Kawasaki

# GPZ500R
# GPZ600R




# Motorcycle
# Service Manual

# Quick Reference Guide


| | |
|---|---|
| General Information | 1 |
| Fuel System | 2 |
| Cooling System | 3 |
| Engine Top End | 4 |
| Clutch | 5 |
| Engine Lubrication System | 6 |
| Engine Removal/Installation | 7 |
| Crankshaft/Transmission | 8 |
| Wheels/Tires | 9 |
| Final Drive | 10 |
| Brakes | 11 |
| Suspension | 12 |
| Steering | 13 |
| Frame | 14 |
| Electrical System | 15 |
| Appendix | 16 |
| Supplement-1986-1989 Models | 17 |


This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

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# Service Manual

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your Motorcycle dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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This warning may apply to any of the following components or any assembly containing one or more of these components:–

Brake Shoes or Pads
Clutch Friction Material
Gaskets
Insulators

SAFETY INSTRUCTIONS

- Operate if possible out of doors or in a well ventilated place.
- Preferably use hand tools or low speed tools equipped, if necessary, with an appropriate dust extraction facility. If high speed tools are used, they should always be so equipped.
- If possible, dampen before cutting or drilling.
- Dampen dust and place it in properly closed receptacle and dispose of it safely.

## LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| A | ampere(s) | lb | pound(s) |
| ABDC | after bottom dead center | m | meter(s) |
| AC | alternating current | min | minute(s) |
| ATDC | after top dead center | N | newton(s) |
| BBDC | before bottom dead center | Pa | pascal(s) |
| BDC | bottom dead center | PS | horsepower |
| BTDC | before top dead center | psi | pound(s) per square inch |
| °C | degree(s) Celsius | r | revolution |
| DC | direct current | rpm | revolution(s) per minute |
| F | farad(s) | TDC | top dead center |
| °F | degree(s) Fahrenheit | TIR | total indicator reading |
| ft | foot, feet | V | volt(s) |
| g | gram(s) | W | watt(s) |
| h | hour(s) | Ω | ohm(s) |
| L | liter(s) | | |

**Read OWNER'S MANUAL before operating**

## EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System
   This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the carburetion system.
2. Exhaust Emission Control System
   This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.
3. Evaporative Emission Control System
   Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions."

"Sec. 203(a) The following acts and the causing thereof are prohibited...

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

(Continued on next page.)

**NOTE**

- *The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows:*
  1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
  2. *Tampering could include:*
     a. *Maladjustment of vehicle components such that the emission standards are exceeded.*
     b. *Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.*
     c. *Addition of components or accessories that result in the vehicle exceeding the standards.*
     d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

**WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10,000 PER VIOLATION.**

## TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

# Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

**For the duration of your warranty period,** especially, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your Motorcycle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

## How to Use this Manual

In preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the product,s systems and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

Whenever you see these WARNING and CAUTION symbols, heed their instructions! Always follow safe operating and maintenance practices.

**WARNING**

○**This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.**

**CAUTION**

○**This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipement.**

This manual contains five more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

**NOTE**

○*This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ● Indicates a procedural step or work to be done.
- ○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a WARNING, CAUTION, or NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.
- ☆ Indicates a conditional sub-step or what action to take based upon the results of the conditional step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

1

# General Information

## Table of Contents

Before Servicing ..... 1-2
Model Identificaiton ..... 1-4
General Specifications ..... 1-5
Periodic Maintenance Chart ..... 1-8

## Before Servicing

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is also required for successful work.

**Especially note the following:**

(1) Dirt

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Battery Ground

Remove the ground (–) lead from the battery before performing any disassembly operations on the motorcycle. This prevents:

(a) the possibility of accidentally turning the engine over while partially disassembled.

(b) sparks at electrical connections which will occur when they are disconnected.

(c) damage to electrical parts.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, they should all be started in their holes and tightened to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of turn and then remove them.

Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(4) Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(6) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(7) High Flash-point Solvent

A high flash-point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(8) Gasket, O-ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(9) Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(10) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

(12) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(13) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high temperature grease on the lips to reduce rubber to metal friction.

(14) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

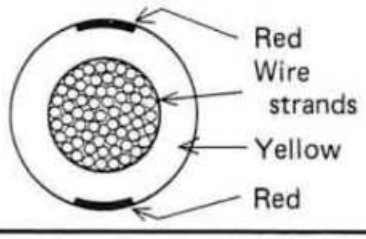
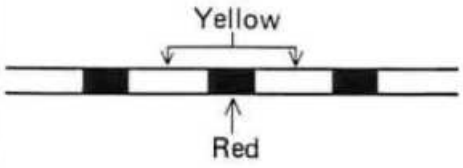
(15) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease ($MoS_2$) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(16) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

| Wire (cross-section) | Name of Wire Color | Picture in Wiring Diagram |
|---|---|---|
|   | Yellow/red |   |

(17) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(18) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

| | | | |
|---|---|---|---|
| Abrasion | Crack | Hardening | Warp |
| Bent | Dent | Scratch | Wear |
| Color change | Deterioration | Seizure | |

(19) Service Data

Numbers of service data in this text have following meanings:

"Standards": Show dimensions or performances which brand-new parts or systems have.

"Service limits": Indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

## Model Identification

ZX600-A1 Left Side View: US Model




ZX500-A1 Right Side View: European Model



## General Specifications

| Items | ZX600-A1 | ZX500-A1 |
|---|---|---|
| **Dimensions:** | | |
| Overall length | 2,140 mm, Ⓒ Ⓢ Ⓤ 2,085 mm | 2,140 mm |
| Overall width | 670 mm | ← |
| Overall height | 1,185 mm | ← |
| Wheelbase | 1,430 mm | ← |
| Road clearance | 140 mm | ← |
| Seat height | 770 mm | ← |
| Dry weight | 1,910 N (195 kg), Ⓒ 1,920 N (195.5 kg) | 1,910 N (195 kg) |
| Curb weight: Front | 1,040 N (106 kg), Ⓒ 1,040 N (106.5 kg) | 1,040 N (106 kg) |
| Rear | 1,060 N (108 kg) | ← |
| Fuel tank capacity | 18.0 L | ← |
| **Performance:** | | |
| Climbing ability | 30° | ← |
| Braking distance | 12.5 m from 50 km/h | ← |
| Minimum turning radius | 2.8 m | ← |
| **Engine:** | | |
| Type | 4-stroke, DOHC, 4-cylinder | ← |
| Cooling system | Liquid-cooled | ← |
| Bore and stroke | 60.0 x 52.4 mm | 55.0 x 52.4 mm |
| Displacement | 592 mL | 497 mL |
| Compression ratio | 11.0 | ← |
| Maximum horsepower | 55.2 kW (75 PS) @10,500 r/min (rpm)<br>Ⓢ 44.1 kW (60 PS) @8,500 r/min (rpm) | 52.2 kW (71 PS) @11,500 r/min (rpm) |
| Maximum torque | 52.0 N-m (5.3 kg-m, 38.3 ft-lb) @9,000 r/min (rpm)<br>Ⓢ 52.0 N-m (5.3 kg-m, 38.3 ft-lb) @8,000 r/min (rpm) | 46.1 N-m (4.7 kg-m, 40.0 ft-lb) @10,000 r/min (rpm) |
| Carburetion system | Carburetors, Keihin CVK32 x 4 | Carburetors, Keihin CVK30 x 4 |
| Starting system | Electric starter | ← |
| Ignition system | Battery and coil (transistorized) | ← |
| Timing advance | Electronically advanced | ← |
| Ignition timing | From 12.5° BTDC @1,050 r/min (rpm) to 40° BTDC @10,000 r/min (rpm)<br>Ⓒ From 7.5° BTDC @1,250 r/min (rpm) to 35° BTDC @10,000 r/min (rpm) | ← |

(Continued on next page.)

| Items | | ZX600-A1 | ZX500-A1 |
|---|---|---|---|
| Spark plug | | NGK DR8ES or ND X27ESR-U<br>Ⓤ Ⓒal Ⓘ Ⓢa NGK D9EA or ND X27ES-U | ← |
| Cylinder numbering method | | Left to right, 1-2-3-4 | ← |
| Firing order | | 1-2-4-3 | ← |
| Valve timing: | | | |
| Inlet | Open | 37° BTDC | ← |
| | Close | 67° ABDC | ← |
| | Duration | 284° | ← |
| Exhaust | Open | 72° BBDC | ← |
| | Close | 32° ATDC | ← |
| | Duration | 284° | ← |
| Lubrication system | | Forced lubrication (wet sump with cooler) | ← |
| Engine oil: | | | |
| Grade | | SE or SF class | ← |
| Viscosity | | SAE10W40, 20W50, 20W40, or 20W50 | ← |
| Capacity | | 3.0 L | ← |
| **Drive Train:** | | | |
| Primary reduction system: | | | |
| Type | | Chain | ← |
| Reduction ratio | | 2.641 (27/23 x 63/28) | ← |
| Clutch type | | Wet multi disc | ← |
| Transmission: | | | |
| Type | | 6-speed, constant mesh, return shift | ← |
| Gear ratios: | 1st | 2.571 (36/14) | ← |
| | 2nd | 1.777 (32/18) | ← |
| | 3rd | 1.380 (29/21) | ← |
| | 4th | 1.125 (27/24) | ← |
| | 5th | 0.961 (25/26) | ← |
| | 6th | 0.851 (23/27) | ← |
| Final drive system: | | | |
| Type | | Chain drive | ← |
| Reduction ratio | | 2.600 (39/15) | 2.800 (42/15) |
| Overall drive ratio | | 5.850 @Top gear | 6.300 @Top gear |
| **Frame:** | | | |
| Type | | Tubular, double cradle | ← |
| Caster (rake angle) | | 27° | ← |
| Trail | | 97 mm | ← |
| Front Tire: | | | |
| Type | | Tubeless | ← |
| Size | | 110/90 V16 | ← |

| Items | ZX600-A1 | ZX500-A1 |
|---|---|---|
| Rear tire: | | |
| Type | Tubeless | ← |
| Size | 130/90 V16 | ← |
| Front suspension: | | |
| Type | Telescopic fork (pneumatic) | ← |
| Wheel travel | 140 mm | ← |
| Rear suspension: | | |
| Type | Swing arm (uni-trak) | ← |
| Wheel travel | 130 mm | ← |
| Brake type: | | |
| Front | Dual disc | ← |
| Rear | Single disc | ← |
| **Electrical Equipment:** | | |
| Battery | 12 V 12 Ah | ← |
| Headlight: | | |
| Type | Semi-sealed beam | ← |
| Bulb | 12 V 60/55 W (quartz-halogen) | ← |
| Tail/brake light | 12 V 5/21 W x 2<br>Ⓒ (SA) Ⓤ 12 V 8/27 W x 2 | ← |
| Alternator: | | |
| Type | Three-phase AC | ← |
| Rated output | 20 A @10,000 r/min (rpm), 14 V | ← |
| Voltage regulator: | | |
| Type | Short-circuit | ← |

Specifications subject to change without notice, and may not apply to every country.

Ⓒ : Canadian Model
(Cal) : California Model
Ⓘ : Italian Model
Ⓢ : Swiss Model
(SA) : South Aflican Model
Ⓤ : US Model

## Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

| OPERATION \ FREQUENCY | Whichever comes first / Every | *ODOMETER READING 800 km | 5,000 km | 10,000 km | 15,000 km | 20,000 km | 25,000 km | 30,000 km | See Page |
|---|---|---|---|---|---|---|---|---|---|
| Spark plug – clean and gap † | | | • | • | • | • | • | • | 15-22 |
| Valve clearance – check † | | • | | • | | • | | • | 4-18 |
| Air suction valve (US) – check † | | | • | • | • | • | • | • | 4-7 |
| Air cleaner element – clean | | • | | • | | • | | • | 2-15 |
| **Throttle grip play – check †** | | • | | • | | • | | • | **2-5** |
| Idle speed – check † | | • | • | • | • | • | • | • | 2-7 |
| Engine vacuum synchronization – check † | | • | • | • | • | • | • | • | 2-7 |
| Fuel system – check † | | | | • | | • | | • | 2-9 |
| Coolant – change | 2 years | | | | | | | • | 3-5 |
| Evaporative emission control system (Cal) – check † | | • | • | • | • | • | • | • | 2-18 |
| Engine oil – change | year | • | | • | | • | | • | 6-5 |
| Oil filter – replace | | • | | • | | • | | • | 6-5 |
| Radiator hoses, connections – check † | year | • | | • | | • | | • | 3-11 |
| Fuel hose – replace | 4 years | | | | | | | | – |
| Clutch – adjust | | • | • | • | • | • | • | • | 5-4 |
| Drive chain wear – check † | | | • | • | • | • | • | • | 10-5 |
| Drive chain – lubricate | 300 km | | | | | | | | 10-6 |
| Drive chain slack – check † | 800 km | | | | | | | | 10-4 |
| Brake lining or pad wear – check † | | | • | • | • | • | • | • | 11-7 |
| Brake fluid level – check † | month | • | • | • | • | • | • | • | 11-11 |
| Brake fluid – change | 2 years | | | | | • | | | 11-11 |
| Brake hose and pipe – replace | 4 years | | | | | | | | 11-13 |
| Anti-dive brake plunger parts – replace | 2 years | | | | | | | | 12-12 |
| Brake master cylinder cup and dust seal – replace | 2 years | | | | | | | | 11-9 |
| Caliper piston seal and dust seal – replace | 2 years | | | | | | | | 11-6 |
| Brake light switch – check † | | • | • | • | • | • | • | • | 15-34 |
| Steering – check † | | • | • | • | • | • | • | • | 13-4 |
| Steering stem bearing – lubricate | 2 years | | | | | • | | | 13-6 |
| Front fork oil – change | | | | | | | | • | 12-5 |
| Tire wear – check † | | | • | • | • | • | • | • | 9-9 |
| Wheel bearing – lubricate | 2 years | | | | | • | | | 9-12 |
| Speedometer gear – lubricate | 2 years | | | | | • | | | 9-14 |
| Swing arm pivot, uni-trak linkage – lubricate | | | | • | | • | | • | 12-15, 12-16 |
| Battery electrolyte level – check † | month | • | • | • | • | • | • | • | 15-10 |
| General lubrication – perform | | | • | • | • | • | • | • | 16-7 |
| Nut, bolt, and fastener tightness – check † | | • | | • | | • | | • | 16-7 |

* : For higher odometer readings, repeat at the frequency interval established here.
† : Replace, add, adjust, clean, or torque if necessary.
(Cal): California vehicle only
(US): US only

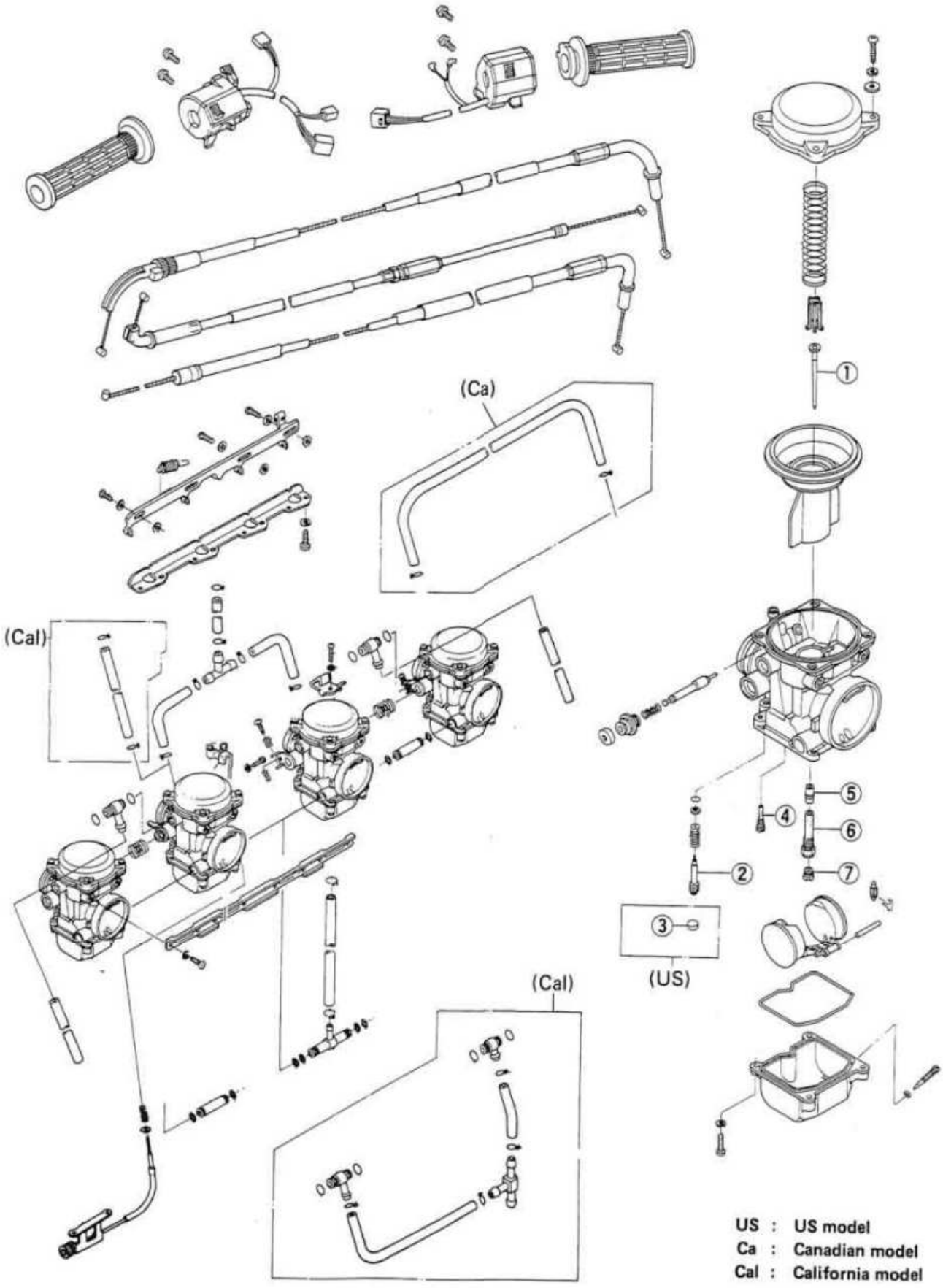
# Fuel System

## Table of Contents

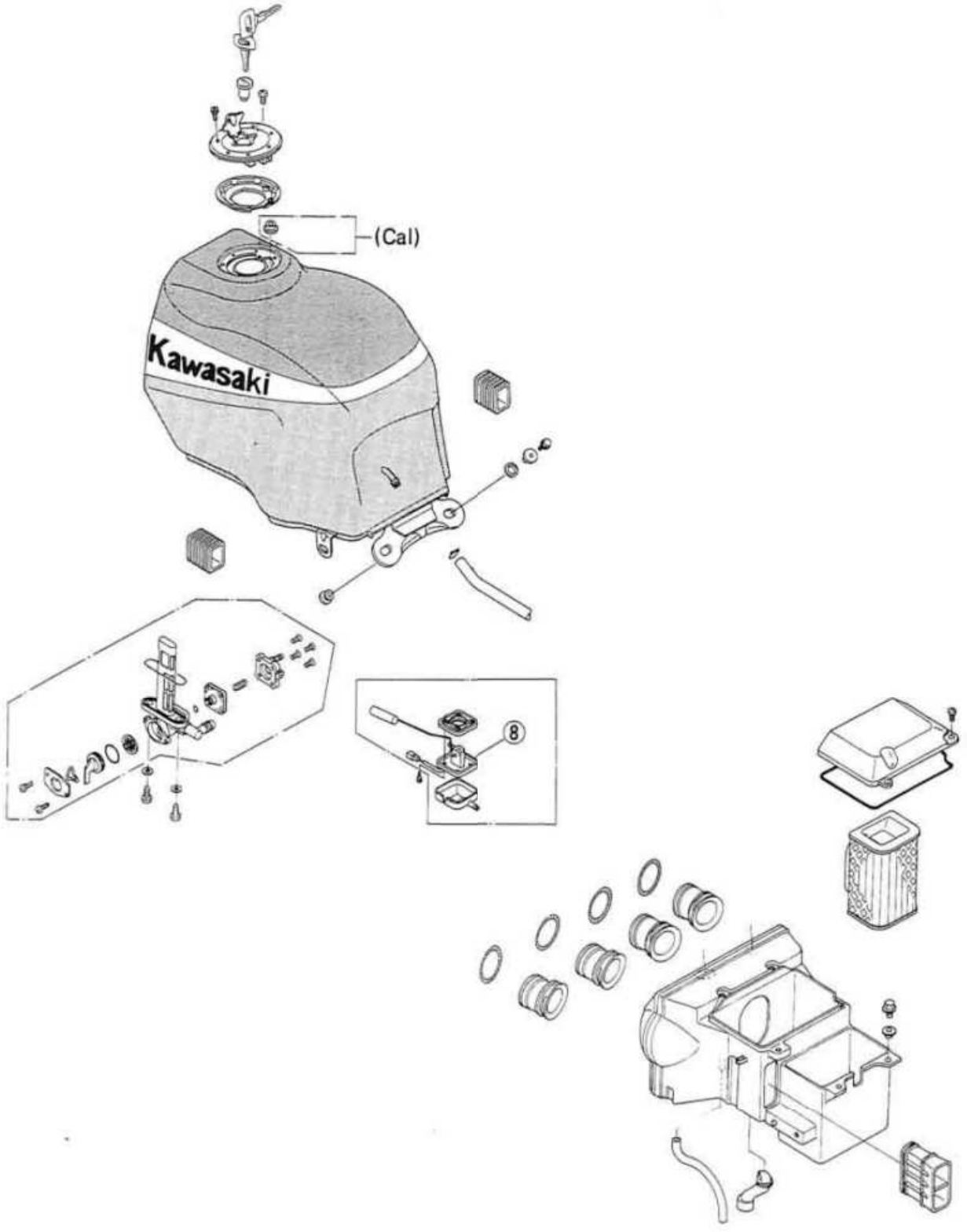
2


**Exploded View** . . . . . 2-2
**Specifications** . . . . . 2-4
**Special Tools** . . . . . 2-4
**Throttle Grip and Cables** . . . . . 2-5
*Throttle Grip Play Inspection* . . . . . 2-5
*Throttle Grip Adjustment* . . . . . 2-5
*Throttle Cable Lubrication* . . . . . 2-6
*Throttle Cable Inspection* . . . . . 2-6
**Choke Cable** . . . . . 2-6
*Choke Cable Free Play Inspection* . . . . . 2-6
*Choke Cable Adjustment* . . . . . 2-6
*Choke Cable Lubrication* . . . . . 2-7
*Choke Cable Inspection* . . . . . 2-7
**Carburetors** . . . . . 2-7
*Idle Speed Inspection* . . . . . 2-7
*Idle Speed Adjustment* . . . . . 2-7
*Carburetor Synchronization Inspection* . . . . . 2-7
*Carburetor Synchronization* . . . . . 2-8
*Fuel Level Inspection* . . . . . 2-8
*Fuel Level Adjustment* . . . . . 2-9
*Fuel System Cleanliness Inspection* . . . . . 2-9
*Carburetor Assembly Removal* . . . . . 2-10
*Carburetor Assembly Installation Notes* . . . . . 2-10
*Carburetor Separation* . . . . . 2-11
*Carburetor Installation* . . . . . 2-11
*Carburetor Disassembly and Assembly Notes* . . . . . 2-12
*Carburetor Cleaning* . . . . . 2-13
*Carburetor Inspection* . . . . . 2-14
**Air Cleaner** . . . . . 2-15
*Air Cleaner Element Removal* . . . . . 2-15
*Air Cleaner Element Installation* . . . . . 2-15
*Air Cleaner Housing Removal* . . . . . 2-15
*Air Cleaner Housing Installation* . . . . . 2-16
*Air Cleaner Element Cleaning* . . . . . 2-16
*Air Cleaner Element Inspection and Replacement* . . . . . 2-16
**Fuel Tank** . . . . . 2-17
*Fuel Tank Removal* . . . . . 2-17
*Fuel Tank Installation* . . . . . 2-17
*Fuel Tank and Tap Cleaning* . . . . . 2-17
*Fuel Tap Inspection* . . . . . 2-18
*Fuel Tank and Cap Inspection* . . . . . 2-18
**Evaporative Emission Control System (US California Vehicle only)** . . . . . 2-18
*Parts Removal/Installation Notes* . . . . . 2-18
*Hose Inspection* . . . . . 2-18
*Separator Inspection* . . . . . 2-18
*Separator Operation Test* . . . . . 2-19
*Canister Inspection* . . . . . 2-19
*Fuel Tank and Cap Inspection (see Fuel Tank section)* . . . . . 2-18
**Fuel Gauge and Level Sensor (see Electrical System chapter)** . . . . . 15-36

## Exploded View




US : US model
Ca : Canadian model
Cal : California model




1. Jet Needle
2. Pilot Screw
3. Plug (US model only)
4. Pilot Jet
5. Needle Jet
6. Needle Jet Holder
7. Main Jet
8. Fuel Level Sensor

## Specifications

**Throttle Grip Free Play**
**Standard: 2 – 3 mm**

**Choke Cable Free Play**
**Standard: 2 – 3 mm**

**Carburetor Specifications**

| | ZX500-A1 | ZX600-A1 |
|---|---|---|
| Make/Type | Keihin/CVK30 | Keihin/CVK32 |
| Main Jet | 105 #1 and #4 cyl. | ←, (Cal) 108 |
| Main Jet | 108 #2 and #3 cyl. | ← |
| Main Air Jet | 100 | ← |
| Jet Needle | N27P | N27L |
| Pilot Jet | 35 | 38 |
| Pilot Air Jet | 140 | 145 |
| Pilot Screw | 2 turns out | ←, (U) — |
| Starter Jet | 52 | 45, (Cal) 42 |
| Fuel Level | – 0.5 mm | ← |
| Float Height | 17 mm | ← |

(U) : US model
(Cal) : California model

**Idle Speed**

| | | |
|---|---|---|
| **Standard:** | **ZX500** | **1,200 ±50 r/min (rpm)** |
| | **ZX600** | **1,050 ±50 r/min (rpm)** |
| | **(Cal)** | **1,300 ±50 r/min (rpm)** |

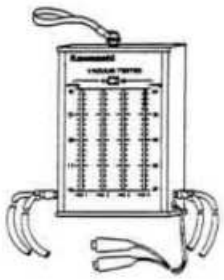
## Special Tools

Along with common hand tools, the following more specialized tools are required for complete fuel system servicing.

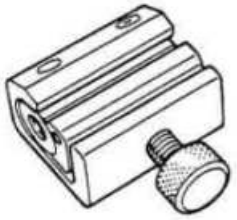
**Fuel Level Gauge: 57001-1017**



**Vacuum Gauge: 57001-1198**



**Pressure Cable Luber: K56019-021**



**Pilot Screw Adjuster: 57001-1239**
This tool is newly available.



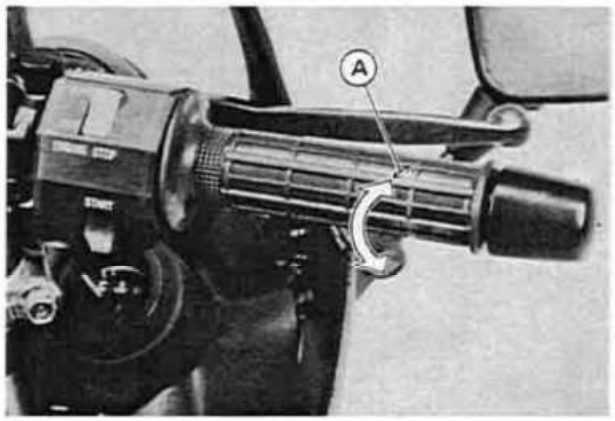
## Throttle Grip and Cables

If the throttle grip has excessive free play due to cable stretch or misadjustment, there will be a delay in throttle response. Also, the throttle valves may not open fully at full throttle. On the other hand, if the throttle grip has no play, the throttle will be hard to control, and the idle speed will be erratic. Check the throttle grip play periodically in accordance with the Periodic Maintenance Chart, and adjust the play if necessary.

### *Throttle Grip Play Inspection*

•Check throttle grip free play by lightly turning the throttle grip back and forth.

**Throttle Grip Free Play**
**2 ~ 3 mm**

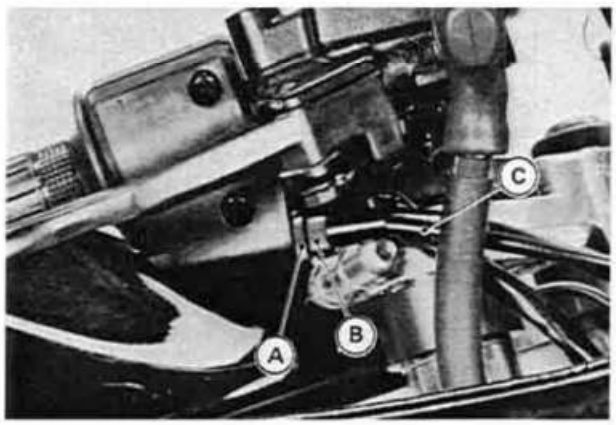



A. Throttle Grip Free Play

★If the throttle grip free play is incorrect, adjust the throttle cables.

### *Throttle Cable Adjustment*

•Loosen the locknut at the upper end of the accelerator cable, and turn the adjuster until the proper amount of throttle grip play is obtained.




A. Locknut
B. Adjuster
C. Accelerator Cable

•Tighten the locknut against the adjuster.

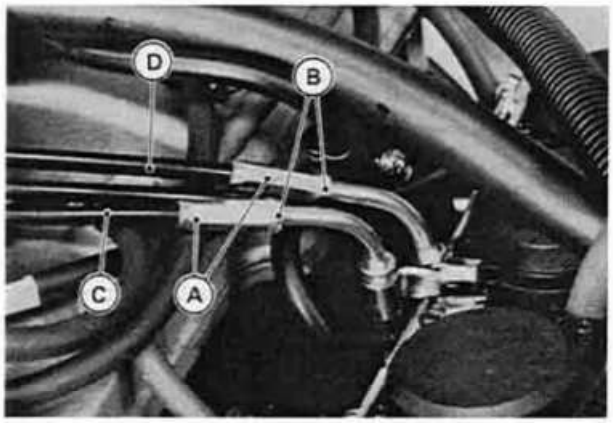
★If the throttle cables can not be adjusted by using the cable adjuster at the upper end of the accelerator cable, use the calbe adjusting nuts at the lower ends of the throttle cables.

•Remove the fuel tank.

•Loosen the locknuts, and screw both throttle cable adjusting nuts in fully at the lower ends of the throttle cables to give the throttle grip plenty of play.

•With the throttle grip completely closed, turn out the decelerator cable adjusting nut until the inner cable just becomes tight.

•Tighten the locknut against the adjusting nut.

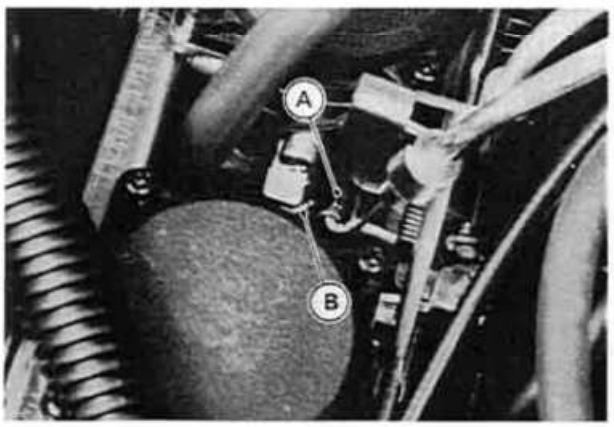



A. Adjusting Nuts
B. Locknuts
C. Decelerator Cable
D. Accelerator Cable

•Turn the accelerator cable adjusting nut until the correct throttle grip free play is obtained.

•Tighten the locknut against the adjusting nut.

•Check that the throttle linkage lever stops against the idle adjusting screw with the throttle grip closed.

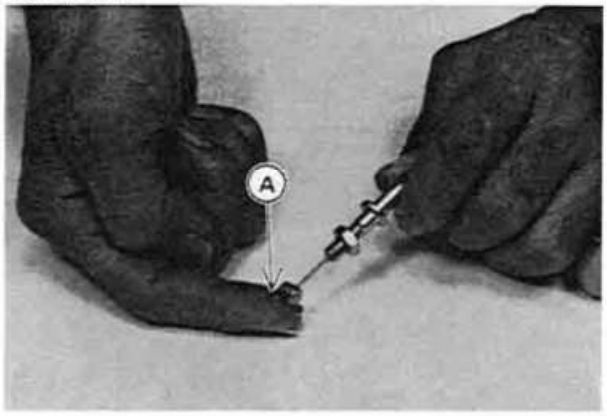



A. Linkage Lever
B. Idle Adjusting Screw

### *Throttle Cable Lubrication*

Whenever the throttle cables are removed, and in accordance with the Periodic Maintenance Chart (see General Information chapter), perform the following.

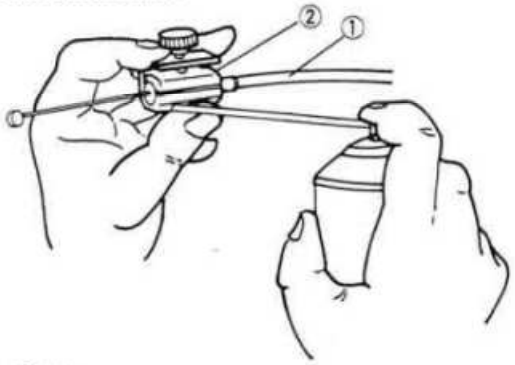
•Apply a thin coating of grease to the throttle cable lower ends.




A. Apply grease.

•Lubricate the cable with a penetrating rust inhibitor through the Pressure Cable Luber (special tool).

**Cable Lubrication**




1. Cable
2. Pressure Cable Luber: K56019-021

### *Throttle Cable Inspection*

•With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.



★If cable movement is not free after lubricating, if the cable is frayed, or if the housing is kinked, replace the cable.

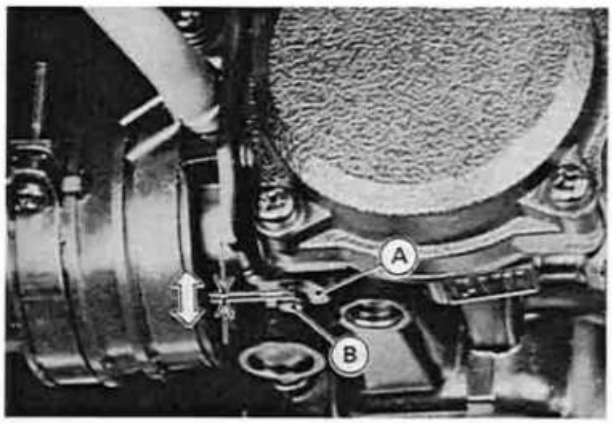
## Choke Cable

### *Choke Cable Free Play Inspection*

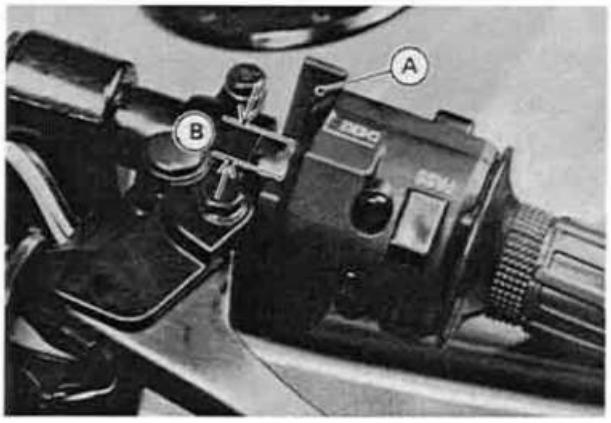
•Check that the choke lever returns properly and that the inner cable slides smoothly.

★If there is any irregularity, check the choke cable as follows:

•Determine the amount of choke cable play at the choke lever. Pull the choke lever until the starter plunger lever at the carburetor contacts with the starter plunger; the amount of choke lever travel is the amount of choke cable play.




A. Starter Plunger Lever B. Starter Plunger



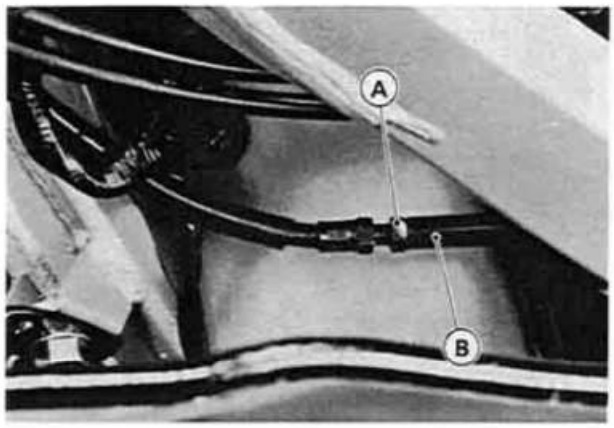

A. Choke Lever B. Play

★If free play is not correct, adjust the choke cable.

| Choke Cable Free Play |
| --- |
| 2 ~ 3 mm |

### *Choke Cable Adjustment*

•Loosen the locknut at the adjusting nut of the choke cable, and turn the adjusting nut until the cable has the proper amount of play.




A. Locknut B. Adjusting Nut

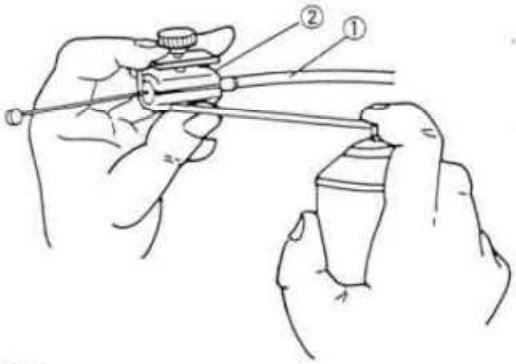
•Tighten the locknut after adjustment.

### *Choke Cable Lubrication*

Whenever the choke cable removed, lubricate the choke cable as follows.

•Lubricate the cable with a penetrating rust inhibitor through the Pressure Cable Luber (special tool).

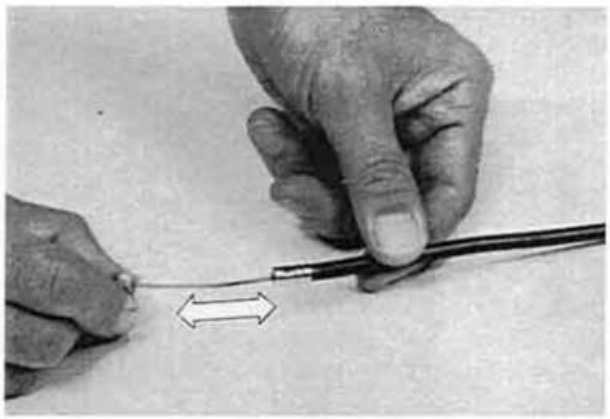
**Cable Lubrication**




1. Cable
2. Pressure Cable Luber: K56019-021

### *Choke Cable Inspection*

•With the choke cable disconnected at the both ends, the cable should move freely within the cable housing.



★If cable movement is not free after lubricating (see Choke Cbale Lubrication), if the cable is frayed, or if the housing is kinked, replace the cbale.

## Carburetors

### *Idle Speed Inspection*

•Start the engine and warm it up thoroughly.

•With the engine idling, turn the handlebar to both sides.

★If handlebar movement changes the idle speed; the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding.

**WARNING**

**○Operation with improperly adjusted, incorrectly routed, or a damaged cable could result in an unsafe riding condition.**

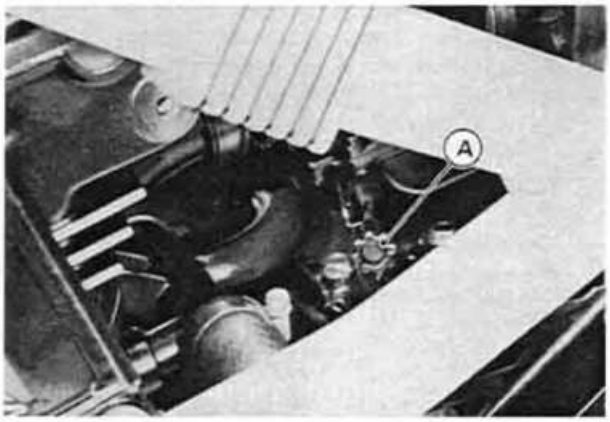
•Check idle speed.

★If the idle speed is out of the specified range, adjust it.

| Idle Speed | |
|---|---|
| ZX500 | 1,200 ±50 r/min (rpm) |
| ZX600 | 1,050 ±50 r/min (rpm) |
| | (Cal) 1,300 ±50 r/min (rpm) |

### *Idle Speed Adjustment*

•Turn the adjusting screw until idle speed is correct.




A. Adjusting Screw

•Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

### *Carburetor Synchronization Inspection*

•Warm up the engine.

•Check idle speed and adjust if necessary.

•Remove the fuel tank.

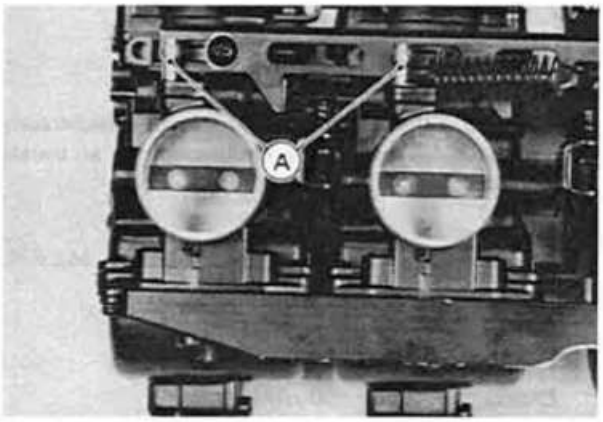
•Supply fuel to the carburetors with an auxiliary fuel tank.

WARNING

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or spark; this includes any appliance with a pilot light.**

•Attach a vacuum gauge set (Special Tool: 57001-1198) to the vacuum hose fittings on the carburetors.

(Viewed from front)




A. Vacuum Hose Fitting

•Start the engine and let it idle to measure the engine intake vacuum.

*If the intake vacuum difference between any two cylinders exceeds the limit, synchronize the carburetor butterfly valves.

**Carburetor Synchronization Vacuum**

**Less than 2.7 kPa (2 cmHg) difference between any two cylinders**

•Remove the vacuum gauge, connect the vacuum hose(s) to the vacuum hose fitting(s), and/or put the cap(s) back on the fitting(s).

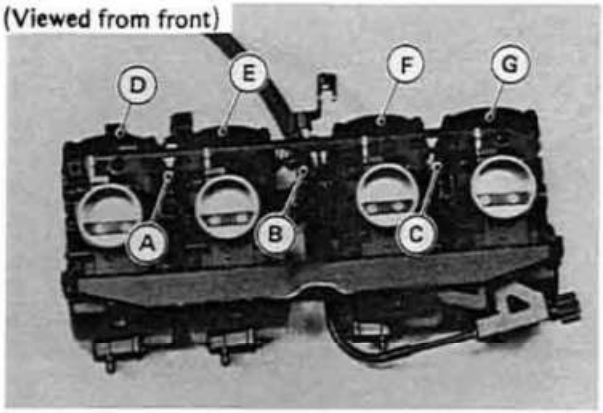
•Install the fuel tank.

### *Carburetor Synchronization*

•Turn the adjusting screws to synchronize the butterfly valves.

•Check idle speed and adjust if necessary.

(Viewed from front)




A. Adjusting Screw (between No.3 and No. 4 cylinders)
B. Adjusting Screw (between No. 1, No. 2 and No. 3, No. 4 Cylinders)
C. Adjusting Screw (between No. 1 and No. 2 Cylinders)
D. No. 4 Cylinder's Carburetor
E. No. 3 Cylinder's Carburetor
F. No. 2 Cylinder's Carburetor
G. No. 1 Cylinder's Carburetor

**NOTE**

○*With the engine idling, first synchronize the left two and then the right two cylinders by means of the adjusting screw between No. 1 and No. 2 cylinders, and between No. 3 and No. 4 cylinders.*

○*Then synchronize the left two cylinders and the right two cylinders using the center adjusting screw.*

### *Fuel Level Inspection*

WARNING

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

•Remove the carburetors, and hold them upright on a stand.

•Put the fuel tank on a bench, and connect the fuel tap to the carburetors using a suitable hose.

•Prepare a fuel hose (6 mm in diameter and about 300 mm long).

•Connect a fuel level gauge (special Tool) to the carburetor float bowl with the fuel hose.

•Hold the gauge vertically against the side of the carburetor body so that the "zero" line is several millimeters higher than the bottom edge of the carburetor body.

•Turn the fuel tap to the PRI position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.

•Wait until the fuel level in the gauge settles.

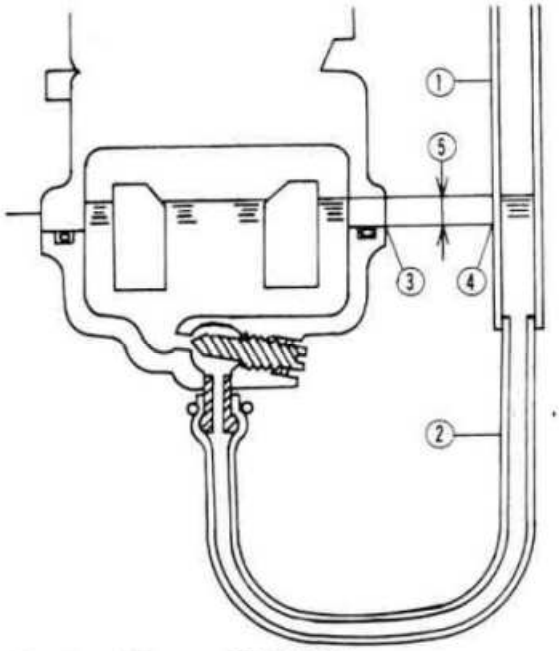
•Keeping the gauge vertical, slowly lower the gauge until the "zero" line is even with the bottom edge of the carburetor body.

**NOTE**

○*Do not lower the "zero" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measured shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into suitable container and start the procedure over again.*

- Read the fuel level in the gauge and compare it to the specification. Screw in the carburetor drain plug.
- Turn the fuel tap to the ON position and remove the fuel level gauge.
- Inspect the fuel level in the other carburetors in the same manner.

★If any fuel level is incorrect, adjust it (see Fuel Level Adjustment).



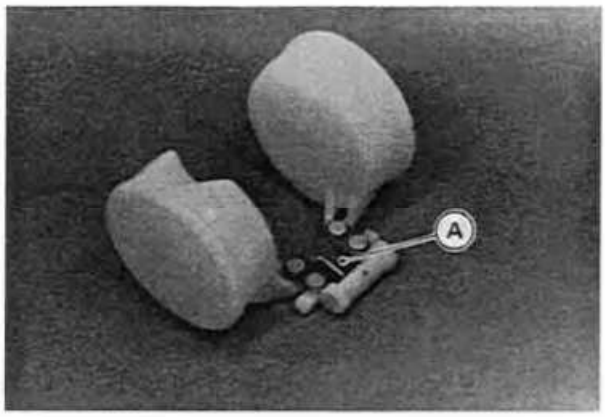

1. Fuel Level Gauge: 57001-1017
2. Fuel Hose
3. Carburetor Body Bottom Edge
4. Zero Line
5. Fuel Level

| Fuel level |
| --- |
| 0.5 ±1 mm above the bottom edge of carburetor body |

*Fuel Level Adjustment*

- Read the WARNING in the Fuel Level Inspection.
- Drain the fuel out of the carburetors into a suitable container.
- Remove the float bowl by taking out the screws with lockwashers.
- Slide out the pivot pin and remove the float.
- Bend the tang on the float arm very slightly to change the float height. Increasing the float height lowers the fuel level and decreasing the float height raises the fuel level.

| Float Height |
| --- |
| 17.0 mm |

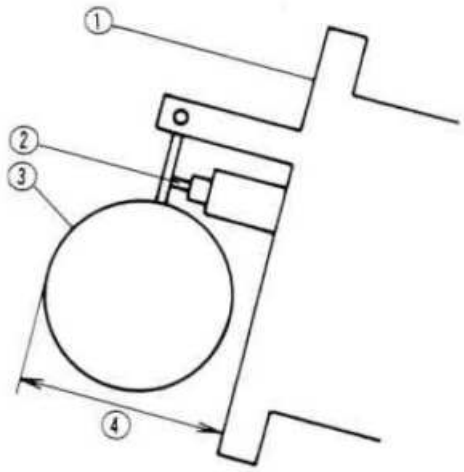



A. Tang

- Assemble the carburetor, and recheck the fuel level.

★If the fuel level cannot be adjusted by this method, the float or the float valve is damaged.

**Float Height Measurement-Keihin Carburetor**



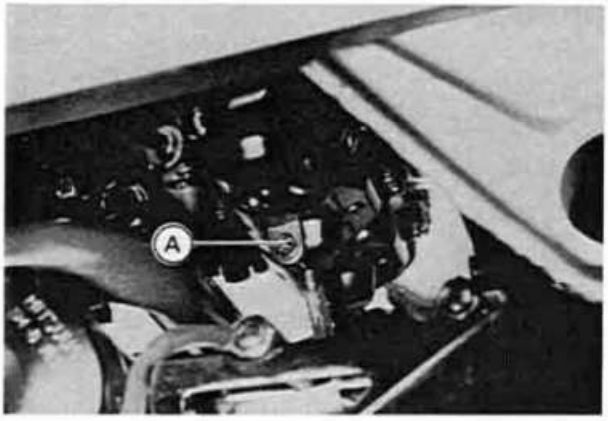

1. Float bowl mating surface
2. Float valve needle rod
3. Float
4. Float Height

*Fuel System Cleanliness Inspection*

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Connect a suitable hose to the fitting at the bottom of each carburetor float bowl.
- Run the lower ends of the hoses into a suitable container.
- Turn the fuel tap to the PRI position.
- Turn out each drain plug a few turns and drain the float bowls.



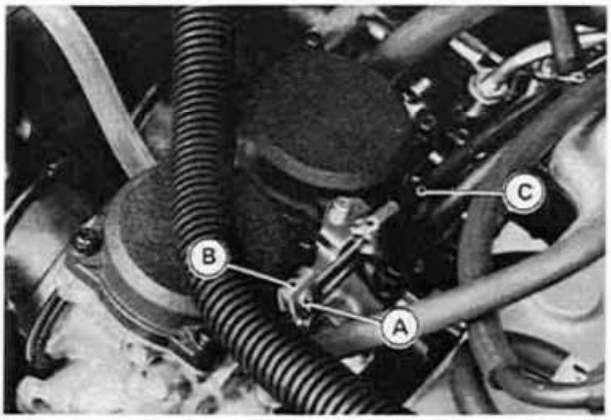

A. Drain Plug

- Check to see if water or dirt comes out.
- Tighten the drain plugs and turn the fuel tap to the ON position.

★If any water or dirt appeared during the above inspection, clean the fuel system (see Carburetor Cleaning and Fuel Tank and Tap Cleaning).

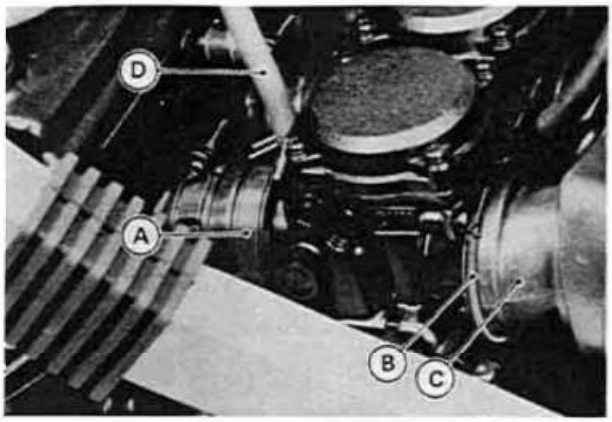
### *Carburetor Assembly Removal*

- Remove the fuel tank.
- Pull the vacuum switch air hose out of the air cleaner housing.
- Loosen the throttle cable adjuster locknuts, and turn in the adjusters.
- Loosen the choke cable adjuster locknuts, and turn in the adjuster.
- Slip the tip of the choke inner cable out of the lever, and pull the cable out.




A. Tip B. Lever C. Choke Cable

- Loosen the carburetor holder clamp screws.
- Slide the spring bands off the air cleaner ducts.




A. Clamp C. Duct
B. Spring D. Vacuum Hose

- Slide the hose clamps up, and pull the vacuum hoses off the carburetors.
- Slip the carburetors up and out.
- Slip the tips of the throttle inner cables out of the pulley to complete carburetor assembly removal.

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- After removing the carburetors, stuff pieces of lint-free, clean cloth into the carburetor holders and the intake ducts to keep dirt out of the engine and air cleaner.

**WARNING**

○**If dirt or dust is allowed to pass through into the carburetors, the throttle may become stuck, possibly causing an accident.**

**CAUTION**

○**If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.**

### *Carburetor Assembly Installation Notes*

- After installing the carburetors, perform the following.

○Check fuel leakage from the carburetors.

**WARNING**

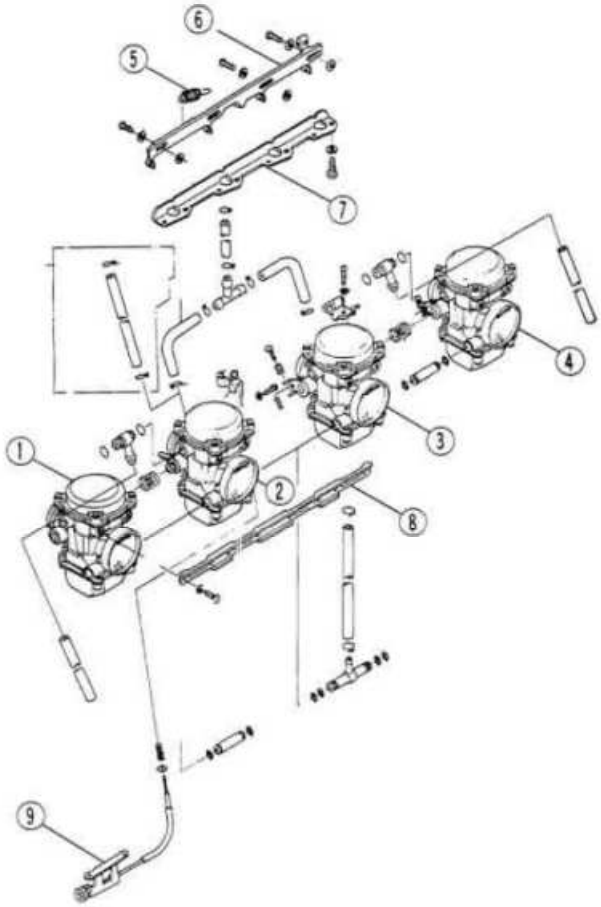
○**Fuel spilled from the carburetors is hazardous.**

○Adjust the following items if necessary.
Idle speed
Carburetor synchronization
Throttle cable
Choke cable

### *Carburetor Separation*

- Remove the carburetor assembly.
- Remove the following parts before carburetor separation.
  - Idle Adjusting Screw Holder
  - Choke Lever Spring and Choke Lever
  - Carburetor Mounting Plates

**Carburetor**



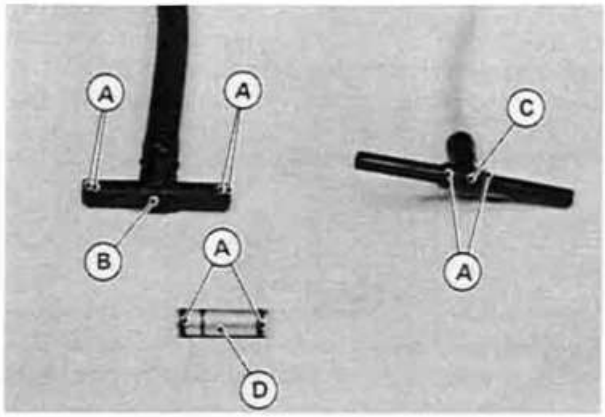

1. No. 1 Carburetor
2. No. 2 Carburetor
3. No. 3 Carburetor
4. No. 4 Carburetor
5. Choke Lever Spring
6. Choke Lever
7. Mounting Plate (Upper)
8. Mounting Plate (Lower)
9. Idle Adjusting Screw Holder

- Gently, separate the carburetors from each other.

### *Carburetor Installation*

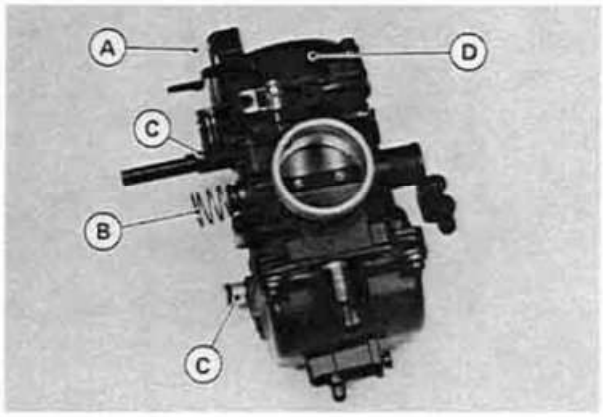
- When installing the carburetor, be careful of the following items.

○Check to see that all the O-rings are in place.



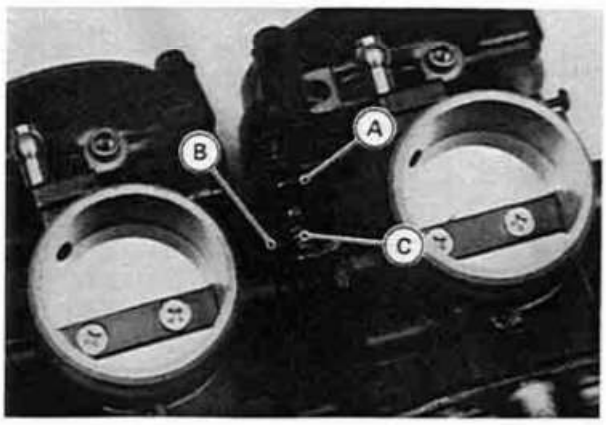

A. O-rings
B. Fuel Pipe Fitting
C. Fitting
D. Fitting

○Install the fittings and spring as shown, and connect the two right side or left side carburetors.




A. Fitting Pipe
B. Spring
C. Fitting
D. No. 3 Cylinder's Carb.

○Install the throttle connecting plates and spring as shown.



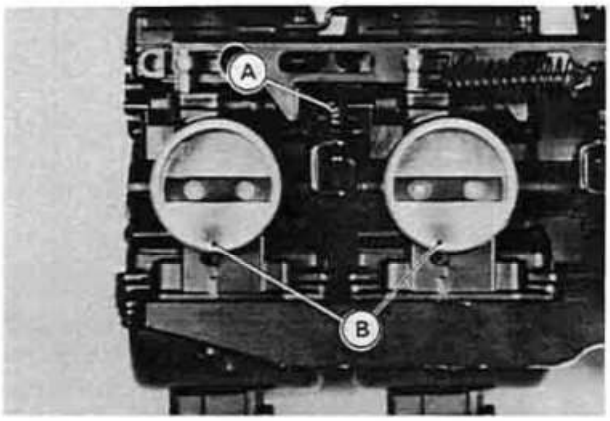

A. Plate
B. Plate
C. Spring

•The center lines of the carburetor bores must be parallel both horizontally and vertically. If they are not, loosen the mounting screws and align the carburetors on a flat surface. Retighten the mounting screws.
•After assembling the choke mechanism, check to see that the choke shaft slides right to left smoothly without abnormal friction.

CAUTION

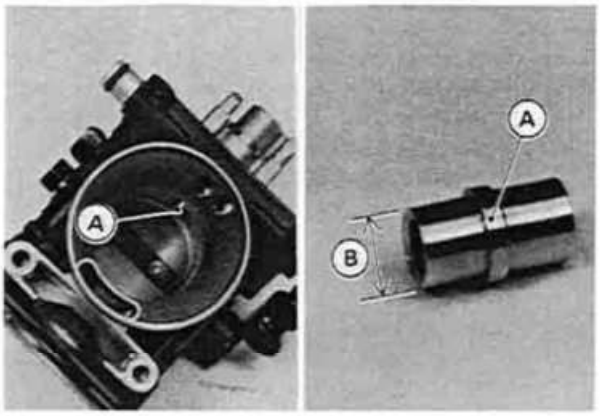
○**Fuel mixture trouble could result if the starter does not seat properly in its rest position after the choke knob is returned.**

•Visually synchronize the throttle (butterfly) valves.
○Check to see that all throttle valves open and close smoothly without binding when turning the pulley.
○Visually check the clearance between the throttle valve and the carburetor bore in each carburetor.



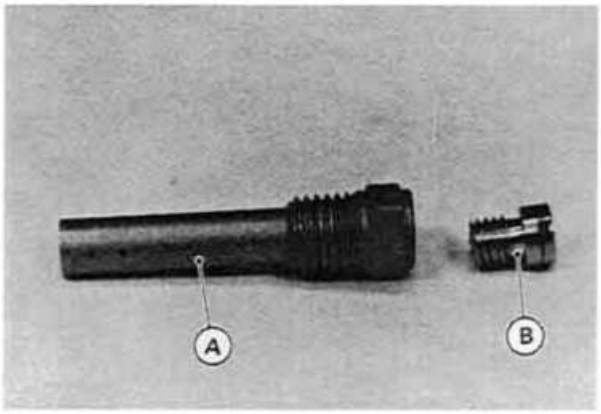

A. Balance Adjusting Screw
B. Clearance

☆If there is a difference between any two carburetors, turn the balance adjusting screw(s) to obtain the same clearance.




A. Needle Jet B. Small Diameter End

•Carefully screw in the air bleed pipe. It will seat against the needle jet, pushing the end of the jet into the carburetor bore.




A. Needle Jet B. Secondary Main Jet

*Carburetor Disassembly and Assembly Notes*

CAUTION

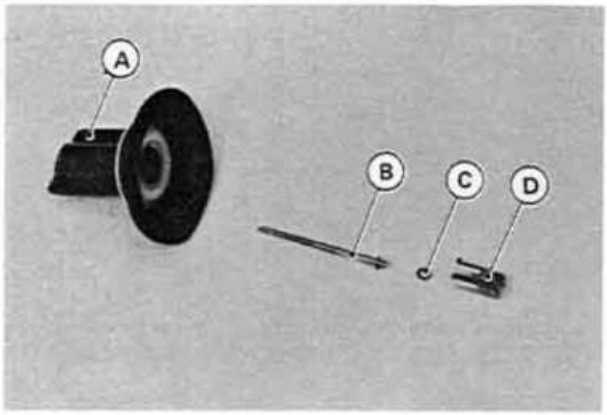
○**During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp tool to remove the diaphragm.**

•To install the needle jet, turn the carburetor body upside-down, and drop the needle jet into place so that the smaller diameter end of the jet goes in first.

CAUTION

○**Do not force the air bleed pipe or overtighten it. The needle jet or the carburetor body could be damaged requiring replacement.**

•Slip the jet needle through the hole in the center of the vacuum piston, and put the washer and spring seat on the top of the needle. Turn the seat so that it does not block the hole at the bottom of the vacuum piston.



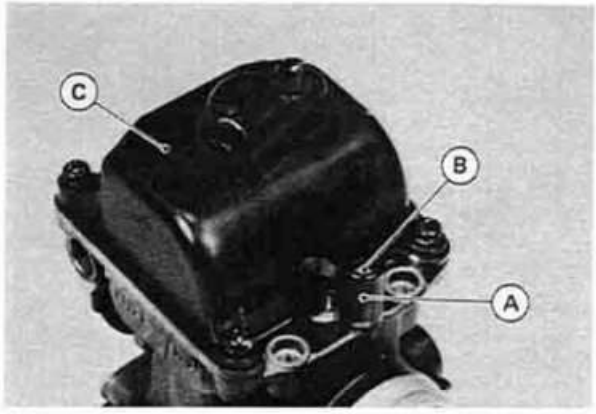

A. Vacuum Piston
B. Jet Needle
C. Washer
D. Spring Seat

•Remove the pilot screws from the carburetors as follows.

○For the US model, remove the pilot screw plug as follows:

Punch a hole in the plug and pry it out with an awl or other suitable tool.

○Turn in the pilot screw and count the number of turns until it seats fully but not tightly, and then remove the screw. This is to set the screw to its original position when assembling.



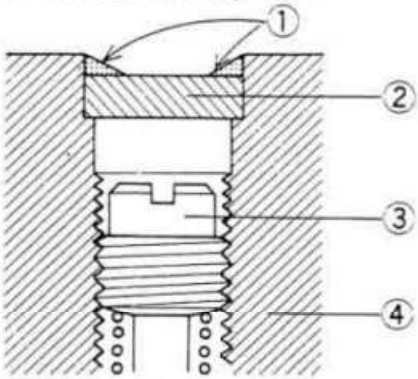

A. Pilot Screw
B. Plug (US model only)
C. Float Bowl

○Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly.

○For the US model, install the pilot screw plug as follows:

Install a new plug in the pilot screw hole, and apply a small amount of a bonding agent to the circumference of the plug to fix the plug.

**Plug Installation (US model only)**




1. Apply a bonding agent.
2. Plug
3. Pilot screw
4. Carburetor body

**CAUTION**

**○Do not apply too much bonding agent to the plug or the pilot screw itself may be fixed.**

*Carburetor Cleaning*

**WARNING**

**○Clean the carburetors in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetors.**

**CAUTION**

**○Do not use compressed air on an assembled carburetor, the floats may be crushed by the pressure, and the vacuum piston diaphragms may be damaged.**

**○Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage or deterioration of the parts.**

**○The carburetor body has plastic parts that cannot be removed. DO NOT use a strong carburetor cleaning solution which could attack these parts; instead, use a mild high flash-point cleaning solution safe for plastic parts.**

**○Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.**

•Disassemble the carburetors.
•Immerse all the metal parts in a carburetor cleaning solution.
•Rinse the parts in water.
•When the parts are clean, dry them with compressed air.
•Blow through the air and fuel passages with compressed air.
•Assemble the carburetors.

*Carburetor Inspection*

**WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Remove the carburetors.
- Before disassembling the carburetors, check the fuel level (see Fuel Level Inspection).

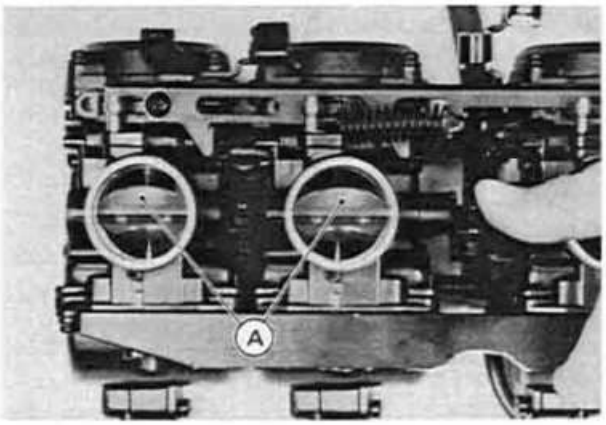
★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.

- Move the choke shaft left and release it to check that the starter plungers move smoothly and return by spring tension.

★If the starter plungers do not work properly, replace the carburetors.

- Turn the throttle cable pulley to check that the throttle butterfly valves move smoothly and return by spring tension.

★If the throttle valves do not more smoothly, replace the carburetors.



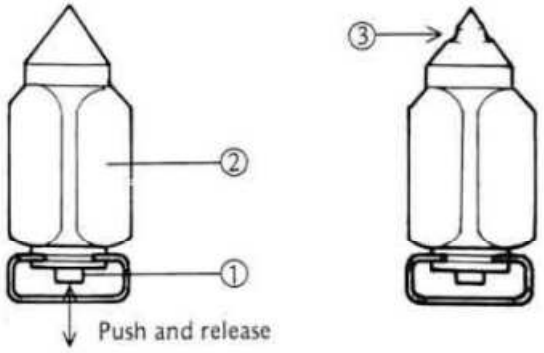

A. Throttle Valves

- Disassemble the carburetors.
- Clean the carburetors.
- Check that the O-rings on the float bowl and drain plug and the diaphragm on the vacuum piston are in good condition.

★If any of the O-rings or diaphragms are not in good condition, replace them.

- Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

**Float Valve Wear**



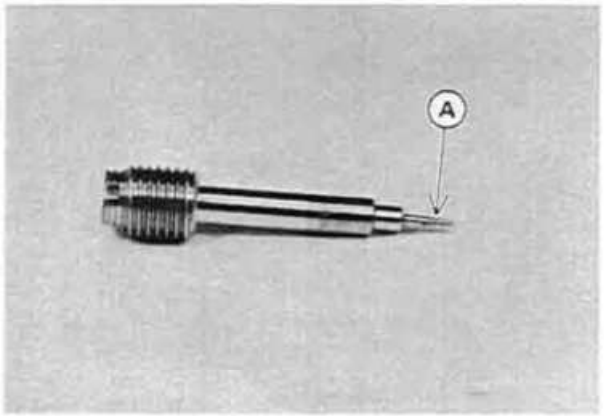

1. Rod
2. Valve Needle
3. Valve Needle Wear

★If the plastic tip is damaged, replace the needle.

- Push in the rod in the other end of the float valve needle and then replace it.

★If it does not spring out, replace the needle.

- Check the tapered portion of the pilot screw for wear or damage.

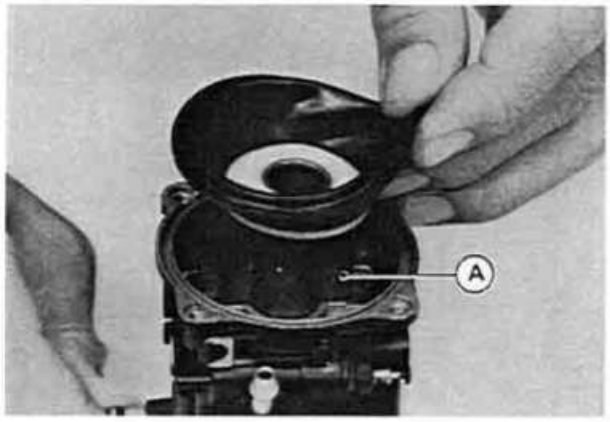



A. Tapered Portion

★If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly, Replace it.

- Check that the vacuum piston moves smoothly in the carburetor body. The surface of the piston must not be excessively worn.

★If the vacuum piston does not move smoothly, or if it is very loose in the carburetor body, replace the carburetor.

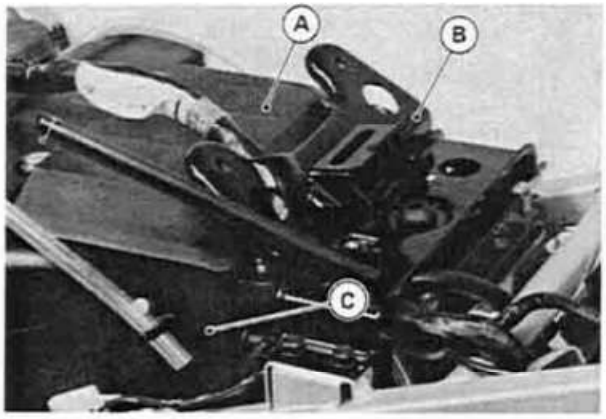



A. Vacuum Piston

## Air Cleaner

### *Air Cleaner Element Removal*

- Remove the fuel tank.
- Remove the fuel tank bracket bolts and take off the bracket.
- Remove the air cleaner housing cover screws and take off the cover.




A. Cover
B. Fuel Tank Bracket
C. Air Cleaner Housing

- Pull out the air cleaner element.

**WARNING**

**○If dirt or dust is allowed to pass through into the carburetors, the butterfly valves may become stuck, possibly causing an accident.**

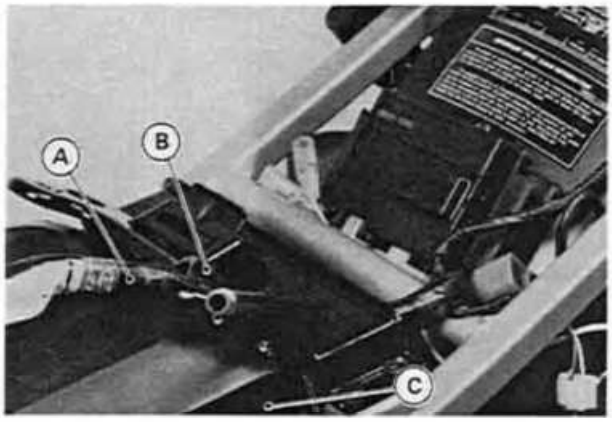
**CAUTION**

**○If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.**

### *Air Cleaner Element Installation*

- Element installation is the reverse of removal. Note the following.

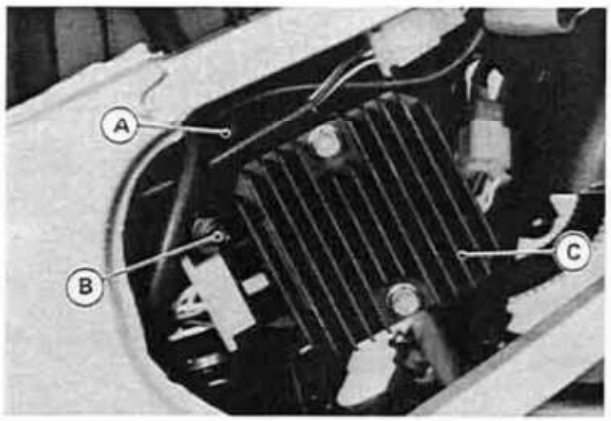
○When installing the fuel tank bracket, route the wiring harness as shown.




A. Wire Harness
B. Bracket
C. Air Cleaner Housing

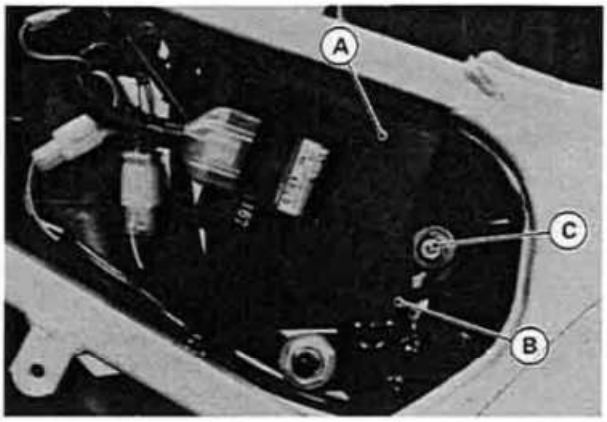
### *Air Cleaner Housing Removal*

- Remove the air cleaner element.
- Remove the battery.
- Remove the regulator/rectifier mounting bolts and then remove the air cleaner housing lower mounting bolt.



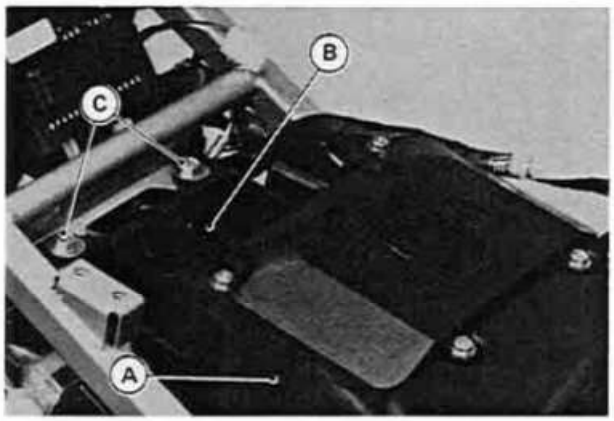

A. Air Cleaner Housing
B. Mounting Bolt
C. Regulator/Rectifier

- Remove the air cleaner housing lower mounting bolt.




A. IC Igniter C. Mounting Bolt
B. Air Cleaner Housing

●Remove the air cleaner upper mounting bolts.




A. Air Cleaner Housing C. Mounting Bolts
B. Battery Case

●Slip the spring band that connects each air cleaner duct to its carburetor out of place.
●Remove the air cleaner housing upward.

### *Air Cleaner Housing Installation*

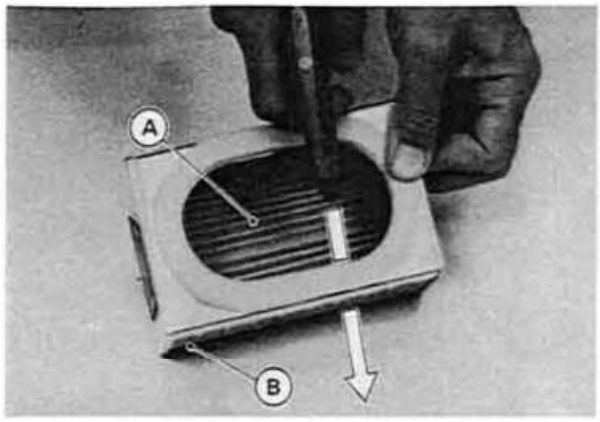
●Installation is the reverse of removal.

### *Air Cleaner Element Cleaning*

**NOTE**

○*In dusty areas, the element should be cleaned more frequently than the recommended interval.*
○*After riding through rain or on muddy roads, the element should be cleaned immediately.*

●Remove the air cleaner element (see Air Cleaner Element Removal).
●Clean the element by directing a stream of compressed air from the inside to the outside (from the clean side to the dirty side).

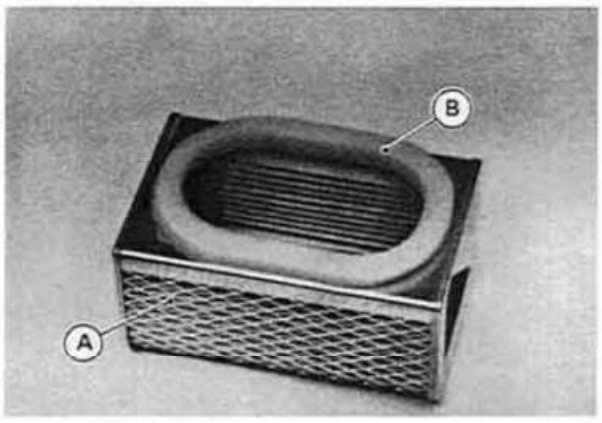



A. Inside B. Outside

●Inspect the element before installing it (see Air Cleaner Element Inspection and Replacement and Air Cleaner Element Installation).

### *Air Cleaner Element Inspection and Replacement*

●Remove the air cleaner element (see Air Cleaner Element Removal).
●Clean the air cleaner element (see Air Cleaner Element Cleaning).
●Visually inspect the element for tears or breaks. Check the sponge gasket also, and the frame.




A. Element B. Gasket

★If the element or gasket have any tears or breaks, replace the element.
★If the element frame is damaged or distorted, replace the element.
★If the sponge gasket comes loose, stick it back on with an adhesive sealant.
●Repeated cleaning opens the pores of the foam in the element. Replace the element according to the Periodic Maintenance Chart (see General Information chapter).

## Fuel Tank

### *Fuel Tank Removal*

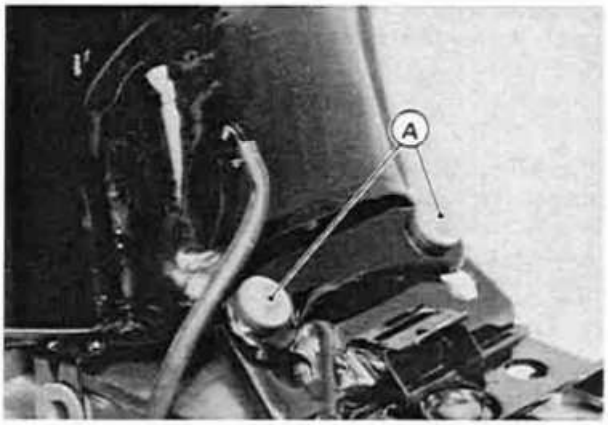
**WARNING**

**○Gasoline is extremely flammable and can be explosive under certain conditions. Turn the engine stop switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

**CAUTION**

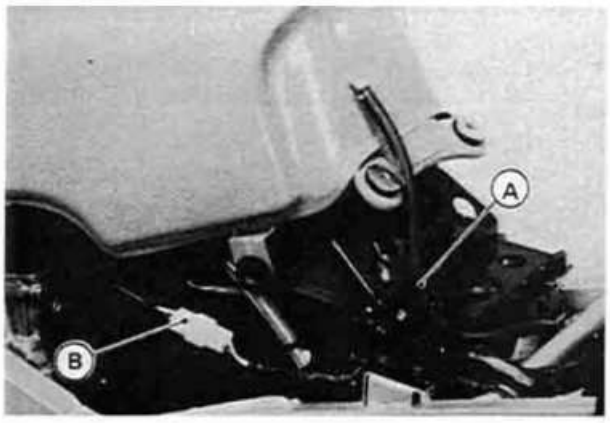
**○For the US california vehicle, if gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated replace it with a new one.**

- Remove the seat and both side covers.
- Remove the bolts from the rear end of the tank.




A. Bolts

- Turn the fuel tap to the ON or RES position.
- Pull off the breather hose from the rear of the tank.
- Tilt the tank out the rear of the frame.
- Disconnect the fuel level sensor connector.




A. Breather Hose B. Connector

- Pull the hoses off the tap.

○For California vehicles, the breather and fuel return hoses must be disconnected from the tank fittings before tank removal. Plug the fuel return fitting. This prevents gasoline from flowing into the canister.

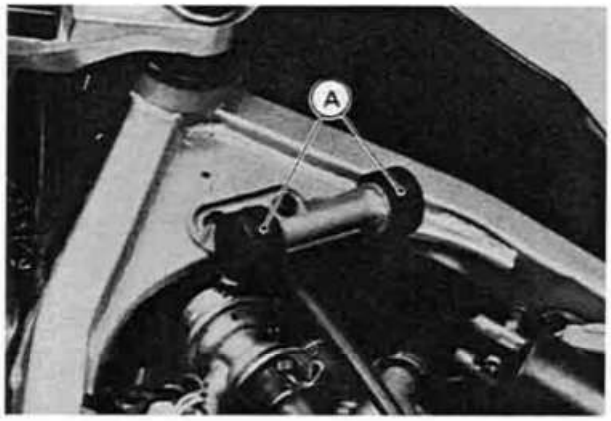
- Drain the fuel tank if necessary.

○Arrange a suitable container under the fuel tank.

○Turn the fuel tap to the PRI position to drain the fuel into the container.

### *Fuel Tank Installation*

- Fuel tank installation is the reverse of removal. Note the following.
- Read the WARNING in the Fuel Tank Removal section.
- Check the rubber dampers on the frame top-tubes.




A. Dampers

★If the dampers are damaged or deteriorated, replace them.

- Be sure the hoses are clamped to the fuel tap and fuel tank to prevent leaks.

### *Fuel Tank and Tap Cleaning*

- Remove the fuel tank and drain it (see Fuel Tank Removal).
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

**WARNING**

**○Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.**

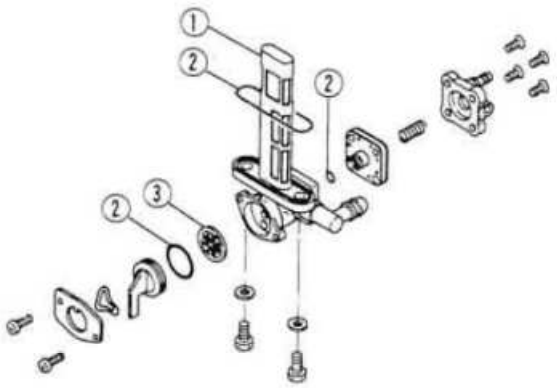
- Pour the solvent out of the tank.
- Remove the fuel tap from the tank by taking out the bolts with nylon washers.
- Clean the fuel tap filter screens in a high flash-point solvent.
- Pour high flash-point solvent through the tap in all lever positions.

•Dry the tank and tap with compressed air.
•Install the tap in the tank (see Fuel Tap Installation).
•Install the fuel tank (see Fuel Tank Installation).

### *Fuel Tap Inspection*

•Remove the fuel tank and drain it (see Fuel Tank Removal).
•Remove the fuel tap by taking out the bolts with nylon washers.
•Check the fuel tap filter screens for any breaks or deterioration.

**Fuel Tap**



1. Filter
2. O-ring
3. Gasket

★If the fuel tap screens have any breaks or are deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.
★If the fuel tap leaks, or allows fuel to flow when it is ON or RES without the engine running, replace the damaged gasket or O-ring.

### *Fuel Tank and Cap Inspection*

•Visually inspect the gaskets on the tank and cap for any damage.
★Replace the gaskets if they are damaged.
•Remove the hose(s) from the fuel tank, and open the tank cap.
•Check to see if the breather pipe (also the fuel return pipe for the US California vehicle) in the tank are not clogged. Check the tank cap breather too.
★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

## Evaporative Emission Control System (US California Vehicle only)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

### *Parts Removal/Installation Notes*

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

**CAUTION**

○**If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated replace it with a new one.**

•To prevent the gasoline from flowing into the canister or from flowing out of the canister, hold the separator perpendicular to the ground.
•Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.

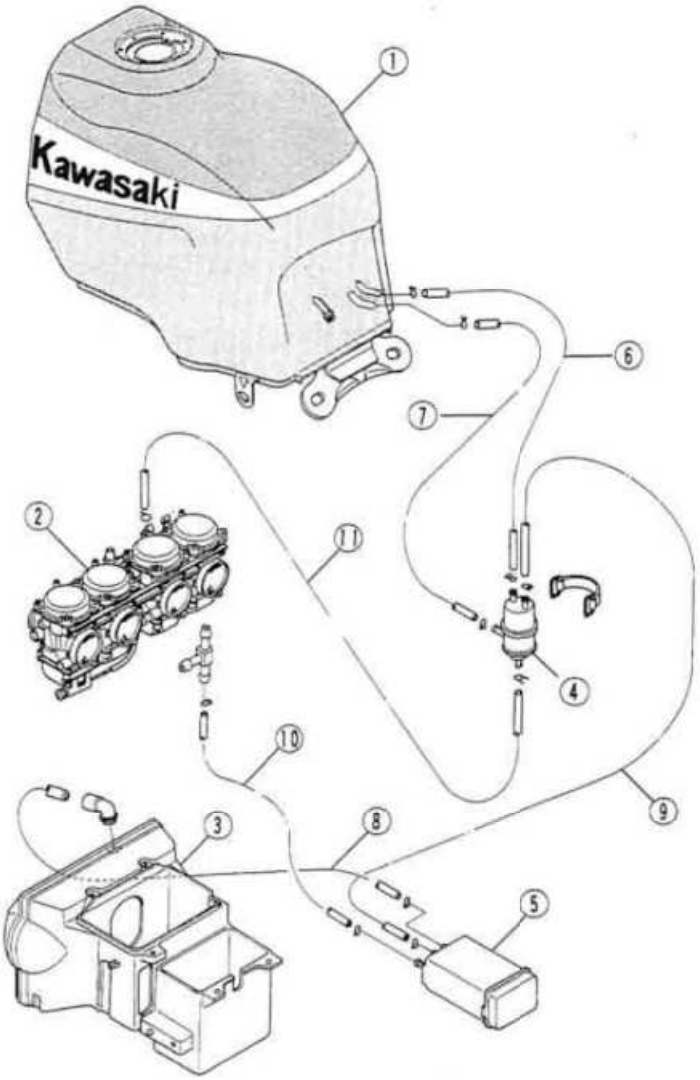
### *Hose Inspection*

•Check that the hoses are securely connected.
•Replace any kinked, deteriorated or damaged hoses.

### *Separator Inspection*

•Disconnect the hoses from the liquid/vapor separator, and remove the separator from the motorcycle.
•Visually inspect the separator for cracks and other damage.
★If the separator has any crack or bad damage, replace it with a new one.

**Evaporative Emission Control System**




1. Fuel Tank
2. Carburetor
3. Air Cleaner Housing
4. Liquid/Vapor Separator
5. Canister
6. Breather Hose (Blue)
7. Fuel Return Hose (Red)
8. Purge Hose (Green)
9. Breather Hose (Blue)
10. Breather Hose (Yellow)
11. Vacuum Hose (White)

*Separator Operation Test*

**WARNING**

○**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL of gasoline into the separator through the hose fitting.
- Disconnect the fuel return hose from the fuel tank.
- Run the open end of the return hose into the container level with the tank top.
- Start the engine, and let it idle.

★If the gasoline in the separator comes out of the hose, the separator works well. If it does not, replace the separator with a new one.

*Canister Inspection*

- Remove the canister, and disconnect the hoses from the canister.
- Visually inspect the canister for cracks and other damage.

★If the canister has any crack or bad damage, replace it with a new one.

**NOTE**

○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

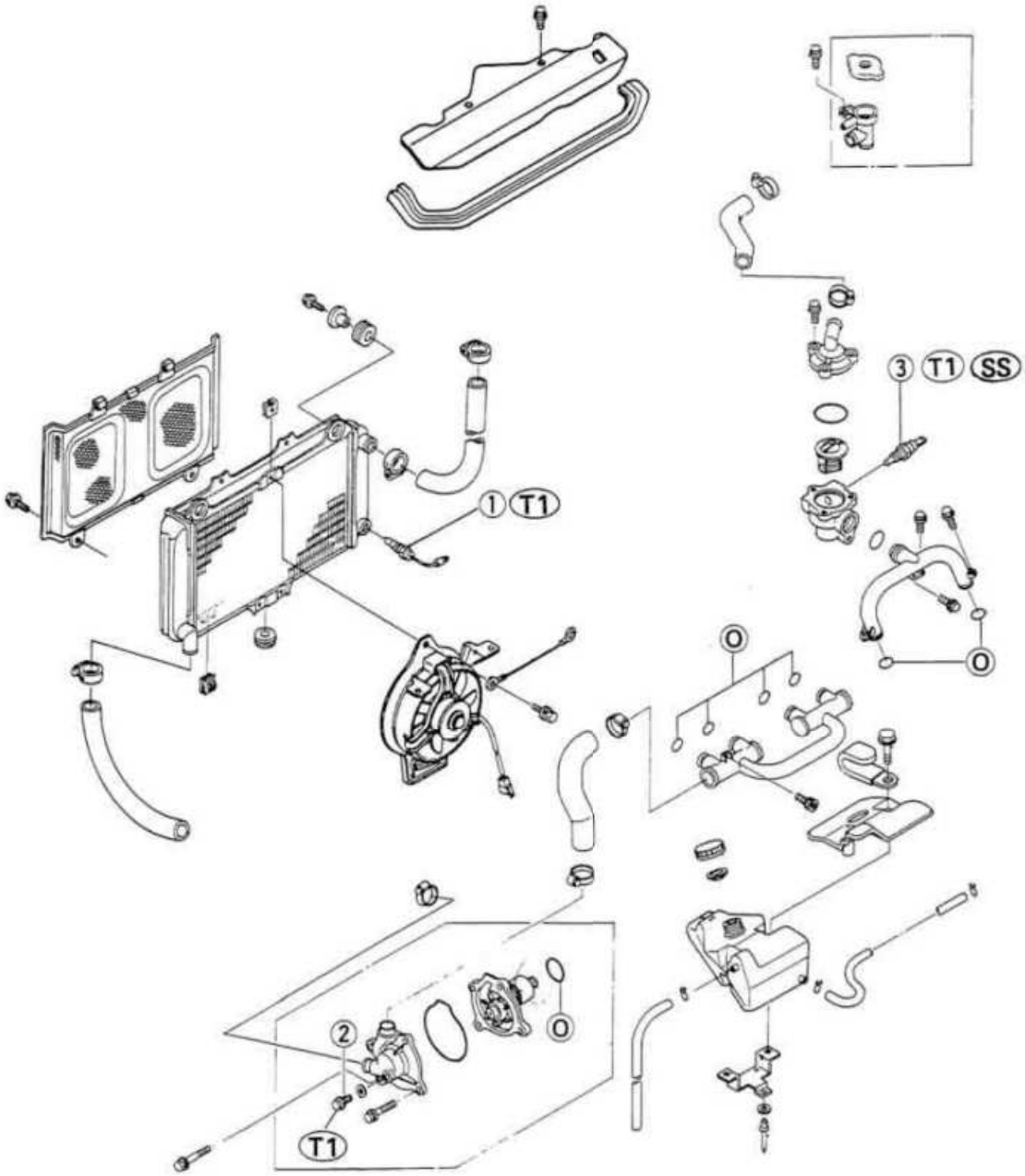
# Cooling System

3

## Table of Contents


**Exploded View** ..... 3-2
**Specifications** ..... 3-3
**Sealant** ..... 3-3
**Cooling System** ..... 3-4
**Coolant** ..... 3-4
*Coolant Deterioration* ..... 3-4
*Coolant Level Inspection* ..... 3-4
*Coolant Draining* ..... 3-5
*Coolant Filling* ..... 3-5
*Air Bleeding* ..... 3-6
*Visual Leak Inspection* ..... 3-6
*Cooling System Pressure Testing* ..... 3-7
*Flushing* ..... 3-7
**Disassembly and Assembly Precautions** ..... 3-7
**Water Pump** ..... 3-7
*Pump Cover Removal* ..... 3-7
*Pump Cover Installation Note* ..... 3-7
*Pump Impeller Inspection* ..... 3-8
*Water Pump Removal* ..... 3-8
*Water Pump Installation Note* ..... 3-8
**Radiator, Radiator Fan** ..... 3-8
*Radiator, Radiator Fan Removal* ..... 3-8
*Radiator Installation Note* ..... 3-10
*Radiator Inspection* ..... 3-10
*Radiator Cleaning* ..... 3-10
*Radiator Cap Inspection* ..... 3-11
*Radiator Hose, Reservoir Tank Hose Inspection* ..... 3-11
*Radiator Hose, Reservoir Tank Tube Installation Notes* ..... 3-11
**Thermostat** ..... 3-11
*Thermostat Removal* ..... 3-11
*Thermostat Housing Removal* ..... 3-12
*Thermostat Housing Installation Note* ..... 3-12
*Thermostat Inspection* ..... 3-12
**Thermostatic Fan Switch, Water Temperature Sensor** ..... 3-13
*Water Temperature Sensor Removal* ..... 3-13
*Installation Note* ..... 3-13
*Inspection* ..... 3-13

## Exploded View




1. Fan Switch (97°C)
2. Drain Plug
3. Water Temperature Sensor

SS : Apply silicone sealant (Kawasaki Bond: 56019-120) to the threads.
O : Apply oil at installation.
T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)

## Specifications

| Item | | Standard |
|---|---|---|
| **Recommended Coolant** | | |
| | Type | Permanent type of antifreeze for aluminum engine and radiator |
| | Color | Green |
| | Mixed ratio | Soft water 50%, coolant 50% |
| | Freezing point | −35°C (−31°F) |
| | Total amount | 2.0 L |
| **Radiator Cap:** | Relief pressure | 93 – 123 kPa<br>(0.95 – 1.25 kg/cm², 14 – 18 psi) |
| **Thermostat:** | | |
| Valve opening temperature | | 69.5 – 72.5°C (157 – 163°F) |
| Valve full opening lift | | not less than 8 mm @85°C (185°F) |

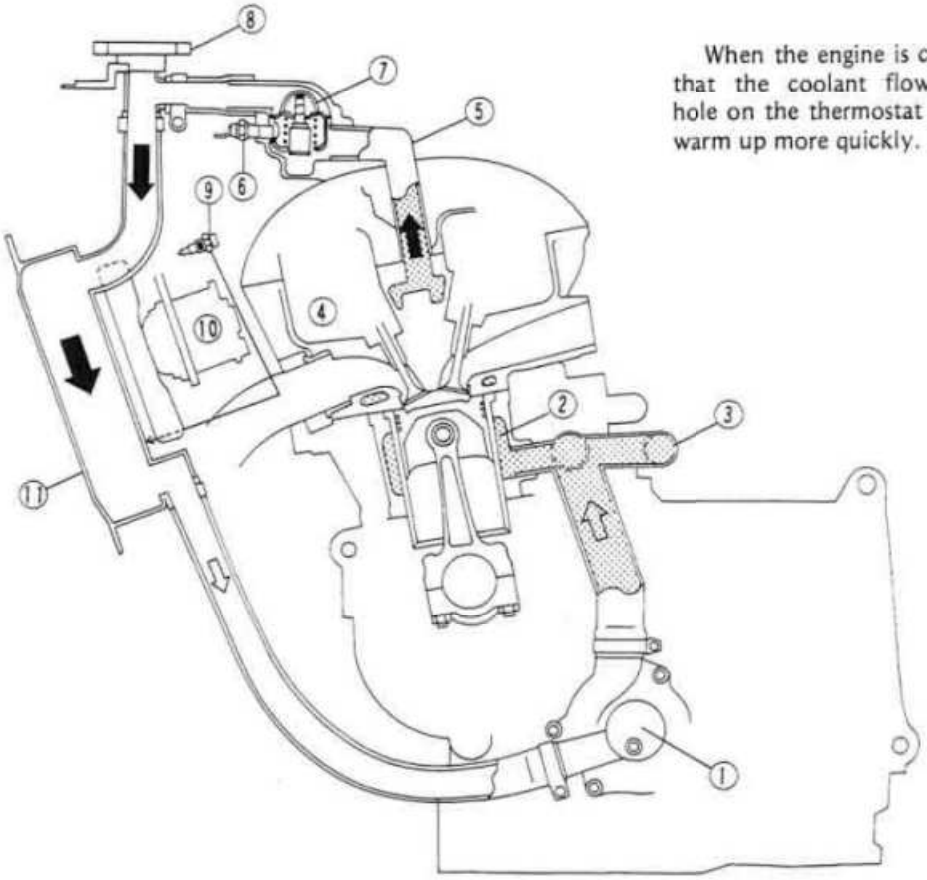
## Sealant

**Kawasaki Bond (Silicone Sealant): 56019-120**



## Cooling System

The liquid cooling system is a pressurized forced circulation type. When the engine load varies, this system controls the engine temperature within narrow limits where the engine operates most efficiently. In this way the engine performs stably in various riding conditions, and is very durable.



When the engine is cold, the thermostat is closed, so that the coolant flow restricted through the small hole on the thermostat (air hole), causing the engine to warm up more quickly.

1. Water pump
2. Water jacket
3. Water pipe (Cylinder)
4. Cylinder head
5. Water pipe (Cylinder head)
6. Water temperature sensor
7. Thermostat
8. Radiator cap
9. Thermostatic fan switch
10. Cooling fan
11. Radiator

## Coolant

### *Coolant Deterioration*

- Visually inspect the coolant in the reservoir tank.
- If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.
- If the coolant gives off an abnormal smell when changing, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

**NOTE**

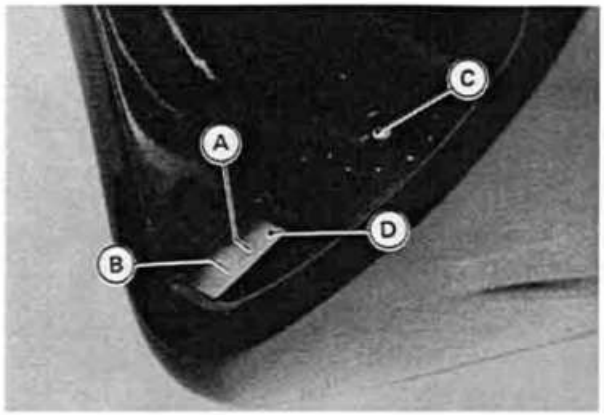
- *Be sure to inspect the coolant at the reservoir tank. If the coolant is checked by removing the radiator cap, the air must be bleed from the cooling system.*

### *Coolant Level Inspection*

- Situate the motorcycle so that it is perpendicular to the ground (on its center stand).
- Check the level through the coolant level gauge on the reservoir tank. The coolant level should be between the H and the L marks.

**NOTE**

- *Check the level when the engine is cold (room or ambient temperature).*
- *Do not check the level by removing the radiator cap. If the cap is removed, air may get into the coolant, and lower cooling efficiency.*




A. H (HIGH) Mark
B. L (LOW) Mark
C. Tank Cap
D. Reservoir Tank

★If the amount of coolant is insufficient, add coolant through the filler opening to the H mark.

**CAUTION**

**○For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.**

**○If coolant must be added often, or the reservoir tank has run completely dry; there is probably leakage in the cooling system. Check the system for leaks (see Visual Leak Inspection, and Pressure Testing).**

### *Coolant Draining*

The coolant should be changed periodically to ensure long engine life.

**CAUTION**

**○Use coolant containing corrosion inhibitors made specifically for aluminum engines and radiators in accordance with the instructions of the manufactures (See Coolant Filling Section).**

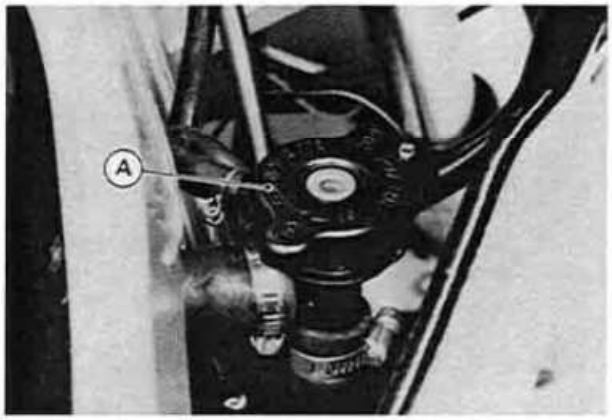
**WARNING**

**○To avoid burns do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.**

**○Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts.**

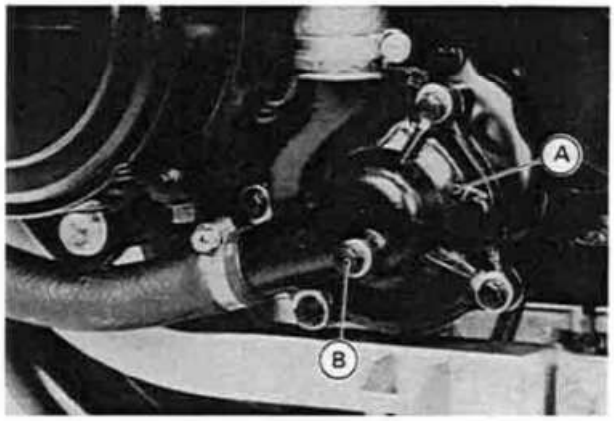
**○Since coolant is harmful to the human body, do not use for drinking.**

•Remove the lower fairing.
•Remove the right side inner fairing.
•Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop and wait there for a few seconds. Then push and turn it further in the same direction and remove the cap.




A. Radiator Cap

•Drain the coolant from the radiator and engine by removing the drain plug at the water pump.



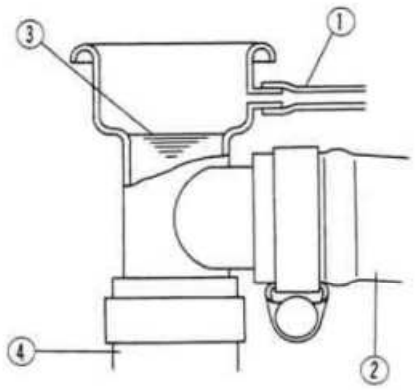

A. Water Pump
B. Drain Plug

•Inspect the old coolant for color, smell (see Coolant Deterioration).

### *Coolant Filling*

•Install the drain plug. Always replace the gasket with a new one, if it is damaged.
•Tighten the drain plug to the specified torque (see Exploded View).
•Fill the radiator up to the radiator filler neck with coolant, and install the cap turning it clockwise about ¼ turn.

**Coolant Filling**




1. Reservoir Tank Tube
2. Radiator Hose – To Engine
3. Coolant Level
4. Radiator Hose – To Radiator

**NOTE**

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*
○*The radiator cap must be installed in two steps. First turn the cap clockwise to the first stop. Then push down on it and the rest of the way.*

●Fill the reservoir tank up to the H mark with coolant, and install the cap.

**CAUTION**

○**Soft or distilled water must be used with the antifreeze (see below for antifreeze) in the cooling system.**
○**If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.**

**NOTE**

○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

**Recommended Coolant**

| | | |
|---|---|---|
| **Type** | : | **Permanent type antifreeze for aluminum engine and radiator** |
| **Color** | : | **green** |
| **Mixed ratio** | : | **soft water 50%, coolant 50%** |
| **Freezing point** | : | **–35°C (–31°F)** |
| **Total amount** | : | **2.0 L (up to H mark)** |

*Air Bleeding*

Before putting the motorcycle into operation, any air trapped in the cooling system must be removed as follows.

●Remove the radiator cap.

●Fill the radiator up to the radiator filler neck with coolant.



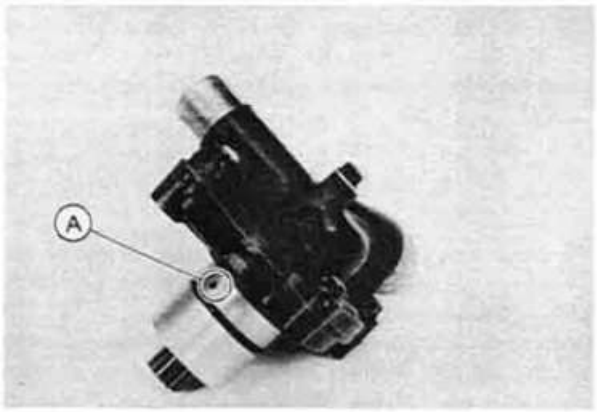

A. Filler Neck B. Coolant Level

●Check the cooling system for leaks.
●Install the radiator cap.
●Start the engine, warm it up thoroughly, and then stop it.
●Check the coolant level in the reservoir tank after the engine cools down.
★If the coolant level is low, add coolant up to the H mark through the reservoir tank opening.

*Visual Leak Inspection*

Any time the system slowly loses water, inspect for leaks.

●Check the water pump body drainage outlet passage for coolant leaks.
★If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the water pump unit.
★If there are no apparent leaks, pressure test the system.



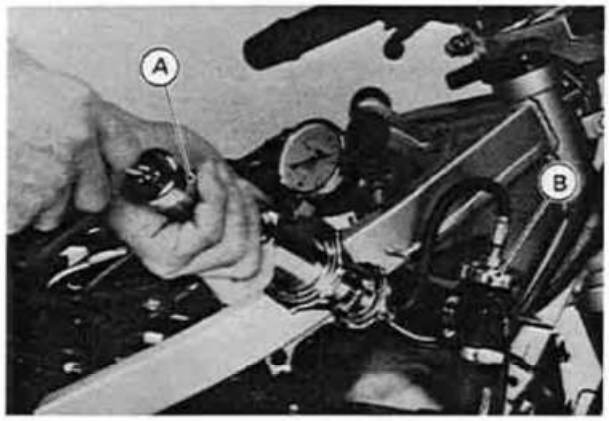

A. Drainage Outlet Passage
:at the bottom of the pump body

*Cooling System Pressure Testing*

CAUTION

○**During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kg/cm², 18 psi).**

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.
- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kg/cm², 18 psi).
- Watch the gauge for at least 6 seconds. If the pressure holds steady, the system is all right.




A. Pressure Tester B. Adapter

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the cylinder liner O-ring for leaks.

*Flushing*

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerably reduce the efficiency of the cooling system.

- Drain the cooling system.
- Fill the cooling system with fresh water mixed with a flushing compound.

CAUTION

○**Avoid the use of a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.**

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant, and bleed the air from the system.

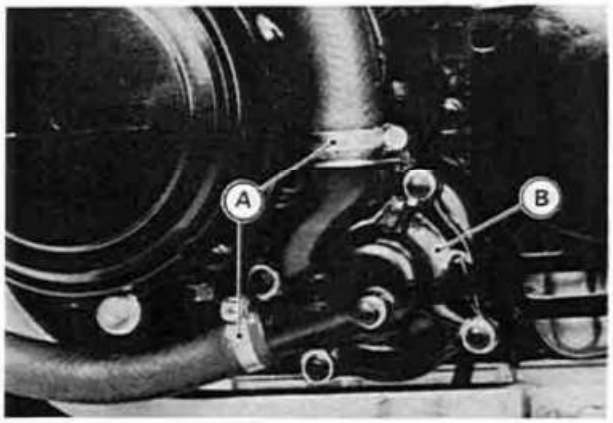
## Disassembly and Assembly Precautions

- Prior to disassembly of cooling system parts (radiator, pump, sensors, etc), wait until the coolant cools down, and then drain the coolant.
- After assembling and filling the system with coolant, bleed any air from the system.

## Water Pump

*Pump Cover Removal*

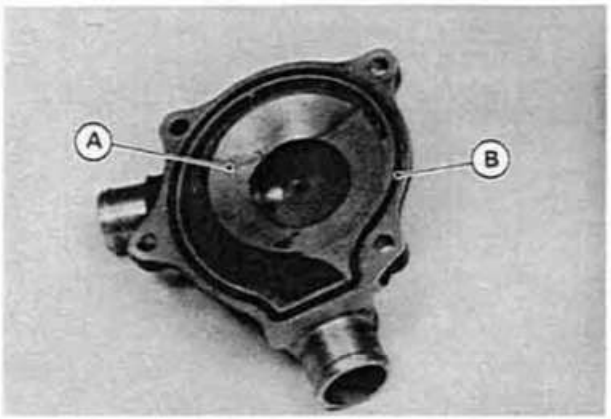
- Drain the coolant by removing the drain plug at the water pump.
- Loosen the clamps and slide the hoses off the pump cover.
- Remove the cover bolts and remove the water pump cover.



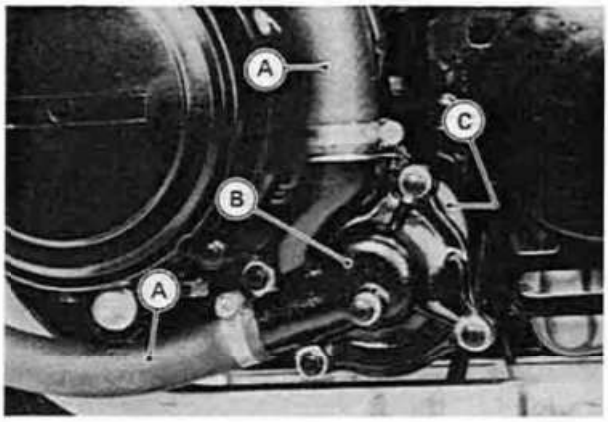

A. Hose Clamps B. Pump Cover

*Pump Cover Installation Note*

- Check that the O-ring is in good condition.




A. Pump Cover B. O-ring




A. Water Hoses C. Gear Case
B. Water Pump

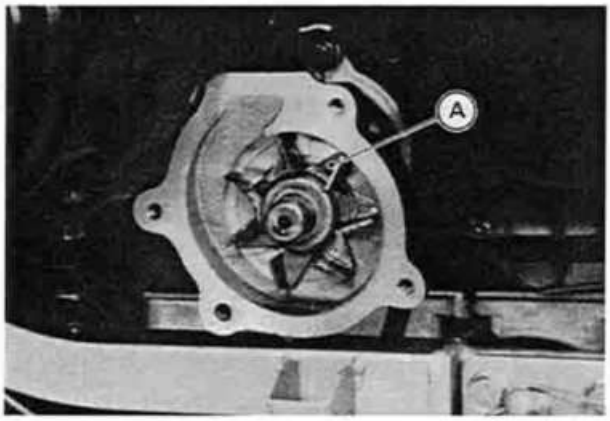
*Water Pump Installation Note*

•Check that the O-ring is good condition, and apply a small amount of engine oil to the O-ring.

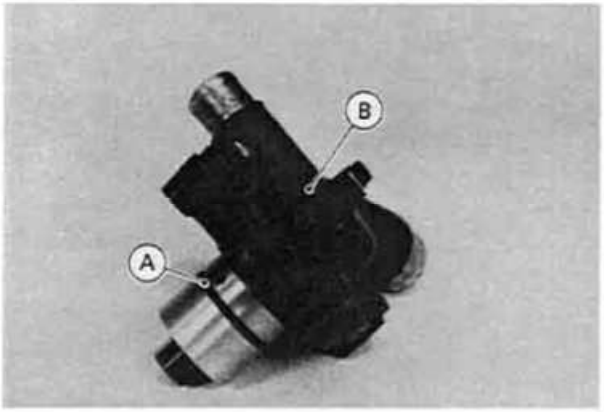
*Pump Impeller Inspection*

•Visually check the impeller.

★If the surface is corroded, or if the blades are damaged, replace the water pump unit.




A. Impeller




A. O-ring B. Pump Body

*Water Pump Removal*

•Remove the lower fairing (see Fairing Removal in Frame chapter).

•Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).

•Drain the coolant.

•Remove the water hoses from the pump.

•Remove the pump mounting bolt, and pull the pump unit out of the water pump gear case.

## Radiator, Radiator Fan

*Radiator, Radiator Fan Removal*

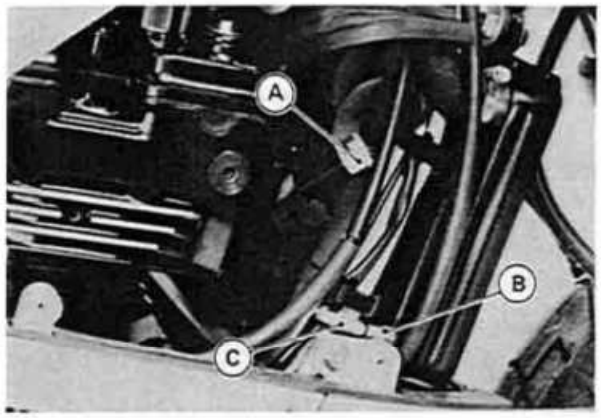
•Remove the upper fairing and lower fairing (see Fairing Removal in Frame chapter).

•Drain the coolant.

•Disconnect the fan motor connector before removal of the radiator or radiator fan.

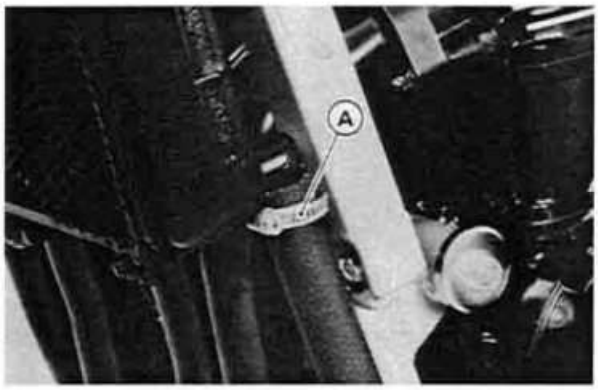
**WARNING**

**○The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.**



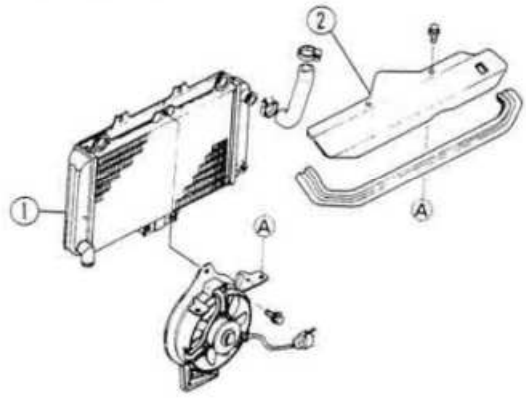

A. Fan Motor Connector
B. Fan Switch
C. Fan Switch Connector
D. Hose Clamp (Right)

- Disconnect the fan switch connector.
- Loosen the hose clamps and pull off the radiator hoses on both side.



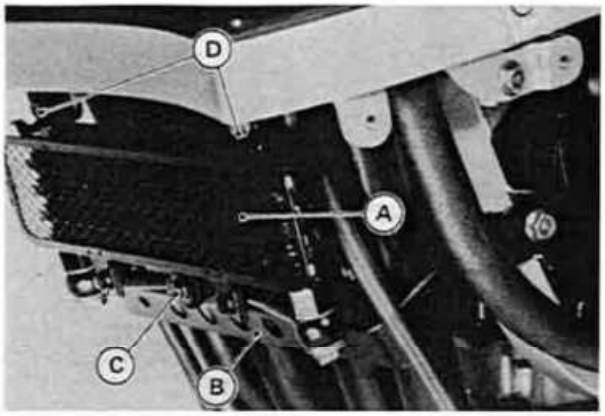

A. Hose Clamp (Left)

- Remove the mounting bolts and pull the baffle plate toward the left.



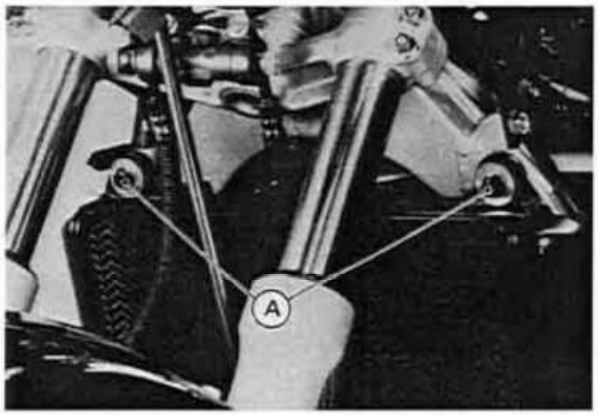

1. Radiator
2. Baffle Plate

- Remove the bolts and remove the oil cooler stay.
- Remove the oil cooler mounting bolts and let the cooler hang from the stays.



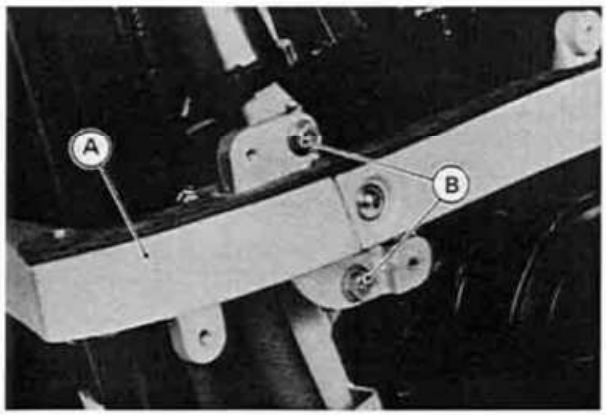

A. Oil Cooler
B. Stay
C. Mounting Bolt (To stay)
D. Mounting Bolts (To fairing stay)

- Remove the radiator mounting bolts.



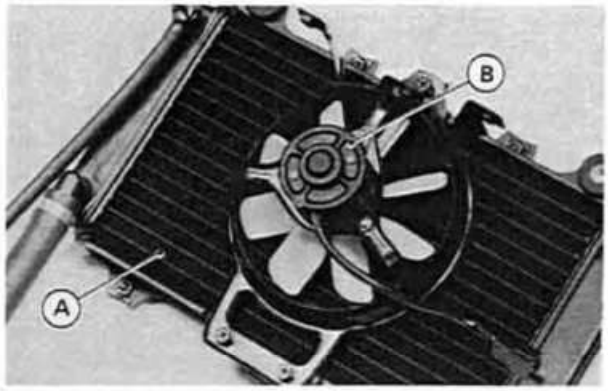

A. Mounting Bolt

- Remove the bolts and take off the front fairing stay with the radiator, and then separate them.




A. Fairing Front Stay
B. Mounting Bolts

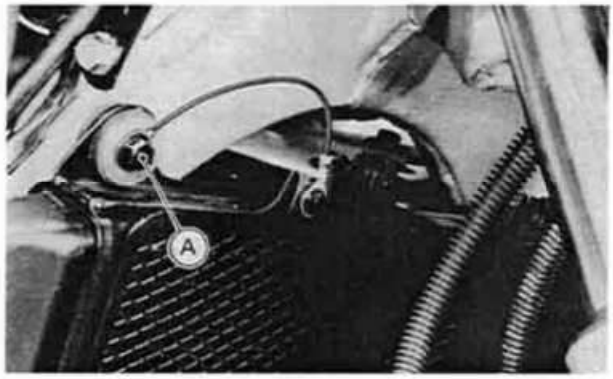
- Pour out the coolant.
- Separate the radiator fan from the radiator.




A. Radiator B. Radiator Fan

*Radiator Installation Note*

•Be sure to install the fan switch ground lead on the radiator mounting bolt.



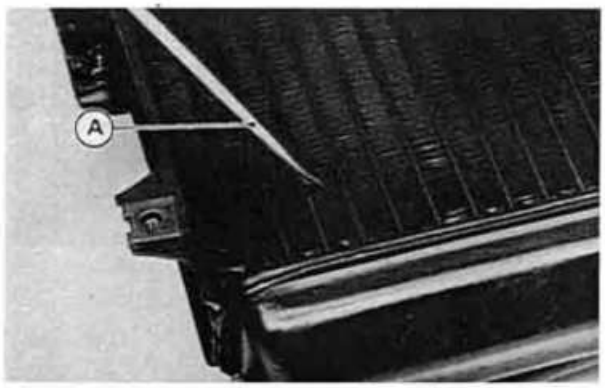

A. Mounting Bolt

*Radiator Inspection*

•Check the radiator core.

★If there are obstructions to air flow, remove them.

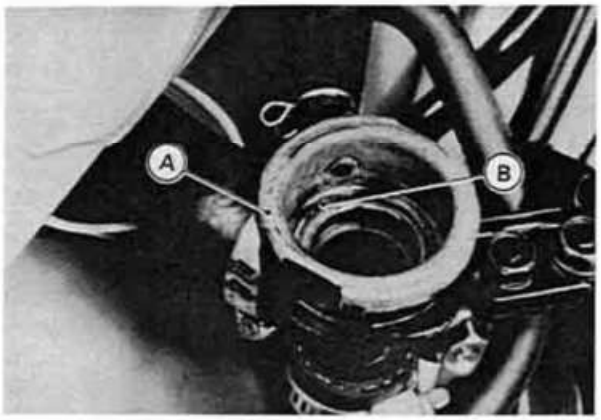
★If the corrugated fins are deformed, carefully straighten them with the blade of a thin screw driver.




A. Thin Screwdriver

•Check the radiator filler neck for signs of damage.

•Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly.




A. Top Sealing Seat B. Bottom Sealing Seat

*Radiator Cleaning*

**CAUTION**

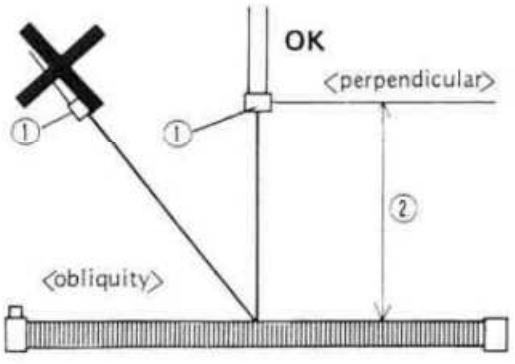
**○When cleaning the radiator with steam cleaner, be careful of the following to avoid damage to the fins.**

**○Keep the air nozzle over 0.5 m (20 in.) away from the radiator.**

**○Blow air perpendicularly to the radiator core.**

**○Never blow air at an angle against the fins but straight through them in the direction of natural air flow.**

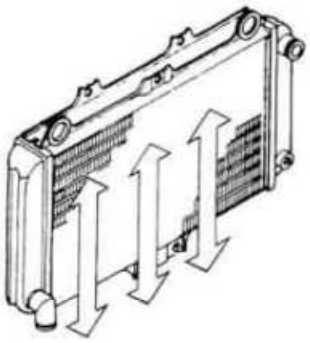
**○Never shake the air nozzle at a right angle against the fins, be sure to move it at a level with the fins.**




1. Steam Gun 2. More than 0.5 m

•Run the gun horizontally following the core fin direction.

**Radiator Cleaning**

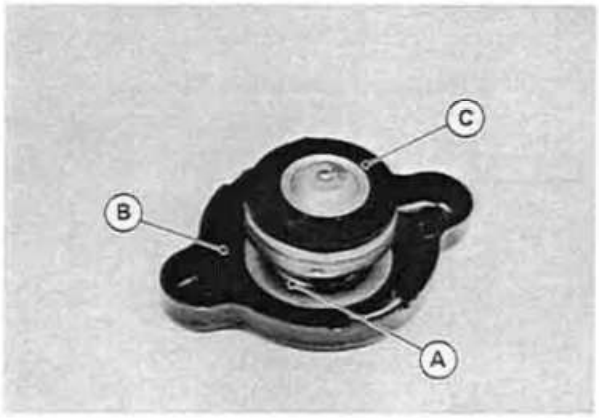


★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

*Radiator Cap Inspection*

- Check the condition of the valve spring, and the top and bottom valve seals of the radiator cap.

★If any one of them shows visible damage, replace the cap.

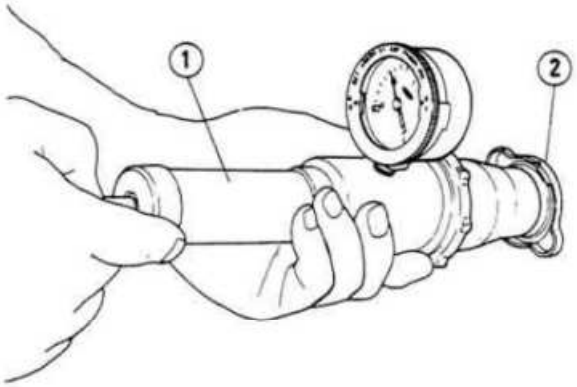



A. Valve Spring
B. Top Seal
C. Bottom Seal

- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Install the cap on a cooling system pressure tester.
- Watching the pressure gauge, pump the pressure tester to build up the pressure. The cap must retain the pressure at least 6 seconds. Also the cap must open at the pressure shown in the table.

| Radiator Cap Relief Pressure |
|---|
| 93 ~ 123 kPa<br>(0.95 ~ 1.25 kg/cm², 14 ~ 18 psi) |

★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.



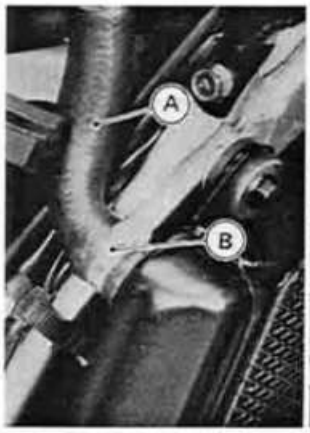

1. Pressure Tester
2. Radiator Cap

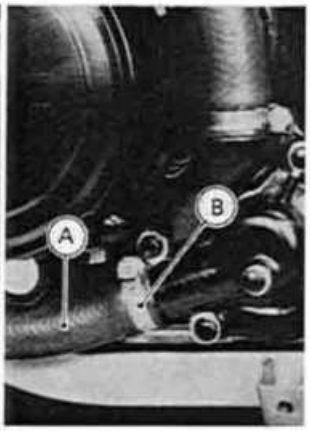
*Radiator Hose, Reservoir Tank Tube Inspection*

- In accordance with the Periodic Maintenance Chart, visually inspect the hoses and tube for signs of deterioration. Squeeze them. They should not be hard and brittle, nor should they be soft or swollen.
- Replace any damaged parts.

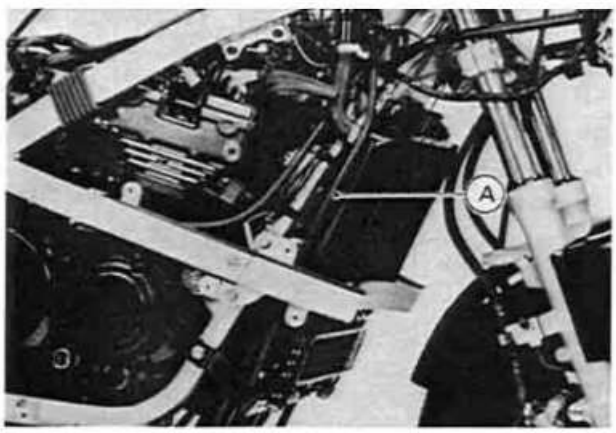
*Radiator Hose, Reservoir Tank Tube Installation Notes*

- Install the radiator hoses and tubes being careful to follow bending direction. (see Exploded Views). Avoid sharp bending, kinking, flattening, or twisting.
- Tighten the hose clamps securely.




A. Radiator Hoses
B. Clamps

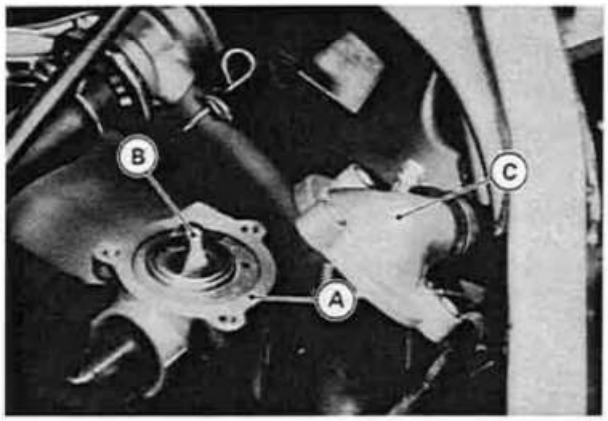



A. Reservoir Tank Tube

## Thermostat

### *Thermostat Removal*

- Remove the following parts.
  - Seat
  - Side Covers
  - Fuel Tank
- Remove the thermostat cover bolts and lift off the cover.

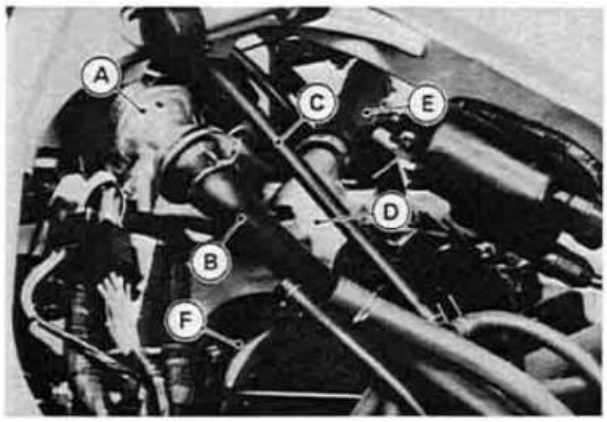



A. Housing
B. Thermostat
C. Cover

- Pull the thermostat out of the thermostat housing.

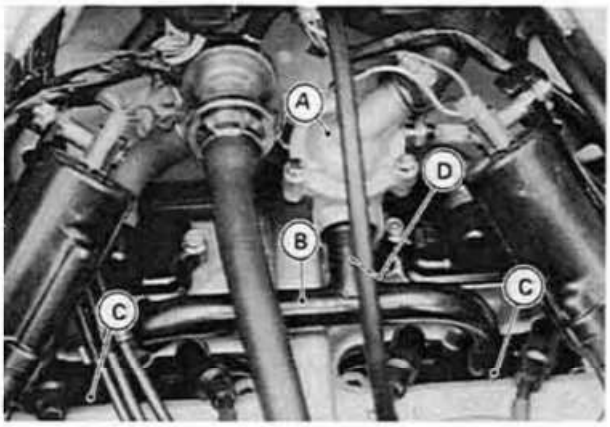
### *Thermostat Housing Removal*

- Pull the vacuum switch valve air hose out of the air cleaner housing.
- Pull the vacuum hose out of the vacuum switch valve.
- Slide the radiator hose clamp out of place. Disconnect the hose from the thermostat housing.




A. Vacuum Switch Valve
B. Air Hose
C. Vacuum Hose
D. Thermostat Housing
E. Radiator Hose
F. Water Pipe

- Remove the water pipe mounting bolts, and pull the pipe with thermostat housing out of the cylinder head.



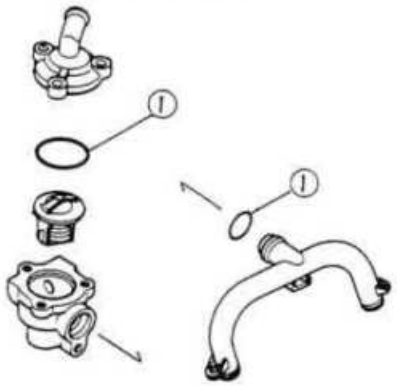

A. Thermostat Housing
B. Water Pipe
C. Pipe Mounting Bolts
D. Housing Bolt

- Remove the thermostat housing bolt, and pull the housing out of the water pipe.
- Remove the thermostat cover and pull out the thermostat if necessary.

### *Thermostat Housing Installation Note*

- Be sure to install the thermostat housing O-ring.

**Thermostat Housing Installation**

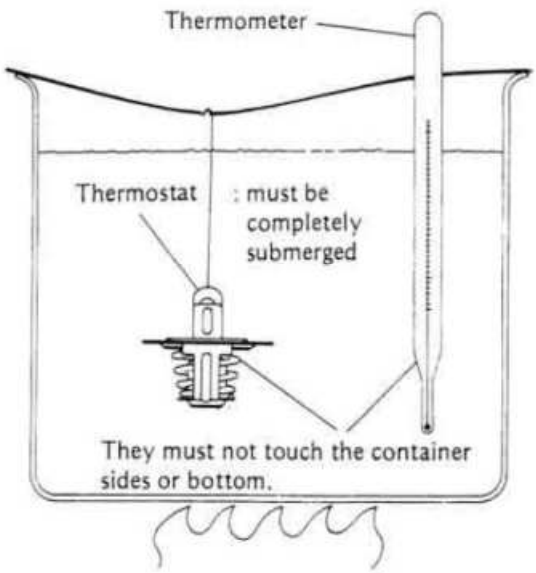



1. O-ring

### *Thermostat Inspection*

- Remove the thermostat, and inspect the thermostat valve at room temperature.
- ★If the valve is open, replace the valve with a new one.
- To check valve opening temperature, suspend the thermostat and an accurate thermometer in a container of water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

**Valve Opening Temperature Measurement**




- Watch the valve. As soon as the valve starts to open, note the temperature.
- ★If it is out of the service limit range, replace the thermostat.

| Thermostat Valve Opening Temperature |
|---|
| 69.5 ~ 72.5°C (157 ~ 163°F) |

## Thermostatic Fan Switch Water Temperature Sensor

*Water Temperature Sensor Removal*

**CAUTION**

**○The fan switch or the water temperature sensor should never be allowed to fall on a hard surface. Such a shock to these parts can damage them.**

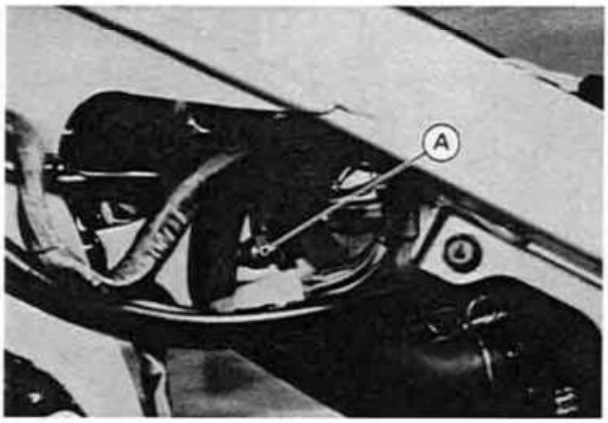
- Drain the coolant (see Coolant Draining).
- Remove the sensor connector.
- Remove the thermostat housing (see Termostat Removal).
- Remove the sensor.

*Installation Note*

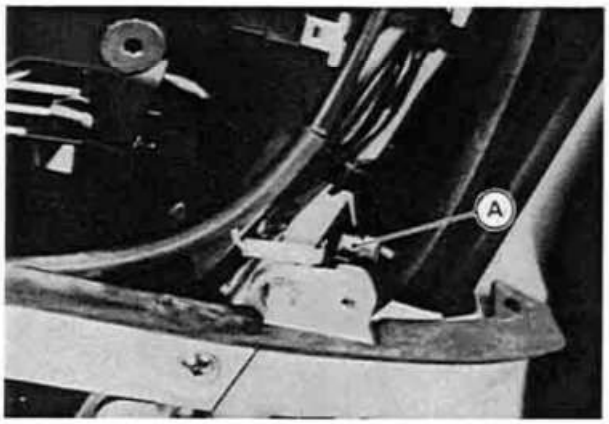
- Apply silicone sealant (Kawasaki Bond: 56019-120) to the threads before mounting the sensor.
- Tighten the water temperature sensor and the fan switch to the specified torque (see Exploded View).

*Inspection*

Refer to the Electrical System chapter.




A. Water Temperature Sensor




A. Thermostatic Fan Switch

# Engine Top End

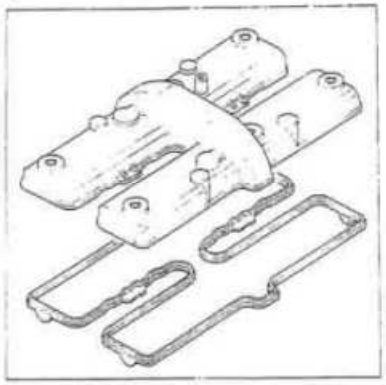
## Table of Contents


**Exploded View** . . . . . 4-2
**Specifications** . . . . . 4-4
**Special Tools** . . . . . 4-6
**Sealant** . . . . . 4-6
**Clean Air System (US model)** . . . . . 4-7
*Air Suction Valve Removal* . . . . . 4-7
*Air Suction Valve Installation Notes* . . . . 4-7
*Vacuum Switch Valve Installation Note* . . . . . 4-7
*Air Suction Valve Inspection* . . . . . 4-7
*Clean Air System Hose Inspection* . . . . . 4-8
*Vacuum Switch Valve Test* . . . . . 4-8
**Cylinder Head Cover** . . . . . 4-8
*Cylinder Head Cover Removal* . . . . . 4-8
*Cylinder Head Cover Installation Notes* . . . . . 4-9
**Camshaft Chain Tensioner** . . . . . 4-9
*Chain Tensioner Removal* . . . . . 4-9
*Chain Tensioner Installation* . . . . . 4-9
**Camshaft, Camshaft Chain, Rocker Shaft** . . . . 4-10
*Camshaft, Rocker Shaft Removal* . . . . . 4-10
*Rocker Shaft Installaiton Notes* . . . . . 4-11
*Camshaft Installation (Including Chain Timing Procedure)* . . . . . 4-12
*Camshaft and Sprokcet Assembly Notes* . . . . . 4-13
*Camshaft Oil Clearance Inspection* . . . . . 4-13
*Camshaft Chain Wear* . . . . . 4-14
*Camshaft Chain Guide Wear* . . . . . 4-14
**Cylinder Head** . . . . . 4-14
*Compression Measurement* . . . . . 4-14
*Cylinder Head Removal* . . . . . 4-15
*Cylinder Head Installation Notes* . . . . . 4-15
*Cylinder Head Disassembly and Assembly (Valve Mechanism Removal and Installation)* . . . . . 4-16
*Cylinder Head Warp* . . . . . 4-17
*Cylinder Head Cleaning* . . . . . 4-18
**Valve** . . . . . 4-18
*Valve Clearance Inspection* . . . . . 4-18
*Valve Clearance Adjustment* . . . . . 4-19
*Valve Seat Inspection* . . . . . 4-19
*Valve Seat Repair* . . . . . 4-19
*Measuring Valve-to-Guide Clearance (Wobble Method)* . . . . . 4-21
**Cylinder, Piston** . . . . . 4-23
*Cylinder Removal* . . . . . 4-23
*Cylinder Installation Notes* . . . . . 4-24
*Piston Removal* . . . . . 4-24
*Piston Installation Note* . . . . . 4-25
*Piston Ring, Piston Ring Groove Wear* . . . . . 4-26
*Piston Ring End Gap* . . . . . 4-26
*Cylinder Inside Diameter* . . . . . 4-26
*Piston Diameter* . . . . . 4-27
*Boring, Honing* . . . . . 4-27
**Carburetor Holder** . . . . . 4-27
*Carburetor Holder Installation* . . . . . 4-27
**Muffler** . . . . . 4-28
*Muffler Removal* . . . . . 4-28
*Muffler Installation Note* . . . . . 4-29


4

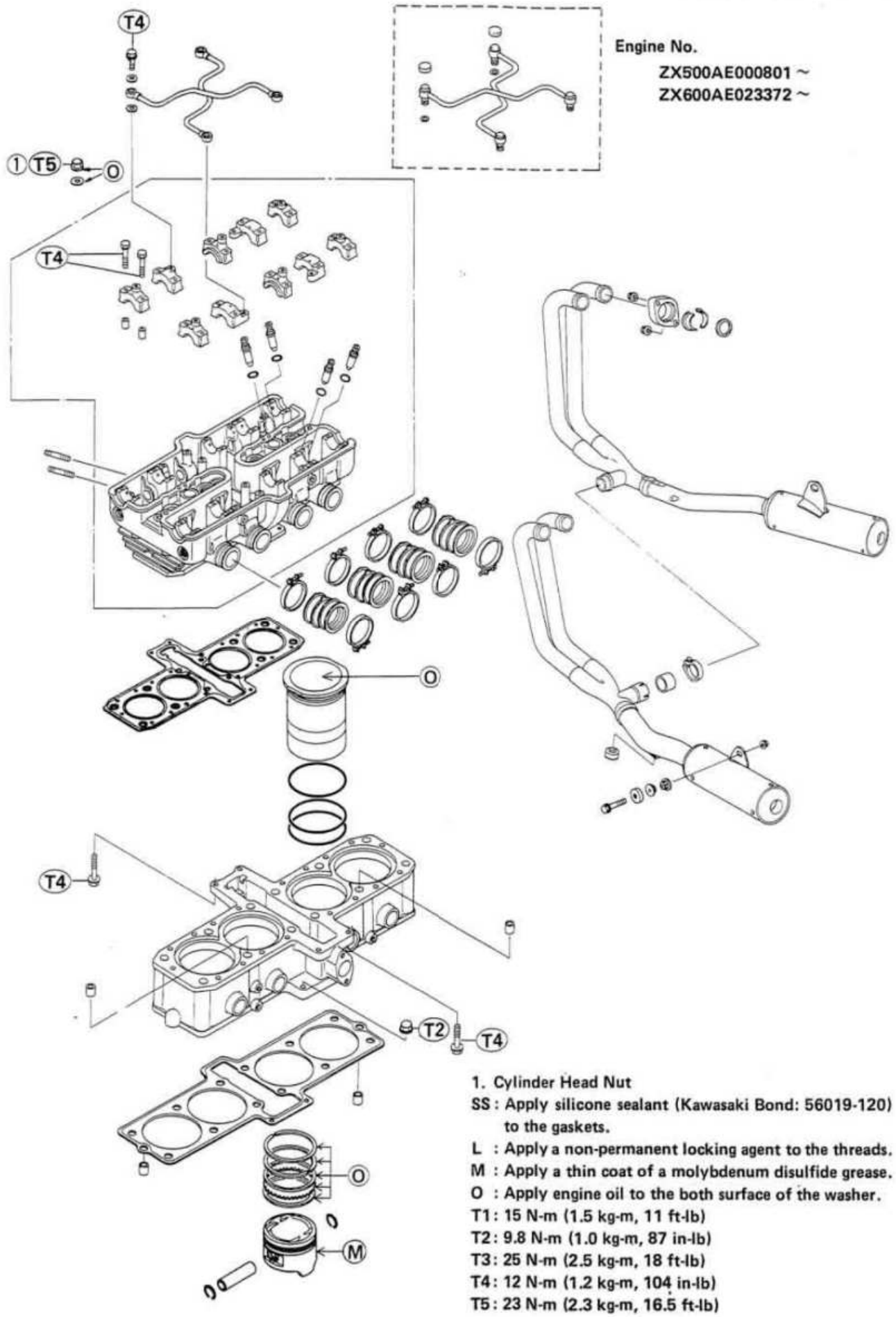
## Exploded View

(Other than US model)






Ca : Canadian model

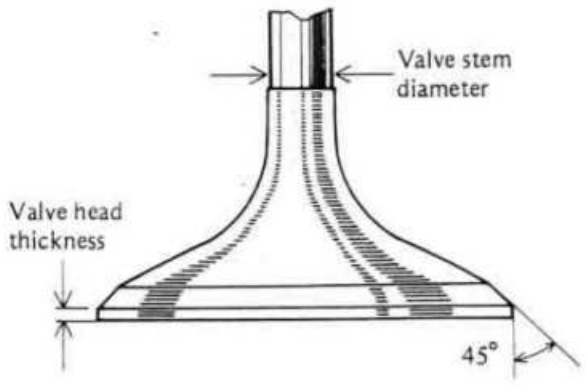



1. Cylinder Head Nut
SS : Apply silicone sealant (Kawasaki Bond: 56019-120) to the gaskets.
L : Apply a non-permanent locking agent to the threads.
M : Apply a thin coat of a molybdenum disulfide grease.
O : Apply engine oil to the both surface of the washer.
T1 : 15 N-m (1.5 kg-m, 11 ft-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 : 25 N-m (2.5 kg-m, 18 ft-lb)
T4 : 12 N-m (1.2 kg-m, 104 in-lb)
T5 : 23 N-m (2.3 kg-m, 16.5 ft-lb)

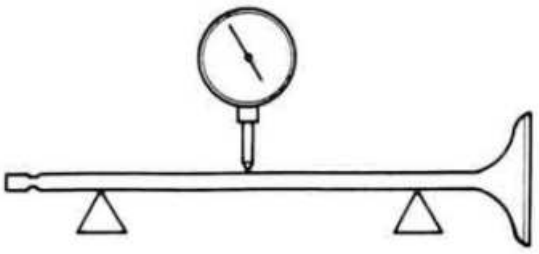
## Specifications

| Item | | Standard | Service Limit |
|---|---|---|---|
| **Cylinder Head, Valves:** | | | |
| Valve clearance: | Inlet | 0.13 – 0.18 mm | – – – |
| | Exhaust | 0.18 – 0.23 mm | – – – |
| Cylinder head warp | | – – – | 0.05 mm |
| Valve head thickness: | Inlet | 0.5 mm | 0.3 mm |
| | Exhaust | 0.8 mm | 0.4 mm |
| Valve stem bend | | Less than 0.02 mm TIR | 0.05 mm TIR |
| Valve stem diameter: | Inlet | 4.975 – 4.990 mm | 4.96 mm |
| | Exhaust | 4.955 – 4.970 mm | 4.94 mm |
| Valve guide inside diameter: | Inlet | 5.000 – 5.012 mm | 5.08 mm |
| | Exhaust | 5.000 – 5.012 mm | 5.08 mm |
| Valve/valve guide clearance (wobble method): | Inlet | 0.03 – 0.10 mm | 0.24 mm |
| | Exhaust | 0.08 – 0.15 mm | 0.29 mm |
| Valve seating surface: | | | |
| Outside diameter | Inlet | 20.7 – 20.9 mm | – – – |
| | Exhaust | 18.3 – 18.5 mm | – – – |
| Width | Inlet | 0.5 – 1.0 mm | – – – |
| | Exhaust | 0.5 – 1.0 mm | – – – |
| Valve spring free length: | Inner | 31.0 mm | 30.0 mm |
| | Outer | 35.0 mm | 33.4 mm |
| Valve seat cutting angle: Inlet, Exhaust | | 32°, 45°, 67.5° | – – – |
| **Clean Air System: (US only)** | | | |
| Vacuum Switch Valve Closing Pressure: Open → Close | | 57 – 65 kPa (430 – 490 mmHg) | – – – |

**Valve Head**

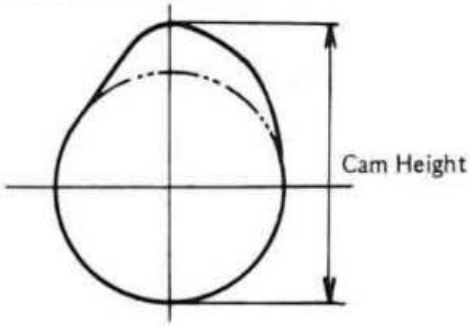



**Valve Stem Bend**

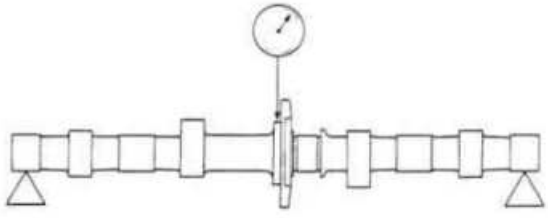


| Item | | Model | Standard | Service Limit |
|---|---|---|---|---|
| **Camshaft:** | | | | |
| Cam height | Inlet | | 36.159 – 36.299 mm | 36.06 mm |
| | Exhaust | | 36.159 – 36.299 mm | 36.06 mm |
| Camshaft bearing oil clearance | | | 0.078 – 0.121 mm | 0.21 mm |
| Camshaft journal diameter | | | 22.900 – 22.922 mm | 22.87 mm |
| Camshaft bearing inside diameter | | | 23.000 – 23.021 mm | 23.03 mm |
| Camshaft runout | | | not more than 0.02 mm TIR | 0.1 mm TIR |
| Camshaft chain 20-link length | | | 127.0 – 127.4 mm | 128.9 mm |
| Rocker arm inside diameter | | | 12.000 – 12.018 mm | 12.05 mm |
| Rocker shaft diameter | | | 11.976 – 11.994 mm | 11.97 mm |
| **Cylinder Compression:** | | | (usable range)<br>755 kPa – 1,080 kPa<br>@550 r/min (rpm)<br>(7.7 – 12.0 kg/cm², 109 – 171 psi) | |
| **Cylinder Block, Piston:** | | | | |
| Cylinder inside diameter | | ZX500 | 55.000 – 55.012 mm | 55.10 mm |
| | | ZX600 | 60.000 – 60.012 mm | 60.10 mm |
| Piston diameter | | ZX500 | 54.952 -- 54.957 mm | 54.80 mm |
| | | ZX600 | 59.942 – 59.957 mm | 59.80 mm |
| Piston/cylinder clearance | | | 0.043 – 0.070 mm | – – – |
| Oversize piston and rings | | | +0.5 mm | – – – |
| Piston ring/groove clearance | | | | |
| | Top | | 0.03 – 0.07 mm | 0.17 mm |
| | Second | | 0.02 – 0.06 mm | 0.16 mm |
| Piston ring groove width | | | | |
| | Top | | 1.02 – 1.04 mm | 1.12 mm |
| | Second | | 1.21 – 1.23 mm | 1.31 mm |
| | Oil | | 2.51 – 2.53 mm | 2.6 mm |
| Piston ring thickness | | | | |
| | Top | | 0.97 – 0.99 mm | 0.9 mm |
| | Second | | 1.17 – 1.19 mm | 1.1 mm |
| Piston ring end gap | Top | | 0.15 – 0.30 mm | 0.6 mm |
| | Second | | 0.15 – 0.35 mm | 0.65 mm |

Cam Height Measurement



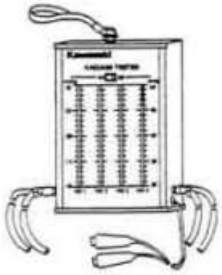

Camshaft Runout



## Special Tools

Along with common hand tools, the following more specialized tools are required for complete engine top end servicing.

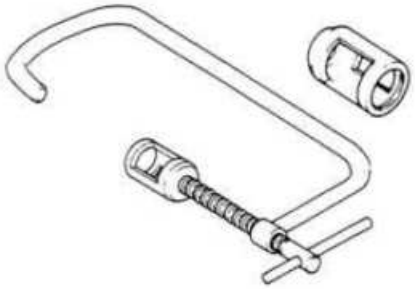
**Vacuum Gauge: 57001-1198**



**Compression Gauge: 57001-221**
**Adapter: 57001-1183**



**Valve Spring Compressor Assembly: 57001-241**
**Adapter: 57001-1202**



**Valve Guide Arbor: 57001-1203**



**Valve Guide Reamer: 57001-1204**



**Valve Adjusting Screw Holder: 57001-1217**



**Cutter Holder ϕ5 mm: 57001-1208**



**Bar: 57001-1128**



**Valve Seat Cutters:**
**(45° ~ ϕ22: 57001-1205)**
**(32° ~ ϕ22: 57001-1206)**
**(67.5° ~ ϕ22: 57001-1207)**



**Piston Pin Puller Assembly: 57001-910**



**Piston Ring Pliers: 57001-115**



**Piston Base: 57001-149**



## Sealant

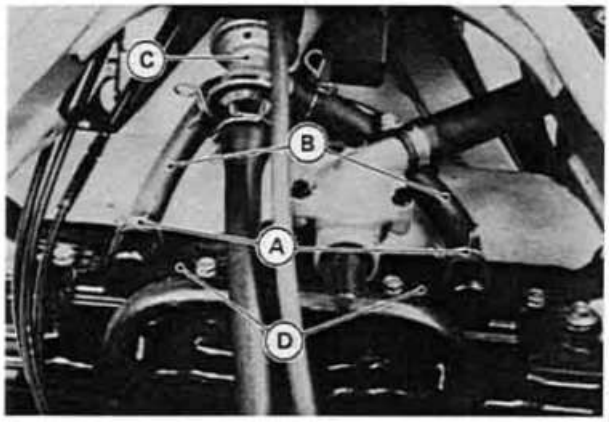
**Kawasaki Bond (Silicone Sealant): 56019-120**



## Clean Air System (US model)

### *Air Suction Valve Removal*

- Remove the fuel tank (see Fuel Tank Removal in Fuel System).
- Remove the ignition coils (see Ignition Coil Removal in Electrical chapter).
- Slide the clamps out of its place from the air hoses of the vacuum switch valve, and then disconnect the air hoses from the air suction valve cover.

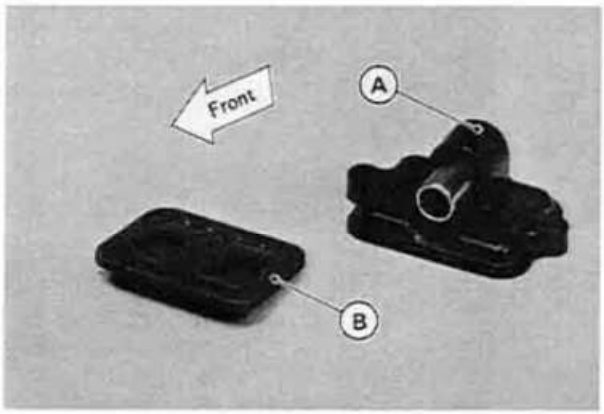



A. Clamps
B. Air Hoses
C. Vacuum Switch Valve
D. Air Suction Valve Cover

- Remove the bolts and take off the air suction valve covers and valves.

### *Air Suction Valve Installation Notes*

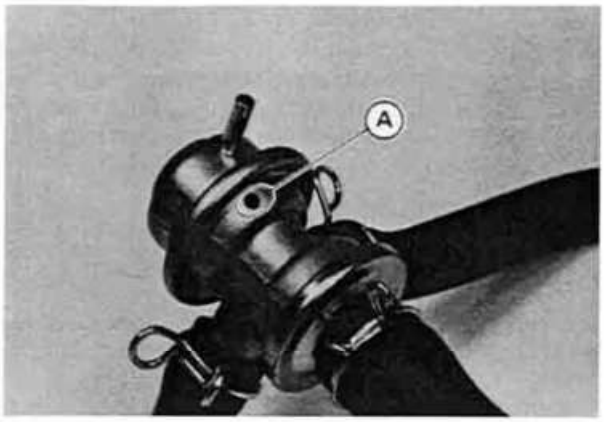
- Replace the gasket with a new one.
- Install the air suction valve and valve cover as shown.




A. Valve Cover
B. Air Suction Valve

### *Vacuum Switch Valve Installation Note*

- Install the switch valve so that the air hole faces downwards.

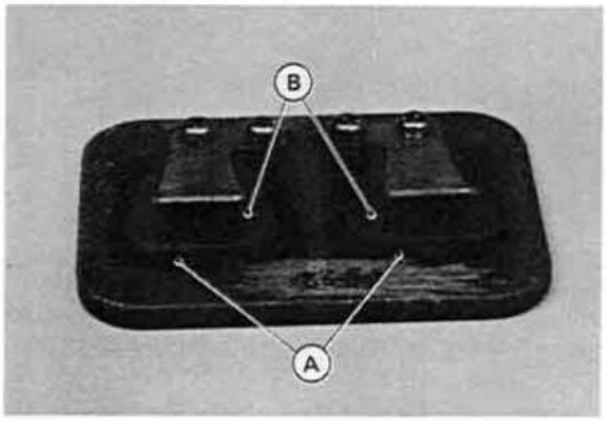



A. Air Hole

### *Air Suction Valve Inspection*

The air suction valve is essentially a check valve which allows fresh air to flow from the air cleaner into the exhaust port. Any air that has passed the air suction valve is prevented from returning to the air cleaner.

- Remove the air suction valves.
- Visually inspect the reeds for cracks, folds, warps, heat damage, or other damage.
- ★If there is any doubt as to the condition of the reed, replace the air suction valve as an assembly.




A. Valve Holder
B. Reeds

- Check the reed contact areas of the valve holder for grooves, scratches, any signs of separation from the holder, or heat damage.
- ★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.

**CAUTION**

- **Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.**

*Clean Air System Hose Inspection*

●Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, silencer, vacuum switch valve, #1 and #4 carburetors, and air suction valve covers.

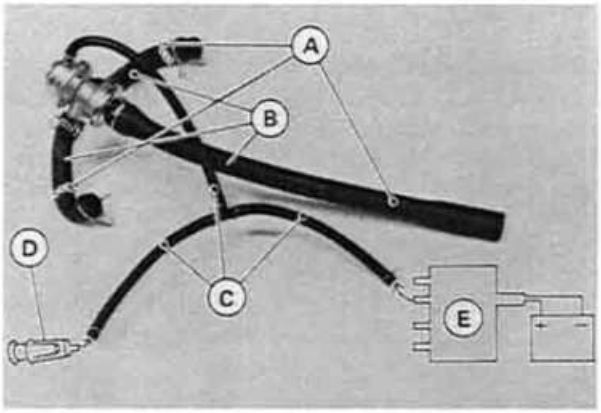
★If they are not, correct them. Replace them if they are damaged.

*Vacuum Switch Valve Test*

Using the vacuum gauge (special tool) and a syringe, inspect the vacuum switch operation as follows:

●Remove the vacuum switch valve.

●Connect the vacuum gauge and syringe to the vacuum hoses as follows.

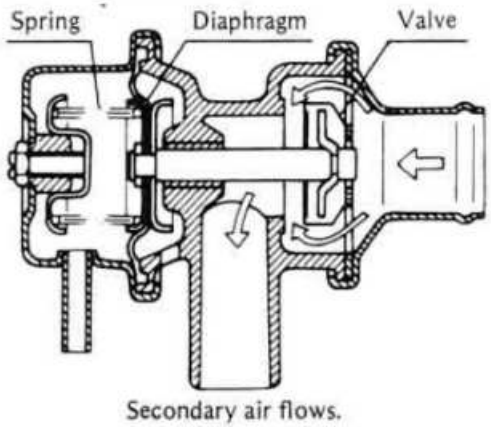



A. Plug
B. Air Hose
C. Vacuum Hose
D. Syringe
E. Vacuum Gauge: 57001-1198

●Gradually raise the vacuum (lower the pressure) applied to the vacuum switch valve, and check the valve operation. When the vacuum is low the vacuum switch valve should permit air to flow. When the vacuum rises a certain level 57 ~ 65 kPa (430 ~ 490 mmHg), it should stop air flow. When the vacuum is high enough, the air cannot also flow through the valve.

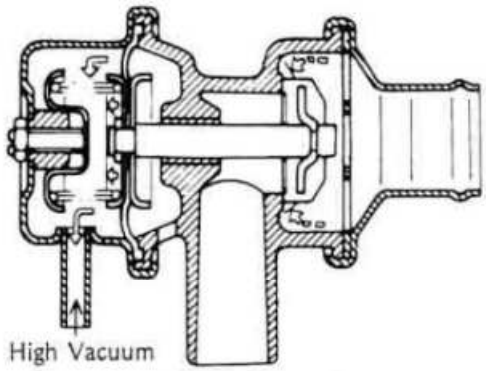
**Vacuum Switch Valve Operation**

1. During Cruising (open throttle)




Secondary air flows.

2. During Engine Braking




Secondary air cannot flow.

★If the vacuum switch valve does not operate as described, replace it with a new one.

**NOTE**

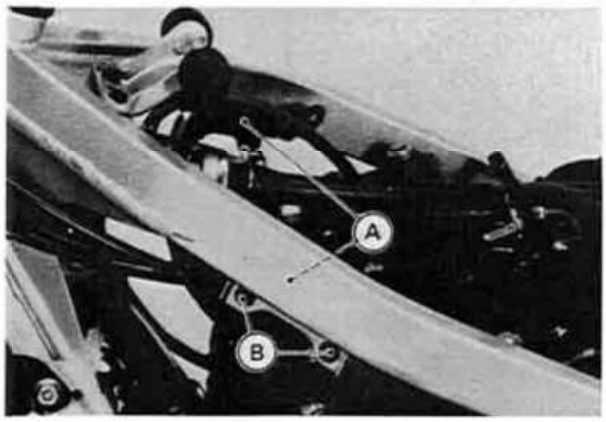
○*To check air flow through the vacuum switch valve, just blow through the air cleaner hose.*

## Cylinder Head Cover

*Cylinder Head Cover Removal*

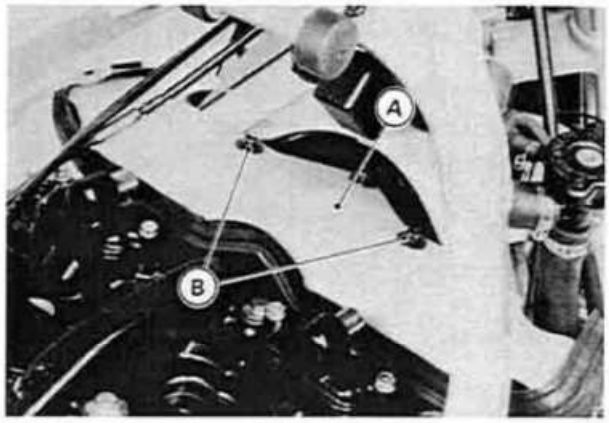
●Remove the following parts before cylinder head cover removal.

Upper and Lower Fairings (see Fairing in Frame chapter)
Coolant Draining (see Coolant Draining in Cooling System chapter)
Fuel Tank (see Fuel Tank Removal in Fuel System chapter)
Left and Right Ignition Coil Bracket with Ignition Coils




A. Bracket
B. Mounting Bolts

○Vacuum Switch Valve (US model only)
○Thermostat Housing and Water Pipe assembly
●Remove the baffle plate by taking it out to the side.

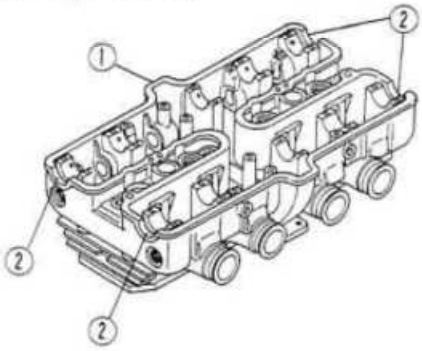



A. Baffle Plate B. Mounting Bolts

●Remove the cylinder head cover bolts and take off the cover.

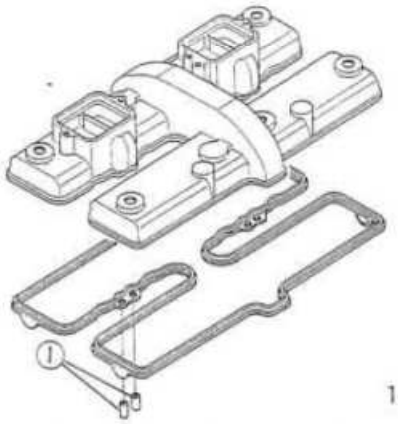
### *Cylinder Head Cover Installation Notes*

●Replace the head cover gasket with new one, if it is damaged.
●Stick the gaskets partially to the cover with a liquid gasket for installation convenience.
●Apply silicone sealant (Kawasaki Bond: 56019-120) as shown in the figure below.




1. Cylinder Head
2. Silicone Sealant Applied Area

●Be sure to install the knock pins (US model only).



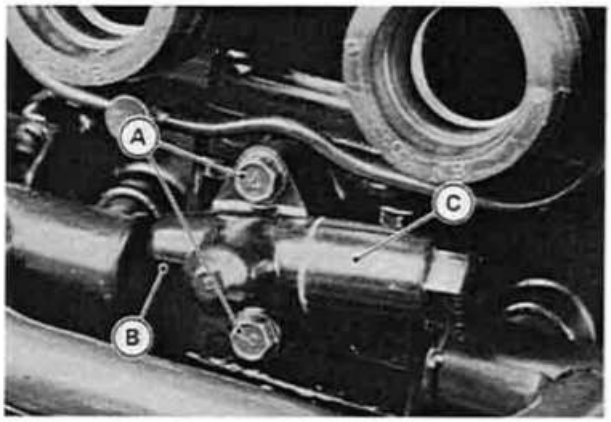

1. Knock Pins

●Tighten the cylinder head cover bolts to the specified torque (see Exploded View).

## Camshaft Chain Tensioner

### *Chain Tensioner Removal*

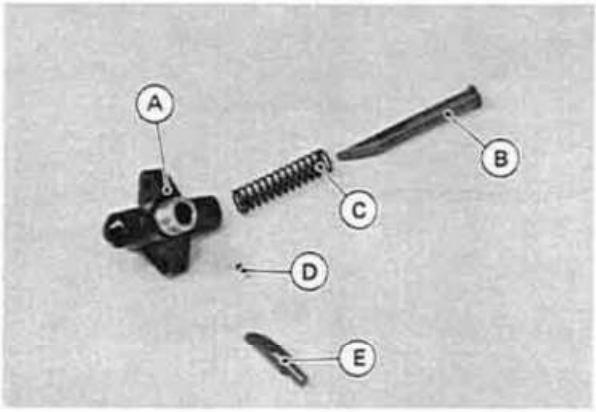
●Remove the fuel tank (see Fuel Tank Removal in Fuel chapter).
●Remove the carburetors (see Carburetors Removal in Fuel chapter).
●Remove the chain tensioner cap, gasket, and spring, and remove the tensioner bolts and tensioner.




A. Bolts C. Tensioner Cap
B. Tensioner

### *Chain Tensioner Installation*

●Remove the pin, and remove the push rod and push rod stop before chain tensioner installation.

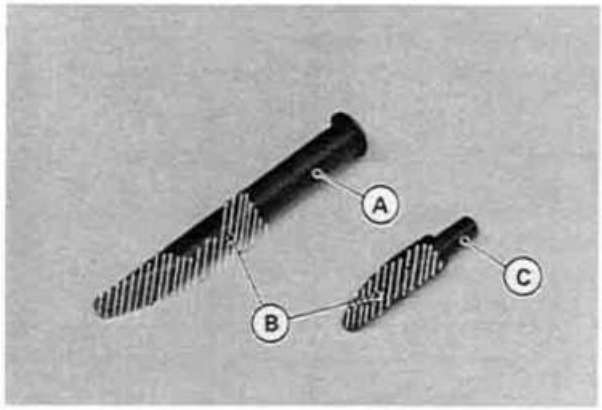



A. Tensioner Body D. Pin
B. Push Rod E. Push Rod Stop
C. Spring

●Clean the tensioner parts using a high flash-point solvent, and then apply a molybdenum disulfide grease to the sliding surfaces.

**CAUTION**

○**Dirt or grime on the sliding surfaces of the tensioner parts could cause the tensioner to malfunction.**



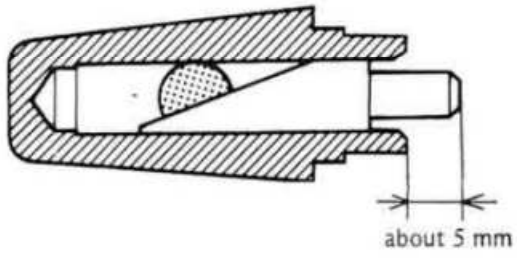

A. Push Rod
B. Molybdenum Disulfide Grease Applied Areas
C. Push Rod Stop

- Install the push rod srpinrg on the push rod and insert the push rod into the tensioner body. Compressing the spring, align the groove in the side of the rod with the pin hole in the side of the tensioner body, and insert the pin into the push rod.
- Install the chain tensioner body and O-ring, and tighten the bolts evenly.
- Install the chain tensioner push rod stop so that the tapered surfaces of the push rod and stop face each other. When the push rod stop has been properly installed, the push rod stop end sticks out about 5 mm.

**NOTE**

○*If the push rod stop sticks out over the correct amount, it shows the camshaft chain slack has not yet been taken up fully. In this case, turn the crankshaft over slowly in the normal direction pushing in the stop end lightly.*

**Push Rod Stop Installation**




- Tighten the tensioner cap with its gasket to the specified torque (see Exploded View).
- Install the carburetors.
- Install the fuel tank.

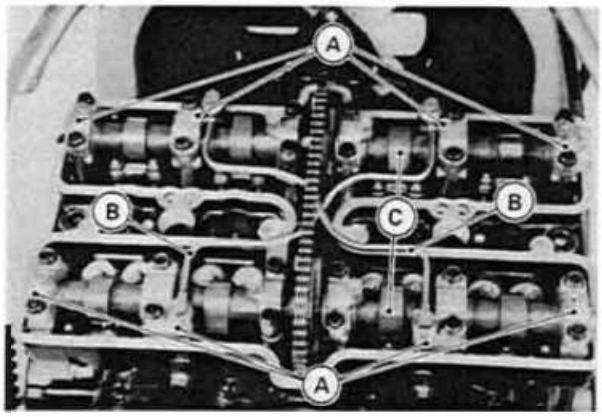
## Camshaft, Camshaft Chain, Rocker Shaft

### *Camshaft, Rocker Shaft Removal*

- Position the crankshaft at TDC for the #1 and #4 pistons.
- Remove the following parts before camshaft and rocker shaft removal.

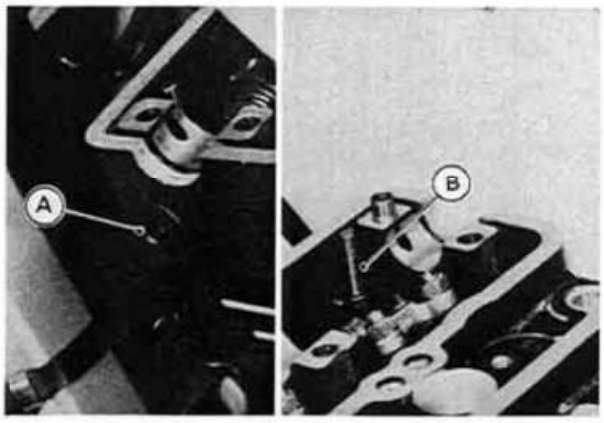
○Camshaft Chain Tensioner
○Cylinder Head Cover

- Remove the oil pipes from the camshaft caps.



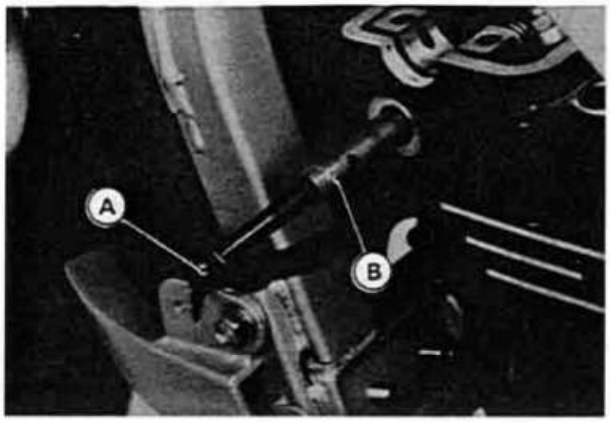

A. Camshaft Caps
B. Oil Pipes
C. Camshafts

- Remove the camshaft cap bolts, and remove the caps and camshaft.
- Remove the rocker shaft pulg, and knock pin.



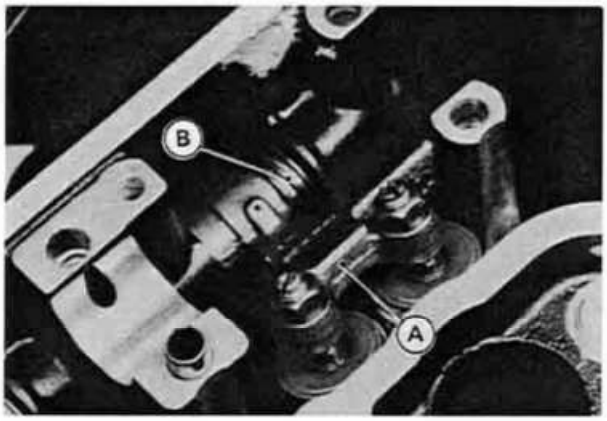

A. Plug
B. Knock Pin

- Using a suitable bolt (ϕ8 P1.25 x about 30 mm long), pull the rocker shaft out.




A. Bolt B. Rocker Shaft

●Take off the rocker arms and retainer springs.



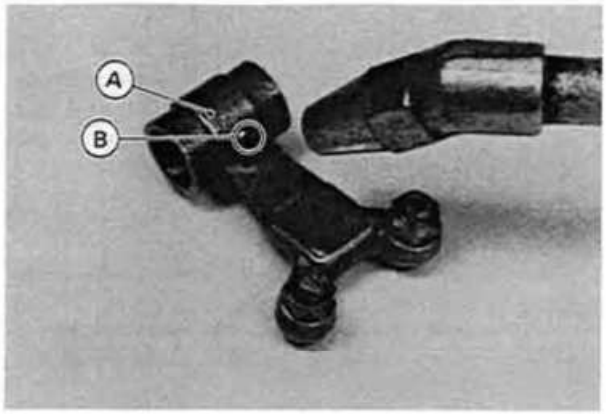

A. Rocker Arm B. Spring

CAUTION

○**The crankshaft may be turned, while the camshafts are removed, but always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.**

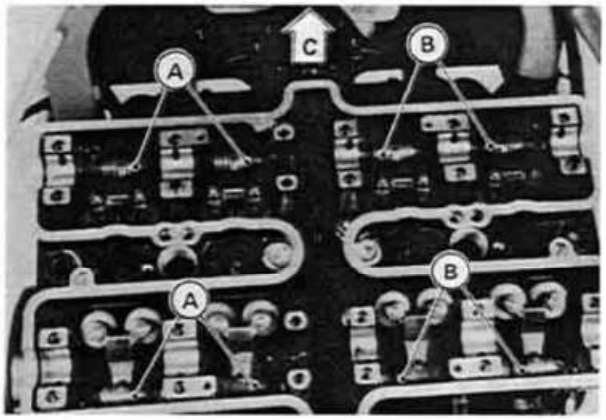
*Rocker Shaft Installation Notes*

●Blow the rocker arm oil passage clean with compressed air and apply oil to the internal surface before installation.




A. Rocker Arm B. Oil Passage

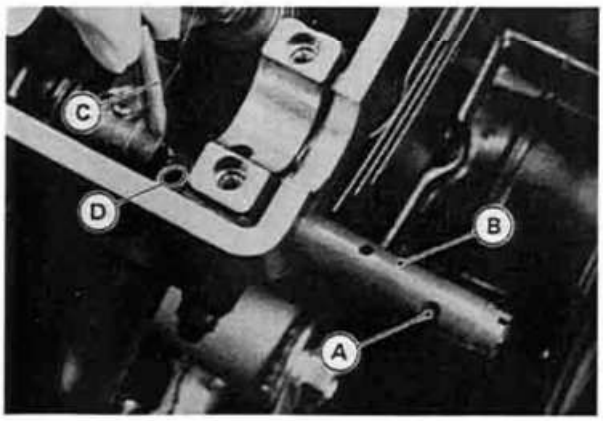
●Install the retainer spring on each rocker arm so that the spring is placed against the rocker arm toward the inside of the engine.




A. L.H. Rocker Arm's Springs
B. R.H. Rocker Arm's Springs
C. Front

●Apply engine oil to the rocker shaft, insert the shaft running it through the cylinder head, the rocker arm and spring.

○After inserting a rocker shaft, turn the shaft so that the notch aligns with the knock pin hole, and insert the knock pin into the knock pin hole.



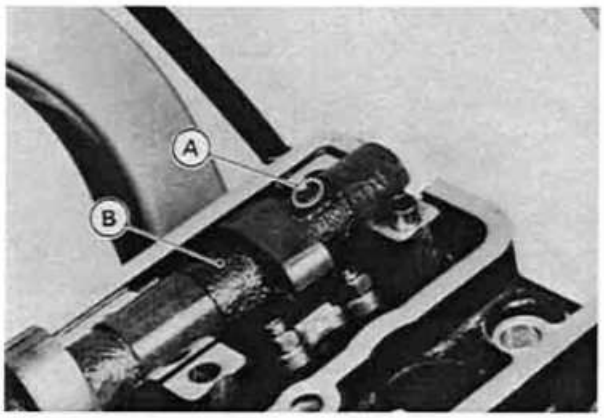

A. Notch C. Knock Pin
B. Rocker Shaft D. Hole

*Camshaft Installation*
*(Including Chain Timing Procedure)*

•Apply engine oil to all cam parts. If the camshaft(s) and/or cylinder head are replaced with new ones, apply a thin coat of a molybdenum disulfide grease on the new cam part surfaces.

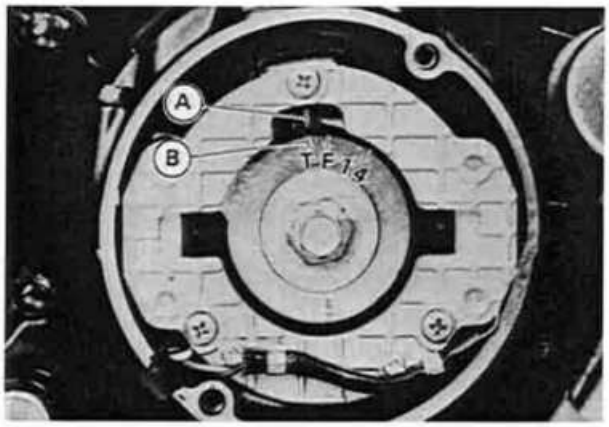
**NOTE**

○*The exhaust camshaft has an EX mark and the inlet camshaft has an IN mark. Be careful not to mix up these shafts.*




A. EX mark B. EX Camshaft

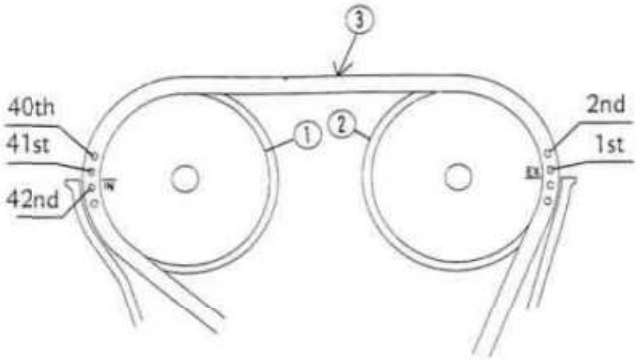
•Apply engine oil to the camshaft cap.
•Check crankshaft position to see that the 1, 4 pistons are still at TDC, and readjust if necessary, engage the camshaft chain with the camshaft sprockets as shown.




A. Timing Mark B. TDC Mark for 1-4 Pistons

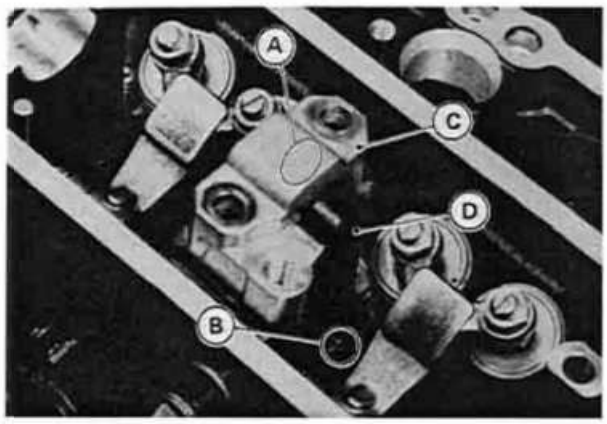
•Pull the tension side (exhaust side) of the chain taut and install the chain on the sprocket.
○Position the camshaft sprockets so that the timing marks align with the cylinder head gasket surface as shown.

**Camshaft Chain Timing (right side view)**




1. Inlet Camshaft Sprocket
2. Exhaust Camshaft Sprocket
3. No slack.

○Count the camshaft chain link pin's as shown to verify that the sprockets are positioned correctly.
•Install the camshaft caps in the correct locations as shown in the figure below. Location numbers are marked on the cylinder head and each cap, and with the arrow on the cap pointing forward.



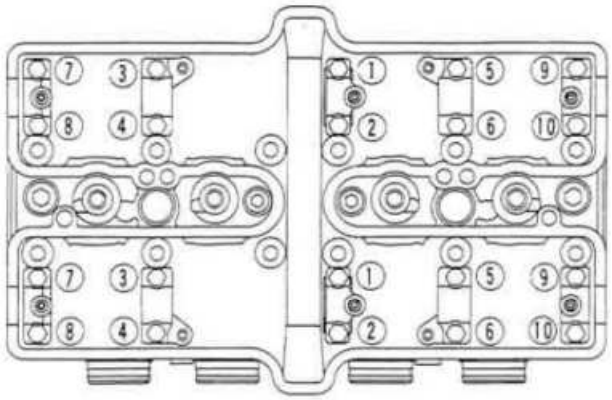

A. Cap Location Number Mark C. Camshaft Cap
B. Head Location Number Mark D. Cylinder Head

**CAUTION**

○**The camshaft caps are machined with the cylinder head. So, if a cap is installed in the wrong location, the camshaft may seize because of improper oil clearance in the bearings.**

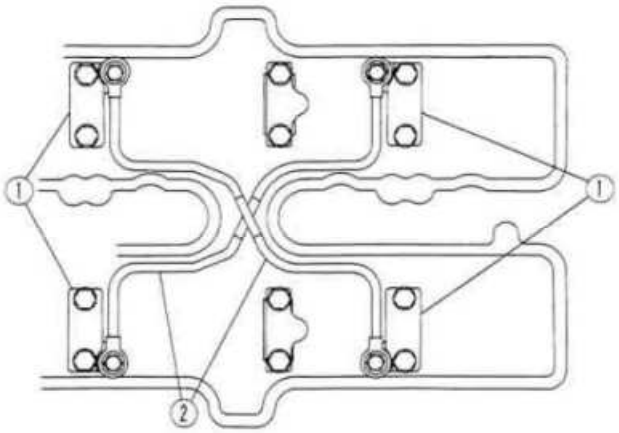
•First tighten down the two camshaft cap bolts (#1 and #2 bolts in the figure) evenly to seat the camshafts in place, then torque all bolts to the specification (see Exploded View), following the specified tightening sequence.

**Camshaft Cap Bolts Tightening Order**



•Install the head oil pipes as shown, and tighten the bolts to the specified torque (see Exploded View).

**Oil Pipe Installation**



1. Camshaft Caps 2. Oil Pipes

*Camshaft and Sprocket Assembly Notes*

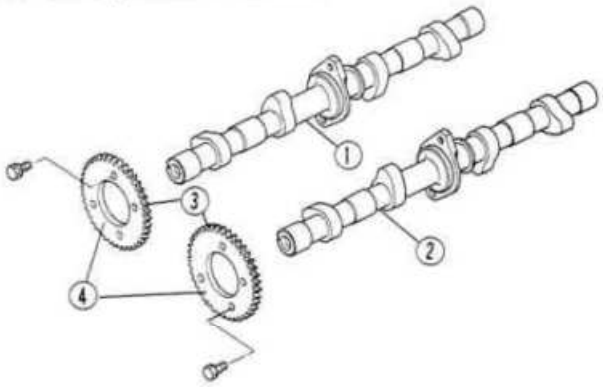
•The inlet and exhaust sprockets are identical.

•Both sprockets should be installed with the side of the sprocket mounting (punch) mark facing the left side of the engine, and for the exhaust shaft align the EX mark on its sprocket with the camshaft bolt hole and for inlet shaft, align the IN mark on the other sprocket with it shaft bolt hole.

•Apply a locking agent to the camshaft sprocket bolts and tighten them to the specified torque (see Exploded View).

•If a new camshaft is to be used, apply a thin coat of a molybdenum disulfide grease to the cam surfaces.

**Camshaft Sprocket Installation**

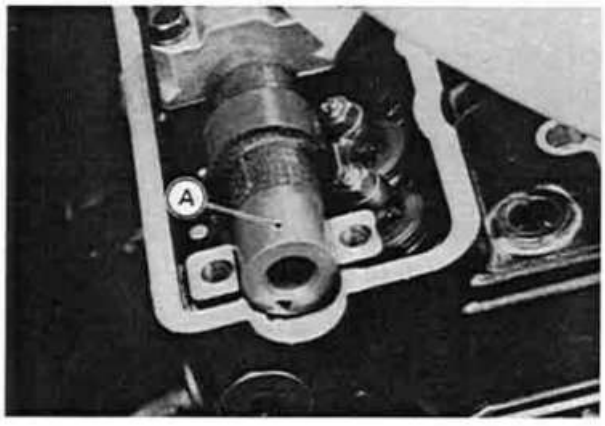


1. EX Camshaft 3. Camshaft Sprockets
2. IN.Camshaft 4. Mounting (Punch) Marks

*Camshaft Oil Clearance Inspection*

The journal wear is measured using plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

•Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position and so that the plastigage will be compressed between the journal and camshaft cap.



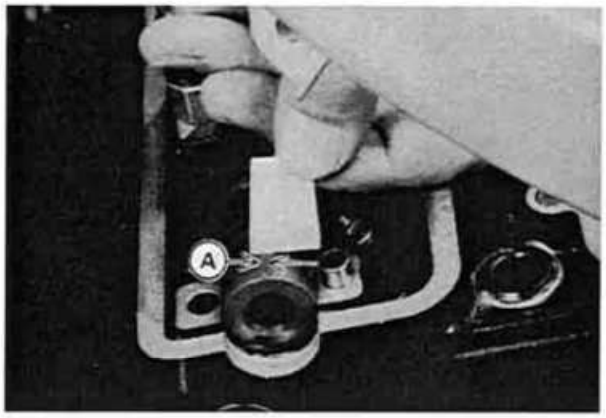
A. Plastigage Strip

•Install the camshaft caps, tightening the bolts in the correct sequence to the specified torque (see Exploded View).

**NOTE**

○*Do not turn the camshaft when the plastigage is between the journal and camshaft cap.*

•Remove the camshaft caps again, and measure the plastigage width to determine the clearance between each journal and the camshaft cap. Measure the widest portion of the plastigage.




A. Plastigage width

★If any clearance exceeds the service limit, replace the camshaft with a new one and measure the clearance again.
★If the clearance still remains out of the limit, replace the cylinder head unit.

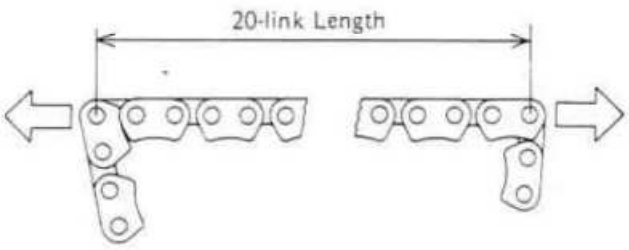
| Camshaft Bearing Oil Clearance | |
|---|---|
| Standard: | 0.078 ~ 0.121 mm |
| Service Limit: | 0.21 mm |

*Camshaft Chain Wear*

•Hold the chain taut with a force of about 5 kg in some manner, and measure a 20-link length. Since the chain may wear unevenly, take measurements at several places.
★If any measurement exceeds the service limit, replace the chain.

| Camshaft Chain 20-link Length | |
|---|---|
| Standard: | 127.0 ~ 127.4 mm |
| Service Limit: | 128.9 mm |

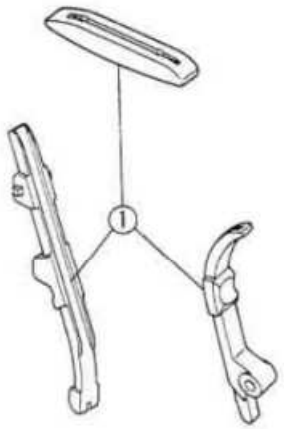
**Chain Length Measurement**




*Camshaft Chain Guide Wear*

•Visually inspect the rubber on the guides.
★If the rubber is damaged, cut, or is missing pieces, replace the guides.

**Camshaft Chain Guides**

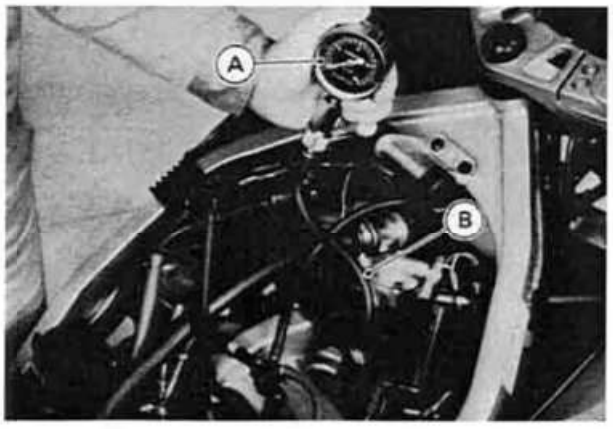



1. Rubber

## Cylinder Head

*Compression Measurement*

•Thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.
•Stop the engine, remove the spark plugs, and ignition coil if necessary, and attach compression gauge (special tool) firmly into the spark plug hole.




A. Compression Gauge: 57001-221
B. Adapter: 57001-1183

•Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.
•Repeat the measurement for the other cylinder.

| Cylinder Compression (Usable Range) |
| --- |
| 755 ~ 1,080 kPa (550 r/min (rpm) |
| (7.7 ~ 12.0 kg/cm$^2$, 109 ~ 171 psi) |

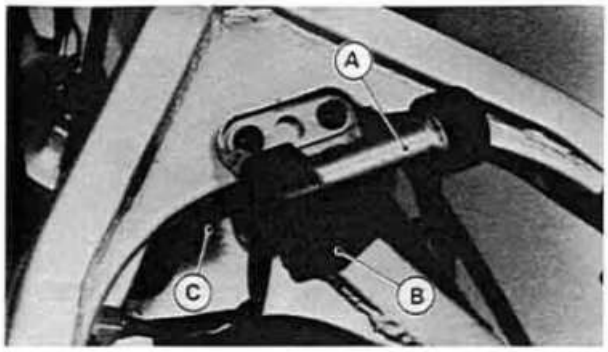
★If cylinder compression is higher than the standard value, check the following;
1. Carbon build-up on the piston head and cylinder head.
   – clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket – use only the proper gaskets for the cylinder head and base. The use of gaskets of the incorrect thickness will change the compression.
3. Valve stem oil seals and piston rings – rapid carbon accumulation in the combustion chambers may be caused by damaged valve stem oil seals and/or damaged piston oil rings. This may be indicated by white exhaust smoke.

★If cylinder compression is lower than the service limit, check the following:
1. Gas leakage around the cylinder head – replace the damaged gasket and check the cylinder head for warp.
2. Condition of the valve seating.
3. Valve clearance – if a valve requires an unusually adjustment to obtain proper clearance, the valve may be bend, and not seating completely.
4. Piston/cylinder clearance, piston seizure.
5. Piston ring, piston ring groove.

### *Cylinder Head Removal*

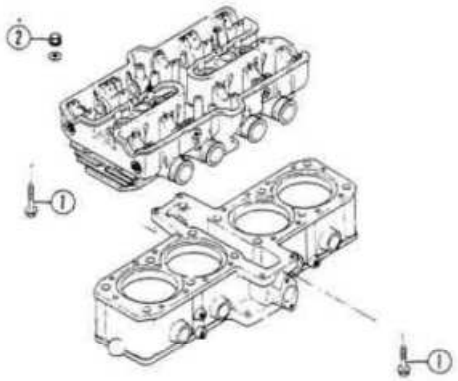
●Remove the following parts.
   Upper and Lower Fairings (see Fairing Removal in Frame chapter)
   Coolant Draining (see Coolant Draining in Cooling System chapter)
   Fuel Tank (see Fuel Tank Removal in Fuel System chapter)
   Radiator (see Radiator, Radiator Fan Removal in Cooling System chapter)
   Muffler (see Muffler Removal in Engine Top End chapter)
   Carburetors (see Carburetor Removal in Fuel System chapter)
   Camshaft Chain Tensioner.
   Left and Right Ignition Coil Bracket with Coils
   Vacuum Switch Valve (US model only)
   Thermostat Housing and Water Pipe Assembly
   Baffle Plate

●Disconnect the turn signal relay and reserve lighting device (US, Canadian model only) connectors, then remove the bolts and take off the fuel tank bracket and reserve lighting device with turn signal relay.



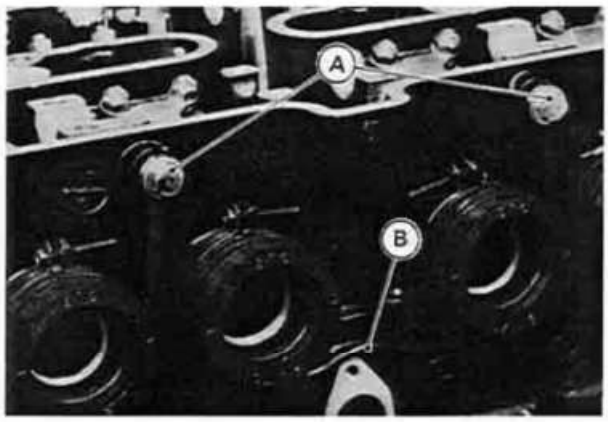

A. Fuel Tank Bracket C. Reserve Lighting Device
B. Turn Signal Relay

●Remove the cylinder head cover.
●Remove the camshafts.
●Remove the cylinder head nuts and bolts.




1. Cylinder Head Bolts 2. Cylinder Head Nuts

●Remove the oil pipe banjo bolts.

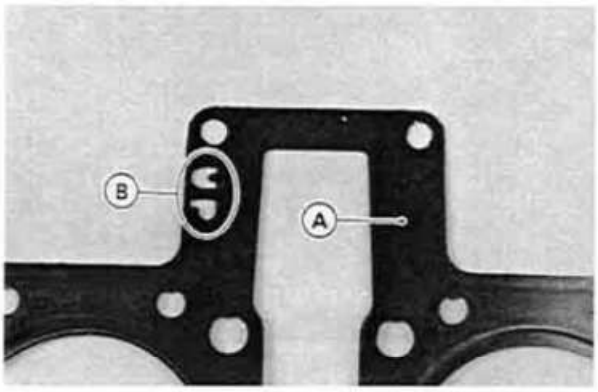



A. Banjo Bolts B. Oil Pipe

●Pull off the cylinder head, and remove the cylinder head gasket.

### *Cylinder Head Installation Notes*

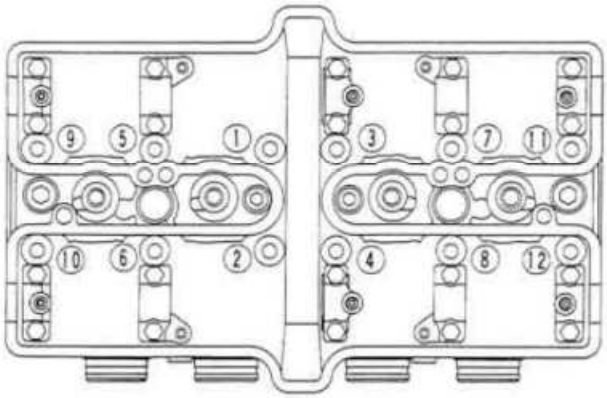
●When installing the cylinder head, be careful of the following items.
○Replace the cylinder head gasket with a new one, and install the gasket with the marked "UP" side toward the right.




A. Gasket B. UP Mark

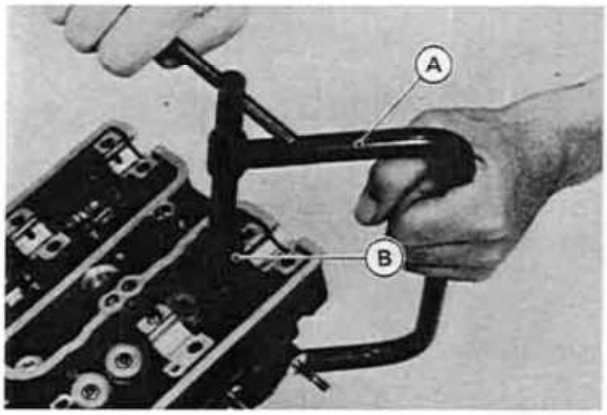
○Apply engine oil to both sides of the cylinder head nut washer.
○Torque the cylinder head nuts following the tightening sequence. Tighten them first to 15 N-m (1.5 kg-m, 11.0 ft-lb) of torque and then tighten them to the specified torque (see Exploded View).

**Cylinder Head Nuts Tightening Order**



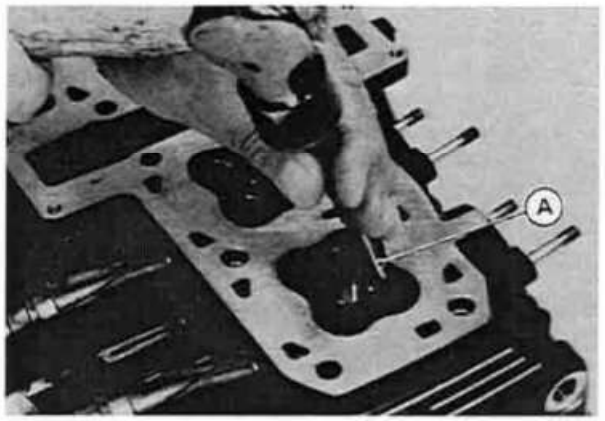

*Cylinder Head Disassembly and Assembly (Valve Mechanism Removal and Installation)*

●Use valve spring compressor assembly (special tool) to press down the valve spring retainer, and remove the split keepers.



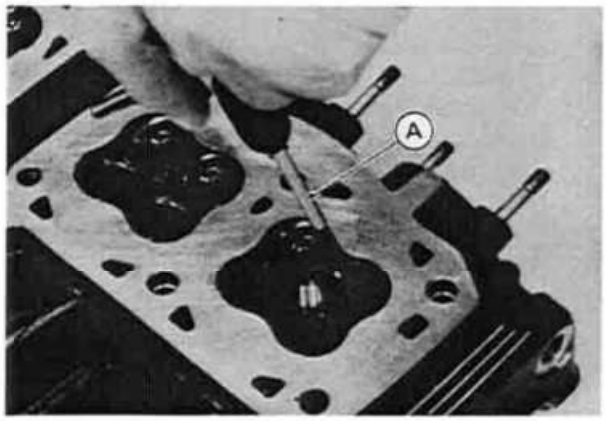

A. Valve Spring Compressor Assembly: 57001-241
B. Adapter: 57001-1202

●Heat the area around the valve guide to about 120 ~ 150°C (248 ~ 302°F), and hammer lightly on valve guide arbor (special tool) to remove the guide from the top of the head.




A. Valve Guide Arbor: 57001-1203

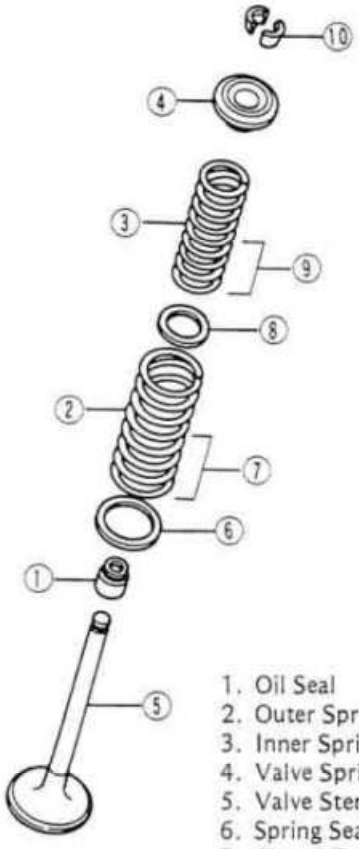
●Valve Guide Installation:
○Apply oil to the valve guide outer surface before installation.
○Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).
○Drive the valve guide in from the top of the head using the valve guide arbor. The flange stops the guide from going in too far.
○Ream the valve guide with the valve guide reamer (special tool) even if the old guide is re-used.




A. Valve Guide Reamer: 57001-1204

●Valve Installation.
○Check to see that the valve moves smoothly up and down in the guide.
○Check to see that the valve seats properly in the valve seat. If it does not, repair the valve seat.

**Valve and Springs**

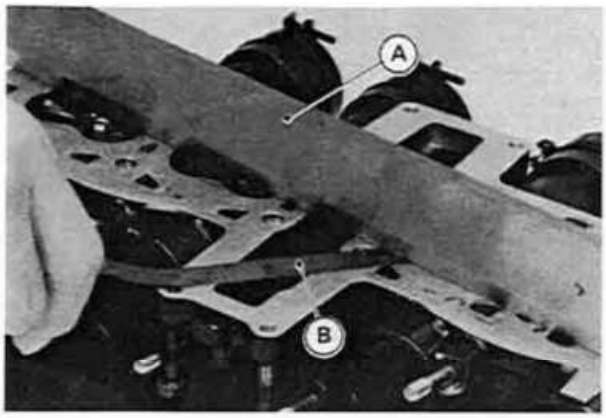



1. Oil Seal
2. Outer Spring
3. Inner Spring
4. Valve Spring Retainer
5. Valve Stem
6. Spring Seat
7. Closed End Coil
8. Spring Seat
9. Closed End Coil
10. Split Keeper

○Apply a thin coat of molybdenum disulfide engine assembly grease to the valve stem before valve installation.
○Be sure to install the inner and outer spring seats under the inner and outer springs.
○Install the springs so that the closed coil end is facing toward the valve seat (downwards).

### *Cylinder Head Warp*

●Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.
★If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.

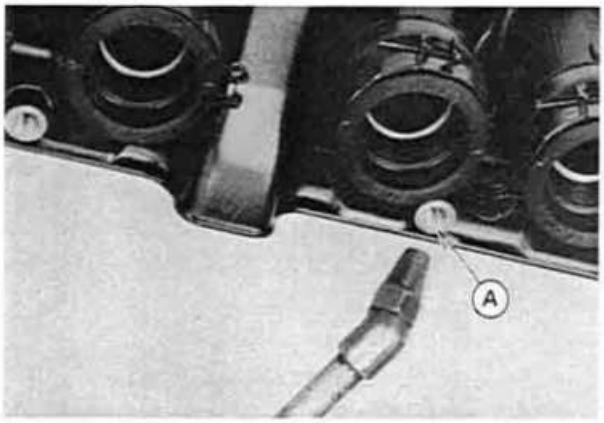



A. Straightedge B. Thickness Gauge

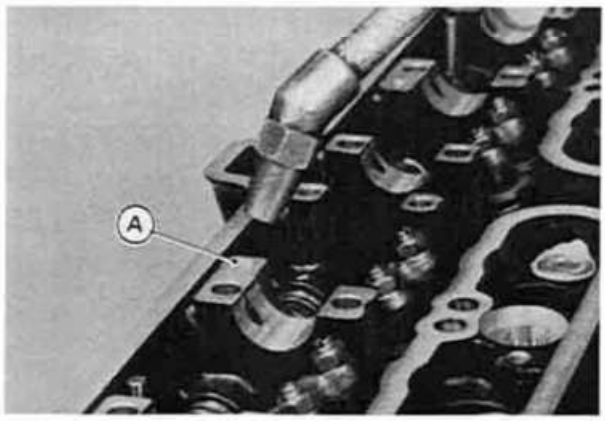
| Cylinder Head Warp | |
|---|---|
| **Service Limit:** | **0.05 mm** |

### *Cylinder Head Cleaning*

●Before installation, blow the oil passages clean with compressed air.




A. Oil Passage

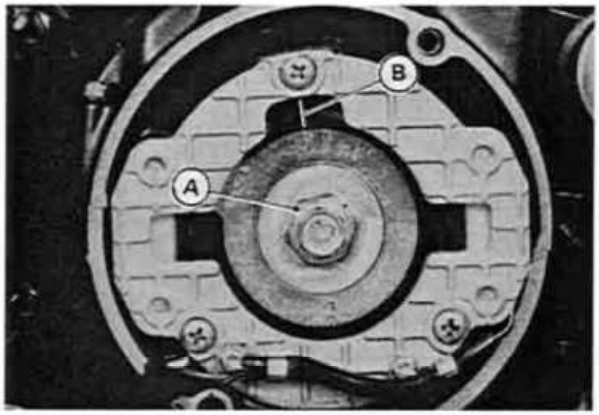



A. Oil Passage

## Valve

### *Valve Clearance Inspection*

•If the engine is hot, wait until the engine cools. Valve clearance must be checked when the engine is cold (room temperature).
•Remove the fuel tank (See Fuel Tank Removal).
•Remove the cylinder head cover.
•Check the valve clearance when the pistons are at TDC, according to the table below.
○The pistons are numbered beginning with the engine left side.
•Using a wrench on the crankshaft rotation nut, turn the crankshaft clockwise until a TDC mark on the rotor is aligned with the timing mark on the crankcase.



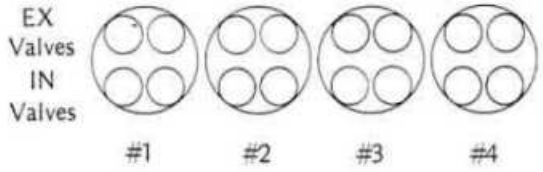

A. Rotation Nut B. TDC Mark

○Measure the valve clearance for the valves whose cam lobe is pointing away from hte rocker arm.
•Each piston has two inlet and two exhaust valves. Measure the inlet or exhaust valves at the same time.

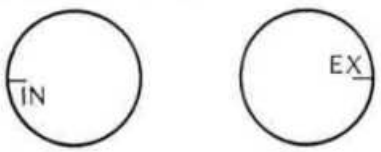
**Valve Clearance Measuring Position**

**#4 Piston TDC at End of Compression Stroke →**
**Inlet valve clearances of #2 and #4 pistons, and**
**Exhaust valve clearance of #3 and #4 pistons.**

**Measuring Valves** ☐

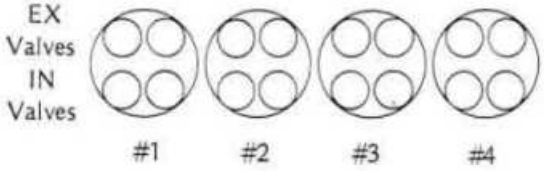



**Camshaft Sprocket Position**

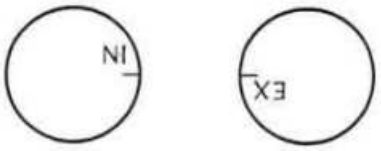



**#1 Piston TDC at End of Compression Stroke →**
**Inlet valve clearance of #1 and #3 pistons, and**
**Exhaust valve clearance of #1 and #2 psitons**

**Measuring Valves** ☐




**Camshaft Sprocket Position**

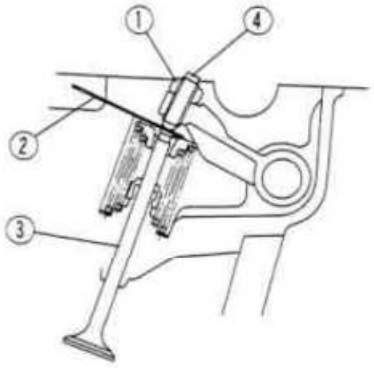



**NOTE**

○*Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.*

•Measure the clearance of each valve by inserting a thickness gauge between the adjusting screw and the valve stem.

**Valve Clearance Measurement**




1. Locknut
2. Thickness Gauge
3. Valve Stem
4. Adjusting Screw

| Valve clearance (when cold) | |
|---|---|
| Inlet: | 0.13 ~ 0.18 mm |
| Exhaust: | 0.18 ~ 0.23 mm |

### *Valve Clearance Adjustment*

★If the valve clearance is incorrect, the valve clearance must be adjusted.
- Loosen the valve adjusting screw locknut.
- Turn the valve adjusting screw until the correct clearance is obtained.
- Keeping the screw from turning with the valve adjusting screw holder (special tool: 57001-1217), tighten the locknut to the specified torque (see Exploded View).
- Install the pickup coil cover and gasket.
- Install the cylinder head cover.
- Install the fuel tank.

### *Valve Seat Inspection*

- Remove the valve (see Cylinder Head Disassembly and Assembly).
- Coat valve seat with machinist's dye.
- Push the valve into the guide.
- Rotate the valve against the seat with a lapping tool.
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.

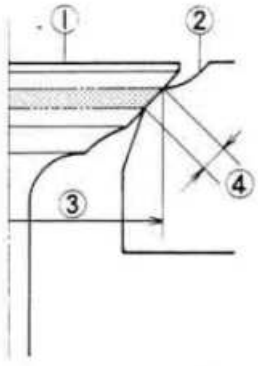
| Valve Seating Surface Width | |
|---|---|
| Inlet | 0.5 ~ 1.0 mm |
| Exhaust | 0.5 ~ 1.0 mm |

**NOTE**

○*The valve stem and guide must be in good condition or this check will not be valid.*

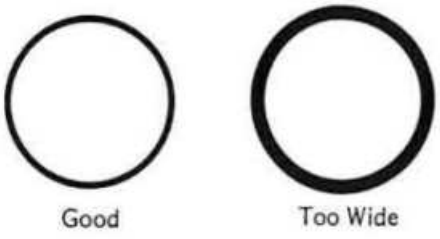
★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

**Valve Seating Area Dimensions**

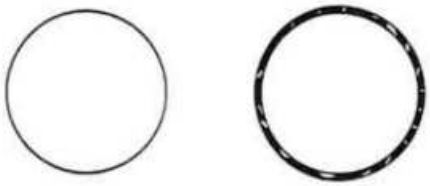



1. Valve
2. Valve Seat
3. Seating Area Outside diameter
4. Seating Area Width

**Valve Seating Pattern**



Good　　Too Wide



Too Narrow　　Uneven

- Measure the outside diameter of the seating pattern on the valve seat.

★If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

| Valve Seating Surface Outside Diameter | |
|---|---|
| Inlet | : 20.7 ~ 20.9 mm |
| Exhaust | : 18.3 ~ 18.5 mm |

### *Valve Seat Repair*

- Clean the cylinder head thoroughly (see Cylinder Head Cleaning).
- Use the following procedure and tools to repair the valve seat.

**Used Valve Seat Cutters**

| Intake Valve and Exhaust Valve | |
|---|---|
| 45° ~ φ22 | 57001-1205 |
| 32° ~ φ22 | 57001-1206 |
| 67.5° ~ φ22 | 57001-1207 |

**Used Holder and Bar**

| | |
|---|---|
| Holder ~ φ5 | 57001-1208 |
| Bar | 57001-1128 |

**Seat Cutter Operating Care:**

1. This valve seat cutter is developed to grind the valve seat for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

**NOTE**

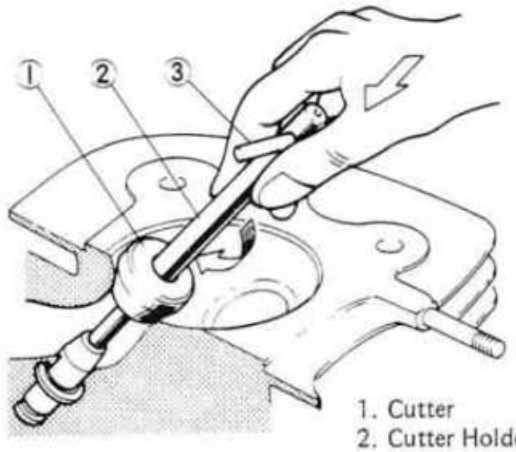
○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

**NOTE**

○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

**Valve Seat Cutter**




1. Cutter
2. Cutter Holder
3. Bar

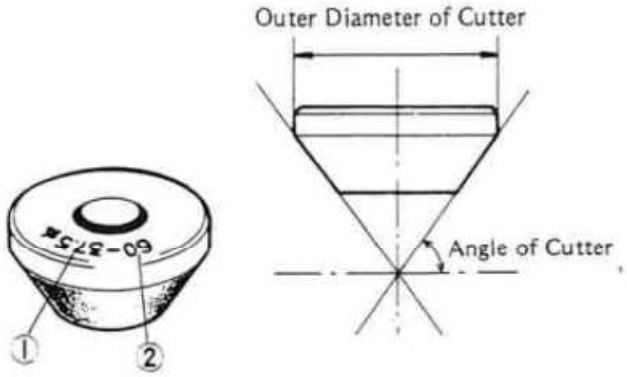
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

**Marks Stamped on the Cutter:**

The marks stamped on the back of the cutter represent the following.

60 . . . . . Cutter angle
37.5ϕ . . . . . Outer diameter of cutter

**Cutter**




1. Outer Diameter of Cutter
2. Cutter Angle

**Operating Procedures:**

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter to the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

**CAUTION**

○**Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.**

- Measure the outside diameter of the seating surface with a vernier caliper.
- ★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
- ★If the outside diameter of the seating surface is too large, make the 32° grind described below.
- ★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
- Grind the seat at a 32° angle until the seat O.D. is within the specified range.

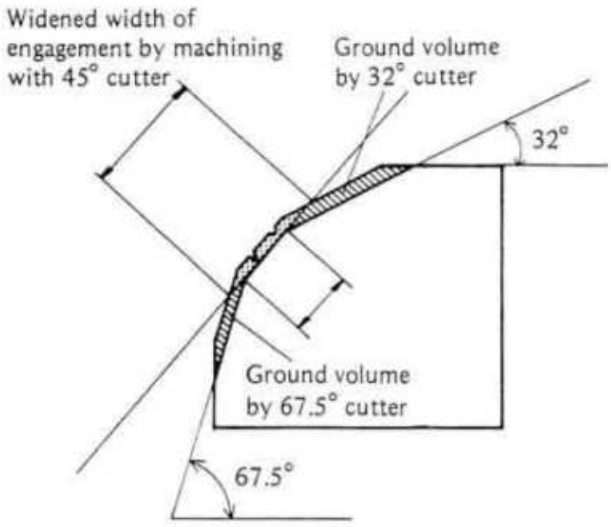
○To make the 32° grind, fit a 32° cutter to the holder, and slide it into the valve guide.

○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

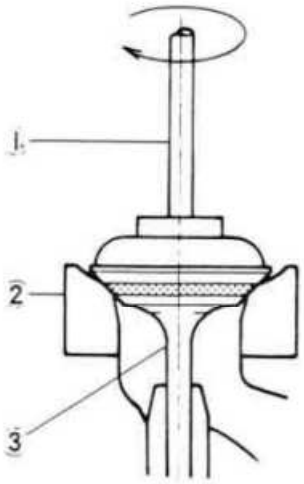
**CAUTION**

○**The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.**

**Valve Seat Repair**




**Valve Lapping**




1. Lapper
2. Valve Seat
3. Valve

○After making the 32° grind, return to the seat O.D. measurement step above.

●To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

★If the seat width is too wide, make the 67.5° grind described below.

★If the seat width is within the specified range, lap the valve to the seat as described below.

●Grind the seat at a 67.5° angle until the seat width is within the specified range.

○To make the 67.5° grind, fit a 67.5° cutter to the holder, and slide it into the valve guide.

○Turn the holder, while pressing down lightly.

○After making the 67.5° grind, return to the seat width measurement step above.

●Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.

○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

○Repeat the process with a fine grinding compound.

●The seating area should be marked about in the middle of the valve face.

★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

●Be sure to remove all grinding compound before assembly.

●When the engine is assembled, be sure to adjust the valve clearances (see Valve Clearance Adjustment).

### *Measuring Valve-to-Guide Clearance (Wobble Method)*

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method, as indicated below.

●Insert a new valve into the guide and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.

●Move the stem back and forth to measure valve/valve guide clearance.

●Repeat the measurement in a direction at a right angle to the first.

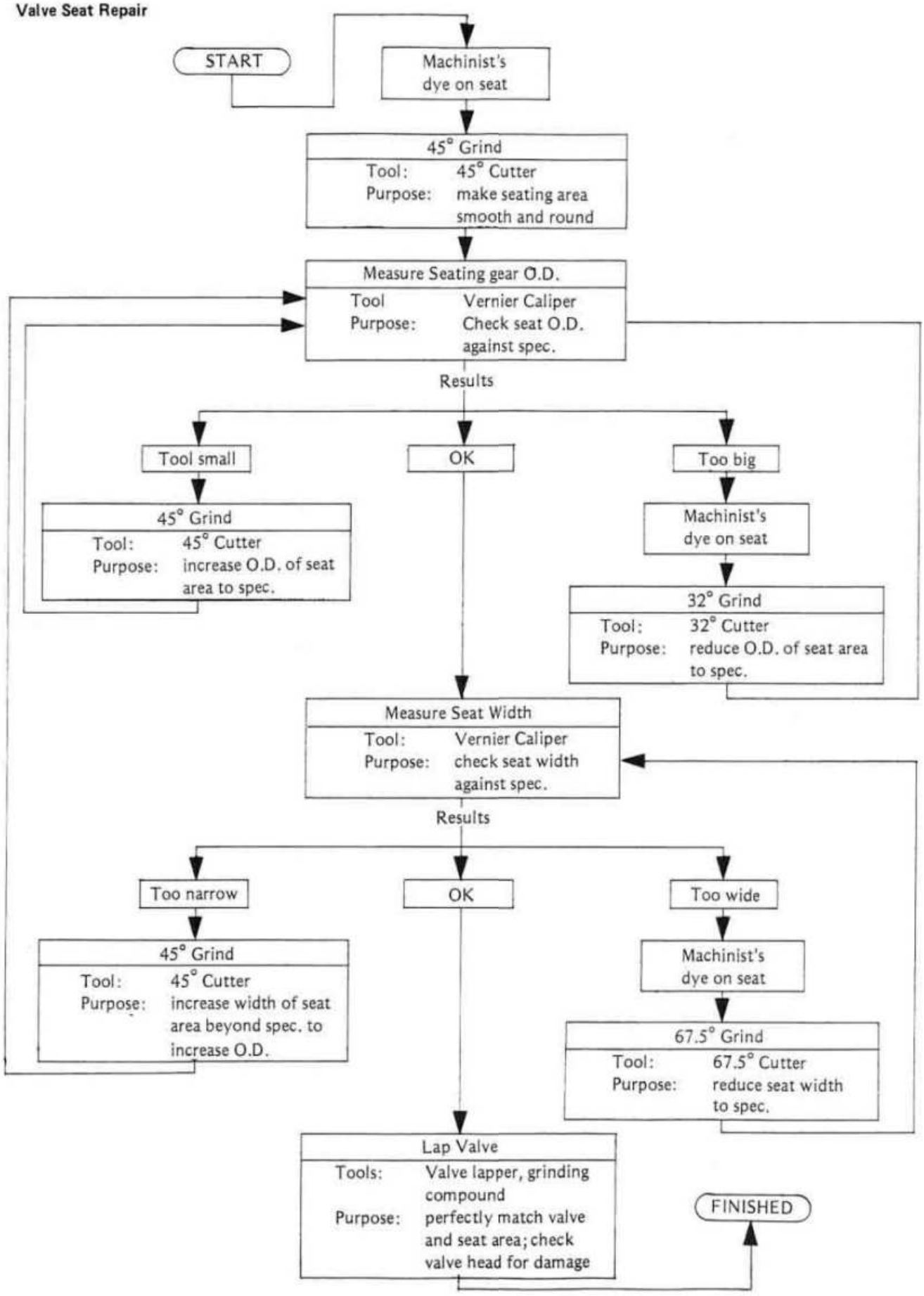
★If the reading exceeds the service limit, replace the guide.

**NOTE**

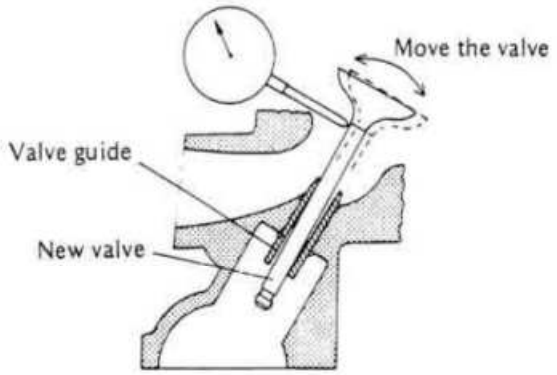
○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

| Valve/Valve Guide Clearance (Wobble Method) | | |
|---|---|---|
| | Standard | Service Limit |
| Inlet | 0.03 ~ 0.10 mm | 0.24 mm |
| Exhaust | 0.08 ~ 0.15 mm | 0.29 mm |

**Valve Seat Repair**



**Wobble Method**

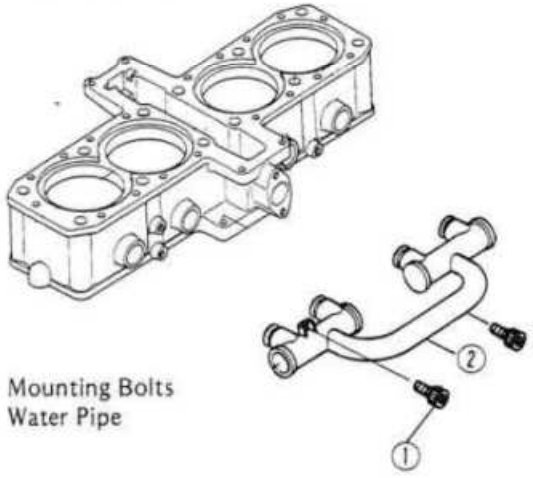



## Cylinder, Piston

### *Cylinder Removal*

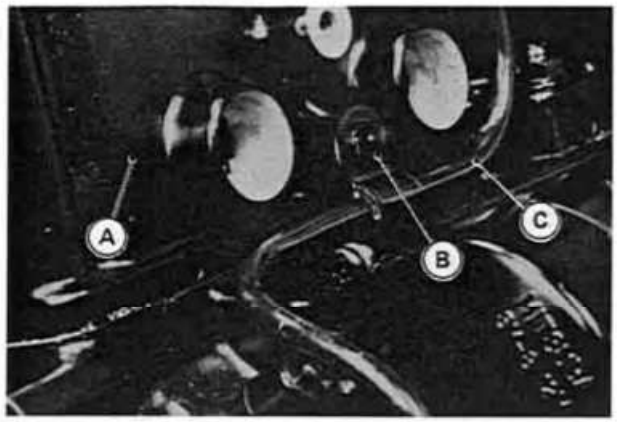
- Remove the following parts before cylinder and piston removal.
  - Position the Crankshaft at TDC for the #1 and #4 Pistons
  - Upper and Lower Fairings
  - Fuel Tank
  - Coolant Draining
  - Radiator
  - Muffler
  - Carburetor
  - Camshaft Chain Tensioner
  - Cylinder Head Cover
  - Cylinder Head
- Remove the water pipe mounting bolts and take off the pipe.

**Water Pipe Mounting Bolts**



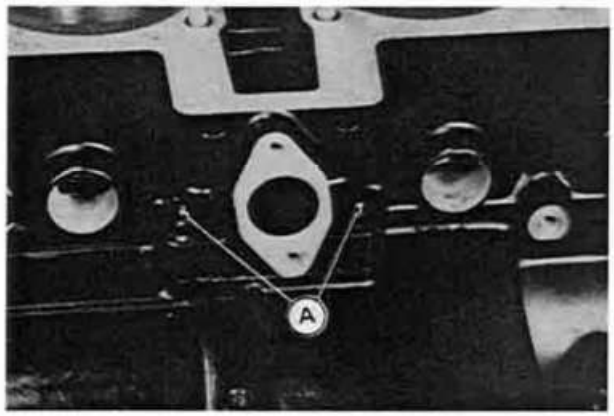

1. Mounting Bolts
2. Water Pipe

- Remove the oil pipe mounting bolt.



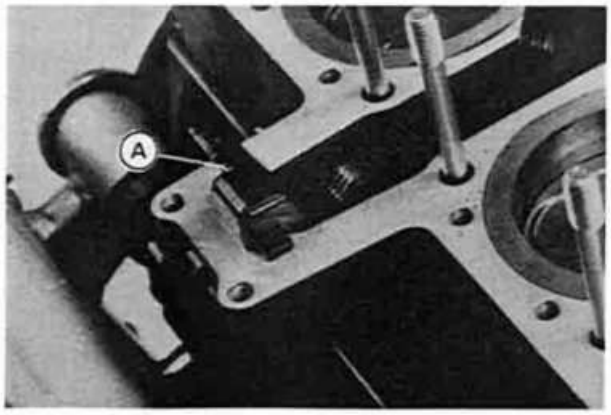

A. Cylinder
B. Mounting Bolt
C. Oil Pipe

- Remove the cylinder nuts from the rear of the cylinder.




A. Cylinder Nuts

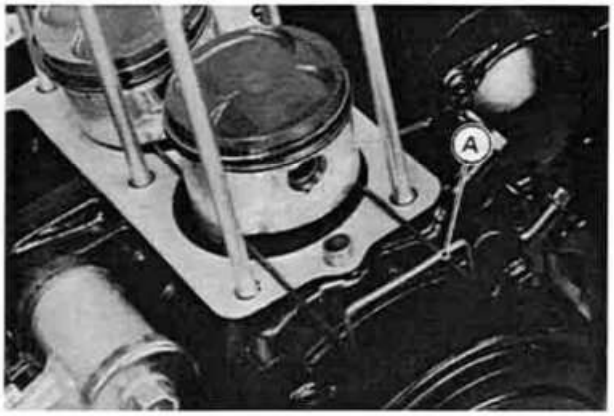
- Take off the front chain guide, and remove the cylinder.




A. Chain Guide

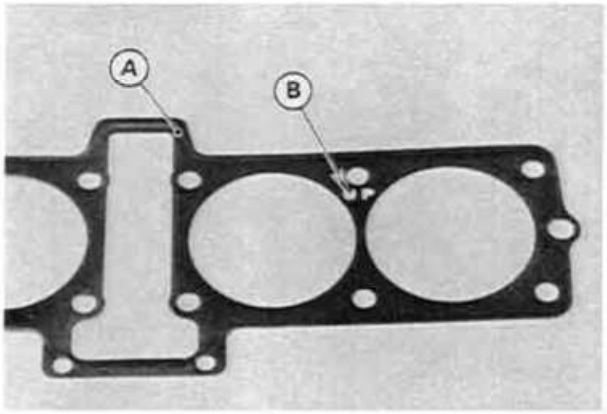
*Cylinder Installation Notes*

- Apply a engine oil to the cylinder bores, and apply a thin coat of a molybdenum disulfide grease to the piston skirt.
- Slip piston bases (special tool) under the pistons to hold them level.



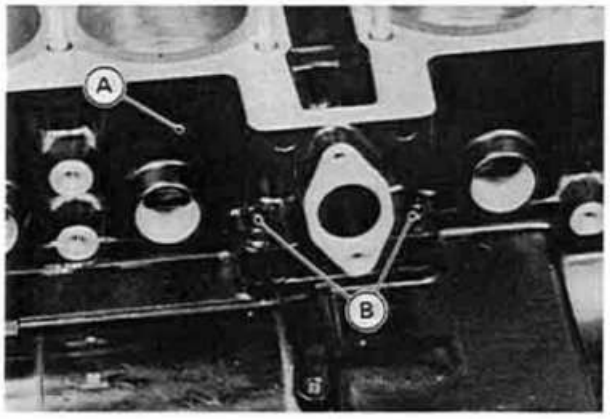

A. Piston Base: 57001-149

- Replace the cylinder base gasket with a new one, and install the gasket with the marked "up" side toward the right.




A. Base Gasket B. **UP** Mark

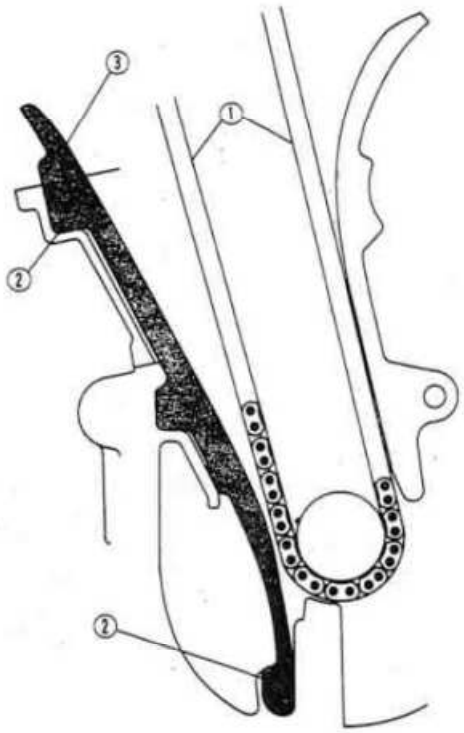
- Torque the cylinder nuts after the cylinder head nuts have been tightened to the specified torque (see Exploded View).




A. Cylinder B. Cylinder Nuts

- After cylinder installation, install the chain guide as shown.

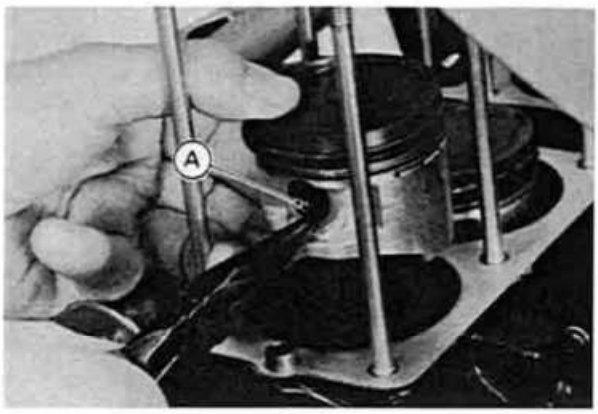
**Chain Guide Installation**




1. Pull the chain
2. Fit here
3. Chain Guide

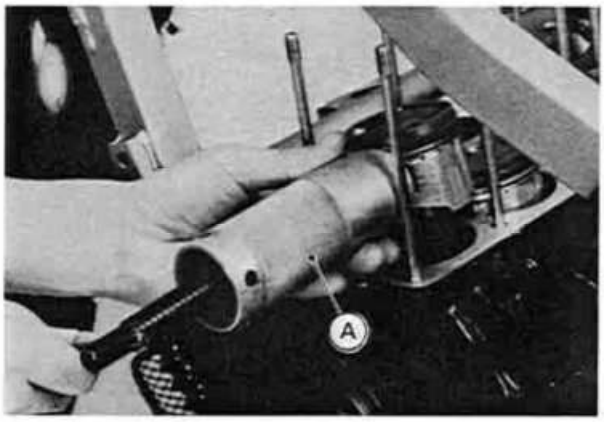
*Piston Removal*

- Remove the piston pin snap ring from the outside of each piston.
- Be sure to place a clean cloth under the piston to prevent the snap ring from falling into the crankcase.



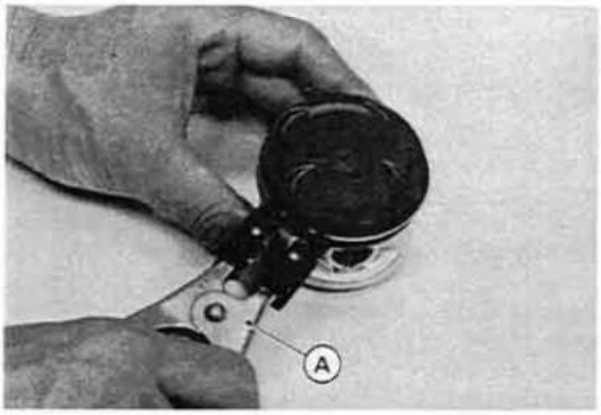

A. Snap Ring

•Remove the piston by pushing its piston pin out the side that the snap ring was removed. Use piston pin puller assembly (special tool), if the pin is tight.




A. Piston Pin Puller Assembly: 57001-910

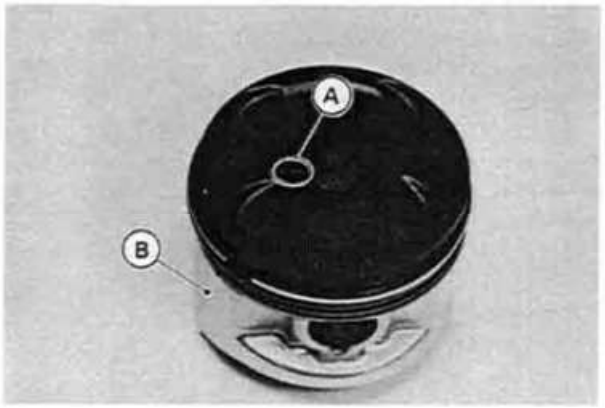
•Remove the top and second rings with the piston rings pliers (special tool). If the special tool is not available, carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.
•Remove the 3-piece oil ring with your thumbs in the same manner.




A. Piston Ring Pliers: 57001-115

*Piston Installation Note*

•The arrow on the Top of the piston must point toward front.




A. Arrow B. Piston

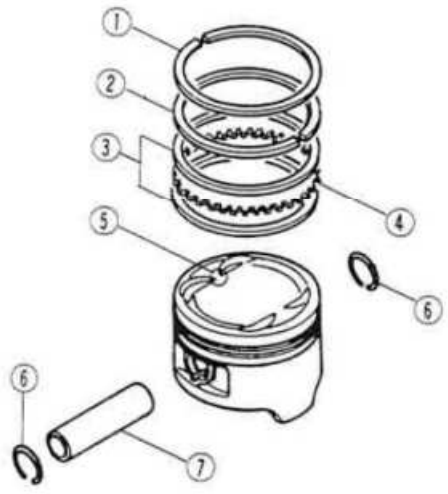
•When installing a piston pin snap ring, compress it only enough to install it and no more.

**CAUTION**

○**Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.**

•Position each piston ring so that the opening in the top ring and oil ring steel rails are facing forwards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.

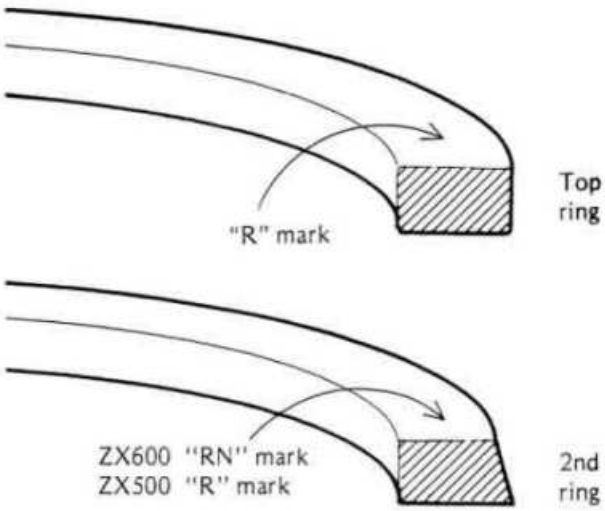
**Piston Ring Installation**




1. Top Ring
2. Second Ring
3. Oil Ring Steel Rails
4. Oil Ring Expander
5. Arrow Mark
6. Snap Ring
7. Piston Pin

○Install the oil ring upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.
●Do not mix up the top and second rings. The top ring is rectangular and symmetrical with respect to the horizontal axis, and the second ring is not symmetrical.
●The top and second rings must be installed with the marked side facing up.

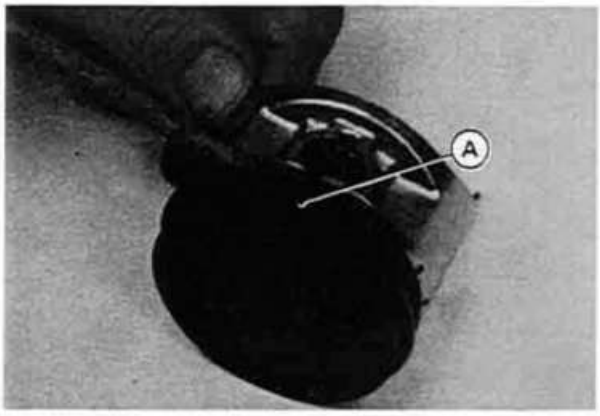
**Cross Section of Piston Rings**




### *Piston Ring, Piston Ring Groove Wear*

●Check for uneven groove wear by inspecting the ring seating.
★The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.
●With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.

| Piston Ring/Groove Clearance | | |
|---|---|---|
| | Standard | Service Limit |
| Top | 0.03 ~ 0.07 mm | 0.17 mm |
| Second | 0.02 ~ 0.06 mm | 0.16 mm |



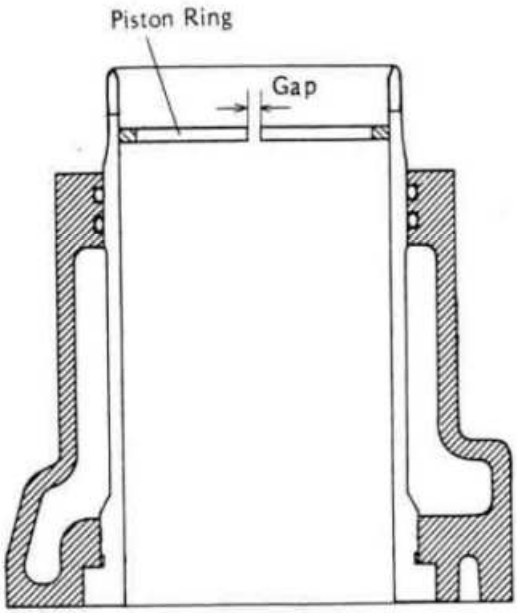

A. Thickness Gauge

### *Piston Ring End Gap*

●Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
●Measure the gap between the ends of the ring with a thickness gauge.

| Piston Ring End Gap | | |
|---|---|---|
| | Standard | Service Limit |
| Top | 0.15 ~ 0.30 mm | 0.6 mm |
| Second | 0.15 ~ 0.35 mm | 0.65 mm |

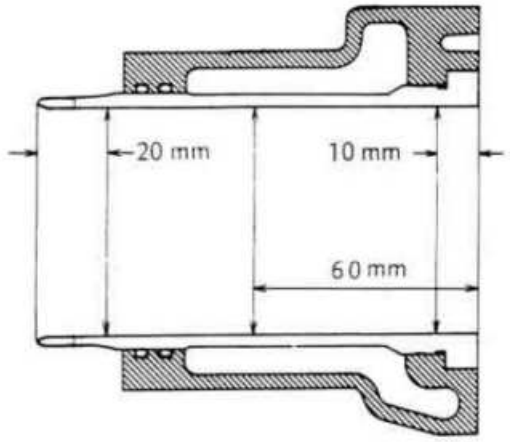
**End Gap Measurement**




### *Cylinder Inside Diameter*

●Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.
★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored to oversize and then honed.

**Cylinder Inside Diameter Measurement**




| Cylinder Inside Diameter | | |
|---|---|---|
| Standard: | ZX500 | 55.000 ~ 55.012 mm |
| | ZX600 | 60.000 ~ 60.012 mm and less than 0.01 mm difference between any two measurements |
| Service Limit: | | |
| | ZX500 | 55.10 mm |
| | ZX600 | 60.10 mm or 0.05 mm difference between any two measurements. |

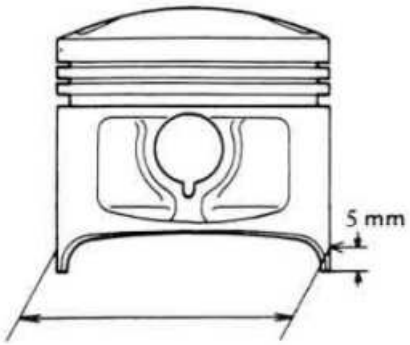
*Piston Diameter*

- Measure the outside diameter of each piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under the service limit, replace the piston.

| Piston Diameter | | |
|---|---|---|
| | Standard | Service Limit |
| ZX500 | 54.942 ~ 54.957 mm | 54.80 mm |
| ZX600 | 59.942 ~ 59.957 mm | 59.80 mm |

**Piston Diameter Measurement**




*Boring, Honing*

When boring and honing a cylinder, note the following:

- There is one size of oversize piston available. Oversize piston require oversize ring.

Oversize Piston and Ring

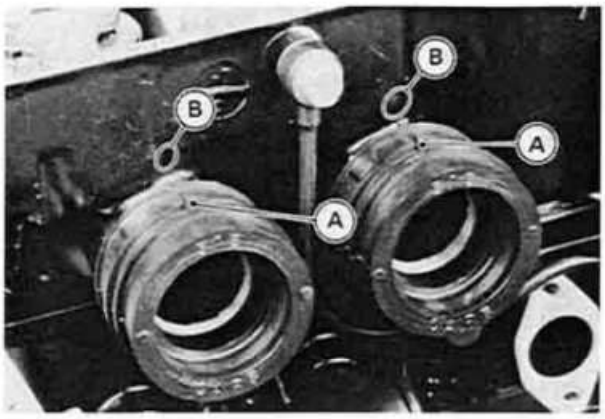
| 0.5 mm | Oversize |
|---|---|

- Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Service Data Section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than **0.5 mm** oversize, the cylinder block must be replaced.
- Cylinder inside diameter must not vary more than **0.01 mm** at any point.
- Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.
- In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus **0.1 mm** and the service limit for the piston is the oversize piston original diameter minus **0.15 mm.** If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.
- Never separate the liner from the cylinder, because the top surface of cylinder and liner is machined at the factory as an assembly.

## Carburetor Holder

*Carburetor Holder Installation*

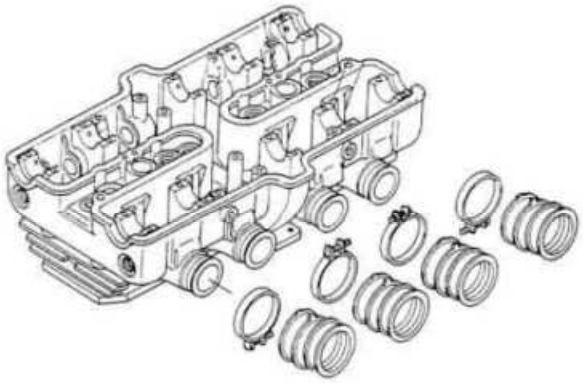
- Install the carburetor holders so that the projections face upwards and align with the cylinder head marks.




A. Holder Projection B. Mark

•Install the holder clamps as shown being careful of the screw position and the screw head direction.

**Carburetor Holder Clamps Installation**



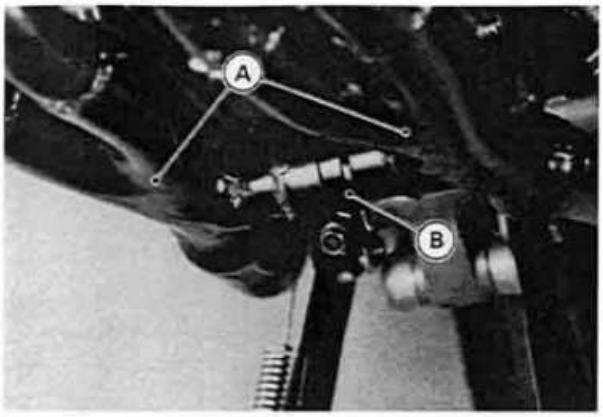
**WARNING**

○**Install the clamp screws horizontal. Or the screws could come in contact with the vacuum adjusting screws, resulting in an unsafe riding condition.**

## Muffler

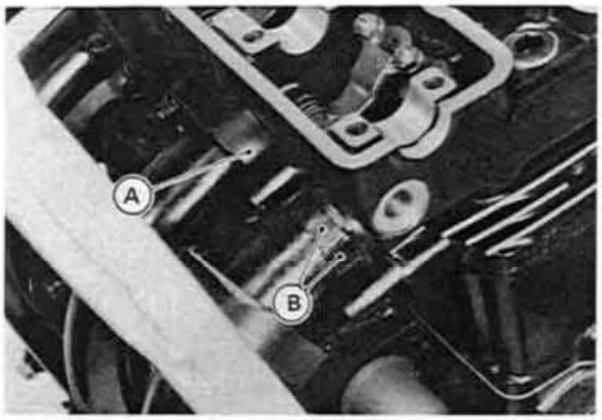
### *Muffler Removal*

•Remove the lower fairing (see Fairings in Frame chapter).
•Drain the coolant (see Coolant Draining in Cooling System chapter).
•Remove the radiator (see Radiator, Radiator Fan Removal in Cooling System chapter).
•Loosen the clamps securing the muffler connecting pipe to the mufflers.



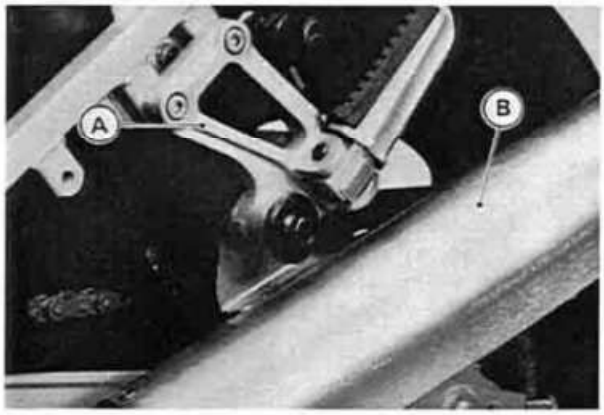

A. Mufflers B. Connecting Pipe

•Remove the exhaust pipe holder nuts, and slide the holder off its cylinder head studs.




A. Exhaust Pipe Holders B. Split Keepers

•Remove the split keeper.
•Remove the muffler mounting bolt at the rear footpeg bracket.




A. Footpeg Bracket B. Muffler

•Pull the muffler toward the front, and separate the left and right mufflers, and then remove each muffler.

CAUTION

○**Do not damage the oil cooler core with the muffler.**

●Remove the exhaust pipe holders and gaskets.

*Muffler Installation Note*

○Replace the muffler connecting pipe gasket with a new one, if necessary.

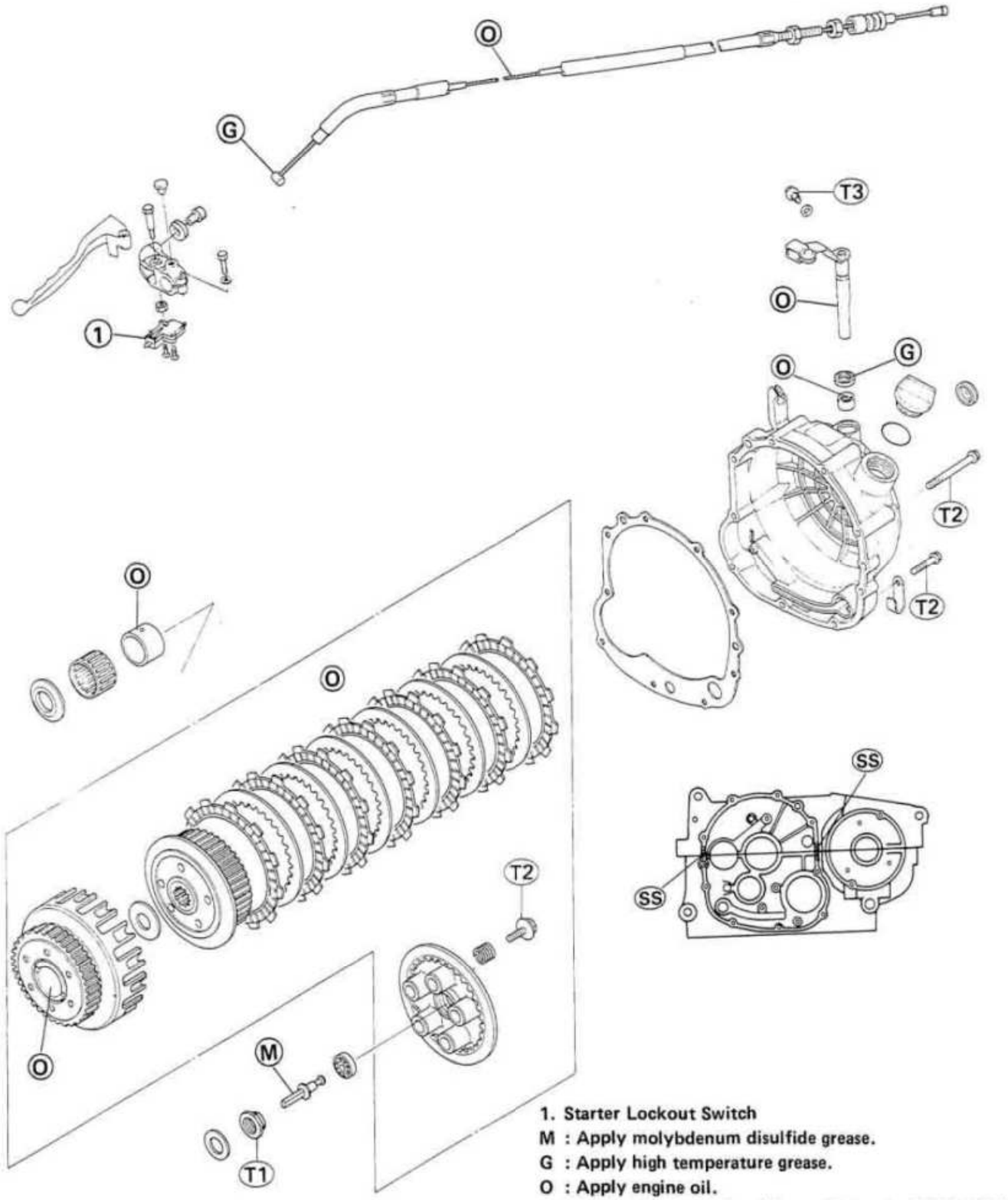
# Clutch

## Table of Contents

5


**Exploded View** ..... 5-2
**Specifications** ..... 5-3
**Special Tools** ..... 5-3
**Sealant** ..... 5-3
**Clutch** ..... 5-4
*Clutch Adjustment Check* ..... 5-4
*Clutch Adjustment* ..... 5-4
*Clutch Release Lever Removal* ..... 5-5
*Clutch Release Lever Installation Notes* ..... 5-5
*Clutch Cover Removal* ..... 5-6
*Clutch Cover Installation Note* ..... 5-6
*Clutch Removal* ..... 5-6
*Clutch Installation Notes* ..... 5-6
*Friction Plate Wear, Damage Inspection* ..... 5-7
*Friction or Steel Plate Warp Inspection* ..... 5-7
*Clutch Spring Free Length Measurement* ..... 5-8
*Clutch Housing Finger Inspection* ..... 5-8
*Clutch Hub Spline Inspection* ..... 5-8

## Exploded View




1. Starter Lockout Switch
M : Apply molybdenum disulfide grease.
G : Apply high temperature grease.
O : Apply engine oil.
SS : Apply silicone sealant (Kawasaki Bond: 56019-120)
T1 : 135 N-m (14 kg-m, 100 ft-lb)
T2 : 8.8 N-m (0.9 kg-m, 78 in-lb)
T3 : 6.9 N-m (0.7 kg-m, 61 in-lb)

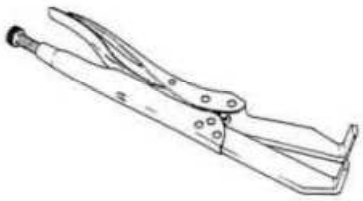
## Specifications

| Item | | Standard | Service Limit |
|---|---|---|---|
| Clutch: | Clutch lever play | 2 – 3 mm | – – – |
| | Clutch spring free length | 32.6 mm | 31.7 mm |
| | Friction plate thickness | 2.9 – 3.1 mm | 2.8 mm |
| | Friction and steel plate warp | Less than 0.2 mm | 0.3 mm |

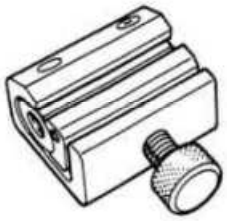
## Special Tools

Along with common hand tools, the following more specialized tools are required for complete clutch servicing.

**Holder: 57001-305**

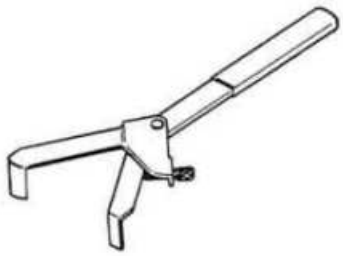


**Pressure Cable Luber: K56019-021**



**Clutch Holder: 57001-1243**

This is newly available instead of Holder: 57001-305.



## Sealant

**Kawasaki Bond (Silicone Sealant): 56019-120**



## Clutch

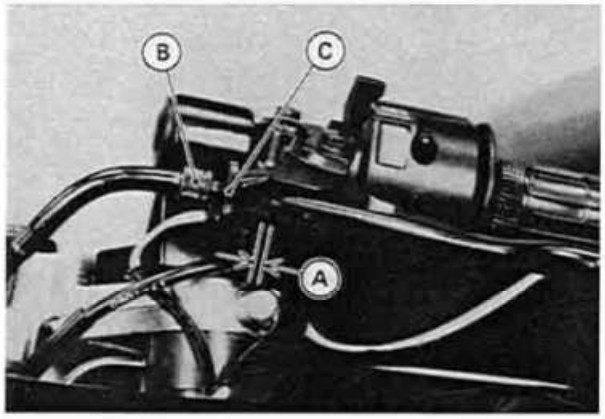
Due to the friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

**WARNING**

**○To avoid a serious burn, never touch the engine or exhaust pipe during clutch adjustment.**

### *Clutch Adjustment Check*

- Pull the clutch lever just enough to take up the free play.
- Measure the gap between the lever and the lever bracket.




A. Clutch Lever Free Play 2 ~ 3 mm
B. Adjuster
C. Locknut

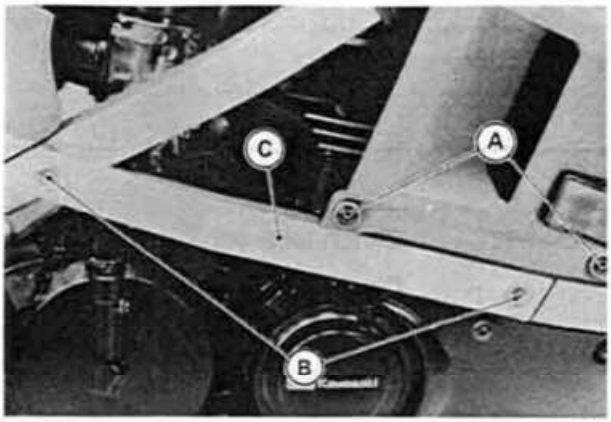
★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust the clutch.

### *Clutch Adjustment*

- Loosen the knurled locknut at the clutch lever.
- Turn the adjuster so that the clutch lever will have 2 ~ 3 mm of play.
- Tighten the locknut.

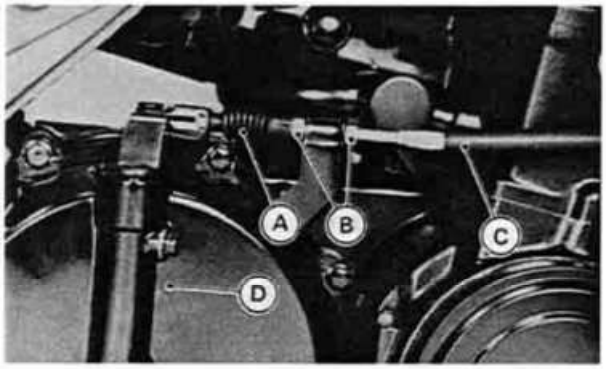
★If it cannot be done, use the adjusting nuts at the lower end of the cable.

- On the right side, remove the fairing mounting screw shown and the fairing stay mounting screws, and take off the rear fairing stay.



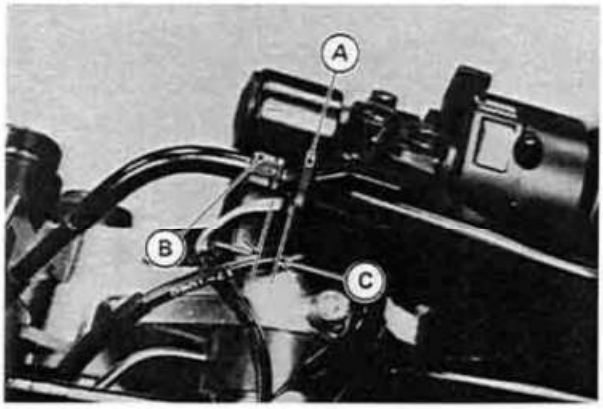

A. Fairing Mounting Screw
B. Stay Mounting Screws
C. Rear Fairing Stay

- Loosen the lower cable adjusting nuts at the clutch cover as far as they will go.



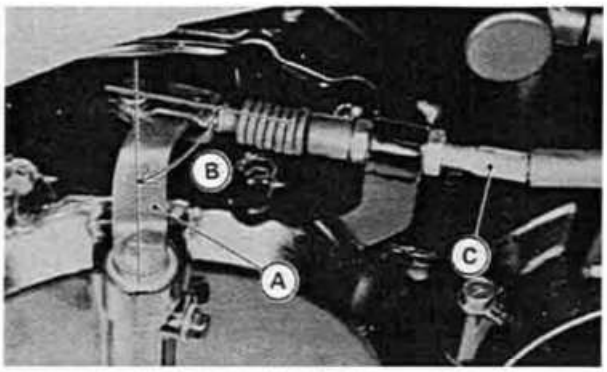

A. Dust Cover
B. Adjusting Nuts
C. Clutch Cable
D. Clutch Cover

- Loosen the knurled locknut at the clutch lever.
- Turn in the adjuster so that 5 ~ 6 mm of threads are visible.




A. Locknut
B. Adjuster
C. 5 ~ 6 mm

- Pull the clutch cable tight and tighten the lower cable adjusting nuts against the bracket.
- Turn the adjuster at the clutch lever until the free play is correct. At this time, check that the clutch release lever to clutch cable angle is 80 ~ 90°.




A. Release Lever
B. 80 ~ 90°
C. Clutch Cable

★If the clutch cannot be adjusted by this method, inspect the clutch parts.

•Tighten the knurled locknut at the clutch lever.

**NOTE**

○*Be sure that the outer cable end at the clutch lever is fully seated in the adjuster at the clutch lever, or it could slip into place later, creating enough cable play to prevent clutch disengagement.*

•After the adjustment is made, start the engine and check that the clutch does not slip and that it releases properly.

### *Clutch Release Lever Removal*

**CAUTION**

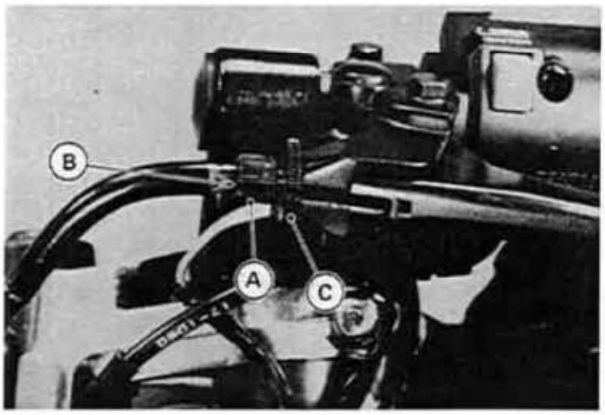
○**Do not remove the clutch release shaft unless it is absolutely necessary. If removed, you must replace the oil seal with a new one.**

•Remove the fairing stay before removing the clutch release lever (see Clutch Adjustment).

•Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play.

•Loosen the knurled locknut at the clutch lever, and screw in the adjuster.

•Line up the slots in the clutch lever, knurled locknut, and adjuster, and then free the cable from the lever.

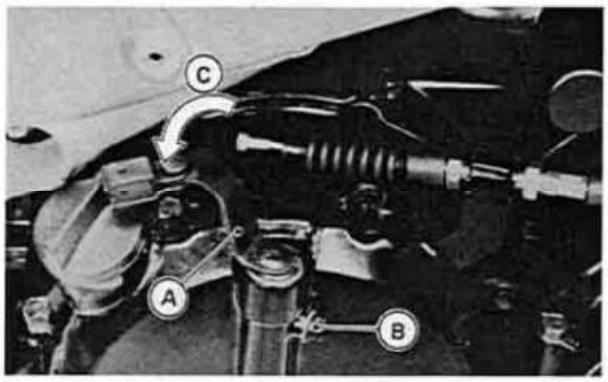



A. Adjuster
B. Slot
C. Knurled Locknut

•Free the clutch inner cable tip from the clutch release lever.

•Remove the positioning bolt.

•Turn the release lever counterclockwise as shown, and then pull out the release lever with its shaft.




A. Release Lever
B. Positioning Bolt
C. Turn Counterclockwise

### *Clutch Release Lever Installation Notes*

•Release lever installation is the reverse of removal.

**CAUTION**

○**Install a new oil seal always when removing the clutch release shaft.**

•Apply high temperature grease to the oil seal lips on the upper ride of the clutch cover.

•Apply oil to the bearings in the hole of the clutch cover.

•Apply oil to the release shaft.

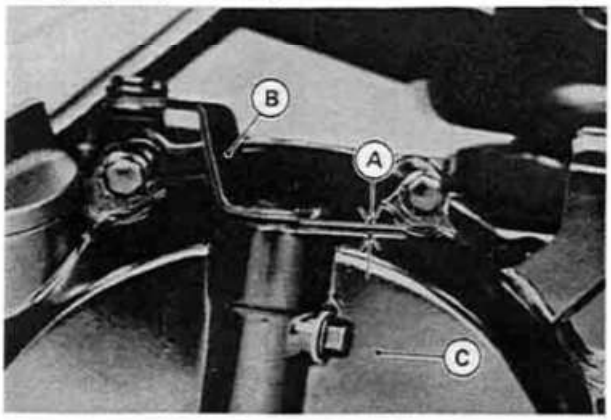
**CAUTION**

○**When inserting the release shaft, be careful not remove the spring of the oil seal.**

•Check the clearance between the release lever and the clutch cover, and install the positioning bolt.

•Tighten the positioning bolt to the specified torque (see Exploded View).

•Make sure the release shaft turns smoothly after torquing the positioning bolt.




A. Clearance 1 ~ 3 mm
B. Release Lever
C. Clutch Cover

### *Clutch Cover Removal*

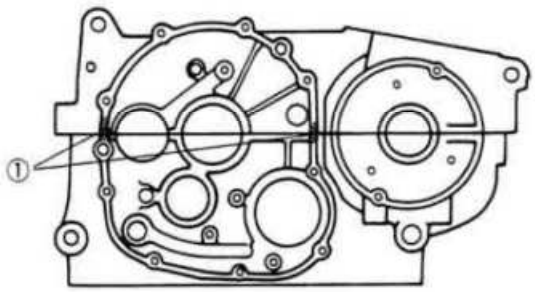
- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Remove the lower fairing (see Lower Fairing Removal in Frame chapter).
- Remove the clutch cable lower end from the clutch cover.
- Remove the clutch cover bolts and take off the cover.

**CAUTION**

**Do not remove the clutch release shaft for clutch cover removal. Clutch release shaft removal damages the oil seal in the clutch cover necessitating the oil seal replacement.**

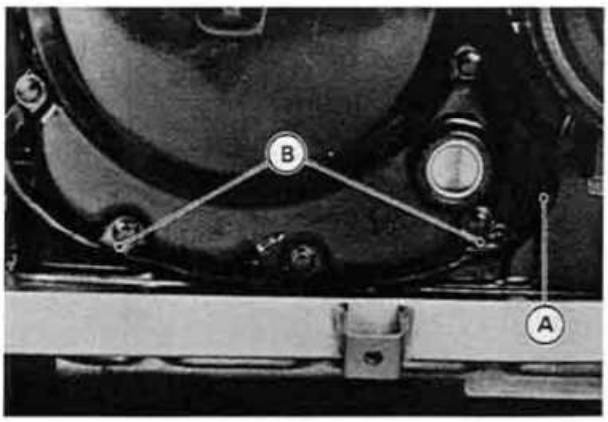
### *Clutch Cover Installation Note*

- Replace the clutch cover gasket with a new one.
- Apply silicone sealant (sealant) to the mating surface as shown.




1. Silicone Sealant (Kawasaki Bond: 56019-120)

- Clamp the pick-up coil wire as shown.

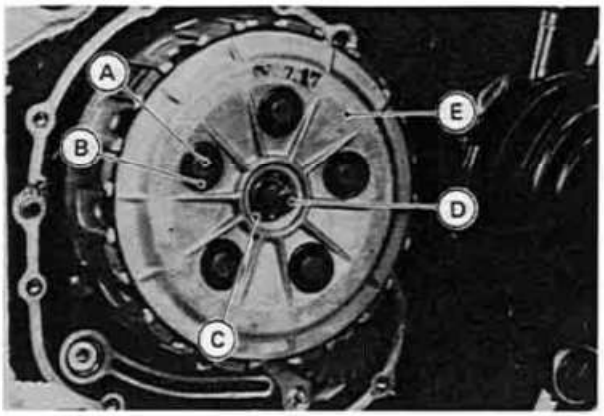



A. Pick-up Coil Wire B. Clamps

- Tighten the clutch cover bolts to the specified torque (see Exploded View).

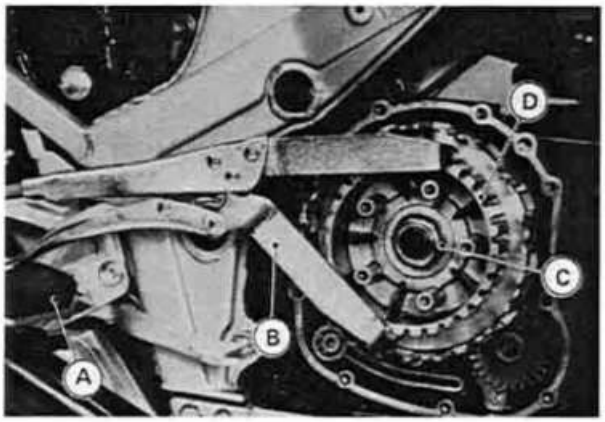
### *Clutch Removal*

- Remove the clutch cover.
- Remove the clutch spring bolts, washers, and springs; then take off the clutch spring plate with the bearing and pusher.




A. Clutch Spring Bolt
B. Washer
C. Bearing
D. Pusher
E. Clutch Spring Plate

- Remove the friction plates and steel plates as a set.
- Remove the clutch hub nut. When loosening the hub nut, use the clutch holder (special tool) to keep the clutch hub from turning as shown.



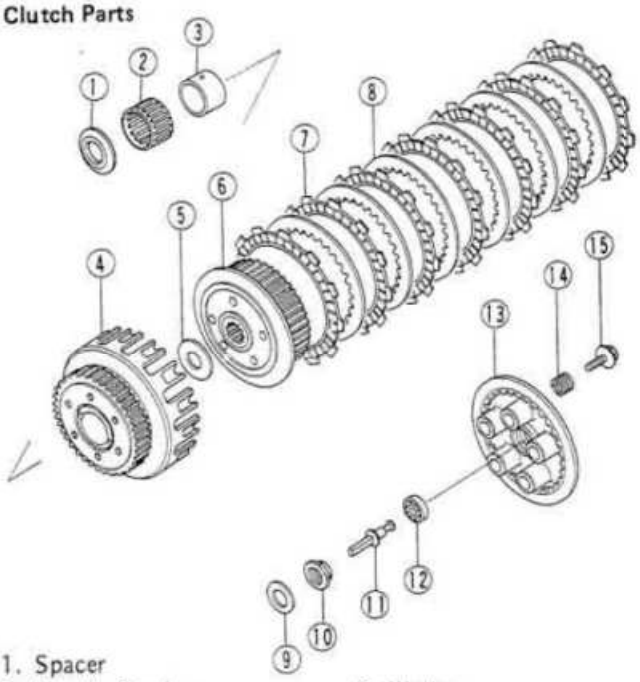

A. Right Footpeg
B. Holder: 57001-305, 1243
C. Hub Nut
D. Clutch Hub

- Remove the thrust washer, clutch hub, washer, clutch housing, needle bearing, collar, and spacer.

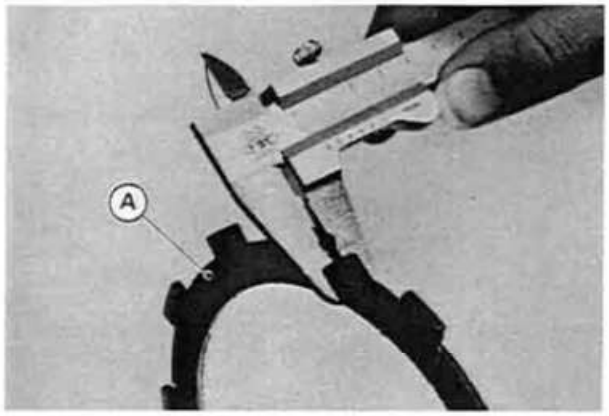
### *Clutch Installation Notes*

- Clutch installation is the reverse of removal. Pay attention to the following items.

**Clutch Parts**



1. Spacer
2. Needle Bearing
3. Collar
4. Clutch Housing
5. Washer
6. Clutch Hub
7. Friction Plate
8. Steel Plate
9. Washer
10. Hub Nut
11. Pusher
12. Bearing
13. Spring Plate
14. Clutch Spring
15. Bolt



A. Friction Plate

| Friction Plate Thickness | |
|---|---|
| Standard: | 2.9 ~ 3.1 mm |
| Service Limit: | 2.8 mm |

○Install the spacer with the chamfered side facing inwards.
○Discard the used hub nut, and install a new nut.
○Install the clutch holder (special tool: 57001-305, 1243) to keep the clutch hub from turning and tighten the clutch hub nut to the specified torque (see Exploded View).
○Install the friction plates and steel plates, starting with a friction plate and alternating them.

**CAUTION**

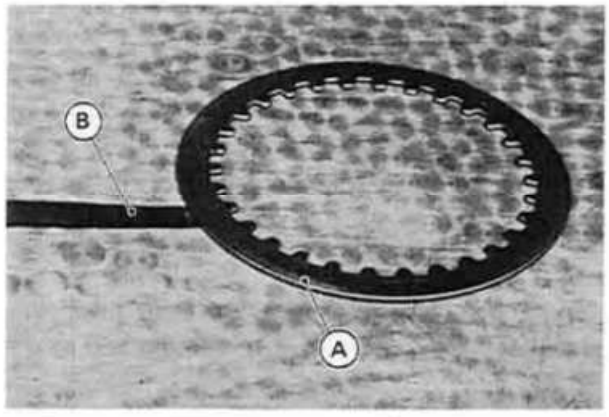
○**If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.**
○Tighten the clutch spring bolts to the specified torque (see Exploded View).

### *Friction Plate Wear, Damage Inspection*

●Visually inspect the friction plates to see if they show any signs of seizure, overheating, or uneven wear.
★If any plates show signs of damage, replace the friction plates and steel plates as a set.
●Measure the thickness of the friction plates at several points (see Specifications).
★If any of the measurements is less than the service limit, replace the friction plate.

### *Friction or Steel Plate Warp Inspection*

●Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate and each friction plate or steel plate. The gap is the amount of friction or steel plate warp.
★If any plate is warped over the service limit, replace it with a new one.

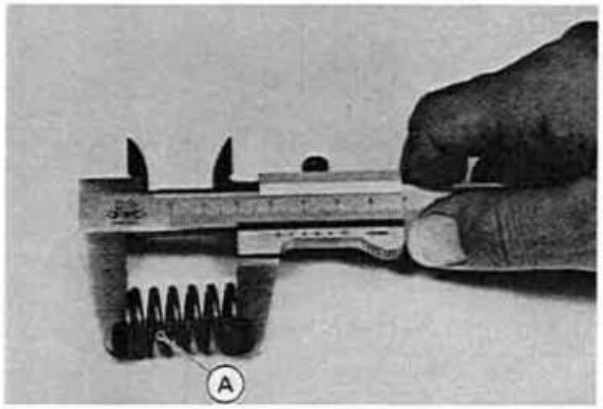


A. Friction or Steel Plate B. Thickness Gauge

| Friction and Steel Plate Warp | |
|---|---|
| Standard: | less than 0.2 mm |
| Service Limit: | 0.3 mm |

### *Clutch Spring Free Length Measurement*

- Since the spring becomes shorter as it weakens, check its free length to determine its condition.
- ★If any of the springs is shorter than the service limit, it must be replaced.

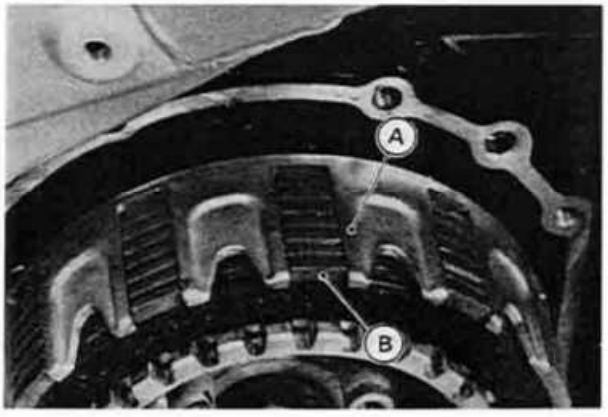



A. Clutch Spring

| Clutch Spring Free Length | |
|---|---|
| Standard: | 32.6 mm |
| Service Limit: | 31.7 mm |

### *Clutch Housing Finger Inspection*

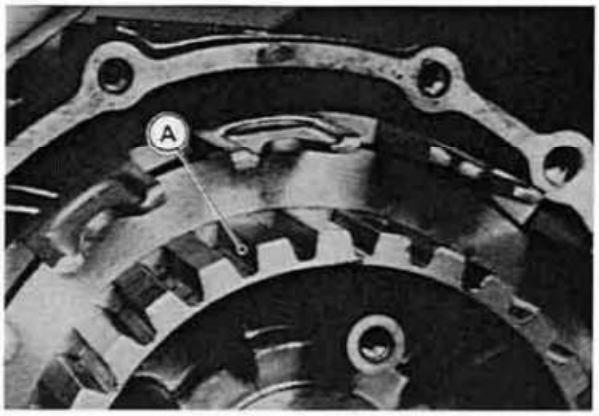
- Visually inspect the fingers of the clutch housing where the tangs of the friction plates hit them.
- ★If they are badly worn or if there are grooves cut where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.




A. Clutch Housing Finger B. Friction Plate Tang

### *Clutch Hub Spline Inspection*

- Visually inspect where the teeth on the steel plates wear against the splines of the clutch hub.
- ★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



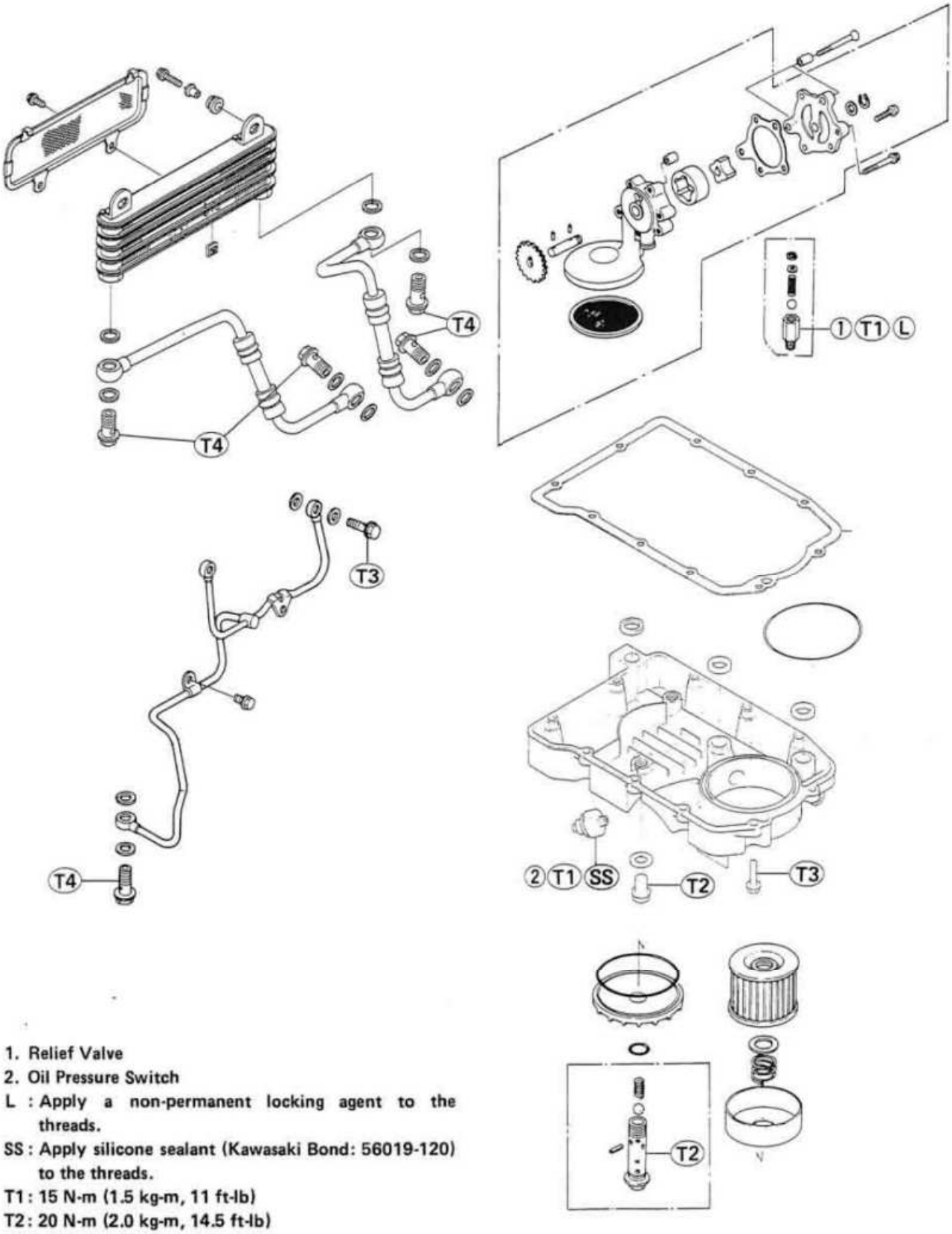

A. Clutch Hub Spline

# Engine Lubrication System

## Table of Contents


**Exploded View** ..... 6-2
**Engine Oil Flow Chart** ..... 6-3
**Specifications** ..... 6-4
**Special Tools** ..... 6-4
**Sealant** ..... 6-4
**Engine Oil and Filter** ..... 6-5
*Engine Oil Level Inpsection* ..... 6-5
*Engine Oil and/or Filter Change* ..... 6-5
*Oil Filter and Mounting Bolt Removal* ..... 6-6
*Oil Filter and Mounting Bolt Installation Notes* ..... 6-6
*Bypass Valve Disassembly* ..... 6-6
*Bypass Valve Assembly* ..... 6-6
*Bypass Valve Cleaning and Inspection* ..... 6-6
**Oil Pan** ..... 6-6
*Oil Pan Removal* ..... 6-6
*Relief Valve Removal* ..... 6-7
*Relief Valve Installation Note* ..... 6-7
*Oil Pan Installation Notes* ..... 6-7
**Oil Pump** ..... 6-7
*Oil Pump Removal* ..... 6-7
*Oil Pump Installation Notes* ..... 6-8
*Oil Pump Disassembly* ..... 6-8
*Oil Pump Assembly Note* ..... 6-8
*Oil Pressure Measurement* ..... 6-8
*Oil Pump Inspection* ..... 6-9
*Relief Valve Inspection* ..... 6-9

## Exploded View




1. Relief Valve
2. Oil Pressure Switch

L : Apply a non-permanent locking agent to the threads.

SS : Apply silicone sealant (Kawasaki Bond: 56019-120) to the threads.

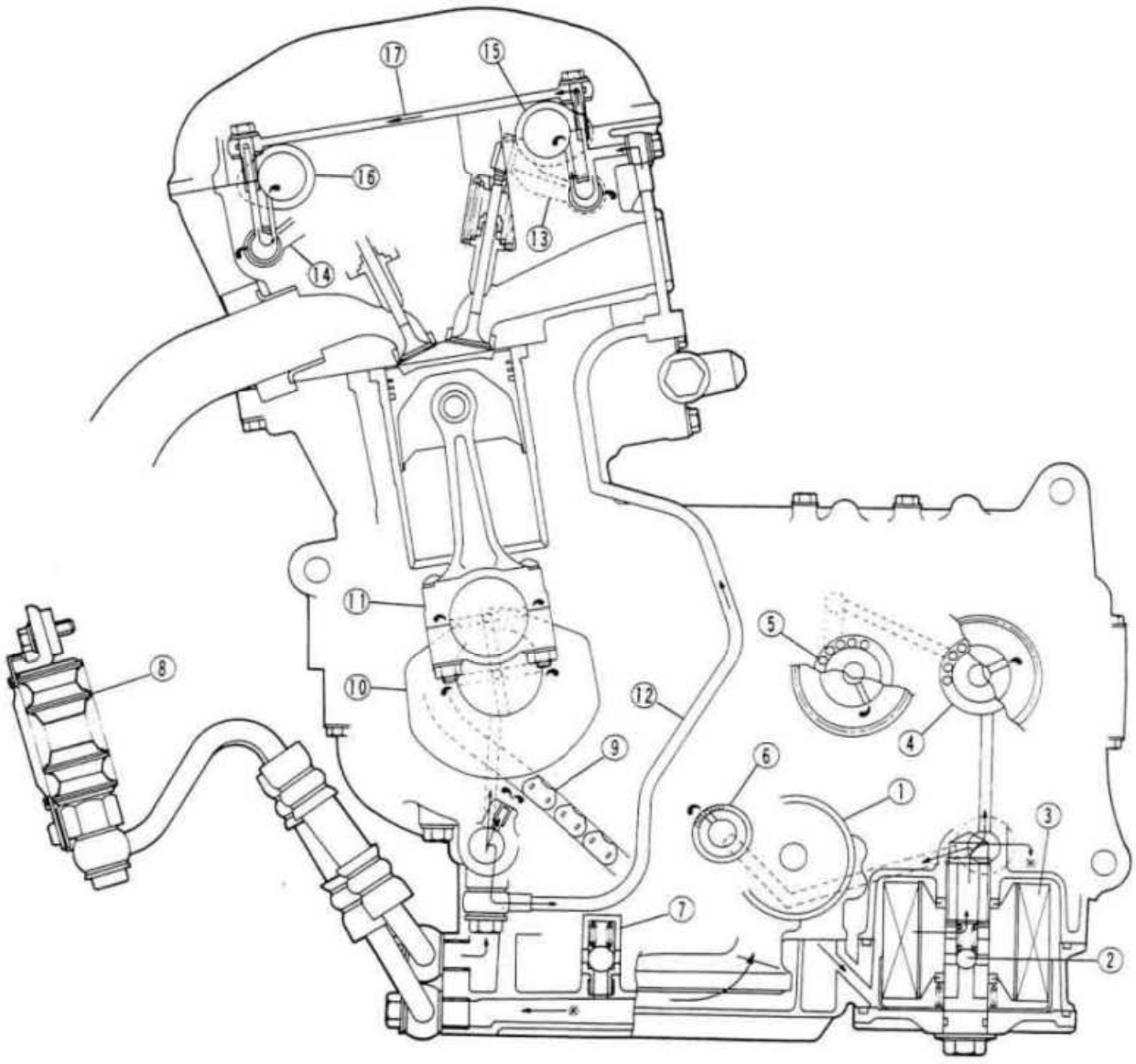
T1 : 15 N-m (1.5 kg-m, 11 ft-lb)

T2 : 20 N-m (2.0 kg-m, 14.5 ft-lb)

T3 : 12 N-m (1.2 kg-m, 104 in-lb)

T4 : 25 N-m (2.5 kg-m, 18 ft-lb)

## Engine Oil Flow Chart




1. Oil Pump
2. Bypass Valve
3. Oil Filter
4. Output Shaft Needle Bearing
5. Drive Shaft Needle Bearing
6. Secondary Gear Shaft Needle Bearing
7. Relief Valve
8. Oil Cooler
9. Primary Chain
10. Crankshaft
11. Connecting Rod
12. Oil Pipe
13. Inlet Rocker Arm
14. Exhaust Rocker Arm
15. Inlet Camshaft
16. Exhaust Camshaft
17. Oil Pipe (Cylinder Head)

## 6-4 ENGINE LUBRICATION SYSTEM

### Specifications

| Item | | Standard |
|---|---|---|
| Engine oil: | Grade | SE or SF class |
| | Viscosity | SAE 10W40, 10W50, 20W40, or 20W50 |
| | Required amount | 2.6 L (when filter is not removed)<br>3.0 L (when filter is removed) |
| | Level | Between upper and lower levels |
| Relief valve opening pressure | | 430 – 590 kPa (4.4 – 6.0 kg/cm², 63 – 85 psi) |
| Oil Pressure @4,000 r/min (rpm), oil temp. 80°C (176°F) | | 216 – 275 kPa (2.2 – 2.8 kg/cm², 31 – 40 psi) |

### Special Tools

Along with common hand tools, the following more specialized tools are required for complete engine lubrication system servicing.

**Oil Pressure Gauge: 57001-164**



**Oil Pressure Gauge Adapter : 57001-1188**



### Sealant

**Kawasaki Bond (Silicone Sealant): 56019-120**



## Engine Oil and Filter

**WARNING**

**○Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.**

### *Engine Oil Level Inspection*

●If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.

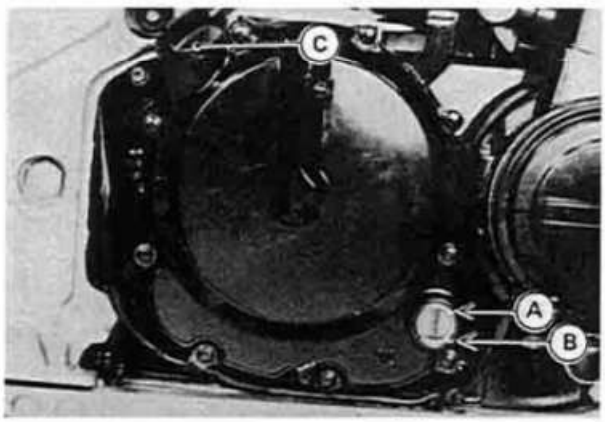
**CAUTION**

**○Racing the engine before the oil reaches every part can cause engine seizure.**

●If the motorcycle has just been used, wait several minutes for all the oil to drain down.
●Situate the motorcycle so that it is perpendicular to the ground, and check the engine oil level through the oil level gauge.
★The oil level should come up between the upper and lower level lines.
★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

**NOTE**

*○If the engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*



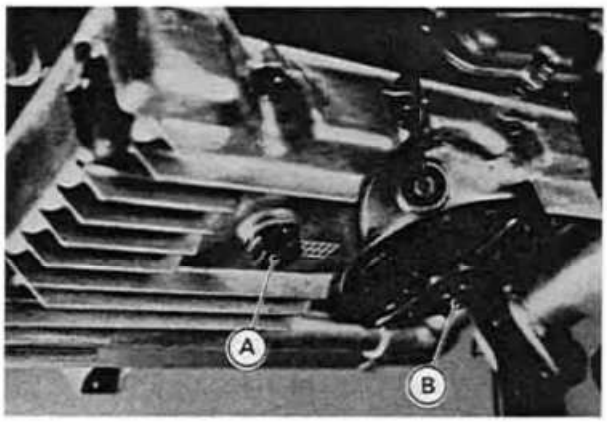

A. Upper Level
B. Lower Level
C. Oil Filler Opening Cap

**CAUTION**

**○If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.**

### *Engine Oil and/or Filter Change*

●Remove the lower fairing.
●Warm up the engine so that the oil will pick up any sediment and drain easily. Then stop the engine.
●With the motorcycle up on its center stand, place an oil pan beneath the engine.
●Remove the engine drain plug, and let the oil drain completely.




A. Drain Plug
B. Oil Filter Mounting Bolt

●If the oil filter is to be changed, replace it with a new one (see Oil Filter and Mounting Bolt Removal and Installation Notes).
●Check the gasket at the drain plug for damage.
★Replace the gasket with a new one if it is damaged.
●After the oil has completely drained out, install the drain plug with the gasket, and tighten it to the specified torque (see Exploded View).
●Fill the engine with a good quality motor oil specified in the table.
●Check the oil level.

| **Engine Oil** | |
|---|---|
| **Grade:** | **SE or SF class** |
| **Viscosity:** | **SAE 10W40, 10W50, 20W40, or 20W50** |
| **Required Amount** | |
| **When filter is not removed:** | **2.6 L** |
| **When filter is removed:** | **3.0 L** |

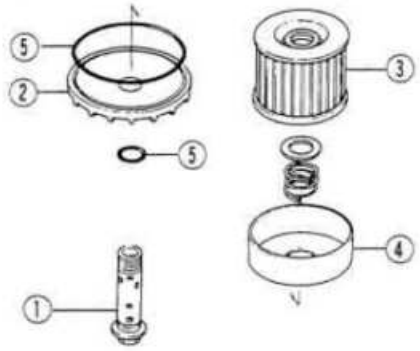
*Oil Filter and Mounting Bolt Removal*

- Remove the lower fairing.
- With the motorcycle up on its center stand, place an oil pan beneath the engine.
- Unscrew the oil filter mounting bolt and drop out the filter.
- Holding the filter steady, turn the mounting bolt to work the filter free and take the filter off the bolt.
- Remove the flat washer, spring, and oil fence, then pull the filter cover off the bolt.
- The oil filter bypass valve is assembled in the mounting bolt.

*Oil Filter and Mounting Bolt Installation Notes*

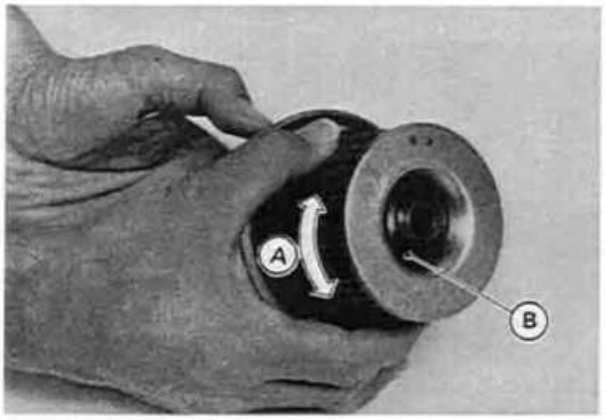
- Check that the O-rings are in good condition.
- ★If they are damaged, replace them with new ones.

**Oil Filter and Mounting Bolt Installation**




1. Mounting Bolt (Including Bypass Valve)
2. Filter Cover
3. Filter
4. Oil Fence
5. O-rings

- Apply oil to the mounting bolt, turn the filter or the mounting bolt to work the filter into place. Be careful that the filter grommets do not slip out of place.




A. Turn the filter. B. Grommet

- Install the oil filter and tighten the mounting bolt to the specified torque (see Exploded View).
- Add engine oil. (see Oil Level Inspection).

*Bypass Valve Disassembly*

- Remove the oil filter. Oil draining is not necessary.
- Drive the retaining pin out of the filter mounting bolt.
- Drop out the spring and the bypass valve steel ball.

*Bypass Valve Assembly*

- Drop the bypass valve steel ball into the filter mounting bolt.
- Put the spring into the mounting bolt and compress it beyond the small hole.
- Drive the retaining pin into the small hole to hold the spring.
- Install the oil filter.

*Bypass Valve Cleaning and Inspection*

- Remove the oil filter.
- Disassemble the bypass valve.
- Clean the bypass valve parts in a high flash-point solvent.

**WARNING**

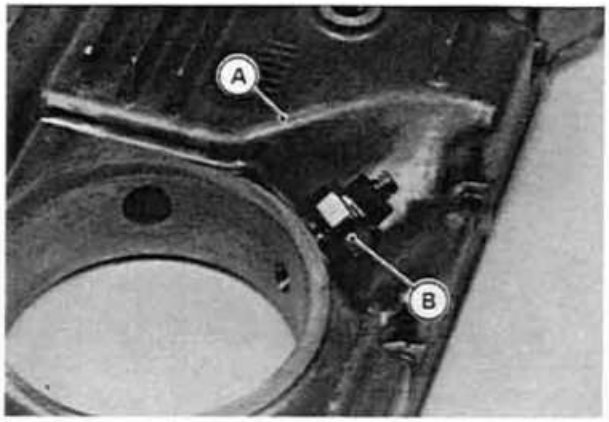
- **Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvent.**

- Visually inspect the bypass valve parts.
- ★If there is any damaged part, replace it.

## Oil Pan

*Oil Pan Removal*

- Drain the engine oil.
- Remove the oil filter.
- Remove the mufflers (see Muffler removal in Engine Top End chapter).
- Remove the banjo bolts at the ends of both oil cooler hoses.
- Remove the bolt and lockwasher, and free the lead from the oil pressure switch.

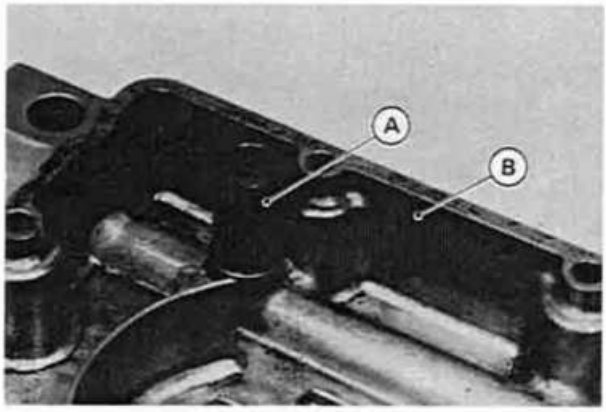



A. Oil Pan B. Oil Pressure Switch

•Remove the oil pan bolts, and pull the oil pan off the crankcase.

*Relief Valve Removal*

•Remove the oil pan.
•Unscrew the oil pressure relief valve from the oil pan.



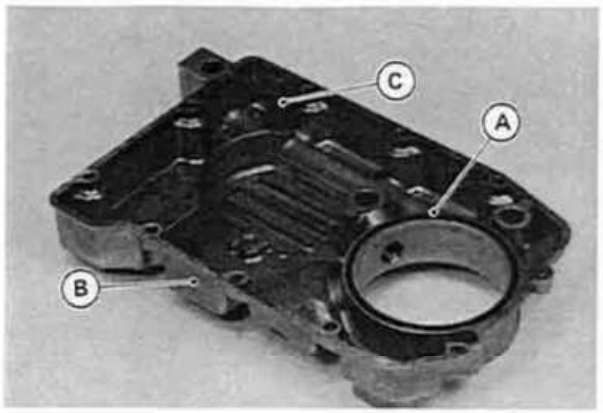

A. Relief Valve B. Oil Pan

*Relief Valve Installation Note*

•Apply a non-permanent locking agent on the valve thread, and tighten the valve to the specified torque (see Exploded View).

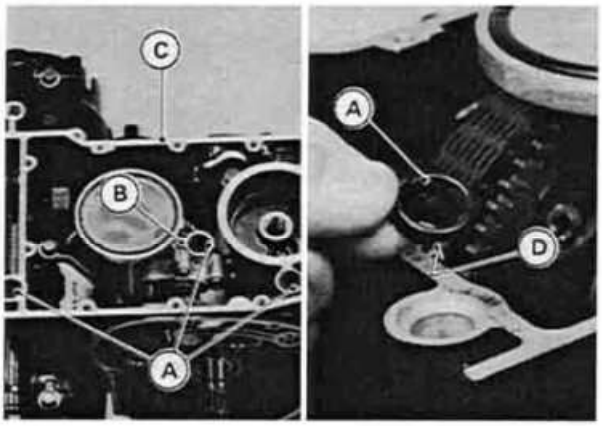
*Oil Pan Installation Notes*

•Check that the O-ring and oil pressure relief valve are in place.




A. O-Ring C. Relief Valve
B. Oil Pan

•Fit the oil passage O-rings on the lower crankcase. Replace the O-rings with new ones, if deteriorated or damaged. The flat side of the O-ring must face down.



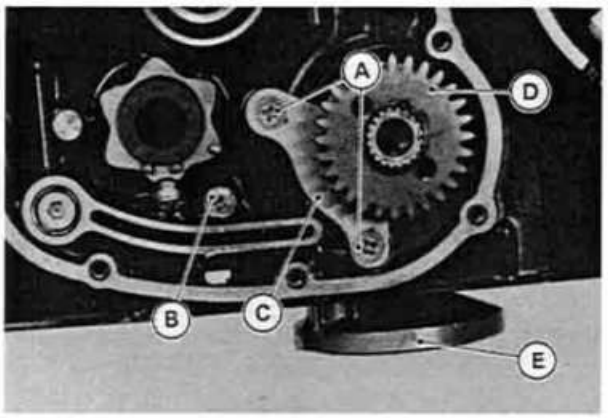

A. O-Rings C. Crankcase
B. Oil Pump D. Flat Side

•Replace the oil pan gasket with a new one.
•Tighten the oil pan bolts to the specified torque (see Exploded View).

## Oil Pump

*Oil Pump Removal*

•Remove the oil pan.
•Remove the clutch (see Clutch Removal in clutch chapter).
•Remove the mounting bolt and screws, and remove the bearing stop.

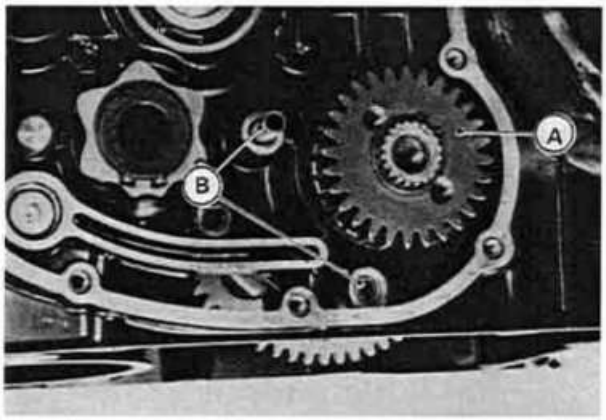



A. Screws
B. Bolt
C. Bearing Stop
D. Secondary Shaft Gear
E. Oil Pump

•Pull the oil pump into the crankcase, and take off the pump. There are two knock pins on the crankcase.

### *Oil Pump Installation Notes*

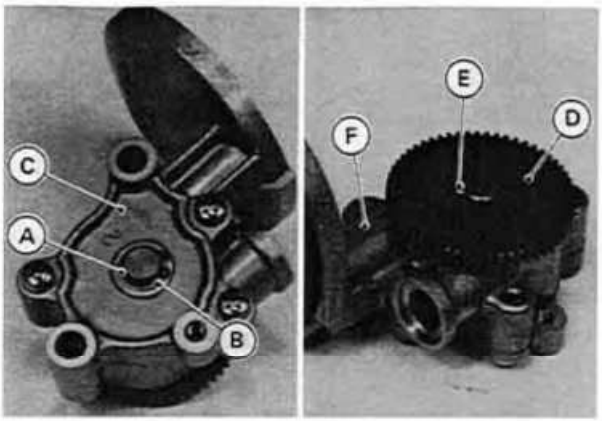
•Fill the oil pump with engine oil for initial lubrication.
•Check to see that the knock pins are in place.
•Stake each oil pump screw head with a punch to prevent loosening.




A. Secondary Shaft Gear B. Knock Pins

### *Oil Pump Disassembly*

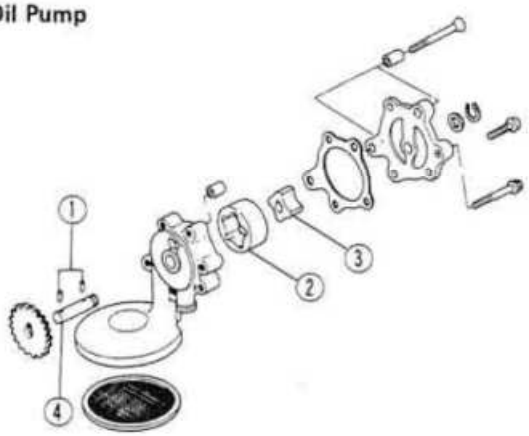
•Remove the oil pump.
•Remove the circlip with circlip pliers (special tool), and remove the washer on the pump shaft end.
•Slide the shaft through the oil pump gear just far enough to take out the pin, and then remove the gear from the shaft.




A. Circlip
B. Washer
C. Oil Pump Cover
D. Pump Gear
E. Pin
F. Oil Pump

•Remove the oil pump cover screws, and take off the cover and gasket.
•Pull the oil pump shaft, pin, inner rotor, and outer rotor from the pump.

**Oil Pump**




1. Pins
2. Outer Rotor
3. Inner Rotor
4. Shaft

### *Oil Pump Assembly Note*

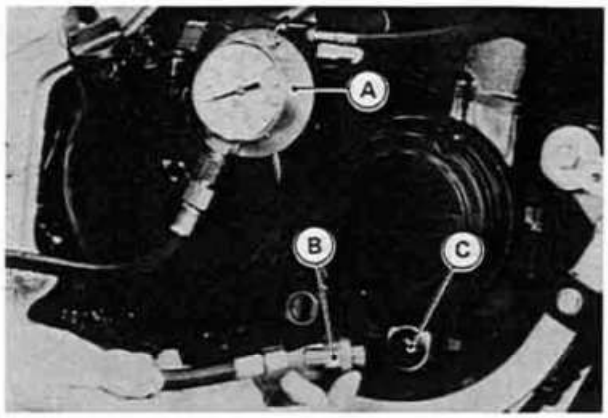
•After completing the oil pump assembly, check that the rotor shaft and rotor turn smoothly.

### *Oil Pressure Measurement*

**NOTE**

○*If relief valve opening pressure measurement is necessary, measure the oil pressure before the engine is warmed up.*

•Measure the relief valve opening pressure when the engine is cold.
○Remove the lower fairing.
○Remove the oil passage plug.
○Install oil pressure gauge 57001-164 and adapter 57001-1188.




A. Oil Pressure Gauge: 57001-164
B. Adapter: 57001-1188
C. Plug

○Start the engine, and read the oil pressure gauge while running the engine at various speeds. A normal relief valve keeps the maximum oil pressure between the specified values.

**Relief Valve Opening Pressure**
**430 ~ 590 kPa**
**(4.4 ~ 6.0 kg/cm², 63 ~ 85 psi)**

○Stop the engine.
○Remove the oil pressure gauge and adapter.
○Install the oil passage plug.
★If the reading exceeds the standard by very much, the relief valve is stuck in its closed position.
★If the reading is much lower than the standard, the relief valve may be stuck open, or there may be other damage in the lubrication system. Stop the engine immediately and find the cause.
●Measure the oil pressure at normal operating temperature.
○Warm up the engine, and then stop the engine.
○Install the oil pressure gauge and adapter as shown above.

**WARNING**

**○If the oil passage plug is removed while the engine is warm, hot engine oil will drain through the oil passage; take care against burns.**

○Start the engine again.
○Run the engine at the specified speed, and read the oil pressure gauge.
★If the oil pressure is significantly below the specification, inspect the oil pump and relief valve.

**Oil Pressure**
**216 ~ 275 kPa (2.2 ~ 2.8 kg/cm², 31 ~ 40 psi)**
**@4,000 r/min (rpm), 80°C (176°F) of oil temp.**

☆If the oil pump and relief valve are not at fault, inspect the rest of the lubrication system.

### *Oil Pump Inspection*

●Disassemble the oil pump.
●Visually inspect the oil pump body, outer and inner rotors, and covers.
★If there is any damage or uneven wear, replace the rotors or the oil pump assembly.

### *Relief Valve Inspection*

●Remove the relief valve.
●Check to see if the steel ball inside the valve slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by valve spring pressure.

**NOTE**

○*Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

**WARNING**

**○Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents.**

★If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.

# Engine Removal/Installation

## Table of Contents

7

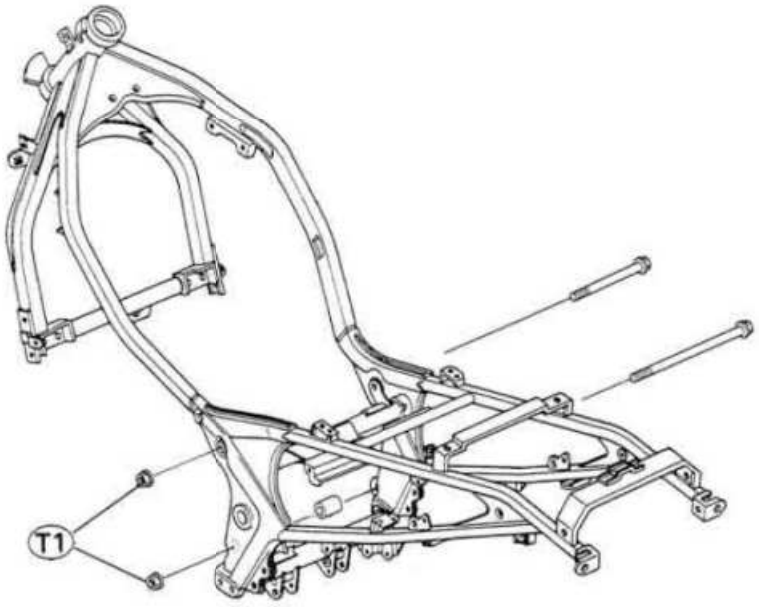
Exploded View ..... 7-2

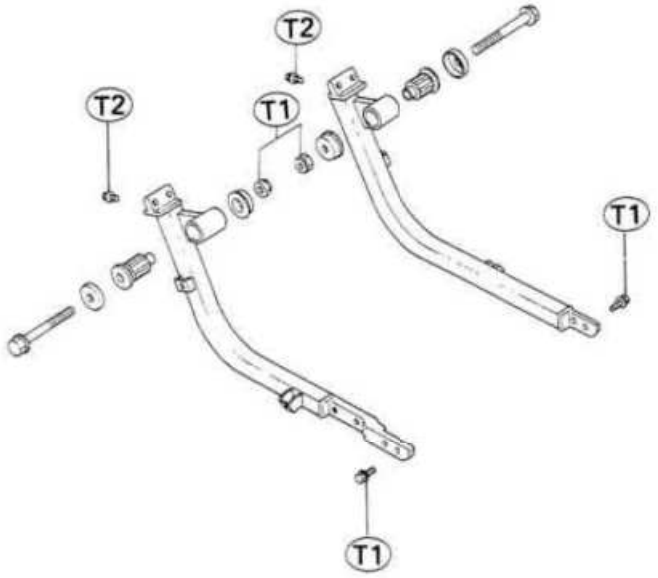
Engine Removal/Installation ..... 7-3

*Engine Removal* ..... 7-3

*Engine Installation* ..... 7-3

## Exploded View



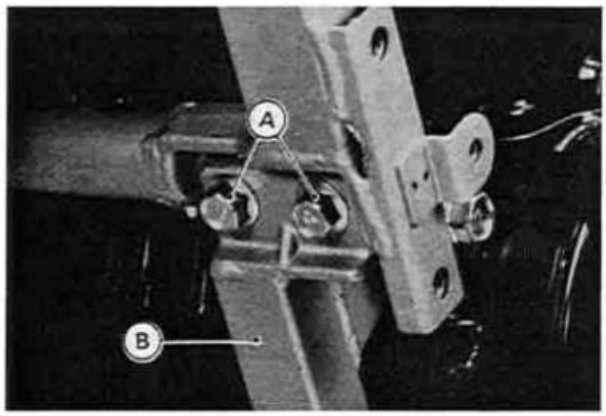




T1: 34 N·m (3.5 kg-m, 25 ft-lb)
T2: 25 N·m (2.5 kg-m, 18 ft-lb)

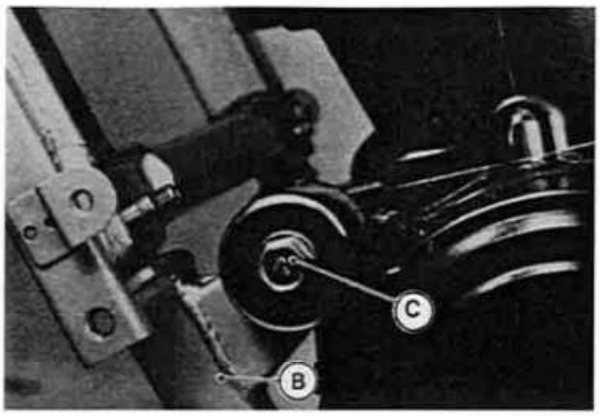
## Engine Removal/Installation

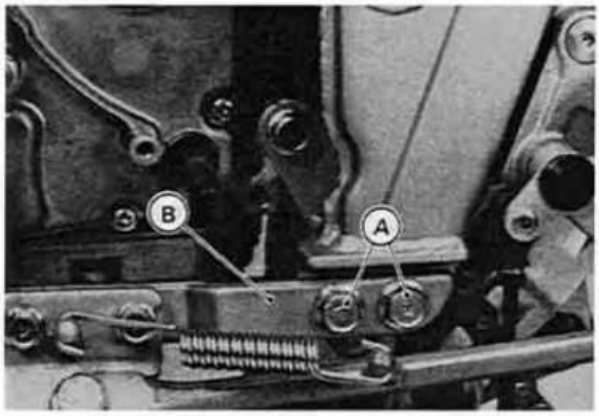
### *Engine Removal*

- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Remove the lower fairing (see Lower Fairing Removal in Frame chapter).
- Drain the coolant (see Coolant Change in Cooling System chapter).
- Remove the following parts.
  - Seat
  - Side Covers
  - Fuel Tank
  - Upper Fairing
  - Ignition Coils
  - Thermostat Housing
  - Vacuum Switch Valve (Clean Air System: US model only)
  - Radiator
  - Muffler
  - Oil Cooler
  - Carburetors
  - Engine Sprocket
  - Fairing Stay (Both Side)
  - Horns with Bracket
- Disconnect wiring from the engine components, and free them from the clamps.
  - Starter Motor Wire Terminal with neutral wire
  - Oil Pressure Switch Wire Terminal
  - Alternator Wire Connector
  - Side Stand Switch Connector
  - Pick-up Coil Wire Connector
  - Battery Ground Wire
- Remove the frame down tube mounting bolts and front engine mounting bolt. Take out the down tubes.



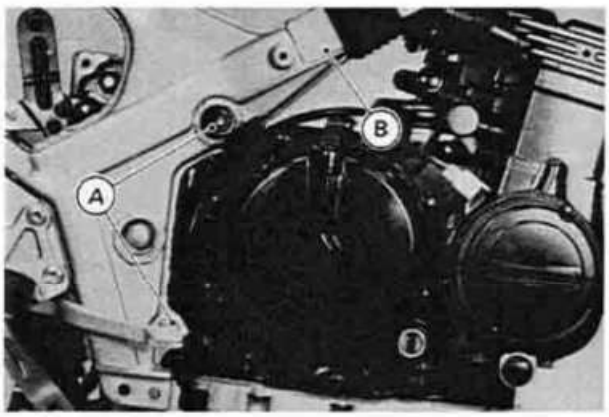

A. Down Tube Mounting Bolts
B. Down Tube




A. Down Tube Mounting Bolts
B. Down Tube
C. Front Engine Mounting Bolt

- Remove the engine mounting bolts. Support the engine before sliding out the engine mounting bolts.

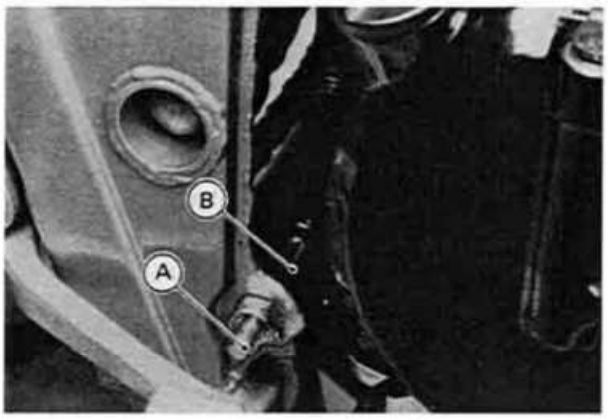



A. Engine Mounting Bolts B. Frame

### *Engine Installation*

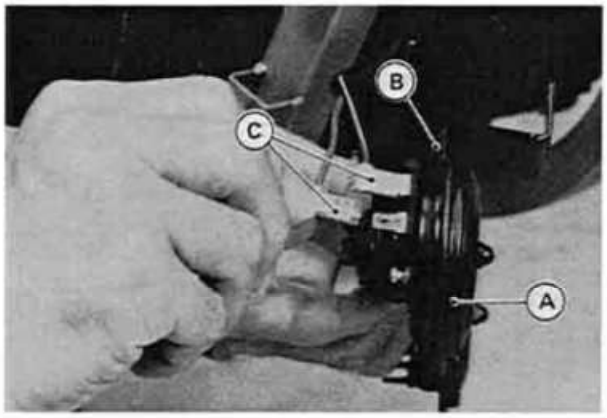
- Engine installation is the reverse of removal. Pay attention to the following items.

○When installing the rear lower engine mounting bolt, do not forget the collar at the right side of the crankcase.




A. Mounting Bolt B. Collar

○Connect the horn wire connectors and install the horns with bracket before muffler installation.




A. Horn C. Connectors
B. Bracket

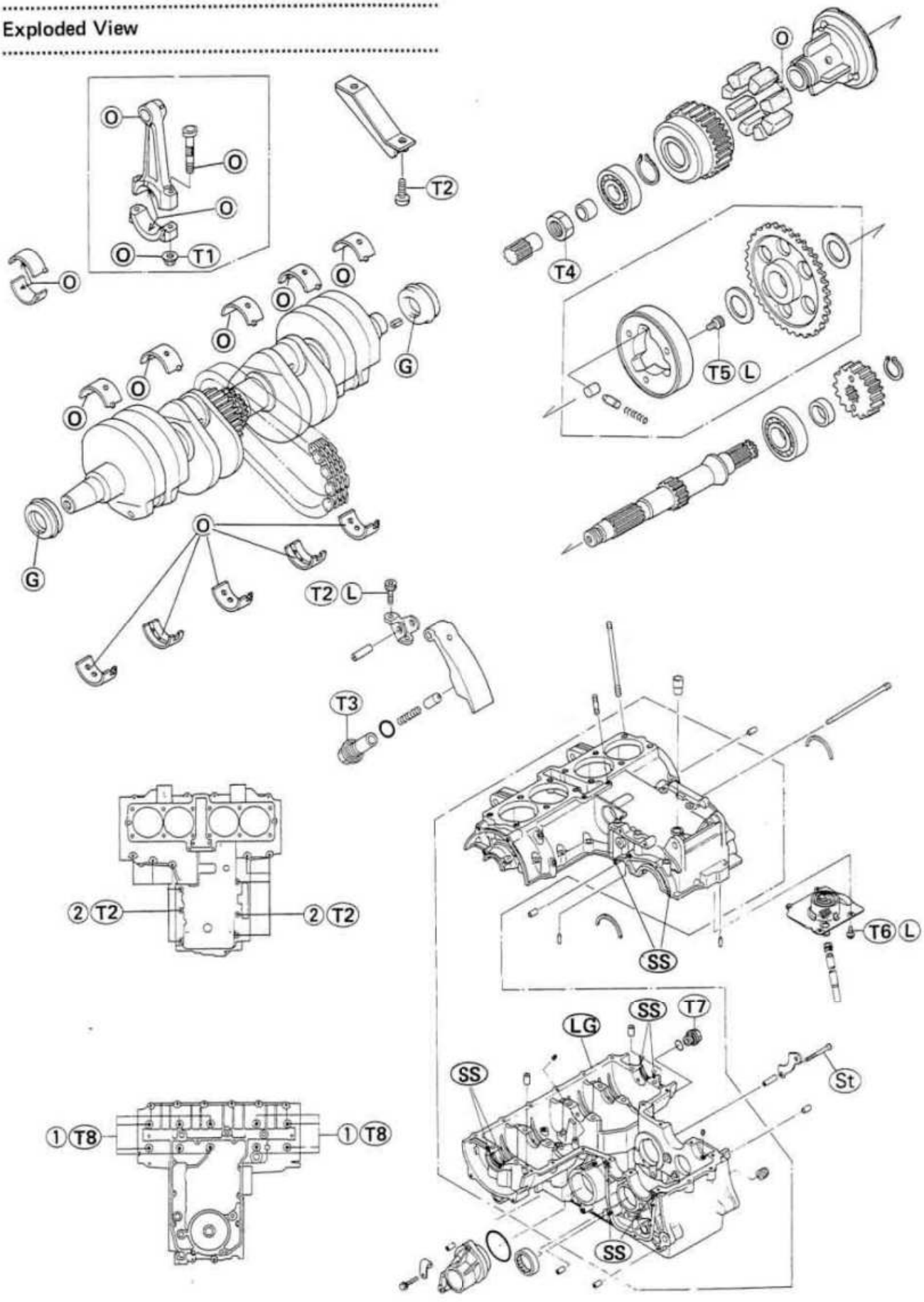
○Tighten the engine mounting bolts, down tube mounting bolts to the specified torque.
○Fill the engine with engine oil (see Engine Oil Change in Engine Lubrication System chapter).
○Fill the engine with coolant (see Coolant Change in Cooling System chapter).
○Adjust the throttle cables.
○Adjust the choke cable.
○Adjust the drive chain.

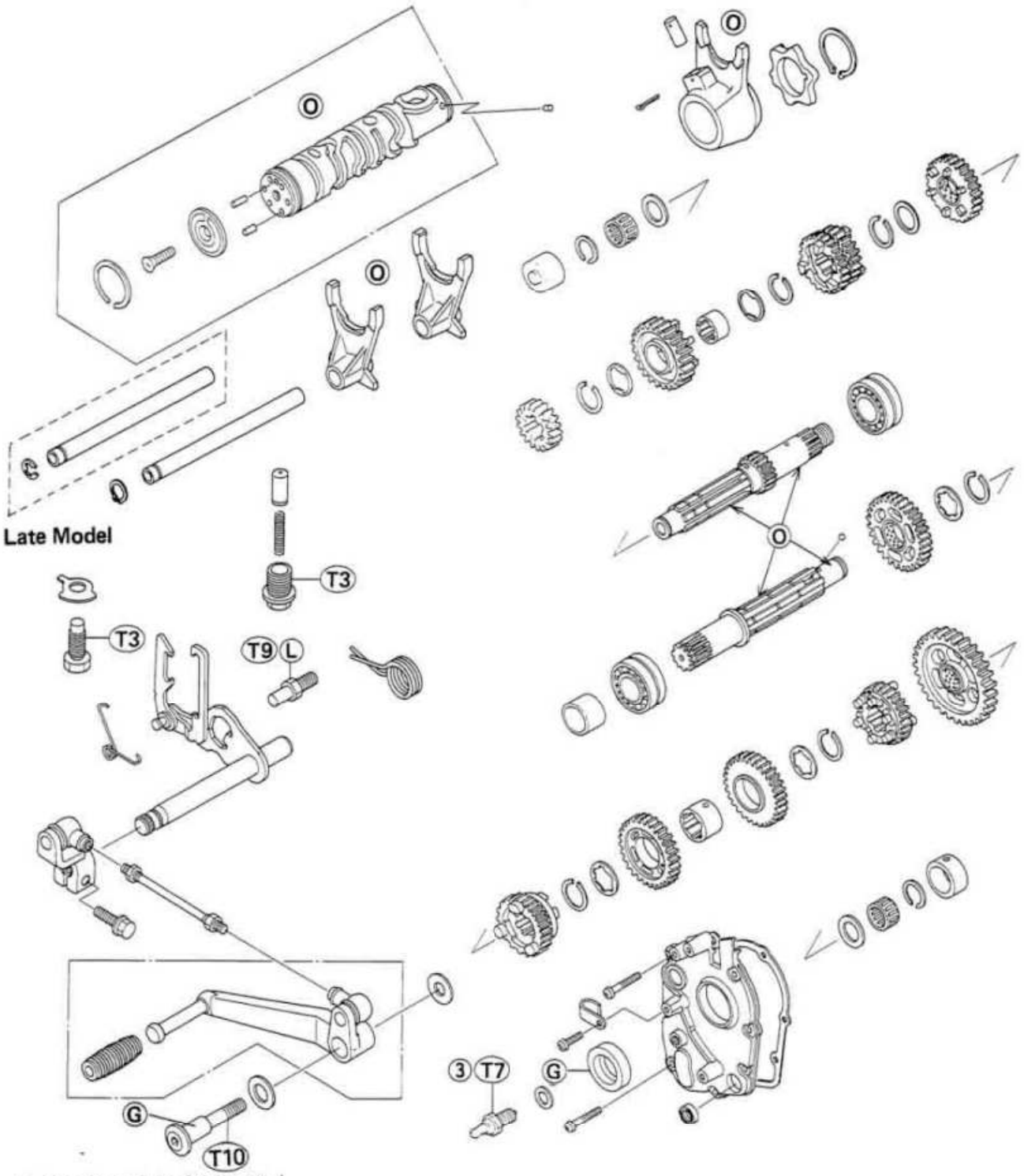
# Crankshaft/Transmission

## Table of Contents


**Exploded View** . . . . . 8-2
**Specifications** . . . . . 8-4
**Special Tools** . . . . . 8-6
**Sealant** . . . . . 8-6
**Crankcase Splitting** . . . . . 8-7
*Crankcase Splitting* . . . . . 8-7
*Crankcase Assembly* . . . . . 8-8
**Crankshaft/Connecting Rods** . . . . . 8-10
*Crankshaft Removal* . . . . . 8-10
*Crankshaft Installation Notes* . . . . . 8-10
*Connecting Rod Removal* . . . . . 8-10
*Connecting Rod Installation Notes* . . . . . 8-10
*Crankshaft/Connecting Rod Cleaning* . . . . . 8-11
*Connecting Rod Bend* . . . . . 8-11
*Connecting Rod Twist* . . . . . 8-11
*Connecting Rod Big End Side Clearance* . . . . . 8-11
*Connecting Rod Big End Bearing Insert/Crankpin Wear* . . . . . 8-12
*Crankshaft Runout* . . . . . 8-13
*Crankshaft Main Bearing Insert/Journal Wear* . . . . . 8-13
*Crankshaft Side Clearance* . . . . . 8-15
**Secondary Sprocket, Shaft/Starter Motor Clutch** . . . . . 8-15
*Secondary Sprocket, Shaft/Starter Motor Clutch Removal* . . . . . 8-15
*Secondary Sprocket, Shaft/Starter Motor Clutch Installation* . . . . . 8-16
*Starter Motor Clutch Disassembly* . . . . . 8-18
*Starter Motor Clutch Assembly* . . . . . 8-18
*Starter Motor Idle Gear Removal* . . . . . 8-18
*Starter Motor Idle Gear Installation Notes* . . . . . 8-18
*Starter Motor Clutch Inspection* . . . . . 8-19
*Primary Chain Upper Guide Removal* . . . 8-19
*Primary Ghain Upper Guide Installation Note* . . . . . 8-19
*Primary Chain Lower Guide Removal* . . . 8-19
*Primary Chain Lower Guide Installation Note* . . . . . 8-19
*Primary Chain Guide Inspection* . . . . . 8-19
*Primary Chain Wear* . . . . . 8-19
*Ball Bearing Wear* . . . . . 8-20
**Transmission** . . . . . 8-20
*External Shift Mechanism Removal* . . . . 8-20
*External Shift Mechanism Installation Notes* . . . . . 8-20
*External Shift Mechanism Inspection* . . . 8-21
*Transmission Shaft Removal* . . . . . 8-21
*Transmission Shaft Installation* . . . . . 8-21
*Drive Shaft Disassembly* . . . . . 8-21
*Drive Shaft Assembly Notes* . . . . . 8-21
*Output Shaft Disassembly* . . . . . 8-22
*Output Shaft Assembly Notes* . . . . . 8-22
*Shift Drum and Fork Removal* . . . . . 8-22
*Shift Drum and Fork Installation* . . . . . 8-23
*Shift Drum Disassembly Note* . . . . . 8-24
*Shift Drum Assembly Notes* . . . . . 8-24
*Gear Backlash* . . . . . 8-25
*Shift Fork Bending* . . . . . 8-25
*Shift Fork/Gear Groove Wear* . . . . . 8-25
*Shift Fork Guide Pin/Shift Drum Groove Wear* . . . . . 8-26
*Gear Dog/Gear Dog Hole Damage* . . . . . 8-26
*Ball and Needle Bearing Wear* . . . . . 8-26

## Exploded View






1. Crankcase Bolts (8 mm Dia.)
2. Crankcase Bolts (6 mm Dia.)
3. Neutral Switch

SS : Apply silicone sealant (Kawasaki Bond: 56019-120).
LG : Apply liquid gasket - black (Kawasaki Bond: 92104-1003) to the upper and lower case mating surface.
G : Apply a high-temperature grease.
L : Apply a non-permanent locking agent to the threads.
O : Apply engine oil to the surface.
St : Stake the fastener.

T1: 36 N-m (3.7 kg-m, 27 ft-lb)
T2: 12 N-m (1.2 kg-m, 104 in-lb)
T3: 25 N-m (2.5 kg-m, 18 ft-lb)
T4: 59 N-m (6.0 kg-m, 54 ft-lb)
T5: 34 N-m (3.5 kg-m, 25 ft-lb)
T6: 9.8 N-m (1.0 kg-m, 87 in-lb)
T7: 15 N-m (1.5 kg-m, 11 ft-lb)
T8: 27 N-m (2.8 kg-m, 20 ft-lb)
T9: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T10: 23 N-m (2.3 kg-m, 16.5 ft-lb)

## Specifications

| Item | | Standard | Service Limit |
|---|---|---|---|
| **Crankshaft, Connecting Rods:** | | | |
| Connecting rod bend | | – – – | 0.2/100 mm |
| Connecting rod twist | | – – – | 0.2/100 mm |
| Connecting rod big end side clearance | | 0.13 – 0.33 mm | 0.5 mm |
| Connecting rod big end bearing insert/crankpin clearance | | 0.035 – 0.059 mm | 0.10 mm |
| Crankpin diameter: | | 32.984 – 33.000 mm | 32.97 mm |
| Marking | None | 32.984 – 32.992 mm | |
| | ○ | 32.993 – 33.000 mm | |
| Connecting rod big end bore diameter: | | 36.000 – 36.016 mm | – – – |
| Marking | None | 36.000 – 36.008 mm | |
| | ○ | 36.009 – 36.016 mm | |
| Connecting rod big end bearing insert thickness: | Blue | 1.489 – 1.494 mm | – – – |
| | Black | 1.485 – 1.490 mm | – – – |
| | Brown | 1.480 – 1.485 mm | – – – |

Connecting rod big end bearing insert selection:

| Con-rod Big End Bore Diameter Marking | Crankpin Diameter Marking | Bearing Insert | |
|---|---|---|---|
| | | Size Color | Part Number |
| ○ | None | Blue | 13034-1067 |
| None | None | Black | 13034-1068 |
| ○ | ○ | | |
| None | ○ | Brown | 13034-1069 |

| | | | |
|---|---|---|---|
| Crankshaft runout | | – – – | 0.05 mm TIR |
| Crankshaft main bearing insert/ journal clearance | | 0.014 – 0.038 mm | 0.08 mm |
| Crankshaft main journal diameter: | | 31.984 – 32.000 mm | 31.96 mm |
| Marking | None | 31.984 – 31.992 mm | |
| | 1 | 31.993 – 32.000 mm | |
| Crankcase main bearing bore diameter: | | 36.000 – 36.016 mm | – – – |
| Marking | ○ | 36.000 – 36.008 mm | |
| | None | 36.009 – 36.016 mm | |

| Item | Standard | Service Limit |
|---|---|---|
| Crankshaft main bearing insert thickness: | | |
| Blue | 1.999 – 2.003 mm | – – – |
| Black | 1.995 – 1.999 mm | – – – |
| Brown | 1.991 – 1.995 mm | – – – |

Crankshaft main bearing insert selection:

| Crankcase Main Bearing Bore Diameter Marking | Crankshaft Main Journal Diameter Marking | Bearing Insert* | | |
|---|---|---|---|---|
| | | Size Color | Part Number | Journal Nos. |
| ○ | 1 | Brown | 13034-1016 | 2, 4 |
| | | | 13034-1066 | 1, 3, 5 |
| ○ | None | Black | 13034-1017 | 2, 4 |
| None | 1 | | 13034-1065 | 1, 3, 5 |
| None | None | Blue | 13034-1018 | 2, 4 |
| | | | 13034-1064 | 1, 3, 5 |

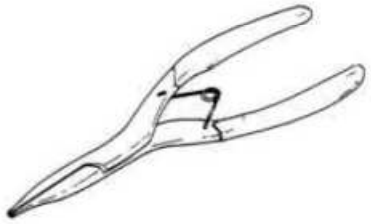
*The bearing inserts for Nos. 2 and 4 journals have an oil groove.

| | | |
|---|---|---|
| Crankshaft side clearance | 0.05 – 0.20 mm | 0.40 mm |
| **Transmission:** | | |
| Gear backlash | 0 – 0.17 mm | 0.25 mm |
| Gear shift fork groove width | 5.05 – 5.15 mm | 5.3 mm |
| Shift fork ear thickness | 4.9 – 5.0 mm | 4.8 mm |
| Shift fork guide pin diameter | 7.9 – 8.0 mm | 7.8 mm |
| Shift drum groove width | 8.05 – 8.20 mm | 8.3 mm |
| **Primary Reduction:** | | |
| Secondary shift gear/Clutch housing gear backlash | 0.03 – 0.10 mm | 0.14 mm |
| Primary chain 20 link length | 190.5 – 190.8 mm | 193.4 mm |

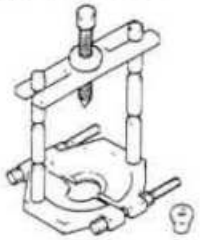
## Special Tools

Along with common hand tools and precision instrument specialized tools are required for complete crankshaft/transmission servicing.

**Circlip Pliers: 57001-144**



**Bearing Puller: 57001-135**



**Oil Seal Guide: 57001-264**



**Bearing Puller Adapter: 57001-136**



**Rotor Holder: 57001-308**



**Gear Pusher: 57001-319**



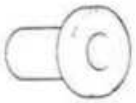
**Bearing Drive Set: 57001-1129**



**Bearing Driver: 57001-382**



**Bearing Driver: 57001-297**



## Sealant

**Kawasaki Bond (Liquid Gasket-Black): 92104-1003**




**Kawasaki Bond (Silicone Sealant): 56019-120**



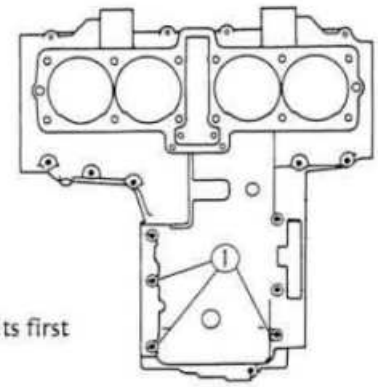
## Crankcase Splitting

### *Crankcase Splitting*

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface or, preferably, mount it on an engine stand to hold the engine steady while parts are being removed.

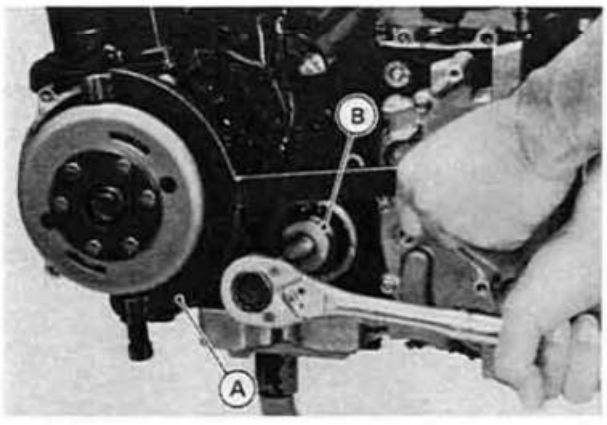
**NOTE**

*If the engine is to be mounted on the Kawasaki engine stand, the upper crankcase half bolts shown must be removed before mounting the engine.*



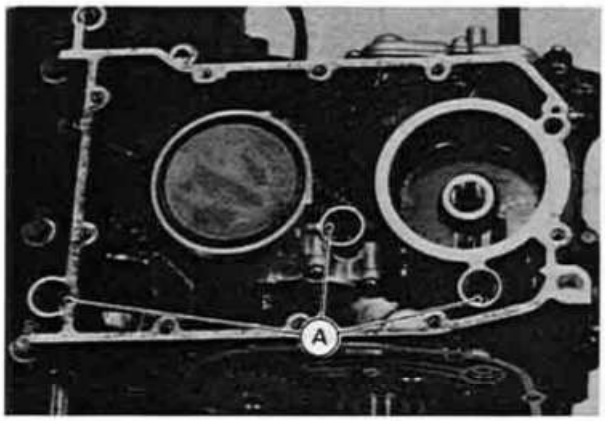

1. Remove these bolts first

- Remove the following parts from the engine.
  - Water Pump and Hose (see Water Pump Removal in Cooling System chapter)
  - Water Pipe
  - Oil Pipe
  - Starter Motor (see Starter Motor Removal in Electrical System chapter)
  - External Shift Mechanism Cover
  - Alternator Cover
  - Shift Arm and Shift Shaft Assembly
  - Timing Rotor
- Holding the alternator rotor steady with the rotor holder (special tool), remove the secondary shaft nut.



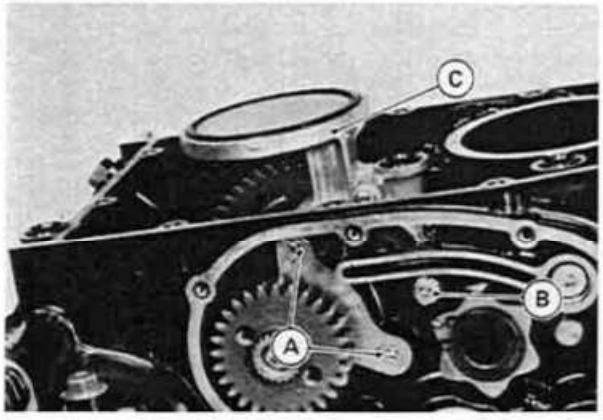

A. Rotor Holder: 57001-308 B. Secondary Shaft Nut

- Remove the alternator rotor and stator (see Alternator Removal in Electrical chapter).
- Remove the following parts only if the crankshaft is to be removed.
  - Cylinder Head
  - Cylinder
  - Pistons
- Remove the clutch only if the transmission drive shaft assembly is to be disassembled.
- Remove the upper crankcase half bolts (12, or 9 if 3 were removed just after engine removal).
- Turn the engine upside down.
- Remove the oil filter mounting bolt, oil filter, and large O-ring.
- Remove the oil pan bolts (10), and remove the oil pan, gasket, large O-ring, and oil passage O-ring (3).



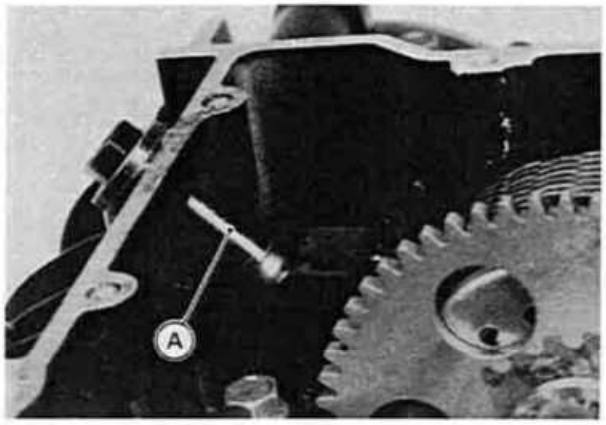

A. Oil Passage "O" Rings

- Remove the secondary shaft bearing stop screws (2), and remove the stop.



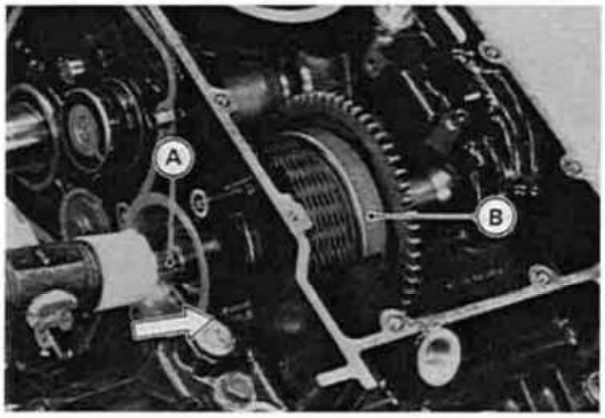

A. Bearing Stop Screws C. Oil Pump
B. Oil Pump Bolt

- Remove th engine oil pump bolt, and take off the engine oil pump. There are two knock pins.
- Remove the primary chain tensioner bolt, spring, and pin as a set.



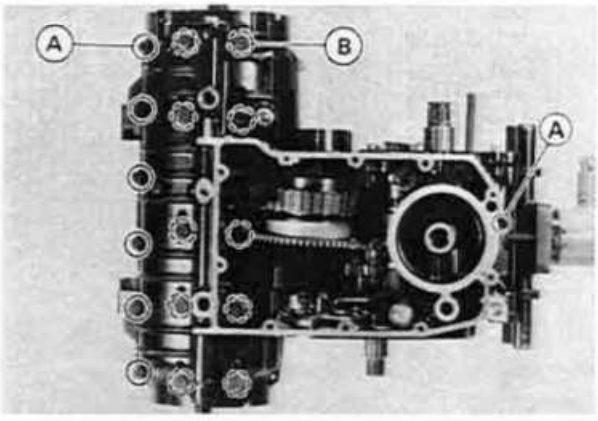

A. Primary Chain Tensioner Bolt

•Tap the secondary shaft from the left side of the crankcase until the right bearing comes out of the case.

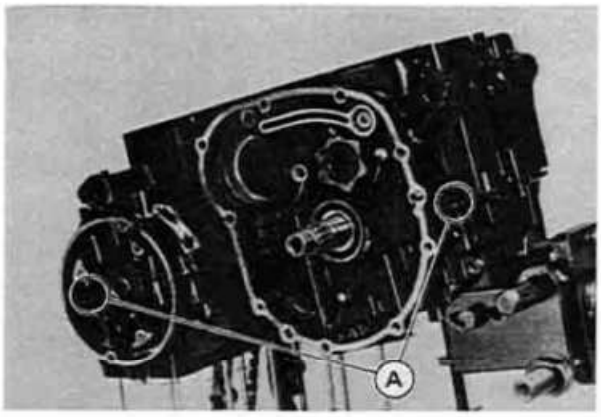



A. Secondary Shaft
B. Starter Motor Clutch Assembly

•Holding the secondary sprocket and starter motor clutch assembly, pull out the secondary shaft.
•Remove the 6 mm and 8 mm lower crankcase half bolts, pry the four points shown to split the two crankcase halves apart, and lift off the lower crankcase half.




A. 6 mm Bolt B. 8 mm bolt



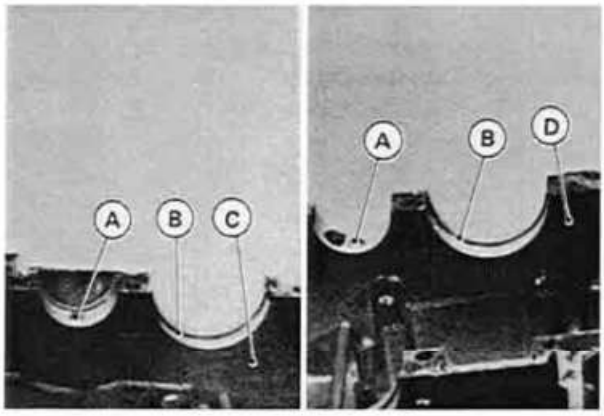

A. Pry Points

*Crankcase Assembly*

**NOTE**

○*The upper and lower crankcase halves are machined at the factory as an assembly, so the crankcase halves must be replaced as a set.*

•Assembly is the reverse of splitting. Be careful of the following items.
○With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
○When installing the output and drive shafts, the crankcase set pins must go into the holes in the needle bearing outer races, and the set rings must fit into the grooves in the ball bearings.

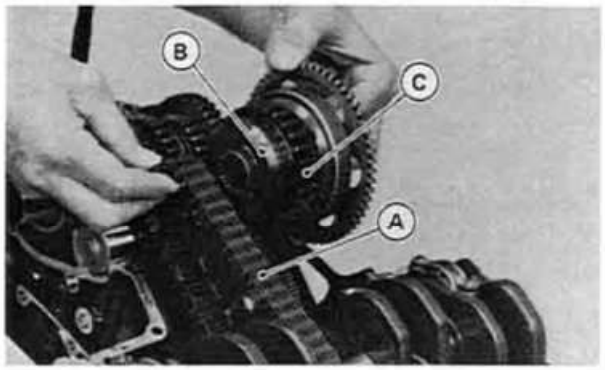



A. Set Pins
B. Set Rings
C. Upper Crankcase Half Right Side
D. Upper Crankcase Half Left Side

**CAUTION**

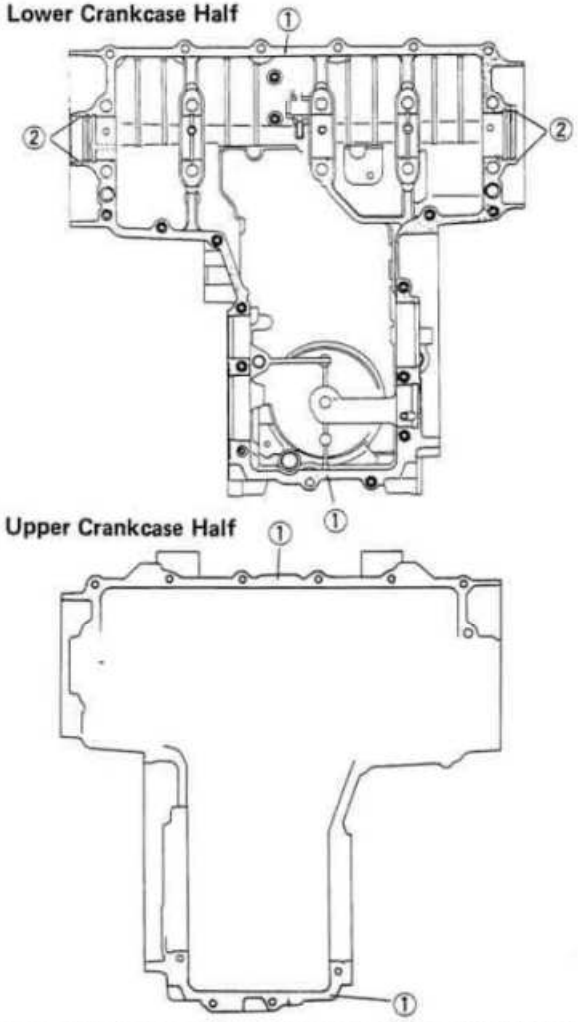
○**Make sure the crankcase set pins are properly aligned to avoid damage to the crankcases upon installation.**

○Check that the knock pins (2) are in place.
○Put the starter motor clutch gear into the secondary sprocket and starter motor clutch assembly.
○Fit the primary chain on the secondary sprocket.




A. Primary Chain
B. Starter Motor Clutch Assembly
C. Secondary Sprocket

○Apply a little engine oil to the transmission gears, ball bearings, shift drum, and crankshaft main bearing inserts.
○Apply liquid gasket – black and silicone sealant as shown in the figure below.

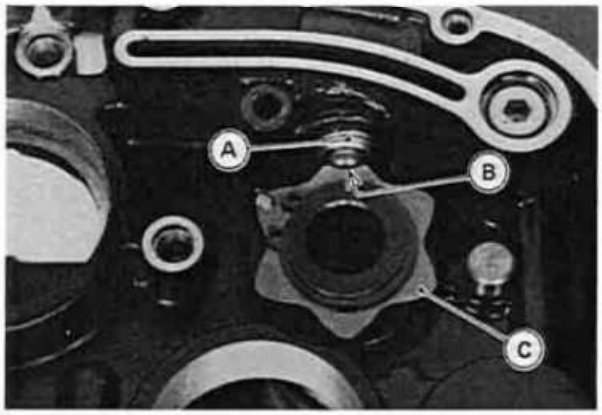



1. Liquid Gasket - Black (Kawasaki Bond: 92104-1003)
2. Silicone Sealant (Kawasaki Bond: 56019-120)
   Apply silicone sealant upon liquid gasket.

**CAUTION**

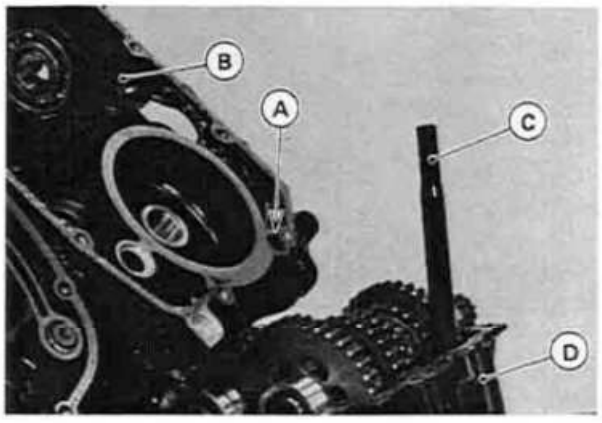
○**If liquid gasket and silicone sealant adheres to any areas not indicated, the engine oil passages may be obstructed, causing engine seizure.**

○Check to see that the shift drum is in the neutral position, that is, the neutral positioning pin fits into the neutral detent on the operating plate.




A. Neutral Positioning Pin
B. Neutral Detent
C. Operating Plate

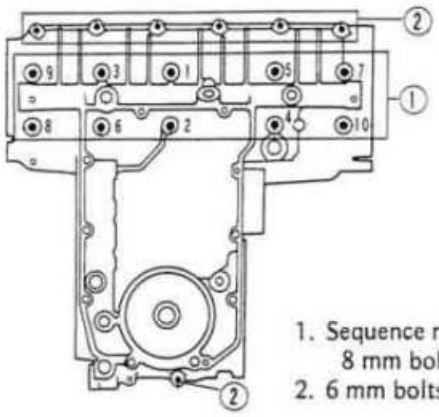
○When fitting the lower crankcase half on the upper crankcase half, each shift fork must fit in its gear groove. Insert the breather tube end into the hole in the lower crankcase half.




A. Hole
B. Lower Crankcase Half
C. Breather Tube
D. Upper Crankcase Half

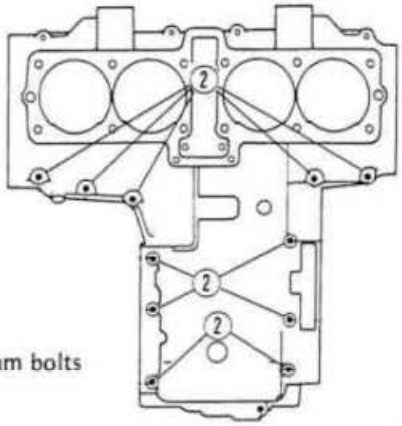
○Loosely tighten all lower crankcase half bolts to a snug fit.
○Following the sequence numbers on the lower crankcase half, tighten the 8 mm bolts first to about one half of the specified torque, and finally to the specified torque in the same sequence (see Exploded View).

**Lower Crankcase Half**




1. Sequence numbers of 8 mm bolts
2. 6 mm bolts

**Upper Crankcase Half**




2. 6 mm bolts

○Tighten the 6 mm bolts on the upper crankcase half to the specified torque (see Exploded View).
○Tighten the 6 mm bolts on the lower crankcase half to the specified torque (see Exploded View).
●After tightening all crankcase bolts, check the following items.
○Drive shaft and output shaft turn freely.
○While spinning the output shaft, shift the transmission smoothly from 1st to 6th gear, and back.
○Unless the output shaft is turning, the transmission cannot be shifted to 2nd gear or other higher gear positions.

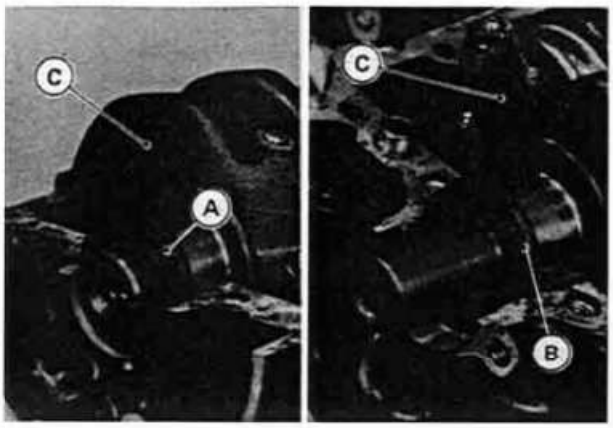
## Crankshaft/Connecting Rods

### *Crankshaft Removal*

●Remove the engine.
●Remove the cylinder head, cylinder and pistons.
●Split the crankcase.
●Take out the crankshaft.

### *Crankshaft Installation Notes*

●If the crankshaft or bearing inserts are replaced with new ones, check the clearances with plastigage to be sure the correct bearing inserts are installed.
●Inspect the oil seals at the crankshaft ends, and replace if necessary. Apply a high temperature grease to the lip of the oil seals.

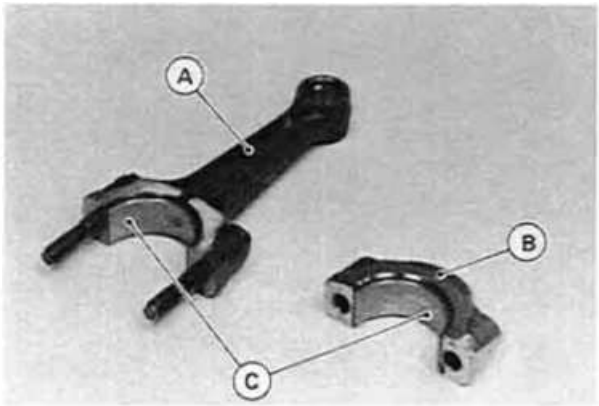



A. Right End Oil Seal
B. Left End Oil Seal
C. Crankshaft

●Apply engine oil to the main bearing inserts.

### *Connecting Rod Removal*

●Remove the crankshaft.
●Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.
●Remove the connecting rod big end cap nuts, and take off the connecting rod and cap with the bearing inserts.




A. Connecting Rod
B. Big End Cap
C. Bearing Insert

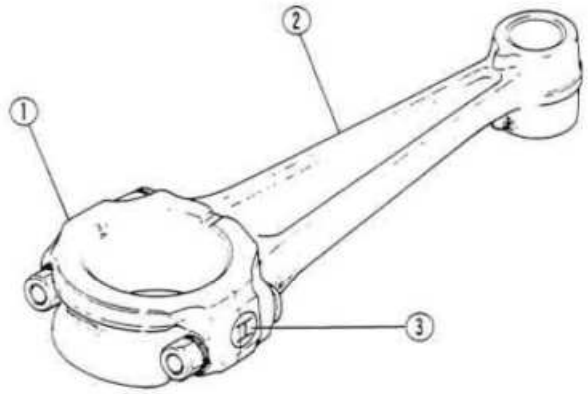
**CAUTION**

**○To prevent damage to the crankpin surfaces, do not allow the big end cap bolts to hit them.**

### *Connecting Rod Installation Notes*

●To minimize vibration, a pair of connecting rods (left two rods or right two) should have the same weight mark. The left two rods are a pair and the right two rods are a pair. The weight mark is indicated by a capital letter, and is stamped on the connecting rod big end.

**Weight Mark Location**




1. Big end cap
2. Connecting rod
3. Weight mark, alphabet

★If the connecting rods or bearing inserts are replaced with new ones, check clearance with plastigage before assembling engine to be sure the correct bearing inserts are installed.
●Apply engine oil to the bearing inserts.

### *Crankshaft/Connecting Rod Cleaning*

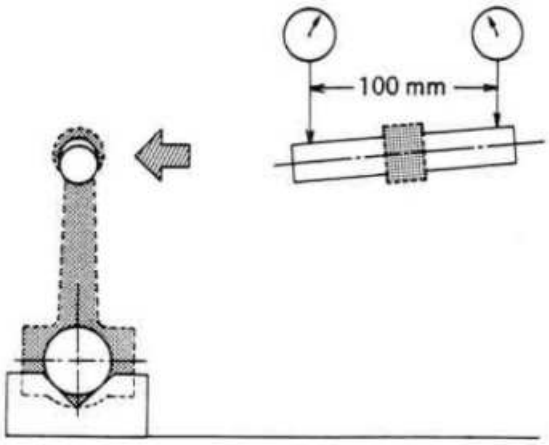
●After removing the connecting rods from the crankshaft, wash them with a high flash-point solvent.
●Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

### *Connecting Rod Bend*

●Measure connecting rod bend.
○Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
○Select an arbor of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
○Select an arbor of the same diameter as the piston pin and at least 100 mm long, and insert the arbor through the connecting rod small end.
○On a surface plate, set the big-end arbor on V blocks.
○With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm length to determine the amount of connecting rod bend.
★If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

| Connecting Rod Bend | |
|---|---|
| Service Limit: | 0.2/100 mm |

**Connecting Rod Bend Measurement**

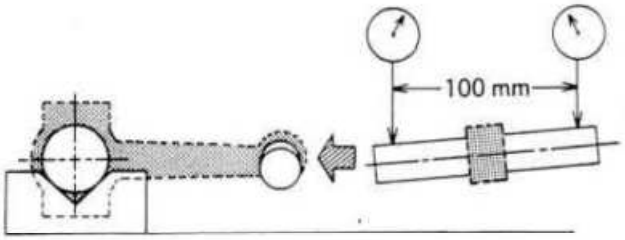



### *Connecting Rod Twist*

●Measure connecting rod twist.
○With the big-end arbor still on V blocks, hold the connecting rod horizontally and measure the amount that the arbor varies from being parallel with the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.
★If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

| Connecting Rod Twist | |
|---|---|
| Service Limit: | 0.2/100 mm |

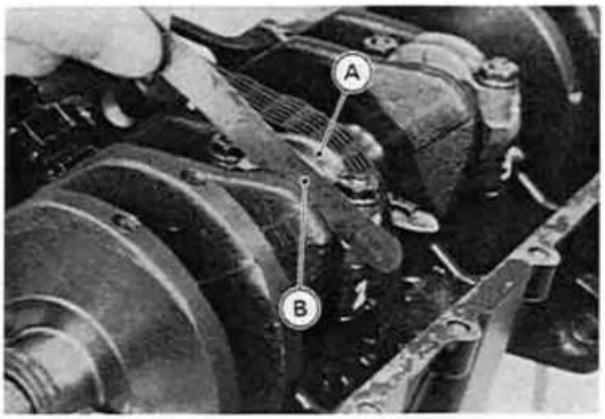
**Connecting Rod Twist Measurement**




### *Connecting Rod Big End Side Clearance*

●Measure connecting rod big end side clearance.
○Insert a thickness gauge between the big end and either crank web to determine clearance.

| Connecting Rod Big End Side Clearance | |
|---|---|
| Standard: | 0.13 ~ 0.33 mm |
| Service Limit: | 0.5 mm |




A. Connecting Rod B. Thickness Gauge

*If clearance exceeds the service limit, replace the connecting rod with a new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

### *Connecting Rod Big End Bearing Insert/Crankpin Wear*

Bearing insert/crankpin wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

●Measure the bearing insert/crankpin clearance.

○Remove the connecting rod big end caps and wipe each bearing insert and crankpin surface clean of oil.

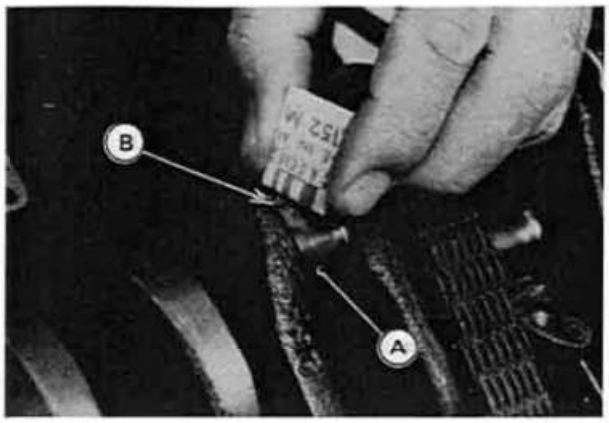
○Cut strips of plastigage to bearing insert width, and place a strip on the crankpin for each connecting rod parallel to the crankshaft so that the plastigage will be compressed between the crankpin and the bearing insert.

○Install the connecting rod big end caps and tighten the big end cap nuts to the specified torque (see Exploded View).

**NOTE**

○*Do not turn the crankshaft during clearance measurement.*

○Remove the connecting rod big end caps, and measure the plastigage width to determine the bearing insert/crankpin clearance.




A. Crankpin B. Plastigage

| Connecting Rod Big End Bearing Insert/Crankpin Clearance | |
|---|---|
| Standard: | 0.035 ~ 0.059 mm |
| Service Limit: | 0.10 mm |

*If clearance is within the standard, no bearing replacement is required.

*If clearance is between 0.059 mm and the service limit (0.10 mm), replace the bearing inserts with inserts painted blue. Check insert/crankpin clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

*If clearance exceeds the service limit, measure the diameter of the crankpins.

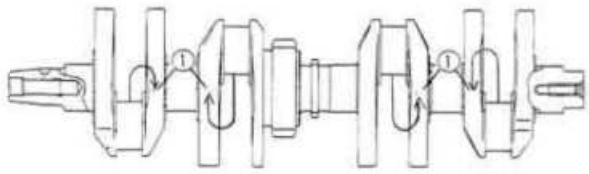
| Crankpin Diameter | |
|---|---|
| Standard: | 32.984 ~ 33.000 mm |
| Service Limit: | 32.97 mm |

*If any crankpin has worn past the service limit, replace the crankshaft with a new one.

*If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

| Crankpin Diameter Marks | |
|---|---|
| None: | 32.984 ~ 32.992 mm |
| ○ : | 32.993 ~ 33.000 mm |

**Crankpin Dia. Mark Location**




1. Crankpin Diameter Marks "O" or None

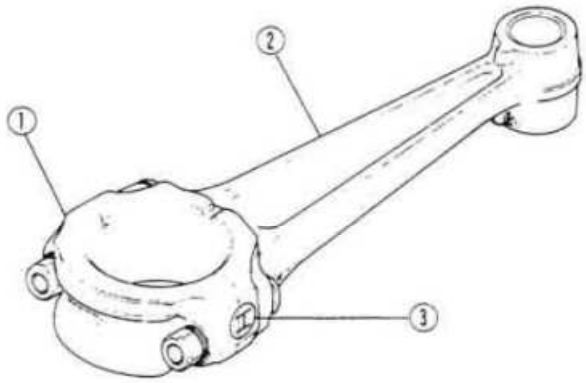
●Put the connecting rod big end caps on the rods and tighten the nuts to the specified torque (see Exploded View).
●Measure the inside diameter, and mark each connecting rod big end in accordance with the inside diameter.

**NOTE**

○*The mark already on the big end should coincide with the measurement.*

| Connecting Rod Big End Inside Diameter Marks | |
|---|---|
| None: | 36.000 ~ 36.008 mm |
| ○ : | 36.009 ~ 36.016 mm |

**Connecting Rod Mark Location**



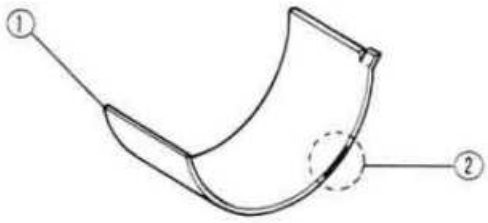

1. Big end cap
2. Connecting rod
3. Diameter mark
   "O" mark or no mark

●Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.
●Install the new insert in the connecting rod and check insert/crankpin clearance with plastigage.

**Bearing Insert Selection**

| Con-rod Big End Bore Diameter Marking | Crankpin Diameter Marking | Bearing Insert | |
|---|---|---|---|
| | | Size Color | Part Number |
| ○ | None | Blue | 13034-1067 |
| ○ | ○ | Black | 13034-1068 |
| None | None | | |
| None | ○ | Brown | 13034-1069 |

**Bearing Insert Size Mark Location**



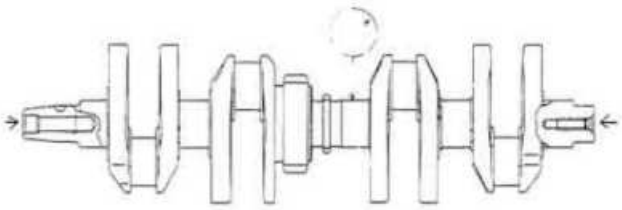

1. Bearing insert  2. Color size mark

### *Crankshaft Runout*

●Measure the crankshaft runout.
○Set the crankshaft in a flywheel alignment jig or on V blocks.
○Set a dial gauge against the center journal.
○Turn the crankshaft slowly to measure the runout. The difference between the highest and lowest dial gauge readings (TIR) is the amount of runout.
★If the measurement exceeds the service limit, replace the crankshaft.

| Crankshaft Runout | |
|---|---|
| Service Limit: | 0.05 mm TIR |

**Crankshaft Runout**



### *Crankshaft Main Bearing Insert/Journal Wear*

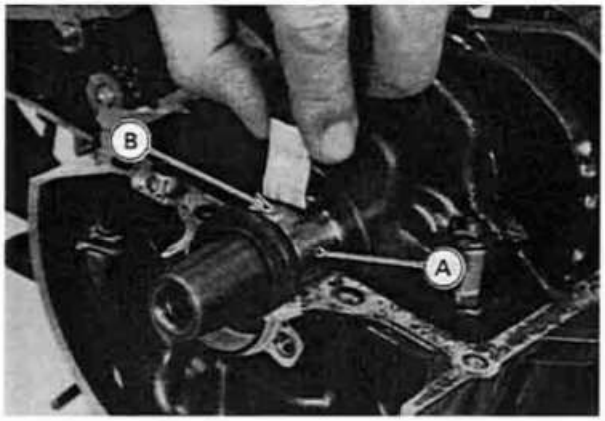
Bearing insert/journal wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

●Measure the bearing insert/journal clearance.
○Split the crankcase and wipe each bearing insert and journal surface clean of oil.
○Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the crankshaft so that the plastigage will be compressed between the journal and the bearing insert.
○Install the lower crankcase half, and tighten the case bolts to the specified torque (see Exploded View).

**NOTE**

○*Do not turn the crankshaft during clearance measurement.*

○Remove the lower crankcase half and measure the plastigage width to determine the bearing insert/journal clearance.




A. Journal B. Plastigage

| Crankshaft Main Bearing Insert/Journal Clearance | |
|---|---|
| Standard: | 0.014 ~ 0.038 mm |
| Service Limit: | 0.08 mm |

○Journal clearance less than 0.025 mm can not be measured by plastigauge, however, using genuine parts maintains the minimum standard clearance.

★If clearance is within the standard, no bearing replacement is required.

★If clearance is between 0.038 mm and the service limit (0.08 mm), replace the bearing inserts with inserts painted blue. Check insert/journal clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

| Crankshaft Main Journal Diameter | |
|---|---|
| Standard: | 31.984 ~ 32.000 mm |
| Serive Limit: | 31.96 mm |

★If any journal has worn past the service limit, replace the crankshaft with a new one.

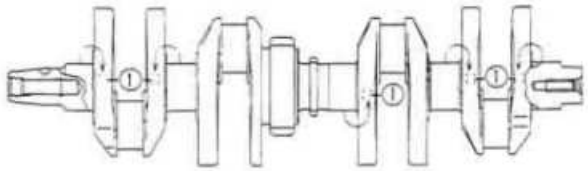
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

| Crankshaft Main Journal Diameter Marks | |
|---|---|
| None : | 31.984 ~ 31.992 mm |
| 1 : | 31.993 ~ 32.000 mm |

●Put the lower crankcase half on the upper crankcase half without bearing inserts, and tighten the case to the specified torque and sequence (see Crankcase Assembly).

●Measure the main bearing bore diameter, and mark the upper crankcase half in accordance with the bore diameter.

**Crankshaft Jurnal Dia. Mark Location**



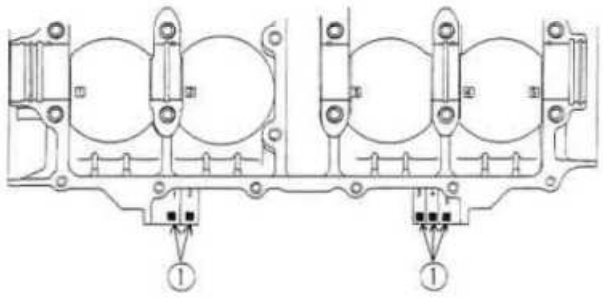

1. Crankshaft Main Journal Diameter Marks "1" or None

**NOTE**

○*The mark already on the upper crankcase half should coincide with the measurement.*

| Crankcase Main Bearing Bore Diameter Marks | |
|---|---|
| ○ : | 36.000 ~ 36.008 mm |
| None : | 36.009 ~ 36.016 mm |

**Crankcase Mark Location**

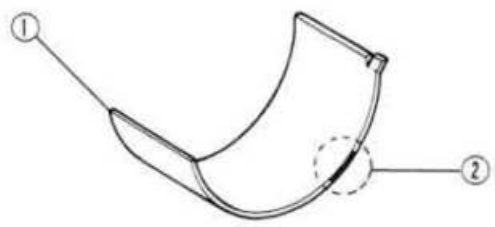



1 Crankcase Main Bearing Bore Diameter Marks "O" or None

●Select the proper bearing insert in accordance with the combination of the crankcase and crankshaft coding.

●Install the new insert in the crankcase and check insert/journal clearance with plastigage.

**Bearing Insert Size Mark Location**




1. Bearing insert 2. Color size mark

**Bearing Insert Selection**

| Crankcase Main Bearing Bore Diameter Marking | Crankshaft Main Journal Diameter Marking | Bearing Insert* | | |
|---|---|---|---|---|
| | | Size Color | Part Number | Journal Nos. |
| ○ | 1 | Brown | 13034-1016 | 2, 4 |
| | | | 13034-1066 | 1, 3, 5 |
| ○ | None | Black | 13034-1017 | 2, 4 |
| None | 1 | | 13034-1065 | 1, 3, 5 |
| None | None | Blue | 13034-1018 | 2, 4 |
| | | | 13034-1064 | 1, 3, 5 |

*The bearing inserts for Nos. 2 and 4 journals have an oil groove.

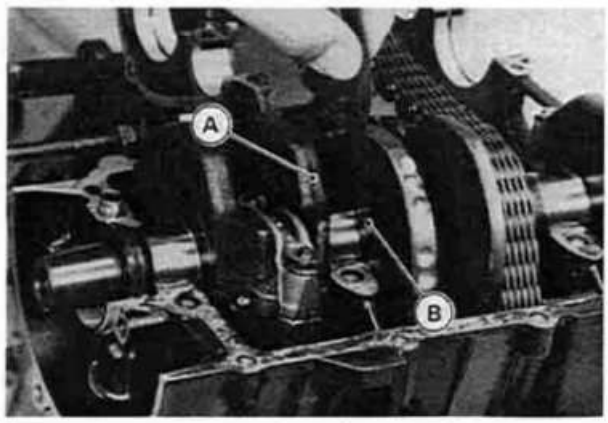
### *Crankshaft Side Clearance*

- Measure crankshaft side clearance.
- Insert a thickness gauge between the No. 2 crankcase main jurnal and the crank web to determine clearance.
- If the clearance exceeds the service limit, replace the crankcase halves as a set.

**NOTE**

*The upper crankcase half, lower crankcase half, are machined at the factory as an assembly, so they must be replaced as a set.*

| Crankshaft Side Clearance | |
|---|---|
| Standard: | 0.05 ~ 0.20 mm |
| Service Limit: | 0.40 mm |

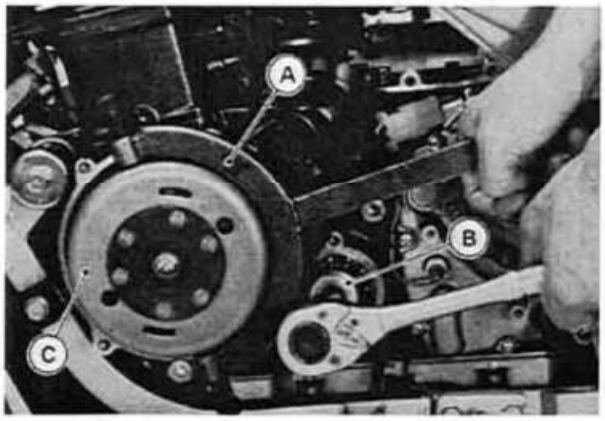



A. Crankshaft B. Thickness Gauge

## Secondary Sprocket, Shaft/ Starter Motor Clutch

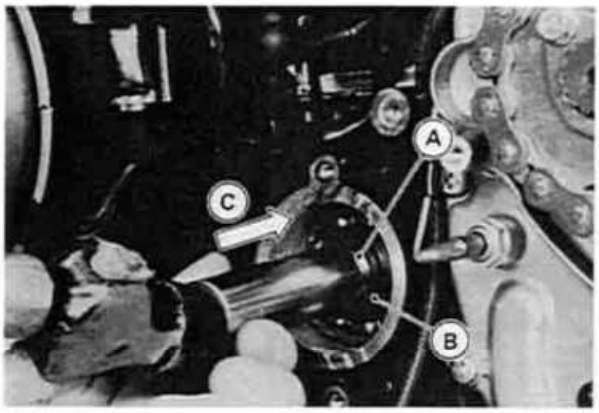
### *Secondary Sprocket, Shaft/ Starter Motor Clutch Removal*

- Drain the engine oil.
- Remove the oil pan (see Oil Pan Removal in Lubrication chapter).
- Remove the clutch (see Clutch Removal in Clutch chapter).
- Remove the oil pump (see Oil Pump Removal in Lubrication chapter).
- Drain the coolant (see Coolant Draining in Cooling System chapter).
- Remove the water pump (see Water Pump Removal in Cooling System chapter).
- Remove the alternator cover.
- Using a rotor holder (special tool) to hold the alternator rotor, remove the secondary shaft nut.



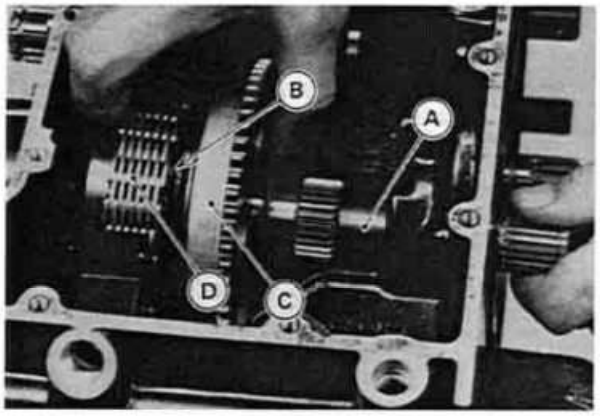

A. Rotor Holder: 57001-308 C. Alternator Rotor
B. Secondary Shaft Nut

- Tap the secondary shaft from the left side of the crankcase until the right bearing comes out of the case. There is a collar in the left bearing.



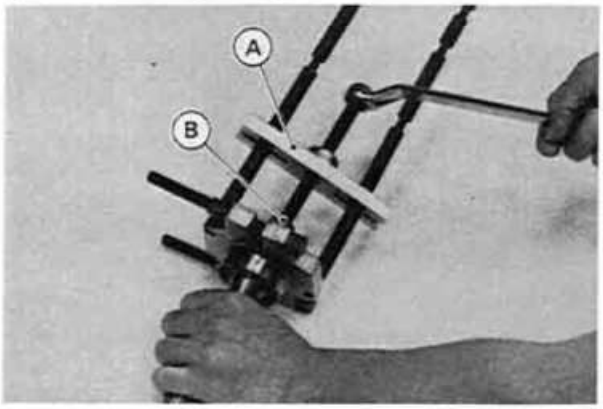

A. Secondary Shaft C. Tap
B. Collar

●Holding the secondary sprocket and starter motor clutch assembly, pull out the secondary shaft.




A. Secondary Shaft
B. Secondary Sprocket
C. Starter Motor Clutch Assembly
D. Primary Chain

●Pull the starter motor clutch gear out of the starter motor clutch.
●Slip the secondary sprocket and starter motor clutch assembly out of the primary chain.
●Remove the secondary shaft gear circlip.
●Using the bearing puller and adapter (special tools), pull the secondary shaft gear off the shaft if necessary.



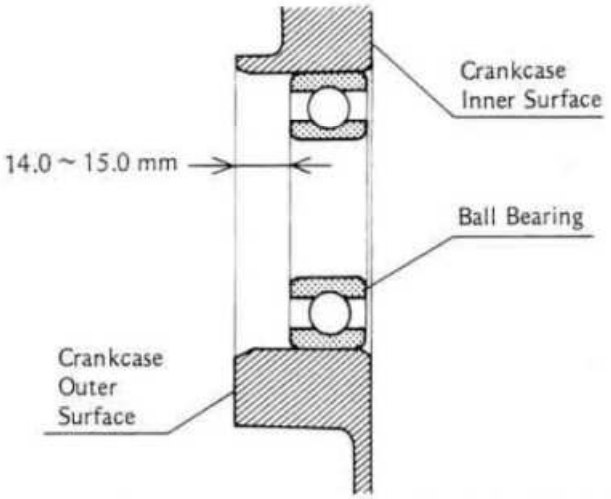

A. Bearing Puller: 57001-135
B. Adapter: 57001-136

●Remove the secondary shaft left ball bearing if necessary.
○Using the bearing driver and bearing driver holder (special tools: 57001-1139, 57001-1146 and 57001-1132), tap the left ball bearing off the crankcase.

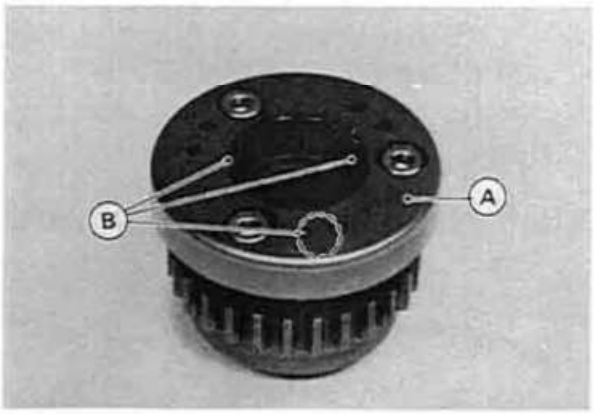
### *Secondary Sprocket, Shaft/Starter Motor Clutch Installation*

●When installing the secondary shaft left ball bearing, be careful of the following item.
○Install the left ball bearing using the same special tools (P/N: 57001-1139, 57001-1146 and 57001-1132) until it is 14.0 ~ 15.0 mm deeper than the crankcase surface

**Ball Bearing Installation**

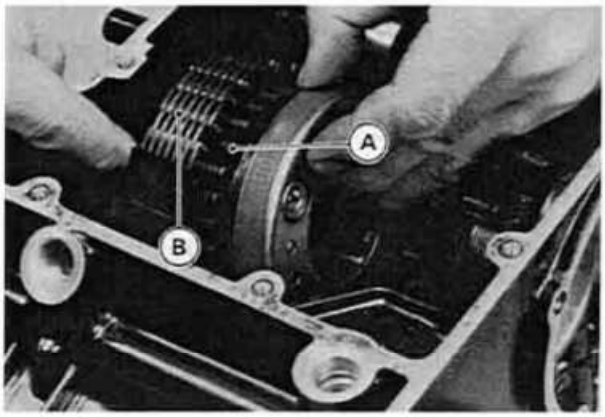



●Check that the starter motor clutch rollers (3) are in place.



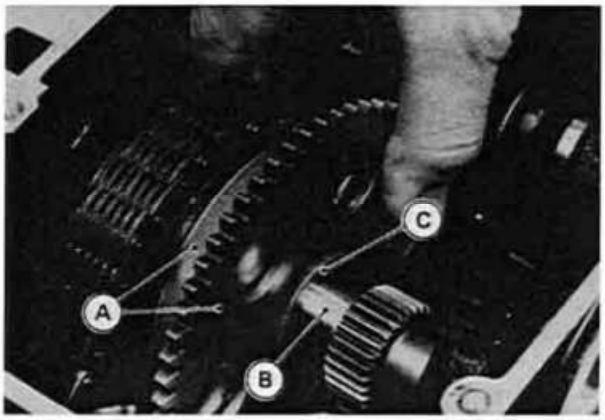

A. Starter Motor Clutch B. Rollers

●Fit the primary chain on the secondary sprocket.



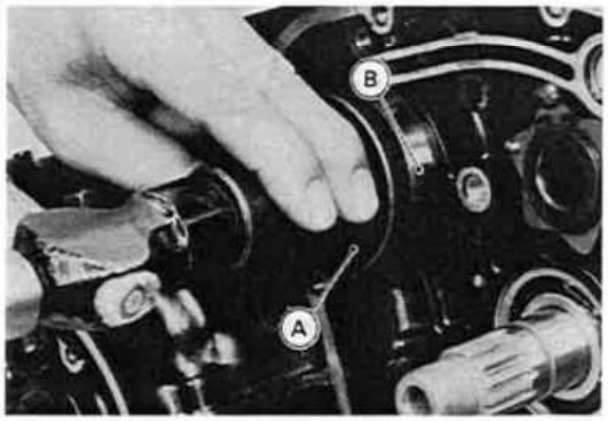

A. Secondary Sprocket B. Primary Chain

- Put the thrust washer and starter clutch gear into the secondary sprocket and starter clutch assembly by rotating the starter motor clutch gear.
- Put the thrust washer on the secondary shaft, and put the secondary shaft into the secondary sprocket and starter motor clutch assembly, fitting their splines.



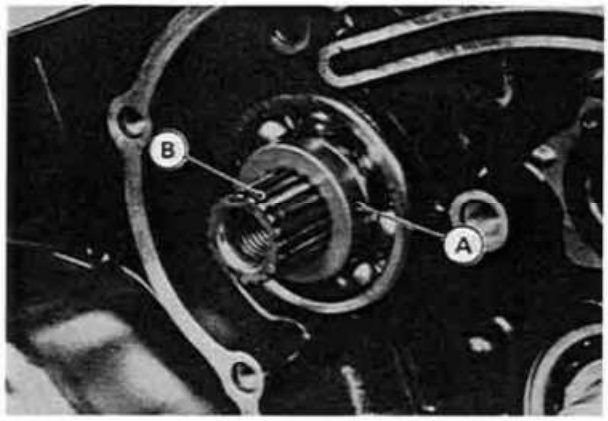

A. Starter Motor Clutch Assembly C. Thrust Washer
B. Secondary Shaft

- Install the left bearing collar.
- Using the bearing driver (special tool), tap the secondary shaft bearing into the crankcase with the secondary shaft until the bearing stops at the bottom of the crankcase bearing hole.



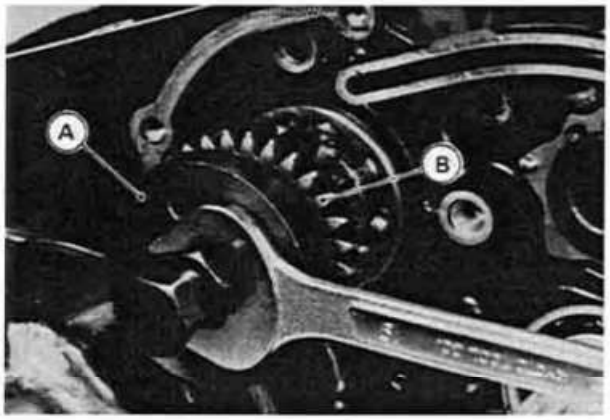

A. Bearing Driver: 57001-297
B. Secondary Shaft Bearing

- Put the collar on the secondary shaft.



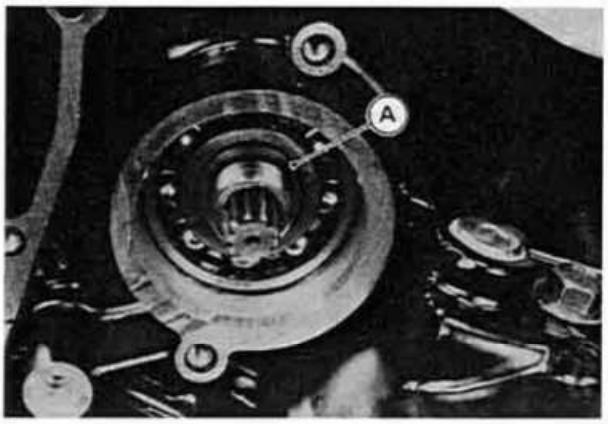

A. Collar B. Secondary Shaft

- Apply a little engine oil on the secondary shaft and between the secondary shaft gear and gear pusher (special tool).
- Using the rotor holder (special tool) to keep the crankshaft and secondary shaft from turning, push the secondary shaft gear on the shaft by rotating the gear pusher (special tool) if necessary.




A. Gear Pusher: 57001-319
B. Secondary Shaft Gear

- Install the circlip on the secondary shaft.
- Install the oil pump, oil pan, and oil filter (see Oil Filter Installation in Lubrication chapter).
- Check that the left bearing collar is in place, and tighten the secondary shaft nut to the specified torque (see Exploded View) by holding the alternator rotor with the rotor holder (special tool).



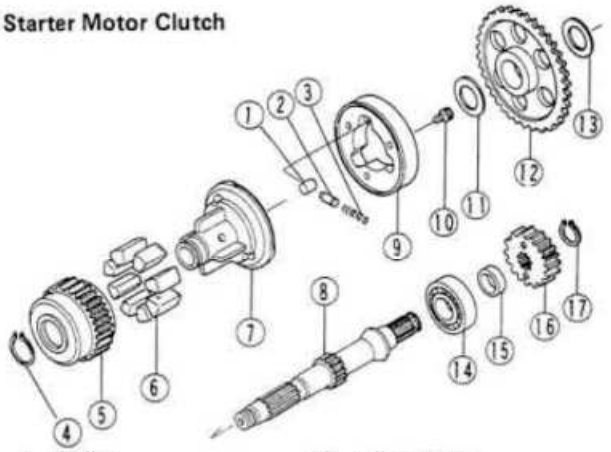

A. Collar

- Install the alternator cover.
- Install the clutch.
- Install the water pump (see Oil Pump Installation in Cooling System chapter).
- Fill the engine with oil.
- Fill the cooling system (see Cooling System chapter).

### *Starter Motor Clutch Disassembly*

- Pull off the starter motor clutch gear and thrust washer.
- Remove the rollers, springs, and spring caps (3 ea) from the starter motor clutch.
- Remove the circlip, and pull off the secondary sprocket. There are rubber dampers (8).
- Holding the secondary shaft coupling steady, remove the Allen bolts (3) to separate the coupling and starter motor clutch.
- Remove the right ball bearing using the same special tool (P/N: 57001-135) used for secondary gear removal.

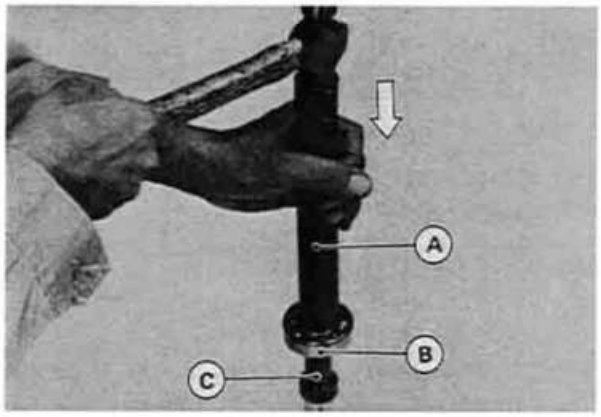
**Starter Motor Clutch**




1. Roller
2. Spring Cap
3. Spring
4. Circlip
5. Secondary Sprocket
6. Rubber Damper
7. Inner Coupling
8. Secondary Shaft
9. Starter Motor Clutch
10. Allen Bolts
11. Thrust Washer
12. Starter Motor Clutch Gear
13. Thrust Washer
14. Ball Bearing
15. Collar
16. Secondary Shaft Gear
17. Circlip

### *Starter Motor Clutch Assembly*

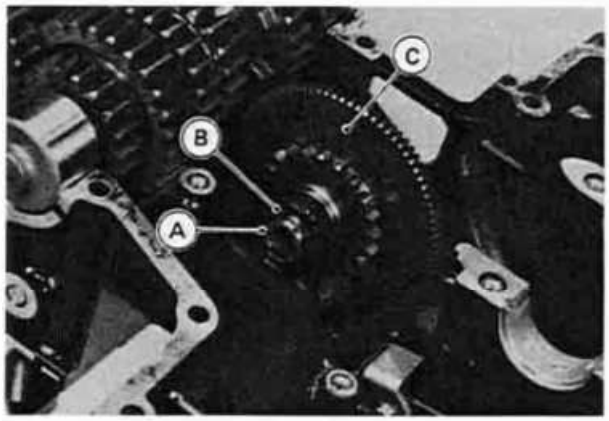
- Check the rubber dampers (8), and replace them with new ones if damaged.
- Apply a little oil to the rubber dampers (8) to assemble the secondary sprocket and coupling.
- Apply a non-permanent locking agent to the starter motor clutch Allen bolts (3), and tighten the bolts to the specified torque (see Exploded View).
- Install the right ball bearing using the bearing driver (special tool).




A. Driver: 57001-382
B. Ball Bearing
C. Secondary Shaft

### *Starter Motor Idle Gear Removal*

- Split the crankcase.
- Remove the crankshaft.
- Remove the primary chain lower guide.
- Remove the circlip, pull out the idle gear shaft, and take off the gear.



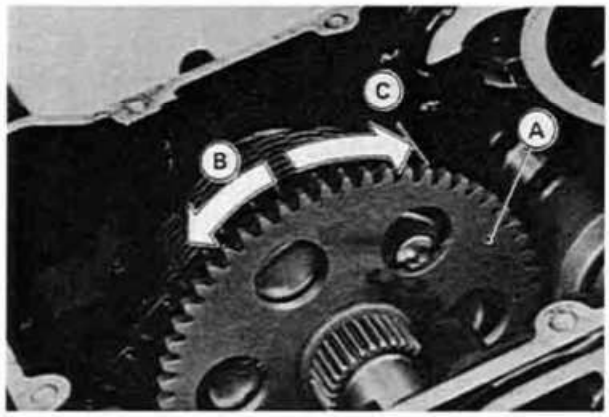

A. Shaft
B. Circlip
C. Idle Gear

### *Starter Motor Idle Gear Installation Notes*

- Apply engine oil to the idle gear shaft.
- After idle gear installation, install the primary chain lower guide.

### *Starter Motor Clutch Inspection*

- Drain the engine oil.
- Remove the oil pan.
- Turn the starter motor clutch gear by hand. When viewed from the right side of the engine, the starter motor clutch gear should turn counterclockwise freely, but should not turn clockwise.




A. Starter Motor Clutch Gear C. Locked
B. Turn Freely

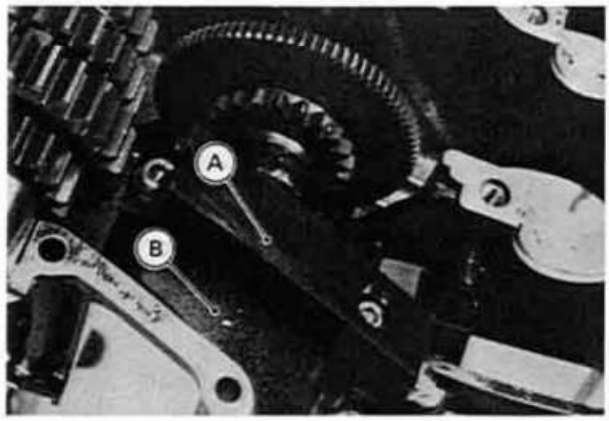
★If the starter clutch does not operate as it should or if it makes noise, go to the next step.

- Disassemble the starter motor clutch, and visually inspect the clutch parts: springs, spring caps, rollers, and gear.

★If there is any worn or damaged part, replace it.

### *Primary Chain Upper Guide Removal*

- Split the crankcase.
- Remove the crankshaft.
- Remove the Allen bolts and take off the primary chain upper guide.



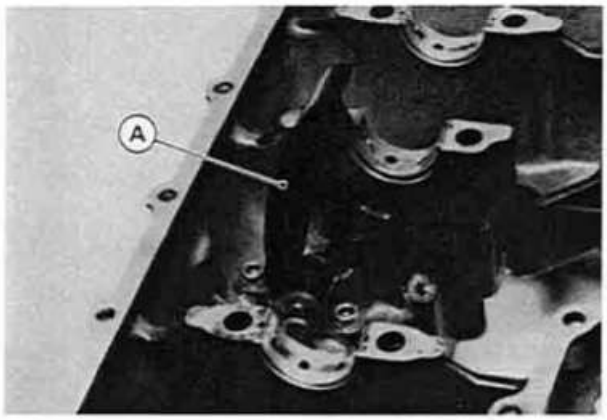

A. Primary Chain Upper Guide
B. Upper Crankcase Half

### *Primary Chain Upper Guide Installation Note*

- Apply a non-permanent locking agent to the threads of the Allen bolts, and tighten them to the specified torque.

### *Primary Chain Lower Guide Removal*

- Split the crankcase.
- Remove the Allen bolts and take off the primary chain lower guide.




A. Chain Lower Guide

### *Primary Chain Lower Guide Installation Note*

- Apply a non-permanent locking agent to the threads of the Allen bolts, and tighten it to the specified torque.

### *Primary Chain Guide Inspection*

- Visually inspect the guides.

★If there is any damage, replace the chain guide with a new one.

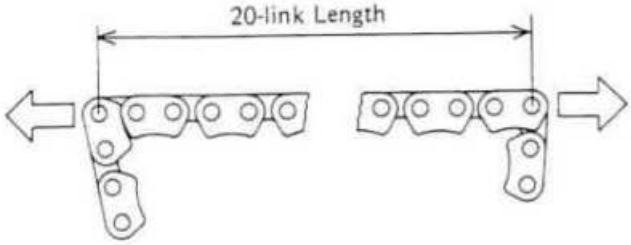
### *Primary Chain Wear*

- Hold the primary chain so that it may be pulled tight.
- Measure the length of 20-links (21 pins) with a vernier caliper.

★If the 20-link length of the primary chain is greater than the service limit, replace it.

| Primary Chain 20-link Length | |
|---|---|
| Standard: | 190.5 ~ 190.8 mm |
| Service Limit: | 193.4 mm |

**Chain 20-Link Length Measurement**



### *Ball Bearing Wear*

- Check the ball bearings:

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean the bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

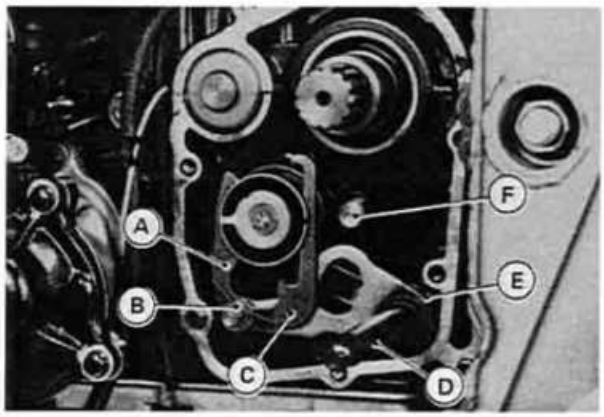
○Spin the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

## Transmission

### *External Shift Mechanism Removal*

- Remove the engine sprocket (see Engine Sprocket Removal in Final Drive chapter).
- Place an oil pan beneath the external shift mechanism cover.
- Remove the external shift mechanism cover screws, and pull off the external shift mechanism cover and gasket.
- Move the shift mechanism arm and overshift limiter out of their positions on the end of the shift drum, and pull out the shift shaft with the arm, pawl spring and return spring.



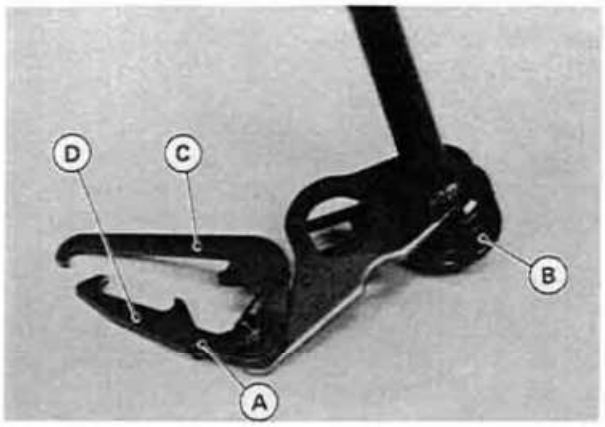

A. Shift Mechanism Arm
B. Pawl Spring
C. Overshift Limiter
D. Shift Shaft
E. Return Spring
F. Shift Rod

**NOTE**

○*Do not pull the shift rod out of the crankcase. The shift forks inside the crankcase will fall to the bottom of the sump, requiring splitting the crankcase to install them.*

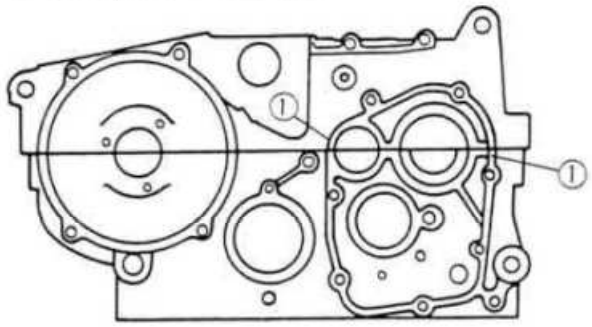
### *External Shift Mechanism Installation Notes*

- Check that the return spring and pawl spring are properly fitted on the mechanism, install the external shift mechanism, and place the shift mechanism arm and overshift limiter on the shift drum pins.



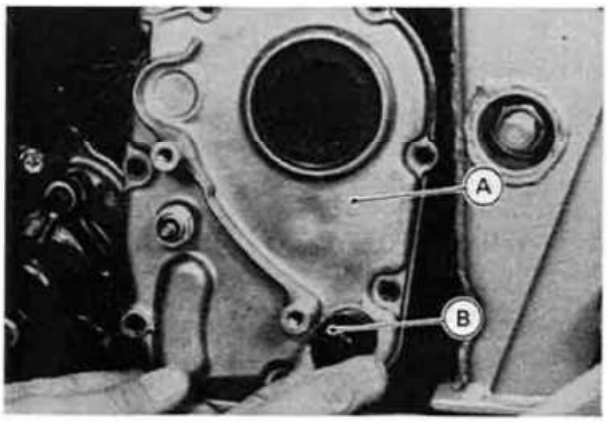

A. Pawl Spring
B. Return Spring
C. Overshift Limiter
D. Shift Mechanism Arm

- Apply high temperature grease to the lips of the output shaft collar oil seal.
- Apply silicone sealant (Kawasaki Bond: 56019-120) to the mating surface as shown.




1. Silicone Sealant Applied Area

- Insert the shift shaft oil seal guide (special tool) in the external shift mechanism cover oil seal, install the cover and gasket, and then tighten the screws.

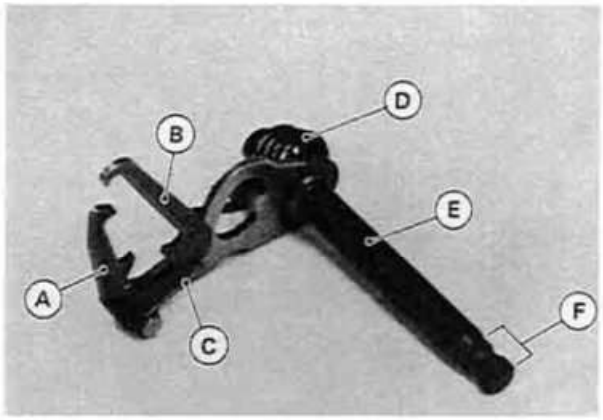



A. External Shift Mechanism Cover
B. Shift Shaft Oil Seal Guide: 57001-264

- Check the engine oil level, and add oil if necessary (see Engine Oil Level Inspection in chapter 6).

### *External Shift Mechanism Inspection*

●Examine the shift shaft for any damage.




A. Shift Mechanism Arm
B. Overshift Limiter
C. Pawl Spring
D. Return Spring
E. Shift Shaft
F. Splines

○Check the shift shaft for bending or damage to the splines.
☆If the shaft is bent, straighten or replace it. If the splines are damaged, replace the shaft.
○Check the return spring and pawl spring for breaks or distortion.
☆If the springs are damaged in any way, replace them.
○Check the shift mechanism arm and overshift limiter for distortion.
☆If the shift mechanism arm or overshift limiter is damaged in any way, replace the shift shaft.
●Check that the return spring pin is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View).
●Visually inspect the shift drum pins, pin holder, and pin plate.
★If they are badly worn or if they show any damage, replace them.

### *Transmission Shaft Removal*

●Remove the engine.
●Split the crankcase.
●Take out the drive and output shaft assemblies.

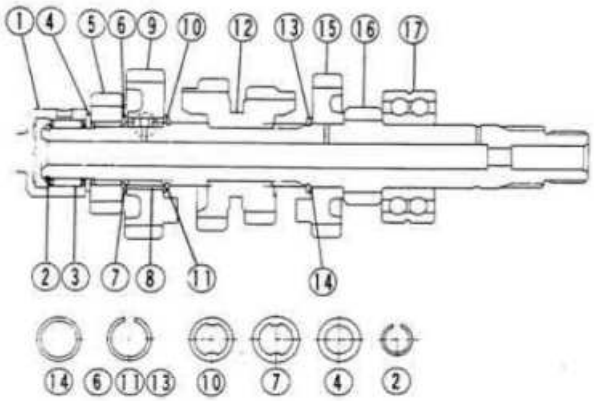
### *Transmission Shaft Installation*

●With a high flash-point solvent, clean off the outer circumferences of the transmission ball bearings and needle bearing housings, and wipe dry.
●Check to see that the set rings and set pins are in place in the transmission bearing housings and blow the oil passages in the bearing housings clean with compressed air.
●Install the drive and output shaft assemblies in the upper crankcase half.
○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance between the crankcase and the bearing outer races.

### *Drive Shaft Disassembly*

●Remove the engine.
●Remove the clutch.
●Split the crankcase.
●Take out the drive shaft assembly.

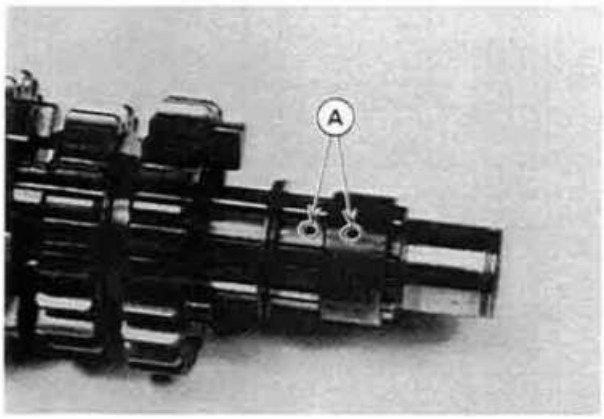
**Drive Shaft**




1. Bearing Outer Race
2. Circlip
3. Needle Bearing
4. Thrust Washer
5. 2nd Gear
6. Circlip
7. Toothed Washer
8. Bushing
9. Top Gear
10. Toothed Washer
11. Circlip
12. 3rd, 4th Gear
13. Circlip
14. Washer
15. 5th Gear
16. Drive Shaft (1st Gear)
17. Ball Bearing

### *Drive Shaft Assembly Notes*

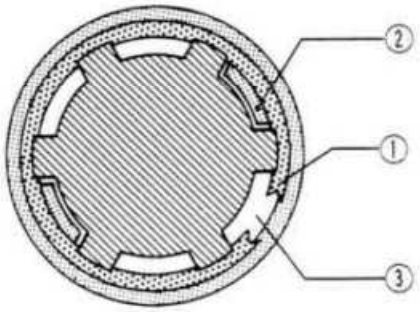
●When assembling the Top gear bushing to the shaft, align its oil holes with the holes in the shaft.




A. Align their Oil Holes

- Replace any circlips that were removed with new ones.
- Always install circlips so that the opening is aligned with a spline groove, and install toothed washers so that the teeth are not aligned with the circlip opening.

**Circlip and Toothed Washer Installation**

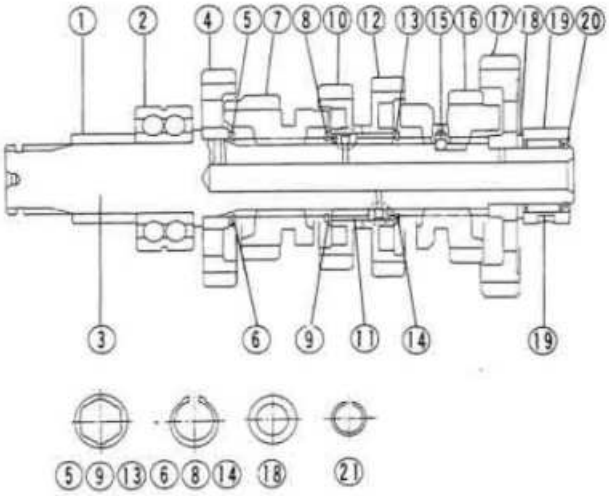



1. Circlip
2. Toothed Washer
3. Groove

*Output Shaft Disassembly*

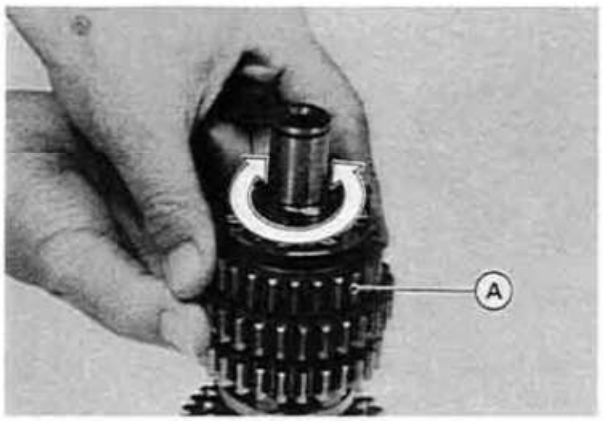
- Remove the engine.
- Split the crankcase.
- Take out the output shaft assembly.

**Output Shaft**




1. Collar
2. Ball Bearing
3. Ouput Shaft
4. 2nd Gear
5. Toothed Washer
6. Circlip
7. Top Gear
8. Circlip
9. Toothed Washer
10. 4th Gear
11. Bushing
12. 3rd Gear
13. Toothed Washer
14. Circlip
15. Steel Ball
16. 5th Gear
17. 1st Gear
18. Thrust Washer
19. Needle Bearing
20. Bearing Outer Race
21. Circlip

- The 5th gear has three steel balls assembled into it for the positive neutral finder mechanism. To remove this gear from the 5th gear, quickly spin the shaft in a vertical position while holding the 3rd gear, and pull off the 5th gear upwards.

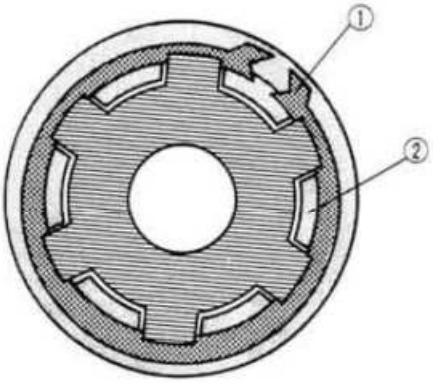



A. 5th Gear

*Output Shaft Assembly Notes*

- When installing the 5th gear and steel balls, do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.
- When assembling the 3rd/4th gear bushing to the shaft, align its oil holes with the holes in the shaft.
- Replace any circlips that were removed with new ones.
- Always install circlips so that the opening is aligned with a spline groove.

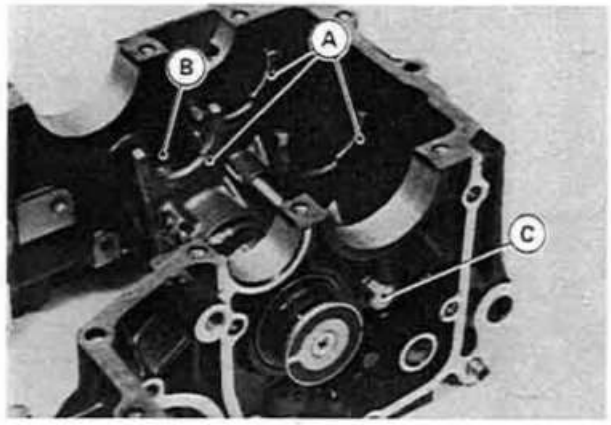
**Circlip and Toothed Washer Installation**




1. Circlip
2. Toothed Washer

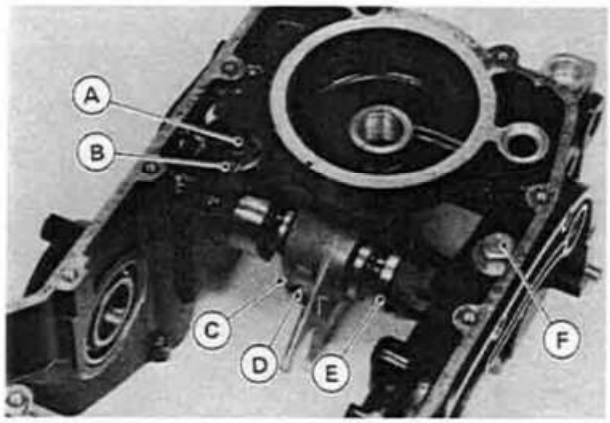
*Shift Drum and Fork Removal*

- Remove the engine.
- Split the crankcase.
- Pull out the shift rod to the left side of the lower crankcase, and take off the shift forks.



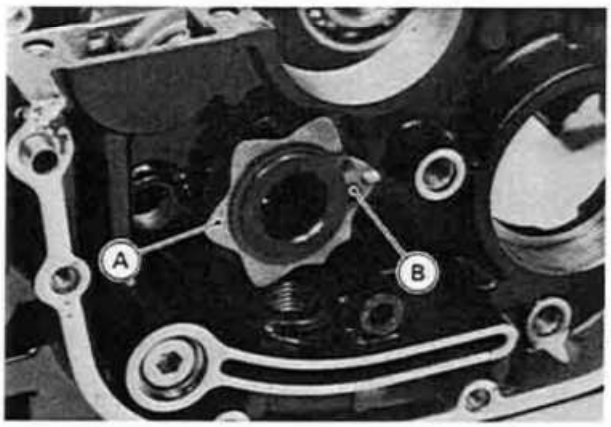

A. Shift Forks
B. Shift Drum
C. Shift Rod

•Remove the shift drum positioning bolt, spring, and pin.
•Straighten the side of the lockwasher that is bent over the side of the shift drum guide bolt, and remove them.




A. Guide Bolt
B. Lockwasher
C. Cotter Pin
D. Guide Pin
E. Shift Drum
F. Positioning Bolt

•Remove the cotter pin, and pull out the guide pin.
•Remove the operating plate circlip and operating plate.

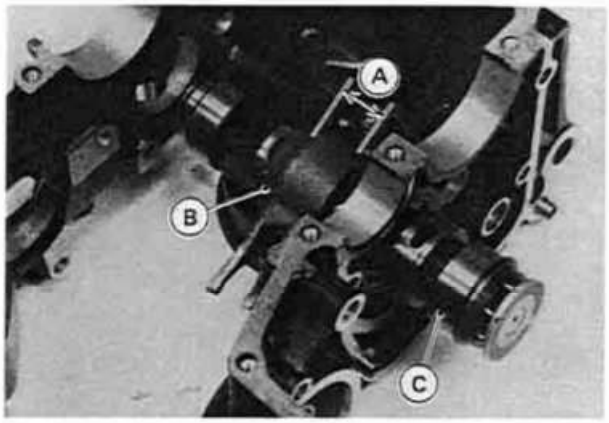



A. Operating Plate
B. Circlip

•Pull out the shift drum slightly, and remove the 5th/6th shift fork. Pull the shift drum out of the crankcase.

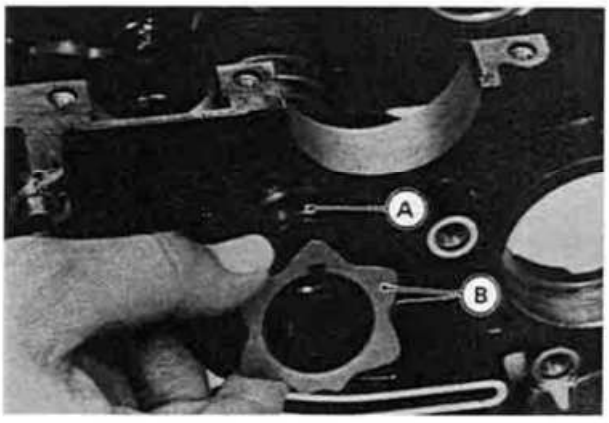
### *Shift Drum and Fork Installation*

•Installation is the reverse of removal. Note the following.
○Insert the shift drum into the crankcase part way, install the 5th/6th shift fork with the long end facing the neutral switch, i.e., the long end goes onto the drum first.




A. Long End
B. 5th/6th Shift Fork
C. Shift Drum

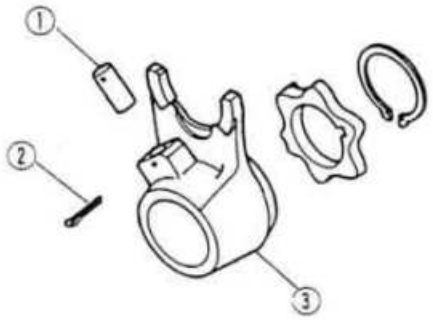
○Check to see that the operating plate pin is in place, fit the operating plate onto the end of the shift drum, and install the circlip.




A. Operating Plate Pin
B. Operating Plate

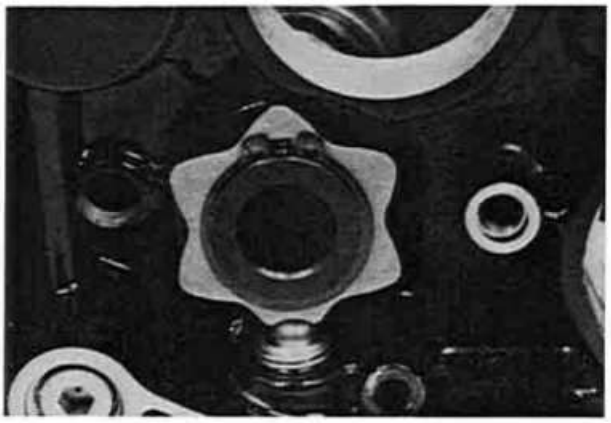
○Insert a new cotter pin through the 5th/6th shift fork and guide pin from the long end side of the shift fork, and spread the cotter pin long end inward.

**Shift Fork Cotter Pin Installation**

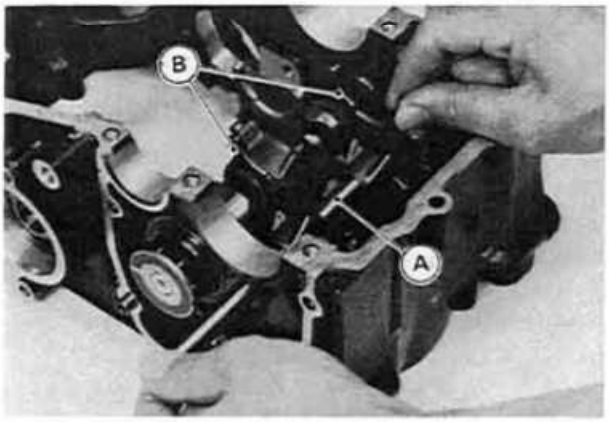



1. Shift Fork Guide Pin
2. Cotter Pin
3. Shift Fork

○Set the shift drum in neutral position as shown.



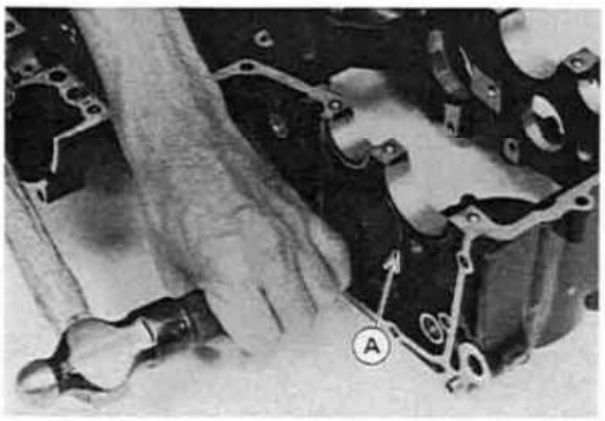
○Apply a little engine oil to the shift rod and shift fork fingers. Insert the shift rod, running it through the shift forks, fitting each shift fork guide pin into the shift drum groove. The shift forks are identical.




A. Shift Rod B. Shift Forks

*Shift Drum Disassembly Note*

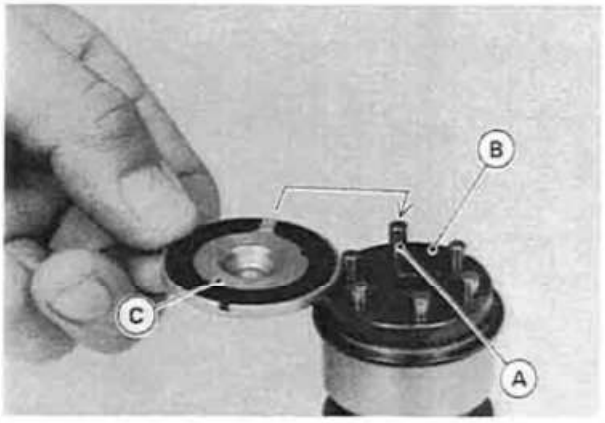
○To remove the shift drum needle bearing, tap out the needle beairng using the shift drum bearing driver and holder (special tools: 57001-1145, 57001-1132).




A. Needle Bearing

*Shift Drum Assembly Notes*

○The long shift drum pin must be in the position shown. If the long pin is put in the wrong place, the neutral indicator light will not light when the gears are in neutral.




A. Long Shift Drum Pin C. Pin Plate
B. Hole

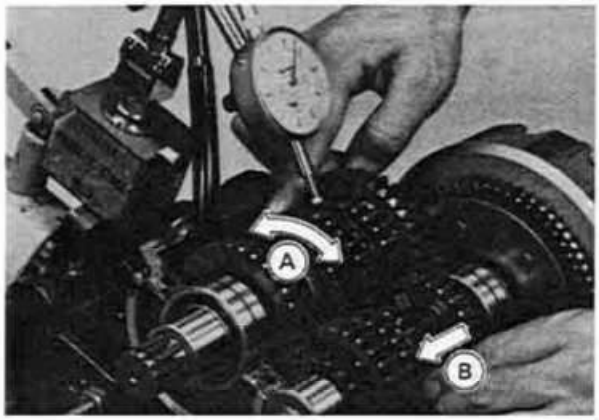
○Apply a non-permanent locking agent to the pin plate screw, and tighten it.

○Install the shift drum needle bearing using a suitable driver. Press it so that the end of the bearing is even with the left end of the hole.

*Gear Backlash*

- Split the crankcase leaving the transmission in place.
- Set a dial gauge against the teeth on one gear, and move the gear back and forth while holding the other gear steady. The difference between the highest and the lowest gauge readings in the amount of backlash.
- ★Replace both gears if the amount of backlash exceeds the service limit.

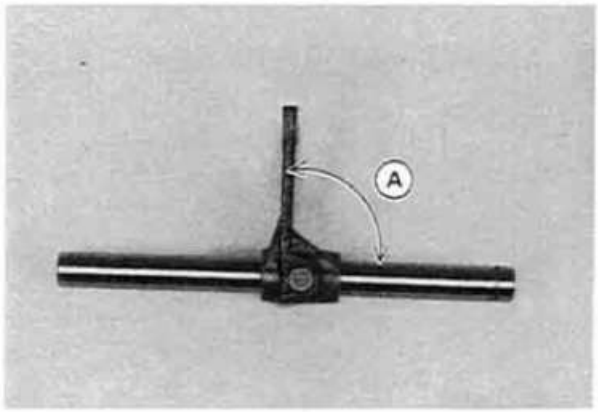
| Gear Backlash | |
|---|---|
| Standard: | 0 ~ 0.17 mm |
| Service Limit: | 0.25 mm |




A. Move back and forth lightly B. Hold steady.

*Shift Fork Bending*

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.




A. 90°

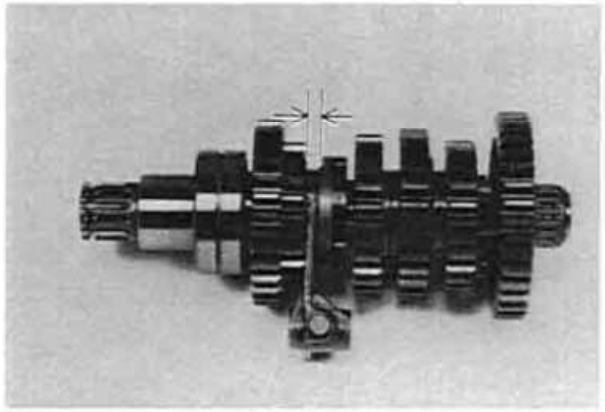
*Shift Fork/Gear Groove Wear*

- Measure the thickness of the shift fork ears, and measure the width of the shift fork grooves on the transmission gears.
- ★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

| Shift Fork Ear Thickness | |
|---|---|
| Standard: | 4.9 ~ 5.0 mm |
| Service Limit: | 4.8 mm |

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

| Gear Shift Fork Groove Width | |
|---|---|
| Standard: | 5.05 ~ 5.15 mm |
| Service Limit: | 5.3 mm |



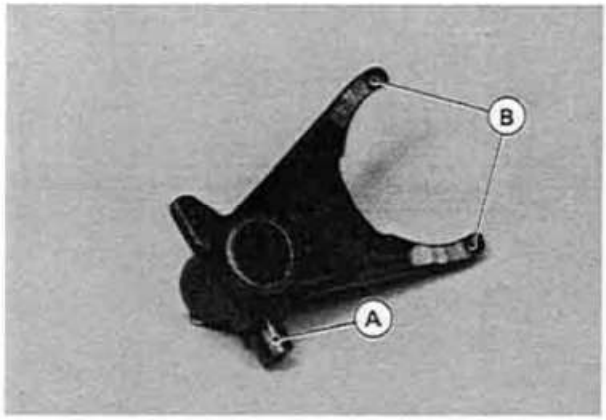
*Shift Fork Guide Pin/Shift Drum Groove Wear*

- Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.
- ★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

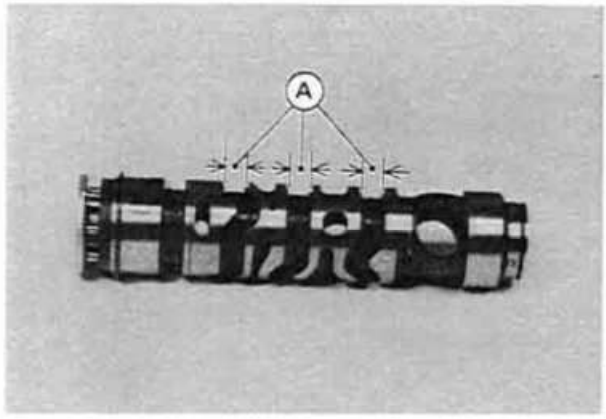
| Shift Fork Guide Pin Diameter | |
|---|---|
| Standard: | 7.9 ~ 8.0 mm |
| Service Limit: | 7.8 mm |

★If any shift drum groove is worn over the service limit, the drum must be replaced.

| Shift Drum Groove Width | |
|---|---|
| Standard: | 8.05 ~ 8.20 mm |
| Service Limit: | 8.3 mm |




A. Shift Fork Guide Pin B. Shift Fork Ears

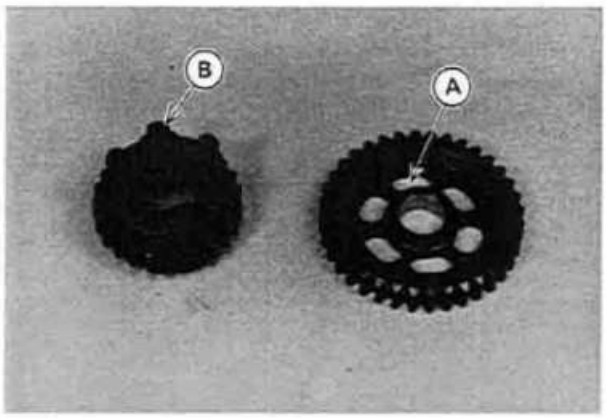



A. Shift Drum Grooves

*Gear Dog/Gear Dog Hole Damage*

•Visually inspect the gear dogs and gear dog holes.

★Replace any gears that have damaged or excessively worn dogs or dog holes.




A. Dog Hole B. Dog

*Ball and Needle Bearing Wear*

•Check the following ball bearings: drive shaft RH, and output shaft LH.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

○Spin the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

•Check the following needle bearing: drive shaft LH, output shaft RH and shift drum LH.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

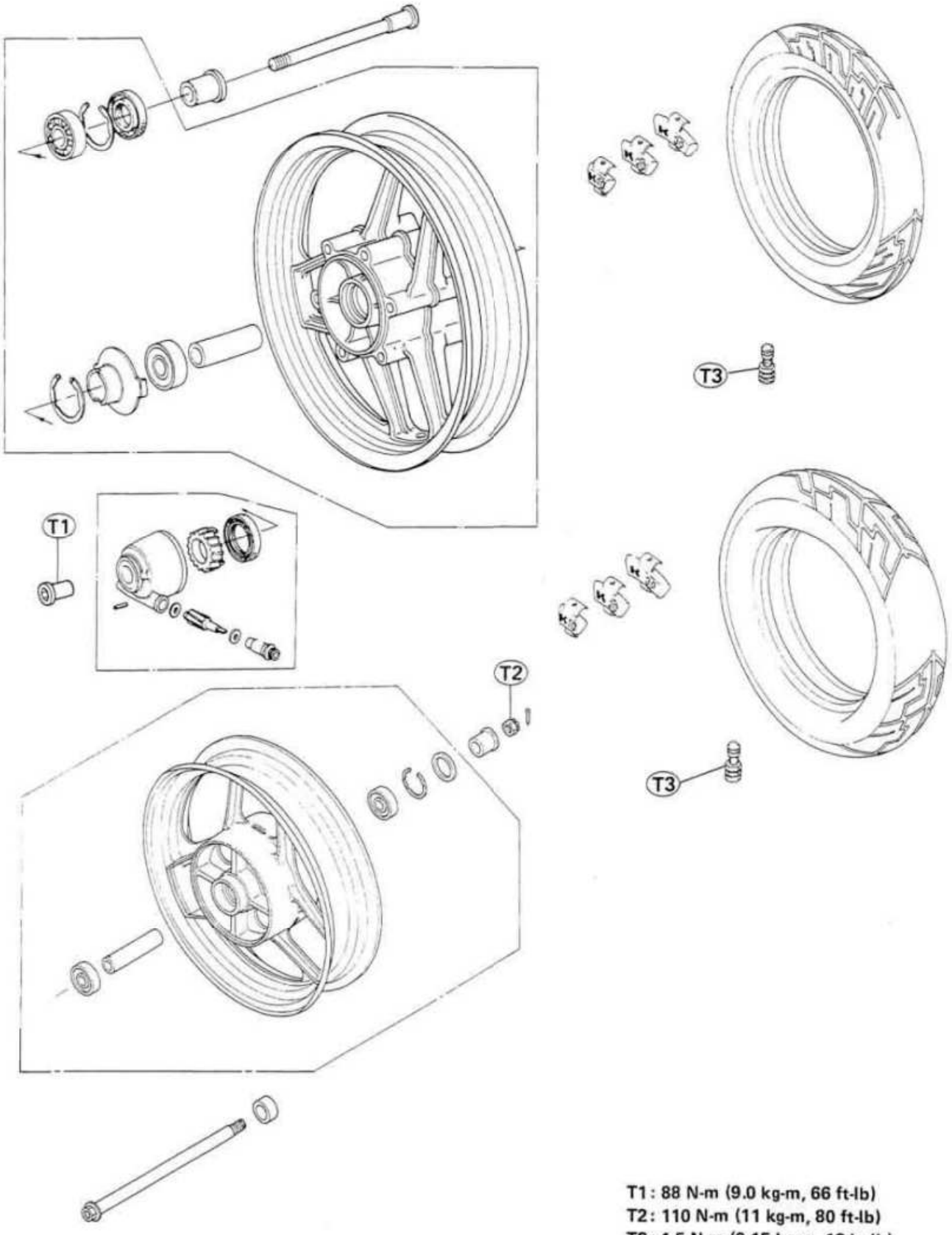
★If there is any doubt as to the condition of a needle bearing, replace it.

# Wheels/Tires

## Table of Contents


Exploded View ..... 9-2
Specifications ..... 9-3
Special Tools ..... 9-3
Wheels (Rims) ..... 9-4
*Front Wheel Removal* ..... 9-4
*Front Wheel Installation* ..... 9-4
*Rear Wheel Removal* ..... 9-4
*Rear Wheel Installation* ..... 9-5
*Wheel Inspection* ..... 9-5
*Axle Inspection* ..... 9-6
*Wheel Balance* ..... 9-6
Tires ..... 9-7
*Tire Removal* ..... 9-7
*Tire Installation* ..... 9-8
*Tire Inspection* ..... 9-9
*Tire Repair* ..... 9-10
Hub Bearings ..... 9-10
*Fornt Hub Bearing Removal* ..... 9-10
*Front Hub Bearing Installation* ..... 9-11
*Rear Hub Bearing Removal* ..... 9-11
*Rear Hub Bearing Installation* ..... 9-12
*Hub Bearing Inspection and Lubrication* ..... 9-12
*Grease Seal Inspection and Lubrication* ..... 9-13
Speedometer Gear Housing ..... 9-13
*Speedometer Gear Housing Disassembly* ..... 9-13
*Speedometer Gear Housing Assembly* ..... 9-13
*Speedometer Gear Housing Lubrication* ..... 9-14

## Exploded View




T1 : 88 N-m (9.0 kg-m, 66 ft-lb)
T2 : 110 N-m (11 kg-m, 80 ft-lb)
T3 : 1.5 N-m (0.15 kg-m, 13 in-lb)

## Specifications

| Item | | Standard | Service Limit |
|---|---|---|---|
| **Tires:** | | | |
| Tire tread depth: | Front | 4.9 mm | 1 mm |
| | Rear | 6.9 mm | 2 mm Under 130 km/h (80 mph)<br>3 mm Over 130 km/h (80 mph) |

Standard tire:

**Other than European Model**

| | | |
|---|---|---|
| Front : | Size | 110/90V16 |
| | Make, Type | DUNLOP K825A, Tubeless |
| Rear : | Size | 130/90V16 |
| | Make, Type | DUNLOP K825, Tubeless |

**European Model**

| | | |
|---|---|---|
| Front : | Size | 110/90V16 |
| | Make, Type | DUNLOP K825A, MICHELIN A48, METZELER ME33 LASER, CONTINENTAL TKV11, AVON Super Venom AM18 Tubeless |
| Rear : | Size | 130/90V16 |
| | Make, Type | DUNLOP K825, MICHELIN M48, METZELER ME99A, CONTINENTAL TK44 RC, AVON Super Venom AM18 Tubeless |

Tire air pressure (when cold):

| | | |
|---|---|---|
| Front | | 225 kPa (2.25 kg/cm$^2$, 32 psi) |
| Rear | Up to 1824N (186 kg, 410 lb) | 250 kPa (2.50 kg/cm$^2$, 36 psi) |

| | | | |
|---|---|---|---|
| **Wheels:** | | | |
| Rim runout: | Axial | — — — | 0.5 mm |
| | Radial | — — — | 0.8 mm |
| Axle runout/100 mm: | | Under 0.05 mm | 0.2 mm |

## Special Tools

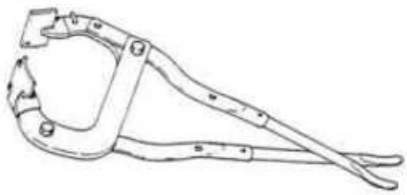
Rim Protector: 57001-1063



**Bearing Driver Set: 57001-1129**
Use the following tools in the set.
**Bearing Driver Holder: 57001-1132**
**Bearing Driver: 57001-1135**
**Bearing Driver: 57001-1136**
**Bearing Driver: 57001-1145**
**Bearing Driver: 57001-1146**



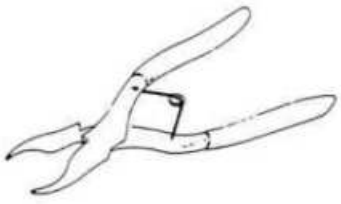
**Bead Breaker Assembly: 57001-1072**



**Tire Irons: 57001-1073**



**Inside Circlip Pliers: 57001-143**



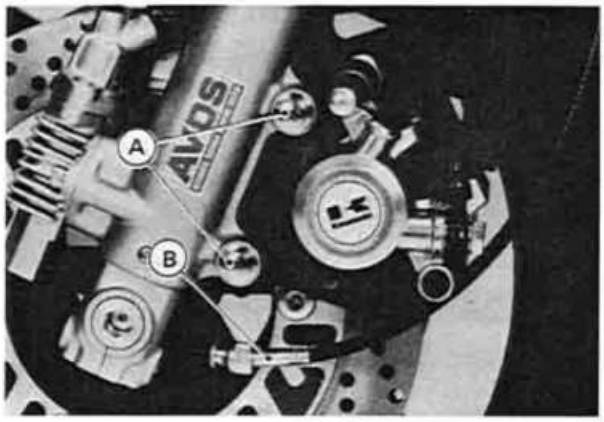
**NOTE**

○*The tire irons (P/N 57001-1073) are included in the bead breaker assembly (P/N 57001-1072).*

## Wheels (Rims)

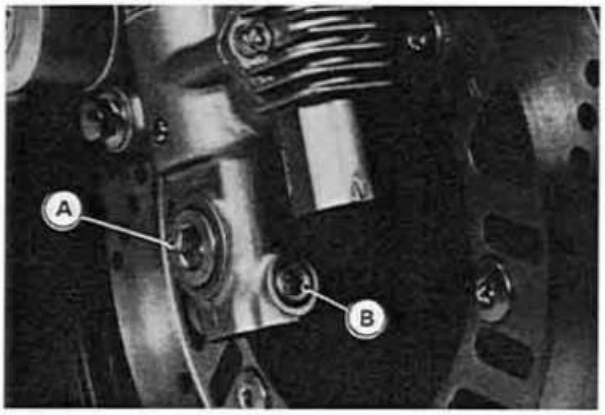
### *Front Wheel Removal*

- Disconnect the speedometer cable lower end.
- Remove both mounting bolts for one of the brake calipers. Support the caliper so that does not hang by its brake hose.




A. Caliper Mounting Bolts B. Speedometer Cable

- Loosen the right side axle clamp bolt.




A. Axle B. Axle Clamp Bolt

- Loosen the axle.
- Use a jack under the engine or other suitable means to lift the front of the motorcycle.
- Pull out the axle to the right and drop the front wheel out of the forks.

**CAUTION**

**○Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the discs do not touch the ground.**

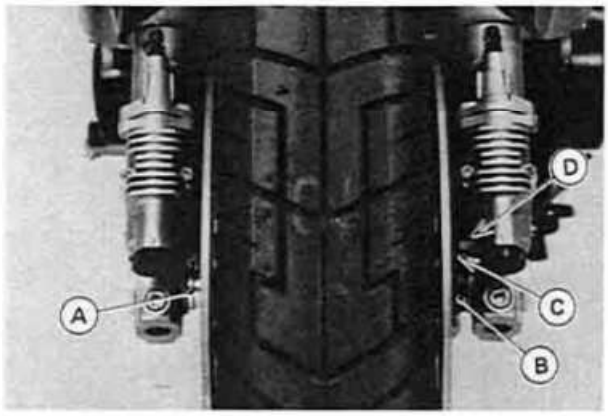
### *Front Wheel Installation*

- Installation is the reverse of removal.

**NOTE**

*○Install the speedometer gear housing so that it fits in the speedometer gear drive notches.*

***○Fit the speedometer gear housing stop to the fork leg stop, and check that the collar is on the right side of the hub.***




A. Collar C. Housing Stop
B. Speedometer Gear Housing D. Fork Leg Stop

- Tighten the axle nut to the specified torque (see Exploded View).
- Tighten the axle clamp bolts to the specified torque (see Exploded View).
- Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter)
- Check the front brake.

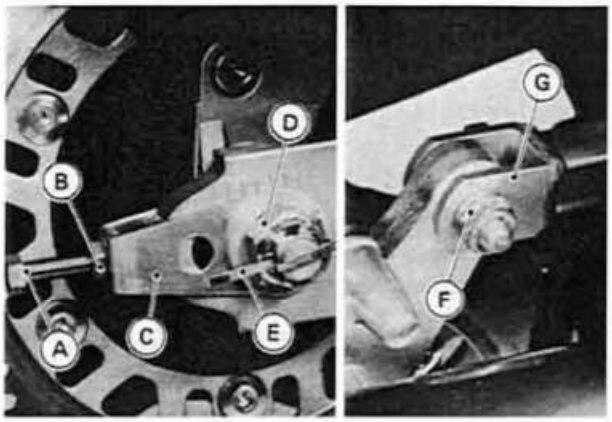
**WARNING**

**○Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brakes will not function on the first application of the lever if this is not done.**

### *Rear Wheel Removal*

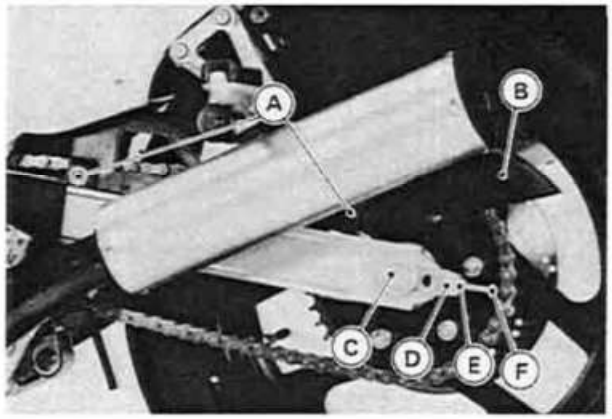
- Remove or loosen the following parts before rear wheel removal.
  - Chain Cover (Remove)
  - Axle Nut Cotter Pin (Remove)
  - Torque Link Nut (Loosen)
  - Chain Adjusting Bolt Locknuts, Adjusting Bolts (Fully Loosen)
  - Drive Chain (Fully Loosen)
  - Axle and Axle Nut (Remove)
- Pull the drive chain toward the left, and remove the rear wheel.

**Right Side**




A. Adjusting Bolt
B. Locknut
C. Chain Adjuster
D. Axle Nut
E. Cotter Pin
F. Torque Link Nut
G. Torque Link

**Left Side**




A. Mounting Bolts
B. Chain Cover
C. Axle
D. Chain Adjuster
E. Locknut
F. Adjusting Bolt

**CAUTION**

○**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

*Rear Wheel Installation*

- Be careful of the following items.
- Installation is the reverse of removal.

○Adjust the drive chain after installation (see Drive Chain Adjustment in Final Drive chapter).

○Tighten the axle nut to the specified torque (see Exploded View).

○Tighten the torque link nut to the specified torque (see Exploded View in Suspension chapter).

*Wheel Inspection*

If there is any doubt as to the condition of the wheel, or if the wheel has received a heavy impact, check the rim runout as follows:

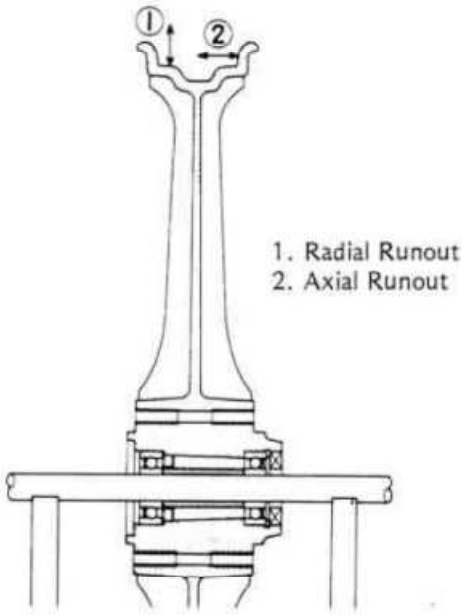
Remove the tire and support the wheel by the axle. Set a dial gauge against the side of the rim, and rotate the wheel to measure the axial runout. The difference between the highest and lowest dial readings is the amount of runout.

Set the dial gauge against the outer circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.

If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged. If the problem is not due to the bearings, the wheel must be replaced. Do not attempt to repair a damaged wheel.

| | |
|---|---|
| **Axial Runout** | |
| **Service Limit:** | **0.5 mm** |
| **Radial Runout** | |
| **Service Limit:** | **0.8 mm** |

**Rim Runout**




1. Radial Runout
2. Axial Runout

Carefully inspect the wheel for small cracks, dents, bending, or warping. If there is any damage to the wheel, it must be replaced.

**WARNING**

○**Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.**

If the rim has a scratch deeper than 0.5 mm and/or across the rim sealing surface, replace the wheel.

*Axle Inspection*

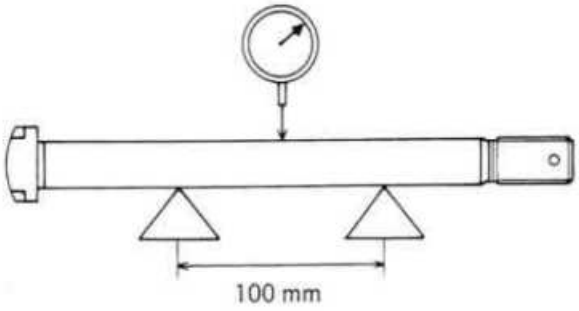
To measure axle runout, remove the axle, place it in V blocks that are 100 mm apart, and set a dial gauge on the axle at a point halfway between the blocks. Turn the axle to measure the runout. The amount of runout is the amount of dial variation.

If runout exceeds the service limit, replace the axle.

**Axle Runout/100 mm**

| | |
|---|---|
| **Service Limit:** | **0.2 mm** |

**Axle Runout**

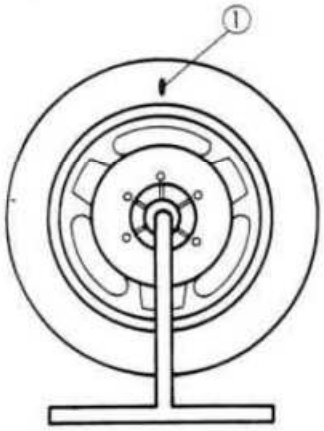



*Wheel Balance*

**To check the wheel balance:**

- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark the wheel at the top when the wheel stops.

**Wheel Balance Check**



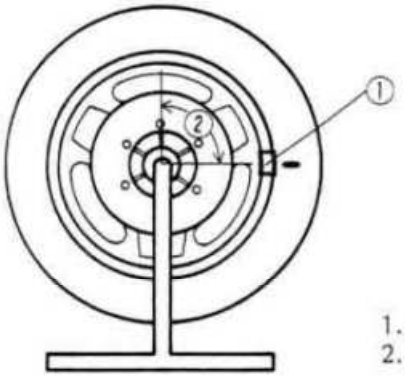

1. Mark

- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

**To balance the wheel:**

- If the wheel always stops in one position, provisionally attach a balance weight on the rim at the marking using adhesive tape.
- Rotate the wheel ¼ turn, and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
- ★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated ¼ turn.
- Rotate the wheel another ¼ turn, and then another ¼ turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weights.

**Wheel Balance Adjustment**




1. Balance Weight
2. ¼ Turn

**Installation of Balance Weight:**

- Check if the weight portion has any play on the blade-and-clip plate.
- ★If it does, discard it.
- Lubricate the balance weight blade, tire bead, and rim flange with a soap and water solution or rubber lubricant. This helps the balance weight slip onto the rim flange.

**CAUTION**

- **Do not lubricate the tire bead with engine oil or gasoline because they will deteriorate the tire.**

- Install the balance weight on the rim.
- Slip the weight onto the rim flange by pushing or lightly hammering the weight in the direction shown in the figure.
- Check that the blade and weight seat fully on the rim flange, and that the clip is hooked over the rim ridge and reaches the flat portion of the rim.

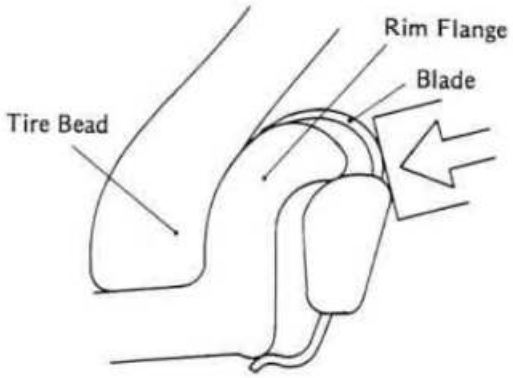
**WARNING**

- **If the balance weight has any play on the rim flange, the blade and/or the clip have been stretched. Replace the loose balance weight.**
- **Do not reuse balance weights.**

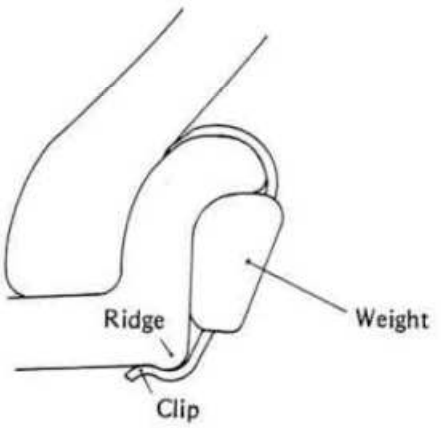
| Balance Weight | |
|---|---|
| Part Number | Weight (grams) |
| 41075-1014 | 10 |
| 41075-1015 | 20 |
| 41075-1016 | 30 |

**Installing Balance Weight**

(a) Press or lightly hammer the weight in.




(b) Installation completed.

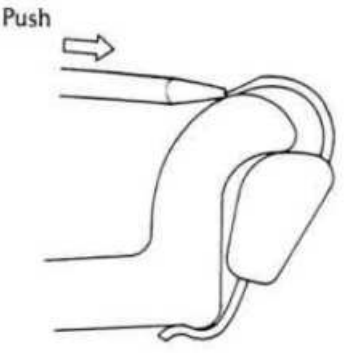



**Removal of Balance Weight:**

(a) When the tire is not on the rim.

- Push the blade portion toward the outside with a regular tip screw driver, and slip the weight off the rim flange.
- Discard the used balance weight.

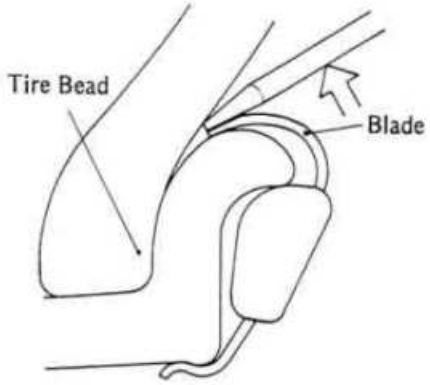
**Removing Balance Weight (without tire on rim)**




(b) When the tire is on the rim.

- Pry the balance weight off the rim flange using a regular tip screw driver as shown in the figure.
  - Insert the tip of the screw driver between the tire bead and the weight blade until the end of the tip reaches the end of the weight blade.
  - Push the screw driver grip toward the tire so that the balance weight slips off the rim flange.
- Discard the used balance weight.

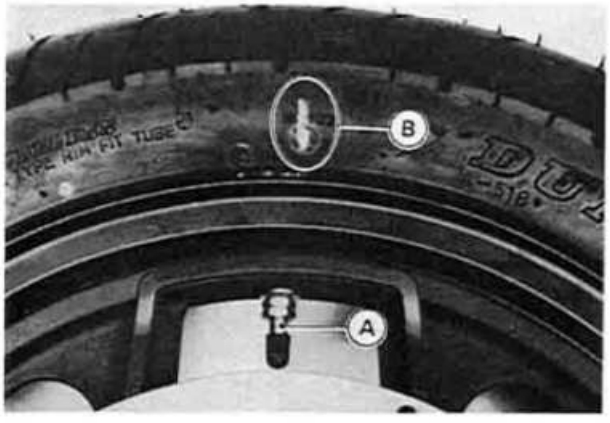
**Removing Balance Weight (with tire on rim)**




## Tires

### *Tire Removal*

- Remove the wheel from the motorcycle (see Wheel Removal), and remove the disc(s) from the hub.
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
- Take out the valve core to let out the air.




A. Valve Core B. Chalk Mark

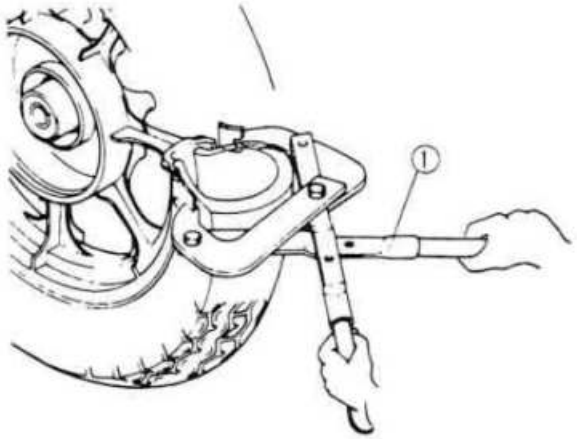
•Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

CAUTION

○**Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.**

•Break the beads away from both sides of the rim with the bead breaker (special tool).

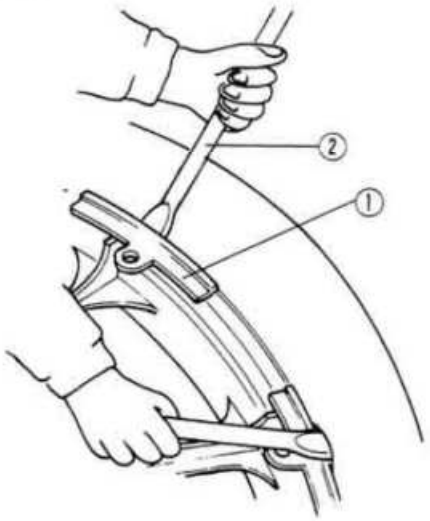
**Tire Beads Brake**




1. Bead Breaker: 57001-1072

•Install the rim protectors (special tools) around the valve stem. Lubricate the tire irons and rim protectors with a soap and water solution, or rubber lubricant.
•Step on the side of the tire opposite the valve stem, and start prying the tire off the rim near the valve stem with tire irons (special tools).

**Tire Removal**




1. Rim Protectors: 57001-1063
2. Tire Irons: 57001-1073

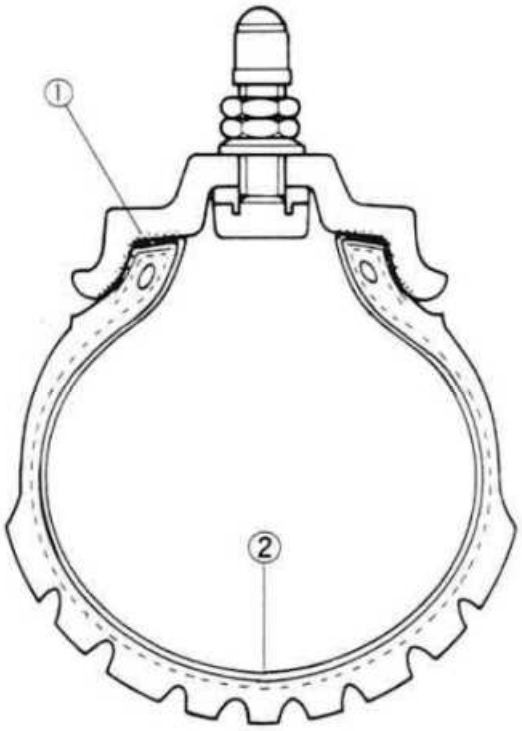
**NOTE**

○*For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time.*

CAUTION

○**Be careful not to scratch the inner liner and air sealing surfaces of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.**

**Air Sealing Surfaces**



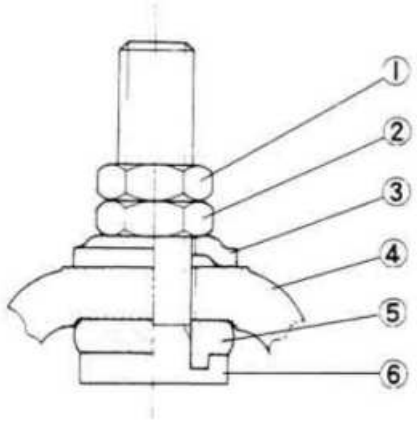

1. Air Sealing Surfaces
2. Inner Liner

•After removing the bead on one side, remove the other bead from the same side.
•Remove the rim from the tire.
•Remove the rim protectors from the rim.

### *Tire Installation*

•Inspect the rim and tire, and replace them if necessary.
•Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
•Replace the valve with a new one. Tighten the mounting nut and locknut to the specified torque (see Exploded View).

Air Valve

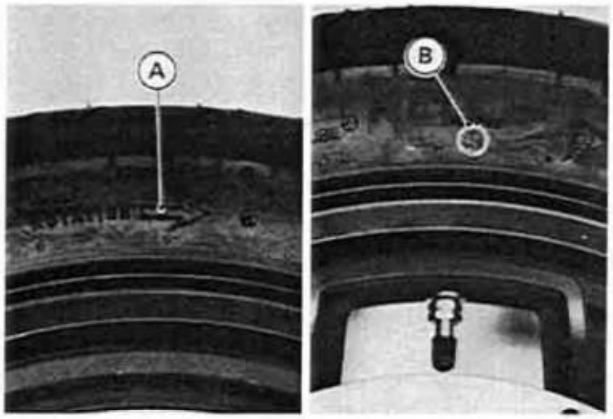



1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem

- Apply a soap and water solution, or rubber lubricant to the rim flanges, rim protectors, tire beads, and tire irons.
- Check the tire rotation mark on the rear tire and install it on the rim accordingly.

**NOTE**

○*The direction of the tire rotation is shown by an arrow on the tire sidewall.*




A. Rotation Mark (Arrow)
B. Balance Mark (Yellow Paint)

- Position the tire on the rim so that the valve is at the tire balance mark (the chalk mark made during removal, or the yellow paint mark on a new tire).
- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve.
- Fit the rim protectors and use tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the part of the bead which is already over the rim flange in the rim well.

**NOTE**

○*To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*

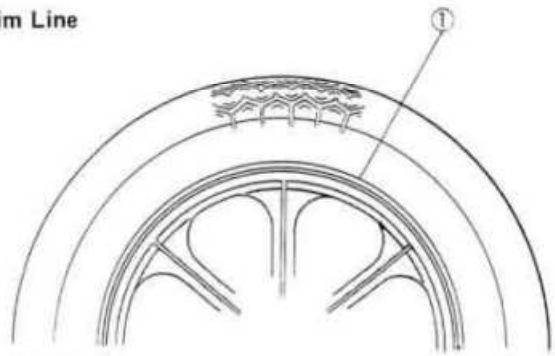
- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

**WARNING**

○**Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 390 kPa (4.0 kg/cm², 57 psi). Overinflation can explode the tire with possibility of injury and loss of life.**

- Check to see that the rim lines on both sides of the tire sidewalls are parallel with the rim flanges.

Rim Line



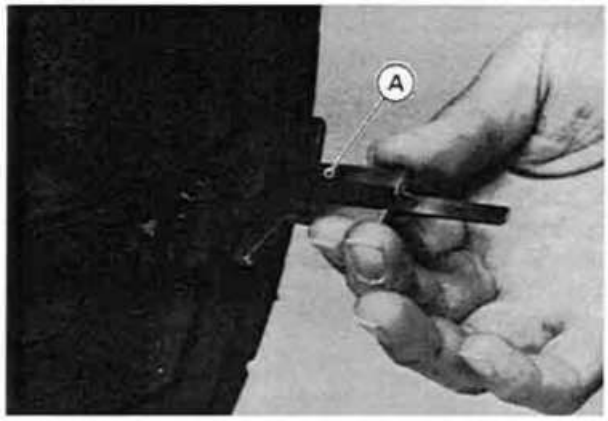

1. Rim Line

- If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core. Lubricate the rim flanges and tire beads. Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leaks. Inflate the tire slightly above standard inflation. Use a soap and water solution or submerge it, and check for bubbles that would indicate leakage.
- Adjust the air pressure to the specified pressure (see Tire Inspection).
- Install the brake disc(s).
- Adjust the wheel balance (see Wheel Balance).

### *Tire Inspection*

As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Swelling or high spots indicate internal damage, requiring tire replacement.
- Measure the tread depth at the center of the tread with a depth gauge. Since the tire may wear unevenly, take measurements at several places.
- ★If any measurement is less than the service limit, replace the tire.




A. Depth Gauge

| Tire Tread Depth | | |
|---|---|---|
| Front | | |
| | Standard | 4.9 mm |
| | Service Limit | 1 mm |
| Rear | | |
| | Standard | 6.9 mm |
| | Service Limit | 2 mm Up to 130 km/h (80 mph)<br>3 mm Over 130 km/h (80 mph) |

**WARNING**

**○To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.**

**○Use the same manufacturer's tires on both front and rear wheels.**

**NOTE**

*○Check and balance the wheel when a tire is replaced with a new one.*

**Standard Tire (European Model)**

| | | |
|---|---|---|
| Front : | Size | 110/90V16 |
| | Make, Type | DUNLOP K825A, MICHELIN A48, METZELER ME33 LASER, CONTINENTAL TKV11, AVON Super Venom AM18 Tubeless |
| Rear : | Size | 130/90V16 |
| | Make, Type | DUNLOP K825, MICHELIN M48, METZELER ME99A, CONTINENTAL TK44RC, AVON Super Venom AM18 Tubeless |

**Standard Tire (Other than European Model)**

| | | |
|---|---|---|
| Front : | Size | 110/90 V16 |
| | Make, Type | DUNLOP K825A, Tubeless |
| Rear : | Size | 130/90 V16 |
| | Make, Type | DUNLOP K825, Tubeless |

**Tire Air Pressure (When cold)**

| | | |
|---|---|---|
| Front | ——— | 225 kPa (2.25 kg/cm², 32 psi) |
| Rear | Up to 1,824 N (186 kg, 410 lb) | 250 kPa (2.50 kg/cm², 36 psi) |

*Tire Repair*

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called a permanent (internal) repaire which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs also have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

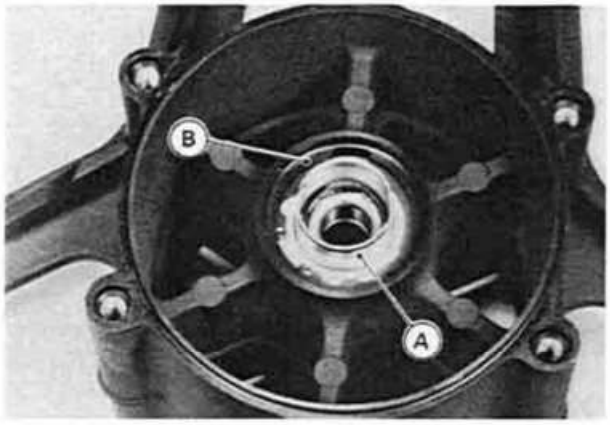
## Hub Bearings

*Front Hub Bearing Removal*

**CAUTION**

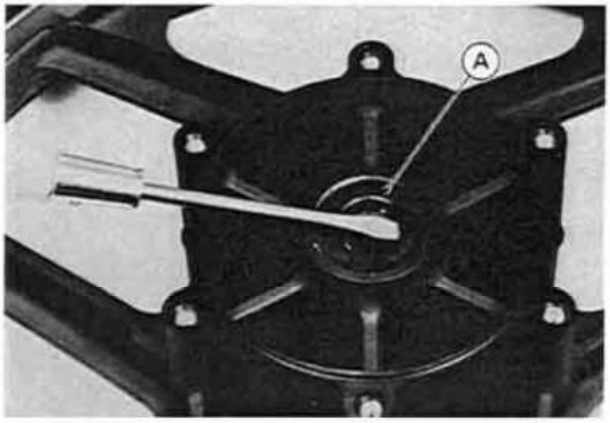
**○Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

- Remove the front wheel.
- Remove the speedometer gear housing, and collar(s) from the wheel.
- Remove the disc mounting Allen bolts and take off the discs.
- Remove the circlip and speedometer gear drive.




A. Speedometer drive B. Circlip

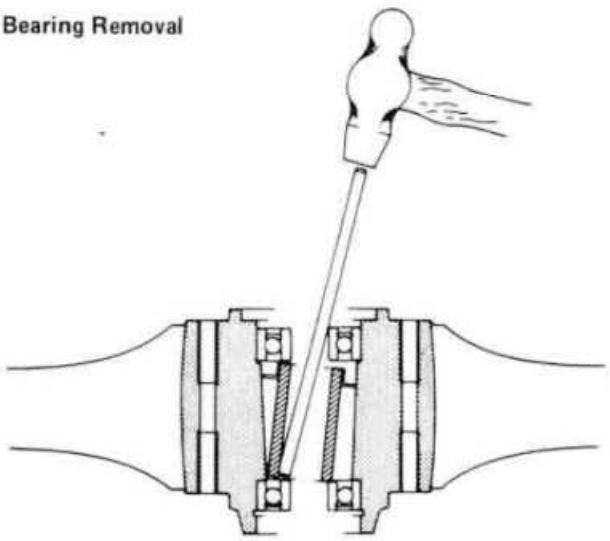
- Remove the grease seal using a hook, and remove the circlip.




A. Grease Seal

- Insert a metal rod into the hub from the left side, and remove the right side bearing by tapping evenly around the bearing inner race.
- Remove the remaining bearing by tapping evenly around the bearing inner race. The distance collar comes out with the bearing.

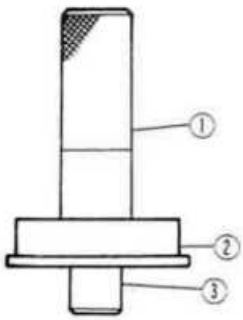
**Bearing Removal**



*Front Hub Bearing Installation*

- When installing the front hub bearings, be careful of the following items.
  - Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
  - Inspect the bearings and replace them if necessary. Lubricate them and install them using the bearing driver and the bearing driver holder (special tools) so that the marked or shielded sides face out.






1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 5700-1145
3. Bearing Driver: 57001-1135

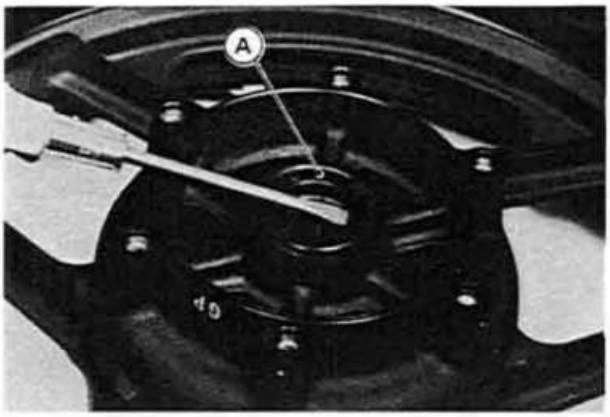
  - Inspect the grease seal and replace if necessary. Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
  - Tighten the disc mounting Allen bolts to the specified torque. The disc must be installed with the chamfered hole side facing toward the wheel. After installing the disc check the disc runout. Completely clean off any grease that has gotton on either side of the disc with a high flashpoint solvent. Do not use one which will leave an oily residue.

*Rear Hub Bearing Removal*

**CAUTION**

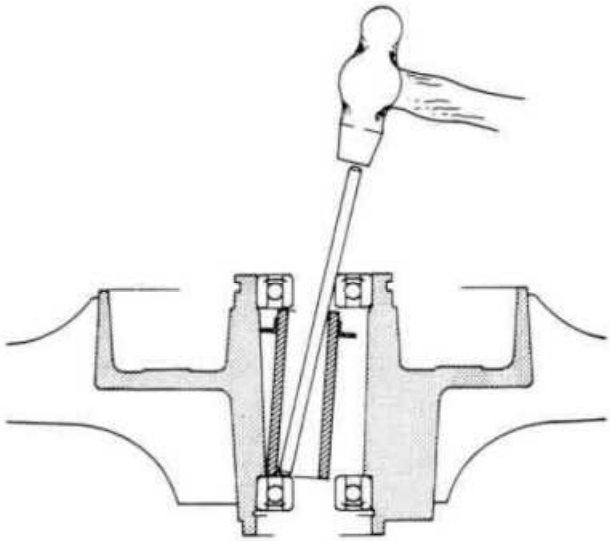
  - **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

- Remove the rear wheel.
- Remove the coupling sleeve, rear wheel coupling, and coupling collar from the wheel.
- Remove the disc mounting Allen bolts and take off the disc.
- Remove the grease seal using a hook, and remove the circlip.



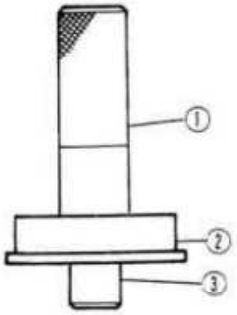

A. Grease Seal

**Bearing Removal**



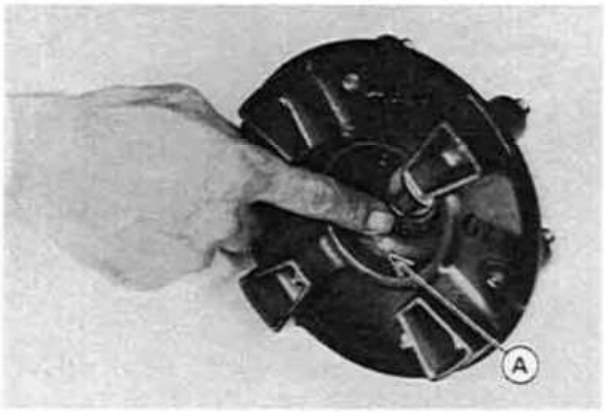
•Insert a metal rod into the hub from the left side, and remove the right side bearing by tapping evenly around the bearing inner race.
•Remove the remaining bearing by tapping evenly around the bearing inner race. The distance collar comes out with the bearing.






1. Bearing Drive Holder: 57001-1132
2. Bearing Driver: 57001-1146
3. Bearing Driver: 57001-1136

○Inspect the grease seal and replace if necessary (see Grease Seal Inspection). Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
○Apply a little grease to the inside of the rear coupling.




A. Grease

○Tighten the disc mounting Allen bolts to the specified torque (see Exploded View in Brake chapter). The disc must be installed with the chamfered hole side facing toward the wheel. After installing the disc, check the disc runout (see Disc Wear in Brake chapter).
○Completely clean off any grease that has gotten on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

### *Rear Hub Bearing Installation*

•When installing the rear hub bearings, be careful of the following items.
○Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
○Inspect the bearings and replace them if necessary (see Hub Bearing Inspection). Lubricate them and install them using the bearing driver and the bearing driver holder (special tools) so that the marked or shielded sides face out.

### *Hub Bearing Inspection and Lubrication*

Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.
•For rear hub bearing, turn each bearing back and forth while checking for roughness or binding.
★If roughness or binding is found, replace the bearing.
•For front hub bearing, wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.

★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

●If the bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the oil grease out of the hub before bearing installation. Clean and grease the wheel bearings in accordance with the Periodic Maintenance Chart.

**NOTE**

○*Since the bearings on the rear wheel hub are packed with grease and shielded, they are not required to be removed for lubrication.*




A. Grease.

●Examine the bearing seal for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

*Grease Seal Inspection and Lublication*

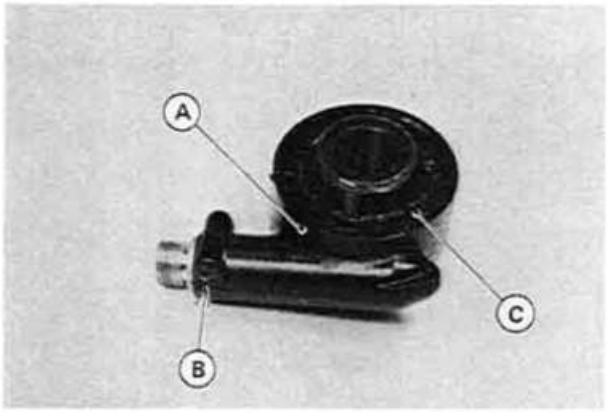
If the grease seals are examined without removing the seals themselves, lock for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seal are generally damaged upon removal.

## Speedometer Gear Housing

*Speedometer Gear Housing Disassembly*

●Pull the speedometer gear housing and collar off the front wheel.

●Pull out the grease seal using a hook.




A. Speedometer Gear Housing C. Grease Seal
B. Pin

●Pull out the speedometer gear.

●If the speedometer cable bushing or speedometer pinion needs to be removed, first drill the housing through the pin using a 1.0 to 1.5 mm drill bit. Drill the housing from the under side using a 3.0 to 3.5 mm drill bit. Using a suitable 3 mm rod, tap out the pin, and then pull out the speedometer cable bushing, pinion, and washers.

**NOTE**

○*It is recommended that the assembly be replaced rather than attempting to repair the components.*

*Speedometer Gear Housing Assembly*

●When assembling the speedometer gear housing, be careful of the following items.

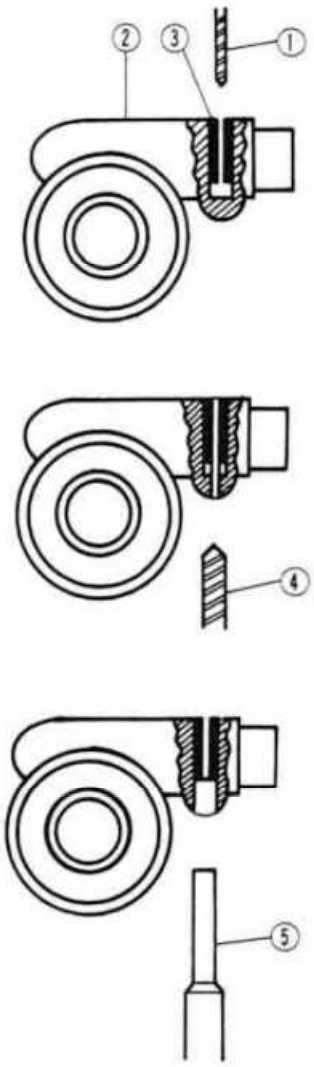
○After inserting a new pin, stake the housing hole to secure the pin in place.

○Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or a suitable driver so that the face of the seal is level with the surface of the housing.

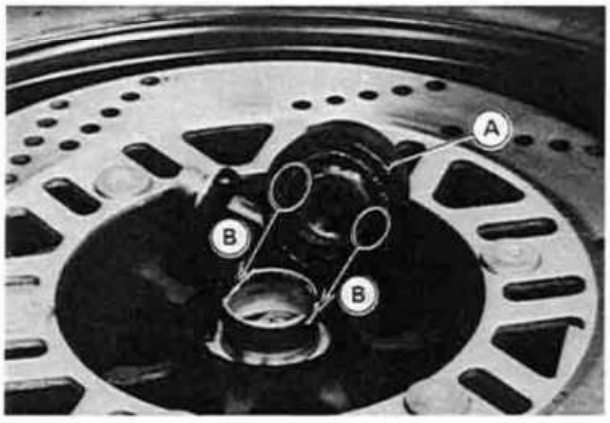
○Regrease the speedometer gear.

○Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

**Speedometer Gear Housing Pin Removal**



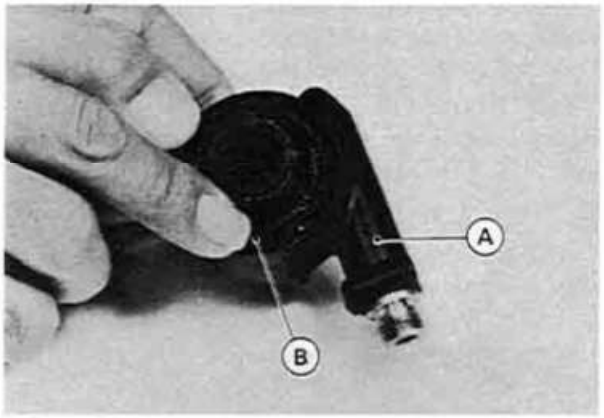

1. 1 ~ 1.5 mm bit
2. Housing
3. Pin
4. 3 ~ 3.5 mm bit
5. 3 mm Rod




A. Speedometer Gear Housing
B. Fit in the gear drive notches.

*Speedometer Gear Housing Lubrication*

Clean and grease the speedometer gear housing in accordance with the Periodic Maintenance Chart.



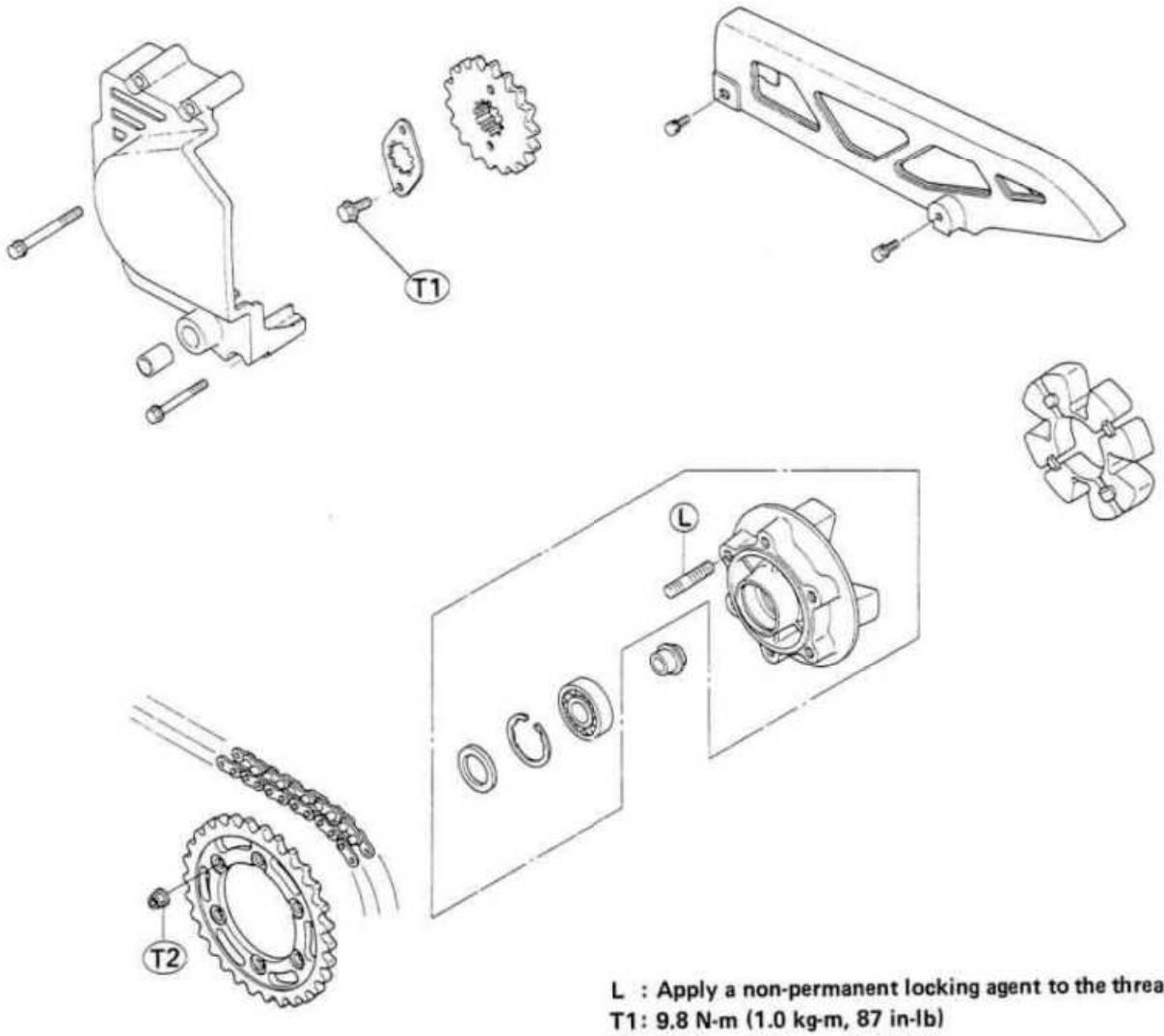

A. Speedometer Gear Housing
B. Grease.

# Final Drive

## Table of Contents


**Exploded View** ..... 10-2
**Specifications** ..... 10-3
**Special Tools** ..... 10-3
**Drive Chain** ..... 10-4
*Drive Chain Slack Inspection* ..... 10-4
*Drive Chain Slack Adjustment* ..... 10-4
*Wheel Alignment Inspection* ..... 10-4
*Wheel Alignment Adjustment* ..... 10-5
*Drive Chain Wear Inspection* ..... 10-5
*Drive Chain Lubrication* ..... 10-6
*Drive Chain Removal* ..... 10-6
*Drive Chain Installation* ..... 10-7
**Sprocket, Coupling** ..... 10-7
*Engine Sprocket Removal* ..... 10-7
*Engine Sprocket Installation* ..... 10-7
*Rear Sprocket, Coupling Removal* ..... 10-7
*Rear Sprocket, Coupling Installation* ..... 10-8
*Sprockets Wear* ..... 10-8
*Sprocket Warp* ..... 10-8
*Coupling Bearing Removal* ..... 10-9
*Coupling Bearing Installation* ..... 10-9
*Coupling Bearing Inspection and Lubrication* ..... 10-9
*Grease Seal Inspection and Lubrication* ..... 10-10
*Damper Inspection* ..... 10-10

## Exploded View




L : Apply a non-permanent locking agent to the threads.
T1: 9.8 N-m (1.0 kg-m, 87 in-lb)
T2: 74 N-m (7.5 kg-m, 54 ft-lb)

## Specifications

| Item | Model | Standard | Service Limit |
|---|---|---|---|
| **Drive Chain:** | | | |
| Make and type | | Enuma Endless | — — — |
| | ZX500 | EK50 KVD-O 104 Link/42T | — — — |
| | ZX600 | EK50 KVD-O 102 Link/39T | |
| Chain slack | | 35 – 40 mm | Less than 35 mm, or more than 45 mm |
| 20-Link length | | 317.5 – 318.4 mm | 323 mm |
| **Sprockets:** | | | |
| Engine sprocket diameter | | 65.58 – 65.78 mm/15T | 64.9 mm |
| Rear sprocket diameter | ZX500 | 202.32 – 202.82 mm/42T | 202.0 mm |
| | ZX600 | 187.02 – 187.52 mm/39T | 186.7 mm |
| Rear sprocket warp | | Under 0.4 mm | 0.5 mm |

## Specjal Tools

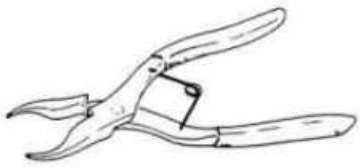
**Bearing Driver Set: 57001-1129**

Use following tools in the set.

**Bearing Driver Holder: 57001-1132**
**Bearing Driver: 57001-1140**
**Bearing Driver: 57001-1146**
**Bearing Driver: 57001-1148**



**Inside Circlip Pliers: 57001-143**



## Drive Chain

The drive chain must be checked, adjusted, and lubricated in accordance with the Periodic Maintenance Chart for safety and to prevent excessive wear. If the chain becomes badly worn or maladjusted – either too loose or too tight – the chain could jump off the sprocket or break.

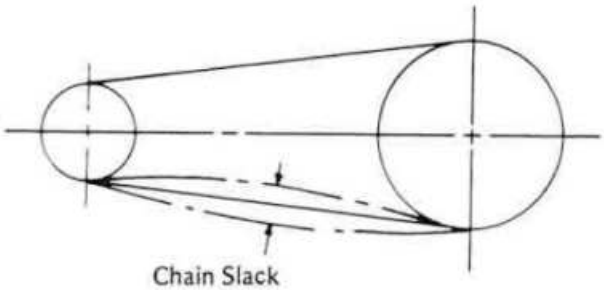
**WARNING**

○**A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.**

### *Drive Chain Slack Inspection*

- Set the motorcycle up on its center stand.
- Check to see if wheel alignment is properly adjusted. The left and right notches on the chain adjuster should point to the same marks or positions on the swing arm. If they do not, adjust wheel alignment as described in the later paragraph–Wheel Alignment Adjustment.
- Turn the rear wheel to find the position where the chain is tightest, and measure the vertical movement midway between the sprockets.
- If the drive chain is too tight or too loose, adjust it so that the chain slack will be within the standard value.

**Chain Slack Inspection**

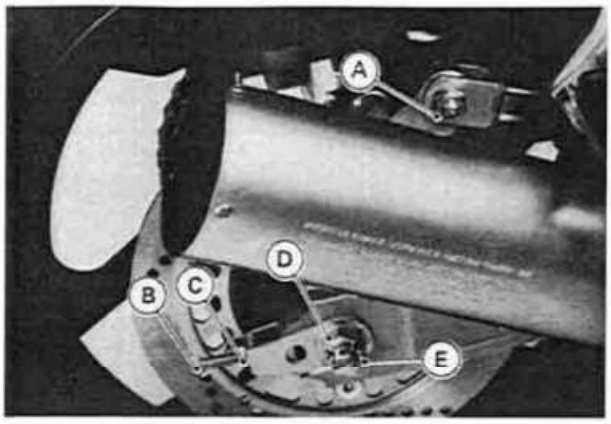


Chain Slack

| Drive Chain Slack | |
|---|---|
| Standard: | 35 ~ 40 mm |
| Too Tight: | Less than 35 mm |
| Too Loose: | More than 45 mm |

### *Drive Chain Slack Adjustment*

- Loosen the torque link nut (rear).
- Loosen the left and right chain adjusting bolt locknuts.




A. Torque Link Nut
B. Chain Adjusting Bolt
C. Locknut
D. Rear Axle Nut
E. Cotter pin

- Remove the axle cotter pin, and loosen the axle nut.
○When the chain is too tight, back out both the chain adjusting bolts evenly, and push the wheel forward until the chain is too loose.
○When the chain is too loose, turn in both the chain adjusting bolts evenly. To keep the chain and wheel aligned, the notch on the left chain adjuster should align with the same swing arm mark that the right chain adjuster notch aligns with.

**WARNING**

○**Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.**

- Tighten the axle nut loosely, and tighten both chain adjusting bolts (but not enough to change the adjustment), and then tighten both locknuts securely.
- Tighten the axle nut and torque link nut to the specified torque (see Exploded View).
- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin through the axle nut and axle, and spread its ends.

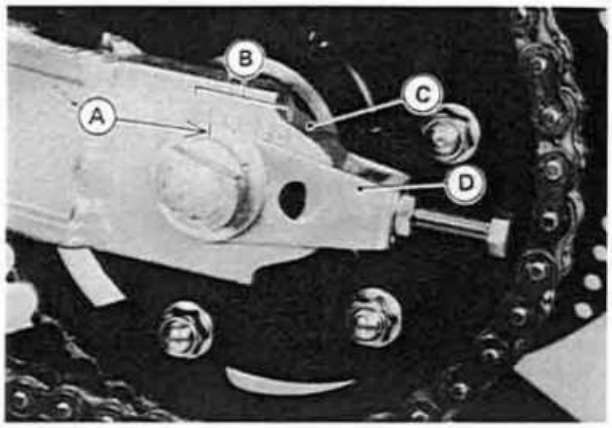
**WARNING**

○**If the axle and torque link nuts are not securely tightened and the cotter pin is not installed, an unsafe riding condition may result.**

- Check the rear brake (see the Brakes section).

### *Wheel Alignment Inspection*

- Set the motorcycle up on its center stand.
- Check to see if wheel alignment is properly adjusted. The left and right notches on the chain adjuster should point to the same marks or positions on the swing arm.
★If they do not, adjust the wheel alignment.




A. Notch
B. Marks
C. Swing Arm
D. Chain Adjuster

**NOTE**

○*Wheel alignment can also be checked using the straight-edge or string method.*

**WARNING**

○**Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.**

### *Wheel Alignment Adjustment*

- Loosen the torque link nut.
- Loosen the left and right chain adjusting bolt locknuts.
- Remove the axle cotter pin, and loosen the axle nut.
- Turn the chain adjusting bolts so that their notches point to the same marks or positions on the swing arm on both sides.
- Inspect the chain slack.
- Tighten the axle nut loosely, and tighten both chain adjusting bolts (but not enough to change the adjustment), and then tighten both locknuts securely.
- Tighten the axle nut and torque link nut to the specified torque (see Exploded View).
- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin through the axle nut and axle, and spread its ends.

**WARNING**

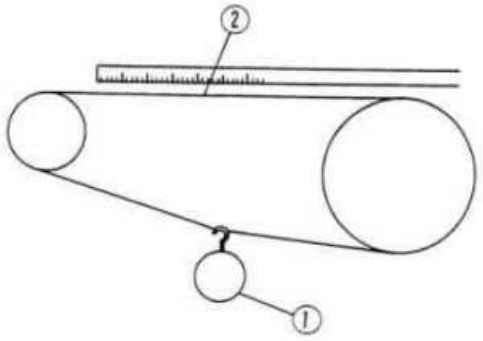
○**If the axle or torque link nuts are not securely tightened or the cotter pin is not installed, an unsafe riding condition may result.**

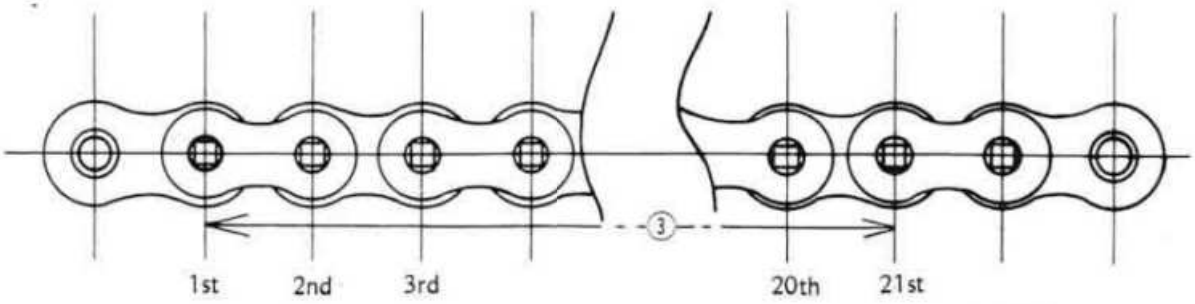
- Check the rear brake (see the Brakes section).

### *Drive Chain Wear Inspection*

- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- Also inspect the sprockets for unevenly or excessively worn teeth, and damaged teeth.
- ★If there is any irregularity, replace the drive chain and both sprockets.
- Stretch the chain taut hanging a 98 N (10 kg, 20 lb) weight on the chain.
- Measure the length of 20 links on the straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

**Chain Length**




1. Weight
2. Measure length here
3. 20 link length

| Drive Chain 20-Link Length | |
|---|---|
| Standard: | 317.5 ~ 318.4 mm |
| Service Limit: | 323 mm |

*If any measurement exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

**WARNING**

**○For safety, use only the standard chain. It is an endless type and should not be cut for installation.**

### *Drive Chain Lubrication*

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication.

If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

- If the chain appears especially dirty, it should be cleaned before lubrication.

**CAUTION**

**○The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.**

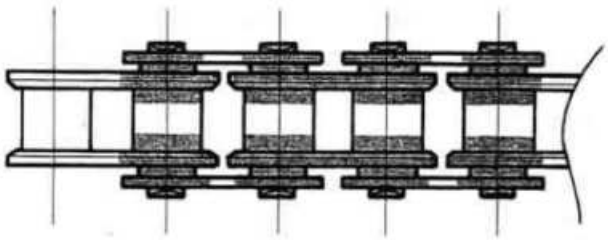
**○Use only kerosene or diesel oil for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.**

**○Immediately blow the chain dry with compressed air after cleaning.**

**○Complete cleaning and drying the chain within 10 minutes.**

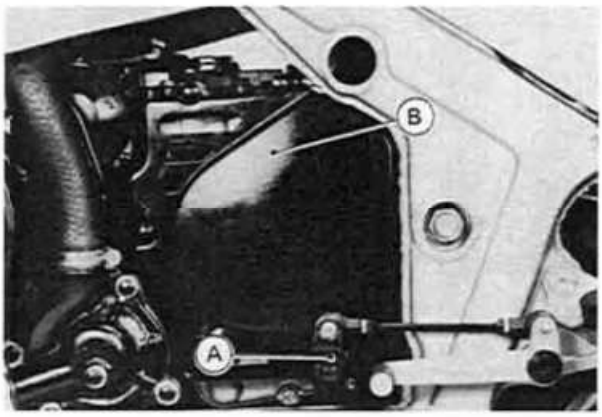
- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.

**Drive Chain Lubrication**



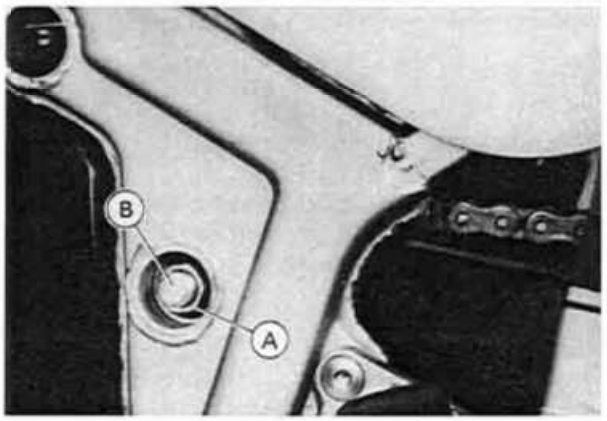
### *Drive Chain Removal*

- Remove the shift lever bolt and pull off the lever.
- Remove the bolts and take off the engine sprocket cover.



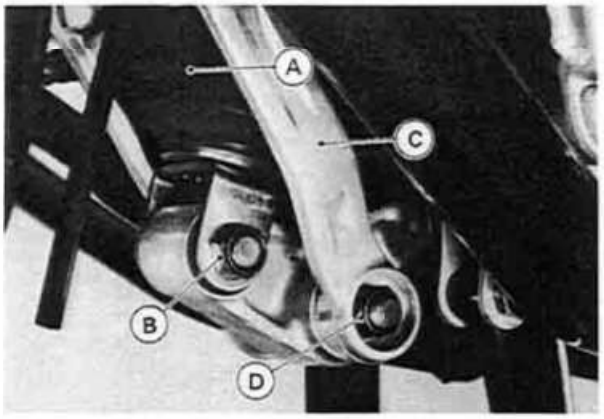

A. Shift Lever B. Engine Sprocket Cover

- Remove the rear wheel (see Rear Wheel Removal in Wheels/Tires chapter).
- Remove the swing arm pivot nut. Do not remove the pivot shaft.




A. Pivot Nut B. Pivot Shaft

- Remove the lower shock absorber nut. Do not remove the bolt.




A. Rear Shock Absorber C. Tie Rod
B. Nut D. Nut

- Remove the Uni-trak tie rod lower nut. Do not remove the bolt.
- Remove the tie rod bolt, shock absorber bolt, and swing arm pivot shaft while supporting the swing arm.
- Pull the swing arm toward the rear.
- Take the drive chain off the engine sprocket and then pull off the chain from the swing arm.

**CAUTION**

**Take care not to damage the brake hose. Damage to the brake line greatly reduces brake line strength and increases the chance of brake fluid leakage, resulting in the loss of brake control.**

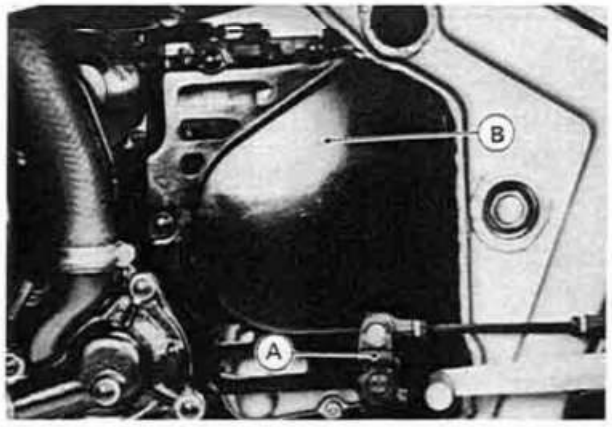
*Drive Chain Installation*

- Installation is the reverse of removal.
- When installing the drive chain, be careful of the following items.
  - Adjust the drive chain after installation.
  - Tighten the swing arm pivot nut to the specified torque (see Exploded View in Frame chapter).
  - Tighten the lower shock absorber nut to the specified torque (see Exploded View in Suspension chapter).
  - Tighten the Uni-trak tie rod lower nut to the specified torque (see Exploded View in Suspension chapter).
  - Tighten the torque link nut to the specified torque (see Exploded View in Brakes chapter).
  - Install the shift lever at the correct position (see Left Footpeg and Bracket Installation in Frame chapter).

## Sprocket, Coupling

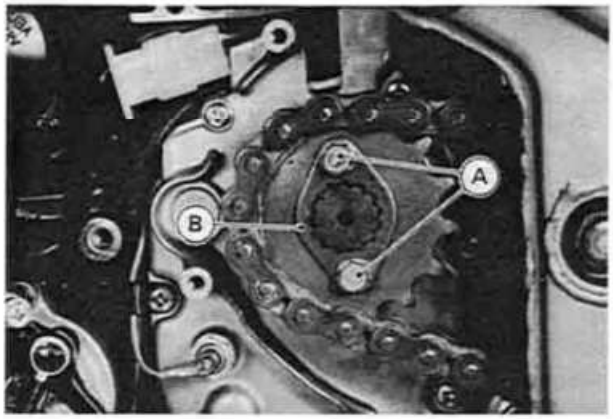
*Engine Sprocket Removal*

- Remove the shift lever bolt and pull off the lever.
- Remove the bolts and take off the engine sprocket cover.




A. Shift Lever B. Engine Sprocket Cover

- Loosen the engine sprocket bolts while applying the rear brake.
- Remove the bolts, holding plate, and pull the engine sprocket off the output shaft with the drive chain, and then separate them.




A. Bolts B. Holding Plate

*Engine Sprocket Installation*

- Installation is the reverse of removal. Note the following.
  - Engage the sprocket with the chain so the recess or "IN" mark faces inwards.
  - Tighten the engine sprocket bolts to the specified torque (see Exploded View).
  - Install the shift lever at the correct position (see Left Footpeg and Bracket Installation in Frame chapter).

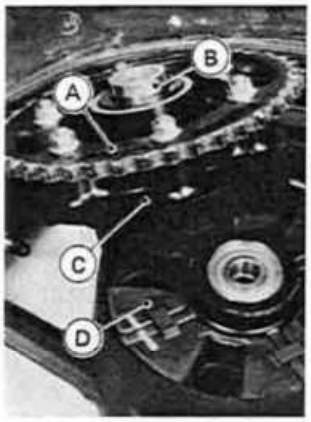
*Rear Sprocket, Coupling Removal*

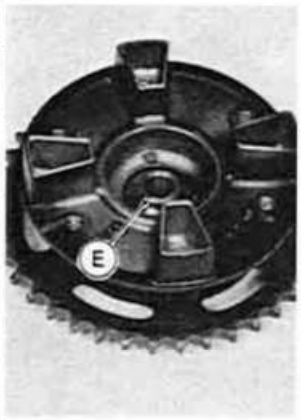
- Remove the rear wheel (see Rear Wheel Removal in Wheels/Tires chapter).

**CAUTION**

**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

- Remove the coupling with the rear sprocket from the wheel.



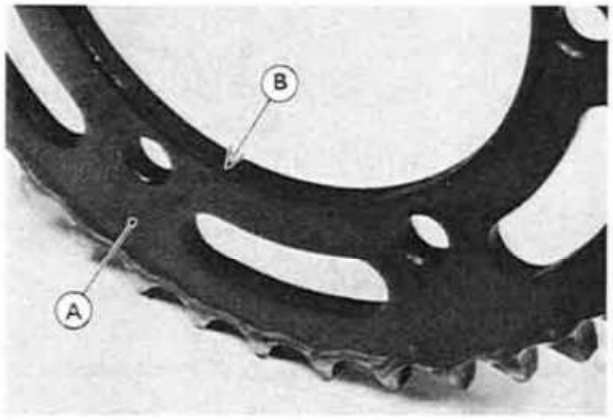

A. Rear Sprocket
B. Coupling Collar
C. Coupling
D. Rubber Damper
E. Coupling Sleeve

- Pull out the coupling collar from the left, and the coupling sleeve from the right.
- Install the rubber damper and wheel coupling temporarily on the rear hub to aid in rear sprocket removal.
- Remove the rear sprocket nuts (6) to separate the rear sprocket and wheel coupling.
- Remove the rear sprocket and remove the coupling from the rear wheel.

### *Rear Sprocket, Coupling Installation*

- Installation is the reverse of removal. Note the following.

○Install the rear sprocket with the chamfered side facing to toward the hub. Tighten the sprocket nuts to the specified torque. (see Exploded View).

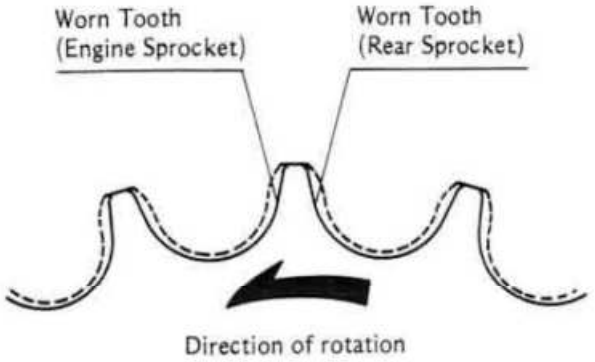



A. Rear Sprocket
B. Chamfered Side

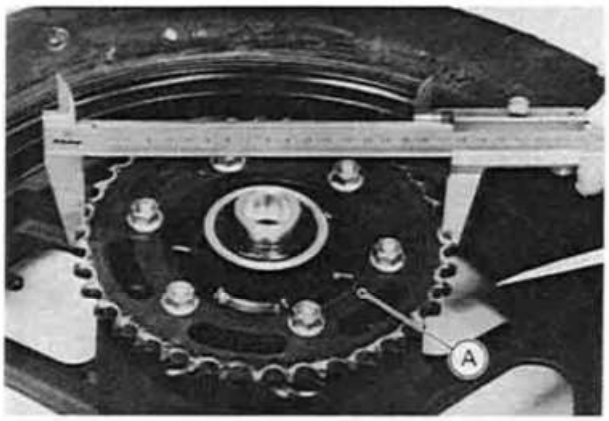
### *Sprockets Wear*

Visually inspect the sprocket teeth. If they are worn as illustrated, replace the sprocket.

**Sprocket Teeth**




Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.




A. Rear Sprocket

| Sprocket Diameter | | | |
|---|---|---|---|
| Engine Sprocket | | | |
| Standard | | | 65.58 ~ 65.78 mm |
| Service Limit | | | 64.9 mm |
| Rear Sprocket | | | |
| ZX600 | 39T | Standard | 187.02 ~ 187.52 mm |
| | | Service Limit | 186.7 mm |
| ZX500 | 42T | Standard | 202.32 ~ 202.82 mm |
| | | Service Limit | 202.0 mm |

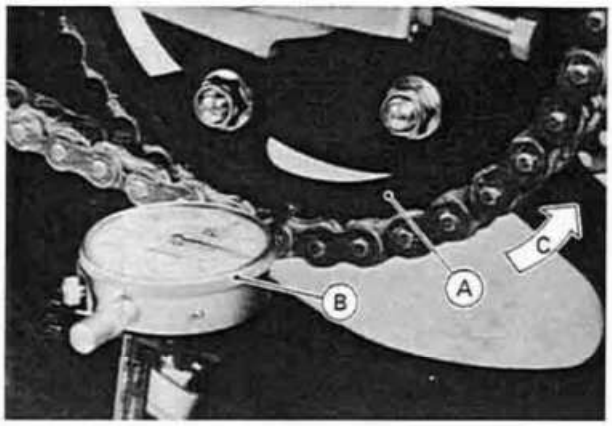
**NOTE**

○*If a sprocket requires replacement, the chain is probably worn also. Upon replacing a sprocket, inspect the chain.*

### *Sprocket Warp*

Elevate the rear wheel so that it will turn freely, and set a dial gauge against the rear sprocket near the teeth as shown. Rotate the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

If the runout exceeds the service limit, replace the rear sprocket.

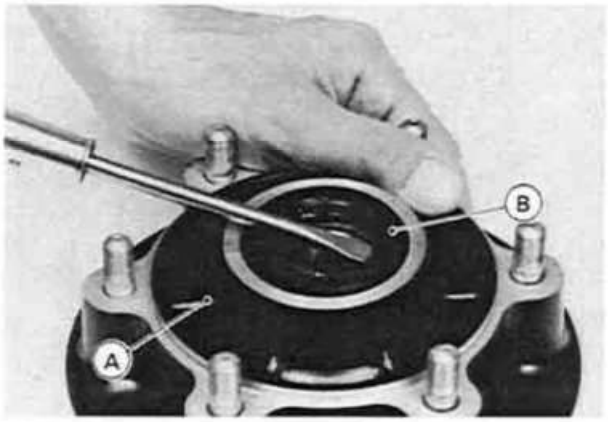



A. Rear Sprocket B. Dial Gauge C. Turn.

| Rear Sprocket Warp | |
|---|---|
| Standard | Under 0.4 mm |
| Service Limit | 0.5 mm |

*Coupling Bearing Removal*

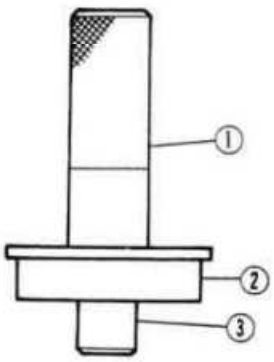
•Using a hook, pull out the grease seal and remove the circlip.




A. Wheel Coupling B. Grease Seal

•Using the bearing driver and driver holder (special tools) or some other suitable tool, remove the bearing by tapping from the wheel side.





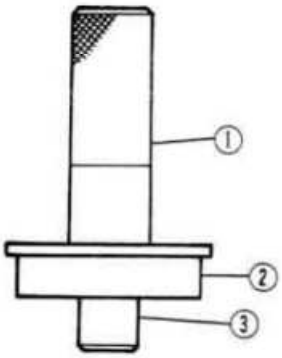

1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 57001-1146
3. Bearing Driver: 57001-1140

*Coupling Bearing Installation*

•Installation is the reverse of removal. Note the following.

○Inspect the bearing, and replace it if necessary (see Coupling Bearing Inspection). Lubricate it, and then install it using the wheel bearing driver and the bearing driver holder (special tools).






1. Bearing Driver Holder: 57001-1132
2. Bearing Driver: 57001-1148
3. Bearing Driver: 57001-1140

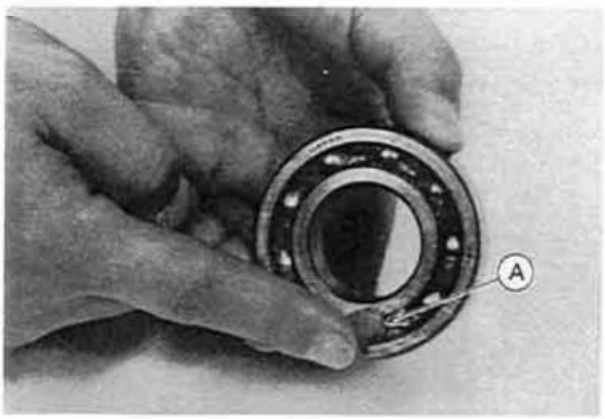
*Coupling Bearing Inspection and Lubrication*

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.

•Wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.

★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

•If the bearing is to be used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation. Clean and grease the coupling bearings in accordance with the Periodic Maintenance Chart.




A. Grease.

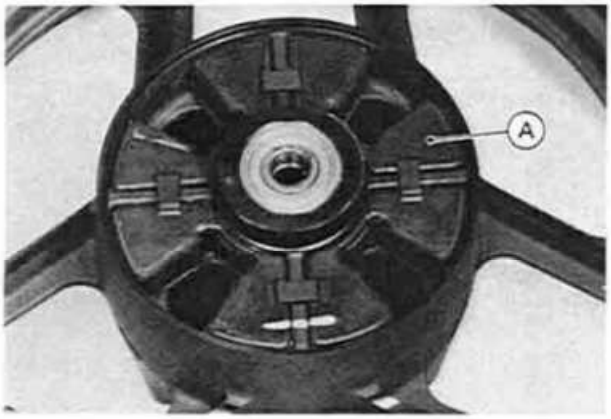
### *Grease Seal Inspection and Lubrication*

If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

### *Damper Inspection*

Remove the rear wheel coupling, and inspect the rubber damper.

Replace the damper if it appears damaged or deteriorated.



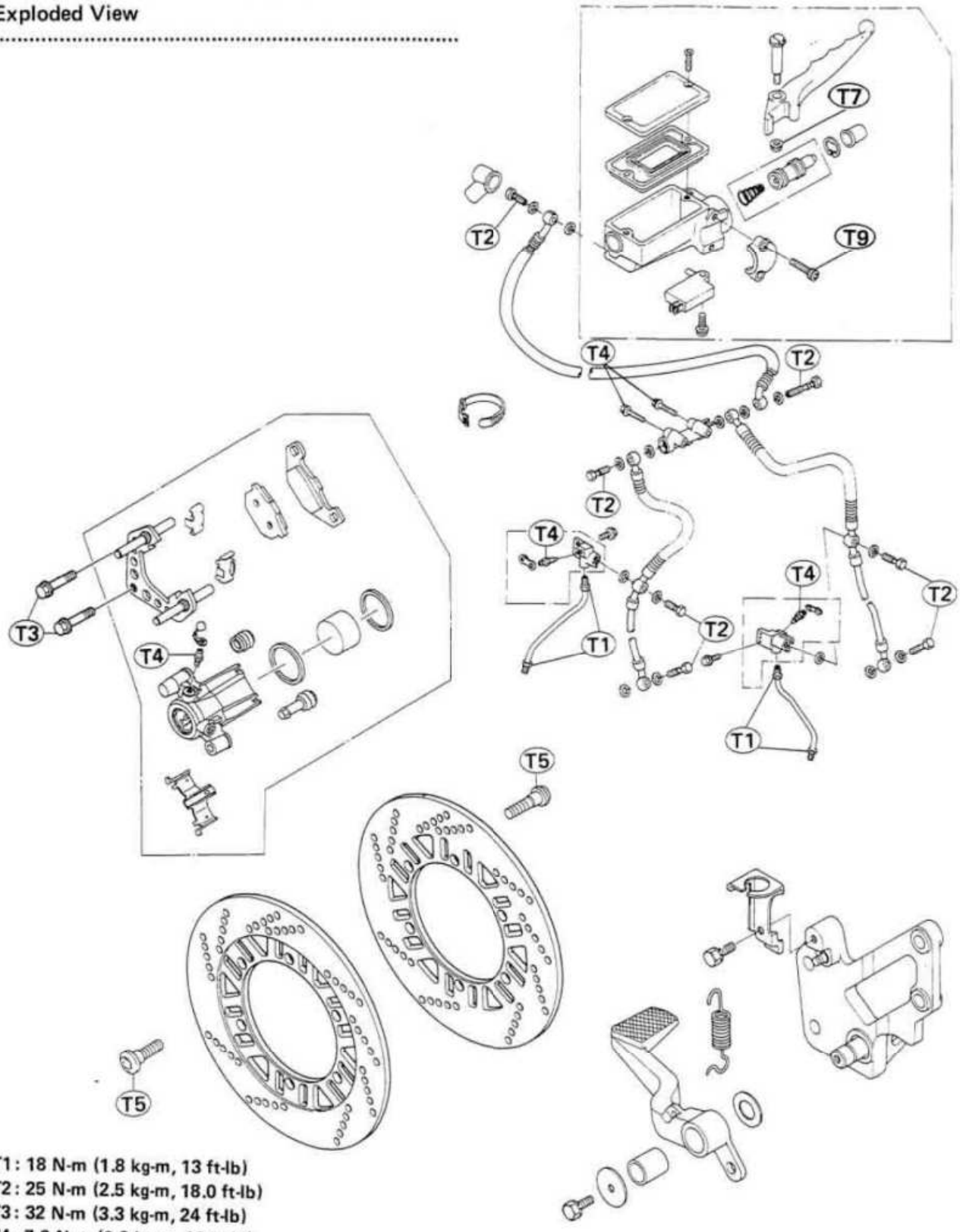

A. Rubber Damper

# Brakes

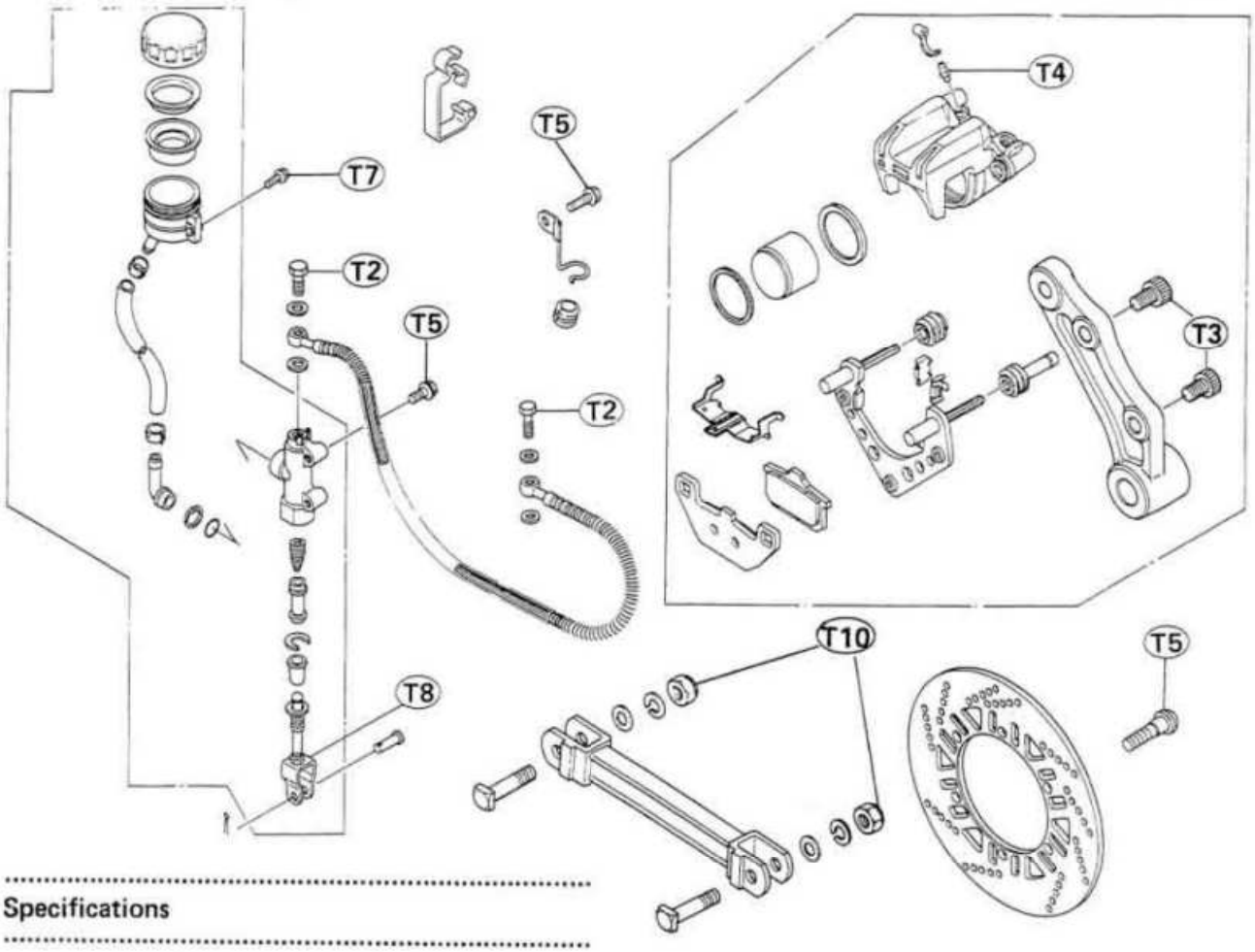
## Table of Contents


Exploded View ..... 11-2
Specifications ..... 11-3
Special Tool ..... 11-3
Brake Adjustment ..... 11-4
  Front Brake: ..... 11-4
  Rear Brake: ..... 11-4
    *Brake Pedal Position Inspection* ..... 11-4
    *Brake Pedal Position Adjustment* ..... 11-4
Calipers ..... 11-5
    *Front Caliper Removal* ..... 11-5
    *Rear Caliper Removal* ..... 11-5
    *Caliper Installation Notes* ..... 11-5
    *Caliper Disassembly Notes* ..... 11-5
    *Caliper Assembly Notes* ..... 11-5
    *Fluid Seal Damage* ..... 11-6
    *Dust Seal and Cover Damage* ..... 11-6
    *Piston Cylinder Damage* ..... 11-6
    *Caliper Holder Shaft Wear* ..... 11-6
Brake Pads ..... 11-6
    *Pad Removal* ..... 11-6
    *Pad Installation Note* ..... 11-7
    *Lining Wear* ..... 11-7
Master Cylinders ..... 11-7
    *Front Master Cylinder Removal* ..... 11-7
    *Front Master Cylinder Installation Notes* ..... 11-7
    *Rear Master Cylinder Removal* ..... 11-7
    *Rear Master Cylinder Installation Notes* ..... 11-8
    *Inspection and Adjustment after Installation* ..... 11-8
    *Front Master Cylinder Disassembly Notes* ..... 11-8
    *Front Master Cylinder Assembly Notes* ..... 11-9
    *Rear Master Cylinder Disassembly Notes* ..... 11-9
    *Rear Master Cylinder Assembly Notes* ..... 11-9
    *Master Cylinder Inspection (Visual Inspection)* ..... 11-9
    *Reservoir Removal Notes* ..... 11-10
    *Reservoir Installation Notes* ..... 11-10
Discs ..... 11-10
    *Disc Wear* ..... 11-11
    *Disc Cleaning* ..... 11-11
    *Disc Warp* ..... 11-11
Brake Fluid ..... 11-11
    *Fluid Level Inspection* ..... 11-11
    *Brake Fluid Change* ..... 11-11
      Brake Fluid Requirement: ..... 11-12
      Changing Brake Fluid: ..... 11-12
    *Bleeding the Brake Line* ..... 11-12
      Bleeding the rear brake line: ..... 11-12
      Bleeding the front brake line: ..... 11-12
Brake Hoses ..... 11-13
  *Brake Hose Inspection* ..... 11-13
  *Brake Hose Replacement* ..... 11-14

## Exploded View




T1 : 18 N-m (1.8 kg-m, 13 ft-lb)
T2 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T3 : 32 N-m (3.3 kg-m, 24 ft-lb)
T4 : 7.8 N-m (0.8 kg-m, 69 in-lb)
T5 : 23 N-m (2.3 kg-m, 16.5 ft-lb)
T6 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T7 : 5.9 N-m (0.6 kg-m, 52 in-lb)
T8 : 18 N-m (1.8 kg-m, 13 ft-lb)
T9 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T10 : 34 N-m (3.5 kg-m, 25 ft-lb)




## Specifications

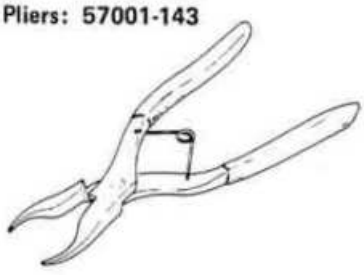
| Item | | Standard | Service Limit |
|---|---|---|---|
| **Brakes:** | | | |
| Pad lining thickness: | Front and Rear | 5 mm | 1 mm |
| Brake fluid grade | | D.O.T.3 | — — — |
| Brake pedal position | | About 40 mm | — — — |
| Disc runout: | Front | Under 0.15 mm | 0.3 mm |
| | Rear | Under 0.15 mm | 0.3 mm |
| Disc thickness | Front | 4.8 – 5.1 mm | 4.5 mm |
| | Rear | 5.8 – 6.1 mm | 5.5 mm |

**Recommended Disc Brake Fluid**

| Type | Brand |
|---|---|
| D.O.T.3 | Atlas Extra Heavy Duty<br>Shell Super Heavy Duty<br>Texaco Super Heavy Duty<br>Wagner Lockheed Heavy Duty<br>Castrol Girling-Universal<br>Castrol GT (LMA)<br>Castrol Disc Brake Fluid |

## Special Tool

**Inside Circlip Pliers: 57001-143**



## Brake Adjustment

### Front Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (see Bleeding the Brake).

**NOTE**

○*Check the brake fluid level in accordance with the Periodic Maintenance Chart.*

### Rear Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However, the brake pedal position may occasionally require adjustment due to wear of the pedal pivot, or in case of disassembly. If the brake pedal has a soft, or "spongy feeling", check the brake fluid level in the reservoir and bleed the air from the brake line (see Bleeding the Brake).

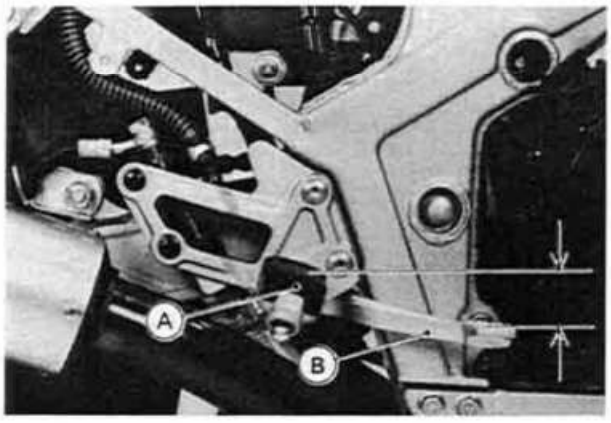
**NOTE**

○*Check the brake fluid level in accordance with the Periodic Maintenance Chart.*

*Brake Pedal Position Inspection*

●When the brake pedal is in its rest position, it should be at the position specified.

| Pedal Position | |
|---|---|
| Standard | About 40 mm below top of footpeg |

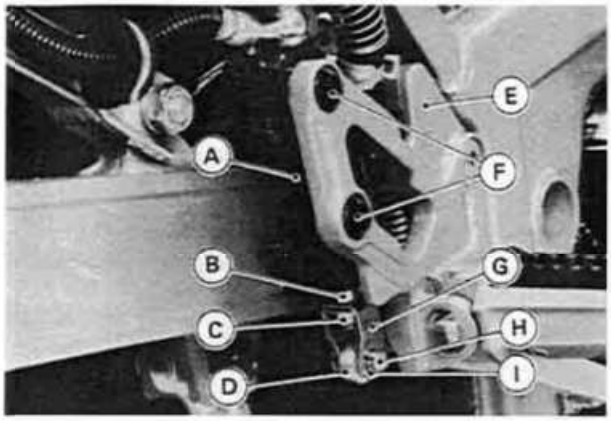



A. Footpeg B. Brake Pedal

●If it is not, adjust the brake pedal position as follows.

*Brake Pedal Position Adjustment*

●Loosen the master cylinder locknut.



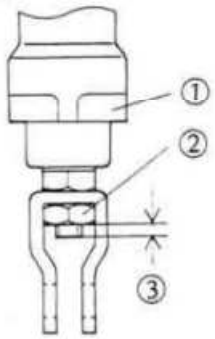

A. Master Cylinder
B. Locknut
C. Adjusting Nut
D. Brake Pedal End
E. Footpeg Bracket
F. Mounting Bolts
G. Clevis
H. Joint Pin
I. Cotter Pin

●Pull out the cotter pin and the joint pin.
●Remove the master cylinder by taking off the mounting bolts.
●Up or down the adjusting nut by turning the clevis to adjust the brake pedal position.
●After the adjustment is made, install the master cylinder to the footpeg bracket.
●Install the removed parts, and tighten the master cylinder locknut and mounting bolts to the specified torque (see Exploded View).

**NOTE**

○*If the pedal position cannot be adjusted by turning the clevis, the brake pedal may be deformed or incorrectly installed.*
○*If the brake rod protrusion is 3.5 ~ 5.5 mm below the nut, the pedal position will be within the standard range (about 40 mm).*

**Brake Rod Protrusion**




1. Master Cylinder
2. Adjusting Nut
3. Rod Protrusion

●Check the brake pedal position, and readjust it if necessary.

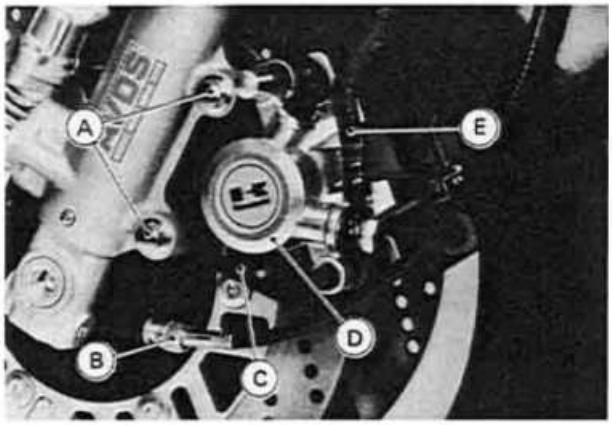
## Calipers

### *Front Caliper Removal*

- Put the motorcycle on its center stand.
- Remove the caliper mounting bolts and take off the caliper.
- Disconnect the brake hose from the caliper.

**NOTE**

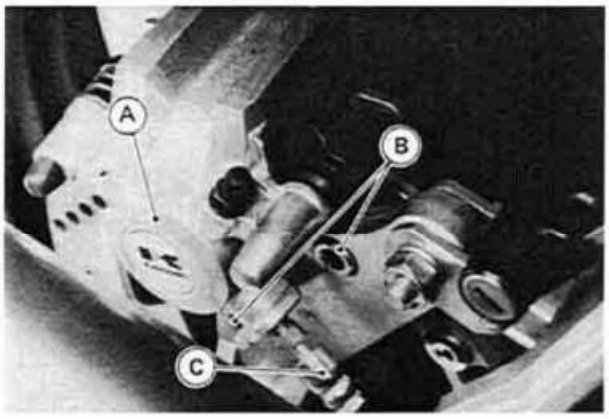
○*Disconnect the speedometer cable lower end before left caliper removal.*




A. Caliper Mounting Bolts
B. Cable Lower End
C. Caliper Holder
D. Caliper
E. Brake Hose

### *Rear Caliper Removal*

- Remove the caliper mounting bolts and take off the caliper.
- Disconnect the brake hose from the caliper.




A. Caliper
B. Caliper Mounting Bolts
C. Brake Hose

★If the front or rear caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.

○Remove the pads.

○Pump the brake lever or pedal to remove the caliper piston.

○Immediately wipe up any brake fluid that spills.

### *Caliper Installation Notes*

- Tighten the caliper mounting bolts to the specified torque (see Exploded View).
- Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View).
- Check the fluid level in the master cylinder (reservoir), and bleed the brake line (see Bleeding the Brake).
- Check the brake for weak braking power, brake drag, and fluid leakage.

### *Caliper Disassembly Notes*

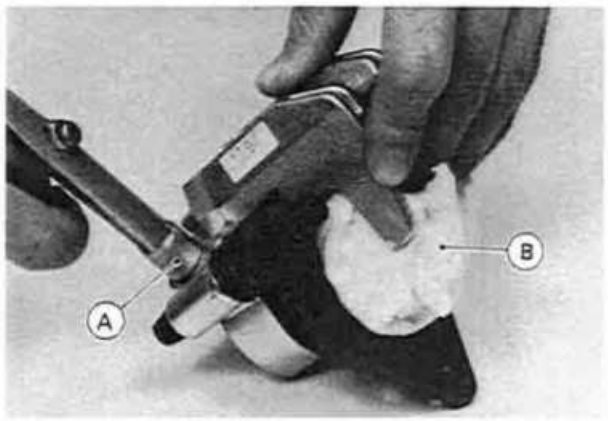
- Using compressed air, remove the piston.

○Cover the caliper opening with a clean, heavy cloth.

○Remove the piston by lightly applying compressed air to where the brake line fits into the caliper.

**WARNING**

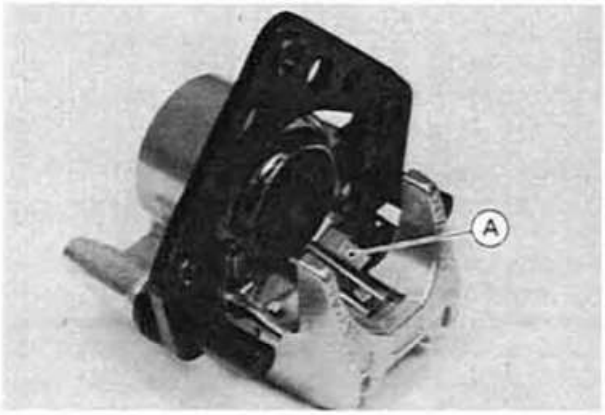
○**To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.**




A. Apply compressed air. B. Cloth

### *Caliper Assembly Notes*

- Apply brake fluid to the outside of the piston and the fluid seal, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistant grease).
- Install the anti-rattle spring in the calipers as shown.

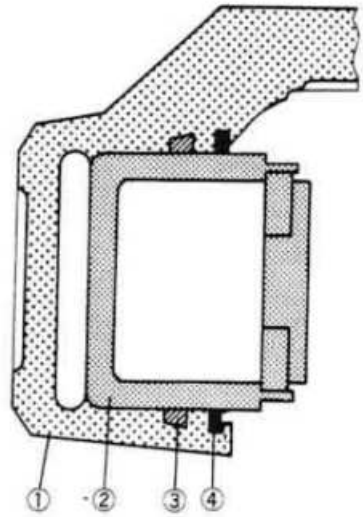



A. Anti-rattle spring

*Fluid Seal Damage*

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

**Caliper**




1. Caliper
2. Piston
3. Fluid Seal
4. Dust Seal

Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

*Dust Seal and Cover Damage*

- Check that the dust seals and covers are not cracked, worn, swollen, or otherwise damaged.
- ★If they show any damage, replace them.

*Piston Cylinder Damage*

- Visually inspect the piston and cylinder surfaces.
- ★Replace the cylinder and piston if they are badly scored or rusty.

*Caliper Holder Shaft Wear*

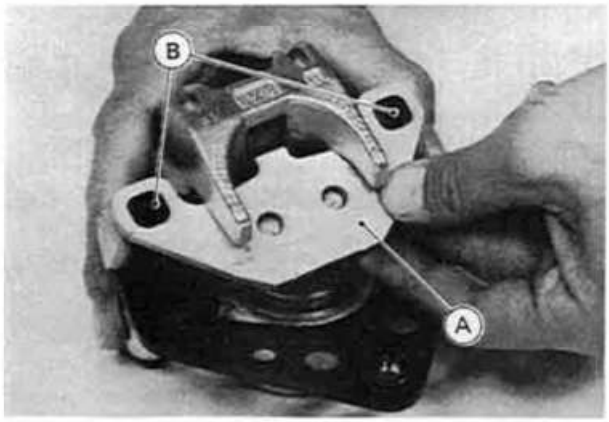
The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, or the rubber friction boots are not damaged.
- ★If the rubber friction boots are damaged, replace the rubber friction boots, and the caliper holder.

## Brake Pads

*Pad Removal*

- Remove the caliper (see Front or Rear Caliper Removal).
- Take the piston-side pad out of the caliper holder.
- Push the caliper holder toward the piston, and then remove the pad from the caliper holder shaft.




A. Pad B. Caliper Holder

*Pad Installation Note*

•Push the caliper piston in by hand as far as it will go.

**WARNING**

**○Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brake will not function on the first application of the lever or pedal if this is not done.**

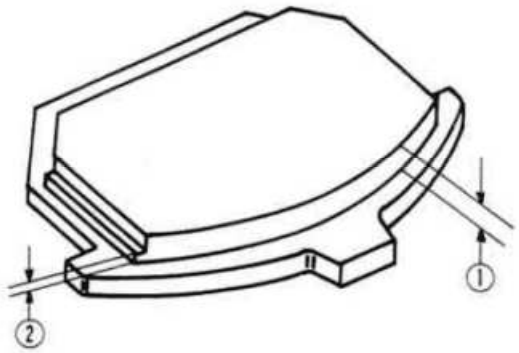
*Lining Wear*

In accordance with the Periodic Maintenance Chart, inspect the front and rear brakes for wear.

•Check the lining thickness of the pads in each caliper.

★If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

**Brake Pad**



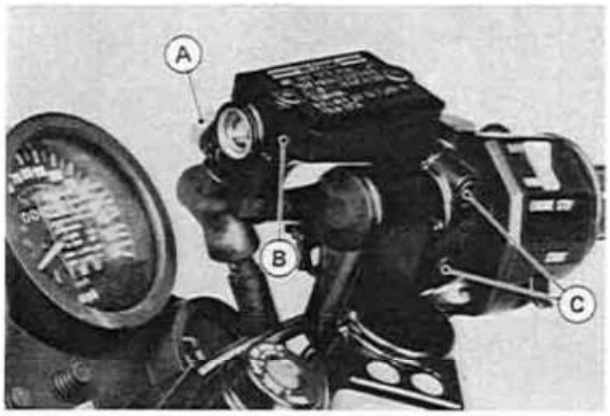

1. Lining Thickness
2. Service Limit

| Pad Lining Thickness | |
|---|---|
| Standard | 5 mm |
| Service Limit | 1 mm |

## Master Cylinders

*Front Master Cylinder Removal*

•Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.




A. Banjo Bolt
B. Master Cylinder
C. Clamp Bolts

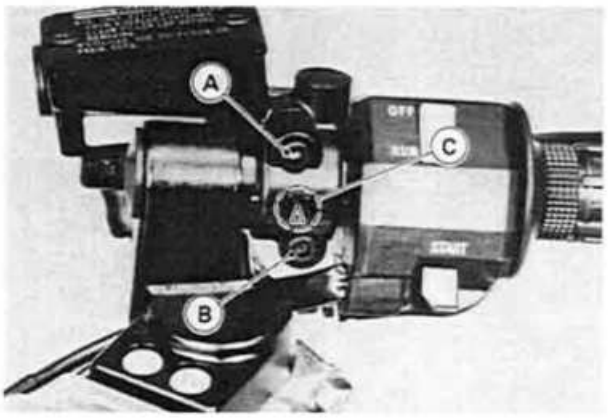
•Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.

*Front Master Cylinder Installation Notes*

•Master Cylinder Clamp Installation:

○The master cylinder clamp must be installed with the arrow mark upward.

○Torque the upper clamp bolt first, and then the lower clamp bolt to the specification (see Exploded View). There will be a gap at the lower part of the clamp after tightening.

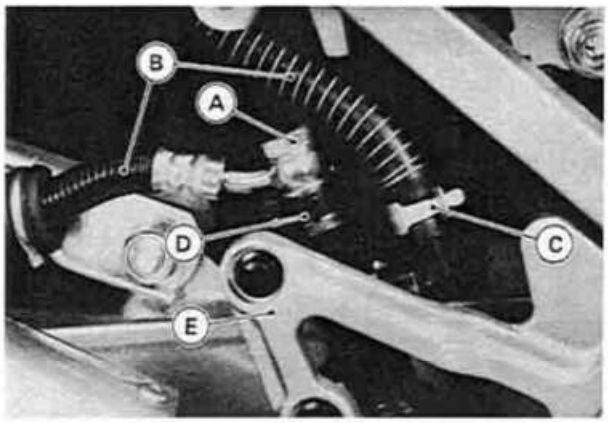



A. Tighten upper clamp bolt first.
B. Lower Clamp Bolt
C. Arrow Mark

•Use a new flat washer on each side of the brake hose fitting, and tigten the banjo bolts to the specified torque (see Exploded View).

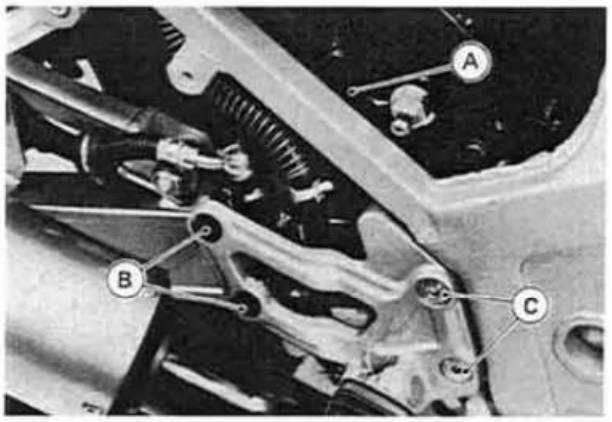
*Rear Master Cylinder Removal*

•Slide the brake hose clamp out of place. Disconnect the brake hose from the master cylinder, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum. Immediately wipe up any brake fluid that spills.



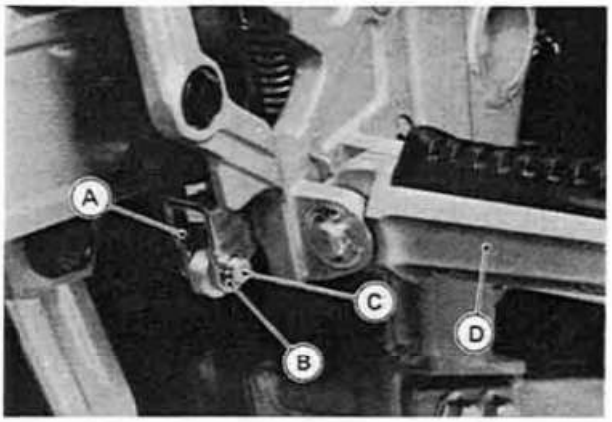

A. Banjo Bolts
B. Brake Hoses
C. Clamp
D. Master Cylinder
E. Footpeg Bracket

•Remove the banjo bolt to disconnect the brake hose from the master cylinder, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum. There is a flat washer on each side of the hose fitting.
•Disconnect the rear brake light switch lead connector, and loosen the master cylinder mounting bolt, and then remove the footpeg bracket bolts and take off the bracket with the master cylinder.




A. Rear Brake Light Switch
B. Mounting Bolts (Loosen)
C. Footpeg Bracket Bolts

•Remove the cotter pin and then pull the pin out of the push rod clevis and brake pedal.




A. Clevis
B. Cotter Pin
C. Pin
D. Pedal

•Remove the master cylinder mounting bolts and take the master cylinder off the footpeg bracket.

### *Rear Master Cylinder Installation Notes*

•Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View). Be sure that the metal pipe is properly fitted into the U-shaped notch in the master cylinder.
•Tighten the rear master cylinder mounting bolts (2) to the specified torque (see Exploded View) after installing the footpeg bracket.
•Check and adjust the following items.
○Brake pedal position (see Rear Brake Pedal Position Inspection).
○Rear brake light switch (see Rear Brake Light Switch Adjustment in Electrical System chapter).

### *Inspection and Adjustment after Installation*

•Bleed the brake line after master cylinder installation.
•Check the brake for weak braking power, brake drag, and fluid leakage.

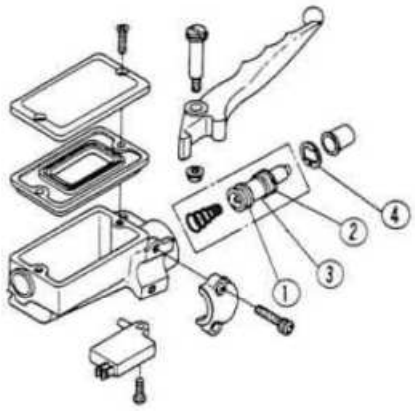
### *Front Master Cylinder Disassembly Notes*

•Remove the front master cylinder from the handlebar.
•Remove the reservoir cap and diaphragm, and empty out the brake fluid.
•Remove the locknut and pivot bolt, and remove the brake lever.
•Slide the dust cover out of place.
•Remove the retainer with circlip pliers and pull out the piston with the secondary cup, and take off the primary cup and spring.

**CAUTION**

○*Do not remove the secondary cup from the piston since removal will damage it.*

**Front Master Cylinder**



1. Primary Cup
2. Secondary Cup
3. Piston
4. Retainer

*Front Master Cylinder Assembly Notes*

•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

**CAUTION**

○**Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

•Apply brake fluid to the parts removed and to the inner wall of the cylinder.

•Tighten the brake lever pivot bolt and tighten the locknut to the specified torque (see Exploded View).

*Rear Master Cylinder Disassembly Notes*

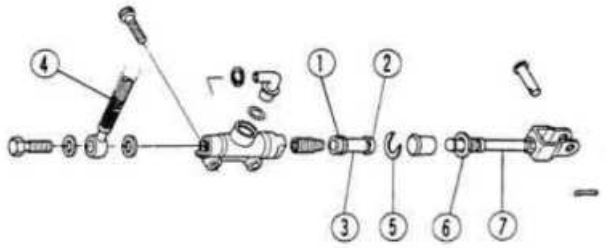
•Remove the rear master cylinder from the right footpeg bracket.

•Remove the retainer with circlip pliers, and pull out the piston stop and push rod, as a set. Then remove the piston and secondary cup, and the spring and primary cup.

**CAUTION**

○*Do not remove the secondary cup from the piston since removal will damage it.*

**Rear Master Cylinder**



1. Primary Cup
2. Secondary Cup
3. Piston
4. Brake Hose
5. Retainer
6. Piston Stop
7. Push Rod

•Remove the retainer with circlip pliers and pull out the brake hose connector and O-ring from the master cylinder.

*Rear Master Cylinder Assembly Notes*

•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

**CAUTION**

○**Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

•Apply brake fluid to the parts removed and to the inner wall of the cylinder.

•Take care not to scratch the piston or the inner wall of the cylinder.

*Master Cylinder Inspection (Visual Inspection)*

•Disassemble the front and rear master cylinders.

•Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.

★If the master cylinder or piston shows any damage, replace them.

•Inspect the primary cups and secondary cups.

★If a cup is worn, damaged, softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cup.

•Check the dust covers for damage.

★If they are damaged, replace them.

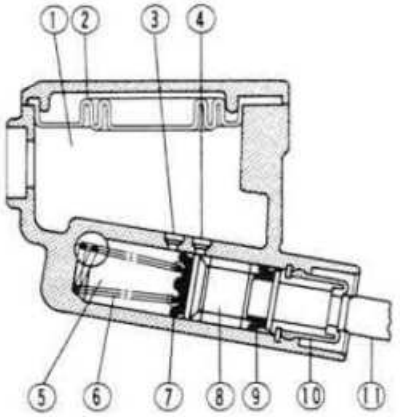
•Check that the relief and supply ports are not plugged.

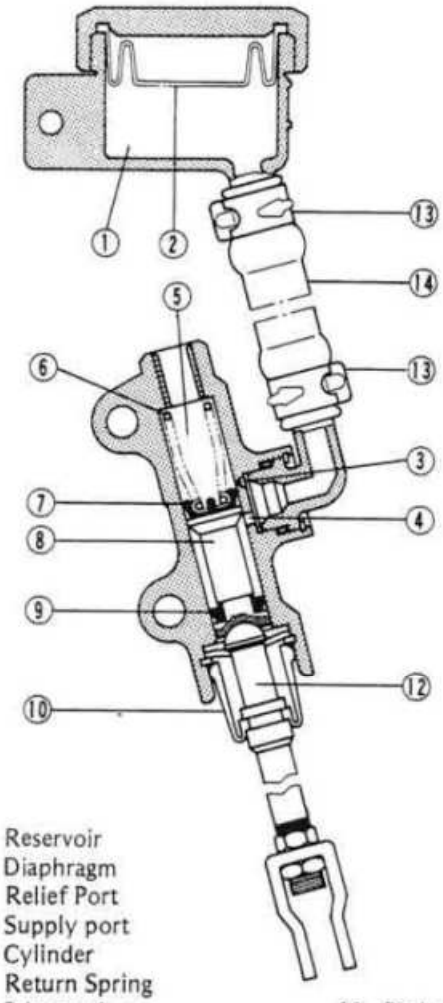
★If the small relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

●Check the piston return springs for any damage.

★If the spring is damaged, replace it.

**Front and Rear Master Cylinder**

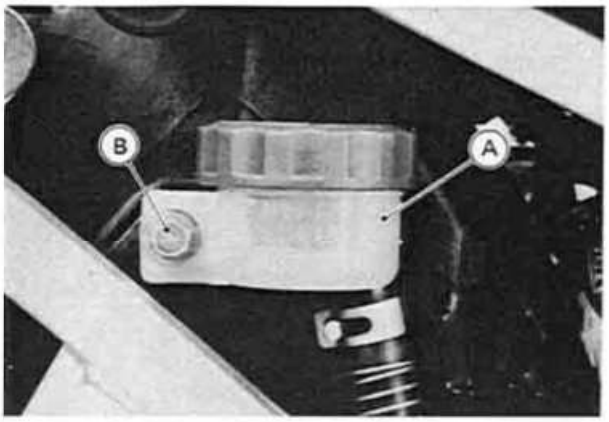




1. Reservoir
2. Diaphragm
3. Relief Port
4. Supply port
5. Cylinder
6. Return Spring
7. Primary Cup
8. Piston
9. Secondary Cup
10. Dust Cover
11. Brake lever
12. Push Rod
13. Clamp
14. Hose

*Reservoir Removal Notes*

●Remove the rear brake reservoir mounting bolt, and take the reservoir off the frame.




A. Reservoir B. Mounting Bolt

●Take off the reservoir cap and diaphragm, and empty the brake fluid into a suitable container.

●Slide the hose clamps, and pull the brake hose off the reservoir. Immediately wip up any brake fluid that spills.

*Reservoir Installation Notes*

●Install the clamps for the brake hose ends.

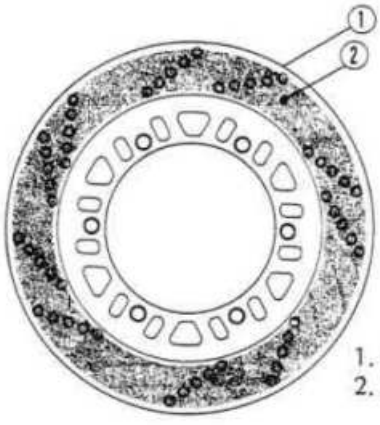
●Fill the reservoir with fresh brake fluid, and bleed the brake line (see Bleeding the Brake).

## Discs

*Disc Wear*

Measure the thickness of each disc at the point where it has worn the most. Replace the disc if it has worn past the service limit.

**Disc Thickness**



1. Brake Disc
2. Measuring Area

| Front Disc Thickness | |
|---|---|
| Standard | 4.8 ~ 5.1 mm |
| Service Limit | 4.5 mm |
| Rear Disc Thickness | |
| Standard | 5.8 ~ 6.1 mm |
| Service Limit | 5.5 mm |

### *Disc Cleaning*

Poor braking can be caused by oil on the disc. Oil on the disc must be cleaned off with an oil-less cleaning fluid such as trichloroethylene or acetone.

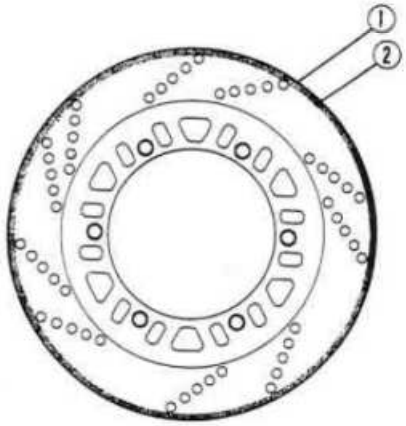
**WARNING**

**○These cleaning fluid are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.**

### *Disc Warp*

Jack up the motorcycle so that the front wheel is off the ground, and turn the handlebar fully to one side. Set up a dial gauge against the front disc, and measure disc runout. Remove the jack, set the motorcycle up on its center stand, and then measure the rear disc runout. If runout exceeds the service limit, replace the disc.

**Disc Runout**




1. Brake Disc
2. Measuring Area

| Disc Runout | |
|---|---|
| Standard | Under 0.15 mm |
| Service Limit | 0.3 mm |

## Brake Fluid

### *Fluid Level Inspection*

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

●Check the brake fluid level in the reservoir.

**NOTE**

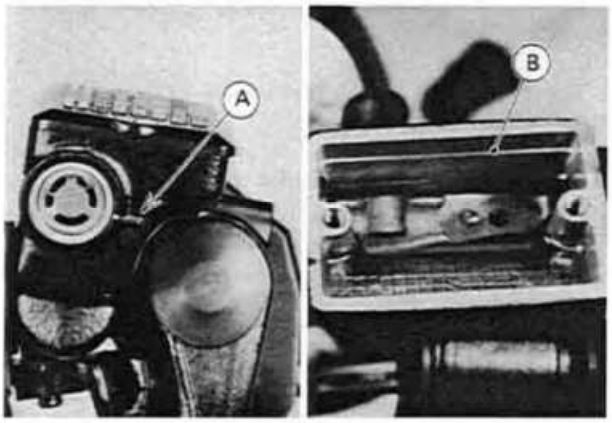
○*Hold the reservoir horizontal when checking brake fluid level.*

★The fluid level must be kept above the lower level lines. If the fluid level is lower than the lower level line, fill the reservoir to the upper level line of the reservoir.

**WARNING**

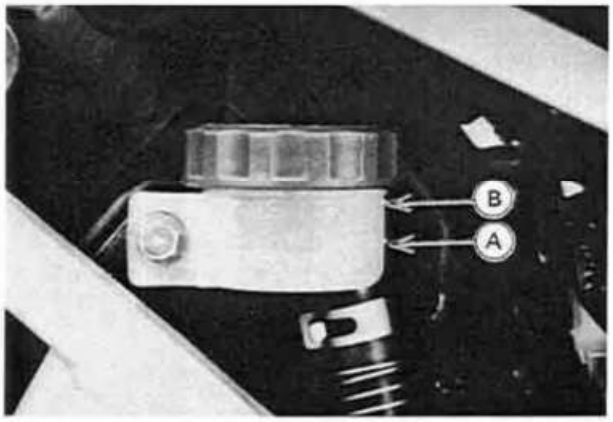
**○Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**

**Front Brake Fluid Reservoir**




A. Lower Level Line B. Upper Level Line

**Rear Brake Fluid Reservoir**




A. Lower Level Line B. Upper Level Line

### *Brake Fluid Change*

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

**Brake Fluid Requirement:**

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.3.

| Recommended Disc Brake Fluid | |
|---|---|
| Type | D.O.T.3. |
| Brand | Atlas Extra Heavy Duty |
| | Shell Super Heavy Duty |
| | Texaco Super Heavy Duty |
| | Wagner Lockheed Heavy Duty |
| | Castrol Girling-Universal |
| | Castrol GT (LMA) |
| | Castrol Disc Brake Fluid |

**Changing Brake Fluid:**

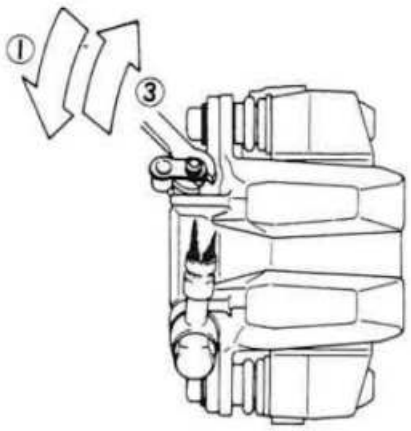
- Remove the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- Close the bleed valve.
- Remove the reservoir cap.
- Fill the reservoir with fresh brake fluid.
- Install the reservoir cap.
- Front brake: Since a dual disc brake is used, repeat the above 4 steps one more time for the other side.
- Open the bleed valve, apply the brake by the brake lever or pedal, close the valve with the brake held applied, and then quickly release the lever or pedal. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

**NOTE**

- *Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.*

- Front brake: Repeat the above step one more time for the other side.
- Bleed the air from the lines (continue with Bleeding the Brake).

**Filling up the Brake Line**




*Bleeding the Brake Line*

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

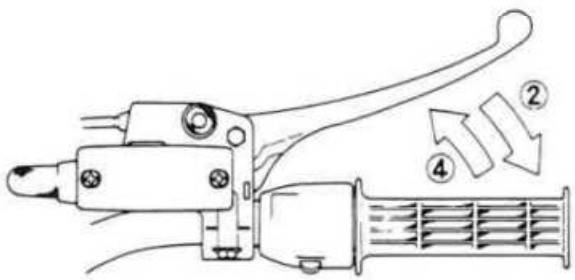
- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir. The fluid level must be checked several times during the bleeding operation and replenished as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- With the reservoir cap off, slowly pump the brake lever or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.

**Bleeding the rear brake line:**

- Install the reservoir cap, and connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container. Pump the brake pedal a few times until it becomes hard and then, holding the pedal pushed down, quickly open (turn counterclockwise) and close the bleed valve. Then release the pedal. Repeat this operation until no more air can be seen coming out into the plastic hose. Check that the brake fluid is filled to the upper level line marked in the reservoir.

**Bleeding the front brake line:**

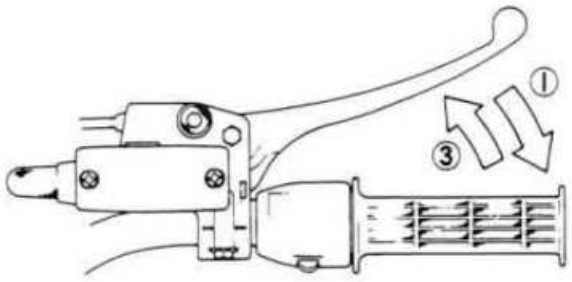
- Bleed the air from the front brake line, first using the bleed valves on the brake calipers and the anti-dive units, and then using the bleed valves on the junction blocks.




1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve
4. Then quickly release the brake.

**Bleeding the Brake Line**



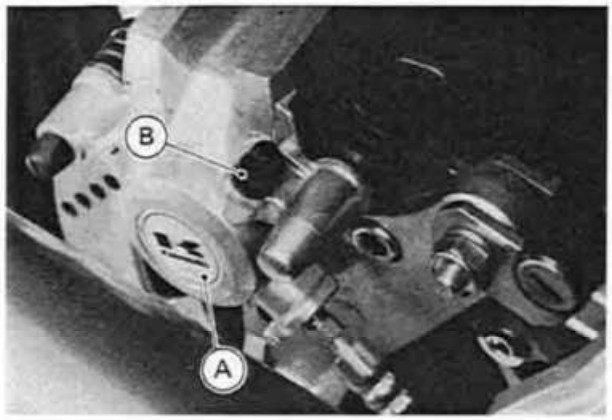




1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

**WARNING**

**○When working with the disc brake, observe the precautions listed below.**

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**




A. Caliper B. Bleed Valve

- Repeat the previous step one more time for the other side.
- When air bleeding is finished, install the rubber caps on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).

## Brake Hoses

### *Brake Hose Inspection*

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace it if any cracks or bulges are noticed.

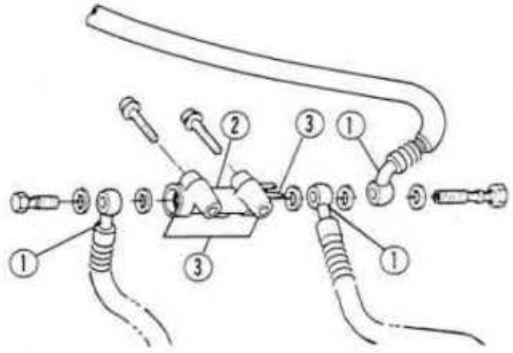
- The metal pipes which feed the brake fluid to the anti-dive units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.

*Brake Hose Replacement*

- Pump the brake fluid out of the line as explained in the Brake Fluid Change in Brake Fluid Section.
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the motorcycle. Especially, for the brake hose between the rear master cylinder and the reservoir, loosen the clamps at both ends of the hose, and take off the hose.
- Install the new brake hose in its place, and tighten the banjo bolts to the specified torque (see Exploded View), noting the following.

○Use a new flat washer for each side of the fittings.

**Brake Hose Installation**



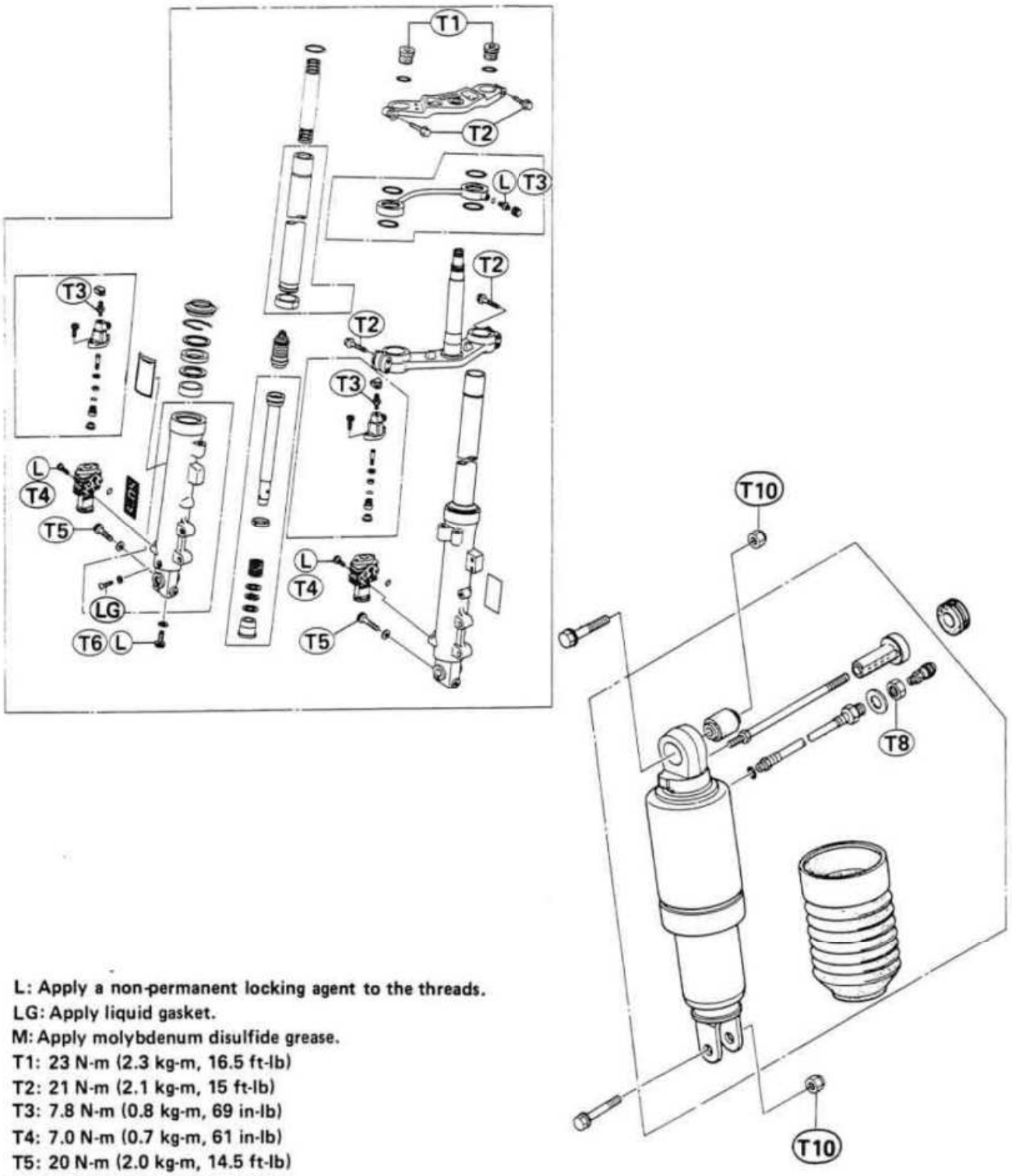

1. Metal Pipe
2. Joint
3. Notch

# Suspension

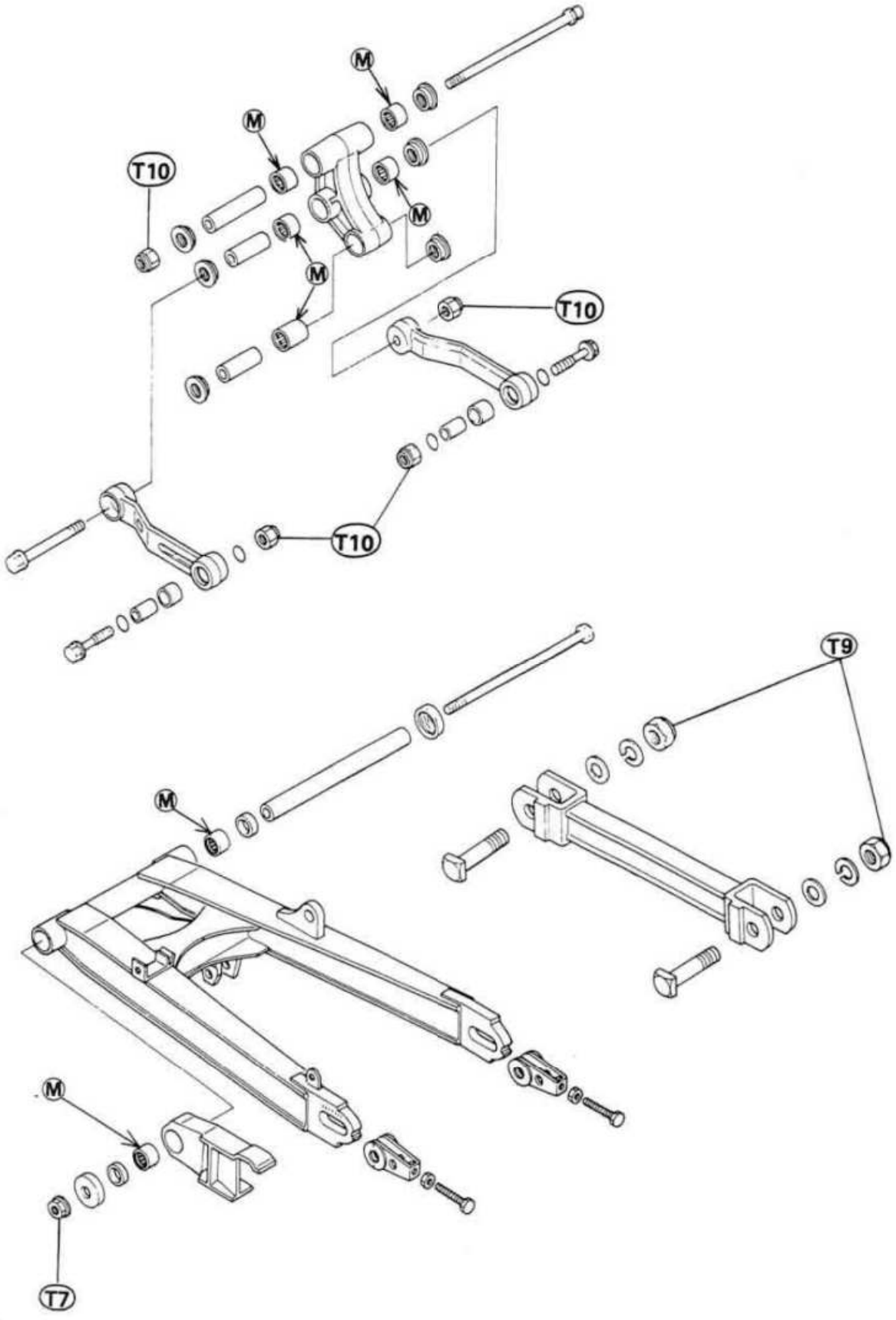
## Table of Contents


**Exploded View** ..... 12-2
**Specifications** ..... 12-4
**Special Tools** ..... 12-4
**Front Fork** ..... 12-5
*Air Pressure Adjustment* ..... 12-5
*Anti-Dive Adjustment* ..... 12-5
*Fork Oil Change* ..... 12-5
*Front Fork Removal (each fork leg)* ..... 12-6
*Front Fork Installation (each fork leg)* ..... 12-7
*Front Fork Disassembly* ..... 12-7
*Front Fork Assembly* ..... 12-8
*Inner Tube Inspection* ..... 12-8
*Guide Bush Inspection* ..... 12-8
*Oil Seal and Dust Seal Inspection* ..... 12-9
*Spring Tension* ..... 12-9
*Brake Plunger Assembly Test* ..... 12-9
*Anti-Dive Valve Assembly Test* ..... 12-10
*Metal Pipe Damage* ..... 12-10
*Anti-Dive Valve Assembly Removal* ..... 12-10
*Anti-Dive Valve Assembly Installation* ..... 12-10
*Brake Plunger Assembly Disassembly* ..... 12-11
*Brake Fluid and Fork Oil Leak Inspection* ..... 12-11
*Anti-Dive System Part Replacement* ..... 12-11
**AVDS (Automatic Variable Damping System):** ..... 12-12
*TCV (Travel Control Valve) Removal* ..... 12-12
*TCV Installation Notes* ..... 12-12
*TCV Troubleshooting* ..... 12-12
**Rear Suspension (Uni-Trak)** ..... 12-13
**Rear Shock Absorber:** ..... 12-13
*Rear Shock Absorber Adjustment* ..... 12-13
*Air Pressure Inspection* ..... 12-13
*Damping Force Adjustment* ..... 12-13
*Rear Shock Absorber Removal* ..... 12-14
*Rear Shock Absorber Installation* ..... 12-14
**Swing Arm:** ..... 12-14
*Swing Arm Removal* ..... 12-14
*Swing Arm Installation Notes* ..... 12-15
*Swing Arm Sleeve Inspection* ..... 12-15
*Swing Arm Needle Bearing Inspection* ..... 12-15
*Swing Arm Needle Bearing Lubrication* ..... 12-15
**Tie-Rod, Rocker Arm:** ..... 12-15
*Tie-Rod Removal* ..... 12-15
*Tie-Rod Installation Note* ..... 12-15
*Rocker Arm Removal* ..... 12-15
*Rocker Arm Installation Notes* ..... 12-15
*Tie-Rod, Rocker Arm Needle Bearing Inspection* ..... 12-16
*Tie-Rod, Rocker Arm Sleeve Inspection* ..... 12-16
*Tie-Rod, Rocker Arm Needle Bearing Lubrication* ..... 12-16

## Exploded View




L: Apply a non-permanent locking agent to the threads.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
T1: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T2: 21 N-m (2.1 kg-m, 15 ft-lb)
T3: 7.8 N-m (0.8 kg-m, 69 in-lb)
T4: 7.0 N-m (0.7 kg-m, 61 in-lb)
T5: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T6: 29 N-m (3.0 kg-m, 22 ft-lb)
T7: 88 N-m (9.0 kg-m, 65 ft-lb)
T8: 12 N-m (1.2 kg-m, 104 in-lb)
T9: 34 N-m (3.5 kg-m, 25 ft-lb)
T10: 49 N-m (5.0 kg-m, 39 ft-lb)


M
M
T10
M
M
T10
T10
T9
M
M
T7

## Specifications

| Item | | Standard | Service Limit |
|---|---|---|---|
| **Front Fork:** | | | |
| Oil type | | SAE 10W20 | – – – |
| Oil capacity | | 321 ±4 mL (approx. 273 mL at oil change) | – – – |
| Oil level | | 334 ±2 mm (Fully Extended) | – – – |
| Air pressure | Standard | 59 kPa (0.6 kg/cm², 8.5 psi) | – – – |
| | Usable range | 49 – 69 kPa (0.5 – 0.7 kg/cm², 7.1 – 10.0 psi) | |
| Fork spring free length | | 478 mm | 468 mm |
| **Rear Shock Absorbers:** | | | |
| Air pressure | Recommended | Atomospheric pressure | |
| | Usable range | Atomospheric pressure – 343 kPa (3.5 kg/cm², 50 psi) | – – – |

## Special Tools

**Front Fork Cylinder Holder Handle: 57001-183**



**Front Fork Cylinder Holder Adapter: 57001-1057**



**Front Fork Oil Seal Driver: 57001-1104**



**Bearing Driver Set: 57001-1129**



## Front Fork

### *Air Pressure Adjustment*

- Put the motorcycle on its center stand, and raise the front wheel off the ground using a jack or other suitable stand under the engine.
- Check and adjust the air pressure when the front fork is cold (room temperature).

**NOTE**

*○Do not use tire gauges for checking the air suspension's air pressure. They may not indicate the correct pressure because of air leaks that occur when the gauge is applied to the valve.*

*○Lower air pressure is for comfortable riding, but it should be increased for high speed riding, or riding on bad roads.*

**CAUTION**

**○Inject air little by little so that air pressure does not rise rapidly. Air pressure exceeding 245 kPa (2.50 kg/cm², 36 psi) may damage the oil seal.**

**WARNING**

**○Be sure to adjust the air pressure within the usable range. Pressure too high or too low can produce a hazardous riding condition.**

**○Only air on nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.**

**○Do not incinerate the front fork.**

**○Do not remove the springs and rely on compressed air only. Correct springs must be used in this suspension system. Use without springs can lead to a condition causing accident and injury.**




A. Air Valve

| Front Fork Air Pressure | |
|---|---|
| Standard | 59 kPa (0.6 kg/cm², 8.5 psi) |
| Usable range: | 49 – 69 kPa (0.5 – 0.7 kg/cm², 7.1 – 10.0 psi) |

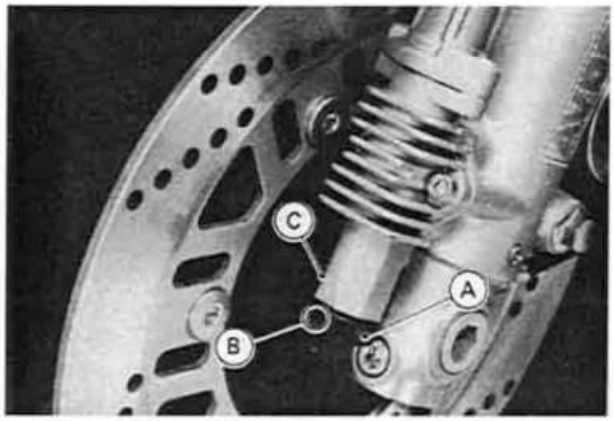
### *Anti-Dive Adjustment*

The anti-dive adjuster on each front fork leg has 3 positions so that the anti-dive system can be adjusted for different road and loading conditions. The numbers on the adjuster show the setting position of the anti-dive system.

- Turn the anti-dive adjuster until you feel a click so that the desired position number aligns with the triangular mark.
- Check to see that both adjusters are turned to the same relative position.

**WARNING**

**○If both anti-dive adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.**

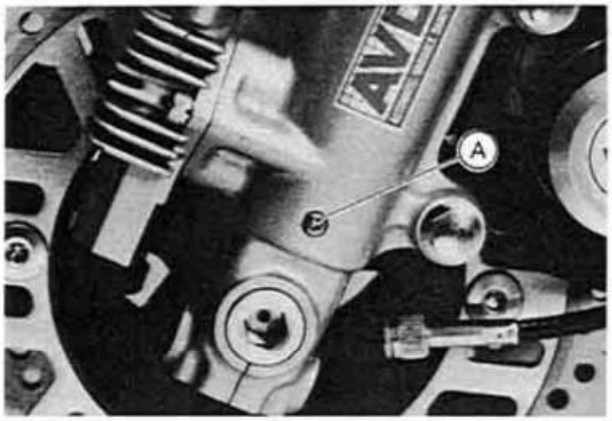



A. Anti-Dive Adjuster C. Triangular Mark
B. Position Number

| Anti-Dive Adjustment | |
|---|---|
| Position 1 | Weak |
| Position 2 | Moderate |
| Position 3 | Strong |

### *Fork Oil Change*

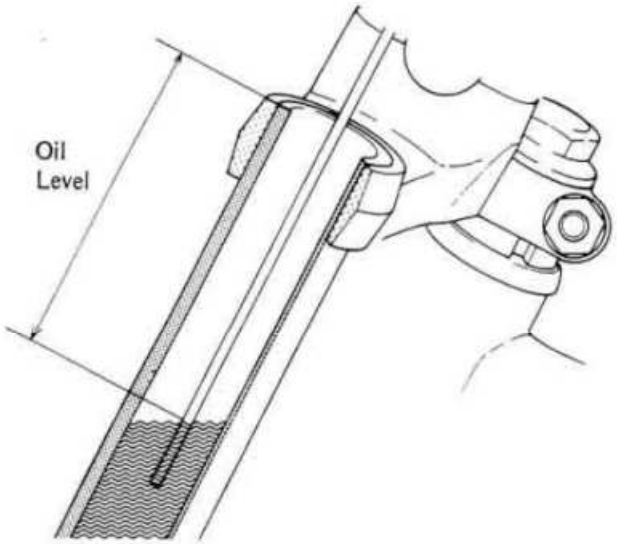
- Release the air in both fork legs through the air valve at the top of the fork leg.
- Remove the handlebar mounting Allen bolts, and take the handlebars off the stem head.
- Unscrew the drain screw and top plug from one fork leg, and pull out the fork spring.




A. Drain Screw

- Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch the oil in a container as it squirts out.
- Wash the drain screw threads clean of oil, and blow them dry.
- Apply a liquid gasket to the threads of the drain screw, and install the screw and gasket.
- Pour in the specified type and amount of oil.
- Pump the fork enough times to expel the air from the upper and lower chambers.
- With the fork fully extended insert a tape measure or rod in the inner tube, and measure the distance from the top of the inner tube to the oil.
- ★If the oil is above or below the specified level, remove or add oil and recheck the oil level.

**Fork Oil Level Measurement**




**CAUTION**

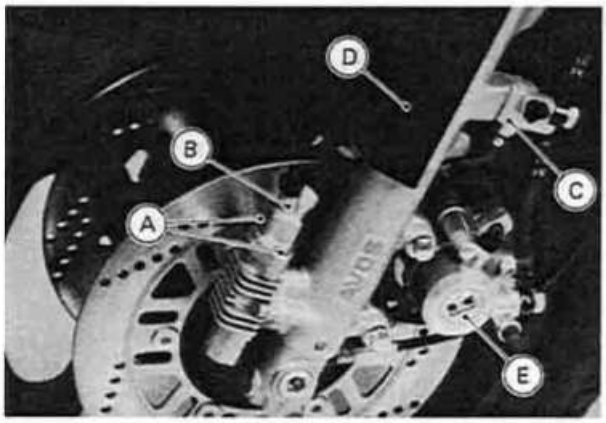
○**The operation of air front forks is especially dependent upon correct oil level. Higher level than specified may cause oil leakage and seal breakage. So be sure to maintain the specified level.**

- Inspect the O-ring on the top plug, and replace it with a new one if it is damaged.
- Install the spring.
- Tighten the top plug.
- Change the oil of the other fork leg in the same manner.
- Adjust the air pressure.

| Front Fork Oil | |
|---|---|
| Viscosity | SAE10W20 |
| Amount per side | |
| When changing oil: | 273 mL |
| After disassembly and completely dry: | 321 ±4mL |
| Level (Fully Extended) | 334 ±2 mm |

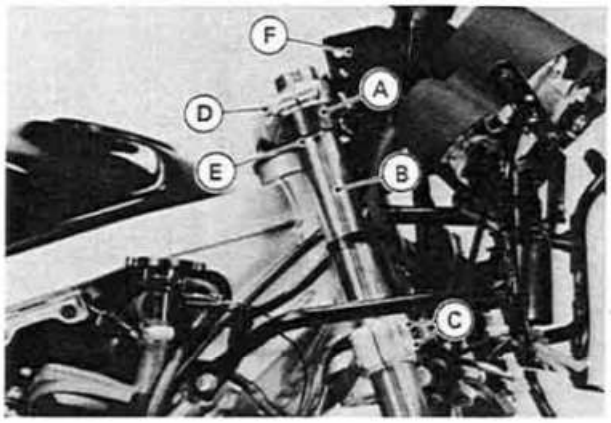
*Front Fork Removal (each fork leg)*

- Release the air pressure from the forks.
- Remove the caliper from the fork leg to be removed, and then remove the front wheel (see Front Wheel Removal in Wheels and Tires chapter).
- Remove the front fender (see Front Fender Removal in Frame chapter).
- Remove the Allen bolts, and remove the brake plunger.




A. Brake Plunger Allen Bolts
B. Brake Plunger
C. Junction Block
D. Front Fender
E. Caliper

- Remove the junction block mounting bolts and take it off, and support the caliper so that it doesn't dangle.
- Remove the each inner fairing (see Fairing Removal in Frame chapter).
- Loosen the upper and lower fork clamp bolts, and work the fork legs down enough to remove the connecting pipe and remove it.
- ★If the fork leg is to be disassembled after removal, remove the handlebar and loosen the top plug before loosening the fork clamp bolts.




A. Connecting Pipe
B. Fork Leg
C. Lower Clamp Bolts
D. Upper Clamp Bolt
E. Retaining Ring
F. Handlebar

- Remove the retaining rings from the fork legs.
- With a twisting motion, work the fork leg down and out.
- Stick a piece of tape over the air hole to keep the oil from running out of the fork.

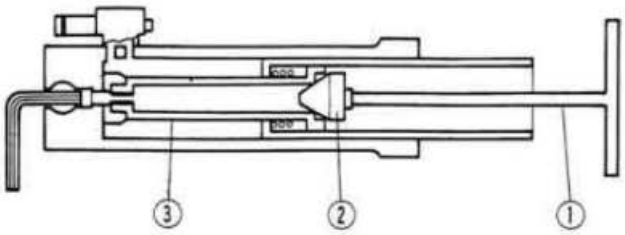
### *Front Fork Installation (each fork leg)*

- When installing the fork leg, be careful of the following items.
  - If the fork leg was disassembled, check the fork oil level. Then inject air through the air valve after installation.
  - Install the retaining rings and connecting pipe between the stem base and stem head.
  - Tighten the lower and upper clamp bolts to the specified torque (see Exploded View).
  - Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter).
  - Check the front brake after installation.

### *Front Fork Disassembly*

- Remove the handlebar mounting Allen bolts, and take the handlebars off the stem head.
- Loosen the top plug before loosening the fork clamp bolts.
- Remove the front fork leg.
- Remove the axle clamp bolt(s).
- Remove the top plug, washer, and spring.
- Pour out the fork oil, and take off the TCV (Travel Control Valve).
- Stop the cylinder from turning by using the front fork cylinder holder handle and adapter (special tools). Unscrew the Allen bolt and take the bolt and gasket out of the bottom of the outer tube.

**Front Fork Cylinder Removal**



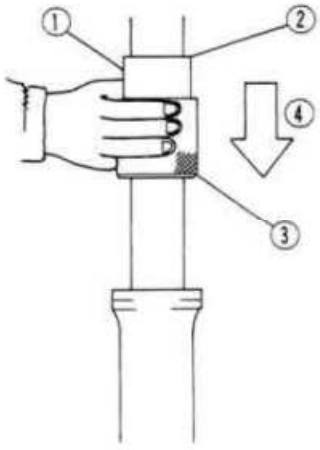

1. Front Fork Cylinder Holder Handle: 57001-183
2. Adapter: 57001-1057
3. Front Fork Cylinder

- Remove the piston and cylinder unit and the short spring from the top of the front fork tube.
- Separate the inner tube from the outer tube as follows.
  - Remove the dust seal from the outer tube.
  - Remove the retainer and washer from the outer tube.
  - Holding the inner tube by hand and keeping the fork leg in a vertical position, tap the outer tube on the upper end with the driver (special tool) until the outer tube falls off the inner tube. Face the big end of the driver downward.

**CAUTION**

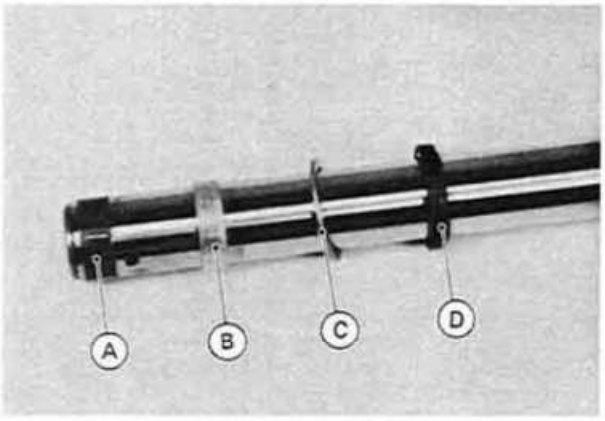
- **To avoid damaging the inner tube guide bush, do not tap the outer tube if the fork leg is horizontal on a work bench.**

**Front Fork Outer Tube Removal**




1. Driver: 57001-1104
2. Small End
3. Big End
4. Tap

- Remove the oil seal, washer and outer tube guide bush from the inner tube.




A. Inner Tube Guide Bush
B. Outer Tube Guide Bush
C. Washer
D. Oil Seal

•Remove the cylinder base, spring washers and washer from the bottom of the outer tube.

### *Front Fork Assembly*

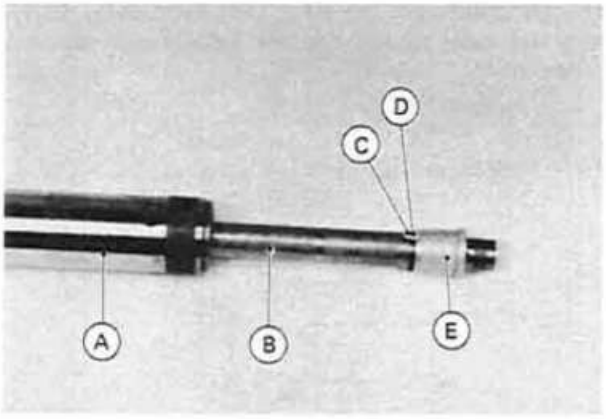
•Fork assembly is the reverse of disaasembly. Pay attention to the following items.

○Check the top plug O-ring for damage. Replace it with new one if damaged.

○Replace the oil seal removed with a new one.

○Inspect the guide bushes (see Guide Bush Inspection), and replace them with new ones if necessary.

○Insert the piston and cylinder unit and the short spring in the inner tube, and put on the spring washers and washer and the cylinder base.



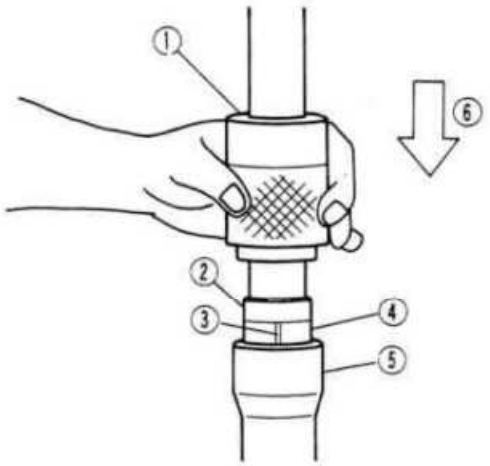

A. Inner Tube
B. Cylinder
C. Spring Washers
D. Washer
E. Cylinder Base

○Insert the inner tube and cylinder unit as a set in the outer tube.

○Apply a non-permanent locking agent to the Allen bolt. Tighten the Allen bolt to the specified torque (see Exploded View), using the front fork cylinder holder handle and holder adapter (special tools) to stop the cylinder from turning.

○Install the guide bush (with a used guide bush on it) by tapping the used guide bush with the driver (special tool) until it stops. The slit of the bush must be faced toward the left or right.

**Guide Bush Installation**




1. Driver: 57001-1104
2. Used Guide Bush
3. Slit
4. New Guide Bush
5. Outer Tube
6. Tap

○Install the oil seal with the driver (special tool).

○If the drain screw was removed, check the gasket for damage. Replace a damaged gasket with a new one. Before installing the drain screw, apply a liquid gasket to the threads of the screw, and tighten the screw securely.

○Pour in the type and amount of fork oil specified (see Specifications), and adjust the oil level.

○Install the TCV with the nuts upward.

○Tighten the top plug to the specified torque after fork installation (see Exploded View).

○Install the handlebar and tighten the mounting Allen bolts to the specified torque (see Exploded View in Steering chapter).

### *Inner Tube Inspection*

•Visually inspect the inner tube, and repair any damage.

•Nicks or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.

★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

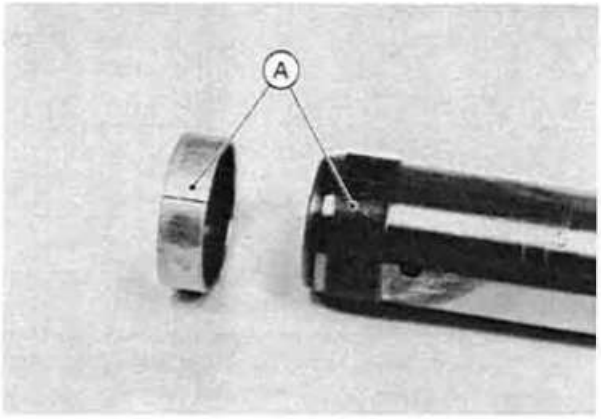
•Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

**CAUTION**

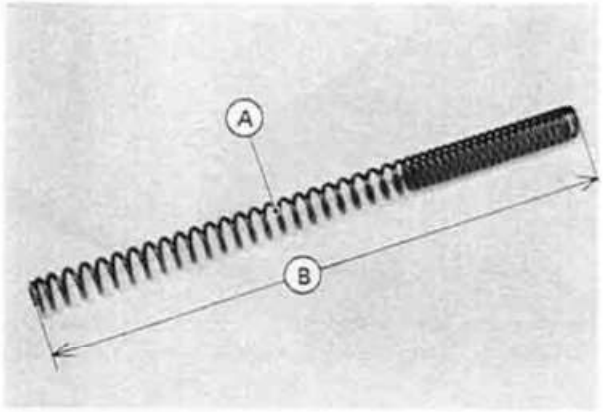
**○If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

### *Guide Bush Inspection*

•Visually inspect the guide bushes, and replace them if necessary.



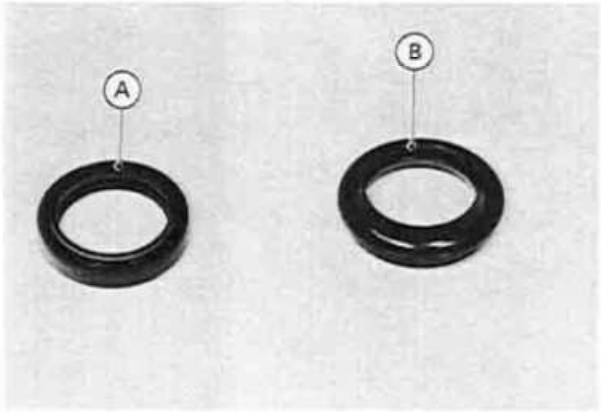

A. Guide Bushes




A. Fork Spring B. Free Length

### *Oil Seal and Dust Seal Inspection*

- Inspect the dust seal for any signs of deterioration or damage.
- ★Replace them if necessary.
- Replace the oil seal with a new one whenever it has been removed.




A. Oil Seal B. Dust Seal

### *Spring Tension*

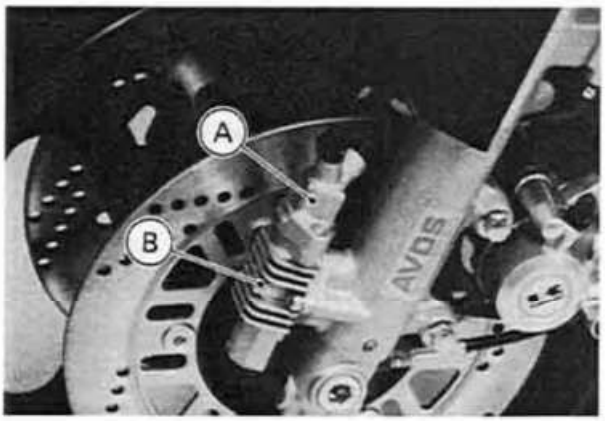
- Since the spring becomes shorter as it weakens, check its free length to determine its condition.
- ★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

| Fork Spring Free Length | |
|---|---|
| **Standard:** | **478 mm** |
| **Service Limit:** | **468 mm** |

### *Brake Plunger Assembly Test*

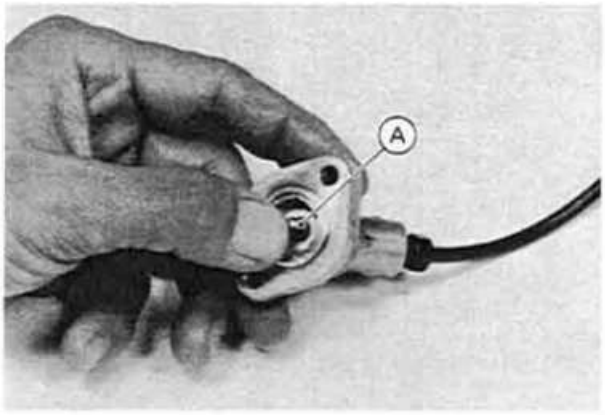
The brake plunger assembly can be tested by separating it from the anti-dive valve assembly with the brake line connected to the brake plunger assembly.

- Separate the plunger assembly from the anti-dive valve assembly.




A. Plunger Assembly B. Anti-Dive Valve Assembly

- Unbolt the junction block from the fork leg to prevent the metal pipe from being deformed.
- Check to see if the plunger in the brake plunger assembly comes out 2 mm when the front brake is lightly applied, and check to see if the plunger goes in smoothly when it is pushed in with your finger.
- ★If the plunger does not move lightly or is stuck in the body, replace the brake plunger assembly.




A. Brake Plunger

### *Anti-Dive Valve Assembly Test*

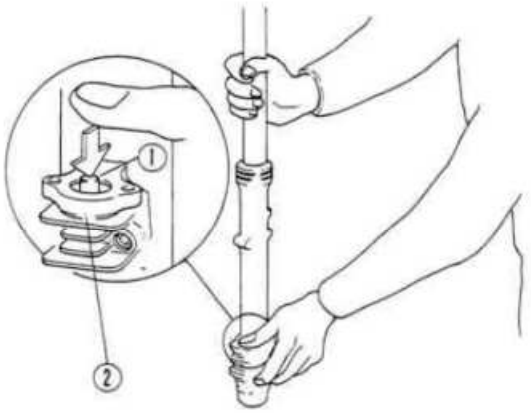
The operation of the anti-dive valve assembly can be checked by removing the front fork leg from the motorcycle.

- Remove the front fork leg (see Front Fork Removal section).
- Remove the handlebar and loosen the top plug before loosening the fork clamp bolts.
- Take the fork spring out of the fork tube.
- With the fork leg held upright, compress the fork leg, and see that the compression stroke is light and smooth when the valve rod is not pushed in and that there is notable damping when the valve rod is pushed in with your finger.

**NOTE**

- *The extension stroke should be smooth with notable damping regardless of valve rod positions.*

**Anti-Dive Valve Assembly Test**




1. Valve Rod
2. Valve Assy

★If the fork leg has a heavy compression stroke when the valve rod is left released, or if it has a light compression stroke when the rod is pushed in; the anti-dive valve assembly does not operate properly. Replace the anti-dive valve assembly.

### *Metal Pipe Damage*

- The metal pipes which feed the brake fluid to the anti-dive units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fitting), or if the plating is badly scratched.

### *Anti-Dive Valve Assembly Removal*

- Drain the front brake oil (see Brakes chapter).
- Remove the bolts and separate the brake plunger assembly from the anti-dive valve assembly.
- Unscrew the brake pipe nipple and remove the metal pipe and brake plunger assembly.
- Remove the mounting bolts, and take the anti-dive valve assembly off the outer tube.

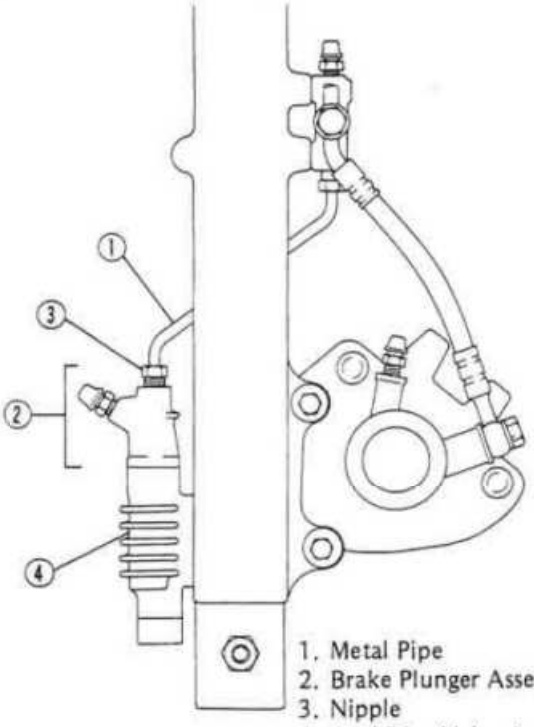
**NOTE**

- *Do not disassemble the anti-dive valve assembly for repair or replacement of internal parts. Always replace it as a unit.*

### *Anti-Dive Valve Assembly Installation*

- Reinstall the anti-dive valve assembly and brake plunger assembly, and metal pipe.

**Anti-Dive Valve Assembly Installation**



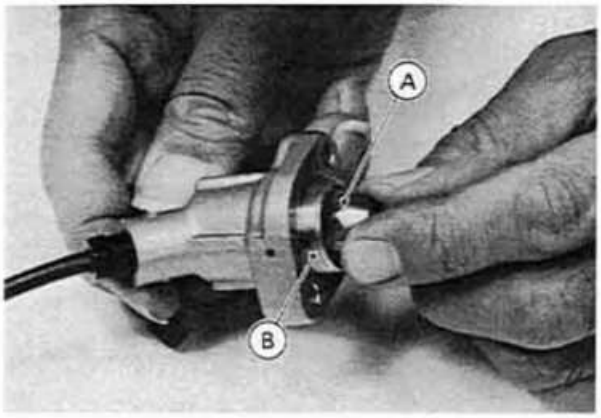

1. Metal Pipe
2. Brake Plunger Assembly
3. Nipple
4. Anti-Dive Valve Assembly

**NOTE**

- *Bleed the brake plunger and brake line after anti-dive valve assembly installation.*

*Brake Plunger Assembly Disassembly*

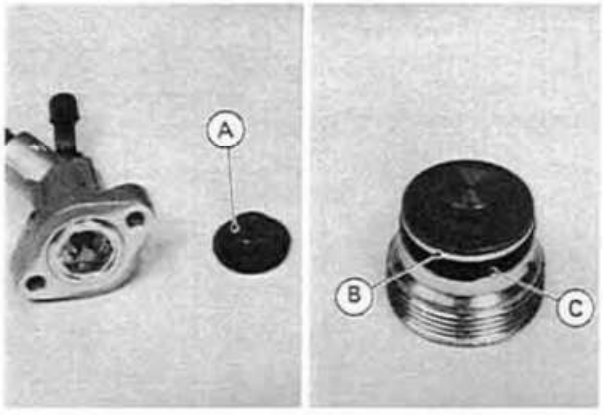
●Remove the rubber cap.
●Remove the seal case using a suitable nut.




A. Suitable Nut (width across flat: 14 mm)
B. Seal Case

*Brake Fluid and Fork Oil Leak Inspection*

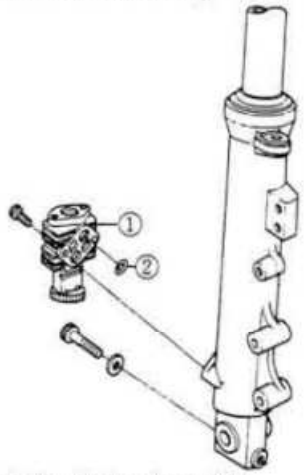
●Visually inspect the anti-dive unit for brake fluid and fork oil leakage.
★If there are brake fluid leaks, replace the brake plunger parts – the rubber cap, O-ring, and seal ring.




A. Rubber Cap
B. O-Ring
C. Seal Ring

★If there are fork oil leaks, replace the O-rings or anti-dive valve assembly.

**Anti-Dive Valve Assembly**




1. Anti-Dive Valve Assembly
2. O-Ring

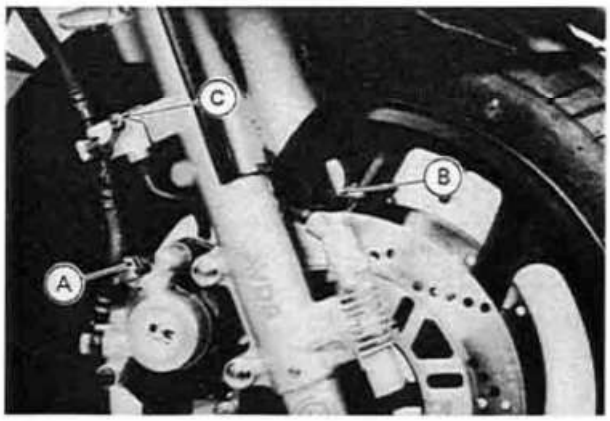
*Anti-Dive System Part Replacement*

In accordance with the Periodic Maintenance Chart, replace the following anti-dive system parts.

**Periodic Replacement Parts of Anti-Dive System**

**Brake plunger parts:**
**rubber cap, O-ring, seal ring**
**Metal pipe (between anti-dive unit and junction block)**

●Be sure to bleed the air from hte brake line after replacement.
○Bleed the air from the brake line, first using the bleed valves on the brake calipers and the anti-dive units, and then using the bleed valves on the junction blocks.




A. Air Bleed Valve (caliper)
B. Air Bleed Valve (anti-dive)
C. Air Bleed Valve (junction block)

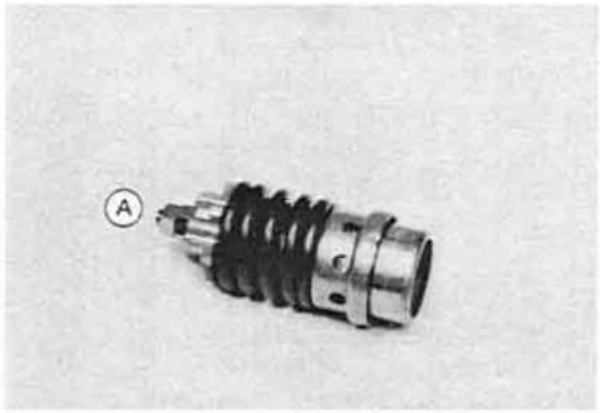
## AVDS (Automatic Variable Damping System):

### *TCV (Travel Control Valve) Removal*

- Remove the front fork leg.
- Remove the top plug, spring, and pour out the fork oil.
- Take off the TCV with the fork upside down.

**NOTE**

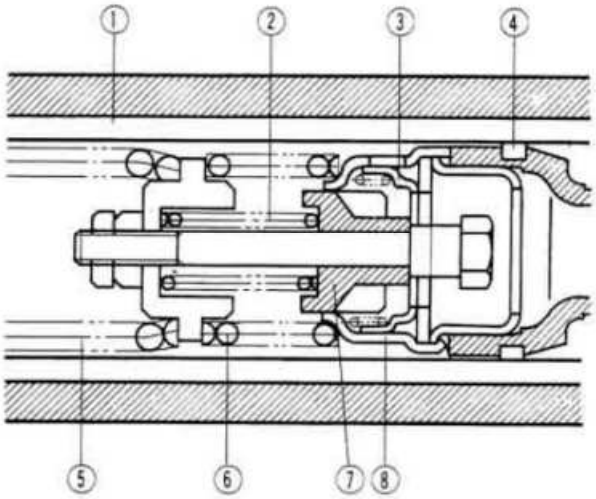
*○Do not disassemble the TCV assembly for repair or replacement of parts. Always replace them as assemblies.*




A. Top End

### *TCV Installation Notes*

- Install the TCV with the nuts upward.
- Installation is the reverse of removal.

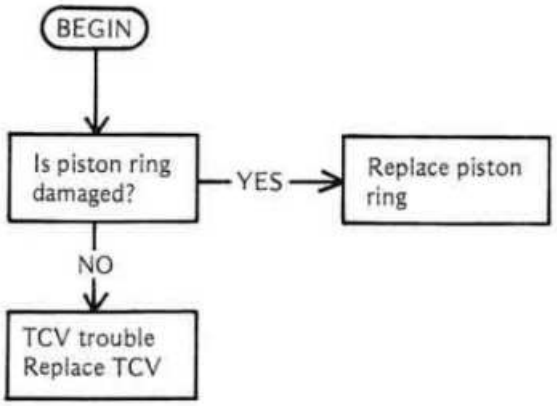



1. Inner Tube
2. Spring (Check Valve)
3. Valve
4. Piston Ring
5. Fork Spring
6. Spring (TCV)
7. Spool
8. Valve Case

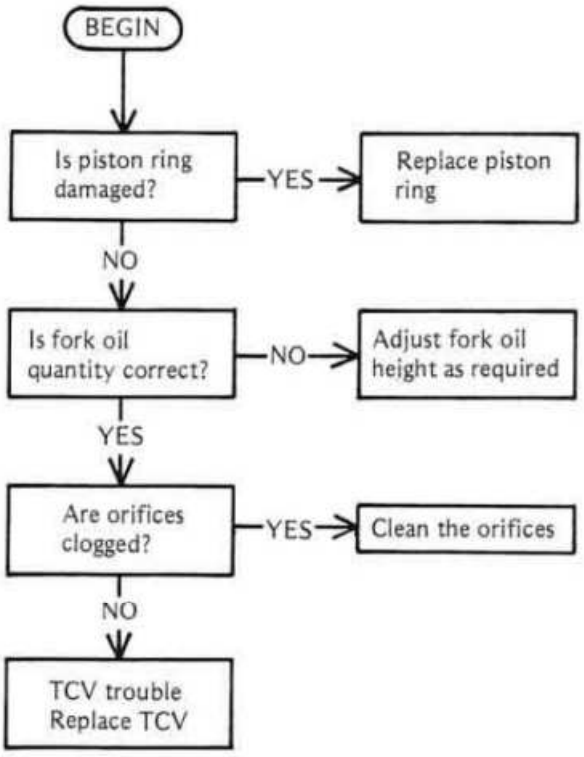
### *TCV Troubleshooting*

If the unit is not working, inspect the TCV according to this troubleshooting guide.

No damping force during compression stroke




No damping force during extension stroke



## Rear Suspension (Uni-Trak)

### Rear Shock Absorber:

*Rear Shock Absorber Adjustment*

The rear shock absorber can be adjusted by changing the air pressure and damping force to suit various riding and loading conditions.

*Air Pressure Inspection*

- Put the motorcycle up on its center stand to raise the rear wheel off the ground.
- Use air pressure gauge 52005-1003 which is specially made for air suspensions.
- Check and adjust the air pressure when the rear shock absorber is cold (room temperature).

**NOTE**

○*Do not use tire gauges for checking air pressure. They may not indicate the correct air pressure because of air leaks that occur when the gauge is applied to the valve.*

○*Lower air pressure is for comfortable riding for an average-build rider with no accessories. Ordinarily, the heavier the total load becomes, the higher the air pressure should be set.*

**CAUTION**

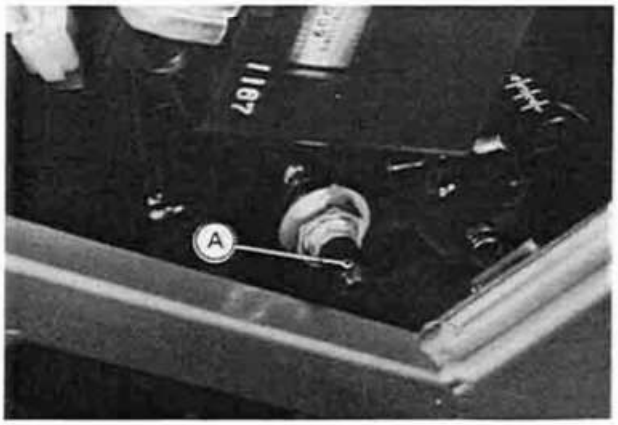
○**Inject air little by little so that air pressure does not rise rapidly. Air pressure exceeding 490 kPa (5.0 kg/cm², 71 psi) may damage the oil seal.**

**WARNING**

○**Be sure to adjust the air pressure within the usable range. Pressure too high can produce a hazardous riding condition.**

○**Only air or nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.**

○**Do not incinerate the rear shock absorber.**




A. Air Valve

**Rear Shock Absorber Air Pressure**

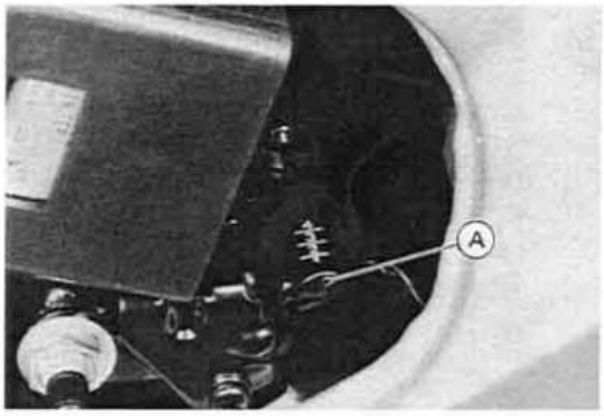
| Air Pressure Usable Range kPa (kg/cm², psi) | Setting | Load | Road |
|---|---|---|---|
| Atmospheric pressure ↑↓ 343 (3.5, 50) | Soft ↑↓ Hard | Light ↑↓ Heavy | Good ↑↓ Bad |

**NOTE**

○*The recommended air pressure is atmospheric pressure for an average-build rider with no accessories.*

*Damping Force Adjustment*

- Push and pull the damper adjusting stick to the desired number until you feel a click. The numbers on the adjusting stick show the setting position.




A. Adjusting Stick

**NOTE**

○*The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding, or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table:*

**Rebound Damping Adjustment**

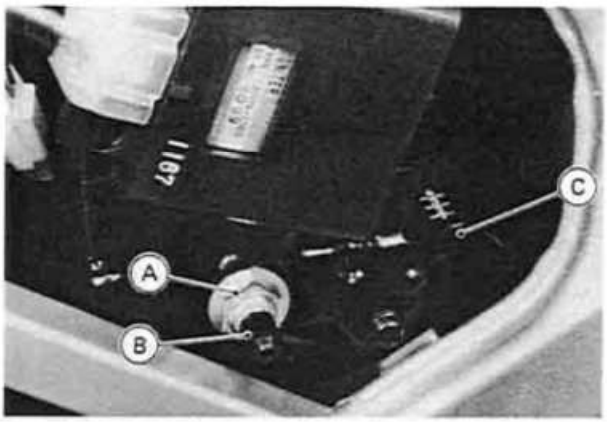
| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 1 | Stronger ↓ | Soft ↑↓ | Light ↑↓ | Good ↑↓ | Low ↑↓ |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | Hard | Heavy | Bad | High |

**NOTE**

○*The recommended adjusting stick position is No. 2 for an average-build rider with no accessories.*

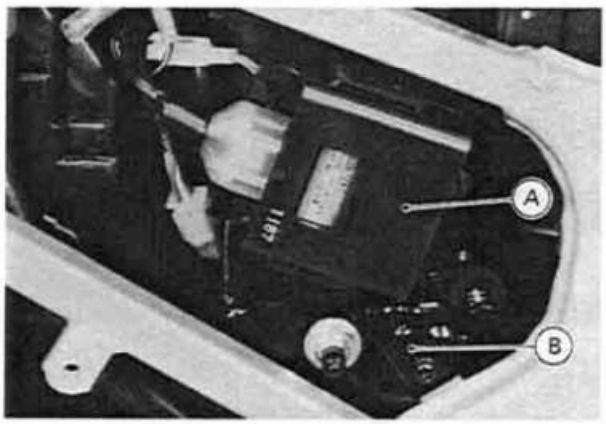
*Rear Shock Absorber Removal*

- Remove the side covers.
- Remove the air valve mounting nut and free the air hose.
- Unscrew the damper adjusting stick and take off the stick.



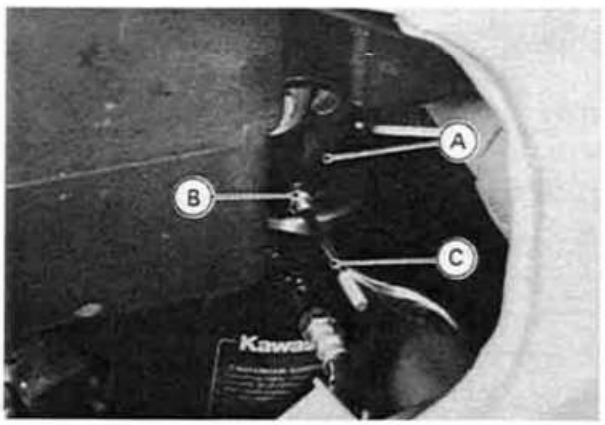

A. Mounting Nut
B. Air Valve
C. Damper Adjusting Stick

- Take off the IC igniter, and remove the screw and take off the igniter bracket.



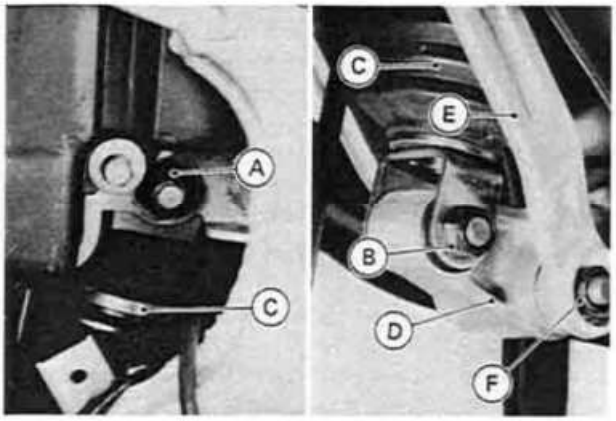

A. Igniter
B. Bracket

- Loosen the locknut and remove the rod.




A. Rear Shock Absorber
B. Locknut
C. Rod

- Loosen the upper shock absorber nut. Do not remove it yet.
- Remove the lower shock absorber bolt, and the tie rod lower bolt.




A. Upper Shock Absorber Nut
B. Lower Shock Absorber Nut
C. Shock Absorber
D. Rocker Arm
E. Tie-rod
F. Tie Rod Lower Nut

- Remove the upper shock absorber nut and bolt, then take off the rear shock absorber unit toward the ground.

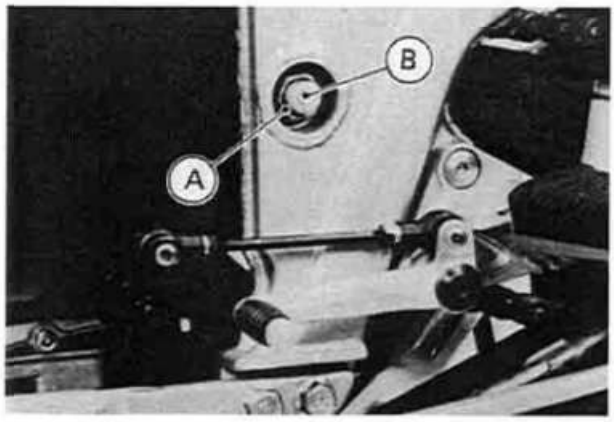
*Rear Shock Absorber Installation*

- Installation is the reverse of removal.
- When installing the rear shock absorber, be careful of the following items.
  - Tighten the upper and lower shock absorber nuts to the specified torque (see Exploded View).
  - Tighten the tie-rod nut to the specified torque (see Exploded View).

**Swing Arm:**

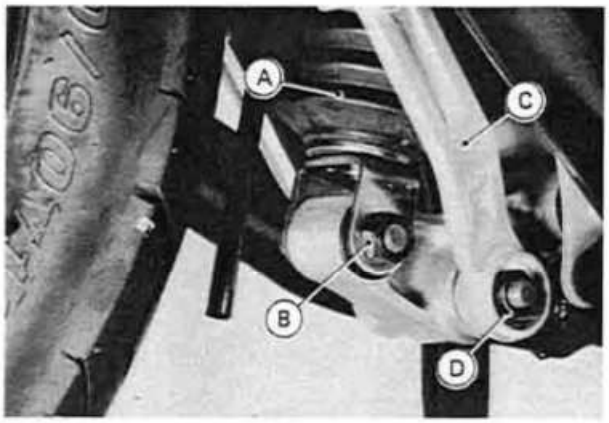
*Swing Arm Removal*

- Remove the rear caliper (see Rear Caliper Removal in Brakes chapter).
- Remove the rear wheel (see Rear Wheel Remove in Wheels/Tires chapter).
- Remove the swing arm pivot nut. Do not remove the pivot shaft.




A. Pivot Nut
B. Pivot Shaft

●Remove the lower shock absorber nut. Do not remove the bolt.




A. Rear Shock Absorber
B. Nut
C. Tie-Rod
D. Nut

●Remove the tie-rod lower nut. Do not remove the bolt.
●Remove the tie-rod bolt, shock absorber bolt, and swing arm pivot shaft while supporting the swing arm.
●Remove the swing arm toward the rear.

*Swing Arm Installation Notes*

●When installing the swing arm, be careful of the following items.
○Tighten the swing arm pivot nut to the specified torque (see Exploded View).
○Tighten the lower shock absorber nut to the specified torque (see Exploded View).
○Tighten the tie-rod lower nut to the specified torque (see Exploded View).
○Tighten the torque link nut to the specified torque (see Exploded View in Brake chapter).
○Adjust the drive chain after installation (see Drive Chain Slack Adjustment in Final Drive chapter).

*Swing Arm Sleeve Inspection*

★If there is visible damage, replace the sleeve and needle bearing as a set.

*Swing Arm Needle Bearing Inspection*

●The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasion, color change, or other damage.
★If there is any doubt as to the condition of either needle bearing, replace the bearing and sleeve as a set.

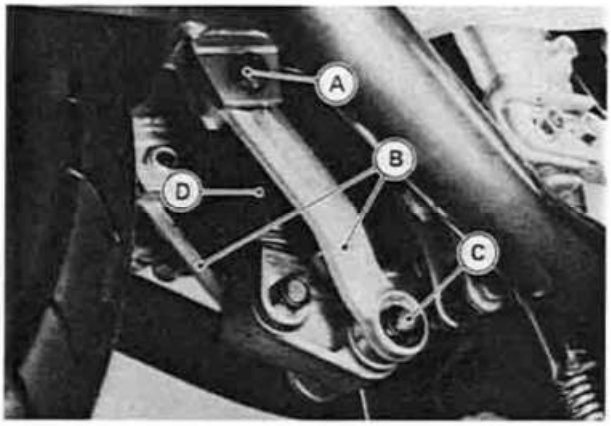
*Swing Arm Needle Bearing Lubrication*

In order for the swing arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.
●Disassemble the swing arm.
●Using a high flash-point solvent, wash the sleeves and needle bearings, and dry them.
●Inspect the needle bearings, sleeves and grease seals for abrasion, color change, or other damage.
●Apply a molybdenum disulfide grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.

**Tie-Rod, Rocker Arm:**

*Tie-Rod Removal*

●Put the motorcycle on its center stand.
●Remove the tie-rod lower bolt.




A. Tie-Rod Upper Bolt
B. Tie-Rods
C. Tie-Rod Lower Bolt
D. Rear Shock Absorber

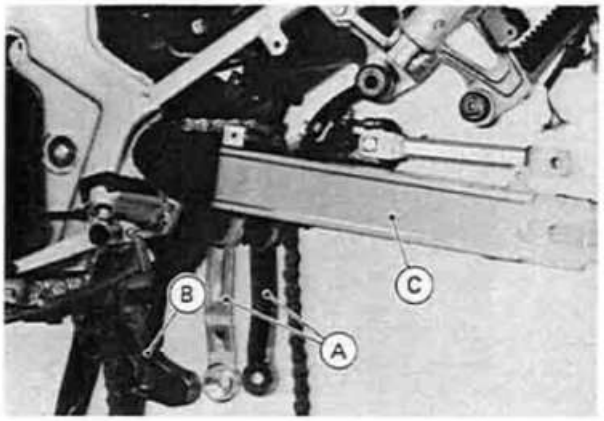
●Remove the tie-rod upper bolt and take the tie-rod off.
●Remove the other tie-rod.

*Tie-Rod Installation Note*

●Tighten the tie-rod upper and lower bolts to the specified torque (see Exploded View).

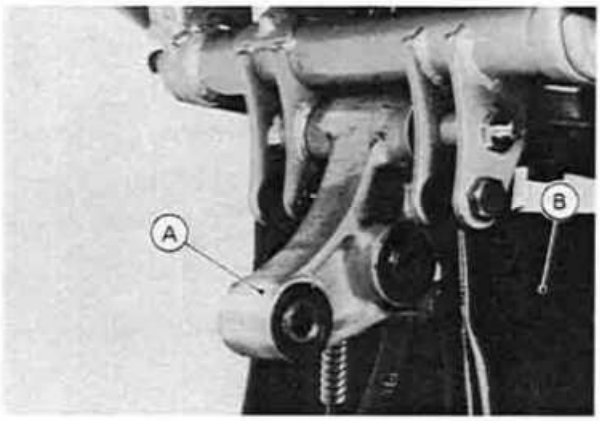
*Rocker Arm Removal*

●Remove the lower fairing.
●Put a suitable stand under the engine.
●Retract the center stand, and remove the spring from the center stand.
●Remove the lower shock absorber nut. Do not remove the bolt.
●Remove the tie-rod lower nut. Do not remove the bolt.
●Remove the tie-rod bolt and shock absorber bolt while supporting the swing arm.




A. Tie-Rod
B. Rocker Arm
C. Swing Arm

- Remove the nut and pull out the rocker arm bolt and remove the rocker arm from the bottom side of the frame.




A. Rocker Arm
B. Stand

### *Rocker Arm Installation Notes*

- Tighten the tie-rod lower nut to the specified torque (see Exploded View).
- Tighten the lower shock absorber nut to the specified torque (see Exploded View).
- Tighten the rocker arm shaft nut to the specified torque (see Exploded View).

### *Tie-Rod, Rocker Arm Needle Bearing Inspection*

- The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasion, color change, or other damage.

★If there is any doubt as to the condition of either needle bearing, replace the bearing and sleeve as a set.

### *Tie-Rod, Rocker Arm Sleeve Inspection*

★If there is visible damage, replace the sleeve and needle bearing as a set.

### *Tie-Rod, Rocker Arm Needle Bearing Lubrication*

In order for the tie-rod and rocker arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.

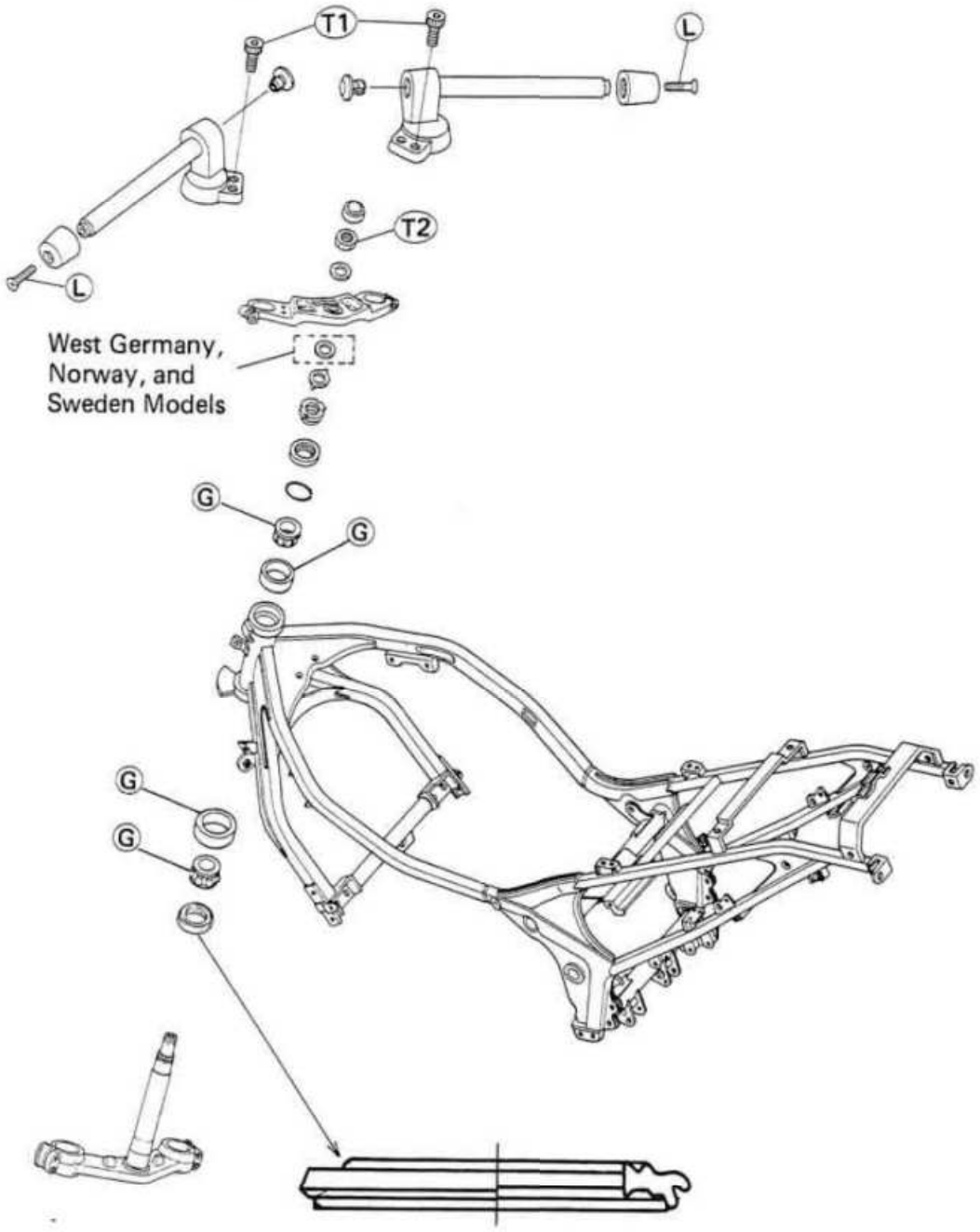
- Disassemble the tie-rod and rocker arm.
- Using a high flash-point solvent, wash the sleeves and needle bearings, and dry them.
- Inspect the needle bearings, sleeves and grease seals for abrasion, color change, or other damage.
- Apply a molybdenum disulfide grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.

# Steering

## Table of Contents


**Exploded View** ..... 13-2
**Special Tools** ..... 13-3
**Steering Adjustment** ..... 13-4
*Steering Inspection* ..... 13-4
**Checking for Steering Too Tight:** ..... 13-4
**Checking for Steering Too Loose:** ..... 13-4
*Steering Adjustment* ..... 13-4
**Steering Removal/Installation** ..... 13-5
*Steering Stem Removal* ..... 13-5
*Steering Stem Installation* ..... 13-5
**Steering Maintenance** ..... 13-6
*Steering Stem Bearing Lubrication* ..... 13-6
*Bearing Wear, Damage* ..... 13-7
*Stem Cap Deterioration, Damage* ..... 13-7
*Steering Stem Warp* ..... 13-7

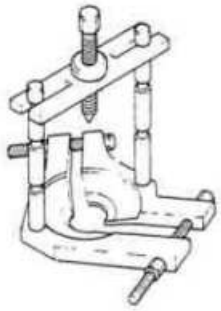
## Exploded View




G: Apply grease
L: Apply a non-permanent locking agent to the threads.
T1: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T2: 39 N-m (4.0 kg-m, 29 ft-lb)

## Special Tools

**Bearing Puller: 57001-158**



**Adapter: 57001-317**



**Pole: 57001-1190**



**Stem Bearing Driver: 57001-137**



**Adapter: 57001-1074**



**Stem Nut Wrench: 57001-1100**



**Driver Press Shaft: 57001-1075**



**Driver: 57001-1106**



**Driver: 57001-1076**



**Stem Bearing Remover: 57001-1107**



**NOTE**

*○The pole (P/N 57001-1190) are included in the bearing puller (P/N 57001-158).*

## Steering Adjustment

When the steering bearings are properly adjusted, the handlebar will turn freely from side to side with no looseness of the steering stem within the frame. In other words, the bearings will have little or no free play and absolutely no preload. Inspect the steering according to the Periodic Maintenance Chart or if the following symptoms are noticed.

Symptoms:

**Tight**

1. The motorcycle wanders while being ridden.
2. The steering feels tight.
3. The bearing races becomes notched.

**Loose**

1. The forks "clunk" or "click" when the brake is applied or when the motorcycle is ridden over a pothole.
2. The handlebars seem to vibrate more than normal.

### *Steering Inspection*

- Set the motorcycle on its center stand or other suitable stand.
- Remove the lower fairing. Use a jack under the engine to lift the front wheel off the ground.

**Checking for Steering Too Tight:**

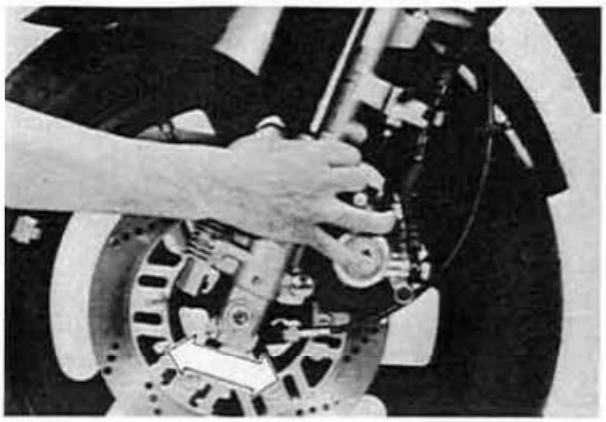
- With the front wheel pointing straight ahead, alternately nudge each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★If the wheel binds or catches before the stop, the steering is too tight.

**NOTE**

- ○*The cables and wiring will have some effect on the motion of the fork which must be taken into account. Be sure the wires and cables are properly routed.*
- ○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

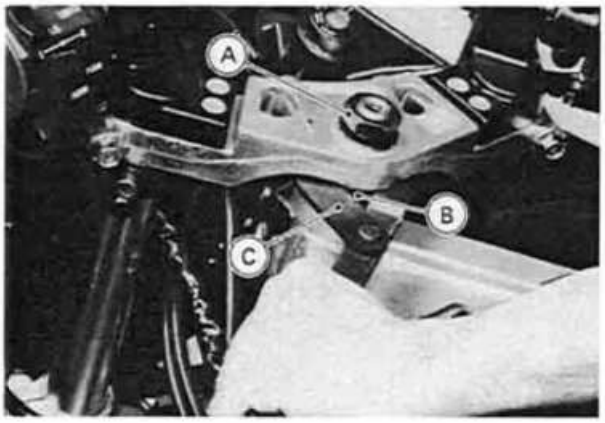
**Checking for Steering Too Loose:**

- Stand in front of the motorcycle and grasp the lower ends of the fork near the axle.
- Feel for steering looseness by pushing and pulling the forks.
- ★If you feel looseness, the steering is too loose.



### *Steering Adjustment*

- Set the motorcycle up on its center stand.
- Remove the fuel tank to avoid damaging the painted surface.
- Loosen the front fork lower clamp bolts.
- Remove the cap and loosen the stem head nut.
- Remove the lower fairing.
- Using a jack under the engine, lift the front wheel off the ground.
- Loosen the stem locknut all the way with the stem nut wrench (special tool).




A. Stem Head Nut C. Stem Nut Wrench: 57001-1100
B. Stem Locknut

- If the steering is too tight, loosen the stem locknut a fraction of a turn; if the steering is too loose, tighten the locknut a fraction of a turn. Turn the locknut 1/8 turn at a time maximum.
- Tighten the steering stem head nut to the specified torque (see Exploded View).
- Tighten the front fork lower clamp bolts to the specified torque (see Exploded View in Suspension chapter).
- Check the steering again.
- ★If the steering is still too tight or too loose, repeat the adjustment.
- Install the removed parts.

## Steering Removal/Installation

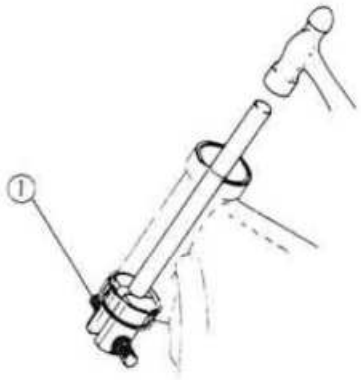
### *Steering Stem Removal*

- Remove the following parts.
  - Fuel Tank
  - Fairing
  - Handlebars
  - Both Front Calipers
  - Front wheel
  - Front Fender
  - Front Fork Legs
- Remove the mounting bolts (2), free the brake hose joint from the stem base, and remove the front brake assembly as a set.
- Remove the cap, stem head nut and flat washer.
- Remove the steering stem head.
- Take off the lockwasher.
- Push up on the stem base, and remove the steering stem locknut with the stem cap using the stem nut wrench (special tool). Remove the O-ring, then remove the steering stem and stem base (single unit).
- Remove the upper tapered roller bearing inner race.
- To remove the outer races pressed into the head pipe, install the stem bearing remover (special tool) as shown below, and hammer the stem bearing remover to drive it out.

**NOTE**

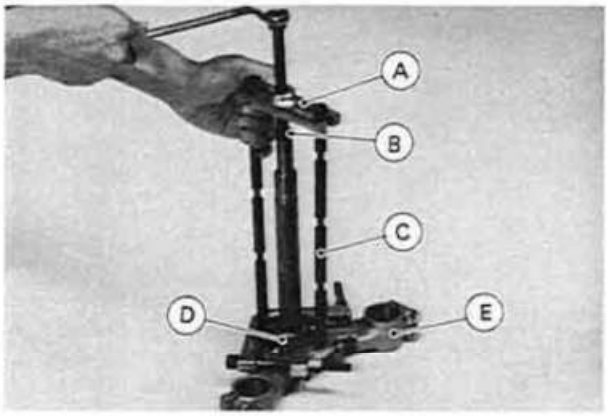
*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*

**Outer Race Removal**




1. Stem Bearing Remover: 57001-1107

- Remove the lower inner race (with its grease seal) which is pressed onto the steering stem, with the steering stem bearing puller and adapters (special tools).

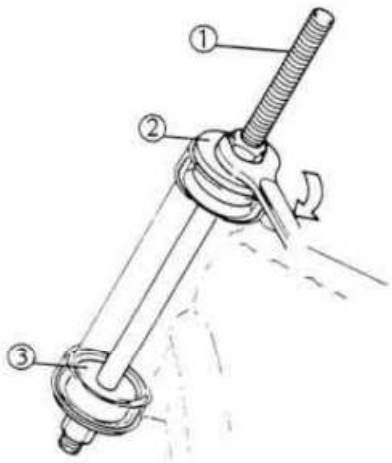



A. Bearing Puller: 57001-158
B. Adapter: 57001-317
C. Pole: 57001-1190
D. Bearing Inner Race
E. Stem Base

### *Steering Stem Installation*

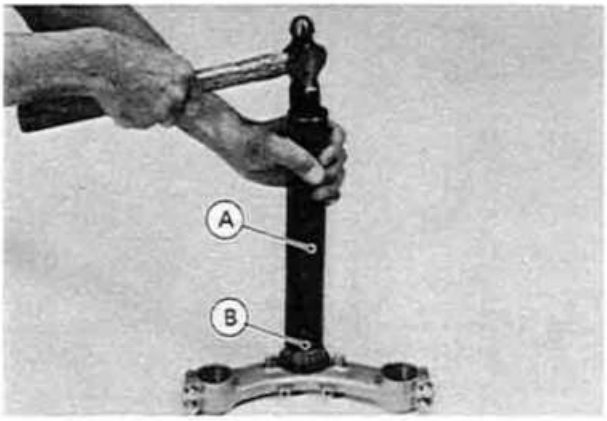
- Apply grease to the outer races, and then drive them into the head pipe using the drivers and the driver press shaft (special tools).

**Outer Race Installation**



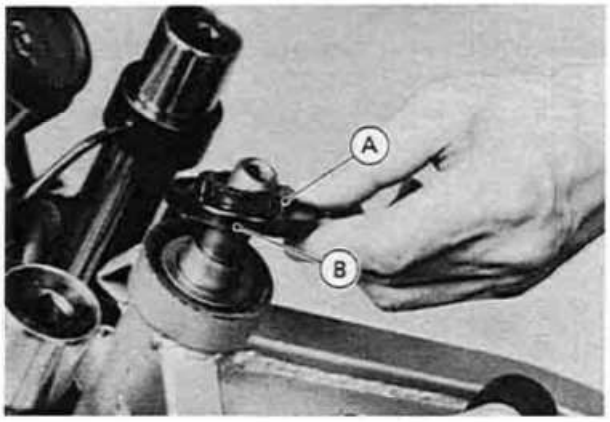

1. Driver Press Shaft: 57001-1075
2. Driver: 57001-1106
3. Driver: 57001-1076

- Apply grease to the lower tapered roller bearing, and drive it onto the steering stem using the stem bearing driver and adapter (special tools).




A. Stem Bearing Driver: 57001-137
B. Adapter: 57001-1074

- Apply grease to the upper tapered roller bearing and put it on the outer race.
- Replace the O-ring with the new one.
- Install the steering stem and the stem locknut (with stem cap) so that the cap side face down.



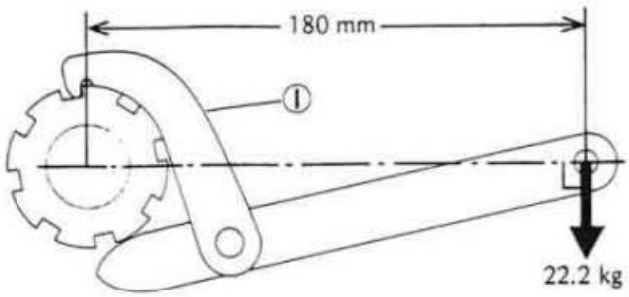

A. Stem Locknut B. Stem Cap

- Install the lockwasher, steering stem head, washer, and nut. Loosely install the nut at this time.

The following four steps should be performed after steering bearing installation. This procedure settles the bearings in place.

- Using the stem nut wrench, tighten the stem locknut to 39 N-m (4.0 kg-m, 29 ft-lb) of torque. (To tighten the steering stem locknut to the specified torque, hook the wrench on the stem locknut, and pull the wrench at the hole by 22.2 kg force in the direction shown).
- Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
- Again back out the stem locknut a fraction of a turn until it turns lightly.

**Torquing Stem Locknut**




1. Stem Nut Wrench: 57001-1100

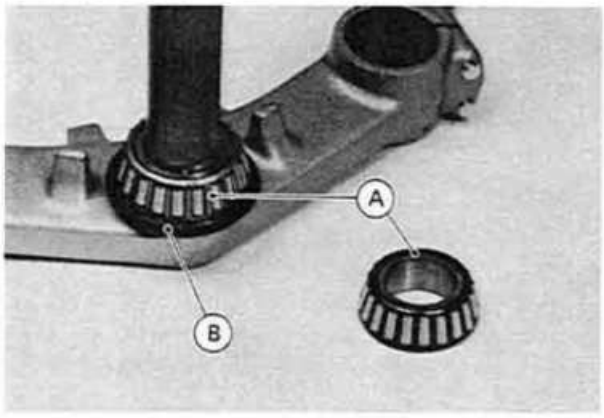
- Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.
- Adjust the steering (see Steering Adjustment).
- Reinstall the following parts.
  - Front Fork Legs
  - Front Fender
  - Front Wheel
  - Both Front Calipers
  - Handlebars
  - Fairing
  - Fuel Tank
- Route the cables and harnesses correctly. The cables and wiring harnesses must not hinder handlebar movement.
- Check and adjust the following items.
  - Front brake
  - Clutch
  - Throttle cable
  - Rear view mirrors
  - Headlight aim

## Steering Maintenance

### *Steering Stem Bearing Lubrication*

In accordance with the Periodic Maintenance Chart, lubricate the steering stem bearings.

- Remove the steering stem.
- Using a high flash-point solvent, wash the upper and lower tapered roller bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★Replace the bearing assemblies if they show wear or damage.
- Pack the upper and lower tapered roller bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem, and adjust the steering.




A. Steering Stem (tapered roller) Bearings
B. Grease Seal

### *Bearing Wear, Damage*

- Using a high flash-point solvent, wash the upper and lower tapered rollers in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
- Visually check the outer races and the rollers.
- ★Replace the bearing assemblies if they show damage.

### *Stem Cap Deterioration, Damage*

- Remove the stem cap with stem locknut, and then separate them.
- Inspect the grease seal for any signs of deterioration or damage.
- ★Replace the stem cap if necessary.

### *Steering Stem Warp*

- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.
- ★If the steering stem shaft is bent, replace the steering stem.

# Frame

## Table of Contents


**Exploded View** ..... 14-2

**Fairings** ..... 14-5

*Lower Fairing Removal* ..... 14-5

*Upper Fairing Removal* ..... 14-5

*Fairing Stay Removal* ..... 14-6

*Fairing Stay Installation Notes* ..... 14-6

*Upper Fairing Installation Note* ..... 14-7

*Lower Faring Installation Note* ..... 14-7

**Fenders** ..... 14-7

*Front Fender Removal* ..... 14-7

*Front Fender Installation Note* ..... 14-7

*Rear Fender Removal* ..... 14-7

*Rear Fender Installation Note* ..... 14-9

**Footpeg and Bracket** ..... 14-9

*Left Footpeg and Bracket Removal* ..... 14-9

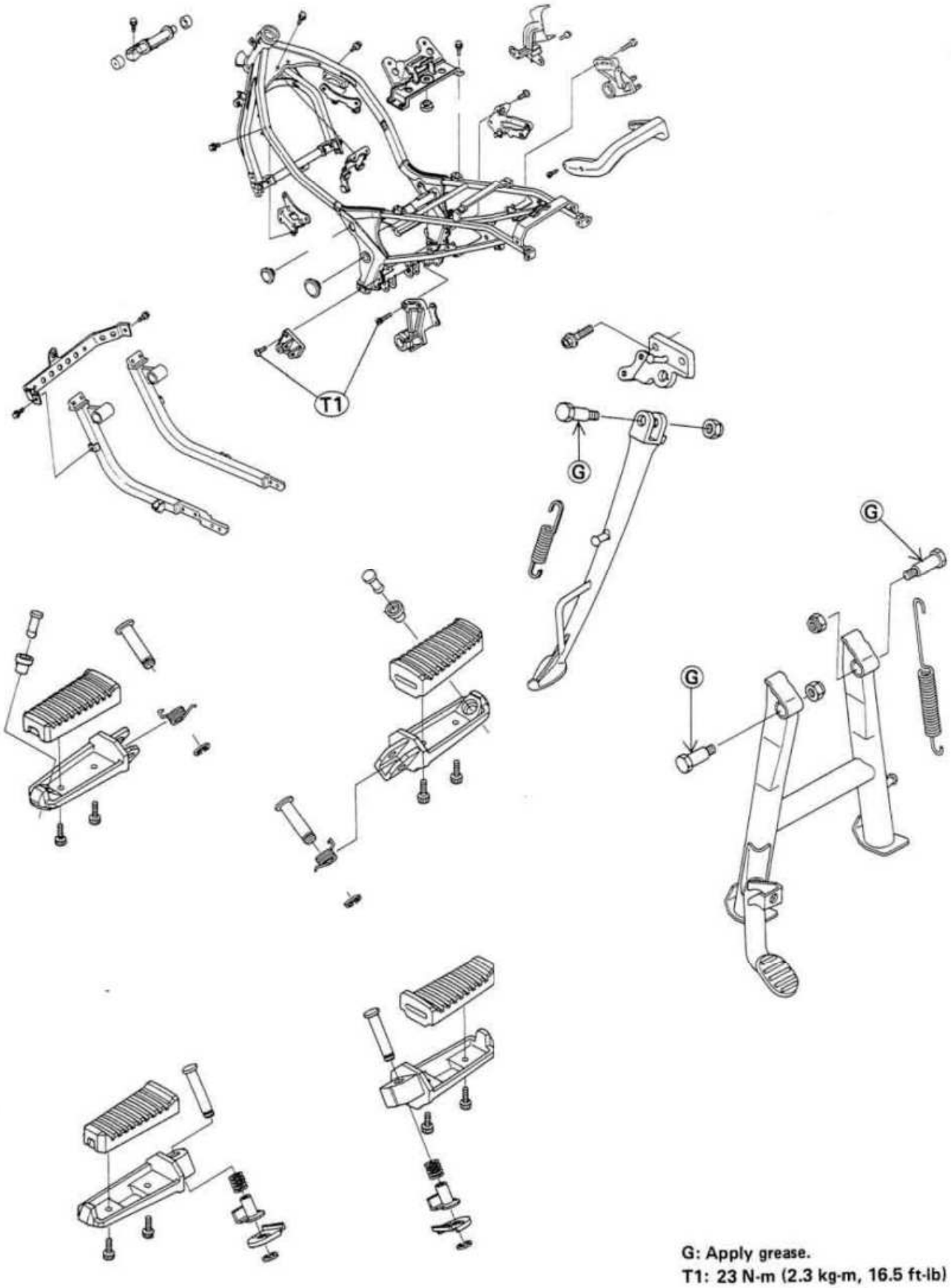
*Left Footpeg and Bracket Installation* ..... 14-9

*Right Footpeg and Bracket Removal* ..... 14-9

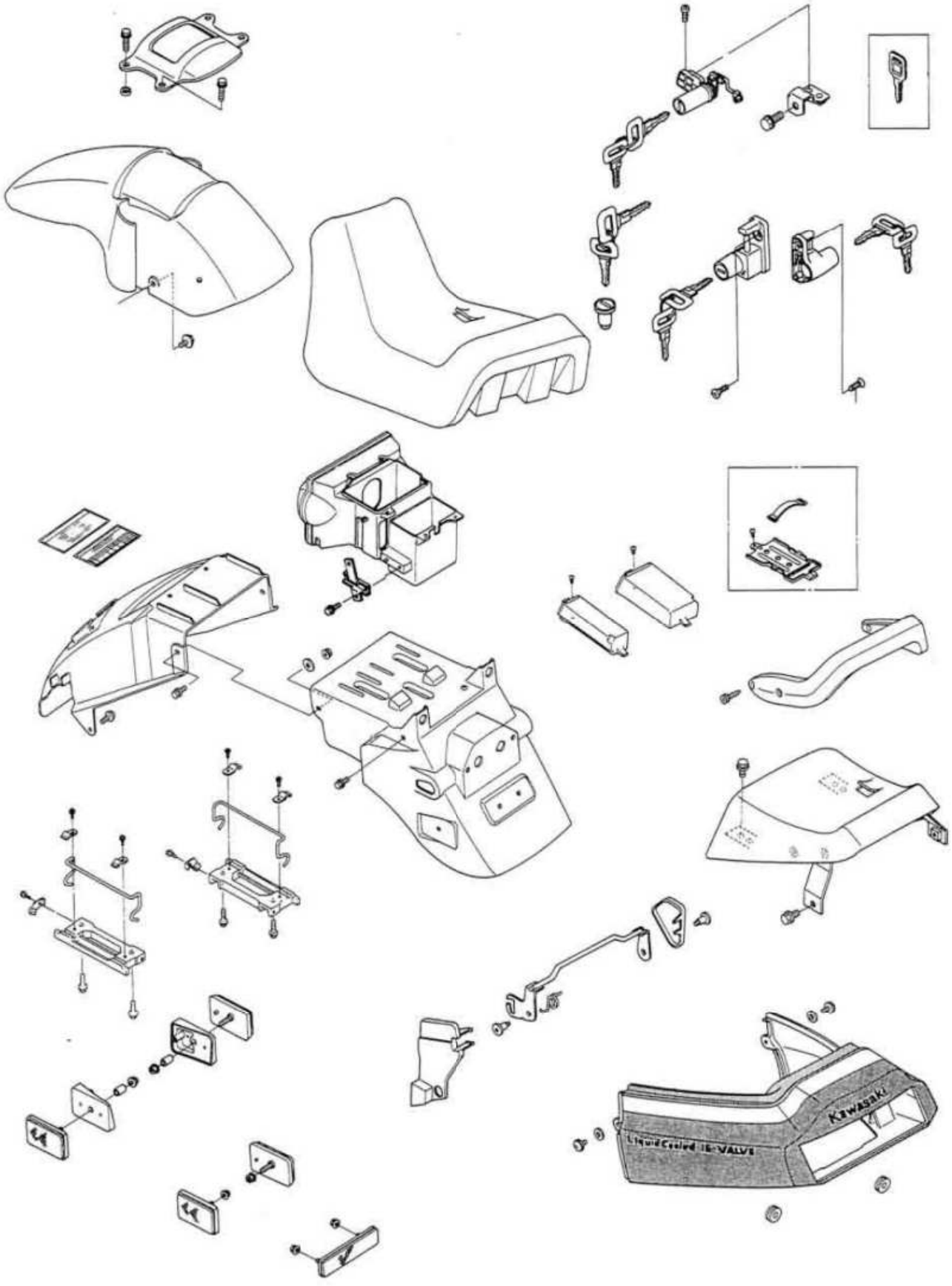
*Right Footpeg and Bracket Installation Notes* ..... 14-10

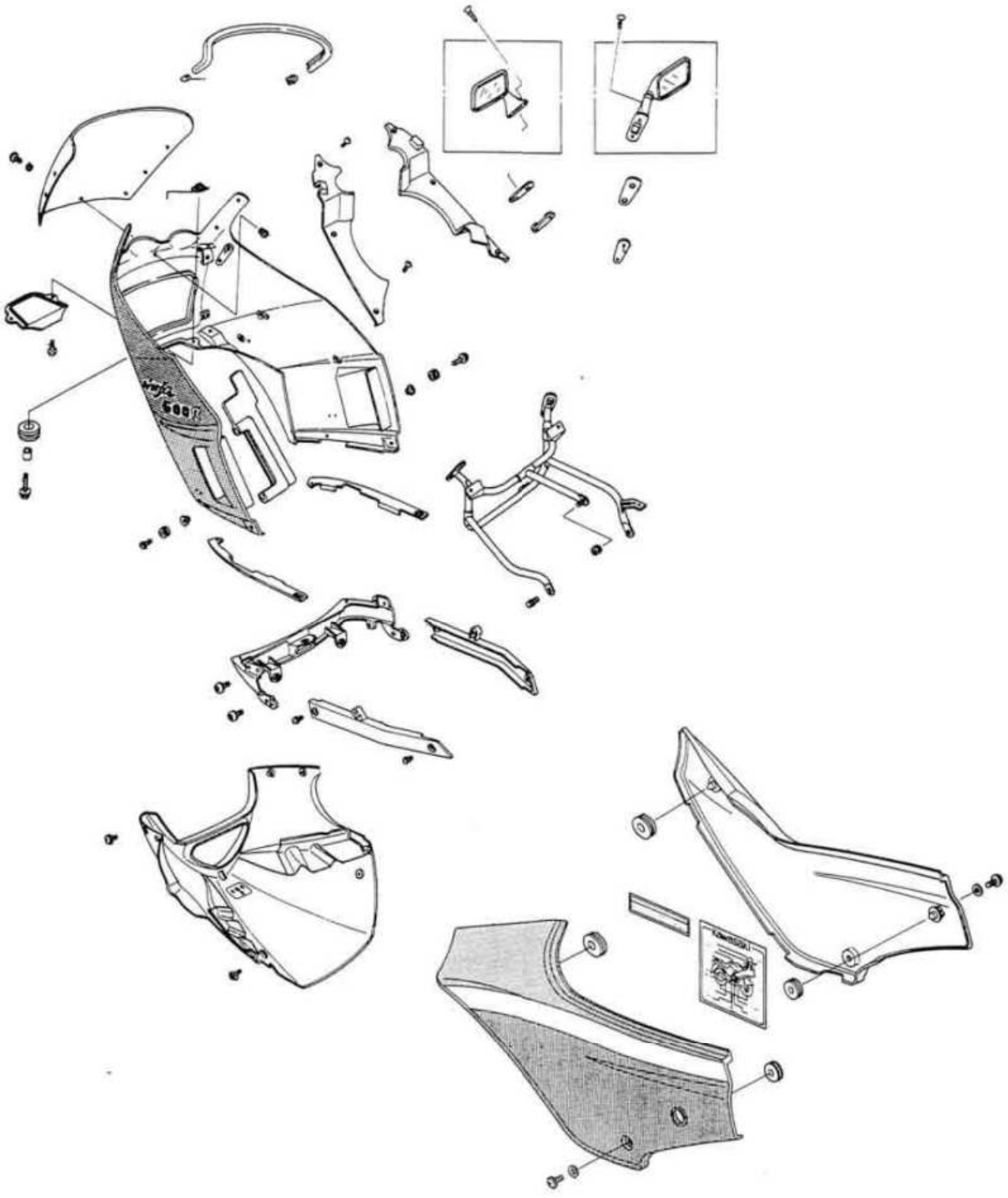
**Suggested Cable or Hose Routing** ..... 14-10

## Exploded View




G: Apply grease.
T1: 23 N-m (2.3 kg-m, 16.5 ft-lb)

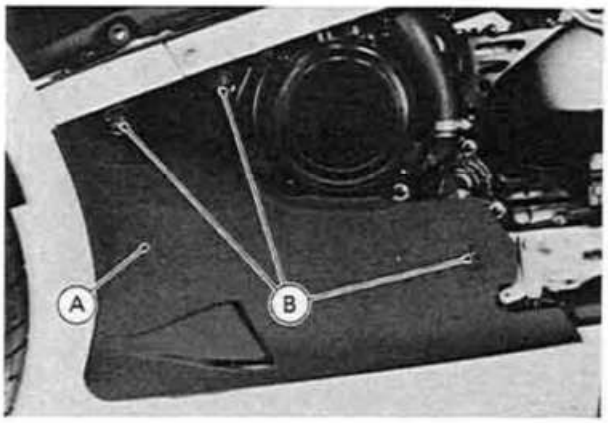

Kawasaki
Liquid-Cooled 4-VALVE



## Fairings

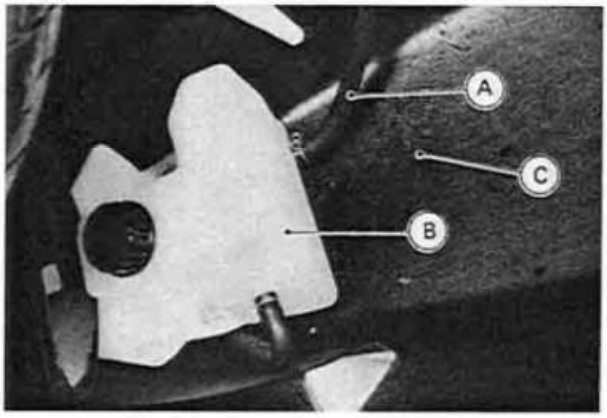
### *Lower Fairing Removal*

●Remove the mounting screws from the lower fairing.




A. Lower Fairing B. Mounting Screws

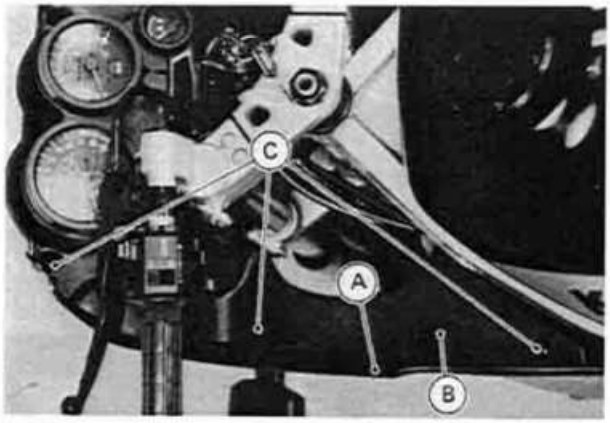
●Take off the lower fairing with reservoir tank, and pull the tube end off the tank.




A. Reservoir Tank Tube C. Lower Fairing
B. Reservoir Tank

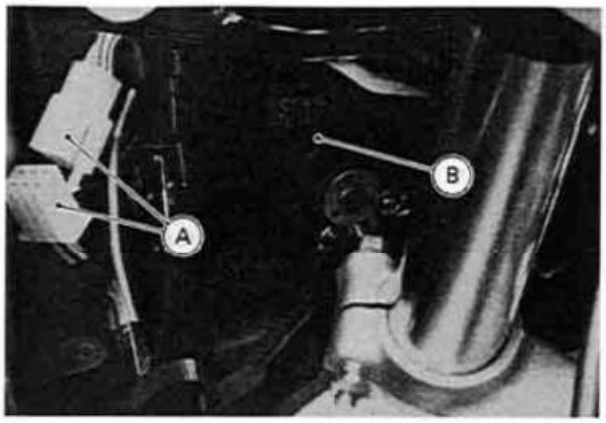
### *Upper Faring Removal*

●Remove the inner fairing mounting screws, and remove the left and right inner fairings.



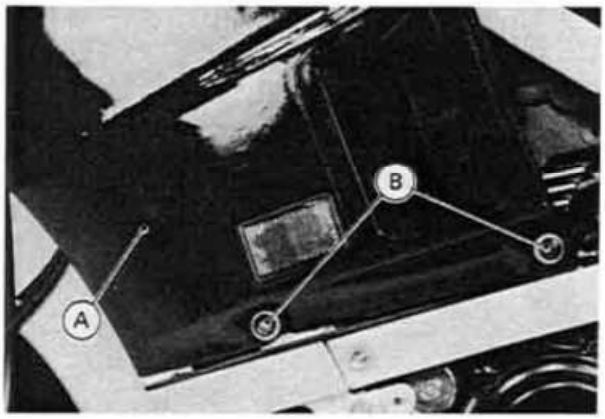

A. Upper Fairing C. Mounting Screws
B. Left Inner Fairing Half

●Disconnect the headlight wire connector.



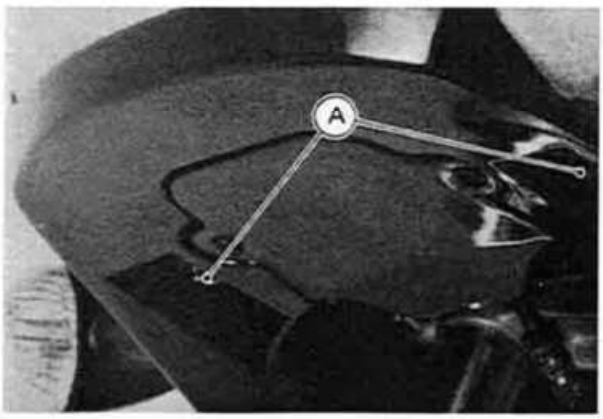

A. Connector B. Headlight

●Remove the upper fairing mounting screws.



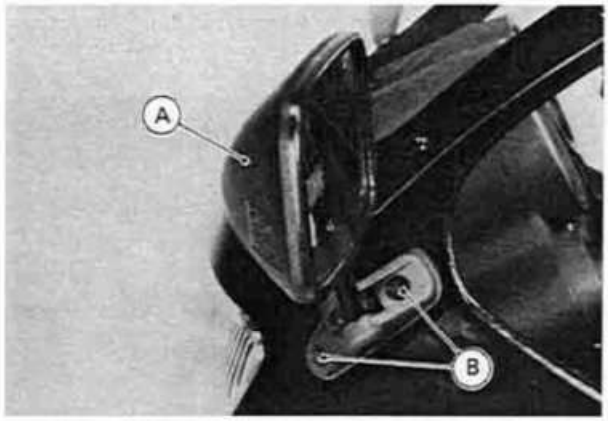

A. Upper Fairing B. Mounting Screws

●Remove the upper fairing mounting bolts.




A. Mounting Bolts

●Remove the rear view mirror mounting screws, and take off the left and right mirrors.

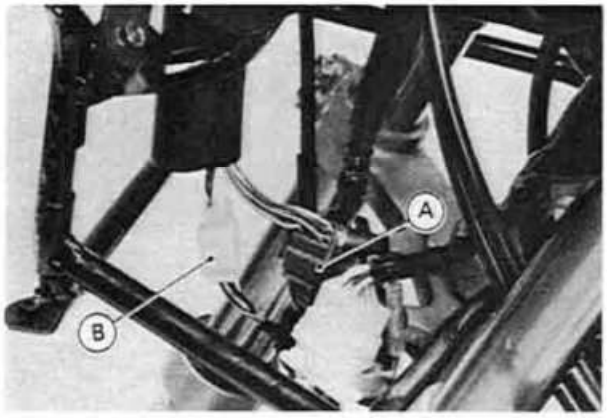



A. Rear View Mirror B. Mounting Screws

•Remove the fairing toward the front, disconnecting the headlight wiring connector from the headlight unit.

*Fairing Stay Removal*

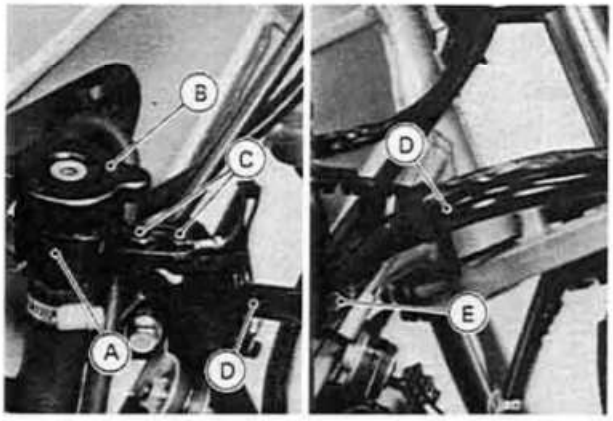
•Disconnect the meter wiring connectors (9-pin: Brown, 4-pin: White).




A. 9-pin Connector B. 4-pin Connector

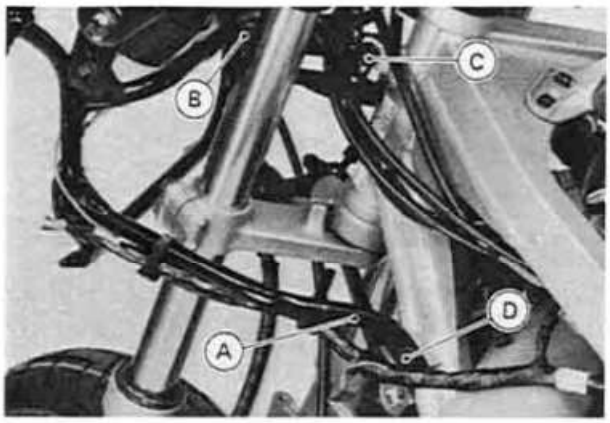
•Remove the speedometer cable lower end.

•Remove the radiator cap, and remove the radiator filler mounting bolts, then remove the right side fairing stay mounting bolt.




A. Radiator Filler
B. Radiator Cap
C. Mounting Bolts
D. Right Fairing Stay
E. Mounting Bolt

•Remove the left side fairing stay mounting bolt and center fairing stay mounting nut.

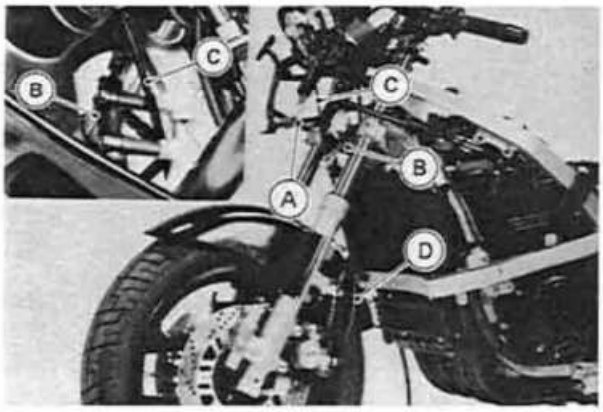



A. Left Fairing Stay C. Mounting Nut
B. Center Fairing Stay D. Mounting Bolt

•Remove the fairing stay with meter assembly toward the front.

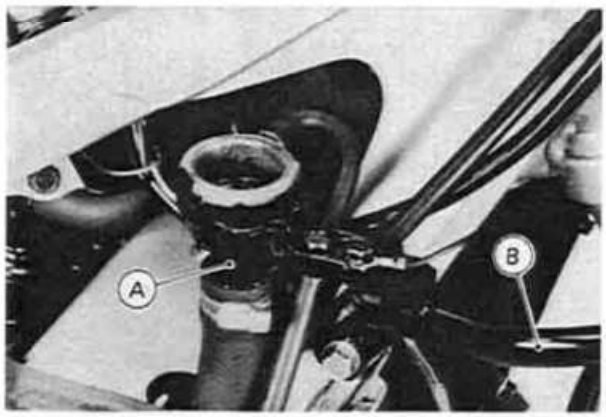
*Fairing Stay Installation Notes*

•Route the speedometer cable as shown.




A. Fairing Stay C. Speedometer Cable
B. 2-Way joint D. Cable Guide

•When the radiator filler is installed, tighten the mounting bolts securely.




A. Radiator Filler B. Fairing Stay

•Connect the meter wiring connectors.

*Upper Fairing Installation Note*

•Connect the headlight wiring connectors before fairing installation.

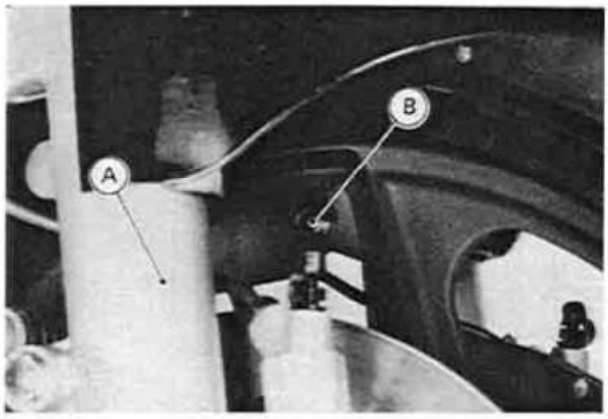
*Lower Fairing Installation Note*

•Connect the reservoir tank tube before fairing installation.

## Fenders

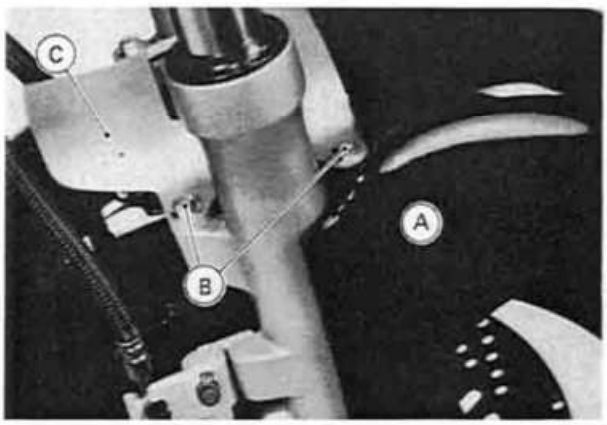
*Front Fender Removal*

•Remove the speedometer cable lower end, and pull it out of the cable guide.
•Remove the fender inside mounting bolts.




A. Fork Leg B. Mounting Bolt

•Remove the fender mounting bolts, and take off the brace.

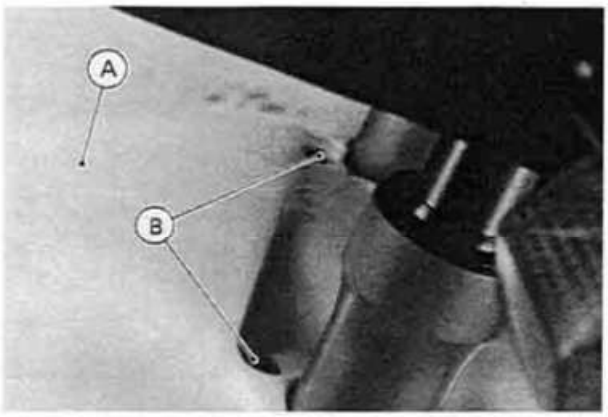



A. Front Fender C. Brace
B. Mounting Bolts

•Remove the fender toward the front.

*Front Fender Installation Note*

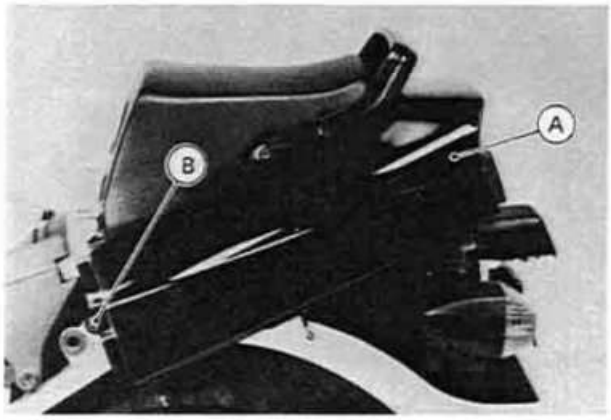
•There are spacers on the fender mounting bolt holes (front left and right).




A. Front Fender B. Spacer

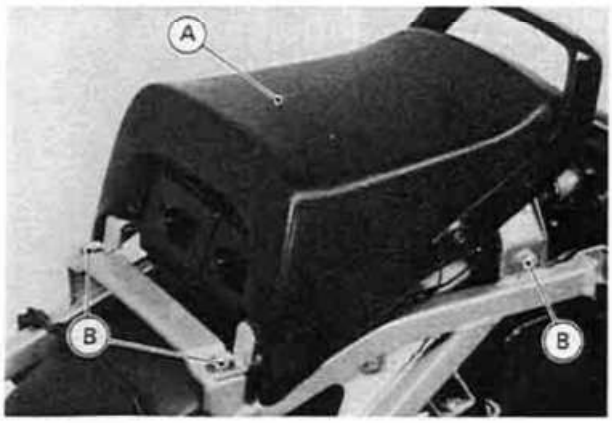
*Rear Fender Removal*

•Remove the rider's seat.
•Remove the left and right side covers.
•Remove the seat cover mounting screws, and take off the cover toward the rear.



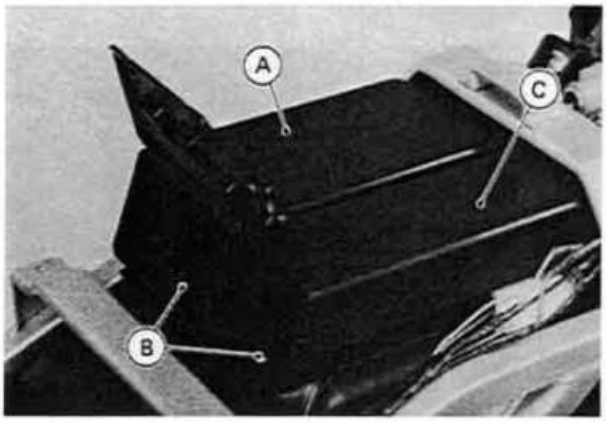

A. Seat Cover B. Mounting Screw

•Remove the passenger seat mounting bolts, and take off the seat toward the front.



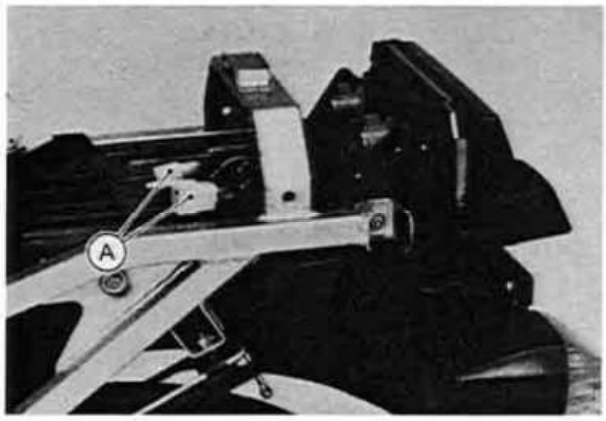

A. Passenger Seat B. Mounting Bolts

•Remove the tool and document container mounting screws, and take the containers off the rear fender.



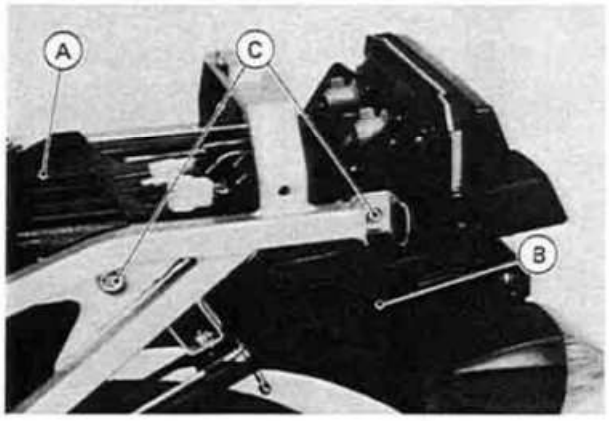

A. Document Container C. Tool Container
B. Mounting Screws

•Disconnect the connectors at the tail/brake and turn signal light lead.



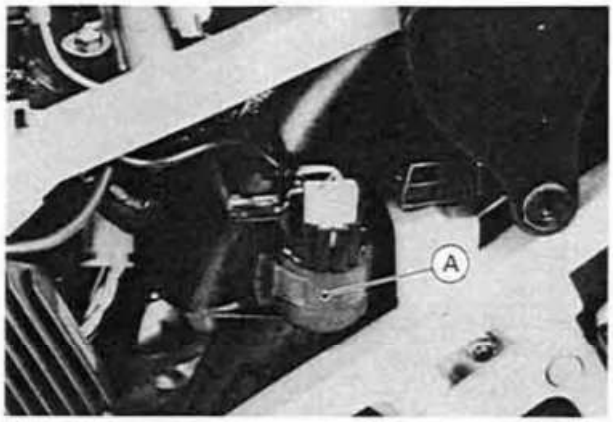

A. Connectors

•Remove the rear fender mounting bolts, and remove the rear fender rear section toward the rear with tail/brake light and license plate light.



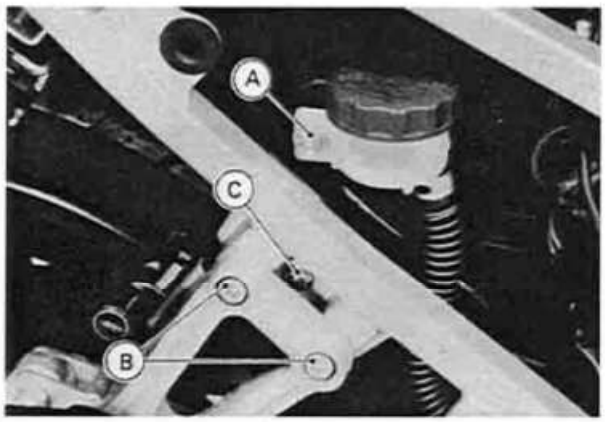

A. Rear Fender Front Section C. Mounting Bolts
B. Rear Fender Rear Section

•Remove the starter relay from the left side of the rear fender front section.



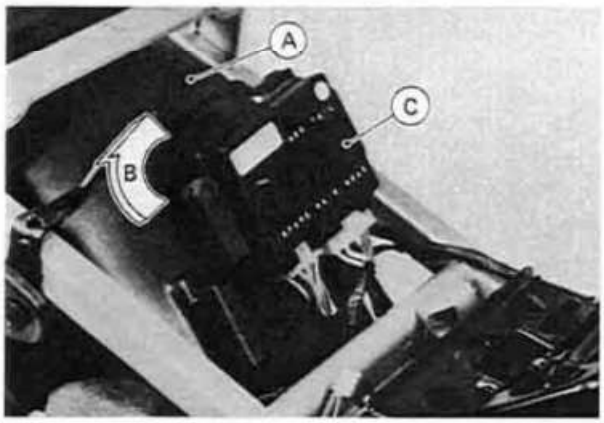

A. Starter Relay

•Remove the rear brake reservoir mounting bolt and free the reservoir.




A. Reservoir Mounting Bolt C. Mounting Nut
B. Footpeg Bracket Bolts

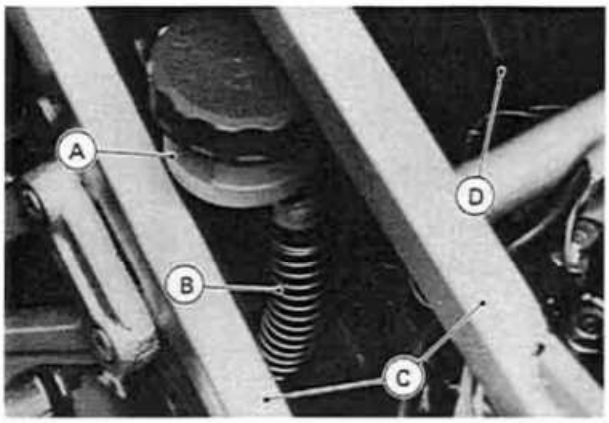
•Remove the rear footpeg bracket bolts and allow the muffler with footpeg bracket to hang free.
•Remove the rear fender front section mounting nuts, and push down the fender toward the wheel.
•Slide the junction box toward the rear and out of place, and take off the rear fender front section.




A. Rear Fender Front Section C. Junction Box
B. Removal

*Rear Fender Installation Note*

•Route the rear brake hose as shown.

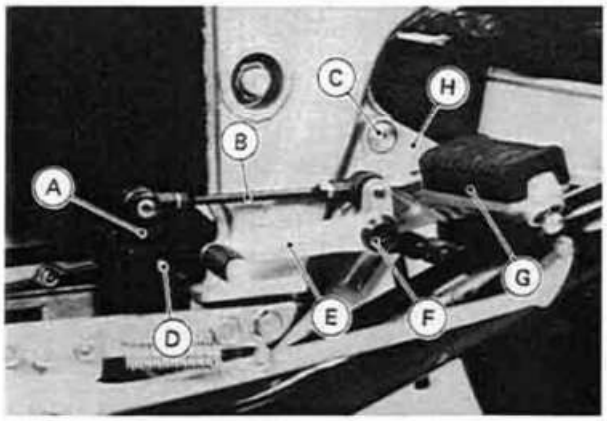



A. Reservoir
B. Brake Hose
C. Frame
D. Rear Fender Front Section

## Footpeg and Bracket

*Left Footpeg and Bracket Removal*

•Remove the shift lever clamp bolt, and pull off the lever.




A. Shift Lever
B. Link Rod
C. Mounting Bolt
D. Clamp Bolt
E. Shift Pedal
F. Mounting Bolt
G. Footpeg
H. Bracket

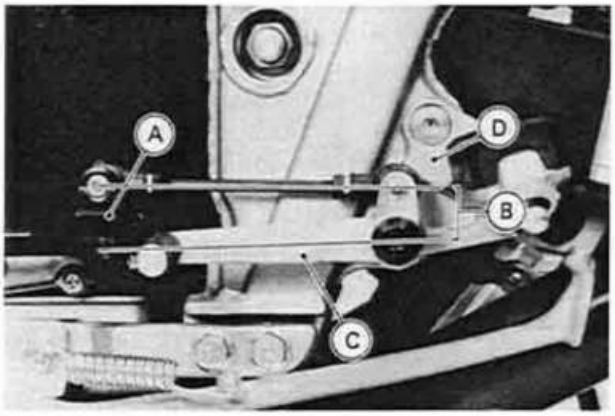
•Remove the shift pedal mounting bolt, and take off the shift pedal with the shift lever.

•Remove the footpeg bracket mounting bolt, and take off the bracket with the footpeg, and then separate them.

*Left Footpeg and Bracket Installation*

•When installing the shift pedal, be careful of the following items.

○Attach the shift pedal to the footpeg bracket as shown.



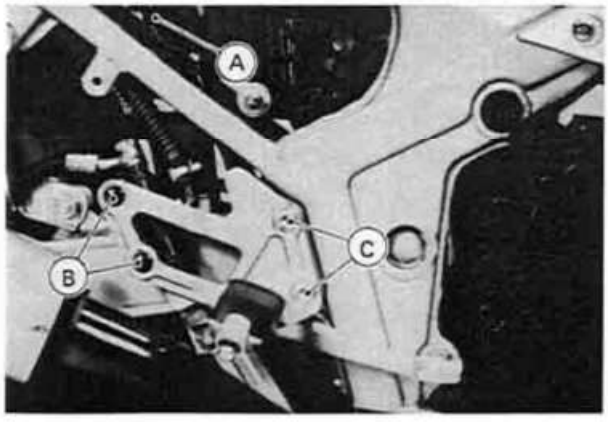

A. Shift Lever
B. Correct Position
C. Shift Pedal
D. Bracket

○Do not install the shift lever upside down.

*Right Footpeg and Bracket Removal*

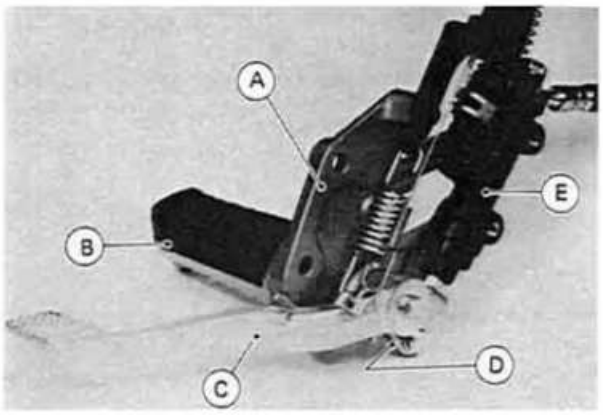
•Disconnect the rear brake light switch lead connector.

•Loosen the rear master cylinder mounting bolts, and remove the right footpeg bracket mounting bolts.




A. Connector
B. Master Cylinder Mounting Bolt
C. Footpeg Bracket Mounting Bolts

•Push the bracket toward the rear, and take off the bracket assembly.



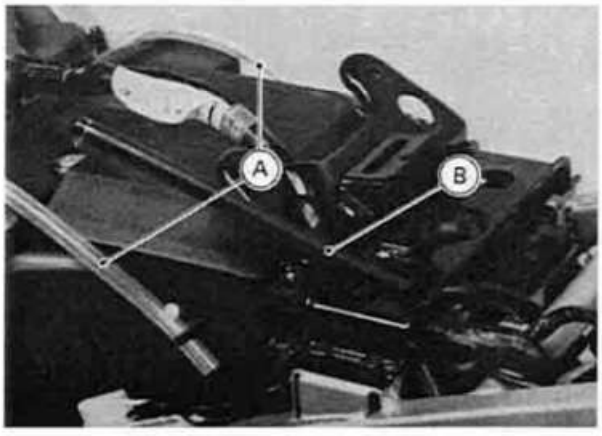

A. Footpeg Bracket
B. Footpeg
C. Brake Pedal
D. Cotter Pin
E. Master Cylinder

- Remove the following parts after right footpeg bracket removal.
  - Rear Master Cylinder
  - Rear Brake Pedal
  - Rear Brake Light Switch and Switch Bracket
- Separate the footpeg and bracket.

### *Right Footpeg and Bracket Installation Notes*

- Tighten the rear master cylinder mounting bolts securely after installing the footpeg bracket.
- Check and adjust the following items after installation.
  - Brake pedal position (see Brake Pedal Position Inspection in Brakes chapter).
  - Rear brake light switch (see Rear Brake Light Switch Adjustment in Electrical chapter).

## Suggested Cable or Hose Routing




A. Carburetor Air Vent Tube
B. Fuel Tank Breather Tube

# Electrical System

## Table of Contents


**Precautions** . . . . . 15-2
**Wiring Diagram (US and Canada)** . . . . . 15-3
**Wiring Diagram (Other than US and Canada)** . . . . . 15-4
**Exploded View** . . . . . 15-5
**Specifications** . . . . . 15-8
**Special Tools** . . . . . 15-9
**Sealant** . . . . . 15-10
**Battery** . . . . . 15-10
**Precautions:** . . . . . 15-10
**Electrolyte:** . . . . . 15-10
*Electrolyte Level Inspection* . . . . . 15-10
**Battery Charging:** . . . . . 15-10
*Battery Condition* . . . . . 15-10
*Battery Initial Charging* . . . . . 15-11
*Battery Ordinary Charging* . . . . . 15-11
*Battery Test Charging* . . . . . 15-12
**Charging System** . . . . . 15-13
*Alternator Rotor Removal* . . . . . 15-13
*Alternator Rotor Installation Notes* . . . . 15-13
*Stator Coil Removal* . . . . . 15-13
*Stator Coil Installation Notes* . . . . . 15-14
*Alternator Inspection* . . . . . 15-14
*Rectifier Inspection* . . . . . 15-15
*Regulator Inspection* . . . . . 15-15
*Regulator/Rectifier Output Voltage Inspection* . . . . . 15-17
**Ignition System** . . . . . 15-17
**Safety Instructions:** . . . . . 15-17
*Pickup Coil Removal* . . . . . 15-17
*Pickup Coil Installation Notes* . . . . . 15-18
*Ignition Coil Removal* . . . . . 15-18
*Ignition Coil Installation Notes* . . . . . 15-18
*Pickup Coil Inspection* . . . . . 15-21
*Ignition Coil Inspection* . . . . . 15-21
*Spark Plug Cleaning Inspection* . . . . . 15-22
*Spark Plug Gap* . . . . . 15-22
*IC Igniter Inspection* . . . . . 15-22
**Electric Starter System** . . . . . 15-23
*Starter Motor Removal* . . . . . 15-23
*Starter Motor Installation Notes* . . . . . 15-23
*Starter Motor Disassembly* . . . . . 15-24
*Starter Motor Assembly Notes* . . . . . 15-24
*Brush Inspection* . . . . . 15-26
*Brush Spring Inspection* . . . . . 15-26
*Commutator Cleaning and Inspection* . . . . . 15-26
*Armature Inspection* . . . . . 15-26
*Brush Plate Inspection* . . . . . 15-27
*Brush and Lead Assembly Inspection* . . . 15-27
*Starter Relay Inspection* . . . . . 15-27
**Lighting System** . . . . . 15-27
*Headlight Beam Horizontal Adjustment* . . . . . 15-27
*Headlight Beam Vertical Adjustment* . . . 15-28
*Headlight Bulb Replacement Notes* . . . . 15-30
*Tail/Brake Light Bulb Replacement Notes* . . . . . 15-30
*Tail/Brake Light Lens Removal/ Installation Note* . . . . . 15-30
*Turn Signal Light Bulb Replacement Note* . . . . . 15-30
*License Plate Light Bulb Replacement Notes* . . . . . 15-30
**Inspection:** . . . . . 15-31
*Headlight Reserve Lighting System Inspection* . . . . . 15-31
**Cooling Fan System** . . . . . 15-31
*Fan System Circuit Inspection* . . . . . 15-31
*Fan Inspection* . . . . . 15-31
*Fan Relay Inspection* . . . . . 15-31
**Meters and Gauges** . . . . . 15-32
*Meter and Gauge Removal/ Installation Note* . . . . . 15-32
*Bulb Replacement Notes* . . . . . 15-32
*Tach/Voltmeter Inspection* . . . . . 15-32
*Fuel Gauge Operation Inspection* . . . . . 15-33
*Water Temperature Gauge Operation Inspection* . . . . . 15-33
**Switches and Sensors** . . . . . 15-34
*Front Brake Light Testing* . . . . . 15-34
*Rear Brake Light Testing* . . . . . 15-34
*Rear Brake Lighting Position Adjustment* . . . . . 15-34
*Switch Removal Note* . . . . . 15-34
*Switch Inspection* . . . . . 15-34
*Fan Switch Inspection* . . . . . 15-36
*Water Temperature Sensor Inspection* . . . . . 15-36
*Fuel Level Sensor Inspection* . . . . . 15-36
**Junction Box** . . . . . 15-37
*Fuse Removal* . . . . . 15-38
*Fuse Installation Note* . . . . . 15-38
*Fuse Inspection* . . . . . 15-38
*Junction Box Fuse Circuit Inspection* . . . . . 15-38
*Fan, Stater Circuit and Headlight Relay Inspection* . . . . . 15-39
*Diode Circuit Inspection* . . . . . 15-39
**Electrical Wiring** . . . . . 15-39
*Wiring Inspection* . . . . . 15-39

## Precautions

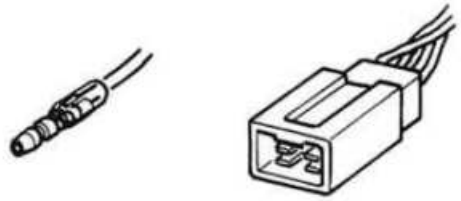
There are numbers of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter switch pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was brough on by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Electrical Connectors

**Female Connectors**



**Male Connectors**

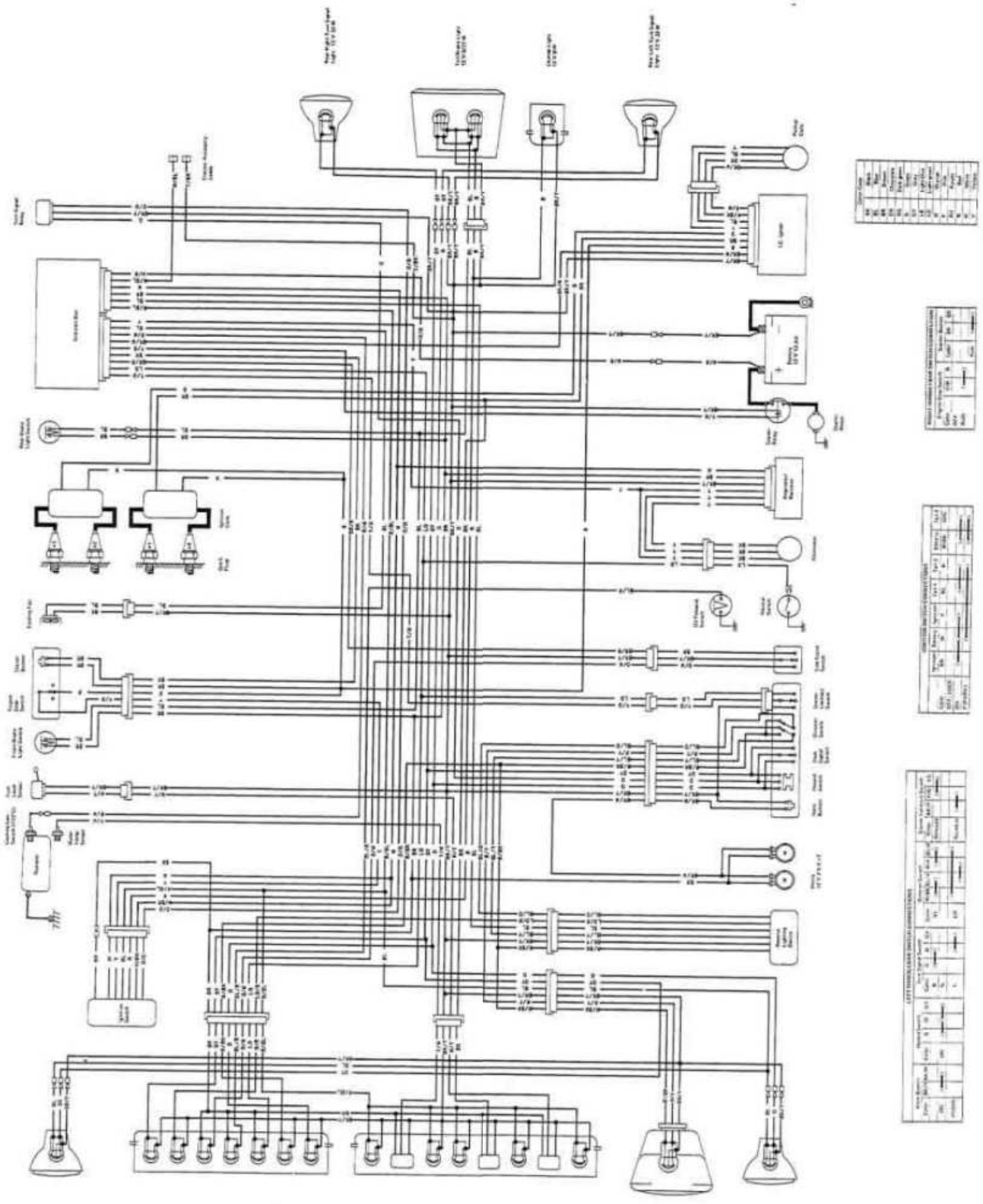


- Color Codes:

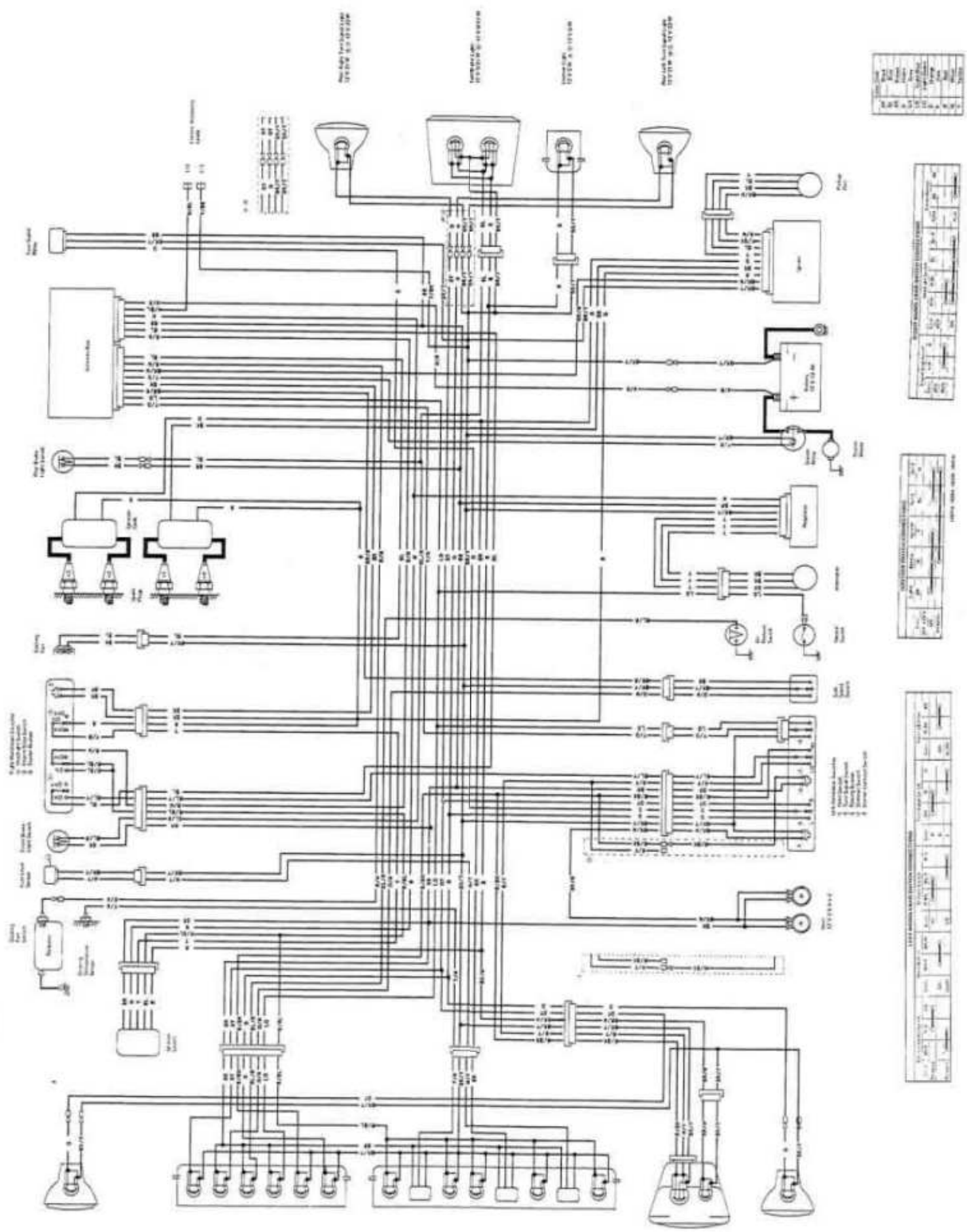
| | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| CH | Chocolate |
| DG | Dark green |
| G | Green |
| GY | Gray |
| LB | Light blue |
| LG | Light green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| W | White |
| Y | Yellow |

- Measure coil and winding resistance when the part is cold (at room temperature).

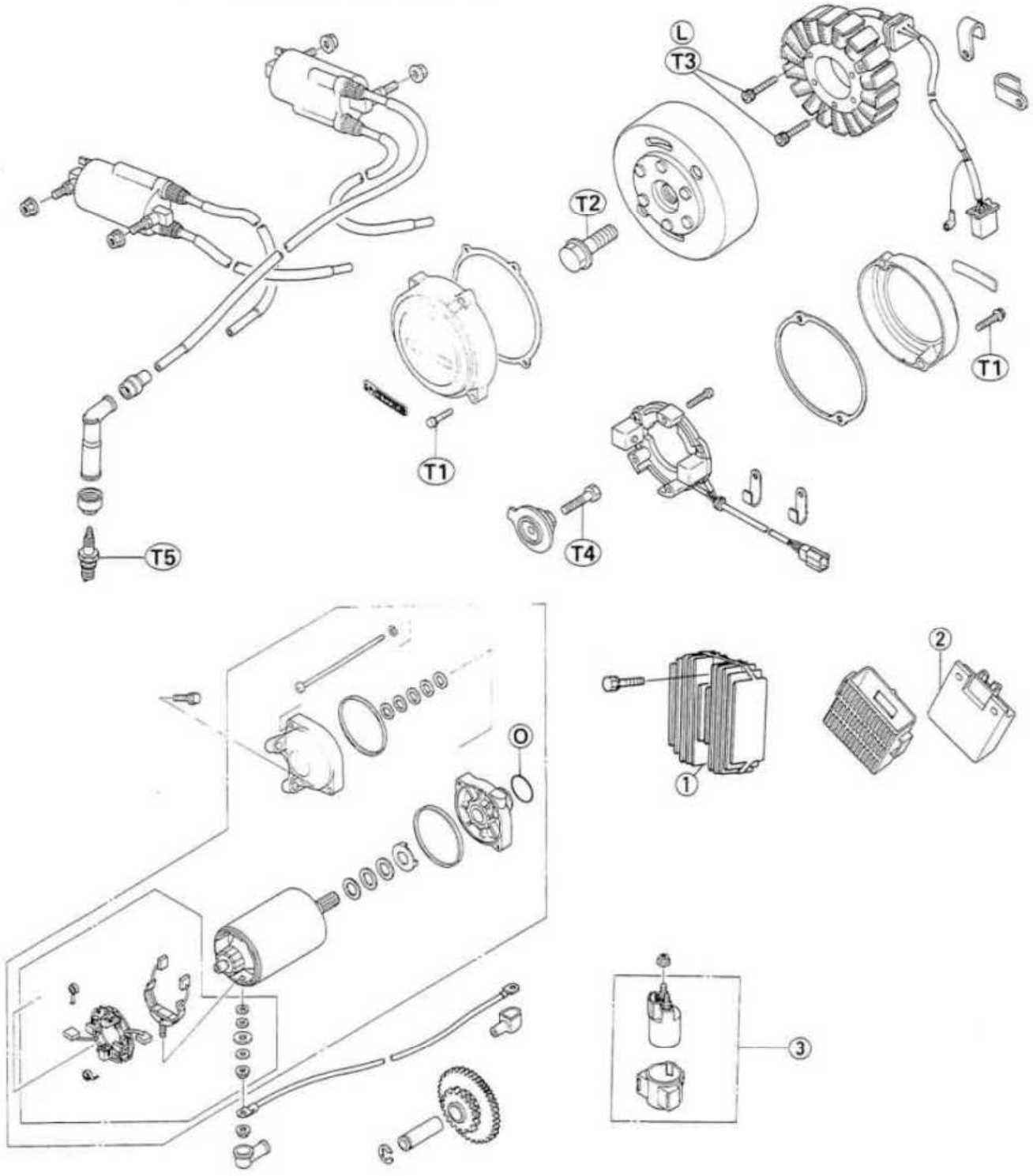
ZX600-A1, A2, A3/ZX600-B1
Wiring Diagram (US and Canada)



ZX500-A1, A2, A3/ZX600-A1, A2, A3, A4
Wiring Diagram (Other than US and Canada)

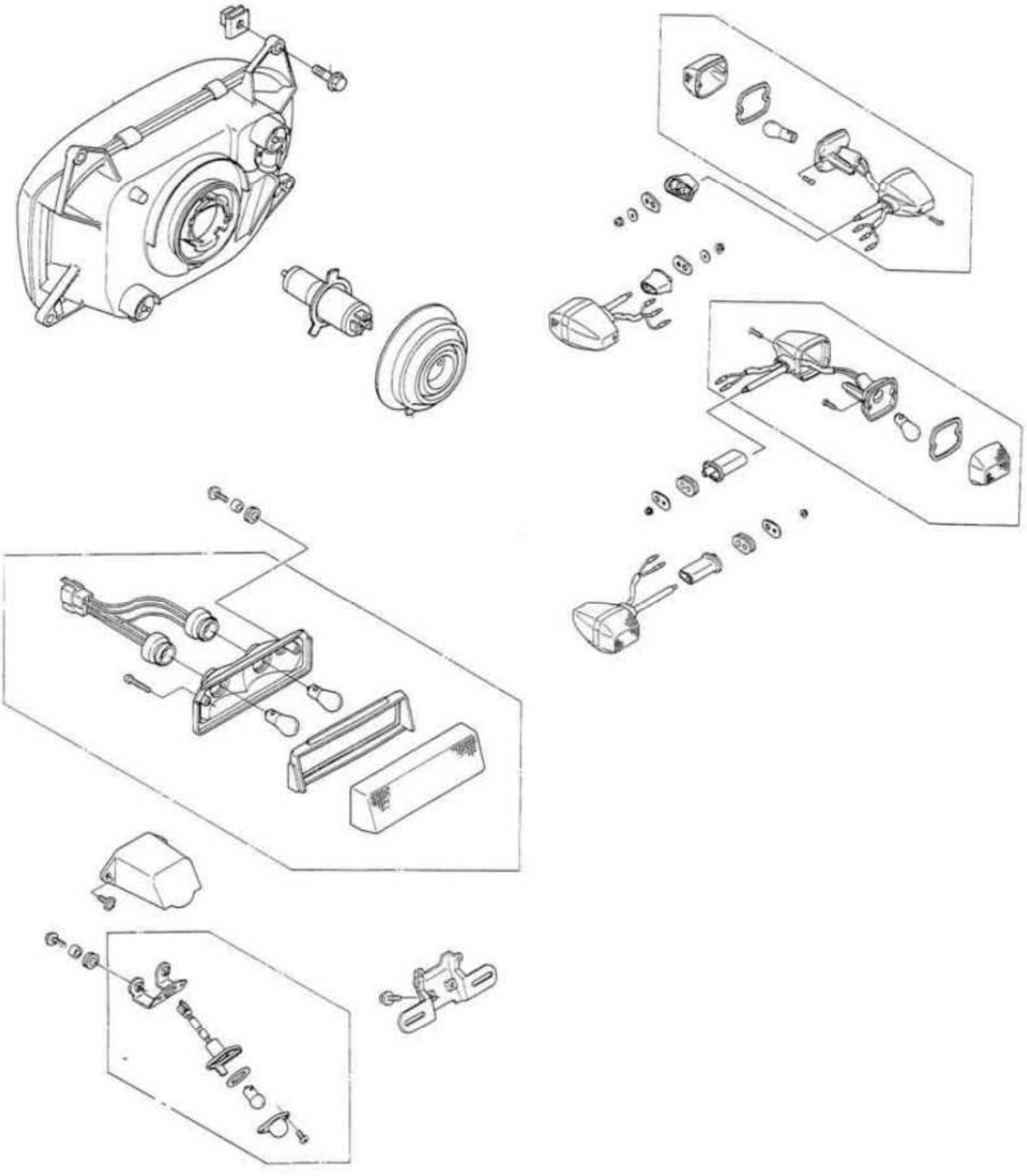


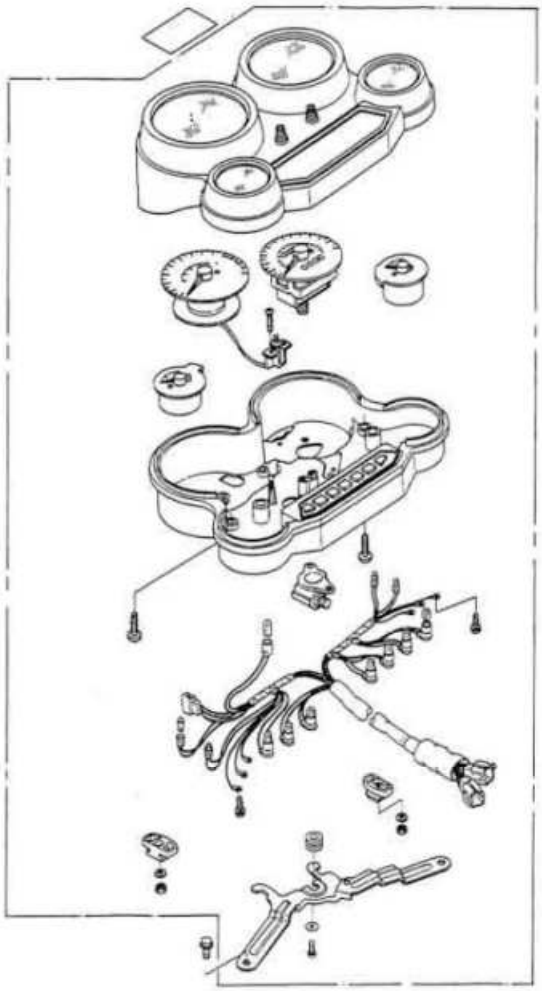
## Exploded View

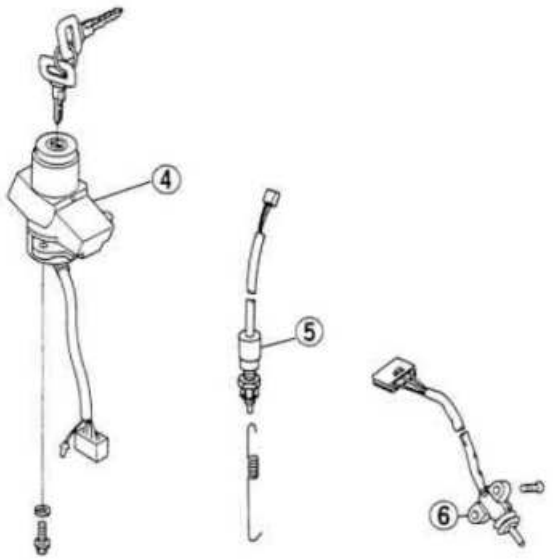


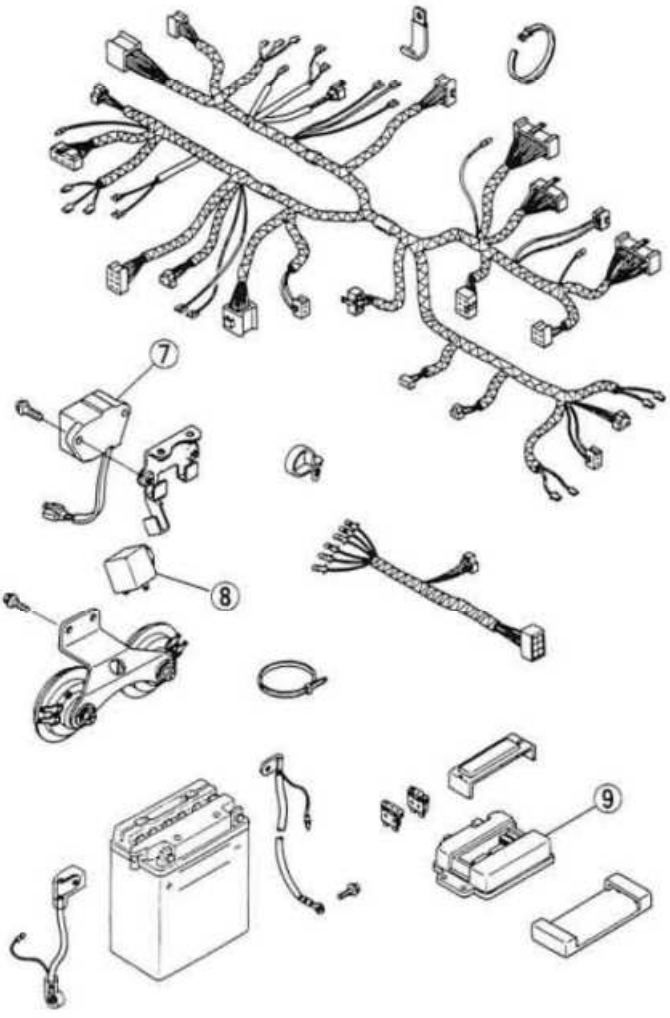

1. Regulator/Rectifire
2. IC Igniter
3. Starter Relay

L : Apply a non-permanent locking agent to the threads.
O : Apply engine oil.
T1 : 4.9 N-m (0.5 kg-m, 43 in-lb)
T2 : 145 N-m (15 kg-m, 110 ft-lb)
T3 : 12 N-m (1.2 kg-m, 104 in-lb)
T4 : 25 N-m (2.5 kg-m, 18 ft-lb)
T5 : 14 N-m (1.4 kg-m, 10 ft-lb)








4. Ignition Switch
5. Brake Light Switch
6. Side Stand Switch
7. Headlight Reserve Lighting Device (US, Canada only)
8. Turn Signal Relay
9. Junction Box

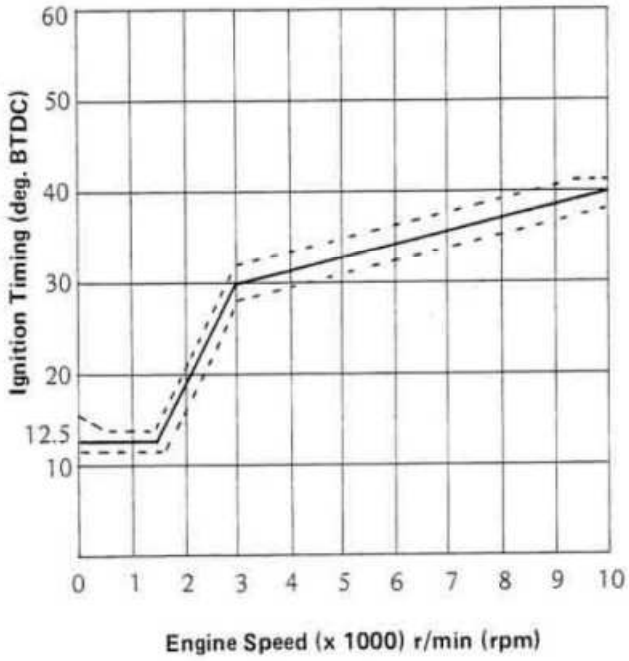
## Specifications

| | |
|---|---|
| **Battery** | |
| Type: | 12 V 12 Ah |
| Specific gravity: | 1.280 @20°C (68°F) |
| Electrolyte amount: | 780 mL, 130 mL (one cell) |
| **Charging System** | |
| Type | Three-phase AC |
| Charging voltage (Regulator/Rectifier output): | 14.5 ±0.5 V @4,000 r/min (rpm) (with Headlight switch ON if applicable) |
| Stator coil resistance: | 0.1 – 0.8 Ω |
| **Ignition System** | |
| Ignition timing: | 12.5° BTDC @1,050 r/min (rpm) – 40° BTDC @10,000 r/min (rpm) |
| | (Cal) 7.5° BTDC @1,250 r/min (rpm) – 35° BTDC @10,000 r/min (rpm) |
| Pickup coil resistance: | 360 – 440 Ω |
| Pickup coil air gap: | 0.5 mm |
| Ignition coil: | |
| 3 needle arcing distance: | 7 mm or more |
| Primary winding resistance: | 1.8 – 2.8 Ω |
| Secondary winding resistance: | 10 – 16 kΩ |
| Spark plug gap: | 0.6 – 0.7 mm |
| **Starter System** | |
| Starter motor: | |
| Carbon brush length: | Standard: 12 mm<br>Service limit: 6 mm |
| Commutator diameter: | Standard: 28 mm<br>Service Limit: 27 mm |

**Switches and Sensors**

| | | |
|---|---|---|
| Rear brake light switch: | On after about 10 mm pedal travel | |
| Fan switch (97°C): | Off → On | 94 – 100°C (201 – 212°F) |
| | On → Off | above 90°C (194°F) |
| Fuel level sensor resistance: | | |
| | Full position 4 – 10 Ω | |
| | Empty position 90 – 100 Ω | |
| Water temperature sensor resistance: | | |
| | 80°C (176°F) about 52 Ω | |
| | 100 °C (212°F) about 27 Ω | |

**Ignition Timing/Engine Speed Relationship**




**Spark Plug**

| | Standard | Low Speed Riding | High Speed Riding |
|---|---|---|---|
| US | NGK D9EA or ND X27ES-U | NGK D8EA or ND X24ES-U | Same as standard |
| Canada | NGK DR8ES or ND X27ESR-U | NGK DR8ES-L or ND X24ESR-U | Same as standard |
| Europe except below | NGK DR8ES or ND X27ESR-U | NGK DR8ES-L or ND X24ESR-U | Same as standard |
| Italy and Other than above | NGK D9EA or ND X27ES-U | NGK D8EA or ND X24ES-U | Same as standard |

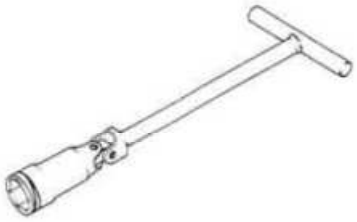
## Special Tools

Along with common hand tools, the following more specialized tools are required for complete electrical system servicing.

**Hand Tester: 57001-983**



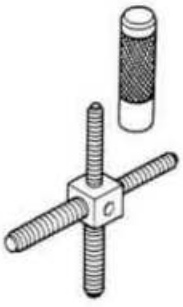
**Spark Plug Wrench: 57001-1024**



**Rotor Holder: 57001-308**



**Rotor Puller: 57001-1216**



**Electro Tester: 57001-980**



**Coil Tester: 57001-1242**

This tool is newly available instead of Electrotester: 57001-980



## Sealant

**Kawasaki Bond (Silicone Sealant): 56019-120**



## Battery

### Precautions:

Following a few simple rules will greatly extend the life of the battery.

○When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.

○Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.

○Avoid quick-charging the battery. A quick-charge will damage the battery plates.

○Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white), and the battery will no longer take a charge.

○Keep the battery well-charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.

○Always keep the battery vent hose free of obstruction, and make sure it does not get pinched, crimped, or melted shut by contact with the hot muffler. If battery gases cannot escape through this hose, they will explode the battery.

○DON'T INSTALL THE BATTERY BACKWARDS. The negative side is grounded.

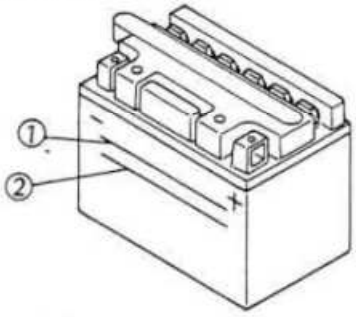
### Electrolyte:

*Electrolyte Level Inspection*

●Remove the battery.

●Visually check the electrolyte level in the battery.

**Battery Electrolyte Level**




1. Upper Level Line
2. Lower Level Line

★If the level line of electrolyte in any cell is below the lower level line on the battery case, add distilled water only to that cell.

●Install the battery.

### Battery Charging:

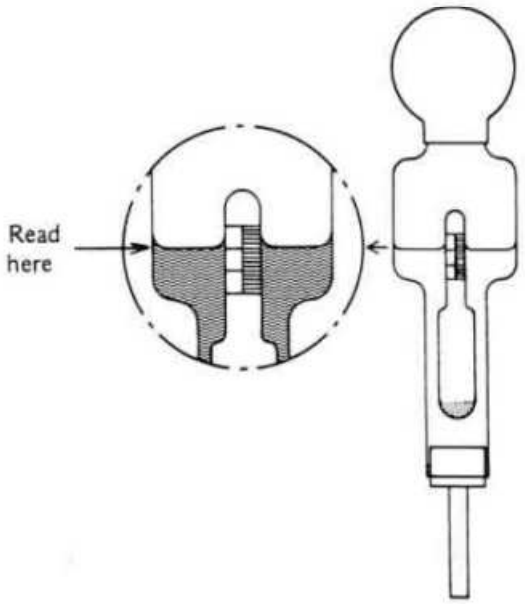
*Battery Condition*

●Before charging, check battery condition by testing the specific gravity of the electrolyte in each cell.

○Draw a little fluid from the cell with a hydrometer.

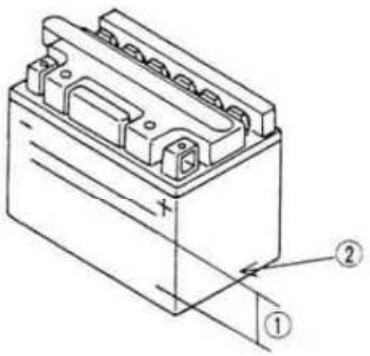
○Read the level of the electrolyte on the floating scale. This is the specific gravity of the electrolyte.

**Hydrometer**




●Look for sediment and white sulfation inside the cells on the bottom of the plates.

**Battery Condition**




1. Sulfation here
2. Sediment here

●See the Battery Troubleshooting Guide in Battery Test Charging.

★If the specific gravity is below 1.220 the battery needs to be charged.

NOTE

○*The specific gravity of the electrolyte varies with changes in temperature, so the specific gravity reading must be corrected for the temperature of the electrolyte.*

○*Celsius: Add 0.007 points to reading for each 10°C above 20°C or subtract 0.007 points for each 10°C below 20°C.*

○*Fahrenheit: Add 0.004 points to reading for each 10°F above 68°F or subtract 0.004 points for each 10°F below 68°F.*

★If the specific gravity of any of the cells is more than 0.050 away from any other reading, the battery will probably not accept a charge. It is generally best to replace a battery in this condition.

★If the specific gravity of all the cells is 1.280 or more, the battery is fully charged.

*Battery Initial Charging*

Before being placed in service, a new battery should be given an initial charging.

- Cut off the sealed end of the battery vent hose and remove the filler caps.
- Fill each cell to the upper level line on the battery case with fresh electrolyte at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

NOTE

○*If the electrolyte level drops, add electrolyte to the upper level line before charging.*

- Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and charge it for 10 hours. For example, if the battery is rated at 12 Ah, the charging rate would be 1.2A.

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

CAUTION

○**Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.**

○**If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.**

- Turn the charger off, then disconnect it from the battery.
- Check battery voltage. Battery voltage should be 12 – 13 V.
- Check the specific gravity of each cell with a hydrometer (see Battery Condition).

★If the voltmeter or hydrometer readings are below those specified, additional charging is necessary before the battery can be installed.

*Battery Ordinary Charging*

- Remove the battery from the motorcycle.

CAUTION

○**Always remove the battery from the motorcycle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the motorcycle.**

- Clean off the battery using a baking soda-and-water solution.

○Mix one heaping tablespoon of baking soda in one cup of water.

○Be careful not to get any of the cleaning solution in the battery.

○The terminals must be especially clean.

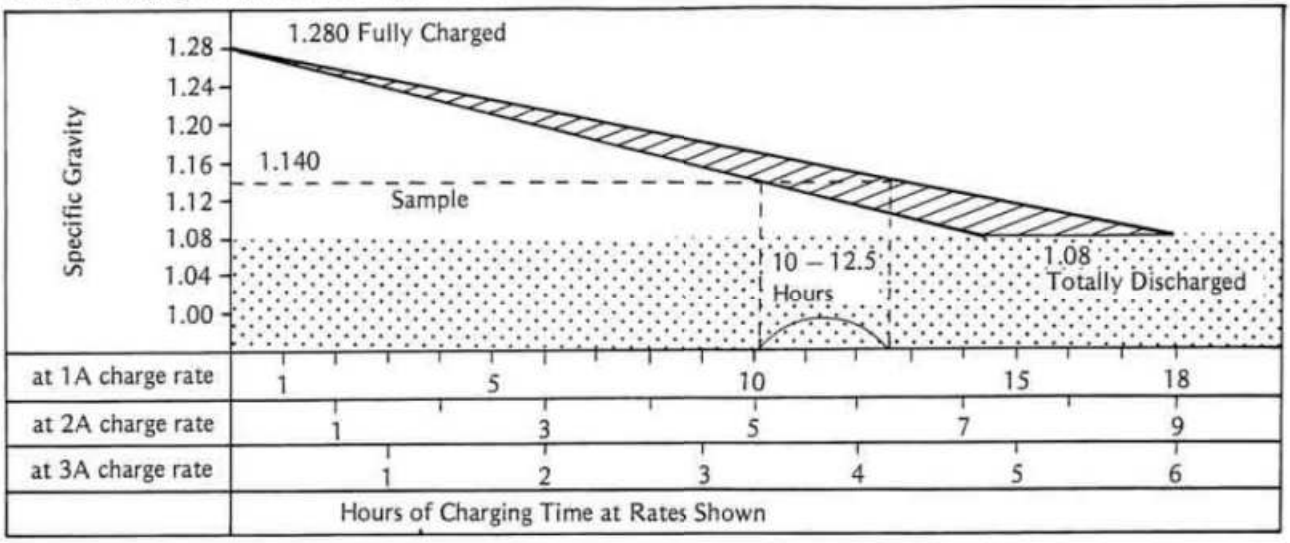
- If any of the cells are low, fill them to the LOWER level line with distilled water only. The electrolyte will expand during charging, and the level will rise.
- Connect a charger to the battery BEFORE plugging it in or turning it on.

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

- Set the charge rate and time according to the battery condition previously determined (see Battery Condition), using the table.

**Battery Charging Rate/Time Table (12V 12Ah)**




**CAUTION**

○**Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.**

○**If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.**

- Turn the charger off or unplug it, then disconnect it from the battery.
- Check battery condition (see Battery Condition).
- ★If the battery condition indicates that it is not fully charged, additional charging time is necessary.

*Battery Test Charging*

- If the battery is suspected of being defective, sulfated, or unable to take a charge, consult the table.
- To test charge a battery, perform the ordinary charging procedure and monitor the battery voltage and other signs as mentioned below.
- ★If the battery voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulfated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 or 13 V in about 30 min to an hour after the start of charging.
- ★If one cell produces no gas bubbles or has a very low specific gravity, it is probably shorted.
- ★If there does not appear to be enough sediment in a cell to short the plates, but that cell has a very low specific gravity after the battery is fully charged, the trouble may be that there is not enough acid in that one cell. In this case only, sulfuric acid solution may be added to correct the specific gravity.
- ★If a fully charged battery not in use loses its charge after 2 to 7 days; or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

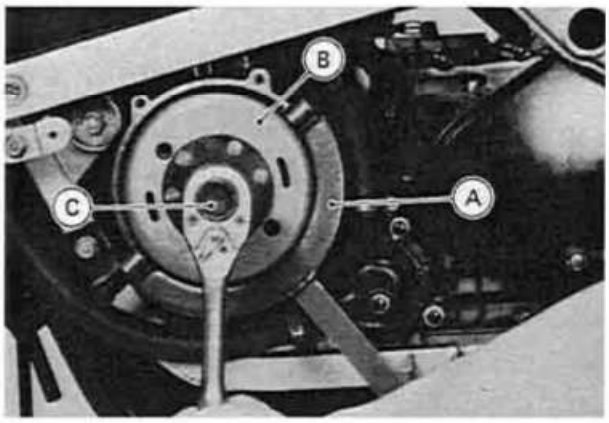
**Battery Troubleshooting Guide**

| | Good Battery | Suspect Battery | Action |
|---|---|---|---|
| Plates | (+) chocolate color<br>(–) gray | white (sulphated); + plates broken or corroded | Replace |
| Sediment | none, or small amount | sediment up to plates, causing short | Replace |
| Voltage | above 12 V | below 12 V | Test charge |
| Electrolyte Level | above plates | below top of plates | Fill and test charge |
| Specific Gravity | above 1.200 in all cells; no two cells more than 0.020 different | below 1.100, or difference of more than 0.020 between two cells | Test charge |

## Charging System

### *Alternator Rotor Removal*

- Remove the lower fairing (see Lower Fairing Removal in Frame chapter).
- Hold the alternator rotor steady with the rotor holder (special tool), and remove the rotor bolt.




A. Rotor Holder: 57001-308
B. Rotor
C. Rotor Bolt

- Using the rotor holder to hold the rotor steady, remove the rotor with rotor puller (special tool).




A. Rotor Puller: 57001-1216

**CAUTION**

**If the rotor is difficult to remove, turn the puller while tapping the end of the puller covered with the cap. Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.**

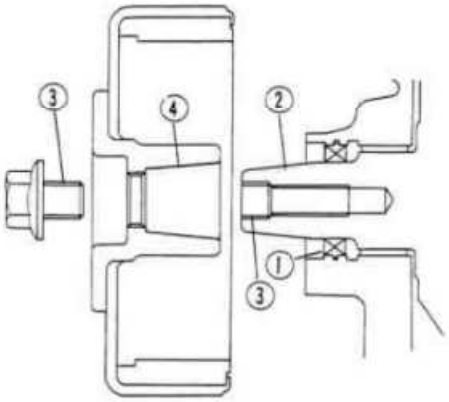
### *Alternator Rotor Installation Notes*

- Clean the following parts with an oil-less cleaning fluid such as trichloroethylene or acetone.

**WARNING**

**These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.**

**Alternator Rotor Cleaning Area**

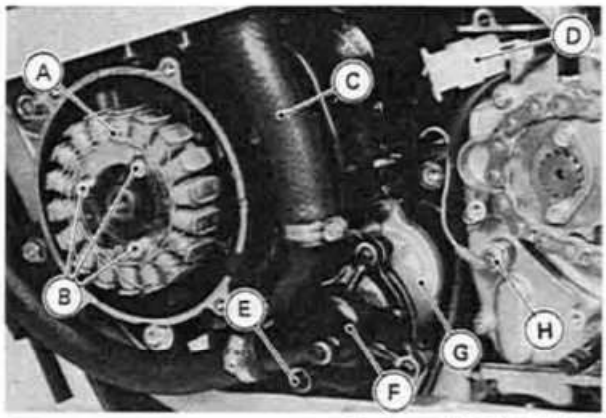



1. The surface of the crankshaft oil seal.
2. The tapered portion of the crankshaft.
3. The alternator rotor bolt and the threads in the crankshaft.
4. The tapered portion of the alternator rotor.

- Tighten the alternator rotor bolt to the specified torque (see Exploded View) while holding the alternator rotor steady with the rotor holder (special tool: 57001-308).

### *Stator Coil Removal*

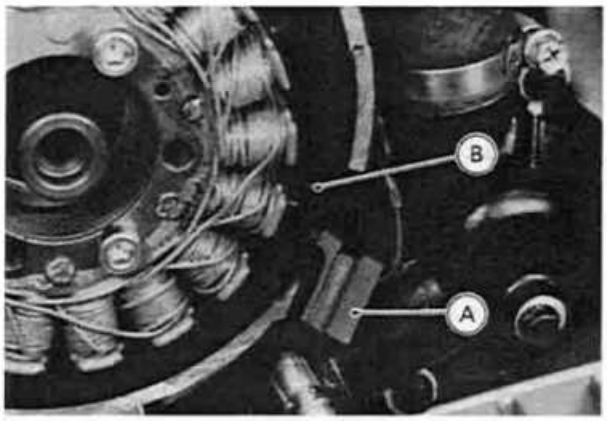
- Remove the alternator rotor.
- Remove the engine sprocket cover (see Engine Sprocket Removal in Final Drive chapter).
- Disconnect the alternator lead connector, and neutral lead from the neutral switch.
- Remove the water pump mounting bolt, and pull the pump body a little out of the gear case.
- Remove the alternator stator Allen bolts and take off the stator.
- Pull the alternator lead and neutral lead past the water hose.




A. Stator
B. Allen Bolts
C. Water Hose
D. Alternator Lead Connector
E. Pump Holding Bolt
F. Pump Body
G. Gear Case
H. Neutral Switch

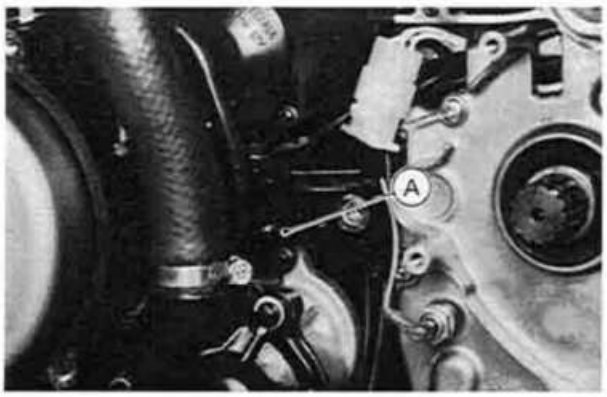
### *Stator Coil Installation Notes*

- Apply a non-parmanent locking agent to the threads of the stator lower Allen bolt.
- Tighten the stator Allen bolts to the specified torque (see Exploded View).
- Fit the lead grommet into the notch in the crankcase.



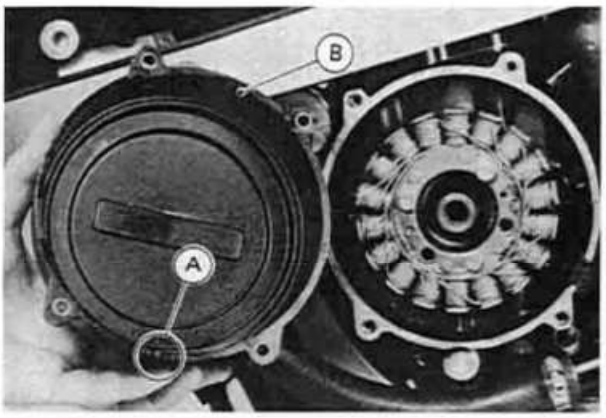

A. Grommet B. Notch

- Fit the water pump body to the gear case, and tighten the mounting bolt to the specified torque (see Exploded View).
- Secure the alternator lead to the crankcase with the clamp.




A. Clamp

- The alternator cover must be installed with the notched side downward.




A. Notch B. Alternator Cover

### *Alternator Inspection*

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

- To check the alternator output voltage, do the following procedures. Refer to the appropriate chapters and charging system Wiring Diagram.
  - Turn off the ignition switch.
  - Disconnect connector 1.
  - Connect the multimeter as shown in table.
  - Start the engine.
  - Run it at the rpm given in table.
  - Note the voltage readings (total 3 measurements).

**Alternator Output Voltage**

| Meter Range | Connections | | Reading @4,000 rpm |
|---|---|---|---|
| | Meter (+) to | Meter (–) to | |
| 250 V AC | One yellow lead (Connector 1) | Another yellow lead (Connector 1) | about 45V |

★If the output voltage shows the value in table, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows:
  - Stop the engine
  - Connect the multimeter as shown in table.
  - Note the readings (total 3 measurement)

**Stator Coil Resistance**

| Meter Range | Connections | | Reading |
|---|---|---|---|
| | Meter (+) to | Meter (–) to | |
| x 1 Ω | One yellow lead (Connector 1) | Another yellow lead (Connector 1) | 0.1 – 0.8 Ω |

★If there is more resistance than shown in the Table, or no meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

●Using the highest resistance range of the multimeter, measure the resistance between each of the yellow leads and chassis ground.

★Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.

★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnetism have probably weakened, and the rotor must be replaced.

*Rectifier Inspection*

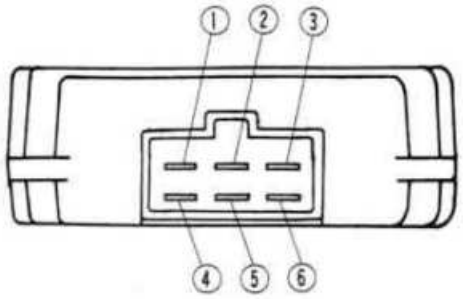
●Check the diode resistance as follows.

●Remove the Regulator/Rectifier and disconnect the connector 2 (see Charging System Wiring Diagram).

●Connect an ohmmeter to the regulator/rectifier as shown in the Table, and check the resistance in both directions of each diode following the table.

**Rectifier Circuit Inspection**

| No. | Connections | | Reading | Meter Range |
|---|---|---|---|---|
| | Meter (+) to | Meter (–) to | | |
| 1 | $Y_1$ | W | ∞ | x 10 Ω or x 100 Ω |
| 2 | $Y_2$ | | | |
| 3 | $Y_3$ | | | |
| 4 | $Y_1$ | Bk/Y | ½ scale | |
| 5 | $Y_2$ | | | |
| 6 | $Y_3$ | | | |
| 7 | W | $Y_1$ | | |
| 8 | | $Y_2$ | | |
| 9 | | $Y_3$ | | |
| 10 | Bk/Y | $Y_1$ | ∞ | |
| 11 | | $Y_2$ | | |
| 12 | | $Y_3$ | | |




1. W Lead Terminal
2. BR Lead Terminal
3. BK/Y Lead Terminal
4. $Y_1$ Lead Terminal
5. $Y_2$ Lead Terminal
6. $Y_3$ Lead Terminal

**NOTE**

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to the first ⅓ of the scale.*

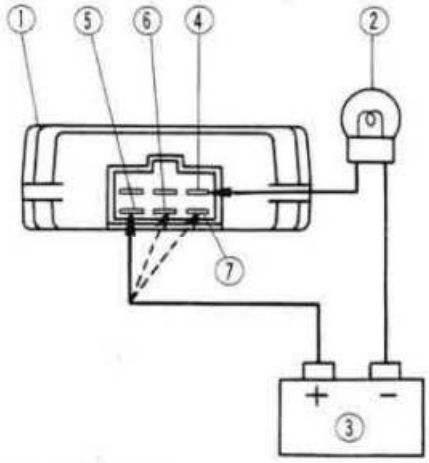
*Regulator Inspection*

To test the regulator out of circuit, use three 12 V batteries and a test light made from a 12 V 3 – 6 W bulb in a socket with leads.

●Remove the regulator/rectifier unit from the frame.

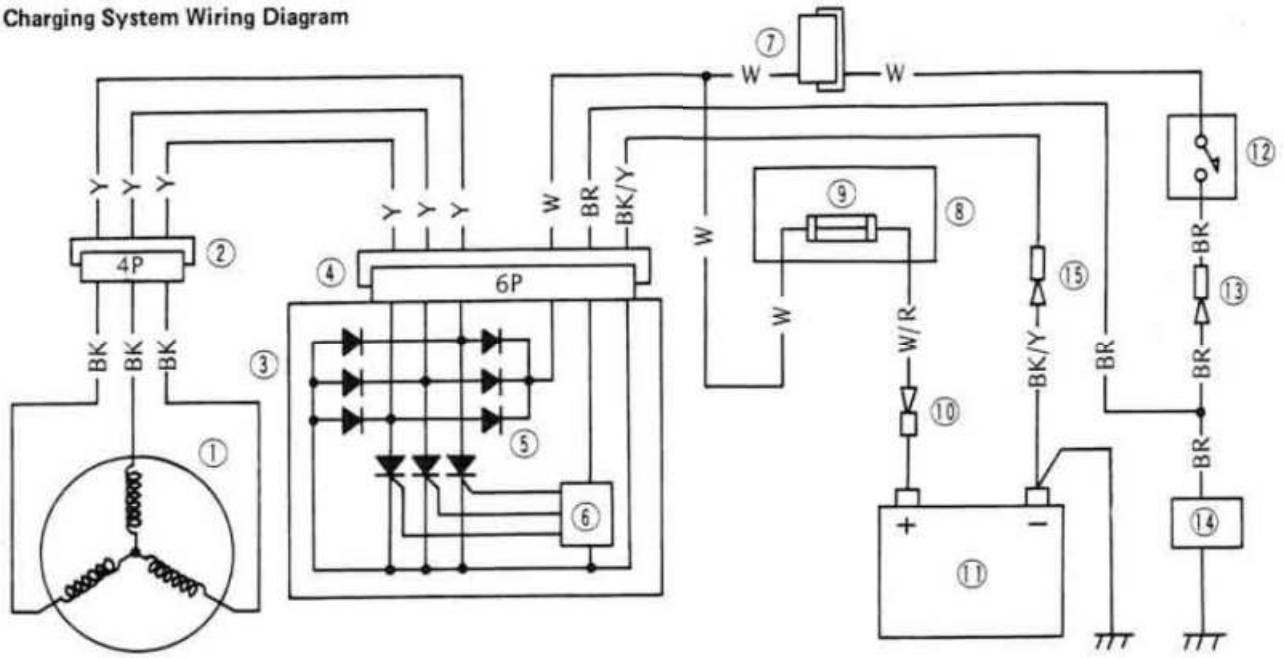
●Using auxiliary leads, connect one of the yellow lead terminal at the unit to the battery (+) terminal, and connect the test light between the black/yellow lead terminal at the unit, and the battery (–) terminal.

●At this time the bulb should not be lit.




1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. BK/Y Lead Terminal
5. $Y_1$ Lead Terminal
6. $Y_2$ Lead Terminal
7. $Y_3$ Lead Terminal

**Charging System Wiring Diagram**

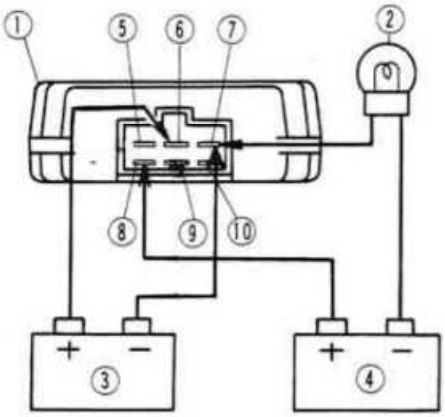



1. Alternator
2. Connector 1
3. Regulator/Rectifier
4. Connector 2
5. Diode (Rectifier)
6. Control Circuit (IC)
7. Connector 3
8. Junction Box
9. Main Fuse 30 A
10. Connector 4
11. Battery
12. Ignition Switch
13. Connector 5
14. Load
15. Connector 6

**CAUTION**

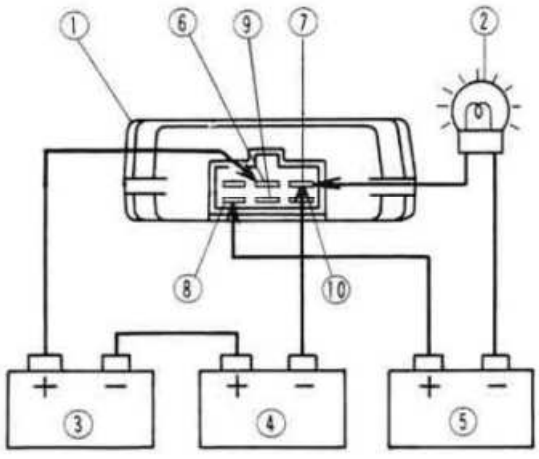
○**The test light works as an indicator and also as a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.**

●Connect the brown lead terminal to the other battery (+) terminal and connect the black/yellow lead terminal to the battery (−) terminal momentarily. At this time the bulb should not be lit.




1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. 12 V Battery
5. W Lead Terminal
6. BR Lead Terminal
7. BK/Y Lead Terminal
8. $Y_1$ Lead Terminal
9. $Y_2$ Lead Terminal
10. $Y_3$ Lead Terminal

●To apply 24 V to the regulator/rectifier, connect two 12 V batteries in series, and connect the brown lead terminal to the battery (+) terminal and the black/yellow lead terminal to the battery (−) terminal momentarily. The bulb should now light and stay on until the bulb circuit is opened.




1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. 12 V Battery
5. 12 V Battery
6. BR Lead Terminal
7. BK/Y Lead Terminal
8. $Y_1$ Lead Terminal
9. $Y_2$ Lead Terminal
10. $Y_3$ Lead Terminal

CAUTION

○**Do not apply more than 24 volts. If more than 24 volts is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 volts is applied for more than a few seconds, the regulator/rectifier may be damaged.**

●Repeat the above three steps for other two yellow leads (in connector 2 which leads to the regulator/rectifier).
★Replace the regulator/rectifier if the bulb does not light as described above.

**NOTE**

○*The above test is not foolproof. If the above checks show the regulator/rectifier is not damaged, but there is still trouble in the charging system, first carefully inspect the alternator, battery, wiring, and all connections. Replace the regulator/rectifier if all these other components turn out good.*

### *Regulator/Rectifier Output Voltage Inspection*

●Check the battery condition (see Battery section).
●Warm up the engine to obtain actual alternator operating conditions.
●Remove the left side cover.
●Check that the ignition switch is turned off, and connect the multimeter as shown in table.

**Regulator/Rectifier Output/Voltage**

| Meter Range | Connectings | | Reading |
|---|---|---|---|
| | Meter (+) to | Meter (–) to | |
| 25 V DC | White/Red (Connector 4) | Black/Yellow (Connector 6) | Battery Voltage–15 V |

●Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. (To turn off the headlight of US model, disconnect the black/yellow lead from the headlight unit in the upper fairing.) The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
●Turn off the ignition switch to stop the engine, and disconnect the multimeter.
★If the regulator/rectifier output voltage is kept between the values given in table, the charging system is considered to be working normally.
★If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
★If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

## Ignition System

### Safety Instructions:

WARNING

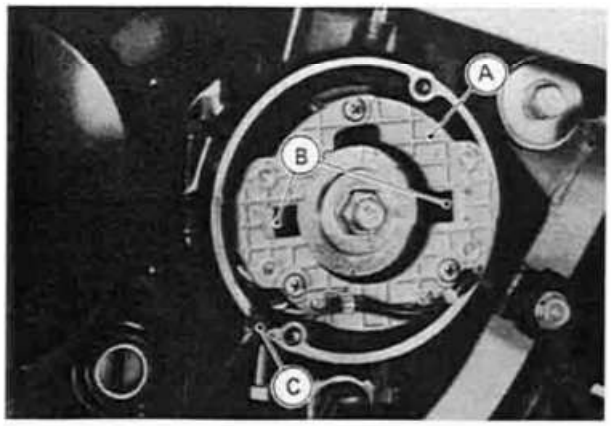
○**The ignition system produces extremely high voltage. Do not touch the spark plugs, high tension coils, or spark plug leads while the engine is running, or you could receive a severe electrical shock.**

CAUTION

○**Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent IC igniter damage.**
○**Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.**

### *Pickup Coil Removal*

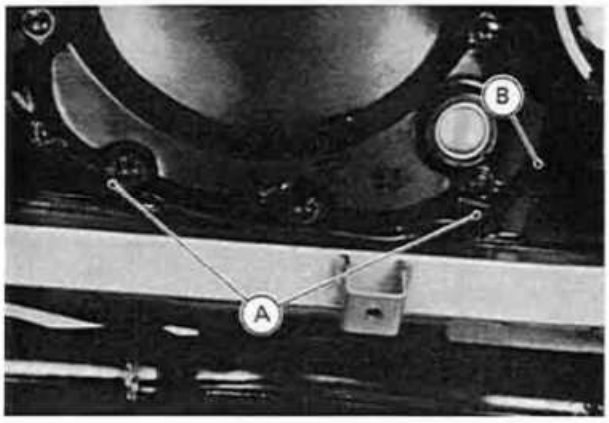
●Remove the pickup coil cover.
●Disconnect the pickup coil lead connector.
●Remove the screws and take off the pickup coil with mounting plate, and then separate them.




A. Mounting Plate
B. Pickup Coils
C. Grommet

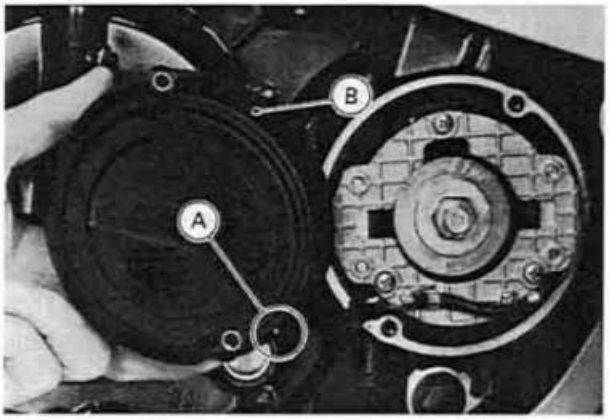
*Pickup Coil Installation Notes*

•Clamp the harness of the pickup coil leads as shown.




A. Clamps B. Pickup Coil Leads

•Fit the lead grommet into the notch in the crankcase.
•The pickup coil cover must be installed with the notched side downward.

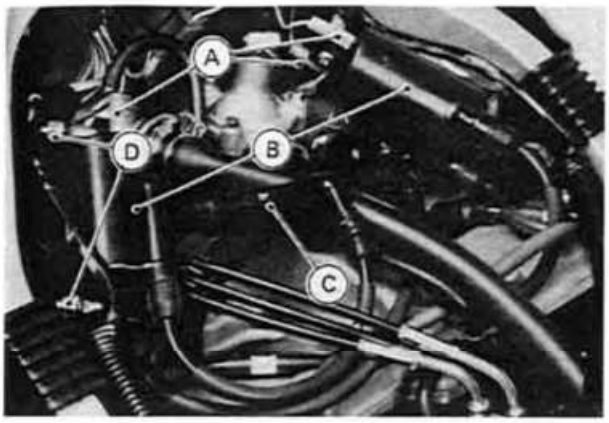



A. Notch B. Pickup Coil Cover

•Tighten the pickup coil cover mounting bolts to the specified torque (see Exploded View).

*Ignition Coil Removal*

•Remove the following parts before ignition coil removal.
Side Covers
Seat
Fuel Tank
•Disconnect the ignition coil primary leads.
•Pull out the plug caps from the spark plugs.
•Remove the ignition coil mounting nuts, and take off the coils.



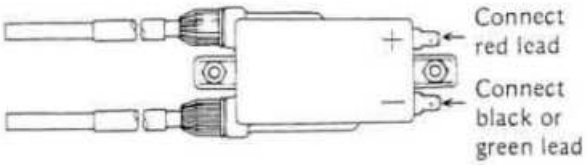

A. Primary Lead C. Plug Cap
B. Ignition Coil D. Mounting Nuts

*Ignition Coil Installation Notes*

•Connect the primary wires to the primary coil terminals as follows:
Black and red wires → No. 1 & 4 ignition coil
Green and red wires → No. 2 & 3 ignition coil
•The + and – markings next to the primary coil terminals on the ignition coil body indicate the polarity of the terminals. The polarity of the two spark plug leads are as shown when the primary leads are connected as indicated in the figure. But both the primary wires (positive red, and negative black and green) can be connected with either terminal on the ignition coil without changing the engine performance.

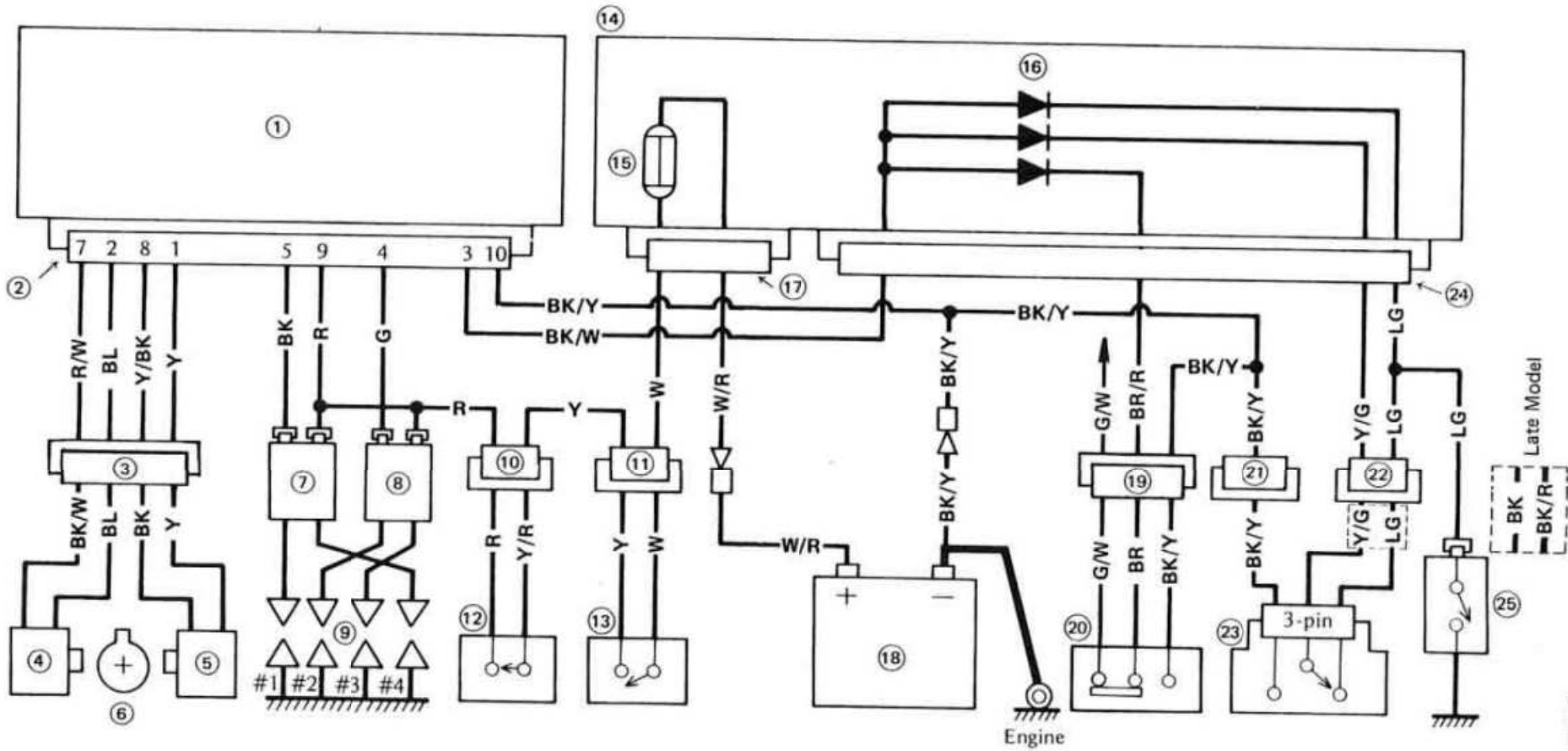
**Polarity of Ignition Coil**

(–) #1 or #2 spark plug lead



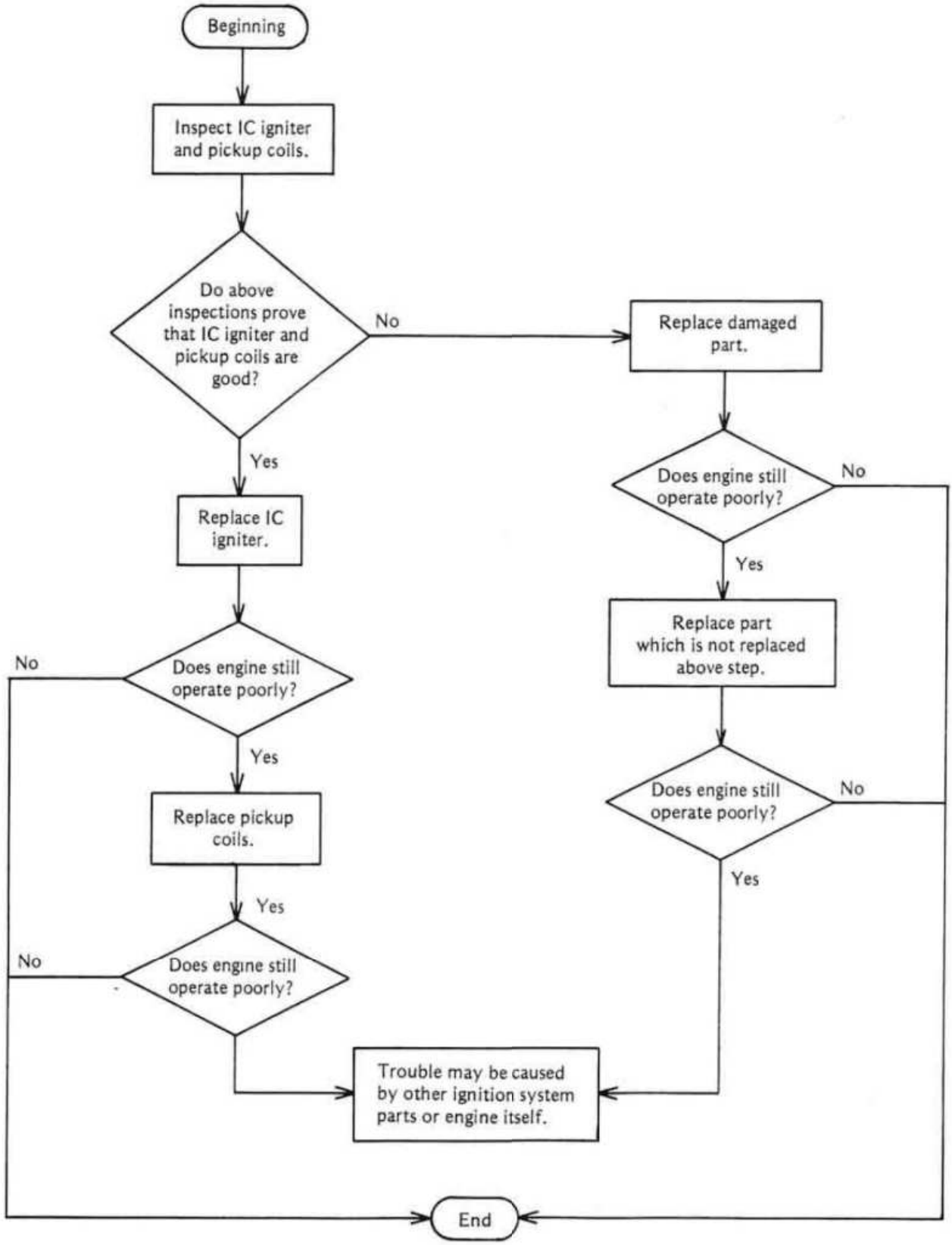

(+) #4 or #3 spark plug lead

Ignition System Wiring Diagram




1. IC igniter
2. IC igniter 10-pin connector
3. Pickup coil 4-pin connector
4. Pickup coil for #2 and #3 cylinder
5. Pickup coil for #1 and #4 cylinder
6. Timing rotor
7. Ignition coil for #1 and #4 cylinders
8. Ignition coil for #2 and #3 cylinders
9. Spark plugs
10. Engine stop switch 4-pin connector (US model: 6-pin connector)
11. Ignition switch 6-pin connector
12. Engine stop switch
13. Ignition switch
14. Junction box
15. Main 30 A fuse
16. Diodes
17. Junction box 8-pin connector
18. Battery
19. Side stand switch 3-pin connector
20. Side stand switch
21. LH switch 9-pin connector
22. Starter lockout switch 2-pin connector
23. Starter lockout switch
24. Junction box 10-pin connector
25. Neutral switch

**Ignition System Troubleshooting:**



### *Pickup Coil Inspection*

- Disconnect the pickup coil connector.
- Zero an ohmmeter, and connect it to the pickup coil leads.

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

**Pickup Coil Resistance**
**360 – 440 Ω**

- Using the highest resistance range of the ohmmeter, measure the resistance between the pickup coil leads and chassis ground.

★Any meter reading less than infinity (∞) indicates a short, necessitating replacement of the pickup coil assembly.

### *Ignition Coil Inspection*

Measuring arcing distance:

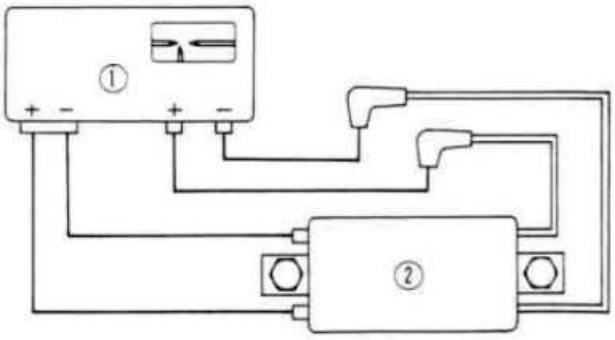
The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with Kawasaki Electro Tester (special tool) or Coil Tester (special tool) for the 3-needle method.

**NOTE**

○***Since a tester other than the Kawasaki Electro Tester or Coil Tester may produce a different arcing distance, the Kawasaki Electro Tester or Coil Tester is recommended for reliable results.***

- Remove the ignition coil.
- Connect the ignition coil (with the spark plug cap left installed at each of the spark plug lead) to the tester, and measure the arcing distance.

**Ignition Coil Test**




1. Electro Tester: 57001-980 or
   Coil Tester: 57001-1242
2. Ignition Coil

**WARNING**

○**To avoid extremely high voltage shocks, do not touch the coil or lead.**

★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

**Ignition Coil Arcing Distance**
**7 mm or more**

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil.

★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

Measuring coil resistance:

If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance.

○Connect an ohmmeter between the coil terminals.
○Set the meter to the x 1 Ω range, and read the meter.

- Measure the secondary winding resistance.

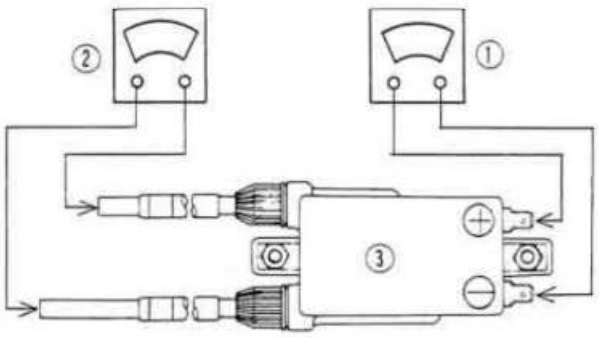
○Pull the spark plug cap off the lead.
○Connect an ohmmeter between the spark plug leads.
○Set the meter to the x 1 kΩ range, and read the meter.

★If the meter does not read as specified, replace the coil.

**Ignition Coil Winding Resistance**

| | |
|---|---|
| **Primary windings:** | **1.8 – 2.8 Ω** |
| **Secondary windings:** | **10 – 16 kΩ** |

**Ignition Coil Winding Resistance**




1. Measure primary winding resistance.
2. Measure secondary winding resistance.
3. Ignition coil

★If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.
●Check the spark plug leads for visible damage.
★If any spark plug lead is damaged, replace the coil.

### *Spark Plug Cleaning Inspection*

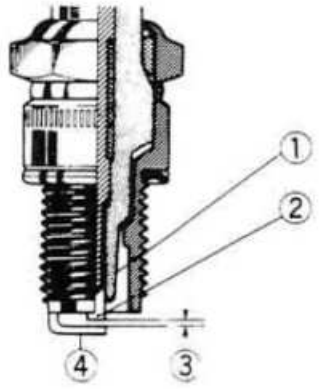
●Remove the spark plug.
●Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool.
★If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.

### *Spark Plug Gap*

●Measure the gap with a wire-type thickness gauge.
★If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

| Spark Plug Gap |
|---|
| 0.6 – 0.7 mm |

**Spark Plug Gap**




1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

### *IC Igniter Inspection*

●Remove the IC igniter.
●Zero an ohmmeter, and connect it to terminals of the IC igniter to check the internal resistance of the igniter.

**CAUTION**

○**Use only Kawasaki Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.**
○**If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.**

**IC Igniter Internal Resistance**

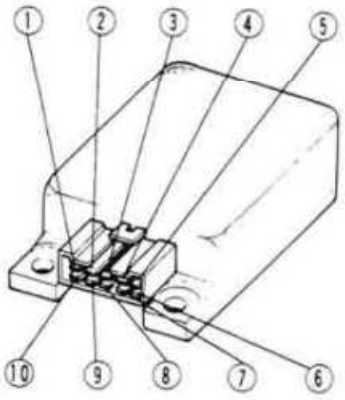
| Tester Negative (–) Lead Connection \ Tester Positive (+) Lead Connection | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | D | D | D | D | D | D | D | D | ∞ |
| 2 | D | | D | D | D | D | D | D | D | ∞ |
| 3 | C | C | | B | B | B | B | B | B | ∞ |
| 4 | ∞ | ∞ | ∞ | | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| 5 | ∞ | ∞ | ∞ | ∞ | | ∞ | ∞ | ∞ | ∞ | ∞ |
| 6 | C | C | B | A | A | | A | 0 | 0 | ∞ |
| 7 | C | C | B | A | A | A | | A | A | ∞ |
| 8 | C | C | B | A | A | 0 | A | | 0 | ∞ |
| 9 | C | C | B | A | A | 0 | A | 0 | | ∞ |
| 10 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | |

| Value (kΩ) | |
|---|---|
| 0 | Zero |
| A | 0.3 – 4.2 |
| B | 6.6 – 21.4 |
| C | 25 – 75 |
| D | 125 – 375 |
| ∞ | Infinity |

Measured with the Kawasaki Hand Tester 57001-983. A tester other than the Kawasaki Hand Tester may show different readings.

★Replace the IC igniter if the reading is not the specified value.

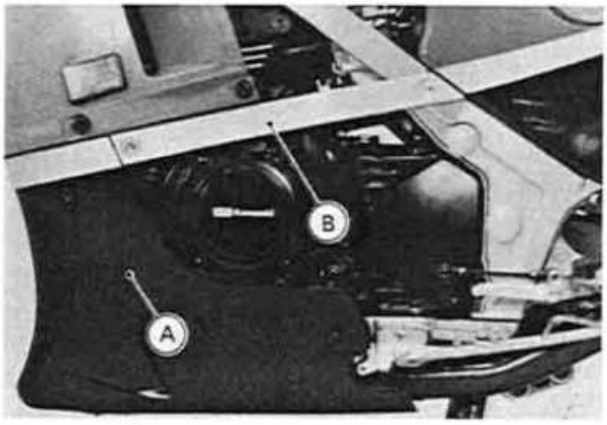
**Terminal No. of IC Igniter**



## Electric Starter System

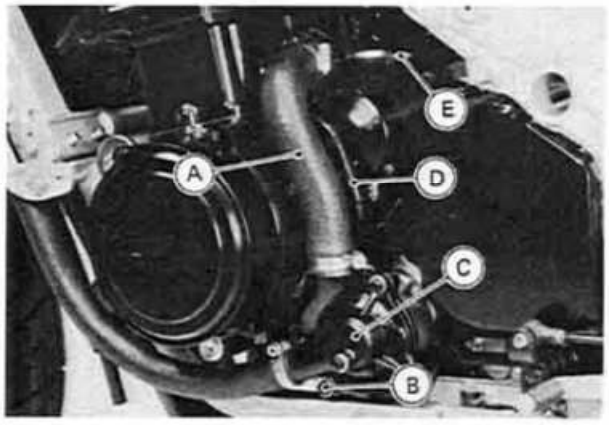
### *Starter Motor Removal*

- Drain the engine oil.
- Remove the lower fairing (see Fairing Removal in Frame chapter).
- Drain the coolant (see Coolant Change in Cooling System chapter).
- Remove the fuel tank.
- Remove the LH fairing stay (see Fairing Removal in Frame chapter).



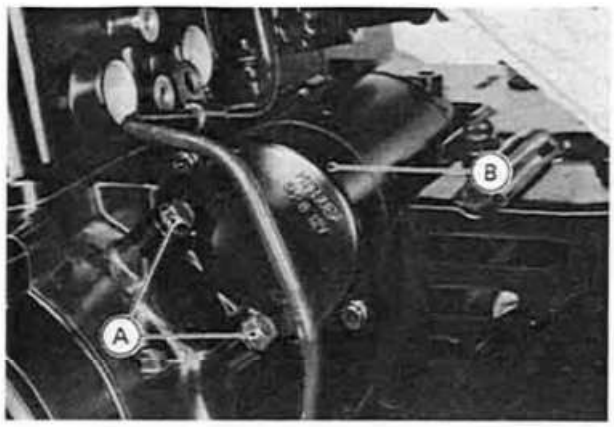

A. Lower Fairing B. Fairing Stay

- Loosen the clamp and pull the water hose off the water pipe left side.
- Remove the water pipe bolts and take off the pipe toward the left.
- Remove the bolt and pull the water pump off the engine.
- Remove the bolts and banjo bolt and free the oil pipe.




A. Water Hose D. Oil Pipe
B. Mounting Bolt E. Water Pipe
C. Water Pump

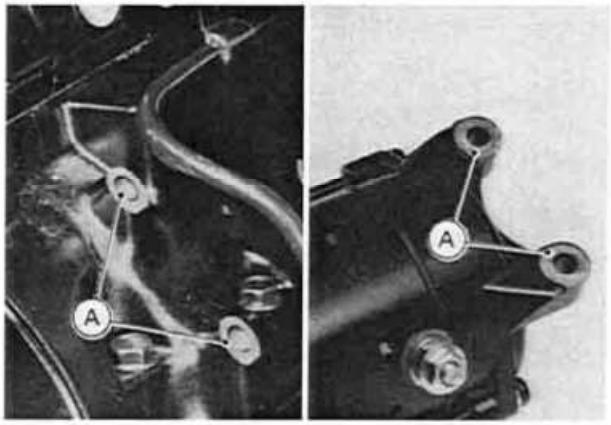
- Remove the bolts and take off the starter motor.




A. Bolts B. Starter Motor

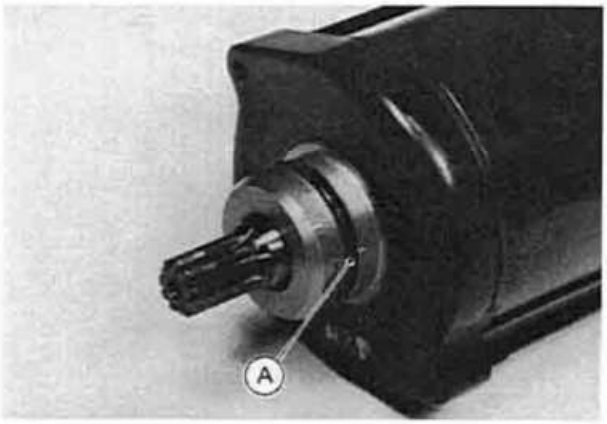
### *Starter Motor Installation Notes*

- Clean the starter motor lugs and crankcase where the starter motor is grounded.




A. Clean Here

- Apply a small amount of engine oil to the O-ring.

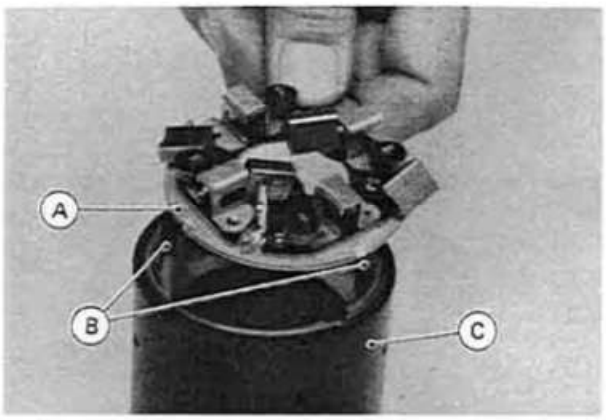



A. O-Ring

- Fill the cooling system with coolant (see Coolant Filling in Cooling System chapter).
- Check the engine oil level and add oil if necessary.

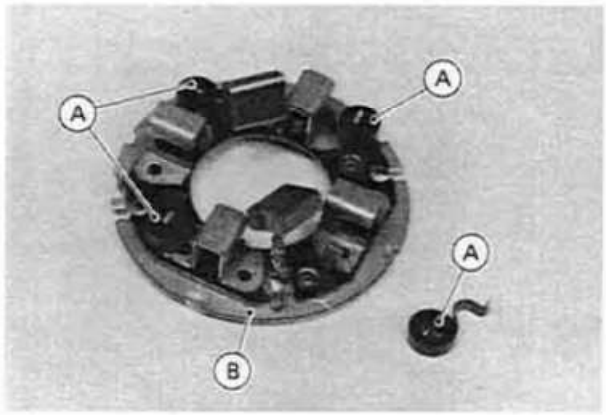
*Starter Motor Disassembly*

- Remove both end covers, and take the armature off the pinion gear side.
- Remove the brush plate from the leads.



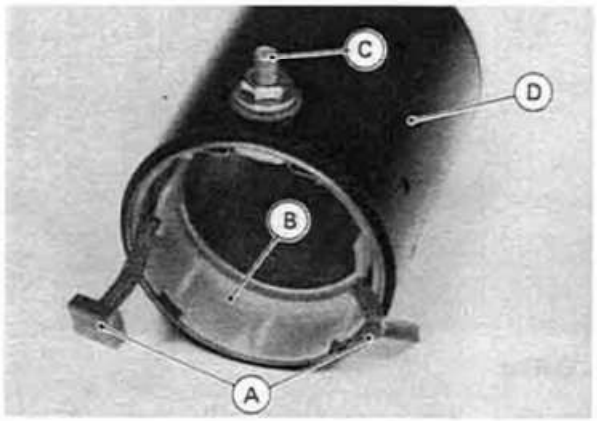

A. Brush Plate
B. Brush Lead
C. Yoke

- Remove the brush springs from the brush plate. This makes armature installation easy.




A. Springs
B. Brush Plate

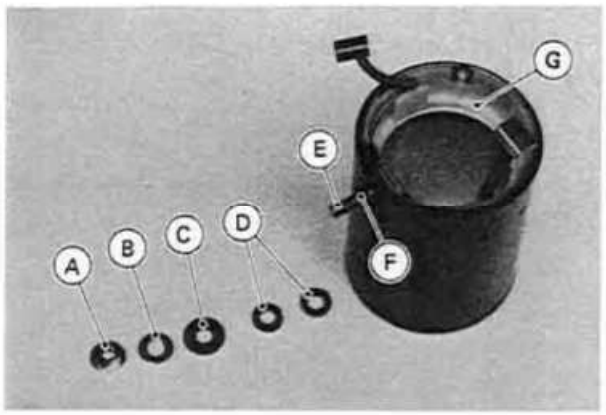
- Remove the nut and remove the terminal bolt, and then remove the brush with plastic holder.




A. Brushes
B. Holder
C. Terminal Bolt
D. Yoke

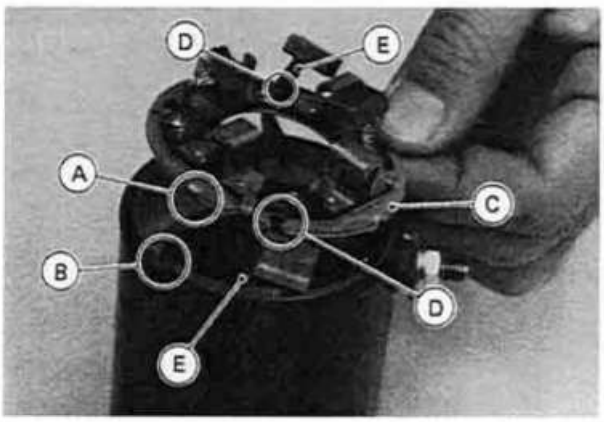
*Starter Motor Assembly Notes*

- Install the terminal bolt as shown.



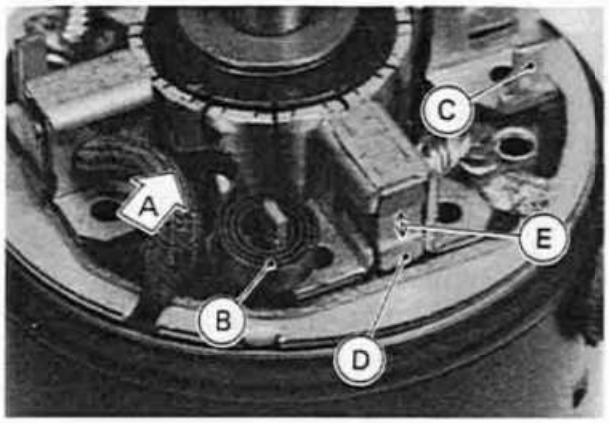

A. Nut
B. Washer
C. Large Washer (Plastic)
D. Small Washer (Plastic)
E. Terminal Bolt
F. O-ring
G. Plastic Holder

- Install the brush plate as follows.
  - Install the brush plate on the yoke fitting the brush leads into the notches in the plate. Fit the brush plate tongue into the yoke notch.



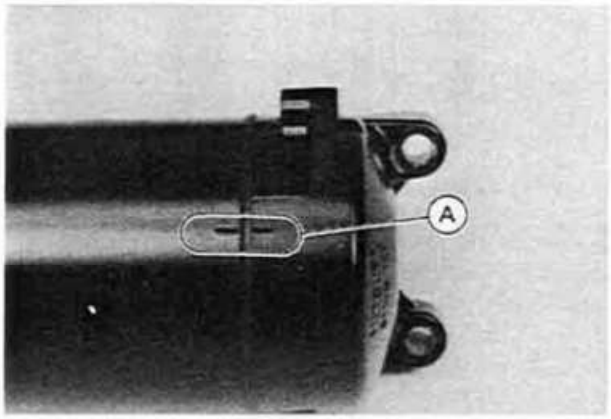

A. Tongue
B. Notch
C. Brush Plate
D. Notches
E. Blush Leads

  - Keeping the motor upright, install the brush springs. Fit the spring on the spring post halfway; the post must be positioned in the D-shaped end of the spring. Turn the other end of the spring a half turn clockwise, and fit the end in the brush groove. Push the spring all the way onto the post at the stepped portion.



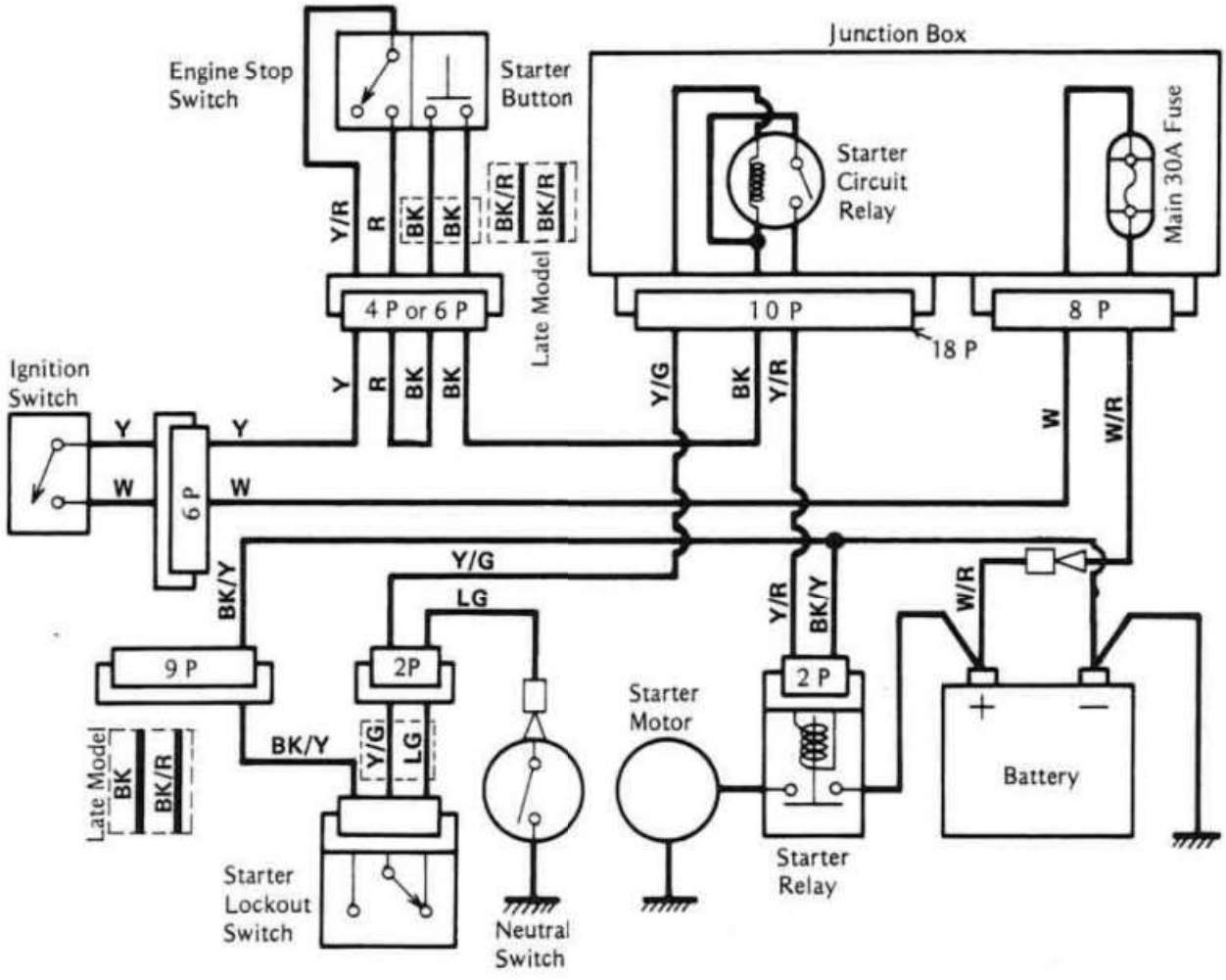

A. Half Turn Clockwise
B. Spring
C. Spring Post
D. Brush
E. Brush Groove

oTo install the end cover on the yoke, align the marks on the end cover and yoke.




A. Align the marks

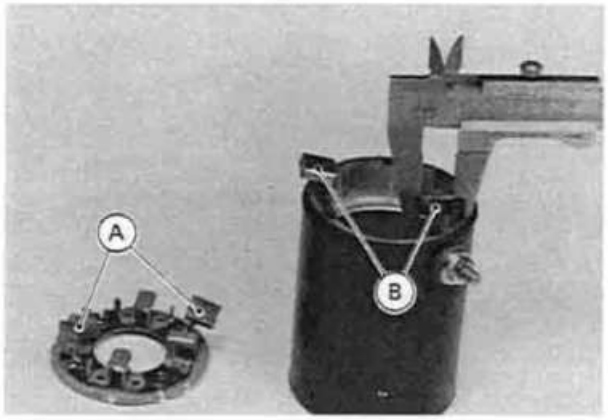
**Electric Starter Circuit**



*Brush Inspection*

•Measure the length of each brush.

★If any is worn down to the service limit, replace all brushes.




A. Brushes with plate.
B. Brushes with yoke.

| Starter Motor Brush Length | |
|---|---|
| Standard: | 12 mm |
| Service Limit: | 6 mm |

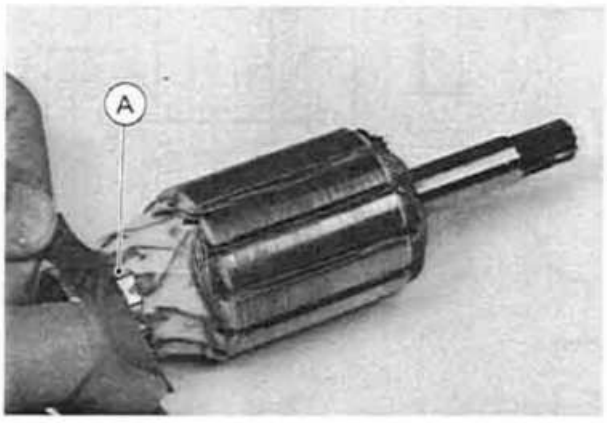
*Brush Spring Inspection*

•Check that the brush springs are in place and will snap the brushes firmly into place.

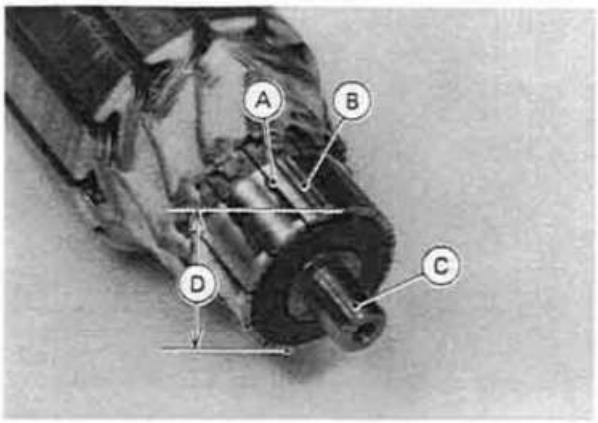
★If not, reinstall or replace the spring.

*Commutator Cleaning and Inspection*

•Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves.




A. Commutator




A. Groove
B. Commutator Segment
C. Shaft
D. Diameter

•Measure the diameter of the commutator.

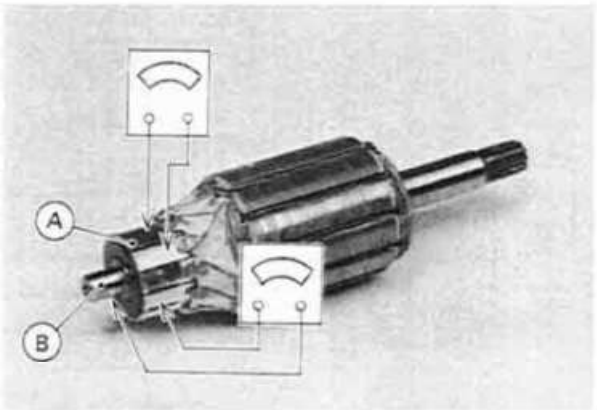
★Replace the starter motor with a new one if the commutator diameter is less than the service limit.

| Commutator Diameter | |
|---|---|
| Standard: | 28 mm |
| Service Limit: | 27 mm |

*Armature Inspection*

•Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments.

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.




A. Segments
B. Shaft

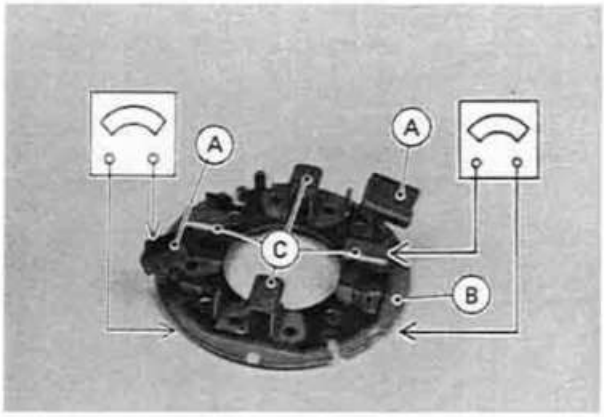
•Using the highest ohmmeter range, measure the resistance between the commutator and the shaft.

★If there is any reading at all the armature has a short and the starter motor must be replaced.

Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

*Brush Plate Inspection*

●Using the x 1 Ω ohmmeter range, measure the resistance between the brush and the brush plate.

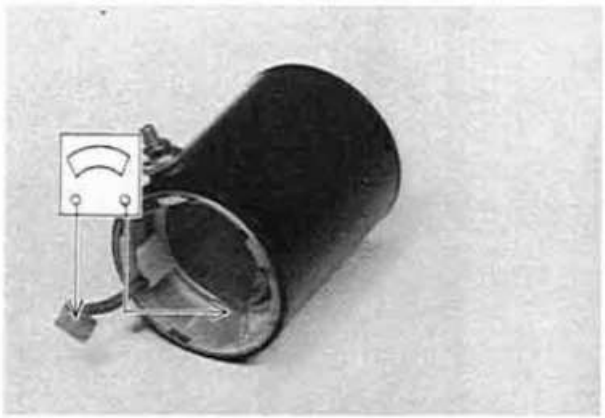



A. Brush
B. Brush Plate
C. Brush Holder

★If there is not close to zero ohms, the brush plate is an open and brush plate assembly must be replaced.
●Using the highest ohmmeter range, measure the resistance between the brush plate and the brush holders.
★If there is any reading at all, the brush holder has a short and the brush plate assembly must be replaced.

*Brush and Lead Assembly Inspection*

●Using the x 1 Ω ohmmeter range, measure the resistance between the brushes.
★If there is a high resistance or no reading (∞), a lead is open and the brush plate assembly must be replaced.



*Starter Relay Inspection*

●Disconnect the starter motor lead and battery positive terminal from the starter relay.

**CAUTION**

○**The battery positive (+) lead with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition switch is off, so take care not to short the removed lead to chassis ground.**

●Using the x 1 Ω ohmmeter range, measure the resistance across the relay terminals.
★If the relay clicks but the meter does not read zero, the relay is defective and must be replaced. If the relay does not click at all, the relay is defective and must be replaced.
★If the relay makes a single clicking sound and the meter reads zero the relay is good. The trouble is in the starter motor or the motor power supply wires.

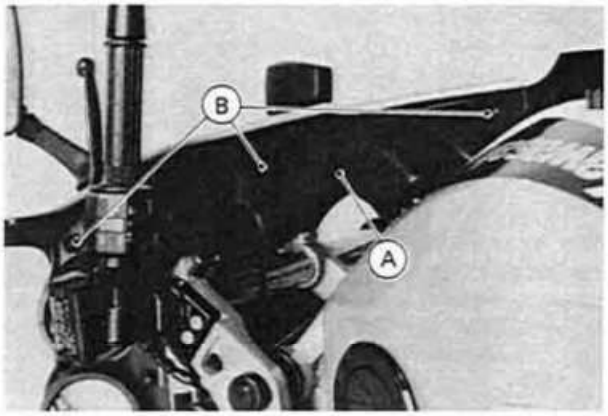
| | |
|---|---|
| **Switch Position:** | |
| **Ignition switch ON** | |
| **Engine stop switch RUN** | |
| **Starter button ON** | |
| **Neutral switch ON (Transmission is in Neutral)** | |
| **Meter Connection:** | |
| **Location** | **Starter relay terminals (Leads disconnected)** |
| **Meter Range** | **x 1 Ω** |
| **Meter Reading:** | **0 Ω and relay clicks when starter button is pushed.** |

## Lighting System

The headlight beam is adjustable both horizontally and vertically. Headlight aiming must be correctly adjusted for your safe riding as well as oncoming drivers. In most areas it is illegal to ride with improperly adjusted headlights.

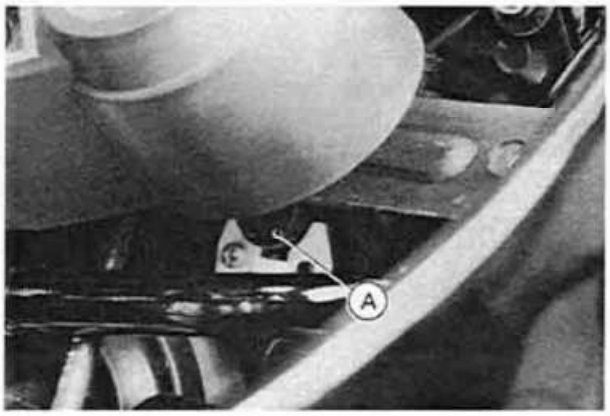
*Headlight Beam Horizontal Adjustment*

●Remove the right inner fairing.



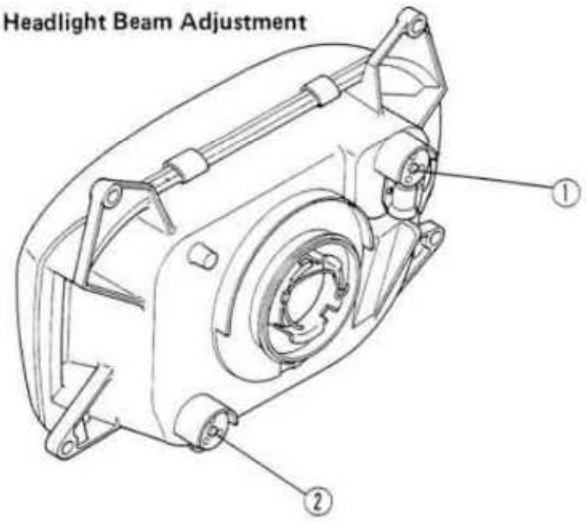

A. Right Inner Fairing B. Screws

- Put a screwdriver into the adjuster guide.
- Turn the adjuster on the headlight in or out until the beam points straight ahead.
- Install the right inner fairing.




A. Adjuster

**Headlight Beam Adjustment**

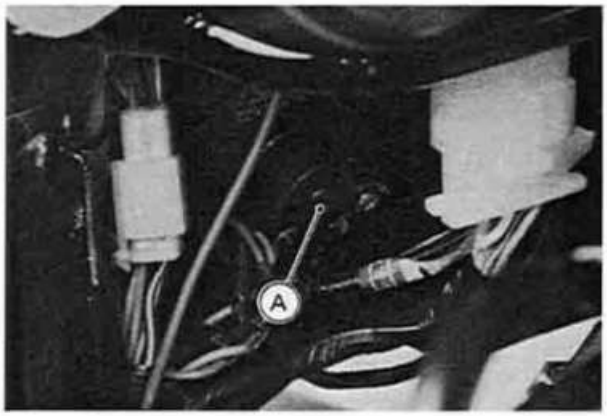



1. Horizontal Adjuster 2. Vertical Adjuster

*Headlight Beam Vertical Adjustment*

The headlight beam is adjustable vertically. If adjusted too low, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead, and the low beam will blind oncoming drivers.

- Put a screwdriver into the adjuster guide.
- Turn the adjuster on the headlight in or out to adjust the headlight vertically.

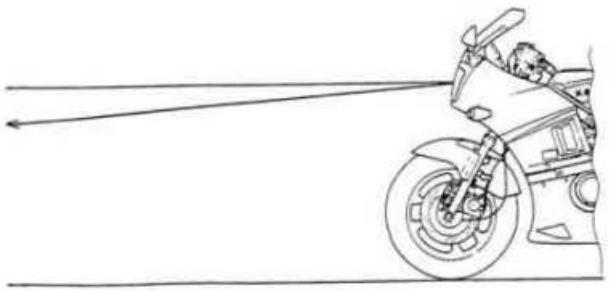



A. Adjuster

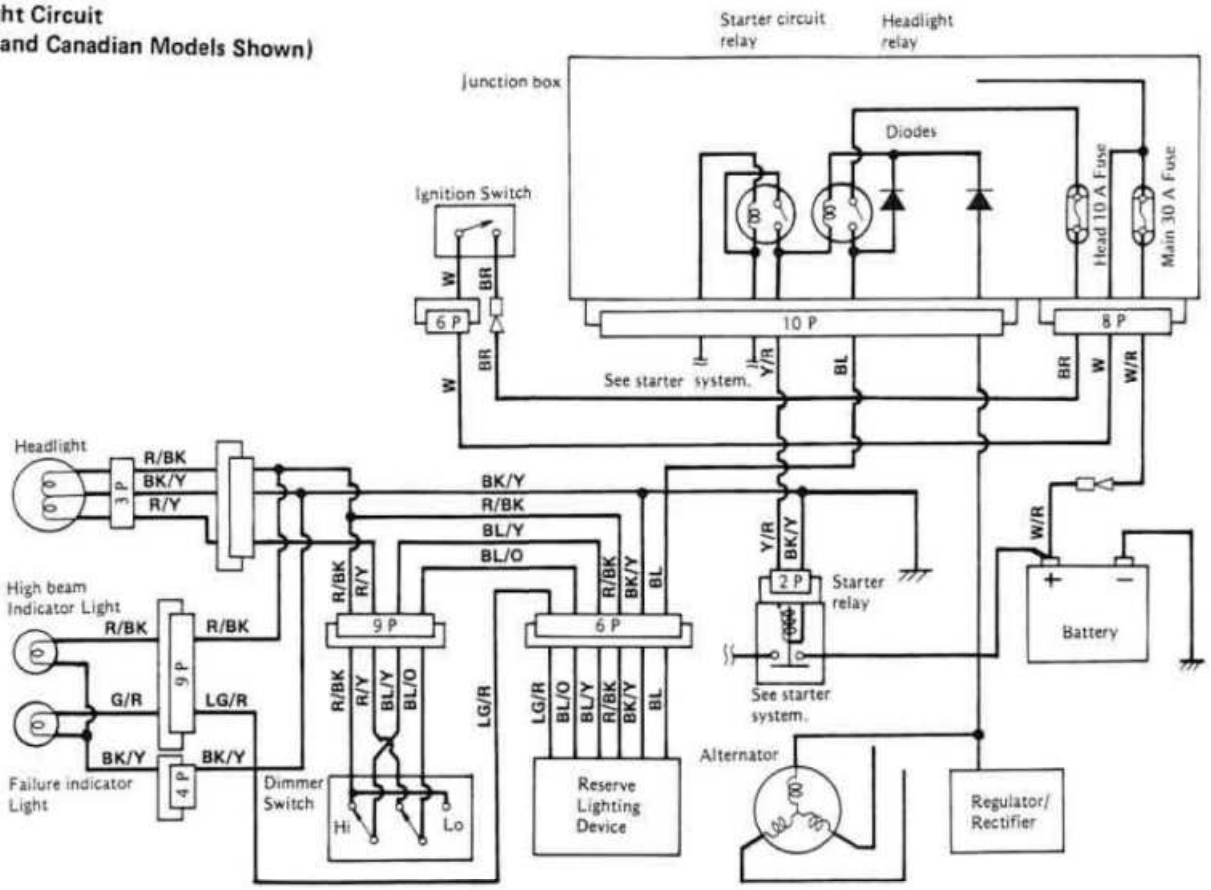
**NOTE**

*○On high beam, the brightest point should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

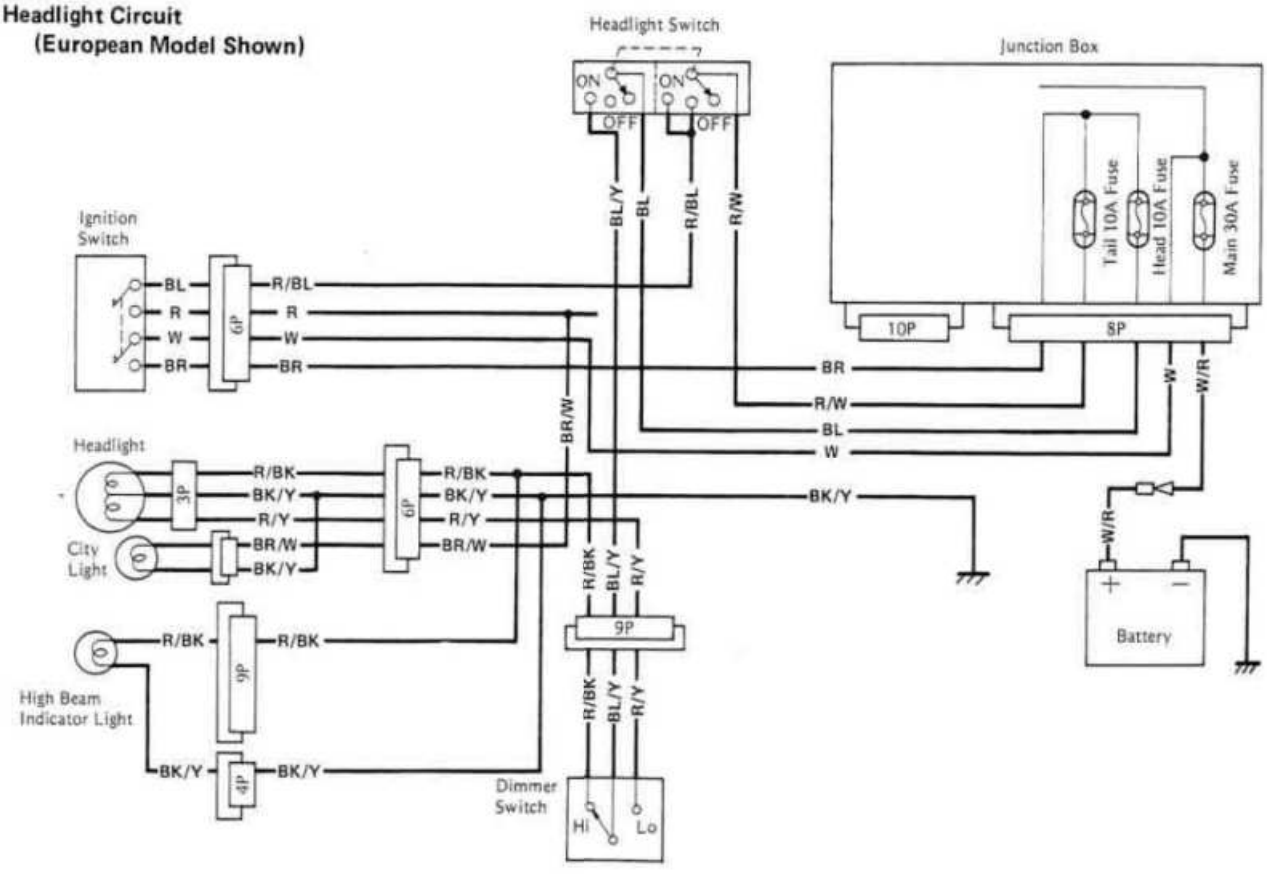
**Vertical Adjustment**



**Headlight Circuit**
**(US and Canadian Models Shown)**




**Headlight Circuit**
**(European Model Shown)**



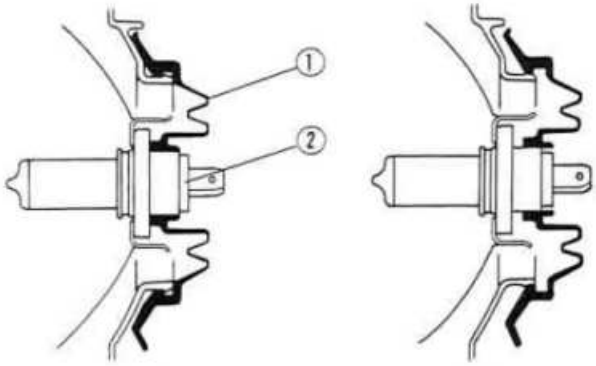
*Healdight Bulb Replacement Notes*

**CAUTION**

**○When handling the quartzhalogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.**

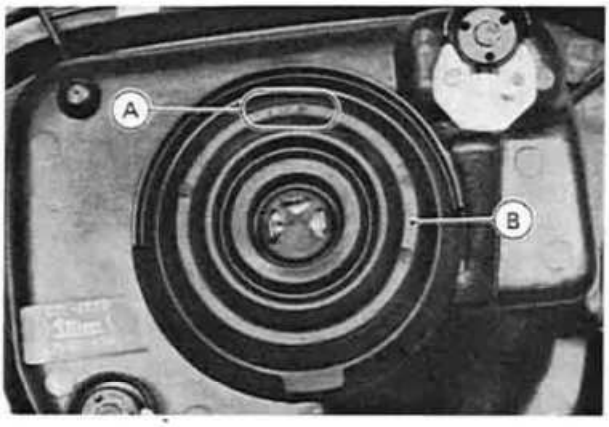
●Fit the dust cover onto the bulb firmly as shown in the figure.

**Dust Cover Installation**




Good Bad

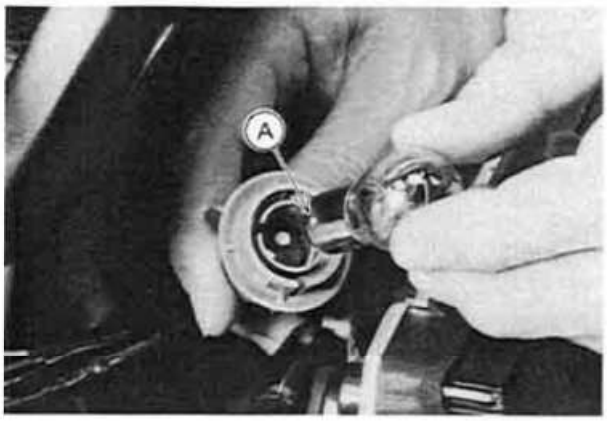
1. Dust Cover 2. Headlight Bulb




A. Top Mark B. Dust Cover

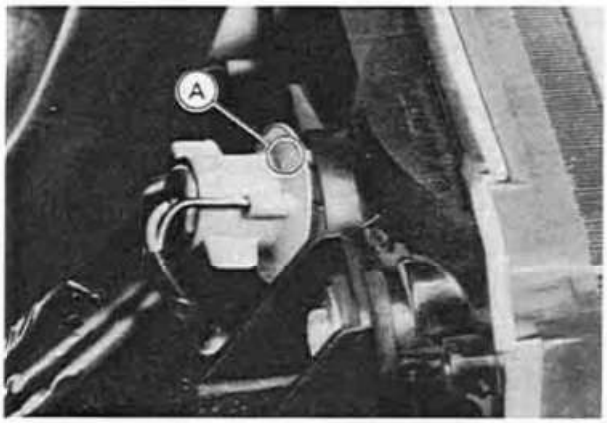
*Tail/Brake Light Bulb Replacement Notes*

●Insert the new bulb by aligning the pins with the grooves in the walls of the socket so that the pin closest to the bulb base is to the upper right.




A. Pin Closest to Base.

●Insert the socket by aligning the tangs with the catches in the housing so that the triangular mark points up, and turn it clockwise.




A. Triangular Mark

*Tail/Brake Light Lens Removal/Installation Note*

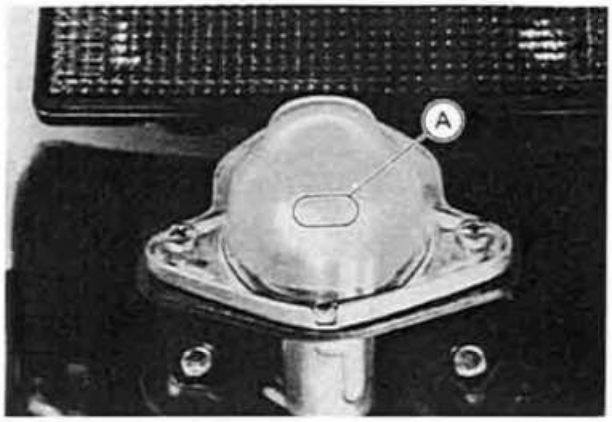
●Be careful not to overtighten the lens mounting screws.

*Turn Signal Light Bulb Replacement Note*

●Be careful not to overtighten the lens mounting screws.

*License Plate Light Bulb Replacement Notes*

●Install the bulb socket and lens so that the "TOP" mark on the lens points up.




A. "TOP" Mark

•Be careful not to overtighten the lens and socket mounting screws.

**Inspection:**

For any lighting system problems, always check the lighting system wiring and the bulbs first (see Wiring Inspection).

*Headlight Reserve Lighting System Inspection*

The US and Canadian models contain a relay in the headlight circuit. In these models, the headlight does not go on when the ignition switch is first turned on, but the headlight goes on once the starter button is pushed to start the engine, and stays on until the ignition switch is turned off. But the headlight goes out whenever the starter button is pushed to restart the engine after engine stalling.

★If all wirings and components other than the reserve lighting device check out good, the device is defective.

**Reserve Lighting System Operation**

| Headlight | Dimmer Switch Position | Headlight Failure Indicator Light | Reserve Lighting |
|---|---|---|---|
| Both high and low beam filaments are normal | HI | Goes on (hardly visible) | ——— |
| | LO | Goes on (hardly visible) | ——— |
| High beam filament burned out | HI | Goes on | Low beam comes on. |
| | LO | Goes on (hardly visible) | ——— |
| Low beam filament burned out | HI | Goes on (hardly visible) | ——— |
| | LO | Goes on | High beam comes on dimly. |

## Cooling Fan System

*Fan System Circuit Inspection*

•Disconnect the connector from the fan switch.
•Ground the red/white wire to the engine with a suitable wire.
★If the fan turns, inspect the fan switch.
★If the fan does not turn, inspect the following.
Junction Box Parts (Fan Relay and Main Fuse)
Fan

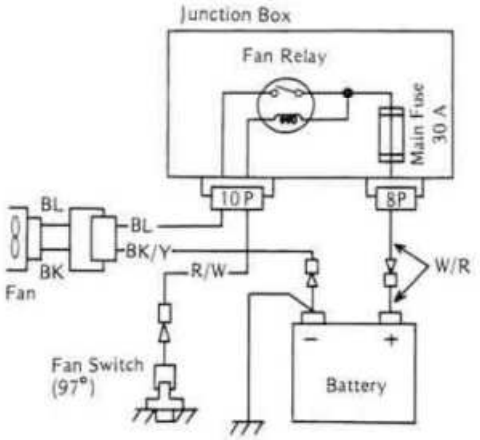
*Fan Inspection*

•Disconnect the 2-pin connector of the fan leads.
•Using two auxiliary wires, supply battery power to the fan.

**Wire Connections**
**Blue Lead ⟷ Battery (+)**
**Black Lead ⟷ Battery (–)**

★If the fan does not turn at this time, the fan is defective and must be replaced.

**Cooling Fan Circuit**




*Fan Relay Inspection*

Refer to the Starter Circuit, and Headlight Relay Inspection in the Junction Box section.

## Meters and Gauges

### *Meter and Gauge Removal/Installation Note*

**CAUTION**

○**Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time it will malfunction.**

### *Bulb Replacement Notes*

●To remove the wedge-base type bulbs (indicator and illumination), pull out the bulb sockets and pull the bulbs off the sockets.

**CAUTION**

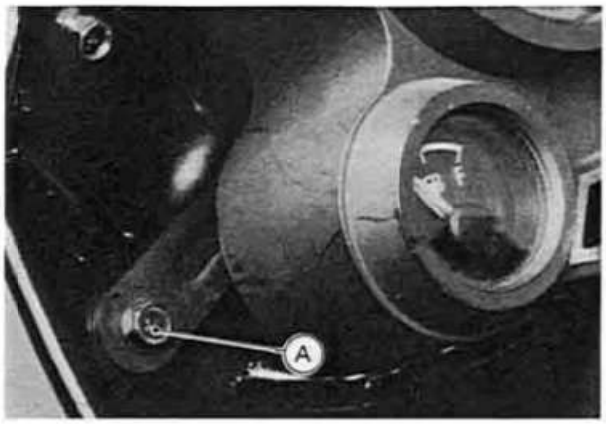
○**Do not use bulbs rated for greater wattage than the specified value, as the meter or gauge panel could become warped by excessive heat radiated from the bulbs.**

### *Tach/Voltmeter Inspection*

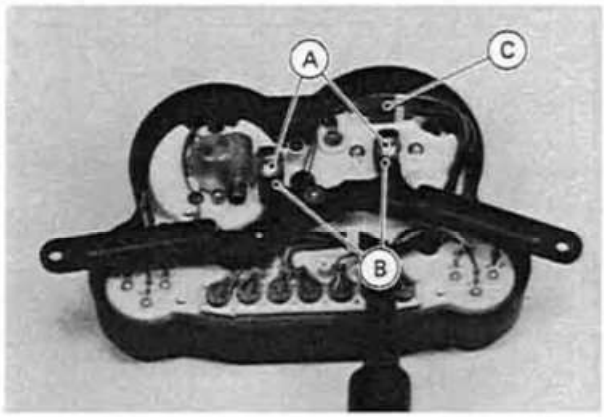
**NOTE**

○*The Tach/Voltmeter inspection is explained on the assumption that the ignition system operates normally.*

●Check to see that the rubber dampers are installed at the meter mounting bracket.
★Install a new damper where it is absent.
●Check to see that the rubber dampers at the meter mounting bracket are in good condition; they should not be hard or cracked.
★Replace any damaged rubber dampers with new ones.
●Check to see that all meter mounting bolts and nuts are tightened securely.
★Tighten the loose fasteners.

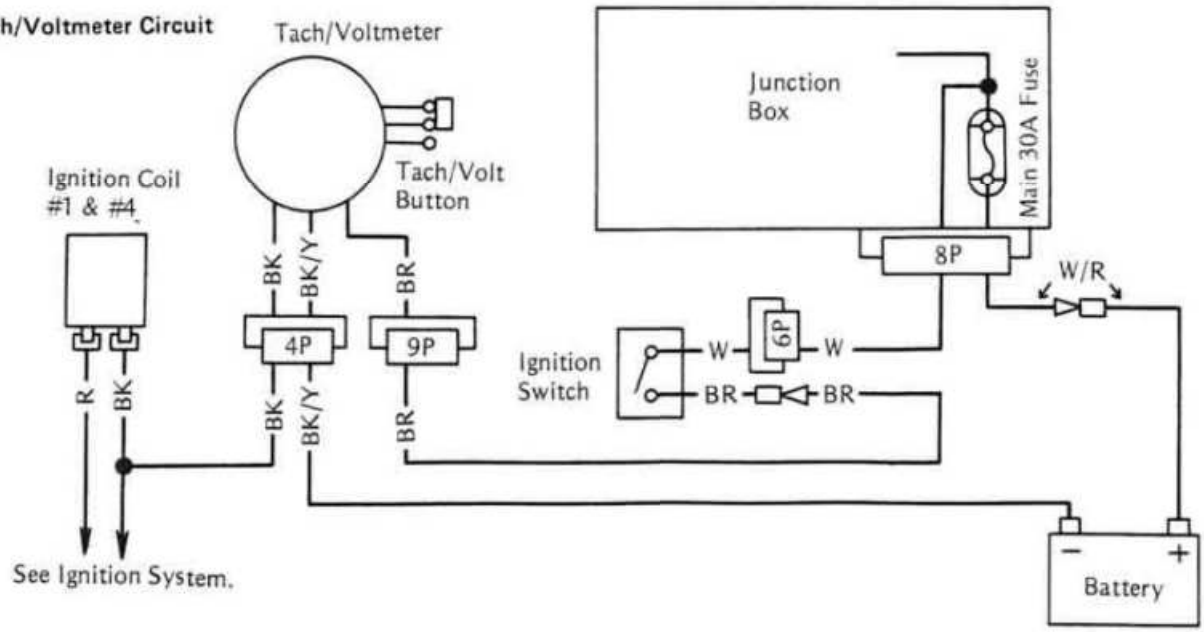



A. Meter Mouting Bolts




A. Meter Mounting Nuts
B. Rubber Damper
C. Tach/Voltmeter 3pin Connector

**Tach/Voltmeter Circuit**



●Check the tach/voltmeter circuit wiring (see Wiring Inspection).
★If all wiring and components other than the tach/voltmeter unit check out good, the unit is defective.

### *Fuel Gauge Operation Inspection*

●Prepare an auxiliary wire, and check the operation of the gauge.

**Fuel Gauge Operation Check**

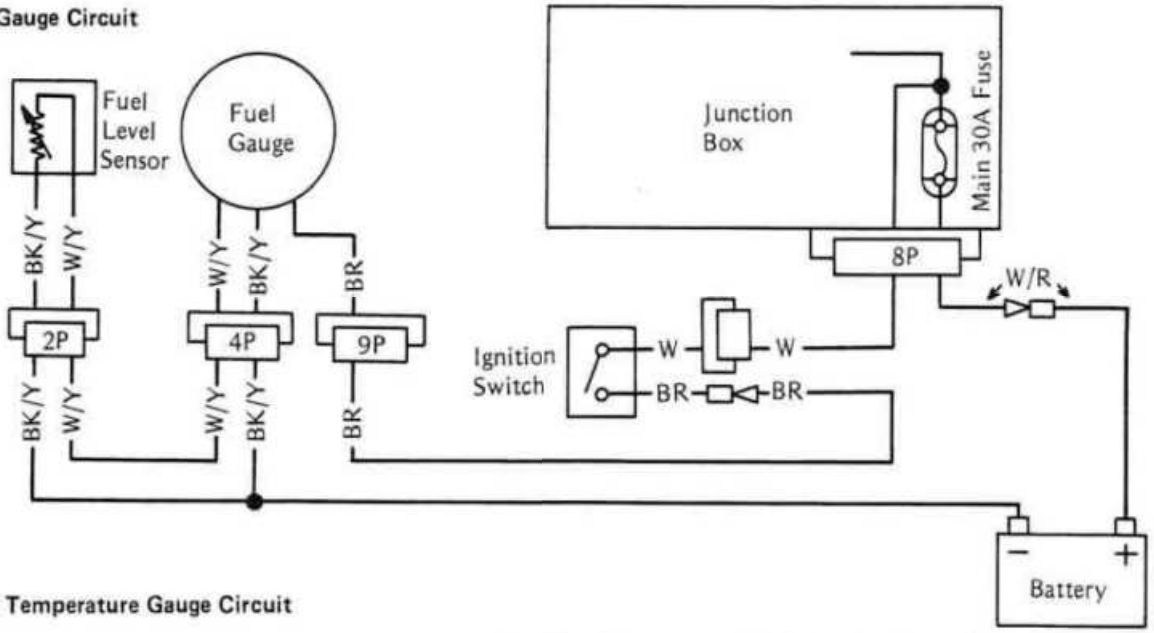
**Ignition Switch Position: ON**
**Wire Location: Female 2-pin sensor connector (disconnected)**
**Results: Gauge should read E when connector wires are opened.**
**Gauge should read F when connector wires are shorted.**

★If these readings are not correct, the trouble is with the gauge and/or wiring.
●Check the fuel gauge circuit wiring (see Wiring Inspection).
★If all wiring and components other than the fuel gauge unit check out good the unit is defective.

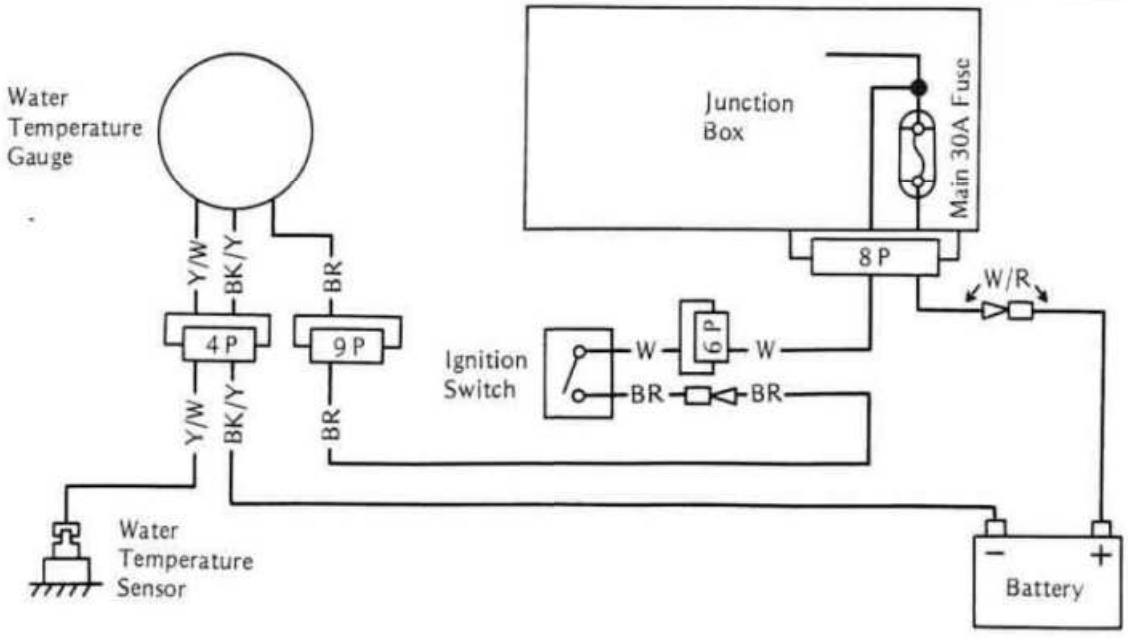
### *Water Temperature Gauge Operation Inspection*

●Prepare an auxiliary wire, and check the operation of the gauge.

**Fuel Gauge Circuit**




**Water Temperature Gauge Circuit**



**Gauge Operation Test**

**Ignition Switch Position: ON**

**Wire Location: Female, Sensor Connector (disconnected)**

**Results: Gauge shuld read C when connector wire is opened.**
**Gauge should read H when connector wire is grounded to engine.**

**CAUTION**

○**Do not ground the wiring longer than necessary. After the needle swings to the H position, stop the test. Otherwise the gauge could be damaged.**

★If these readings are not correct, the trouble is with the gauge and/or wiring.
- Check the water temperature gauge circuit wiring (see Wiring Inspection).
- If all wiring and components other than the water temperature gauge unit check out good, the unit is defective.

## Switches and Sensors

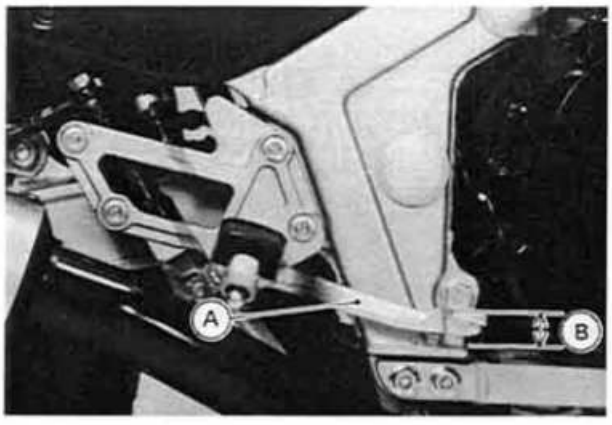
### *Front Brake Light Testing*

- Turn on the ignition switch.
- The brake light should go on when the front brake is applied.

★If it does not, inspect the switch.

### *Rear Brake Light Testing*

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about 10 mm of pedal travel.




A. Rear Brake Pedal B. 10 mm

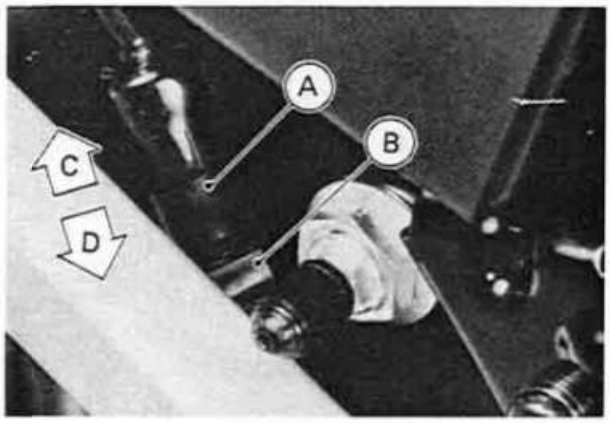
★If it does not, adjust the brake light switch.

### *Rear Brake Lighting Position Adjustment*

- Remove the RH side cover.
- Turn the adjusting nut to adjust the switch.

**CAUTION**

○**To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.**




A. Rear Brake Light Switch
B. Adjusting Nut
C. Light sooner.
D. Lights later.

### *Switch Removal Note*

- Refer to the appropriate chapters for the switches and sensors.

### *Switch Inspection*

- Using an ohmmeter, check to see that only the connectings shown in the table have continuity (about zero ohms).

★If the switch has an open or short, repair it or replace it with new one.

**Ignition Switch Connections**

| | BR | W | Y | BL | R | W/BK | O/G |
|---|---|---|---|---|---|---|---|
| OFF, LOCK | | | | | | | |
| ON | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| P (Park) | | ○ | ○ | ○ | ○ | ○ | ○ |
| | | | | | | | US, Canada |

**Starter Lockout Switch Connections**

| | BK/Y | Y/G (BK) | LG (BK/R) |
|---|---|---|---|
| When clutch lever is pulled in | ○ | ○ | |
| When clutch lever is released | | ○ | ○ |

( ): Late Model

**Engine Stop Switch Connections**

| | R | Y/R |
|---|---|---|
| OFF | | |
| RUN | ○ | ○ |

**Dimmer Switch Connections (US, Canada)**

| | BL/Y | BL/O | R/Y | R/BK |
|---|---|---|---|---|
| HI | ○ | ○ | ○ | |
| LO | ○ | | ○ | ○ |

**Starter Button Connections**

| | BK (BK/R) | BK (BK/R) |
|---|---|---|
| Free | | |
| Push on | ○ | ○ |

( ): Late Model

**Dimmer Switch Connections (Other than US, Canada)**

| | R/BK | BL/Y | R/Y |
|---|---|---|---|
| HI | ○ | ○ | |
| LO | | ○ | ○ |

**Headlight Switch Connections (Other than US, Canada)**

| | R/W | R/BL | BL | BL/Y |
|---|---|---|---|---|
| OFF | | | | |
| ■ | ○ | ○ | | |
| ON | ○ | ○ | ○ | ○ |

**Turn Signal Switch Connections**

| | GY | O | G |
|---|---|---|---|
| R | ○ | ○ | |
| N | | | |
| L | | ○ | ○ |

**Front Brake Light Switch Connections**

| | BR (BK) | BL or BL/R (BK) |
|---|---|---|
| When brake lever is pulled in | ○ | ○ |

( ): Late Model

**Hazard Switch Connections**

| | GY | O | G |
|---|---|---|---|
| Off ■ | | | |
| On ▬ | ○ | ○ | ○ |

**Rear Brake Light Switch Connections**

| | BR | BL |
|---|---|---|
| When brake pedal is pushed down | ○ | ○ |

**Side Stand Switch Connections**

| | BR | BK/Y | G/W |
|---|---|---|---|
| When side stand is up | ○ | ○ | |
| When side stand is down | | ○ | ○ |

**Passing Button Connections (Other than US, Canada)**

| | | BR | R/BK |
|---|---|---|---|
| Free | | | |
| Push on | | ○ | ○ |

**Neutral Switch Connections**

| | LG | ⏚ |
|---|---|---|
| When transmission is in neutral | ○ | ○ |
| When transmission is not in neutral | | |

**Horn Button Connections**

| | | BK/W | BK/Y |
|---|---|---|---|
| Free | | | |
| Push on | | ○ | ○ |

**Oil Pressure Switch Connections***

| | SW. Terminal | ⏚ |
|---|---|---|
| When engine is stopped | ○ | ○ |
| When engine is running | | |

* : Engine lubrication System is in good condition.

### *Fan Switch Inspection*

- Remove the fan switch.
- Suspend the switch in a container of water so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using an ohmmeter, measure the internal resistance of the switch across the terminal and the body at the temperatures shown in the table.

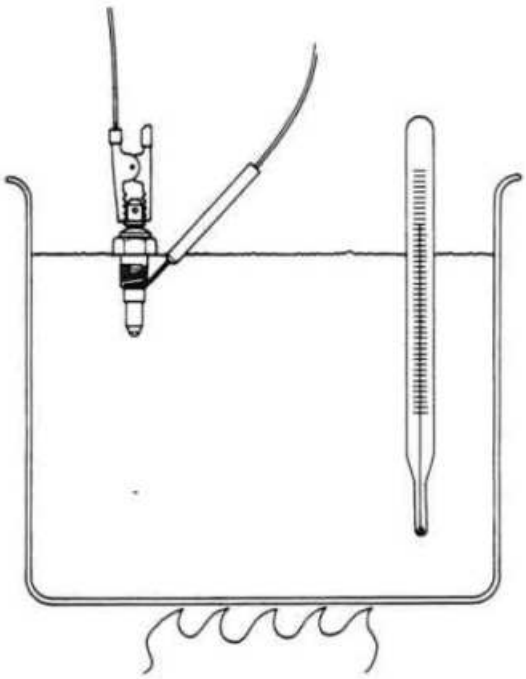
★If the ohmmeter does not show the specified values, replace the switch.

| Fan Switch (97°C) Connections | |
|---|---|
| ○Rising temperature: | From OFF to ON at 94 – 100°C (201 – 212°F) |
| ○Falling temperature: | From ON to OFF above 90°C (194°F) |
| ON: Less than 0.5 Ω | |
| OFF: More than 1 MΩ | |

**NOTE**

○*The switch and thermometer must not touch the container sides or bottom.*

**Fan Switch Inspection**



### *Water Temperature Sensor Inspection*

- Remove the water temperature sensor.
- Suspend the sensor in a container of water so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

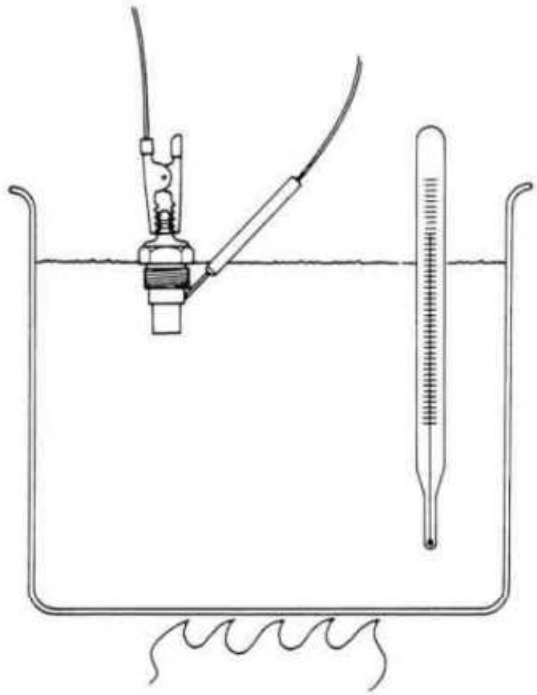
★If the ohmmeter does not show the specified values, replace the sensor.

| Internal Resistance of Water Temperature Sensor | |
|---|---|
| 80°C (176°F): | 47 – 57 Ω |
| 100°C (212°F): | 25 – 30 Ω |

**NOTE**

○*The sensor and thermostat must not touch the container sides or bottom.*

**Water Temperature Sensor Inspection**

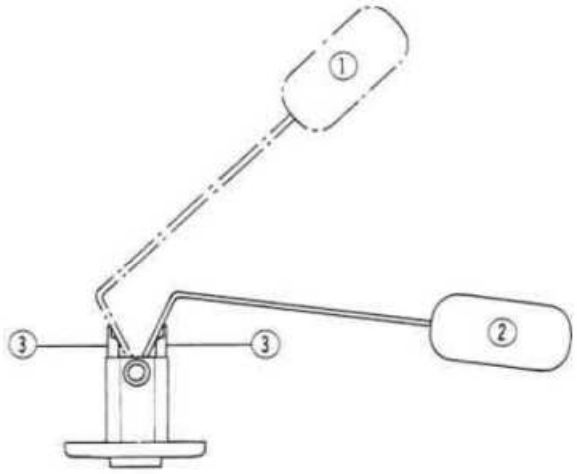


### *Fuel Level Sensor Inspection*

- Remove the fuel level sensor.
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the sensor.

**Fuel Level Sensor**




1. Float in full position
2. Float in empty position
3. Float arm stop

●Measure the resistance of the fuel level sensor with an ohmmeter.

★If the ohmmeter does not show the specified values, or the readings do not change smoothly as the float moves up and down, replace the sensor.

| Fuel Level Sensor Resistance | |
|---|---|
| Full Position: | 4 – 10 Ω |
| Empty Position: | 90 – 100 Ω |

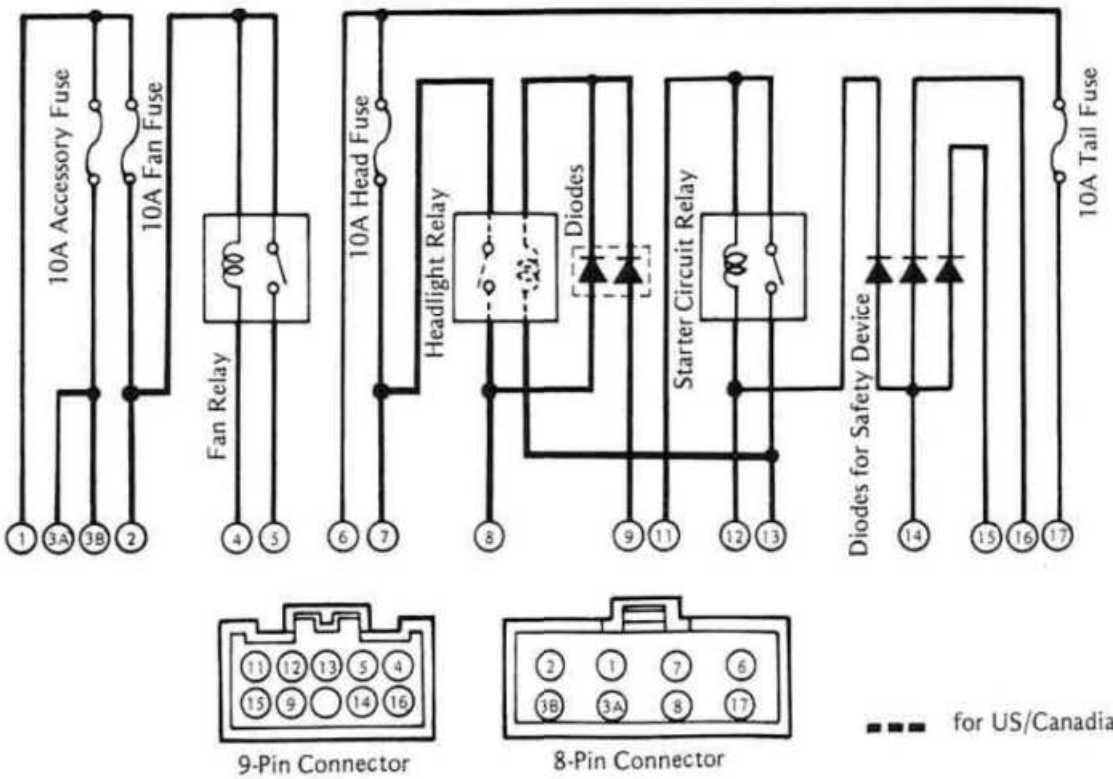
●Inspect the leads and 2-pin connector.

★If they show any signs of damage, replace the sensor.

## Junction Box

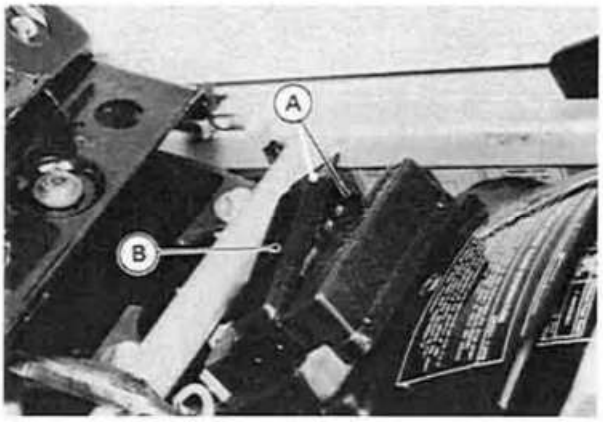
The junction box has fuses, relays and diodes. The relays and diodes can not be removed.

**Junction Box Internal Circuit**



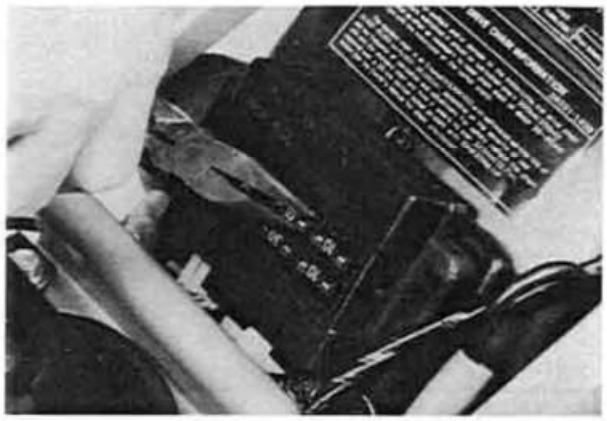
*Fuse Removal*

•Remove the seat.
•Unlock the hook to lift up the locking arm.



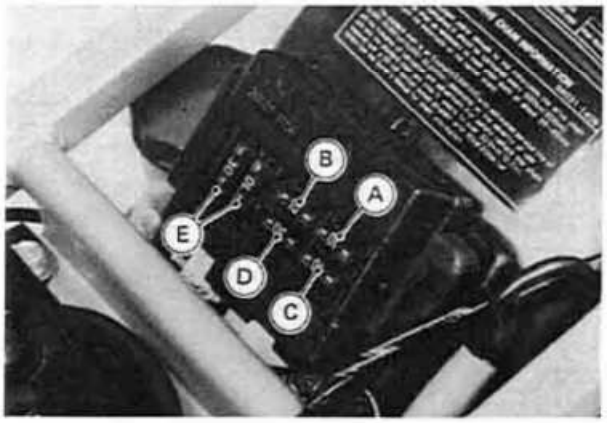

A. Locking Arm B. Fuse Cover

•Pull the fuses straight off the junction box with needle nose pliers.



*Fuse Installation Note*

○Install the fuses on the original positions shown.




A. 10 A for Taillight
B. 10 A for Accessory
C. 10 A for Headlight Relay
D. 30 A Main Fuse
E. Spare Fuses

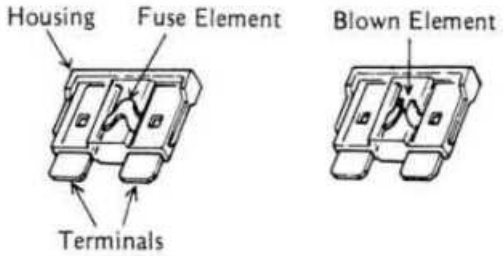
*Fuse Inspection*

•Remove the fuse from the junction box.
•Inspect the fuse element.
★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

**CAUTION**

○**When replacing a fuse, be sure the new fuse matches the speciifed fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.**

**Fuse**




*Junction Box Fuse Circuit Inspection*

•Remove the junction box from the motorcycle.
•Pull off the connectors from the junction box.
•Make sure all connector terminals are clean and tight, and none of them have been bent.
★Clean the dirty terminals and, straighten slightly-bent terminals.
•Check conductivity of the numbered terminals with hand tester.
★If the meter does not read as specified, replace the junction box.

**Fuse Circuit Inspection**

| Meter Connection | Meter Reading (Ω) |
|---|---|
| 1 — 2 | 0 |
| 1 — 3 | 0 |
| 6 — 7 | 0 |
| 6 — 17 | 0 |
| 1 — 7 | ∞ |
| 3A — 8 | ∞ |
| 8 — 17 | ∞ |

*Fan, Starter Circuit and Headlight Relay Inspection*

•Remove the junction box from the motorcycle.
•Check conductivity of the following numbered terminals by connecting an ohmmeter and one 12 V battery to the junction box as shown.
★If the meter does not read as specified, replace the junction box.

**Relay Circuit Inspection (with the battery disconnected)**

| Meter Connection | Meter Reading (Ω) |
|---|---|
| 2-5 | ∞ |
| 4-5 | ∞ |
| *7-8 | ∞ |
| *7-13 | ∞ |
| 11-13 | ∞ |
| 12-13 | ∞ |

**Relay Circuit Inspection (with the battery connected)**

| Meter Connection | Battery Connection + — | Meter Reading (Ω) |
|---|---|---|
| 2-5 | 2 — 4 | 0 |
| *7-8 | 9 — 13 | 0 |
| 11-13 | 11 — 12 | 0 |

* US, Canadian Models Only

### *Diode Circuit Inspection*

- ●Remove the junction box from the motorcycle.
- ●Pull off the connectors from the junction box.
- ●Check conductivity of the following pair of terminals.

**Terminals for Diode Circuit Inspection**
***13-8, *13-9, 12-14, 15-14, 16-14**

*** US, Canadian Models Only**

★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the junction box must be replaced.

**NOTE**

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to the first ⅓ of the scale.*

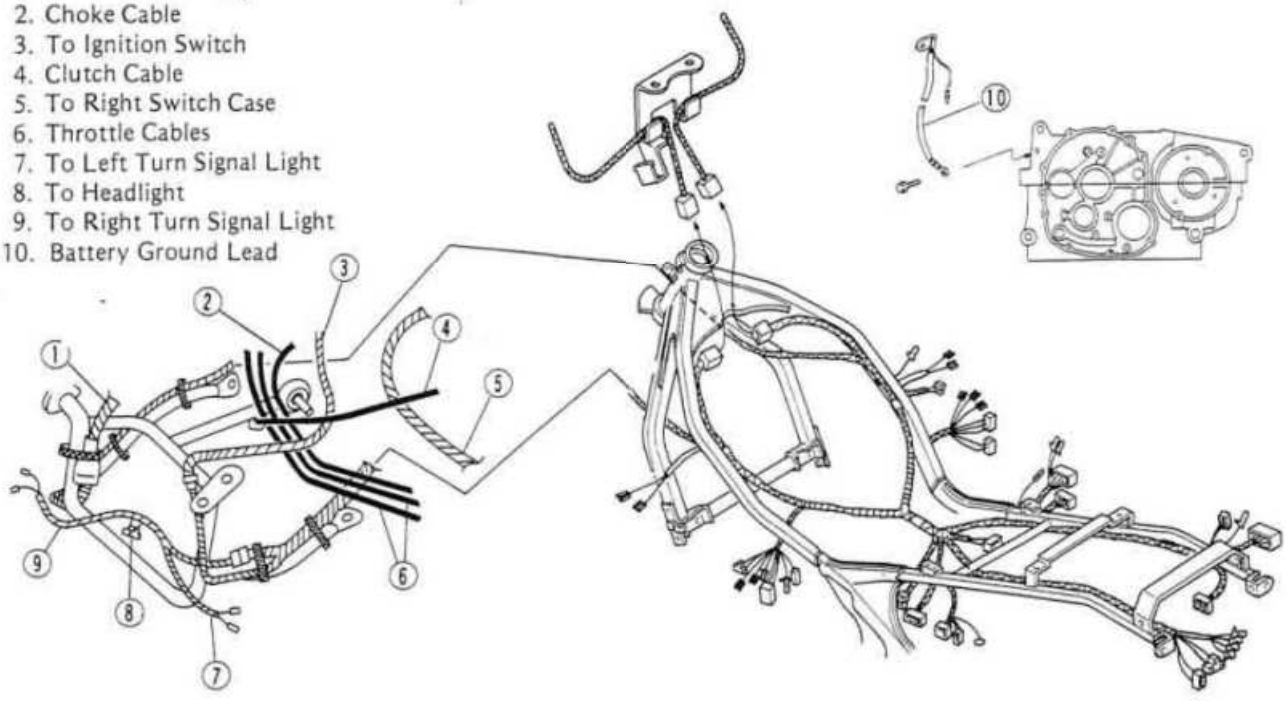
## Electrical Wiring

### *Wiring Inspection*

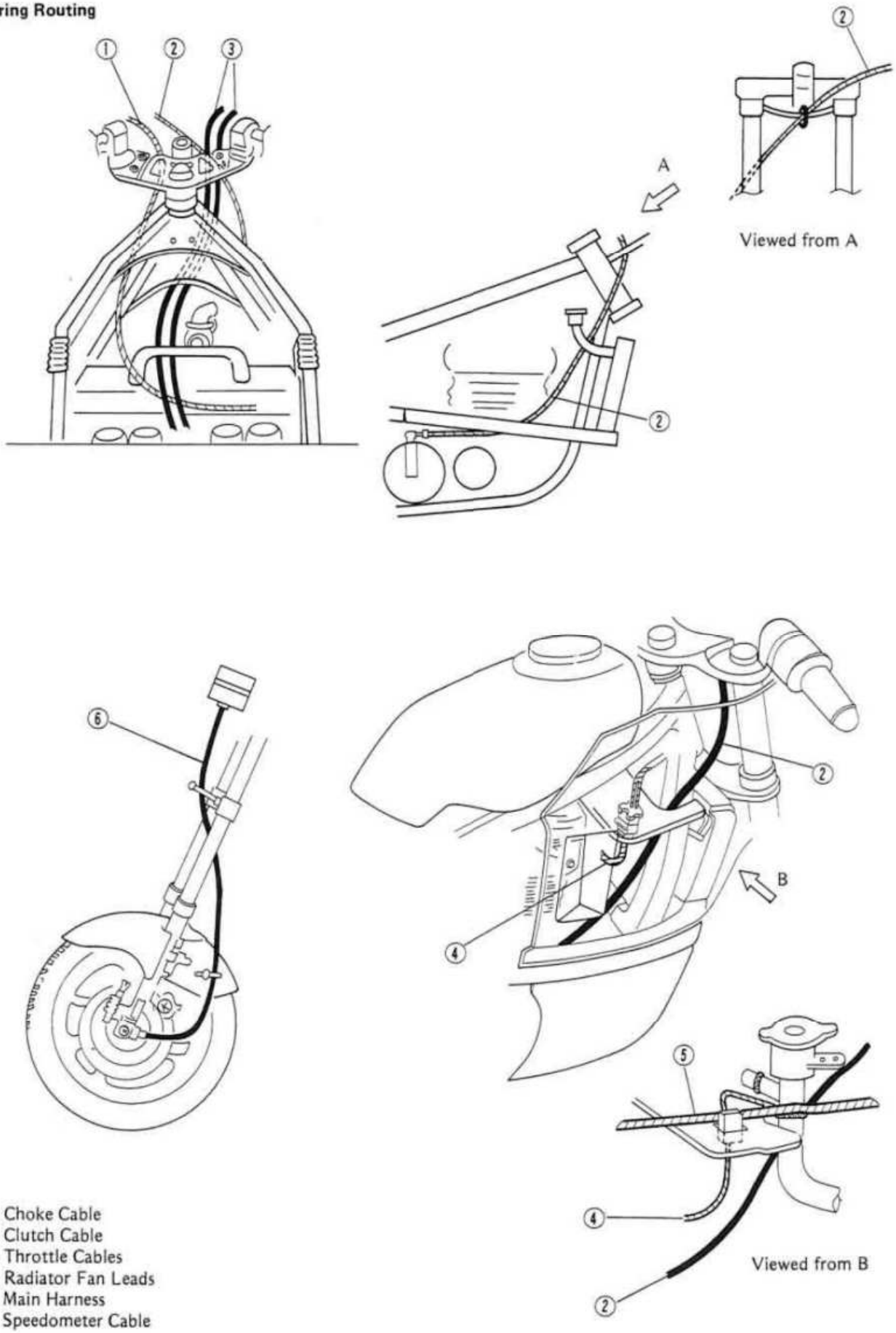
- ●Visually inspect the wiring for signs of burning, fraying, etc.
- ★If any wiring is poor, apart and inspect it for corrosion, dirt, and damage.
- ●Pull each connector apart and inspect it for corrosion, dirt, and damage.
- ★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- ●Check the wiring for continuity.
- ○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- ○Connect an ohmmeter between the ends of the leads.
- ○Set the meter to the x 1 Ω range, and read the meter.
- ★If the meter does not read 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.

**Wiring Routing**

1. To Meter Assembly
2. Choke Cable
3. To Ignition Switch
4. Clutch Cable
5. To Right Switch Case
6. Throttle Cables
7. To Left Turn Signal Light
8. To Headlight
9. To Right Turn Signal Light
10. Battery Ground Lead



**Wiring Routing**




1. Choke Cable
2. Clutch Cable
3. Throttle Cables
4. Radiator Fan Leads
5. Main Harness
6. Speedometer Cable

# Appendix

## Table of Contents


Additional Considerations for Racing ..... 16-2
Carburetor: ..... 16-2
Spark Plug: ..... 16-2
*Spark Plug Inspection* ..... 16-2
Troubleshooting Guide ..... 16-3
General Lubrication ..... 16-7
*Lubrication* ..... 16-7
Nut, Bolt, and Fastener Tightness ..... 16-7
*Tightness Inspection* ..... 16-7
Standard Torque Table ..... 16-8
Unit Conversion Table ..... 16-9

## Additional Considerations for Racing

This motorcycle has been manufactured for use in a reasonable and prudent manner and as a vehicle only. However, some may wish to subject this motorcycle to abnormal operation, such as would be experienced under racing conditions. KAWASAKI STRONGLY RECOMMENDS THAT ALL RIDERS RIDE SAFELY AND OBEY ALL LAWS AND REGULATIONS CONCERNING THEIR MOTORCYCLE AND ITS OPERATION.

Racing should be done under supervised conditions, and recognized sanctioning bodies should be contacted for further details. For those who desire to participate in competitive racing or related use, the following technical information may prove useful. However, please note the following important points.

- You are entirely responsible for the use of your motorcycle under abnormal conditions such as racing, and Kawasaki shall not be liable for any damages which might arise from such use.
- Kawasaki's Limited Motorcycle Warranty and Limited Emission Control Systems Warranty specifically exclude motorcycles which are used in competitive or related uses. Please read the warranty carefully.
- Motorcycle racing is a very sophisticated sport, subject to many variables. The following information is theoretical only, and Kawasaki shall not be liable for any damages which might arise from alterations utilizing this information.
- When the motorcycle is operated on public roads, it **must** be in its original state in order to ensure safety and compliance with applicable regulations.

### Carburetor:

Sometimes an alteration may be desirable for improved performance under special conditions when proper mixture is not obtained after the carburetor has been properly adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly rich or lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. A smaller numbered jet gives a leaner mixture and a larger numbered jet a richer mixture.

### Spark Plug:

The spark plug ignites the fuel/air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be used, and the spark plug must be kept clean and adjusted.

Tests have shown the plug listed in the "General Information" chapter to be the best plug for general use.

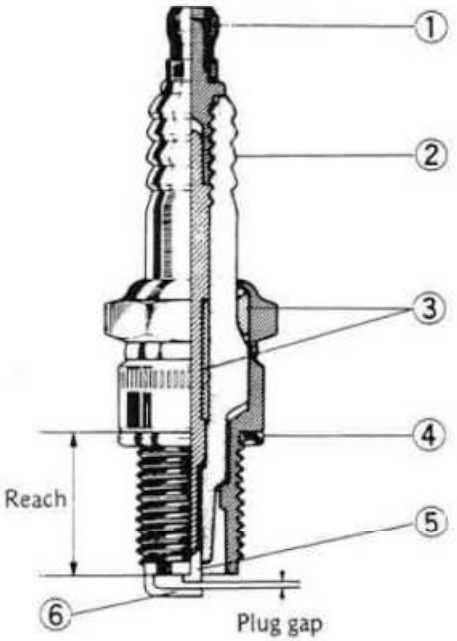
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of the correct heat range is used should be determined by removing and inspecting the plug.

When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 ~ 800°C (750 ~ 1,450°F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light brown color, the plug is operating at the right temperature.

A spark plug for higher operating temperatures is used for racing. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a "colder" plug. If a spark plug with too cool a heat range is used – that is, a "cold" plug that cools itself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramix insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

**Spark Plug**

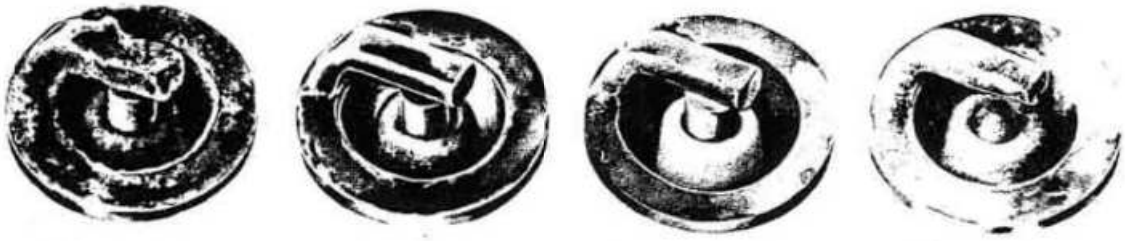



1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center electrode
6. Side electrode

*Spark Plug Inspection*

- Remove the spark plug and inspect the ceramic insulator.

**Spark Plug Condition**



Carbon fouling | Oil fouling | Normal operation | Overheating

★Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

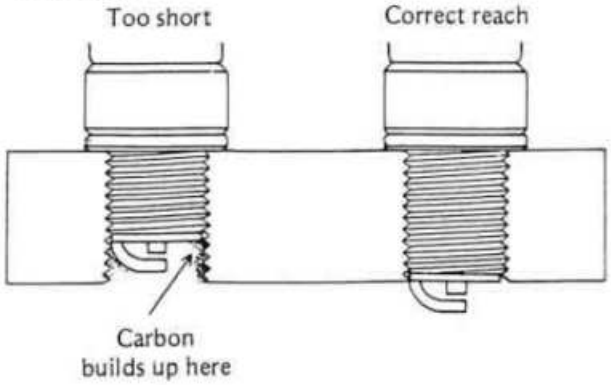
**CAUTION**

○**If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.**

○**If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.**

○**If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.**

**Plug Reach**




| Standard Spark Plug Threads | |
|---|---|
| Diameter: | 12 mm |
| Pitch: | 1.25 mm |
| Reach: | 19.0 mm |

**NOTE**

○*The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).*

## Troubleshooting Guide

**NOTE**

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

### Engine Doesn't Start, Starting Difficulty:

**Starter motor not rotating:**
- Starter lockout or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

**Starter motor rotating but engine doesn't turn over:**
- Starter motor clutch trouble

**Engine won't turn over:**
- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

**No fuel flow:**
- Fuel tap vacuum hose clogged
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

**Engine flooded:**
- Fuel level in carburetor float bowl too high
- Float valve worn or stuck open
- Starting technique faulty
- (When flooded, crank the engine with the throttle fully open to allow more air to reach the engine.)

**No spark; spark weak:**
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- IC igniter trouble
- Neutral, starter lockout, or side stand switch trouble
- Pickup coil trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

**Compression Low:**
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

## Poor Running at Low Speed:

**Spark weak:**
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or high tension wiring trouble
- Spark Plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

**Fuel/air mixture incorrect:**
- Pilot screw maladjusted
- Pilot jet, or air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter plunger stuck open
- Fuel level in carburetor float bowl too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

**Compression low:**
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head warped
- Cylinder head gasket damaged
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

**Other:**
- IC igniter trouble
- Carburetors not synchronizing
- Vacuum piston doesn't slide smoothly
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging
- Air suction valve trouble (US model)
- Vacuum switch valve trouble (US model)

## Poor Running or No Power at High Speed:

**Firing incorrect:**
- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

**Fuel/air mixture incorrect:**
- Starter plunger stuck open
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Air jet clogged
- Fuel level in carburetor float bowl too high or too low
- Bleed holes of air bleed pipe or needle jet clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct poorly sealed
- Water of foreign matter in fuel
- Carburetor holder loose
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged

**Compression low:**
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

**Knocking:**
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- IC igniter trouble

**Miscellaneous:**
Throttle valve won't fully open
Vacuum piston doesn't slide smoothly
Brake dragging
Clutch slipping
Overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Air suction valve trouble (US model)
Vacuum switch valve trouble (US model)

## Overheating:

**Firing incorrect:**
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
IC igniter trouble

**Fuel/air mixture incorrect:**
Main jet clogged or wrong size
Fuel level in carburetor float bowl too low
Carburetor holder loose
Air cleaner poorly sealed, or missing
Air cleaner duct poorly sealed
Air cleaner clogged

**Compression high:**
Carbon built up in combustion chamber

**Engine load faulty:**
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging

**Lubrication inadequate:**
Engine oil level too low
Engine oil poor quality or incorrect

**Gauge incorrect:**
Water temperature gauge broken
Water temperature sensor broken

**Coolant incorrect:**
Coolant level too low
Coolant deteriorated

**Cooling system component incorrect:**
Radiator clogged
Thermostat trouble
Radiator cap trouble
Thermostatic fan switch trouble
Fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

## Over Cooling:

**Gauge incorrect:**
Water temperature gauge broken
Water temperature sensor broken

**Cooling system component incorrect:**
Thermostatic fan switch trouble
Thermostat trouble

## Clutch Operation Faulty:

**Clutch slipping:**
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch release mechanism trouble
Clutch hub or housing unevenly worn

**Clutch not disengaging properly:**
Clutch plate warped or too rough
Clutch spring tension uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch release mechanism trouble
Clutch hub locknut loose

## Gear Shifting Faulty:

**Doesn't go into gear; shift pedal doesn't return:**
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift return spring weak or broken
Shift return spring pin loose
Pawl spring broken
Shift mechanism arm broken

**Jumps out of gear:**
Shift fork worn
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Neutral positioning pin spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn

**Overshifts:**
Neutral positioning pin spring weak or broken
Pawl spring broken

## Abnormal Engine Noise:

**Knocking:**
IC igniter trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating

**Piston slap:**
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn

**Valve noise:**
Valve clearance incorrect
Valve spring broken or weak

Camshaft bearing worn

**Other noise:**

Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken or stuck
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Primary and secondary shaft sprockets worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged (US model)
Vacuum switch valve damaged (US model)

## Abnormal Drive Train Noise:

**Clutch noise:**

Weak or damaged rubber damper
Clutch housing/friction plate clearance excessive
Clutch housing gear worn

**Transmission noise:**

Bearings worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

**Drive chain noise:**

Drive chain adjusted improperly
Chain worn
Rear and/or engine sprocket worn
Chain lubrication insufficient
Rear wheel misaligned

## Abnormal Frame Noise:

**Front fork noise:**

Oil insufficient or too thin
Spring weak or broken

**Rear shock absorber noise:**

Shock absorber damaged

**Disc brake noise:**

Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

**Other noise:**

Bracket, nut, bolt, etc. not properly mounted or tightened

## Oil Pressure Warning Light Goes On:

Engine oil pump damaged
Engine oil pump screen clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearings worn
Crankshaft bearings worn
Oil pressure switch damaged
Wiring damaged
Relief valve stuck open
O-ring at the oil pipe in the crankcase damaged

## Exhaust Smokes Excessively:

**White smoke:**

Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

**Black smoke:**

Air cleaner clogged
Main jet too large or fallen off
Starter plunger stuck open
Fuel level in carburetor float bowl too high

**Brown smoke:**

Main jet too small
Fuel level in carburetor float bowl too low
Air cleaner duct loose
Air cleaner poorly sealed or missing

## Handling and/or Stability Unsatisfactory:

**Handlebar hard to turn:**

Steering stem locknut too tight
Bearing damaged
Steering bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

**Handlebar shakes or excessively vibrates:**

Tire worn
Swing arm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar mounting bolts loose
Steering stem head nut loose

**Handlebar pulls to one side:**

Frame bent
Wheel misalignment
Swing arm bent or twisted
Steering maladjusted
Front fork bent
Right/left fork legs unbalanced (oil level, air pressure, anti-dive setting)

**Shock absorption unsatisfactory:**

(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Front fork air pressure too high
Rear shock absorber air pressure too high
Tire air pressure too high
Front fork anti-dive mechanism trouble
Front fork bent
(Too soft)
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low

Front fork air pressure too low
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking
Front fork anti-dive mechanism trouble

**Brake Doesn't Hold:**

Air in the brake line
Pad or disc worn
Brake fluid leak
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged
Master cylinder scratched inside

**Battery Discharged:**

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Batterly leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/Rectifire trouble

**Battery Overcharged:**

Regualtor/Rectifire trouble

**Points: Lubricate with Grease.**

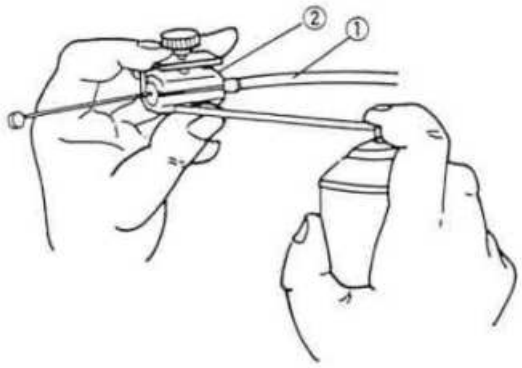
Throttle Inner Cable Lower End
Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly.

**Cables: Lubricate with Penetrating Rust Inhibitor.**

Choke Cable
Throttle Cables
Clutch Cable

**Cable Lubrication**




1. Cable
2. Pressure Cable Luber: K56019-021

## General Lubrication

### *Lubrication*

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

**NOTE**

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

**Pivots: Lubricate with Motor Oil.**

Center Stand
Side Stand
Clutch Lever
Brake Lever
Brake Pedal
Rear Brake Rod Joint

## Nut, Bolt, and Fastener Tightness

### *Tightness Inspection*

- Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

**NOTE**

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by ½ turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

**Nut, Bolt, and Fastener to be checked**

- Wheels:
  - Front Axle Nut
  - Front Axle Clamp Bolts
  - Rear Axle Nut
  - Chain Adjusting Bolt Locknut
- Brakes:
  - Front Master Cylinder Clamp Bolts
  - Front Caliper Mounting Bolts
  - Rear Master Cylinder Mounting Bolt
  - Rear Caliper Mounting Bolt
  - Torque Link Nuts
  - Brake Lever Pivot Nut
  - Brake Pedal Bolt
  - Brake Rod Joint Cotter Pin
- Suspension:
  - Front Fork Clamp Bolts
  - Front Fender Mounting Bolts
  - Rear Shock Absorber Mounting Bolts
  - Swing Arm Pivot Shaft Nuts
  - Uni-trak Link Nuts
- Steering:
  - Stem Head Nut
  - Handlebar Mounting Bolts
- Engine:
  - Engine Mounting Bolts
  - Cylinder Head Bolts
  - Muffler Connecting Pipe Clamp Bolts
  - Muffler Mounting Bolts
  - Muffler Connecting Clamp Bolts
  - Clutch Lever Pivot Nut
- Others:
  - Center Stand Bolts
  - Side Stand Bolt
  - Front Footpeg Mounting Bolts
  - Footpeg Bracket Mounting Bolts
  - Down Tube Mounting Bolts

**General Fasteners**

| Threads dia. (mm) | Torque | | |
|---|---|---|---|
| | N-m | kg-m | ft-lb |
| 5 | 3.4 ~ 4.9 | 0.35 ~ 0.50 | 30 ~ 43 in-lb |
| 6 | 5.9 ~ 7.8 | 0.60 ~ 0.80 | 52 ~ 69 in-lb |
| 8 | 14 ~ 19 | 1.4 ~ 1.9 | 10.0 ~ 13.5 |
| 10 | 25 ~ 34 | 2.6 ~ 3.5 | 19.0 ~ 25 |
| 12 | 44 ~ 61 | 4.5 ~ 6.2 | 33 ~ 45 |
| 14 | 73 ~ 98 | 7.4 ~ 10.0 | 54 ~ 72 |
| 16 | 115 ~ 155 | 11.5 ~ 16.0 | 83 ~ 115 |
| 18 | 165 ~ 225 | 17.0 ~ 23 | 125 ~ 165 |
| 20 | 225 ~ 325 | 23 ~ 33 | 165 ~ 240 |

## Standard Torque Table

This table relating tightening torque to thread diameter, lists the basic torque for bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. Refer to each chapter for reference to these features. All of the values are for use with dry solvent-cleaned threads.

## Unit Conversion Table

### Prefixes for Units:

| Prefix | Symbol | Power |
|---|---|---|
| mega | M | x 1,000,000 |
| kilo | k | x 1,000 |
| centi | c | x 0.01 |
| milli | m | x 0.001 |
| micro | $\mu$ | x 0.000001 |

### Units of Mass:

| | | | | |
|---|---|---|---|---|
| kg | x | 2.205 | = | lb |
| g | x | 0.03527 | = | oz |

### Unit of Volume:

| | | | | |
|---|---|---|---|---|
| L | x | 0.2642 | = | gal (US) |
| L | x | 0.2200 | = | gal (imp) |
| L | x | 1.057 | = | qt (US) |
| L | x | 0.8799 | = | qt (imp) |
| L | x | 2.113 | = | pint (US) |
| L | x | 1.816 | = | pint (imp) |
| mL | x | 0.03381 | = | oz (US) |
| mL | x | 0.02816 | = | oz (imp) |
| mL | x | 0.06102 | = | cu in |

### Units of Force:

| | | | | |
|---|---|---|---|---|
| N | x | 0.1020 | = | kg |
| N | x | 0.2248 | = | lb |
| kg | x | 9.807 | = | N |
| kg | x | 2.205 | = | lb |

### Units of Length:

| | | | | |
|---|---|---|---|---|
| km | x | 0.6214 | = | mile |
| m | x | 3.281 | = | ft |
| mm | x | 0.03937 | = | in |

### Units of Torque:

| | | | | |
|---|---|---|---|---|
| Nm | x | 0.1020 | = | kg-m |
| Nm | x | 0.7376 | = | ft-lb |
| Nm | x | 8.851 | = | in-lb |
| kg-m | x | 9.807 | = | Nm |
| kg-m | x | 7.233 | = | ft-lb |
| kg-m | x | 86.80 | = | in-lb |

### Units of Pressure:

| | | | | |
|---|---|---|---|---|
| kPa | x | 0.01020 | = | $kg/cm^2$ |
| kPa | x | 0.1450 | = | psi |
| kPa | x | 0.7501 | = | cmHg |
| $kg/cm^2$ | x | 98.07 | = | kPa |
| $kg/cm^2$ | x | 14.22 | = | psi |
| cmHg | x | 1.333 | = | kPa |

### Units of Speed:

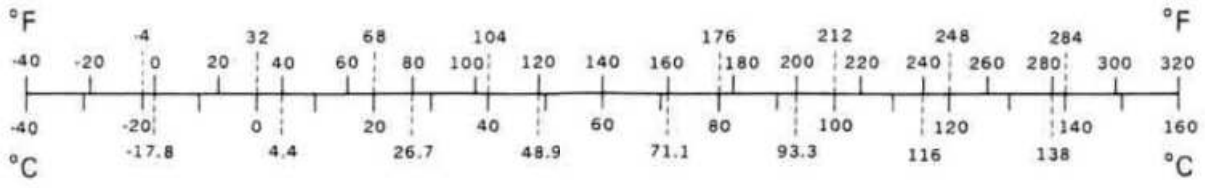
| | | | | |
|---|---|---|---|---|
| km/h | x | 0.6214 | = | mph |

### Units of Power:

| | | | | |
|---|---|---|---|---|
| kW | x | 1.360 | = | PS |
| kW | x | 1.341 | = | HP |
| PS | x | 0.7355 | = | kW |
| PS | x | 0.9863 | = | HP |

### Units of Temperature:

$$\frac{9\,(°C + 40)}{5} - 40 = °F \qquad \frac{5\,(°F + 40)}{9} - 40 = °C$$



# Supplement-1986-1989 Models

This "Supplement-1986 – 1989 Models" chapter is designed to be used in conjunction with the front part of this manual (up to the end of the "Appendix" chapter). The maintenance and repair procedures described in this chapter are only those that are unique to the 1986 through 1989 models. Complete and proper servicing of the 1986 through 1989 models, therefore requires mechanics to read both this chapter and the text in front of this chapter.

**NOTE**

○*The service information for the 1987 ZX600-B1 is newly included in this chapter. Unless otherwise noted, refer to the information for the 1987 ZX600-A3.*

## Table of Contents


General Information ..... 17-2
General Specifications ..... 17-2
Periodic Maintenance Chart (1989 ZX600-A5) ..... 17-8
Fuel System ..... 17-9
Specifications ..... 17-9
Special Tools ..... 17-9
Engine Top End ..... 17-11
Specifications ..... 17-11
Special Tools ..... 17-11
Clean Air System (1989 Swiss model) ..... 17-11
Engine Lubrication System ..... 17-11
Exploded View ..... 17-11
Special Tools ..... 17-12
Engine Oil Flow Chart ..... 17-12
Engine Removal/Installation ..... 17-13
Exploded View (1987 ZX600-B1) ..... 17-13
Crankshaft/Transmission ..... 17-14
Special Tool ..... 17-14
Transmission (1987-1989 models) ..... 17-14
Wheels/Tires ..... 17-14
Special Tools ..... 17-14
Tires (1989 model) ..... 17-14
Suspension ..... 17-15
Special Tools ..... 17-15
Steering ..... 17-16
Special Tools (1987 ZX600-B1) ..... 17-16
Steering Removal/Installation (1987 ZX600-B1) ..... 17-16
Frame ..... 17-17
Exploded View (1987 ZX600-B1) ..... 17-17
Electrical System ..... 17-17
Special Tools ..... 17-17
Charging System (1987-1989 models) ..... 17-17
Wiring Diagram (1989 ZX600-A5) ..... 17-17


17

# General Information

## General Specifications

| Items | ZX600-A2, A3, A4, A5 | ZX500-A2, A3 |
|---|---|---|
| **Dimensions:** | | |
| Overall length | 2 140 mm, (C) (SA) (U) 2 085 mm | 2 140 mm |
| Overall width | 670 mm | ← |
| Overall height | 1 185 mm | ← |
| Wheelbase | 1 430 mm | ← |
| Road clearance | 140 mm | ← |
| Seat height | 770 mm | ← |
| Dry weight | 195 kg, (Cal) 195.5 kg | 195 kg |
| Curb weight: Front | 106 kg, (Cal) 106.5 kg | 106 kg |
| Rear | 108 kg | ← |
| Fuel tank capacity | 18.0 L | ← |
| **Performance:** | | |
| Braking distance | 12.5 m from 50 km/h | ← |
| Minimum turning radius | 2.8 m | ← |
| **Engine:** | | |
| Type | 4-stroke, DOHC, 4-cylinder | ← |
| Cooling system | Liquid-cooled | ← |
| Bore and stroke | 60.0 x 52.4 mm | 55.0 x 52.4 mm |
| Displacement | 592 mL | 497 mL |
| Compression ratio: | 11.0 | ← |
| A5 | 11.7 | – – – |
| Maximum horsepower: | | |
| A2, A3, A4 | 55.2 kW (75 PS) @10 500 r/min (rpm) | 52.2 kW (71 PS) @11 500 r/min (rpm) |
| (S) A3, A4 | 36.0 kW (49 PS) @7 000 r/min (rpm) | |
| A5 | 60.3 kW (82 PS) @10 500 r/min (rpm) | |
| (S) A5 | 35.3 kW (48 PS) @6 000 r/min (rpm) | – – – |
| (G) A5 | DIN 60.3 kW (82 PS) @10 500 r/min (rpm) | |
| Maximum torque: | | |
| A2, A3, A4 | 52.0 N-m (5.3 kg-m, 38.3 ft-lb) @9 000 r /min (rpm) | 46.1 N-m (4.7 kg-m, 40.0 ft-lb) @10 000 r/min (rpm) |
| | (S) 52.0 N-m (5.3 kg-m, 38.3 ft-lb) @8 000 r/min (rpm) | |
| (S) A3, A4 | 50.0 N-m (5.1 kg-m, 36.9 ft-lb) @6 500 r/min (rpm) | |
| A5 | 58.8 N-m (6.0 kg-m, 43.4 ft-lb) @8 000 r/min (rpm) | – – – |
| (S) A5 | 56.9 N-m (5.8 kg-m, 42.0 ft-lb) @5 500 r/min (rpm), | |

| Items | | ZX600-A2, A3, A4, A5 | ZX500-A2, A3 |
|---|---|---|---|
| Ⓖ A5 | | DIN 58.8 N-m (6.0 kg-m, 43.4 ft-lb) @8 000 r/min (rpm) | |
| Carburetion system | | Carburetors, Keihin CVK32 x 4 | Carburetors, Keihin CVK30 x 4 |
| Starting system | | Electric starter | ← |
| Ignition system | | Battery and coil (transistorized) | ← |
| Timing advance | | Electronically advanced | ← |
| Ignition timing: | | From 12.5° BTDC @1 050 r/min (rpm) to 40° BTDC @10 000 r/min (rpm) | ← |
| | | (Cal) From 7.5° BTDC @1 250 r/min (rpm) to 35° BTDC @10 000 r/min (rpm) | – – – |
| | A5 | From 10° BTDC @1 050 r/min (rpm) to 32.5° BTDC @10 000 r/min (rpm) | – – – |
| Spark plug | | NGK DR8ES or ND X27ESR-U | ← |
| | | (U) (Cal) (I) (SA) NGK D9EA or ND X27ES-U | |
| Cylinder numbering method | | Left to right, 1-2-3-4 | ← |
| Firing order | | 1-2-4-3 | ← |
| Valve timing: | | | |
| Inlet | Open | 37° BTDC | ← |
| | Close | 67° ABDC | ← |
| | Duration | 284° | ← |
| Exhaust | Open | 72° BBDC | ← |
| | Close | 32° ATDC | ← |
| | Duration | 284° | ← |
| Lubrication system | | Forced lubrication (wet sump with cooler) | ← |
| Engine oil: | Grade | SE or SF class | ← |
| | Viscosity | SAE10W-40, 20W-50, 20W-40, or 20W-50 | ← |
| | Capacity | 3.0 L | ← |
| **Drive Train:** | | | |
| Primary reduction system: | | | |
| Type | | Chain | ← |
| Reduction ratio | | 2.641 (27/23 x 63/28) | ← |
| Clutch type | | Wet multi disc | ← |
| Transmission: | | | |
| Type | | 6-speed, constant mesh, return shift | ← |
| Gear ratios: | 1st | 2.571 (36/14) | ← |
| | 2nd | 1.777 (32/18) | ← |
| | 3rd | 1.380 (29/21) | ← |
| | 4th | 1.125 (27/24) | ← |
| | 5th | 0.961 (25/26) | ← |
| | 6th | 0.851 (23/27) | ← |

| Items | ZX600-A2, A3, A4, A5 | ZX500-A2, A3 |
|---|---|---|
| Final drive system: | | |
| Type | Chain drive | ← |
| Reduction ratio | 2.600 (39/15) | 2.800 (42/15) |
| Overall drive ratio | 5.850 @Top gear | 6.300 @Top gear |
| **Frame:** | | |
| Type | Tubular, double cradle | ← |
| Caster (rake angle) | 27° | ← |
| Trail | 97 mm | ← |
| Front tire: | | |
| Type | Tubeless | ← |
| Size: | 110/90 V16 | ← |
| Ⓖ A5 | 110/90 V16, 120/80 V16 – V250 | – – – |
| Rear tire: | | |
| Type | Tubeless | ← |
| Size: A2, A3, A4, Ⓢ A5 | 130/90 V16 | ← |
| A5 (other than Ⓢ) | 130/90 V16, 130/90 VR16 – V250 | – – – |
| Ⓖ A5 | 130/90 V16, 130/90 VR16 – V250, 140/80 VB16 | – – – |
| | | – – – |
| Front suspension: | | |
| Type | Telescopic fork (pneumatic) | ← |
| Wheel travel | 140 mm | ← |
| Rear suspension: | | |
| Type | Swing arm (uni-trak) | ← |
| Wheel travel | 130 mm | ← |
| Brake type: | | |
| Front | Dual disc | ← |
| Rear | Single disc | ← |
| **Electrical Equipment:** | | |
| Battery | 12 V 12 Ah | ← |
| Headlight: Type | Semi-sealed beam | ← |
| Bulb | 12 V 60/55 W (quartz-halogen) | ← |
| Tail/brake light | 12 V 5/21 W x 2 | ← |
| | Ⓒ Ⓢ Ⓐ Ⓤ 12 V 8/27 W x 2 | |
| Alternator: | | |
| Type | Three-phase AC | ← |
| Rated output | 20 A @10 000 r/min (rpm), 14 V | ← |

Ⓒ : Canadian Model
Ⓒal : California Model
Ⓖ : West German Model
Ⓘ : Italian Model
Ⓢ : Swiss Model
Ⓢ Ⓐ : South African Model
Ⓤ : US Model

| Items | | ZX600-B1 (US model) |
|---|---|---|
| **Dimensions:** | | |
| Overall length | | 2 075 mm |
| Overall width | | 670 mm |
| Overall height | | 1 180 mm |
| Wheelbase | | 1 420 mm |
| Road clearance | | 140 mm |
| Seat height | | 770 mm |
| Dry weight | | 187.5 kg, (Cal) 188 kg |
| Curb weight: | Front | 101 kg, (Cal) 101.5 kg |
| | Rear | 105.5 kg |
| Fuel tank capacity | | 18.0 L |
| **Performance:** | | |
| Braking distance | | 12.5 m from 50 km/h |
| Minimum turning radius | | 2.8 m |
| **Engine:** | | |
| Type | | 4-stroke, DOHC, 4-cylinder |
| Cooling system | | Liquid-cooled |
| Bore and stroke | | 60.0 x 52.4 mm |
| Displacement | | 592 mL |
| Compression ratio | | 11.0 |
| Carburetion system | | Carburetors, Keihin CVK32 x4 |
| Starting system | | Electric starter |
| Ignition system | | Battery and coil (transistorized) |
| Timing advance | | Electronically advanced |
| Ignition timing | | From 12.5° BTDC @1 050 r/min (rpm) to 40° BTDC @10 000 r/min (rpm)<br>(Cal) From 7.5° BTDC @1 250 r/min (rpm) to 35° BTDC @10 000 r/min (rpm) |
| Spark plug | | NGK D9EA or ND X27ES-U |
| Cylinder numbering method | | Left to right, 1-2-3-4 |
| Firing order | | 1-2-4-3 |
| Valve timing: | | |
| Inlet | Open | 37° BTDC |
| | Close | 67° ABDC |
| | Duration | 284° |
| Exhaust | Open | 72° BBDC |
| | Close | 32° ATDC |
| | Duration | 284° |

(Continued on next page.)

| Items | | ZX600-B1 (US model) |
|---|---|---|
| Lubrication system | | Forced lubrication (wet sump with cooler) |
| Engine oil: | Grade | SE or SF class |
| | Viscosity | SAE10W-40, 10W-50, 20W-40, or 20W-50 |
| | Capacity | 3.0 L |
| **Drive Train:** | | |
| Primary reduction system: | | |
| Type | | Chain |
| Reduction ratio | | 2.641 (27/23 x 63/28) |
| Clutch type | | Wet multi disc |
| Transmission: | | |
| Type | | 6-speed, constant mesh, return shift |
| Gear ratios: | 1st | 2.571 (36/14) |
| | 2nd | 1.777 (32/18) |
| | 3rd | 1.380 (29/21) |
| | 4th | 1.125 (27/24) |
| | 5th | 0.961 (25/26) |
| | 6th | 0.851 (23/27) |
| Final drive system: | | |
| Type | | Chain drive |
| Reduction ratio | | 2.600 (39/15) |
| Overall drive ratio | | 5.850 @Top gear |
| **Frame:** | | |
| Type | | Aluminum tubular, double cradle |
| Caster (rake angle) | | 26° |
| Trail | | 86 mm |
| Front tire: | Type | Tubeless |
| | Size | 110/90 V16-K825A |
| Rear tire: | Type | Tubeless |
| | Size | 130/90 V16-K825 |
| Front suspension: | Type | Telescopic fork (pneumatic) |
| | Wheel travel | 140 mm |
| Rear suspension: | Type | Swing arm (uni-trak) |
| | Wheel travel | 130 mm |
| Brake type: | Front | Dual disc |
| | Rear | Single disc |

| Items | | ZX600-B1 (US model) |
|---|---|---|
| **Electrical Equipment:** | | |
| Battery | | 12 V 12 Ah |
| Headlight: | Type | Semi-sealed beam |
| | Bulb | 12 V 60/55 W (quarz-halogen) |
| Tail/brake light | | 12 V 8/27 W x 2 |
| Alternator: | Type | Three-phase AC |
| | Rated output | 20 A @10 000 r/min (rpm), 14 V |

Specifications are subject to change without notice, and may not apply to every country.

(Cal): California Model

## Periodic Maintenance Chart (1989 ZX600-A5)

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

| FREQUENCY / OPERATION | Whichever comes first ➡ Every | *ODOMETER READING 800 km | 5 000 km | 10 000 km | 15 000 km | 20 000 km | 25 000 km | 30 000 km | See Page |
|---|---|---|---|---|---|---|---|---|---|
| Spark plug – clean and gap † | | | • | • | • | • | • | • | 15-22 |
| Valve clearance – check † | | • | | • | | • | | • | 4-18 |
| Air suction valve (S) – check † | | | • | • | • | • | • | • | 4-7 |
| Air cleaner element – clean | | • | | • | | • | | • | 2-15 |
| Throttle grip play – check † | | • | | • | | • | | • | 2-5 |
| Idle speed – check † | | • | • | • | • | • | • | • | 2-7 |
| Engine vacuum synchronization – check † | | • | • | • | • | • | • | • | 2-7 |
| Fuel system – check † | | | | • | | • | | • | 2-9 |
| Coolant – change | 2 years | | | | | | | • | 3-5 |
| Engine oil – change | year | • | | • | | • | | • | 6-5 |
| Oil filter – replace | | • | | • | | • | | • | 6-5 |
| Radiator hoses, connections – check † | year | • | | • | | • | | • | 3-11 |
| Fuel hose – replace | 4 years | | | | | | | | – |
| Clutch – adjust | | • | • | • | • | • | • | • | 5-4 |
| Drive chain wear – check † | | | • | • | • | • | • | • | 10-5 |
| Drive chain – lubricate | 300 km | | | | | | | | 10-6 |
| Drive chain slack – check † | 800 km | | | | | | | | 10-4 |
| Brake lining or pad wear – check † | | | • | • | • | • | • | • | 11-7 |
| Brake fluid level – check † | month | • | • | • | • | • | • | • | 11-11 |
| Brake fluid – change | 2 years | | | | | • | | | 11-11 |
| Brake hose and pipe – replace | 4 years | | | | | | | | 11-13 |
| Anti-dive brake plunger parts – replace | 2 years | | | | | | | | 12-12 |
| Brake master cylinder cup and dust seal – replace | 2 years | | | | | | | | 11-9 |
| Caliper piston seal and dust seal – replace | 2 years | | | | | | | | 11-6 |
| Brake light switch – check † | | • | • | • | • | • | • | • | 15-34 |
| Steering – check † | | • | • | • | • | • | • | • | 13-4 |
| Steering stem bearing – lubricate | 2 years | | | | | • | | | 13-6 |
| Front fork oil – change | | | | | | | | • | 12-5 |
| Tire wear – check † | | | • | • | • | • | • | • | 9-9 |
| Swing arm pivot, uni-trak linkage – lubricate | | | | • | | • | | • | 12-15,12-16 |
| Battery electrolyte level – check † | month | • | • | • | • | • | • | • | 15-10 |
| General lubrication – perform | | | • | • | • | • | • | • | 16-7 |
| Nut, bolt, and fastener tightness – check † | | • | | • | | • | | • | 16-7 |

* : For higher odometer readings, repeat at the frequency interval established here.
† : Replace, add, adjust, clean, or torque if necessary.
(S) : Swiss only

# Fuel System

## Specifications

**Carburetor Specifications for 1987 ZX600-A3 Swiss Model:**

| | |
|---|---|
| Make/Type | Keihin/CVK32 |
| Main Jet | 102 for all cylinders |
| Main Air Jet | 100 |
| Jet Needle | N27T |
| Pilot Jet | 35 |
| Pilot Air Jet | 140 |
| Pilot Screw | 2 turns out |
| Starter Jet | 52 |
| Fuel Level | –0.5 mm |
| Float Height | 17.0 mm |

**Carburetor Specifications for 1989 ZX600-A5 models**

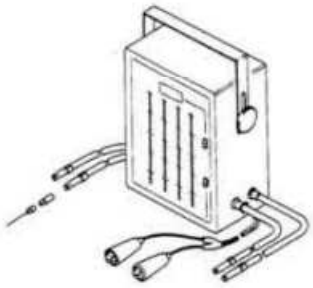
| | |
|---|---|
| Make/Type | Keihin/CVK32 |
| Main Jet | 102, Ⓢ 105 for all cylinders |
| Main Air Jet | 100 |
| Jet Needle | N52N, Ⓢ N52Q |
| Pilot Jet | 35 |
| Pilot Air Jet | 160, Ⓢ 150 |
| Pilot Screw (turns out) | 2 1/8, (UK) 2 1/4, Ⓖ 1 5/8, Ⓢ – |
| Starter Jet | 52 |
| Fuel Level | –0.5 mm |
| Float Height | 17 mm |

Ⓖ : West German model
Ⓢ : Swiss model
(UK) : United Kingdom model

- For the 1989 Swiss model, remove and install the pilot screw as described on p. 2-3 in the Base Manual.

## Special Tools

**Vacuum Gauge & Tachometer: 57001-1291**
○This tool may be used instead of Vacuum Gauge 57001-1198).



**Pilot Screw Adjuster "C" : 57001-1292**
○This tool may be used instead of Pilot Screw Adjuster (57001-1239).



# Engine Top End

## Specifications

### Camshafts (1987 – 1989 models):

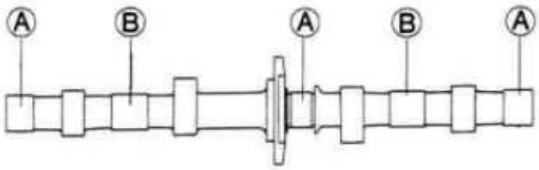
Camshaft Bearing Oil Clearance

| | Standard | Service Limit |
|---|---|---|
| Journal A | 0.028 ~ 0.071 mm | 0.16 mm |
| Journal B | 0.078 ~ 0.121 mm | 0.21 mm |

Camshaft Journal Diameter

| | Standard | Service Limit |
|---|---|---|
| Journal A | 22.950 ~ 22.972 mm | 22.92 mm |
| Journal B | 22.900 ~ 22.922 mm | 22.87 mm |

Camshaft Journal Identification




### Cylinder Head (1989 models)

Cylinder Compression (1989 models)

Usable Range: 960 – 1470 kPa
@640 r/min (rpm)
(9.8 – 15.0 kg/cm$^2$, 139 – 213 psi)

### Cylinder Piston (1989 models):

Piston Ring Groove Width (1989 models)

Second:
- Standard: 1.01 – 1.03 mm
- Service limit: 1.11 mm

Oil:
- Standard: 2.01 – 2.03 mm
- Service limit: 2.1 mm

Piston Ring Thickness (1989 models)

Second:
- Standard: 0.97 – 0.99 mm
- Service limit: 0.90 mm

Piston Ring End Gap (1989 models)

Second:
- Standard: 0.15 – 0.30 mm
- Service limit: 0.60 mm

### Cylinder Piston (1986, 1987 ZX500-A2, A3)

Piston Ring/Groove Clearance

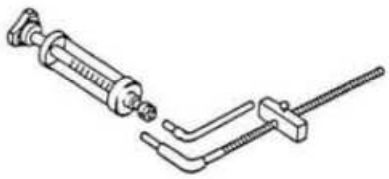
Top and Second:
- Standard: 0.03 ~ 0.07 mm
- Service limit: 0.17 mm

Piston Ring Groove Width

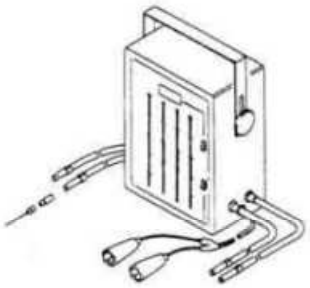
Second:
- Standard: 1.22 ~ 1.24 mm
- Service limit: 1.32 mm

## Special Tools

**Oil Syringe: 57001-1290**
○This tool may be used for vacuum switch valve test.



**Vacuum Gauge & Tachometer: 57001-1291**
○This tool may be used for vacuum switch valve test.



## Clean Air System (1989 Swiss model)

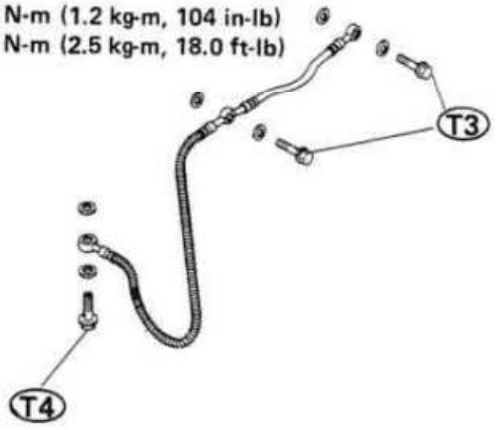
○The clean air system for the Swiss model is the same as for the US model. Refer to the Clean Air System (US model) on page 4-7.

# Engine Lubrication System

## Exploded View

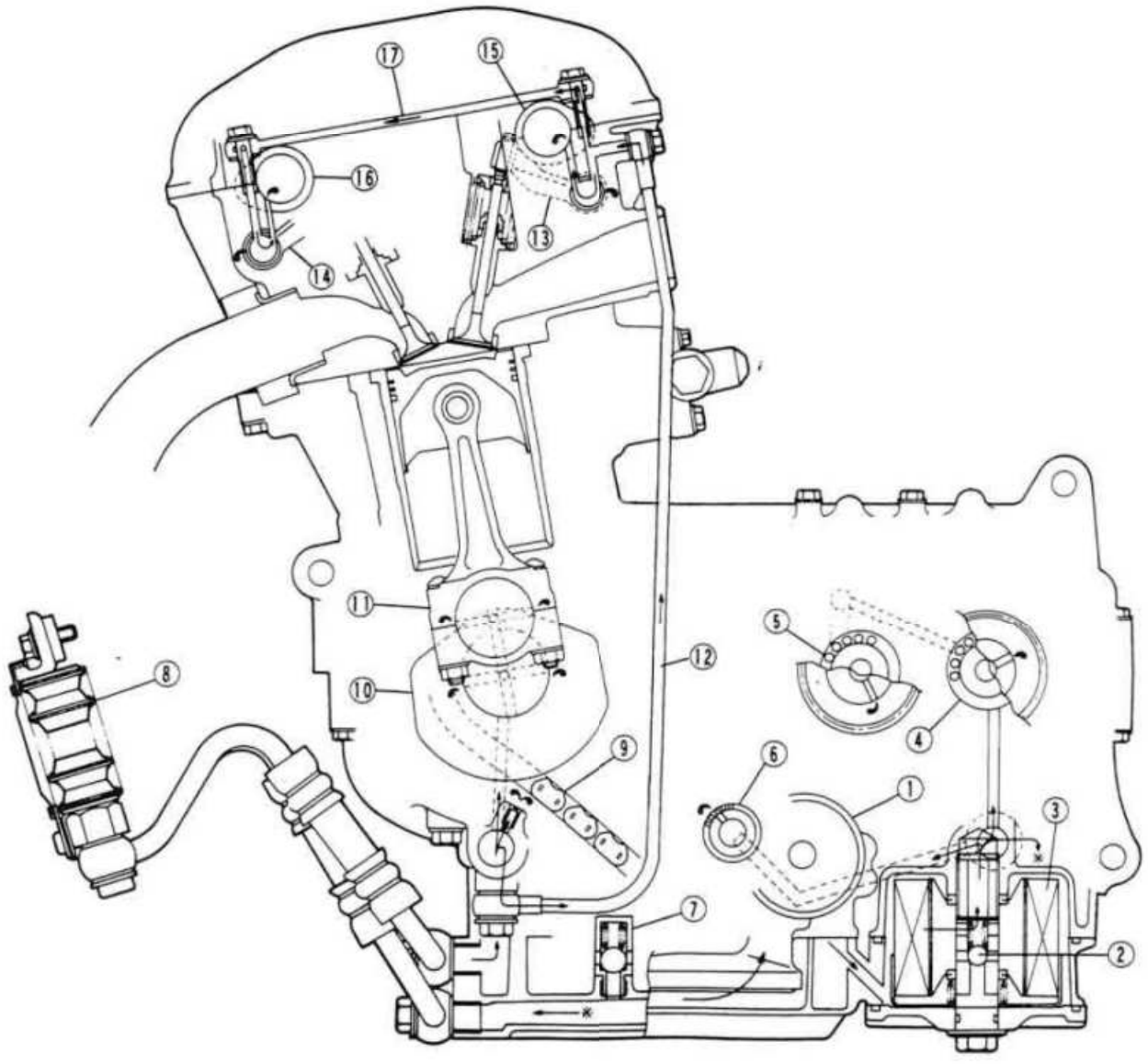
Refer to p. 6-2, noting the following.
●The oil pipe between the lower crankcase and the cylinder head is changed.

**T3: 12 N-m (1.2 kg-m, 104 in-lb)**
**T4: 25 N-m (2.5 kg-m, 18.0 ft-lb)**



## Engine Oil Flow Chart

1. Oil Pump
2. Bypass Valve
3. Oil Filter
4. Output Shaft Needle Bearing
5. Drive Shaft Needle Bearing
6. Secondary Gear Shaft Needle Bearing
7. Relief Valve
8. Oil Cooler
9. Primary Chain
10. Crankshaft
11. Connecting Rod
12. Oil Hose
13. Inlet Rocker Arm
14. Exhaust Rocker Arm
15. Inlet Camshaft
16. Exhaust Camshaft
17. Oil Pipe (Cylinder Head)



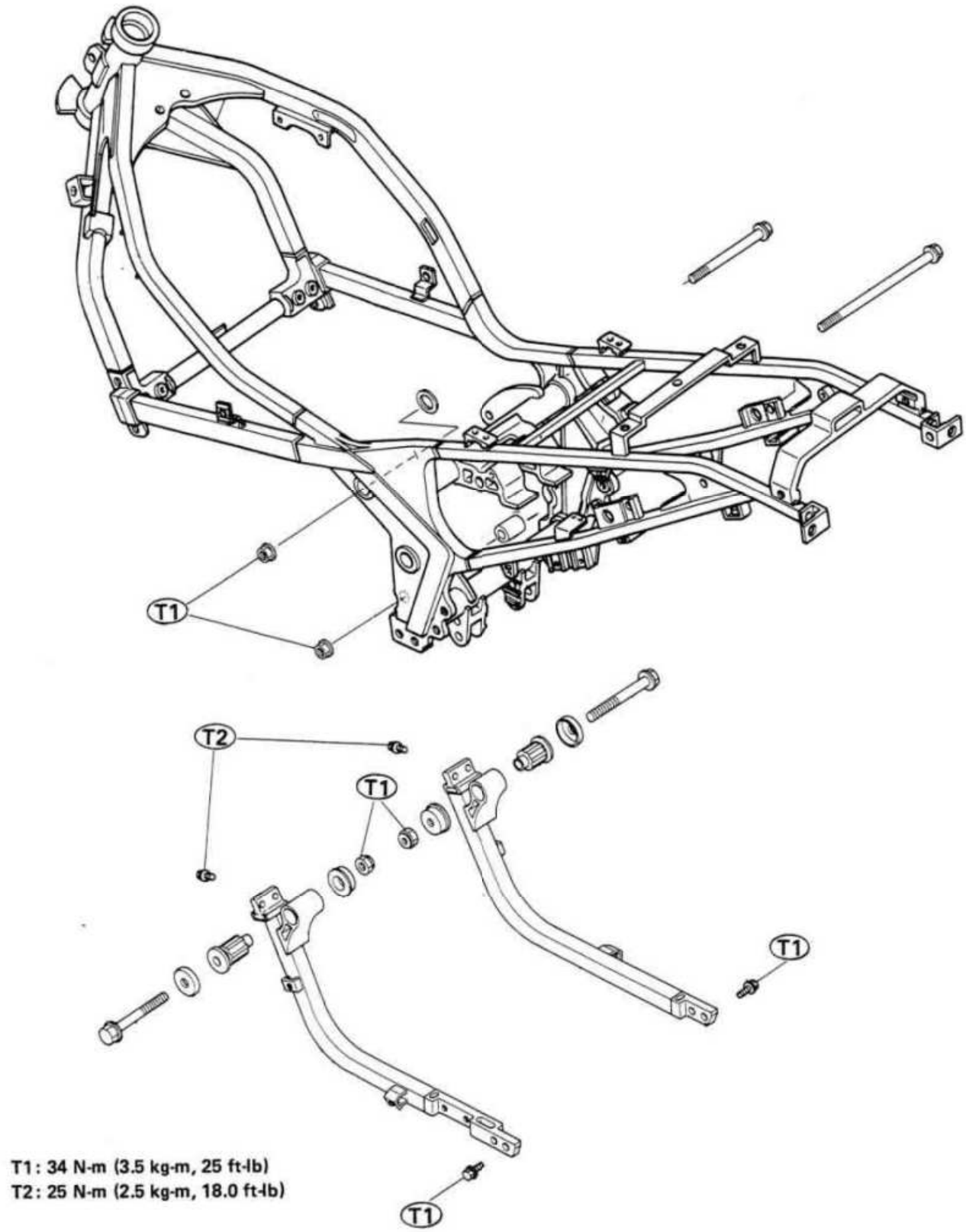

## Special Tools

Oil Pressure Gauge Adapter : 57001-1278
○ This tool may be used instead of Oil Pressure Gauge Adapter (57001-1188)



# Engine Removal/Installation

## Exploded View (1987 ZX600-B1)

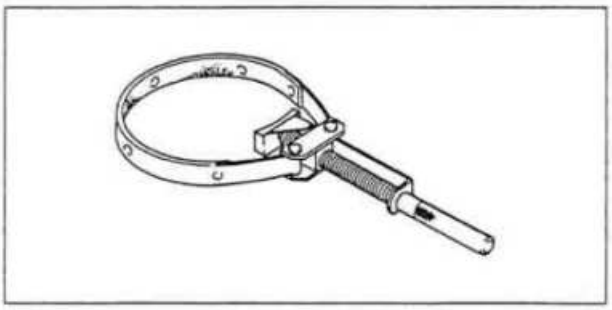



T1: 34 N-m (3.5 kg-m, 25 ft-lb)
T2: 25 N-m (2.5 kg-m, 18.0 ft-lb)

# Crankshaft/Transmission

## Special Tool

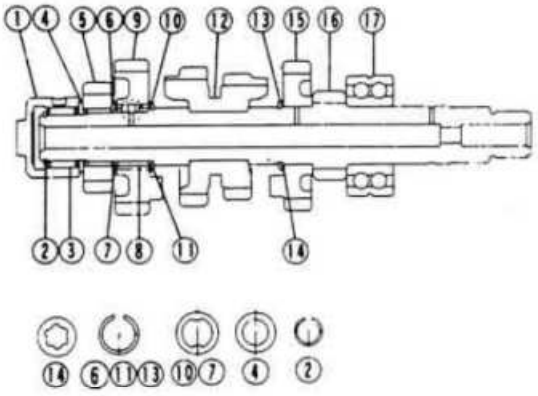
**Flywheel Holder: 57001-1313**
○This tool may be used instead of Rotor Holder (57001-308).



## Transmission (1987 – 1989 models)

Refer to pp. 8-20 ~ 8-22, noting the following.

**Drive Shaft**



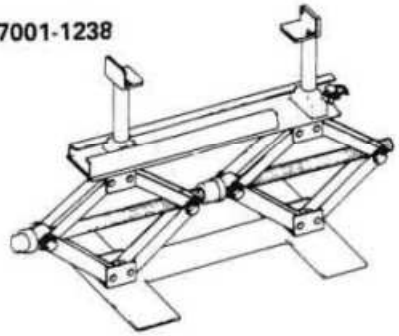
1. Bearing Outer Race
2. Circlip
3. Needle Bearing
4. Thrust Washer
5. 2nd Gear
6. Circlip
7. Toothed Washer
8. Bushing
9. Top Gear
10. Toothed Washer
11. Circlip
12. 3rd, 4th Gear
13. Circlip
14. Washer
15. 5th Gear
16. Drive Shaft (1st Gear)
17. Ball Bearing

# Wheels/Tires

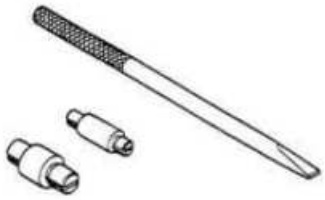
## Special Tools

The following new tools may be used.

**Jack: 57001-1238**



**Bearing Remover Set: 57001-1264**
○This tool may be used for hub bearing removal.



## Tires (1989 models)

*Tire Installation*

Along with the standard tires listed on P. 9-3 and P. 9-10, the following tires can also be used for the 1989 models.

**WARNING**

**○Use the same manufacturer's tires on the front and rear wheels.**

**Additional Standard Tires (West German Model)**

| | | |
|---|---|---|
| Front: | Size | 120/80 V16 – V250 |
| | Make, Type | METZELER ME33 LASER Tubeless |
| Rear: | Size | 140/80 VB16 |
| | Make, Type | METZELER ME1, Tubeless |
| | Size | 130/90 VR16 – V250 |
| | Make, Type | DUNLOP K700 Tubeless |

**Additional Standard Tires (other than Swiss Model)**

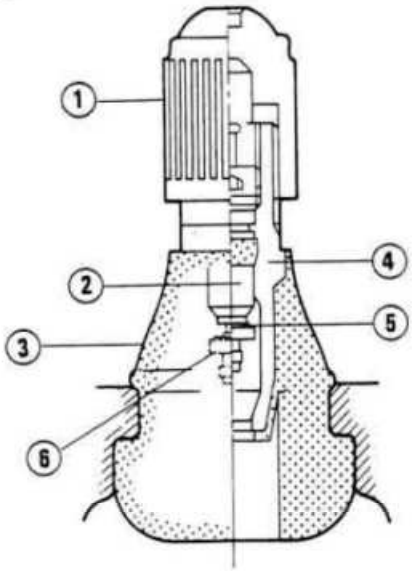
| | | |
|---|---|---|
| Rear: | Size | 130/90 VR16 – V250 |
| | Make, Type | DUNLOP K700 Tubeless |

○A rubber-type air valve is used on the rear wheel.
● Remove the rubber-type air valve and discard it.

CAUTION

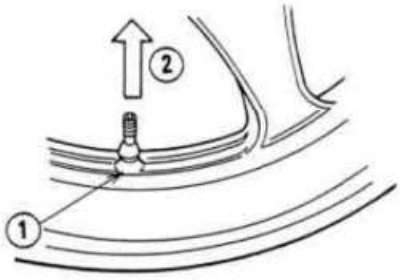
**○Replace the rubber-type air valve whenever the tire is replaced.**
**○Do not reuse the air valve.**

**Air Valve**




1. Plastic Cap
2. Valve Core
3. Stem Seal
4. Valve Stem
5. Valve Seat
6. Valve Opened

● Install a new valve in the rim.
○Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem through the rim from the inside out until it snaps into place.




1. Apply soap and water solution.
2. Pull the stem out.

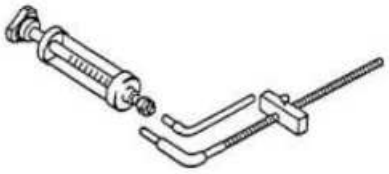
CAUTION

**○Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.**

# Suspension

## Special Tools

**Oil Syringe: 57001-1290**
○This tool may be used for fork oil level measurement.



**Front Fork Outer Tube Weight: 57001-1218**
○This tool may be used instead of Front Fork Oil Seal Driver (57001-1104).



**Front Fork Oil Seal Driver: 57001-1219**
○This tool may be used instead of Front Fork Oil Seal Driver (57001-1104).



# Steering

## Special Tools (1987 ZX600-B1)

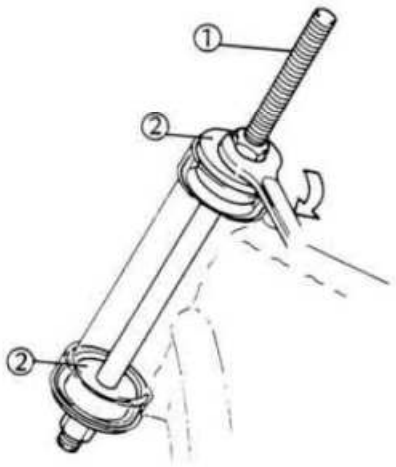
Refer to p. 13-3, noting the following.

- Driver (57001-1076) is not required for steering servicing of the 1987 ZX600-B1.

## Steering Removal/Installation (1987 ZX600-B1)

- Refer to pp. 13-5 ~ 13-6, noting the following.

**Outer Race Installation**

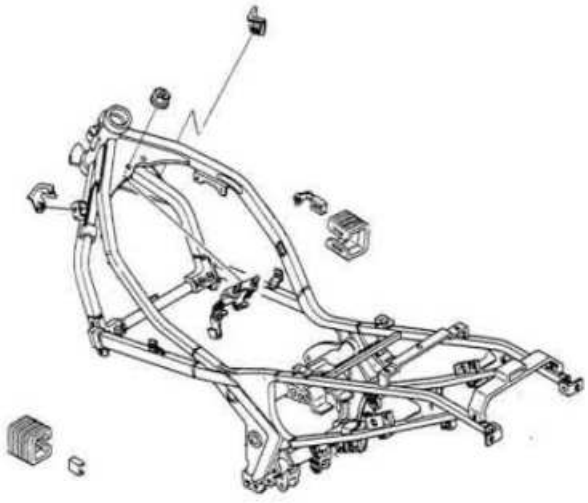


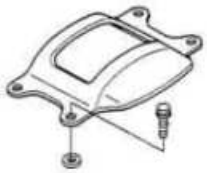

1. Driver Press Shaft: 57001-1075
2. Driver: 57001-1106

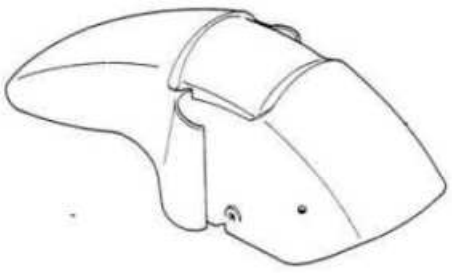
# Frame

## Exploded View (1987 ZX600-B1)

Refer to pp. 14-2 ~ 14-4, noting the following.
- The main frame is changed.
- The washers are installed between the front fender and its bracket rear mounts.



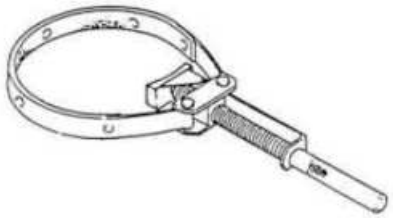




# Electrical System

## Special Tools

**Flywheel Holder: 57001-1313**
○This tool may be used instead of Rotor Holder (57001-308).



**Rotor Puller Adapter: 57001-1244**
Refer to p. 15-9, noting that the following tool must be used for 1987 – 1989 models.



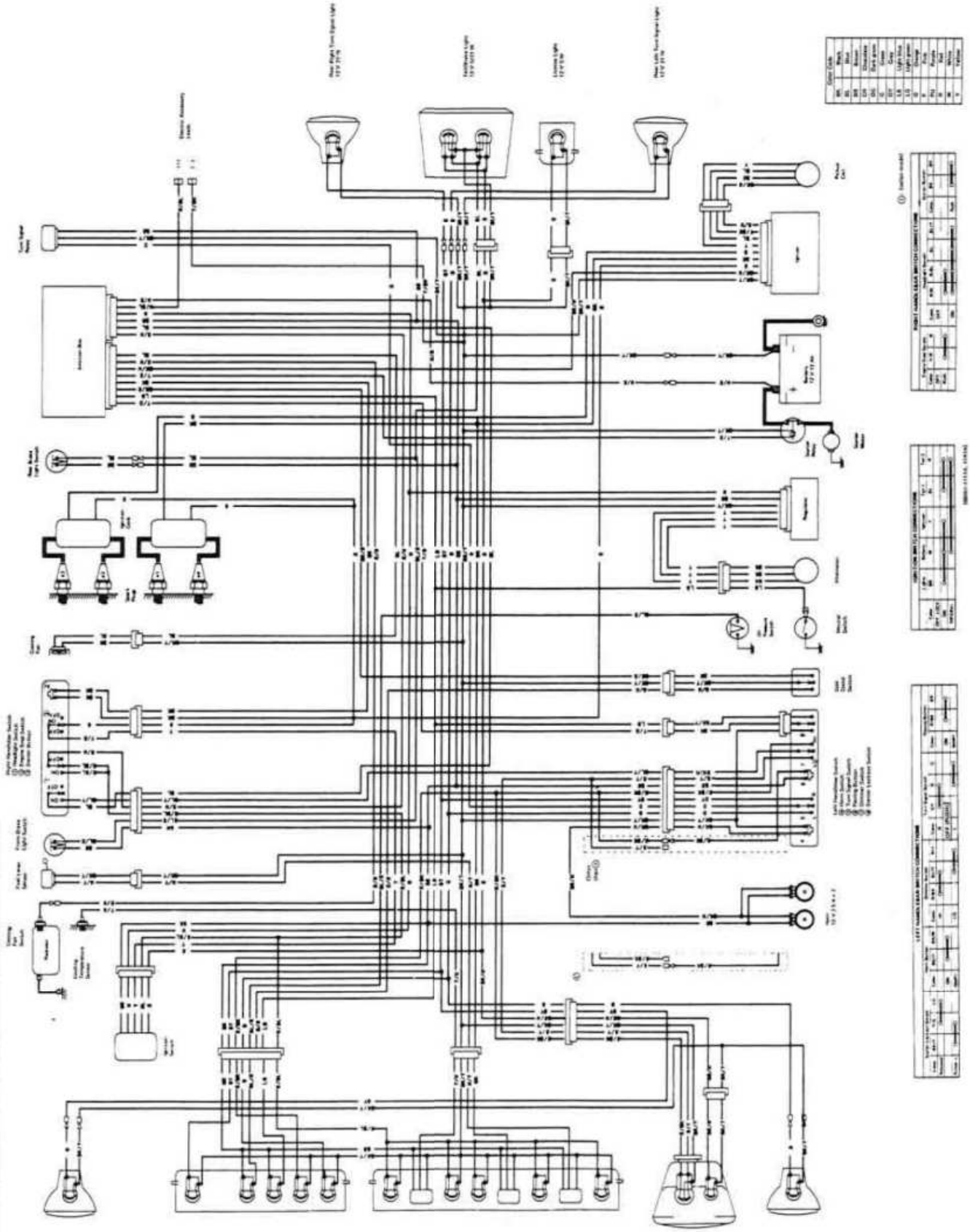
## Charging System (1987 – 1989 models)

Refer to p. 15-13, noting the following.
- When removing the alternator rotor, insert the rotor puller adapter (special tool: 57001-1244) into the rotor bolt hole before installing the rotor puller (special tool: 57001-1216).

## Wiring Diagram (1989 ZX600-A5)

The following is a wiring diagram for 1989 ZX600-A5. Refer to pp. 15-3 ~ 15-4 for the models other than 1989 model.

## ZX600-A5 Wiring Diagram (other than US and Canada)



## MODEL APPLICATION

| Year | Model | Beginning Frame No. |
|---|---|---|
| 1985 | ZX500-A1 | ZX500A-000001 |
| | ZX600-A1 | ZX600A-000001 or JKAZX4A1□FA000001 |
| 1986 | ZX500-A2 | ZX500A-000801 |
| | ZX600-A2 | ZX600A-025001 or JKAZX4A1□GA025001 |
| 1987 | ZX500-A3 | ZX500A-001601 |
| | ZX600-A3 | ZX600A-046001 or JKAZX4A1□HA046001 |
| | ZX600-B1 | JKAZX4B1□HA000001 |
| 1988 | ZX600-A4 | ZX600A-054001 |
| 1989 | ZX600-A5 | ZX600A-055801 |

□ : This digit in the frame number changes from one machine to another.

Kawasaki
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