Kawasaki 454LTD



1982

Motorcycle Service Manual

Quick Reference Guide

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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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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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LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

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

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 system 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.

- ● 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.

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 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 untilmate 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).
- Remove 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.

General Information

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1-2 GENERAL INFORMATION

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 detail 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 plasticfaced 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, Nonpermanent 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 nonpermanent 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.

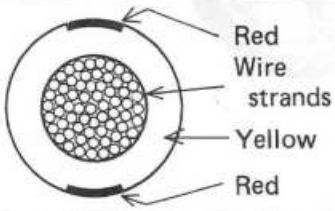
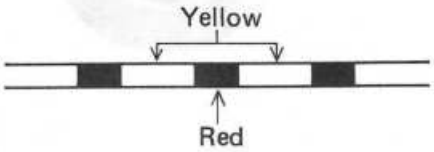
(15) Lubrication

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 singlecolor or twocolor and, with only a few exceptions, must be connected to wires of the same color. On any of the twocolor wires there is a greater amount of one color and a lesser amount of a second color, so a twocolor 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

EN450-A1



EN450-A2



EN400-A2



General Specifications

Items	EN450-A1/A2, EN400-A2
Dimensions:	
Overall length	2 205 mm, Ⓞ 2 210 mm
Overall width	820 mm
Overall height	1 220 mm
Wheelbase	1 485 mm
Road clearance	130 mm
Seat height	745 mm
Dry weight	1 770 N (180 kg), Ⓞ 1 780 N (181 kg), Ⓒ 1 770 N (180.5 kg)
Curb weight: Front	830 N (84.5 kg), Ⓞ 830 N (85 kg)
Rear	1 060 N (108.5 kg), Ⓞ Ⓒ 1 070 N (109 kg)
Fuel tank capacity	11.0
Performance:	
Climbing ability	30°
Braking distance	12.5 m from 50 km/h
Minimum turning radius	2.5
Engine:	
Type	4-stroke, DOHC, 2-cylinder
Cooling system	Liquid-cooled
Bore and stroke	72.5 x 55.0 mm, *70.0 x 51.8 mm
Displacement	454 mL, *398 mL
Compression ratio	10.7
Maximum horsepower	Max. 36.8 kW (50 PS) @9 500 r/min (rpm), Ⓖ 19.9 kW (27 PS) @8 500 r/min (rpm), Ⓦ 25.0 kW (34 PS) @9 000 r/min (rpm), *33.1 kW (45 PS) @9 500 r/min (rpm)
Maximum torque	41.2 N-m (4.2 kg-m, 30.4 ft-lb) @8 000 r/min (rpm), ⒼⓌ 32.4 N-m (3.3 kg-m, 23.9 ft-lb) @4 000 r/min (rpm), *33 N-m (3.4 kg-m, 25 ft-lb) @8 500 r/min (rpm)
Carburetion system	Carburetors, Keihin CVK34 x 2
Starting system	Electric starter
Ignition system	Battery and coil (transistorized)
Timing advance	Electronically advanced
Ignition timing	From 10° BTDC @1 200 r/min (rpm) to 37.5° BTDC @10 000 r/min (rpm)
Spark plug	NGK DR8ES or ND X27ESR-U, Ⓤ Ⓐ Ⓘ NGK D9EA or ND X27ES-U

Items		EN450-A1/A2, EN400-A2
Cylinder numbering method		Left to right, 1-2
Firing order		1-2
Valve timing:		
Inlet	Open	35° BTDC
	Close	55° ABDC
	Duration	270°
Exhaust	Open	60° BBDC
	Close	30° ATDC
	Duration	270°
Lubrication system		Forced lubrication (wet sump)
Engine oil:		
Grade		SE or SF class
Viscosity		SAE10W40, 10W50, 20W40, or 20W50
Capacity		3.4 L
Drive Train:		
Primary reduction system:		
Type		Chain
Reduction ratio		2.952 (62/21)
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		Belt drive
Reduction ratio		2.720 (68/25)
Overall drive ratio		6.840 @Top gear
Frame:		
Type		Tubular, diamond cradle
Caster (rake angle)		31.5°
Trail		139 mm
Front tire:		
Type		Tubeless
Size		100/90-19 57S
Rear tire:		
Type		Tubeless
Size		140/90-15 70S

Items	EN450-A1/A2, EN400-A2
Front suspension:	
Type	Telescopic fork (pneumatic)
Wheel travel	160 mm
Rear suspension:	
Type	Swing arm
Wheel travel	110 mm
Brake type:	
Front	Single disc
Rear	Drum
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 8/27 W x 2, Ⓞ 12 V 5/21 W x 2
Alternator:	
Type	Three-phase AC
Rated output	17 A @6,000 r/min (rpm), 14 V
Voltage regulator:	
Type	Short-circuit

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

* : EN400-A2
Ⓒal : Californian Model
Ⓘ : Italian Model
Ⓞ : Other than US and Canadian Model
Ⓤ : US Model
Ⓐ : Australian Model
Ⓦ : Swiss Model

Periodic Maintenance Chart

The scheduled maintenance must be done is 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
Carburetor synchronization – check †		•	•	•	•	•	•	•	2-8
Idle speed – check †		•	•	•	•	•	•	•	2-7
Throttle grip play – check †		•	•	•	•	•	•	•	2-5
Spark plug – clean and gap †		•	•	•	•	•	•	•	15-19
Valve clearance – check †		•		•		•		•	4-20
Air suction valve – check †			•	•	•	•	•	•	4-7
Air cleaner element – clean			•		•		•		2-13
Air cleaner element – replace	5 cleanings			•		•		•	2-14
Fuel system – check				•		•		•	2-10
Cylinder head bolts and nuts tightness – check †		•		•		•		•	4-17
Evaporative emission control system (c) – check †		•	•	•	•	•	•	•	2-16
Battery electrolyte level – check †	month	•	•	•	•	•	•	•	15-9
Brake play – check †		•	•	•	•	•	•	•	11-12
Brake light switch – check †		•	•	•	•	•	•	•	15-33
Brake lining wear – check †			•	•	•	•	•	•	11-6
Brake fluid level – check †	month	•	•	•	•	•	•	•	11-9
Brake fluid – change	2 years					•			11-9
Clutch – adjust		•	•	•	•	•	•	•	5-5
Steering play – check †		•	•	•	•	•	•	•	13-4
Drive belt wear – check †		•	•	•	•	•	•	•	10-6
Drive belt tension – check †		•	•	•	•	•	•	•	10-4
Nuts, bolts, and fastener tightness – check †		•		•		•		•	16-8
Tire wear – check †			•	•	•	•	•	•	9-10
Engine oil – change	year	•	•	•	•	•	•	•	6-6
Oil filter – replace		•		•		•		•	6-7
General lubrication – perform			•	•	•	•	•	•	16-8
Front fork oil – change				•		•		•	12-5
Swing arm pivot – lubricate				•		•		•	12-10
Brake camshaft – lubricate	2 years					•			11-16
Coolant – change	2 years							•	3-4
Radiator hoses, connections – check †	year	•		•		•		•	3-12
Steering stem bearing – lubricate	2 years					•			13-7
Master cylinder cup and dust seal – replace	2 years								11-8
Caliper piston seal and dust seal – replace	2 years								11-5
Brake cable – replace	2 years								11-14
Brake hose – replace	4 years								11-11
Fuel hose – replace	4 years								–

* : For higher odometer readings, repeat at the frequency interval established here.
† : Replace, add, adjust, or torque if necessary.
(C) : Californian model only

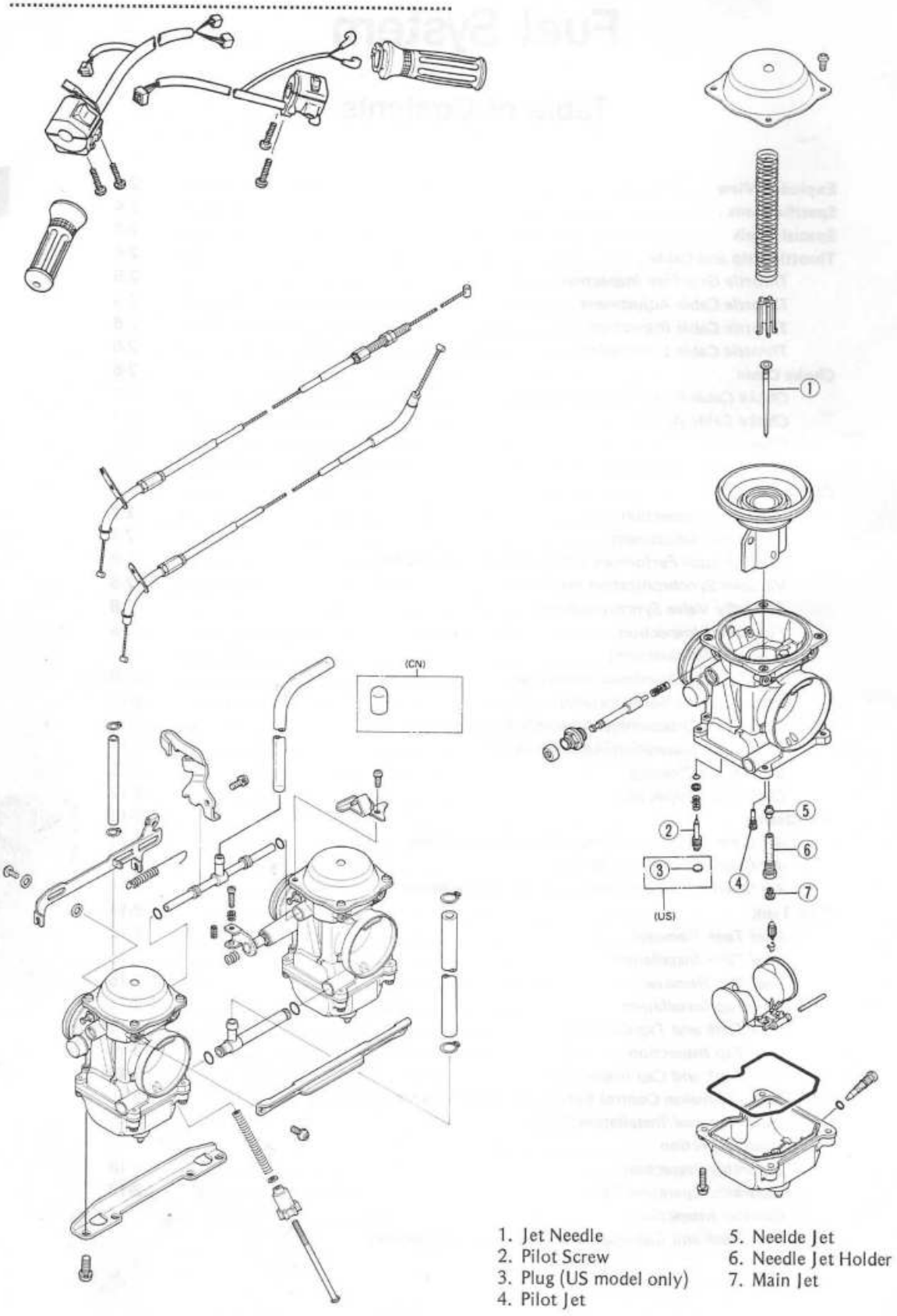
Fuel System

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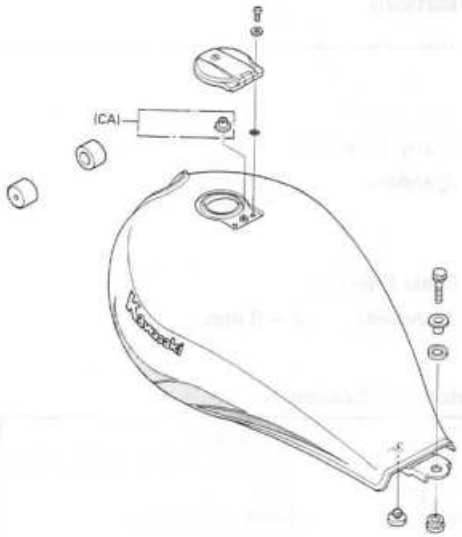
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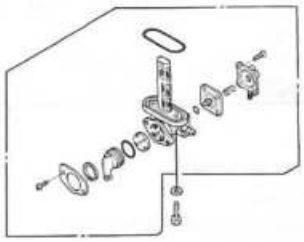
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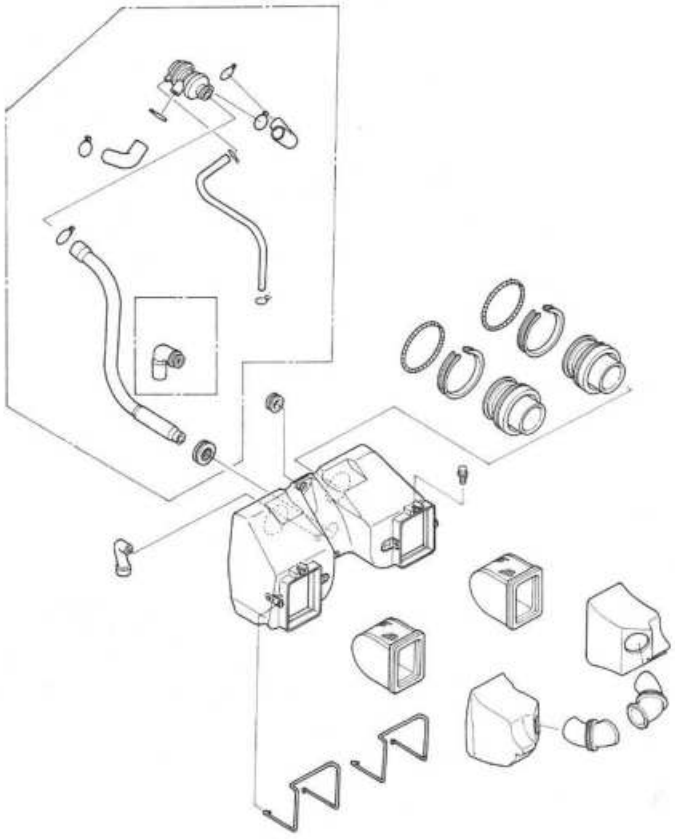
Exploded View



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


(CA)





Specifications

Throttle Grip Free Play

Standard: 2 – 3 mm

Choke Cable Free Play

Standard: 2 – 3 mm

Carburetor Specifications

Make/Type	Keihin/CVK34
Main Jet	112, ©Ⓤ 125 (122), *115
Main Air Jet	100
Jet Needle	N31E, Ⓤ N31D
Pilot Jet	35 (32)
Pilot Air Jet	150
Pilot Screw	1¾ turns out, Ⓤ ——
Starter Jet	45
Fuel Level	–0.5 mm
Float Height	17 mm

© : Canadian model
Ⓤ : US model
() : for high altitude (US only)
* : EN400-A2

Idle Speed

Standard: 1,200 ±50 r/min (rpm)

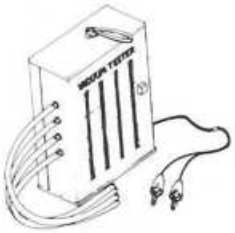
Special Tools

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



Throttle Grip and Cable

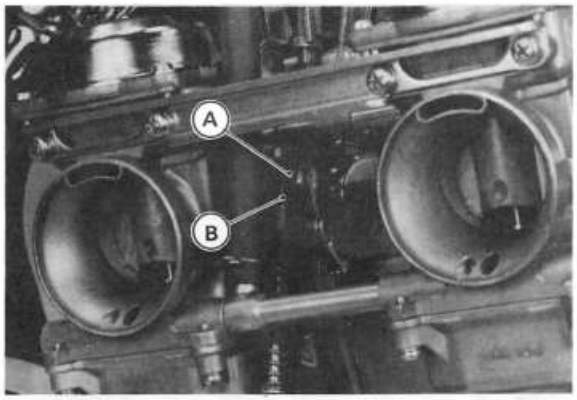
Throttle Grip Play Inspection

There are two throttle cables: an accelerator cable for opening the throttle valves, and a decelerator cable for closing them. If the cables are too loose due either to cable stretch or maladjustment, the excessive play in the throttle grip will cause a delay in throttle response, which will be especially noticeable at low speeds. Also, the throttle valves may not open fully at full throttle. On the other hand, if the cables are too tight, the throttle will be hard to control, and the idling speed may be erratic.

- Check that there is 2 – 3 mm throttle grip play.
- Push the throttle grip completely closed. At this time there should be no clearance between the cable bracket and the stopper.

NOTE

○*This assures that the stress of throttle grip return will be taken by the pulley, protecting the carburetor linkage mechanism.*

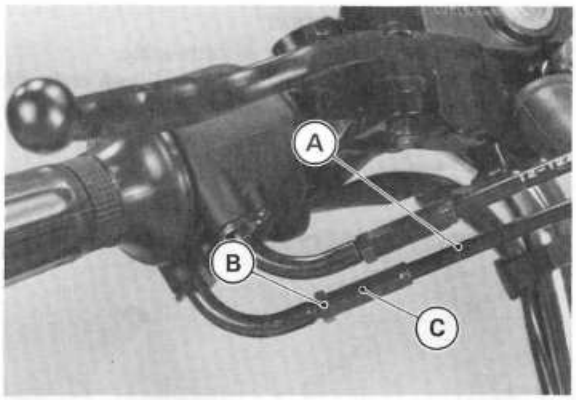


A. Cable Bracket B. Stopper

★If any one of the above checks shows improper adjustment, adjust the throttle cables.

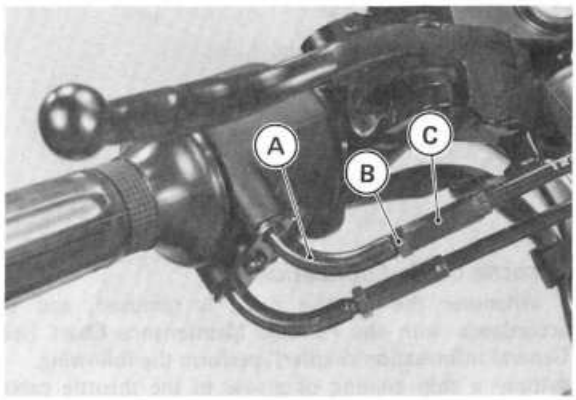
Throttle Cable Adjustment

- Loosen the locknuts, and screw both throttle cable adjusting nuts in fully at the upper end of the throttle cables so as to give the throttle grip plenty of play.
- Turn out the decelerator cable adjusting nut until there is no clearance between the cable bracket and the stopper when the throttle grip is completely closed. Tighten the locknut.



A. Decelerator Cable C. Adjusting Nut
B. Locknut

- Turn the accelerator cable adjusting nut until 2 – 3 mm of throttle grip play is obtained. Tighten the locknut.



A. Accelerator Cable C. Adjusting Nut
B. Locknut

★If the throttle cables can not be adjusted by using the cable adjusting nuts at the upper end of the throttle cables, use the cable adjusters at the lower ends of the throttle cables. Do not forget to securely tighten the adjuster mounting nuts.

- Start the engine.
- Turn the handlebar from side to side while idling the engine.

★If idle speed varies, the throttle cable may be poorly routed or it may be damaged.

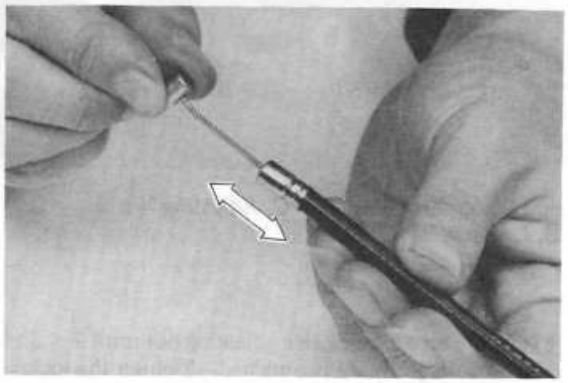
- Correct any problem before operating the motorcycle.

WARNING

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

Throttle Cable Inspection

- Remove the both ends of the throttle cable.
- With the throttle cable disconnected at both ends, the cable should move freely within the cable housing.

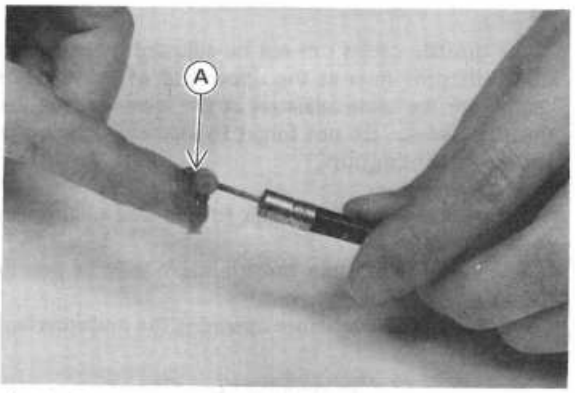


- Lubricate the throttle cable.

Throttle Cable Lubrication

Whenever the throttle cable is 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 end.



A. Apply grease.

- Lubricate the throttle cable by seeping the oil between the cable and cable housing.

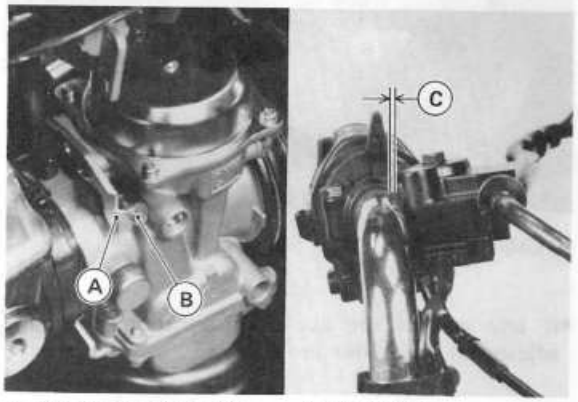
Cable Lubrication



Choke Cable

Choke Cable Free Play Inspection

- Push the choke lever back all the way to its released position.
- Pull the choke lever back until starter plunger lever connects the starter plunger, the amount of choke lever travel is the amount of choke cable free play.



A. Starter Plunger Lever
B. Starter Plunger
C. Free Play

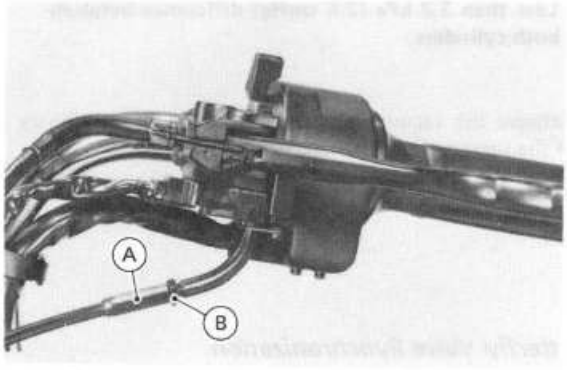
★If free play is not correct, adjust the choke cable.

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
- Tighten the locknut after adjustment.



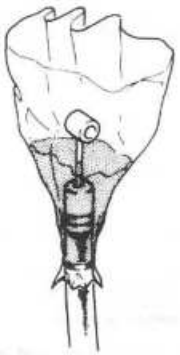
A. Adjusting Nut B. Locknut

Choke Cable Lubrication

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

- Lubricate the choke cable by seeping the oil between the cable and cable housing.

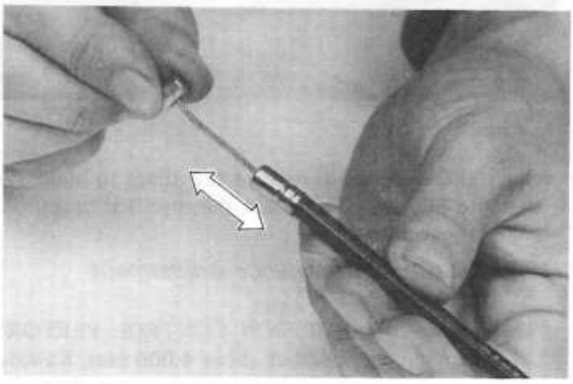
Cable Lubrication



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 Cable Lubrication), if the cable is frayed, or if the housing is kinked, replaced the cable.



A. Adjusting Nut B. Locknut

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.

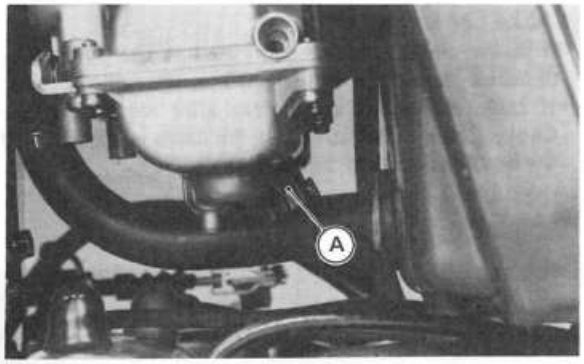
★If the idle speed is out of the specified range, adjust it.

Idle Speed

1,200 ±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.

High Altitude Performance Adjustment (U.S. model)

○To improve the EMISSION CONTROL PERFORMANCE of vehicle operated above **4,000 feet**, Kawasaki recommends the following Environmental Protection Agency (EPA) approved modification.

•Change the main jet and pilot jet for high altitude use.

High Altitude Carburetor Specifications

Main Jet:	**#122**
Pilot Jet:	**#32**

Vacuum Synchronization Inspection

•Warm up the engine.

•Check idle speed and adjust if necessary.

•Remove the fuel tank.

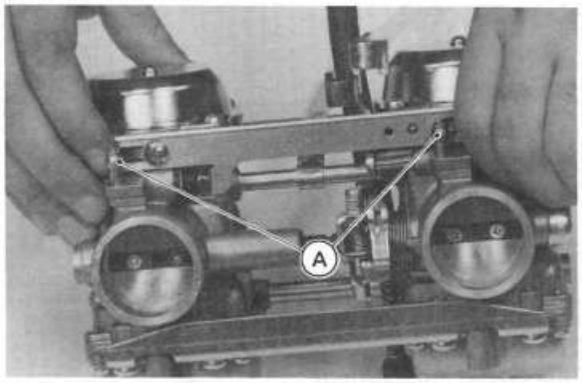
•Supply fuel to the carburetors with an auxiliary fuel tank.

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 vacuum gauge (special tool: 57001-1198) to the vacuum hose fittings on the carburetors.

(Viewed from front)



A. Vacuum Hose Fittings

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

*If the intake vacuum difference between the two cylinders exceeds the limit, synchronize the carburetor butterfly valves (see Butterfly Valve Synchronization).

Engine Vacuum Synchronization

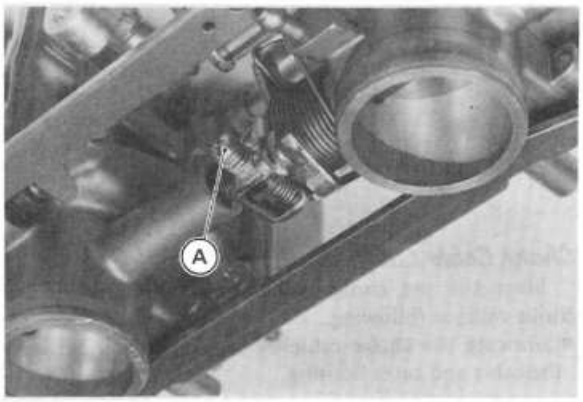
Less than 3.2 kPa (2.4 cmHg) difference between both cylinders

•Remove the vacuum gauge, connect the vacuum hoses to the vacuum hose fittings.

•Install the fuel tank.

Butterfly Valve Synchronization

•Turn the adjusting screw to synchronize the butterfly valves.



A. Adjusting Screw

•Check idle speed and adjust if necessary.

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.**

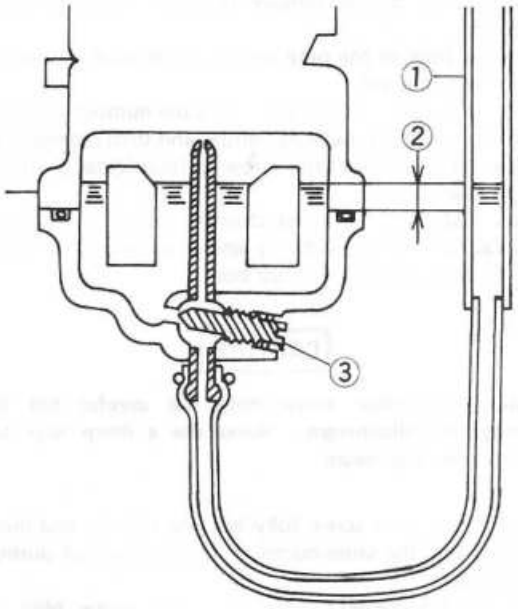
- Remove the carburetors, and hold them in true vertical position on a stand.
- Put the fuel tank on a bench, and connect the fuel tap to the carburetors using a suitable hose (6 mm in diameter and about 300 mm long).
- Connect fuel level gauge (special tool) to the carburetor float bowl with the rubber 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 it 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 a 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.

Fuel Level Measurement



1. Fuel Level Gauge: 57001-1017
2. Fuel Level
3. Drain Plug

Fuel Level

0.5 ±1 mm above the bottom edge of carburetor body

- Turn the fuel tap to the ON position and remove the fuel level gauge.
- Inspect the fuel level in another carburetor in the same manner.

★If the fuel level is incorrect, adjust it.

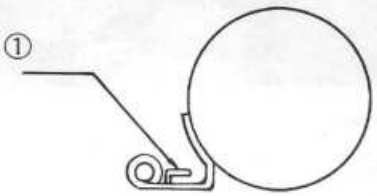
Fuel Level Adjustment

- Drain fuel from the carburetor.
- 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

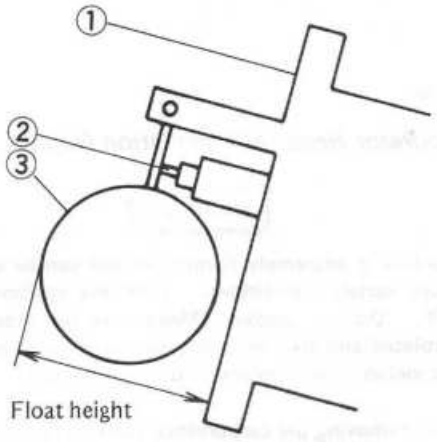
17.0 ±2.0 mm

Float Level Adjustment



1. Tang

Float Height Measurement-Keihin Carburetor



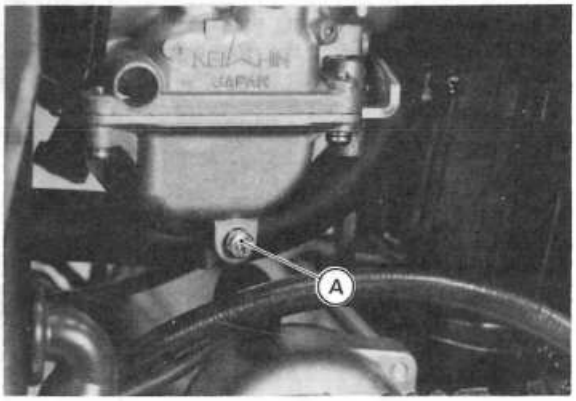
1. Float bowl mating surface
2. Float valve needle rod (contacted but unloaded)
3. Float

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 ON.

★If any water or dirt appeared during the above inspection, clean the carburetor, fuel tank and tap.

Carburetor 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.

- After removing the carburetors, stuff pieces of lint-free, clean cloths into the carburetor holders and the intake ducts to keep the 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.

- 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
Vacuum synchronization
Throttle cable
Choke cable

Carburetor Disassembly/Assembly Notes

- Read the WARNINGS in the Carburetor Removal/Installation Points.
- For the US model, remove the pilot screw plug as follows.

○Punch a hole in the plug and pry it at 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.
- After installing the upper chamber cover, check that the vacuum piston slides up and down smoothly without binding in the carburetor bore.

CAUTION

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

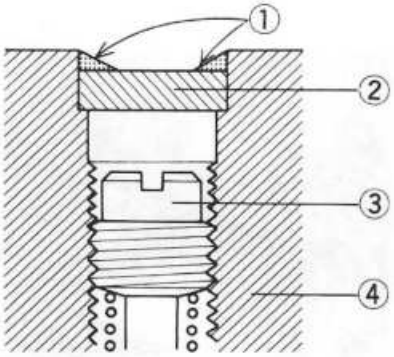
- Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly.
- For the US model, install the pilot screw plug as follows:

○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.

CAUTION

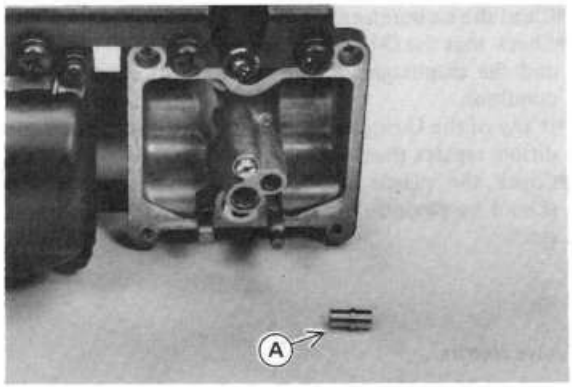
○**Do not apply too much bond on the plug to keep the pilot screw itself from being fixed.**

Plug Installation (US model only)



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

●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.



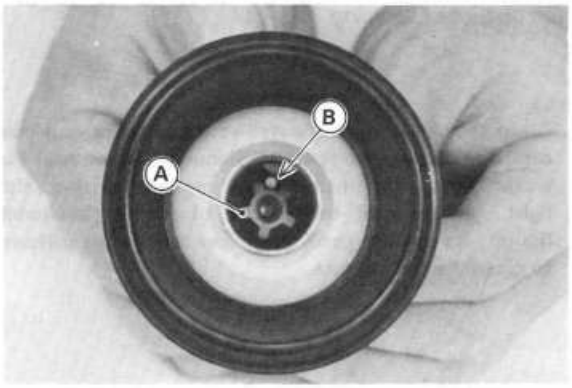
A. Small End

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

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 needle through the hole in the center of the vacuum piston, and put the 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. Spring Seat B. Hole

Carburetor Separation/Assembly Notes

●Read the WARNINGS in the Carburetor Removal/Installation Notes.

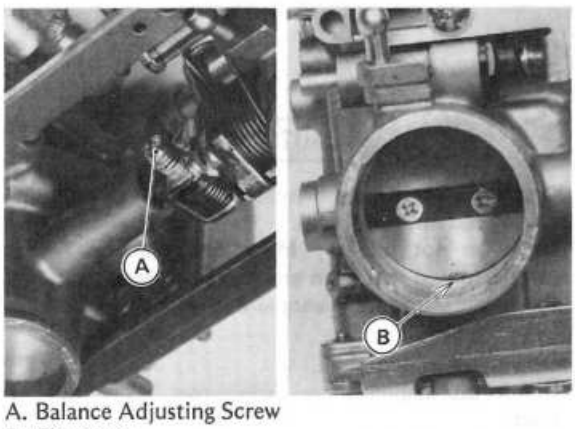
●The center lines of the carburetor bores must be parallel both horizontally and vertically. If they are not, loosen the mounting screws and align the carburetors on a flat surface. Retighten the mounting screws.

●After assembling the choke mechanism, check to see that the choke shaft slides from side to side smoothly without abnormal friction.

CAUTION

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

●Visually synchronize the throttle (butterfly) valves.
○Check to see that the throttle valves open and close.
○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 the throttle valves, turn the balance adjusting screw to obtain the same clearance.

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.

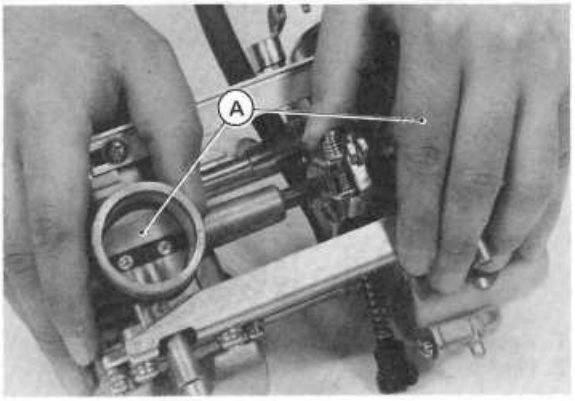
●Disassemble the carburetors.
●Immerse all the metal parts in a carburetor cleaning solution.
●Rinse the parts in water.
●When the parts are clean, dry them with compressed air.
●Blow through the air and fuel passages with compressed air.
●Assemble the carburetors.

Carburetor Inspection

CAUTION

○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 applicance with a pilot light.

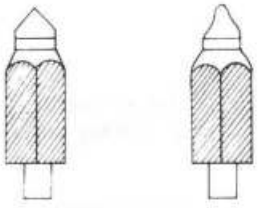
●Remove the carburetors.
●Before disassembling the carburetors, check the fuel level.
★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
●Move the choke shaft from side to side to check that the starter plungers move smoothly without abnormal friction.
★If the starter plungers do not work properly, replace the carburetors.
●Turn the throttle cable bracket to check that the throttle butterfly valves move smoothly and return with spring tension.
★If the throttle valves do not move smoothly. Replace the carburetors.



A. Throttle Valves

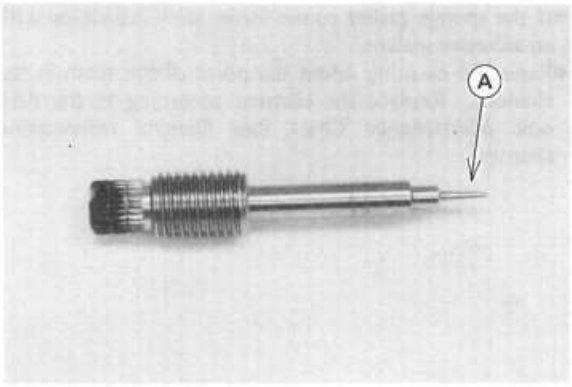
●Disassemble the carburetors.
●Clean the carburetors.
●Check that the O-rings on the float bowl and drain plug and the diaphragm on the vacuum piston are in good condition.
★If any of the O-rings or diaphragms are not in good condition, replace them.
●Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

Valve Needle



Good Bad

★If the plastic tip is damaged, replace the needle.
●Push in the rod in the other end of the float valve needle.
★If it does not spring out, replace the needle.
●Check the tapered portion of the pilot screw for wear or damage.

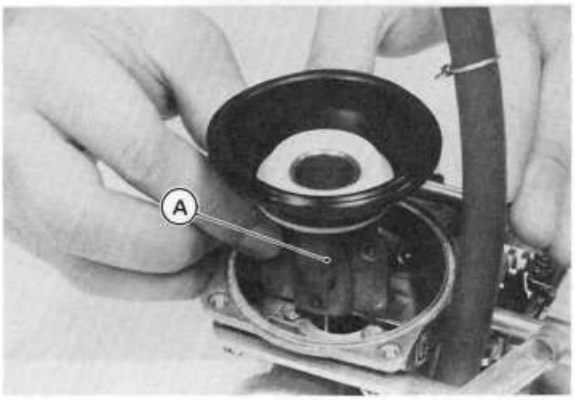


A. Tapered Portion

★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 both the body and the vacuum piston.



A .Vacuum Piston

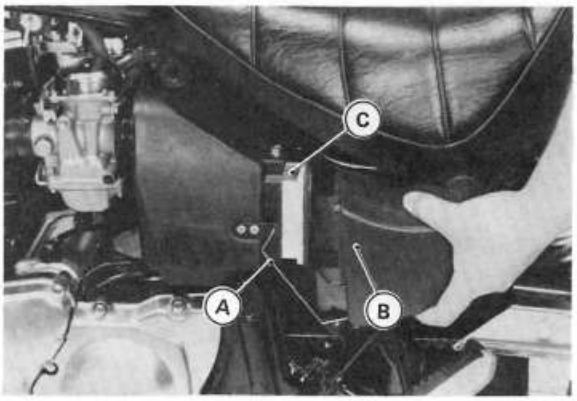
Air Cleaner

Air Cleaner Element Removal/Installation Notes

●Slide down the holder.

●Remove the air cleaner cover.

●Pull out the air cleaner element.



A. Holder
B. Air Cleaner Cover
C. Air Cleaner Element

●Push a clean, lint-free towel into the air cleaner housing to keep dirt or other foreign material from entering.

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 Cleaning

NOTE

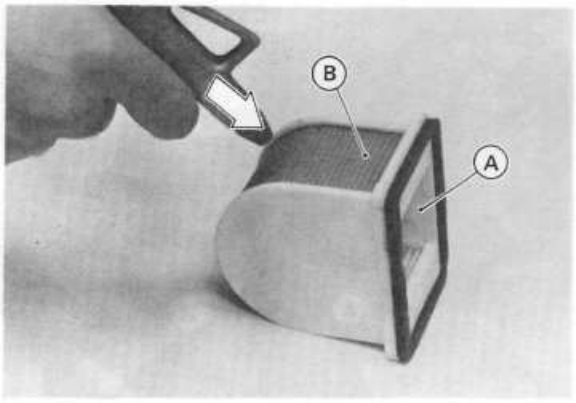
○*In dusty areas, the element should be cleaned more frequently than the recommended interval.*

○*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 tapping it lightly to loosen dust.

●Blow away the remaining dust by applying compressed air from the outside to the inside (from the clean side to the dirty side).

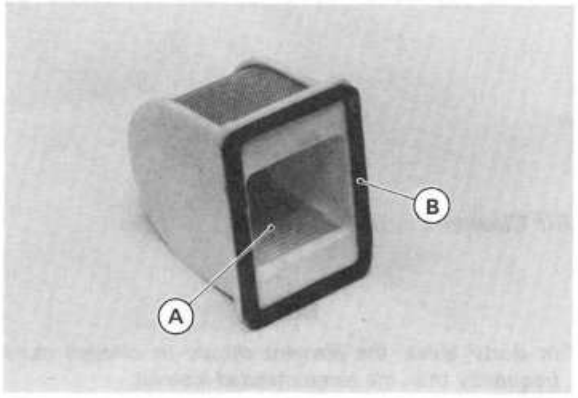


A. Inside B. Outside

•Inspect the element before installing it.

Air Cleaner Element Inspection and Replacement

•Remove the air cleaner element.
•Clean the air cleaner element.
•Visually check the element for tears or breaks. Check the sponge gasket also, and the plastic 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

•Remove the seat.
•Remove the bolt from the rear end of the tank.



A. Bolt

•Turn the fuel tap ON.
•Pull the hoses off the tank and 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.

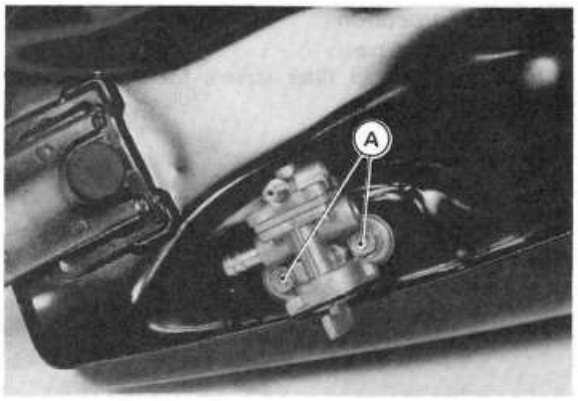
WARNING

○**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

○**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.**

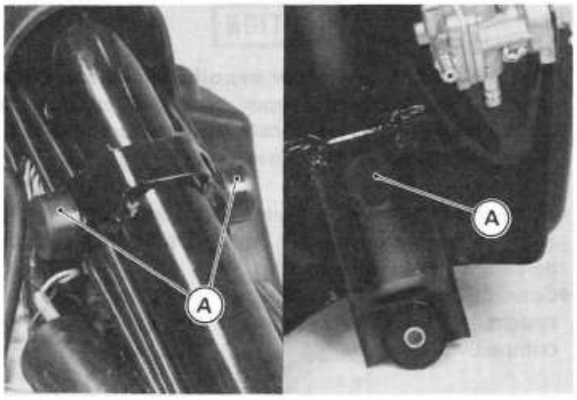
●Tilt the tank out the rear of the frame.
●Drain the fuel tank.
○Arrange a suitable container under the fuel tank.
○Turn the fuel tap to PRI to drain the fuel into the container.



A. Bolts

Fuel Tank Installation

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



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 Tap Removal

●Remove the fuel tank and drain it.
●Remove the bolts with nylon flat washers and take out the fuel tap.

Fuel Tap Installation

●Fuel tap installation is the reverse of removal. Note the following.
●Be sure the O-ring is in good condition to prevent leaks.
●Be sure to clamp the fuel hose to the tap to prevent leaks.
●Be sure the nylon washers are in good condition to prevent leaks.
○Do not use steel washers in place of the nylon washers, because they will not seal the bolts properly and fuel will leak.

Fuel Tank and Tap Cleaning

●Remove the fuel tank and drain it.
●Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.

WARNING

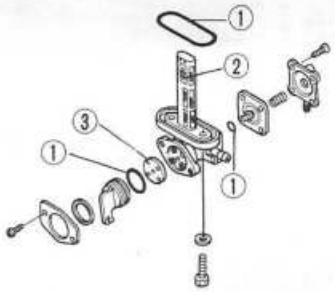
○**Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.**

●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.
●Install the fuel tank.

Fuel Tap Inspection

- Remove the fuel tap.
- Check the fuel tap filter screens for any breaks or deterioration.

Fuel Tap



1. O-ring
2. Filter
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 at ON or RES without engine running, replace the damaged gasket or O-ring.

Fuel Tank and Cap Inspection

- Open the tank cap.
- Visually inspect the gaskets on the tank and cap for any damage.

★Replace the gaskets if they are damaged.

- Remove the breather and fuel return pipe and check to see if the pipes in the tank do not clogged up. 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. (US California vehicle only)

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 crimped.

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.

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 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.

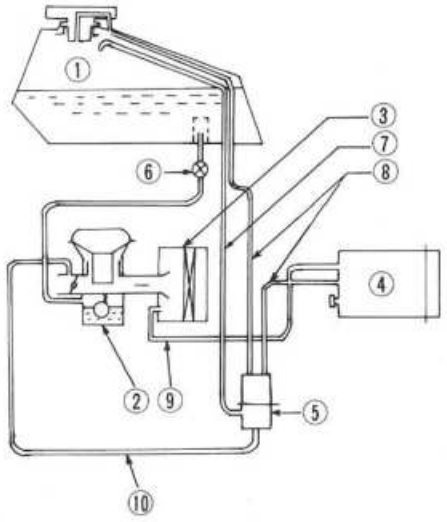
Canister Inspection

●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.*

Evaporative Emission Control System



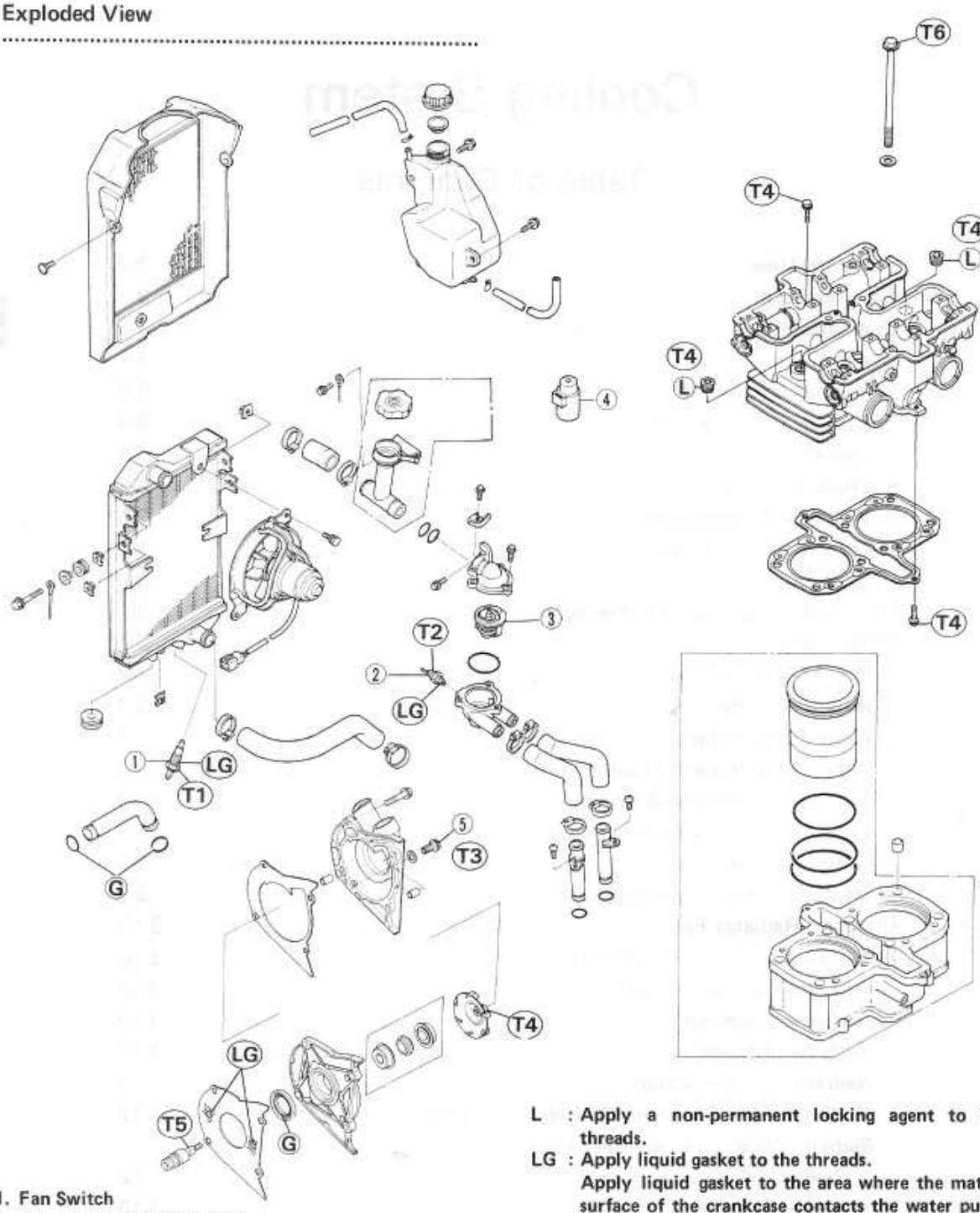
1. Fuel Tank
2. Carburetor
3. Air Cleaner
4. Canister
5. Separator
6. Cock
7. Red Color Hose
8. Blue Color Hose
9. Green Color Hose
10. White Color Hose

Cooling System

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Exploded View



1. Fan Switch
2. Water Temperature Sensor
3. Thermostat
4. Fan Relay
5. Drain Plug

T1 : 7.4 N-m (0.75 kg-m, 65 in-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 12 N-m (1.2 kg-m, 104 in-lb)
T4 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T5 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T6 : 39 N-m (4.0 kg-m, 29 ft-lb)

L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
Apply liquid gasket to the area where the mating surface of the crankcase contacts the water pump housing gasket.
G : Apply high temperature grease.

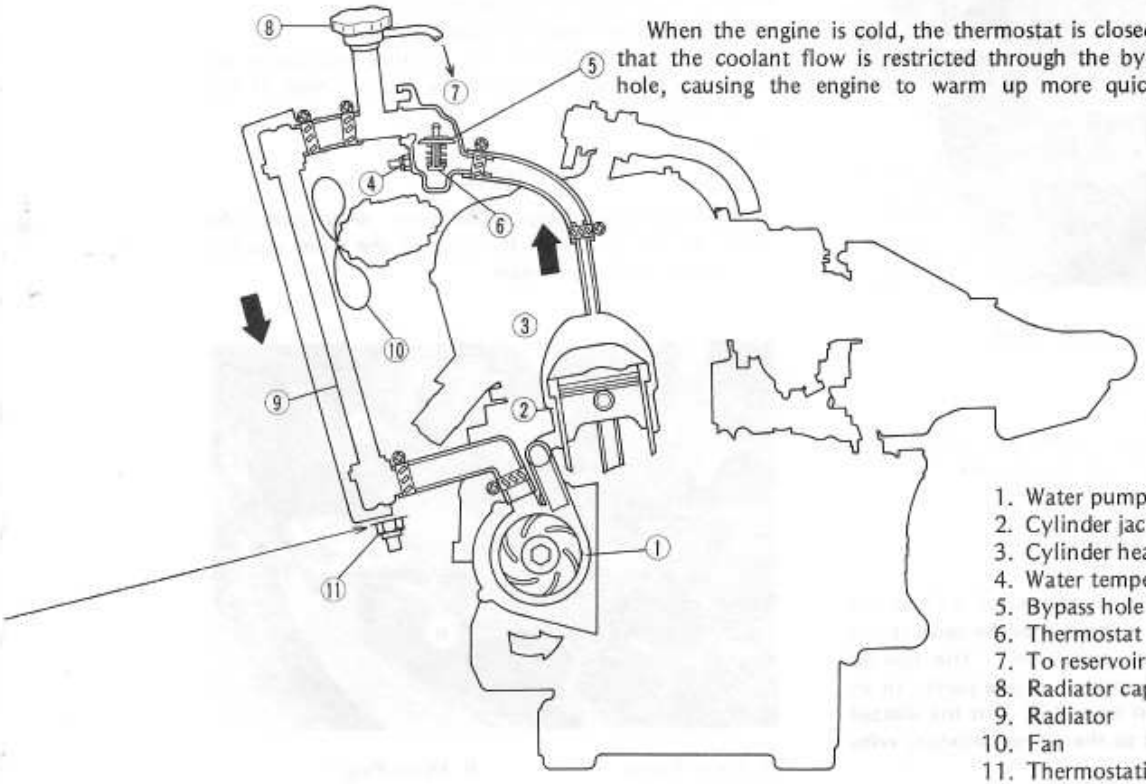
If the coolant or engine oil temperature goes up beyond the predetermined level, the thermostatic fan switch conducts to operate the fan relay. The fan relay closes its contacts, completes the fan motor circuit, and the cooling fan turns to speed up the cooling action of the radiator. When the coolant or oil cools down; the fan switch cuts the relay current, and the fan stops. This electric cooling fan system saves engine power.

Specifications

Item		Standard
Coolant Provided when Shipping:		
	Type	Permanent type of antifreeze for aluminum engine and radiator
	Color	Green
	Mixed ratio	Soft water 57%, coolant 43%
	Freezing point	−30°C (−22°F)
	Total amount	1.4 L
Radiator Cap:	Relief pressure	73.5 – 103 kPa (0.75 – 1.05 kg/cm², 11 – 15 psi)
Thermostat:		
Valve opening temperature		69.5 – 72.5°C (157.1 – 162.5°F)
Valve full opening lift		not less than 8 mm @95°C (203°F)

Cooling System

The water 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 possesses high durability.



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, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

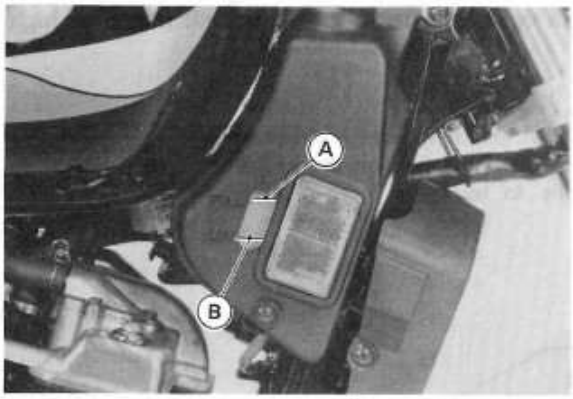
Coolant Level Inspection

•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 FULL and the LOW marks.

NOTE

○*Check the level when the engine is cold (room or ambient temperature).*



A. "FULL" Mark B. "LOW" Mark

★If the amount of coolant is insufficient, add coolant through the filler opening to the FULL 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 Cooling System 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).**

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.**

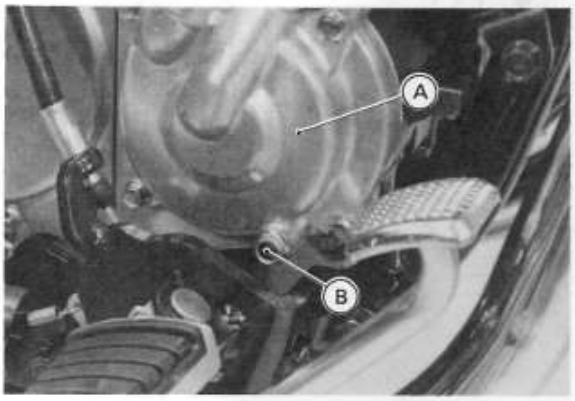
•Set the motorcycle up on its center stand.

•Place a container under the water pump.

•Drain the coolant from the radiator and engine by loosening the drain plug at the bottom side of the water pump.

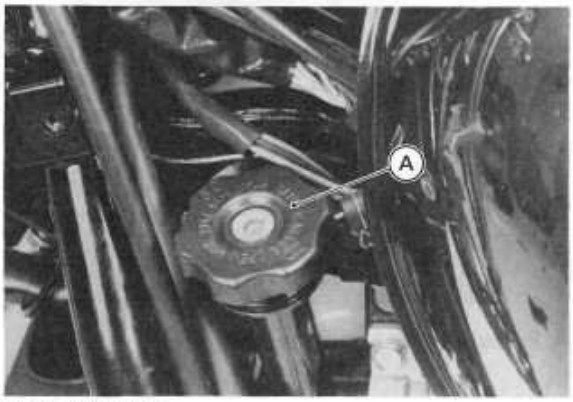
NOTE

○*Loosen the drain plug a few turns, when direct the hole on the thread of the plug to the front lest the coolant should be splashed.*



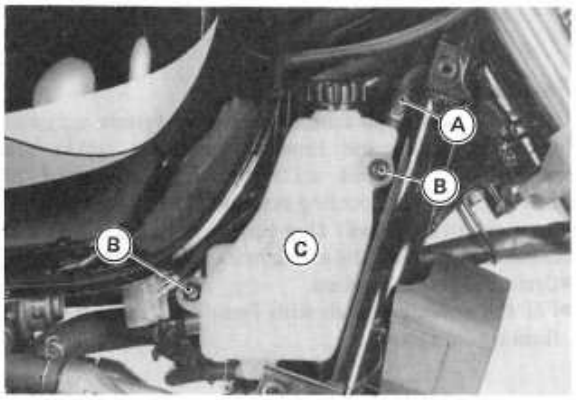
A. Water Pump B. Drain Plug

•Remove the left front side cover.
•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 down and remove the cap.



A. Radiator Cap

•Remove the right front side cover.
•Pull off the air vent hose and unscrew the bolts and remove the reservoir tank with lower hose attached.
•Unscrew the cap and pour the coolant into a container.



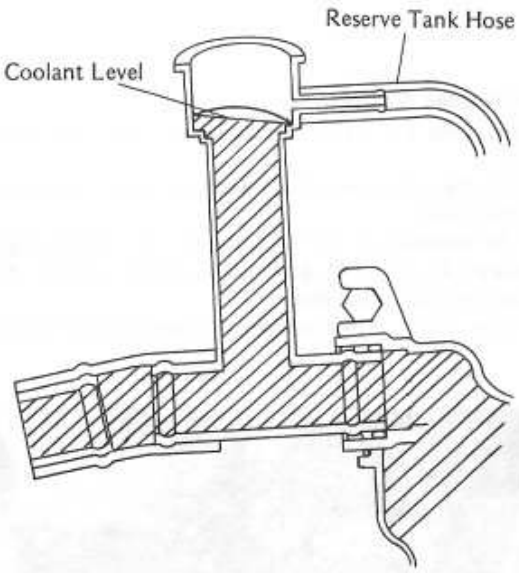
A. Air Vent Hose
B. Bolt
C. Reservoir Tank

•Inspect the old coolant for color, smell (mentioned above).

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 bottom of the radiator filler neck with coolant, and install the cap turning it clockwise about ¼ turn.

Radiator Filler Neck



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 FULL mark with coolant, and install the cap.
•Check the cooling system for leaks.
•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 Full mark through the reservoir tank opening.

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.*

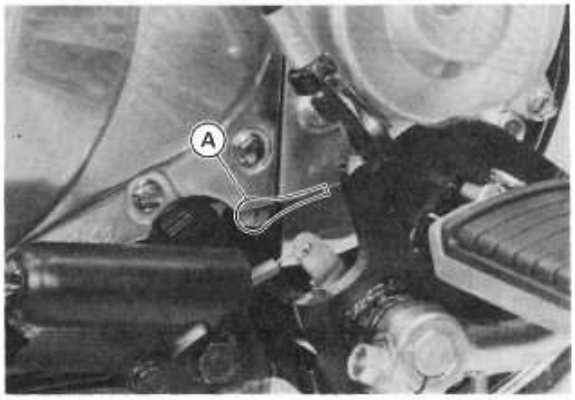
The coolant provided when shipping

Type	:	Permanent type antifreeze for aluminum engine and radiator
Color	:	green
Mixed ratio	:	soft water 57%, coolant 43%
Freezing point	:	−30° (−22°F)
Total amount	:	1.4 L (up to "FULL" mark)

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 mechanical seal.
- ★If there are no apparent leaks, pressure test the system.



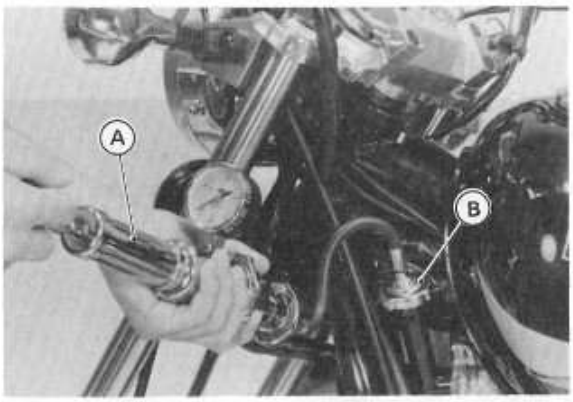
A. Drainage Outlet Passage
: at the bottom of the pump body

Cooling System Pressure Testing

CAUTION

- ○**During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure: 103 kPa (1.05 kg/cm², 15 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 103 kPa (1.05 kg/cm², 15 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-rings.

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 passages 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.

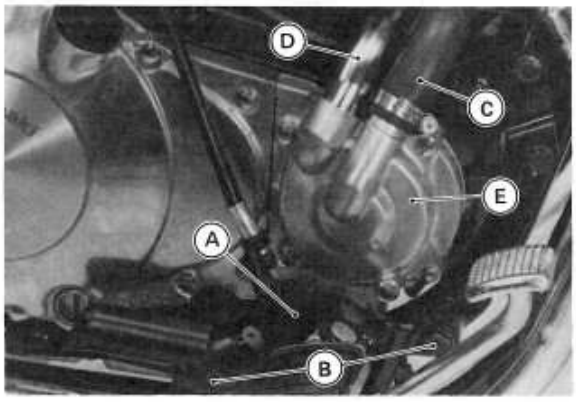
Disassembly and Assembly Precaution

●Prior to disassembly of cooling system parts (radiator, pump, sensors, etc), wait until coolant cools down and drain coolant.

Water Pump

Pump Cover Removal

●Drain the coolant.
●Remove the right footpeg assembly mounting bolts and let the assembly hang down.
●Loosen the clamp and remove the radiator hose from the water pump cover.
●Remove the four cover bolts.
●With the water pipe attached, remove the water pump cover.



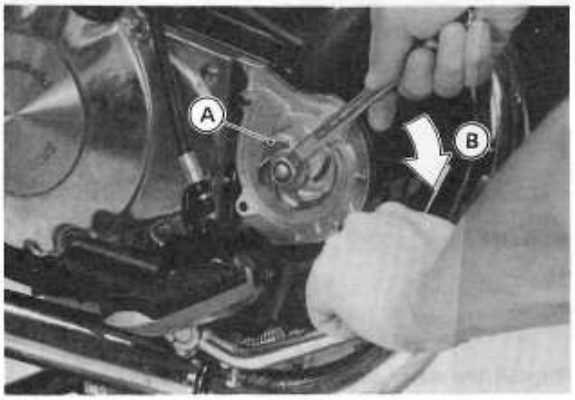
A. Right Footpeg Assembly
B. Mounting Bolts
C. Raditor Hose
D. Water Pipe
E. Water Pump Cover

Water Pump Removal

●Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).
●Install the right footpeg assembly.
●Shift the transmission into 1st gear and apply the rear brake.
●Remove the impeller.

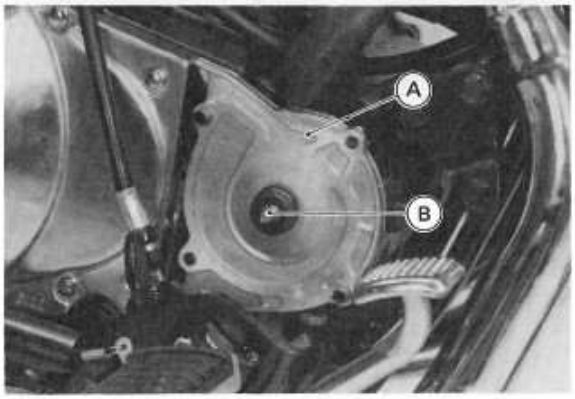
NOTE

○*The impeller has a left-handed thread, therefore it must be turned clockwise to remove it.*



A. Impeller B. Turn Clockwise

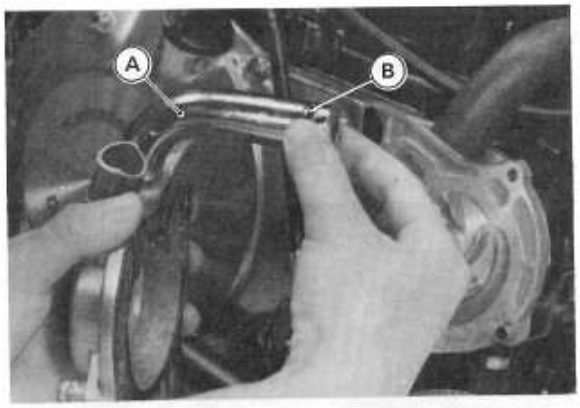
●Pull the water pump housing out of the right crankcase.
●Turn the water pump shaft clockwise, and remove it.



A. Water Pump Housing B. Water Pump Shaft

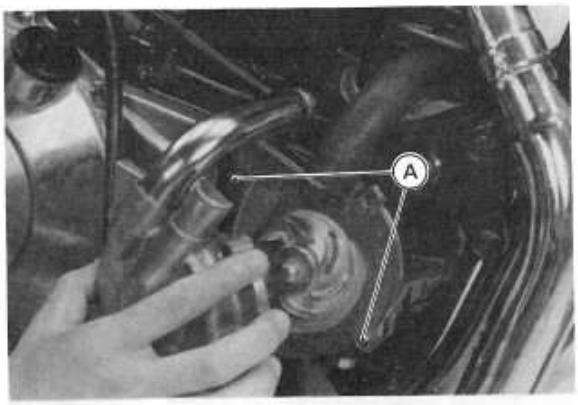
Water Pump Installation Notes

●When installing the water pump shaft or impeller, shift the transmission into 1st gear.
●When installing the water pump shaft or impeller, turn them counterclockwise, and tighten them to the specified torque (see Exploded View).
●Be sure to install the water pipe O-rings, and apply high temperature grease to them.



A. Water Pipe B. O-ring

●Install the water pump cover with the water pipe, being careful of the two knock pins.



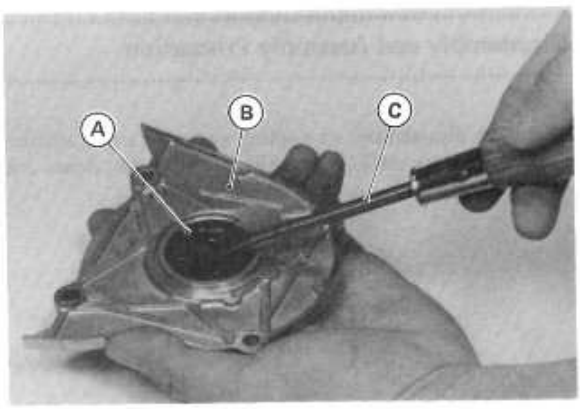
A. Knock Pins

Water Pump Housing Disassembly

CAUTION

○**Be careful not to damage the sealing surface of the mechanical seal.**

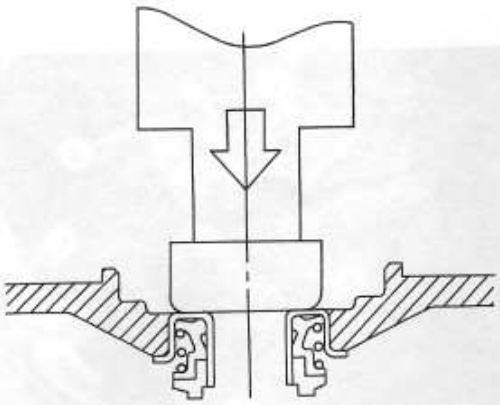
●Take the oil seal out of the housing with a hook.



A. Oil Seal C. Hook
B. Water Pump Housing

●Press the mechanical seal out of the housing with a bearing driver (special tool).

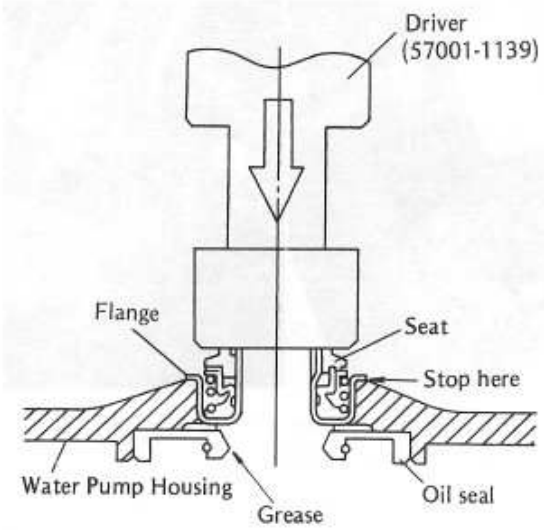
Mechanical Seal Removal



Water Pump Housing Assembly

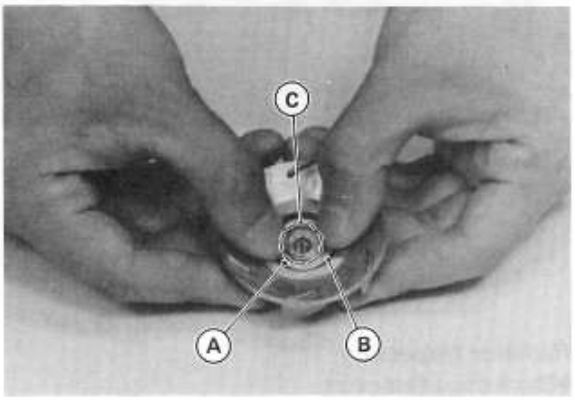
●Apply a high temperature grease to the oil seal.
●Press the oil seal into the hole with a bearing driver (special tool) until it stops at the bottom surface of the housing.
●Press the mechanical seal into the hole with a bearing driver (special tool) until its flange touches the surface of the housing.

Mechanical Seal Installation



Impeller Assembly Notes

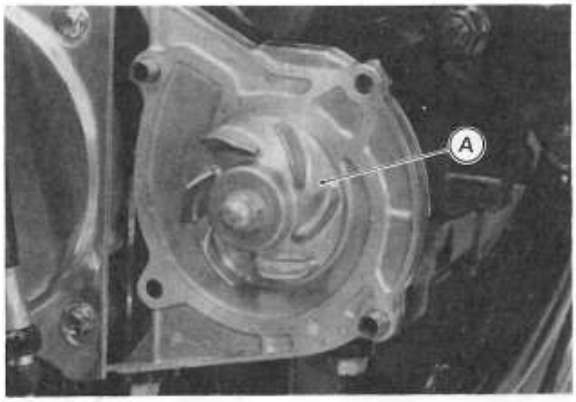
- ●Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- ●Apply coolant to the surfaces of the rubber seal and sealing seat, and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



A. Sealing Seat
B. Rubber Seal
C. Apply coolant to the surfaces

Pump Impeller Inspection

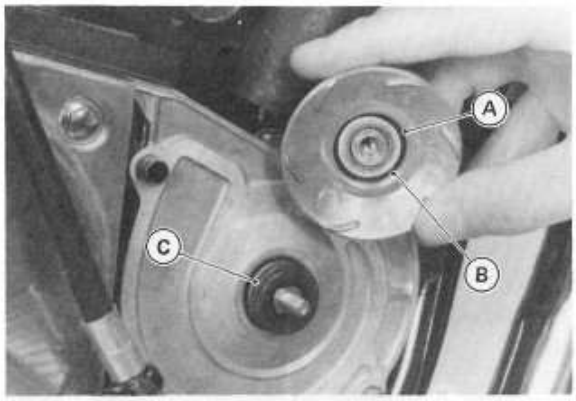
- ●Visually check the impeller.
- ★If the surface is corroded, or if the blades are damaged, replace the impeller.



A. Impeller

Mechanical Seal Inspection

- ●Visually inspect the mechanical seal.
- ★If any one of the parts is damaged, replace the mechanical seal as a unit.
- ○The sealing seat and rubber seal may be removed easily by hand.

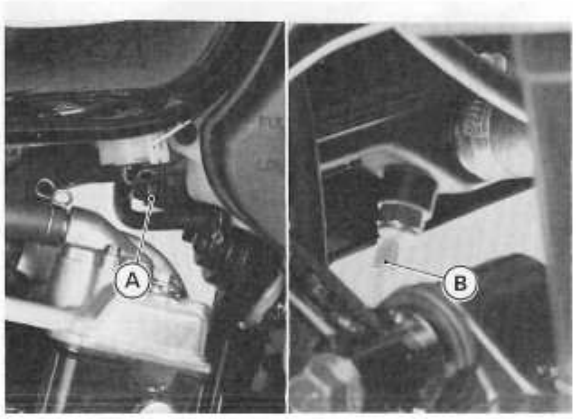


A. Impeller Sealing Seat Surface
B. Rubber Seal
C. Mechanical Seal Diaphragm

Radiator, Radiator Fan

Raditor, Radiator Fan Removal

●Disconnect the fan motor connector and the fan switch lead before removal of the radiator or radiator fan.

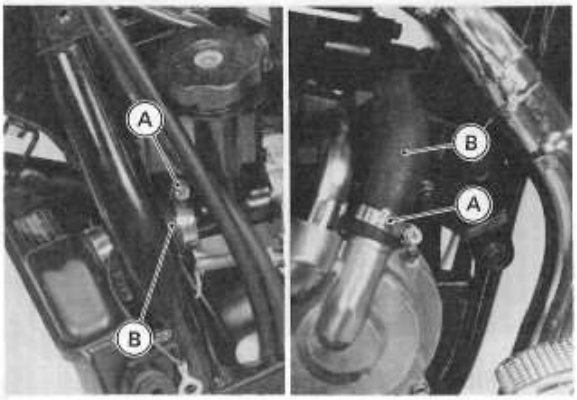


A. Fan Motor Connector B. Fan Switch Lead

WARNING

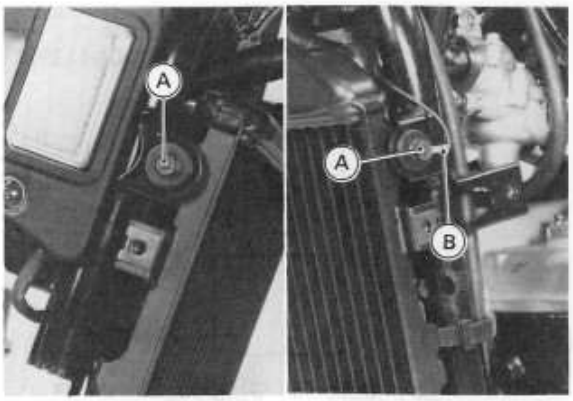
○**The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.**

●Remove the radiator grill.
●Remove the left front side cover.
●Loosen the hose clamps and pull off the radiator hoses on both sides.



A. Clamp B. Radiator Hose

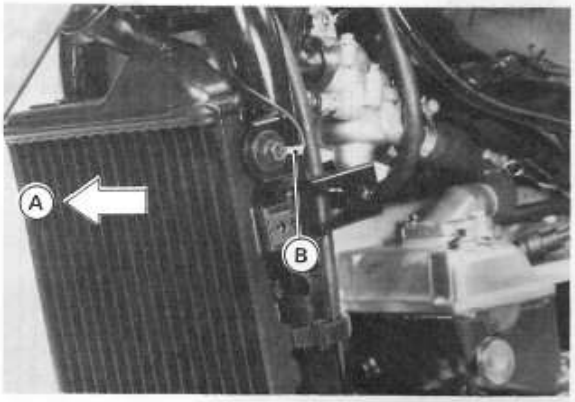
●Remove the radiator mounting bolts and the fan switch ground lead.
●Remove the radiator with the fan taking care not to damage the radiator core.



A. Radiator Mounting Bolt
B. Fan Switch Ground Lead

Radiator Installation Note

●Be sure to install the fan switch ground lead on the chassis.



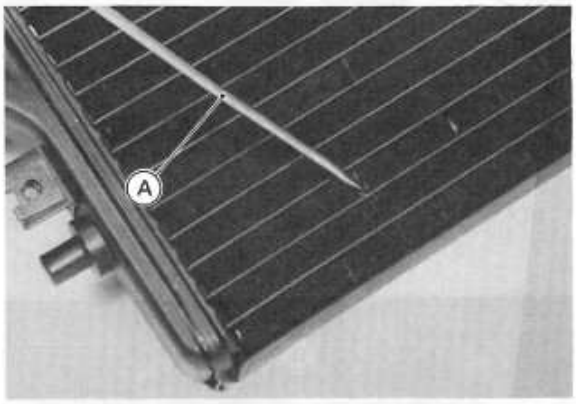
A. Front B. Fan Switch Ground Lead

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.

CAUTION

○**Do not tear the radiator tubes while straightening the fins.**

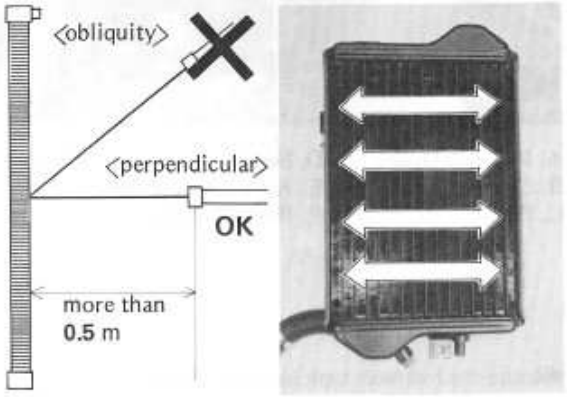


A. Thin Screwdriver

★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.

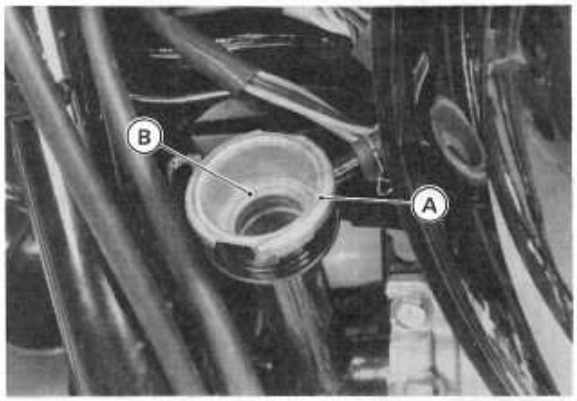
CAUTION

○**When cleaning the radiator with compressed air, 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.**



Filler Neck Inspection

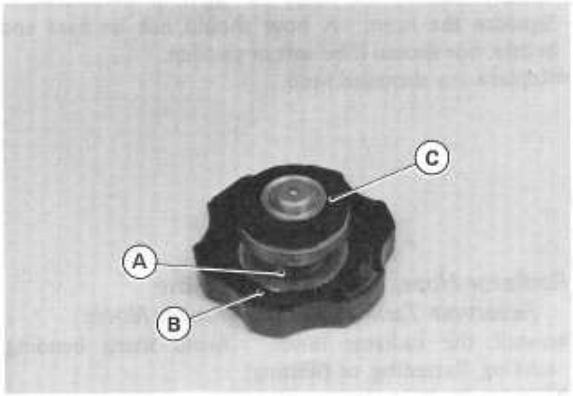
●Check the radiator filler neck for signs of damage.
●Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly.



A. Top Sealing Seat B. Bottom Sealing Seat

Radiator 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.



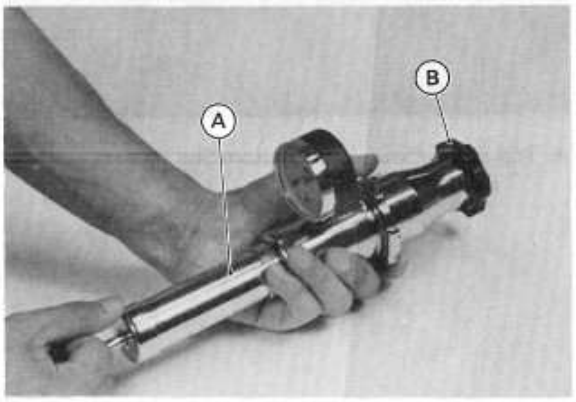
A. Valve Spring C. Bottom Seal
B. Top Seal

•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.

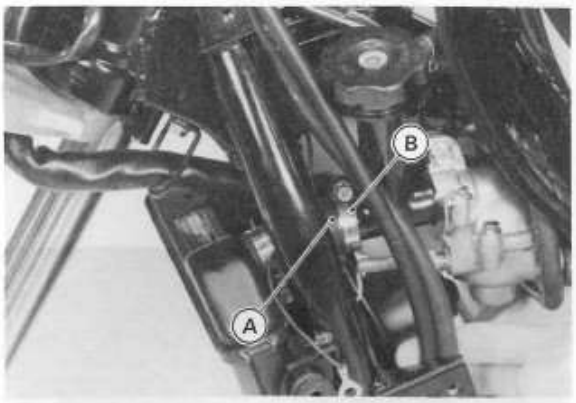
Radiator Cap Relief Pressure

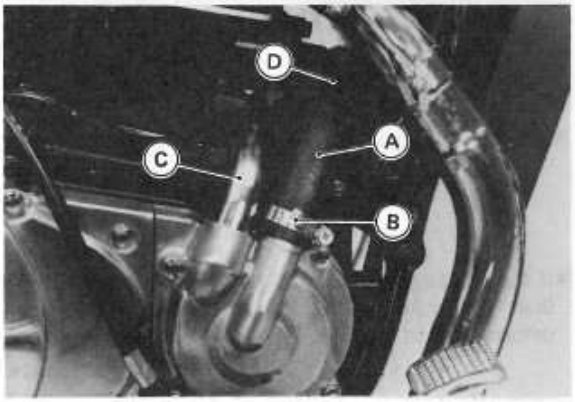
73.5 – 103 kPa
(0.75 – 1.05 kg/cm^2, 11 – 15 psi)

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



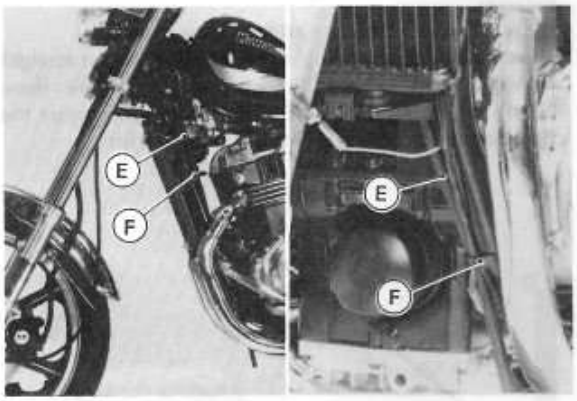
A. Pressure Tester B. Radiator Cap





Radiator Hose, Reservoir Tank Hose Inspection

•In accordance with the Periodic Maintenance Chart, visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
•Replace any damaged hose.

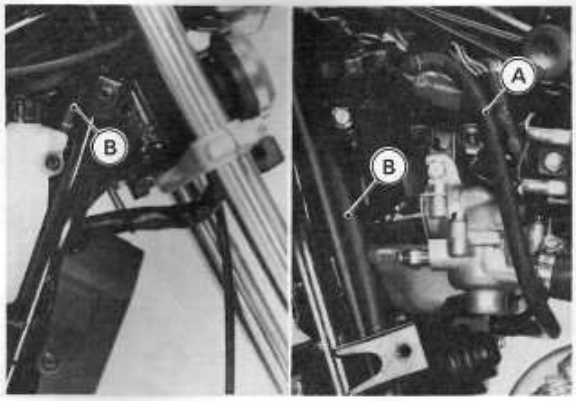


A. Radiator Hose
B. Clamp
C. Pipe
D. Bend
E. Air Vent Hose
F. Plastic Clamp

Radiator Hose, Pipe, Air Vent Hose Reservoir Tank Hose Installation Notes

•Install the radiator hoses. Avoid sharp bending, kinking, flattening, or twisting.
•Tighten the hose clamps securely.
•Bind the air vent hose with a plastic clamp and make sure it does not touch the exhaust pipe.

•Route the reservoir tank hoses as shown.

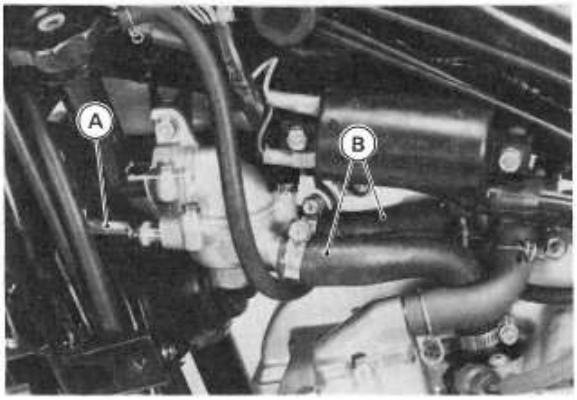


A. Reservoir Tank Hose
B. Air Vent Hose

Thermostat

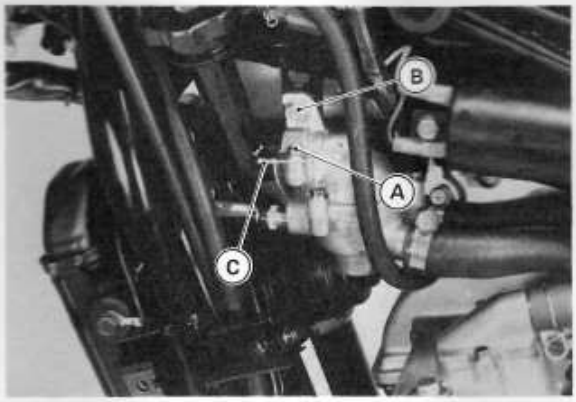
Thermostat Removal

- Remove the following parts.
  - Seat
  - Fuel Tank
  - Left Front Side Cover
- Disconnect the water temperature sensor lead.
- Remove the water hoses.



A. Water Temperature Sensor Lead
B. Water Hoses

- Loosen the thermostat housing clamp bolt and mounting bolt.
- Pull the thermostat housing out of the water pipe.

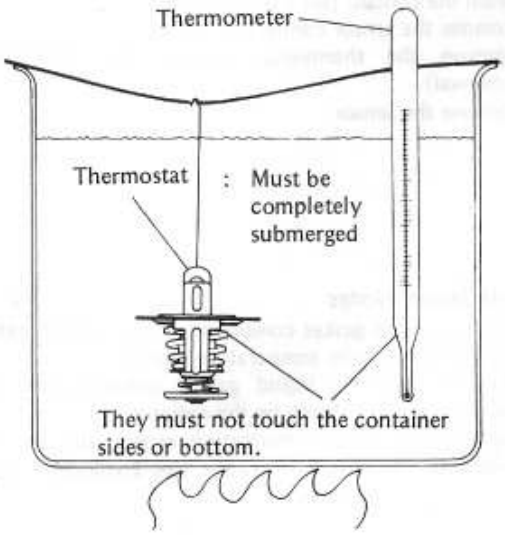


A. Clamp Bolt
B. Mounting Bolt
C. Water Pipe

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.

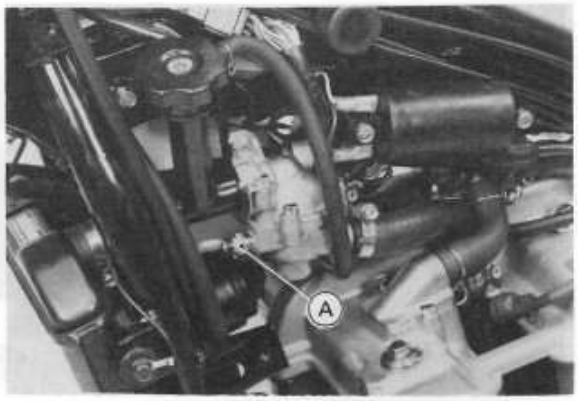
Valve Opening Temperature Measurement



- 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 (157.1 – 162.5°F)



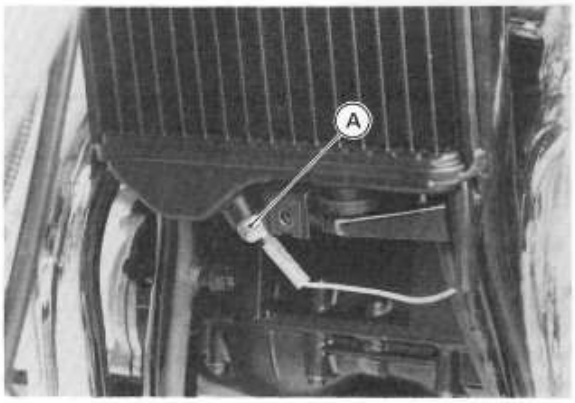
A. Water Temperature Sensor

Thermostatic Fan Switch Water Temperature Sensor

Removal Caution

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.



A. Thermostatic Fan Switch on the radiator

Water Temperature Sensor Removal

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

Installation Notes

- ●Apply a liquid gasket compound to the threads before mounting the water temperature sensor.
- ○Do not apply a liquid gasket compound to the thermostatic fan switch on the radiator.
- ●Tighten the water temperature sensor and the fan switch to the specified torque (see Exploded View).

Inspection

Refer to the Electrical System chapter.

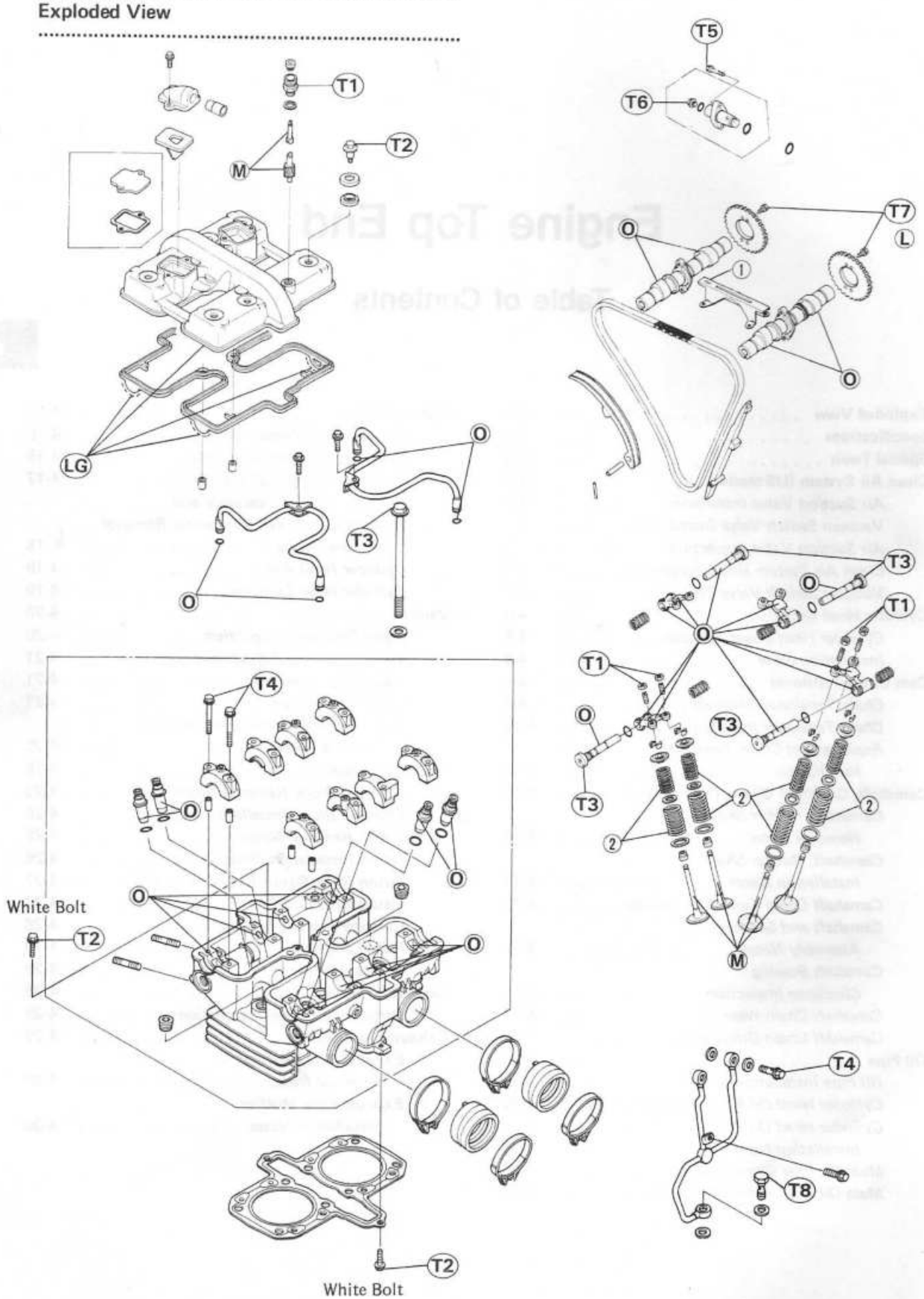
Engine Top End

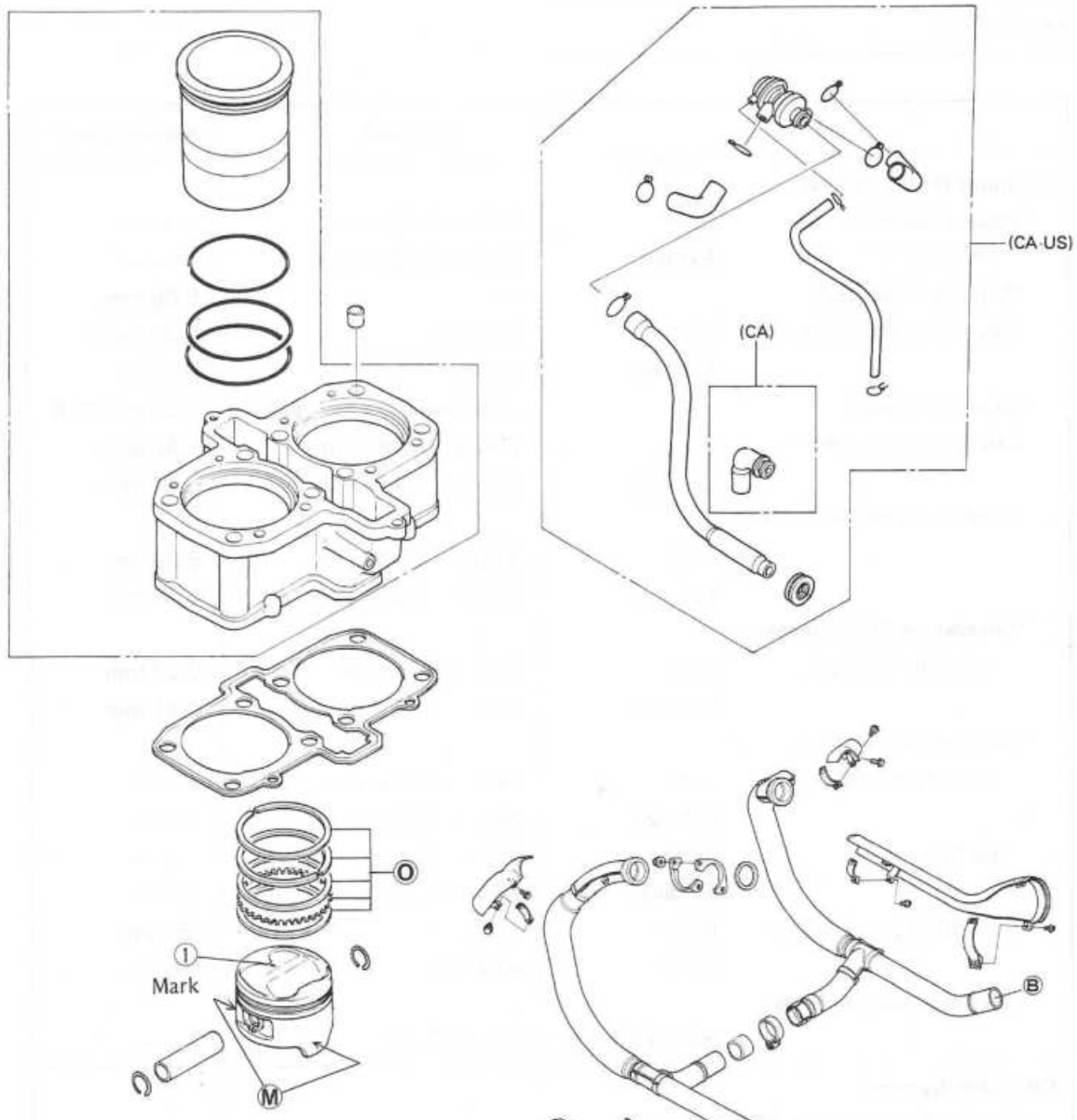
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Exploded View





1. Arrow mark is must point toward the front.
2. Closed coil end down ward.

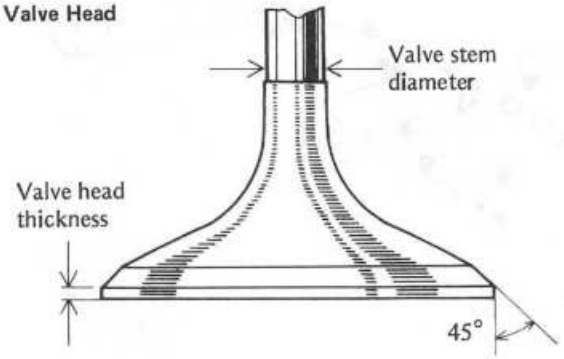
LG : Apply a liquid gasket to the threads or gaskets.
L : Apply a non-permanent locking agent to the threads.
M : Apply a thin coat of a molybdenum disulfide grease.
O : Apply engine oil to the surface.
T1 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 : 39 N-m (4.0 kg-m, 29 ft-lb)
T4 : 12 N-m (1.2 kg-m, 104 in-lb)
T5 : 8.8 N-m (0.9 kg-m, 78 in-lb)
T6 : 4.9 N-m (0.5 kg-m, 43 in-lb)
T7 : 15 N-m (1.5 kg-m, 11.0 ft-lb)
T8 : 20 N-m (2.0 kg-m, 14.5 ft-lb)

TORQUE SPECS

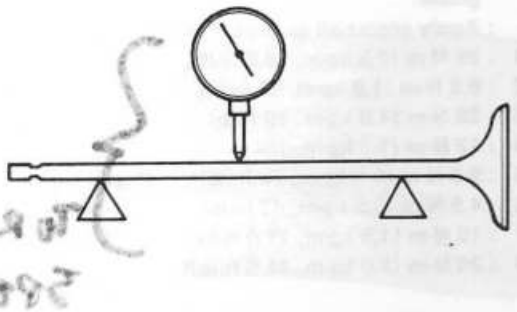
Specifications

Item		Standard	Service Limit
Cylinder Head, Valves:			
Valve clearance (when cold)	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	0.25 mm
	Exhaust	1 mm	0.7 mm
Valve stem bend		Less than 0.02 mm TIR	0.05 mm TIR
Valve stem diameter:	Inlet	5.475 – 5.490 mm	5.46 mm
	Exhaust	5.455 – 5.470 mm	5.44 mm
Valve guide inside diameter:			
	Inlet	5.500 – 5.512 mm	5.58 mm
	Exhaust	5.500 – 5.512 mm	5.58 mm
Valve/valve guide clearance (wobble method):	Inlet	0.02 – 0.08 mm	0.22 mm
	Exhaust	0.07 – 0.14 mm	0.27 mm
Valve seating surface:			
Outside diameter	Inlet	28.3 – 28.5 mm	– – –
	Exhaust	24.0 – 24.2 mm	– – –
Width	Inlet	0.5 – 1.0 mm	– – –
	Exhaust	0.5 – 1.0 mm	– – –
Valve spring free length:	Inner	36.3 mm	35 mm
	Outer	40.4 mm	39 mm
Valve seat cutting angle:			
	Inlet, Exhaust	32°, 45°, 60°	– – –
Clean Air System:			
Vacuum Switch Valve Switch Pressure:			
	Open → Close	54 – 68 kPa (410 – 510 mmHg)	– – –

Valve Head



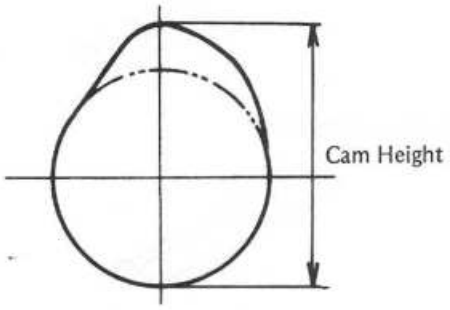
Valve Stem Bend



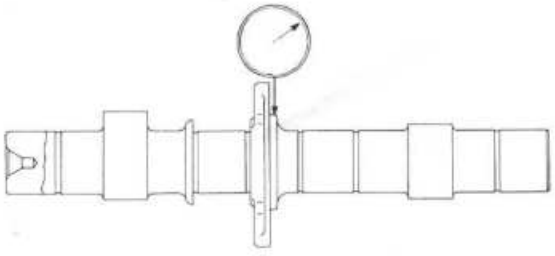
Item		Standard	Service Limit
Camshaft:			
Cam height	Inlet	35.536 – 35.644 mm	35.44 mm
	Exhaust	35.536 – 35.644 mm	35.44 mm
Camshaft bearing oil clearance		0.030 – 0.071 mm	0.16 mm
Camshaft journal diameter		24.950 – 24.970 mm	24.92 mm
Camshaft bearing inside diameter		25.000 – 25.021 mm	25.08 mm
Camshaft runout		not more than 0.04 mm TIR	0.1 mm TIR
Camshaft chain 20-link length		127.0 – 127.4 mm	128.9 mm
Rocker arm inside diameter		12.500 – 12.518 mm	12.55 mm
Rocker shaft diameter		12.466 – 12.484 mm	12.44 mm
Cylinder Compression:		(usable range) 825 – 1,280 kPa @390 r/min (rpm) (8.4 – 13.0 kg/cm², 119 – 185 psi), *890 – 1,370 kPa @410 r/min (rpm) (9.1 – 14.0 kg/cm², 129 – 199 psi)	
Cylinder Block, Piston:			
Cylinder inside diameter		72.494 – 72.506 mm *69.994 – 70.006 mm	72.6 mm *70.1 mm
Piston diameter		72.425 – 72.460 mm *69.925 – 69.960 mm	72.29 mm *69.79 mm
Piston/cylinder clearance		0.044 – 0.071 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	1.01 – 1.03 mm	1.12 mm
	Oil	2.51 – 2.53 mm	2.6 mm
Piston ring thickness	Top	0.97 – 0.99 mm	0.9 mm
	Second	0.97 – 0.99 mm	0.9 mm
Piston ring end gap	Top	0.2 – 0.35 mm	0.7 mm
	Second	0.2 – 0.35 mm	0.7 mm
	Oil	0.2 – 0.7 mm	1.0 mm

* : EN400-A2

Cam Height Measurement



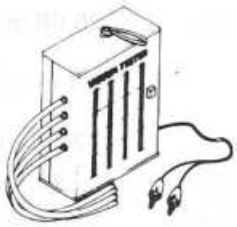
Camshaft Runout



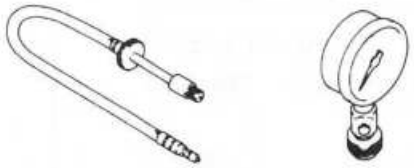
Special Tools

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

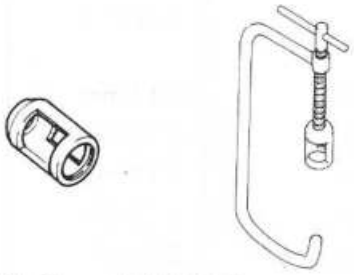
Vacuum Gauge: 57001-1198



Compression Gauge: 57001-221
Adapter: 57001-1183



Valve Spring Compressor Assembly: 57001-241
Adapter: 57001-1019



Valve Guide Arbor: 57001-1021



Valve Guide Reamer: 57001-1079



Valve Seat Cutter Set: 57001-1110

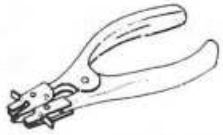


Use the following tools in the set.
(Cutter Holder ϕ5.5 mm: 57001-1125)
(Bar: 57001-1128)
(Seat Cutter: 57001-1113)
(Seat Cutter: 57001-1187)
(Outside Cutter: 57001-1119)
(Outside Cutter: 57001-1120)
(Inside Cutter: 57001-1123)

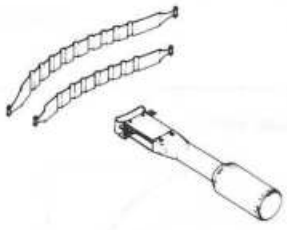
Piston Pin Puller Assembly: 57001-910



Piston Ring Pliers: 57001-115



Piston Ring Compressor Assembly: 57001-1094



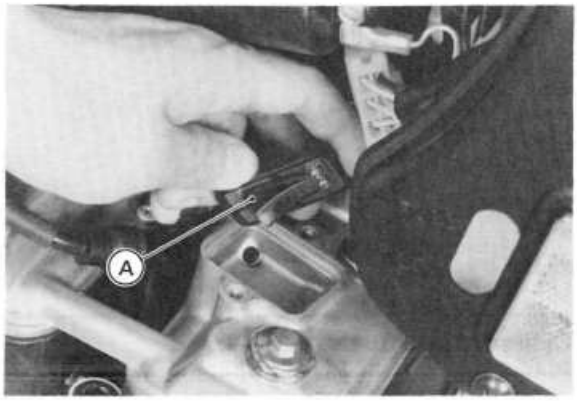
Piston Base: 57001-149



Clean Air System (US model)

Air Suction Valve Installation

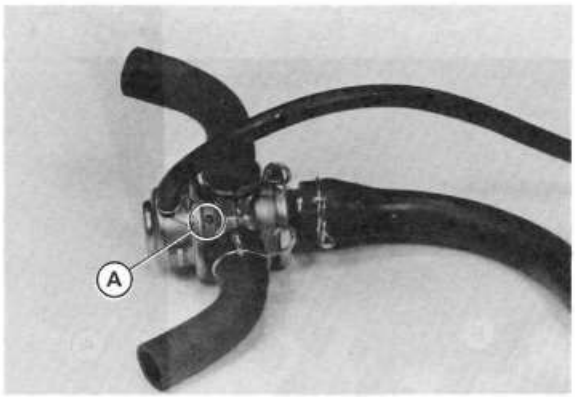
●Install the valve assembly between the cylinder head cover and the cap.



A. Valve Assembly

Vacuum Switch Valve Installation

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



A. Air Hole

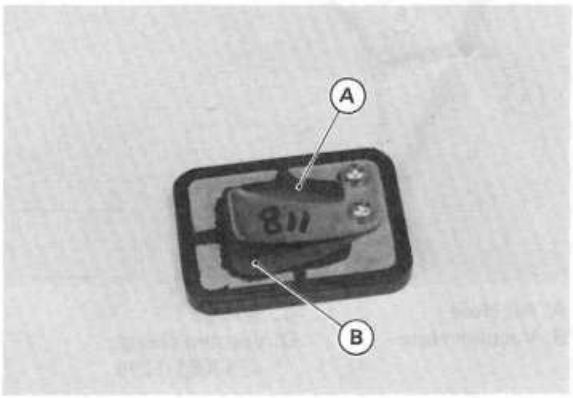
Air Suction Valve Inspection

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, carburetors, and air suction valve covers.

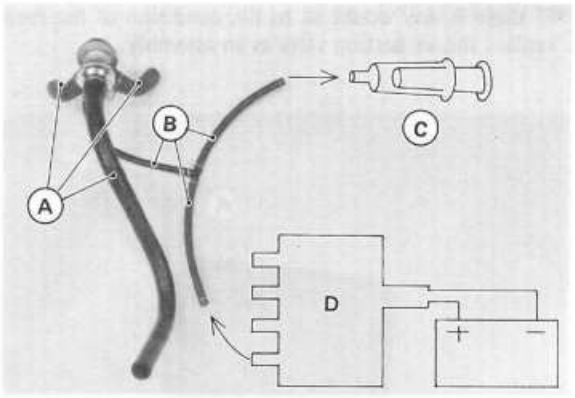
★If they are not, correct them. Replace them if they are damaged.

Vacuum Switch Valve Test

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

●Remove the vacuum switch valve.

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

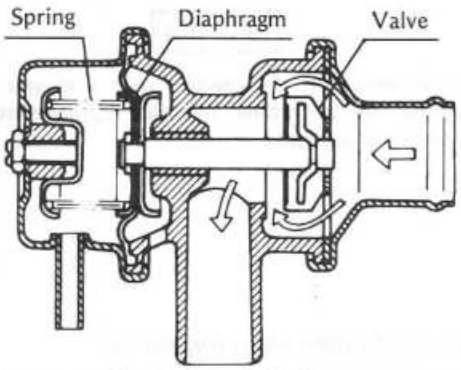


A. Air Hose
B. Vacuum Hose
C. Syringe
D. Vacuum Gauge: 57001-1198

•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 to a certain level: 54 – 68 kPa (410 – 510 mmHg), the valve should stop air flow. When the vacuum is high enough, air cannot flow through the valve.

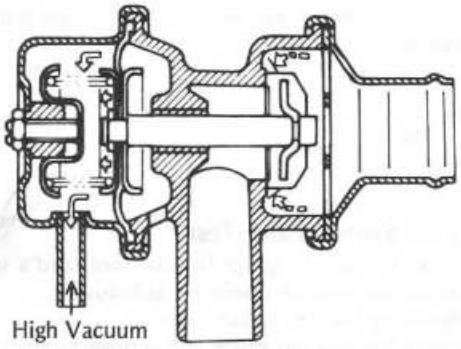
Vacuum Switch Valve Operation

1. During Cruising (open throttle)



Secondary air flows.

2. During Engine Braking (closed throttle)



Secondary air cannot flow.

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

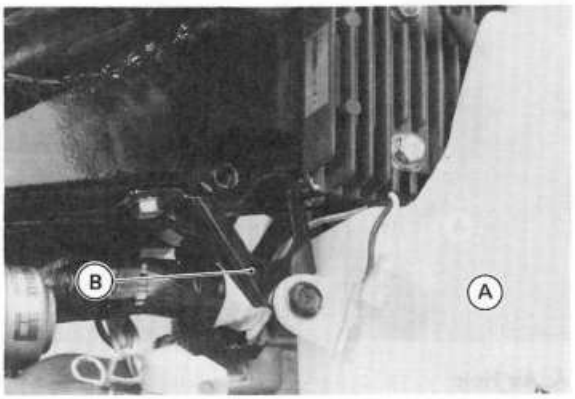
NOTE

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

Cylinder Head Cover

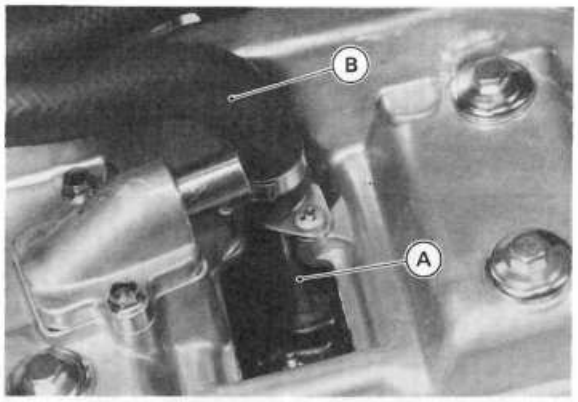
Cylinder Head Cover Removal

•Drain the coolant (see Coolant Draining in the Cooling System chapter).
•Remove the following parts:
Seat
Fuel Tank
Front Side Covers
Reservoir Tank and Bracket



A. Reservoir Tank
B. Bracket

Radiator Assembly
Thermostat Housing
Ignition Coils
Tachometer Cable Lower End
Air Suction Valves with Hoses (US model)
Water Pipes with Hoses



A. Water Pipe B. Hose

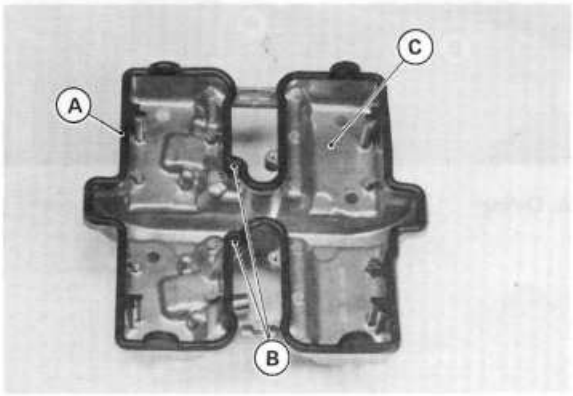
•Remove the cylinder head cover.

Installation Notes

•Replace the head cover gasket with a new one, if it is damaged.

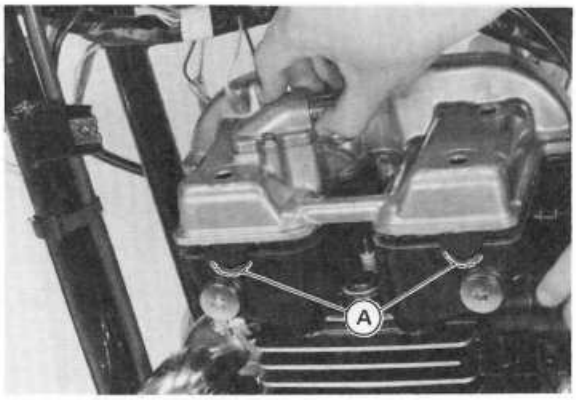
•Stick the gasket to the cover with a liquid gasket for installation convenience.

•Be sure to install the knock pins.



A. Head Cover Gasket C. Head Cover
B. Knock Pins

•Apply a liquid gasket as shown in the figure below.



A. Liquid Gasket Application Areas

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

Cam Chain Tensioner

Chain Tensioner Removal

CAUTION

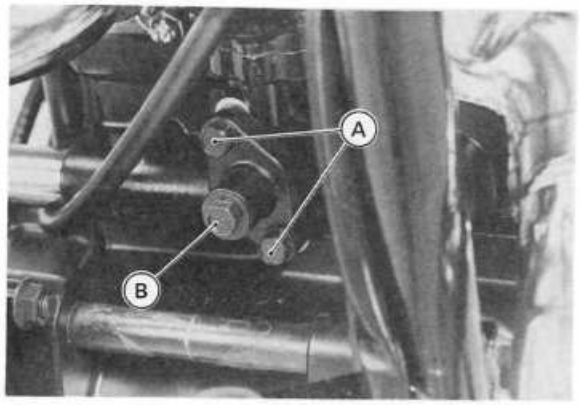
This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below:

○When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Chain Tensioner Installation".

○Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

•Loosen the cap bolt before tensioner removal for later disassembly convenience.

•Unscrew the mounting bolts and remove the camshaft chain tensioner.



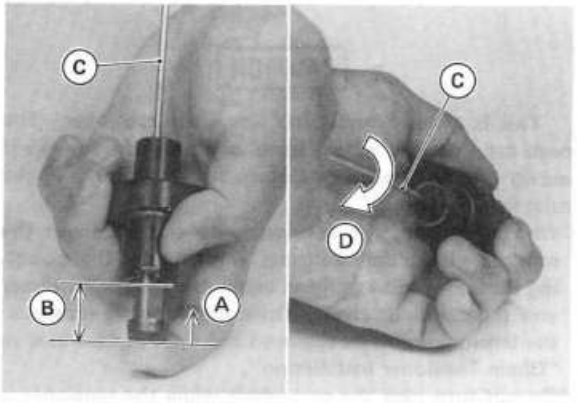
A. Mounting Bolts B. Cap Bolt

Chain Tensioner Installation

- Remove the cap bolt and O-ring.
- Use a screwdriver to turn the rod clockwise while pushing it in until it protrudes about **10 mm** from the tensioner body as shown.

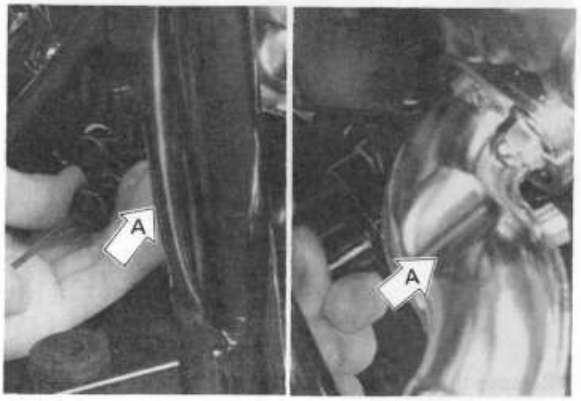
CAUTION

○**Do not turn the rod counterclockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.**



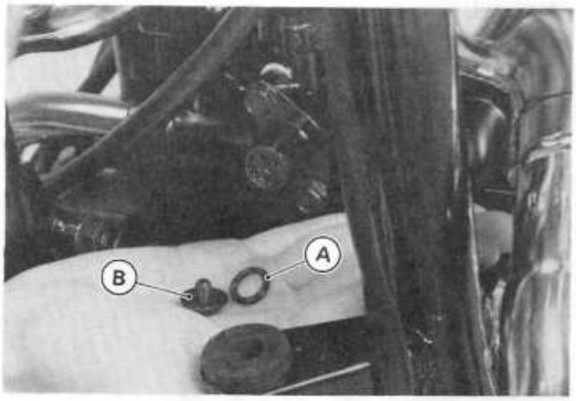
A. Compress the rod C. Screwdriver
B. About 10 mm D. Clockwise

- While holding the rod in position, install the tensioner on the cylinder block.
- While pushing the tensioner against the cylinder block as shown, remove the screwdriver.
- Tighten the mounting bolts finger tight to hold the tensioner.



A. Push the tensioner.

- Tighten the mounting bolts to the specified torque (see Exploded View).
- Install the O-ring and tighten the cap bolt to the specified torque (see Exploded View).

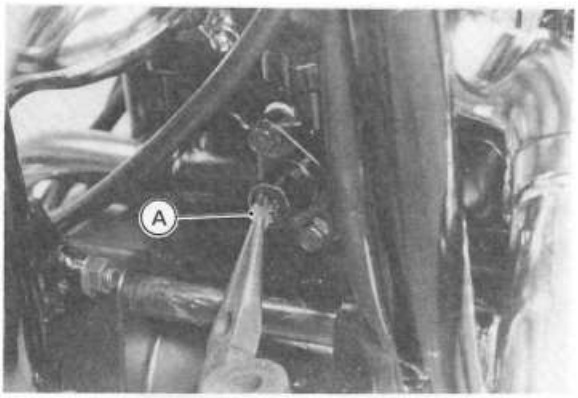


A. O-ring B. Cap Bolt

Replacement Chain Tensioner Installation

○A replacement chain tensioner from stock has a rod holder plate.

- Install the tensioner on the cylinder block, and tighten the mounting bolts to the specified torque (see Exploded View).
- Remove the plate to release the push rod.



A. Rod Holder Plate

•Install the O-ring and tighten the cap bolt to the specified torque (see Exploded View).

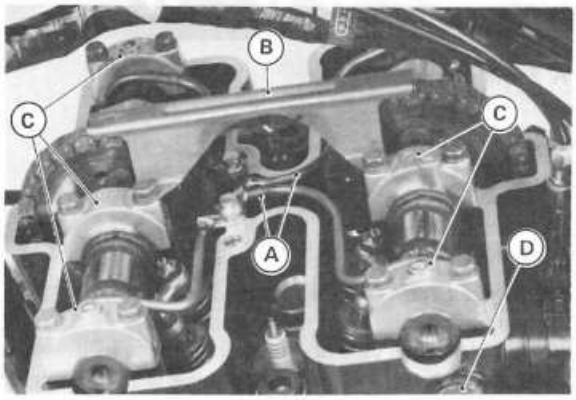
CAUTION

○**Do not pull the rod while the tensioner is removed. This could detach the rod and the tensioner cannot be reinstalled.**

Camshaft, Camshaft Chain, Rocker Shaft

Camshaft, Rocker Shaft Removal Notes

•Remove the following parts before removing the camshafts.
  Cam Chain Tensioner
  Cylinder Head Oil Pipes
  Top Chain Guide
  Camshaft Caps
  Tachometer Pinion
•Remove the rocker shafts.



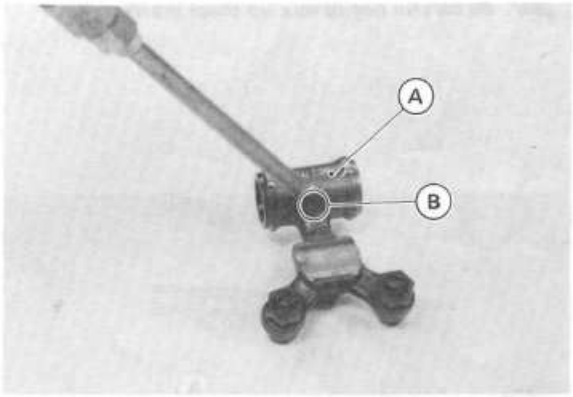
A. Cylinder Head Oil Pipes
B. Top Chain Guide
C. Cam Shaft Caps
D. Rocker Shaft

CAUTION

○**The crankshaft may be turned, while the camshafts are removed. 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.**

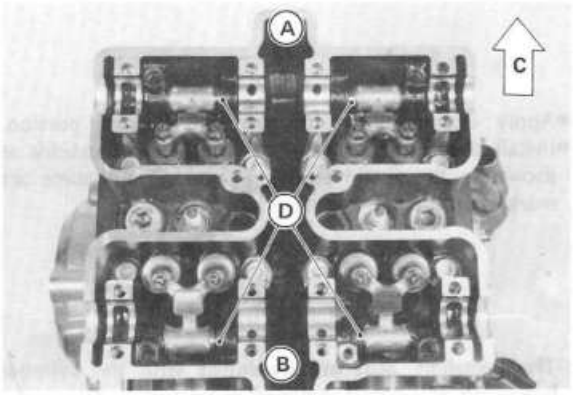
Camshaft, Rocker Shaft Installation Notes

•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 to the camshaft chain side after installation.

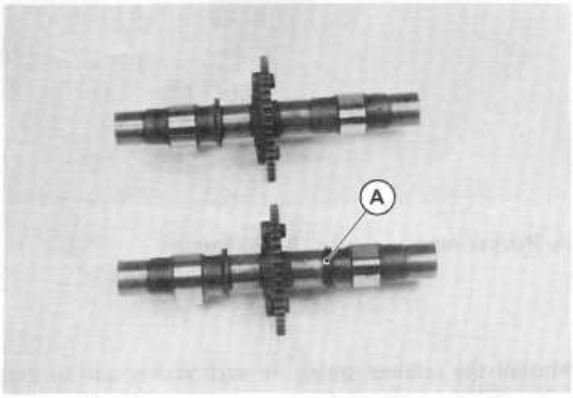


A. Exhaust Side
B. Inlet Side
C. Front
D. Retainer Spring

- Apply engine oil to the rocker shaft, insert the shaft running it through the cylinder head, the rocker arms and springs.
- Tighten the rocker shafts to the specified torque (see Exploded View).
- Tighten the head bolts to the specified torque (see Exploded View), following the specified tightening sequence (see Cylinder Head Installation Notes).
- Install the head oil pipes (see Head Oil Pipe Installation).
- 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 engine assembly grease on the new cam part surfaces.

NOTE

○*The inlet camshaft has threads for the tachometer gear. Be careful not to mix up these shafts.*



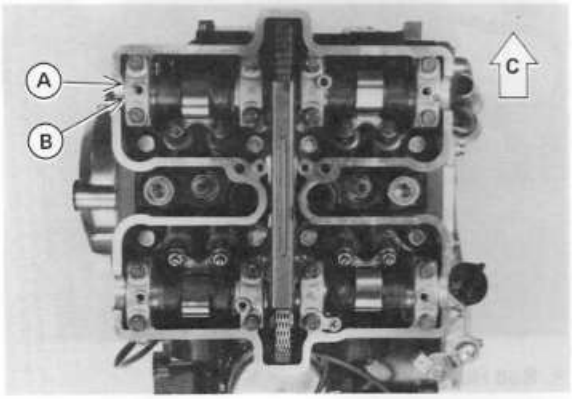
A. Threads

- Apply engine oil to the camshaft bearing portion.
- Install the camshaft caps in the correct locations as shown in the figure below. Location alphabets are marked on the cylinder head and each caps.

CAUTION

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

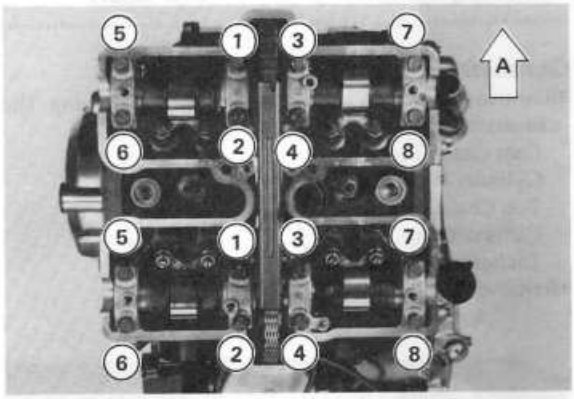
Camshaft Cap Installation



A. Mark: must be faced forwards
B. Identification Alphabet
C. Front

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

Camshaft Cap Bolt Tightening Sequence



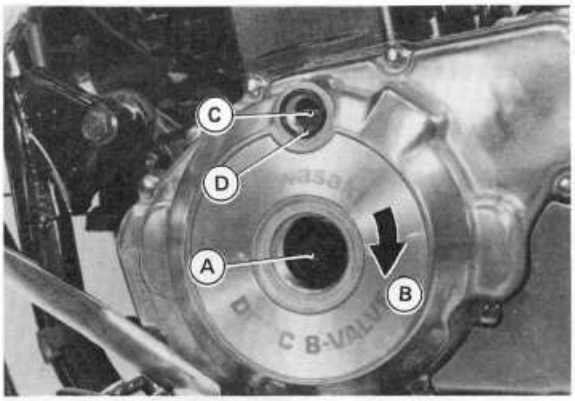
A. Front

Camshaft Chain Timing Procedure

○Be sure to operate from the engine left side.
- Unscrew the two caps on the alternator cover.

○The pistons are numbered beginning with the engine left side.
- Position the crankshaft at TDC for the #2 (right cylinder) piston.

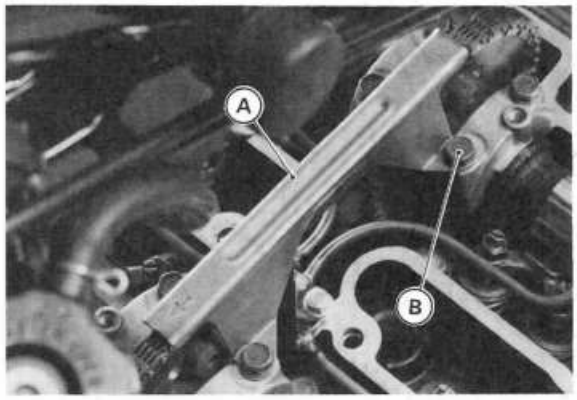
○Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the "C" TDC mark on the rotor is aligned with the notch in the edge of the upper hole in the alternator cover.



A. Rotation Bolt
B. Clockwise
C. "C" TDC Mark
D. Notch

●Engage the camshaft chain with the camshaft sprockets.
○Pull the tension side (inlet side) of the chain taut to install the chain.
○The timing marks on the inlet sprocket must be aligned with the cylinder head upper surface.
●Pull the chain taut and fit it onto the camshaft sprocket.
●Starting with the punch mark on the top of the inlet sprocket, count to the 24th pin. Feed the inlet camshaft through the chain and align that 24th pin with the punch mark on the exhaust camshaft sprocket.

●Install the top chain guide and tighten the mounting bolts to the specified torque (see Exploded View).



A. Top Chain Guide
B. Mounting Bolt

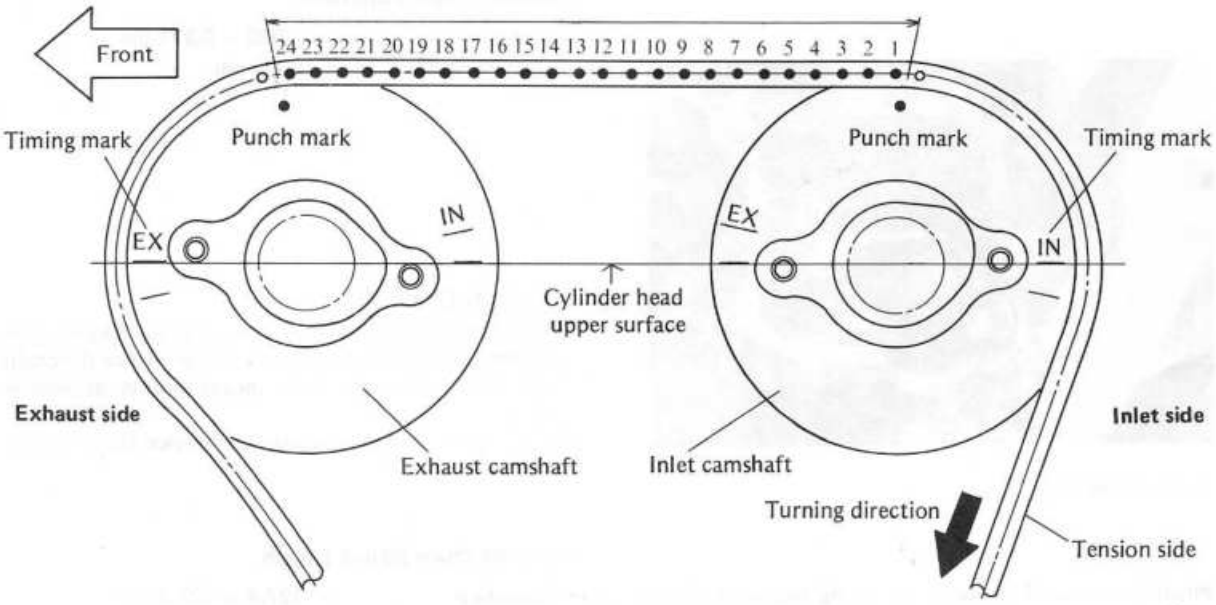
Camshaft and Sprocket Assembly Notes

○The inlet and exhaust sprockets are identical.
●Install the sprockets so that the marked ("IN" and "EX") side faces to the left side.

CAUTION

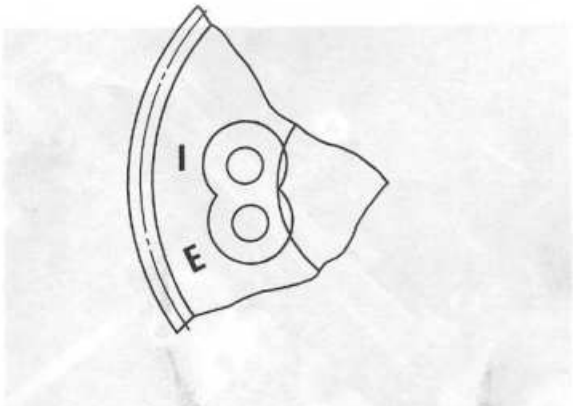
○Inlet sprocket must use "I" marked bolt holes.
○Exhaust sprocket must use "E" marked bolt holes.

Camshaft Chain Timing (left side view)



#2 Piston TDC

Sprocket Installation (right side view)

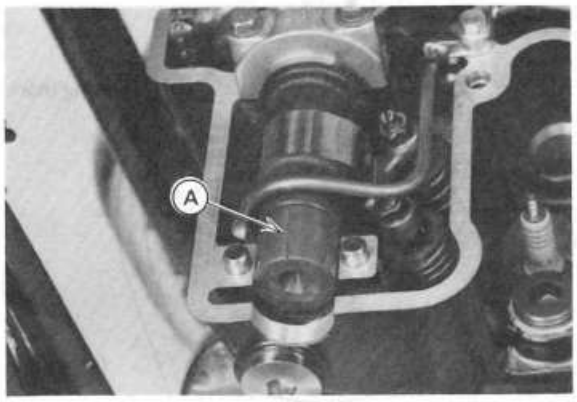


- Apply a locking agent to the camshaft sprocket bolts and tighten them to the specified torque (see Exploded View).
- If a new camshaft is to be used, apply a thin coat of a molybdenum disulfide grease to the cam surfaces.

Camshaft Bearing 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.



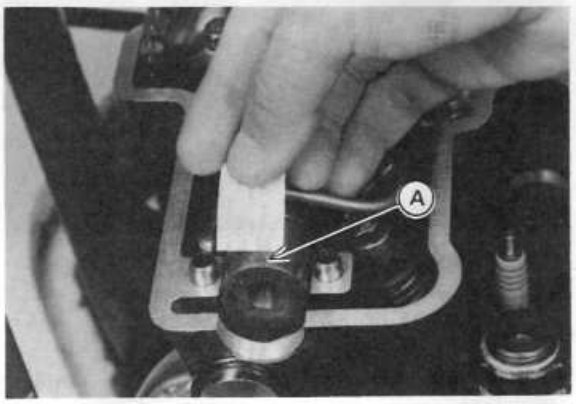
A. Plastigage Strip

- Install the camshaft caps, tightening the bolts in the correct sequence to the specified torque.

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, measure the camshaft journal diameter and the camshaft bearing inside diameter.

★If any of the measurements is beyond the service limit, replace the worn part and check the clearance again.

Camshaft Bearing Clearance

Standard	:	**0.030 – 0.071 mm**
Service limit	:	**0.16 mm**

Camshaft Chain Wear

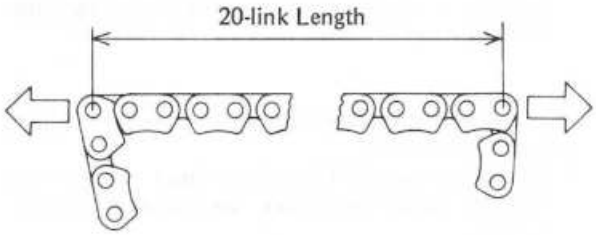
- Hold the chain taut with a force of about 5 kg in some manner, and measure a 20-link length. Since the chain may wear unevenly, take measurements at several places.

★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

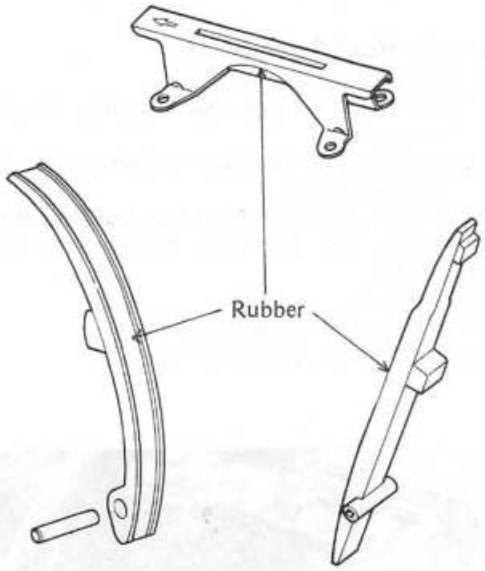


Camshaft Chain Guide Wear

•Visually inspect the rubber on the guides.

★If the rubber is damaged, cut, or is missing pieces, replace the guides.

Camshaft Chain Guides



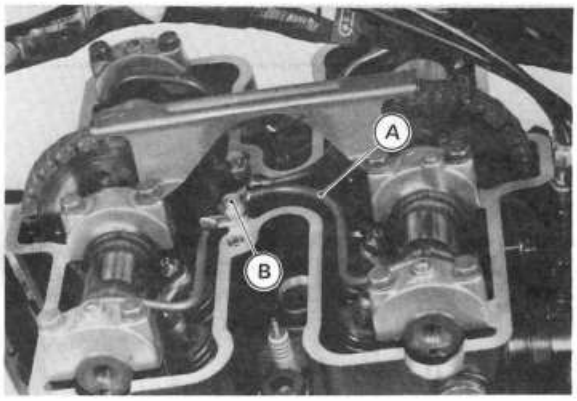
Oil Pipe

Oil Pipe Installation Note

•Before installation, flush out the oil pipes with a high flash-point solvent.

Cylinder Head Oil Pipe Removal

•Remove the oil pipe mounting bolt and pull the oil pipe and O-rings out of the cylinder head.



A. Oil Pipe B. Mounting Bolt

Cylinder Head Oil Pipe Installation Notes

•Check that the O-rings are in good condition.

★If they are damaged, replace them with new ones.

•Apply a small amount of oil to the O-rings.

•Fix the oil pipes properly into the cylinder head oil passage holes by pushing both ends at the same time.

•Install the oil pipe mounting bolts.

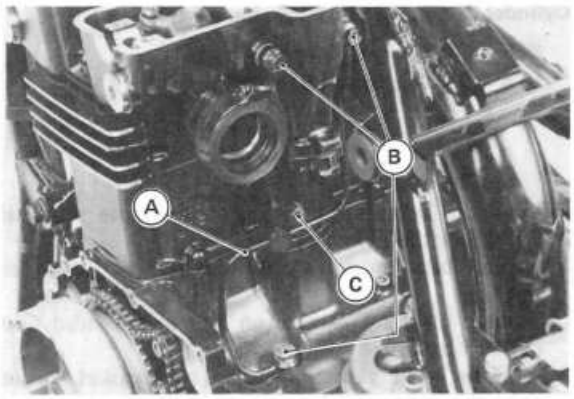
Main Oil Pipe Removal Note

•Remove the carburetors and the starter motor (see Starter Motor Removal in the Crankshaft/Transmission chapter) before removal of the main oil pipe.

Main Oil Pipe Installation Notes

•Discard the used gaskets and install new gaskets on each side of the pipe fittings.

•Tighten the banjo bolts and mounting bolt to a snug fit, and the tighten the banjo bolts to the specified torque (see Exploded View).

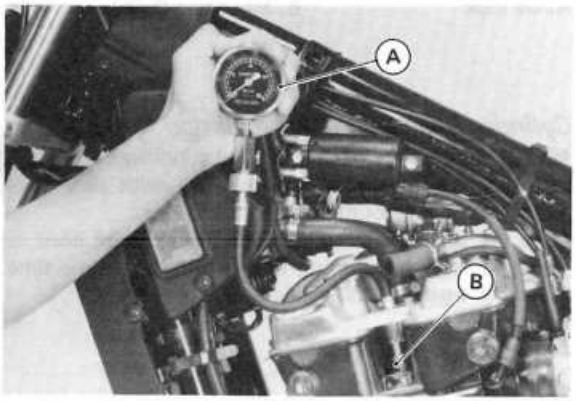


A. Main Oil Pipe C. Mounting Bolt
B. Banjo Bolts

Cylinder Head

Compression Measurement

- Remove the seat.
- 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 fuel tank, the air hoses and the spark plugs, 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)

825 – 1,280 kPa @390 r/min (rpm)
(8.4 – 13.0 kg/cm^2, 119 – 185 psi)

★If cylinder compression is higher than the standard value, check the following:

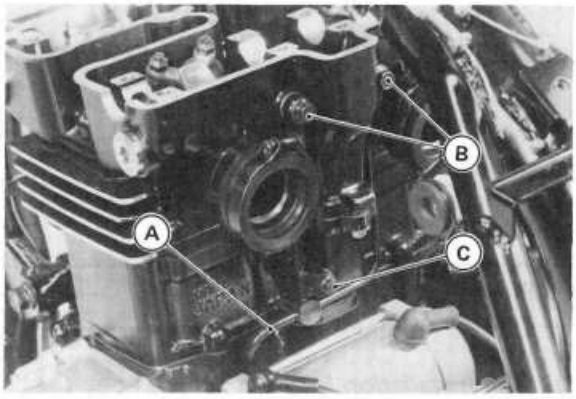
1. Carbon build-up on the piston head and cylinder head.
   – clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket – use only the proper gaskets for the cylinder head and base. The use of gaskets of the incorrect thickness will change the compression.
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 warping.
2. Condition of the valve seating.
3. Valve clearance – if a valve requires an unusually large adjustment to obtain proper clearance, the valve may be bent, and not seating completely.
4. Piston/cylinder clearance, piston seizure.
5. Piston ring, piston ring groove.

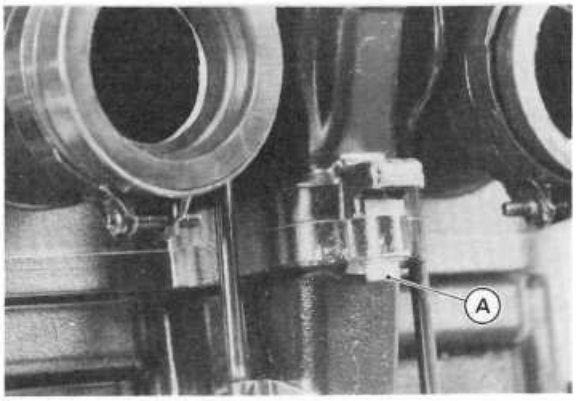
Cylinder Head Removal Notes

- Remove the following parts:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Exhaust Pipes and Mufflers (see Exhaust Pipe, Muffler Removal Notes)
  Cam Chain Tensioner (see Chain Tensioner Removal)
  Camshafts (see Camshaft, Rocker Shaft Removal Notes)
  Carburetors
- Remove the main oil pipe banjo bolts.
- Loosen the main oil pipe mounting bolt.

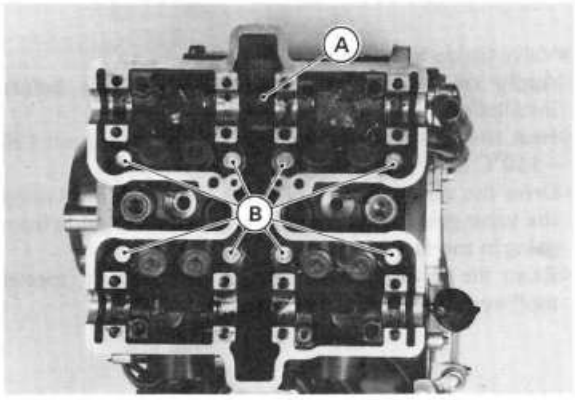


A. Main Oil Pipe
B. Banjo Bolts
C. Mounting Bolt

- Remove the small cylinder head bolts (6 mm) first, then remove the other cylinder head bolts (10 mm). This prevents excessive stress on the small bolts.

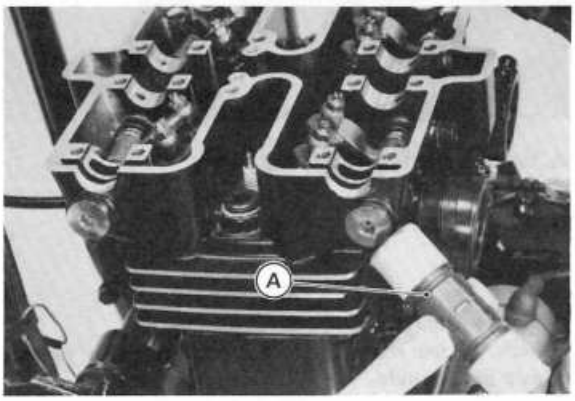


A. Cylinder Head Bolt (6 mm)



A. Cylinder Head Bolt (6 mm)
B. Cylinder Head Bolts (10 mm)

•Tap in the places shown with a mallet to remove the cylinder head.

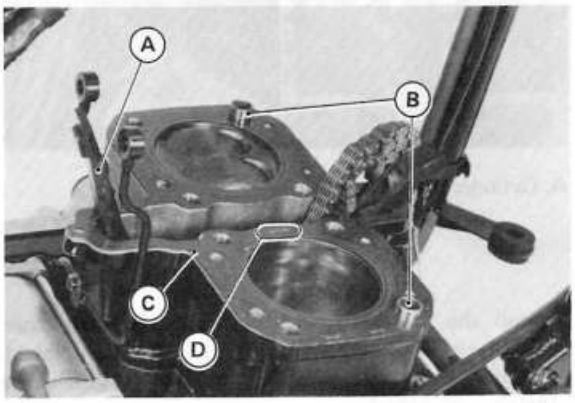


A. Mallet

Cylinder Head Installation Notes

•Before cylinder head installation, install the rear chain guide, knock pins and gasket.

•The gasket has a "HEAD" mark on its one surface, therefore when installing it, face the marked side to the cylinder head.

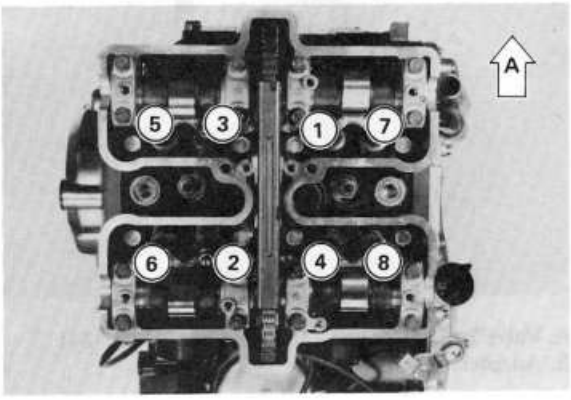


A. Rear Chain Guide
B. Knock Pins
C. Gasket
D. "HEAD" Mark

•The camshaft caps are machined with the cylinder head so if a new cylinder head is installed, use the caps that are supplied with the new head.

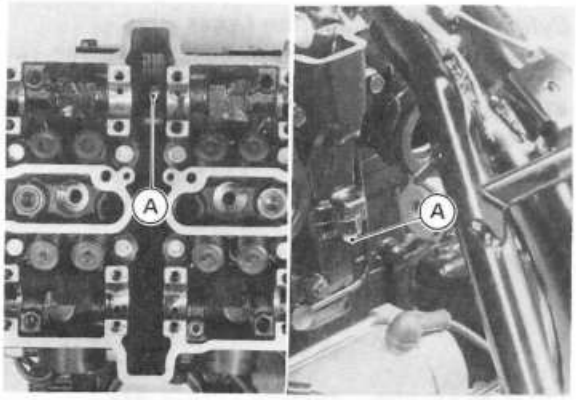
•Tighten the large cylinder head bolts (10 mm) following the tightening sequence. Tighten them first to about one half of the specified torque and then tighten them to the specified torque (see Exploded View).

Cylinder Head Bolt Tightening Sequence



A. Front

•Tighten the small cylinder head bolts (6 mm) to the specified torque (see Exploded View).

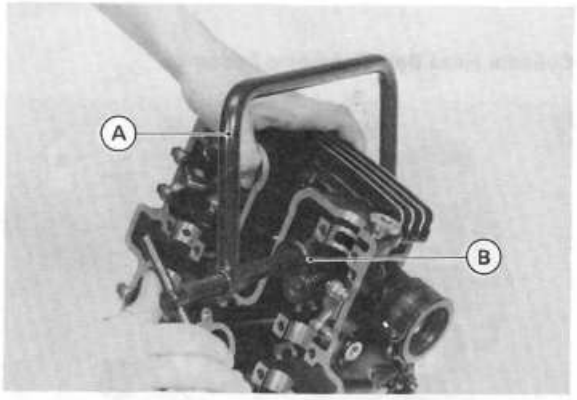


A. Cylinder Head Bolt (6 mm)

•Install the camshafts, camshaft caps and top chain guide (see Camshaft, Rocker Shaft Installation Notes).
•Install the head oil pipes (see Cylinder Head Oil Pipe Installation Notes).

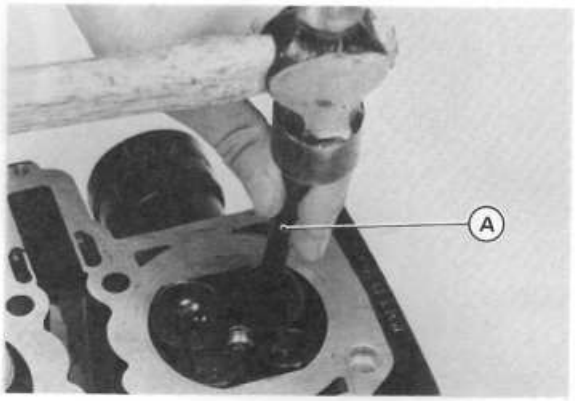
Cylinder Head Disassembly and Assembly (Valve Mechanism Removal and Installation)

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



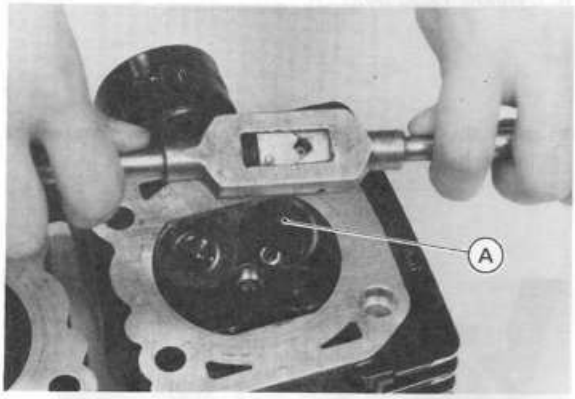
A. Valve Spring Compressor Assembly: 57001-241
B. Adapter: 57001-1019

•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: 57001-1021

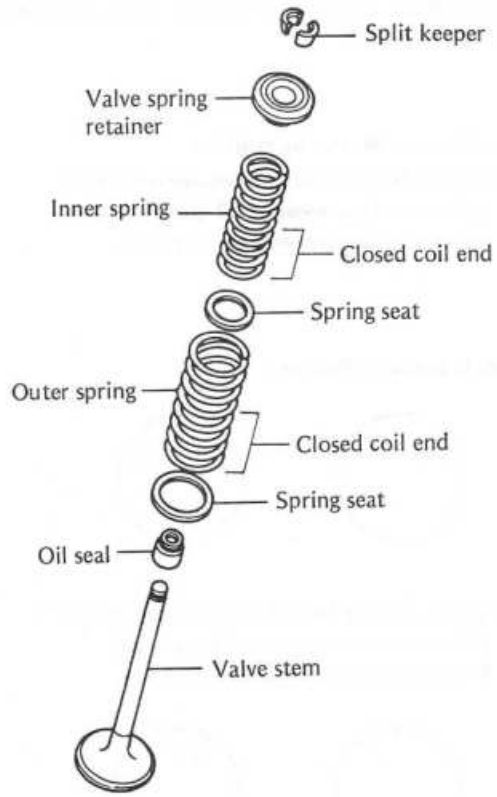
•Valve Guide Installation:
○Apply oil to the valve guide outer surface before installation.
○Heat the area around the valve guide hole to about 120 – 150°C (248 – 302°F).
○Drive the valve guide in from the top of the head using the valve guide arbor. The circlip stops the guide from going in too far.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



A. Valve Guide Reamer: 57001-1079

•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.

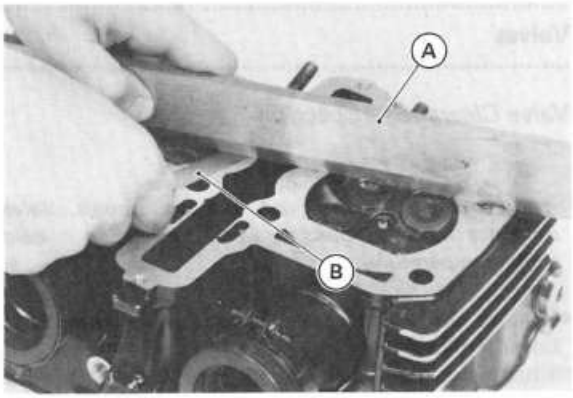
Valve and Springs



○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 sets under the inner and outer springs.
○Install the springs so that the close 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.



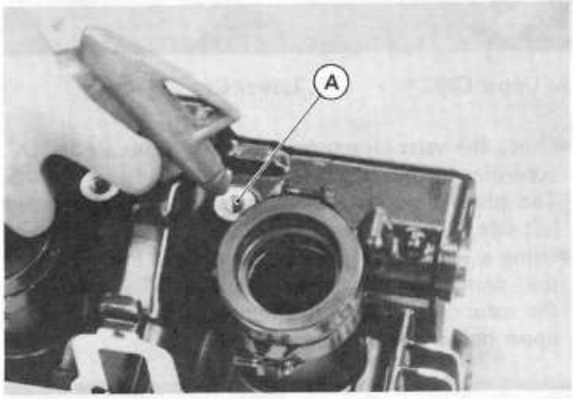
A. Straightedge B. Thickness Gauge

Cylinder Head Warp

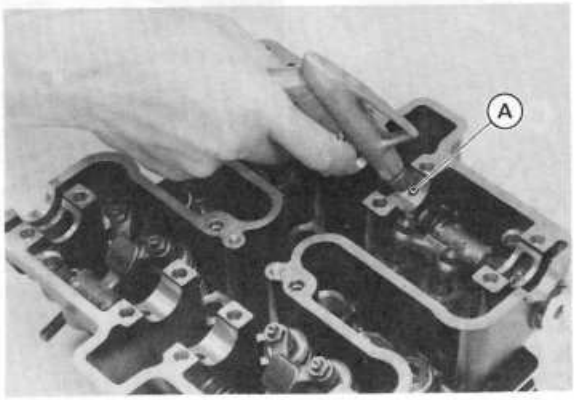
Service Limit: 0.05 mm

Cylinder Head Cleaning

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



A. Oil Passage



A. Oil Passage

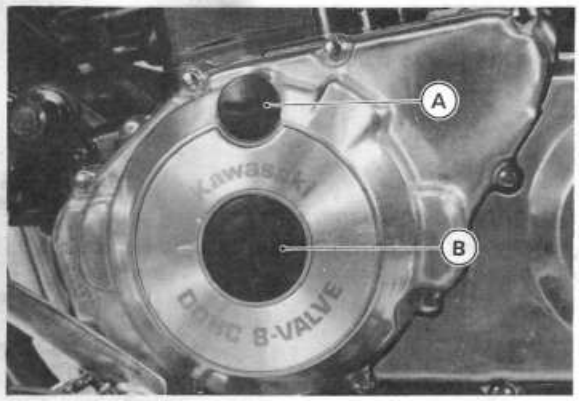
Valves

Valve Clearance Inspection

NOTE

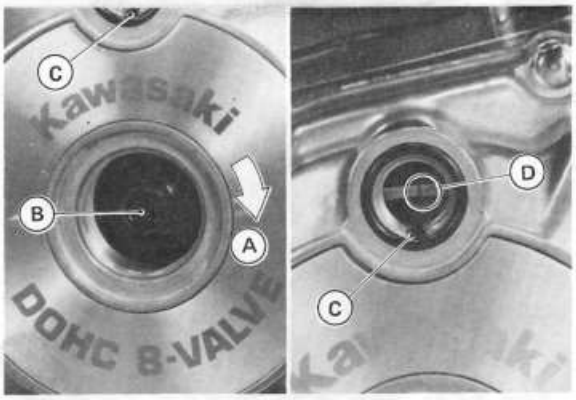
○*If the engine is hot, wait until the engine cools. Valve clearance must be checked when the engine is cold (room temperature).*

●Remove the cylinder head cover (see Cylinder Head Cover Removal).
○Situate the motorcycle on its center stand to make engine oil loss to a minimum.
●Remove the cylinder head oil pipes (see Oil Pipe).
●Unscrew the two caps on the alternator cover.



A. Upper Cap B. Lower Cap

●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 bolt, turn the crankshaft clockwise until a TDC mark on the rotor is aligned with the notch in the edge of the upper hole in the alternator cover.



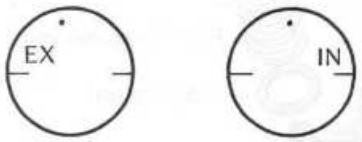
A. Normal Direction of Crankshaft Rotation
B. Crankshaft Rotation Bolt
C. Notch
D. TDC Mark ("T" or "C")

○Measure the valve clearance of the valves for which the cam lobe is pointing away from the rocker arm.
●Each piston has two inlet and two exhaust valves. Measure these two inlet or exhaust valves at the same crankshaft position.

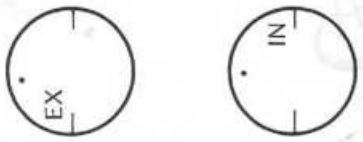
Valve Clearance Measuring Position

#2 Piston TDC at End of Compression Stroke →
Inlet valve clearances of #2 piston, and
Exhaust valve clearance of #2 piston

Camshaft Sprocket Position



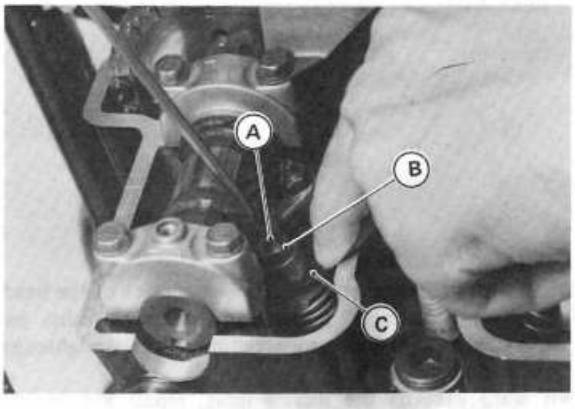
#1 Piston TDC at End of Compression Stroke →
Inlet valve clearance of #1 piston, and
Exhaust valve clearance of #1 piston



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.



A. Adjusting Screw C. Thickness Gauge
B. Locknut

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, loosen the locknut and turn the adjusting screw until the correct clearance is obtained.

●Tighten the locknut to the specified torque (see Exploded View).

●Install the two caps on the alternator cover.

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

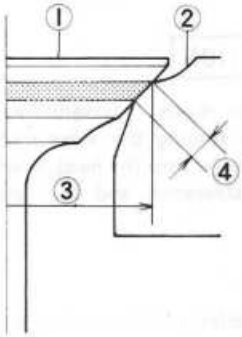
Inlet	:	**0.5 – 1.0 mm**
Exhaust	:	**0.5 – 1.0 mm**

NOTE

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

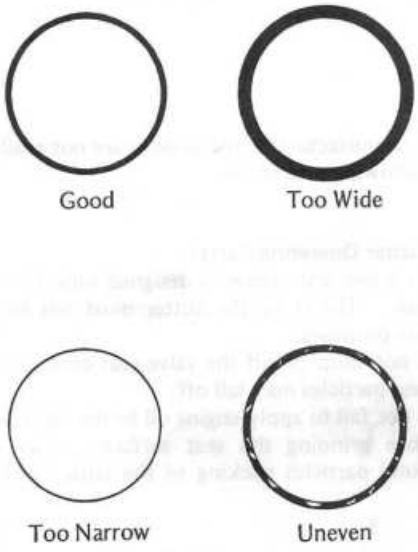
★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

Valve Seating Area Dimensions



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

Valve Seating Pattern



●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	:	**28.3 – 28.5 mm**
Exhaust	:	**24.0 – 24.2 mm**

Valve Seat Repair

●Follow the manufacturer's instructions for use of valve seat cutters.

Use these Cutters

Intake Valve		
Seat Cutter	**45° – φ30.0**	**57001-1187**
Outside Cutter	**32° – φ30.0**	**57001-1120**
Inside Cutter	**60° – φ30.0**	**57001-1123**
Exhaust Valve		
Seat Cutter	**45° – φ24.5**	**57001-1113**
Outside Cutter	**32° – φ28.0**	**57001-1119**
Inside Cutter	**60° – φ30.0**	**57001-1123**

Use this Holder and Bar

Holder – ϕ5.5	**57001-1125**
Bar	**57001-1128**

★If the manufacturer's instructions are not available, use the following procedure.

Seat Cutter Operating Cares:

1. This valve seat cutter is designed only for valve seat repair. Therefore the cutter must not be used for other purposes.
2. Do not drop or hit 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

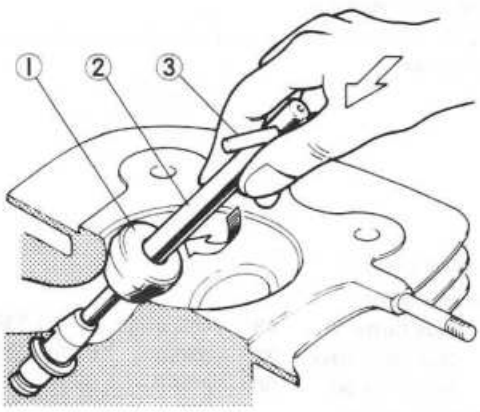
○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

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

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 the cutter with washing oil and apply a thin layer of engine oil before storing.

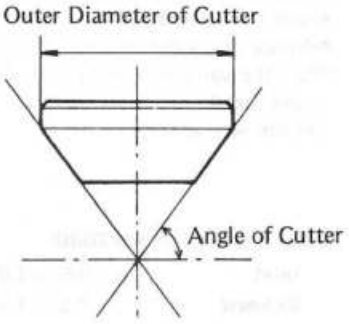
Marks Stamped on the Cutter:

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

①	Cutter number, selected from ① to ⑫
45°	Cutter angle
24.5ϕ	Outer diameter of cutter
KS00	Manufactured lot number

Cutter





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.**

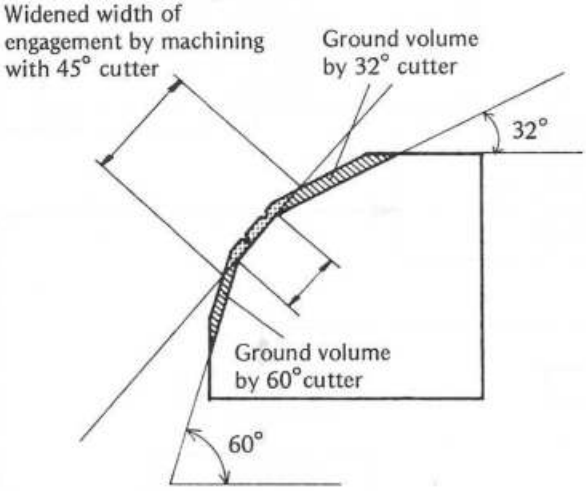
- Measure the outside diameter of the seating surface with a vernier caliper.

★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

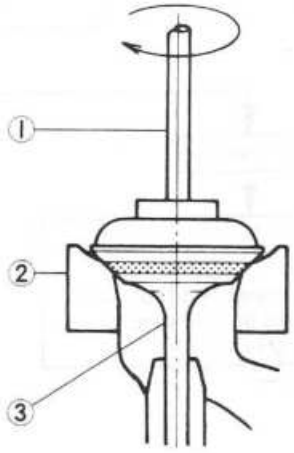
○**The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent over-grinding.**

Valve Seat Repair



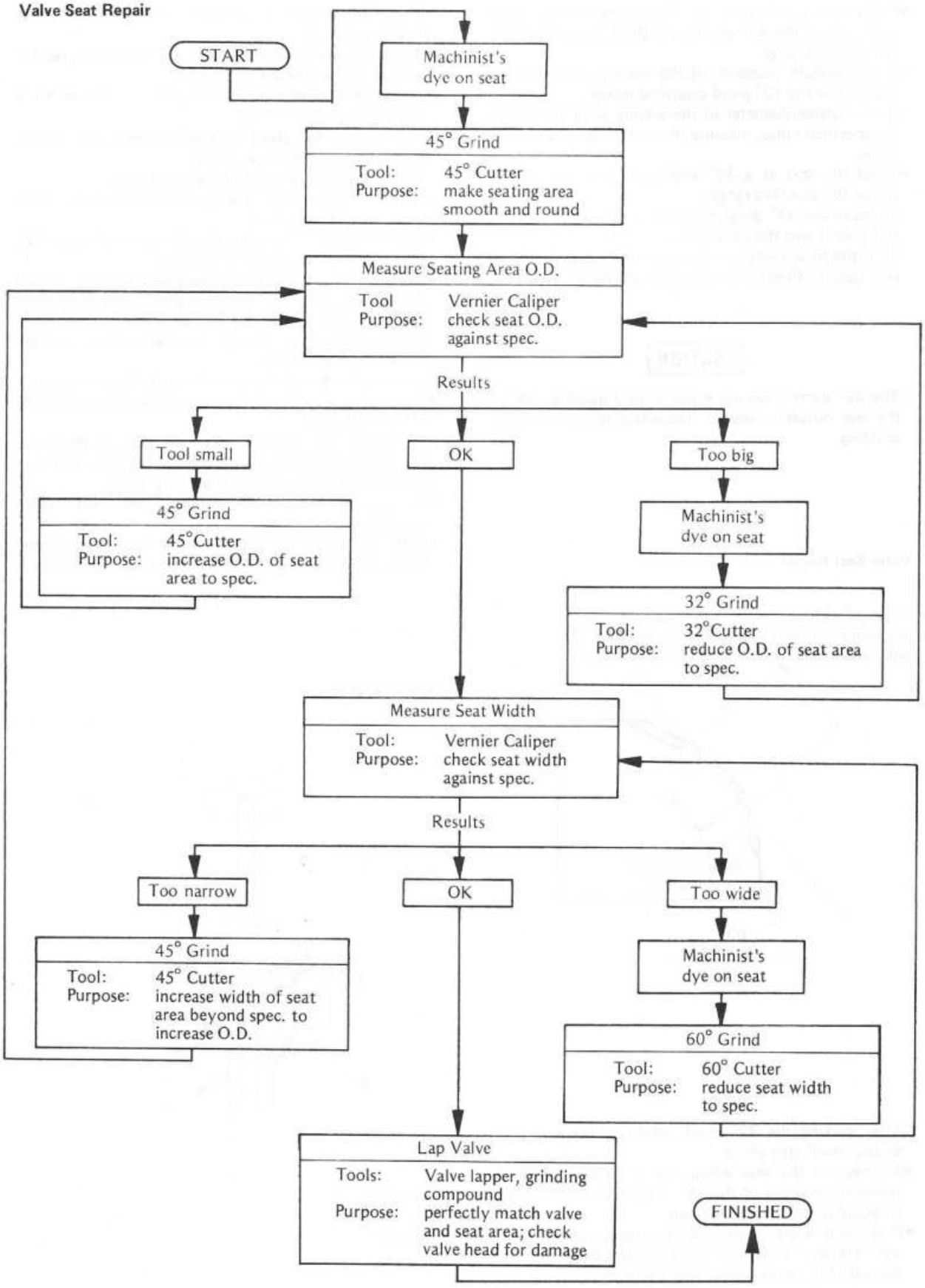
○After making the 32° grind, return to the seat O.D. measurement step above.
●To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.
★If the seat width is too wide, make the 60° 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 60° angle until the seat width is within the specified range.
○To make the 60° grind, fit a 60° cutter to the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 60° 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).

Valve Lapping



1. Lapper
2. Valve Seat
3. Valve

Valve Seat Repair



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 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.

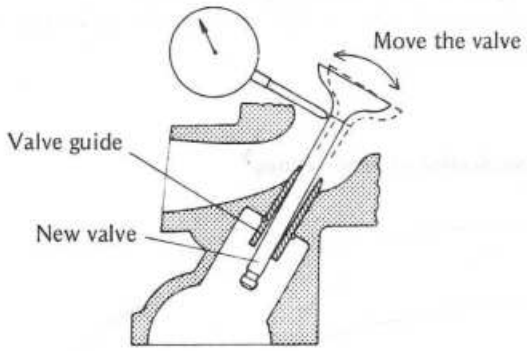
NOTE

○*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	0.02 – 0.08 mm	0.22 mm
Exhaust	0.07 – 0.14 mm	0.27 mm

Wobble Method



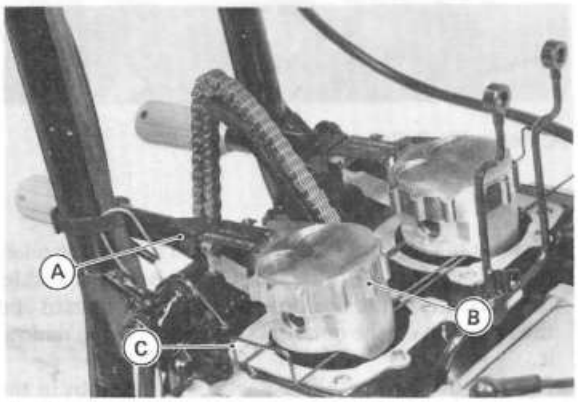
Cylinder, Piston

Cylinder Block Removal Notes

- Remove the cylinder head (see Cylinder Head Removal Notes).
- Remove the main oil pipe mounting bolt.
- Pull out the water pipe with water pump cover (see Pump Cover Removal in the Cooling System chapter).
- Take out the cylinder block so as not to damage the main oil pipe.

Cylinder Block Installation Notes

- If new pistons and/or a new cylinder block are installed, apply a thin coat of a molybdenum disuifide engine assembly grease to the new positions and cylinder bores.
- Slip piston bases (special tool) under the pistons to hold them level.
- Compress the piston rings using piston ring compressors (special tool).

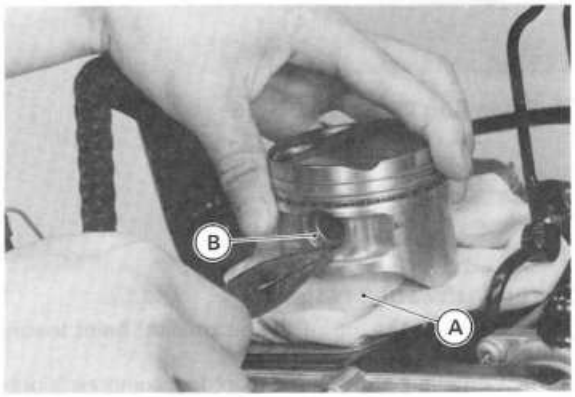


A. Piston Ring Compressor: 57001-1094
B. Use belt (ϕ50 – ϕ67)
C. Piston base: 57001-149

- Install the cylinder block so as not to damage the main oil pipe.

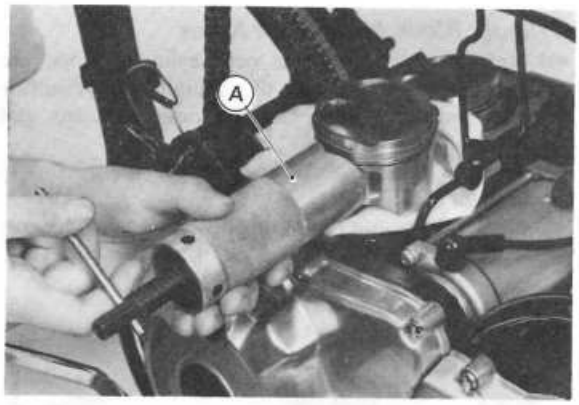
Piston Removal Notes

- Wrap a clean cloth around the base of each piston to secure it in position for removal and so that no parts and dirt will fall into the crankcase.
- Remove the piston pin snap rings from the outside of each piston.



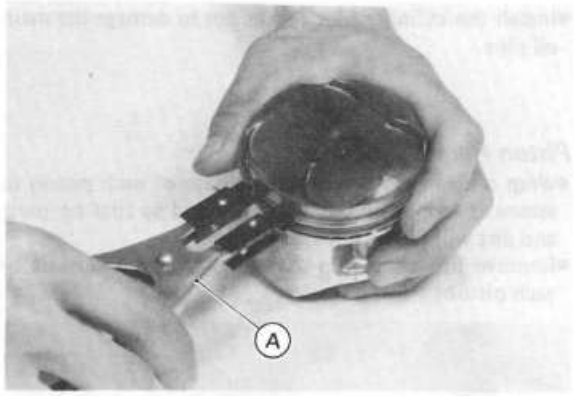
A. Clean Cloth B. Snap Ring

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



A. Piston Pin Puller: 57001-910

•Remove the top and second rings with piston ring 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 Notes

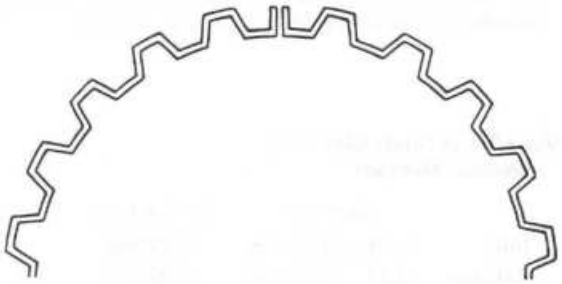
•The arrow on the top of the piston must point toward the front.
•When installing a piston pin snap ring, compress it only enough to install it and no more.

CAUTION

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

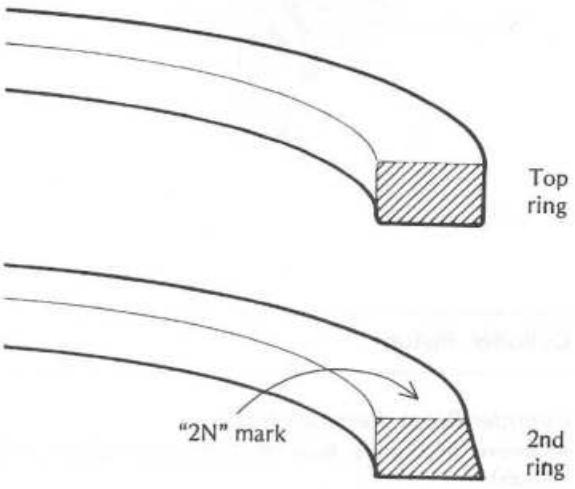
•Oil Ring Installation:
○First install the expander in the piston oil ring groove so that the expander ends butt together, never overlap.
○Install the upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.

Oil Ring Expander Installation



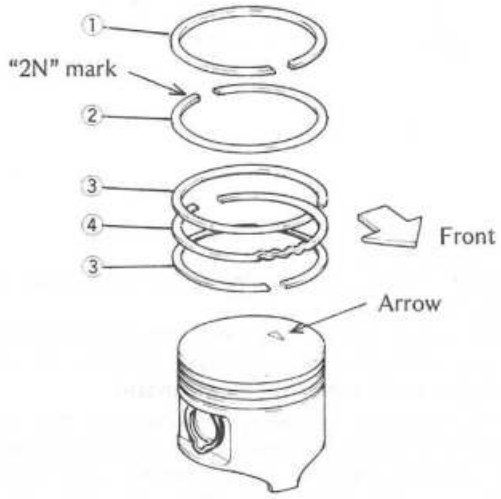
•Do nut mix up the second and top ring. The top ring is rectangular and symmetrical with respect to the horizontal axis; it can be installed either way.
•The second ring is not symmetrical and must be installed as shown.

Cross Section of Piston Rings



•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 Openings
: Viewed from Front



1. Top ring
2. Second ring
3. Steel rail, oil ring
4. Expander, oil ring

Piston Ring, Piston Ring Groove Wear

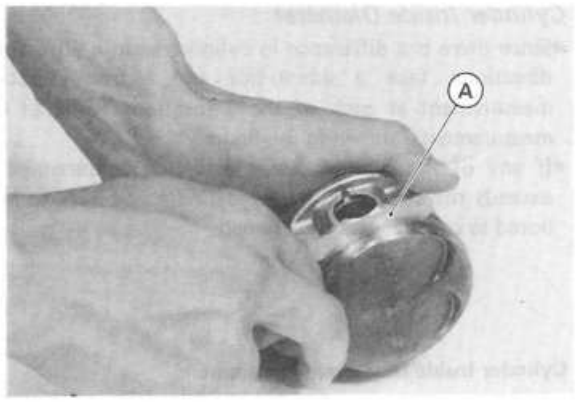
•Check for uneven groove wear by inspecting the ring seating.

★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

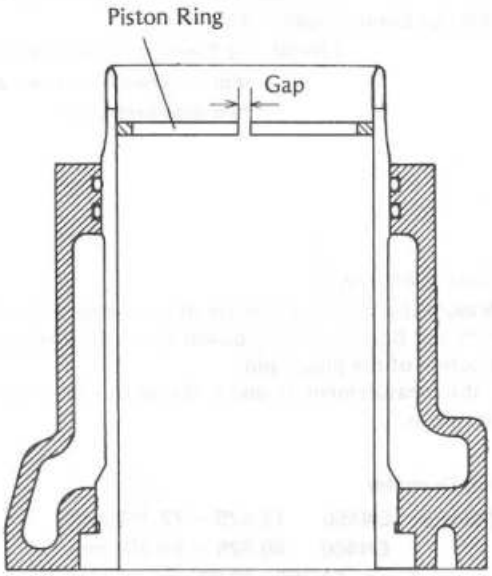
•Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.

•Measure the gap between the ends of the ring with a thickness gauge.

Piston Ring End Gap

	Standard	Service Limit
Top	0.2 – 0.35 mm	0.7 mm
Second	0.2 – 0.35 mm	0.7 mm
Oil	0.2 – 0.7 mm	1.0 mm

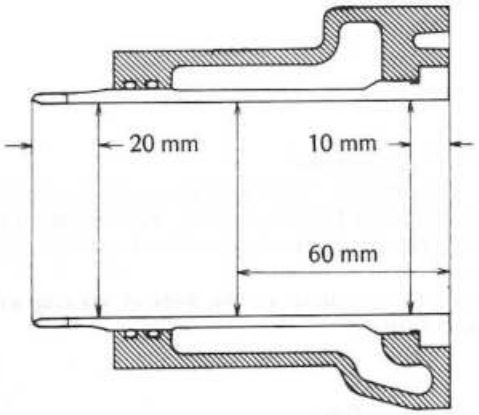
End Gap Measurement



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: EN450 72.494 – 72.506 mm
EN400 69.994 – 70.006 mm and less than 0.01 mm difference between any two measurements
Service Limit: EN450 72.6 mm
EN400 70.1 mm, or more than 0.05 mm difference between any two measurements

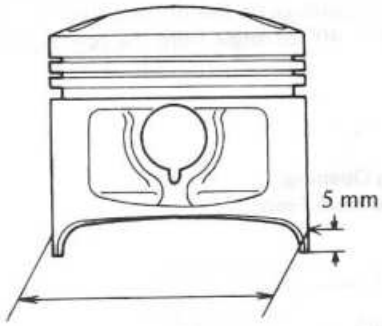
Piston Diameter

- 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: EN450 72.425 – 72.460 mm
EN400 69.925 – 69.960 mm
Service Limit: EN450 72.29 mm
EN400 69.79 mm

Piston Diameter Measurement



Boring, Honing

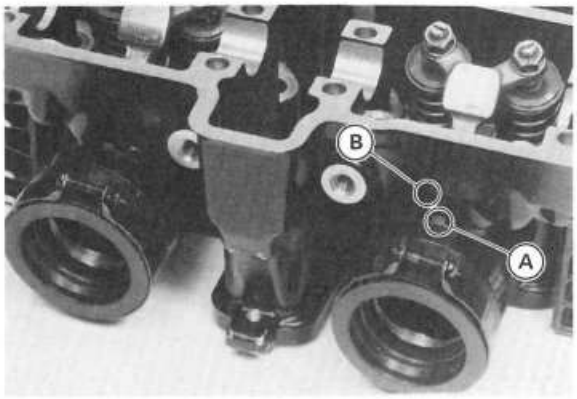
When boring and honing a cylinder, note the following:

- ○There is one oversize piston available. Oversize pistons require oversize rings. Oversize pistons and rings available are **0.5 mm** larger than standard.
- ○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.

Carburetor Holder

Carburetor Holder Installation

- Install the carburetor holders so that the projections are aligned with the cylinder head marks. The projection faces upwards.



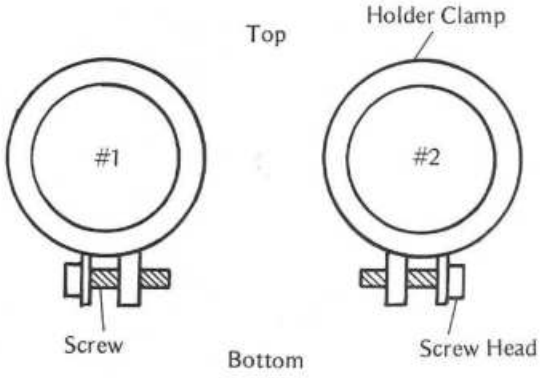
A. Holder Projection B. Mark

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

WARNING

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

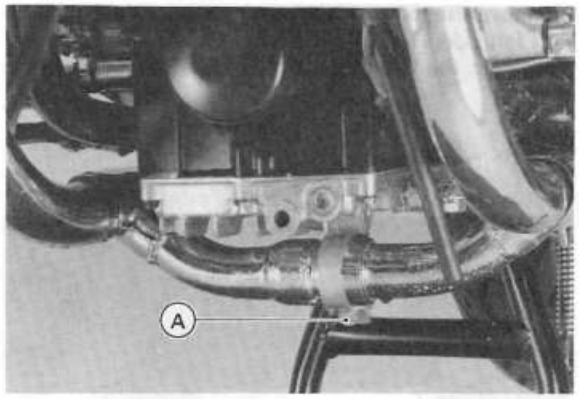
Holder Clamp Installation



Exhaust Pipe, Muffler

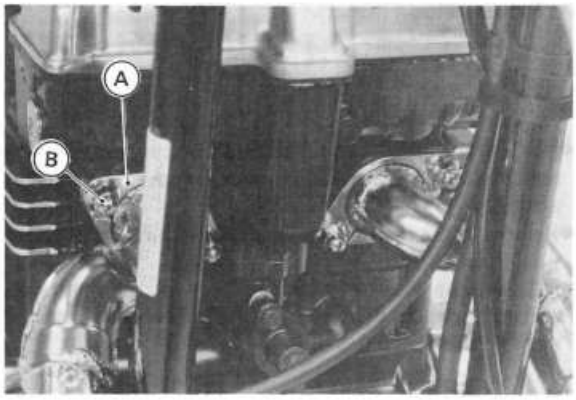
Exhaust Pipe, Muffler Removal Notes

●Loosen the exhaust pipe clamp bolt under the engine.



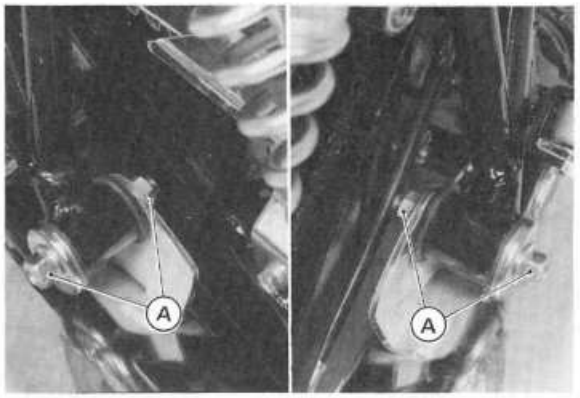
A. Clamp Bolt

●Remove the exhaust pipe cover and loosen the exhaust pipe holder nuts on the right side.



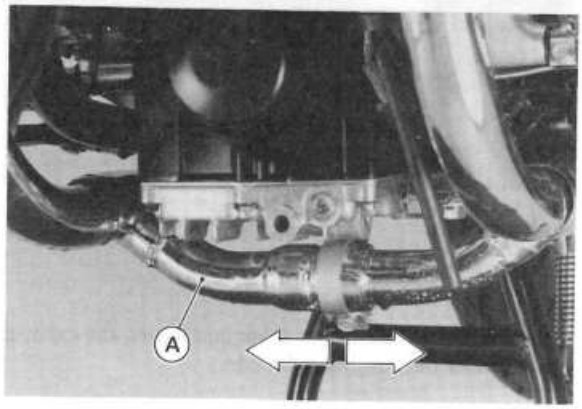
A. Exhaust Pipe Holder B. Nut

●Loosen the muffler mounting bolt on both mufflers and remove the nut.



A. Muffler Mounting Bolt and Nut

- Remove the exhaust pipe cover, holders and nuts on the left side.
- Separate the left exhaust pipe from the right exhaust pipe.



A. Exhaust Pipe

- Pull out the muffler mounting bolt on the left side, and remove the left exhaust pipe, muffler cover and muffler assembly.
- Remove the exhaust pipe holders and nuts on the right side.
- Pull out the muffler mounting bolt on the right side, and remove the right exhaust pipe, muffler cover and muffler assembly.

Exhaust Pipe, Muffler Installation Notes

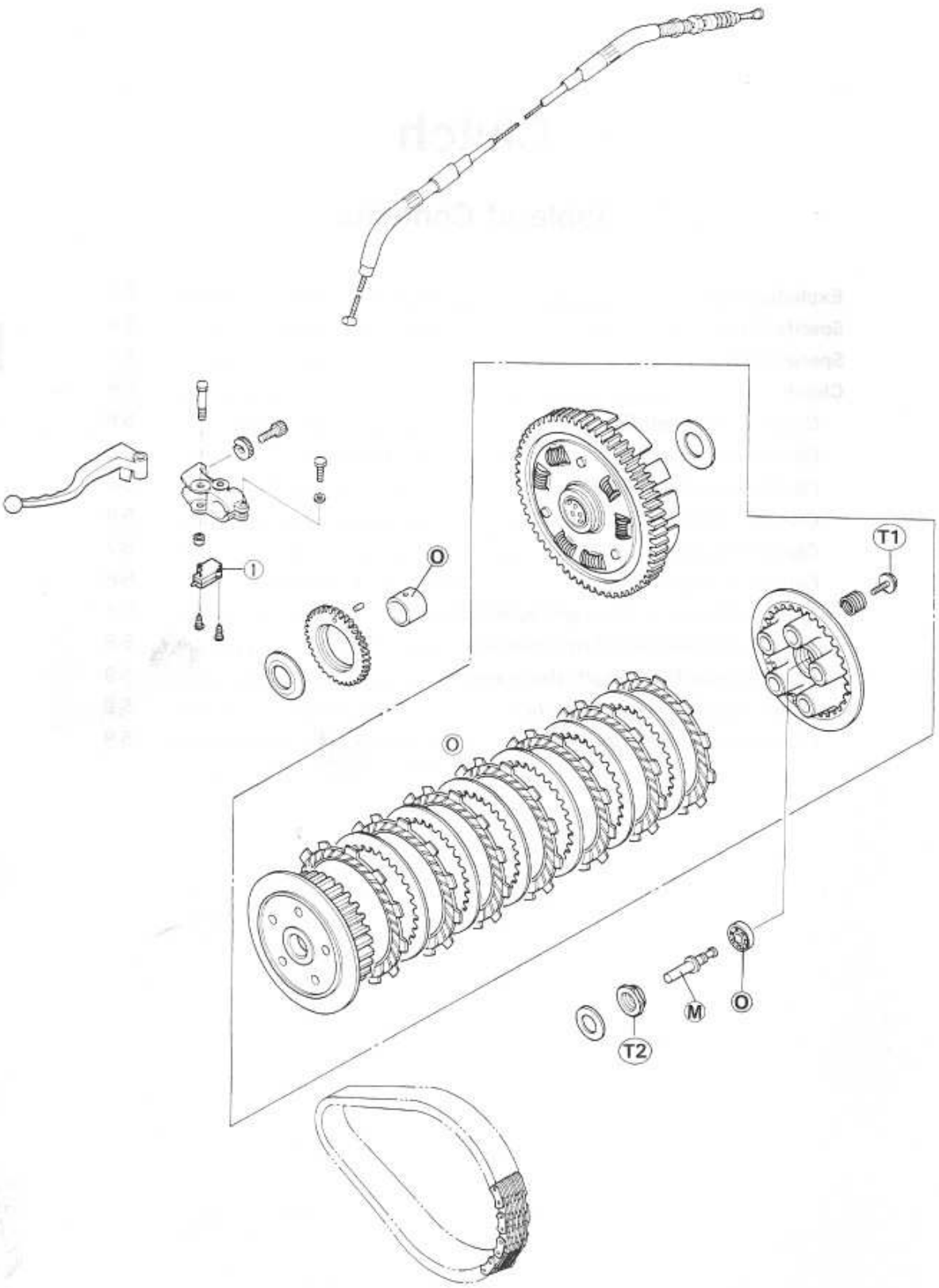
- Exhaust pipe and muffler installation is the reverse of removal.
- Thoroughly warm up the engine, wait until the engine cools down, and then retighten the clamp bolt.

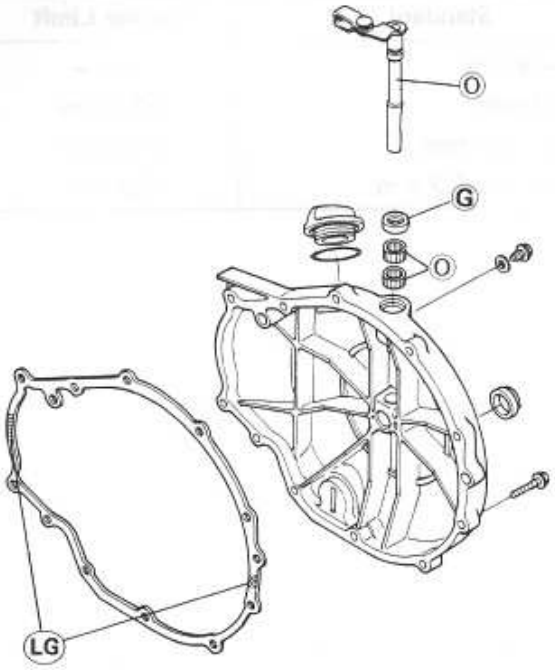
Clutch

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Exploded View





1. Starter Lockout Switch
M : Apply molybdenum disulfide grease.
G : Apply high temperature grease.
O : Apply engine oil to the surface.
LG: Apply liquid gasket tothe area where the mating surface of the crankcase contacts the clutch cover gasket.
T1 : 9.3 N-m (0.95 kg-m, 82 in-lb)
T2 : 130 N-m (13.5 kg-m, 98 ft-lb)

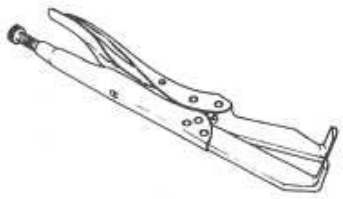
Specifications

Item		Standard	Service Limit
Clutch:	Clutch lever free play	2 – 3 mm	– – –
	Clutch spring free length	34.2 mm	32.2 mm
	Friction plate thickness	2.9 – 3.1 mm	2.75 mm
	Friction and steel plate warp	Less than 0.2 mm	0.3 mm

Special Tool

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

Holder: 57001-305



Clutch

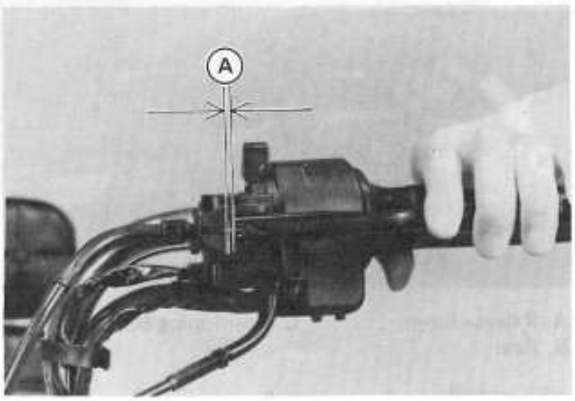
Due to friction plate wear and clutch cable stretch over a long period of use, the clutch must be adjusted in accordance with the Periodic Maintenance Chart.

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.

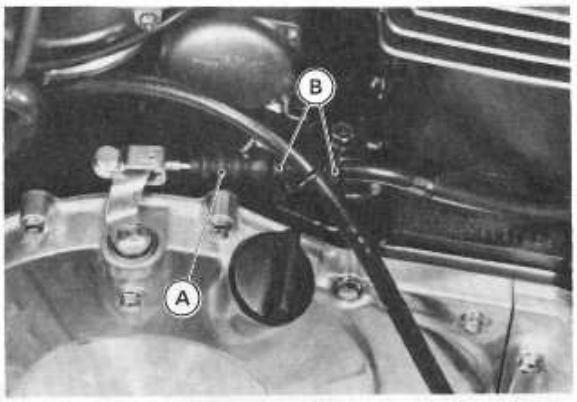


A. Clutch Lever Free Play 2 – 3 mm

★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.

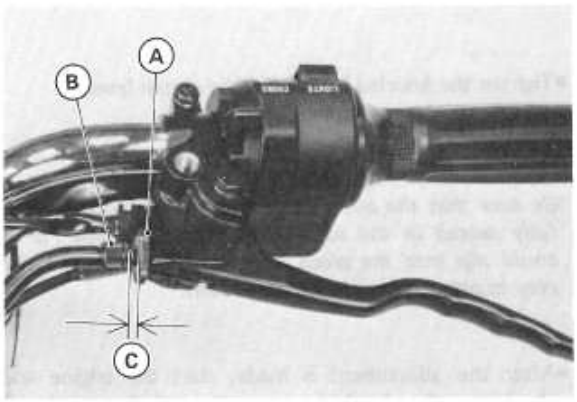
Clutch Adjustment

- Slide back the dust cover.
- Loosen both adjuster nuts at the right hand crankcase as far as they will go.



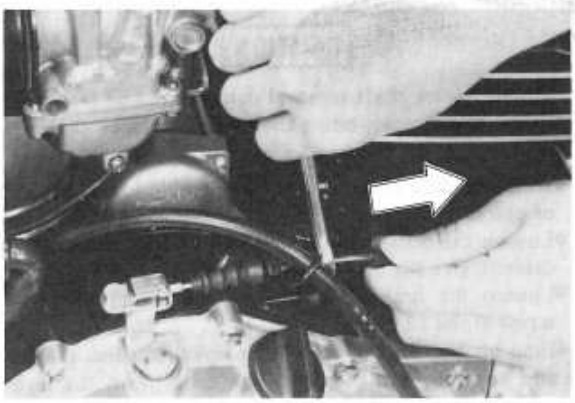
A. Dust Cover B. Adjuster Nuts

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

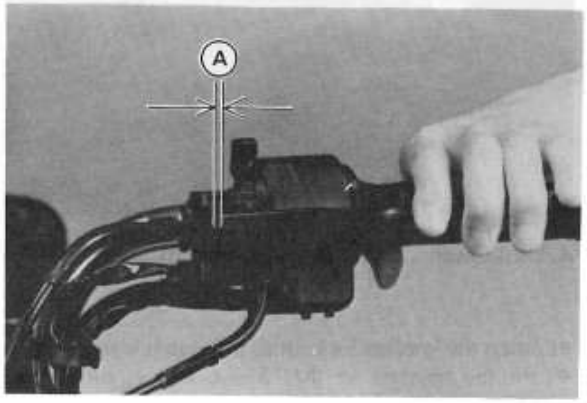


A. Knurled Locknut C. 5 – 6 mm
B. Adjuster

- Pull the clutch cable tight and tighten the adjuster nuts against the bracket.



•Slip the rubber dust cover back into place.
•Turn the adjuster at the clutch lever until the free play is correct (2 – 3 mm).



A. 2 – 3 mm

•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 the 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 Removal

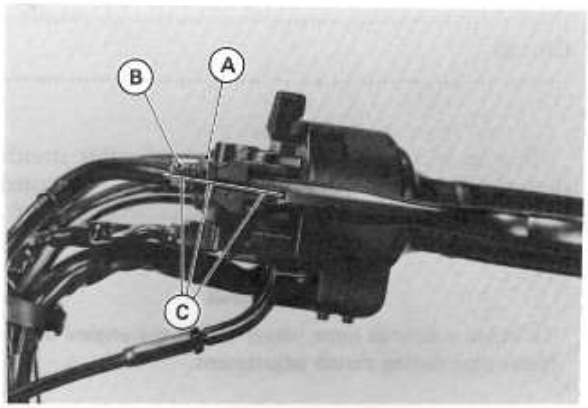
NOTE

○*Do not pull out the clutch release shaft for clutch cover removal.*

CAUTION

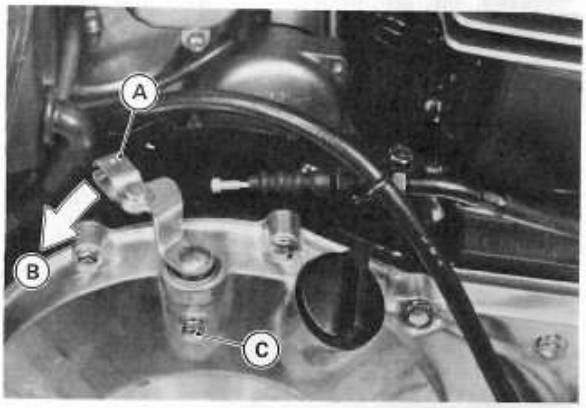
○**Clutch release shaft removal damages the oil seal in the clutch cover necessitating the oil seal replacement.**

•Slide the dust cover at the clutch cable lower end out of place.
•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. Knurled Locknut B. Adjuster C. Slot

•Free the clutch inner cable tip from the clutch release lever.
•Turn the release lever toward the rear as shown in the figure.



A. Release Lever C. Positioning Bolt
B. Rear

•Remove the positioning bolt.
•Pull the lever and shaft assembly out of the clutch cover.

Clutch Release Installation

CAUTION

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

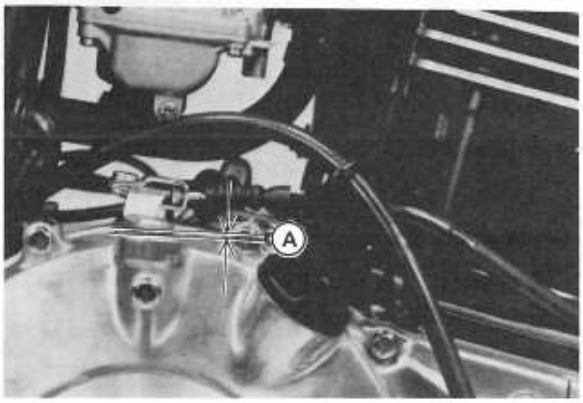
•Apply high temperature grease to the oil seal lips on the upper ride of the clutch cover.
•Apply oil to the bearings in the hole of the clutch cover.
•Apply oil to the release shaft.
•Turning the release lever toward the rear, insert the release shaft straight into the upper hole of the clutch cover.

CAUTION

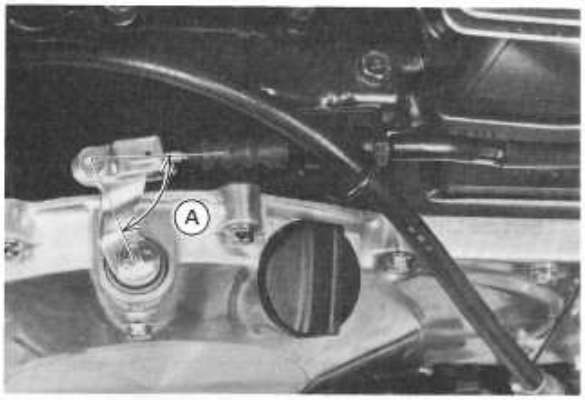
○**When inserting the release shaft, be careful not to remove the spring of the oil seal.**

- Install the positioning bolt.
- Turn the release lever clockwise until it becomes hard to turn.

○The release lever should have proper clearance and angle as shown.



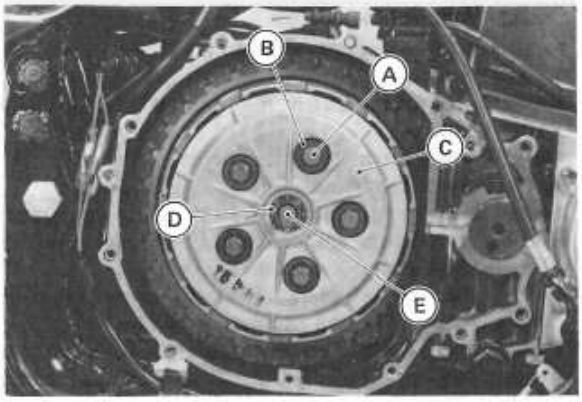
A. 1 – 3 mm



A. 80° – 90°

Clutch Removal

- Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).
- Remove the rear mounting bolt of the right footpeg assembly, the rear brake switch assembly mounting bolt, and let the brake switch assembly hang down.
- Remove the clutch cover.
- Remove the clutch spring bolts, washers and springs.
- Remove the clutch spring plate with the thrust ball bearing and pusher.
- Remove the friction plates and steel plates.

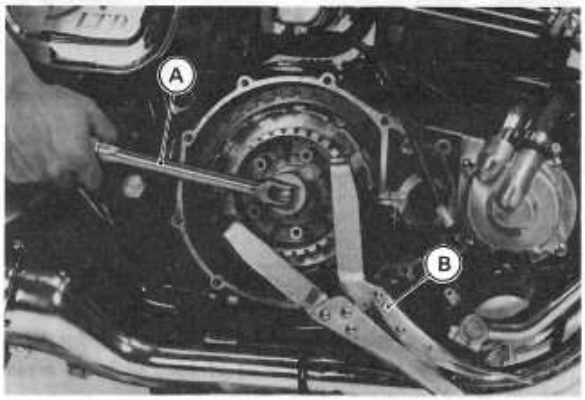


A. Clutch Spring Bolt
B. Washer
C. Clutch Spring Plate
D. Thrust Ball Bearing
E. Clutch Spring Plate Pusher

- When loosening the clutch hub self-locking nut, use a holder (special tool) to keep the clutch hub from turning as shown.

○Install the rear mounting bolt of the right footpeg assembly.

○Turn the wrench counterclockwise slowly.



A. Wrench
B. Holder: 57001-305

- Remove the clutch hub self-locking nut and washer.
- Pull out the clutch hub and thrust washer.

NOTE

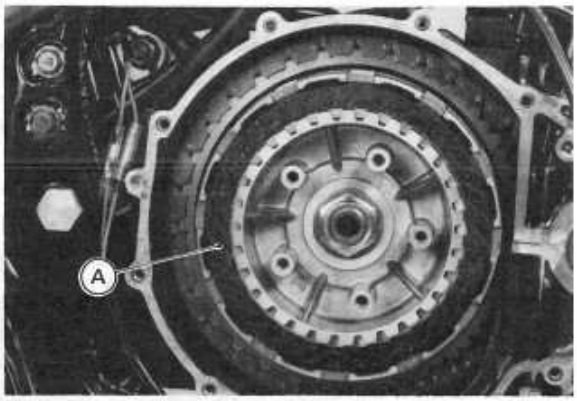
○*The clutch housing can not be removed without major disassembly work (see Clutch Housing/Primary Chain Removal in the Crankshaft/Transmission chapter).*

- Remove the rear mounting bolt of the right footpeg assembly.

Clutch Installation Notes

- Install the thrust washer and the clutch hub.
- Install the washer.
- Discard the used clutch hub self-locking nut, and install a new nut.
- Install the clutch hub self-locking nut with the projected side facing outward.
- Install the clutch holder to keep the clutch hub from turning and tighten the clutch hub self-locking nut to the specified torque (see Exploded View).
- Install the friction plates and steel plates, starting with a friction plate and alternating them.

○The grooves on the friction plate surfaces are cut tangentially and radially, install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counter-clockwise viewed from the engine right side).



A. Grooves

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.**

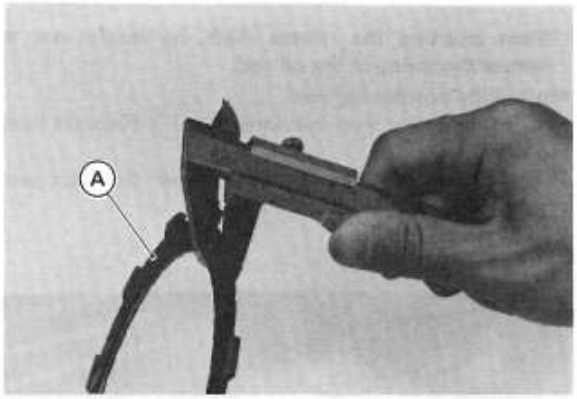
- Apply engine oil to the thrust ball bearing.
- Apply molybdenum disulfide grease to the rubbing portion of clutch spring plate pusher.
- Tighten the clutch spring bolts to the specified torque (see Exploded View).

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.

Friction Plate Thickness Measurement



A. Friction Plate

Friction Plate Thickness

Standard:	**2.9 – 3.1 mm**
Service Limit:	**2.75 mm**

Friction or Steel Plate Warp Inspection

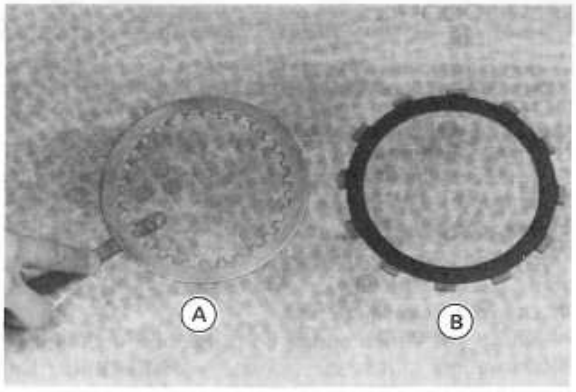
- Place each friction plate or steel plate on a surface plate, and measure the gap between the surface plate and each friction plate or steel plate. The gap is the amount of friction or steel plate warp.

★If any plate is warped over the service limit, replace it with a new one.

Friction and Steel Plate Warp

Standard:	**less than 0.2 mm**
Service Limit:	**0.3 mm**

Friction and Steel Plate Warp Measurement

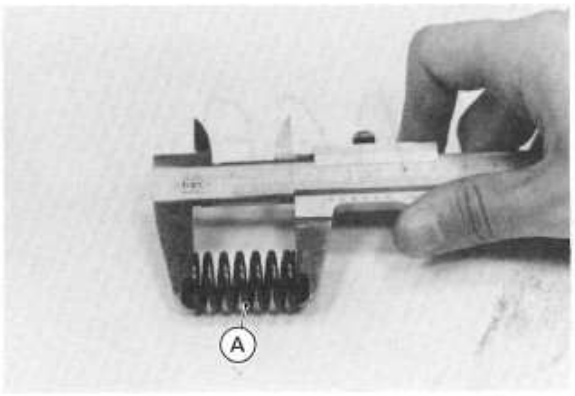


A. Steel Plate B. Friction Plate

Clutch Spring Free Length Measurement

Clutch Spring Free Length

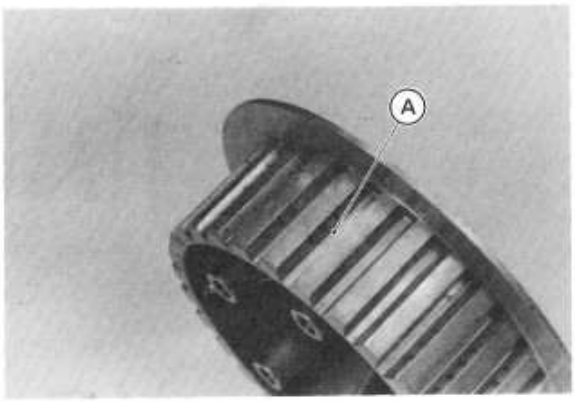
Standard:	**34.2 mm**
Service Limit:	**32.2 mm**



A. Clutch Spring

Clutch Hub Spline Inspection

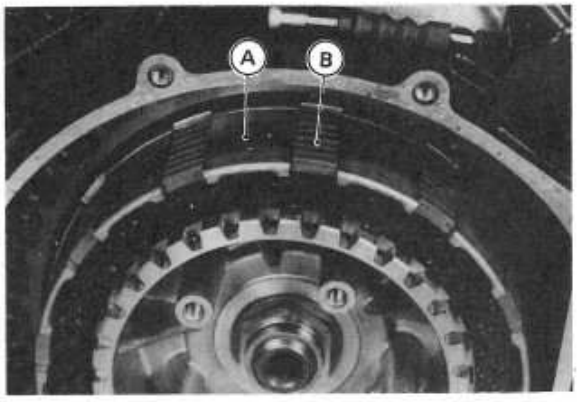
- Visually inspect where the teeth on the steel plates wear against the splines of the clutch hub.
- ★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



A. Clutch Hub Spline

Clutch Housing Finger Inspection

- Visually inspect the fingers of the clutch housing where the housing 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.



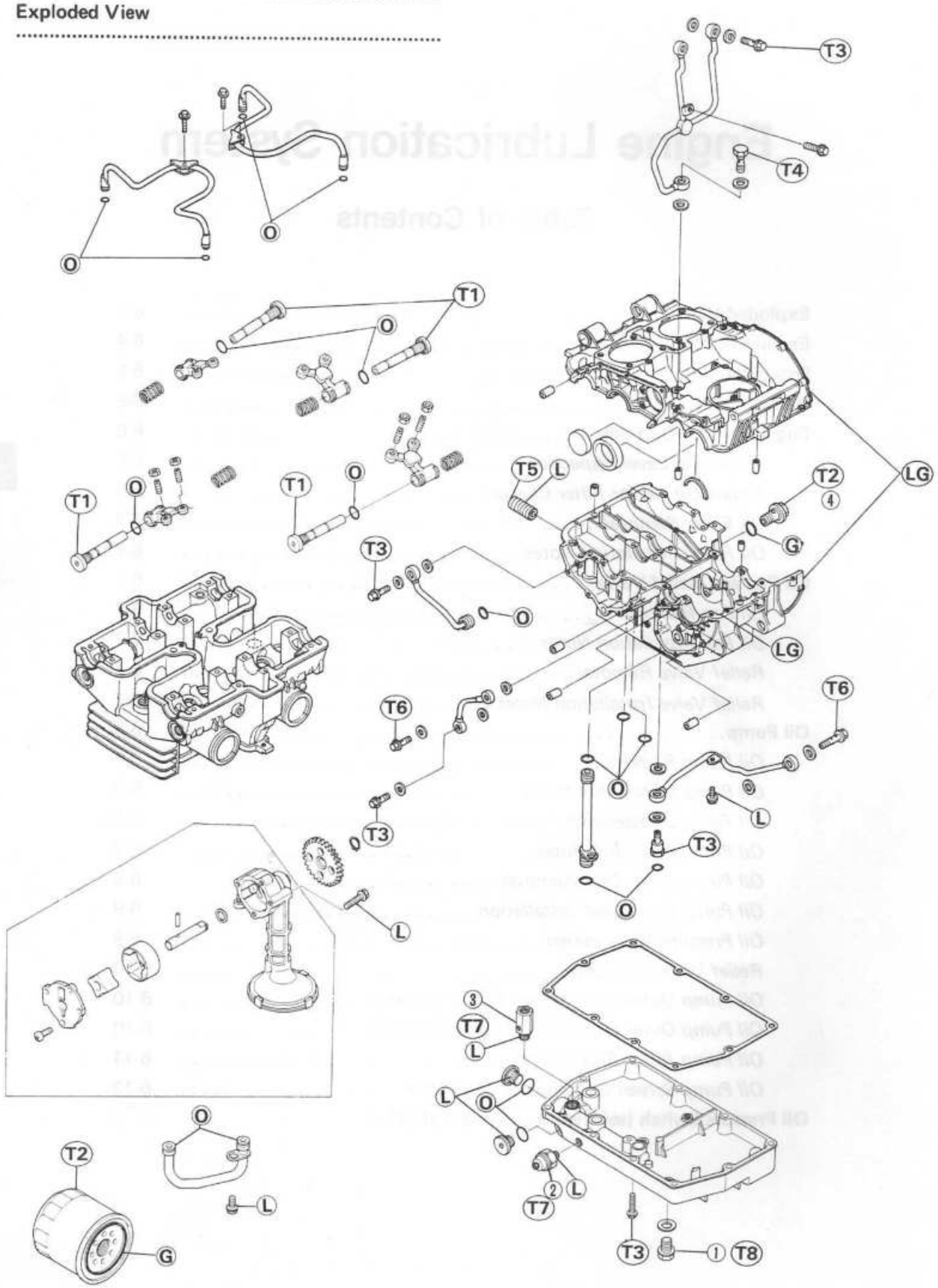
A. Clutch Housing Finger B. Friction Plate Tang

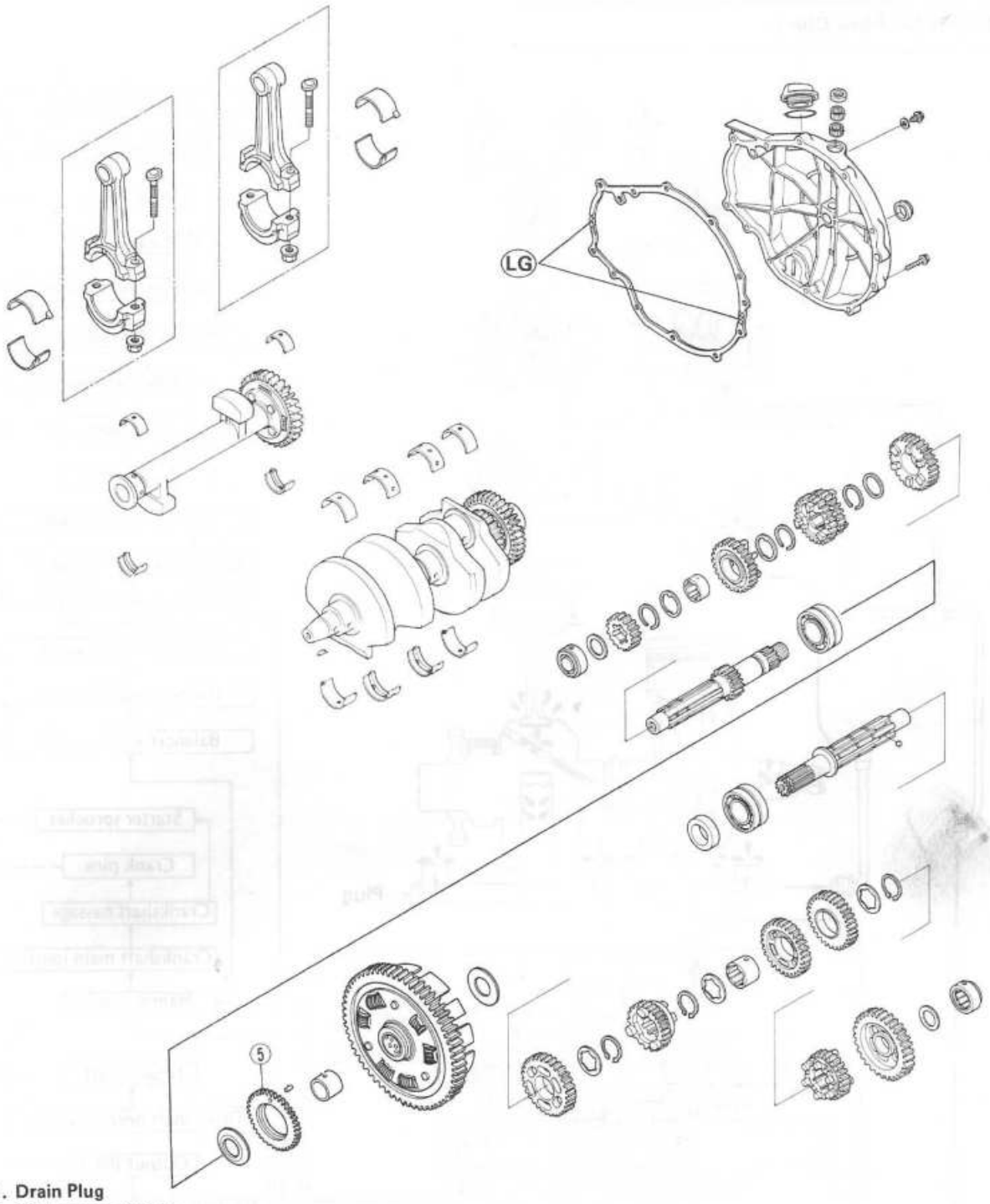
Engine Lubrication System

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Exploded View



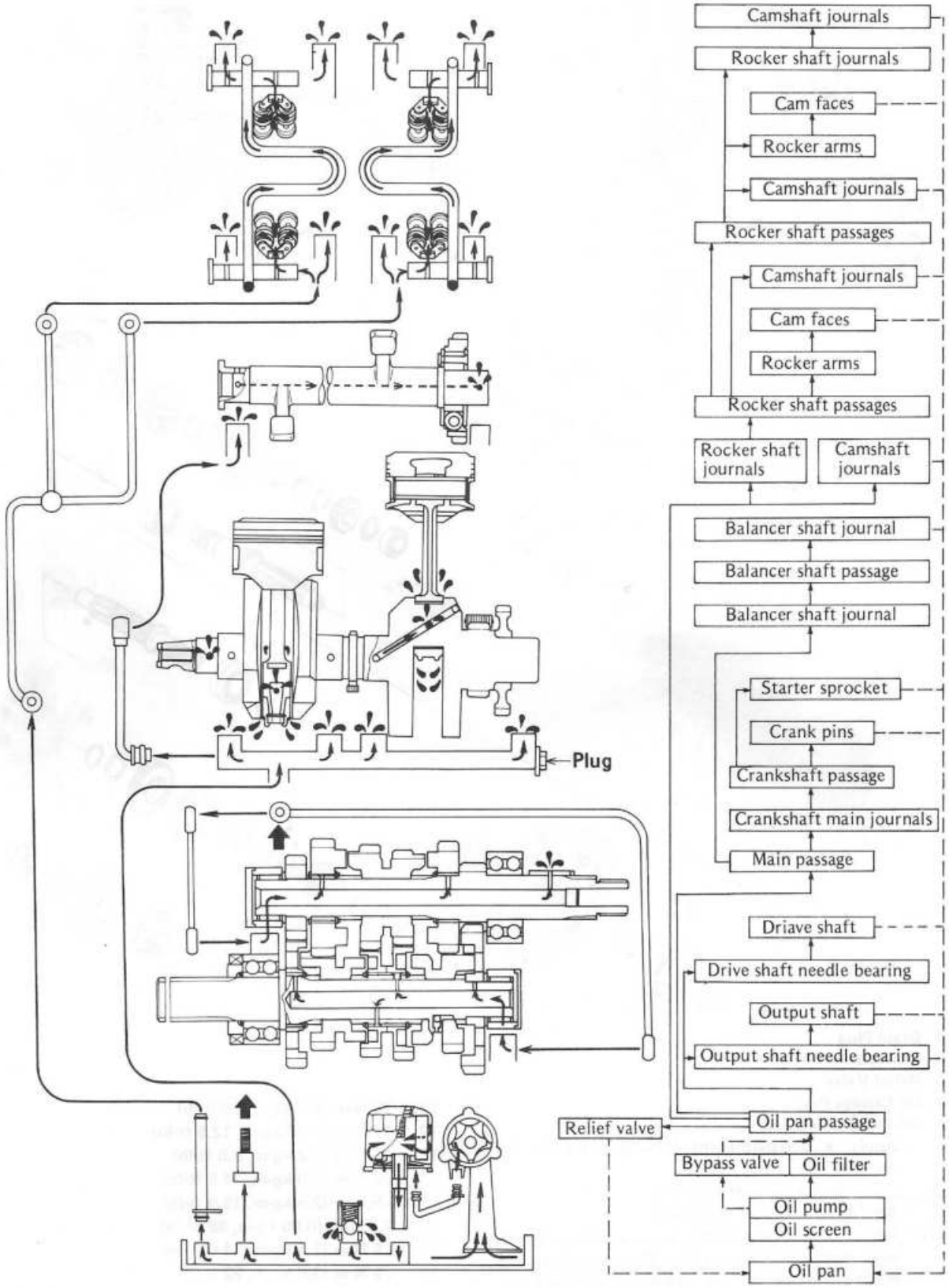


1. Drain Plug
2. Oil Pressure Switch
3. Relief Valve
4. Oil Passage Plug
5. Oil Pump Drive Gear

L : Apply a non-permanent locking agent to the threads.
O : Apply engine oil to the surface.
G : Apply high temperature grease.
LG : Apply liquid gasket to the upper and lower crankcase mating surface and to the area where the mating surface of the crankcase contacts the clutch cover gasket.

T1 : 39 N-m (4.0 kg-m, 29 ft-lb)
T2 : 17 N-m (1.75 kg-m, 12.5 ft-lb)
T3 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
T4 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T5 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T6 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T7 : 15 N-m (1.5 kg-m, 11.0 ft-lb)
T8 : 29 N-m (3.0 kg-m, 22 ft-lb)

Engine Oil Flow Chart



Specifications

Item		Standard	Service Limit
Engine Oil:	Grade	SE or SF class	
	Viscosity	SAE 10W40, 10W50, 20W40, or 20W50	
	Capacity	3.4 L	
	Required amount	2.8 L (when filter is not removed) 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. 90°C (194°F)		275 – 335 kPa (2.8 – 3.4 kg/cm², 40 – 48 psi)	
Oil Pump:			
Outer rotor/inner rotor clearance		Under 0.15 mm	0.20 mm
Outer rotor/pump body clearance		0.15 – 0.23 mm	0.30 mm
Outer rotor diameter		40.53 – 40.56 mm	40.45 mm
Body inside diameter		40.71 – 40.74 mm	40.80 mm
Rotor side clearance		0.02 – 0.08 mm	0.12 mm

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: 57001-1209



Oil Filter Wrench: 57001-1212



Engine Oil and Oil 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.

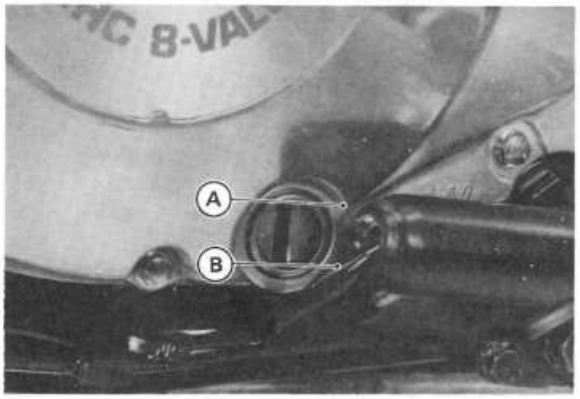
CAUTION

○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.*



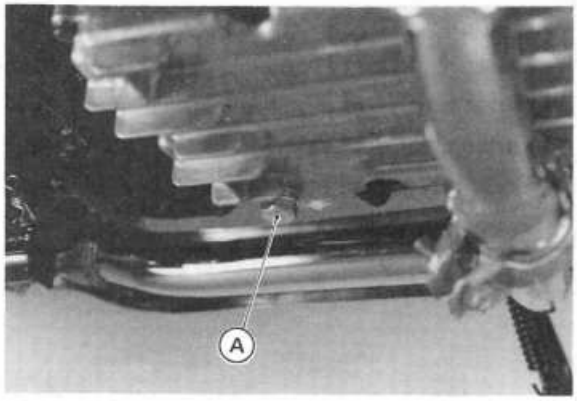
A. Upper Level B. Lower Level

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

●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

●If the oil filter is to be changed, replace it with a new one (see Oil Filter 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.

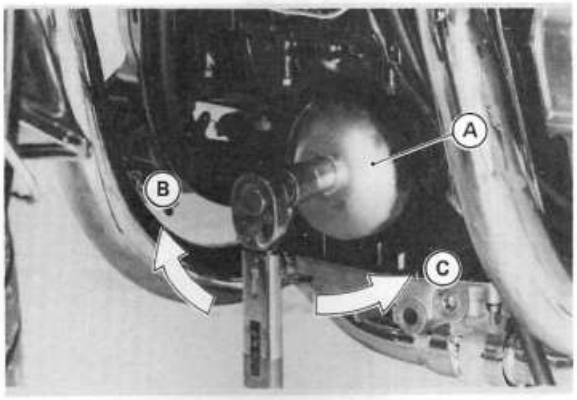
Engine Oil

Grade:	**SE or SF class**
Viscosity:	**SAE 10W40, 10W50, 20W40, or 20W50**

Required Amount
When filter is not removed: 2.8 L
When filter is removed: 3.0 L

Oil Filter Removal

- With the motorcycle up on its center stand, place an oil pan beneath the oil filter.
- Using an oil filter wrench (special tool) on the oil filter, unscrew it.



A. Oil Filter Wrench: 57001-1212
B. Tighten
C. Loosen

Oil Filter Installation Notes

- Apply a thin film of high temperature grease to the gasket before screwing on.
- Tighten the oil filter with an oil filter wrench to the specified torque (see Exploded View).
- Add engine oil (see Oil Level Inspection).
- Thoroughly warm up the engine and check for oil leakage.

Oil Pan and Relief Valve

Oil Pan Removal

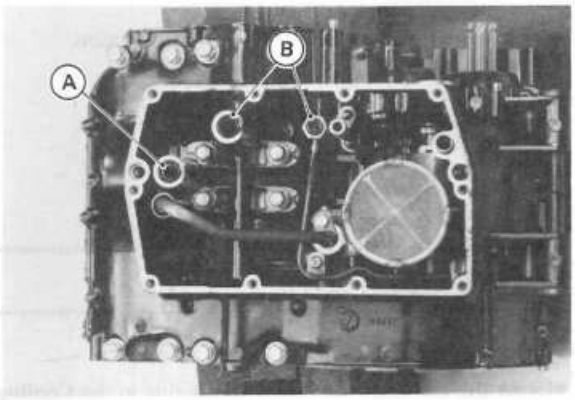
- Drain the engine oil (see Engine Oil and/or Filter Change).
- Disconnect the oil pressure switch lead.
- Remove the oil pan mounting bolts and the oil pan from the crankcase.

Oil Pan Installation Notes

- Check that the O-rings are in good condition.

☆If they are damaged, replace them with new ones.

○The outlet side and inlet side O-rings between the oil pan and the lower case oil passage must be installed so that flat side faces the lower case oil passage.

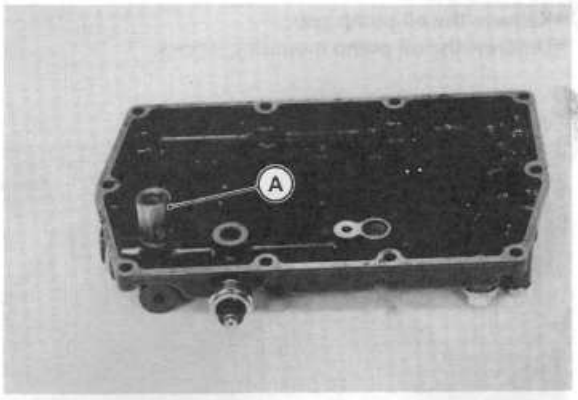


A. Outlet Side O-ring
B. Inlet Side O-ring

- Apply a small amount of oil to the O-rings.
- Install the oil pan and tighten its mounting bolts to the specified torque (see Exploded View).
- Connect the oil pressure switch lead.
- Fill the engine with the specified oil (see Engine Oil and/or Filter Change).

Relief Valve Removal

- Remove the oil pan.
- Remove the relief valve from the oil passage on the oil pan.



A. Relief Valve

Relief Valve Installation Notes

- Apply a non-permanent locking agent to the threads of the relief valve, and tighten it to the specified torque (see Exploded View).

CAUTION

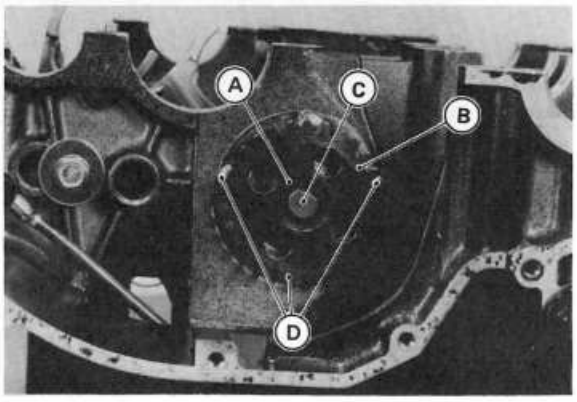
○**Do not over-apply a non-permanent locking agent to the threads. This may block the oil passage.**

●See the next section for Relief Valve Inspection.

Oil Pump

Oil Pump Removal

●Drain the coolant (see Coolant Draining in the Cooling System chapter).
●Drain the engine oil completely (see Engine Oil and/or Filter Change · Oil Filter Removal).
●Remove the engine (see Engine Removal/Installation chapter).
●Remove the following:
Water Pump
Clutch Cover
Alternator Cover with Gear Change Link and Pedal
Chain Guide (Starter Motor – Free Wheel Gear)
Starter Motor
Plate for Drive Shaft Plug
Upper Case Mounting Bolts
●Turn the engine upside down and remove the following:
Oil Pan
Oil Pump Outer Oil Pipe
Lower Case Mounting Bolts
Lower Case
●Remove the circlip that holds the oil pump gear on the oil pump shaft.
●Remove the oil pump gear.
●Unscrew the oil pump mounting screws.

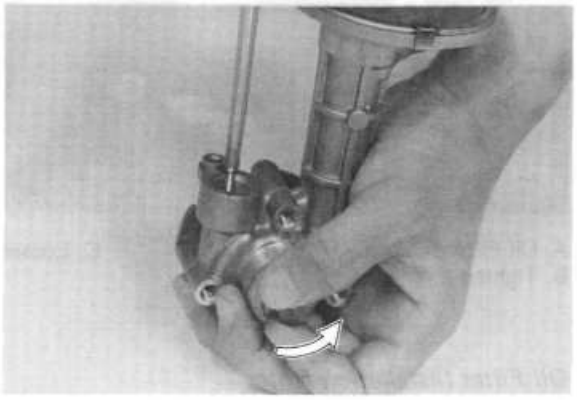


A. Circlip
B. Oil Pump Gear
C. Oil Pump Shaft
D. Oil Pump Mounting Screws

●Remove the oil pump from the lower case.

Oil Pump Installation Notes

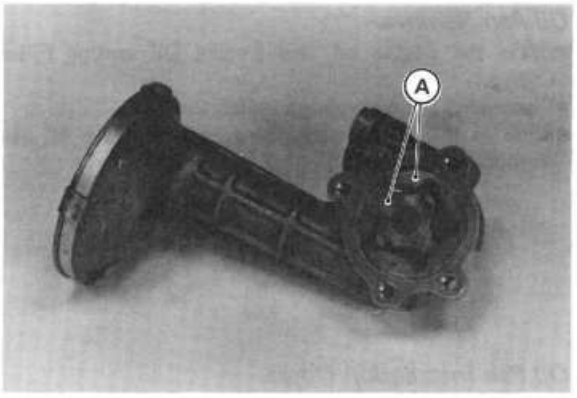
●Installation of the oil pump is the reverse of removal.
●Fill the pump with engine oil turning the pump shaft before installation.



●Apply a non-permanent locking agent to the threads of the oil pump mounting screws.

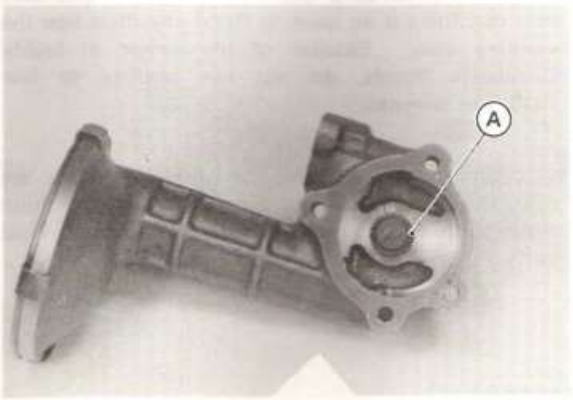
Oil Pump Disassembly

●Remove the oil pump from the lower case.
●Unscrew the oil pump cover screws.
●Remove the oil pump cover.
●Drop the rotors out of the oil pump body.



A. Rotors

●Pull the pin out of the pump shaft.



A. Pin

●Pull the oil pump shaft out of the body.
●Remove the master.

Oil Pump Assembly Notes

●Assembly of the oil pump is the reverse of disassembly.
●Before installing the oil pump, be sure the shaft and rotors turn freely.

Oil Pump Drive Gear Removal

●The oil pump drive gear is removed during drive shaft assembly removal (see Crankshaft/Transmission chapter).

Oil Pump Drive Gear Installation

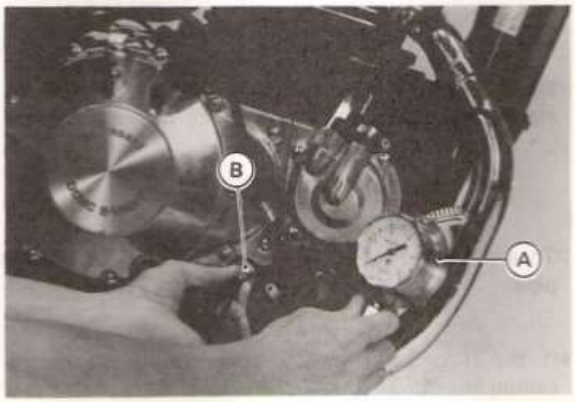
●The oil pump drive gear is installed during drive shaft assembly installation (see Crankshaft/Transmission chapter).

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 plastic clamps for the brake switch lead.
○Disconnect the brake switch lead connector.
○Remove the brake switch spring.
○Remove the mounting bolt (rear) of the right footpeg assembly, and remove the brake switch with bracket and cover.
○Loosen the mounting bolt (front) of the right footpeg assembly.
○Remove the oil passage plug.
○Install oil pressure gauge and adapter (special tool).



A. Oil Pressure Gauge: 57001-164
B. Adapter: 57001-1209

○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/cm^2, 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 at 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.
○Stop the engine.
○Remove the oil pressure gauge and adapter.
○Install the oil passage plug and tighten it to the specified torque (see Exploded View).
○Install the brake switch with bracket and cover in the reverse order of removal.

NOTE

○*When binding the brake switch lead with the plastic clamp, make sure it does not touch the exhaust pipe.*

WARNING

○**To avoid a serious burn, never touch the hot exhaust pipe.**

★If the oil pressure is significantly below the specification, inspect the oil pump and relief valve.

Oil Pressure

275 – 335 kPa (2.8 – 3.4 kg/cm², 40 – 48 psi) @4,000 r/min (rpm), 90°C (194°F) of oil temp.

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

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 a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

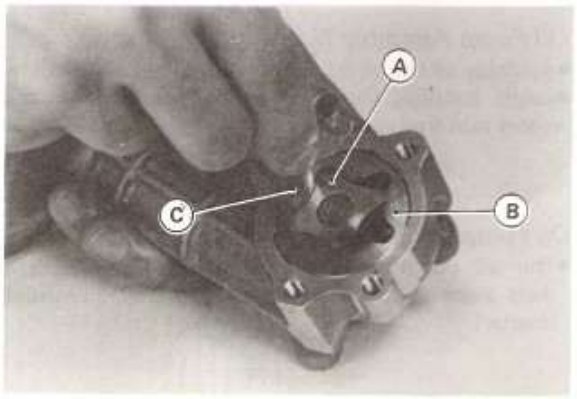
WARNING

○**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 flashpoint 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.

Oil Pump Outer Rotor/Inner Rotor Clearance

●Remove the oil pump (see Oil Pump Removal).
●Remove the oil pump cover (see Oil Pump Disassembly).
●Measure the clearance between the rotors with a thickness gauge, as shown.



A. Inner Rotor
B. Outer Rotor
C. Thickness Gauge

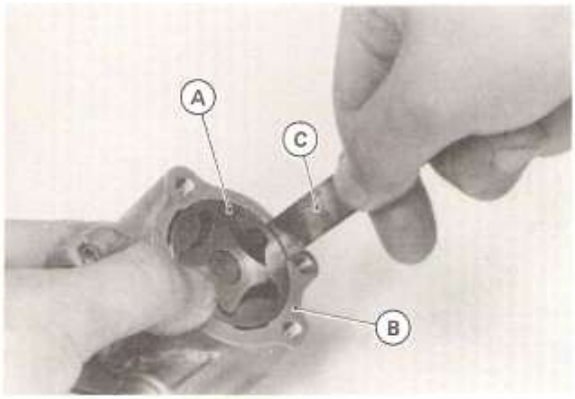
Oil Pump Outer Rotor/Inner Rotor Clearance

Standard:	**Under 0.15 mm**
Service Limit:	**0.20 mm**

★If the clearance is greater than the service limit, replace the rotors as a set.

Oil Pump Outer Rotor/Pump Body Clearance

●Remove the oil pump (see Oil Pump Removal).
●Remove the oil pump cover (see Oil Pump Disassembly).
●Measure the clearance between the outer rotor and the pump body with a thickness gauge, as shown.

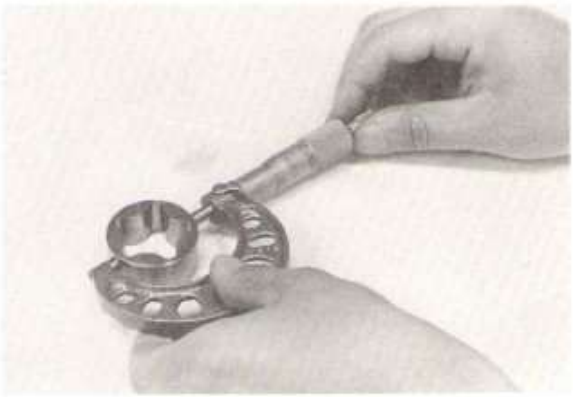


A. Outer Rotor
B. Pump Body
C. Thickness Gauge

Oil Pump Outer Rotor/Pump Body Clearance

Standard:	**0.15 – 0.23 mm**
Service Limit:	**0.30 mm**

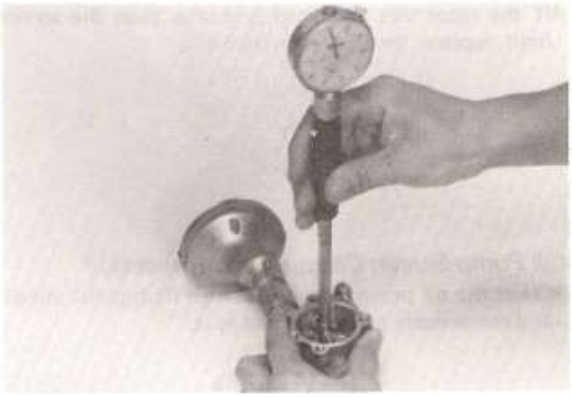
★If the clearance is greater than the service limit, measure the outer rotor diameter and the pump body inside diameter to see which is faulty.
●Measure the rotor diameter with a micrometer.



Oil Pump Outer Rotor Diameter

Standard:	**40.53 – 40.56 mm**
Serivce Limit:	**40.45 mm**

★If the outer rotor diameter is less than the service limit replace the rotors as a set.
●Measure the pump body inside diameter with a bore gauge.



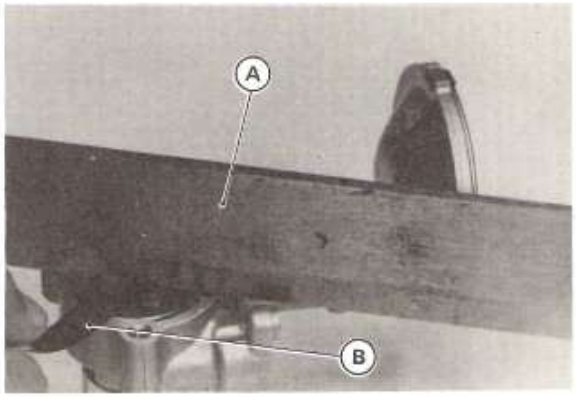
Oil Pump Body Inside Diameter

Standard:	**40.71 – 40.74 mm**
Service Limit:	**40.80 mm**

★If the pump body inside diameter is greater than the service limit, replace the oil pump assembly.

Oil Pump Rotor Side Clearance

●Remove the oil pump (see Oil Pump Removal).
●Remove the oil pump cover (see Oil Pump Disassembly).
●Lay a straightedge across the pump body and measure the clearance between it and the rotors with a thickness gauge.



A. Straightedge
B. Thickness Gauge

Oil Pump Rotor Side Clearance

Standard:	**0.02 – 0.08 mm**
Service Limit:	**0.12 mm**

★If the rotor side clearance is greater than the service limit, replace the oil pump assembly.

Oil Pump Screen Cleaning and Inspection

●Clean the oil pump screen with high flash-point solvent and remove any particles stuck to it.

WARNING

○**Clean the screen 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.**

NOTE

○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

●Check the screen carefully for any damage: holes and broken wires.

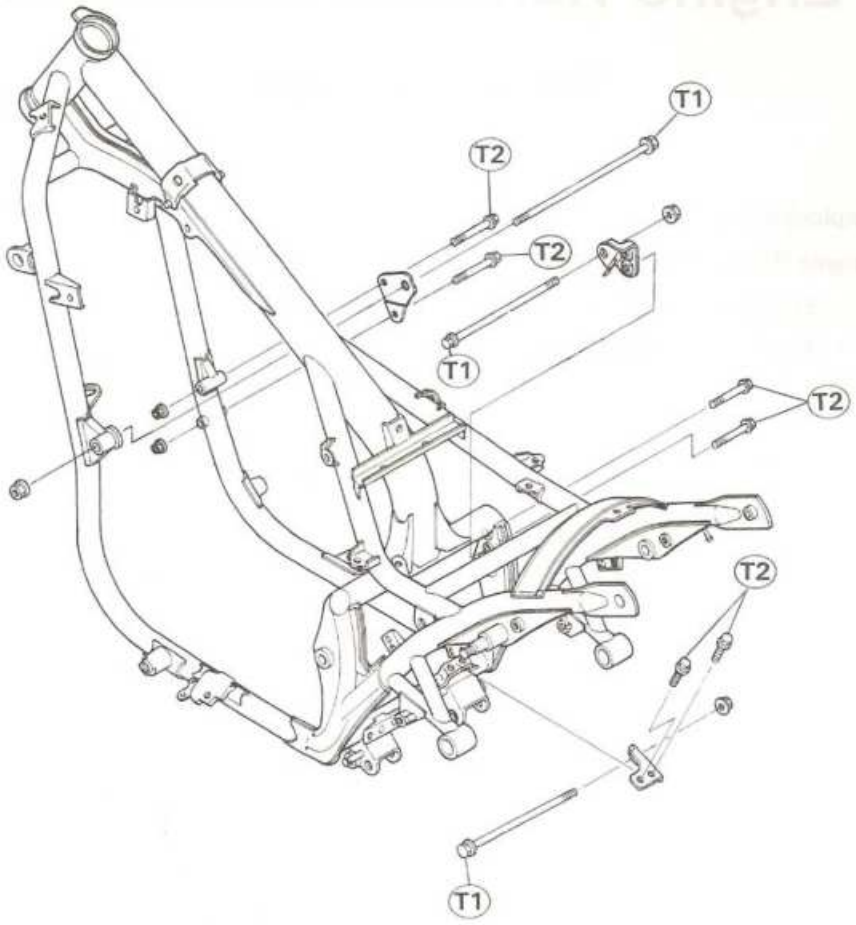
★If the screen is damaged, replace the oil pump assembly.

Engine Removal/Installation

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Exploded View

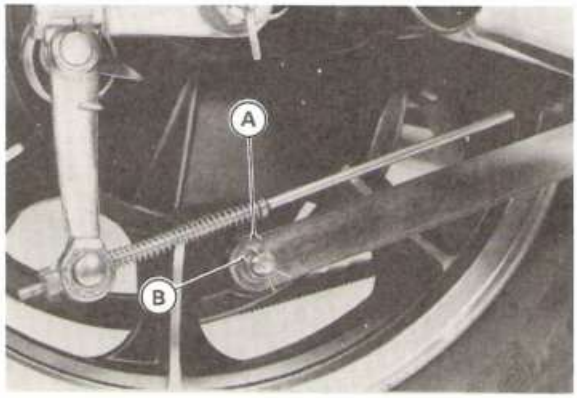


T1 : 39 N-m (4.0 kg-m, 29 ft-lb)
T2 : 24 N-m (2.4 kg-m, 17.5 ft-lb)

Engine Removal/Installation

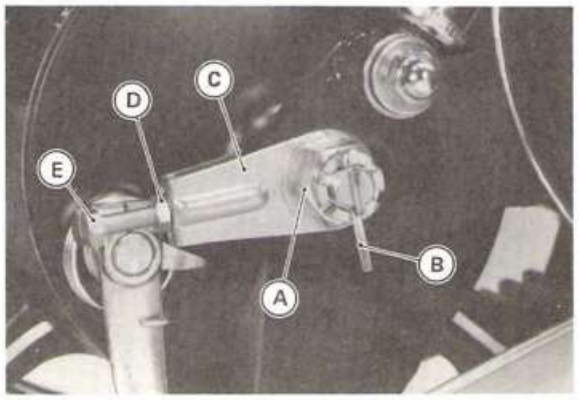
Engine Removal

- Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).
- Drain the coolant (see Coolant Draining in the Cooling System chapter).
- Remove the following:
  - Seat
  - Fuel Tank
  - Left and Right Front Side Covers
  - Radiator Grill and Radiator Assembly (Prior to removing them, disconnect fan motor connector and thermostatic fan switch lead.)
  - Reservoir Tank
  - Thermostat Housing
  - Tachometer Cable Lower End
  - Vacuum Switch Valve with Hoses (US model)
  - Mufflers and Exhaust Pipes
  - Carburetors
  - Breather Hose
  - Left and Right Side Covers
  - Air Cleaner Housing
  - Clutch Cable Lower End and Bracket
  - Right Footpeg and Rear Brake Assembly
  - Gear Change Pedal (after loosening the left footpeg mounting bolt and let the footpeg hang down)
  - Engine Pulley Cover
- Disconnect the following leads or connectors.
  - Ignition Coil Leads
  - Starter Motor Leads
  - Alternator Lead Connectors
  - Neutral Switch Connector
  - Oil Pressure Switch Lead
  - Rear Brake Switch Leads
- Remove the bolts and holding plate from the engine pulley.
- Remove the drive belt cover.
- Remove the cotter pin, torque link nut and the rear end of the torque link.



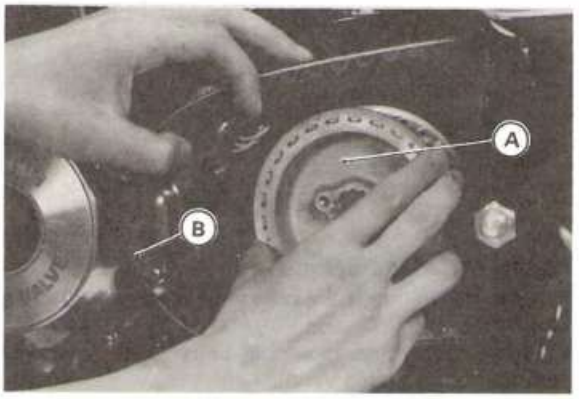
A. Cotter Pin B. Torque Link Nut

- Loosen the left and right belt adjuster locknuts, and fully loosen both belt adjuster bolts.



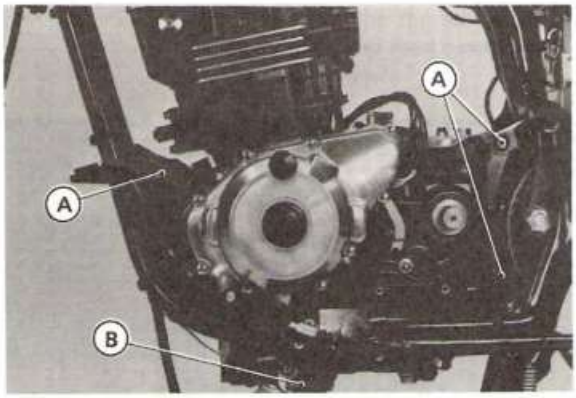
A. Axle Nut D. Locknut
B. Cotter Pin E. Adjuster Bolt
C. Belt Adjuster

- Remove the cotter pin, loosen the axle nut, and then push the wheel forward so that the belt can be easily removed from the rear pulley.
- Remove the drive belt toward the right side of the rear pulley.
- Pull the slack of belt forward, remove the belt toward the left side of the engine pulley.
- Remove the engine pulley.

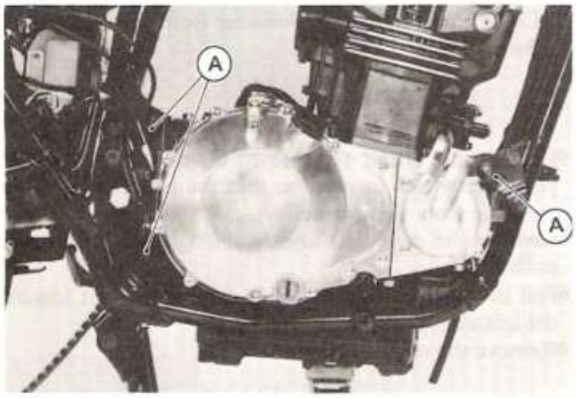


A. Pulley B. Belt

- Jack or lever the engine up slightly to take the weight off the mounting bolts.
- Loosen the engine mounting bolts.
- Loosen the engine bracket bolts.
- Remove the engine brackets.
- Remove the engine mounting bolts.
- Remove the engine to the right.



A. Mounting Bolts B. Jack



A. Mounting Bolts

Engine Installation Notes

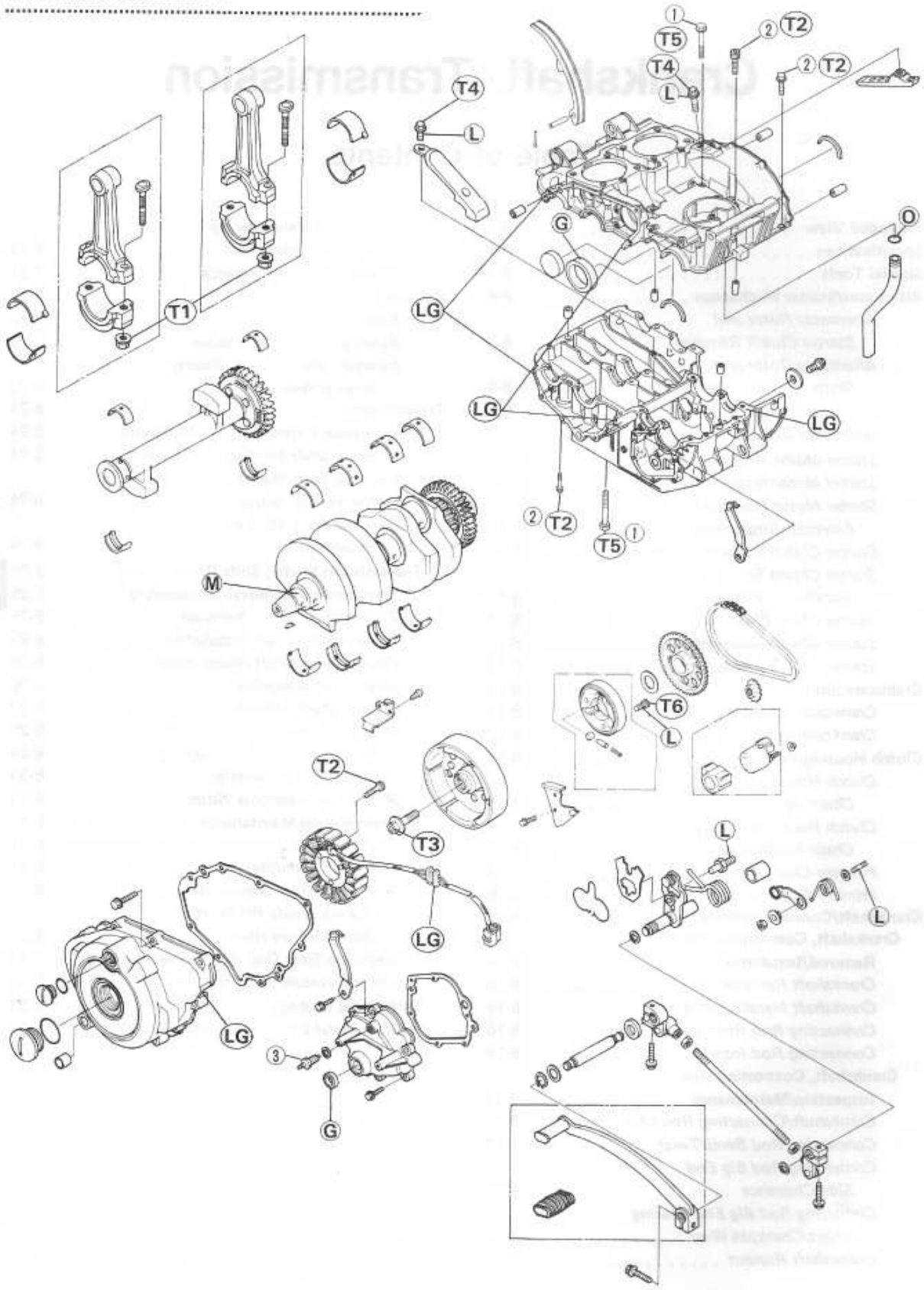
- Engine installation is the reverse of removal. Note the following.
- Tighten the engine mounting bolts to the specified torque (see Exploded View).
- Fill the engine with engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).
- Fill the engine with coolant (see Coolant Filling in the Cooling System chapter).
- Adjust the following.
  - Throttle Cable (see Throttle Grip and Cable in the Fuel System chapter)
  - Clutch Cable (see Clutch in the Clutch chapter)
  - Drive Belt (see Drive Belt in the Final Drive chapter)
  - Rear Brake (see Brake Adjustment in the Brakes chapter)

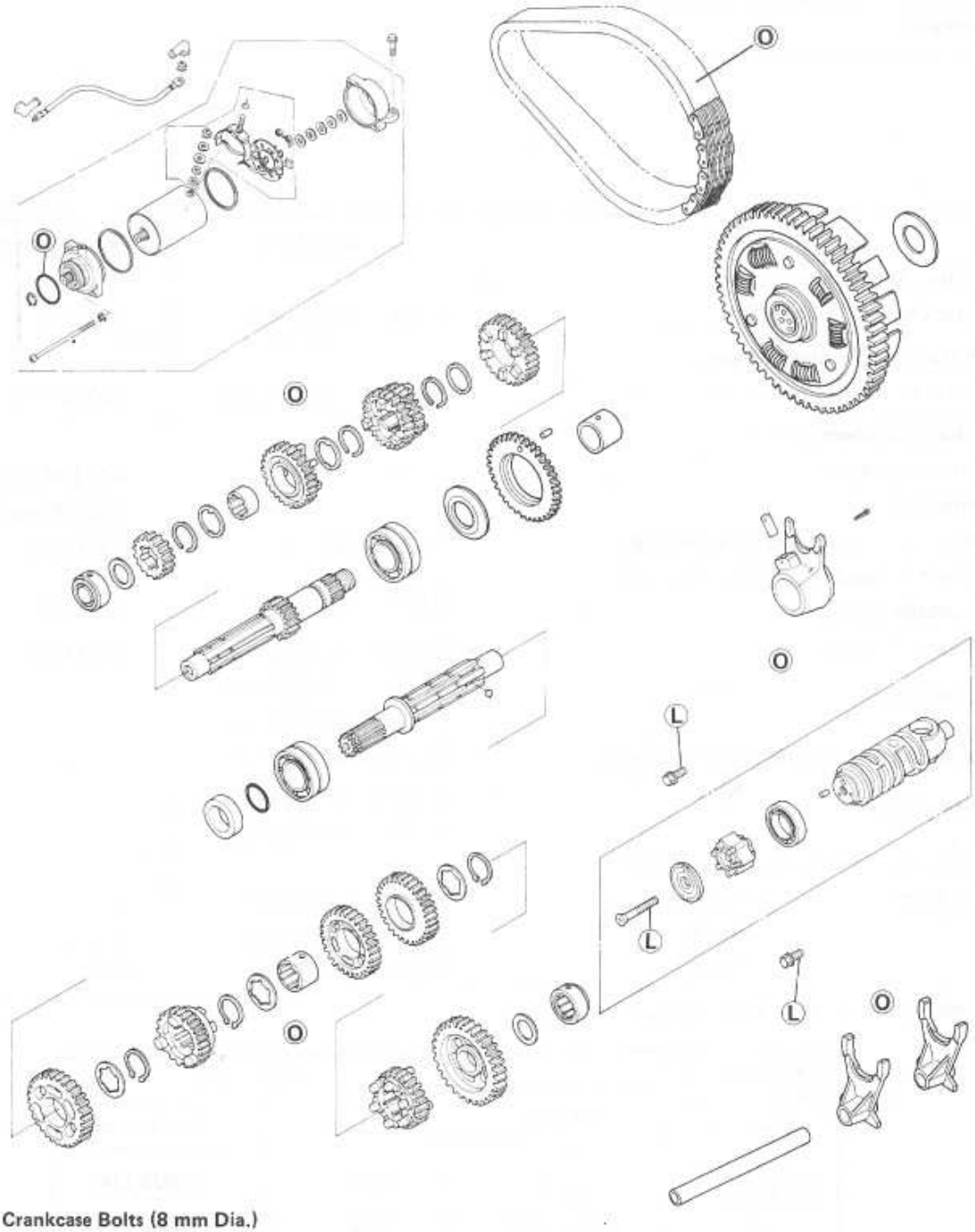
Crankshaft/Transmission

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Exploded View





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

O : Apply engine oil to the transmission gears and shift forks, etc.
M : Apply a thin coat of a molybdenum disulfide grease.
G : Apply high temperature grease.
LG : Apply liquid gasket to the upper and lower case mating surface and to the area where the mating surface of the crankcase contacts the alternator cover gasket.
L : Apply a non-permanent locking agent to the threads.

T1 : 36 N-m (3.7 kg-m, 27 ft-lb)
T2 : 12 N-m (1.2 kg-m, 104 in-lb)
T3 : 69 N-m (7.0 kg-m, 51 ft-lb)
T4 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T5 : 27 N-m (2.8 kg-m, 20 ft-lb)
T6 : 34 N-m (3.5 kg-m, 25 ft-lb)

Specifications

Item	Standard	Service Limit
Alternator, Starter Mechanism:		
Starter chain 20-link length	155.5 – 155.9 mm	159 mm
Clutch Housing, Primary Chain:		
Primary chain 20-link length	190.50 – 190.97 mm	193.4 mm
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	0.50 mm
Connecting rod big end bearing insert/ crankpin clearance	0.036 – 0.066 mm	0.10 mm
Crankpin diameter:	37.984 – 38.000 mm	37.97 mm
Marking None	37.984 – 37.994 mm	
Marking ○	37.995 – 38.000 mm	
Connecting rod big end inside diameter:	41.000 – 41.016 mm	– – –
Marking None	41.000 – 41.008 mm	
Marking ○	41.009 – 41.016 mm	
Connecting rod big end bearing insert thickness: Brown	1.475 – 1.480 mm	– – –
Black	1.480 – 1.485 mm	– – –
Blue	1.485 – 1.490 mm	– – –

Connecting rod big end bearing insert selection:

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Black	92028-1349
None	None		
○	None	Blue	92028-1348
None	○	Brown	92028-1350

Crankshaft runout	less than 0.02 mm TIR	0.05 mm TIR
Crankshaft main bearing insert/ Journal clearance	0.020 – 0.044 mm	0.08 mm

Item		Standard	Service Limit
Crankshaft main journal diameter:		35.984 – 36.000 mm	35.96 mm
Marking	None	35.984 – 35.992 mm	
	1	35.993 – 36.000 mm	
Crankcase main bearing inside diameter:		39.000 – 39.016 mm	– – –
Marking	○	39.000 – 39.008 mm	
	None	39.009 – 39.016 mm	
Crankshaft main bearing insert thickness:			
	Brown	1.490 – 1.494 mm	– – –
	Black	1.494 – 1.498 mm	– – –
	Blue	1.498 – 1.502 mm	– – –

Crankshaft main bearing insert selection:

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1102	2, 3
			92028-1274	1, 4
None	None	Blue	92028-1100	2, 3
			92028-1272	1, 4
○	None	Black	92028-1101	2, 3
None	1		92028-1273	1, 4

*The bearing inserts for Nos. 2 and 3 journals have oil grooves.

Crankshaft side clearance	0.05 – 0.25 mm	0.40 mm
Balancer Shaft:		
Balancer shaft bearing insert/ journal clearance	0.020 – 0.044 mm	0.08 mm
Balancer shaft journal diameter:	27.987 – 28.000 mm	27.96 mm
Marking None	27.987 – 27.993 mm	
Marking ○	27.994 – 28.000 mm	
Crankcase bearing inside diameter:	31.000 – 31.025 mm	– – –
Marking ○	31.000 – 31.013 mm	
Marking None	31.014 – 31.025 mm	
Balancer shaft bearing insert thickness:		
Brown	1.490 – 1.494 mm	– – –
Black	1.494 – 1.498 mm	– – –
Blue	1.498 – 1.502 mm	– – –

Item	Standard	Service Limit
Balancer shaft bearing insert selection:		

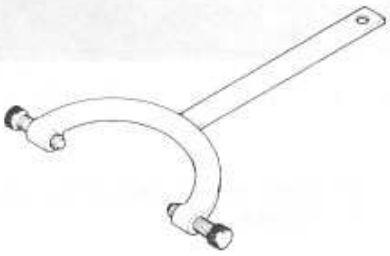
Crankcase Bearing Inside Diameter Marking	Balancer Shaft Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1346
None	None	Blue	92028-1344
○	None	Black	92028-1345
None	○		

Transmission:		
Gear backlash	0 – 0.17 mm	0.24 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

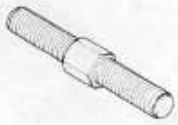
Special Tools

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

Rotor Holder: 57001-308



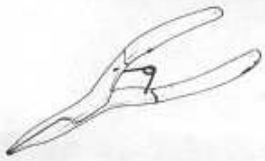
Rotor Puller: 57001-1099 (or 57001-254)



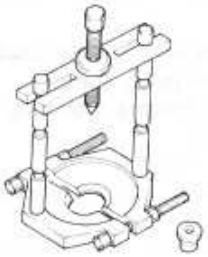
Oil Seal Guide: 57001-264



Circlip Pliers: 57001-144



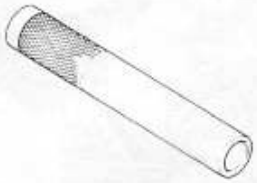
Bearing Puller: 57001-135



Bearing Puller Adapter: 57001-317



Driver: 57001-382



Bearing Driver Set: 57001-1129



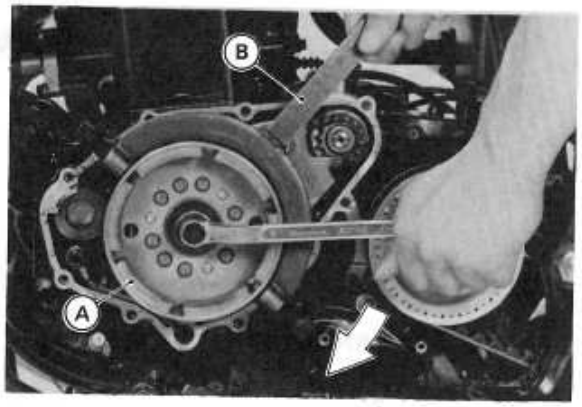
Alternator/Starter Mechanism

Alternator Rotor and Starter Clutch Removal

- Remove the engine pulley cover.
- Loosen the left footpeg mounting bolt and let the footpeg hang down.
- Remove the shift pedal.
- Remove the circlip and the washer from the shift shaft.
- Disconnect the alternator lead connectors.
- Place an oil pan beneath the alternator cover.
- Remove the alternator cover bolts (9), and pull off the alternator cover and gasket. There are two knock pins in the cover mating surface.
- Hold the alternator rotor steady with the rotor holder (special tool), and remove the rotor bolt.

NOTE

○*The rotor bolt has left-handed threads, therefore it must be turned clockwise in removing.*

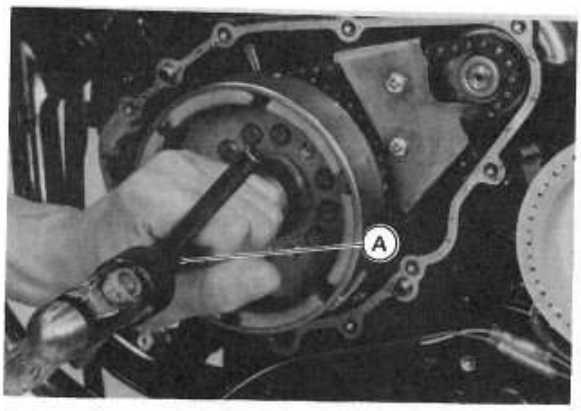


A. Alternator Rotor B. Rotor Holder: 57001-308

- Using the rotor puller (special tool), remove the alternator rotor and starter clutch assembly from the crankshaft. There is a spacer between the starter clutch sprocket and the alternator rotor. The woodruff key may come out with the alternator rotor and starter clutch assembly.

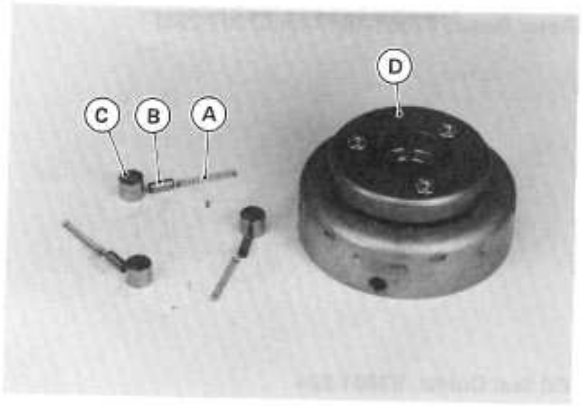
CAUTION

○**If the rotor is difficult to remove, turn the puller shaft using a wrench while tapping the head of the puller shaft with a hammer. Do not attempt to strike the grab bar or the alternator rotor itself. Striking the bar or the rotor can cause the bar to bend or the magnets to lose their magnetism.**



A. Rotor Puller: 57001-254 or 57001-1099

- Remove the rollers, springs, and spring caps (3 ea.) from the starter clutch.



A. Spring
B. Spring Cap
C. Roller
D. Starter Clutch

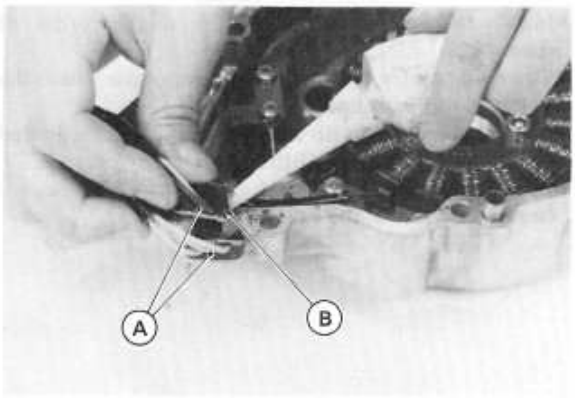
- Holding the rotor steady with the rotor holder (special tool), remove the Allen bolts (3) to separate the rotor and starter clutch.



A. Holder: 57001-308

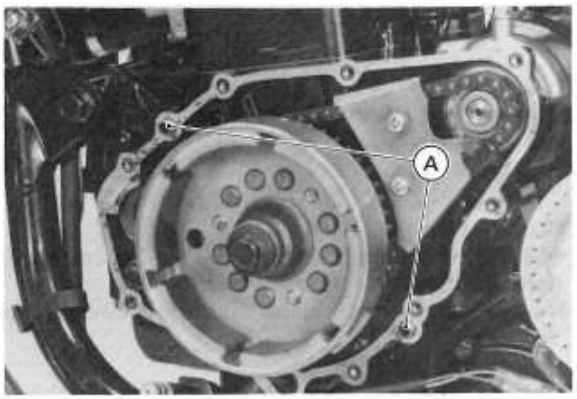
Alternator Rotor and Starter Clutch Installation

- Accomplish installation procedures in reverse order of removal. Note the follwoing.
- Apply a non-permanent locking agent to the starter clutch Allen bolts threads, and tighten them to the specified torque (see Exploded View) in assembling the starter clutch onto the alternator rotor.
  - Be careful that the rollers do not drop out of the starter clutch during assembly.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the crankshaft taper and rotor tapered hole.
- Fit the woodruff key on the rotor securely in the crankshaft before installing the rotor assembly on the crankshaft.
- Tighten the rotor bolt to the specified torque (see Exploded View).
  - Hold the rotor steady with the rotor holder (special tool), and turn the rotor bolt counterclockwise to install it.
- Apply liquid gasket around the circumference of the wiring grommets before setting it in the notch of the alternator cover.



A. Grommets B. Apply a liquid gasket.

- Check that knock pins (2) are in place on the crankcase.



A. Knock Pins

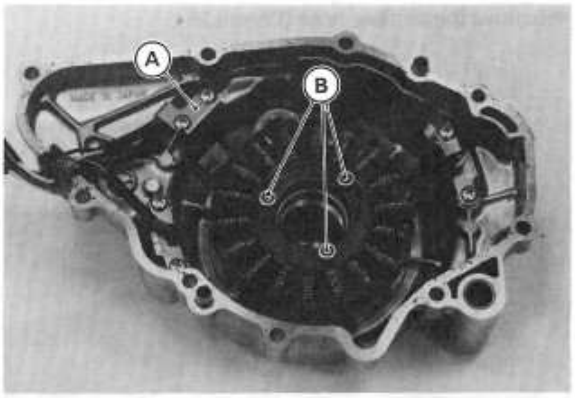
- Replace the gasket if it is deteriorated or damaged.
- Check the engine oil level, and add more if necessary (see Engine Oil Level Inspection in the Engine Lubrication System chapter).

Alternator Stator Removal

NOTE

To keep the loss of engine oil to a minimum, set the motorcycle on the center stand.

- Remove the alternator cover (see Alternator Rotor and Starter Clutch Removal).
- Remove the screws and the holding plate for the stator wiring.



A. Holding Plate B. Allen Bolt

- Unscrew the Allen bolts and remove the stator.
- Remove the grommet for the pick-up coil lead.

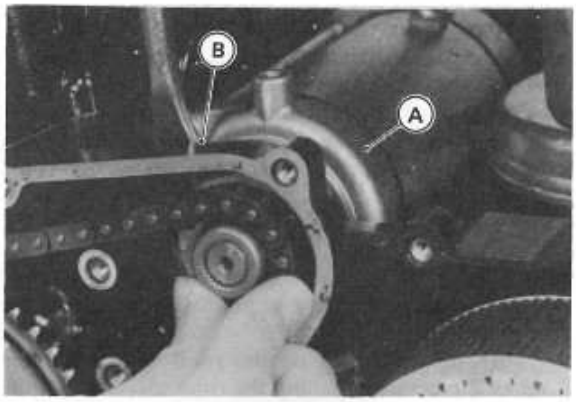
Alternator Stator Installation Notes

- Apply liquid gasket around the circumference of the wiring grommets before setting them in the notch of the alternator cover.
- Install the grommet for the stator wiring and pick-up coil lead in that order.

CAUTION

○**The stator wiring has to be installed along the alternator cover without rising away from its surface. If the wires touch the rotor, they will be damaged.**

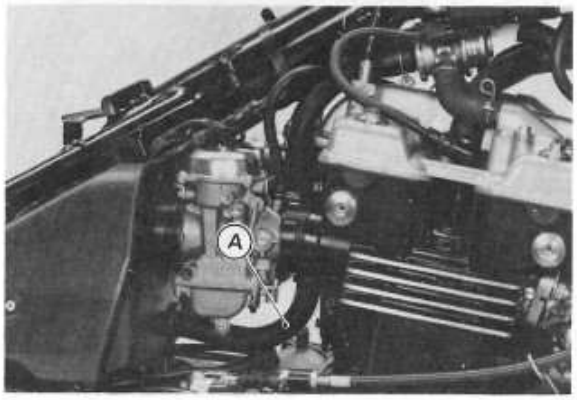
●Tighten the Allen bolts (3) to the specified torque (see Exploded View).



A. Starter Motor B. Pry motor loose.

Starter Motor Removal

●Remove the alternator cover (see Alternator Rotor and Starter Clutch Removal).
●Remove the starter chain guide.
●Remove the carburetors.
●Remove the air flow hose (US model).



A. Air Flow Hose

●Disconnect the starter motor leads.
●Remove the starter motor mounting bolts.
●Pry the starter motor loose from the crankcase with a screwdriver, slide the starter motor off towards the right side of the engine, while pulling the motor shaft out of the sprocket with the starter chain, and then lift it upwards.

CAUTION

○**Do not tap on the starter motor shaft or body. Tapping on the shaft or body may damage the motor.**

Starter Motor Installation Notes

●Install the starter motor in the reverse order of removal.
●Clean the starter motor lugs and crankcase where the starter motor is grounded.
●Replace the O-ring with a new one, if it is deteriorated or damaged, and apply a little oil to it.
●Check idle, and adjust the carburetors if necessary (see Carburetors in the Fuel System chapter).

Starter Motor Disassembly/Assembly/Inspection

○See Electrical System chapter.

Starter Clutch Sprocket Removal

●Remove the following:
Alternator Cover
Alternator Rotor with Starter Clutch
●Remove the starter chain guide.
●Remove the starter clutch sprocket, starter motor sprocket and starter chain as a set.
●In case that the starter motor has been removed, do the following.
○Remove the starter motor sprocket.
○Remove the alternator rotor with starter clutch, starter clutch sprocket and starter chain as a set.

Starter Clutch Sprocket Installation Notes

- Apply a thin coat of a molybdenum disulfide grease to the frictional surface between the crankshaft and the starter clutch sprocket.
- If the starter motor has been removed, install it first.
- Install the starter clutch sprocket, starter motor sprocket and starter chain as a set.
- Install the alternator rotor with starter clutch and alternator cover (refer to Alternator Rotor and Starter Clutch Installation).

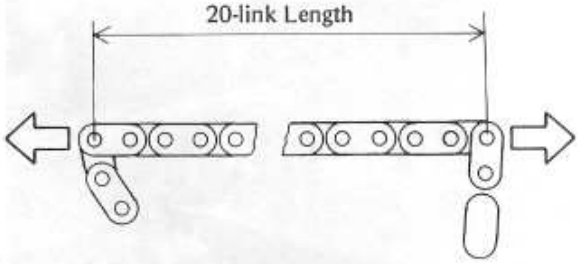
Starter Chain Wear

- Pull starter chain tight.
- Measure the length of 20 links (21 pins) with a vernier caliper.
- ★If the 20 link length of the starter chain is greater than the service limit, replace it.

Starter Chain 20-link Length

Standard:	**155.5 – 155.9 mm**
Service Limit:	**159 mm**

Chain 20-Links Length Measurement

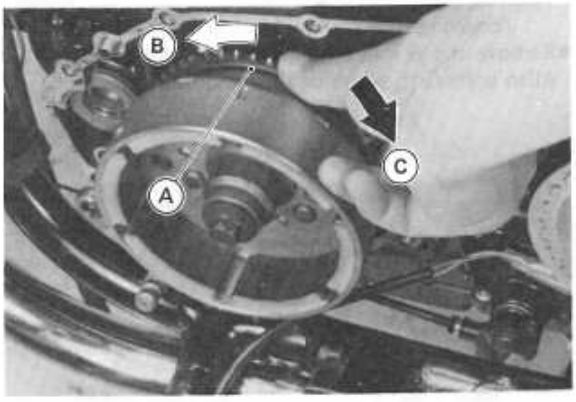


Starter Chain Guide Wear

- Visually inspect the rubber on the guide.
- If the rubber is cut or damaged in any way, replace the guide.

Starter Clutch Inspection

- Remove the following parts:
  - Alternator Cover
  - Starter Chain Guide
  - Starter Motor and Sprocket
  - Starter Chain
- Turn the starter clutch sprocket by hand. The starter clutch sprocket should turn counterclockwise freely, but should not turn clockwise.
- If the clutch does not operate as it should or if it makes noise, disassemble the starter clutch, examine each part, any replace any worn or damaged parts.

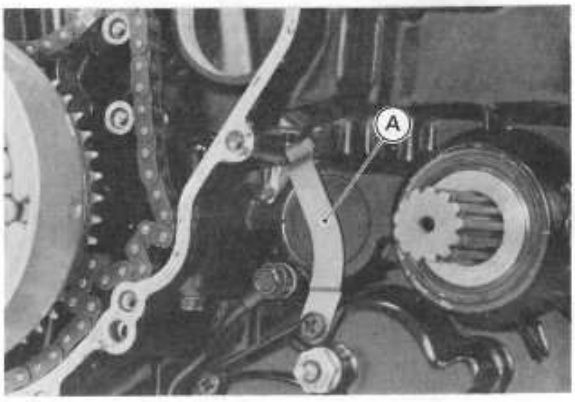


A. Starter Clutch Gear
B. Turns Freely.
C. Locked.

Crankcase Splitting

Crankcase Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface while parts are being removed.
- Remove the following parts from the engine:
  - Shift Lever (rear side)
  - Alternator Cover
  - Starter Chain Guide
  - Starter Motor and Starter Motor Sprocket
  - Plate for Drive Shaft Plug

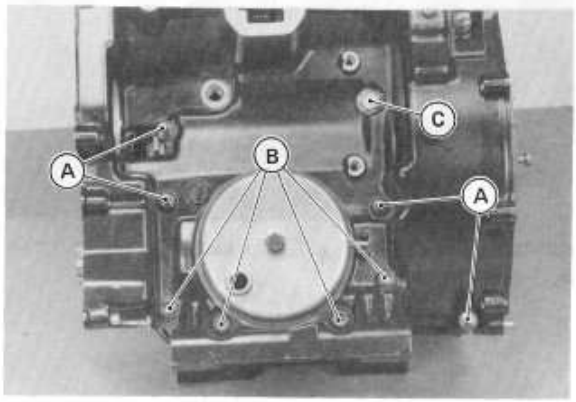


A. Plate

Water Pump
Clutch Release
Clutch Cover

•Remove the following parts only if the crankshaft is to be removed:
Cylinder Head, Cylinder and Pistons
Alternator Rotor and Starter Clutch
Starter Clutch Sprocket and Starter Chain
Clutch (Clutch Housing cannot be removed without removing the transmission drive shaft assembly.)

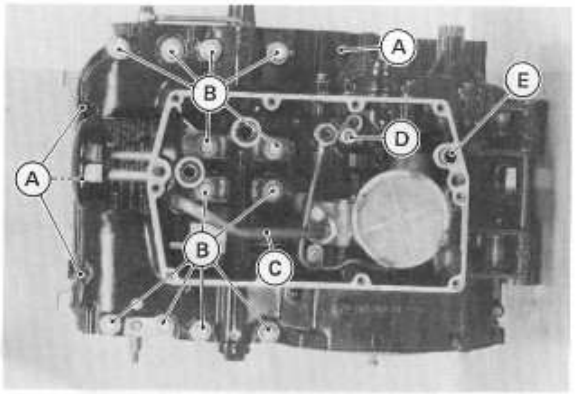
•Remove the 6 mm upper crankcase-half bolts and the Allen bolts first, and then the 8 mm bolt.



A. 6 mm Bolts
B. Allen Bolts
C. 8 mm Bolt

•Turn the engine upside down and remove the following parts:
Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
Oil Pump Outer Pipe
Main Oil Pipe Connecting Pipe

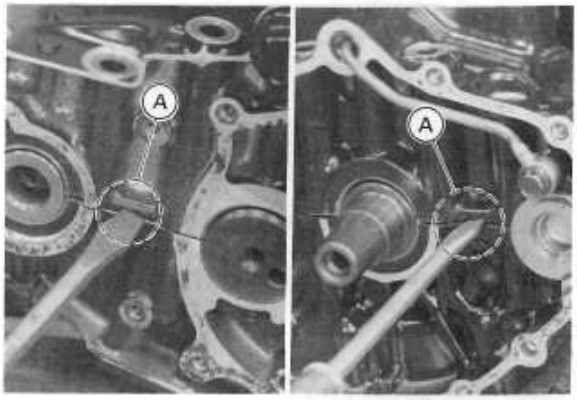
•Remove the 6 mm lower crankcase-half bolts first, and then the 8 mm bolts in the reverse order of installation sequence (see Crankcase Assembly).



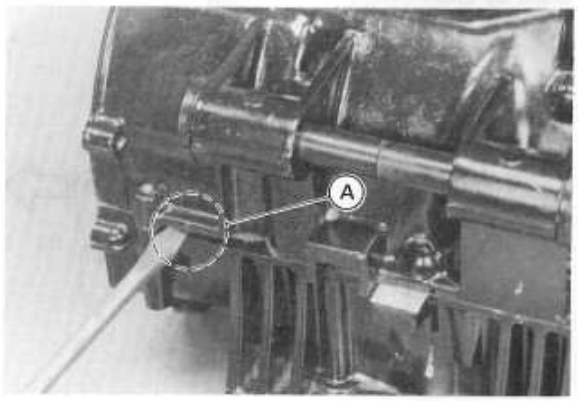
A. 6 mm Bolts
B. 8 mm Bolts
C. Oil Pump Outer Pipe
D. Main Oil Pipe Connecting Pipe
E. Breather Return Pipe

•Pull the breather return pipe out of the crankcase and leave it in place temporarily.

•Pry the points indicated in the figure to split the crankcase halves apart, and remove the lower crankcase half. There are two knock pins at the front and rear of the cases.



A. Pry Point



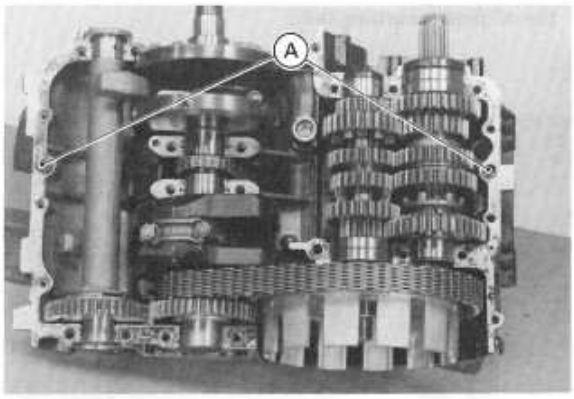
A. Pry Point

Crankcase Assembly

NOTE

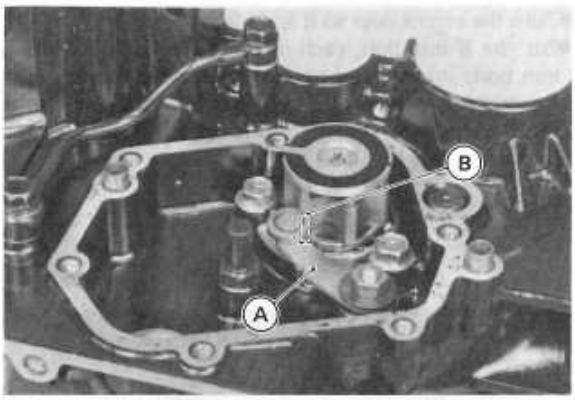
○*The upper crankcase half and the lower crankcase half are machined at the factory in the assembled state, so the crankcase halves must be replaced together as a set.*

●Assembly is the reverse of splitting. Note the following.
●Before fitting the lower case on the upper case, check the following.
○Check to see that the following parts are in place on the upper crankcase half.



A. Knock Pins

○Check to see that the shift drum is in the neutral position, that is, the gear positioning lever fits into the detent on the shift drum cam (see Transmission External Shift Mechanism).

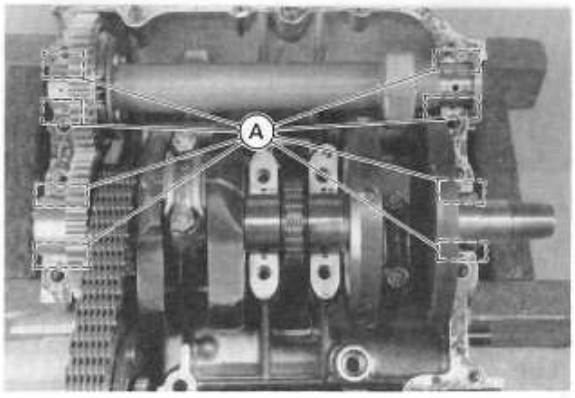


A. Positioning Lever B. Neutral Detent

○Check that the O-ring of breather return pipe is in good condition.
☆If it is damaged, replace it with new one.
○Apply a small amount of oil to the O-ring.
●With a high flash-point solvent, clean off the mating surfaces of the crankcases halves and wipe dry.
●Apply liquid gasket to the mating surface of the lower crankcase half.

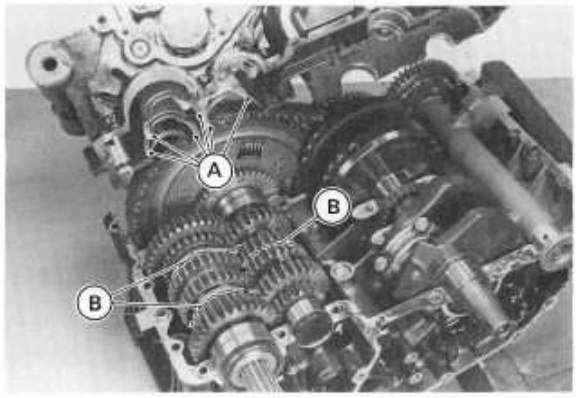
CAUTION

○Do not apply liquid gasket around the crankshaft main bearing inserts and balancer shaft ones.



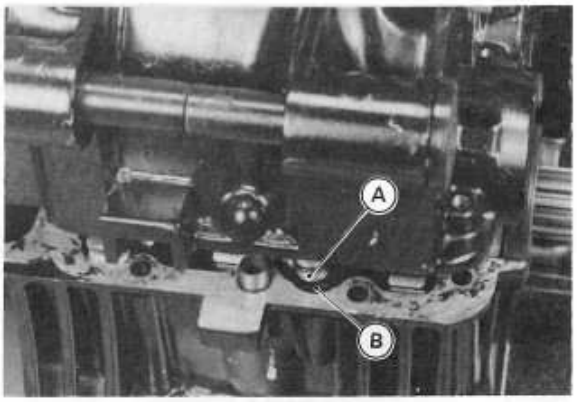
A. Do not apply liquid gasket here.

●Fit the lower crankcase half on the upper crankcase half observing the following.
○Set the shift forks so that the ears of each fork fit into the grooves of the gears.



A. Shift Fork Ears B. Gear Grooves

○Fit the breather return pipe into the passage in the upper crankcase half.

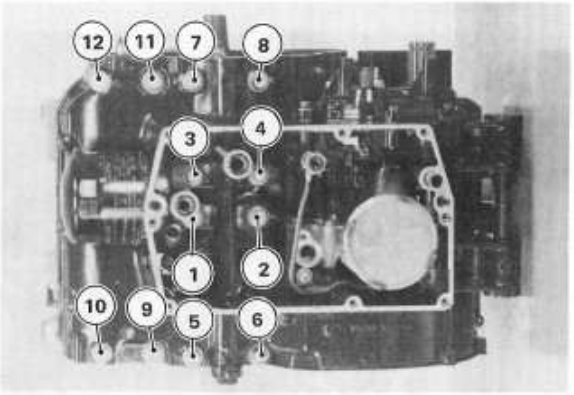


A. Breather Return Pipe B. Passage

- Fit the lower crankcase half on the upper crankcase half.
- Tighten the lower crankcase half bolts using the following 3 steps:

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

Lower Case Mounting Bolt Tightening Sequence



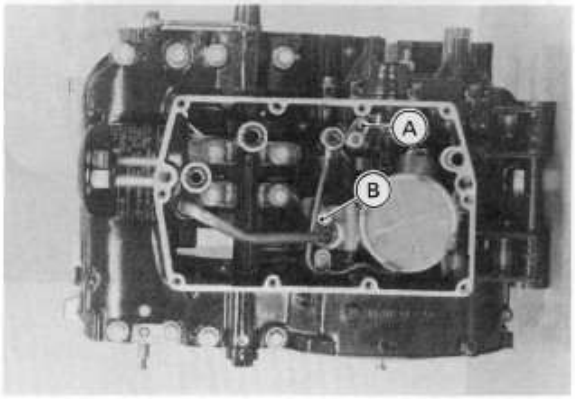
Torque Value for 8 mm Bolts

First:	**14 N-m (1.4 kg-m, 10.0 ft-lb)**
Final:	**27 N-m (2.8 kg-m, 20 ft-lb)**

○Torque the 6 mm bolts to the specification (see Exploded View).
- Install the main oil pipe connecting pipe.

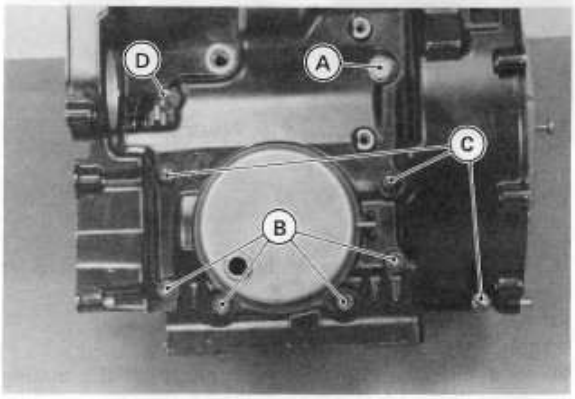
○Check that the O-rings are in good condition.
☆If they are damaged, replace new ones.
○Apply a small amount of oil to the O-rings.
○The positioning hole in the connecting pipe must fit the boss on the lower case.
- Install the oil pump outer pipe.

○Apply a small amount of oil to the pipe both end connectors.
○Apply a non-permanent locking agent to the threads of the oil pipe mounting bolt.



A. Boss B. Mounting Bolt

- Install the oil pan (see Oil Pan and Relief Valve in the Engine Lubrication chapter).
- Turn the engine over so it is upright.
- Put the 8 mm bolt, each of the Allen bolts and the 6 mm bolts into the upper crankcase half as shown in the figure, torque the 8 mm bolt first, then the other bolts in the sequence shown to the specified torque (see Exploded View).



A. 8 mm Bolt C. 6 mm Bolts (60 mm Length)
B. Allen Bolts D. 6 mm Bolts (40 mm Length)

●After tightening all crankcase bolts, check the following items:
○Drive shaft and output shaft turn freely.
○While spinning the output shaft, gears shift smoothly from the 1st to 6the gear, and 6th to 1st.
○When the output shaft stays still, the gear can not be shift to 2nd gear or other higher gear positions.

Clutch Housing/Primary Chain

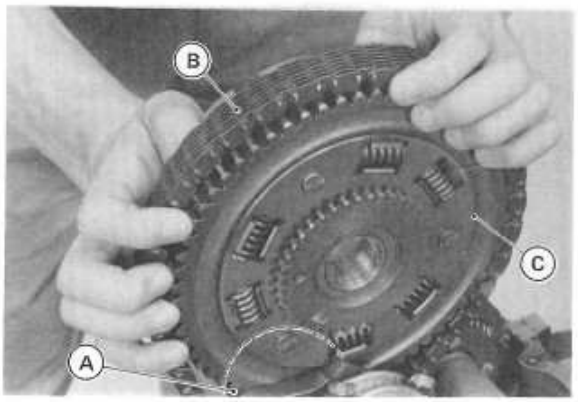
Clutch Housing/Primary Chain Removal

●Remove the engine.
●Remove the following parts:
Cylinder Head, Cylinder and Pistons
Alternator Rotor and Starter Clutch
Starter Clutch Sprocket, Starter Motor Sprocket and Starter Chain
Clutch (except the Clutch Housing)
●Split the crankcase.
●Lift up the transmission drive shaft assembly, and pull the shaft out of the clutch housing on the primary chain.



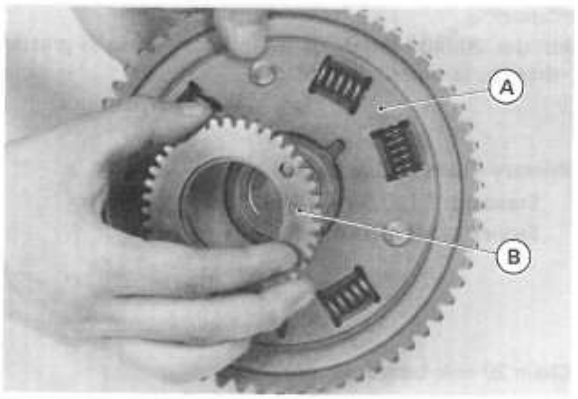
A. Drive Shaft B. Clutch Housing

●Place the clutch housing on the balancer drive gear, slack off the primary chain as much as possible and slip the primary chain off the clutch housing sprocket.



A. Balancer Drive Gear C. Clutch Housing Sprocket
B. Primary Chain

●Remove the clutch housing.
●Pull off the oil pump drive gear from the clutch housing.

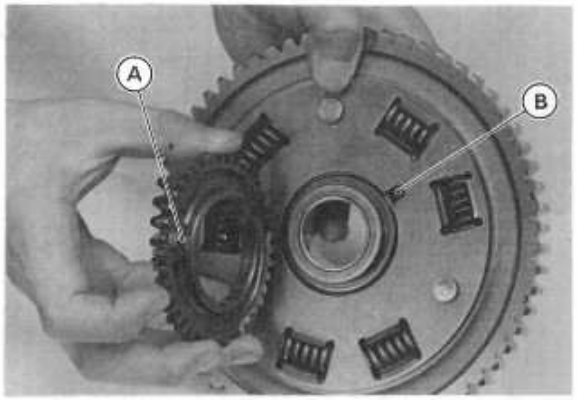


A. Clutch Housing B. Oil Pump Drive Gear

●Lift up the crankshaft, and remove the primary chain.

Clutch Housing/Primary Chain Installation

●Install the primary chain on the sprocket of the crankshaft.
●Install the oil pump drive gear fitting its pin with the groove of clutch housing sprocket.



A. Oil Pump Drive Gear Pin B. Groove

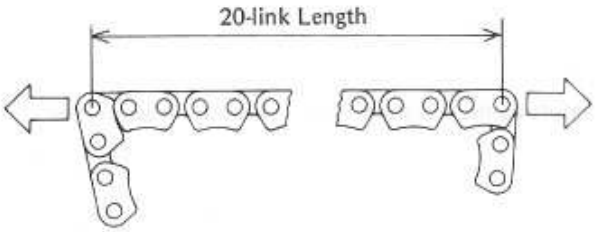
•Install the clutch housing in the reverse order of removal.

Primary Chain Wear

•Pull the primary chain 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: 190.50 – 190.97 mm
Service Limit: 193.4 mm

Chain 20-link Length Measurement



Primary Chain Guide Wear

•Visually inspect the rubber on the guides.
•If the rubber is cut or damaged in any way, replace the guide.

Crankshaft/Connecting Rods

Crankshaft, Connecting Rod Removal/Installation:

Crankshaft Removal

•Remove the engine.
•Remove the pistons.
•Split the crankcase.
•Remove the clutch housing and the primary chain.

Crankshaft Installation Notes

•If the crankshaft or bearing inserts are replaced with new ones, check clearance with plastigage before assembling engine to be sure the correct bearing inserts are installed.

Connecting Rod Removal

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

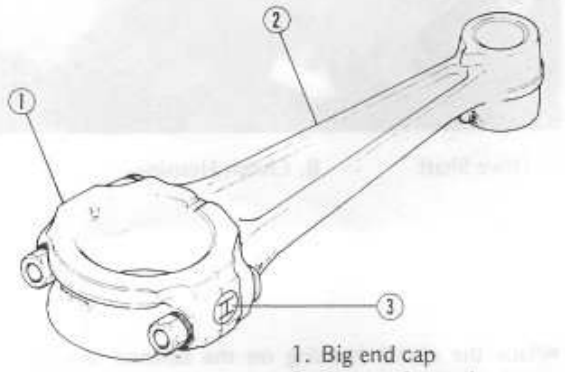
CAUTION

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

Connecting Rod Installation Notes

•The connecting rod and the connecting rod big end cap are machined at the factory in the assembled state, so they must be replaced together as a set.
•To minimize vibration, the connecting rods should have the same weight mark. 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.

Crankshaft, Connecting Rod Inspection/Maintenance:

Crankshaft/Connecting Rod Cleaning

●After removing the connecting rods from the crankshaft clean 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.

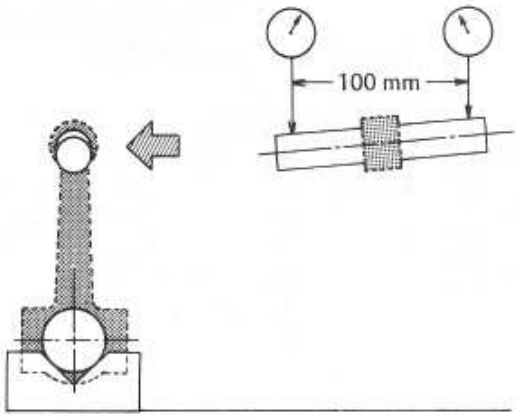
Connecting Rod Bend/Twist

●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 the 20-link length of the primary chain is greater than the service limit, replace it.

Connecting Rod Bend

Service Limit: **0.2/100 mm**

Connecting Rod Bend Measurement

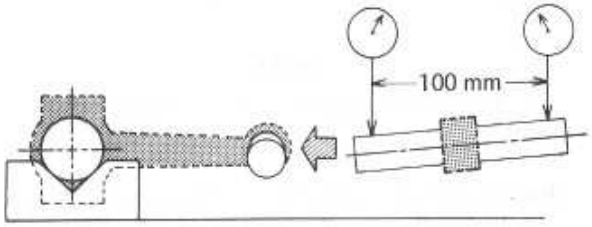


●Measure connecting rod twist.
○With the big-end arbor still on V blocks, hold the connecting rod horizontally and measure the amount that the arbor varies form being parallel with the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.
★If connecting rod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

Connecting Rod Twist

Service Limit: **0.2/100 mm**

Connecting Rod Twist Measurement

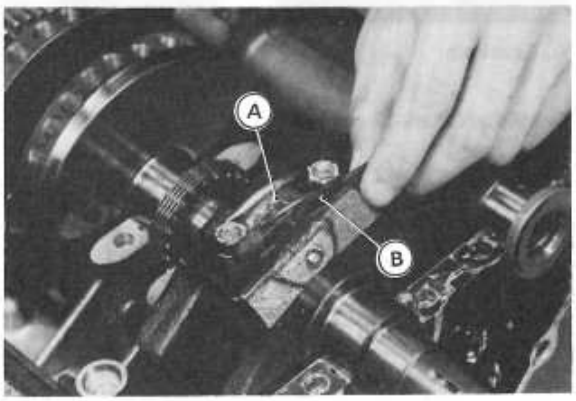


Connecting Rod Big End Side Clearance

●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 – 0.38 mm**
Service Limit: **0.50 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 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.

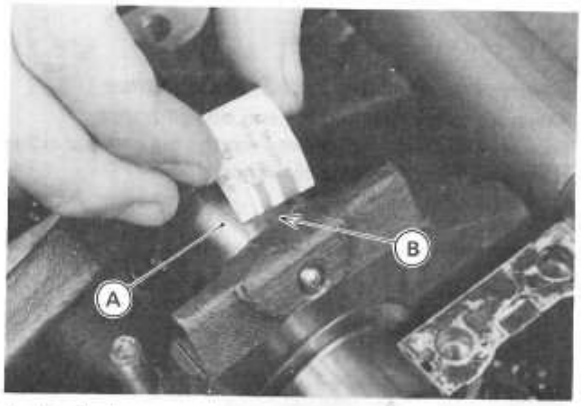
○Cut strips of plastigage to bearing insert width, and place a strip on the crankpin for each connecting rod parallel to the crankshaft so that the plastigage will be compressed between the crankpin and the bearing insert.

○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:	**0.036 – 0.066 mm**
Service Limit:	**0.10 mm**

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

★If clearance is between 0.066 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:	**37.984 – 38.000 mm**
Service Limit:	**37.97 mm**

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

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

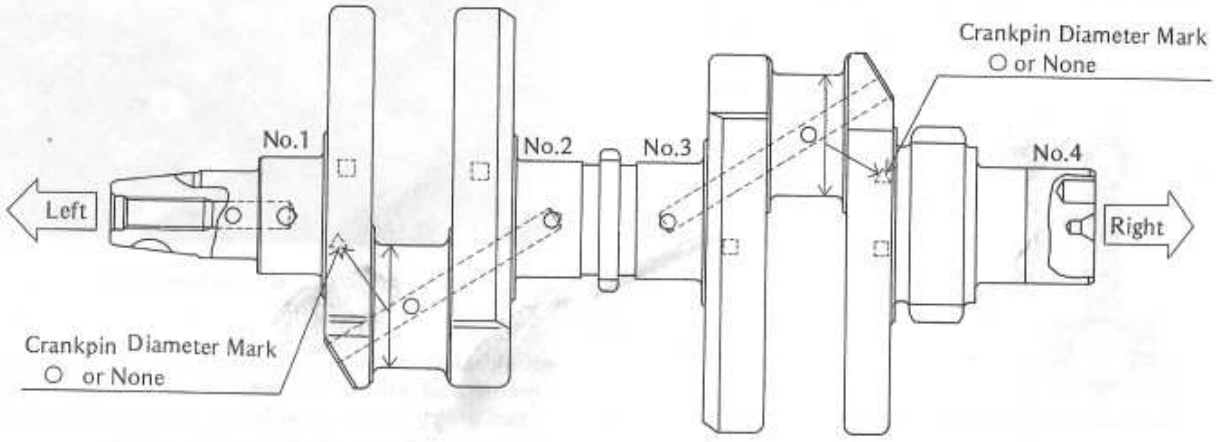
Crankpin Diameter Marks

None:	**37.984 – 37.994 mm**
○ :	**37.995 – 38.000 mm**

•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.

Crankshaft Mark Location



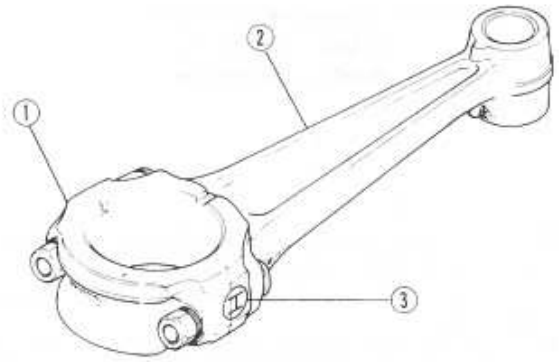
NOTE

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

Connecting Rod Big End Inside Diameter Marks

None:	41.000 – 41.008 mm
○ :	41.009 – 41.016 mm

Connecting Rod Mark Location



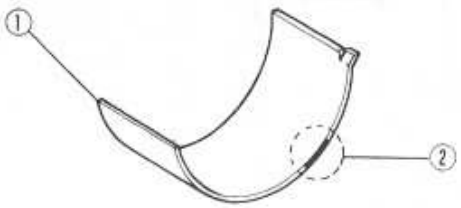
1. Big end cap
2. Connecting rod
3. Diameter mark
   ○mark or no mark, around weight mark alphabet

●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/journal clearance with plastigage.

Bearing Insert Selection

Con-rod Big End Inside Diameter Mark	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	○	Black	92028-1349
None	None		
○	None	Blue	92028-1348
None	○	Brown	92028-1350

Bearing Insert Size Mark Location



1. Bearing insert
2. Color size mark

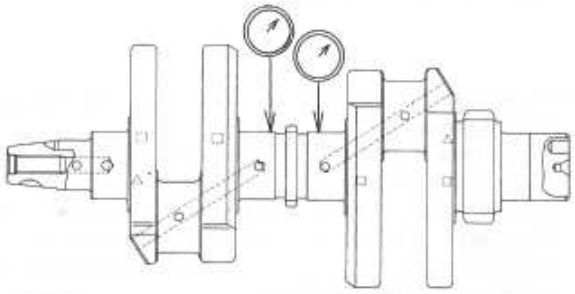
Crankshaft Runout

●Measure the crankshaft runout.
○Set the crankshaft in a flywheel alignment jig or on V blocks.
○Set a dial gauge against the points indicated.
○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

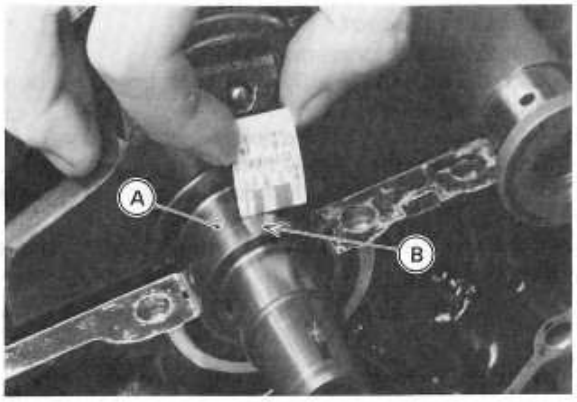
Bearing insert/journal wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

●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: 0.020 – 0.044 mm
Service Limit: 0.08 mm

★If clearance is within the standard, no bearing replacement is required.
★If clearance is between 0.044 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: 35.984 – 36.000 mm
Service Limit: 35.96 mm

★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameter is not less than the service limit, but does not coincide with the original diameter marking on the crankshaft, write a new mark on it.

Crankshaft Main Journal Diameter Marks

None: 35.984 – 35.992 mm
1 : 35.993 – 36.000 mm

●Put the lower crankcase half on the upper crankcase half without bearing inserts, and tighten the case bolts to the specified torque and sequence (see Crankcase Assembly).
●Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

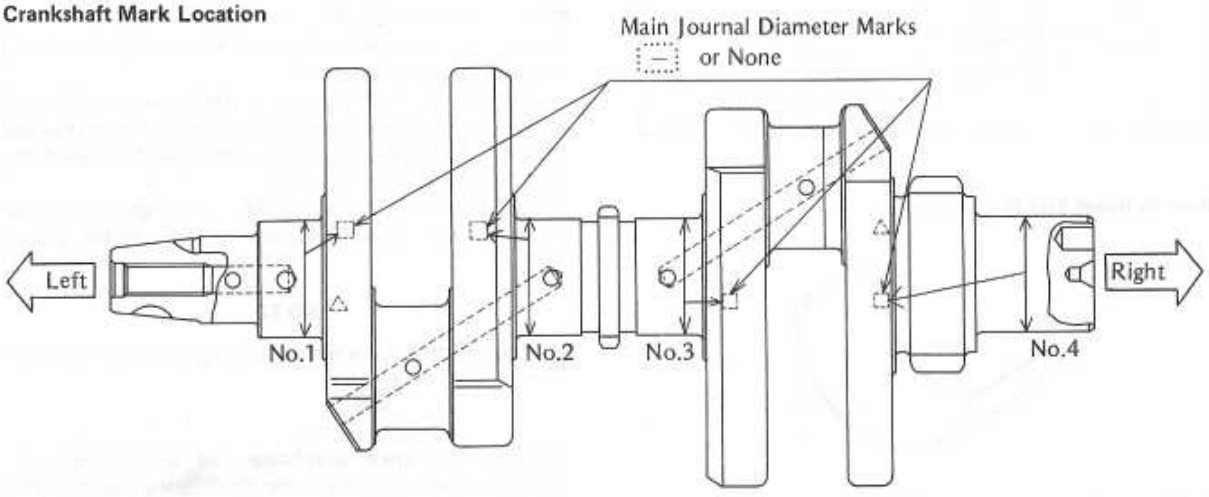
NOTE

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

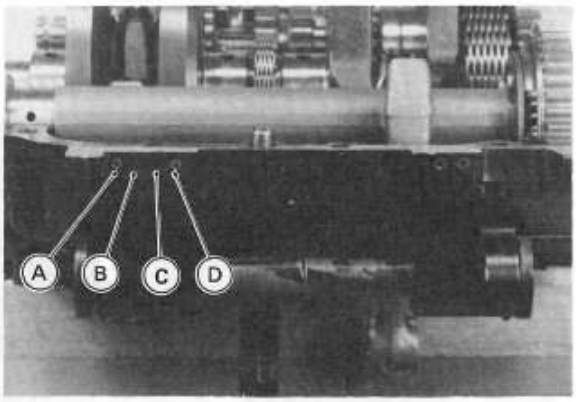
Crankcase Main Bearing Inside Diameter Marks

○ : 39.000 – 39.008 mm
None: 39.009 – 39.016 mm

Crankshaft Mark Location



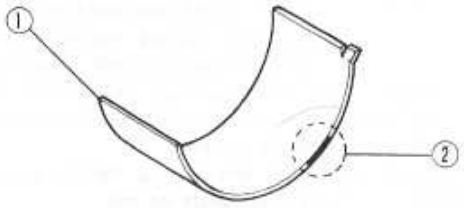
Crankcase Mark Location



A. No. 1 Journal
B. No. 2 Journal
C. No. 3 Journal
D. No. 4 Journal

•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

Crankshaft Side Clearance

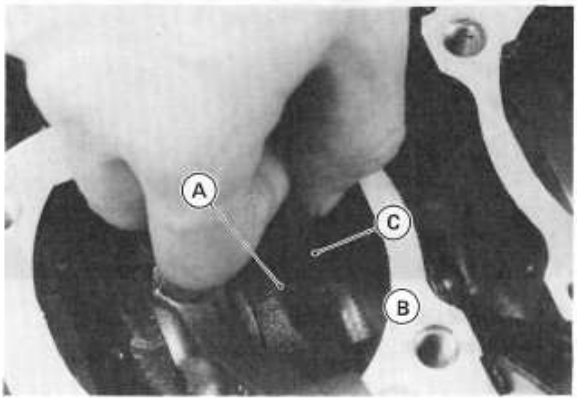
•Measure crankshaft side clearance.
○Install the lower crankcase half on the upper crankcase half, and turn the crankcase upside down.
○Insert a thickness gauge between the upper crankcase and the crank web at the No. 2 or No. 3 journal to determine clearance.
★If the clearance exceeds the service limit, replace the crankcase halves.

NOTE

○*The upper crankcase half and lower crankcase half, are machined at the factory in the assembled state, so they must be replaced as a set.*

Crankshaft Side Clearance

Standard: **0.05 – 0.20 mm**
Service Limit: **0.40 mm**



A. Crank Web
B. Upper Crankcase Half
C. Thickness Gauge

Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1102	2, 3
			92028-1274	1, 4
None	None	Blue	92028-1100	3
			92028-1272	1, 4
○	None	Black	92028-1101	2, 3
None	1		92028-1273	1, 4

*The bearing inserts for Nos. 2 and 3 journals have oil grooves.

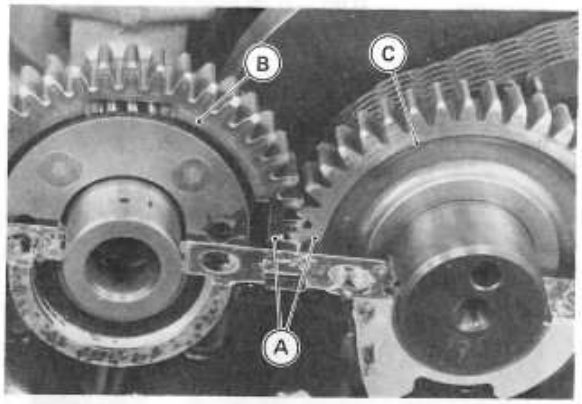
Balancer

Balancer Removal

- Split the crankcase.
- Pull the balancer shaft with the balancer gear out of the crankcase.

Balancer Installation Notes

- Apply oil to the inside of the balancer shaft bearing insert.
- Align the timing mark on the balancer gear with the timing mark on the balancer drive gear of the crankshaft.



A. Timing Mark
B. Balancer Gear
C. Balancer Driver Gear

Balancer Shaft 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.

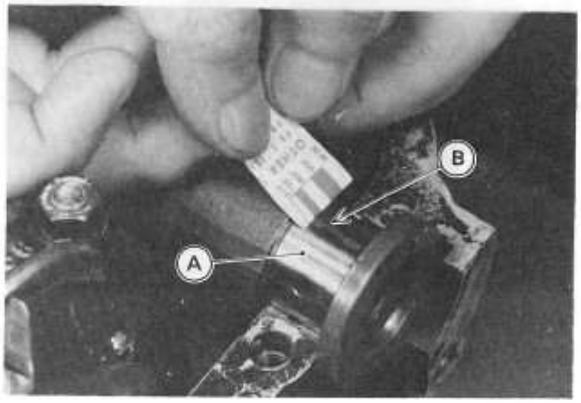
○Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the balancer shaft so that the plastigage will be compressed between the journal and the bearing insert.

○Install the lower crankcase half, and tighten the case bolts to the specified torque (see Exploded View).

NOTE

○Do not turn the balancer shaft during clearance measurement.

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



A. Journal
B. Plastigage

Balancer Shaft bearing Insert/Journal Clearance

Standard:	**0.020 – 0.044 mm**
Service Limit:	**0.08 mm**

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

★If clearance is between 0.044 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 balancer shaft journal.

Balancer Shaft Journal Diameter

Standard:	**27.987 – 28.000 mm**
Service Limit:	**27.96 mm**

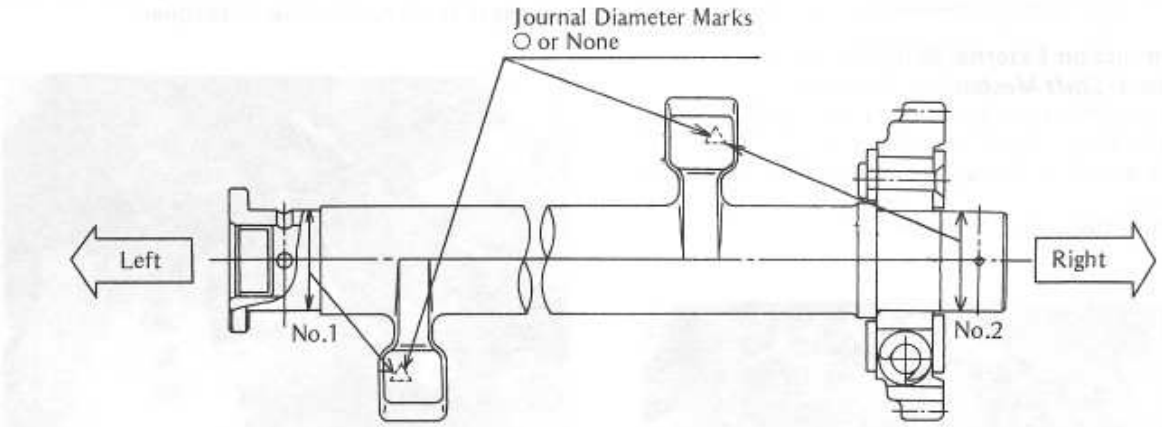
★If either journal has worn past the service limit, replace the balancer shaft with a new one.

★If the measured journal diameter is not less than the service limit, but does not coincide with the original diameter markings on teh balancer shaft, write new marks on it.

Balancer Shaft Journal Diameter Marks

None:	**27.987 – 27.993 mm**
○ :	**27.994 – 28.000 mm**

Balancer Shaft Mark Location



- Put the lower crankcase half on the upper crankcase half without bearing inserts, and tighten the case bolts to the specified torque and sequence (see Crankcase Assembly).
- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

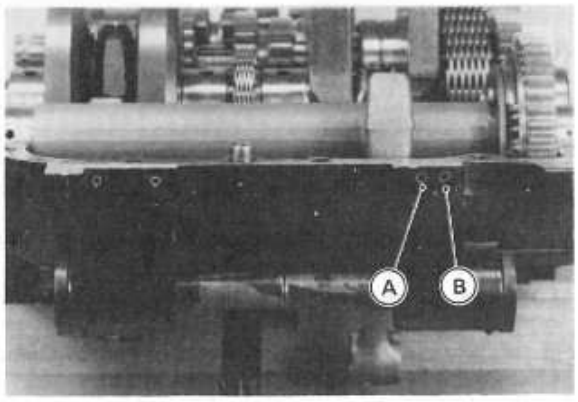
NOTE

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

Crankcase Bearing Inside Diameter Marks

○ :	**31.000 – 31.013 mm**
None:	**31.014 – 31.025 mm**

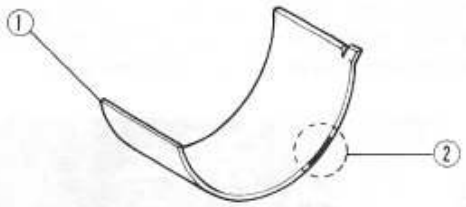
Crankcase Mark Location



A. No. 1 Journal B. No. 2 Journal

- 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.

Balancer Shaft Mark Location



1. Bearing insert 2. Color size mark

Bearing Insert Selection

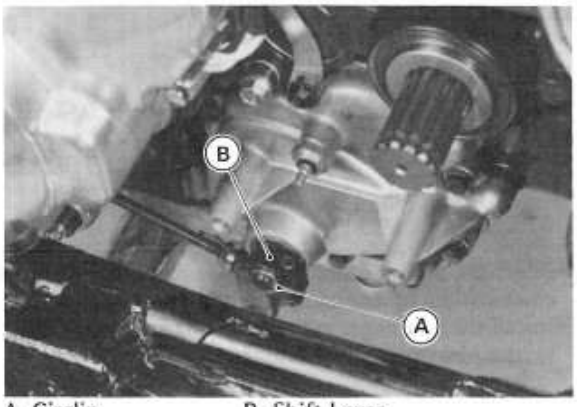
Crankcase Bearing Inside Diameter Mark	Balancer Shaft Journal Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1346
None	None	Blue	92028-1344
○	None	Black	92028-1345
None	○		

Transmission

Transmission External Shift Mechanism:

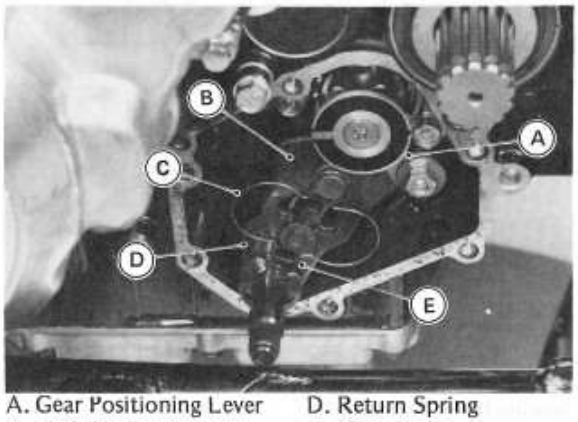
External Shift Mechanism Removal

- Remove the engine pulley (see Engine Removal in the Engine Removal/Installation chapter).
- Place an oil pan beneath the external shift mechanism cover.
- Remove the circlip and the shift lever.



A. Circlip B. Shift Lever

- Remove the external shift mechanism cover bolts and pull off the external shift mechanism cover and gasket. There are two knock pins in the cover mating surface.
- Move the shift mechanism arm out of its position on the shift drum cam, and pull out the shift shaft with the arm, spring, shaft return spring and collar.

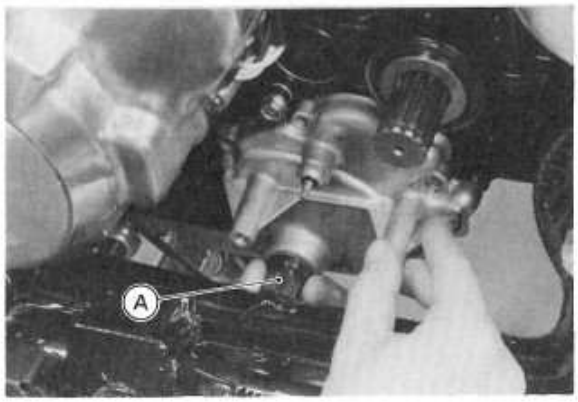


A. Gear Positioning Lever D. Return Spring
B. Shift Mechanism Arm E. Shift Shaft
C. Arm Spring

- Remove the nut and take off the gear positioning lever. The lever has a collar, spring, and washer.

External Shift Mechanism Installation Notes

- The small diameter side of the collar in the gear positioning lever must face toward the crankcase.
- Apply high temperature grease to the seal lips.
- Use oil seal guide (special tool) to protect the seal during shift mechanism cover installation.

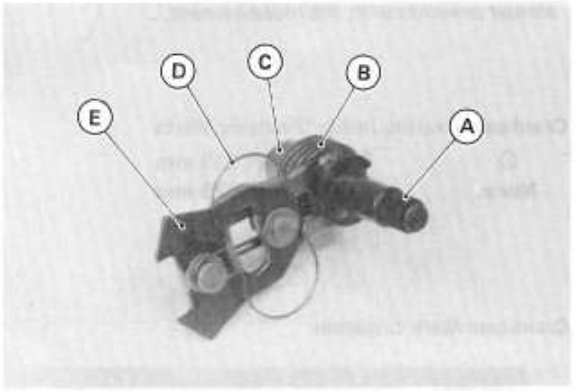


A. Oil Seal Guide: 57001-264

- Check the engine oil level, and add oil if necessary (see Engine Oil and Oil Filter in the Engine Lubrication System chapter).

External Shift Mechanism Inspection

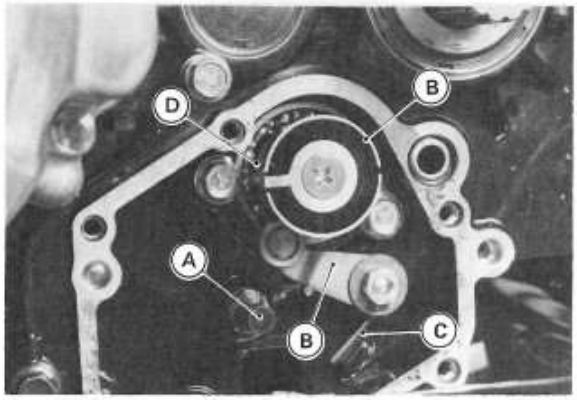
- Examine the shift shaft for any damage.



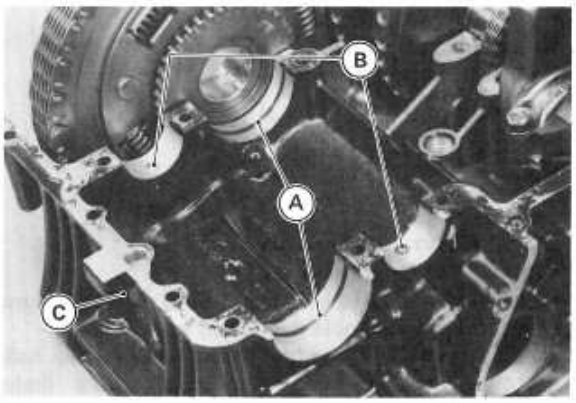
A. Splines D. Arm Spring
B. Return Spring E. Shift Mechanism Arm
C. Collar

○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 arm spring for breaks or distortion.
☆If the springs are damaged in any way, replace them.
○Check the shift mechanism arm for distortion.
☆If the shift mechanism arm is damaged in any way, replace the arm.

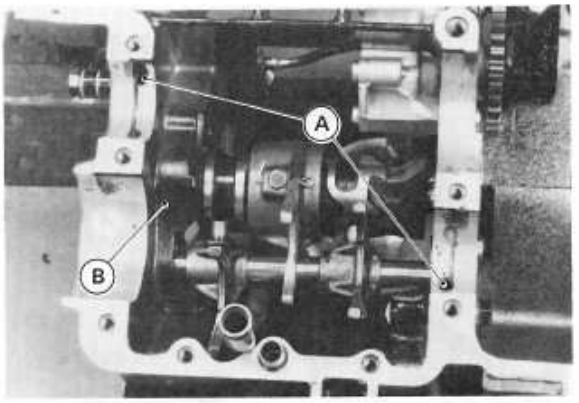
•Check that the return spring pin is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View).
•Check the gear positioning lever, and its spring for break or distortion.
★If the lever or spring is damaged in any way, replace them.
•Visually inspect the shift drum cam and neutral holder.
★If they are badly worn or if they show any damage, replace them.



A. Return Spring Pin
B. Gear Positioning lever
C. Spring
D. Shift Drum Cam
E. Neutral Holder



A. Set Rings
B. Set Pins
C. Upper Crankcase Half



A. Oil Passage Holes
B. Lower Crankcase Half

Transmission Shafts, Shift Drum, Forks:

Transmission Removal/Disassembly:

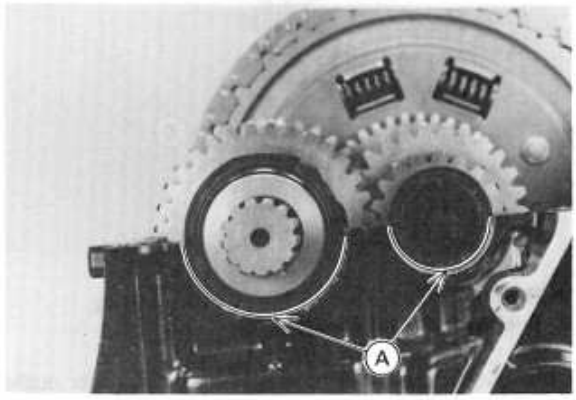
Transmission Shaft Removal

•Remove the engine.
•Disassemble the clutch leaving the clutch housing on the transmission drive shaft.
•Split the crankcase.
•Take out the output shaft assembly.
•Lift up the drive shaft assembly, and pull the shaft assembly out of the clutch housing. Leave the clutch housing and primary chain in place.

Transmission Shaft Installation

•With a high flash-point solvent, clean off the outer circumferences of the transmission ball bearings and needle bearings, and their 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.

•Lift up the clutch housing and primary chain, insert the drive shaft assembly into the clutch housing, and install the drive shaft assembly in the upper crankcase half.
•Install the output shaft assembly 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.

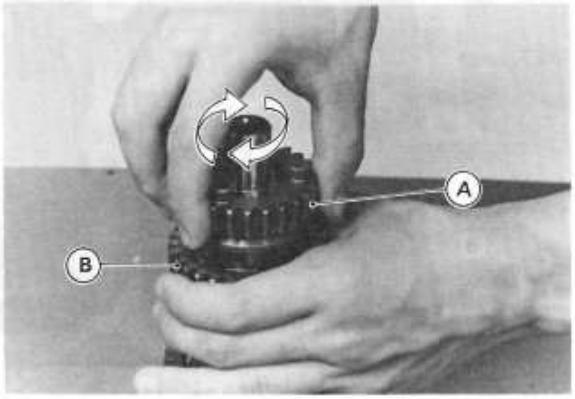


A. No Clearance (both left and right sides)

- Assemble the crankcase.
- Reassemble the clutch.
- Install the engine.

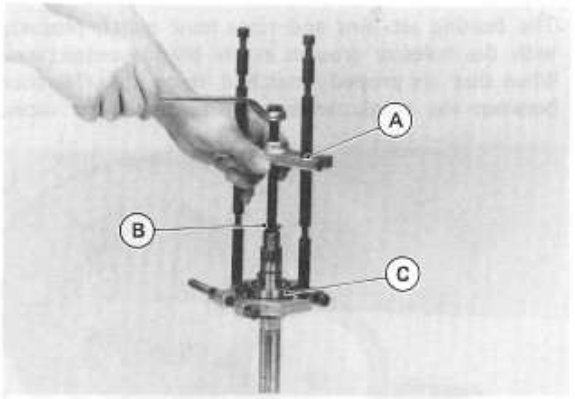
Transmission Shaft Disassembly

- Remove the transmission shafts.
- Using circlip pliers (special tool: 57001-144) to remove the circlips, disassemble the transmission shafts.
- The 5th gear on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. To remove this gear from the shaft, quickly spin the shaft in a vertical position while holding the 3rd gear, and pull off the 5th gear upwards.



A. 5th Gear B. 3rd Gear

- The ball bearings and collar are press-fit on the transmission shafts. To remove the bearings, use a press or the bearing puller and bearing puller adapter (special tool).

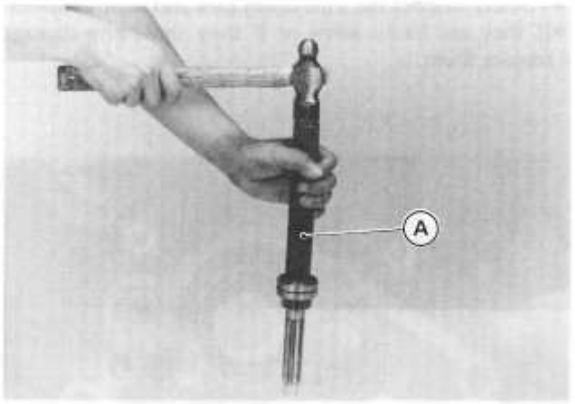


A. Bearing Puller: 57001-135 C. Ball Bearing
B. Bearing Puller Adapter: 57001-317

- The output shaft ball bearing, O-ring and collar ought to be removed together.
- No need the bearing puller adapter at output shaft.

Drive Shaft Assembly

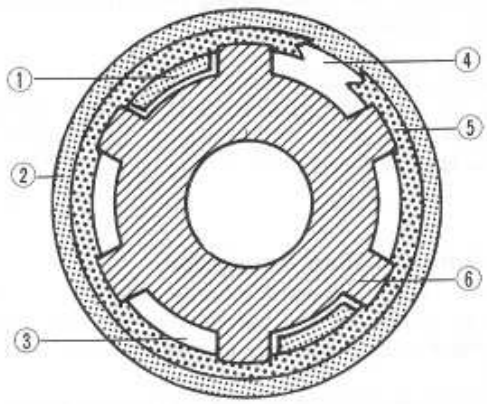
- Assembly is the reverse of disassembly. Note the following.
- Apply engine oil liberally to the transmission shaft, gears, bearings and bushing.
- Install the drive shaft ball bearing using the driver (special tool).



A. Driver: 57001-382

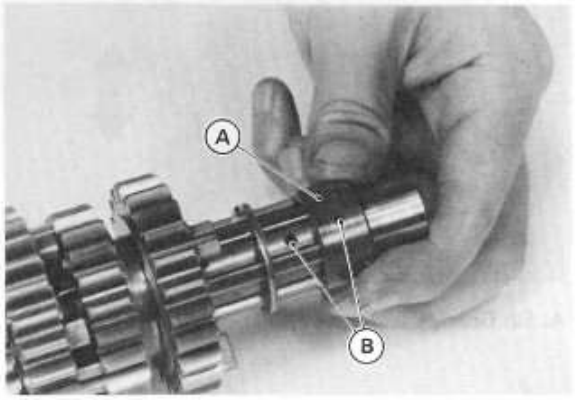
- Replace any circlips that were removed with new ones.
- Always install circlips so that the opening is aligned with a spline groove, and install toothed washers so that the teeth are not aligned with the circlip opening. To install a circlip without damage, fit the circlip onto the shaft expanding it just enough to install it, and use a suitable gear to push the circlip into place.

Circlip and Toothed Washer Installation



1. Teeth of Toothed Washer
2. Toothed Washer
3. Groove of Shaft
4. Opening of Circlip
5. Circlip
6. Shaft

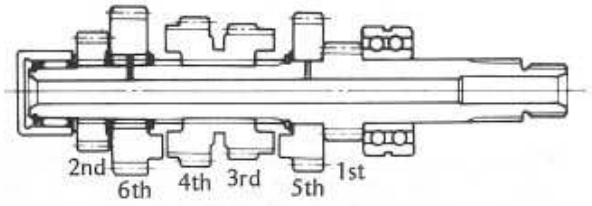
•When assembling the drive shaft 6th gear bushing onto the shaft, align its oil hole with the hole in the shaft.



A. 6th Gear Bushing B. Oil Holes

•The drive shaft gears can be identified by size; the smallest diameter gear is 1st gear, and the largest is 6th. Be sure that all parts are put back in the correct sequence, facing the proper direction, and all circlips and washers are properly in place.

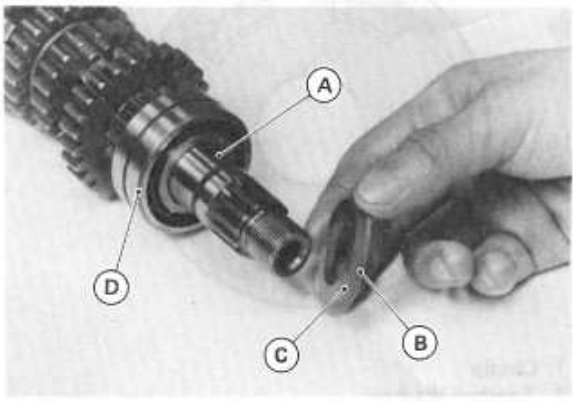
Drive Shaft Gears



•Proper sequence starting with 1st gear (part of drive shaft) is: 1st gear, 5th gear (face the flat side of the gear to the right), washer, circlip, 3rd/4th gear (face 3rd gear side to the right), circlip, toothed washer, bushing (align the oil hole with the hole in the shaft), 6th gear (face the dogs to the right), toothed washer, circlip, 2nd gear, spacer, needle bearing, needle bearing outer race, and plug.

○The toothed washer before the bushing has slightly smaller teeth than the last one.

•Install the spacer onto the drive shaft, facing the chamfered side to the ball bearing.



A. Drive Shaft C. Chamfered Side
B. Spacer D. Ball Bearing

•Check that each gear spins or slides freely on the transmission shaft without binding.

Output Shaft Assembly

•Assembly is the reverse of disassembly. Note the following.

•Apply engine oil liberally to the transmission shaft, gears, bearings, bushing and O-ring.

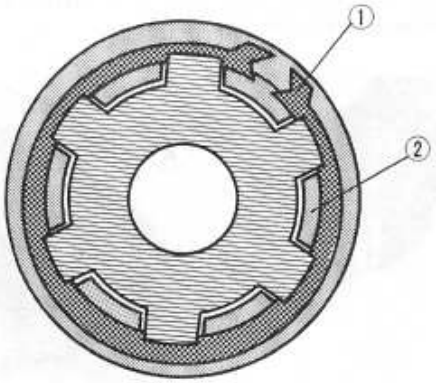
•Install the output shaft ball bearing, O-ring and collar using the driver (special tool: 57001-382).

○The ball bearing, O-ring and collar ought to be installed individually.

•Replace any circlips that were removed with new ones.

○Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, fit the circlip onto the shaft expanding it only enough to install it, and use a suitable gear to push the circlip into place.

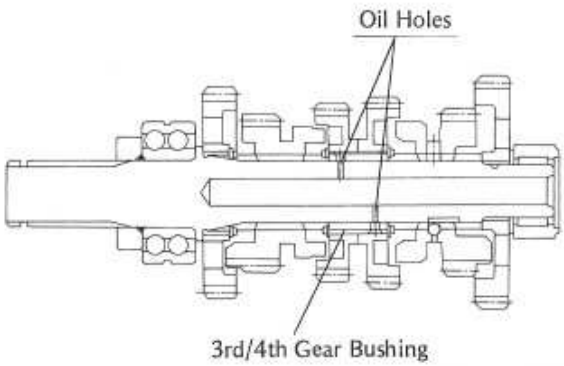
Circlip and Toothed Washer Installation



1. Circlip
2. Toothed Washer

•When assembling the output shaft 3rd/4th gear bushing to the shaft, align its oil holes with the holes in the shaft.

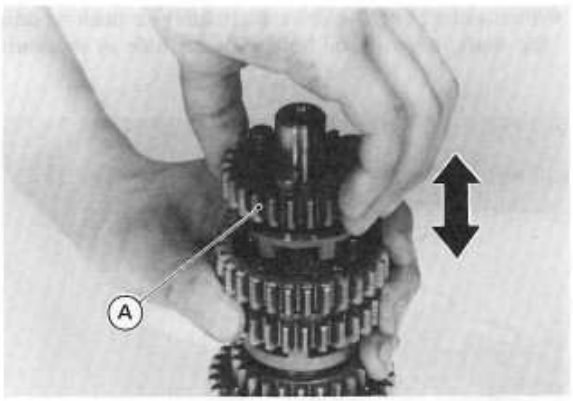
Oil Holes Alignment



•When installing the 5th gear and steel balls on the output shaft, do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

•Check the effect of ball-locking, after assembling the 5th gear and steel balls on the output shaft.

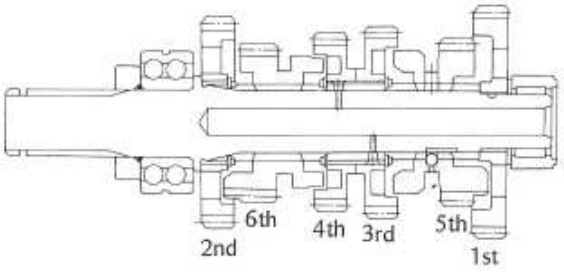
○Check that the 5th gear does not come out of the output shaft when moring it up and down by hands.



A. 5th Gear

•The output shaft gears can be identified by size; the largest diameter gear is 1st gear, and the smallest in 6th. Be sure that all parts are put back in the collect sequence and facing the proper direction, and that all circlips and washers are properly in place.

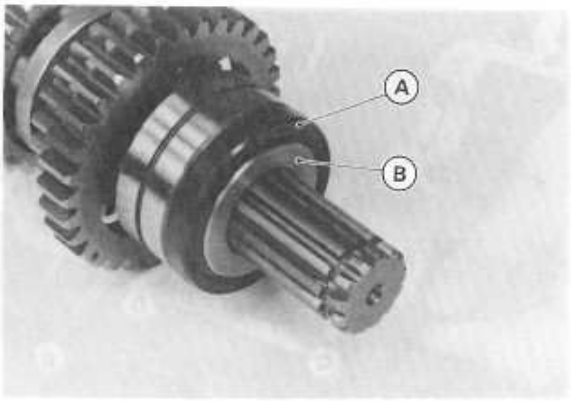
Output Shaft Gears



•Proper sequence starting with 2nd gear is: 2nd gear (face the flat side of the gear to the left), toothed washer, circlip, 6th gear (face the fork groove side to the right), circlip, toothed washer, bushing (align the oil holes with the holes in the shaft), 4th gear (face the side with the dog recesses to the left), 3rd gear (face the side with the dog recesses to the right), toothed washer, ciclip, 5th gear (face the fork groove side to the left) and steel balls (3), 1st gear (face the flat side of the gear to the right), spacer, needle bearing, and needle bearing outer race.

•Press the oil seal onto the collar so it is flush with the end of collar.

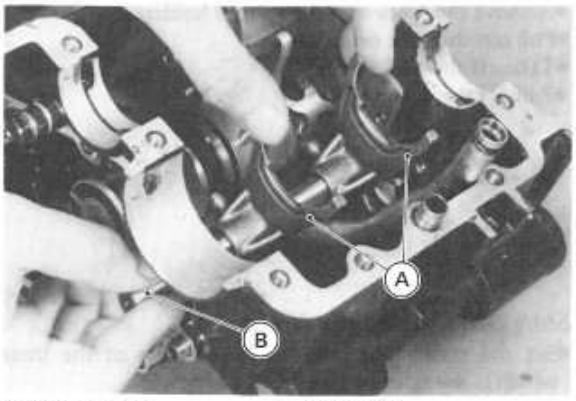
•Check that each gear spins or slides freely on the transmission shaft without binding.



A. Oil Seal B. Collar

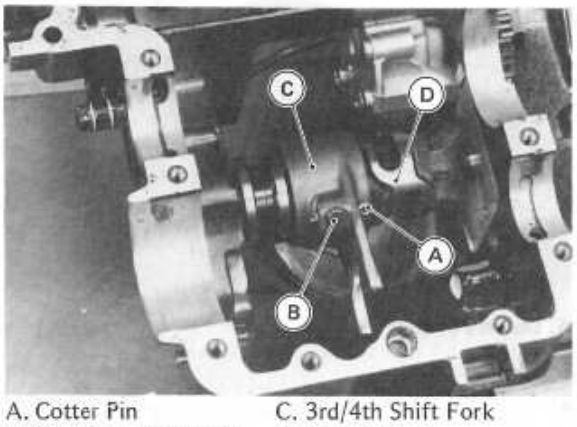
Shift Drum and Fork Removal

- Remove the external shift mechanism cover.
- Pull out the shift rod, and remove the two shift forks in the lower crankcase half.



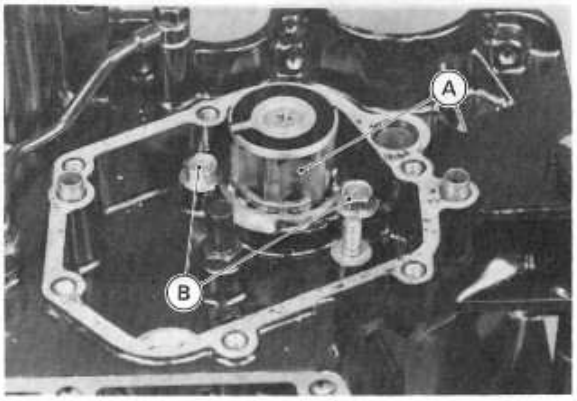
A. Shift Forks B. Shift Rod

- Take out the breather return pipe.
- Remove the cotter pin, and pull out the 3rd/4th shift fork guide pin.



A. Cotter Pin C. 3rd/4th Shift Fork
B. Shift Fork Guide Pin D. Shift Drum

- Remove the external shift mechanism.
- Remove the bolts holding the shift drum ball bearing.

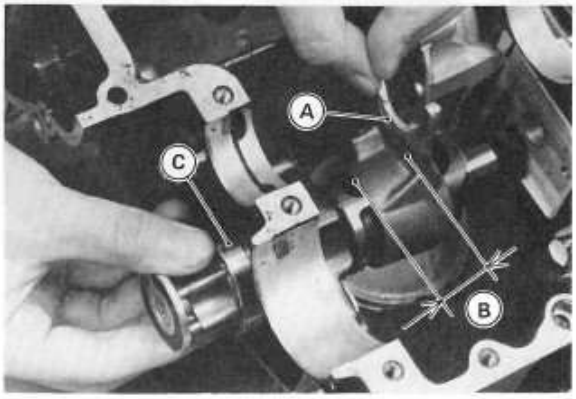


A. Shift Drum B. Holding Bolts

- Pull out the shift drum slightly, and remove the 3rd/4th shift fork. Pull the shift drum free from the crankcase.

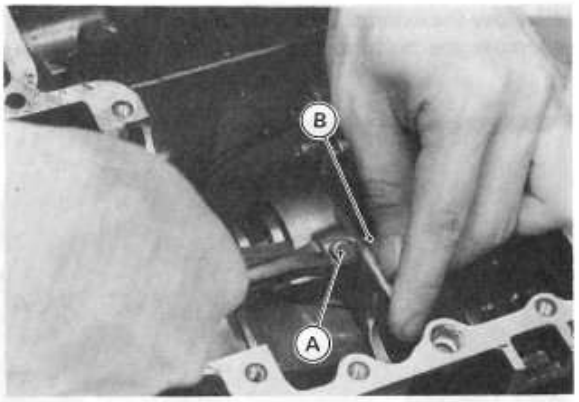
Shift Drum and Fork Installation

- Insert the shift drum into the crankcase part way, install the 3rd/4th shift fork with the long end facing the neutral switch, i.e., the long end goes onto the drum first.

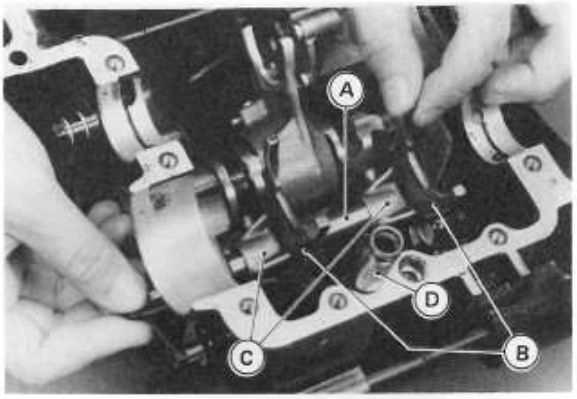


A. 3rd/4th Shift Fork C. Shift Drum
B. Long End

- Push the shift drum in the rest of the way.
- Apply a non-permanent locking agent to the threads of the holding bolts, and tighten them.
- Put the shift fork guide pin into the 3rd/4th shift fork. The guide pin rides in the middle groove of the three guide pin grooves.
- Insert a new cotter pin through the 3rd/4th shift fork and guide pin from the short end side of the shift fork, and spread the cotter pin long end inward.

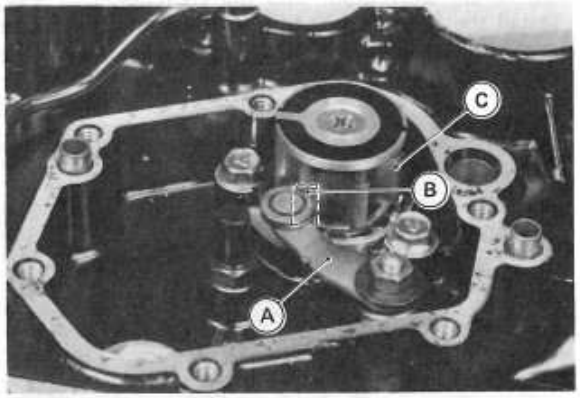


A. Shift Fork Guide Pin B. Cotter Pin



A. Shift Rod
B. Shift Forks
C. Long End
D. Breather Return Pipe

- Install the washer, spring, gear positioning lever, collar and nut.
- Set the shift drum in the neutral position, that is, fit the gear positioning lever into the detent on the shift drum cam.



A. Gear Positioning Lever
B. Neutral Detent
C. Shift Drum Cam

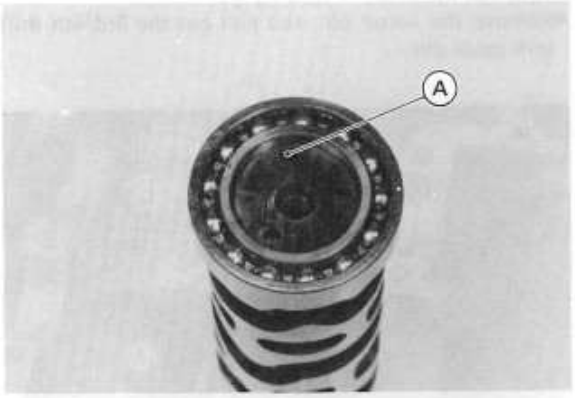
- Install the shift shaft.
- Install the breather return pipe.
- Apply a little engine oil to the shift rod and shift fork ears. Insert the shift rod, running it through the shift forks, fitting each shift fork guide pin into the shift drum groove. The shift forks are identical, and must be installed with their long ends facing toward the external shift mechanism.

Shift Drum Disassembly

- Remove the screw and the neutral holder.
- Pull out the shift drum cam.
- Take off the ball bearing.
- Pull off the dowel pin.

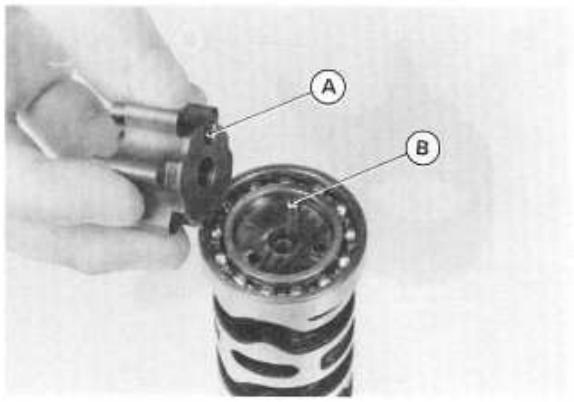
Shift Drum Assembly Notes

- Set the dowel pin into the largest hole of the three which is the farthest hole from the center.



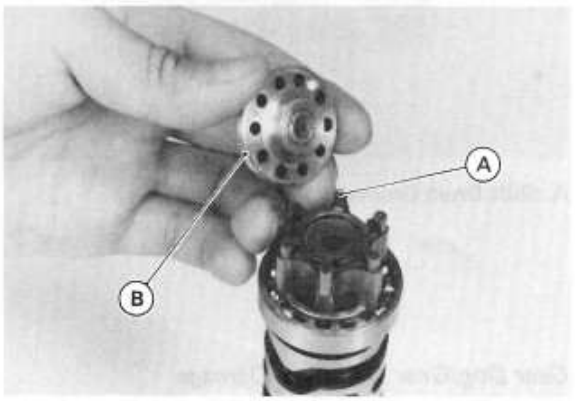
A. Dowel Pin Hole

- Install the shift drum cam aligning its groove with the dowel pin.



A. Groove B. Dowel Pin

•There are six points on the shift drum cam. The highest point must be fit into the back of the neutral holder. If these parts are assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral.



A. Highest Point B. Neutral Holder

•Apply a non-permanent locking agent to the threads of the neutral holder screw.

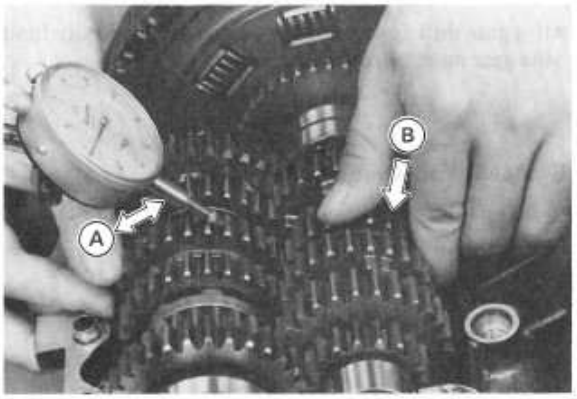
Transmission Maintenance:

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 is the amount of backlash.
★Replace both gears if the amount of backlash exceeds the service limit.

Gear Backlash

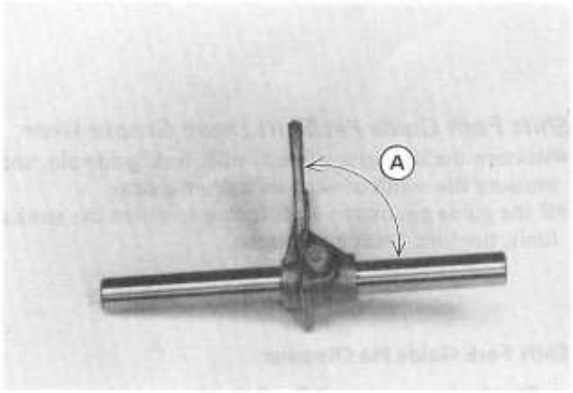
Standard:	**0 – 0.17 mm**
Service Limit:	**0.24 mm**



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 ears shift fork, and measure the width of the shift fork grooves on transmission gears.
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

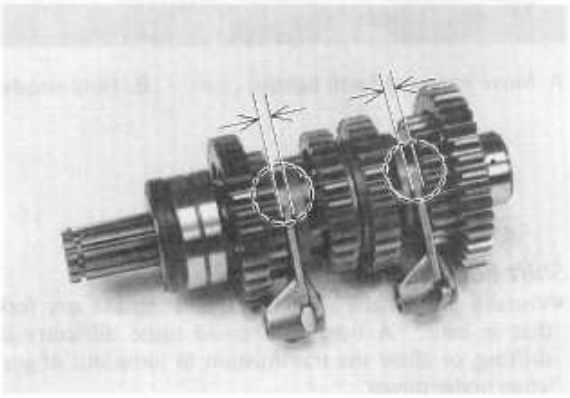
Shift Fork Ear Thickness

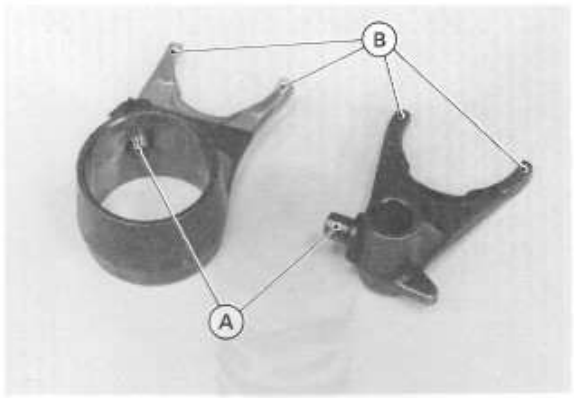
Standard:	**4.9 – 5.0 mm**
Service Limit:	**4.8 mm**

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

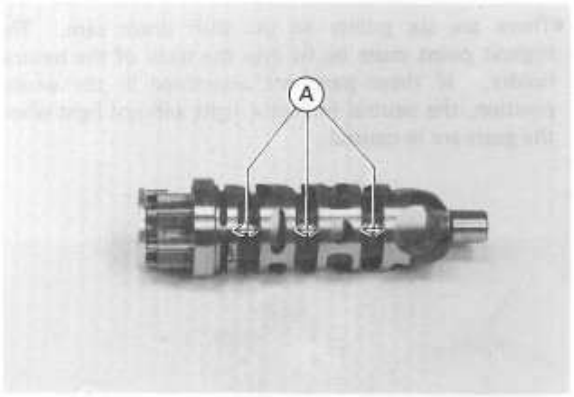
Gear Shift Fork Groove Width

Standard:	**5.05 – 5.15 mm**
Service Limit:	**5.3 mm**





A. Shift Fork Guide Pin B. Shift Fork Ears



A. Shift Drum Grooves

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.

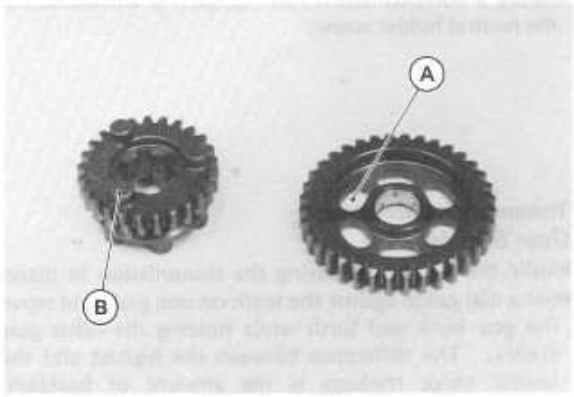
Shift Drum Groove Width

Standard:	**8.05 – 8.20 mm**
Service Limit:	**8.3 mm**

Gear Dog/Gear Dog Hole Damage

●Visually inspect the gear dogs and gear dog holes.

★Replace any damaged gears or gears with excessively worn dogs or dog holes.



A. Dog Hole B. Dog

Ball and Needle Bearing Wear

●Check the following ball bearings: shift drum LH, 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 and output shaft RH.

○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.

Shift Pedal Linkage:

For the motorcycle which has the shift pedal linkage, to make the shift pedal function most effectively, the shift pedal linkage should be at 90° angles. Improper angles of the shift pedal linkage may cause inaccurate shift operation.

Shift Pedal Linkage Adjustment

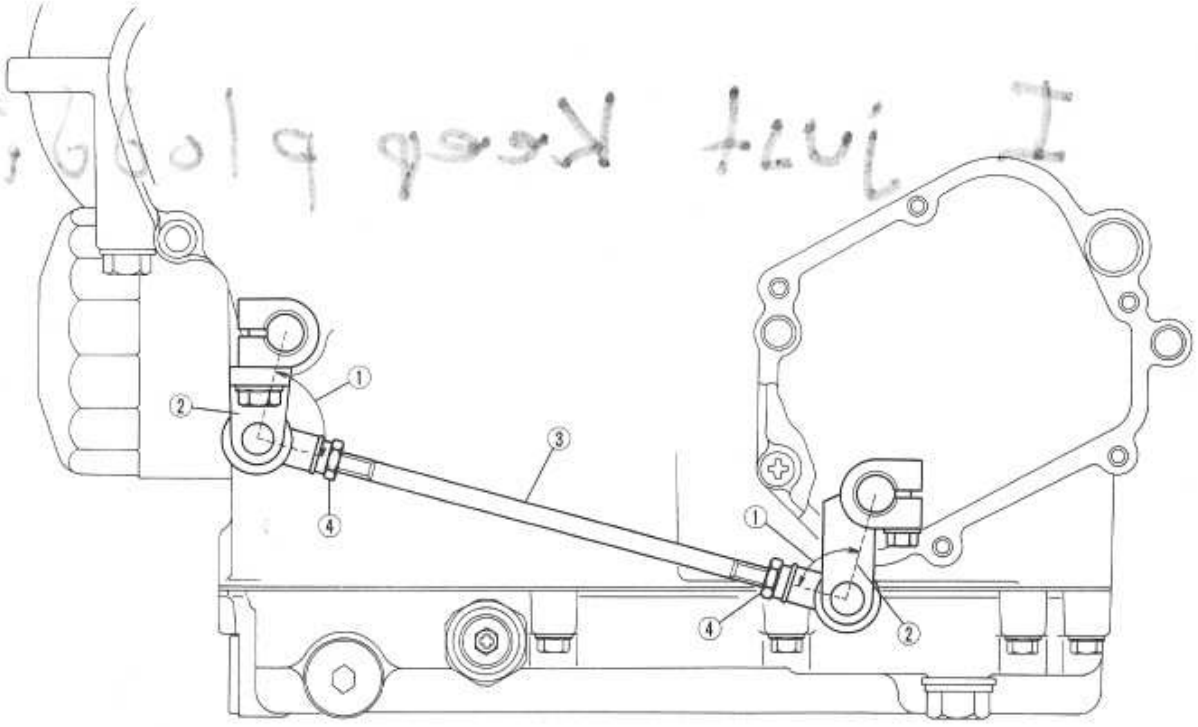
●In case of the linkage angle at the shift lever is improper, first remove the lever, and then remount it at a new position on the shift shaft for the proper angle.

●Tighten the lever bolt.

●Loosen the locknuts of the shift linkage rod.

●Turn the rod to make the proper shift linkage angle, and tighten the locknuts.

Shift Pedal Linkage



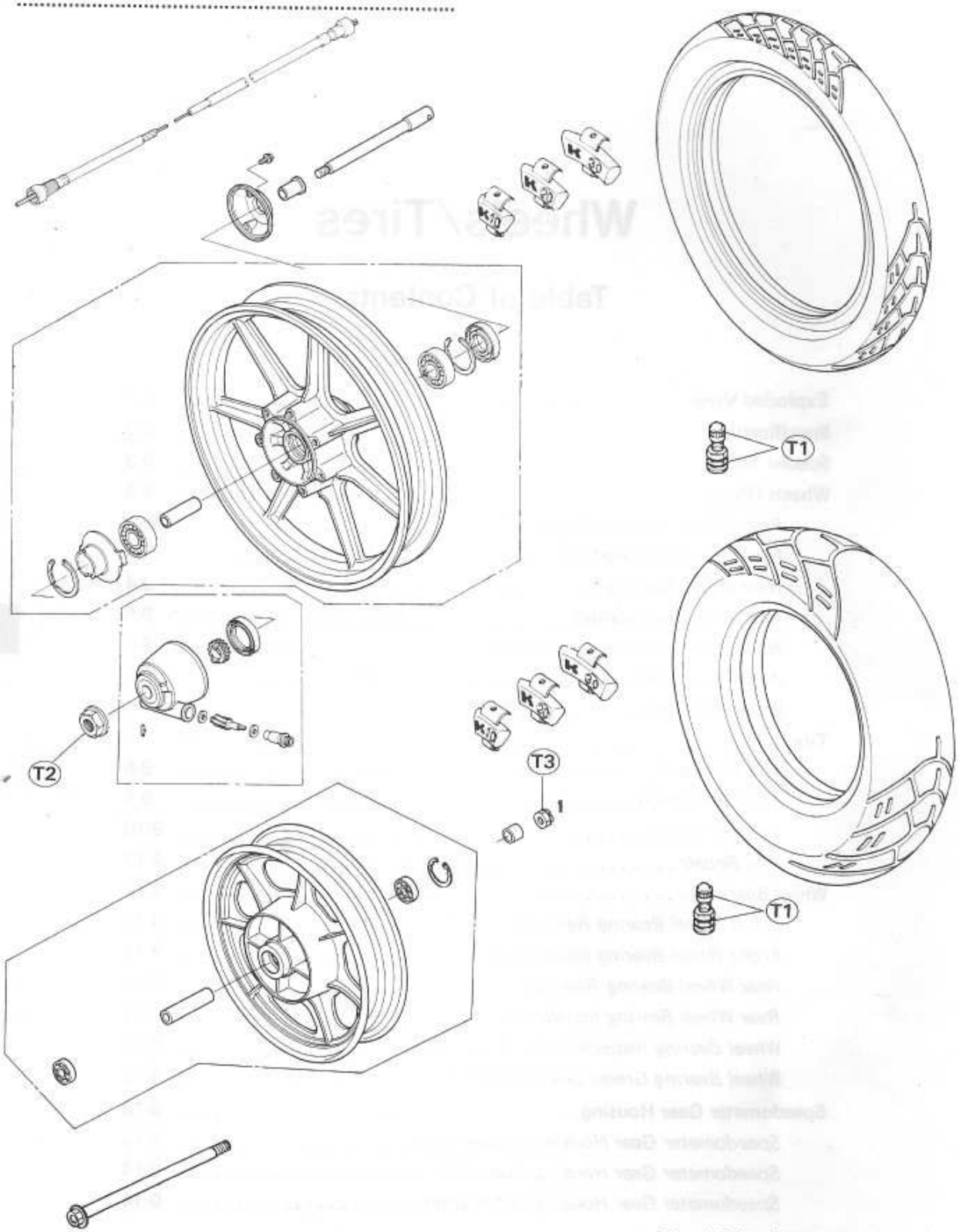
1. 90° 2. Shift Lever 3. Shift Linkage Rod 4. Locknut

Wheels/Tires

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Exploded View



T1: 1.5 N-m (0.15 kg-m, 13 in-lb)
T2: 88 N-m (9.0 kg-m, 65 ft-lb)
T3: 125 N-m (13 kg-m, 94 ft-lb)

Specifications

Tire Tread Depth
- Front
  - Standard: 4.3 mm
  - Service Limit: 1 mm
- Rear
  - Standard: 7.7 mm
  - Service Limit: 2 mm

Standard Tire
- Front: 100/90-19 57S
  TUBELESS BRIDGESTONE G523 or
  TUBELESS DUNLOP F17
- Rear: 140/90-15 70S
  TUBELESS BRIDGESTONE G524 or
  TUBELESS DUNLOP K425

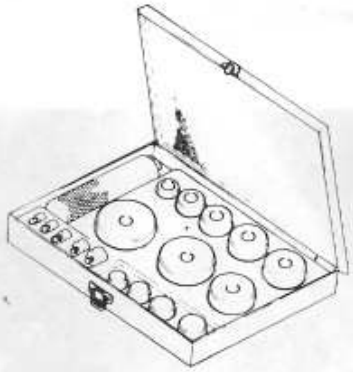
Tire Air Pressure (when cold)
- (US, Canadian, Australian, South African and Swedish Models)
  - Front: 196 kPa (2.00 kg/cm^2, 28 psi)
  - Rear: Up to 956 N (97.5 kg, 215 lb):
    196 kPa (2.00 kg/cm^2, 28 psi)
    956 – 1,520 N (97.5 – 155 kg, 215 – 342 lb):
    221 kPa (2.25 kg/cm^2, 32 psi)
- (Other than the above models)
  Up to 1,824 N (186 kg, 410 lb):
  196 kPa (2.00 kg/cm^2, 28 psi)

Rim Runout Service Limit
- Axial: 0.5 mm
- Radial: 0.8 mm

Axle Runout
- Standard: Under 0.05/100 mm
- Service Limit: 0.2/100 mm (0.7/100 mm : RL)
- Rear
  - Standard: Under 0.05 mm
  - Service Limit: 0.2/100 mm (0.7/100 mm : RL)

Special Tools

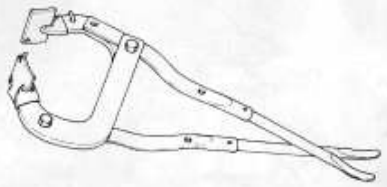
Bearing Driver Set: 57001-1129



Rim Protector: 57001-1063



Bead Breaker Ass'y: 57001-1072



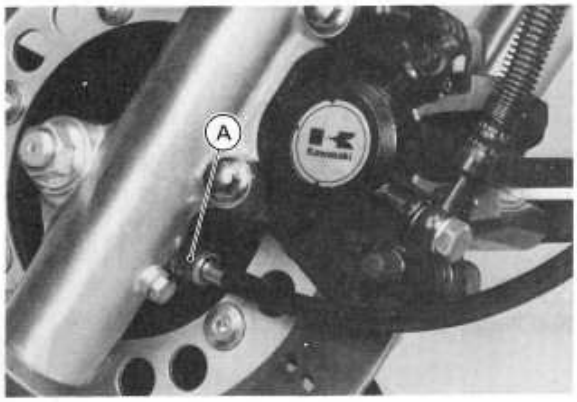
Tire Iron: 57001-1073



Wheels (Rims)

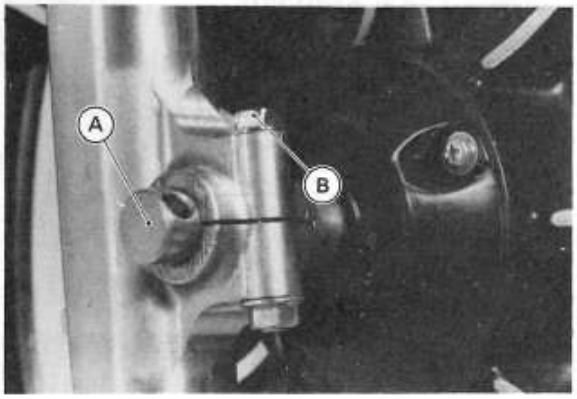
Front Wheel Removal

●Remove the following parts before front wheel removal.
Speedometer Cable Lower End



A. Speedometer Cable

Right Side Axle Clamp Bolts Loosend



A. Axle B. Axle Clamp Bolt

Axle Loosened

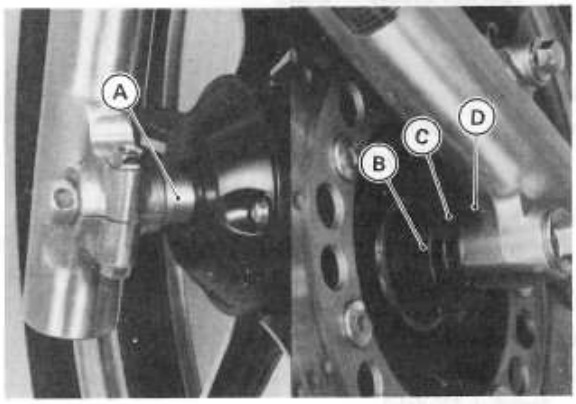
●Use a jack under the engine or other suitable means to lift the front of the motorcycle. Pull out the axle to the right and drop the front wheel out of the forks.
●Remove the front wheel.

CAUTION

○**Do not lay the wheel down on the disc. This can damage or warp the disc.**

Front Wheel Installation

●When installing the front wheel, be careful of the following items.
○Installation is the reverse of removal.
○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
B. Speedometer Gear Housing
C. Housing Stop
D. Fork Leg Stop

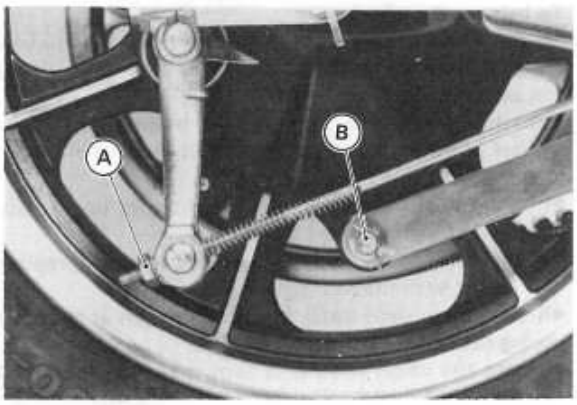
○Tighten the axle nut to the specified torque.
○Tighten the axle clamp bolts to the specified torque.
○Check the front brake.

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.
Drive Belt Cover (Remove)
Rear Brake Cable Adjuster (Remove)
Torque Link Lower Bolt (Remove)
Axle Nut and Axle (Remove)
Belt Tension Adjuster (Remove)
●Pull the drive belt toward the left, and remove the rear wheel.



A. Rear Brake Cable Adjuster
B. Torque Link Lower Bolt

Rear Wheel Installation

- Installation is the reverse of removal. Note the following.
- ○Adjust the drive belt tension after installation (see Drive belt tension Adjustment in the Final Drive chapter).
- ○Adjust the brake pedal free play (see Brake Pedal Free play in the Brakes chapter).
- ○Tighten the axle nut and axle clamp bolts to specified torque.

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.

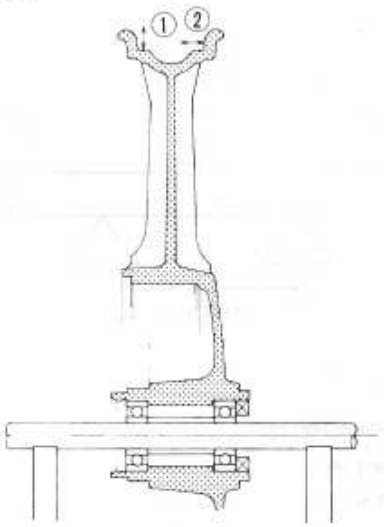
Axial Runout

Service Limit: 0.5 mm

Radial Runout

Service Limit: 0.8 mm

Rim Runout



1. Radial Runout
2. Axial 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.

- Carefully inspect the wheel for small cracks, dents, bending, or warp.

★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.

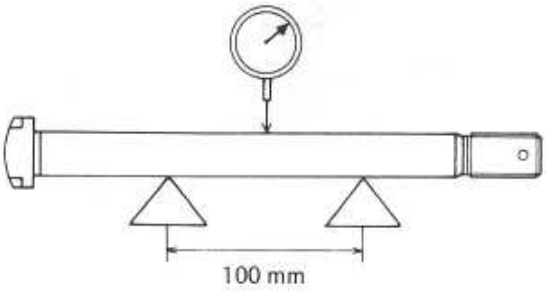
Axle Inspection

- 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 block.
- Turn the axle to measure the runout. The amount of runout is the amount of dial variation.

★If runout exceeds the service limit, straighten the axle or replace it.

★If the axle cannot be straightened to within service limit, or if runout exceeds the repair limit, replace the axle.

Axle Runout



Axle Runout/100 mm

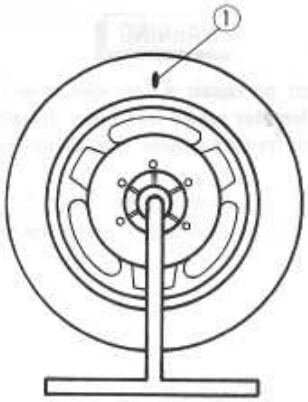
Service Limit:	**0.2 mm**
Repair Limit:	**0.7 mm**

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 an adhesive tape.

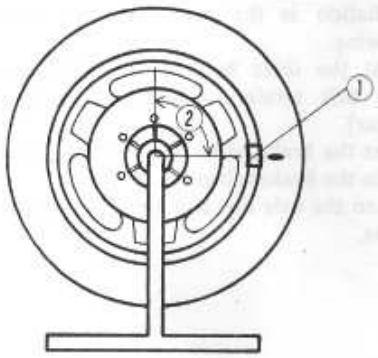
- Rotate the wheel ¼ turn, and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★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.

Wheel Balance Adjust



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 on 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 rim flat portion.

WARNING

○Replace the balance weight, if it has any play on the rim flange, the blade and/or clip of the weight are widened, or the weight is loose on the blade-and-clip plate.

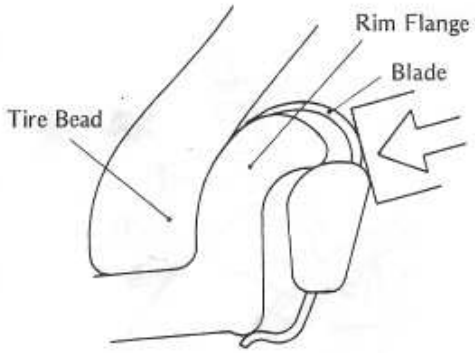
○Do not reuse used balance weights.

Balance Weight

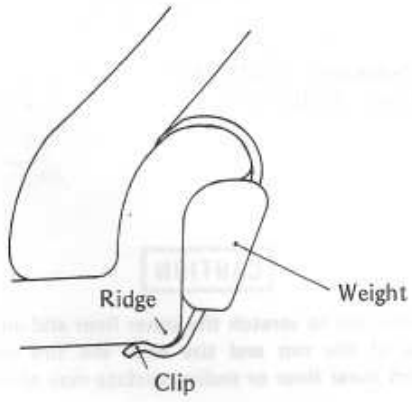
Part Number	Weight (grams)
41075-1014	10
41075-1015	20
41075-1016	30

Installing Balance Weight.

(a) Press or lightly hammer the weight onto the rim flange.



(b) Installation completed.



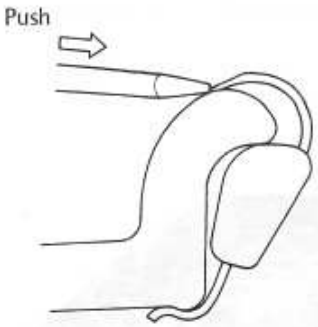
Removal of Balance Weight:

(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.

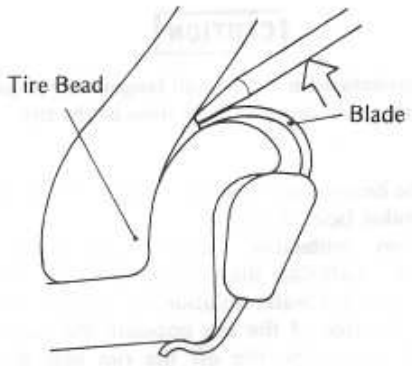
●Pry the Balance weight off the rim flange using a regular tip screw driver as shown in the figure.

○Insert a tip of the screw driver between the tire bead and weight blade until the end of the tip reaches the end of the weight blade.

○Push the driver grip toward the tire so that the balance weight slips off the rim flange.

●Discard the used balance weight.

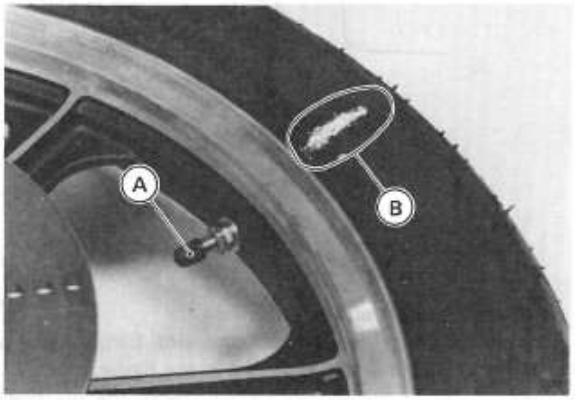
Removing Balance Weight (with tire on rim)



Tires

Tire Removal

- Remove the wheel from the motorcycle.
- For the front tire, remove the disc and wheel cap from the hub.
- For the rear tire, remove the wheel coupling sleeve, wheel coupling, brake panel, and coupling collar from the hub.
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire will be reinstalled in the same position.
- Take out the valve core to let out the air.



A. Valve Core B. Chalk Mark

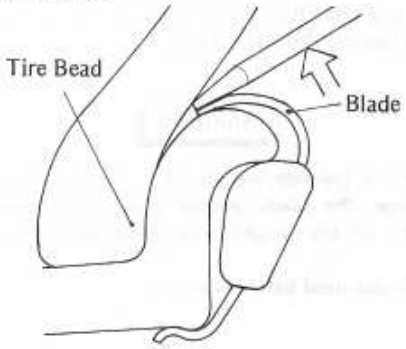
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

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 bead breaker (special tool).
- Install rim protectors (special tool) 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 tool).

Tire Beads Brake

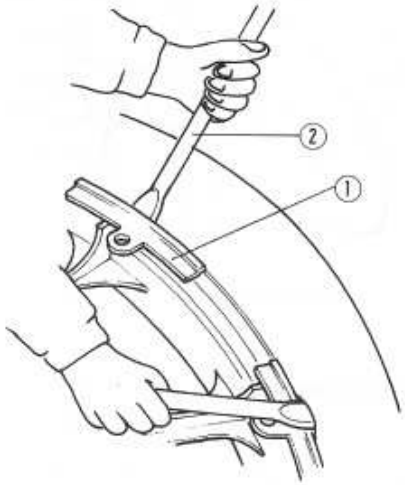


1. Bead Breaker: 57001-1072

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.*

Tire Removal

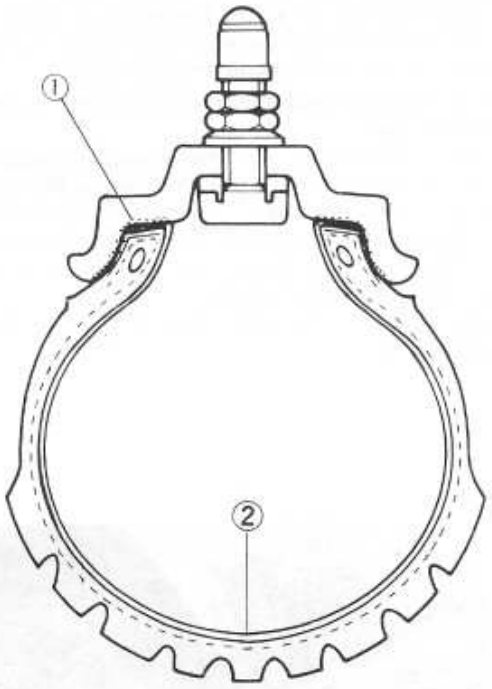


1. Rim Protectors: 57001-1063
2. Tire Irons: 57001-1073

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

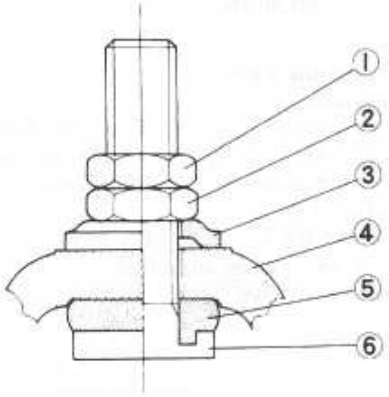


1. Air Sealing Surfaces
2. Inner Liner

- After removing the bead on one side, turn the wheel over and remove the other side.
- Remove the tire from the rim.
- Remove the rim protectors from the rim.

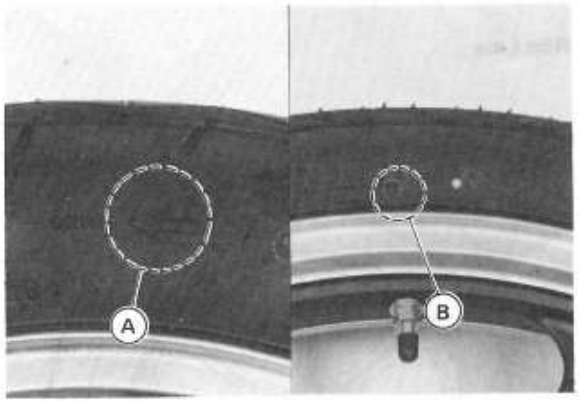
Air Valve

1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem



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)

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.
- Apply a soap and water solution, or rubber lubricant to the rim flanges, rim protectors, tire beads, and tire irons.
- If the tires with rotation marks are used, install them in the right direction.
- 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).
- Fit the rim protectors on the rim flange near the valve stem.
- 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.
- 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.*

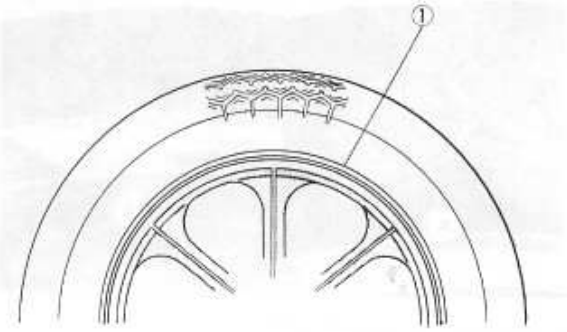
- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads on the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat against 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/cm^2, 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

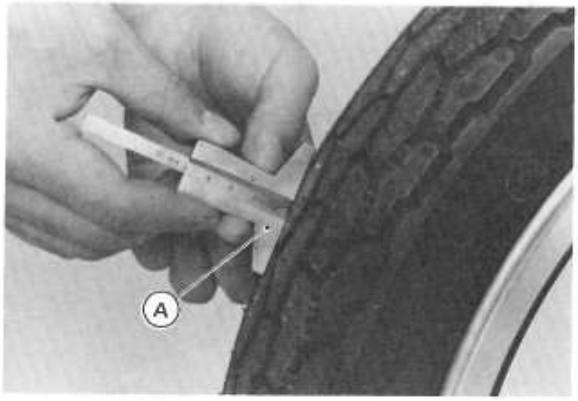
★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.
- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leaks.

○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.
- Adjust the 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	**4.3 mm**
Service Limit	**1 mm**
Rear	
Standard	**7.7 mm**
Service Limit	**2 mm**

WARNING

○**To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.**

Standard Tire

Front:	100/90-19 57S TUBELESS BRIDGESTONE G523 or 100/90-19 57S TUBELESS BUNLOP F17
Rear:	140/90-15 70S TUBELESS BRIDGESTONE G524 or 140/90-15 70S TUBELESS BUNLOP K425

NOTE

○*Check and balance the wheel when a tire is replaced with a new one.*

Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called temporary (external) repairs which can be carried out without removing the tire from the rim, and another type is called permanent (internal) repairs which require 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.

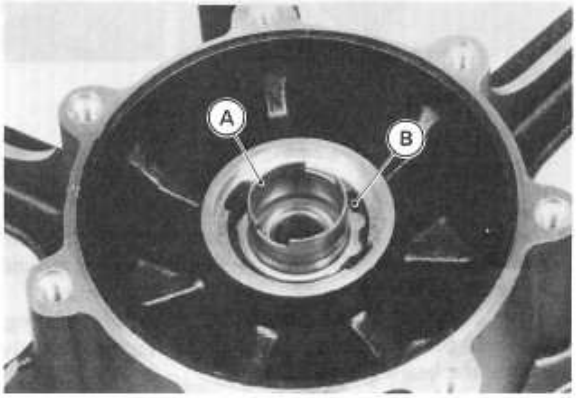
Wheel Bearings

Front Wheel Bearing Removal

CAUTION

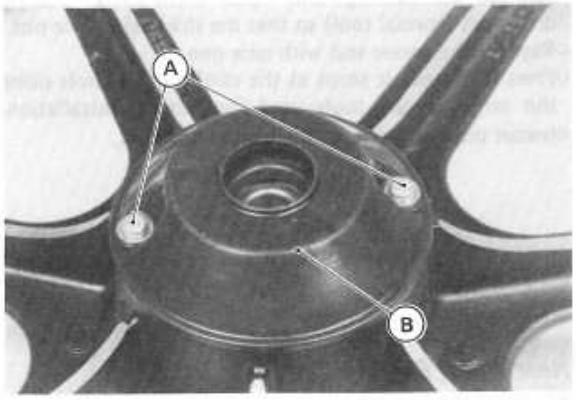
○**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc.**

●Remove the front wheel.
●Remove the speedometer gear housing, and collar from the wheel.
●Remove the disc (see Disc Removal in the Brakes chapter).
●Remove the circlip and speedometer gear drive, and turn the wheel over.



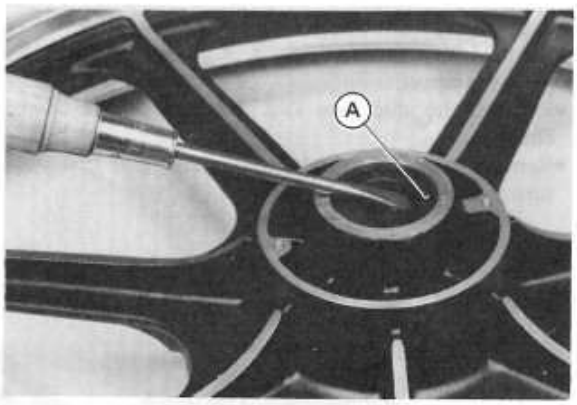
A. Speedometer Gear Drive B. Circlip

●Remove the wheel cap by unscrewing the mounting screws.



A. Mounting Screws B. Wheel Cap

●Remove the grease seal using a hook, and remove the circlip.



A. Grease Seal

•Insert a metal rod into the hub from the right side, and remove the left side bearing by tapping evenly around the bearing inner race.
The distance collar comes out with the bearing.
•Remove the remaining bearing by tapping evenly around the bearing inner race.

Front Wheel Bearing Installation

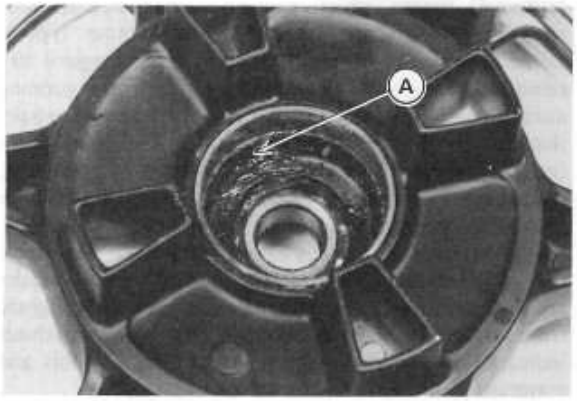
•When install the front wheel bearing, be careful of the following items.
○Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
○Replace the bearings and install them using bearing driver set (special tool) so that the shield side face out.
○Replace the grease seal with new one.
○Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
○Install the disc (refer to the Brakes chapter).

Rear Wheel Bearing Removal

•Remove the rear wheel.
•Remove the coupling sleeve, rear wheel coupling, and coupling collar from the left side of the wheel.
•Remove the brake panel from the right side, and remove the circlip.
•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. The distance collar comes out with the bearing.
•Insert the distance collar into the hub from the right side.
•Drive the remaining left side bearing by tapping on the distance collar with bearing driver set (special tool) and hammer.

Rear Wheel Bearing Installation

•When installing the rear wheel bearing, 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.
○Replace the bearings.
•Install the bearings using bearing driver set (special tool).
○Apply a little grease to the inside of the rear coupling.



A. Grease

Wheel Bearing Inspection and Lubrication

•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.
•For front hub bearing, if the bearing is wash in good condition with a high flashpoint solvent, dry it, and pack it with good quality bearing grease.
○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 hub before bearing installation.
○Clean and grease the wheel bearings in accordance with the Periodic Maintenance Chart.

Wheel Bearing Grease Seal Inspection

- Whenever the seal is removed for greasing the bearing, replace the seal.
- Visually inspect the following items.
  - Discoloration
  - Hardening
  - Damage to the internal ribbing
  - Other damages.

★If there is any damage to the seal, replace it.

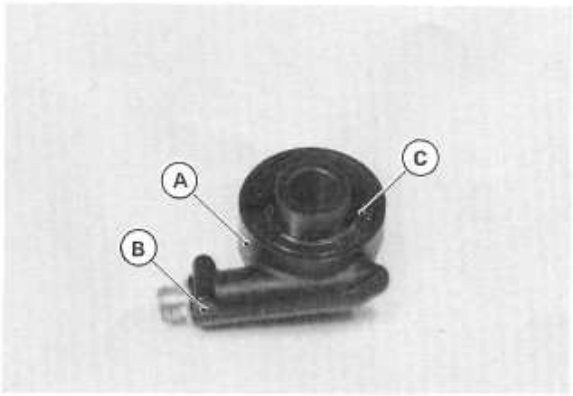
Speedometer Gear Housing

Speedometer Gear Housing Disassembly

NOTE

○*It is recommended that the assembly be replaced rather than attempting to repair the components.*

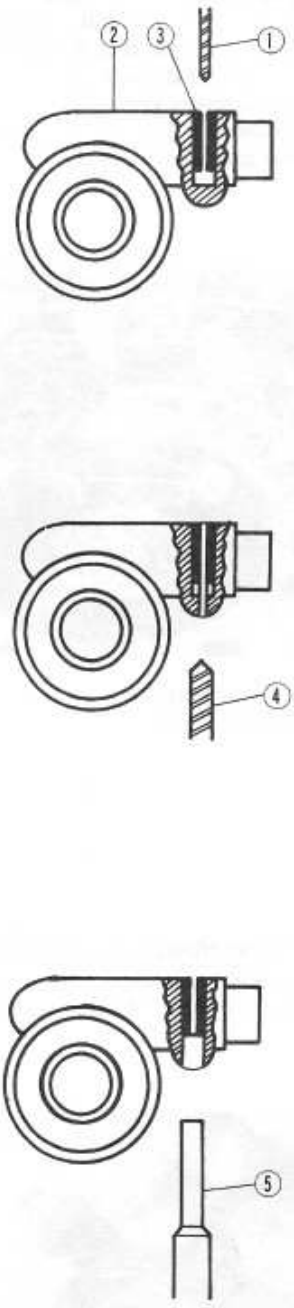
- Pull the speedometer gear housing and collar off the front wheel.
- Pull out the grease seal using a hook.



A. Speedometer Gear Housing
B. Pin
C. Grease Seal

- 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 gear side using a 3.0 to 3.5 mm drill bit. Using a suitable tool, tap out the pin, and then pull out the speedometer cable bushing, pinion, and washers.

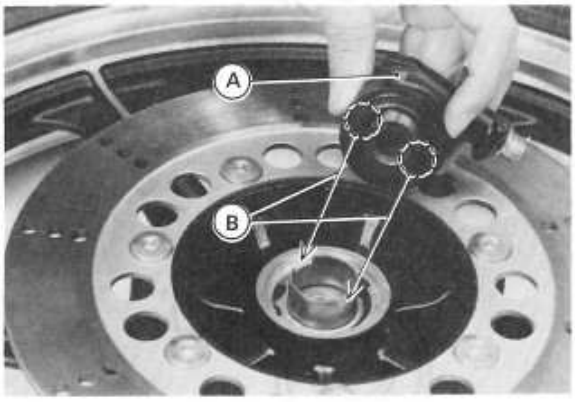
Speedometer Gear Housing Pin Removal



1. 1 – 1.5 mm bit
2. Housing
3. Pin
4. 3 – 3.5 mm bit
5. 3 mm Rod

Speedometer Gear Housing Assembly

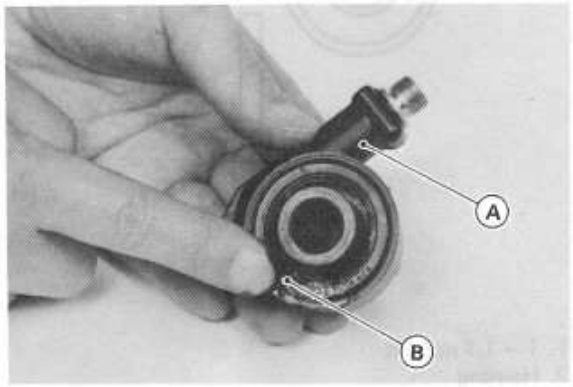
- When assembling the speedometer gear housing, be careful of the following items.
  - After inserting a new pin, stake the housing hole to secure the pin in place.
  - Replace the grease seal with a new one.
  - Apply a little grease to the seal. Install it using a press or a suitable driver so that 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.



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.

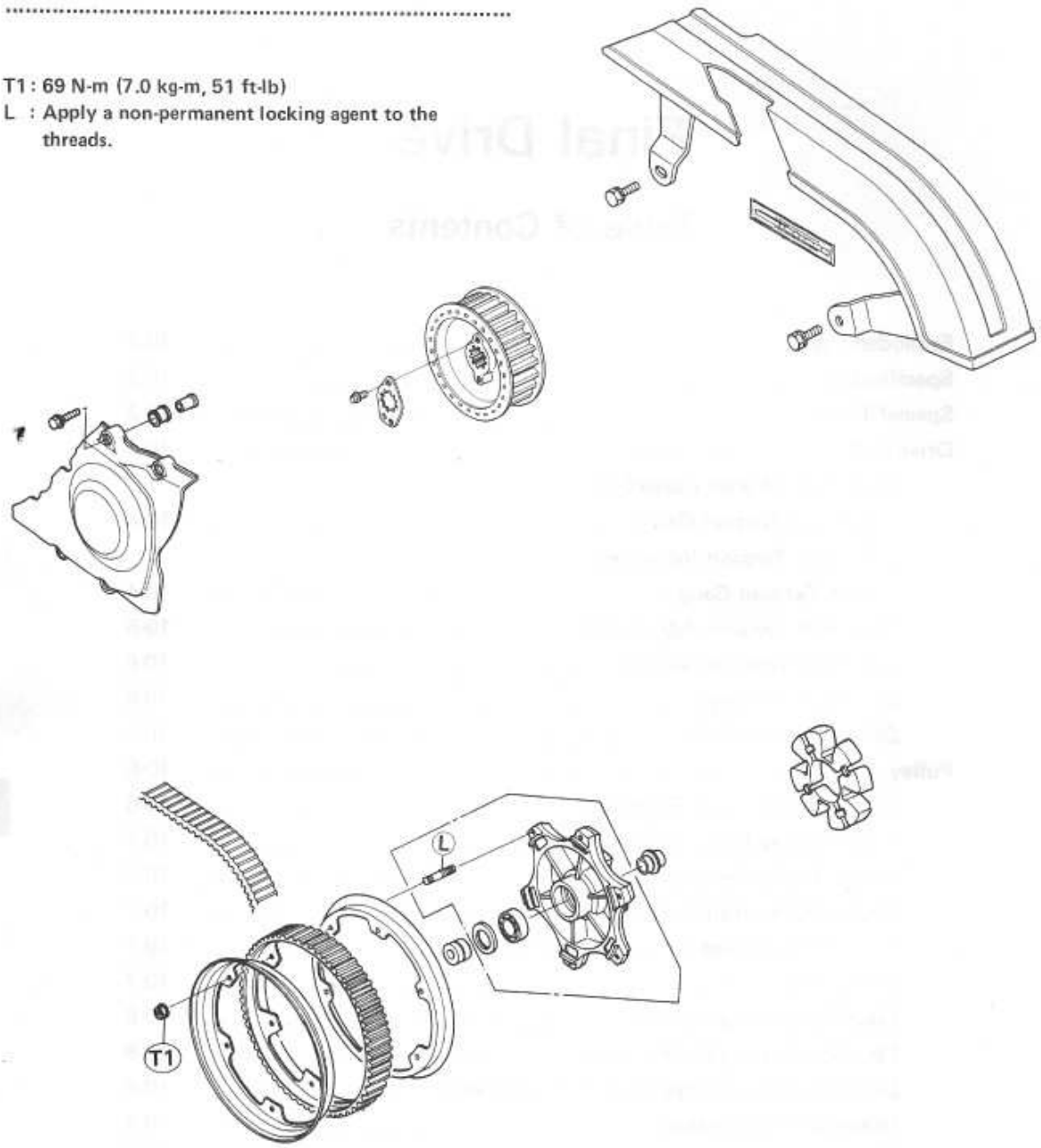
Final Drive

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Exploded View

T1 : 69 N-m (7.0 kg-m, 51 ft-lb)
L : Apply a non-permanent locking agent to the threads.



Specifications

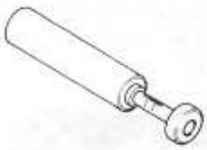
Item	Standard	Service Limit
Drive Belt:		
Gates	14.0 mm Pitch x 40.0 mmWidth x 128 Teeth	– – –
Belt tension		
(without Tension Gauge)	8.5 – 18.5 mm/44.1 N (4.5 kg)	– – –
(with Tension Gauge)	3.0 – 12.0 mm	– – –
Pulleys:		
Engine pulley tooth height	6.6 – 6.73 mm	6.3 mm
Rear pulley diameter	300.23 – 300.28 mm	299.63 mm

Special Tools

Bearing Driver Set: 57001-1129



Tension Gauge: 57001-1155



Drive Belt

The drive belt must be checked, and adjusted in accordance with the Periodic Maintenance Chart for safety and to prevent excessive wear. If the belt becomes badly worn or maladjusted – either too loose or too tight – the belt could jump off the pulley or break.

WARNING

○A belt that breaks or jumps off the pulleys could snag on the engine pulley or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.

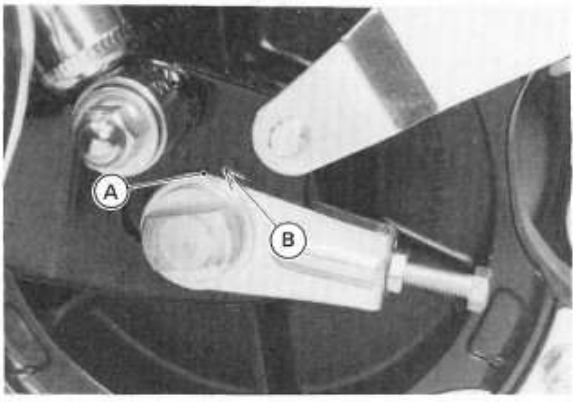
Drive Belt Tension Inspection without Tension Gauge

- Set the motorcycle up on its center stand.
- Visually inspect the belt for damage. If it is damaged, replace it with a new one.

WARNING

○A belt worn past the nylon fabric facing must be replaced. Such a worn belt may cause a serious accident.

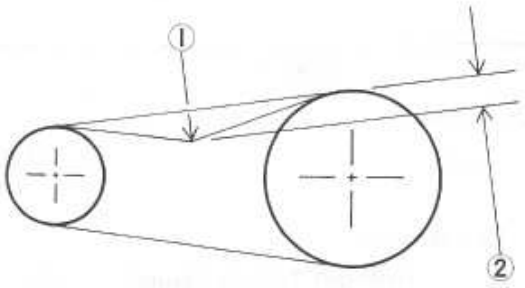
- Check to see if wheel alignment is properly adjusted. The left and right notches on the belt adjuster should point to the same marks or positions on the swing arm. If they do not, adjust wheel alignment (see Drive Belt Tension Adjustment).



A. Notch B. Marks

- Apply 4.5 kg of force on the belt midway between the pulleys and measure the deflection.
- If the deflection is out of the usable range, adjust it.

Tension Inspection without Tension Gauge



1. 4.5 kg Force 2. Deflection

Drive Belt Tension without Tension Gauge
Usable Range: 8.5 – 18.5 mm/44 N (4.5 kg)
5/16 - 3/4

Drive Belt Tension Inspection With Tension Gauge

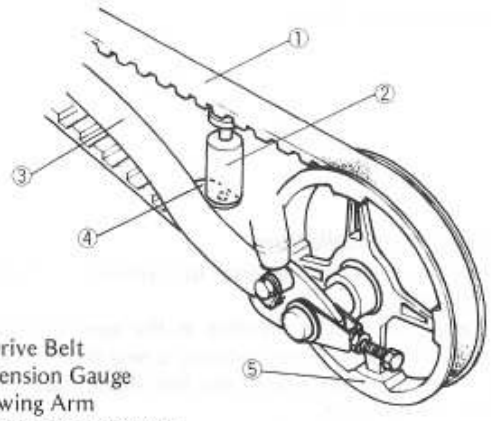
- Set the motorcycle up on its center stand.
- Visually inspect the belt for damage. If it is damaged, replace it with a new one.

WARNING

○A belt worn past the nylon fabric facing must be replaced. Such a worn belt may cause a serious accident.

- Check to see if wheel alignment is properly adjusted. The left and right notches on the belt adjuster should point to the same marks or positions on the swing arm. If they do not, adjust wheel alignment (see Drive Belt Tension adjustment).
- Position the tension gauge (special tool) between the tension gauge positioning bracket on the swing arm and the upper run of the drive belt. Place the plate of the gauge on the top of the belt teeth, and the projection of the lower stop of the gauge into the hole of the gauge positioning bracket.

Tension Inspection with Tension Gauge

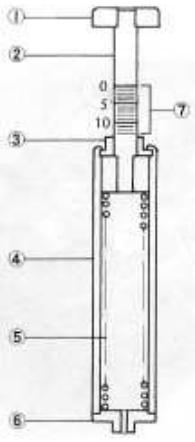


1. Drive Belt
2. Tension Gauge
3. Swing Arm
4. Positioning Bracket
5. Rear Pulley

●Read the gauge at the top of the upper stop, and remove the gauge.
●Check the tension at several positions by rotating the rear wheel.
●Tension is acceptable when the reading is between the usable range. If the tension is out of the usable range, adjust it.

Tension Inspection with Tension Gauge
Usable Range: 3.0 – 12.0 mm

Construction of Tension Gauge

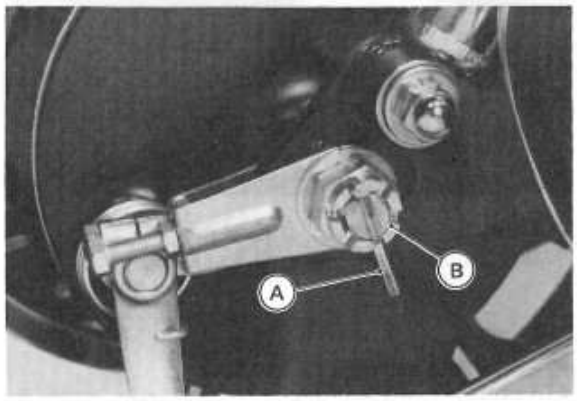


1. Plate
2. Rod
3. Upper Stop
4. Body
5. Spring
6. Lower Stop
*7. Lines

*Calibrated at 1 mm. The line numbers are counted from the topmost line, 0 bearing the highest line, and 13th lowest.

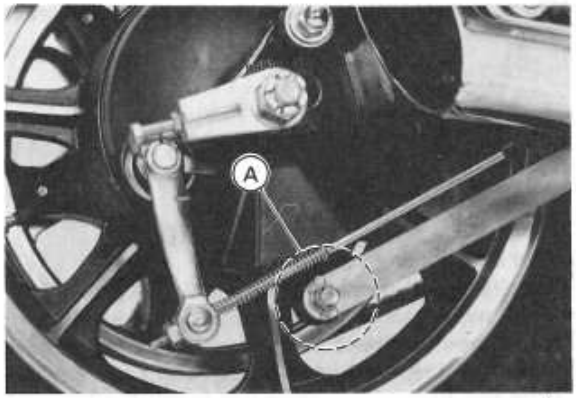
Drive Belt Tension Adjustment

●Inspect the drive belt (see Drive Belt Wear Inspection).
●Remove the axle cotter pin, and loosen the axle nut.



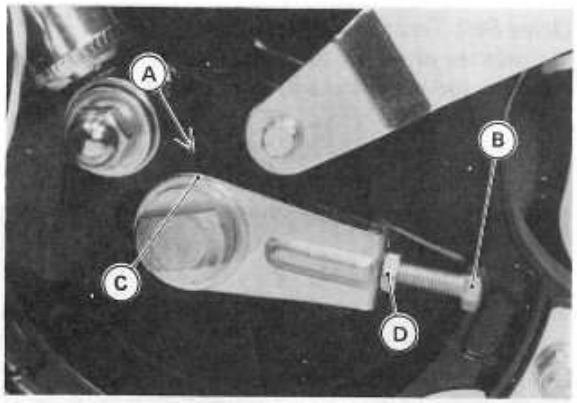
A. Axle Cotter Pin B. Axle Nut

●Remove the cotter pin and nut at the rear end of the torque link.



A. Rear end of the torque link.

●Loosen the left and right belt adjuster locknuts.
★If the belt is too tight, back out the left and right belt adjuster bolts, and kick the wheel forward until the belt is too loose.
●Turn in the left and right belt adjuster bolts evenly until the drive belt has the correct amount of slack.
○To keep the belt and wheel aligned, the notch on the left belt adjuster should align with the same swing arm mark that the right belt adjuster notch aligns with.



A. Swing Arm Marks
B. Belt Adjuster Bolt
C. Notch
D. Locknut

- Tighten both belt adjuster locknuts.
- To prevent a soft, or "spongy feeling" brake, center the brake panel assembly in the brake drum as follows:
  - Tighten the axle nut to a snug fit.
  - Spin the wheel, and apply the rear brake, and then tighten the rear axle nut to the specified torque (see Exploded View in the Wheels/Tires chapter).
- Inspect drive belt tension (see Drive Belt Inspection). Readjust if necessary.
- Replace the cotter pin with a new one.
- Tighten the torque link rear end nut to the specified torque (see Exploded View in the Brakes chapter).
- Replace the cotter pin with new one.
- Check the rear brake for weak braking power and brake drag.

Drive Belt Wear Inspection

- Visually inspect the belt for wear.
- ★If the nylon fabric facing of any portion is worn off, and the polyurethane compound is exposed, remove the belt and replace it immediately with a new one (see Drive Belt Removal and Drive Belt Installation).
- Whenever the belt is replaced, inspect the engine and rear pulleys (see Pulley Wear).

Drive Belt Removal

- Mark the direction of belt rotation on the belt with chalk so that the belt can be reinstalled in the same direction to ensure longer belt life.
- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the engine pulley (see Engine Pulley Removal).
- Remove the swing arm (see Swing Arm Removal in the Suspension chapter).
- Remove the drive belt.

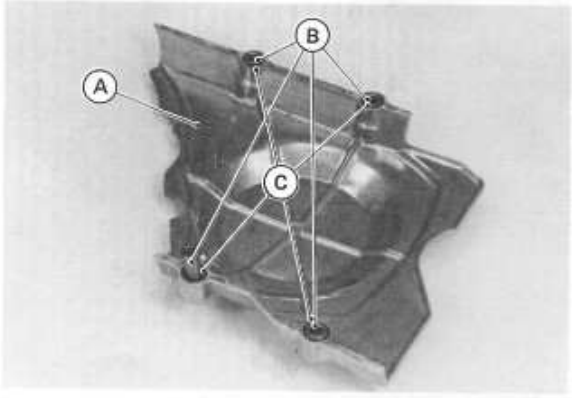
Drive Belt Installation

- Installation is the reverse of removal. Note the following.
  - Be sure that belt is installed in the same direction as before removal. When installing a new belt, the yellow paint mark on the side of the belt should face inwards of the motorcycle.
  - Tighten the pivot shaft nut to the specified torque (see Exploded View in the Suspension chapter).
  - Adjust the drive belt tension (see Drive Belt Tension Adjustment).

Pulley, Coupling

Engine Pulley Cover Removal

- Unscrew the engine pulley cover mounting bolts.



A. Engine Cover
B. Collers
C. Rubber Dampers

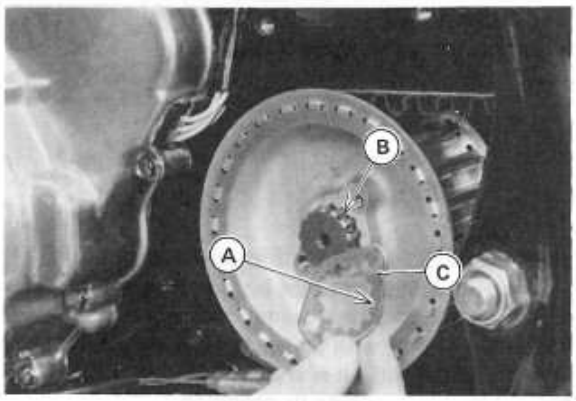
- Remove the engine pulley cover, collars, and rubber dampers.

Engine Pulley Cover Installation

●Installation is reverse of removal. Note the following.
○Visually check the rubber dampers.
★If the dampers are damaged or deteriorated, replace them.
●Insert the collars from inside the cover.

Engine Pulley Removal

●Remove the engine pulley cover (see Engine Pulley Cover Removal).
●Loosen the belt fully (see Drive Belt Tension Adjustment). Remove the drive belt toward the right side from the rear pulley.
●Unscrew the engine pulley holding plate mounting bolts.
●Turn the holding plate so that fit the grooves inside the plate onto the splines on the output shaft.
●Pull out the plate.



A. Grooves
B. Splines
C. Holding Plate

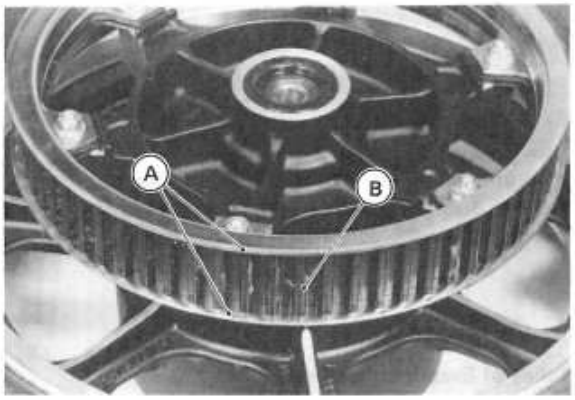
●Pull out the engine pulley from the output shaft.

Engine Pulley Installation

●Installation is reverse of removal. Note the following.
○Fit the grooves inside the plate onto the the splines on the output shaft.
○Turn the plate so that the holes on the plate and engine pulley align.
○Adjust the drive belt tension (see Drive Belt Tension Adjustment).

Rear Pulley, Coupling Removal/Installation

●Remove the rear wheel (see rear wheel removal in Wheels/Tires chapter).
●Remove the coupling from the wheel.
●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 pulley removal.
●Remove the rear pulley nuts to separate the rear pulley and guides from the wheel coupling.
●Remove the coupling from the rear wheel.



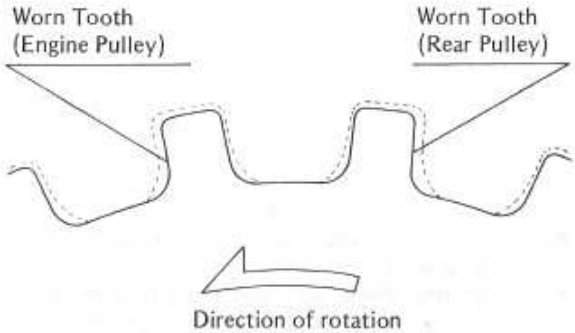
A. Guides
B. Rear Pulley

●Installation is reverse of removal. Note the following.
○Apply a little grease to the inside of the rear coupling.
○Tighten the rear pulley nuts to the specified torque (see Exploded View).
○Adjust belt tension (see Drive Belt Tension Adjustment).

Pulley Wear

●Visually inspect the pulleys, and replace them if they are worn as illustrated.
★If the pulley requires replacement, the belt is probably worn. Whenever replacing the pulley, inspect the belt.

Pulley Teeth

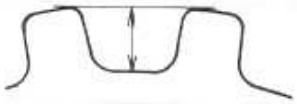


Engine Pulley

•Measure the tooth height.

★If the pulley is worn down to less than the service limit, replace the pulley (see Specifications).

Tooth Height Measurement

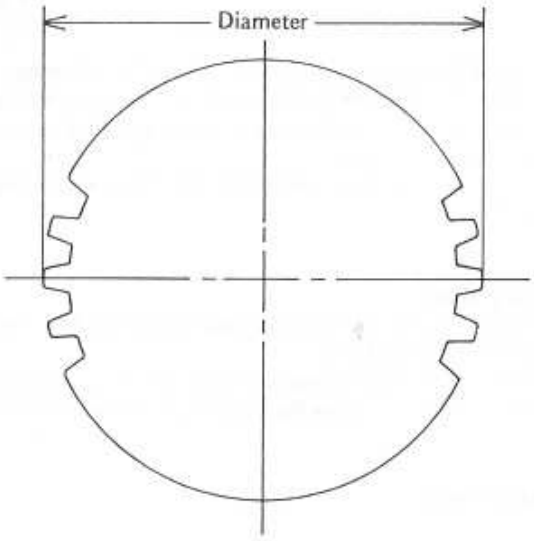


Rear Pulley

•Measure the diameter of the pulley as shown.

★If the pulley is worn down to less than the service limit, replace the pulley (see Specifications).

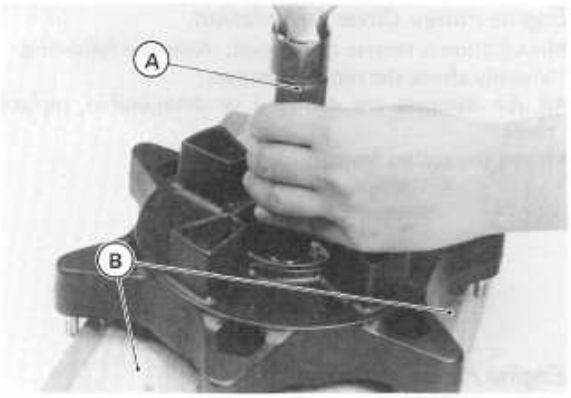
Pulley of Even Number Teeth



Coupling Bearing Removal

•Place blocks under coupling so that the studs does not touch the ground.

•Using bearing driver set (special tool), remove the bearing and grease seal by tapping from the wheel side.



A. Bearing Driver Set: 57001-1129
B. Blocks

Coupling Bearing Installation

•Installation is the reverse of removal. Note the following.

○Replace the grease seal with a new one using a hook.

○Press the seal in until the face of the seal is level with the end of the grease seal hole.

○Apply a little grease to the grease seal lip.

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 same bearing is to be sued again, re-wash 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.

Grease Seal Inspection

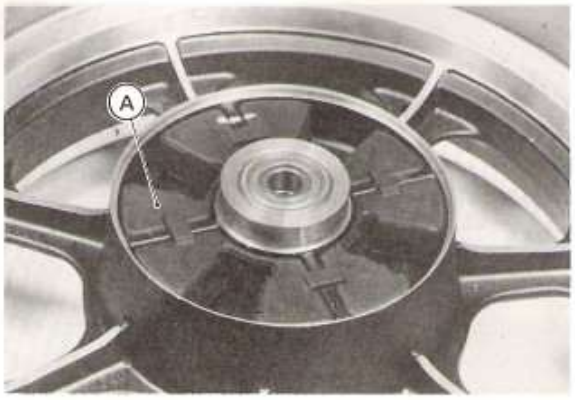
•Whenever the seal is removed for greasing the bearing, replace the seal.

•Visually inspect the seal for the following:
Discoloration
Hardening
Damage to the internal ribbing.
Other damages.

★If there is any damage to the seal, replace it.

Damper Inspection

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the rear wheel coupling, and inspect the rubber damper.
- Replace the damper if it appears damaged or deteriorated.



A. Rubber Damper

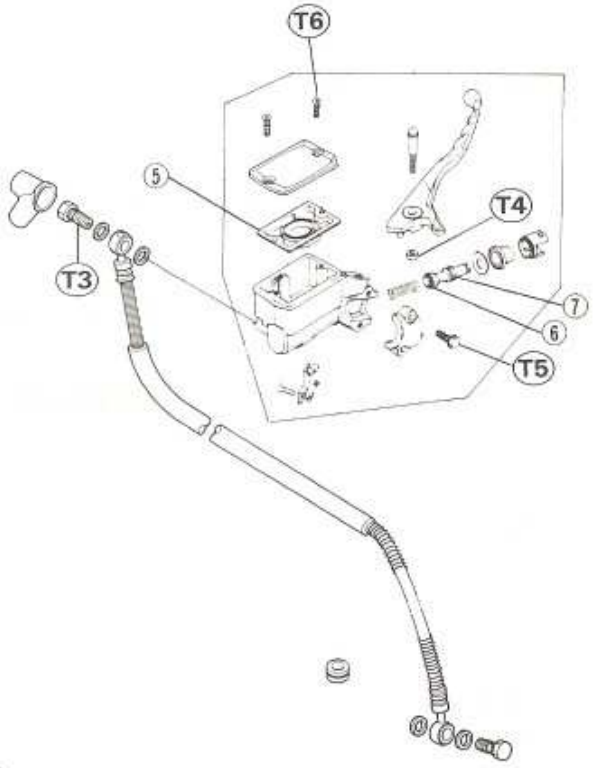
Brakes

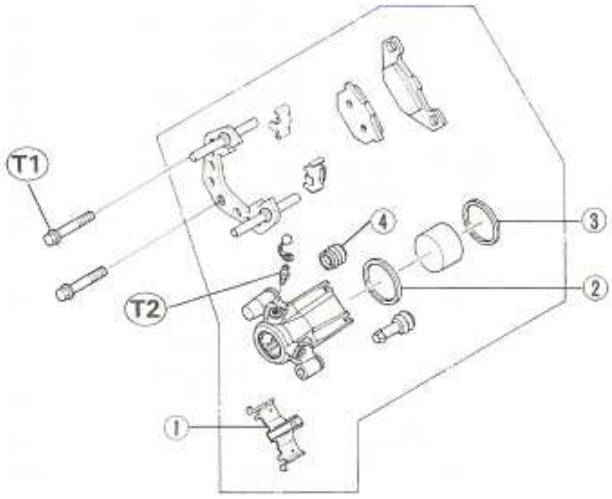
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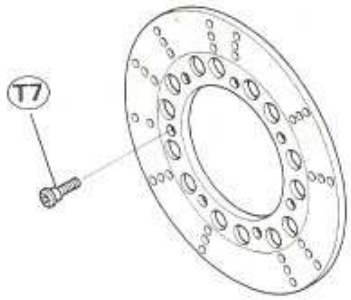
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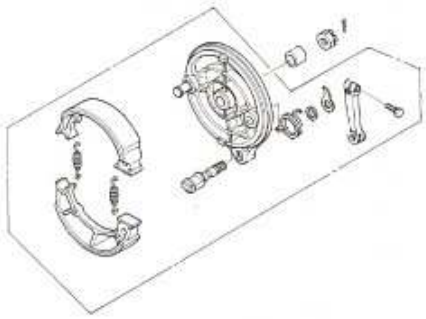
Exploded View

1. Anti-rattle Spring
2. Fluid Seal
3. Dust Seal
4. Cover
5. Diaphragm
6. Primary Cup
7. Piston

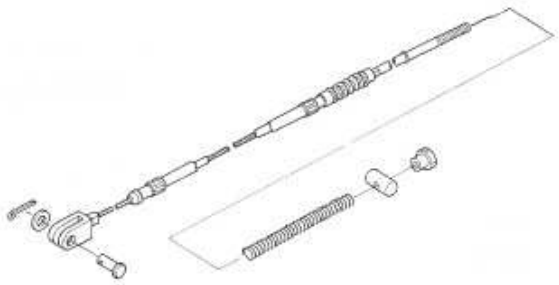


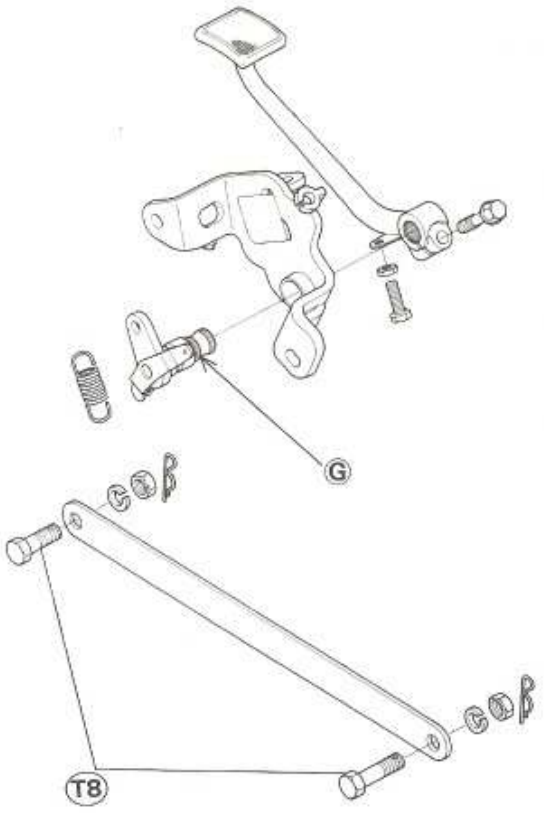






G : Apply grease.
T1 : 29 N-m (3.0 kg-m, 22 ft-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 29 N-m (3.0 kg-m, 22 ft-lb)
T4 : 5.9 N-m (0.60 kg-m, 52 in-lb)
T5 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T6 : 1.5 N-m (0.15 kg-m, 13 in-lb)
T7 : 23 N-m (2.30 kg-m, 16.5 ft-lb)
T8 : 29 N-m (3.0 kg-m, 22 ft-lb)




G
T8

Specifications

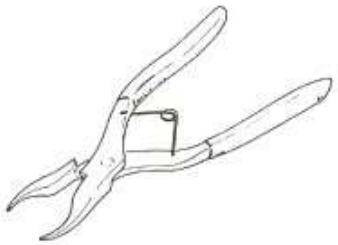
Item	Standard	Service Limit
Brakes:		
Pad lining thickness	4.85 mm	1 mm
Brake fluid grade	D.O.T.3	– – –
Brake pedal position	Above 50 – 60 mm	– – –
Disc runout	Under 0.2 mm	0.3 mm
Disc thickness	4.8 – 5.1 mm	4.5 mm
Cam lever angle	80 – 90°	– – –
Brake pedal free play	20 – 30 mm	– – –
Brake drum inside diameter	180.00 – 180.16 mm	180.75 mm
Brake shoe lining thickness	5 mm	2.5 mm
Brake camshaft diameter	16.975 – 16.984 mm	16.88 mm
Brake camshaft hole diameter	17.00 – 17.07 mm	17.15 mm

Recommended Disc Brake Fluid

Type	Brand
D.O.T.3	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

Special Tool

Circlip Pliers: 57001-143

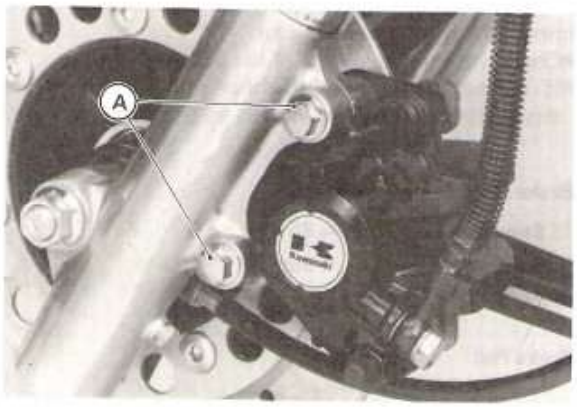


Front Brake

Caliper:

Caliper Removal

•Unscrew the caliper mounting bolts, and remove the caliper.



A. Mounting Bolts

•Remove the brake hose from the caliper.

★If the 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 (see Pad Removal).

○Pump the brake lever to remove the caliper piston.

○Immediately wipe up any brake fluid that spills.

Caliper Installation Notes

•Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting.

•Check the fluid level in the master cylinder, and bleed the brake line (see Bleeding the Brake Line).

•Check the brake for weak braking power, brake drag, and fluid leakage.

Caliper Disassembly Notes

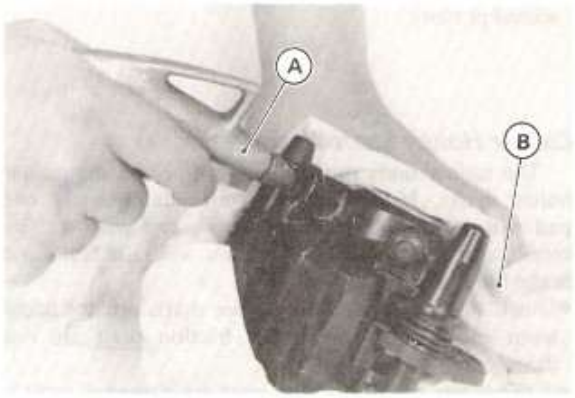
•Using compressed air, remove the piston.

○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).

•Check that the anti-rattle spring is in place in the caliper body (see Exploded View).

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.

•Replace the fluid seal under any of the following conditions:

•Fluid leakage around the pad.

•Brakes overheat.

•There is a large difference in left and right pad wear.

•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 seal 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 if the caliper holder shafts are not badly worn or stepped, or rubber friction boot are not damaged.

★If the shafts rubber friction boot are damaged, replace the rubber friction boot, and the caliper holder.

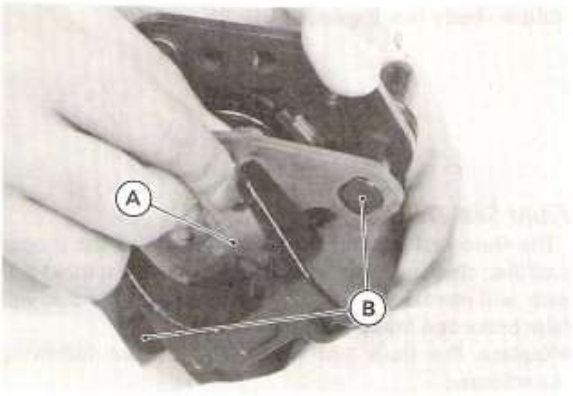
Brake Pads:

Pad Removal/Installation Notes

•Remove the caliper with caliper holder (see Caliper Removal).

•Take off the piston side pad from the caliper holder.

•Push the caliper holder to the piston side, and then remove the pad from the caliper holder shaft.



A. Pad B. Caliper Holder

•When installing the piston, push in by hand as far as it will go.

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 brake will not function on the first application of the lever if this is not done.**

Lining Wear

In accordance with the Periodic Maintenance Chart, inspect the front brake for wear.

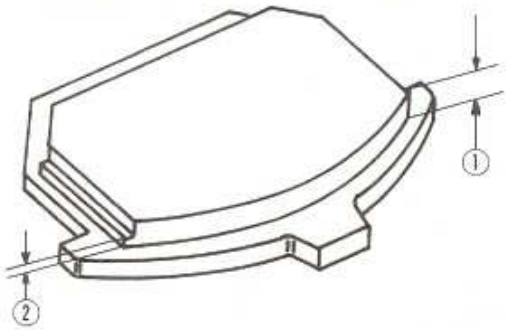
•Check the lining thickness of the pads.

★If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

Brake Pad Lining Thickness

Standard	**4.85 mm**
Service Limit	**1 mm**

Brake Pad



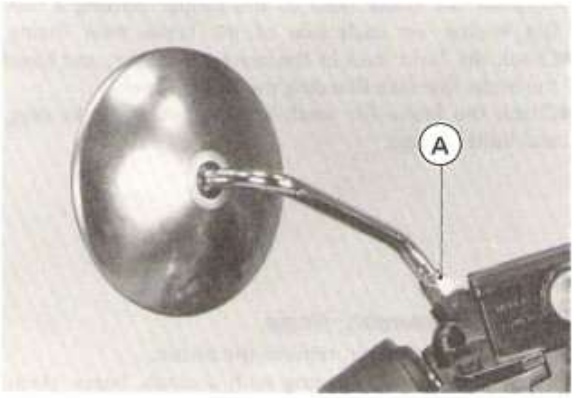
1. Lining Thickness 2. Service Limit

Master Cylinder:

Master Cylinder Removal

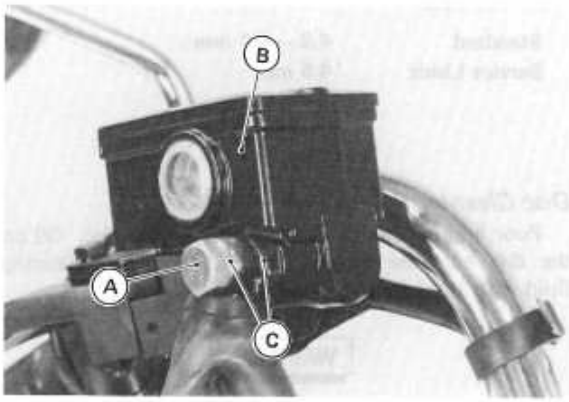
•Loosen the right side rear view mirror locknut.

•Remove the mirror.



A. Locknut

•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.



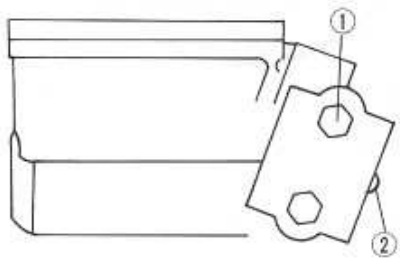
A. Banjo Bolt
B. Master Cylinder
C. Washers

•Disconnect the front brake switch wires.
•Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.

Master Cylinder Installation Notes

•Master Cylinder Clamp Installation:
○The master cylinder clamp must be installed with the projected side facing right.
○Torque the upper clamp bolt first, and then the lower clamp bolt to the specification. There will be a gap at the lower part of the clamp after tightening.

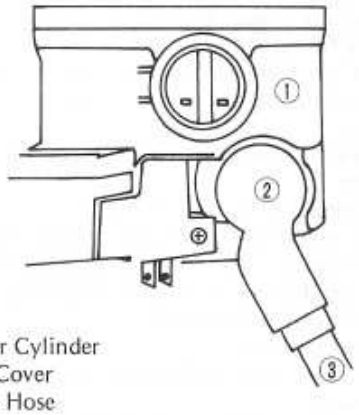
Master Cylinder Clamp Bolt Tightening



1. Tighten upper clamp bolt first.
2. Projection

•Use a new flat washer on each side of the brake hose fitting as shown, and tighten the banjo bolts to the specified torque (see Exploded View).

Master Cylinder



1. Master Cylinder
2. Dust Cover
3. Brake Hose

•Bleed the brake line after master cylinder installation (see Bleeding the Brake Line).
•Check the brake for weak breaking power, brake drag, and fluid leakage.

Master Cylinder Disassembly Notes

•Remove the master cylinder from the handlebar (see Master Cylinder Removal).
•Remove the reservoir cap and diaphragm, and empty out the brake fluid.
•Remove the pivot bolt, and remove the brake lever.
•Pull out the dust cover, piston, washer, O-ring, primary cup, and spring.

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 removed parts and to the inner wall of the cylinder.
○Tighten the brake lever pivot bolt nut and reservoir cap bolts to the specified torque (see Exploded View).

Master Cylinder Inspection

•Disassemble the master cylinder (see Master Cylinder Disassembly Notes).
•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 cup and O-ring.
★If the cup or O-ring shows any damage, replace it.
★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cup.
•Check the dust cover for damaged.
★If is damaged, replace it.
•Check the relief and supply ports inside the bottom of the reservoir.
★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 spring for any damage.
★If the spring is damaged, replace it.

Disc:

Disc Removal

•Remove the front wheel (see Front Wheel Removal in the Wheels/Tires chapter).
•Unscrew the disc mounting allen bolts and take off the disc.

Disc Installation

•Installation is the reverse of removal. Note the following.
○Completely clean off any grease or dirt that has got on either side of the disc or studs (see Disc Cleaning).

CAUTION

○Do not use the solvent which will leave an oily residue.
○The disc must be installed with the chamfered hole side facing toward the wheel.
○Tighten the disc mounting allen bolts to the specified torque (see Specifications).
○After installing the disc, check the disc runout (see Disc Runout in the Brakes chapter).

Disc Wear

•Measure the thickness of disc at the point where it has worn the most.
•Replace the disc if it has worn past the service limit.

Disc Thickness

Standard	**4.8 – 5.1 mm**
Service Limit	**4.5 mm**

Disc Cleaning

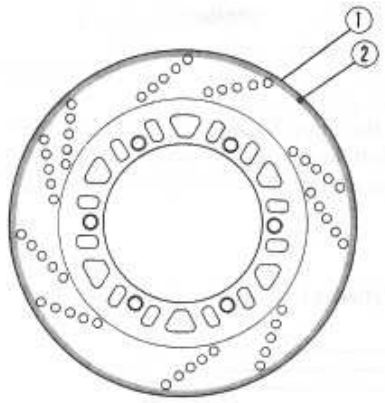
Poor braking can be caused by oil on the disc. Oil on the disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.

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 Runout

•Jack up the motorcycle so that the front wheel is off the ground.
•Turn the handlebar fully to one side.
•Set up a dial gauge against the front disc as illustrated.
•Measure disc runout.
★If runout exceeds the service limit, replace the disc (see Specifications).



1. Brake Disc
2. Measuring Points

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 brake fluid reservoir.

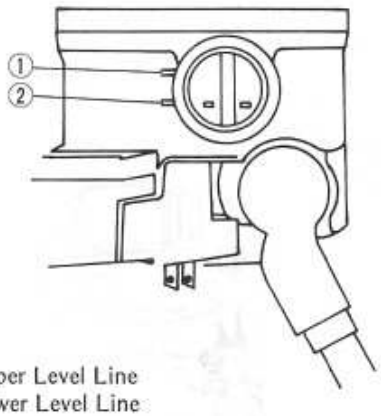
●Check the brake fluid level in the reservoir.

NOTE

○*Hold the reservoir horizontal when checking brake fluid level.*

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line (see Break Fluid change).

Brake Fluid Level Line



1. Upper Level Line
2. Lower Level Line

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.

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 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 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 reservoir cap and diaphragm and 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 until all the fluid is drained from the line.

●Close the bleed valve.

●Fill the reservoir with fresh brake fluid.

●Open the bleed valve, apply the brake using the brake lever, close the valve with the brake held applied, and then quickly release the lever.

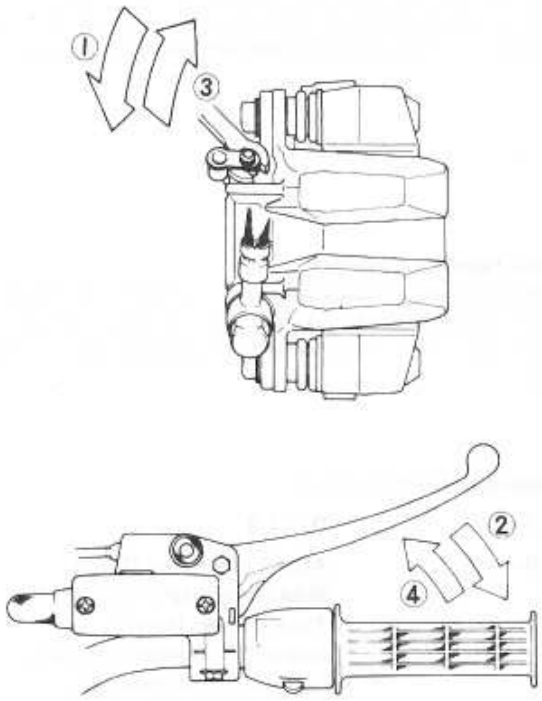
●Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

NOTE

○*Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.*

●Bleed the air from the lines (see Bleeding the Brake Line).

Filling up the Brake Line



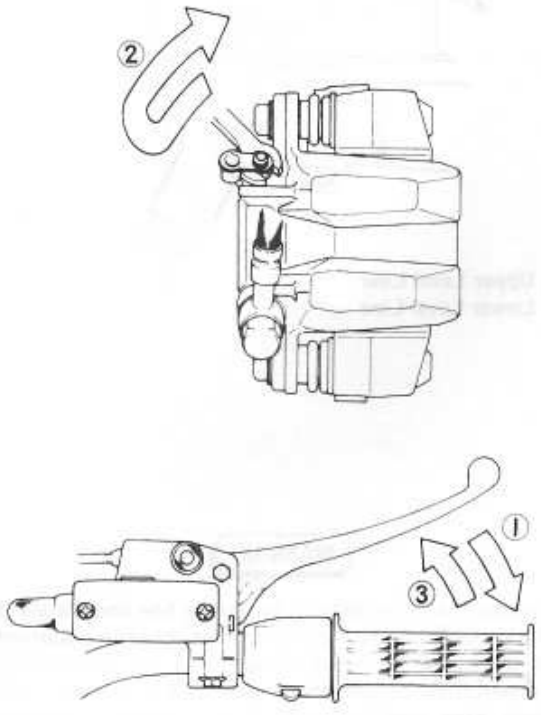
1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve
4. Then quickly release the brake.

Bleeding the Brake Line

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake line, brake lever movement will be partially used in compressing the air. This will make the lever feel spongy, and there will be a loss in braking power.

- ●Bleed the air from the brake whenever brake lever action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.
- ●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 (see Brake Fluid Change).
- ★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 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.
- ★If brake lever action still feels soft or spongy, bleed the remaining air as follows.
- ○Pump the brake lever a few times until it comes hard.
- ○Holding the brake applied, quickly open (turn counterclockwise) and close the bleed valve.
- ○Release the lever.
- ○Repeat this operation until no more air can be seen coming out into the plastic hose.
- ○Check the fluid level in the reservoir every so often, replenishing it as necessary.
- ●When air bleeding is finished, install the rubber cap on the bleed valve, and check that the brake fluid is filled to the upper level line marked on the reservoir (handlebar turned so that the reservoir is level).

Bleeding the Brake Line



1. Holding the brake applied.
2. Quickly open and close the bleed 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 discs, 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 reach and break down 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.**

Brake Hose:

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.

Brake Hose Replacement

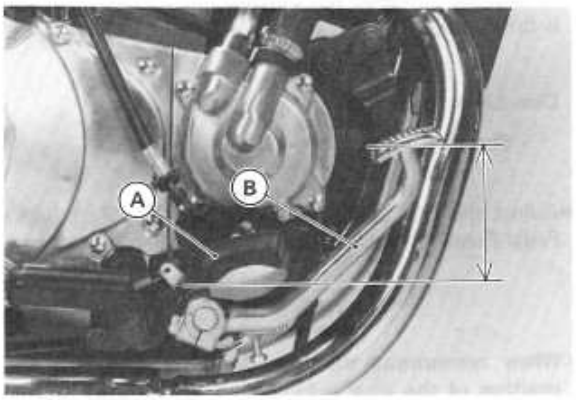
- Pump the brake fluid out of the line (see Brake Fluid Change).
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the motorcycle.
- Install the new brake hose in its place.
- Tighten the banjo bolts to the specified torque (see Specifications).
- Use a new flat washer for each side of the fittings.

Rear Brake

Brake Adjustment:

Brake Pedal Position Inspection/Adjustment

- With the brake pedal in the rest position, inspect the brake pedal position as shown.



A. Footpeg B. Brake Pedal

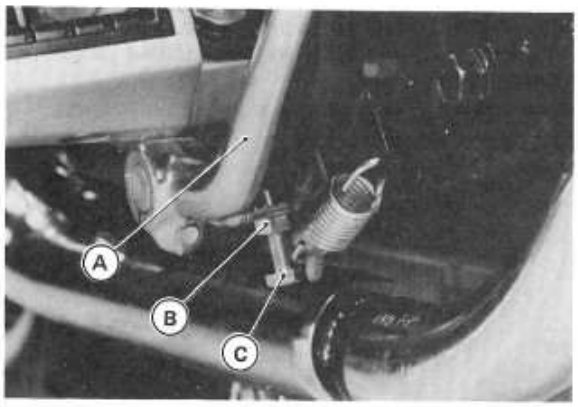
Pedal Position

Standard: 50 – 60 mm

(from center of the footpeg to center of the brake pedal)

★If it is not, loosen the locknut, and turn in or turn out the adjusting bolt to adjust the brake pedal position.

- After adjusting brake pedal position, check brake pedal free play and rear brake light switch, and adjust if necessary.



A. Brake Pedal
B. Locknut
C. Bolt

NOTE

○*If the pedal position cannot be adjusted by turning the adjusting bolt, the brake pedal may be deformed or incorrectly installed.*

Cam Lever Angle Adjustment

●Take off the cam lever, and mount it at a new position so that the cam lever has a proper angle when the brake is fully applied.

Cam Lever Angle

Standard	**80 – 90°**

●Adjust the rear brake pedal free play (see Rear Brake Pedal Free Play Adjustment).

WARNING

○**When remounting the cam, lever be sure that the position of the wear indicator on the serrated shaft is not altered.**

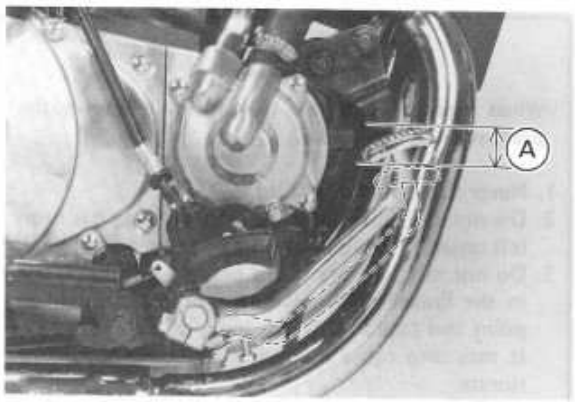
○**A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position.**

○**In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail.**

Brake Pedal Free Play Inspection

●Depress the rear brake pedal lightly by hand until the brake is applied.

●Measure the pedal travel. This is the free play.



A. Brake Pedal Free Play

★If the rear brake pedal free play is incorrect, adjust it (see Specifications and Rear Brake Pedal Free Play Adjustment).

Brake Pedal Free Play

Standard	**20 – 30 mm**

●Operate the pedal a few times to see that it returns to its rest position immediately upon release.

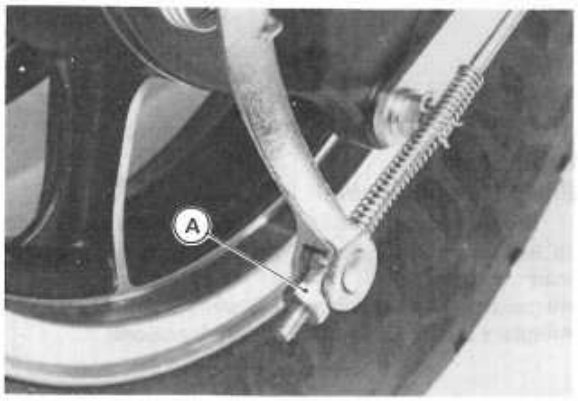
●Rotate the rear wheels to check for brake drag.

●Check braking effectiveness.

★If there is any doubt as to the conditions of the brake, check the brake parts for wear or damage.

Brake Pedal Free Play Adjustment

●Turn the adjuster at the rear brake until the brake pedal has the correct amount of play (see Specifications).

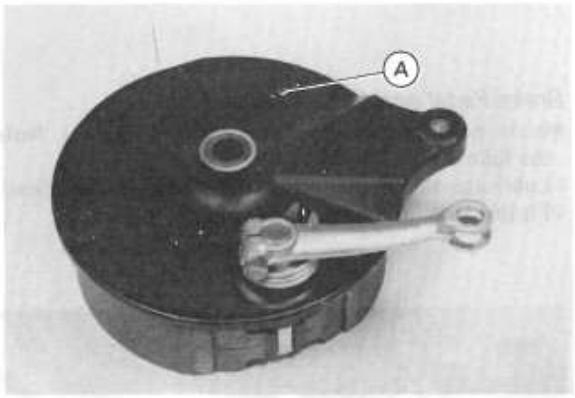


A. Adjuster

Brake Removal/Disassembly:

Brake Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Separate the brake panel.



A. Brake Panel

WARNING

Brake linings contain asbestos fiber. Inhalation of asbestos may cause serious scarring of the lungs and may promote other internal injury and illness, including cancer. Observe the following precautions when handling brake linings:

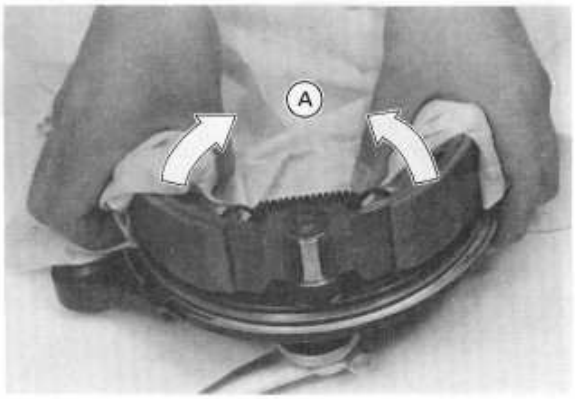
1. **Never blow brake lining dust with compressed air.**
2. **If any components are to be cleaned, wash them with detergent, then immediately discard the cleaning solution and wash your hands.**
3. **Do not grind any brake lining material unless a ventilation hood is available and properly used.**

Brake Installation

- Installation is the reverse of removal. Note the following.
- Adjust the brake pedal free play (see Brake Pedal Free Play Adjustment).

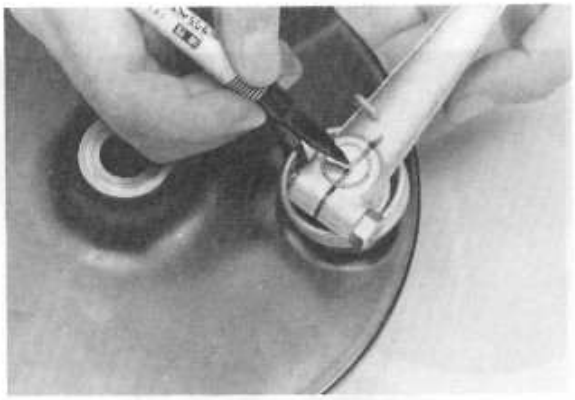
Brake Panel Disassembly

- See WARNING in Brake Removal before operation.
- Hold the brake shoes, one in each hand with a clean cloth to protect the linings from grease and dirt.
- Pull up on the shoes to remove them from the panel.



A. Lift

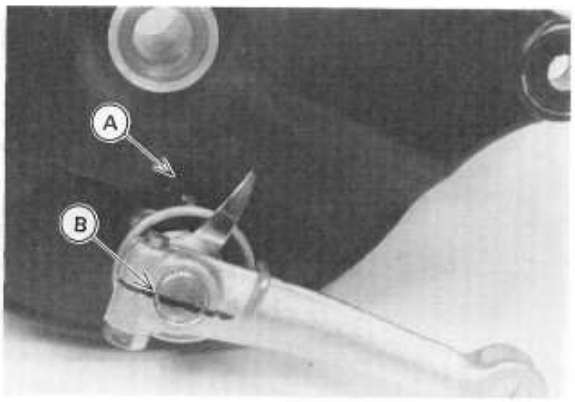
- Remove the springs to separate the two shoes.
- Mark the cam shaft and cam lever so that they can be aligned the same way during assembly.



- Remove the brake cam lever.
- Pull the brake cam shaft out from the inside. Do not lose the dust seal.

Brake Panel Assembly

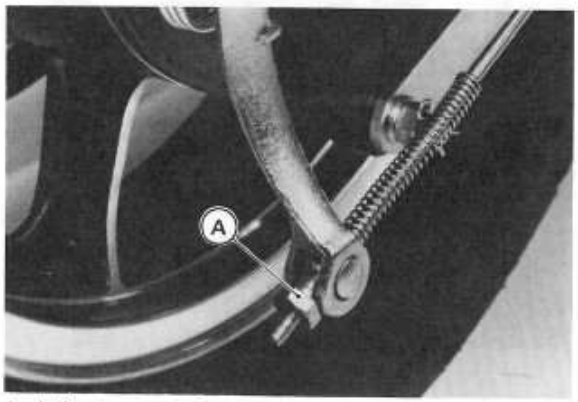
- See Brake Lubrication.
- Slip the brake cam shaft through the panel.
- Link the brake shoes together with the springs, and push them onto the panel in the reverse of removal.
- Install the wear indicator so that it points to the right end of the USABLE RANGE box.
- Put the dust seal over the end of the cam shaft. Fit the cam lever so that the marks aligns.
- Put in the cam lever bolt, and tighten securely.
- Install the brake panel assembly (see Brake Installation).



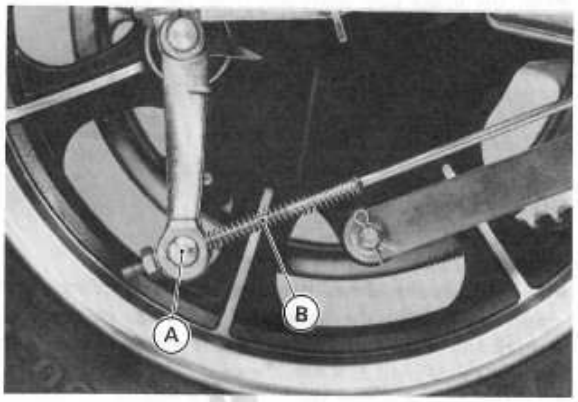
A. Place wear indicator in this position.
B. Align mark.

Brake Pedal and Cable Removal

●Remove the rear brake cable.
○Unscrew the adjuster at the rear brake panel and pull the cable out of the brake cam lever. Do not lose the clevis pin and return spring.



A. Adjuster

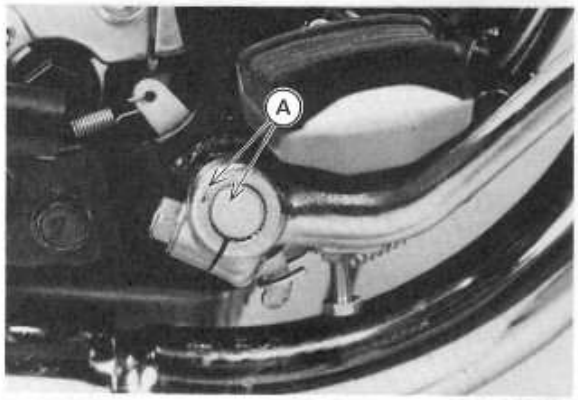


A. Clevis Pin B. Return Spring

○Remove the cotter pin and washer at front end of the brake cable, and pull out the joint pin.
○Pull the cable out from the vehicle.
●Remove the brake pedal.
○Unscrew the brake pedal bolt.
○Pull the brake pedal out from shaft.
○Unhook the return spring.
○Pull out the brake pedal shaft.

Brake Pedal and Cable Installation

●Brake pedal installation is the reverse of removal. Note the following.
○Lubricate the brake pedal (see Brake Lubrication).
○Fit the pedal so that the marks align.



A. Marks

●Brake cable installation is the reverse of removal. Note the following.
○Lubricate the brake cable (see Brake Lubrication).
○Adjust the brake pedal free play (see Brake Pedal Free Play Adjustment).

Brake Maintenance:

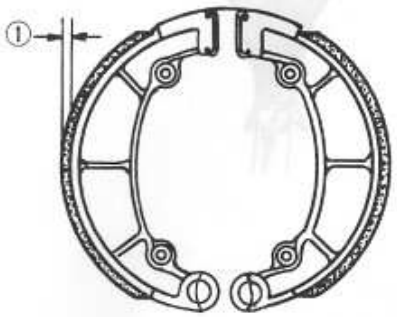
Brake Drum Wear

●Remove the rear wheel (see Wheel Removal in the Wheels/Tires chapter).
●Measure the inside diameter of the drum (see Specifications).
○Use calipers and measure at several points.
★If any measurement is greater than the service limit, replace the wheel hub.
★If the drum is worn unevenly or scored, lightly turn the drum on a brake drum lathe or replace the wheel hub. Do not turn the drum beyond the service limit.

Brake Shoe Lining Wear

●See WARNING in Brake Removal, before operation.
●Remove the break shoes (see Brake Panel Disassembly).
●Measure the lining thickness (see Specifications).
○Use a caliper or scale, and measure at several points as shown.

Brake Lining Measurement



1. Lining Thickness

☆If any measurement is less than the service limit, replace both shoes as a set.
☆If the lining thickness is greater than the service limit, do the following before installing the shoes.
○File or sand down any high spots on the surface of the lining.
○Use a wire brush to remove any foreign particles from the lining.
●Wash off any oil or grease with an oilless cleaning fluid such as trichloroethylene or acetone.

WARNING

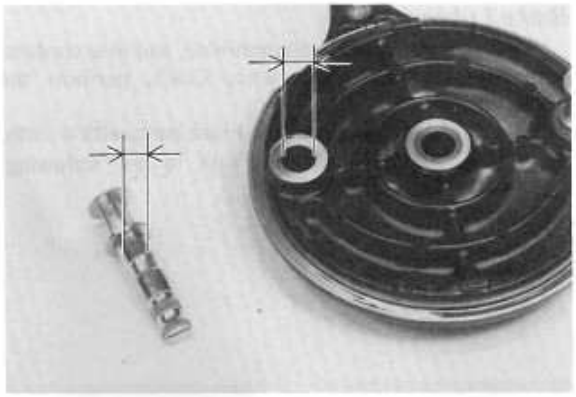
○**These cleaning fluid are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.**

Brake Shoe Spring Inspection

●Visually inspect the brake shoe springs for breaks or distortion.
★If the springs are damaged in any way, replace them.

Brake Camshaft and Camshaft Hole Wear

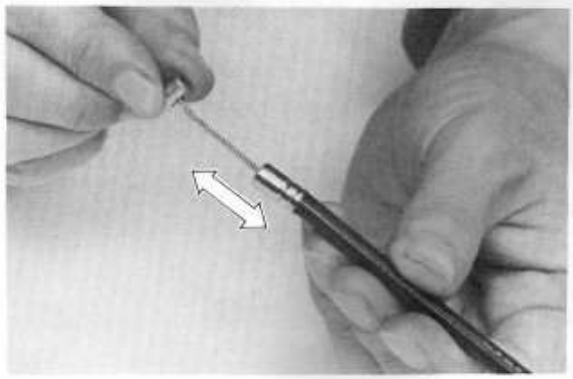
●Remove the brake camshaft (see Brake Panel Disassembly).
●Measure the shaft diameter (see Specifications).
○Use a micrometer at the point shown.



★If any measurement is less than the service limit, replace the camshaft.
●Measure the inside diameter of the camshaft hole in the break panel (see Specifications).
○Use a small hole gauge in several directions inside the hole, and then measure the small hole gauge with a micrometer.
★If any measurement is larger than the service limit, replace the brake panel.

Brake Cable Inspection

●With the brake cable disconnected at both ends, the cable should move freely within the cable housing.

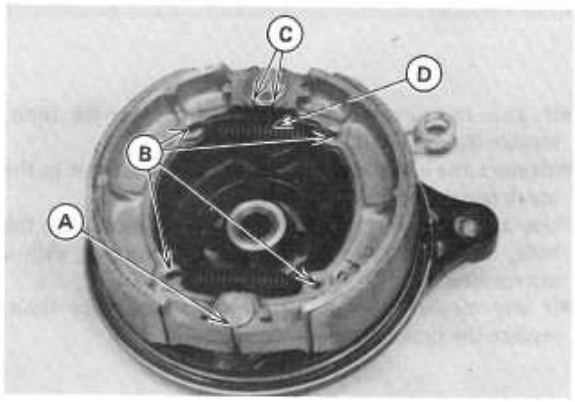


★If cable movement is not free after lubricating (see Brake Lubrication), if the cable is frayed, or if the cable housing is kinked, replace the cable.

Brake Lubrication

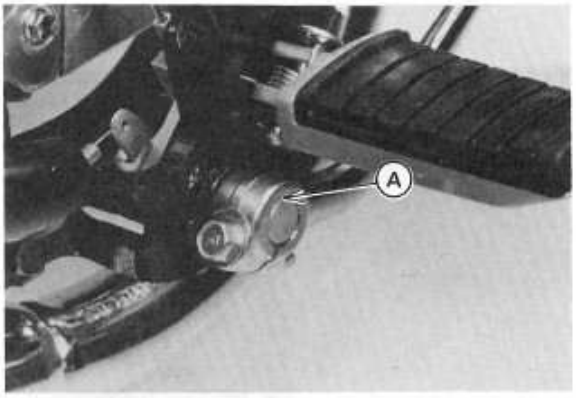
Whenever the brake is disassembled, and in accordance with the Periodic Maintenance Chart, perform the following.

- Clean all old grease out of the brake parts with a cloth.
- Apply a high-temperature grease to the following:
  - Brake Shoe Anchor Pin
  - Spring Ends
  - Cam Surfaces
  - Camshaft Groove



A. Brake Shoe Anchor Pin
B. Spring Ends
C. Cam Surfaces
D. Camshaft Groove

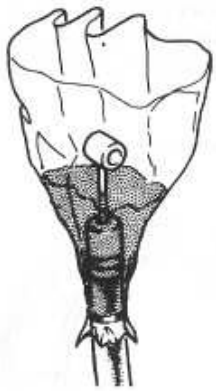
- Lubricate the brake pedal by applying a multi-purpose grease to the pedal pivot shaft groove.



A. Apply grease.

- Clean any excess grease from the parts before assembly.
- lubricate the brake cable by seeping the oil between the cable and cable housing.

Cable Lubrication



- Oil the following lightly:
  - Brake adjusters

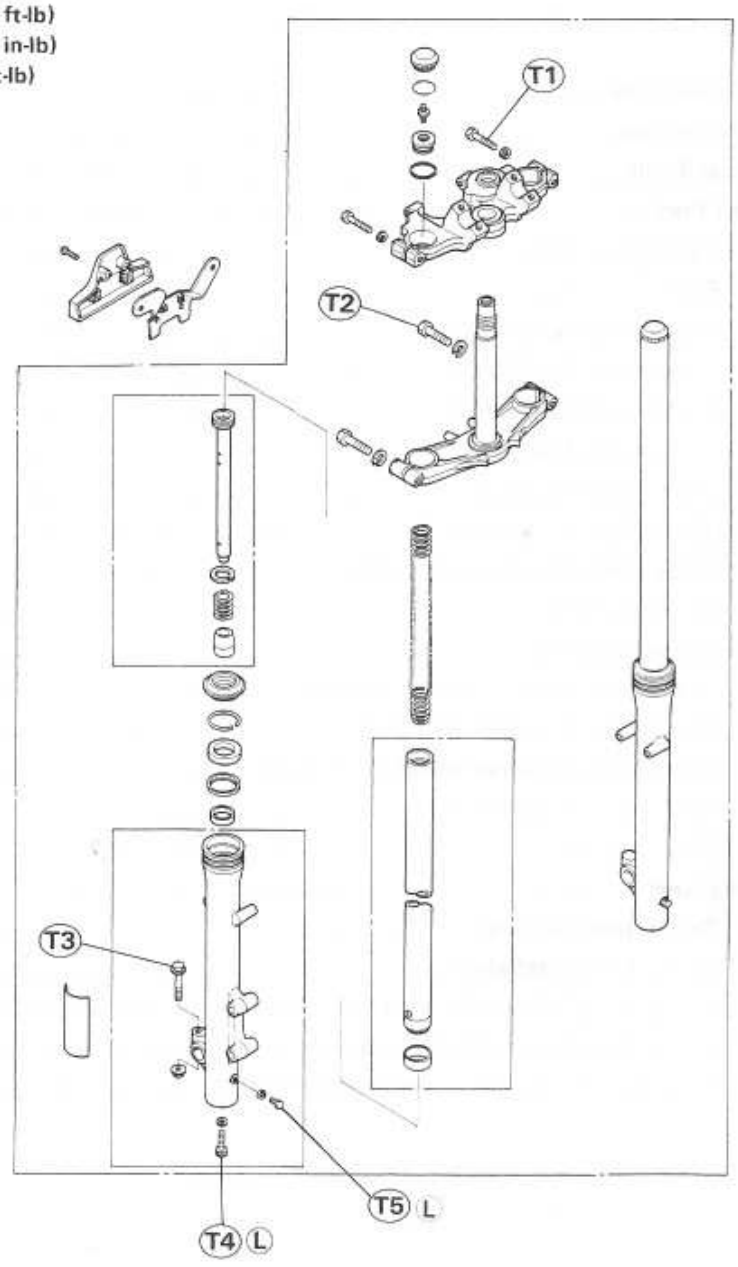
Suspension

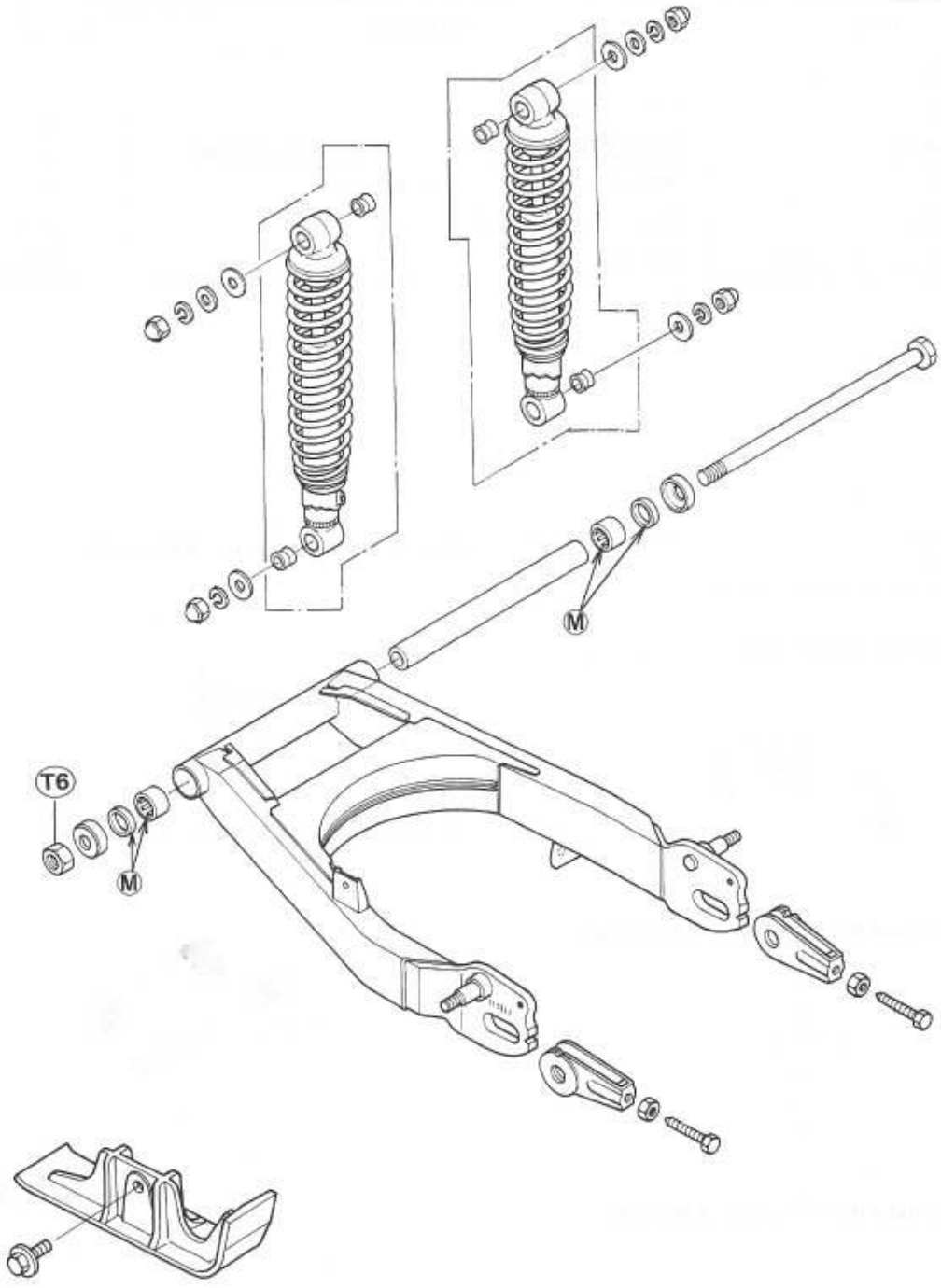
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Exploded View

L : Apply a non-permanent locking agent to the threads.
M : Apply molybdenum disulfide grease.
T1 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T2 : 25 N-m (2.5 kg-m, 18 ft-lb)
T3 : 14 N-m (1.4 kg-m, 10 ft-lb)
T4 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T5 : 7.4 N-m (0.75 kg-m, 65 in-lb)
T6 : 88 N-m (9.0 kg-m, 65 ft-lb)




T6
M
M

Specifications

Item	Standard	Service Limit
Front Fork:		
Oil type	SAE 10W20	– – –
Oil capacity	355 ±2.5 mL (approx. 300 mL at oil change)	– – –
Oil level	162 ±2 mm (Fully Compressed)	– – –
Air pressure	0 kPa (0 kg/cm², 0 psi)	– – –
Fork spring free length	442 mm	433 mm

Special Tools

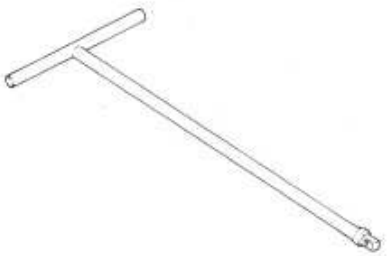
Air Pressure Gauge: 52005-1003



Front Fork Cylinder Holder Adapter: 57001-1057



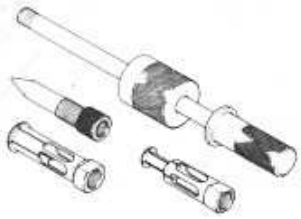
Front Fork Cylinder Holder Handle: 57001-183



Front Fork Oil Seal Driver: 57001-1091



Oil Seal and Bearing Remover: 57001-1058



Front Fork

Air Pressure Adjustment

- Put the motorcycle on its center stand, and raise the front wheel off the ground using a jack under the engine or other suitable means.
- Use the air pressure gauge (special tool: 52005-1003) specially made for air suspensions.
- Check and adjust the air pressure when the front fork is cold (room temperature).

Front Fork Air Pressure

Standard: 0 kPa (0 kg/cm², 0 psi)

NOTE

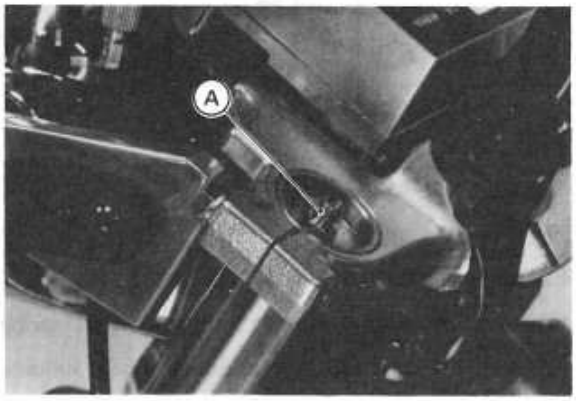
- *Do not use a tire gauge for checking air suspension's air pressure. They do not indicate the correct pressure because of air leaks that occur when the gauge is applied to the valve.*
- *Lower air pressure is for comfortable riding, but it should be increased for high speed riding, or riding on bad 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.**
- **Try to set the air pressure of the right and left fork legs as equally as possible.**

WARNING

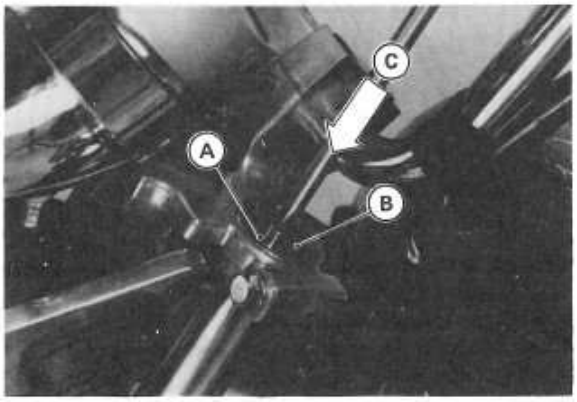
- **Be sure to adjust the air pressure within the usable range. Pressure too high can produce a hazardous riding condition.**
- **Only air or nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.**
- **Do not incinerate the front fork without first removing the air valve or it may explode.**
- **Do not remove the springs and relay 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

Fork Oil Change

- Use a jack under the engine or other suitable means to lift the front of the motorcycle.
- Release the air in the fork leg through the air valve at the top of the fork leg.
- Press the top plug to remove the top plug retaining ring, and then remove the top plug.



A. Top Plug
B. Retaining Ring
C. Press down

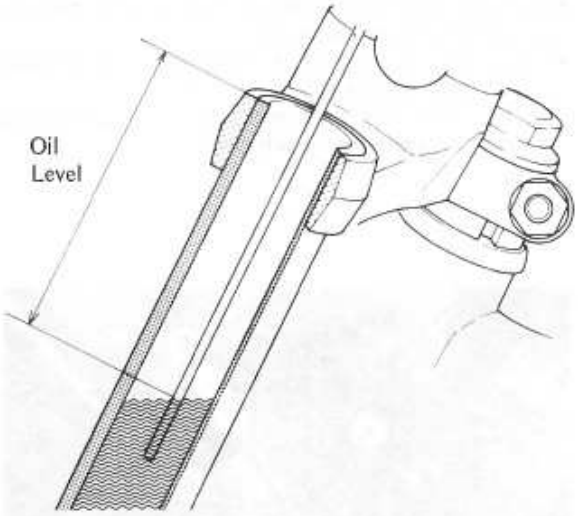
- Pull out the collar, fork spring seat, and fork spring.
- Remove the drain bolt.
- Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch to oil in a container as it squirts out.
- Wash the drain bolt threads clean of oil, and blow them dry and install it.
- 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 compressed 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.

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.**

Fork Oil Level Measurement



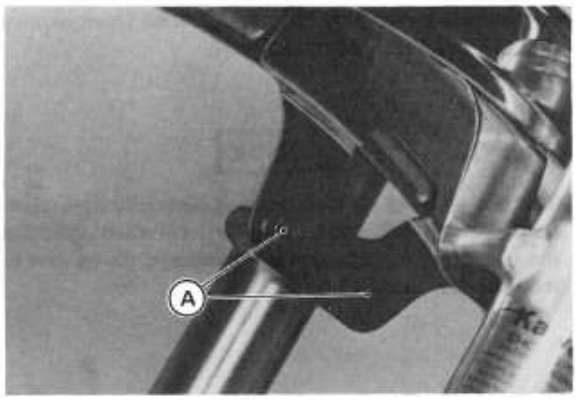
- Inspect the O-ring on the top plug, and replace it with a new one if it is damaged.
- Install the spring and spring seat.
- Push down the top plug, and install retaining ring.
- Change the oil of the other fork leg in the same manner.
- Adjust the air pressure.

Front Fork Oil

Viscosity	**SAE 10W20**
Amount per side	
When changing oil:	**300 mL**
After disassembly and completely dry:	**355 ±2.5 mL**
Level	**162 ±2 mm**

Front Fork Removal

- Remove the following parts. Refer to the appropriate chapters.
  - Caliper (for left fork only)
  - Front wheel
  - Front fender
  - Upper clamp bolt (loosen)
  - Lower clamp bolt (loosen)



A. Fender Mounting Bolts

- With a twisting motion, work the fork leg down and out.

Front Fork Installation

- Installation is the reverse of removal. Note the following.
  - If the fork leg was disassembled, check the fork oil level (see Fork Oil Change).
  - Route the brake hoses correctly.
  - Tighten the lower and upper clamp bolts to the specified torque (see Exploded View).
  - Tighten the caliper mouning bolts to the specified torque (see Exploded View in the Brakes chapter).
  - Check the front brake after installation.

Front Fork Disassembly

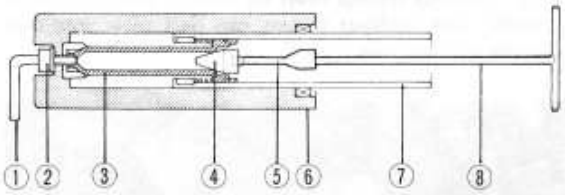
- Remove the front fork leg (see Front Fork Removal).
- Release air pressure from the fork.
- Remove the top plug, collar, and spring (see Fork Oil Change).
- Pour out the fork oil.

NOTE

- *The length of the front fork holder is insufficient, so attach some suitable extension bar (more than 50 mm long) to the holder.*

- Stop the cylinder from turning by using the front fork cylinder holder handle, adapter (special tools) and any suitable extension bar.
- Unscrew the Allen bolt and take off the bolt, and gasket from the bottom of the outer tube.

Front Fork Cylinder Removal



1. Wrench
2. Bolt
3. Cylinder
4. Adapter: 57001-1057
5. Extension Bar
6. Outer Tube
7. Inner Tube
8. Handle: 57001-183

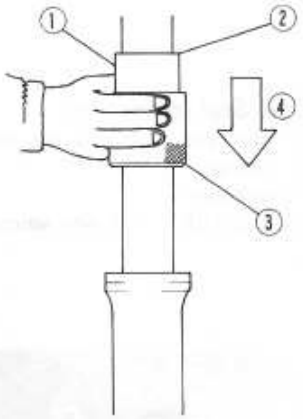
- Remove the piston cylinder unit and short spring up side down of the front fork.
- Separate the inner tube from the outer tube as follows.

○Remove the dust seal from the outer tube.
○Remove the retainer 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

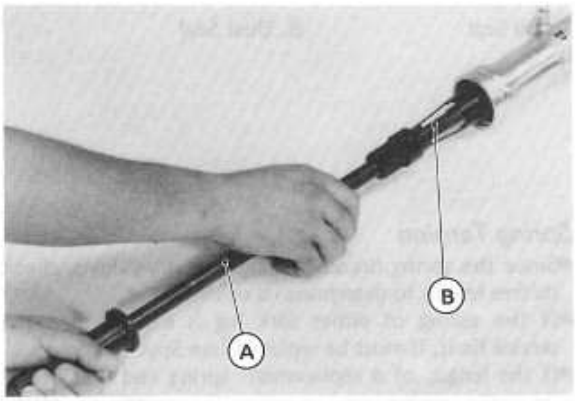
○**To avoid damaging the inner tube guide bush, do not tap the outer tube when the fork leg is put horizontally on a work bench.**

Front Fork Outer Tube Removal



1. Driver: 57001-1091
2. Small End
3. Big End
4. Tap

○Remove the oil seal, washer and outer tube guide bush using oil seal and bearing remover (special tool).



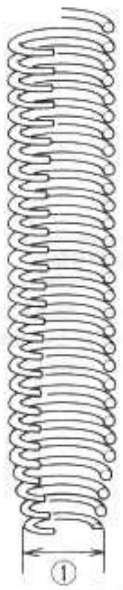
A. Oil Seal and Bearing Remover: 57001-1058
B. Adapter

●Remove the cylinder base out of the bottom of the outer tube.

Front Fork Assembly

Assemble the front fork as follows. Refer to the appropriate sections.
●Visually inspect the O-ring to the top plug, and replace it if necessary.
●Inspect the guide bushes as Guide Bush Inspection section.
●Insert the cylinder unit to the inner tube.
●Install the cylinder base.
●Insert the inner tube and cylinder as a set to the outer tube.
●Apply a non-permanent locking agent to the allen bolt.
●Tighten the Allen bolt to the specified torque (see Exploded View).
●Install the guide bush as Guide Bush Installation illust until it stops.
○The slit of the bush must baced toward the left or right.
●Install the new oil seal with driver (special tool: 57001-1091).
★If the drain screw is removed, note the following.
○Visually inspect it, and replace it if necessary.
○Apply a non-permanent locking agent to the threads of the drain screw.
○Tighten the drain screw to the specified torque (see Exploded View).
●Insert the fork spring with the small diameter end facing down.

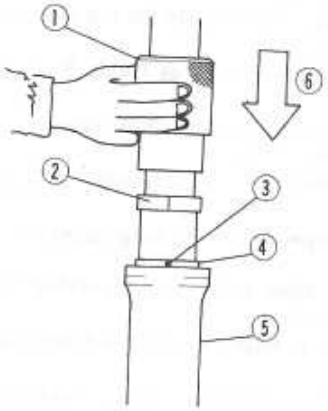
Front Fork Spring



1. Small Diameter End

- Pour in the type and amount of fork oil specified.
- Adjust the oil level as Fork Oil Change section.
- Install the top plug and retaining ring.

Guide Bush Installation



1. Driver: 57001-1091
2. Used Guide Bush
3. Slit
4. New Guide Bush
5. Outer Tube
6. Tap

Inner Tube Inspection

- Visually inspect the inner tube, and repair any damage.
- Nicks or rust damage can sometimes be repaired by using a oilstone 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.

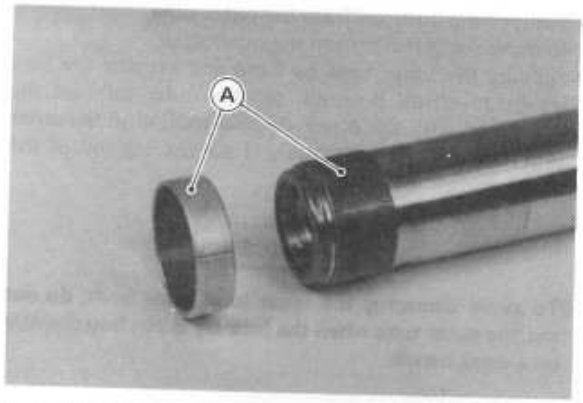
- Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION

○**If the inner tube is bent or badly 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.



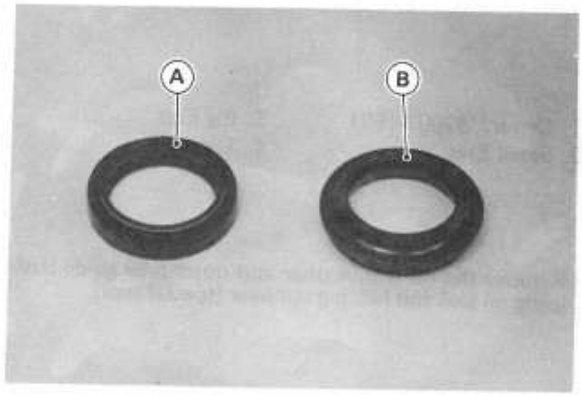
A. Guide Bushes

Oil Seal and Dust Seal Inspection

- Inspect the oil seal and 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.

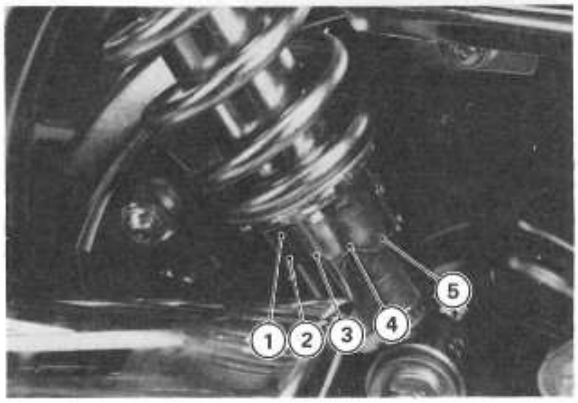
★If the spring of either fork leg is shorter than the service limit, it must be replaced (see Specifications).

★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.

Rear Shock Absorber

Rear Shock Absorber Adjustment

The spring adjusting sleeve on each rear shock absorber has 5 positions so that the spring can be adjusted for different road and loading conditions.



If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Adjuster

Position	Spring Force	Setting	Load	Road	Speed
1	Stronger	Soft	Light	Good	Low
2	↓	↑	↑	↑	↑
3		↓	↓	↓	↓
4					
5	↓	Hard	Heavy	Bad	High

NOTE

○*The recommended position is 1 for one rider with no accessories.*

●Check to see that both adjusting sleeves are turned to the same relative position

WARNING

○**If they are not adjusted to the same position, an unsafe riding condition may result.**

Rear Shock Absorber Removal

●Set the motorcycle up on its center stand.
●Remove the muffler (see Muffler Removal Notes in the Engine Top End chapter).
●Remove the cap nut, lockwasher, and flat washer from the both ends of the rear shock absorber.
●Pull off the rear shock absorber.

Rear Shock Absorber Installation Notes

●Tighten the mounting nuts to the specified torque (see Exploded View).
●Adjust the rear shock absorber position (see Rear Shock Absorber Adjustment).

Rear Shock Absorber Wear

●Remove the rear shock absorbers (see Rear Shock Absorber Removal).
●Compress each rear shock absorber.
●Visually inspect the following items.
Compression stroke
Oil leakage
Other damage
★If there is any damage to the rear shock absorber, or one unit feels weaker than the other, replace both shock absorbers as a set.

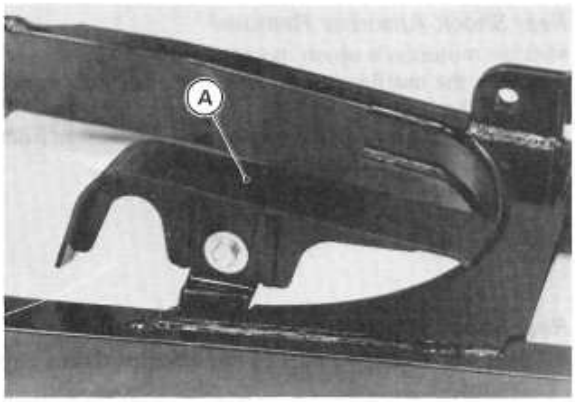
Bushing Wear

●Visually inspect the rubber bushings.
★If they show any signs of damage, replace them.

Swing Arm

Swing Arm Removal

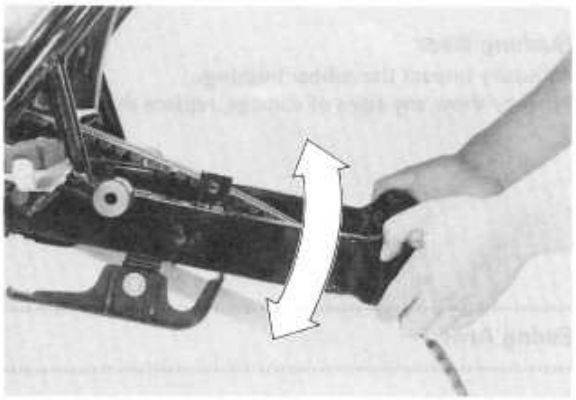
●Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
●Remove the muffler (see Muffler Removal Notes in the Engine Top End chapter).
●Remove the rear shock absorbers (see Rear Shock Absorber Removal).
●Remove the torque link.
●Remove the pivot shaft nut, and pull out the pivot shaft.
●Pull back the swing arm and take off the swing arm at this time. A cap on each side of the swing arm will also drop off.
●Remove the drive belt guide from the swing arm.



A. Drive Belt Guide

Swing Arm Installation

- Installation is the reverse of removal. Note the following.
  - Tighten the pivot shaft nut to the specified torque (see Exploded View).
  - Tighten the torque link nut to the specified torque (see Exploded View).
  - Move the swing arm up and down to check for abnormal friction.

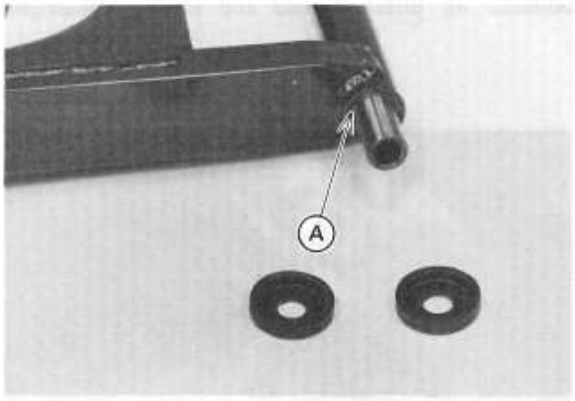


Swing Arm Disassembly/Assembly Note

- Remove the needle bearing using oil seal and bearing remover (special tool: 57001-1058), see Front Fork Disassembly.
- Insert the needle bearing using bearing driver set (special tool: 57001-1129) so that marked side faces outside.
- Apply a thin coat of a molybdenum disulfide grease to lips of the grease seals.

Swing Arm Needle Bearing Lubrication

- Apply a thin coat of a molybdenum disulfide grease to the inner surfaces of the needle bearings in accordance with the Periodic Maintenance Chart.



A. Apply grease.

Swing Arm Sleeve and Needle bearing Wear

- Visually inspect the swing arm sleeve and needle bearing.

★If there is any damage to them, replace it.

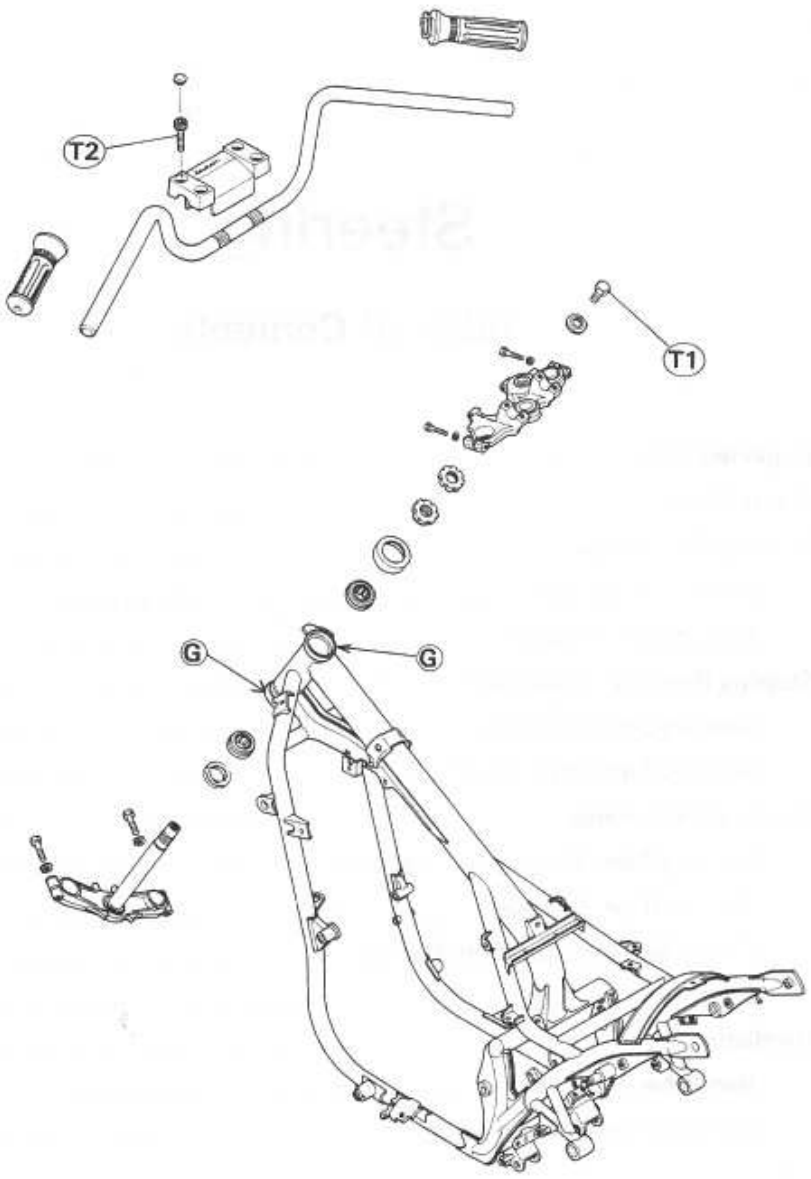
Steering

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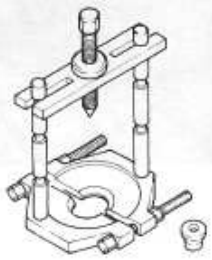
Exploded View



G: Apply grease.
T1: 42 N-m (4.3 kg-m, 31 ft-lb)
T2: 19 N-m (1.9 kg-m, 13.5 ft-lb)

Special Tools

Bearing Puller: 57001-135



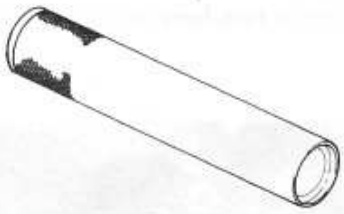
Adapter: 57001-136



Pole: 57001-1190



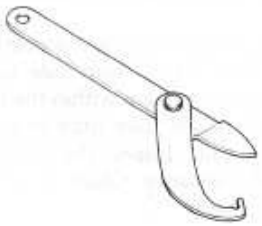
Stem Bearing Driver: 57001-137



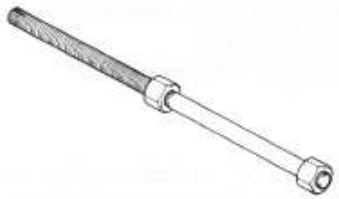
Adapter: 57001-1074



Stem Nut Wrench: 57001-1100



Driver Press Shaft: 57001-1075



Driver: 57001-1106



Driver: 57001-1076



Stem Bearing Remover: 57001-1107



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.
- 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 tap 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.

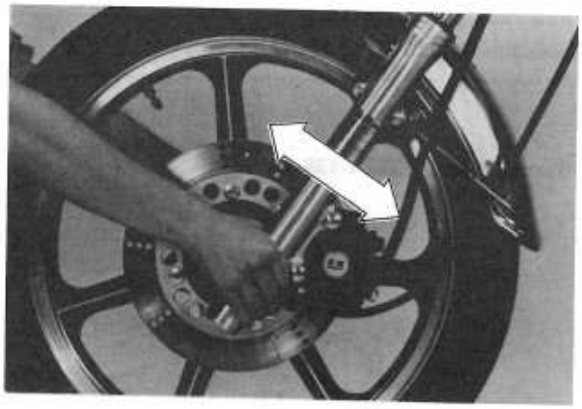
NOTE

○*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 fork near the axle.
- Feel for steering looseness by pushing and pulling the forks.

★If you feel looseness, the steering is too loose.



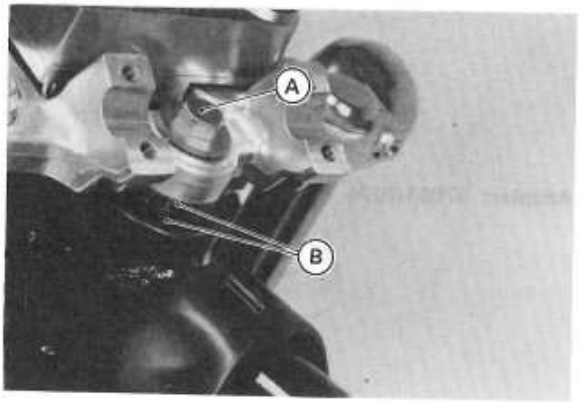
Steering Adjustment

Proper steering adjustment is completed by adjusting the lower stem locknut and by tightening the stem head bolt to the specified torque.

- Set the motorcycle up on its center stand.
- Remove the following parts. Refer to the appropriate chapters.
  - Fuel Tank
  - Handlebar
  - Front Fork Lower Clamp Bolts (Loosen)
  - Stem Head Bolt (Loosen)
- Using a jack under the engine, lift the front wheel off the ground.
- Loosen the stem locknuts all the way with the stem nut wrench (special tool: 57001-1100).

NOTE

○*Do not separate the upper and lower stem locknut.*
○*Loosen the steering by turning the lower stem locknut counterclockwise.*
○*Tighten the steering by turning the upper stem locknut clockwise.*



A. Stem Head Bolt B. Stem Locknuts

•If the steering is too tight, loosen the stem locknuts a fraction of turn; if the steering is too loose, tighten the locknuts a fraction of turn. Turn the locknut a 1/8 turn at maximum at a time.
•Tighten the following parts to the specified torque (see Exploded View).
Steering Stem Head Bolt
Front Fork Lower Clamp Bolts
•Check the steering again.
★If the steering is still too tight or too loose, repeat the adjustment.
•Install the removed parts.
•Check that the cable and wires are routed properly.

Steering Removal/Installation

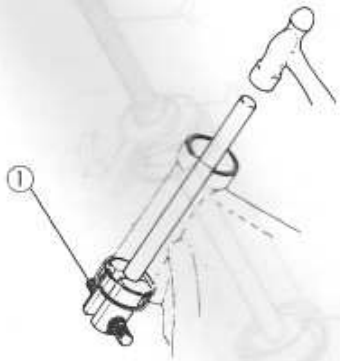
Steering Stem Removal

•Remove the following parts. Refer to the appropriate chapters.
Fuel Tank
Front Wheel
Front Turn Signal Lights
Headlight
Meter
Ignition Switch
Front Forks
Master Cylinder
Handlebar
Stem Head Bolt
Stem Head Flat Washer
Steering Stem Head
•Push up on the stem base, and remove the following parts. Steering stem locknuts with stem nut wrench (special tool: 57001-1100). Steering stem base and steering stem (single unit). Steering stem cap. 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

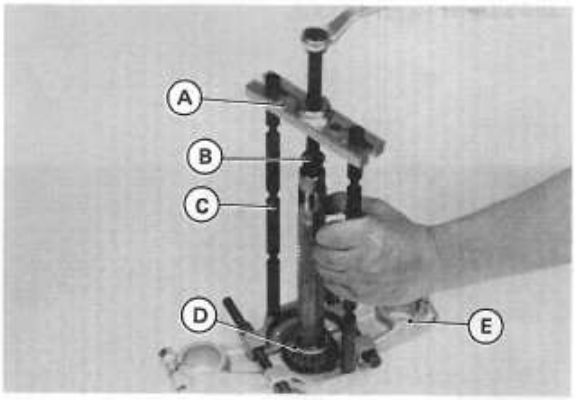
○*If any steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*

Outer Race Removal



1. Stem Bearing Remover: 57001-1107

•Remove the lower inner race with grease seal which is pressed onto the steering stem, with the steering stem bearing puller and adapter (special tools).

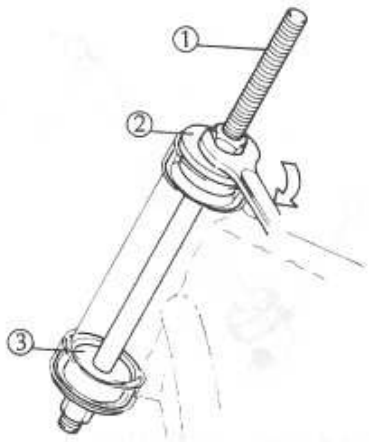


A. Bearing Puller: 57001-135
B. Adapter: 57001-316
C. Pole: 57001-1190
D. Bearing Inner Race
E. Stem Base

Steering Stem Installation

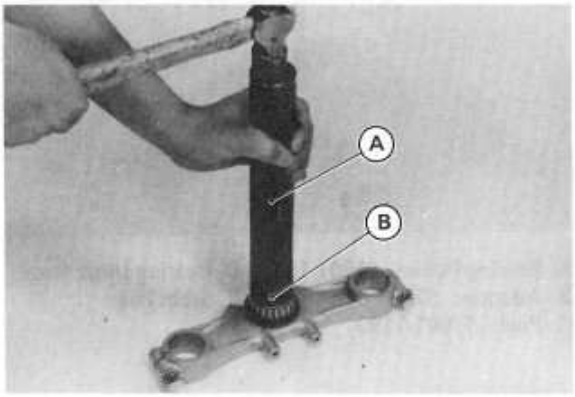
•Apply grease to the outer races, and then drive them into the head pipe using the drivers and the driver press shaft (special tools).

Outer Race Installation



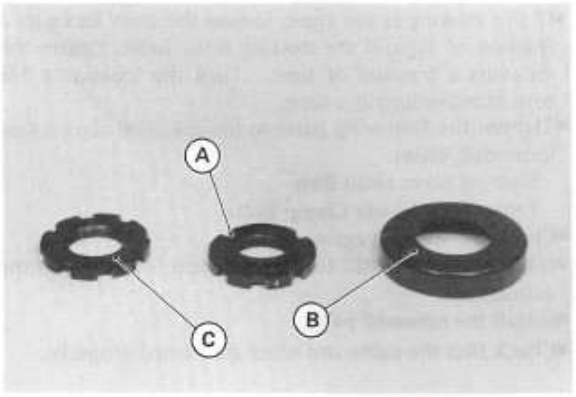
1. Driver Press Shaft: 57001-1075
2. Driver: 57001-1106
3. Driver: 57001-1076

•Apply grease to the 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

•Lubricate the steering stem bearings with grease.
•Install the steering stem cap.
•Install the steering stem locknut so that the stepped side faces down, and then install the plain locknut by hand.
•Install the steering stem head, washer, and bolt. Loosely install the bolt at this time.

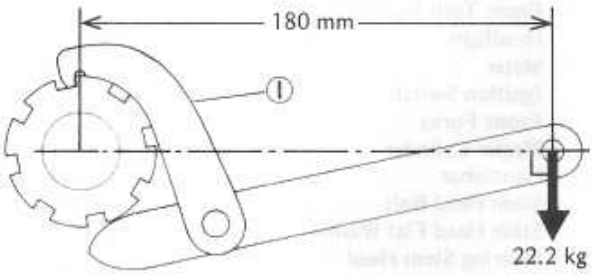


A. Stepped B. Cap C. Plane Locknut

The following steps should be performed after steering bearing installation. This procedure sets the bearing in place.

○Using the stem nut wrench, tighten the stem locknut which has a step 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.

Torquing Stem Locknut



1. Stem Nut Wrench: 57001-1100

○Check that there is no play and the steering stem turns smoothly. If not, the steering stem bearing may be damaged.
○Loosen the steering stem locknut and proceed with adjustment of bearings (see Steering Adjustment).
•Reinstall the removed parts.
•Route the cables and harnesses correctly. The cables and wiring harnesses must not hinder handlebar movement.

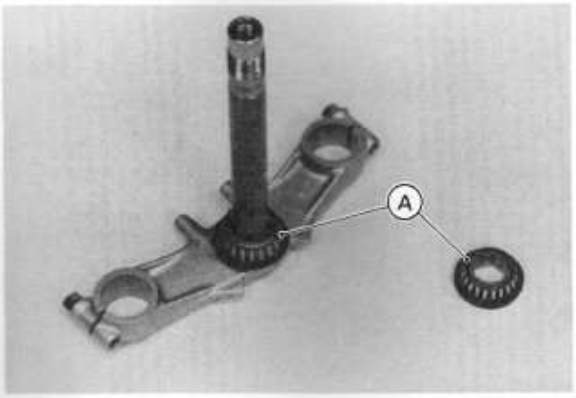
•Check and adjust the following items. Refer to the appropriate chapters.
Steering
Front Brake
Clutch
Throttle Cable
Rear View Mirrors
Headlight Beam

Steering Maintenance

Steering Stem Bearing Lubrication

In accordance with the Periodic Maintenance Chart, the steering stem bearings should be relubricated.

•Remove the steering stem.
•Using a high flashpoint 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 Bearings

Bearing Wear, Damage

•Using a high flashpoint 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 off grease and dirt.
•Visually check the outer races and the rollers.
•Replace the bearing assemblies if they show damage.

Grease Seal Deterioration, Damage

•Inspect the grease seal on the upper tapered roller bearing for any signs of deterioration or damage.
★Replace the grease seal if necessary.

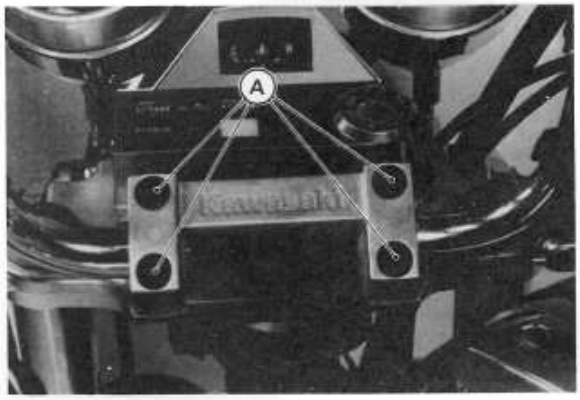
Steering Stem Warp

•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.

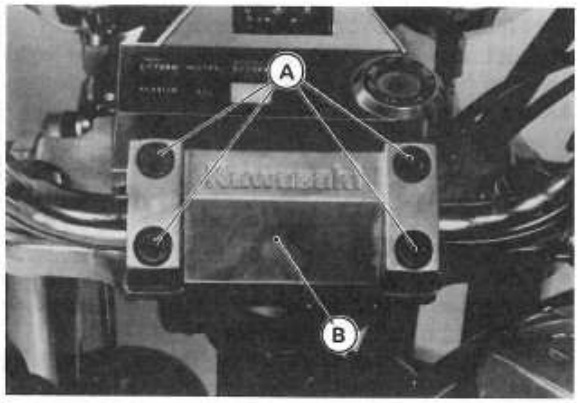
Handlebar

Handlebar Removal

•Remove the following parts. Refer to the appropriate chapter.
Clutch Lever
Left Switch Housing
Right Switch Housing
Throttle Grip
Front Turn Signal Lights
Master Cylinder
Handlebar Clamp Bolt Caps (with suitable tool)
Handlebar Clamp Bolts
Stem Head Cover
Handlebar



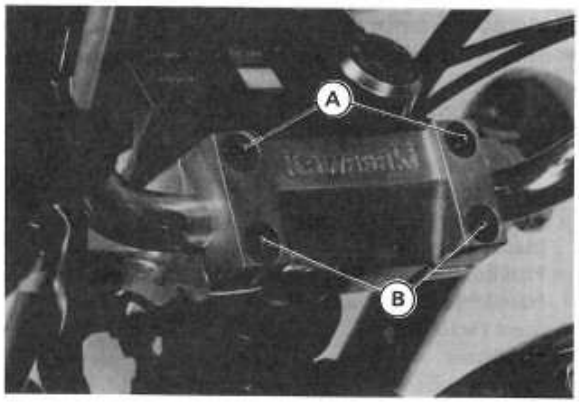
A. Caps



A. Handlebar Clamp Bolts
B. Stem Head Cover

Handlebar Installation Notes

- Tighten the front and then rear handlebar clamp bolts to the specified torque (see Exploded View).



A. Front Handlebar Clamp Bolts
B. Rear Handlebar Clamp Bolts

Frame

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Rear Fender Rear Section Installation Note 14-4

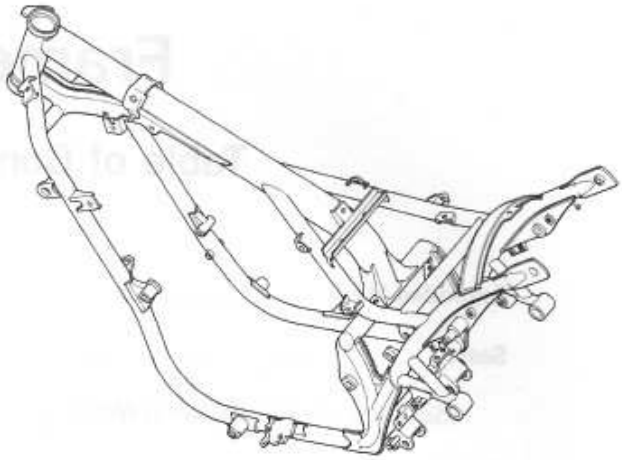
Rear Fender Front Section Removal 14-4

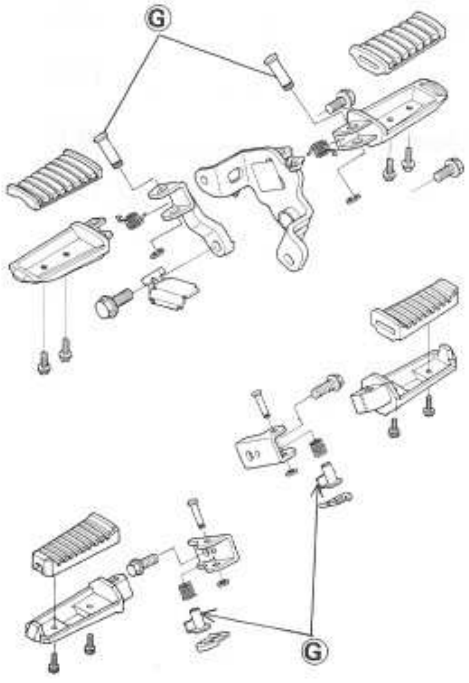
Rear Fender Front Section Installation Note 14-5

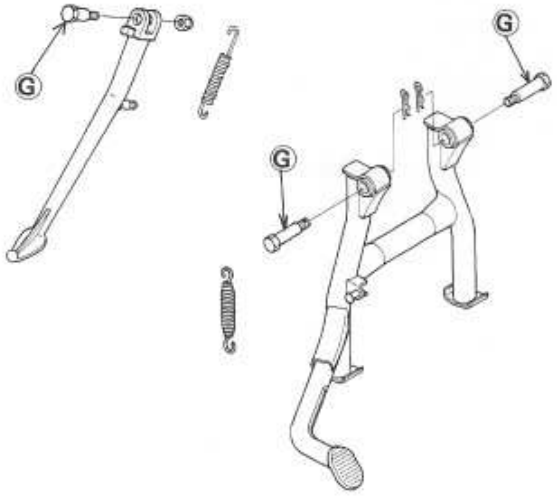
Cable Routing 14-5

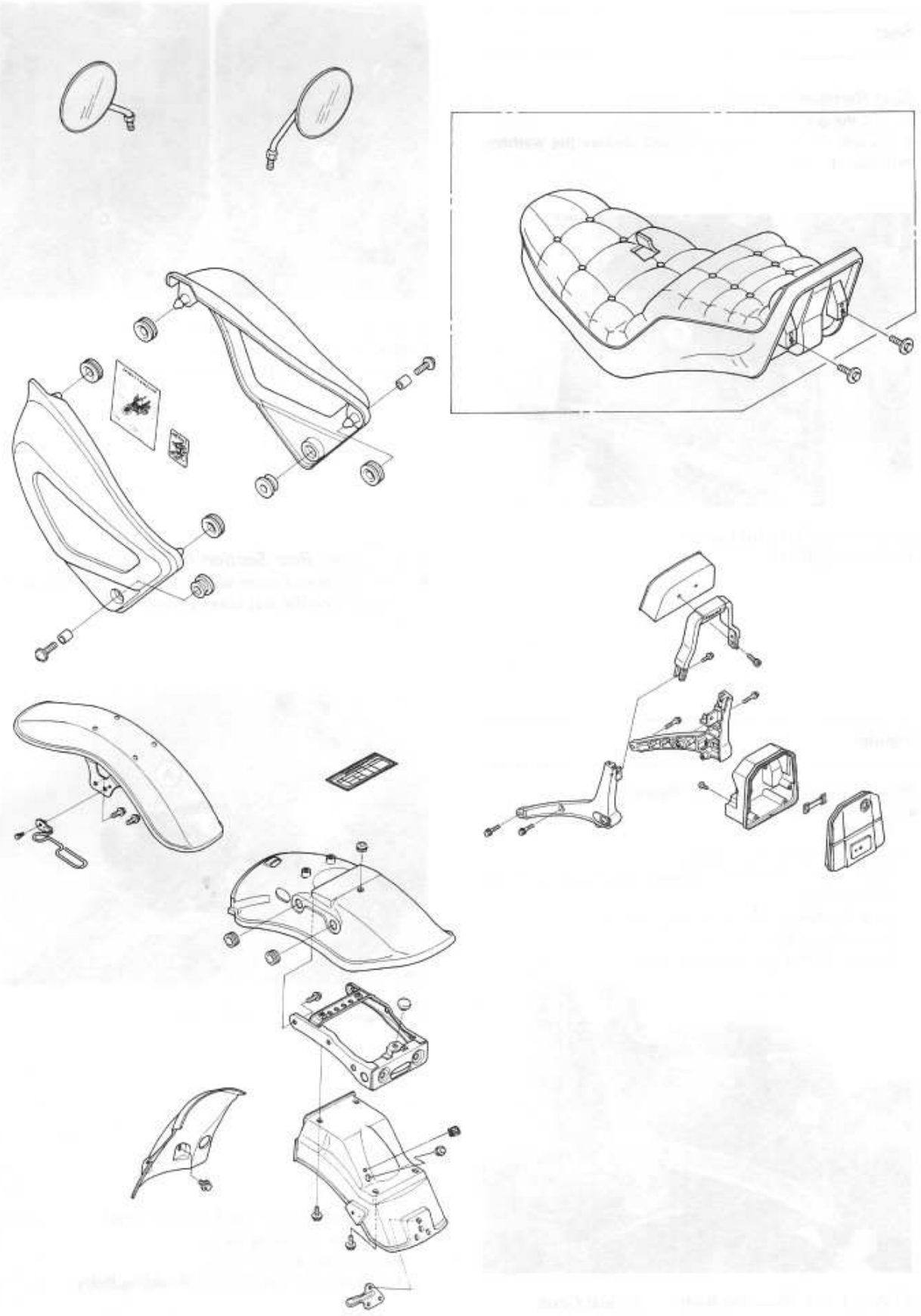
Exploded View

G : Apply grease.





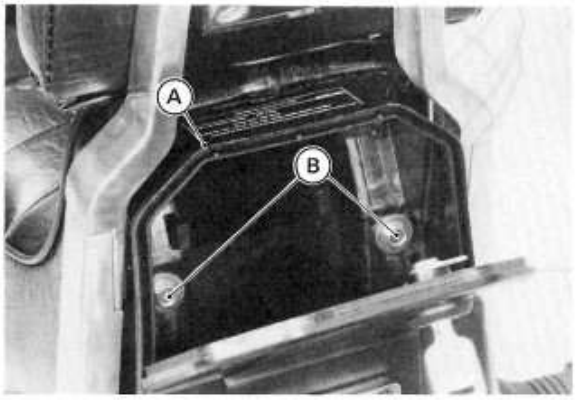




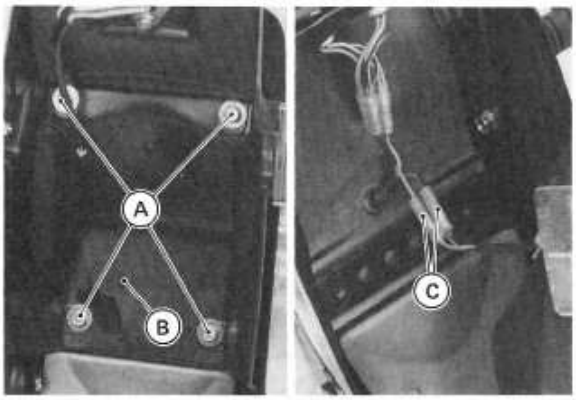
Seat

Seat Removal/Installation Notes

- Open the document/tool kit container.
- Unscrew the mounting bolts and remove the washers.
- Remove the seat.



A. Document/Tool Kit Container
B. Mounting Bolts



A. Rear Fender Rear Section Mounting Bolts
B. Rear Fender Rear Section
C. License Plate Light Lead Connectors

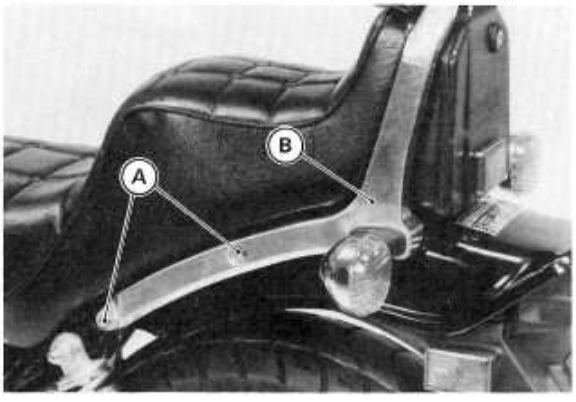
Rear Fender Rear Section Installation Note

- To install the seat cover on the frame, fit the tongue on the frame into the seat cover groove.

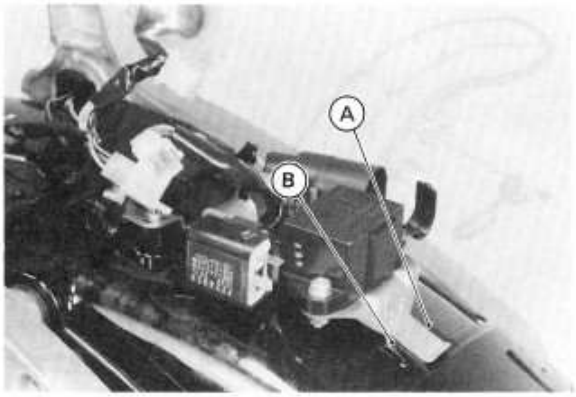
Fender

Rear Fender Rear Section Removal

- Remove the following parts.
  - Seat
  - Back Frame Mounting Bolts
  - Back Frame with Seat Cover, and Electric Component Parts
  - Rear Fender Rear Section Mounting Bolts
  - Rear Fender Rear Section
  - License Plate Light Lead Connector (Disconnect)



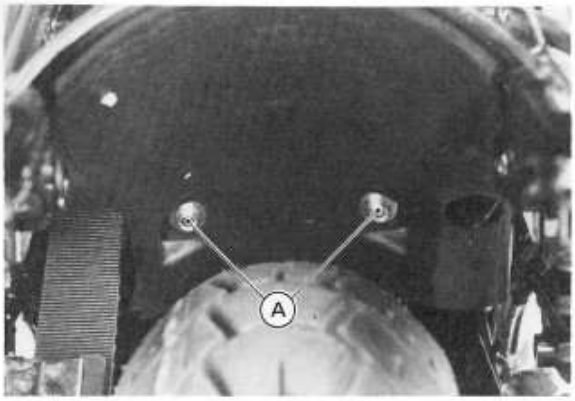
A. Back Frame Mounting Bolts
B. Back Frame
C. Seat Cover



A. Tongue
B. Groove

Rear Fender Front Section Removal

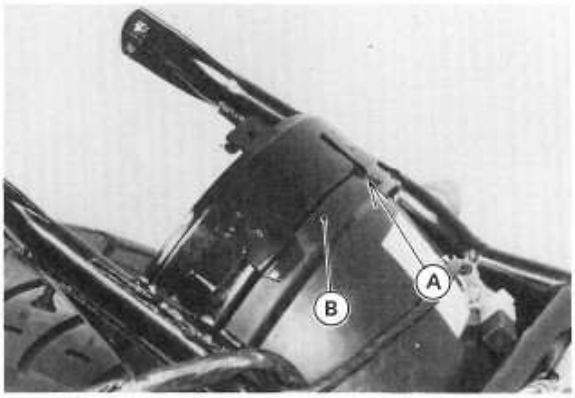
- Remove the following parts.
  - Rear Fender Rear Section
  - Rear Fender Front Section Mounting Bolts



A. Rear Fender Front Section Mounting Bolts

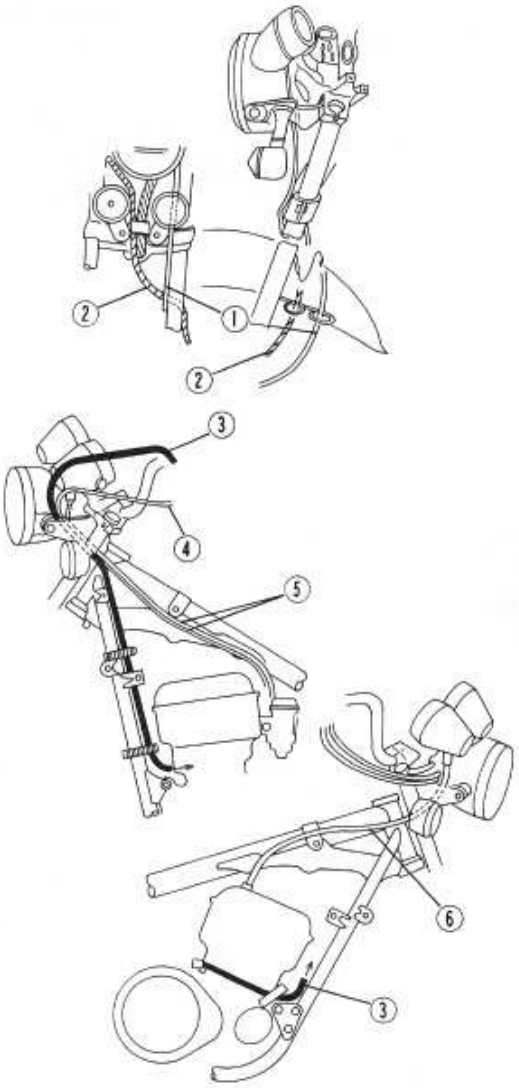
Rear Fender Front Section Installation Note

- When installing the rear fender front section, fit the tongue into the groove in the rear frame.



A. Groove B. Tongue

Cable Routing



1. Speedometer Cable
2. Front Brake Hose
3. Clutch Cable
4. Choke Cable
5. Throttle and Choke Cables
6. Tachometer Cable

Electrical System

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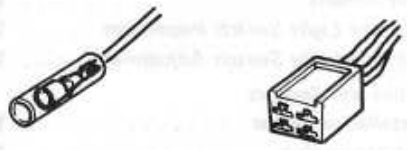
15

Precautions

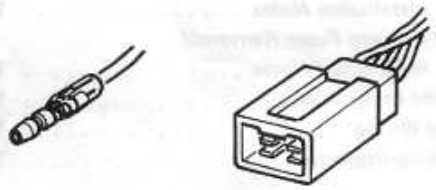
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- 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 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 the 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 brought 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



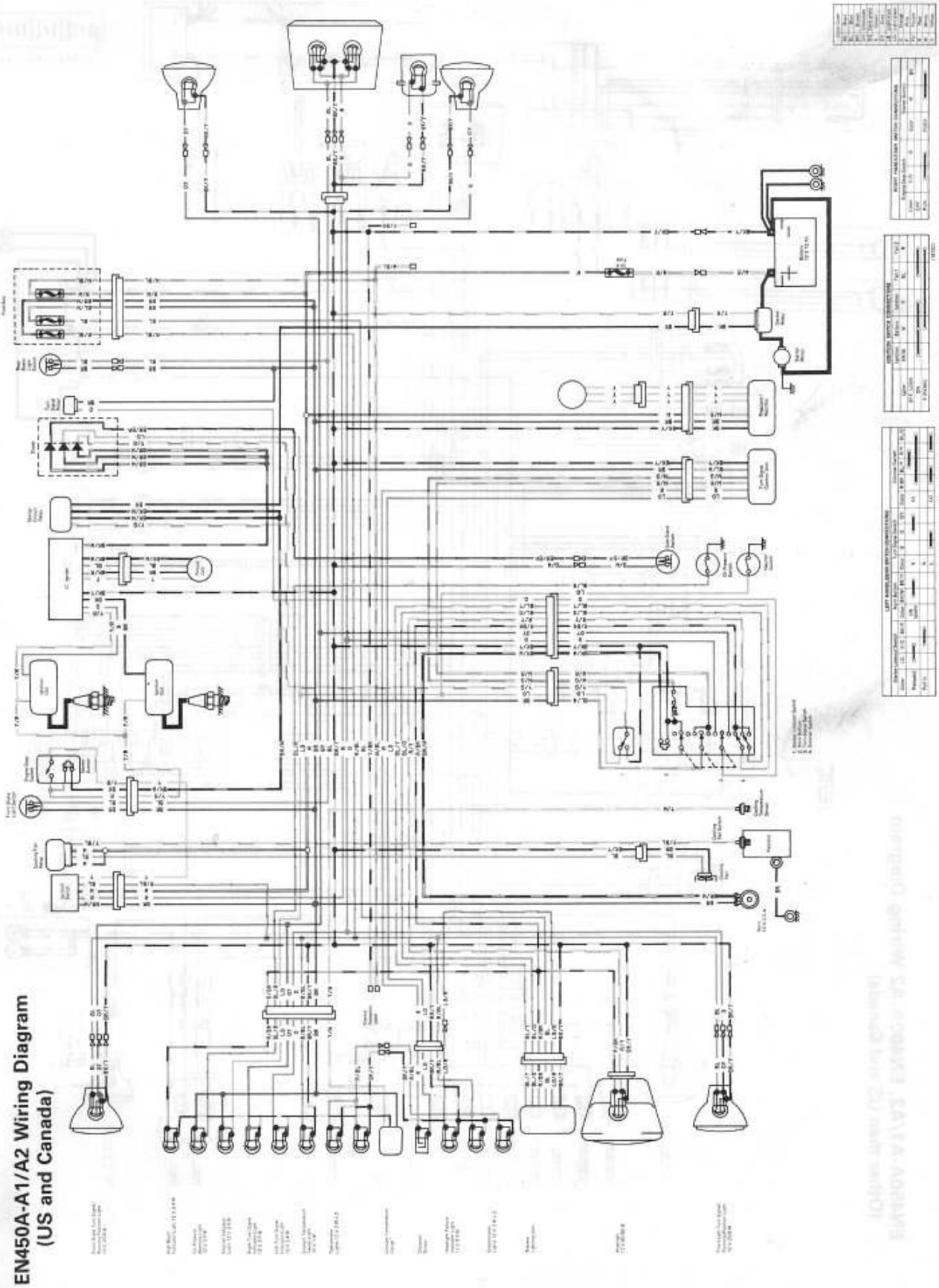
Male Connectors



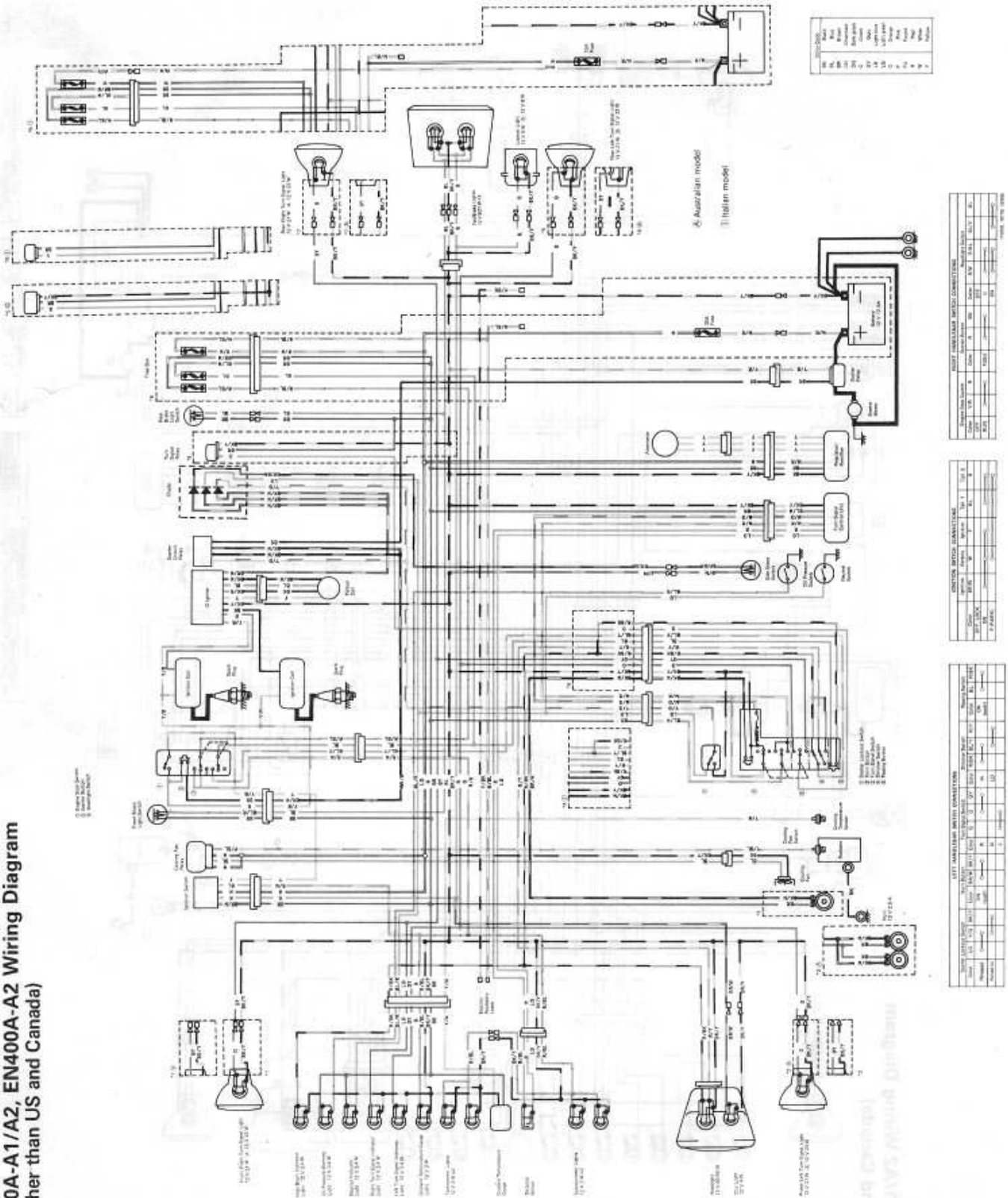
- Color Codes:

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).

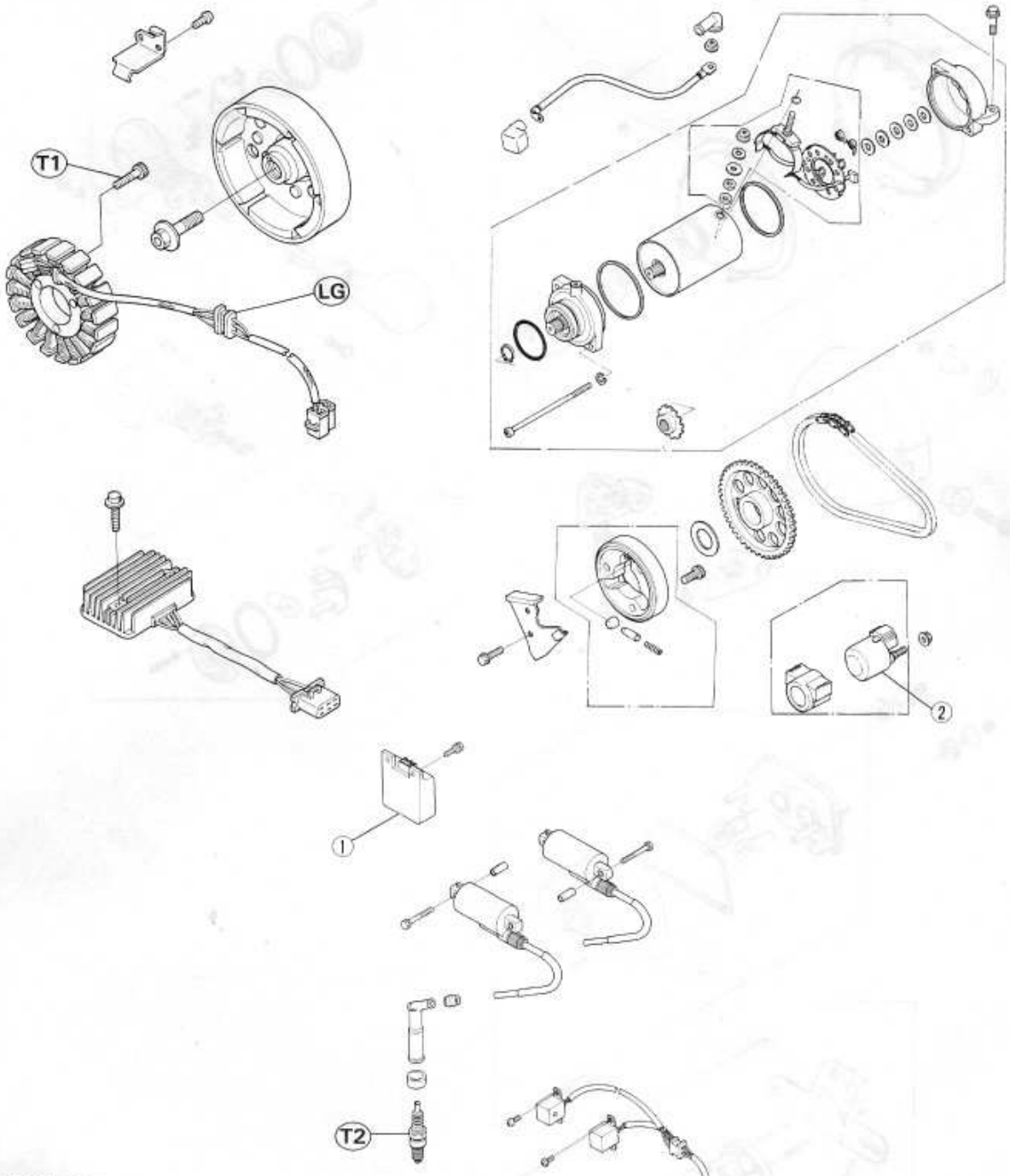


EN450A-A1/A2 Wiring Diagram
(US and Canada)



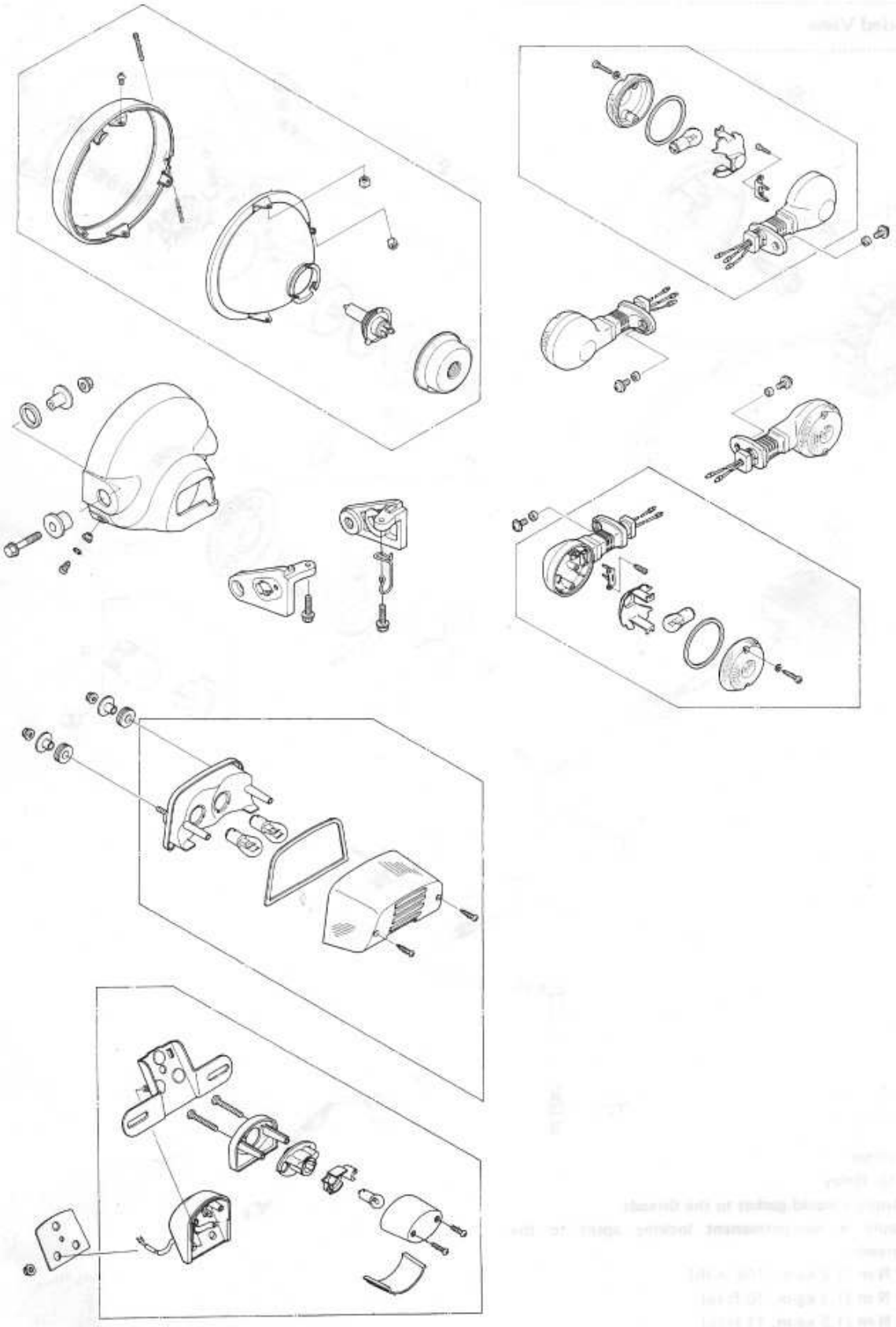
EN450A-A1/A2, EN400A-A2 Wiring Diagram
(Other than US and Canada)

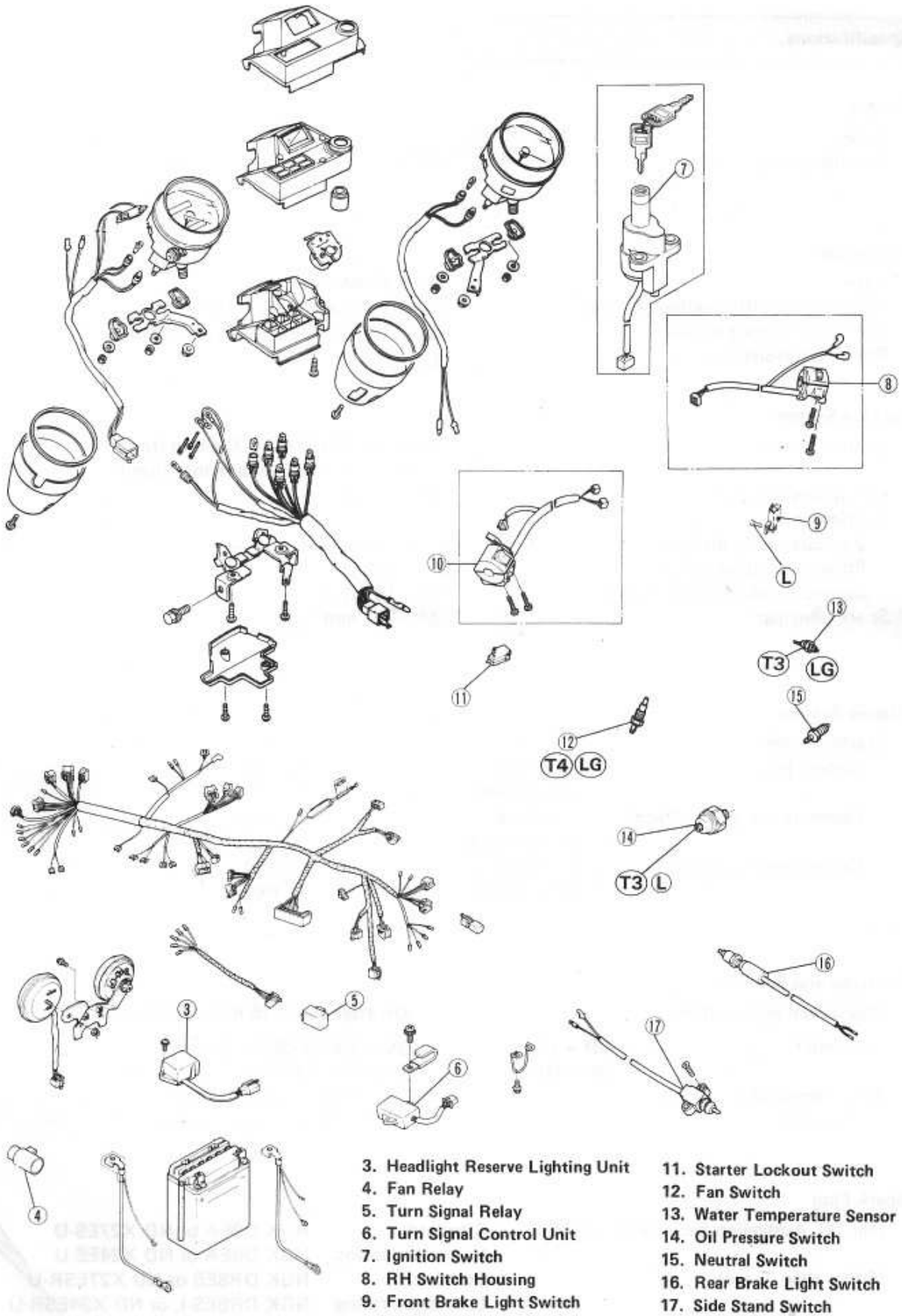
Exploded View



1. IC Igniter
2. Starter Relay

LG : Apply a liquid gasket to the threads.
L : Apply a non-permanent locking agent to the threads.
T1 : 12 N-m (1.2 kg-m, 104 in-lb)
T2 : 14 N-m (1.4 kg-m, 10 ft-lb)
T3 : 15 N-m (1.5 kg-m, 11 ft-lb)
T4 : 0.4 N-m (0.75 kg-m, 65 in-lb)





3. Headlight Reserve Lighting Unit
4. Fan Relay
5. Turn Signal Relay
6. Turn Signal Control Unit
7. Ignition Switch
8. RH Switch Housing
9. Front Brake Light Switch
10. LH Switch Housing
11. Starter Lockout Switch
12. Fan Switch
13. Water Temperature Sensor
14. Oil Pressure Switch
15. Neutral Switch
16. Rear Brake Light Switch
17. Side Stand Switch

Specifications

Battery

Type:	12 V 12 Ah
Specific gravity:	1.280 @20°C (68°F)

Alternator

Type:	Three-phase AC
Regulator/Rectifier output voltage:	Battery voltage 14 – 15 V
Alternator output voltage:	about 60 V @4,000 r/min (rpm)
Stator coil resistance:	0.3 – 0.6 Ω

Ignition System

Ignition timing:	From 10° BTDC @1,200 r/min (rpm) to 37.5° BTDC @10,000 r/min (rpm)
Pickup coil resistance:	400 – 490 Ω
Ignition coil:	
3 needle arcing distance:	7 mm or more
Primary winding resistance:	2.1 – 3.2 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
	Service limit:	6.5 mm
Commutator groove Depth:	Standard:	2.0 mm
	Service limit:	1.5 mm
Commutator diameter:	Standard:	28 mm
	Service limit:	27 mm

Switches and Sensors

Rear brake light switch:		On after about 15 mm pedal travel
Fan switch:	Off → On	94 – 100°C (201 – 212°F)
	On → Off	above 90°C (194°F)
Water temperature sensor resistance:		40°C (104°F) about 600 Ω
		80°C (176°F) about 130 Ω

Spark Plug

(for US, Australian and Italian model)	Standard:	NGK D9EA or ND X27ES-U
	Low speed riding:	NGK D8EA or ND X24ES-U
(Other than above)	Standard:	NGK DR8ES or ND X27ESR-U
	Low speed riding:	NGK DR8ES-L or ND X24ESR-U

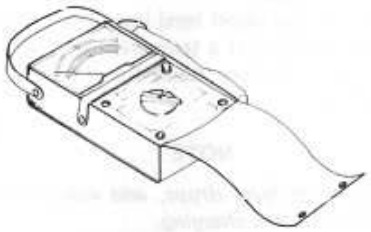
Special Tools

Along with common hand tools, the following move specialized tools are equired for complete electrical system servicing.

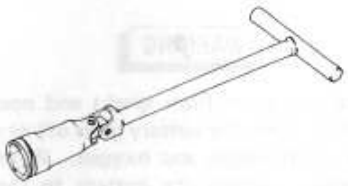
Electro Tester: 57001-980



Hand Tester: 57001-983



Spark Plug Wrench: 57001-1024



Bearing Driver Set: 57001-1129



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.

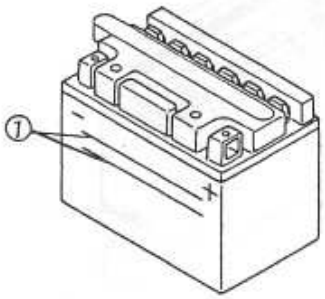
Electrolyte:

Electrolyte Level Inspection

●Remove the battery.

●Visually check the electrolyte level in the battery.

Electrolyte Level



1. Level Lines

★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:

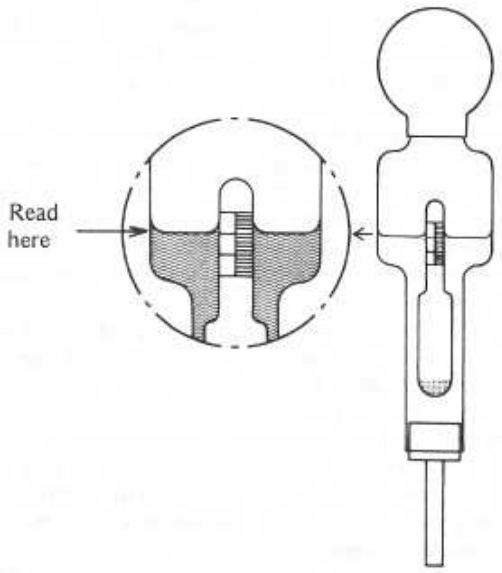
Battery Condition

●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.

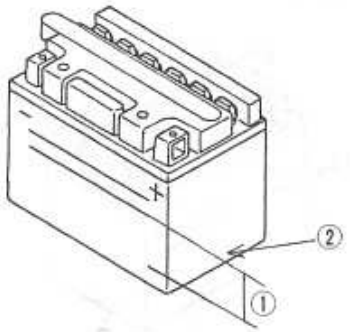
○Read the level of the electrolyte on the floating scale. This is the specific gravity of the electrolyte.

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 1,280 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 move 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 18 Ah, the charging rate would be 1.8 A.

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.

CAUTION

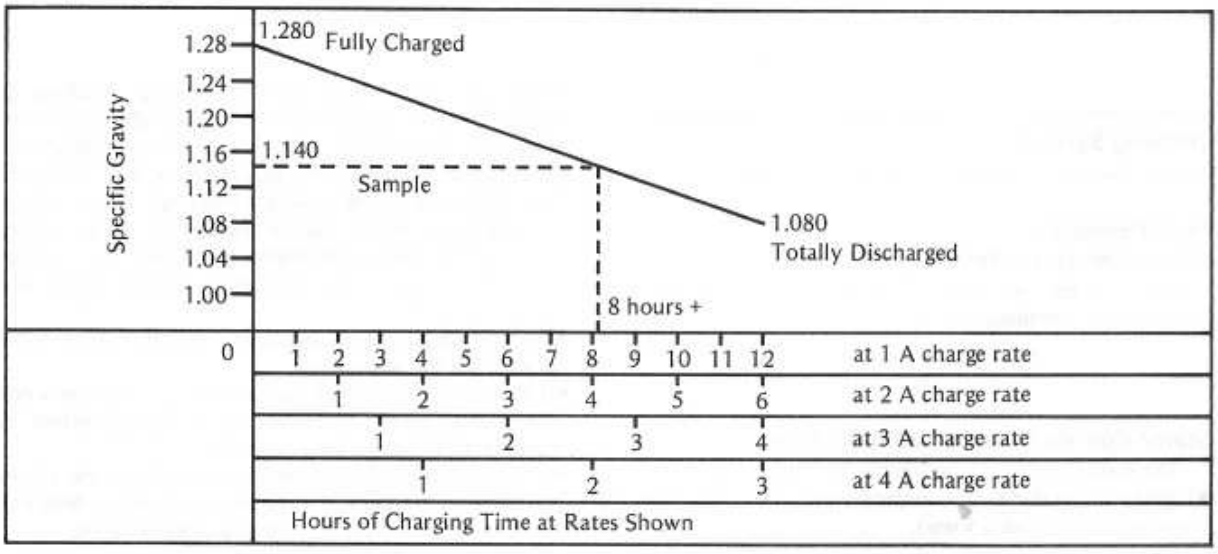
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○**If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.**

•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.

Battery Charging Rate/Time Table



Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (–) 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

•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.

Charging System

Parts Removal:

Alternator Rotor Removal/Installation

Refer to the Alternator/Starter Mechanism in the Crankshaft/Transmission chapter.

Stator Coil Removal/Installation Notes

The stator is mounted inside the alternator cover.

•Tighten the stator coil mounting bolts to the specified torque (see Exploded View).

Inspection:

Regulator/Rectifier Output Voltage Inspection

•Check the battery condition (see Battery section).

•Warm up the engine to obtain actual alternator operating conditions.

•Remove the seat, and pull out connector 1 (see Charging System Wiring Diagram).

•Check that the ignition switch is turned off, and connect the multimeter as shown in table.

CAUTION

○**The white/red lead is connected directly to the battery positive (+) terminal even when the ignition switch is off, so take care not to short the meter probes or clips to the chassis ground.**

Regulator/Rectifier Output Voltage

Meter Range	Connectings		Reading
	Meter (+) to	Meter (–) to	
25 V DC	White/Red (Connector 1)	Black/Yellow (Connector 2)	Battery Voltage – 14 – 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 headlight housing.) 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.

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.
○Remove the seat.
○Remove the air filter.
○Pull out connector 3.
○Disconnect connector 3.
○Connect the multimeter as shown in table 1.

Table 1 Alternator Output Voltage

Meter Range	Connections		Reading @4,000 rpm
	Meter (+) to	Meter (–) to	
250 V AC	One yellow lead (Connector 3)	Another yellow lead (Connector 3)	about 60 V

○Start the engine.
○Run it at the rpm given in table 1.
○Note the voltage readings (total 3 measurements).

★If the output voltage shows the value in table 1, 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 2.
○Note the readings (total 3 measurement).

Table 2 Stator Coil Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (–) to	
x 1 Ω	One yellow lead (Connector 3)	Another yellow lead (Connector 3)	0.3 – 0.6 Ω

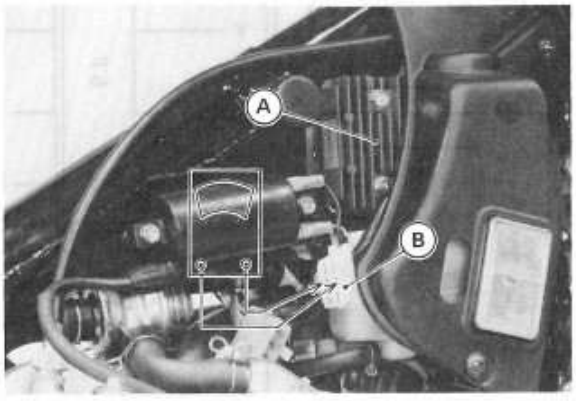
★If there is more resistance than shown in Table, or no meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

●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 magnets have probably weakened, and the rotor must be replaced.

Rectifier Inspection

●Check the diode resistance as follows. Refer to the appropriate chapters and charging system Wiring Diagram.
●Turn off the ignition switch.
●Remove the seat.
●Disconnect the connector 4.
●Using the 1 kΩ range, check the resistance in both directions between the white/red lead and each yellow lead (in the 6-pin connector which leads to the alternator), and between the black lead and each yellow lead. There is a total of 12 measurements. The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced.



A. Regualtor/Rectifer B. Connector 6

NOTE

○*The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking, the lower reading should be from zero to the first 1/3 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 from the frame.
- Using auxiliary leads, connect one of the yellow leads to the battery (+) terminal, and connect the test light between the black lead and the battery (–) terminal. At this time the bulb should not be lit.

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 to the other battery (+) terminal and connect the black lead to the battery (–) terminal momentarily. At this time the bulb should not be lit.
- To apply 24 V to the regulator/rectifier, connect two 12 V batteries in series, and connect the brown lead to the battery (+) terminal and the black lead to the battery (–) terminal momentarily. The bulb should now light and stay on until the bulb circuit is opened.

CAUTION

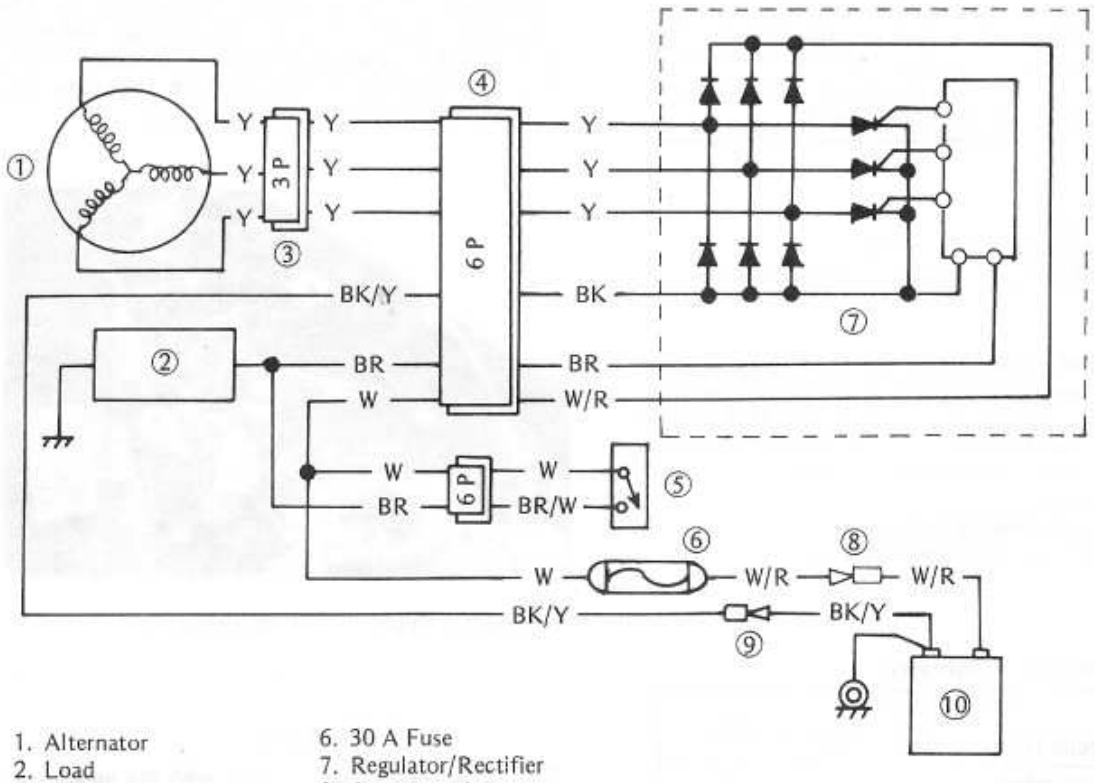
Do not apply more than 24 volts. If more than 24 volts is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 volts is applied for more than a few seconds, the regulator/rectifier may be damaged.

- Repeat the above three steps for other two yellow leads (in connector 4 which leads to the regulator/rectifier).
- Replace the regulator/rectifier if the bulb does not light as described above.

NOTE

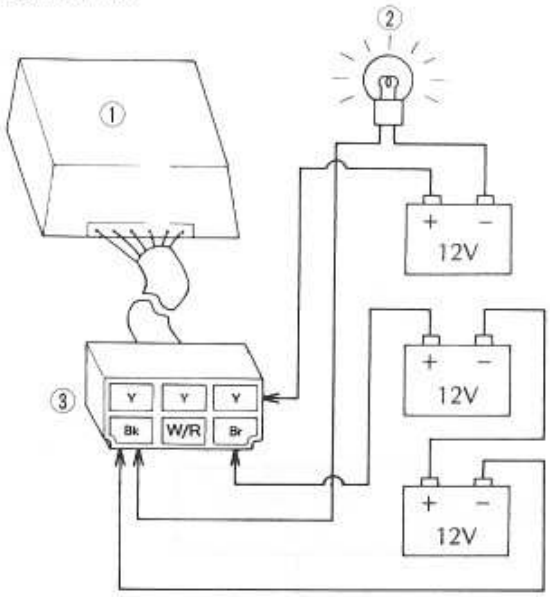
The above test is not foolproof. If the above checks show the regulator/rectifier is not damaged, but there is still trouble in the charging system, first carefully inspect the alternator, battery, wiring, and all connections. Replace the regulator/rectifier if all these other components turn out good.

Charging System Wiring Diagram

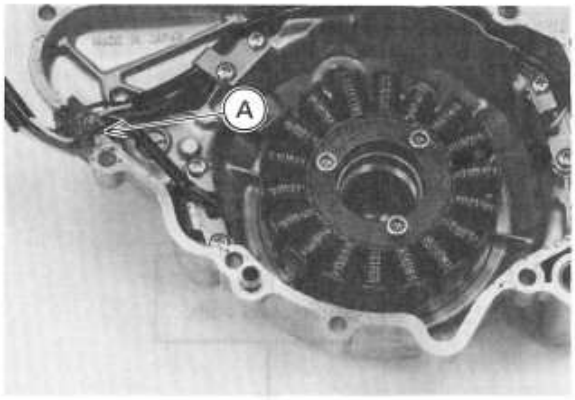


1. Alternator
2. Load
3. Connector 3
4. Connector 4
5. Ignition Switch
6. 30 A Fuse
7. Regulator/Rectifier
8. Connector 1
9. Connector 2
10. Battery

Regulator Test



1. Regulator/Rectifier
2. Test Bulb
3. Connector 4



A. Groove

Ignition Coil Removal/Installation Notes

- Connect the primary wires to the primary coil terminals as follows:
  Yellow/Red Wire → Ignition Coil (+) Terminals
  Black or Green Wires → Ignition Coil (–) Terminals

Spark Plug Removal/Installation Notes

- Carefully pull the spark plug cap from the spark plug and unscrew the spark plug.
- If necessary, use spark plug wrench (special tool: 57001-1024).
- Tighten the spark plug to the specified torque (see Exploded View).

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.

Parts Removal:

Pickup Coil Removal/Installation Notes

The pickup coil is mounted inside of the alternator cover.

- Apply liquid gasket to the groove on the alternator cover.

Inspection:

For any ignition system problems, always check the ignition system wiring first (see Wiring Inspection).

IC Igniter Inspection

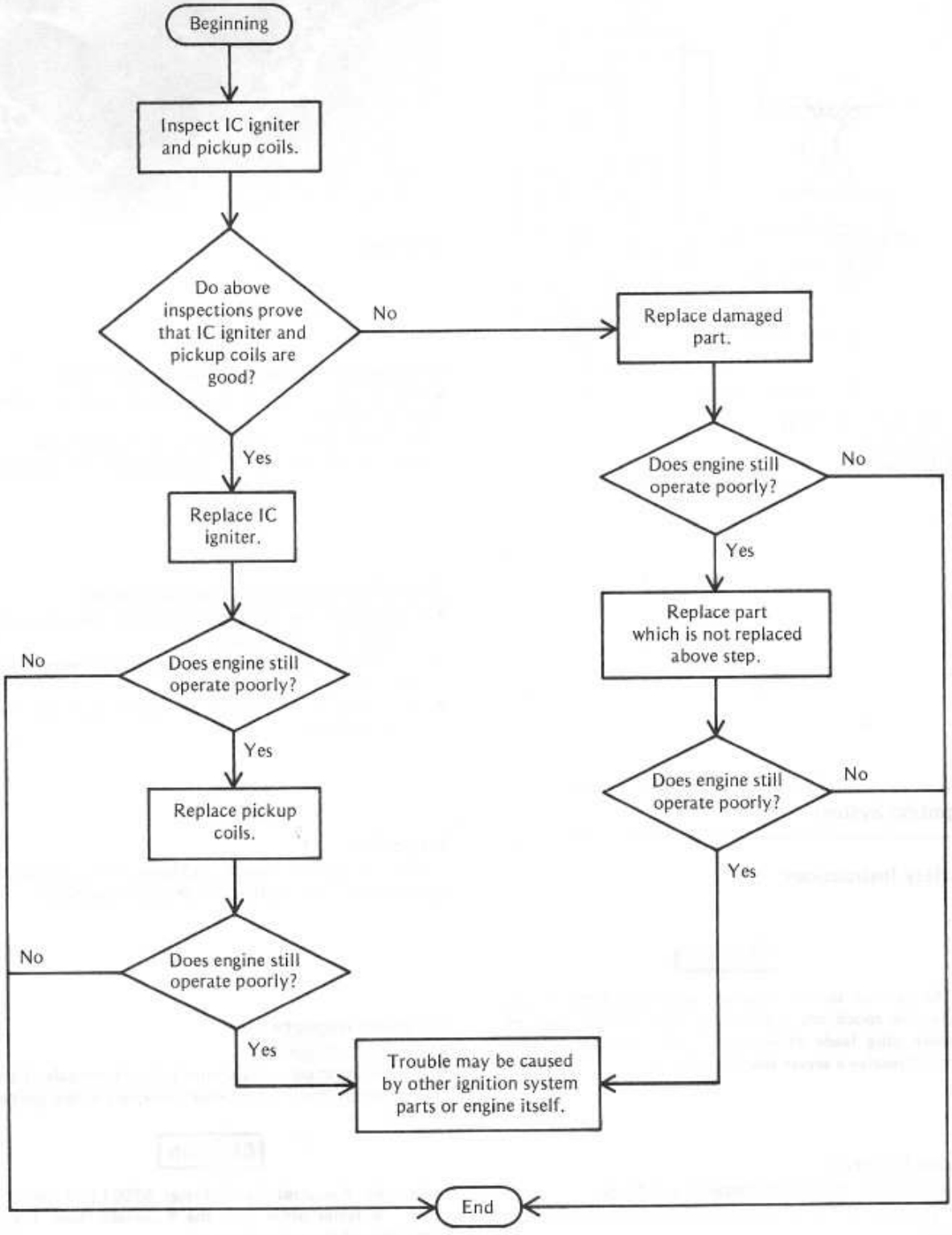
- Remove the IC igniter.
- Zero an ohmmeter, and connect it to terminals of the IC igniter to check the internal resistance of the igniter.

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.

Ignition System Troubleshooting:



★Replace the IC igniter if the reading is not the specified value.



A. IC Igniter

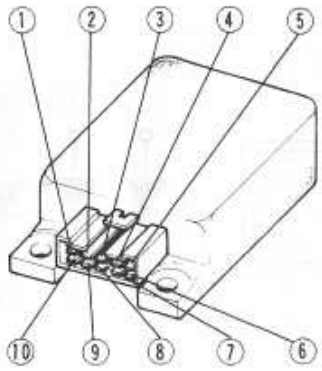
IC Igniter Internal Resistance

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.

Terminal No. of IC Igniter



Diodes Inspection

●Disconnect the diode assembly.

●Zero the ohmmeter, and connect it to each diode terminals to check the resistance in both directions.

★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 diode assembly must be replaced.

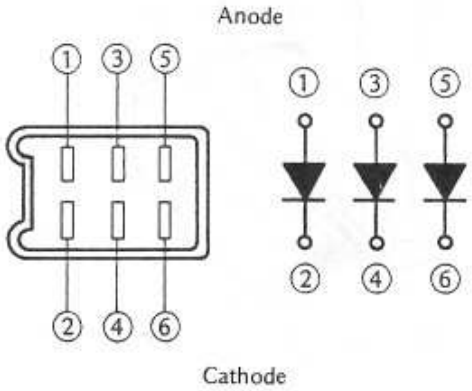


A. Diode Assembly

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 1/2 of the scale.*

Polarity of Diode



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

400 – 490 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 infimity (∞) indicates a short, necessitating replacement of the pickup coil assembly.

Ignition Coil Inspection

Measuring arcing distance:

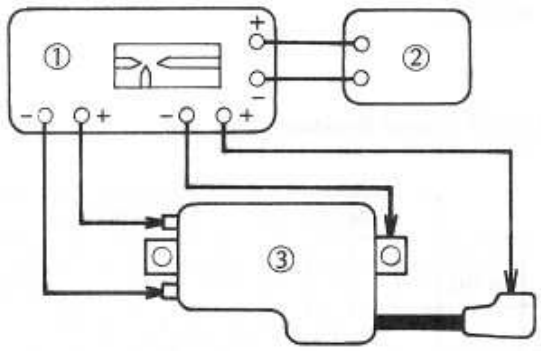
The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with a Kawasaki Electro Tester (special tool: 57001-980) for the 3-needle method.

NOTE

○*Since a tester other than the Kawasaki Electrotester may produce a different arcing distance, the Kawasaki Electrotester 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. Electotester
2. Voltage Source
3. Igniton 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:

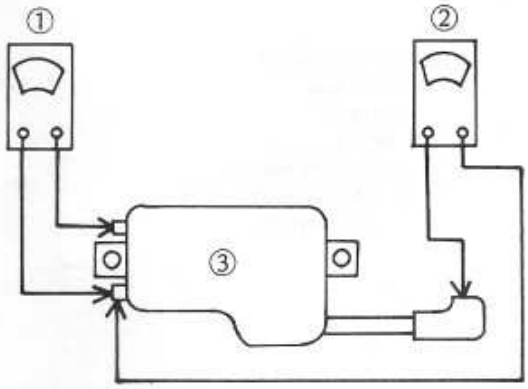
If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

●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 lead and black or green lead terminal.
○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:	**2.1 – 3.2 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 and 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.

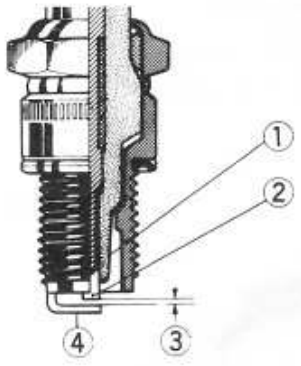
Spark Plug Gap

●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

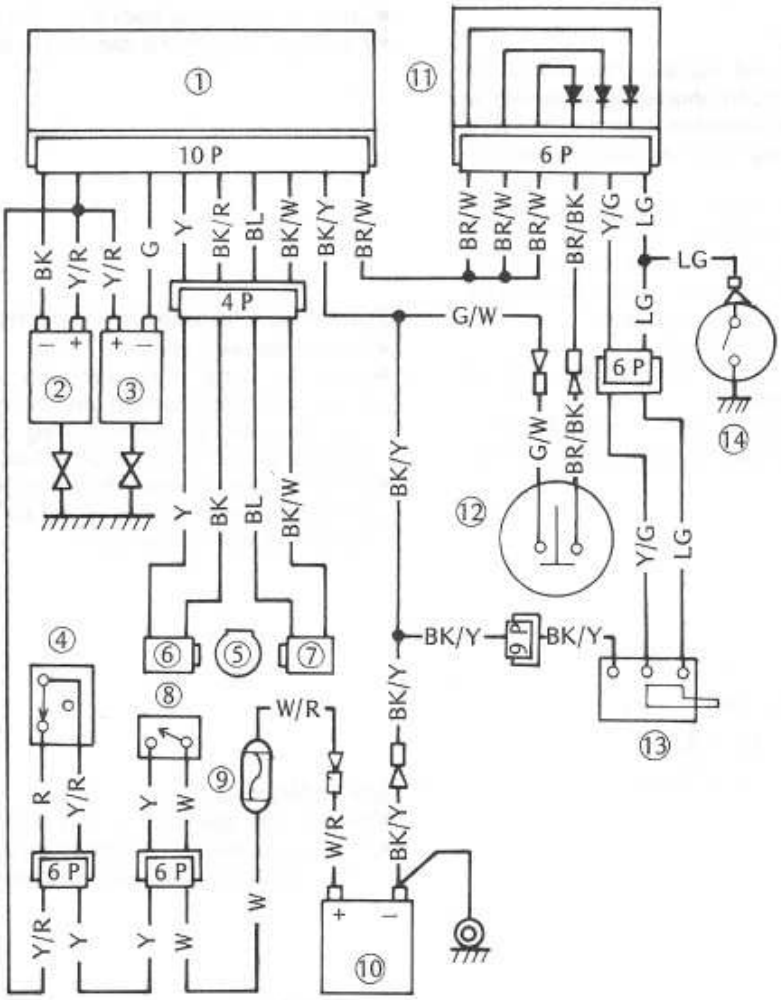
0.6 – 0.7 mm

Spark Plug Gap



1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

Ignition System Wiring Diagram



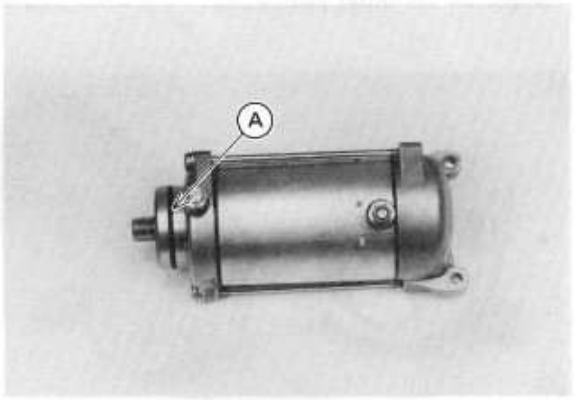
1. IC igniter
2. Ignition coil for #1 cylinder
3. Ignition coil for #2 cylinder
4. Engine stop switch
5. Timing rotor
6. Pickup coil for #1 cylinder
7. Pickup coil for #2 cylinder
8. Ignition switch
9. 30 A fuse
10. Battery
11. Diodes
12. Side stand switch
13. Starter lockout switch
14. Neutral switch

Electric Starter System

Parts Removal:

Starter Motor Removal/Installation Notes

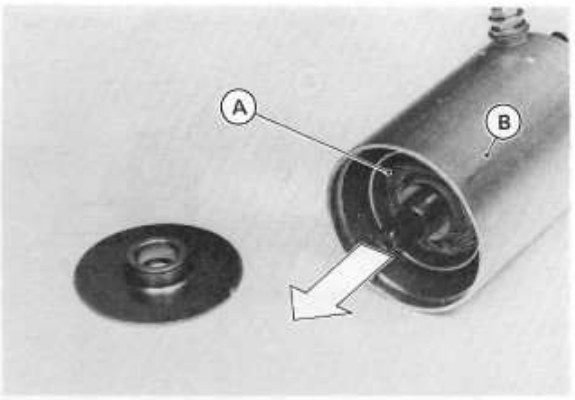
- Loosen the left footpeg mounting bolt and rotate it do down.
- Remove the following parts. Refer to the appropriate chapters.
  - Carburetors
  - Starter Motor Leads
  - Starter Motor Mounting Bolts
  - Shift Link (shift shaft side)
  - Alternator Cover (with shift pedal and shift link)
  - Starter Chain Guide
- Take out the starter motor.
- When installing the starter motor, apply a small amount of engine oil to the O-ring.



A. O-ring

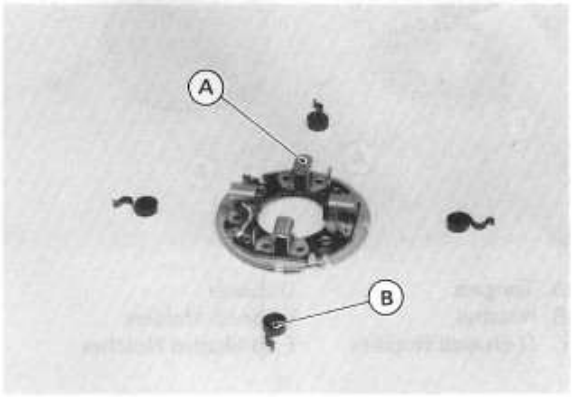
Starter Motor Disassembly Notes

- Remove the armature out of the yoke towards the gear cover.



A. Armature B. Yoke

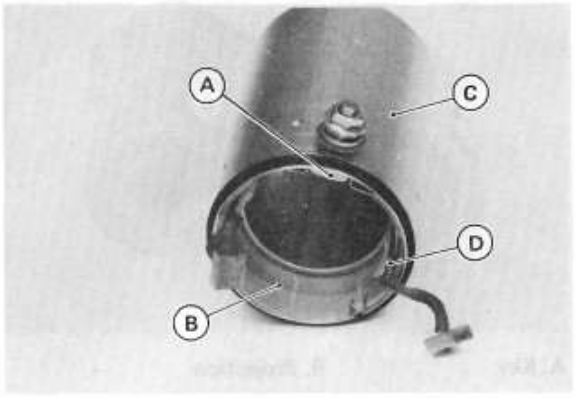
- Remove the brush plate form the yoke, and remove the brush springs from the brush plate. This makes armature installation easy.



A. Brush Plate B. Springs

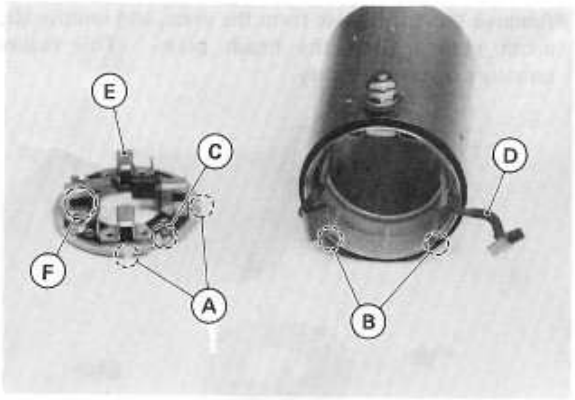
Starter Motor Assembly Notes

- Install the terminal bolt as follows.
  - The projection on the terminal goes to the outside.
  - Make sure that the plastic holder, brush and lead assembly are fully seated in the yoke.



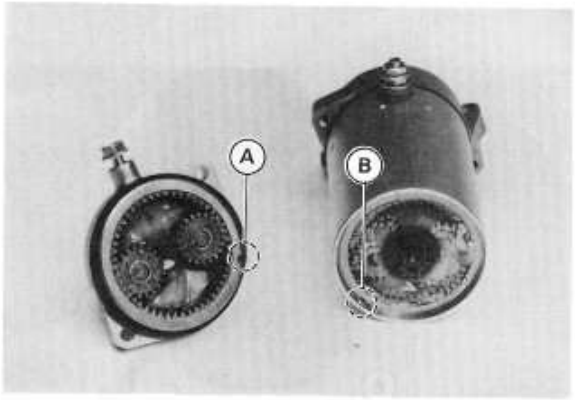
A. Projection C. Yoke
B. Holder D. Brush and Lead Assembly

- Install the brush plate and armature as follows.
  - Install the brush plate on the yoke fitting the brush leads into the Ω-shaped notches in the plate. The brush plate tongue fit into the plastic plate notches.



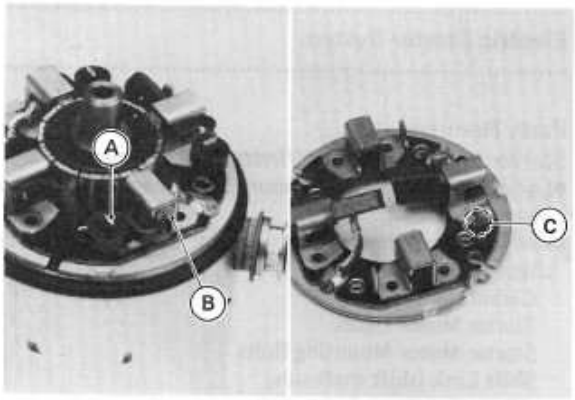
A. Tongues
B. Notches
C. Ω-Shaped Notches
D. Leads
E. Brush Holders
F. U-Shaped Notches

○Insert each brush all the way into the brush holder fitting the brush lead into the U-shaped notch in the holder.
○Insert the armature into the yoke. Spread the brushes and then set them against the commutator.
○Assemble the gear cover side of the starter motor. Match the internal gear groove with the key in the gear cover, and fit the projection in the yoke into the end plate notch and the internal gear groove.



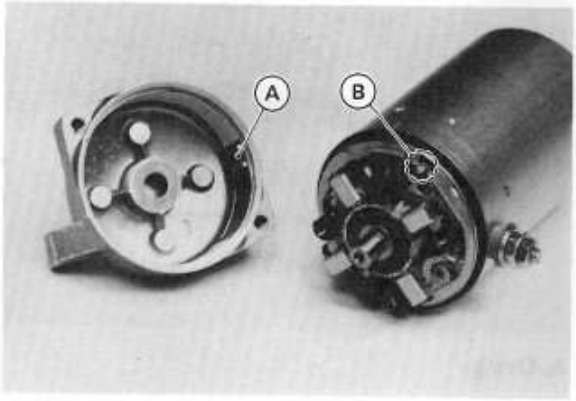
A. Key
B. Projection

○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 until it stops at the stepped portion.



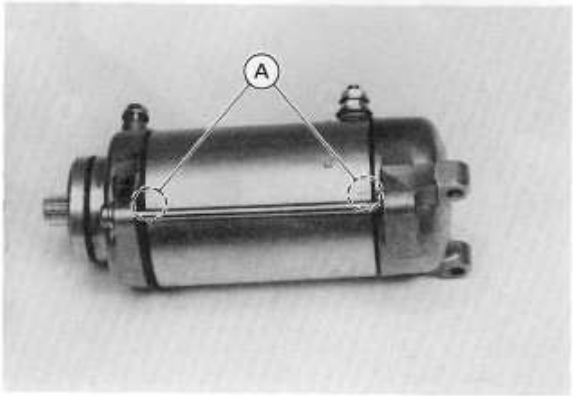
A. Spring Post
B. Brush Groove
C. Stepped Portion

○To install the end cover on the motor, fit the long tongue on the brush plate into the end cover groove.



A. Groove
B. Tongue

●When the gear cover, internal gear, yoke, brush plate, and end cover are correctly assembled, the marks on the covers and yokes align with each other.



A. Marks

Inspection:

For any electric starter system problems, always chekc the electric starter system wiring first (see Wiring Inspection).

CAUTION

○**Because of the large amount of current, never keep the starter switch pushed any time that the starter motor will not turn over, or the current may burn out the starter motor windings.**

Starter Relay Inspection

●Disconnect the starter motor lead and battery positive (+) lead from the starter relay.



A. Starter Relay

CAUTION

○**The battery positive (+) lead with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition swithc 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:

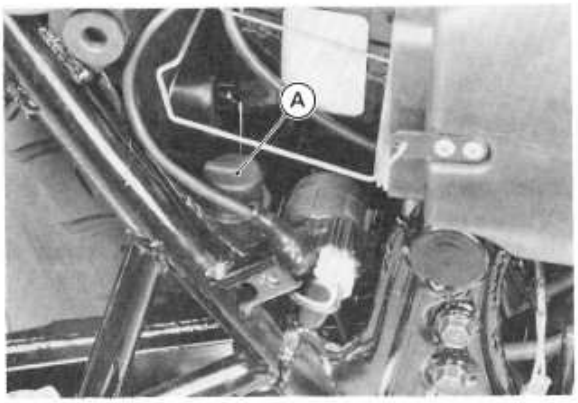
Ignition switch ON
Engine stop switch RUN
Starter button ON
Neutral switch ON (Transmission is in Neutral)

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.**

Starter Circuit Relay Inspection

●Remove the relay.



A. Starter Circuit Relay

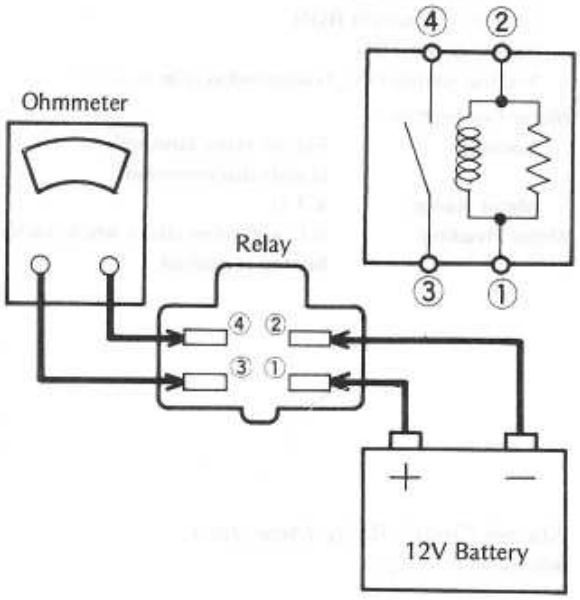
●Connect an ohmmeter and one 12 V battery to the relay as shown.

★If the relay does not work as specified, the relay is defective.

Testing Relay

Meter range: **1 Ω range**
Criteria:
When battery is connected → 0 Ω
When battery is disconnected → ∞ Ω

Testing Relay



① and ② : Relay Coil Terminals
③ and ④ : Relay Switch Terminals

Brush Inspection

•Measure the length of each brush.
★If any is worn down to the service limit, replace all brushes.

Starter Motor Brush Length

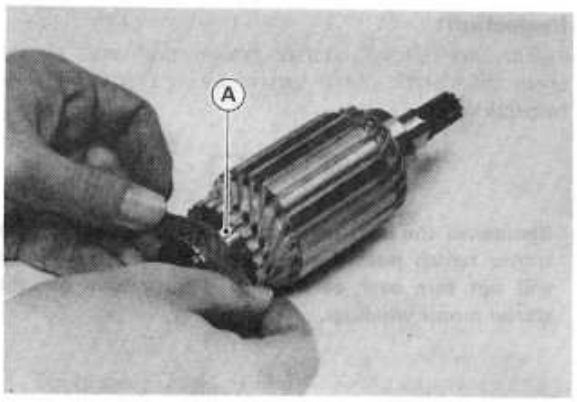
Standard:	**12 mm**
Service Limit:	**6.5 mm**

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 as illustrated.



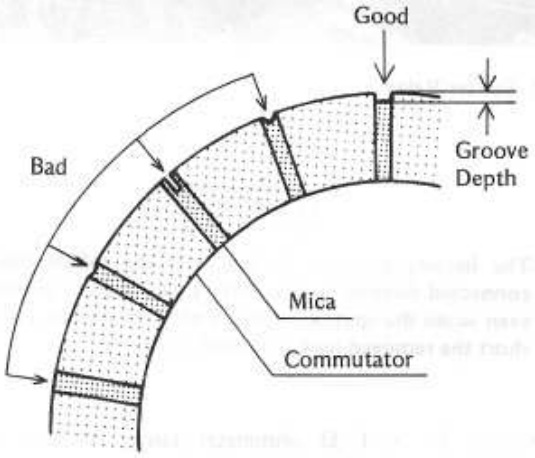
A. Commutator

•Determine as accurately as possible the depth of the grooves between commutator segments.
★Replace the starter motor with a new one if the groove depth is less than the service limit.

Commutator Groove Depth

Standard:	**2.0 mm**
Service Limit:	**1.5 mm**

Commutator



•Measure the diameter of the commutator.
★Replace the starter motor with a new one if the commutator diameter is less than the service limit.

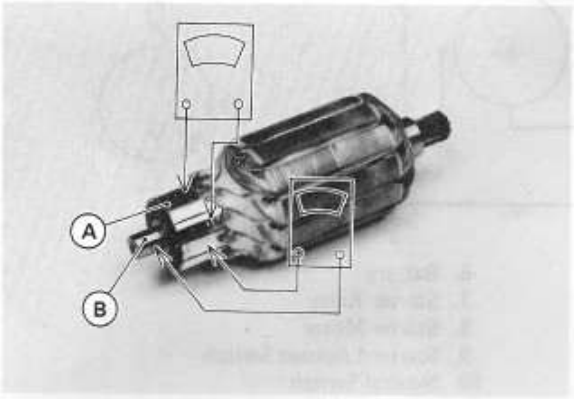
Commutator Diameter

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 coummutator and the shaft.

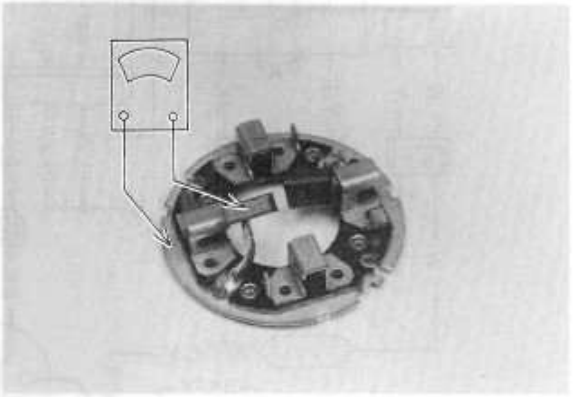
★If there is any reading at all, the armature has a short and the starter motor must be replaced.

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 plate.

★If there is not close to zero ohms, the brush plate has an open and it must be replaced.



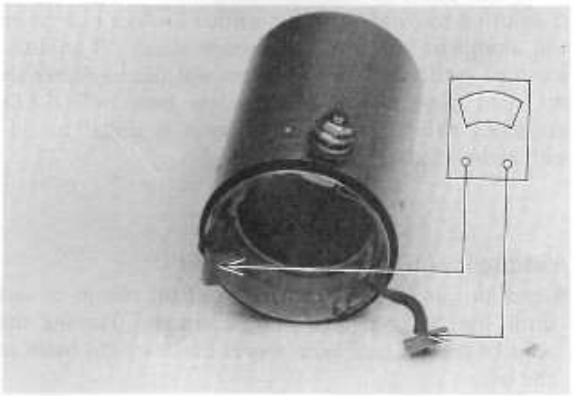
•Using the highest ohmmeter range, measure the resistance between the metal plate and the brush holders.

★If there is any reading at all, the brush holder has a short and the brush plate must be replaced.

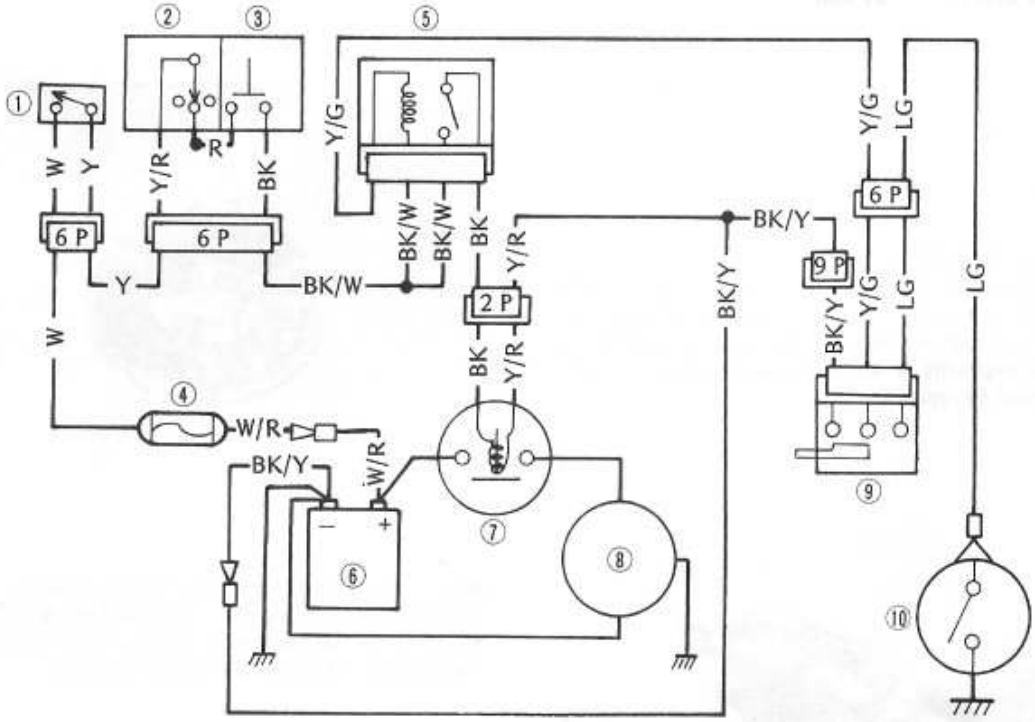
Brush and Lead Assembly Inspection

•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 and lead assembly must be replaced.



Electric Starter System Wiring Diagram

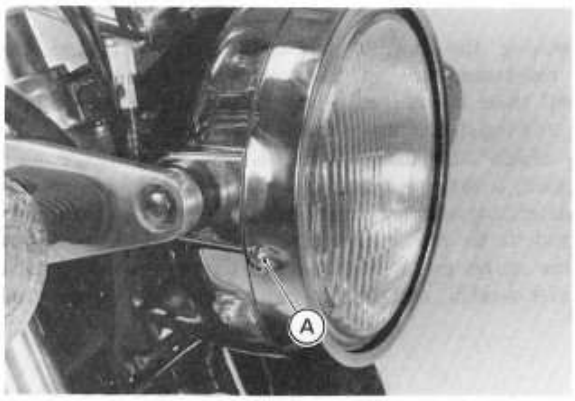


1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. 30 A Fuse
5. Starter Circuit Relay
6. Battery
7. Starter Relay
8. Starter Motor
9. Starter Lockout Switch
10. Neutral Switch

Lighting System

Adjustment:

The headlight beam is adjustable both horizontally and vertically. If not properly adjusted horizontally, the beam will point to one side rather than straight ahead. If adjusted too low vertically, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high vertically, the high beam will fail to illuminate the road close ahead, and the low beam will dazzle oncoming drivers. In most areas it is illegal to ride with an improperly adjusted headlight.



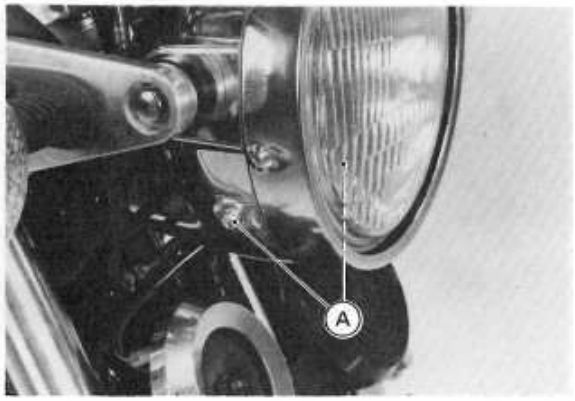
A. Adjusting Screw

Headlight Horizontal Adjustment

- Turn the small screw on the headlight rim in or out until the beam points straight ahead. Turning the adjusting screw clockwise moves the headlight beam to the left.

Headlight Vertical Adjustment

•Remove the two screws from the lower side of the headlight housing, and remove the headlight unit.



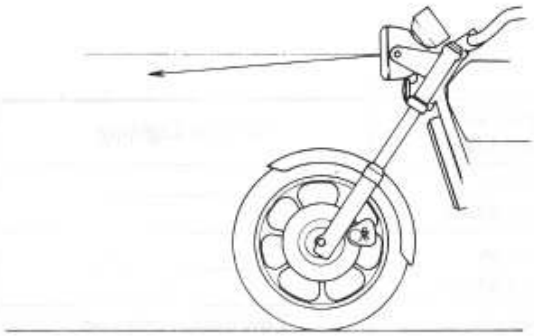
A. Screws

•Loosen the headlight housing mounting nuts, and adjust the headlight vertically.

NOTE

○*On high beam, the brightest point should be slightly below horizontal. Adjust the headlight to the proper angle according to the regulation that applies to its operation. Adjust with normal operational weight loaded on the motorcycle.*

Vertical Adjustment



•Tighten the headlight housing mounting nuts, and remount the headlight unit.

Parts Removal:

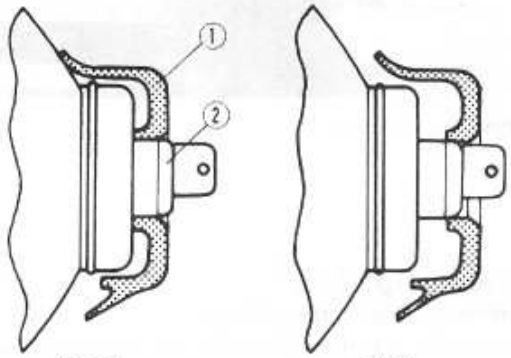
Headlight Bulb Replacement Notes

CAUTION

○**When handling quartz-halogen 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

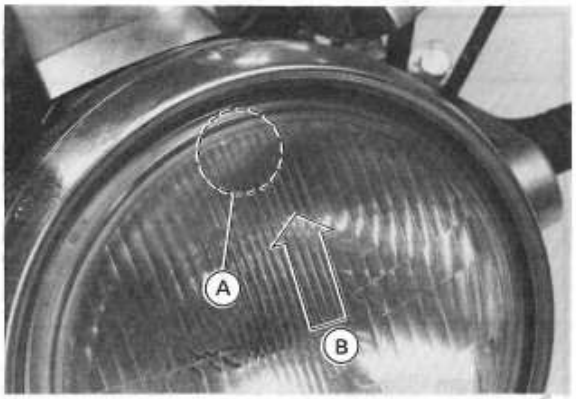


Good Bad

1. Dust Cover
2. Headlight Bulb

Headlight Unit Removal/Installation Note

•Install the headlight unit so that the "TOP" mark on the lens points up.

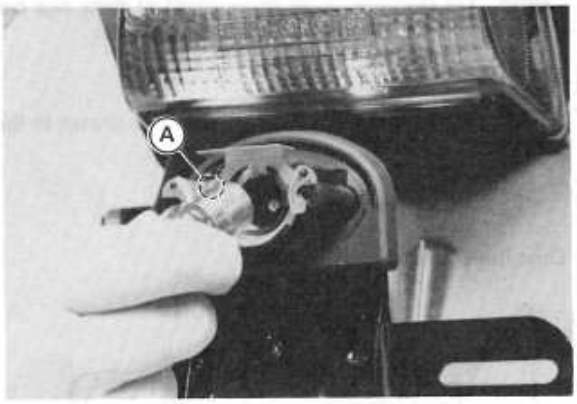


A. Top Mark B. Up

Tail/Brake Light Bulb Replacement Notes

●Remove the tail/brake light lens.

●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.

Tail/Brake Light Lens Removal/Installation Note

●Be careful not to overtighten the lens mounting screws.

Turn Signal Light Bulb Replacement Note

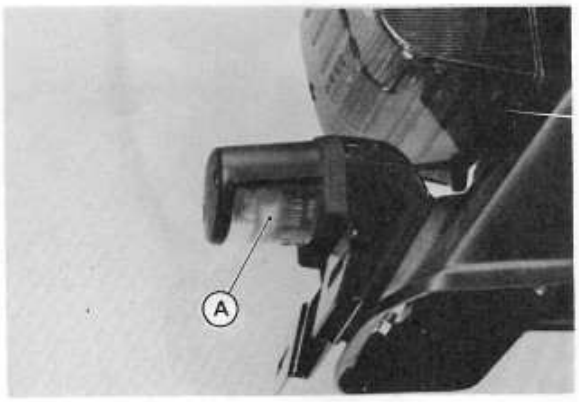
●Refer to the Tail/Brake Light Bulb Replacement Notes section. Note the following.

○Be careful not to overtighten the lens mounting screws.

License Plate Light Bulb Replacement Notes

●Refer to the Tail/Brake Light Bulb Replacement Notes section. Note the following.

○Install the lens so that transparent side faces down.



A. Transparent Side

○Be careful not to overtighten the lens mounting screws.

Inspection:

For any lighting system problems, always check the lighting system wiring and the bulbs first (see Wiring Inspection).

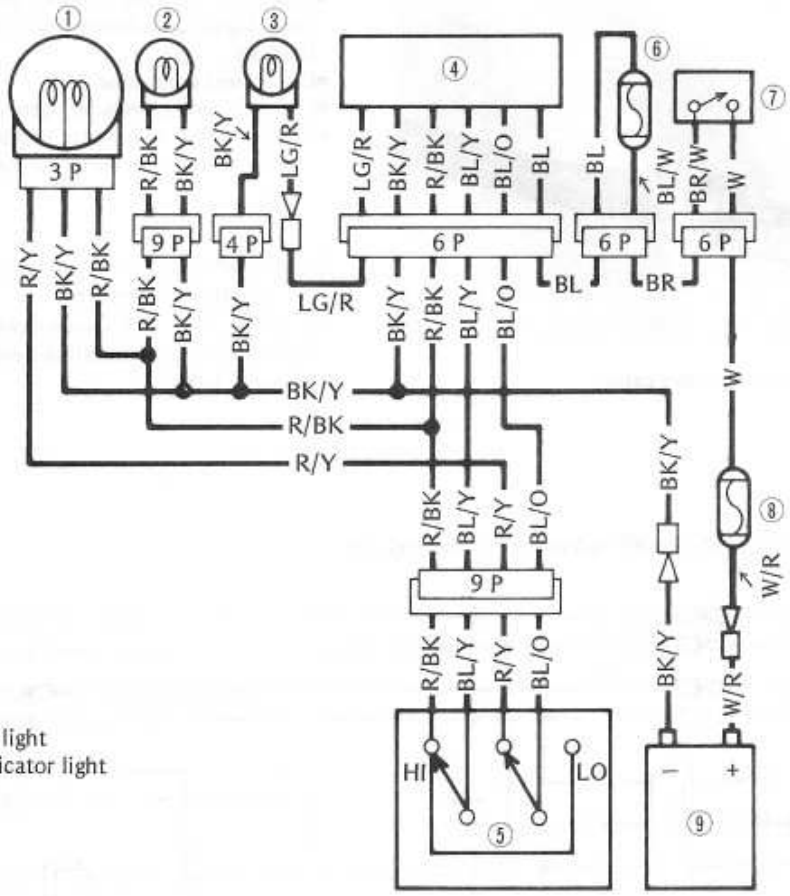
Headlight Reserve Lighting System Inspection

★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.

Headlight and Reserve Lighting System Wiring Diagram



1. Headlight
2. High beam indicator light
3. Headlight failure indicator light
4. Reserve lighting unit
5. Dimmer switch
6. 10 A fuse
7. Ignition switch
8. 30 A fuse
9. Battery

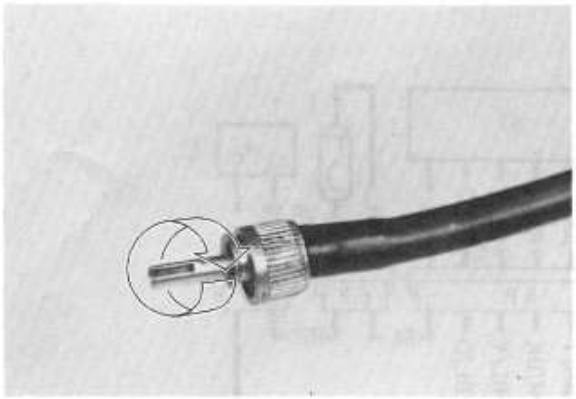
Automatic Turn Signal Cancelling System Inspection

When the turn signal selector switch is in the on (automatic) position, a solenoid turns off the turn signal after it has been on for 4 seconds, plus the time that the motorcycle has traveled an additional 50 meters. The cancelling system consists of the battery (power source), turn signal control unit, distance sensor, solenoid, and turn signal switch. When the turn signal switch is pushed to the left or right, the turn signals start flashing and the control unit starts counting off 4 seconds. At the end of this time, the control unit starts calculating distance traveled using pulses from the distance sensor at the rear of the speedometer. When the motorcycle has traveled 50 meters, the control unit operates the solenoid, which returns the turn signal switch to the off position. If the turn signal cancelling system does not function properly, first check all the wiring connections carefully, and then inspect the distance sensor and turn signal switch/solenoid assembly. If all these are good, replace the turn signal control unit.

Distance Sensor Inspection

- Inspect the distance sensor as follows. Refer to the appropriate chapters and Turn Signal and Automatic Cancelling System Wiring Diagram.
- Open the headlight housing.
- Disconnect connector 1.
- Remove the speedometer cable lower end.
- Connect an ohmmeter across the sensor leads.
- Turning the speedometer inner cable slowly, count how many times the sensor shows continuity.

★If ohmmeter does not show continuity four times per revolution, replace the sensor.



A. Turn the speedometer inner cable.

Turn Signal Relay Inspection

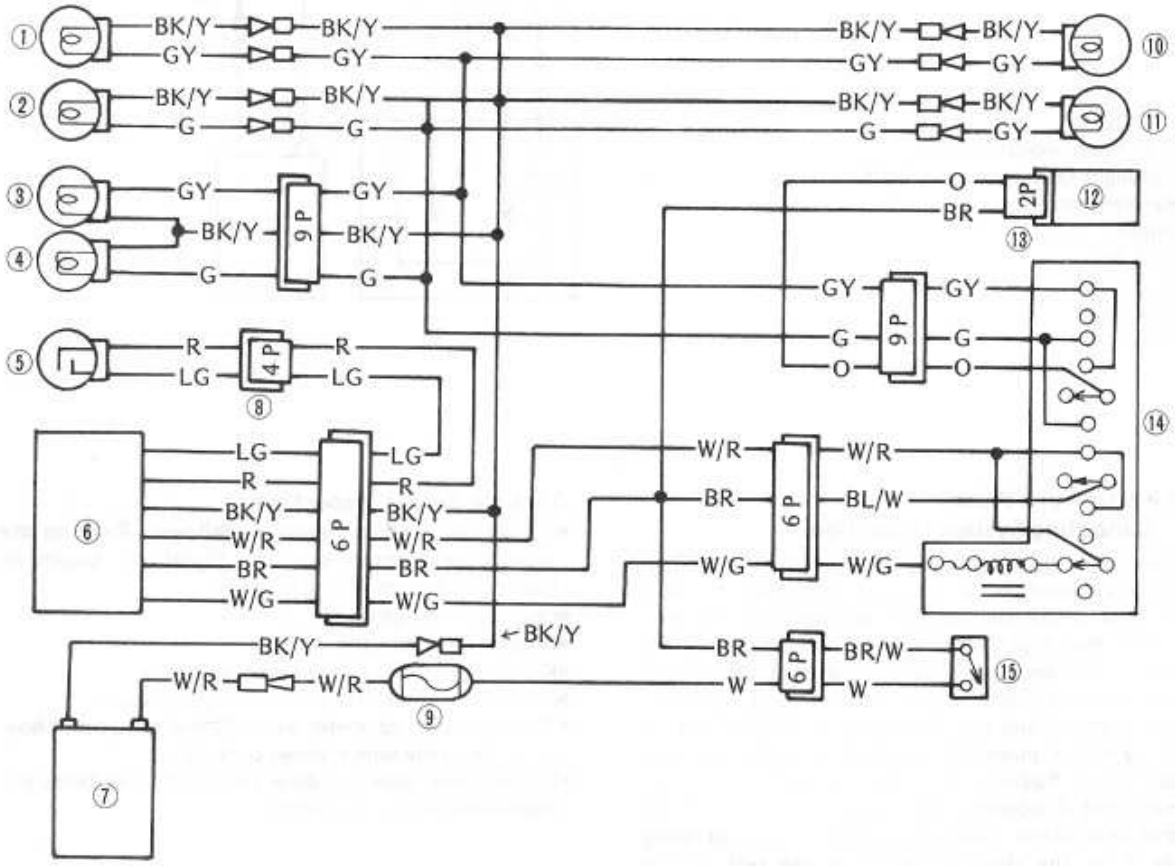
- Check the turn signal relay as follows. Refer to the Turn Signal and Automatic Cancelling System Wiring Diagram.
- Disconnect connector 2.
- Connect an ohmmeter across the relay terminals.

★If there is no ohmmeter reading, or if there is 5 – 6 ohms resistance, replace the relay.

Turn Signal Automatic Cancelling System Inspection

★If all wirings and components other than the turn signal automatic cancelling device check out good, the device is defective.

Turn Signal and Automatic Cancelling System Wiring Diagram



1. Front RH Turn Signal Light
2. Front LH Turn Signal Light
3. RH Turn Signal Indicator Light
4. LH Turn Signal Indicator Light
5. Distance Sensor
6. Turn Signal Control Unit
7. Battery
8. Connector 1
9. 30 A Fuse
10. Rear RH Turn Signal Light
11. Rear LH Turn Signal Light
12. Turn Signal Relay
13. Connector 2
14. Turn Signal Switch
15. Ignition Switch

Cooling Fan System

Fan System Circuit Inspection

- Check the fan system circuit as follows. Refer to the appropriate chapters and Cooling Fan System Wiring Diagram.
- Disconnect female connector 1 from the fan relay.
- Connect the blue wire to any white wire in with a suitable wire.

★If the fan turns, inspect the following.
- Wires and Connectors
- Fan Relay
- Fan Switch

★If the fan does not turn, inspect the following.
- Wires and Connectors
- Fuse
- Fan

Fan Inspection

- Disconnect connector 2 from the fan.
- Using two auxiliary wires, supply battery power to the fan.

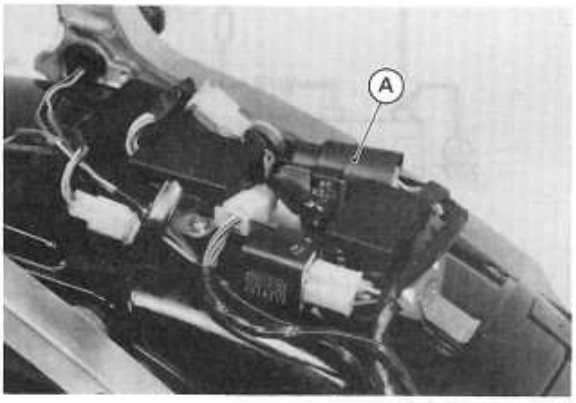
Wire Connections

Blue Lead ⟷ Battery (+)
Black Lead ⟷ Battery (–)

★If the fan does not turn at this time, the fan is defective and must be replaced.

Fan Relay Inspection

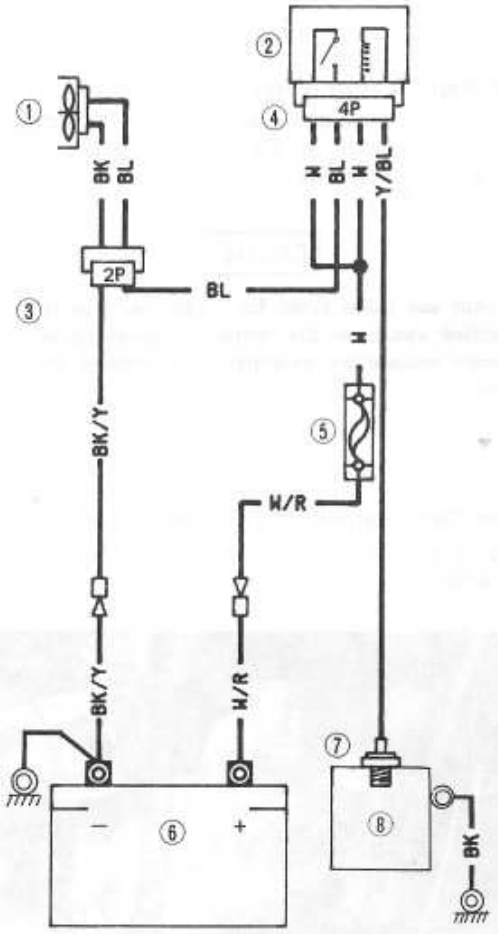
- Remove the relay from the rear fender cover.



A. Fan Relay

- Fan relay inspection is same as starter circuit relay inspection. Refer to the starter circuit relay inspection section.

Cooling Fan System Wiring Diagram



1. Fan
2. Fan Relay
3. Connector 2
4. Connector 1
5. 30 A Fuse
6. Battery
7. Fan Switch
8. Radiator

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

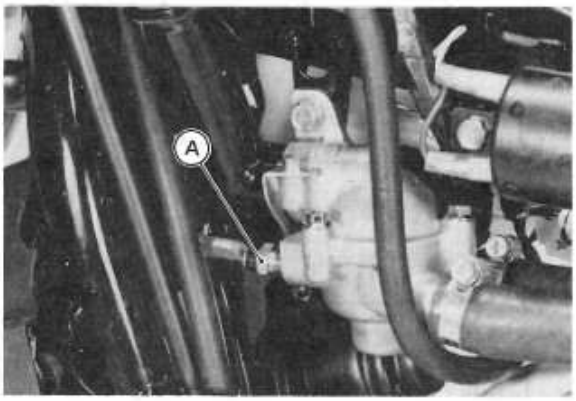
●To remove the wedge-base type bulbs (indicator and illumination), pull out the bulb sockets and pull the bulbs out of the sockets.

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.**

Water Temperature Gauge Operation Inspection

●Prepare an auxiliary wire, and check the operation of the gauge.



A. Water Temperature Sensor

Gauge Operation Test

Ignition Switch Position: ON

Wire Location: Female, Sensor Connector (disconnected)

Results: Gauge should read C when sensor wire is opened. Gauge should read H when sensor wire is grounded to engine.

CAUTION

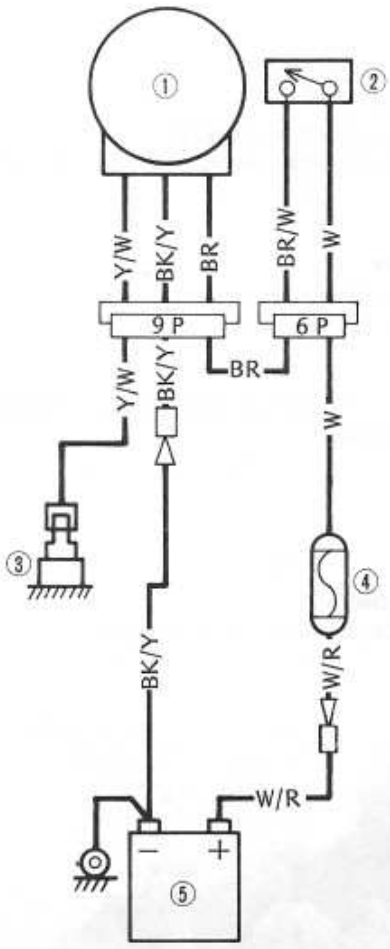
○**Do not ground the wiring longer than necessary. After the needle swings to the H position, stop the test. Otherwise the gauge could be damaged.**

★If the gauge readings are correct, the water temperature sensor is bad. If these readings are not obtained, 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 gauge is defective.

Water Temperature Gauge Wiring Diagram

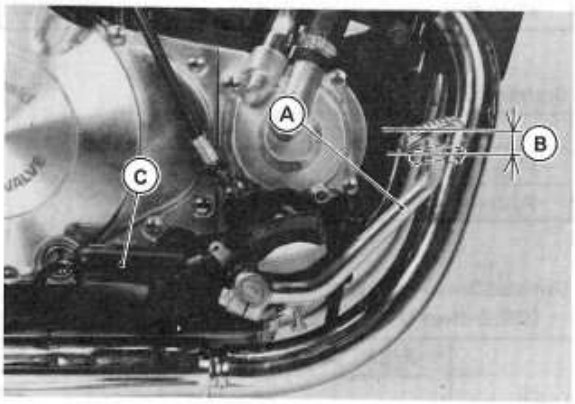


1. Water Temperature Gauge
2. Ignition Switch
3. Water Temperature Sensor
4. 30 A Fuse
5. Battery

Switches and Sensors

Rear Brake Light Switch Inspection

- 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 15 mm of pedal travel.



A. Rear brake pedal B. 15 mm
C. Rear Brake Light Switch Cover

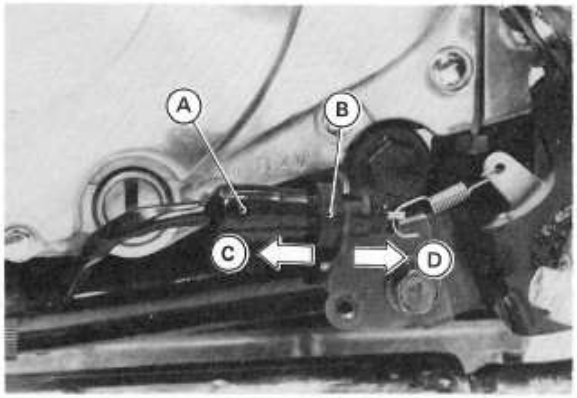
★If it does not, adjust the brake light switch.

Rear Brake Light Switch Adjustment

- Turn the adjusting nut to adjust the switch.

CAUTION

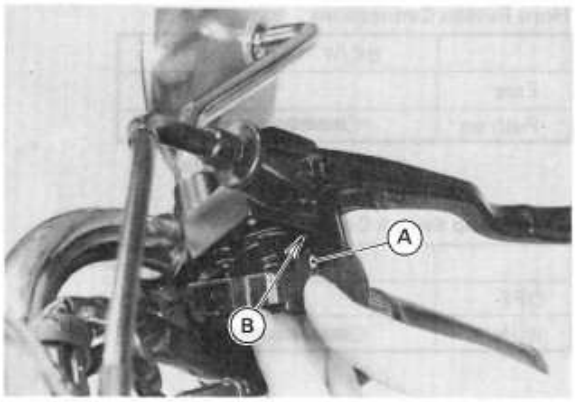
○**To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.**



A. Rear Brake Light Switch C. Light sooner.
B. Adjusting Nut D. Lights later.

Switches and Sensors Installation Notes

- Apply a non-permanent agent to the threads of following parts.
  - Oil Pressure Switch
  - Front Brake Light Switch Mounting Screw
- Apply a liquid gasket to the threads of the following part.
  - Water Temperature Sensor
  - Fan Switch
- Tighten the following parts to the specified torque (see Exploded View).
  - Oil Pressure Switch
  - Water Temperature Sensor
  - Fan Switch
- When installing the starter lockout switch, fit the projection on the switch into the small hole in the left switch housing.



A. Projection B. Small Hole

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 a new one.

Ignition Switch Connections

	BR/W	W	Y	BL	R
OFF, LOCK					
ON	○	○	○	○	○
P (Park)		○			○

Dimmer Switch Connections (US, Canada)

	BL/Y	BL/O	R/Y	R/BK
HI	○			○
		○	○	
LO	○		○	
		○		○

Headlight Switch Connections

	R/W	R/BL	BL	BL/Y
OFF				
□	○——○			
ON	○——○	○——○	○——○	

Oil Pressure Switch Connections*

	SW. Terminal	⏚
When engine is stopped	○——○	
When engine is running		

* : Engine lubrication system is in good condition.

Horn Button Connections

	BK/W	BK/Y
Free		
Push on	○——○	○——○

Engine Stop Switch Connections

	R	Y/R
OFF		
RUN	○——○	○——○

Side Stand Switch Connections

	BR/BK	G/W
When side stand is up	○——○	○——○
When side stand is down		

Rear Brake Light Switch Connections

	BR	BL
When brake pedal is pushed down	○——○	○——○
When brake pedal is released		

Starter Button Connections

	BK	R
Free		
Push on	○——○	○——○

Dimmer Switch Connections (Other than US, Canada)

	R/BK	BL/Y	R/Y
HI		○——○	○——○
LO	○——○	○——○	

Passing Button Connections

	BL	R/BK
Free		
Push on	○——○	○——○

Front Brake Light Switch Connections

	BR	BL
When brake lever is pulled in	○——○	○——○
When brake lever is released		

Neutral Switch Connections

	SW. Terminal	⏚
When transmission is in neutral	○——○	○——○
When transmission is not in neutral		

Turn Signal Switch Connections

	GY	O	G	W/G	W/R	BL/W	BK/Y
R	○——○				○——○	○——○	
N				○——○	○——○	○——○	○——○
L		○——○	○——○		○——○	○——○	

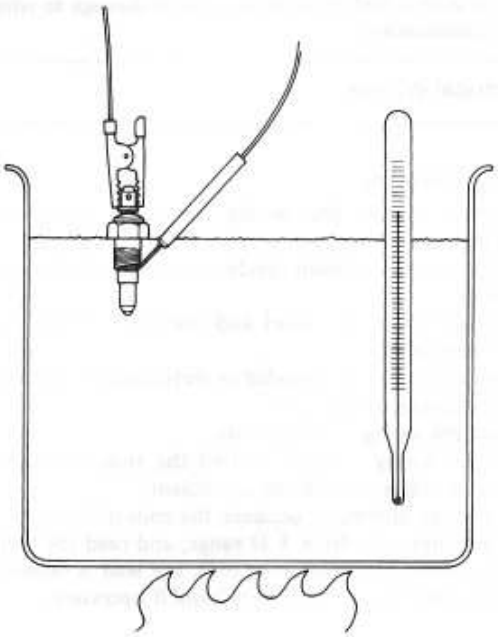
Starter Lockout Switch Connections

	BK/Y	Y/G	LG
When clutch lever is pulled in	○——○		
When clutch lever is released		○——○	○——○

Fan Switch 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

Fan Switch Inspection



●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.

NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

●Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

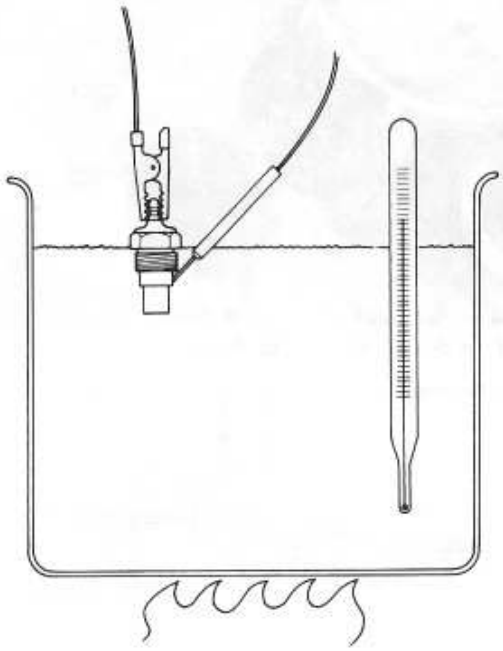
Water Temperature Sensor Inspection

●Remove the water temperature sensor.
●Suspend the sensor in a container of water so that the temperature sensing projection and threaded portion are submerged. The sensor must not touch the container sides or bottom.
●Suspend an accurate thermometer in the water. It must not touch the container, either.
●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

40°C (104°F):	**About 600 Ω**
80°C (176°F):	**About 130 Ω**

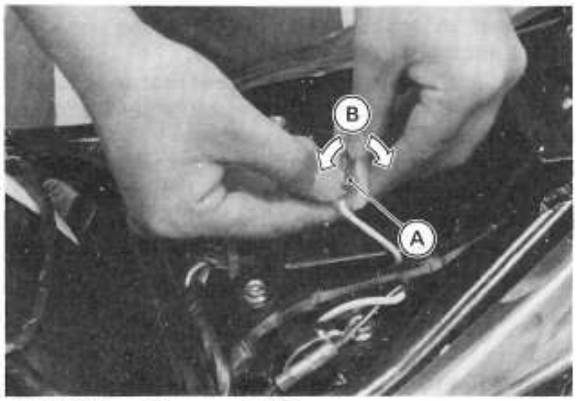
Water Temperature Sensor Inspection



Fuses

30 Ampere Fuse Removal/Installation Note

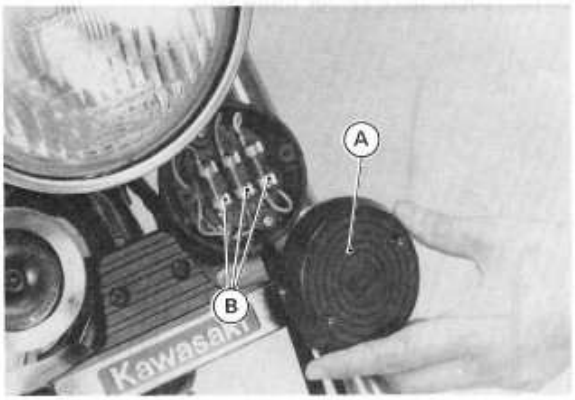
●Remove the 30 ampere fuse as follows.
○Remove the seat.
○Pull out the 30 ampere fuse case.
○Open the case.
○Remove the fuse carefully.



A. Main Fuse Case B. Open

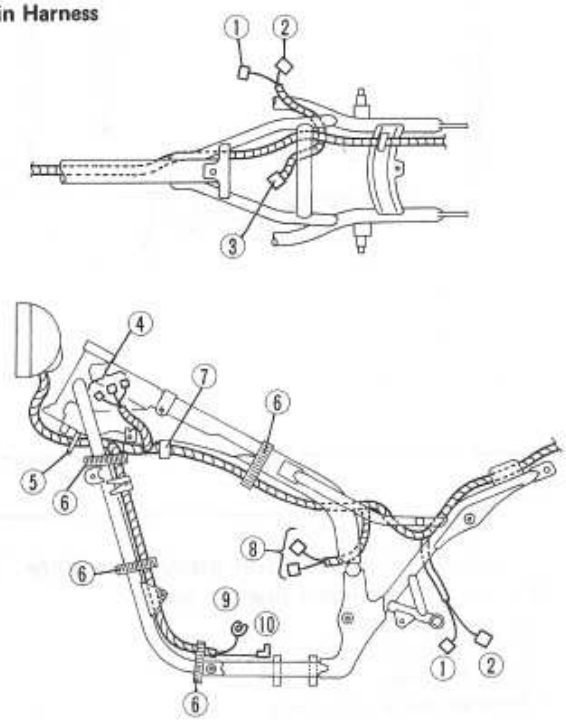
10 Ampere Fuse Removal/Installation Note

- Remove the 10 ampere fuse(s) as follows.
- Remove the fuse box cover.
- Remove the fuse(s) carefully.



A. Fuse Box Cover B. Fuses

Main Harness



Fuse Inspection

- Remove the fuse.
- 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 specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.**

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.

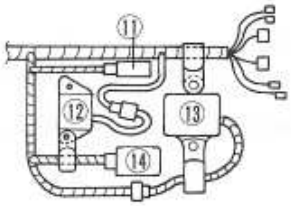
★If any wiring is in poor condition, replace the damaged wiring.

- Pull each connector apart and insect 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.



1. **Starter Relay Connector**
2. **Starter Control Relay Connector**
3. **IC Igniter Connector**
4. **Handle Grip Switch Connector**
5. **Clamp**
6. **Straps**
7. **Marking Tape (White)**
8. **Alternator Connector**
9. **Oil Pressure Switch Connector**
10. **Neutral Switch Connector**
11. **Turn Signal Relay**
12. **Reserve Lighting Unit**
13. **Turn Signal Automatic Cancelling Unit**
14. **Fan Relay**

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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 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.

Test have shown the plug listed in the "Electrical System" chapter to be the best plug for general use.

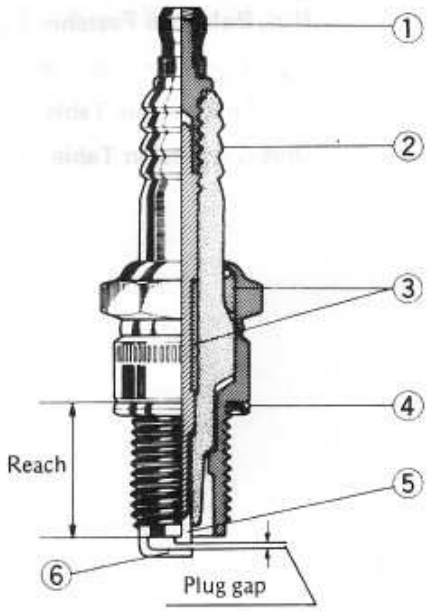
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.

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 high a heat range is used – that is, a "cold" plug that cools iteself too well – the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceremic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceremic 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 redhot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

Spark Plug

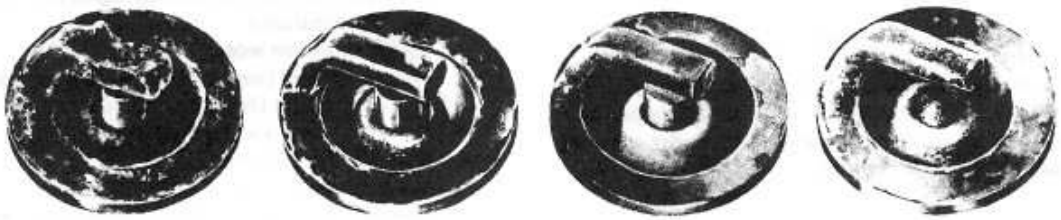


1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center electrode
6. Side electrode

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 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.**

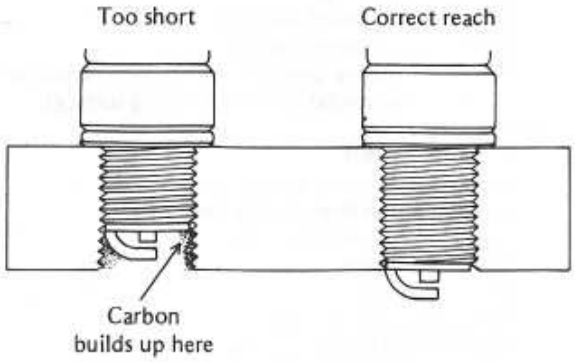
○**If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.**

○**If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preigniton, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.**

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).*

Plug Reach



Standard Spark Plug Threads

Diameter:	**12 mm**
Pitch:	**1.25 mm**
Reach:	**19.0 mm**

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
- Alternator shaft bearing seizure
- Balancer bearing 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
- Vacuum switch valve trouble

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
Vaccum 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
Vacuum switch valve trouble

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:
No clutch lever play
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch cable maladjusted
Clutch inner cable catching
Clutch release mechanism trouble
Clutch hub or housing unevenly worn

Clutch not disengaging properly:
Clutch lever play excessive
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
Loosen clutch hub locknut

Gear Shifting Faulty:

Doesn't go into gear; shift pedal does't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft

Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken

Jumps out of gear:
Shift fork worn
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm 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 chain worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Loose alternator rotor
Air suction valve damaged
Vacuum switch valve damaged
Balancer gear worn or chipped
Balancer shaft position maladjusted
Balancer bearing worn
Starter chain, sprocket, guide worn

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 belt noise:
Drive belt adjusted improperly
Drive belt worn
Rear and/or engine pulley worn
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 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
Cylinder head gasket damaged
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 excessivery vibrates:
- Tire worn
- Swing arm pivot bearing worn
- Rim warped, or not balanced
- Wheel bearing worn
- Handlebar clamp 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)

Shock absorption unsatisfactory:
- (Too hard)
- Front fork oil excessive
- Front fork oil viscosity too high
- Front fork air pressure too high
- Rear shock absorber maladjusted
- Tire air pressure too high
- Front fork bent
- (Too soft)
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

Brake Doesn't Hold:

Front brake:
- 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

Rear brake:
- Brake maladjusted
- Brake lining, drum worn
- Overheated
- Water in brake drum
- Brake cam, camshaft worn
- Oil on brake linings

Battery Discharged:

- Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
- Battery leads making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Alternator trouble
- Wiring faulty

Battery Overcharged:

- Regulator/rectifier defective

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
Clutch Lever
Front Brake Lever
Rear Brake Cable Joint
Rear Brake Pedal
Shift Pedal
Side Stabd

Points: Lubricate with Grease.

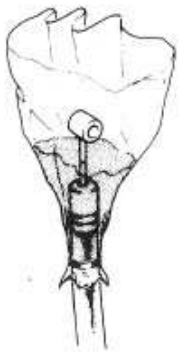
Clutch Inner Cable Upper End
Clutch Inner Cable Lower End
Rear Brake Inner Cable Front End
Rear Brake Inner Cable Rear End
Speedometer Inner Cable*
Tachometer Inner Cable*
Throttle Inner Cable Lower Ends

*Grease the lower part of the inner cable sparingly.

Cables: Lubricate with Motor Oil.

Choke Cable
Throttle Cable

Cable Lubrication



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 Bolt
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brake:
- Master Cylinder Clamp Bolts
- Caliper Mounting Bolts
- Brake Cam Lever Bolt
- Torque Link Nuts
- Brake Pedal Bolt
- Torque Link Nut Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Swing Arm Pivot Shaft Nut
- Rear Shock Absorber Nuts

Steering:
- Handlebar Clamp Bolts
- Stem Head Bolt

Engine:
- Muffler Mounting Nuts
- Exhaust Pipe Holder Nuts
- Engine Mounting Nuts
- Shift Pedal Bolt
- Muffler Connecting Pipe Clamp Bolt
- Cylinder Head Bolts

Others:
- Clutch Lever Holder Bolts
- Side Stand Nut
- Center Stand Cotter Pin
- Front Footpeg Mounting Bolts
- Rear Footpeg Mounting Bolts
- Front Footpeg Safety Clips
- Rear Footpeg Safety Clips
- Right Switch Housing Screws

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
mili	m	x 0.001
micro	μ	x 0.000001

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units 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:

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb
kg-m	x	9.807	=	N-m
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	=	cm Hg
kg/cm^2	x	98.07	=	kPa
kg/cm^2	x	14.22	=	psi
cm Hg	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:

$$\frac{9\,(°C + 40)}{5} - 40 = °F$$

$$\frac{5\,(°F + 40)}{9} - 40 = °C$$

