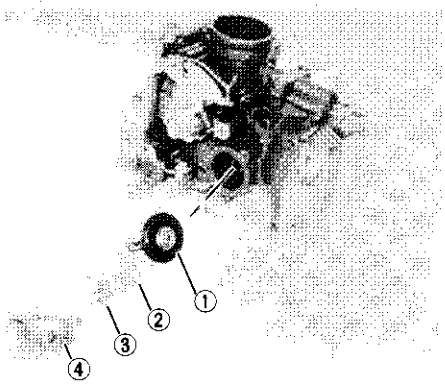
Coasting enrichment valve

1. Remove the valve cover, throttle cable bracket, and coasting enrichment valve assembly.



1. Valve cover
2. Throttle cable bracket

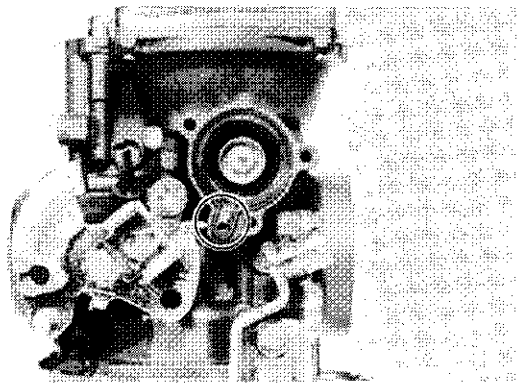
2. Inspect the rubber diaphragm. If the diaphragm is torn, replace the valve assembly.
3. Install the valve, spring, spring seat and cover on the carburetor.



1. Valve
2. Spring
3. Spring seat
4. Cover

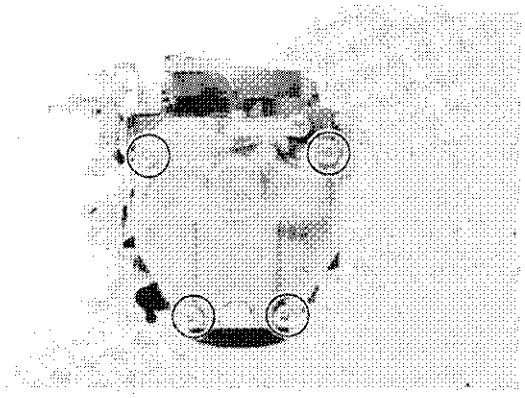
**NOTE:**

There is a tab on the rubber diaphragm and a matching recess in the carburetor body to accept the diaphragm tab.

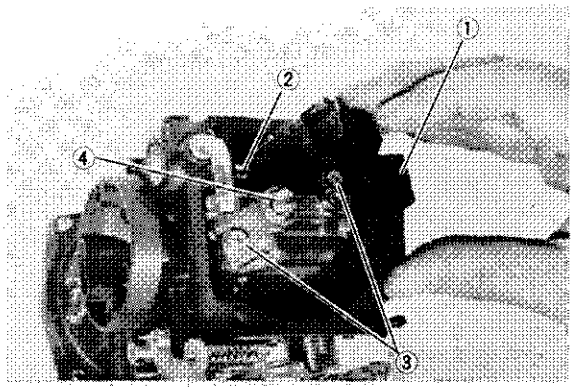


Float chamber

1. Remove the screws holding the float chamber cover and remove the cover.

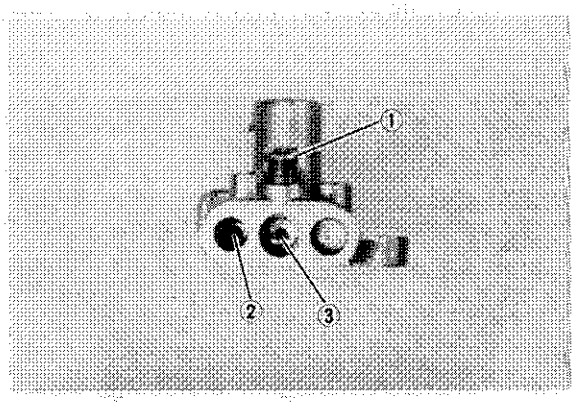


2. Remove the float, float needle valve. Loosen the jet block screw and needle jet screw.
   Remove the jet block, gasket and O-ring.



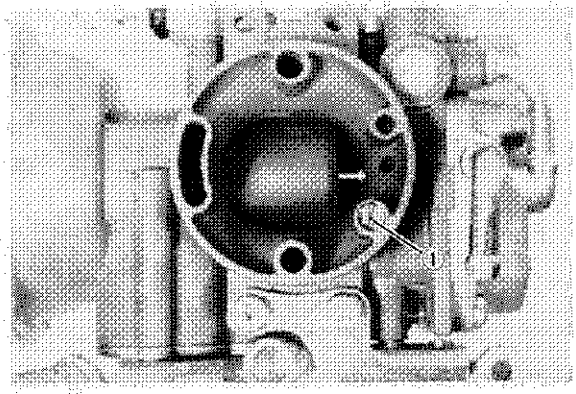
1. Float
2. Float needle valve
3. Jet block screw
4. Needle jet screw

3. Remove the main jet, pilot jet, and main bleed pipe from the jet block.



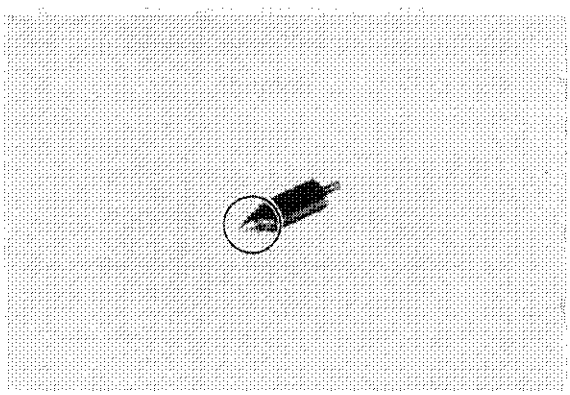

1. Main jet
2. Pilot jet
3. Main bleed pipe

4. Remove the pilot air jet 1.

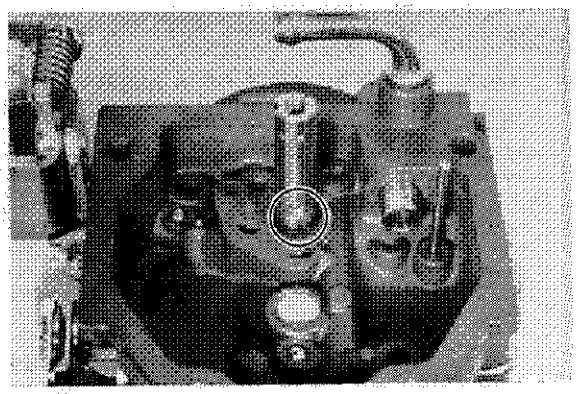


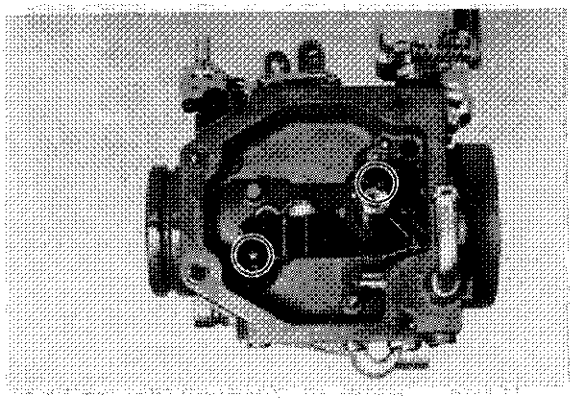

1. Pilot air jet #1

5. Examine the carburetor body and fuel passages. If contaminated, wash the carburetor in a petroleum-based solvent. Do not use caustic carburetor cleaning solutions. Blow out all passages and jets with compressed air.
6. Examine the condition of the floats. If the floats are damaged, they should be replaced.
7. Inspect the float needle valve for wear or contamination. If the needle is severely worn, replace it.

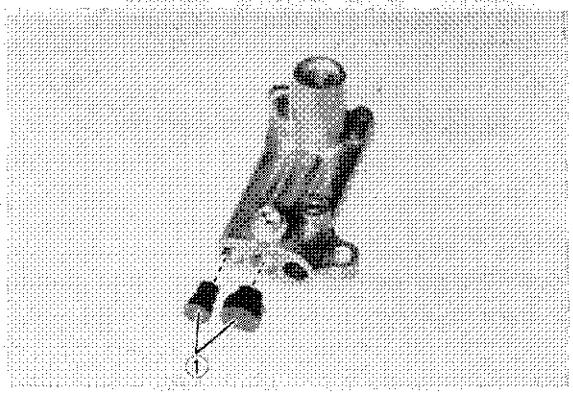


8. Install the O-ring and jet block gasket on the carburetor.



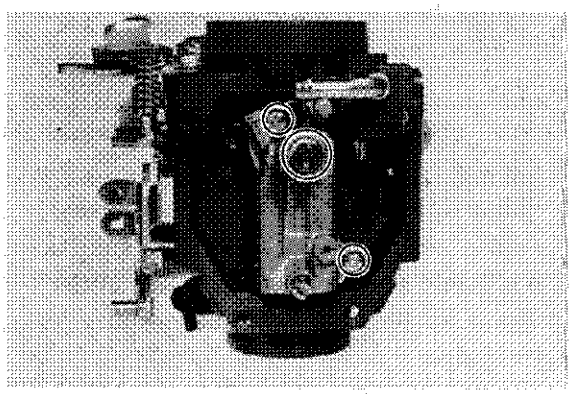


9. Install the jets and rubber plungs on the jet block.




1. Rubber plug

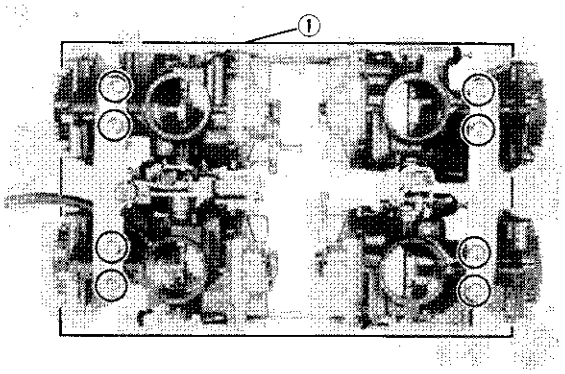
10. Install the jet block on the carburetor.



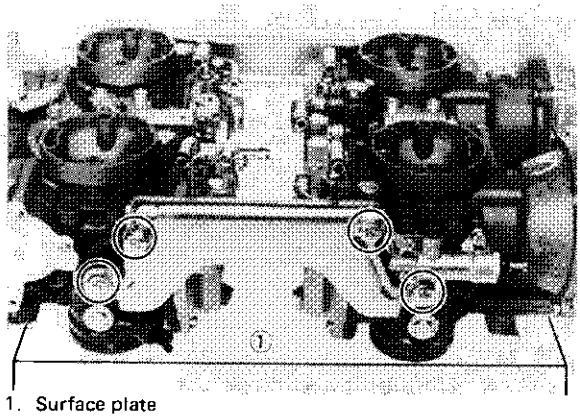
11. Install the float valve, float and float chamber cover.

**Installation**

1. Place the carburetors on a surface plate and install the carburetor support brackets. Apply a thread locking compound such as "LOCTITE" and tighten the screws securely while holding the carburetor body.



1. Surface plate



1. Surface plate

**NOTE:**

When reassembling, the surface plate should be used for the proper carburetor alignment.

2. Reassemble in reverse order of step C. "Carburetor separating".

**Adjustment**

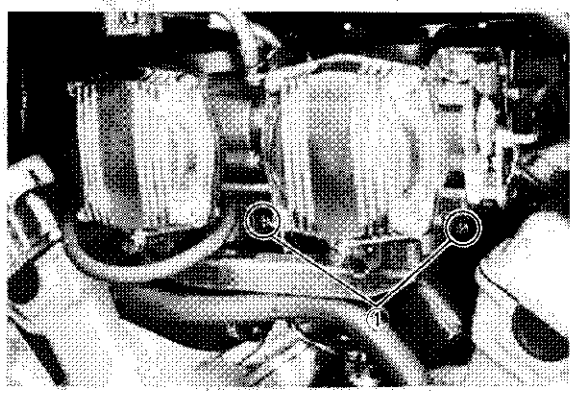
Fuel level

**NOTE:**

Before checking the fuel level, note the following:

- Place the motorcycle on a level surface.
- Adjust the motorcycle position by placing a suitable stand or a garage jack under the engine so that the carburetor is positioned vertically.

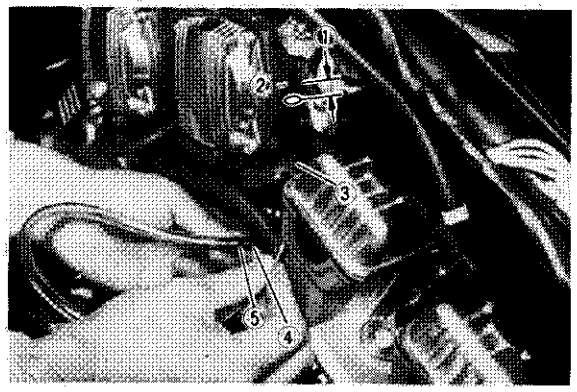
1. Conect the level gauge (special tool) to the drain pipe using a level gauge adapter.
2. Set the gauge and loosen the drain screw.



1. Drain screw

3. Start the engine and stop it after a few minutes of running. This procedure is necessary to obtain the correct fuel level.
4. Check the fuel level one by one. The level should be in the specified range.

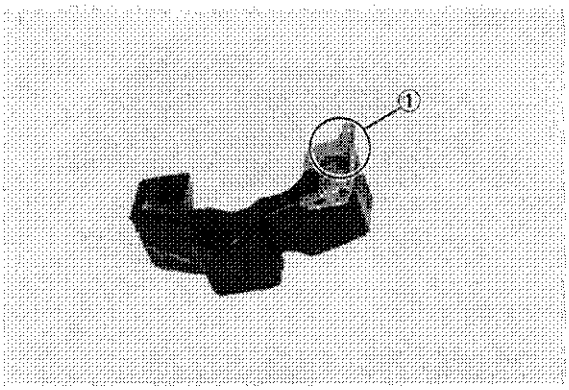
Fuel level:
14 ± 0.5 mm (0.55 ± 0.020 in) below from the carburetor piston valve center.



1. Fuel level
2. Piston valve center mark
3. Level gauge
4. Level gauge adapter
5. Drain pipe

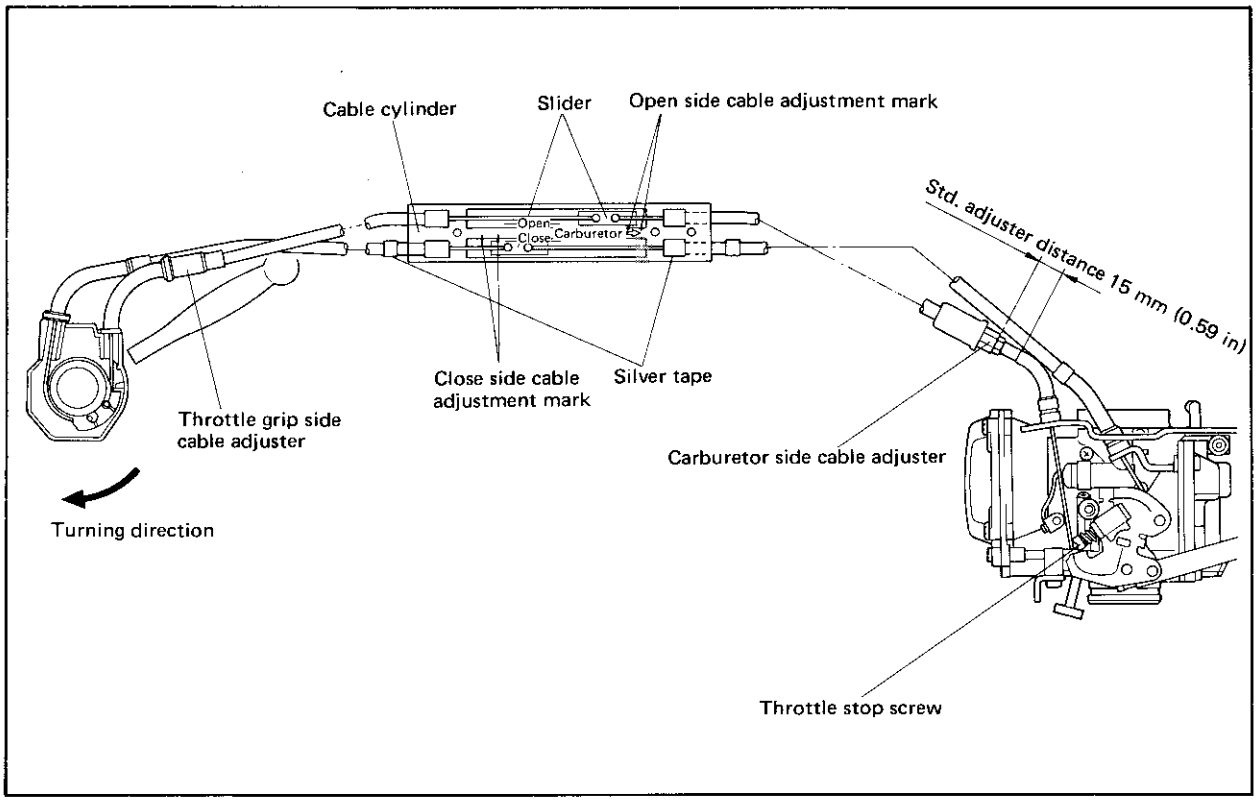
5. If the fuel level is incorrect, remove the carburetor assembly from the motorcycle and check the fuel valve(s) and float assembly(s) for damage.

6. If no damage is found, correct the fuel level by slightly bending the float arm tang. Recheck the fuel level.

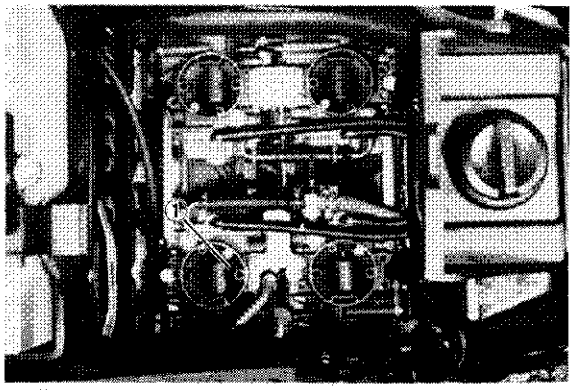



1. Float arm tange

Throttle cable



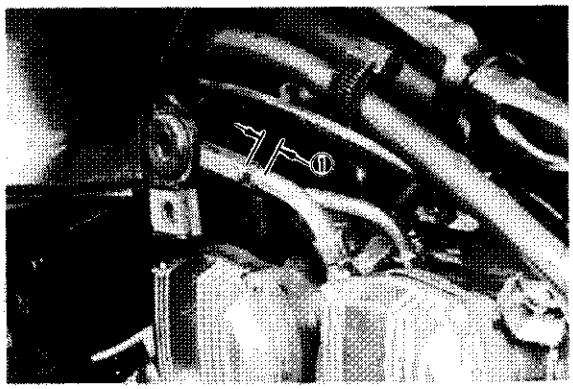

1. Remove the air cleaner and loosen the stop screw on the #2 carburetor to set the throttle valve at full closed.



1. #2 Carburetor

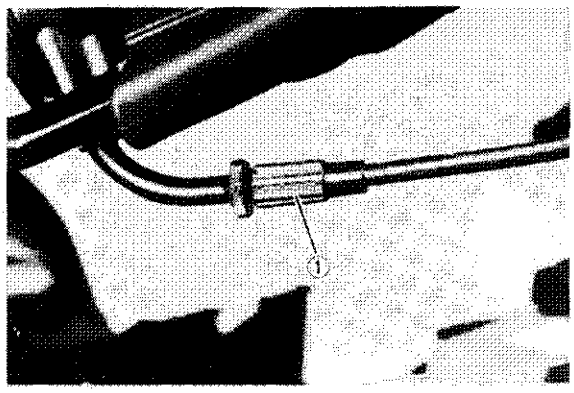
2. Loosen or tighten the carburetor side adjuster so that the distance between the threaded end of the tubular-control cable-guide and the adjuster (standard carburetor side adjuster distance) is within the specifications shown below.

| Std. carburetor side adjuster distance: 15 mm (0.59 in) |
|---|



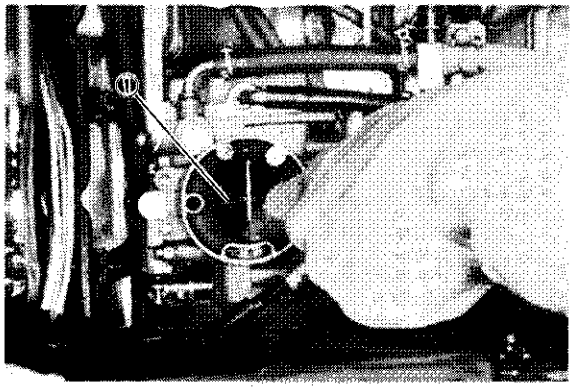
1. Std. carburetor side adjuster distance

3. Loosen or tighten the throttle grip side adjuster so the grip free play is within 2 ~ 3 mm (0.08 ~ 0.12 in).

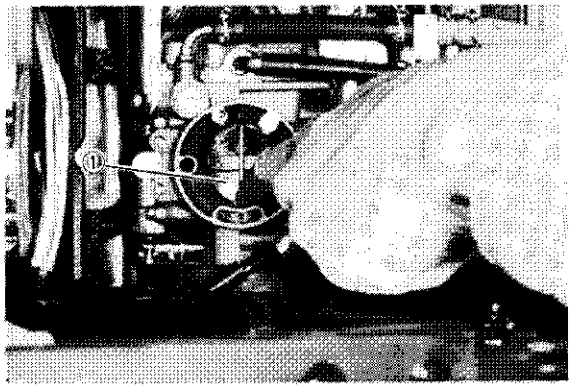


1. Throttle grip side adjuster

4. While turning the throttle grip back and forth, check the #2 carburetor to determine if the throttle valve operates at full open and full closed. If the valve operates in this fashion it is functioning normally.



1. Throttle valve full open



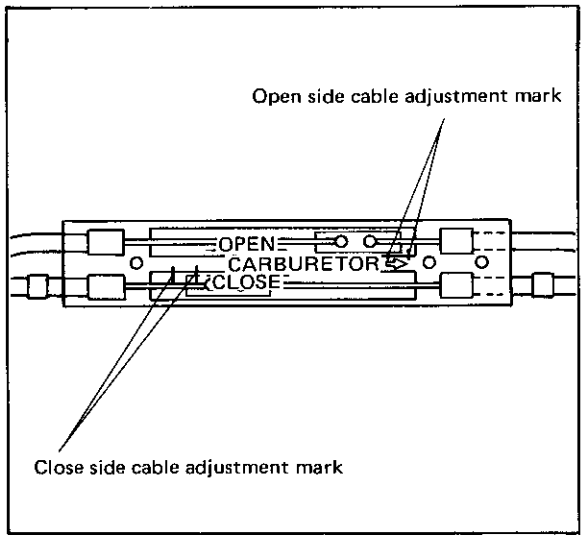
1. Throttle valve full closed

5. After determining that the throttle valve is operating correctly, tighten the adjuster locknut.
6. If the throttle valve does not operate at full closed, follow these steps.
   a. Turn the carburetor side adjuster clockwise, just a little.
   b. Turn the grip side adjuster counterclockwise and adjust the grip free play to within 2 ~ 3 mm (0.08 ~ 0.12 in).
   c. Now check to determine if the throttle valve operates at full closed.
   d. Then repeat steps a. ~ c., set the throttle valve at full closed, and tighten the adjuster locknut.
7. If the throttle valve does not operate at full open:
   a. Turn the carburetor side adjuster counterclockwise, just a little.
   b. Turn the grip side adjuster clockwise so the grip free play is within 2 ~ 3 mm (0.08 ~ 0.12 in).
   c. Check to determine if the throttle valve operates at full open.
   d. Repeat steps a. ~ c., set the throttle valve at full open, then tighten the adjuster locknut.

NOTE:

If the throttle valve does not operate at full open or full closed on the #2 carburetor after following the above steps, then you should:

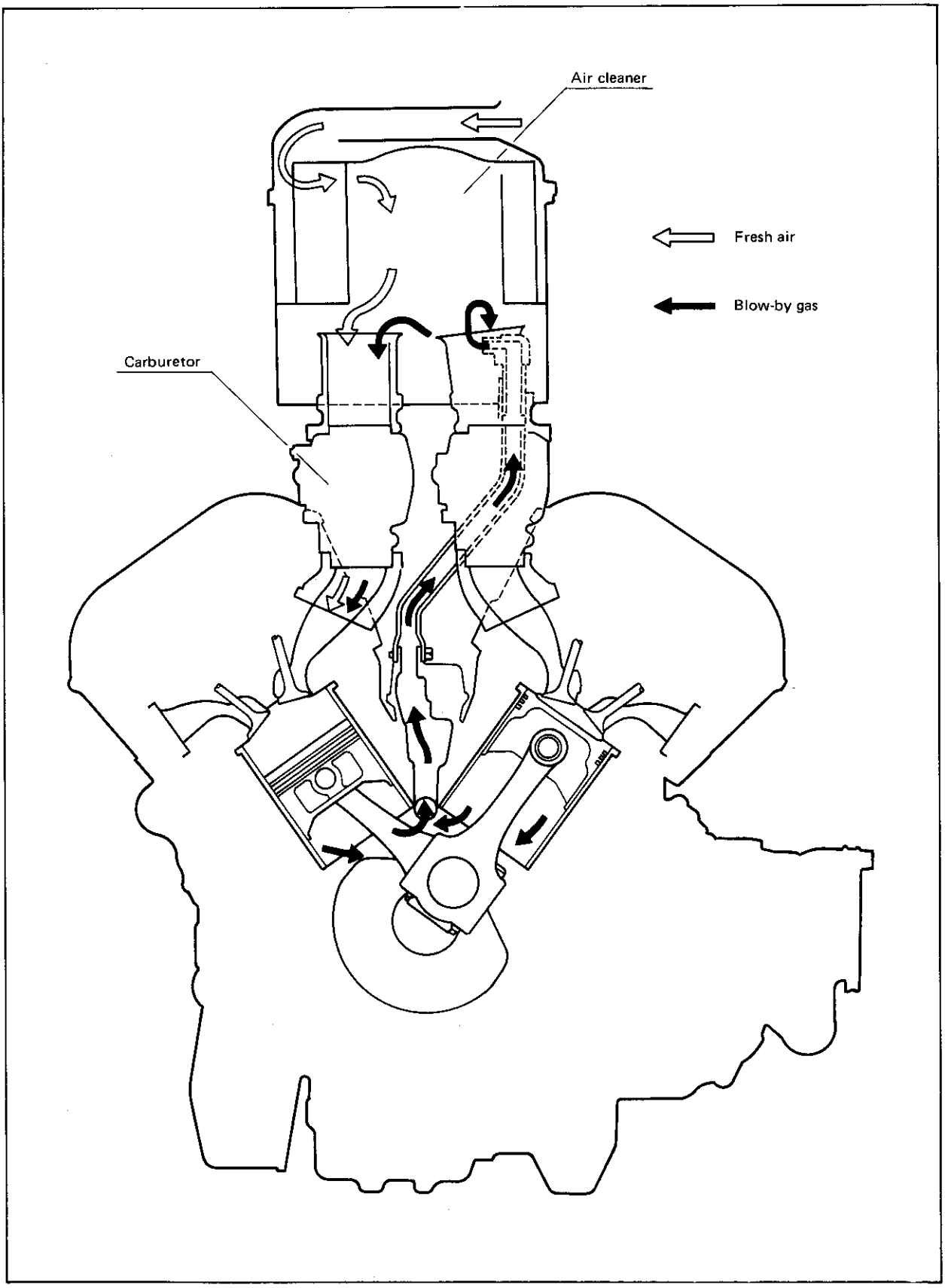
- Check to determine if the throttle cable installation is correct. Be sure the silver throttle cable is positioned opposite the adjusters.
- Check the position of the control cable sliders in the throttle cable cylinder. Be sure the open side slider (silver cable side) falls between the two adjustment marks on the carburetor side. Check to be sure the closed side slider falls between the two adjustment marks on the throttle grip side. If the slider(s) fall outside the adjustment marks then the throttle cable(s) must be replaced.




If the #2 carburetor operates at full open and full closed, but the other carburetor(s) do not operate at full open and full closed, adjust their synchronization to match the #2 carburetor.

8. Install the air cleaner and set the engine idle speed to the recommended specifications.

## AIR CLEANER AND CRANKCASE VENTILATION SYSTEM




Refer to "CHAPTER 2" for the air cleaner maintenance.

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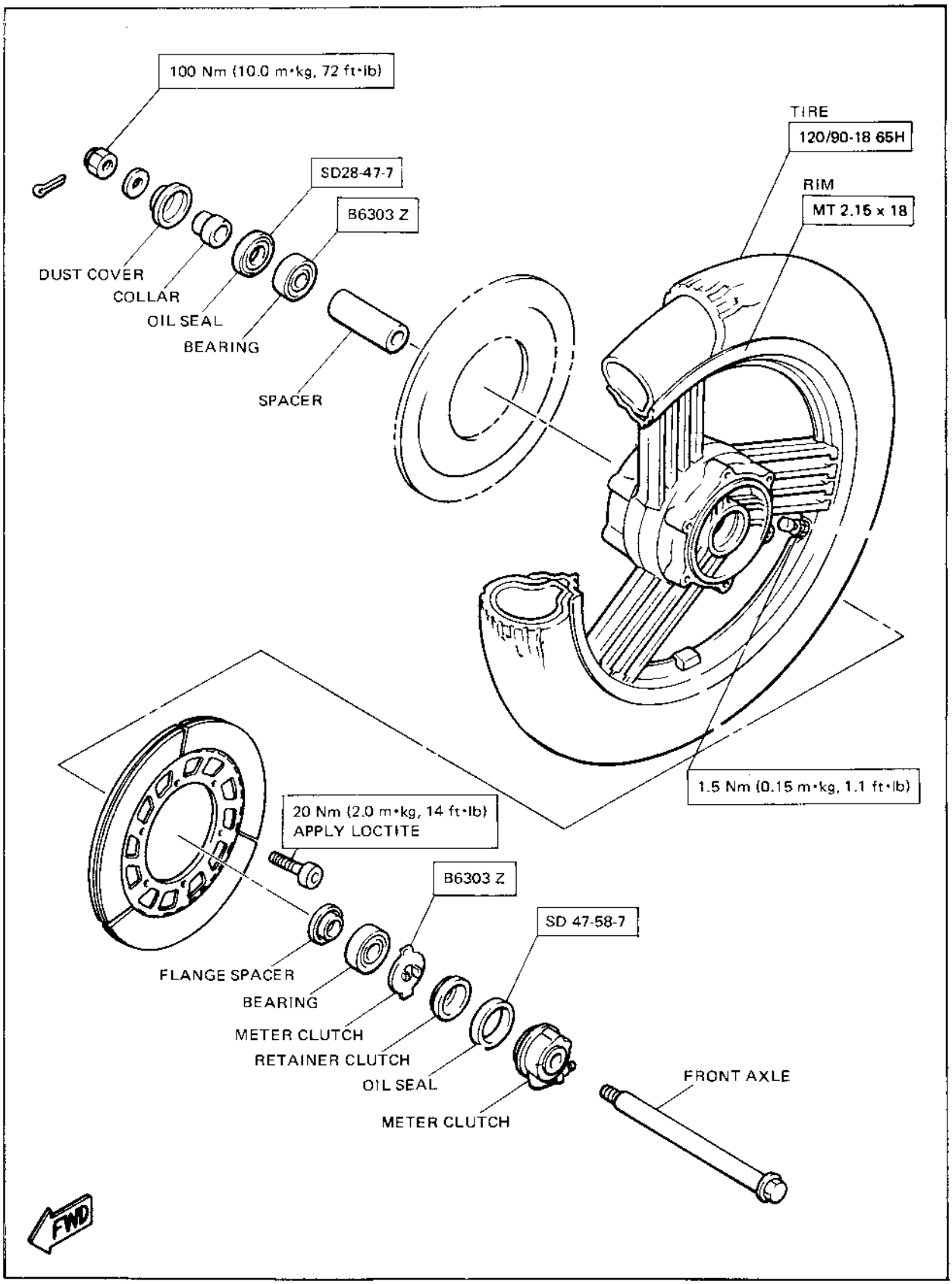
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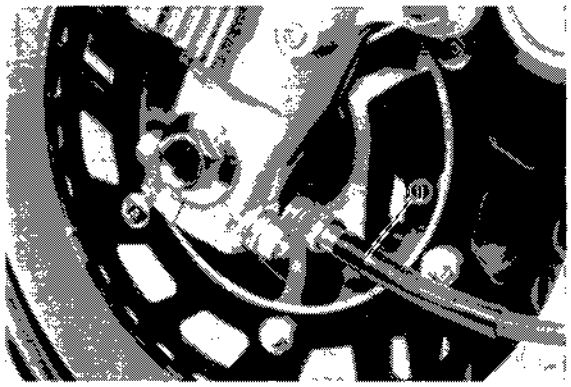
## FRONT WHEEL




5

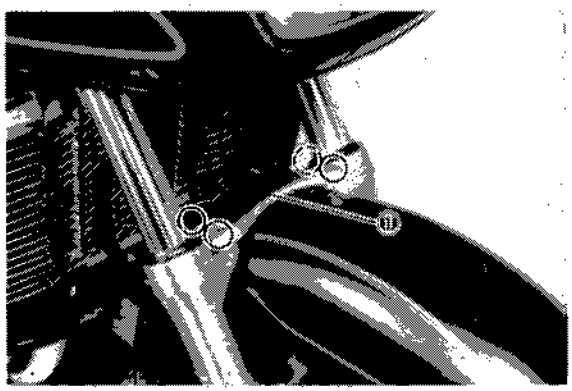
**Removal**

1. Place the machine on the centerstand.
2. Remove the speedometer cable holder and disconnect the cable.



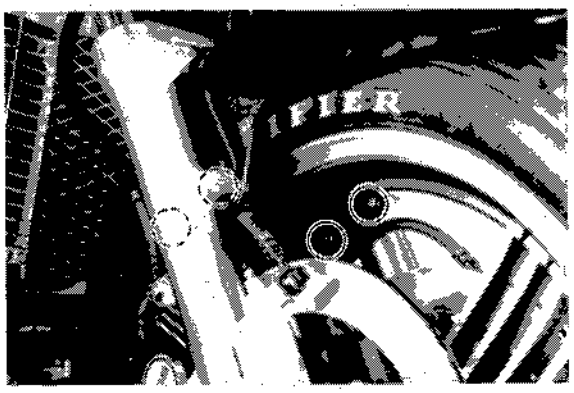
1. Speedometer cable

3. Remove the fork brace securing bolts and remove fork brace.

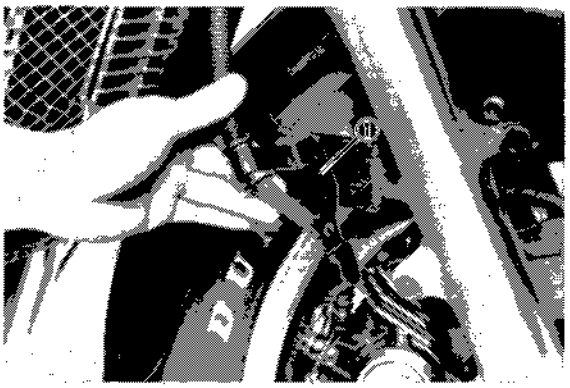


1. Front fork brace

4. Remove the front fender securing bolts.



5. Remove the brake hose from the brake hose holder and remove the fender.



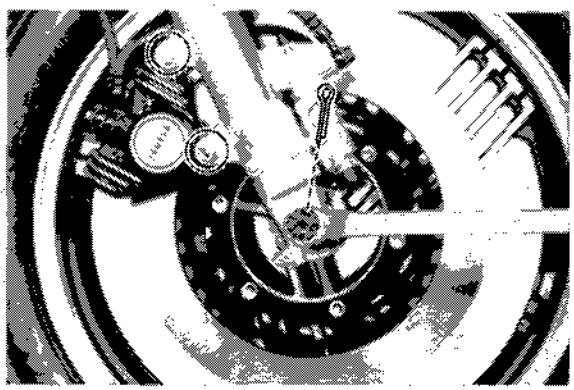
1. Holder

6. Remove the brake caliper securing bolts and remove the caliper.

**NOTE:**

Do not squeeze the brake lever while the wheel is off the machine, as the brake pads will be forced out of the cylinder, making reassembly difficult. Placement of a wooden wedge between the brake pads may be helpful.

7. Loosen the right and left side pinch bolts securing the axle.
8. Remove the axle nut and pull out the wheel axle. In this case, make sure the motorcycle is properly supported.



9. Remove the wheel.

### Tubeless Tires and Cast Wheels

This motorcycle is equipped with cast wheels designed for either tube or tubeless tires. Tubeless tires are installed as standard equipment.

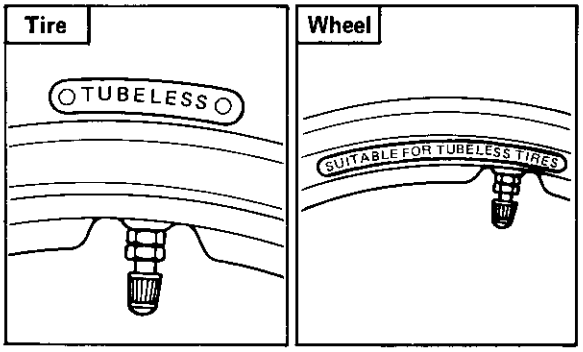
**WARNING:**

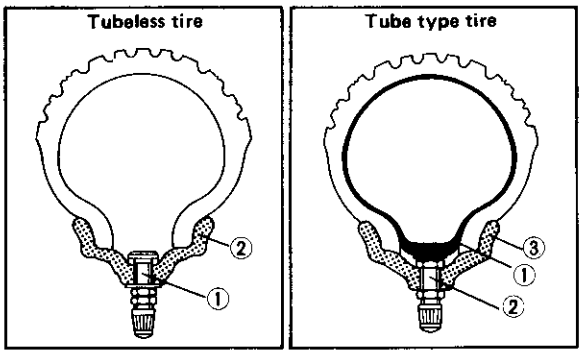
**Do not attempt to use tubeless tires on a wheel designed for use only with tube-type tires. Tire failure and personal injury may result from sudden deflation.**

| | | |
|---|---|---|
| Tube-type Wheel | → | Tube-type Tires only |
| Tubeless-type Wheel | → | Tube-type or Tubless tires |

**WARNING:**

**When using tube-type tires, be sure to install the proper tube.**



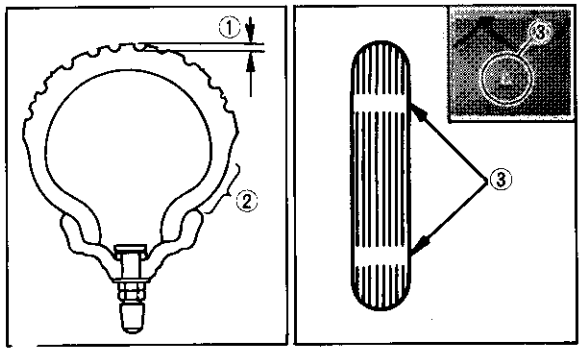




1. Air valve
2. Cast wheel

1. Tube
2. Air valve
3. Cast wheel

### Tire Inspection

Always check the tires tread. If a tire tread shows crosswise lines (minimum tread depth), if the tire has a nail or glass fragments in it, or if the side wall is cracked, replace the tire.




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

| | Standard tire |
|---|---|
| Front:<br>Manufacture/Size | Bridgestone/ 120/90-18<br>Dunlop/ 120/90-18 |
| Rear:<br>Manufacture/Size | Bridgestone/ 140/90-16<br>Dunlop/ 140/90-16 |
| Minimum tire tread depth (front and rear) | 1.0 mm (0.04 in) |

### Front Axle Inspection

Remove any corrosion from the axle with fine emery cloth. Place the axle on a surface plate and check for bends. If bent, replace axle. Do not attempt to straighten a bent axle.

### Wheel Inspection

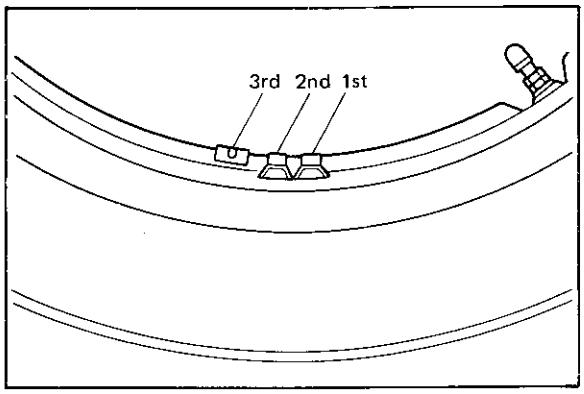
1. Check for cracks, bends or warpage of wheels. If a wheel is deformed or cracked, it must be replaced.
2. Check wheel run-out. If the deflection exceeds the tolerance below, check the wheel bearings or replace the wheel as required.

Rim run-out limits:
Vertical – 1.0 mm (0.04 in)
Lateral – 0.5 mm (0.02 in)

3. Check wheel balance. Rotate the wheel lightly several times and observe resting position. If the wheel is not statically balanced, it will come to rest at the same position each time. Install an appropriate balance weight at lightest position (at top).

**NOTE:**

The wheel should be balanced with the brake discs installed.




BALANCER INSTALLATION

FRONT

| 1st | 2nd | 3rd | 4th |
|---|---|---|---|
| Meter gear side | Meter gear side | Other side | Other side |

REAR

| 1st | 2nd | 3rd | 4th |
|---|---|---|---|
| Clutch hub side | Clutch hub side | Disc side | Disc side |

4. After installing a tire, ride conservatively to allow the tire to seat itself on the rim properly. Failure to allow proper seating may cause tire failure resulting in damage to the motorcycle and injury to the rider.
5. After repairing or replacing a tire, check to be sure the valve stem lock nut is securely fastened. If not, torque it as specified.

Tightening torque:
1.5 Nm (0.15 m·kg, 1.1 ft·lb)

**Replacing Wheel Bearings**

If the bearings allow play in the wheel hub or if wheel does not turn smoothly, replace the bearings as follows:

1. Clean the outside of the wheel hub.
2. Drive the bearing out by pushing the spacer aside and tapping around the perimeter of the bearing inner race with a soft metal drift pin and hammer. Both bearings can be removed in this manner.

**WARNING:**

**Eye protection is recommended when using striking tools.**

3. To install the wheel bearing, reverse the above sequence. Use a socket that matches the outside race of the bearing as a tool to drive in the bearing.

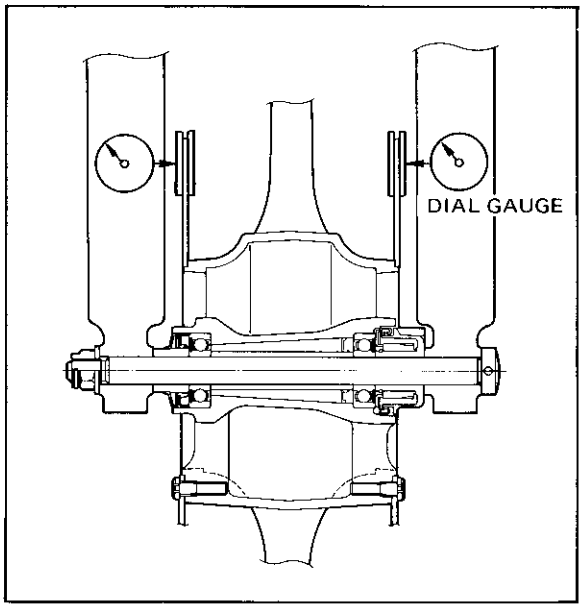
**CAUTION:**

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

**Disc Inspection**

Check for wear and deflection of disc.

Maximum deflection (front and rear):
0.15 mm (0.006 in)
Minimum disc thickness (front and rear):
6.5 mm (0.26 in)



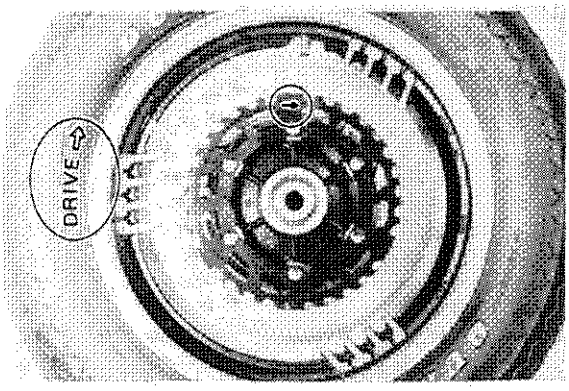
If disc is worn beyond minimum thickness or deflection exceeds specified amount, replace disc.

**Brake Disc Installation**

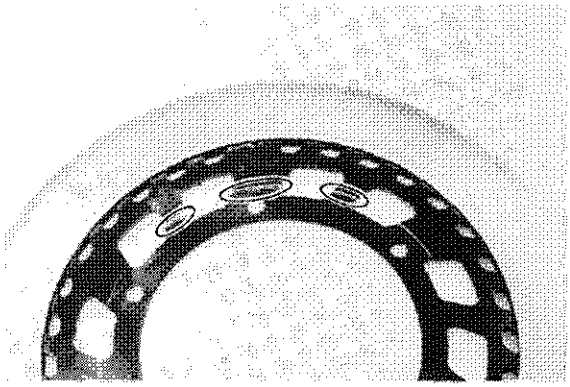
1. When installing the brake disc(s), the slots on the disc should be positioned as shown.

NOTE:

The arrow mark must point the rotating direction of the wheel.




The step on disc must be on the wheel hub side.



**Brake Disc Assembly**

If the brake disc has been removed from the hub or is loose, tighten the bolts.

Before tightening the bolts, coat them with Loctite®.

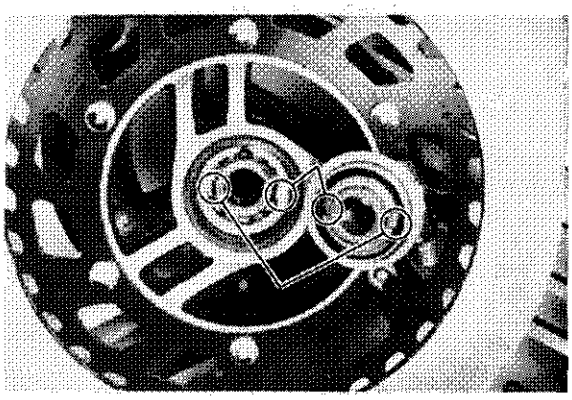
| Disc bolt torque: |
| --- |
| 20 Nm (2.0 m·kg, 14 ft·lb) |

**Installing Front Wheel**

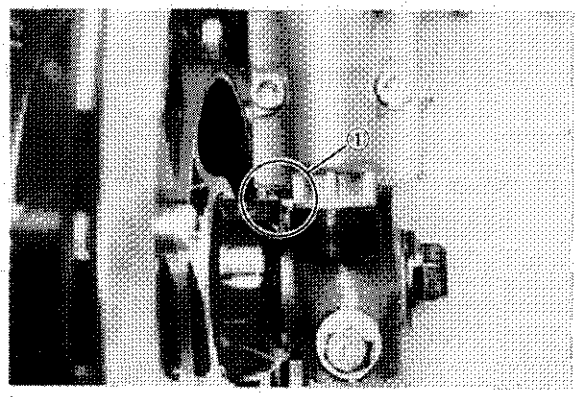
When installing the front wheel, reverse the removal procedure.

Note the following points:

1. Lightly grease the lips of the front wheel oil seals and the gear teeth of speedometer drive and driven gears. Use lightweight lithium base grease.
2. Make sure the two projections inside the wheel hub are meshed with the two slots in the speedometer clutch assembly.

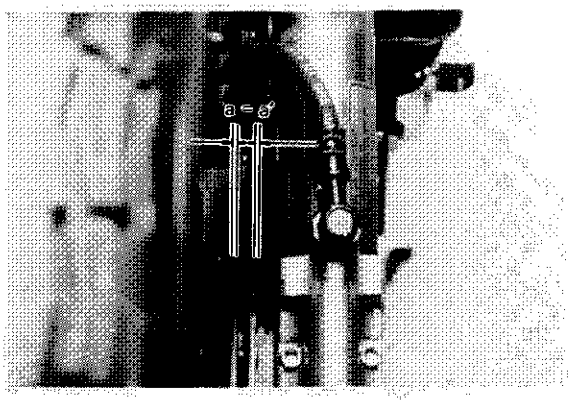


3. Make sure the projecting portion (torque stopper) of the speedometer housing is positioned correctly.




1. Torque stopper

4. Before tightening the pinch bolt, compress the front forks several times to make sure of proper fork operation. With the axle pinch bolt loose, work the right fork leg back and forth until the proper clearance between the disc and caliper bracket on the front fork are obtained.



5. Tighten the axle nut and instal a new cotter pin.

| Axle nut torque: |
| --- |
| 100 Nm (10.0 m·kg, 72 ft·lb) |

6. Tighten the axle pinch bolt.

| Axle pinch bolt torque: |
| --- |
| 20 Nm (2.0 m·kg, 14 ft·lb) |

7. After installing the wheel, install the fork brace.

| Front fender and fork brace<br>Tightening torque: |
| --- |
| 20 Nm (2.0 m·kg, 14 ft·lb) |

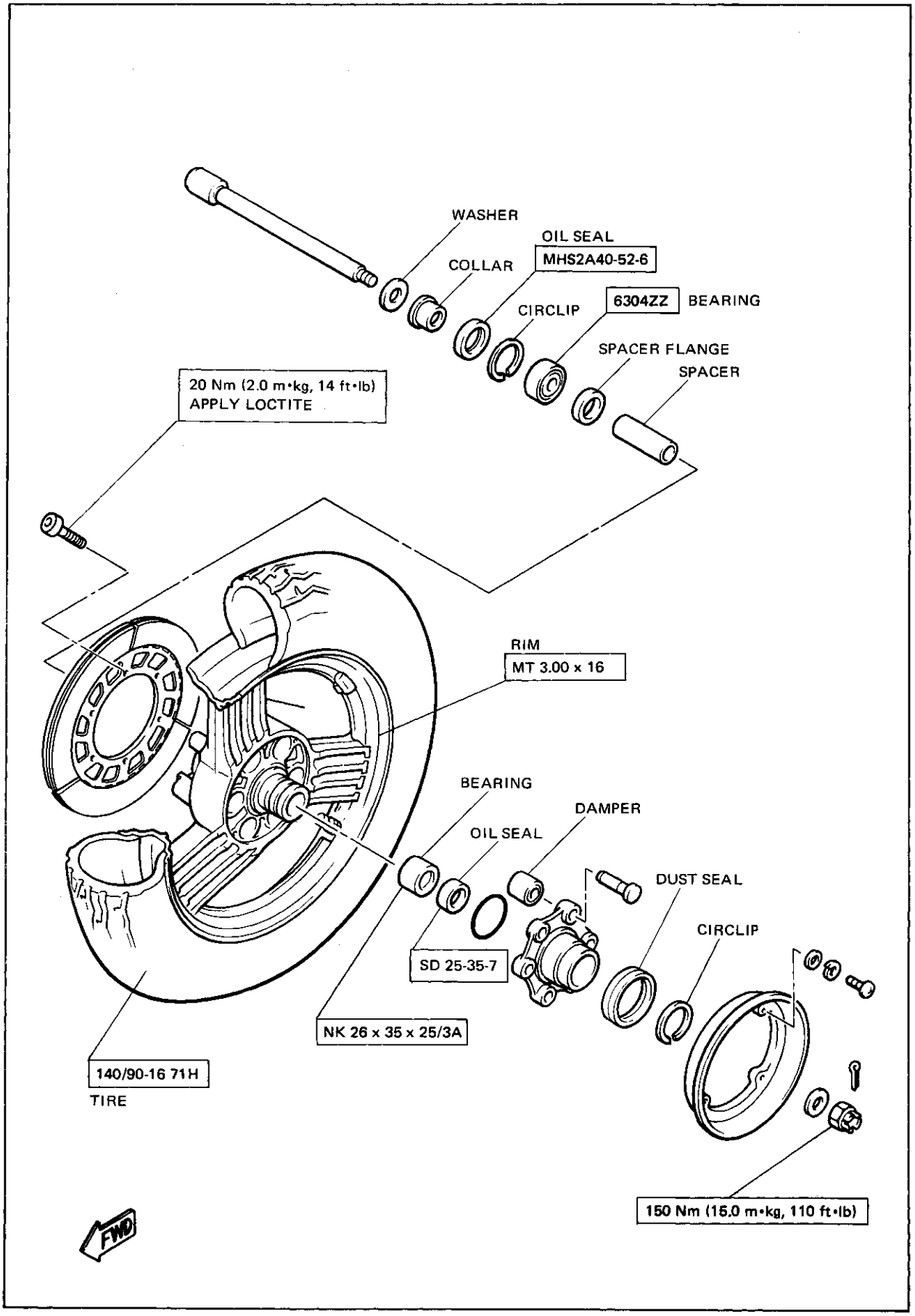
8. Install the calipers.

| Tightening torque: |
| --- |
| 45 Nm (4.5 m·kg, 32 ft·lb) |

## WHEELS, TIRES

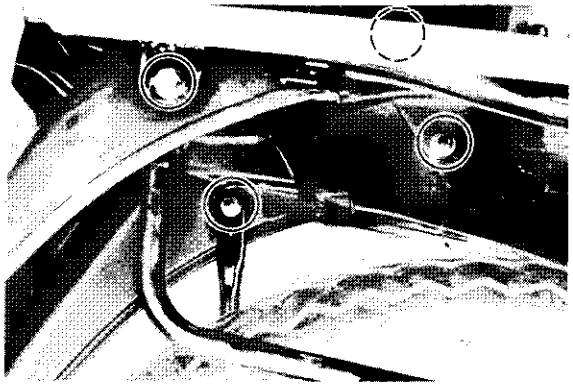
Refer to "Tubeless Tire and Wheel Manual" for tubeless tire and wheel service.

## REAR WHEEL

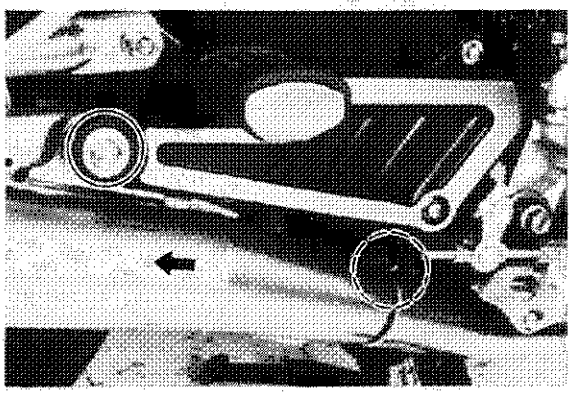

WASHER
OIL SEAL
MHS2A40-52-6
COLLAR
CIRCLIP
6304ZZ
BEARING
SPACER FLANGE
SPACER
20 Nm (2.0 m•kg, 14 ft•lb)
APPLY LOCTITE
RIM
MT 3.00 x 16
BEARING
DAMPER
OIL SEAL
DUST SEAL
CIRCLIP
SD 25-35-7
NK 26 x 35 x 25/3A
140/90-16 71H
TIRE
150 Nm (15.0 m•kg, 110 ft•lb)
FWD

**Removal**

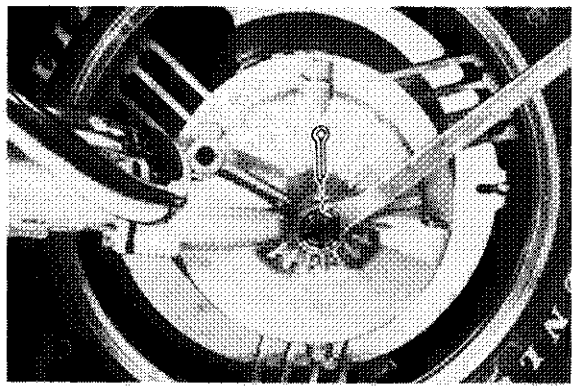
1. Place the motorcycle on the center stand.
2. Remove the saddle bags and rear fender.



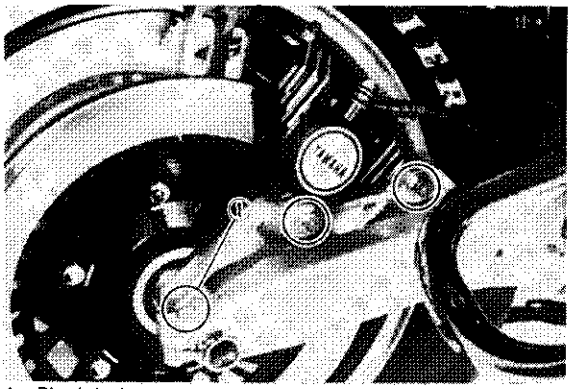
3. Remove the mufflers.



4. Remove the axle nut cotter pin, washer and axle nut.



5. Remove the caliper and loosen the pinch bolt.

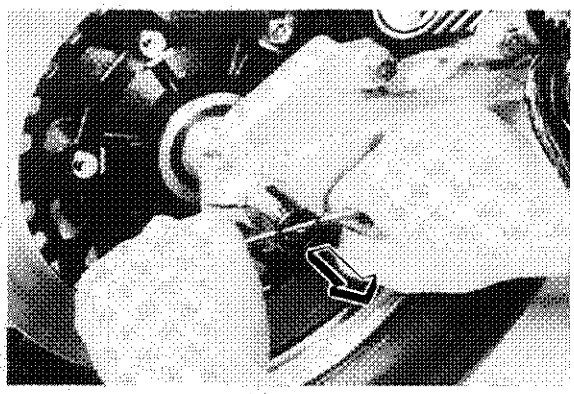


1. Pinch bolt

**NOTE:**

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

6. While supporting the brake torque stopper plate, pull out the rear axle.



7. Move the wheel to the right side to separate it from the final gear cases and remove the rear wheel.

**Rear Axle Inspection**

(See Front Wheel, Axle Inspection Procedures).

**Replacing Wheel Bearings**

Rear wheel bearing replacement is similar to the procedure for the front wheel.

**Rear Wheel Inspection**

(See Front Wheel, Inspection Procedures).

**Disc Inspection**

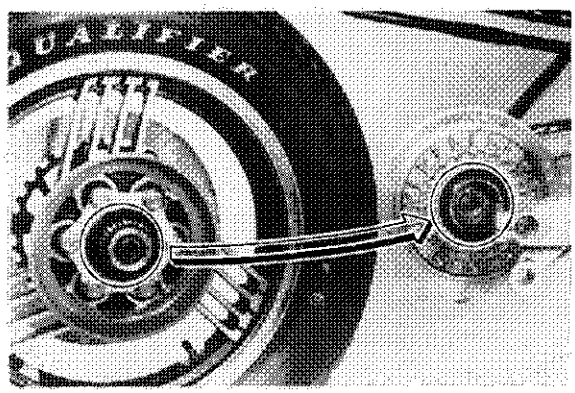
(See Front Wheel, Disc Inspection Procedure).

**Installation**

1. Lightly grease lips of rear wheel oil seals.
2. Install the rear wheel assembly and wheel axle.

**NOTE:**

Before installing the rear wheel, apply a light coating of lithium base grease on the final gear case splines. When installing the rear wheel, be sure the splines on the wheel hub fit into final gear case.



**CAUTION:**

**Always use a new cotter pin on the rear axle nut.**

| |
|---|
| Tighteing torque:<br>Axle nut:<br>150 Nm (15.0 m·kg, 110 ft·lb)<br>Axle pinch bolt:<br>10 Nm (1.0 m·kg, 7.2 ft·lb) |

3. Install the caliper.

**NOTE:**

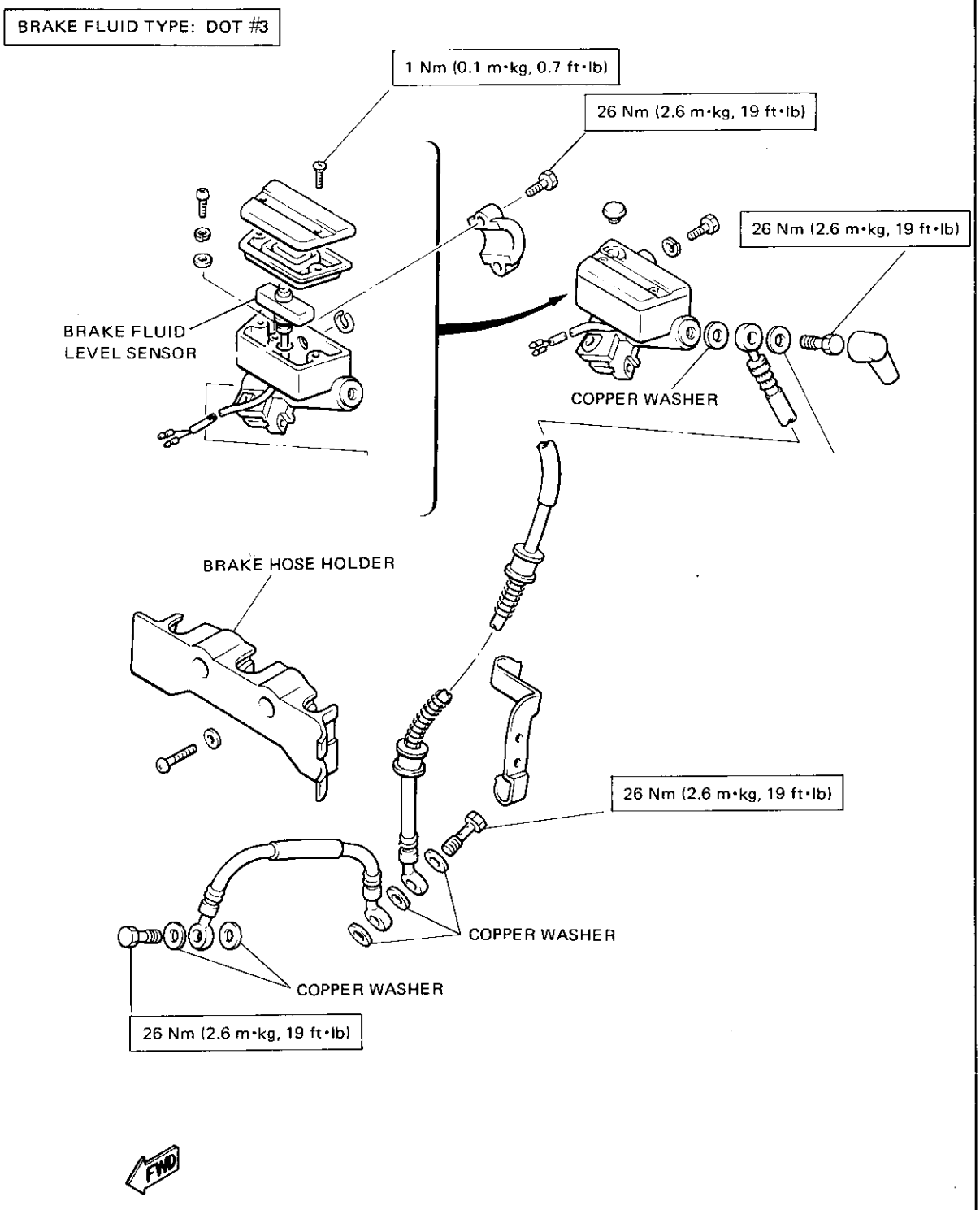
Make sure there is enough gap between the brake pads before inserting the brake disc.

| |
|---|
| Tighteint roque:<br>45 Nm (4.5 m·kg, 32 ft·lb) |

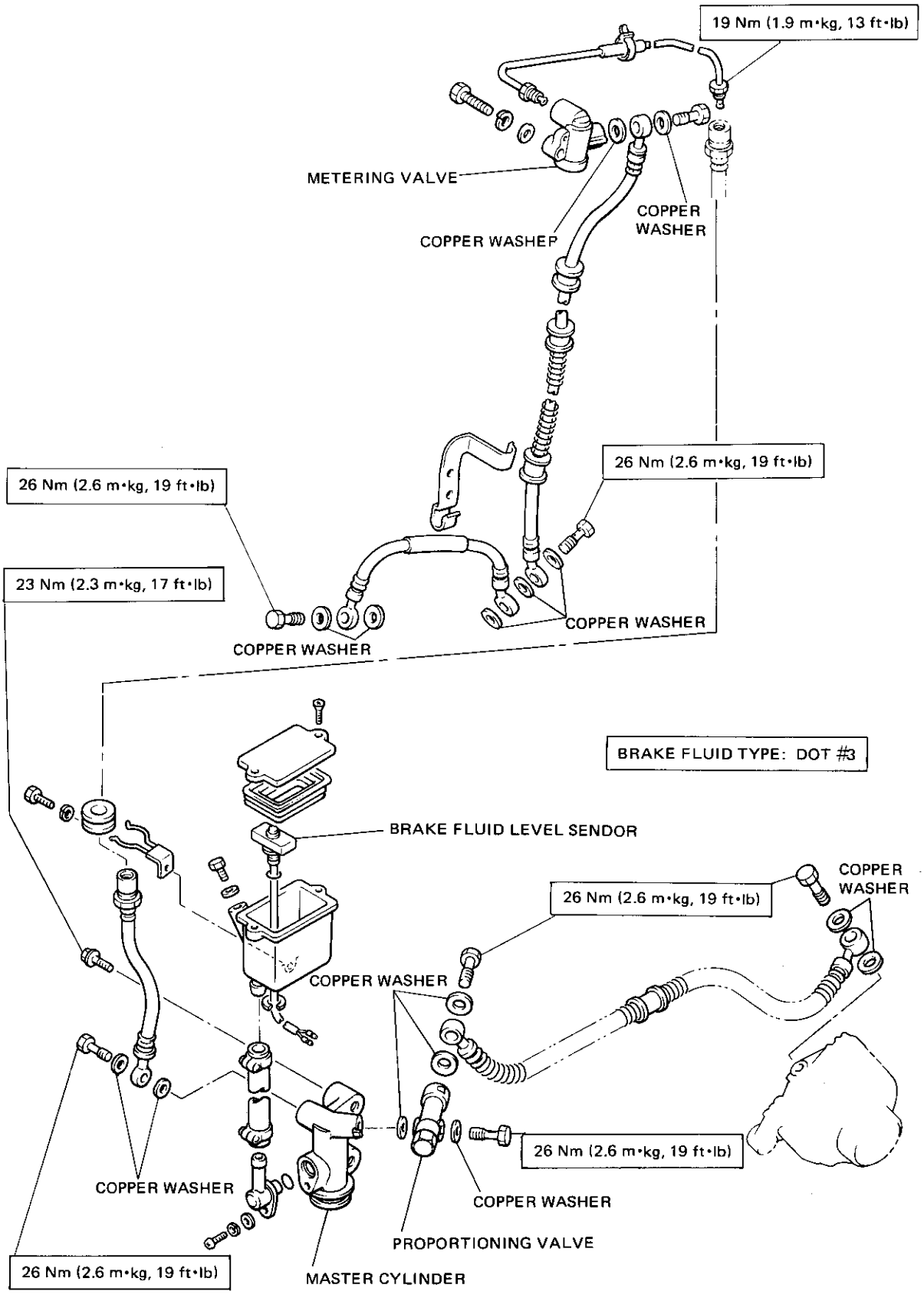
**WHEELS, TIRES, TUBES**

Refer to "Tubeless Tire and Wheel Manual" for tubeless tire and wheel service.

## (Front) Brake Master Cylinder



## (Rear) Brake Master Cylinder



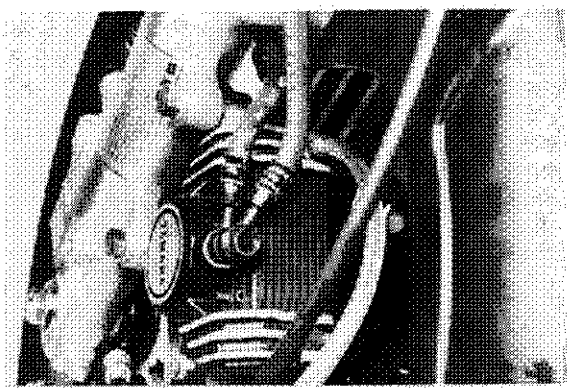
### Air Bleeding

**WARNING:**

**If the brake system is disasembled 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.**

**Failure to bleed the brake system porperly can result in a dangerous loss of braking performance.**

1. Add proper brake fluid to the reservoir. Install the diaphragm, being careful not to spill or overflow the reservoir.
2. Connect the clear plastic tube of 4.5 mm (3/16 in) inside diameter tightly to the caliper bleed screw. Put the other end of the tube into a container.



3. Slowly apply the brake lever or pedal several times. Pull in lever (push down pedal). Hold lever or pedal in "on" position. Loosen bleed screw. Allow the pedal or lever to travel slowly toward its limit. When the limit is reached, tighten bleed screw. Then release lever (or pedal).
4. Repeat step "3" procedure until all air bubbles are removed from system.

**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 settle out.

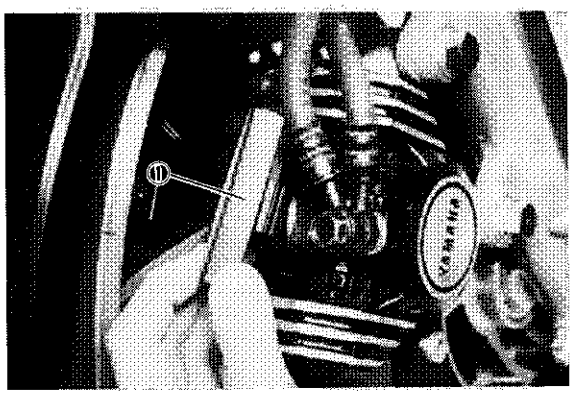
| Bleed screw tightening torque: |
| --- |
| 6 Nm (0.6 m·kg, 4.3 ft·lb) |

### Caliper Pad Replacement

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

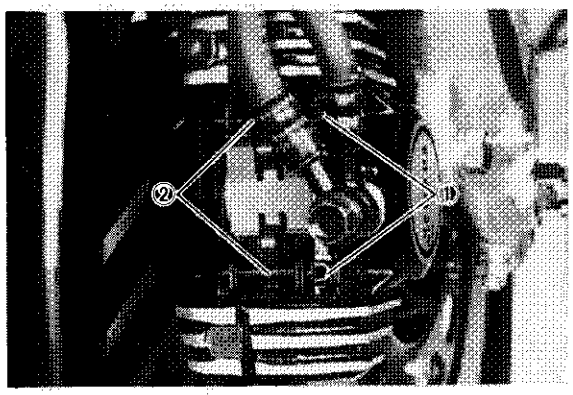
FRONT CALIPER PADS

1. Remove the cover.



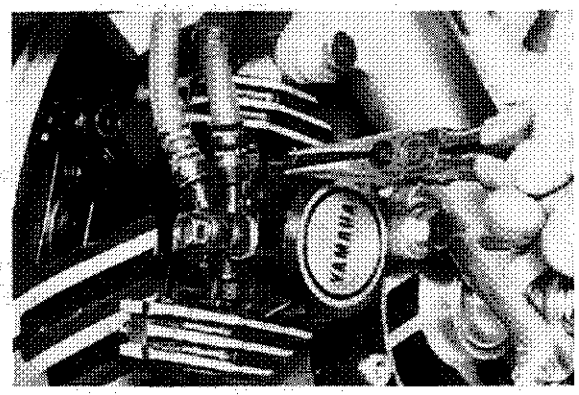
1. Cover

2. Remove the pad retaining pin clip.

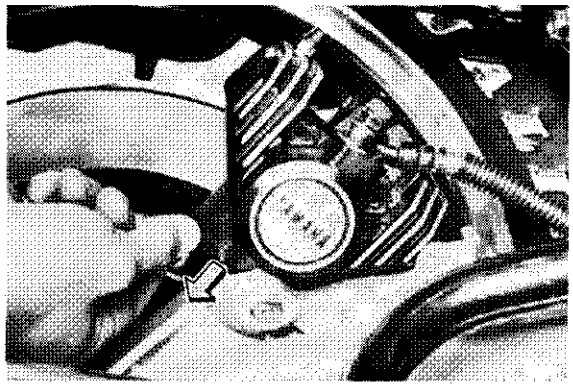


1. Pin clip 2. Pin

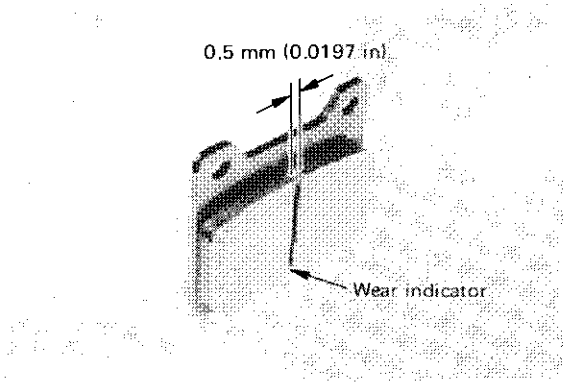
3. Pull out the pad retaining pin.



4. Remove the apds and pad spring.



Pad wear limit: 0.5 mm (0.0197 in)



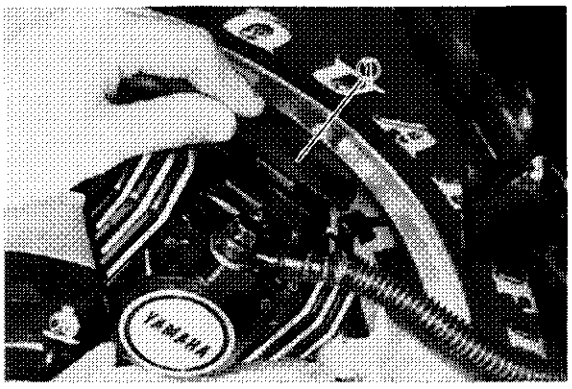

**NOTE:**

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

5. Install the new brake pads.
   Also replace the pad spring if pad replacement is required.

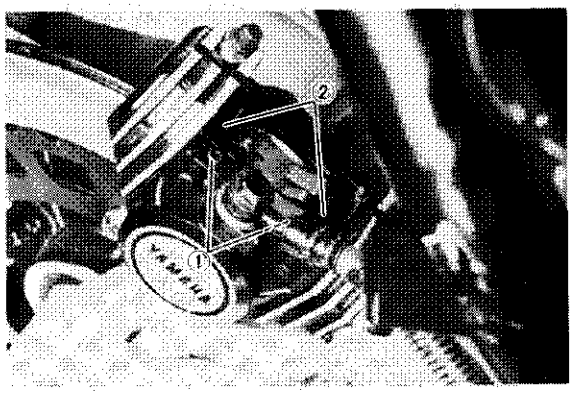
REAR CALIPER PADS

1. Remove the right side saddle bag.
2. Remove the cover.

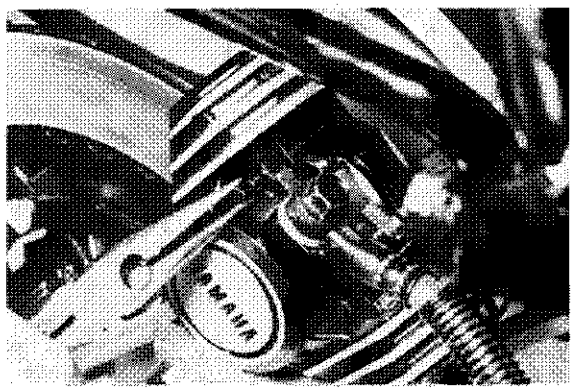


1. Cover

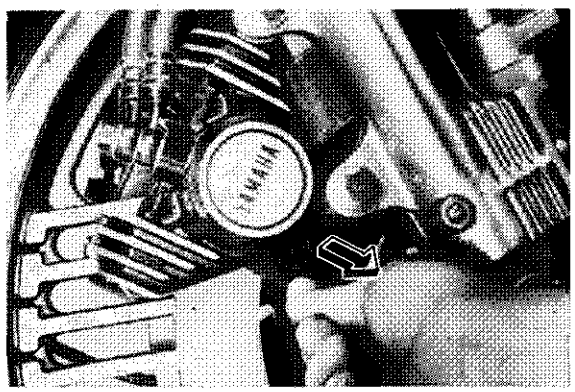
3. Remove the pad retaining pin clips and pull out the pad retaining pins.



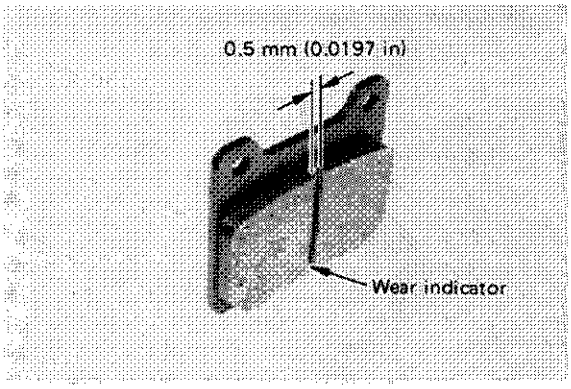
1. Pin clip 2. Pin



4. Remove the pads and pad spring.



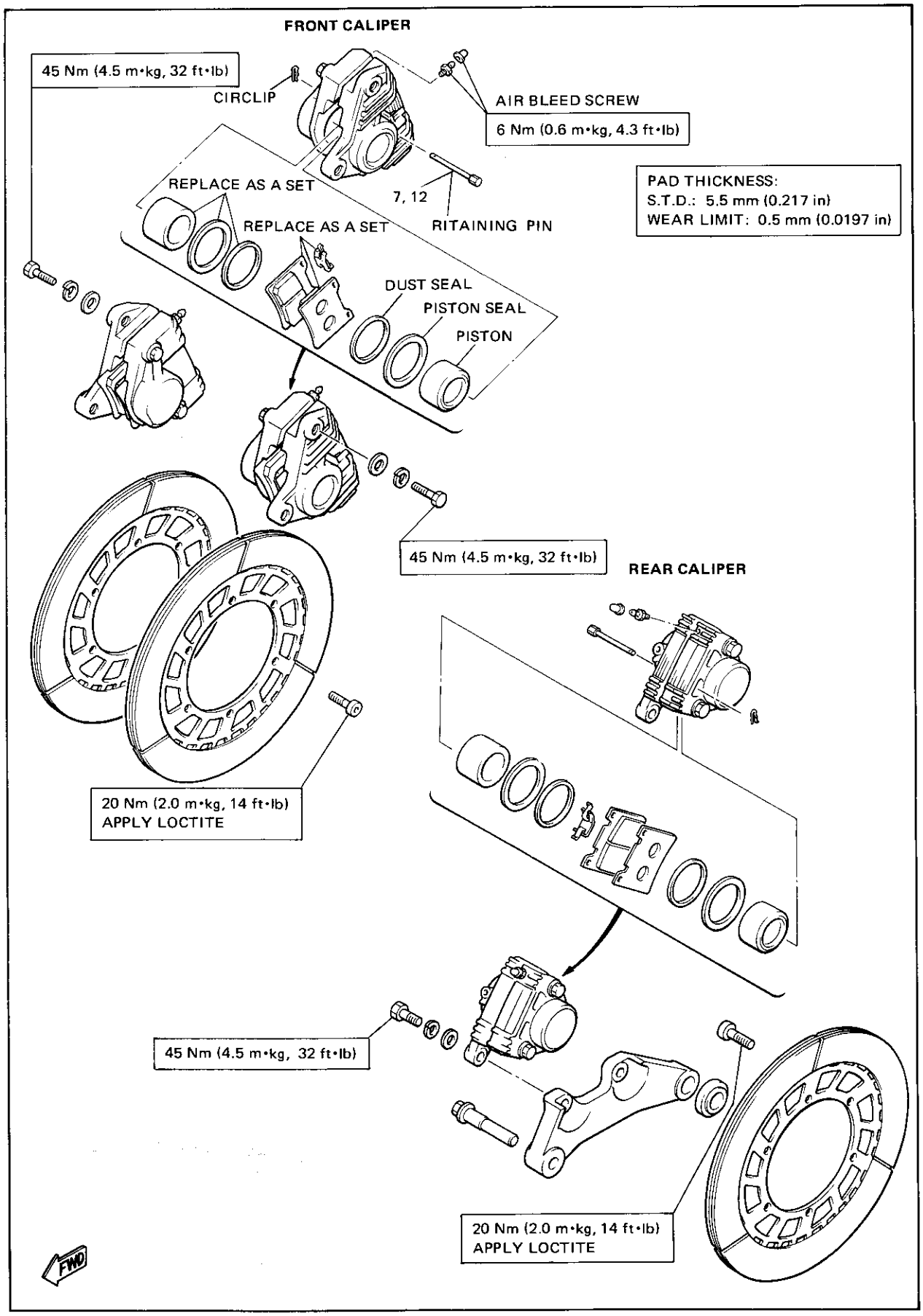
Pad wear limit: 0.5 mm (0.0197 in)




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

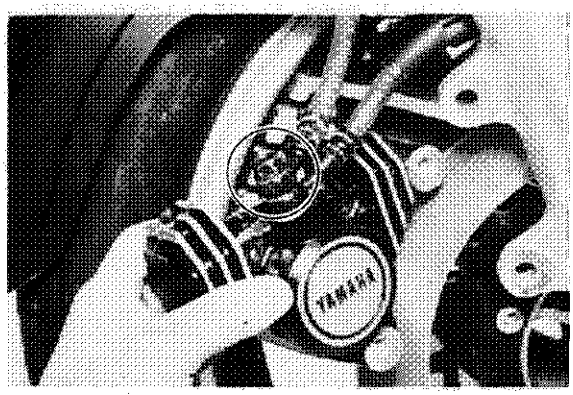
5. Install the new brake pads.
   Also replace the pad spring if pad replacement is required.

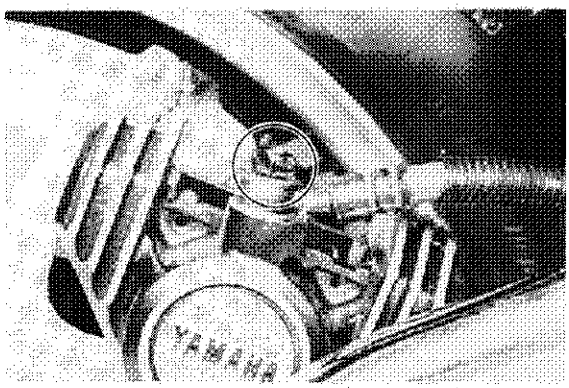
## FRONT AND REAR CALIPER



**Caliper Disassembly**

1. Remove the caliper support bolts and the pad retaining pins as described in the Caliper Pad Replacement procedure.
2. Remove the caliper brake hose. Allow fluid in the caliper assembly to drain into a container.

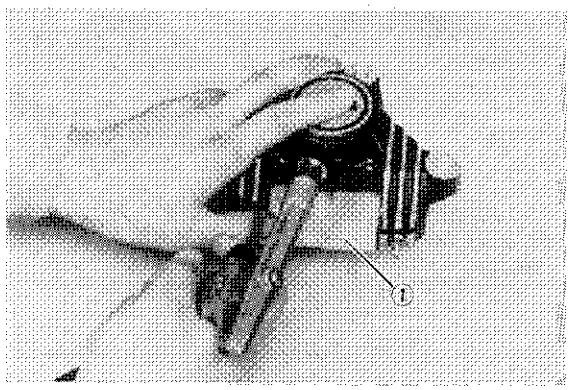




3. Place the open hose end into the container and pump the old fluid out carefully.
4. Remove the pistons one by one, and check each.

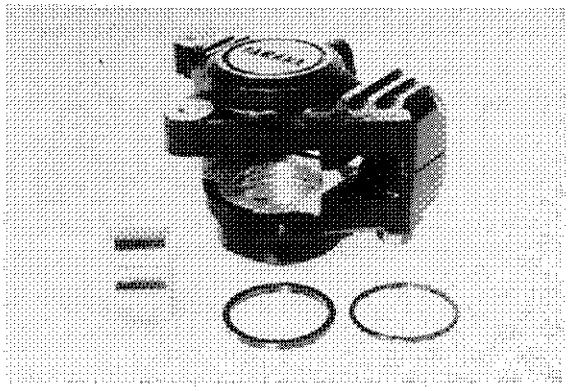
a. Insert a proper wooden board into the caliper to lock the right side piston.

b. By blowing air into the tube joint opening, force out the left side piston from caliper body.



1. Wooden board

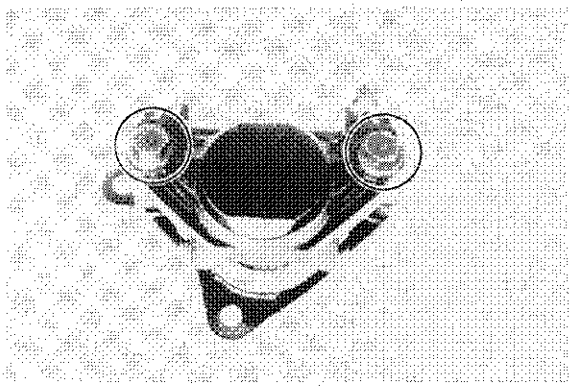
c. Remove the dust and piston seals.



d. After installing the left side piston, remove the right side piston and seals.

**CAUTION:**

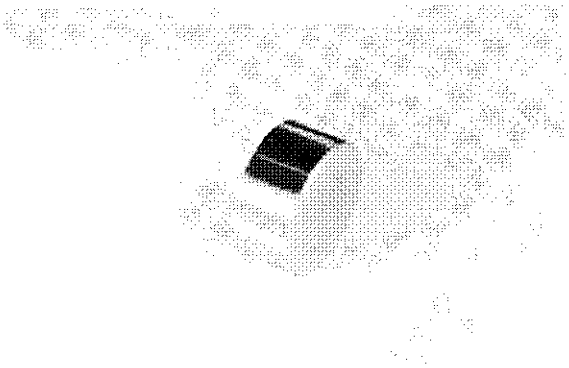
**Never loosen the bridge bolts on both side of the caliper.**



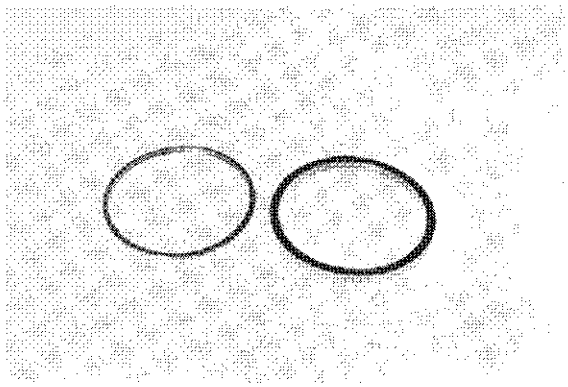
**Brake Inspection and Repair**

| 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. Replace the caliper piston if it is damaged, rusty or unevenly worn.



2. Replace any brake pad worn beyond limits. Always replace the brake pads as a set.
3. Replace piston and dust seals if damaged. Replace seals every two years.

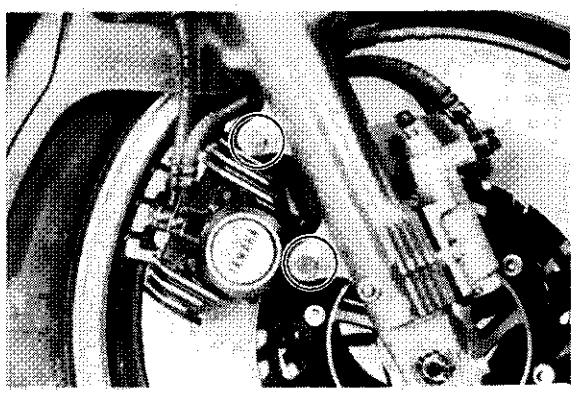


**Installation**

Replace the following parts whenever a caliper is disassembled: bleed screw and cap, piston seal and dust seal.

1. All internal parts should be cleaned in new brake fluid only. Internal parts shoule be lubricated with brake fluid when installed.
2. Install the piston seal and piston. Place the caliper cylinder into the caliper body.
3. Install the pad spring, pads, pins and clips.

4. Install the caliper assembly on the frame.



| Tightening torque: 45 Nm (4.5 ft·kg, 32 ft·lb) |
|---|

5. Attache the brake hoses (front and rear).

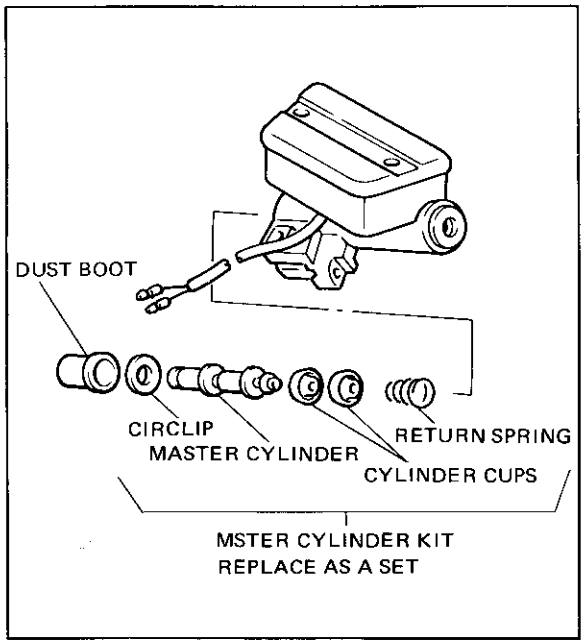
| Tightening torque: Brake hose: Union bolt: 26 Nm (2.6 m·kg, 19 ft·lb) |
|---|

**Master Cylinder Disassembly**

**CAUTION:**

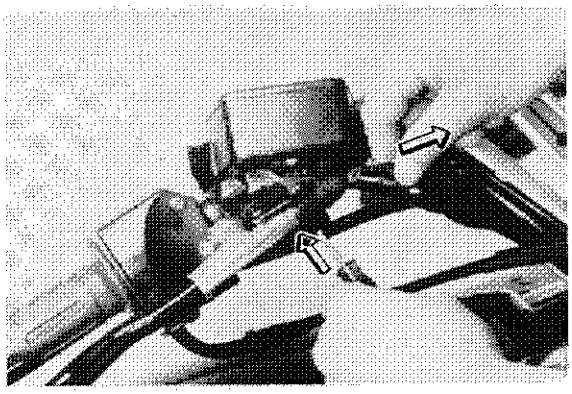
**Before removing, drain the brake fluid.**

**FRONT:**

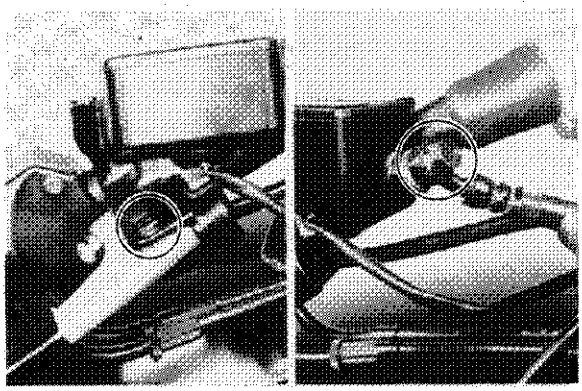



1. Remove the lever cover.

2. Remove the brake light switch.

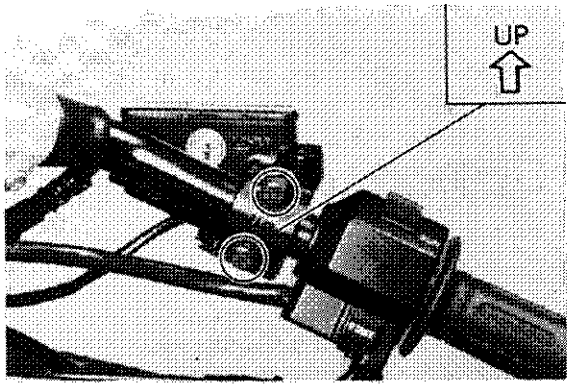


3. Remove the brake lever and spring.
4. Remove the brake hose.

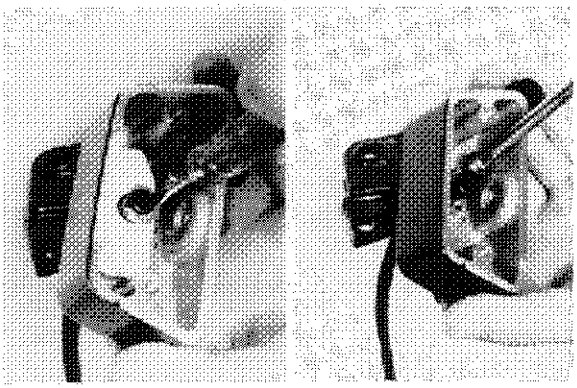


5. Remove the headlight unit, and disconnect the brake fluid sensor from wire harness.

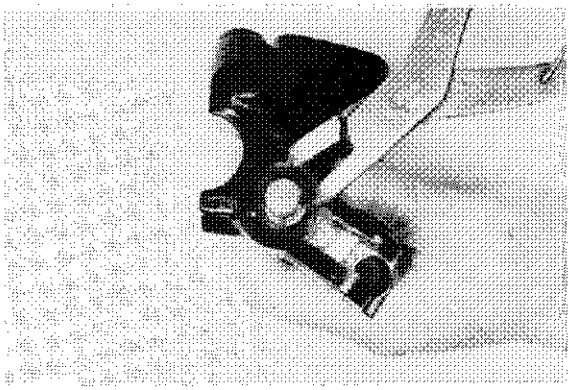
6. Remove the master cylinder from the handlebar. Remove the cap and drain the remaining fluid.



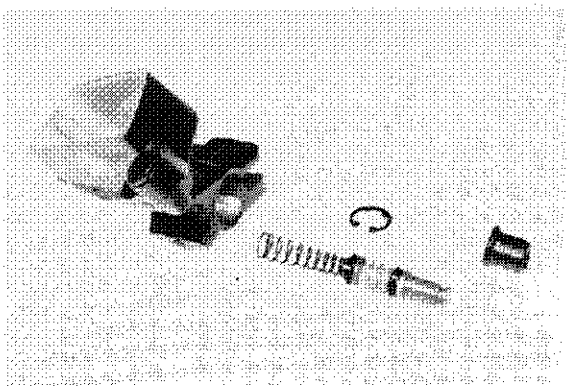

7. Remove the brake fluid level sensor.



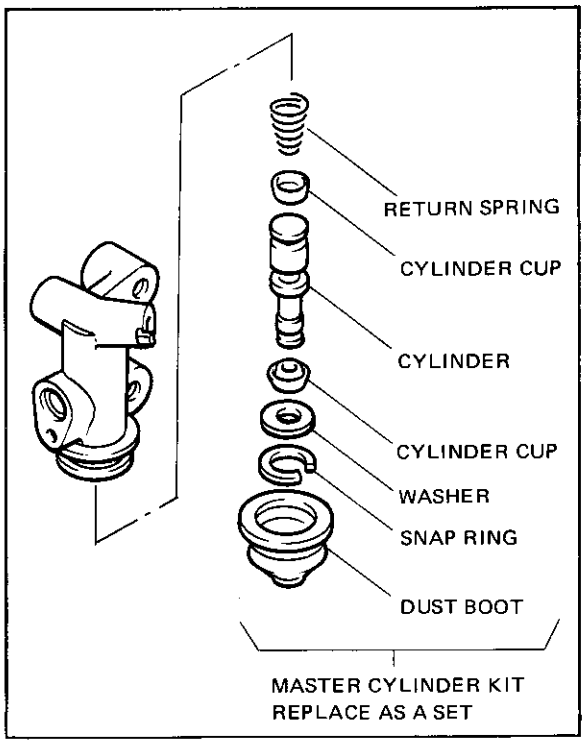
8. Remove the master cylinder dust boot.
9. Remove the snap ring.



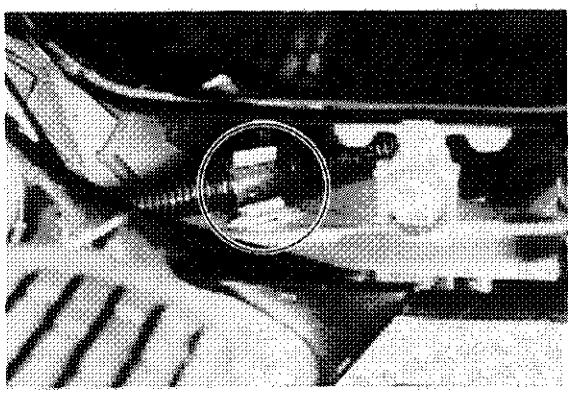
10. Remove the master cylinder cup assembly. Note that the cylinder cups are installed with the larger diameter (lips) inserted first.



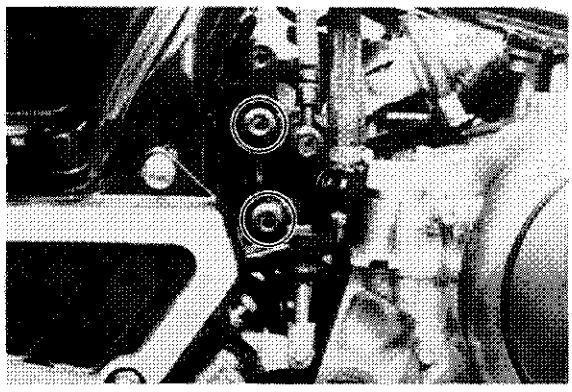
REAR:



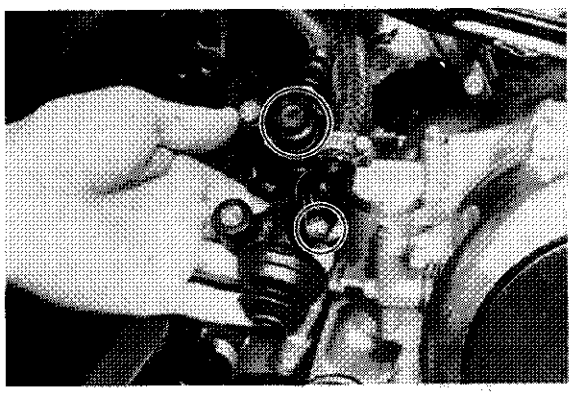

1. Remove the brake hose from the brake hose clamp.



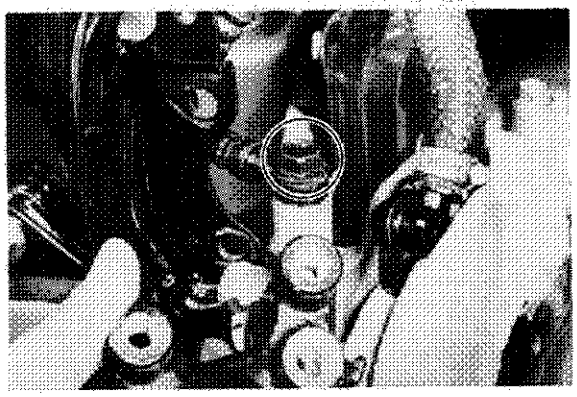
2. Remove the rear brake master cylinder holding bolts and remove the master cylinder from the brake rod.



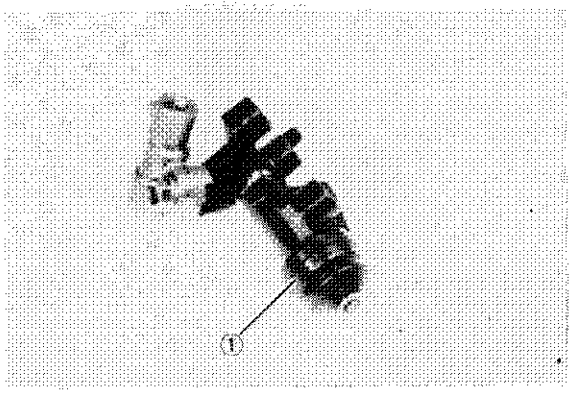
3. Remove the panhead screw and remove the brake hose. Drain the remaining fluid.



4. Remove the brake hose and remove the master cylinder.

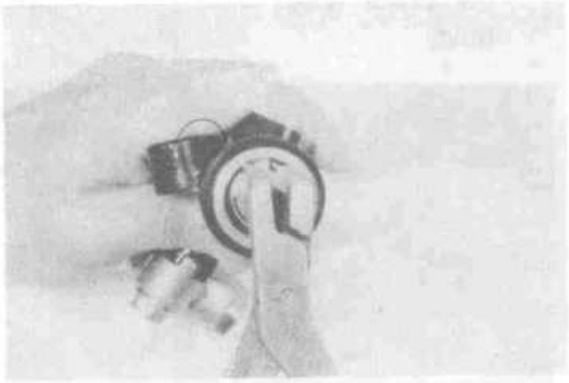


5. Remove the master cylinder dust boot.

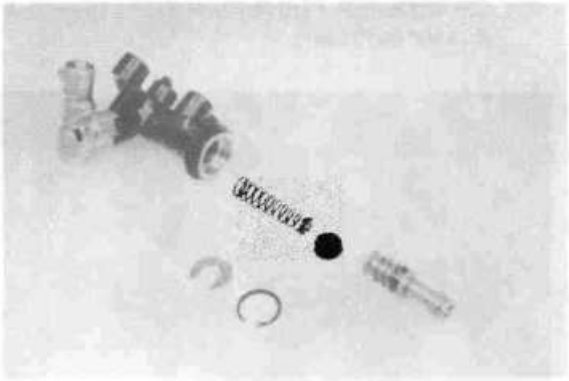



1. Dust boot

6. Remove the snap ring.



7. Remove the master cylinder cup assembly.



8. Remove the proportioning valve.



**Inspection**

1. Inspect master cylinder body. Replace if scratched. Clean all passages with new brake fluid.
2. Inspect the brake hoses. Replace every four years or immediately if cracked, frayed, or damaged.

**Installation**

Reassemble master cylinder as shown in illustration.

1. Install a new proportioning valve on the rear master cylinder.



Proportioning valve mounting bolt torque:
25 Nm (2.5 m·kg, 18 ft·lb)

2. Install the master cylinder on the frame.

Mounting bolt torque:
23 Nm (2.3 m·kg, 17 ft·lb)

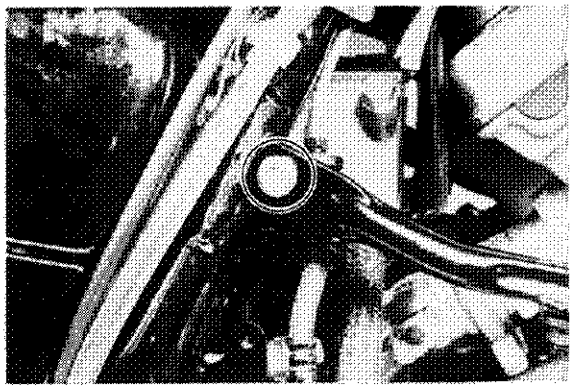
3. Install the brake hose to the master cylinder.

Brake hose torque
(all brake union bolts):
26 Nm (2.6 m·kg, 19 ft·lb)

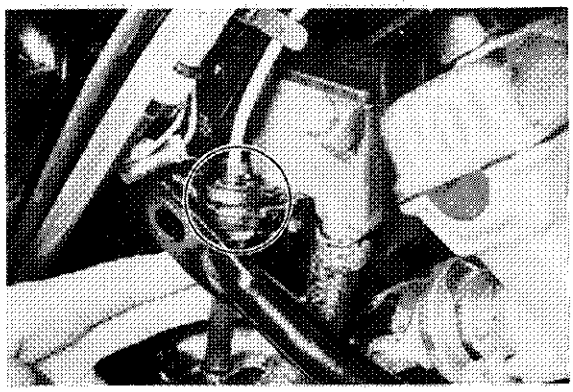
## RESERVOIR TANK

- Before removing, drain the brake fluid.

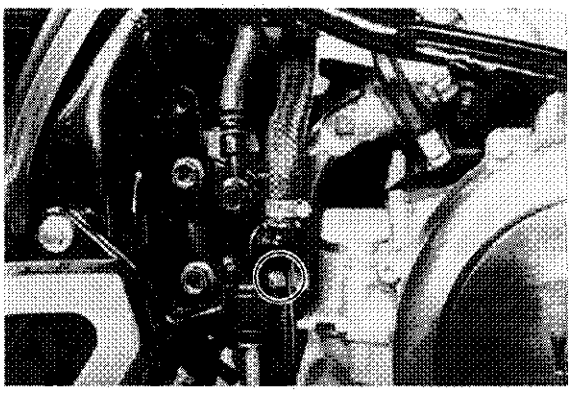
1. Remove the bolt holding the fairing mount pipe.



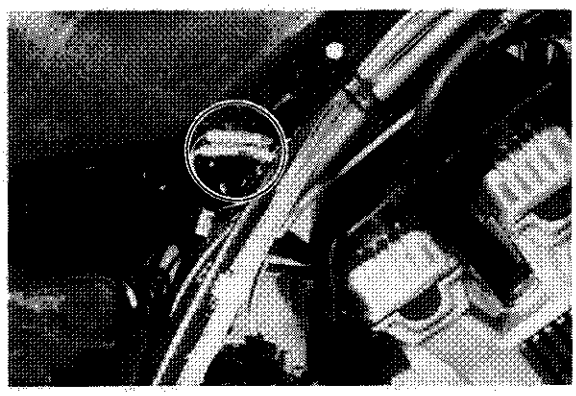
2. Remove the brake hose from the holder.



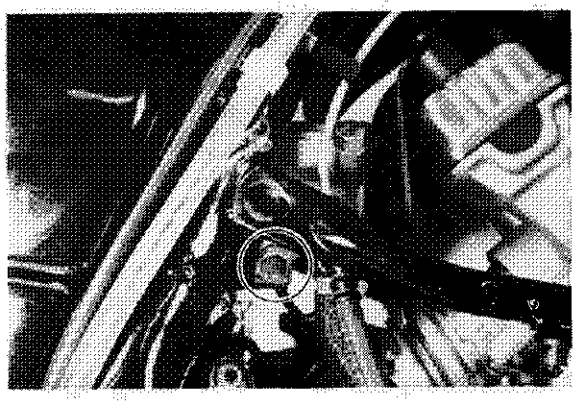
3. Remove the brake hose from the master cylinder.

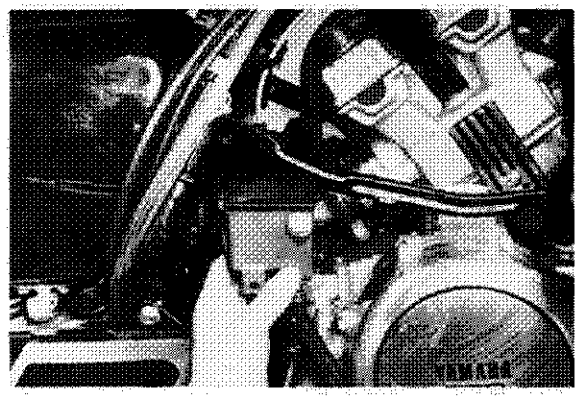


4. Remove the leads coming from the brake fluid level sensor.



5. Remove the reservoir mounting bolt, and remove the reservoir.



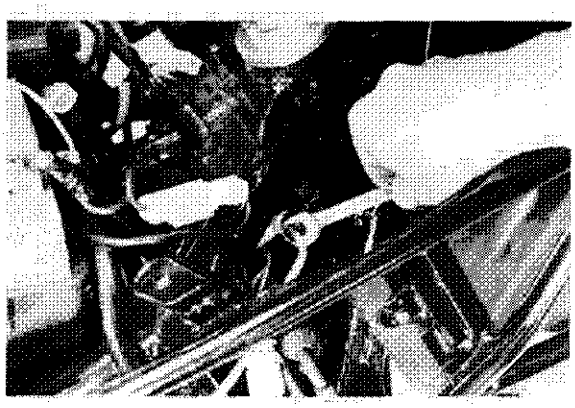


6. When installing, reverse the removal procedure.

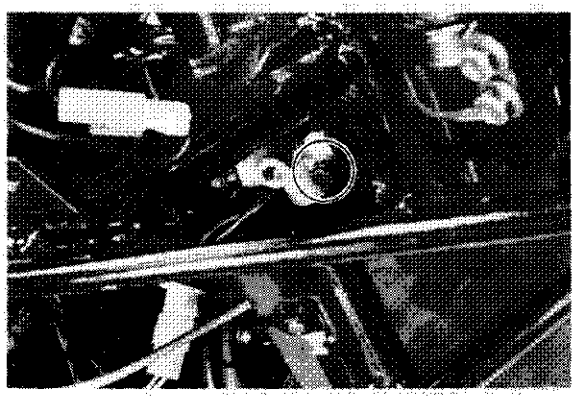
## METERING VALVE

After removing the fairing, proceed as follows:

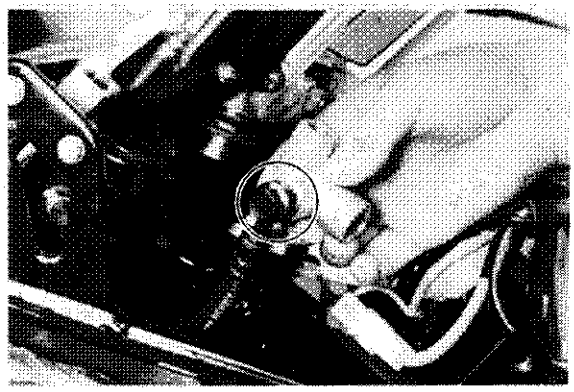
1 Loosen the union bolt, and disconnect the brake pipe.



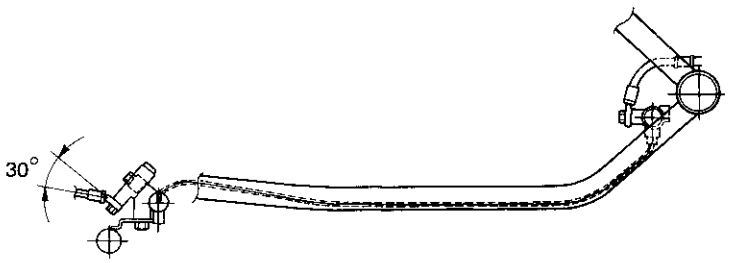
2. Remove the bolt securing the metering valve.

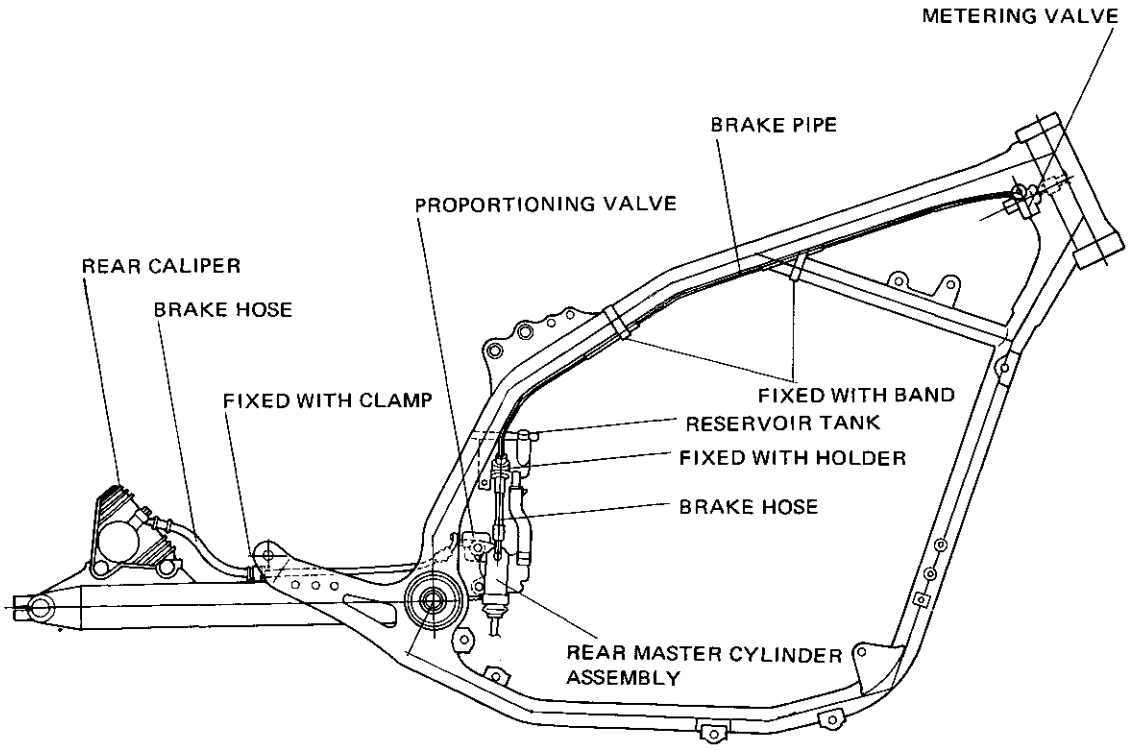


3. Disconnect the brake hose from the metering valve, and remove the metering valve.

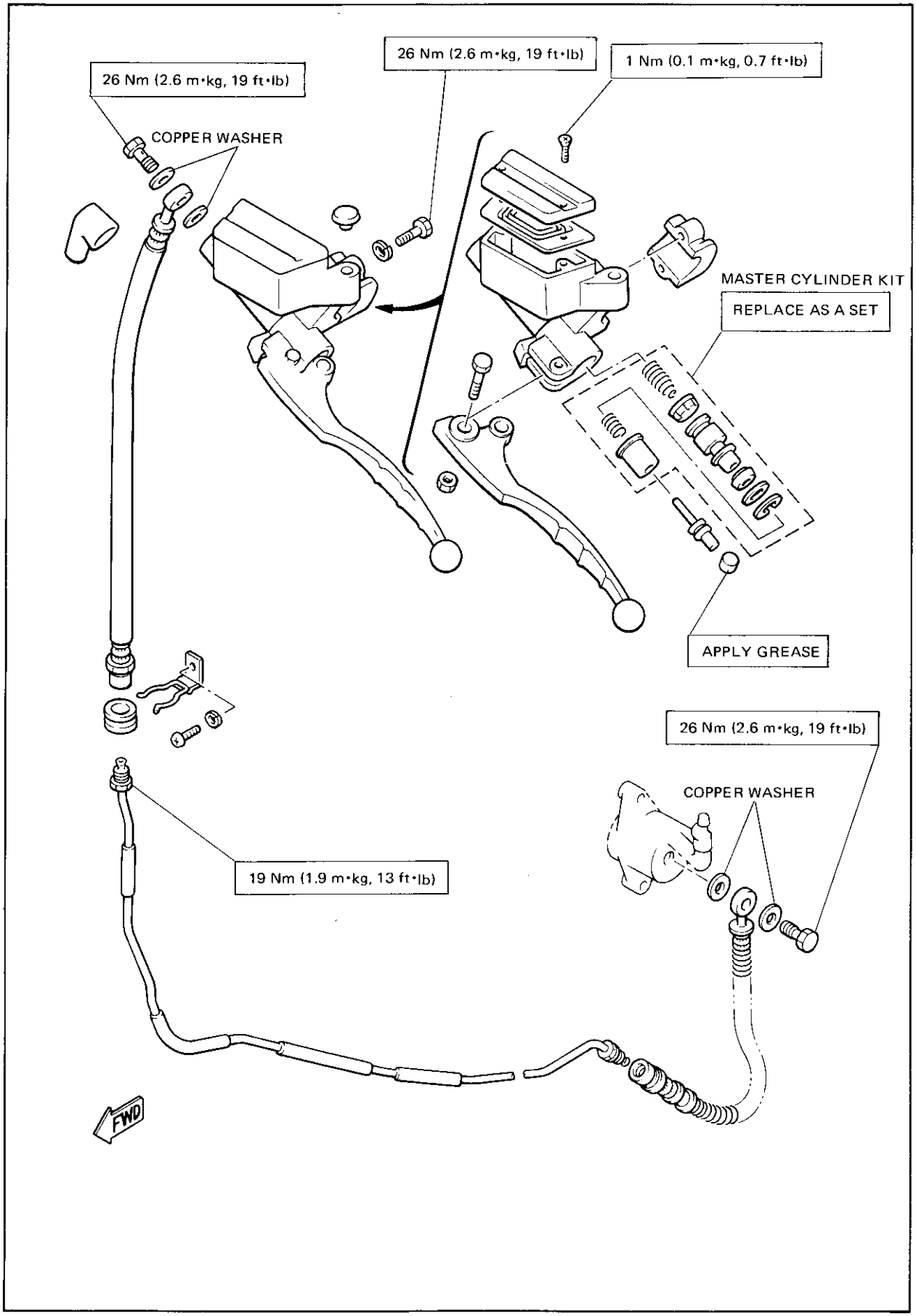


## BRAKE SYSTEM INSTALLATION



## HYDRAULIC CLUTCH

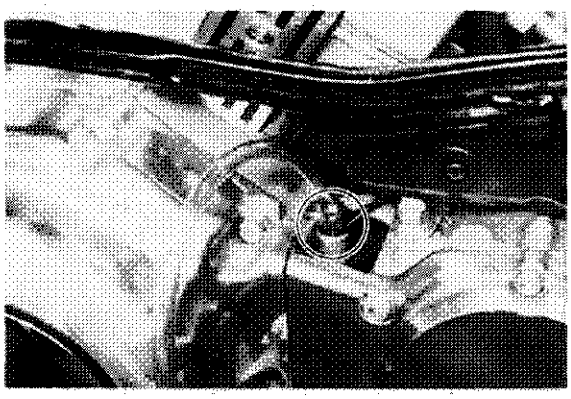


### Air Bleeding

**WARNING:**

**If the clutch system is disassembled or it any clutch hose has been loosened or removed, the clutch system must be bled to remove air from the fluid. If the fluid level is very low or clutch operation is incorrect, bleed the clutch system.**

1. Add proper brake fluid to the reservoir. Install the diaphragm, being careful not to spill or overflow the reservoir.
2. Connect the clear plastic tube of 4.5 mm (3/16 in) inside diameter tightely to the caliper bleed screw. Put the other end of the tube into a container.



3. Slowly apply the clutch lever several times. Pull in lever. Hold lever in "on" position. Loosen bleed screw. Allow the lever to travel slowly toward its limit. When the limit is reached, tighten bleed screw. Then release lever.
4. Repeat step "3" procedure until all air bubbles are removed from system.

**NOTE:**

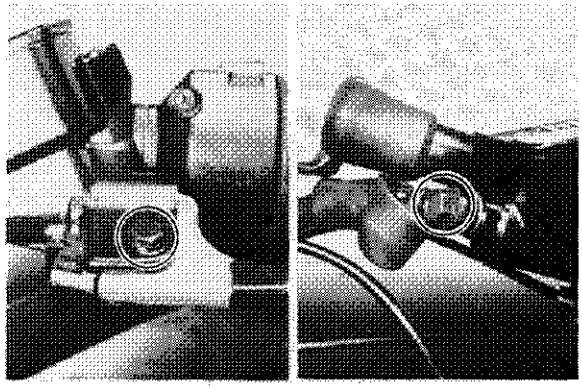
If bleeding is difficult, it may be necessary to let the brake fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system settle out.

### Master Cylinder Disassembly

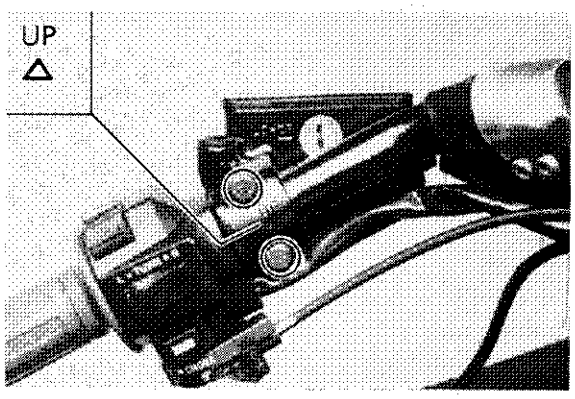
1. Remove the lever cover.
2. Remove the clutch switch.



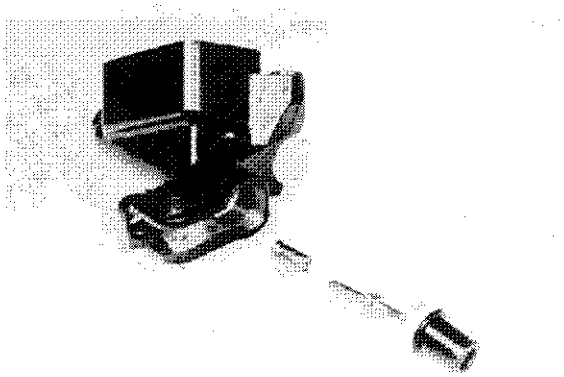
3. Remove the clutch lever and spring.
4. Remove the clutch hose.



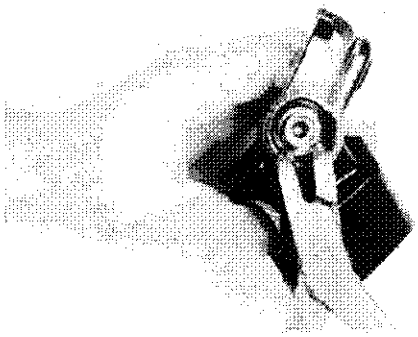
5. Remove the master cylinder from the handlebar. Remove the cap and drain the remaining fluid.

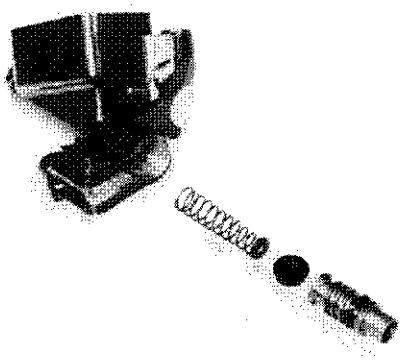


6. Remove the dust boot, push rod and spring.



7. Remove the snap ring and master cylinder cup assembly.



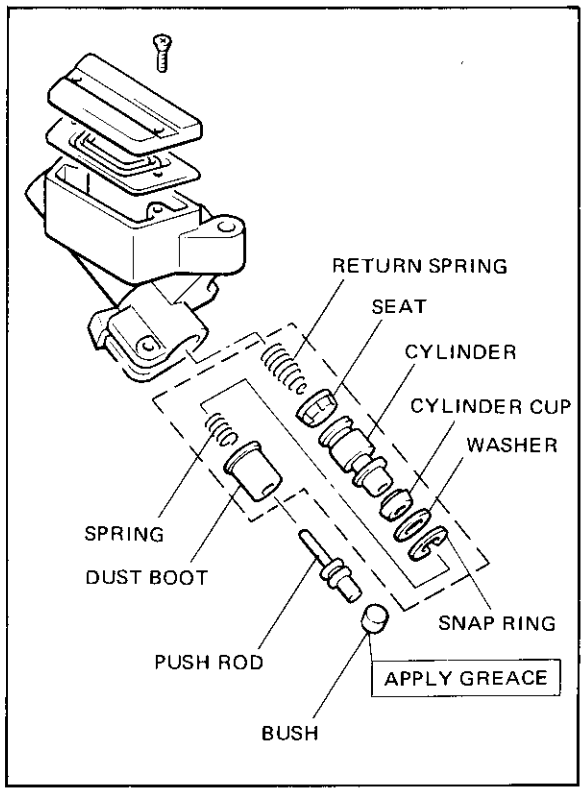


**Inspection**

1. Inspect master cylinder body. Replace if scratched. Clean all passages with new brake fluid.
2. Inspect the clutch hoses and pipes. Replace every four years, replace immediately if cracked, frayed, or damaged.

**Installation**

Reassemble master cylinder as shown in illustration.



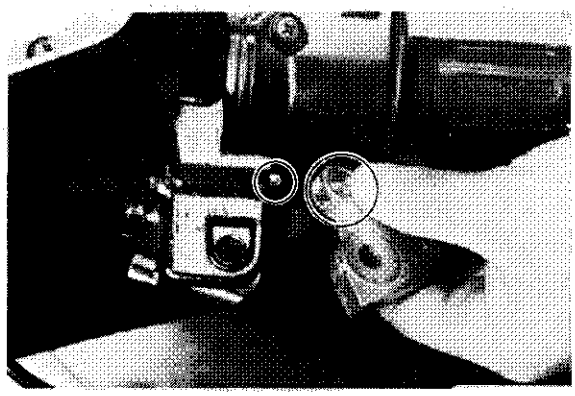

1. Install the master cylinder to the handlebar.

| Tightening torque: 26 Nm (2.6 m·kg, 19 ft·lb) |
|---|

2. Install the clutch hose to the master cylinder.

| Tightening torque: 26 Nm (2.6 m·kg, 19 ft·lb) |
|---|

3. Insert the push rod into the clutch lever pivot hole.



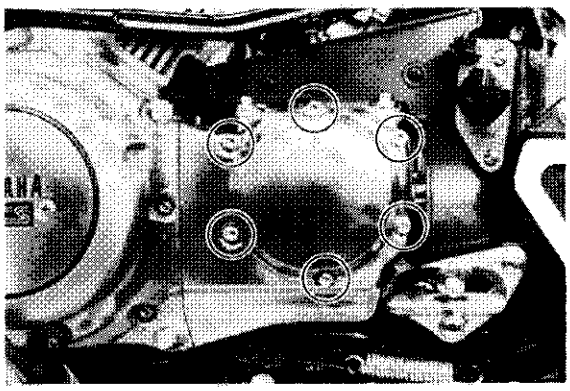
**NOTE:**

Grease the pivot point.

## CLUTCH RELEASE

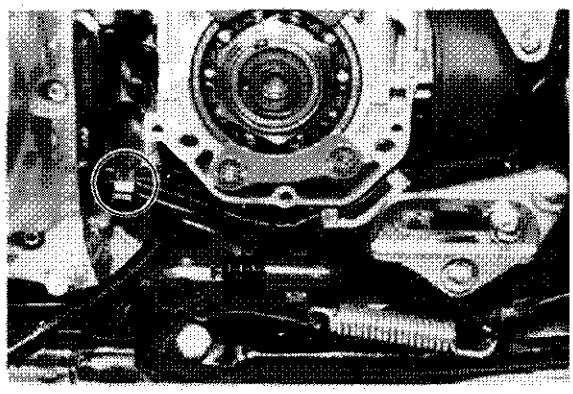
### Disassembly

1. Remove the change pedal and footrest assembly.
2. Remove the middle gear case cover.

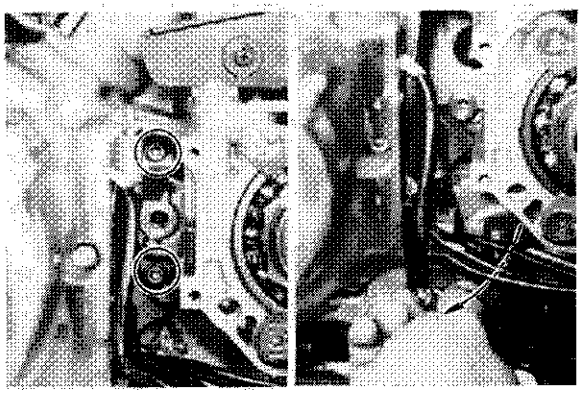


**NOTE:**
When removing the middle gear case cover, be sure oil does not leak out of the case.

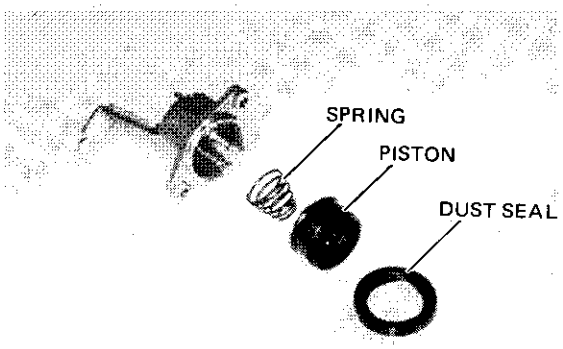
3. Remove the leads from the clamp.



4. Disconnect the clutch hose completely from the clutch release.
5. Remove the clutch release assembly from the engine.



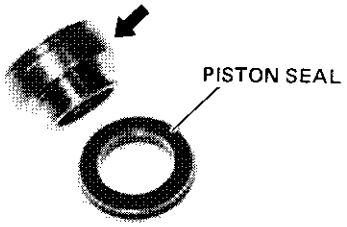
6. Remove the dust seal, piston, and spring.




### Inspection

Recommended clutch component replacement schedule:
Piston seal,
dust sel . . . . . .Every two years
Clutch hoses . . .Every four years
Clutch fluid. . . .Replace only when clutch is disassembled

1. Check the piston for uneven wear, and replace it as required.




2. Replace piston and dust seals if damaged.

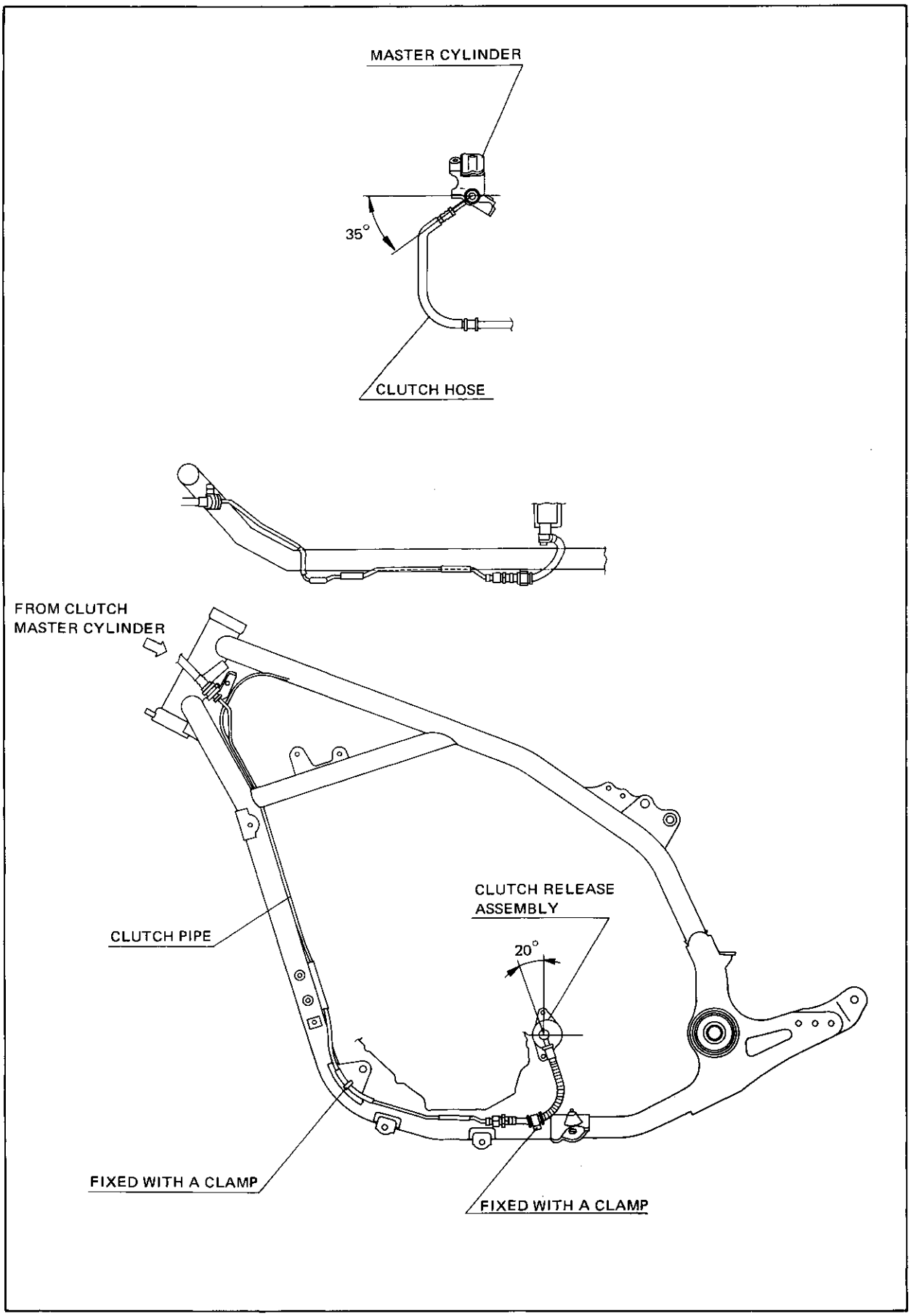
### Installation

Install the clutch release in reverse order of disassembly.

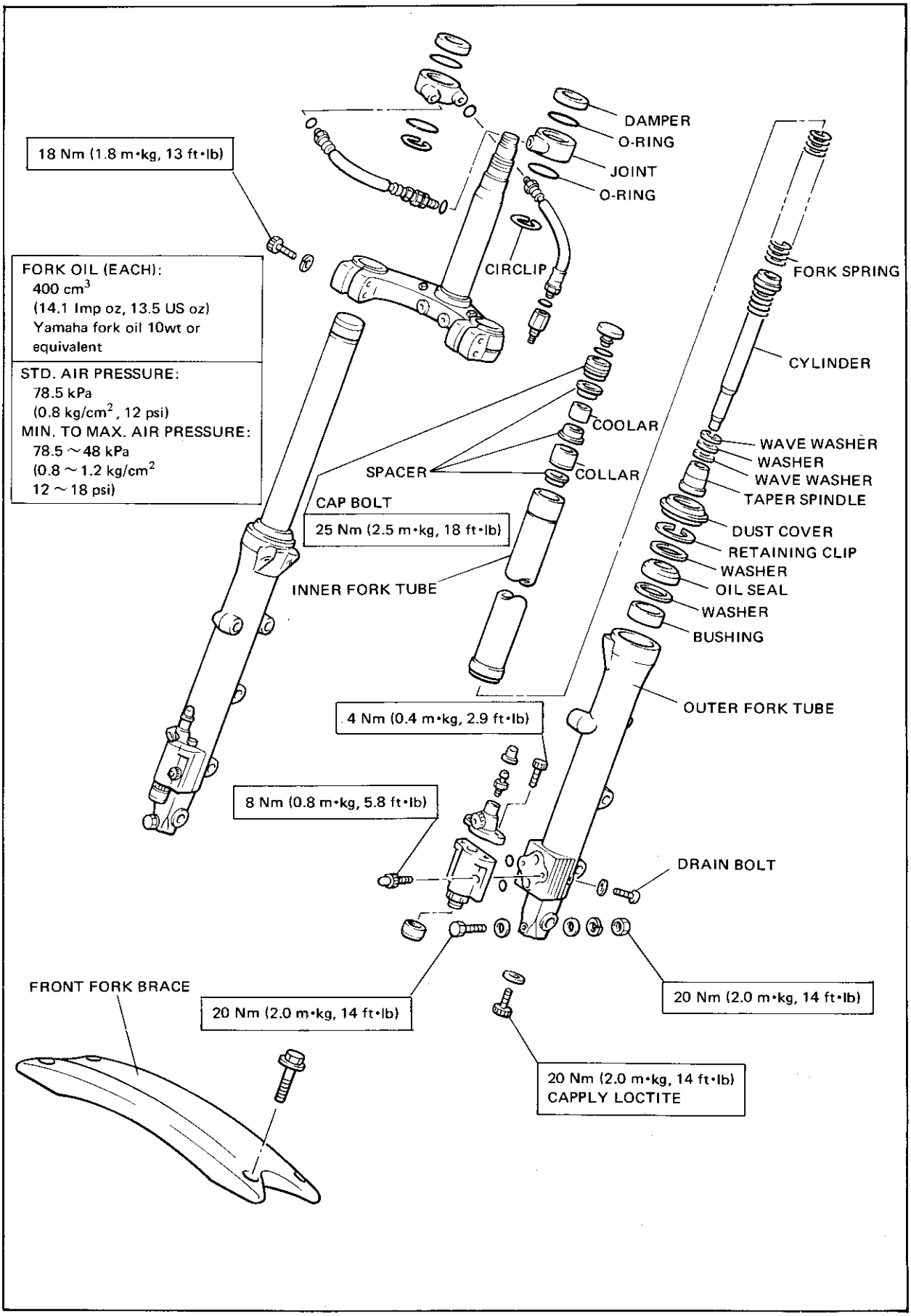
1. Apply the brake fluid to the piston and piston seal, and install them.
2. Tighten the bolts to specifications.

Tighteing torque:
Hose: 26 Nm (2.6 m·kg, 19ft·lb)
Release complete:
12 Nm (1.2 m·kg, 8.7 ft·lb)

## HYDRAULIC CLUTCH INSTALLATION CHART



## FRONT FORK


18 Nm (1.8 m•kg, 13 ft•lb)
FORK OIL (EACH):
400 cm³
(14.1 Imp oz, 13.5 US oz)
Yamaha fork oil 10wt or equivalent
STD. AIR PRESSURE:
78.5 kPa
(0.8 kg/cm², 12 psi)
MIN. TO MAX. AIR PRESSURE:
78.5 ~ 48 kPa
(0.8 ~ 1.2 kg/cm²
12 ~ 18 psi)
DAMPER
O-RING
JOINT
O-RING
CIRCLIP
FORK SPRING
CYLINDER
COOLAR
SPACER
COLLAR
WAVE WASHER
WASHER
WAVE WASHER
TAPER SPINDLE
CAP BOLT
25 Nm (2.5 m•kg, 18 ft•lb)
DUST COVER
RETAINING CLIP
WASHER
OIL SEAL
WASHER
BUSHING
INNER FORK TUBE
OUTER FORK TUBE
4 Nm (0.4 m•kg, 2.9 ft•lb)
8 Nm (0.8 m•kg, 5.8 ft•lb)
DRAIN BOLT
FRONT FORK BRACE
20 Nm (2.0 m•kg, 14 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
CAPPLY LOCTITE

**Removal**

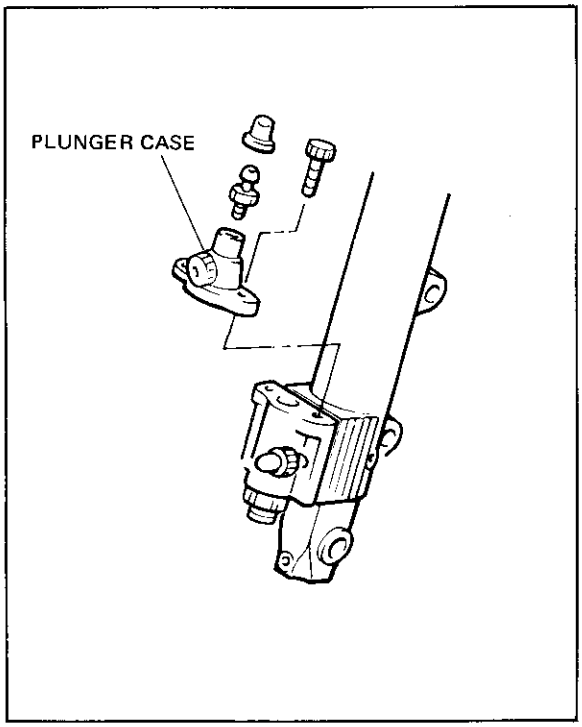
After removing the following parts, and remove the front fork.

- Fairing
- Handlebar
- Front wheel

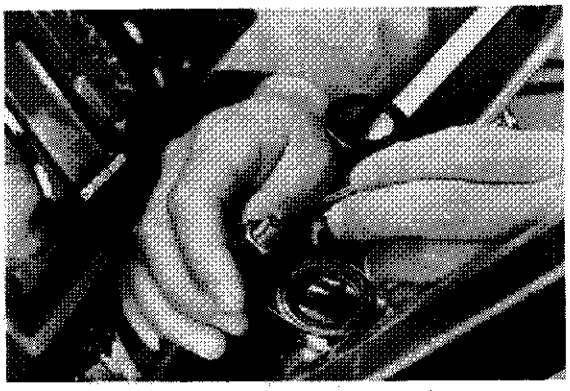
**WARNING:**

**Securely support the motorcycle so it won't fall over when the front wheel and front forks are removed.**

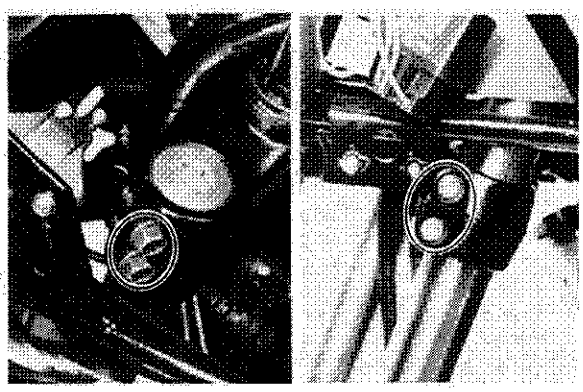
1. Remove the plunger case securing bolts and remove the plunger case from anti-dive unit.



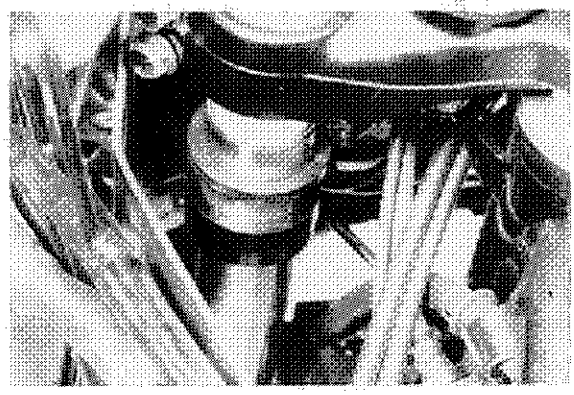

2. Remove the fork air valve cap and depress the valve until the air pressure escapes completely from both forks.



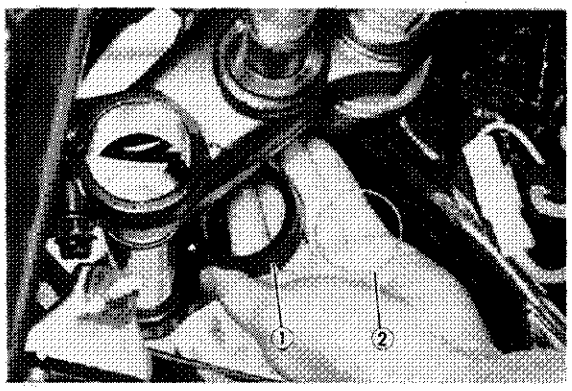
3. Remove the rubber cap and loosen the complete fork cap bolt one (1) turn.
4. Loosen the fork pinch bolts in the steering crown and underbracket.



5. Pull out the inner fork tubes from steering crown and remove the rubber damper.

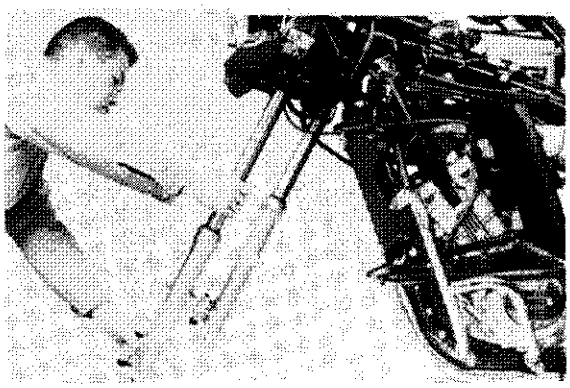


6. Push up the air joint bracket, and remove the spring wire clip.

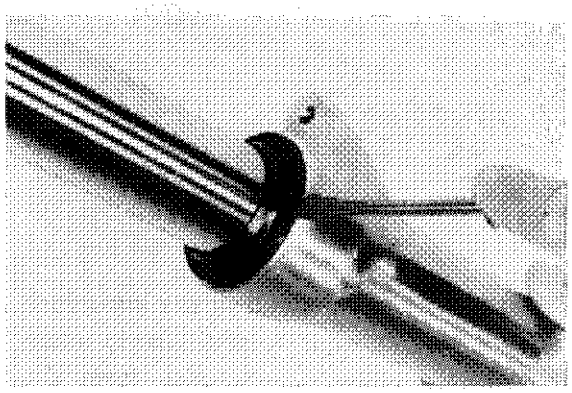



1. Joint 2. Circlip

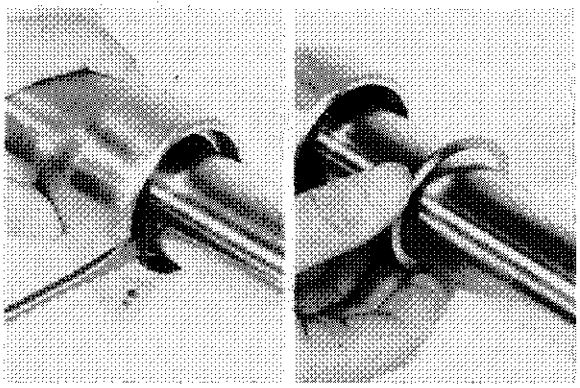
7. Remove the front forks.



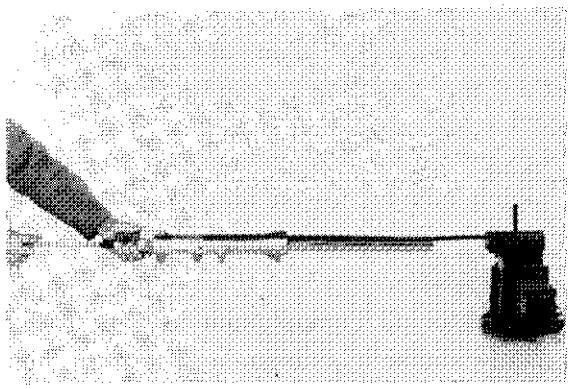
8. Remove the cap bolt assembly, spacers, and fork spring.
9. Drain the fork oil.
10. Remove the dust cover with a thin screwdriver. Take care not to scratch the inner fork tube.



11. Remove the oil seal retaining clip and washer.



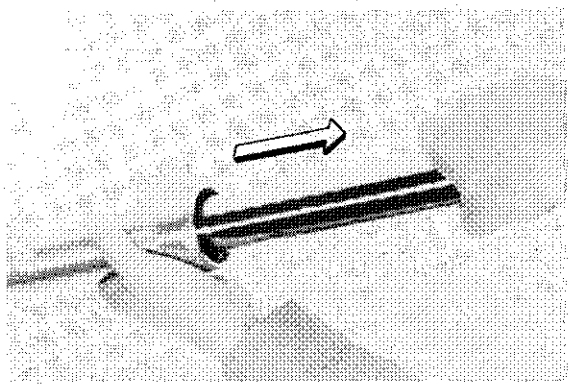
12. Remove allen bolt from bottom of outer tube.



13. Hold the fork leg horizontally and securely clamp the axle mounting boss of the outer tube in a vice with soft jaws. Then remove bushing grom to of outer tube by carefully but forcefully with drawing the inner tube.

**NOTE:**

- Excessive force will damage the bottom and/or the top bushing. Damaged bushing must be replaced.
- Avoid bottoming the inner tube in the outer tube during the above procedure, as the oil lock valve assembly will be damaged.



14. Remove all components of the oil lock valve assembly and inspect them; replace the assembly if there are any damaged components.
15. Clean all fork leg components and inspect them; replace any worn or damaged components prior to reassembly.

**Inspection Note**

Clean and inspect all front fork components. Replace any worn or damaged components prior to reassembly.

1. Examine the inner fork tube and replace if the tube is badly scratched or bent.

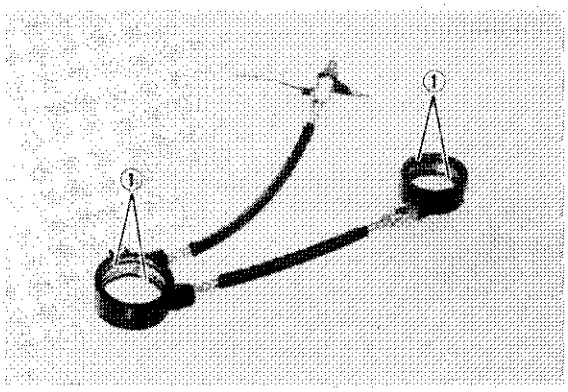
**WARNING:**

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

2. Inspect the outer surface of the fork seal seat and outer surface of the guide bushing seat in the outer fork tube. If these surfaces are damaged, replace the outer fork tube.
3. Check the outer fork tube for dents. Replace the tube it for necessary.
4. Check the free length of the fork spring.

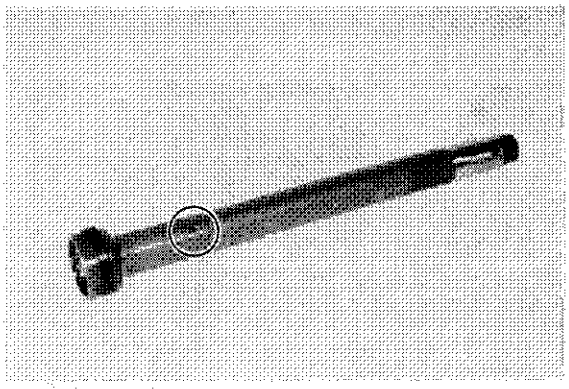
| Fork spring free length: |
| --- |
| 453.5 mm (23.6 in) |

5. Check the O-ring of the cap bolt assembly, air joint pipe bolt, and air joint cover. Replace any damaged O-ring.




1. O-ring

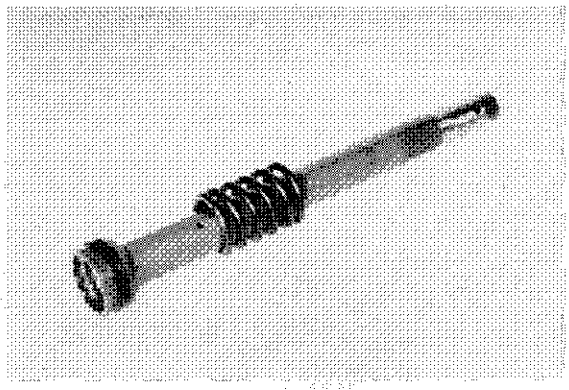
6. Check the oil seal spacer. If the seat is damaged or replace it.
7. Check the damper rod for wear, damage, or contamination. Blow out all oil passages with compressed air. If it is worn or damaged, replace it.



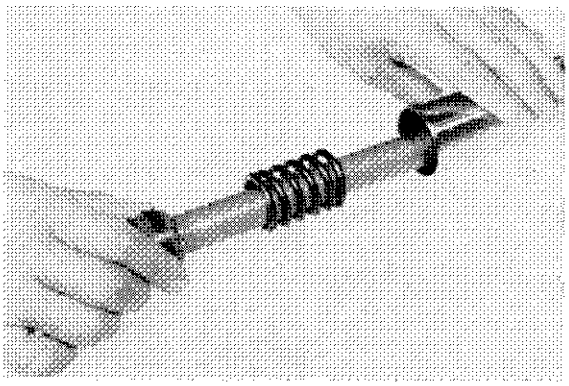
**Reassembly**

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

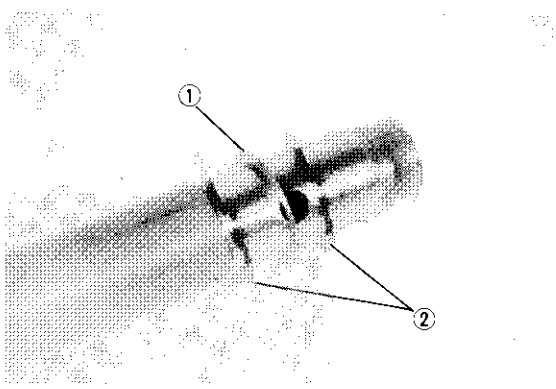
1. Install the rebound spring on the damper rod.



2. Install the damper rod in the inner fork tube, and allow it to slide slowly down the tube until it protrudes from the bottom.

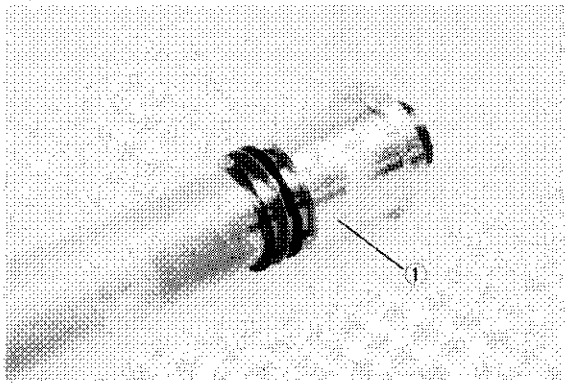


3. Install the washer, wave washers on the damper rod.




1. Washer 2. Wave washer

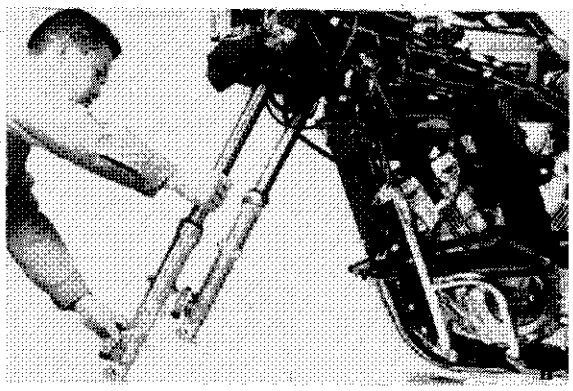
4. Place the taper spindle over the end of the damper rod, and insert the inner fork tube into the outer fork tube.



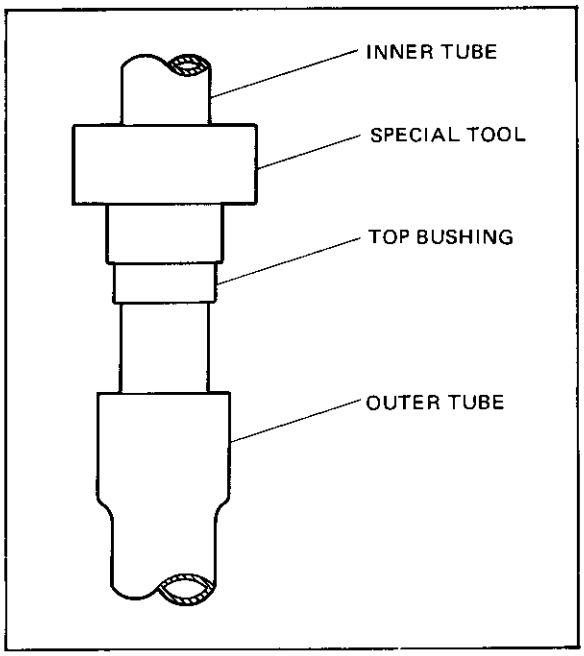

1. Taper spindle

5. Apply a thread-locking compound such as Loctite® to the threads of the cylinder securing bolt, install the bolt in the damper rod, and torque it to specification.

Tightening torque:
20 Nm (2.0 m·kg, 14 ft·lb)



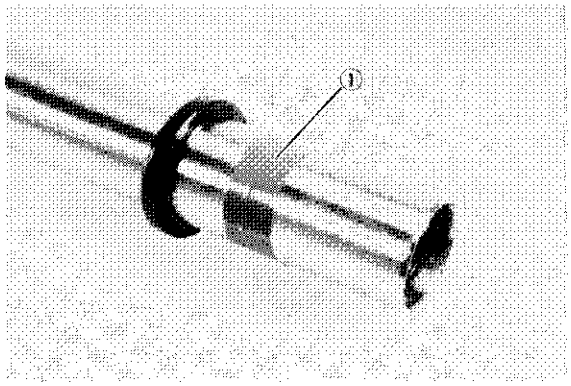
6. Install top bushing in outer tube.



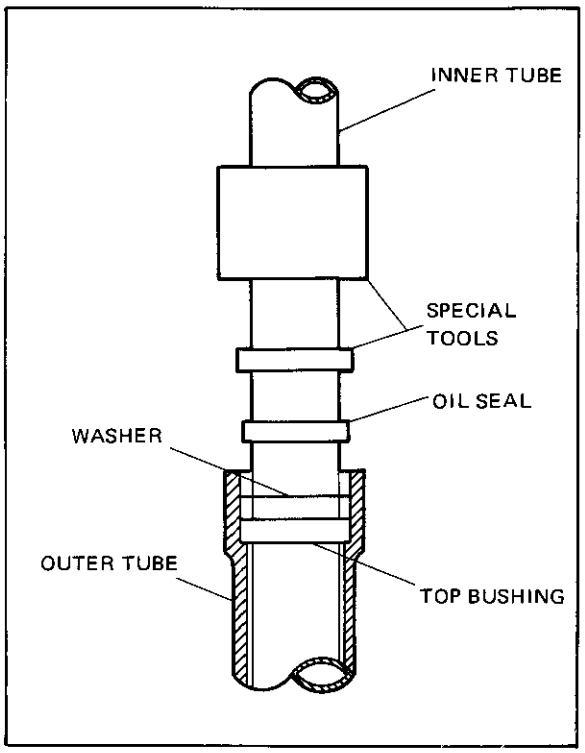

7. Install the washer on top of the bushing and then install the oil seal with the numbered side up, using the special tool.

**CAUTION:**

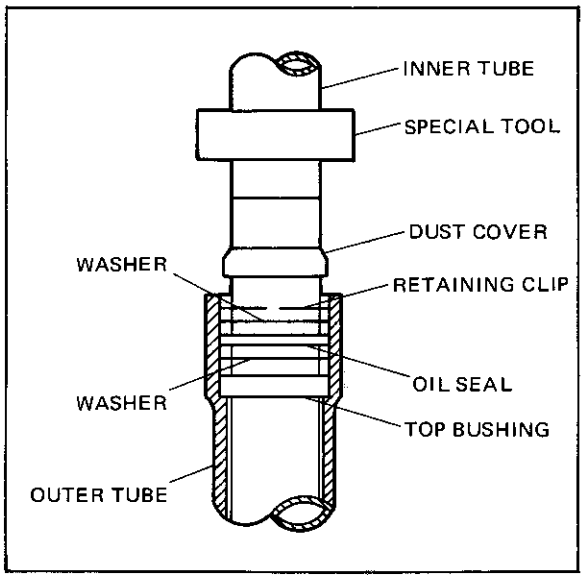
**When installing the oil seal on the inner tube, wind a vinyl tape around the circlip groove in the tube.**




1. Vinyl tape



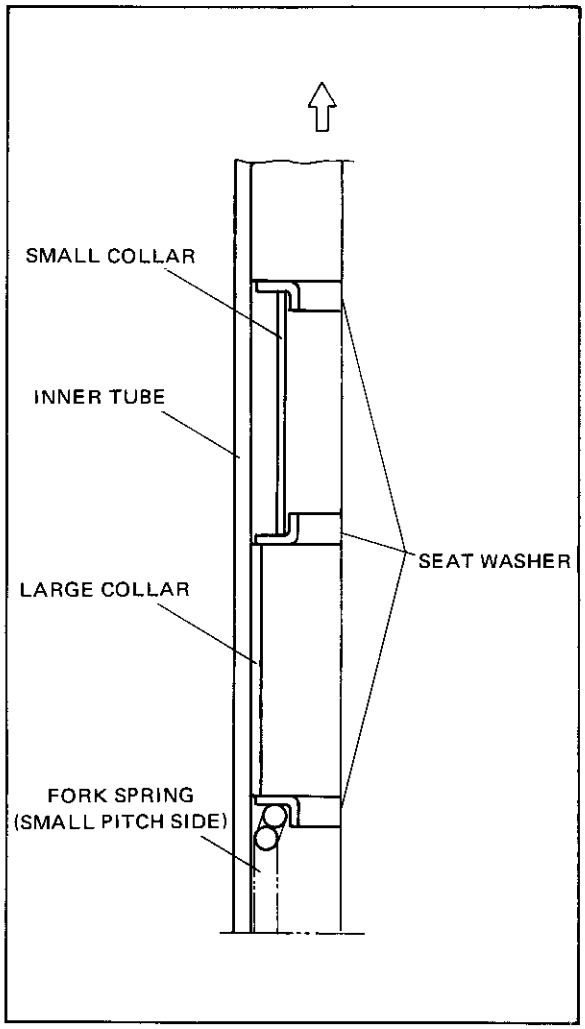

8. Install washer and circlip then install dust cover using special tool.




9. Pour specified amount of oil into inner tube.

Front fork oil (each):
400 cm³ (14.1 Imp oz, 13.5 US oz)
Recommended oil:
Yamaha fork oil 10 wt or equivalent
After filling, slowly pump the fork up and down to distribute oil.

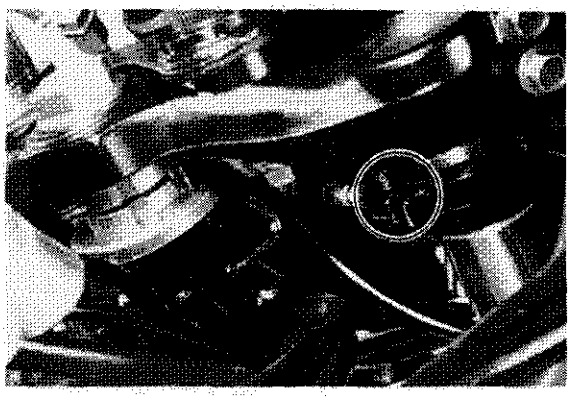
10. Install spring, seal collars and cap bolt.



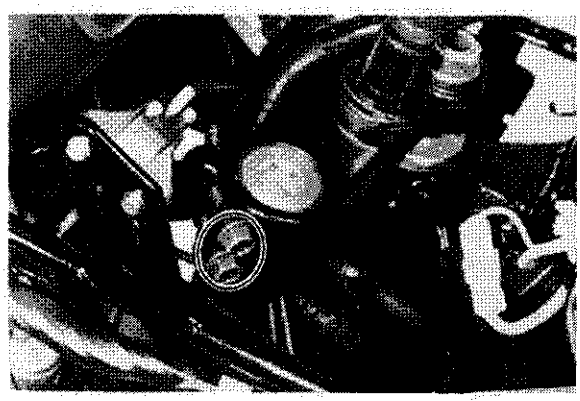

**NOTE:**
The fork spring should be installed with the smaller pitch side facing upward.

11. Slide the fork into the under bracket.
12. Install the circlip on the inner tube.
13. Apply a light coat of lithium base grease to the O-rings in the air joint bracket. Install the air joint bracket, rubber damper over the inner fork tube.
14. Slide the fork into the handle crown in the following way.

a. Make sure the projecting portion (stopper) of the air joint bracket is positioned correctly.



b. Be sure the inner tube end is flush with the top of the steering crown.



15. Tighten the pinch bolts at the under bracket.

| Tightening torque: 17 Nm (1.7 m·kg, 12 ft·lb) |
|---|

16. Tighten the cap-bolt assembly to specification.

| Tightening torque: 25 Nm (2.5 m·kg, 18 ft·lb) |
|---|

17. Tighten the pinch bolt at the steering crown.

| Tightening torque: 20 Nm (2.0 m·kg, 14 ft·lb) |
|---|

18. Reinstall plunger case.

**WARNING:**

**When reinstalling the plunger case, use utmost care to free the inside of the case from any mineral oils (eg. engine oil, fork oil, etc.). Otherwise, such oils will deteriorate the actuating piston O-ring nesulting in brake fluid leakage.**

**CAUTION:**

**After installing the plunger case, check for oil or air leakage.**

## ANTI DIVE SYSTEM

### System inspection

1. Apply the front brake for a few minutes and check to see if any brake fluid leaks out of the pipe joint and/or the vent.
2. Check the fork for oil leakage.
3. Turn the anti-dive adjusting bolt to the maximum position.
   Compress the front forks while applying the front brake. If the front forks are compressed easily, the anti-dive system may be damaged.

**NOTE:**

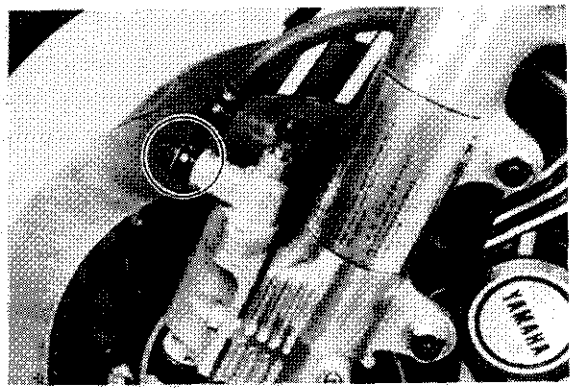
The anti-dive valve housing can not be disassembled so it must be replaced with a new one if the anti-dive valve malfunction is found.

### Removal

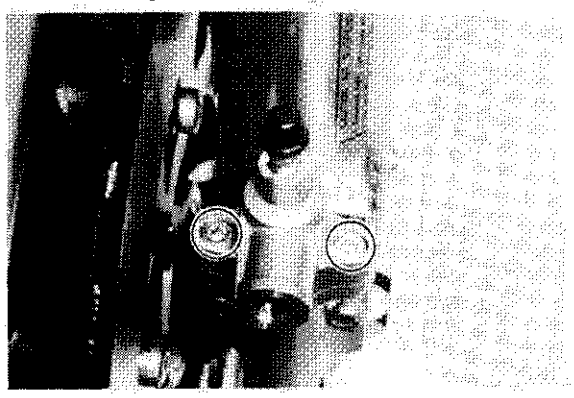
**CAUTION:**

**Before removing, drain the fork oil and brake fluid.**

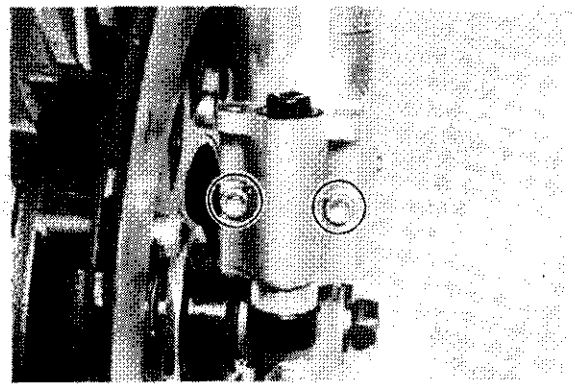
1. Remove the brake hose from the actuating piston housing.

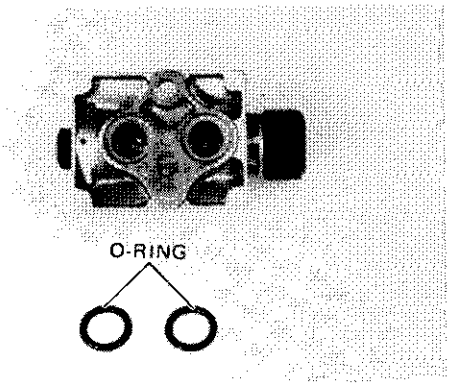


2. Remove the allen bolts securing the actuating piston housing, and remove the housing from the anti-dive valve housing.



3. Remove two bolts securing the anti-dive valve assembly and remove the housing assembly from the front fork. Remove two O-rings from the front fork.






**Assembly**

For assembly, reverse the disassembly procedure. Take the following precautions:

1. Before installing the piston, apply oil to piston and bushing.
2. Install new O-rings around the front fork oil pasages.
3. Install the anti-dive valve housing onto the front fork and secure it with allen bolts. Torque the bolts to the specification.

| Tightening torque: |
| --- |
| 8 Nm (0.8 m·kg, 5.8 ft·lb) |

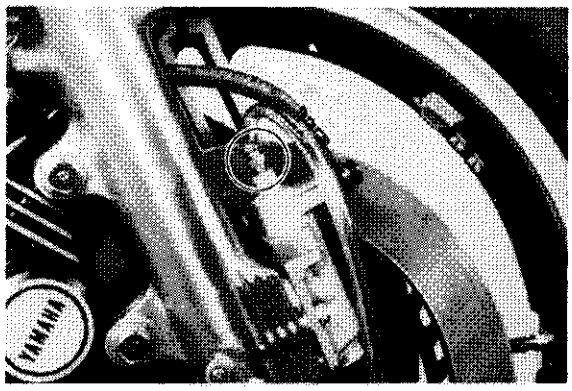
4. Install the actuating piston housing onto the anti-dive valve housing and secure it with two bolts. Torque the bolts to the specification.

| Tightening torque: |
| --- |
| 4 Nm (0.4 m·kg, 2.9 ft·lb) |

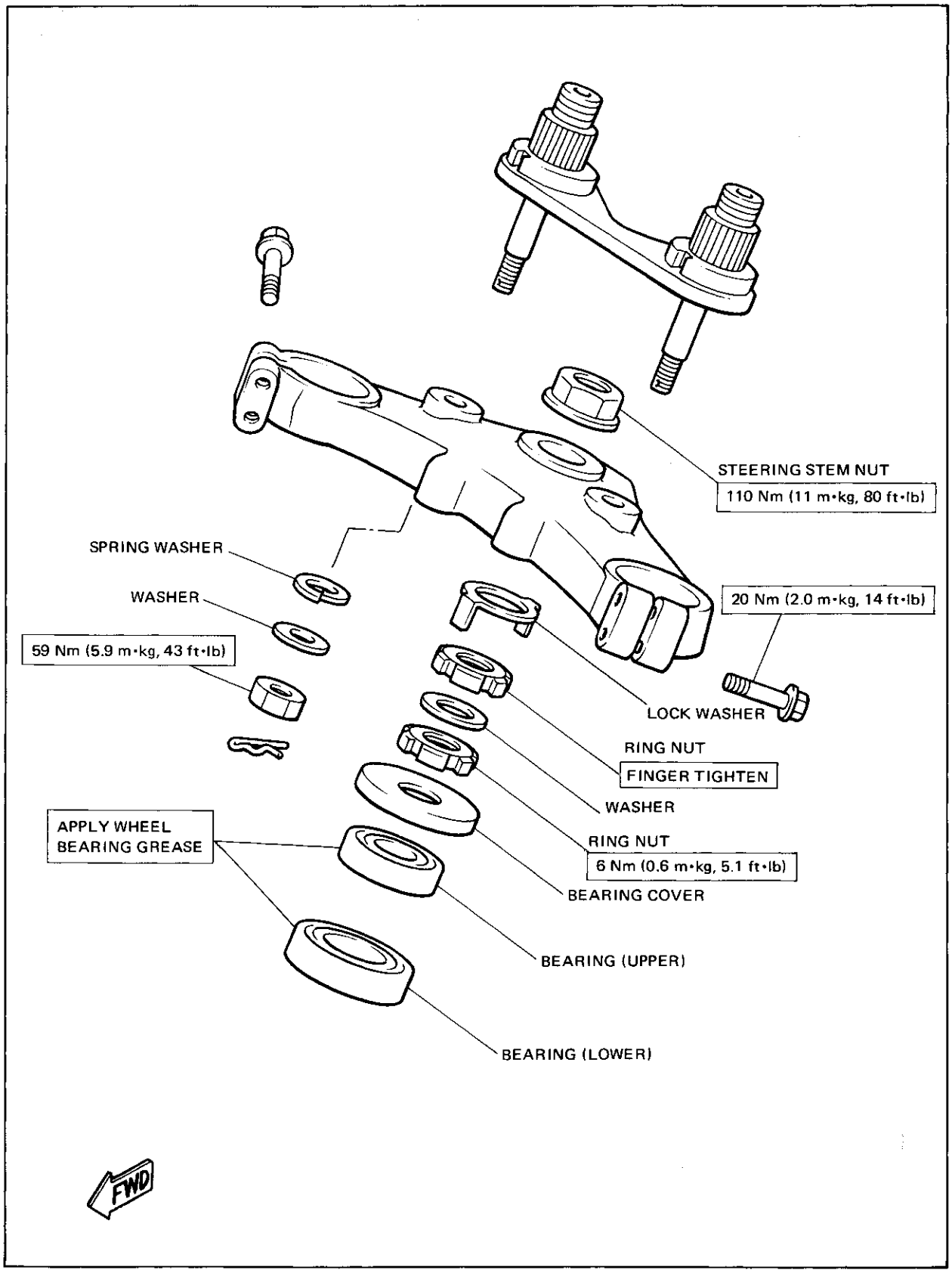
5. Connect the brake hose to the actuating piston housing with the union bolt and copper washers. Torque it to the specification.

| Tightening torque: |
| --- |
| 26 Nm (2.6 m·kg, 18.8 ft·lb) |

6. After assembling, check the anti-dive system for oil leakage.
7. Bleed air from the brake system.



## STEERING HEAD



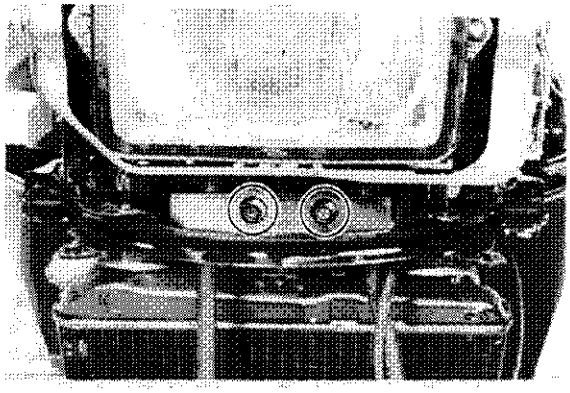

**Adjustment**

(See Chapter 2 for Steering Head Adjustment).

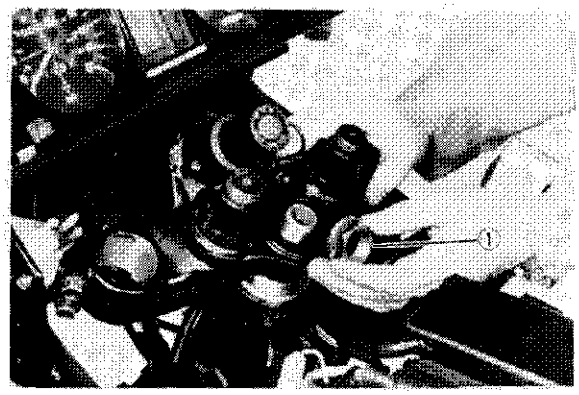
**Removal**

After removing the following parts, and remove the steering head.
a. Fairing b. Handlebars c. Front wheel
d. Steering head

1. Remove the front brake hose holder.

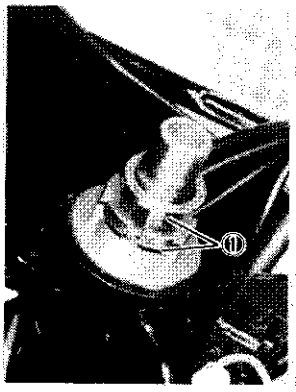


2. Remove the steering stem nut and steering crown.

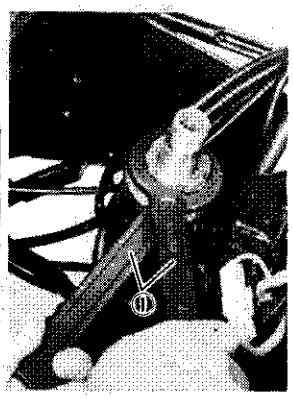


1. Streeing stem nut

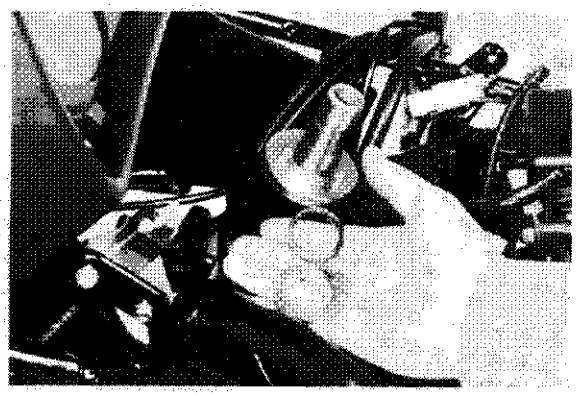
3. Remove the lock washer top ring nut and washer.



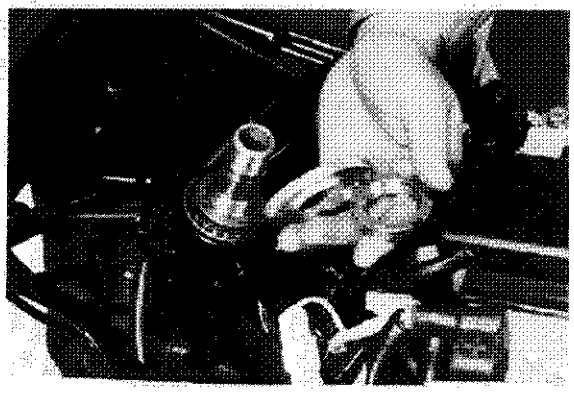
1. Steering ring nut



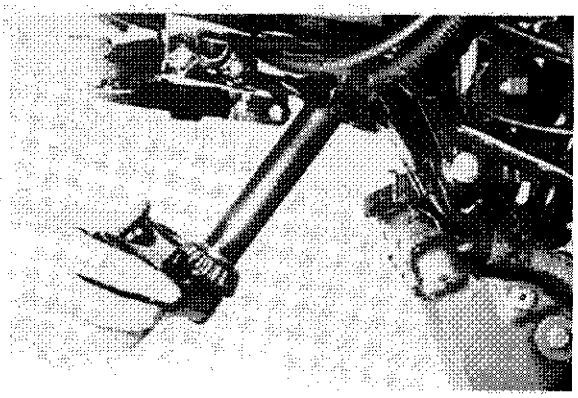
1. Ping nut wrench



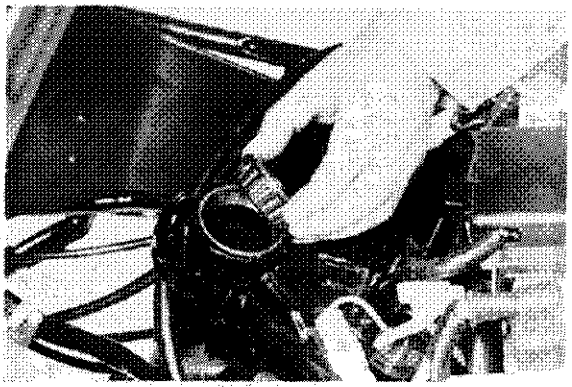
4. Support the steering stem (underbracket) and remove the bottom ring nut and dust cover.



5. Remove the steering stem.



6. Remove the bearings.

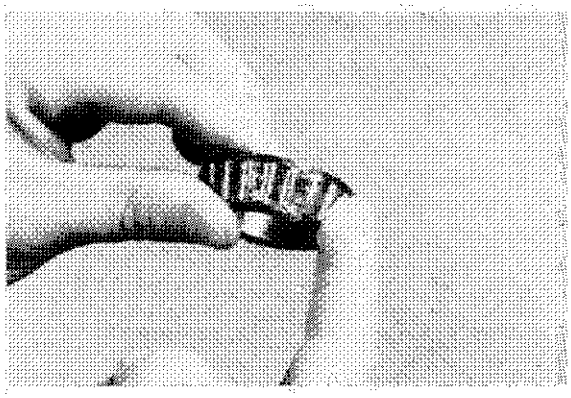


### Inspection

1. Wash the bearings in solvent.
2. Inspect the bearings for pitting or other damage. Replace the bearings if pitted or damaged. Replace the races when bearings are replaced.
3. Clean and inspect the bearing races. If races are damaged, replace the bearings.
4. Install the bearings in the races. Spin the bearings by hand. If the bearings hand up or are not smooth in their operation in the races, replace bearings and races.

### Reassembly

1. Grease the bearings and races with wheel bearings grease.

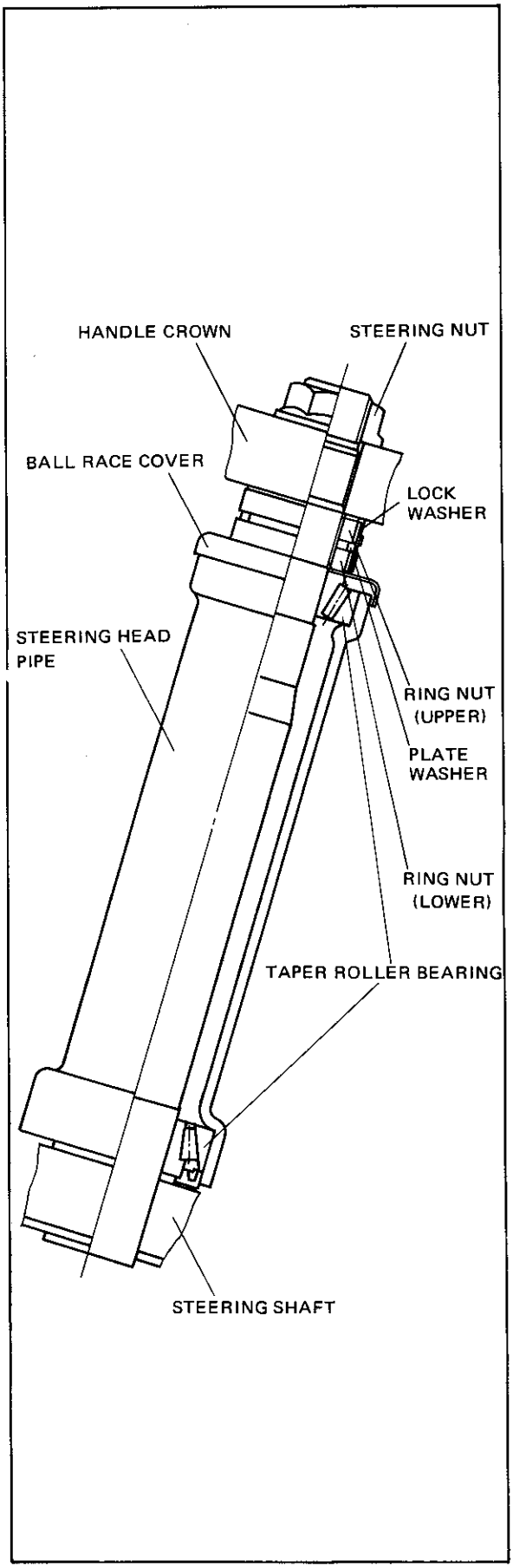


2. Install the steering stem (underbracket) and bearings.
3. Install the bottom ring nut. Tighten it to approximately 6 Nm (0.6 m·kg, 4 ft·lb). Do not overtighten it.
4. Install the plate washer and top ring nut.
5. Tighten the top ring nut by hand and align the slots of bottom and top ring nut.
6. Install the lock washer so that the tab is aligned with the slot in the nut.
7. Install the steering crown, and tighten the stem nut.

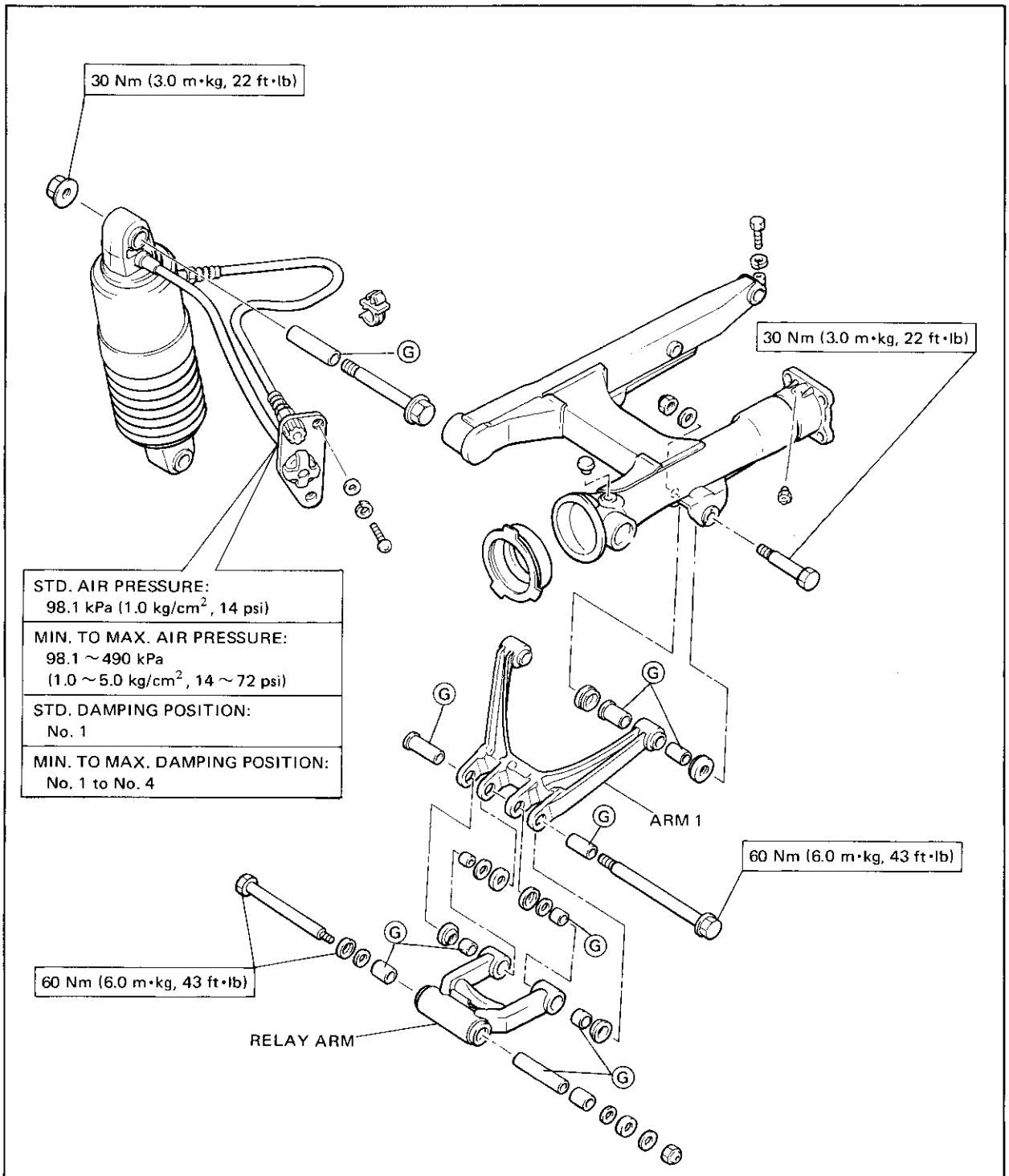
| Tightening torque: |
| --- |
| 110 Nm (11.0 m·kg, 80 ft·lb) |

8. When assembly is complete, check the steering stem by turning it from lock to lock. If there is any binding or looseness, readjust the steering stem tightness.

### Assembling chart



## REAR SHOCK ABSORBER/REAR ARMS

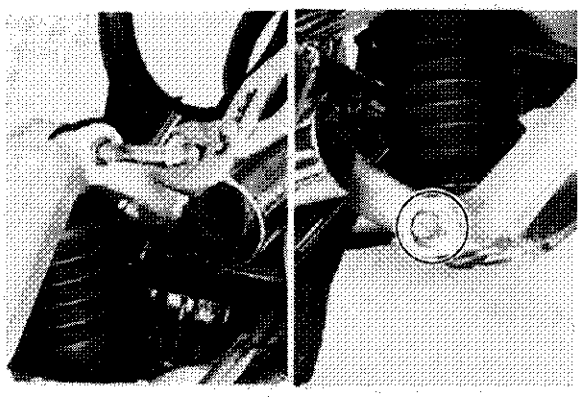



Ⓖ : APPLY MOLYBDENUM DISULFITE GREASE

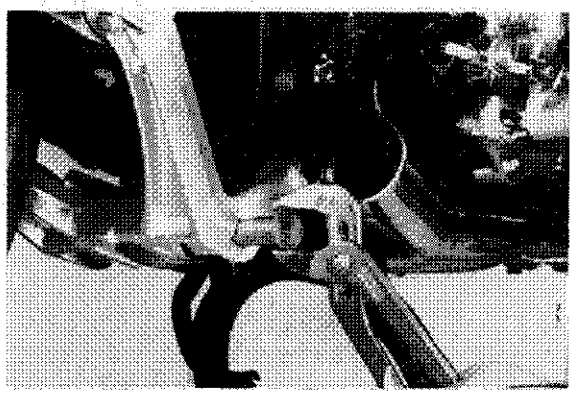
**NOTE:**
When installing, coat the bushings, thrustwashers, dust seales, and bolts with a liberal amount of molybdenum disulfite grease.
After installing, thoroughly wipe off excess grease.

**Removal**

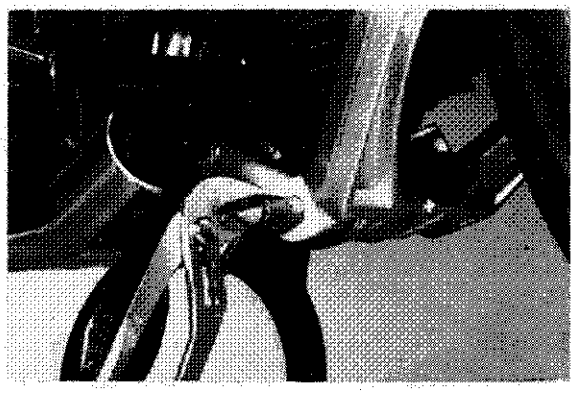
1. Remove both right and left mufflers.
2. Remove both right and left side covers.
3. Loosen the bolt holding the lower part of rear shock absorber and pull it out to the left.



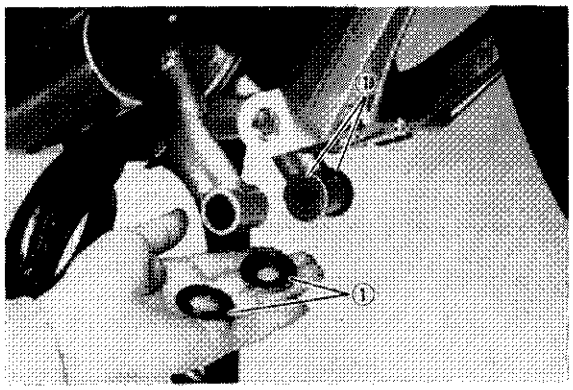
4. Pull out the bushing to the right.



5. Pull out the bushing to the left.

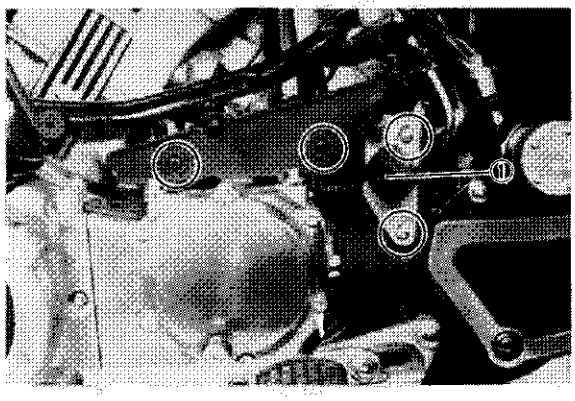


6. By moving each arm back and forth, remove the dust covers.



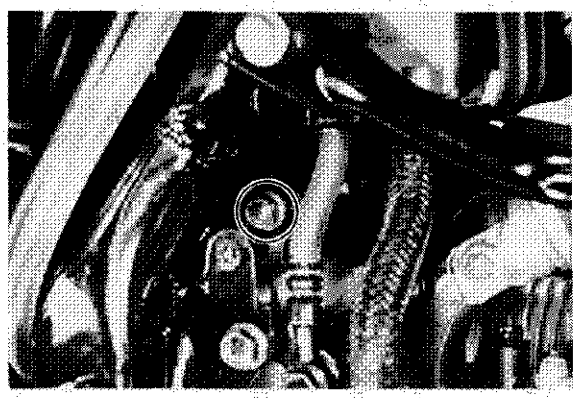
1. Dust cover

7. Remove the two bolts holding the damping adjuster.

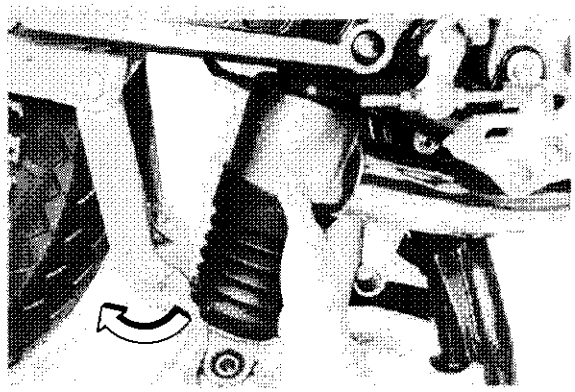


1. Damping adjuster

8. Remove the bolt holding the upper part of rear shock absorber while holding the shock by hand.



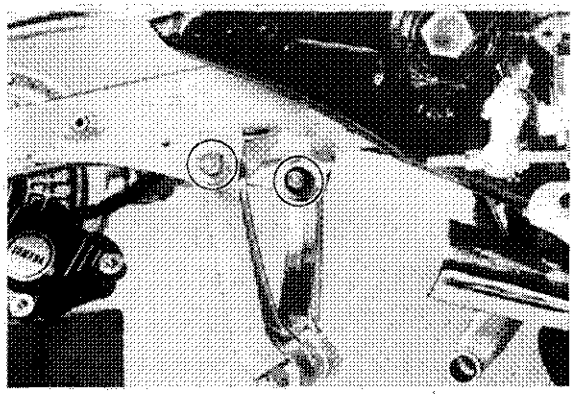
9. Remove the rear shock absorber from the frame by pulling it downward.



**CAUTION:**

**Be careful so that the rear shock absorber air hose does not contact the frame.**

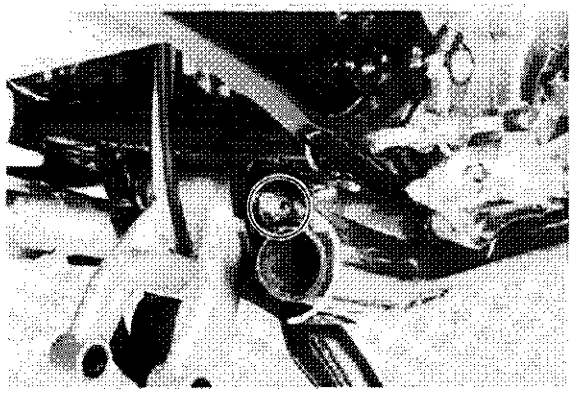
10. Remove the arm 1 from the swingarm.



11. Remove the relay arm from the frame.

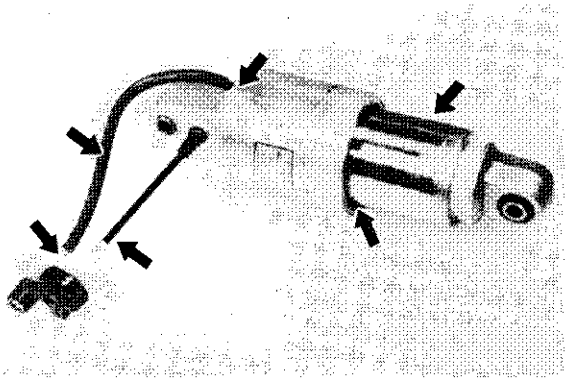
**NOTE:**

When removing the relay arm, loosen the bolt holding the expansion chamber, and move the chamber downward. Now the bolt holding the relay arm can be removed.

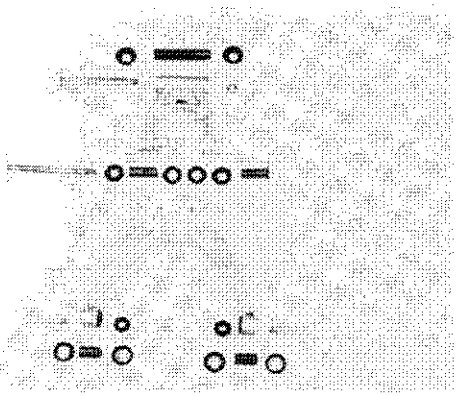


**Inspection**

1. Make sure there is no air leakage from air valves or hoses. If air leaks, replace rear shock absorber assembly.
2. Check for oil leakage. If oil leakage is evident, replace the shock absorber.



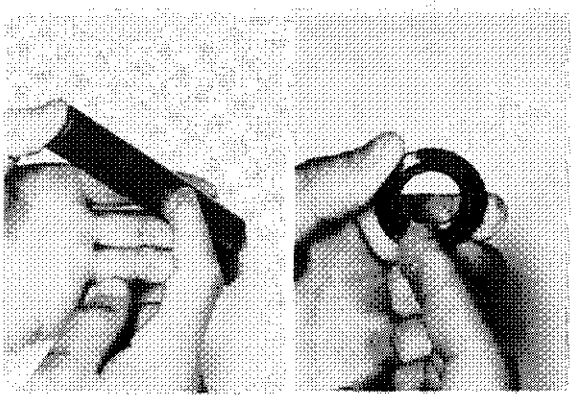
3. Check the bushing for grooved wear or damage. Check the dust seal for damage. If damaged, replace it.



**Installtion**

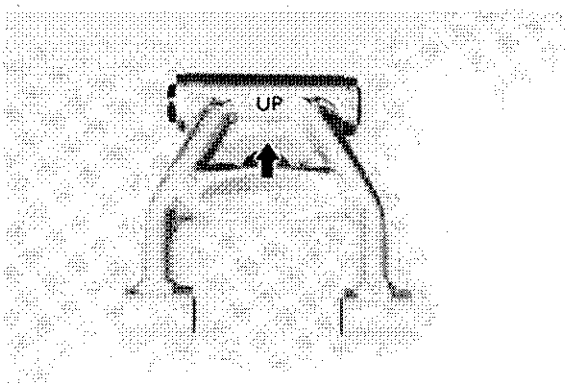
For installtion, reverse the removal procedure.

1. Coat the bushing and dust seal with molybdenum grease.



2. Install the relay arm and arm 1.

| Tightening torque: |
|---|
| Relay arm & Frame |
| 60 Nm (6.0 m·kg, 43 ft·lb) |
| Arm 1 & Swingarm |
| 30 Nm (3.0 m·kg, 21 ft·lb) |

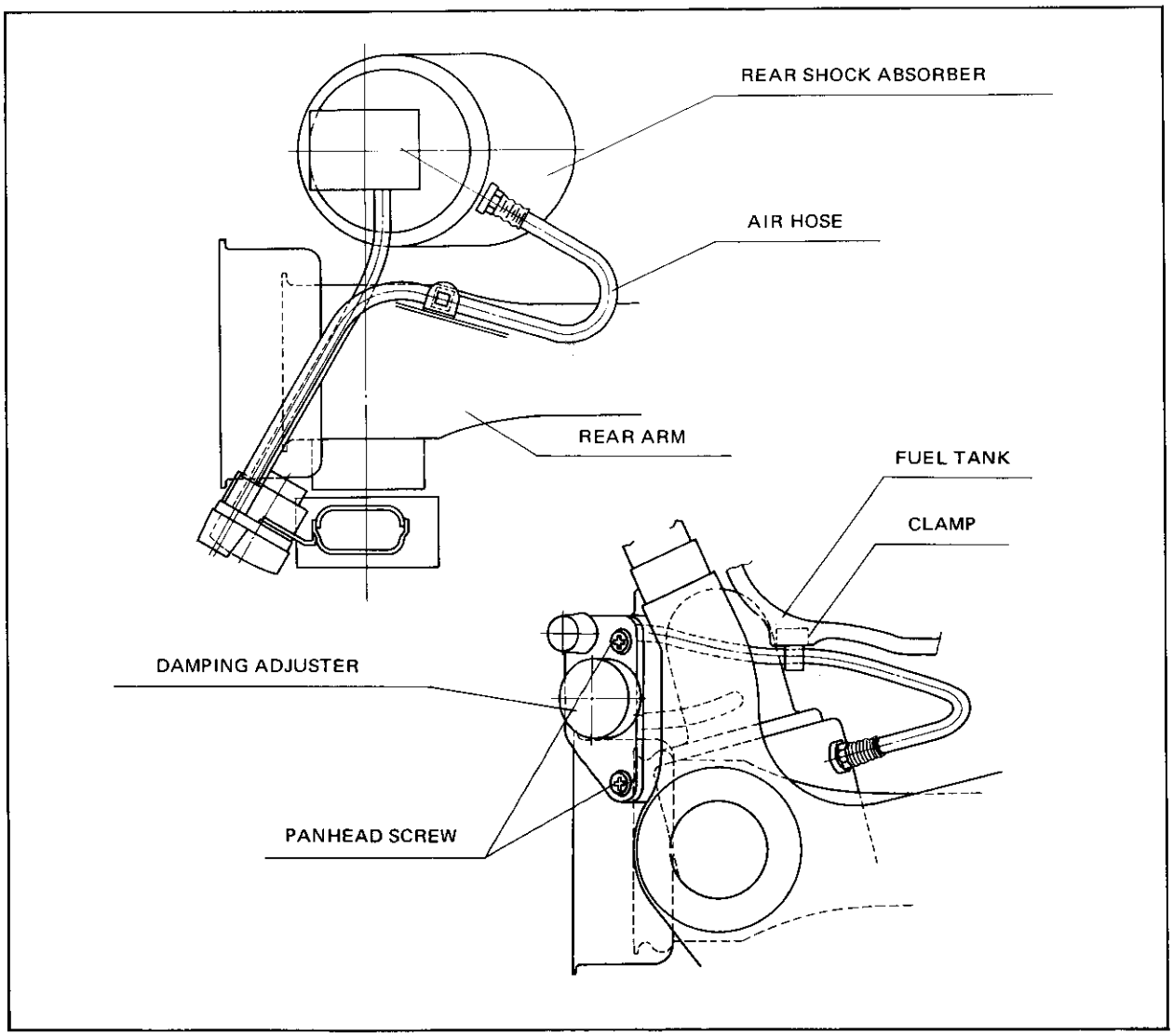



**NOTE:**
The relay arm should be installed so that the recess in the arm faces upward.

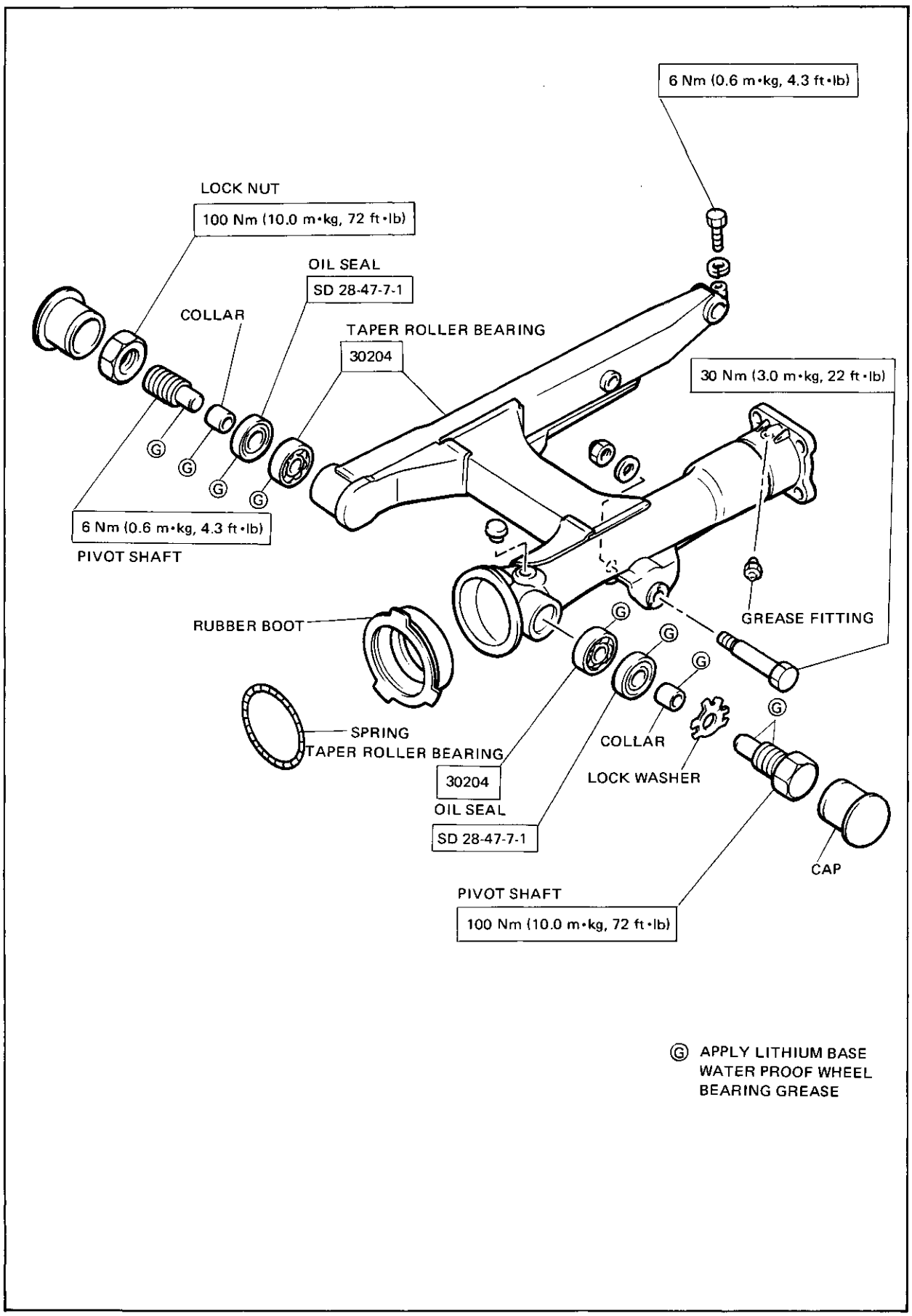
3. Install the rear shock absorber.

| Tightening torque: |
|---|
| Upper: 30 Nm (3.0 m·kg, 22 ft·lb) |
| Lower: 60 Nm (6.0 m·kg, 43 ft·lb) |

**Rear shock installation chart**

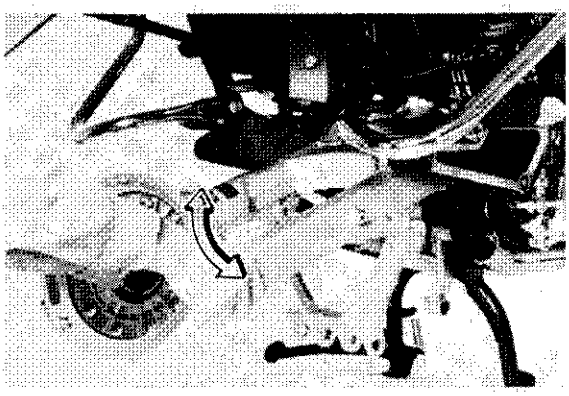


## SWINGARM

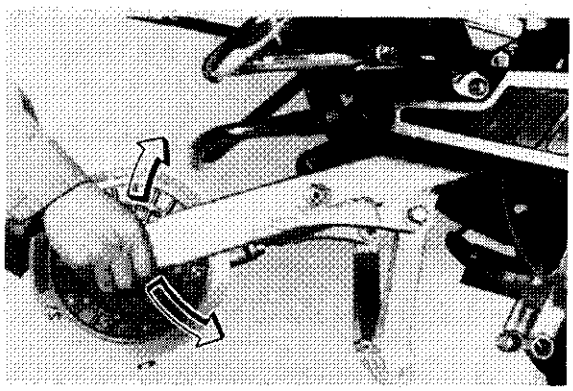

6 Nm (0.6 m•kg, 4.3 ft•lb)
LOCK NUT
100 Nm (10.0 m•kg, 72 ft•lb)
OIL SEAL
SD 28-47-7-1
COLLAR
TAPER ROLLER BEARING
30204
30 Nm (3.0 m•kg, 22 ft•lb)
6 Nm (0.6 m•kg, 4.3 ft•lb)
PIVOT SHAFT
RUBBER BOOT
GREASE FITTING
SPRING
TAPER ROLLER BEARING
30204
OIL SEAL
SD 28-47-7-1
COLLAR
LOCK WASHER
CAP
PIVOT SHAFT
100 Nm (10.0 m•kg, 72 ft•lb)
Ⓖ APPLY LITHIUM BASE WATER PROOF WHEEL BEARING GREASE

**Inspection**

1. Free play inspection
   Remove the rear wheel and shock absorber. Grasp the swingarm and try to move it from side to side. There should be not noticeable side play.



2. The swingarm is mounted on tapered bearings. Move the swingarm up and down. The swingarm should move smoothly, without tightness, binding or rough spots that could indicate damaged bearings.

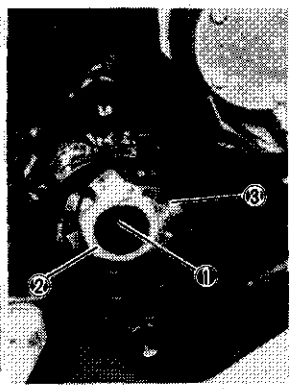


**Removal**

1. Remove the rear wheel, shock absorber and rear brake assembly.
2. Remove the final gear assembly.
3. Remove the footrest brackets.
4. Remove the pivot shaft caps from the left and right sides of the swingarm.

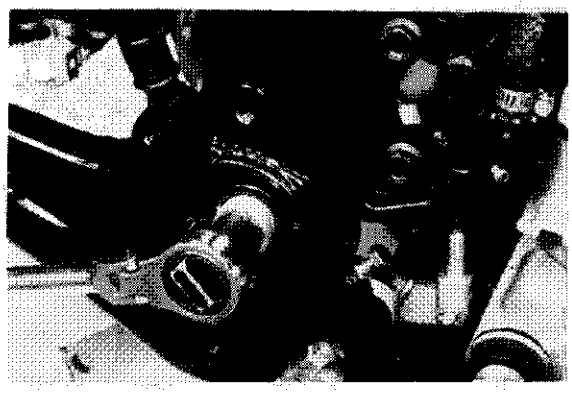


1. Pivot shaft cap
2. Pivot shaft



1. Pivot shaft cap
2. Pivot shaft
3. Lock washer

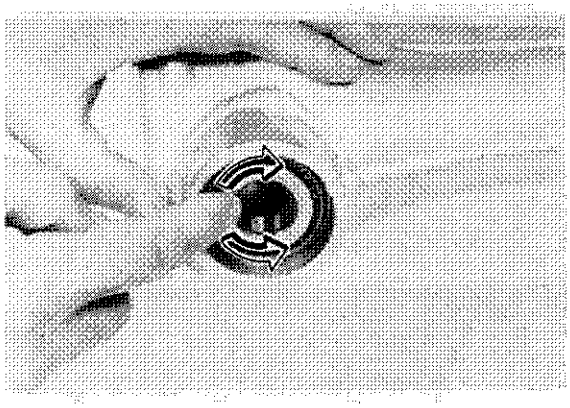
5. Remove the both side pivot shafts.



6. Remove the swingarm assembly.

**Inspection and Lubrication**

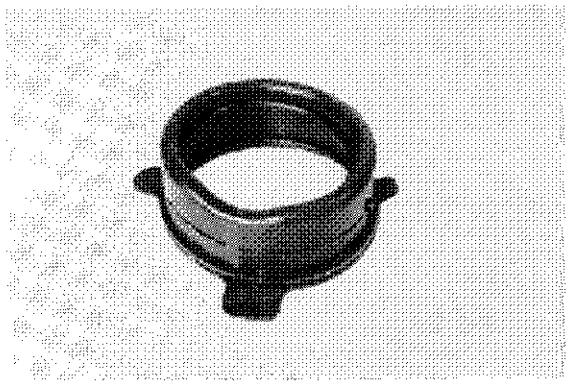
1. Remove the oil seals and the bearings. Inspect the bearings for pitting or other damage. Make sure that the bearings roll freely. If a bearing is damaged, both bearings and both sets of inner and outer bearing races should be replaced.



**CAUTION:**

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

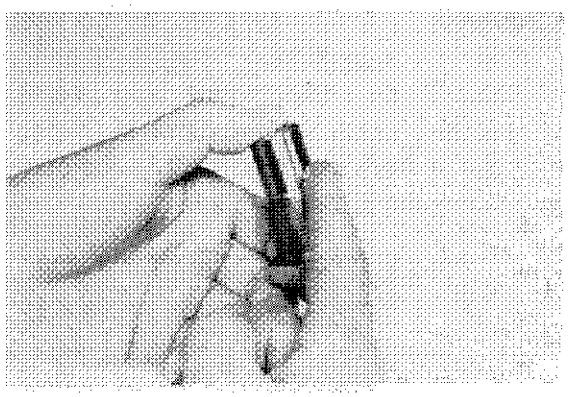
2. Always replace the oil seals when bearings are removed.
3. Examine the rubber boot for damage. Replace if damaged.



**Installation**

For installation, reverse the removal procedure.

1. When installing new bearings and pivot shafts, grease liberally with lithium base water proof wheel bearing grease.



2. Install the swing arm on the frame, and install both right and left pivot shafts. Install the left side lock washer firmly.
3. Screw in the left side pivot shaft and tighten it to specification.

| Tightening torque: 100 Nm (10.0 m·kg, 72 ft·lb) |
|---|

4. Screw in the right side pivot shaft until it contacts the collar, and tighten it to specification.

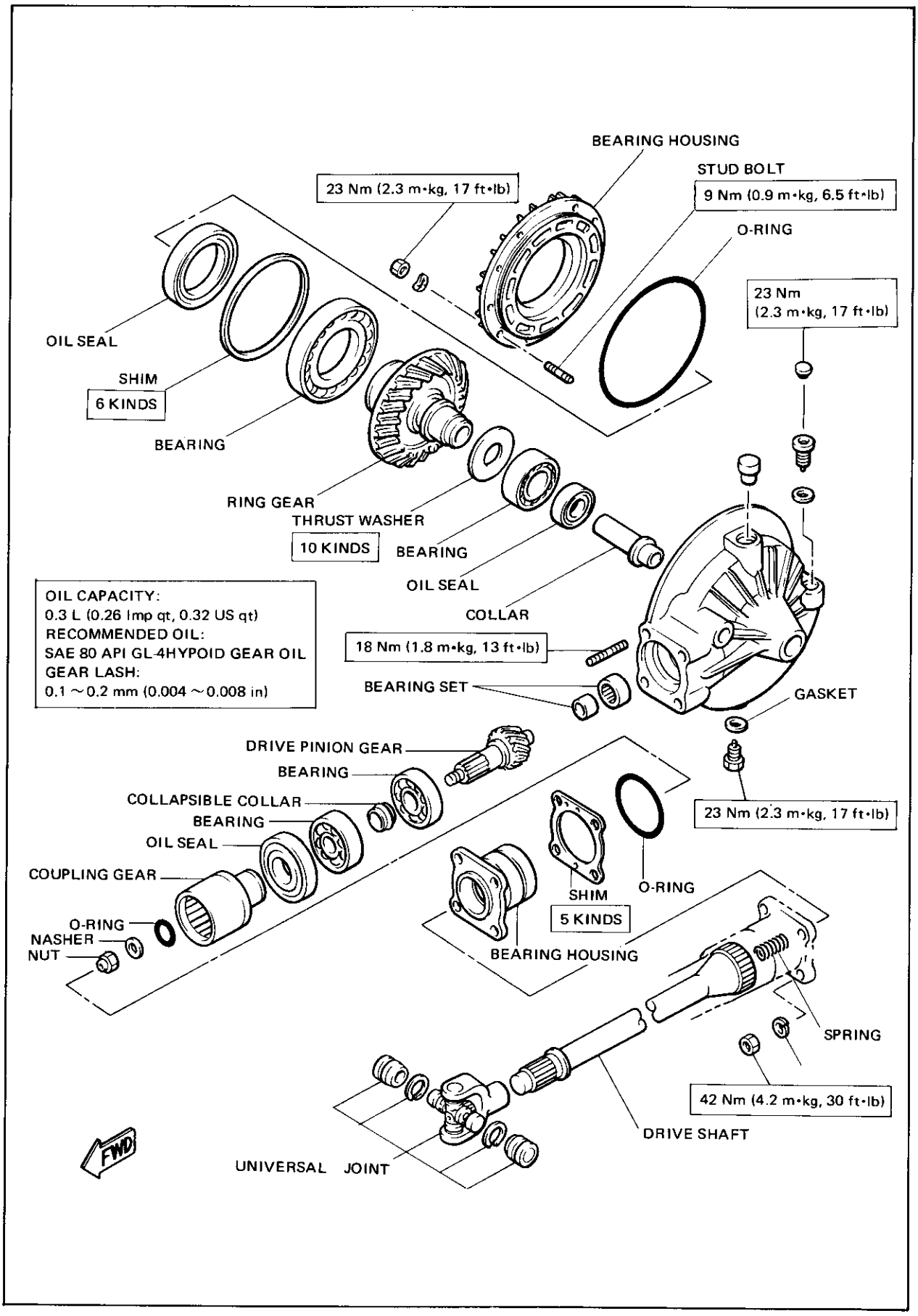
| Tightening torque: 6 Nm (0.6 m·kg, 4.3 ft·lb) |
|---|

5. Tighten the lock nut to specification.

| Tightening torque: 100 Nm (10.0 m·kg, 72 ft·lb) |
|---|

6. Bend the tab of the lock washer over the nut.

## SHAFT DRIVE


BEARING HOUSING
STUD BOLT
23 Nm (2.3 m•kg, 17 ft•lb)
9 Nm (0.9 m•kg, 6.5 ft•lb)
O-RING
23 Nm
(2.3 m•kg, 17 ft•lb)
OIL SEAL
SHIM
6 KINDS
BEARING
RING GEAR
THRUST WASHER
10 KINDS
BEARING
OIL SEAL
COLLAR
OIL CAPACITY:
0.3 L (0.26 Imp qt, 0.32 US qt)
RECOMMENDED OIL:
SAE 80 API GL-4HYPOID GEAR OIL
GEAR LASH:
0.1 ~ 0.2 mm (0.004 ~ 0.008 in)
18 Nm (1.8 m•kg, 13 ft•lb)
BEARING SET
GASKET
DRIVE PINION GEAR
BEARING
COLLAPSIBLE COLLAR
BEARING
OIL SEAL
COUPLING GEAR
O-RING
NASHER
NUT
23 Nm (2.3 m•kg, 17 ft•lb)
SHIM
5 KINDS
O-RING
BEARING HOUSING
SPRING
42 Nm (4.2 m•kg, 30 ft•lb)
DRIVE SHAFT
FWD
UNIVERSAL JOINT

**Troubleshooting**

The following conditions may idicate damaged shaft drive components:

| Symptoms | Possible Damaged Areas |
|---|---|
| 1. Apronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)<br>2. A "rolling rumble" noticeable at low speed; a high-piched whine; a "clunk" from a shaft drive component or area. | A. Damage to bearings.<br>B. Improper gear lash.<br>C. Gear tooth damage. |
| 3. A locked-up condition of the shaft drive mechanism; no power transmitted from engine to rear wheel. | D. Broken drive-shaft.<br>E. Broken gear teeth.<br>F. Seizure due to lack of lubrication.<br>G. Small foreign object lodged between moving parts. |

**NOTE:**

Damage areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal motorcycle operating noise. If there is reason to believer these components are damaged, remove the components for specific inspection.

Inspection notes:

1. During coasting, accelerating, or decelerating, the "rolling rumble" will increase with rear wheel speed, not engine or transmission gear speeds. However, such noise may also be due to damaged wheel bearings.
2. Noise that varies with acceleration and deceleration: following incorrect reassembly, a condition of too-little gear lash may produce a whine during deceleration.

**CAUTION:**

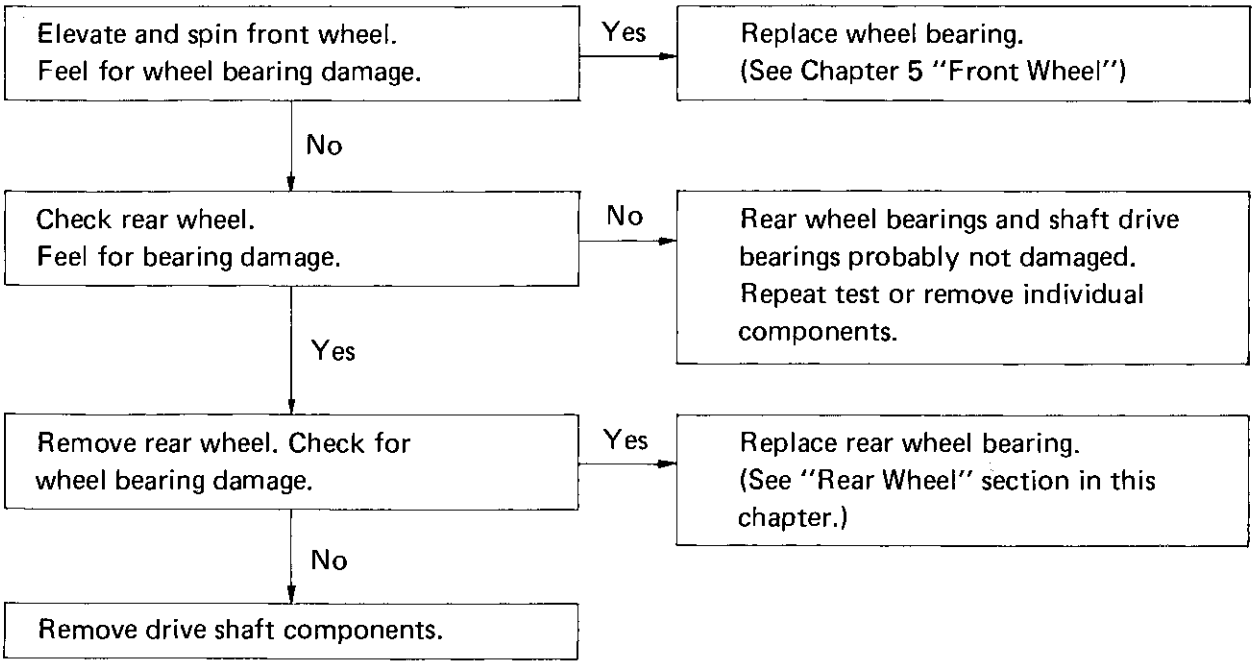
**Too-little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize damage to the gears.**

3. A slight "thunk" must be distinguished from normal motorcycle operation. It will be most noticeable at low speed and could indicate broken gear teeth.

**WARNING:**

**If broken gear teeth are suspected, stop riding immediately. This condition could lead to locking-up of the shaft drive assembly and result in harm to a rider.**

4. Troubleshooting chart
   Where basic conditions "1" and "2" above exist, consider the following chart:



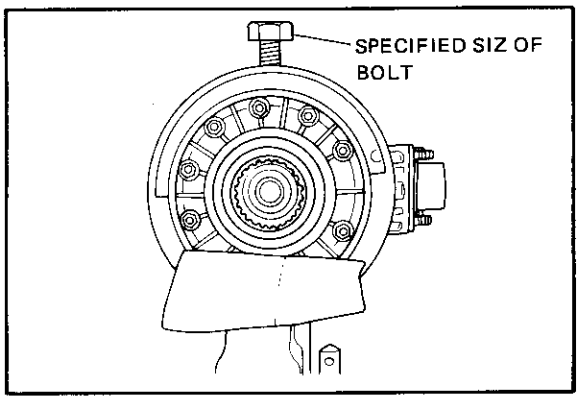

5. Checking drained oil
   Whenever a problem is suspected in either the middle or final gear assemblies, drain and inspect the oil. Metal particles on the drain plug or in the oil could indicate a bearing seizure or other problem. However, a small amount of metal particles in the oil is normal.

## FINAL DRIVE GEAR

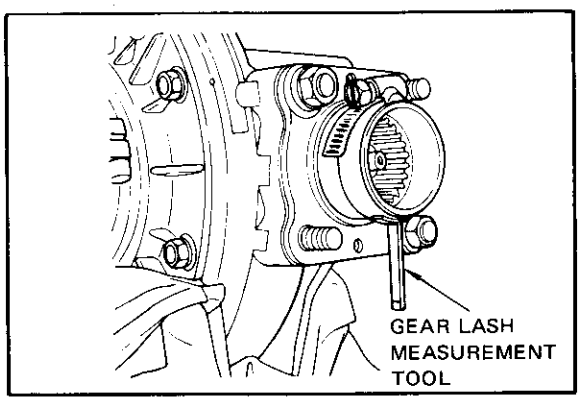
### Gear Lash Inspection

1. Secure the gear case in a vise or other support.
2. Remove the drain plug from the final gear case and drain the oil.
3. Install a specified size of bolt (as shown) into the drain plug hole. Finger tighten the bolt until it holds the ring gear.

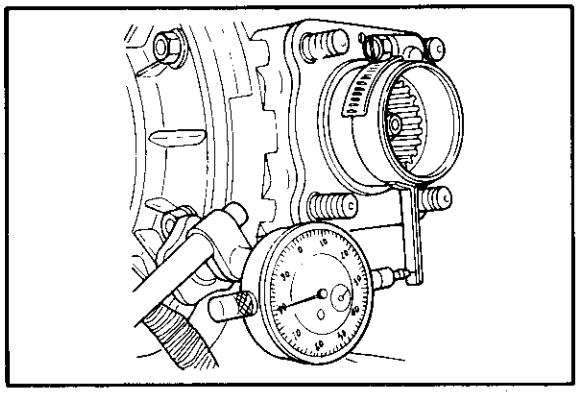
**NOTE:**
The bolt should not be over tightened, finger-tight is sufficient.




4. Install the final gear lash measurement tool on the gear coupling (input side).

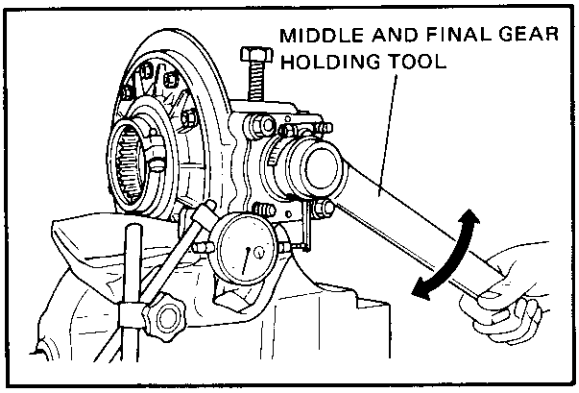



5. Place a dial gauge and stand as shown to measure gear lash (movement). Gear lash is the measurement from gear engagement to gear engagement as the gear coupling is rotated. The measurement point on the tool is 36 mm (1.42 in) from the surface of the gear coupling.

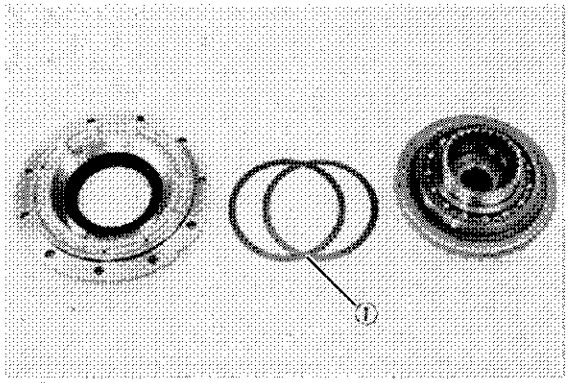


6. Use the special wrench to gently rotate the gear coupling from engagement to engagement. Note the lash measurement on the dial gauge.

Final gear lash:
0.10 ~ 0.20 mm (0.000 ~ 0.000 in)




7. Check this engagement at 4 positions. Rotate the shaft 90° each time and repeat the gear lash check.
8. If the gear lash exceeds the specified limits, adjust as follows:
   - To reduce gear lash, increase the ring gear shim.
   - To increase gear lash, reduce the ring gear shim.




1. Ring gear shim

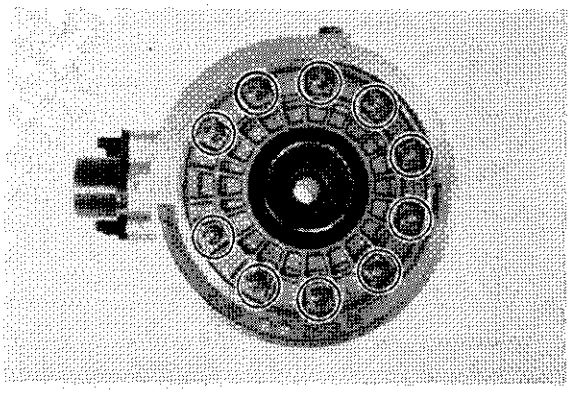
- If it is necessary to increase the ring gear shim by more than 0.1 mm (0.004 in), reduce the thrust washer thickness by 0.1 mm (0.004 in) for each 0.1 mm (0.004 in) of ring-gear-shim increase. If it is necessary to reduce the shim by more than 0.1 mm (0.004 in), reverse the above procedure.

Ring gear shim thickness:
0.25 mm (0.010 in), 0.30 mm (0.012 in), 0.35 mm (0.014 in), 0.40 mm (0.016 in), 0.45 mm (0.018 in), 0.50 mm (0.020 in)

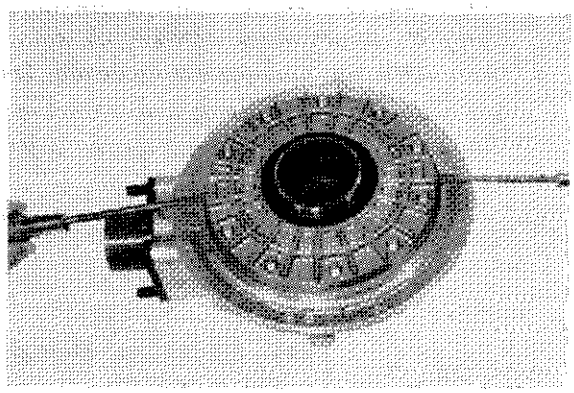
Thrust washer thickness:
1.2 mm (0.047 in), 1.3 mm (0.051 in), 1.4 mm (0.055 in), 1.5 mm (0.059 in), 1.6 mm (0.063 in), 1.7 mm (0.067 in), 1.8 mm (0.071 in), 1.9 mm (0.075 in), 2.0 mm (0.079 in), 2.1 mm (0.083 in)

**Final Gear Disassembly**

1. Remove the nuts holding the bearing housing.



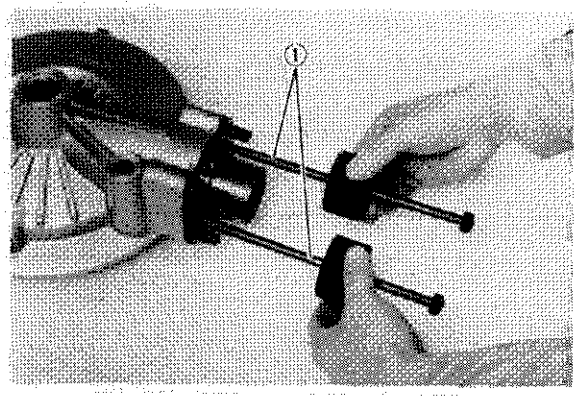
2. Remove the ring gear assembly and thrust washer from the final gear case.



**Drive Pinion Gear Disassembly**

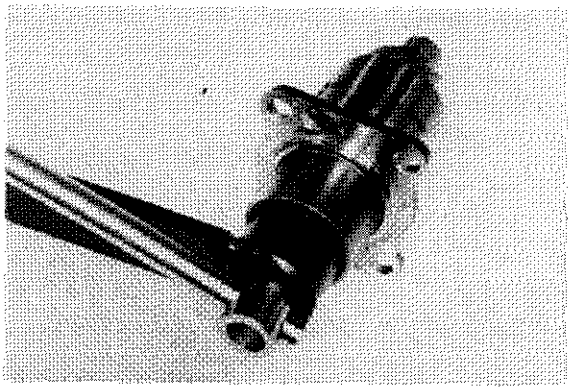
**NOTE:**
This procedure should be performed only if gearing replacement is necessary. Do not re-use bearings or races after removal.

1. Use two slied hammers and 6 mm shafts to remove bearing housing.



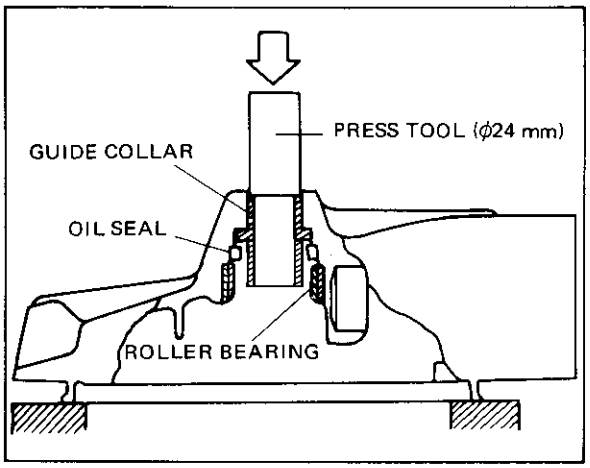

1. Slide hammer

2. Hold gear coupling with special tool, remove self-locking nut from drive pinion. Tap lightly with a soft hammer to remove drive pinion from coupling.

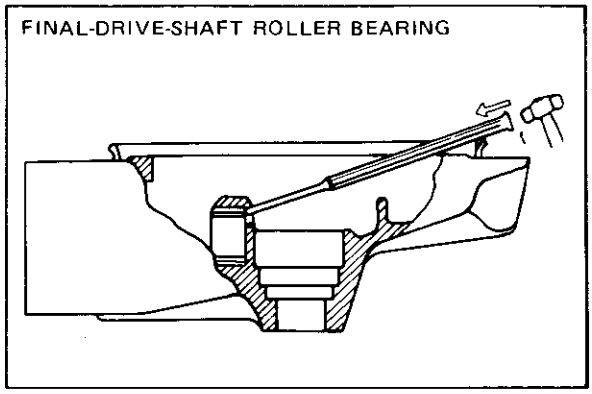


**Bearing Removal and Reassembly**

1. Remove the guide collar, oil seal, and roller bearing from the main housing by using an appropriate press tool and a press. Use the appropriate supports for the main housing during this operation. The roller bearing may be reused if undamaged. Do not reuse the oil seal.

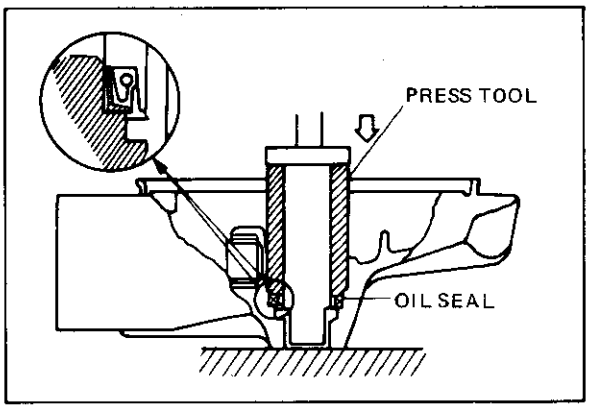


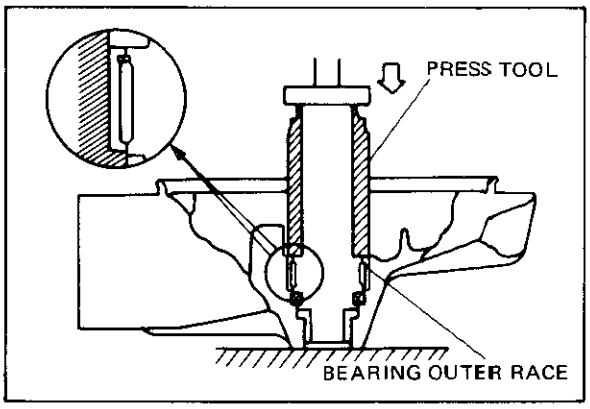

2. Final-drive-shaft roller bearing; removal of this bearing is difficult and seldom necessary. Heat the bare housing to 150°C (302°F). Use an appropriately shaped punch to remove the roller bearing outer race. Remove the inner race from the final drive shaft.




3. Install the new rear final-drive-shaft roller bearing. Heat the bare bearing to 150°C (302°F), and use an appropriate adapter to install the roller bearing outer race. Install the inner race onto the final drive shaft.
4. Using an appropriate press tool and a press, install the guide collar, new oil seal, and roller bearing into the main housing in that order.

**NOTE:**
The removed roller bearing can be used if undamaged; however, we recommend replacement with a new one.

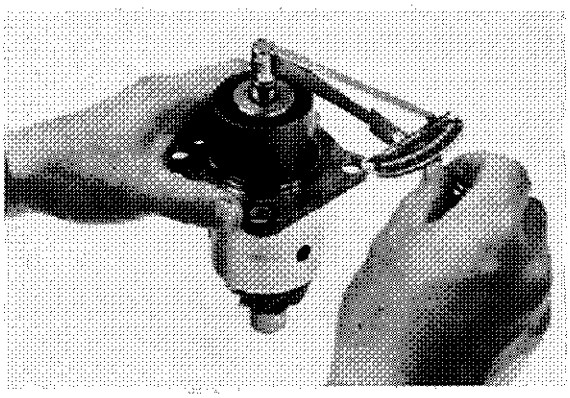


**Drive Pinion Gear Installation and Adjustment**

1. After installing the bearing, oil the bearing.
2. Install new expansion spacer on the drive pinion shaft.
3. Install the drive pinion assembly into the bearing housing assembly.
4. Grease the inside surface of the bearing housing oil seal and install the flange.
5. Install plate washer and nut. Gradually tighten nut to proper preload as follows:

a. Use a 0 ~ 30 cm·kg torque wrench.
b. Hold flange and tighten nut slightly. Avoid overtightening. Overtightening will require disassembly and replacement of the expansion spacer.



c. Hold bearing housing and check preload. This preload is determined by turning the shaft with a torque wrench and measuring the resistance of the bearings to the rotation of the shaft.

**CAUTION:**

**Do not hold the bearing housing in a rise.**

Pre-load specification:
4 ~ 5 cm·kg (3.4 ~ 4.3 in·lb)

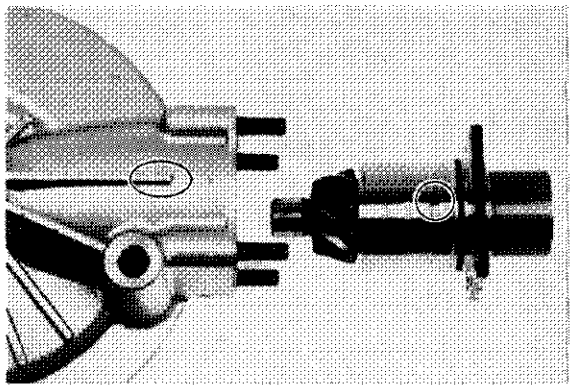
Nut tightening torque:
130 Nm (13.0 m·kg, 00 ft·lb)

d. Repeat steps (a), (b) and (c) until proper preload is reached.

6. Install new O-ring on drive pinion bearing housing.
7. Install original shim on bearing housing. Align and install bearing housing assembly.

**NOTE:**

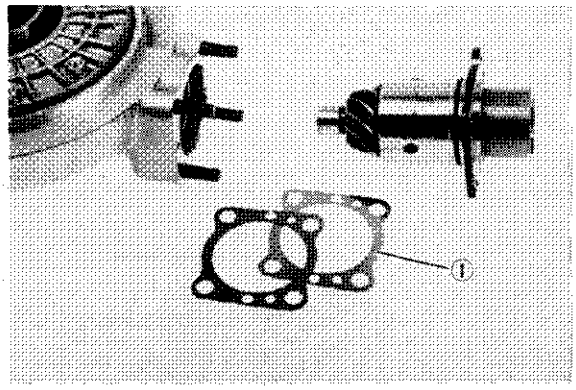
The oil hole in the bottom of the bearing housing must align with the slot in the bottom of the final drive housing.



8. Check gear lash and adjust if necessary.
   - Lash too large:
     Install one-size larger ring gear shim.
   - Lash too small:
     Install one-size smaller ring gear shim.
     Recheck gear lash.

**Tooth Contact Pattern and Gear Lash Adjustment**

1. Remove drive pinion assembly from final gear housing. The ring gear must be assembled for this check.



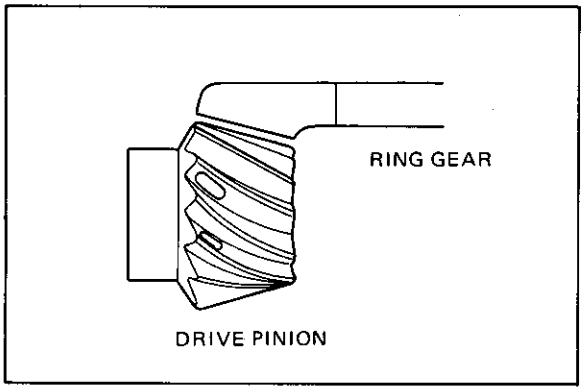

1. Drive pinion gear shim

2. Apply contact pattern checking paint to ring gear. Check pattern and adjust if necessary.

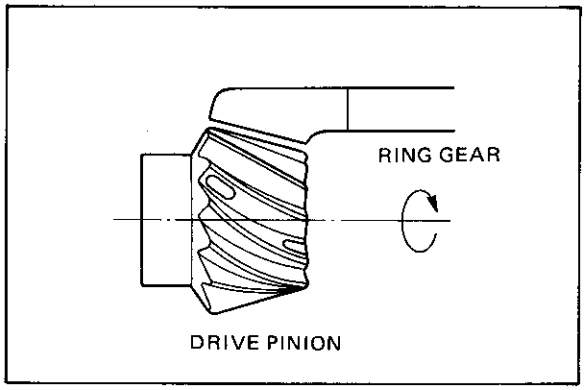
**NOTE:**

In the following pattern adjustment procedures, always increase or decrease the drive pinion shim for adjusting the tooth contact and increase or decrease the ring gear shim for adjusting the gear lash.

Correct Pattern



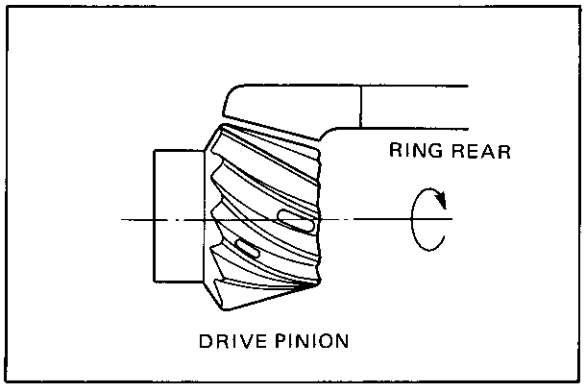

Incorrect Pattern A




Correction Procedure:

a. Reduce drive pinion shim 0.05 mm.
b. Recheck tooth pattern.
c. If necessary, repeat step "a" in 0.05 mm steps.

Incorrect Pattern B




Correct Procedure:

a. Increase drive pinion shim 0.05 mm.
b. Recheck tooth pattern.
c. If necessary, repeat step "a" in 0.05 mm steps.

3. Check and adjust gear lash.
   To reduce gear lash, increase ring gear shim. To increase gear lash, reduce ring gear shim. If it is necessary to increase ring gear shim by more than 0.1 mm, reduce the thrust washer thickness by 0.1 mm for each 0.1 mm of ring gear shim increase. If it is necesasary to reduce shim by more than 0.1 mm, reverse above procedure.

## DRIVE SHAFT

### Removal

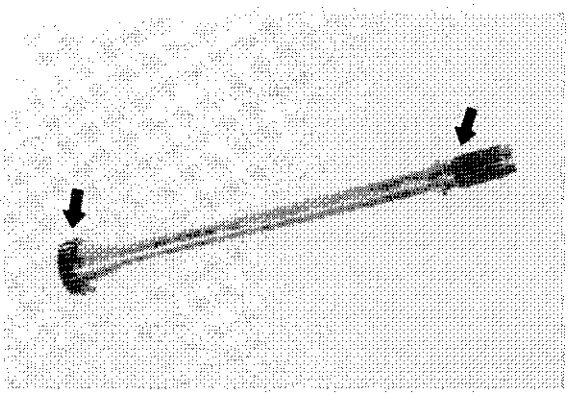
1. Remove the rear wheel. See "REAR WHEEL" in this chapter.
2. Remove the final gear case assembly.
3. Remove the drive shaft.



### Inspection

1. Inspect the shaft splines for wear and/or damage. If wear is excessive, replace the drive shaft.

**NOTE:**
When installing the drive shaft, lubricate the splines with molybdenum disulfide grease.



**Installation**

When installing the drive shaft, reverse the removal procedure. Note the following points:

- Lubricate the shaft splines with molybdenum disulfide grease.
- When installing the drive shaft, first set the universal joint in place on the middle case side, and then install the drive shaft.
- Torque the final gear case nuts to specification.

| Tightening torque: |
| --- |
| 42 Nm (4.2 m·kg, 30 ft·lb) |

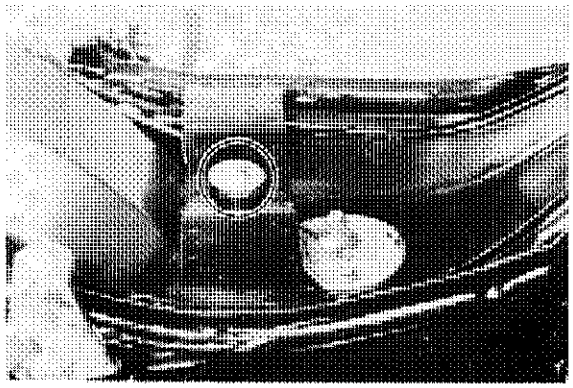
## REAR FRAME

**Removal**

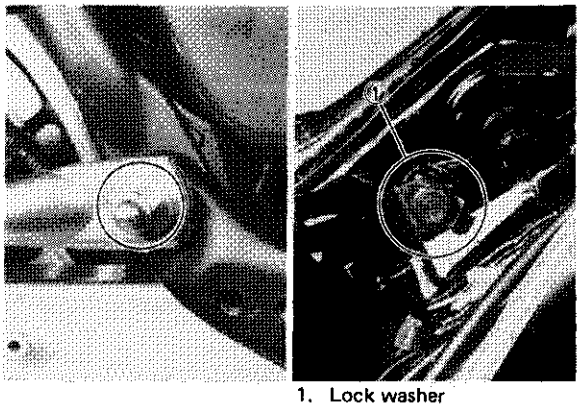
Before removing the rear frame, remove the following parts first.

- Remove the travel trunk, saddle bags, and seat.
- Remove both right and left mufflers.
- Remove both right and left footrest.

1. Remove the bolt holding the fuel tank to frame.

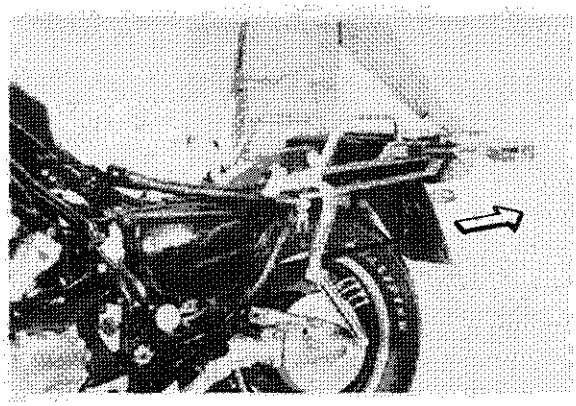


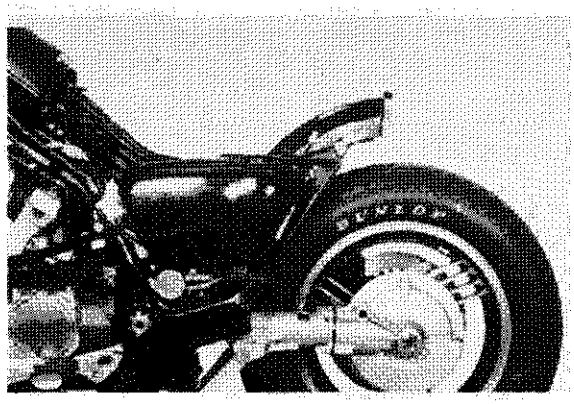
2. Remove the four bolts holding the frame.



1. Lock washer

3. Disconnect the taillight coupler.
4. Remove the rear frame by pulling it backward.





**Installation**

For installation, reverse the removal.

1. Tighten the bolt to specification.

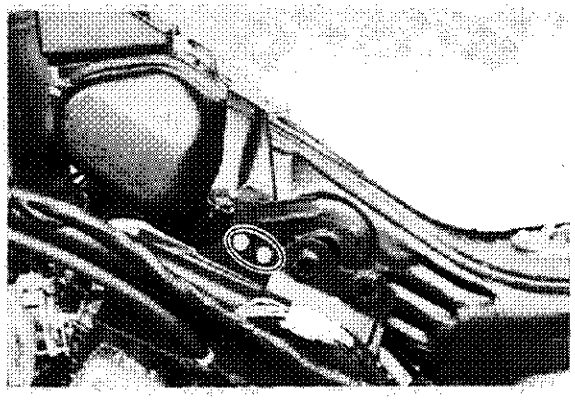
| Tightening torque: |
| --- |
| 55 Nm (5.5 m·kg, 40 ft·lb) |

## FUEL TANK

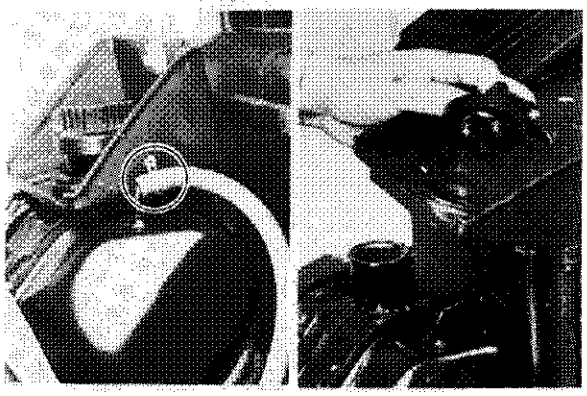
### Removal

Before removing the fuel tank, remove the rear frame.

1. Remove the fuel tank cover.
2. Remove the two bolts holding the fuel tank bracet, and remove the bracket.



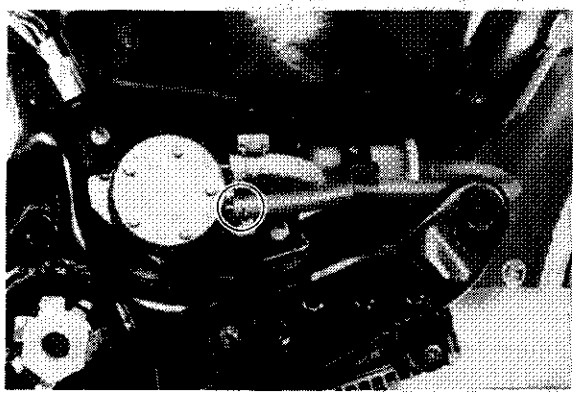
3. Remove the breather hose from the fuel tank.
4. Remove the over flow tank cover.



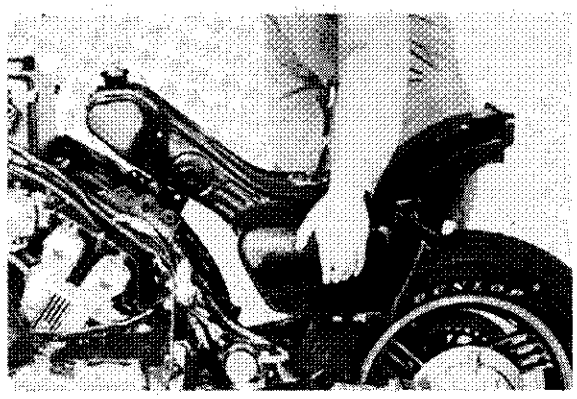
5. Turn off the fuel valve, and disconnect the fuel hose on the fuel tank side.

**NOTE:**

Be sure that no dust enters the fuel pump.



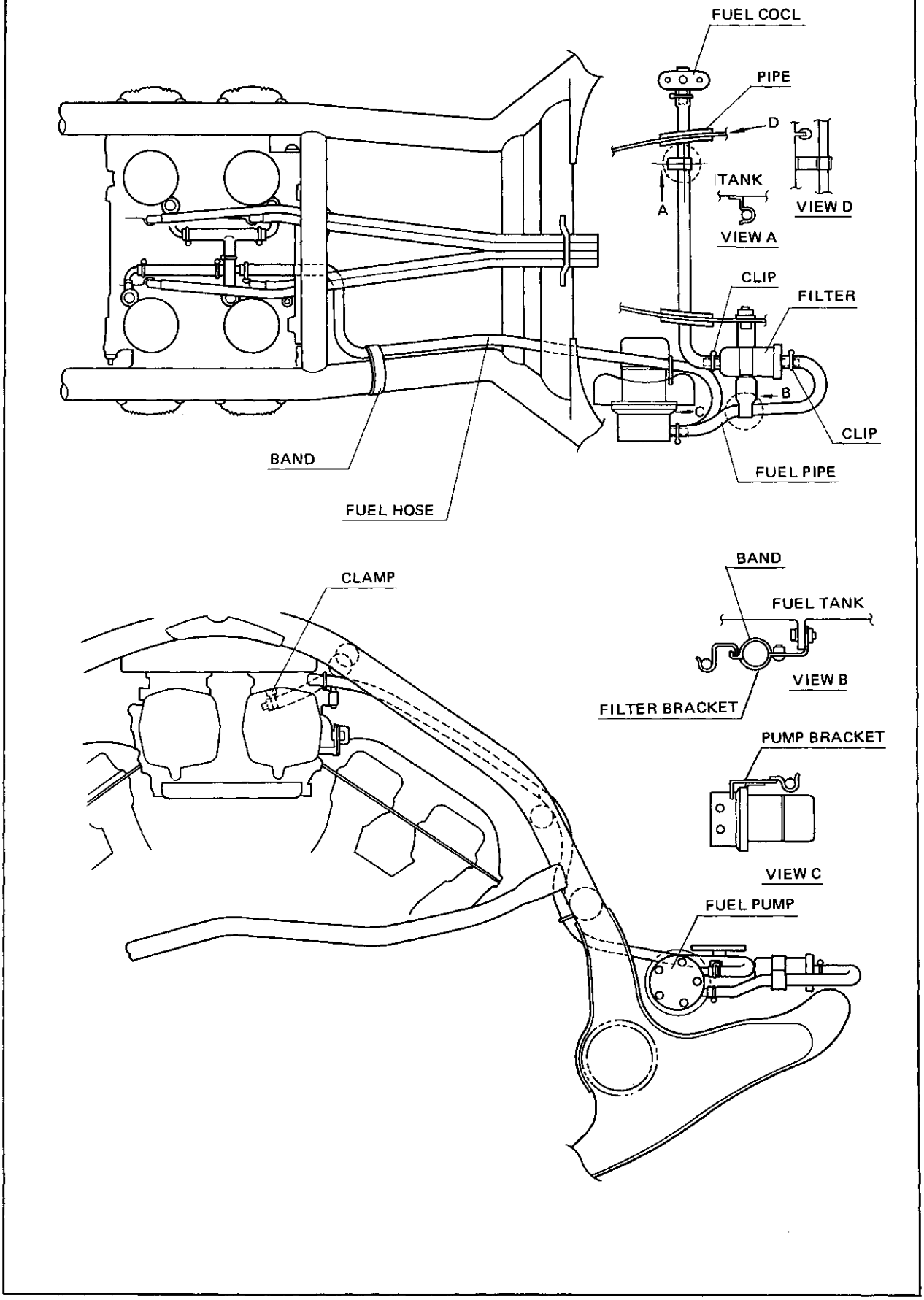
6. Remove the fuel tank.



### Installation

For installation, reverse the removal procedure.

- Before connecting the hose, check it for cracks or any other damage.
- Be sure to fit the hose clips on both ends of each fuel hose.
- As shown, route the hoses and clamp them with bands.


FUEL COCL
PIPE
D
TANK
A
VIEW D
VIEW A
CLIP
FILTER
B
C
CLIP
BAND
FUEL PIPE
FUEL HOSE
BAND
CLAMP
FUEL TANK
VIEW B
FILTER BRACKET
PUMP BRACKET
VIEW C
FUEL PUMP

## CABLES AND FITTINGS

### Cable Maintenance

**NOTE:**

See "MAINTENANCE AND LUBRICATION" interval charts. Cable maintenance is primarily concerned with preventing deterioration and providing proper lubrication to allow the cable to move freely within its housing. Cable removal is straight forward and uncomplicated. Removal is not discussed within this section.

**WARNING:**

**Cable routing is very important. For details of cable routing, see the "CABLE ROUTING" at the end of this manual. Improperly routed or adjusted cables may make the motorcycle unsafe for operation.**

1. Remove the cable.
2. Check for free movement of the cable within its housing. If movement is obstructed, check for frayed strands or kinking of the cable. If damage is evident, replace the cable.
3. To lubricate the cable, hold it in a vertical position. Apply lubricatn to the uppermost end of the cable. Leave it in the vertical position until the lubricant appears at the bottom. Allow any excess to drain, and reinstall the cable.

**NOTE:**

Choice of a lubricant depends upon conditions and preferences. However, a semidrying chain and cable lubricant will perform adequately under most conditions.

### Throttle Maintenance

1. Remove the phillips head screws from the throttle housing assembly and separate the two halves of housing.
2. Disconnect the cable end from the throttle grip assembly, and remove the grip assembly.
3. Wash all parts in a mild solvent, and check all contact surfaces for burrs or other damage. (Also clean and inspect the righthand end of the hadlebar.)
4. Lubricate all contact surfaces with a light coat of lithium-base grease and reassemble.

**NOTE:**

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

5. Check for smooth throttle operation and quick spring return. Make certain that the housing does not rotate on the handlebar.

# CHAPTER 6. COOLING SYSTEM


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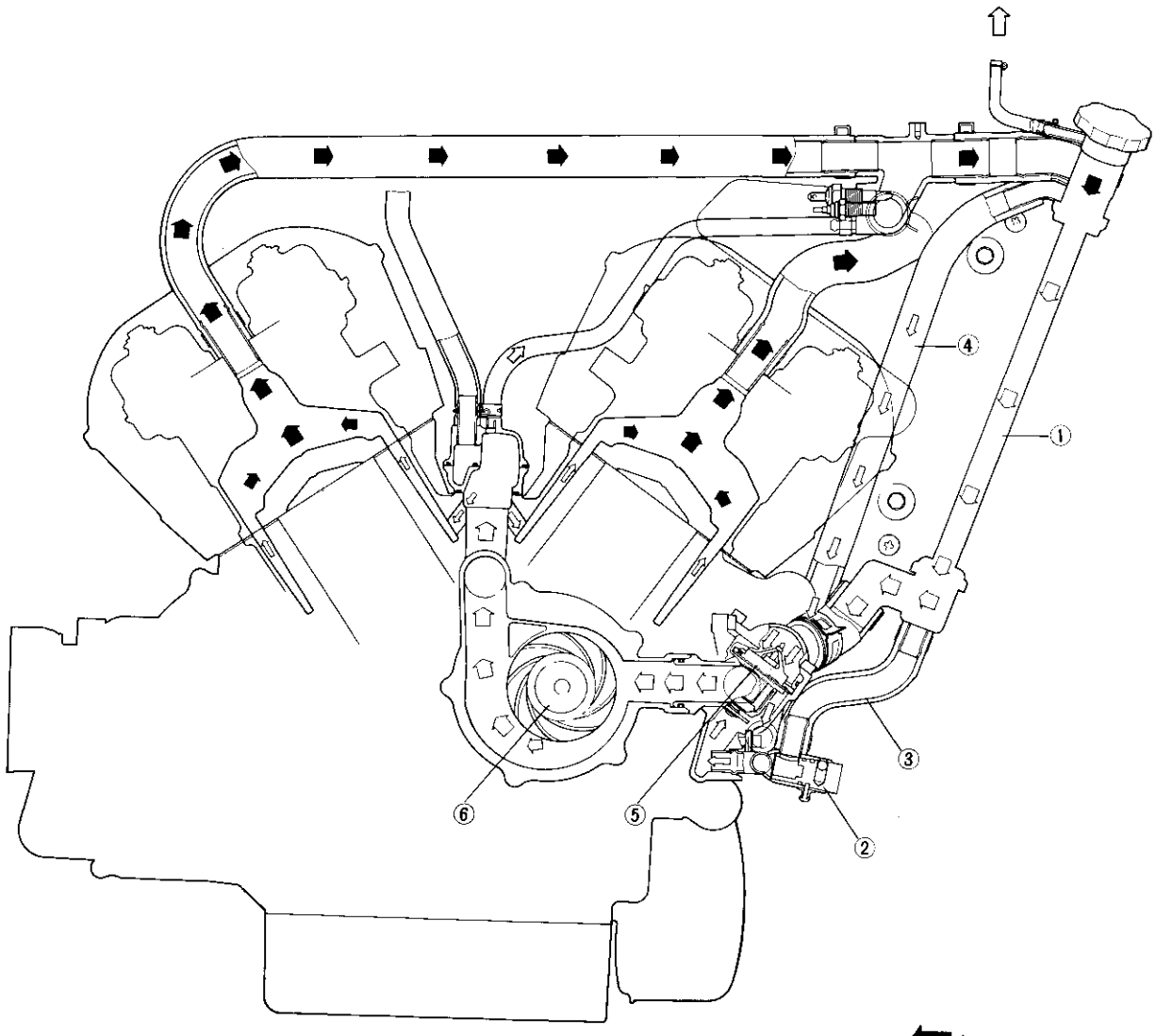
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6

# COOLING SYSTEM




: Hot coolant

: Cool coolant

1. Radiator
2. Coolant drain valve
3. Bypass pipe to the coolant drain valve
4. Bypass pipe to the thermostatic valve
5. Thermostatic valve
6. Water pump
7. To the reservoir tank

6

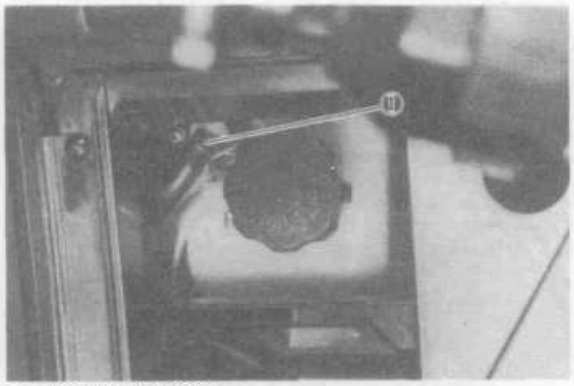
## COOLANT REPLACEMENT

**WARNING:**

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

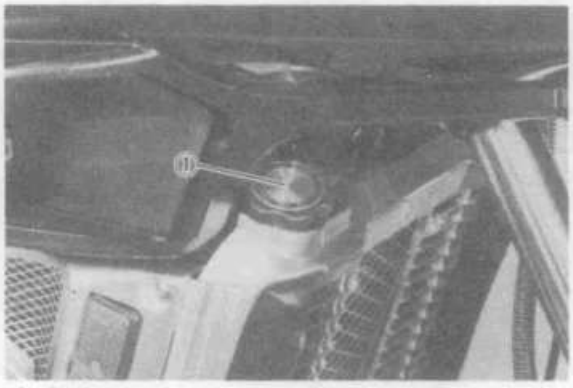
### Radiator

1. Place an open container under the coolant drain bolt.
2. Remove the reserve tank feed pipe.



1. Reserve tank hose

3. Remove the radiator cap.



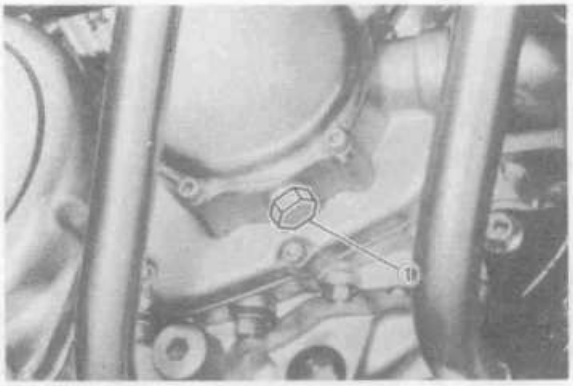
1. Radiator cap

4. Align the "ON" mark on the coolant drain valve with the alignment mark on the drain valve housing.




1. "ON" position

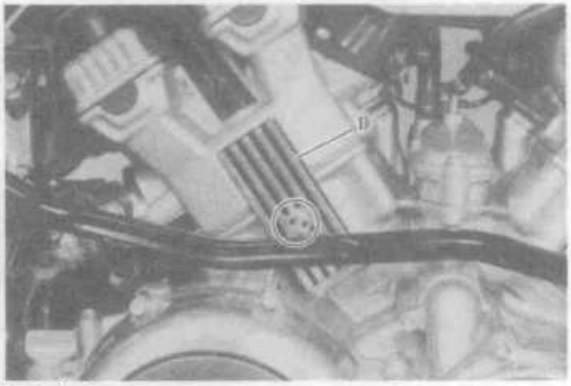
5. Remove the coolant drain bolt and drain the coolant.



1. Drain bolt

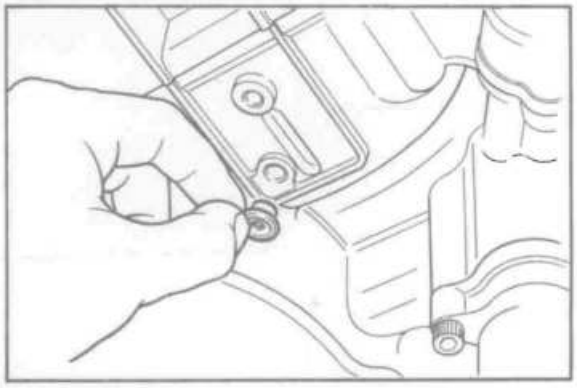
### Engine

1. Remove the side panels.
2. Remove the cylinder covers.



1. Cylinder cover

3. Remove the rubber plugs from the upper crankcase and drain the coolant.



**NOTE:**

To facilitate removal of the rubber plug's, screw a spark plug into the threaded hole and hand-pull the spark plug firmly.

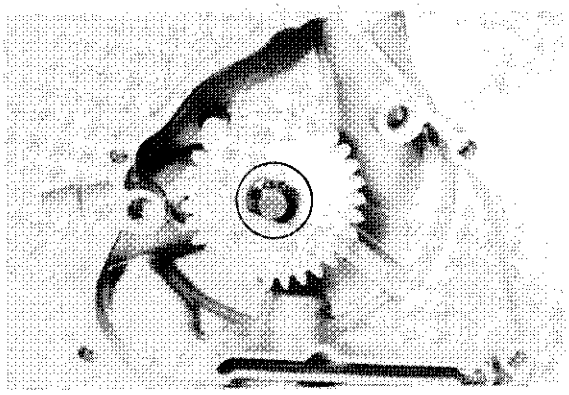
## WATER PUMP

### Disassembly

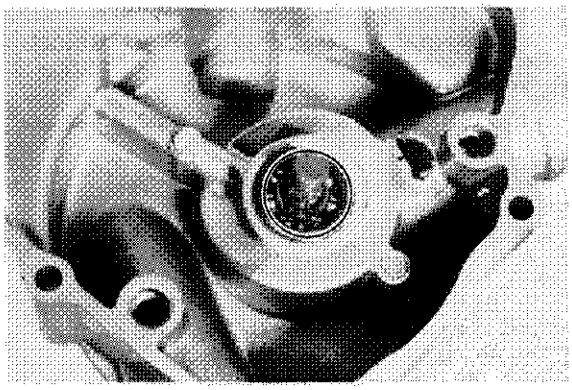
NOTE:

- Be sure to drain the coolant before disassembly of the cooling system components.
- Refer to Engine Disassembly for water pump disassembly.

1. Remove the circlip, water pump driven gear, and gear stopper pin from the impeller shaft.

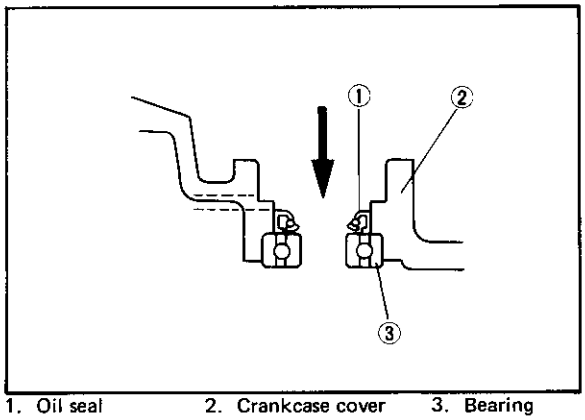


2. Remove the circlip and impeller shaft from crankcase cover.



### Inspection

1. Remove the deposits from the impeller and water pump housing.
2. Check the bearing and oil seal for damage. Replace if necessary.
   Remove the bearing and oil seal from the crankcase cover by tapping them off from the water pump seal side. Install the new oil seal and bearing.

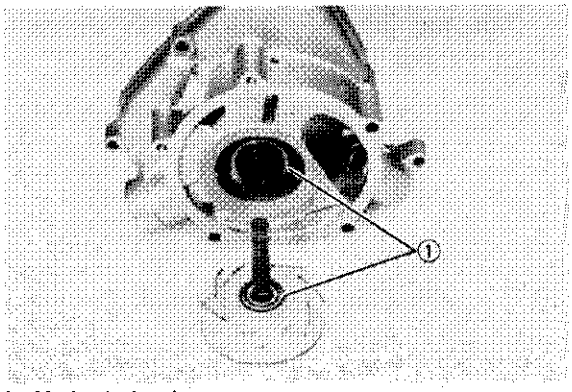



1. Oil seal 2. Crankcase cover 3. Bearing

NOTE:

Install the oil seal, with the manufacturer's marks or numbers facing the mechanical seal side.

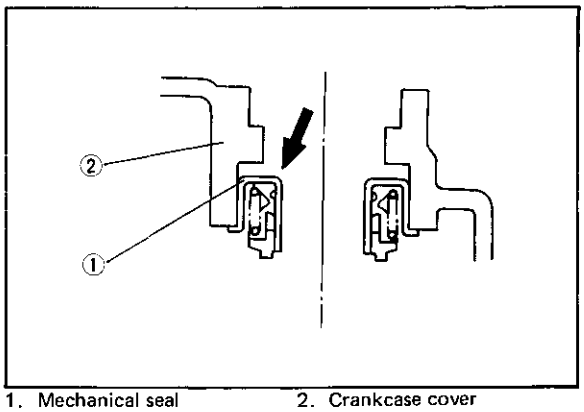
3. Check the impeller for cracks, wear, or damage. Replace if necessary.
4. Check the water pump mechanical seal set for wear and damage. If damaged or worn replace.




1. Mechanical seal set

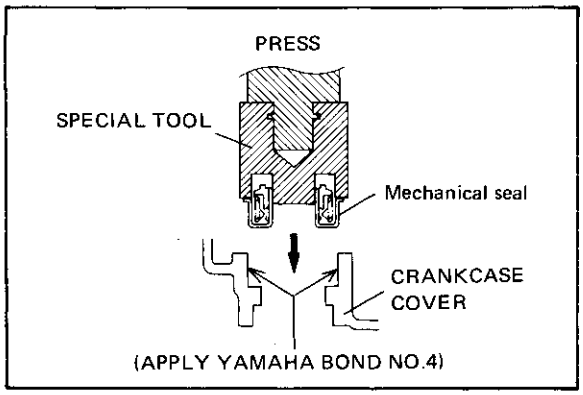
Crankcase side mechanical seal

1. Remove the mechanical seal from the crankcase by taping.



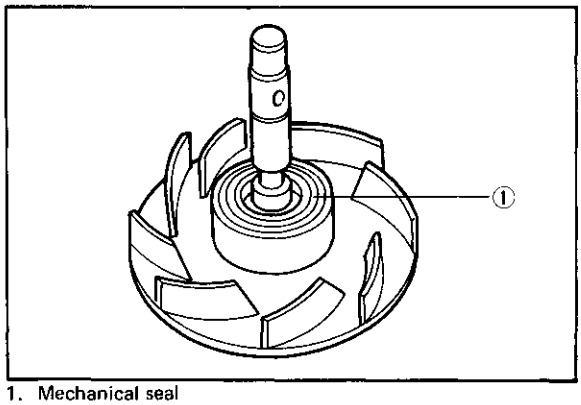

1. Mechanical seal 2. Crankcase cover

2. Apply grease to oil seal lip. Install the oil seal into the crankcase cover.




Impeller side mechanical seal

1. Remove the water pump mechanical seal from the impeller by carefully prying out the seal with a small screwdriver.

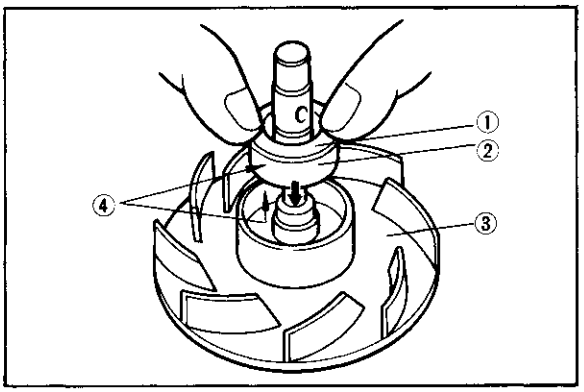



1. Mechanical seal

2. Install the water pump mechnical seal into the impeller.

**NOTE:**

When fitting water pump mechanical seal to the impeller, apply water or coolant to the outer surface of the damper rubber and impeller hub. Put the seal and damper rubber together, and fit them to the impeller hub.

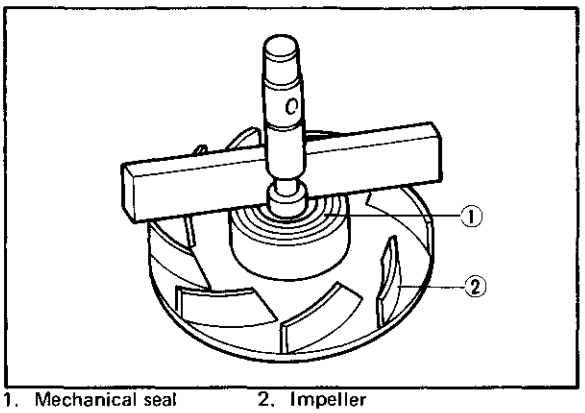



1. Slip ring 2. Seal rubber
3. Impeller 4. Apply water or coolant

**CAUTION:**

**Never apply oil or grease to water pump seal surfaces.**

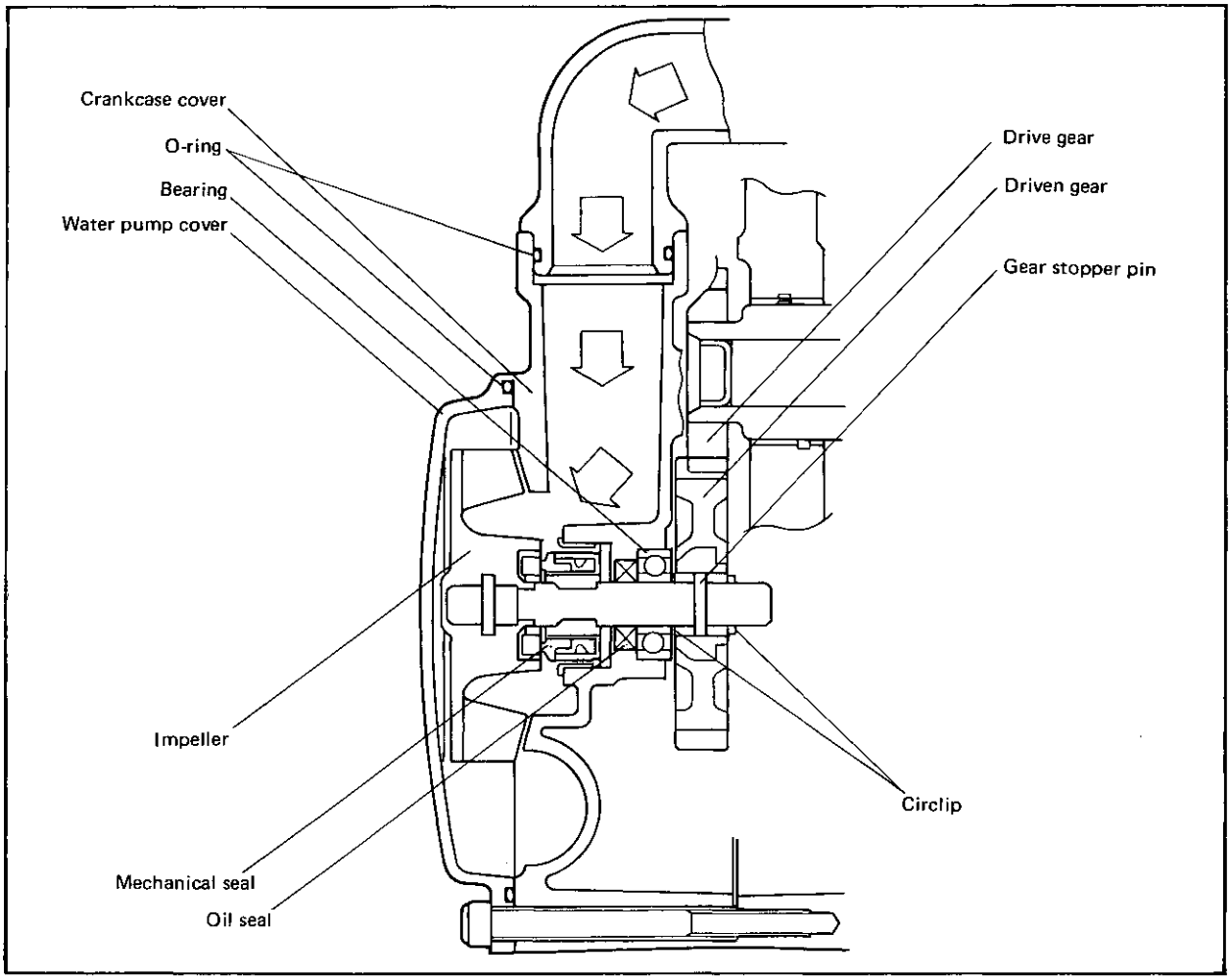
3. After installing water pump mechanical seal make sure it fits squarely.



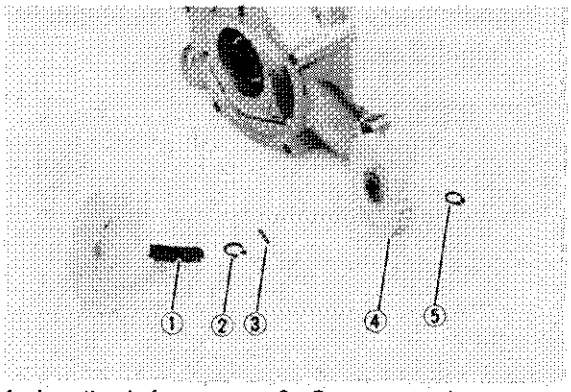

1. Mechanical seal 2. Impeller

Tilt limit:
0.15 mm (0.006 in)

## Assembly




1. Install the impeller shaft into the crankcase cover. Apply grease lightly to the impeller shaft.
   Lock the impeller shaft with a circlip.




1. Impeller shaft
2. Impeller shaft locking circlip
3. Gear stopper pin
4. Driven gear
5. Driven gear locking circlip

**CAUTION:**

**Be sure not to scratch the water pump mechanical seal while installing.**
**Replace any scratched seal.**

2. Install the gear stopper pin, driven gear and circlip into the impeller shaft.

**NOTE:**

Refer to engine assembly and adjustment for water pump installation.

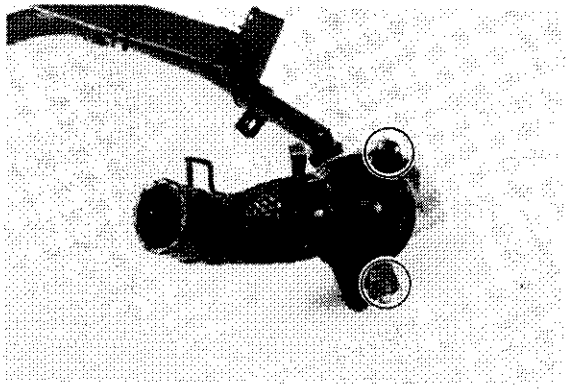
## THERMOSTATIC VALVE

### Removal

**NOTE:**

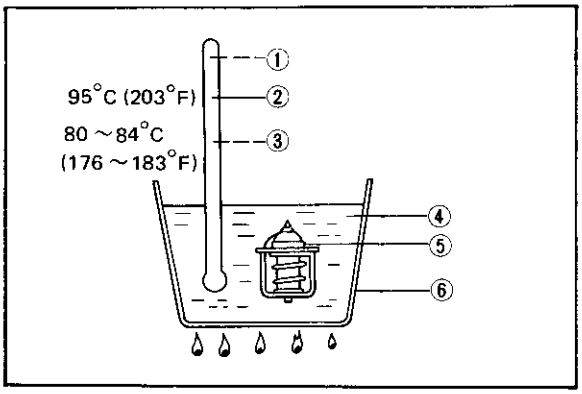
Refer to Engine Disassembly for thermostatic valve removal.

1. Remove the thermostat cover and thermostatic valve from the thermostat housing.

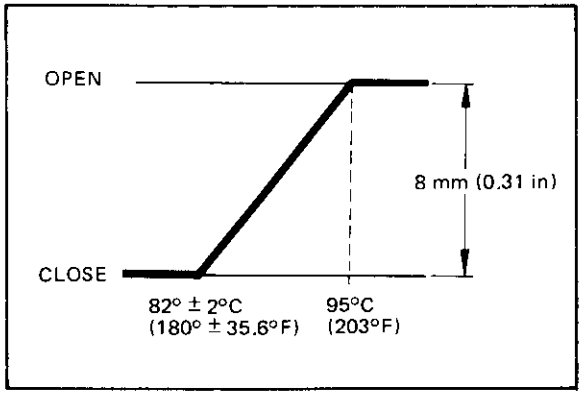


**Inspection**

1. Suspend thermostatic valve in a vessel of water that contains a reliable thermometer.
2. Heat the water slowly. Then note the thermometer reading while stirring the water continually.
3. The thermostatic valve should begin to open at 80 ~ 84°C (176 ~ 183°F).



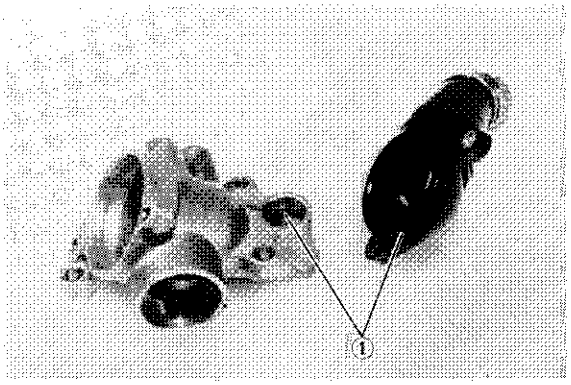

1. Thermometer
2. Full open
3. Begin to open
4. Water
5. Thermostatic valve
6. Vessel




**NOTE:**

Thermostat is sealed and its setting is specialized work. Always replace if its accuracy is in doubt. A faulty unit could cause serious overheating or overcooling.

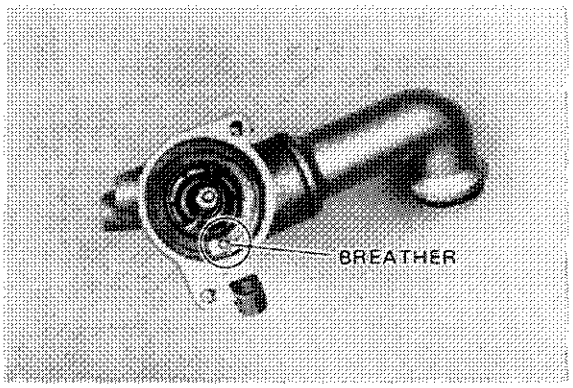
4. Check the O-rings for damage. Replace if necessary.




1. O-ring

**Assembly**

1. Insert the thermostatic valve into the thermostat housing with the breather positioned shown below.



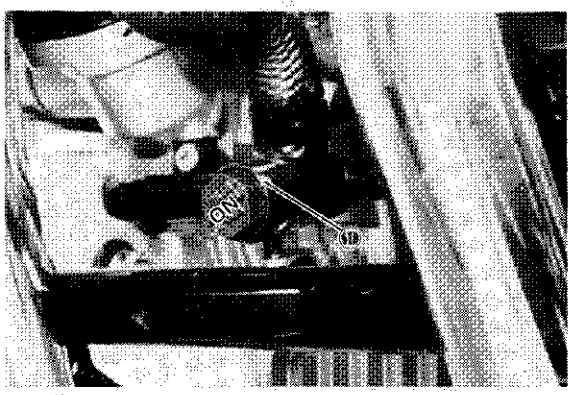

**NOTE:**

Refer to "Water Pump and Thermostatic Valve" on page 3-50.

## COOLANT DRAIN VALVE

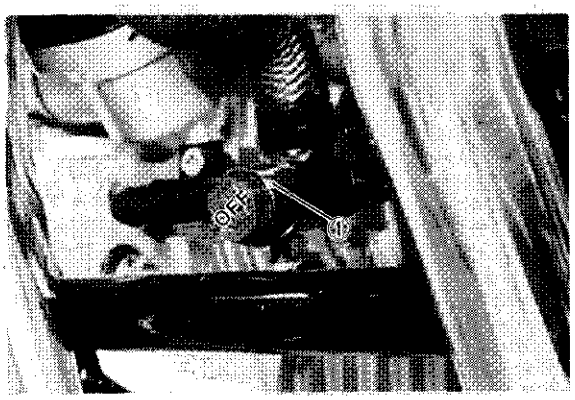
The coolant drain valve is installed to facilitate the filling and draining of coolant. The valve operates as follows:

1. When filling and draining coolant, align the "ON" mark on the drain valve with the alignment mark on the drain valve housing. The valve position allows the coolant to flow directly from the radiator to the drain valve, bypassing the thermostat. The coolant then passes through the bypass pipe and on ward to the water pump, where the flow is forced through to the cylinder and finnaly channeled back to the radiator.




1. Alignment mark

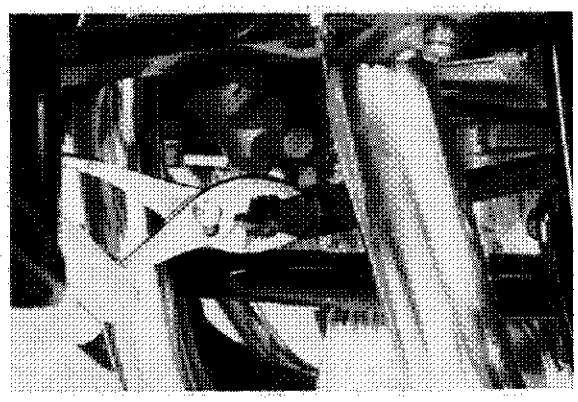
2. When the machine is in operation, be sure the "OFF" mark on the drain valve is aligned with the alignment mark on the drain valve housing. This valve position allows the coolant to flow directly from the radiator to the thermostat, bypassing the drain valve. The coolant then repeats the same cycle as in step a.



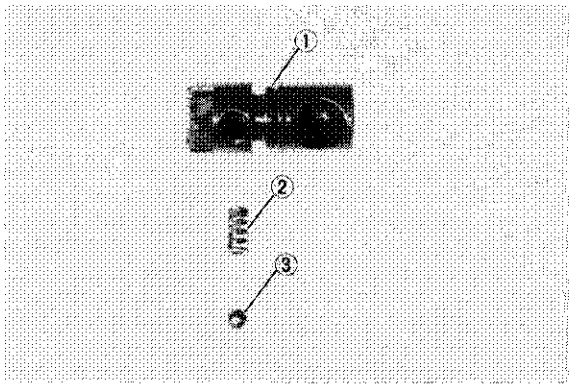

1. Alignment mark

### Disassembly Inspection, and Assembly

1. Remove the screw and pull out the valve assembly.



2. Check the O-ring, spring and stopper ball for damage. Replace if necessary.



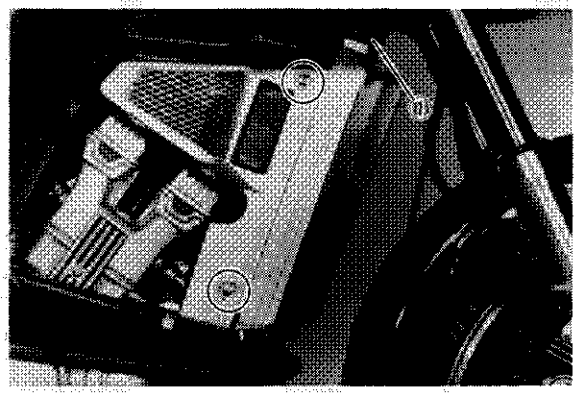

1. O-ring 2. Spring 3. Ball

3. Install the valve assembly so that the stopper ball fall into the body hole. Lock the valve assembly with the retaining screw.

## RADIATOR

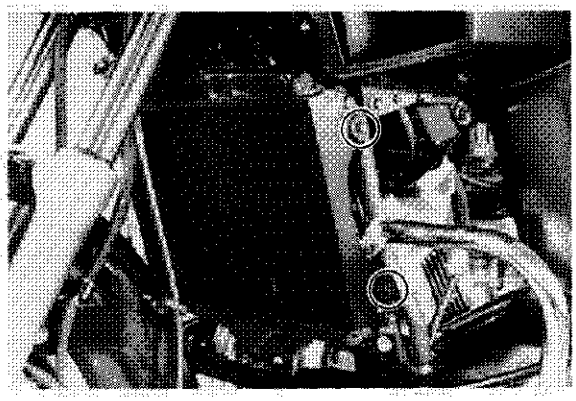
### Disassembly

1. Remove the radiator cover and cap.

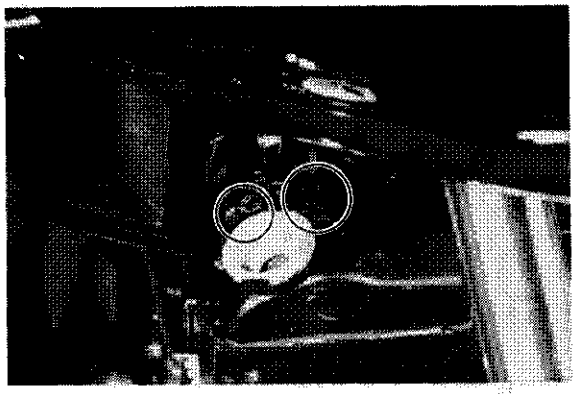


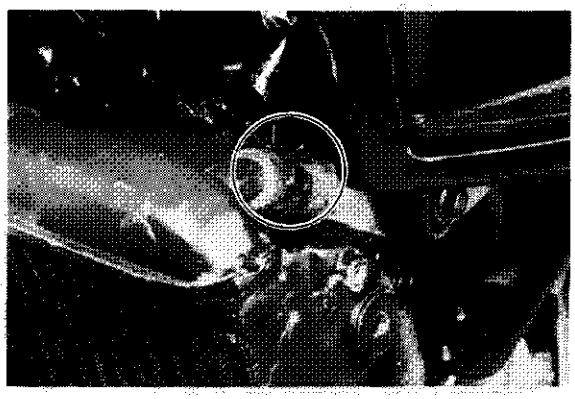

1. Radiator cap

2. Remove the radiator mounting bolts.

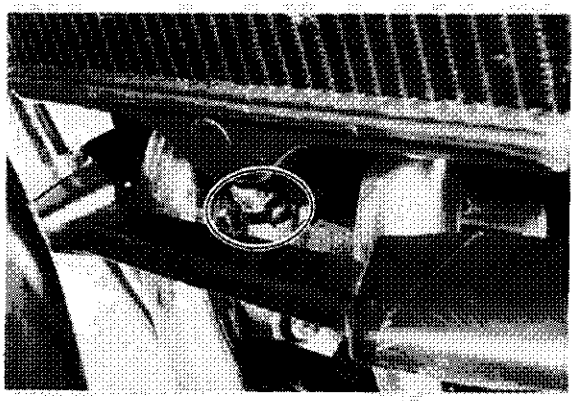


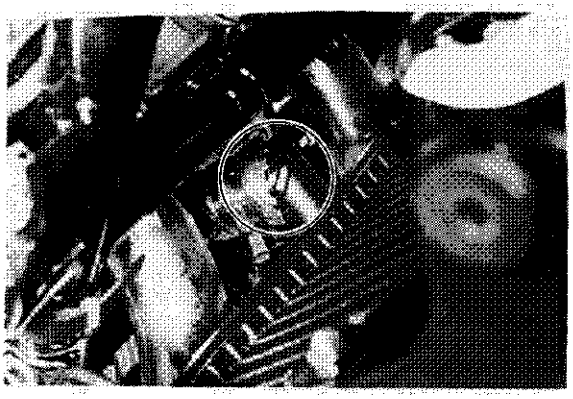
3. Remove the upper radiator hoses from the radiator.



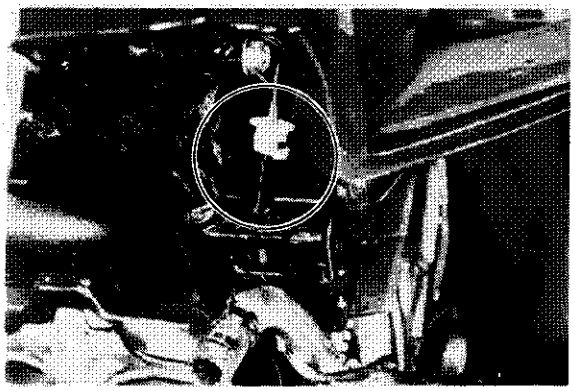


4. Remove the lower radiator hoses from the radiator.

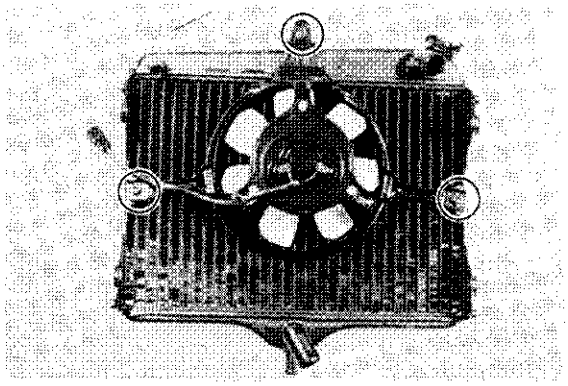




5. Disconnect the fan motor coupller and remove the radiator assembly from the frame.

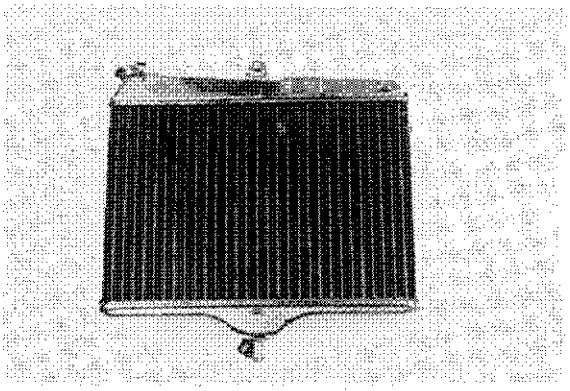


6. Remove the fan assembly from radiator.



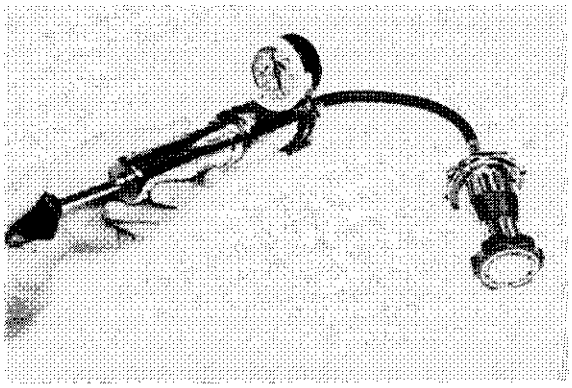
**Inspection**

1. Check the radiator core for clogged or flattened fins. If more than 20% of the radiator core area is flattened, repair or replace the radiator core.
   If the radiator is clogged with dirt or dust, clean it by blowing compressed air through the rear (engine side) of the radiator.



2. Check the coolant hoses for cracks or damage. Replace as required.

3. Using a pressure gauge, inspect the radiator cap pressure and vacuum valve for spring tension and seating condition. If the valve opens at a pressure level below the specified value or is otherwise defective, replace the radiator cap.



Valve opening pressure:
0.8 ~ 1.0 kg/cm² (11.4 ~ 14.2 lb/in²)

**Assembly**

Connect the fan motor cuppler and install the radiator and coolant pipes.

Torque the radiator mounting bolts to specification.

Tightening toque:
7 Nm (0.7 m·kg, 5.1 ft·lb)

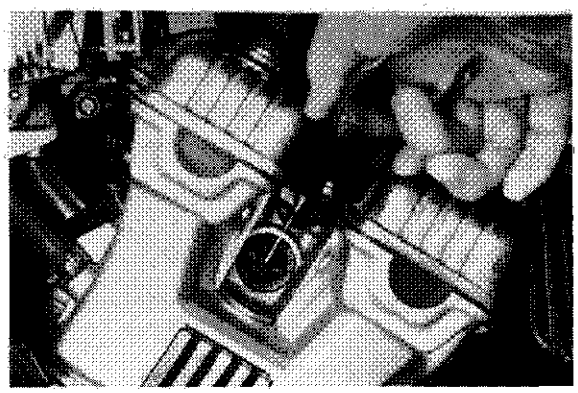
## CYLINDER HEAD WATER JACKET JOINT

**CAUTION:**

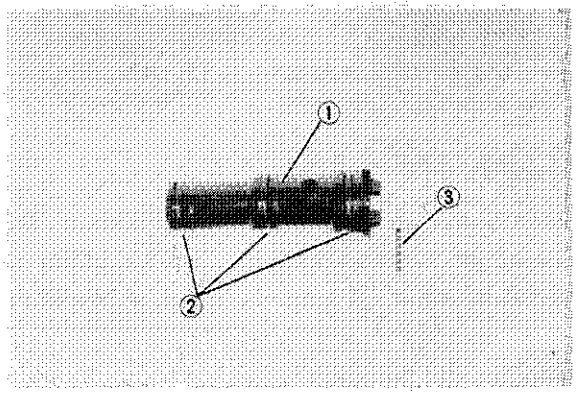
- **Be sure to drain the coolant before you disassemble the water jacket joints otherwise the coolant will flow into the crankcase.**
- **Do not remove the water jacket joints unless absolutely essential; e.g., when overhauling the engine.**

**Removal, Inspection, and Assembly**

1. Remove the spark plugs.
2. Remove the stopper pins and water jacket joints from cylinder heads.

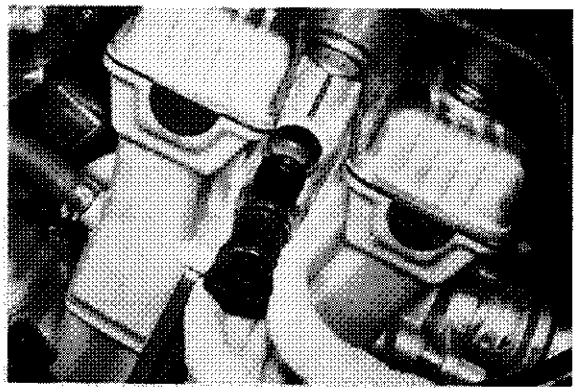


3. Check the O-rings, water jacket joints and lock pins for damage. Replace if necessary.




1. Water jacket joint 2. O-ring 3. Stopper pin

4. Install the water jackets into the cylinder heads.
   Install the stopper pins to lock the joints.



## COOLANT FILLING

### Coolant Type

The coolant is a mixture of soft water and antifreeze. You may use an antifreeze sold in the market, but the coolant should be prepared by taking into account the relation between the mixing ratio and freezing point.

Recommended coolant:
High-quality ethylene glycol anti-freeze containing anti-corrosion inhibitors for aluminum engines.
Collant and soft water mix ratio:
50%/50%
Total amount:
2.8 L (2.5 Imp qt, 3.0 US qt)
Reservoir tank capacity:
0.39 L (0.34 Imp qt, 0.41 US qt)
From LOW to FULL level:
0.25 L (0.2 Imp qt, 0.3 US qt)

**CAUTION:**

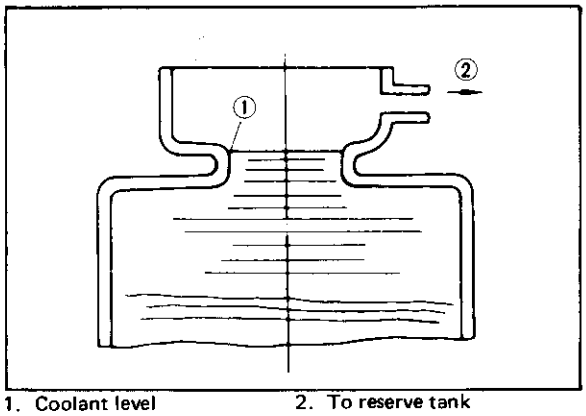
**Hard water or salt water is harmful to the engine parts. You may use boiled water or distilled water, if no soft water is available.**

### Coolant Filling

1. Install the coolant drain bolt.

Tightening torque:
43 Nm (4.3 m·kg, 31 ft·lb)

2. Align the "ON" mark on the coolant drain valve with the alignment mark on the drain valve housing.
3. Remove the radiator cap, and pour the coolant into the radiator to the level shown in the illustration. Start the engine.



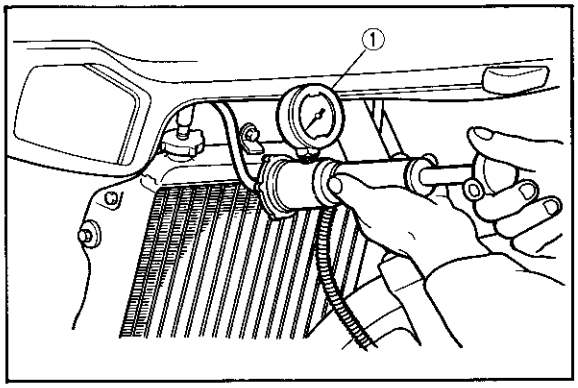

1. Coolant level 2. To reserve tank

4. After starting the engine, the coolant level will go down. Add coolant while the engines running.
5. When the coolant level in the radiator becomes stable, stop the engine.
6. Add coolant to radiator again up to the level line shown in the illutration.
7. Install the radiator cap.
8. Align the "OFF" mark on the coolant drain valve with the alignment mark on the drain valve housing.

**CAUTION:**

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

9. Connect the reservoir tank feed pipe.
10. Check the cooling system compression check.
    a. Remove the radiator cover.
    b. Fill the coolant.
    c. Install a pressure gauge.

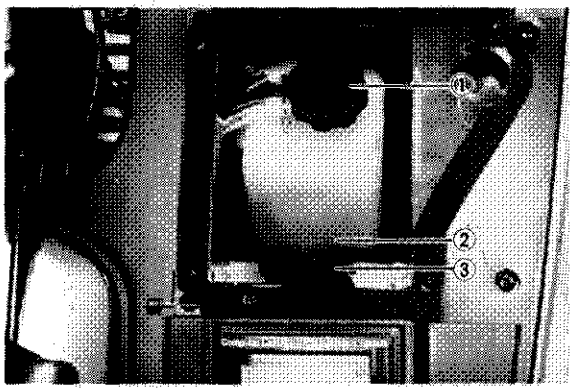



1. Radiator pressure tester

    d. Apply 1.0 kg/cm$^2$ (14 lb/in$^2$) pressure, and check the gauge to see if the pressure drops or not. If the pressure shows a drop, the cooling system is leaky. Repair as required.

**Coolant Level**

1. Check the coolant level in the reservoir tank when the engine is cold.
   If the reservoir tank level is under the "LOW" level mark, add coolant until it reaches the "FULL" level mark. The air remaining in the system will be expelled through the radiator cap.




1. Coolant reservoir tank cap
2. "Full" level
3. "Low" level

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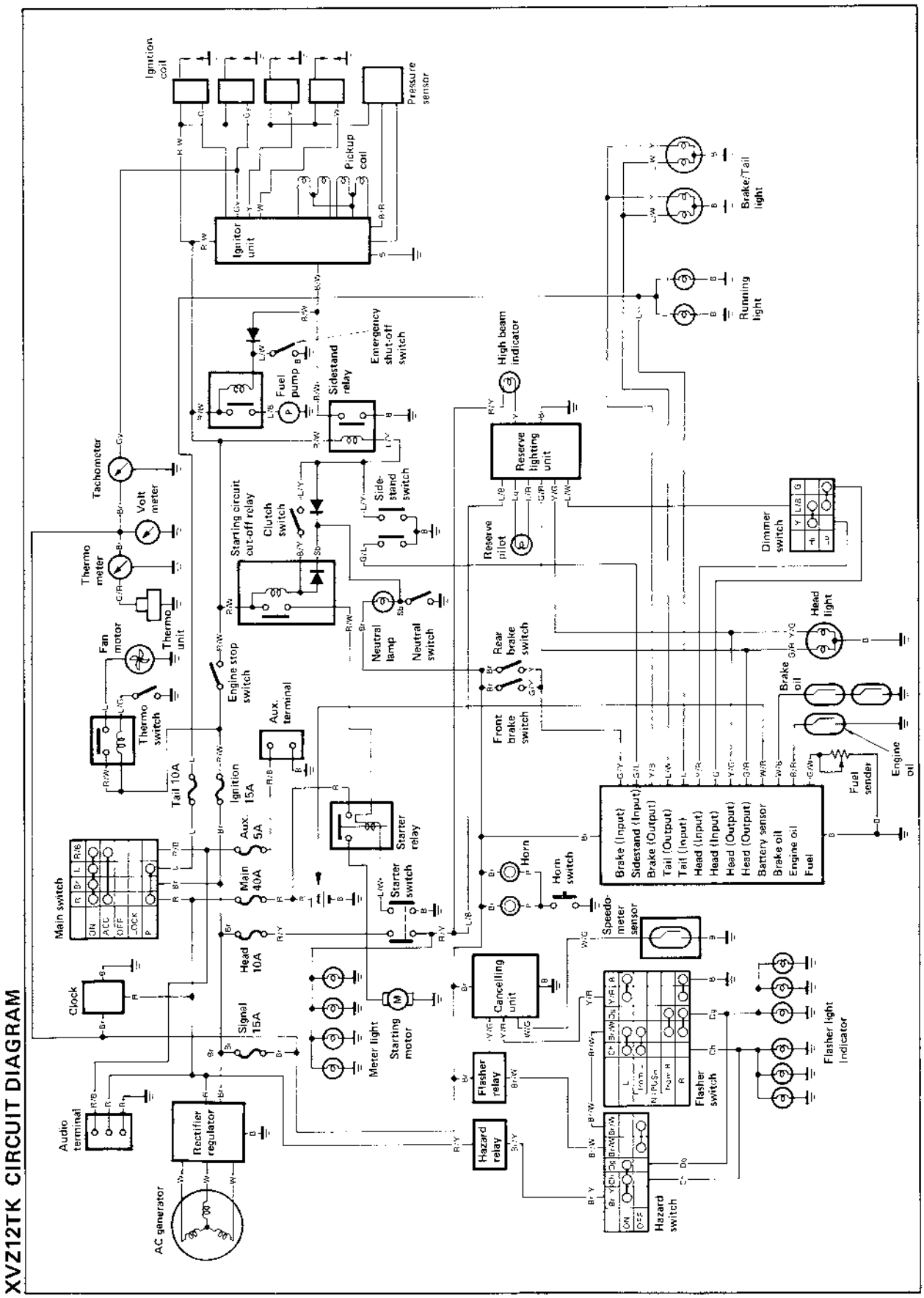
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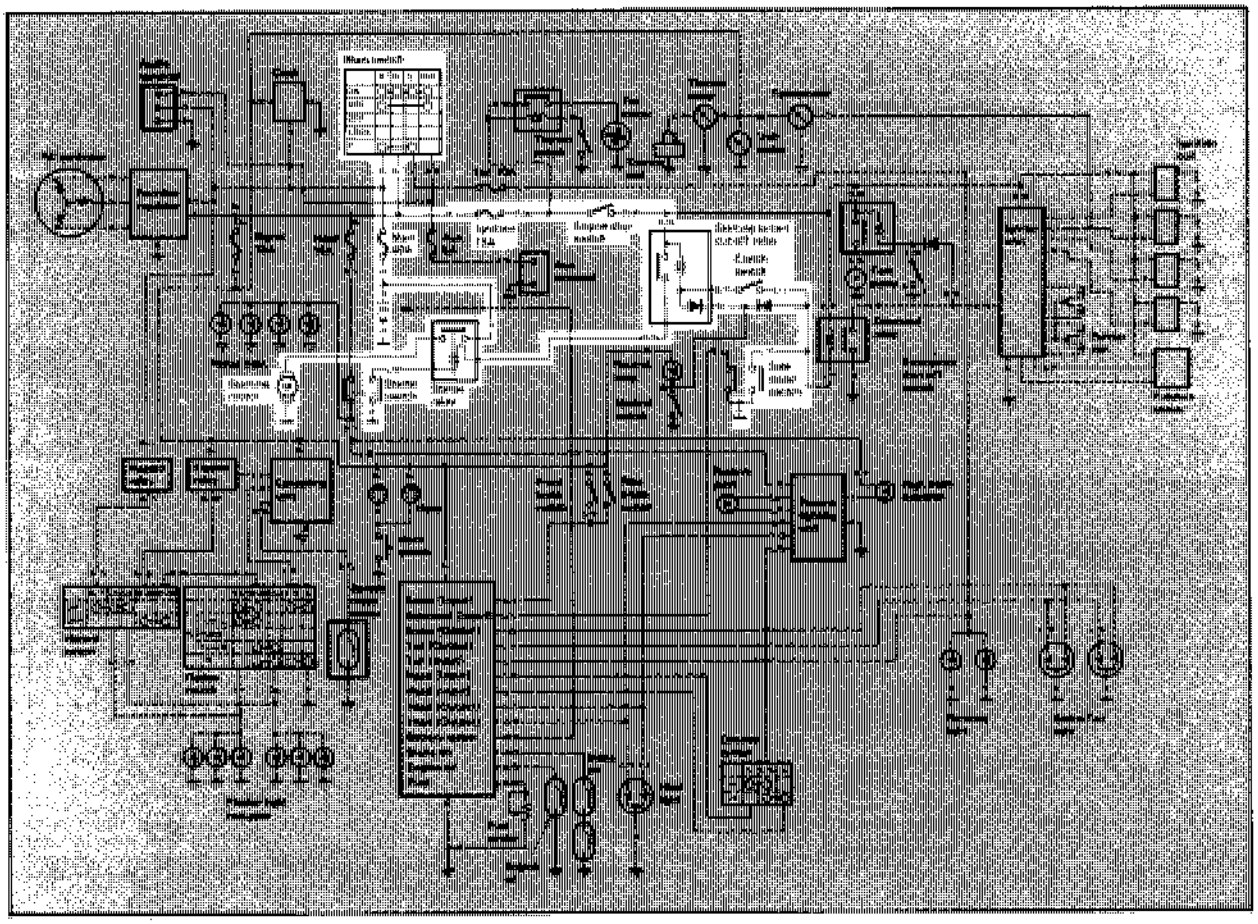
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## XVZ12TK CIRCUIT DIAGRAM

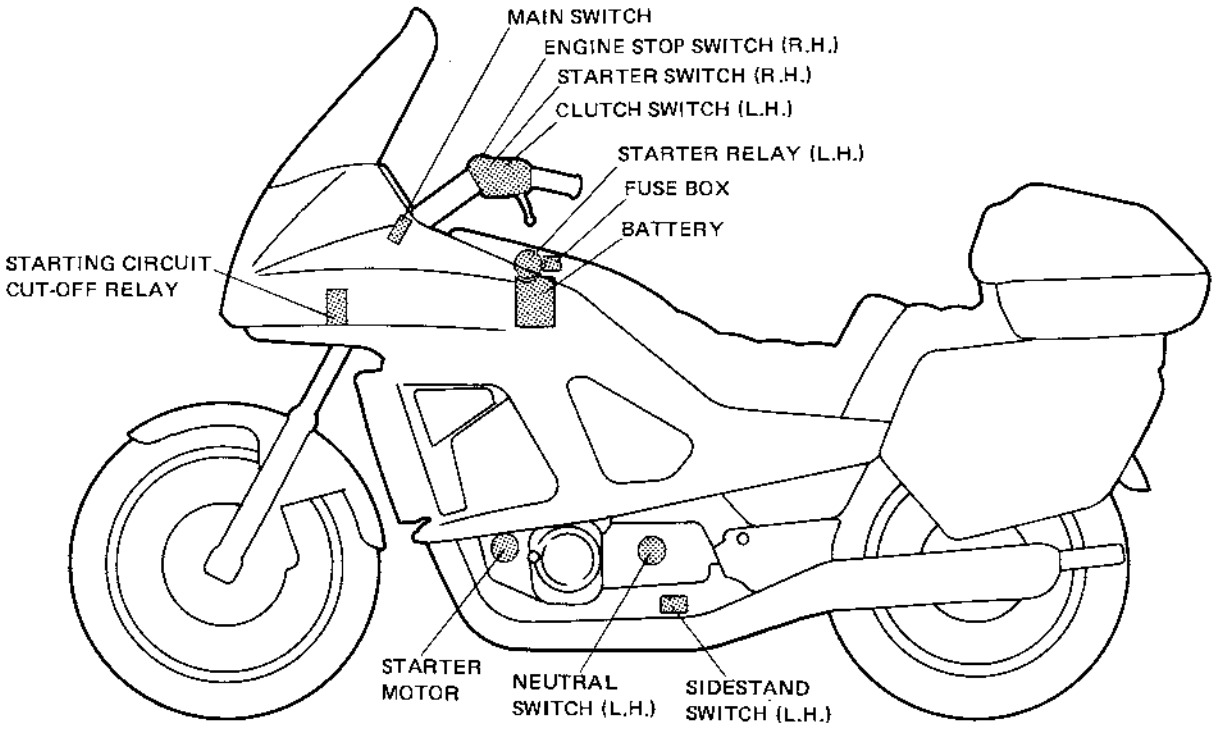


# ELECTRIC STARTING SYSTEM

## Circuit Diagram



**Above circuit diagram shows starter circuit in wiring diagram.**



## STARTING CIRCUIT CUT-OFF SYSTEM

The starting circuit cut-off system is employed. Hence, the following description.

### Starting Circuit Operation

The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch and the main switch are both on, the starter motor can operate only if:

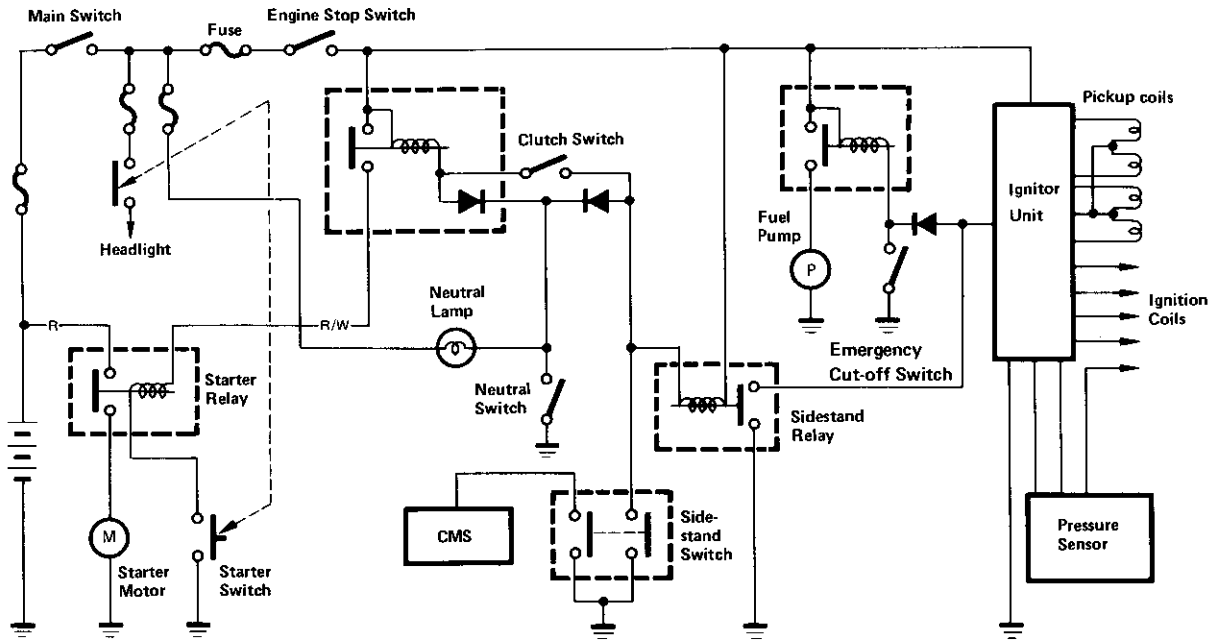
- **The transmission is in neutral (the neutral switch is on).**

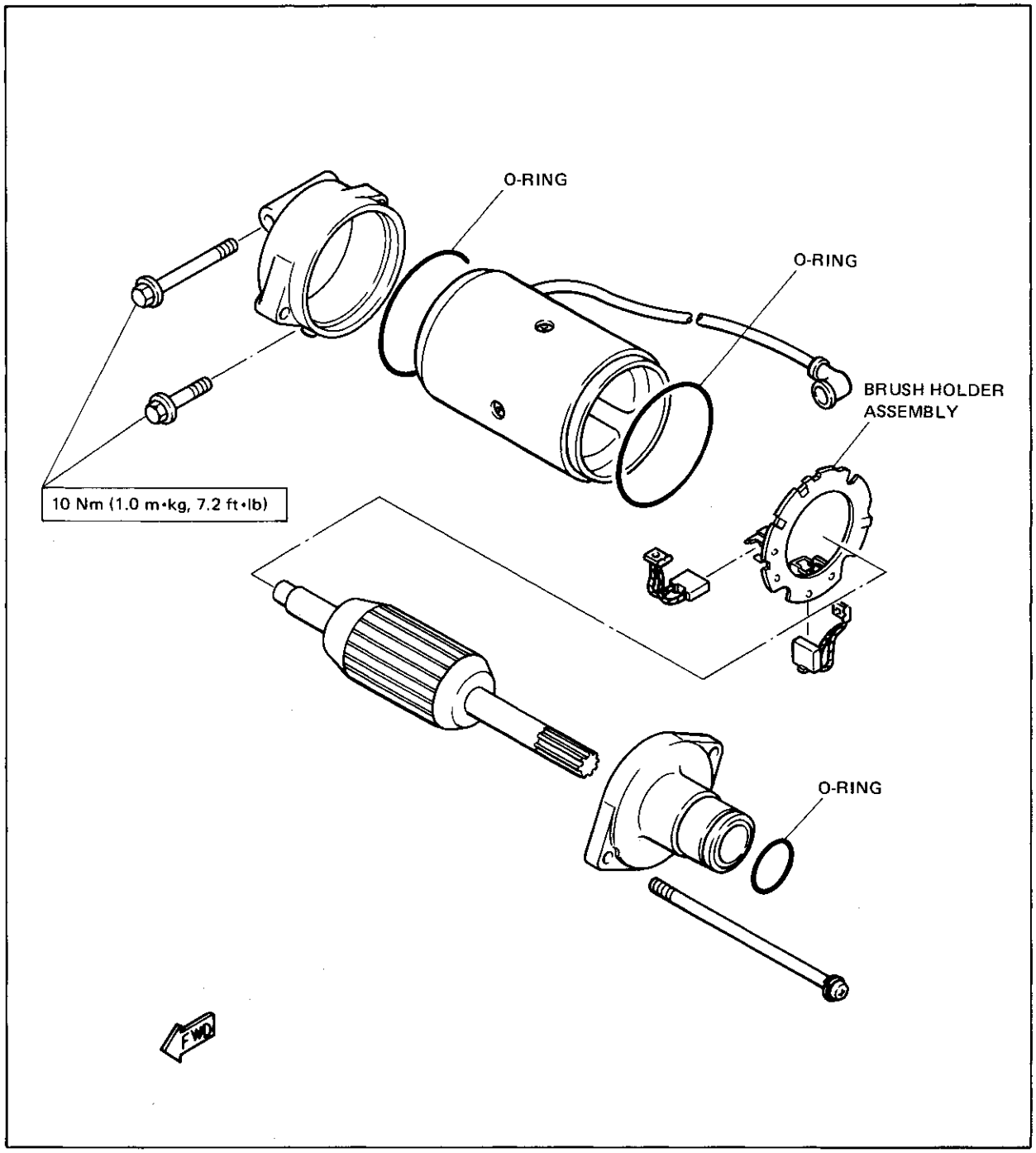
**or if**

- **The clutch lever is pulled to the handlebar (the clutch switch is on) and the sidestand is up (the sidestand switch is on.)**

Only under the aforementioned conditions can the engine be started.

When the motorcycle is in any other mode of operation, the starting circuit cut-off relay will prevent the starter from operating by cutting off current to the starter motor.






**Removal**

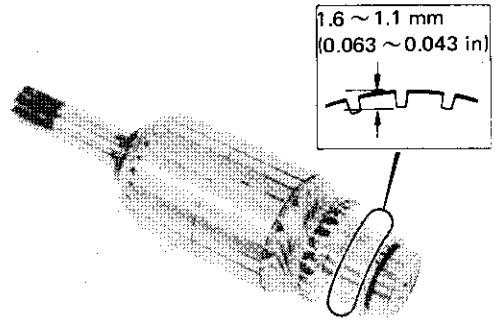
1. See Chapter 3. "ENGINE DISASSEMBLY."

**Inspection and Repair**

1. Check the outer surface of the commutator. If its surface is dirty, clean it with #600 grit sandpaper.
2. The mica insulation between the commutator segments should be 1.1 ~ 1.6 mm (0.04 ~ 0.06 in) below the segment level. If not, scrape the mica to proper limits with an appropriately shaped tool. (A hacksaw blade can be ground to fit.)

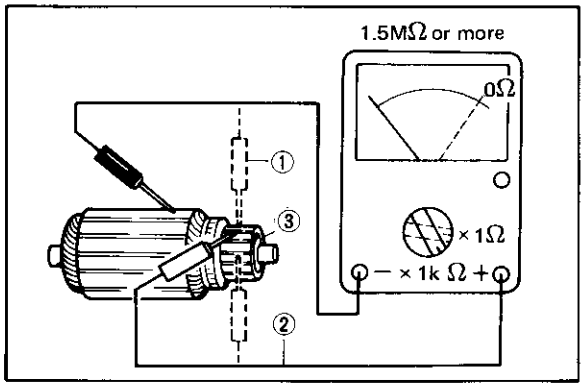
**NOTE:**

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.



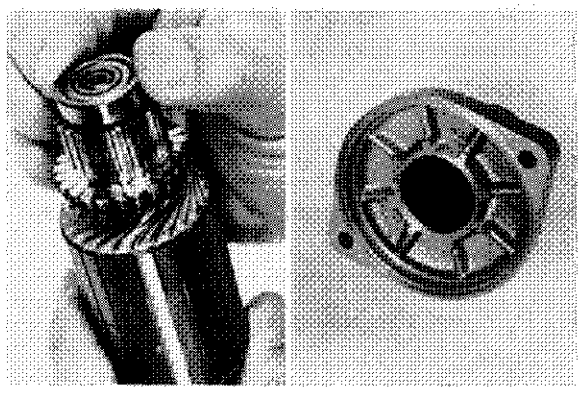

3. The armature coil should be checked for insulation breakdown (shorting to each other or to ground) and for continuity. Use a pocket tester.

| Coil resistance<br>Armature coil: 1.5MΩ or more |
|---|



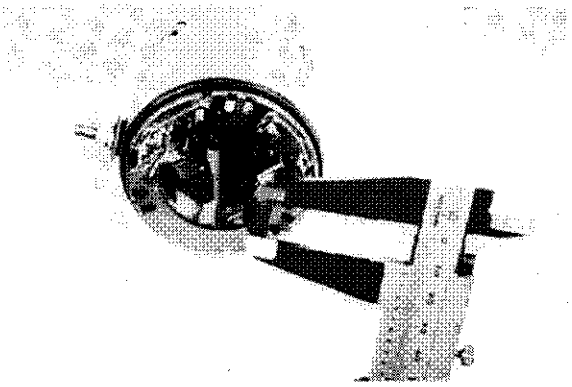

1. Continuity check 2. Insulation check 3. Armature coil

4. Check the bearing and the oil seal for damage. If either is damaged, the starter motor must be replaced.



5. Check the brush length. Replace the brush if it's at or near its limits.

| Minimum brush length:<br>4.5 mm (0.177 in) |
|---|



6. Check the brush spring pressure. Compare it with a new spring. Replace the old spring if it is weak.

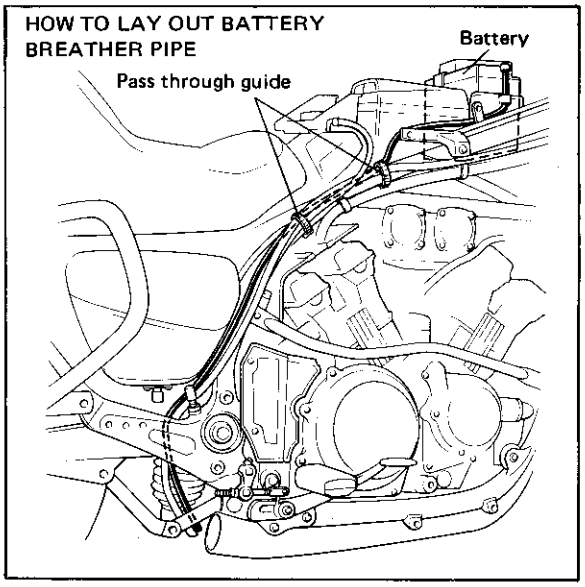
## BATTERY

1. The fluid level should be between the upper and lower level marks. Use only distilled water if refilling is necessary.

**CAUTION:**

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

2. Always make sure the connections are correct when installing the battery. Make sure the breather pipe is properly connected, properly routed, and is not damaged or obstructed.



**CAUTION:**

**The battery must be charged before using to insure maximum performance. Failure to properly charge the battery before first use or a low electrolyte level will cause premature failure of the battery.**
**Charging current. 1.2 amps/10 hrs or until the specific gravity reaches 1.280 at 20°C (68° F).**

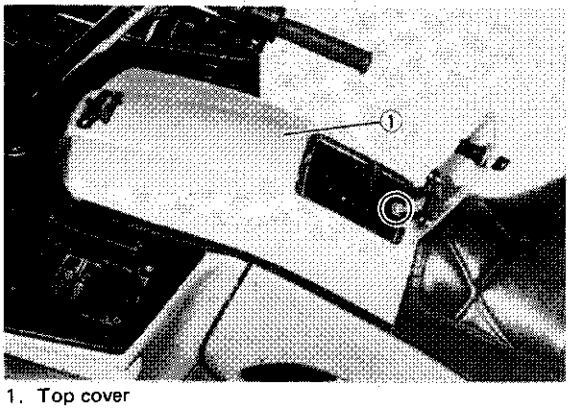
**WARNING:**

**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 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 when working near batteries.**
**KEEP OUT OF REACH OF CHILDREN.**

**Replenishing the Battery Fluid**

A poorly maintained battery will deteriorate quickly. The battery fluid should be checked at least once a month.

1. Remove the top cover.

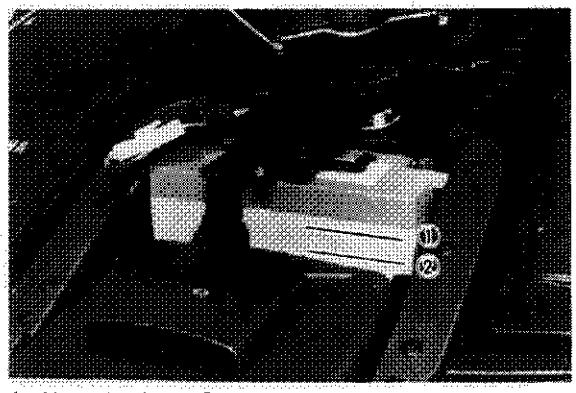



1. Top cover

2. The level should be between the upper and lower level marks. Use only distilled water if refilling is necessary.

**CAUTION:**

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




1. Upper level 2. Lower level

3. When the motorcycle is not to be used for a month or longer, remove the battery and store it in a cool, dark place. Completely recharge the battery before reusing.
4. If the battery is to be stored for a longer period than the above, check the specific gravity of the fluid at least once a month and recharge the battery when it is too low.
5. Always make sure the connections are correct when putting the battery back in the motorcycle.
   Make sure the breather pipe is properly connected and is not damaged or obstructed.

**CAUTION:**

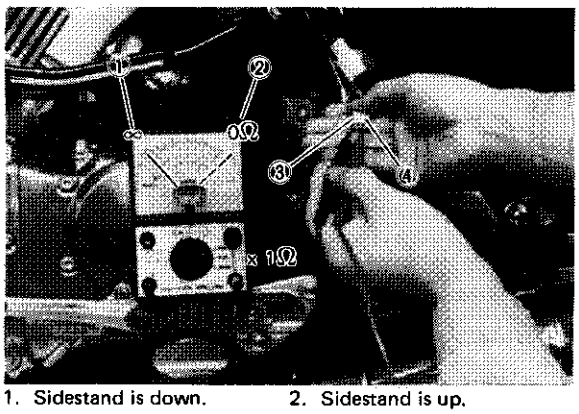
**Make sure that the connection to the battery is correct.**

6. Reinstall the top cover and tighten the bolts.

## SIDESTAND SWITCH

### Inspection

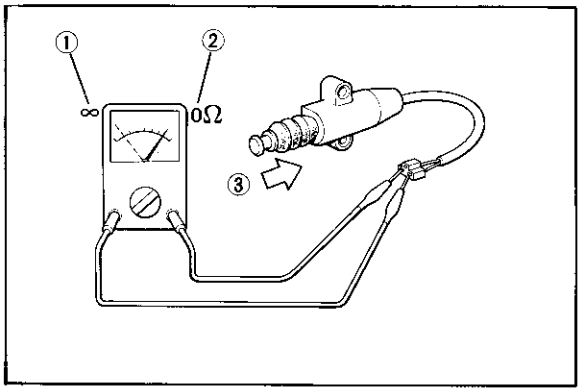
1. Remove the required fairing.
2. Disconnect the connector from the wiring harness.
3. Conncet the pocket tester leads as shown, and set the tester selector to ohm x 1. When the sidestand is up, the tester should read zero ohms. When the side stand is down, the tester should read infinity.




1. Sidestand is down. 2. Sidestand is up.
3. Green/Blue 4. Blue/Yellow

| SIDESTAND | SWITCH | L/Y | B | G/L |
|---|---|---|---|---|
| UP | ON (Free) | ○ | ○ | ○ |
| DOWN | OFF (Pushed-in) | | | |

Also you can remove the switch and check it as a unit.

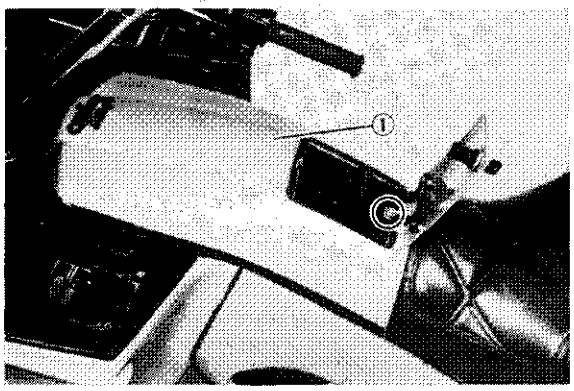



1. OFF (Pushed-in) 2. ON (Free) 3. Sidestand switch

## STARTER RELAY

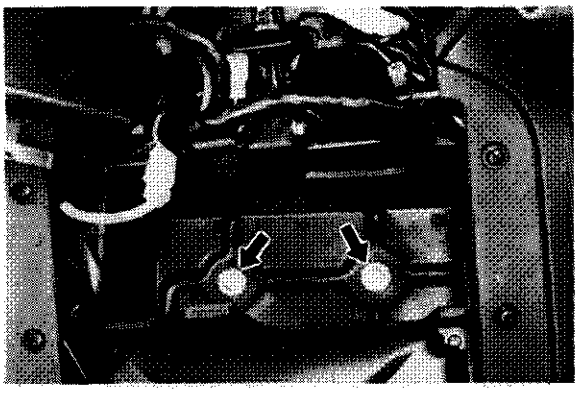
### Inspection

1. Remove the top cover.

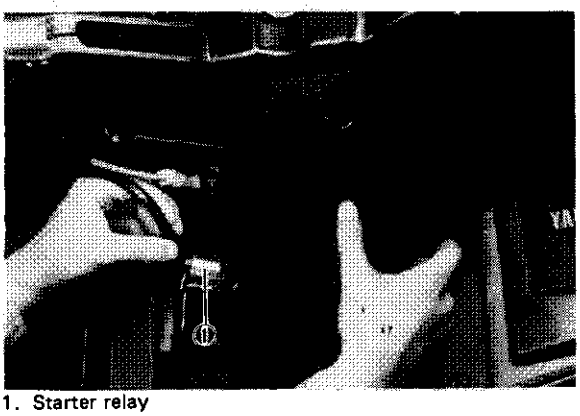



1. Top cover

2. Turn the ignition switch to "ON", the engine stop switch to RUN and the shift pedal to NEUTRAL.
3. Push the starter switch and check whether the starter relay clicks.
4. If the relay does not click, remove the battery and the battery case.

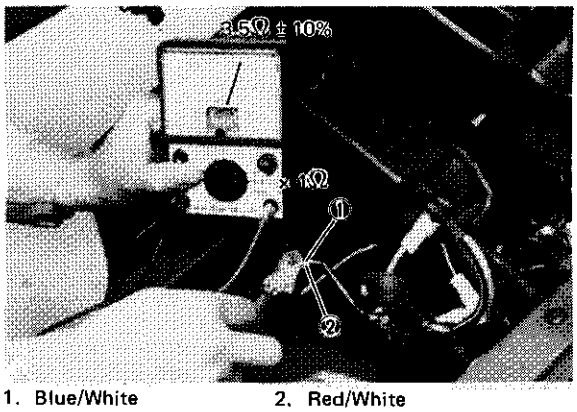


5. Remove the starter relay.




1. Starter relay

6. Disconnect the connector and check the coil resistance. (Blue/White – Red/White)



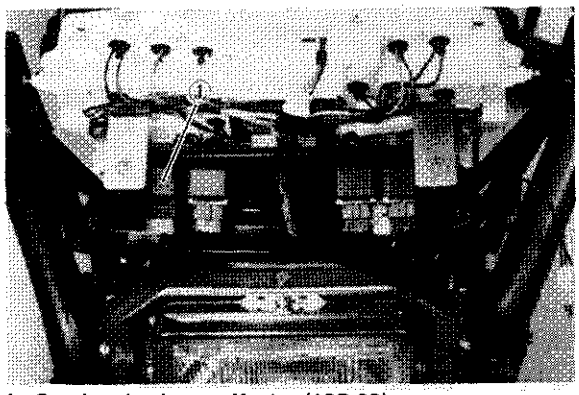

1. Blue/White 2. Red/White

If the resistance is not within specification, replace the relay.

## STARTING CIRCUIT CUT-OFF RELAY

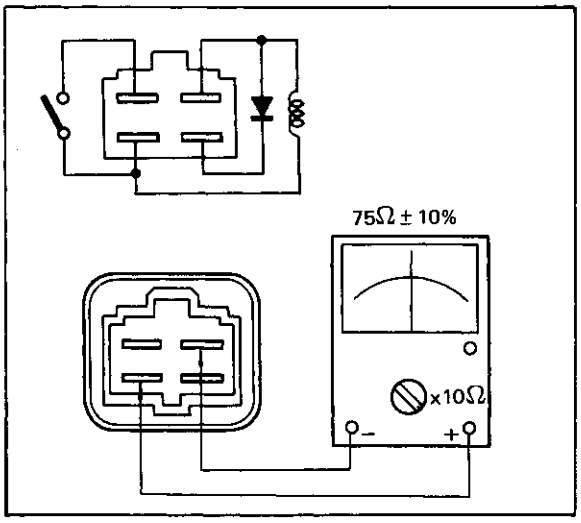
### Inspection

1. Remove the required fairing.
2. Remove the starting circuit cut-off relay from the frame, and disconnect the connector.



1. Starting circuit cut-off relay (12R-00)

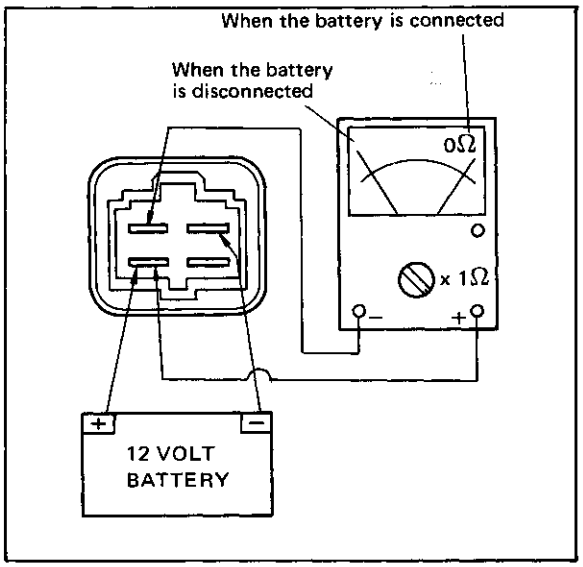
3. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.



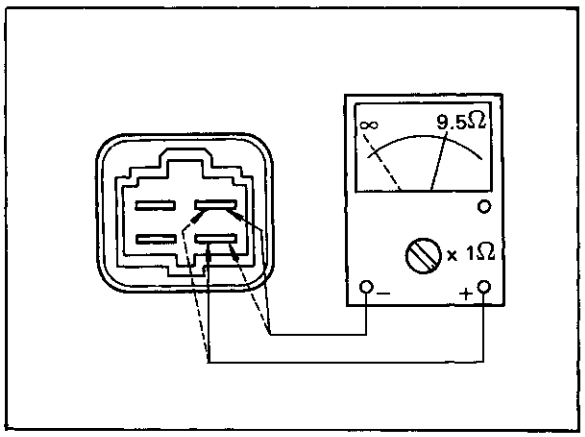

4. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.

**CAUTION:**

**Wrong connection of the battery leads may cause damage to the relay diode.**




5. Check the diode in the relay with the pocket tester as shown in the illustration. Replace the relay if the diode is damaged.

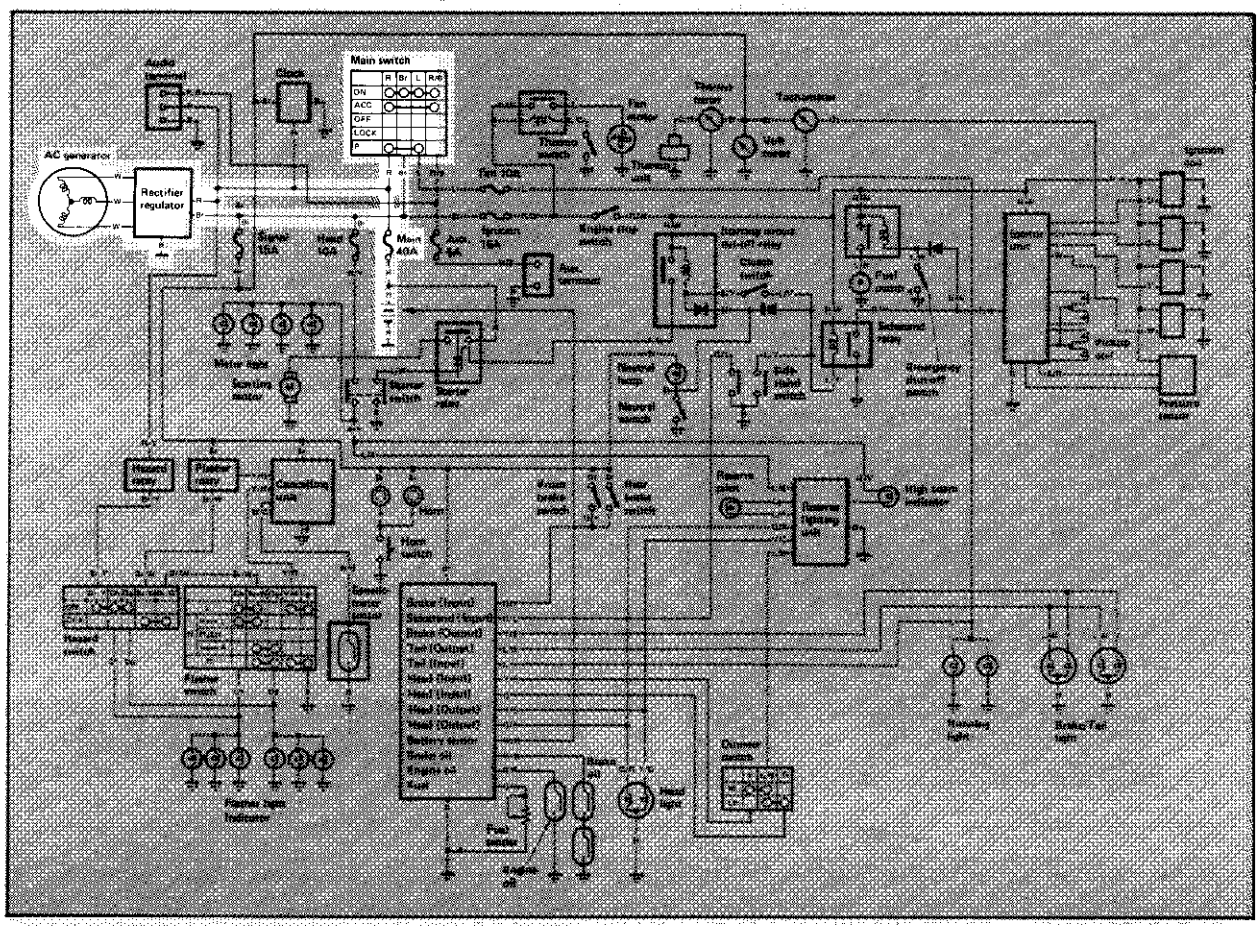



**NOTE:**

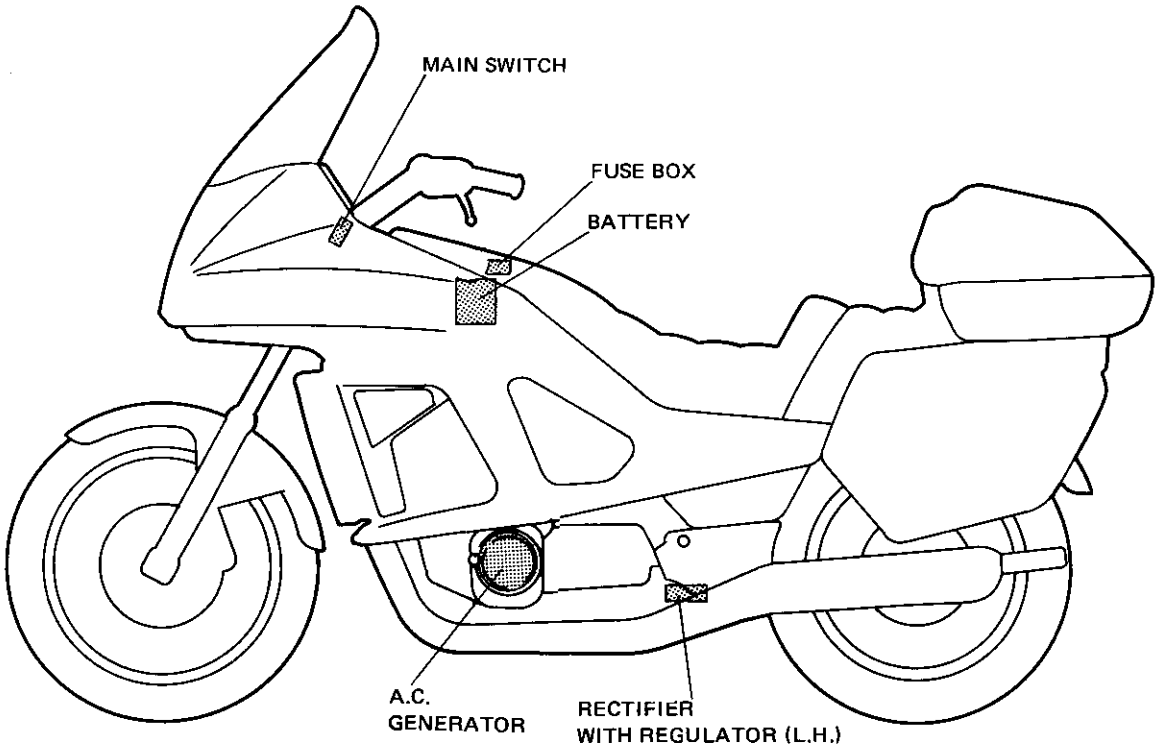
Only the Yamaha Pocket Tester will give a 9.5Ω reading when testing continuity. The particular characteristics of other testers will cause the continuity test readings to vary.

# CHARGING SYSTEM

## Circuit Diagram




**Above circuit diagram shows charging circuit in wiring diagram.**

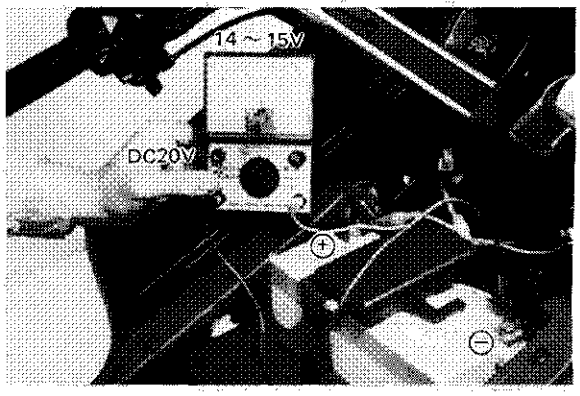


## AC GENERATOR AND VOLTAGE REGULATOR

### Generator Voltage Inspection

1. Connect the pocket tester to the battery terminals.
2. Start the engine.
3. Accelerate the engine to approximately 2,000 r/min or more, and check the generator voltage.

| Generator voltage: 14.5 ± 0.5V |
|---|




4. If the indicated voltage cannot be reached, check all connections. If the connections are all good, check the battery, stator coil, and the regulator/rectifier. If both the battery and stator coil are in working order, the regulator is defective and should be replaced.

**CAUTION:**

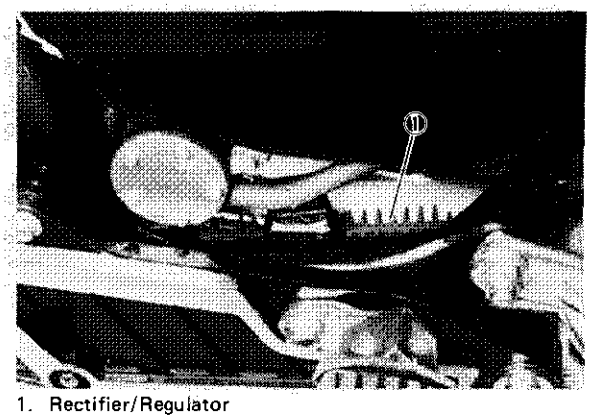
**Never disconnect the wires from the battery while the generator is operating. If the battery is disconnected, the voltage across the generator terminals will increase and damage the semi-conductors.**

### Battery Inspection

1. Check the battery terminals and couplers. They should be tight.
2. Measure the specific gravity of the battery. If it is less than 1.260, remove and charge the battery until the specific gravity is greater than 1.260.

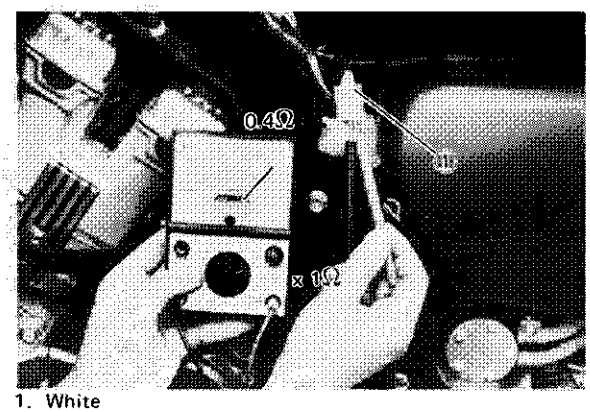
### Stator Coil Inspection

1. Remove the required fairing.




1. Rectifier/Regulator

2. Disconnect the stator coil leads from the voltage regulator, and connect the pocket tester as shown. If the resistance does not equal the specified value, the startor coil is defective and should be replaced.



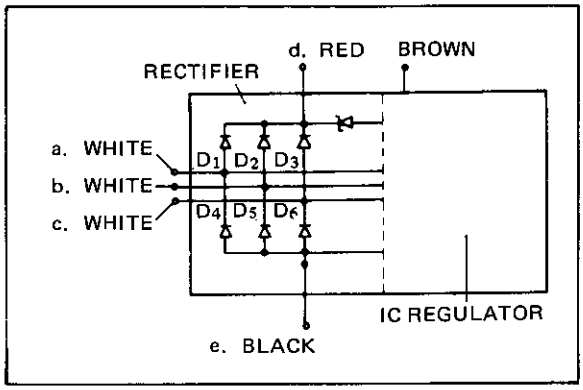

1. White

| Stator coil resistance:<br>0.42Ω ± 15% of 20°C (68°F)<br>Color:<br>White – White |
|---|

3. If the resistance in each coil is correct, check the stator for a short to ground. Connect one lead of the ohmmeter to a white lead, the other lead to ground. With the selector knob set at x 1Ω, the reading should be infinity (∞). If it is not, the stator is defective and should be replaced.

### Silicon Rectifier Inspection

1. Check the silicon rectifier as specified using the pocket tester.




| Diode number | Test number | Pocket tester connecting point (+) (red) | Pocket tester connecting point (−) (black) | Good | Replace (element shorted) | Replace (element opened) |
|---|---|---|---|---|---|---|
| $D_1$ | 1 | d | a | ○ | ○ | x |
| | 2 | a | d | x | ○ | x |
| $D_2$ | 1 | d | b | ○ | ○ | x |
| | 2 | b | d | x | ○ | x |
| $D_3$ | 1 | d | c | ○ | ○ | x |
| | 2 | c | d | x | ○ | x |
| $D_4$ | 1 | a | e | ○ | ○ | x |
| | 2 | e | a | x | ○ | x |
| $D_5$ | 1 | b | e | ○ | ○ | x |
| | 2 | e | b | x | ○ | x |
| $D_6$ | 1 | c | e | ○ | ○ | x |
| | 2 | e | c | x | ○ | x |

○ : Continuity
x : Discontinuity (∞)

**NOTE:**

In the above table, each diode is good if the next two conditions are both satisfied.

1. In test 1, the tester shows "Continuity.
2. In test 2, the tester shows "Discontinuity".

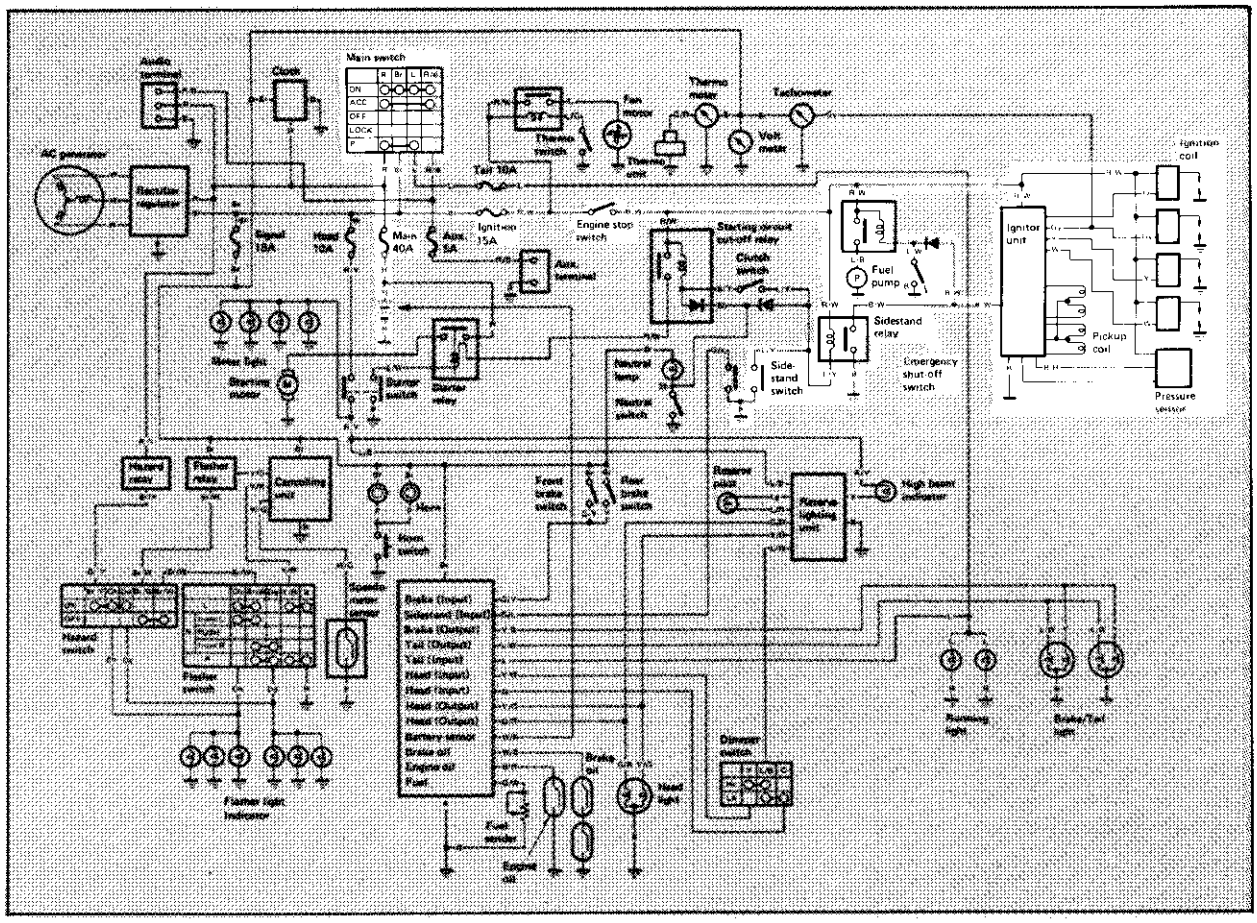
2. If any element is broken, replace the entire unit.

**CAUTION:**

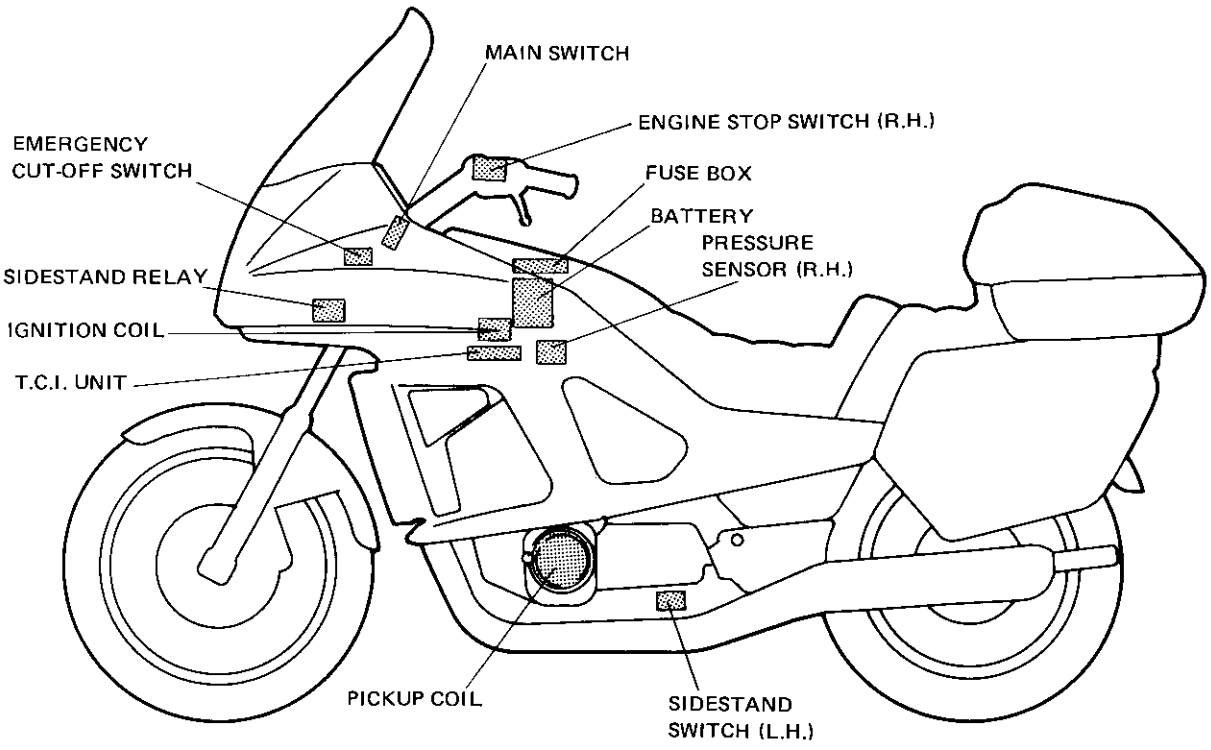
**The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a continuity check.**

# IGNITION SYSTEM

## Circuit Diagram



**Above circuit diagram shows only ignition circuit in wiring diagram.**

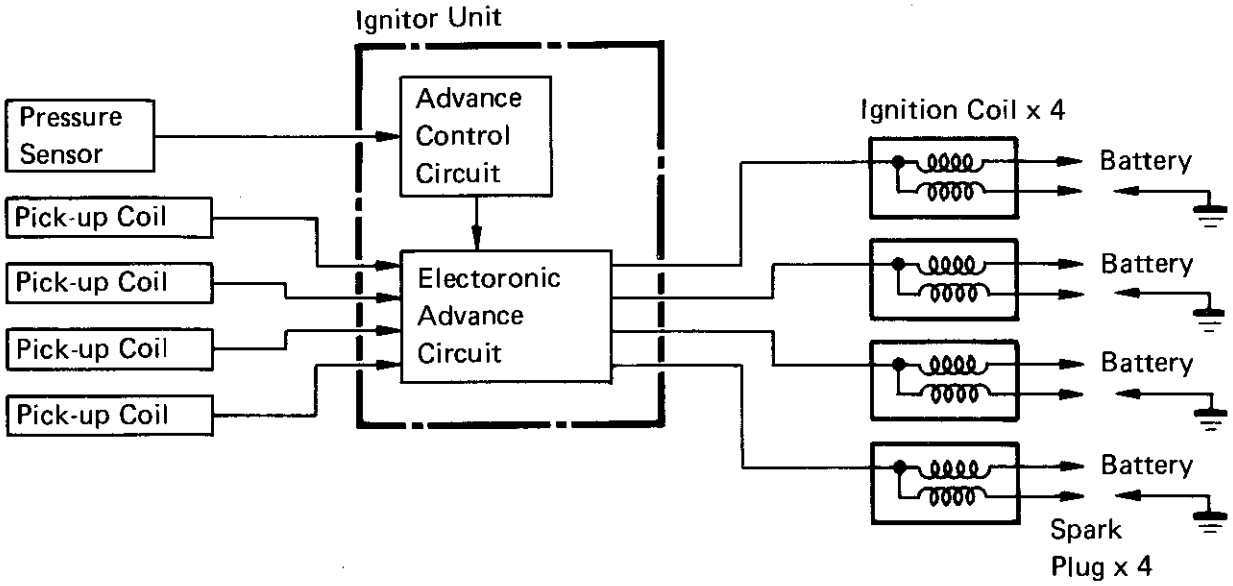


**Description**

This model is equipped with a battery operated, fully transistorized, breakerless ignition system. By using magnetic pickup coils, the need for contact breaker points is eliminated. This adds to the dependability of the system by eliminating frequent cleaning and adjustment of points and ignition timing. The TCI (Transistor Control Ignition) unit incorporates an automatic advance circuit controlled by signals generated by the pickup coil. This adds to the dependability of the system by eliminating the mechanical advancer. This TCI system consists of two units: a pickup unit and an ignitor unit.

**NOTE:**

The ignition circuit can be operated only when the sidestand is up (the sidestand switch if on) or the transmission is in neutral.
neutral.

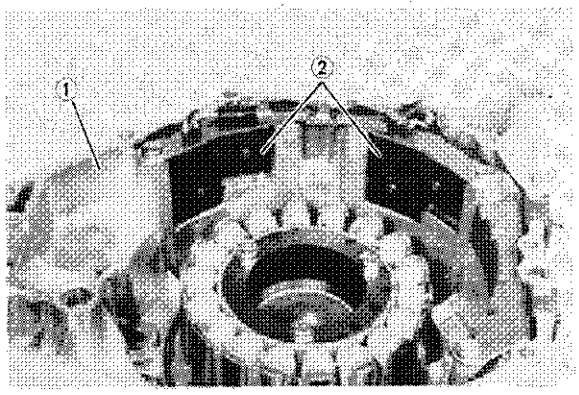



**Operation**

The TCI functions on the same principle as a conventional DC ignition system with the exception of using magnetic pickup coils and a transistor control box (TCI) in place of contact breaker points.

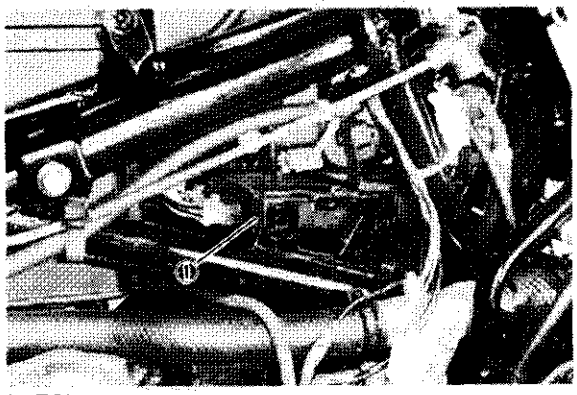
1. Pickup unit
   The pickup unit consists of two pickup coils and a flywheel mounted onto the crankshaft. When the projection on the flywheel passes a pickup coil, a signal is generated and transmitted to the ignitor unit. The width of the projection on the flywheel determines the ignition advance.

The pickup coils are located in the crankcase cover (right).



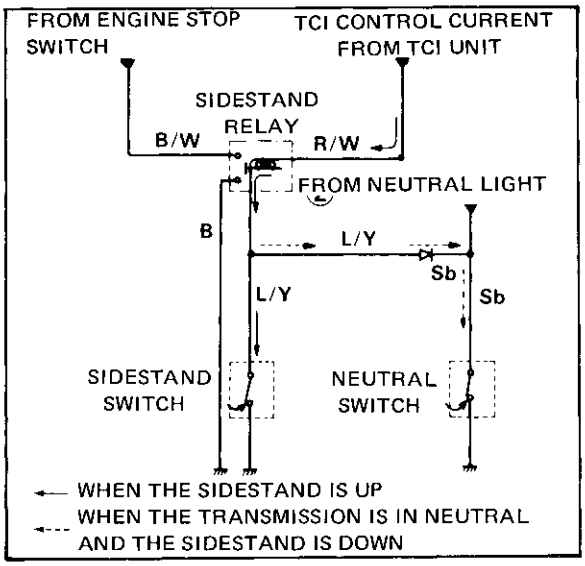

1. Crankcase cover (right) 2. Pickup coils

2. Ignitor unit (TCI unit)
   The ignitor unit is located under the battery. This unit controls wave form, duty control, switching, electronic ignition advance, etc. The duty control circuit reduces electrical consumption by controlling the duration of the primary ignition current.
   The ignitor unit also has a protective circuit for the ignition coil. If the ignition switch is on and the crankshaft is not turning, the protective circuit interrupts the current flow to the primary coil after a few seconds. When the crankshaft if turning, however, the ignitor unit sends current to the primary coil.

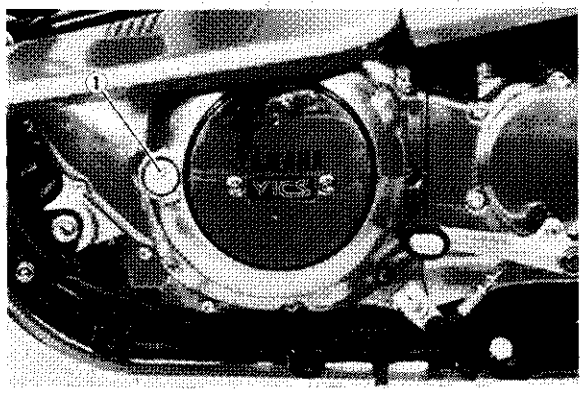


1. TCI unit

3. Sidestand relay operation
   The sidestand relay operates by shorting the TCI control current. When the sidestand is down, the sidestand relay is closed, and the TCI control current is grounded through the sidestand relay. Thus, the engine will not run with the sidestand down unless the transmission is in neutral.

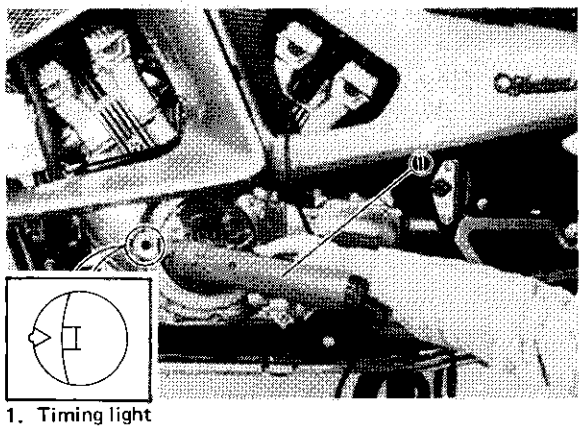



4. Ignition timing inspection
   1. Remove the blind plug



1. Blind plug

   2. Clip a timing light lead onto the #1 spark plug wire and look at the timing mark in the hole.



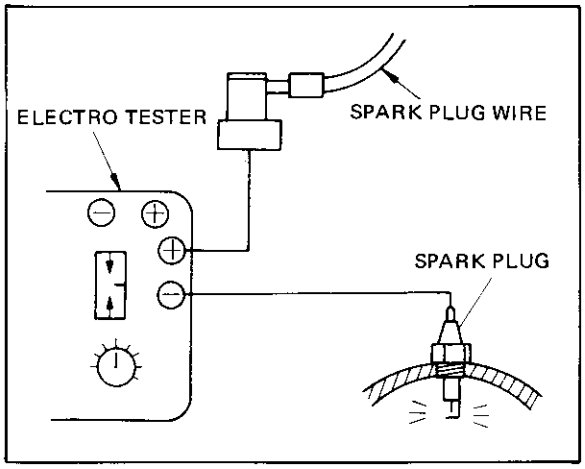
1. Timing light

| Specified ignition timing: |
| --- |
| BTDC 5° at 1,000 r/min |

**Troubleshooting**

The entire ignition system can be checked for misfire and weak spark by using the Electro Tester. If the ignition system will fire across a specified gap, the entire ignition system is good. If it will not fire across the gap, proceed with the individual component tests until the source of the problem is located.

1. Warm up the engine thoroughly so all electrical components are at operating temperature.
2. Stop the engine, and connect the tester as shown.



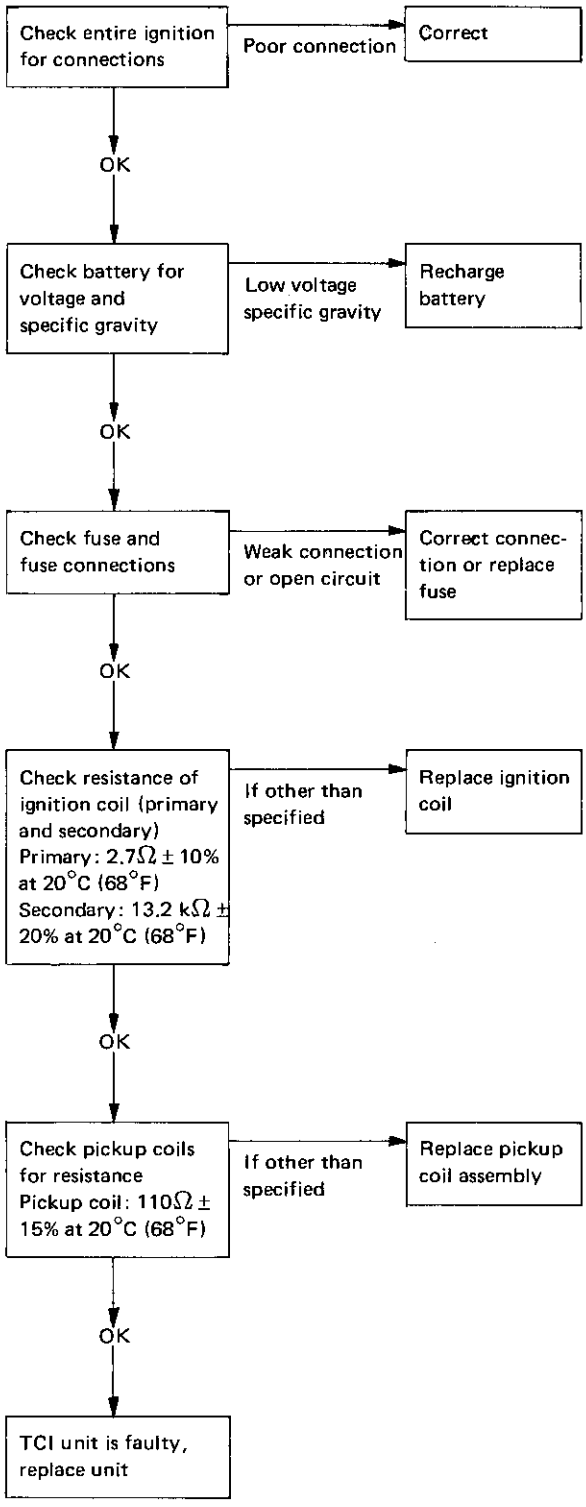

3. Start the engine, and increase the spark gap until misfire occurs. (Test at various r/min between idle and red line.)

| Minimum spark gap: 6 mm (0.24 in) |
|---|

**CAUTION:**

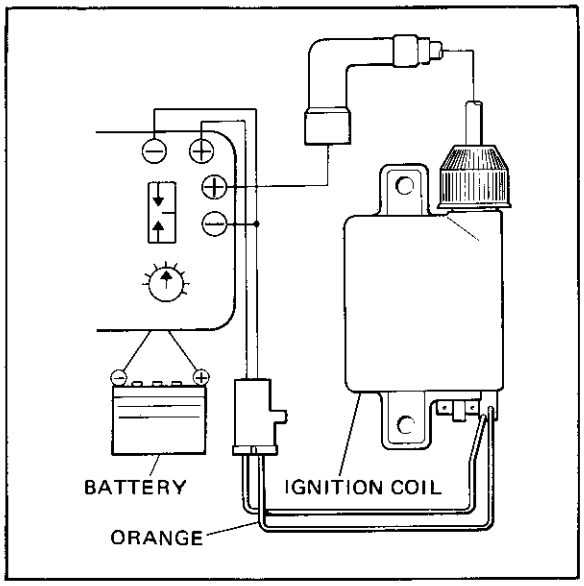
**Do not run the engine in neutral above 6,000 r/min for more than 1 or 2 seconds.**

If the ignition system becomes inoperative or if the engine misfires at the minimum spark gap or at a smaller gap, there is a problem in the ignition system. Follow the troubleshooting chart until the source of the problem is located.



Ignition spark gap test

1. Remove the sidecovers and fuel tank, and disconnect the ignition coil leads from the wiring harness and from the spark plugs.
2. Connect the Electro Tester as shown.

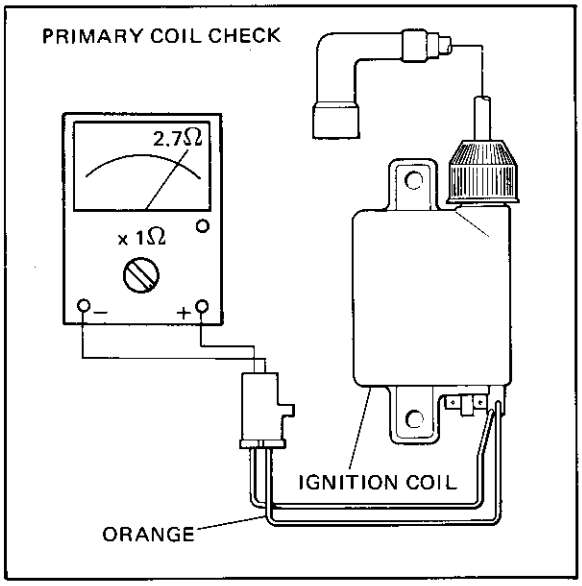


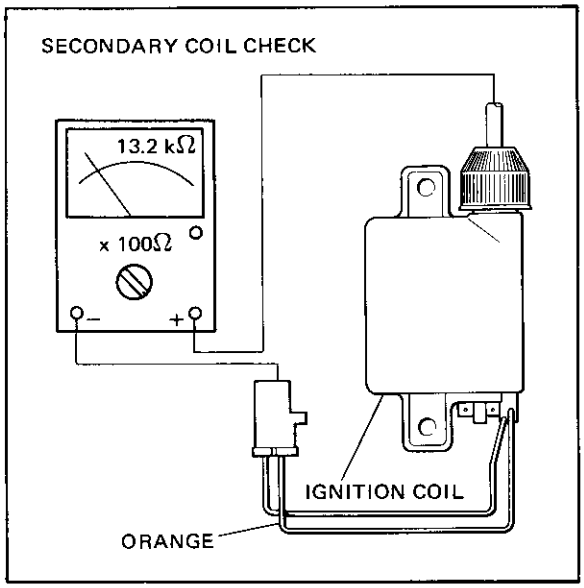

3. Connect a fully charged battery to the tester.
4. Turn on the spark gap switch, and increase the gap to maximum unless misfire occurs first.

| Minimum spark gap: 6 mm (0.24 in) |
|---|

Direct current resistance test.
Use the pocket tester to determine resistance and continuity of primary and secondary coil windings.

| Standard value: |
|---|
| Primary coil resistance: |
| 2.7Ω ± 10% at 20°C (68°F) |
| Secondary coil resistance: |
| 13.2 kΩ ± 20% at 20°C (68°F) |
| Spark plug cap resistance: |
| 10 kΩ ± 10% |




Pickup coil inspection

1. Remove the left sidecover.
2. Disconnect the pickup coil connector from the wire harness.

3. Check the resistance of the pickup coil windings with the pocket tester. If the resistance is not within specification, replace the pickup coil assembly.




Pickup coil resistance:
110Ω ± 10% at 20°C (68°F)
(O-B), (O-Gy), (O-W/G), (O-W/R)

Spark plug

The life of a spark plug and its coloring vary according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with new ones of the specified type. It is actually economical to install new plugs often since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

1. Inspect and clean the spark plug every 4,000 km (2,500 mi), and replace after initial 12,000 km (7,500 mi).
2. Clean the electrodes of carbon, and adjust the electrode gap to the specification. Be sure to use replacement plug(s) of the proper type, reach, and electrode gap to avoid overheating, fouling or piston damage.

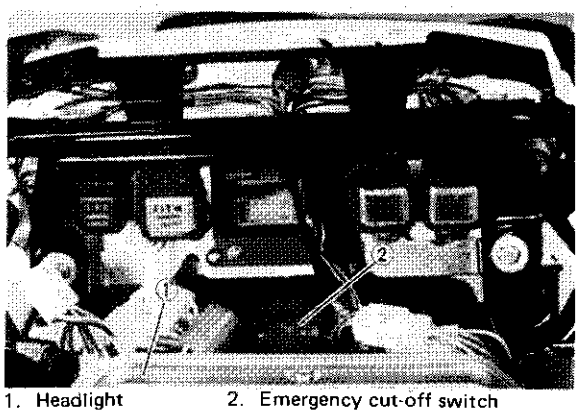
Type:
DPR8EA-9 (NGK) or
X24EPR-U9 (ND)
Electrode gap:
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Tightening torque:
17.5 Nm (1.75 m·kg, 12.5 ft·lb)

## EMERGENCY CUT-OFF SWITCH

The emergency cut-off switch is a mechanical switch and mounted behind the headlight. This switch will cut-off the ignition system if for any reason the motorcycle reaches a lean angle of 60 degrees or more from vertical.

### Removal

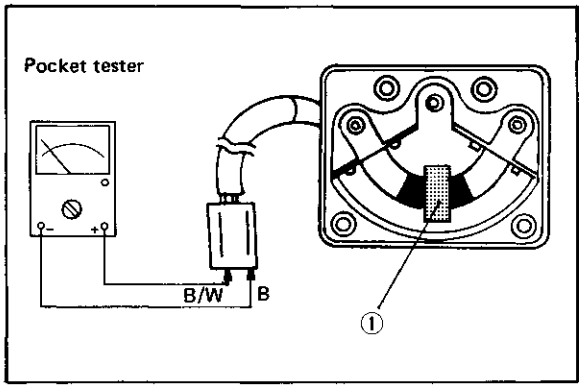
1. Remove the required fairing.
2. Disconnect the lead wires from the wire harness and pull out the switch assembly from its rubber mounting.




1. Headlight 2. Emergency cut-off switch

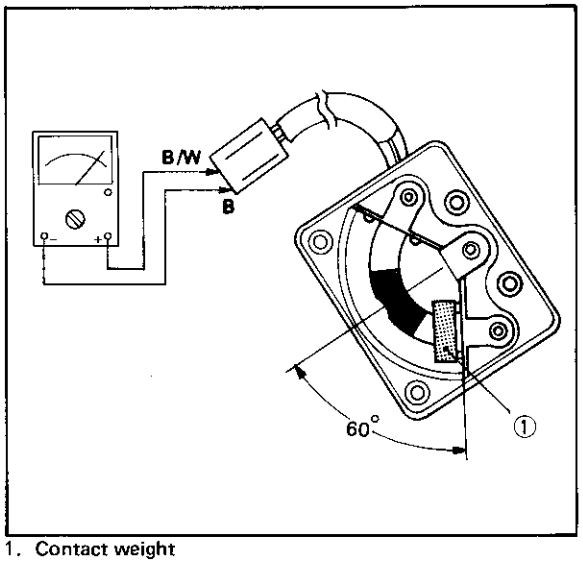
### Inspection

1. Connect the pocket tester leads as shown.
2. The tester (with ohms x 100 scale) needle should show infinity (∞) when the switch is positioned vertically as shown. Replace the switch if it shows 0Ω.




1. Contact weight

3. The tester (with ohms x 100 scale) needle should swing to 0Ω when the switch is leaned about 60 degrees or more to either left or right from the vertical position.
   Replace the switch if it shows infinite resistance (∞).

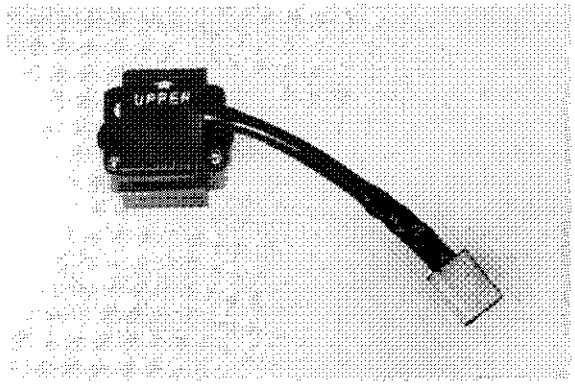



1. Contact weight

### Installation

**CAUTION:**

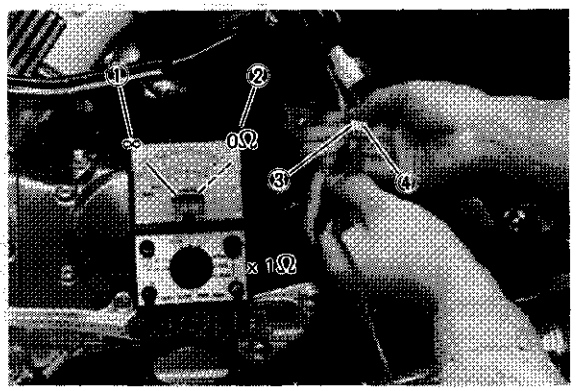
**Install the switch with the arrow pointing up, or the switch will not operate correctly.**




## SIDESTAND SWITCH

### Inspection

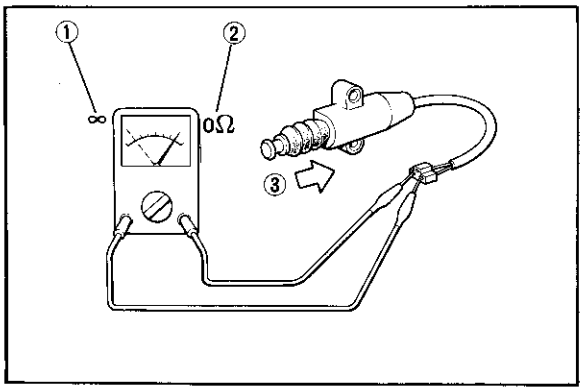
1. Remove the required fairing.
2. Disconnect the connector from the wiring harness.
3. Connect the pocket tester leads as shown, and set the tester selector to ohm x 1. When the sidestand is up, the tester should read zero ohms. When the sidestand is down, the tester should read infinity.




1. Sidestand is down
2. Sidestand is up
3. Green/Blue
4. Blue/Yellow

| SIDESTAND | SWITCH | L/Y | G/L | B |
|---|---|---|---|---|
| UP | ON (Free) | ○ | ○ | ○ |
| DOWN | OFF (Pushed-in) | | | |

Also you can remove the switch and check it as a unit.

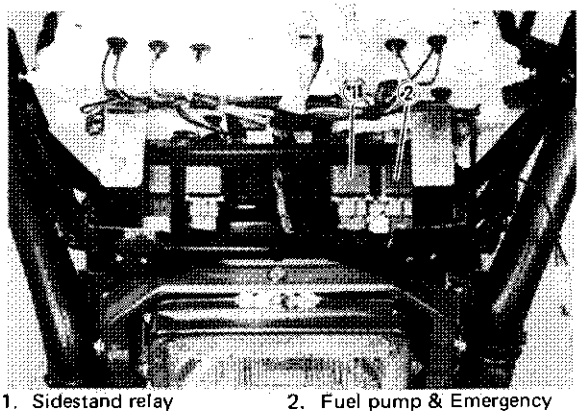



1. OFF (Pushed-in)
2. ON (Free)
3. Sidestand switch

## SIDESTAND RELAY AND FUEL PUMP/ EMERGENCY CUT-OFF RELAY

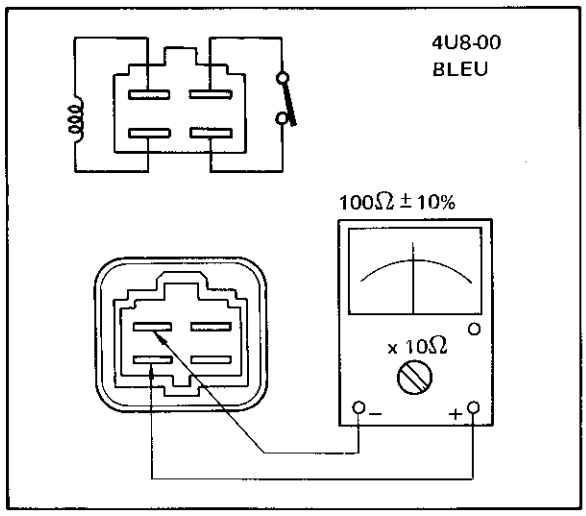
### Inspection

1. Remove the required fairing.
2. Disconnect the connector and remove the sidestand relay and or the fuel pump/emergency cut-off relay.

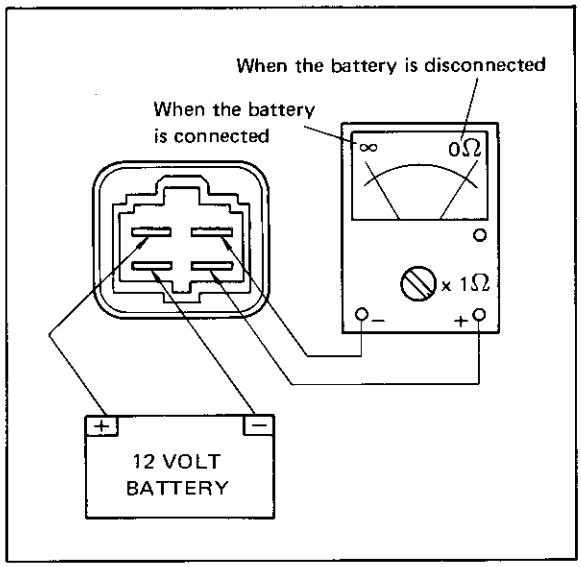



1. Sidestand relay
2. Fuel pump & Emergency cut-off relay

3. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay(s).

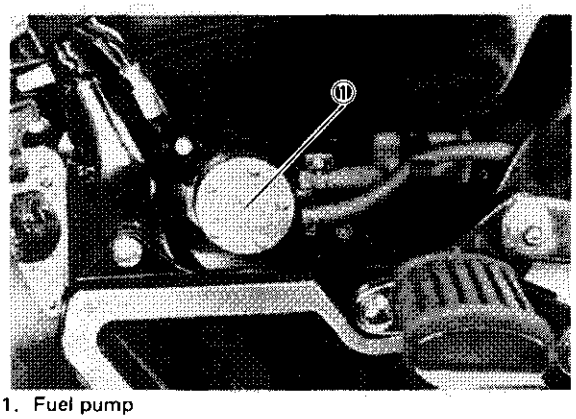



4. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay(s).

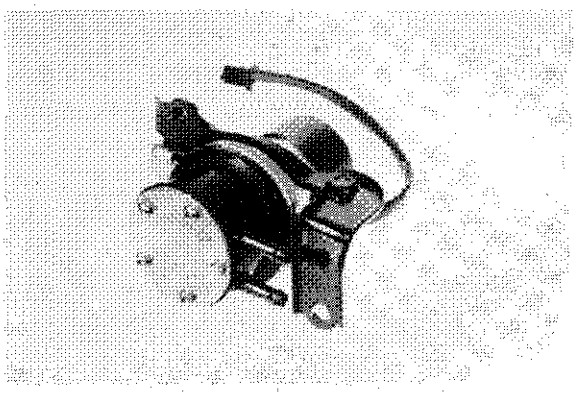


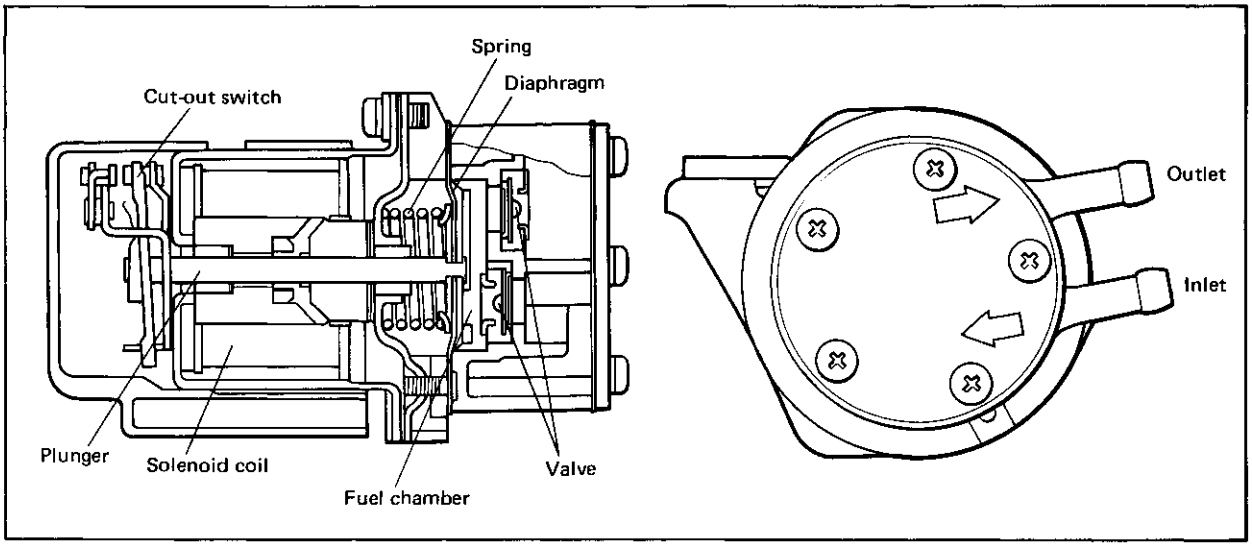
## FUEL PUMP

The fuel pump is located in front of the rear footrest (left).

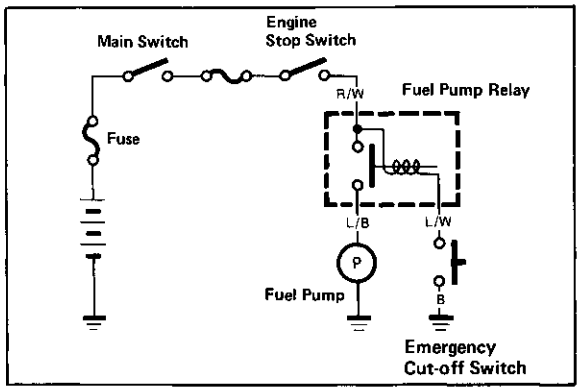



1. Fuel pump






### Block diagram



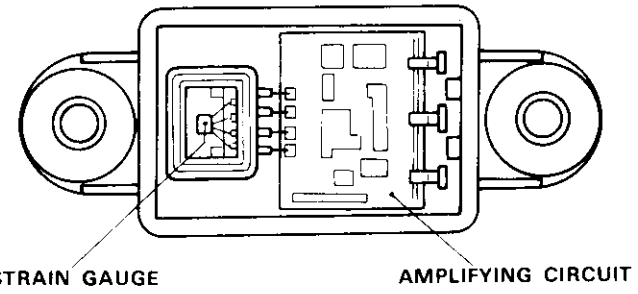

### Operation

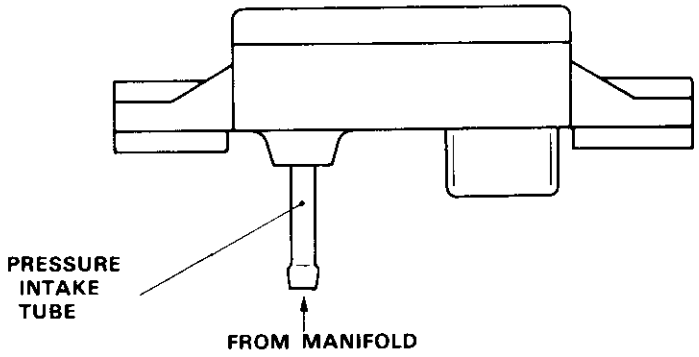
The diaphragm is pulled left by the plunger allowing fuel to be sucked into the fuel chamber. Fuel is pushed out from the pump until carb float chamber is filled with fuel, and then the cut-off switch cuts off the circuit.

When the spring pushes the diaphragm further to the end, the cut-off switch turns on and the solenoid coil pulls the plunger with the diaphragm forcing fuel into the fuel chamber.

## PRESSURE SENSOR

This pressure sensor unit consists of a semiconductor strain gauge and an amplifying circuit. Pressure to the carb manifold (venturi portion) is sensed by the strain gauge and amplified in the circuit connected with this gauge. The amplified pressure signals are then transmitted to the ignition system for the control of ignition timing advance.

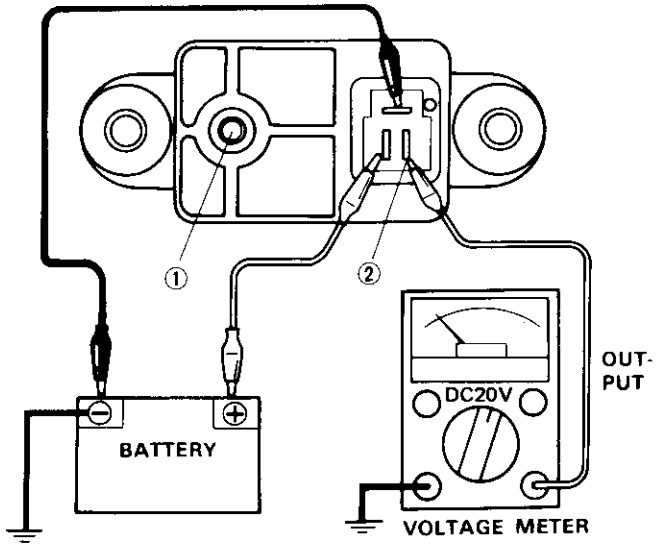


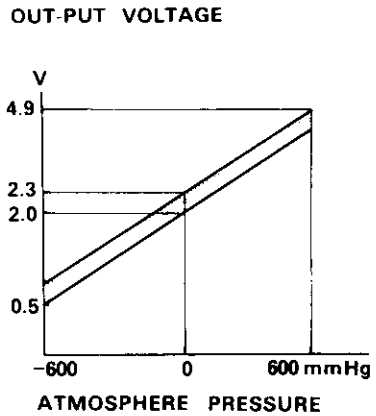




### Inspection (off-frame)

Open the pressure intake tube ① to the atmosphere, and check the voltage between the output terminal ② and the ground. See the following picture.

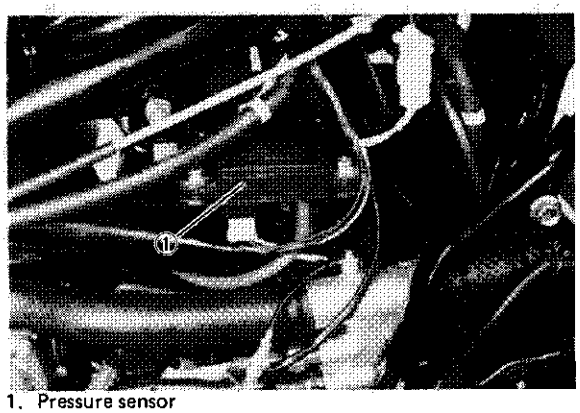
Output voltage: About 2.0 DC. volt



**Inspection (on-frame)**

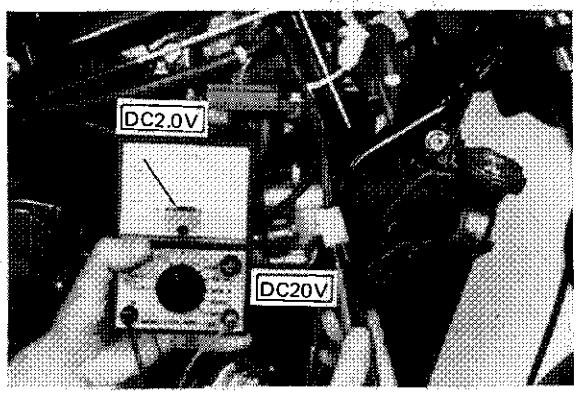
1. Remove the required fairing.




1. Pressure sensor

2. Disconnect the pressure sensor connecter and connect a Yamaha Pocket Tester.

   ⊕ lead – Black/Red
   ⊖ lead – Black/Yellow

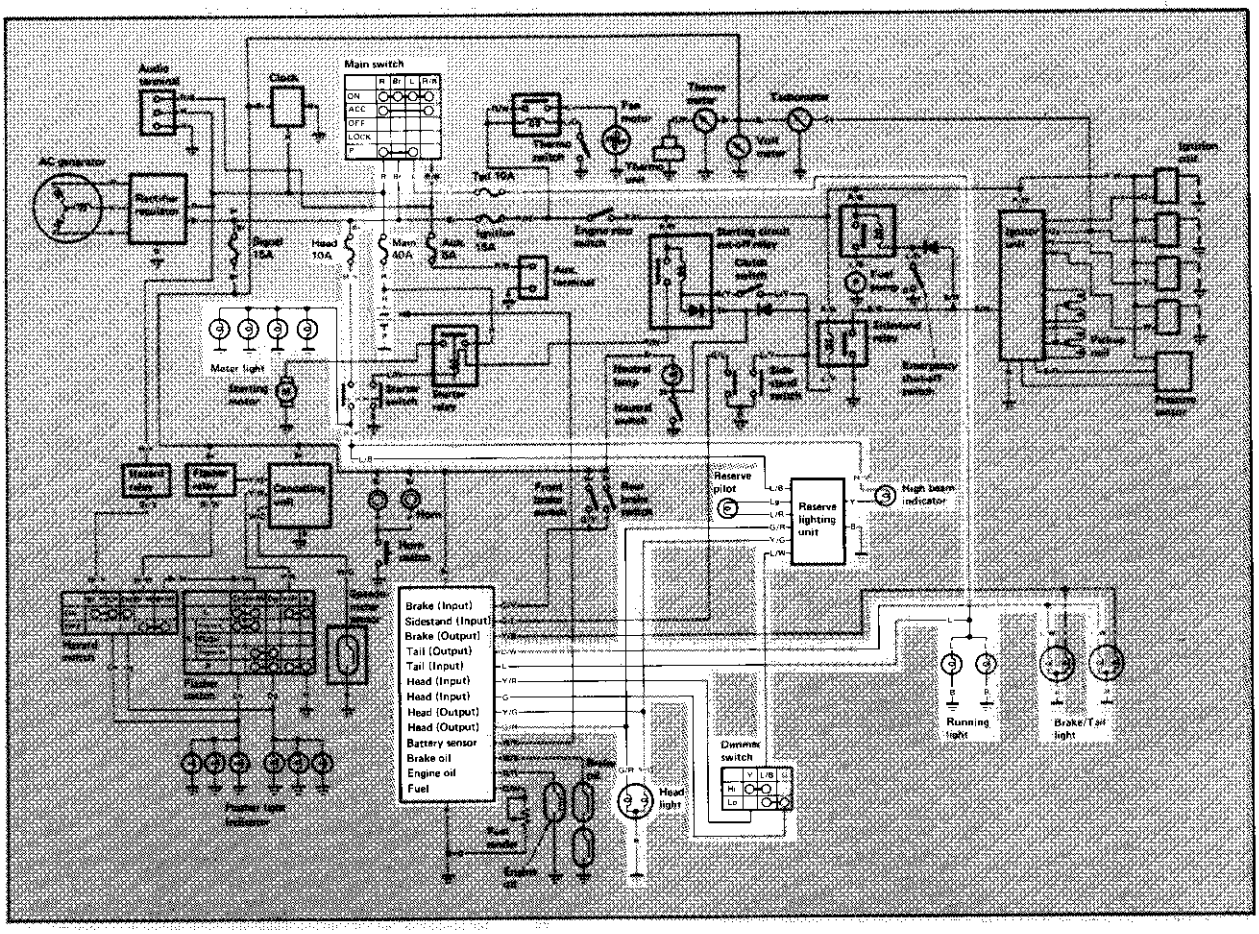



3. Turn the main switch key to ON; or connect the battery + lead to R/W and – lead to ground.
4. Read the tester. If the tester reading is not in the vicinity of the specified range, replace the pressure switch.

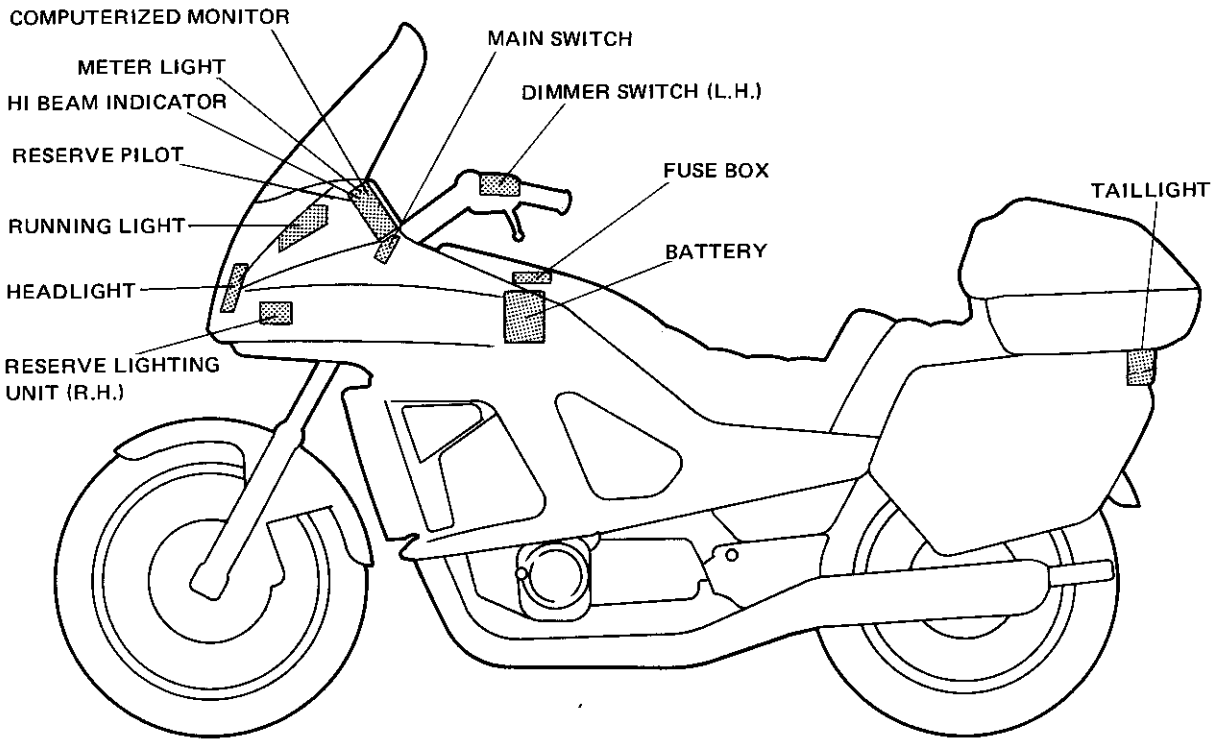
| Specified range: About 2.0 DC. volt |
|---|

# LIGHTING SYSTEM

## Circuit Diagram




**Above circuit diagram shows only lighting circuit in wiring diagram.**



**Headlight Beam Adjustment**

Horizontal adjustment

To adjust the beam to the left, turn the adjusting screw counterclockwise.

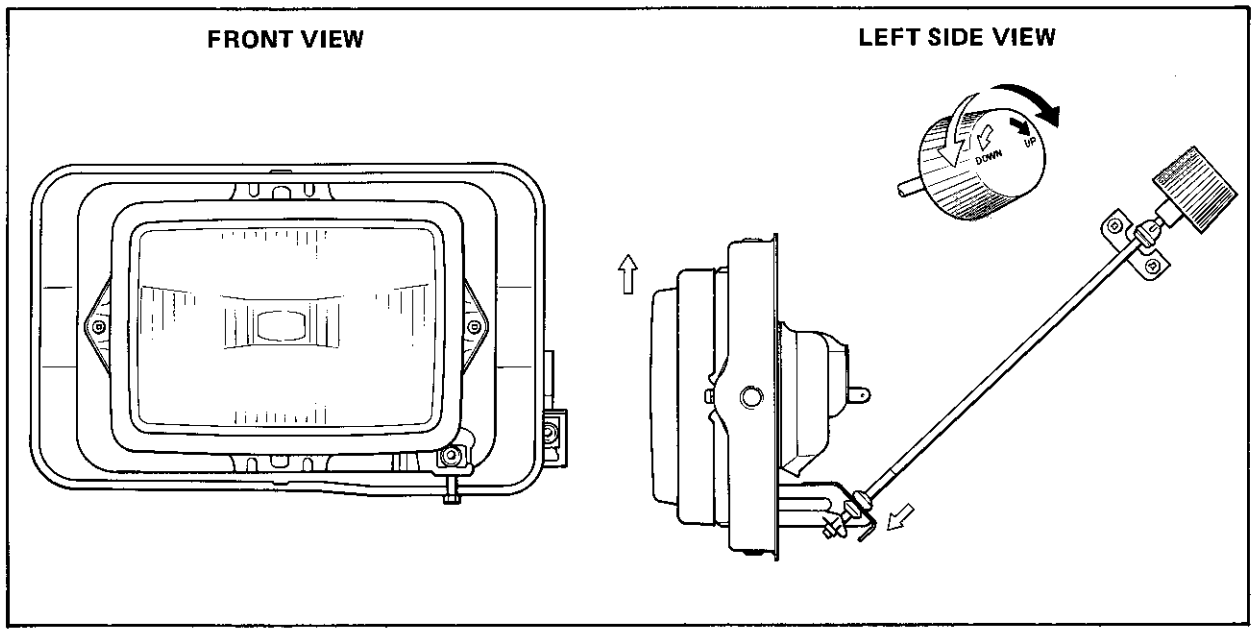
To adjust the beam to the right, turn the screw clockwise.

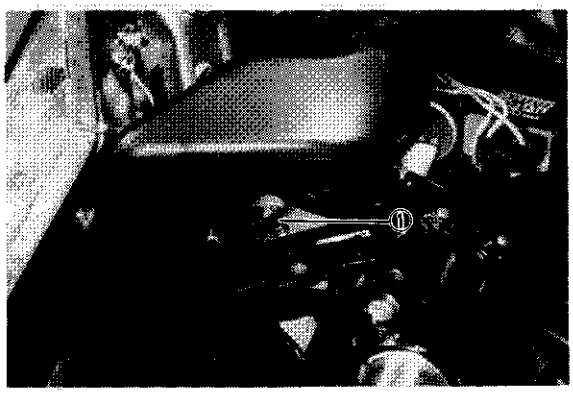
Vertical adjustment

To adjust the beam to the upper, turn the adjusting knob clockwise.

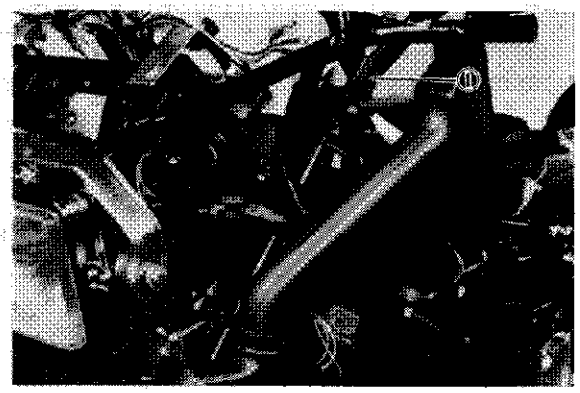
HORIZONTAL ADJUSTMENT

VERTICAL ADJUSTMENT



1. Horizontal adjusting screw



1. Vertical adjusting knob

**Lighting Tests and Checks**

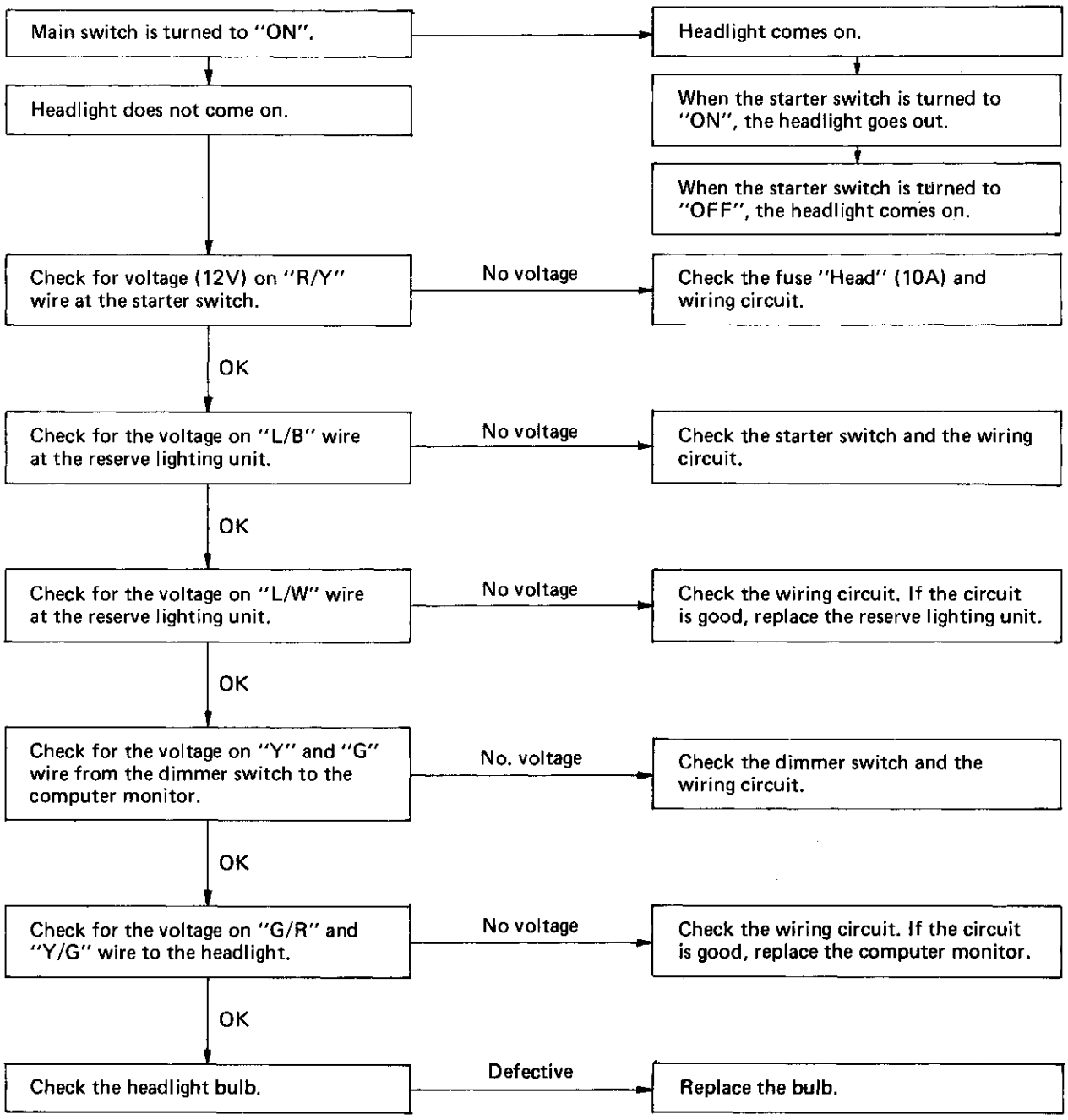
The battery provides power for operation of the headlight, taillight, and meter lights. If none of the above operates, always check battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery fluid level, or a defective charging system.

Also check fuse condition. Replace any "open" fuses. There are individual fuses for various circuits (see complete Circuit Diagram).

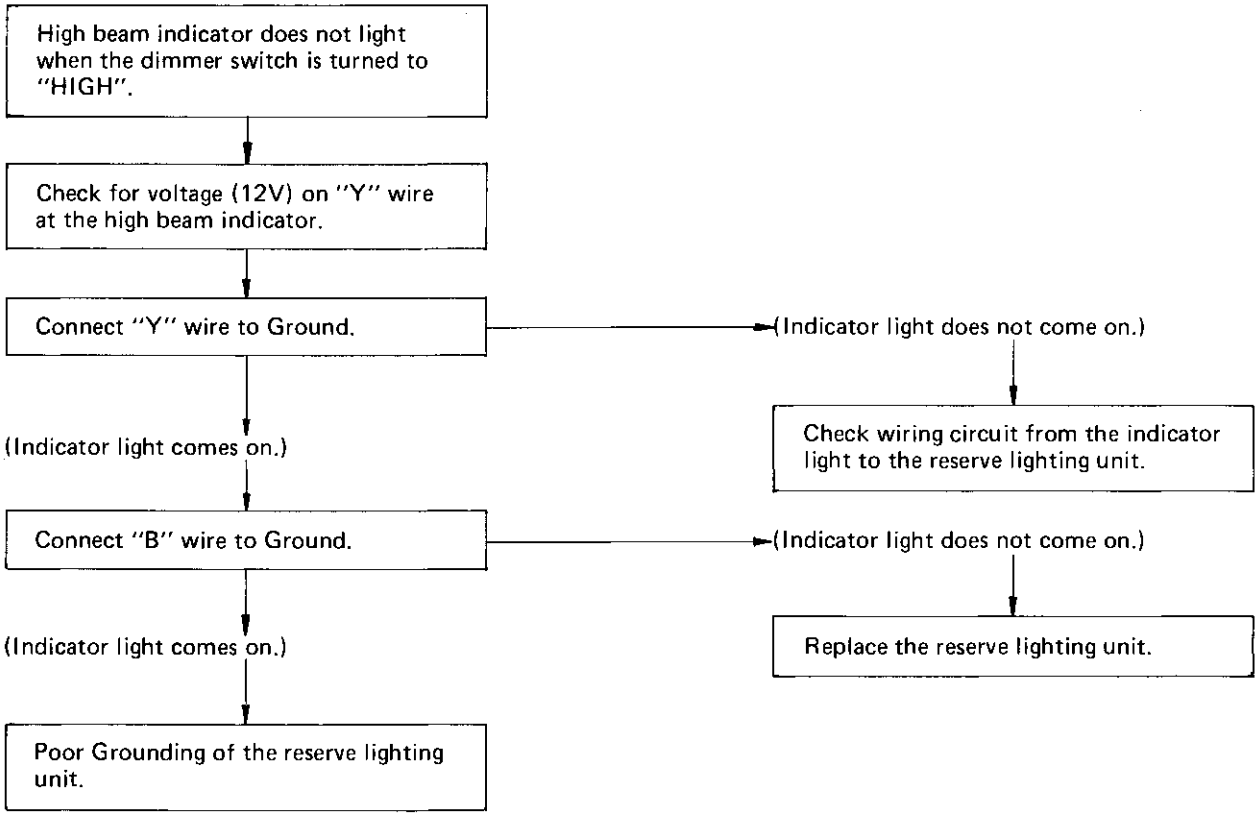
**NOTE:**

Check each bulb first before performing the following check.

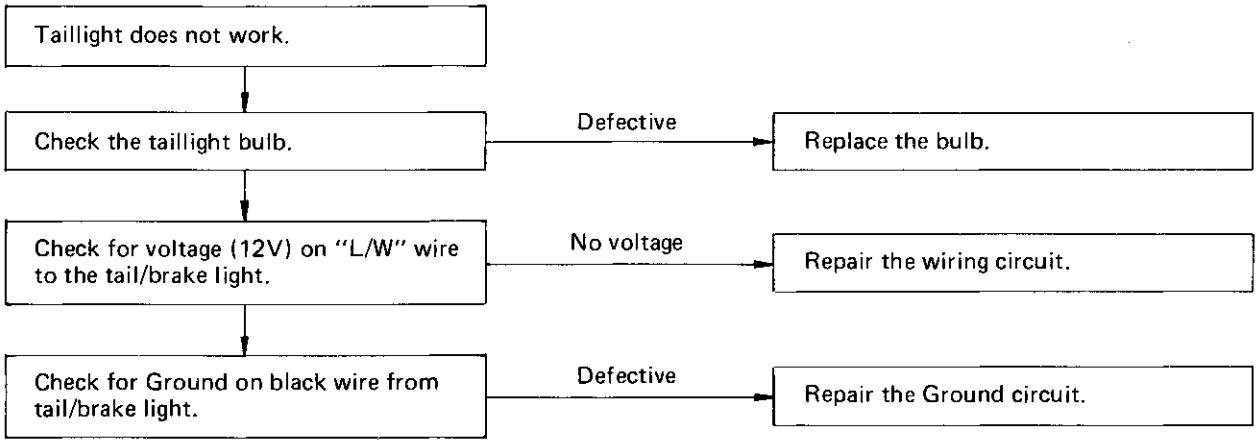
Headlight check



## Highbeam indicator check

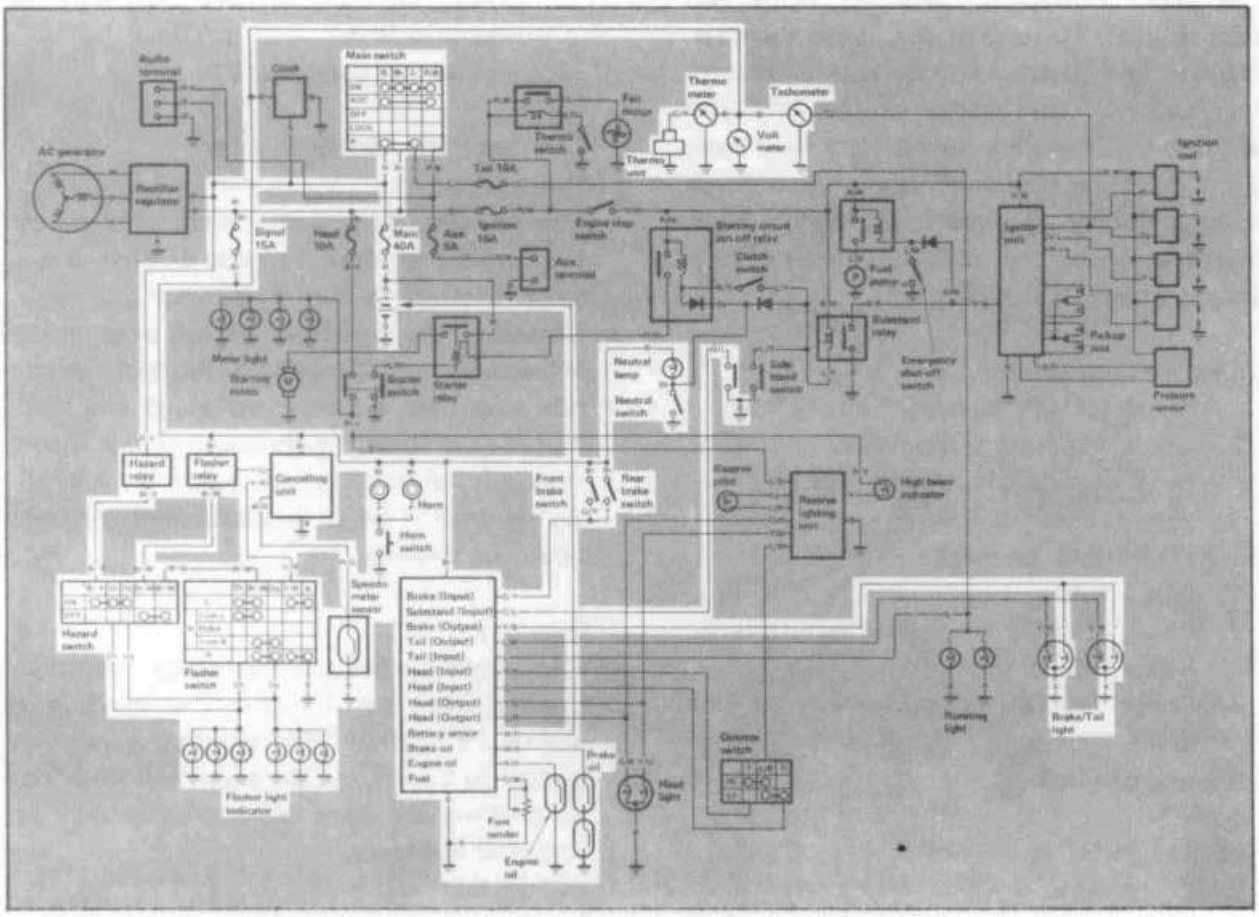



## Taillight check

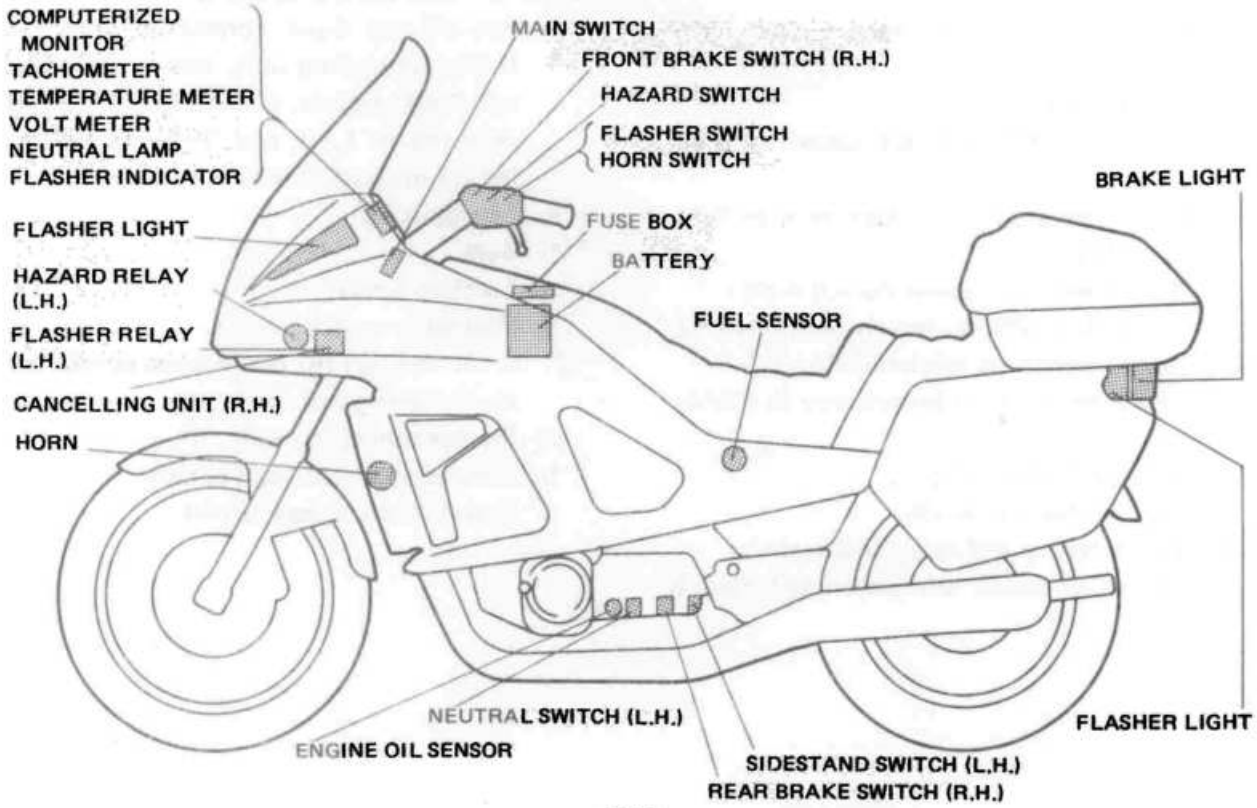


# SIGNAL SYSTEM

## Circuit Diagram



**Above circuit diagram shows only signal circuit in wiring diagram.**



**Signal System Tests and Checks**

The battery provides power for operation of the horn, brakelight, indicator lights and falsher light. If none of the above operates, always check battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery fluid level, or a defective charging system. Also check fuse condition. Replace any "open" fuses. There are individual fuses for various circuits (see complete Circuit Diagram).

Horn does not work:

1. Check for 12V on brown wire to horn.
2. Check for good grounding of horn (pink wire) when horn button is pressed

Brake light does not work:

1. Check bulb.
2. Check for 12V on yellow wire to brake light.
3. Check for 12V on brown wire to each brake light switch (front brake and rear brake switches).

Flasher light(s) do not work:

1. Check bulb.
2. Right circuit:
   a. Check for 12V on dark green wire to light.
   b. Check for ground on black wire to light assembly.
3. Left circuit:
   a. Check for 12V on dark brown wire to light.
   b. Check for ground on black wire to light assembly.
4. Reight and left circuits do not work:
   a. Check for 12V on brown/white wire to flasher switch on left handlebar.
   b. Check for 12V on brown wire to flasher relay.
   c. Replace flasher relay.
   d. Replace flasher switch.
5. Check flasher self-cancelling system. (Refer to flasher self-cancelling system.)

Neutral light does not work:

1. Check bulb.
2. Check for 12V on sky blue wire to neutral switch.
3. Replace neutral switch.

**Self-cancelling Flasher System**

Description:

The self-cancelling flasher system turns off the turn signal after a period of time or distance involved in turning or changing lanes. Generally, the signal will cancel after either 10 seconds, or 150 meters (490 feet), whichever is greater. At very low speed, the function is determined by distance; at high speed, especially when changing speeds the cancelling determination is a combination of both times and distance.

Operation:

The handlebar switch has three positions: L (left), OFF, and R (right). The switch lever will return to the "OFF" position after being pushed to L or R, but the signal will function. By pushing the lever in, the signal may be cancelled manually.

Inspection:

If the flasher self-cancelling system should become inoperative, proceed as follows:

1. Pull off the 6-pin connector from the flasher cancelling unit, and operate the handlebar switch, if the signal operates normally in L, R, and OFF, the following are in good condition.
   a. Flasher relay
   b. Bulb
   c. Lighting circuit
   d. Handlebar switch circuit
2. If (a) through (d) are in good condition, the following may be faulty:
   a. Flasher cancelling unit.
   b. Handlebar switch reset circuit.
   c. Speedometer sensor circuit.

3. Pull of the 6-pin connector from the flasher cancelling unit, and connect a tester (ohms x 100 range) across the white/green and the black lead wires on the wire harness side. Turn the speedometer shaft. If the tester needle swing back and forth between 0 and ∞, the speedometer sensor circuit is in good condition. If not, the sensor to wire harness may be inoperative.
4. Pull the 6-pin connector from the flasher cancelling unit. Check if there is continuity between the yellow/red lead wire on the wire harness side and the chassis.

| |
|---|
| Flasher switch OFF: ∞<br>Flasher switch L or R: 0 ohms |

If the tester needle does not swing as indicated above, check the handlebar switch circuit and wire harness.

5. If no defect is found with the above three check-ups and the flasher cancelling system is still inoperative, replace the flasher cancelling unit.
6. If the signal flashes only when the handlebar switch lever is turned to L or R and it turns off immediately when the handlebar switch lever returns to center, replace the flasher cancelling unit.

**Switches**

Switches may be checked for continuity with a pocket tester on the "ohm x 1" position.

1. Main switch

| Switch Position | Wire Color | | | |
|---|---|---|---|---|
| | R | Br | L | R/B |
| ON | ○—— | ○—— | ○—— | ○ |
| OFF | | | | |
| LOCK | | | | |
| P (parking) | ○—— | | ○ | |
| ACC | ○—— | | | ○ |

2. "ENGINE STOP" Switch

| Switch Position | Wire Color | |
|---|---|---|
| | R/W | R/W |
| OFF | | |
| Run | ○—— | ○ |

3. "START" switch

| Button Position | Wire Color | | | |
|---|---|---|---|---|
| | R/Y | L/B | L/W | B |
| OFF | ○—— | ○ | | |
| PUSH | | | ○—— | ○ |

4. "LIGHTS" (Dimmer) switch

| Switch Position | Wire Color | | |
|---|---|---|---|
| | Y | L/B | G |
| HI | ○—— | ○ | |
| LO | | ○—— | ○ |

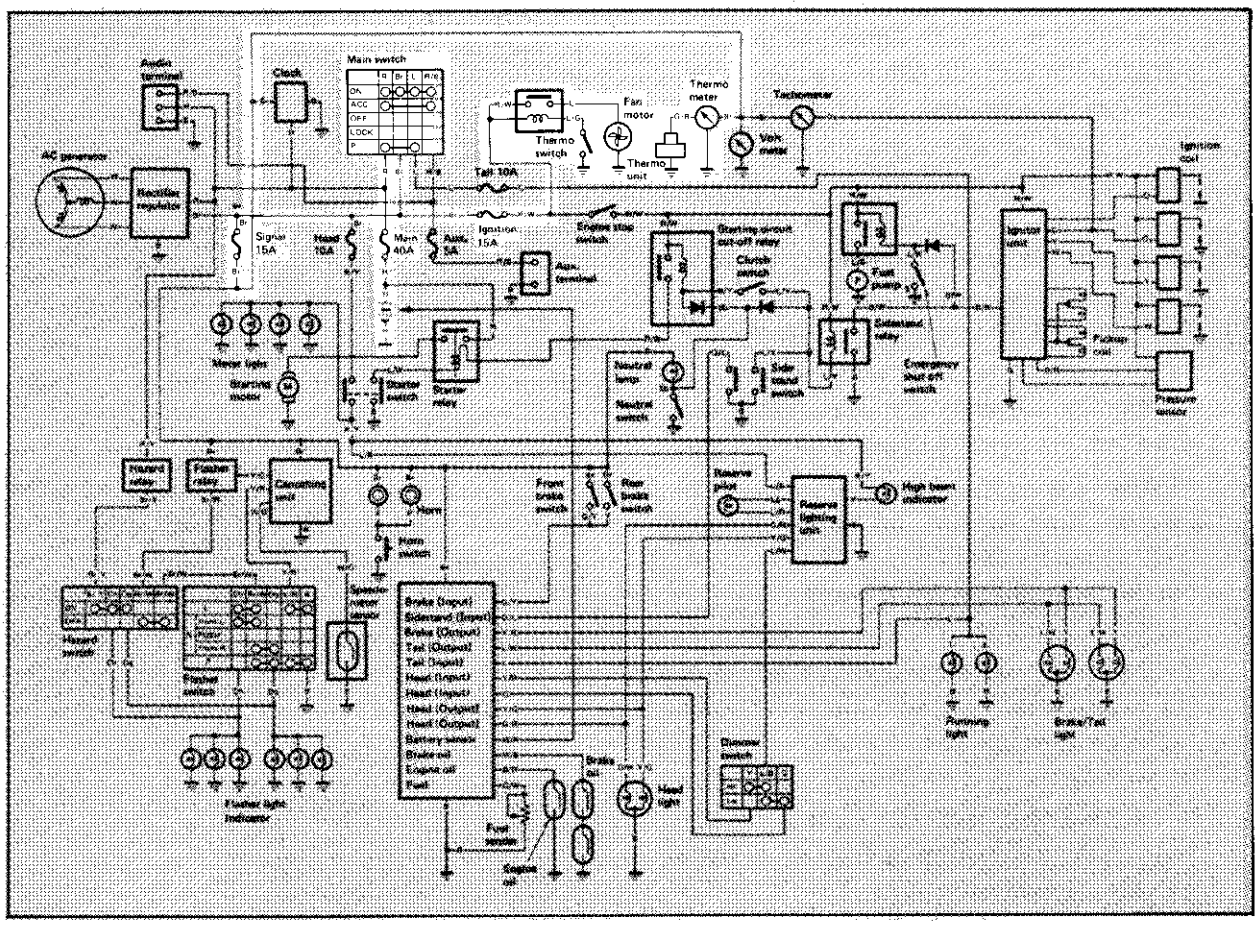
5. "TURN" switch

| Switch Position | Wire Color | | | | |
|---|---|---|---|---|---|
| | Ch | Br/W | Dg | Y/R | B |
| L | ○—— | ○ | | ○—— | ○ |
| L→N | ○—— | ○ | | | |
| N→Push | | | | | |
| R→N | | ○—— | ○ | | |
| R | | ○—— | ○ | ○—— | ○ |

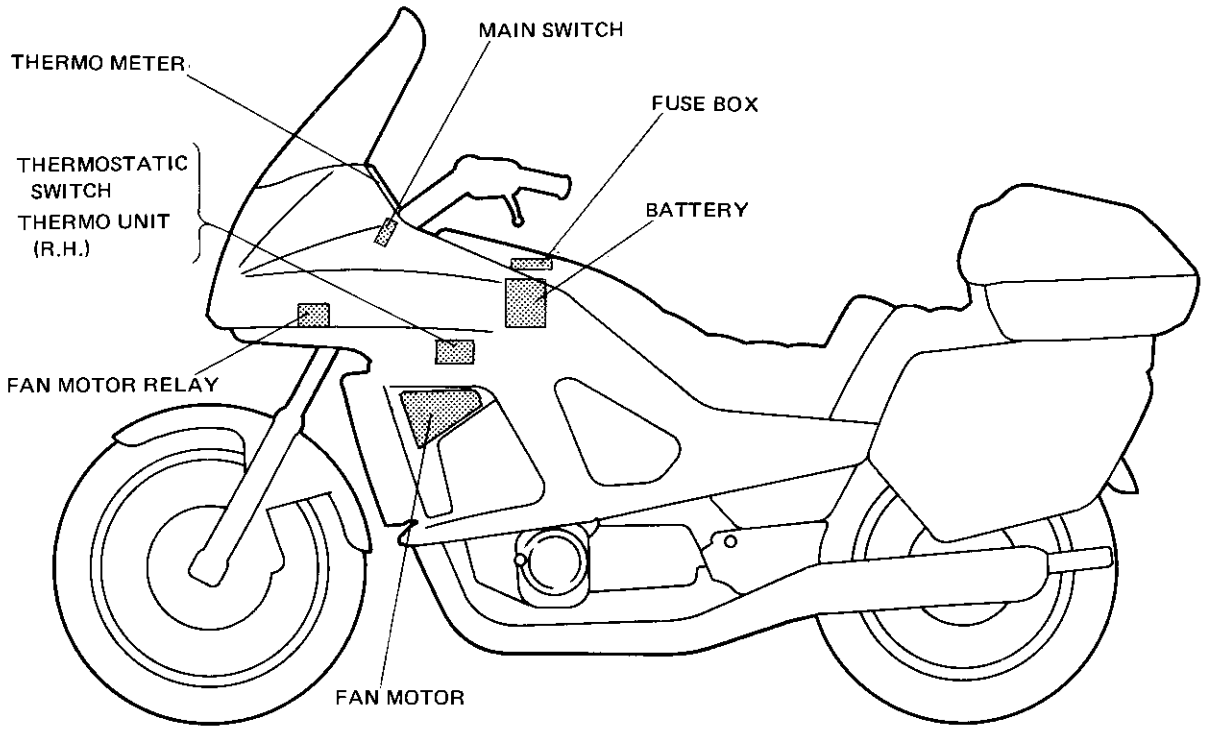
6. "HORN" Switch

| Button Position | Wire Color | |
|---|---|---|
| | P | B |
| PUSH | ○—— | ○ |
| OFF | | |

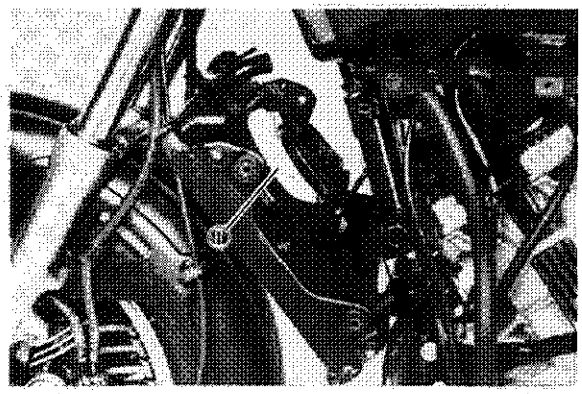
## COOLING SYSTEM




**This circuit diagram shows only the cooling circuit in the wiring diagram.**



## ELECTRIC FAN AND THERMOSTATIC SWITCH



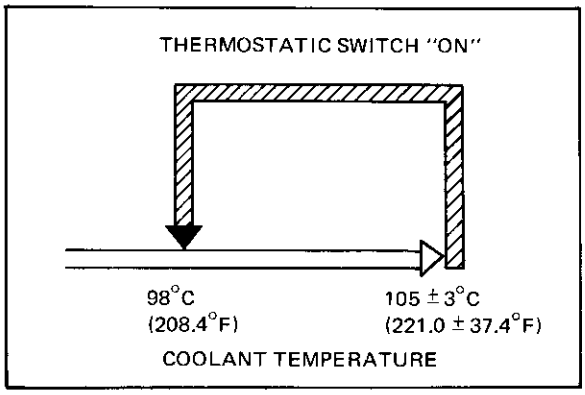
1. Electric fan

### Operation

The electric fan will be switched ON or OFF according to the coolant temperature in the radiator.

**NOTE:**

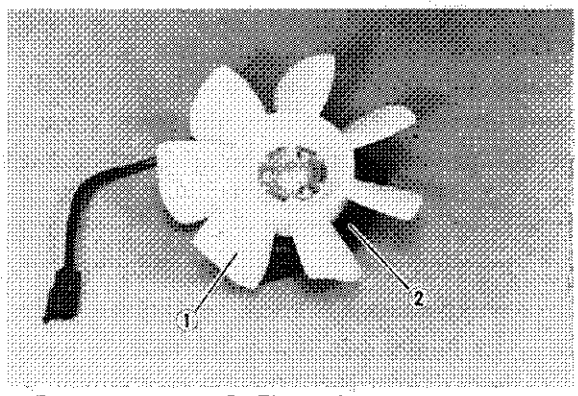
The electric fan is controlled by the thermostatic switch while the main switch "ON". Thus, under certain operating conditions, this fan may continue to run until the engine temperature has cooled down to about 91°C (195.8°F).




### Electric Fan Inspection

Check the following points and repair or replace as necessary:

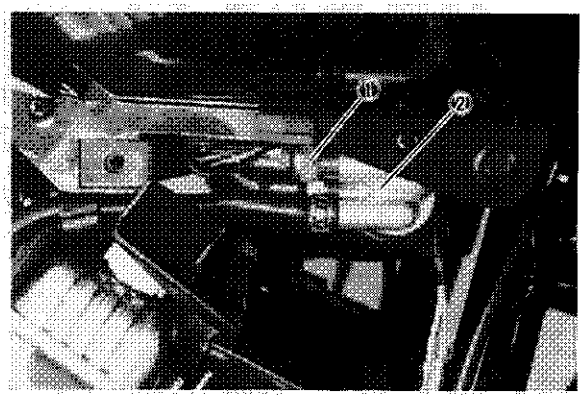
- Smooth operation of the fan motor
- Excessive vibration of the fan motor
- Cracks in the fan motor bracket
- Cracks in fan blades
- Loose bolts securing the fan motor bracket and radiator mounting bolts



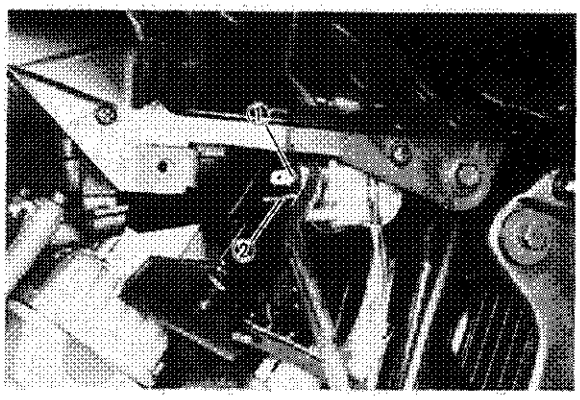
1. Fan 2. Electric fan motor

### Thermostatic Switch Inspection

1. Remove the thermostatic switch from the T-joint.



1. Thermostatic switch 2. T-joint



1. Thermostatic switch 2. Thermo-unit

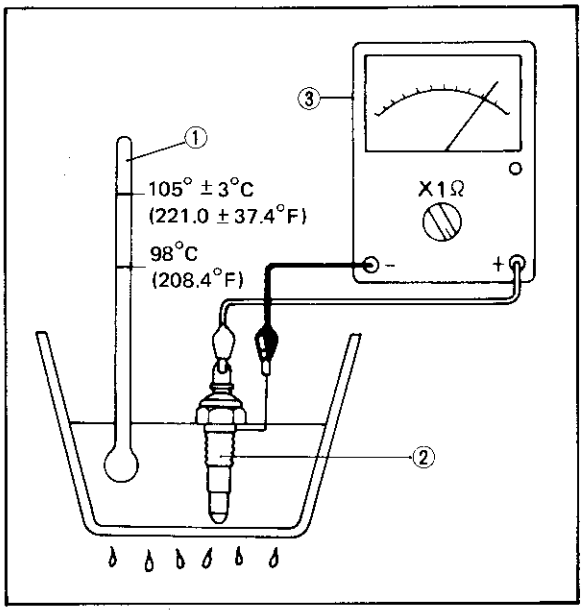
**WARNING:**

**Handle the thermostatic valve very carefully. Never subject it to strong shock or allow it to be droped. Should it be dropped, it must be replaced.**

2. Immerse the thermostatic switch in the water as shown. While heating the water, check the continuity at each temperature. If the thermostatic switch will not operate as shown in the table below, the switch is faulty and should be replaced.

| Test step | Water temperature | Pocket tester (Ω x 1) |
|---|---|---|
| 1 | 0 ~ 98°C (32 ~ 208.4°F) | Discontinuity |
| 2 | more than 105 ± 3°C (more than 221.0 ± 37.4°F) | Continuity |
| 3* | 105 to 98°C (221 to 208.4°F) | Continuity |
| 4* | less than 208.4°C (less than 208.4°F) | Discontinuity |

Test 1 & 2; Heat-up tests
Test 3* & 4*; Cool-down tests



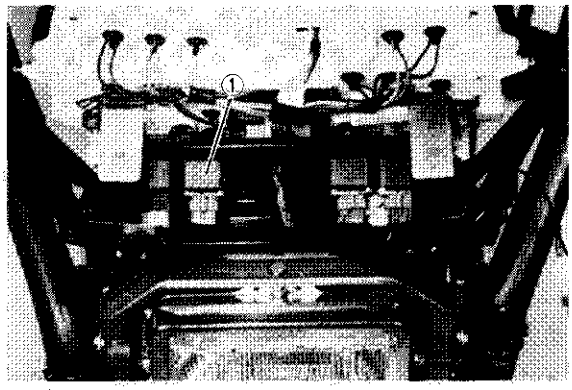

1. Temperature gauge
2. Thermostatic switch
3. Pocket tester

3. Apply the screw sealing agent (THREE BOND SEALOCK #10) and install the thermostatic switch.
4. Torque the switch to specification.

Tightening torque:
15 Nm (1.5 m·kg, 11 ft·lb)

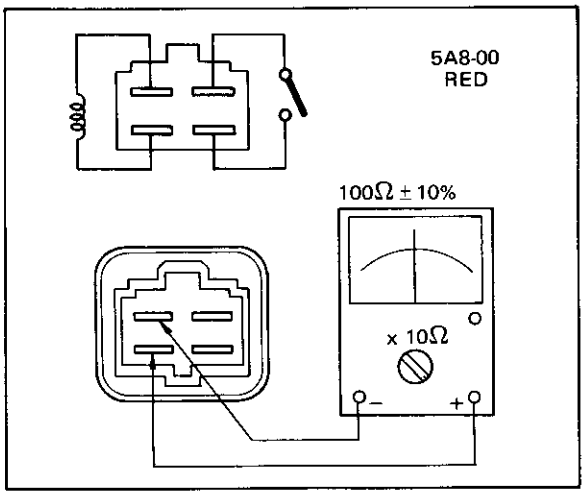
**Fan Motor Relay Inspection**

1. Remove the required fairing.
2. Disconnect the connector.
3. Remove the fan motor relay.

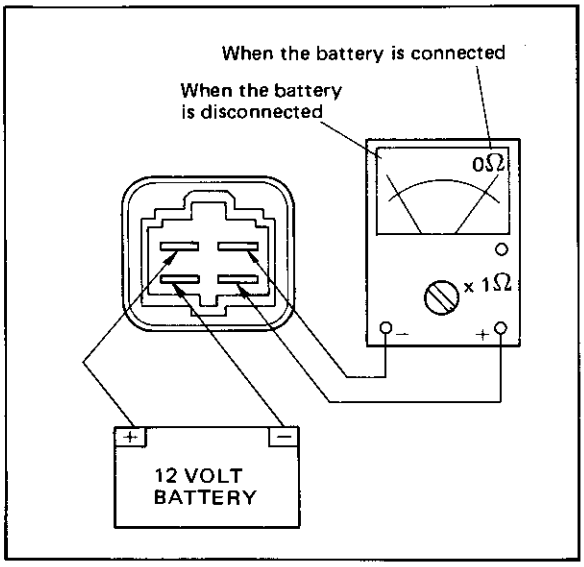



1. Fan motor relay

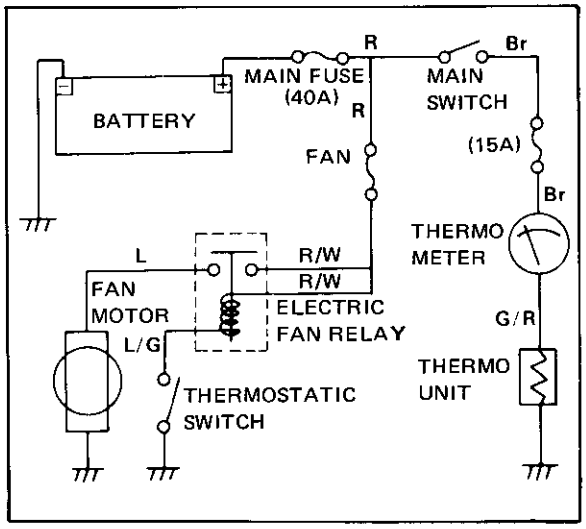
4. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.



5. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.

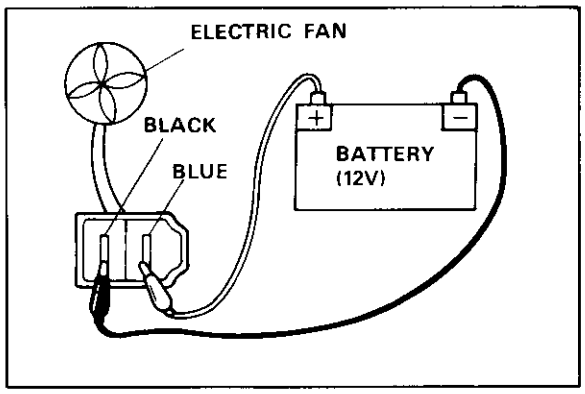



**Troubleshooting**




If the electric fan will not turn at coolant temperatures of 105 ± 3°C (221.0 ± 37.4 °F) or more:

1. Check the wire connections. Repair if necessary.
2. Disconnect the electric fan connector, and connect the battery (12V) to the electric fan connector as shown.

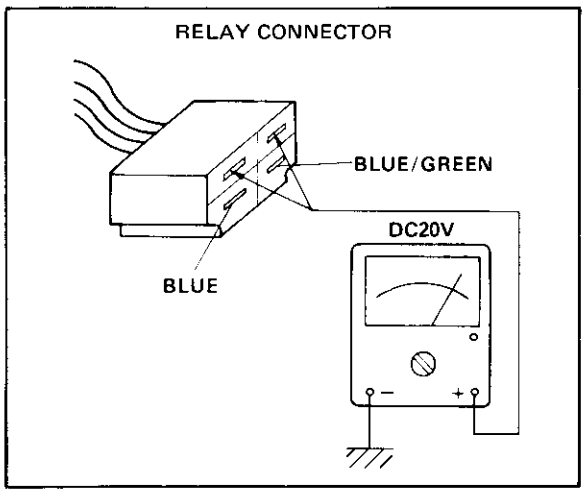


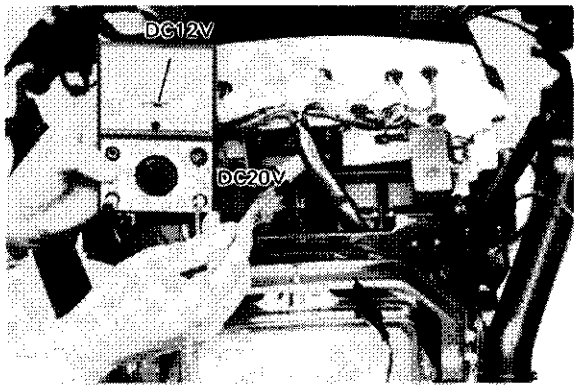

3. If the electric fan operates, it is in good condition; if it does not, replace the electric fan motor assembly.

**NOTE:**

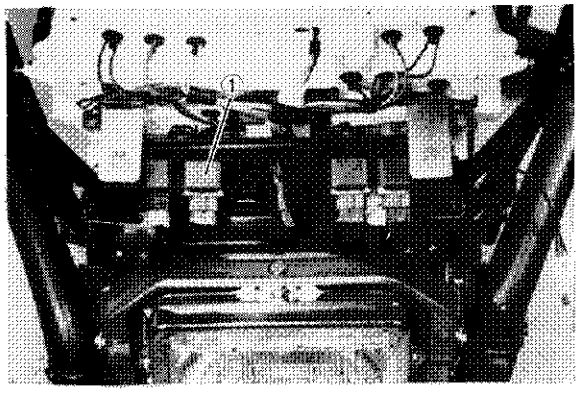
If the electric fan is in good condition, but it does not turn when the coolant temperature rises:

- Disconnect the fan motor relay connector, turn on the main switch, and check the voltage (12V) of the red leads as shown below. If no voltage is measure, check the red leads.



- Disconnect the blue/green lead of the thermostatic switch and ground it to the motor body.
  If the electric fan turns, it is in good condition, but the thermostatic switch is probably faulty. Replace it and check that the fan rotates.
- If the fan does not turn with the thermostatic switch lead being grounded to the engine body, check if the fan relay clicks when the relay lead is grounded.
  If not, replace the relay and make a check again before replacing the thermostatic switch.



1. Fan motor relay

- Replace the thermostatic switch with a new one, as necessary, and tighten it to specification.

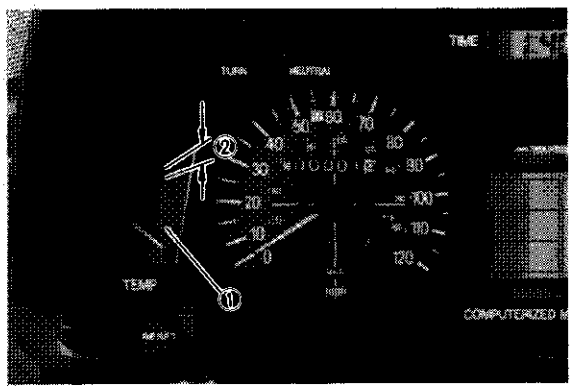
| Tightening torque: |
| --- |
| 15 Nm (1.5 m·kg, 11.0 ft·lb) |

**CAUTION:**

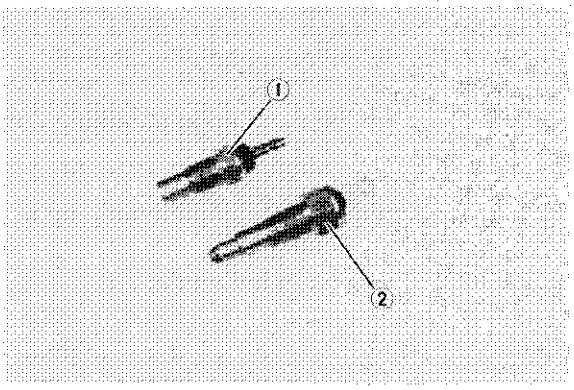
**After replacing the thermostatic switch, check the coolant level in the radiator and also check for any leakage.**

## THERMO-UNIT AND THERMOMETER

### Operation



1. Thermometer
2. Red zone

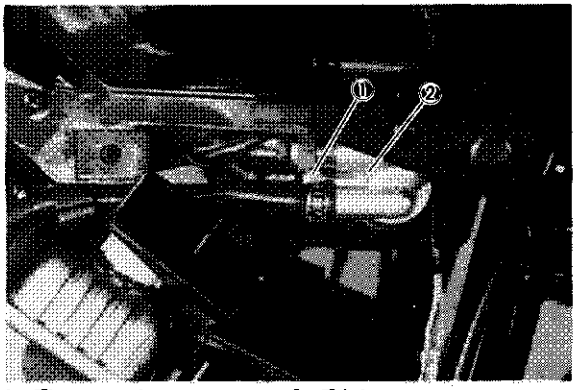


1. Thermo-unit
2. Thermostatic switch

The thermo unit has less resistance at higher temperatures and thus allows more current to pass through. When more current flows to the coil in the thermometer, the armature to which the needle is attached by the increased magnetic field. In this way, the needle indicates the temperature.

### Inspection

1. Remove the termo-unit from the T-joint.



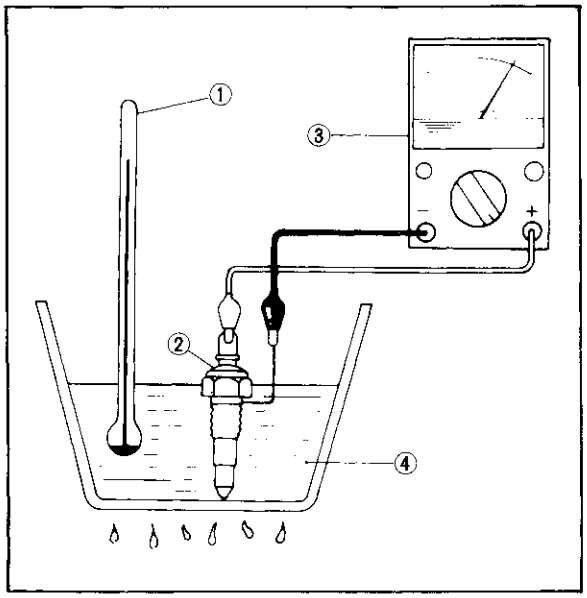
1. Thermo-unit
2. T-joing

2. Immerse the thermo-unit in the water as shown. While heating the water and check the resistance at each temperature as tabulated. If the resistance measured is out of specification, the thermo-unit is faulty. If should be replaced.

**WARNING:**

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

| Water Temperature | 50°C (122°F) | 80°C (176°F) | 100°C (212°F) |
|---|---|---|---|
| Resistance | 153.9Ω | 47.5 ~ 56.8Ω | 26.2 ~ 29.3Ω |



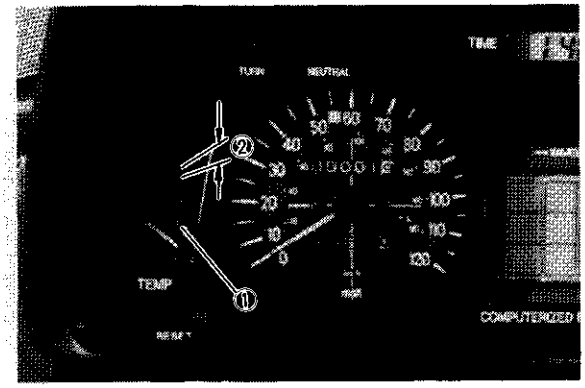

1. Temperature gauge
2. Thermo-unit
3. Pocket tester
4. Water

**Troubleshooting**

1. Turn on the main switch.
2. Disconnect the lead (green/red) of the thermostatic switch and ground it to the engine body. Check if the engine temperature gauge needle swings from 0 to the red zone when the lead is grounded.

**WARNING:**

**When the thermometer needle swings into the red zone, stop grounding of the lead (green/red) immediately.)**




1. Thermometor
2. Redzone

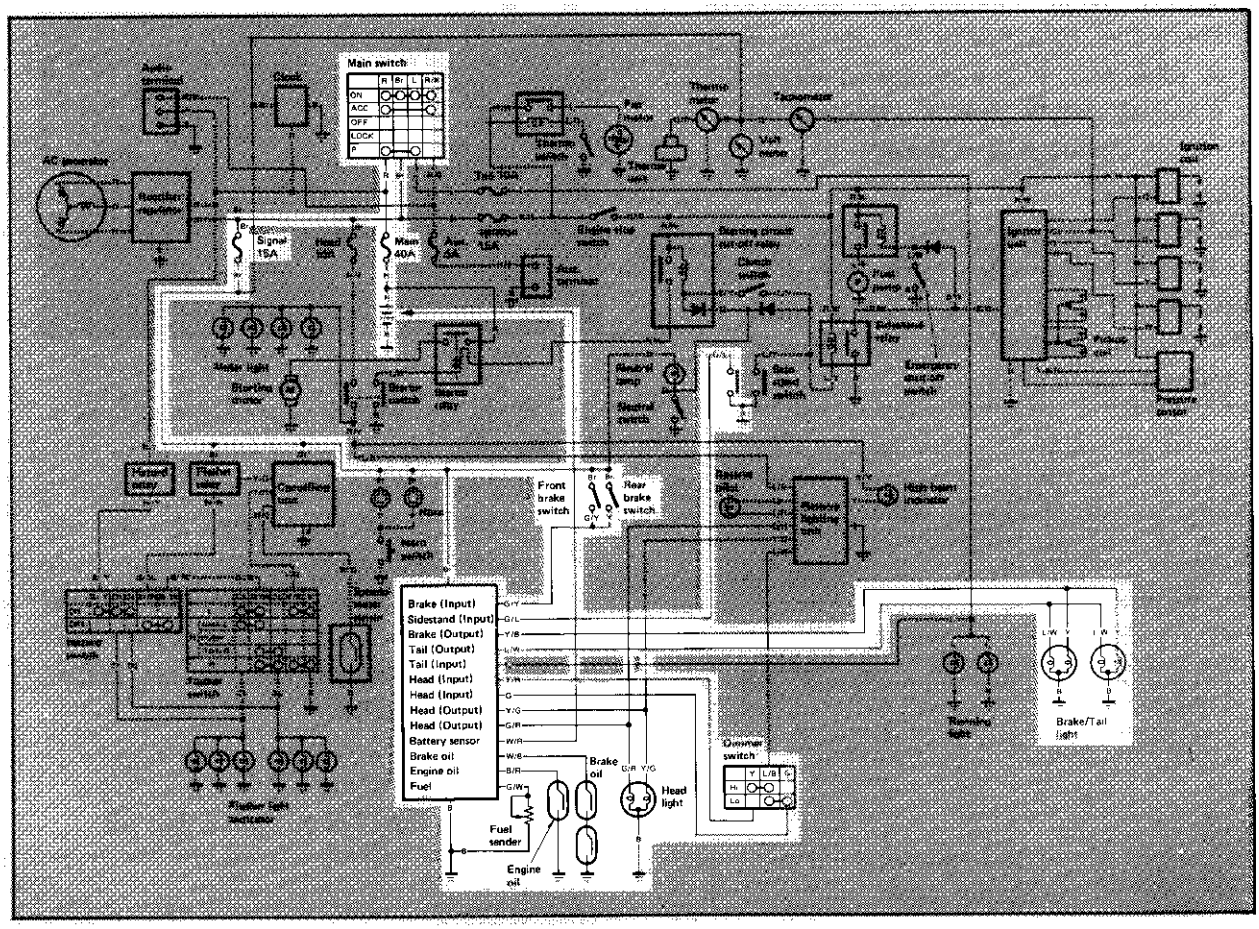
3. When the thermometer needle swings to the red zone, the thermometer is in good condition but the thermo-unit is considered to be faulty. Replace the thermo-unit. If the needle fails to swing to the red zone, replace the thermometer.
4. After replacing the thermo-unit, tighten it to specification.

Tightening torque:
15 Nm (1.5 m·kg, 11.0 ft·lb)

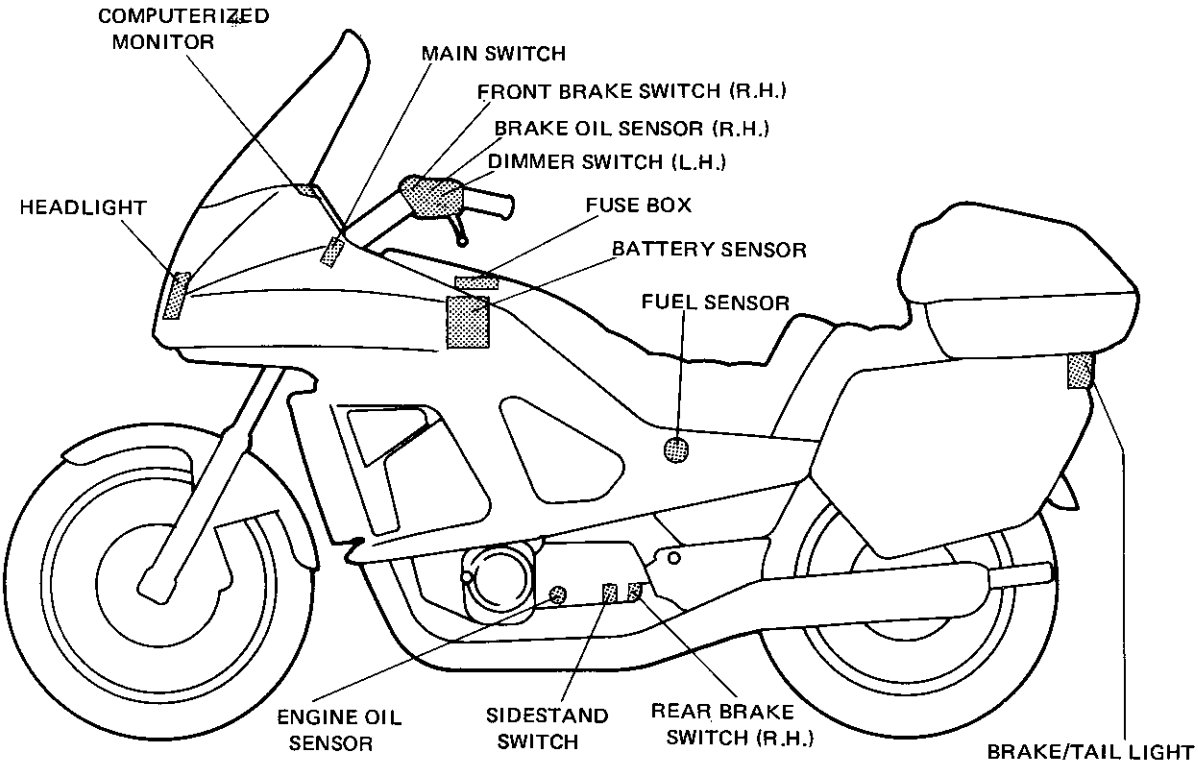
**CAUTION:**

**After replacing the thermo-unit, check the coolant level in the radiator and also check for any leakage.**

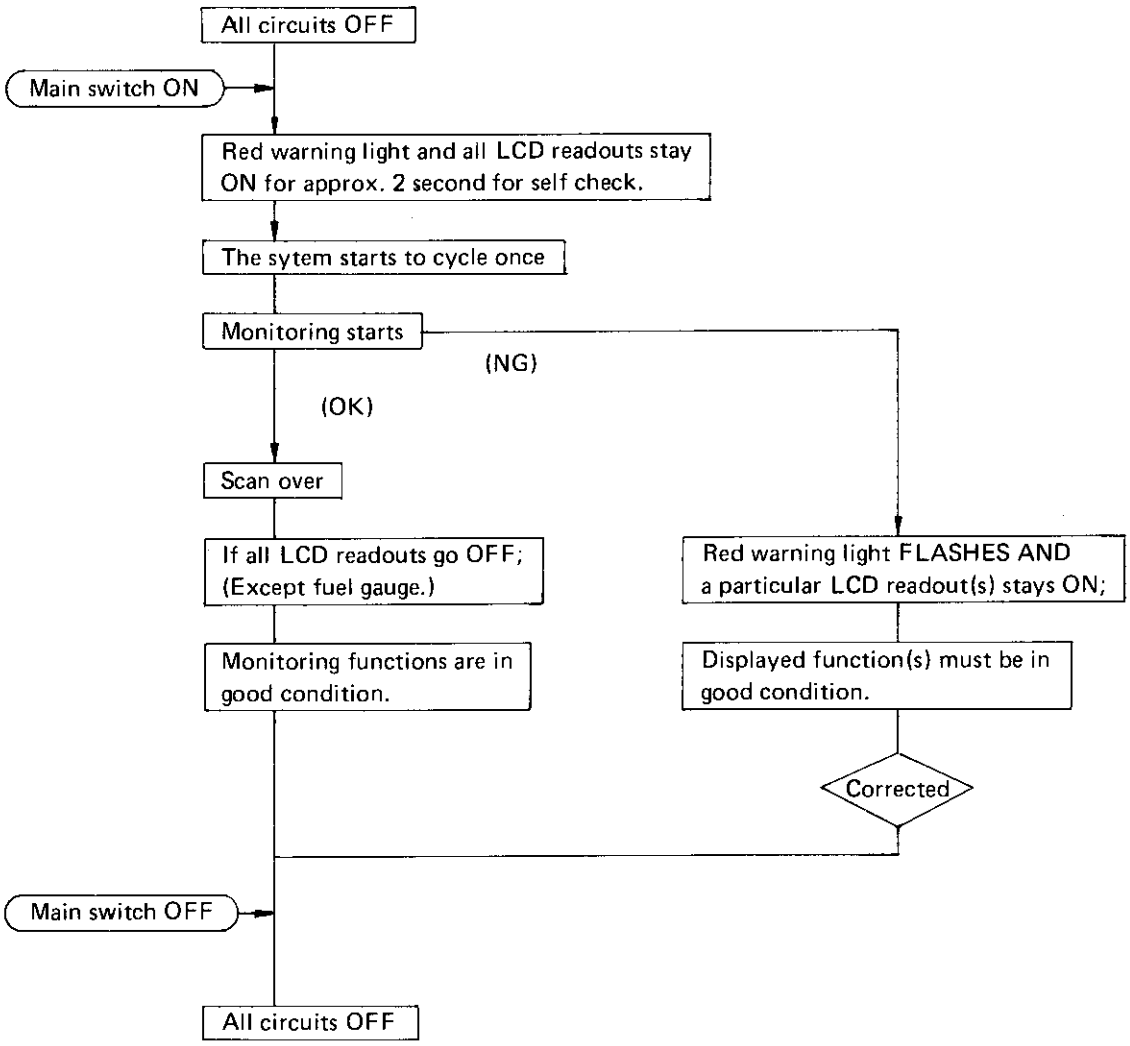
## COMPUTERIZED MONITOR SYSTEM




**This circuit diagram shows the monitoring circuit in the wiring diagram.**



## COMPUTER MONITOR SYSTEM OPERATION FLOW CHART

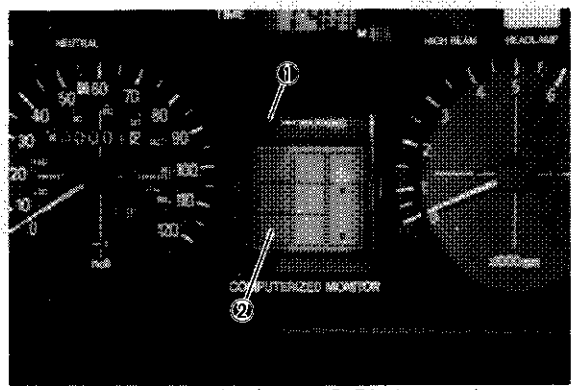



**NOTE:**

- Fuel level display:
  CMS displays real fuel level reading of approx. 2 seconds after the main switch is turned on. After approx. 2 seconds, CMS displays the fuel level of an average of approx. 5 seconds.
- Brake fluid, Engine oil, and Battery fluid level display:
  CMS displays when the fluid level becomes insufficient for more than approx. 8 seconds.

### Operation

This system monitors seven separate functions and will warn you of any malfunction until it if fixed. In addition, the fuel gauge in this system indicates the amount of fuel in the tank.



1. "WARNING" light (red) 2. Display panel

1. When the main switch is turned on, all seven liquid crystal displays (LCDs) come on, with the bottom fuel display (■■■■■) indicating the amount of fuel in the tank.
2. When the main switch is turned on, the system begines its scan of the motorcycle conditions. From top to bottom all the LCDs flash on and then off in sequence. If any one condition is found improper or inadequate, the red warning light will begin flashing and the LCD for the area in question will remain displayed.

**WARNING:**

**If any LCD remains displayed or the warning light flashes on, correct the problem immediately.**

### Display Panel

 : Sidestand

This indicator is displayed when the side stand is down. Be sure to retract if before starting out on the road.

 : Brake fluid level

This indicator is displayed when the brake fluid level is below specification in the front and rear brake master cylinder. In this case, ask your Yamaha dealer or qualified mechanic immedately.

**WARNING:**

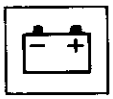
**Do not run the motorcycle with a low brake fluid level for a long time or at high speeds.**

 : Engine oil level

This indicator is displayed when the engine oil level is low. If it remains displayed or keeps flickering while riding, add engine oil at the first opportunity.

**WARNING:**

**Do not run the motorcycle with a low engine oil level for a long time or at high speeds.**

 : Battery fluid level

This indicator is displayed when the battery fluid level is low. If it remains displayed, add distilled water at the first opportunity.

**CAUTION:**

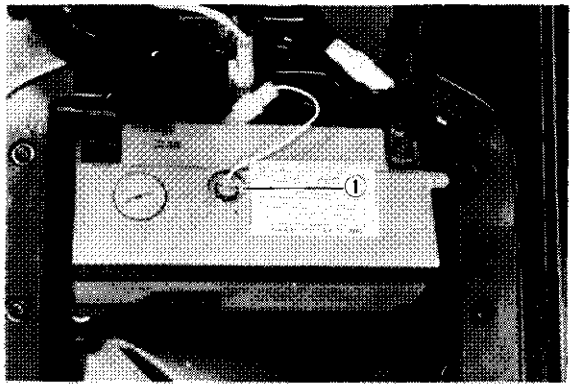
**Continuous riding with a low battery fluid level will damage the battery.**

**NOTE:**

The battery sensor terminal must be cleaned approximately every 5,000 km (3,000 mi). The terminal is constructed of lead, and its surface may become corroded, allowing a system malfunction.

**CAUTION:**

**Make sure that the connection to the battery is correct; otherwise, damage to the microcomputer may occur.**



1. Battery sensor

: Headlight bulb

This indicator is displayed when the headlight bulb is burned out. If it remains displayed, have it replaced and correctly adjusted at the first opportunity.

: Tail/brake light bulbs

This indicator is displayed when the taillight and/or brake light bulbs are burned out. If it remains displayed, have it replaced at the first opportunity.

: Fuel amount

This indicator is displayed when the fuel level is low. If it remains displayed or keeps flickering while riding, add fuel at the first opportunity.

**GENERAL CAUTION:**

**Failure to observe any of the following "don'ts" may result in malfunction of the microscomputer or damage to the electrical circuit.**

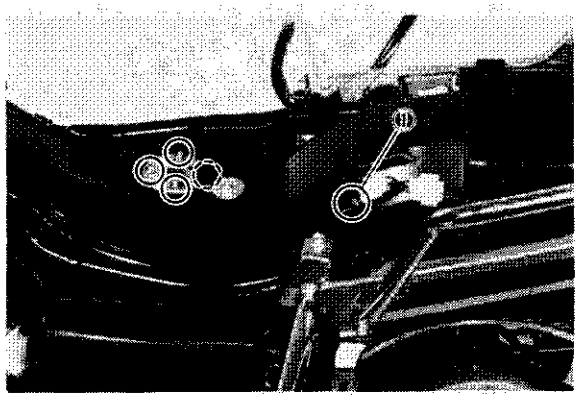
- **Don't use a taillight, brake light, or any other bulb that is not of the specified wattage.**
- **Don't connect extra electrical accessories to the Computerized Monitor System circuit (taillight, headlight, etc.).**
- **Don't allow any water or steam to come in contact with the instrument pane.**
- **Don't exert undue pressure on the display panel or subject it to strong shock.**
- **Don't place a magnet or any magnetized objects close to the display panel.**

## COMPUTERIZED MONITOR SYSTEM SENSOR INSPECTION

### Fuel Level Sensor

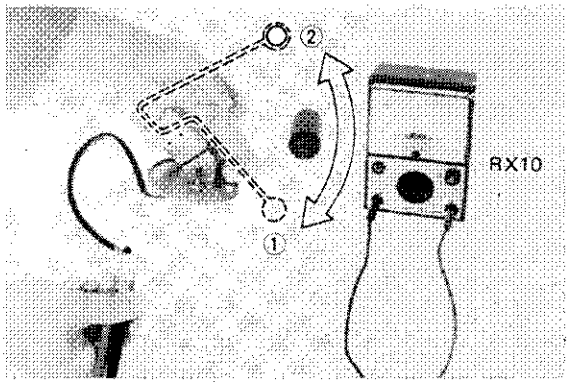
Use a pocket tester (with ohm x 10 scale) for this check.

1. Remove the sensor unit from the fuel tank.



1. Clamp

2. Connect the pocket tester leads across the green wire and the black wire of the sensor unit. The meter should show the following resistances at the specified fuel level. If not, replace.



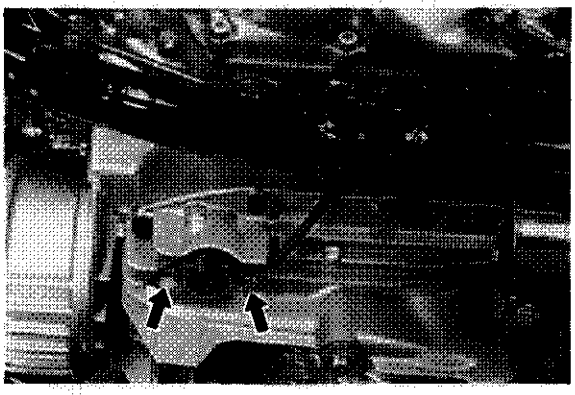

1. Full 2. Empty

| Fuel sensor resistance | |
|---|---|
| Full | 30Ω or less |
| 1/2 | 160 ~ 180Ω |
| Empty | 300Ω or more |

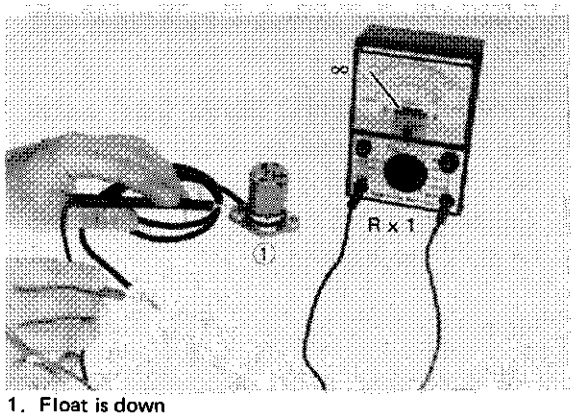
### Oil Level Sensor

Use a pocket tester (with ohm x 1 scale) for this check.

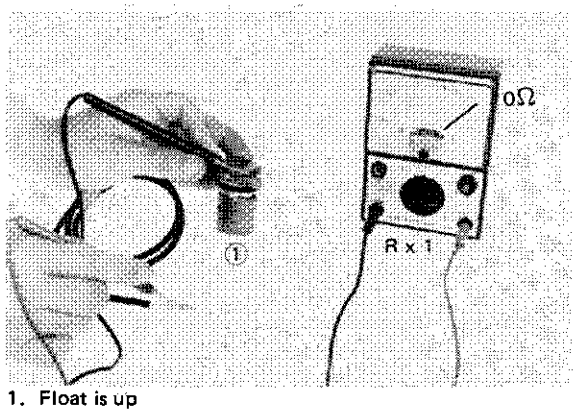
1. Remove the sending unit from the engine.



2. Connect the pocket tester leads as shown.
   When the oil level sensor stands up right, the tester should read infinity. When the sensor stand up side down, the tester should read 0 ohms.




1. Float is down

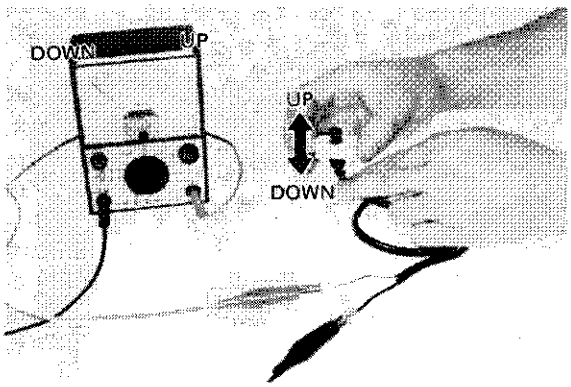



1. Float is up

**Brake Fluid Sensor (Front and Rear)**

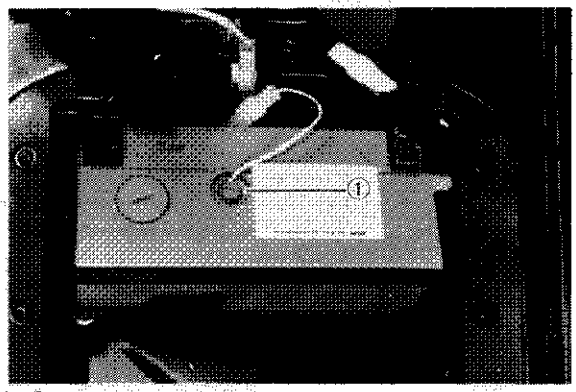
Use a pocket tester (with ohm x 1 scale) for this check.

1. Remove the master cylinder from the motorcycle. And remove the brake fluid sensor from the master cylinder.
2. Connect the pocket tester leads as shown. When the brake fluid sensor stands up right, the tester should read 0 ohms. When the sensor stands up side down, the tester should read infinity.



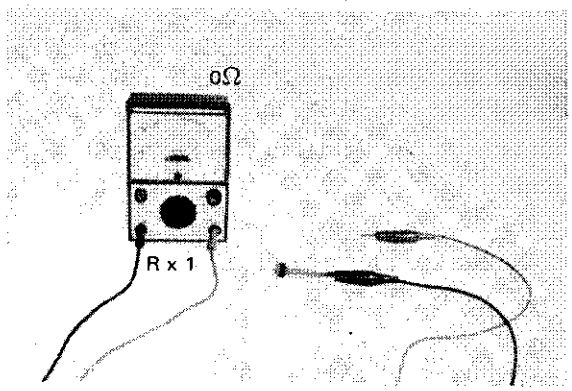

**Battery Fluid Sensor**

1. Remove the top cover and remove the battery sensor from the battery.




1. Battery sensor

   Use a pocket tester (with ohm x 1 scale) for this check.
2. Connect the pocket tester leads as shown.
   The tester needle should swing to 0Ω. Replace the switch if it shown infinite resistance (∞).




3. Check each sensor and replace it, if necessary. Next, check the main wire harness between the sensor connector and the computer conitor for breakage. If both wire harness and sensors are in good condition, replace the computer monitor.

## LCD PANEL

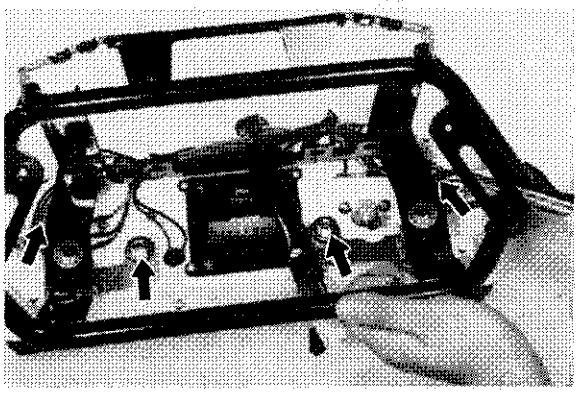
### Troubleshooting

1. After the main switch is turned on:

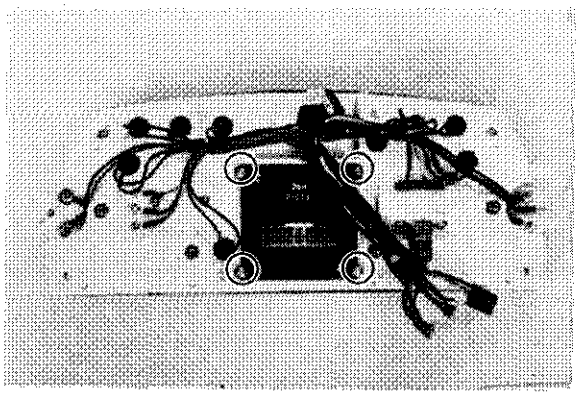
| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| a. Warning light doesn't come on. | LCD is broken. | Replace LCD panel. |
| | Low battery charge. | Recharge battery. |
| | Faulty coupler connection. | Clean coupler contacts. |
| | Broken wire. | Replace wiring. |
| | CMS control unit failed. | Replace CMS control unit. |
| b. Liquid crystal display (LCD) flashes on and off. | CMS control unit failed. | Replace CMS control unit. |
| c. LCD does not function. | LCD connectors incorrectly installed. | Reinstall connectors. |
| | Broken wire. | Replace wiring. |
| | Faulty contact between LCD panel and LCD holder. | Clean contacts. |
| | LCD panel failed. | Replace LCD panel. |
| | CMS control unit failed. | Replace CMS control unit. |
| d. LCD only partically displays. | LCD panel failed. | Replace LCD panel. |
| e. LCD dones not cycle. | Faulty coupler connection. | Clean coupler contacts. |
| | Broken wire. | Replace wiring. |
| | CMS control unit failed. | Replace CMS control unit. |

### LCD Removal

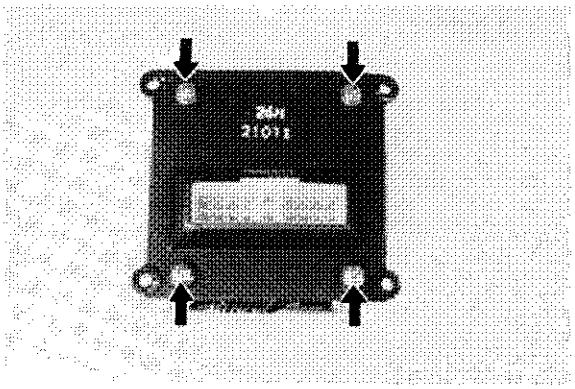
1. Remove the meter assembly from the support frame.



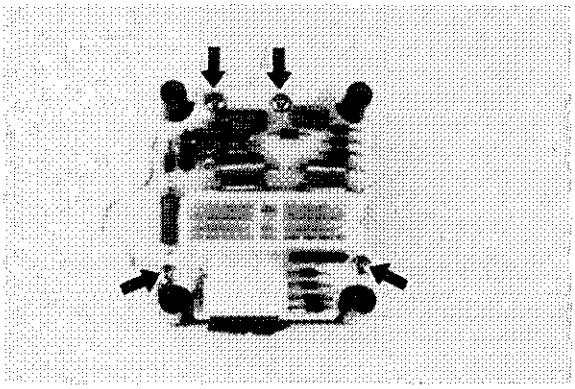
2. Loosen the four screws and remove the micro computer unit.



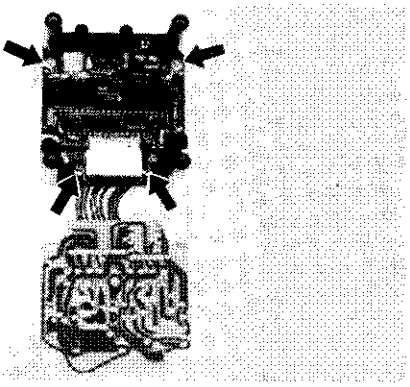
3. Loosen the four screws and remove the unit cover.



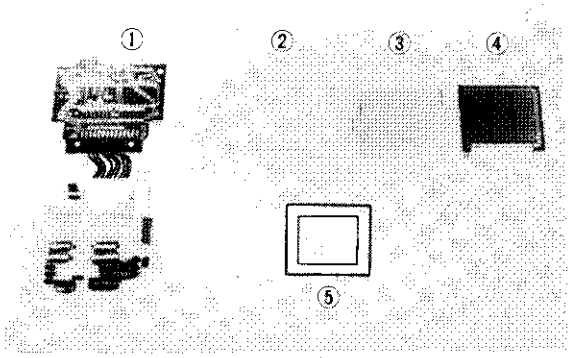
4. Loosen the four screws and remove the circuit board assembly.



5. Loosen the four screws and remove the circuit board assembly.



6. Remove the all component parts.



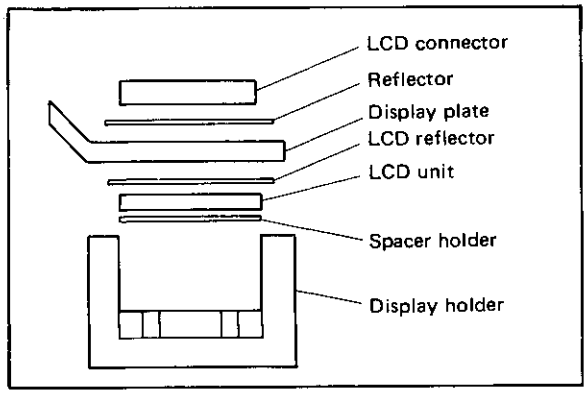

1. Circuit board assembly
2. Display plate
3. Reflector
4. LCD unit
5. Holder spacer

**LCD Assembly**

Reverse the removal procedure.

Note the following points:

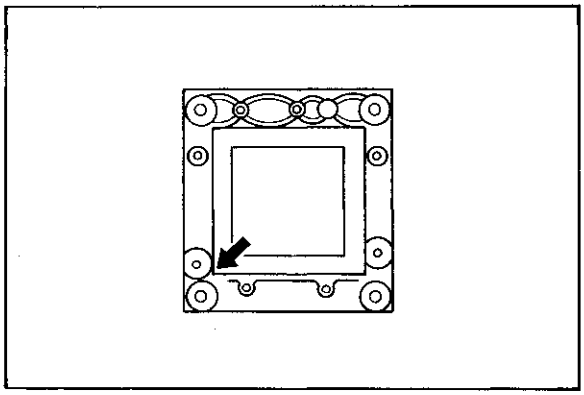
1. All component parts to be reassembled should be in good conditions.




**NOTE:**

- Do not assemble the parts up side down.
- Assemble all parts in their proper order.

2. LCD unit should be installed in the directions of the arrow.



| Tightening torque: | | | |
|---|---|---|---|
| | Nm | m·kg | ft·lb |
| M3 | 0.8 | 0.08 | 0.6 |
| M4 | 1.2 | 0.12 | 0.9 |

# CHAPTER 8. APPENDICES


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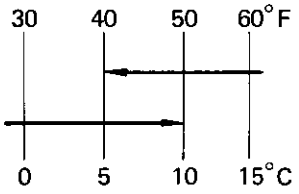
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CABLE ROUTING ..... 8-37

WIRING DIAGRAM ..... 8-45

# SPECIFICATIONS

## GENERAL SPECIFICATIONS

| Model | XVZ12TDK |
|---|---|
| Model Code Number:<br>Engine Starting Number<br>Vehicle I.d Number | 31M<br>31M-000101<br>JYA31M00*DA000101 |
| Dimensions:<br>Overall Length<br>Overall Width<br>Overall Height<br>Seat Height<br>Wheelbase<br>Minimum Ground Clearance | <br>2,470 mm (97.2 in)<br>940 mm (37.0 in)<br>1,490 mm (58.7 in)<br>785 mm (30.9 in)<br>1,610 mm (63.4 in)<br>145 mm ( 5.7 in) |
| Basic Weight:<br>Wight Oil and Full Fuel Tank | <br>341 kg (752 lb) |
| Minimum Turning Radius: | 2,900 mm (114 in) |
| Engine:<br>Engine Type<br>Cylinder Arrangement<br>Displacement<br>Bore x Stroke<br>Compression Ratio<br>Compression Pressure<br>Starting System | <br>Liquid cooled 4-stroke gasolin, DOHC<br>V-4 cylinder<br>1,198 $cm^3$<br>76.0 x 66.0 mm (2.99 x 2.60 in)<br>10.5 : 1<br>1,176.8 kPa (12.0 $kg/cm^2$, 171 psi)<br>Electric starter |
| Lubrication System: | Wep sump |
| Oil Type or Grade:<br>Engine oil<br><br><br>Final Gear Oil | <br>Yamalube 4-cycle oil or SAE 20W40 type SE motor oil<br>(If temperature does not go below 5°C (40°F))<br><br>SAE 10W30 type SE motor oil<br>(If temperature does not go above 15°C (60°F))<br><br>SAE 80 API "GL-4" Hypoid gear oil |
| Oil Capacity:<br>Engine Oil: Periodic Oil Change<br>With Oil Filter Replacement<br>Total Amount<br>Final Gear Case Oil Amount | <br>3.2 L (2.8 Imp qt, 3.4 US qt)<br>3.5 L (3.1 Imp qt, 3.7 US qt)<br>4.5 L (3.9 Imp qt, 4.8 US qt)<br>0.3 L (0.26 Imp qt, 0.32 US qt) |
| Radiator Capacity:<br>(Including All routes) | <br>2.7 L (2.4 Imp qt, 2.8 US qt) |
| Air Filter: | Dry type element |
| Fuel:<br>Type<br>Tank Capacity | <br>Regular gasoline<br>20 L (4.4 Imp qt, 5.3 US gal) |
| Carburetor:<br>Type/Manufacturer | <br>BDS 34 x 4 / MIKUNI |
| Spark Plug:<br>Type/Manufacturer<br>Gap | <br>DPR8EA-9/NGK, X24EPR-U9/NIPPONDENSO<br>0.8 ~ 0.9 mm (0.031 ~ 0.035 in) |

| Model | XVZ12TDK |
|---|---|
| Clutch Type: | Wet, multiple-disc |
| Transmission:<br>Primary Reduction System<br>Primary Reduction Ratio<br>Secondary Reduction System<br>Secondary Reduction Ratio<br>Transmission Type<br>Operation<br>Gear Ratio 1st<br>2nd<br>3rd<br>4th<br>5th | <br>Spar gear<br>87/49 (1.775)<br>Shaft drive<br>21/27 x 33/10 (2.567)<br>Constant mesh, 5-speed<br>Left foot operation<br>39/15 (2.600)<br>39/22 (1.772)<br>31/23 (1.347)<br>31/29 (1.068)<br>29/32 (0.906) |
| Chassis:<br>Frame Type<br>Caster Angle<br>Trail | <br>Tublar steel, Double cradle<br>28° 30'<br>125 mm (4.9 in) |
| Tire:<br>Type<br>Size (F)<br>Size (R) | <br>Tubeless<br>120/90-18-65H<br>140/90-16-71H |
| Tire Pressure (Cold tire):<br>Basic weight:<br>With oil and full fuel tank<br>Maximum load* | <br><br>341 kg (752 lb)<br>189 kg (417 lb) |

| Cold tire pressure | FRONT | REAR |
|---|---|---|
| Up to 90 kg (198 lb) load* | 221 kPa (2.3 kg/cm$^2$, 32 psi) | 221 kPa (2.3 kg/cm$^2$, 32 psi) |
| 90 kg (198 lb) ~ 189 kg (417 lb) load* | 221 kPa (2.3 kg/cm$^2$, 32 psi) | 275 kPa (2.8 kg/cm$^2$, 40 psi) |
| High speed riding | 221 kPa (2.3 kg/cm$^2$, 32 psi) | 221 kPa (2.3 kg/cm$^2$, 32 psi) |

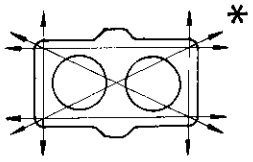
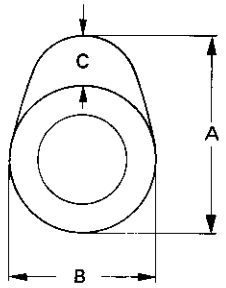
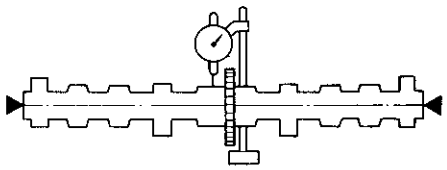
* Load is the total weight of acrgo, rider, passenger, and accessories.

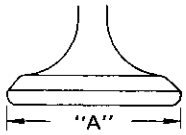
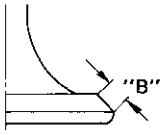
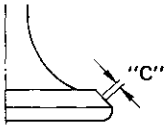
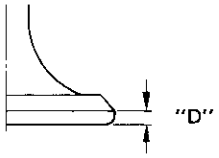
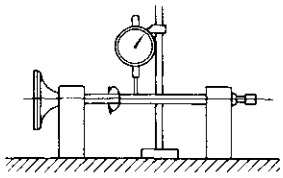
| | |
|---|---|
| Brake:<br>Front Right-side<br>Operation<br>Front Left-side and Rear<br>Operation | <br>Disc brake<br>Right hand operation<br>Disc brake<br>Right foot operation |
| Suspension:<br>Front Suspension<br>Rear Suspension | <br>Telescopic fork<br>Swingarm (New monocross suspension) |
| Shock Absorber:<br>Front Shock Absorber<br>Rear Shock Absorber | <br>Air, Coil spring, Oil damper<br>Air, Coil spring, Oil damper |
| Wheel Travel:<br>Front Wheel Travel<br>Rear Wheel TRavel | <br>140 mm (5.5 in)<br>105 mm (4.1 in) |
| Electrical:<br>Ignition System<br>Generator System<br>Battery Type or Model<br>Battery Capacity | <br>T.C.I.<br>A.C. generator<br>GM18Z-3A<br>12V 20AH |
| Headlight Type: | Bulb type (Quartz bulb) |

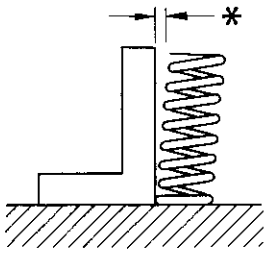
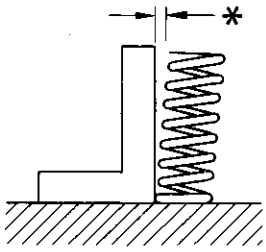
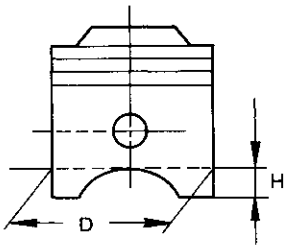
| Model | XVZ12TDK |
|---|---|
| Bulb Wattage/Quantity: | |
| Headlight | 12V, 60W/55W x 1 |
| Tail/Brake Light | 12V, 8W/27W x 2 |
| Flasher Light | 12V, 27W x 4 |
| Parking/Running Light | 12V, 8W x 2 |
| Meter Light | 12V, 3.4W x 4 |
| Indicator Light Wattage/Quantity: | |
| "HEAD LAMP" | 12V, 3.4W x 1 |
| "NEUTRAL" | 12V, 3.4W x 1 |
| "HIGH BEAM" | 12V, 3.4W x 1 |
| "TURN" | 12V, 3.4W x 2 |

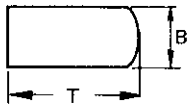
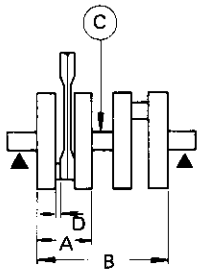
## MAINTENANCE SPECIFICATIONS

## ENGINE

| Model | XVZ12TDK |
|---|---|
| Cylinder Head: | |
| Warp Limit*  | 0.03 mm (0.0012 in) |
| Cylinder: | |
| Bore Size | 75.07 ~ 76 2 mm (2.96 ~ 2.99 in) |
| Taper Limit | 0.05 mm (0.002 in) |
| Out of Round Limit | 0.05 mm (0.002 in) |
| Cam shaft: | |
| Drive Method | Chain drive (Center) |
| Cam Cap Inside Dia. | 25.000 ~ 25.021 mm (0.984 ~ 0.985 in) |
| Camshaft Outside Dia. | 24.967 ~ 24.980 mm (0.983 ~ 0.983 in) |
| Shaft-to-Cap Clearance | 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in) |
| Cam Dimensions | |
| Intake "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit > | 36.15 mm (1.42 in) |
| Intake "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
| Exhaust "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit > | 36.15 mm (1.42 in) |
| Exhaust "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
|   | |
| Camshaft Runout Limit | 0.03 mm (0.0012 in) |
|  | |
| Cam Chain: | |
| Cam Chain Type/No. of Links | BF05M/118 |
| Cam Chain Adjustment Method | Automatic |

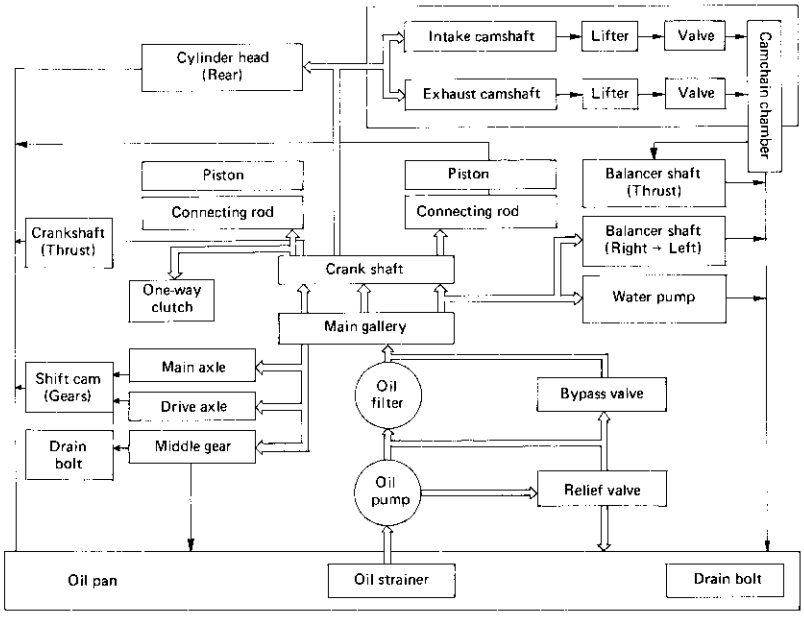
| Model | | XVZ12TDK |
|---|---|---|
| Valve, Valve Seat, Valve Guide: | | |
| Valve Clearance (Cold): | IN. | 0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in) |
| | EX. | 0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in) |
| Valve Dimensions | | |
|   Head Dia. | | |
|   Face Width | | |
|   Seat Width | | |
|   Margin Thickness | | |
| "A" Head Dia. | IN. | 28.9 ~ 29.1 mm (1.138 ~ 1.146 in) |
| | EX. | 23.9 ~ 24.1 mm (0.941 ~ 0.949 in) |
| "B" Face Width | IN. | 1.6 ~ 3.1 mm (0.063 ~ 0.122 in) |
| | EX. | 1.3 ~ 2.4 mm (0.051 ~ 0.095 in) |
| "C" Seat Width | IN. | 0.9 ~ 1.1 mm (0.035 ~ 0.043 in) |
| | EX. | 0.9 ~ 1.1 mm (0.035 ~ 0.043 in) |
| < Limit > | IN. | 1.4 mm (0.055 in) |
| | EX. | 1.4 mm (0.055 in) |
| "D" Margin Thickness | IN. | 1.1 ~ 1.5 mm (0.043 ~ 0.059 in) |
| | EX. | 1.1 ~ 1.5 mm (0.043 ~ 0.059 in) |
| < Limit > | IN. | 0.7 mm (0.028 in) |
| | EX. | 0.7 mm (0.028 in) |
| Stem Outside Dia. | IN. | 5.975 ~ 5.990 mm (0.235 ~ 0.236 in) |
| | EX. | 5.960 ~ 5.975 mm (0.235 ~ 0.235 in) |
| < Limit > | IN. | 5.945 mm (0.234 in) |
| | EX. | 5.92 mm (0.233 in) |
| Guide Inside Dia. | IN. | 6.000 ~ 6.012 mm (0.236 ~ 0.237 in) |
| | EX. | 6.000 ~ 6.012 mm (0.236 ~ 0.237 in) |
| < Limit > | IN. | 6.05 mm (0.238 in) |
| | EX. | 6.05 mm (0.238 in) |
| Stem-to-Guide Clearance | IN. | 0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in) |
| | EX. | 0.025 mm (0.001 in) |
| < Limit > | IN. | 0.08 mm (0.0031 in) |
| | EX. | 0.1 mm (0.0039 in) |
| Stem Runout Limit | | 0.01 mm (0.0004 in) |
|  | | |
| Valve Spring: | | |
| Inner Spring: | | |
| Free Length | IN. | 37.3 mm (1.47 in) |
| | EX. | 37.3 mm (1.47 in) |
| < Limit > | IN. | 35.3 mm (1.39 in) |
| | EX. | 35.3 mm (1.39 in) |
| Set Length (Valve Closed) | IN. | 31.8 mm (1.25 in) |
| | EX. | 31.8 mm (1.25 in) |
| Compressed Pressure (Installed) | IN. | 4.57 ~ 5.37 kg (10.08 ~ 11.84 lb) |
| | EX. | 4.57 ~ 5.37 kg (10.08 ~ 11.84 lb) |

| Model | | XVZ12TDK |
|---|---|---|
| Tilt Limit* | IN. | 2.5° / 1.6 mm (0.063 in) |
| | EX. | 2.5° / 1.6 mm (0.063 in) |
|  | | |
| Direction of Winding | IN. | Left |
| | EX. | Left |
| Outer Spring: | | |
| Free Length | IN. | 39.45 mm (1.55 in) |
| | EX. | 39.45 mm (1.55 in) |
| < Limit > | IN. | 37.25 mm (1.47 in) |
| | EX. | 37.25 mm (1.47 in) |
| Spring Rate | IN-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | IN-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| | EX-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | EX-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| Set Length (Valve Closed) | IN. | 33.8 mm (1.33 in) |
| | EX. | 33.8 mm (1.33 in) |
| Compressed Pressure (Installed) | IN. | 10.1 ~ 11.9 kg (22.27 ~ 26.24 lb) |
| | EX. | 10.1 ~ 11.9 kg (22.27 ~ 26.24 lb) |
| Tilt Limit* | IN. | 2.5° / 1.7 mm (0.067 in) |
|  | EX. | 2.5° / 1.7 mm (0.067 in) |
| Direction of Winding | IN. | Right |
| | EX. | Right |
| Piston: | | |
| Piston Clearance | | 0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in) |
| < Limit > | | 0.15 mm (0.0059 in) |
| Piston Size "D" | | 75.905 ~ 75.955 mm (2.988 ~ 2.990 in) |
| Measuring Point "H" | | 6.5 mm (0.256 in) |
|  | | |
| Oversize | 1st | 76.25 mm (3.00 in) |
| Oversize | 2nd | 76.5 mm (3.01 in) |

| Model | XVZ12TDK |
|---|---|
| Piston Ring: | |
| Top Ring:   | |
| Type | Plain (Barrel face) |
| Dimensions (B x T) | 2.8 x 1.2 mm (0.110 x 0.047 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.7 mm (0.0276 in) |
| Side Clearance (Installed) | 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| 2nd Ring:   | |
| Type | Plain (Taper face) |
| Dimensions (B x T) | 3.2 x 1.5 mm (0.126 x 0.059 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.8 mm (0.0315 in) |
| Side Clearance | 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| Oil Ring:   | |
| Dimensions (B x T) | 3.1 x 2.8 mm (0.122 x 0.110 in) |
| End Gap (Installed) | 0.3 ~ 0.9 mm (0.0118 ~ 0.0354 in) |
| Connecting Rod: | |
| Oil Clearance | 0.021 ~ 0.045 mm (0.0008 ~ 0.0018 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green |
| Crankshaft:   | |
| Crank Width "A" | 83.92 ~ 83.97 mm (3.304 ~ 3.306 in) |
| Assembly Width "B" | 242.72 ~ 243.17 mm (9.556 ~ 9.574 in) |
| Runout Limit "C" | 0.03 mm (0.0012 in) |
| Big End Side Clearance "D" | 0.320 ~ 0.924 mm (0.0126 ~ 0.0364 in) |
| Journal Oil Clearance | 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green 5. Yellow |
| Clutch: | |
| Friction Plate Thickness | 2.9 ~ 3.1 mm (0.114 ~ 0.122 in) |
| Quantity | 8 pcs. |
| Wear Limit | 2.8 mm (0.11 in) |
| Clutch Plate Thickness | 2.2 ~ 2.4 mm (0.087 ~ 0.095 in) |
| Quantity | 7 pcs. |
| Warp Limit | 0.2 mm (0.0079 in) |
| Clutch Spring Free Length | 41.6 mm (1.64 in) |
| Quantity | 6 pcs. |
| Minimum Length | 40.3 mm (1.59 in) |
| Push Rod Bending Limit | 0.5 mm (0.0197 in) |
| Transmission: | |
| Main Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Drive Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Shifter: | |
| Shifter Type | Guide Bar |
| Guide Bar Bending Limit | 0.025 mm (0.001 in) |

| Model | | XVZ12TDK |
|---|---|---|
| Carburetor: | | |
| I.D. Mark | | 26H 00 |
| Main Jet | (M.J.) | #117.5 |
| Main Air Jet | (M.A.J.) | #65 |
| Jet Needle | (J.N.) | 5GLZ18-3 |
| Needle Jet | (N.J.) | X-6 |
| Pilot Air Jet | (P.A.J.) | #80 |
| Pilot Outlet | (P.O.) | 0.8 |
| Pilot Jet | (P.J.) | #42.5 |
| Bypass | (B.P. 1) | 0.8 |
| | (B.P. 2) | 0.8 |
| | (B.P. 3) | 0.9 |
| Valve Seat Size | (V.S.) | 1.5 |
| Starter Jet | (G.S. 1) | #45 |
| | (G.S. 2) | 0.8 |
| Fuel Level | (F.L.) | 16.5 ~ 17.5 mm (0.650 ~ 0.689 in) |
| Engine Idling Speed | | 950 ~ 1,050 r/min |
| Vacuum Pressure at Idling Speed | | Above 250 mm Hg (9.843 in Hg) |
| Vacuum Synchronous Difference | | Below 10 mm Hg (0.394 in Hg) |
| Fuel Pump: | | |
| Type | | Electrical type |
| Consumption Amperage (Max.) | | 0.7A |
| Out-put Pressure | | 10.8 ~ 15.7 kPa (0.11 ~ 0.16 kg/cm$^2$, 1.16 ~ 2.28 psi) |
| Lubrication System: | | |
| Oil Filter Type: | | Paper type |
| Oil Pump Type: | | Trochoid type |
| Tip clearance | | 0 ~ 0.12 mm (0 ~ 0.0047 in) |
| < Limit > | | 0.17 mm (0.0067 in) |
| Side Clearance | | 0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in) |
| < Limit > | | 0.08 mm (0.0031 in) |
| Bypass Valve Setting Pressure | | 167 ~ 235 kPa (1.7 ~ 2.4 kg/cm$^2$, 24.2 ~ 34.1 psi) |
| Relief Valve Operating Pressure | | 432 ~ 549 kPa (4.4 ~ 5.6 kg/cm$^2$, 62.6 ~ 79.6 psi) |

Lubrication Chart:



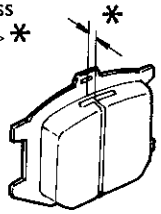
| Model | | XVZ12TDK |
|---|---|---|
| Cooling System: | | |
| Radiator Core Size: | Width | 363.8 mm (14.3 in) |
| | Height | 240 mm (9.45 in) |
| | Thickness | 16 mm (0.63 in) |
| Radiator Cap Opening Pressure | | 74 ~ 103 kPa (0.75 ~ 1.05 kg/cm$^2$, 10.7 ~ 14.9 psi) |
| Reservoir Tank Capacity | | 0.39 L (0.343 Imp qt, 0.412 US qt) |
| < From Low to Full Level > | | 0.25 L (0.22 Imp qt, 0.264 US qt) |
| Water Pump | | |
| Type | | Single-suction centrifugal pump |
| Reduction Ratio | | 31/21 (1.476) |
| Shaft Drive: | | |
| Middle Gear Backlash | | 0.1 ~ 0.2 mm (0.0039 ~ 0.0079 in) |
| < Limit > | | 0.3 mm (0.0118 in) |
| Final Gear Backlash | | 0.1 ~ 0.2 mm (0.0039 ~ 0.0079 in) |
| < Limit > | | 0.3 mm (0.0118 in) |

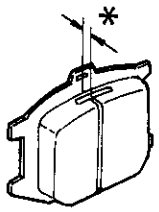
## Tightening torque

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Camshaft cap | Bolt | M6 | 32 | 10 | 1.0 | 7.2 | |
| Cylinder head sand hole plug | Screw | M20 | 6 | 43 | 4.3 | 31 | Apply Loctite |
| Spark plug | – | M12 | 4 | 17.5 | 1.75 | 12.5 | |
| Cylinder head | Nut | M10 | 10 | 35 | 3.5 | 25 | |
| Cylinder head cover | Bolt | M6 | 16 | 10 | 1.0 | 7.2 | |
| Connecting rod | Bolt | M8 | 8 | 38 | 3.8 | 27 | Apply molybdenum disulfide grease |
| AC magneto rotor | Bolt | M10 | 1 | 90 | 9.0 | 65 | |
| Cam sprocket | Special | M7 | 8 | 20 | 2.0 | 14 | |
| Plate (damper chain) | Flange bolt | M8 | 1 | 24 | 2.4 | 17 | Apply Loctite |
| Tensioner | Bolt | M6 | 4 | 12 | 1.2 | 8.7 | |
| Water pump cover | Bolt | M6 | 5 | 12 | 1.2 | 8.7 | |
| Water pump housing | Bolt | M6 | 4 | 12 | 1.2 | 8.7 | |
| Coolant drain plug | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Thermostatic valve housing | Bolt | M6 | 3 | 12 | 1.2 | 8.7 | |
| Thermostatic valve cover | Bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Electric fan motor | Screw with washer | M5 | 3 | 4 | 0.4 | 2.9 | |
| Radiator assembly | Bolt with washer | M6 | 4 | 7 | 0.7 | 5.1 | |
| Radiator cover | Screw | M5 | 4 | 4 | 0.4 | 2.9 | |
| Chamber cover (oil/water/breather) | Bolt | M6 | 6 | 12 | 1.2 | 8.7 | |
| Oil pump cover | Screw | M6 | 4 | 7 | 0.7 | 5.1 | |
| Oil pump housing | Screw | M6 | 3 | 7 | 0.7 | 5.1 | |
| Oil pump | Bolt | M6 | 3 | 12 | 1.2 | 8.7 | |
| Oil filter cover | Union bolt | M20 | 1 | 32 | 3.2 | 23 | |
| Engine oil drain bolt | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Oil pan | Bolt | M6 | 12 | 12 | 1.2 | 8.7 | |
| Oil baffle plate | Screw | M6 | 5 | 7 | 0.7 | 5.1 | |
| Oil delivery pipe (lower) | Union bolt | M10 | 1 | 20 | 2.0 | 14 | |
| Oil delivery pipe (upper) | Union bolt | M8 | 2 | 17.5 | 1.75 | 12.5 | |

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Carburator joint | Bolt | M6 | 8 | 12 | 1.2 | 8.7 | |
| Fuel pump | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Exhaust pipe (# 1, # 3) & joint | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Exhaust pipe clamp | Bolt | M8 | 6 | 20 | 2.0 | 14 | |
| Exhaust pipe flange | Nut | M8 | 8 | 20 | 2.0 | 14 | |
| Muffler bracket | Flange bolt | M10 | 2 | 25 | 2.5 | 18 | |
| Muffler stay & chamber | Bolt | M8 | 2 | 24 | 2.4 | 17 | |
| Muffler stay & lower case | Bolt | M8 | 2 | 20 | 2.0 | 14 | |
| Exhaust joint cover | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Crankcase | Bolt | M6 | 10 | 12 | 1.2 | 8.7 | Apply oil to bolt threads |
| Crankcase | Bolt | M8 | 20 | 24 | 2.4 | 17 | Apply oil to bolt threads |
| Crankcase | Bolt | M10 | 8 | 37 | 3.7 | 27 | Apply oil to bolt threads |
| Bearing retainer | Torx screw | M8 | 4 | 25 | 2.5 | 18 | Stake |
| Bearing retainer | Screw | M6 | 3 | 6 | 0.6 | 4.3 | Apply Loctite |
| Crankcase cover (left) | Bolt | M6 | 11 | 12 | 1.2 | 8.7 | |
| Lead clamp | Screw | M6 | 1 | 7 | 0.7 | 5.1 | |
| Crankcase cover (right) | Bolt | M6 | 6 | 12 | 1.2 | 8.7 | |
| Middle gear case cover | Bolt | M6 | 6 | 12 | 1.2 | 8.7 | |
| Middle gear oil drain bolt | Bolt | M8 | 1 | 38 | 3.8 | 27 | |
| Startor one-way clutch | Bolt | M8 | 3 | 24 | 2.4 | 17 | Apply Loctite |
| Clutch housing | Nut | M20 | 1 | 70 | 7.0 | 50 | Use lock washer |
| Clutch push lever | Special | M6 | 2 | 12 | 1.2 | 8.7 | |
| Middle drive gear | Nut | M44 | 1 | 110 | 11 | 80 | Stake, Apply Loctite |
| Middle drive shaft | Self-lock nut | M14 | 1 | 90 | 9.0 | 65 | |
| Middle drive shaft bearing housing | Bolt | M8 | 3 | 30 | 3.0 | 22 | |
| Shift cam segment | Screw | M6 | 1 | 12 | 1.2 | 8.7 | Apply Loctite |
| Shift cam plate (neutral) | Screw | M5 | 1 | 4 | 0.4 | 2.9 | Apply Loctite |
| Shift cam retainer | Screw | M6 | 3 | 6 | 0.6 | 4.3 | Apply Loctite |
| Change lever adjustor | Screw | M8 | 1 | 22 | 2.2 | 16 | Use lock washer |
| Change lever | Screw with washer | M6 | 1 | 8 | 0.8 | 5.8 | |
| Change pedal adjustor lock | Nut | M6 | 4 | 10 | 1.0 | 7.2 | |
| Change pedal/linkage pinch bolt | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Thermostatic switch | – | – | 1 | 15 | 1.5 | 11 | |
| Thermo-unit | – | – | 1 | 15 | 1.5 | 11 | |
| Neutral switch | Screw | M5 | 3 | 4 | 0.4 | 2.9 | |
| Oil level switch | Bolt with washer | M6 | 2 | 10 | 1.0 | 7.2 | |

## CHASSIS

| Model | | XVZ12TDK |
|---|---|---|
| Steering System: | | |
| Steering Bearing Type | | Taper roller bearing |
| Front Suspension: | | |
| Front Fork Travel | | 140 mm (5.51 in) |
| Fork Spring Free Length | | 453.5 mm (17.9 in) |
| < Limit > | | 448.5 mm (17.7 in) |
| Collar Length | | 97 mm (3.82 in) |
| Spring Rate | K1 | 4.12 N/mm (0.42 kg/mm, 23.5 lb/in) |
| | K2 | 7.85 N/mm (0.8 kg/mm, 44.8 lb/in) |
| Stroke | K1 | 0 ~ 112 mm (0 ~ 4.41 in) |
| | K2 | 112 ~ 140 mm (4.41 ~ 5.51 in) |
| Optional Spring | | No. |
| Oil Capacity | | 400 $cm^3$ (14.1 Imp oz, 13.5 US oz) |
| Oil Level | | 162.5 mm (6.4 in) |
| Oil Grade | | Yamaha fork oil 10wt or equivalent |
| Enclosed Air Pressure (Std.) | | 78.5 kPa (0.8 $kg/cm^2$, 11.4 psi) |
| < Min. ~ Max. > | | 0 ~ 147.1 kPa (0 ~ 1.5 $kg/cm^2$, 0 ~ 21.3 psi) |
| Rear Suspension: | | |
| Shock Absorber Travel | | 40 mm (1.57 in) |
| Spring Free Length | | 162 mm (6.38 in) |
| < Limit > | | 157 mm (6.18 in) |
| Fitting Length | | 115 mm (4.53 in) |
| Spring Rate | K1 | 71.1 N/mm (7.25 kg/mm, 406 lb/in) |
| Stroke | K1 | 40 mm (1.57 in) |
| Optional Spring | | No. |
| Enclosed Gas/Air Pressure (Std.) | | 1,471 kPa (15 $kg/cm^2$, 213 psi) |
| < Min. ~ Max. > | | 49 ~ 588 kPa (0.5 ~ 6.0 $kg/cm^2$, 7.1 ~ 85.3 psi) |
| Rear Arm: | | |
| Swingarm Free Play Limit | End | 0 mm (0 in) |
| Swingarm Free Play Limit | Side | 0 mm (0 in) |
| Front Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT2.15 x 18 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.0394 in) |
| | Lateral | 0.5 mm (0.0197 in) |
| Rear Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT3.00 x 16 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.0394 in) |
| | Lateral | 0.5 mm (0.0197 in) |
| Front Disc Brake: | | |
| Type | | Dual |
| Disc Outside Dia. x Thickness | | 298.0 x 8.5 mm (11.73 x 0.335 in) |
| Pad Thickness | Inner | 5.5 mm (0.217 in) |
| < Limit > | | 0.5 mm (0.0197 in) |
| Pad Thickness | Outer | 5.5 mm (0.217 in) |
| < Limit > *  | | 0.5 mm (0.0197 in) |

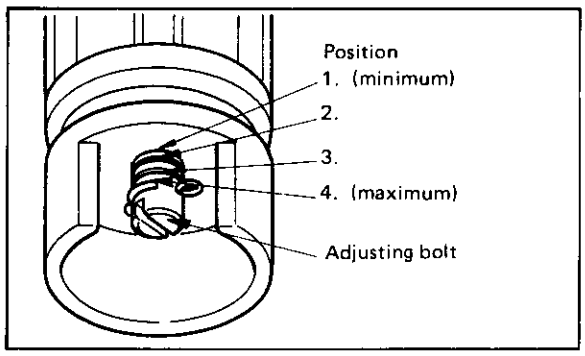
| Model | XVZ12TDK |
|---|---|
| Master Cylinder Inside Dia. | 12.7 mm (0.5 in) |
| Caliper Cylinder Inside Dia. | 38.1 mm (1.5 in) |
| Brake Fluid Type | DOT #3 |
| Rear Disc Brake: | |
| Type | Single |
| Disc Outside Dia. x Thickness | 298.0 x 8.5 mm (11.73 x 0.335 in) |
| Pad Thickness Inner | 5.5 mm (0.217 in) |
| < Limit > | 0.5 mm (0.0197 in) |
| Pad Thickness Outer | 5.5 mm (0.217 in) |
| < Limit >* | 0.5 mm (0.0197 in) |
|  | |
| Master Cylinder Inside Dia. | 15.87 mm (0.6 in) |
| Caliper Cylinder Inside Dia. | 42.8 mm (1.7 in) |
| Brake Fluid Type | DOT #3 |
| Brake Lever and Brake Pedal: | |
| Brake Lever Free Play | 5 ~ 8 mm (20 ~ 32 psi) |
| Brake Pedal Position | 10 mm (0.4 in) |
| Brake Pedal Free Play | 13 ~ 15 mm (0.5 ~ 0.6 in) |

**Recommended combinations of the front fork and the rear shock absorber.**
Use this table as guidance to meet specific riding conditions and motorcycle load.

| Front fork | Rear shock absorber | | Loading condition | | | |
|---|---|---|---|---|---|---|
| Air pressure | Air pressure | Damping adjuster | Solo rider | With passenger | With accessory equipments | With accessory equipments and passenger |
| 78.5 kPa (0.8 kg/cm$^2$, 12 psi) | 98.1 kPa (1.0 kg/cm$^2$ 14 psi) | 1 or 2 | ○ | | | |
| 78.5 ~ 98.1 kPa (0.8 ~ 1.0 kg/cm$^2$, 12 ~ 14 psi) | 196 ~ 294 kPa (2.0 ~ 3.0 kg/cm$^2$, 28 ~ 42 psi) | 2 or 3 | | ○ | ○ | |
| 78.5 ~ 118 kPa (0.8 ~ 1.2 kg/cm$^2$, 12 ~ 18 psi) | 294 ~ 490 kPa (3.0 ~ 5.0 kg/cm$^2$, 42 ~ 72 psi) | 3 or 4 | | | | ○ |

**Recommended adjustment of the front fork anti-dive.**
Use this table as guidance to meet specific riding conditions and motorcycle load.

| Adjusting bolt position | Loading condition | | |
|---|---|---|---|
| | Solo rider | With accessory equipments or passenger | With accessory equipments and passenger |
| 1 | ○ | | |
| 2 | ○ | ○ | |
| 3 | | ○ | ○ |
| 4 | | | ○ |

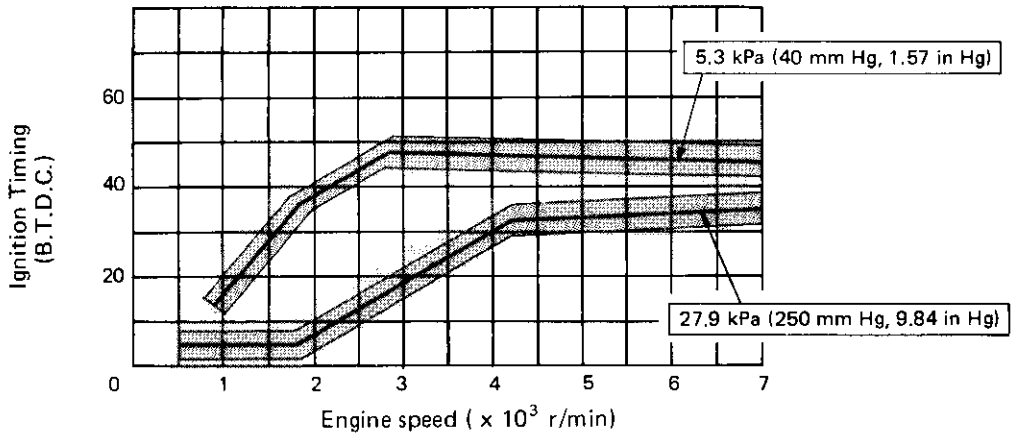


## Tightening torque

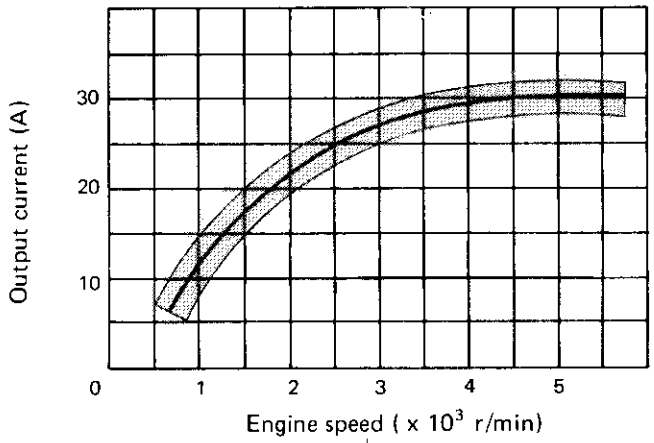
| Part to be tightened | Thread size | Tightening torque | | | Remarks |
|---|---|---|---|---|---|
| | | Nm | m·kg | ft·lb | |
| Front axle nut | M14 x 1.25 | 100 | 10 | 72 | |
| Front axle pinch bolt | M8 x 1.25 | 20 | 2 | 14.0 | |
| Under bracket & inner tube | M8 x 1.25 | 18 | 1.8 | 13 | |
| Steering crown & inner tube | M8 x 1.25 | 20 | 2 | 14 | |
| Steering stem | M22 x 1.0 | | | | |
| Steering shaft ring nut (Upper) | M25 x 1.0 | 110 | 11 | 8.0 | |
| Steering shaft ring nut (Lower) | M25 x 1.0 | 6 | 0.6 | 5.1 | |
| Caliper & front fork | M10 x 1.25 | 45 | 4.5 | 32 | Front |
| Caliper & bracket | M10 x 1.25 | 45 | 4.5 | 32 | Rear |
| Caliper & bleed screw | M8 x 1.25 | 6 | 0.6 | 4.3 | |
| Brake hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Clutch hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Brake hose & brake pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Clutch hose & clutch pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Front master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Front master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Clutch master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder & frame | M8 x 1.25 | 23 | 2.3 | 17 | |
| Pivot shaft (Left) & frame | M25 x 1.5 | 100 | 10 | 72 | |
| Pivot shaft (Right) & frame | M25 x 1.5 | 6 | 0.6 | 4.3 | |
| Pivot shaft (Right) & locknut | M25 x 1.5 | 100 | 10 | 72 | |
| Front fender & front fork | M8 x 1.25 | 20 | 2.0 | 14 | |
| Handlebar stopper nut | M10 x 1.0 | 35 | 3.5 | 25 | |
| Handlebar pinch bolt | M6 x 1.0 | 17 | 1.7 | 12 | |
| Handle stopper nut | M22 x 1.0 | 125 | 12.5 | 90 | |
| Handle pinch bolt | M8 x 1.25 | 30 | 3.0 | 22 | |
| Engine bracket (Front upper) | M10 x 1.25 | 42 | 4.2 | 30 | |
| Engine bracket (Front lower) | M10 x 1.25 | 42 | 4.2 | 30 | |
| Engine bracket (Rear) | M12 x 1.25 | 70 | 7.0 | 50 | |
| Engine stay & frame | M8 x 1.25 | 16 | 1.6 | 11 | |
| Stopper bolt & swingarm | M14 x 1.5 | 92 | 9.2 | 66 | |
| Rear axle | M18 x 1.5 | 150 | 15 | 110 | |
| Rear master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Fuel sendor | M6 x 1.0 | 5 | 0.5 | 3.6 | |
| Relay arm & frame | M12 x 1.25 | 59 | 5.9 | 43 | |
| Relay arm & rear shock absorber | M10 x 1.25 | 59 | 5.9 | 43 | |
| Arm 1 & swingarm | M10 x 1.25 | 32 | 3.2 | 23 | |
| Shock absorber & frame | M10 x 1.25 | 32 | 3.2 | 23 | |
| Down tube & frame | M10 x 1.25 | 32 | 3.2 | 23 | |
| Footrest & bracket | M10 x 1.25 | 32 | 3.2 | 23 | |
| Frame & rear frame (Seat rail side) | M10 x 1.25 | 55 | 5.5 | 40 | Upper |
| Frame & rear frame (Back stay side) | M10 x 1.25 | 55 | 5.5 | 40 | Lower |
| Frame & cross bar assembly | M8 x 1.25 | 23 | 2.3 | 17 | |

## ELECTRICAL

| Model | XVZ12TDK |
|---|---|
| Voltage: | 12V |
| Ignition System: | |
| Ignition Timing (B.T.D.C.) | 5° at 1,000 r/min |
| Advanced Timing (B.T.D.C.) | 32.5° at 4,500 r/min |
| Advancer Type | Electrical, vacuum |




| | |
|---|---|
| T.C.I.: | |
| Pickup Coil Resistance (Color) | 110Ω ± 15% at 20°C (68°F)<br>(Orange – Black), (Orange – Gray)<br>(Orange – White/Green), (Orange – White/Red) |
| T.C.I. Unit-Model/Manufacturer | T1D14-17/HITACHI |
| Ignition Coil: | |
| Model/Manufacturer | CM11-61/HITACHI |
| Primary Winding Resistance | 2.7Ω ± 10% at 20°C (68°F) |
| Secondary Winding Resistance | 13.2 kΩ ± 20% at 20°C (68°F) |
| Charging System/Type: | A.C. magneto generator |
| A.C. Generator: | |
| Model/Manufacturer | F-X736/HITACHI |
| Nominal Output | 14V, 30A at 5,000 r/min |



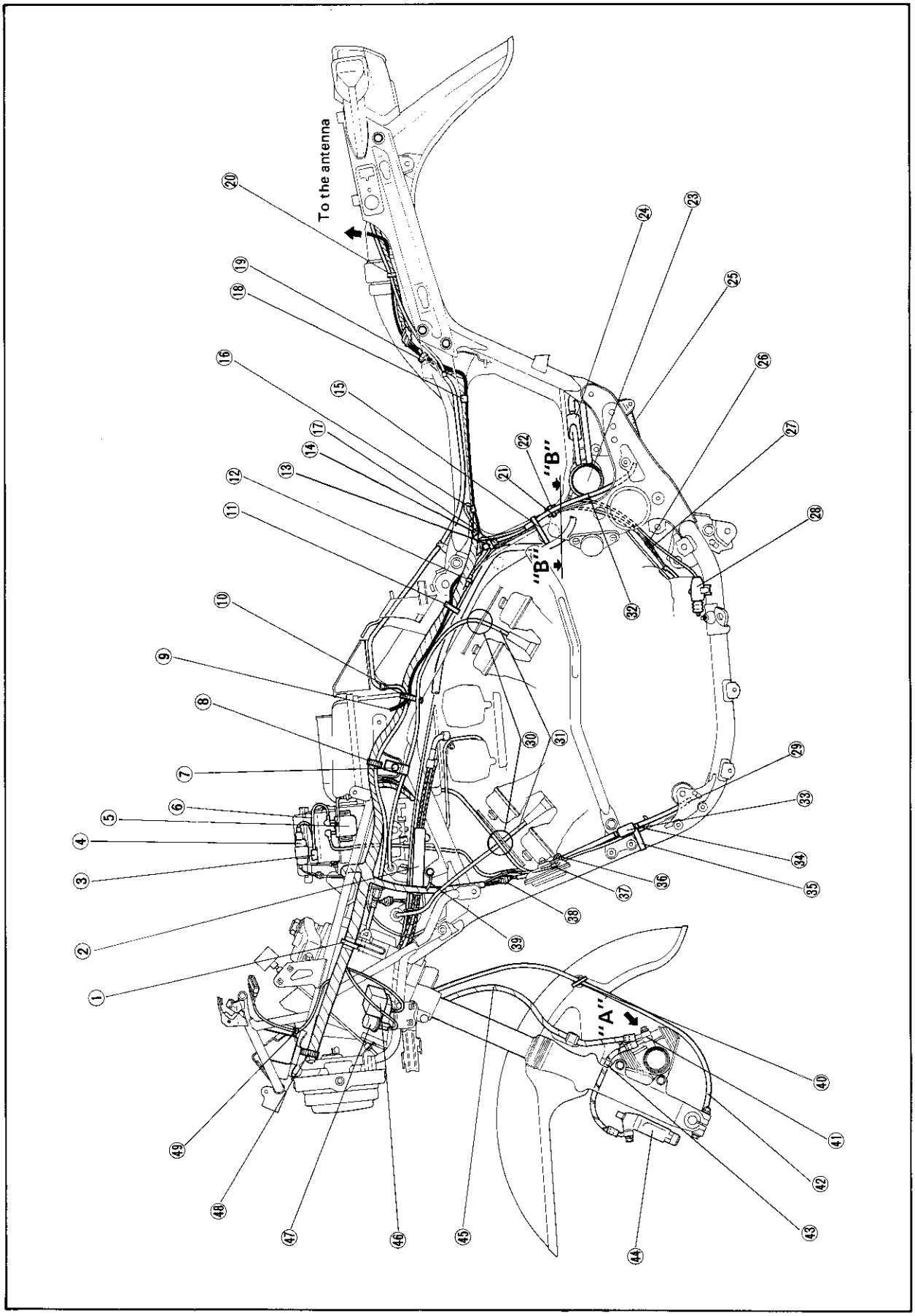

| | |
|---|---|
| Startor Coil Resistance (Color) | 0.42Ω ± 15% at 20°C (68°F)<br>(White – White) |

| Model | XVZ12TDK |
|---|---|
| Voltage Regulator: | |
| Type | Short circuit |
| Model/Manufacture | SH545-12/SHINDENGEN |
| No Load Regulated Voltage | 14 ~ 15V |
| Rectifier: | |
| Model/Manufacturer | SH545-12/SHINDENGEN |
| Capacity | 26A |
| Withstand Voltage | 200V |
| Battery: | |
| Capacity | 12V, 20 AH |
| Specific Gravity | 1.280 |
| Electric Starter System: | |
| Type | Constant mesh type |
| Starter Motor: | |
| Model/Manufacturer | SM-229C/MITSUBA |
| ID. Number | SM-229C |
| Out put | 0.6 kW |
| Brush-Overall Length | 12.5 mm (0.492 in) |
| < Limit > | 5.5 mm (0.217 in) |
| Spring Pressure | 560 ~ 680 g (19.751 ~ 23.984 oz) |
| Commutator Dia. | 28 mm (1.1 in) |
| < Wear Limit > | 27 mm (1.06 in) |
| Mica Undercut | 0.5 mm (0.0197 in) |
| Starter Switch | |
| Model/Manufacturer | 126-22011-D000/HONDALOCK |
| Amperage Rating | 150A |
| Coil Winding Resistance | 3.4Ω ± 10% at 20°C (68°F) |
| Horn: | |
| Type/Quantity | Plain type x 2 |
| Model/Manufacturer | CF3-12/NIKKO |
| Maximum Amperage | 3.0A |
| Flasher Relay: | |
| Type | Condenser type |
| Model/Manufacturer | FU257CD/NIPPONDENSO |
| Self Cancelling Device | Yes. |
| Flasher Frequency | 75 ~ 95 cycle/min |
| Wattage | 27W x 2 + 3.4W |
| Hazard Flasher Relay: | |
| Type | Heat plate type |
| Model/Manufacturer | FR-9H22/MITSUBA |
| Flasher Frequency | 68 ~ 102 cycle/min |
| Wattage | 27W x 4 + 3.4W |
| Self Cancelling Unit: | |
| Model/Manufacturer | YH-001/MATSUSHITA |
| Reserve Lighting Unit: | |
| Model/Manufacturer | 337-81901/KOITO |
| Oil Level Switch: | |
| Model/Manufacturer | 10L/NIPPONDENSO |
| Fuel gauge: | |
| Model/Manufacturer | 26H/NIPPONSEIKI |
| Sender Unit Resistance | |
| Full | 40.3Ω ± 10% at 20°C (68°F) |
| Empty | 310Ω or more ± 12% at 20°C (68°F) |

| Model | XVZ12TDK |
|---|---|
| Starting Circuit Cut off Relay: | |
| Model/Manufacturer | G4MW-1121T-100-Y10/TATEISHI |
| Coil Winding Resistance | 75Ω ± 10% at 20°C (68°F) |
| Diode | Yes. |
| Side Stand Relay: | |
| Model/Manufacturer | G2MW-1121T-010-Y4/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Diode | No. |
| Fuel Pump Relay: | |
| Model/Manufacturer | G2MW-1121T-010-Y4/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% |
| Color Code | Blue |
| Electric Fan: | |
| Model/Manufacturer | 26H/NIPPONDENSO |
| Fan Motor Relay: | |
| Model/Manufacturer | G2MW-1121T-100-Y7/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Thermostatic Switch: | |
| Model/Manufacturer | 11H/NIPPONDENSO |
| Thermo-Unit: | |
| Model/Manufacturer | 11M/NIPPONSEIKI |
| Circuit Breaker: | |
| Type | Fuse |
| Amperage for Individual Circuit/Quantity | |
| Main | 40A x 1 |
| Headlight | 10A x 1 |
| Signal | 15A x 1 |
| Ignition | 15A x 1 |
| Tail | 10A x 1 |
| Accessories | 10A x 1 |
| Reserve | 15A x 1 |
| | 10A x 2 |

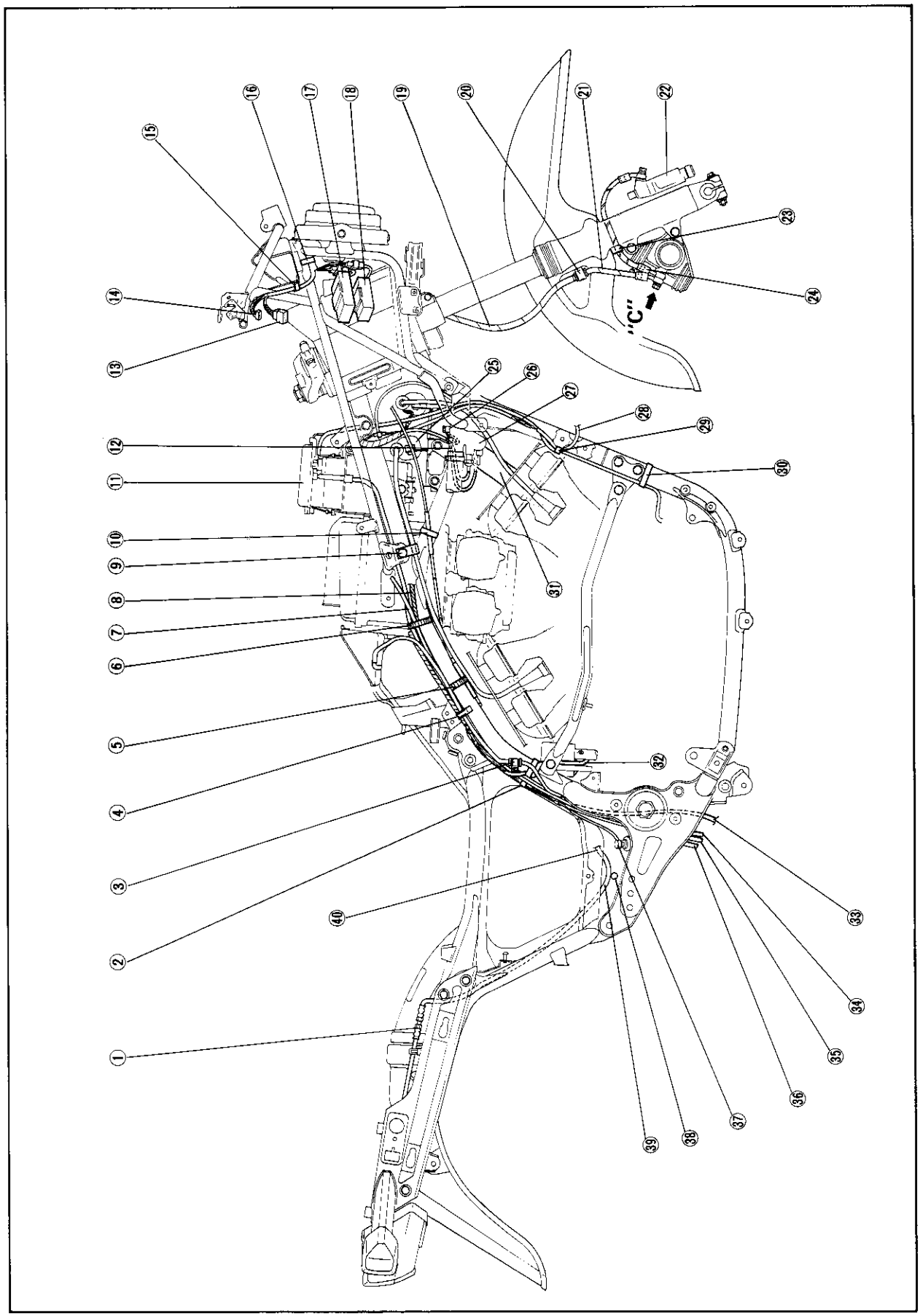
# — MEMO —

## CABLE ROUTING (1)



1. Clamp the wire harness at the white tape wound around it.
2. Throttle wire joint
3. Battery positive terminal
4. Fuse holder
5. Starter switch
6. Battery positive lead
7. Clamp the high tension cord
8. Band
9. Antenna cord to the tuner
10. Clamp the main harness, air hose and antenna cord. (Don't clamp the high tension cord.)
11. Clamp the wireharness and antenna cord.
12. Connector for the pick-up coil
13. Connector for the rectifier
14. Connector for the AC generator
15. Clamp all the leads
16. Clamp the wireharness, antenna cord and AC generator lead.
17. Insert the connector while lifting it so that it is not pinched by the fuel tank.
18. Clamp the wireharness and antenna lead
19. Clamp the wireharness
20. Clamp the sub lead, front air hose and antenna cord.
21. Connector for the sidestand
22. Connector for the fuel pump
23. Fuel pump (Pass the leads upward of the fuel pump)
24. Fuel strainer
25. Rectifier with regulator
26. Neutral switch lead
27. Oil level switch lead
28. Sidestand switch
29. Insert the air cleaner drain pipe between the frame and the engine mount bracket.
30. Clamp the high tension cord by the heat protector.
31. Pass the high tension cord outside of others except for the air cleaner drain pipe
32. Pass the rectifier lead outside the fuel pump
33. Locate the filter behind the under cowling and rout the drain pipe behind the water hose.
34. Positive lead
35. Clamp the positive lead not to touch the exhaust pipe
36. Horn lead
37. Clamp the horn lead and the positive lead
38. Fan motor lead
39. Ground (—) lead
40. Pass the speedometer cable through the guide.
41. Install the brake hose joints with the anti-dive hose placed at bottom.
42. Speedometer cable
43. Clamp the vinyl tube of the anti-dive hose behind the front fork.
44. Anti-dive unit
45. Front brake hose
46. Flasher relay
47. Hazard flasher relay
48. Band
49. Clamp

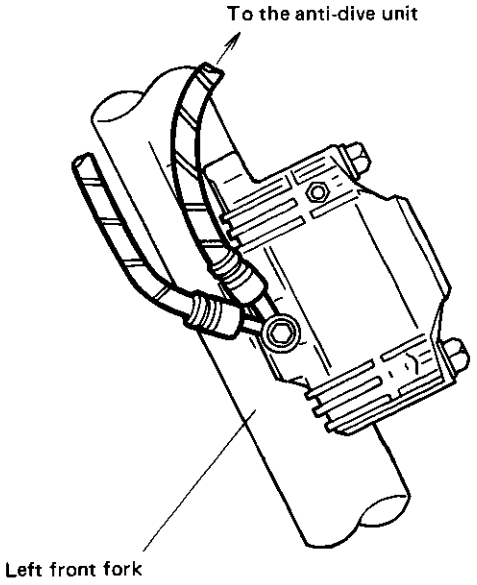
## CABLE ROUTING (2)



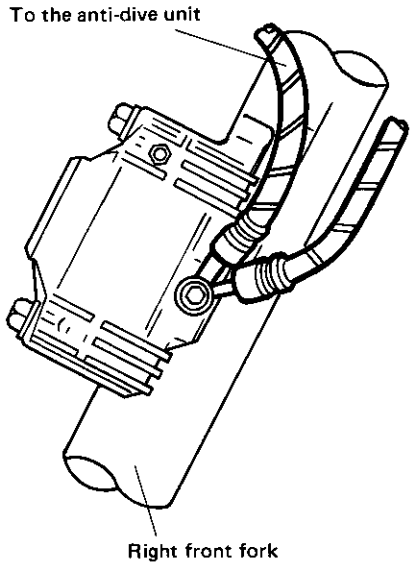
1. Air hose joint for the rear suspension
2. Clamp only the rear master cylinder lead and brake switch lead so that the former is not slack.
3. Be sure the roll over valve installed vertically.
4. Clamp the wireharness, battery breather pipe, fuel tank breather pipe, reservoir tank drain pipe and filler tube receiver drain pipe.
5. Clamp only the brake pipe.
6. Clamp the battery breather pipe, reservoir tank drain pipe and CLASS controller wireharness.
7. To the reservoir tank
8. CLASS controllar wireharness
9. Clamp only the high tension cord
10. Clamp only the brake pipe
11. Fuse box
12. Route the leads between the water hose (T-joint) and the tension pipe.
13. Connector for the hazard flasher
14. Connector for the flasher
15. Clamp the flasher lead and hazard flasher lead
16. Band
17. Reserve lighting unit
18. Flasher cancelling unit
19. Route the leads between the frame and T-joint.
20. Holder for the brake hose
21. Brake hose
22. Anti-dive
23. Clamp the anti-dive hose and vinyl tube of the brake hose behind the front fork.
24. Install the brake hose joints with the anti-dive hose placed a bottom.
25. Ignition coil
26. Ground (—) lead
27. T-joint
28. Horn lead
29. Clamp the horn lead and the negative lead
30. Band
31. Water hose
32. Route the master cylinder lead between the hose and the brake pipe.
33. Reservoir tank drain pipe
34. Battery breather pipe
35. Fuel tank breather pipe
36. Filler tube receiver drain pipe
37. Brake switch
38. Fuel hose
39. Route the air hose above the fuel hose
40. To rear shock absorber

# CABLE ROUTING (3)

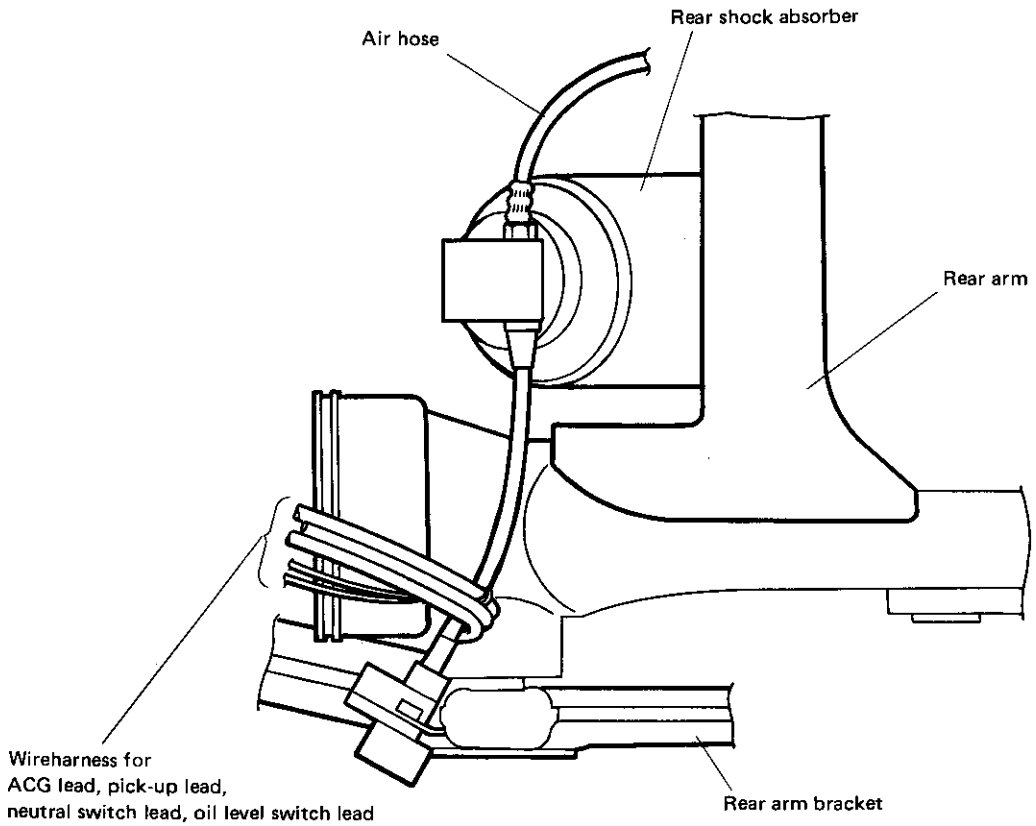
"A" VIEW (CABLE ROUTING (1))



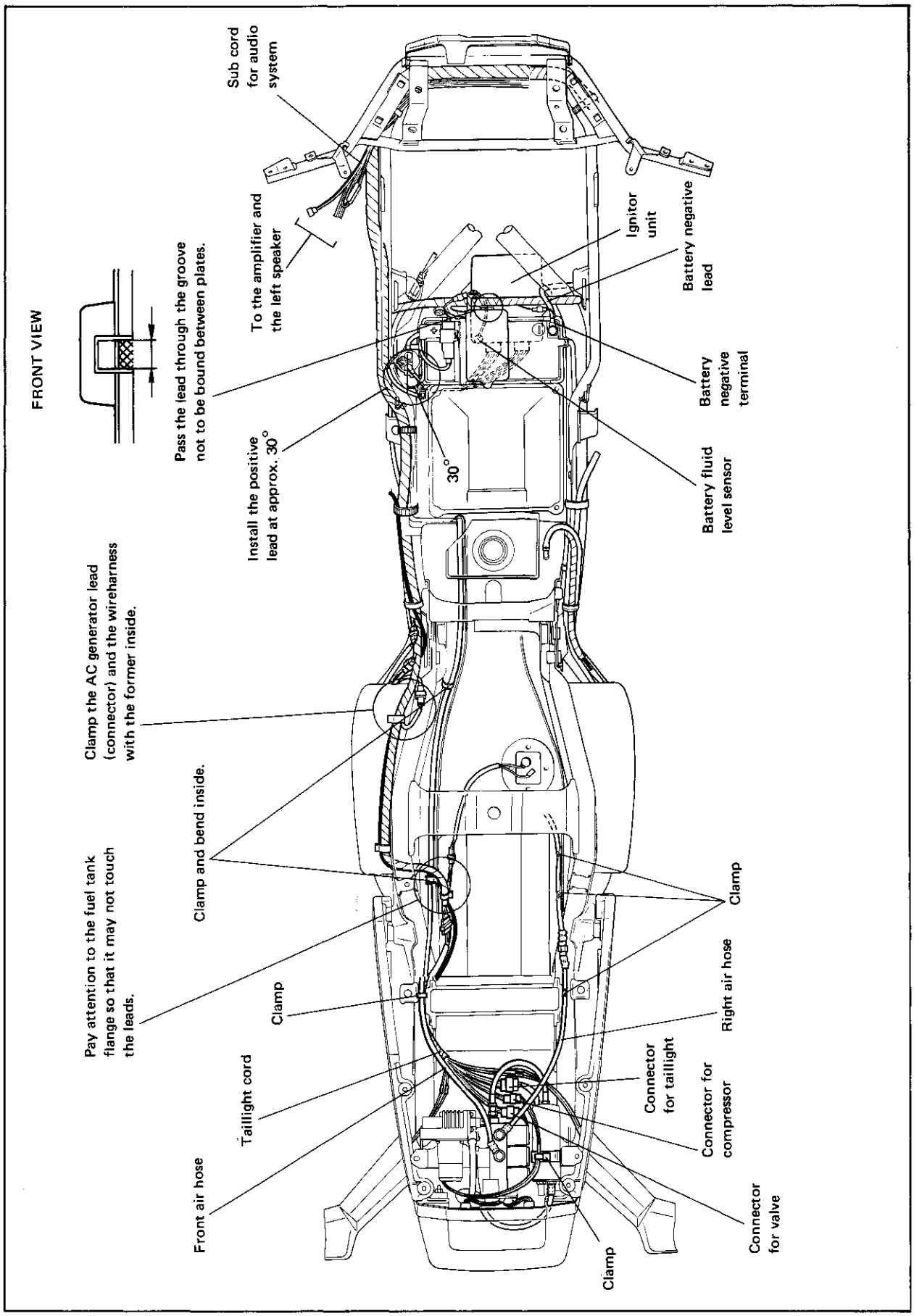

"C" VIEW (CABLE ROUTING (2))



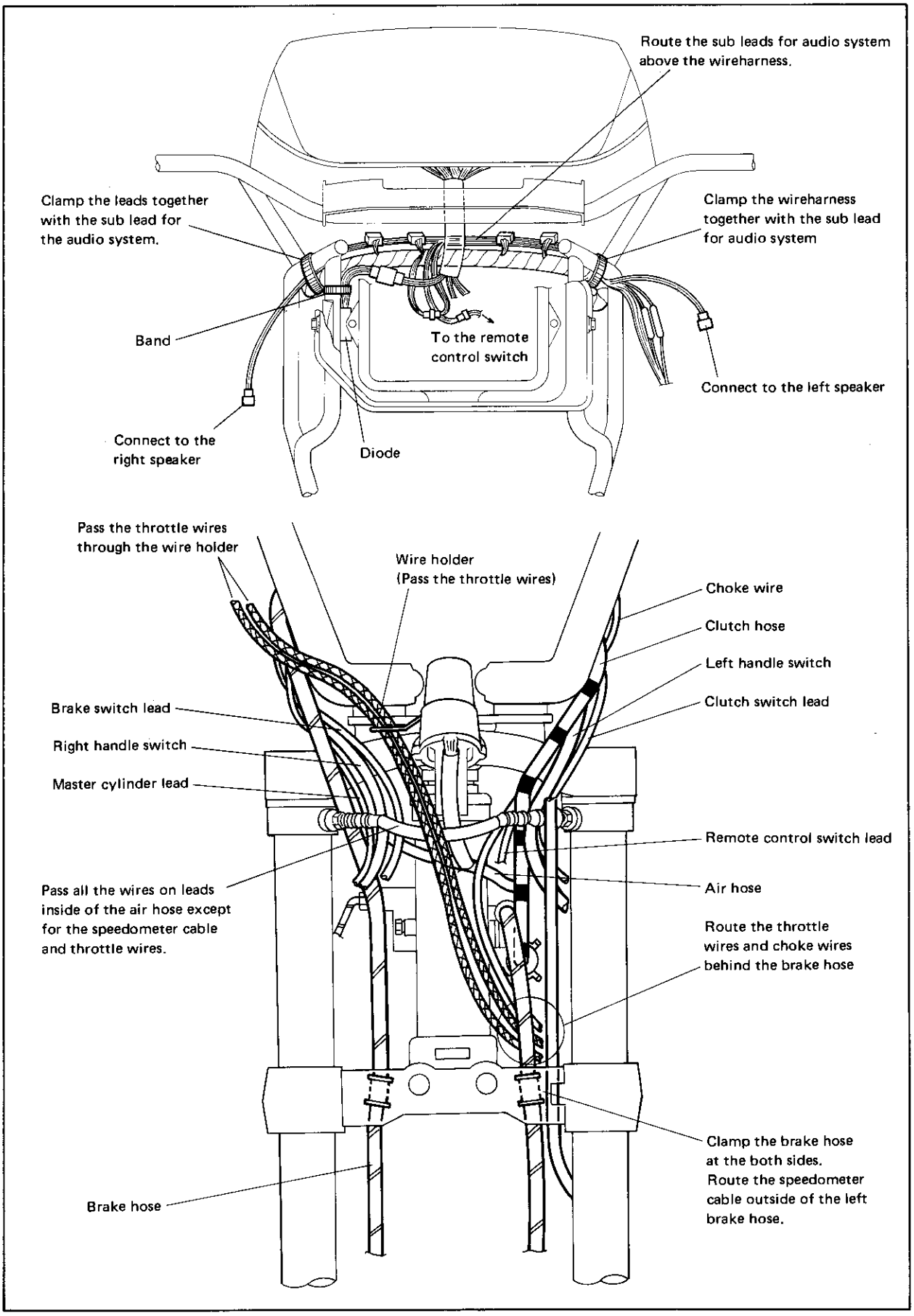

"B" – "B" VIEW (CABLE ROUTING (1))



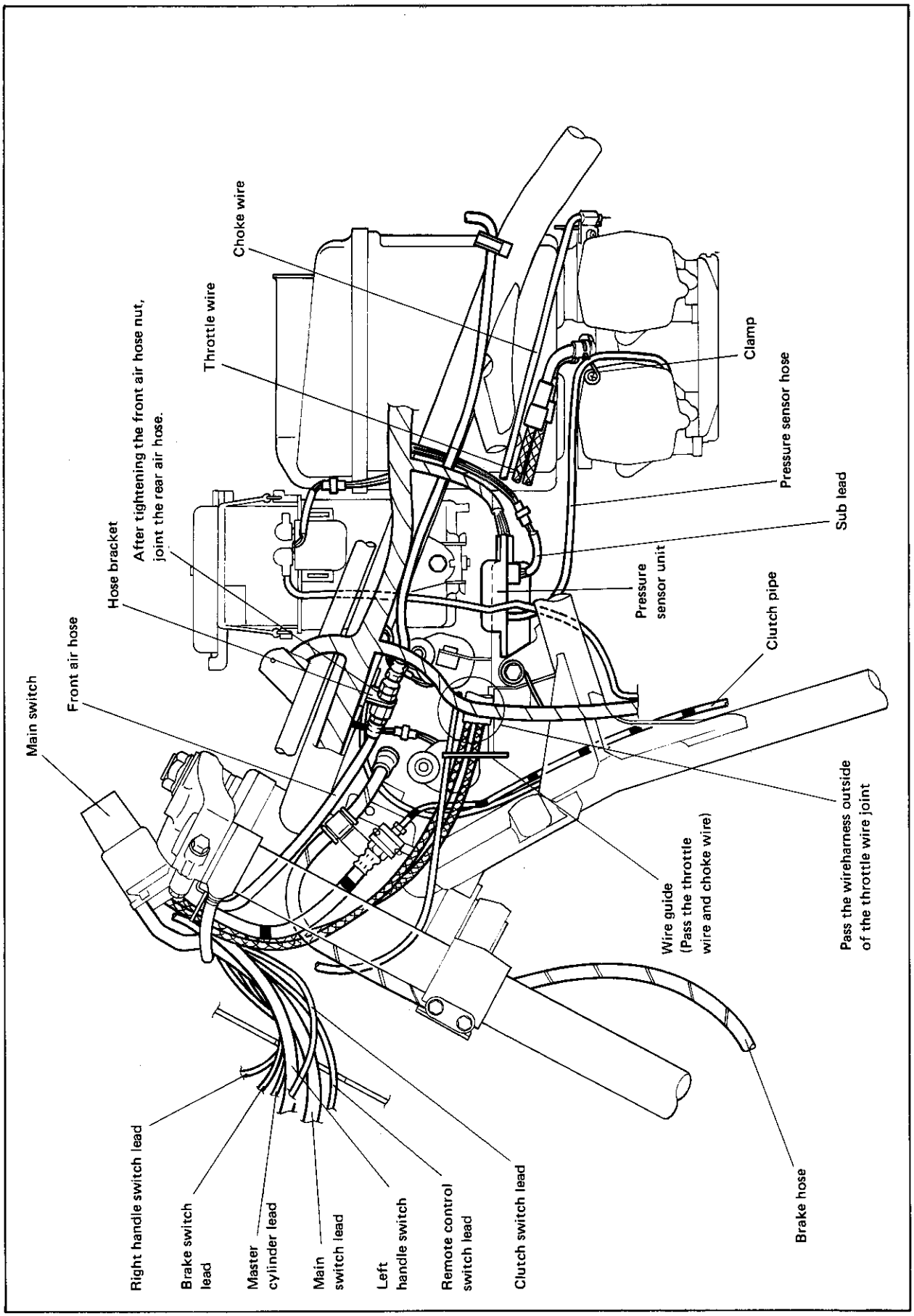
# CABLE ROUTING (4)



# CABLE ROUTING (5)

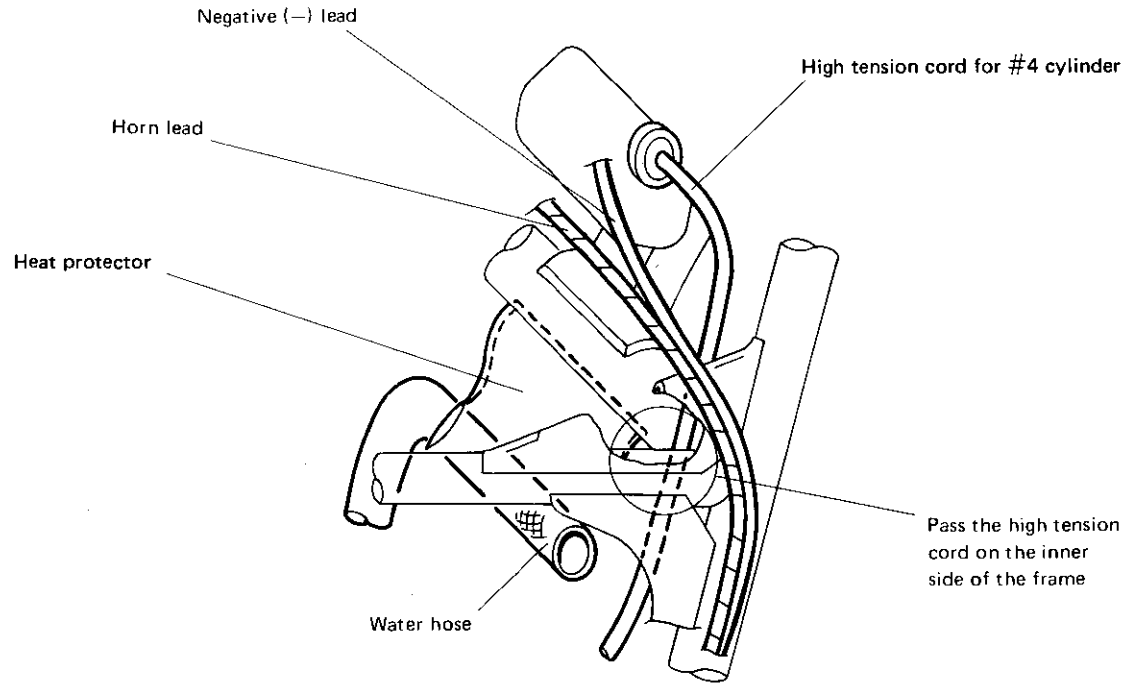


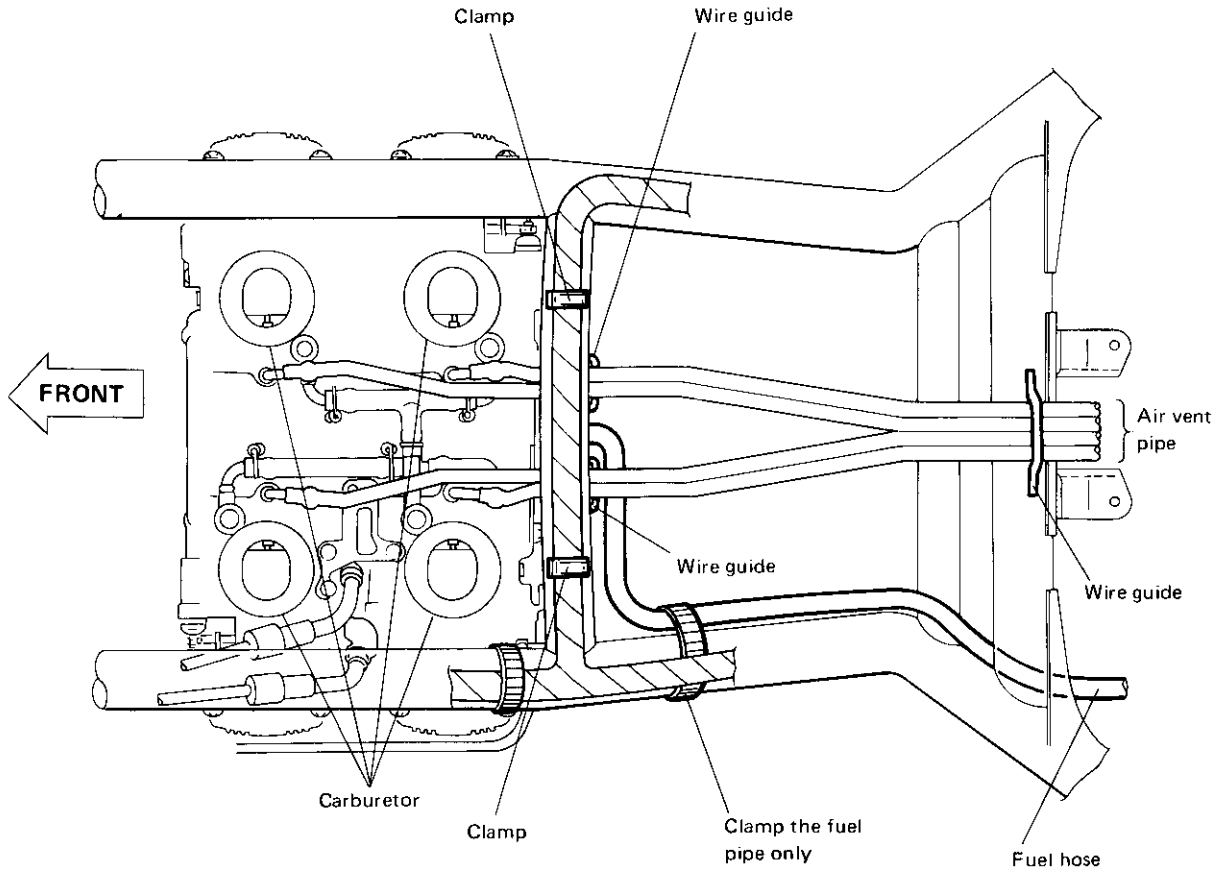
# CABLE ROUTING (6)



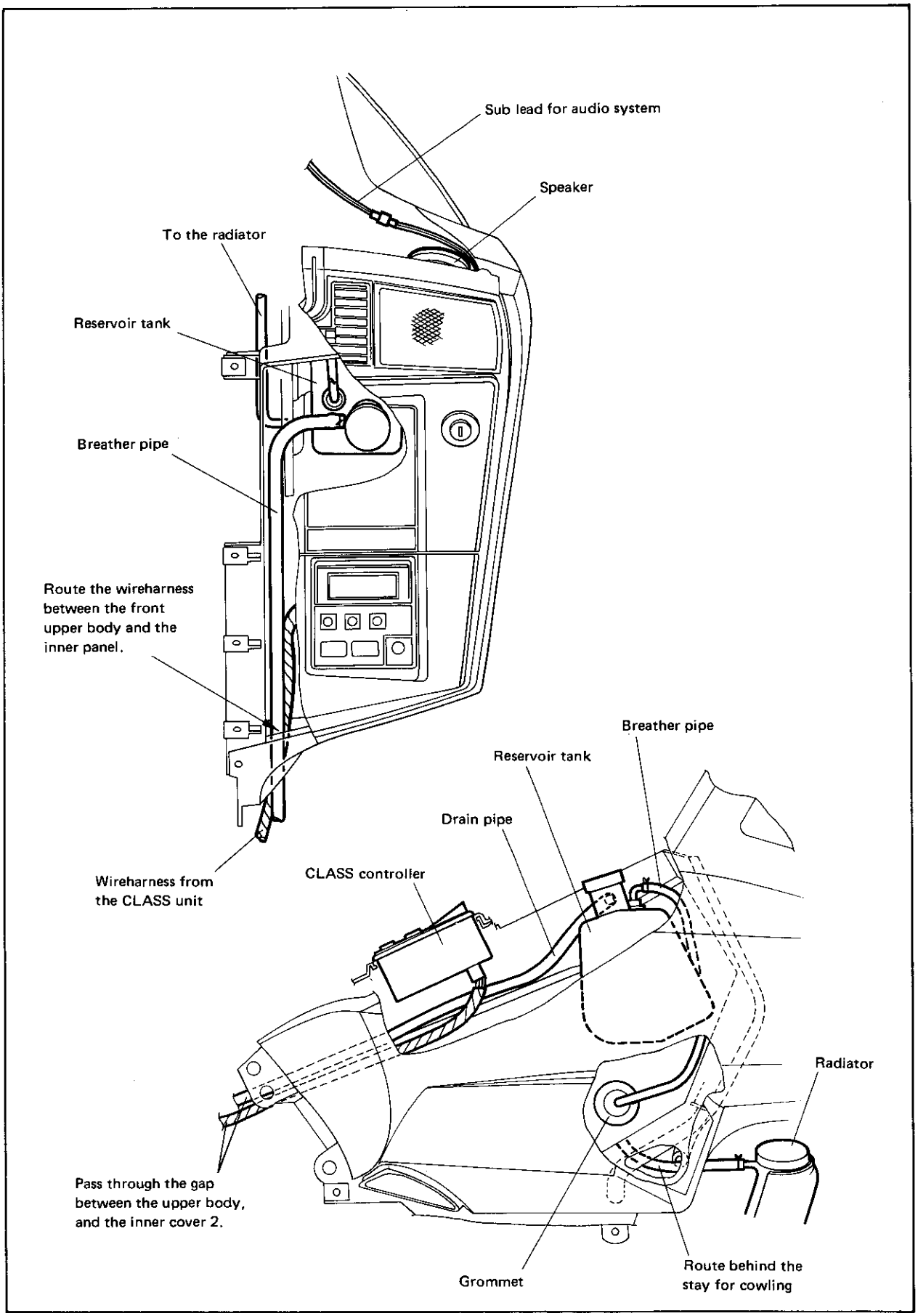
# CABLE ROUTING (7)

## HIGHTENSION CORD ROUTING FOR FRONT RIGHT SIDE

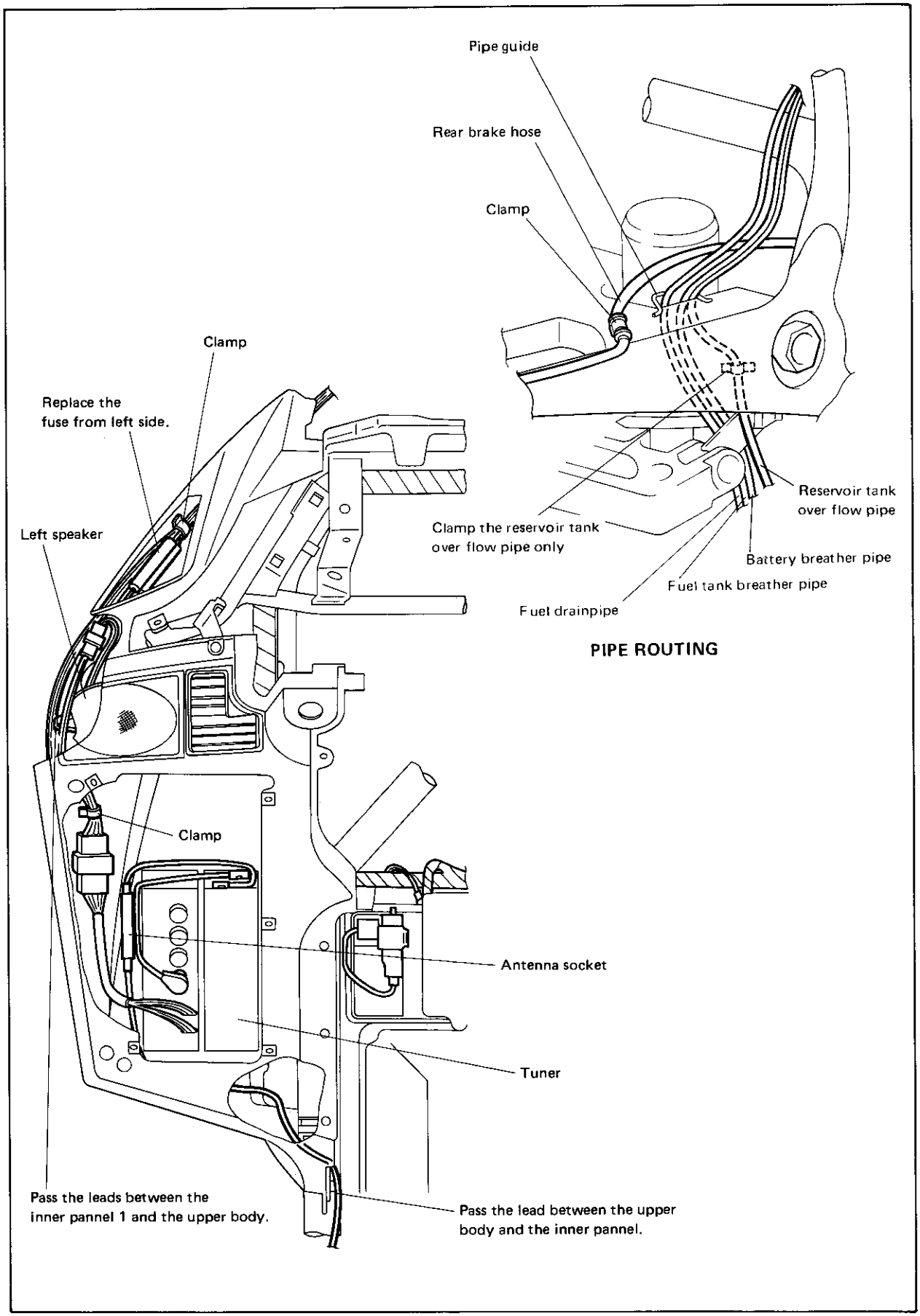


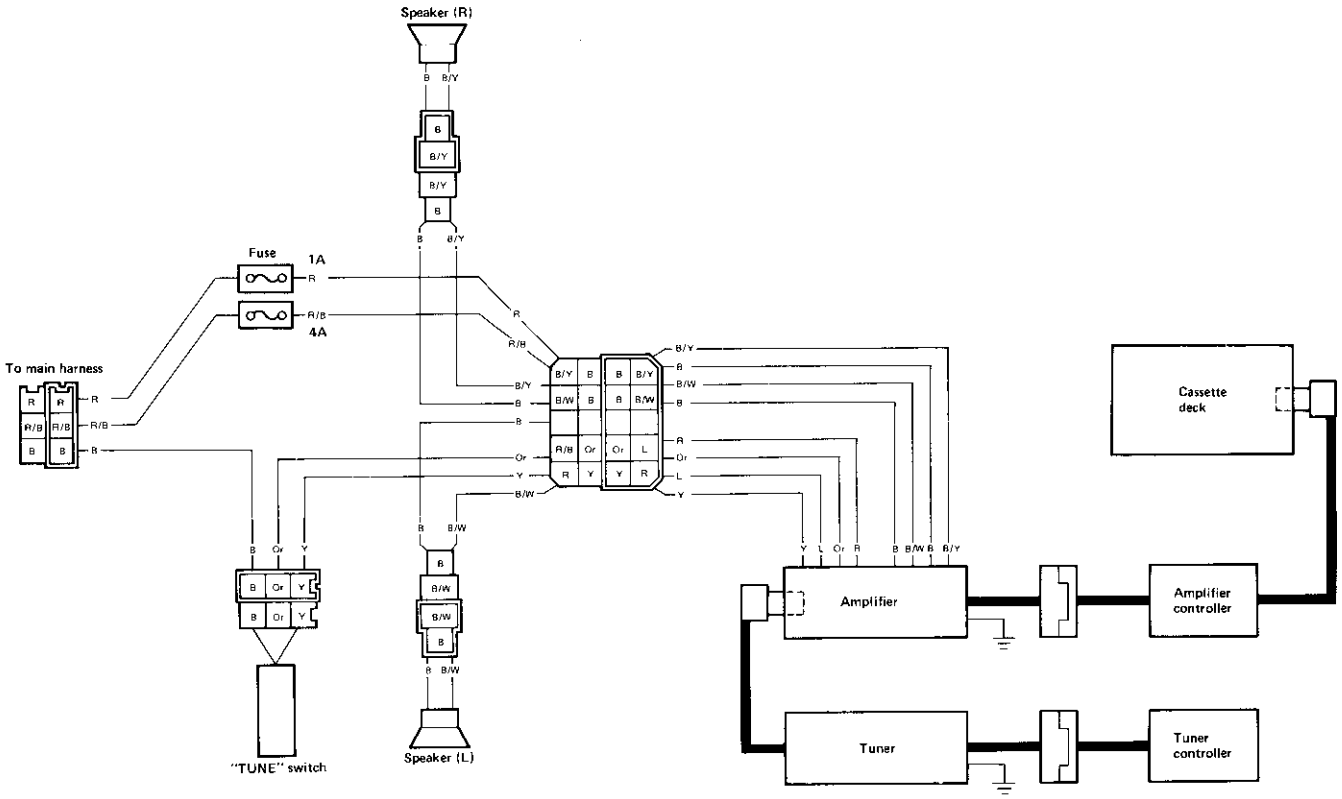
# CABLE ROUTING (8)



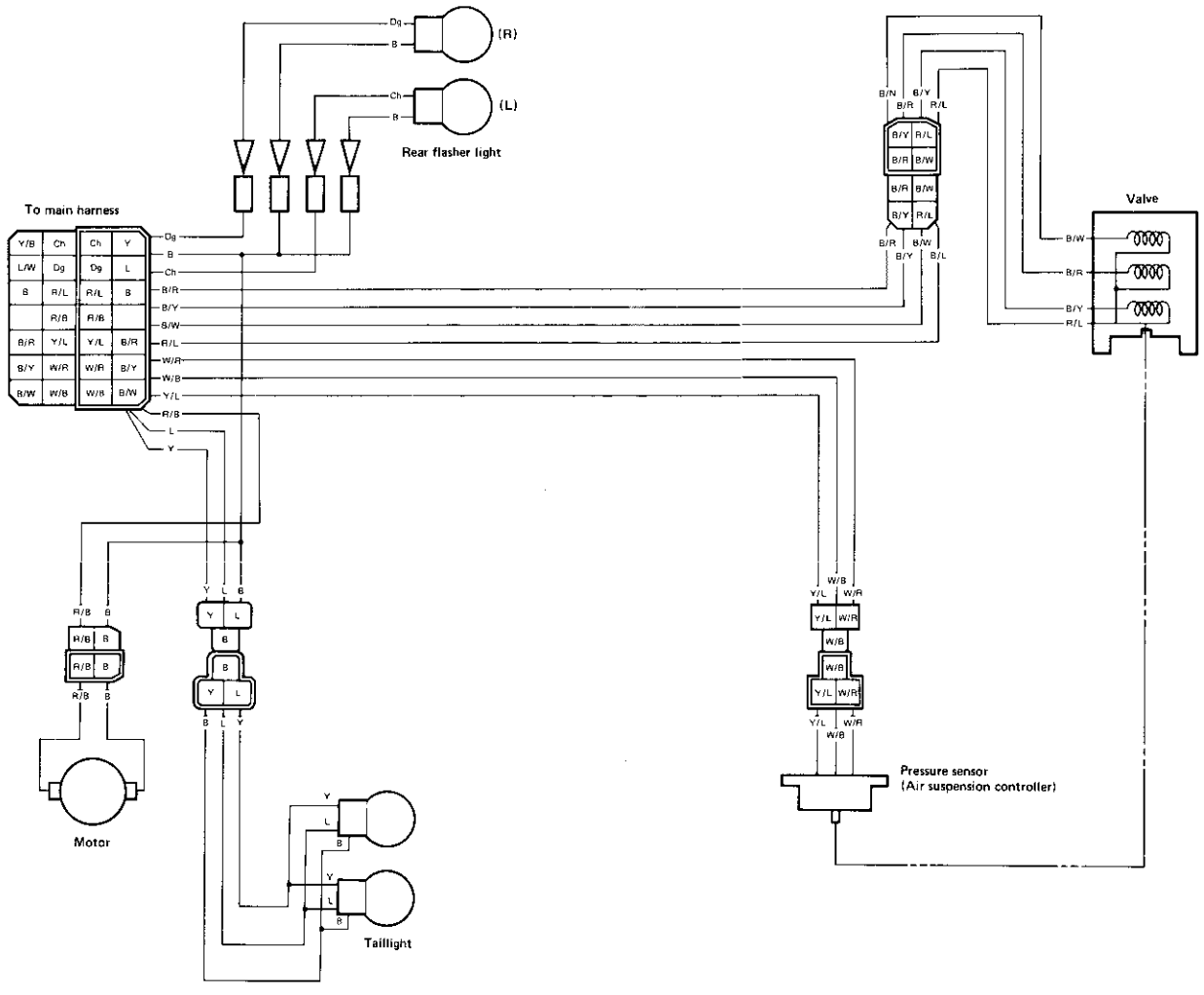
# CABLE ROUTING (9)



## Audio system



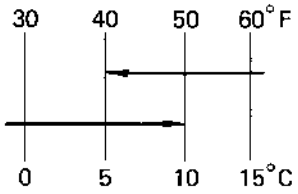

## Air suspension controller



# APPENDICES

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

| Model | XVZ12TK |
|---|---|
| Model Code Number:<br>Engine Starting Number<br>Vehicle I.d Number | 26H<br>26H-000101<br>JYA26H00*DA000101 |
| Dimensions:<br>Overall Length<br>Overall Width<br>Overall Height<br>Seat Height<br>Wheelbase<br>Minimum Ground Clearance | <br>2,470 mm (97.2 in)<br>940 mm (37.0 in)<br>1,490 mm (58.7 in)<br>785 mm (30.9 in)<br>1,610 mm (63.4 in)<br>145 mm ( 5.7 in) |
| Basic Weight:<br>Wight Oil and Full Fuel Tank | <br>333 kg (734 lb) |
| Minimum Turning Radius: | 2,900 mm (114 in) |
| Engine:<br>Engine Type<br>Cylinder Arrangement<br>Displacement<br>Bore x Stroke<br>Compression Ratio<br>Compression Pressure<br>Starting System | <br>Liquid cooled 4-stroke gasolin, DOHC<br>V-4 cylinder<br>1,198 $cm^3$<br>76 x 66 mm (2.99 x 2.60 in)<br>10.5 : 1<br>1176.8 kPa (12.0 $kg/cm^2$, 171 psi)<br>Electric and kick starter |
| Lubrication System: | Wep sump |
| Oil Type or Grade:<br>Engine oil<br><br><br><br>Final Gear Oil | <br>Yamalube 4-cycle oil or SAE 20W40 type SE motor oil SAE 20W40 type SE motor oil<br>(If temperature does not go below 5°C (40°F))<br><br>SAE 10W30 type SE motor oil (If temperature does not go above 15°C (60°F))<br><br>SAE 80 API "GL-4" Hypoid gear oil |
| Oil Capacity:<br>Engine Oil: Periodic Oil Change<br>With Oil Filter Replacement<br>Total Amount<br>Final Gear Case Oil Amount | <br>3.2 L (2.8 Imp qt, 3.4 US qt)<br>3.5 L (3.1 Imp qt, 3.7 US qt)<br>4.5 L (3.9 Imp qt, 4.8 US qt)<br>0.3 L (0.26 Imp qt, 0.32 US qt) |
| Radiator Capacity:<br>(Including All routes) | <br>2.8 L (2.5 Imp qt, 3.0 US qt) |
| Air Filter: | Dry type element |
| Fuel:<br>Type<br>Tank Capacity | <br>Regular gasoline<br>2.0 L (4.4 Imp qt, 5.3 US gal) |
| Carburetor:<br>Type/Manufacturer | <br>BDS 34 x 4 / MIKUNI |
| Spark Plug:<br>Type/Manufacturer<br>Gap | <br>DPR8EA-9/NGK, X24EPR-U9/NIPPONDENSO<br>0.8 ~ 0.9 mm (0.031 ~ 0.035 in) |

8

| Model | XVZ12TK |
|---|---|
| Clutch Type: | Wet, multiple-disc |
| Transmission: | |
| Primary Reduction System | Spar gear |
| Primary Reduction Ratio | 87/49 (1.775) |
| Secondary Reduction System | Shaft drive |
| Secondary Reduction Ratio | 21/27 x 33/10 (2.567) |
| Transmission Type | Constant mesh, 5-speed |
| Operation | Left foot operation |
| Gear Ratio 1st | 29/15 (2.600) |
| 2nd | 39/22 (1.772) |
| 3rd | 31/23 (1.347) |
| 4th | 31/29 (1.068) |
| 5th | 29/32 (0.906) |
| Chassis: | |
| Frame Type | Tublar stee, Double cradle |
| Caster Angle | 28° 30′ |
| Trail | 125 mm (4.9 in) |
| Tire: | |
| Type | Tubeless |
| Size (F) | 120/90-18-65H |
| Size (R) | 140/90-16-71H |
| Tire Pressure (Cold tire): | |
| Basic weight: | |
| With oil and full fuel tank | 333 (734 lb) |
| Maximum load* | 197 kg (434 lb) |

| Cold tire pressure | FRONT | REAR |
|---|---|---|
| Up to 90 kg (198 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |
| 90 kg (198 lb) ~ 197 kg (434 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 275 kPa (2.8 kg/cm$^2$, 40 psi) |
| High speed riding | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |

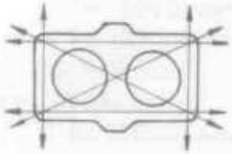
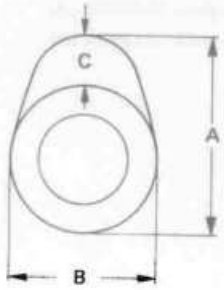
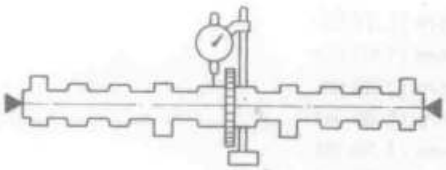
* Load is the total weight of acrgo, rider, passenger, and accessories.

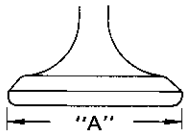
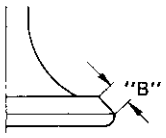
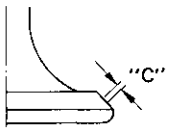
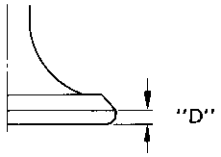
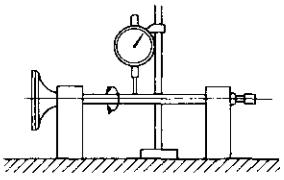
| | |
|---|---|
| Brake: | |
| Front Right-side | Disc brake |
| Operation | Right hand operation |
| Front Left-side and Rear | Disc brake |
| Operation | Right foot operation |
| Suspension: | |
| Front Suspension | Telescopic fork |
| Rear Suspension | Swing arm (Monocross suspension) |
| Shock Absorber: | |
| Front Shock Absorber | Air, Coil spring, Oil damper |
| Rear Shock Absorber | Air, Coil spring, Oil damper |
| Wheel Travel: | |
| Front Wheel Travel | 140 mm (5.5 in) |
| Rear Wheel TRavel | 105 mm (4.1 in) |
| Electrical: | |
| Ignition System | T.C.I. |
| Generator System | A.C. generator |
| Battery Type or Model | GM18Z-3A |
| Battery Capacity | 12V 20AH |
| Headlight Type: | Semi-sealed beam (Quartz bulb) |

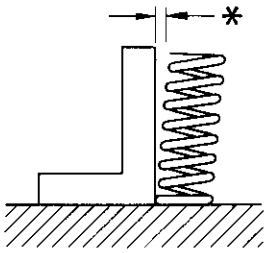
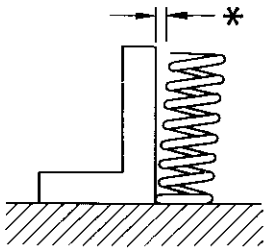
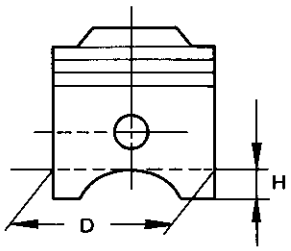
| Model | XVZ12TK |
|---|---|
| Bulb Wattage/Quantity: | |
| Headlight | 12V, 60W/55W x 1 |
| Tail/Brake Light | 12V, 8W/27W x 2 |
| Flasher Light | 12V, 27W x 4 |
| Parking/Running Light | 12V, 8W x 2 |
| Indicator light WAttage/Quantity: | |
| "METER LIGHT" | 12V, 3.4W x 4 |
| "NEUTRAL" | 12V, 3.4W x 1 |
| "HIGH BEAM" | 12V, 3.4W x 1 |
| "TURN" | 12V, 3.4W x 2 |

## MAINTENANCE SPECIFICATIONS

### ENGINE

| Model | XVZ12TK |
|---|---|
| Cylinder Head: | |
| Warp Limit*  | 0.03 mm (0.0012 in) |
| Cylinder: | |
| Bore Size | 75.07 ~ 76.02 mm (2.9555 ~ 2.9929 in) |
| Taper Limit | 0.05 mm (0.002 in) |
| Out of Round Limit | 0.05 mm (0.002 in) |
| Cam shaft: | |
| Drive Method | Chain drive (Center) |
| Cam Cap Inside Dia. | 25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in) |
| Camshaft Outside Dia. | 24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in) |
| Shaft-to-Cap Clearance | 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in) |
| Cam Dimensions | |
| Intake "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit > | 36.15 mm (1.42 in) |
| Intake "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
| Exhaust "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit > | 36.15 mm (1.42 in) |
| Exhaust "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
|   | |
| Camshaft Runout Limit | 0.03 mm (0.0012 in) |
|  | |
| Cam Chain: | |
| Cam Chain Type/No. of Links | BF05M/118 |
| Cam Chain Adjustment Method | Automatic |

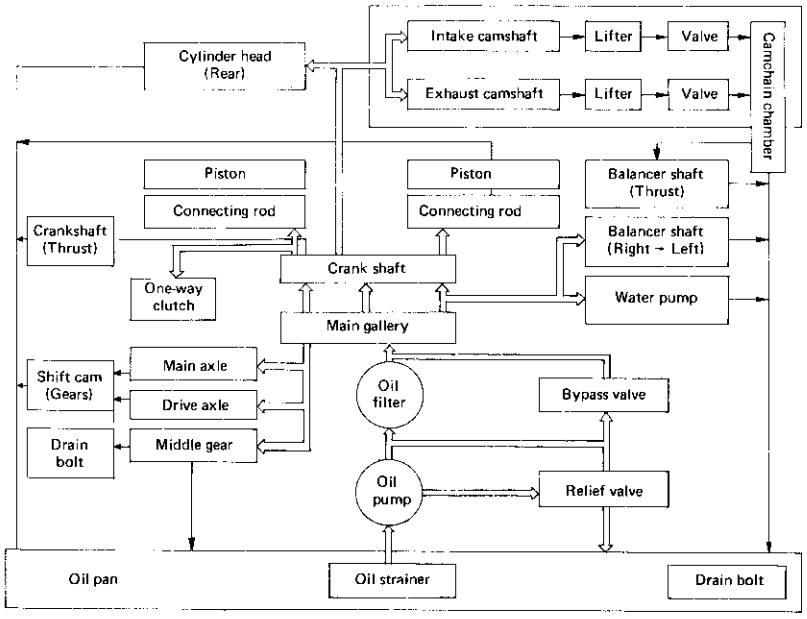
| Model | | XVZ12TK |
|---|---|---|
| Valve, Valve Seat, Valve Guide: | | |
| Valve Clearance (Cold): | IN. | 0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in) |
| | EX. | 0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in) |
| Valve Dimensions | | |
|   Head Dia. | | |
|   Face Width | | |
|   Seat Width | | |
|   Margin Thickness | | |
| "A" Head Dia. | IN. | 28.9 ~ 29.1 mm (1.1378 ~ 1.1457 in) |
| | EX. | 23.9 ~ 24.1 mm (0.9409 ~ 0.9488 in) |
| "B" Face Width | IN. | 1.6 ~ 3.1 mm (0.063 ~ 0.122 in) |
| | EX. | 1.3 ~ 2.4 mm (0.0512 ~ 0.0945 in) |
| "C" Seat Width | IN. | 0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in) |
| | EX. | 0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in) |
| < Limit > | IN. | 1.4 mm (0.0551 in) |
| | EX. | 1.4 mm (0.0551 in) |
| "D" Margin Thickness | IN. | 1.1 ~ 1.5 mm (0.0433 ~ 0.0591 in) |
| | EX. | 1.1 ~ 1.5 mm (0.0433 ~ 0.0591 in) |
| < Limit > | IN. | 0.7 mm (0.0276 in) |
| | EX. | 0.7 mm (0.0276 in) |
| Stem Outside Dia. | IN. | 5.975 ~ 5.990 mm (0.2352 ~ 0.2358 in) |
| | EX. | 5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in) |
| < Limit > | IN. | 5.945 mm (0.234 in) |
| | EX. | 5.92 mm (0.233 in) |
| Guide Inside Dia. | IN. | 6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in) |
| | EX. | 6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in) |
| < Limit > | IN. | 6.05 mm (0.238 in) |
| | EX. | 6.05 mm (0.238 in) |
| Stem-to-Guide Clearance | IN. | 0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in) |
| | EX. | 0.025 ~ 0.052 mm (0.0010 ~ 0.020 in) |
| < Limit > | IN. | 0.08 mm (0.0031 in) |
| | EX. | 0.10 mm (0.0039 in) |
| Stem Runout Limit | | 0.01 mm (0.0004 in) |
|  | | |
| Valve Spring: | | |
| Inner Spring: | | |
| Free Length | IN. | 37.3 mm (1.47 in) |
| | EX. | 37.3 mm (1.47 in) |
| < Limit > | IN. | 35.3 mm (1.39 in) |
| | EX. | 35.3 mm (1.39 in) |
| Set Length (Valve Closed) | IN. | 31.8 mm (1.25 in) |
| | EX. | 31.8 mm (1.25 in) |
| Compressed Pressure | IN. | 4.57 ~ 5.37 kg (10.077 ~ 11.841 lb) |
| (Installed) | EX. | 4.57 ~ 5.37 kg (10.077 ~ 11.841 lb) |

| Model | | XVZ12TK |
|---|---|---|
| Tilt Limit* | IN. | 2.5° / 1.6 mm (0.063 in) |
| | EX. | 2.5° / 1.6 mm (0.063 in) |
|  | | |
| Direction of Winding | IN. | Left |
| | EX. | Left |
| Outer Spring: | | |
| Free Length | IN. | 39.45 mm (1.55 in) |
| | EX. | 39.45 mm (1.55 in) |
| < Limit > | IN. | 37.25 mm (1.47 in) |
| | EX. | 37.25 mm (1.47 in) |
| Spring Rate | IN-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | IN-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| | EX-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | EX-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| Set Length (Valve Closed) | IN. | 33.8 mm (1.33 in) |
| | EX. | 33.8 mm (1.33 in) |
| Compressed Pressure (Installed) | IN. | 10.1 ~ 11.9 kg (22.271 ~ 26.240 lb) |
| | EX. | 10.1 ~ 11.9 kg (22.271 ~ 26.240 lb) |
| Tilt Limit | IN. | 2.5° / 1.7 mm (0.0669 in) |
|  | EX. | 2.5° / 1.7 mm (0.0669 in) |
| Direction of Winding | IN. | Right |
| | EX. | Right |
| Piston: | | |
| Piston Clearance | | 0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in) |
| < Limit > | | 0.15 mm (0.0059 in) |
| Piston Size "D" | | 75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in) |
| Measuring Point "H" | | 6.5 mm (0.256 in) |
|  | | |
| Oversize | 1st | 76.25 mm (3.002 in) |
| Oversize | 2nd | 76.50 mm (3.012 in) |

| Model | XVZ12TK |
|---|---|
| Piston Ring: | |
| Top Ring: | |
| Type | Barrel |
| Dimensions (B x T) | 2.8 x 1.2 mm (0.1102 x 0.0472 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.7 mm (0.0276 in) |
| Side Clearance (Installed) | 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| 2nd Ring: | |
| Type | Taper |
| Dimensions (B x T) | 3.2 x 1.5 mm (0.1260 x 0.0591 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.8 mm (0.0315 in) |
| Side Clearance | 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| Oil Ring: | |
| Dimensions (B x T) | 3.1 x 2.8 mm (0.1220 x 0.1102 in) |
| End Gap (Installed) | 0.3 ~ 0.9 mm (0.0118 ~ 0.0354 in) |
| Connecting Rod: | |
| Oil Clearance | 0.021 ~ 0.045 mm (0.0008 ~ 0.0018 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink |
| Crankshaft: | |
| Runout Limit "C" | 0.03 mm (0.0012 in) |
| Big End Side Clearance "D" | 0.320 ~ 0.924 mm (0.0126 ~ 0.0364 in) |
| Journal Oil Clearance | 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink 7. Red |
| Clutch: | |
| Friction Plate Thickness | 2.9 ~ 3.1 mm (0.1142 ~ 0.1220 in) |
| Quantity | 8 pcs. |
| Wear Limit | 2.8 mm (0.11 in) |
| Clutch Plate Thickness | 2.2 ~ 2.4 mm (0.0866 ~ 0.0945 in) |
| Quantity | 7 pcs. |
| Warp Limit | 0.2 mm (0.0079 in) |
| Clutch Spring Free Length | 41.6 mm (1.64 in) |
| Quantity | 6 pcs. |
| Minimum Length | 40.3 mm (1.59 in) |
| Push Rod Bending Limit | 0.5 mm (0.0197 in) |
| Transmission: | |
| Main Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Drive Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Shifter: | |
| Shifter Type | Guide Bar |
| Guide Bar Bending Limit | 0.025 mm (0.001 in) |

| Model | | XVZ12TK |
|---|---|---|
| Carburetor: | | |
| I.D. Mark | | 26H 00 |
| Main Jet | (M.J.) | #117.5 |
| Main Air Jet | (M.A.J.) | #65 |
| Jet Needle | (J.N.) | 5GLZ37 |
| Needle Jet | (N.J.) | X-6 |
| Pilot Air Jet | (P.A.J. 1) | #80 |
| | (P.A.J. 2) | #180 |
| Pilot Outlet | (P.O.) | 0.8 |
| Bypass | (B.P. 1) | 0.8 |
| | (B.P. 2) | 0.8 |
| | (B.P. 3) | 0.9 |
| Valve Seat Size | (V.S.) | 1.5 |
| Starter Jet | (G.S. 1) | #45 |
| | (G.S. 2) | #0.8 |
| Fuel Level | (F.L.) | 14 ± 0.5 mm (0.55 ± 0.020 in) |
| Engine Idling Speed | | 950 ~ 1,050 r/min |
| Vacuum Pressure at Idling Speed | | Above 250 mm Hg (9.8425 in Hg) |
| Vacuum Synchronous Difference | | Below 10 mm Hg (0.3937 in Hg) |
| Fuel Pump: | | |
| Type | | Electrical type |
| Consumption Amperage (Max.) | | 0.7A |
| Out-put Pressure | | 10.8 ~ 15.7 kPa (0.11 ~ 0.16 kg/cm$^2$, 1.16 ~ 2.28 psi) |
| Lubrication System: | | |
| Oil Filter Type: | | Paper type |
| Oil Pump Type: | | Trochoid type |
| Tip clearance | | 0 ~ 0.12 mm (0 ~ 0.0047 in) |
| < Limit > | | 0.17 mm (0.0067 in) |
| Side Clearance | | 0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in) |
| < Limit > | | 0.08 mm (0.0031 in) |
| Bypass Valve Setting Pressure | | 166.72 ~ 235.37 kPa (1.7 ~ 2.4 kg/cm$^2$, 24.174 ~ 34.128 psi) |
| Relief Valve Operating Pressure | | 431.51 ~ 549.19 kPa (4.4 ~ 5.6 kg/cm$^2$, 62.568 ~ 79.632 psi) |

Lubrication Chart:



| Model | | XVZ12TK |
|---|---|---|
| Cooling System: | | |
| Radiator Core Size: | Width | 363.8 mm (14.3 in) |
| | Height | 240 mm (9.45 in) |
| | Thickness | 16 mm (0.63 in) |
| Radiator Cap Opening Pressure | | 73.553 ~ 102.97 kPa (0.75 ~ 1.05 kg/cm$^2$, 10.665 ~ 14.931 psi) |
| Reservoir Tank Capacity | | 0.39 L (0.343 Imp qt, 0.412 US qt) |
| < From Low to Full Level > | | 0.25 L (0.22 Imp qt, 0.264 US qt) |
| Water Pump | | |
| Type | | Single-suction centrifugal pump |
| Reduction Ratio | | 31/21 (1.476) |
| Shaft Drive: | | |
| Middle Gear Backlash | | 0.05 ~ 0.10 mm (0.002 ~ 0.004 in) |
| < Limit > | | 0.3 mm (0.0118 in) |
| Final Gear Backlash | | 0.1 ~ 0.2 mm (0.0039 ~ 0.0079 in) |
| < Limit > | | 0.3 mm (0.0118 in) |

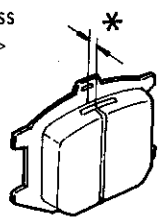
## Tightening torque

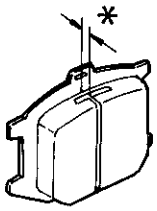
| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Camshaft cap | Bolt | M6 | 32 | 10 | 1.0 | 7.2 | |
| Cylinder head sand hole plug | Screw | M20 | 6 | 43 | 4.3 | 31 | Apply Loctite |
| Spark plug | – | M12 | 4 | 17.5 | 1.75 | 12.5 | |
| Cylinder head | Nut | M10 | 10 | 43 | 4.3 | 31 | |
| Cylinder head cover | Bolt | M6 | 16 | 10 | 1.0 | 7.2 | |
| Connecting rod | Bolt | M8 | 8 | 38 | 3.8 | 27 | Apply molybdenum disulfide grease |
| AC magneto rotor | Bolt | M10 | 1 | 130 | 13.0 | 94 | |
| Cam sprocket | Special | M7 | 8 | 20 | 2.0 | 14 | |
| Plate (damper chain) | Flange bolt | M8 | 1 | 24 | 2.4 | 17 | Apply Loctite |
| Tensioner | Bolt | M6 | 4 | 12 | 1.2 | 8.7 | |
| Tensioner stopper bolt | Bolt | M16 | 2 | 20 | 2.0 | 14 | |
| Water pump cover | Bolt | M6 | 5 | 10 | 1.0 | 7.2 | |
| Water pump housing | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Coolant drain plug | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Thermostatic valve housing | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Thermostatic valve cover | Screw | M6 | 2 | 7 | 0.7 | 5.1 | |
| Electric fan motor | Screw with washer | M5 | 3 | 4 | 0.4 | 2.9 | |
| Radiator assembly | Bolt with washer | M6 | 4 | 7 | 0.7 | 5.1 | |
| Radiator cover | Screw | M5 | 4 | 4 | 0.4 | 2.9 | |
| Chamber cover (oil/water/breather) | Bolt | M6 | 6 | 10 | 1.0 | 7.2 | |
| Oil pump cover | Screw | M6 | 4 | 7 | 0.7 | 5.1 | |
| Oil strainer housing | Screw | M6 | 3 | 7 | 0.7 | 5.1 | |
| Oil pump | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Oil filter cover | Union bolt | M20 | 1 | 32 | 3.2 | 23 | |
| Engine oil drain bolt | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Oil pan | Bolt | M6 | 12 | 10 | 1.0 | 7.2 | |
| Oil baffle plate | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Oil delivery pipe (lower) | Union bolt | M10 | 1 | 20 | 2.0 | 14 | |
| Oil delivery pipe (upper) | Union bolt | M8 | 2 | 17.5 | 1.75 | 12.5 | |
| Oil delivery pipe (4) | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Oil pipe | Union bolt | M8 | 1 | 17.5 | 1.75 | 12.5 | |

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Carburator | Bolt | M6 | 8 | 12 | 1.2 | 8.7 | |
| Fuel pump | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Exhaust pipe (#1, #3) & joint | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Exhaust pipe (#2, #4) & chamber clamp | Bolt | M8 | 2 | 25 | 2.5 | 18 | |
| Exhaust pipe flange (#2, #4) | Nut | M8 | 8 | 20 | 2.0 | 14 | |
| Muffler bracket | Flange bolt | M10 | 2 | 25 | 2.5 | 18 | |
| Muffler stay & chamber | Nut | M8 | 2 | 24 | 2.4 | 17 | |
| Muffler stay & lower case | Bolt | M8 | 2 | 20 | 2.0 | 14 | |
| Exhaust joint cover | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Crankcase | Blot | M6 | 10 | 12 | 1.2 | 8.7 | |
| Crankcase | Bolt | M8 | 19 | 24 | 2.4 | 17 | |
| Crankcase | Bolt | M10 | 8 | 40 | 4.0 | 29 | Apply oil to bolt threads |
| Dive axle bearing retainer | Torx screw | M8 | 4 | 25 | 2.5 | 18 | Stake |
| Main axle bearing retainer | Screw | M6 | 3 | 7 | 0.7 | 5.1 | Apply Loctite |
| Crankcase cover (left) | Bolt | M6 | 11 | 10 | 1.0 | 7.2 | |
| Lead clamp | Screw | M6 | 2 | 7 | 0.7 | 5.1 | |
| Crankcase cover (right) | Bolt | M6 | 6 | 10 | 1.0 | 7.2 | |
| Middle gear case cover | Bolt | M6 | 9 | 10 | 1.0 | 7.2 | |
| Middle gear oil drain bolt | Bolt | M8 | 1 | 38 | 3.8 | 27 | |
| Startor one-way clutch | Bolt | M8 | 3 | 24 | 2.4 | 17 | Apply Loctite, stake |
| Clutch boss | Nut | M20 | 1 | 70 | 7.0 | 50 | Use lock washer |
| Clutch release cylinder | Special | M6 | 2 | 12 | 1.2 | 8.7 | |
| Clutch pressure plate | Screw | M6 | 6 | 8 | 0.8 | 5.8 | |
| Middle drive gear | Nut | M44 | 1 | 110 | 11 | 80 | Stake |
| Middle drive shaft | Self-lock nut | M14 | 1 | 90 | 9.0 | 65 | Apply Loctite |
| Middle drive shaft bearing housing | Bolt | M8 | 3 | 30 | 3.0 | 22 | |
| Shift cam segment | Torx screw | M6 | 1 | 12 | 1.2 | 8.7 | Apply Loctite |
| Shift cam plate (neutral) | Screw | M5 | 1 | 4 | 0.4 | 2.9 | Apply Loctite |
| Shift cam bearing stopper | Screw | M6 | 3 | 7 | 0.7 | 5.1 | Apply Loctite |
| Change lever adjustor | Screw | M8 | 1 | 22 | 2.2 | 16 | Use lock washer |
| Shift cam stopper lever | Screw with washer | M6 | 1 | 8 | 0.8 | 5.8 | Apply Loctite |
| Change pedal adjustor lock | Nut | M6 | 4 | 10 | 1.0 | 7.2 | |
| Change pedal/linkage pinch bolt | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Thermostatic switch | – | – | 1 | 15 | 1.5 | 11 | Apply Yamabond #4 |
| Thermo-unit | – | – | 1 | 15 | 1.5 | 11 | Apply Yamabond #4 |
| Neutral switch | Screw | M5 | 3 | 4 | 0.4 | 2.9 | |
| Starter motor | Flange bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Oil level switch | Bolt with washer | M6 | 2 | 10 | 1.0 | 7.2 | |

## CHASSIS

| Model | | XVZ12TK |
|---|---|---|
| Steering System: | | |
| Steering Bearing Type | | Taper roller bearing |
| Front Suspension: | | |
| Front Fork Travel | | 140 mm (5.51 in) |
| Fork Spring Free Length | | 453.5 mm (17.9 in) |
| < Limit > | | 448.5 mm (17.7 in) |
| Collar Length | | 97 mm (3.82 in) |
| Spring Rate | K1 | 4.12 N/mm (0.42 kg/mm, 23.5 lb/in) |
| | K2 | 7.85 N/mm (0.8 kg/mm, 44.8 lb/in) |
| Stroke | K1 | 0 ~ 112 mm (0 ~ 4.4094 in) |
| | K2 | 112 ~ 140 mm (4.4094 ~ 5.5118 in) |
| Optional Spring | | No. |
| Oil Capacity | | 400 $cm^3$ (14.1 Imp oz, 13.5 US oz) |
| Oil Level | | 162.5 mm (6.4 in) |
| Oil Grade | | Yamaha fork oil 10wt or equivalent |
| Enclosed Air Pressure (Std.) | | 78.5 kPa (0.8 $kg/cm^2$, 11.4 psi) |
| < Min. ~ Max. > | | 78.5 ~ 118 kPa (0.8 ~ 1.2 $kg/cm^2$, 12 ~ 18 psi) |
| Rear Suspension: | | |
| Shock Absorber Travel | | 40 mm (1.57 in) |
| Spring Free Length | | 214.5 mm (8.44 in) |
| < Limit > | | 209.5 mm (8.25 in) |
| Fitting Length | | 181.5 mm (7.15 in) |
| Spring Rate | K1 | 84.3 N/mm (8.6 kg/mm, 481 lb/in) |
| Stroke | K1 | 40 mm (1.5748 in) |
| Optional Spring | | No. |
| Enclosed Gas/Air Pressure (Std.) | | 98.1 kPa (1 $kg/cm^2$, 14 psi) |
| < Min. ~ Max. > | | 98.1 ~ 490 kPa (1.0 ~ 5.0 $kg/cm^2$, 14 ~ 72 psi) |
| Rear Arm: | | |
| Swingarm Free Play Limit | End | 0 mm (0 in) |
| Swingarm Free Play Limit | Side | 0 mm (0 in) |
| Front Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT2.15 x 18 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.0394 in) |
| | Lateral | 0.5 mm (0.0197 in) |
| Rear Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT3.00 x 16 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.04 in) |
| | Lateral | 0.5 mm (0.02 in) |
| Front Disc Brake: | | |
| Type | | Dual |
| Disc Outside Dia. x Thickness | | 298.0 x 8.5 mm (11.732 x 0.3346 in) |
| Pad Thickness | Inner | 5.5 mm (0.217 in) |
| < Limit > | | 0.5 mm (0.0197 in) |
| Pad Thickness | Outer | 5.5 mm (0.217 in) |
| < Limit > | | 0.5 mm (0.0197 in) |



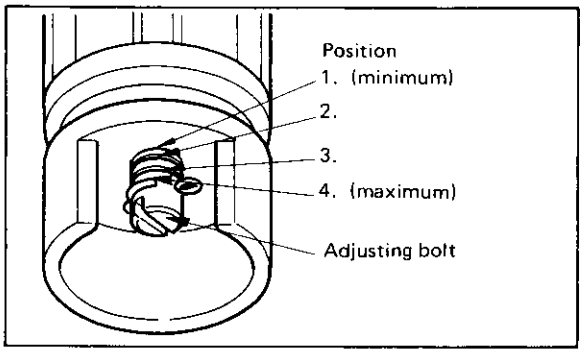
| Model | XVZ12TK |
|---|---|
| Master Cylinder Inside Dia. | 12.7 mm (0.5 in) |
| Caliper Cylinder Inside Dia. | 38.1 mm (1.5 in) |
| Brake Fluid Type | DOT #3 |
| Rear Disc Brake: | |
| Type | Single |
| Disc Outside Dia. x Thickness | 298.0 x 8.5 mm (11.732 x 0.3346 in) |
| Pad Thickness Inner | 5.5 mm (0.217 in) |
| < Limit > | 0.5 mm (0.0197 in) |
| Pad Thickness Outer | 5.5 mm (0.217 in) |
| < Limit > | 0.5 mm (0.0197 in) |
|  | |
| Master Cylinder Inside Dia. | 15.87 mm (0.625 in) |
| < Limit > | 0 mm (0 in) |
| Caliper Cylinder Inside Dia. | 42.8 mm (1.69 in) |
| < Limit > | 0 mm (0 in) |
| Brake Fluid Type | DOT #3 |
| Brake Lever and Brake Pedal: | |
| Brake Lever Free Play | 5 ~ 8 mm (0.20 ~ 0.32 in) |
| Brake Pedal Position | 10 mm (0.4 in) |
| Brake Pedal Free Play | 13 ~ 15 mm (0.5 ~ 0.6 in) |

**Recommended combinations of the front fork and the rear shock absorber.**
Use this table as guidance to meet specific riding conditions and motorcycle load.

| Front fork | Rear shock absorber | | Loading condition | | | |
|---|---|---|---|---|---|---|
| Air pressure | Air pressure | Damping adjuster | Solo rider | With passenger | With accessory equipments | With accessory equipments and passenger |
| 78.5 kPa (0.8 kg/cm$^2$, 12 psi) | 98.1 kPa (1.0 kg/cm$^2$, 14 psi) | 1 or 2 | ○ | | | |
| 78.5 ~ 98.1 kPa (0.8 ~ 1.0 kg/cm$^2$, 12 ~ 14 psi) | 196 ~ 294 kPa (2.0 ~ 3.0 kg/cm$^2$, 28 ~ 42 psi) | 2 or 3 | | ○ | ○ | |
| 78.5 ~ 118 kPa (0.8 ~ 1.2 kg/cm$^2$, 12 ~ 18 psi) | 294 ~ 490 kPa (3.0 ~ 5.0 kg/cm$^2$, 42 ~ 72 psi) | 3 or 4 | | | | ○ |

**Recommended adjustment of the front fork anti-dive.**
Use this table as guidance to meet specific riding conditions and motorcycle load.

| Adjusting bolt position | Loading condition | | |
|---|---|---|---|
| | Solo rider | With accessory equipments or passenger | With accessory equipments and passenger |
| 1 | ○ | | |
| 2 | ○ | ○ | |
| 3 | | ○ | ○ |
| 4 | | | ○ |

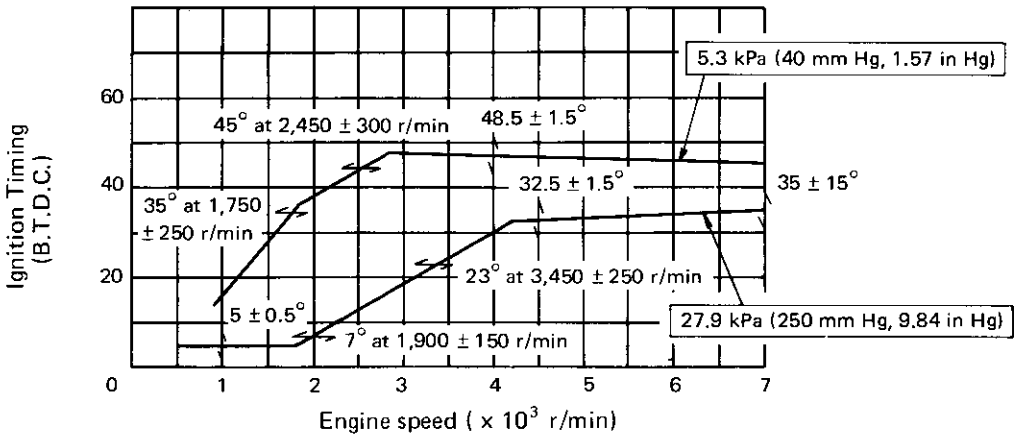


## Tightening torque

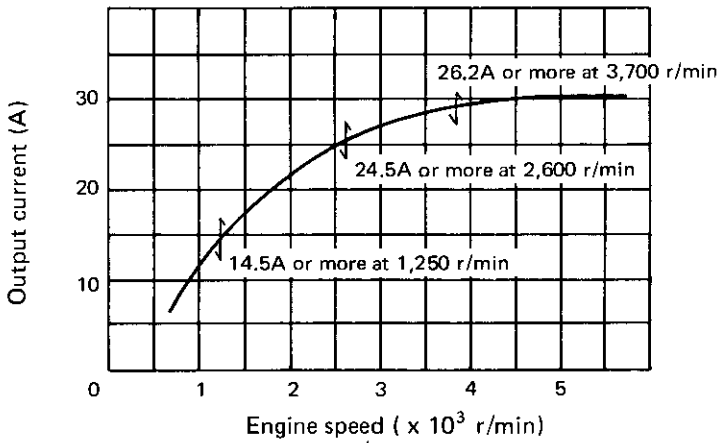
| Part to be tightened | Thread size | Tightening torque | | | Remarks |
|---|---|---|---|---|---|
| | | Nm | m·kg | ft·lb | |
| Front axle nut | M14 x 1.25 | 100 | 10 | 72 | |
| Front axle pinch bolt | M8 x 1.25 | 20 | 2.0 | 14.0 | |
| Under bracket & inner tube | M8 x 1.25 | 17 | 1.7 | 12 | |
| Steering crown & inner tube | M8 x 1.25 | 20 | 2.0 | 14 | |
| Steering stem | M22 x 1.0 | 110 | 11 | 80 | |
| Steering shaft ring nut (Upper) | M25 x 1.0 | 110 | 11 | 80 | |
| Steering shaft ring nut (Lower) | M25 x 1.0 | 6 | 0.6 | 5.1 | |
| Caliper & front fork | M10 x 1.25 | 45 | 4.5 | 32 | Front |
| Caliper & bracket | M10 x 1.25 | 45 | 4.5 | 32 | Rear |
| Caliper & bleed screw | M8 x 1.25 | 6 | 0.6 | 4.3 | |
| Brake hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Clutch hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Brake hose & brake pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Clutch hose & clutch pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Front master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Front master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Clutch master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder & frame | M8 x 1.25 | 23 | 2.3 | 17 | |
| Pivot shaft (Left) & frame | M25 x 1.5 | 100 | 10 | 72 | |
| Pivot shaft (Right) & frame | M25 x 1.5 | 6 | 0.6 | 4.3 | |
| Pivot shaft (Right) & locknut | M25 x 1.5 | 100 | 10 | 72 | |
| Front fender & front fork | M8 x 1.25 | 20 | 2.0 | 14 | |
| Handlebar stopper nut | M10 x 1.0 | 35 | 3.5 | 25 | |
| Handlebar pinch bolt | M6 x 1.0 | 17 | 1.7 | 12 | |
| Handle securing nut | M22 x 1.0 | 125 | 12.5 | 90 | |
| Handle pinch bolt | M8 x 1.25 | 30 | 3.0 | 22 | |
| Engine bracket (Front upper) | M10 x 1.25 | 40 | 4.0 | 29 | |
| Engine bracket (Front lower) | M10 x 1.25 | 40 | 4.0 | 29 | |
| Engine bracket (Rear) | M12 x 1.25 | 70 | 7.0 | 50 | |
| Front cross frame tube | M8 x 1.25 | 23 | 2.3 | 17 | |
| Left side fram tube | M8 x 1.25 | 15 | 1.5 | 11 | |
| Stopper bolt & swingarm | M14 x 1.5 | 92 | 9.2 | 66 | |
| Rear axle | M18 x 1.5 | 150 | 15 | 110 | |
| Rear master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Fuel sendor | M6 x 1.0 | 5 | 0.5 | 3.6 | |
| Relay arm & frame | M12 x 1.25 | 60 | 6.0 | 43 | |
| Relay arm & rear shock absorber | M10 x 1.25 | 60 | 6.0 | 43 | |
| Arm 1 & swingarm | M10 x 1.25 | 30 | 3.0 | 22 | |
| Shock absorber & frame | M10 x 1.25 | 30 | 3.0 | 22 | |
| Footrest & bracket | M10 x 1.25 | 32 | 3.2 | 23 | |
| Frame & rear frame (Seat rail side) | M10 x 1.25 | 55 | 5.5 | 40 | Upper |
| Frame & rear frame (Back stay side) | M10 x 1.25 | 55 | 5.5 | 40 | Lower |
| Frame & cross bar assembly | M8 x 1.25 | 23 | 2.3 | 17 | |

## ELECTRICAL

| Model | XVZ12TK |
|---|---|
| Voltage: | 12V |
| Ignition System: | |
| Ignition Timing (B.T.D.C.) | 5° at 1,000 r/min |
| Advancer Type | Electrical, vacuum |




| | |
|---|---|
| T.C.I.: | |
| Pickup Coil Resistance (Color) | 110Ω ± 15% at 20°C (68°F)<br>(Orange – Black), (Orange – Gray)<br>(Orange – White/Green), (Orange – White/Red) |
| T.C.I. Unit-Model/Manufacturer | T1D14-17/HITACHI |
| Ignition Coil: | |
| Model/Manufacturer | CM11-61/HITACHI |
| Primary Winding Resistance | 2.7Ω ± 10% at 20°C (68°F) |
| Secondary Winding Resistance | 13.2 kΩ ± 20% at 20°C (68°F) |
| Charging System/Type: | A.C. magneto generator |
| A.C. Generator: | |
| Model/Manufacturer | F-X736/HITACHI |
| Nominal Output | 14.5V, 30A at 5,000 r/min |

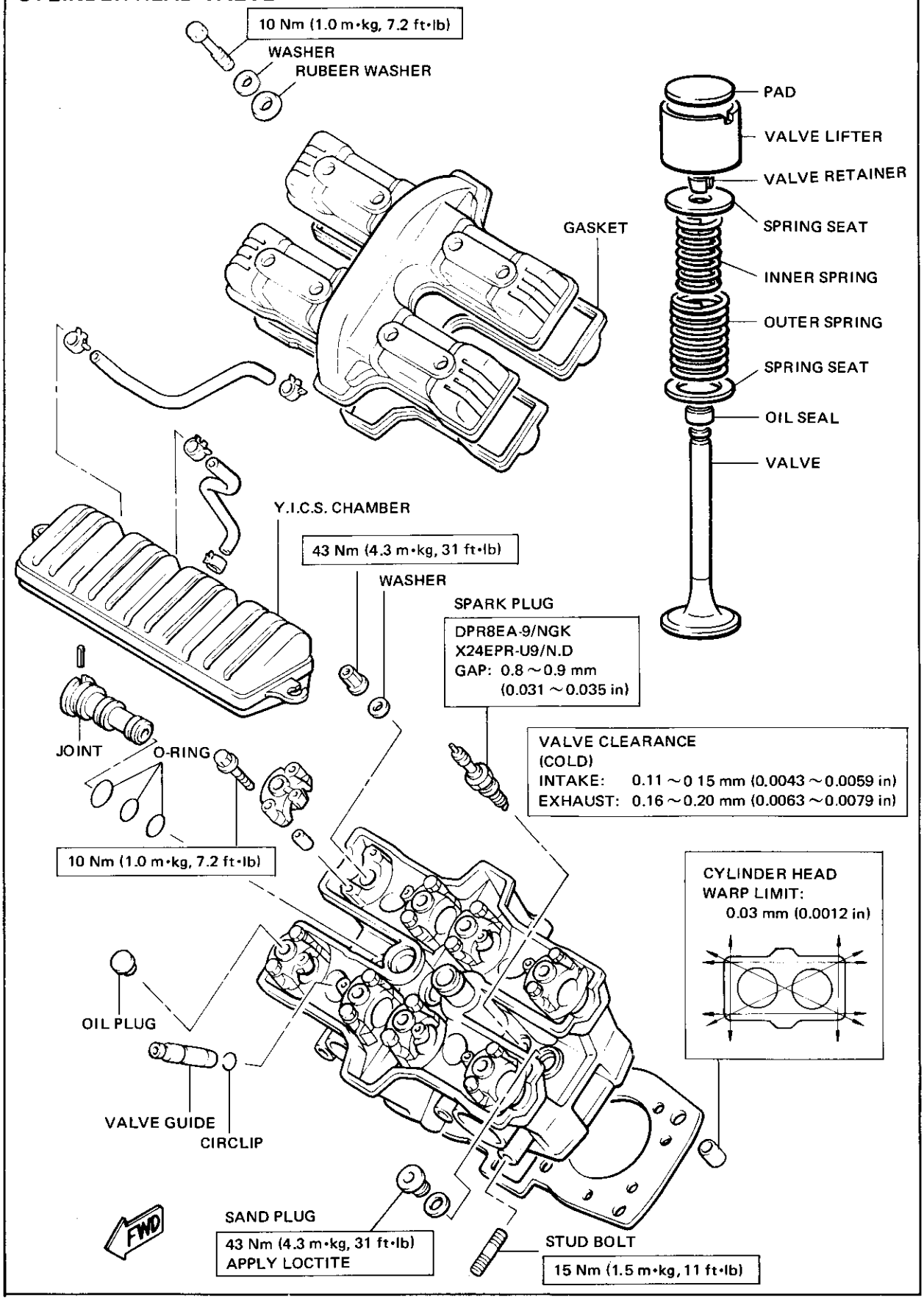


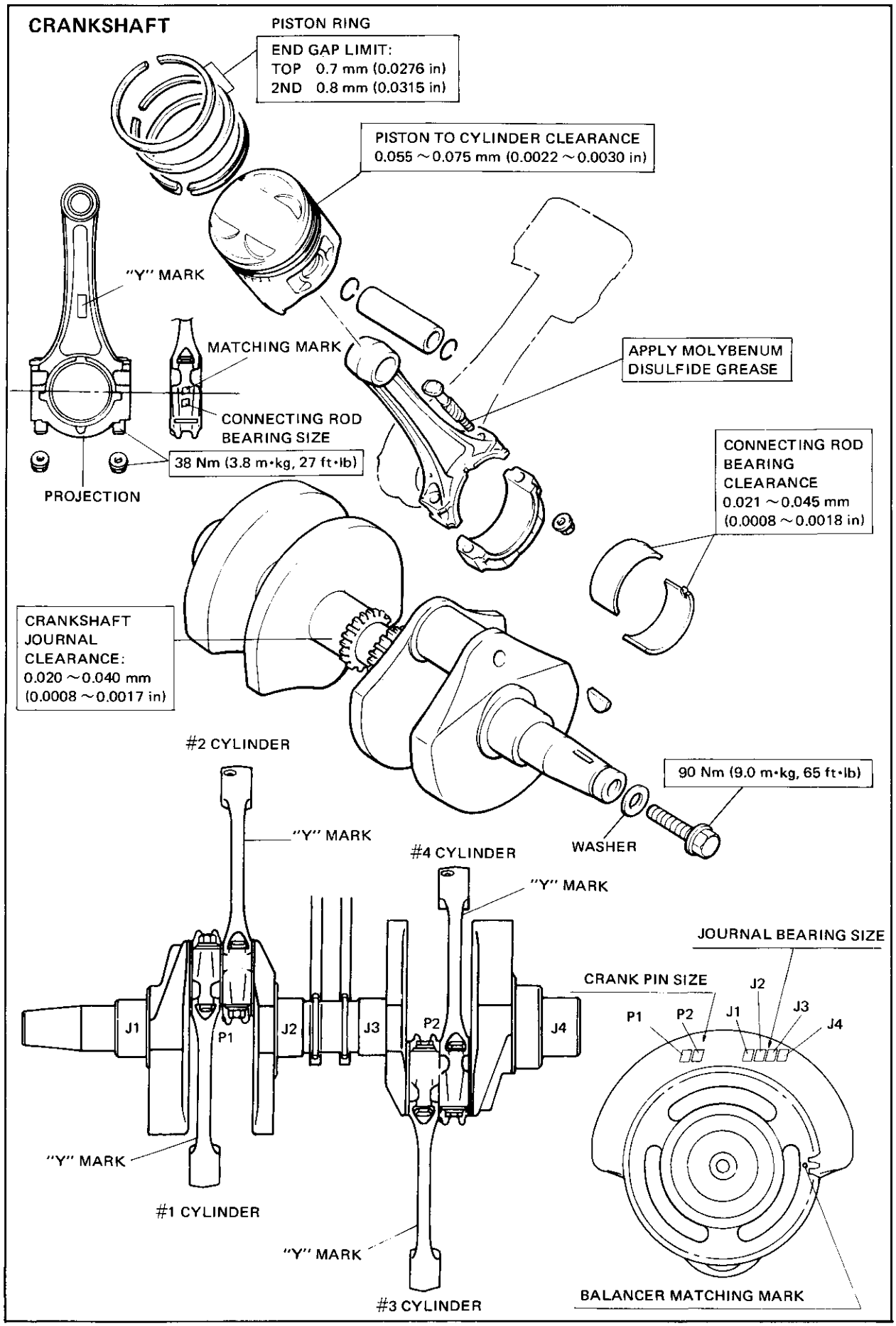

| | |
|---|---|
| Startor Coil Resistance (Color) | 0.42Ω ± 15% at 20°C (68°F)<br>(White – White) |

| Model | XVZ12TK |
|---|---|
| Voltage Regulator: | |
| Type | Short control |
| Model/Manufacture | SH545-12/SHINDENGEN |
| No Load Regulated Voltage | 14 ~ 15V |
| Rectifier: | |
| Model/Manufacturer | SH545-12/SHINDENGEN |
| Capacity | 26A |
| Withstand Voltage | 200V |
| Battery: | |
| Capacity | 12V, 20 AH |
| Specific Gravity | 1.280 |
| Electric Starter System: | |
| Type | Constant mesh type |
| Starter Motor: | |
| Model/Manufacturer | SM-229C/MITSUBA |
| ID. Number | SM-229C |
| Out put | 0.6 kW |
| Brush-Overall Length | 12.5 mm (0.492 in) |
| < Limit > | 4.5 mm (0.177 in) |
| Spring Pressure | 560 ~ 680 g (19.751 ~ 23.984 oz) |
| Commutator Dia. | 28 mm (1.1 in) |
| < Wear Limit > | 27 mm (1.06 in) |
| Mica Undercut | 0.5 mm (0.0197 in) |
| Starter Switch | |
| Model/Manufacturer | I26-22011-D000/HONDALOCK |
| Amperage Rating | 150A |
| Coil Winding Resistance | 3.5Ω ± 10% at 20°C (68°F) |
| Horn: | |
| Type/Quantity | Plain type x 2 |
| Model/Manufacturer | CF3-12/NIKKO |
| Maximum Amperage | 3.0A |
| Flasher Relay: | |
| Type | Condenser type |
| Model/Manufacturer | FU257CD/NIPPONDENSO |
| Self Cancelling Device | Yes. |
| Flasher Frequency | 75 ~ 95 cycle/min |
| Wattage | 27W x 2 + 3.4W |
| Hazard Flasher Relay: | |
| Type | Heat plate type |
| Model/Manufacturer | FR-9H22/MITSUBA |
| Flasher Frequency | 68 ~ 102 cycle/min |
| Wattage | 27W x 4 + 3.4W |
| Self Cancelling Unit: | |
| Model/Manufacturer | YH-001/MATSUSHITA |
| Reserve Lighting Unit: | |
| Model/Manufacturer | 337-81901/KOITO |
| Oil Level Switch: | |
| Model/Manufacturer | 10L/NIPPONDENSO |
| Fuel gauge: | |
| Model/Manufacturer | 26H/NIPPONSEIKI |
| Sender Unit Resistance | |
| Full | 40 ~ 290Ω ± 10% at 20°C (68°F) |
| Empty | 310Ω or more ± 12% at 20°C (68°F) |

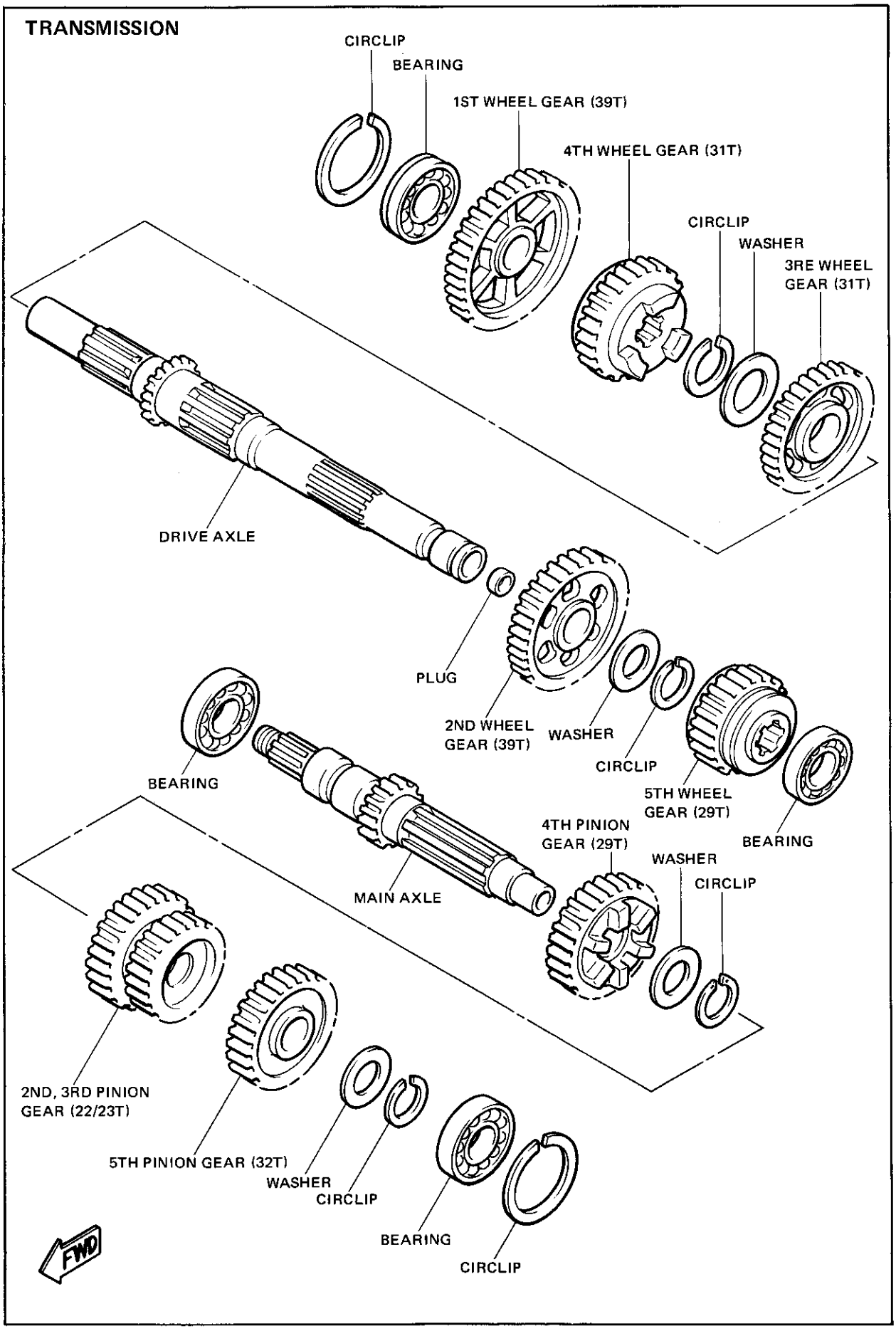
| Model | XVZ12TK |
|---|---|
| Starting Circuit Cut off Relay: | |
| Model/Manufacturer | G4MW-1121T-100-Y10/TATEISHI |
| Coil Winding Resistance | 75Ω ± 10% at 20°C (68°F) |
| Diode | Yes. |
| Side Stand Relay: | |
| Model/Manufacturer | G2MW-1121T-010-Y4/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Diode | No. |
| Fuel Pump Relay: | |
| Model/Manufacturer | G2MW-1121T-010-Y4/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Color Code | Blue |
| Electric Fan: | |
| Model/Manufacturer | 26H/NIPPONDENSO |
| Fan Motor Relay: | |
| Model/Manufacturer | G2MW-1121T-100-Y7/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Thermostatic Switch: | |
| Model/Manufacturer | 11H/NIPPONDENSO |
| Thermo-Unit: | |
| Model/Manufacturer | 11M/NIPPONSEIKI |
| Circuit Breaker: | |
| Type | Fuse |
| Amperage for Individual Circuit/Quantity | |
| Main | 40A x 1 |
| Headlight | 10A x 1 |
| Signal | 15A x 1 |
| Ignition | 15A x 1 |
| Tail | 10A x 1 |
| Accessories | 5A x 1 |
| Reserve | 15A x 1 |
| | 10A x 2 |

## CYLINDER HEAD VALVE

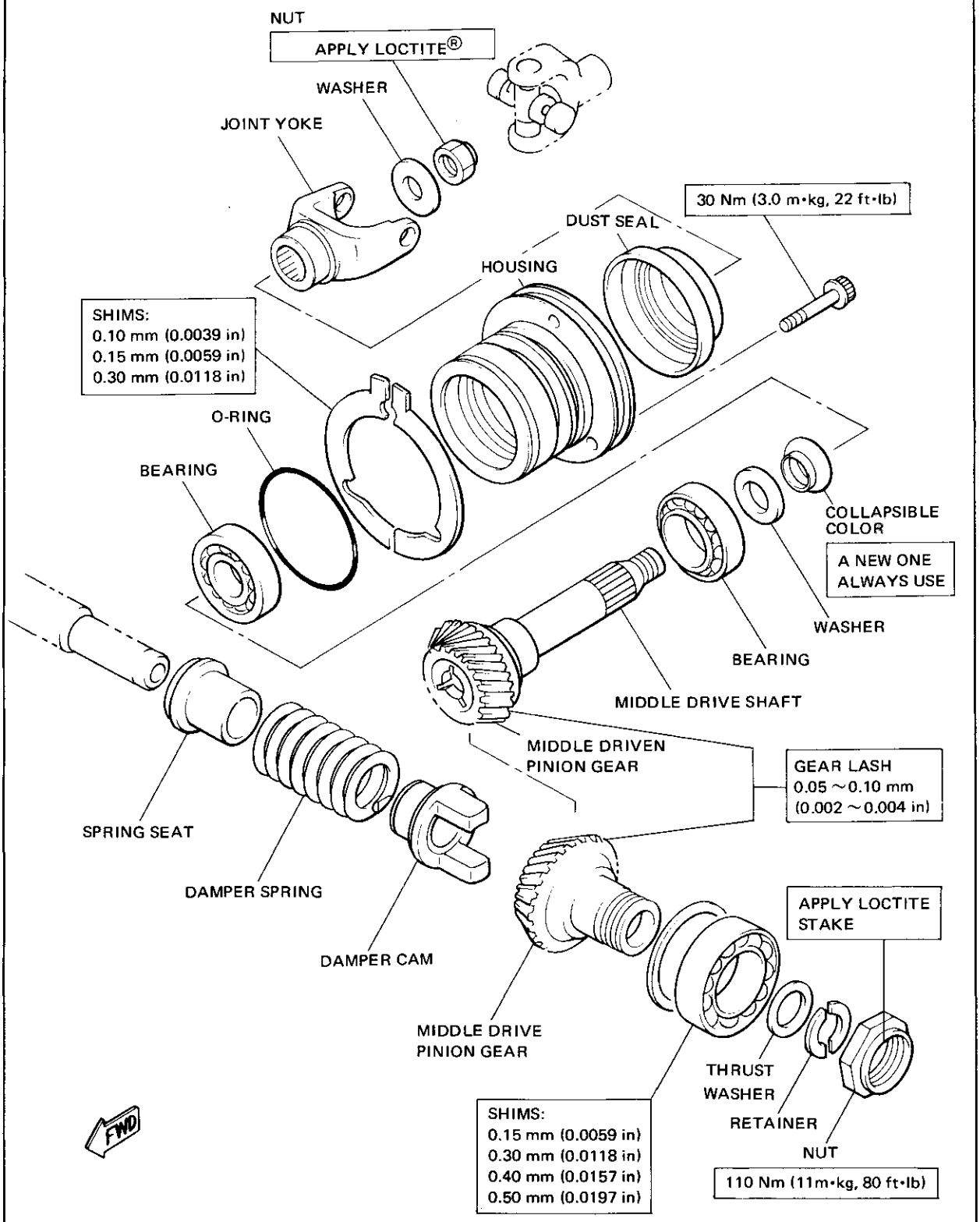



CRANKSHAFT
PISTON RING
END GAP LIMIT:
TOP 0.7 mm (0.0276 in)
2ND 0.8 mm (0.0315 in)
PISTON TO CYLINDER CLEARANCE
0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in)
"Y" MARK
MATCHING MARK
CONNECTING ROD BEARING SIZE
38 Nm (3.8 m·kg, 27 ft·lb)
PROJECTION
APPLY MOLYBENUM DISULFIDE GREASE
CONNECTING ROD BEARING CLEARANCE
0.021 ~ 0.045 mm
(0.0008 ~ 0.0018 in)
CRANKSHAFT JOURNAL CLEARANCE:
0.020 ~ 0.040 mm
(0.0008 ~ 0.0017 in)
#2 CYLINDER
90 Nm (9.0 m·kg, 65 ft·lb)
WASHER
"Y" MARK
#4 CYLINDER
"Y" MARK
JOURNAL BEARING SIZE
CRANK PIN SIZE
J1
P1
J2
J3
P2
J4
"Y" MARK
#1 CYLINDER
"Y" MARK
#3 CYLINDER
BALANCER MATCHING MARK

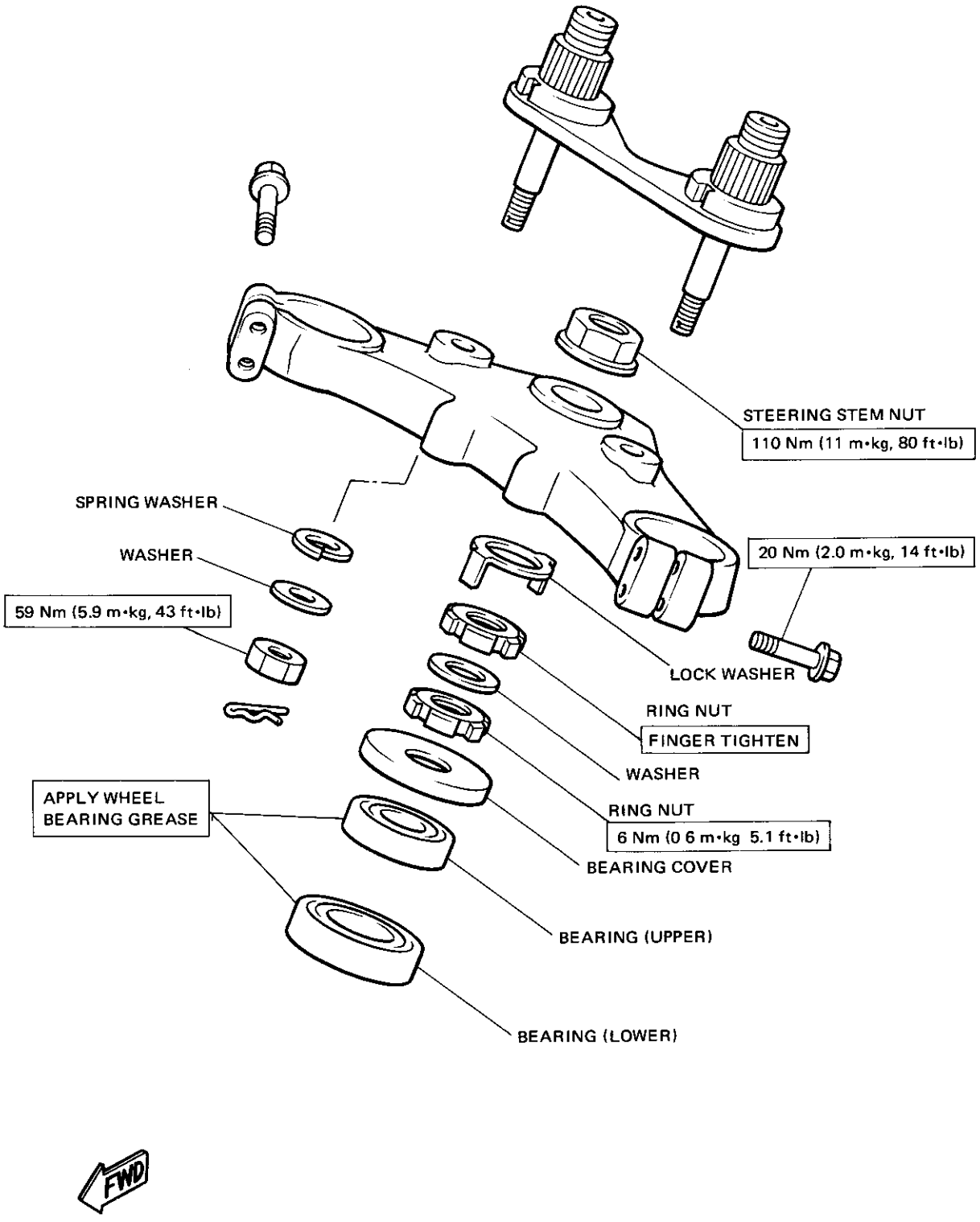
## TRANSMISSION



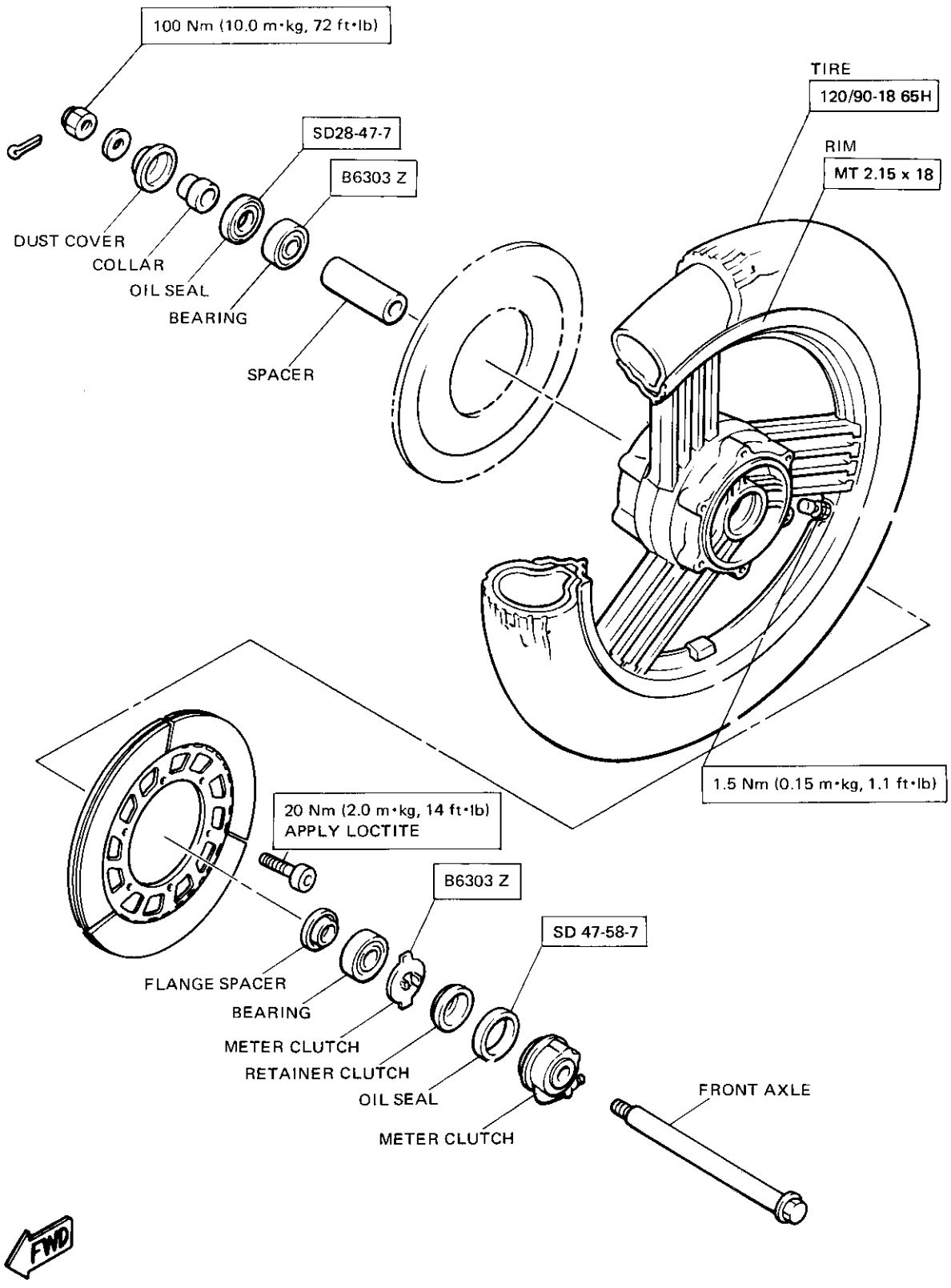
## MIDDLE GEAR


NUT
APPLY LOCTITE®
WASHER
JOINT YOKE
30 Nm (3.0 m•kg, 22 ft•lb)
DUST SEAL
HOUSING
SHIMS:
0.10 mm (0.0039 in)
0.15 mm (0.0059 in)
0.30 mm (0.0118 in)
O-RING
BEARING
COLLAPSIBLE COLOR
A NEW ONE ALWAYS USE
WASHER
BEARING
MIDDLE DRIVE SHAFT
MIDDLE DRIVEN PINION GEAR
GEAR LASH
0.05 ~ 0.10 mm
(0.002 ~ 0.004 in)
SPRING SEAT
DAMPER SPRING
DAMPER CAM
APPLY LOCTITE STAKE
MIDDLE DRIVE PINION GEAR
THRUST WASHER
RETAINER
NUT
110 Nm (11m•kg, 80 ft•lb)
SHIMS:
0.15 mm (0.0059 in)
0.30 mm (0.0118 in)
0.40 mm (0.0157 in)
0.50 mm (0.0197 in)
FWD

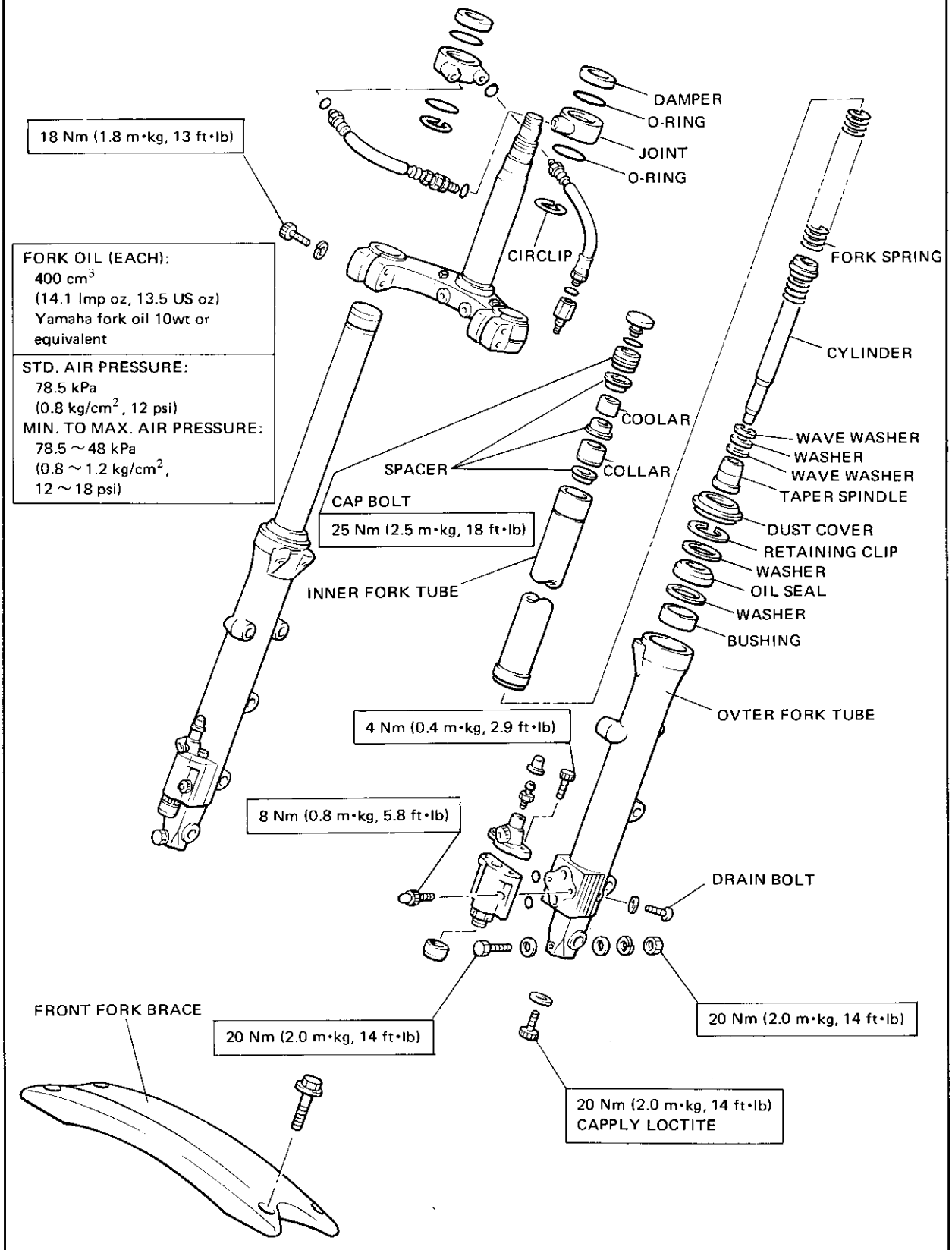
## STEERING


STEERING STEM NUT
110 Nm (11 m•kg, 80 ft•lb)
SPRING WASHER
WASHER
59 Nm (5.9 m•kg, 43 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
LOCK WASHER
RING NUT
FINGER TIGHTEN
WASHER
RING NUT
6 Nm (0 6 m•kg 5.1 ft•lb)
APPLY WHEEL BEARING GREASE
BEARING COVER
BEARING (UPPER)
BEARING (LOWER)
FWD

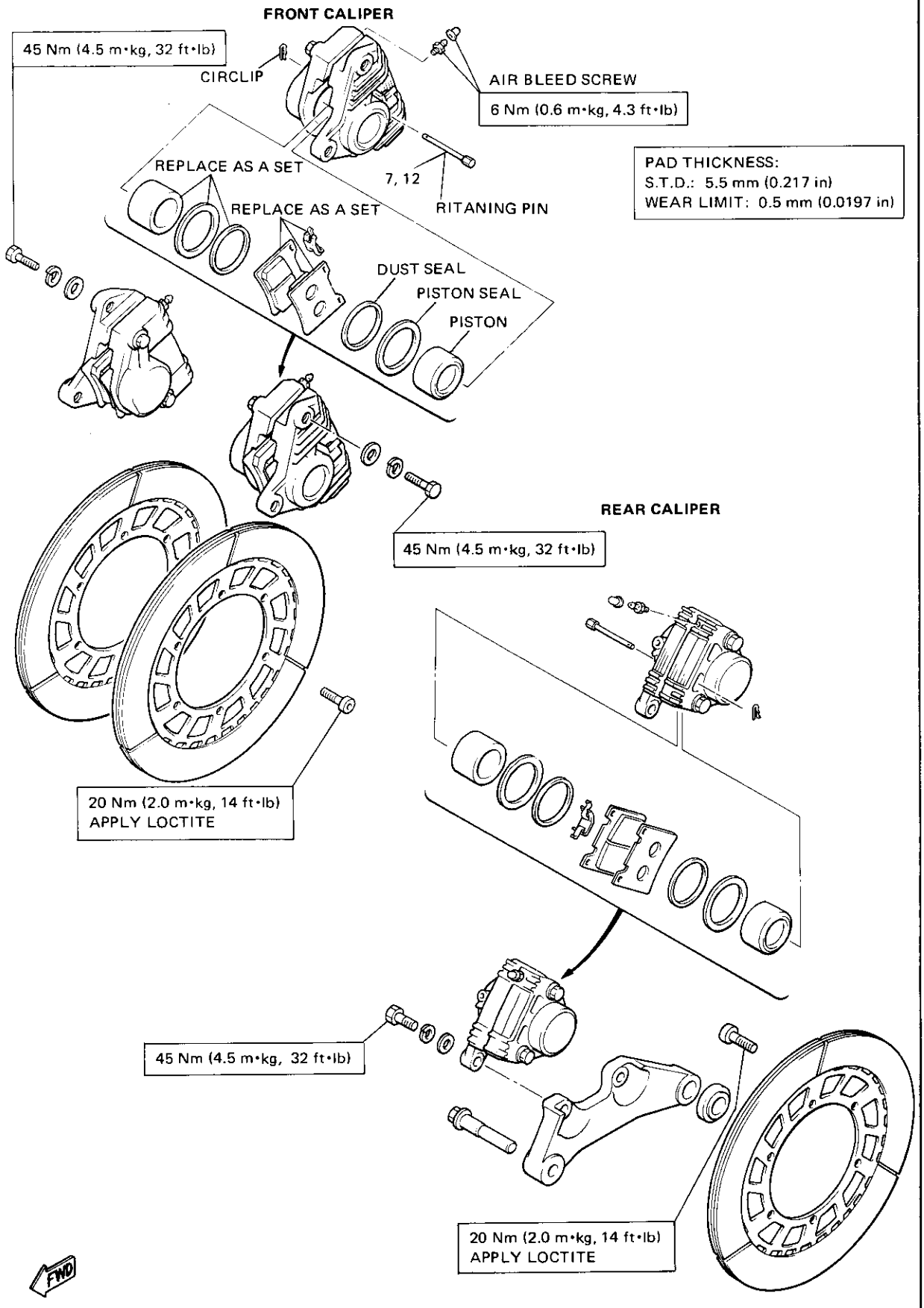
## FRONT WHEEL


100 Nm (10.0 m•kg, 72 ft•lb)
SD28-47-7
B6303 Z
DUST COVER
COLLAR
OIL SEAL
BEARING
SPACER
TIRE
120/90-18 65H
RIM
MT 2.15 x 18
1.5 Nm (0.15 m•kg, 1.1 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
APPLY LOCTITE
B6303 Z
SD 47-58-7
FLANGE SPACER
BEARING
METER CLUTCH
RETAINER CLUTCH
OIL SEAL
METER CLUTCH
FRONT AXLE
FWD

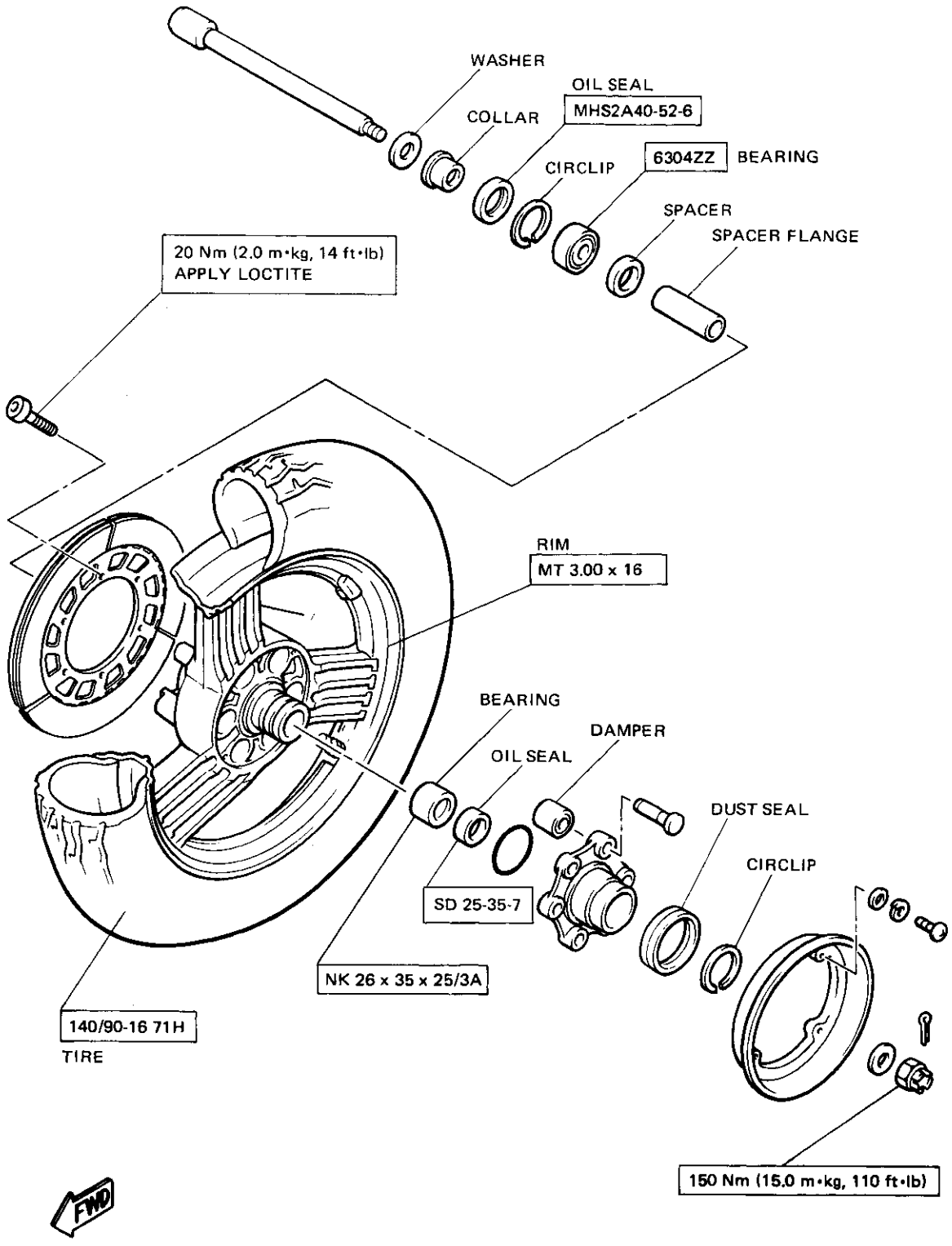
## FRONT FORK


18 Nm (1.8 m•kg, 13 ft•lb)
FORK OIL (EACH):
400 cm³
(14.1 Imp oz, 13.5 US oz)
Yamaha fork oil 10wt or equivalent
STD. AIR PRESSURE:
78.5 kPa
(0.8 kg/cm², 12 psi)
MIN. TO MAX. AIR PRESSURE:
78.5 ~ 48 kPa
(0.8 ~ 1.2 kg/cm², 12 ~ 18 psi)
DAMPER
O-RING
JOINT
O-RING
CIRCLIP
FORK SPRING
CYLINDER
COOLAR
SPACER
COLLAR
WAVE WASHER
WASHER
WAVE WASHER
TAPER SPINDLE
CAP BOLT
25 Nm (2.5 m•kg, 18 ft•lb)
INNER FORK TUBE
DUST COVER
RETAINING CLIP
WASHER
OIL SEAL
WASHER
BUSHING
OVTER FORK TUBE
4 Nm (0.4 m•kg, 2.9 ft•lb)
8 Nm (0.8 m•kg, 5.8 ft•lb)
DRAIN BOLT
FRONT FORK BRACE
20 Nm (2.0 m•kg, 14 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
20 Nm (2.0 m•kg, 14 ft•lb)
CAPPLY LOCTITE

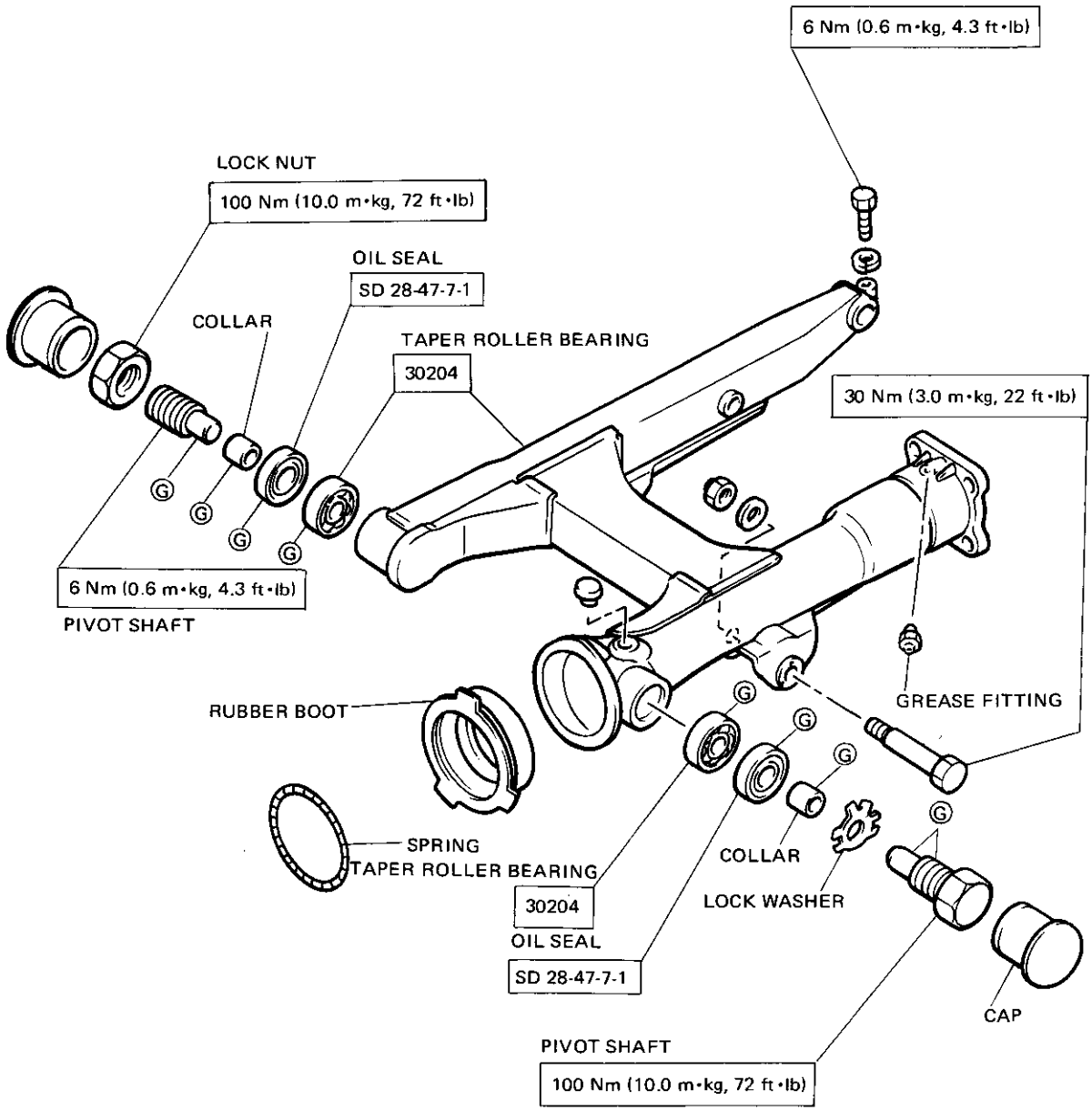
## FRONT BRAKE CALIPER



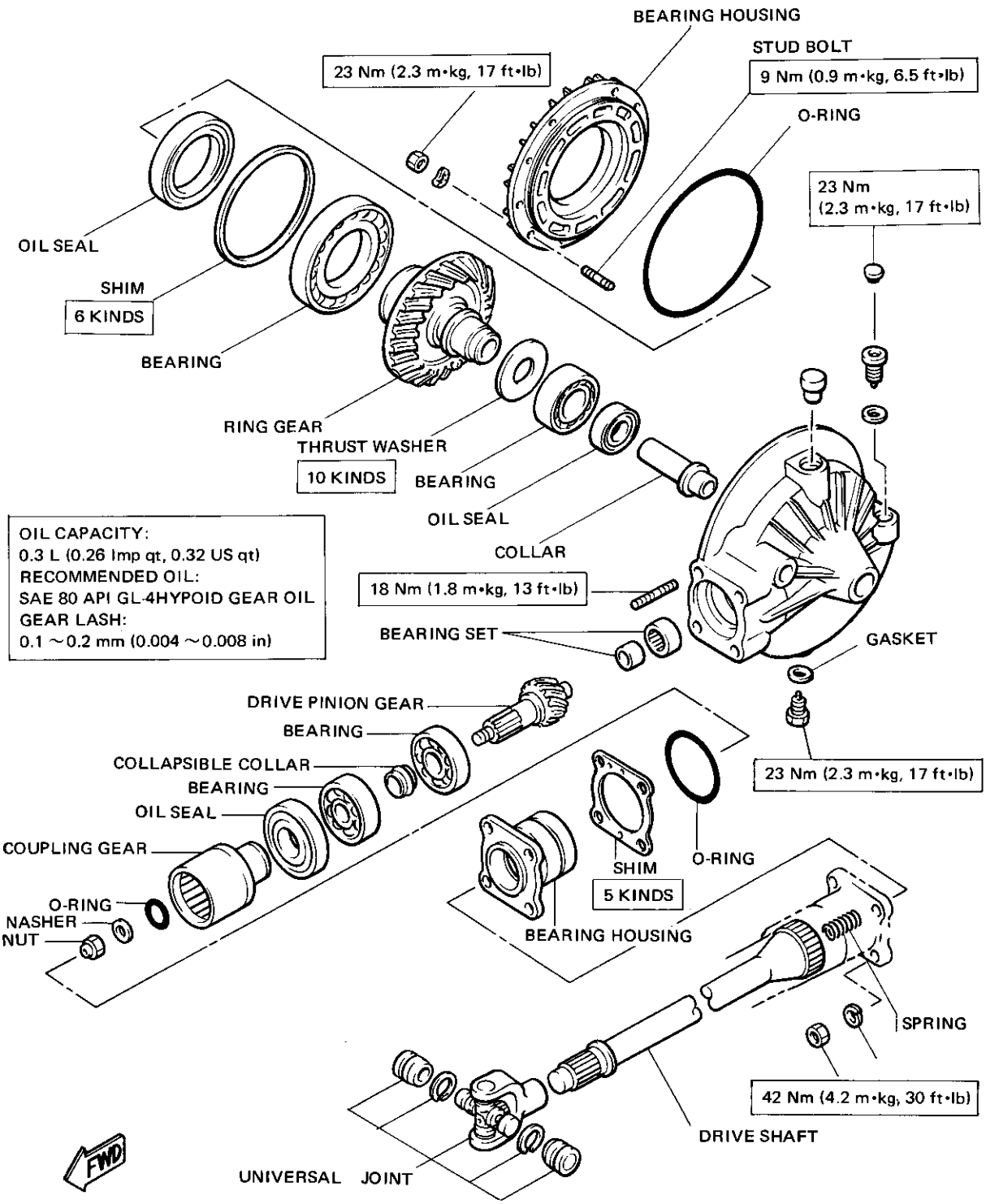
## REAR WHEEL


WASHER
OIL SEAL
MHS2A40-52-6
COLLAR
CIRCLIP
6304ZZ
BEARING
SPACER
SPACER FLANGE
20 Nm (2.0 m•kg, 14 ft•lb)
APPLY LOCTITE
RIM
MT 3.00 x 16
BEARING
DAMPER
OIL SEAL
DUST SEAL
CIRCLIP
SD 25-35-7
NK 26 x 35 x 25/3A
140/90-16 71H
TIRE
150 Nm (15.0 m•kg, 110 ft•lb)
FWD

## SWINGARM

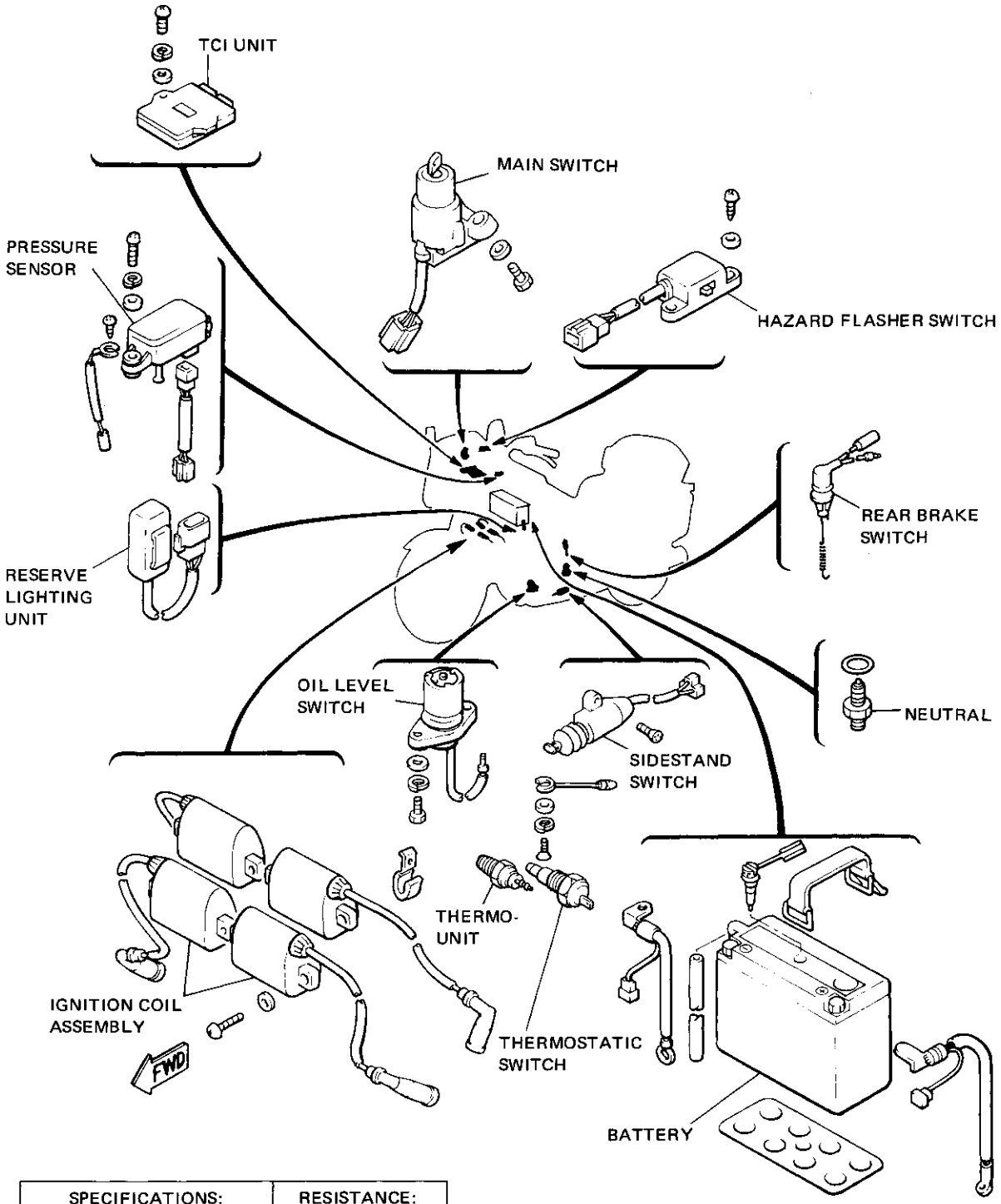

6 Nm (0.6 m•kg, 4.3 ft•lb)
LOCK NUT
100 Nm (10.0 m•kg, 72 ft•lb)
OIL SEAL
SD 28-47-7-1
COLLAR
TAPER ROLLER BEARING
30204
30 Nm (3.0 m•kg, 22 ft•lb)
6 Nm (0.6 m•kg, 4.3 ft•lb)
PIVOT SHAFT
RUBBER BOOT
GREASE FITTING
SPRING
TAPER ROLLER BEARING
30204
OIL SEAL
SD 28-47-7-1
COLLAR
LOCK WASHER
CAP
PIVOT SHAFT
100 Nm (10.0 m•kg, 72 ft•lb)
Ⓖ: APPLY LITHIUM BASE WATER PROOF WHEEL BEARING GREASE

## FINAL GEAR/DRIVE SHAFT



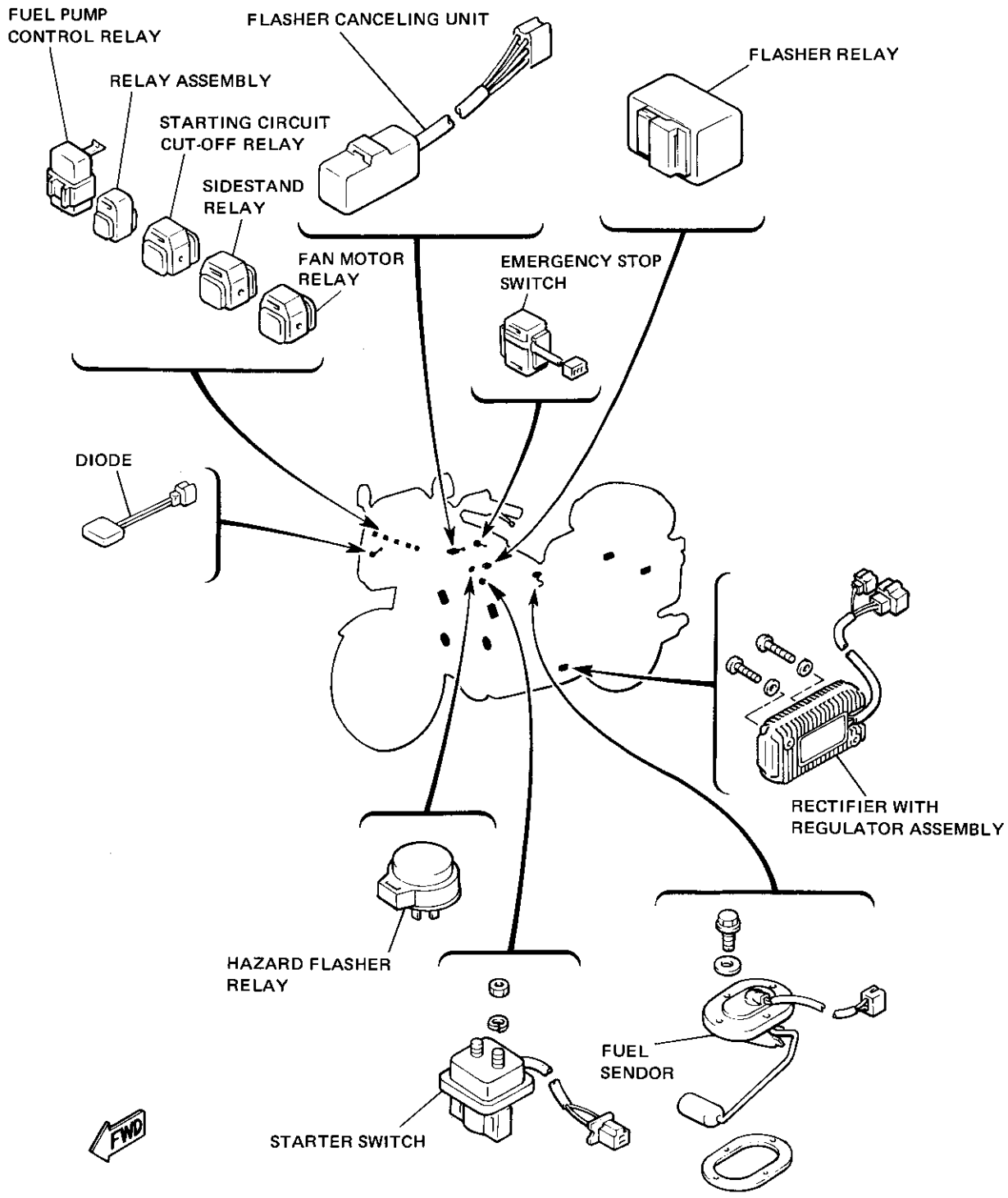
## ELECTRICAL COMPONENTS

STARTER MOTOR:
BRUSH WEAR LIMIT: 4.5 mm (0.177 in)
COMMUTATOR DIA. WEAR LIMIT: 27 mm (1.06 in)



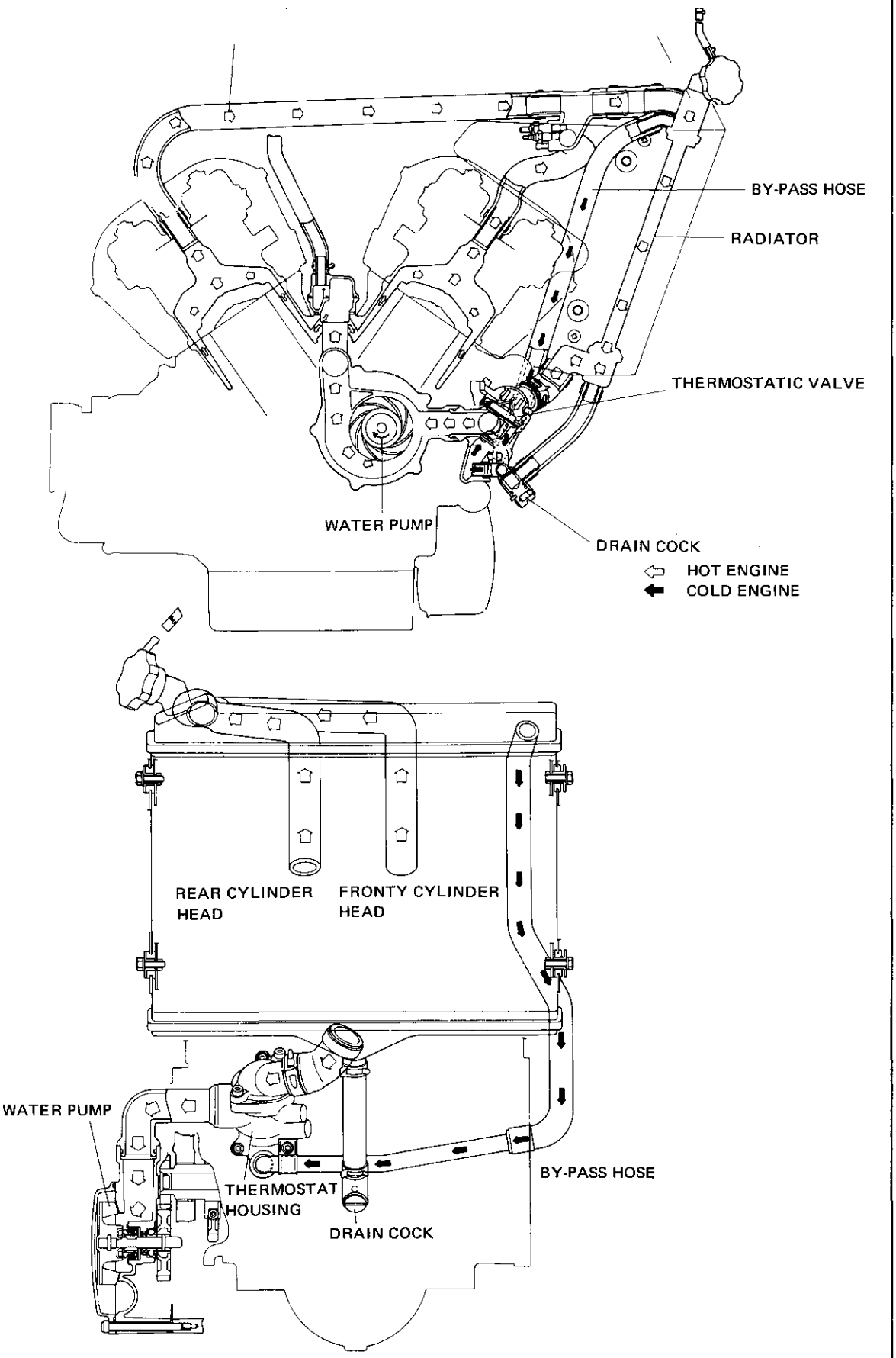

| SPECIFICATIONS: | RESISTANCE: |
|---|---|
| PICUP COIL | 110Ω ± 15% |
| IGNITION COIL | |
| (PRIMALY) | 2.7Ω ± 10% |
| (SECONDALY) | 13.2 kΩ ± 20% |
| STATOR COIL | 0.42Ω ± 15% |

## ELECTRICAL COMPONENTS




| SPECIFICATIONS: | RESISTANCE: |
|---|---|
| FUEL GAUGE: (FULL) | 40 ~ 290Ω ± 10% |
| (EMPTY) | 310Ω or MODE ± 12% |
| SIDESTAND RELAY | 100Ω ± 10% |
| FAN MOTOR RELAY | 100Ω ± 10% |
| FUEL PUMP RELAY | 100Ω ± 10% |
| STARTING CIRCUIT CUT-OFF RELAY | 75Ω ± 10% |
| STARTER SWITCH | 3.5Ω ± 10% |

## COOLING SYSTEM



**NOTICE**

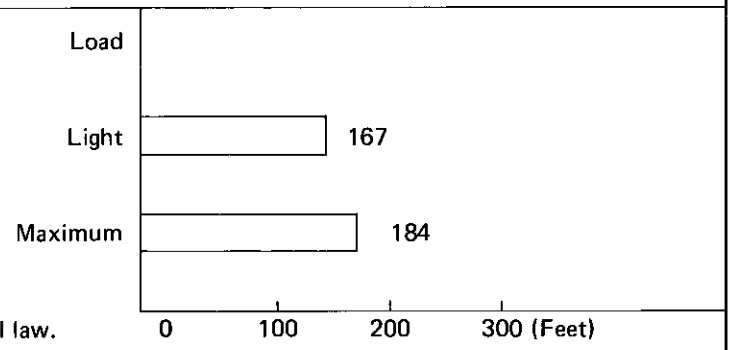
**The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions, and the information may not be correct under other conditions.**

### Stopping distance

These figures indicate braking performance that can be met or exceeded by the vehicles to which they apply, without locking the wheels, under different conditions of loading and with partial failures of the braking system. The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions and the information may not be correct under other coditions.

Description of vehicles to which this table applies.: Yamaha motorcycle XVZ12TK

A Fully Operational Service Brake



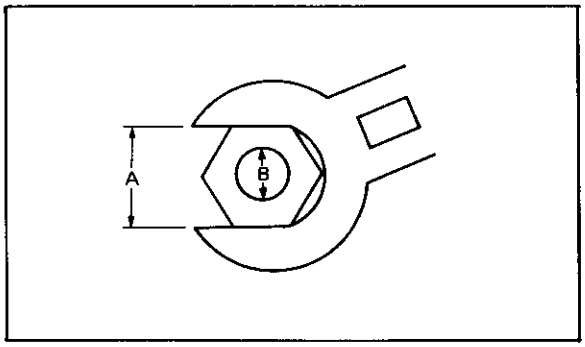

Stopping distance in feet from 60 mi/h

**NOTE:**
The statement above is required by U.S. Federal law. "Partial failures" of the braking system do not apply to this chart.

## 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 criss-cross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specificaitons 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 |



## DEFINITION OF UNITS

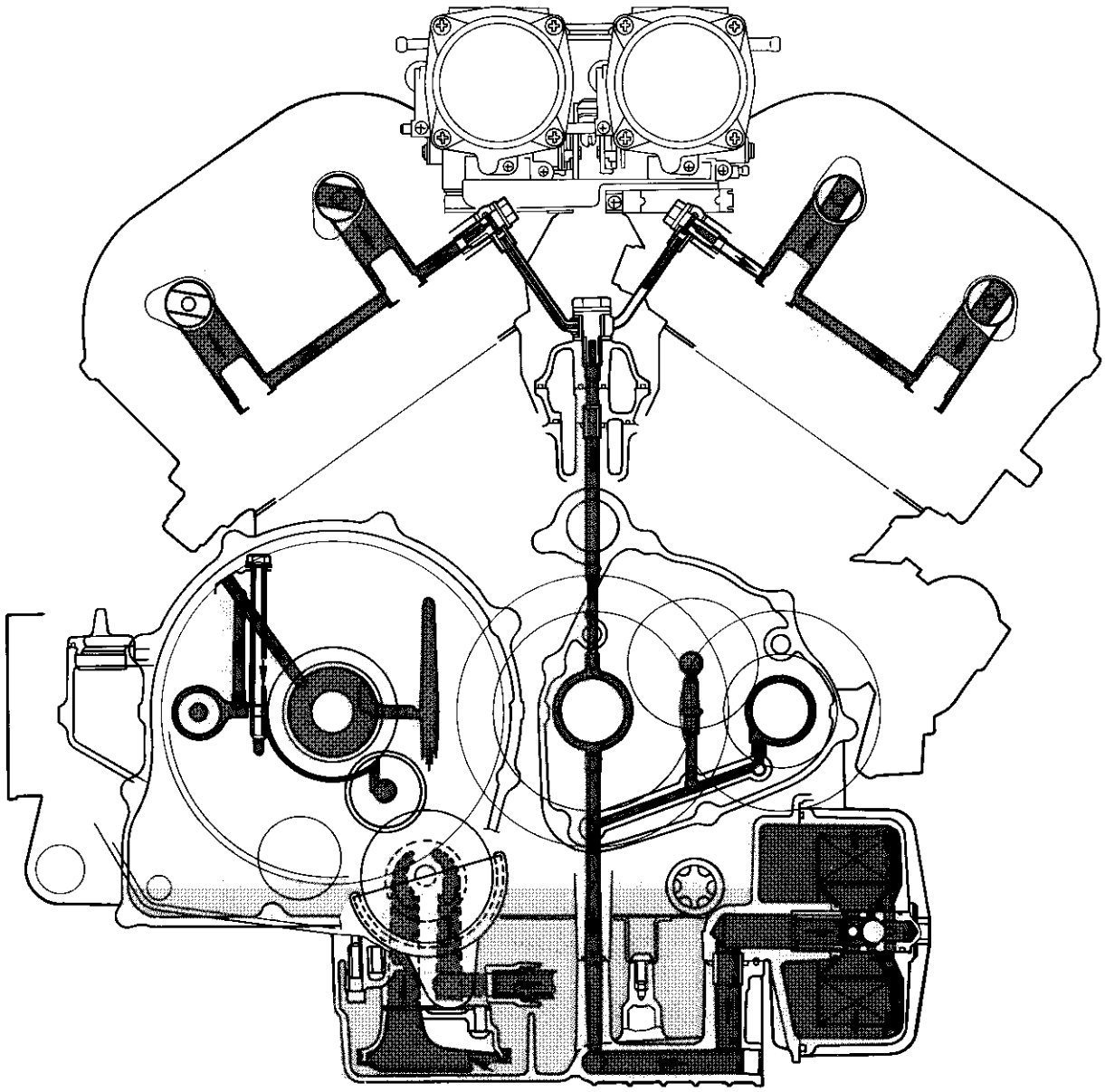
| Unit | Read | Definition | Measure |
|---|---|---|---|
| mm<br>cm | millimeter<br>centimeter | $10^{-3}$ meter<br>$10^{-2}$ meter | Length<br>Length |
| kg | kilogram | $10^{3}$ gram | Weight |
| N | Newton | 1 kg x m/sec$^{2}$ | Force |
| Nm<br>m•kg | Newton meter<br>Meter kilogram | N x m<br>m x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

## CONVERSION TABLES

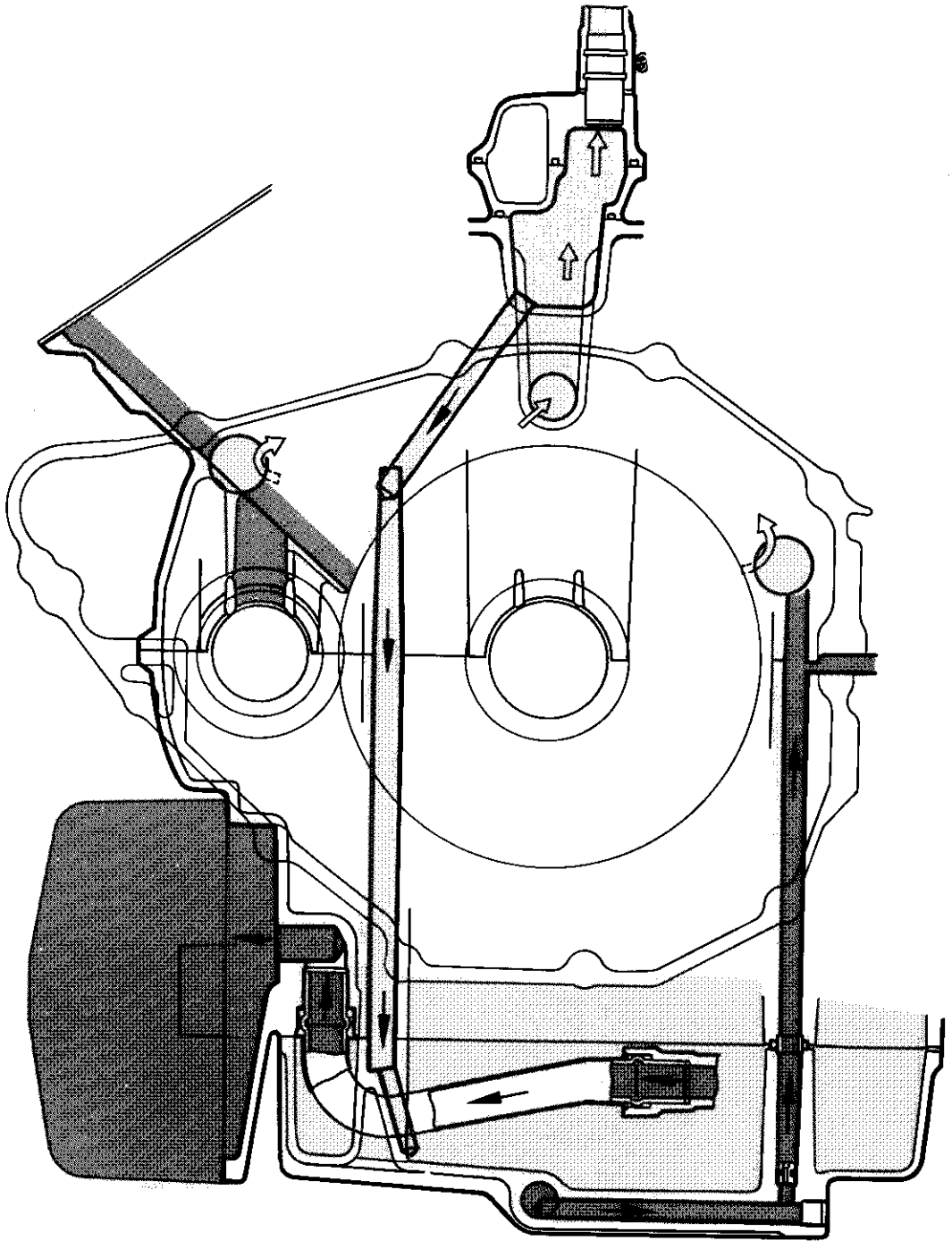
| Metric to inch system | | |
|---|---|---|
| Known | Multiplier | Result |
| m•kg | 7.233 | ft•lb |
| m•kg | 86.80 | in•lb |
| cm•kg | 0.0723 | ft•lb |
| cm•kg | 0.8680 | in•lb |
| kg | 2.205 | lb |
| g | 0.03527 | oz |
| kg/lit | 2.352 | mpg |
| km/hr | 0.6214 | mph |
| km | 0.6214 | mi |
| m | 3.281 | ft |
| m | 1.094 | yd |
| cm | 0.3937 | in |
| mm | 0.03937 | in |
| cc (cm$^{3}$) | 0.03382 | oz (US liq) |
| cc (cm$^{3}$) | 0.06102 | cu in |
| lit (liter) | 2.1134 | pt (US liq) |
| lit (liter) | 1.057 | qt (US liq) |
| lit (liter) | 0.2642 | gal (US liq) |
| kg/mm | 56.007 | lb/in |
| kb/cm$^{2}$ | 14.2234 | psi (lb/in$^{2}$) |
| Centigrade (°C) | 9/5 (°C) + 32 | Fahrenheit (°F) |

| Inch to metric system | | |
|---|---|---|
| Known | Multiplier | Result |
| ft•lb | 0.13826 | m•kg |
| in•lb | 0.01152 | m•kg |
| ft•lb | 13.831 | cm•kg |
| in•lb | 1.1521 | cm•kg |
| lb | 0.4535 | kg |
| oz | 28.352 | g |
| mpg | 0.4252 | km/lit |
| mph | 1.609 | km/hr |
| mi | 1.609 | km |
| ft | 0.3048 | m |
| yd | 0.9141 | m |
| in | 2.54 | cm |
| in | 25.4 | mm |
| oz (US liq) | 29.57 | cc (cm$^{3}$) |
| cu in | 16.387 | cc (cm$^{3}$) |
| pt (US liq) | 0.4732 | lit (liter) |
| qt (US liq) | 0.9461 | lit (liter) |
| gal (US liq) | 3.785 | lit (liter) |
| lb/in | 0.017855 | kg/mm |
| psi (lb/in$^{2}$) | 0.07031 | kg/cm$^{2}$ |
| Fahrenheit (°C) | 5/9 (°F − 32) | Centigrade (°F) |

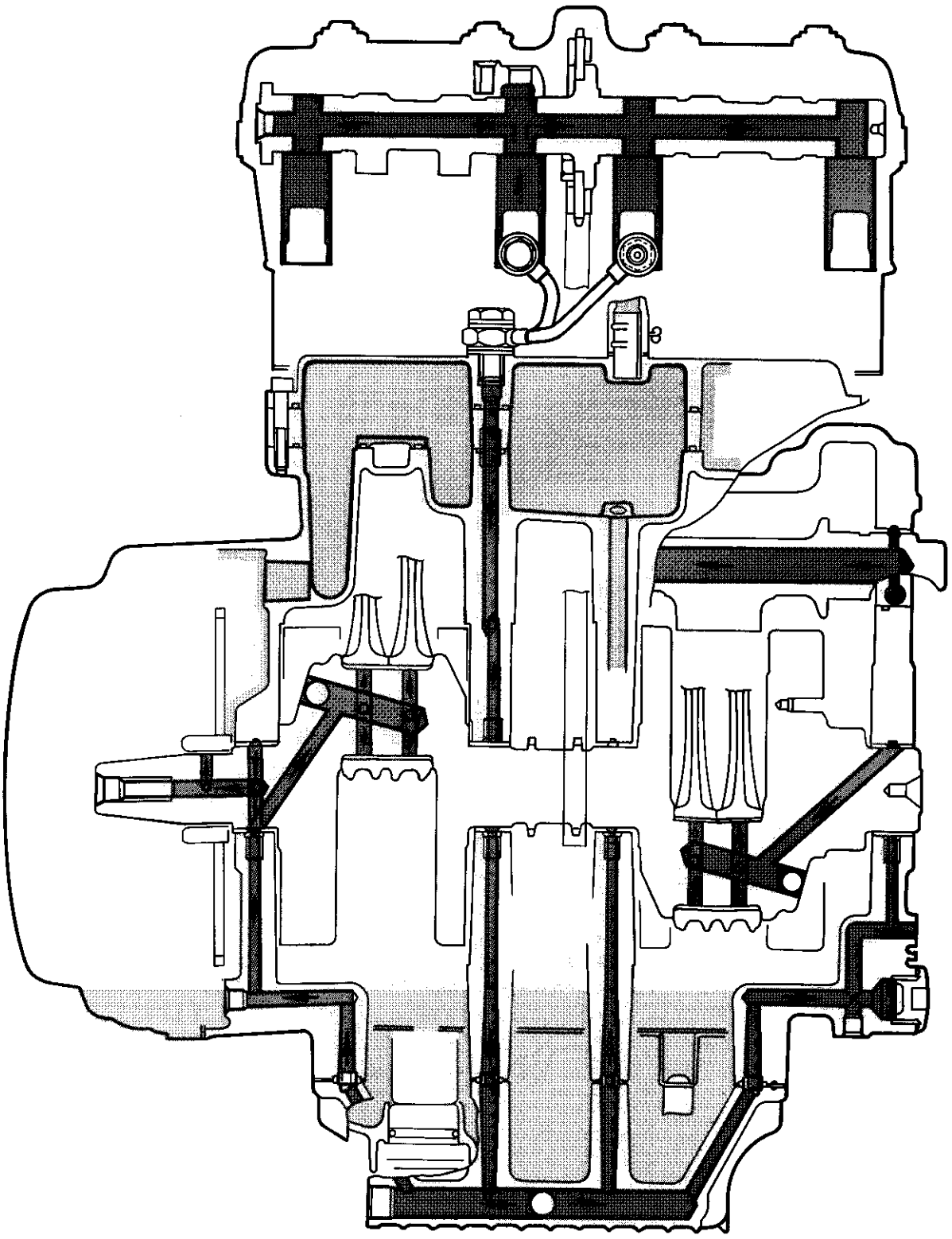
## LUBLICATION DIAGRAM (1)



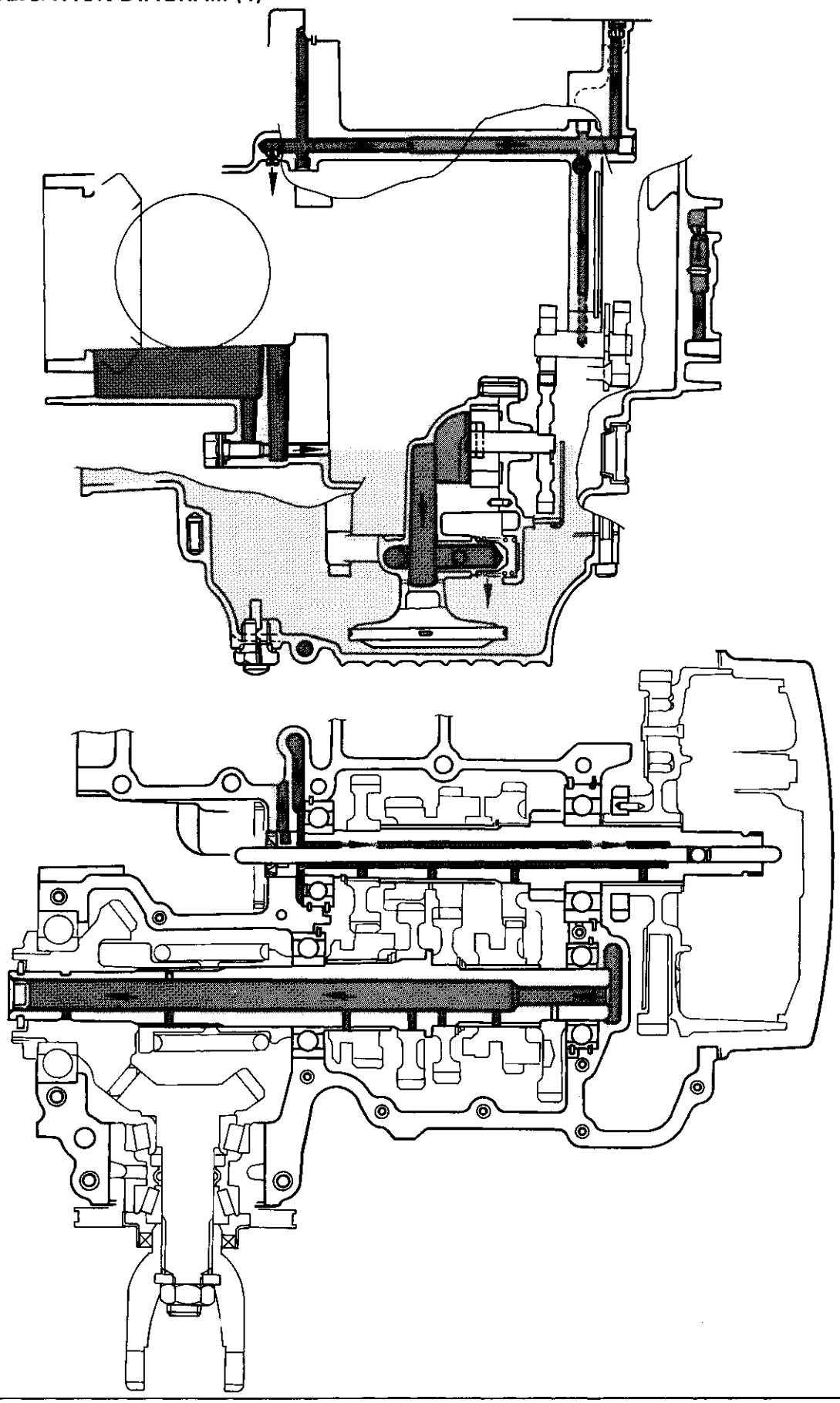
## LUBLICATION DIAGRAM (2)

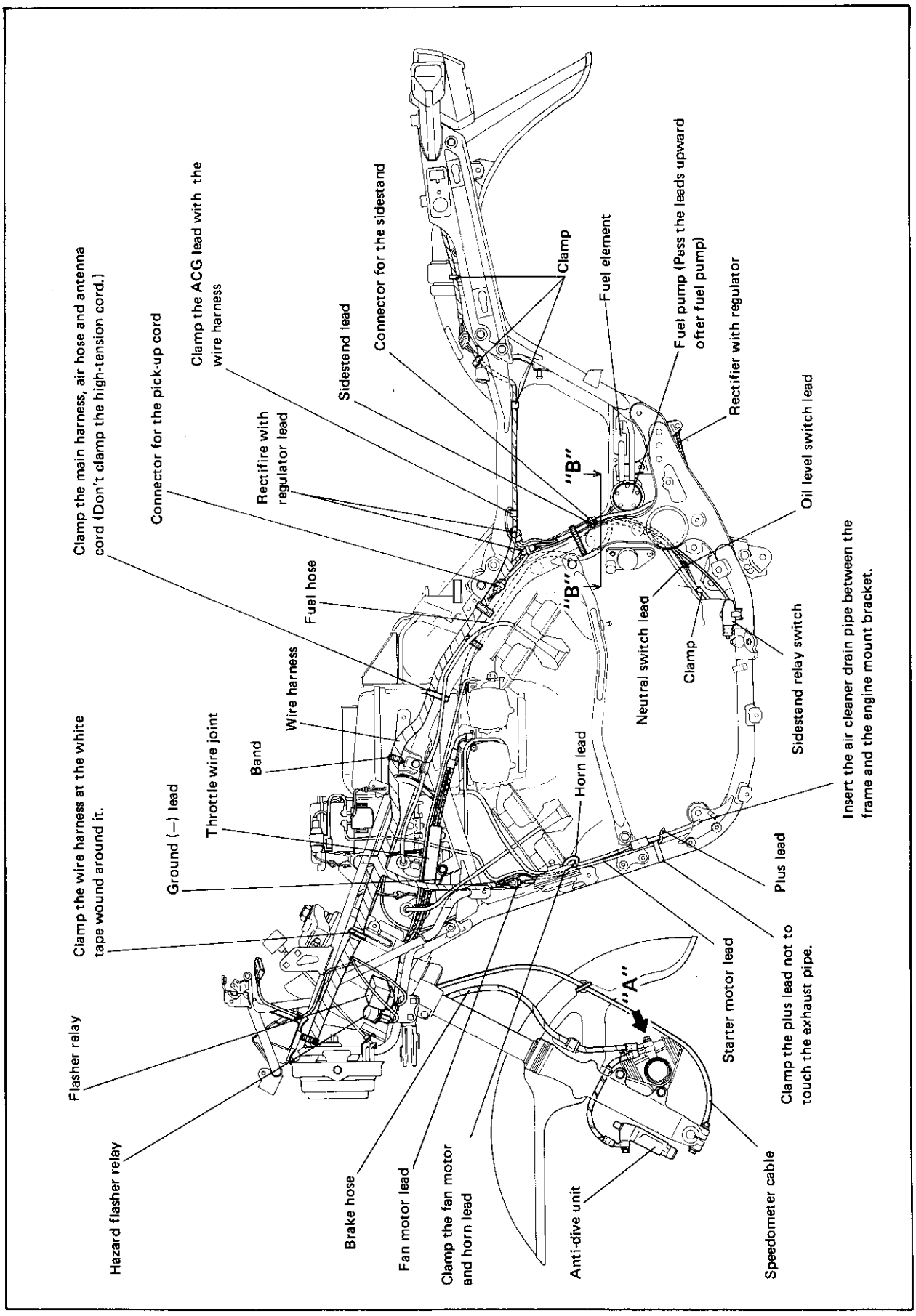


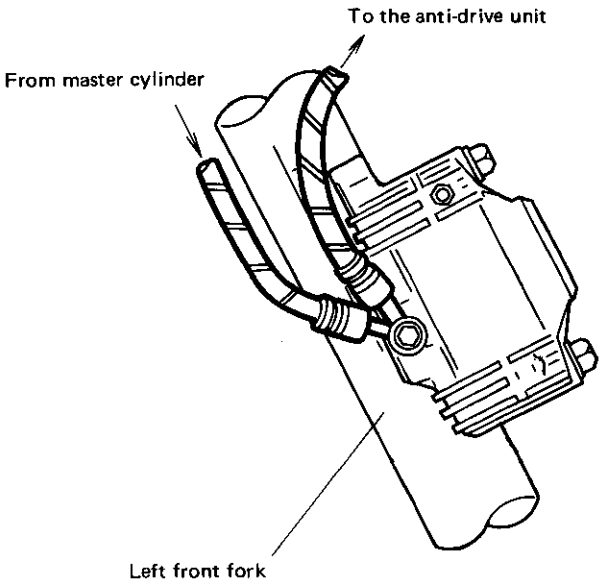
## LUBLICATION DIAGRAM (3)



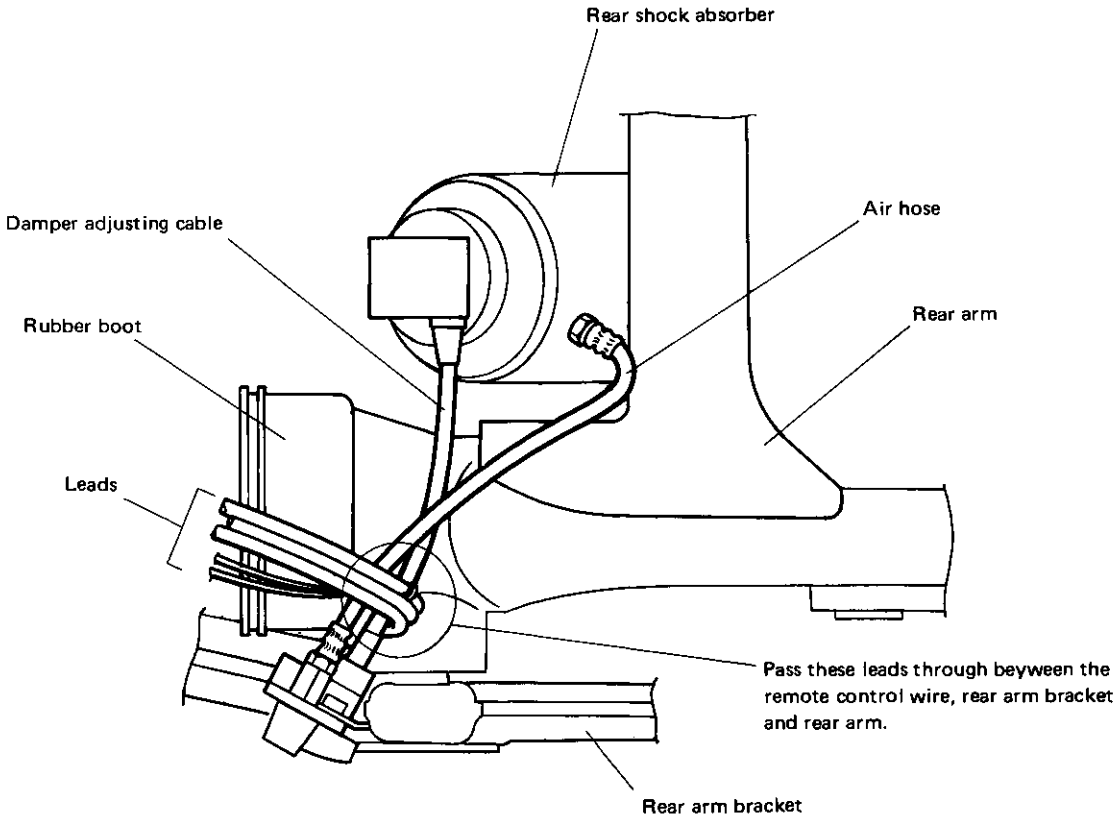
## LUBLICATION DIAGRAM (4)



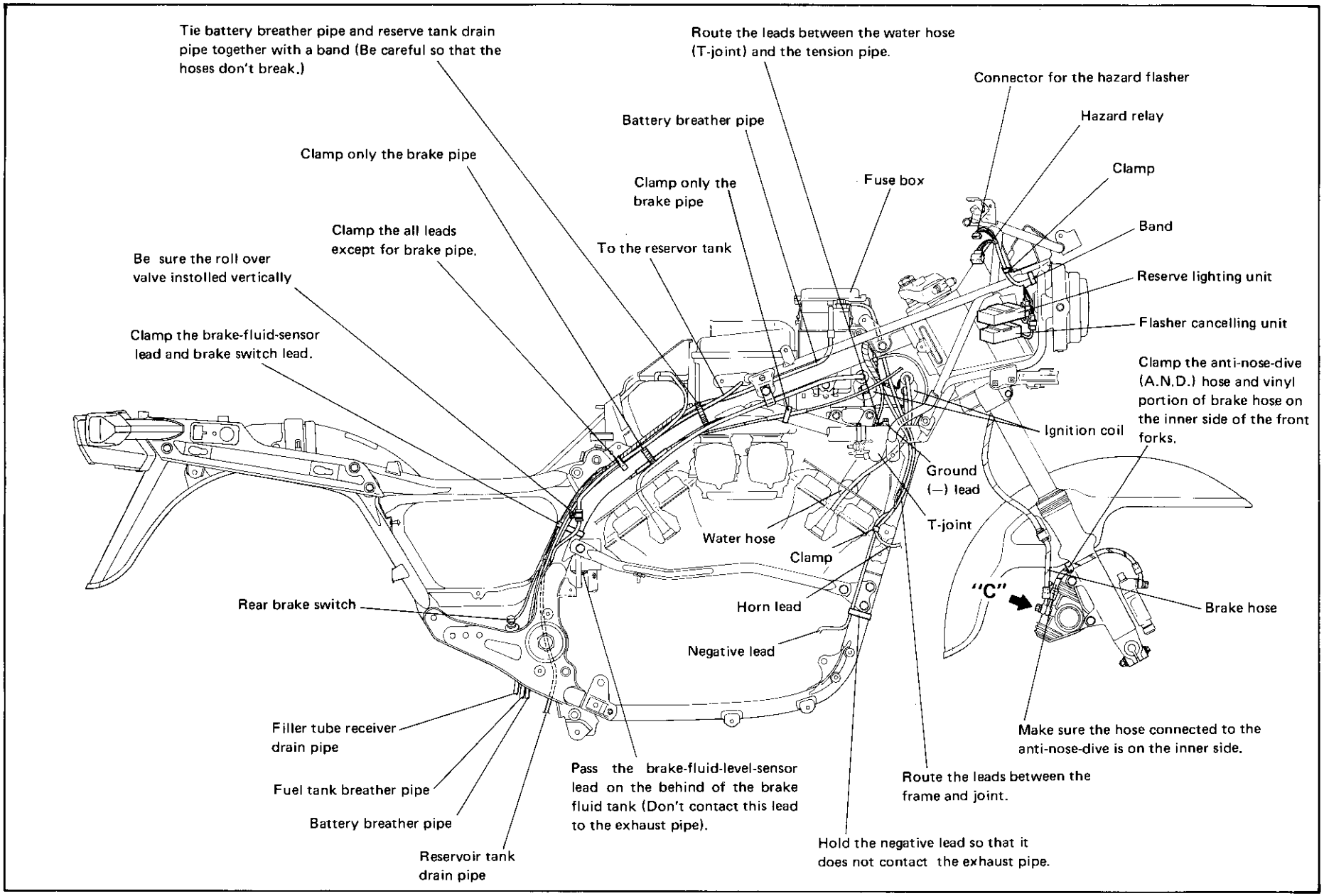

Clamp the main harness, air hose and antenna cord (Don't clamp the high-tension cord.)
Connector for the pick-up cord
Clamp the ACG lead with the wire harness
Rectifire with regulator lead
Sidestand lead
Connector for the sidestand
Clamp
Fuel element
Fuel pump (Pass the leads upward ofter fuel pump)
Rectifier with regulator
Oil level switch lead
Fuel hose
"B"
"B"
Neutral switch lead
Clamp
Sidestand relay switch
Wire harness
Band
Throttle wire joint
Horn lead
Ground (—) lead
Clamp the wire harness at the white tape wound around it.
Insert the air cleaner drain pipe between the frame and the engine mount bracket.
Plus lead
Flasher relay
"A"
Starter motor lead
Clamp the plus lead not to touch the exhaust pipe.
Hazard flasher relay
Brake hose
Fan motor lead
Clamp the fan motor and horn lead
Anti-dive unit
Speedometer cable

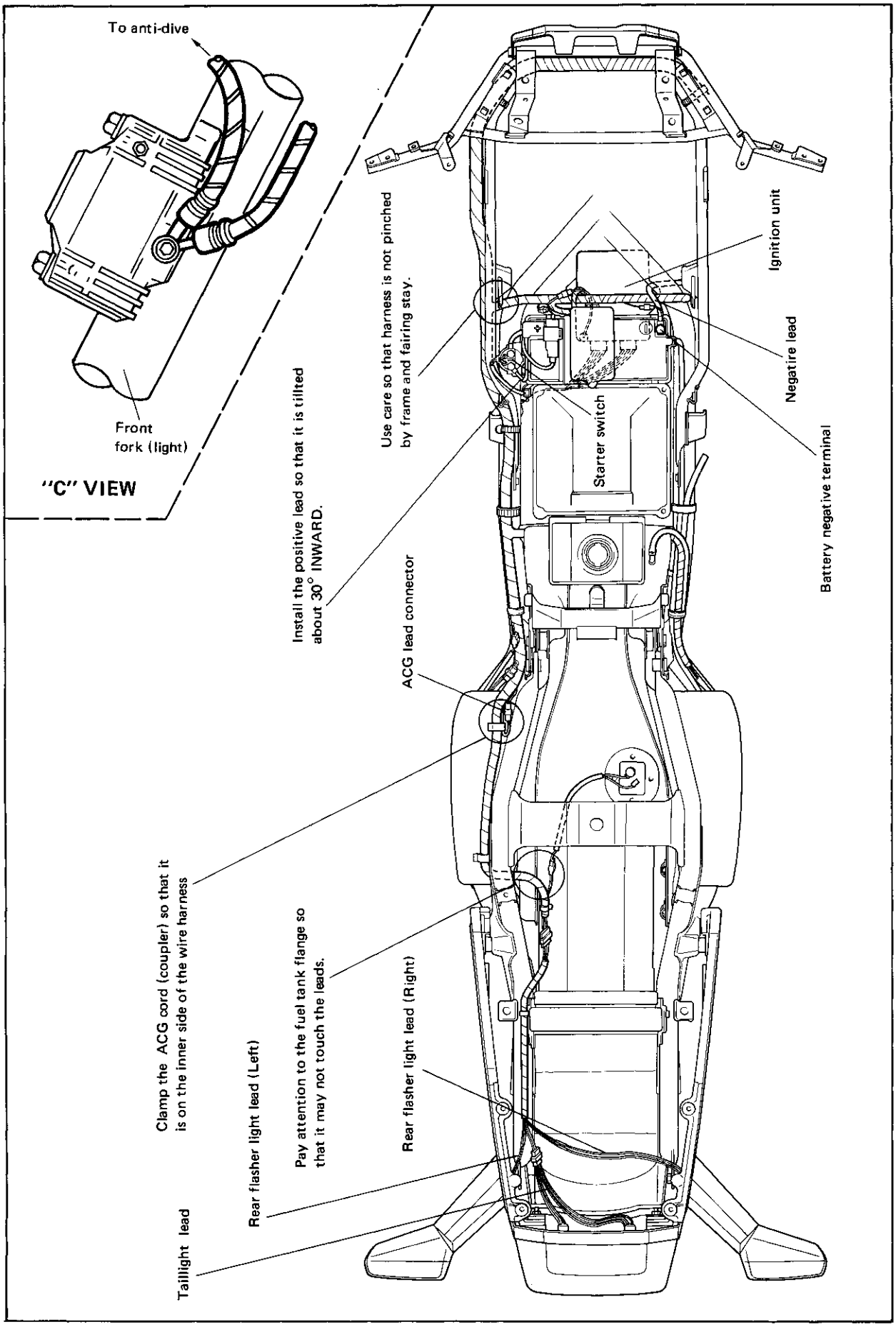


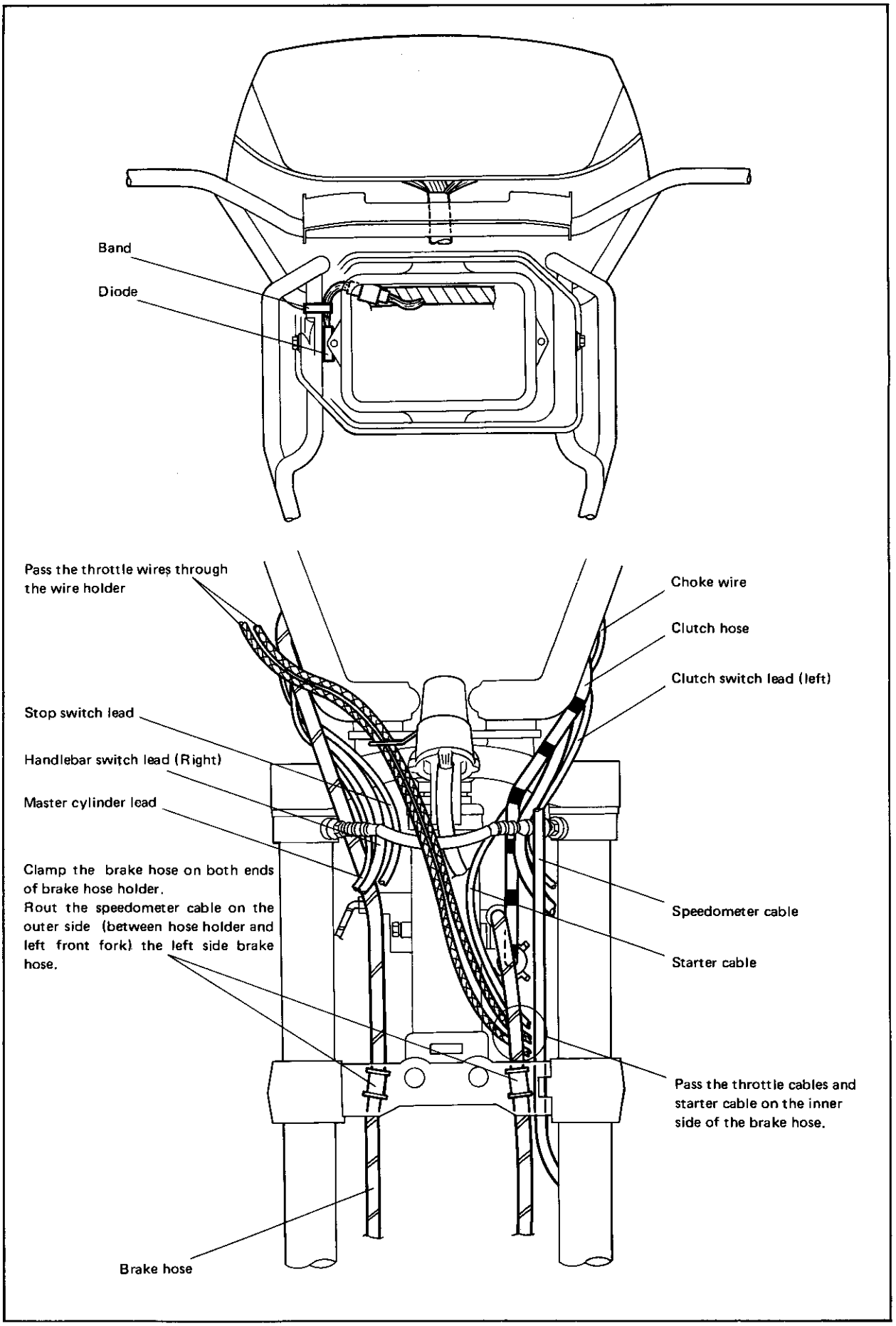

"A" VIEW

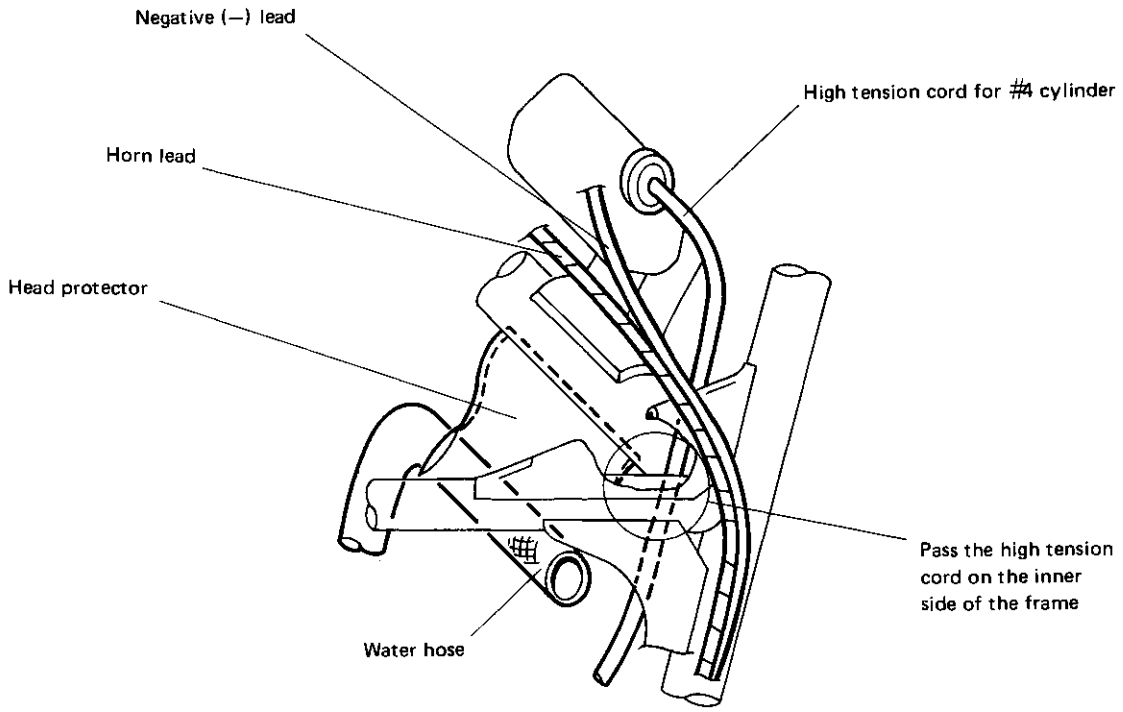



"B" – "B" VIEW

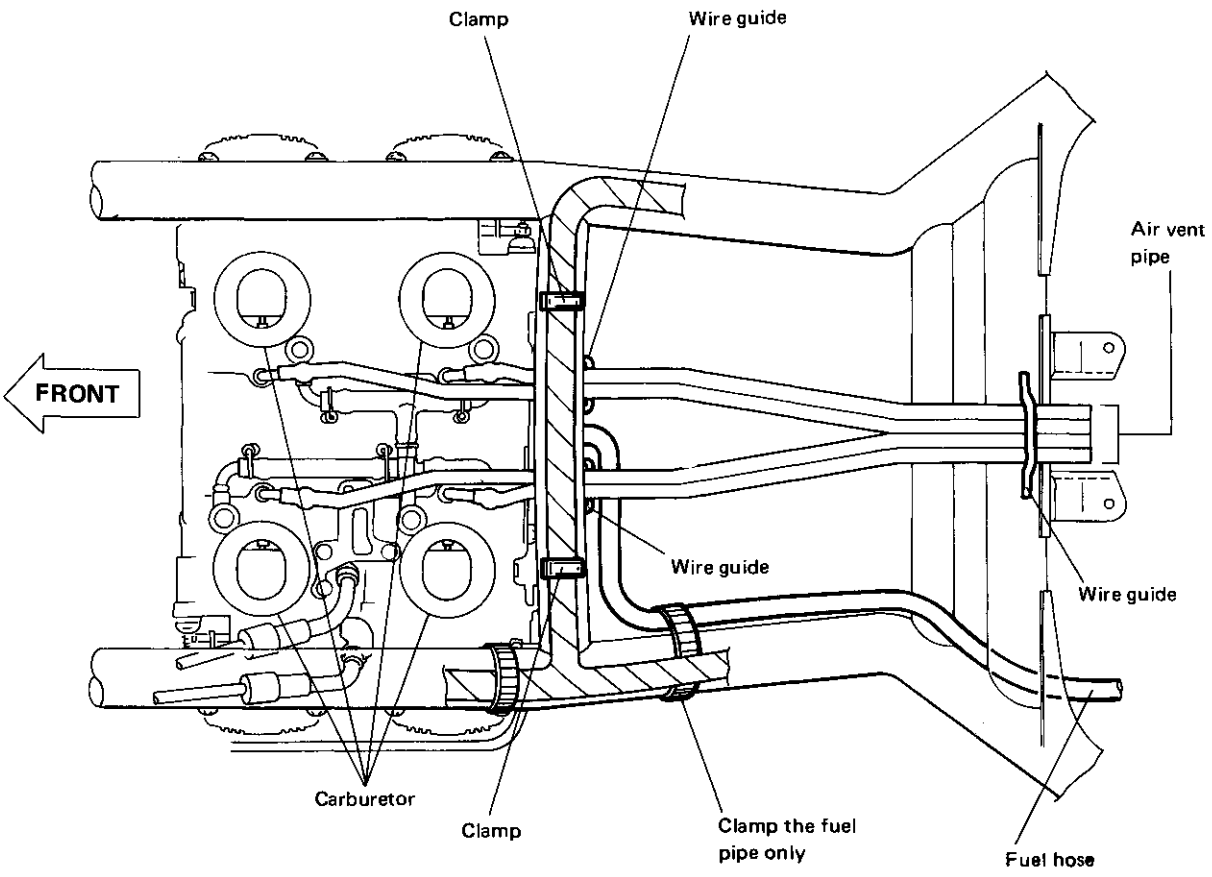

Tie battery breather pipe and reserve tank drain pipe together with a band (Be careful so that the hoses don't break.)
Route the leads between the water hose (T-joint) and the tension pipe.
Connector for the hazard flasher
Hazard relay
Battery breather pipe
Clamp only the brake pipe
Clamp
Clamp only the brake pipe
Fuse box
Band
Clamp the all leads except for brake pipe.
To the reservor tank
Be sure the roll over valve instolled vertically
Reserve lighting unit
Flasher cancelling unit
Clamp the brake-fluid-sensor lead and brake switch lead.
Clamp the anti-nose-dive (A.N.D.) hose and vinyl portion of brake hose on the inner side of the front forks.
Ignition coil
Ground (–) lead
T-joint
Water hose
Clamp
"C"
Rear brake switch
Horn lead
Brake hose
Negative lead
Filler tube receiver drain pipe
Make sure the hose connected to the anti-nose-dive is on the inner side.
Fuel tank breather pipe
Pass the brake-fluid-level-sensor lead on the behind of the brake fluid tank (Don't contact this lead to the exhaust pipe).
Route the leads between the frame and joint.
Battery breather pipe
Hold the negative lead so that it does not contact the exhaust pipe.
Reservoir tank drain pipe

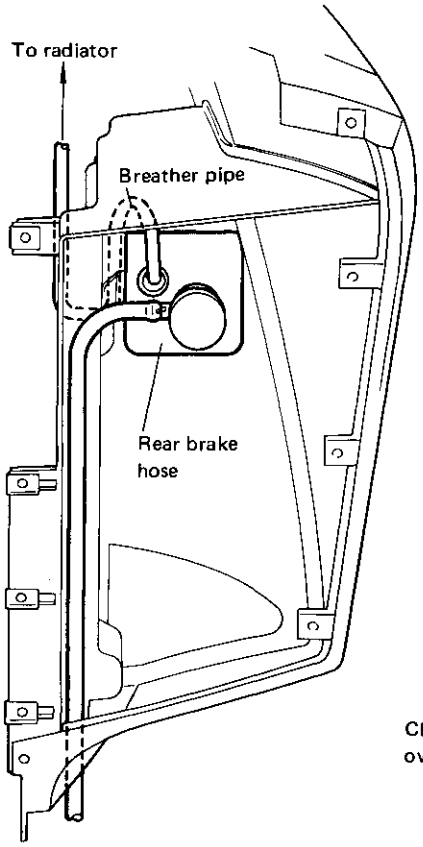

To anti-dive
Front fork (light)
"C" VIEW
Clamp the ACG cord (coupler) so that it is on the inner side of the wire harness
Rear flasher light lead (Left)
Taillight lead
Pay attention to the fuel tank flange so that it may not touch the leads.
Rear flasher light lead (Right)
ACG lead connector
Install the positive lead so that it is tilted about 30° INWARD.
Use care so that harness is not pinched by frame and fairing stay.
Starter switch
Ignition unit
Negatire lead
Battery negative terminal


Band
Diode
Pass the throttle wires through the wire holder
Choke wire
Clutch hose
Clutch switch lead (left)
Stop switch lead
Handlebar switch lead (Right)
Master cylinder lead
Clamp the brake hose on both ends of brake hose holder.
Rout the speedometer cable on the outer side (between hose holder and left front fork) the left side brake hose.
Speedometer cable
Starter cable
Pass the throttle cables and starter cable on the inner side of the brake hose.
Brake hose

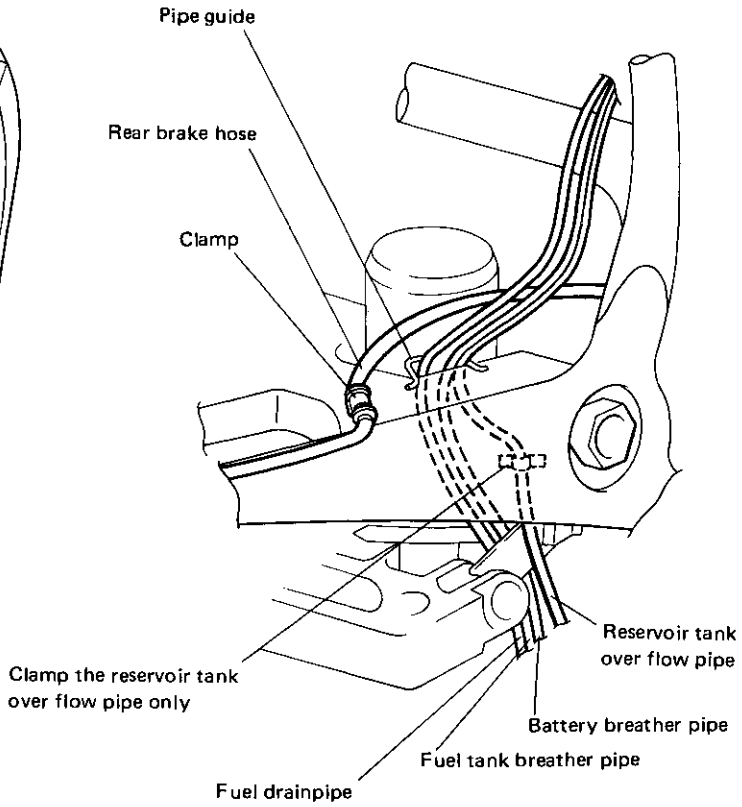



**HIGHTENSION CORD ROUTING FOR FRONT RIGHT SIDE**

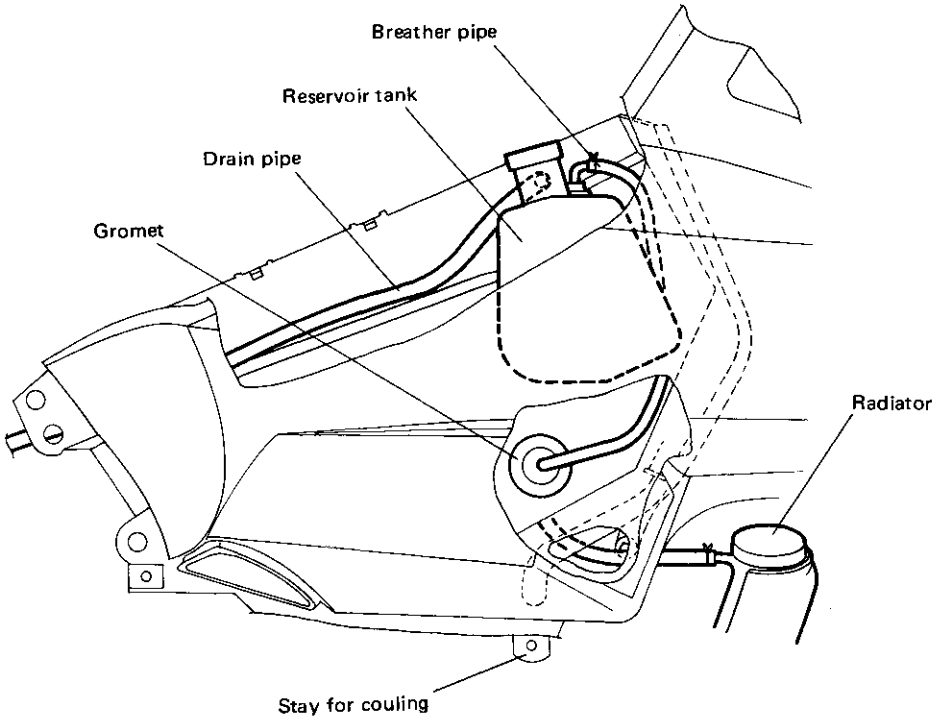





FRONT RIGHT SIDE TOP VIEW




PIPE ROUTING




RESERVOIR TANK, DRAIN PIPE AND BREATHER PIPE ROUTING

YAMAHA

# XVZ12TDK

# Supplementary Service Manual

LIT-11616-03-36

31M-28197-10

# FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and new data for the XVZ12TDK.
For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the following manual.

| XVZ12TK Service Manual (LIT-11616-03-35) |
|---|

**OVERSEAS SERVICE**
**OVERSEAS OPERATIONS**
**YAMAHA MOTOR CO., LTD.**

# 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 machines have a basic understanding of the mechanical concepts and procedures inherent to machine repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit for use and/or unsafe.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the machine will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his machine and to conform with federal environmental quality objectives.

Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and 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.
Particularly important information is distinguished in this manual by the following notations:

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

**CAUTION:** A CAUTION indicates special procedure that must be followed to avoid damage to the machine.

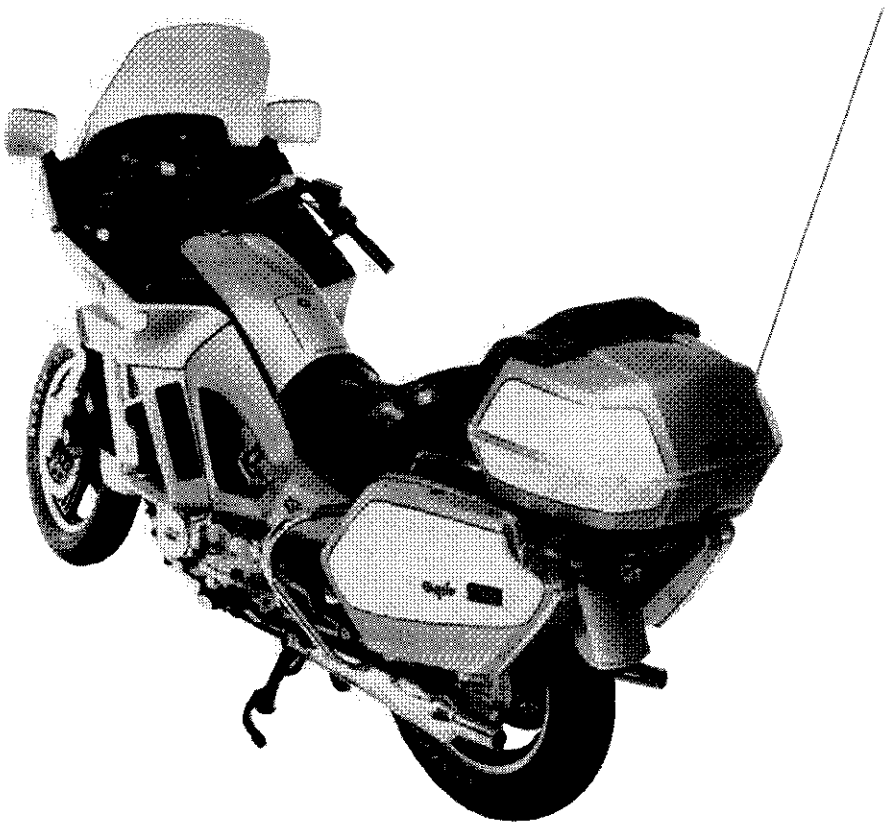
**WARNING:** A WARNING indicates special procedure that must be followed to avoid injury to a machine operator or person inspecting or repairing the machine.



XVZ12TDK
SUPPLEMENTARY SERVICE MANUAL
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P/N LIT-11616-03-36

**Starting Serial Number**

| |
|---|
| XVZ12TDK 31M-000101 |



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# PERIODIC INSPECTION AND ADJUSTMENT

## 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 and to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

## MAINTENANCE INTERVALS CHARTS

Proper periodic maintenance is important. Especially important are the maintenance services related to emissions control. These controls not only function to ensure cleaner air but are also vital to proper engine operation and maximum performance. In the following maintenance tables, the services related to emissions control are grouped separately.

## PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

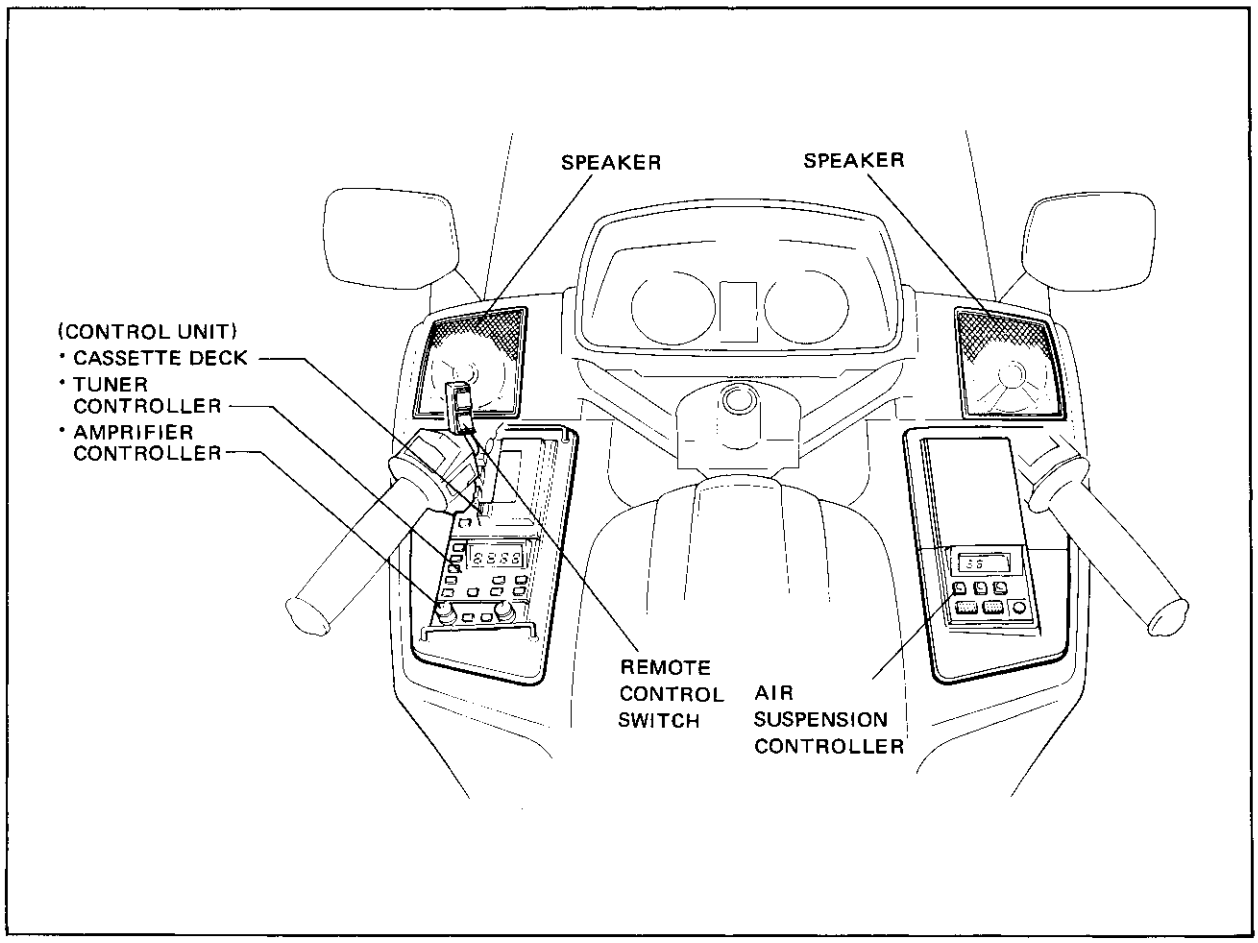
| No. | Item | Remarks | Initial break-in | | Thereafter every | |
|---|---|---|---|---|---|---|
| | | | 1,000 km (600 mi) or 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months |
| 1 | Valve clearance | Check and adjust valve clearance when engine is cold. Adjust after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | ○ | | | Adjust every 12,000 km (7,500 mi) or 18 months |
| 2 | Spark plugs | Check condition. Adjust gap/Clean. Replace after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | | ○ | ○ | Repalce every 12,000 km (7,500 mi) or 18 months |
| 3 | Crankcase ventilation system | Check ventilation hose for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 4 | Fuel line | Check fuel hose for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 5 | Fuel filter | Replace initial 33,000 km (20,500 mi) and thereafter every 32,000 km (20,000 mi). | | | | Replace every 32,000 km (20,000 mi) |
| 6 | Exhaust system | Check for leakage. Retighten if necessary. Replace gasket(s) if necessary. | | ○ | ○ | |
| 7 | Carburetor synchronization | Adjust synchronization of carburetors. | | ○ | ○ | |
| 8 | Idle speed | Check and adjust engine idle speed. Adjust cable free play. | | ○ | ○ | |

# GENERAL MAINTENANCE/LUBRICATION

| No. | Item | Remarks | Type | Initial break-in | | Thereafter every | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1,000 km (600 mi) or 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months | 16,000 km (10,000 mi) or 24 months |
| 1 | Engine oil | Warm up engine before draining. | Refer to page 53 | ○ | | | Replace every 12,000 km (7,500 mi) or 18 months | |
| 2 | Oil filter | Replace | — | ○ | | | | |
| 3 | Air filter | Clean with compressed air. Replace if necessary | — | | ○ | | ○ | |
| 4 | Cooling system | Check hoses for cracks or damage, replace if necessary. | — | | | ○ | ○ | |
| | | Replace coolant 24 months. | Ethylene glycol anti-freeze coolant. | | | | | Every 24 months |
| 5 | Brake system | Adjust free play. Replace pads if necessary. | — | ○ | ○ | ○ | | |
| 6 | Final gear oil | Replace | SAE 80 API GL-4 Hypoid gear oil | ○ | | | | ○ |
| 7 | Control and meter cable | Apply chain lube thoroughly. | Yamaha chain and cable lube or SAE 10W30 motor oil | ○ | ○ | ○ | | |
| 8 | Shift pedal and brake pedal shaft pivot. | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil. | | ○ | ○ | | |
| 9 | Center and sidestand pivots | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 10 | Steering bearing and reces. | Check bearing assemblies for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 11 | Front fork oil | Drain completely. Refill to specification. | Yamaha fork oil 10wt or equivalent | | | | | ○ |
| 12 | Wheel bearings | Check bearings for smooth rotation. Replace if necessary. | — | | ○ | ○ | | |
| 13 | Battery | Check specific gravity. Check breather pipe for proper operation. | — | | ○ | ○ | | |
| 14 | Brake lever and clutch lever pivot shaft | Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 15 | Rear arm pivot bearing | Check bearing assembly for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 16 | Rear suspension link pivots | Apply chain lube | Lithium soap base grease | | | | | ○ |
| 17 | Air drier | Replace desiccant every 24 months | — | | | | | every 24 months |
| 18 | Suction filter | Clean filter every 12 months | — | | | | every 12 months | |

# MAJOR FEATURES

## AUDIO SYSTEM




YAMAHA AUDIO SYSTEM is equipped with a 12-watt amplifier, amplifier controller, tuner controller, cassette tape deck, left & right speakers, and remote control switch.

The tuner controller provides both auto-tuning and auto-dimmer LED display. The radio can be preselected for five FM stations and five AM stations.

The cassette tape deck has both auto-reverse and metal tape capabilities.

Weatherproof speakers are located at both sides of the fairing.

The remote control switch can control both the tuner and the cassette deck for auto-tuning, muting, or tape reverse operation.

Volume adjusts automatically to compensate for ambient noise levels.

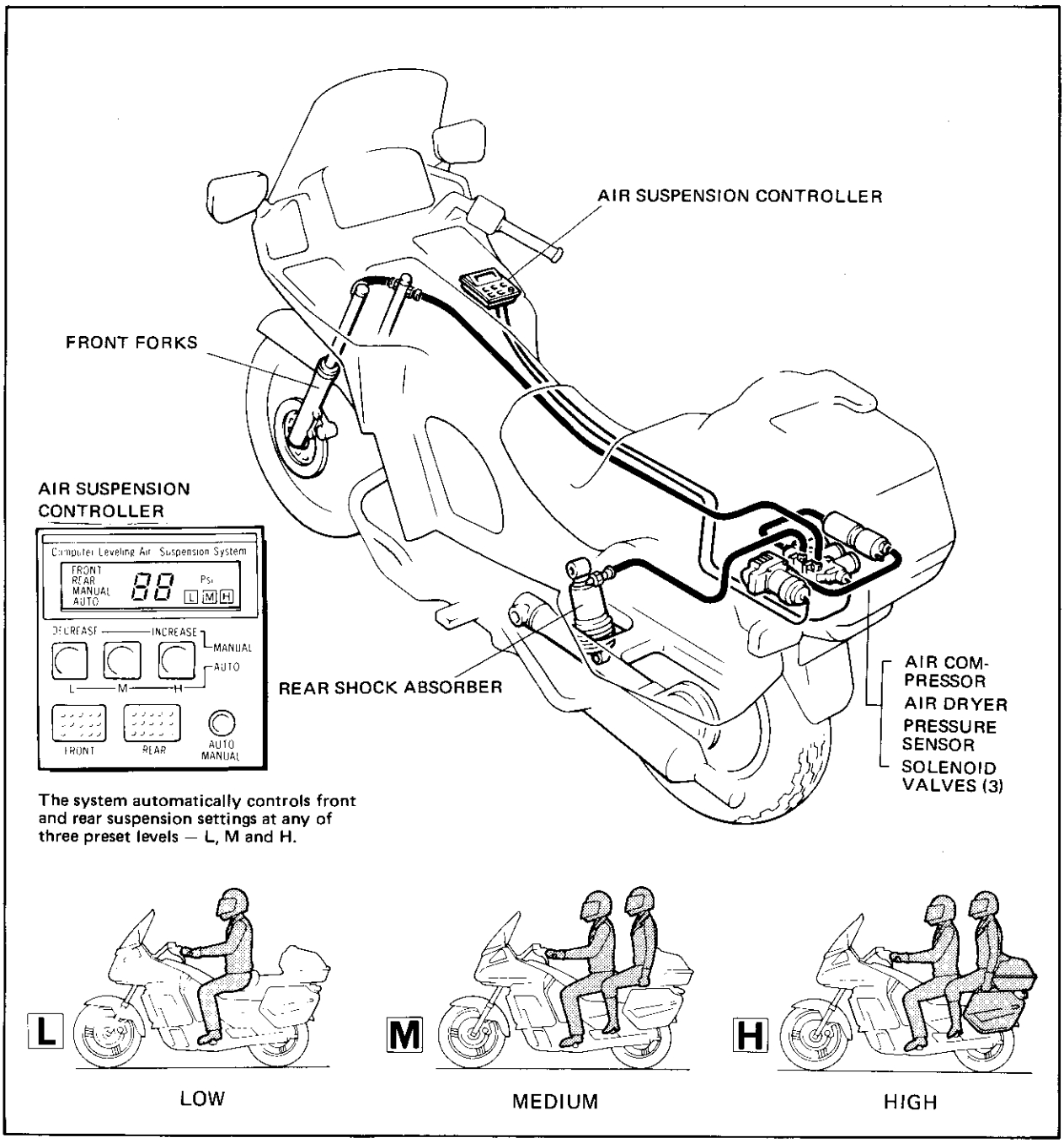
The controller units are detachable for security and the connectors are gold-plated for corrosion resistance.

## CLASS (Computer Leveling Air Suspension System)

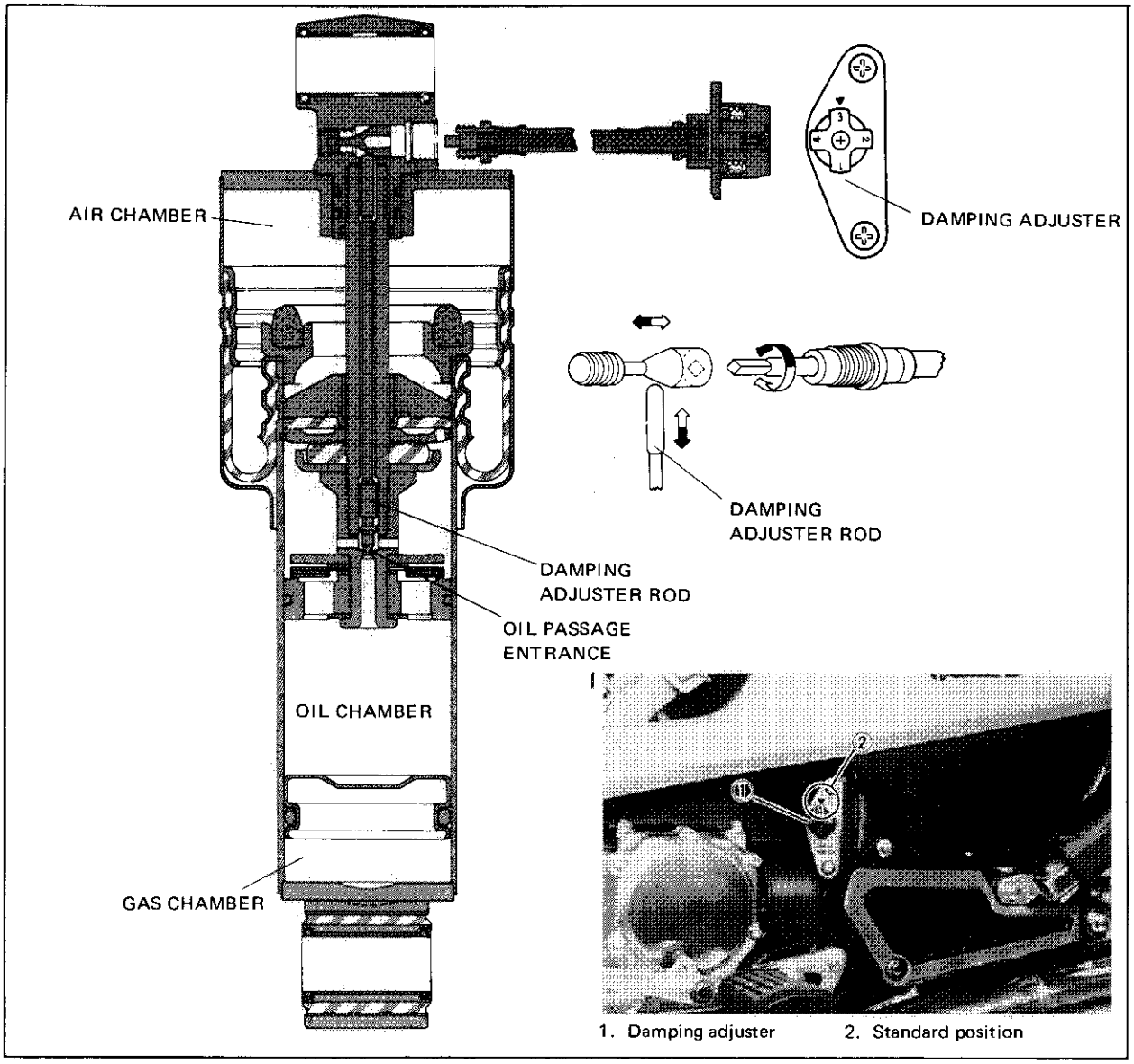
CLASS is the world's first suspension control system by which the front and rear suspension air pressures can be controlled at a touch.

The operation of buttons on the control panel's (air suspension controller) enables the semiconductor pressure sensor and microcomputer to measure both front and rear suspension air pressures and automatically adjust the pressures in three stages. On the MANUAL mode, it is possible to set the pressures at any desired level.

The air suspension controller, equipped with a built in microcomputer controls the solenoid valves and air compressor motor, the controller simultaneously provide a reach out of the constantly changing air pressure on the liquid crystal display (LCD) during pressure adjustment. In case of trouble, the self-diagnosis function indicates an "error" sign (E1 to E6) on the display to help in troubleshooting.



## REAR SHOCK DAMPING ADJUSTER




1. Damping adjuster 2. Standard position

### Damping

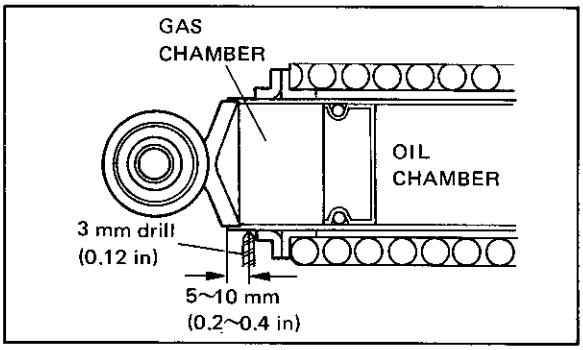
Turn the damping adjuster to increase or decrease the damping.

If the damping adjuster is turned toward the 4, the damping becomes harder; if the adjuster is turned toward the 1, damping becomes softer.

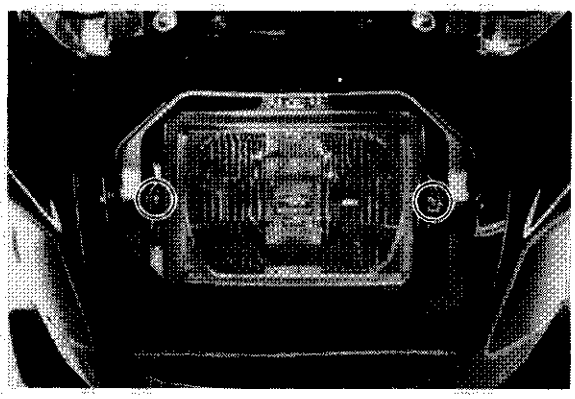
| |
|---|
| Standard position – No. 1 |
| No. 1 – Minimum damping |
| No. 4 – Maximum damping |

**WARNING:**

1. **This unit contains high pressure nitrogen gas.**
2. **Incineration or disassembly may cause explosion.**
3. **Drill as shown with eye protection.**



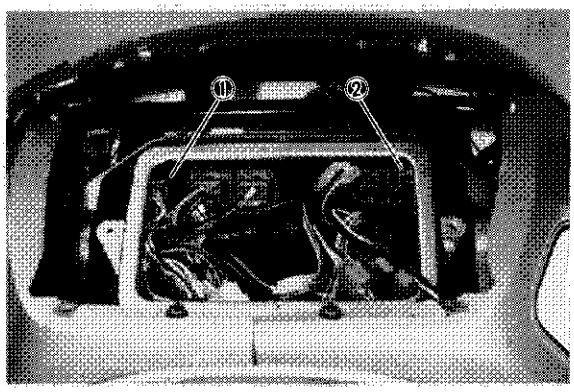
2. Remove the headlight holding screws (2).



3. Disconnect the lead wires and remove the light unit assembly.



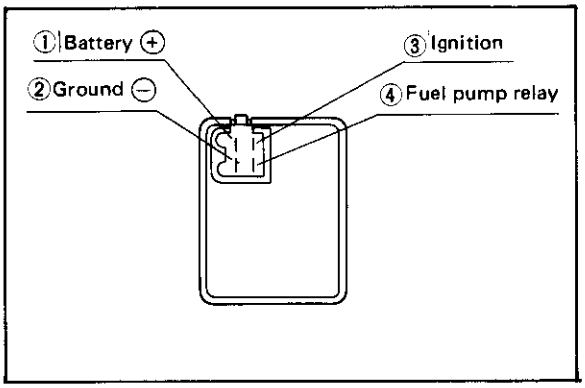
4. Pull out the fuel pump control unit and the relay from the rubber mountings, and disconnect the connectors.




1. Fuel pump control unit 2. Fuel pump relay

**Fuel pump control unit inspection**

Check the resistance using a pocket tester.



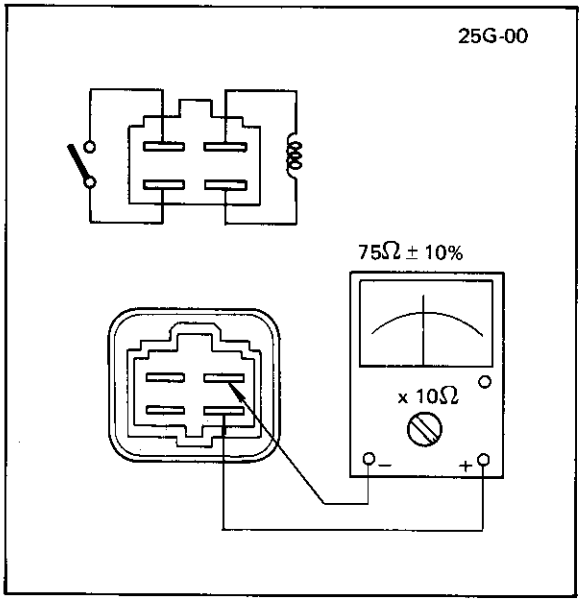

(kΩ range)

| Tester ⊖ lead \ Tester ⊕ lead | ① | ② | ③ | ④ |
|---|---|---|---|---|
| ① | | ∞ | ∞ | ∞ |
| ② | 1 ~ 30 | | ∞ | 1 ~ 15 |
| ③ | ∞ | | | ∞ |
| ④ | 1 ~ 15 | ∞ | ∞ | |

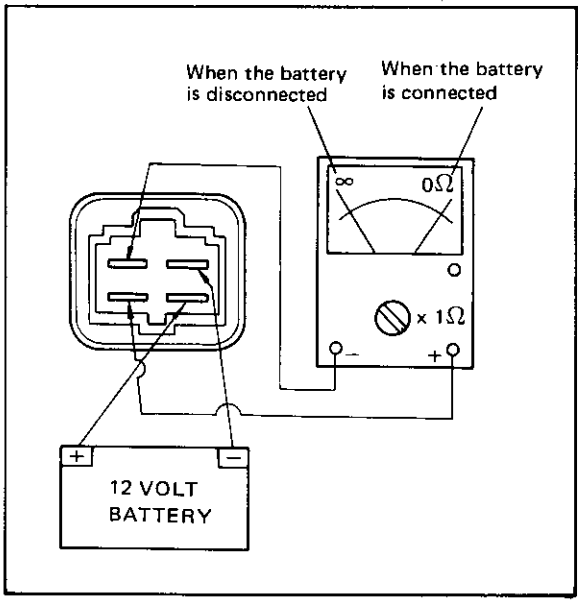
If the resistance is not within specification, replace the control unit.

**Fuel pump relay inspection**

1. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.

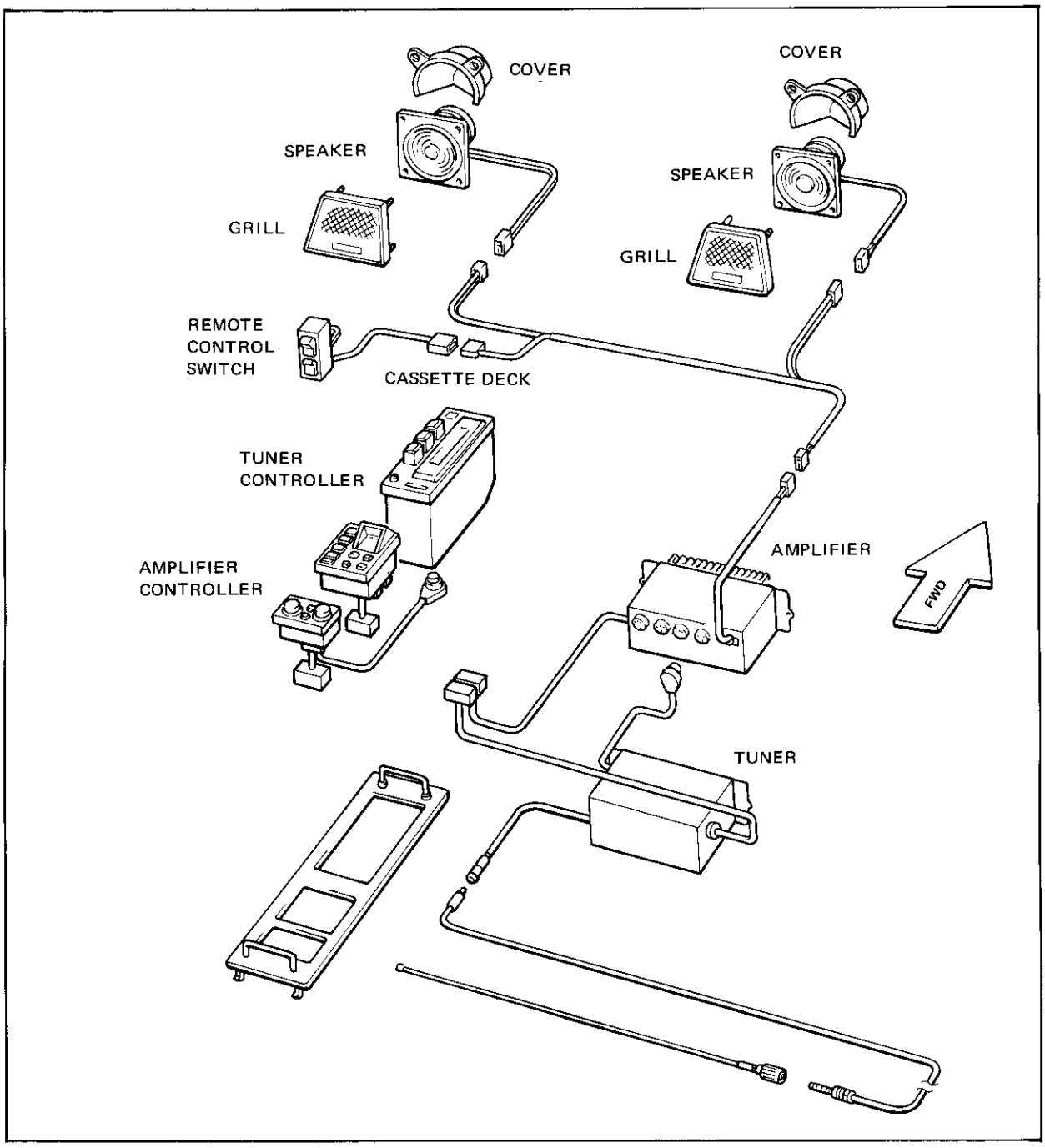



2. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.



# AUDIO SYSTEM

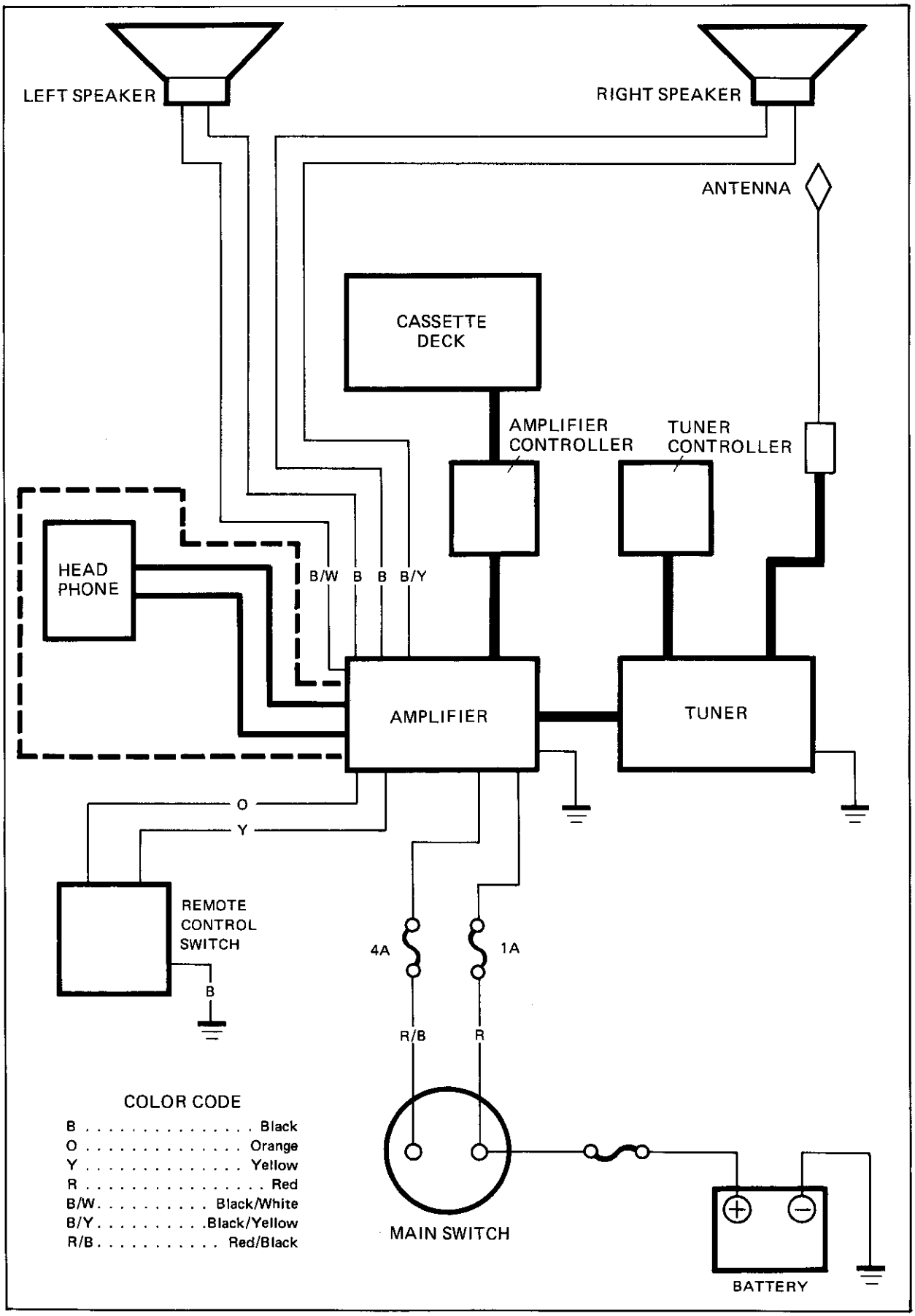
## SYSTEM DIAGRAM



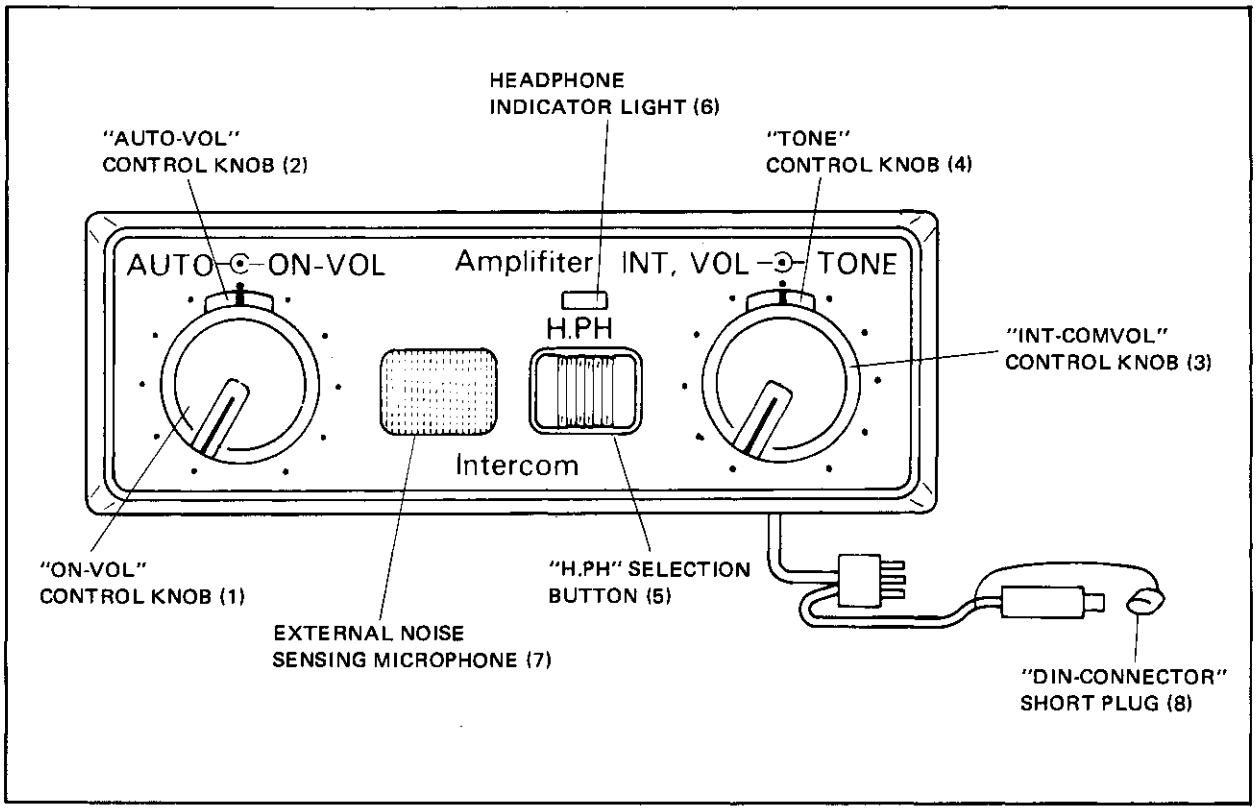

**CAUTION:**

- Although the cassette deck, tuner controller, and amplifier controller are of waterproof design, never hose or splash them with water or clean them with a wet scrub brush. For their own protection, be sure to remove these units before washing your motorcycle.
- When removing these units, never splash the connectors with water, allow dirt to come in contact with the connectors, or bend the connector pins.
- When removing the units, be sure to turn off their main switches and power sources (ON-VOL/INT-VOL).

## WIRING DIAGRAM



## AMPLIFIER CONTROLLER




Operation

(1) "ON-VOL" control knob

- This controls the power source and sound volume for the tuner and the cassette deck. Turning this knob counterclockwise full cuts off the power source, while turning the bend-clockwise increases the volume.
- Insertion or ejection of a cassette tape into and out of the deck makes an automatic change from tuner to deck or deck to tuner operation.

(2) "AUTO-VOL" control knob

- During riding there is a lot of ambient noise which tends to absorb the sound volume of the tuner, and deck. Turning this automatic volume control knob clockwise increases the relative volume. When this knob is turned fully to the left, it cancels the feature.
- Proper positioning of both POWER-VOL and AUTO-VOL can provide approximately the same level of hearing whether the motorcycle is parked, idling in traffic, or in motion.

(3) "INT-COMVOL" control knob

- This is a power source as well as volume control switch for the inter-com component. Turning it counterclockwise turns off the power source and turning it clockwise increases the inter-com sound volume.
- The INT-COM VOL has no bearing with the POWER-VOL in operation. Thus, to turn off the whole system, turn off the power source switches (1) and (3).

(4) "TONE" control knob
- This is for the tone adjustment with the tuner and deck. Turning it counterclockwise emphasizes the bass tones, whereas a clockwise rotation brings out the treble tones.

(5) Switch-over from HEADPHONE to SPEAKER and vice versa
- Pushing this switch alternately turns on the headphone and speaker. When the headphone is turns on, the indicator glows.

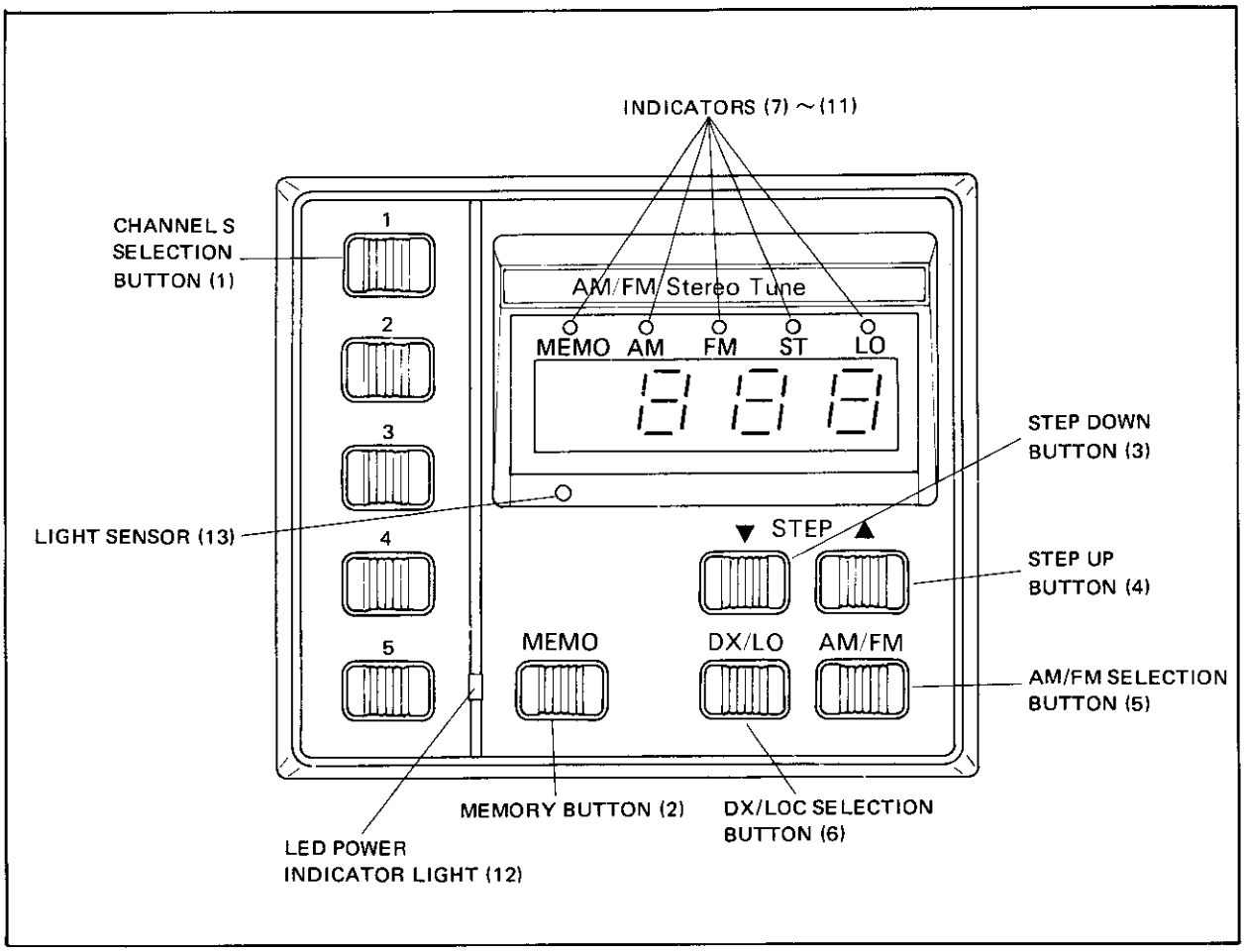
(6) Headphone indicator light
- When the above switch-over knob is turned for HEADPHONE, this indicator comes on.

(7) External noise sensing microphone
- This is a noise sensing microphone for automatic sound volume control. It is covered with a waterproof cloth which lets sounds through.
- Be careful not to clog this mesh cloth with dust or foreign material and avoid tearing it.

(8) DIN-CONNECTOR short plug
- When the cassette deck is not connected, short the DIN-CONNECTOR using this plug. If this plug is not inserted, the amplifier will not work.

**NOTE:**
- Pull out the short plug from the DIN connector only when it is connected with the deck.
- Adjust the auto-volume so that it reaches a comfortable hearing level whether the motorcycle is parked or in motion. As the sensor microphone for the auto-volume adjustment is covered with a special waterproof cloth, do not it too hard.
- The power source switch and intercom switch are independent of each other. Turn them on or off as required.
- The change-over switch from headphone to speaker/speaker to headphone is effective only for sound from the radio or tape. Sound through the intercom (microphone) comes only through the headphone. Please note that if the HP-SP switch is at the HP position, no sound will come out of the speaker. Do not mistake it for component failure.
- Clean the panel surface with a soft cloth moistened with a neutral detergent. Never use thinner, benzene, or gasoline.

## TUNER CONTROLLER




Operation

(1) CHANNEL selection button
- Pre-selected AM or FM stations can be recalled at a touch by pressing of the five channel selected buttons.
- These five station selection buttons enable you to select either five AM or five FM stations.

(2) Memory button
- Push this memory button; LED (7) glows for minutes.
- If any of the channel selection buttons is touched while LED (7) is glowing, the selected frequency will by instantly fed into the tuner controller's memory bank for later recall.

(3) STEP DOWN button
- Each touch on this button selects the station in descending order. If this button is held the quick selection of stations will accur in a descending order of frequency, i.e., towards the slower end of the waveband.

(4) STEP UP button
- This is the reverse of the above operation.

(5) AM/FM selection button
- Each touch on this button changes tuning from AM to FM or from FM to AM.
- When AM reception is selected, indicator (8) glows; while during FM reception indicator (9) is displayed.

(6) DX/LOC selection button
- Each touch on this button replaces DX for LOC and vice versa. The indicator (11) comes on for LOC.
- With DX, a relatively weak frequency can be received.
- With LOC, only strong frequencies can be caught.
- Push on the handlebar remote control tune switch and the tuner controller will scan the waveband for an available stations.

(7) to (11) Indicators
- Red LED is used for the indicators.
- With the indicaotor ST (10), it comes on only for FM stereo broadcasting.

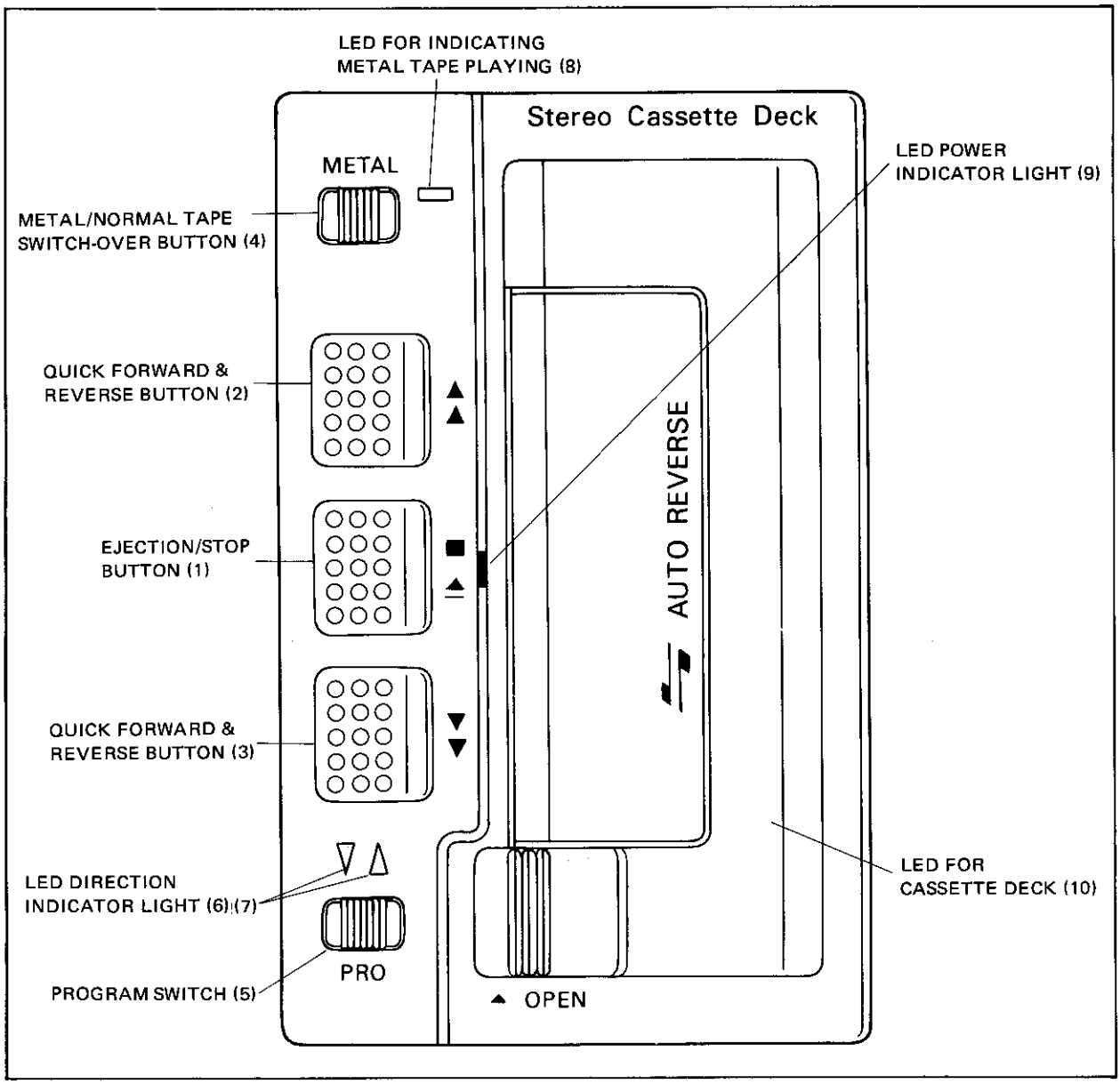
(12) LED power indicator light
- This lights when the main switch is turned to "ACC."

(13) Light sensor
- This senses surrounding brightness for control of the LED lights. According to the ambient brightness, LED either increases or decreases its brightness automatically for better visibility.

**NOTE:**
- The audio system is subjected to noises on a motorcycle, such as sounds induced by improper spark plugs. Thsu, resistor plugs are employed. Always replace with the specified type.
- Unclear radio reception such as static or station "crossover" may occur on some frequencies due to weak redio transmitting waves. Try another station.
- Do not use the battery for a long time without recharging it.
- Clean the Tuner Controller panel surface with a soft cloth moistened with a neutral detergent. Never use thinner, benzene, or gasoline.
- Do not allow clutch oil or brake oil to drop or touch on the controller panel. If this happens, immediately wipe off the oil thoroughly.

## CASSETTE DECK

### Appearance and Description




Operation

(1) Ejection/stop button

- Press this button firmly, then remove the tape.
- Press this button lightly to release the fast forward or fast reverse operation; the tape will then revert to the play mode.

(2) & (3) Quick forward/reverse buttons

- Press button (2) for fast forward or fast reverse depending on what program direction the tape is running.
- Press button (3) for fast forwardor fast revers, depending on what progsam direction the tape is running.

(4) Metal/Normal tape switch-over button
- Each push on this button replaces metal to normal, or normal to metal tape playing.
- LED (8) lights to show metal tape playing.

(5) Program switch
- Each push on this button changes the program direction.
- Tape playing deraction is indicated by LED (6) and (7).

(6) & (7) LED direction indicator light
- Tape direction is indicated by LED (6) and (7).

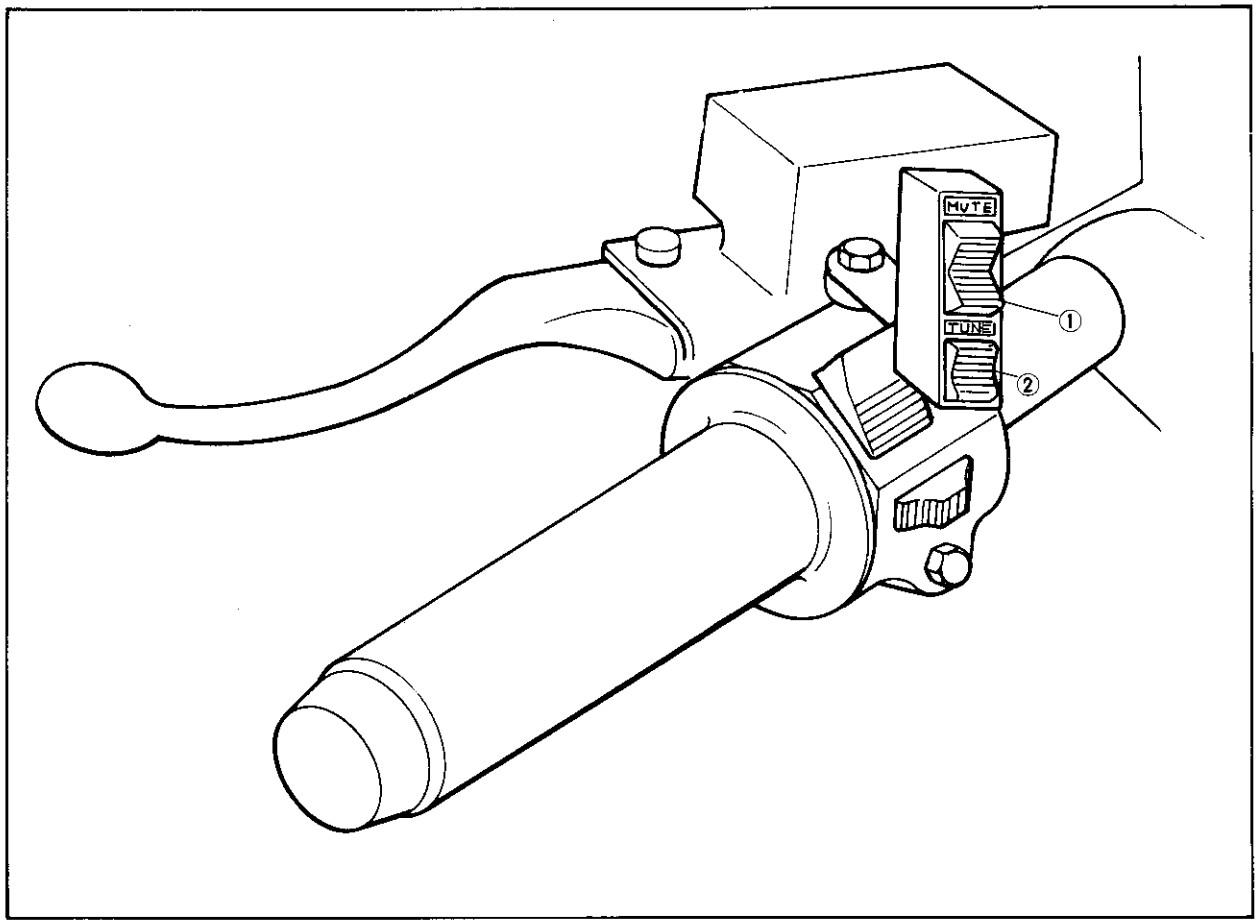
(8) LED for indicating metal tape playing.

(9) LED power indicator light
- When the power source is turned on for tuner operation, the power indicator light is displayed.

(10) Lid for cassette deck
- The cassette deck lid is of waterproof design. Be sure that the cassette deck lid is closed when not in use.
- This lid can remain closed after depressing button(1) to stop the tape button (1).

**NOTE:**
- Use a waterproof cover over the cassette deck in wet weather.
- Keep the cassette insertion lid closed whice the tape is being played. Also keep it closed when the deck is not in use.
- Store the cassette tapes in a case to protect the tape from dirt, scratches, or unraveling.
- Be sure to make the tape tight before playing it, as it may get entangled in the deck.
- Do not expose the tapes in the sun for a long time.
- If the cassette deck gets water in it, dry it in the shade with the cassette insertion lid open.
- Clean the magnetic head using an alcohol moistened cotton-tipped srick.
- Clean the cassette dack panel surface with a soft cloth moistened with a neutral detergent. Never use thinner, benzene, or gasoline.
- Do not use the battery for a long tume without recharging it.
- Do not allow clutch oil or brake oil to drop or touch on the controller panel. If this happens, immediately wipe off the oil thotoughly.

## REMOTE CONTROL SWITCH

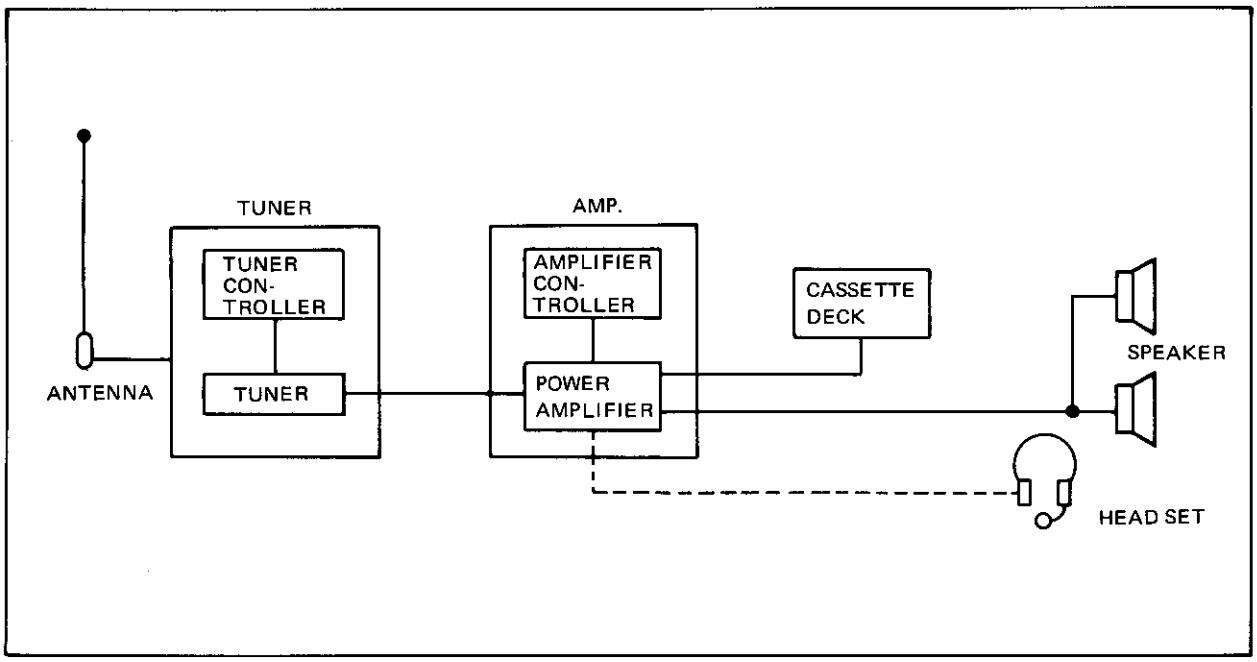



(1) MUTE switch
Push this switch at the upper portion, and the volume decreases automatically by 20 dB.

(2) TUNE siwtch
Push this switch one, and auto-tuning (auto-seeking) starts to seek whatever station can be received.

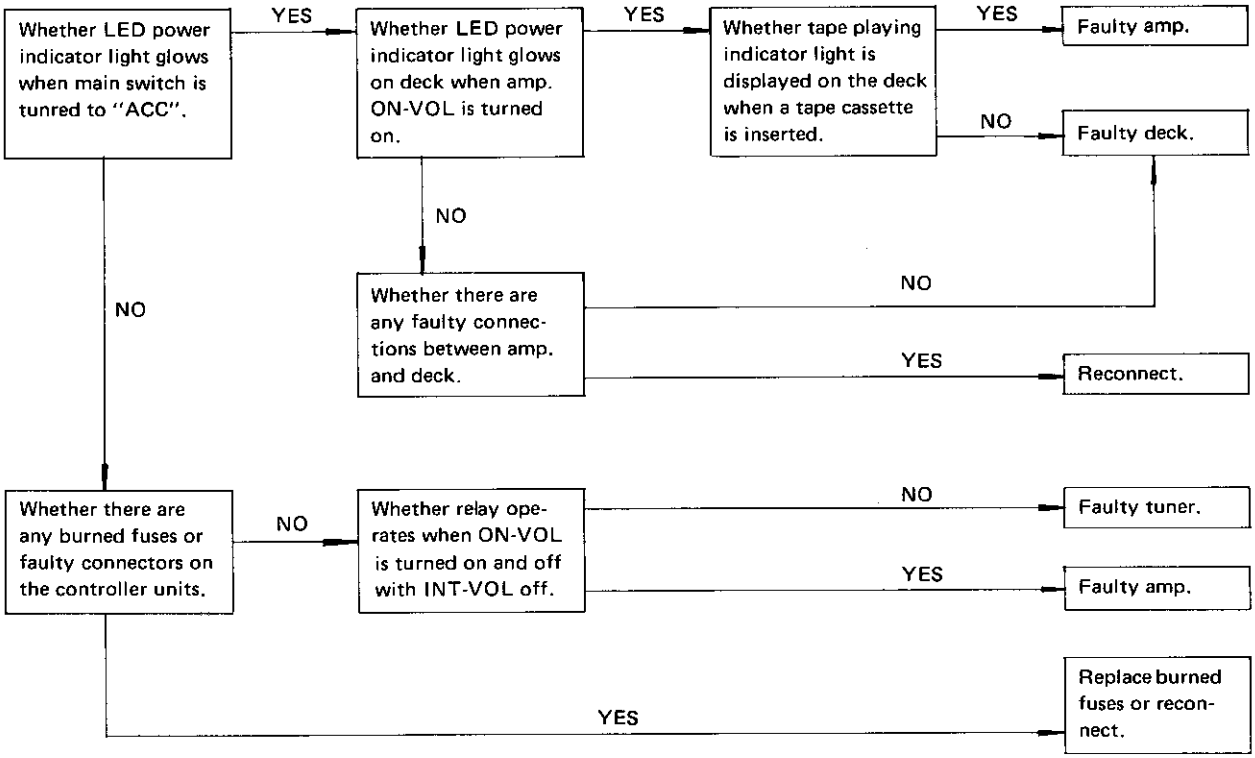
## TROUBLESHOOTING

Check the following chart for component problems:



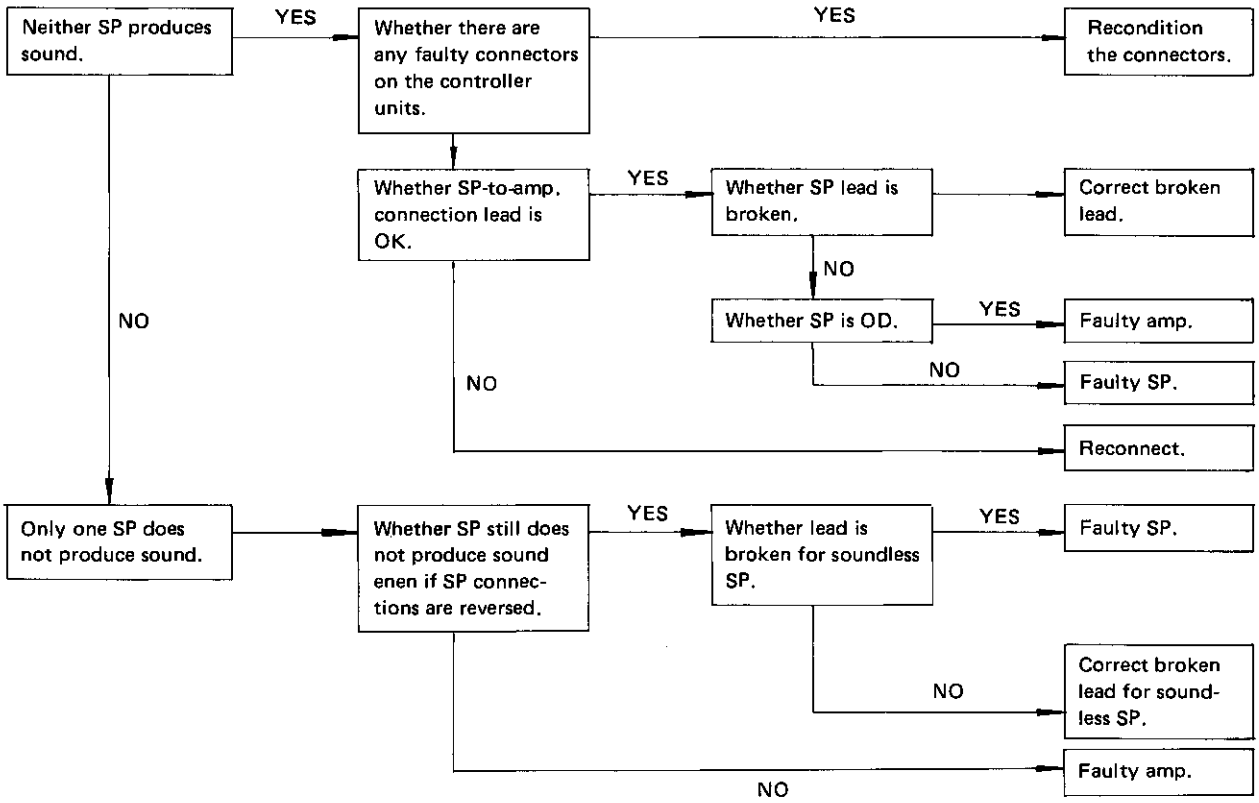

1. No power from the battery.

Check:



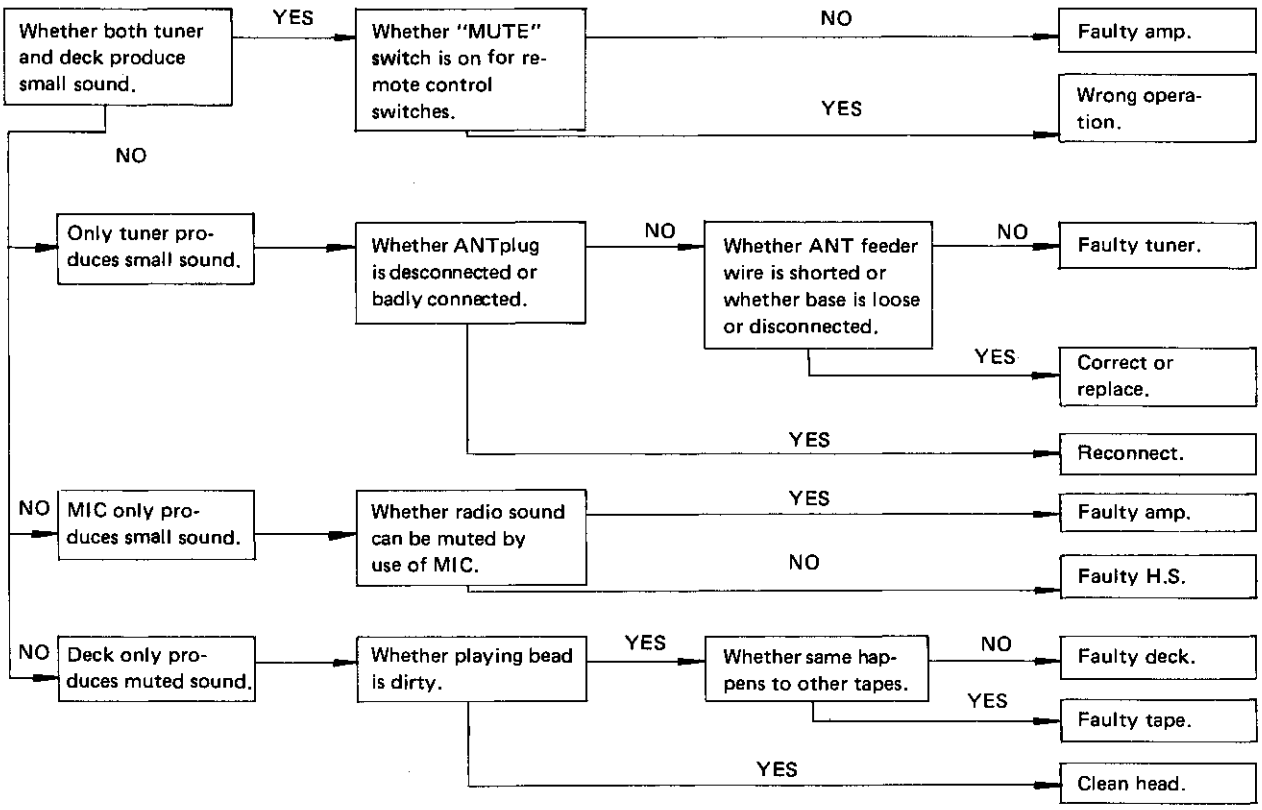
2. No sound from speaker only.
   Before checking the following chart:
   - Be sure that HEADPHONE switch on the amplifier controller is turned to OFF.

Check:



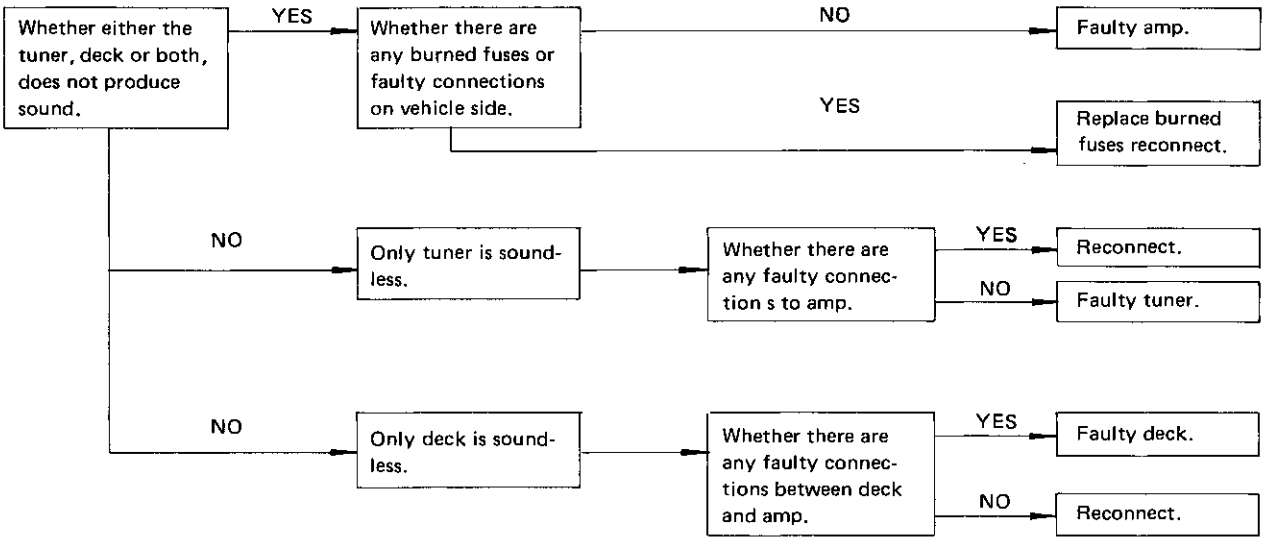

3. Sound is muted.

Check:



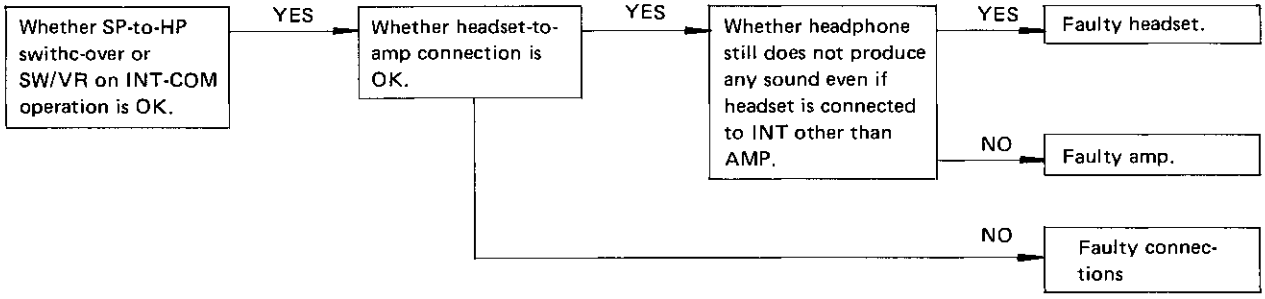
4. No sound from the speaker headphone.

Check:



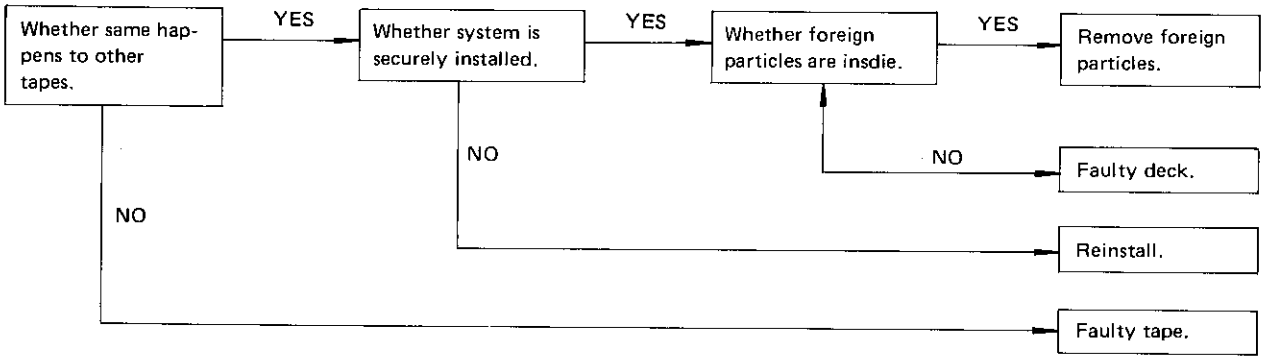

5. No sound from the headphone only.

Check:



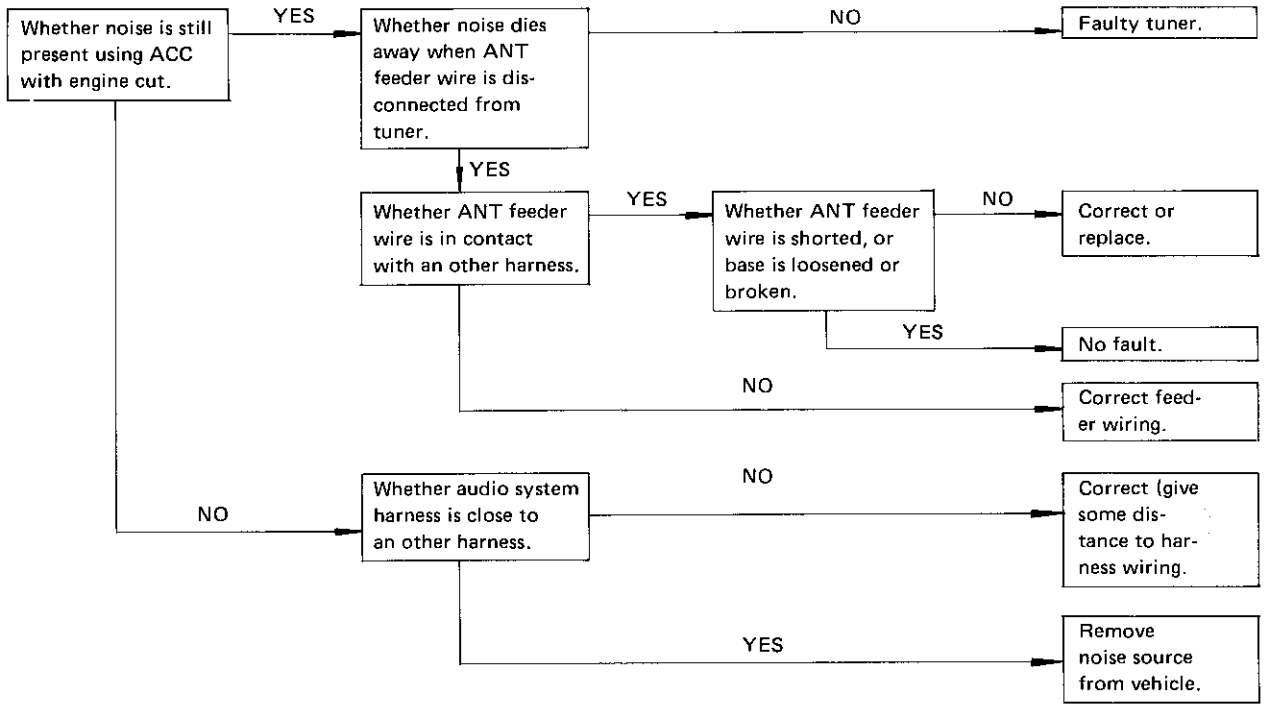
6. System is subjected to wowing and fluttering.

Check:



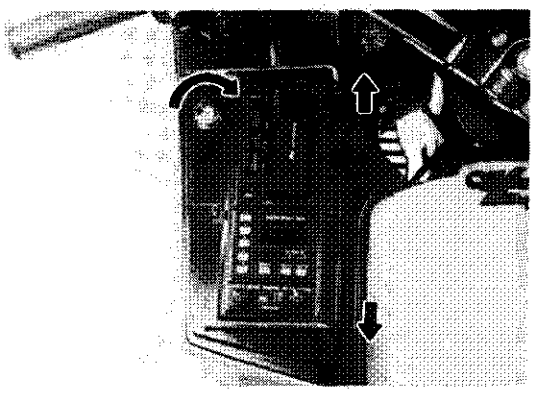

7. There are many noises.
   Before checking the following chart:
   - Check the high tension code for binding and connection from igniton coils to spark plug caps.
   - Check the ground lead from the amplifier and tuner to chassis. (Inside of the left fairing panel)

Check:



## AUDIO SYSTEM REMOVAL

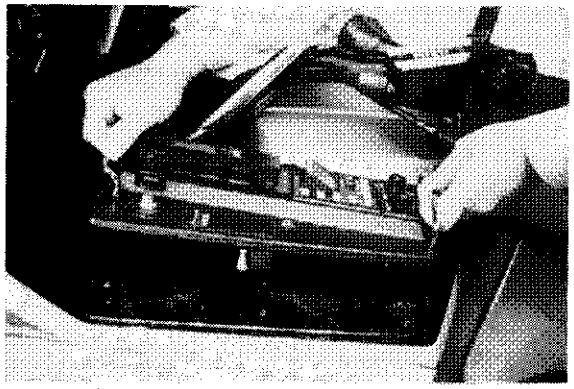
1. Insert the key in the lock and turn it clockwise.
2. Push each lever as shown.



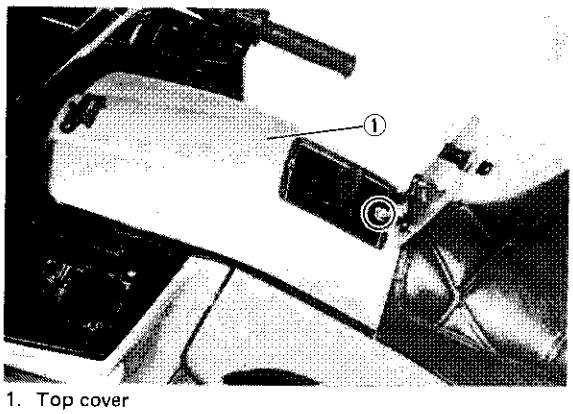
3. Pull the audio controller out from the fairing.

**CAUTION:**

**Before removing the control unit, turn off the main switch and "ON-VOL"/"INT.VOL" control knobs.**
**When removing the control unit, protect it, as well as the conectors from water and mud. Do not bend or strain the connector terminals.**

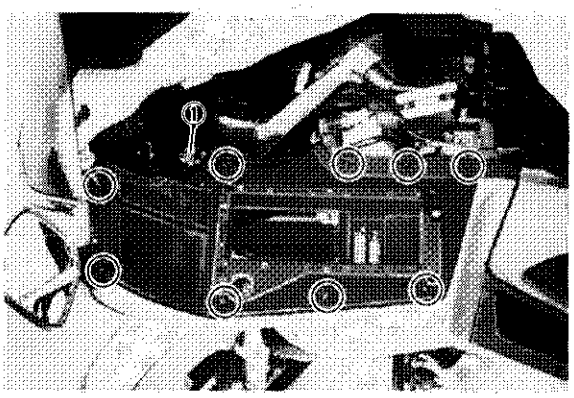


4. Remove the top cover.



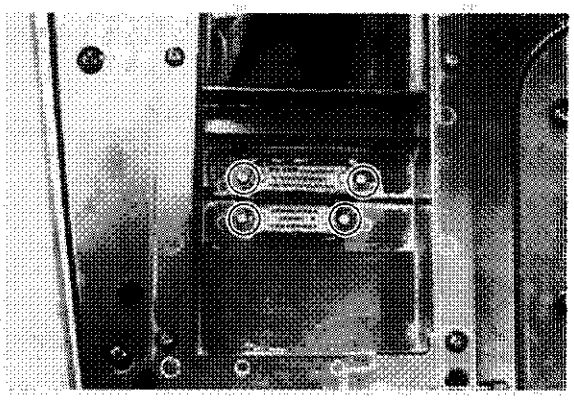

1. Top cover

5. Pull out the headlight adjusting knob and remove the screws (9) securing the console box panel.

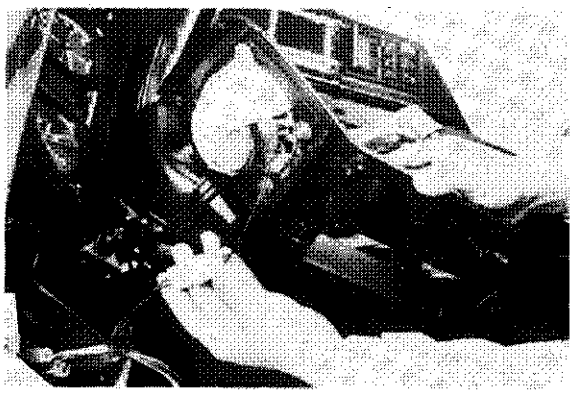


1. Headlight adjusting knob

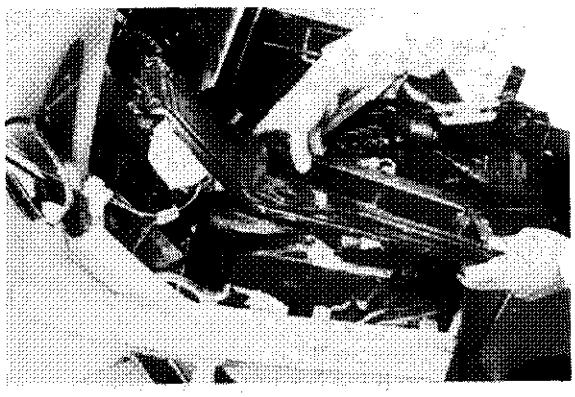
6. Remove the screws (4) securing the connectors from amp. and tuner.



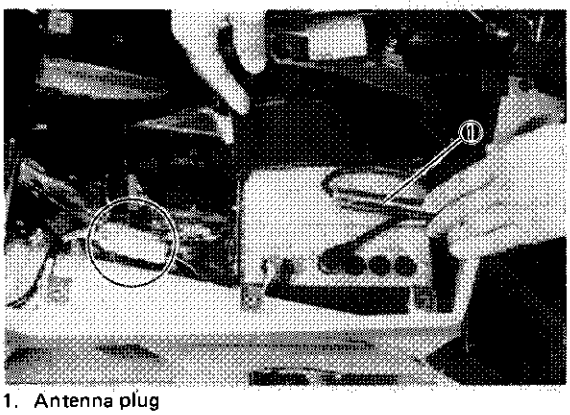
7. Disconnect the speaker lead connector.



8. Remove the console box panel (left) with loud speaker attached.

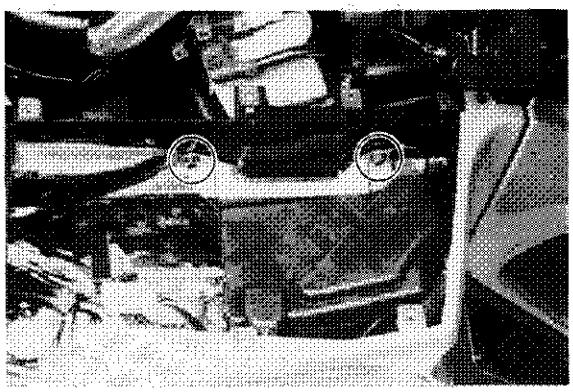


9. Disconnect the connector from the power amplifier and antenna plug.

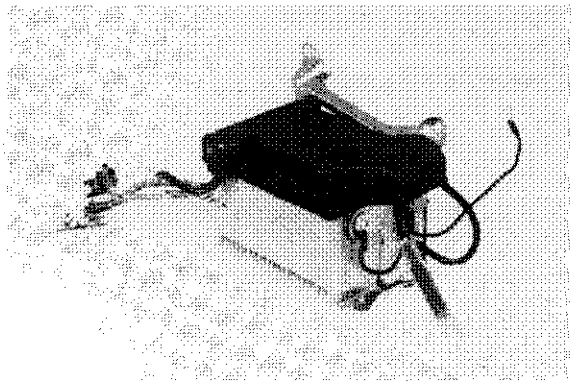


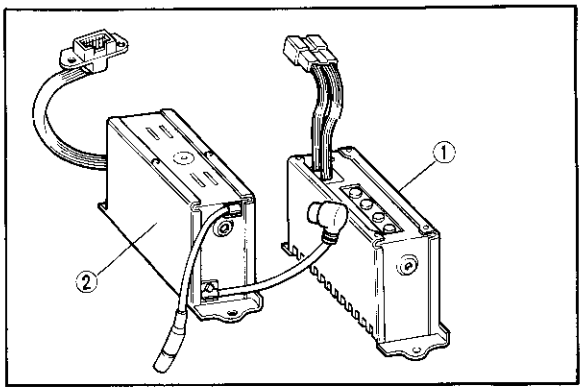

1. Antenna plug

10. Remove the two bolts (2) securing the amplifier and tuner bracket.



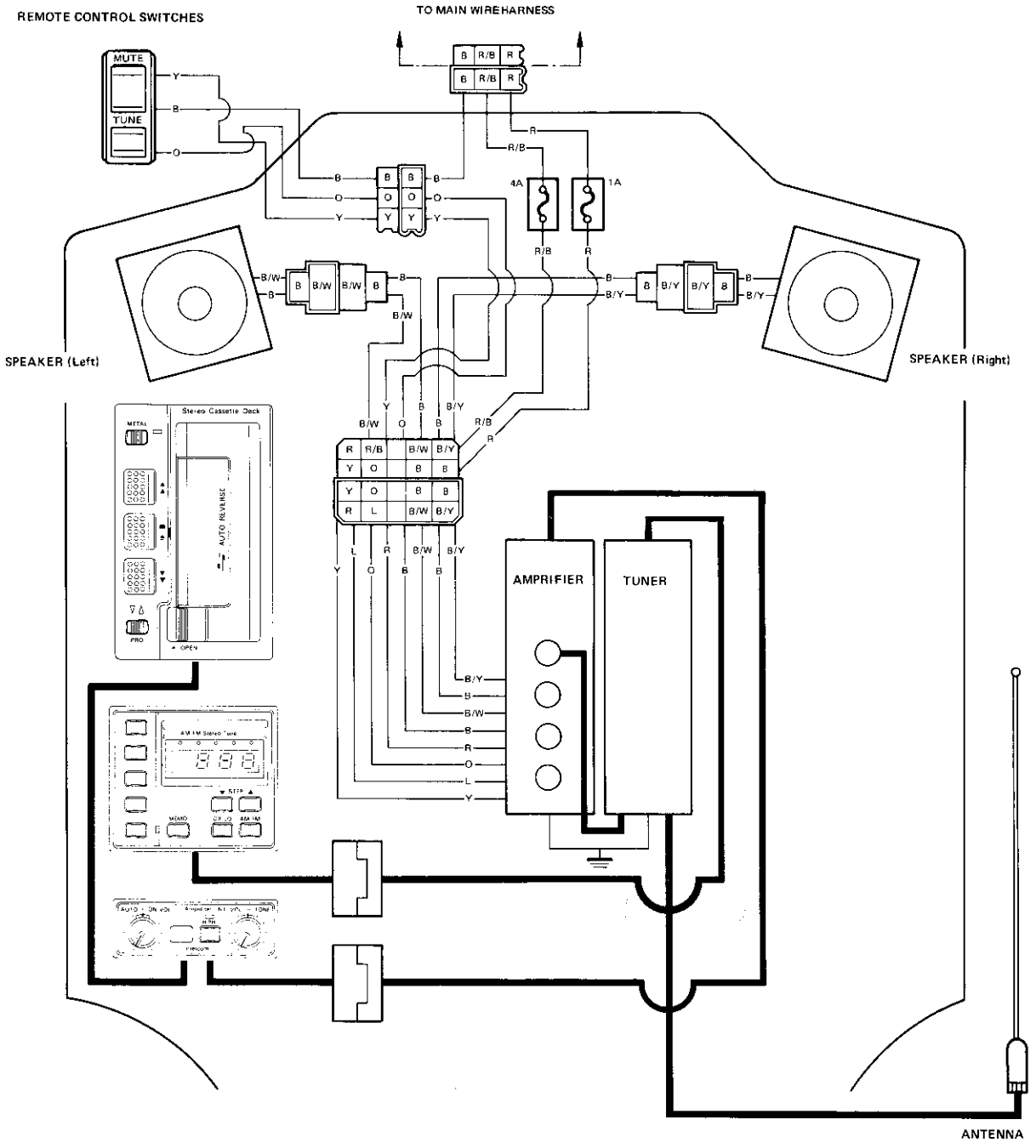
11. Remove the amplifier and tuner.






1. Amplifier 2. Tuner

## AUDIO CONNECTING DIAGRAM




### COLOR CODE

| | | | |
|---|---|---|---|
| B . . . . . | Bleak | R/B . . . . . | Red/Black |
| R . . . . . | Red | O . . . . . | Orange |
| Y . . . . . | Yellow | B/Y . . . . . | Black/Yellow |
| L . . . . . | Blue | B/W . . . . . | Black/White |

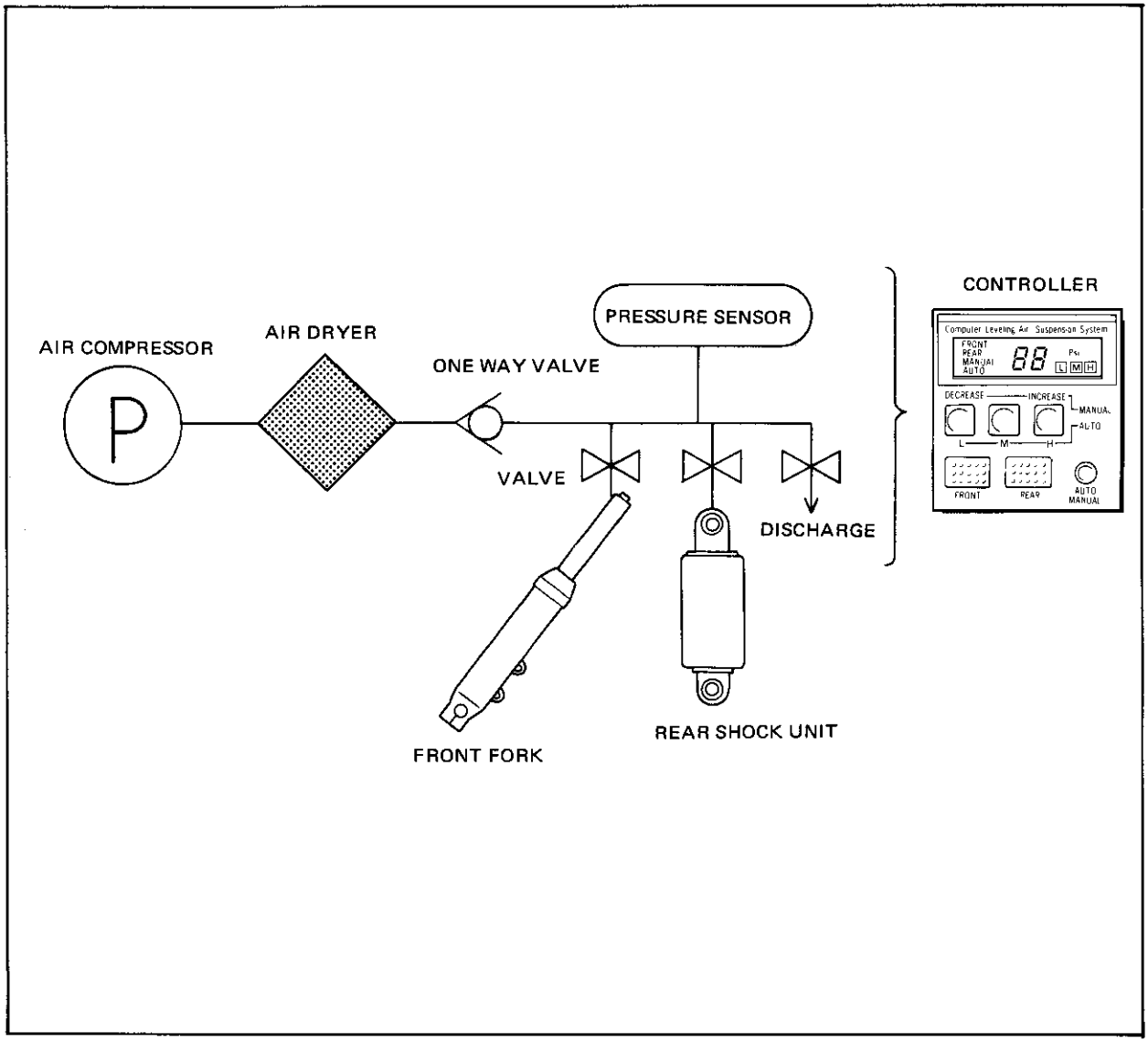
## AUDIO SPECIFICATIONS

| ITEM | RADIO | | | |
|---|---|---|---|---|
| | AM SECTION | FM SECTION | | |
| TUNINGN RANGE | 530 ~ 1,620 KHZ | 87.9 ~ 107.9 MHZ | | |
| INTERMEDIATE FREQUENCY | 450 KHZ | 10.7 MHZ | | |
| USABLE SENSITIVITY | 38 dB V(Max) | 18 dB V(Max) | | |
| STOP SENCITIVITY | DX: 30 dB V (Norm)<br>LOC: 55 dB V (Norm) | DX: 15 dB V (Norm)<br>LOC: 45 dB V (Norm) | | |
| STEREO SEPAPATION | – | 20 dB(Min) | | |
| SIZE(Unit: mm) | | Width | Height | Depth |
| | RADIO PANEL | 93 | 82 | 30 |
| | RADIO BLACK BOX | 160 | 50 | 99 |
| CURRENT CONSUMPTION | Switch ON | 100 mA(Max) | | |
| | Switch OFF | 1 mA(Max) | | |

| ITEM | | AMPLIFIER | | | DECK | | |
|---|---|---|---|---|---|---|---|
| OUTPUT POWER | | 12W | | | – | | |
| AUTO–VOL. RANGE | | 20 dB | | | – | | |
| OUTPUT IMPEDENCE | | SPEAKER: 4Ω<br>HEADPHONE: 8Ω | | | – | | |
| | | | | | | | |
| CIRCUIT SYSTEM | | – | | | 4-track, 2-channel<br>Stereo for reproduction | | |
| TAPE SPEED | | – | | | 4.76 cm/sec. | | |
| TAPE | | – | | | Normal and Metal | | |
| SIZE(unit: mm) | | Width | Height | Depth | Width | Height | Depth |
| | PANNEL | 93 | 32 | 45 | 87 | 142 | 162 |
| | BLACK BOX | 160 | 50 | 99 | | | |
| CURRENT CONSUMPTION | Switch ON | ACC: 5.5A | | | ACC: 1A(Max) | | |
| | | MAIN: 100mA | | | MAIN: 5mA(Max) | | |
| | Switch OFF | 1mA(Max) | | | | | |

## CLASS (Computer Leveling Air Suspension System)

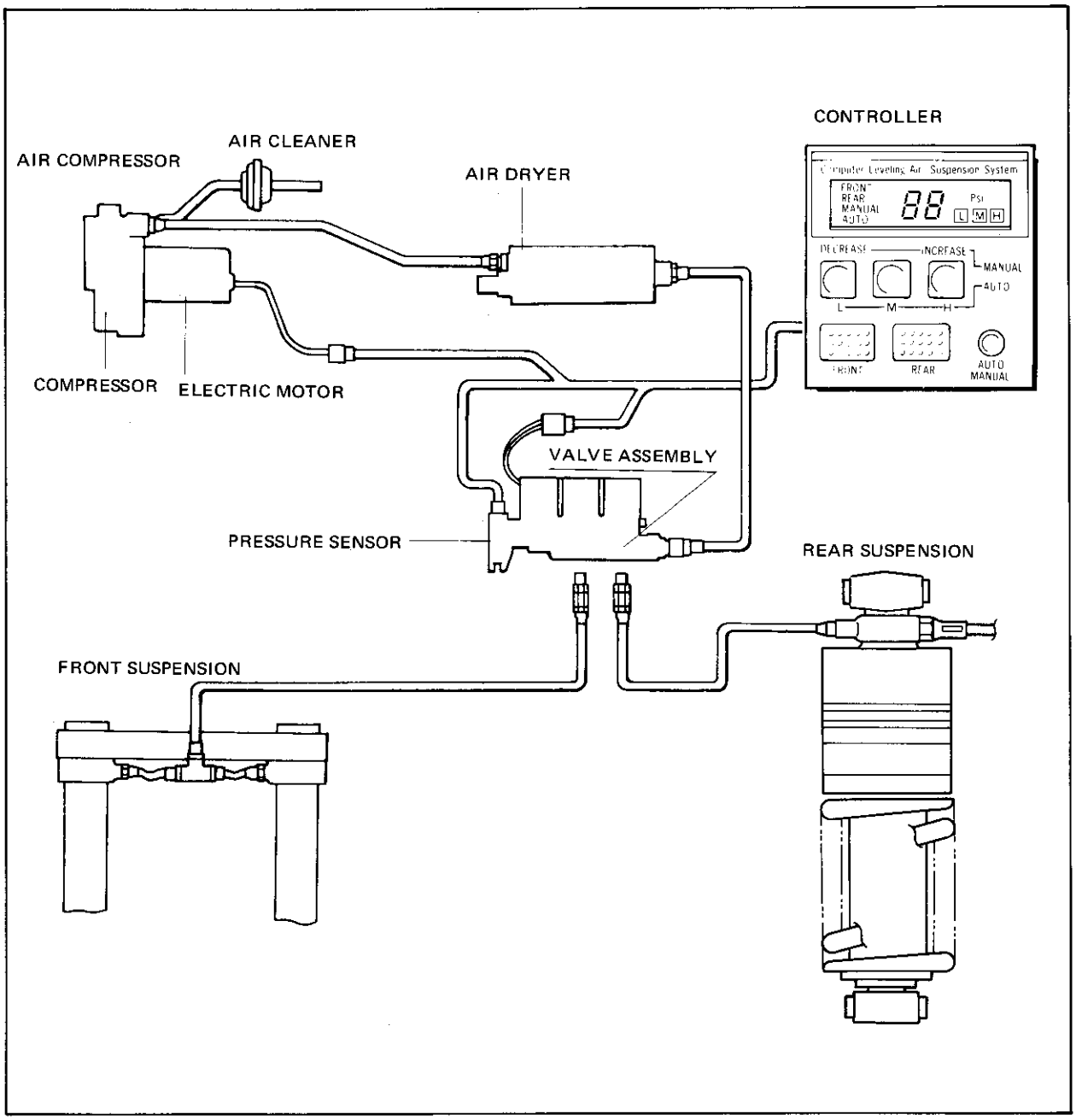
### DESCRIPTION OF THE SYSTEM




The operation of buttons on the controller enbles the semiconductor pressure sensor and microcomputer to measure both front and rear suspension air pressures and automatically adjust the pressures in three stages. On the MANUAL mode, it is possible to set the pressures at any desired level.

The controller has a biult-in microcomputer that controls the solenoid valves and air compressor motor. Simultaneously the controller also indicuted the constantly banging air pressure on the liquid crystal display (LCD) during pressure adjustment. In case of trouble, the self-diaguosis fuuction indicotes an "error" sign (E1 to E6) on the display to aid in troubleshooting.

## CLASS COMPONENT PARTS




The air suspension controller controls the air compressor and three solenoid valves. It also feeds air to and draws air from the front and rear suspension systems. The semiconductor pressure sensor constantly measures the air pressure during pressure adjustment and transmits it to the controller.

By operating the switch, the front and rear suspension air chambers and the pressure sensor chamber can be connected, and the compressor operates when air is required. If air has to be drawn out, the discharge valve openes. In this way, the suspension air pressures are controlled.

**Functions**

1. Air pressure measurement of the front and rear suspensions.
2. Air pressure adjustment of the fromt and rear suspensions.

a) Automatic adjustment
Both front and rear suspension air pressures can be set in three stages.

| MODE | | KPa | kg/cm$^2$ | psi |
|---|---|---|---|---|
| L | FRONT | 78.4 | 0.8 | 11 |
| | REAR | 98.1 | 1.0 | 14 |
| M | FRONT | 98.1 | 1.0 | 14 |
| | REAR | 294 | 3.0 | 42 |
| H | FRONT | 118 | 1.2 | 17 |
| | REAR | 490 | 5.0 | 71 |

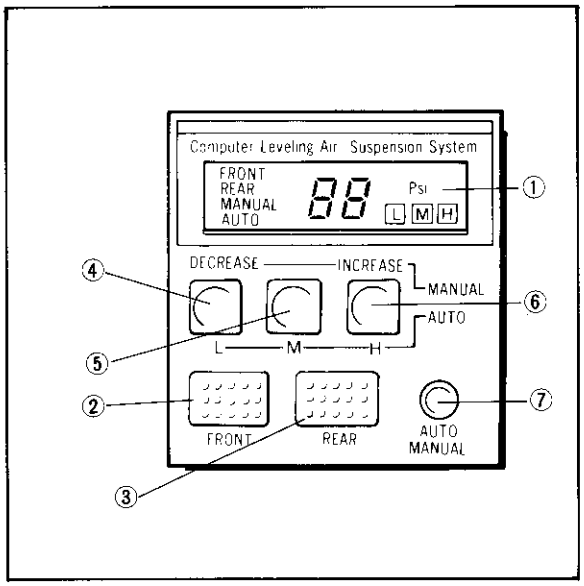
b) Manual adjustment
Both front and rear suspension air pressures can be set at any desired level within adjustable range.

| | Unit | Lower limit | Upper limit |
|---|---|---|---|
| FRONT | kPa | 49.0 | 147 |
| | kg/cm$^2$ | 0.5 | 1.5 |
| | psi | 7 | 21 |
| REAR | kPa | 49.0 | 588 |
| | kg/cm$^2$ | 0.5 | 6.0 |
| | psi | 7 | 85 |

3. LCD (Liquid crystal display) of air pressure and mode
LCD indicates the selection of the front or rear suspension, the present suspension air pressure, the adjusted air pressure, AUTO/MANUAL mode, and error sign.
4. Error diagnosis
LCD shows six different error signs depending on trouble diagnosis. Refer to "Troubleshooting".

## OPERATION

**Control Panel**



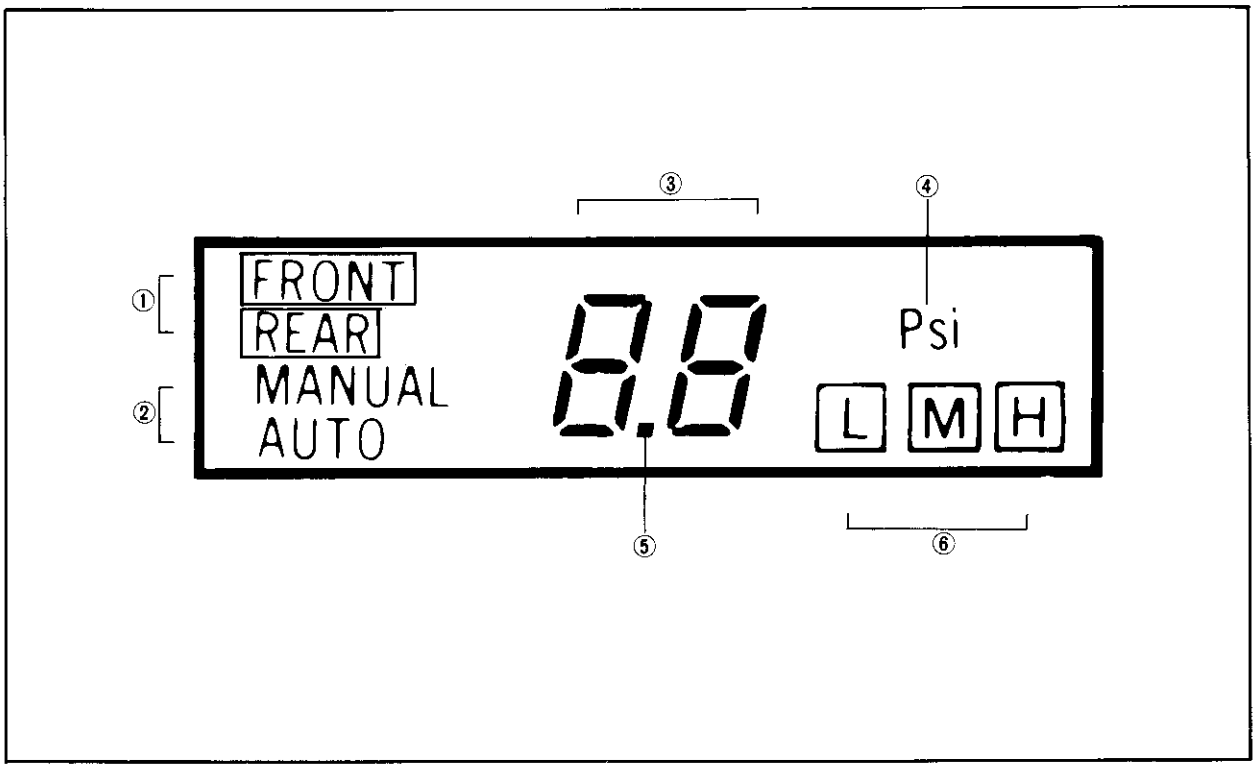

1. Display panel
2. "FRONT" switch
3. "REAR" switch
4. "LOW" switch
5. "MEDIUM" switch
6. "HIGH" switch
7. "AUTO/MANUAL" switch

1. Diaplay panel
The display panel shows the front and rear suspension air pressures (kg/cm$^2$ and psi), FRONT or REAR, AUTO or MANUAL mode, and the present air pressure. It also gives an error message. (Refer to page xx.)
2. "FRONT" switch
This switch is used to measure and adjust the front suspension air pressure.
3. "REAR" switch
This switch is used to measure and adjust the rear suspension air pressure.
4. "LOW" switch (DECREASE switch)
In the AUTO mode, this switch serves as the the LOW level (solo rider) preset switch, and in the MANUAL mode, it plays the role of a suspension air pressure DECREASE switch.
5. "MEDIUM" switch
In the AUTO mode, this switch is used as the MEDIUM level (with a passenger) preset switch, and in the MANUAL mode, it serves no purpose.

6. "HIGH" switch (INCREASE switch)
   In the AUTO mode, this switch serves as the HIGH level (with a passenger and extra load) preset switch, and in the MANUAL mode, it changes into the air pressure INCREASE switch.

7. "AUTO/MANUAL" switch
   This switch selects the AUTO or MANUAL mode.

**Display Panel Detail**




1. Shows that pressure measurement or adjustment is being made of front or rear suspension.
2. Shows that the system is either in AUTO or in MANUAL mode.
   When the switch is turned on, the system is always set in the AUTO mode.
3. Air pressure is shown in two digits, and for example, an error sign such as E2 appears.
4. Psi: For 31M (U.S.A.)
   $kg/cm^2$ : For 31N (CAN.)
5. This dot will not be shown when psi is used as a measuring unit.
6. L-M-H
   In measurement mode: Indicates that the present air pressure is at L, M, or H.
   In AUTO mode: Indicates the pressure level to which air pressure should be adjusted.
   In MANUAL mode: Indicates that the present air pressure is at L, M, or H.

**How to Operate**

**NOTE:**
When operating CLASS, be sure to erect the mainstand.

1. Set the main switch at ACC.

**NOTE:**
CLASS can operate only when the main switch is set to ACC.

2. For 3.0 seconds after the main switch is turned on, all letters and numbers are shown on the display panel for a segment check; simultaniously CLASS also measures atmospheric pressure.
   Up to this moment, all switches are unacceptable.
3. Push the switch, FRONT or REAR, whichever you desire to set.

**NOTE:**
The pressure adjustment switch, L, M, or H, is unacceptable.

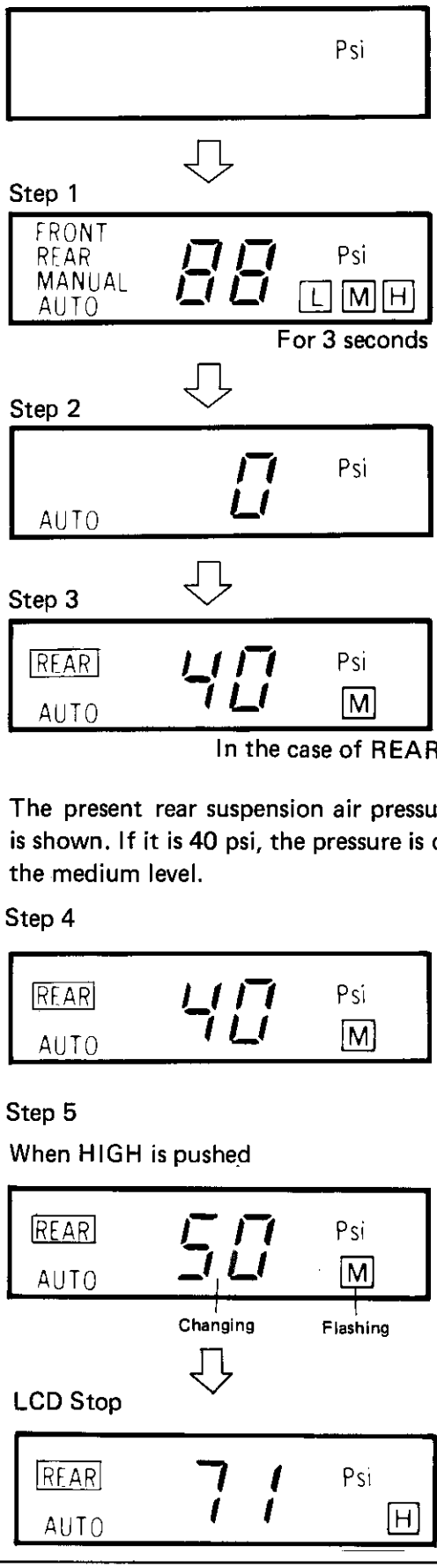
If an error sign is shown, refer to "Troubleshooting."

a. Auto adjustment: Start with step 4.
b. Manual adjustment: Start with step 6.
c. Measurement of suspension air pressure: Repeat steps, starting with step 4.
d. Switch of suspension from one to another: Repeat steps, starting with 3.

4. Automatic adjustment
   When MANUAL is shown, push the AUTO/MANUAL switch so that the mode reverts to AUTO.
5. Push the switch, L, M, or H, whichever you desire.
   When the display stops flashing, the pressure adjustment is complete.

| Switch | FRONT | | REAR | |
|---|---|---|---|---|
| | kg/cm² | psi | kg/cm² | psi |
| LOW | 0.8 | 11 | 1.0 | 14 |
| MEDIUM | 1.0 | 14 | 3.0 | 42 |
| HIGH | 1.2 | 17 | 5.0 | 71 |

Example of display




The present rear suspension air pressure is shown. If it is 40 psi, the pressure is on the medium level.

6. Manual adjustment
   Push the AUTO/MANUAL switch so that the mode reverts to MANUAL.
7. Push the INCREASE switch to set the pressure slightly higher than the preset level.
   Push the DECREASE switch to set the pressure slightly lower. While observing the display, set the pressure to your desired level.

| | Adjustable range | |
|---|---|---|
| FRONT | $kg/cm^2$ | 0.5 ~ 1.5 |
| | psi | 7 ~ 21 |
| REAR | $kg/cm^2$ | 0.5 ~ 6.0 |
| | psi | 7 ~ 85 |

If the pressure goes out of the above range, the compressor motor and all valves stop automatically.

**NOTE:**

- Switch of suspension from one to another: Start with step 3.
- Measurement of suspension air pressure: Start with step 3.
- Automatic adjustment: Start with step 4.
- Manual adjustment: Start with step 6.

Example of display

Step 6




MANUAL is shown.

Step 7

INCREASE switch is pushed









L, M, or H is shown indicating the pressure level.

**Operation Notes**

1. Pressure adjustment should be made with the mainstand erected. The pressure levels for automatic adjustment are preset with the main stand erected.
2. Avoid pushing two switches at close intervals, or they will not work. Push one by one at full intervals.
   (For instance, to measure the suspension air pressure, you must wait until the pressure has stabilized. Otherwise, the adjustment switch cannot be operated.)
3. When two switches are pushed at a time, the one pushed first has preference.
4. If three switches are pushed at one time, CLASS may stop functioning.
5. Switches may sometimes not work during operation; this does not necessarily mean trouble. Refer to the switch acceptance chart below;
6. In the MANUAL mode, the front suspension air pressure should be first adjusted. If the order is reversed, the residual high pressure air in the circuit will flow into the front suspension. (In this case, use the DECREASE switch for pressure adjustment.)
7. Avoid operating citizens band radio while operating CLASS.
8. Air will be discharged, though in a small amount, each time the air pressure is measured. So when air pressure measurement is repeated, the air pressure will show a decrease.
9. Automatic adjustment is possible with an accuracy of ± 0.1 kg/cm$^2$ (± 1.4 psi). Any slight difference may be shown when the air pressure is checked after automatic adjustment is made, but it does not necessarily represent air leakage.
10. Do not operate this system while running.

**Switch Acceptance Chart**

| No. | Condition | Front, Rear Switch | LMH, INC, DEC Switch | AUTO/MANUAL Switch |
|---|---|---|---|---|
| 1 | All characters on LCD are shown. | No | No | No |
| 2 | Atmospheric pressure is being read. | No | No | No |
| 3 | Suspension air pressure is being measured. | No | No | Yes |
| 4 | After suspension air pressure is measured. | Yes | Yes | Yes |
| 5 | During automatic adjustment. | No | Yes | No |
| 6 | After automatic adjustment. | Yes | Yes | Yes |
| 7 | During manual adjustment. | No | No | No |
| 8 | After manual adjustment. | Yes | Yes | Yes |
| 9 | Error sign is on. | No | No | No |

## TROUBLESHOORING

### When an "Error" Sign Appears

To show troubles by self-check functions, the following six signs are used:

E1 to E6

E1: Shows a trouble of the system. (If detected by self-check when power is turned on.

E2: Air pressure does not rise when the air compressor is operated.

E3: The air compressor has been operated continuously for about one minute.

E4: The pressure sensor has no output voltage.

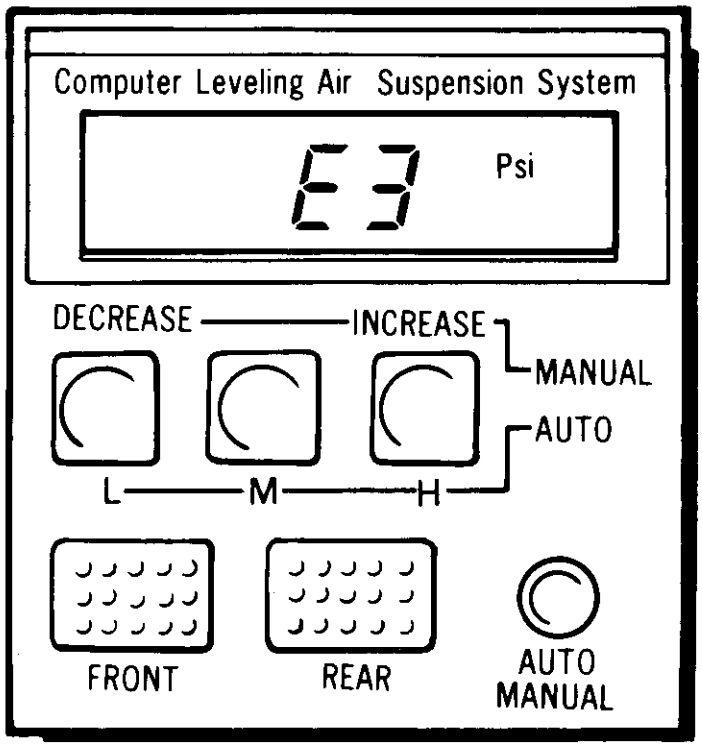
E5: Control unit has trouble.

E6: Air pressure does not drop with the discharge valve opened.

Troubles are shown in the above six categories, but if more than one trouble is combined, the error sign cannot be identical with the troubles. In this case, refer to "How to locate the cause of trouble." (For example, if a connector has a poor contact, one of the six errors which is incorrect may appear at random.)

**NOTE:**

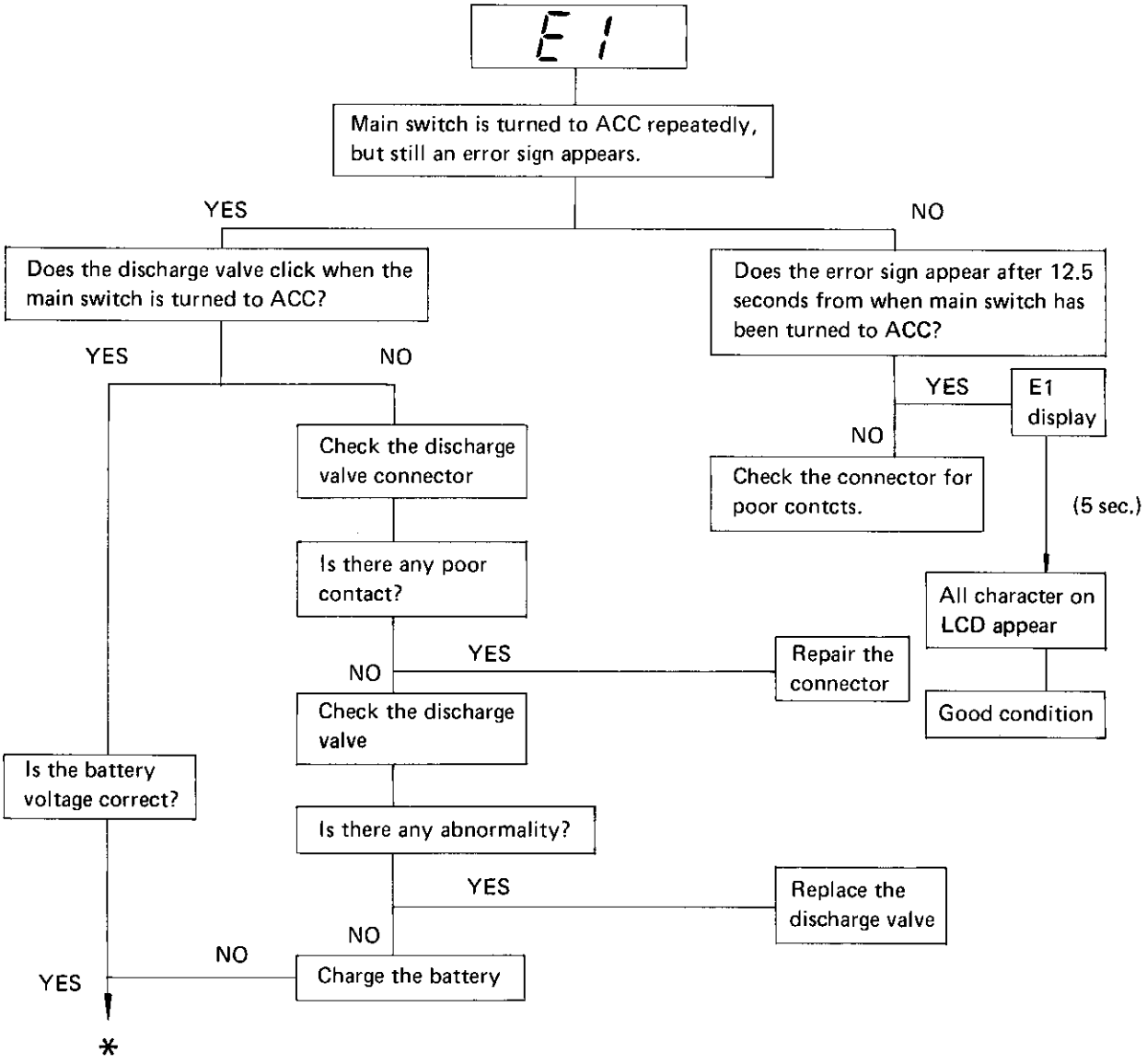
Should any error sign appear, the system will be reset after 5 seconds.



**How to Locate the Cause of Trouble**

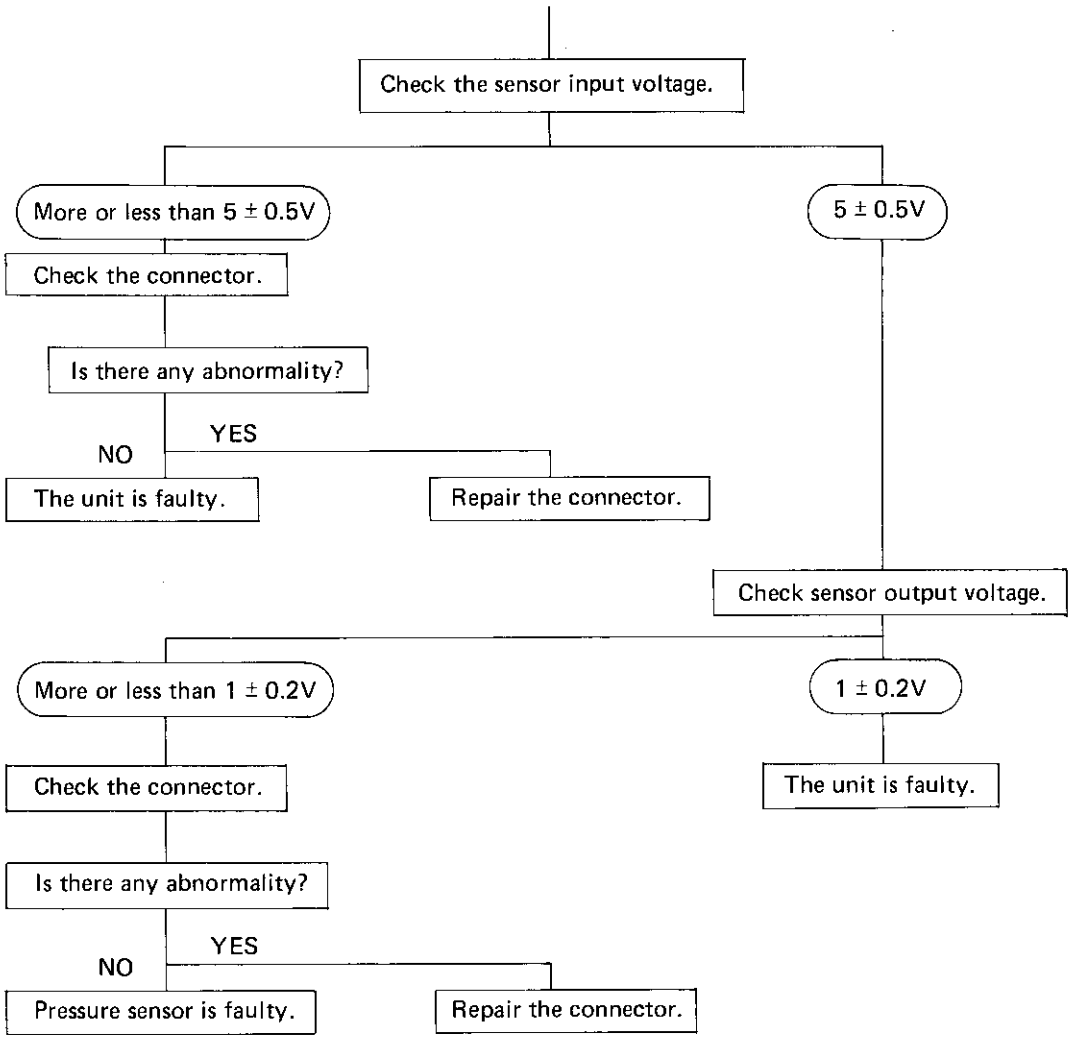
The causes of the possible troubles are classified by an error sign as shown in the following troubleshooting flow chart to assist you in trouble diagnosis.

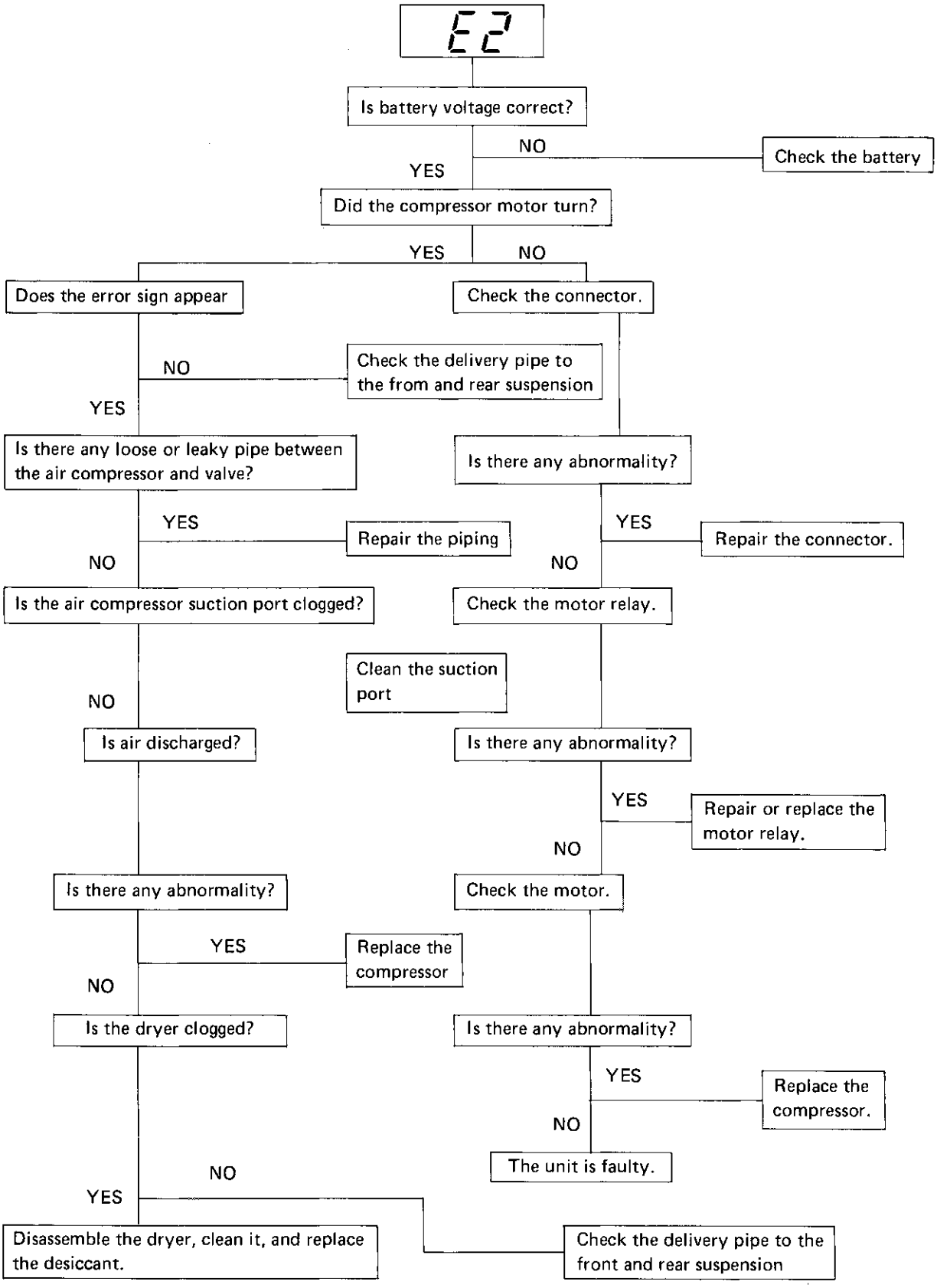
If the unit is found faulty, check for the cause of trouble by referring to the Unit Check Flow Chart.

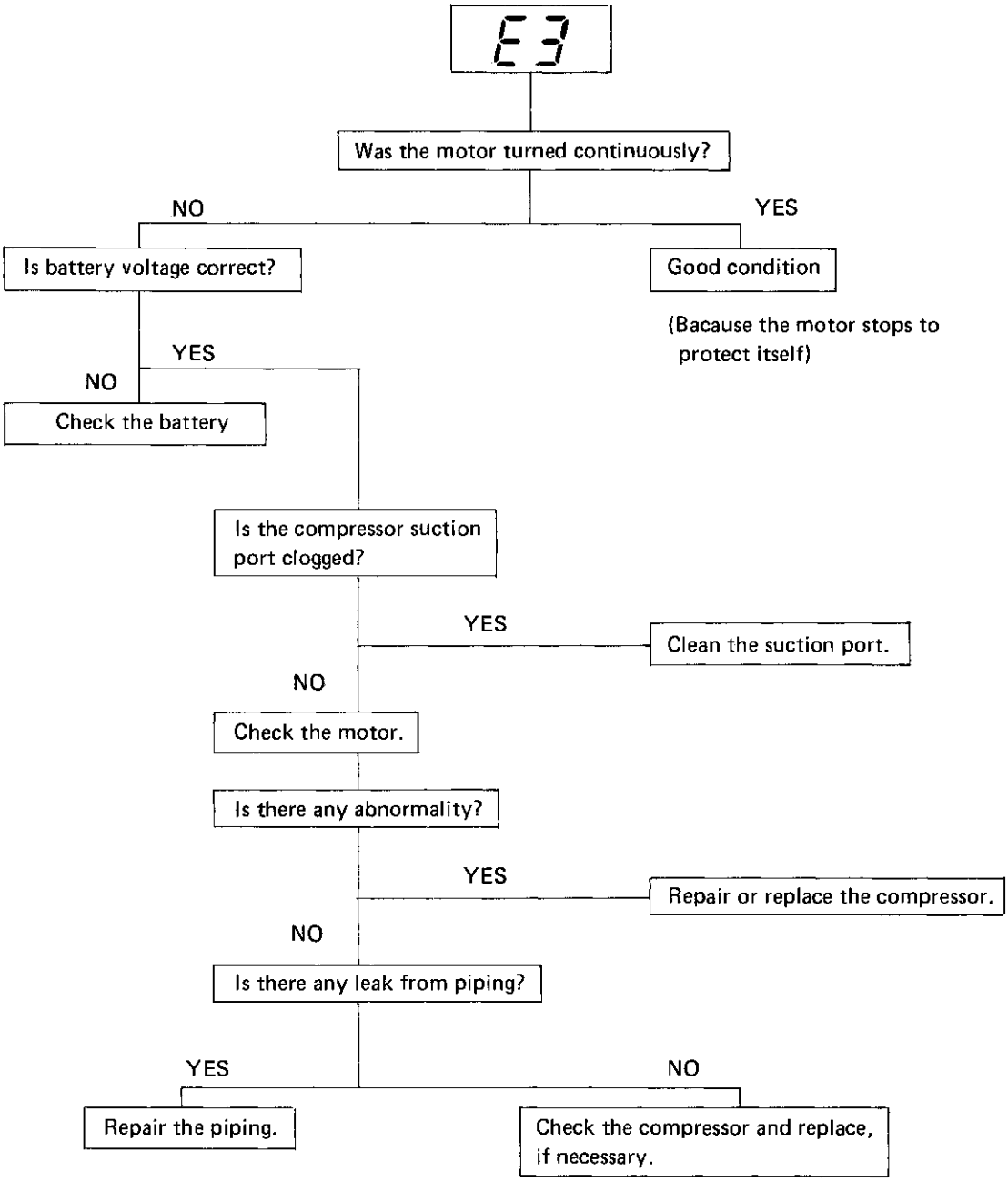


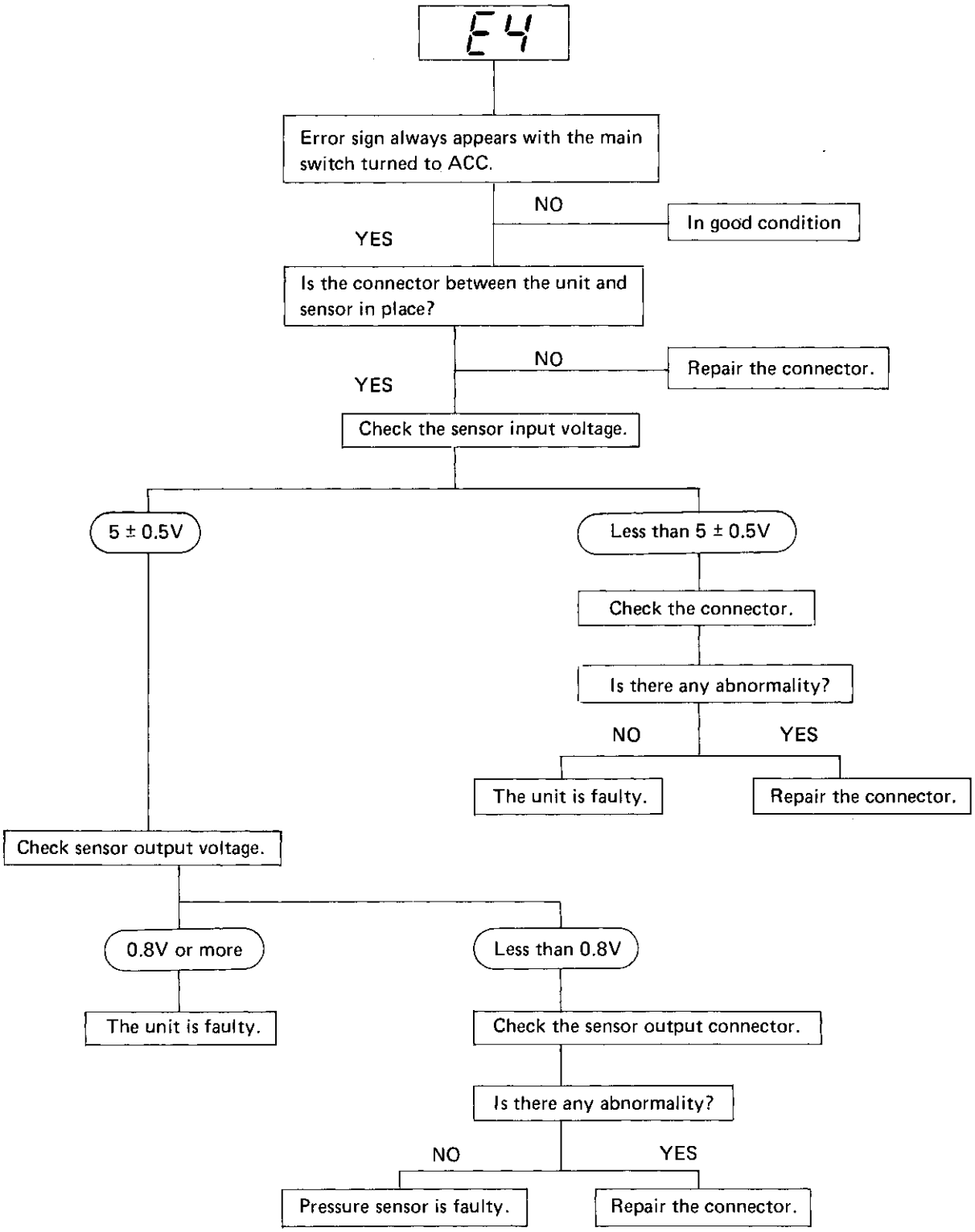
(From preceding page)

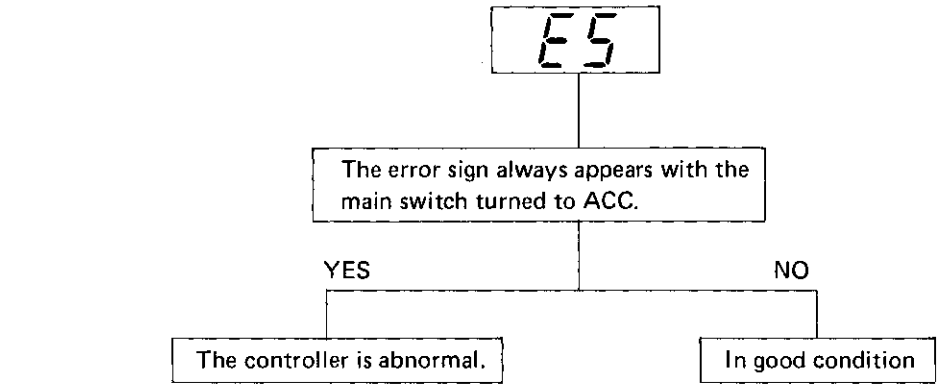
*

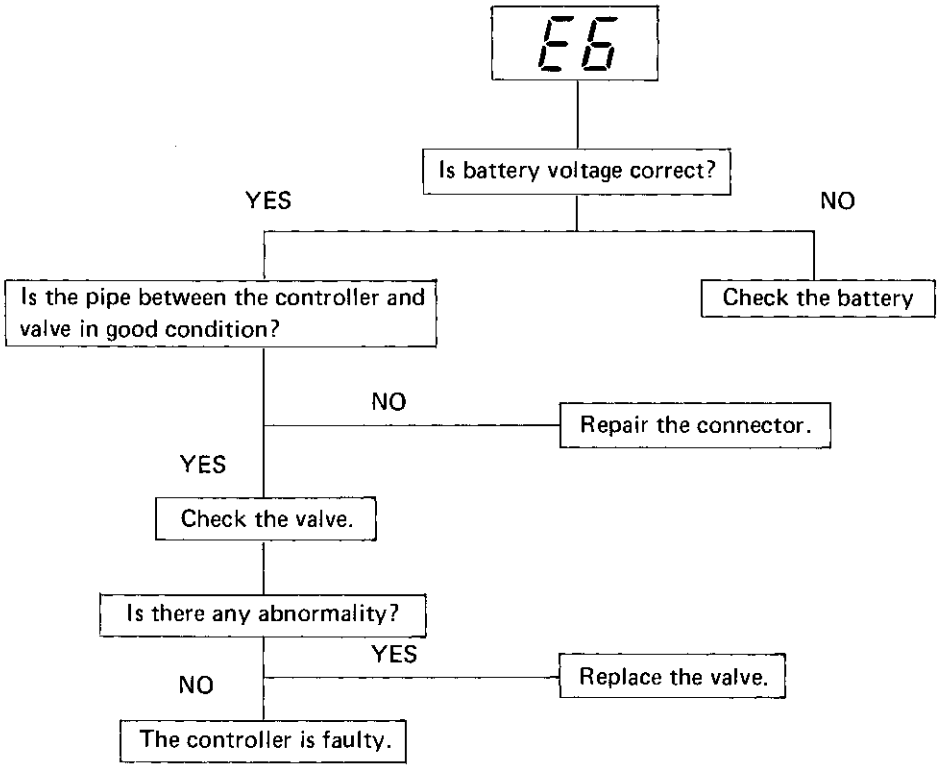



E2
Is battery voltage correct?
NO
Check the battery
YES
Did the compressor motor turn?
YES
NO
Does the error sign appear
Check the connector.
NO
Check the delivery pipe to the from and rear suspension
YES
Is there any loose or leaky pipe between the air compressor and valve?
Is there any abnormality?
YES
Repair the piping
YES
Repair the connector.
NO
NO
Is the air compressor suction port clogged?
Check the motor relay.
Clean the suction port
NO
Is air discharged?
Is there any abnormality?
YES
Repair or replace the motor relay.
NO
Is there any abnormality?
Check the motor.
YES
Replace the compressor
NO
Is the dryer clogged?
Is there any abnormality?
YES
Replace the compressor.
NO
The unit is faulty.
NO
YES
Disassemble the dryer, clean it, and replace the desiccant.
Check the delivery pipe to the front and rear suspension

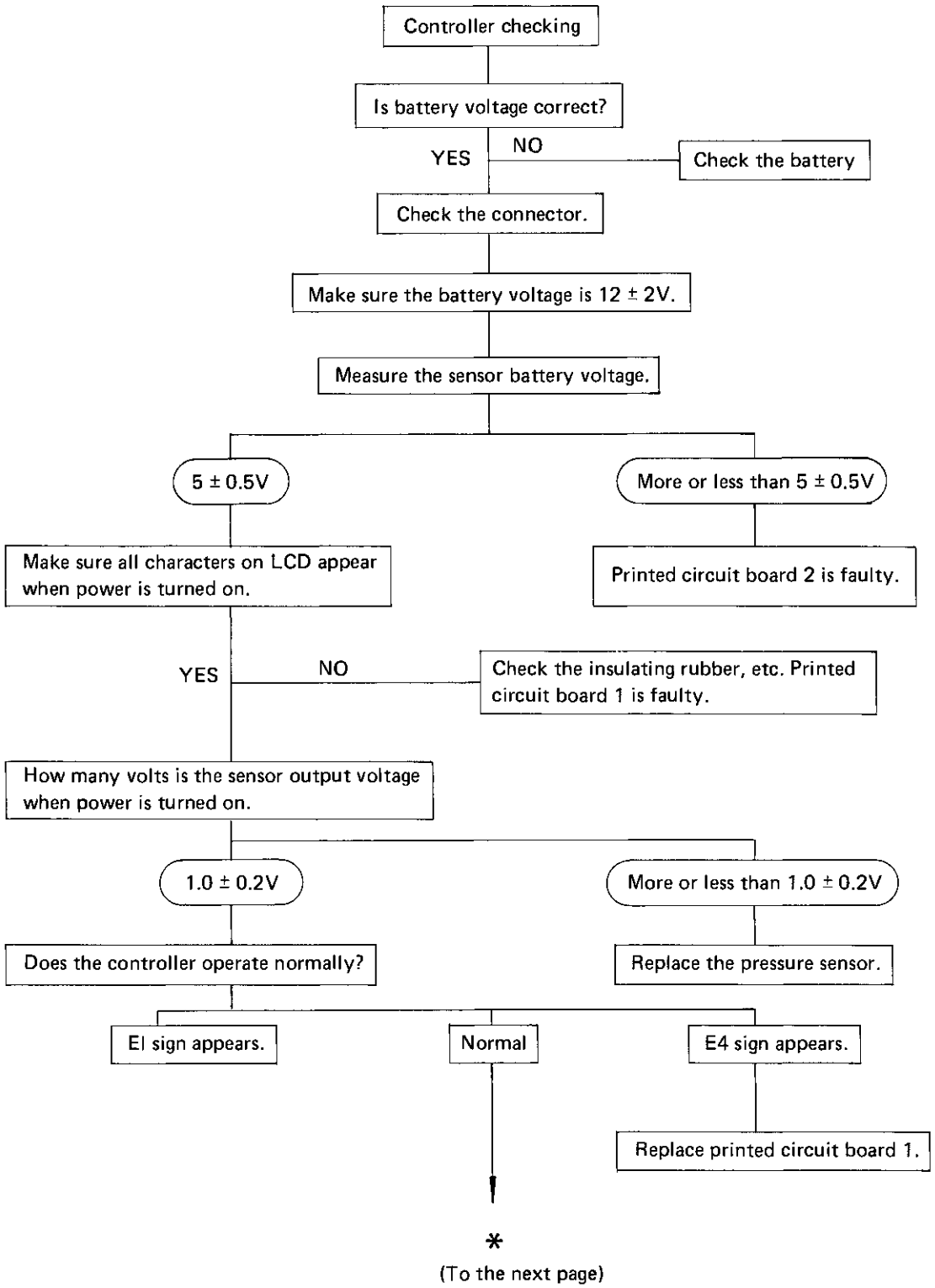

E3
Was the motor turned continuously?
NO
YES
Is battery voltage correct?
Good condition
(Bacause the motor stops to protect itself)
YES
NO
Check the battery
Is the compressor suction port clogged?
YES
Clean the suction port.
NO
Check the motor.
Is there any abnormality?
YES
Repair or replace the compressor.
NO
Is there any leak from piping?
YES
NO
Repair the piping.
Check the compressor and replace, if necessary.


E4
Error sign always appears with the main switch turned to ACC.
NO
In good condition
YES
Is the connector between the unit and sensor in place?
NO
Repair the connector.
YES
Check the sensor input voltage.
5 ± 0.5V
Less than 5 ± 0.5V
Check the connector.
Is there any abnormality?
NO
YES
The unit is faulty.
Repair the connector.
Check sensor output voltage.
0.8V or more
Less than 0.8V
The unit is faulty.
Check the sensor output connector.
Is there any abnormality?
NO
YES
Pressure sensor is faulty.
Repair the connector.

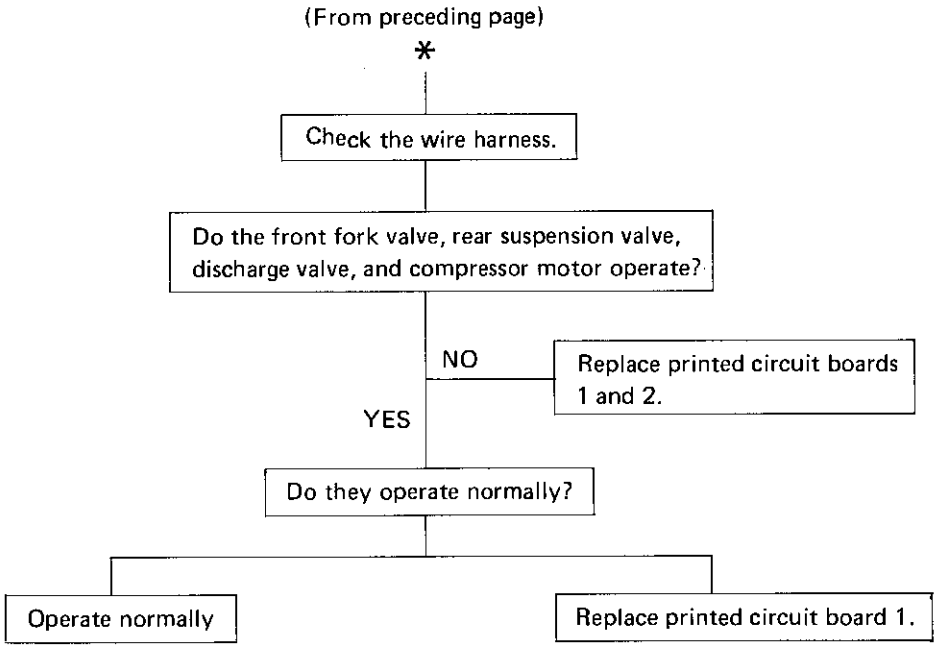

E5
The error sign always appears with the main switch turned to ACC.
YES
NO
The controller is abnormal.
In good condition


E6
Is battery voltage correct?
YES
NO
Is the pipe between the controller and valve in good condition?
Check the battery
NO
Repair the connector.
YES
Check the valve.
Is there any abnormality?
YES
NO
Replace the valve.
The controller is faulty.

**Controller check flow chart**




(To the next page)




## Other Irrgularities

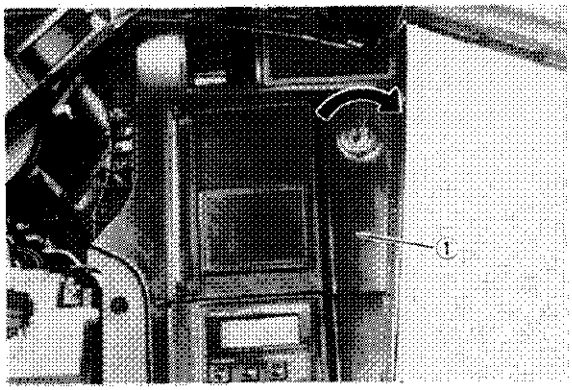
| | Trouble | Possible cause |
|---|---|---|
| 1 | Unit does not operate at all. (No light comes on.) | Fuse broken |
| 2 | All characters on LCD is kept turned on. | Control unit is faulty. (Mainly printed circuit board 2) |
| 3* | Pressure adjustment can be complete unusually quickly, but measurement shows different values each time it is rechecked. | • Fork oil may clog the air hose. (Return the oil into the front fork.)<br>• Valve is fauty. (It does not operate.) |

* See page 51 for more detail.

## CLASS REMOVAL

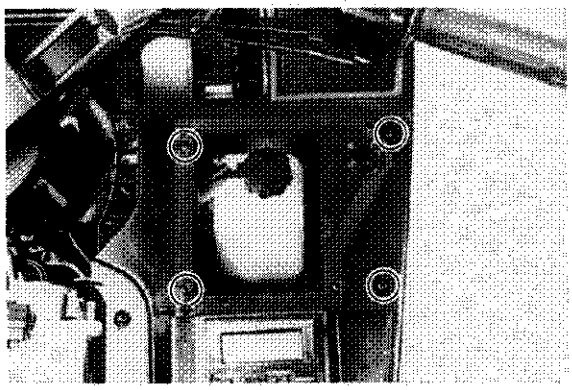
### Air Suspension Controller Removal

1. Insert the key in the lock and turn it clockwise.
2. Pull the lever as shown and remove the cover.

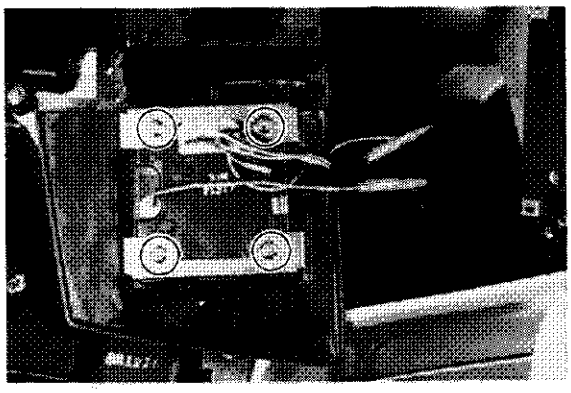



1. Cover

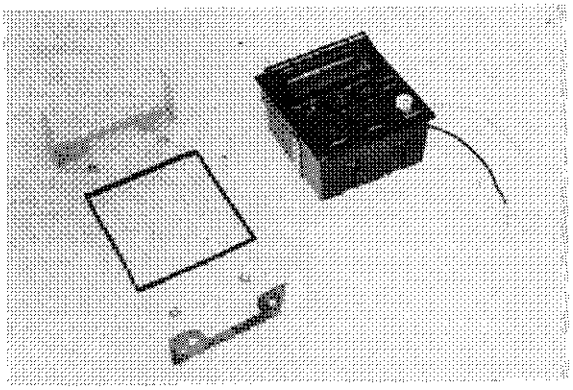
3. Loosen and remove the screws (4).



4. Pull out the base panel with the air suspension controller.
5. Disconnect the connectors and remove the securing nuts (4).



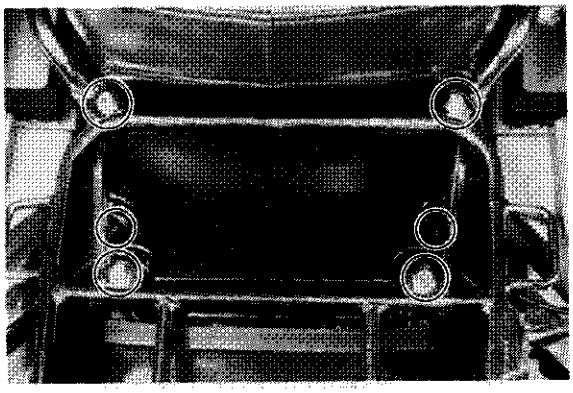
6. Remove the air suspension controller from the base panel.



To install the air suspension controller, reverse the removal procedure.

### Component Parts Removal

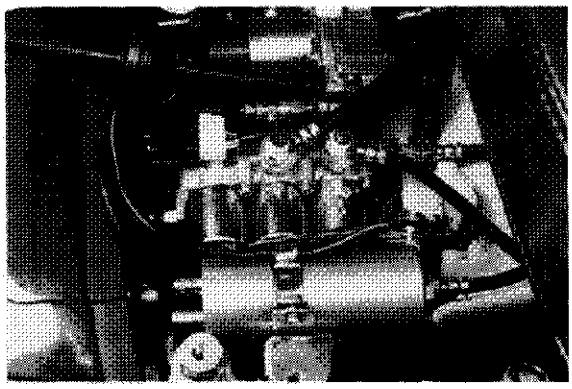
1. Remove the travel trunk, antenna, carrier, and cover.



**NOTE:**

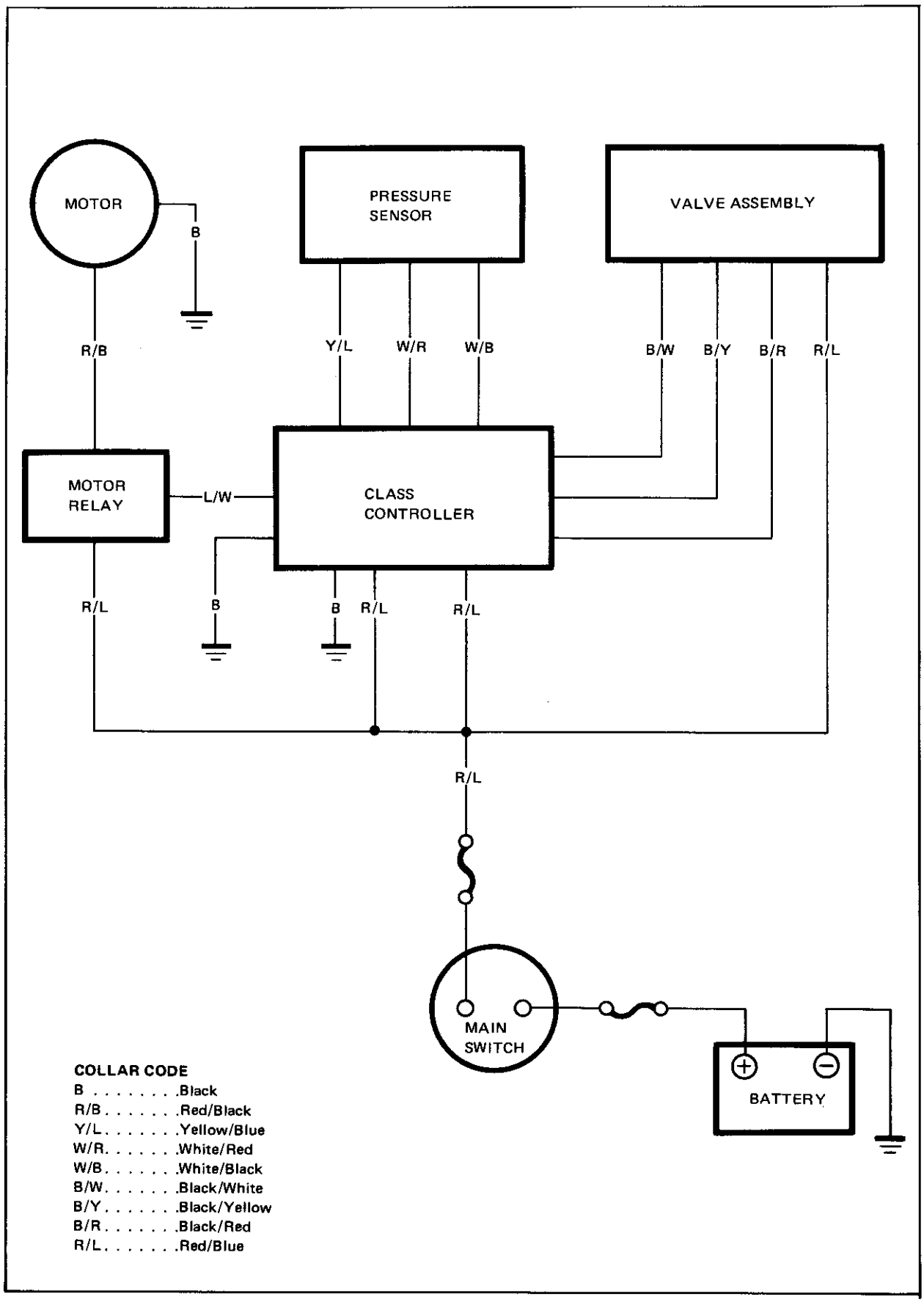
Refer to owner's manual to remove the travel trunk.

2. Remove the required component parts.



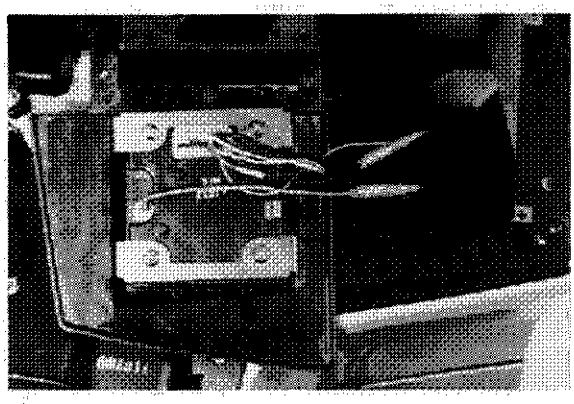
## CLASS INSPECTION

### BLOCK DIAGRAM

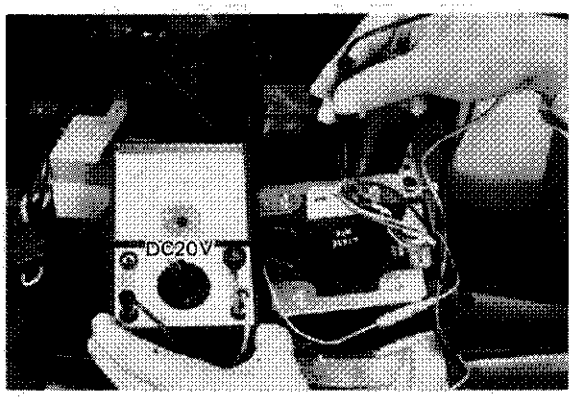


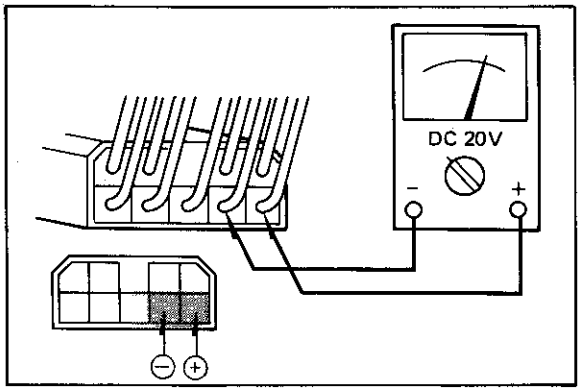
**Checking Battery Voltage**

1. Remove the control unit together with the mounting panel with all leads still connected.
   (See "Air Suspension Controller Removal")



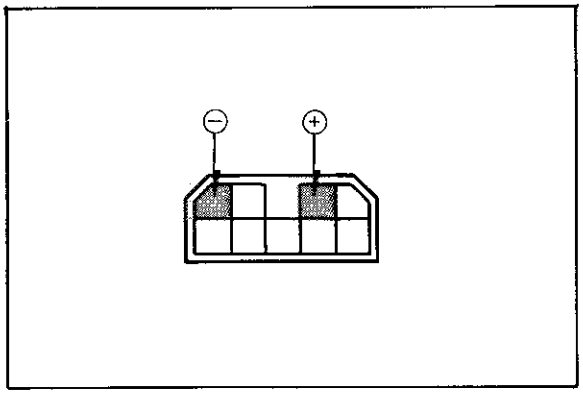
2. Turn the main switch to ACC, and hook a tester up to the coupler on the rear of the control unit.
   Black-Red/Blue: 12 ± 2V



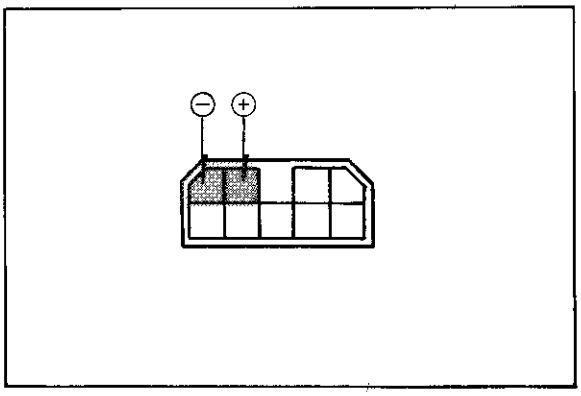

**Checking the Sensor Power Voltage**

The check should be made with the main switch set to ACC, White/Black-Yellow/Blue: 5 ± 0.5V.



**Checking the Sensor Output Voltage**

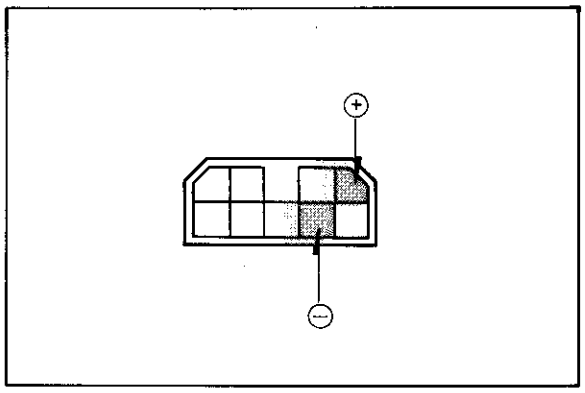
Measure the voltage about 10 seconds after the main switch is turned on.
White/Black-White/Red: 1.0 ± 0.2V



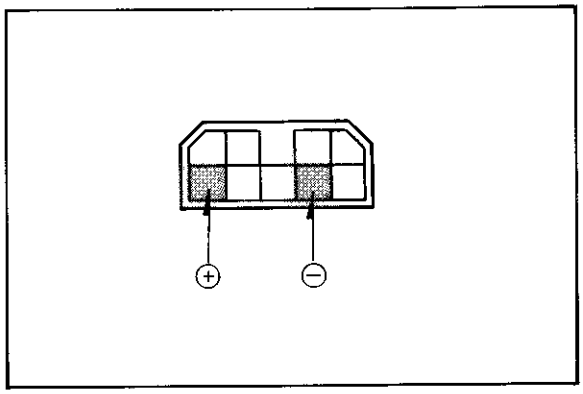
**Checking the Valve by Operating the Controller**

The check should be made with the main switch set to ACC and with each control switch being pushed.

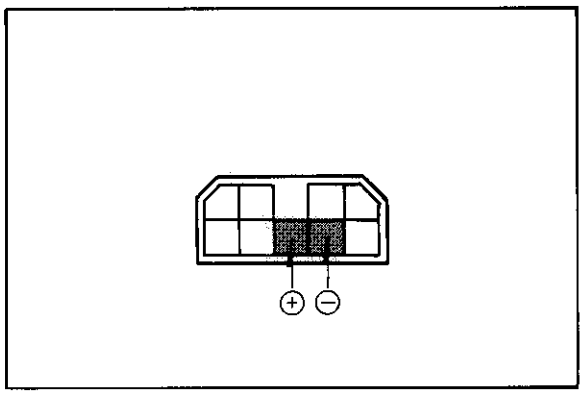
1. Connect the tester + lead to Black/Red and – lead to Black. Push the "FRONT" switch. When tester readings change from 12V to 0V, the front valve circuit is in good condition.



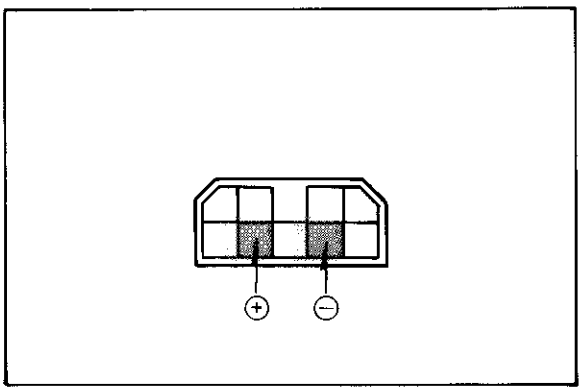
2. Connect the tester + lead to Black/Yellow and – lead to Black. Push the "REAR" switch. When tester readings change from 12V, to 0V, the rear valve circuit is in good condition.



3. Connect the tester + lead to Blue/White and – lead to Black. Push the required controller switch(es) to operate the motor relay. When tester readings change from 12V to 0V, the motor relay circuit is in good condition.

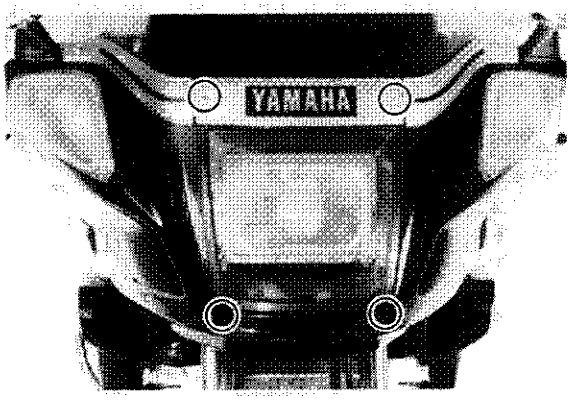


4. Connect the tester + lead to Black/White and – lead to Black. Push the required controller switch to operate the discharge valve. When tester readings change from 12V to 0V, the discharge valve circuit is in good condition.

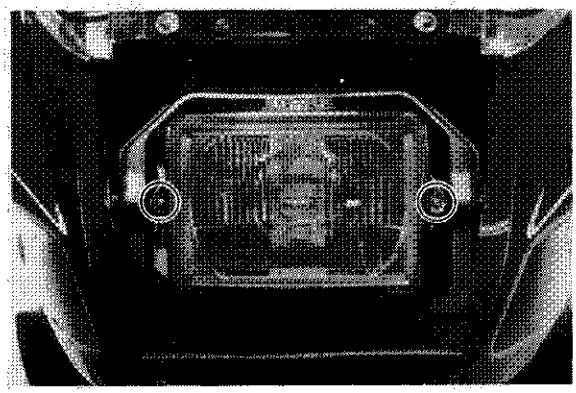


### Checking the Compressor Motor Relay

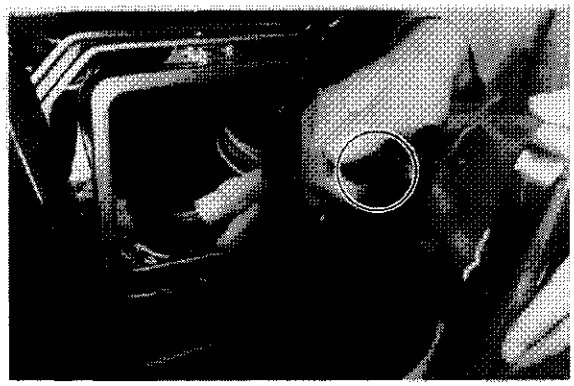
1. Remove the four screws.



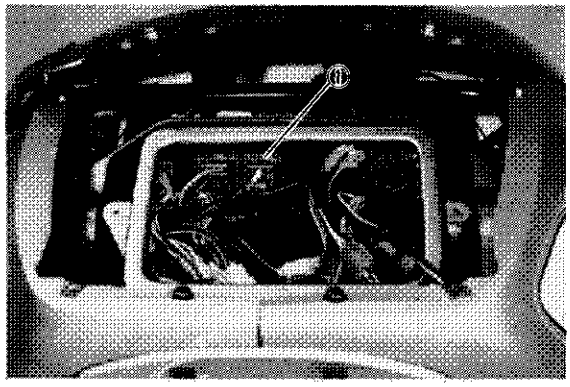

2. Remove the headlight holding screws (2).



3. Disconnect the lead wires and remove the light unit assembly.



4. Remove the compressor motor relay.



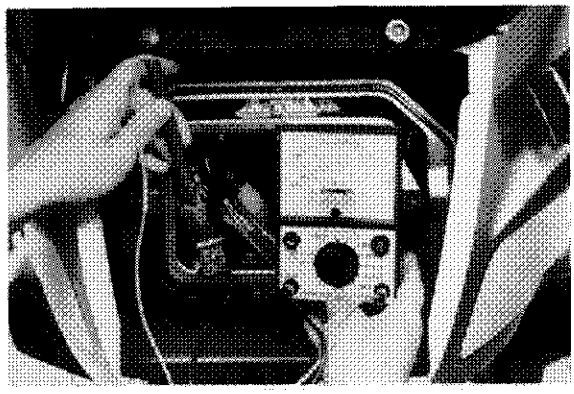
1. Compressor motor relay (5A8-00)

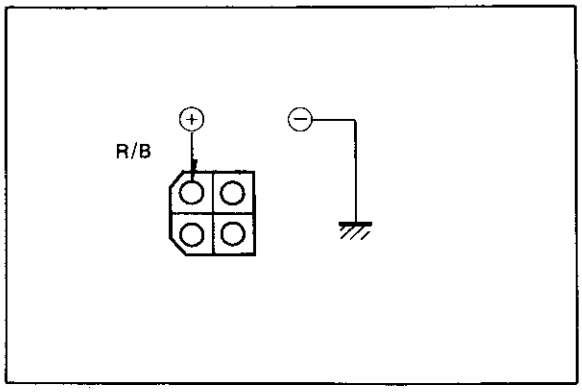
### On-frame Checking

**NOTE:**

Main switch is set to ACC.

1. Connect the tester + lead to Red/Black and − lead to Ground.

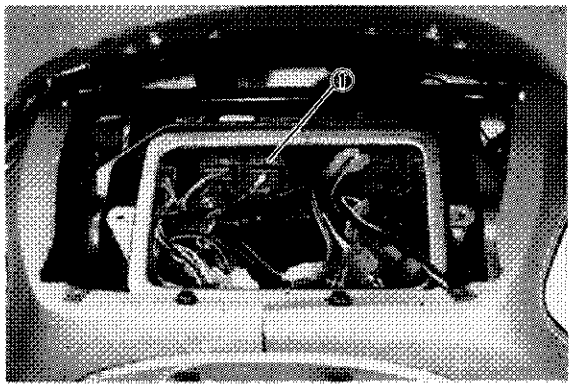





2. Push the INCREASE switch to operate the motor relay.
3. When tester readings change from 0V to 12V, the motor relay is in good condition.

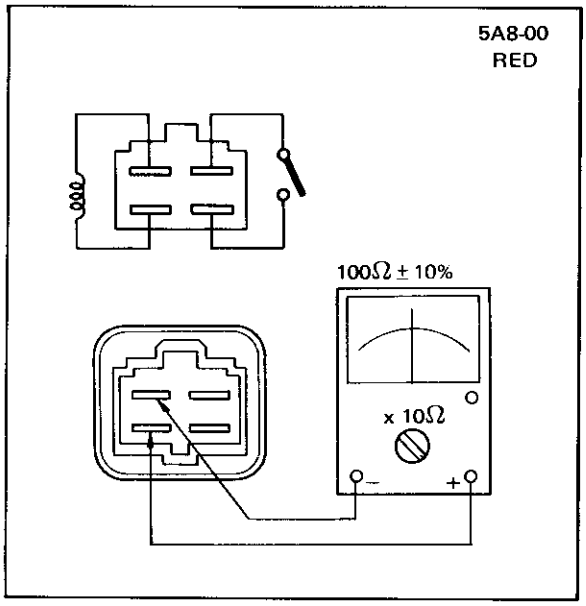
### Off-frame Checking

1. Disconnect and remove the compressor motor relay.

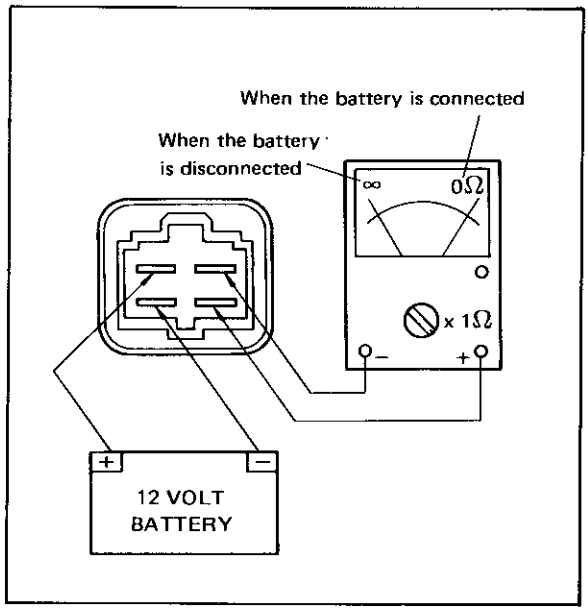


1. Compressor motor relay

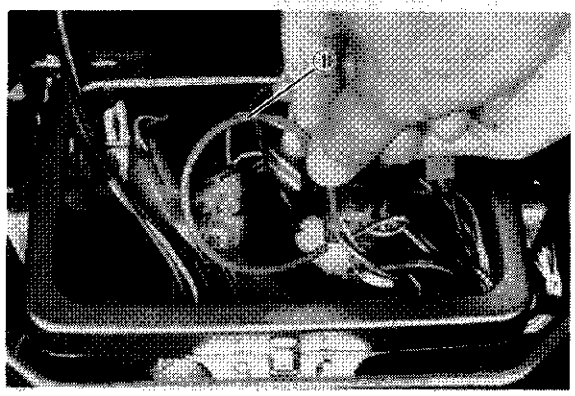
2. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.



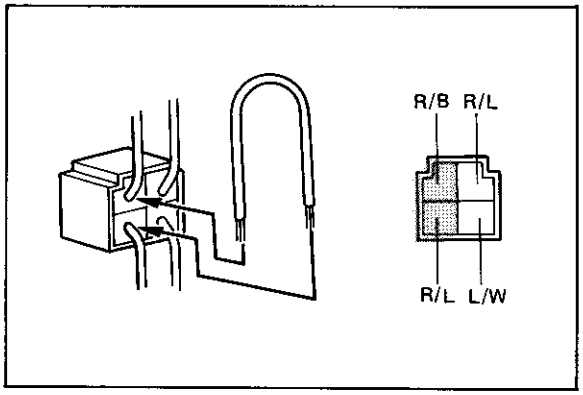

3. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.




**Checking the Operation of the Compressor**
(With the main switch set to ACC)
Short the Red/Black and Red/Blue connector with a jumper cable. If the compressor runs, it is in good condition.




1. Jumper cable




**CAUTION:**

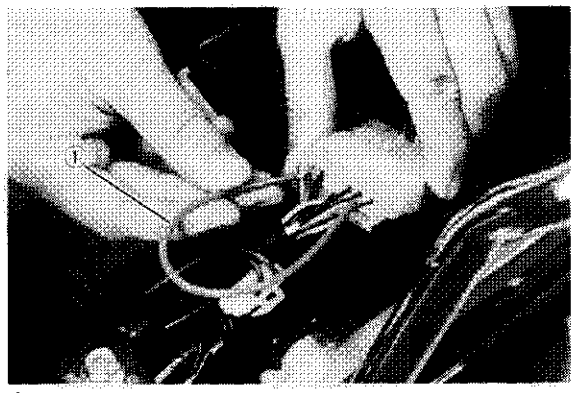
**Bad connection of a jumper wire may cause damage to the controller's micro-computer.**

**Checking the Valves**
(With the main switch set to ACC)

1. Remove the seat and locate the (13 pin) connector.

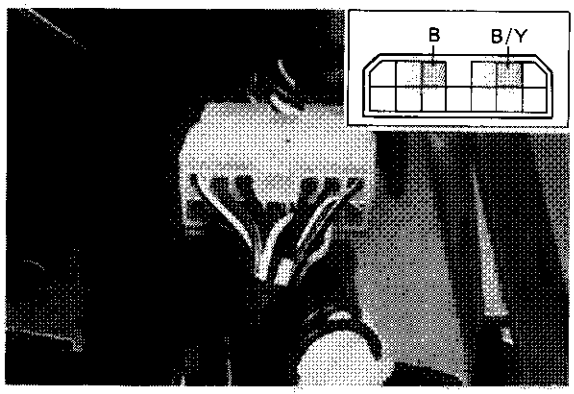


2. Check the operation of the valve using a jumper cable.

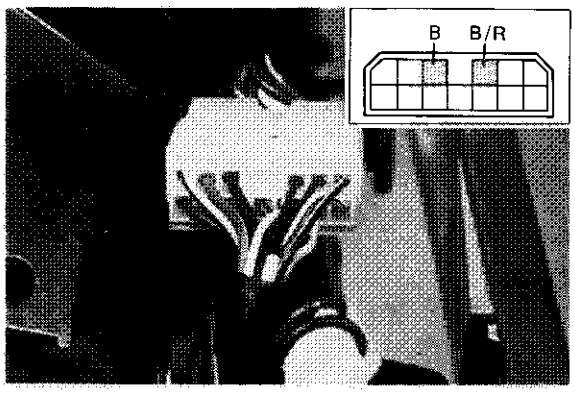


1. Jumpen cable

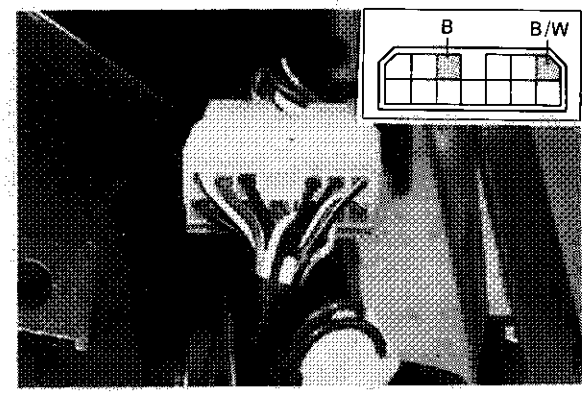
Rear valve
Black-Black/Yellow: Short the leads, and if the front valve clicks, it is in good condition.




Front valve
Black-Black/Red: Short the leads, and if the rear valve clicks, it is in good condition.

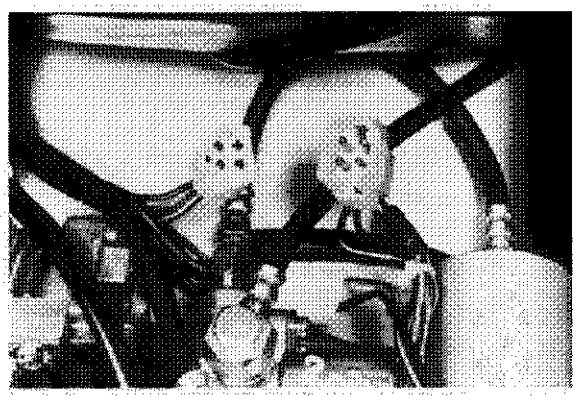



Discharge valve
Black-Black/White: Short the leads, and if the discharge valve clicks, it is in good condition.

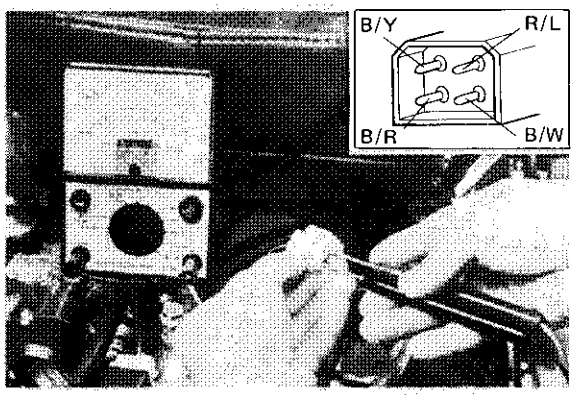



**Checking the Solenoid Valve Resistance**

1. Disconnect the connector.



2. Using a tester, check the resistance of the circuit.




| | |
|---|---|
| Front solenoid | R/L – B/R |
| Rear solenoid | R/L – B/Y |
| Discharge solenoid | R/L – B/W |

Standard resistance
Approx. 30Ω

**Replacing the Desiccant in the Air Dryer**

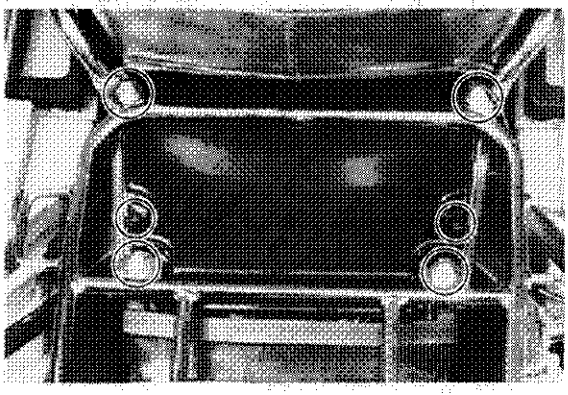
The air dryer contains 60 grams of silica gel as an absorbant. The absorbing power of the desiccant decreases as it absorbs moisture so it must be replaced periodically. The desiccant is colorless when it is new but turns to pink after absorbing moisture.

| Replacement interval: 2 years |
|---|

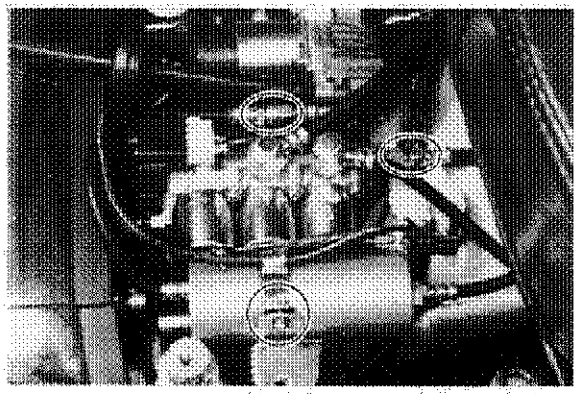
**NOTE:**

When used frequently or in humid areas, replacement intervals should be shortened.

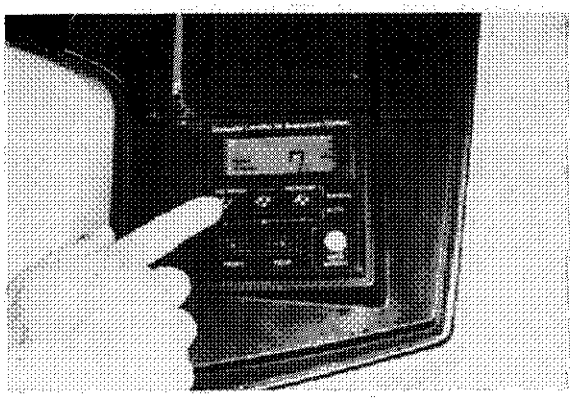
1. Remove the travel trunk, antenna, carrier, and cover.



2. Loosen the union nuts and disconnect the hoses. Remove the dryer.



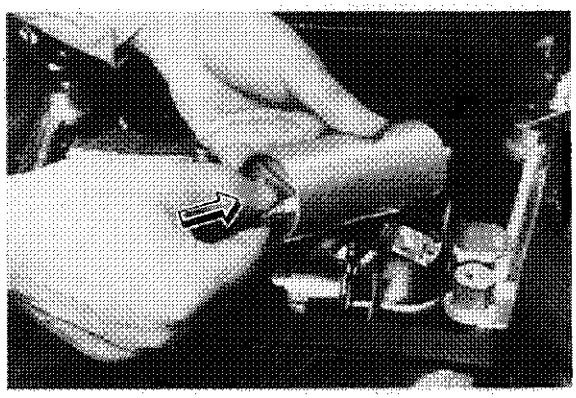
3. Release the compressed air in the dryer by pushing the DECREASE (MANUAL) switch on the controller.



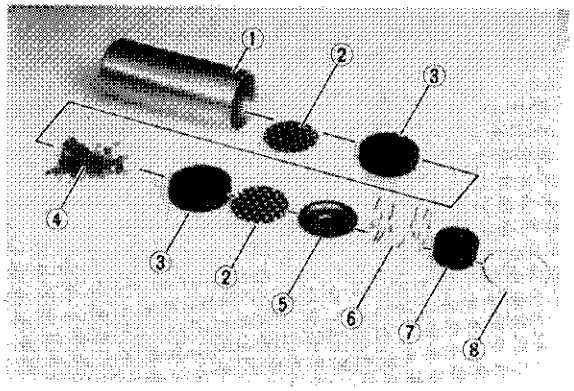
4. By pushing the cap, remove the circlip, and pull out the cap.

**CAUTION:**

**Avoid pulling the hose. Keep the opening of the chamber upright so that inner parts do not fall off.**

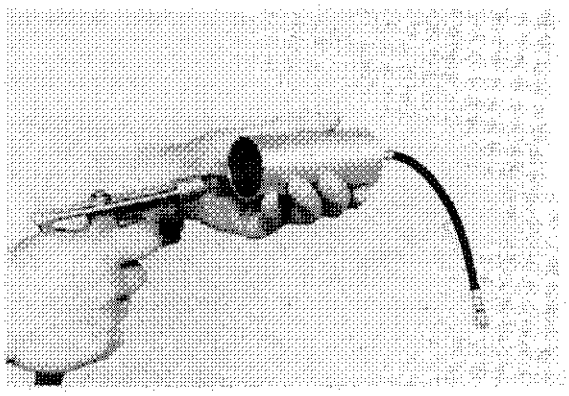


5. Remove the spring, filter 2, baffle plate, filter plate, filter 1, desiccant, filter 1 and filter plate.



1. Dryer case
2. Filter plate
3. Filter 1
4. Disiccant
5. Baffle plate
6. Spring
7. Filter 2
8. Circlip

6. Thoroughly blow the particles out of the case and hose by compressed air.



**CAUTION:**

**Wear an eye protector to protect your eyes from injury.**

7. Wash the filter in water and dry it off.
8. Install the filter plate and filter on the bottom of the dryer.

**NOTE:**

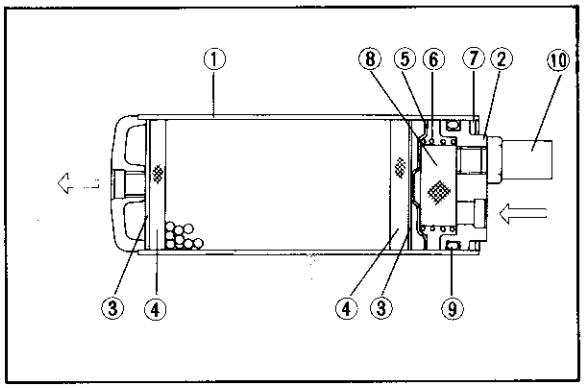
There must be no particles beyond the filter. These may cause damage or air leaks to the valve.

9. Put 60 grams of the specified desiccant (SILICA GEL) into the dryer case, and install the filter 1, filter plate, baffle plate, spring, and filter 2 in that order.

**CAUTION:**

- **Use this desiccant as soon as the bag is opened.**
- **Do not press or crush this desiccant in any way.**
- **Any pulverized desiccant should be excluded.**
- **Keep out of reach of children.**
- **This desiccant cannot be eaten. Should you swallow any, see a doctor immediately.**

10. Install the cap and the circlip in its place, and pull the cap.



1. Dryer case
2. Cap
3. Filter plate
4. Filter 1
5. Baffle plate
6. Spring
7. Circlip
8. Filter 2
9. O-ring
10. Relief valve

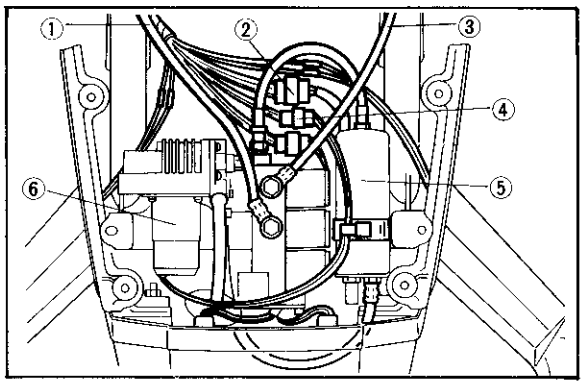
11. Install the dryer on the bracket.

**CAUTION:**

**When installing the dryer, be sure you do not pinch pipes and wires.**

**NOTE:**

Make sure that pipes and wires are routed properly.



1. To front suspension
2. Taillight connector
3. To rear suspension
4. Air compressor lead wire connector
5. Air dryer
6. Air compressor

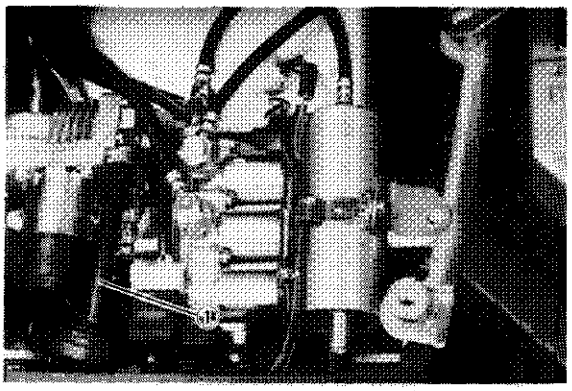
12. Install the cover, carrier antenna, and travel trunk.

**Cleaning the Suction Filter**

The air compressor suction port is fitted with a filter which must be cleaned periodically.

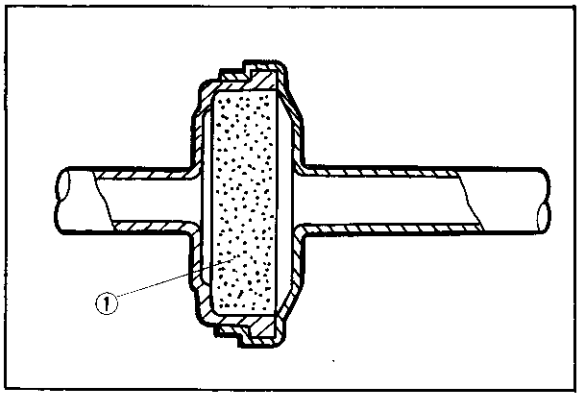
| Cleaning interval: One year |
|---|

1. Remove the travel trunk antenna, carrier, and cover.
2. Remove the suction pipe.



1. Suction pipe

3. Remove the suction filter in the suction pipe.




1. Suction filter

4. After cleaned in a cleaning solvent, the filter should be dried up. After installing the filter, connect the hose to the filter housing while taking care not to ben it. The open end of the hose should face downward, and the filter housing halves should be put together so that no water enters through the mating surfaces.
5. Install the cover, carrier antenna, and travel trunk.

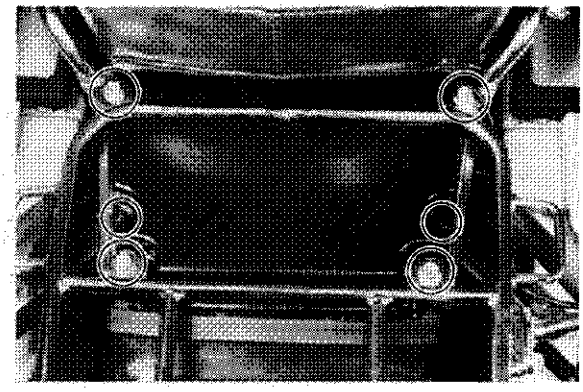
**Removing the Oil in the Air Hose**

If the motorcycle falls down, the front fork oil may flow into the air hose.

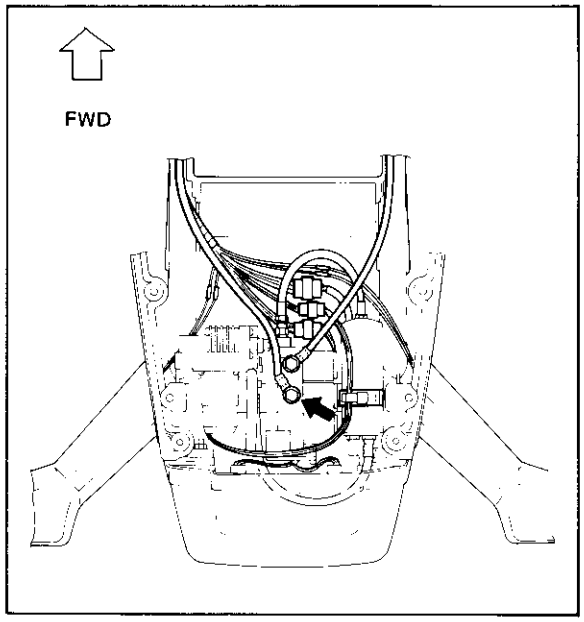
If air pressuer reading goes further down than 3 psi (0.21 kg/cm$^2$) in 2 ~ 3 seconds after setting the fork air pressure and if the air is not leaking, the fork oil is suspected to be in the air hose.

Remove the oil in the air hose as follows.

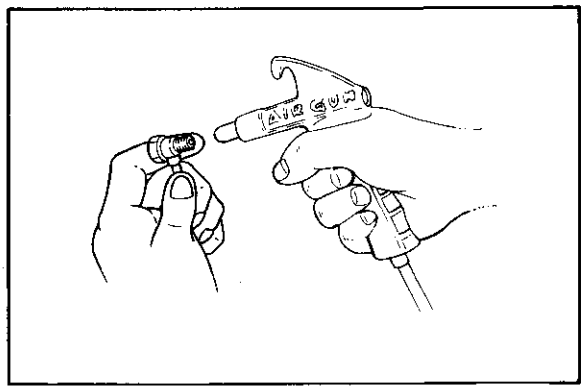
1. Loosen and remove the left fork cap bolt.
2. Remove the travel trunk, antenna, carrier and cover.



3. Loosen the union bolt and disconnect the air hose for the front fork.



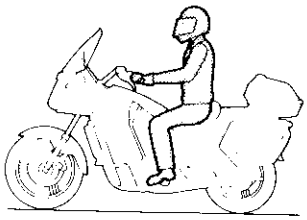
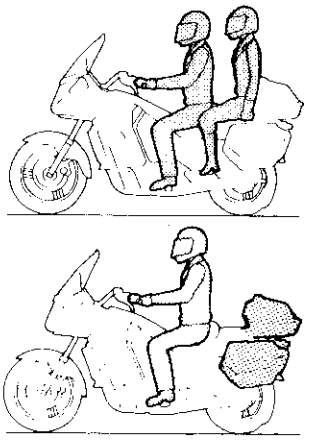
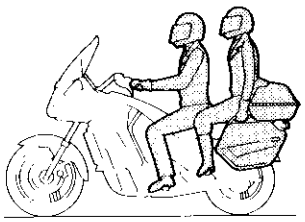
4. Blow the air hose using compressed air to return the fork oil completely into the front fork.



5. Reverse the removal procedure for reassembly.

Tightening torgue:
Union bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
Fork cap bolt
25 Nm (2.5 m·kg, 18 ft·lb)

**Recommended combinations of the front fork and the rear shock absorber.**
Use this table as a guide to meet specific riding conditions and motorcycle load.

| | | L | | M | | H | |
|---|---|---|---|---|---|---|---|
| Loading condition | | Solor rider | | With passenger or accessory equipment | | With accessory equipement and passenger | |
| | |  | |  | |  | |
| Air Pressure | | kg/cm$^2$ | pai | kg/cm$^2$ | pai | kg/cm$^2$ | psi |
| | Front | 0.8 | 11 | 1.0 | 14 | 1.2 | 17 |
| | Rear | 1.0 | 14 | 3.0 | 42 | 5.0 | 71 |
| Damping adjuster | | 1 or 2 | | 2 or 3 | | 3 or 4 | |

YAMAHA

# XVZ12L/KC2
# XVZ12DL/DKC2

# Supplementary Service Manual

.IT-11616-04-06

41R-28197-10

XVZ12L/KC2
XVZ12DL/DKC2
**SUPPLEMENTARY SERVICE MANUAL**
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**1st Edition, October 1983**
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**Printed in U.S.A.**
**P/N LIT-11616-04-06**

**Starting Serial Number**

| | |
|---|---|
| XVZ12L | 41R-000101 |
| XVZ12DL | 41V-000101 |

| | |
|---|---|
| XVZ12KC2 | 47R-000101 |
| XVZ12DKC2 | 47T-000101 |

# FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and new data for the XVZ12L, KC2, DL, and DKC2.
For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the following manuals.

| |
|---|
| XVZ12TK Service Manual (LIT-11616-03-36) |
| XVZ12TDK Supplementary Service Manual (LIT-11616-03-35) |

**OVERSEAS SERVICE**
**OVERSEAS OPERATIONS**
**YAMAHA MOTOR CO., LTD.**

# 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 machines have a basic understanding of the mechanical concepts and procedures inherent to machine repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit for use and/or unsafe.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the machine will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his machine and to conform with federal environmental quality objectives.

Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and 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.
Particularly important information is distinguished in this manual by the following notations:

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

**CAUTION:** A CAUTION indicates special procedure that must be followed to avoid damage to the machine.

**WARNING:** A WARNING indicates special procedure that must be followed to avoid injury to a machine operator or person inspecting or repairing the machine.


DUNLOP

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# PERIODIC INSPECTION AND ADJUSTMENT

## 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 and to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

## MAINTENANCE INTERVALS CHARTS

Proper periodic maintenance is important. Especially important are the maintenance services related to emissions control. These controls not only function to ensure cleaner air but are also vital to proper engine operation and maximum performance. In the following maintenance tables, the services related to emissions control are grouped separately.

## PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

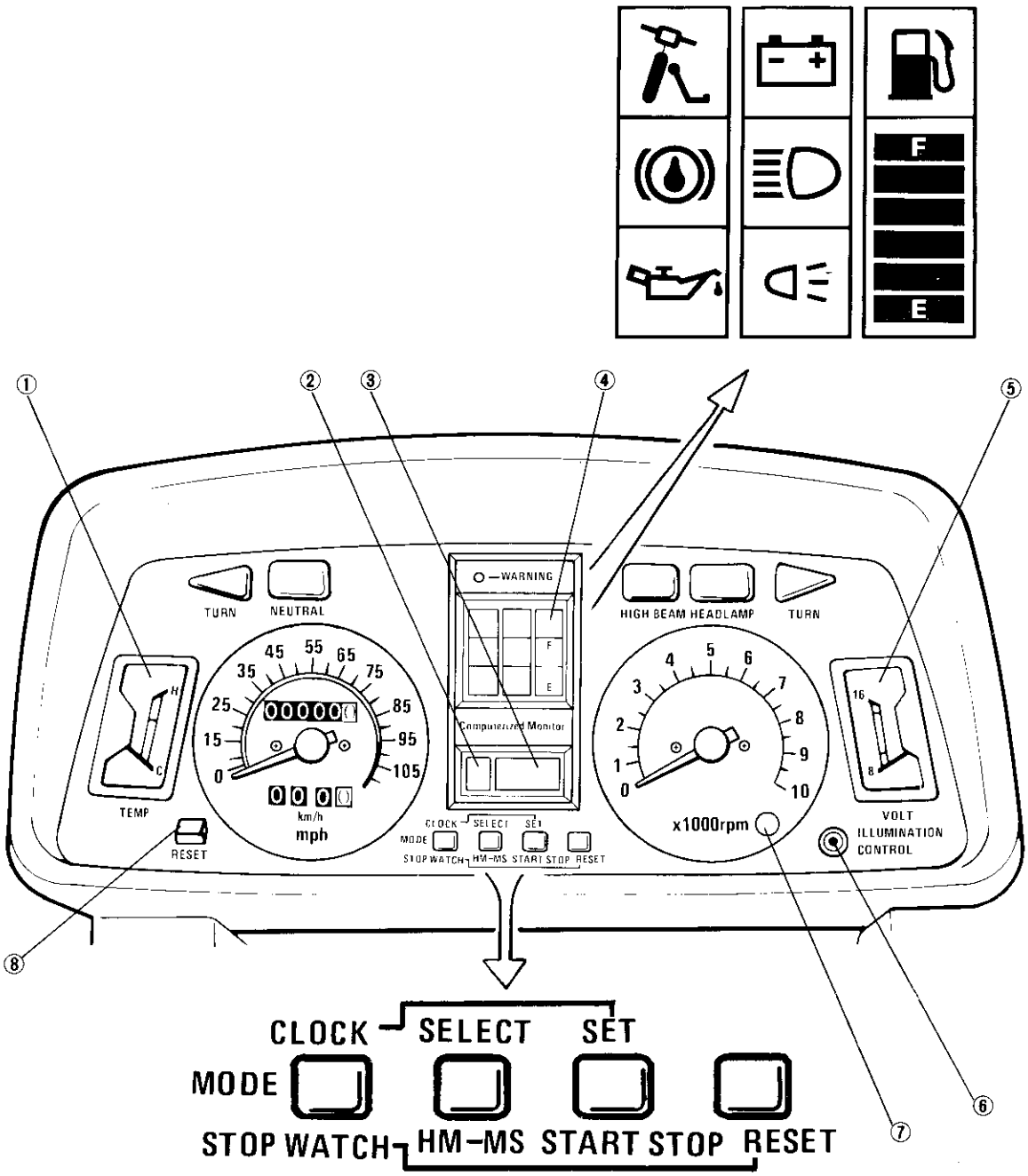
| No. | Item | Remarks | Initial break-in | | Thereafter every | |
|---|---|---|---|---|---|---|
| | | | 1,000 km (600 mi) or 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months |
| 1 | Valve clearance | Check and adjust valve clearance when engine is cold. Adjust after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | ○ | | | Adjust every 12,000 km (7,500 mi) or 18 months |
| 2 | Spark plugs | Check condition. Adjust gap/Clean. Replace after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months. | | ○ | ○ | Repalce every 12,000 km (7,500 mi) or 18 months |
| 3 | Crankcase ventilation system | Check ventilation hose for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 4 | Fuel line | Check fuel hose for cracks or damage. Replace if necessary. | | ○ | | ○ |
| 5 | Fuel filter | Replace initial 33,000 km (20,500 mi) and thereafter every 32,000 km (20,000 mi). | | | | Replace every 32,000 km (20,000 mi) |
| 6 | Exhaust system | Check for leakage. Retighten if necessary. Replace gasket(s) if necessary. | | ○ | ○ | |
| 7 | Carburetor synchronization | Adjust synchronization of carburetors. | | ○ | ○ | |
| 8 | Idle speed | Check and adjust engine idle speed. Adjust cable free play. | | ○ | ○ | |

# GENERAL MAINTENANCE/LUBRICATION

| No. | Item | Remarks | Type | Initial break-in | | Thereafter every | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1,000 km (600 mi) or 1 month | 5,000 km (3,000 mi) or 7 months | 4,000 km (2,500 mi) or 6 months | 8,000 km (5,000 mi) or 12 months | 16,000 km (10,000 mi) or 24 months |
| 1 | Engine oil | Warm up engine before draining. | Refer to page | ○ | | | Replace every 12,000 km (7,500 mi) or 18 months | |
| 2 | Oil filter | Replace | – | ○ | | | | |
| 3 | Air filter | Clean with compressed air. Replace if necessary | – | | ○ | | ○ | |
| 4 | Cooling system | Check hoses for cracks or damage, replace if necessary. | – | | | ○ | ○ | |
| | | Replace coolant 24 months. | Ethylene glycol anti-freeze coolant. | | | | | Every 24 months |
| 5 | Brake system | Adjust free play. Replace pads if necessary. | – | ○ | ○ | ○ | | |
| 6 | Final gear oil | Replace | SAE 80 API GL-4 Hypoid gear oil | ○ | | | | ○ |
| 7 | Control and meter cable | Check operation. Apply chain lube thoroughly. | Yamaha chain and cable lube or SAE 10W30 motor oil | ○ | ○ | ○ | | |
| 8 | Shift pedal and brake pedal shaft pivot. | Check operation. Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil. | | ○ | ○ | | |
| 9 | Center and sidestand pivots | Check operation. Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 10 | Steering bearing and reces. | Check bearing assemblies for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 11 | Front fork oil | Drain completely. Refill to specification. | Yamaha fork oil 10wt or equivalent | | | | | ○ |
| 12 | Wheel bearings | Check bearings for smooth rotation. Replace if necessary. | – | | ○ | ○ | | |
| 13 | Battery | Check specific gravity. Check breather pipe for proper operation. | – | | ○ | ○ | | |
| 14 | Brake lever and clutch lever pivot shaft | Check operation. Apply chain lube lightly. | Yamaha chain and cable lube or SAE 10W30 motor oil | | ○ | ○ | | |
| 15 | Rear arm pivot bearing | Check bearing assembly for looseness. Moderately repack every 16,000 km (10,000 mi) | Medium weight wheel bearing grease | | ○ | ○ | | Repack |
| 16 | Rear suspension link pivots | Apply chain lube | Lithium soap base grease | | | | | ○ |
| 17 | Sidestand switch | Check and clean or replace as required | – | ○ | ○ | ○ | | |
| 18* | Air drier | Replace desiccant every 24 months | – | | | | | Every 24 months |
| 19* | Suction filter | Clean filter every 12 months | – | | | | Every 12 months | |

* These items are applicable only for XVZ12DL (41V & 47T).

## METER PANEL FOR XVZ12DL




1. TEMP. meter
2. GEAR indicator
3. TIME indicator
4. COMPUTERIZED MONITOR
5. VOLT meter
6. ILLUMINATION CONTROL knob
7. CRUISE CONTROL indicator light
8. RESET button

**Gear indicator panel**
This panel indicates the gear position which is selected.

**Digital clock**
This digital clock functions both as a watch and as a stop watch. A clock mode (watch or stop watch) can be displayed on the display panel by turning "ON" the main switch.

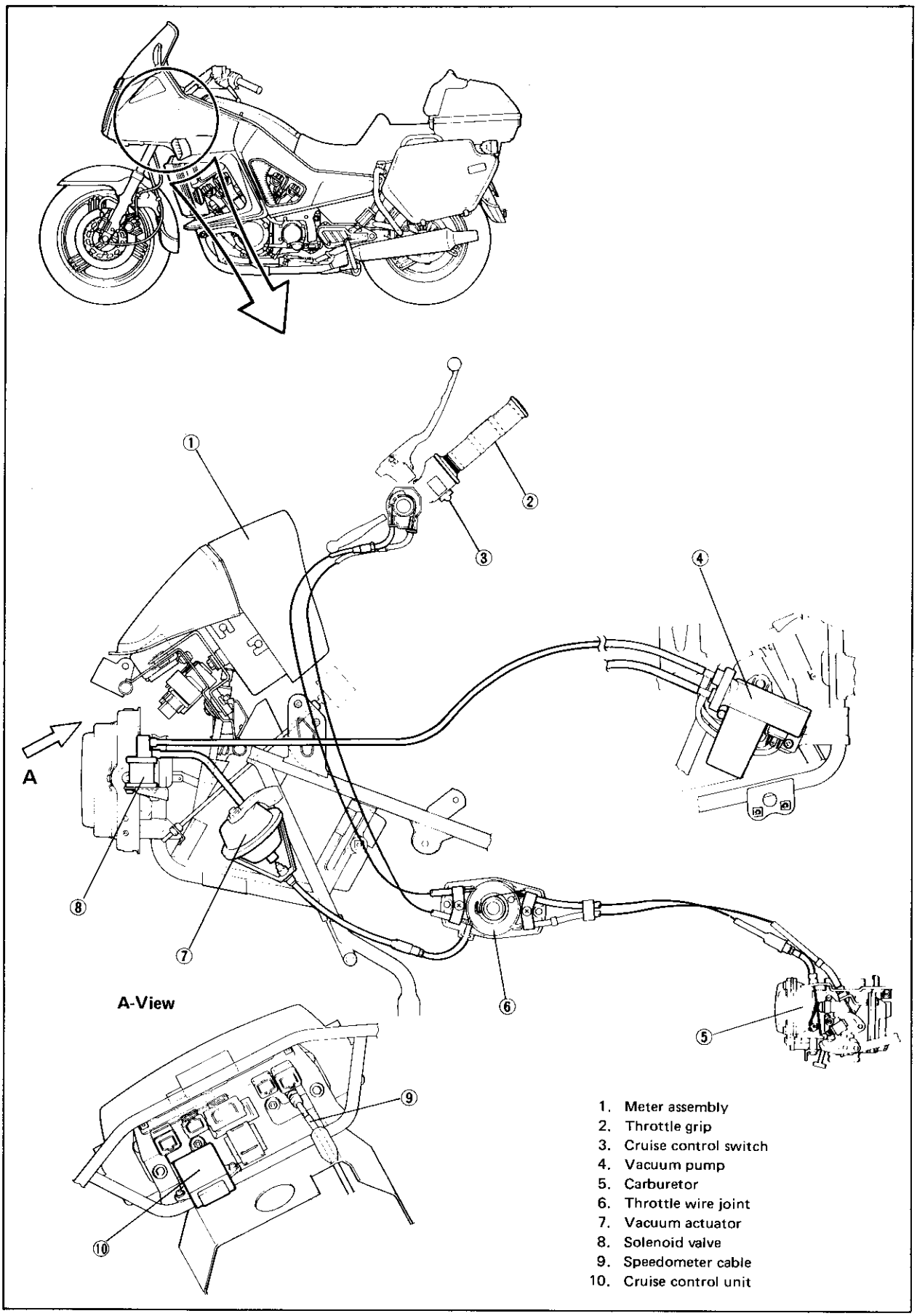
CLOCK ADJUSTMENT
1. Turn "ON" the main switch.
2. Place the clock in the clock mode by pressing the "CLOCK/STOP WATCH" switch.
3. Press the "SELECT/HM-MS" switch and select the clock model (hour or minute) you want to adjust. The flashing digit can be adjusted.
4. By pressing the SET/START-STOP switch, the flashing digit can be adjusted.

STOP WATCH OPERATION
1. Turn "ON" the main switch.
2. By pressing the "CLOCK/STOP WATCH" switch, place the clock in the stop watch mode.
3. Select the display of the hour and minutes or the minutes and seconds by pressing the "SELECT/HM-MS" switch.
4. By pressing the "SET/START-STOP" switch, the watch can be started or stopped.
5. The watch can be reset by pressing the "RESET" switch.

**Illumination control knob**
This control knob is used to adjust the intensity of the meter light. Turning the knob clockwise darkens the light and turning it counterclockwise brightens the light.

**CRUISE CONTROL indicator light**
This light, when glowing, indicates that the "CRUISE CONTROL" system is in function. This system allows the driver to select the speed the wishes without having to rely on the throttle grip opening.

# VENTURE CRUISE CONTROL SYSTEM FOR XVZ12DL



# VENTURE CRUISE CONTROL SYSTEM

## DESCRIPTION

This system enables the rider to select the desired speed at which he can run his motorcycle without operating the throttle. If the rider slides the control switch on the right side handle to "SET" during a ride, the motorcycle maintains the same speed. This is accomplished by a microcomputer that controls the throttle automatically, depending on changes in the engine load. For example, when climbing a hill or riding against a head wind, the cruise control system will compensate for variations in gravity and wind resistance against the moving bike, enabling it to maintain a pre-selected, fixed speed. This means that the rider can reach his destination with less fatigue.

## OPERATION

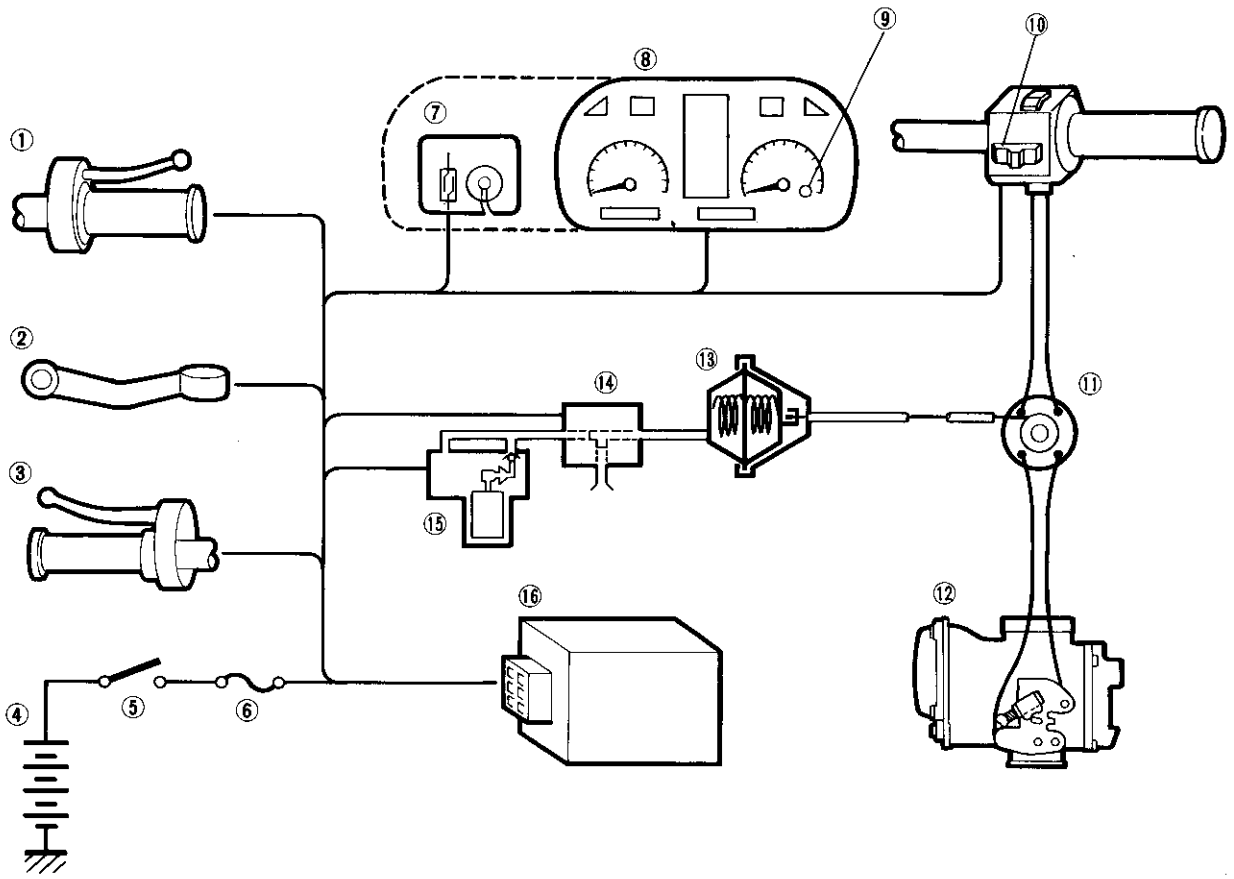
1. While running at speeds in the range from 30 to 80 mph (50 to 130 km/h), slide the cruise control switch to "SET" and gently release it.
2. When the cruise control is activated, the indicator light on the tachometer lights up.
3. To increase the fixed speed, open the throttle grip, and run the bike at your desired speed. While running at this speed, slide the cruise control switch to "SET" and release it gently.
4. To decrease the fixed speed, release the cruise control, and proceed as above.
   To cancel the cruise control, operate the front brake, rear brake, or clutch, or turn off the cruise control switch.
5. To increase the vehicle speed temporarily during the cruise control, open the throttle grip.
6. When the vehicle speed drops more than 5mph (8 km/h), while in the cruise control mode, the system cancels itself automatically. Also, when the microcomputer controlled self-diagnosis system detects any abnormality, the cruise control cancels itself automatically.

## FEATURES

1. The XVZ12DL is equipped with a vacuum pump to operate the vacuum actuator without making use of a vacuum in the engine.
2. The vacuum actuator regulates the throttle valve through the throttle wire joint.
3. Temporary acceleration is possible by operating the throttle grip during cruise control.
4. A microcomputer is used to provide a programmed self-diagnosis function that shows the condition of the cruise control system by various displays emitted by the cruise control indicator light (See page 11).
5. By operating the front brake, rear brake, or the clutch, the system can be cancelled. It can also be cancelled by turning off the cruise control switch.

## VENTURE CRUISE CONTROL SYSTEM

### BLOCK DIAGRAM



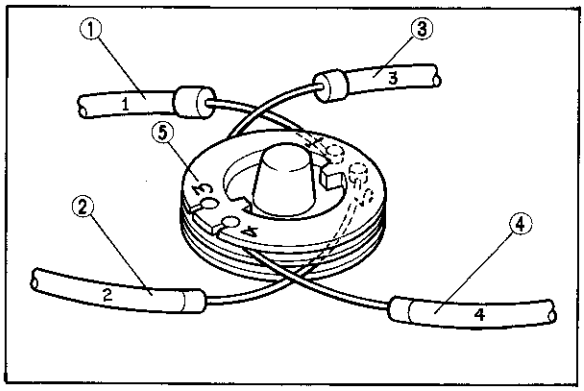

1. Front brake
2. Rear brake
3. Clutch
4. Battery
5. Main switch
6. Fuse
7. Speed sensor
8. Meter assembly
9. Cruise control indicator light
10. Cruise control switch
11. Throttle wire joint
12. Carburetor
13. Vacuum actuator
14. Solenoid valve
15. Vacuum pump
16. Cruise control unit

**PROCEDURE FOR THROTTLE WIRE INSTALLATION**

1. Install throttle wire 1 and throttle wire 2 onto rotor 1.
   Install throttle wire 3 and throttle wire 4 onto rotor 1.

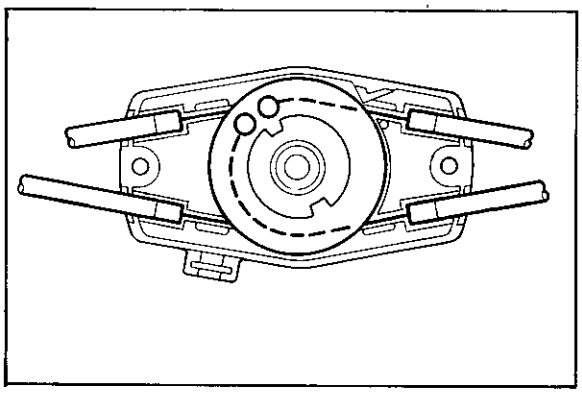
**NOTE:**

When installing the throttle wire end to the rotor 1, correspond the painted number on the throttle wire to the embossed number on rotor 1.

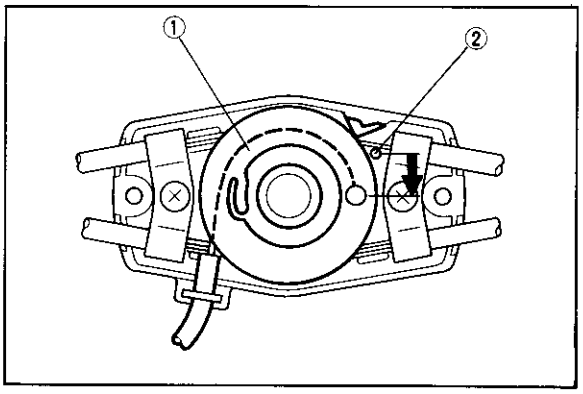



1. Throttle wire 1
2. Throttle wire 2
3. Throttle wire 3
4. Throttle wire 4
5. Rotor 1

2. Clamp together outer wires of throttle wire 3 and throttle wire 4. In clamping them together, both wire ends must be in line. Also both ends of throttle wire 1 and throttle wire 2 must be in line.
3. Then, install rotor 1 to housing (1).
4. Secure throttle wire 3 and throttle wire 4 using wire clamp and screw. Make sure that outer wire end is properly seated in the groove.



5. Secure throttle wire 1 and throttle wire 2 using wire clamp and screw. Make sure that outer wire end is properly seated in the groove.
6. Install actuator wire onto rotor 2.
7. Install rotor 2 to rotor 1; then, fit wire guide flange of actuator wire into housing groove. Make sure that wire end of actuator wire is placed below the projection mark.

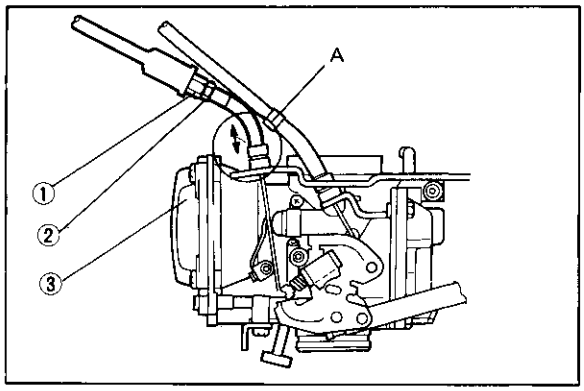



1. Rotor 2
2. Projection mark

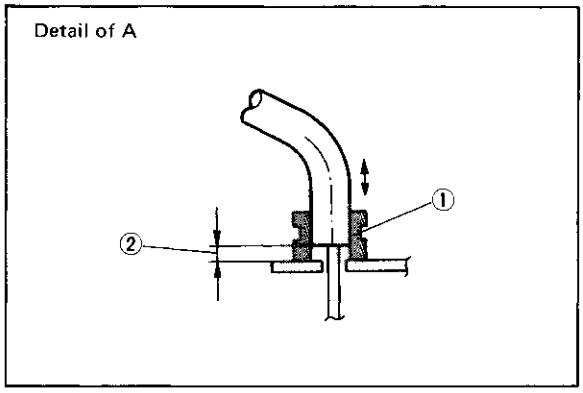
8. Hang one end of torsion spring on rotor 2 and the other on projection of housing 1.
9. Fit housing 2 over housing 1 and secure it with screw.

## PROCEDURE FOR THROTTLE WIRE ADJUSTMENT

1. Make adjustment so that the outer wire can have a free play of 1 ~ 2 mm (0.04 ~ 0.08 in).



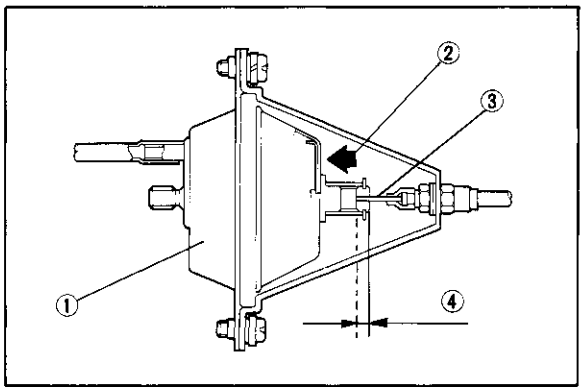

1. Adjust nut
2. Locknut
3. Carburetor
4. Push by finger



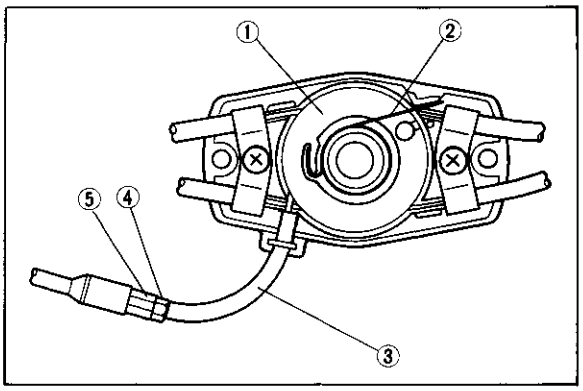

1 Carb wire guide 2. Free play 1 ~2 mm (0.04 ~0.08 in)

2. Adjust throttle wire 1.
   Make adjustment so that throttle grip can have a play of 5 ~ 8 mm (0.20 ~ 0.31 in) on grip flange circumference.

3. Adjust actuator wire.
   Make adjustment so that the actuator wire can have a free play of 1 ~ 2 mm (0.04 ~ 0.08 in) by pushing actuator.
   By further pushing actuator, check that throttle grip is able to turn.




1. Actuator 2. Push 3. Actuator wire
4. Free play 1 ~2 mm (0.04 ~0.08 in)

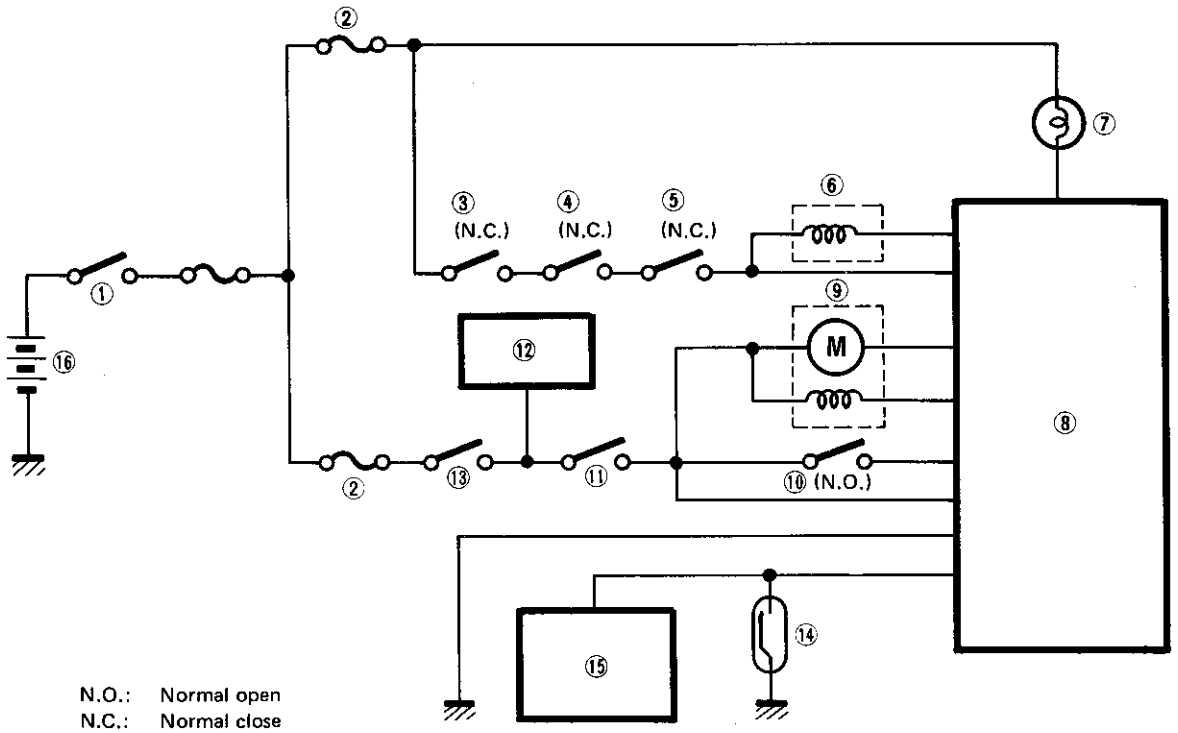



1. Rotor 2 2. Torsion spring 3. Actuator wire
4. Locknut 5. Adjust nut

4. Check that carb operates at fully opened or closed when turning throttle grip.

# TROUBLESHOOTING

## BLOCK DIAGRAM

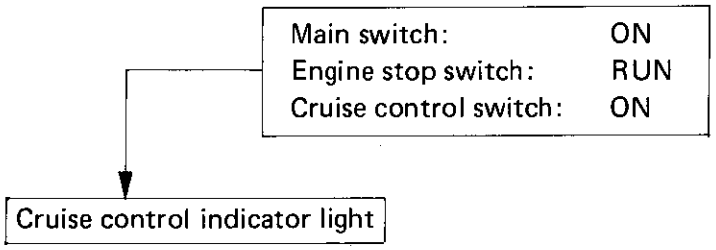



N.O.: Normal open
N.C.: Normal close

1. Main switch
2. Fuse
3. Front brake switch
4. Rear brake switch
5. Clutch switch
6. Solenoid valve
7. Cruise control indicator light
8. Cruise control unit
9. Vacuum pump
10. Cruise control "SET" switch
11. Cruise control "POWER" switch
12. Ignitor unit
13. Engine stop switch
14. Speed sensor
15. Speedometer
16. Battery

**DETECTING AN ABNORMALITY WITH THE MOTORCYCLE STOPPED:**

The cruise control indicator light shows any abnormality of the cruise control system. Set the main switch to ON, and turn the stopswitch to RUN. Slide the cruise control switch to ON, and check the cruise control indicator light.



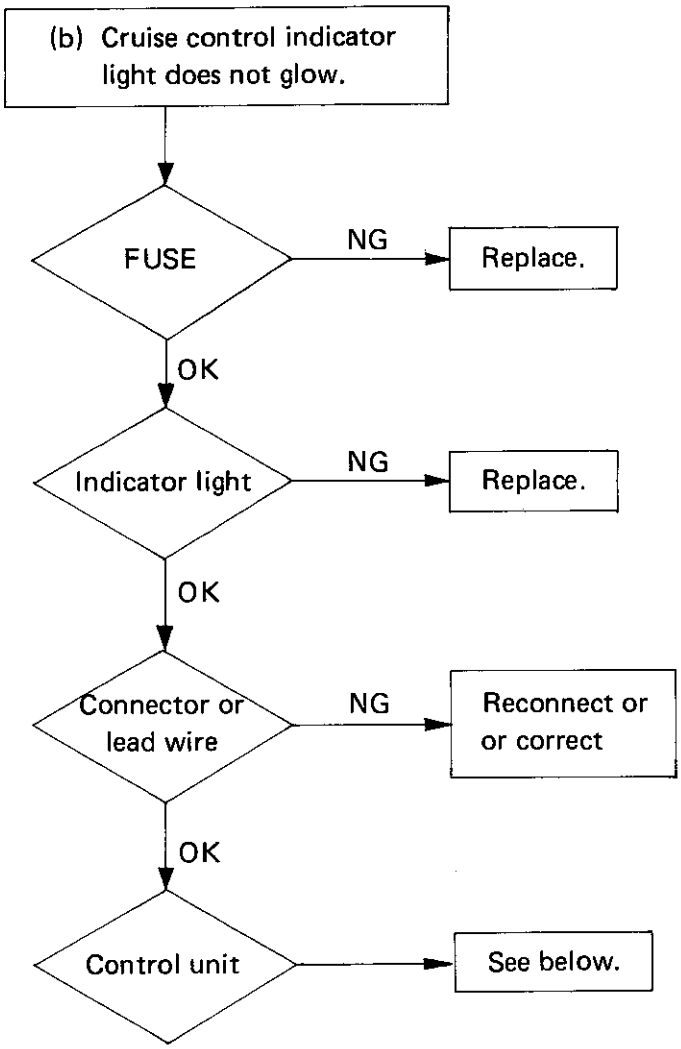

(a) Dim ..... Normal
(Somewhat dark)

(b) Off ..... Indicator light or related parts are faulty.

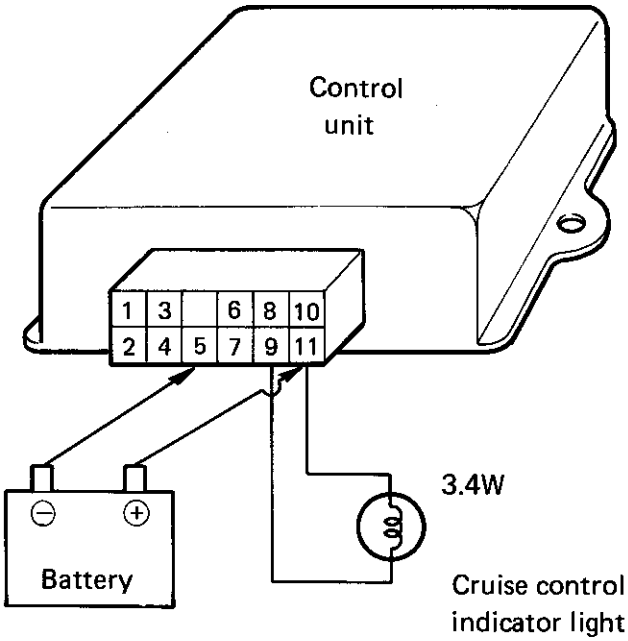
(c) One flash ..... Vacuum pump or related parts are faulty.
(Within 2 seconds)

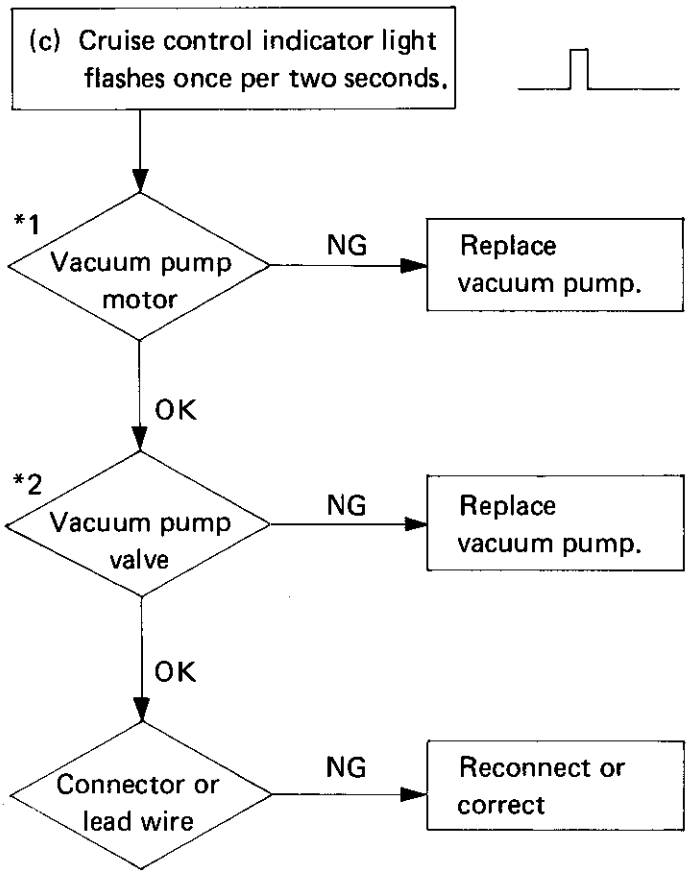
(d) Two flashes ..... Solenoid valve or related parts are faulty.
(Within 2 seconds)

(e) Three flashes ..... Control unit or related parts are faulty.
(Within 2 seconds)



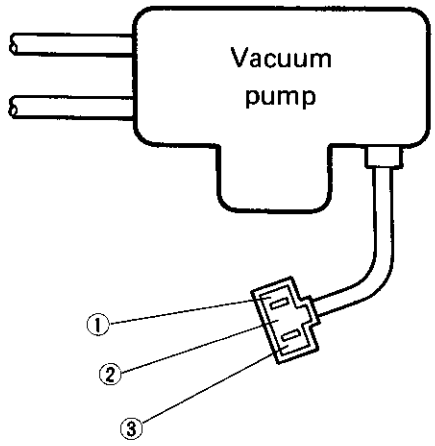

Control unit inspection:
As shown in figure, connect the battery. When the indicator light is dim, the control unit is in good condition.

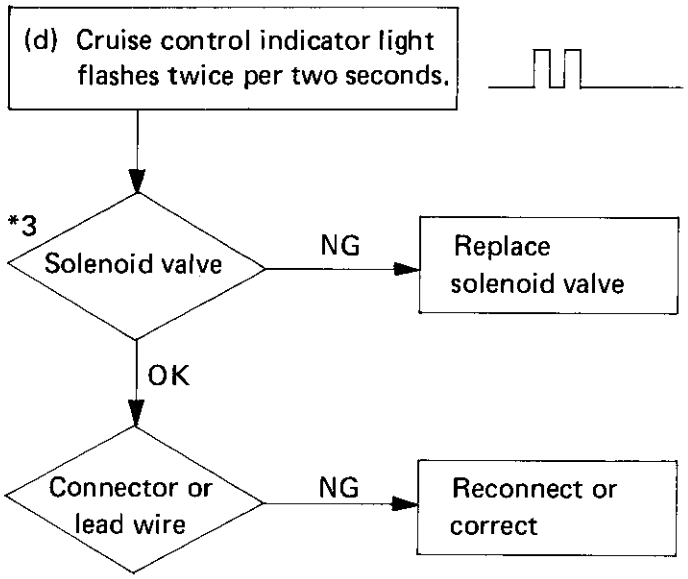




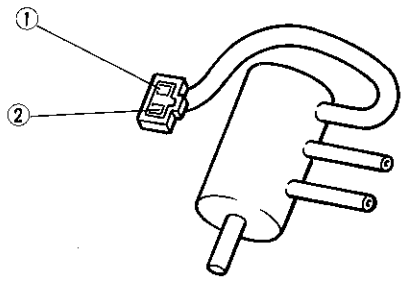

*1 As shown in figure, connect the battery's positive side to the connector (1) and the negative side to the connector (2) and disconnect the battery. Check the sound of the rotating vacuum pump.

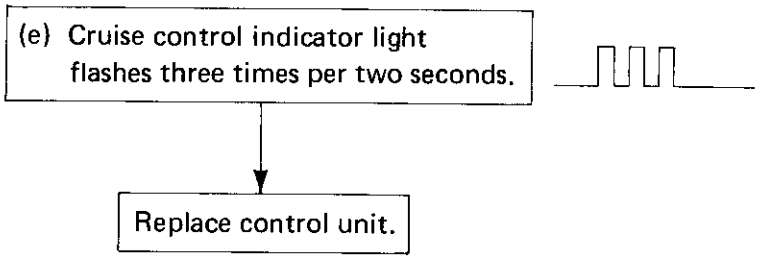
*2 Connect the battery's positive side to the connector (1), and the negative side to the connector (3), then disconnect. While repeating connection and disconnection, check the sound of the valve operation.





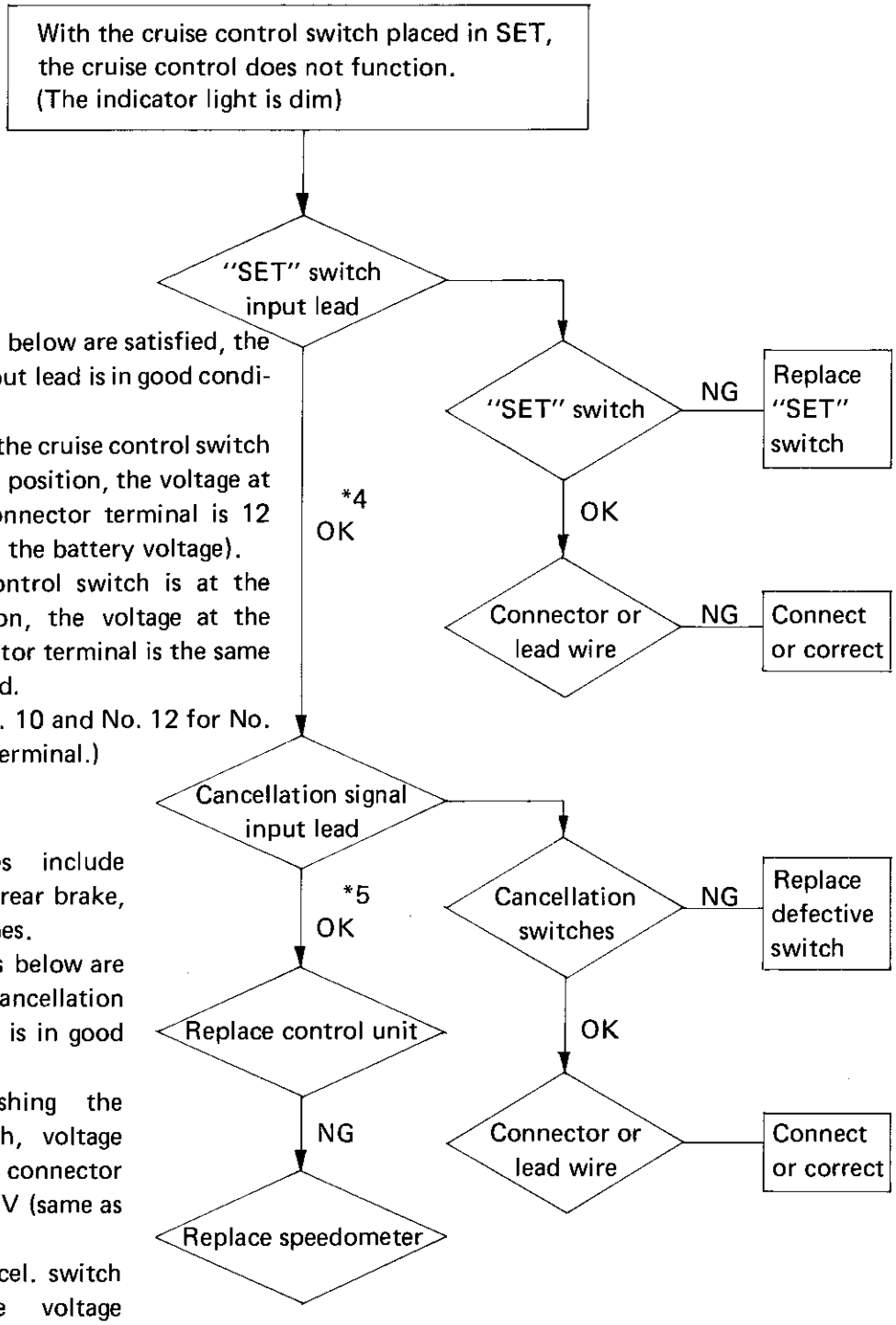

3 Check to see that resistance between terminals (1) and (2) of the connector is 20 to 50 ohms.



**DETECTING AN ABNORMALITY DURING OPERATION:**

Slide the cruise control switch to SET while running at approx. 30 to 50 mph (50 to 130 km/h), and if it is impossible to set the speed and at the same time the indicator light is dim, check the cruise control system as follows:




*4 If two conditions below are satisfied, the "SET" switch input lead is in good condition.

1. When sliding the cruise control switch to the "SET" position, the voltage at the No. 4 connector terminal is 12 volts (same as the battery voltage).
2. When the control switch is at the "ON" position, the voltage at the No. 4 connector terminal is the same level as ground.
   (See page No. 10 and No. 12 for No. 4 connector terminal.)

*5 Cancel. switches include the front brake, rear brake, and clutch switches.
If two conditions below are satisfied, the cancellation signal input lead is in good condition.

1. Without pushing the cancel. switch, voltage at the No. 3 connector terminal is 12V (same as the battery).
2. With the cancel. switch pushed, the voltage should be the same as ground voltage.

With the cruise control switch placed in SET, the cruise control is impossible (The indicator light is on.)

Throttle wire → Replace.

OK

*6 Throttle wire joint → Replace.

*6 Push the vacuum actuator hard by hand, and check if the throttle valve opens.

OK

Vacuum hose → Replace.

OK

*7 Solenoid valve → Replace.

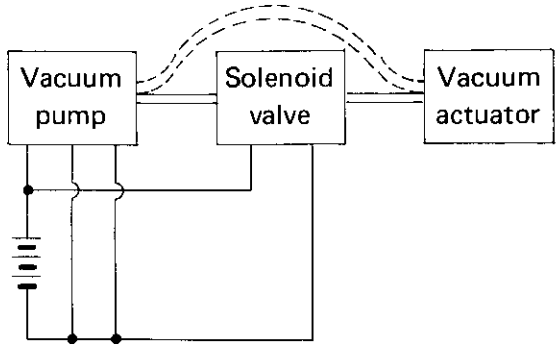
*7 If the vacuum actuator will not operate, connect the vacuum pump to the vacuum actuator directly. If the vacuum actuator operates, the solenoid valve is considered to be faulty. When the vacuum pump, solenoid valve and vacuum actuator are in good condition, the actuator will finish its operation in 5 seconds.

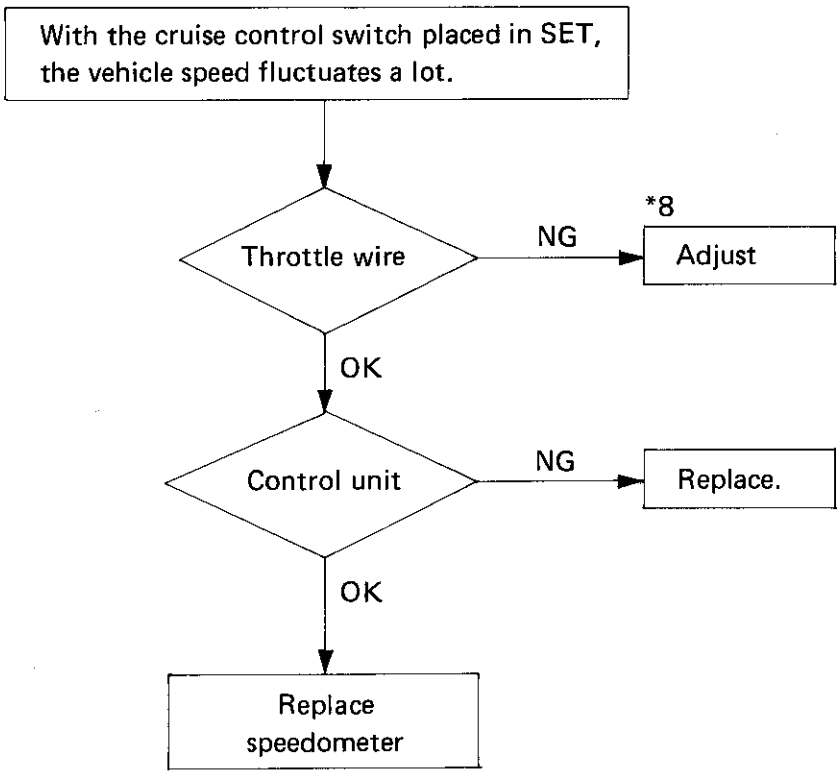
OK

Vacuum pump → Replace.

OK

Replace vacuum actuator

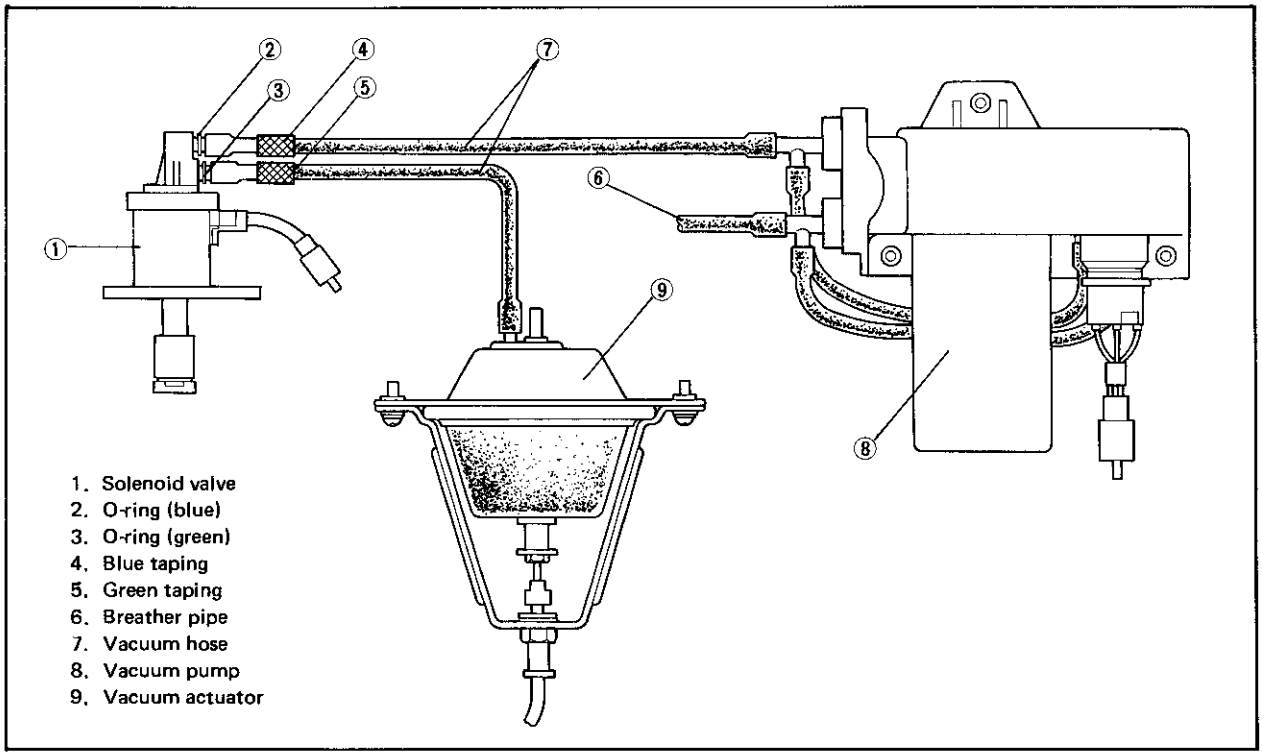





*8 Make adjustment so that the actuator wire can have a free play of 1 ~ 2 mm (0.04 ~ 0.08 in) by pushing the actuator. (See page No. 7)

**CAUTION:**

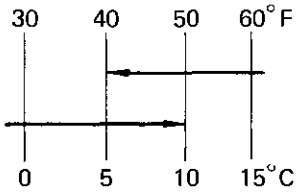
**The vacuum hoses connecting the vacuum pump and vacuum actuator to the solenoid valve should be connected correctly. See the illustration below. If connections are reversed, the cancellation of cruise control will be impossible.**



# APPENDICES

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Model Code Number:<br>Engine Starting Number<br>Vehicle I.d Number | 41R / 41R-000101 / JYA41R00* / EA000101<br>[41V / 41V-000101 / JYA41V00* / EA000101]<br>47R / 47R-000101 / JYA47R00* / DA000101<br>[47T / 47T-000101 / JYA47T00* / DA000101] |
| Dimensions:<br>Overall Length<br>Overall Width<br>Overall Height<br>Seat Height<br>Wheelbase<br>Minimum Ground Clearance | <br>2,470 mm (97.2 in)<br>940 mm (37.0 in)<br>1,535 mm (60.4 in)<br>785 mm (30.9 in)<br>1,610 mm (63.4 in)<br>145 mm ( 5.7 in) |
| Basic Weight:<br>Wight Oil and Full Fuel Tank | 41R, 47R: 334 kg (736 lb)<br>41V, 47T: [343 kg (756 lb)] |
| Minimum Turning Radius: | 2,900 mm (114 in) |
| Engine:<br>Engine Type<br>Cylinder Arrangement<br>Displacement<br>Bore x Stroke<br>Compression Ratio<br>Compression Pressure<br>Starting System | <br>Liquid cooled 4-stroke gasolin, DOHC<br>V-type 4-cylinder<br>1,198 $cm^3$<br>76.0 x 66.0 mm (2.99 x 2.60 in)<br>10.5 : 1<br>1176.8 kPa (12.0 $kg/cm^2$, 171 psi)<br>Electric starter |
| Lubrication System: | Wet sump |
| Oil Type or Grade:<br>Engine oil<br><br><br>Final Gear Oil | <br>Yamalube 4-cycle oil or SAE 20W40 type SE motor oil SAE 20W40 type SE motor oil<br>(If temperature does not go below 5°C (40°F))<br>SAE 10W30 type SE motor oil (If temperature does not go above 15°C (60°F))<br>SAE 80 API "GL-4" Hypoid gear oil |
| Oil Capacity:<br>Engine Oil: Periodic Oil Change<br>With Oil Filter Replacement<br>Total Amount<br>Final Gear Case Oil Amount | <br>3.5 L (3.1 Imp qt, 3.7 US qt)<br>3.8 L (3.3 Imp qt, 4.0 US qt)<br>4.7 L (4.1 Imp qt, 5.0 US qt)<br>0.3 L (0.26 Imp qt, 0.32 US qt) |
| Radiator Capacity:<br>(Including All routes) | <br>2.8 L (2.5 Imp qt, 3.0 US qt) |
| Air Filter: | Dry type element |
| Fuel:<br>Type<br>Tank Capacity | <br>Regular gasoline<br>20 L (4.4 Imp qt, 5.3 US gal) |
| Carburetor:<br>Type/Manufacturer | <br>BDS 34 x 4 / MIKUNI |
| Spark Plug:<br>Type/Manufacturer<br>Gap | <br>DPR8EA-9/NGK, X24EPR-U9/NIPPONDENSO<br>0.8 ~ 0.9 mm (0.031 ~ 0.035 in) |

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Clutch Type: | Wet, multiple-disc |
| Transmission: | |
| Primary Reduction System | Spur gear |
| Primary Reduction Ratio | 87/49 (1.775) |
| Secondary Reduction System | Shaft drive |
| Secondary Reduction Ratio | 21/27 x 33/10 (2.566) |
| Transmission Type | Constant mesh, 5-speed |
| Operation | Left foot operation |
| Gear Ratio 1st | 39/15 (2.600) |
| 2nd | 39/22 (1.772) |
| 3rd | 31/23 (1.347) |
| 4th | 31/29 (1.068) |
| 5th | 29/32 (0.906) |
| Chassis: | |
| Frame Type | Tubular steel, Double cradle |
| Caster Angle | 28° 30′ |
| Trail | 125 mm (4.9 in) |
| Tire: | |
| Type | Tubeless |
| Size (F) | 120/90-18-65H |
| Size (R) | 140/90-16-71H |
| Tire Pressure (Cold tire): | |
| Basic weight: | |
| With oil and full fuel tank | 334 kg (736 lb) [343 kg (756 lb)] |
| Maximum load* | 196 kg (432 lb) |

| Cold tire pressure | FRONT | REAR |
|---|---|---|
| Up to 90 kg (198 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |
| 90 kg (198 lb) ~ 196 kg (432 lb) load* | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 275 kPa (2.8 kg/cm$^2$, 40 psi) |
| High speed riding | 225 kPa (2.3 kg/cm$^2$, 32 psi) | 225 kPa (2.3 kg/cm$^2$, 32 psi) |

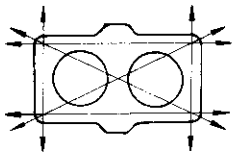
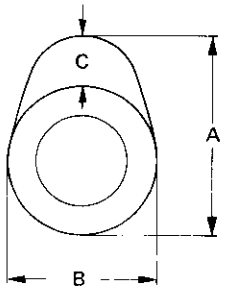
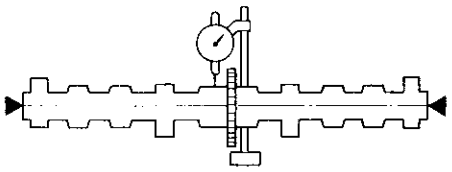
* Load is the total weight of acrgo, rider, passenger, and accessories.

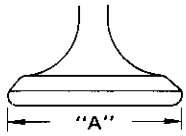
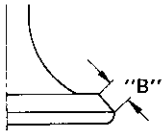
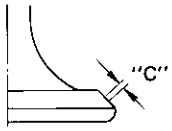
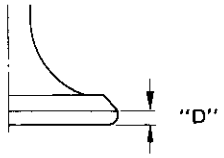
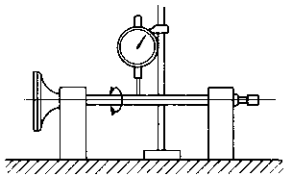
| | |
|---|---|
| Brake: | |
| Front Right-side | Disc brake |
| Operation | Right hand operation |
| Front Left-side and Rear (Unified Brake) | Disc brake |
| Operation | Right foot operation |
| Suspension: | |
| Front Suspension | Telescopic fork |
| Rear Suspension | Swingarm (Monocross suspension) |
| Shock Absorber: | |
| Front Shock Absorber | Air, Coil spring, Oil damper |
| Rear Shock Absorber | Air, Coil spring, Oil damper |
| Wheel Travel: | |
| Front Wheel Travel | 140 mm (5.5 in) |
| Rear Wheel TRavel | 105 mm (4.1 in) |
| Electrical: | |
| Ignition System | T.C.I. |
| Generator System | A.C. magneto generator |
| Battery Type or Model | GN18Z-3A [GM18Z-3A] |
| Battery Capacity | 12V 20AH |
| Headlight Type: | Semi-sealed beam (Quartz bulb) |

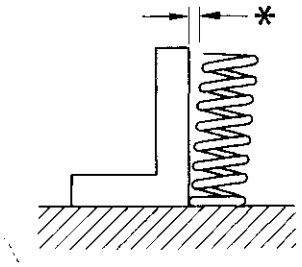
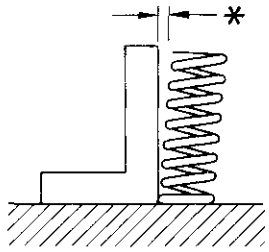
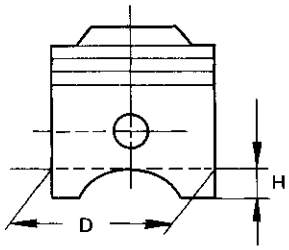
| Model | XVZ12L [XVZ12DL] |
|---|---|
| Bulb Wattage/Quantity: | |
| Headlight | 12V, 60W/55W x 1 |
| Tail/Brake Light | 12V, 8W/27W x 2 |
| Flasher Light | 12V, 27W x 4 |
| Parking/Running Light | 12V, 8W x 2 |
| Meter Light | 12V, 3.4W x 4 |
| Indicator light Wattage/Quantity: | |
| "NEUTRAL" | 12V, 3.4W x 1 |
| "HIGH BEAM" | 12V, 3.4W x 1 |
| "TURN" | 12V, 3.4W x 2 |
| "VENTURE CRUISE" | [12V, 3.4W x 1] |

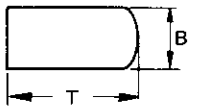
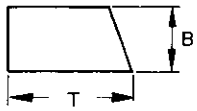
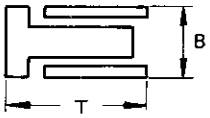
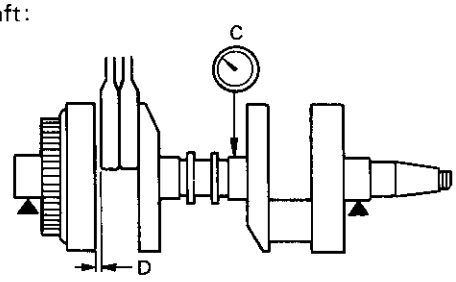
## MAINTENANCE SPECIFICATIONS

### ENGINE

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Cylinder Head: | |
| Warp Limit*  | 0.03 mm (0.0012 in) |
| Cylinder: | |
| Bore Size | 75.07 ~ 76.2 mm (2.96 ~ 2.99 in) |
| Taper Limit | 0.05 mm (0.002 in) |
| Out of Round Limit | 0.05 mm (0.002 in) |
| Cam shaft: | |
| Drive Method | Chain drive |
| Cam Cap Inside Dia. | 25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in) |
| Camshaft Outside Dia. | 24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in) |
| Shaft-to-Cap Clearance | 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in) |
| Cam Dimensions | |
| Intake "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit >  | 36.15 mm (1.42 in) |
| Intake "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
| Exhaust "A" | 36.25 ~ 36.35 mm (1.427 ~ 1.431 in) |
| < Limit > | 36.15 mm (1.42 in) |
| Exhaust "B" | 28.18 ~ 28.28 mm (1.109 ~ 1.113 in) |
| < Limit > | 28.08 mm (1.11 in) |
| Camshaft Runout Limit  | 0.03 mm (0.0012 in) |
| Cam Chain: | |
| Cam Chain Type/No. of Links | BF05M/118 |
| Cam Chain Adjustment Method | Automatic |

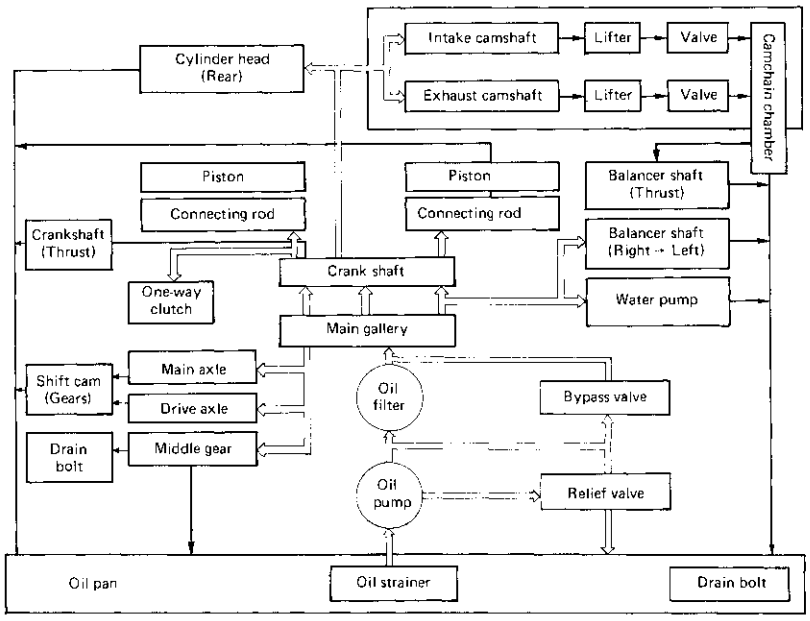
| Model | | XVZ12L [XVZ12DL] |
|---|---|---|
| Valve, Valve Seat, Valve Guide: | | |
| Valve Clearance (Cold): | IN. | 0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in) |
| | EX. | 0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in) |
| Valve Dimensions | | |
|   Head Dia. | | |
|   Face Width | | |
|   Seat Width | | |
|   Margin Thickness | | |
| "A" Head Dia. | IN. | 28.9 ~ 29.1 mm (1.1378 ~ 1.1457 in) |
| | EX. | 23.9 ~ 24.1 mm (0.9409 ~ 0.9488 in) |
| "B" Face Width | IN. | 1.6 ~ 3.1 mm (0.063 ~ 0.122 in) |
| | EX. | 1.3 ~ 2.4 mm (0.0512 ~ 0.0945 in) |
| "C" Seat Width | IN. | 0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in) |
| | EX. | 0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in) |
| < Limit > | IN. | 1.4 mm (0.0551 in) |
| | EX. | 1.4 mm (0.0551 in) |
| "D" Margin Thickness | IN. | 1.1 ~ 1.5 mm (0.0433 ~ 0.0591 in) |
| | EX. | 1.1 ~ 1.5 mm (0.0433 ~ 0.0591 in) |
| < Limit > | IN. | 0.7 mm (0.0276 in) |
| | EX. | 0.7 mm (0.0276 in) |
| Stem Outside Dia. | IN. | 5.975 ~ 5.990 mm (0.2352 ~ 0.2358 in) |
| | EX. | 5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in) |
| < Limit > | IN. | 5.945 mm (0.234 in) |
| | EX. | 5.92 mm (0.233 in) |
| Guide Inside Dia. | IN. | 6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in) |
| | EX. | 6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in) |
| < Limit > | IN. | 6.05 mm (0.238 in) |
| | EX. | 6.05 mm (0.238 in) |
| Stem-to-Guide Clearance | IN. | 0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in) |
| | EX. | 0.025 ~ 0.052 mm (0.0010 ~ 0.0020) |
| < Limit > | IN. | 0.08 mm (0.0031 in) |
| | EX. | 0.10 mm (0.0039 in) |
| Stem Runout Limit | | 0.01 mm (0.0004 in) |
|  | | |
| Valve Spring: | | |
| Inner Spring: | | |
| Free Length | IN. | 37.3 mm (1.47 in) |
| | EX. | 37.3 mm (1.47 in) |
| < Limit > | IN. | 35.3 mm (1.39 in) |
| | EX. | 35.3 mm (1.39 in) |
| Set Length (Valve Closed) | IN. | 31.8 mm (1.25 in) |
| | EX. | 31.8 mm (1.25 in) |
| Compressed Pressure | IN. | 4.57 ~ 5.37 kg (10.077 ~ 11.841 lb) |
| (Installed) | EX. | 4.57 ~ 5.37 kg (10.077 ~ 11.841 lb) |

| Model | | XVZ12L [XVZ12DL] |
|---|---|---|
| Tilt Limit* | IN. | 2.5° / 1.6 mm (0.063 in) |
| | EX. | 2.5° / 1.6 mm (0.063 in) |
|  | | |
| Direction of Winding | IN. | Left |
| | EX. | Left |
| Outer Spring: | | |
| Free Length | IN. | 39.45 mm (1.55 in) |
| | EX. | 39.45 mm (1.55 in) |
| < Limit > | IN. | 37.25 mm (1.47 in) |
| | EX. | 37.25 mm (1.47 in) |
| Spring Rate | IN-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | IN-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| | EX-K1 | 19.1 N/mm (1.95 kg/mm, 109 lb/in) |
| | EX-K2 | 24.8 N/mm (2.53 kg/mm, 142 lb/in) |
| Set Length (Valve Closed) | IN. | 33.8 mm (1.33 in) |
| | EX. | 33.8 mm (1.33 in) |
| Compressed Pressure (Installed) | IN. | 10.1 ~ 11.9 kg (22.27 ~ 26.24 lb) |
| | EX. | 10.1/~ 11.9 kg (22.27 ~ 26.24 lb) |
| Tilt Limit | IN. | 2.5°/1.7 mm (0.0669 in) |
|  | EX. | 2.5°/1.7 mm (0.0669 in) |
| Direction of Winding | IN. | Right |
| | EX. | Right |
| Piston: | | |
| Piston Clearance | | 0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in) |
| < Limit > | | 0.15 mm (0.0059 in) |
| Piston Size "D" | | 75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in) |
| Measuring Point "H" | | 6.5 mm (0.256 in) |
|  | | |
| Oversize | 1st | 76.25 mm (3.002 in) |
| Oversize | 2nd | 76.50 mm (3.012 in) |

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Piston Ring: | |
| Top Ring:   | |
| Type | Plain (Barrel face) |
| Dimensions (B x T) | 2.8 x 1.2 mm (0.1102 x 0.0472 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.7 mm (0.0276 in) |
| Side Clearance (Installed) | 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| 2nd Ring:   | |
| Type | Plain (Taper face) |
| Dimensions (B x T) | 3.2 x 1.5 mm (0.1260 x 0.0591 in) |
| End Gap (Installed) | 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in) |
| < Limit > | 0.8 mm (0.0315 in) |
| Side Clearance   | 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) |
| < Limit > | 0.12 mm (0.0047 in) |
| Oil Ring: | |
| Dimensions (B x T) | 3.1 x 2.8 mm (0.1220 x 0.1102 in) |
| End Gap (Installed) | 0.3 ~ 0.9 mm (0.0118 ~ 0.0354 in) |
| Connecting Rod: | |
| Oil Clearance | 0.021 ~ 0.045 mm (0.0008 ~ 0.0018 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink |
| Crankshaft:   | |
| Runout Limit "C" | 0.03 mm (0.0012 in) |
| Big End Side Clearance "D" | 0.320 ~ 0.924 mm (0.0126 ~ 0.0364 in) |
| Journal Oil Clearance | 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in) |
| Bearing Color Code | 1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink 7. Red |
| Clutch: | |
| Friction Plate Thickness | 2.9 ~ 3.1 mm (0.1142 ~ 0.1220 in) |
| Quantity | 8 pcs. |
| Wear Limit | 2.8 mm (0.11 in) |
| Clutch Plate Thickness | 2.2 ~ 2.4 mm (0.0866 ~ 0.0945 in) |
| Quantity | 7 pcs. |
| Warp Limit | 0.2 mm (0.0079 in) |
| Clutch Spring Free Length | 41.6 mm (1.64 in) |
| Quantity | 6 pcs. |
| Minimum Length | 40.3 mm (1.59 in) |
| Push Rod Bending Limit | 0.5 mm (0.0197 in) |
| Transmission: | |
| Main Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Drive Axle Deflection Limit | 0.08 mm (0.0031 in) |
| Shifter: | |
| Shifter Type | Guide Bar |
| Guide Bar Bending Limit | 0.025 mm (0.001 in) |
| Carburetor: | |
| I.D. Mark | 41R00 |
| Main Jet (M.J.) | #117.5 |

| Model | | XVZ12L [XVZ12DL] |
|---|---|---|
| Carburetor: | | |
| Main Air Jet | (M.A.J.) | #55 |
| Jet Needle | (J.N.) | 5FX59-1 |
| Needle Jet | (N.J.) | Y-0 |
| Pilot Air Jet | (P.A.J. 1) | #80 |
| | (P.A.J. 2) | #180 |
| Pilot Outlet | (P.O.) | 0.8 |
| Pilot Jet | (P.J.) | #37.5 |
| Bypass | (B.P. 1) | 0.8 |
| | (B.P. 2) | 0.8 |
| | (B.P. 3) | 0.9 |
| Valve Seat Size | (V.S.) | 1.5 |
| Starter Jet | (G.S. 1) | #45 |
| | (G.S. 2) | #0.8 |
| Fuel Level | (F.L.) | 15.5 ~ 16.5 mm (0.610 ~ 0.650 in) |
| Engine Idling Speed | | 950 ~ 1,050 r/min |
| Vacuum Pressure at Idling Speed | | Above 250 mm Hg (9.8425 in Hg) |
| Vacuum Synchronous Difference | | Below 10 mm Hg (0.3937 in Hg) |
| Fuel Pump: | | |
| Type | | Electrical type |
| Consumption Amperage (Max.) | | 0.7A |
| Out-put Pressure | | 10.8 ~ 15.7 kPa (0.11 ~ 0.16 kg/cm$^2$, 1.16 ~ 2.28 psi) |
| Lubrication System: | | |
| Oil Filter Type: | | Paper type |
| Oil Pump Type: | | Trochoid type |
| Tip clearance | | 0 ~ 0.12 mm (0 ~ 0.0047 in) |
| < Limit > | | 0.17 mm (0.0067 in) |
| Side Clearance | | 0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in) |
| < Limit > | | 0.08 mm (0.0031 in) |
| Bypass Valve Setting Pressure | | 166.72 ~ 235.37 kPa (1.7 ~ 2.4 kg/cm$^2$, 24.174 ~ 34.128 psi) |
| Relief Valve Operating Pressure | | 431.51 ~ 549.19 kPa (4.4 ~ 5.6 kg/cm$^2$, 62.568 ~ 79.632 psi) |

Lubrication Chart:



| Model | | XVZ12L [XVZ12DL] |
|---|---|---|
| Cooling System: | | |
| Radiator Core Size: | Width | 363.8 mm (14.3 in) |
| | Height | 240 mm (9.45 in) |
| | Thickness | 16 mm (0.63 in) |
| Radiator Cap Opening Pressure | | 73.6 ~ 103.0 kPa (0.75 ~ 1.05 kg/cm$^2$, 10.7 ~ 14.9 psi) |
| Reservoir Tank Capacity | | 0.39 L (0.343 Imp qt, 0.412 US qt) |
| < From Low to Full Level > | | 0.25 L (0.22 Imp qt, 0.264 US qt) |
| Water Pump | | |
| Type | | Single-suction centrifugal pump |
| Reduction Ratio | | 31/21 (1.476) |
| Shaft Drive: | | |
| Middle Gear Backlash | | 0.05 ~ 0.12 mm (0.002 ~ 0.005 in) |
| < Limit > | | 0.3 mm (0.0118 in) |
| Final Gear Backlash | | 0.1 ~ 0.2 mm (0.0039 ~ 0.0079 in) |
| < Limit > | | 0.3 mm (0.0118 in) |

## Tightening torque

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Camshaft cap | Bolt | M6 | 32 | 10 | 1.0 | 7.2 | |
| Cylinder head sand hole plug | Screw | M20 | 6 | 43 | 4.3 | 31 | Apply Loctite |
| Spark plug | – | M12 | 4 | 17.5 | 1.75 | 12.5 | |
| Cylinder head | Nut | M10 | 10 | 43 | 4.3 | 31 | |
| Cylinder head cover | Bolt | M6 | 16 | 10 | 1.0 | 7.2 | |
| Connecting rod | Bolt | M8 | 8 | 38 | 3.8 | 27 | Apply molybdenum disulfide grease |
| AC magneto rotor | Bolt | M10 | 1 | 130 | 13.0 | 94 | |
| Cam sprocket | Special | M7 | 8 | 20 | 2.0 | 14 | |
| Plate (damper chain) | Flange bolt | M8 | 1 | 24 | 2.4 | 17 | Apply Loctite |
| Tensioner | Bolt | M6 | 4 | 12 | 1.2 | 8.7 | |
| Tensioner stopper bolt | Bolt | M16 | 2 | 20 | 2.0 | 14 | |
| Water pump cover | Bolt | M6 | 5 | 10 | 1.0 | 7.2 | |
| Water pump housing | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Coolant drain plug | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Thermostatic valve housing | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Thermostatic valve cover | Screw | M6 | 2 | 7 | 0.7 | 5.1 | |
| Electric fan motor | Screw with washer | M5 | 3 | 4 | 0.4 | 2.9 | |
| Radiator assembly | Bolt with washer | M6 | 4 | 7 | 0.7 | 5.1 | |
| Radiator cover | Screw | M5 | 4 | 4 | 0.4 | 2.9 | |
| Chamber cover (oil/water/breather) | Bolt | M6 | 6 | 10 | 1.0 | 7.2 | |
| Oil pump cover | Screw | M6 | 4 | 7 | 0.7 | 5.1 | |
| Oil strainer housing | Screw | M6 | 3 | 7 | 0.7 | 5.1 | |
| Oil pump | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Oil filter cover | Union bolt | M20 | 1 | 32 | 3.2 | 23 | |
| Engine oil drain bolt | Bolt | M14 | 1 | 43 | 4.3 | 31 | |
| Oil pan | Bolt | M6 | 12 | 10 | 1.0 | 7.2 | |
| Oil baffle plate | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Oil delivery pipe (lower) | Union bolt | M10 | 1 | 20 | 2.0 | 14 | |
| Oil delivery pipe (upper) | Union bolt | M8 | 2 | 17.5 | 1.75 | 12.5 | |
| Oil delivery pipe (4) | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Oil pipe | Union bolt | M8 | 1 | 17.5 | 1.75 | 12.5 | |

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m·kg | ft·lb | |
| Carburator | Bolt | M6 | 8 | 12 | 1.2 | 8.7 | |
| Fuel pump | Flange bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Exhaust pipe (#1, #3) & joint | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Exhaust pipe (#2, #4) & chamber clamp | Bolt | M8 | 2 | 25 | 2.5 | 18 | |
| Exhaust pipe flange (#2, #4) | Nut | M8 | 8 | 20 | 2.0 | 14 | |
| Muffler bracket | Flange bolt | M10 | 2 | 25 | 2.5 | 18 | |
| Muffler stay & chamber | Nut | M8 | 2 | 24 | 2.4 | 17 | |
| Muffler stay & lower case | Bolt | M8 | 2 | 20 | 2.0 | 14 | |
| Exhaust joint cover | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Crankcase | Blot | M6 | 10 | 12 | 1.2 | 8.7 | |
| Crankcase | Bolt | M8 | 19 | 24 | 2.4 | 17 | |
| Crankcase | Bolt | M10 | 8 | 40 | 4.0 | 29 | Apply oil to bolt threads |
| Dive axle bearing retainer | Torx screw | M8 | 4 | 25 | 2.5 | 18 | Stake |
| Main axle bearing retainer | Screw | M6 | 3 | 7 | 0.7 | 5.1 | Apply Loctite |
| Crankcase cover (left) | Bolt | M6 | 11 | 10 | 1.0 | 7.2 | |
| Lead clamp | Screw | M6 | 2 | 7 | 0.7 | 5.1 | |
| Crankcase cover (right) | Bolt | M6 | 6 | 10 | 1.0 | 7.2 | |
| Middle gear case cover | Bolt | M6 | 9 | 10 | 1.0 | 7.2 | |
| Middle gear oil drain bolt | Bolt | M8 | 1 | 38 | 3.8 | 27 | |
| Startor one-way clutch | Bolt | M8 | 3 | 24 | 2.4 | 17 | Apply Loctite, stake |
| Clutch boss | Nut | M20 | 1 | 70 | 7.0 | 50 | Use lock washer |
| Clutch release cylinder | Special | M6 | 2 | 12 | 1.2 | 8.7 | |
| Clutch pressure plate | Screw | M6 | 6 | 8 | 0.8 | 5.8 | |
| Middle drive gear | Nut | M44 | 1 | 110 | 11 | 80 | Stake |
| Middle drive shaft | Self-lock nut | M14 | 1 | 90 | 9.0 | 65 | Apply Loctite |
| Middle drive shaft bearing housing | Bolt | M8 | 3 | 30 | 3.0 | 22 | |
| Shift cam segment | Torx screw | M6 | 1 | 12 | 1.2 | 8.7 | Apply Loctite |
| Shift cam plate (neutral) | Screw | M5 | 1 | 4 | 0.4 | 2.9 | Apply Loctite |
| Shift cam bearing stopper | Screw | M6 | 3 | 7 | 0.7 | 5.1 | Apply Loctite |
| Change lever adjustor | Screw | M8 | 1 | 22 | 2.2 | 16 | Use lock washer |
| Shift cam stopper lever | Screw with washer | M6 | 1 | 8 | 0.8 | 5.8 | Apply Loctite |
| Change pedal adjustor lock | Nut | M6 | 4 | 10 | 1.0 | 7.2 | |
| Change pedal/linkage pinch bolt | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Thermostatic switch | – | – | 1 | 15 | 1.5 | 11 | Apply Yamabond #4 |
| Thermo-unit | – | – | 1 | 15 | 1.5 | 11 | Apply Yamabond #4 |
| Neutral switch | Screw | M5 | 3 | 4 | 0.4 | 2.9 | |
| Starter motor | Flange bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Oil level switch | Bolt with washer | M6 | 2 | 10 | 1.0 | 7.2 | |

## CHASSIS

| Model | | XVZ12L [XVZ12DL] |
|---|---|---|
| Steering System: | | |
| Steering Bearing Type | | Taper roller bearing |
| Front Suspension: | | |
| Front Fork Travel | | 140 mm (5.51 in) |
| Fork Spring Free Length | | 461.5 mm (18.2 in) |
| < Limit > | | 456.5 mm (18.0 in) |
| Collar Length | | 97 mm (3.82 in) |
| Spring Rate | K1 | 4.12 N/mm (0.42 kg/mm, 23.5 lb/in) |
| | K2 | 7.85 N/mm (0.8 kg/mm, 44.8 lb/in) |
| Stroke | K1 | 0 ~110 mm (0 ~4.33 in) |
| | K2 | 110 ~140 mm (4.33 ~5.51 in) |
| Optional Spring | | No. |
| Oil Capacity | | 375 $cm^3$ (13.2 Imp oz, 12.7 US oz) |
| Oil Level | | 193.5 mm (7.62 in) |
| Oil Grade | | SAE 10W30 SE Motor Oil |
| Enclosed Air Pressure (Std.) | | 78.5 kPa (0.8 $kg/cm^2$, 11.4 psi) |
| < Min. ~ Max. > | | 0 ~ 147 kPa (0 ~ 1.5 $kg/cm^2$, 0 ~ 21 psi) |
| Rear Suspension: | | |
| Shock Absorber Travel | | 40 mm (1.57 in) |
| Spring Free Length | | 214.5 mm (8.44 in) |
| < Limit > | | 209.5 mm (8.25 in) |
| Fitting Length | | 181.5 mm (7.15 in) |
| Spring Rate | K1 | 84.3 N/mm (8.6 kg/mm, 481 lb/in) |
| Stroke | K1 | 40 mm (1.57 in) |
| Optional Spring | | No. |
| Enclosed Gas/Air Pressure (Std.) | | 98.1 kPa (1 $kg/cm^2$, 14 psi) |
| < Min. ~ Max. > | | 0 ~ 490 kPa (0 ~ 5.0 $kg/cm^2$, 0 ~ 71.1 psi) |
| Rear Arm: | | |
| Swingarm Free Play Limit | End | 0 mm (0 in) |
| Swingarm Free Play Limit | Side | 0 mm (0 in) |
| Front Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT2.50 x 18 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.0394 in) |
| | Lateral | 0.5 mm (0.0197 in) |
| Rear Wheel: | | |
| Type | | Cast wheel |
| Rim Size | | MT3.00 x 16 |
| Rim Material | | Aluminum |
| Rim Runout Limit | Vertical | 1 mm (0.04 in) |
| | Lateral | 0.5 mm (0.02 in) |
| Front Disc Brake: | | |
| Type | | Dual |
| Disc Outside Dia. x Thickness | | 298.0 x 8.5 mm (11.732 x 0.3346 in) |
| Pad Thickness | Inner | 5.5 mm (0.217 in) |
| < Limit > | | 0.5 mm (0.0197 in) |
| Pad Thickness | Outer | 5.5 mm (0.217 in) |
| < Limit > | | 0.5 mm (0.0197 in) |

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Master Cylinder Inside Dia. | 12.7 mm (0.5 in) |
| Caliper Cylinder Inside Dia. | 38.1 mm (1.5 in) |
| Brake Fluid Type | DOT #3 |
| Rear Disc Brake: | |
| Type | Single |
| Disc Outside Dia. x Thickness | 298.0 x 8.5 mm (11.732 x 0.3346 in) |
| Pad Thickness Inner | 5.5 mm (0.217 in) |
| < Limit > | 0.5 mm (0.0197 in) |
| Pad Thickness Outer | 5.5 mm (0.217 in) |
| < Limit > | 0.5 mm (0.0197 in) |
| Master Cylinder Inside Dia. | 15.87 mm (0.625 in) |
| < Limit > | 0 mm (0 in) |
| Caliper Cylinder Inside Dia. | 42.8 mm (1.69 in) |
| < Limit > | 0 mm (0 in) |
| Brake Fluid Type | DOT #3 |
| Brake Lever and Brake Pedal: | |
| Brake Lever Free Play | 2 ~ 5 mm (0.08 ~ 0.20 in) |
| Brake Pedal Position | 10 mm (0.4 in) |
| Brake Pedal Free Play | 13 ~ 15 mm (0.5 ~ 0.6 in) |

**Recommended combinations of the front fork and the rear shock absorber.**

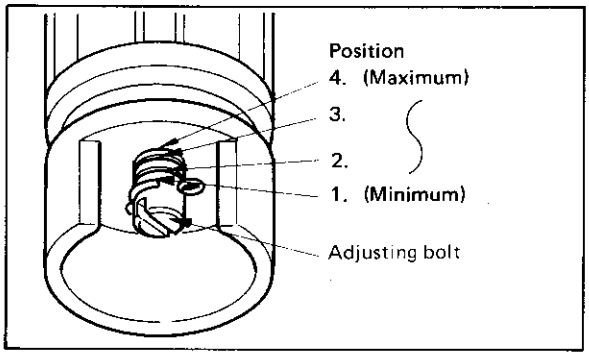
Use this table as guidance to meet specific riding conditions and motorcycle load.

| Front fork | Rear shock absorber | | Loading condition | | | |
|---|---|---|---|---|---|---|
| Air pressure | Air pressure | Damping adjuster | Solo rider | With passenger | With accessory equipments | With accessory equipments and passenger |
| 78.5 kPa (0.8 kg/cm$^2$, 12 psi) | 98.1 kPa (1.0 kg/cm$^2$, 14 psi) | 1 or 2 | ○ | | | |
| 78.5 ~ 98.1 kPa (0.8 ~ 1.0 kg/cm$^2$, 12 ~ 14 psi) | 196 ~ 294 kPa (2.0 ~ 3.0 kg/cm$^2$, 28 ~ 42 psi) | 2 or 3 | | ○ | ○ | |
| 78.5 ~ 118 kPa (0.8 ~ 1.2 kg/cm$^2$, 12 ~ 18 psi) | 294 ~ 490 kPa (3.0 ~ 5.0 kg/cm$^2$, 42 ~ 72 psi) | 3 or 4 | | | | ○ |

**Recommended adjustment of the front fork anti-dive.**

Use this table as guidance to meet specific riding conditions and motorcycle load.

| Adjusting bolt position | Loading condition | | |
|---|---|---|---|
| | Solo rider | With accessory equipments or passenger | With accessory equipments and passenger |
| 1 | ○ | | |
| 2 | ○ | ○ | |
| 3 | | ○ | ○ |
| 4 | | | ○ |

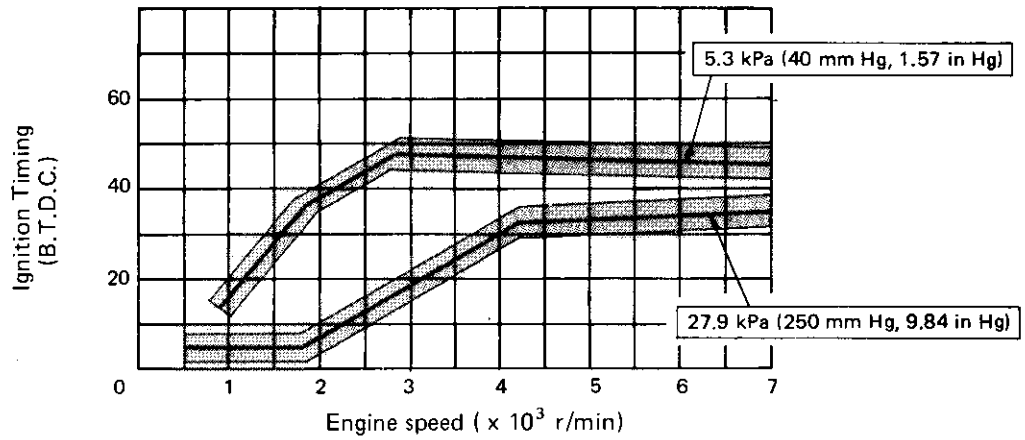


## Tightening torque

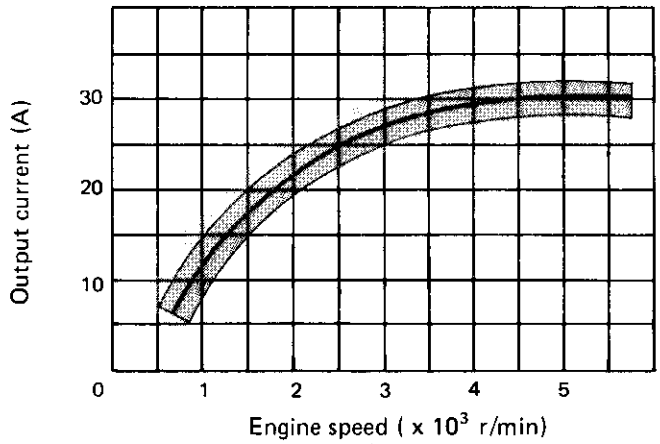
| Part to be tightened | Thread size | Tightening torque | | | Remarks |
|---|---|---|---|---|---|
| | | Nm | m•kg | ft•lb | |
| Front axle nut | M14 x 1.25 | 100 | 10 | 72 | |
| Front axle pinch bolt | M8 x 1.25 | 20 | 2.0 | 14.0 | |
| Under bracket & inner tube | M8 x 1.25 | 17 | 1.7 | 12 | |
| Steering crown & inner tube | M8 x 1.25 | 20 | 2.0 | 14 | |
| Steering stem | M22 x 1.0 | 110 | 11 | 80 | |
| Steering stem nut | M25 x 1.0 | 110 | 11 | 80 | |
| Steering shaft ring nut (Lower) | M25 x 1.0 | 4.5 | 0.45 | 3.3 | |
| Caliper & front fork | M10 x 1.25 | 45 | 4.5 | 32 | Front |
| Caliper & bracket | M10 x 1.25 | 45 | 4.5 | 32 | Rear |
| Caliper & bleed screw | M8 x 1.25 | 6 | 0.6 | 4.3 | |
| Brake hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Clutch hose union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Brake hose & brake pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Clutch hose & clutch pipe | M10 x 1.0 | 19 | 1.9 | 13 | |
| Front master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Front master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Clutch master cylinder bracket | M8 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder union bolt | M10 x 1.25 | 26 | 2.6 | 19 | |
| Rear master cylinder & frame | M8 x 1.25 | 23 | 2.3 | 17 | |
| Pivot shaft (Left) & frame | M25 x 1.5 | 100 | 10 | 72 | |
| Pivot shaft (Right) & frame | M25 x 1.5 | 6 | 0.6 | 4.3 | |
| Pivot shaft (Right) & locknut | M25 x 1.5 | 100 | 10 | 72 | |
| Front fender & front fork | M8 x 1.25 | 20 | 2.0 | 14 | |
| Handlebar stopper nut | M10 x 1.0 | 35 | 3.5 | 25 | |
| Handlebar pinch bolt | M6 x 1.0 | 17 | 1.7 | 12 | |
| Handle securing nut | M22 x 1.0 | 125 | 12.5 | 90 | |
| Handle pinch bolt | M8 x 1.25 | 30 | 3.0 | 22 | |
| Engine bracket (Front upper) | M10 x 1.25 | 40 | 4.0 | 29 | |
| Engine bracket (Front lower) | M10 x 1.25 | 40 | 4.0 | 29 | |
| Engine bracket (Rear) | M12 x 1.25 | 70 | 7.0 | 50 | |
| Front cross frame tube | M8 x 1.25 | 23 | 2.3 | 17 | |
| Left side frame tube | M8 x 1.25 | 15 | 1.5 | 11 | |
| Stopper bolt & swingarm | M14 x 1.5 | 92 | 9.2 | 66 | |
| Rear axle | M18 x 1.5 | 150 | 15 | 110 | |
| Rear master cylinder cap | M4 x 0.7 | 1 | 0.1 | 0.7 | |
| Fuel sendor | M6 x 1.0 | 5 | 0.5 | 3.6 | |
| Relay arm & frame | M12 x 1.25 | 60 | 6.0 | 43 | |
| Relay arm & rear shock absorber | M10 x 1.25 | 60 | 6.0 | 43 | |
| Arm 1 & swingarm | M10 x 1.25 | 30 | 3.0 | 22 | |
| Shock absorber & frame | M10 x 1.25 | 30 | 3.0 | 22 | |
| Footrest & bracket | M10 x 1.25 | 32 | 3.2 | 23 | |
| Frame & rear frame (Seat rail side) | M10 x 1.25 | 55 | 5.5 | 40 | Upper |
| Frame & rear frame (Back stay side) | M10 x 1.25 | 55 | 5.5 | 40 | Lower |
| Frame & cross bar assembly | M8 x 1.25 | 23 | 2.3 | 17 | |

## ELECTRICAL

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Voltage: | 12V |
| Ignition System: | |
| Ignition Timing (B.T.D.C.) | 5° at 1,000 r/min |
| Advancer Type | Electrical, vacuum |




| | |
|---|---|
| T.C.I.: | |
| Pickup Coil Resistance (Color) | 110Ω ± 15% at 20°C (68°F)<br>(Orange – Black), (Orange – Gray)<br>(Orange – White/Green), (Orange – White/Red) |
| T.C.I. Unit-Model/Manufacturer | T1D14-17/HITACHI |
| Ignition Coil: | |
| Model/Manufacturer | CM11-61/HITACHI |
| Primary Winding Resistance | 2.7Ω ± 10% at 20°C (68°F) |
| Secondary Winding Resistance | 13.2 kΩ ± 20% at 20°C (68°F) |
| Charging System/Type: | A.C. magneto generator |
| A.C. Generator: | |
| Model/Manufacturer | F-X736/HITACHI |
| Nominal Output | 14.5V, 30A at 5,000 r/min |



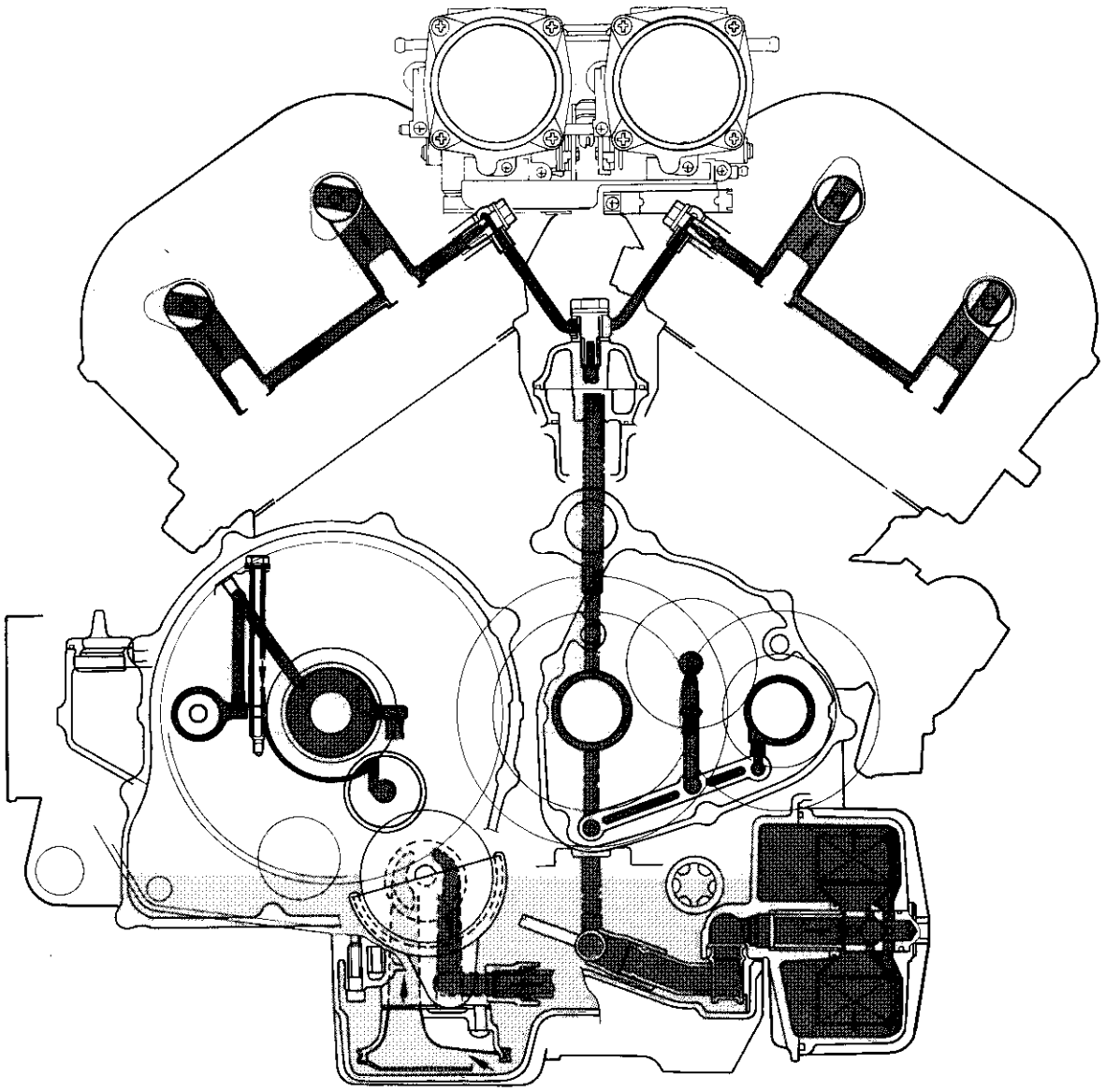

| | |
|---|---|
| Startor Coil Resistance (Color) | 0.42Ω ± 15% at 20°C (68°F)<br>(White – White) |

| Model | XVZ12L [XVZ12DL] |
|---|---|
| Voltage Regulator: | |
| Type | Short control |
| Model/Manufacture | SH545-12/SHINDENGEN |
| No Load Regulated Voltage | 14 ~ 15V |
| Rectifier: | |
| Model/Manufacturer | SH545-12/SHINDENGEN |
| Capacity | 26A |
| Withstand Voltage | 200V |
| Battery: | |
| Capacity | 12V, 20 AH |
| Specific Gravity | 1.280 |
| Electric Starter System: | |
| Type | Constant mesh type |
| Starter Motor: | |
| Model/Manufacturer | SM-229C/MITSUBA |
| ID. Number | SM-229C |
| Out put | 0.6 kW |
| Brush-Overall Length | 12.5 mm (0.492 in) |
| < Limit > | 4.5 mm (0.177 in) |
| Spring Pressure | 560 ~ 680 g (19.751 ~ 23.984 oz) |
| Commutator Dia. | 28 mm (1.1 in) |
| < Wear Limit > | 27 mm (1.06 in) |
| Mica Undercut | 0.5 mm (0.0197 in) |
| Starter Switch | |
| Model/Manufacturer | 126-22011-D000/HONDALOCK |
| Amperage Rating | 150A |
| Coil Winding Resistance | 3.5Ω ± 10% at 20°C (68°F) |
| Horn: | |
| Type/Quantity | Plain type x 2 |
| Model/Manufacturer | CF3-12/NIKKO |
| Maximum Amperage | 3.0A |
| Flasher Relay: | |
| Type | Semi transistor type |
| Model/Manufacturer | FX257N/NIPPONDENSO |
| Self Cancelling Device | Yes. |
| Flasher Frequency | 75 ~ 95 cycle/min |
| Wattage | 27W x 2 + 3.4W |
| Hazard Flasher Relay: | |
| Type | Heat plate type |
| Model/Manufacturer | FX257N/NIPPONDENSO |
| Flasher Frequency | 68 ~ 92 cycle/min |
| Wattage | 27W x 4 + 3.4W |
| Self Cancelling Unit: | |
| Model/Manufacturer | FX257N/NIPPONDENSO |
| Reserve Lighting Unit: | |
| Model/Manufacturer | 337-81901/KOITO |
| Oil Level Switch: | |
| Model/Manufacturer | 10L/NIPPONDENSO |
| Fuel gauge: | |
| Model/Manufacturer | 26H/NIPPONSEIKI |
| Sender Unit Resistance | |
| Full | 40.3Ω ± 10% at 20°C (68°F) |
| Empty | 310Ω or more ± 12% at 20°C (68°F) |

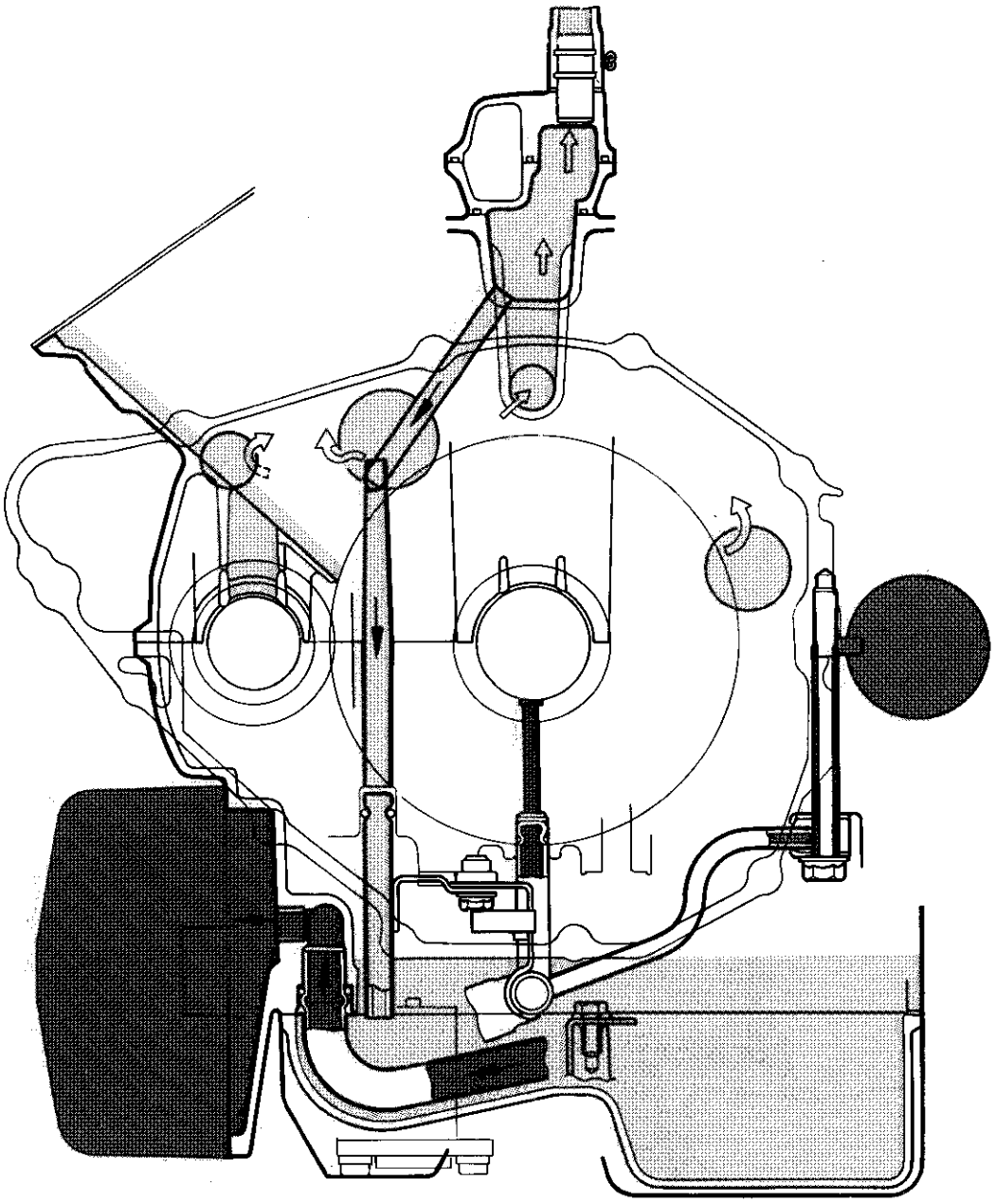
| Model | XVZ12L [XVZ12DL] |
|---|---|
| Starting Circuit Cut off Relay: | |
| Model/Manufacturer | FX257N/NIPPONDENSO |
| Coil Winding Resistance | 225Ω ± 10% at 20°C (68°F) |
| Diode | No. |
| Side Stand Relay: | |
| Model/Manufacturer | G2MW-1121T-010-Y4/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Diode | No. |
| Fuel Pump Control Unit: | |
| Model/Manufacturer | G8D-02Y/TATEISHI |
| Electric Fan: | |
| Model/Manufacturer | 26H/NIPPONDENSO |
| Fan Motor Relay: | |
| Model/Manufacturer | G2MW-1121T-100-Y7/TATEISHI |
| Coil Winding Resistance | 100Ω ± 10% at 20°C (68°F) |
| Thermostatic Switch: | |
| Model/Manufacturer | 11H/NIPPONDENSO |
| Thermo-Unit: | |
| Model/Manufacturer | 11M/NIPPONSEIKI |
| Circuit Breaker: | |
| Type | Fuse |
| Amperage for Individual Circuit/Quantity | |
| Main | 40A x 1 |
| Headlight | 15A x 1 |
| Signal | 15A x 1 |
| Ignition | 15A x 1 |
| Taillight | 10A x 1 |
| Accessories | 10A x 1 |
| Reserve | 15A x 1 |
| | 10A x 1 |
| | 5A x 1 |

## LUBRICATION DIAGRAMS

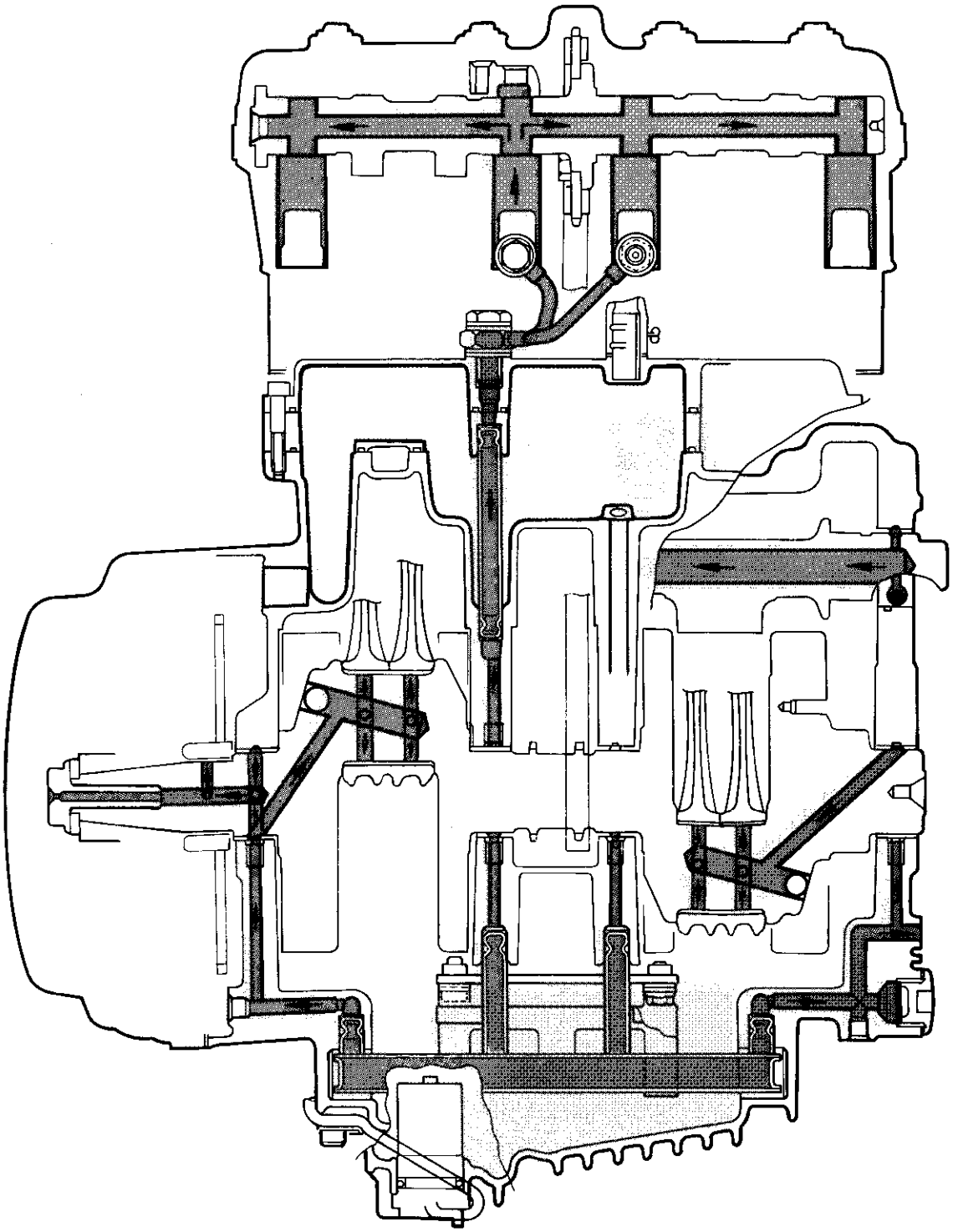
### LUBRICATION DIAGRAM (1)



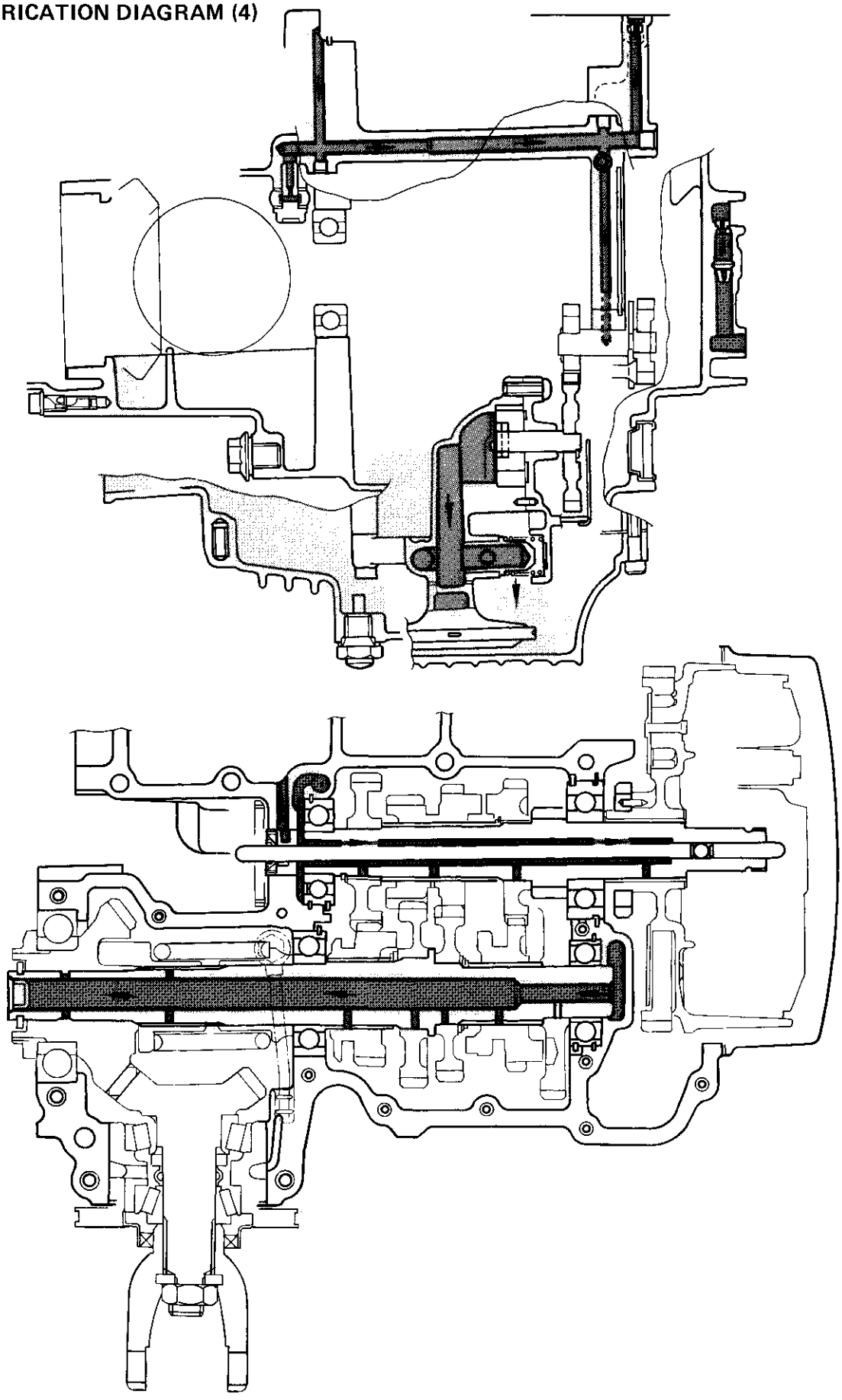
## LUBRICATION DIAGRAM (2)



## LUBRICATION DIAGRAM (3)

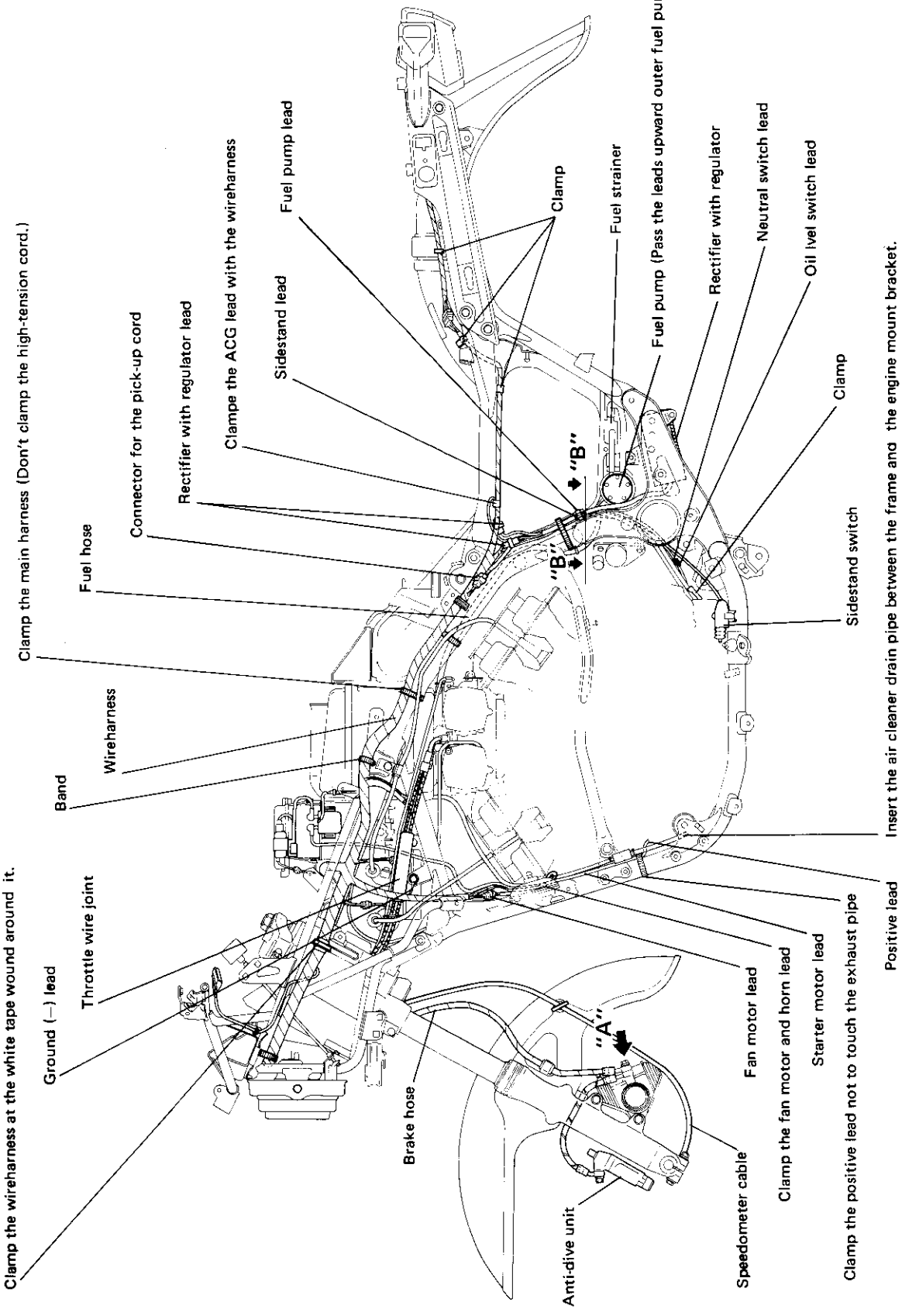


## LUBRICATION DIAGRAM (4)

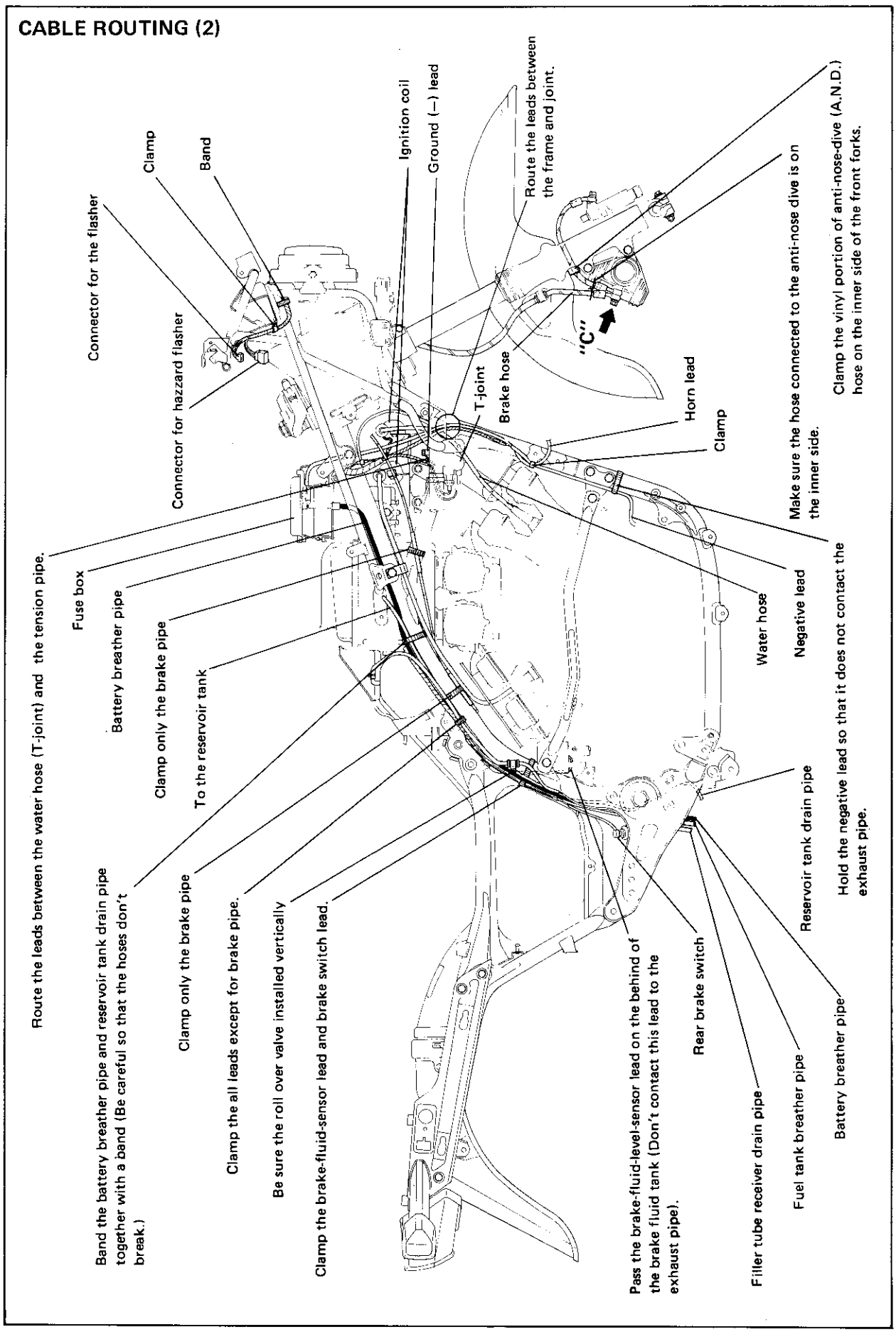


# CABLE ROUTING FOR XVZ12L

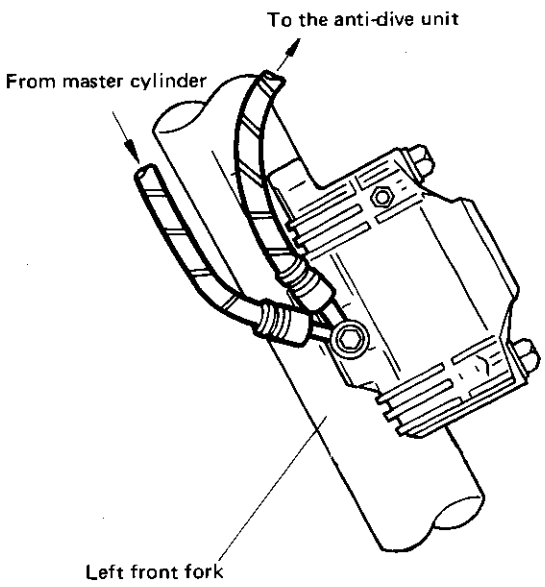
## CABLE ROUTING (1)



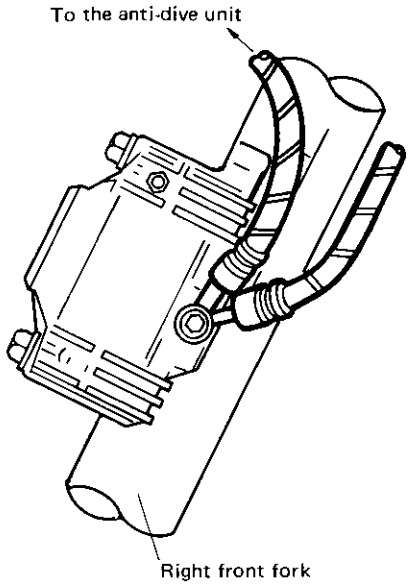
## CABLE ROUTING (2)



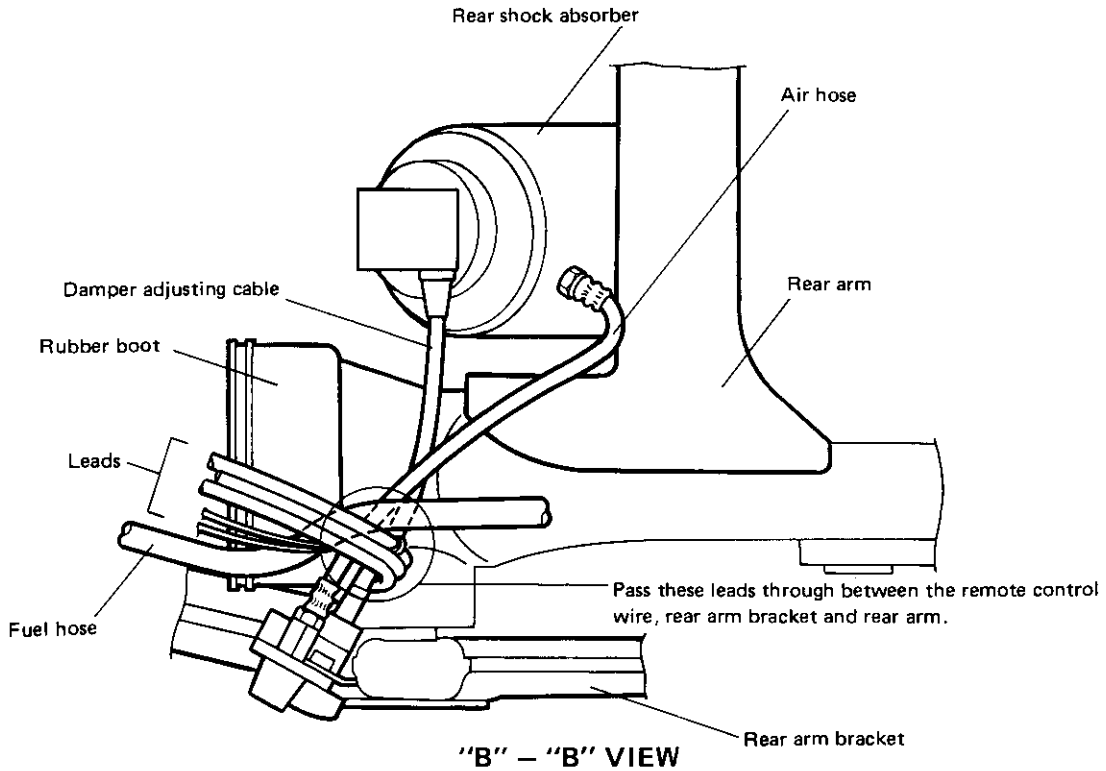
## CABLE ROUTING (3)




"A" VIEW

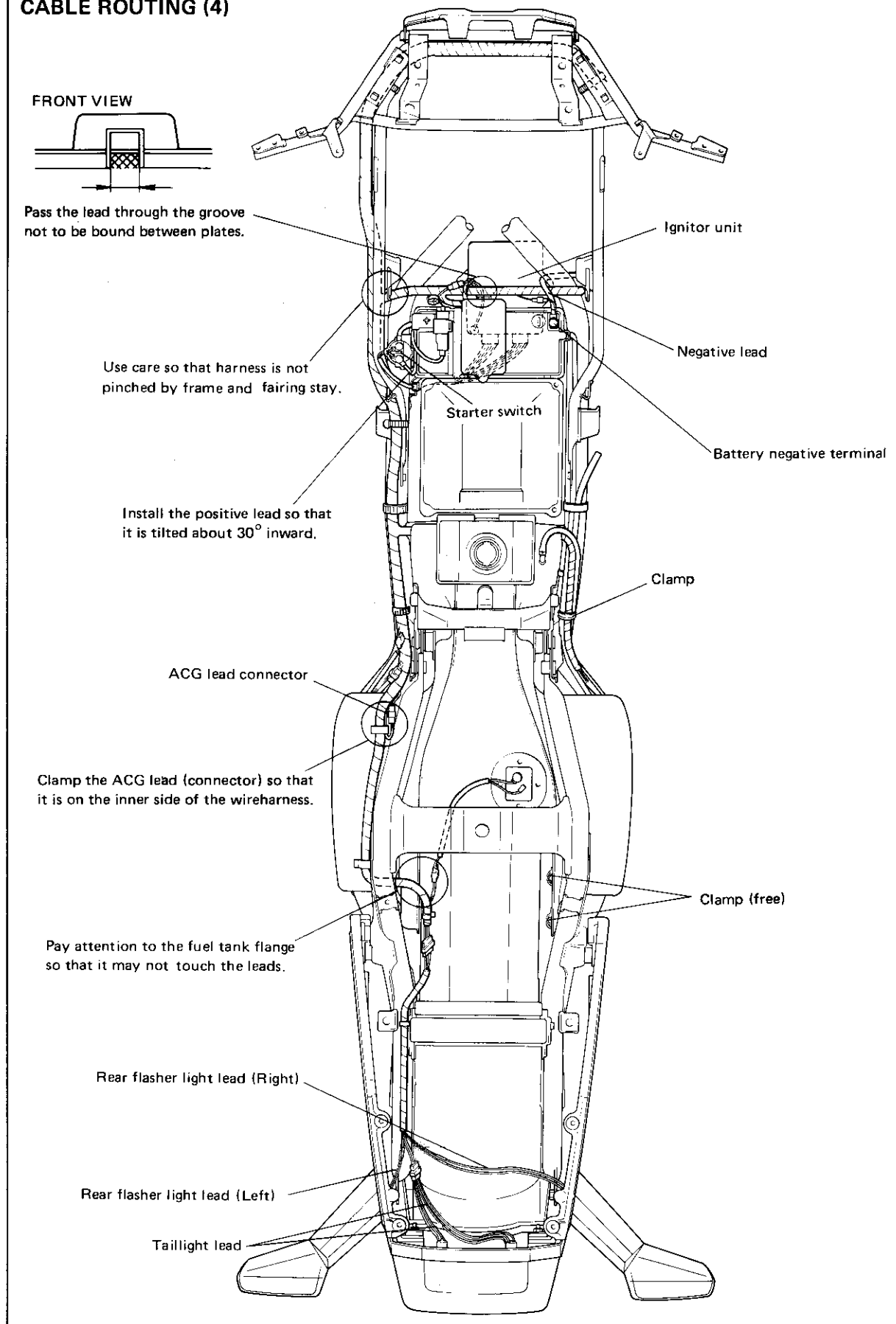



"C" VIEW

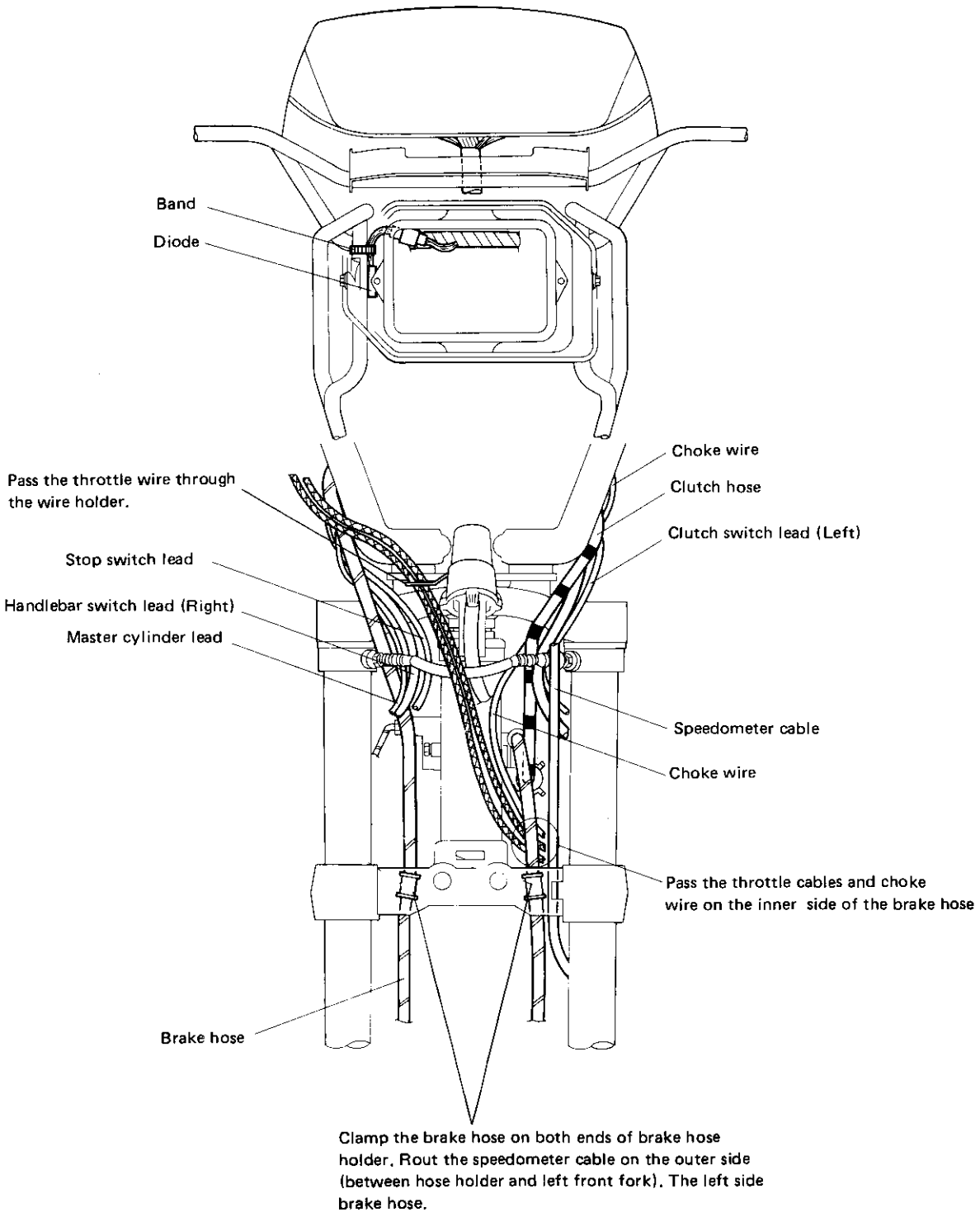



"B" – "B" VIEW
(CABLE ROUTING (1))

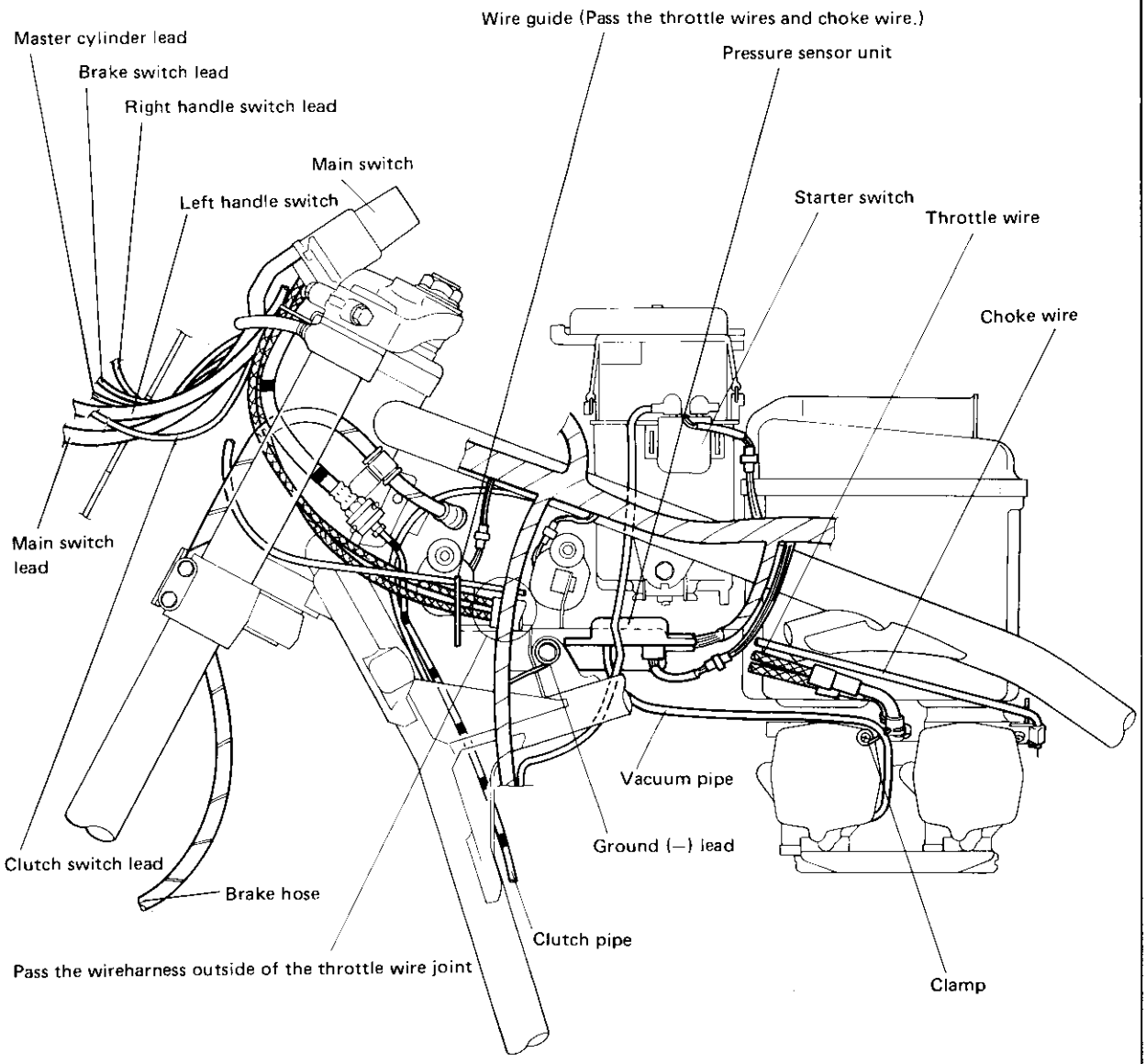
## CABLE ROUTING (4)



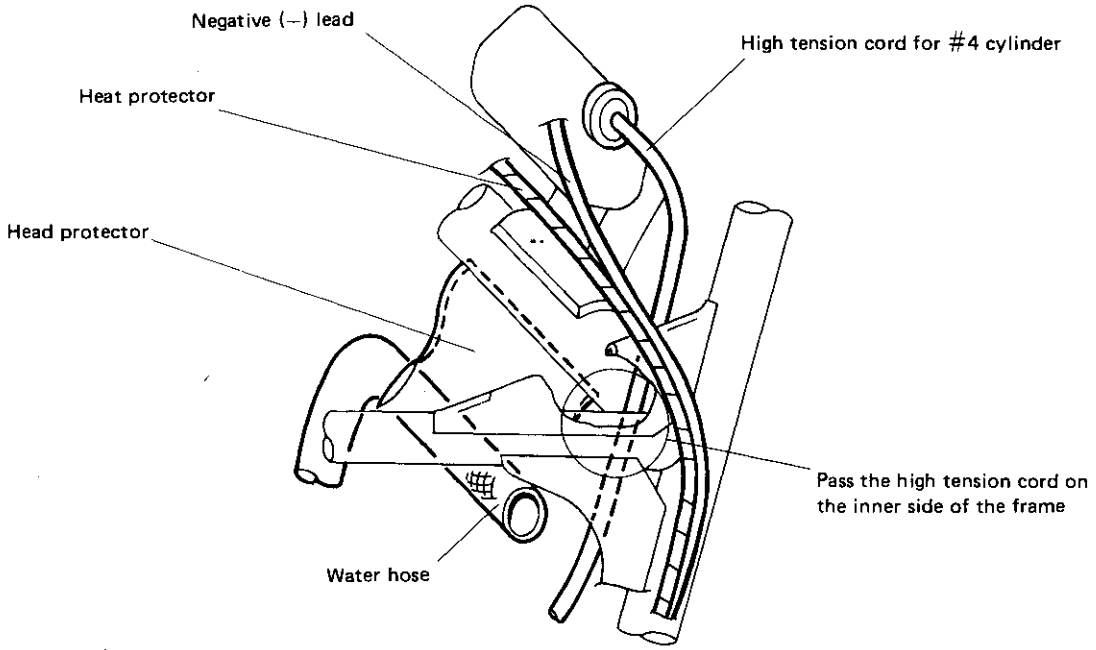
## CABLE ROUTING (5)



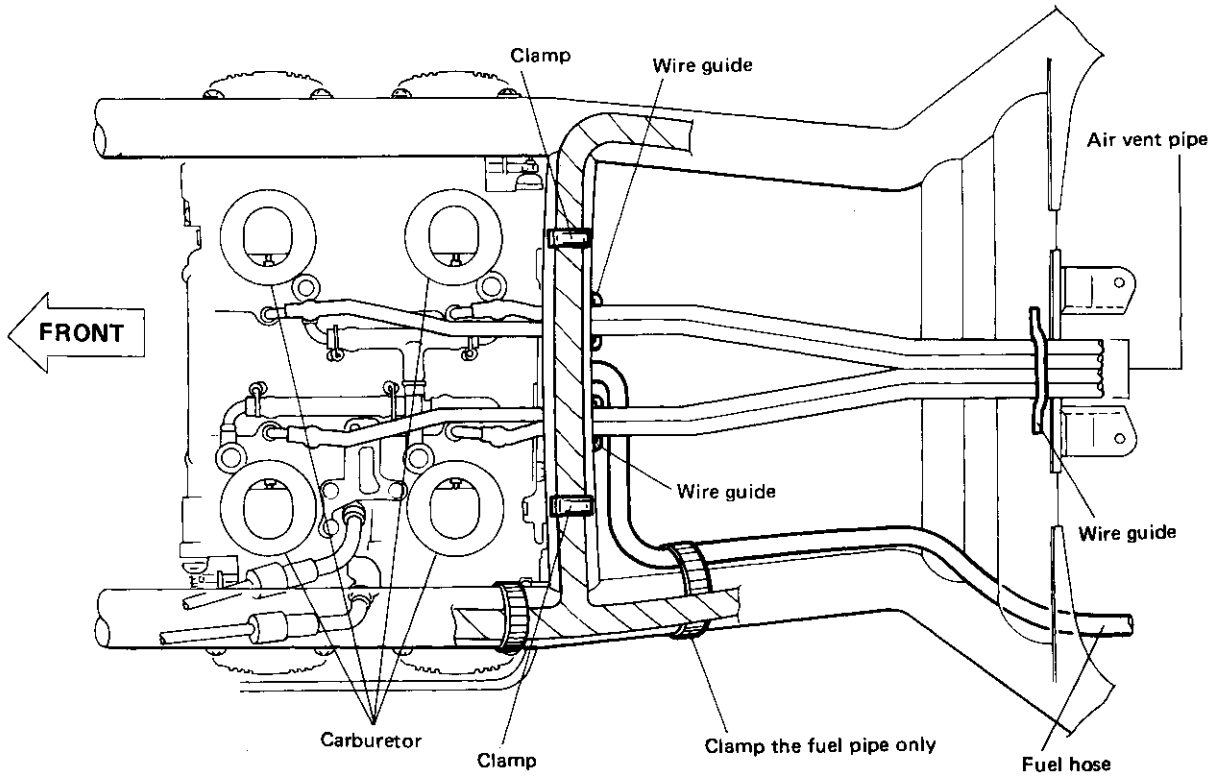
## CABLE ROUTING (6)



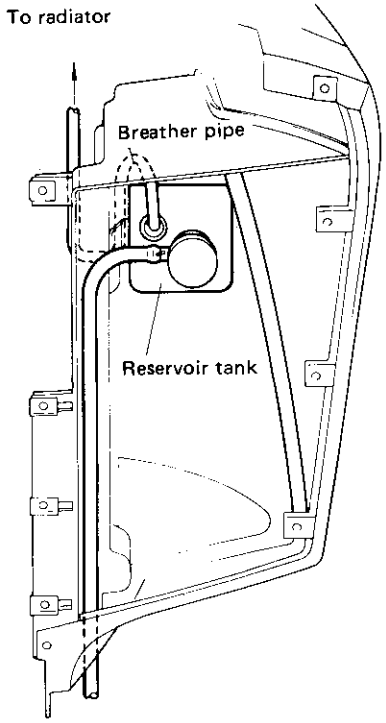
## CABLE ROUTING (7)



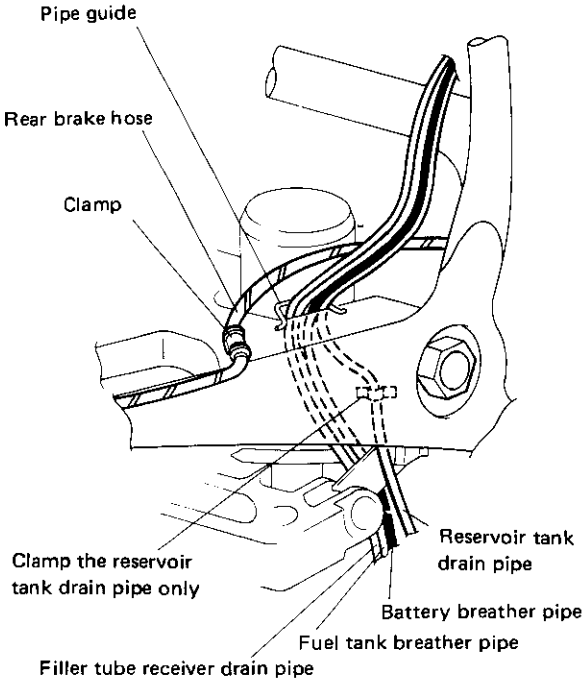

**HIGHTENSION CORD ROUTING FOR FRONT RIGHT SIDE**



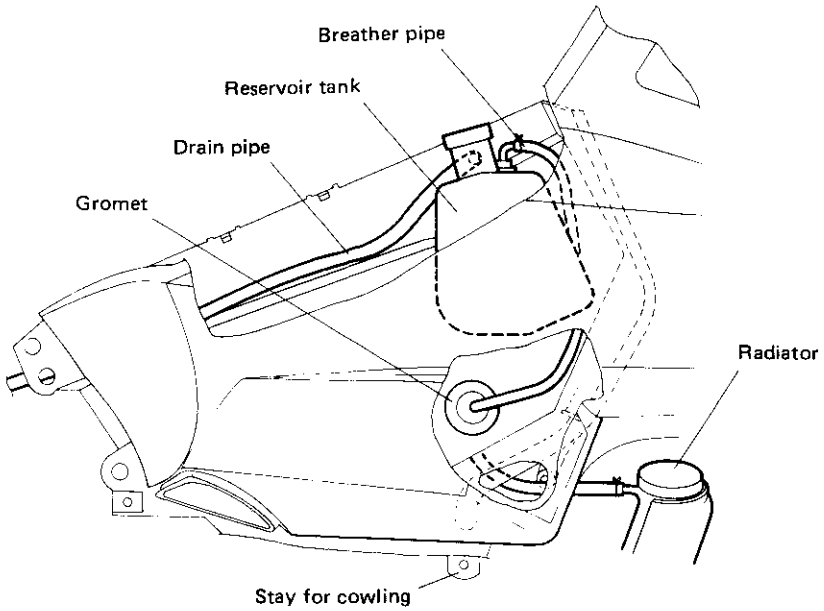
## CABLE ROUTING (8)




FRONT RIGHT SIDE TOP VIEW

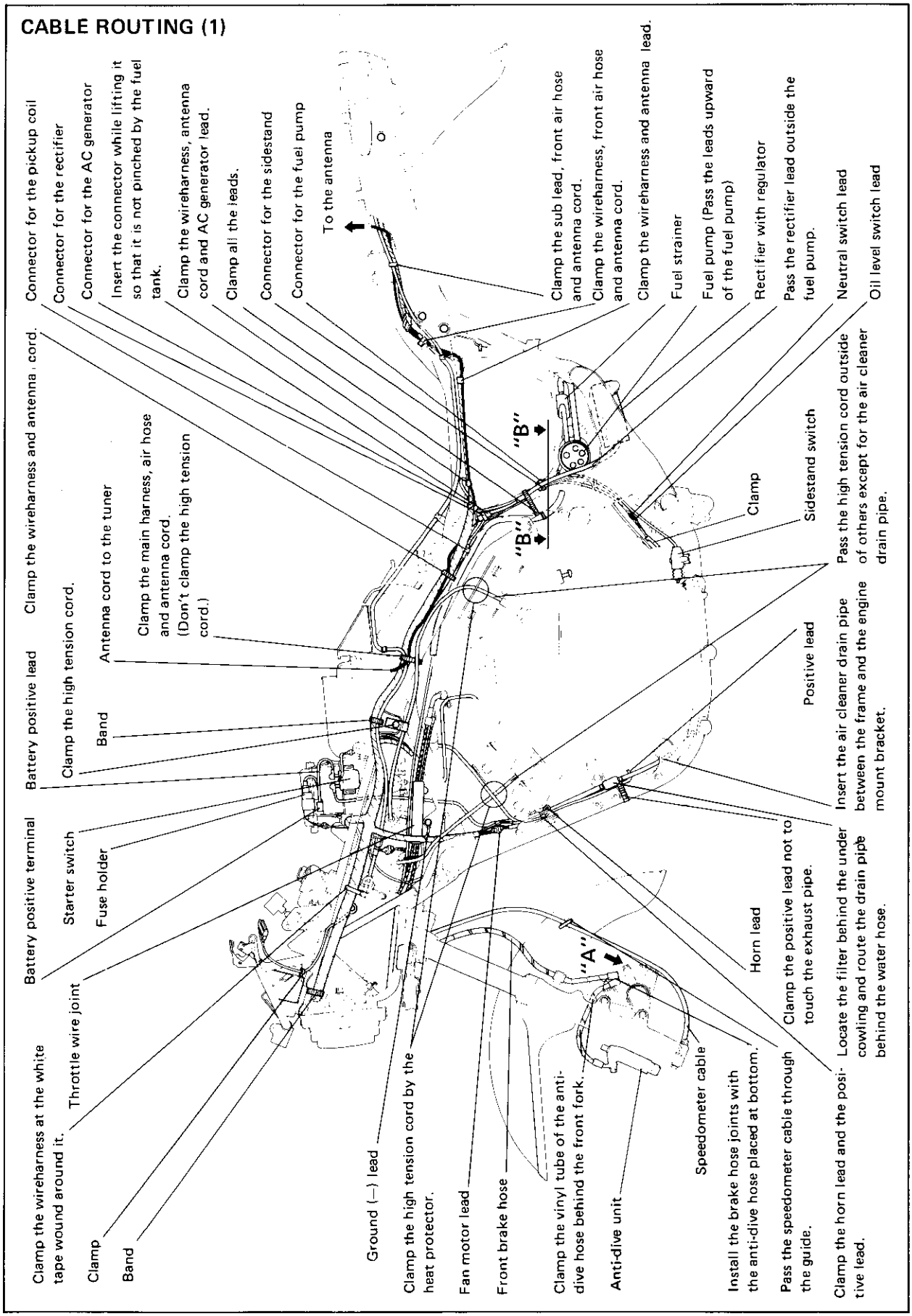



PIPE ROUTING

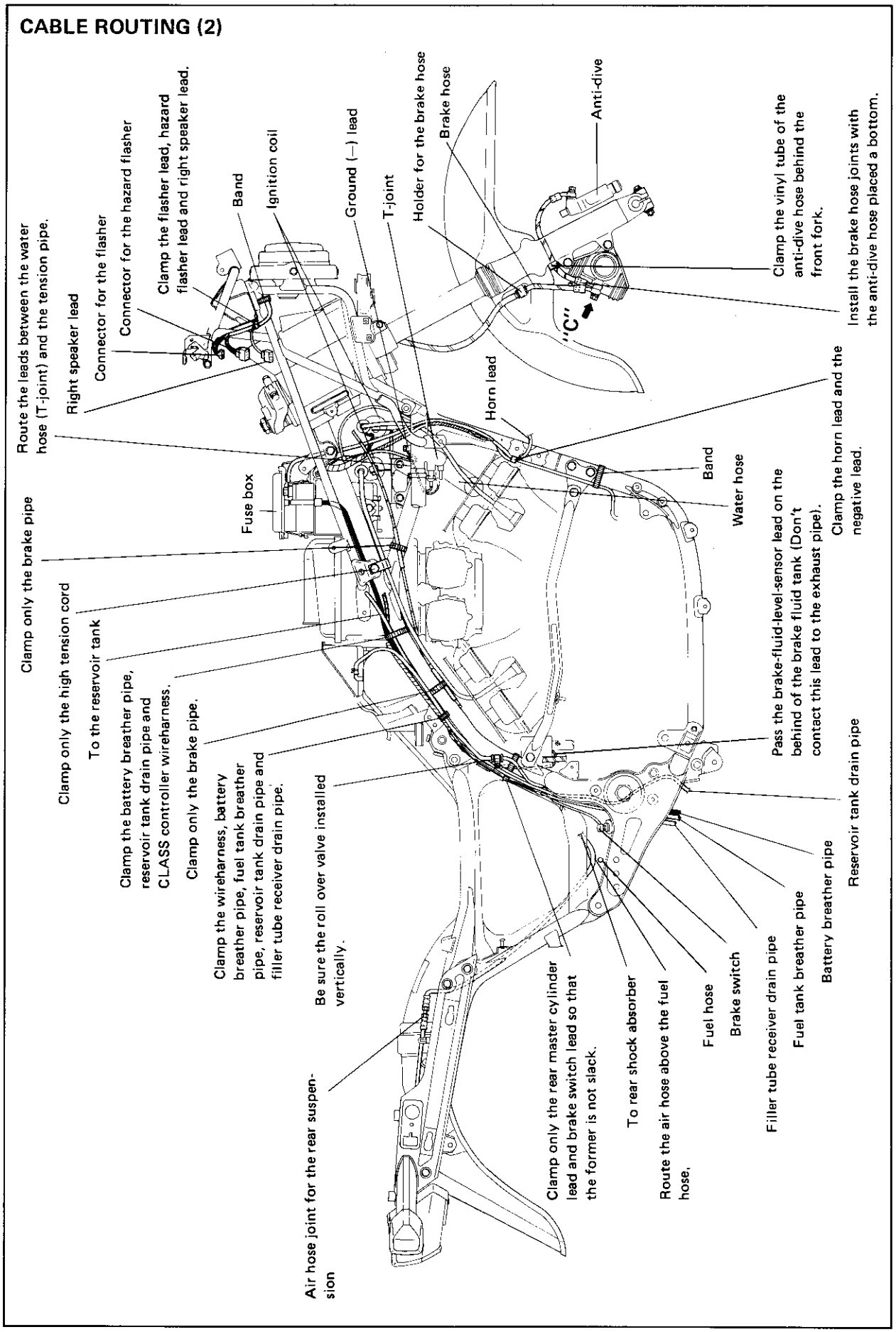



RESERVOIR TANK DRAIN PIPE AND BREATHER PIPE ROUTING

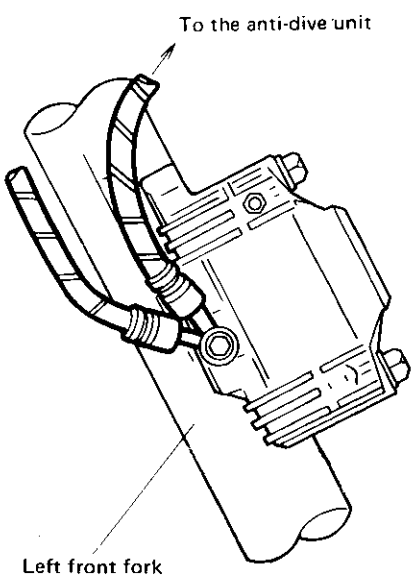
# CABLE ROUTING FOR XVZ12DL



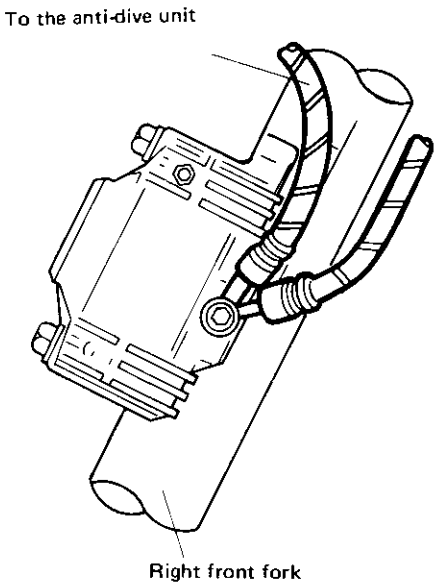
## CABLE ROUTING (2)



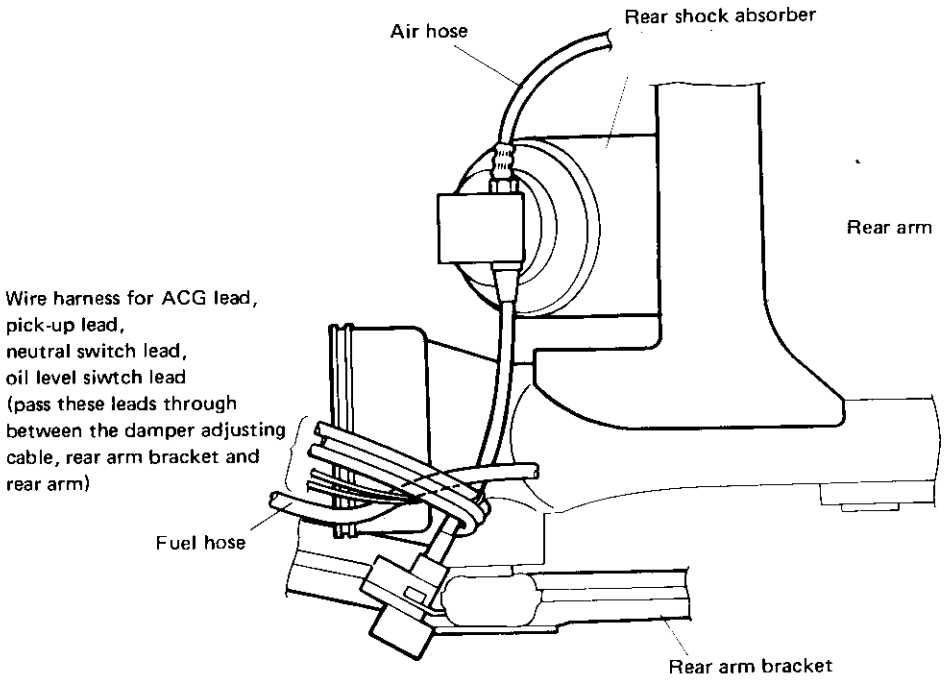
## CABLE ROUTING (3)




"A" VIEW (CABLE ROUTING (1))

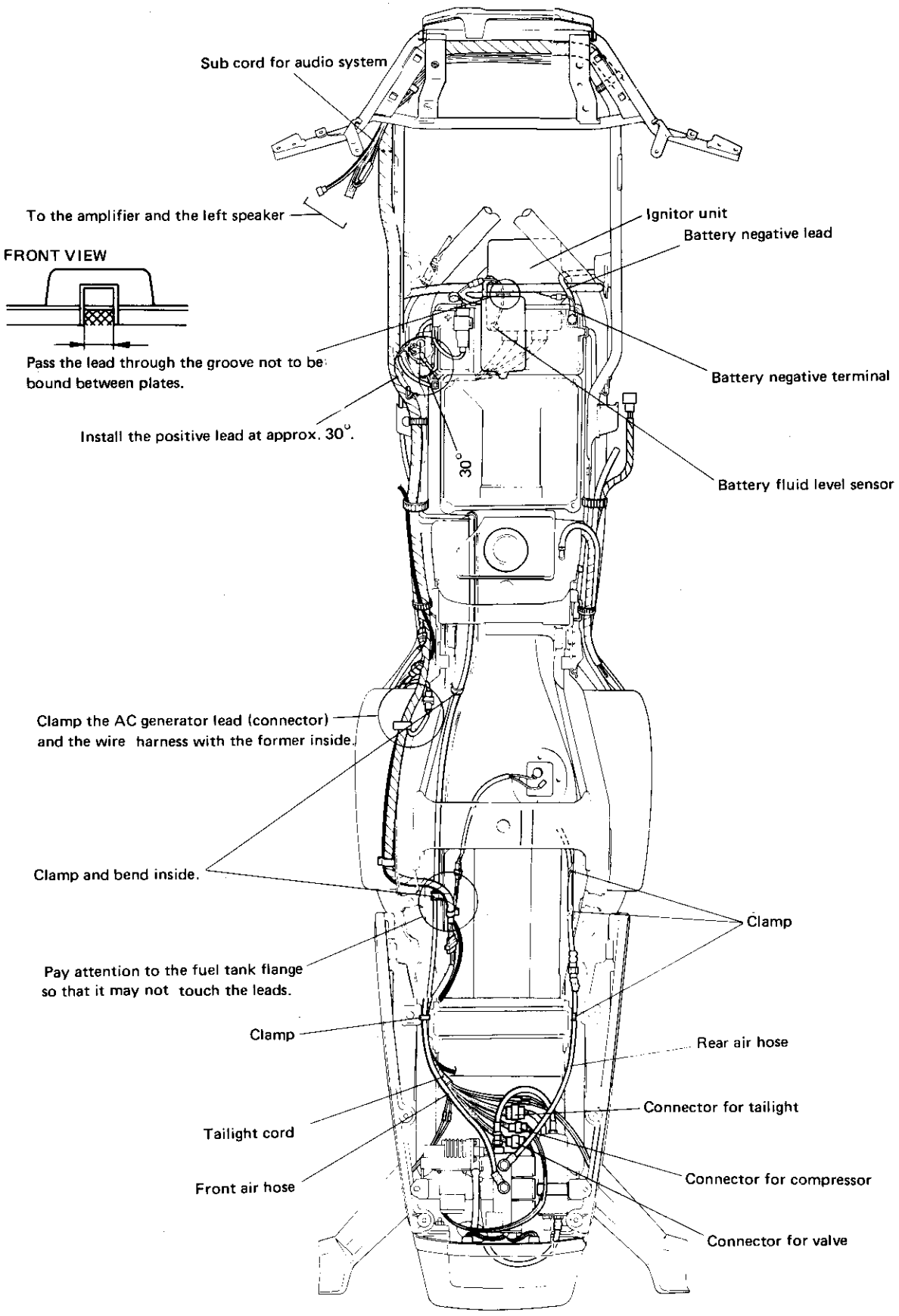



"C" VIEW (CABLE ROUTING (2))

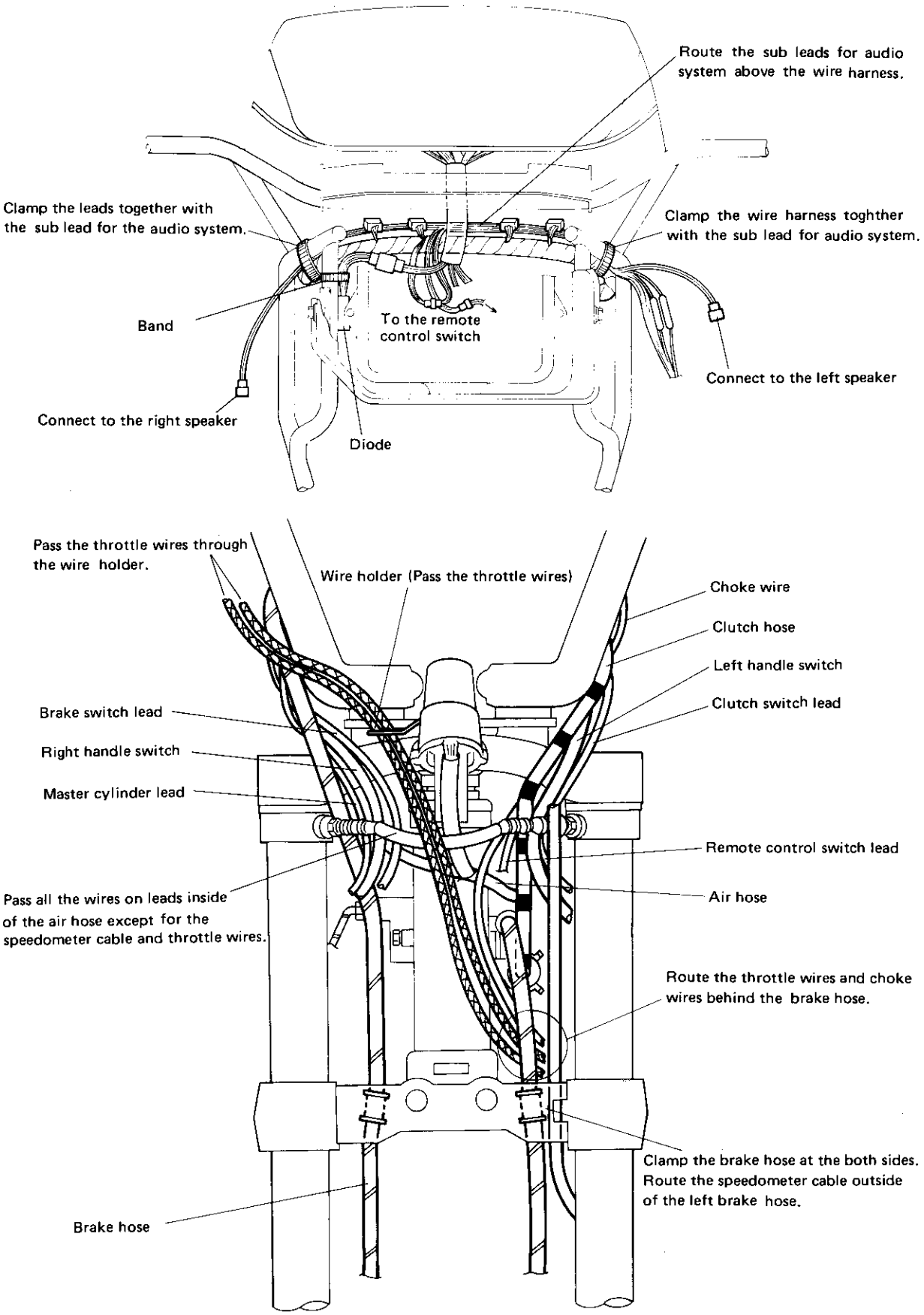



"B" – "B" VIEW (CABLE ROUTING (1))

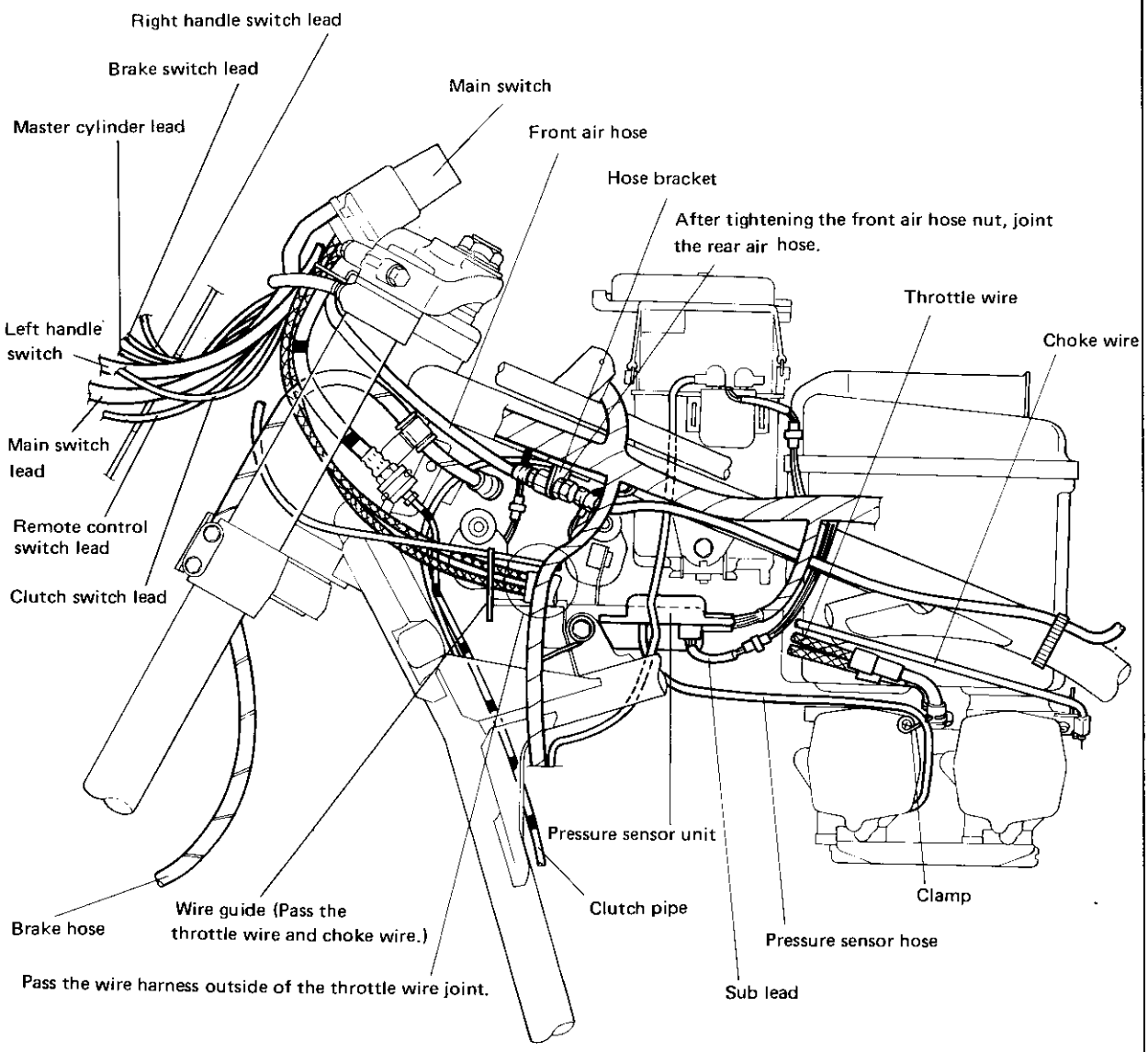
## CABLE ROUTING (4)



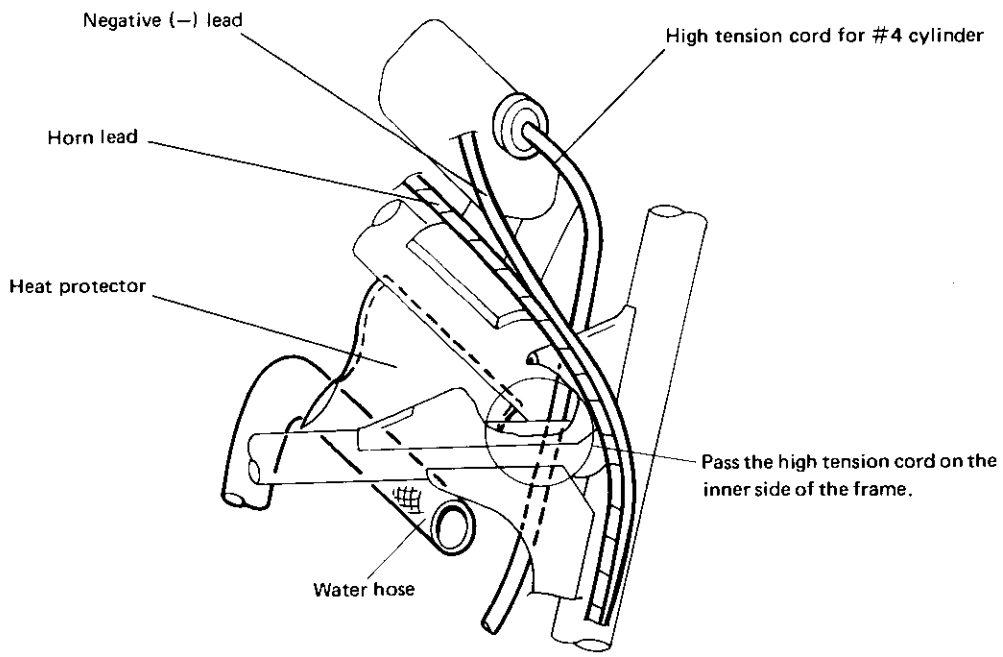
## CABLE ROUTING (5)



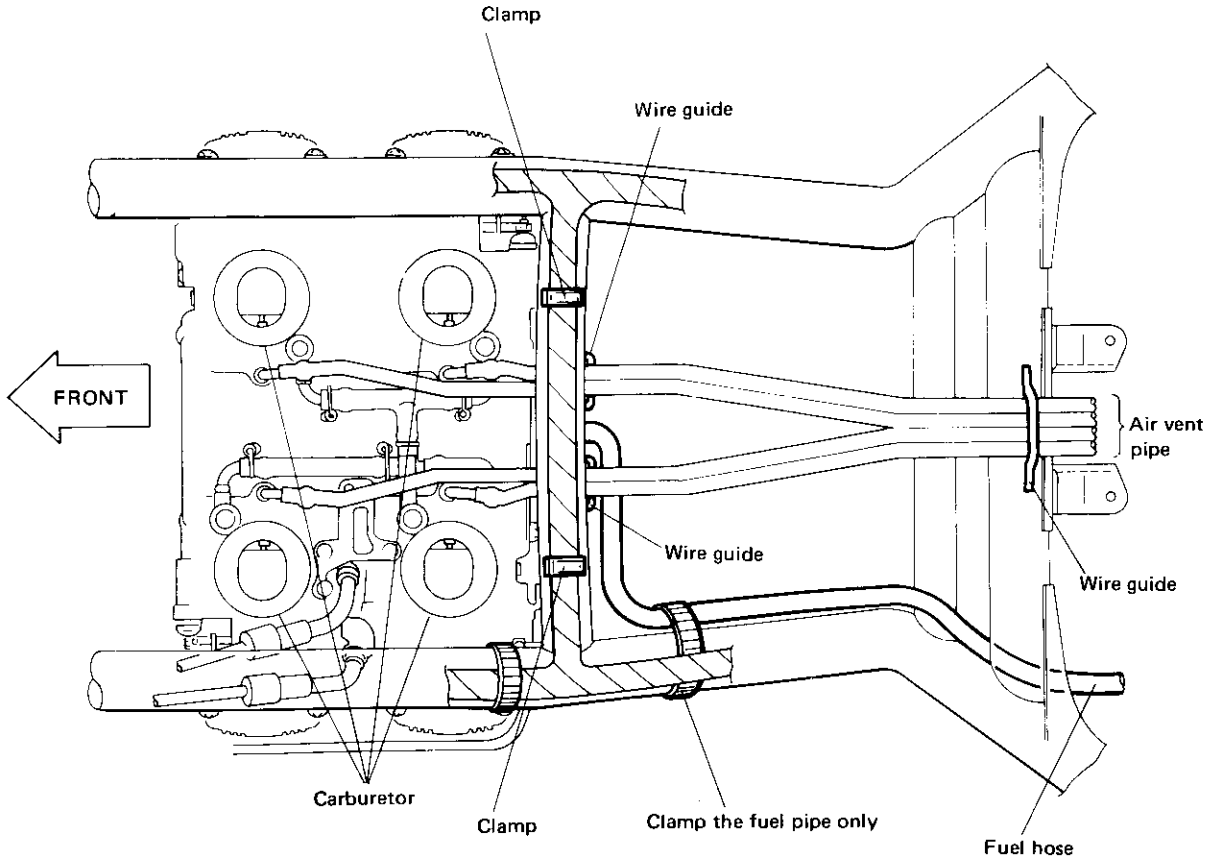
## CABLE ROUTING (6)



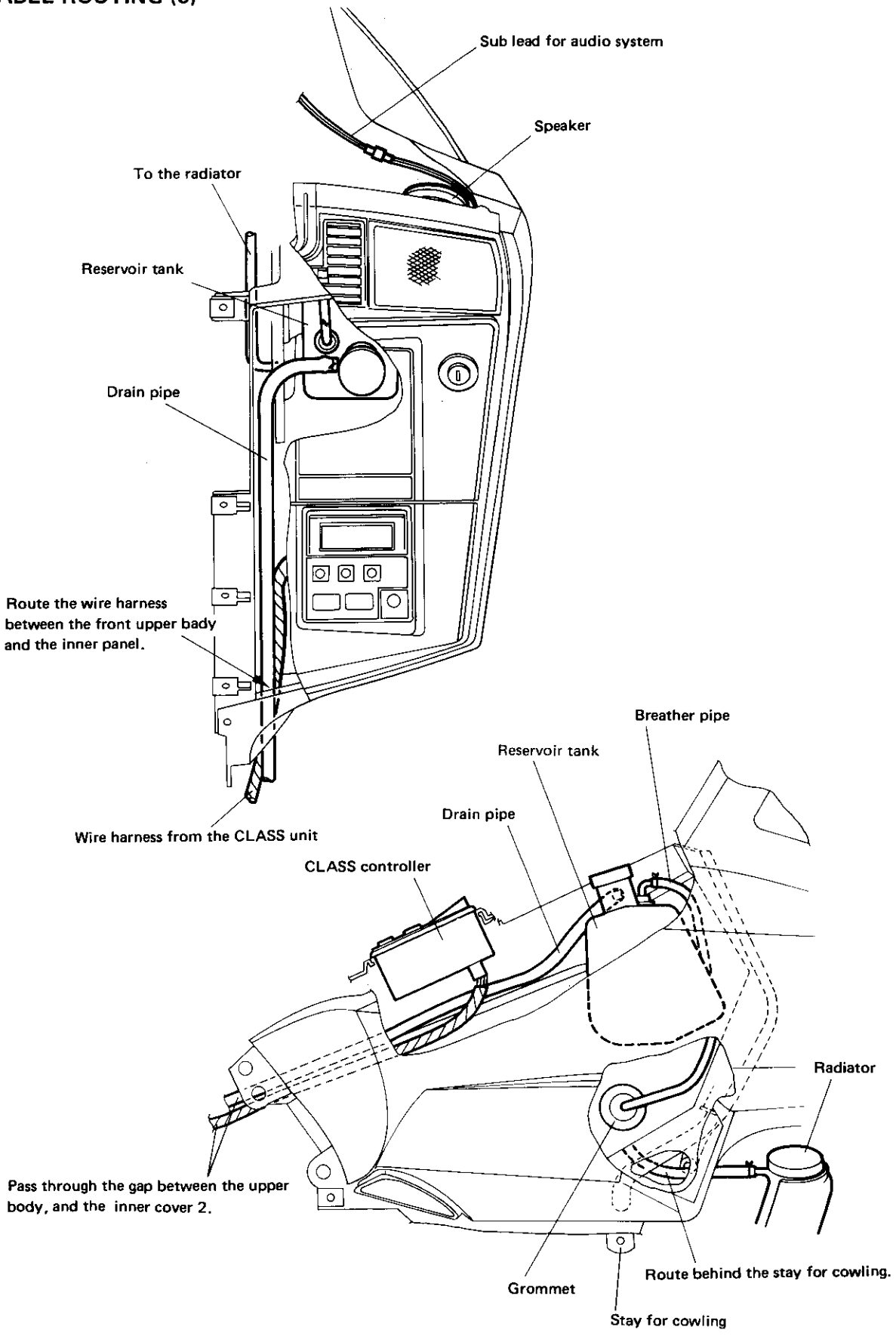
## CABLE ROUTING (7)




### HIGHTENSION CORD ROUTING FOR FRONT RIGHT SIDE

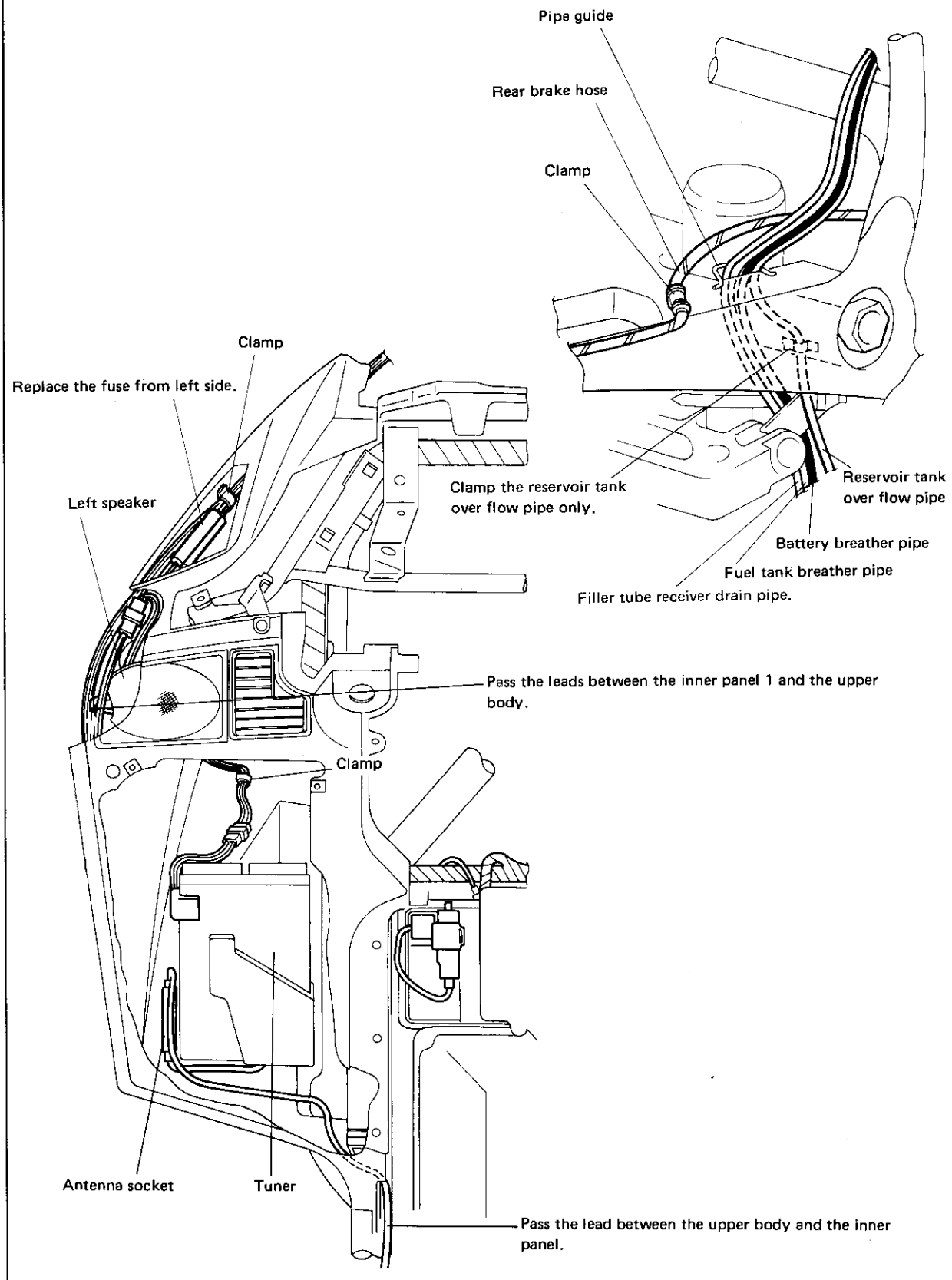


## CABLE ROUTING (8)

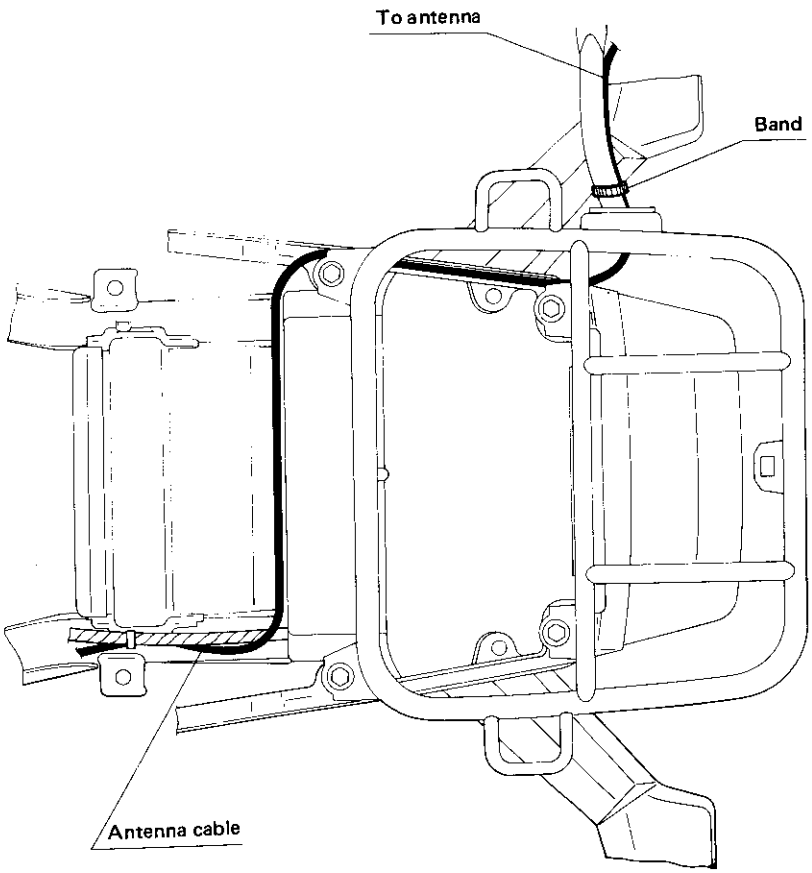


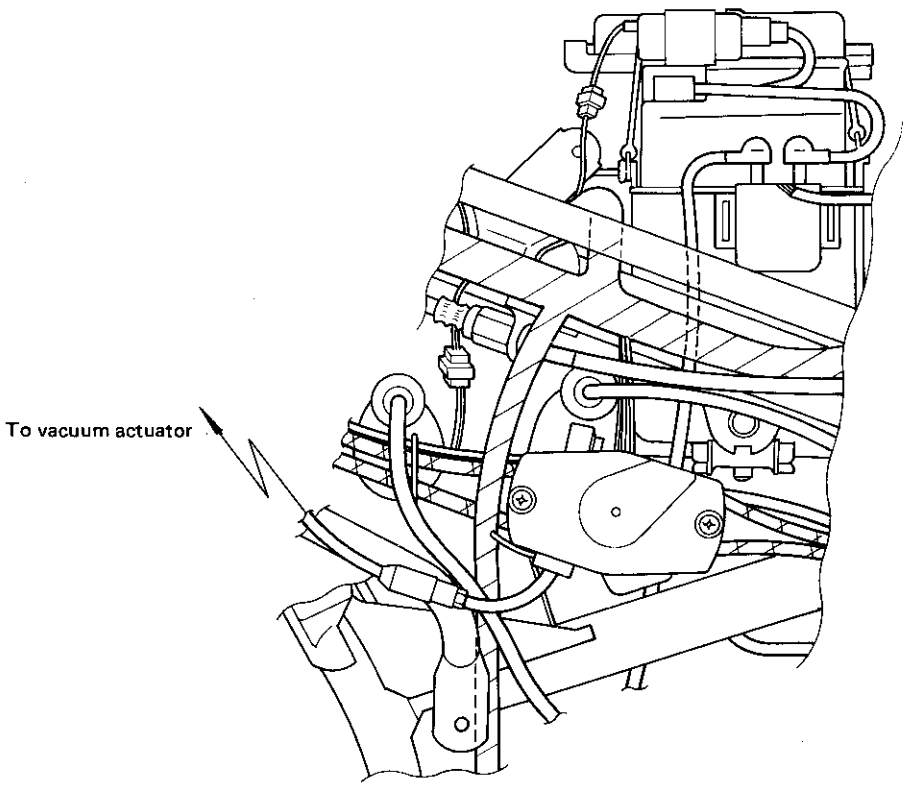
## CABLE ROUTING (9)

### PIPE ROUTING



## CABLE ROUTING (10)



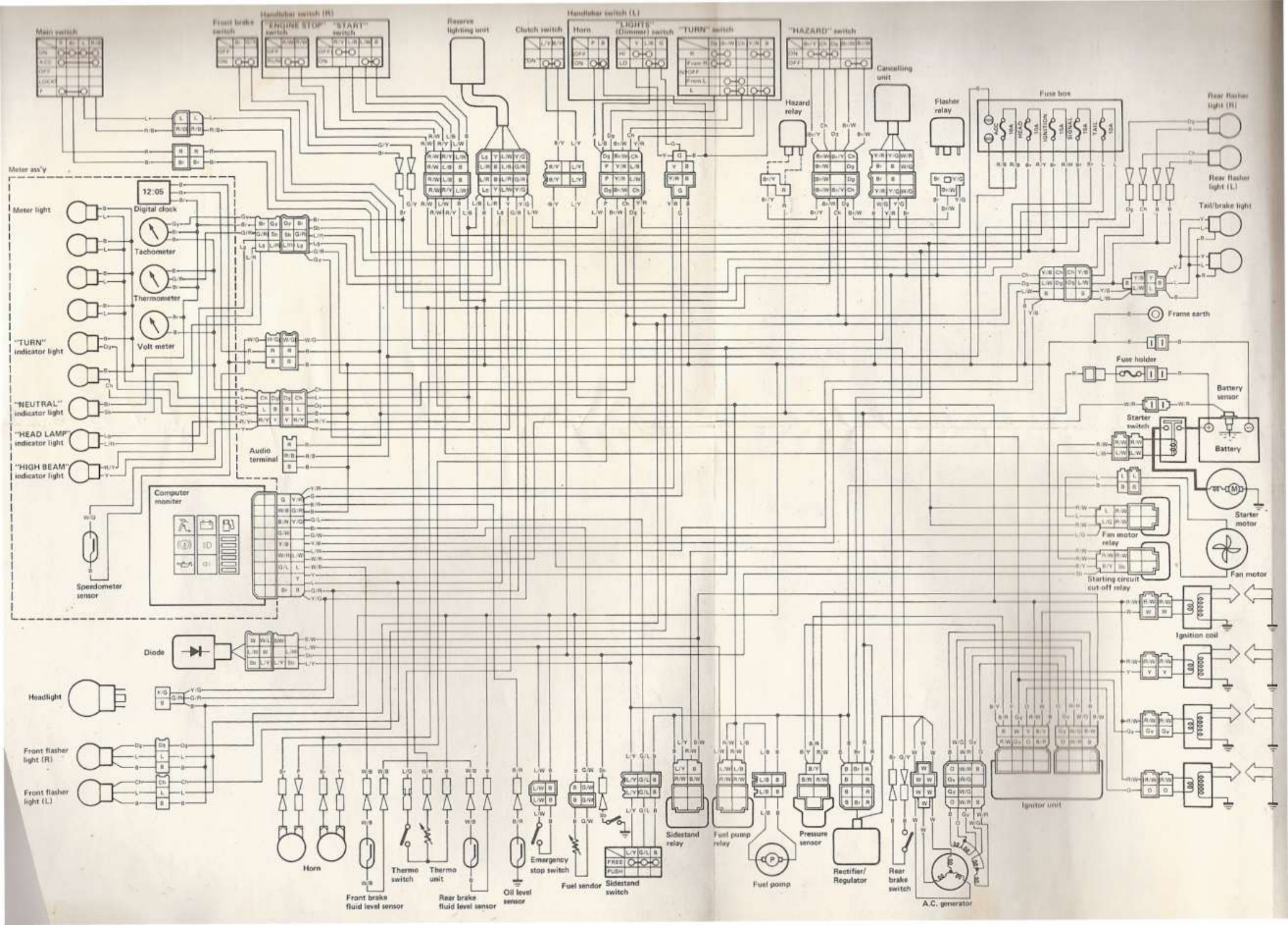





**YAMAHA MOTOR CO.,LTD.**

IWATA, JAPAN

PRINTED IN U


Main switch
Front brake switch
Handlebar switch (R)
"ENGINE STOP" switch
"START" switch
Reserve lighting unit
Clutch switch
Handlebar switch (L)
Horn
"LIGHTS" (Dimmer) switch
"TURN" switch
"HAZARD" switch
Cancelling unit
Hazard relay
Flasher relay
Fuse box
Rear flasher light (R)
Rear flasher light (L)
Tail/brake light
Meter ass'y
Meter light
12:05
Digital clock
Tachometer
Thermometer
Volt meter
"TURN" indicator light
"NEUTRAL" indicator light
"HEAD LAMP" indicator light
"HIGH BEAM" indicator light
Audio terminal
Computer moniter
Speedometer sensor
Diode
Headlight
Front flasher light (R)
Front flasher light (L)
Frame earth
Fuse holder
Battery sensor
Starter switch
Battery
Starter motor
Fan motor relay
Starting circuit cut-off relay
Fan motor
Ignition coil
Ignitor unit
Horn
Front brake fluid level sensor
Thermo switch
Thermo unit
Rear brake fluid level sensor
Oil level sensor
Emergency stop switch
Fuel sendor
Sidestand switch
Sidestand relay
Fuel pump relay
Fuel pump
Pressure sensor
Rectifier/ Regulator
Rear brake switch
A.C. generator

# Yamaha Venture
# 1983 XVZ12TK
# Wiring Diagram
# Sheet #1 of 1

Revision -0-
Gary Dinges
11/1/2009 9:54 PM

## Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission in Neutral & other systems in a normal state.

Diode
Anode — Cathode
Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

Wire Connectors
Bullet
Spade Lug
Soldered or at Plug Connector

Relay
Operating Coil
Contacts

Ground
Indicates current path to Negative Battery is through frame or engine member

Wire Color Code
Br/W
Indicates Brown Wire with White Tracer See Color Code chart for other designations

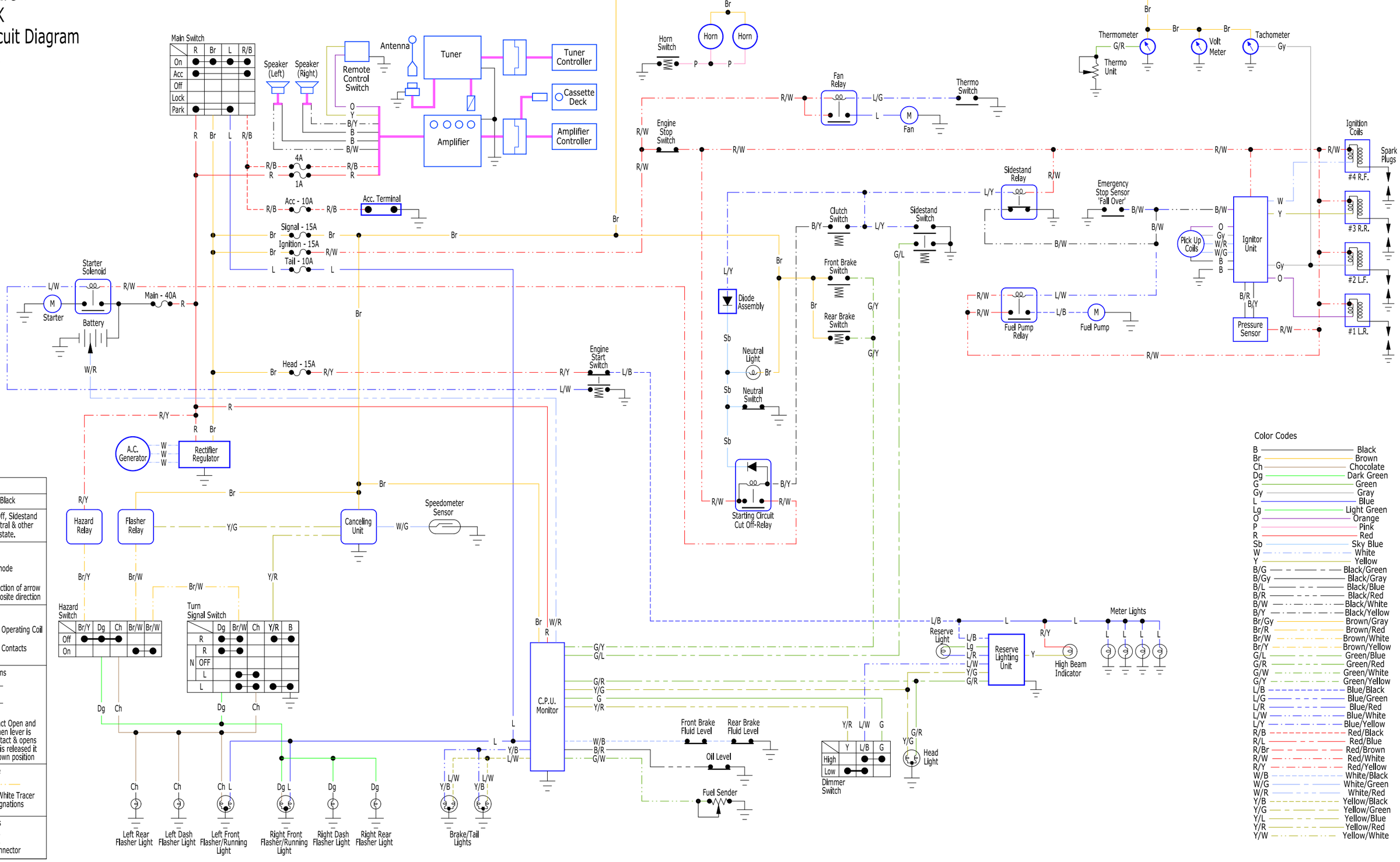
## Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

Left Handle Bar Switch Assembly
Dimmer Switch
Horn Switch
Turn Signal Switch
Hazard Switch
Rear Brake Switch
Front Brake Switch
Clutch Switch
Right Handle Bar Switch Assembly
Start Switch
Engine Stop Switch
Main Switch
Hazard Relay
Flasher Relay
Canceling Unit
Reserve Lighting Unit
All Dash Bulbs #158
High Beam Indicator Light
Reserve Pilot Light
Turn (R) Indicator Light
Turn (L) Indicator Light
Neutral Indicator Light
Tachometer
Temperature Meter
Volt Meter
Digital Clock
Speedometer Sensor
Meter Lights
Fuse
Acc - 10A
Head - 10A
Ignition - 15A
Signal - 15A
Tail - 10A
Front Flasher Light (R) Bulb #1157
Front Flasher Light (L) Bulb #1157
Rear Flasher Light (R) Bulb # 1156
Rear Flasher Light (L) Bulb # 1156
Tail/Brake Lights Bulb #1157
Diode Assembly
6.2 Ohms
Headlight Bulb #H4
High
Low
Amplifier Controller
Cassette Deck
Tuner Controller
Amplifier
Tuner
Antenna
Remote Control Switch
Speaker (Left)
Speaker (Right)
Computer Monitor
Front Brake Fluid Level Sensor
Rear Brake Fluid Level Sensor
N.C.
Horn
Neutral Switch
Oil Level Switch
Fuel Sendor
Thermo Unit
Thermo Switch
Sidestand Relay
Sidestand Switch
Emergency Stop Sensor "Fall Over"
Fuel Pump Control Relay
Fuel Pump
IC Regulator
Rectifier/Regulator
Pressure Sensor
A.C. Generator
0.42 Ohms - Each Pair of Coils
Pick Up Coils
93.5 ~ 126.5 Ohms - Each Coil
Ignitor Unit
Spark Plugs
#1 (L.R.)
#2 (L.F.)
#3 (R.R.)
#4 (R.F.)
Ignition Coils
Primary
2.4 ~ 3.0 Ohms
Secondary
10.6K ~ 15.8K Ohms
Fuse Holder - 40A
Battery
Starter Solenoid
Starter Motor
Fan Motor
Fan Motor Relay
Starting Circuit Cut-Off Relay

# Yamaha Venture
# 1983 XVZ12TK
## Simplified Circuit Diagram
## Sheet #1 of 1

Revision -D-
Gary Dinges
11/1/2009 2:49 PM




### Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission in Neutral & other systems in a normal state.

**Diode**

Anode — Cathode

Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

**Relay**

Operating Coil
Contacts

**Switch Designations**

Switch shown has Top contact Open and Bottom contact Closed, when lever is pulled, spring closes top contact & opens bottom contact. When lever is released it pushes contacts back to shown position

**Wire Color Code**

Br/W

Indicates Brown Wire with White Tracer
See chart for other designations

**Wire Connectors**

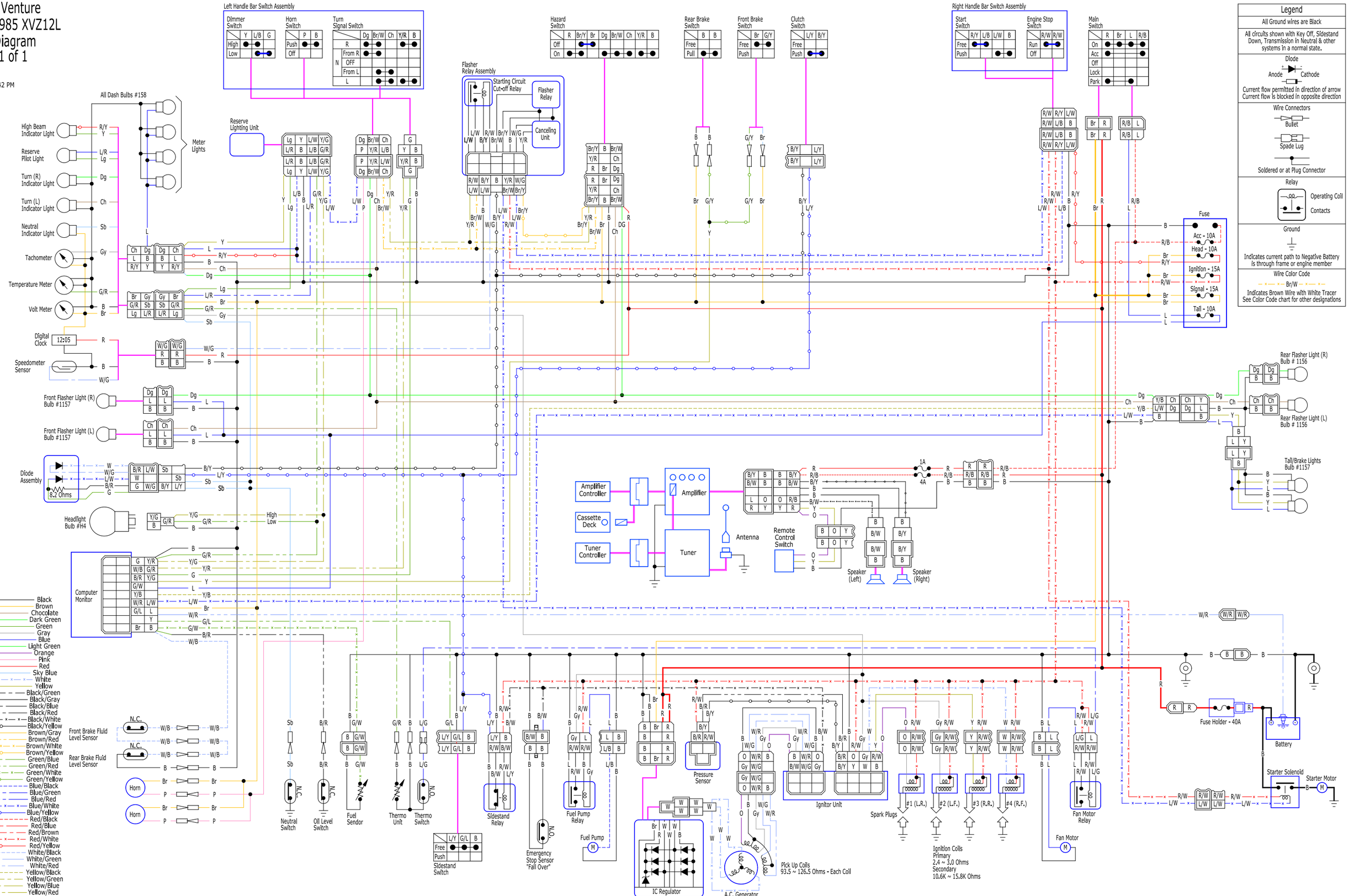
Soldered or at Plug Connector

### Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

# Yamaha Venture
# 1984 - 1985 XVZ12L
# Wiring Diagram
# Sheet #1 of 1

Revision -D-
Gary Dinges
11/1/2009 12:42 PM




## Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

## Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission in Neutral & other systems in a normal state.

Diode
Anode — Cathode
Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

Wire Connectors
Bullet
Spade Lug
Soldered or at Plug Connector

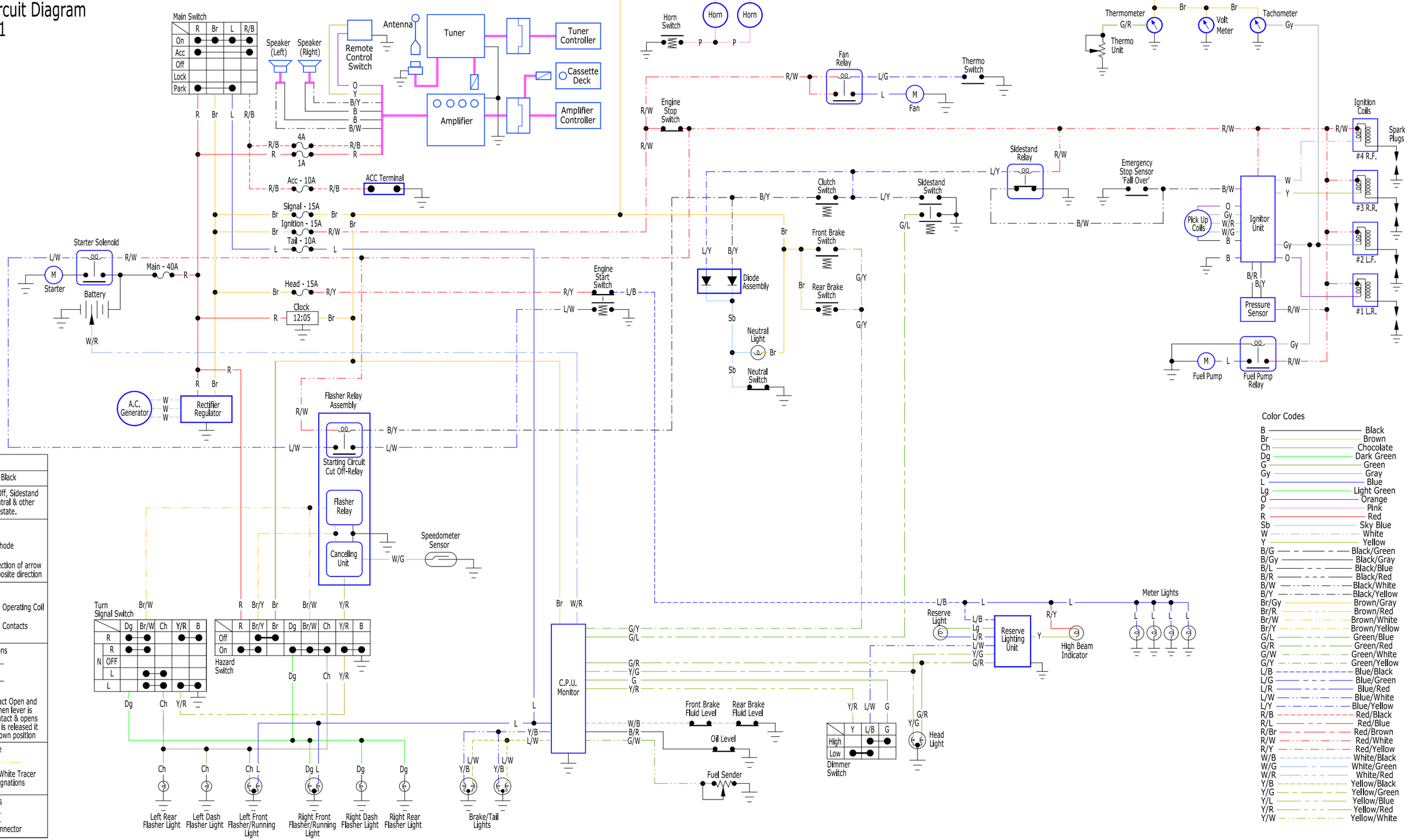
Relay
Operating Coil
Contacts

Ground
Indicates current path to Negative Battery is through frame or engine member

Wire Color Code
Br/W
Indicates Brown Wire with White Tracer
See Color Code chart for other designations

# Yamaha Venture
# 1984 -1985 XVZ12L
# Simplified Circuit Diagram
# Sheet #1 of 1

Revision -D-
Gary Dinges
11/1/2009 7:04 PM




## Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission in Neutral & other systems in a normal state.

**Diode**

Anode — Cathode

Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

**Relay**

Operating Coil
Contacts

**Switch Designations**

Switch shown has Top contact Open and Bottom contact Closed, when lever is pulled, spring closes top contact & opens bottom contact. When lever is released it pushes contacts back to shown position

**Wire Color Code**

Br/W

Indicates Brown Wire with White Tracer
See chart for other designations

**Wire Connectors**

Soldered or at Plug Connector

## Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

# Yamaha Venture Royale
# 1984 - 1985 XVZ12DL
# Wiring Diagram
# Sheet #1 of 1

RevIsIon -D-
Gary DInges
11/1/2009 12:43 PM

Left Handle Bar Switch Assembly
Dimmer Switch
Horn Switch
Turn Signal Switch
Hazard Switch
Rear Brake Switch
Front Brake Switch
Clutch Switch
Right Handle Bar Switch Assembly
Venture Cruise Switch
Start Switch
Engine Stop Switch
Main Switch
Flasher Relay Assembly
Starting Circuit Cut-off Relay
Flasher Relay
Cancelling Unit
All Dash Bulbs #158
Reserve Lighting Unit
Meter Lights
Illumination Controller
Cruise Indicator Light
High Beam Indicator Light
Reserve Pilot Light
Turn (R) Indicator Light
Turn (L) Indicator Light
Neutral Indicator Light
Tachometer
Temperature Meter
Volt Meter
Speedometer Sensor
Cruise Unit
Cruise Vacuum Pump Assembly
Vacuum Pump
Valve
Cruise Solenoid Valve
Fuse
Acc - 10A
Head - 10A
Ignition - 15A
Signal - 15A
Tail - 10A
CLASS Fuse Holder - 20A
Front Flasher Light (R) Bulb #1157
Front Flasher Light (L) Bulb #1157
Rear Flasher Light (R) Bulb #1156
Rear Flasher Light (L) Bulb #1156
Diode Assembly
8.2 Ohms
Headlight Bulb #H4
High
Low
Amplifier Controller
Cassette Deck
Tuner Controller
Amplifier
Tuner
Antenna
Remote Control Switch
Speaker (Left)
Speaker (Right)
CLASS Controller Unit
CLASS Relay
CLASS Compressor
CLASS Solenoid Valve
CLASS Pressure Sensor
Tail/Brake Light Bulb #1157
C.P.U. Monitor
Gear Indicator
Stop Watch
Digital Clock
Front Brake Fluid Level Sensor
Rear Brake Fluid Level Sensor
N.C.
Horn
Gear Position Switch
Oil Level Switch
Fuel Sendor
Thermo Unit
Thermo Switch
Sidestand Relay
Sidestand Switch
Emergency Stop Sensor "Fall Over"
Fuel Pump Relay
Fuel Pump
IC Regulator
Rectifier/Regulator
Pressure Sensor
A.C. Generator
0.42 Ohms - Each Pair of Coils
Pick Up Coils
93.5 ~ 126.5 Ohms - Each Coil
Ignitor Unit
Spark Plugs
#1 (L.R.)
#2 (L.F.)
#3 (R.R.)
#4 (R.F.)
Ignition Coils
Primary
2.4 ~ 3.0 Ohms
Secondary
10.6K ~ 15.8K Ohms
Fan Motor Relay
Fan Motor
Fuse Holder - 40A
Battery
Starter Solenoid
Starter Motor

## Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission In Neutral & other systems in a normal state.

Diode
Anode
Cathode
Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

Wire Connectors
Bullet
Spade Lug
Soldered or at Plug Connector

Relay
Operating Coil
Contacts

Ground
Indicates current path to Negative Battery
Is through frame or engine member

Wire Color Code
Br/W
Indicates Brown Wire with White Tracer
See Color Code chart for other designations

## Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

# Yamaha Venture
# 1984 -1985 Royale XVZ12DL
# Simplified Circuit Diagram
# Sheet #1 of 1

Revision -D-
Gary Dinges
11/1/2009 12:50 PM

Main Switch

| | R | Br | L | R/B | R/L |
|---|---|---|---|---|---|
| On | ● | ● | ● | ● | |
| Acc | ● | | | | ● |
| Off | | | | | |
| Lock | | | | | |
| Park | ● | | ● | | |

Antenna
Tuner
Tuner Controller
Cassette Deck
Amplifier Controller
Amplifier
Speaker (Left)
Speaker (Right)
Remote Control Switch
O
Y
B/Y
B
B
B/W
4A
1A
CLASS - 20A
Acc - 10A
Acc. Terminal
Signal - 15A
Ignition - 15A
Tail - 10A
Starter Solenoid
Starter
Battery
W/R
Main - 40A
Head - 15A
Engine Start Switch
A.C. Generator
Rectifier Regulator
Relay Assembly
Starting Circuit Cut Off-Relay
Flasher Relay
Canceling Unit
Speedometer Sensor
Horn Switch
Horn
Horn
Fan Relay
Fan
Thermo Switch
Thermometer
Thermo Unit
Volt Meter
Tachometer
Engine Stop Switch
Sidestand Relay
Emergency Stop Sensor 'Fall Over'
Ignition Coils
Spark Plugs
#4 R.F.
#3 R.R.
#2 L.F.
#1 L.R.
Pick Up Coils
Ignitor Unit
Pressure Sensor
Fuel Pump
Fuel Pump Relay
Clutch Switch
Sidestand Switch
Diode Assembly
Front Brake Switch
Rear Brake Switch
Neutral Light
Cruise Control Switch

| | R/L | B | R/B |
|---|---|---|---|
| Off | | | |
| On | ● | | |
| Set | | ● | ● |

Cruise Solenoid Valve
Cruise Vacuum Pump
Cruise Control Unit
Cruise Light
Turn Signal Switch

| | | Dg | Br/W | Ch | Y/R | B |
|---|---|---|---|---|---|---|
| R | R | ● | ● | | ● | |
| N | OFF | | | | | |
| L | | | ● | ● | ● | |

Hazard Switch

| | R | Br/Y | Br | Dg | Br/W | Ch | Y/R | B |
|---|---|---|---|---|---|---|---|---|
| Off | | | | | | | | |
| On | ● | ● | | ● | ● | ● | ● | ● |

Left Rear Flasher Light
Left Dash Flasher Light
Left Front Flasher/Running Light
Right Front Flasher/Running Light
Right Dash Flasher Light
Right Rear Flasher Light
Brake/Tail Lights
C.P.U. Monitor
Gear Position Switch
Front Brake Fluid Level
Rear Brake Fluid Level
Oil Level
Fuel Sender

| | Y | L/B | G |
|---|---|---|---|
| High | | ● | |
| Low | ● | | ● |

Dimmer Switch
Head Light
Illumination Controller
Meter Lights
Reserve Light
Reserve Lighting Unit
High Beam Indicator
CLASS Solenoid Valve
CLASS Pressure Sensor
CLASS Light
CLASS Controller Unit
CLASS Relay
CLASS Compressor

## Legend

All Ground wires are Black

All circuits shown with Key Off, Sidestand Down, Transmission in Neutral & other systems in a normal state.

Diode
Anode
Cathode
Current flow permitted in direction of arrow
Current flow is blocked in opposite direction

Relay
Operating Coil
Contacts

Switch Designations

Switch shown has Top contact Open and Bottom contact Closed, when lever is pulled, spring closes top contact & opens bottom contact. When lever is released it pushes contacts back to shown position

Wire Color Code
Br/W
Indicates Brown Wire with White Tracer
See chart for other designations

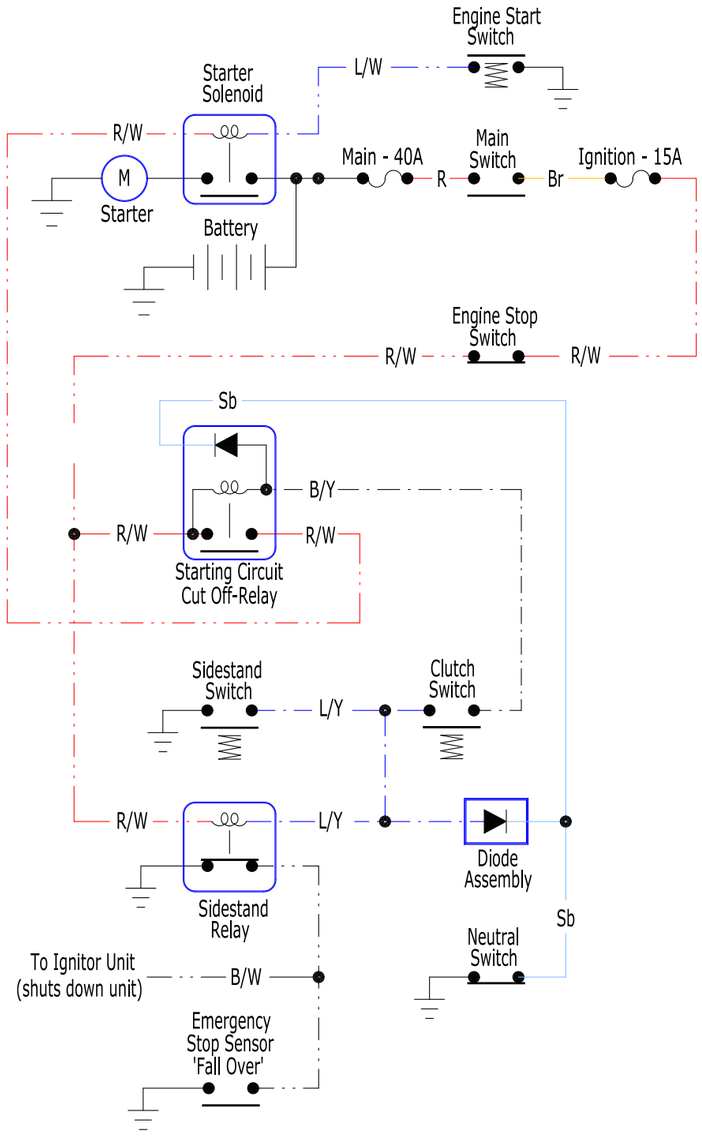
Wire Connectors
Soldered or at Plug Connector

## Color Codes

| | |
|---|---|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark Green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light Green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky Blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/Gy | Black/Gray |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/Gy | Brown/Gray |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/Br | Red/Brown |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| W/R | White/Red |
| Y/B | Yellow/Black |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/R | Yellow/Red |
| Y/W | Yellow/White |

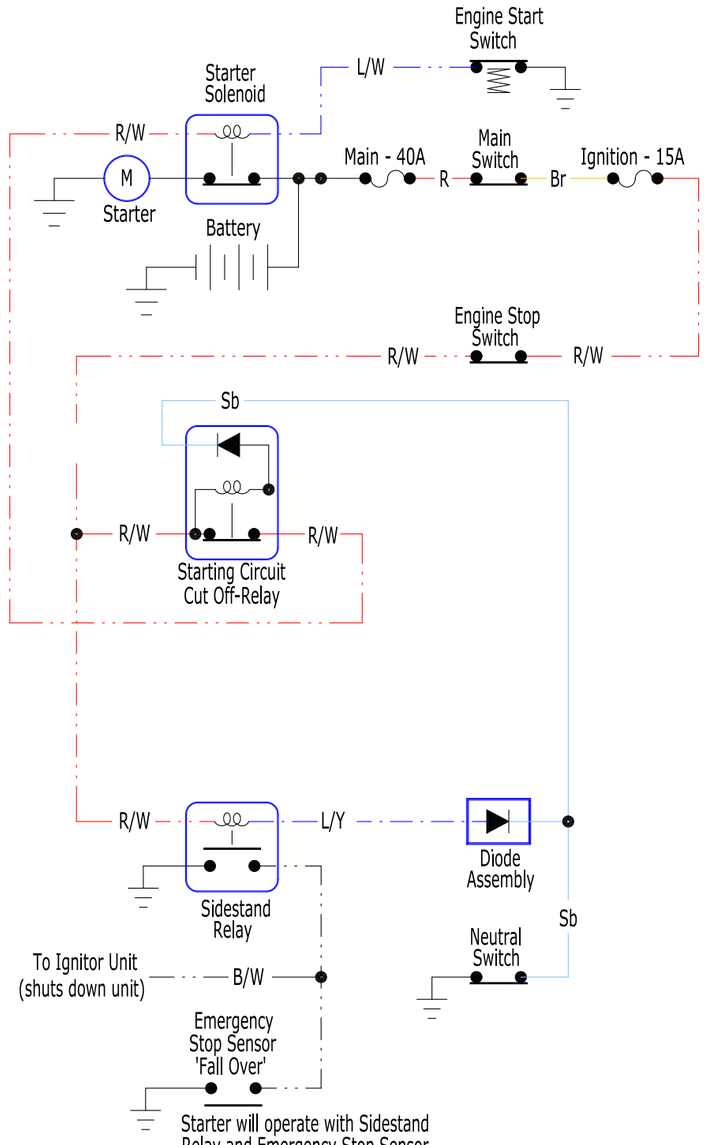
# 1983 Yamaha Venture Starting Circuit Operation

## Key Off
## Sidestand Down
## Transmission in Neutral




## Key at On position
## Transmission in Neutral

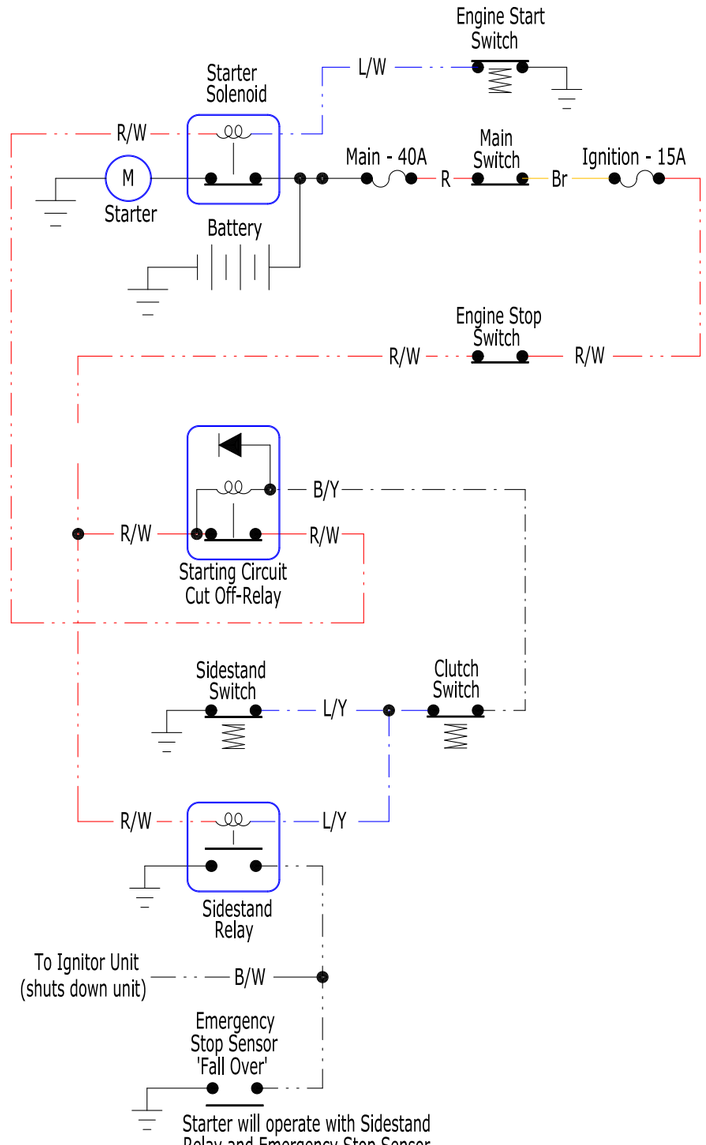
Engine Stop Switch in Run position
Sidestand relay is energized through Engine Stop switch, Diode & Neutral Switch
Starting Circuit Cut-off relay energized through Engine Stop switch & Neutral Switch
Start switch depressed
Starter Solenoid energized through Starting Circuit Cut-off relay & Engine Start switch




Starter will operate with Sidestand Relay and Emergency Stop Sensor in either position. If either have a path to ground on the B/W wire though, the Ignitor unit is shut down and the Engine will not run.

## Key at On position
## Transmission in Gear
## Sidestand Up & Clutch Pulled In

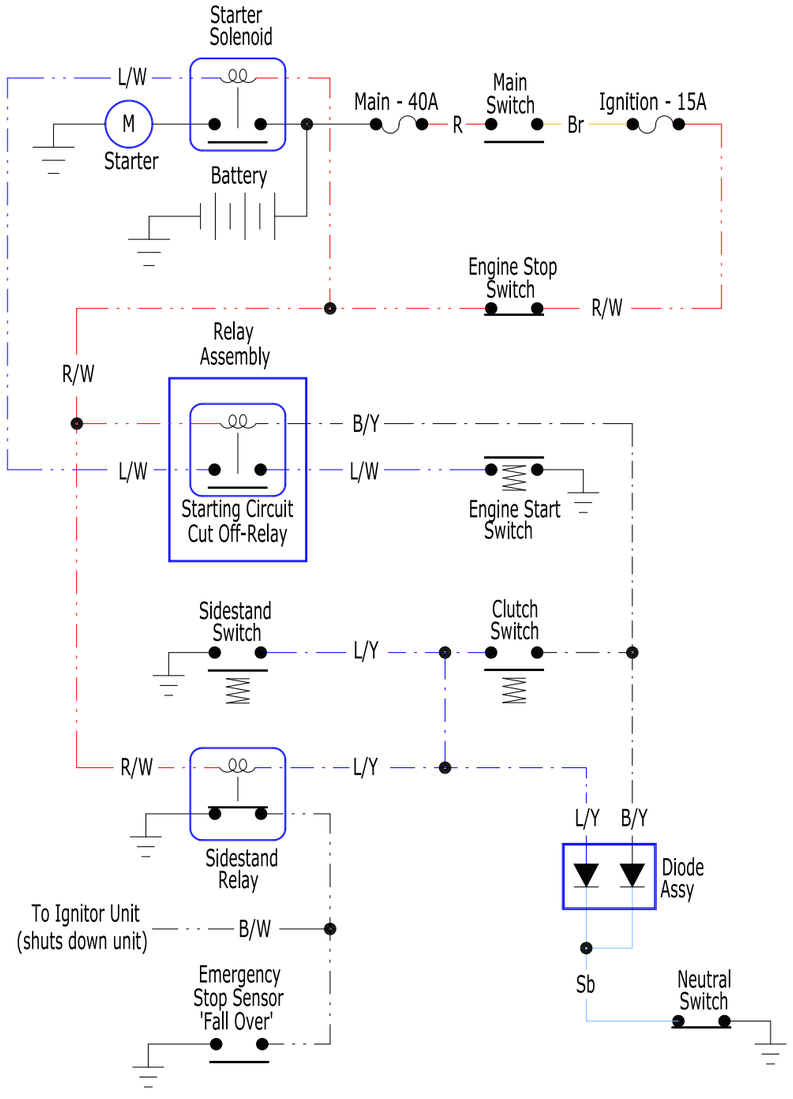
Engine Stop Switch in Run position
Sidestand relay is energized through Engine Stop switch & Sidestand switch
Starting Circuit Cut-off relay energized through Engine Stop switch, Clutch switch & Sidestand switch
Start switch depressed
Starter Solenoid energized through Starting Circuit Cut-off relay, Engine Start switch & Engine Stop switch




Starter will operate with Sidestand Relay and Emergency Stop Sensor in either position. If either have a path to ground on the B/W wire though, the Ignitor unit is shut down and the Engine will not run.

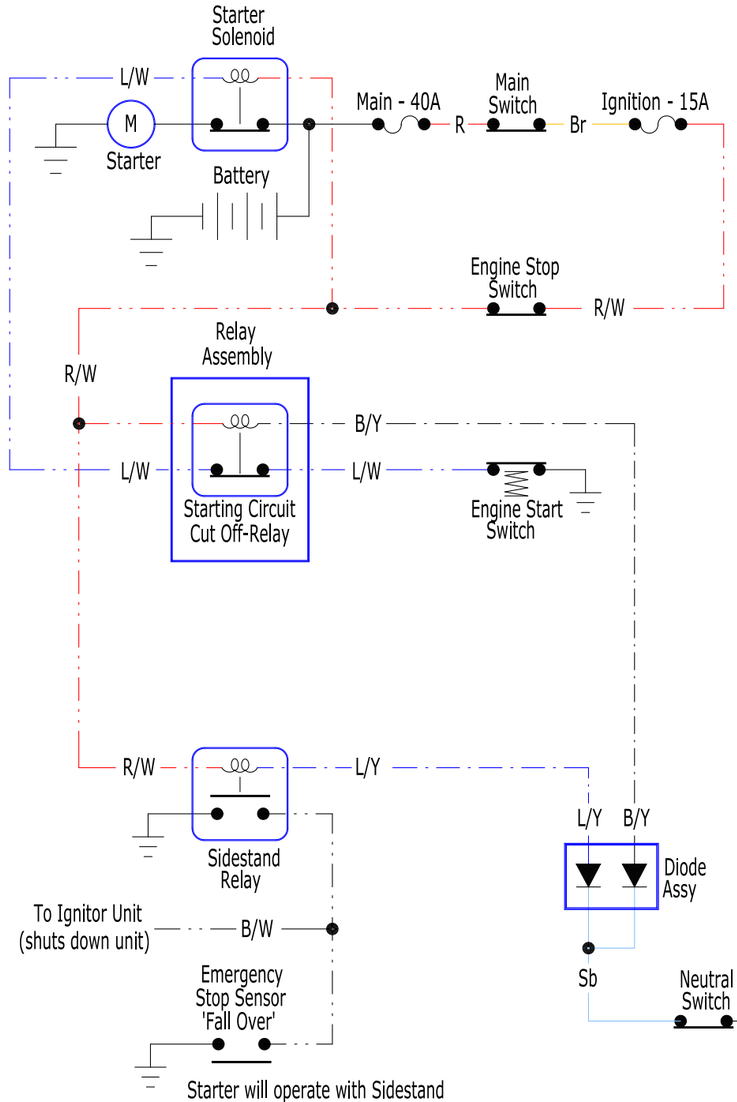
# 1984-1985 Yamaha Venture Starting Circuit Operation

## Key Off
## Sidestand Down
## Transmission in Neutral




## Key at On position
## Transmission in Neutral

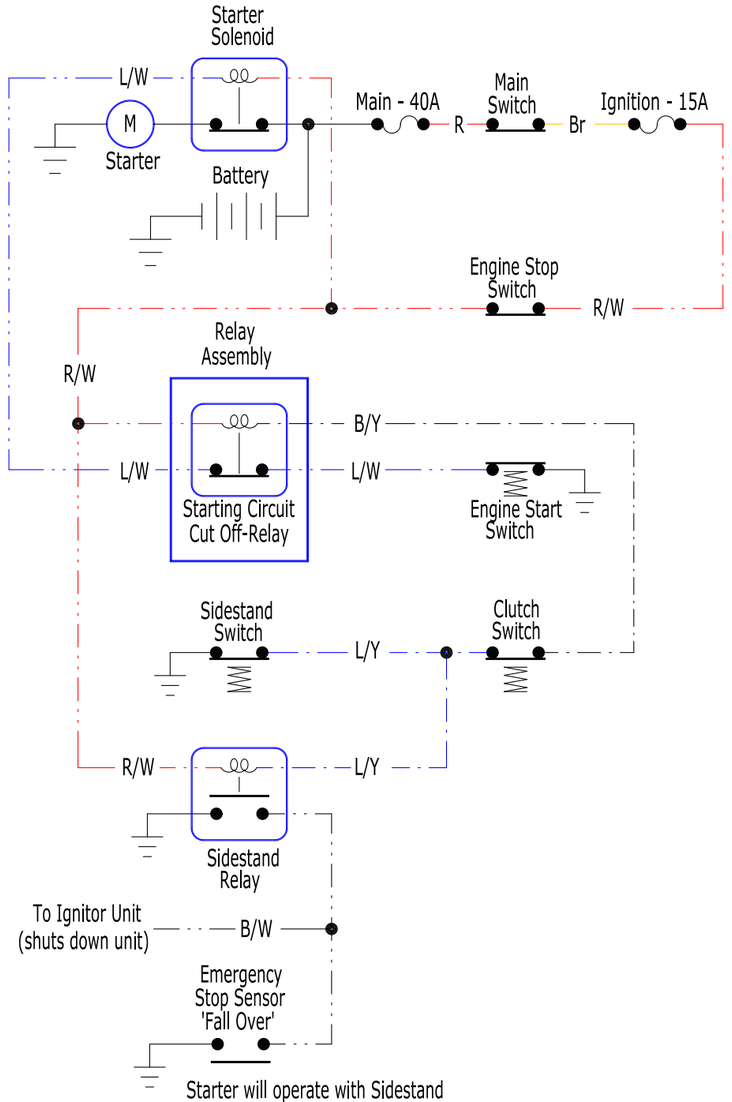
Engine Stop Switch in Run position
Sidestand relay is energized through Engine Stop switch, left diode & Neutral Switch
Starting Circuit Cut-off relay energized through Engine Stop switch, right diode & Neutral Switch
Start switch depressed
Starter Solenoid energized through Starting Circuit Cut-off relay & Engine Start switch




Starter will operate with Sidestand Relay and Emergency Stop Sensor in either position. If either have a path to ground on the B/W wire though, the Ignitor unit is shut down and the Engine will not run.

## Key at On position
## Transmission in Gear
## Sidestand Up & Clutch Pulled In

Engine Stop Switch in Run position
Sidestand relay is energized through Engine Stop switch & Sidestand switch
Starting Circuit Cut-off relay energized through Engine Stop switch, Clutch switch & Sidestand switch
Start switch depressed
Starter Solenoid energized through Starting Circuit Cut-off relay & Engine Start switch




Starter will operate with Sidestand Relay and Emergency Stop Sensor in either position. If either have a path to ground on the B/W wire though, the Ignitor unit is shut down and the Engine will not run.