Kawasaki

Ninja250R
GPZ250R

Motorcycle
Service Manual

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

Brake Shoes or Pads
Clutch Friction Material
Gaskets
Insulators

SAFETY INSTRUCTIONS

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

LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

Foreword

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

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

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

To get the longest life out of your Motorcycle:

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

How to Use this Manual

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

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

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

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

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

WARNING

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

CAUTION

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

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

NOTE

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

●Indicates a procedural step or work to be done.

○Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a WARNING, CAUTION, or NOTE.

★Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

☆Indicates a conditional sub-step or what action to take based upon the results of the conditional step it follows.

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

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 noize control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

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

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- 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.

Quick Reference Guide

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

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.

1

General Information

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Torque and Locking Agent 1-9
Suggested Wiring Cable or Hose Routing 1-12

Before Servicing

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

Especially note the following:

(1) Dirt

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

(2) Battery Ground

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

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

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

(c) damage to electrical parts.

(3) Tightening Sequence

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

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

(4) Torque

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

(5) Force

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

(6) Edges

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

(7) High Flash-point Solvent

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

(8) Gasket, O-ring

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

(9) Liquid Gasket, 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 non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(10) Press

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

(11) Ball Bearing

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

(12) Oil Seal and Grease Seal

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

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

(13) Seal Guide

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

(14) Circlip, Retaining Ring

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

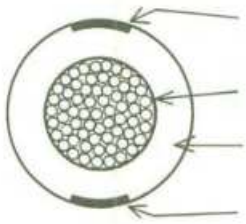
(15) Lubrication

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

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

(16) Electrical Wires

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

Wire (cross-section)	Name of Wire Color
	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

EX250-E1 Left Side View: US model



EX250-E1 Right Side View: Other than US model



General Specifications

Items		EX250-E1, E2
Dimensions:		
Overall length		1 985 mm
Overall width		695 mm
Overall height		1 075 mm
Wheelbase		1 400 mm
Road clearance		135 mm
Seat height		745 mm
Dry weight		1 353 N (138 kg), (Cal) 1 358 N (138.5 kg)
Curb weight:	Front	721 N (73.5 kg)
	Rear	794 N (81 kg), (Cal) 799 N (81.5 kg)
Fuel tank capacity		12.6 L
Performance:		
Climbing ability		25°
Braking distance		12.5 m from 50 km/h
Minimum turning radius		2.8 m
Engine:		
Type		4-stroke, DOHC, 2-cylinder
Cooling system		Liquid-cooled
Bore and stroke		62.0 x 41.2 mm
Displacement		248 mL
Compression ratio		12.0
Maximum horsepower		Max. 27.9 kW (38 PS) @11 000 r/min (rpm), Ⓐ 29.4 kW (40 PS) @12 500 r/min (rpm)
Maximum torque		24.5 N-m (2.5 kg-m, 18.1 ft-lb) @10 000 r/min (rpm) Ⓐ 23.5 N-m (2.4 kg-m, 17.4 ft-lb) @11 000 r/min (rpm)
Carburetion system		Carburetors, Keihin CVK32 x 2
Starting system		Electric starter
Ignition system		Battery and coil (transistorized)
Timing advance		Electronically advanced
Ignition timing		From 10° BTDC @1 300 r/min (rpm) to 38° BTDC @4 000 r/min (rpm) (Cal) From 5° BTDC @1 500 r/min (rpm) to 33° BTDC @4 200 r/min (rpm)
Spark plug		NGK C8HA or ND U24FS-L Ⓒ NGK CR8HS or ND U24FSR-U
Cylinder numbering method		Left to right, 1-2
Firing order		1-2

(Continued on next page.)

Items			EX250-E1, E2
Valve timing:	Inlet	Open	30° BTDC
		Close	70° ABDC
		Duration	280°
	Exhaust	Open	70° BBDC
		Close	30° ATDC
		Duration	280°
Lubrication system			Forced lubrication (wet sump with cooler)
Engine oil:	Grade		SE or SF class
	Viscosity		SAE10W40, 10W50, 20W40, or 20W50
	Capacity		1.9 L
Drive Train:			
Primary reduction system:		Type	Gear
		Reduction ratio	3.086 (71/23)
Clutch type			Wet multi disc
Transmission:	Type		6-speed, constant mesh, return shift
	Gear ratios:	1st	2.600 (39/15)
		2nd	1.789 (34/19)
		3rd	1.409 (31/22)
		4th	1.160 (29/25)
		5th	1.000 (27/27)
		6th	0.892 (25/28)
Final drive system:	Type		Chain drive
	Reduction ratio		3.000 (42/14)
	Overall drive ratio		8.268 @Top gear
Frame:			
Type			Tubular, diamond
Caster (rake angle)			27°
Trail			83 mm
Front tire:	Type		Tubeless
	Size		100/80-16 50S
Rear tire:	Type		Tubeless
	Size		120/80-16 60S
Front suspension:	Type		Telescopic fork
	Wheel travel		140 mm
Rear suspension:	Type		Swing arm (uni-trak)
	Wheel travel		130 mm
Brake type:	Front		Single disc
	Rear		Single disc

(Continued on next page.)

Items		EX250-E1, E2
Electrical Equipment:		
Battery		12 V 8 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 @10 000 r/min (rpm), 14 V
Voltage regulator:	Type	Short-circuit

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

Ⓐ : Australian Model
Ⓒal : California Model
Ⓒ : Canadian Model

Periodic Maintenance Chart

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

OPERATION \ FREQUENCY	Whichever comes first → Every	*ODOMETER READING 800 km	5 000 km	10 000 km	15 000 km	20 000 km	25 000 km	30 000 km	See Page
Carburetor synchronization --check †		•	•	•	•	•	•	•	2-8
Idle speed--check †		•	•	•	•	•	•	•	2-7
Throttle grip play--check †		•		•		•		•	2-5
Spark plug--clean and gap †			•	•	•	•	•	•	15-20
Valve clearance--check †		•		•		•		•	4-15
Air cleaner element--clean †		•		•		•		•	2-16
Air cleaner element--replace	5 cleanings					•			2-16
Fuel system--check †				•		•		•	2-9
Evaporative emission control system(c)--check †		•	•	•	•	•	•	•	2-18
Battery electrolyte level--check †	month	•	•	•	•	•	•	•	15-9
Brake light switch--check †		•	•	•	•	•	•	•	15-35
Brake pad wear--check †			•	•	•	•	•	•	11-7
Brake fluid level--check †	month	•	•	•	•	•	•	•	11-11
Brake fluid--change	2 years					•			11-11
Clutch--adjust		•	•	•	•	•	•	•	5-4
Steering--check †		•	•	•	•	•	•	•	13-4
Drive chain wear--check †			•	•	•	•	•	•	10-5
Nuts, bolts, and fasteners tightness--check †		•		•		•		•	16-7
Tire wear--check †			•	•	•	•	•	•	9-9
Enigne oil--change	year	•		•		•		•	6-6
Oil filter--replace		•		•		•		•	6-6
General lubrication--perform			•	•	•	•	•	•	16-7
Front fork oil--change								•	12-4
Swing arm pivot, uni-trak linkage--lubricate				•		•		•	12-10 12-11
Coolant--change	2 years							•	3-5
Radiator hoses, connections --check †	year	•		•		•		•	3-11
Steering stem bearing--lubricate	2 years					•			13-6
Master cylinder cup and dust seal--replace	2 years								11-9
Caliper piston seal and dust seal--replace	2 years								11-6
Brake hose--replace	4 years								11-14
Fuel hose--replace	4 years								
Drive chain--lubricate	Every 300 km								10-6
Drive chain slack--check †	Every 800 km								10-4

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

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:
L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
O : Apply an oil to the threads and seated surface.
S : Tighten the fasteners following the specified sequence.
St : Stake the fasteners to prevent loosening.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Cooling System:				
Fan Switch	7.8	0.80	69 in-lb	
Water Temperature Sensor	7.8	0.80	69 in-lb	L
Drain Plug: Cylinder	7.8	0.80	69 in-lb	
Water Pump	7.8	0.80	69 in-lb	
Engine Top End:				
Cylinder Head Cover Bolts	9.8	1.0	87 in-lb	
Chain Guide Bolt (Upper)	25	2.5	18.0	L
Chain Guide Lever Bolt (Lower)	27	2.8	20	
Camshaft Sprocket Bolts	15	1.5	11.0	L
Valve Adjusting Screw Locknuts	20	2.0	14.5	
Camshaft Cap Bolts	12	1.2	104 in-lb	S
Cylinder Head Bolts (8 mm Dia.)	25	2.5	18.0	S
Cylinder Head Bolts (6 mm Dia.)	12	1.2	104 in-lb	S
Camshaft Chain Tensioner Bolts	—	—	—	L
Clutch:				
Clutch Spring Bolts	8.8	0.90	78 in-lb	
Clutch Hub Nut	130	13.5	98	
Clutch Cover Damper Bolts (US model)	9.8	1.0	87 in-lb	L
Engine Lubrication System:				
Oil Passage Plug	15	1.5	11.0	
Lower Crankcase Plug (25 mm Dia.)	20	2.0	14.5	
Oil Pressure Switch	15	1.5	11.0	L
Oil Pressure Relief Valve	15	1.5	11.0	L
Oil Hose Banjo Bolts	20	2.0	14.5	
Oil Pipe Banjo Bolt (Crankcase LH)	12	1.2	104 in-lb	
Oil Drain Bolt	20	2.0	14.5	
Oil Filter Bolt	20	2.0	14.5	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Engine Removal/Installation:				
Engine Mounting Nuts	32	3.3	24	
Cylinder Head Bracket Bolts	32	3.3	24	
Crankshaft/Transmission:				
Connecting Rod Big End Cap Nuts	27	2.8	20	
Starter Clutch Allen Bolts	34	3.5	25	L
Crankcase Bolts (6 mm Dia.)	12	1.2	104 in-lb	
Crankcase Bolts (8 mm Dia.)	27	2.8	20	
Shift Drum Ball Bearing Holder Allen Bolts	—	—	—	L
Shift Drum Pin Plate Screw	—	—	—	L
Shift Drum Positioning Bolt	25	2.5	18	
External Shift Mechanism Return Spring Pin	20	2.0	14.5	L
Neutral Switch	15	1.5	11.0	
Wheels/Tires:				
Air Valve Nuts	1.5	0.15	13 in-lb	
Front Axle Nut	88	9.0	65	
Rear Axle Nut	110	11.0	80	
Final Drive:				
Engine Sprocket Bolts	9.8	1.0	87 in-lb	
Rear Sprocket Nuts	67	6.8	49	
Brakes:				
Brake Lever Pivot Nut	5.9	0.60	52 in-lb	
Front Master Cylinder Clamp Bolts	8.8	0.90	78 in-lb	S
Brake Hose Banjo Bolts	25	2.5	18	
Bleed Valves	7.8	0.80	69 in-lb	
Caliper Mounting Bolts (Front)	32	3.3	24	
(Rear)	29	3.0	22	
Disc Mounting Bolts	23	2.3	16.5	
Torque Link Nuts	32	3.3	24	
Rear Master Cylinder Clevis Locknut	18	1.8	13	
Rear Master Cylinder Mounting Bolts	23	2.3	16.5	
Suspension:				
Front Fork:				
Fork Clamp Bolts: Upper	20	2.0	14.5	
Lower	29	3.0	22	
Drain Bolts	7.8	0.80	69 in-lb	L
Bottom Allen Bolts	20	2.0	14.5	L

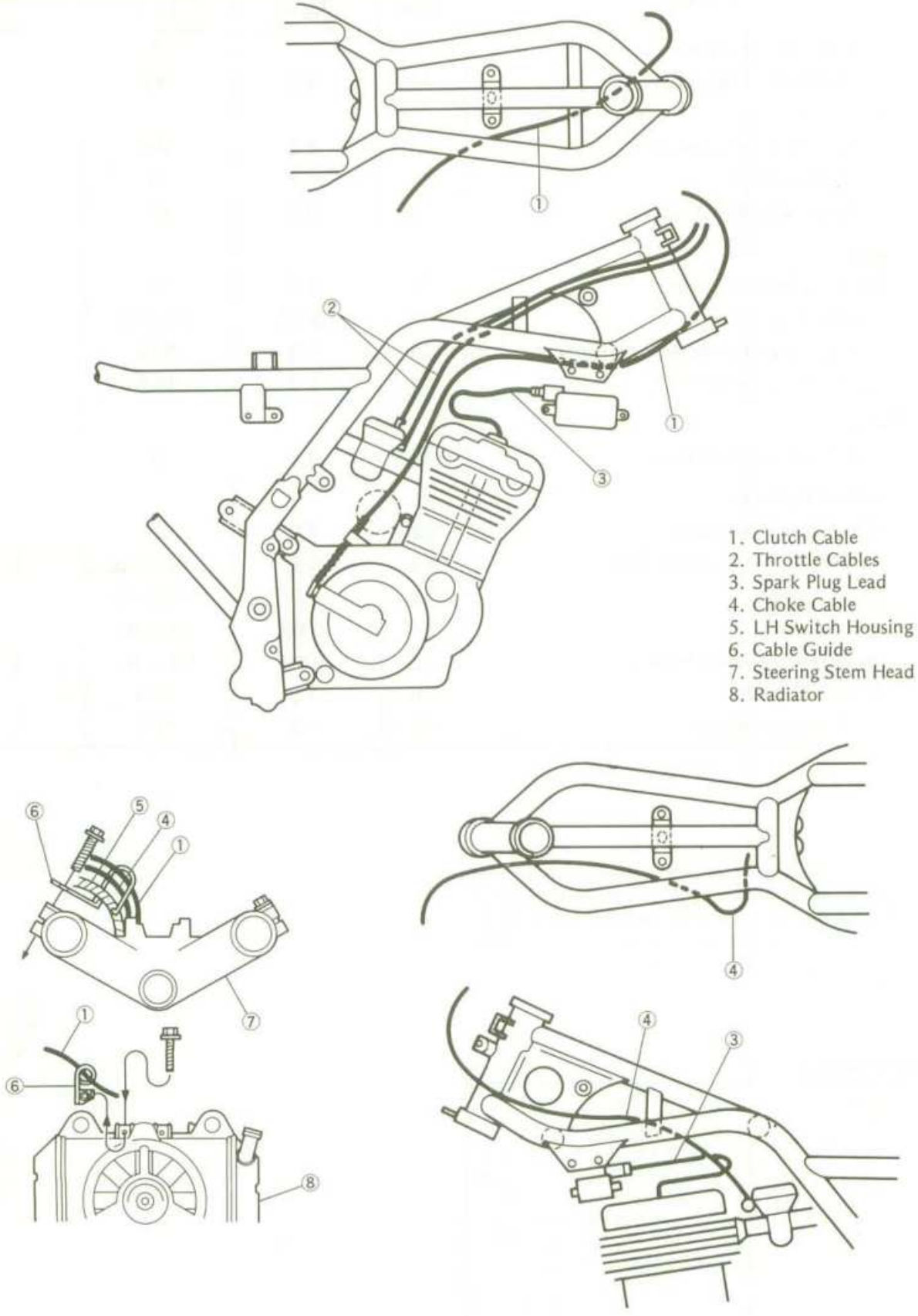
Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Rear Shock Absorber:				
Shock Absorber Nuts	44	4.5	33	
Uni-Trak:				
Rocker Arm Sleeve Bolt	44	4.5	33	
Tie-Rod Nuts	44	4.5	33	
Swing Arm Pivot Nut	88	9.0	65	
Steering:				
Steering Stem Head Bolt	47	4.8	35	
Steering Stem Nut	7.4	0.75	65 in-lb	
Handlebar Holder Mounting Bolts	23	2.3	16.5	
Handlebar Clamp Bolts	23	2.3	16.5	
Frame:				
Side Stand Bracket Bolts	34	3.5	25	
Electrical System:				
Alternator Rotor Bolt	69	7.0	51	
Alternator Stator Allen Bolts	12	1.2	104 in-lb	L
Spark Plugs	13	1.3	113 in-lb	
Fan Switch	7.8	0.80	69 in-lb	
Water Temperature Sensor	7.8	0.80	69 in-lb	L
Neutral Switch	15	1.5	11.0	
Oil Pressure Switch	15	1.5	11.0	L

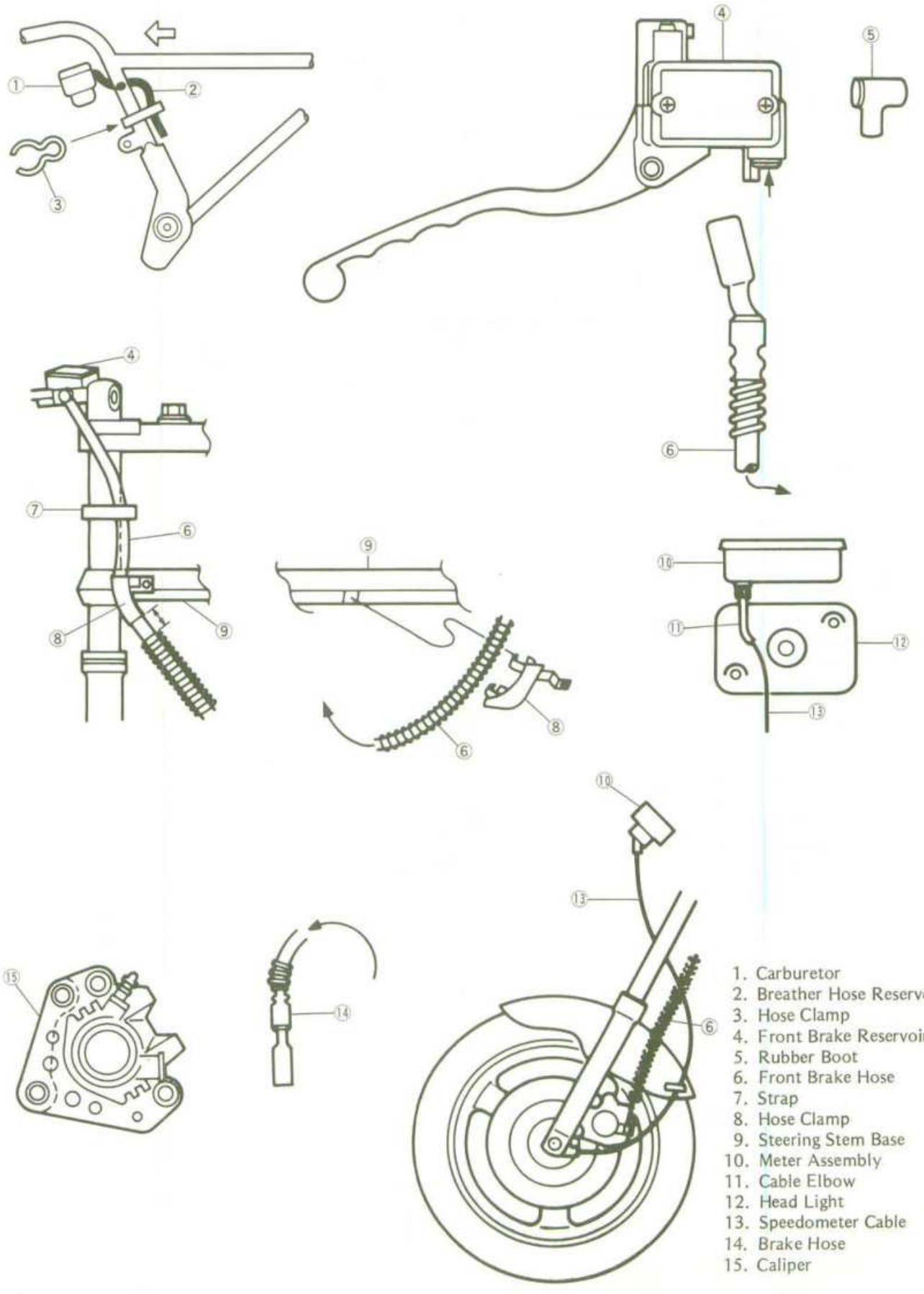
The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

General Fasteners

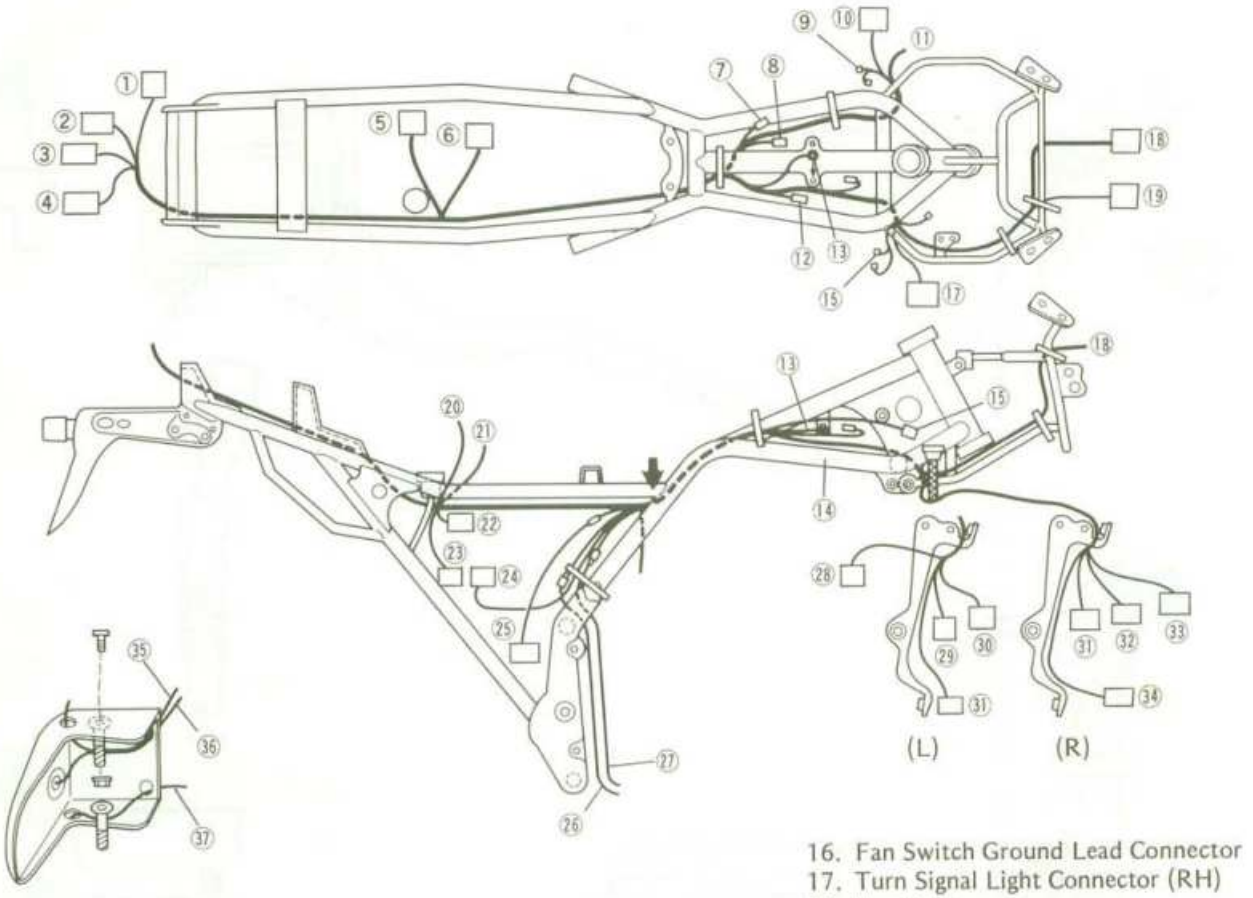
Threads dia. (mm)	Torque		
	N-m	kg-m	ft-lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in-lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in-lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Suggested Wiring, Cable or Hose Routing

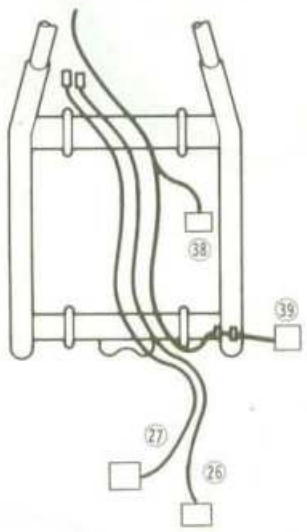


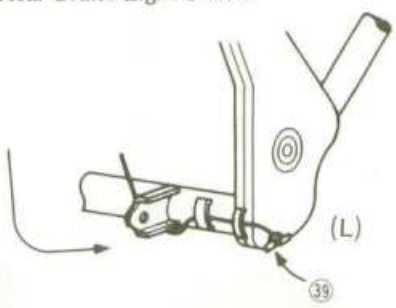


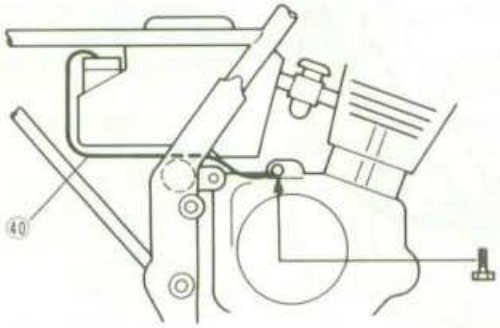
1. Carburetor
2. Breather Hose Reservoir
3. Hose Clamp
4. Front Brake Reservoir
5. Rubber Boot
6. Front Brake Hose
7. Strap
8. Hose Clamp
9. Steering Stem Base
10. Meter Assembly
11. Cable Elbow
12. Head Light
13. Speedometer Cable
14. Brake Hose
15. Caliper



1. Turn Signal Light (LH)
2. License Light
3. Tail/Brake Light
4. Turn Signal Light (RH)
5. Regulator/Rectifier
6. Junction Box
7. Left Switch Housing Connector
8. Ignition Switch Connector
9. Ignition Coil Connector (LH)
10. Turn Signal Light Connector (LH)
11. To Left Engine Bracket
12. Right Switch Housing Connector
13. Water Temperature Sensor Ground Lead
14. Water Temperature Sensor Connector
15. Ignition Coil Connector (RH)
16. Fan Switch Ground Lead Connector
17. Turn Signal Light Connector (RH)
18. Headlight
19. Meter Assembly
20. Battery (+) Terminal
21. Battery (–) Terminal
22. Starter Relay
23. Turn Signal Relay
24. IC Igniter
25. Rear Brake Light Switch







26. Alternator Lead
27. Pickup Coil Lead
28. Fan Switch Connector
29. Ignition Coil
30. Turn Signal Light
31. Cooling Fan
32. Ignition Coil
33. Turn Signal Light (RH)
34. Horn
35. Turn Signal Light Lead (RH)
36. License Light Lead
37. Turn Signal Light Lead (LH)
38. Neutral Switch
39. Side Stand Switch
40. Battery Ground Lead

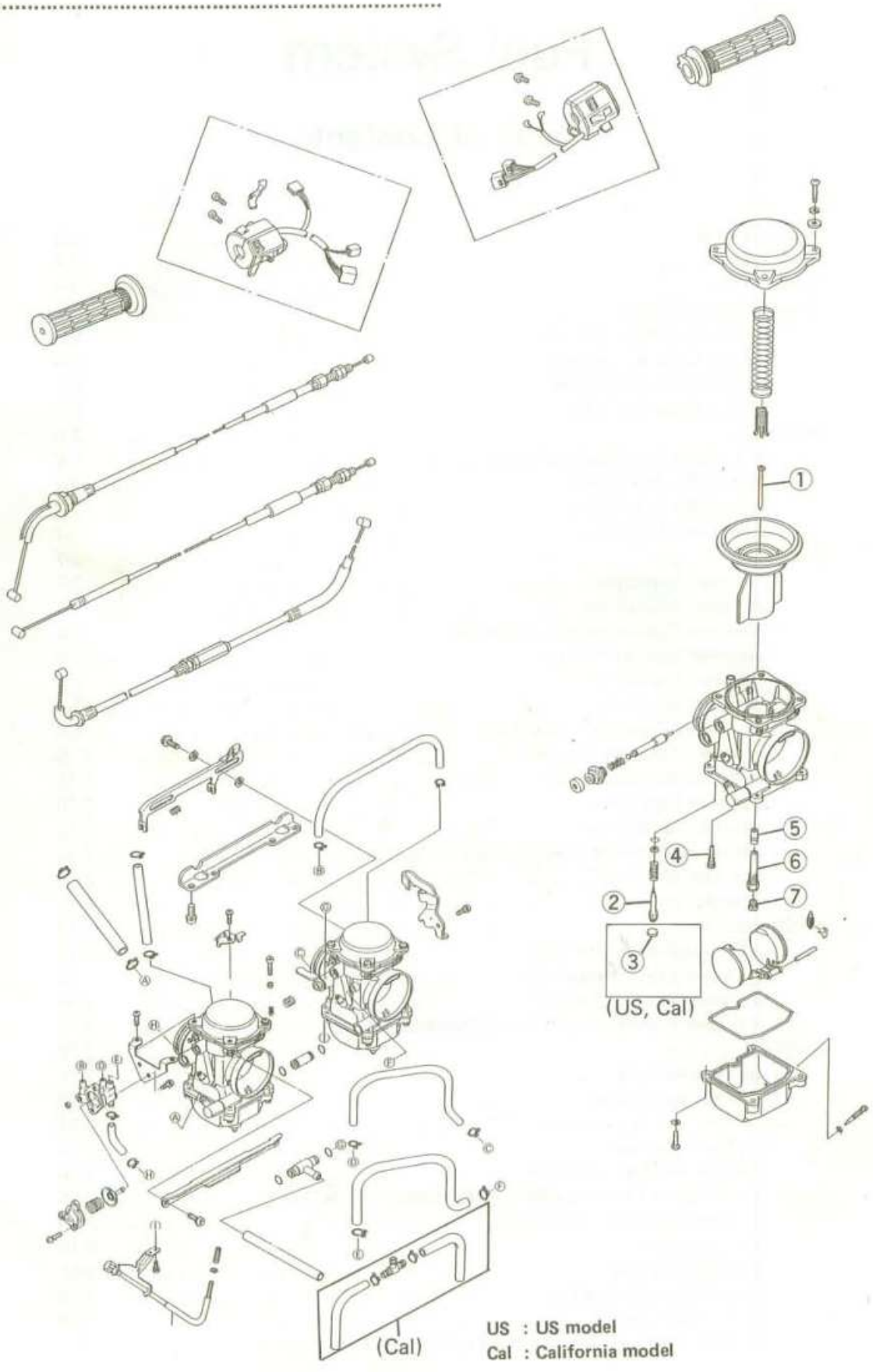
Fuel System

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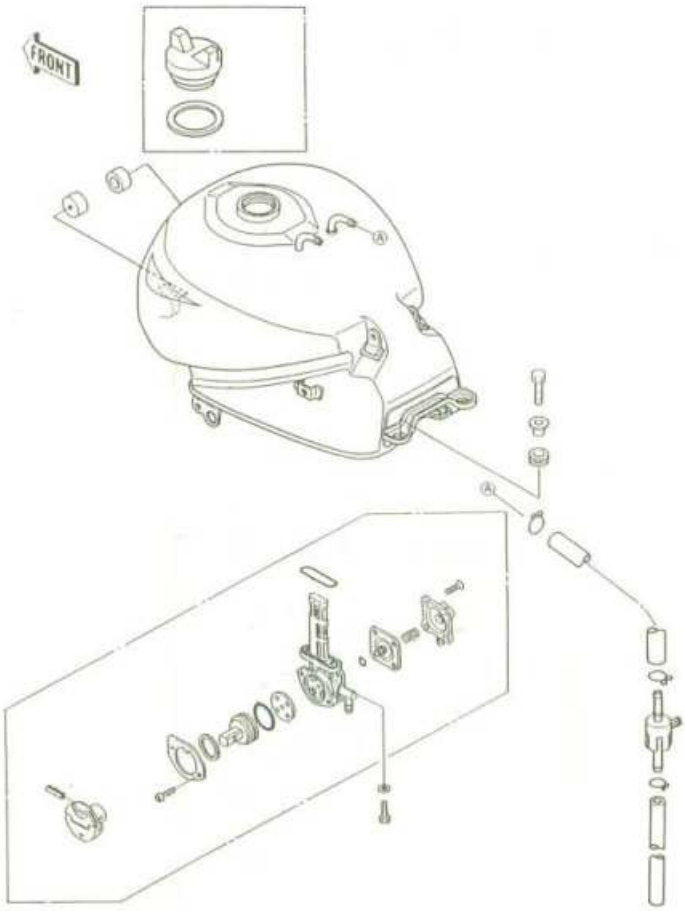
2

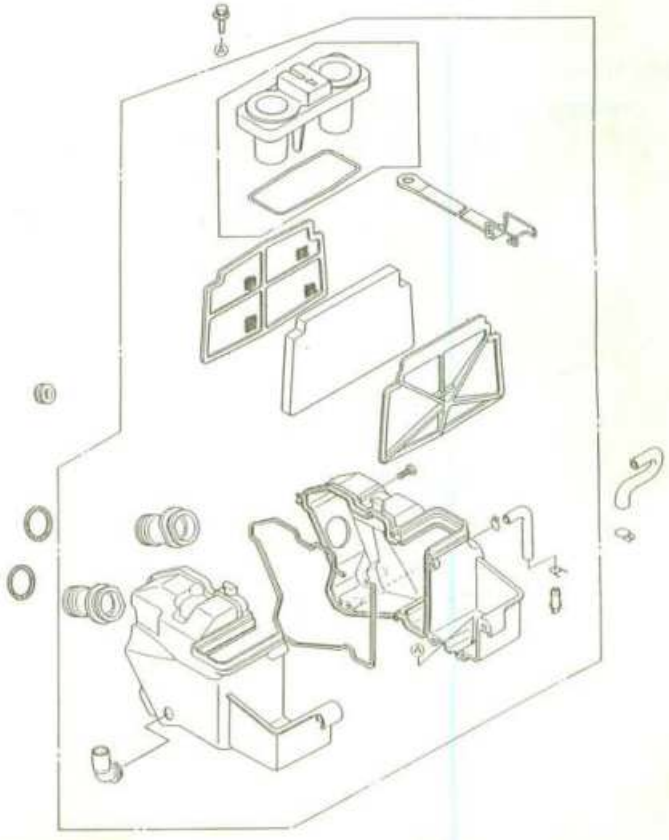
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Exploded View



US : US model
Cal : California model





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

Specifications

Throttle Grip Free Play

Standard: 2 – 3 mm

Choke Cable Free Play

Standard: 2 – 3 mm

Carburetor Specifications

Make/Type	Keihin/CVK32
Main Jet	110 (Cal) 108
Main Air Jet	100
Jet Needle	Left : N52H Right: N52I
Pilot Jet	35
Pilot Air Jet	90
Pilot Screw	2½ turns out
Starter Jet	52
Fuel Level	–0.5 mm
Float Height	17 mm

(Cal) : California model

Idle Speed

Standard 1 300 ±100 r/min (rpm)

(Cal) 1 500 ±100 r/min (rpm)

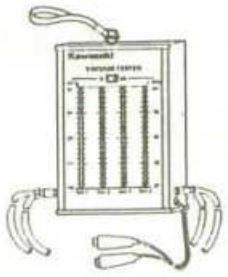
Special Tools

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

Fuel Level Gauge: 57001-1017



Vacuum Gauge: 57001-1198



Pressure Cable Luber: K56019-021



Throttle Grip and Cables

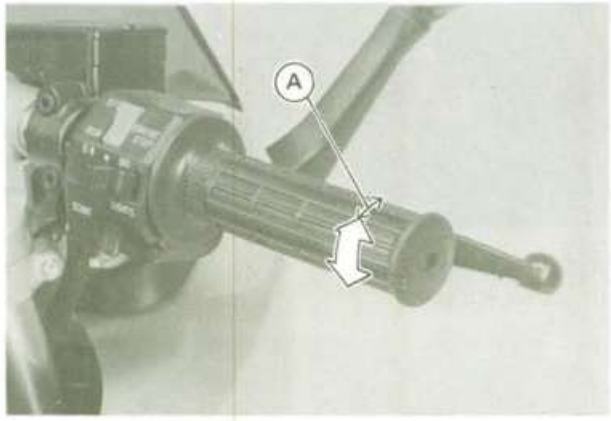
If the throttle grip has excessive free play due to cable stretch or misadjustment, there will be a delay in throttle response. Also the throttle valves may not open fully at full throttle. On the other hand, if the throttle grip has no play, the throttle will be hard to control, and the idle speed will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

Throttle Grip Play Inspection

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

Throttle Grip Free Play

2 ~ 3 mm

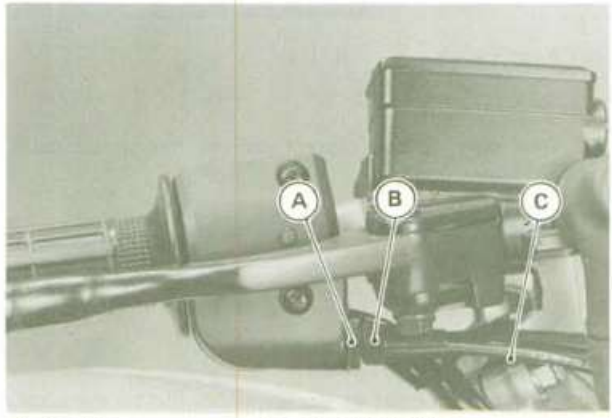


A. Throttle Grip Free Play

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

Throttle Cable Adjustment

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



A. Locknut
B. Adjuster
C. Throttle Cable

●Tighten the locknut.

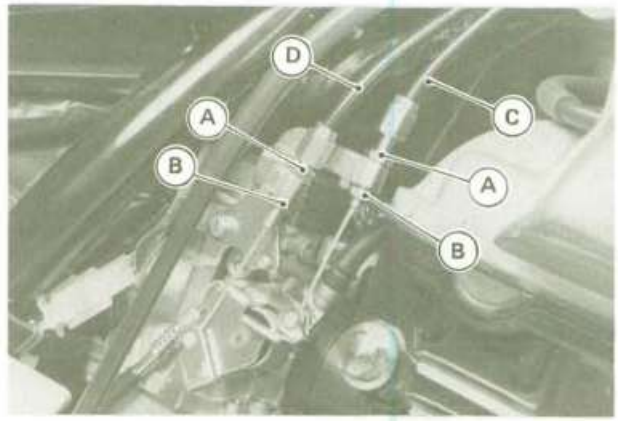
★If the throttle cables can not be adjusted by using the cable adjuster at the upper end of the throttle cable, use the cable adjusters at the lower ends of the throttle cables.

●Remove the right hand kneegrip pad.

●Loosen the locknut at the throttle grip and turn in the adjuster fully.

●Tighten the locknut.

●Turn out both upper nuts and turn in both lower nuts as far as they will go so as to give the throttle grip plenty of play.

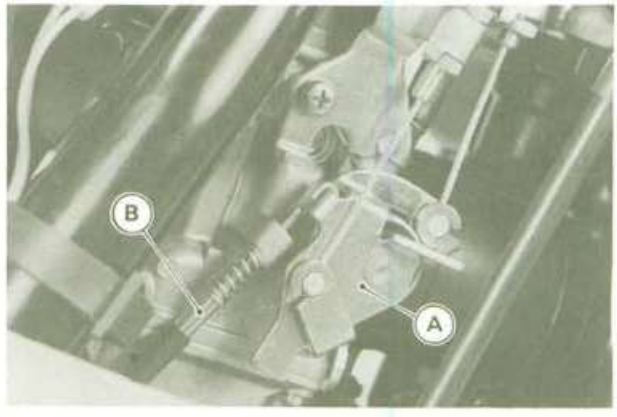


A. Upper Nuts
B. Lower Nuts
C. Decelerator Cable
D. Accelerator Cable

●With the throttle grip completely closed, turn out the lower nut and turn in the upper nut of the decelerator cable until the inner cable just becomes tight.

●Turn out the lower nut and turn in the upper nut of the accelerator cable until the correct free play is obtained.

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



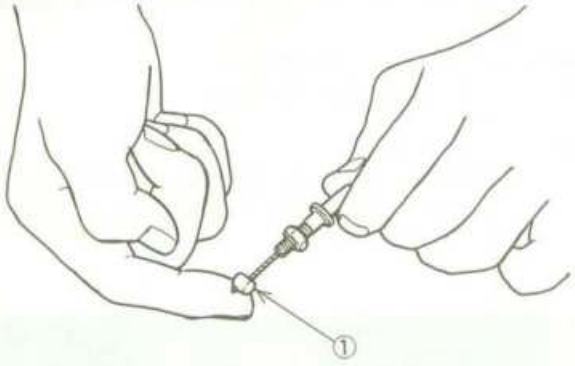
A. Linkage Lever
B. Idle Adjusting Screw

Throttle Cable Lubrication

Whenever the throttle 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 ends.

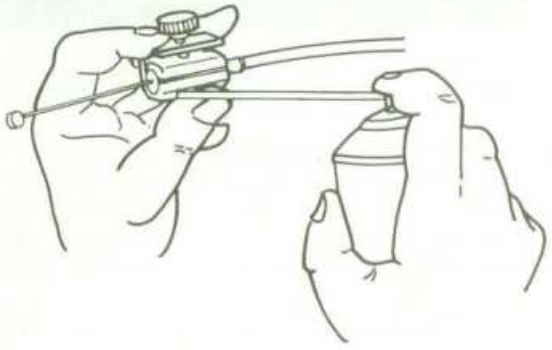
Throttle Cable Lubrication



1. Apply grease.

•Lubricate the cable with a penetrating rust inhibitor.

Cable Lubrication



Throttle Cable Inspection

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

Throttle Cable Inspection



1. Throttle Cable

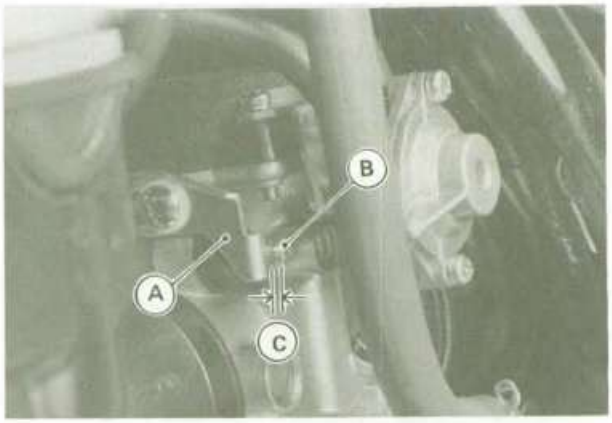
Choke Cable

Choke Cable Free Play Inspection

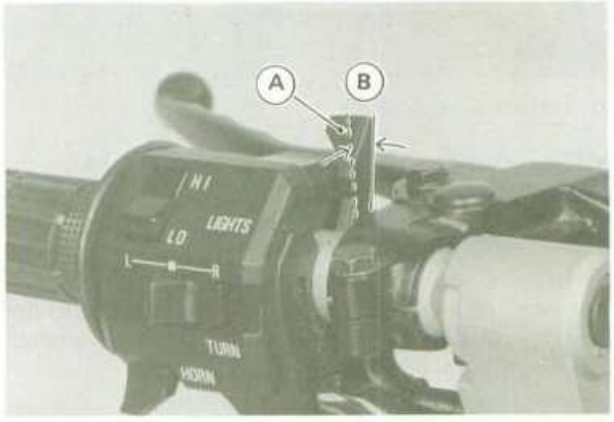
•Check that the choke lever returns properly and that the inner cable slides smoothly.

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

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



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



A. Choke Lever
B. Play

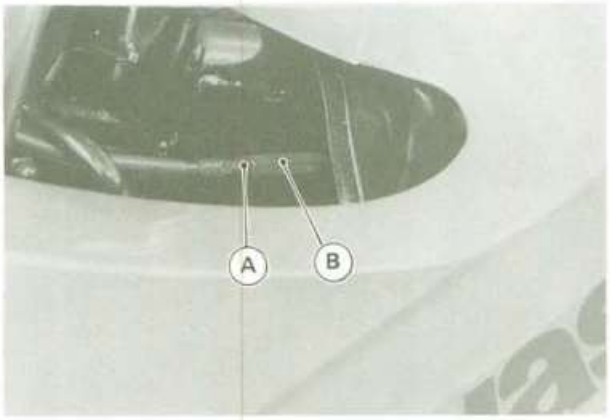
★If free play is not correct, adjust the choke cable.

Choke Cable Free Play

2 ~ 3 mm

Choke Cable Adjustment

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



A. Locknut B. Adjusting Nut

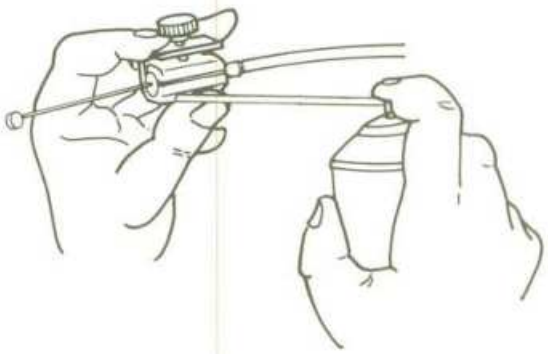
●Tighten the locknut after adjustment.

Choke Cable Lubrication

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

●Lubricate the cable with a penetrating rust inhibitor.

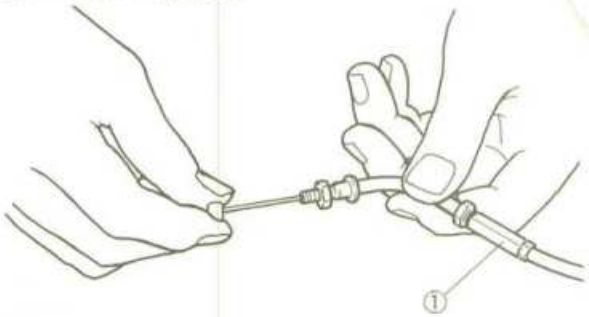
Cable Lubrication



Choke Cable Inspection

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

Choke Cable Inspection



1. Choke Cable

★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.

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.

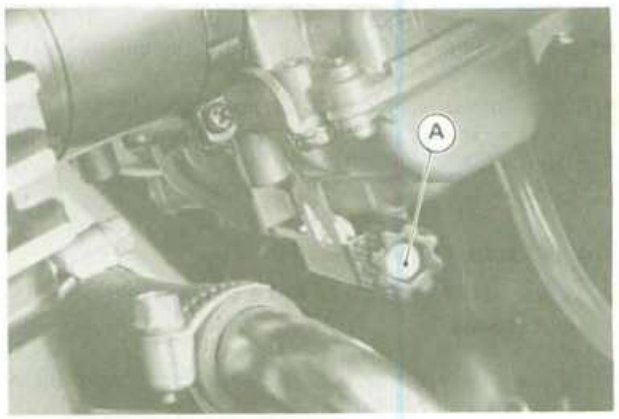
★If the idle speed is out of the specified range, adjust it.

Idle Speed

1 300 ±100 r/min (rpm)
(Cal) 1 500 ±100 r/min (rpm)

Idle Speed Adjustment

●Turn the adjusting screw until idle speed is correct.



A. Idle Adjusting Screw

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

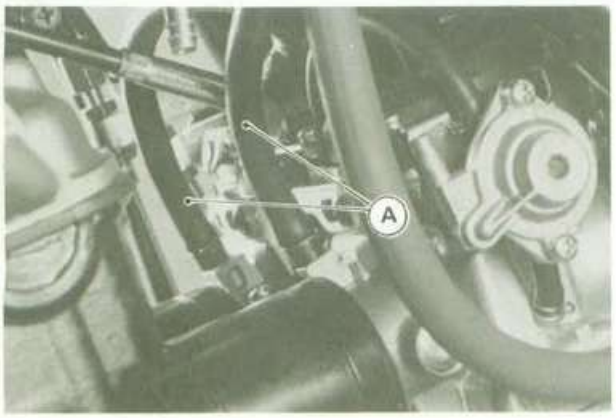
Carburetor Synchronization Inspection

- Warm up the engine.
- Check idle speed and adjust if necessary.
- Remove the left hand kneegrip cover.
- Turn the fuel tap PRI position.

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.**

- Pull the vacuum hoses out of the vacuum hose fittings at the fuel tap and the carburetor fuel enricher.
- Attach vacuum gauge set (special tool: 57001-1198) to the vacuum hoses.



A. Vacuum Hoses

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

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

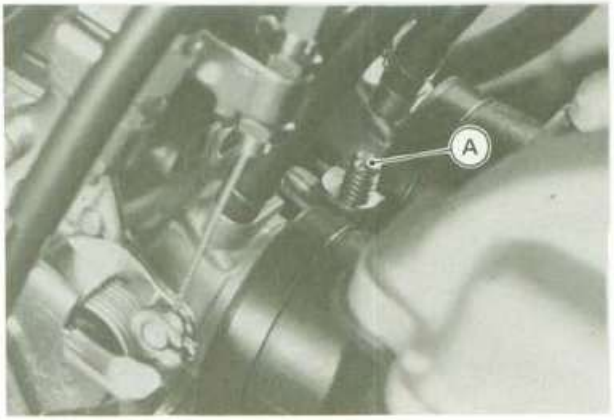
Engine Vacuum Synchronization

Less than 2.7 kPa (2.0 cmHg) difference between both cylinders

- Remove the vacuum gauge, connect the vacuum hoses to the vacuum hose fittings.
- Insert the kneegrip pad.

Carburetor 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.**

- Prepare a rubber hose (6 mm in diameter and about 300 mm long).
- Connect fuel level gauge (Special Tool) to the carburetor float bowl with the fuel hose.
- Hold the gauge vertically against the side of the carburetor body so that the "zero" line is several millimeters higher than the bottom edge of the carburetor body.
- Turn the fuel tap to the PRI position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "zero" line is even with the bottom edge of the carburetor body.

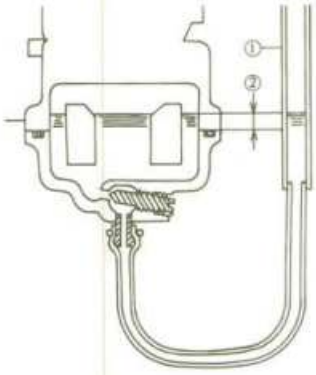
NOTE

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

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

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

Fuel Level Measurement



1. Fuel Level Gauge: 57001-1017
2. Fuel Level

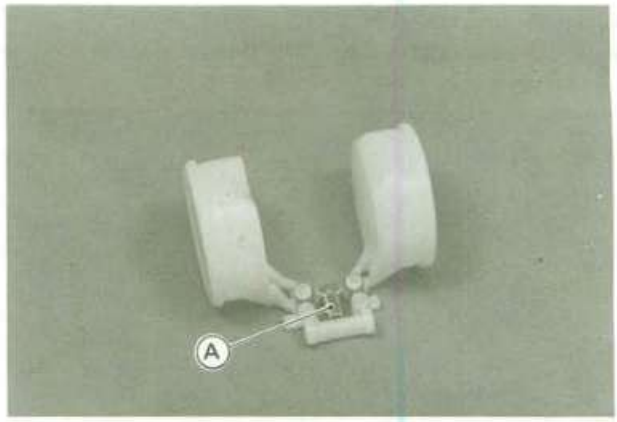
Fuel level

0.5 ±1 mm above the bottom edge of carburetor body

Fuel Level Adjustment

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

Float Height: **17 mm**

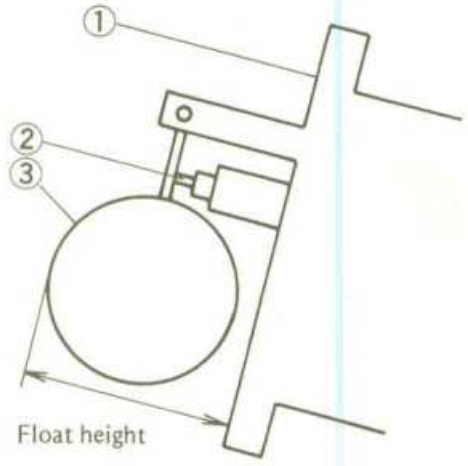


A. Tang

- Assemble the carburetor, and recheck the fuel level.

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

Float Height Measurement-Keihin Carburetor



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

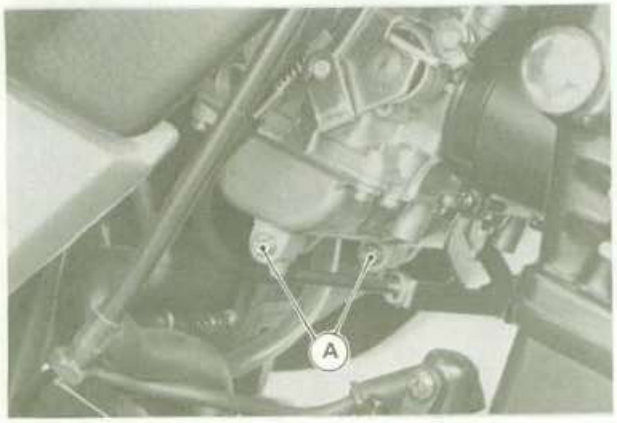
Fuel System Cleanliness Inspection

WARNING

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

- Connect a suitable hose to the fitting at the bottom of each carburetor float bowl.
- Run the lower ends of the hoses into a suitable container.

•Turn the fuel tap to the PRI position.
•Turn out each drain plug a few turns and drain the float bowls.

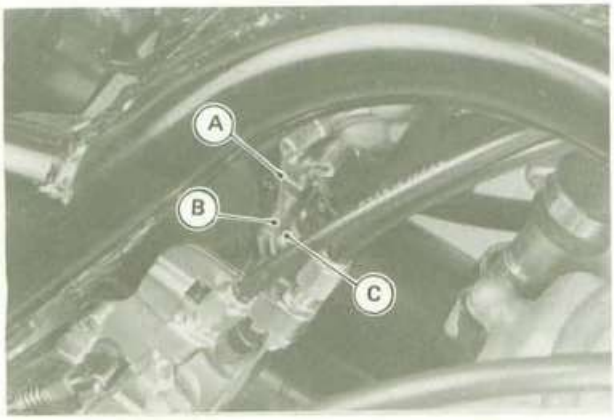


A. Drain Plugs

•Check to see if water or dirt comes out.
•Tighten the drain plugs and turn the fuel tap to ON position.
*If any water or dirt appeared during the above inspection, clean the fuel system (see Carburetor Cleaning and Fuel Tank and Tap Cleaning).

Carburetor Assembly Removal

•Remove the following parts.
Passenger and Rider's Seats
Left and Right Kneegrip Pads
Left and Right Side Covers
Rubber Band and Battery
Air Cleaner Housing Mounting Bolts
Rear Fender Mounting Bolts
Rear Fender Front Section Mounting Bolts
Rear Brake Reservoir
(Remove the mounting bolt and pull the reservoir out of place.)
Coolant Reservoir Tank
•Slide the spring bands off the air cleaner ducts.
•Pull the air cleaner housing rearward.
•Slip the carburetors out.
•Slip the tip of the choke inner cable out of the lever, and pull the cable out.



A. Choke Inner Cable
B. Choke Lever
C. Cable Tip

•Slip the tips of the throttle inner cables out of the pulley to complete carburetor assembly removal.

WARNING

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

Carburetor Assembly Installation Notes

•After installing the carburetors, perform the following.
○Check fuel leakage from the carburetors.

WARNING

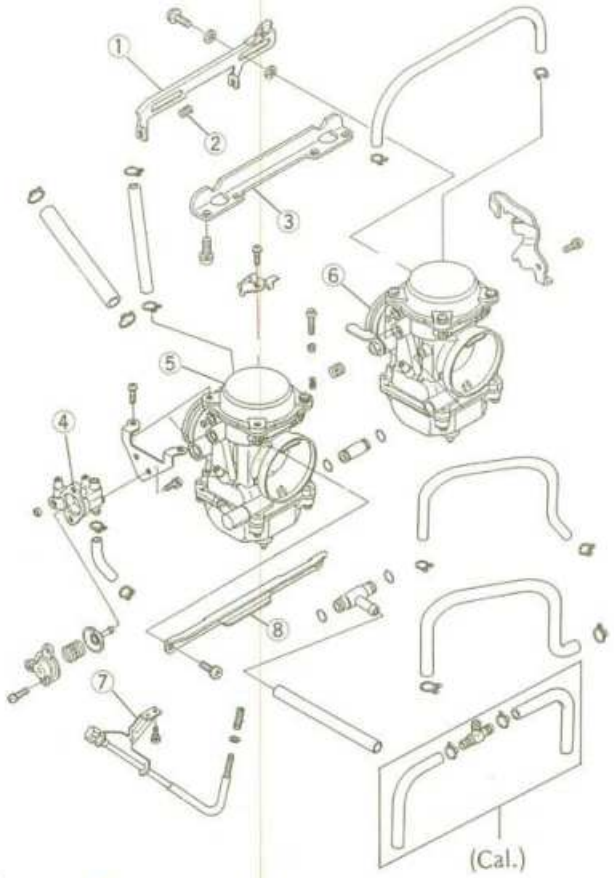
○**Fuel spilled from the carburetors is hazardous.**

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

Carburetor Separation

•Remove the carburetor assembly.
•Remove the following parts before carburetor separation.
Choke Lever Spring and Choke Lever
Carburetor Mounting Plates.

Carburetor



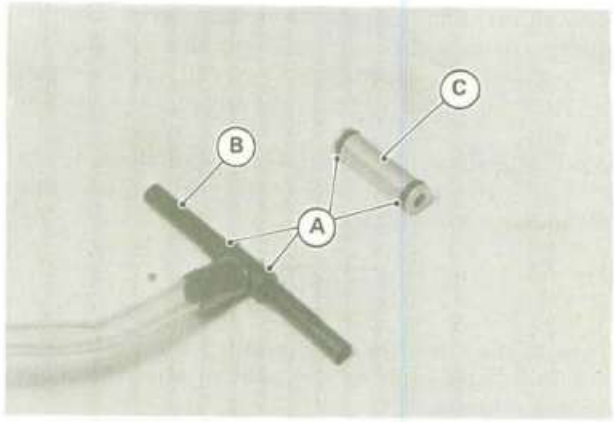
1. Choke Lever
2. Choke Lever Spring
3. Mounting Plate (Upper)
4. Coasting Enricher System
5. No. 1 Carburetor (LH)
6. No. 2 Carburetor (RH)
7. Idle Adjusting Screw Holder
8. Mounting Plate (Lower)

●Gently, separate the carburetors from each other.

Carburetor Installation

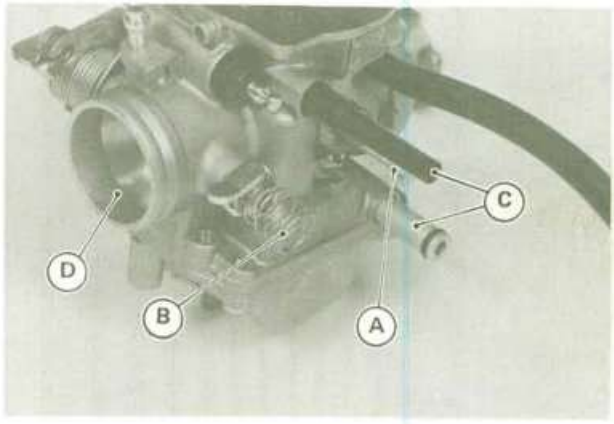
●When installing the carburetor, be careful of the following items.

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



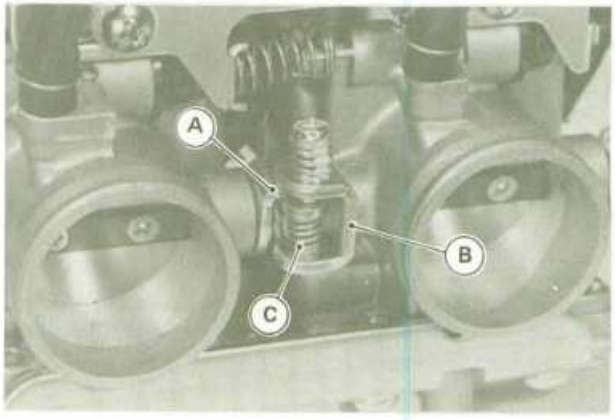
A. O-rings
B. Fitting
C. Fitting

○Install the fittings and spring as shown.



A. Fitting Pipe
B. Spring
C. Fittings
D. Carburetor Body

○Install the throttle connecting plates and spring as shown.



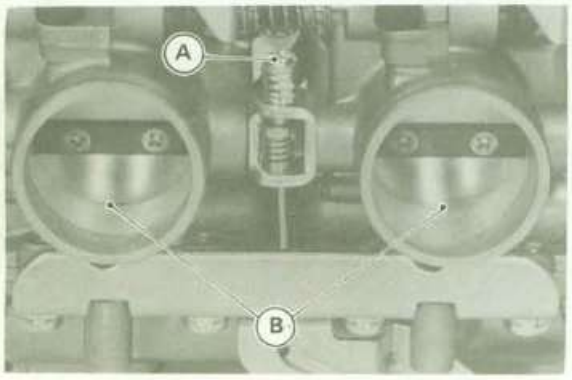
A. Plate
B. Plate
C. Spring

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

CAUTION

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

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



A. Balance Adjusting Screw
B. Clearance

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

Carburetor Disassembly and Assembly Notes

CAUTION

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

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

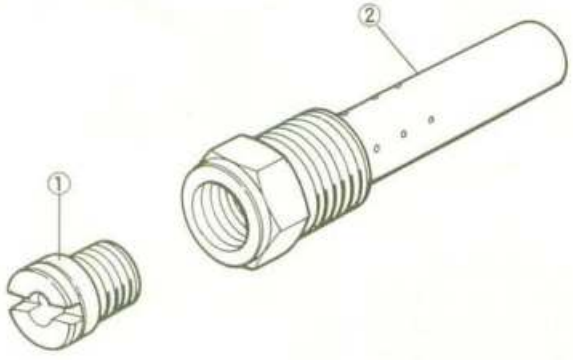
Needle Jet



1. Needle Jet 2. Small Diameter End

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

Main Jet and Needle Jet Holder



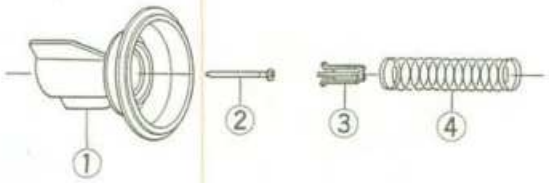
1. Main Jet 2. Needle Jet Holder

CAUTION

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

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

Vacuum Piston



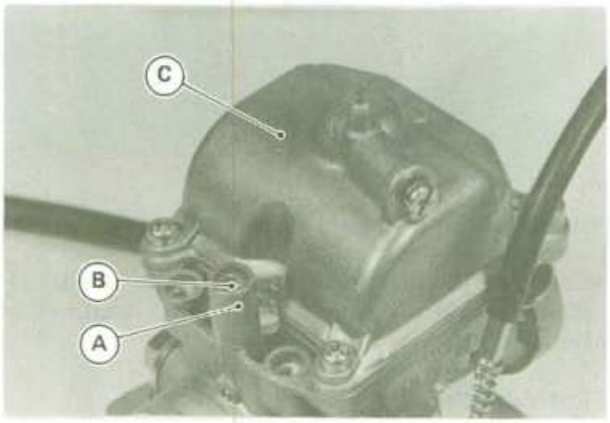
1. Vacuum Piston
2. Jet Needle
3. Spring Seat
4. Spring

●Remove the pilot screws from the carburetors as follows.

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

Punch a hole in the plug and pry it 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.



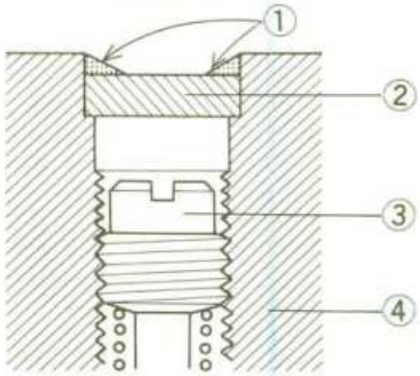
A. Pilot Screw
B. Plug (US model only)
C. Float Bowl

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

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

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

Plug Installation (US model only)



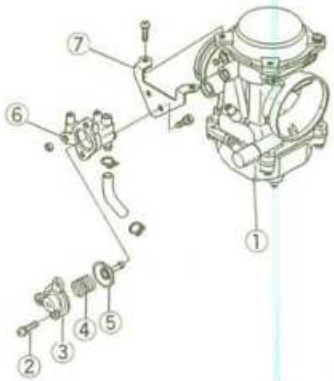
1. Apply a bonding agent.
2. Plug
3. Pilot screw
4. Carburetor body

CAUTION

○Do not apply too much bonding agent to the plug or the pilot screw itself from being fixed.

●When removing the coasting enricher system, unscrew the mounting screws, and remove the cover, spring, O-ring and diaphragm.

Coasting Enricher System



1. Carburetor (LH)
2. Mounting Screw
3. Cover
4. Spring
5. Diaphragm
6. Coasting Enricher Body
7. Mounting Plate

Carburetor Cleaning

WARNING

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

CAUTION

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

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

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

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

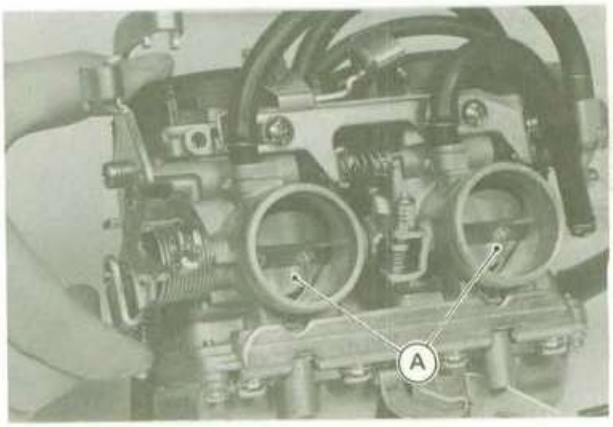
●Disassemble the carburetors.
●Immerse all the metal parts in a carburetor cleaning solution.
●Rinse the parts in water.
●When the parts are clean, dry them with compressed air.
●Blow through the air and fuel passages with compressed air.
●Assemble the carburetors.

Carburetor Inspection

WARNING

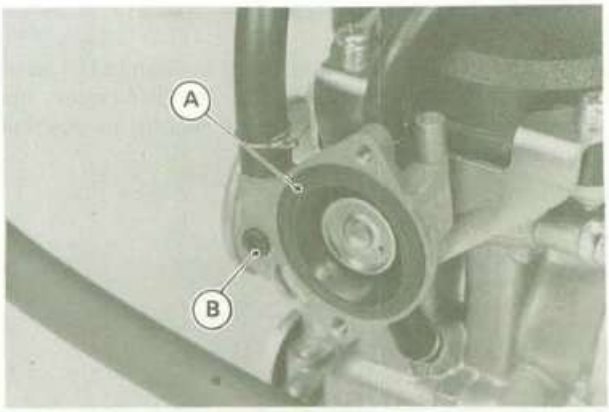
○Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

●Remove the carburetors.
●Before disassembling the carburetors, check the fuel level (see Fuel Level Inspection).
★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.
●Slide the choke lever right to left it to check that the starter plungers move smoothly and return with spring tension.
★If the starter plungers do not work properly, replace the carburetors.
●Turn the throttle cable pulley to check that the throttle butterfly valves move smoothly and return by spring tension.
★If the throttle valves do not more smoothly. Replace the carburetors.



A. Throttle Valves

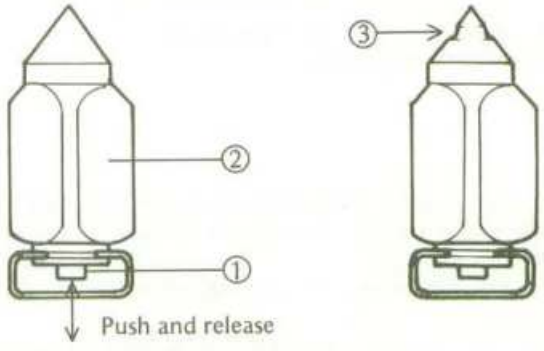
●Disassemble the carburetors.
●Clean the carburetors.
●Check that the O-rings on the float bowl and drain plug and the diaphragm on the vacuum piston are in good condition.
★If any of the O-rings or diaphragms are not in good condition, replace them.
●Check the O-ring and diaphragm of coasting enricher system.



A. Diaphragm B. O-ring

★If any of the O-rings or diaphragms are not in good condition, replace them.
●Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.

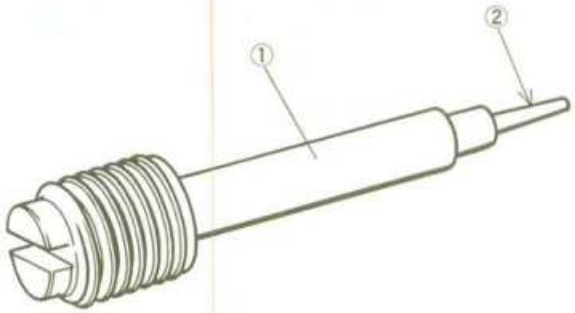
Float Valve Wear



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

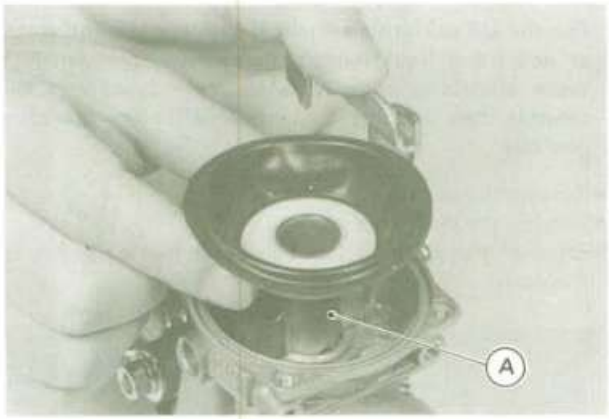
★If the plastic tip is damaged, replace the needle.
●Push in the rod in the other end of the float valve needle and then replace it.
★If it does not spring out, replace the needle.
●Check the tapered portion of the pilot screw for wear or damage.

Pilot Screw



1. Pilot Screw 2. 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 carburetor body, replace the carburetor.

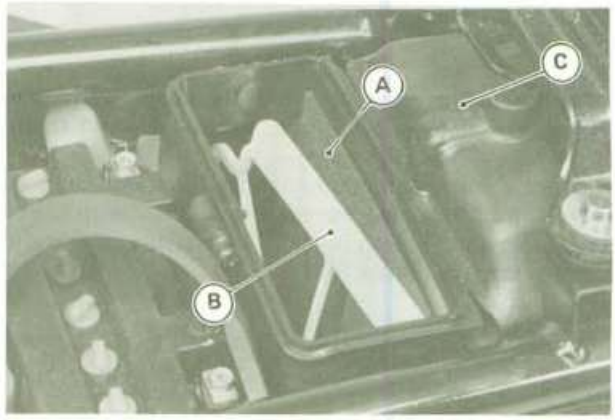


A. Vacuum Piston

Air Cleaner

Air Cleaner Element Removal

●Remove the passenger seat, and rider's seat.
●Remove the air cleaner housing rubber band and take off the air cleaner housing cap.



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

●Pull the element holder out of place.
●Pull out the air cleaner element.

WARNING

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

CAUTION

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

Air Cleaner Element Installation

●Element installation is the reverse of removal. Note the following.
○Set the housing cap with the arrow mark forward.

NOTE

○*Replace the element after cleaning it 5 times or if it is damaged.*

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 in a bath high flash-point solvent, and then dry it with compressed air or by shaking it.

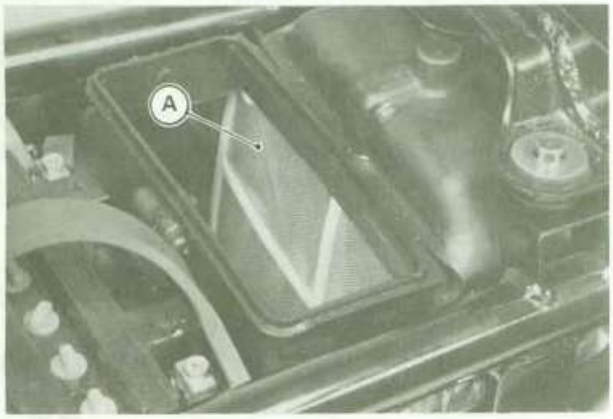
WARNING

○Do not use gasoline or a low flash-point solvent to clean the element. A fire or explosion could result.

●After cleaning, saturate the sponge filter with SE class SAE 30 oil, squeeze out the excess, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the sponge filter.

Air Cleaner Element Inspection and Replacement

●Remove the air cleaner element (see Air Cleaner Element Removal).
●Clean the air cleaner element (see Air Cleaner Element Cleaning).
●Visually inspect the element for tears or breaks. Check the element holder and wire screen.

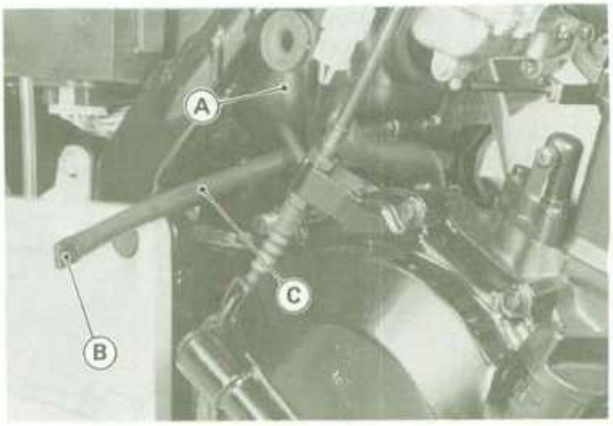


A. Screen

★If it has any tears or breaks, replace the element.
★If the holder or the screen are distorted, replace them.
○When replacing the holder or screen, remove the air cleaner housing and separate it.
●Repeated cleaning opens the pores of the foam in the element. Replace the element according to the Periodic Maintenance Chart (see General Information chapter).

Bleather Oil Inspection

Remove the plug at the end of the drain tube on the bottom of the air cleaner housing and drain oil accumulated in the tube.



A. Air Cleaner Housing
B. Plug
C. Drain Tube

Fuel Tank

Fuel Tank Removal

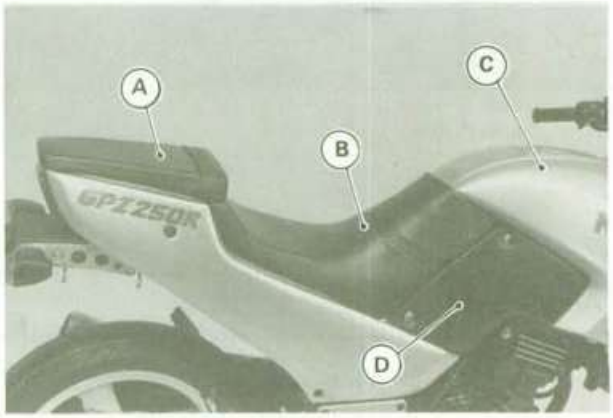
WARNING

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

CAUTION

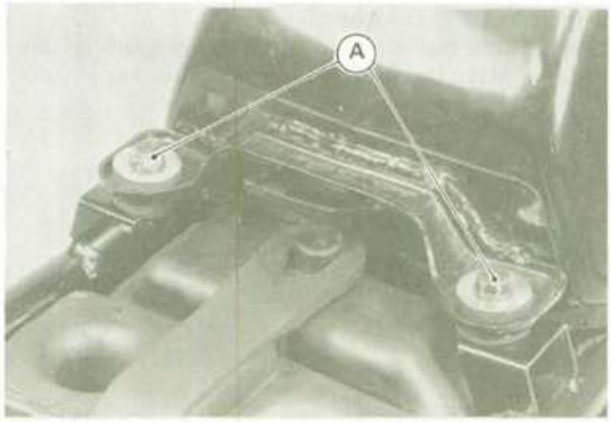
○For the US california vehicle, if gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated replace it with a new one.

●Remove the seats.
●Remove the both kneegrip pads.
●Remove the fairing (see Fairing Removal in Frame chapter).



A. Passenger's Seat
B. Rider's Seat
C. Fairing
D. Kneegrip Pad

●Remove the bolts from the rear end of the tank.

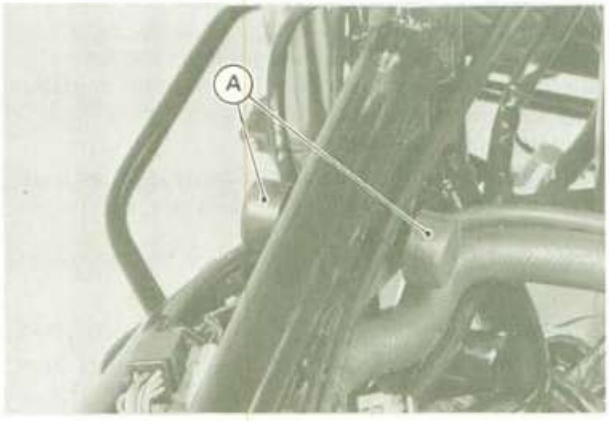


A. Bolts

●Turn the fuel tap on the ON or RES position.
●Tilt the tank out the rear of the frame.
●Pull the hoses off the tap.
○For California vehicles, the breather and fuel return hoses must be disconnected from the tank fittings before tank removal. Plug the fuel return fitting. This prevents gasoline from flowing into the canister.
●Drain the fuel tank if necessary.
○Arrange a suitable container under the fuel tank.
○Turn the fuel tap PRI to drain the fuel into the container.

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 Tank and Tap Cleaning

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

WARNING

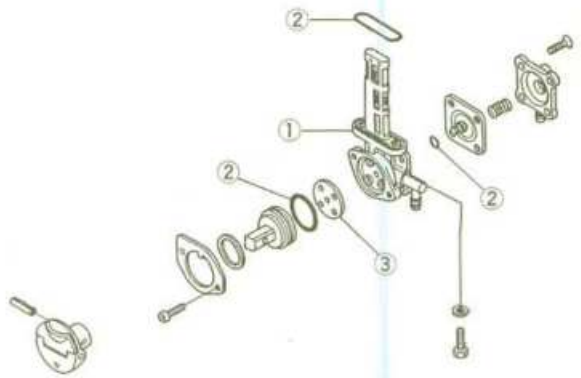
○**Clean the tank in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents to clean the tank.**

●Pour the solvent out of the tank.
●Remove the fuel tap from the tank by taking out the bolts with nylon washers.
●Clean the fuel tap filter screens in a high flash-point solvent.
●Pour high flash-point solvent through the tap in all lever positions.
●Dry the tank and tap with compressed air.
●Install the tap in the tank (see Fuel Tap Installation).
●Install the fuel tank (see Fuel Tank Installation).

Fuel Tap Inspection

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

Fuel Tap



1. Filter
2. O-ring
3. Gasket

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

Fuel Tank and Cap Inspection

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

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 lowing out of the canister, hold the separator perpendicular to the ground.
●Connect the hoses according to the diagram of the system. Make sure they do not get pinched or kinked.

Hose Inspection

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

Separator Inspection

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

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 spark; this includes any appliance with a pilot light.**

●Connect the hoses to the separator, and install the separator on the motorcycle.
●Disconnect the breather hose from the separator, and inject about 20 mL of gasoline into the separator through the hose fitting.
●Disconnect the fuel return hose from the fuel tank.
●Run the open end of the return hose in to 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.

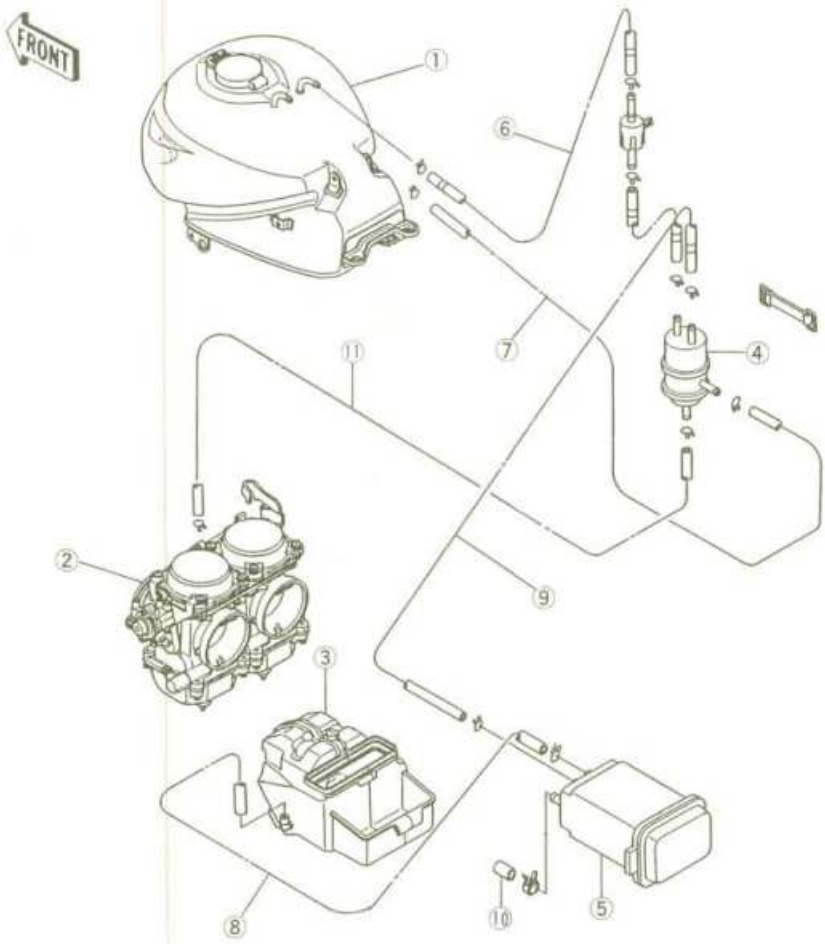
Canister Inspection

●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 Housing
4. Liquid/Vapor Separator
5. Canister
6. Breather Hose (Blue)
7. Fuel Return Hose (Red)
8. Purge Hose (Green)
9. Breather Hose (Blue)
10. Cap
11. Vacuum Hose (White)

Cooling System

3

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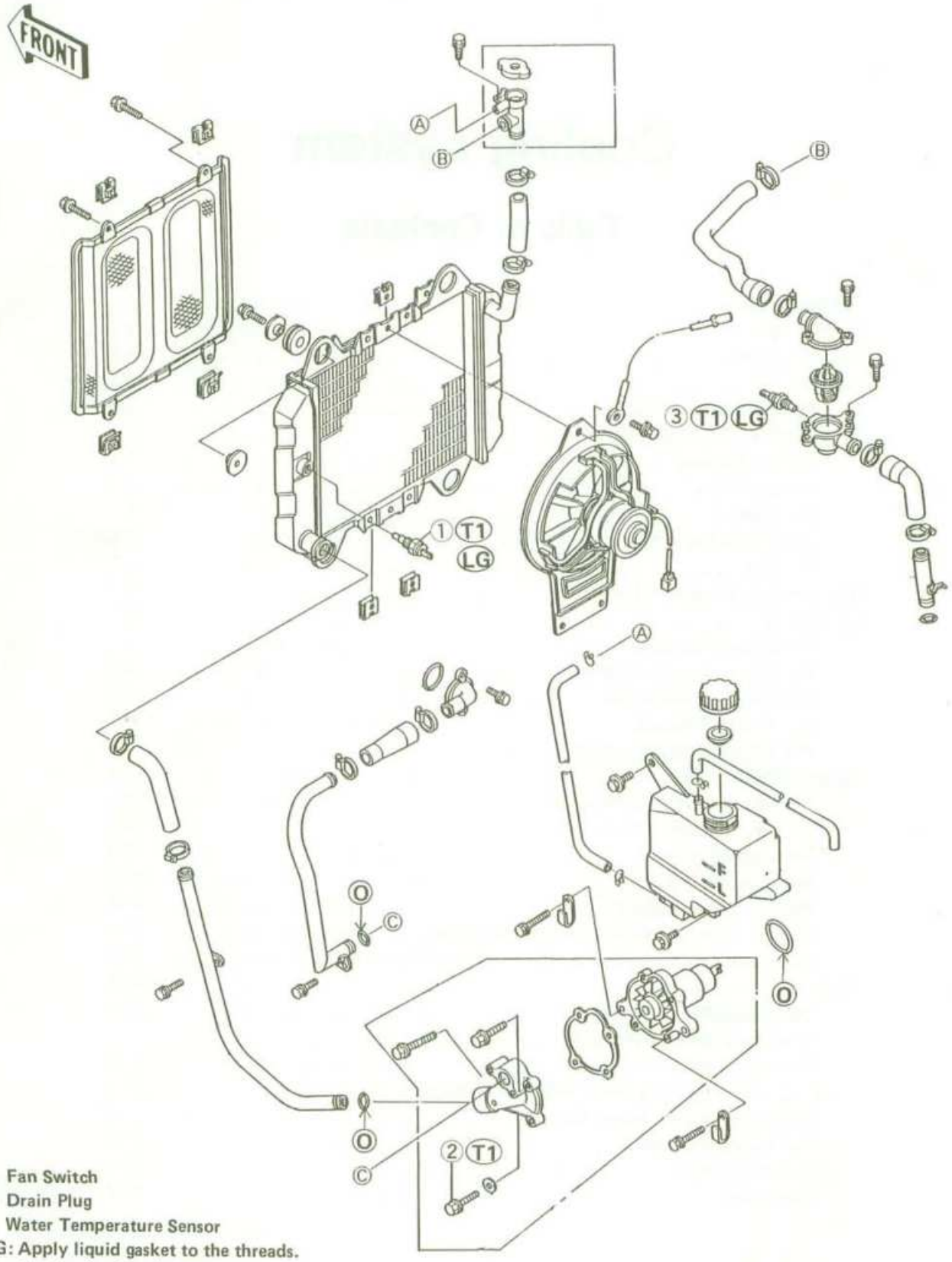
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Exploded View



1. Fan Switch
2. Drain Plug
3. Water Temperature Sensor

LG: Apply liquid gasket to the threads.
O : Apply oil at insullation
T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)

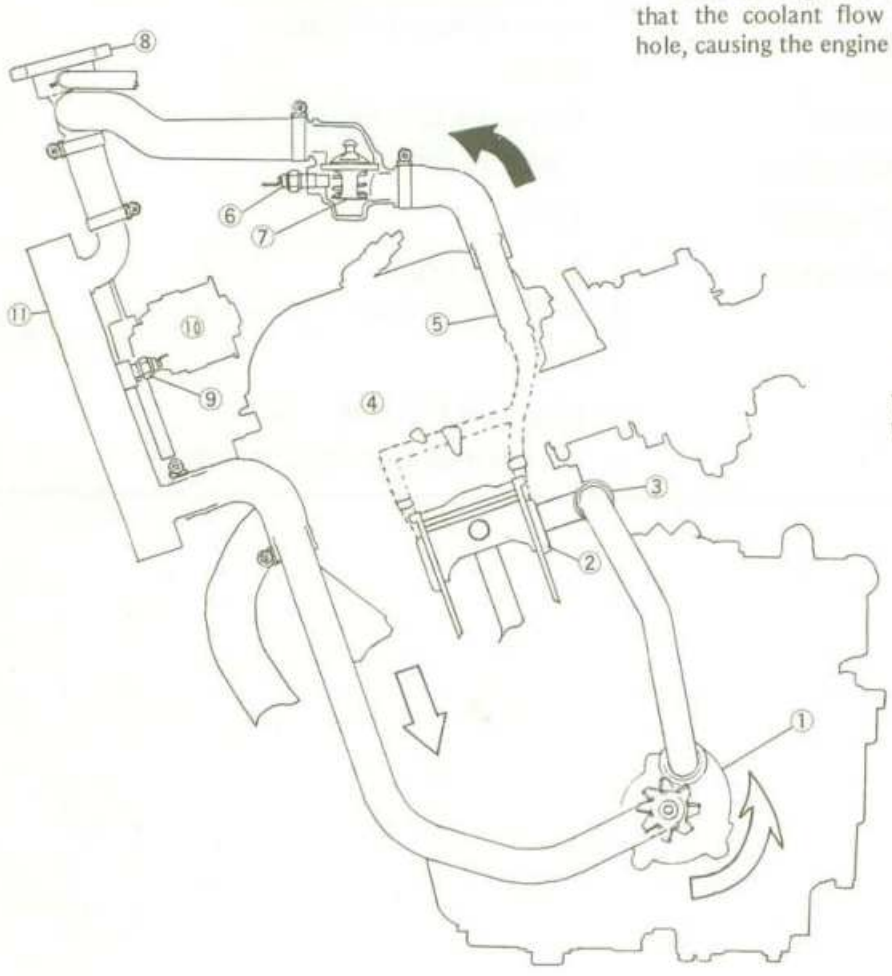
Specifications

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	1.0 L
Radiator Cap:	Relief pressure	93 – 123 kPa (0.95 – 1.25 kg/cm², 14 – 18 psi)
Thermostat:		
Valve opening temperature		63.5 – 66.5°C (146 – 152°F)
Valve full opening lift		not less than 6 mm @80°C (176°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 is very durable.

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



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

Coolant

Coolant Deterioration

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

NOTE

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

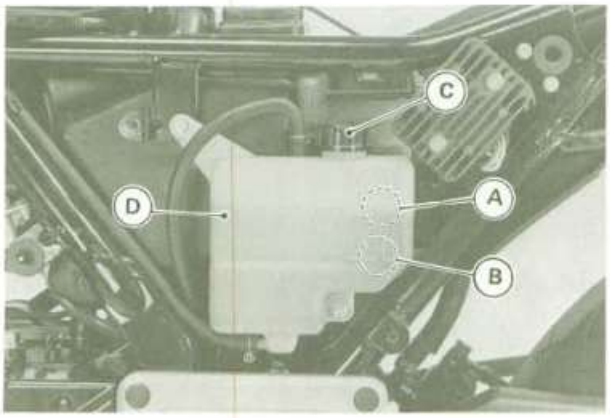
Coolant Level Inspection

- Situate the motorcycle so that it is perpendicular to the ground (on its center stand).
- Remove the seats, left kneegrip Pad, and left side cover.
- 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).

Do not check the level by removing the cap. If the cap is removed, air may get into the coolant, and lower cooling efficiency.



A. FULL Mark
B. LOW Mark
C. Tank Cap
D. Reservoir Tank

★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 Pressure Testing).**

Coolant Draining

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

CAUTION

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

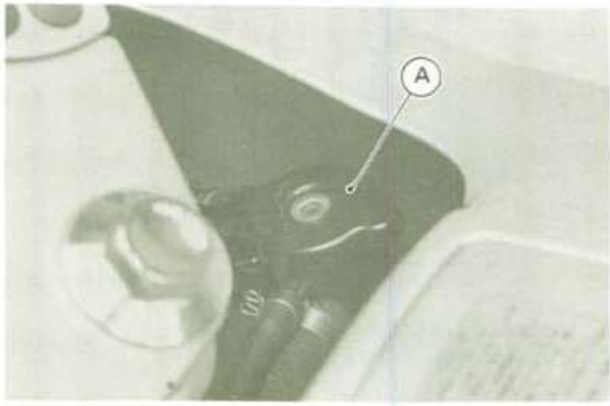
WARNING

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

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

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

●Remove the 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.

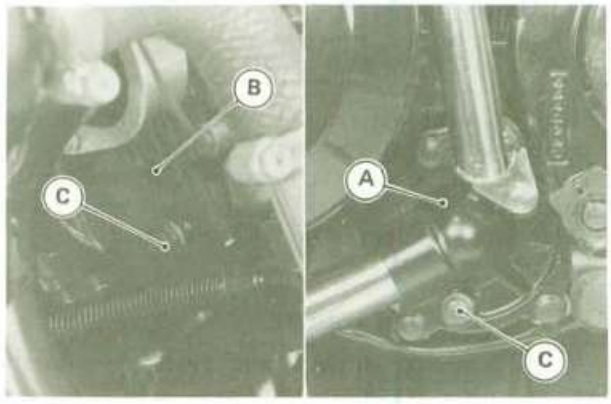


A. Radiator Cap

●Drain the coolant from the radiator and engine by removing the drain plugs at the water pump and front of the cylinder.

NOTE

○*When taking off the drain bolt of water pump, the coolant flows abruptly to the direction of left side. Be careful not to wet your clothes and floor by the coolant.*



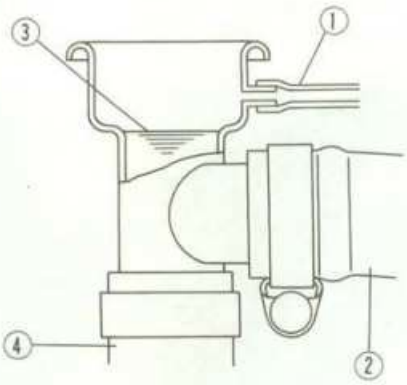
A. Water Pump
B. Cylinder
C. Drain Plugs

●Remove the left side cover.
●Remove the reservoir tank by removing the mounting bolts.
●Unscrew the cap off the reservoir tank, and pour the coolant into a container.
●Inspect the old coolant for color, smell (see Coolant Deterioration).

Coolant Filling

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

Coolant Filling



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

NOTE

○*Pour in the coolant slowly so that it can expel the air from he 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.

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

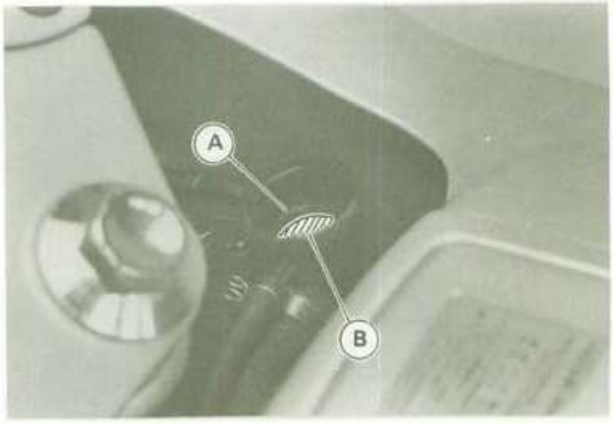
○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

Original Coolant

Type	:	**Permanent type antifreeze for aluminum engine and radiator**
Color	:	**green**
Mixed ratio	:	**soft water 57%, coolant 43 %**
Freezing point	:	**–30°C (–22°F)**
Total amount	:	**1.0 L (up to "Full" mark)**

Air Bleeding

Before putting the motorcycle into operation, any air trapped in the cooling system must be removed as follows.
●Remove the radiator cap.
●Fill the radiator up to the radiator filler neck with coolant.

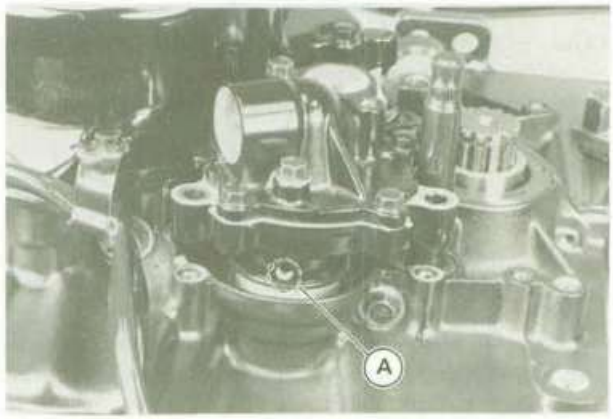


A. Filler Neck B. Coolant Level

●Check the cooling system for leaks.
●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.

Visual Leak Inspection

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



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

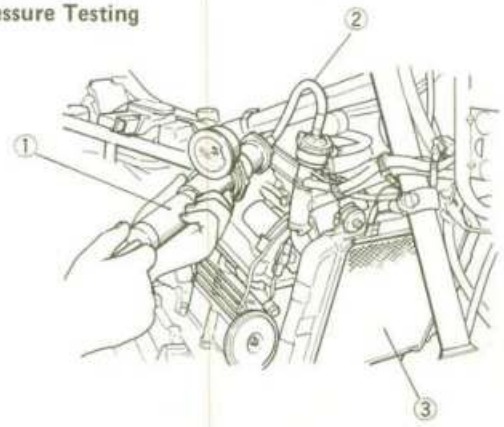
Cooling System Pressure Testing

CAUTION

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

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.
- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
- Build up pressure in the system carefully until the pressure reaches 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.

Pressure Testing



1. Pressure Tester
2. Adapter
3. Radiator

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

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

Flushing

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

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

CAUTION

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

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

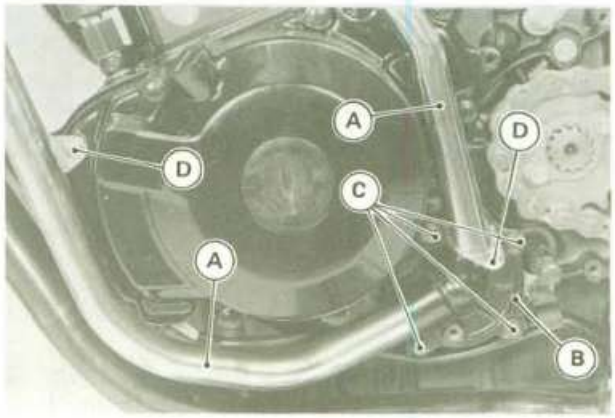
Disassembly and Assembly Precautions

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

Water Pump

Pump Cover Removal

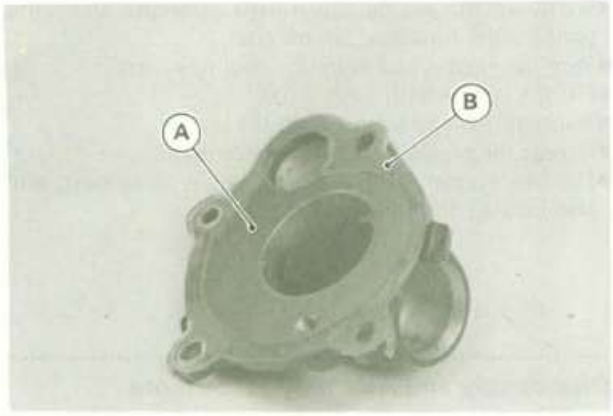
- Drain the coolant by removing the drain plug at the water pump.
- Remove the shift lever bolt and pull the lever out of the shift shaft.
- Remove the engine sprocket cover.
- Remove the Water pipe bolts and pull the pipes off the pump cover.
- Remove the cover bolts and remove the water pump cover.



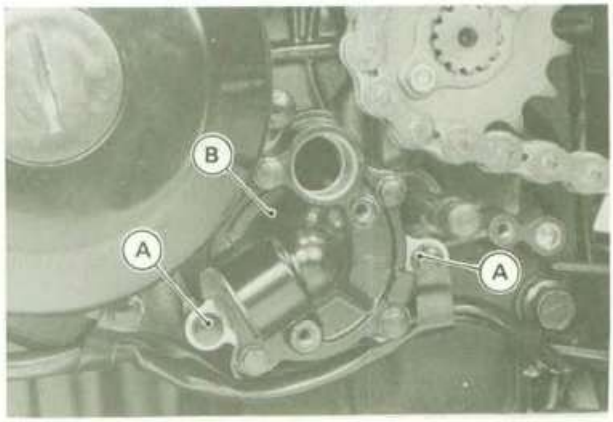
A. Water Pipes
B. Pump Cover
C. Cover Bolts
D. Pipe Bolts

Pump Cover Installation Note

- Replace the pump cover gasket with new one.



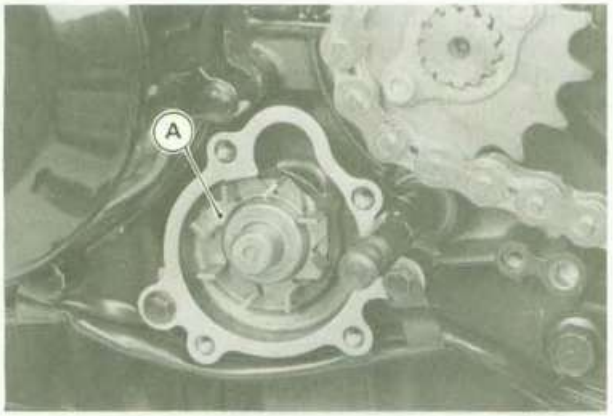
A. Pump Cover --B. Gasket



A. Pump Mounting Bolts B. Water Pump

Pump Impeller Inspection

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



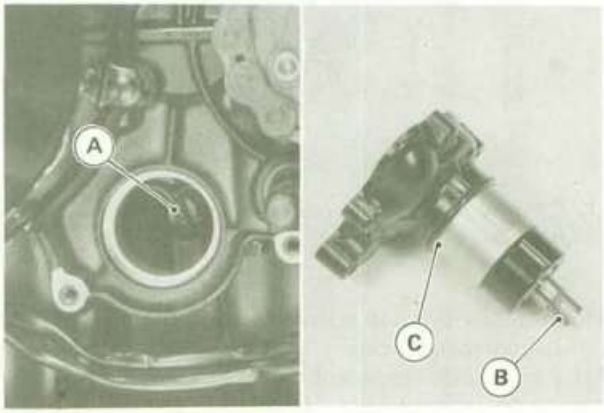
A. Impeller

Water Pump Removal

- Drain the engine oil (see Engine Oil and/or Filter Change in the Engine Lubrication System chapter).
- Drain the coolant.
- Remove the shift lever bolt and pull the lever out of the shift shaft.
- Remove the engine sprocket cover.
- Remove the water pipes from the pump.
- Remove the pump mounting bolts, and pull the pump unit out of the crankcase.

Water Pump Installation Notes

- Check that the O-ring is good condition, and apply a small amount of engine oil to the O-ring.
- Turn the water pump shaft until the slit on the shaft is aligned with the notch on the oil pump shaft in the crankcase.



A. Oil Pump Shaft C. O-ring
B. Water Pump Shaft

Radiator, Radiator Fan

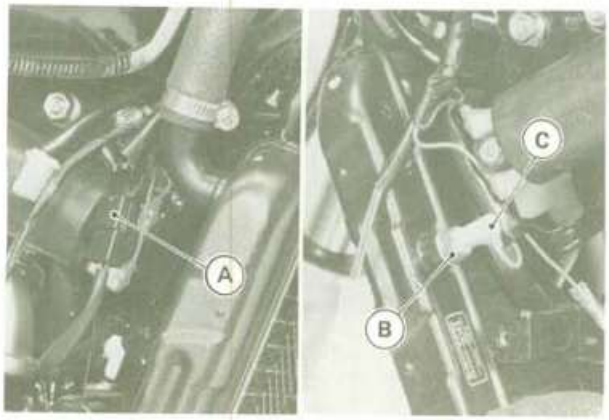
Radiator, Radiator Fan Removal

- Remove the fairing (see Fairing Removal in Frame chapter).
- Remove the fuel tank.
- Drain the coolant.
- Disconnect the fan motor connector before removal of the radiator or radiator fan.

WARNING

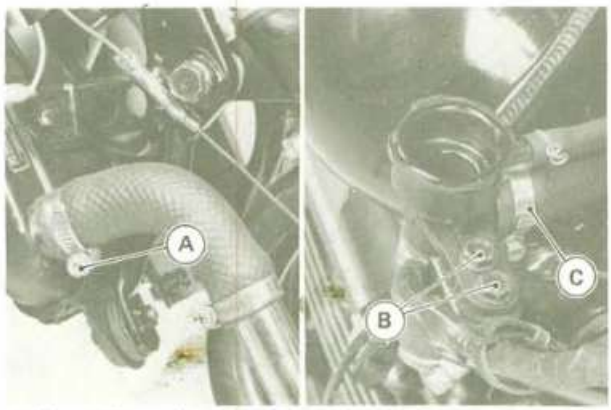
○**The radiator fan and fan switch are connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE ENGINE COMPLETELY**

COOLS OFF. TOUCHING THE FAN BEFORE THE ENGINE COOLS COULD CAUSE INJURY FROM THE FAN BLADES.



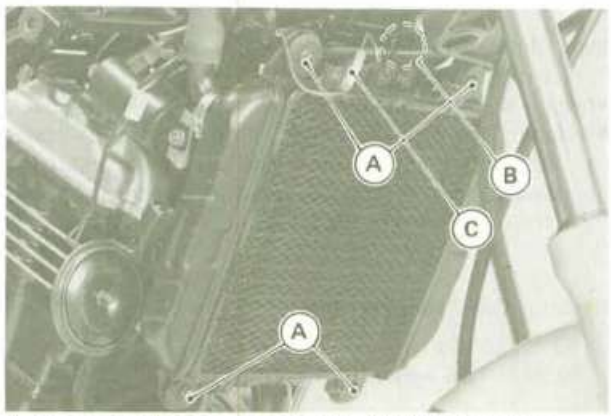
A. Fan Motor Connector
B. Fan Switch
C. Fan Switch Connector

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



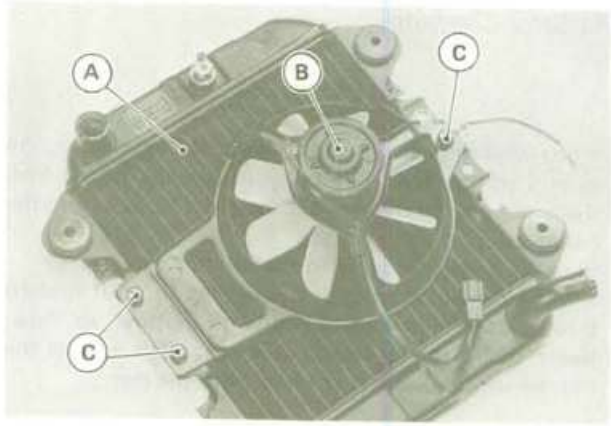
A. Hose Clamp (Left)
B. Filler Mounting Bolts
C. Hose Clamp (Right)

- Remove the bolt and free the clutch cable clamp.
- Disconnect the ground wire connector, then remove the radiator mounting bolts and take the radiator off the frame.



A. Mounting Bolts
B. Cable Clamp
C. Ground Wire Connector

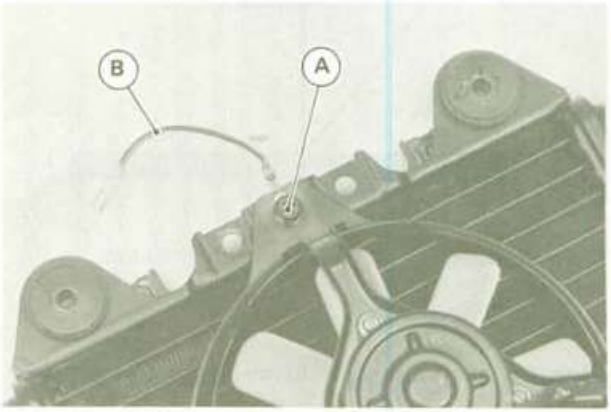
- Separate the filler and radiator hose from the radiator.
- Separate the radiator fan from the radiator.



A. Radiator
B. Radiator Fan
C. Fan Mounting Bolts

Radiator Installation Note

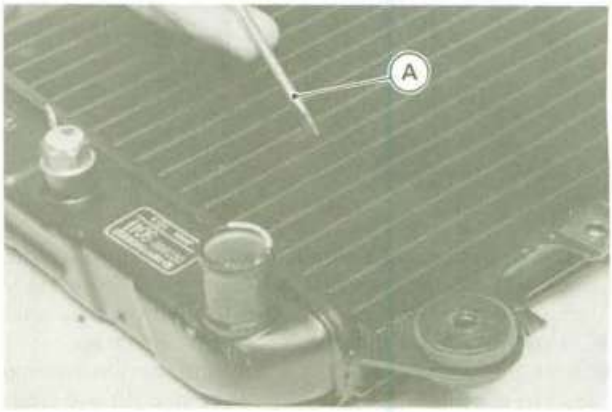
- Be sure to install the fan switch ground wire on the one of the fan mounting bolts.



A. Mounting Bolt
B. 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.

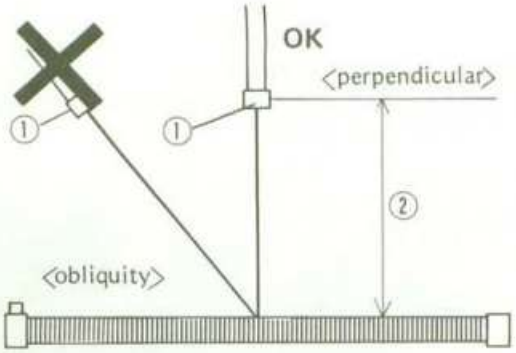


A. Thin Screwdriver

Radiator Cleaning

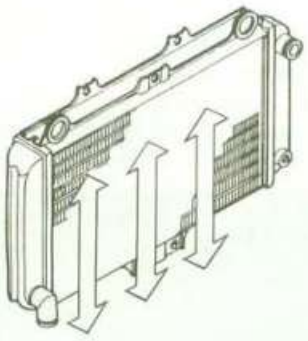
CAUTION

○When cleaning the radiator with steam cleaner, be careful of the following to avoid damage to the fins.
○Keep the air nozzle over 0.5 m (20 in.) away from the radiator.
○Blow air perpendicularly to the radiator core.
○Never blow air at an angle against the fins but straight through them in the direction of natural air flow.
○Never shake the air nozzle at a right angle against the fins, be sure to move it at a level with the fins.

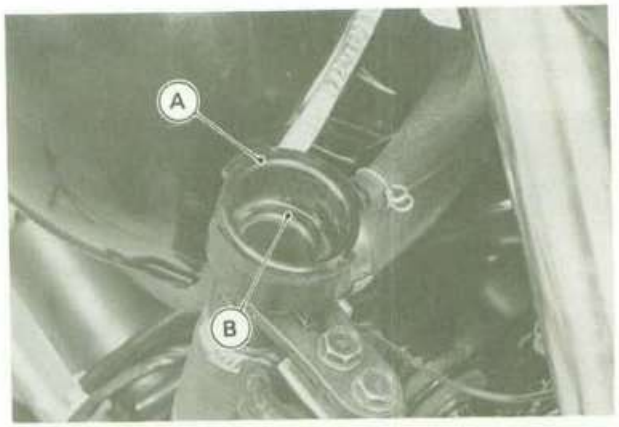


1. Steam Gun
2. More than 50 mm

●Run the gun horizontally following the core fin direction.



★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.
●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.

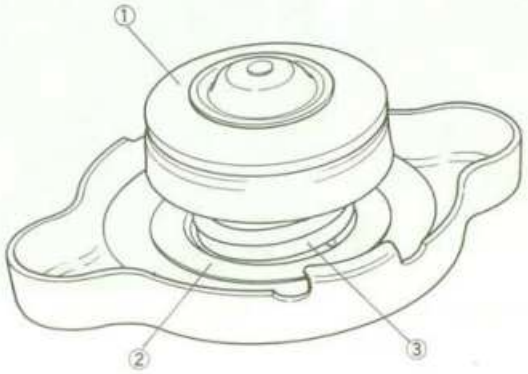


A. Top Sealing Seat B. Bottom Sealing Seat

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.

Radiator Cap



1. Top Seal
2. Bottom Seal
3. Valve Spring

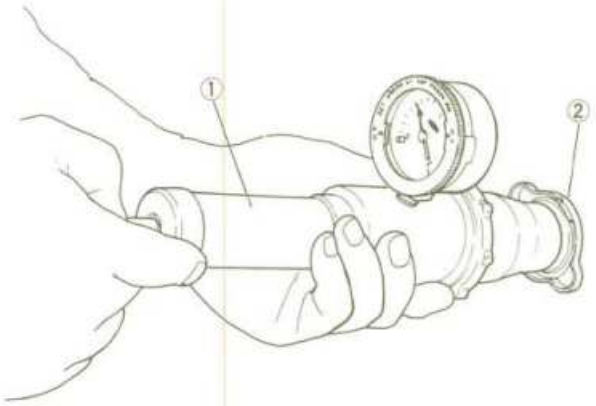
●Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
●Install the cap on a cooling system pressure tester.
●Watching the pressure gauge, pump the pressure tester to build up the pressure. The cap must retain the pressure at least 6 seconds. Also the cap must open at the pressure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

Radiator Cap Relief Pressure

93 ~ 123 kPa
(0.95 ~ 1.25 kg/cm^2, 14 ~ 18 psi)

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

Radiator Cap Testing



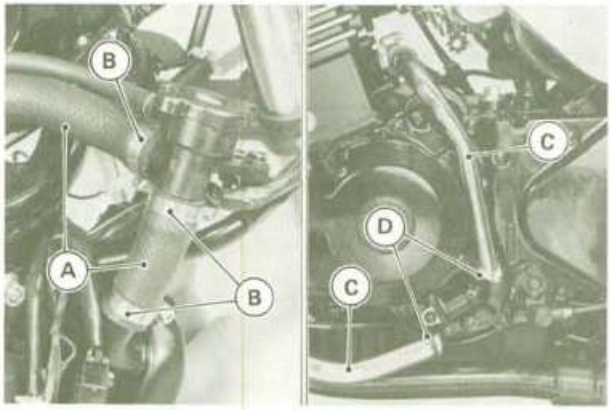
1. Pressure Tester 2. Radiator Cap

Radiator Hose, Reservoir Tank Tube Inspection

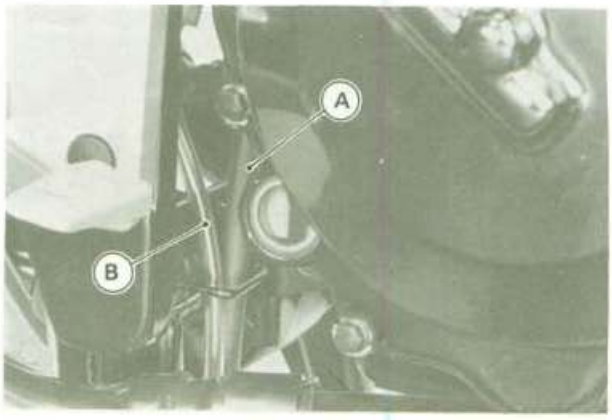
- In accordance with the Periodic Maintenance Chart, visually inspect the hoses and tube for signs of deterioration. Squeeze them. They should not be hard and brittle, nor should they be soft or swollen.
- Replace any damaged parts.

Radiator Hose, Pipes, Reservoir Tank Tube Installation Note

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



A. Radiator Hoses C. Water Pipe
B. Clamps D. O-rings

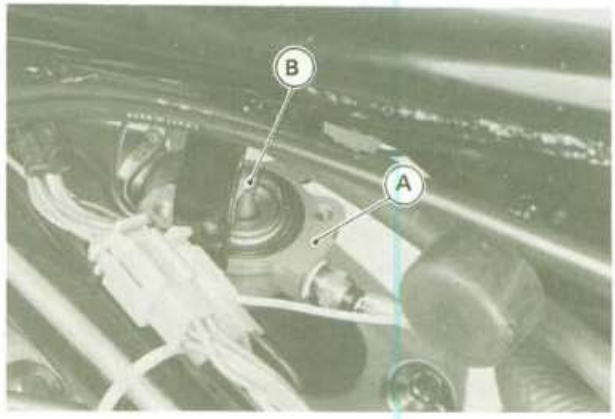


A. Reservoir Tank Tube B. Battery Vent Hose

Thermostat

Thermostat Removal

- Remove the following parts.
  - Seats
  - Fairings
  - Fuel Tank
- Remove the thermostat cover bolts and lift the cover.

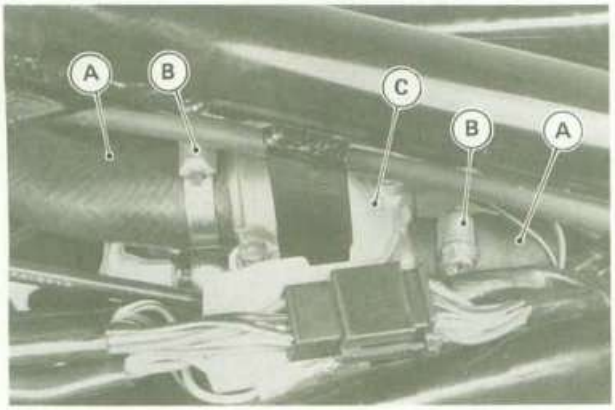


A. Housing B. Thermostat

- Pull out the thermostat from the thermostat housing.

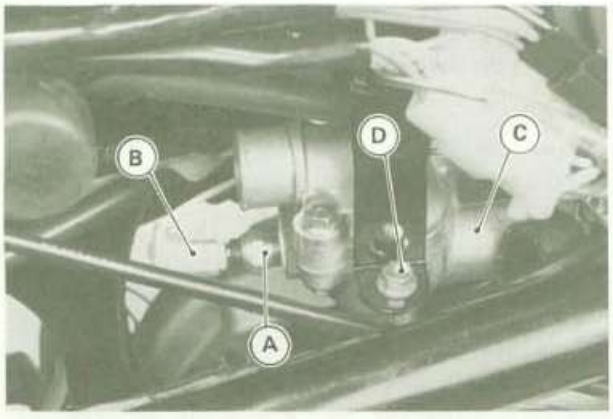
Thermostat Housing Removal

- Drain the coolant.
- Remove the following parts.
  - Seats
  - Fairings
  - Fuel Tank
- Slide the radiator hose clamps out of place. Disconnect the hoses from the thermostat housing and cover.



A. Radiator Hoses
B. Clamps
C. Thermostat Housing

●Disconnect the water temperature sensor connector.



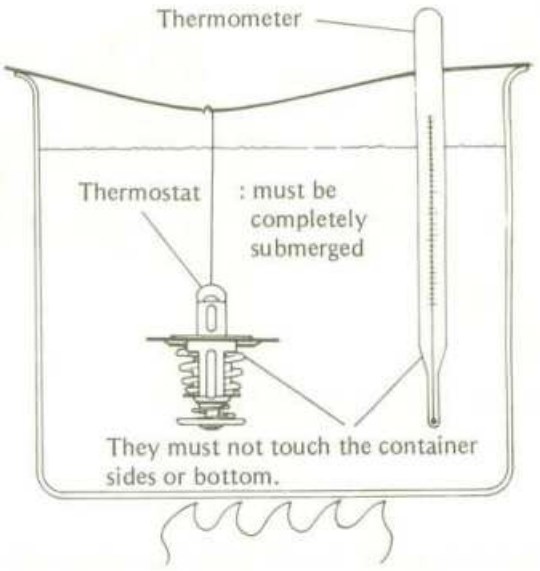
A. Sensor
B. Connector
C. Thermostat Housing
D. Housing Bolts

●Remove the thermostat housing bolts, and pull the housing out of the frame.
●Remove the thermostat cover and pull out the thermostat if necessary.

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
63.5 ~ 66.5° (146 ~ 152°F)

Thermostatic Fan Switches Water Temperature Sensor

Water Temperature Sensor Removal

CAUTION

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

●Remove the thermostat housing (see Thermostat Housing Removal).
●Remove the sensor from the thermostat housing.
●Remove the sensor from the thermostat housing.

Fan Switch Removal

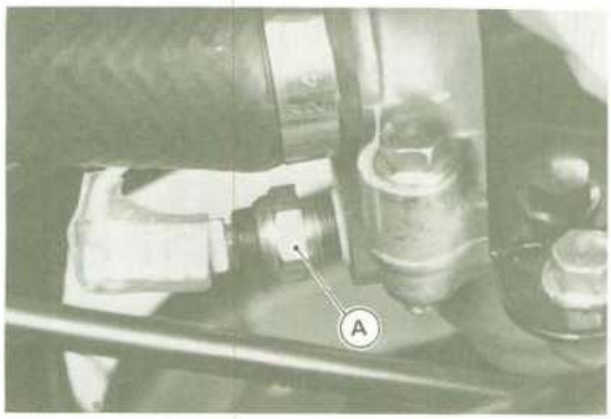
- Drain the coolant.
- Remove the fairing.
- Remove the fan switch connector, then remove the fan switch.

Installation Note

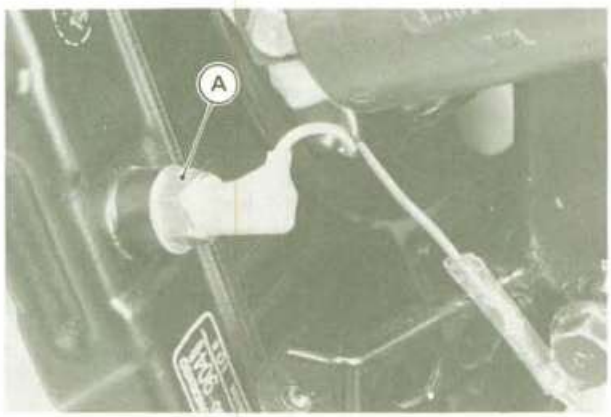
- Apply a liquid gasket compound to the threads before mounting the sensor.
- Tighten the water temperature sensor and the fan switch to the specified torque (see Exploded Viewing).

Inspection

Refer to the Electrical System chapter.



A. Water Temperature Sensor



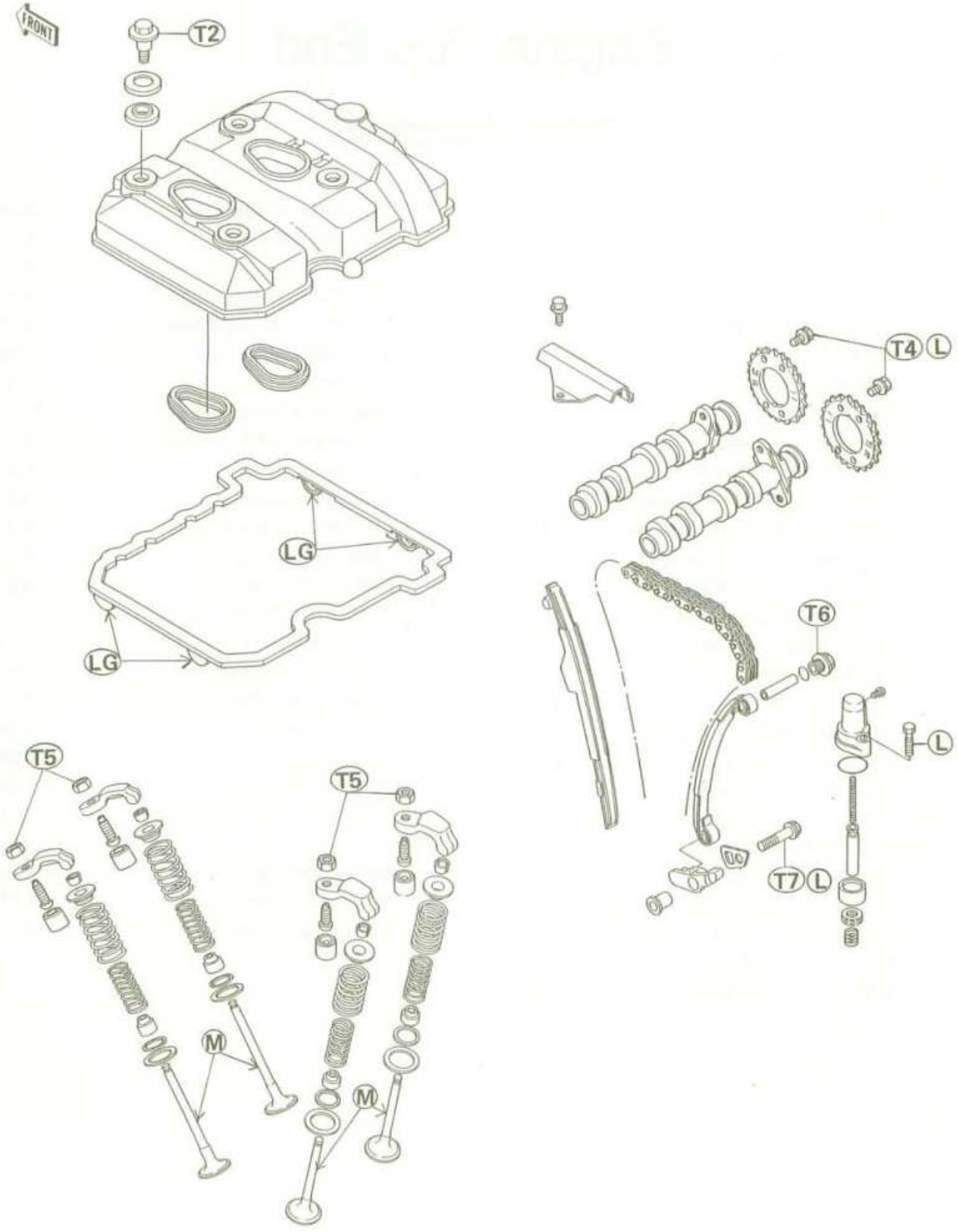
A. Thermostatic Fan Switch

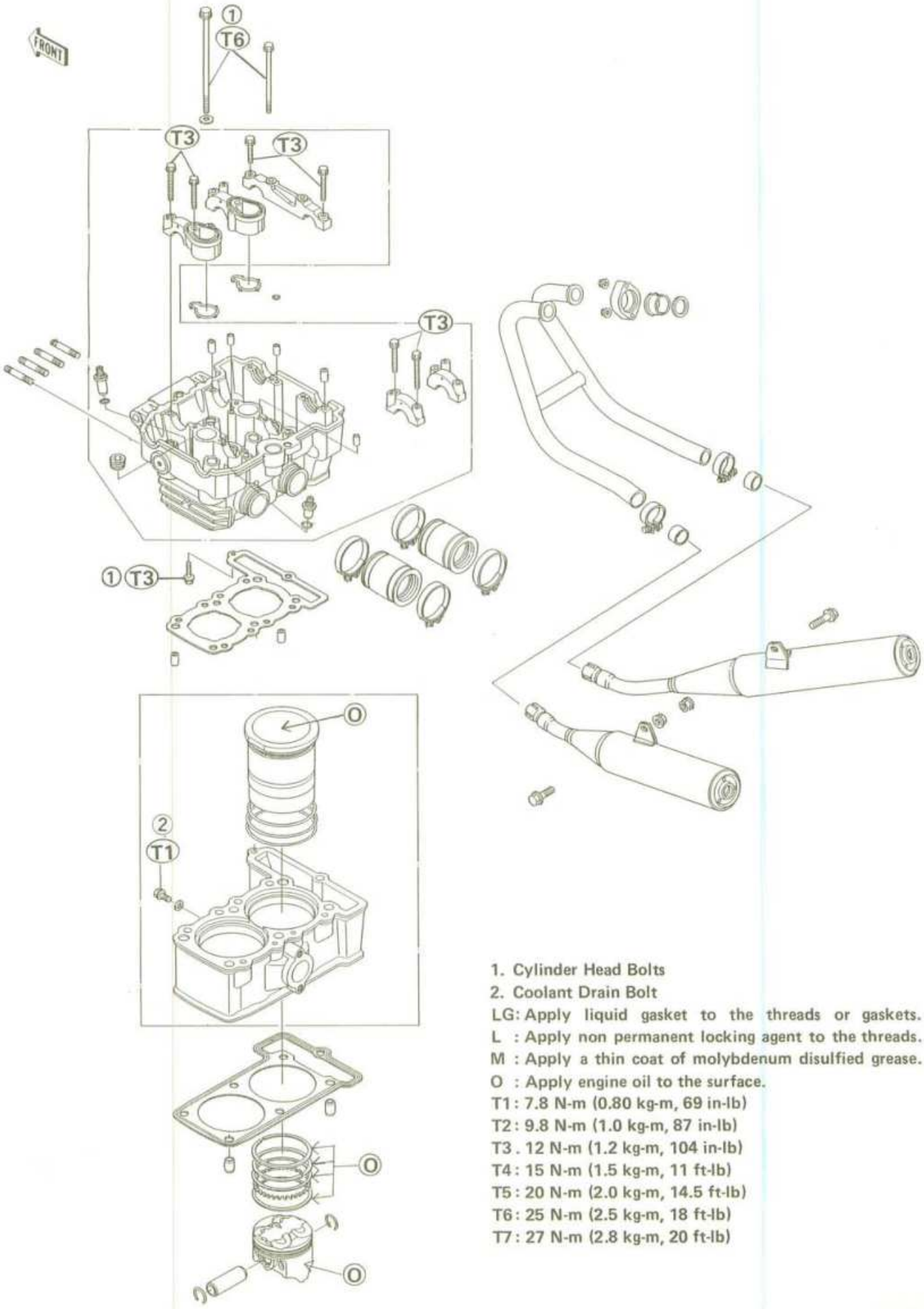
Engine Top End

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Exploded View





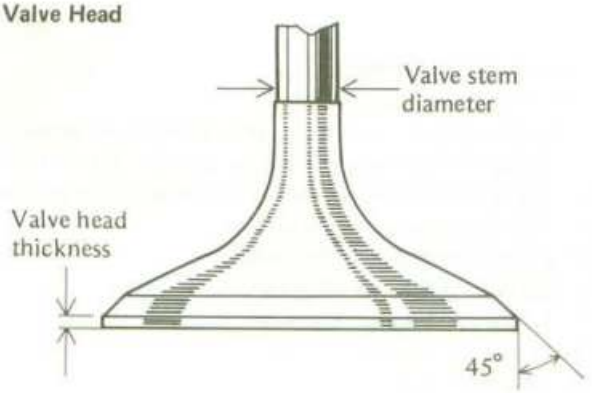
1. Cylinder Head Bolts
2. Coolant Drain Bolt

LG: Apply liquid gasket to the threads or gaskets.
L : Apply non permanent locking agent to the threads.
M : Apply a thin coat of molybdenum disulfied grease.
O : Apply engine oil to the surface.
T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 . 12 N-m (1.2 kg-m, 104 in-lb)
T4 : 15 N-m (1.5 kg-m, 11 ft-lb)
T5 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T6 : 25 N-m (2.5 kg-m, 18 ft-lb)
T7 : 27 N-m (2.8 kg-m, 20 ft-lb)

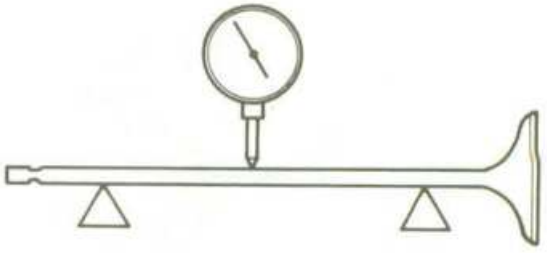
Specifications

Item		Standard	Service Limit
Cylinder Head, Valves:			
Valve clearance:	Inlet	0.08 – 0.13 mm	– – –
	Exhaust	0.11 – 0.16 mm	– – –
Cylinder head warp		– – –	0.05 mm
Valve head thickness:	Inlet	0.65 mm	0.3 mm
	Exhaust	0.80 mm	0.4 mm
Valve stem bend		Less than 0.02 mm TIR	0.05 mm TIR
Valve stem diameter:	Inlet	4.975 – 4.990 mm	4.96 mm
	Exhaust	4.955 – 4.970 mm	4.94 mm
Valve guide inside diameter:	Inlet	5.000 – 5.012 mm	5.08 mm
	Exhaust	5.000 – 5.012 mm	5.08 mm
Valve/Vale guide clearance			
(wobble method):	Inlet	0.03 – 0.10 mm	0.24 mm
	Exhaust	0.08 – 0.15 mm	0.29 mm
Valve seating surface:			
Outside diameter	Inlet	22.9 – 23.1 mm	– – –
	Exhaust	20.3 – 20.5 mm	– – –
Width	Inlet	0.5 – 1.0 mm	– – –
	Exhaust	0.5 – 1.0 mm	– – –
Valve spring free length:	Inner	31.8 mm	30.1 mm
	Outer	36.4 mm	34.9 mm
Valve seat cutting angle:			
	Inlet, Exhaust	32°, 45°, 67.5°	– – –

Valve Head

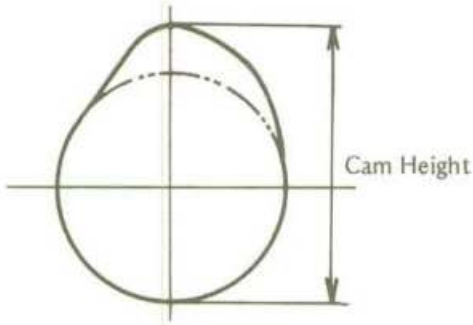


Valve Stem Bend

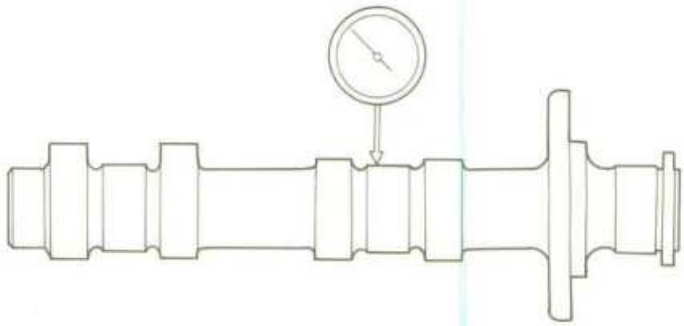


Item		Standard	Service Limit
Camshaft:			
Cam height	Inlet, Exhaust	32.229 – 32.370 mm	32.13 mm
Camshaft journal diameter		23.950 – 23.970 mm	23.92 mm
Camshaft bearing inside diameter		24.000 – 24.021 mm	24.8 mm
Camshaft runout		not more than 0.02 mm TIR	0.1 mm TIR
Camshaft chain 20-link length		127.0 – 127.4 mm	128.9 mm
Cylinder Compression:		(usable range) 960 kPa – 1,470 kPa @470 r/min (rpm) (9.8 – 15.0 kg/cm² 139 – 213 psi)	
Cylinder Block, Piston:			
Cylinder inside diameter		62.000 – 62.012 mm	62.10 mm
Piston diameter		61.942 – 61.957 mm	61.80 mm
Piston/cylinder clearance		0.043 – 0.070 mm	– – –
Oversize piston and rings		+0.5 mm and +1.0 mm	– – –
Piston ring/groove clearance			
	Top, Second	0.02 – 0.06 mm	0.16 mm
Piston ring groove width	Top, Second	0.81 – 0.83 mm	0.91 mm
	Oil	2.01 – 2.03 mm	2.11 mm
Piston ring thickness	Top, Second	0.77 – 0.79 mm	0.70 mm
Piston ring end gap	Top, Second	0.30 – 0.45 mm	0.80 mm
	Oil	0.2 – 0.8 mm	1.10 mm

Cam Height Measurement



Camshaft Runout



Special Tools

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

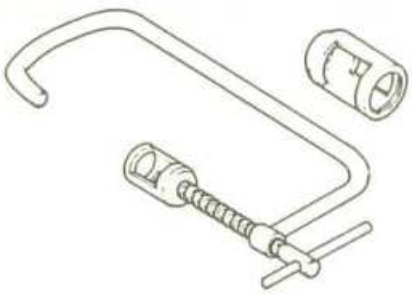
Piston Base: 57001-149



Compression Gauge: 57001-221
Adapter: 57001-1255
Gasket: 57001-1224



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



Valve Guide Arbor: 57001-1203



Valve Guide Reamer: 57001-1204



Cutter Holder ϕ5 mm: 57001-1208



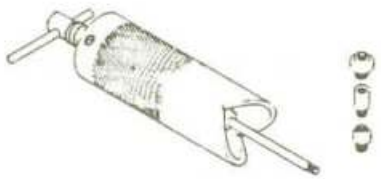
Bar: 57001-1128



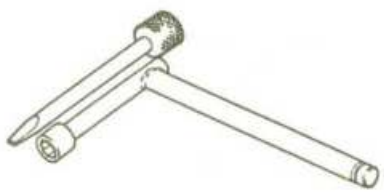
Valve Seat Cutters:
(45° ~ ϕ24.5: 57001-1113)
(32° ~ ϕ25: 57001-1118)
(32° ~ ϕ22: 57001-1206)
(67.5° ~ ϕ22: 57001-1207)



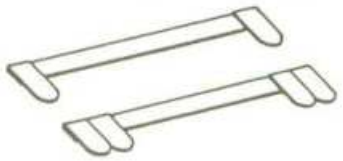
Piston Pin Puller Assembly: 57001-910



Valve Adjusting Screw Adjuster: 57001-1220



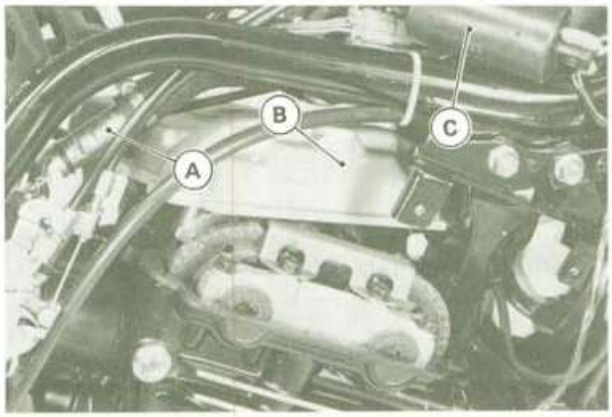
Thickness Gauge Set: 57001-1221



Cylinder Head Cover

Cylinder Head Cover Removal

- Coolant Draining (see Coolant Draining in Cooling chapter).
- Remove the seats and kneegrip covers.
- Remove the fuel tank (see Fuel Tank Removal in Fuel System chapter).
- Remove the bolts and take the ignition coils off the bracket.
- Remove the cylinder head cover bolts, and lift the head cover.
- Pull the water pipe out of the cylinder head.

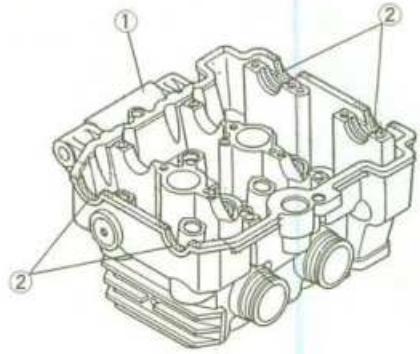


A. Water Pipe
B. Cylinder Head Cover
C. Ignition Coil

Cylinder Head Cover Installation Notes

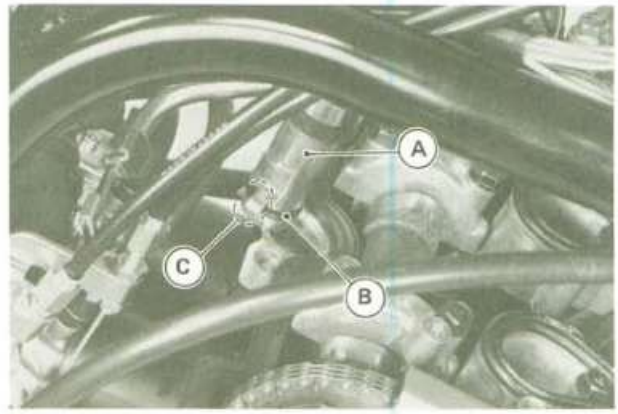
- Replace the headcover gasket with a new one, if it is damaged.
- Stick the gaskets partially to the cover with a liquid gasket for installation convenience.
- Apply a liquid gasket as shown in the figure below.

Liquid Gasket Applied Area



1. Cylinder Head
2. Liquid Gasket Applied Area

- Check that the O-ring is good condition, and install the water pipe as shown.



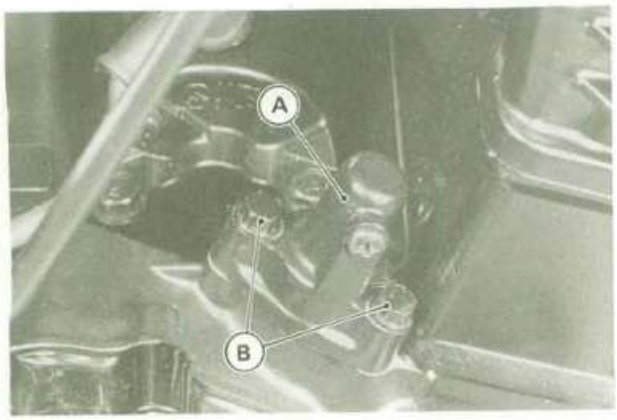
A. Water Pipe
B. O-ring
C. Hook

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

Camshaft Chain Tensioner

Chain Tensioner Removal

- Remove the right hand kneegrip pad.
- Remove the tensioner mounting bolts and take out the chain tensioner.



A. Tensioner B. Mounting Bolts

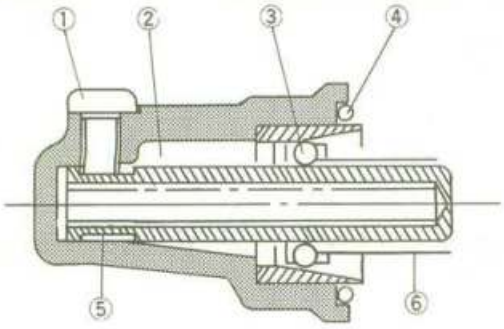
CAUTION

○Do not turn the engine while the camshaft chain tensioner is removed. Engine damage could result.

Chain Tensioner Installation

- ●Loosen the lock screw, and screw out about 2 mm.
- ●Drop the ball and retainer assembly onto the push rod.
- ●Push the push rod up into the tensioner body held vertically.
- ●When the push rod is in as far as it will go, turn in the lock screw.

Chain Tensioner



1. Lock Screw
2. Push Rod
3. Ball and Retainer Assembly
4. O-ring
5. Spring (Tensioner)
6. Spring (Ball and Retainer)

- ●Be sure the O-ring is in place in the tensioner body.
- ●Install the tensioner to the crankcase.
- ●After installation of the tensioner, unscrew the lock screw about 2 mm and then tighten it. With the bolt loose, the stiff spring inside takes up any slack automatically.

Camshaft Chain Tensioner Disassembly

- ●Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- ●Remove the spring (Ball and Retainer).
- ●Remove the screw locking the push rod in place.
- ●Carefully pull the push rod out of the tensioner body. Do not drop the ball and retainer assembly.
- ●Slide the ball and retainer assembly and the spring (Tensioner) off the push rod.

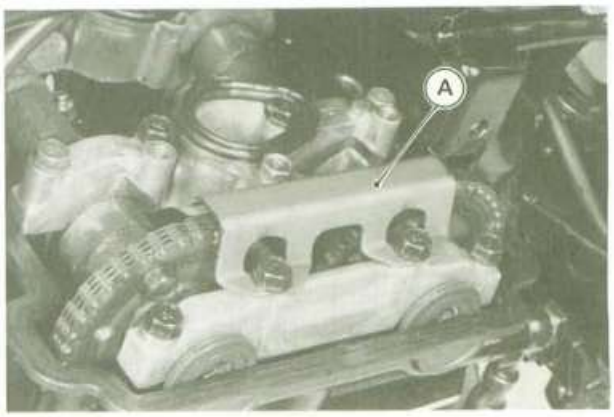
Camshaft Chain Tensioner Assembly

- ●Slip the spring (Tensioner) into the push rod and compress it down full stroke.
- ●Turn in the lock screw.
- ●Drop the ball and retainer assembly onto the push rod, and slip the spring (Ball and Retainer) over the push rod.

Camshaft, Camshaft Chain, Rocker Arm

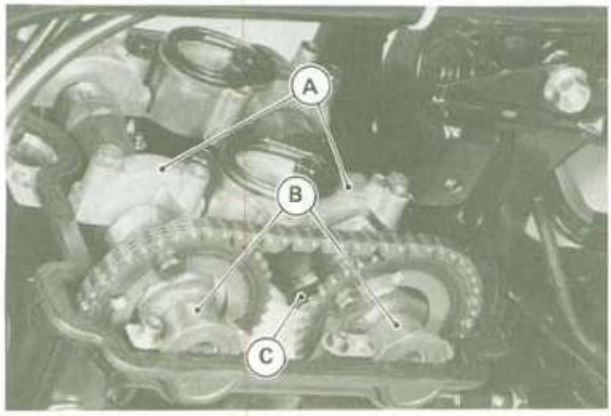
Camshaft, Rocker Arm Removal

- ●Remove the cylinder head cover (see Cylinder Head Cover Removal).
- ●Position the crankshaft (cam is not push the valve) at following.
- ○Turn the crankshaft counterclockwise while watching the movement of the #2 cylinder's inlet valves.
- ○When the valves have just finished opening and closing (moving downwards and returning upwards).
- ○Turn the crankshaft in the same direction until the "2T" mark on the alternator rotor is aligned with the notch in the inspection window in the alternator cover (Compression Stroke TDC).
- ○Turn the crankshaft clockwise about 90°.
- ●Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- ●Remove the camshaft top chain guide bolts, and remove the guide.



A. Top Chain Guide

●Remove the camshaft cap bolts, and remove the caps and camshafts.
○Cover the chain tunnel with a clean cloth.



A. Camshaft Caps
B. Camshafts
C. Rocker Arms

●Pick the rocker arms off the cylinder head.
○Mark the each rocker arms original rocation.

NOTE

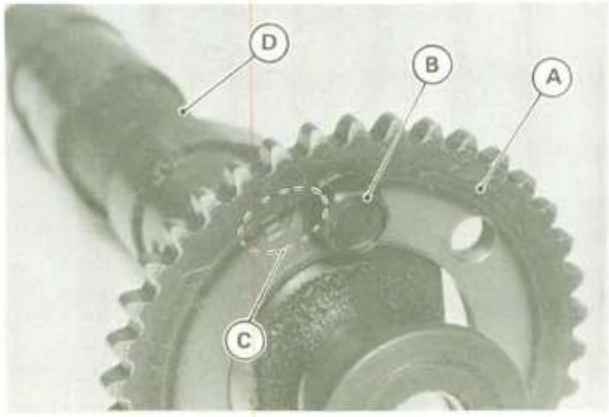
○*Do not drop the rocker arm in the chain tunnel at the cylinder head.*

Camshaft Installation (Including Chain Timing Procedure)

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

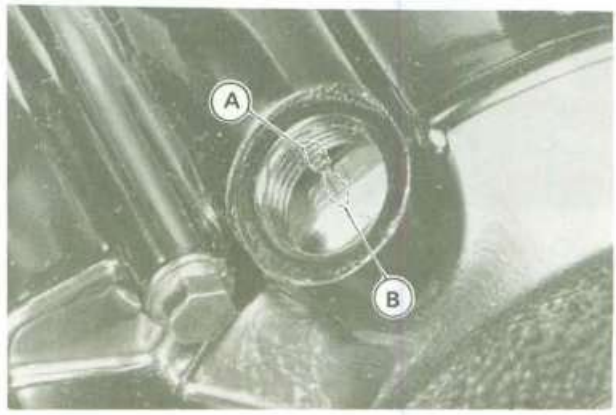
NOTE

○*The exhaust camshaft is installed EX mark on the sprocket and inlet camshaft is IN mark.*



A. Camshaft Sprocket
B. Bolt
C. Mark
D. EX Camshaft

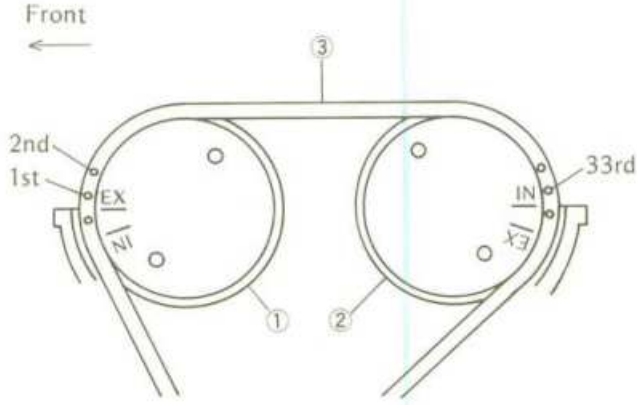
●Apply engine oil to the camshaft cap.
●Check crankshaft position to see that the Number 2 piston is still at TDC, and readjust if necessary, engage the camshaft chain with the camshaft sprockets as shown.



A. Timing Mark (Notch)
B. TDC Mark (Number 2 Piston)

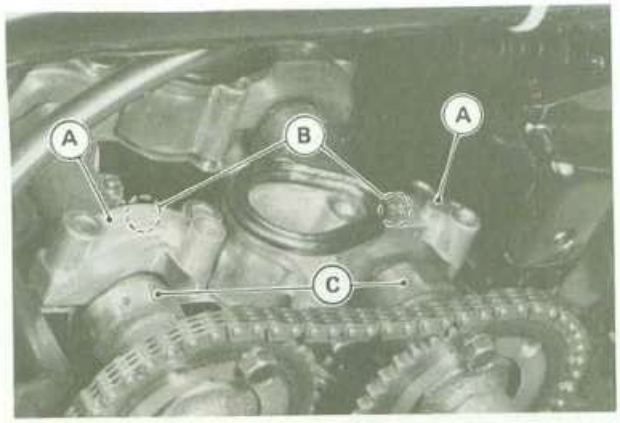
●Pull the tension side (exhaust side) of the chain taut and install the chain on the sprocket.
○Position the camshaft sprockets so that the timing marks align with the cylinder head gasket surface as shown.

Camshaft Chain Timing



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

○Count the camshaft chain link pin's as shown to verify that the sprockets are positioned correctly.
●Install the camshaft caps in the correct locations as shown in the figure below. Location numbers are marked on the each cap.



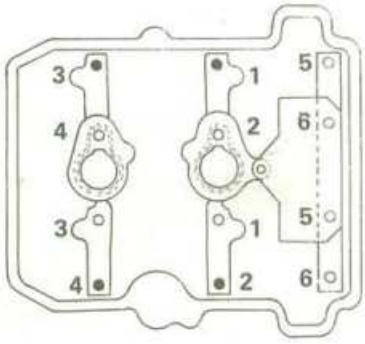
A. Camshaft Caps
B. Location Numbers
C. Camshafts

CAUTION

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

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

Camshaft Cap Bolts Tightening Order



●M6 x 46 mm Bolts

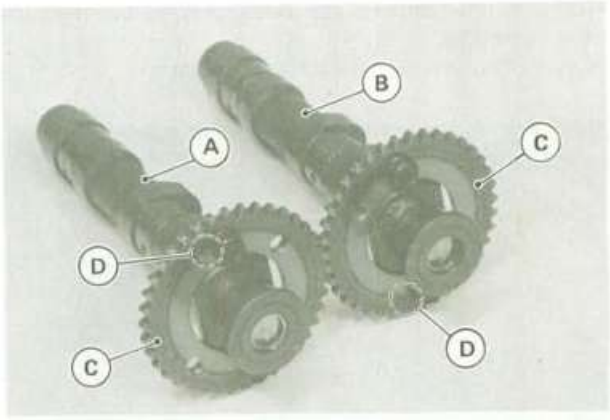
Camshaft and Sprocket Assembly Notes

●The inlet and exhaust sprockets, and the inlet and exhaust camshafts are identical.

●Both sprockets should be installed with the side of the mark facing the right side of the engine, and for the exhaust shaft align the EX mark on its sprocket with the camshaft bolt hole and for inlet shaft, align the IN mark on the other sprocket with it shaft bolt hole.

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

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

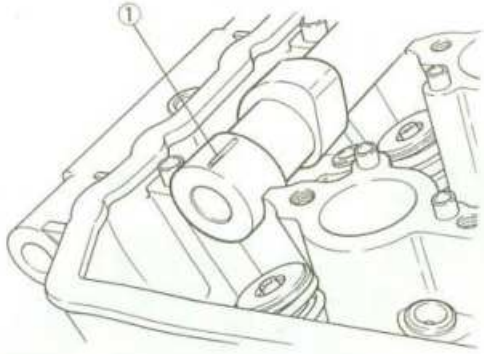


A. EX Camshaft
B. IN Camshaft
C. Camshaft Sprockets
D. IN and EX Marks

Camshaft Oil Clearance Inspection

The journal wear is measured using platigage (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.



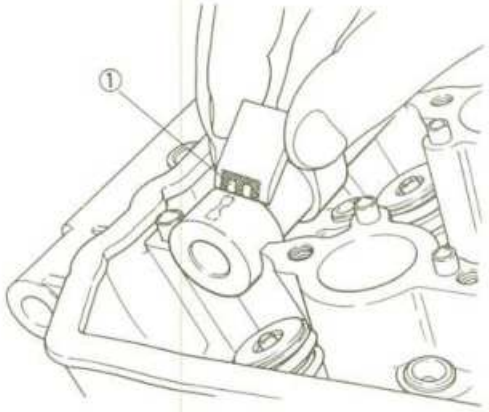
1. Plastigage Strip

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

NOTE

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

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



1. Plastigage width Measurement

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

Camshaft Bearing Oil Clearance:

Standard:	**0.030 ~ 0.071 mm**
Service Limit:	**0.16 mm**

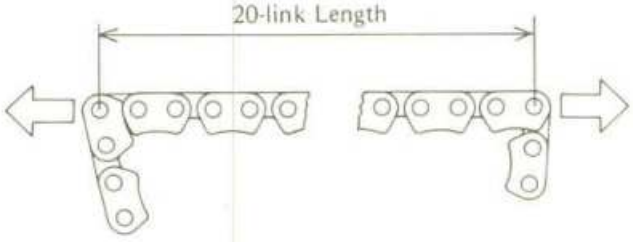
Camshaft Chain Wear

●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



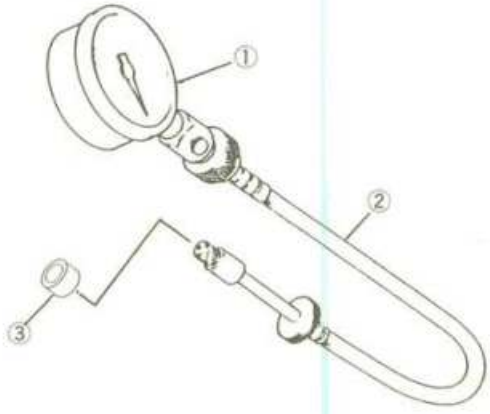
1. Rubber
2. Front Chain Guide
3. Rear Chain Guide

Cylinder Head

Compression Measurement

●Thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.
●Stop the engine, remove the spark plugs, and fuel tank, and attach compression gauge (special tool) dirmly into the spark plug hole.

Compression Gauge



1. Compression Gauge: 57001-221
2. Adapter: 57001-1255
3. Gasket: 57001-1224

●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)

961 ~ 1,471 kPa, 470 r/min (rpm)
(9.8 ~ 15.0 kg/cm², 139 ~ 213 psi)

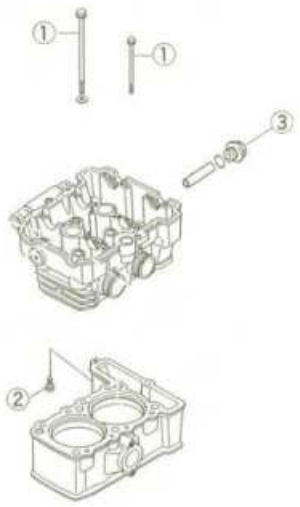
★If cylinder compression is higher than hte standard value, check the following;
1. Carbon build-up on the piston on the piston head and cylinder head.
   – clean off any carbon on the piston head and cylinder head.
2. Cylinder head gasket, cylinder base gasket – use only the proper gaskets for the cylinder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

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

Cylinder Head Removal

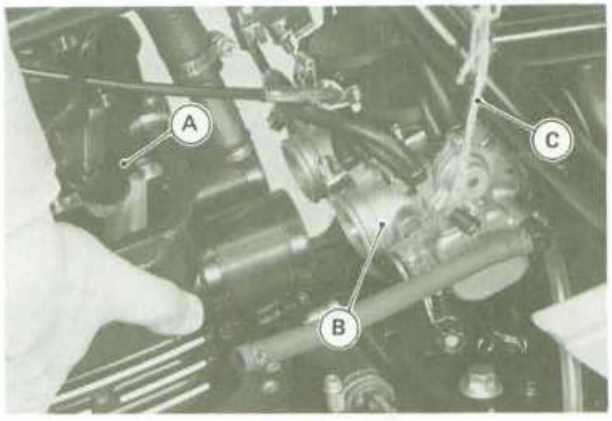
●Remove the following parts.
Fairing (see Fairing Removal in Frame chapter)
Coolant Draining (see Coolant Draining in Cooling System chapter)
Ful Tank (see Fuel Tank Removal in Fuel System chapter)
Radiator (see Radiator, Radiator Fan Removal in Cooling System chapter)
Muffler (see Muffler Removal)
Camshaft Chain Tensioner
Left and Right Engine Bracket with Ignition Coils
●Remove the thrmostat housing bolts, and free the housing.
●Remove the cylinder head cover.
●Remove the camshaft.
●Remove the rear camshaft chain guide bolt (upper), and take the guide off the cylinder head.
●Pull the front camshaft chain guide off the cylinder head.
●Remove the cylinder head bolts.

Cylinder Head Installation



1. Cylinder Head Bolts (φ6 mm)
2. Cylinder Head Bolts (φ8 mm)
3. Chain Guide Bolt (Upper)

●Remove the oil hose banjo bolt.
●Before removing the cylinder head, hold the carburetor to the air cleaner duct with a strings.
●Pull off the cylinder head, and remove the cylinder head gasket.

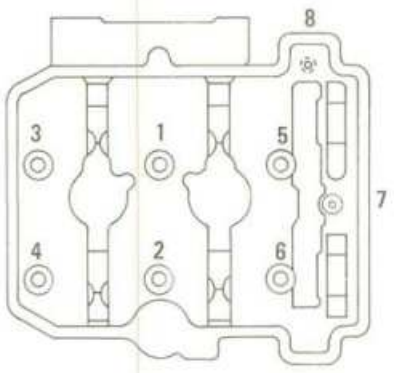


A. Cylinder Head
B. Carburetor
C. Strings

Cylinder Head Installation Notes

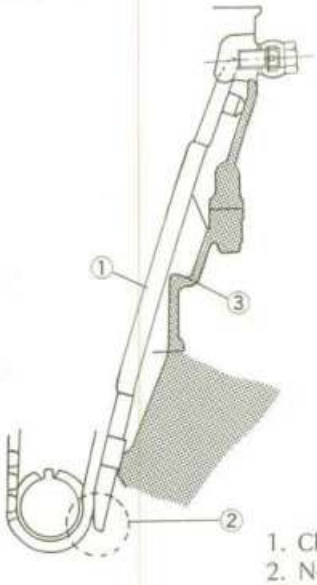
●When installing the cylinder head, be careful of the following items.
○Replace the cylinder head gasket with a new one.
○Tighten the cylinder head bolts (φ8) and (φ6) to the specified torque (see Exploded View).

Cylinder Head Bolts Tightening Order



○After cylinder head installation, install the front camshaft chain guide as shown.

Chain Guide Installation



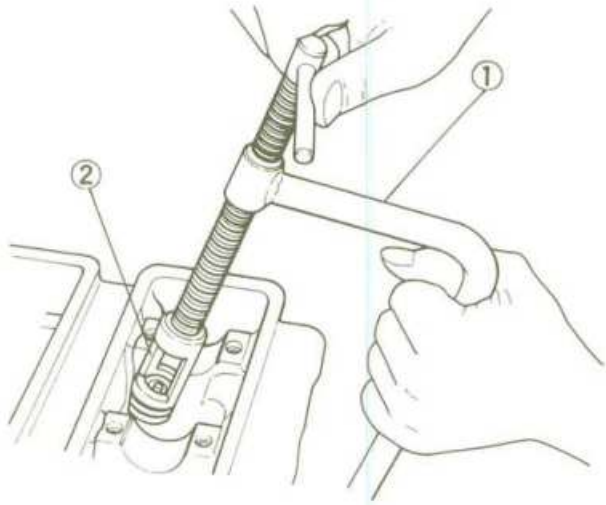
1. Chain Guide
2. No Slack
3. Fit hear

○Tighten the rear camshaft chain guide bolt (upper) to the specified torque (see Exploded View).
○Tighten the oil hose banjo bolt to the specified torque (see Exploded View).

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

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

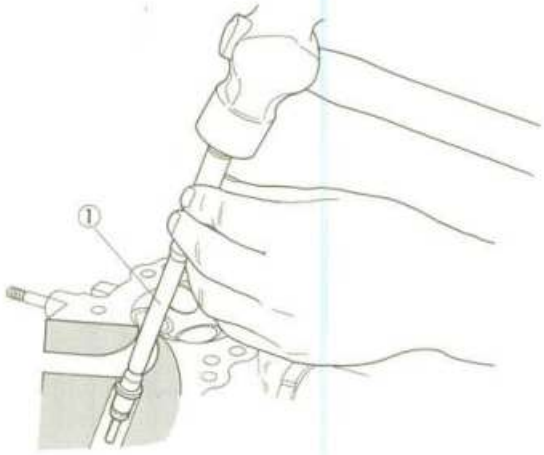
Valve Spring Removal



1. Valve Spring Compressor Assembly: 57001-241
2. Adapter: 57001-1202

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

Valve Guide Removal



1. Valve Guide Arbor: 57001-1203

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

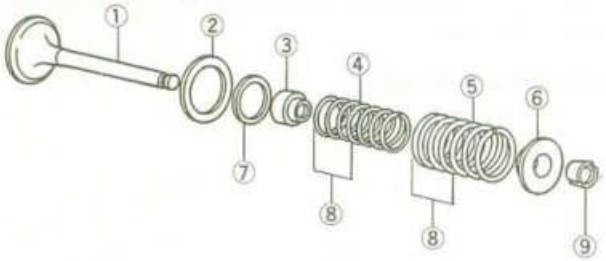
Valve Guide Reamer



1. Valve Guide Reamer: 57001-1204

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

Valve and Springs

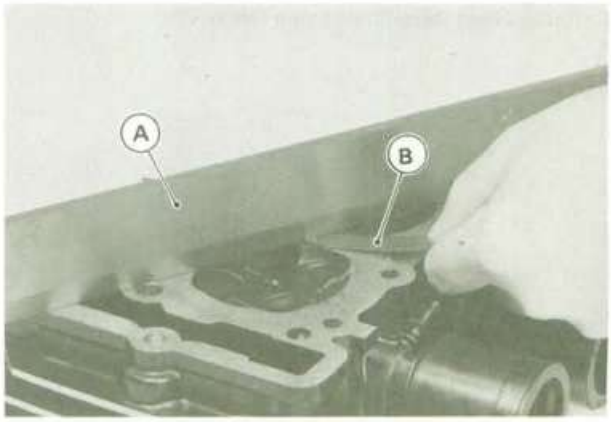


1. Valve Stem
2. Spring Seat
3. Oil Seal
4. Inner Spring
5. Outer Spring
6. Valve Spring Retainer
7. Spring Seat
8. Closed End Coil
9. Split Keeper

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

Cylinder Head Warp

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



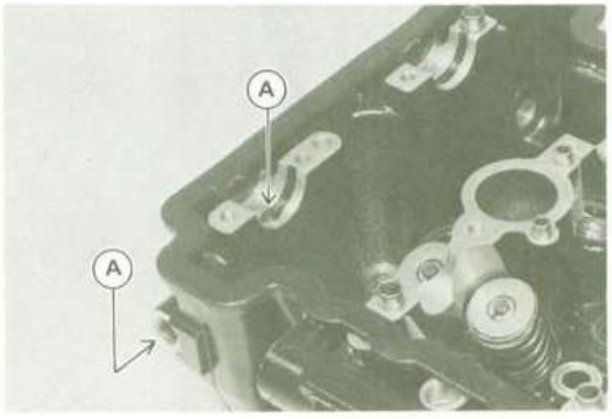
A. Straightedge B. Thickness Gauge

Cylinder Head Warp

Service Limit:	**0.05 mm**

Cylinder Head Cleaning

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



A. Oil Passage

Valves

Valve Clearance Inspection

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

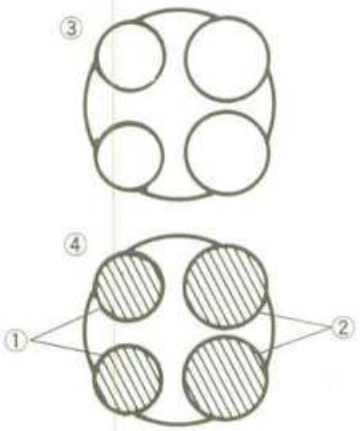
●Remove the following parts.
Coolant Draining
Fairings
Fuel Tank
Radiator and Fan Motor
Right Hand Ignition Coil
Cylinder Head Cover
Alternator Cover Plugs

●Using a wrench on the crankshaft rotation bolt, turn the crankshaft counterclockwise until a TDC mark (Compression Stroke) on the rotor is aligned with the timing mark in the inspection window.

○Watching the movement of the Number 1 (left side) cylinder's inlet valve.

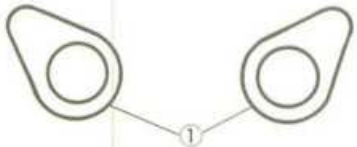
○When the valves have just finished opening and closing (moving downwards and returning upwards), turn the crankshaft in the same direction until the "1T" mark on the alternator rotor is aligned with the notch in the inspection window in the alternator cover.

Measuring Valves



1. Exhaust Valves
2. Inlet Valves
3. Number 2 Cylinder
4. Number 1 Cylinder

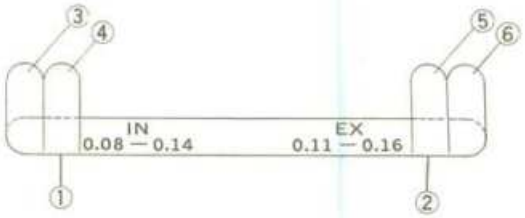
Camshaft Position



1. Number 1 Cylinder's Camshafts

●Measure the clearance of Number 1 cylinder's inlet valves by inserting a thickness gauge (special tool: limit gauge) enough between the cam lobe and rocker arm.

Thickness Gauge: 57001-1221 Limit Gauge



1. For Inlet Valve Inspection
2. For Exhaust Valve Inspection
3. GO End
4. NO-GO End
5. NO-GO End
6. GO End

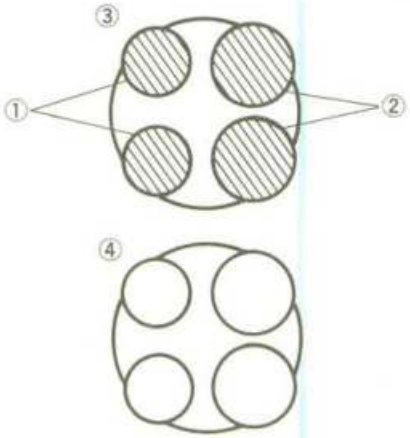
○When the "GO" end of the gauge will fit not but not the "NO-GO" end, the valve clearance is correct.

●After adjusting the Number 1 cylinder inlet valves, measure the exhaust valves in the same manner.

●Turn the crankshaft 180° counterclockwise until the inspection window projection on the alternator cover aligns with the "2T" mark on the alternator rotor.

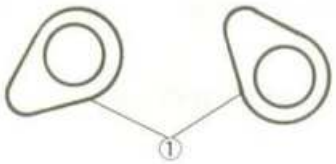
●Measure the Number 2 cylinder's inlet and exhaust valve clearances in the same manner as for the first cylinder.

Measuring Valves



1. Exhaust Valves
2. Inlet Valves
3. Number 2 Cylinder
4. Number 1 Cylinder

Camshaft Position

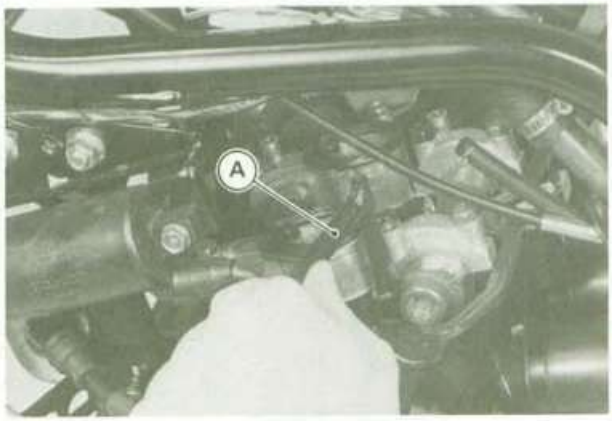


1. Number 1 Cylinder s Camshafts

★If the valve clearance is incorrect, the valve clearance must be adjusted.

Valve Clearance Adjustment

●Loosen the valve adjusting screw locknut by using the valve adjuster (special tool).



A. Valve Adjuster: 57001-1220

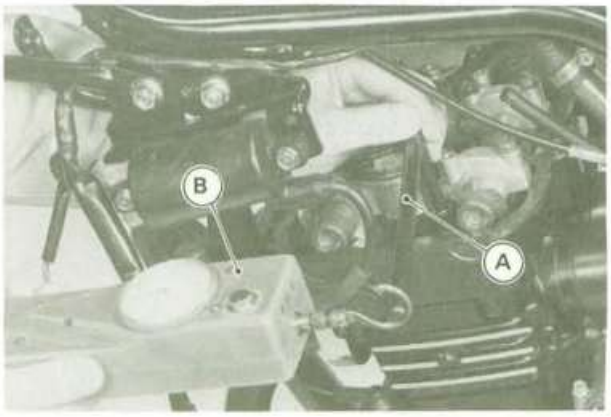
●Inspect the adjust gauge (special tool) between the cam lobe and the locker arm.
●Turn the adjusting screw until the gauge drags in the clearance.

Thickness Gauge: 57001-1221 Adjust Gauge



1. For Inlet Valve Adjustment
2. For Exhaust Valve Adjustment

●Tighten the locknut by the valve adjuster temporary.
●Tighten the locknut to the specified torque (13 kg Force) while preventing the adjusting screw from revolving with the locknut by using a push-pull gauge.



A. Valve Adjuster B. Push-Pull Gauge

●Reinstall the removing parts.
●Fill the radiator up to the filler neck with coolant.

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

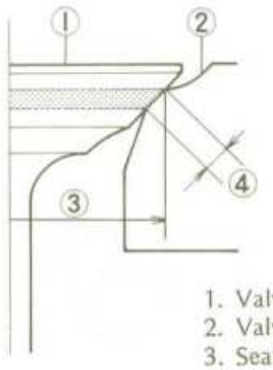
Inlet	**0.5 – 1.0 mm**
Exhaust	**0.5 – 1.0 mm**

NOTE

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

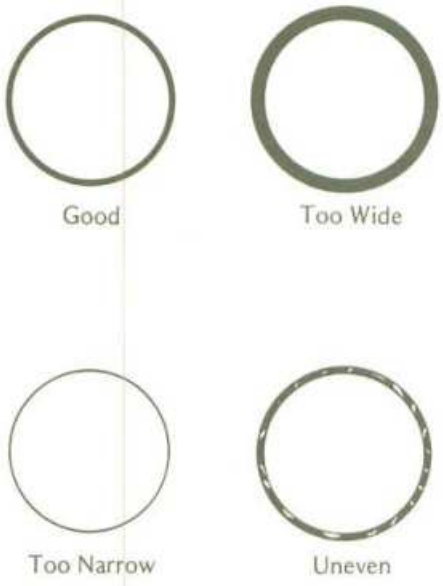
★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

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	**22.9 – 23.1 mm**
Exhaust	**20.3 – 20.5 mm**

Valve Seat Repair

●Clean the cylinder head thoroughly (see Cylinder Head Cleaning).

●Use the following procedure and tools to repair the valve seat.

Used Valve Seat Cutters

	Intake Valve and Exhaust Valve	
IN	45° – φ24.5	57001-1113
	32° – φ25.0	57001-1118
	67.5° – φ22.0	57001-1207
EX	45° – φ24.5	57001-1113
	32° – φ22.0	57001-1206
	67.5° – φ22.0	57001-1207

Used Holder and Bar

Holder – φ5	**57001-1208**
Bar	**57001-1128**

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

Seat Cutter Operating Care:

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

NOTE

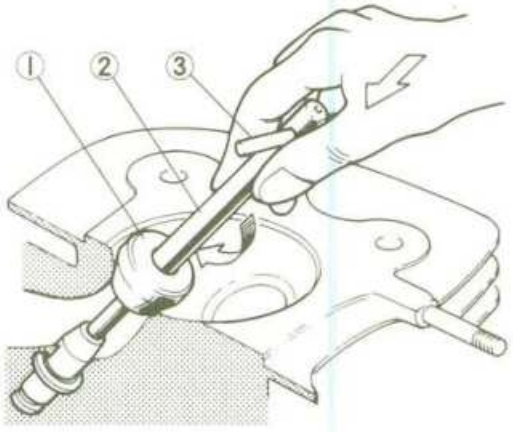
○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

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

NOTE

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

Valve Seat Cutter



1. Cutter
2. Cutter Holder
3. Bar

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

Marks Stamped on the Cutter:

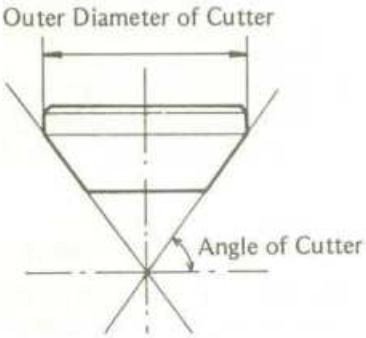
The marks stamped on the back of the cutter represent the following.

60° . . . . . Cutter angle

37.5φ . . . . . Outer diameter of cutter

Cutter





1. Outer Diameter of Cutter
2. Cutter Angle

Operating Procedures:

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

CAUTION

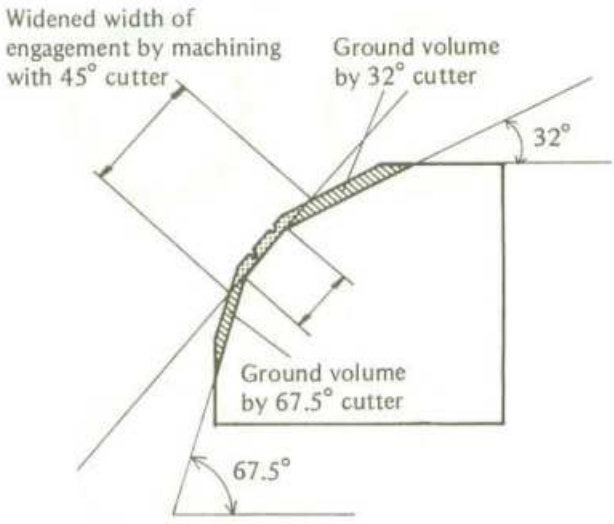
○Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

- Measure the outside diameter of the seating surface with a vernier caliper.
- ★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
- ★If the outsdie 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

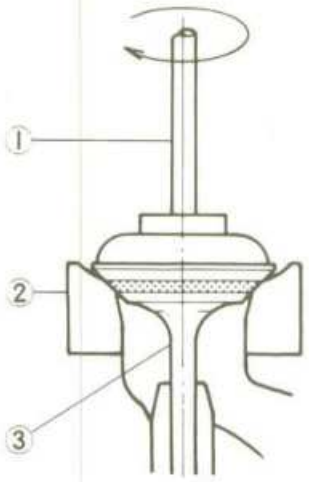
○The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent over-grinding.

Valve Seat Repair



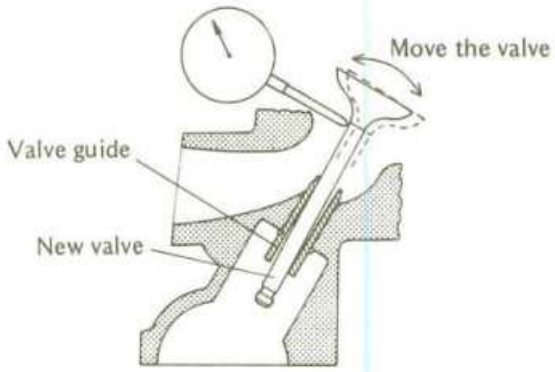
- ○After making the 32° grind, return to the seat O.D. measurement step above.
- To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
- ★If the seat width is too narrow, repeat the 45° gind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.
- ★If the seat width is too wide, make the 67.5° grind described below.
- ★If the seat width is within the specified range, lap the valve to the seat as described below.
- Grind the seat at a 67.5° angle until the seat width is within the specified range.
- ○To make the 67.5° grind, fit a 67.5° cutter to the holder, and slide it into the valve guide.
- ○Turn the holder, while pressing down lightly.
- ○After making the 67.5° grind, return to the seat width meassurement 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 onthe 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

Wobble Method



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.

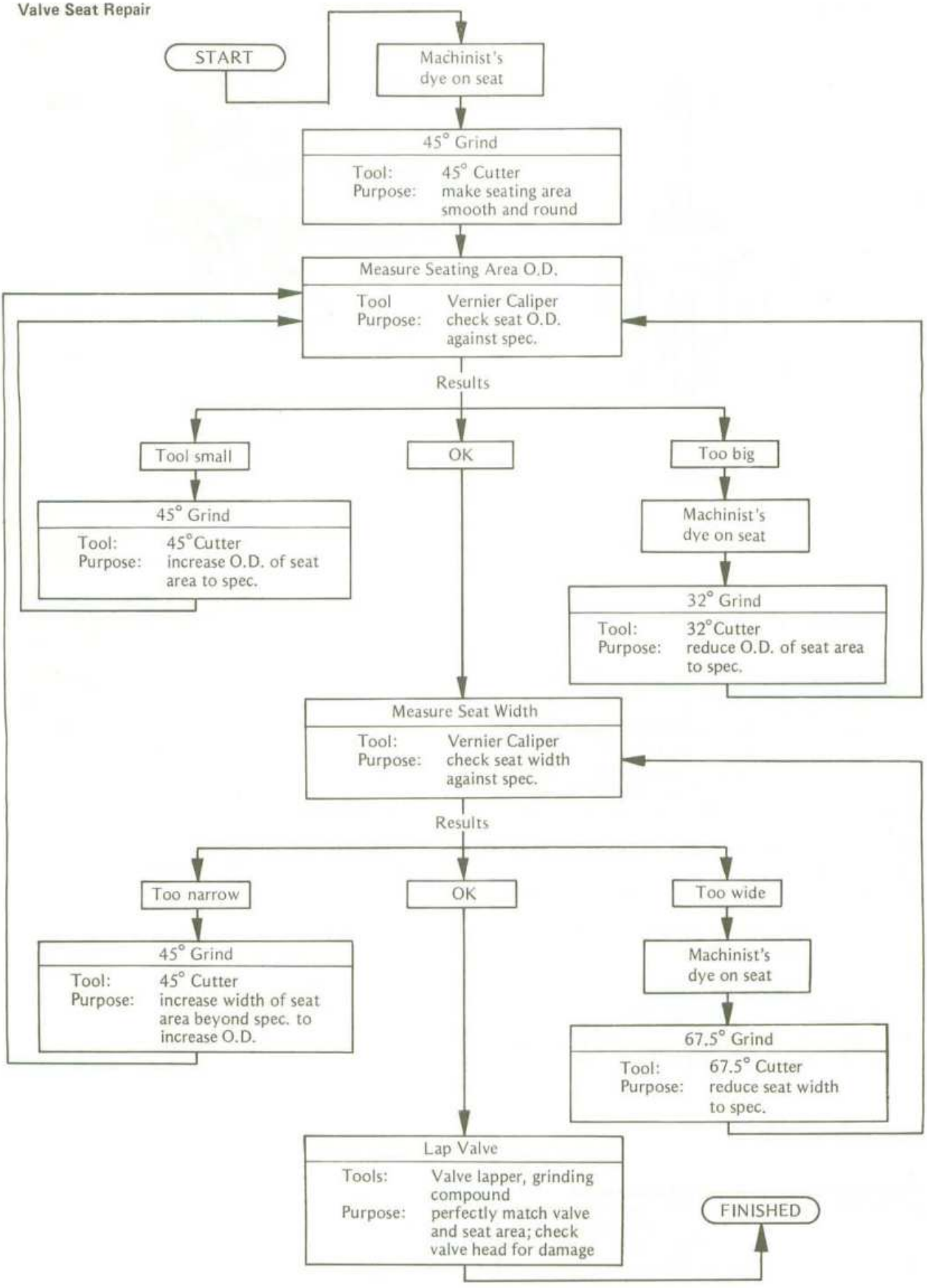
NOTE

○*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	0.03 – 0.10 mm	0.24 mm
Exhaust	0.08 – 0.15 mm	0.29 mm

Valve Seat Repair



Cylinder, Piston

Cylinder Removal

●Remove the following parts before cylinder and piston removal.

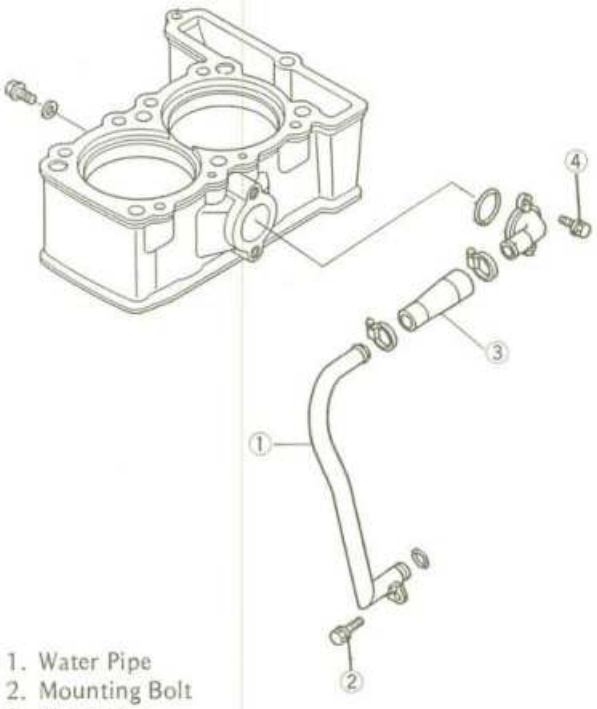
Position the crankshaft at compression stroke TDC for the Number 2 piston, and then turn the clockwise about 90°.

Fairing
Fuel Tank
Coolant Draining
Radiator
Muffler
Carburetor (Pull the rearward)
Camshaft Chain Tensioner
Rear Camshaft Chain Guide Bolt (Upper)
Cylinder Head Cover
Cylinder Head

●Remove the water pipe mounting bolt and take off the pipe from the water pump.

●Remove the cylinder, and then remove the water hose from the cylinder.

Water Pipe and Hose



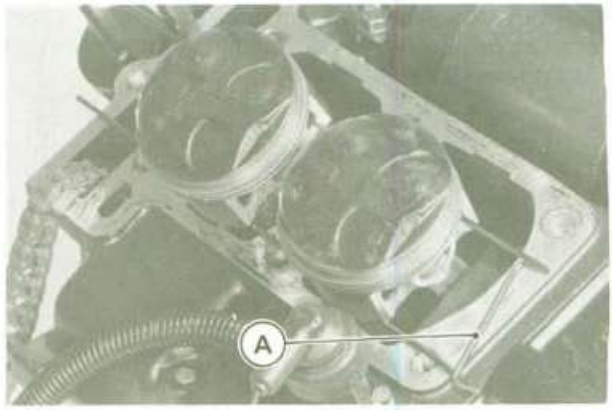
1. Water Pipe
2. Mounting Bolt
3. Water Hose
4. Mounting Bolts

Cylinder Installation Notes

●Apply a engine oil to the cylinder bores, piston rings, and piston skirt.

●Replace the cylinder base gasket with a new one.

●Slip piston base (special tool) as shown if necessary to hold piston level.



A. Piston Base: 57001-149

Piston Removal

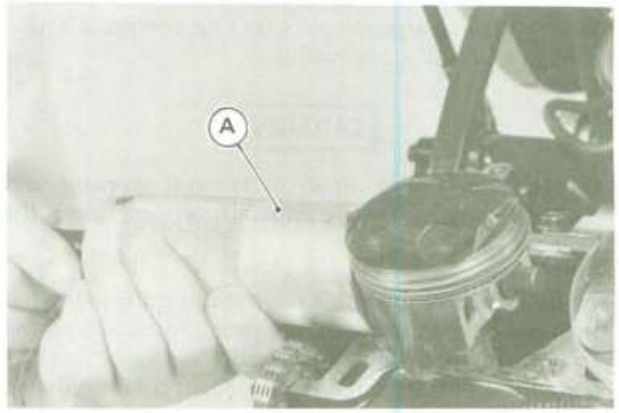
●Remove the piston pin snap ring from the outside of each piston.

○Be sure to place a clean cloth under the piston to prevent the snap ring from falling into the crankcase.



A. Snap Ring

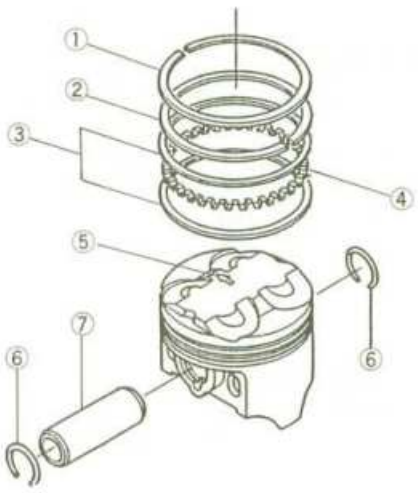
●Remove the piston by pushing its piston pin out the side that the snap ring was removed. Use piston pin puller assembly (special tool), if the pin is tight.



A. Piston Pin Puller Assembly: 57001-910

•When the top, second and oil rings for carefully spread the ring opening with your thumbs and then push up on the opposit side of the ring to remove it.

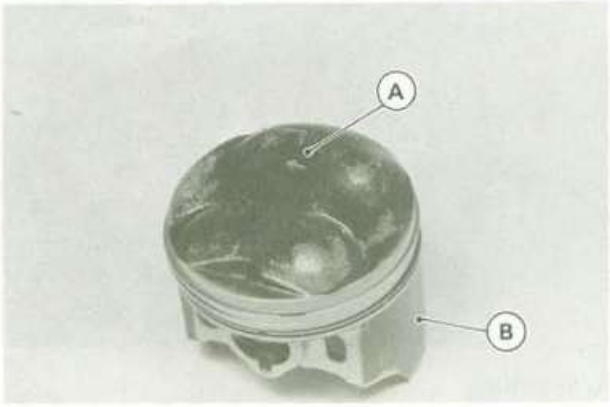
Piston Ring Installation



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

Piston Installation Note

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



A. Arrow B. Piston

○Install the oil ring upper and lower steel rails. There is no UP or DOWN to the rails. They can be installed either way.

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

CAUTION

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

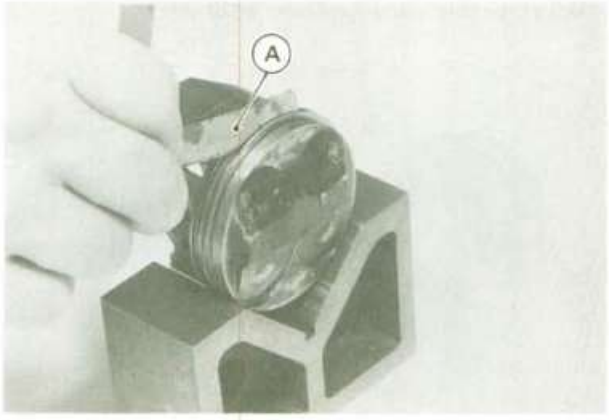
•Position each piston ring so that the opening in the top ring and oil ring steel rails are facing fowards, and the second ring and oil ring expander openings face the rear. The openings of the oil ring steel rails must be about 30 – 40° of angle from the opening of the top ring.

Piston Ring, 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, Second	0.02 – 0.06 mm	0.16 mm



A. Thickness Gauge

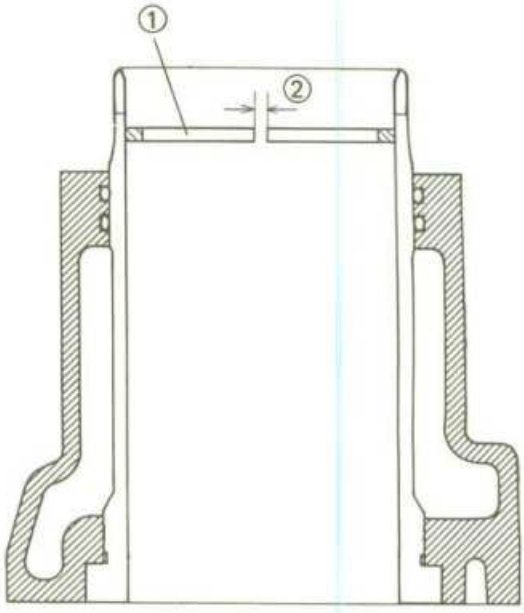
Piston Ring End Gap

- 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, Second	0.30 – 0.45 mm	0.80 mm
Oil	0.2 – 0.8 mm	1.1 mm

End Gap Measurement

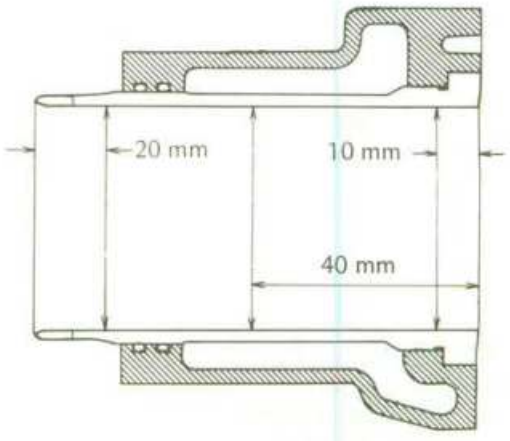


1. Piston Ring
2. Gap

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 cny 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:	**62.000 – 62.012 mm and less than 0.01 mm difference between any two measurements**
Service Limit:	**62.10 mm or more than 0.05 mm difference between any two measurements.**

Piston Diameter

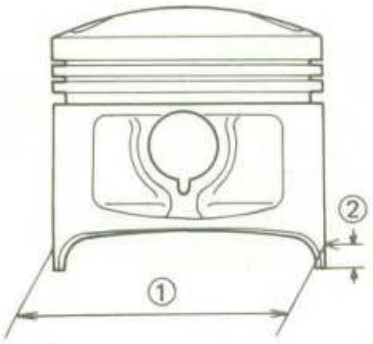
●Measure the outside diameter of each piston 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

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

Piston Diameter

Standard	Service Limit
61.942 – 61.957 mm	61.80 mm

Piston Diameter Measurement



1. Piston Diameter
2. 5 mm

Boring, Honing

When boring and honing a cylinder, not the following:

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

Oversize Piston and Ring

0.5 mm Oversize

○Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Service Data Section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than **0.5 mm** oversize, the cylinder block must be replaced.

○Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

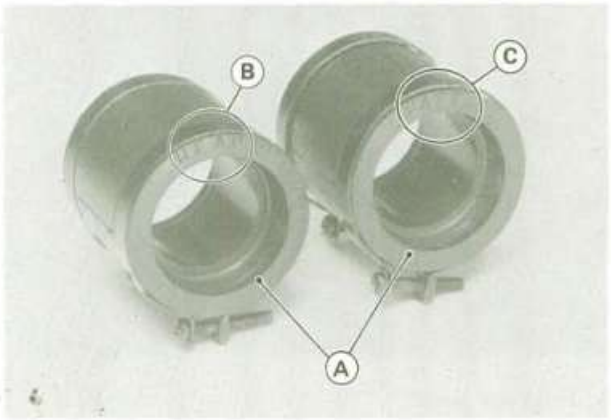
○In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plug **0.1 mm** and the service limit for the piston is the oversize piston original diameter minus **0.15 mm.** If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

○Never separate the liner from the cylinder, because the top surface of cylinder and liner is machined at the factory as an assembly.

Carburetor Holder

Carburetor Holder Installation

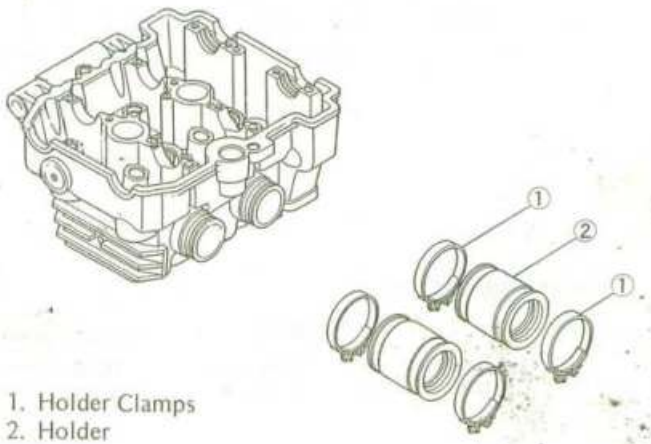
●Install the carburetor holders so that the "HEAD" marks face fore wards (cylinder head side).



A. Carburetor Holder C. "CARB" Mark
B. "HEAD" Mark

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

Carburetor Holder Clamps Installation



1. Holder Clamps
2. Holder

WARNING

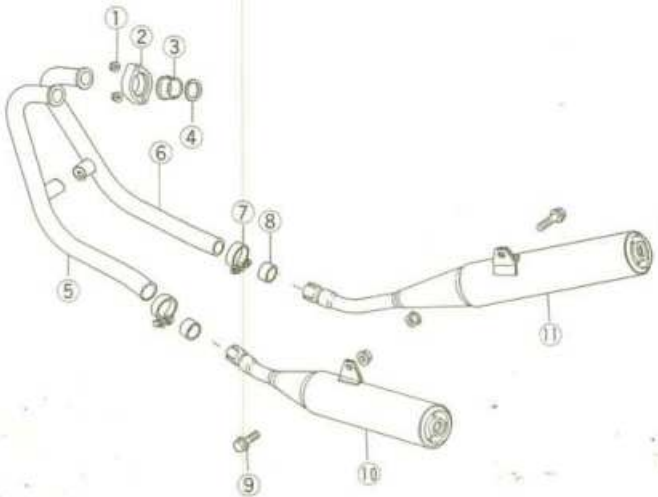
○**Install the clamp screws horizontal. Or the screws could come in contact with the vacuum adjusting screws, resulting in an unsafe riding condition.**

Muffler

Muffler Removal

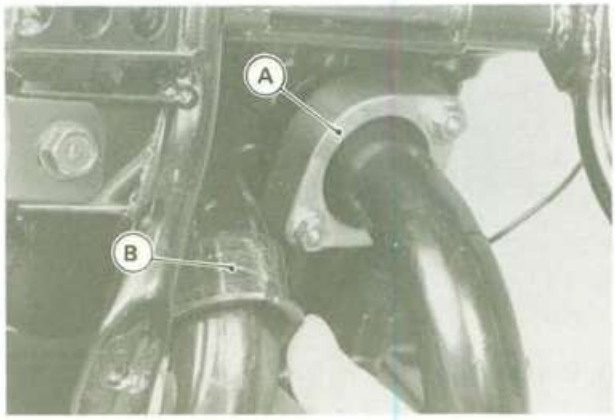
- ●Drain the coolant (see Coolant Draining in Cooling chapter).
- ●Remove the radiator (see Radiator, Radiator Fan Removal in Cooling System chapter).
- ●Loosen the muffler clamp bolt until the clamp turns freely on the mufflers.
- ●Remove the muffler mounting bolt at the rear footpeg bracket, and take off the each mufflers.

Muffler



1. Nut
2. Exhaust Pipe Holder
3. Sprit Keeper
4. Gasket
5. Exhaust Pipe (LH)
6. Exhaust Pipe (RH)
7. Clamp
8. Gasket
9. Mounting Bolt
10. Muffler (LH)
11. Muffler (RH)

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

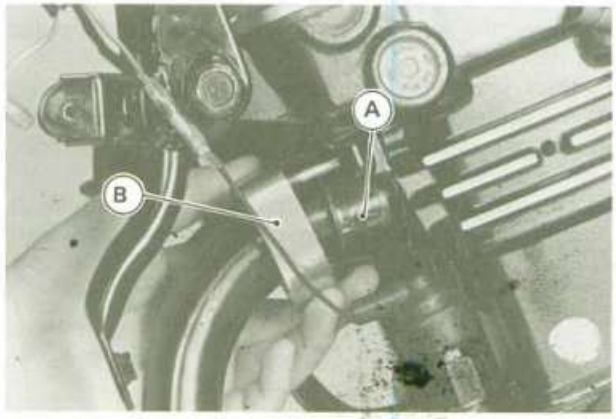


A. Exhaust Pipe Holders B. Split Keepers

- ●Remove the slit keeper.
- ●Pull the exhaust pipe toward the front, and separate the exhaust pipe and left and right mufflers.
- ●Remove the exhaust pipe holders and gaskets.

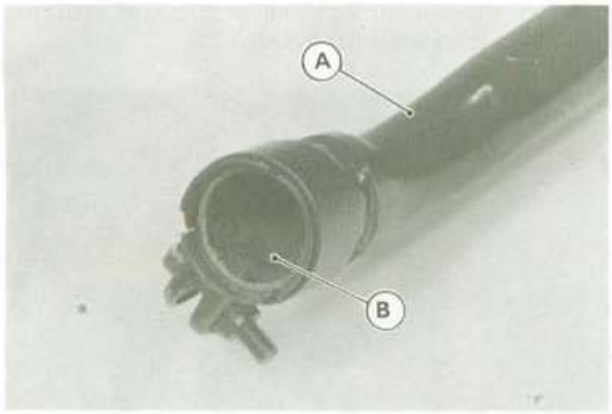
Muffler Installation

- ●Smear a little grease on a new exhaust pipe gasket and stick it into the exhaust port in the cylinder head.
- ●Slip the exhaust pipe holder over the exhaust pipe.
- ●Attach the exhaust pipe loosely to the cylinder head.
- ○Tape the split keeper in place as shown.



A. Split Keeper B. Holder

- ○Position the exhaust pipe in the exhaust port.
- ○Slide the holder into place on the studs.
- ○Thread on the nuts, but do not tighten them yet.
- ●Check the gasket and replace if necessary.



A. Exhaust Pipe B. Gasket

- Slip the muffler into place from the rear of the frame, so that it fits over the exhaust pipe.
- Hold the muffler up and put in the mounting bolts, but do not tighten them yet.
- Tighten the exhaust pipe holder nuts evenly and securely.
- Tighten the muffler mounting bolts securely.
- Tighten the muffler clamp bolt securely.

Exhaust System Inspection

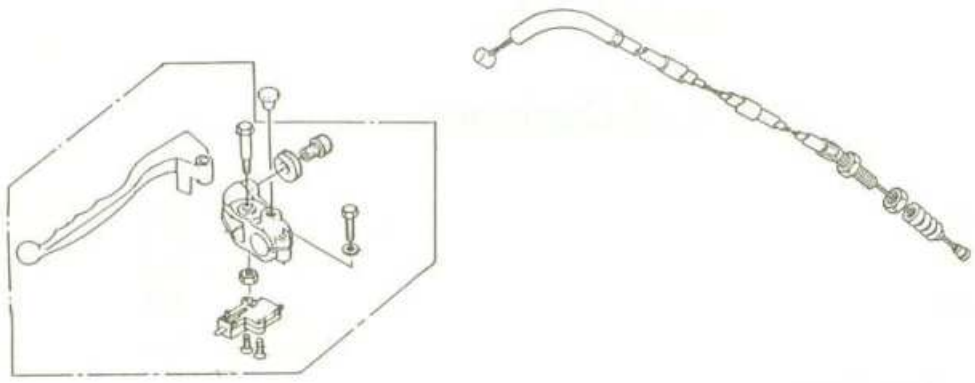
- Before removing the exhaust system, check for signs of leakage at the exhaust pipe gasket in the cylinder head and at the muffler clamp.
- ★If there are signs of leakage around the exhaust pipe gasket, it should be replaced. If the muffler-to exhaust pipe joint leaks, tighten the clamp.
- Remove the exhaust system (see Exhaust Pipe and Muffler Removal).
- Inspect the gasket for damage and signs of leakage.
- ★If the gasket is damaged or has been leaking, replace it.
- Check the exhaust pipe and muffler for dents, cracks, rust and holes.
- ★If the exhaust pipe or muffler is damaged or holes, it should be repalced for best performance and least noise.

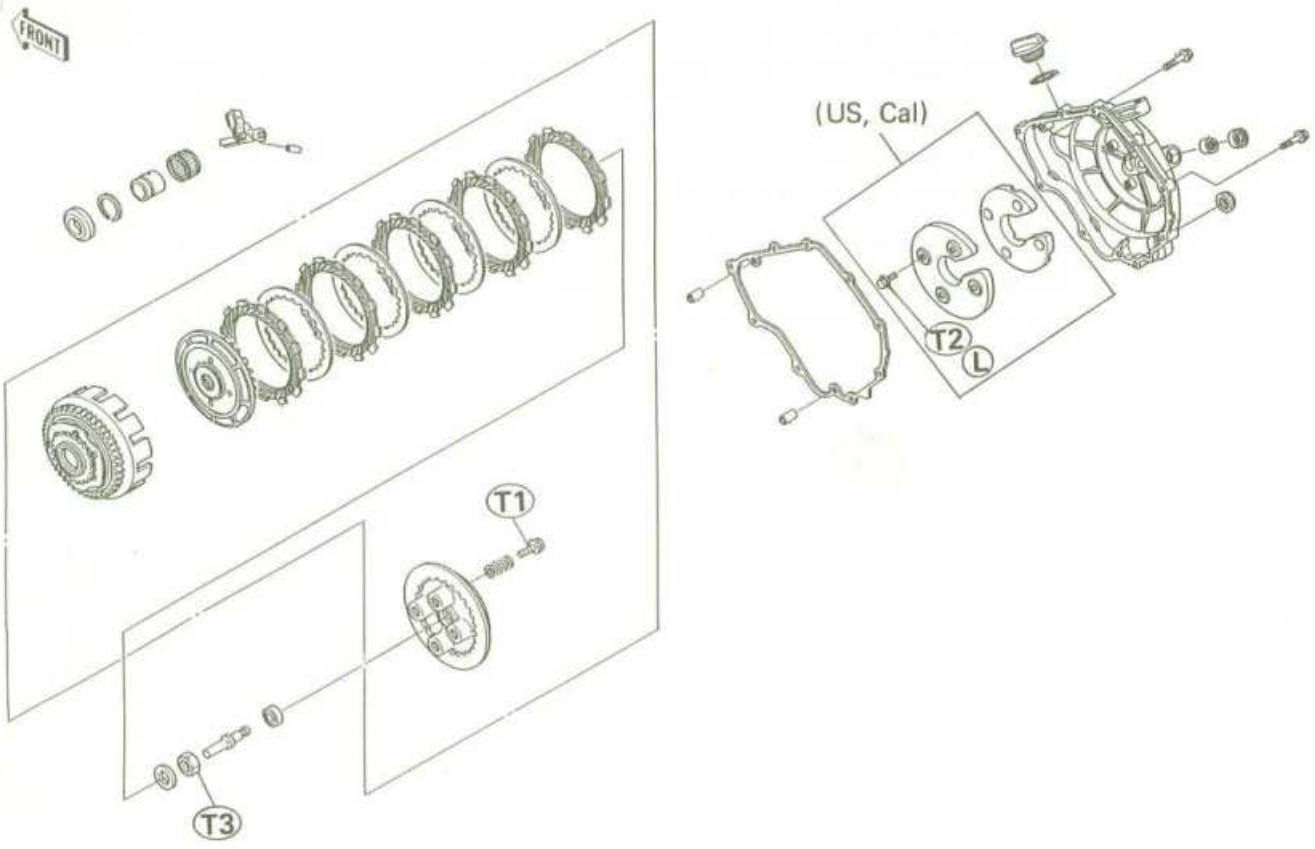
Clutch

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Exploded View





L : Apply non-permanent locking agent to the threads.
T1 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 : 130 N-m (13.5 kg-m, 98 ft-lb)

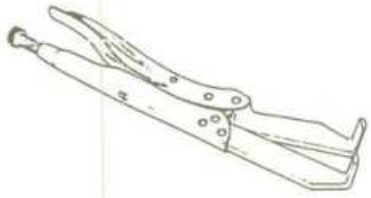
Specifications

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

Special Tools

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

Clutch Hub Holder: 57001-305



Clutch

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

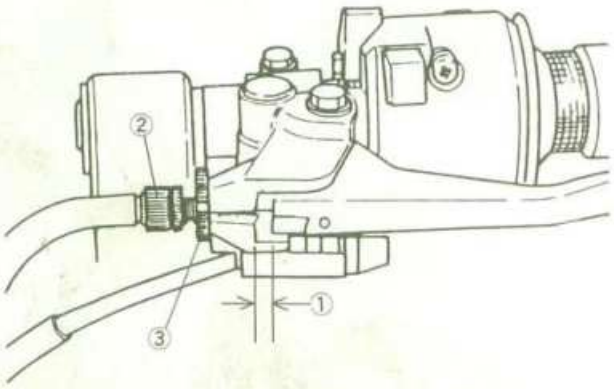
WARNING

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

Clutch Adjustment Check

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

Clutch Lever Free Play



1. Clutch Lever Free Play 2 ~ 3 mm
2. Adjuster
3. Locknut

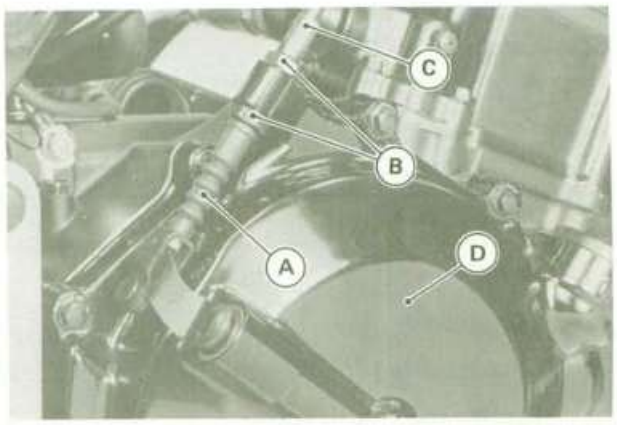
★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust the clutch.

Clutch Adjustment

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

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

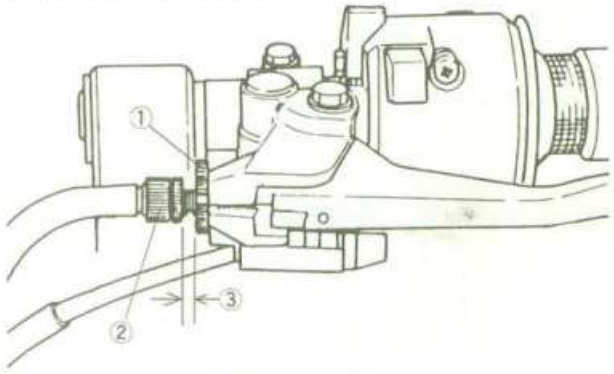
- Loosen the lower cable adjusting nuts at the clutch cover as far as they will go.



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

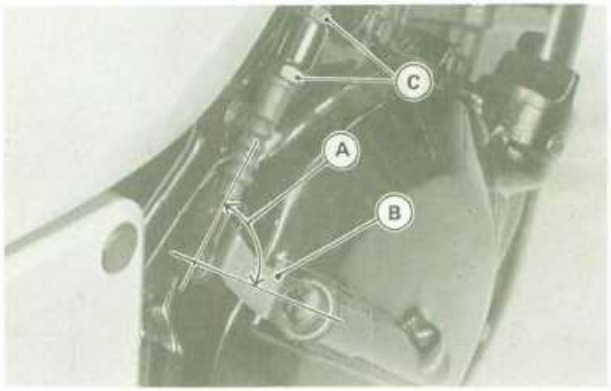
- Loosen the knurled locknut at the clutch lever.
- Turn in the adjuster so that 5 ~ 6 mm of threads are visible.

Clutch Adjuster Clearance



1. Locknut
2. Adjuster
3. 5 ~ 6 mm

- Pull the clutch outer cable tight and tighten the lower cable adjusting nuts against the bracket.
- At this time, check that the clutch release lever to clutch cable angle is 80 ~ 90°.



A. 80 ~ 90°
B. Release Lever
C. Adjusting Nuts

- Turn the adjuster at the clutch lever until the free play is correct.

*If the clutch cannot be adjusted by this method, inspect the clutch parts.
•Tighten the knurled locknut at the clutch lever.

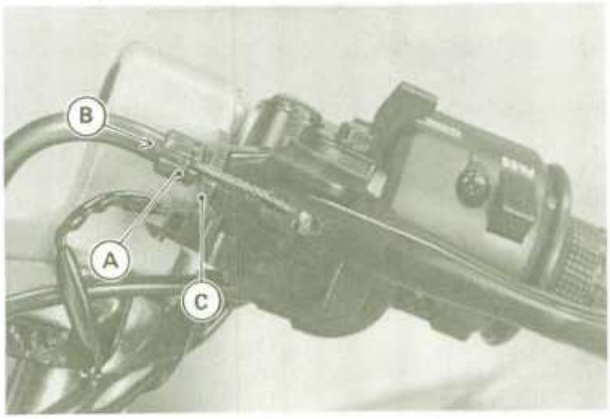
NOTE

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

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

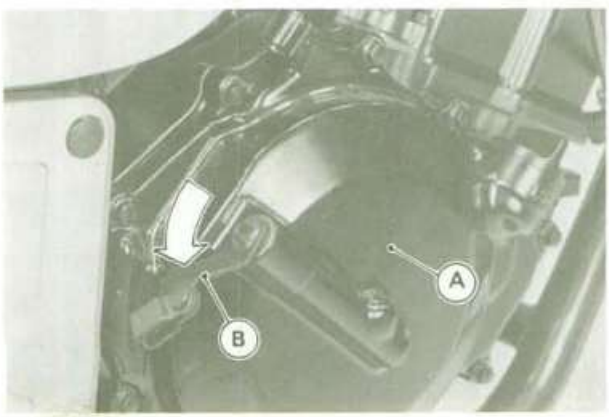
Clutch Cover Removal

•Drain the engine oil (see Engine oil Change in Engine Lubrication System chapter).
•Loosen the nuts, and slide the lower end of the clutch cable to give the cable plenty of play.
•Loosen the knurled locknut at the clutch lever, and screw in the adjuster.
•Line up the slots in the clutch lever, knurled locknut, and adjuster, and then free the cable from the lever.



A. Adjuster C. Knurled Locknut
B. Slot

•Remove the clutch cable lower end from the release lever.
•Turn the release lever counterclockwise about 90°.
•Remove the clutch cover bolts and take off the cover.



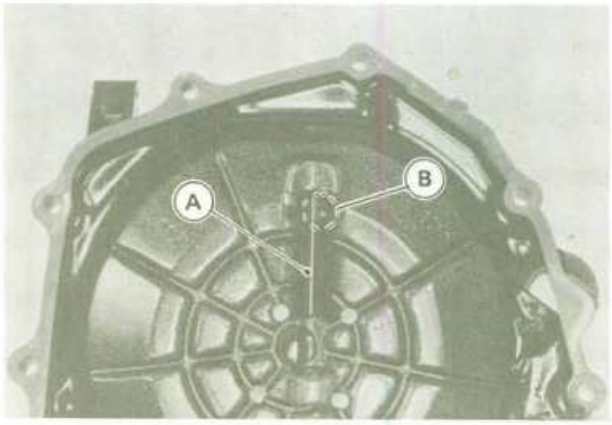
A. Clutch Cover B. Release Lever

Clutch Cover Installation Note

•Replace the clutch cover gasket with a new one.

Clutch Release Lever (Shaft) Removal

•Remove the clutch cover.
•Turn the release lever forward as shown.
•Take the pin off of the release shaft.

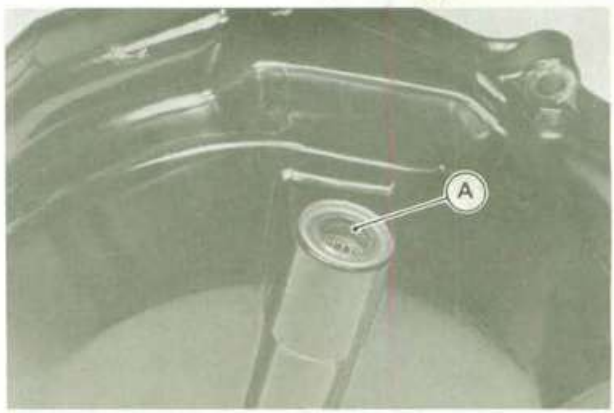


A. Release Shaft B. Pin

•Pull the release shaft out of the cover.

Clutch Release Lever (Shaft) Installation Note

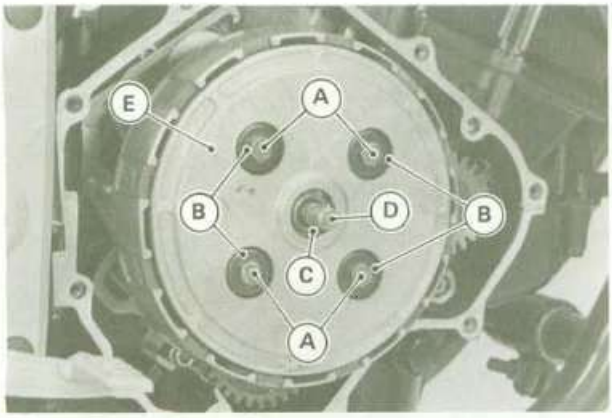
•Release lever installation is the reverse of removal.
•Inspect the oil seal and replace if necessary.



A. Oil Seal

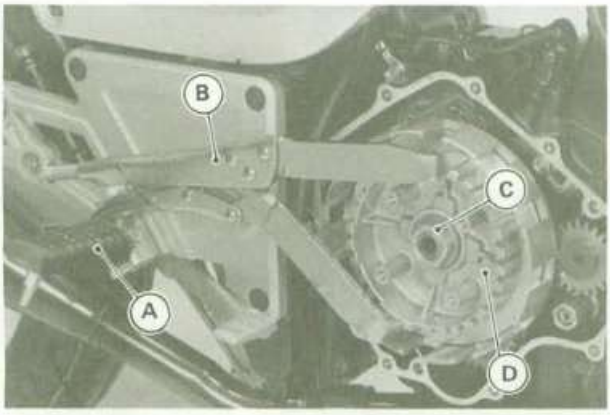
Clutch Removal

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



A. Clutch Spring Bolts
B. Washers
C. Bearing
D. Pusher
E. Clutch Spring Plate

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



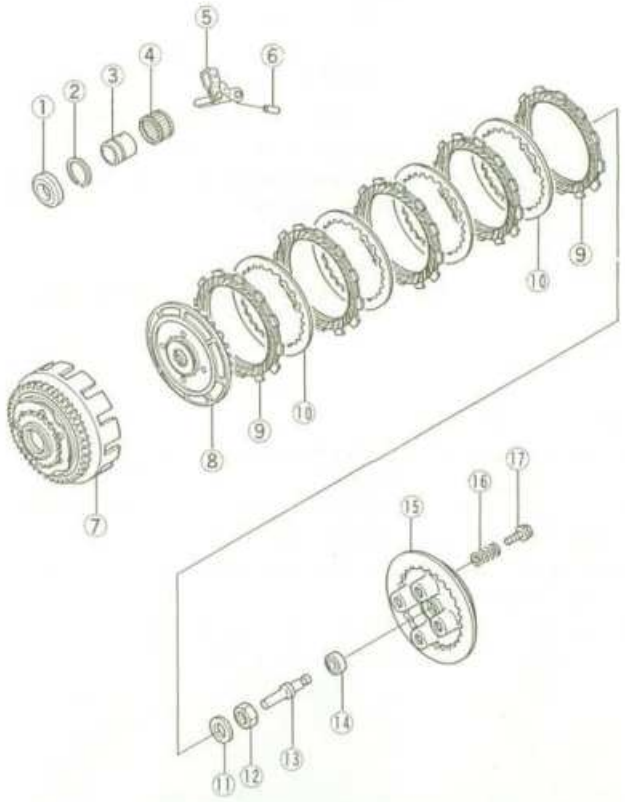
A. Right Footpeg
B. Holder: 57001-305
C. Hub Nut
D. Clutch Hub

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

Clutch Installation Notes

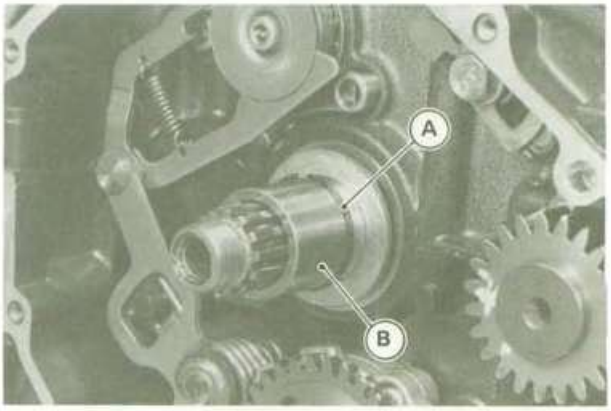
●Clutch installation is the reverse of removal. Pay attention to the following items.

Clutch Parts



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

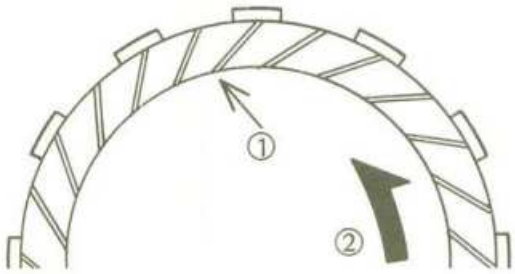
○Install the spacer with the chamfered side facing inwards.
○Install the collar with the attached circlip side inwards.



A. Circlip
B. Collar

○When installing the clutch housing, mesh the oil pump drive gear with the oil pump gear so that the pump gear is turning.
○Discard the used hub nut, and install a new nut.
○Install the clutch hub holder (special tool: 57001-305) to keep the clutch hub from turning and tighten the clutch hub nut to the specified torque (see Exploded Views).
○Install the friction plates and steel plates, starting with a friction plate and alternating them.
○The grooves on the friction plate surfaces are cut trangentially and radially; install the friction plates so that the grooves run toward the center in the direction of clutch housing rotation (counterclockwise viewed from the engine right side).

Friction Plate Installation



1. Oil Groove 2. Direction of Rotation

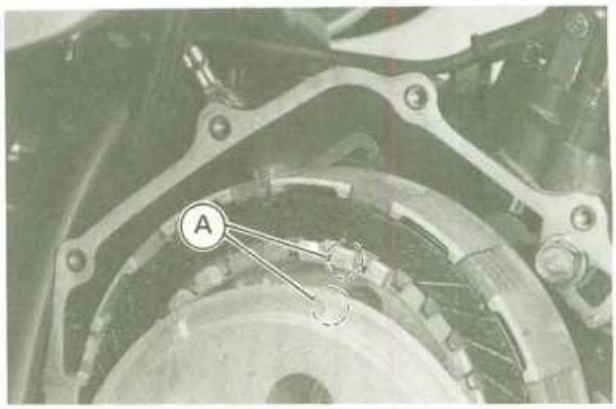
CAUTION

○If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

○Fit the spring plate back into place, aligning the mark on the plate with the mark on the clutch hub.

CAUTION

○Misalignment of the spring plate can cause clutch drag (when it is disengaged), or clutch slipping.



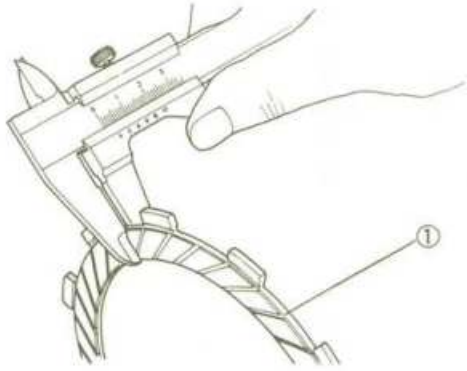
A. Marks

○Tighten the clutch spring bolts to the specified torque (see Exploded View).

Friction Plate Wear, Damage Inspection

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

Friction Plate Thickness Measurement



1. Friction Plate

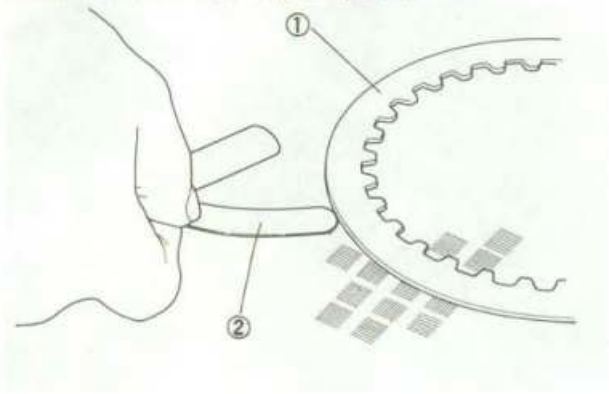
Friction Plate Thickness

Standard:	**2.9 – 3.1 mm**
Service Limit:	**2.8 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 or Steel Plate Warp Inspection



1. Friction or Steel Plate 2. Thickness Gauge

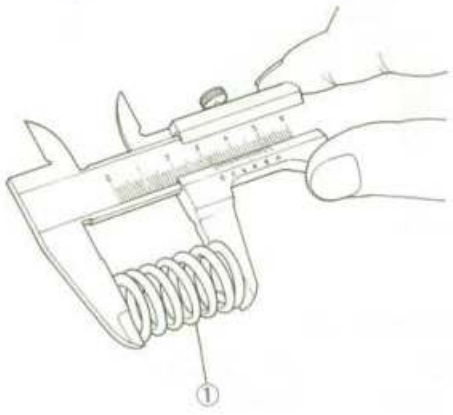
Friction and Steel Plate Warp

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

Clutch Spring Free Length Measurement

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

Clutch Spring Free Length Measurement



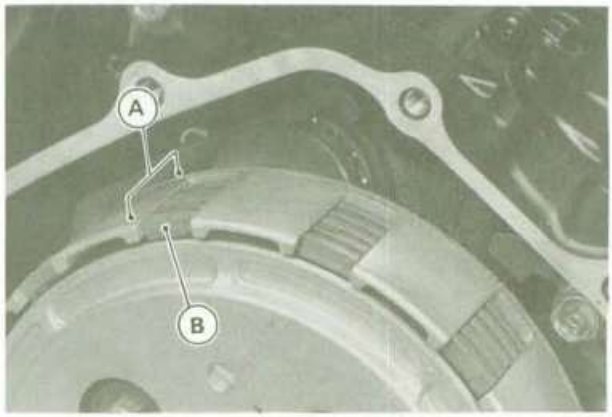
1. Clutch Spring

Cltuch Spring Free Length

Standard:	**32.6 mm**
Service Limit:	**31.7 mm**

Clutch Housing Finger Inspection

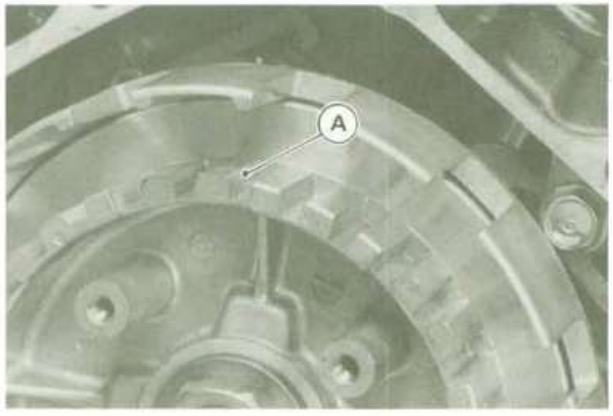
- Visually inspect the fingers of the clutch housing where the tangs of the friction plates hit them.
- ★If they are badly worn or if there are grooves cut where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



A. Clutch Housing Finger B. Friction Plate Tang

Clutch Hub Spline Inspection

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



A. Clutch Hub Spline

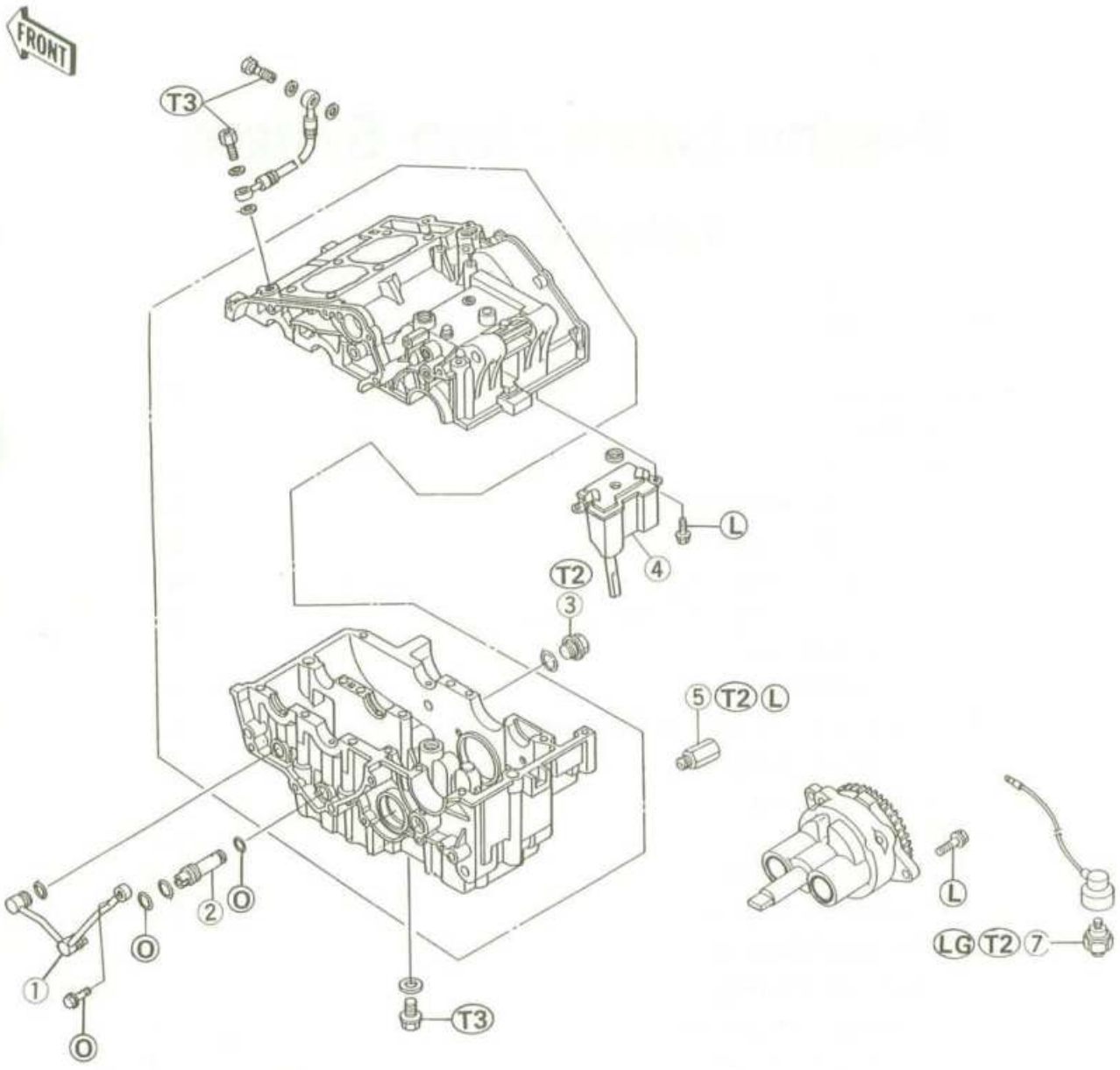
Engine Lubrication System

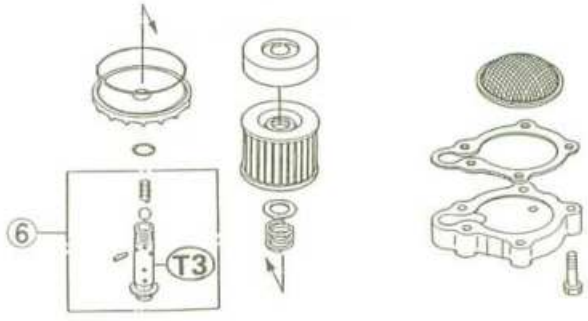
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Exploded View

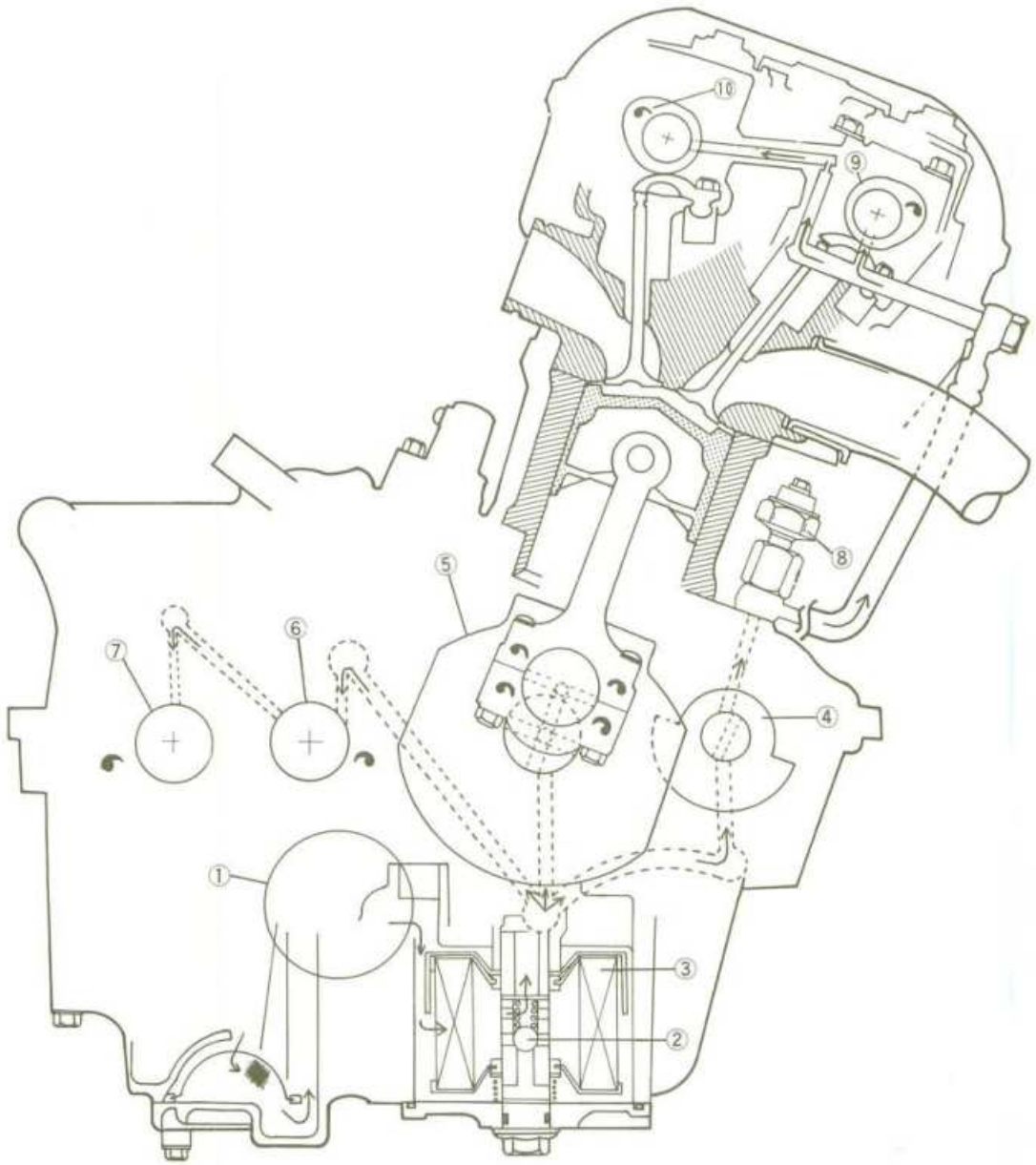




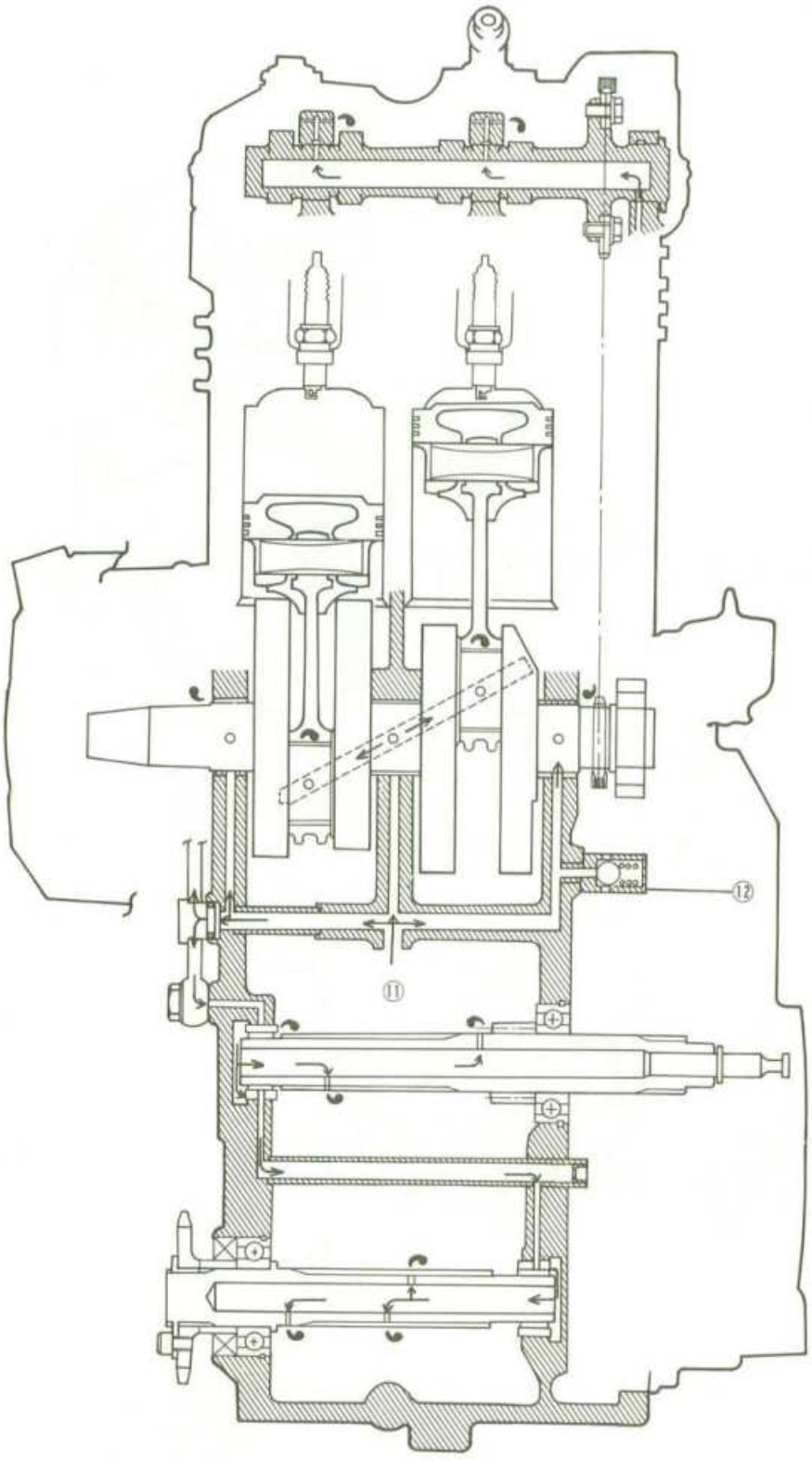
1. Oil Pipe
2. Oil Passage Pipe
3. Oil Passage Plug
4. Oil Breather
5. Relief Valve
6. Oil Filter Bolt
7. *Oil Pressure* Switch

L : Apply non-permanent locking agent to the threads.
LG: Apply liquid gasket to the threads.
O : Apply engine oil to the surface.
T1: 12 N-m (1.2 kg-m, 104 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T3: 20 N-m (2.0 kg-m, 14.5 ft-lb)

Engine Oil Flow Chart



1. Oil Pump
2. Bypass Valve
3. Oil Filter
4. Balancer Shaft
5. Crankshaft
6. Drive Shaft
7. Output Shaft
8. Oil Pressure Switch
9. Exhaust Camshaft
10. Inlet Camshaft



11. Oil Flow from Oil Pump
12. Relief Valve

Specifications

Item		Standard
Engine oil:	Grade	SE or SF class
	Viscosity	SAE 10W40, 10W50, 20W40, or 20W50
	Required amount	1.5 L (when filter is not removed)
		1.9 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)		More than 343 kPa (3.5 kg/cm², 49.8 psi)

Special Tools

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

Oil Pressure Gauge: 57001-164



Oil Pressure Gauge Adapter: 57001-1188



Engine Oil and Filter

WARNING

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

Engine Oil Level Inspection

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

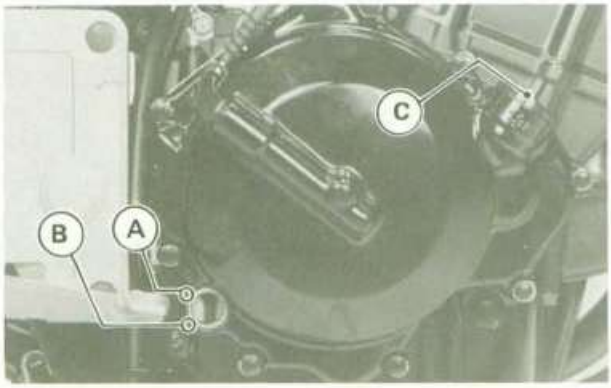
CAUTION

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

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

NOTE

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



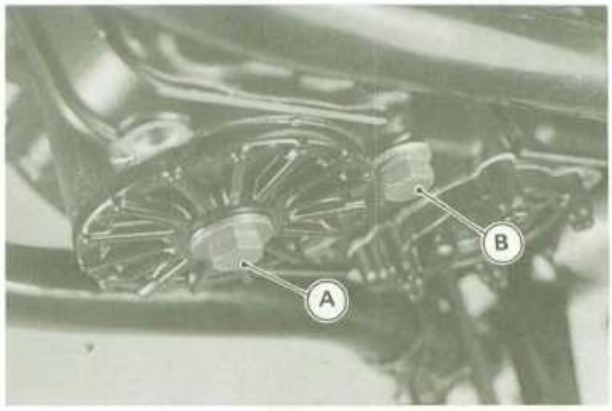
A. Upper Level
B. Lower Level
C. Oil Filler Opening Cap

CAUTION

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

Engine Oil and/or Filter Change

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



A. Drain Plug
B. Oil Filter Mounting Bolt

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

Engine Oil

Grade: SE or SF class
Viscosity: SAE 10W40, 10W50, 20W40, or 20W50
Required Amount
When filter is not removed: 1.5 L
When filter is removed: 1.9 L

Oil Filter and Mounting Bolt Removal

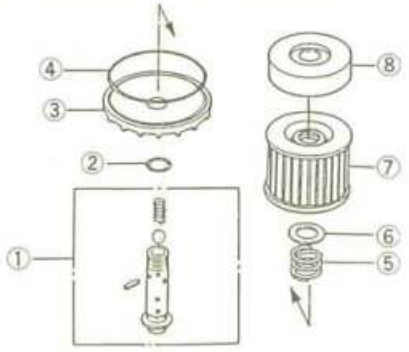
- With the motorcycle up on its center stand, place an oil pan beneath the engine.
- Unscrew the oil filter mounting bolt and drop out the filter.
- Take off the oil fence, and then holding the filter steady, turn the mounting bolt to work the filter free and take the filter off the bolt.
- Remove the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

Oil Filter and Mounting Bolt Installation Notes

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

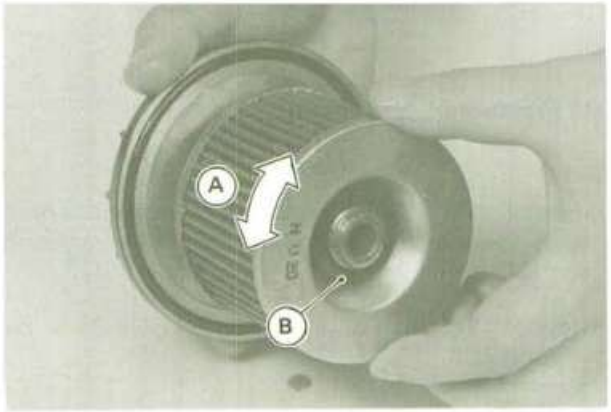
★If they are damaged, replace them with new ones.

Oil Filter and Mounting Bolt Installation



1. Mounting Bolt (including Bypass Valve)
2. O-ring
3. Filter Cover
4. O-ring
5. Spring
6. Washer
7. Oil Filter
8. Filter Cover

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



A. Turn the filter. B. Grommet

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

Bypass Valve Disassembly

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

Bypass Valve Assembly

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

Bypass Valve Cleaning and Inspection

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

WARNING

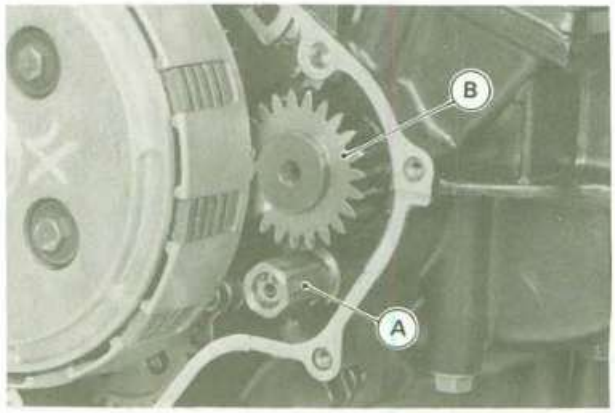
○**Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvent.**

- Visually inspect the bypass valve parts.

★If there is any damaged part, replace it.

Relief Valve Removal

- Remove the clutch cover.
- Unscrew the oil pressure relief valve from the crankcase.



A. Relief Valve B. Primary Gear

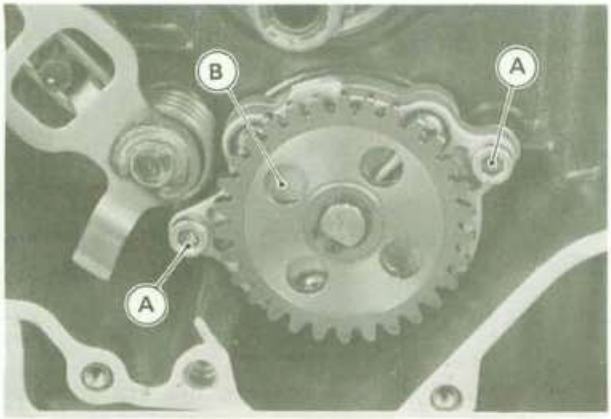
Relief Valve Installation Note

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

Oil Pump

Oil Pump Removal

- Remove the clutch cover (see Clutch Cover Removal in Clutch chapter).
- Remove the clutch (see Clutch Removal in Clutch chapter).
- Remove the oil pump mounting Allen bolts.

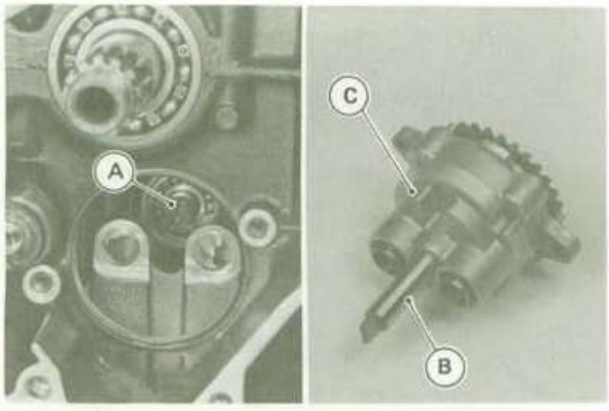


A. Allen Bolts B. Oil Pump

- Pull the oil pump off the crankcase.

Oil Pump Installation Notes

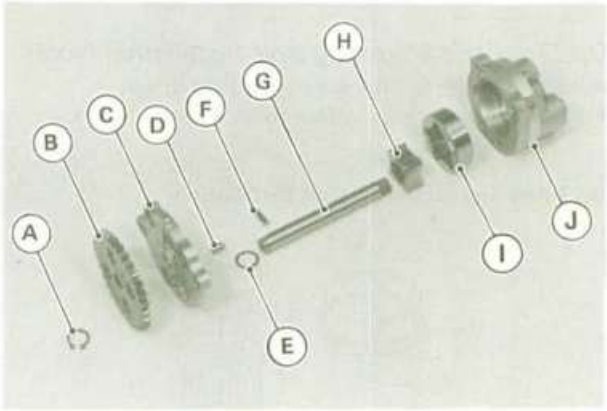
- Fill the oil pump with engine oil for initial lubrication.
- Apply a non-permanent locking agent to the threads of the pump Allen bolts.
- When installing the oil pump, note the position of the water pump shaft slot and turn the oil pump shaft so that the projection fits into the slot.



A. Water Pump Shaft C. Oil Pump
B. Oil Pump Shaft

Oil Pump Disassembly

- Remove the oil pump.
- Remove the circlip with circlip pliers (special tool) on the pump shaft end.
- Take off the gear from the shaft.
- Unscrew the oil pump cover screws, and take off the cover.
- Pull the oil pump shaft, washer, pin, inner rotor, and outer rotor from the pump.



A. Circlip E. Washer H. Inner Rotor
B. Gear F. Pin I. Outer Rotor
C. Pump Cover G. Pump Shaft J. Pump Body
D. Pin

Oil Pump Assembly Note

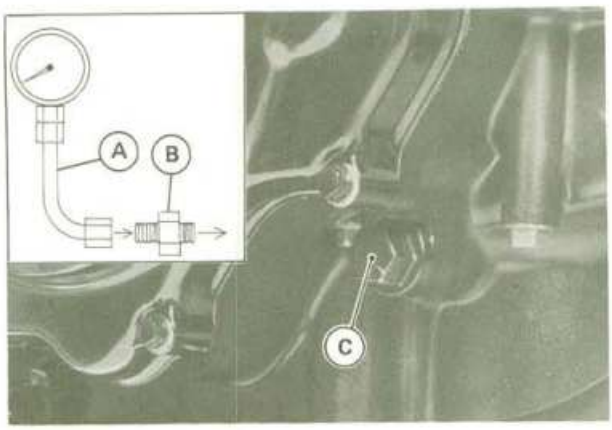
- After completing the oil pump assembly, check that the rotor shaft and rotor turn smoothly.

Oil Pressure Measurement

NOTE

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

- Measure the relief valve opening pressure when the engine is cold.
  - Remove the oil passage plug.
  - Install the oil pressure gauge and adapter (special tools).



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

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

Relief Valve Opening Pressure

430 ~ 590 kPa
(4.4 ~ 6.0 kg/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 in its closed position.
★If the reading is much lower than the standard, the relief valve may be stuck open, or there may be other damage in the lubrication system. Stop the engine immediately and find the cause.
●Measure the oil pressure at normal operating temperature.
○Warm up the engine, and then stop the engine.
○Install the oil pressure gauge and adapter as shown above.

WARNING

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

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

Oil Pressure

More than 345 kPa (3.5 kg/cm^2, 50 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.

Oil Pump Inspection

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

Relief Valve Inspection

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

NOTE

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

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

WARNING

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

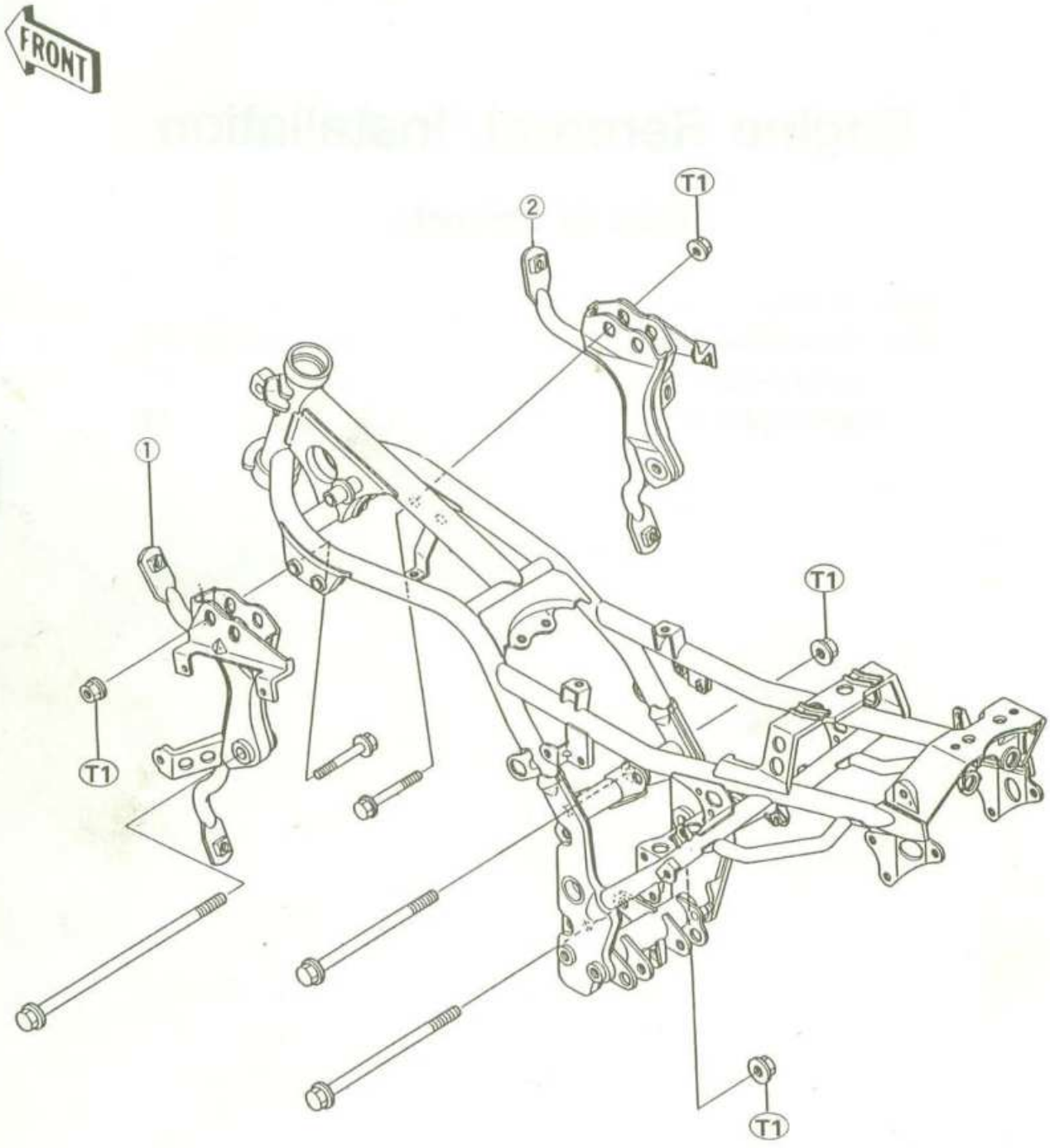
★If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance fore replacement of individual parts.

Engine Removal/Installation

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Exploded View



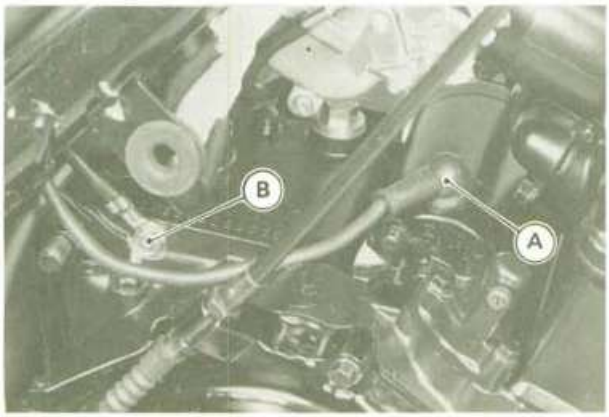
1. LH Engine Bracket
2. RH Engine Bracket

T1. 32 N-m (3.3 kg-m, 24 ft-lb)

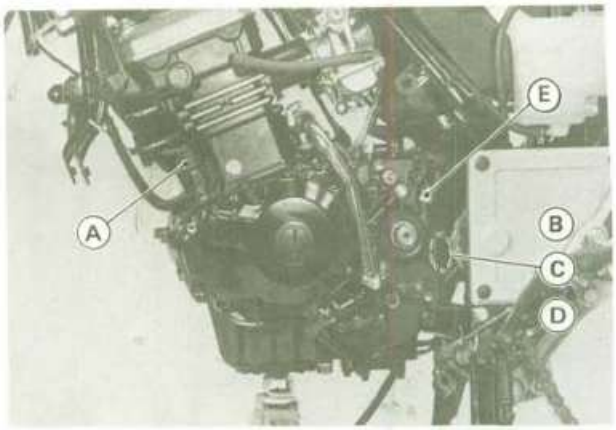
Engine Removal/Installation

Engine Removal

- Drain the engine oil (see Engine Oil Change in Engine Lubrication System chapter).
- Drain the coolant (see Coolant Change in Cooling System chapter).
- Remove the seats, side covers, kneegrip pads.
- Remove the fairing (see Fairing Removal in Frame chapter).
- Remove the fuel tank (see Fuel Tank Removal in Fuel chapter).
- Remove the following parts.
  - Radiator (see Radiator Removal in Cooling System chapter)
  - Muffler (see Muffler Removal in Engine Top End chapter)
  - Engine Sprocket (see Engine Sprocket Removal in Final Drive chapter)
  - Throttle and Choke Cables
  - Clutch Cable
- Disconnect the wiring from the engine components, and free them from the clamps.
  - Starter Motor Wire Terminal
  - Oil Pressure Switch Wire Terminal
  - Alternator Wire Connector
  - Pickup Coil Wire Connector
  - Side Stand Switch Wire Connector
  - Battery Ground Wire Terminal
  - Neutral Switch Wire Terminal

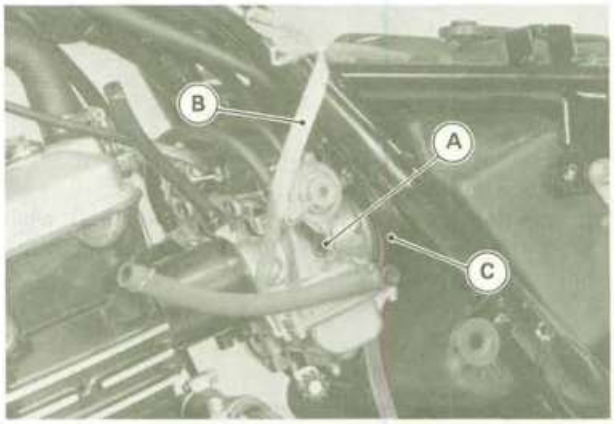


A. Starter Motor Wire Terminal
B. Battery Ground Wire Terminal



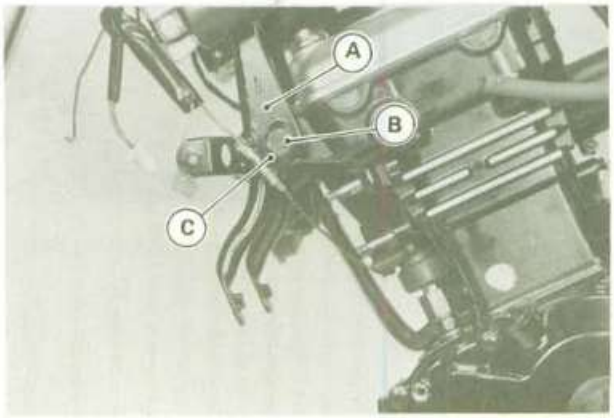
A. Oil Pressure Switch Wire Terminal
B. Alternator Wire Connector
C. Pickup Coil Wire Connector
D. Side Stand Switch Wire Terminal
E. Neutral Switch Wire Terminal

- Before removing the engine, hold the carburetor to the air cleaner duct with a string.



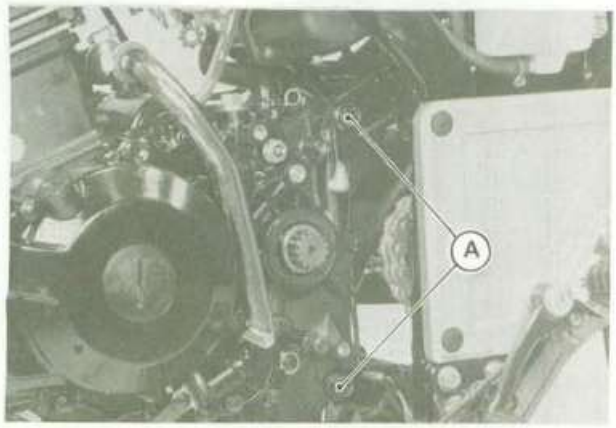
A. Carburetor
B. String
C. Air Cleaner Duct

- Remove the engine bracket bolt and take the both bracket with ignition coils off the frame.

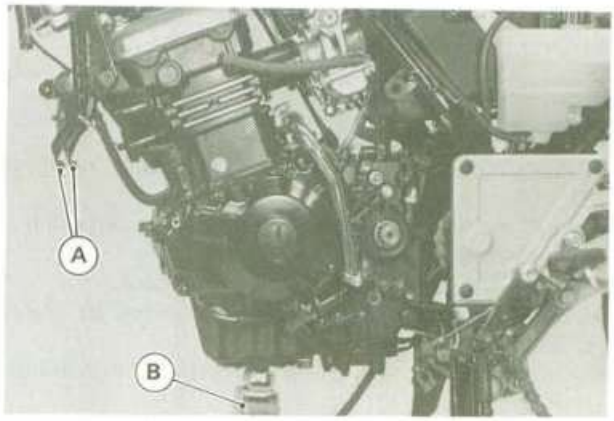


A. Engine Bracket
B. Engine Bracket Bolt
C. Oil Pressure Switch Wire Connector

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



A. Engine Mounting Bolts



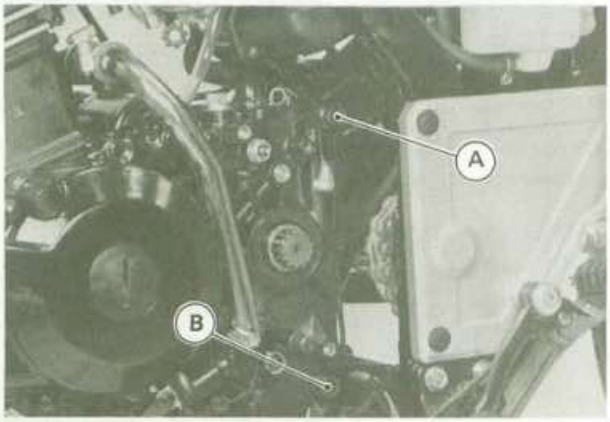
A. Engine Brackts B. Jack

○Route the wiring harness correctory (see *Wiring* Routing in General Informaiton chapter).

Engine Installation

•Engine installation is the reverse of removal. Pay attention to the following item.

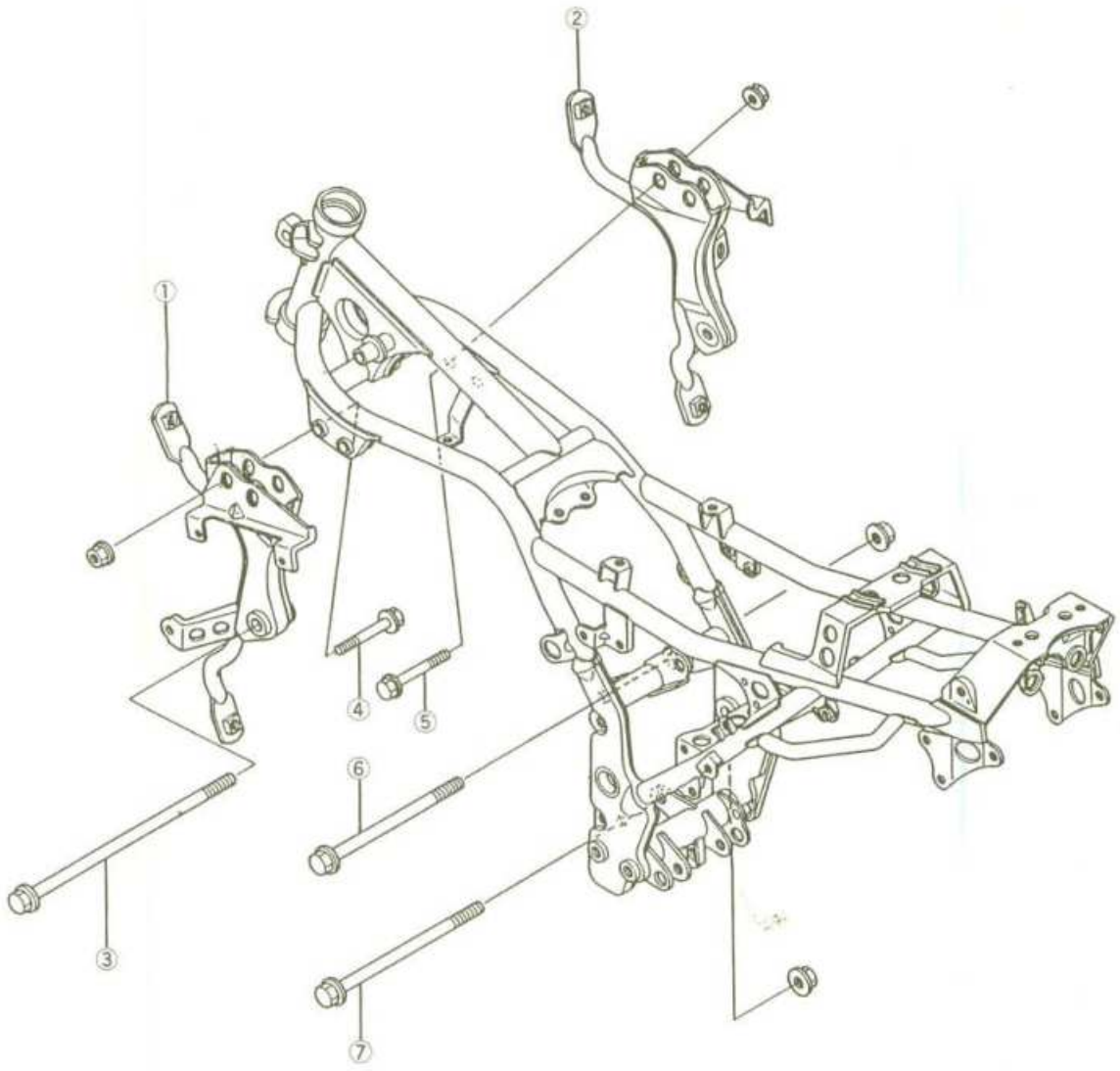
○Insert the lower engine mounting bolt first, while supporting the engine. Then insert the upper mounting bolt, and tighten the nuts loosely.



A. Upper Mounting Bolt B. Lower Mounting Bolt

○Before tightening the mounting bolts, install the engine brackets. When inserting the front engine mounting bolt, use a jack under the engine to lift the engine.

Engine Mounting Bolts



1. Engine Bracket (L.H.)
2. Engine Bracket (R.H.)
3. Engine Mounting Bolts (Front)
4. Engine Bracket Bolt (L.H.)
5. Engine Bracket Bolt (R.H.)
6. Engine Mounting Bolt (Upper)
7. Engine Mounting Bolt (Lower)

Crankshaft/Transmission

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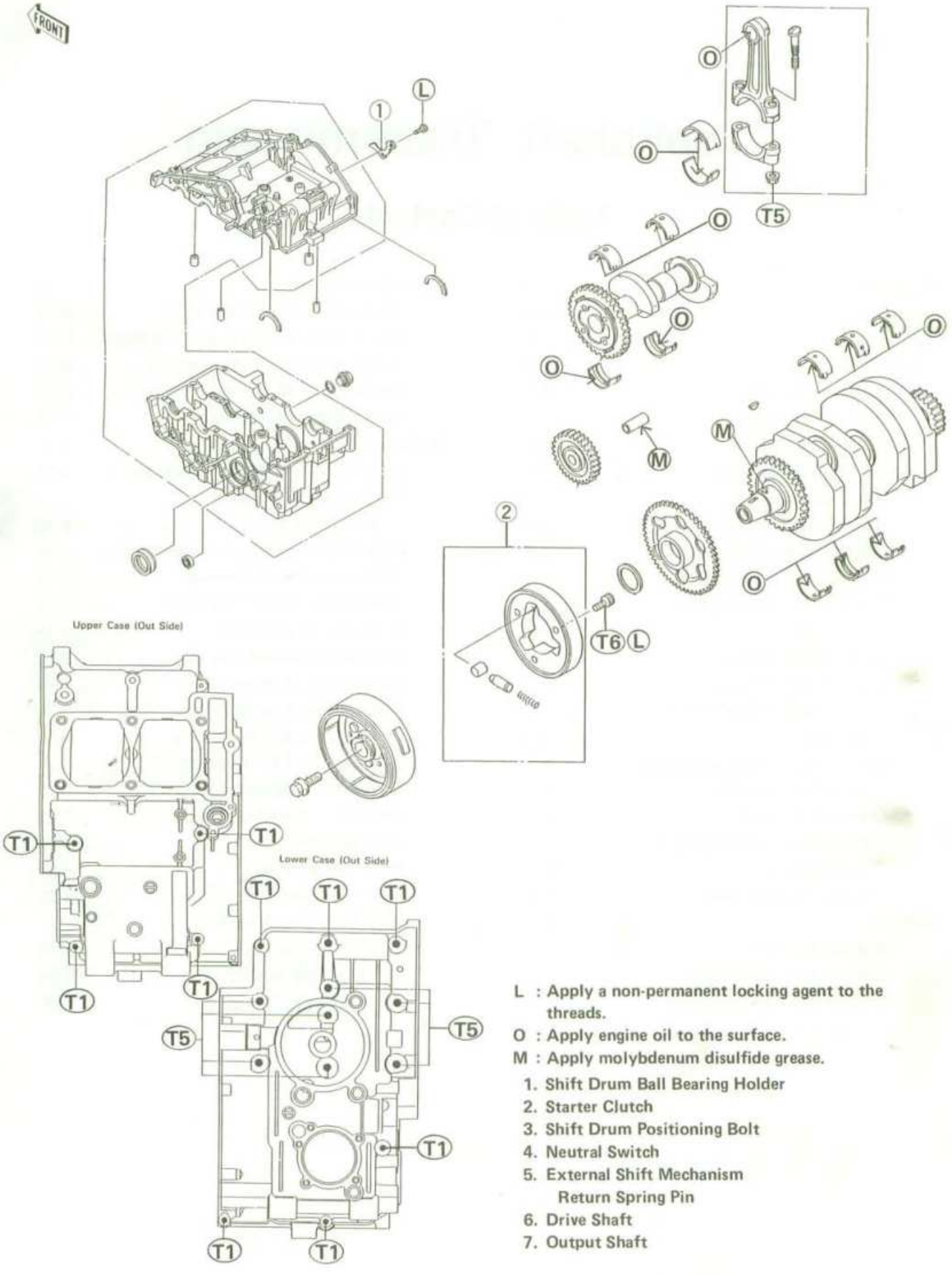
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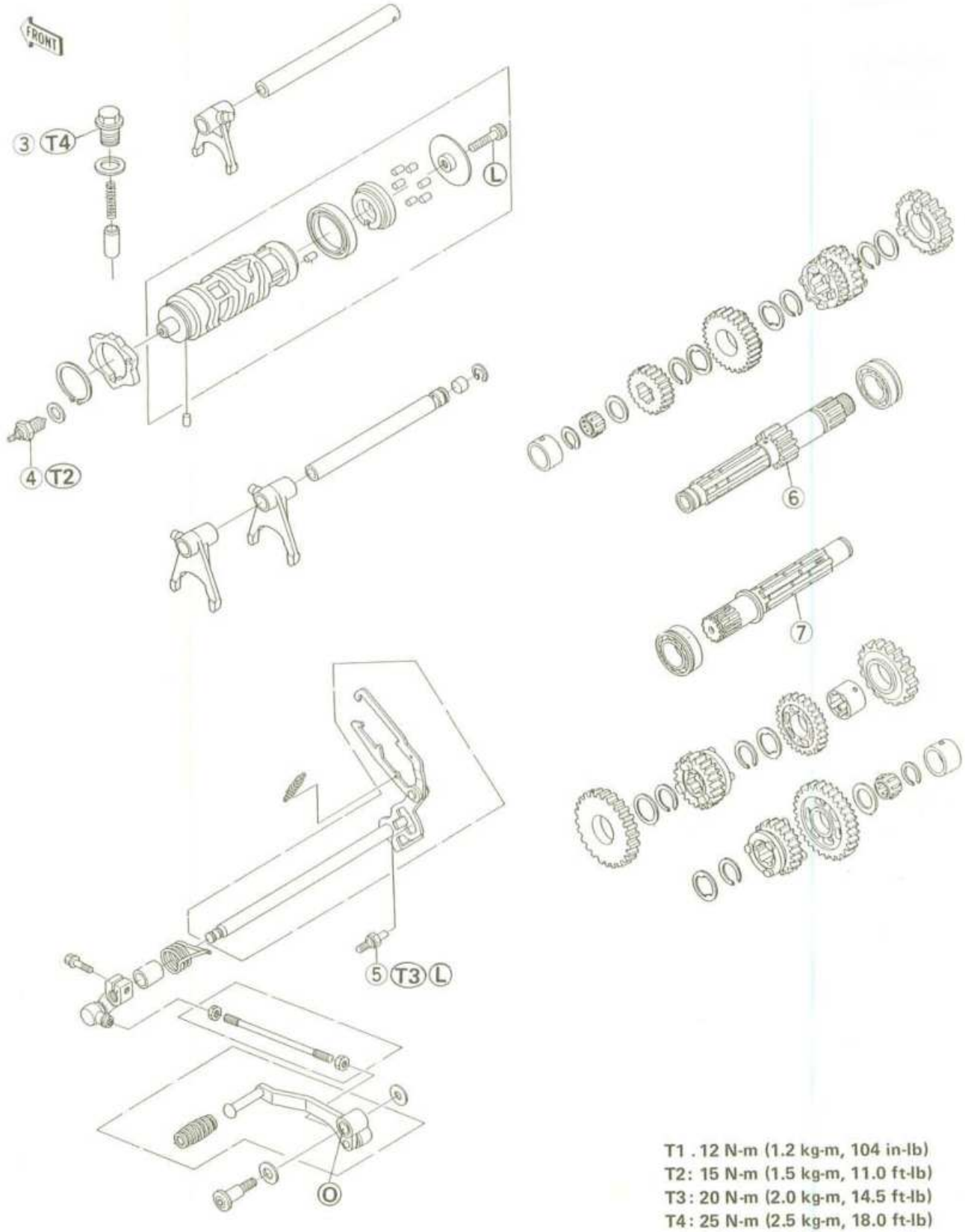
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Exploded View



L : Apply a non-permanent locking agent to the threads.
O : Apply engine oil to the surface.
M : Apply molybdenum disulfide grease.

1. Shift Drum Ball Bearing Holder
2. Starter Clutch
3. Shift Drum Positioning Bolt
4. Neutral Switch
5. External Shift Mechanism Return Spring Pin
6. Drive Shaft
7. Output Shaft



T1 . 12 N-m (1.2 kg-m, 104 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T3: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T4: 25 N-m (2.5 kg-m, 18.0 ft-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
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 – 0.38 mm	0.50 mm
Connecting rod big end bearing insert/crankpin clearance		0.031 – 0.059 mm	0.10 mm
Crankpin diameter:		32.984 – 33.000 mm	32.97 mm
Marking	None	32.984 – 32.992 mm	
	○	32.993 – 33.000 mm	
Connecting rod big end bore diameter:		36.000 – 36.015 mm	– – –
Marking	None	36.000 – 36.008 mm	
	○	36.009 – 36.016 mm	
Connecting rod big end bearing insert thickness:	White/Blue	1.490 – 1.494 mm	– – –
	White/Black	1.485 – 1.490 mm	– – –
	White/Brown	1.480 – 1.485 mm	– – –

Connecting rod big end bearing insert selection:

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	None	White/Blue	92028-1429
None	None	White/Black	92028-1430
○	○		
None	○	White/Brown	92028-1431

Crankshaft runout		– – –	0.05 mm TIR
Crankshaft main bearing insert/journal clearance		0.014 – 0.038 mm	0.08 mm
Crankshaft main journal diameter:		29.984 – 30.000 mm	29.96 mm
Marking	None	29.984 – 29.992 mm	
	1	29.993 – 30.000 mm	
Crankcase main bearing bore diameter:		33.000 – 33.016 mm	– – –
Marking	○	33.000 – 33.008 mm	
	None	33.009 – 33.016 mm	
Crankshaft main bearing insert thickness:			
	Blue	1.499 – 1.503 mm	– – –
	Black	1.495 – 1.499 mm	– – –
	Brown	1.491 – 1.495 mm	– – –

Item	Standard	Service Limit
Crankshaft main bearing insert selection:		
Crankshaft side clearance	0.05 – 0.20 mm	0.40 mm
Transmission:		
Gear backlash	0 – 0.17 mm	0.25 mm
Gear shift fork groove width	5.05 – 5.15 mm	5.3 mm
Shift fork ear thickness	4.9 – 5.0 mm	4.8 mm
Shift fork guide pin diameter	5.9 – 6.0 mm	5.8 mm
Shift drum groove width	6.05 – 6.20 mm	6.3 mm
Balancer Shaft:		
Balancer shaft bearing insert/ journal clearance	0.020 – 0.044 mm	0.08 mm
Balancer shaft journal diameter:	25.984 – 26.000 mm	25.96 mm
Marking: None	25.984 – 25.992 mm	– – –
Marking: ○	25.993 – 26.000 mm	– – –
Balancer shaft bearing bore diameter:	29.000 – 29.016 mm	– – –
Marking: ○	29.000 – 29.008 mm	– – –
Marking: None	29.009 – 29.016 mm	– – –

Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1418	1, 3
			92028-1421	2
○	None	Black	92028-1417	1, 3
None	1		92028-1420	2
None	None	Blue	92028-1416	1, 3
			92028-1419	2

*The bearing insert for No. 2 journals have oil grooves.

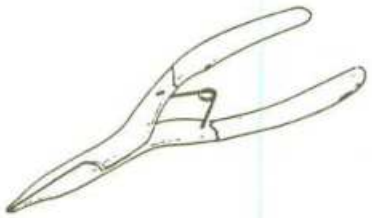
Balancer shaft bearing insert selection:

Balancer Shaft Journal Diameter Marking	Crankcase Balancer Shaft Bore Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
○	None	Black	92028-1423
None	○		
None	None	Blue	92028-1422

Special Tools

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

Circlip Pliers: 57001-144



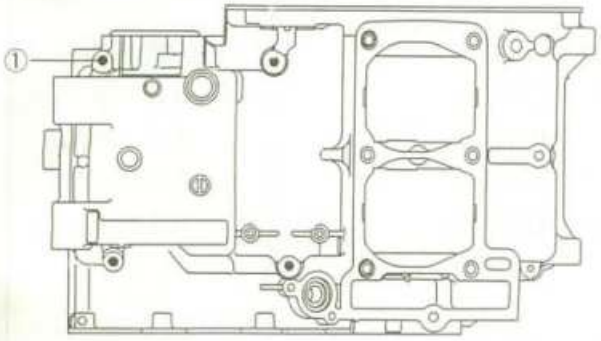
Crankcase Splitting

Crankcase Splitting

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

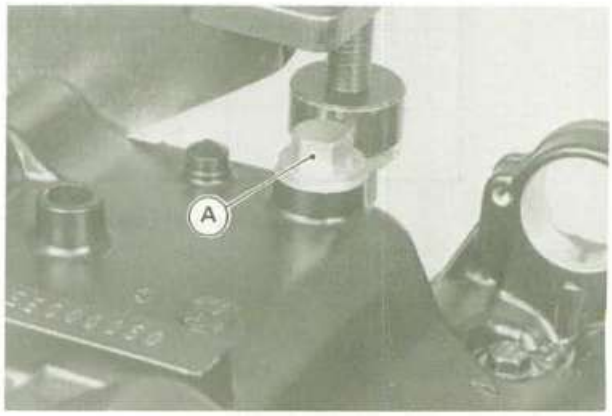
NOTE

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



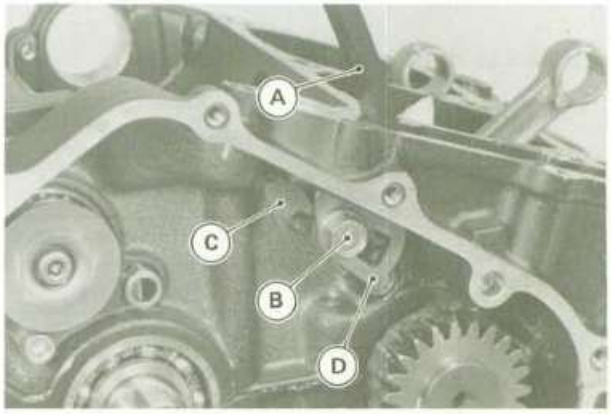
1. Remove this bolt first.

- Remove the following parts from the engine.
  - Water Pump, Hose and Pipe (see Water Pump Removal in Cooling System chapter)
  - Starter Motor Clutch Gear
  - Oil Pipe and Banjo Bolt
  - Starter Motor
  - Oil Pump (see Oil Pump Removal in Lubrication System chapter)
- Remove the following parts only if the crankshaft is to be removed.
  - Cylinder Head Cover
  - Alternator Cover Plugs
  - Position the Crankshaft at Number 2 Cylinder's TDC (compression stroke), and turn it clockwise about 90°
  - Alternator Rotor
  - Oil Hose Banjo Bolt
  - Camshaft Chain Tensioner
  - Camshafts (see Camshaft, Rocker Arm Removal in Engine Top End chapter)
  - Rocker Arms
  - Cylinder Head (see Cylinder Removal in Engine Top End chapter)
  - Cylinder (Cylinder Removal in Engine Top End chapter)
  - Pistons (see Piston Removal in Engine Top End chapter)
- Remove the clutch only if the transmission drive shaft assembly.
- Remove the neutral positioning bolt.



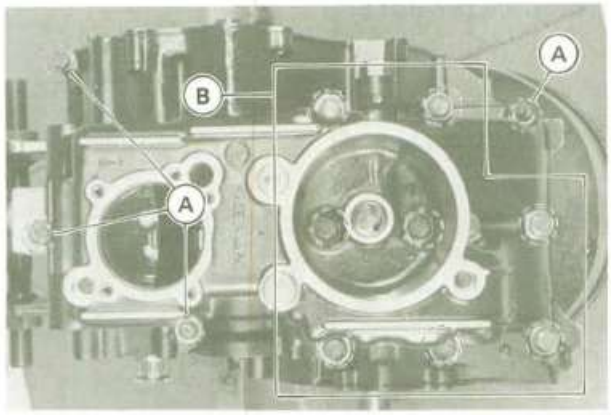
A. Neutral Positioning Bolt

- Remove the oil pressure switch lead terminal, pressure switch and oil hose.
- Remove the neutral switch.
- Remove the external shift mechanism.
- Remove the chain guide lever bolt and take the stopper plate, guide lever, guide, and spacer as a set.

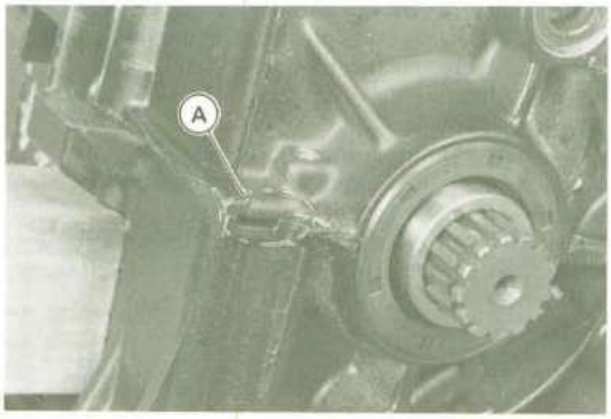


A. Chain Guide
B. Lever Bolt
C. Guide Lever
D. Stopper Plate

- Remove the upper crankcase half bolts (4 or 2 if 2 were removed just after engine removal).
- Turn the engine upside down.
- Remove the oil filter mounting bolt, oil filter, and large O-ring.
- Remove the oil screen cover and screen if necessary.
- Remove the 6 mm and 8 mm lower crankcase half bolts, ply the two points shown to split the two crankcase halves apart, and lift off the lower crankcase half.



A. 6 mm Bolts B. 8 mm Bolts



A. Ply Point

Crankcase Assembly

NOTE

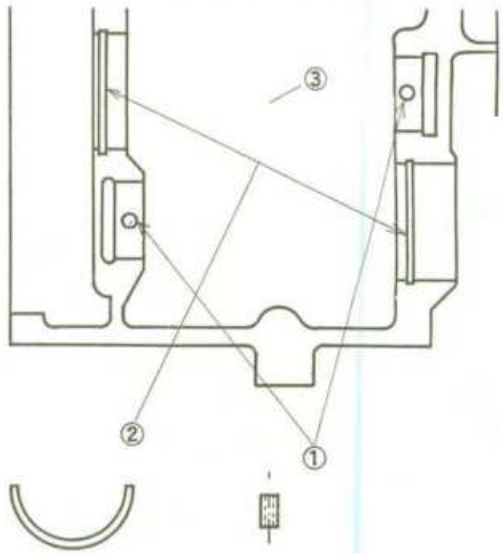
○*The upper and lower crankcase halves are machined at the factory as an assembly, so the crankcase halves must be replaced as a set.*

●Assembly is the reverse of splitting. Be careful of the following items.

○With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

○When installing the output and drive shafts, the crankcase set pins must go into the holes in the needle bearing outer races, and the set rings must fit into the grooves in the ball bearings.

Set Pins and Set Rings Installation



1. Set Pins
2. Set Rings
3. Upper Crankcase Half

CAUTION

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

○**Don't use usual set pins because the set pins of this model are different from usual pins. They are hollow and also used to pass oil. If you use usual pins by mistake, the engine always seizes.**

○Check that the knock pins (2) are in place.

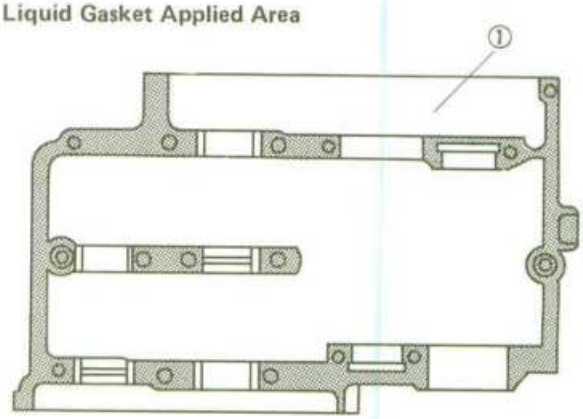
○Apply a little engine oil to the transmission gears, ball bearings, shift drum, and crankshaft main bearing inserts.

○Apply liquid gasket to the mating surface of the lower crankcase half.

CAUTION

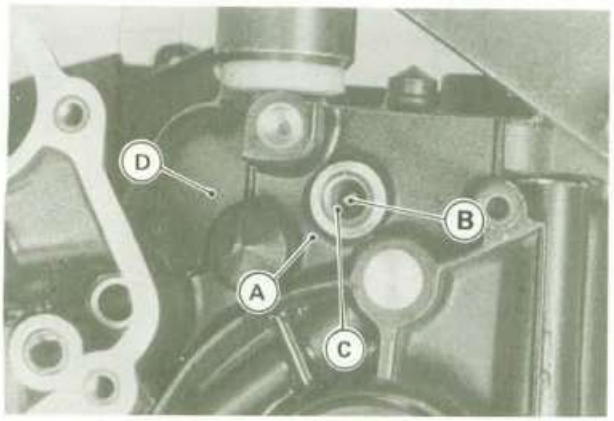
○**If liquid gasket adheres to any areas not indicated, the engine oil passages may be obstructed, causing engine seizure.**

Liquid Gasket Applied Area



1. Lower Crankcase Half

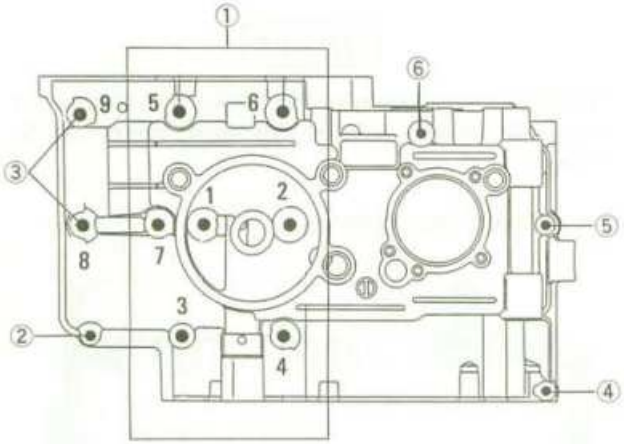
○Check to see that the shift drum is in the neutral position, that is, the projection at operating plate is seen from neutral switch hole at the upper crankcase half.



A. Neutral Switch Hole
B. *Projection*
C. Operating Plate
D. Upper Crankcase Half

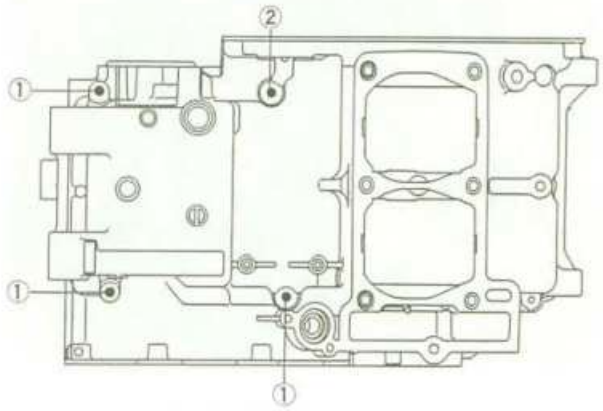
○When fitting the lower crankcase half on the upper crankcase half, each shift fork must fit in its gear groove.
○Loosely tighten all lower crankcase half bolts to a snug fit.
○Following the sequence numbers on the lower crankcase half, tighten the 8 mm bolts first to about one half of the specified torque, and finally to the specified torque in the same sequence (see Exploded View).

Lower Crankcase Half Bolts Tightening Order



1. M8 x 72 mm
2. M6 x 38 mm
3. M8 x 90 mm
4. M6 x 60 mm
5. M6 x 135 mm
6. M6 x 85 mm (Copper Washer)

Upper Crankcase Half Bolts



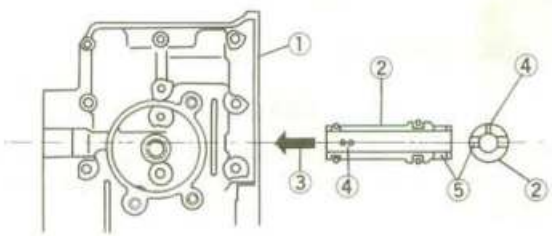
1. M6 x 85 mm
2. M6 x 60 mm (Copper Washer)

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

Crankcase Exchange

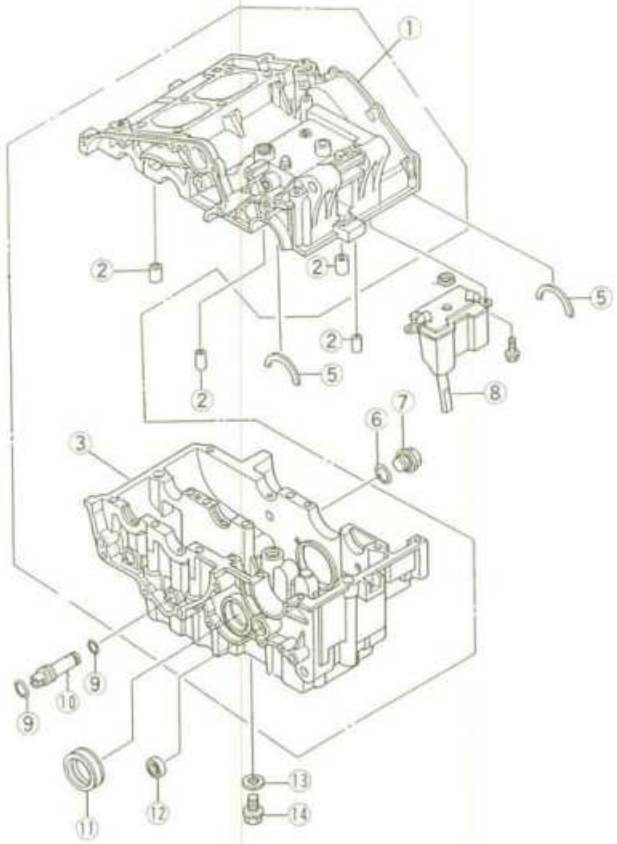
★If crankcase is damaged, replace it with new one.
●Remove the crankcase parts from the damaged case, and install it to the new case. Pay attention to the following items.
○When installing the oil passage plug must be inserted as shown.

Oil Passage Pipe Installation



1. Lower Crankcase Half
2. Oil Passage Pipe
3. Press
4. Small Hall (Up)
5. Slit (Horizontal)

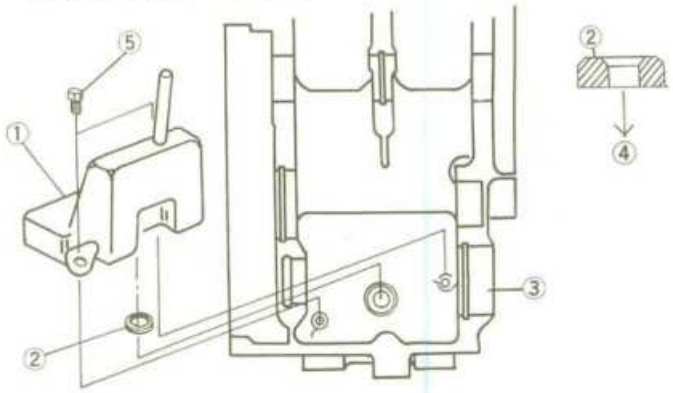
Crankcase Parts



1. Upper Crankcase Half
2. Knock Pin
3. Lower Crankcase Half
4. O-ring
5. Set Ring
6. O-ring
7. Oil Passage Plug
8. Breather Body
9. O-ring
10. Oil Passage Pipe
11. Oil Seal
12. Oil Seal
13. Gasket
14. Drain Plug

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

Breather Body Installation



1. Breather Body
2. O-ring
3. Upper Crankcase Half
4. Crankcase Side
5. Bolt

○Apply a non-permanent locking agent to the thread of the breather bolts, and tighten them.

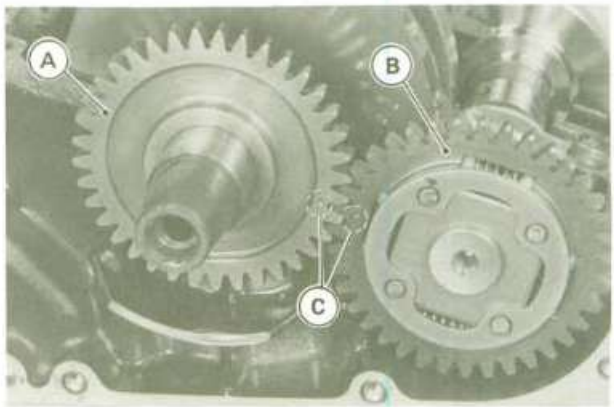
Crankshaft/Connecting Rods

Crankshaft Removal

•Remove the engine.
•Remove the cylinder head, cylinder and pistons.
•Split the crankcase (see Crankcase Splitting).
•Take the crankshaft out of the upper crankcase.

Crankshaft Installation Notes

•If the crankshaft or bearing inserts are replaced with new ones, check the clearances with plastigage to be sure the correct bearing inserts are installed.
•Align the timing mark on the balancer drive gear with the timing mark on the balancer gear.

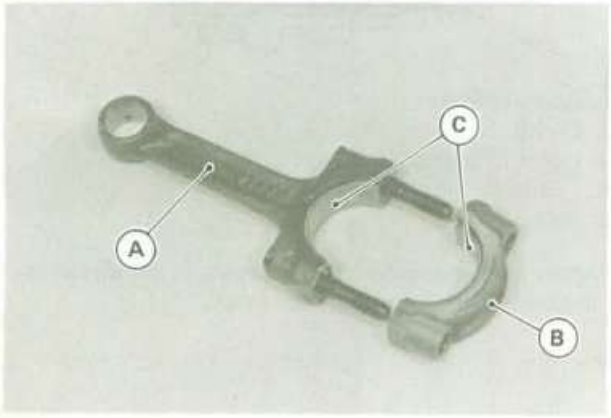


A. Balancer Drive Gear
B. Balancer Shaft Gear
C. Marks Aligned

•Apply engine oil to the main bearing inserts.

Connecting Rod Removal

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



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

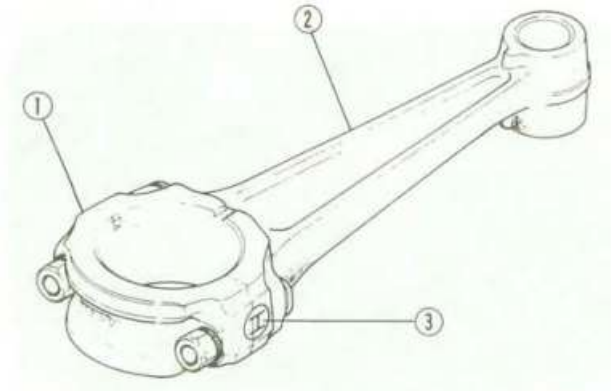
CAUTION

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

Connecting Rod Installation Notes

•To minimize vibration, a pair of connecting rods 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 correcting bearing inserts are installed.
•Apply engine oil to the bearing inserts.

Crankshaft/Connecting Rod Cleaning

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

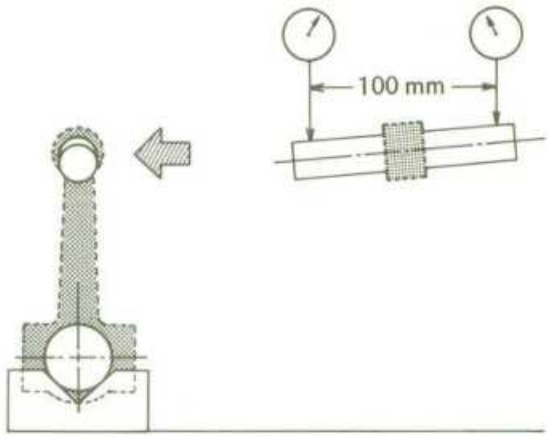
Connecting Rod Bend

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

Connecting Rod Bend

Service Limit:	**0.2/100 mm**

Connecting Rod Bend Measurement



Connecting Rod Twist

●Measure connecting rod twist.

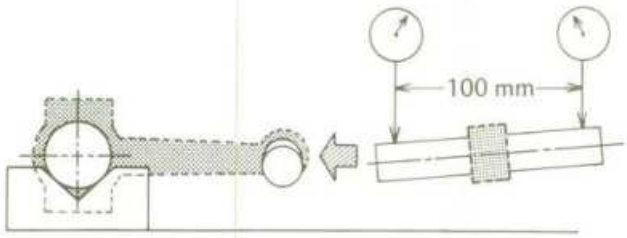
○With the big-end arbor still on V blocks, hold the connecting rod horizontally and measure the amount that the arbor varies from being parallel with the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.

★If the 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



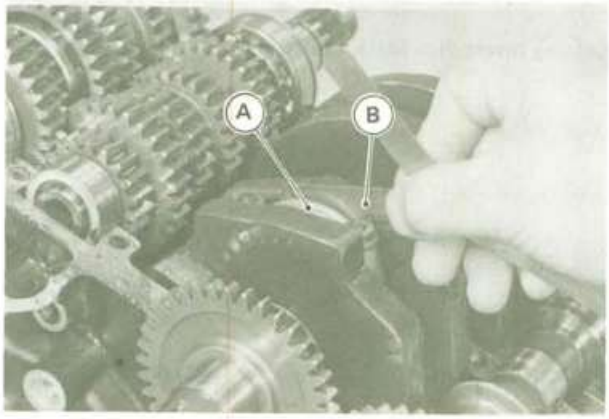
Connecting Rod Big End Side Clearance

●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 also must be replaced.

Connecting Rod Big End Bearing Insert/Crankpin Wear

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

●Measure the bearing insert/crankpin clearance.

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

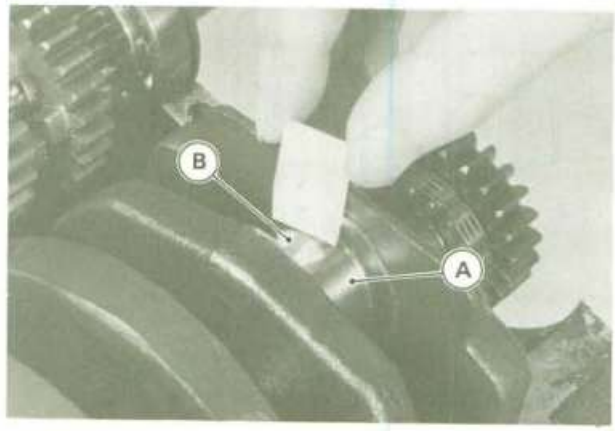
○Cut strips of plastigage to bearing insert width, and place a strip on the crankpin for each connecting rod parallel to the crankshaft so that the plastigage will be compressed between the crankpin and the bearing insert.

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

NOTE

○*Do not turn the crankshaft and/or connecting rod 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:	**0.031 – 0.059 mm**
Service Limit:	**0.10 mm**

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

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

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

Crankpin Diameter

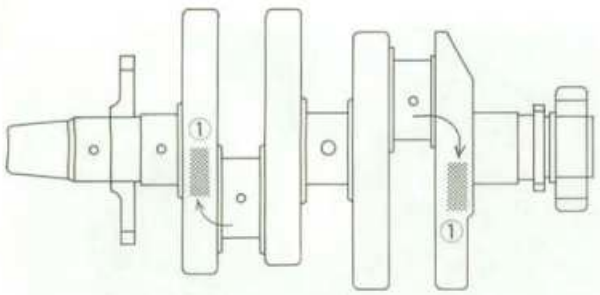
Standard: 32.984 – 33.000 mm
Service Limit: 32.97 mm

★If any crankpin has worn past the service limit, replace the crankshaft with a new one.
★If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankpin Diameter Marks

None: 32.984 – 32.992 mm
○ : 32.993 – 33.000 mm

Crankpin Dia. Mark Location



1. Crankpin Diameter Marks "O" or None

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

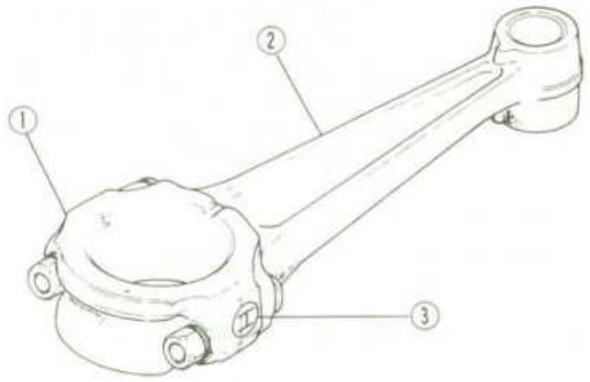
NOTE

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

Connecting Rod Big End Inside Diameter Marks

None: 36.000 – 36.008 mm
○ : 36.009 – 36.016 mm

Connecting Rod Mark Location



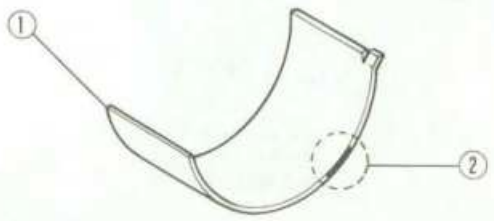
1. Big End Cap
2. Connecting Rod
3. Diameter Mark
"O" Mark or No Mark

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

Bearing Insert Selection

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	None	White/Blue	92028-1429
○	○	White/Black	92028-1430
None	None		
None	○	White/Brown	92028-1431

Bearing Insert Size Mark Location



1. Bearing Insert 2. Color Size Mark

Crankshaft Runout

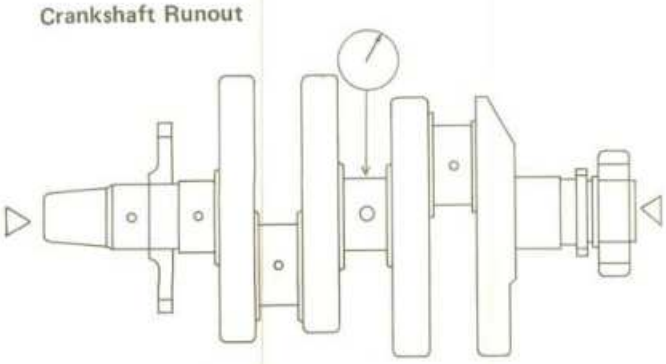
●Measure the crankshaft runout.
○Set the crankshaft in a flywheel alignment jig or on V blocks.
○Set a dial gauge against the center journal.

○Turn the crankshaft slowly to measure the runout. The difference between the highest and lowest dial gauge readings (TIR) is the amount of runout.
★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Service Limit: 0.05 mm TIR

Crankshaft Runout



Crankshaft Main Bearing Insert/Journal Wear

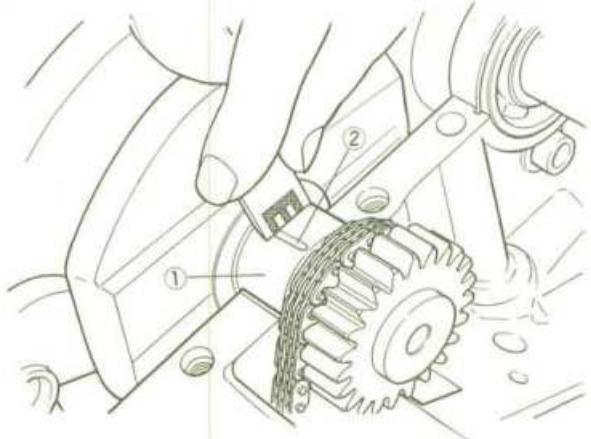
Bearing insert/journal wear is measured using a plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

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

NOTE

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

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



1. Journal 2. Plastigage

Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.014 – 0.038 mm
Service Limit: 0.08 mm

★If clearance is within the standard, no bearing replacement is required.
★If clearance is between 0.038 mm and the service limit (0.08 mm), replace the bearing inserts with inserts painted blue. Cehck 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: 29.984 – 30.000 mm
Service Limit: 29.96 mm

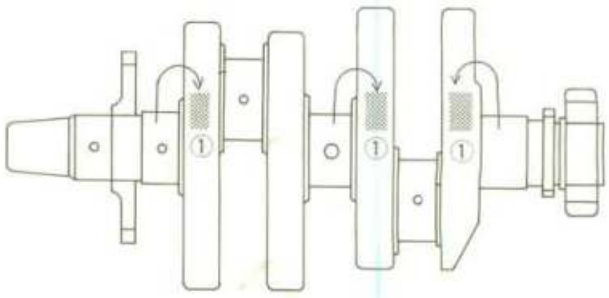
★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankshaft Main Journal Diameter Marks

None: 29.984 – 29.992 mm
1 : 29.993 – 30.000 mm

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

Crankshaft Journal Dia. Mark Location



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

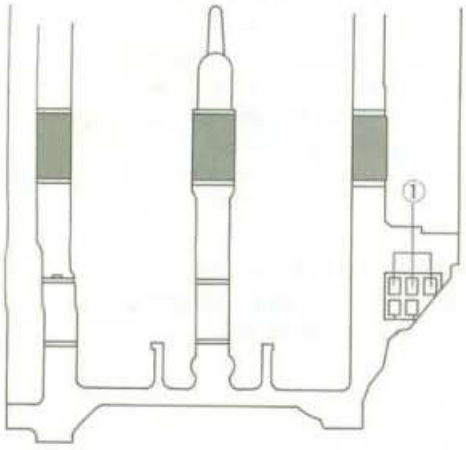
NOTE

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

Crankcase Main Bearing Bore Diameter Marks

○ :	33.000 – 33.008 mm
None:	33.009 – 33.016 mm

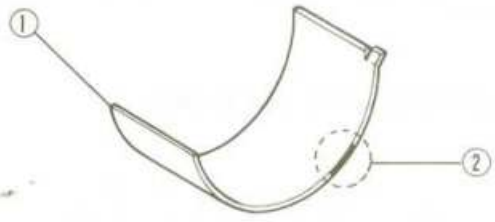
Crankcase Mark Location (Crankshaft)



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

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

Bearing Insert Size Mark Location



1. Bearing Insert 2. Color Size Mark

Crankshaft Side Clearance

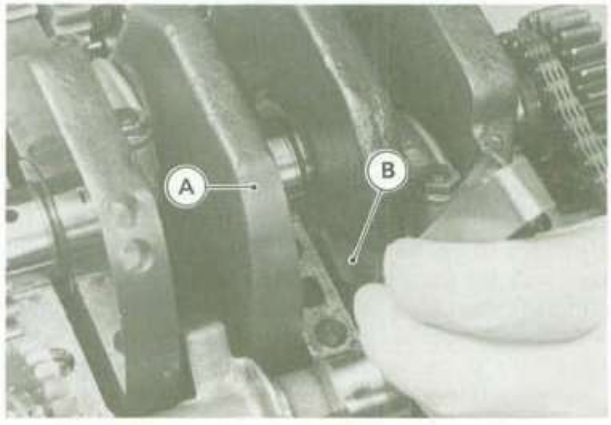
●Measure crankshaft side clearance.
○Insert a thickness gauge between the No.x crankcase main jurnal and the crank web to determine clearance.
★If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

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

Crankshaft Side Clearance

Standard:	0.05 – 0.20 mm
Service Limit:	0.40 mm



A. Crankshaft B. Thickness Gauge

Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1418	1, 3
			92028-1421	2
○	None	Black	92028-1417	1, 3
None	1		92028-1420	2
None	None	Blue	92028-1416	1, 3
			92028-1419	2

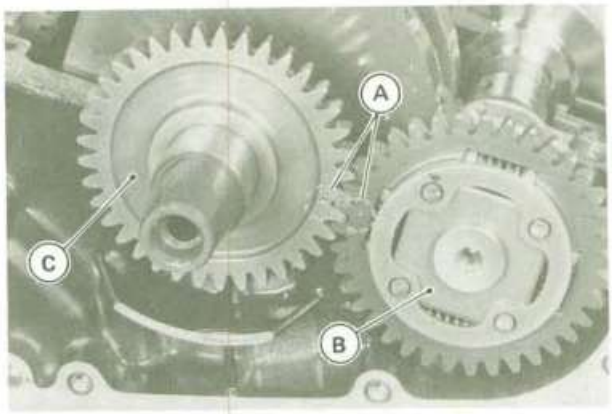
Balancer

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 Drive 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/injournal clearance.

○Split the crankcase and wipe each bearing insert and journal surface clean of oil.

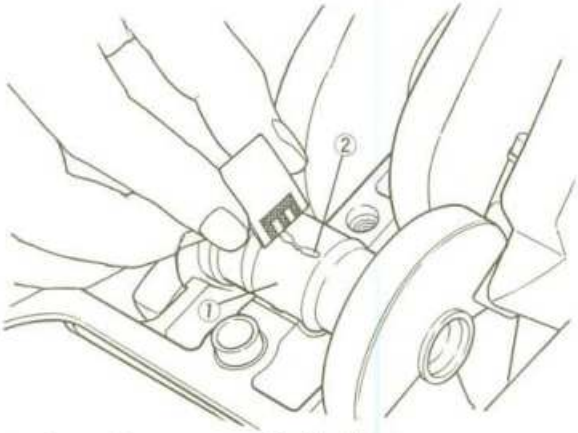
○Cut strips of plastigage to bearing insert width, and place a strip on each journal parallel to the balancer shaft so that the plastigage will be compressed between the journal and the bearing insert.

○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.



1. Journal
2. 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; meausre the diameter of the balancer shaft journal.

Balancer Shaft Journal Diameter

Standard: 25.984 – 26.000 mm
Service Limit: 25.96 mm

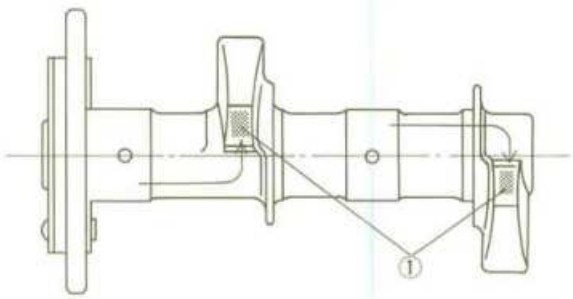
★If either journal has worn past the service limit, replace the balancer shaft with a new one.

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

Balancer Shaft Journal Diameter Marks

None: 25.984 – 25.994 mm
○ : 25.995 – 26.000 mm

Balancer Shaft Mark Location



1. Journal Diameter Marks
○ or None

- 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.

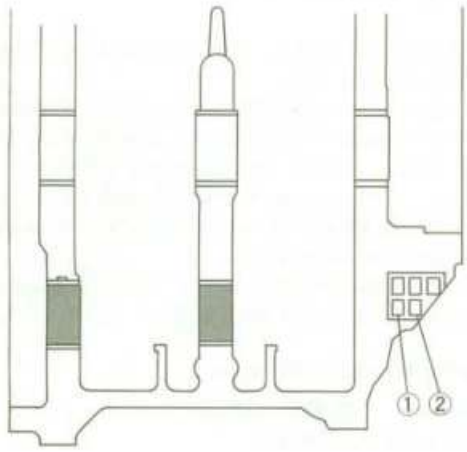
NOTE

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

Crankcase Bearing Inside Diameter Marks

○ :	29.000 – 29.008 mm
None:	29.009 – 29.016 mm

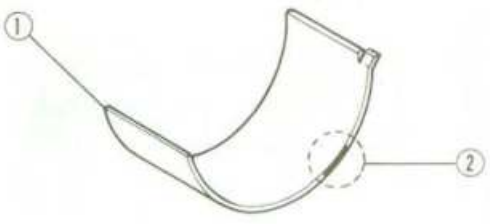
Crankcase Mark Location (Balancer Shaft)



1. No. 1 Journal
2. 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

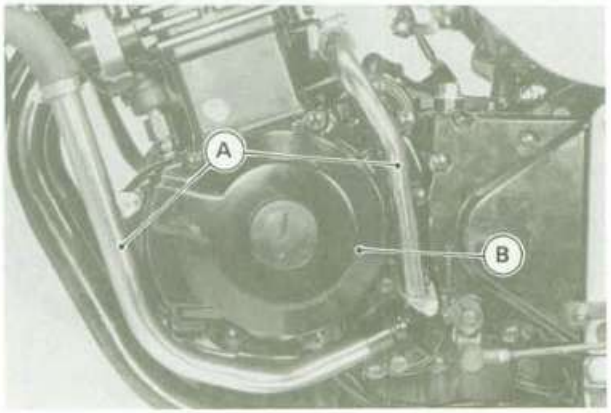
Bearing Insert Selection

Crankcase Bearing Inside Diameter Mark	Balancer Shaft Journal Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
None	None	Blue	92028-1422
○	None	Black	92028-1423
None	○		

Starter Motor Clutch

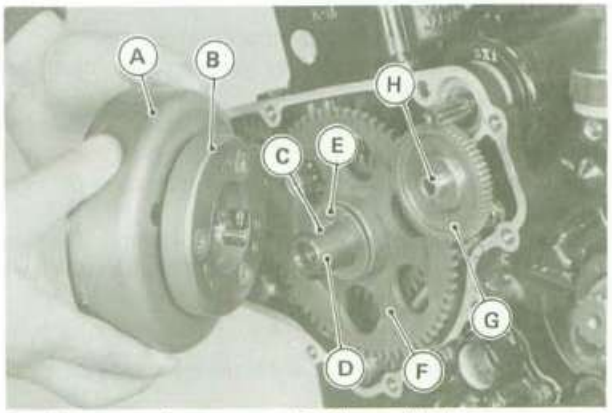
Starter Motor Clutch Removal

- Drain the engine oil.
- Drain the coolant (see Coolant Draining in Cooling System chapter).
- Pull the water pipes off the water pump (see Water Pump Removal in Cooling System chapter).



A. Water Pipes
B. Alternator Cover

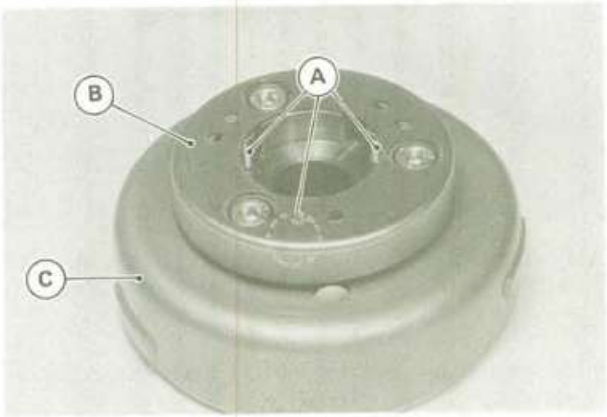
- Remove the alternator cover.
- Remove the alternator rotor (see Alternator Rotor Removal in Electrical chapter).
- Pull the starter motor idle gear and shaft out of the crankcase.
- Remove the woodruff key, thrust washer, and stater motor clutch gear from the crankshaft end.



A. Alternator Rotor
B. Starter Motor Clutch
C. Woodruff Key
D. Crankshaft End
E. Thrust Washer
F. Starter Motor Clutch Gear
G. Starter Motor Idle Gear
H. Shaft

Starter Motor Clutch Installation Notes

- Apply a molybdenum disulfide grease to the inside of the starter motor clutch gear.
- Check that the starter motor clutch rollers (3) are in place.



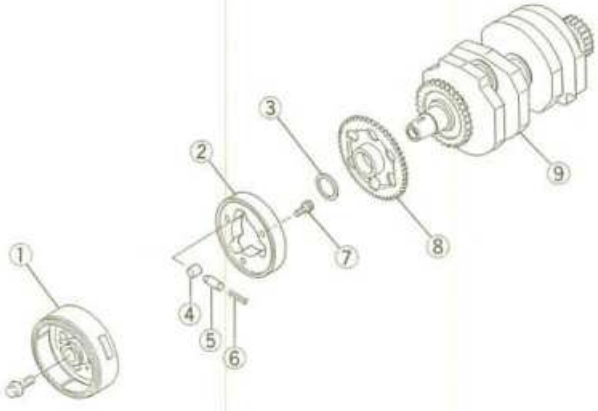
A. Rollers
B. Starter Motor Clutch
C. Alternator Rotor

- Put the alternator rotor (with starter motor clutch) by rotating the starter motor clutch gear counterclockwise.

Starter Motor Clutch Disassembly

- Remove the alternator cover.
- Remove the alternator rotor (see Alternator Rotor Removal in Electrical chapter).
- Holding the alternator rotor steady, remove the Allen bolts (3) to separate the rotor and starter motor clutch.
- Remove the Roller, Spring cap, and spring if necessary.

Starter Motor Clutch



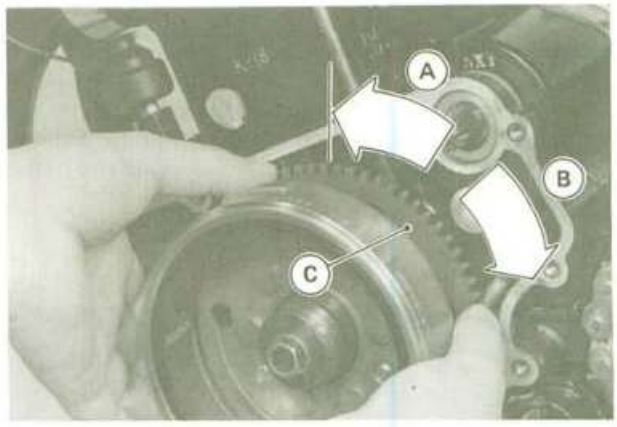
1. Alternator Rotor
2. Starter Motor Clutch
3. Thrust Washer
4. Roller
5. Spring Cap
6. Spring
7. Allen Bolt
8. Starter Motor Clutch Gear
9. Crankshaft

Starter Motor Clutch Assembly Note

- Apply a non-permanent locking agent to te thread of the starter motor clutch Allen bolts (3), and tighten the bolts to the specified torque (see Exploded View).

Starter Motor Clutch Inspection

- Drain the engine oil.
- Drian the coolant (see Coolant Draining in Cooling System chapter).
- Pull the water pipes off the water pump.
- Remove the alternator cover.
- Remove the starter motor idle gear and shaft from the crankcase.
- Turn the starter motor clutch gear by hand. The starter motor clutch gear should turn clockwise freely but should not turn counterclockwise.



A. Locked
B. Turn Freely.
C. Starter Motor Clutch Gear

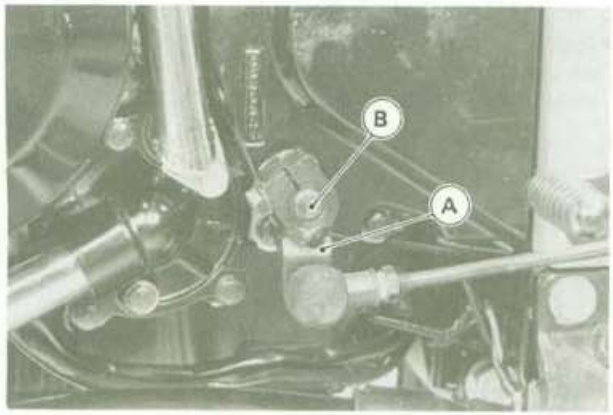
★If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts: springs, spring caps, rollers, and gear.

★If there is any worn or damaged part, replace it.

Transmission

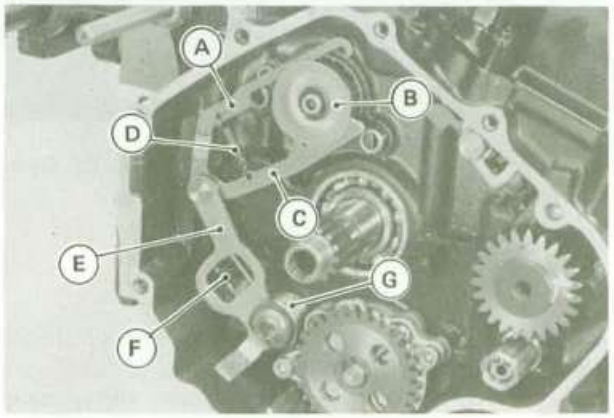
External Shift Mechanism Removal

- Remove the shift lever bolt and pull the lever off the shift shaft end.



A. Shift Lever
B. Shift Shaft

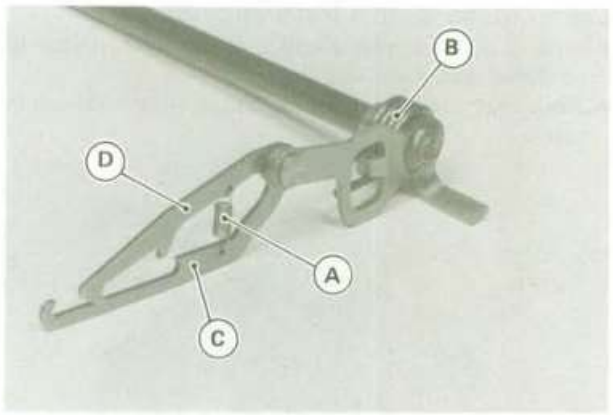
•Remove the clutch (see Clutch Removal in Clutch chapter).
•Move the shift mechanism arm and overshift limiter out of their positions on the end of the shift drum, and pull out the shift shaft with the arm, pawl spring and return spring.



A. Overshift Limiter
B. Shift Drum
C. Shift Mechanism Arm
D. Pawl Spring
E. Shift Shaft
F. Return Spring Bolt
G. Return Spring

External Shift Mechanism Installation Notes

•Check that the return spring and pawl spring are properly fitted on the mechanism, install the external shift mechanism, and place the shift mechanism arm and overshift limiter on the shift drum pins.

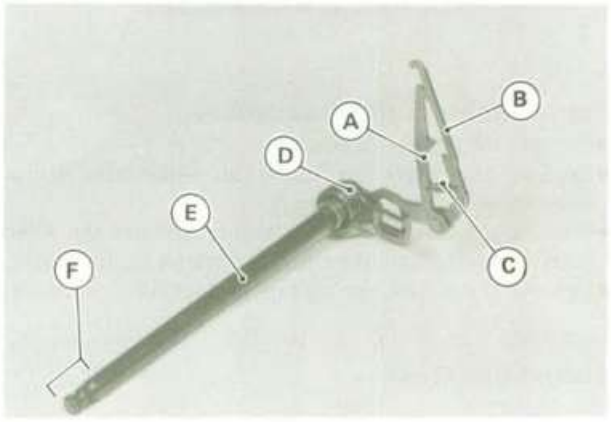


A. Pawl Spring
B. Return Spring
C. Overshift Limiter
D. Shift Mechanism Arm

•Add engine oil (see Engine Oil Level Inspection in Lubrication System chapter).

External Shift Mechanism Inspection

•Examine the shift shaft for any damage.



A. Shift Mechanism Arm
B. Overshift Limiter
C. Pawl Spring
D. Return Spring
E. Shift Shaft
F. Splines

○Check the shift shaft for bending or damage to the splines.
☆If the shaft is bent, straighten or replace it. If the splines are damaged, replace the shaft.
○Check the return spring and pawl spring for breaks or distortion.
☆If the springs are damaged in any way, replace them.
○Check the shift mechanism arm and overshift limiter for distortion.
☆If the shift mechanism arm or overshift limiter is damaged in any way, replace the shift shaft.
•Check that the return spring pin is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it to the specified torque (see Exploded View).

●Visually inspect the shift drum pins, pin holder, and pin plate.
★If they are badly worn or if they show any damage, replace them.

Transmission Shaft Removal

●Remove the engine.
●Split the crankcase.
●Take out the drive and output shaft assemblies.

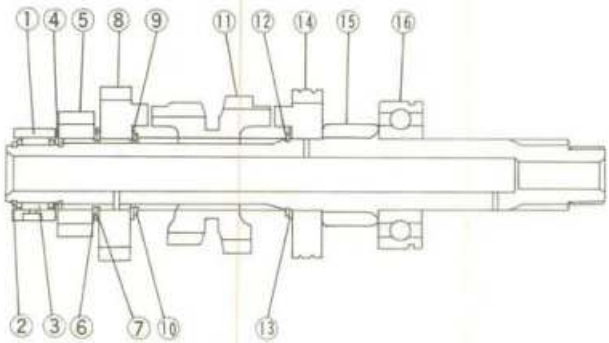
Transmission Shaft Installation

●With a high flash-point solvent, clean off the outer circumferences of the transmission ball bearings and needle bearing housings, and wipe dry.
●Check to see that the set rings and set pins are in place in the transmission bearing housings and blow the oil passages in the bearing housings clean with compressed air.
●Install the drive and output shaft assemblies in the upper crankcase half.
○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance between the crankcase and the bearing outer races.
●Assemble the crankcase.
●Install the engine.

Drive Shaft Disassembly

●Remove the engine.
●Remove the clutch.
●Split the crankcase.
●Take out the drive shaft assembly.

Drive Shaft

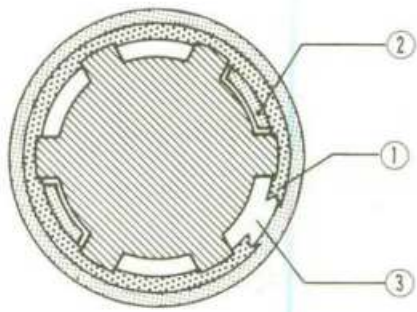


1. Bearing Outer Race
2. Circlip
3. Needle Bearing
4. Thrust Washer
5. 2nd Gear
6. Circlip
7. Toothed Washer
8. Top Gear
9. Toothed Washer
10. Circlip
11. 3rd, 4th Gear
12. Circlip
13. Washer
14. 5th Gear
15. Drive Shaft (1st Gear)
16. Ball Bearing

Drive Shaft Assembly Notes

●Replace any circlips that were removed with new ones.
●Always install circlips so that the opening is aligned with a spline groove, and install toothed washers so that the teeth are not aligned with the circlip opening.

Circlip and Toothed Washer Installation

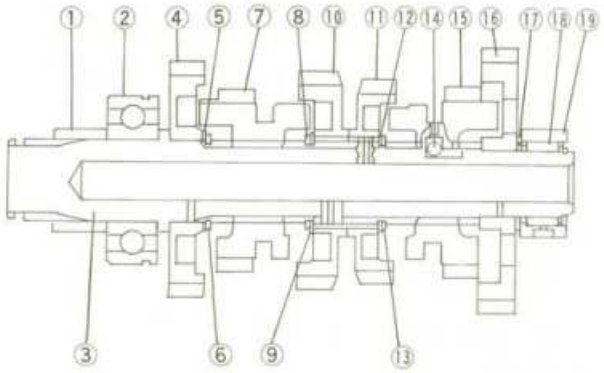


1. Circlip
2. Toothed Washer
3. Groove

Output Shaft Disassembly

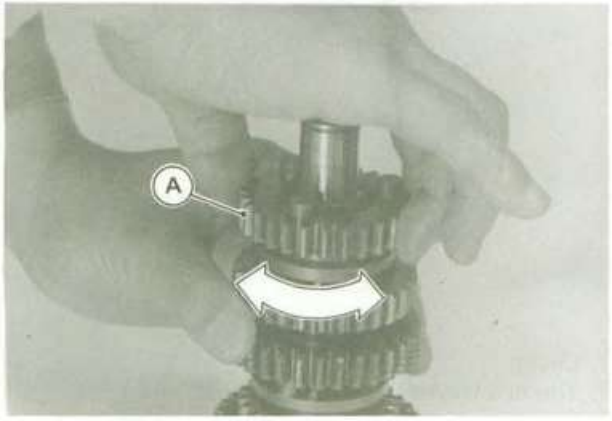
●Remove the engine.
●Split the crankcase.
●Take out the output shaft assembly.

Output Shaft



1. Collar
2. Ball Bearing
3. Output Shaft
4. 2nd Gear
5. Toothed Washer
6. Circlip
7. Top Gear
8. Circlip
9. Toothed Washer
10. 4th Gear
11. 3rd Gear
12. Toothed Washer
13. Circlip
14. Steel Ball
15. 5th Gear
16. 1st Gear
17. Thrust Washer
18. Needle Bearing
19. Bearing Outer Race

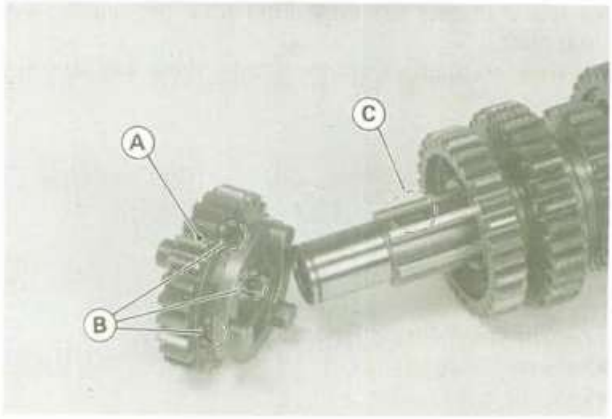
•The 5th gear has three steel balls assembled into it for the positive neutral finder mechanism. To remove this gear from the 5th gear, quickly spin the shaft in a vertical position while holding the 3rd gear, and pull off the 5th gear upwards.



A. 5th Gear

Output Shaft Assembly Notes

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

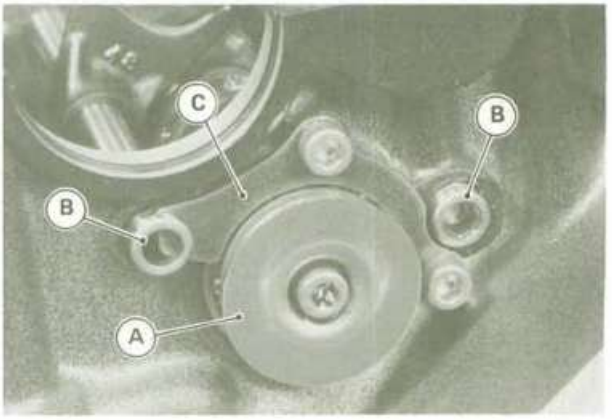


A. 5th Gear
B. Steel Balls
C. Recess

•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.

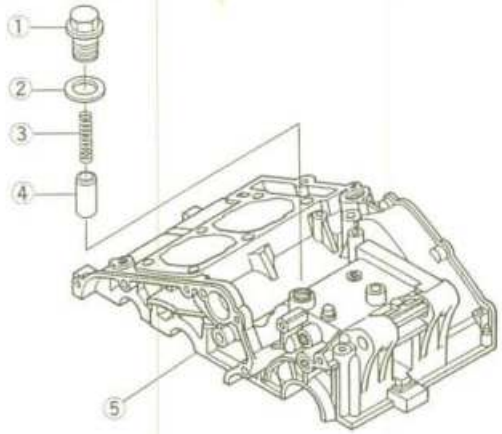
Shift Drum and Fork Removal

•Remoeve the engine (see Engine Removal in Engine Removal/Installation chapter).
•Split the crankcase (see Crankcase Splitting).
•Remove the neutral positioning bolt and take off the washer, spring, and pin from the crankcase.
•Remove the shift drum holding plate bolts (2) and take the plate out of the shift drum and shift rod.



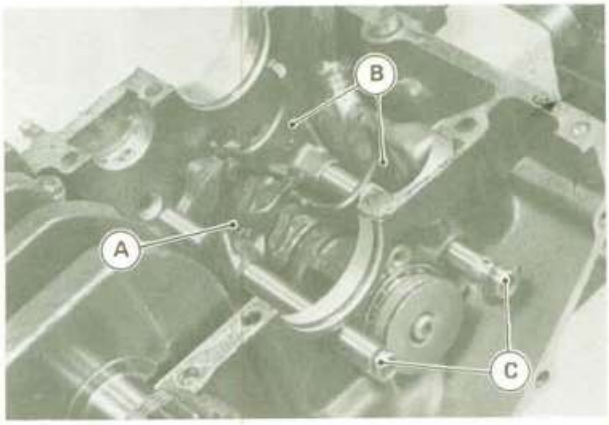
A. Shift Drum
B. Shift Rods
C. Holding Plate

Neutral Positioning Bolt



1. Neutral Positioning Bolt
2. Gasket
3. Spring
4. Pin
5. Upper Crankcase Half

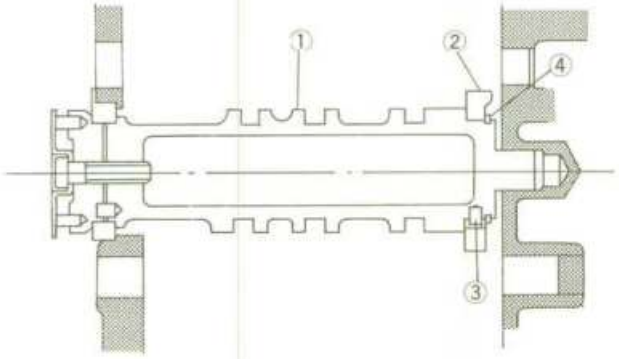
●Pull the shift rods off the right side of the crankcase, and take off the shift forks.



A. Shift Fork (Drive)
B. Shift Forks (Output)
C. Shift Rods

●Pull out the shift drum about half.
●Remove the operating plate circlip and operating plate.

Shift Drum



1. Shift Drum
2. Operating Plate
3. Operating Plate Pin
4. Circlip

●Pull the shift drum out of the upper crankcase half.

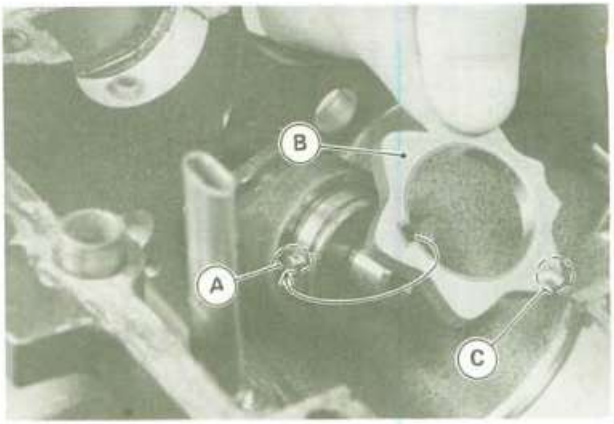
Shift Drum and Fork Installation

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

○Check to see that the operating plate pin is in place, fit the operating plate onto the end of the shift drum, and install the circlip.

NOTE

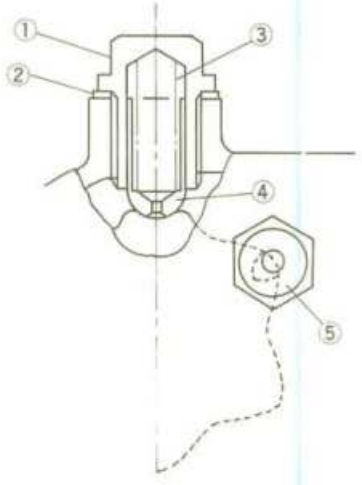
○*When installing the operating plate, the projections face toward the outside.*



A. Operating Plate Pin
B. Operating Plate
C. Projection

○Set the shift drum in neutral position as shown.

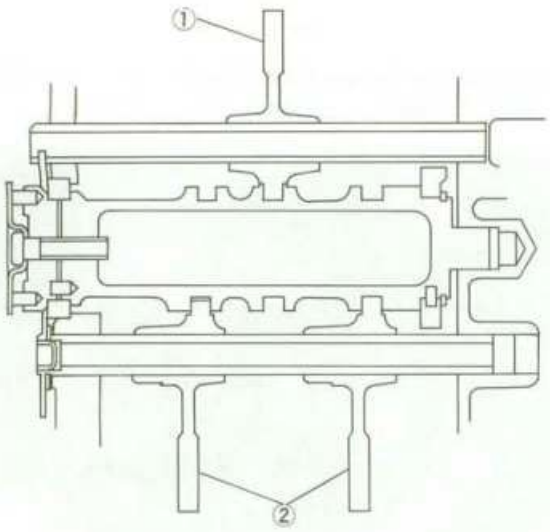
Neutral Position



1. Neutral Positioning Bolt
2. Gasket
3. Spring
4. Pin
5. Neutral Switch

○Apply a little engine oil to the shift rod and shift fork fingers. Insert the shift rod, running it through the shift forks, fitting each shift fork guide pin into the shift drum groove. The output shaft shift forks are identical.

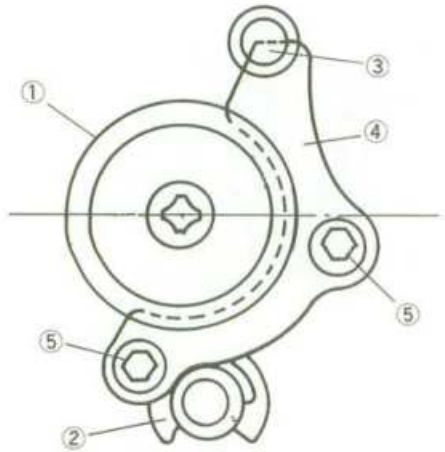
Shift Forks Installation



1. Shift Fork (Drive Shaft)
2. Shift Forks (Output Shaft)

○Install the shift drum holding plate as shown.

Shift Drum Holding Plate Installation



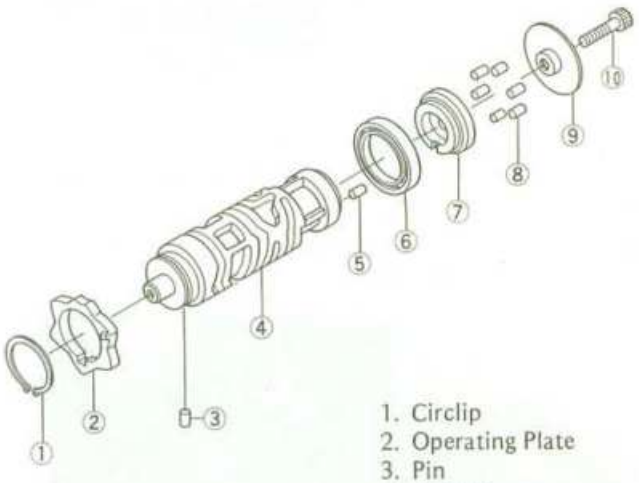
1. Shift Drum
2. Circlip
3. Fit the plate end to the notch.
4. Holding Plate
5. Plate Bolts

○Apply a non-permanent locking agent to the thread of the plate bolts, and tighten them.

Shift Drum Disassembly Note

○Remove the shift drum and the disassemble the drum as shown.

Shift Drum Parts



1. Circlip
2. Operating Plate
3. Pin
4. Shift Drum
5. Pin
6. Bearing
7. Holder
8. Pin
9. Pin Plate
10. Pin Plate Allen Bolt

Shift Drum Assembly Notes

○The shift drum pins (6) are identical.

○Apply a non-permanent locking agent to the pin plate bolt, and tighten it.

Gear Backlash

●Split the crankcase leaving the transmission in place.

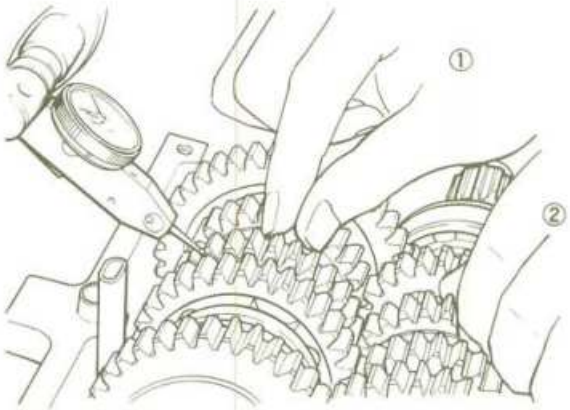
●Set a dial gauge against the teeth on one gear, and move the gear back and forth while holding the other gear steady. The difference bewteen the highest and the lowest gauge readings in the amount of backlash.

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

Gear Backlash

Standard:	**0 – 0.17 mm**
Service Limit:	**0.25 mm**

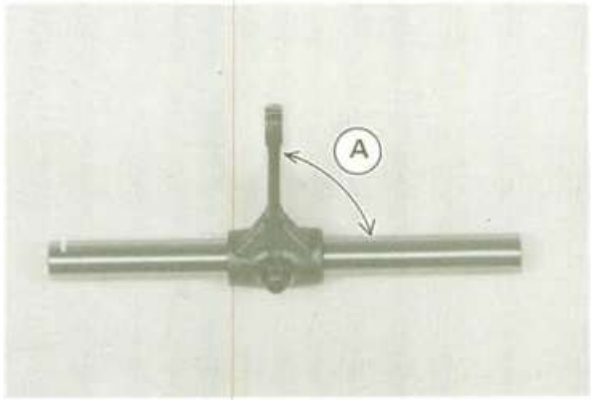
Gear Backlash Inspection



1. Move back and forth lightly
2. Hold steady.

Shift Fork Bending

●Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.



A. 90°

Shift Fork/Gear Groove Wear

●Measure the thickness of the shift fork ears, and measure the width of the shift fork grooves on the transmission gears.

★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

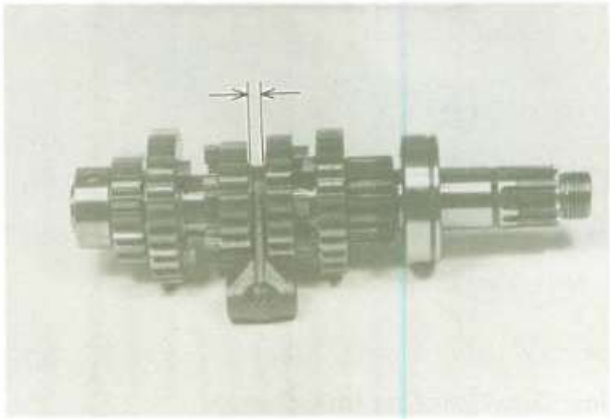
Shift Fork Ear Thickness

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

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

Gear Shift Fork Groove Width

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



Shift Fork Guide Pin/Shift Drum Groove Wear

●Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove.

★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

Standard:	**5.9 – 6.0 mm**
Service Limit:	**5.8 mm**

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Fork



1. Shift Fork Ears
2. Shift Fork Guide Pin
3. Shift Fork

Shift Drum Groove Width

Standard:	**6.05 – 6.20 mm**
Service Limit:	**6.3 mm**



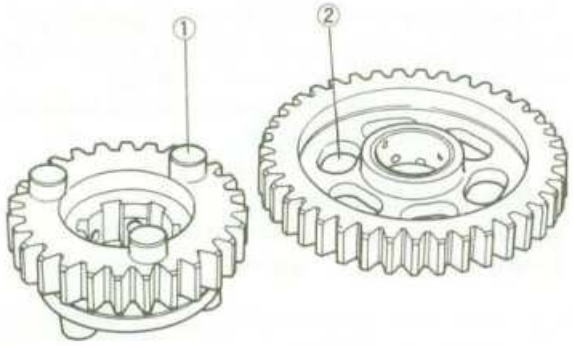
A. Shift Drum Grooves

Gear Dog/Gear Dog Hole Damage

●Visually inspect the gear dogs and gear dog holes.

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

Gear Dog/Dog Hole



1. Dog 2. Dog Hole

Ball and Needle Bearing Wear

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

○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.

Wheels/Tires

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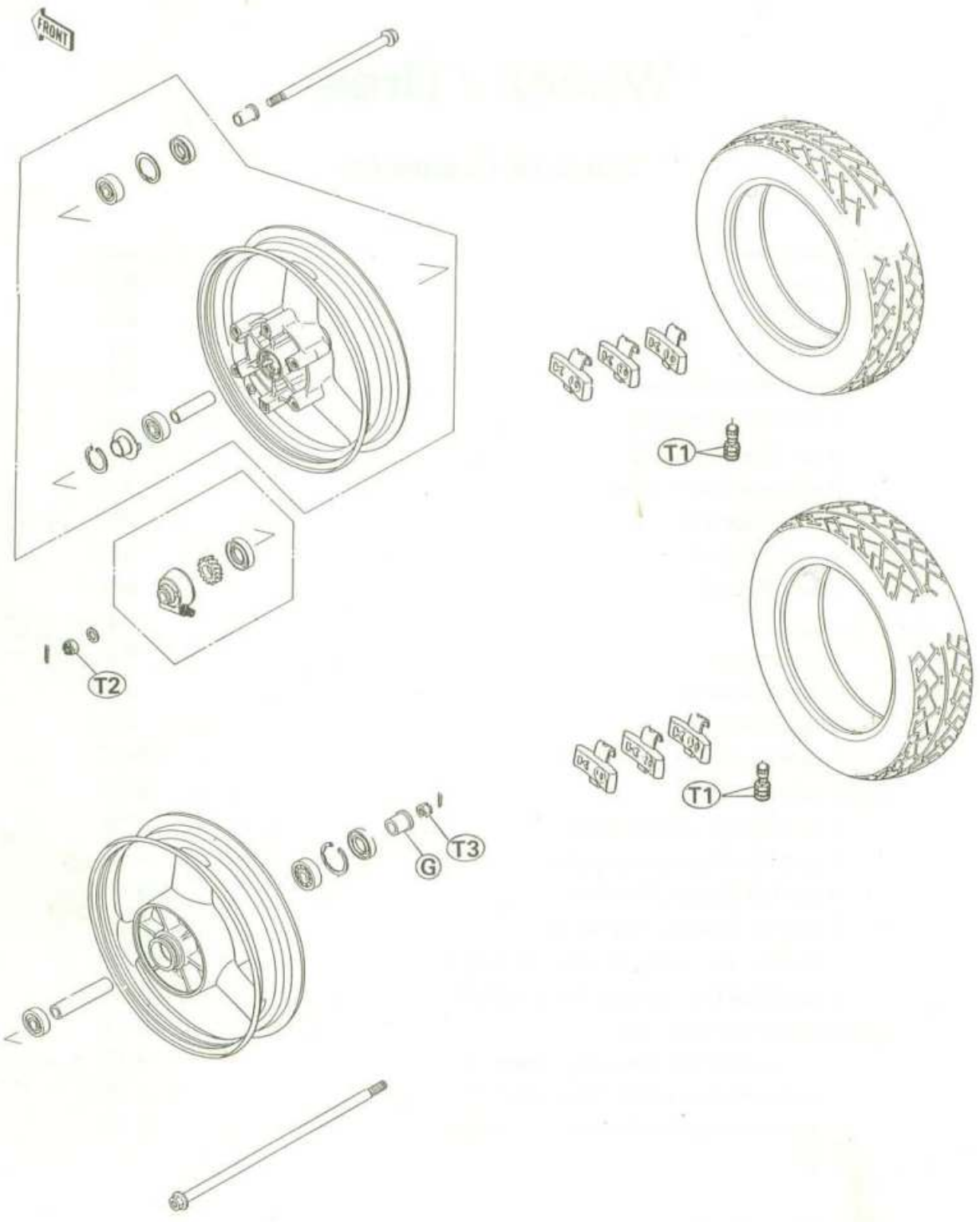
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Exploded View



G : Apply grease.
T1 : 1.5 N-m (0.15 kg-m, 13 in-lb)
T2 : 88 N-m (9.0 kg-m, 65 ft-lb)
T3 : 110 N-m (11.0 kg-m, 80 ft-lb)

Specifications

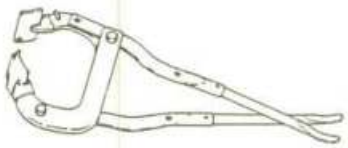
Item		Standard	Service Limit
Wheels:			
Tire tread depth:	Front	3.9 mm	1 mm
	Rear	6.4 mm	2 mm Under 130 km/h (80 mph) 3 mm Over 130 km/h (80 mph)
Stnadard tire:	Front	100/80-16 50S TUBELESS DUNLOP K530F	– – –
	Rear	120/80-16 60S TUBELESS DUNLOP K530	– – –

		Load	Air Pressure (when cold)
Tire air pressure	Front		200 kPa (2.0 kg/cm², 28 psi)
	Rear	Up to 1 520 N (155 kg, 342 lb)	225 kPa (2.25 kg/cm², 32 psi)

Rim runout:	Axial	– – –	0.5 mm
	Radial	– – –	0.8 mm
Axle runout/100 mm:		Under 0.05 mm	0.2 mm (0.7 mm : RL)

Special Tools

Bead Breaker Assembly: 57001-1072



Rim Protector: 57001-1063



Bearing Driver Set: 57001-1129



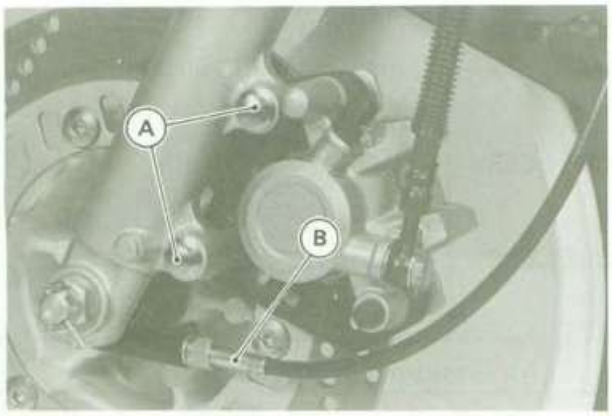
Tire Iron: 57001-1073



Wheels (Rims)

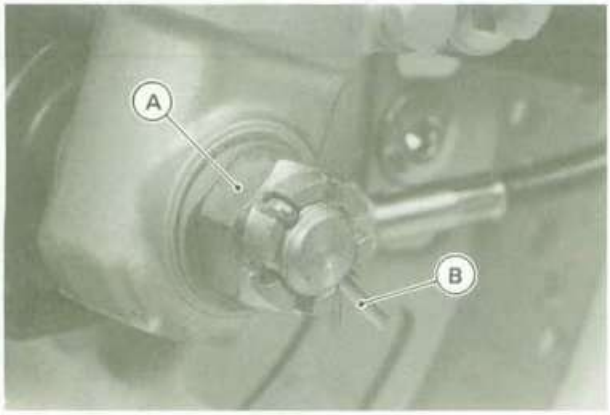
Front Wheel Removal

- Disconnect the speedometer cable lower end.
- Remove both mounting bolts for the brake caliper. Support the caliper so that does not hang by its brake hose.



A. Caliper Mounting Bolts B. Speedometer Cable

- Remove the cotter pin, and loosen the axle nut.



A. Axle Nut B. Cotter Pin

- 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. Place blocks under the wheel so that the disc do not touch the ground.

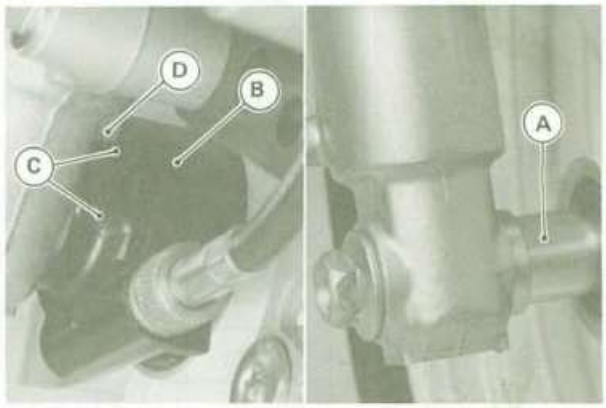
Front Wheel Installation

- Install is the reverse of removal.

NOTE

○Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

○Fit the speedometer gear housing stop to the fork leg stop, and check that the collar is on the right hand side of the hub.



A. Collar C. Housing Stop
B. Speedometer Gear Housing D. Fork Leg Stop

- Tighten the axle nut to the specified torque (see Exploded View).
- Replace the axle nut cotter pin with a new one.
- Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter).
- Check the front brake.

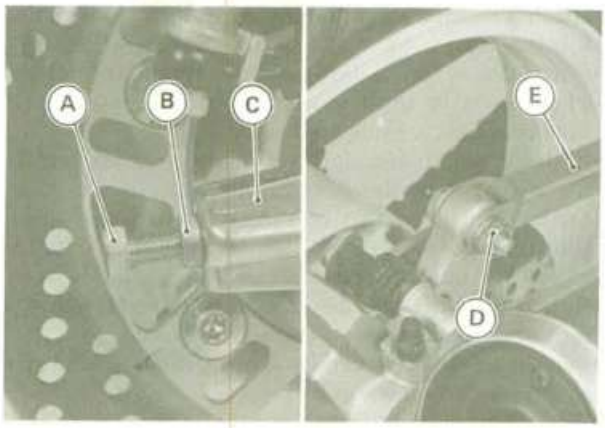
WARNING

○Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brakes will not function on the first application of the lever if this is not done.

Rear Wheel Removal

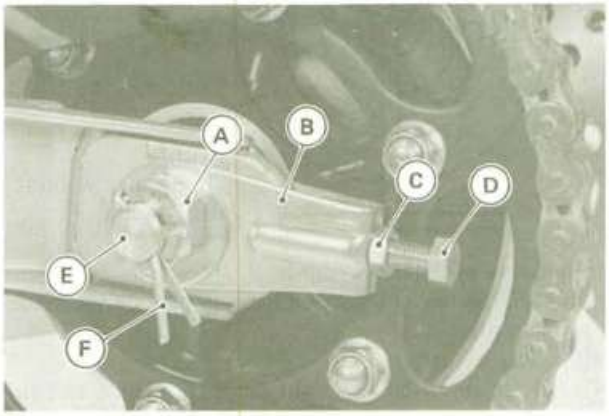
- Remove or loosen the following parts before rear wheel removal.
  - Chain Cover (Remove)
  - Axle Nut Cotter Pin (Remove)
  - Torque Link Nut (Loosen)
  - Chain Adjusting Bolt Locknuts, Adjusting Bolts (Full Loosen)
  - Drive Chain (Full Loosen)
  - Axle and Axle Nut (Remove)
- Pull the drive chain toward the left, and remove the rear wheel.

Right Side



A. Adjusting Bolt
B. Locknut
C. Chain Adjuster
D. Torque Link Nut
E. Torque Link

Left Side



A. Axle Nut
B. Chain Adjuster
C. Locknut
D. Adjusting Bolt
E. Axle
F. Cotter Pin

CAUTION

○**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

Rear Wheel Installation

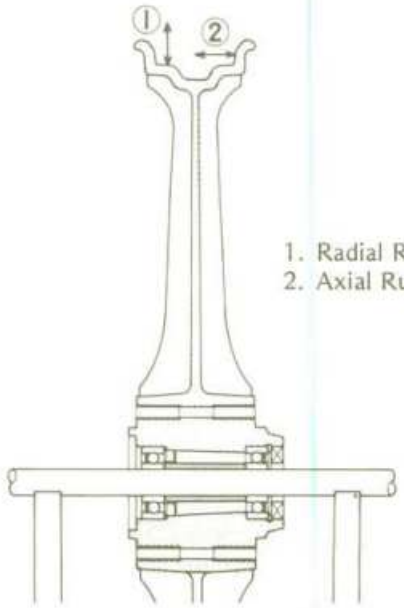
●Installation is the reverse of removal.
●Be careful of the following items.
○Adjust the drive chain after installation (see Drive Chain Adjustment in Final Drive chapter).
○Tighten the axle nut to the specified torque (see Exploded View).
○Tighten the torque link nut to the specified torque (see Exploded View in Brake chapter).

Wheel Inspection

If there is any doubt as to the condition of the wheel, or if the wheel has received a heavy impact, check the rim runout as follows:

●Remove the tire and support the wheel by the axle. Set a dial gauge against the side of the rim, and rotate the wheel to measure the axial runout. The difference between the highest and lowest dial readings is the amount of runout.
●Set the dial gauge against the outer circumference of the rim, and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.
★If rim runout exceeds the service limit, check the wheel bearings first. Replace them if they are damaged.
★If the problem is not due to the bearings, the wheel must be replaced. Do not attempt to repair a damaged wheel.

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



1. Radial Runout
2. Axial Runout

Carefully inspect the wheel for small cracks, dents, bending, or warping. If there is any damage to the wheel, it must be replaced.

WARNING

○**Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.**

If the rim has a scratch deeper than 0.5 mm and/or across the rim-sealing surface, replace the wheel.

Axle Inspection

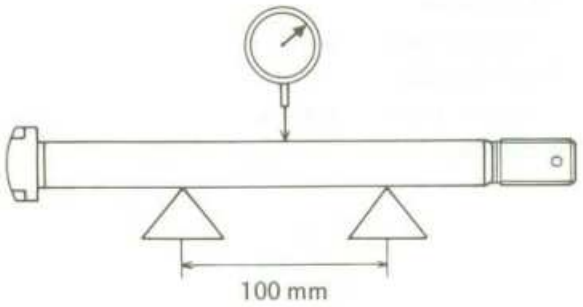
To measure axle runout, remove the axle, place it in V blocks that are 100 mm apart, and set a dial gauge on the axle at a point halfway between the blocks. Turn the axle to measure the runout. The amount of runout is the amount of dial variation.

If runout exceeds the service limit, 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/100 mm

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

Axle Runout

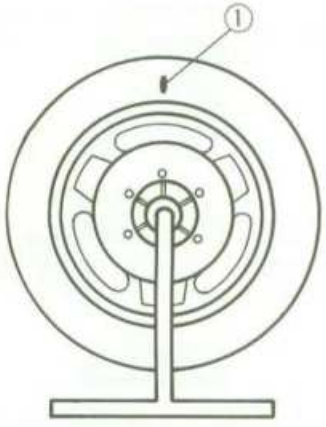


Wheel Balance

To check the wheel balance:

- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark the wheel at the top when the wheel stops.

Wheel Balance Check



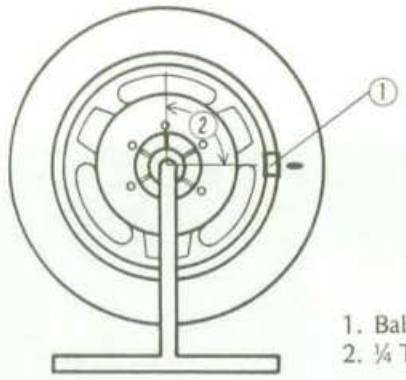
1. Mark

- Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

To balance the wheel:

- If the wheel always stops in one position, provisionally attach a balance weight on the rim at the marking using adhesive tape.
- Rotate the wheel ¼ turn, and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.
- ★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated ¼ turn.
- Rotate the wheel another ¼ turn, and then another ¼ turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weights.

Wheel Balance Adjustment



1. Balance Weigtht
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 rim flat portion.

WARNING

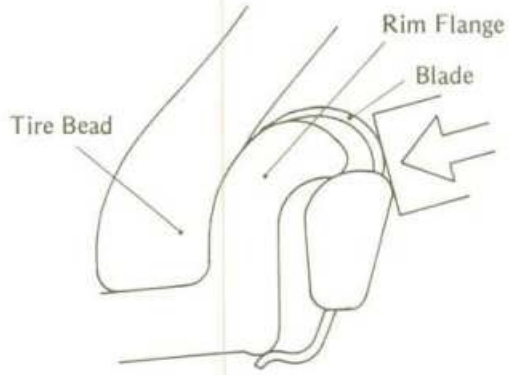
- ○**If the balance weight has any play on the rim flange, the blade and/or clip have been stretched. Replace the loose balance weight.**
- ○**Do not reuse used balance weights.**

Balancer Weight

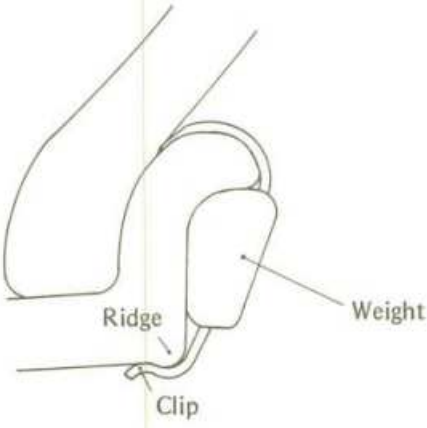
Part Number	Weight (grams)
41075-1014	10
41075-1015	20
41075-1016	30

Installing Balance Weight

(a) Press or lightly hammer the weight in.



(b) Installation completed.

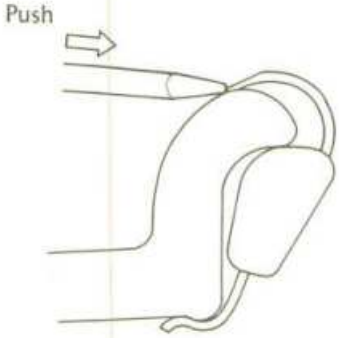


Removal of Balance Weight:

(a) When the tire is not on the rim.

- Push the blade portion toward the outside with a regular tip screw driver, and slip the weight off the rim flange.
- Discard the used balance weight.

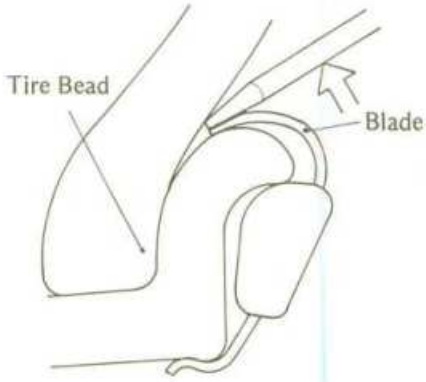
Removing Balance Weight (without tire on rim)



(b) When the tire is on the rim.

- Pry the Balance weight off the rim flange using a regular tip screw driver as shown in the figure.
  - Insert 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 slip s off the rim flange.
- Discard the used balance weight.

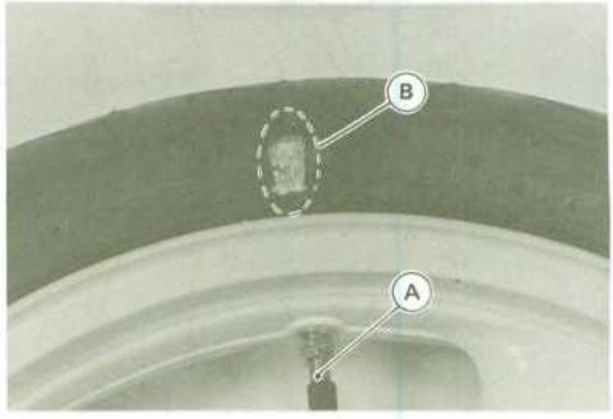
Removing Balance Weight (with tire on rim)



Tires

Tire Removal

- Remove the wheel from the motorcycle (see Wheel Removal), and remove the disc 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

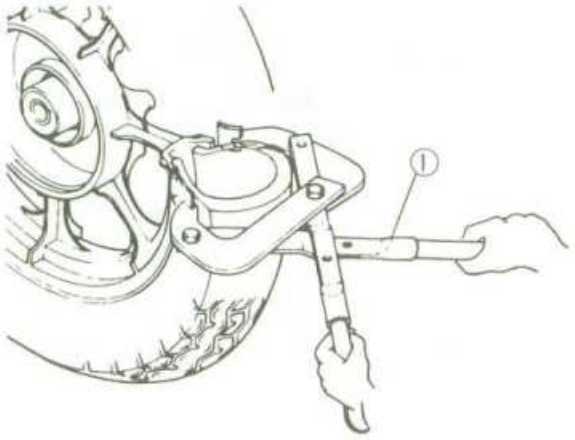
●Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

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 the bead breaker (special tool).

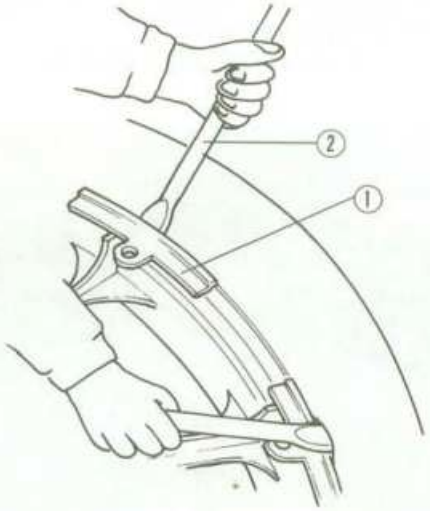
Tire Beads Brake



1. Bead Breaker: 57001-1072

●Install the rim protectors (special tools) around the valve stem. Lubricate the tire irons and rim protectors with a soap and water solution, or rubber lubricant.
●Step on the side of the tire opposite the valve stem, and start prying the tire off the rim near the valve stem with tire irons (special tools).

Tire Removal



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

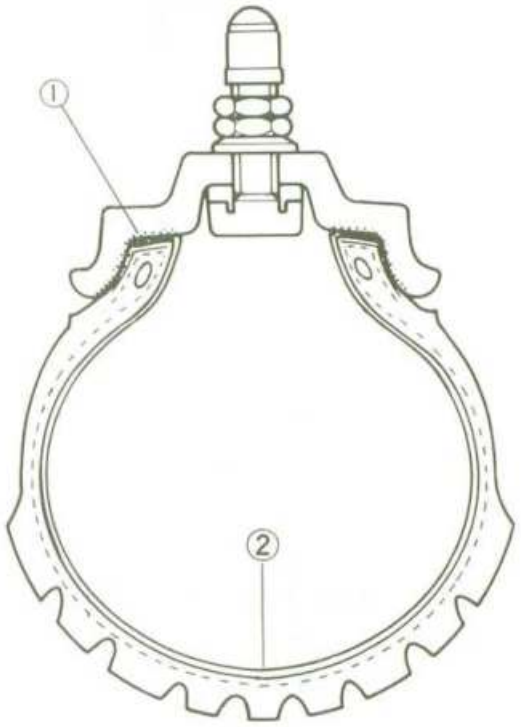
NOTE

○*For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time.*

CAUTION

○**Be careful not to scratch the inner liner and air sealing surfaces of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.**

Air Sealing Surfaces



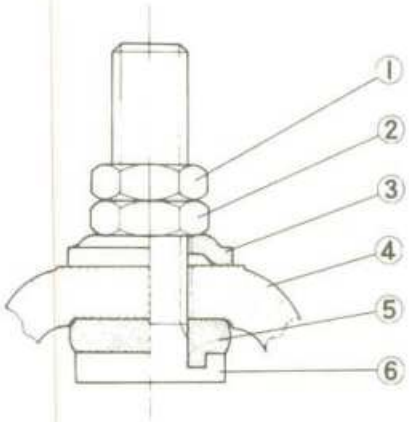
1. Air Sealing Surfaces
2. Inner Liner

●After removing the bead on one side, remove the other bead from the same side.
●Remove the rim from the tire.
●Remove the rim protectors from the rim.

Tire Installation

●Inspect the rim and tire, and replace them if necessary.
●Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
●Replace the valve with a new one. Tighten the mounting nut and locknut to the specified torque (see Exploded View).

Air Valve

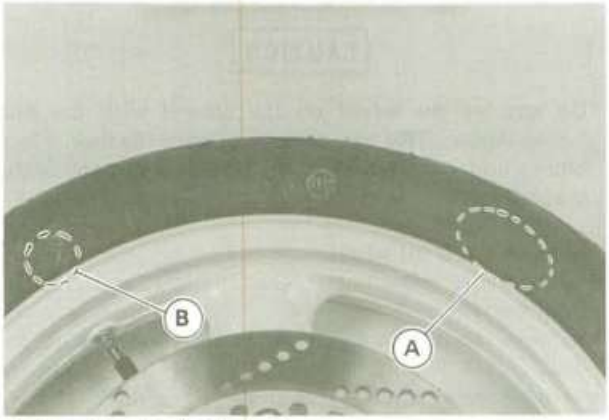


1. Locknut
2. Nut
3. Washer
4. Cast Wheel
5. Grommet
6. Valve Stem

- Apply a soap and water solution, or rubber lubricant to the rim flanges, rim protectors, tire beads, and tire irons.
- Check the tire rotation mark on the tire and install it on the rim accordingly.

NOTE

○*The direction of the tire rotation is shown by an arrow on the tire sidewall.*



A. Rotation Mark (Arrow)
B. Balance Mark (Yellow Paint)

- Position the tire on the rim so that the valve is at the tire balance mark (the chalk mark made during removal, or the yellow paint mark on a new tire).
- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve.
- Fit the rim protectors and tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the parts of the bead which is already over the rim flange in the rim well.

NOTE

○*To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*

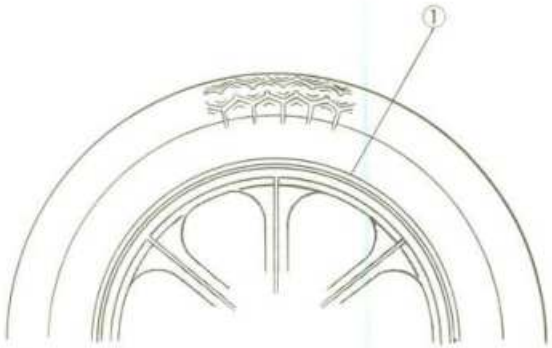
- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate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

WARNING

○**Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 390 kPa (4.0 kg/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 (see Tire Inspection).
- Install the brake disc.
- Adjust the wheel balance (see Wheel Balance).

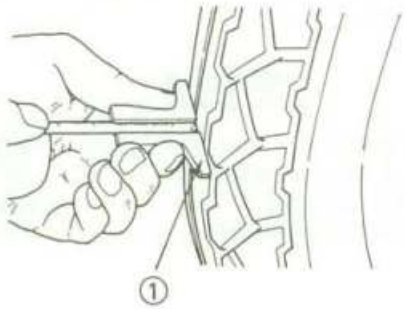
Tire Inspection

As the tire tread wears down, the tire becomes more susceptible the 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.

Tire Wear Inspection



1. Depth Gauge

Tire Tread Depth

Front	
Standard	**3.9 mm**
Service Limit	**1 mm**
Rear	
Standard	**6.4 mm**
Service Limit	**2 mm Up to 130 km/h (80 mph)** **3 mm Over 130 km/h (80 mph)**

WARNING

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

NOTE

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

Standard Tire

Front	
Size	**100/80 16 50S TUBELESS**
Make, Type	**DUNLOP K530F**
Rear	
Size	**120/80 16 60S TUBELESS**
Make, Type	**DUNLOP K530**

Tire Air Pressure (when cold)

Front	**200 kPa (2.0 kg/cm^2, 28 psi)**
Rear	**225 kPa (2.25 kg/cm^2, 32 psi)**

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.

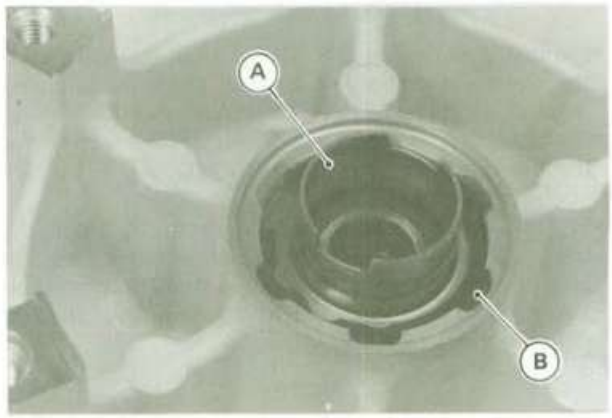
Hub Bearings

Front Hub Bearing Removal

CAUTION

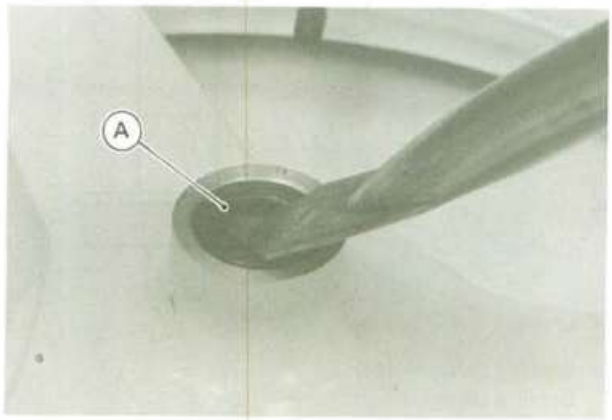
○Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.

●Remove the front wheel.
●Remove the speedometer gear housing, and collar(s) from the wheel.
●Remove the disc mounting Allen bolts and take off the discs.
●Remove the circlip and speedometer gear drive.



A. Speedometer drive B. Circlip

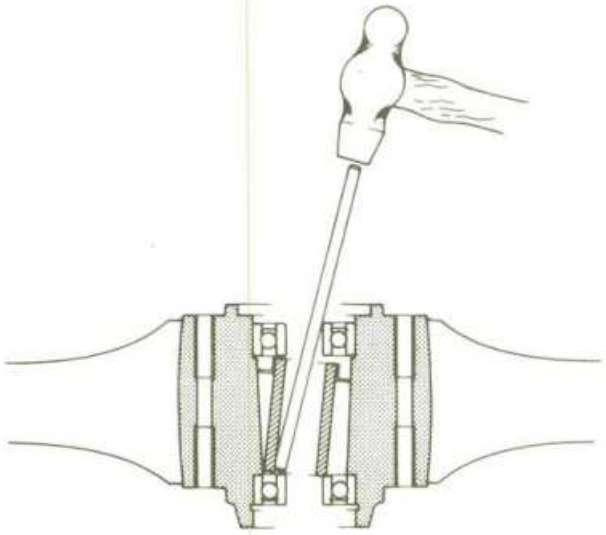
●Remove the grease seal using a hook, and remove the circlip.



A. Gear Seal

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

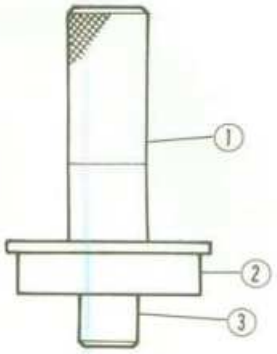
Bearing Removal



Front Hub Bearing Installation

●When install the front hub, be careful of the following items.
○Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
○Inspect the bearings and replace them if necessary. Lubricate them and install them using the bearing driver set (special tools) so that the marked or shielded sides face out.





1. Bearing Driver Holder
2. Bearing Driver
3. Bearing Driver

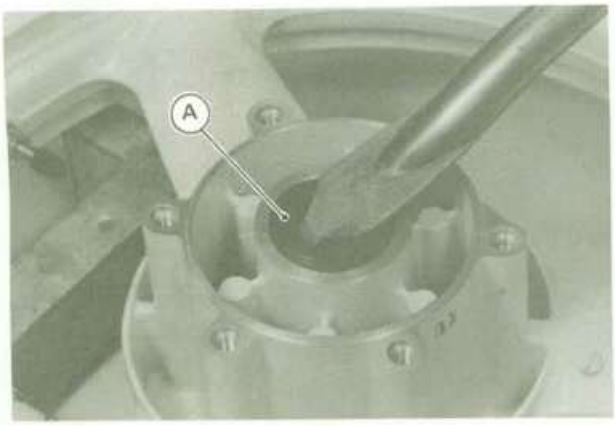
○Inspect the grease seal and replace if necessary. Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
○Tighten the disc mounting Allen bolts to the specified torque. The disc must be installed with the chamfered hole side facing toward the wheel. After installing the disc check the disc runout. Completely clean off any grease that has gotton on either side of the disc with a high flashpoint solvent. Do not use one which will leave an oily residue.

Rear Hub Bearing Removal

CAUTION

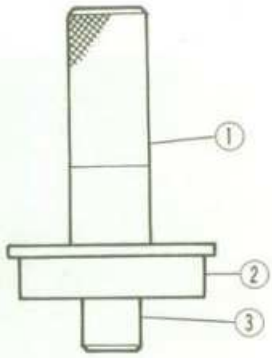
○**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

●Remove the rear wheel.
●Remove the coupling sleeve, rear wheel coupling, and coupling collar from the wheel.
●Remove the disc mounting Allen bolts and take off the disc.
●Remove the grease seal using a hook, and remove the circlip.



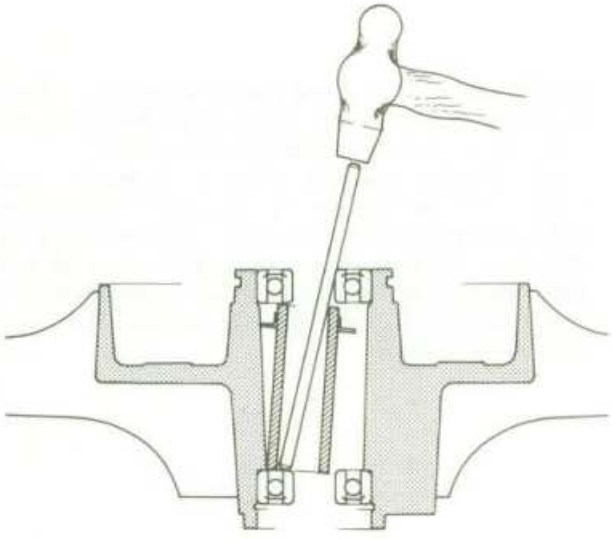
A. Grease Seal





1. Bearing Drive Holder
2. Bearing Driver
3. Bearing Driver

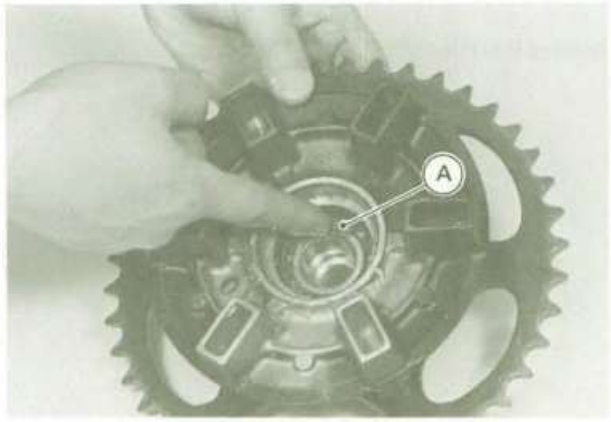
Bearing Removal



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

Rear Hub Bearing Installation

- When installing the rear hub, be careful of the following items.
  - Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
  - Inspect the bearings and replace them if necessary (see Hub Bearing inspection). Lubricate them and install them using the bearing driver set (special tools) so that the marked or shielded Sides face out.
  - Inspect the grease seal and replace if necessary (see Grease Seal Inspection). Press it in until it stops at the circlip in the hole using the same special tools used for bearing installation.
  - Apply a little grease to the inside of the rear coupling.



A. Grease

- Tighten the disc mounting Allen bolts to the specified torque (see Exploded View in Brake chapter). The disc must be installed with the flat side facing toward the wheel. After installing the disc, check the disc runout (see Disc Wear in Brake chapter).
- Completely clean off any grease that has gotton on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.

Hub Bearing Inspection and Lubrication

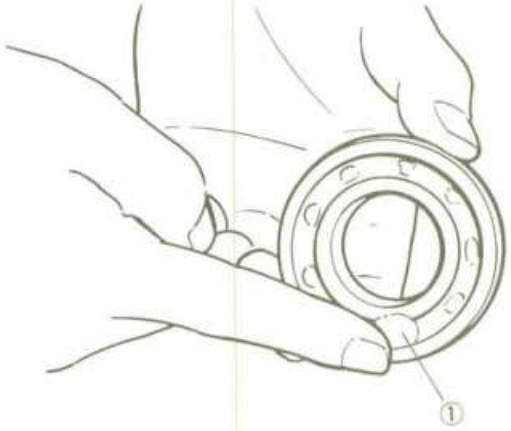
Since the wheel bearings are made to extremely close tolerances, the clearance cannot normally be measured.

•For front hub bearing, turn each bearing back and forth while checking for roughness or binding.
★If roughness or binding is found, replace the bearing.
•For rear hub bearing, wash the bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.
★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
★If the bearing is to be used again, rewash it with a quality flash-point solvent, dry it and pack it with good bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the oil grease out of the hub before bearing installation. Clean and grease the wheel bearings in accordance with the Periodic Maintenance Chart.

NOTE

○*Since the bearings on the rear wheel hub are packed with grease and shield, they are not required to be removed for lubrication.*

Bearing Lubrication



1. Grease.

•Examine the bearing seal for tears or leakage.
★If the seal is torn or is leaking, replace the bearing.

Grease Seal Inspection and Lubrication

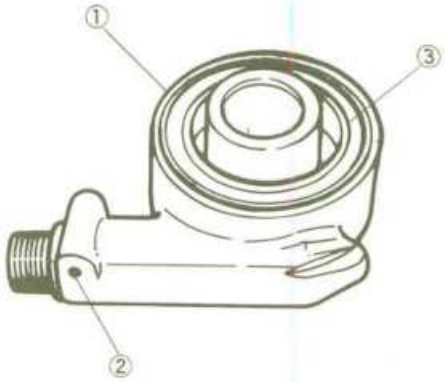
If the grease seals are examined without removing the seals themselves, lock for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seal are generally damaged upon removal.

Speedometer Gear Housing

Speedometer Gear Housing Disassembly

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

Speedometer Gear Housing



1. Speedometer Gear Housing
2. Pin
3. 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 under 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.

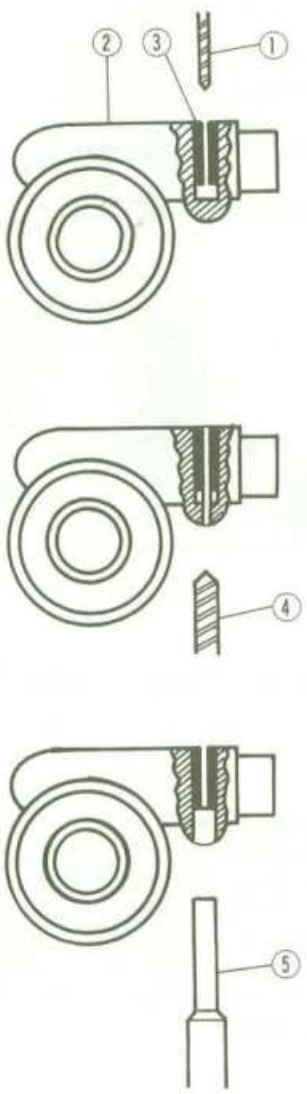
NOTE

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

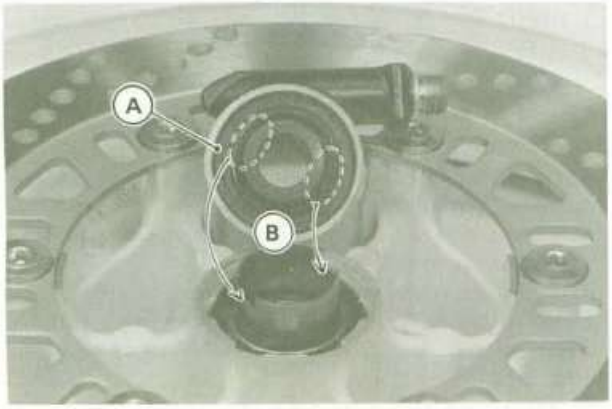
Speedometer Gear Housing Assembly

•When assembling the speedometer gear housing, be careful of the following items.
○After inserting a new pin, stake the housing hole to secure the pin in place.
○Replace the grease seal with a new one. Apply a little grease to the seal. Install it using a press or a suitable driver so that the face of the seal is level with the surface of the housing.
○Regrease the speedometer gear.
○Install the speedometer gear housing so that it fits in the speedometer gear drive notches.

Speedometer Gear Housing Pin Removal



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

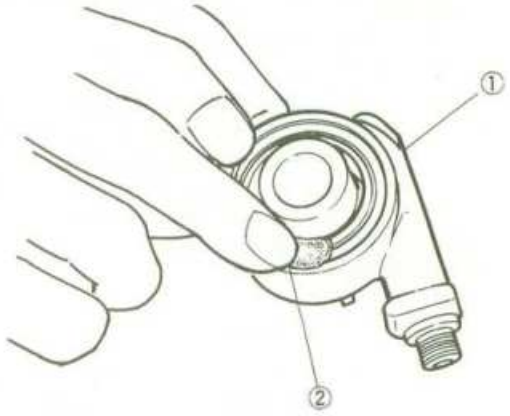


A. Speedometer Gear Housing
B. Fit in the gear drive notches.

Speedometer Gear Housing Lubrication

Clean and grease the speedometer gear housing in accordance with the Periodic Maintenance Chart.

Speedometer Gear Housing Lubrication



1. Speedometer Gear Housing
2. Grease.

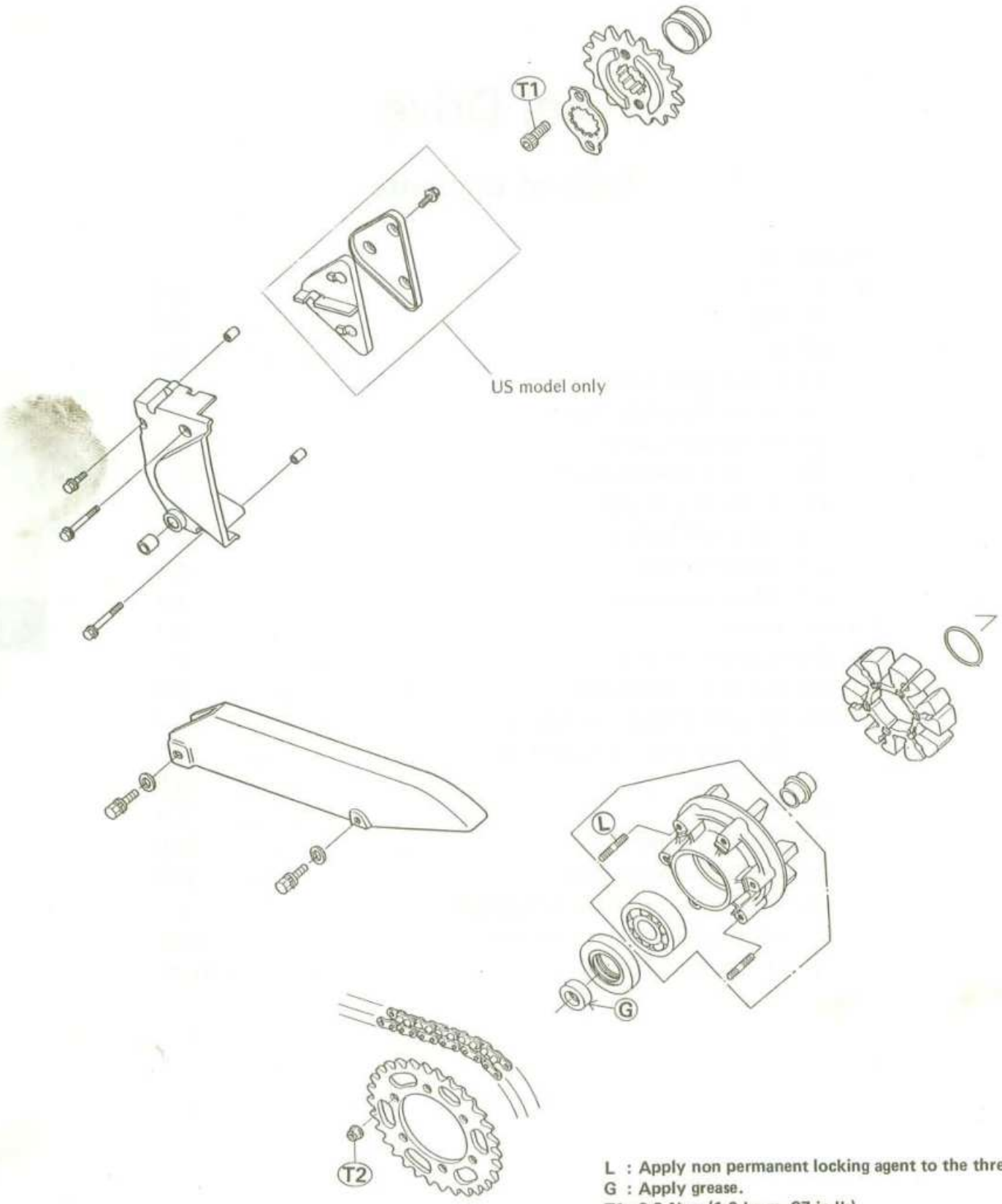
Final Drive

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Exploded View



L : Apply non permanent locking agent to the threads.
G : Apply grease.
T1 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T2 : 67 N-m (6.8 kg-m, 49 ft-lb)

Specifications

Item	Standard	Service Limit
Drive Chain:		
Make and type	Enuma Endless EK520HVDO104 Link	– – – – – –
Chain slack	35 – 40 mm	Less than 35 mm, or more than 45 mm
20-Link length	317.5 – 318.4 mm	323 mm
Sprockets:		
Engine sprocket diameter	60.68 – 61.18 mm/14T	60.3 mm
Rear sprocket diameter	202.32 – 202.82 mm/42T	202 mm
Rear sprocket warp	Under 0.4 mm	0.5 mm

Special Tools

Bearing Driver Set: 57001-1129



Drive Chain 20-Link Length

Standard:	**317.5 ~ 318.4 mm**
Service Limit:	**323 mm**

★If any measurements exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

WARNING

○**For safety, use only the standard chain. It is an endless type and should not be cut for installation.**

Drive Chain Lubrication

The chain should be lubricated with a lubricant which will both prevent the exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication.

If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

●If the chain appears especially dirty, it should be cleaned before lubrication.

CAUTION

○**The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.**

○**Use only kerosene or diesel oil for cleaning an O-ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-rings.**

○**Immediately blow the chain dry with compressed air after cleaning.**

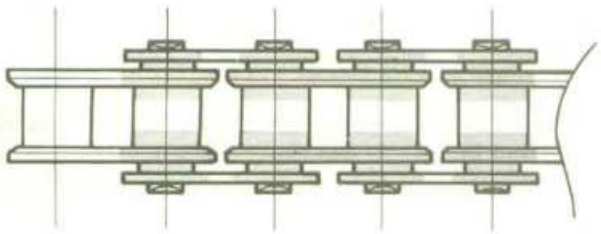
○**Complete cleaning and drying the chain within 10 minutes.**

●Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.

●Wipe off any excess oil.

Drive Chain Lubrication

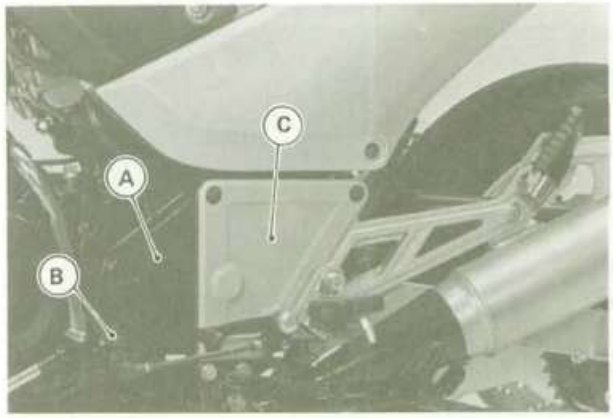
Oil Applied Areas



Drive Chain Removal

●Remove the engine sprocket cover (see Engine Sprocket Removal).

●Remove the left side footpeg bracket (see Left Footpeg Bracket Removal in Frame chapter).



A. Engine Sprocket Cover C. Footpeg Bracket
B. Shift Lever

●Remove the LH muffler.

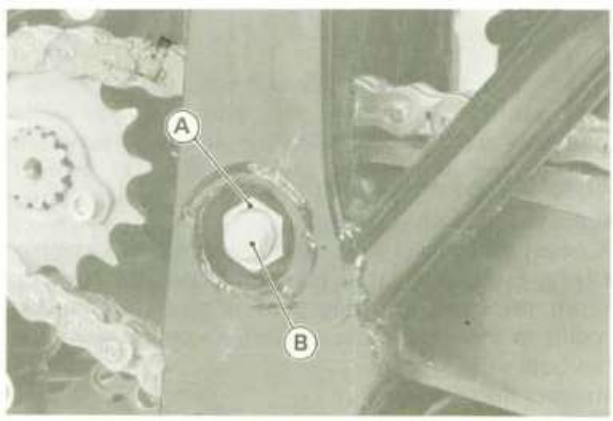
●Remove the right side footpeg bracket (see Right Footpeg Bracket Removal in Frame chapter).

●Remove the RH muffler.

●Remove the rear caliper (see Rear Caliper Removal in Brakes chapter).

●Remove the rear wheel (see Rear Wheel Removal in Wheels/Tires chapter).

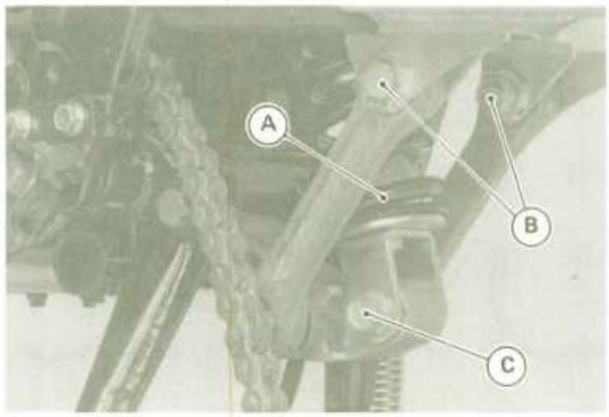
●Remove the swing arm pivot nut. Do not remove the pivot shaft.



A. Pivot Nut B. Pivot Shaft

●Remove the lower shock absorber nut. Do not remove the bolt.

●Remove the uni-trak tie-rod upper nut. Do not remove the bolt.



A. Rear Shock Absorber C. Bolt
B. Tie-rod Upper Bolt

- Remove the Uni-trak tie rod lower nut. Do not remove the bolt.
- Remove the tie rod bolt, shock absorber bolt, and swing arm pivot shaft while supporting the swing arm.
- Pull the swing arm toward the rear.
- Take the drive chain off the engine sprocket.

CAUTION

- **Take care not to damage the brake hose. Damage to the brake line greatly reduces the brake line strength and increases the change of brake fluid leakage, resulting in the loss of brake control.**

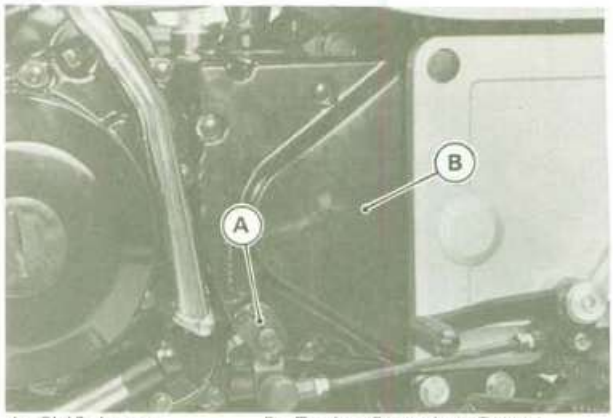
Drive Chain Installation

- Installation is the reverse of removal.
- When installing the drive chain, be careful of the following items.
- Tighten the swing arm pivot nut to the specified torque (see Exploded View in Suspension chapter).
- Tighten the lower shock absorber nut to the specified torque (see Exploded View in Suspension chapter).
- Tighten the torque link nut to the specified torque. (see Exploded View in Brakes chapter).
- Install the shift lever at the correct position (see Left Footpeg Bracket Installation Note in Frame chapter).
- Adjust the drive chain slack after installation.

Sprocket, Coupling

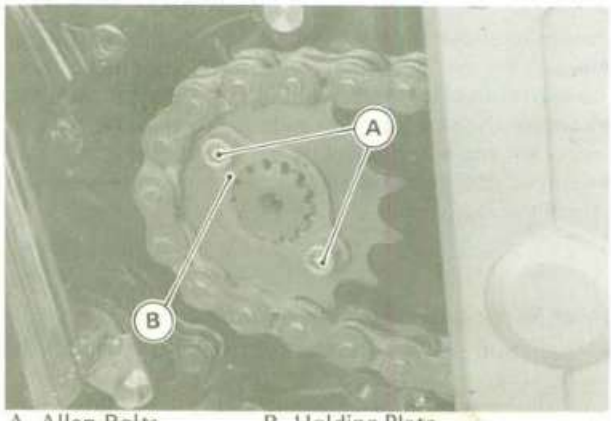
Engine Sprocket Removal

- Remove the shift lever bolt and pull the lever.
- Remove the bolts and take off the engine sprocket cover.



A. Shift Lever B. Engine Sprocket Cover

- Loosen the engine sprocket Allen bolts while applying the rear brake.
- Remove the rear wheel (see Rear Wheel Removal in Wheels/Tires chapter).
- Remove the Allen bolts, holding plate, and pull the engine sprocket off the output shaft with the drive chain, and then separate them.



A. Allen Bolts B. Holding Plate

Engine Sprocket Installation

- Installation is the reverse of removal. Note the following.
- Engage the sprocket with the chain so the flat side faces outward.
- Tighten the engine sprocket bolts to the specified torque (see Exploded View).
- Tighten the torque link nut to the specified torque (see Exploded View in Brakes chapter).
- Install the shift lever at the correct position (see Left Footpeg Bracket Installation in Frame chapter).

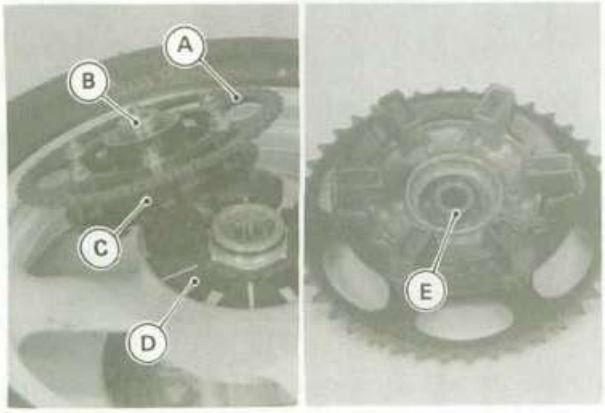
Rear Sprocket, Coupling Removal

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

CAUTION

- **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.**

●Remove the coupling with the rear sprocket from the wheel.

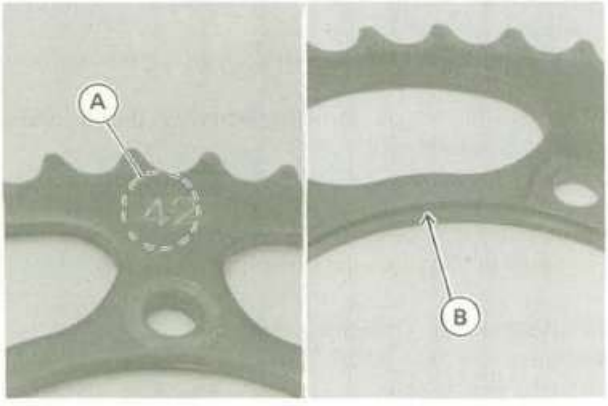


A. Rear Sprocket
B. Coupling Collar
C. Coupling
D. Rubber Damper
E. Coupling Sleeve

●Pull out the coupling collar from the left, and the coupling sleeve from the right.
●Install the rubber damper and wheel coupling temporarily on the rear hub to aid in rear sprocket removal.
●Remove the rear sprocket nuts (6) to separate the rear sprocket and wheel coupling.
●Remove the rear sprocket and remove the coupling form the rear wheel.

Rear Sprocket, Coupling Installation

●Installation is the reverse of removal. Note the following.
○Install the rear sprocket with the chamfered side facing to toward the hub (tooth number marking side outward). Tighten the sprocket nuts to the specified torque (see Exploded View).

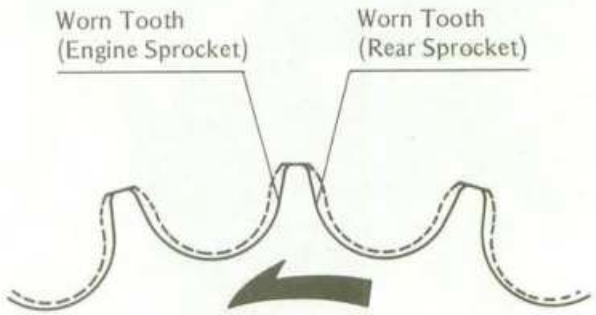


A. Tooth Number Marking
B. Chamfered Side

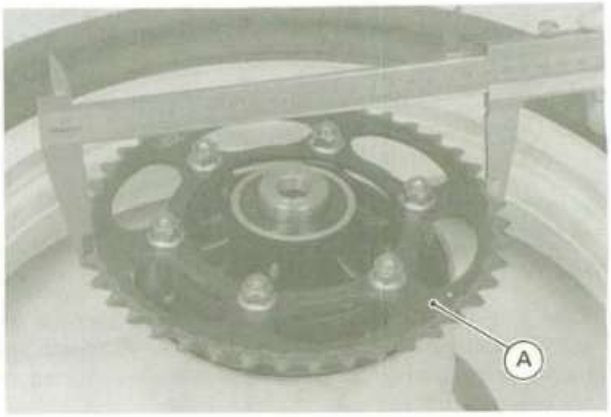
Sprockets Wear

Visually inspect the sprocket teeth. If they are worn as illustrated, replace the sprocket.

Sprocket Teeth



Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.



A. Rear Sprocket

Sprocket Diameter

Engine Sprocket	
Standard	**60.68 ~ 61.18 mm**
Service Limit	**60.3 mm**
Rear Sprocket	
Standard	**202.32 ~ 202.82 mm**
Service Limit	**202.0 mm**

NOTE

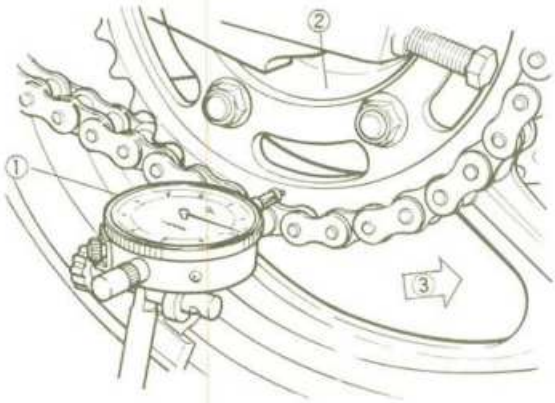
○*If a sprocket requires replacement, the chain is provably worn also. Upon replacing a sprocket, inspect the chain.*

Sprocket Warp

Elevate the rear wheel so that it will turn freely, and set a dial gauge against the rear sprocket near the teeth as shown. Rotate the rear wheel. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

If the runout exceeds the service limit, replace the rear sprocket.

Sprocket Warp Inspection



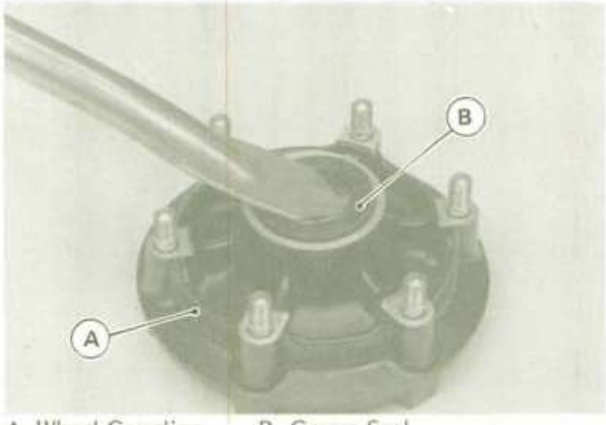
1. Dial Gauge
2. Rear Sprocket
3. Turn.

Rear Sprocket Warp

Standard	**Under 0.4 mm**
Service Limit	**0.5 mm**

Coupling Bearing Removal

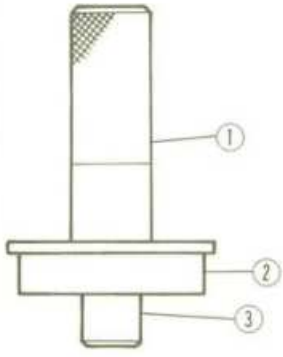
●Using a hook, pull out the grease seal and remove the circlip.



A. Wheel Coupling B. Grease Seal

●Using the bearing driver set (special tools) or some other suitable tool, remove the bearing by tapping from the wheel side.





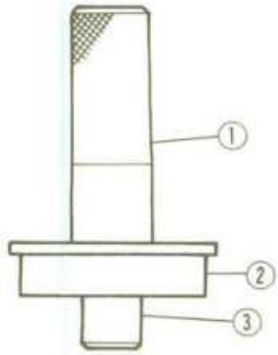
1. Bearing Driver Holder
2. Bearing Driver
3. Bearing Driver

Coupling Bearing Installation

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

○Inspect the bearing, and replace if necessary (see Coupling Bearing Inspection). Lubricate it, and then install it using the wheel bearing driver set (special tools).





1. Bearing Driver Holder
2. Bearing Driver
3. Bearing Driver

Coupling Bearing Inspection and Lubrication

Since the coupling bearings are 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 used again, rewash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease before installation. Turn the bearing by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation. Clean and grease the coupling bearings in accordance with the Periodic Maintenance Chart.

Bearing Lubrication



1. Grease.

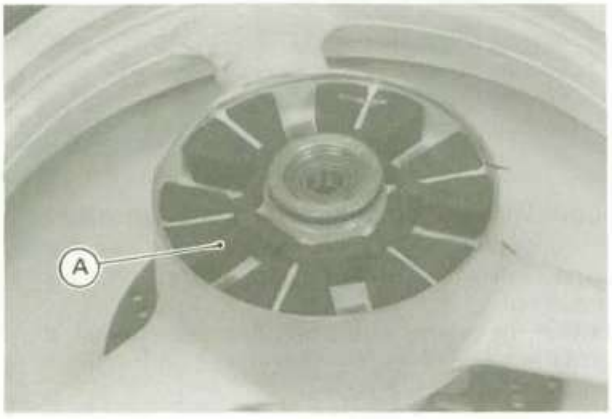
Grease Seal Inspection and Lubrication

If the grease seals are examined without removing the seals themselves, look for discoloration (indicating the rubber has deteriorated), hardening, damage to the internal ribbing, or other damage. If the seal or internal ribbing has hardened, the clearance between the seal and the axle sleeve will not be taken up, which will allow dirt and moisture to enter and reach the bearing. If in doubt as to its condition and whenever the seal is removed for greasing the bearing, the seal should be replaced. The seals are generally damaged upon removal.

Damper Inspection

Remove the rear wheel coupling, and inspect the rubber damper.

Replace the damper if it appears damaged or deteriorated.



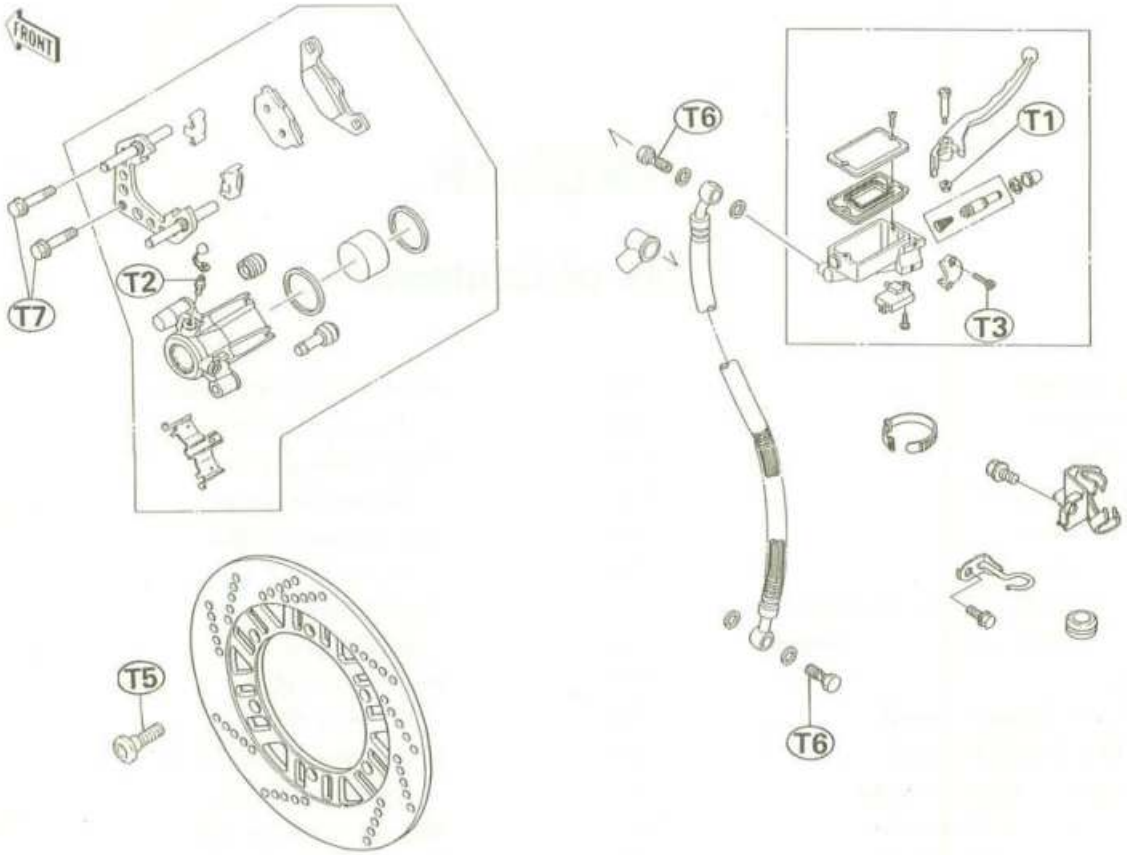
A. Rubber Damper

Brakes

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Exploded View



Specifications

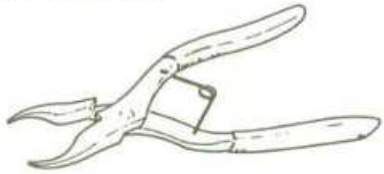
Item		Standard	Service Limit
Brakes:			
Pad lining thickness:	Front and Rear	5.0 mm	1 mm
Brake fluid grade		D.O.T.3	— — —
Brake pedal position		About 40 mm	— — —
Disc runout:	Front	Under 0.15 mm	0.3 mm
	Rear	Under 0.15 mm	0.3 mm
Disc thickness:	Front	4.8 – 5.1 mm	4.5 mm
	Rear	5.3 – 5.6 mm	5.0 mm

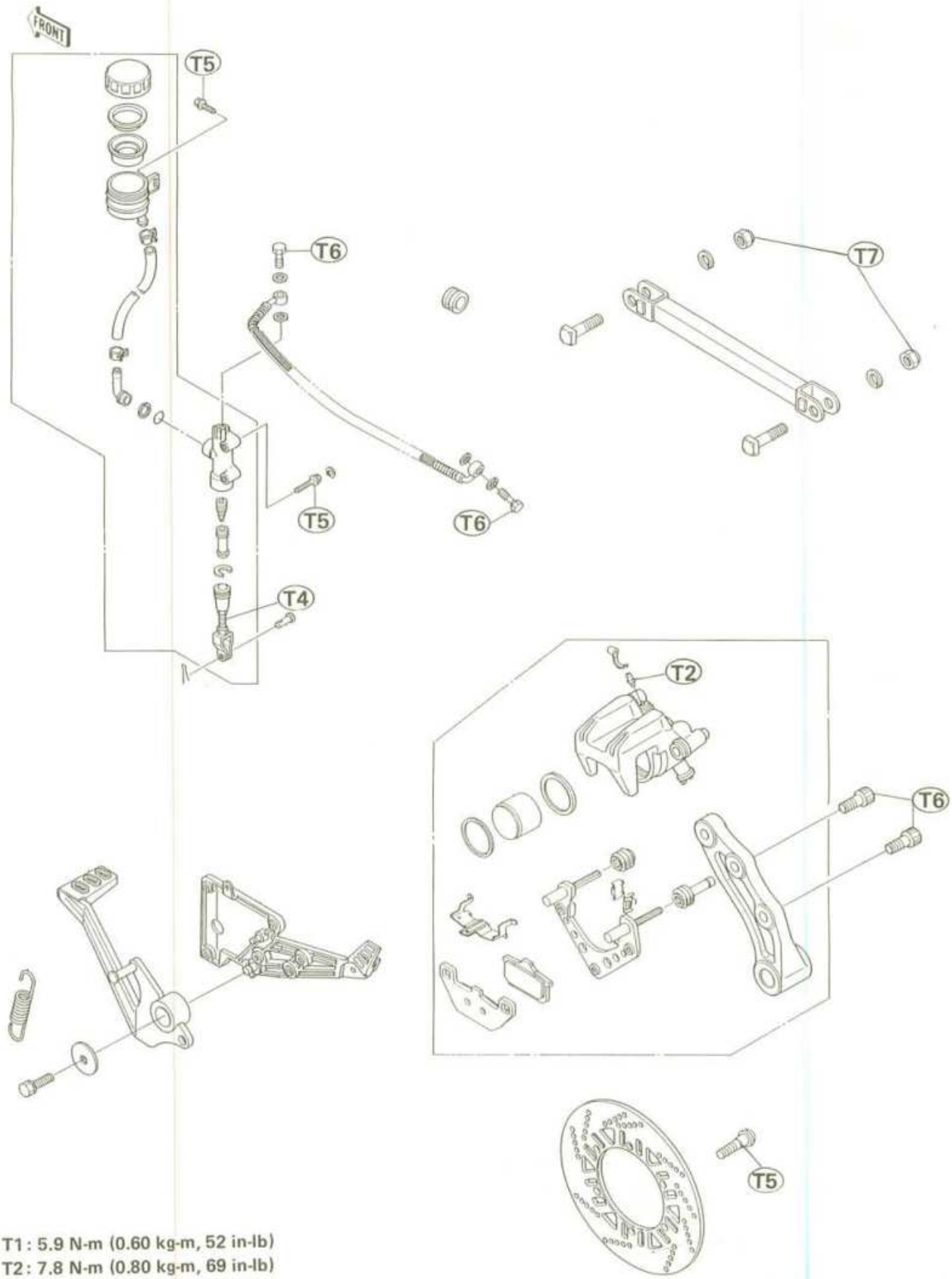
Recommended Disc Brake Fluid

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 Tools

Circlip Pliers: 57001-143





T1 : 5.9 N-m (0.60 kg-m, 52 in-lb)
T2 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T3 : 8.8 N-m (0.90 kg-m, 78 in-lb)
T4 : 18 N-m (1.8 kg-m, 13 ft-lb)
T5 : 23 N-m (2.3 kg-m, 16.5 ft-lb)
T6: 25 N-m (2.5 kg-m, 18 ft-lb)
T7 : 32 N-m (3.3 kg-m, 24 ft-lb)

Brake Adjustment

Front Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (see Bleeding the Brake).

NOTE

○*Check the brake fluid level in accordance with the Periodic Maintenance Chart.*

Rear Brake:

Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However, the brake pedal position may occasionally require adjustment due to wear of the pedal pivot, or in case of disassembly. If the brake pedal has a soft, or "spongy feeling", check the brake fluid level in the reservoir and bleed the air from the brake line (see Bleeding the Brake).

NOTE

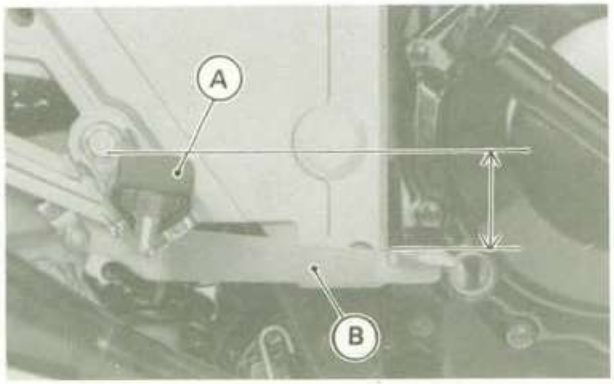
○*Check the brake fluid level in accordance with the Periodic Maintenance Chart.*

Brake Pedal Position Inspection

●When the brake pedal is in its position, it should be at the correct position.

Pedal Position

Standard	**About 40 mm below top of footpeg**



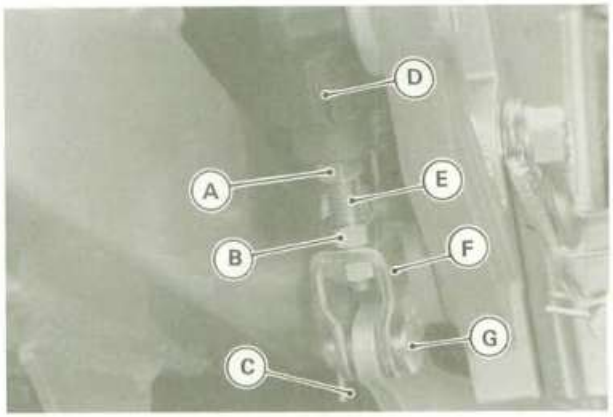
A. Footpeg B. Brake Pedal

★If it is not, adjust the brake pedal position as follows.

Brake Pedal Position Adjustment

●Remove the right hand muffler.

●Loosen the clevis locknut and up or down the clevis by turning the adjuster to adjust the brake pedal position.



A. Adjuster
B. Clevis Locknut
C. Cotter Pin
D. Master Cylinder
E. Push Rod
F. Clevis
G. Joint Pin

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

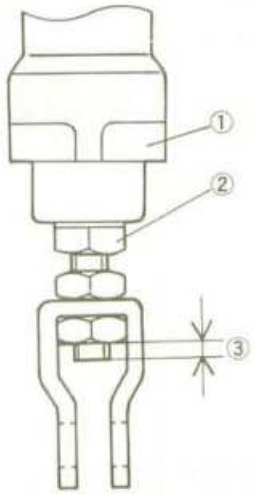
●Install the removal parts.

NOTE

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

○*If the brake rod protrusion is 3.5 ~ 5.5 mm below the nut, the pedal position will be within the standard range (about 40 mm).*

Brake Rod Protrusion



1. Master Cylinder
2. Adjuster
3. Rod Protrusion

●Check the brake pedal position, and readjust it if necessary.

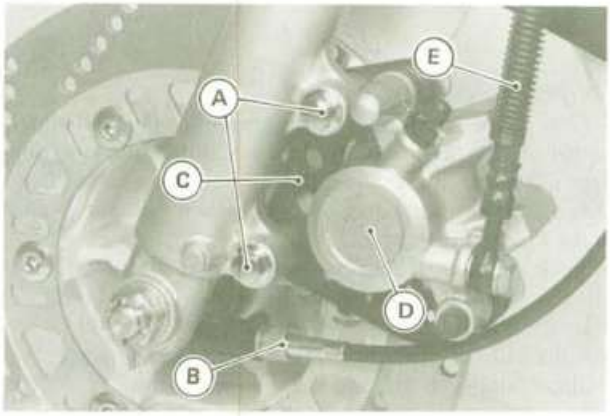
Calipers

Front Caliper Removal

- Put the motorcycle on center stand.
- Loosen the banjo bolt at the caliper, and tighten it loosely.
- Remove the caliper mounting bolts and take off the caliper.
- Disconnect the brake hose from the caliper.

NOTE

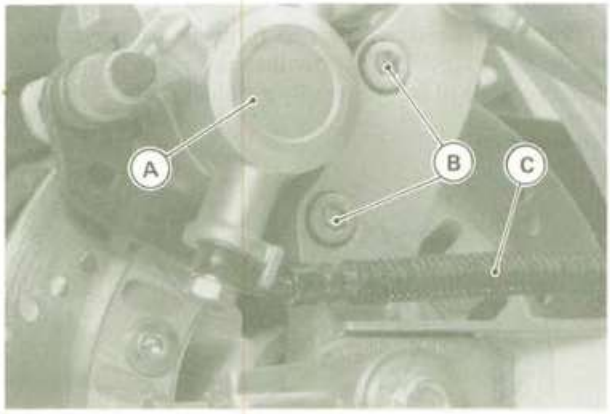
○*Disconnect the speedometer cable lower end before caliper removal.*



A. Caliper Mounting Bolts
B. Cable Lower End
C. Caliper Holder
D. Caliper
E. Brake Hose

Rear Caliper Removal

- Loosen the banjo bolt at the caliper, and tighten it loosely.
- Remove the caliper mounting bolts and take off the caliper.
- Disconnect the brake hose from the caliper.



A. Caliper
B. Caliper Mounting Bolts
C. Brake Hose

★If the front or rear caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.

○Remove the pads.
○Pump the brake lever or pedal to remove the caliper piston.
○Immediately wipe up any brake fluid that spills.

Caliper Installation Notes

- Tighten the caliper mounting bolts to the specified torque (see Exploded View).
- Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque (see Exploded View).
- Check the fluid level in the master cylinder (reservoir), and bleed the brake line (see Bleeding the Brake).
- Check the brake for weak braking power, brake drag, and fluid leakage.

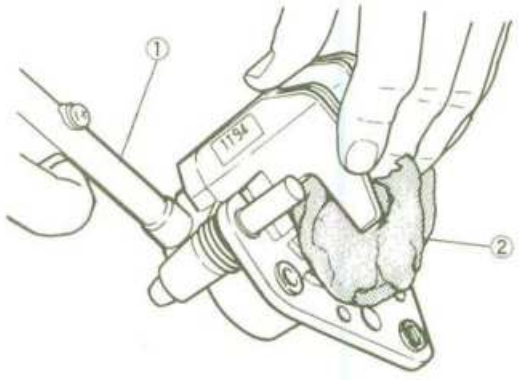
Caliper Disassembly Notes

- Using compressed air, remove the piston.
○Cover the caliper opening with a clean, heavy cloth.
○Remove the piston by lightly applying compressed air to where the brake line fits into the caliper.

WARNING

○**To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.**

Piston Removal



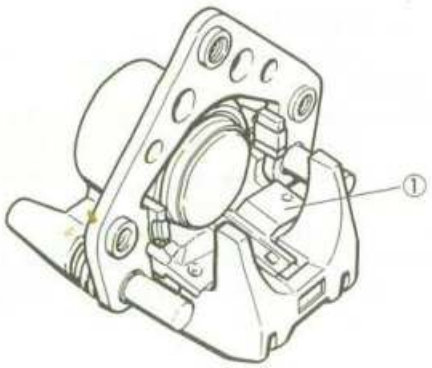
1. Apply compressed air.
2. Cloth

Caliper Assembly Notes

- Apply brake fluid to the outside of the piston and the fluid seal, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.

●Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistant grease).
●Install the anti-rattle spring in the calipers as shown.

Anti-rattle Spring Installation

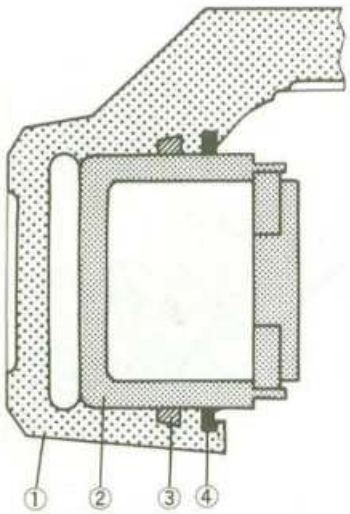


1. Anti-rattle spring

Fluid Seal Damage

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

Caliper



1. Caliper
2. Piston
3. Fluid Seal
4. Dust Seal

Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

Dust Seal and Cover Damage

●Check that the dust seals and covers are not cracked, worn, swollen, or otherwise damaged.
★If they show any damage, replace them.

Piston Cylinder Damage

●Visually inspect the piston and cylinder surfaces.
★Replace the cylinder and piston if they are badly scored or rusty.

Caliper Holder Shaft Wear

The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

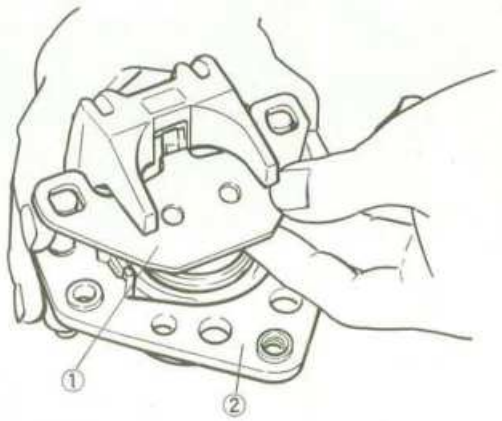
●Check to see if the caliper holder shafts are not badly worn or stepped, or rubber friction boot are not damaged.
★If the rubber friction boot are damaged, replace the rubber friction boot, and the caliper holder.

Brake Pads

Pad Removal

●Remove the caliper (see Front or Rear Caliper Removal).
●Take off the piston side pad form the caliper holder.
●Push the caliper holder to the piston side, and then remove the pad from the caliper holder shaft.

Pad Removal



1. Pad
2. Caliper Holder

Pads Installation Notes

●Push the caliper piston in by hand as far as it will go.

WARNING

○**Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brake will not function on the first application of the lever or pedal if this is not done.**

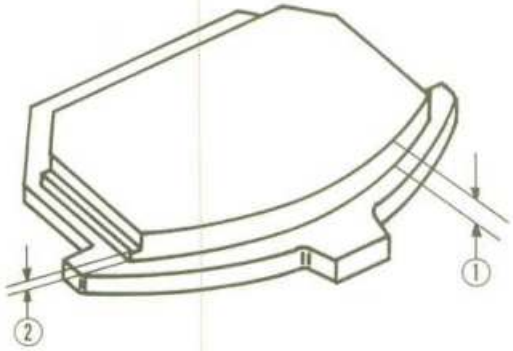
Lining Wear

In accordance with the Periodic Maintenance Chart, inspect the front and rear brakes for wear.

●Check the lining thickness of the pads in each caliper.

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

Brake Pad



1. Lining Thickness
2. Service Limit

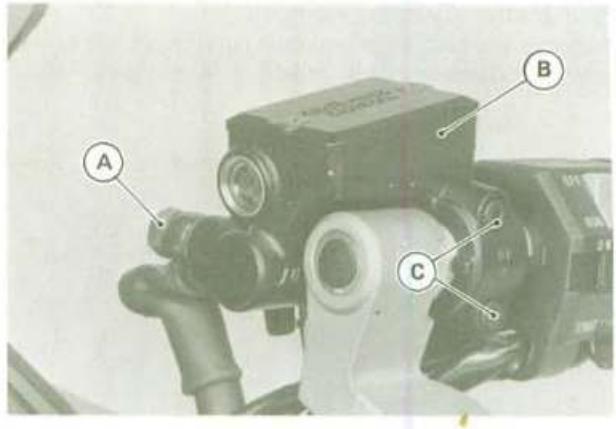
Pad Lining Thickness

Standard	**5 mm**
Service Limit	**1 mm**

Master Cylinders

Front Master Cylinder Removal

●Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.



A. Banjo Bolt
B. Master Cylinder
C. Clamp Bolts

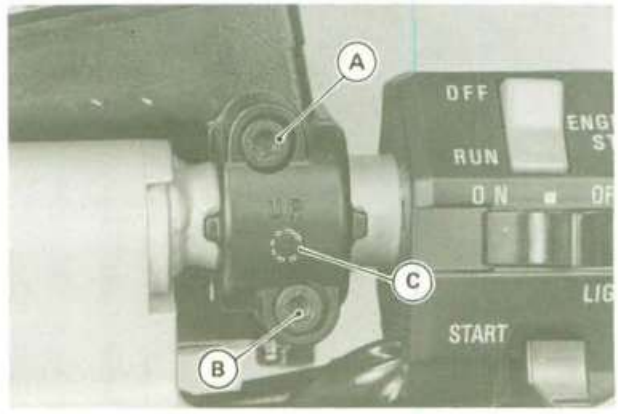
●Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.

Front Master Cylinder Installation Notes

●Master Cylinder Clamp Installation:

○The master cylinder clamp must be installed with the arrow mark upward.

○Torque the upper clamp bolt first, and then the lower clamp bolt to the specification (see Exploded View). There will be a gap at the lower part of the clamp after tightening.

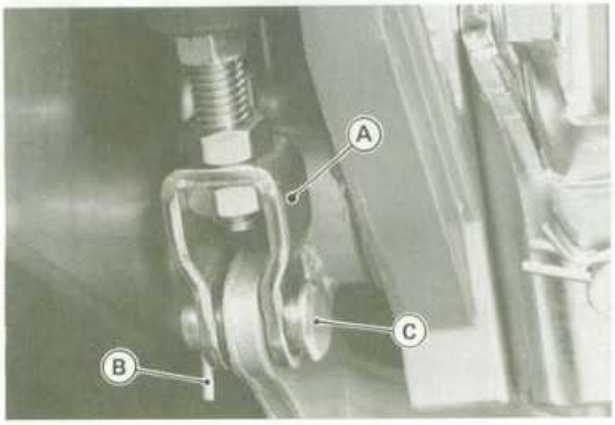


A. Tighten upper clamp bolt first.
B. Lower Clamp Bolt
C. Arrow Mark

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

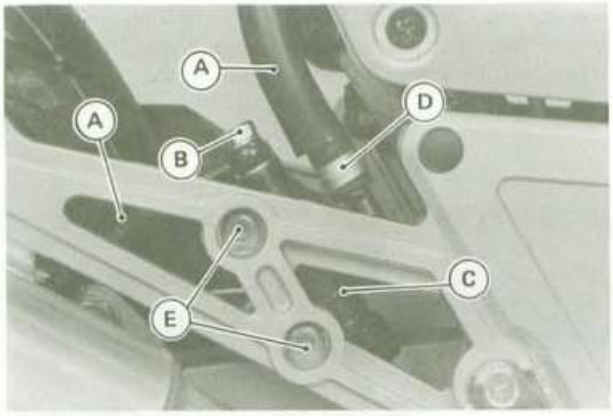
Rear Master Cylinder Removal

●Remove the cotter pin and then pull the pin out of the push rod clevis and brake pedal.



A. Clevis
B. Cotter Pin
C. Joint Pin

●Slide the brake hose (master cylinder) clamp out of place.



A. Brake Hoses
B. Banjo Bolt
C. Master Cylinder
D. Hose Clamp
E. Mounting Bolts

●Disconnect the brake hose from the master cylinder, and temporarily secure the end of the brake hose so some high place to keep fluid loss to a minimum immediately wipe up any brake fluid that spills.

●Remove the master cylinder mounting bolts and take the master cylinder off the footpeg bracket.

●Remove the banjo bolt to disconnect the brake hose from the master cylinder, and temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum. There is a flat washer on each side of the hose fitting.

Rear Master Cylinder Installation Notes

●Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolts to the specified torque (see Exploded View). Be sure that the metal pipe is properly fitted into the U-shaped notch in the master cylinder.

●Tighten the rear master cylinder mounting bolts (2) to the specified torque (see Exploded View).

●Check and adjust the following items.

○Brake pedal position (see Brake Pedal Position Inspection).

○Rear brake light switch (see Rear Brake Light Switch Position Adjustment in Electrical System chapter).

Inspection and Adjustment after Installation

●Bleed the brake line after master cylinder installation.

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

Front Master Cylinder Disassembly Notes

●Remove the front master cylinder from the handlebar.

●Remove the reservoir cap and diaphragm, and empty out the brake fluid.

●Remove the locknut and pivot bolt, and remove the brake lever.

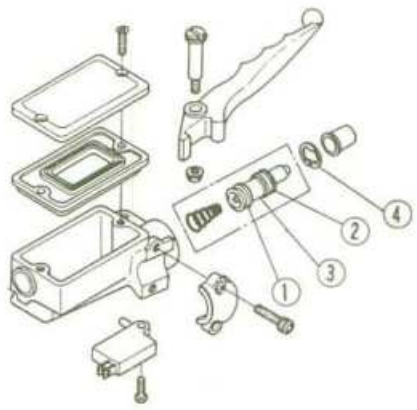
●Slide the dust cover out of its place.

●Remove the retainer with a circlip pliers and pull out the piston with secondary cup, and take off the primary cup and spring.

CAUTION

○**Do not remove the secondary cup from the piston since removal will damage them.**

Front Master Cylinder



1. Primary Cup
2. Secondary Cup
3. Piston
4. Retainer

Front Master Cylinder Assembly Notes

•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

○**Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cuase 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 and tighten the locknut to the specified torque.

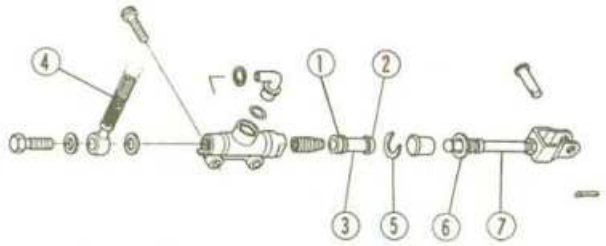
Rear Master Cylinder Disassembly Notes

•Remove the rear master cylinder from the right footpeg bracket.
•Remove the retainer with a circlip pliers, and pull out the piston stop, push rod, as a set. Then remove the piston and secondary cup, and the spring and primary cup.

CAUTION

○**Do not remove the secondary cup from the piston since removal will damage it.**

Rear Master Cylinder



1. Primary Cup
2. Secondary Cup
3. Piston
4. Brake Hose
5. Retainer
6. Piston Stop
7. Push Rod

•Remove the retainer with a circlip pliers *and pull* out the brake hose connector and O-ring from the master cylinder.

Rear Master Cylinder Assembly Notes

•Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

○**Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cuase deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

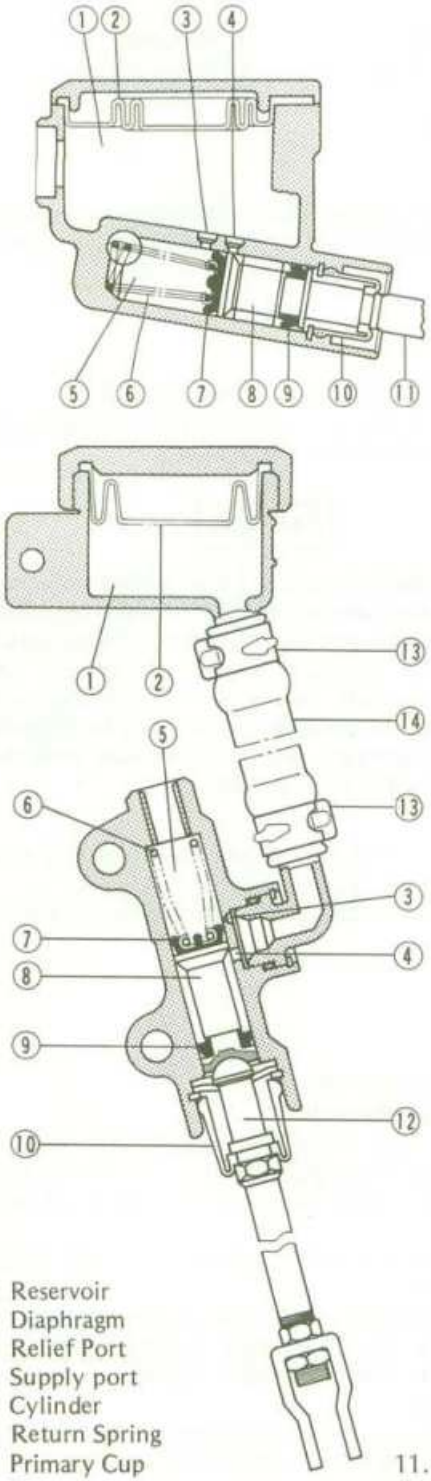
•Apply brake fluid to the parts removed and to the inner wall of the cylinder.
•Take care not to scratch the piston or the inner wall of the cylinder.

Master Cylinder Inspection (Visual Inspection)

•Disassemble the front and rear master cylinders.
•Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.
★If the master cylinder or piston shows any damage, replace them.
•Inspect the primary cups and secondary cups.
★If a cup is worn, damaged, softened (rotted), or swollen, the piston assembly should be replace to renew the cups.
★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cup.
•Check the dust covers for damage.
★If they are damaged, replace them.
•Check that the relief and supply ports are not plugged.

★If the small relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
●Check the piston return springs for any damage.
★If the spring is damaged, replace it.

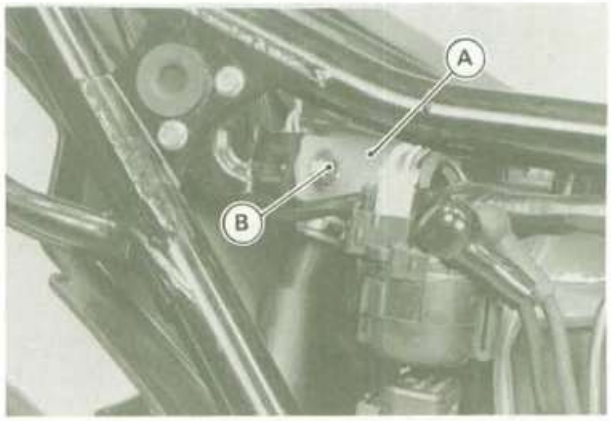
Front and Rear Master Cylinder



1. Reservoir
2. Diaphragm
3. Relief Port
4. Supply port
5. Cylinder
6. Return Spring
7. Primary Cup
8. Piston
9. Secondary Cup
10. Dust Cover
11. Brake lever
12. Push Rod
13. Clamp
14. Hose

Reservoir Removal

●Remove the rear brake reservoir mounting bolt.
●Remove the bolts and take the bracket off the frame.
●Take the starter relay off the bracket, and pull the reservoir out of the frame.



A. Reservoir B. Mounting Bolt

●Take off the reservoir cap and diaphragm, and empty the brake fluid into a suitable container.
●Slide the hose clamps, and pull the brake hose off the reservoir. Immediately wipe up any brake fluid that spills.

Reservoir Installation Notes

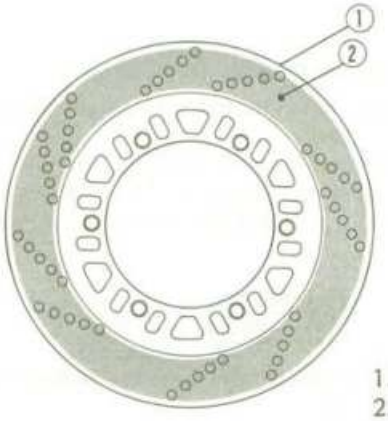
●Install the clamps for e brake hose ends.
●Fill the reservoir with fresh brake fluid, and bleed the brake line (see Bleeding the Brake).

Discs

Disc Wear

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

Disc Thickness



1. Brake Disc
2. Measuring Area

Front Disc Thickness

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

Rear Disc Thickness

Standard	**5.3 ~ 5.6 mm**
Service Limit	**5.0 mm**

Disc Cleaning

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

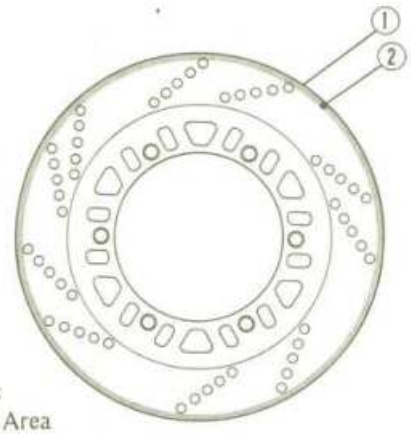
WARNING

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

Disc Warp

Jack up the motorcycle so that the front wheel is off the ground, and turn the handlebar fully to one side. Set up a dial gauge against the front disc, and measure disc runout. Remove the jack, set the motorcycle up on its center stand, and then measure the rear disc runout. If runout exceeds the service limit, replace the disc.

Disc Runout



1. Brake Disc
2. Measuring Area

Disc Runout

Standard	**Under 0.15 mm**
Service Limit	**0.3 mm**

Brake Fluid

Fluid Level Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

●Check the brake fluid level in the reservoir.

NOTE

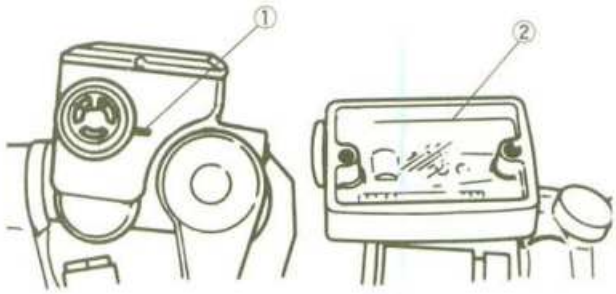
○*Hold the reservoir horizontal when checking brake fluid level.*

★The fluid level must be kept above the lower level lines. If the fluid level is lower than the lower level line, fill the reservoir to the upper level line of the reservoir.

WARNING

○**Change the brake fluid in the brake *line* completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**

Front Brake Fluid Reservoir



1. Lower Level Line 2. Upper Level Line

Rear Brake Fluid Reservoir



1. Lower Level Line 2. Upper Level Line

Brake Fluid Change

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

Brake Fluid Requirement:

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.3.

Recommended Brake Fluid

Type	D.O.T.3.
Brand	Atlas Extra Heavy Duty
	Shell Super Heavy Duty
	Texaco Super Heavy Duty
	Wagner Lockheed Heavy Duty
	Castrol Girling-Universal
	Castrol GT (LMA)
	Castrol Disc Brake Fluid

Changing Brake Fluid:

- ●Remove the rubber cap on the bleed valve.
- ●Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- ●Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- ●Close the bleed valve.
- ●Remove the reservoir cap.
- ●Fill the reservoir with fresh brake fluid.
- ●Install the reservoir cap.
- ●Open the bleed valve, apply the brake by the brake lever or pedal, close the valve with the brake held applied, and then quickly release the lever or pedal. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

NOTE

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

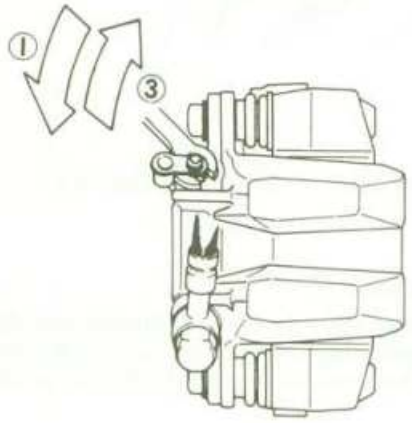
- ●Bleed the air from the lines (continue with Bleeding the Brake).

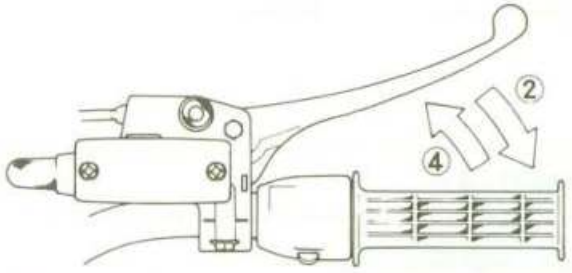
Bleeding the Brake Line

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

- ●Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.
- ●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 or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.
- ★If brake lever or pedal action still feels soft or spongy, bleed the remaining air as follows.
- ○Connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container.
- ○Pump the brake lever or pedal a few times until it comes hard.
- ○Holding the brake applied, quickly open (turn counterclockwise) and close the bleed valve.
- ○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.

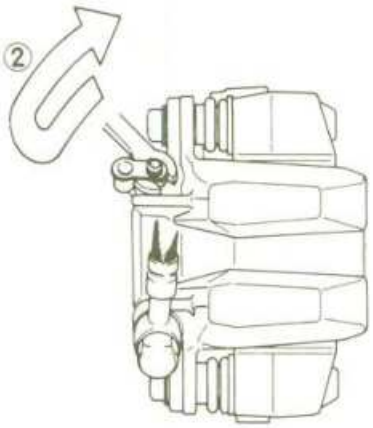
Filling up the Brake Line

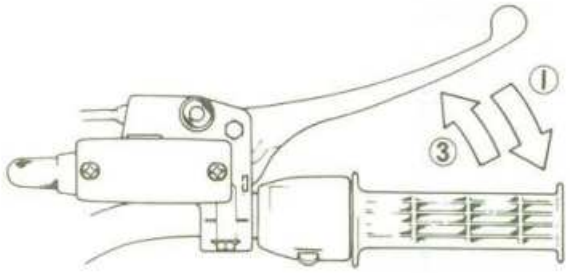




1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve
4. Then quickly release the brake.

Bleeding the Brake Lineillust



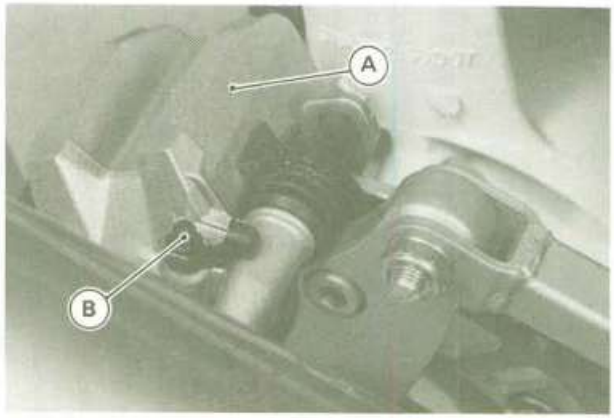


1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

WARNING

○**When working with the disc brake, observe the precautions listed below.**

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**



A. Caliper B. Bleed Valve

●When air bleeding is finished, install the rubber caps on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).

Brake 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.

●The metal pipes which feed the brake fluid to the anti-dive units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.

Brake Hose Replacement

- Pump the brake fluid out of the line as explained in the Brake Fluid Change in Brake Fluid Section.
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the motorcycle. Especially, for the brake hose between the rear master cylinder and the reservoir, loosen the clamps at both ends of the hose, and take off the hose.
- Install the new brake hose in its place, and tighten the banjo bolts to the specified torque (see Exploded View), noting the following.

○Use a new flat washer for each side of the fittings.

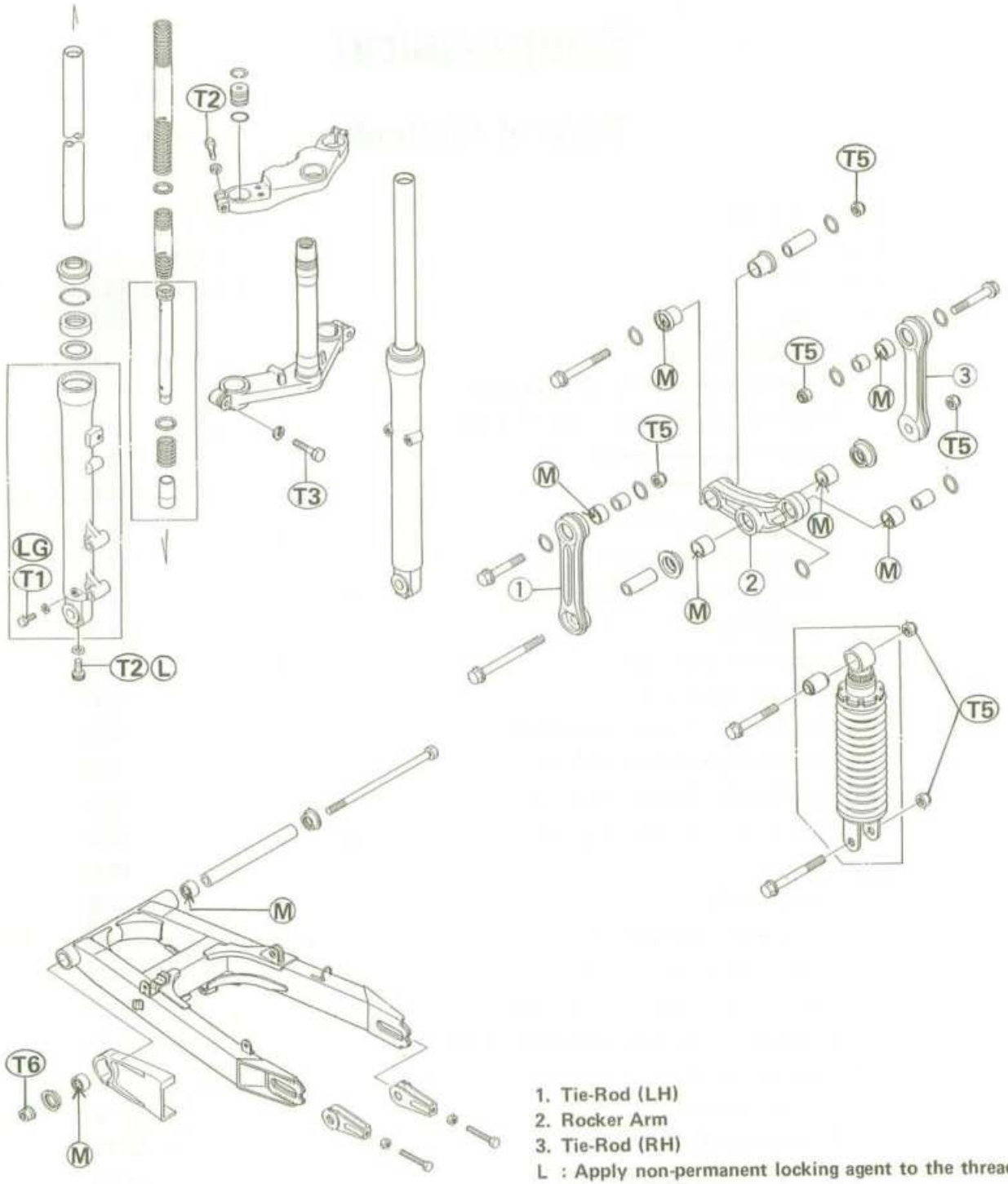
Suspension

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Exploded View



1. Tie-Rod (LH)
2. Rocker Arm
3. Tie-Rod (RH)

L : Apply non-permanent locking agent to the threads.
LG: Apply liquid gasket.
M : Apply molybdenum disulfide grease.
T1: 7.8 N-m (0.80 kg-m, 69 in-lb)
T2: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T3: 29 N-m (3.0 kg-m, 22 ft-lb)
T4: 39 N-m (4.0 kg-m, 29 ft-lb)
T5: 44 N-m (4.5 kg-m, 33 ft-lb)
T6: 88 N-m (9.0 kg-m, 65 ft-lb)

Specifications

Item		Standard	Service Limit
Front Fork:			
Oil type		SAE 10W20	– – – –
Oil capacity		202 ±2.5 mL	
		(approx. 170 mL at oil change)	– – –
Oil level		226 ±2 mm (Fully compressed)	– – – –
Fork spring free length	Long	274.4 mm	269 mm
	Short	265.2 mm	260 mm
Rear Shock Absorbers:			
Spring Preload	Recommended	Spring Free Length minus 5 mm	
	Usable Range	Spring Free Length minus 0 mm to Spring Free Length minus 20 mm	– – – –

Special Tools

Bearing Driver Set: 57001-1129



Front Fork Cylinder Holder Adapter: 57001-1057



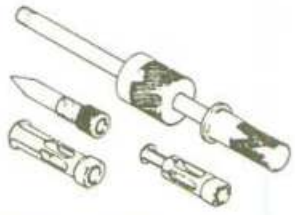
Front Fork Cylinder Holder Handle: 57001-183



Front Fork Oil Seal Driver: 57001-1219



Oil Seal and Bearing Remover: 57001-1058



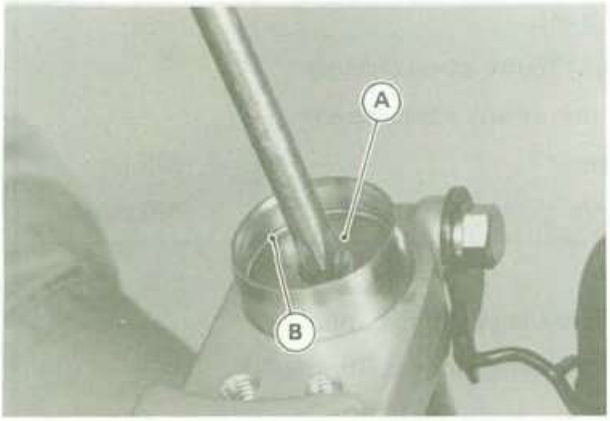
Stem Nut Wrench: 57001-1100



Front Fork

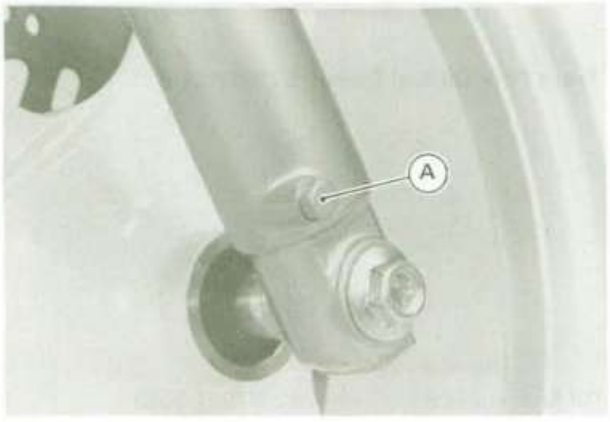
Fork Oil Change

- Remove the handlebar holder mounting Allen bolts, and take the handlebar off the stem head.
- Press the top plug to remove the retaining ring, and then remove the plug.



A. Top Plug B. Retaining Ring

- Pull the fork spring off the fork leg.
- Unscrew the drain bolt from the lower end of the outer tube.

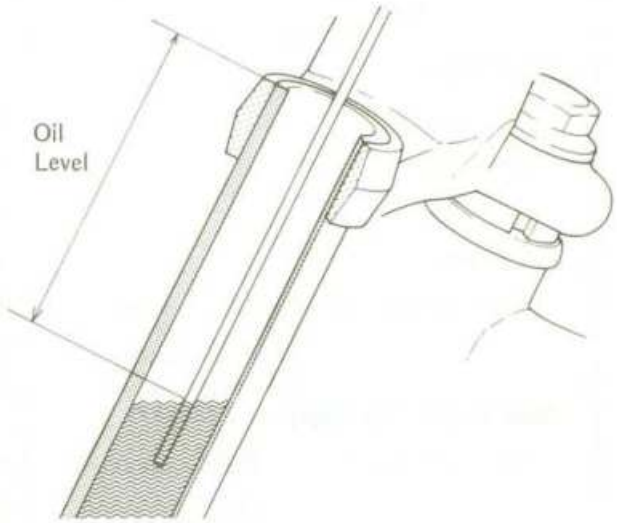


A. Drain Bolt

- Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch the oil in a container as it squirts out.
- Wash the drain bolt threads clean of oil, and blow them dry.
- Apply a liquid gasket to the threads of the drain bolt, and install the bolt and gasket.
- Pour in the specified type and amount of oil.
- Pump the fork enough times to expel the air form 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.

Fork Oil Level Measurement



CAUTION

○**The operation of air front forks is especially dependent upon correct oil level. Higher level than specified may cause oil leakage and seal breakage. So be sure to maintain the specified level.**

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

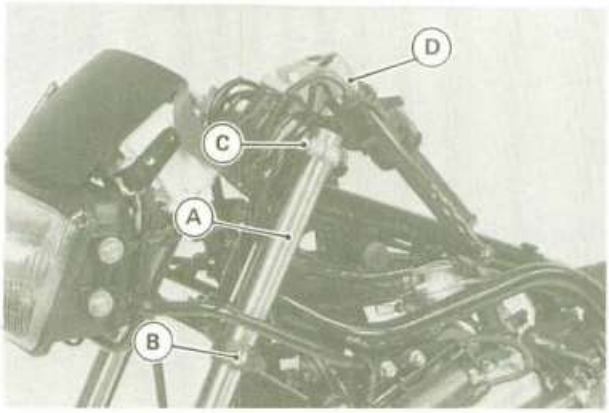
Front Fork Oil

Viscosity	**SAE 10W20**
Amount per side	
When changing oil:	**170 mL**
After disassembly and completely dry:	**202 ±2.5 mL**
Level (Fully Compressed)	**226 mm**

Front Fork Removal (each fork leg)

- Remove the caliper from the fork leg to be removed, and then remove the front wheel (see Front Wheel Removal in Wheels and Tires chapter).

- Remove the front fender (see Front Fender Removal in Frame chapter).
- Loosen the upper and lower fork clamp bolts.
- With a twisting motion, work the fork leg down and out.



A. Fork Leg
B. Lower Clamp Bolt
C. Upper Clamp Bolt
D. Handlebar

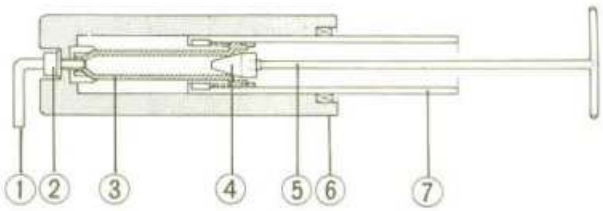
Front Fork Installation (each fork leg)

- When installing the fork leg, be careful of the following items.
  - If the fork leg was disassembled, check the fork oil level.
  - Tighten the lower and upper clamp bolts to the specified torque (see Exploded View).
  - Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter).
  - Check the front brake after installation.

Front Fork Disassembly

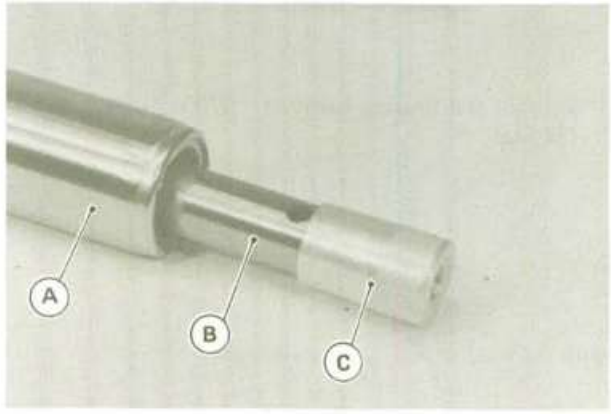
- Remove the front fork leg (see Front Fork Removal).
- Remove the retaining ring, top plug, springs, and spring seat.
- Pure out the fork oil.
- Stop the cylinder from turning by using the front fork cylinder holder handle and adapter (special tools). Unscrew the Allen bolt and take the bolt, and gasket out of the bottom of the outer tube.

Removing Bottom Allen Bolt



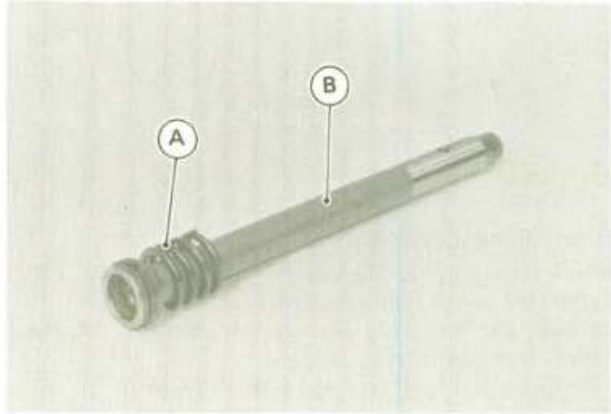
1. Wrench
2. Bolt
3. Cylinder
4. Adapter: 57001-1057
5. Handle: 57001-183
6. Outer Tube
7. Inner Tube

- Remove the dust seal with a hook.
- Remove the retaining ring.
- Pull the inner tube out of the outer tube, and take the cylinder base off the piston and cylinder unit.



A. Inner Tube
B. Fork Cylinder
C. Cylinder Base

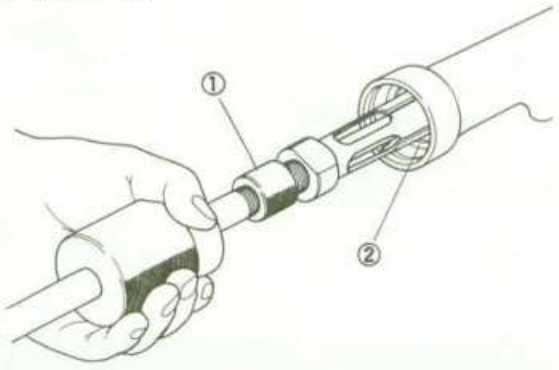
- Remove the piston and cylinder unit and the rebound spring from the top of the inner tube.



A. Rebound Spring
B. Piston and Cylinder Unit

●Remove the dust seal using a hook.
●Remove the retaining ring.
●Remove the fork oil seal using a oil seal and bearing remover (special tool).

Oil Seal Removal



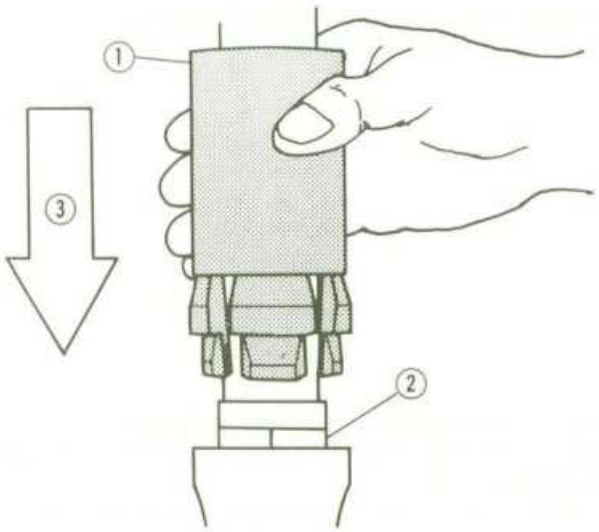
1. Oil Seal and Bearing Remover: 57001-1058
2. Oil Seal

●Pull the washer out of the outer tube.

○Insert the inner tube and cylinder as a set in 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), using the front fork cylinder holder handle and holder adapter (special tools) to stop the cylinder from turning.

○Use the fork oil seal driver (special tool) to install the oil seal in the front fork.

Oil Seal Installation



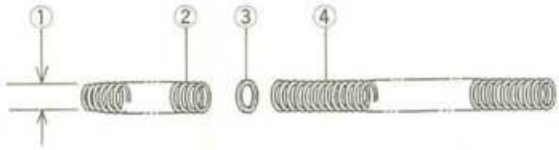
1. Driver: 57001-1219
2. Oil Seal
3. Tap

Front Fork Assembly

●Fork assembly is the reverse of disassembly. Pay attention to the following items.
○Check the top plug O-rings for damage. Replace them with new ones if damaged.
○Replace the oil seal removed with a new one.
○Insert the piston and cylinder unit and the rebound spring in the inner tube.

○If the drain bolt was removed, check the gasket for damage. Replace a damaged gasket with a new one. Before installing the drain bolt, apply a liquid gasket to the threads of the bolt, and tighten the bolt specified torque (see Exploded View).
○Pour in the type and amount of fork oil specified (see Specifications), and adjust the oil level.
○Install the fork springs as shown.

Fork Springs



1. Small Diameter End
2. Spring (Short)
3. Spring Sheet
4. Spring (Long)

Inner Tube Inspection

- Visually inspect the inner tube, and repair any damage.
- Nicks or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.

★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

- Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION

○**If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

Guide Bush Inspection

- Visually inspect the guide bushes, and replace the outer tube if necessary.

Fork Guide Bush



1. Guide Bush

Oil Seal and Dust Seal Inspection

- Inspect the dust seal for any signs of deterioration or damage.

★Replace them if necessary.

- Replace the oil seal with a new one whenever it has been removed.

Oil Seal and Dust Seal



1. Oil Seal
2. Dust Seal

Spring Tension

- Since the spring becomes shorter as it weakens, check its free length to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

Standard	**Long**	**274.4 mm**
	Short	**265.2 mm**
Service Limit	**Long**	**269 mm**
	Short	**260 mm**

Fork Spring Free Length



1. Fork Spring
2. Free Length

Rear Suspension (Uni-trak)

Rear Shock Absorber:

Rear Shock Absorber Adjustment

The rear shock absorbers can be adjusted by changing the spring preload to suit various riding and loading conditions.

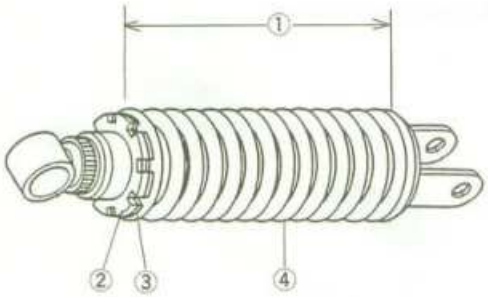
Uni-trak Spring Preload Adjustment

- Remove the shock absorber from the frame.
- Using the hook wrenches (special tool: 57001-1100), loosen the locknut and unscrew the adjusting nut until the spring is fully extended.
- Measure the free length of the shock absorber spring.
- Turn in the adjusting nut as required.
  - Turning the adjusting nut down makes the spring preload stronger.
  - The recommended adjusting nut position is compressed 5 mm than spring free length.

Spring Preload Setting

Recommended:	**Spring Free Length minus 5 mm**
Usable Range:	**Spring Free Length minus 0 mm to Spring Free Length minus 20 mm**

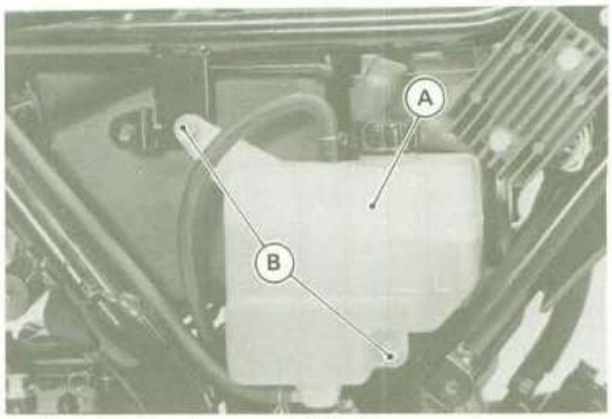
Spring Preload Adjustment



1. Spring Length
2. Locknut
3. Adjusting Nut
4. Spring

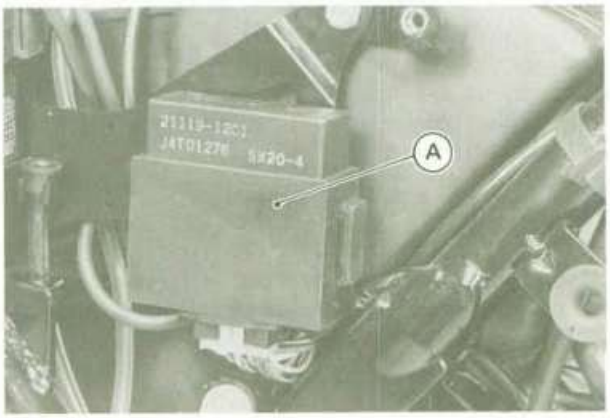
Rear Shock Absorber Removal

- Remove the seats, kneegrip pads, and side covers.
- Remove the coolant reservoir tank bolts, and take the tank out of the frame.



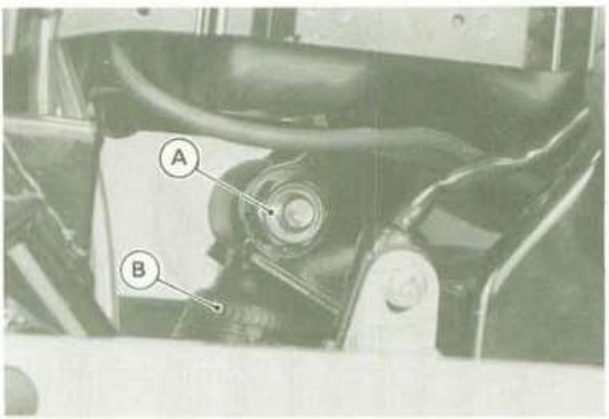
A. Reservoir Tank B. Bolts

- Pull the IC igniter off the bracket and out of place.

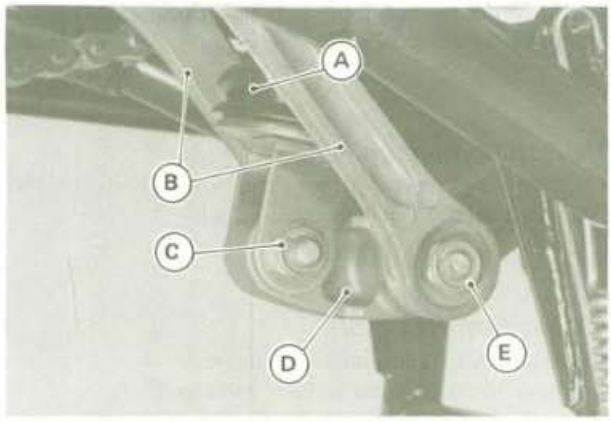


A. IC Igniter

- Loosen the upper shock absorber nut. Do not remove it yet.
- Remove the lower shock absorber bolt, and the tie rod lower bolt.



A. Upper Shock Absorber Nut B. Shock Absorber



A. Shock Absorber
B. Tie-rods
C. Lower Shock Absorber Nut
D. Rocker Arm
E. Tie-rod Lower Nut

- Remove the upper shock absorber nut and bolt, then take off the rear shock absorber unit toward the ground.

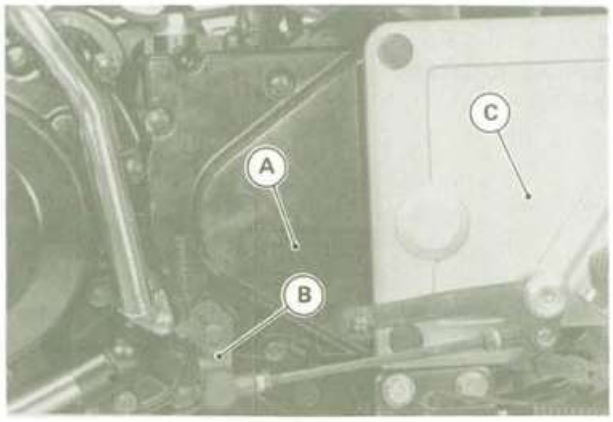
Rear Shock Absorber Installation

- Installation is the reverse of removal.
- When installing the rear shock absorber, be careful of the following items.
  - Tighten the upper and lower shock absorber nuts to the specified torque.
  - Tighten the tie rod nut to the specified torque (see Exploded View).

Swing Arm:

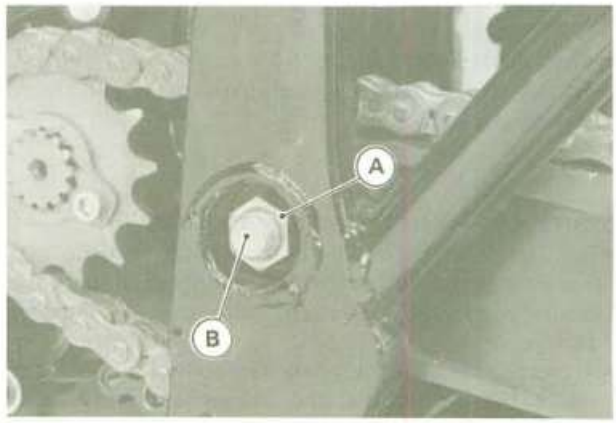
Swing Arm Removal

- Remove the left side footpeg bracket (see Left Footpeg Bracket Removal in Frame chapter).



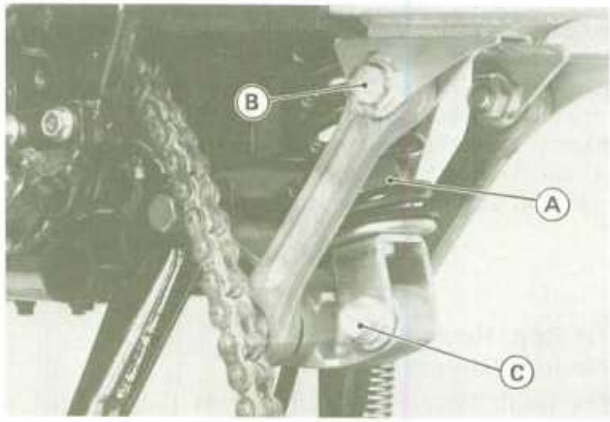
A. Engine Sprocket Cover
B. Shift Lever
C. Footpeg Bracket

- Remove the LH muffler.
- Remove the right side footpeg bracket (see Right Footpeg Bracket Removal in Frame chapter).
- Remove the RH muffler.
- Remove the rear caliper (see Rear Caliper Removal in Brakes chapter).
- Remove the rear wheel (see Rear Wheel Removal in Wheels/Tires chapter).
- Remove the swing arm pivot nut. Do not remove the pivot shaft.



A. Pivot Nut
B. Pivot Shaft

- Remove the lower shock absorber nut. Do not remove the bolt.
- Remove the uni-trak tie rod upper nut. Do not remove the bolt.



A. Rear Shock Absorber
B. Tie Rod Upper Bolt
C. Lower Bolt

- Remove the tie-rod bolt, shock absorber bolt, and swing arm pivot shaft while supporting the swing arm.
- Remove the swing arm toward the rear.

Swing Arm Installation Notes

- When installing the swing arm, be careful of the following items.
  - Tighten the swing arm pivot nut to he specified torque (see Exploded View).
  - Tighten the lower shock absorber nut to the specified torque (see Exploded View).

○Tighten the tie-rod upper nut to the specified torque (see Exploded View).
○Tighten the torque link nut to the specified torque (see Exploded View in Brake chapter).
○Adjust the drive chain after installation (see Drive Chain Slack Adjustment in Final Drive chapter).

Swing Arm Sleeve Inspection

★If there is visible damage, replace the sleeve and needle bearing as a set.

Swing Arm Needle Bearing Inspection

●The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the needle bearings for abrasion, color change, or other damage.
★If there is any doubt as to the condition of either needle bearing, replace the bearing and sleeve as a set.

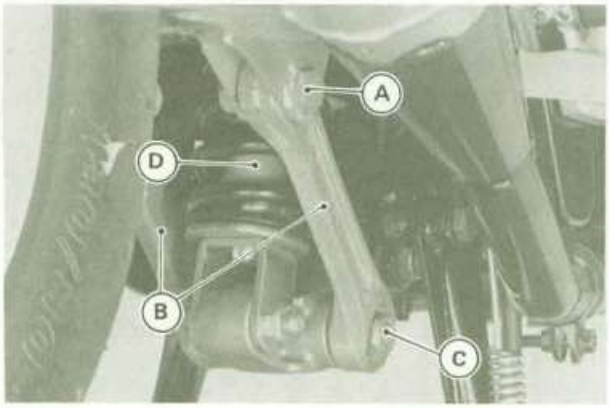
Swing Arm Needle Bearing Lubrication

In order for the swing arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.
●Disassemble the swing arm.
●Using a high flash-point solvent, wash the sleeves and needle bearings, and dry them.
●Inspect the needle bearings, sleeves and grease seals for abrasion, color change, or other damage.
●Apply a molybdenum disulfide grease to the outer circumference of the sleeves, and pack the needle bearings with the same grease.

Tie-Rod, Rocker Arm:

Tie-Rod Removal

●Put the motorcycle on its center stand.
●Remove the tie-rod lower bolt.



A. Tie-rod Upper Bolt
B. Tie-rods
C. Tie-rod Lower Bolt
D. Rear Shock Absorber

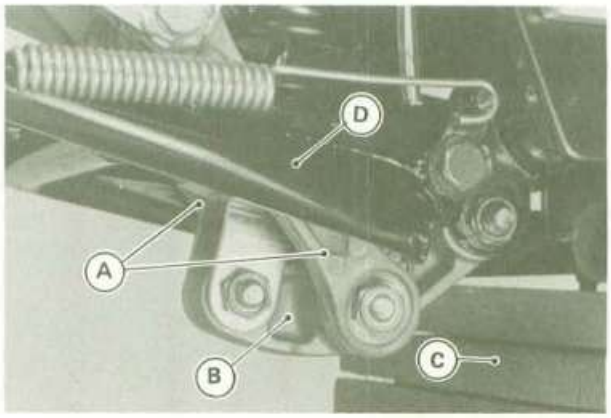
●Remove the tie-rod upper bolt and take the tie-rod off.
●Remove the other tie-rod.

Tie-Rod Installation Note

●Tighten the tie-rod upper and lower bolts to the specified torque (see Exploded View).

Rocker Arm Removal

●Put a suitable stand under the engine.
●Remove the right hand and left hand mufflers.
●Retrack the center stand.
●Remove the lower shock absorber nut. Do not remove the bolt.
●Remove the tie-rod lower nut. Do not remove the bolt.
●Remove the tie-rod bolt and shock absorber bolt while supporting the swing arm.



A. Tie-rods
B. Rocker Arm
C. Suitable Stand
D. Center Stand

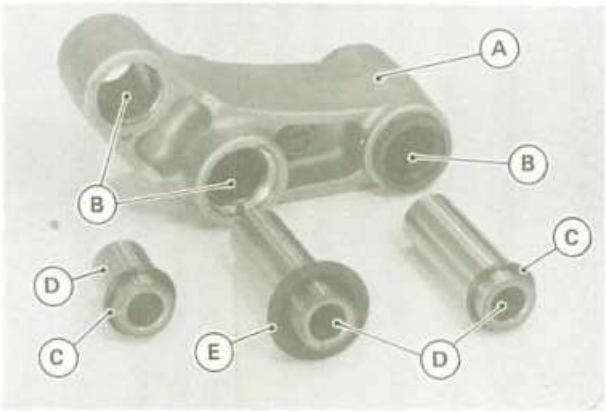
●Remove the nut and pull out the rocker arm shaft and remove the rocker arm from the bottom side of the frame.

CAUTION

○Use the stand suitable for the height of the motorcycle's engine, or the brake hose may be tugged and damaged.

Rocker Arm Installation Notes

●Check that the O-rings is in good condition.



A. Rocker Arm
B. Sleeves
C. O-rings
D. Sleeves
E. Grease Seal

- Tighten the tie-rod lower nut to the specified torque (see Exploded View).
- Tighten the lower shock absorber nut to the specified torque (see Exploded View).
- Tighten the rocker arm shaft nut to the specified torque (see Exploded View).

Tie-rod, Rocker Arm Bushing Inspection

- The bushings wear so little that the wear is difficult to measure. Instead, inspect the bushings for abrasion, color change, or other damage.

★If there is any doubt as to the condition of either bushings, replace the bushing with new one.

Tie-rod, Rocker Arm Sleeve Inspection

★If there is visible damage, replace the sleeve with new one.

Tie-rod, Rocker Arm Bushing Lubrication

In order for the tie-rod and rocker arm to function safely and wear slowly, it should be lubricated in accordance with the Periodic Maintenance Chart or whenever disassembled.

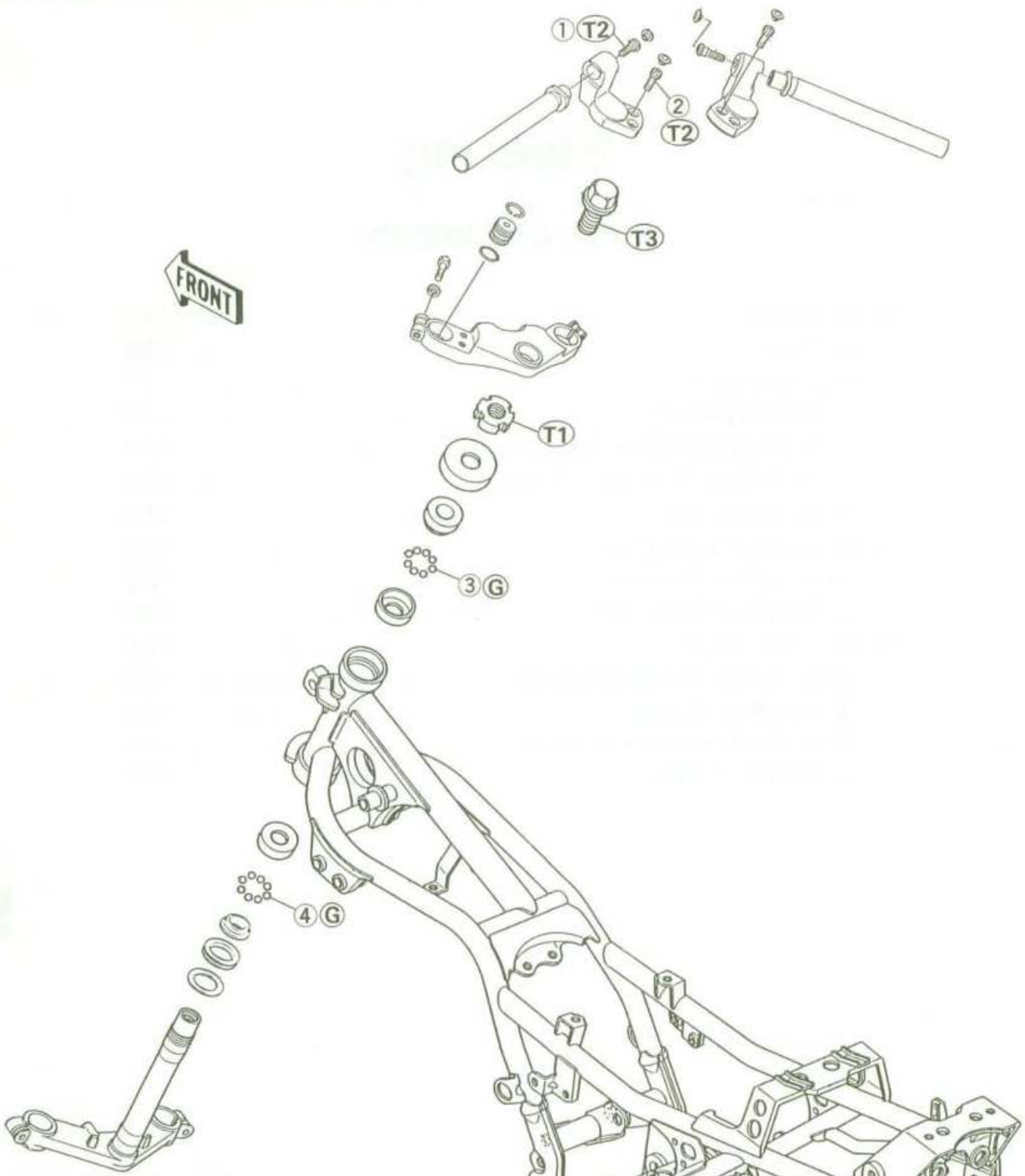
- Disassemble the tie-rod and rocker arm.
- Using a high flash-point solvent, wash the sleeves and bushings, and dry them.
- Inspect the bushings, sleeves and grease seals for abrasion, color change, or other damage.
- Apply a molybdenum disulfide grease to the outer circumference of the sleeves, and pack the bushings with the same grease.

Steering

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Exploded View



1. Handlebar Clamp Bolts
2. Handlebar Holder Mounting Bolts
3. Steel Ball (19)
4. Steel Ball (20)

G : Apply grease

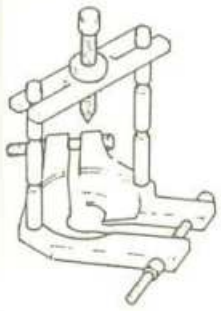
T1 : 7.4 N-m (0.75 kg-m, 65 in-lb)

T2 : 23 N-m (2.3 kg-m, 16.5 ft-lb)

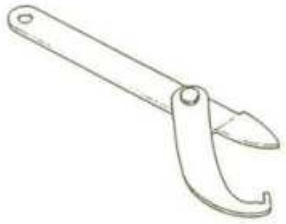
T3 : 47 N-m (4.8 kg-m, 35 ft-lb)

Special Tools

Bearing Puller: 57001-158



Stem Nut Wrench: 57001-1100



Adapter: 57001-317



Pole: 57001-1190



Stem Bearing Driver: 57001-137



Adapter: 57001-294



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:

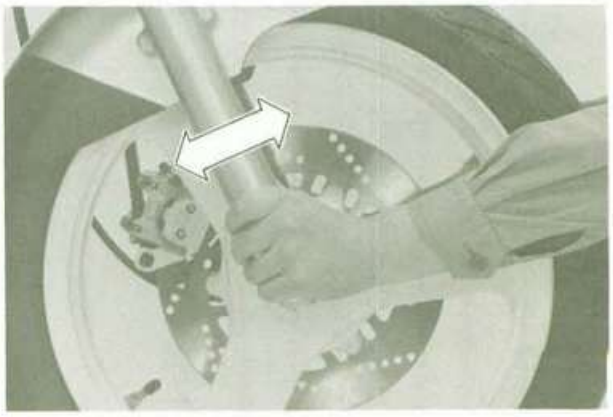
- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.
- ★If the wheel binds or catches before the stop, the steering is too tight.

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.*

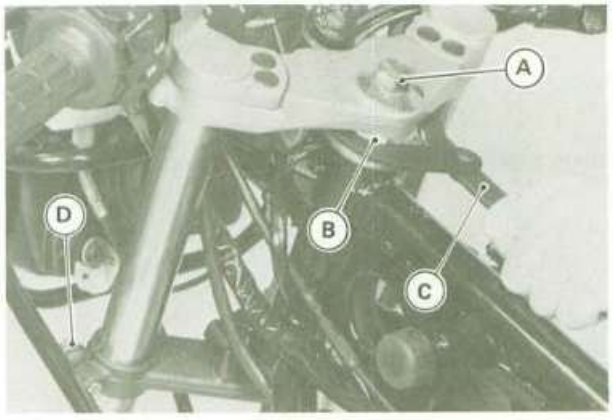
Checking for Steering Too Loose:

- 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

- Set the motorcycle up on its center stand.
- Remove the fairings and the fuel tank to avoid damaging the painted surface.
- Loosen the front fork lower clamp bolts.
- Loosen the stem head bolt.
- Using a jack under the engine, lift the front wheel off the ground.
- Back out the steering stem locknut using the stem nut wrench (special tools) a or 2 turns until it turns without drag.



A. Stem Head Bolt
B. Stem Locknut
C. Stem Nut Wrench: 57001-1100
D. Fork Lower Clamp Bolt

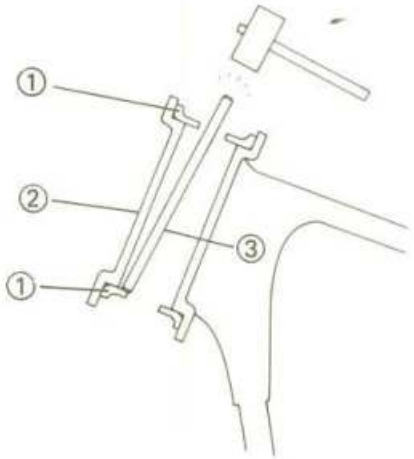
- If the steering is too tight, loosen the stem locknut a fraction of turn; if the steering is too loose, tighten the locknut a fraction of turn. Turn the locknut 1/16 (20°) turn at a time maximum.
- Tighten the steering stem head bolt to the specified torque (see Exploded View).
- Tighten the front fork lower clamp bolts to the specified torque (see Exploded View in Suspension chapter).
- Check the steering again.
- ★If the steering is still too tight or too loose, repeat the adjustment.
- Install the removed parts.

Steering Removal/Installation

Steering Stem Removal

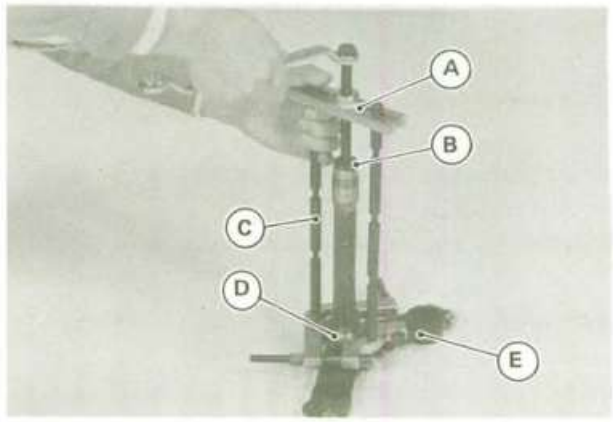
- Remove the following parts.
  - Fairings
  - Fuel Tank
  - Handlebars
  - Front Caliper
  - Front Wheel
  - Front Fender
  - Front Fork Legs
- Remove the mounting bolts (2), free the brake hose clamp from the stem base, and remove the front brake assembly as a set.
- Remove the stem head bolt.
- Remove the steering stem head.
- Push up on the stem base, and remove the steering stem locknut with the stem nut wrench (special tool), remove the steering stem and stem base (single unit).
- As the stem is removed, some of the steel balls will drop out of the lower outer race. Remove the remaining balls. There are 20 steel balls in the lower outer race.
- Remove the steering stem cap, the upper inner race, and the upper steel balls (19).
- To remove the outer races pressed in the head pipe, insert a bar into the head pipe, and hammer evenly around the circumference of the opposite race to drive it out.

Bearing Race Removal



1. Outer Races
2. Head Pipe
3. Bar

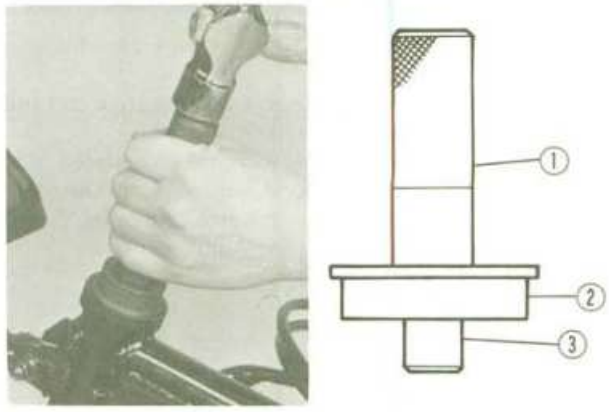
- Remove the lower inner race (with its grease seal) which is pressed onto the steering stem, with the steering stem bearing puller and adapters (special tools).



A. Bearing Puller: 57001-158
B. Adapter: 57001-317
C. Pole: 57001-1190
D. Bearing Inner Race
E. Stem Base

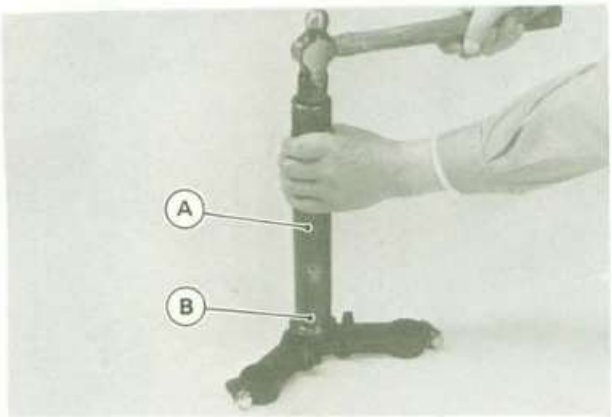
Steering Stem Installation

- Apply oil to the outer races, and drive the races into the head pipe using the bearing driver and the bearing driver holder (special tools). Be sure to drive them in until they stop at the stepped portion in the head pipe.



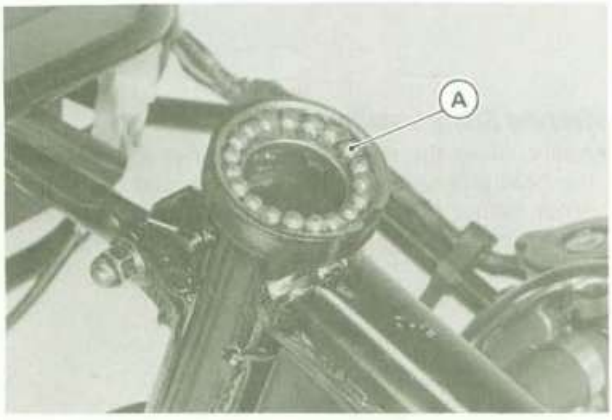
1. Bearing Driver Holder
2. Bearing Driver
3. Bearing Driver

- Apply oil to the lower inner race, and drive it onto the steering stem using the stem bearing driver and adapter (special tools). Be sure to press it in until it stops at the stem base.



A. Stem Bearing Driver: 57001-137
B. Adapter: 57001-294

•Apply grease to the upper and lower outer races in the head pipe so that the steel balls will stick in place during stem insertion. Install the upper steel balls (19) and lower steel balls (20). All the steel balls are same size.



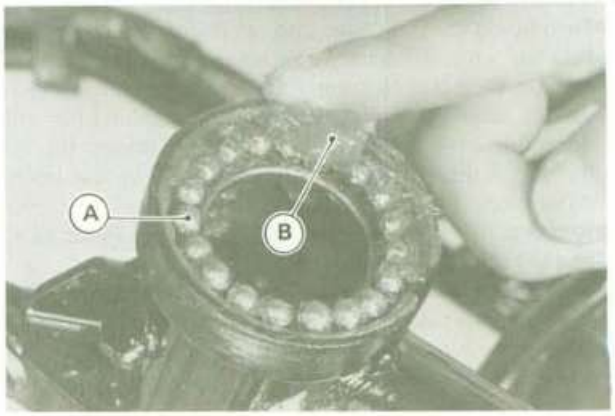
A. Steel Balls

•Put on the upper inner race and steering stem cap and insert the steering stem into the head pipe.
•Turn in the stem locknut with the chamfered side facing to toward the ground, and tighten the stem locknut to the specified torque (see Exploded View).
•Adjust the steering (see Steering Adjustment).
•Reinstall the following parts.
Front Fork Legs
Front Fender
Front Wheel
Front Caliper
Handlebars
Fuel Tank
Fairings
•Route the cables and harnesses correctly. The cables and wiring harnesses must not hinder handlebar movement.
•Check and adjust the following items.
Front Brake
Clutch
Throttle Cable
Rear View Mirrors
Headlight Aim

Steering Maintenance

Steering Stem Bearing Lubrication

In accordance with the Periodic Maintenance Chart, lubricate the steering stem bearings.
•Remove the steering stem.
•Wipe all the old grease off the races and balls, washing them in a high flash-point solvent.
•Visually check the races and the balls.
★Replace the bearing assemblies if they show wear or damage.
•Pack the upper and lower races with grease, and stick the bearing balls in place with grease.
•Install the steering stem, and adjust the steering.



A. Bearing Balls B. Grease

Bearing Wear, Damage

•Using a high flash-point solvent, wash the bearings clean of grease and dirt, and examine the races and balls.
•Visually check the balls or races.
★If the balls or races are worn, or if either race is dented, replace both races and all the balls for that bearing as a set.

Grease Seal Deterioration, Damage

•Inspect the grease seal 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.

Frame

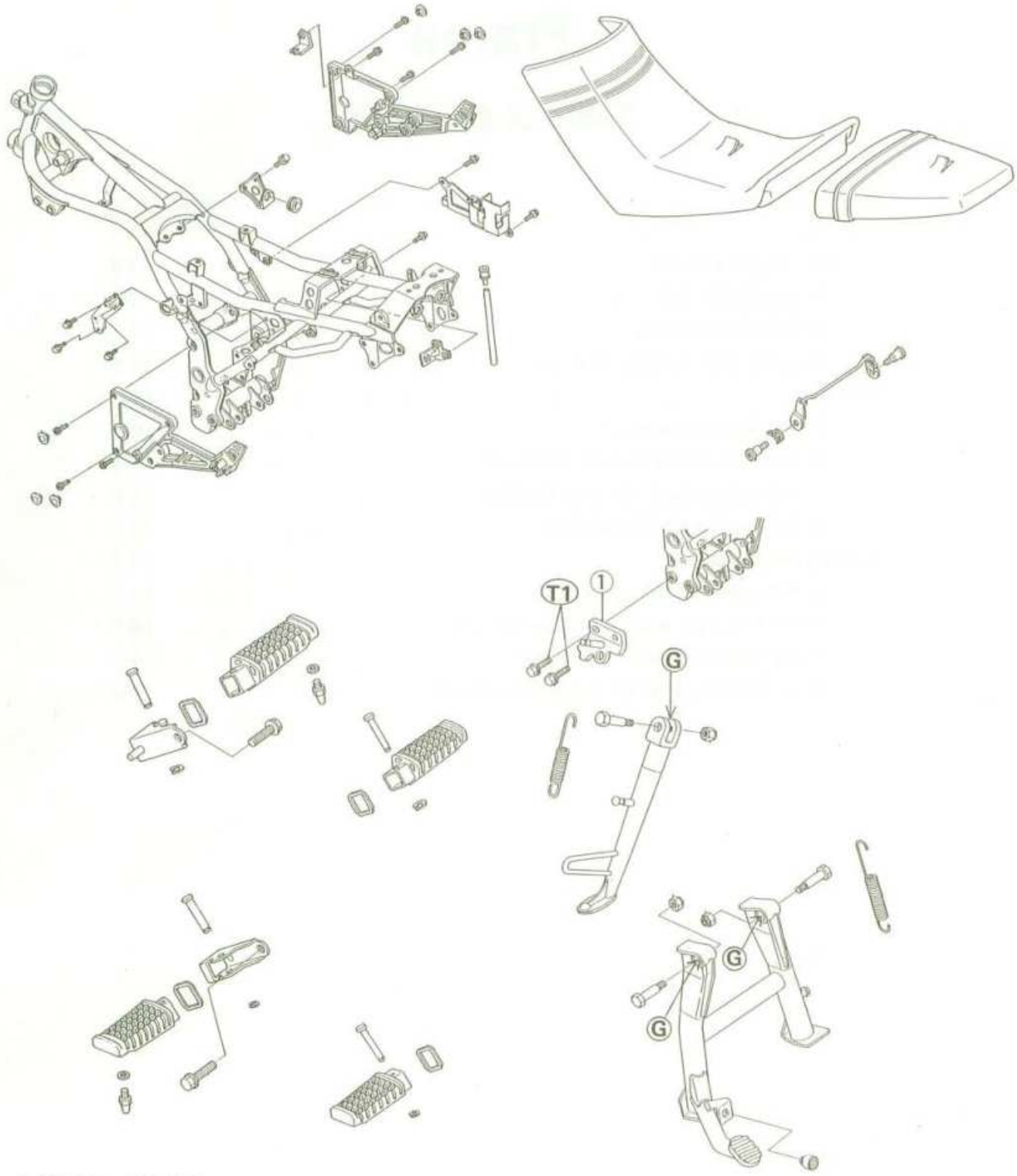
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- Fairing Stay Installation Note 14-5

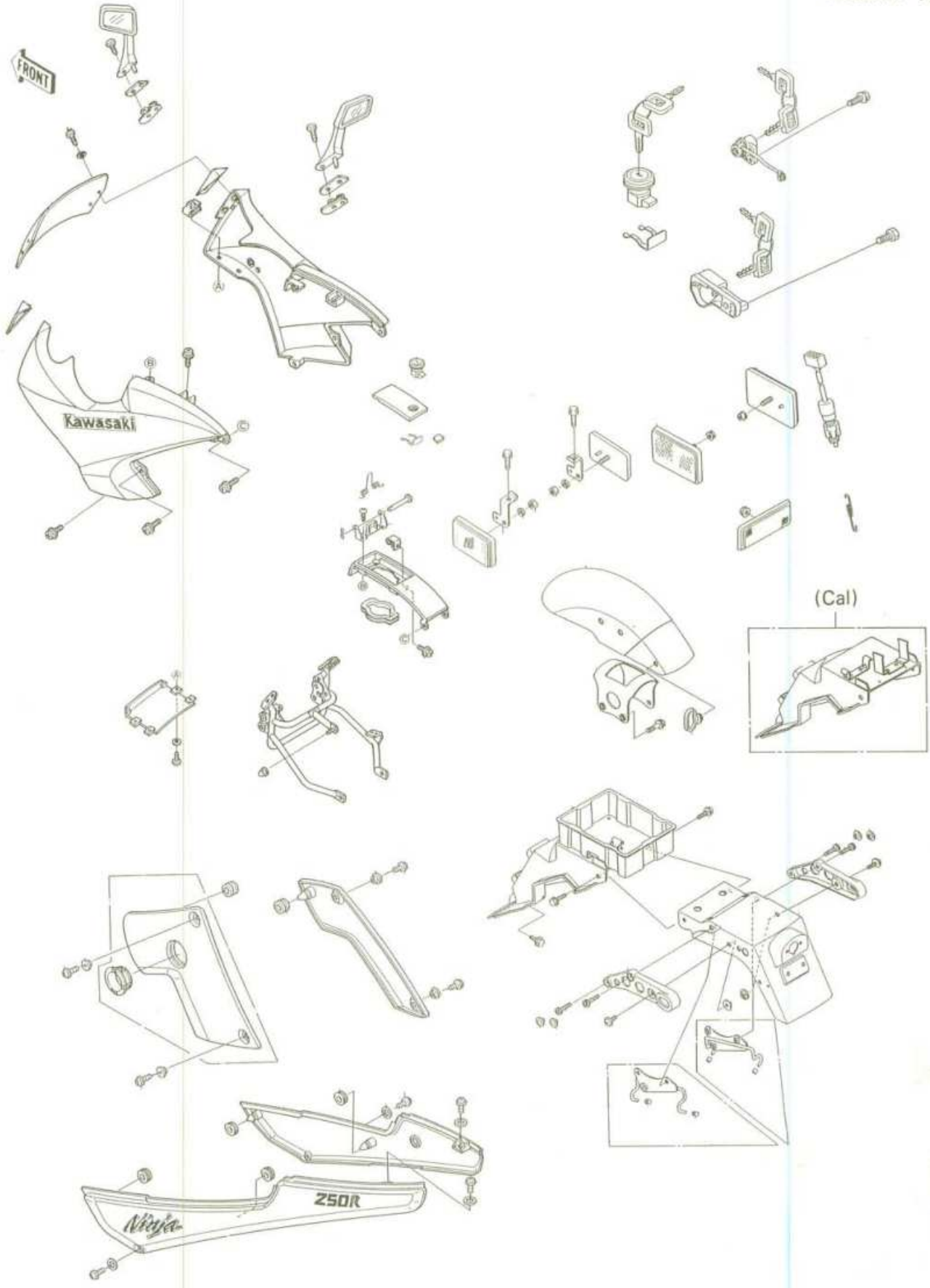
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Exploded View



1. Side Stand Bracket
G : Apply grease.
T1 : 34 N-m (3.5 kg-m, 25 ft-lb)

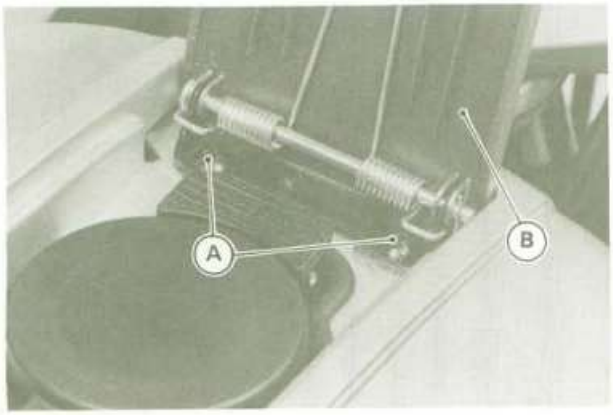


Cal: California model

Fairings

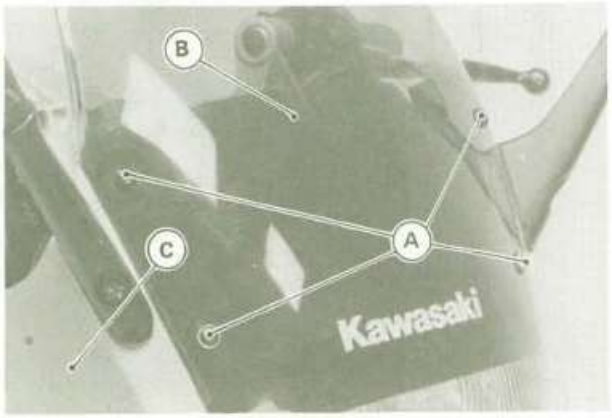
Fairings Removal

- Remove the seats and kneegrip pads.
- Open the fuel tank cap cover, then remove the screws and take off the cover.



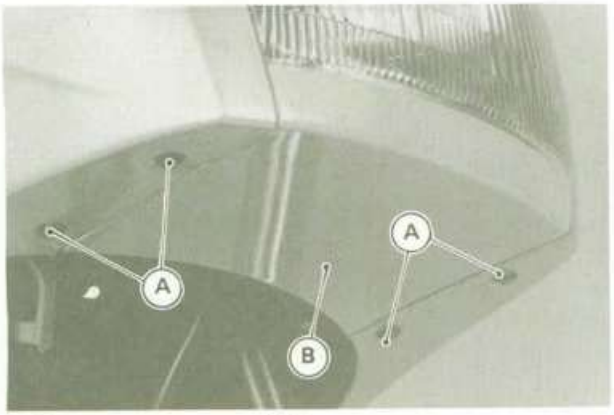
A. Screws B. Cover

- Remove the screws and take the windshield off the fairing.



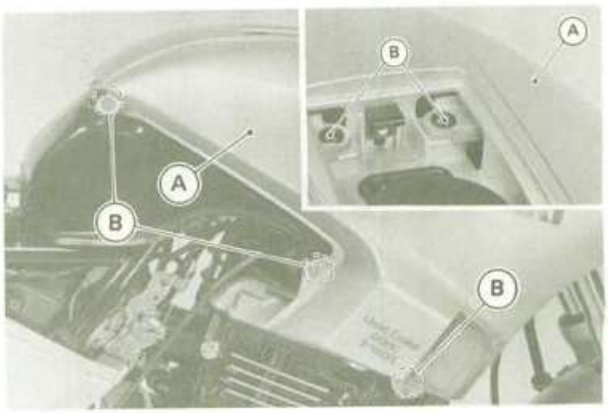
A. Screws C. Fairing
B. Windshield

- Remove the headlight lower cover screws (each side).



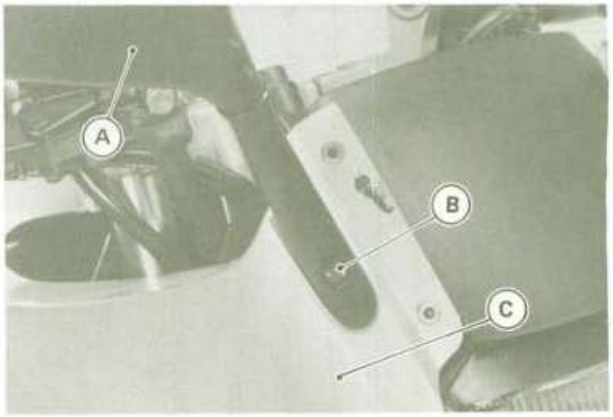
A. Screws B. Cover

- Remove the fairing mounting screws (each side).



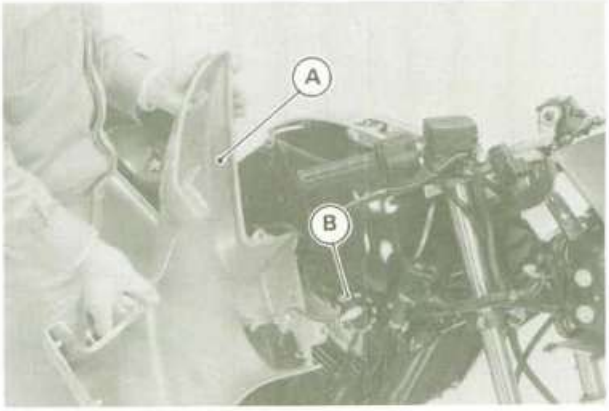
A. Fairing B. Screws

- Remove the rear view mirror mounting screw (each side), hold the fairing steady and take the mirror off the fairing stay.



A. Rear View Mirror C. Fairing
B. Screw

- Pull the fairing half out of the frame, disconnecting the turn signal light wiring connector from the wire harness.



A. Fairing Half B. Connector

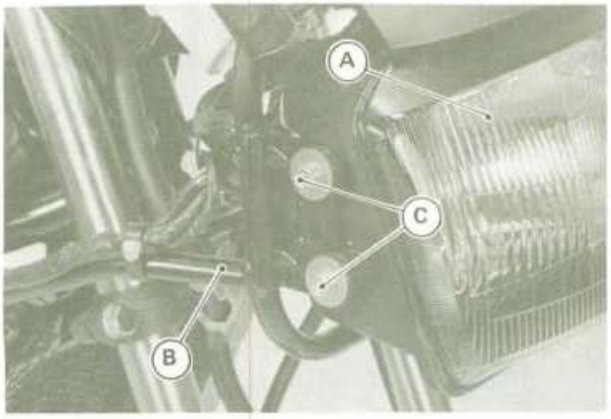
- Remove the other fairing half of the same manner.
- Remove the center fairing from the fuel tank.

Fairings Installation Note

- Before installation, connect the turn signal light lead connector.

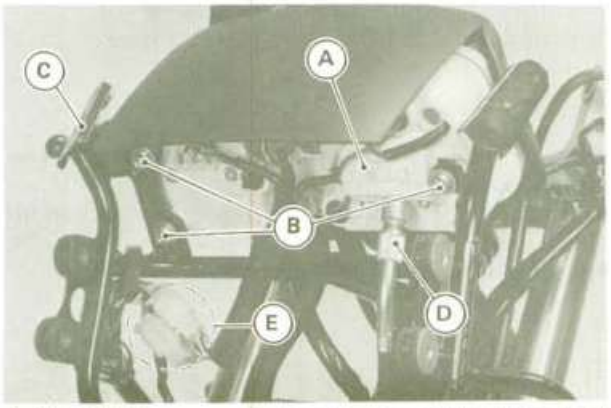
Fairing Stay Removal

- Remove the seats and kneegrip pads.
- Remove the fairings.
- Remove the fuel tank.
- Remove the headlight mounting bolts and pull the headlight unit out of the fairing stay, then disconnect the socket from the headlight bulb.



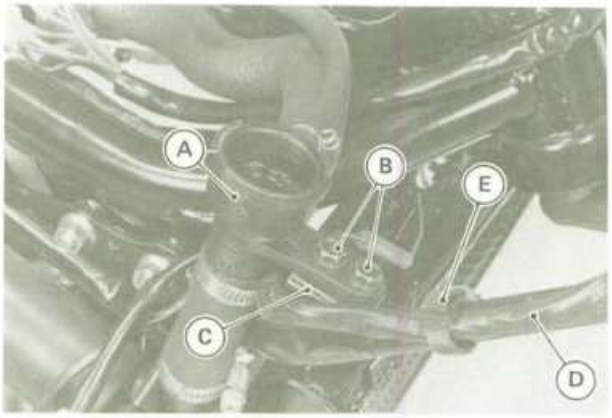
A. Headlight Unit
B. Fairing Stay
C. Mounting Bolts

- Remove the speedometer cable upper end.
- Disconnect the meter wiring connectors (4-pin and 6-pin).
- Remove the meter mounting nuts and take the meter unit off the fairing stay.



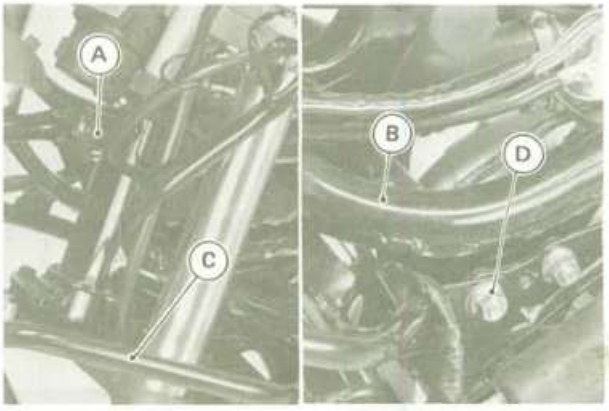
A. Meter Unit
B. Mounting Nut
C. Fairing Stay
D. Speedometer Cable Upper End
E. Wiring Connectors

- Remove the radiator cap, and remove the radiator filler mounting bolts, then unfastner the wiring straps.



A. Radiator Filler
B. Mounting Bolts
C. Fairing Stay
D. Wiring Harness
E. Wiring Strap

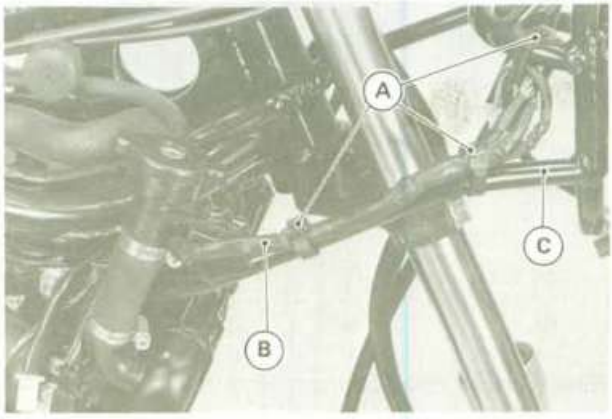
- Remove the fairing stay mounting nuts, and take the stay off the frame toward the front.



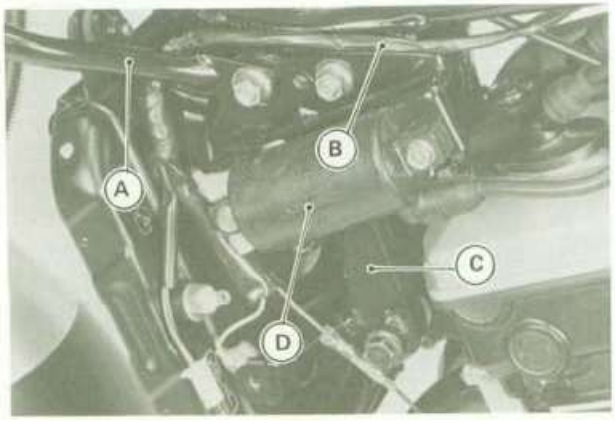
A. Mounting Nut (Upper)
B. Frame
C. Fairing Stay
D. Mounting Nut (Left and Right)

Fairing Stay Installation Note

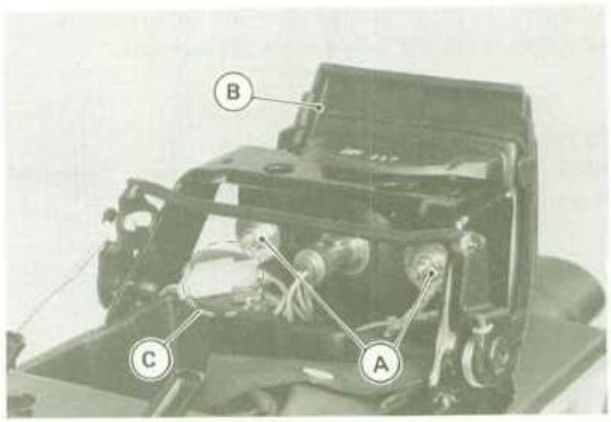
- Route the wiring harness as shown.



A. Wiring Straps
B. Wiring Harness
C. Fairing Stay (RH)



A. Fairing Stay (LH)
B. Wiring Harness
C. Engine Bracket
D. Ignition Coil

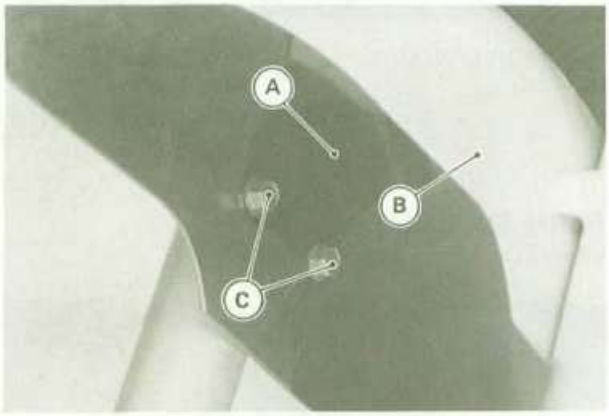


A. Nuts
B. Tail/Brake Light
C. Connector

Fenders

Front Fender Removal

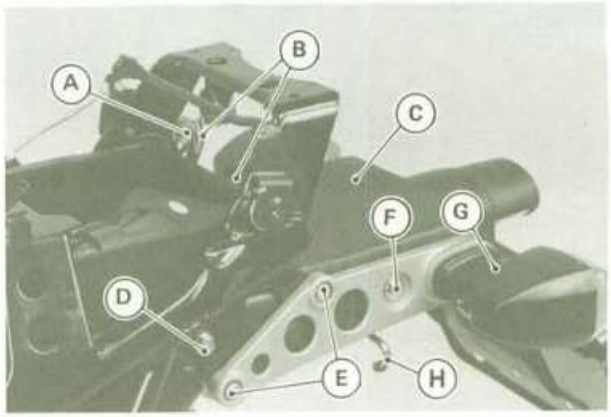
- Remove the speedometer cable lower end, and pull it out of the cable guide.
- Remove the front wheel (see Front Wheel Removal in Wheels/Tires chapter).
- Remove the fender mounting bolts and take off the brace, and remove the front fender.



A. Brace
B. Front Fender
C. Mounting Bolts

Rear Fender Rear Section Removal

- Remove the seats, kneegrip pads, and side covers.
- Remove the nuts and take off the tail/brake light, and disconnect the tail/brake light lead connector.
- Disconnect the turn signal light lead connectors and license light lead connectors.
- Remove the turn signal light stay mounting Allen bolts and screw while supporting the light stay. Take the stays off the rear end of the frame.

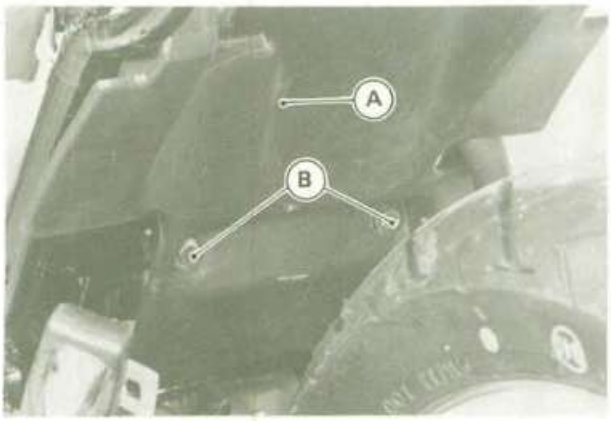


A. License Light Leads
B. Turn Signal Light Leads
C. Rear Fender Rear Section
D. Mounting Bolt
E. Mounting Allen Bolt
F. Mounting Screw
G. Stay
H. Tying Hook

- Remove the fender mounting bolts supporting the rear fender rear section.
- Take the tying hook and rear fender rear section off the frame.
- Remove the license light if necessary.

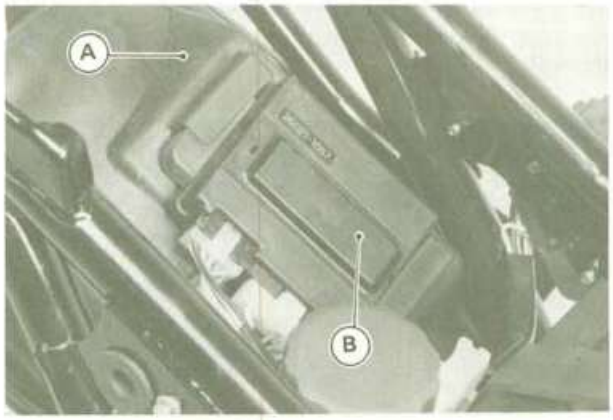
Rear Fender Front Section Removal

- Remove the rear fender rear section.
- Remove the mounting nuts and take off the rear fender front section.



A. Rear Fender Front Section B. Mounting Nuts

•Slide the junction box toward the right and out of place.

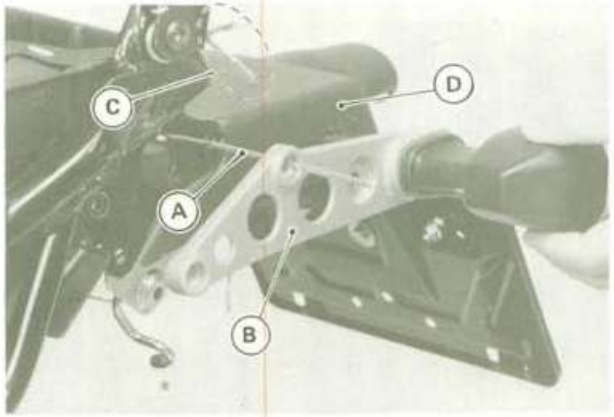


A. Rear Fender Front Section B. Junction Box

Rear Fender Installation Notes

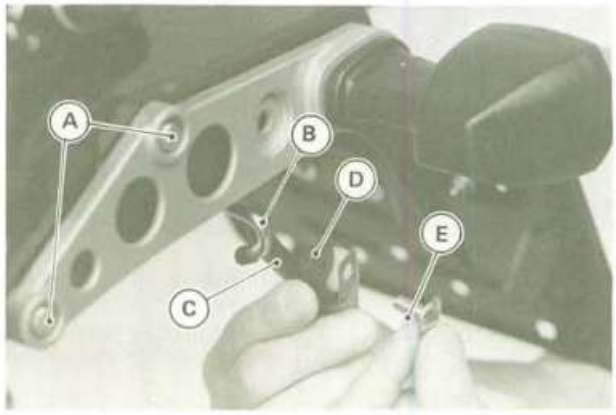
•Installation is the reverse of removal, note the following.

○When installing the rear fender rear section, attach the rear fender rear section, tying hook, and turn signal light stay, to the rear end of the frame, and insert the rod as shown.



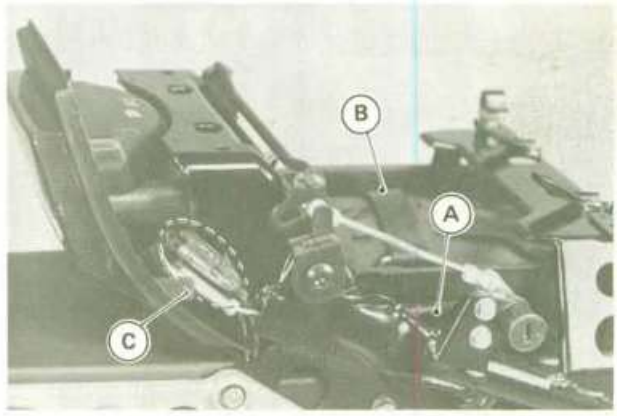
A. Rod C. Wiring Reads
B. Stay D. Rear Fender Rear Section

○Loosely tighten the Allen bolts and screws as shown, and then tighten the all bolts securely.



A. Allen Bolt D. Nut
B. Tying Hook E. Screw
C. Wiring Lead Clamp

○Route the tail/brake, turn signal and license light leads as shown.

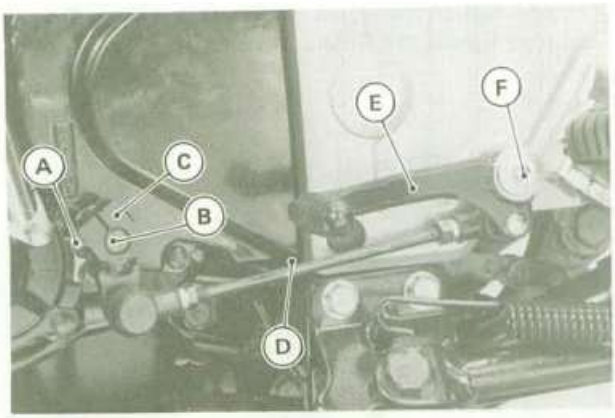


A. Wire Harness C. Lead Connectors
B. Document/Tool Kit Container

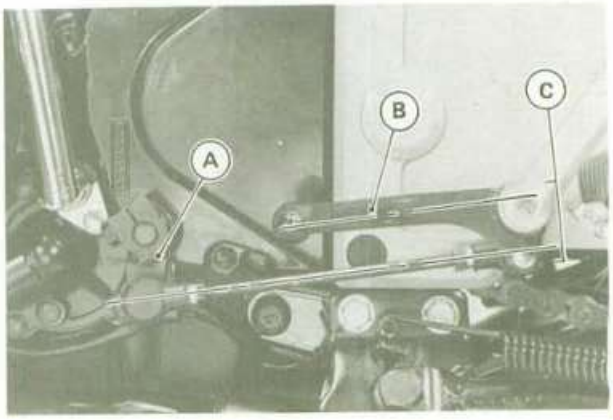
Footpeg Bracket

Left Footpeg Bracket Removal

•Remove the shift lever bolt, and pull the lever off the shift shaft.

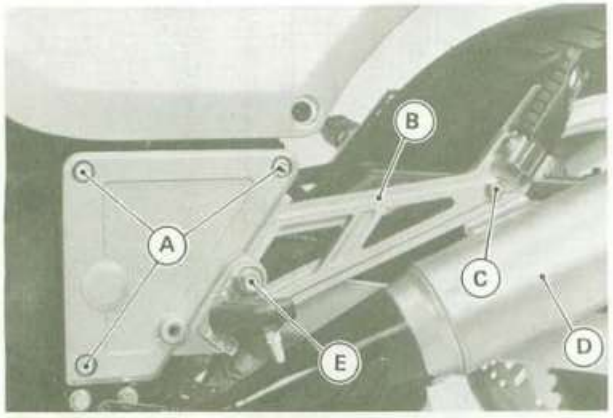


A. Bolt
B. Shift Shaft
C. Shift Lever
D. Link Rod
E. Shift Pedal
F. Pedal Mounting Bolt



A. Shift Lever
B. Shift Pedal
C. Correct Position

- Remove the shift pedal mounting bolt, and take the shift pedal off the footpeg bracket with the shift lever.
- Hold the footpeg bracket steady, and remove the muffler mounting bolt and footpeg bracket Allen bolts.



A. Allen Bolts
B. Footpeg Bracket
C. Mounting Bolt
D. Muffler
E. Footpeg Mounting Bolt

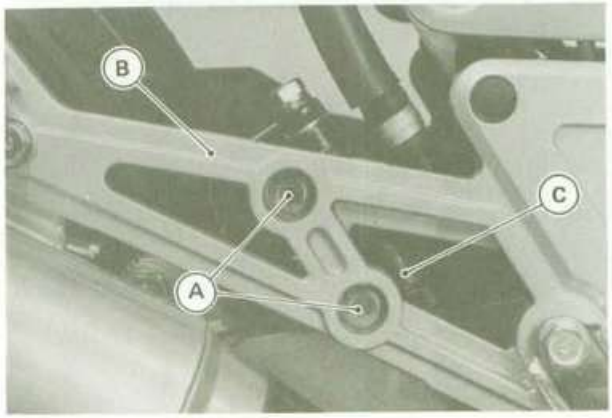
- Remove the footpeg mounting bolt, rear footpeg pin and take the footpegs off the bracket if necessary.

Left Footpeg Bracket Installation Note

- When installing the shift pedal, attach the shift pedal to the footpeg bracket as shown.

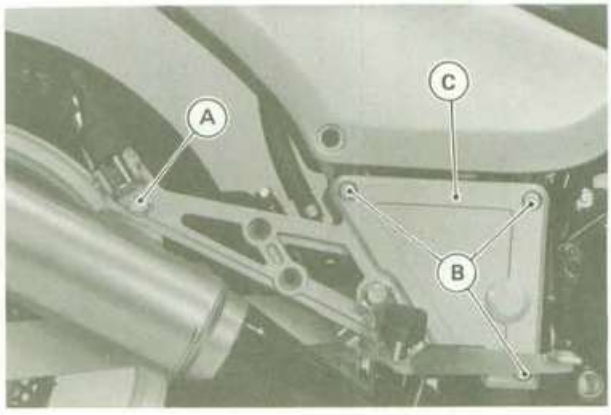
Right Footpeg Bracket Removal

- Remove the rear brake master cylinder mounting Allen bolts.



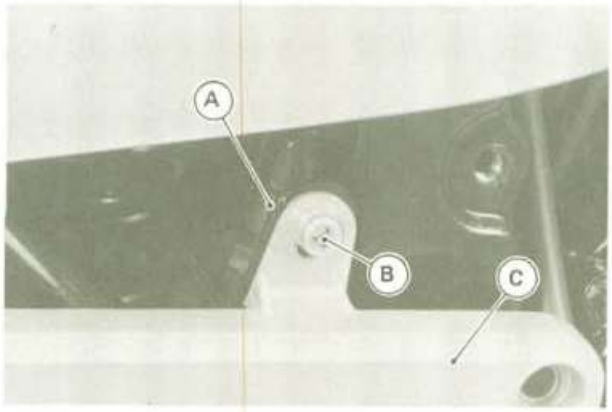
A. Mounting Allen Bolts
B. Footpeg Bracket
C. Rear Master Cylinder

- Hold the footpeg bracket steady, and remove the muffler mounting bolt and footpeg bracket Allen bolts.



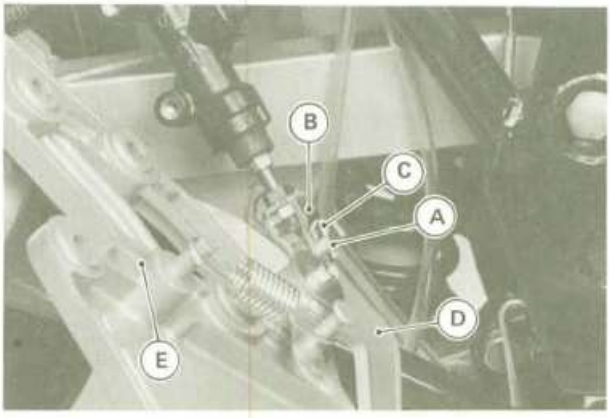
A. Mounting Bolt
B. Allen Bolts
C. Footpeg Bracket

•Remove the rear brake light switch mounting screw.



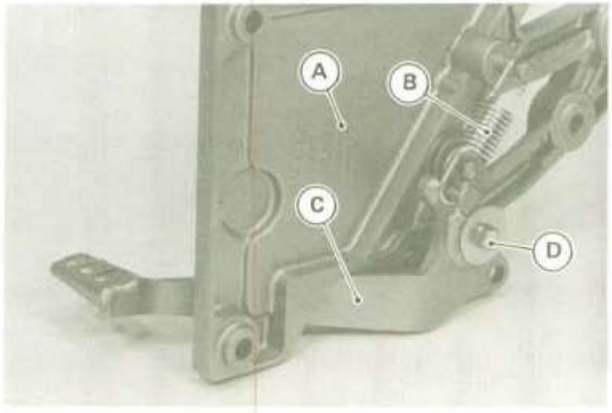
A. Rear Brake Light Switch
B. Mounting Screw
C. Footpeg Bracket

•Remove the cotter pin and then pull the joint pin out of the push rod clevis and brake pedal, and take the footpeg bracket off the rear master cylinder.



A. Joint Pin
B. Clevis
C. Cotter Pin
D. Brake Pedal
E. Footpeg Bracket

•Unhook the brake pedal spring, and remove the brake pedal mounting bolt, then separate it.



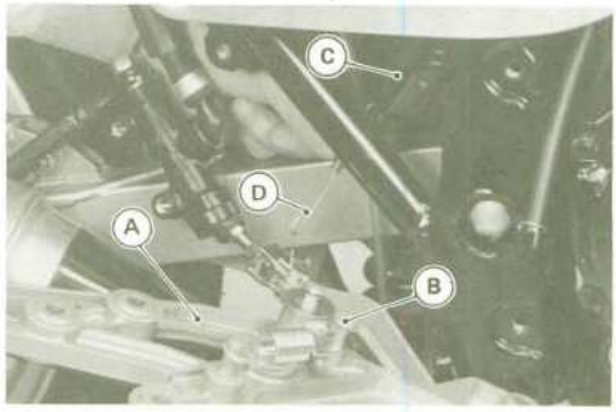
A. Footpeg Bracket
B. Spring
C. Brake Pedal
D. Mounting Bolt

•Remove the footpeg mounting bolt, rear footpeg pin and take the footpegs off the bracket if necessary.

Right Footpeg Bracket Installation Notes

•When the brake pedal is installed, apply grease to the brake pedal pivot.

•Before installing the footpeg bracket, hook the brake light switch spring to the spring pin at the bracket, and then install the brake light switch to the bracket.



A. Footpeg Bracket
B. Spring Pin
C. Brake Light Switch
D. Spring

Electrical System

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Precautions

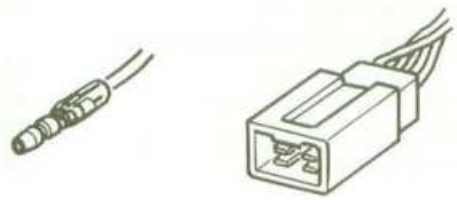
There are numbers of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter switch pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a meter illumination bulb rated for other than voltage or wattage specified in the wiring diagram, as the meter or gauge panel could be warped by excessive heat radiated from the bulb.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was brough on by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Electrical Connectors

Female Connectors



Male Connectors

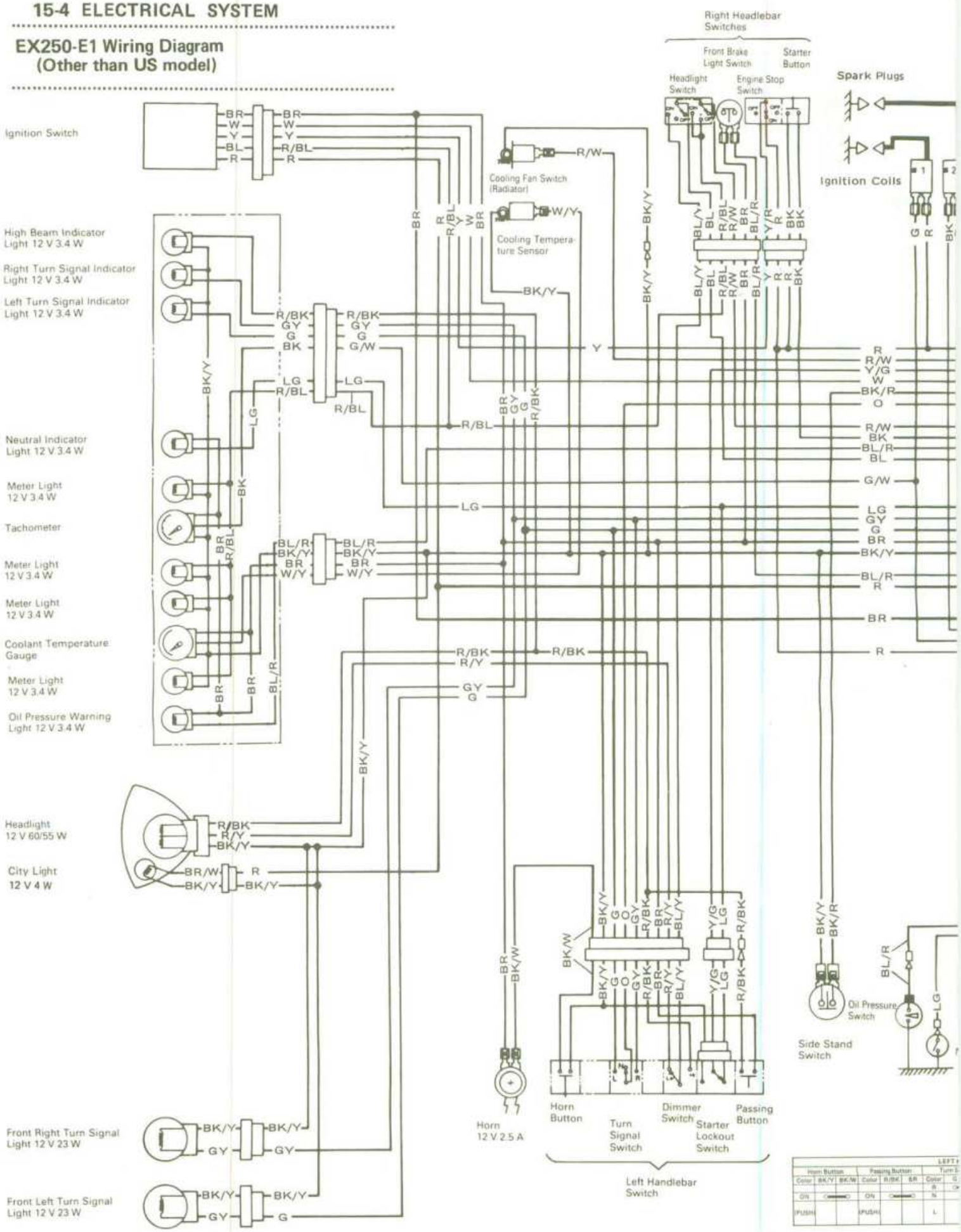


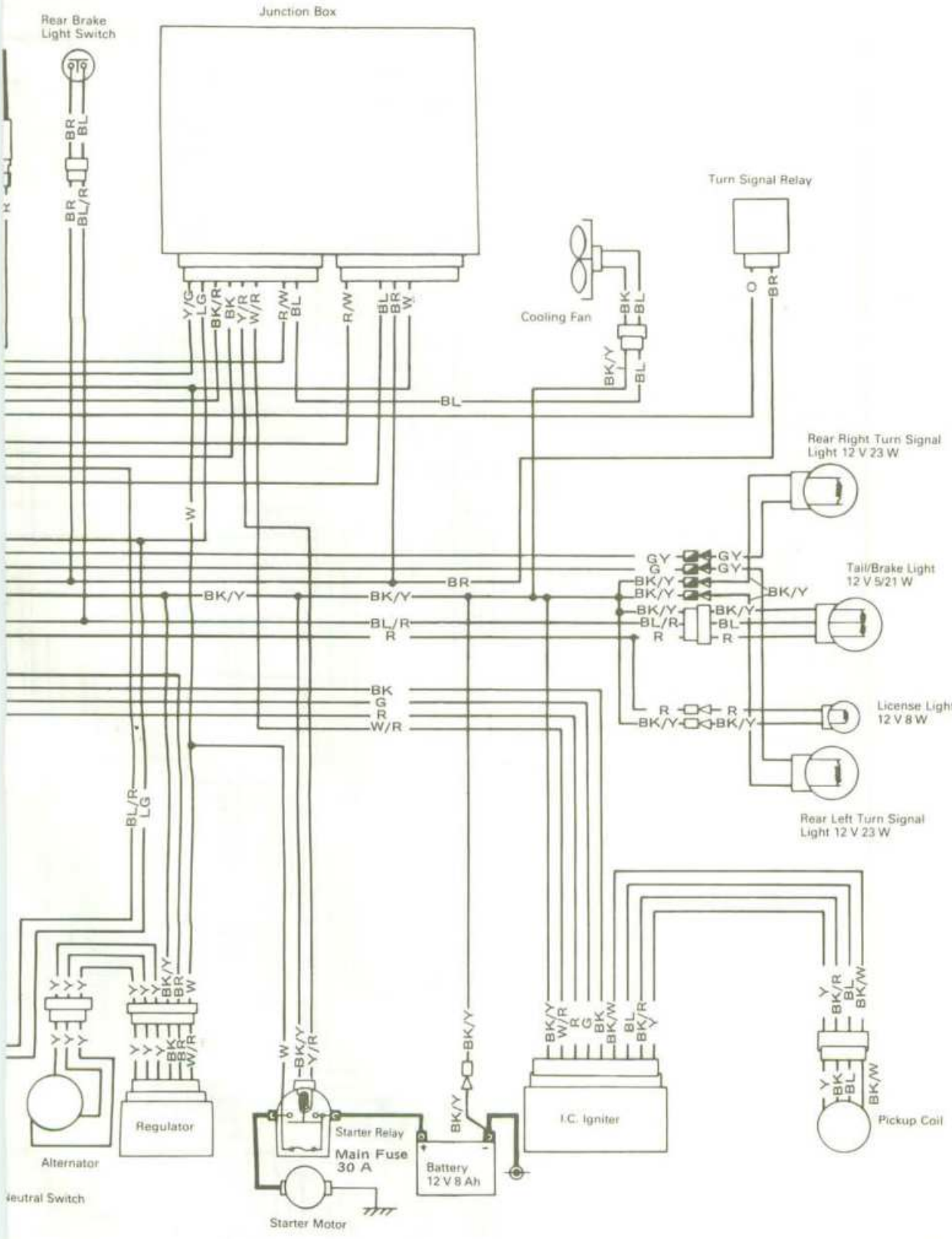
- Color Codes:

BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark green
G	Green
GY	Gray
LB	Light blue
LG	Light green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

- Measure coil and winding resistance when the part is cold (at room temperature).

EX250-E1 Wiring Diagram (Other than US model)





Color Code	
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

HANDLEBAR SWITCH CONNECTIONS

Signal Switch		Dimmer Switch				Starter Lockout Switch			
O	GY	Color	R/BK	BL/Y	B/Y	BL/O	Color	BK/Y	Y/G	LG
		HI					Released			
		LO					Pulled in			

IGNITION SWITCH CONNECTIONS

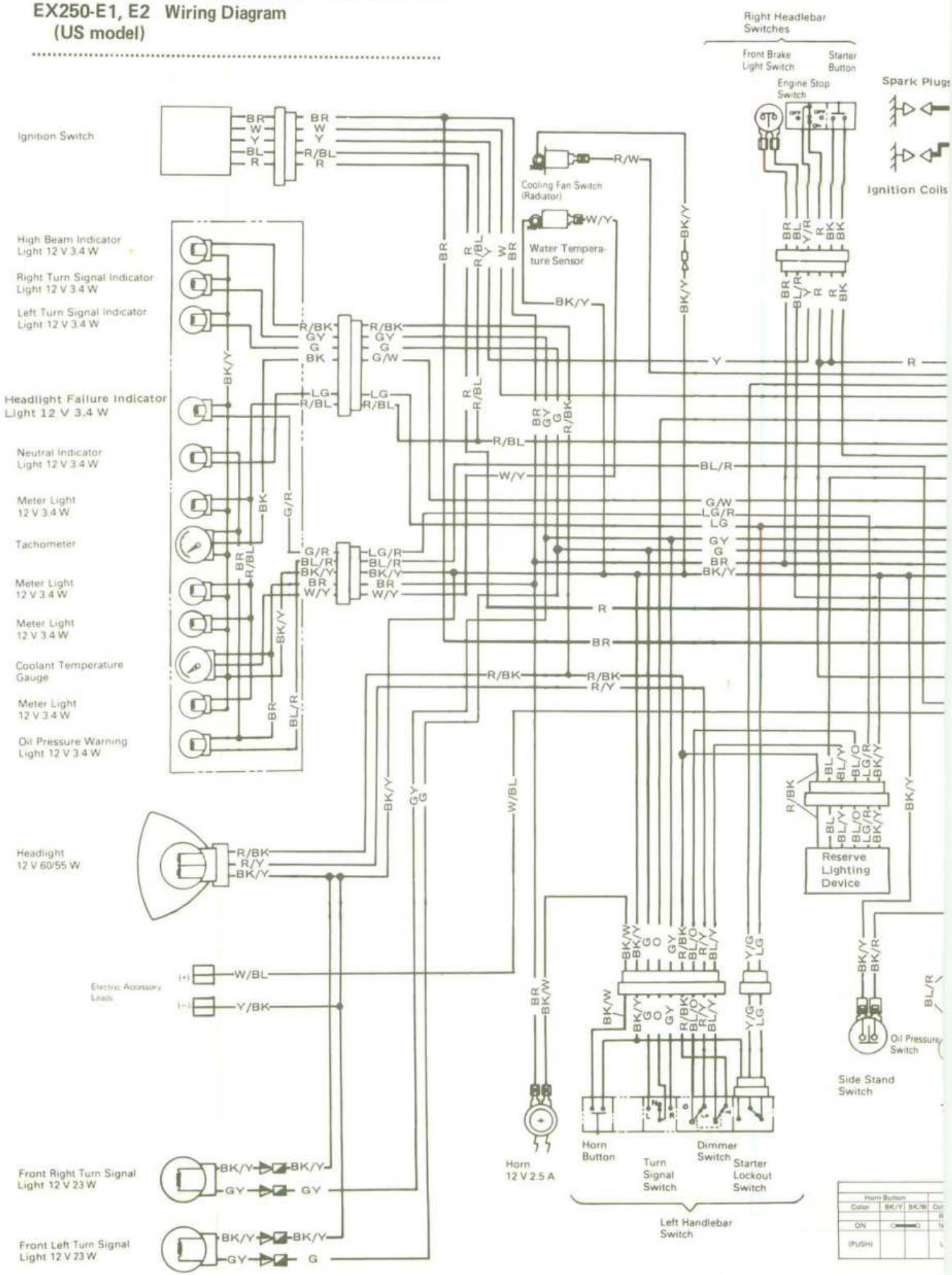
	Ignition	Battery	Ignition	Tail 1	Tail 2
Color	B/R	W	Y	BL	R
OFF, LOCK					
ON					
P (PARK)					

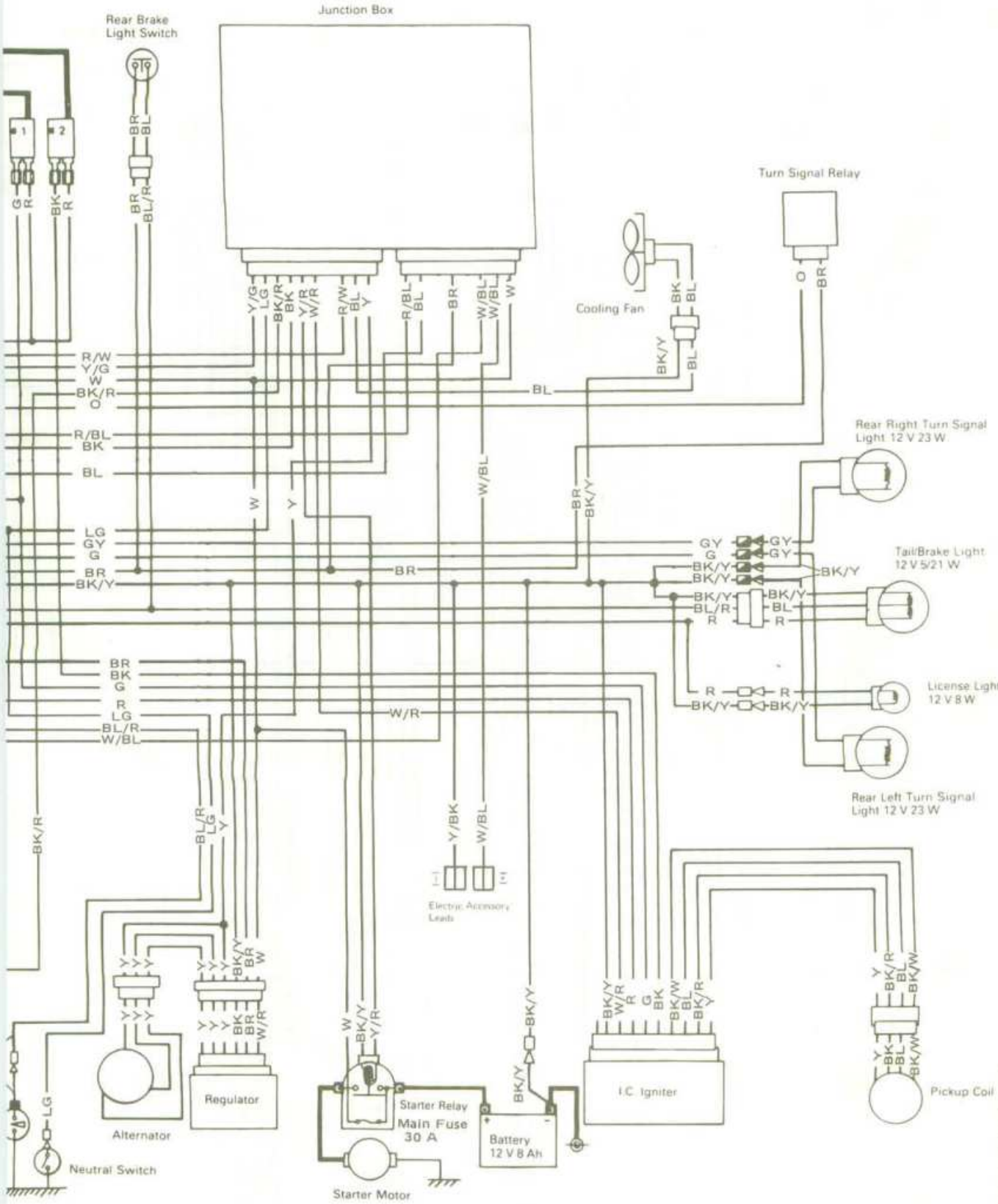
RIGHT HANDLEBAR SWITCH CONNECTION

Engine Stop Switch			Starter Button		Headlight Switch			
Color	V/B	R	Color	BK	BK	Color	R/W	R/BL	BL	BL/Y
OFF						OFF				
RUN										
			Push			ON				

(1BM4)

EX250-E1, E2 Wiring Diagram (US model)





Color Code	
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

LEFT HANDLEBAR SWITCH CONNECTIONS

Turn Signal Switch				Dimmer Switch				Starter Lockout Switch			
	G	O	GY	Color	R/BK	BL/Y	R/Y	BL/O	Color	BK/Y	Y/G	LG
				HI					Released			
				LO					Pulled in			

IGNITION SWITCH CONNECTIONS

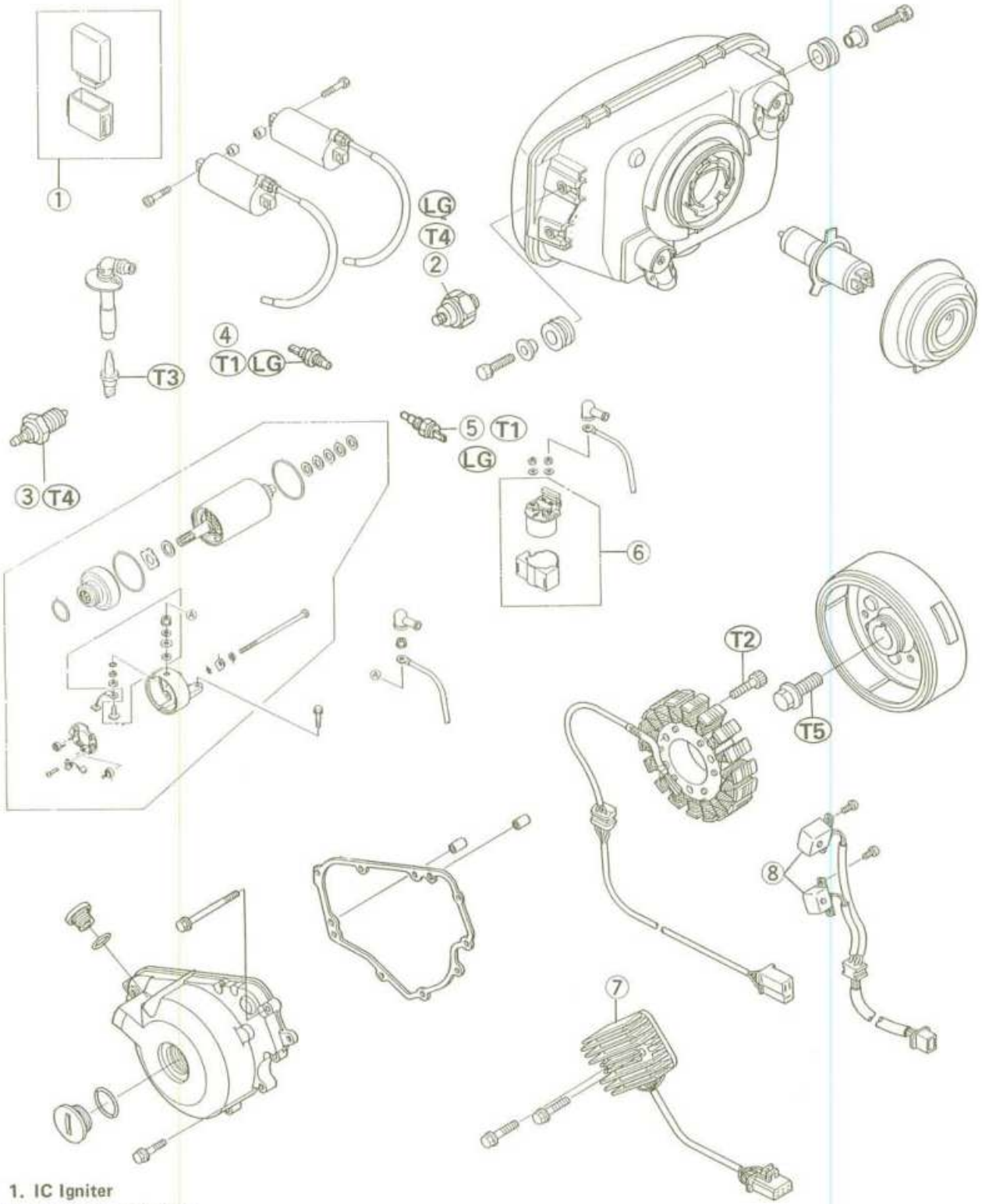
	Ignition	Battery	Ignition	Tail 1	Tail 2
Color	BR	W	Y	BL	R
OFF, LOCK					
ON					
P (PARK)					

RIGHT HANDLEBAR SWITCH CONNECTION

Engine Stop Switch			Starter Button		
Color	Y/R	R	Color	BK	BK
OFF					
RUN					
			Push		

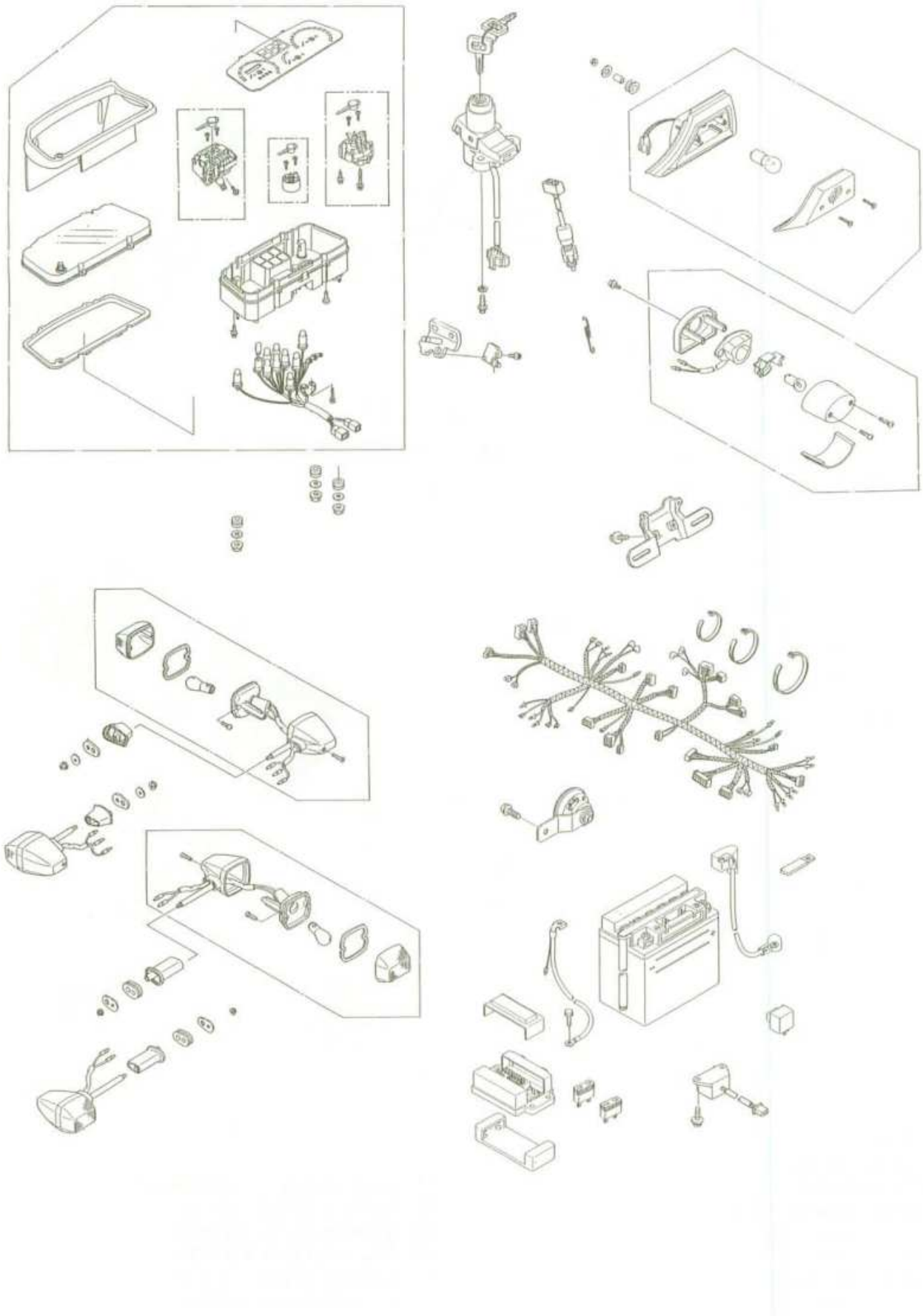
(1871B)

Exploded View



1. IC Igniter
2. Oil Pressure Switch
3. Neutral Switch
4. Water Temperature Sensor
5. Fan Switch
6. Starter Relay
7. Regulator/Rectifier
8. Pickup Coils

LG: Apply liquid gasket to the threads.
T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T2 : 12 N-m (1.2 kg-m, 104 in-lb)
T3 : 13 N-m (1.3 kg-m, 113 in-lb)
T4: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T5 : 69 N-m (7.0 kg-m, 51 ft-lb)



Specifications

Battery

Type:	FB9L-A2K
Capacity:	12 V 8 Ah
Specific gravity:	1.280 @20°C (68°F)
Electrolyte amount:	540 mL, 90 mL (one cell)

Charging System

Type	Three-phase AC
Charging voltage (Regulator/Rectifier output):	14.5 ±0.5 V @4 000 r/min (rpm) (with Headlight switch ON if applicable)
Stator coil resistance:	0.2 – 0.9 Ω

Ignition System

Ignition timing:	10° BTDC @1 300 r/min (rpm) – 38° BTDC @4 000 r/min (rpm)
	(Cal) 5° BTDC @1 500 r/min (rpm) – 33° BTDC @4 200 r/min (rpm)
Pickup coil resistance:	400 – 490 Ω
Pickup coil air gap:	0.7 mm

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

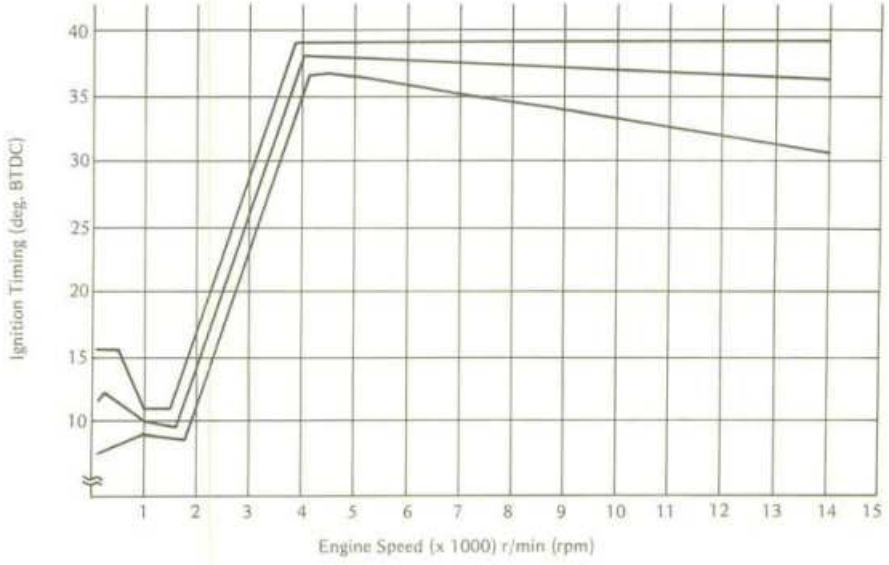
Starter motor:
- Carbon brush length: Standard: 11 mm
  Service limit: 5 mm
- Commutator diameter:
  Standard: 23 mm
  Service Limit: 22 mm

Switch and Sensors

Rear brake light switch:		On after about 10 mm pedal travel
Fan switch (97°C):	Off → On	94 – 100°C (201 – 212°F)
	On → Off	above 90°C (194°F)

Water temperature sensor resistance:
- 80°C (176°F) about 52 Ω
- 100°C (212°F) about 27 Ω

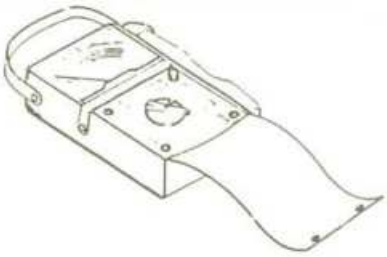
Ignition Timing/Engine Speed Relationship



Special Tools

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

Hand Tester: 57001-983



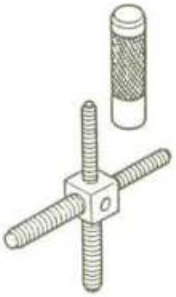
Electrotester: 57001-980



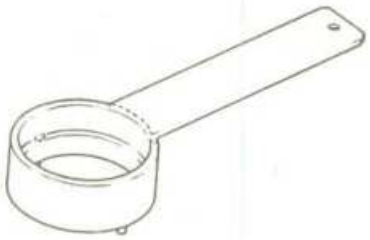
Bearing Driver Set: 57001-1129



Rotor Puller: 57001-1216



Rotor Holder: 57001-1222



Rotor Puller: 57001-1223



Battery

Precautions:

Following a few simple rules will greatly extend the life of the battery.

○When the level of the electrolyte in the battery is low, add only distilled water to each cell, until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.

○Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.

○Avoid quick-charging the battery. A quick-charge will damage the battery plates.

○Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white), and the battery will no longer take a charge.

○Keep the battery well-charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.

○Always keep the battery vent hose free of obstruction, and make sure it does not get pinched, crimped, or melted shut by contact with the hot muffler. If battery gases cannot escape through this hose, they will explode the battery.

○DON'T INSTALL THE BATTERY BACKWARDS. The negative side is grounded.

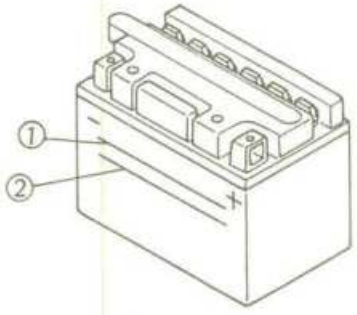
Electrolyte:

Electrolyte Level Inspection

●Remove the battery.

●Visually check the electrolyte level in the battery.

Battery Electrolyte Level



1. Upper Level Line
2. Lower Level Line

★If the level line of electrolyte in any cell is below the lower level line on the battery case, add distilled water only to that cell.

●Install the battery.

Battery Charging:

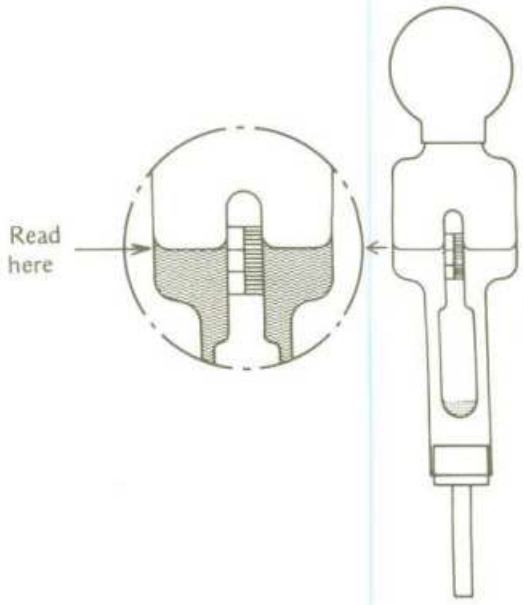
Battery Condition

●Before charging, check battery condition by testing the specific gravity of the electrolyte in each cell.

○Draw a little fluid from the cell with a hydrometer.

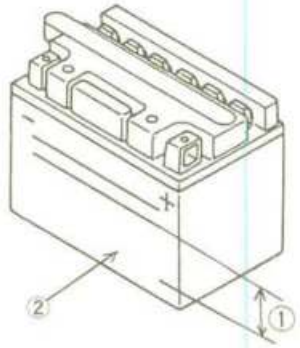
○Read the level of the electrolyte on the floating scale. This is the specific gravity of the electrolyte.

Hydrometer



●Look for sediment and white sulfation inside the cells on the bottom of the plates.

Battery Condition



1. Sulfation here
2. Sediment here

●See the Battery Troubleshooting Guide in Battery Test Charging.

★If the specific gravity is below 1.280 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 must be given an initial charging.**

●Cut off the sealed end of the battery vent hose and remove the filler caps.

●Fill each cell to the upper level line on the battery case with fresh electrolyte at a temperature of 30°C (86°F) or less. Let the battery stand for about 30 minutes before charging.

NOTE

○*If the electrolyte level drops, add electrolyte to the upper level line before charging.*

●Leaving the caps off the cells, connect the battery to a charger, set the charging rate at 1/10 the battery capacity, and **charge it for 10 hours.** For example, if the battery is rated at 12 Ah, the charging rate would be 1.2 A.

CAUTION

○**If the battery is not given a full initial charging, it will discharge in a few weeks. After that it can not be charged by supplement charging.**

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

CAUTION

○**Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.**

○**If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.**

●Turn the charger off, then disconnect it from the battery.

●Check battery voltage. Battery voltage should be 12 – 13 V.

●Check the specific gravity of each cell with a hydrometer (see Battery Condition).

★If the voltmeter or hydrometer readings are below those specified, additional charging is necessary before the battery can be installed.

Battery Ordinary Charging

●Remove the battery from the motorcycle.

CAUTION

○**Always remove the battery from the motorcycle for charging. If the battery is charged while still installed, battery electrolyte may spill and corrode the frame or other parts of the motorcycle.**

●Clean off the battery using a baking soda-and-water solution.

○Mix one heaping tablespoon of baking soda in one cup of water.

○Be careful not to get any of the cleaning solution in the battery.

○The terminals must be especially clean.

●If any of the cells are low, fill them to the LOWER level line with distilled water only. The electrolyte will expand during charging, and the level will rise.

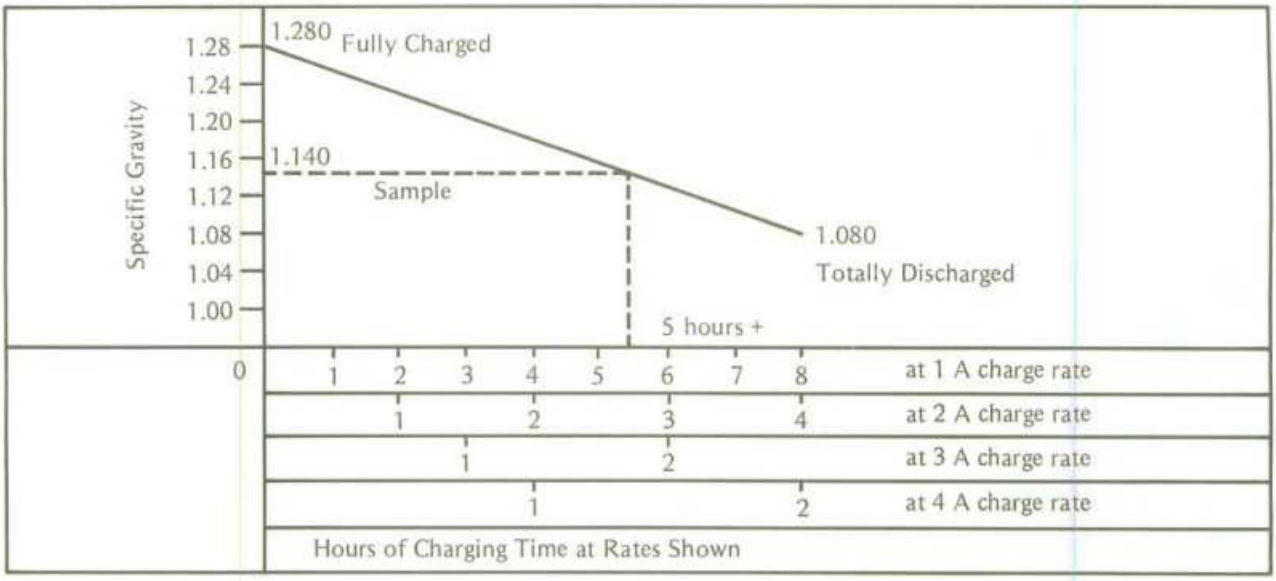
●Connect a charger to the battery BEFORE plugging it in or turning it on.

WARNING

○**Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases.**

●Set the charge rate and time according to the battery condition previously determined (see Battery Condition), using the table.

Battery Charging Rate/Time Table



CAUTION

○Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting.

○If the temperature of the electrolyte rises above 45°C (115°F) during charging, reduce the charging rate to lower the temperature, and increase charging time proportionately.

- Turn the charger off or unplug it, then disconnect it from the battery.
- Check battery condition (see Battery Condition).
- ★If the battery condition indicates that it is not fully charged, additional charging time is necessary.

Battery Test Charging

- If the battery is suspected of being defective, sulfated, or unable to take a charge, consult the table.
- To test charge a battery, perform the ordinary charging procedure and monitor the battery voltage and other signs as mentioned below.
- ★If the battery voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulfated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 or 13 V in about 30 min to and hour after the start of charging.
- ★If one cell produces no gas bubbles or has a very low specific gravity, it is probably shorted.
- ★If there does not appear to be enough sediment in a cell to short the plates, but that cell has a very low specific gravity after the battery is fully charged, the trouble may be that there is not enough acid in that one cell. In this case only, sulfuric acid solution may be added to correct the specific gravity.
- ★If a fully charged battery not in use loses its charge after 2 to 7 days; or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

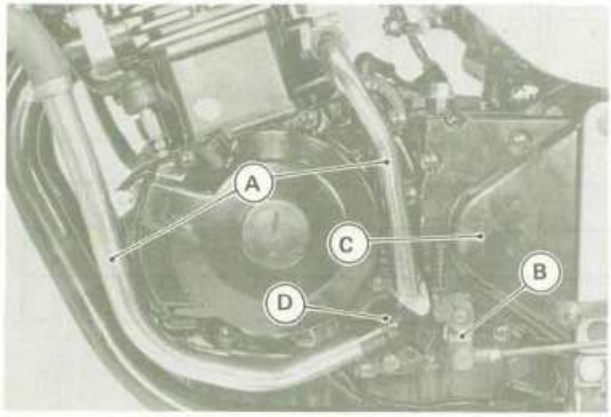
Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (–) gray	white (sulphated); + plates broken or corroded	Replace
Sediment	none, or small amount	sediment up to plates, causing short	Replace
Voltage	above 12 V	below 12 V	Test charge
Electrolyte Level	above plates	below top of plates	Fill and test charge
Specific Gravity	above 1.200 in all cells; no two cells more than 0.020 different	below 1.100, or difference of more than 0.020 between two cells	Test charge

Charging System

Alternator Cover Removal

- Drain the coolant (see Coolant Draining in Cooling System chapter).
- Remove the water pipes from the water pump.



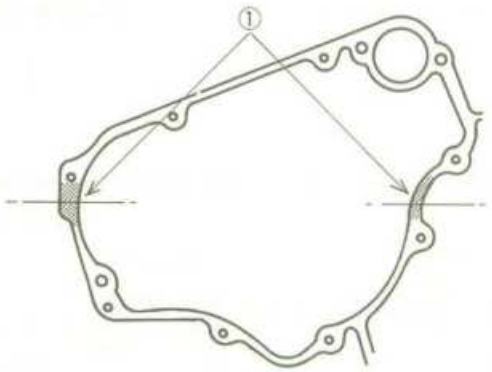
A. Water Pipes
B. Shift Lever
C. Engine Sprocket Cover
D. Water Pump

- Remove the shift lever.
- Remove the engine sprocket cover.
- Disconnect the alternator lead and pickup coil lead connectors.
- Remove the cover bolts and take the cover off the crankcase.

Alternator Cover Installation Note

○Apply liquid gasket to the mating surface as shown.

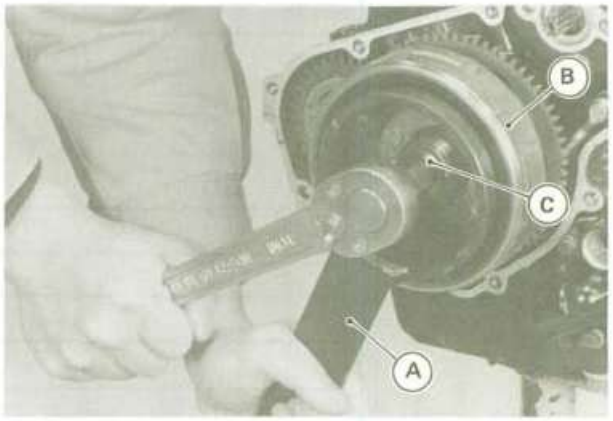
Liquid Gasket Applied Area



1. Liquid Gasket Applied Area

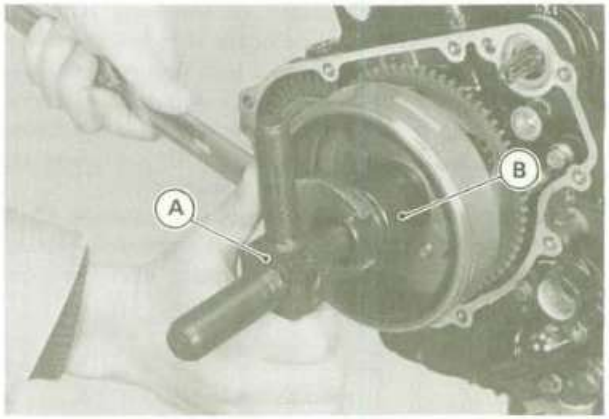
Alternator Rotor Removal

- Remove the alternator cover (see Alternator Cover Removal).
- Hold the alternator rotor steady with the rotor holder (special tool), and remove the rotor bolt.



A. Rotor Holder: 57001-1222
B. Rotor
C. Rotor Bolt

- Remove the rotor with rotor pullers (special tools).



A. Rotor Puller: 57001-1216
B. Rotor Puller: 57001-1223

CAUTION

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

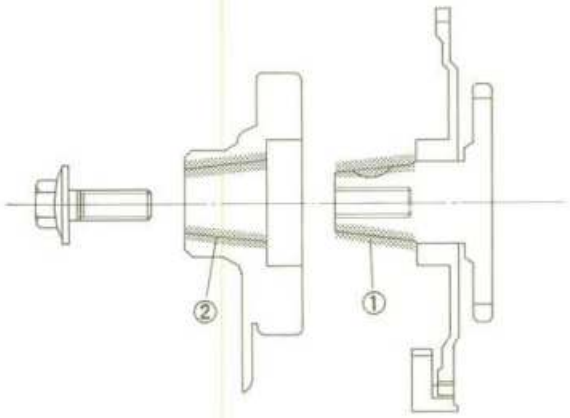
Alternator Rotor Installation Notes

- Clean the following parts with an oil-less cleaning fluid such as trichlorethylene or acetone.

WARNING

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

Alternator Rotor Cleaning Area

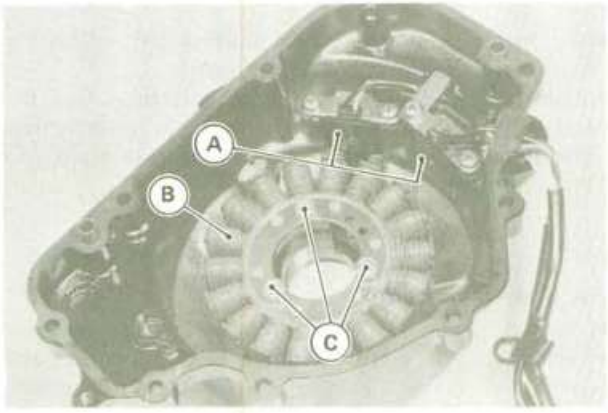


1. The tapered portion of the crankshaft.
2. The tapered portion of the alternator rotor.

●When installing the alternator rotor, fit the rotor on the crankshaft tapered portion and tighten the rotor bolt temporarily.
●Tighten the alternator rotor bolt to the specified torque (see Exploded View) while holding the alternator rotor steady with the rotor holder.

Stator Coil Removal

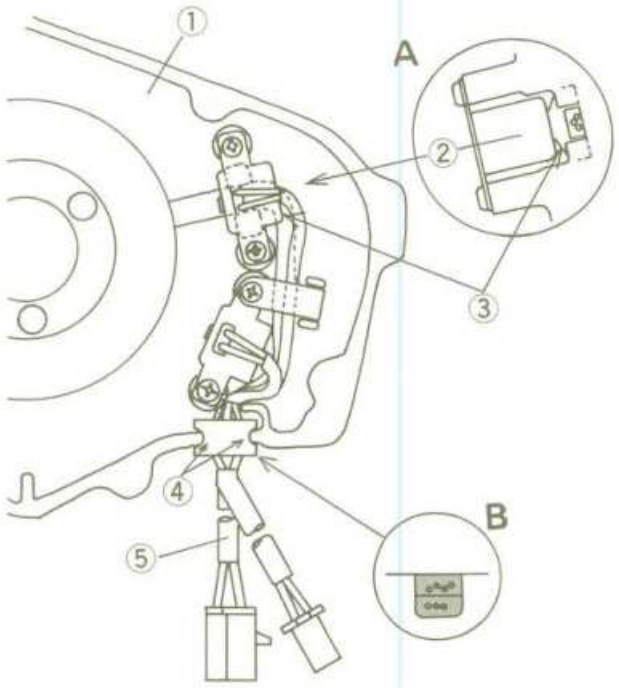
●Remove the alternator cover.
●Remove the pickup coil screws, and take off the coils.
●Remove the alternator stator Allen bolts and take off the stator.



A. Clamps
B. Stator
C. Allen Bolts

Stator Coil Installation Notes

Alternator Lead Installation



1. Alternator Cover
2. Pickup Coil
3. Grommet
4. Liquid Gasket Applied Area
5. Alternator Lead

●Fit the leads grommet into the notch in the alternator cover. Note the following.
○Clamp the alternator lead to the grommet, and push in the grommet at the pickup coil as shown Fig. A.
○Apply a liquid gasket to the grommet, and fit the grommet as shown Fig. B.
●Install the pickup coils (see Pickup Coil Installation).
●Tighten the startor Allen bolts to the specified torque (see Exploded View).

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

●To check the alternator output voltage, do the following procedures. Refer to the appropriate chapters and charging system Wiring Diagram.
Turn off the ignition switch.
Disconnect connector 2.
Connect the multimeter as shown in table.
Start the engine.
Run it at the rpm given in table.
Note the voltage readings (total 3 measurements).

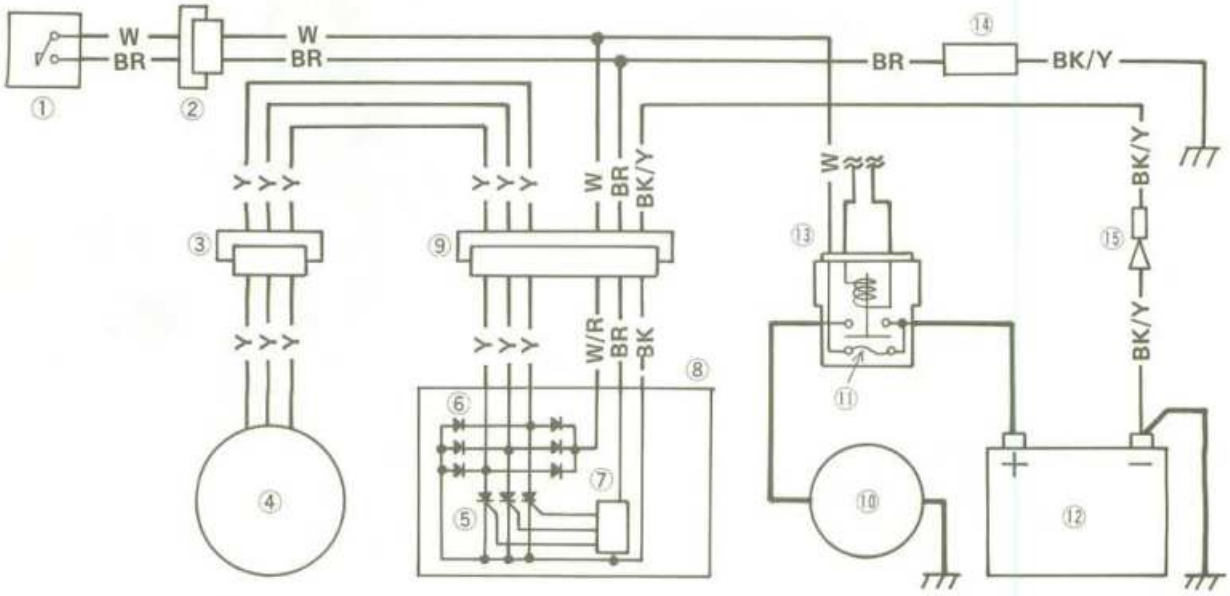
Alternator Output Voltage

Meter Range	Connections		Reading @4 000 rpm
	Meter (+) to	Meter (–) to	
250 V AC	One yellow lead (Connector 2)	Another yellow lead (Connector 2)	about 45V

★If the output voltage shows the value in table, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

●Check the stator coil resistance as follows:
Stop the engine
Connect the multimeter as shown in table.
Note the readings (total 3 measurement)

Charging System Wiring Diagram



1. Ignition Switch
2. Connector 1
3. Connector 2
4. Alternator
5. Thyristors
6. Diodes (Rectifier)
7. Control Circuit (IC)
8. Regulator/Rectifier
9. Connector 3
10. Starter Motor
11. Main Fuse
12. Battery
13. Starter Relay
14. Load
15. Connector 4

Stator Coil Resistance

Meter Range	Connections		Reading
	Meter (+) to	Meter (–) to	
x 1 Ω	One yellow lead (Connector 1)	Another yellow lead (Connector 1)	0.2 – 0.9 Ω

★If there is more resistance than shown in the Table, or no meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

●Using the highest resistance range of the multimeter, measure the resistance between each of the yellow leads and chassis ground.

★Any meter reading less than infinity (∞) indicates a short, necessitating stator replacement.

★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnetism have probably weakened, and the rotor must be replaced.

Rectifier Inspection

●Check the diode resistance as follows.

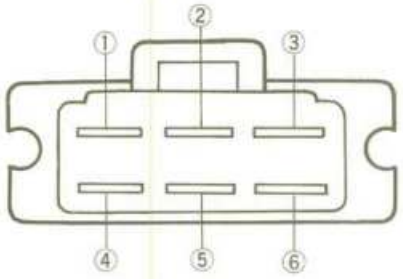
●Remove the Regulator/Rectifier and disconnect the connector 3 (see Charging System Wiring Diagram).

●Connect an ohmmeter to the regulator/rectifier as shown in the Table, and check the resistance in both directions of each diode following the table.

Rectifier Circuit Inspection

Range x 100 Ω		Meter (+) Lead Connection					
Terminal		BK	BR	W/R	Y	Y	Y
Meter (−) Lead Connection	BK		1 kΩ ~ 5 kΩ	400 Ω ~ 2 kΩ	200 Ω ~ 600 Ω	200 Ω ~ 600 Ω	200 Ω ~ 600 Ω
	BR	10 kΩ ~ ∞		10 kΩ ~ ∞	10 kΩ ~ ∞	10 kΩ ~ ∞	100 kΩ ~ ∞
	W/R	∞	∞		∞	∞	∞
	Y	∞	∞	200 Ω ~ 600 Ω		∞	∞
	Y	∞	∞	200 Ω ~ 600 Ω	∞		∞
	Y	∞	∞	200 Ω ~ 600 Ω	∞	∞	

Regulator/Rectifier Terminal



1. Brown Lead Terminal
2. White/Red Lead Terminal
3. Black Lead Terminal
4. Y_1
5. Y_2
6. Y_3

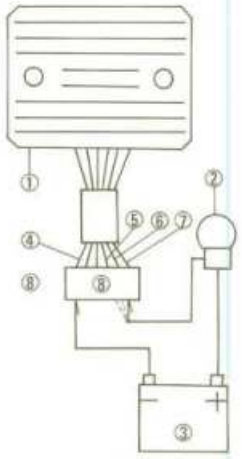
NOTE

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to the first ⅓ of the scale.*

Regulator Inspection

To test the regulator out of circuit, use three 12 V batteries and a test light made from a 12 V 3 – 6 W bulb in a socket with leads.

- Remove the regulator/rectifier 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.

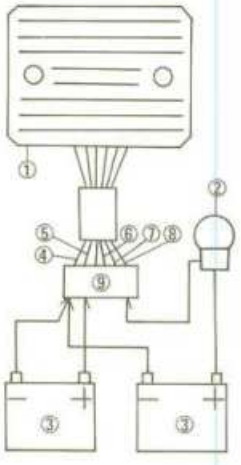


1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. BK
5. Y_1
6. Y_2
7. Y_3
8. 6 Pin Connector

CAUTION

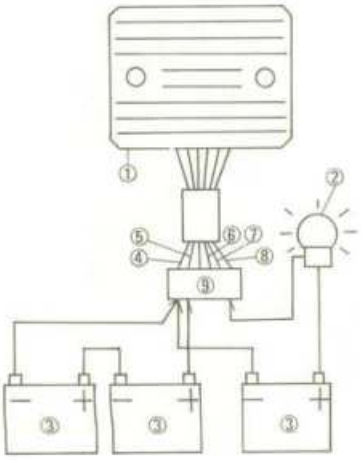
○**The test light works as an indicator and also as a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.**

- 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.



1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. BK
5. BR
6. Y_1
7. Y_2
8. Y_3
9. 6 Pin Connector

•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.



1. Regulator/Rectifier
2. Test Light
3. 12 V Battery
4. BK
5. BR
6. Y_1
7. Y_2
8. Y_3
9. 6 Pin Connector

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, the regulator/rectifier may be damaged.**

•Repeat the above three steps for other two yellow leads (in connector 3 which leads to the regulator/rectifier).

★Replace the regulator/rectifier if the bulb does not light as described above.

NOTE

○*The above test is not foolproof. If the above checks show the regulator/rectifier is not damaged, but there is still trouble in the charging system, first carefully inspect the alternator, battery, wiring, and all connections. Replace the regulator/rectifier if all these other components turn out good.*

Regulator/Rectifier Output Voltage Inspection

•Check the battery condition (see Battery section).

•Warm up the engine to obtain actual alternator operating conditions.

•Remove the left side cover.

•Check that the ignition switch is turned off, and connect the multimeter as shown in table.

Regulator/Rectifier Output Voltage

Meter Range	Connectings		Reading
	Meter (+) to	Meter (–) to	
25 V DC	White/Red (Connector 3)	Black (Connector 3)	14 – 15 Volts @ 4 000 r/min

•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 headlight connector from the headlight unit in the fairing.) The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

•Turn off the ignition switch to stop the engine, and disconnect the multimeter.

★If the regulator/rectifier output voltage is kept between the values given in table, the charging system is considered to be working normally.

★If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Ignition System

Safety Instructions:

WARNING

○**The ignition system produces extremely high voltage. Do not touch the spark plugs, high tension coils, or spark plug leads while the engine is running, or you could receive a severe electrical shock.**

CAUTION

○**Do not disconnect the battery leads or any other electrical connections when the ignition switch on, or while the engine is running. This is to prevent IC igniter damage.**

○**Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.**

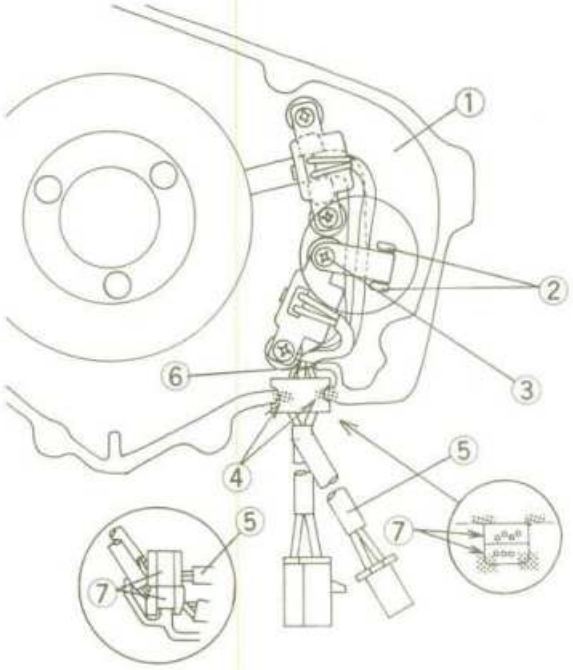
Pickup Coil Removal

- Remove the alternator cover (see Alternator Rotor Removal).
- Remove the pickup coil lead clamp screw, and take the clamp off the cover, then remove the pickup coils.

Pickup Coil Installation

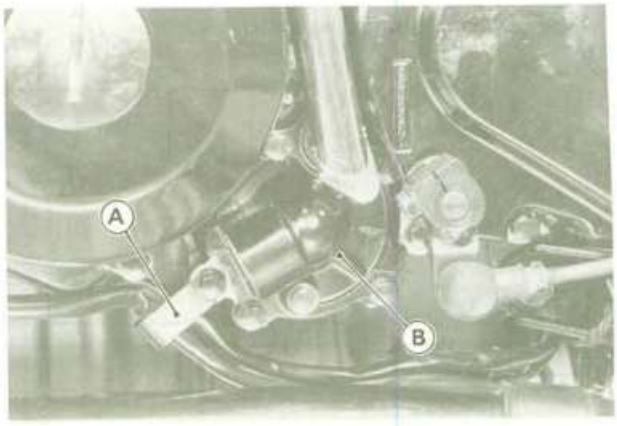
- Install the pickup coils as follows.
  - Install the lead clamp between the libs on the alternator cover as shown.
  - Apply liquid gasket to the grommets, and fit the grommets as shown.

Pickup Coil Lead Installation



1. Alternator Cover
2. Libs
3. Clamp
4. Liquid Gasket Applied Area
5. Pickup Coil Lead
6. Lib
7. Grommets

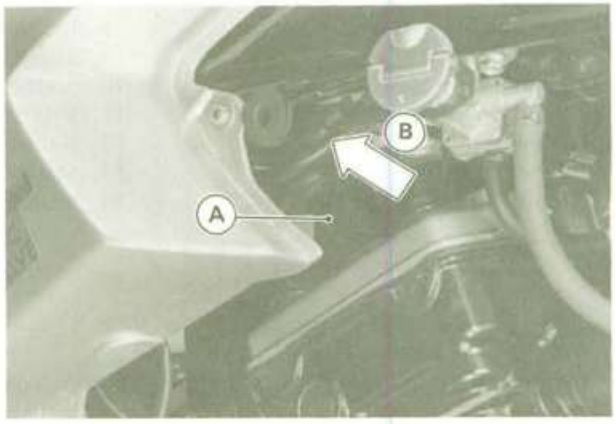
  - Do not run on the lead to the alternator cover lib as shown.
  - The pickup coil grommet must be installed with the lead side downward as shown.
  - Clamp the harness of the pickup coil leads as shown.



A. Clamp B. Water Pump

Spark Plug Removal

- Remove the left and right knee grip pads.
- Carefully pull the spark plug caps up and forward from the spark plugs.
- Unscrew the spark plugs using spark plug wrenches in the tool kit.

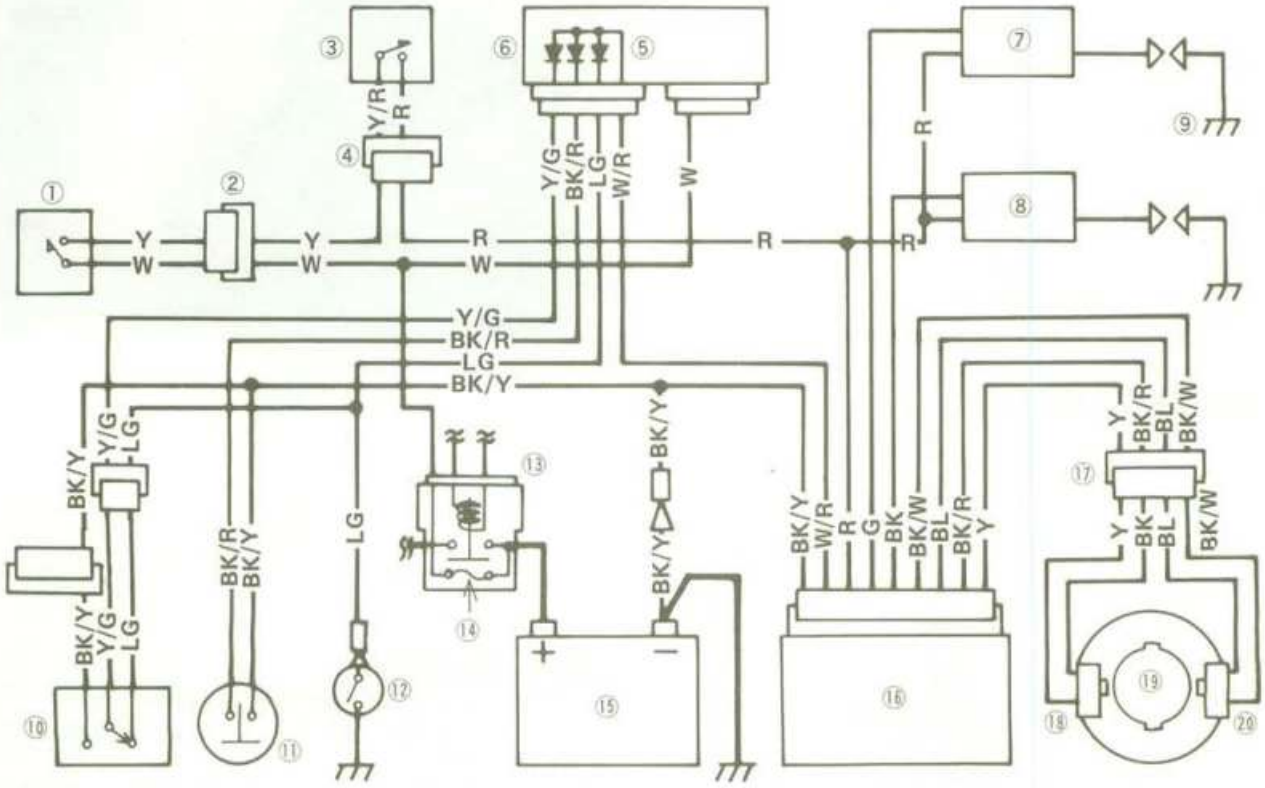


A. Spark Plug Cap B. Cap Removal

Spark Plug Installation Note

- Tighten the spark plug to the specified torque (see Exploded View).

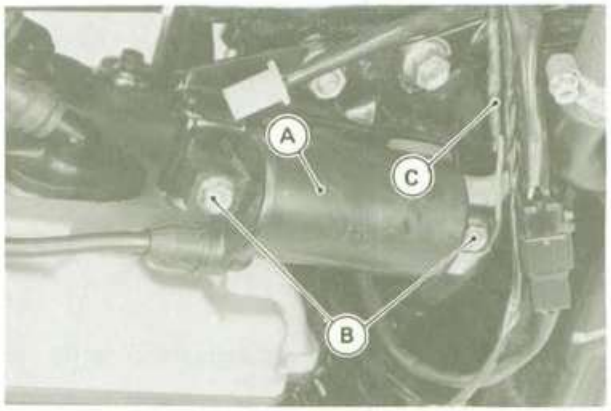
Ignition System Wiring Diagram



1. Ignition Switch
2. 6-pin Connector
3. Engine Stop Swtich
4. 6-pin Connector
5. Diodes
6. Junction Box
7. Ignition Coil #1 Cylinder
8. Ignition Coil #2 Cylinder
9. Spark Plugs
10. Starter Lockout Switch
11. Side Stand Switch
12. Neutral Switch
13. Starter Relay
14. Main Fuse 30A
15. Battery
16. IC Igniter
17. 4-pin Connector
18. Pickup Coil #1 Cylinder
19. Alternator Rotor
20. Pickup Coil #2 Cylinder

Ignition Coil Removal

- Remove the following parts before ignition coil removal.
  - Seats
  - Side Covers
  - Kneegrip Pads
  - Fairings
  - Fuel Tank
- Disconnect the ignition coil primary leads connector.
- Pull out the plug caps from the spark plugs.
- Remove the ignition coil mounting bolts and take off the coils.

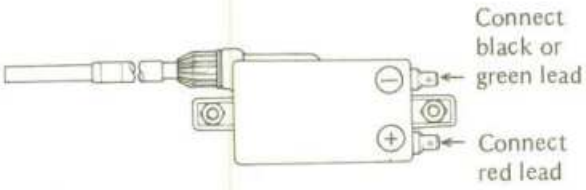


A. Ignition Coil
B. Mounting Bolts
C. Primary Lead

Ignition Coil Installation Notes

- Connect the primary wires to the primary coil terminals as follows:
  Black and red wires → No. 2 ignition coil
  Green and red wires → No. 1 ignition coil
- The + and – markings next to the primary coil terminals on the ignition coil body indicate the polarity of the terminals. The polarity of the two spark plug leads are as shown when the primary leads are connected as indicated in the figure. But both the primary wires (positive red, and negative black and green) can be connected with either terminal on the ignition coil without changing the engine performance.

Polarity of Ignition Coil



Pickup Coil Inspection

- Disconnect the pickup coil connector.
- Zero the ohmmeter, and connect it to 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 infinity (∞) indicates a short, necessitating replacement of the pickup coil assembly.

Ignition Coil Inspection

Measuring arcing distance:

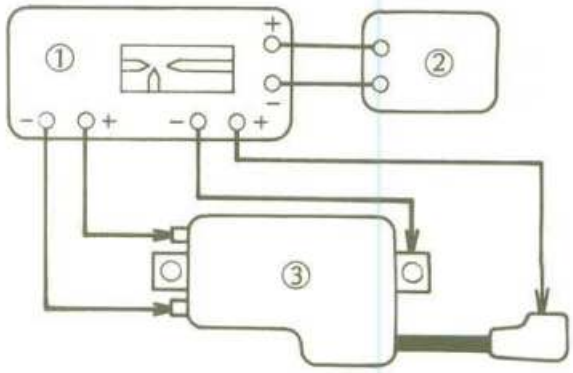
The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with a Kawasaki Electrotester (special tool: 57001-980) tester for the 3-needle method.

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

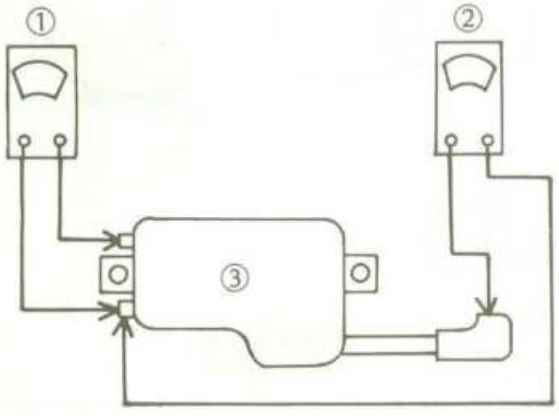
ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting form insulation breakdown under high voltage.

- ●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 the 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 Inspection

- ●Remove the spark plug.
- ●Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool.

★If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard plug or its equivalent.

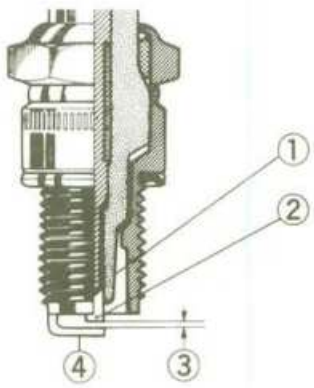
Spark Plug Gap

- ●Measure the gap with a wire-type thickness gauge.
- ★If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.

Spark Plug Gap

0.6 – 0.7 mm

Spark Plug Gap



1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

IC Igniter Inspection

- ●Remove the IC igniter.
- ●Zero an ohmmeter, and connect it to terminals of the IC igniter to check the internal resistance of the igniter.

CAUTION

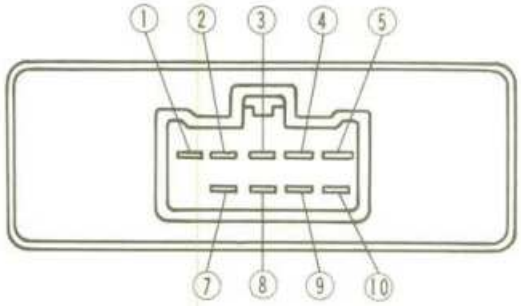
- ○**Use only Kawasaki Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.**
- ○**If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.**

IC Igniter Intenal Resistance

Tester (−) Lead Connection \ Tester (+) Lead Connection	1	2	3	4	5	7	8	9	10
1		A	D	B	B	A	A	B	A
2	A		D	B	B	A	A	B	A
3	D	D		E	E	D	D	B	D
4	∞	∞	∞		∞	∞	∞	∞	∞
5	∞	∞	∞	∞		∞	∞	∞	∞
7	A	A	D	B	B		A	B	A
8	A	A	D	B	B	A		B	A
9	B	B	B	C	C	B	B		A
10	A	A	C	A	A	A	A	A	

Value (kΩ)	
∞	Infinity
A	2 – 6
B	5 – 11
C	9 – 20
D	15 – 28
E	25 – 55

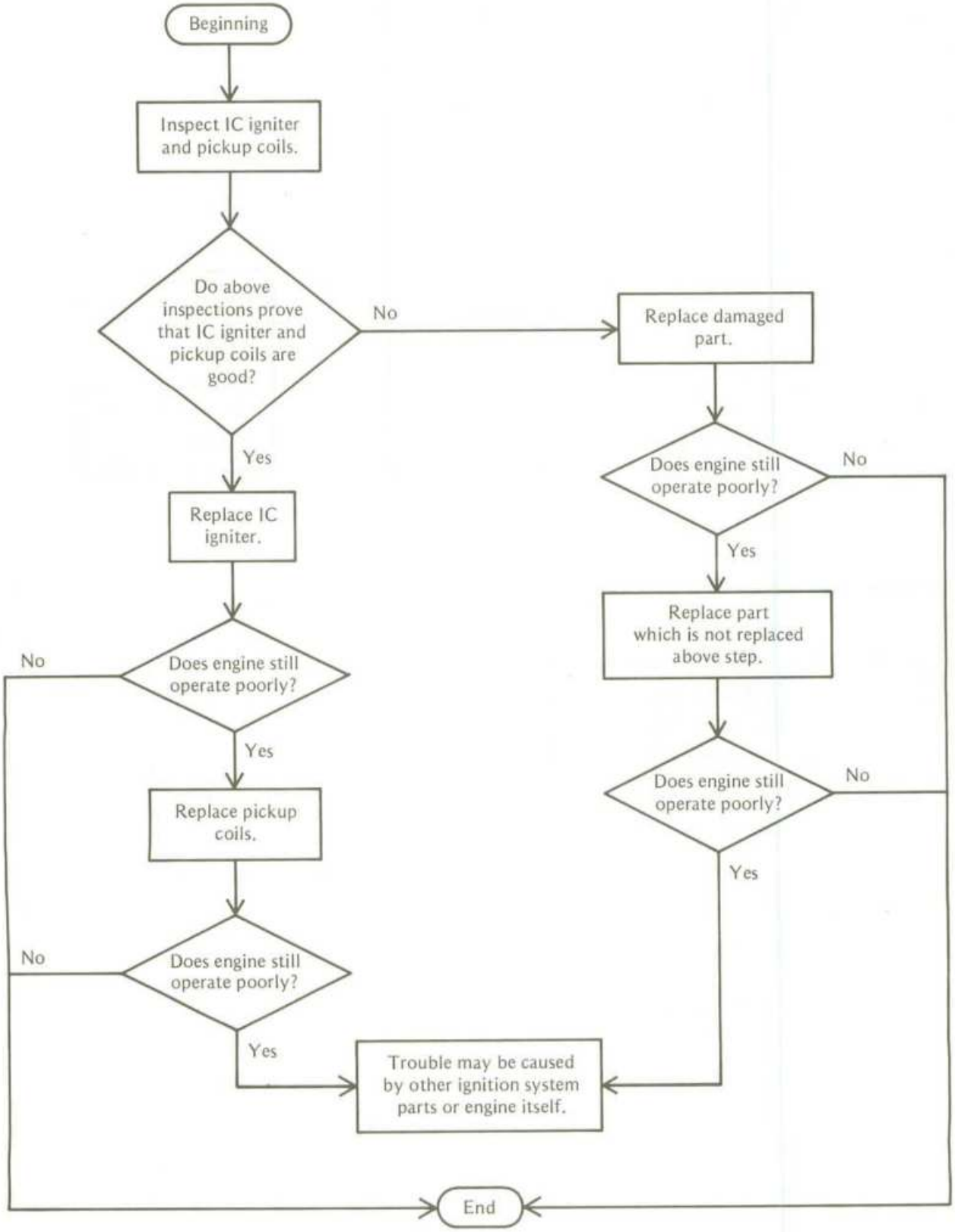
Terminal No. of IC Igniter



Measured with the Kawasaki Hand Tester 57001-983. A tester other than the Kawasaki Hand Tester may show different readings.

★Replace the IC igniter if the reading is not the specified value.

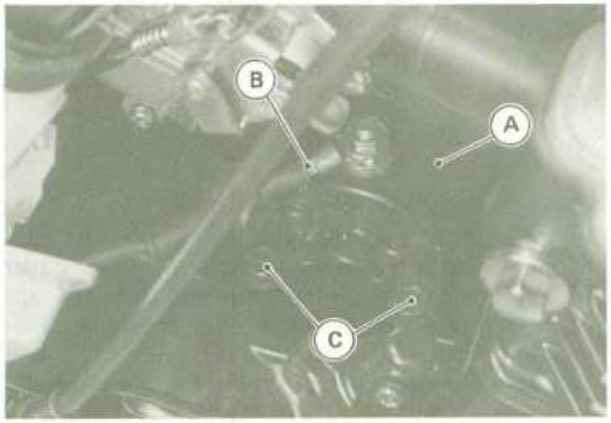
IC Igniter Troubleshooting



Electric Starter System

Starter Motor Removal

- Drain the engine oil.
- Drain the coolant (see Coolant Change in Cooling System chapter).
- Remove the water pipe bolts and take the pipes off the water pump.
- Remove the shift lever and remove the engine sprocket cover.
- Remove the alternator cover and starter idle gear with shaft.
- Disconnect the starter motor lead from the motor.

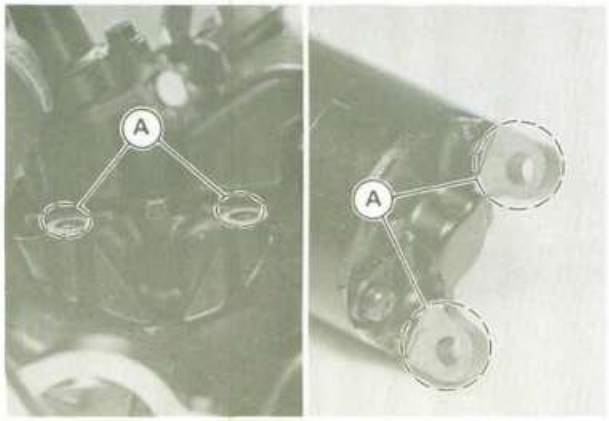


A. Starter Motor
B. Starter Motor Lead
C. Starter Motor Bolts

- Remove the starter motor bolts and pull the motor toward the right.

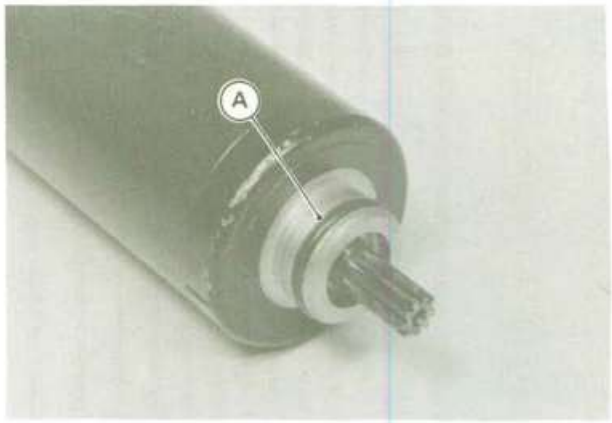
Starter Motor Installation Notes

- Clean the starter motor lugs and crankcase where the starter motor is grounded.



A. Clean Here

- Apply a small amount of engine oil to the O-ring.

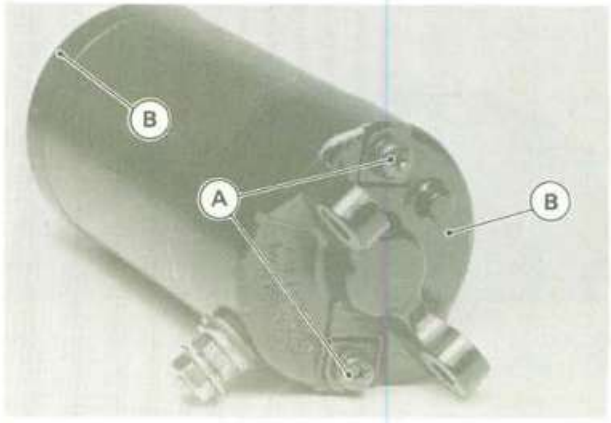


A. O-Ring

- Put the starter motor on the crankcase.
- Press the part of the motor end cover and push the motor into the crankcase hole.

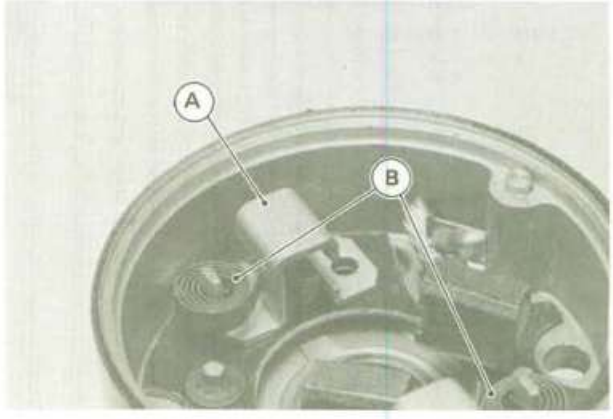
Starter Motor Disassembly

- Remove the starter motor (see Starter Motor Removal).
- Take out the screws and remove both end covers.



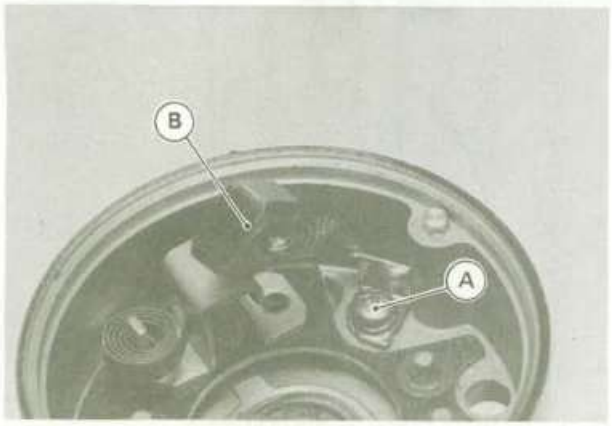
A. Screws
B. End Covers

- Take the armature off the pinion gear side.
- Remove the brush springs from the brush holder.



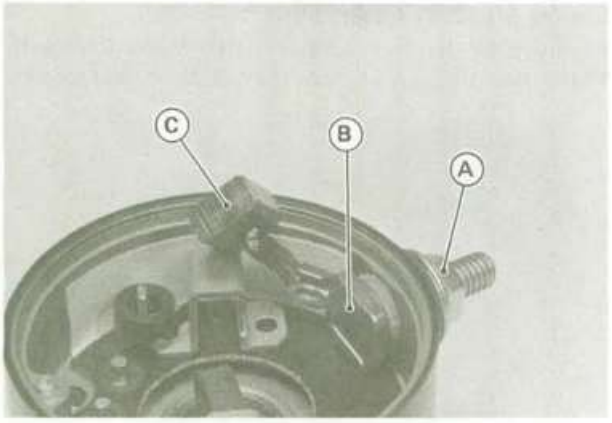
A. Brush Holder
B. Brush Springs

●If the brushes are to be removed, follow the below.
○Remove the screw and take off the negative brush.



A. Screw B. Negative Brush

○Remove the nut and terminal bolt then take off the positive brush.

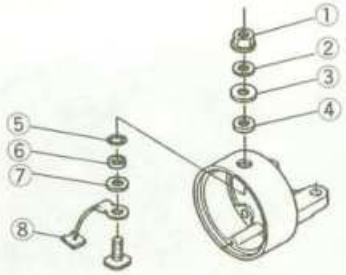


A. Nut C. Positive Brush
B. Terminal Bolt

Starter Motor Assembly

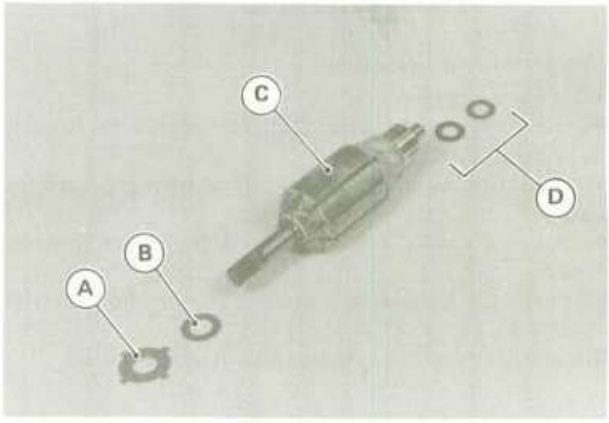
●Install the negative brush.
●Install the terminal bolt and the removed parts as shown.

Terminal Bolt and Parts



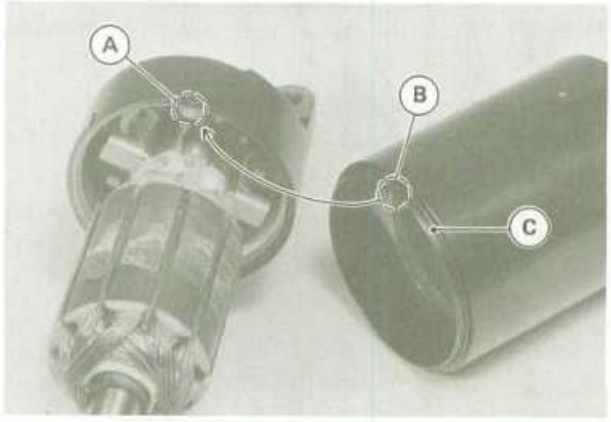
1. Nut
2. Washer
3. Large Insulator
4. Small Insulator
5. O-ring
6. Terminal Bolt
7. Plastic Washer
8. Positive Brush

●Install the washers on the armature as shown.



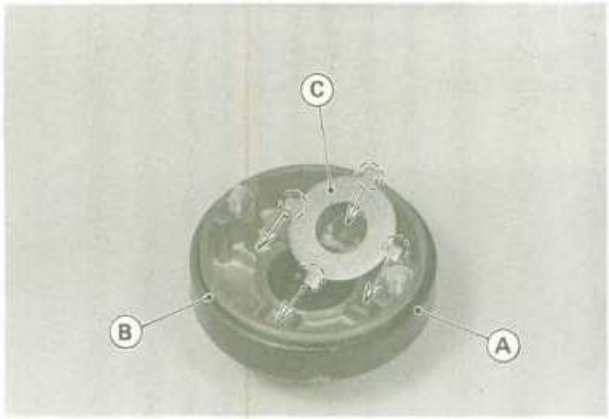
A. Toothed Washer C. Armature
B. Thrust Washer D. Trust Washer

●Install the armature and yoke as follows.
○Fit the spring on the spring post halfway; the post must be positioned in the D-shaped end of the spring. Turn the other end of the spring a half turn clockwise, and fit the end in the brush groove. Push the spring all the way onto the post at the stepped portion.
○Be sure the slender O-ring is in place on the brush side yoke end.
○Fit the yoke notch onto the end cover pin.

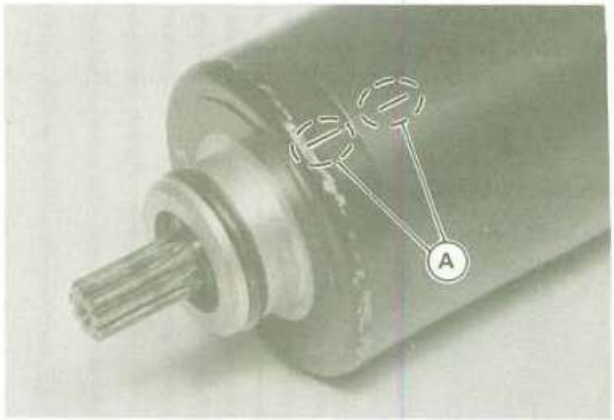


A. Pin C. Slender O-ring
B. Notch

●When installing the pinion gear side end ocver, note the following.
○Fit the toothed washer tangs into the notches.
○Be sure the slender O-ring is in place on the end cover.



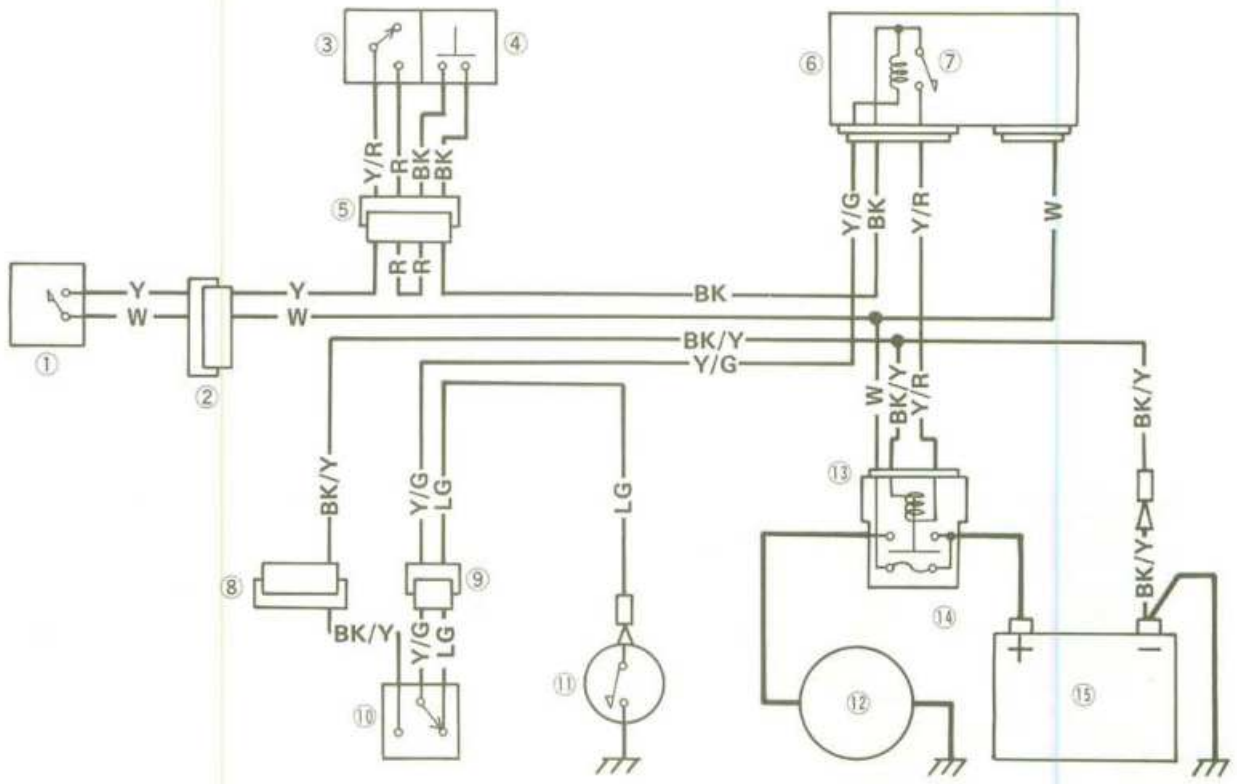
A. End Cover
B. O-ring
C. Toothed Washer



A. Align the marks

●Align the mark on the pinion gear side end cover with the mark on the yoke.

Electric Starter Circuit



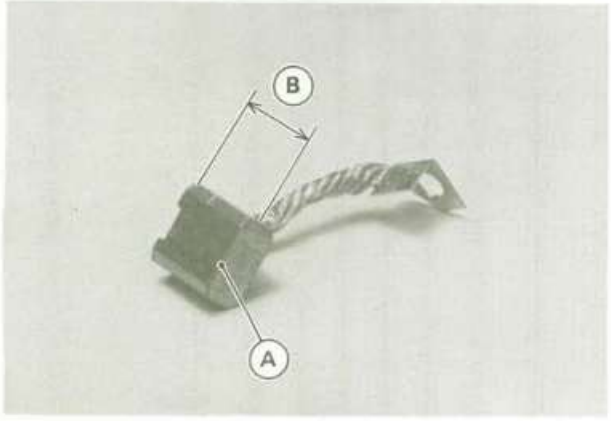
1. Ignition Switch
2. 6-pin Connector
3. Engine Stop Switch
4. Starter Button
5. 6 or 4-pin Connector
6. Junction Box
7. Starter Circuit Relay
8. 9-pin Connector
9. 2-pin Connector
10. Starter Lockout Switch
11. Neutral Switch
12. Starter Motor
13. Starter Relay
14. Main Fuse 30A
15. Battery

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:	**11 mm**
Service Limit:	**5 mm**



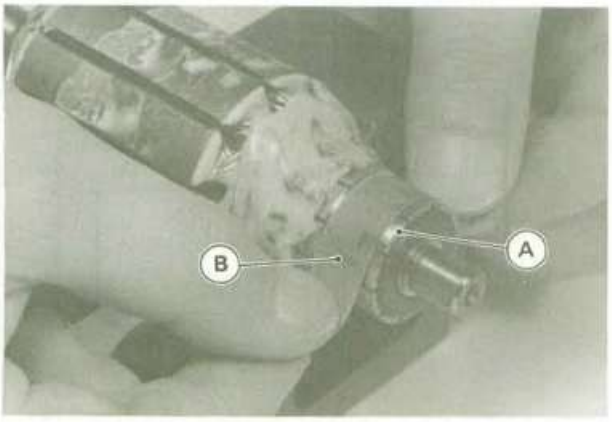
A. Brush B. Length

Brush Spring Inspection

•Check that the brush springs are in place and will snap the brushes firmly into place.
★If not, reinstall or replace the spring.

Commutator Cleaning and Inspection

•Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves.

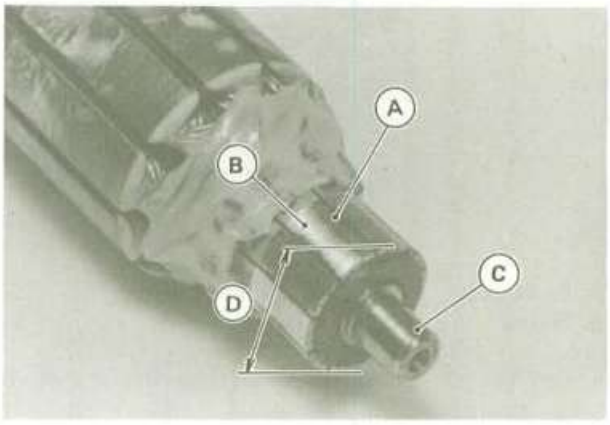


A. Commutator B. Emery Cloth

•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

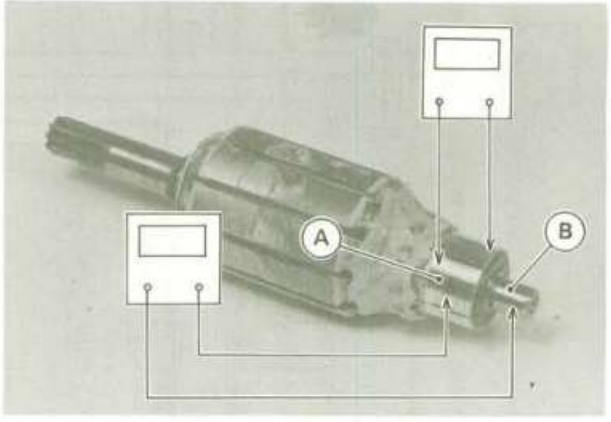
Standard:	**23 mm**
Service Limit:	**22 mm**



A. Groove C. Shaft
B. Commutator Segment D. Diameter

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.



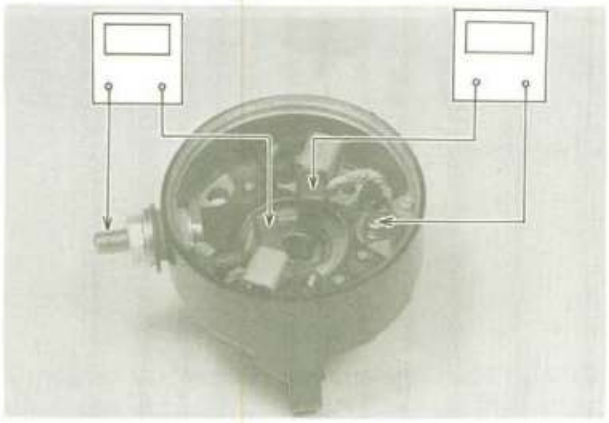
A. Segment B. Shaft

•Using the highest ohmmeter range, measure the resistance between the commutator and the shaft.
★If there is any reading at all, the armature has a short and the starter motor must be replaced.

Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

Brush Leads Inspection

- Set the ohmmeter to the x 1 Ω range.
- Measure the resistance between the negative brush and the plate.
- Measure the resistance between the positive brush and the terminal.

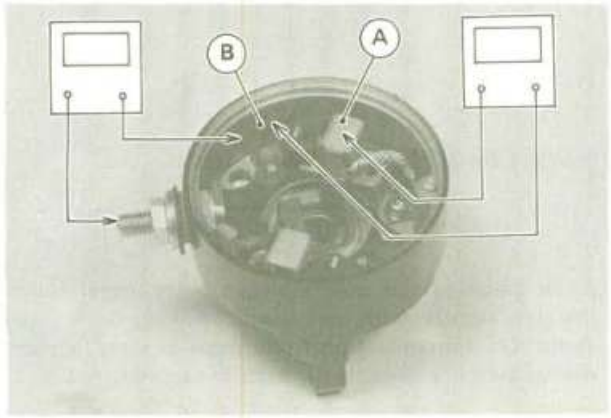


★If there is not close to zero ohms, the bursh is an open and brush must be replaced.

Brush Plate and Terminal Bolt Inspection

- Set the ohmmeter to the highest range.
- Measure the resistance between the positive brush holder and the end cover.
- Measure the resistance between the terminal and the end cover.

★If there is any reading at all, the insulator may be failed and the washer (insulator) of the end cover must be replaced.



A. Positive Blush Holder B. End Cover

Starter Relay Inspection

- Disconnect the starter motor lead and battery positive terminal from the starter relay.

CAUTION

○**The battery positive (+) lead with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition switch is off, so take care not to short the removed lead to chassis ground.**

- Using the x 1 Ω ohmmeter range, measure the resistance across the relay terminals.

★If the relay clicks but the meter does not read zero, the relay is defective and must be replaced. If the relay does not click at all, the relay is defective and must be replaced.

★If the relay makes a single clicking sound and the meter reads zero the relay is good. The trouble is in the starter motor or the motor power supply wires.

Switch Position:
Ignition switch ON
Engine stop switch RUN
Starter button ON
Neutral switch ON (Transmission is in Neutral)
Meter Connection:

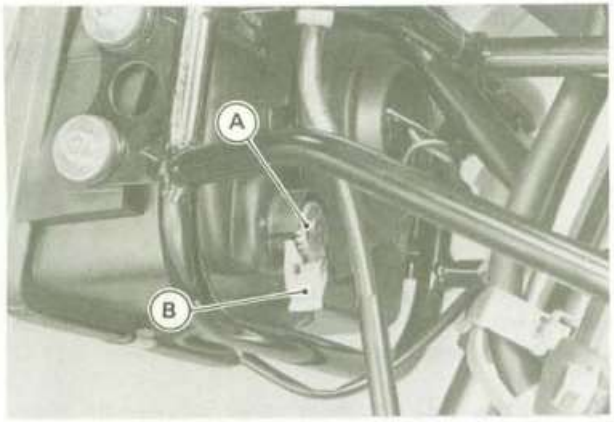
Location	**Starter relay terminals (Leads disconnected)**
Meter Range	**x 1 Ω**
Meter Reading:	**0 Ω and relay clicks when starter button is pushed.**

Lighting System

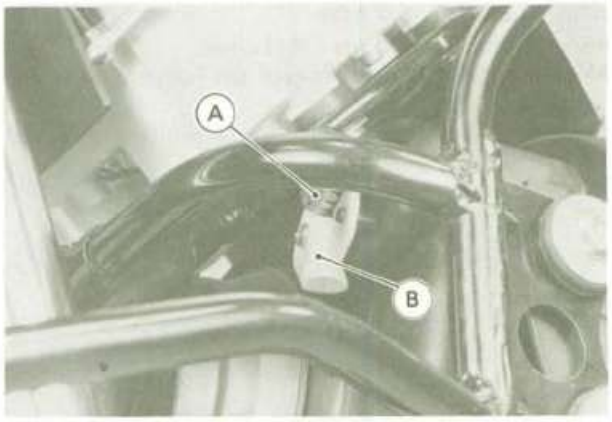
The headlight beam is adjustable both horizontally and vertically. Headlight aiming must be correctly adjusted for your safe riding as well as oncoming drivers. In most areas it is illegal to ride with improperly adjusted headlights.

Headlight Beam Horizontal Adjustment

- Put a Phillips screwdriver into the horizontal adjuster guide on the back of the headlight.



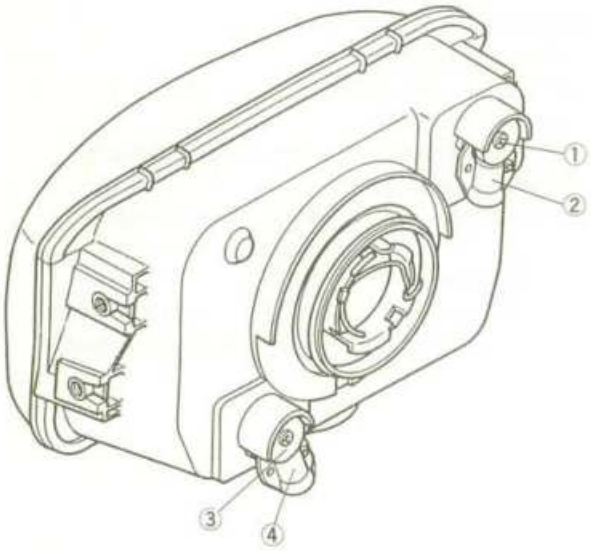
A. Vertical Adjuster B. Guide



A. Horizontal Adjuster B. Guide

- Turn the adjuster on the headlight in or out until the beam points straight ahead.

Headlight Beam Adjustment

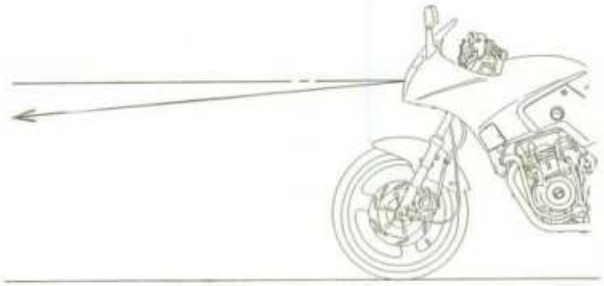


1. Horizontal Adjuster
2. Adjuster Guide
3. Vertical Adjuster
4. Adjuster Guide

NOTE

On high beam, the brightest point should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.

Vertical Adjustment



Headlight Beam Vertical Adjustment

The headlight beam is adjustable vertically. If adjusted too low, neither low nor high beam will illuminate the road far enough ahead. If adjusted too high, the high beam will fail to illuminate the road close ahead, and the low beam will blind oncoming drivers.

- Put a Phillips screwdriver into the vertical adjuster guide.
- Turn the adjuster on the headlight in or out to adjust the headlight vertically.

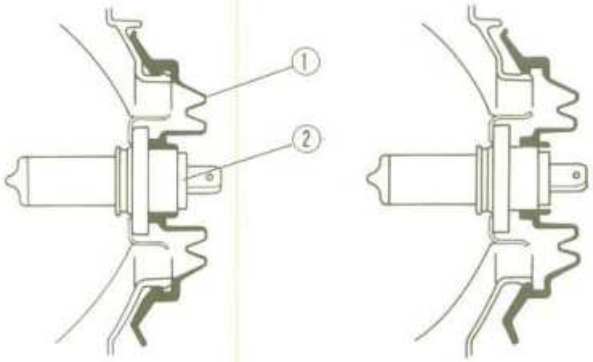
Healight Bulb Replacement Notes

CAUTION

When handling the quartzhalogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

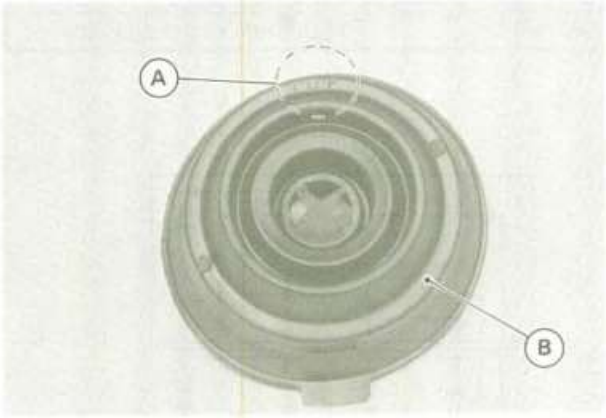
- Fit the dust cover onto the bulb firmly as shown in the figure.

Dust Cover Installation



Good Bad

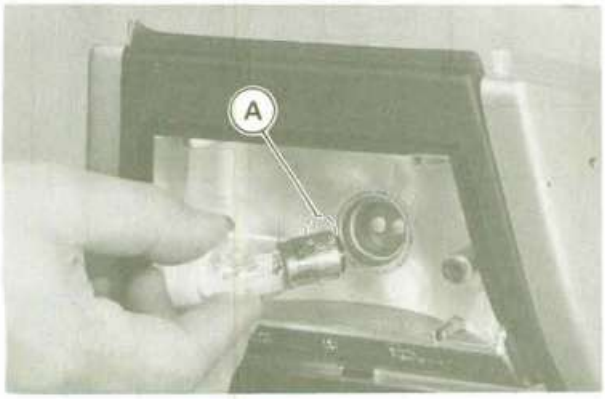
1. Dust Cover 2. Headlight Bulb



A. Top Mark B. Dust Cover

Tail/Brake Light Bulb Replacement Notes

- Insert the new bulb by aligning the pins with the grooves in the walls of the socket so that the pin closest to the bulb base is to the upper right.



A. Pin Closest to Base.

Tail/Brake Light Lens Removal/Installation Note

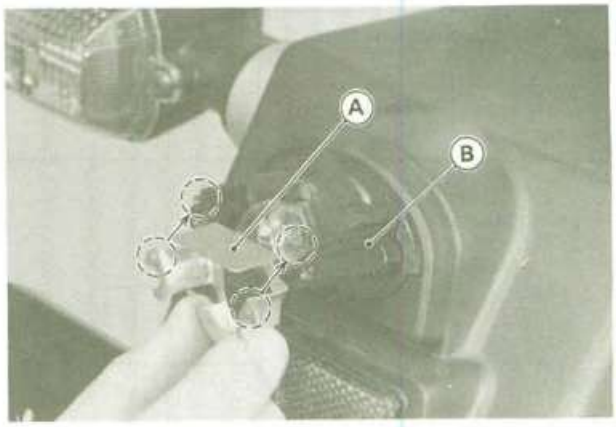
- Be careful not to overtightenthe lens mounting screws.

Turn Signal Light Bulb Replacement Note

- Be careful not to overtighten the lens mounting screws.

License Plate Light Bulb Replacement Notes

- When installing the reflector of license light, fit the pins on the end of license light's body in the pin's holes of the reflector.



A. Reflector B. Body

- Be careful not to overtighten the lens and socket mounting screws.

Headlight Reserve Lighting System Inspection

The US model contain a relay in the headlight circuit. In this model, the headlight does not go on when the ignition switch is first turned on, but the headlight goes on the starter button is pushed to start the engine, and stays on until the ignition switch is turned off. But the headlight goes out whenever the starter button is pushed to restart the engine after engine stalling.

★If all wirings and components other than the reserve lighting device check out good, the device is defective.

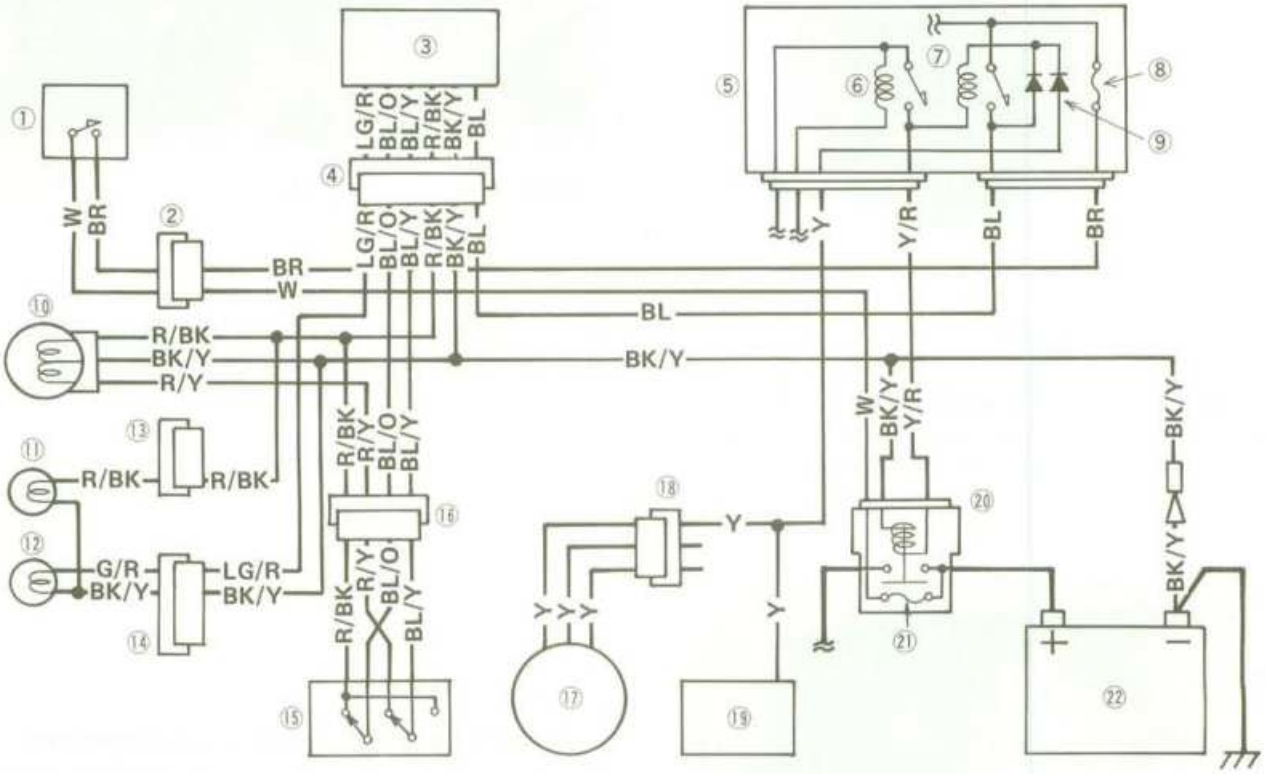
Inspection:

For any lighting system problems, always check the lighting system wiring and the bulbs first (see Wiring Inspection).

Reserve Lighting System Operation

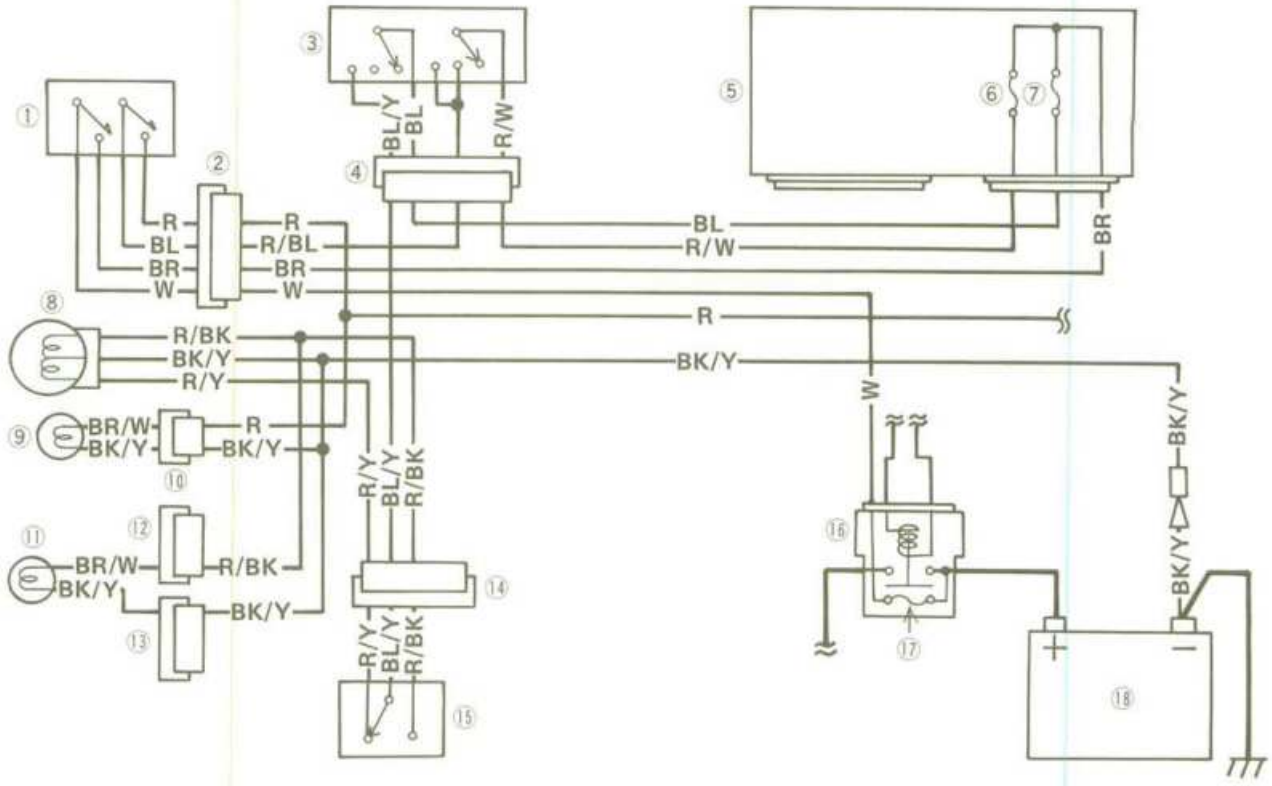
Headlight	Dimmer Switch Position	Headlight Failure Indicator Light	Reserve Lighting
Both high and low beam filaments are normal	HI	Goes on (hardly visible)	———
	LO	Goes on (hardly visible)	———
High beam filament burned out	HI	Goes on	Low beam comes on.
	LO	Goes on (hardly visible)	———
Low beam filament burned out	HI	Goes on (hardly visible)	———
	LO	Goes on	High beam comes on dimly.

Headlight Circuit (US Model Shown)



1. Ignition Switch
2. 6-pin Connector
3. Reserve Lighting Device
4. 6-pin Connector
5. Junction Box
6. Starter Circuit Relay
7. Headlight Relay
8. Headlight Fuse 10A
9. Diodes
10. Headlight
11. High Beam Indicator Light
12. Failure Indicator Light
13. 6-pin Connector
14. 6-pin Connector
15. Dimmer Switch
16. 9-pin Connector
17. Alternator
18. 3-pin Connector
19. Regulator/Rectifier
20. Starter Relay
21. Main Fuse 30A
22. Battery

Headlight Circuit
(Other than US Model Shown)



1. Ignition Switch
2. 6-pin Connector
3. Headlight Switch
4. 6-pin Connector
5. Junction Box
6. Taillight Fuse 10A
7. Headlight Fuse 10A
8. Headlight
9. City Light
10. 2-pin Connector
11. High Beam Indicator Light
12. 6-pin Connector
13. 4-pin Connector
14. 9-pin Connector
15. Dimmer Switch
16. Starter Relay
17. Main Fuse 30A
18. Battery

Cooling Fan System

Fan System Circuit Inspection

- Disconnect the connector from the fan switch.
- Ground the red/white wire to the engine with a suitable wire.

★If the fan turns, inspect the fan switch.

★If the fan does not turns, inspect the following.
Junction Box Parts (Fan Fuse, Fan Relay)
Fan
Main Fuse

Fan Inspection

- Disconnect the 2-pin connector of the fan leads.
- Using two auxiliary wires, supply battery power to the fan.

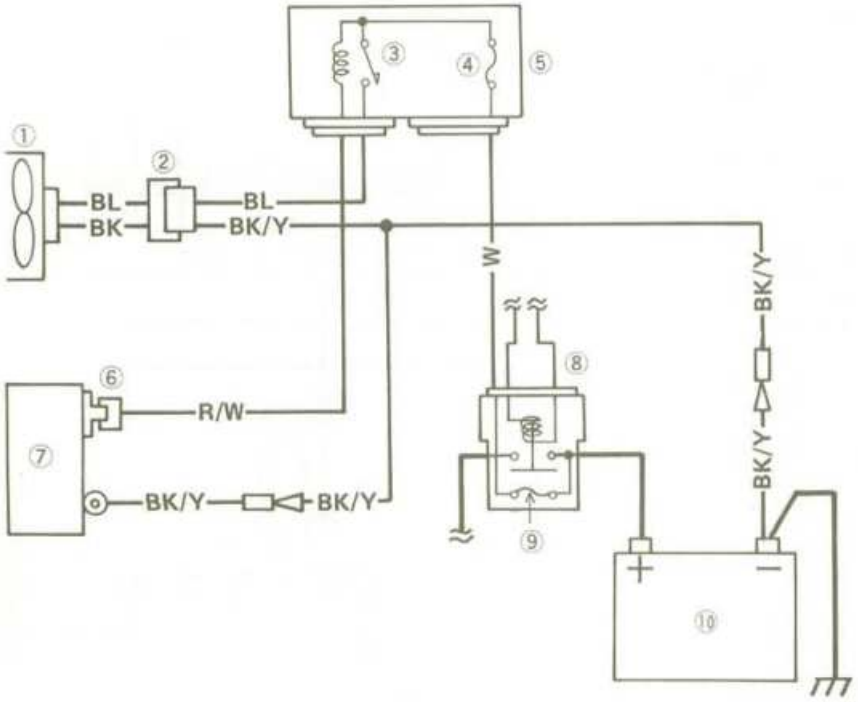
Wire Connections
Blue Lead ↔ Battery (+)
Black Lead ↔ Battery (–)

★If the fan does not turn at this time, the fan is defective and must be replaced.

Fan Relay Inspection

Refer to the Main, Starter Circuit, and Headlight Relay Inspection in the Junction Box section.

Cooling Fan Circuit



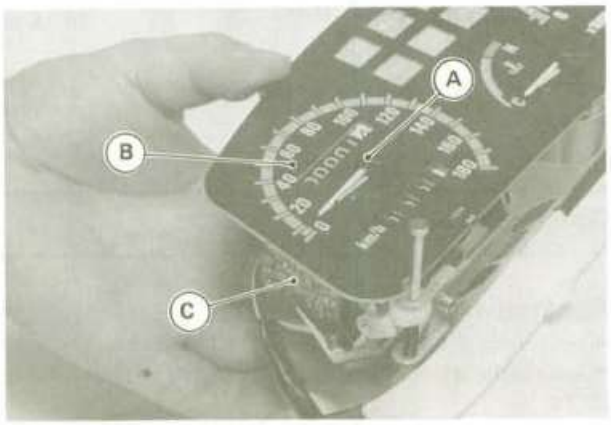
1. Cooling Fan
2. 2-pin Connector
3. Fan Relay
4. Fan Fuse 10A
5. Junction Box
6. Fan Switch
7. Radiator
8. Starter Relay
9. Main Fuse 30A
10. Battery

Meters and Gauges

Meter Replacement Notes

CAUTION

○**Do not remove a meter pointer unless the meter is to be replaced. The pointers cannot be reinstalled. The pointer mounting is different from replacement meters.**

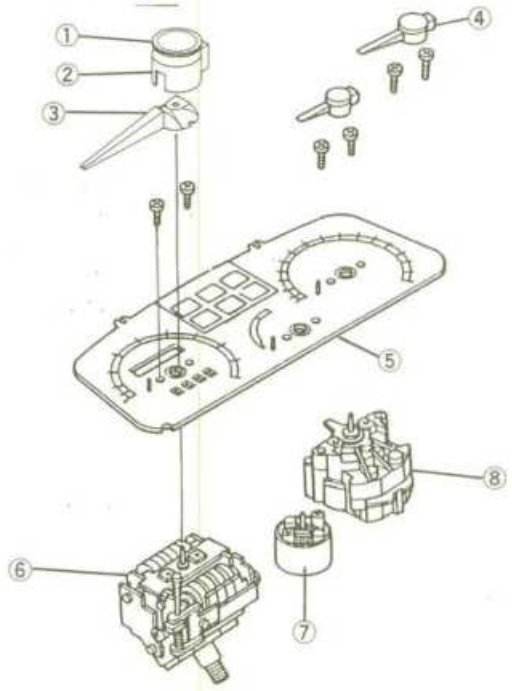


A. Pointer
B. Dial
C. Meter Unit

●To disassemble the meter case, remove all the screws and wiring from the back side of the case.
●Pull the pointer off the meter shaft of the bad meter only, and remove the meter unit from the dial face.
●After mounting the meter unit on the dial face, put on the pointer so that it fits on the meter shaft notch.
●Install the retainer, and tighten the cap while holding the pointer.

○Install the cap, then hold the pointer and tighten the retainer.

Meter's Pointer Installation



1. Retainer
2. Cap — New Parts
3. Pointer
4. Pointer — Original Parts
5. Dial
6. Speedometer Unit
7. Water Temperature Gauge Unit
8. Tachometer Unit

Bulb Replacement Notes

●To remove the wedge-base type bulbs (indicator and illumination), pull out the bulb sockets and pull the bulbs off the sockets.

CAUTION

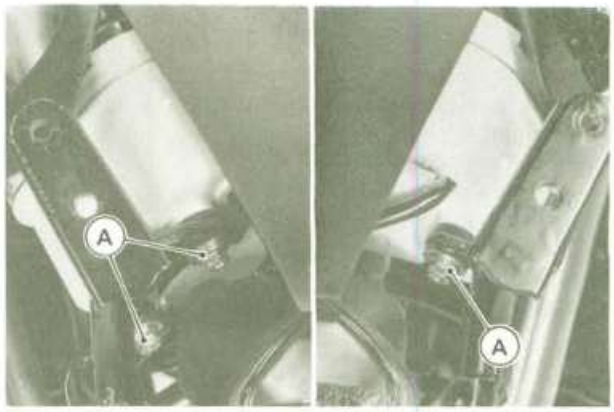
○**Do not use bulbs rated for greater wattage than the specified value, as the meter or gauge panel could become warped by excessive heat radiated from the bulbs.**

Tachometer Inspection

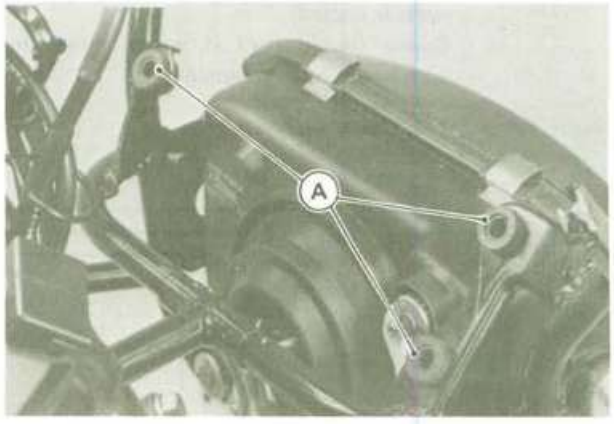
NOTE

○*The Tachometer inspection is explained on the assumption that the ignition system operates normally.*

●Check to see that the rubber dampers are installed at the meter mounting bracket.
★Install a new damper where it is absent.
●Check to see that the rubber dampers at the meter mounting bracket are in good condition they should not be hard or cracked.
★Replace any damaged rubber dampers with new ones.
●Check to see that all meter mounting nuts are tightened securely.
★Tighten the loose fasteners.



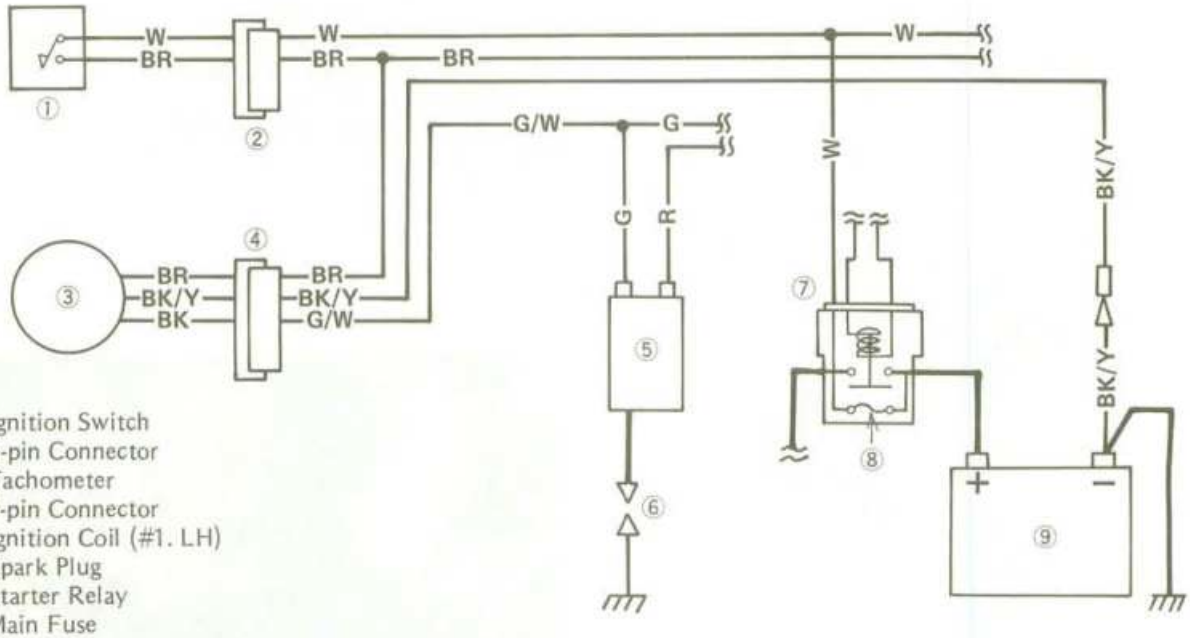
A. Meter Mounting Nuts



A. Rubber Damper

●Check the tachometer circuit wiring (see Wiring Inspection).
★If all wiring and components other than the tachometer unit check out good, the unit is defective.

Tachometer Circuit



1. Ignition Switch
2. 6-pin Connector
3. Tachometer
4. 6-pin Connector
5. Ignition Coil (#1. LH)
6. Spark Plug
7. Starter Relay
8. Main Fuse
9. Battery

Water Temperature Gauge Operation Inspection

●Prepare an auxiliary wire, and check the operation of the gauge.

Gauge Operation Check

Ignition Switch Position: ON

Wire Location: Female, Sensor connector (disconnected)

Results: Gauge should read C when connector wires is opened.

Gauge should read H when connector wire is grounded to engine.

CAUTION

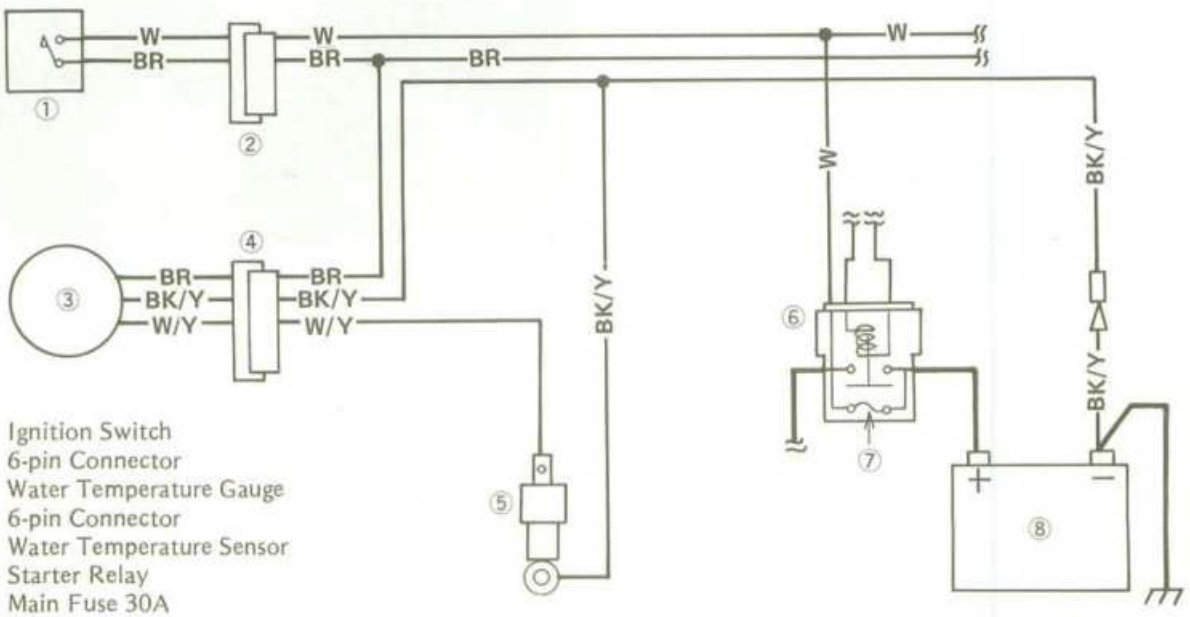
○**Do not ground the wiring longer than necessary. After the needle swings to the H position, stop the test. Otherwise the gauge could be damaged.**

★If these readings are not correct, the trouble is with the gauge and/or wiring.

●Check the water temperature gauge circuit wiring (see Wiring Inspection).

●If all wiring and components other than the water temperature gauge unit check out good the unit is defective.

Water Temperature Gauge Circuit



1. Ignition Switch
2. 6-pin Connector
3. Water Temperature Gauge
4. 6-pin Connector
5. Water Temperature Sensor
6. Starter Relay
7. Main Fuse 30A
8. Battery

Switches and Sensors

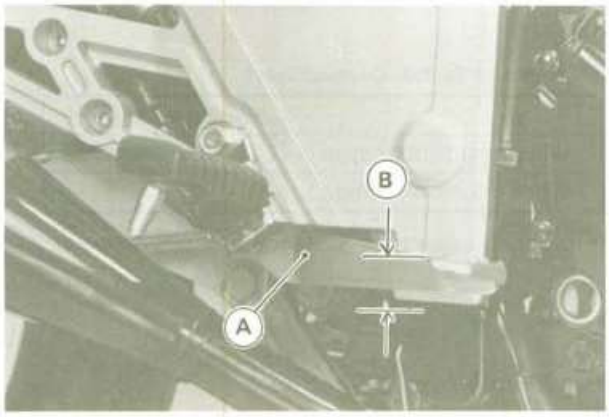
Front Brake Light Testing

- Turn on the ignition switch.
- The brake light should go on when the front brake is applied.

★If it does not, inspect the switch.

Rear Brake Light Testing

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about 10 mm of pedal travel.



A. Rear Brake Pedal B. 10 mm

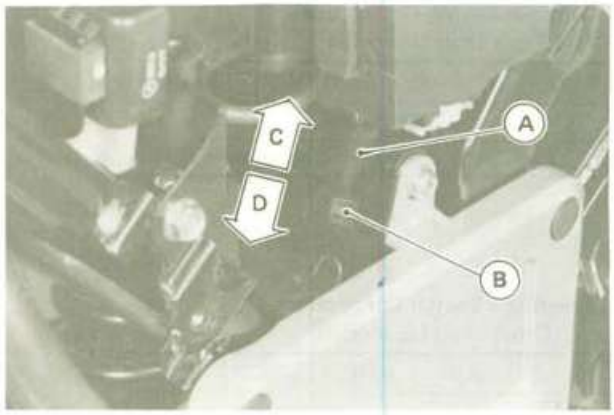
★If it does not, adjust the brake light switch.

Rear Brake Light Switch Position Adjustment

- Remove the RH side cover.
- Turn the adjusting nut to adjust the switch.

CAUTION

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.



A. Rear Brake Light Switch C. Light sooner.
B. Adjusting Nut D. Lights later.

Switch Removal Note

- Refer to the appropriate chapters for the switches and sensors.

Switch Inspection

- Using an ohmmeter, check to see that only the connectings shown in the table have continuity (about zero ohms).

★If the switch has an open or short, repair it or replace it with new one.

Ignition Switch Connections

	BR	W	Y	BL	R
OFF, LOCK					
ON	○	○	○	○	○
P(Park)		○	○	○	○

Starter Button Connections

	BK	BK
Free		
Push on	○	○

Starter Lockout Switch Connections

	BK/Y	Y/G	LG
When clutch lever is pulled in	○	○	
When clutch lever is released		○	○

Engine Stop Switch Connections

	R	Y/R
OFF		
RUN	○	○

Dimmer Switch Connections (US model)

	BL/Y	BL/O	R/Y	R/BK
HI	○	○		○
LO	○		○	
		○		○

Dimmer Switch Connections (Other than US model)

	R/BK	BL/Y	R/Y
HI	○	○	
LO		○	○

Headlight Switch Connections (Other than US model)

	R/W	R/BL	BL	BL/Y
OFF				
■	○	○		
ON	○	○	○	○

Passing Button Connections (Other than US model)

	BR	R/BK
Free		
Push on	○	○

Front Brake Light Switch Connections

	BR	BL
When brake lever is pulled in	○	○

Rear Brake Light Switch Connections

	BR	BL
When brake pedal is pushed down	○	○

Turn Signal Switch Connections

	GY	O	G
R	○	○	
N			
L		○	○

Horn Button Connections

	BK/W	BK/Y
Free		
Push on	○	○

Side Stand Switch Connections

	BK/R	BK/Y
When side stand is up	○	○
When side stand is down		

Neutral Switch Connections

	LG	⏚
When transmission is in neutral	○	○
When transmission is not in neutral		

Oil Pressure Switch Connections*

	SW. Terminal	⏚
When engine is stopped	○	○
When engine is running		

* : Engine lubrication System is in good condition.

Fan Switch Inspection

- Remove the fan switch
- Suspend the switch in a container of water so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using an ohmmeter measure the internal resistance of the switch across the terminal and the body at the temperatures shown in the table.

★If the ohmmeter does not show the specified values, replace the switch.

Fan Switch (97°C) Connections

○**Rising temperature: From OFF to ON at 94 ~ 100°C (201 ~ 212°F)**

○**Falling temperature: From ON to OFF above 90°C (194°F)**

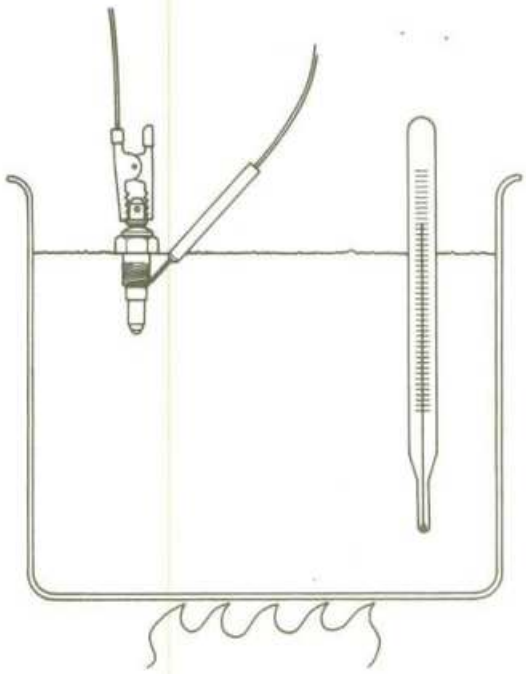
ON: Less than 0.5 Ω

OFF: More than 1 MΩ

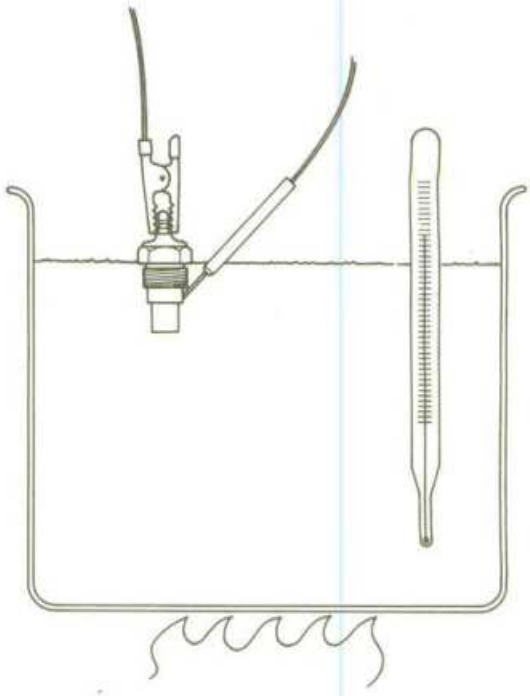
NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

Fan Switch Inspection.



Water Temperature Sensor Inspection



Junction Box

The junction box has fuses, relays and diodes. The relays and diodes can not be removed.

Water Temperature Sensor Inspection

- Remove the water temperature sensor.
- Suspend the sensor in a container of water so that the temperature sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer in the water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using an ohmmeter Measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

★If the ohmmeter does not show the specified values, replace the sensor.

Internal Resistance of Water Temperature Sensor

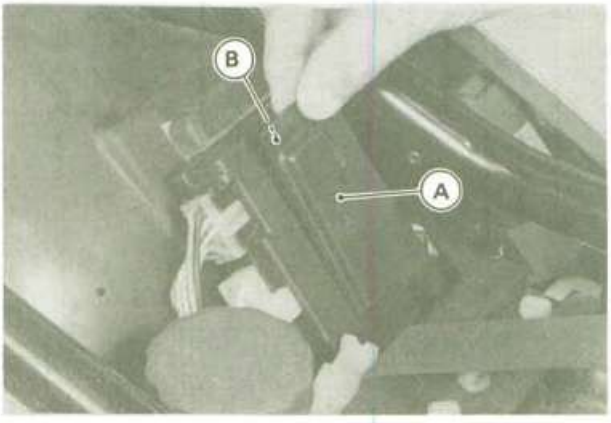
80°C (176°F):	About 52 Ω
100°C (212°F):	About 27 Ω

NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

Fuse Removal

- Remove the seat.
- Unlock the hook to lift up the locking arm.



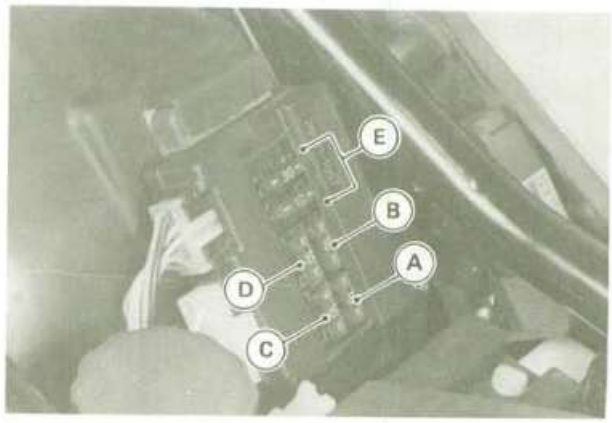
A. Fuse Cover B. Locking Arm

- Pull the fuses straight off the junction box with needle nose pliers.



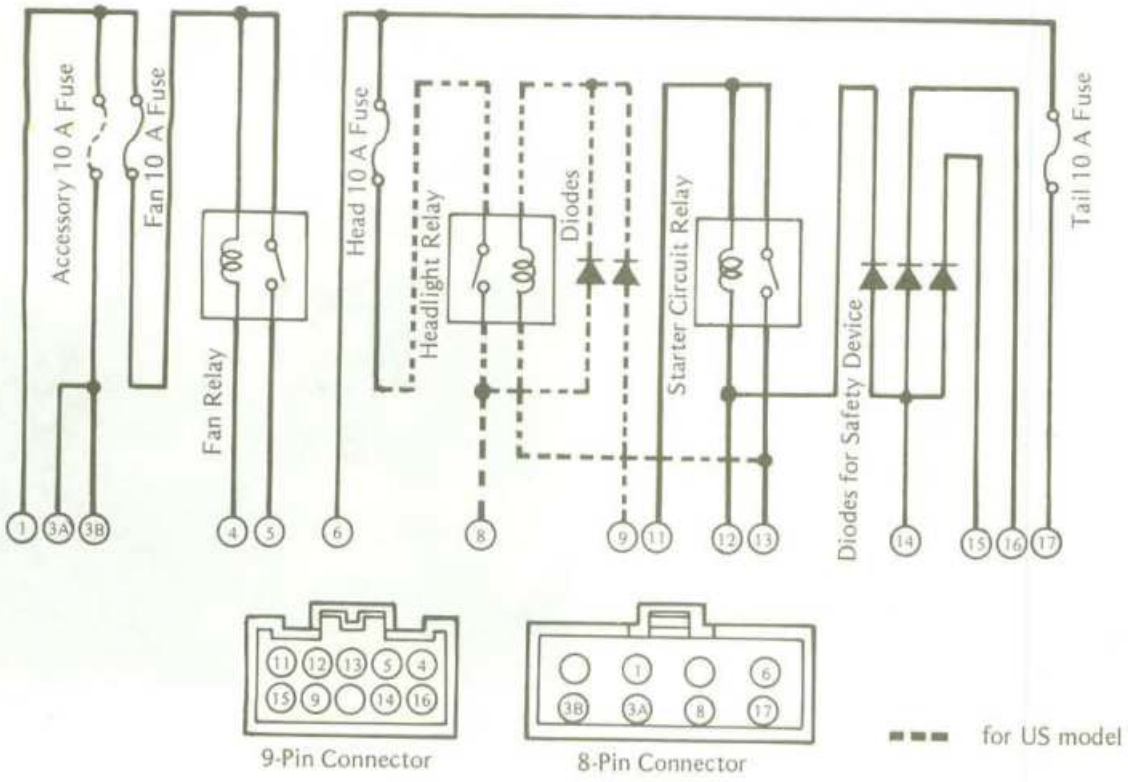
Fuse Installation Note

○Install the fuses on the original positions shown.



A. 10 A for Taillight
B. 10 A for Accessory
C. 10 A for Headlight Relay
D. 10 A for Fan Relay
E. Spare Fuses

Junction Box Internal Circuit



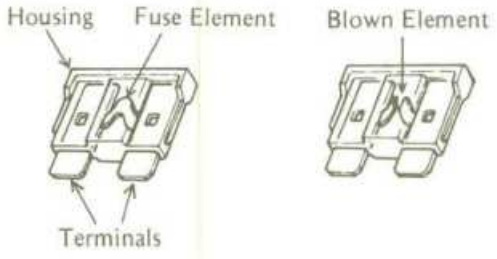
Fuse Inspection

- Remove the fuse from the junction box.
- Inspect the fuse element.
- ★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

CAUTION

○**When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.**

Fuse



Junction Box Fuse Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Make sure all connector terminals are clean and tight, and none of them have been bent.
- ★Clean the dirty terminals and, straighten slightly-bent terminals.
- Check conductivity of the numbered terminals with hand tester.
- ★If the meter does not read as specified, replace the junction box.

Fuse Circuit Inspect

Meter Connection	Meter Readaing (Ω)
1 — 3A	0
6 — 17	0
*3A — 8	∞
*8 — 17	∞

*US Model Only

Fan, Starter Circuit and Headlight Relay Inspection

- Remove the junction box from the motorcycle.
- Check conductivity of the following numbered terminals by connecting and ohmmeter and one 12 V battery to the junction box as shown.
- ★If the meter does not read as specified, replace the junction box.

Relay Circuit Inspection (with the battery disconnected)

Meter Connection	Meter Reading (Ω)
4 — 5	∞
11 — 13	∞
12 — 13	∞

Relay Circuit Inspection (with the battery connected)

Meter Connection	Battery Connection +	Battery Connection −	Meter Reading (Ω)
11 — 13	11	12	0

Diode Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Check conductivity of the following pair of terminals.

Terminals for Diode Circuit Inspection

***13-8, *13-9, 12-14, 15-14, 16-14**

*US Models Only

- ★The resistance should be low in one direction and move than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the junction box must be replaced.

NOTE

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to the first ½ of the scale.*

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★If any wiring is poor, apart and inspect it for corrosion, dirt, and damage.

●Pull each connector apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
●Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect an ohmmeter between the ends of the leads.
○Set the meter to the x 1 Ω range, and read the meter.
★If the meter does not read 0 Ω, the lead is defective. Replace the lead or the wiring loom if necessary.

Appendix

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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.

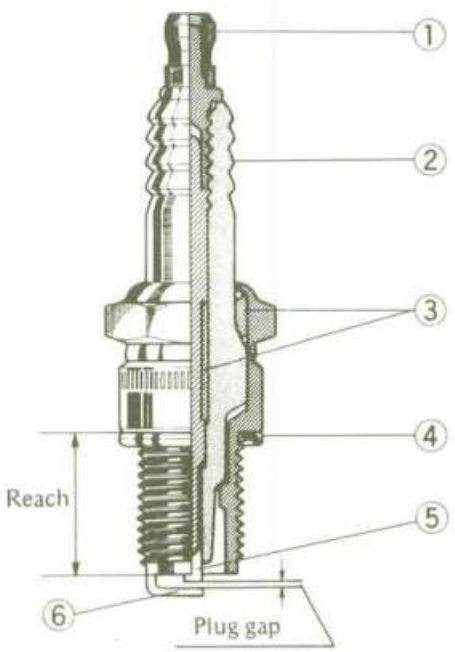
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.

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 itself too well – the plug will stay too cool to burn off the carbon, and the carbon will correct on the electrodes and the ceramic insulator.

The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will prevent an effective spark. Carbon buildup on the plug can also cause other troubles. It can heat up red-hot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

Spark Plug



1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center Electrode
6. Side Electrode

Spark Plug Inspection

- Remove the spark plug and inspect the ceramic insulator.

Spark Plug Condition



Carbon fouling | Oil fouling | Normal operation | Overheating

★Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

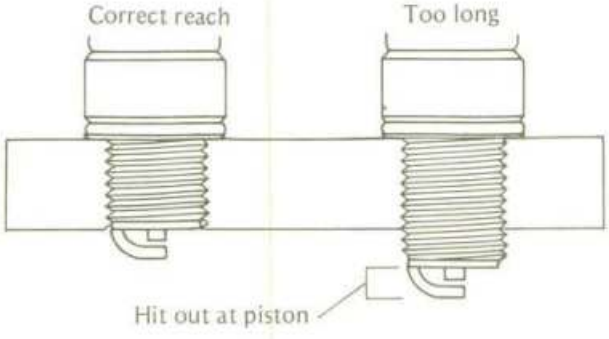
CAUTION

○**If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.**

○**If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.**

○**If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.**

Plug Reach



Standard Spark Plug Threads

Diameter: 10 mm
Pitch: 1.25 mm
Reach: 12.7 mm

NOTE

○*The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).*

Troubleshooting Guide

NOTE

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Starter lockout or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Main fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter motor clutch trouble

Engine won't turn over:
- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

No fuel flow:
Fuel tap vacuum hose clogged
Fuel tank air vent obstructed
Fuel tap clogged
Fuel line clogged
Float valve clogged

Engine flooded:
Fuel level in carburetor float bowl too high
Float valve worn or stuck open
Starting technique faulty
(When flooded, crank the engine with the throttle fully open to allow more air to reach the engine.)

No spark; spark weak:
Battery voltage low
Spark plug dirty, broken, or maladjusted
Spark plug cap or high tension wiring trouble
Spark plug cap not in good contact
Spark plug incorrect
IC igniter trouble
Neutral, starter lockout, or side stand switch trouble
Pickup coil trouble
Ignition coil trouble
Ignition or engine stop switch shorted
Wiring shorted or open
Main 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

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug cap shorted or not in good contact
Spark plug incorrect
IC igniter trouble
Pickup coil trouble
Ignition coil trouble

Fuel/air mixture incorrect:
Starter plunger stuck open
Main jet clogged or wrong size
Jet needle or needle jet worn
Air jet clogged
Fuel level in carburetor float bowl too high or too low
Bleed holes of air bleed pipe or needle jet clogged
Air cleaner clogged, poorly sealed, or missing
Air cleaner duct poorly sealed
Water of foreign matter in fuel
Carburetor holder loose
Fuel tank air vent obstructed
Fuel tap clogged
Fuel line clogged

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/land clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
IC igniter trouble

Miscellaneous:
Throttle valve won't fully open
Vacuum piston doesn't slide smoothly
Brake dragging
Clutch slipping
Overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble

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
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:

Cooling system component incorrect:
Thermostatic fan switch trouble
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch release mechanism trouble
Clutch hub or housing unevenly worn
Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring tension uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift return spring weak or broken
Shift return spring pin loose
Pawl spring broken
Shift mechanism arm broken
Jumps out of gear:
Shift fork worn
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Neutral positioning pin spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Neutral positioning pin spring weak or broken
Pawl spring broken

Abnormal Engine Noise:

Knocking:
IC igniter trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating
Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn
Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken or stuck
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose

Crankshaft bearing worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn

Abnormal Drive Train Noise:

Clutch noise:
Weak or damaged damper
Clutch housing/friction plate clearance excessive
Clutch housing gear worn

Transmission noise:
Bearings worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive chain noise:
Drive chain adjusted improperly
Chain worn
Rear and/or engine sprocket worn
Chain lubrication insufficient
Rear wheel misaligned

Abnormal Frame Noise:

Front fork noise:
Oil insufficient or too thin
Spring weak or broken

Rear shock absorber noise:
Shock absorber damaged

Disc brake noise:
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

Other noise:
Bracket, nut, bolt, etc. not properly mounted or tightened

Oil Pressure Warning Light Goes On:

Engine oil pump damaged
Engine oil screen clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearings worn
Crankshaft bearings worn
Oil pressure switch damaged
Wiring damaged
Relief valve stuck open
O-ring at the oil pipe in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke:
Air cleaner clogged
Main jet too large or fallen off
Starter plunger stuck open
Fuel level in carburetor float bowl too high

Brown smoke:
Main jet too small
Fuel level in carburetor float bowl too low
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:
Steering stem locknut too tight
Bearing damaged
Steering bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates:
Tire worn
Swing arm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar mounting bolts loose
Steering stem head bolt loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swing arm bent or twisted
Steering maladjusted
Front fork bent
Right/left fork legs oil level unbalanced

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
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:

Air in the brake line
Pad or disc worn
Brake fluid leak
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged
Master cylinder scratched inside

Battery Discharged:

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Batterly leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/Rectifier trouble

Battery Overcharged:

Regulator/Rectifier trouble

General Lubrication

Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

Pivots: Lubricate with Motor Oil.

Center Stand
Side Stand
Clutch Lever
Brake Lever
Brake Pedal
Rear Brake Rod Joint

Points: Lubricate with Grease.

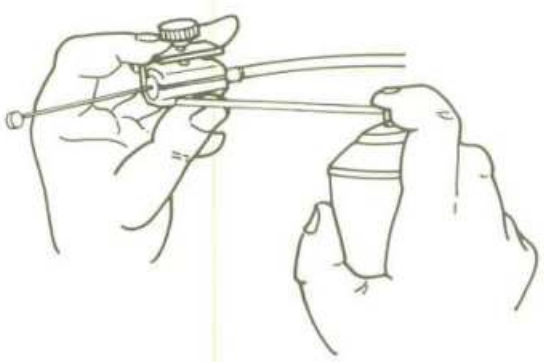
Throttle Inner Cable Lower End
Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly.

Cables: Lubricate with Motor Oil.

Choke Cable
Throttle Cables
Clutch 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
  Rear Axle Nut
  Chain Adjusting Bolts and Locknuts
Brakes:
  Front Master Cylinder Clamp Bolts
  Front Caliper Mounting Bolts
  Rear Master Cylinder Mounting Bolt
  Rear Caliper Mounting Bolt
  Torque Link Nuts
  Brake Lever Pivot Nut
  Brake Pedal Bolt
  Brake Push Rod Clevis Cotter Pin
Suspension:
  Front Fender Mounting Bolts
  Rear Shock Absorber Mounting Bolts
  Swing Arm Pivot Shaft Nuts
  Uni-trak Link Nuts
Steering:
  Stem Head Bolt
  Handlebar Mounting Bolts
Engine:
  Engine Mounting Bolts
  Cylinder Head Bolts
  Muffler Connecting Pipe Clamp Bolts
  Muffler Mounting Bolts
  Muffler Connecting Clamp Bolts
  Clutch Lever Pivot Nut
Others:
  Center Stand Bolts
  Side Stand Bolt
  Front Footpeg Mounting Bolts
  Footpeg Bracket Mounting Bolts

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
milli	m	x 0.001
micro	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:

$$\frac{9\,(°C + 40)}{5} - 40 = °F \qquad \frac{5\,(°F + 40)}{9} - 40 = °C$$

